THE NEW YORK HERALD

SECTION EIGHT

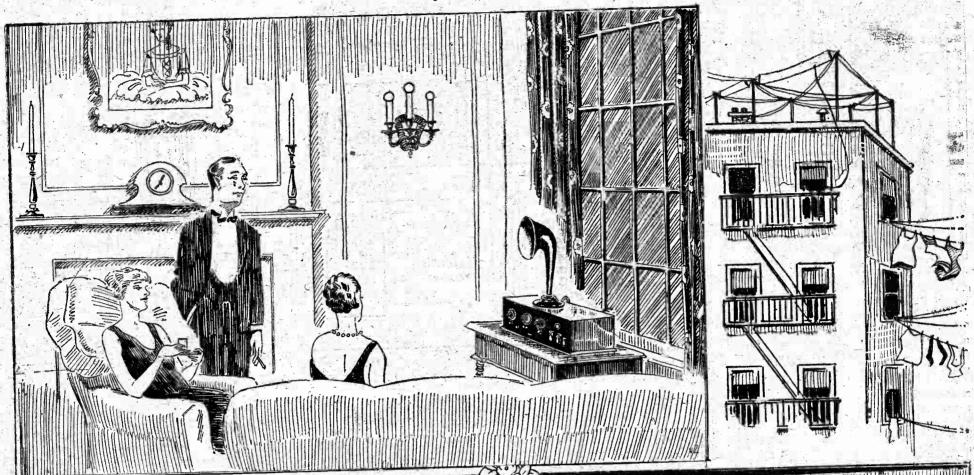
YORK, SUNDAY, FEBRUARY 10, 1924.

TWENTY-EIGHT PAGES

Radio's Growth Due to Popular Appeal

No Excuse for Anyone to Lack Entertainment, as Good Receiving Sets Are Now Being Madeto Fit Every Pocketbook

By A. C. BRADY.



Large sets, capable of bringing in the concerts with excellent quality, are now

ID you ever stop to consider the tremendous growth of radio and what is behind it all? Do you know why it is that radio has such a universal appeal to all classes and walks of life, rich and poor alike? Do you know that there are vast factories working day and night in a vain endeavor to keep up with the tremendous demand for radio sets and parts, and that these sets range in price from only a few dollars to several hundreds of dollars?

At the present time there are many broadcasting stations, all filling the air every night with music, speeches and interesting talks, and many of these stations are within the range of even a small receiving set. This fact alone is responsible for the great interest shown by thousands of fans, who are constantly trying to add to their great lists of stations which they have heard.

The "genus radio" may be subdivided into many classes, but there are relatively few of them that are immune to the urge for greater and greater distance. This notwithstanding the fact that generally the programs from the local stations come in the best, both in clearness and sureness. Distant stations have a bad habit of slowly fading out just at the time you are most anxious to hear what the announcer has to say.

Let us look into this great mass of radio fans and see what they are com-

In the first place let it be understood that the average American man or boy has a positive genius for mechanical workings. As a rule he loves nothing better than to be able to make something with his own hands. He is a natural born mechanic, and in most cases a mighty good mechanic at that.

Father Is Interested.

The father will generally educate his on to like things mechanical. He will

start off with a yearning to be a locomotive engineer or even a garage mechanic. Anything that holds forth a promise for close contact with whirring machinery and where he will have a chance to get his hands begrimed and be in close proximity with machinery. Very few boys are immune to this urge.

The old joke about the father who buys his son a mechanical toy and then spends his own time in playing with it has been repeated many times in radio. Fathers have a way of going into a radio store and telling the salesman that it "is for their son," and the knowing salesman winks the other eye and lets it go at that. This subterfuge was used a great deal in the early days of radio, but father has become so deeply interested by now that he forgets all about it. He goes in boldly now and orders what he wants. An excuse never enters his head. Father even goes so far as to have heated arguments on the train in the morning with his fellow commuters, and in some cases old friendships have been broken up over the relative merits of certain circuits.

Small Set Is Practical.

On the other hand there are many boys who have not had a mechanically inclined father and they have become interested, in radio through schoolmates or through reading magazines. Many times these boys will surprise their families by what to the family will appear to be great mechanical genius.

Radio, though, has long passed through the stage of a boy's game, and it is at present being taken up by everybody. The millionaire, who has practically no interest in the workings of a set, will order an elaborate affair and then put it up to his chauffeur to keep the thing in working order. He will like to sit down at night after dinner and listen to some good music, because radio has been developed to such a point that it is quite possible to listen to an excellent program without interference or other extraneous sounds. A high grade machine will give everything that a fine phonograph will give, and in some cases will be even better in tone.

Unfortunately things have developed

A small crystal set is well within the reach of any one. along the lines of trying to get the greatest amount of volume from a given set. Everything will be overloaded in this attempt and the result is bound to be anything but edifying to a real musical taste. It is possible to take such a radio set and tone it down just a little and as a result receive the broadcasting with the finest tonal quality, without distortion and in such a manner as to be thoroughly enjoyable. Now let us consider the man who can-

not afford to spend several hundred dollars on such an elaborate set as this. He will find that it is quite possible to install a smaller set which will give him exactly the same programs as his rich neighbor. It is true that he may not hear as many stations, but what he does hear will compensate him for his expenditure.

It is quite possible for him to start off with an extremely modest set and gradually add to it, when he can afford to do so, until he has a set fully the equal of the larger outfit. The radio set can only be developed so far, and when it reaches this point the extra cost usually goes into a better looking and more expensive cabinet. It is quite possible to buy a receiving set right now which will have all the appearances of a piece of the

finest furniture. Cabinets are procurable in any "period" desired, in much the same manner that phonographs are made up. Such sets, of course, have the wiring entirely concealed, and generally the tuning is done after a hinged lid has been lifted up. This is not any more difficult to do than it is to run a phonograph.

Generally the man who builds his own set will not go in much for such elaboration as this, but the "workings" of his set may be fully as good. There are thousands of cases on record of comparatively cheap homemade sets that have picked up stations thousands of miles away. Some of these feats have been done repeatedly, night after night.

A set that will do this does not have to be any more elaborate than a set that will pick up the local broadcasting stations in good shape.

Long Distance Easy.

Some types of radio fans will make the remark that they will be perfectly satisfied to have a set which will pick up the local station only. If they have such a set-barring the simple crystal set, of course—they will undoubtedly be able to hear other stations many hundreds of

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Radio Pointers to Bear in Mind

Short Notes That Prove Helpful When Building a Radio Set.

The addition of a C battery may be easily made to any two stage audio frequency amplifier. By following through on the secondary circuit it will be seen that one side of the transformer goes to the grid, the other going to the negative filament. The C battery is simply connected between the negative A battery and the bottom of this transformer, with the negative pole connected so that it is toward the transformer.

Placing a condenser in series with your aerial or ground, will materially reduce the wave length of your receiving set. If you cannot reach the higher waves on your set this may be the cause. Place the condenser so that one side is connected to the aerial and the other to the ground. This is a parallel connection and will raise the wave length range of the

It frequently happens that the owner of a new set will experience keen disappointment for the first few days. This is simply because he does now know just how to operate it, but as soon as the secret is learned the results will be forthcoming. This is one reason why it is a good thing to use a set for a few weeks before you make up your mind that it is no

Leaving the storage battery completely discharged will probably cause trouble. If you intend to close down your radio set for any length of time it is advisable to take the battery to some convenient service station where it will be taken care of.

When building a three circuit tuner it is wise to mount the apparatus on a panel about 7x20. The two variometers should be mounted about 12 inches apart and the variocoupler should be placed midway between them.

Adding more A batteries to your dry cell tube will not give you any louder signals. On the other hand it is far more apt to burn out the tube. Every box containing a vacuum tube has a printed sheet giving exact data on connection and A and B battery voltages. It is best to follow these

Dry batteries will have a greater life if they are kept in an upright po-

If an overload is placed on either a U. V. 201-A or U. V. 199 tube it will be noticed that the tube will not work as well after the accident as before. In most cases the tube can be restored to-its original condition by burning the filament for an hour or so without the B battery discon-

Often the quality of reproduction from a loud speaker can be improved by reversing wires at the terminals.

The selectivity of a receiver can be increased by decreasing the length of the aerial. In most cases an aerial about 100 feet long will give best re-

A "C" battery should be used in connection with all audio amplifiers that use a plate voltage in excess of 45 volts. The negative of the "C" battery should be connected to the common filament terminal of the amplifying transformers, and the positive should be connected to the negative of the "A" battery.

In any type of regenerative set where proper regeneration does not seem to take place it is frequently advisable to reverse the wires which run to the tickler coil. This is particularly true of honeycomb coil sets and other sets of a similar na-

In a radio frequency set it is highly important that the grid and plate wires be kept separate.

If a tickler feed back receiver regenerates too freely the capacity of the phone condenser should be re-

In some instances a three circuit regenerative set can be improved by reversing the terminals of the plate variometer.

A 221/2 volt "B" battery should be considered dead after its voltage drops below 17 volts.

The outside wire terminal of the secondary of an amplifying transformer should always be connected to the grid of the tube.

For minimum resistance an inductance should have a ratio of 2.46:1 between the diameter and the

Better Amplification Radio's Need

Amplification Without Distortion Is More Necessary Than Volume of Sound.

HE outstanding need of radio them up, so that they are clear and ment of the art and to prosound industry is more efficient am-

Not only research engineers but manufacturers agree that the wider use of better amplification is the next stage of development of the utility. This will not only vastly increase the number of radio users but immeasurably improve the standard and quality of results obtained in homes throughout the land.

To be sure amplification is already used with a vegeance. Vengeance is often the precise word. Too much of it sounds like an alley cat singing to its mate: "Last night on the back fence I loved you best of all."

Radio's supreme need is amplification without distrortion. To amplify is easy, but to amplify so that no distortion or change in the sound is made requires careful design of the amplifier. In all amplifiers there are transformers and vacuum tubes. The transformer is the heart of the amplifier. Unless the proper transformer is used the singer's voice in New York is distorted into squeals and squawks in Chicago. The voice will be amplified, but the tone and the

rich natural quality will not be preserved without a proper transtransformer. The general public is realizing more every day that amplification is the most important single factor without amplification radio to-day would be impossible. Changing elec-

heard plainly. Amplification builds gram.

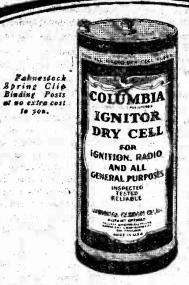
to-day, both for the enjoy- easy to hear. Amplification is used at the transmitting station as well as at the receiving instrument. Faint mote its further development as a whispers thousands of miles away become clear, living voices in the homes of millions.

Amplification is multiplication. The small amount of sound energy generated by the voice or violin string at the broadcasting station is changed to electrical energy and then multiplied or amplfied millions of times. This large amount of energy is then put into an antenna and radiated out into space as an electromagnetic wave. When this wave strikes a similar antenna thousands of miles away it gives up to it a small amount of this energy to be amplified again, so that a whole room full of people at the remote point can listen and understand.

In real and vital sense the key to radio is amplification, and the public is increasingly realizing this. Even more important, they are demanding amplification, which gives not only volume but quality of sound -amplification without distortion.

Dr. J. Percival Huget to Speak From WEAF To-day

To-day's afternoon service offered by the New York Federation of Churches through WEAF will be presided ever by William B. Millar, general secretary of the organization. He will introduce Dr. J. Percival Huget. The subject of his adin radio. It is so fundamental that dress will be "The First American." A solo number by Arthur Billings Hunt as well as choral numbers by tric waves to sound waves wouldn't the Federation Radio Choir will conmean much if they couldn't be stitute the musical part of the pre-



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 CABINETS
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World Radio History

China Society Dinner Will Bring Orient to WJY

The addresses which will be given broadcast by station WJY Tuesday evening, will afford a great deal of speakers whom Gen. J. G. Harbord, that there can be no further imthe toastmaster, will introduce will be provement in broadcasting condi-Prof. Henry Fairfield Osborn, chair- tions, particularly as regards spark man of the American Museum of telegraph interference, unless it is Natural History, and Roy Chapman possible to increase the power of Andrews, the famed finder of the dinosaur eggs and head of the recent expedition to Mongolia. The volume, it reduces the ratio of teleprincipal subject of the talks will graph and static interference as upon the trip.

Swinging of Aerial Will Cause Fading

Around this time of year, as at all enjoy the program. ether times, watch your outdoor aerial to see that the ropes or other supports are not loosened by the wind, allowing the aerial to sway. The capacity which governs wave length of an aerial depends on, among other things, its distance from the ground. Therefore, if the aerial sets must, of course, be adapted by is swinging and thus changing its wave length, the tuning of your set will vary from instant to instant, upsetting the operation of the set. Keep the aerial taut. If supported by a rope over a pulley, suspend a weight on the rope, to take up the slack as the pole sways.—G: M. C.

Soloists at WJY

Sunday Afternoon Two noted soloists will be heard by broadcasting stations. However, this duplex board, cut it to panel size. WJY listeners Sunday afternoon, for is a condition which can certainly be Lay out the panel as you think you Jewel Farrington, celebrated so- corrected by simple adjustments of want it, drill the holes, attach it to prano, and Max Schwartzman, tenor, the receiving sets. It may be rethe baseboard and mount the instruwill give radio recitals from that called that when two channel broadstation. Jewel Farrington is one of casting operation was first inaugu- them temporarily. You can see how the most promising of the younger rated last year on 360 and 400 meters singers, and has achieved consider- listeners were troubled by interferable success in the few concerts ence, but by improvement in their which she has as yet given. Max sets now separate these two wave Schwartzman is one of the leading lengths without any difficulty. Simichurch singers of the city, and has lar difficulty was experienced when a host of enthusiastic adherents in four channel operation was underboth the metropolitan and outlying taken in the metropolitan area. districts.

Frank McGlynn to

Speak About Lincoln He will give his views of the char- distances. acter of Abraham Lincoln as based upon Drinkwater's study of original sources, which he portrayed behind the use of antenna of too great

WEAF'S Increased Power Appreciated by Many Fans

WEAF's development work in con-New York broadcasting stations.

to the most modest equipment in operation. The owner of a crystal receiving set receives WEAF's program with much greater volume and is consequently much better able to

Those possessing vacuum tube sets with many stages of amplification are able to operate successfully with reduced amplification, avoiding overloading of tubes and securing in consequence a much higher quality of reproduction. Sensitive receiving correct adjustments to receive properfy under the new conditions. Audio frequency amplifiers if overloaded by signals of too great volume do not reproduce as faithfully as they do when amplifying a current of normal

An indication of the selectivity obtainable with suitable receiving apparatus is given by the fact that a 600 meter watch is maintained within a few feet of WEAF's antenna. A Frank McGlynn, famous character, short receiving antenna is employed, in the presentation of Drinkwater's which successfully eliminates WEAF play "Abraham Lincoln," will broad- so that reception of ship wave lengths cast a talk on the Great Emanc: is possible. If this can be done within pator as a feature of WEAF'S Lin- fifty feet of the broadcasting station coln's Birthday evening program; the feat can be duplicated at greater

One of the causes of difficulty which have frequently been noted is lengths for local reception.

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EXPERIENCED RADIO COIL WINDER ler 2718. TRANSMITTER for sale; portable De Forest, 3 tube, type OTS; never used; \$100 vestment. AARON SEIGALL, 2007 3d ast cash. BATES, 103 East 75th street, Ave., City.

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COCKADAY improved four-circuit tunes with power amplifier, perfect condition with power amplifier, perfect condition, new, \$75; demonstration evenings. 264 Nichols av., Brooklyn, N. Y.

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EISEMANN 3 tube set, cost \$85, sell \$45 also sell equipment extra, best price; demonstrated evenings, 15 Wyona st., near Jamaica av., Brooklyn.

YOUR opportunity—only a few more left; one tube receiving sets, tested and fully guaranteed, in handsome cabinet, to close out at \$6.75. BURSCH, 276 Canal st., cor. Broadway.

torage batteries and Tungar charger; rgain. I. GELTMAN, 2853 West 33d st.,

GREBE C.R. 12, new, inside aerial, 4 tube, radio frequency set, \$115; must sell quick; seaving town. Phone evenings, Fordham 2510, apt. 58.

Changes in Station List

Frequency, Wave Lgth., Power, ·Call. Meters. at the China Society dinner, to be nection with the use of higher power WBBN-Blake, A. B., Wilmington, N. C..... 1090 275 has aroused the interest of radio WBBQ-Frank Crook, Pawtucket, R. I..... 1190listeners not only in the metropoli- WBBM-Fr. Atlass Produce Co., Lincoln, Ill. 1330 200 in, dealing as they will with the tan area but throughout the eastern WBBK-Kaufmann & Baer Co., Pittsburgh.. 1180 mysterious country of the East about half of the United States. It has WBBO—Limestone & Chem. Co., Rogers, Mich. 1200 which most Americans have only long been realized by radio engineers WBBR—Peoples Pulpit Asso., Rossville, N. Y. 1230 hazy impressions. The two principal who have studied the situation here WEBF—Petoskey High Sch., Petoskey, Mich. 1220 KDZE-Rhodes Dept. Store, Seattle, Wash. .. 1110 KFJQ-Valley Radio, Div. of Elect. Constr.

Co., Grand Forks, N. D........... 1070 TRANSFERRED, CLASS C TO CLASS A. WJAS-Pittsburgh Radio Supply House,

Pittsburgh 1200 Increased power results in greater LIST OF BROADCASTING STATIONS DELETED DURING THE MONTH OF JANUARY, 1924.

KFAV-Abbot Kinney Company, Venice, Cal. undoubtedly be the recent archaeo- compared with the broadcast pro- WJAB—American Electric Company, Lincoln, Neb. logical expedition and the fascinating gram. This improvement applies not KFIY—Brott Laboratories, Seattle, Wash. and thrilling incidents attendant only to expensive receiving sets, but KFCK—Colorado Springs Radio Co., Colorado Springs, Col, WOAJ-Ervins Electrical Company, Parsons, Kan.

WDAX-First National Bank, Centerville, Ia. WABC-Fulwider-Grimes Battery Company, Anderson, Ind. KFIK-Gladbrook Electric Company, Gladbrook, Ia. WAAZ-Hollister Miller Motor Company, Emporia, Kan. KFIB-Jenkins, Franklin W., St. Louis, Mo.

WBAW-Marietta College, Marietta, Ohio. KFDU-Nebraska Radio Electric Company, Lincoln, Neb. WGAY-Northwestern Radio Company, Inc., Madison, Wis. WLAN-Putnam Hardware Company, Houlton, Me. WIAT-Radio and Specialty Company, Burlington, Ia.

WABJ-Radio Laboratories, South Bend, Ind. KFCD-Salem Electric Company, Salem, Ore.

WKAW-Turner Cycle Company, Beloit, Wis. KFJD-Weld County Printing and Publishing Company, Greeley, Col.

Here's a Way to Guard Against Mistakes

Receiving sets located within a to secure the best layout of material as many as needed without rulning short distance of WEAF's transmit- on the panels are often puzzled to a sheet of expensive panelling.—G ter or those not adapted to selective know, without drilling the panel, M. C. tuning may at first interfere with just how instruments will appear. satisfactory reception of other local Take a piece of heavy cardboard or ments, using rubber bands to hold

between instruments work out. it is satisfactory use the cardboar as a template for drilling the panel Radio set builders who take pains II changes are needed you can make





U.S. TOOL VERNIER CONDENSERS §3.45 \$2.85

MUSIC MASTER SPFAKERS, \$21.95 WESTERN ELECTRIC 10 D. SPEAKERS, \$36.00 A.C.CHARGERS Vailey... 17.50 Sterling... 10.95 Home Ch 12.50 Balkits... 18.00

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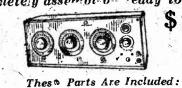
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1 U.V. 200 or C 300.
2 45-Volt—Novo.
2 Pacent Phone Plugs.
1 Urv. 201A or C 301 A.
1 Brandes Table Talker.
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2 45-Volt—Novo.
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LISTEN TO THE LEDO 4-Tube set before buying \$44.95 a radio set at any price. FADA 5-Tube \$65.95 Regular Our Price Price

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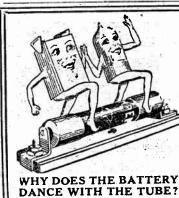


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'THE HOUSE OF SERVICE"



THROOP AUTO SUPPLY 832 De Kalb Av. at Throop, BROOKLYN, N. Y. DECATUR 8379.

For Real Bargains in Radio Sets see Radio Exchange Page 22

Australia Now Has One of the World's Largest Broadcasting Stations

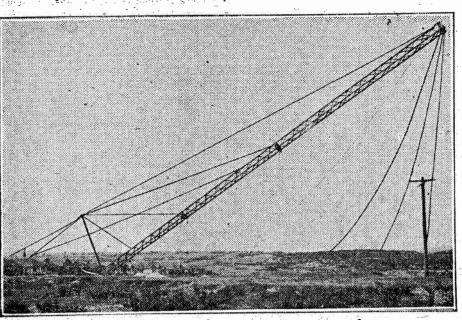
"2 FC" Near Sydney Will Probably Be Heard in the United States

introduced into Australia. A scheme which is unique and which has been drafted after the experience of other countries in regard to broadcasting had been considered has been evolved. In considering the hroadcasting problem in Australia difficulties which were unknown in other parts of the world presented themselves. The

ADIO broadcasting has now been | sued after the broadcasting company's | should also be heard under ideal condi- | nection with Farmer & Co.'s service subscription has been paid.

Arrangements have been completed whereby radio dealers become agents of the broadcasting companies for the issue of licenses and the collection of the subscription fees for the broadcasting service. No person can purchase a wireless set unless the license has first been obtained.

Most people have now thoroughly realized that if broadcasting is to be



Raising one of the 200 foot Towers was quite a feat.

immense area of the Commonwealth, with | its almost minute and greatly scattered population, rendered it impossible for any of the systems which had been adopted in England or America to be employed in Australia. It was realized, of course, that the establishment of broadcasting should be on such a basis as to render it permanent, and with this end in view a conference of those interested was summoned by the Postmaster General, Mr. Gibson, who is the Minister responsible for the administration of the wireless telegraph act of the Commonwealth. This conference discussed the matter, and eventually evolved a scheme which at a later date was approved of by the Government and was made the subject of special Government

regulations.

Under this scheme those wishing to erect stations and broadcast, after being approved of by the Government and also after providing a financial bond of £1,000 guaranteeing continuity of service for five years, are allotted a certain wave length upon which to transmit. Receivers designed to respond to the wave length of the service and sealed so as to respond only to that wave length are then available for purchase by those wishing to avail themselves of broadcasting. This system is an entirely new one, and the exact manner in which it functions is being watched with keen interest by experts. The providing of a service under it becomes similar to the providing of an ordinary telephone service, except that in the case of broadcasting a set is purchased and not hired, and also that it is a receiver only. At first sight the scheme may appear strange and complicated, but the exact manner in which it will operate becomes quite clear if the case of, say, one broad-

casting company is considered. If a company is desirous of establishing a broadcasting service after being granted the necessary approval and license a wave length is afforted to it. The company then erects its station and transmits programs of speech and music according to its own arrangements. The person desirous of receiving then purchases a set designed by experts and tuned so as to receive telephony on the wave length of the service for which it is sold. It is sealed to that wave length, and is not alterable except by deliberate tampering. The testing is done by the Government, and the seal is a Government seal applied by the manufacturer under Government permit.

Must Pay for Broadcasting. The Government fee for a receiving license is 10 shillings per annum. The broadcasting stations control the issue of these licenses, and also charge whatever subscription fee they may think fit

per annum. The license can only be is-

maintained in a regular and high class manner it must be established on some basis which provides a certain measure of profit for those responsible for its maintenance. It was with this end in view that the Australian regulations were

Experimental Licenses. There are, of course, many details in connection with the Australian scheme which make it elastic. For instance a genuine experimenter, after being tested by the Government authorities, is allowed perfect freedom on all wave lengths after payment of license fees only. Similarly the person who decides to receive more than one broadcasting service may have his receiver altered and resealed so as to respond to a number of wave lengths -providing, of course, that he has paid the necessary fees of the broadcasting stations using those wave lengths. Under this scheme it is expected that the Australian broadcasting movement will be

Farmer & Co., Ltd., of Sydney have commenced broadcasting in a large way. This company enjoys the position of senior broadcasting station in Australia, having been allotted No. 1 license by the Government. They have erected one of the most powerful and up to date broadwhich operates on 5,000 watts power and on a wave length of 1,100 meters. When in full swing the station should cover the whole of New South Wales, portions of Victoria and Queensland, and | music which are transmitted in con-

ters, bedrooms and bathroom for the operating staff, and situated some little Uses Cage Aerial.

tervals along the wire and to which the

A special steel tower set in concrete ing room, and to this tower the "lead

tions in other parts of the world.

Situated on the highest point of Willoughby, about eight miles on the northern side of Sydney, New South Wales, the station, which is officially known as

2FC, has now commenced transmission. The two steel towers which support the aerial system are each 200 feet high and are built in lattice fashion. The distance between these towers is 575 feet. and across this space the aerial system. is stretched. Directly beneath the aerial and almost in the center of the two towers is situated the operatng house and quarters for the staff. A large room houses the 5,000 watt set which is used for the transmission of programs and also a smaller 500 watt set. Adjoining the instrument room are the living quardistance is a large storehouse-

The aerial is of the cage type and consists of four wires stretched taut and kept in position by means of huge brass hoops, which are secured at regular inwire itself is attached. Special attention has been given to the "earth" system, which is most elaborate. No direct contact is made with earth, but a complicated earth screen has been constructed. This comprises a counterpoise arrangement, the wire used in connection with it being supported by small steel masts, each carrying heavy insulators and holding the earth screen 9 distance of about fifteen feet from the

is erected near the side of the operat-

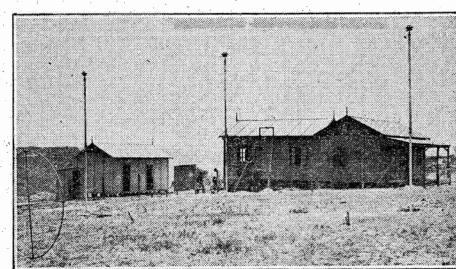
are provided in elaborate studios which have been constructed on the roof garden of the company's big retail store in Pitt, Market and George streets, Sydney, and about eight miles from the station. A land line conveys the speech and music to Willoughby, where it is transmitted. The studios have been constructed at considerable expense from plans and specifications obtained after consultation with representatives of broadcasting interests in all parts of the world. No stone has been left unturned to insure the best results being achieved, and the studios have been planned accordingly. Constructed in a special manner so as

to be soundproof, they comprise a large and a small studio, an instrument room and a special reception room for the artists. The instrument room adjoins both studios, and the operator is able to watch the progress of the concerts being broadcast through a special double soundproof plate glass window. Walls and ceilings have been draped carefully with thick felt. All doors are double and have been constructed on soundproof principles.

Two Studios In Operation.

The use of two studios results in their being very little delay, the manager of the service being able to arrange his artists in one room while the item is actually being rendered in the other. A quick change over on the part of the operator results in one item following another in rapid succession. The microphones into which the artists sing are kept in the studios, and the sound is "stepped up" before being carried by telephone wire to the station at Willoughby.

A special series of switches enables the



The Studios are located seven miles from his operating house.

in" from the aerial is led and a connec- i operator and studio manager to control tion is also made with the "lead" from the earth screen. This small tower by heavy insulators to the actual in- station is in operation. struments.

The actual programs of speech and

Radio's Popular Appeal

Continued From Second Page.

one to build at home, with the possible exception of the really mechanically inclined man. Even then he is apt to get into trouble unless he has had previous experience with smaller and less complicated sets. There are many cases of success, though, and generally it is simply a matter of time and patience.

Radio has an appeal to every one. The programs offered by the great broadcasting stations are such that there is almost sure to be some feature which will interest any taste. There are talks for the children, for women and for the men. These run from bedtime stories to talks on the financial situation or sporting events. The great leaders of politics and of the nation take advantage of radio to place their thoughts right in the homes of millions of citizens, and the home with a radio set should never lack for entertainment of some kind from the day the set is built until the last instrument has been completely worn out.

Radio is here to stay and it has reached

the status of a public necessity. Do not let any one try to convince you that it is only a passing fancy and that it cannot last, because there are vast sums of money tied up in manufacturing plants and millions of dollars have been spent by the fans in purchasing their parts.

What started as an interesting experiment has taken the public fancy by storm and it has reached such a high stage of development that it is now possible for every one to own and operate some form

President Coolidge's Address to Be Broadcast.

The address by President Calvin Coolidge, to be given at the annual Lincoln dinner of the National Republican Club, on February 12, will be broadcast by Station WJZ of the Radio Corporation of America directly from the main ballroom of the Waldorf-Astoria Hotel. Station WJZ will commence broadcasting the

the operation of the studio with the utmost simplicity, and a series of signal casting stations in the world—a station stands upright against the house, and lamps is arranged so as to give full from it the various wires are carried warning to artists and staffs when the One of the greatest achievements by the directors of Farmer & Co., Ltd.,

has been the securing of the sole broadcasting rights from J. C. Williamson, Ltd., and Messrs. J. & N. Tait, the Australian theatrical organization, of the whole of their musical and dramatic productions. For this purpose the four theaters controlled by J. C. Williamson, Ltd., and Messrs. J. & N. Tait have been connected by trunk lines with Farmer's broadcasting studios, and the productions are broadcast as they are produced direct from the theaters.

In addition Farmer & Co., Ltd., have secured the sole rights of the Sydney Morning Herald, Australia's principal morning newspaper, and the Evening News, the principal evening newspaper in Sydney, for broadcasting purposes. A regular feature of the broadcast program will be stock exchange quotations and market reports embracing all the primary products of the country, for which purpose the cooperation of Dalgety & Co., Ltd., has been secured. The Sydney Town Hall, the headquarters of the city Municipal Council, has also been connected with Farmer's broadcasting station by a trunk line, while arrangements are being made for the connection of the New South Wales Conservatorium of Music, which is controlled by the State Government, and is the seat of musical proceedings of the dinner at 9 o'clock, education in the Commonwealth,

Distortion Can Be Eliminated in a Three Stage Amplifier by Careful Design

Selection of Proper Tubes and Transformers Increases Amplification and Improves Reproduction.

By FRED H. CANFIELD.

RACTICALLY all persons who own radio receivers are desirous of having a distortionless amplifler that will increase the intensity of signals to any desired degree. If the word distortionless were omitted from the requirements it would be comparatively easy to construct such an amplifier; however, when more than two stages of transformer coupled audio frequency amplification are to be used the amplifier requires careful design if the distortion is to be decreased to a minimum. It will therefore be the purpose of this article to give suggestion for the construction of a multistage audio amplifier.

The selection of the proper audio frequency amplifying transformer is proball frequencies this would not be neces- be materially increased. The most satissary: however, in many cases a 5:1 transformer can be used to advantage in the

Selection of Proper Tube.

At the present time there is very little assortment of amplifier tubes, and as the 201A is so far superior to any other tube in general use little need be said on the subject. It should be said, however, that the value of the amplifying constant is of very little importance and that the value of the mutual conductance and the plate resistance determines the efficiency of the tube as an audio frequency amplifier. The mutual conductance of a tube should be as high as possible and the plate resistance should be low, i. e., between 6,000 and 20,000 ohms. Table 1 ably the most important thing to consider gives the electrical characteristics of tively charged the signals will be badly more useful energy without being over-

factory way of accomplishing this is to use a larger tube and to increase the plate voltage. A five watt power tube will answer this requirement satisfactorily and any of the available tubes namely the UV202, C302 or VT2, are suitable. When these tubes are used in the third stage a B battery voltage of at least 150 volts should be used.

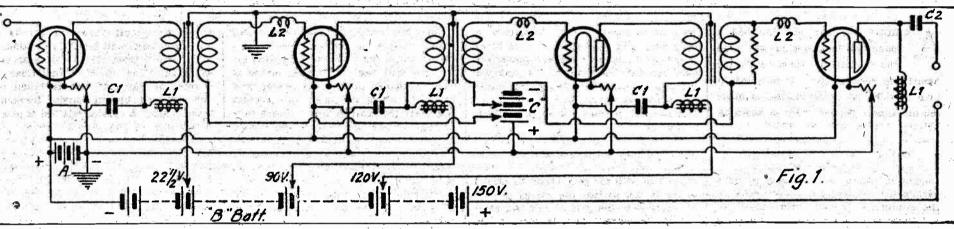
If, because of improper filament supply it is impossible to use a power ube, two amplifier tubes could be connected with their elements in parallel, and fair results will be had. In the third stage a one to two megohm resistance should be connected across the secondary of the transformer to prevent the tube from being paralyzed.

If the grid of an audio frequency amplifier tube is allowed to become posi-

formers gave uniform amplification on 1 is to be used the output of that tube must 1 cial apparatus is not obtainable in a electrical store. The bellringing transformers are used all the time when wiring houses and the condensers are used in telephone work.

The Third Stage.

An examination of the wiring diagram will show that the wiring in the third stage is somewhat different from the first two stages. In this stage the iron core choke coil is used to pass the B battery current to the plate of the tube. and the condenser is used to prevent the plate current from passing through the windings of the loud speaker. The adcore of the loud speaker is not saturated by the heavy B battery current, and this makes it possible for it to carry so much



tunately little information is available on this subject. It may be said, however, that the ratio between the turns on the secondary and primary windings of the transformer has a great effect upon the operation of the device.

Amplifying transformers with a high ratio between the windings have a tendency to amplify sounds with a frequency of about 1,000 cycles to a much greater degree than sounds of lower or higher frequency and this results in bad distortion. As the turn ration of the transformer is decreased the amplification becomes more uniform over a greater band of frequencies and also the voltage amplification of the transformer is decreased. The best transformer therefore is the one with the highest turn ratio that gives fairly uniform amplification on all frequencies. This desired transformer has never been produced with a ratio greater than 5 to 1.

Low Ratio Transformers Best.

Another argument in favor of a low ratio transformer is that the impedance high ratio transformer than in a low ratio transformer. This is not a set rule, but at the present time the manufacturers of high ratio transformers usually decrease the turns on the primary winding in order to increase the ratio between the secondary and primary windings. This practice, of course, is not advisable as the amplification of a transformer is dependent upon the ratio between the impedance of the tube and the impedance of the transformer and if the impedance of the transformer is lower than that of the tube maximum results cannot be had.

The desirable ratio for an audio frequency transformer is affected somewhat by the tube with which it is to be used. If a tube with a high impedance is used best results will be had with a rather low ratio transformer, and a tube with a low impedance can be used successfully with a comparatively high ratio transformer. The Radio Corporation and Cunningham receiving tubes, that are used almost exclusively in the broadcast listeners' installation, al have an impedance of less than 20,000 ohms, an1 with these tubes the ratio of the transformer windings should never be greater than 5 to 1 and in the second and third stages a transformer with a ratio not greater than 4 to 1 will usually give best

Some manufacturers advise the use of transformers with different turn ratios in each stage of amplification. If the transOverloading of the amplifier tubes is

one of the most common causes for distortion in a multi-stage audio frequency amplifier. An easy way to overcome this difficulty is to increase the output of each succeeding tube by increasing the plate potential. In the detector circuit, when a soft tube is used, a plate potential of not more than 221/2 volts will usually give best results, but if a hard tube is used a plate potential of between 30 and 45 volts is often required for satisfactory operation. The amplifler tubes are required to handle greater energy than the detector, and therefore the output of the tube must be increased by increasing the plate voltage on each

In the average broadcast receiver between 60 and 90 volts of B battery voltage is applied to the plates of the amplifier tubes. This arrangement gives fair results, but even better results could be had if a different voltage were placed on each stage. With the Radio Corporation and Cunningham receiving tubes most satisfactory results are had when 60 volts is placed on the plate of the tube in the first stage of amplification and between 90 and 120 volts on the second stage. This rule does not necessarily apply to tubes manufactured by other concerns, however, as other tubes may have different characteristics, and tubes with a high plate resistance require a higher plate voltage if the same results are desired. The AP amplifier, the Marconi amplifier and the 216-A are examples of tubes with high plate resist-

Tube for Third Stage.

In a well designed two stage amplifier the energy amplification is often as great as 1,500 and if the amplification were to continue at this rate the energy in the plate circuit of the tube in the third stage of amplification would be about 59,000 times as great as the energy in the plate circuit of the detector. From these figures it can be seen that if a third stage | have a capacity of 1 mfd. If this spe-

distorted. Distortion from this cause | loaded: This same arrangement could can be eliminated by the use of the proper voltage C battery, and in Table tery voltage necessary for various B battery voltages. The use of the C battery not only improves the quality of reproduction but also lengthens the life of

Practically no current is taken from the C battery in an audio frequency aniplifier, and therefore small flashlight cells may be used for this purpose. The same cells may be used for all the stages provided separate taps are taken off for the different voltages, and the C battery may be placed in the amplifier cabinet.

Effect of Coupling.

In a multistage amplifier a certain amount of coupling always exists between the stages, and if this coupling is present to an appreciable degree all sorts of manifestations can be expected Growling, whistling, howling and other disagreeable sounds are the result of coupling, and if proper thought is given beforehand they may be eliminated en-

tirely. The wiring diagram that has been suggested in Figure 1 shows how the coupling that takes place through the B battery can be eliminated. It will be noticed that an iron core choke coil has been placed in series with each poritive B battery lead, and that a condenser has been connected between that coil and the negative of the B battery. This wiring arrangement eliminates any coupling that might take place through the batteries and also makes it possible to use the same B battery for all

stages. The Iron core choke coils that are used for this purpose should have an inductance of 30 henrys, and the primary winding of a standard bellringing transformer may be used. The condensers that are shunt between the choke coil and the negative of the B battery

ું પુરુષ્ય મિલ્લાક્ષ્મલોક કહેલા કહેલા કહેલા <u>ટનું તુ</u> ં મુખ્યત્વે જીતામાં ફોલે ફોલેન કહેલ કહેલા, ફોલે છે છે,	
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so distributed by E. T. Cunningham.	-

be used in the first two stages of amplification, but in most cases the B battery

In about one case out of every ten ultra high frequency oscillations are set up between the stages, and these oscillations have a detrimental effect upon the operation of the amplifier. If a radio frequency choke coil is inserted in series with each grid leak, as is illustrated in the diagram, any ultra high frequency oscillations that may exist in the amplifier will be overcome. This choke coil may be made by winding about 12 turns of No. 28 wire on a tube one inch in diameter.

The best possible cabinet for an amplifler is a long, narrow one. This is so that the parts of the amplifier may be well spaced to prevent any coupling between the stages.

The amplifying transformers and the tubes should be placed at least three inches apart, and the amplifying transformers should be placed at right angles. to each other. Another precaution might

Plate	٠.	TA	BLE	. 2	-,,,,	Same	
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Volts	٠٠٠٠			10-4	Grid-	Volts.	
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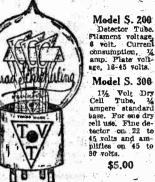
be to ground the core of the amplifying transformers. The iron core choke coils and the by-pass condensers should be mounted in the amplifier cabinet and arranged so that the wiring between them and the other parts of the set is as short as possible. The radio frequency choke coils should be mounted as near the grid binding post of the socket as possible.

The best method of wiring the amplifier is to keep all grid and plate wires as short as possible and separate from all other wiring or instruments. The battery wires in the amplifier should also be kept as short as possible, but parallel to each other. In all cases inductive loops in the wiring should be avoided.

. In wiring the amplifying transformers greatest amplification will be had if the grid wire is connected to the outside of the secondary coil of the transformer, and the plate wire to the outside of the

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112 Trinity Plac New York Can lence with other stations. Each li-distance.

but lows "you had best come with me is certain, a man with a face and a fist like that is either leaving or

The man halled away and bound for a State prison. But, as Randy says, taken all in loped Randy on the nose. When Randy got his bearings and all, the radio enlarges one's culture, could see, his quarry had gone. A widen's one's wisdom and keeps one lot of people who haven't the slight- posted. There is one other advanest iniative have tried to kid Randy tage. Suppose you have a bunch of

about the insident. One of the dumbbells in on a Sunday afternoon people who live in the apartment and they won't dance to your vichouse said it was a Mr. Pushin, who trola records. What is easier and conducts a clothing business on Sixth simpler than to lead them to the avenue, which is mannyfestly ab- radio console and turn on the Chrissurb. Both Randy and I are con- tian Endevear program?

vinced that it was the convict who For the hostess the burden of con escaped from Baltimore. One thing versation is now lifted,

Radio at the Antipodes

Receivers Scarce and Regulations Severe on Other Side of Earth.

By JAMES FRANCIS.

accurate, and remedies are daily forthcoming in the form of increased

perfection in instruments of transaission and reception. . If in America, defects of radio rethis is partly due to the fact that the legal guardian of radio has accorded ment, free from vexatious ailments, paratus, official attention being however insignificant. Certain types mainly confined to the reaction and and regulations there governing broadcasting are on the whole much ore severe than in the United tipodes that the most rigid restrictions have been imposed. In New Zealand, where the number of re-

ceiving sets in operation has been estimated at 3,000 only, Government regulations respecting broadcasting and receiving are quite liberal, and lue provision has been made to safe-Regenerative circuits are allowed tuning coil, or the two coil regen-

guard the rights of all concerned. provided the reaction coil is not coupled directly to the aerial. This practically prevents the use of anyextensively on this continent. The ordinary three coil honeycomb set. the variocoupler and variometer sets.

Australian Laws Are Drastic. The Australian Government goes much further in imposing regulations of a very precise nature, some of which are considered by the radio enthusiasts as being absolutely devoid of all human sentiment. An application for a broadcasting license by a fee of \$75, a complete description of the proposed installation and as a form of entertainment which is circuit diagram of the transmitting and receiving instruments. The type and power of the transmitter. type of aerial and wave lengths, at the beginning of this article, tha character of modulation, hours and class of service, &c., must all be de- full. But there is no doubt that scribed in detail. A guaranty of American amateurs, enjoying all the \$5,000 must be given that service will privileges that can be bestowed by commence within the six menths following the issue of the license. Power is rated in watts measured in the high frequency generator circuit of the transmitting apparatus. The use of any power between 500 and Regarding Trick Aerial 5,000 watts may be applied for but Experiments is accorded at the discretion of the Trying freak aerials is interesting

ength shown in the license.

N SPITE of the rapid progress cense is issued for the use of a parmade in the last decade and the ticular wave length, which is deteruniversal favor which it enjoys mined by the authorities and which

be said to have emerged from the The preceding regulations interest experimental stage. It can still be the amateur radioist only in so far considered as a young, though lusty as they may affect reception. It is and vigorous infant, subject to occasional attacks of "statis" mumps and embarrassing; those which effecinterference" whooping cough, tively take all the joy out of radio Phese minor maladies, while they as it is known in America. The Australian amateur is obliged to subscribe to a broadcasting station, and novance to the nurse, do not in any this subscription must be forwarded way endanger the existence of the to the Government Radio Service, toyoungster—they, merely serve to gether with an annual license fee of stimulate research. Every symptom \$2.50. His receiving apparatus must eccives careful attention, the diag- be of a type approved by the authornoses are becoming more and more ities and stamped accordingly. His receiver must be so constructed as to respond to the wave length indicated on the official stamp, or to any wave length not differing more than 10 per cent, from that specified ception are particularly noticeable, Response to wave lengths outside the specified limits is not permitted. No regard is paid to the method of concase in some other countries, where any external device to be connected many precautions are taken to in- to the outside terminals and thereby sure a healthy and normal develop- effect a "loading" of the tuning apof receiving apparatus are prohibited the wave length to which the ren the United Kingdom, for instance, ceiver will respond, without altera-

Must Subscribe to Broadcasting. American amateurs might consider hese clauses adequately restrictive Not so the Commonwealth Government. To make doubly sure of compliance with the regulations each receiving instrument, in addition to the official stamp which it carries, mus an accredited agent is allowed to indignation which would arise from the ranks of the "station hunters" of this continent can easily be imagined thing in the nature of a three slide if the adoption of such a device to confine or restrict their all-absorbing erative circuits, which are used so passion were even suggested. The Australian enthusiasts feel that they are being deprived of a little mild and harmless excitement and they are permitted. Broadcasting by ama, have already voiced their dissatisteurs is not encouraged in New Zea-faction with the "sealed" receiver and land, and licenses for transmission the restriction to the one wave length of the broadcasting station su scribed to. They naturally desire a variety of programs and to obtain this variety they ask to be permitted to subscribe to other stations. They contend, with much truth, that these regulations, by depriving amateurs of the fascination of being able to turn from one wave length to an other, as fancy may suggest, will n Australia should be accompanied prevent radio from obtaining in Australia the high degree of popularity

enjoys in other countries and par

ticularly in the United States. It is

not likely, for the reasons outlined

their demands will be acceded to i

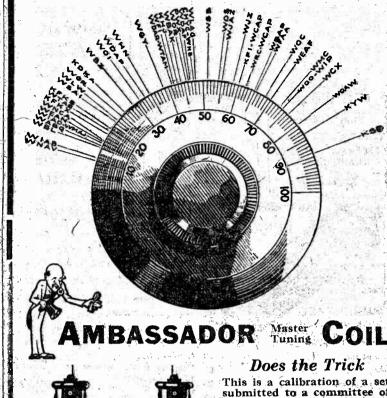
lly sympathize with their less for-

tunately situated brethren under the

authorities, and the station must be costs little and may develop some operated at the power and wave thing worth while. A wire window Further regulations control the screen, of the variety which usually operation of instruments and the covers half the window, offers intermanner of transmission with a view esting results. It has directional efto the maintenance of reasonably fects which can be made useful continuous radiation during the peri- Suspended on a string and attached eds of operation, and the elimination to a neutrodyne or radio-frequency of injurious harmonics and interfer-set it will often bring in considerable

on the air

A committee in Philadelphia hears 49 stations, from Cuba to Los Angeles, actually sign off.



engineers. Remember, the same stations will be heard at the same points on the condenser night after night. Ask your dealer or write us for free diagram of Ambassador **AMBASSADOR** Mighty Magnets will hold up three pairs o Ambassador Phones as shown lake this test and compar

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which to buy a radio.

stinktively.

Went Out."

and found him arrived before me-I

hould say I-one has simply got to

perticular in such things if you're

stenog for a fussy man-when I

und that Randy was home first, I

new it must be mischeif. Because

ings are started in the dinner line.

"Here's a radio," he said in a sur-

in like a musquito, without his aid.

battery or the volts or whatever you

"Sure you do. That's why you

I sat down in the new red velou

"You've destroyed my confidence

to our mutuel promise to stop slang,

dren have a much better chance now

married me," he retorted.

rm not Randy's.

"Listen, Pettie---"

radio.

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Confessions of a Radio Wife

Police Reports Prove Too Much for Hubby When He Tries to Make a Capture.

By ANNE COLLINS. TYHEN Randy brought home a didn't care so much for that, but radio set I was furious. Randy said it was a pretty handy We had been married five thing to know. We had been married five Postage Stamp Collecting, and you'd months and two days and hitherto hardly beleive how ignorant I had had lived a happy married life. He been about such a simple thing as is twenty-three and I am twenty-two stamps. Then we got WBZ-Springand we are both good looking and he field, Mass., and we heard a humerous program that was a scream. We works in a bank-it's a shame what laughed as we said the loke was little vision that bank has when it quite on them, as we sat at home comes to appreciating real merrit in and never had to pay to hear it and a man like Randy. Randy is really they had all the trouble. We even keeping that bank going in a way for heard the weather report. I bet the if he divvulged the things he's are scared to death that the radio newspapers, if they'd tell the truth, earned in the Stastistical Depart- will up plant them. ment where he works, the bank would | Well, we staid up so late trying be ruined and there'd probably be a to get WWJ-Detroit-that I was run on the bank tomorrow. But right blear-eyed the next day. I Randy is a real hero and he's never had a time making out my notes. I came to some hooks and dashes that said a word to any body but me. I'm were quite meaningless and I find it

a stenog in a downtown office and be- saves time to ask your boss what it lieve me, it's no joke to be a "woikin' means. So I upped and said "Mr. wife." However I stuff twenty-two Bumpus, what does this mean?" I dollars in my stocking every week proved that the phrase was "mearly Which reminds me of why I was the irreguliarites of the proceedure." furious with Randy and the radio. Now, I ask you, what is your honest You see we being a buisness opinion of a man who dictates such couple, and especially Randy being stuff? He was positively impertin the banking business, agreed we nent about that and then when he should have a bank account. A made an uncalled for remark about joint account, if you get what I the "quintessence of my spelling," I mean, being as we were both con- said, "Well, Mr. Bumpus, if you will tributing to its support. Then as the presist in dictating over your shoullawyers say, we had further agreed der with a cigar in your mouth, you to withdraw no money without the can't expect me to dissipher your other's knowlidge and consent. I cerletter." If he had been a gentleman tainly had had no intimidation that that would have crushed him, but as he was to take any money out with I allways say, you can tell a gentleman by his fingernails. I knew instantly when I got home

But to get back to the radio. always thought I had shown suttle common sense when I married Randy. The arrival of the radio convinced me. Because he became a master of the radio-insides in less no time. He could discoarse on storalways lingers until he is certain age batteries, volts, aeirial wire, instulators, lightning arresters, tubes, And then he rushes in and offers to plugs, coils, wave traps and dials and help. This evening he was guilty he talked about them brilliantly. He looking and was whistling to keep has the inventitive type of mind and his courage up. I knew this inexpect him to do something big prized sort of voice, as though it got

As for me. I retain what I learn but new subjects come slowly within He fumbled industriously with the my grasp. I confess I did not learn the intricacies of radio as quickly as call them and whistled "When You did he, yet and all, I think there is not sex in brain. For instance, he I threw the delicatessen dinner I was talking something about sphahad in a paper bag on the gate leg getti and I thought he wanted sphagetti for dinner, and I had some, and "I like your nerve," I said in a he didn't eat it, and I said why. Then he said he was not talking about sphagetti to eat, but sphagetti tubing. I made the same mistake about the word "tickler." I really thought wing chair, and because I was tired he said, "I do not like to tickler," of pounding a "Noiseless" more than when what he said was, "I do not because I was sore on the radio, I like the tickler." When I said such begun to cry on the arm. The chair a remark is in bad taste and he finally got it straightened out, he said your head reminds me of a

in you," I sobbed. "You took the vacuum tube. money out of the bank without tell- We are indeed radio fans. Nothing ing me. Without my knowlidge and wets our enthusim. Not even the fact that Randy got knocked do through his alleagiance to it. He "You ought to be ashamed! How came in one night with a spouting much did it cost? And you know nose, and I thought he would die, and very well I want a gold band set of that I should be a widow, and that it was fortunate that black became me, "Aw, honey, listen," returned all the while another corner of my Randy, leaving the insides of the brain was remembering my first aid radio and running over to me. "Don't instructions learned from the Red you go and get all stirred up. Listen, Cross. I hastily made a torniquet sugar, I didn't touch the bank ac- which I twisted tightly around his count. I won this in a crap game." nose, which is Roman, with enough Honest, I was so relieved. I dried room for me to get a good holt, and my eyes and we made up and kissed the result was it stopped bleeding. and then I took an interest in the As soon as he could talk, Randy told me the whole story. You see we had

The radio was wonderful. If I got the story over the radio about must say it, Randy is clever. He got the two convicts who escaped from the thing all hitched up and never the Baltimore pennytentiary. One's shall I forget how awed and queer description was that he was tall and we felt when first we got tuned in thin, with a bald head, wearing nose and heard the Farm Report. It was glasses and a cap. At least that's WJZ and as clear as christial. Of what we understood. So just as course I don't know a thing about Randy was about to enter our apartwe got WOR and heard the Moon cap and a villinous look? Randy, Man. He told some bed time stories couragious as a lion, stepped right and Randy said "Gee." Then, true up to him and said:

"Are you the escaped convict?" Randy begun again. You see when The man looked so utterly surprised one works for a bank, one simply that Randy took his silence for conmust acquire a mannor born. "Chil- sent.

"Come with me to the nearest pothan when I was a ki-a youngster," liceman," said Randy sternly. As said Randy. "When ever I asked usual, there was not a policeman in some one to tell me a story they al- sight.

"Why, what does this mean ways said 'Go away and don't bother stammered the man, "Are you We got KYW-Chicago - and crazy?" "No," said Randy in a harsh voice, eard the market report as plain. I





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rotor as a tickler, use the primary as a | couple the tickler to that. Where you secondary, and wind three or four turns around the tube over the new secondary and use this winding as an untuned primary. On the whole, though, the three coil mounting works out best for tickler feed back. It permits a wide range of ad-

150

A department of popular

discussion of technical points

usually considered too intri-

cate for general explanation.

LMOST any one who has had a

panel to look behind has used

the "daddy of them all," the

Armstrong regenerative. It is going to

take a whole lot of persuasion to make

the old timers believe there is anything

better. There may be differences of

opinion whether plate tuning or tickler

feed back is to be preferred and whether

the grid circuit should be tuned by a

condenser across the secondary or by a

variometer in the grid circuit between

the secondary and the grid condenser,

but there is no difference of opinion as

to whether a good old fashioned well

made regenerative brings in the signal.

Then there is the reflex, the circuit

that makes a tube do double duty. It

has lots of admirers and we are all its

friends. Theoretically it should be the

best hook-up of all from the standpoint

of economy. Commercial sets using this

hook-up are, on the average, more suc-

cessful in bringing in distance than com-

mercial sets using the regenerative

hook-up, so far as my experience goes.

Home made sets where only one tube

is used are on the average more satisfy-

ing with the reflex than with regenera-

Both these circuits have a lot in com-

mon and modifications in between the

two have given some surprising results.

As a field for experiment and for the

purpose of learning the workings of both,

the four diagrams are given at the top

of this page. There is no intimation here

that reflex involves regeneration nor

that regeneration contemplates reflex.

but having the two circuits in mind it

to the other step by step, pausing at

each step to contemplate what we are

doing and what results we are getting.

We'll learn the whys and wherefores of

what's behind the panel and maybe find

something wrong with our present set

or some way of changing it to give re-

sults we prefer to have. Some want

volume, some look for distance, some

prefer quality, others desire easy tuning.

and many just want to tinker and see

what happens. The last group at least

will get a lot of fun out of the process

of changing from regeneration to reflex

by the easy payment method shown above.

The first diagram shows the usual

tickler feed back regenerative circuit.

If the primary and secondary coils are

to have variable coupling and the tick-

ler is to have variable coupling with

the secondary, the only coils you can

use with this set are those arranged for

a three coil mounting. Until recently

that meant either honeycomb coils or

spider web coils. Now in addition we

have the splendidly effective curkoids

which are O. K. in every particular ex-

cept the name and that may not be as

bad as honeycomb since I heard a man

about fifty stroll in a store last week

Of course, the tickler may be fixed-

a separate winding on the stator along-

side of, but separated from, the primary.

Some couplers are made that way. An-

other way of arranging the three circuits,

and perhaps a better way, is to use the

and ask to see some "beehive" coils!

ems almost natural to pass from one

tion, I think.

As to the action of the circuit shown in (1), you know the explanation of the three-circuit hook-up. The plate circuit is coupled with the grid circuit by means of the tickler so that the energy in part is returned to the grid circuit and reinforces the current already there so as to impress an amplified signal on the grid. It's a good deal as though you hitched a hose pipe on the smoke stack of a locomotive and connected the other end of the hose to the fire box of the locomotive to increase the draft and

burn up the smoke. The tickler is coupled to the secondary normally but you can put a coil in series with the secondary as shown at (2) and | that night, but I certainly learned to re-

the coil. About the only thing that has not been suggested, and I suggest it now, is a coil wound like a spiral spring and mounted so as to be stretched and thus vary the space be

back. In effect you now have a radio

frequency transformer with primary con-

nected to plate and forming the tickler

and secondary connected in the grid cir-

cuit and delivering energy thereto in

place of to a second tube. In fact, an

R. F. fixed transformer may be used

here with pretty good results, if the

primary is funed by a variable con-

It is but a short step from (2) to (3).

In place of coupling grid and plate cir-

cuits together directly, two couplings

are used with an in-between circuit,

tuned by a small variable condenser.

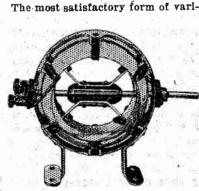
Two coil mountings or fixed R. F. trans-

formers may be used in each position,

whichever are desired. Maybe I had an

unusually effective rabbit's foot with me

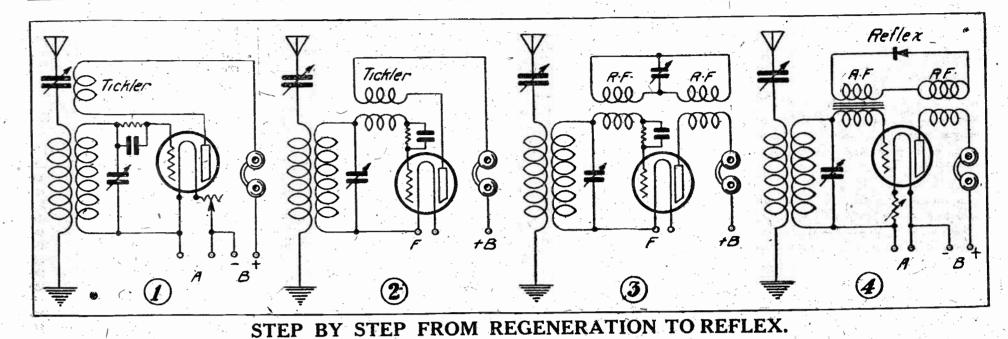
tween turns. The most satisfactory form of vari-



able inductance yet found is the variometer, which comprises two coils wound in series so as to form a continuous winding. One coil is fixed and the other coil relatively movable. By rotation of the one coil its magnetic field may be made to coincide or to "buck" the magnetic field of the other coil. Any adjustment between these two positions may be made. The resistance is always constant and the capacity of the coil nearly constant, at different positions of its setting. Because of the mutual inductance of the coils the total inductance of a variometer is greater than the sum of the inductance of the separate coils. The minimum is very low.

In general the main difference between standard variometers of reliable manufacture is a difference between the form. Some are moulded and some are skeleton frame. Electrically the latter are more to be desired. For strength, beauty and ruggedness the moulded type may sometimes be excused. Either will give

Copyrighted by R. P. CLARKSON THE PANEL



spect the circuit shown in (3) as an experimental circuit for DX reception. have a coupler in the set now this ar-To change from (3) to (4) is as easy rangement, using a two coil mounting for as lying. The R. F. transformer or the grid coil and the tickler, makes it easy to change over to the tickler feed

coupler on the grid end is taken out and replaced by an audio frequency transformer. A crystal rectifier is placed somewhere in the circuit between the transformers. Try it both ways and in both legs of the circuit to satisfy yourself that you have it in the right place. If the reflex is operating, you can't take the rectifier out and get just as good results. The crystal is there for a purpose. In (3) we fed back or reflexed all radio frequency. In (4) we rectify the radio frequency in the in-between circuit so that audio frequency is impressed on the A. F. transformer in the grid circuit and through that to the

The circuit shown in (1) is the standard Armstrong regenerative, three circuit hook-up. The circuit shown in (4) is the standard straight reflex giving one step of radio frequency amplification, detection, and one step of audio frequency amplifaction with the one tube. assisted by a crystal and two transformers. There is no tickler in (4). The circuits of (2) and (3) are used here as illustrative of imaginary working from regeneration to reflex and are well worth playing with a while.

It is possible, of course, to use neither coupled coils nor fixed transformers at the various places in (3) and (4) where R. F. coupling is shown. A variometer in any of these places is exceptionally effective. Especially is this true in the circuit of (4). A variometer may be here placed in the plate lead just as if the circuit were to be plate tuned regenerative and from the terminals of the variometer leads are taken which form the connections to the crystal and the audio frequency transformer.

Any one of these circuits also forms a good starting place to begin experimenting with resistance coupled amplification. In (3) or (4), for example, in place of the radio frequency transformer in the plate side, try out resistance coupling something of the general value of 100,000-ohms. You can buy short carbon rods of approximately that resistance at some of the stores and they will go in the usual fixed grid leak mounting or in a couple of clips.

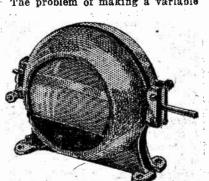
Resistance coupling will also work out for audio frequency amplification. If you retain the coupled coils or some good radio frequency transformer in the circuit shown by diagram (4), try out resistance coupling at the other end, in the grid circuit. Maybe you will make it work well Remember, resistance coupling does not give the volume of transformer coupling but has a clarity and freedom from distortion which is highly prized. In a circuit such as (4) no B battery current passes through it so it cannot be attacked as wasteful of B battery current.

For the experimenter nothing offers quite the lure of using something and then using it over again. That's what reflex does. It makes the tube do double duty. Why not see if we can't make it do triple duty or even more?

STANDARD APPARATUS—Variometers

HE object of all tuning operations in the control of a radio receiver is to so adjust the circuit in which the control lies as to put that circuit in resonance with some other circuit. Without breaking connections or inserting some fixed unit this adjustment may take place by varying the electrical constants of the units in the circuit. The variation can only be in two electrical characteristics, namely, inductance and capacity. With a fixed value of either the other may be adjusted so that the circuit is in resonance with some other circuit. Both may be adjusted and it is usually desirable to adjust both unless one or the other is very small. Usually it is very important for sharp resonance to make the inductance as great as possible and the capacity as small as

The problem of making a variable



inductance is not an easy one to solve. The ordinary single slide tuner is a variable inductance, but it varies irregularly and by jumps. The tapped coil is an adjustable inductance, but just as unsatisfactory. A coil with an adjustable metal core has been used on at least one first class receiving set. Another manufacturer at one time used a fixed coil with a plate movable to and fro from

World Radio History

Mirrorlike Surface in Sky Reflects Distant Radio Waves to Listener

Interesting Article Explains in Simple Language the Causes of Fading.

By ALFRED N. GOLDSMITH,

ECULIAR things happen sometimes in the receiving of broadcast radio concerts. Every listener, as soon as he gets acquainted with a number of nearby and distant stations, finds that he is puzzled by some of the results he gets. How shall he explain such things as

1. Late at night he can hear stations hundreds of miles away clearly, while earlier in the evening, or by day, he can chardly hear fifty miles.

2. He will hear some stations at night steadily, and particularly the distant ones, but some other nearer stations will "fade" in and out rapidly and in irregular

3. Still nearer stations, say twentyfive miles away, will not fade in or out at night or by day.

4. In one part of a city, station 1 in that city will be heard loudly and station 2 in that city hardly at all. In another part of the same city the reverse. will be the case. Outside the city both stations will be about equally loud.

5. A listener in the country will sometimes hear stations hundreds of miles away much better than he will hear stations in a nearby city say fifty miles away. Charles Correct of the Large of

The Heaviside Theory.

Radio engineers have a theory to explain these effects. It can be simply expressed, but it should be remembered that it is not a positively proven theory but only a plausible and satisfying explanation of all the puzzling effects just mentioned. It is based on a theory of Sir Oliver Heaviside, the eminent English electrician and mathematician. Heaviside pointed out that, twenty-five or fifty miles up, the air enveloping the earth becomes very rare and is therefore an electrical conductor just as is the rarefied "violet ray" tubes sold for medical purposes. So that, far up in the sky, there is a layer of conducting air which scientists have called the Heaviside layer. It is also well known that substances which conduct electricity, such as metals, are good reflectors for radio waves, so that this layer is actually a sort of curved reflector in the sky. It is therefore called the "mirror layer" in this description for the sake of simplicity.

By day the mirror layer is spoiled in several ways. In the first place the brilliant sunlight falling on it causes disturbing air currents and irregularities, so that instead of being a smooth and polished mirror it becomes a roughened irregular layer of little use as a reflector. Furthermore, sunlight has the property of converting rarefied air into a sort of "fog" which, while clear and transparent to ordinary light, does absorb radio waves vigorously. By day the mirror layer is rough and mist covered.

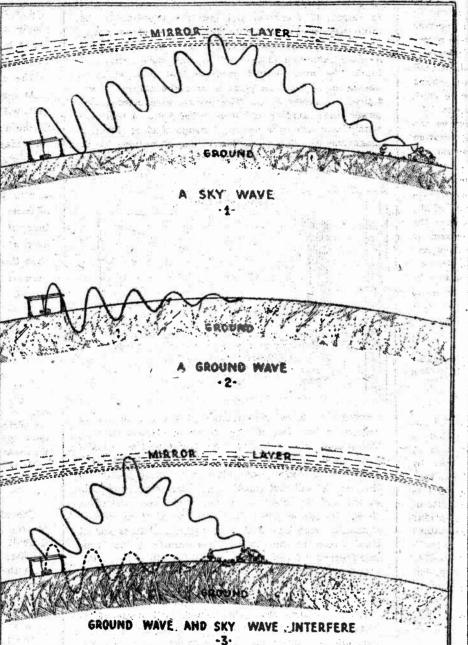
Probably most listeners have never speculated as to whether the radio waves which reach their receiving aerial come sweeping along the ground or whether they are shot down to the aerial wires after reflection from a mirror layer in the sky. Yet actually radio waves arrive by

In the illustration of this article part 1 is a general sketch of a sky wave. It leaves the radio transmitting station at the left, passes obliquely up until it strikes the mirror layer far up in the air and is then reflected back again to the earth, arriving finally at the receiving station to the right. It may be mentioned that these sky waves do not die down rapidly because their path is entirely through the air and they are but little

absorbed or interfered with in their mes-

either or both of these dissimilar routes. ; are steel structured buildings, mountains to about 200 miles he gets both ground (particularly those containing metal deposits) and to a less extent forests of large trees. The result is that a ground wave rapidly dies away, and this has been indicated in the diagram.

To take typical figures, which are roughly correct for an average broadcasting station in the eastern portion of the United States, the ground waves are very strong near the transmitting station for the first few miles and rapidly die down, becoming relatively quite weak at



sage. So that we should expect sky waves , a distance of a hundred miles or so. The to carry radio messages loudly over great distances, particularly at night when the mirror layer is smoothest and most effective and when the absorption of the radio

sunlight is absent. Part 2 of the illustration is the other sort of wave which may reach a receiving station. It is a ground wave and clings crosely to the earth. Naturally such a ground wave encounters all sorts of energy absorbing obstacles in its path, which rapidly reduces its power and the loudness of the signals it can produce in

sky waves, on the other hand, are hardly received at all near the transmitting station since their path is above the earth until after they have been reflected back waves by the "electrical fog" caused by to the ground. They come back to the ground and begin to be useful at disthe transmitting station, and beyond that distance they are readily received with good intensity for distances of several hundred miles. It amounts to this, to summarize: For distances up to about seventy-five miles the listener is depending almost entirely on the ground waves the receiver. Such objectionable obstacles | for his signal. From seventy-five miles

most of his reception is dependent on the What Is 'Fading.'

waves and sky waves. Beyond 200 miles

For locations where both sky waves and ground waves are received reception may become very erratic with marked "fading effects." Part 3 of the illustration shows how this may come about. The two sets of waves, arriving at the receiving station by different paths, may help each other or they may actually annul each other. Futhermore, as the mirror layer shifts slightly from moment to moment the ground waves may sometimes strengthen and sometimes weaken or annul the sky waves and thus cause fading. We can therefore explain the five puzzling effects mentioned at the beginning of the articles as follows:

1. Night reception over long distances is accomplished by the slightly absorbed sky waves, and these cannot exist by day because of the absence of a smooth mirror layer and the disturbing presence of sunlight "fog.". So that day reception is by ground waves, which do not reach out powerfully nearly as far as sky waves. This partly explains the superiority of night reception.

Night Reception Best.

2. Night reception from distant stations is by means of the sky waves only and is therefore comparatively steady. Night reception from stations roughly from seventy-five to 200 miles away is by a combination of sky waves and ground waves and therefore fades in and out as these two sorts of waves interfere with each other.

3. Reception from stations nearer than seventy-five miles is chiefly by ground waves only and is therefore reasonably

4. Reception in a city from nearby stations is by ground waves, which are badly absorbed by the steel structures of the city. A mile or two of city buildings will so weaken the signals from a city station, as received by a city listener, that reception may become quite poor. As a result in those parts of the city where the signals have first to plow through miles of steel to reach the listener, reception from that station will be poor. In other parts of the city the reception will be excellent. Far outside the city, reception will be by the sky waves and about equally good from all comparable stations within the city.

5. A listener in the country will get signals from the city fifty miles away almost entirely on weak ground waves. but will get distant signals on the powerful sky waves. Thus the distant signals are sometimes astonishingly loud in com-

It adds another chapter to the romance of radio to know that the concerts from distant cities have traveled up to the sky on their way to the broadcast listeners. and that an enormous mirror in the upper layers of the earth's atmosphere is chiefly responsible for the enjoyment of distant

By-Pass Condensers Frequently Help in Radio Set

condenser may be put to that the fans do not take advantage of in order that the reception of concerts may be improved. All of the uses to which one may be put are classed under the heading of by-pass condensers.

The capacity of a by-pass condenser will vary with the use, and each use willtake a different capacity for various tubes, transformers, batteries and other details such as wiring, &c. Therefore, only the uses will be given, and the capacity of the condenser will be left to the fan. However, the various sizes will be between .00025 and .006 mfd. with a few applications of a 1 or 2 mfd. condenser.

In regenerative tuners it is sometimes of advantage to place a large condenser

HERE are many uses which a fixed 1 side of the tube that is not connected to 1 tery, these resistances will, with the conthe "B" battery.

> The most general use of by-pass condensers come, however, in amplifying circuits, and these will be taken up instead of the slight use in detector circuits. Audio frequency amplification is the first

In audio frequency circuits a small condenser connected across the secondary of the second transformer will aid in clearing up raspy noises. A condenser from plate to filament of the last amplifier will. also do much toward clearing up the signals. This condenser must be large.

If a 1 or 2 mfd. condenser be placed across each set of batteries a lot of the battery noises will be eliminated, If a resistance of about 1,000 chms across the "A" battery and a resistance of about densers, clear up all battery noises.

In radio frequency amplifiers it is important that the potentiometer be bypassed properly. There are two ways to do this. One is to take a 2 mfd. condenser and connect it from the middle leg of the potentiometer to the negative leg of the potentiometer. Or to use two .006 mfd. condensers and connect them as follows: One condenser goes from the middle leg of the potentiometer to the negative leg of the potentiometer. The other condenser connects the middle leg and the positive leg of the potentiometer together.

A medium sized condenser connected from the "B" battery side of the radio. frequency transformer to one side of the filament-just which side will have to be found by experiment-will improve reception considerably.

from the plate of the tube to the filament. 20,000 ohms be placed across the "B" bat. A good, strong condenser from the plate I fier.

of an audio amplifier to the ground will often improve the tone of the set.

Transformer Hints In building audio frequency amplifiers always ground the cores of the transformers by running a thin wire from the transformer core to the ground binding post. This should be done even with the shielded type of transformers. Some types of transformers should be turned at right angles to each other, but many other types are not benefited by this: To be safe, the transformers should ha placed as far apart as possible. The use of a low ratio transformer for the second stage is advised if clarity and quality of tone is your object rather than volume. Buy only the best materials.

Storage Battery Tube Proves Best

Operating Cost Is Lower in the Long Run With This Type of Tube.

By MICHAEL SAMITCA.

ESPITE the numerous articles desirable for vacuum tube operation that have appeared explain- and the storage battery is much bet-ing the proper fields for the fer suited to this use. The storage dry cell and storage battery tubes battery, whether of lead-acid or althere still exists a need for further kall-nickel type, will furnish a steady enlightenment on this subject. Hence current, large or small, for a long this article, the purpose of which is period, continuously or intermitto assist prospective purchasers in tently, with hardly any difference in reaching a wise decision.

The most widely used tubes are pacity. That is what we want in a those of the Radio Corporation and radio battery. Cunningham, known as the 200, 201A, 11, 12 and 193. The two former us compare the cost of running a are classed as storage battery tubes, WD on dry cells with that for a 201A and the latter as dry cell tubes. The on storage battery. characteristics of these tubes, which Assuming a life of 76 hours for a are of interest in this discussion, are pere hour storage battery lighting a

Ed. Detow.		00,.00,224, 02,3	0011 111011 0	
	1	4		·
			WD 11, WD 12	
	UV 206	UV 201 A	OT.	UV 199
	O7,	or	от С 11	OT.
	€ 200.	C 201 A.	€ 12.	C 199
ed filament veltage	5.0	5.0	1.1 .	3.0 volts.
ed filament current	1.0	0.25	0.25	0.06 amps
red of filament current	Ster. bat.	Stor. bat.	1 dry cell.	3 dry cells
The state of the s	1 4	AP 4 dry	5	in series
		cells in series.		(30 ohm rhed
P F gamplifier	1	Good.	Poor	Excellent.
R. & smplifler	Excellent.	Good. &	Good.	Good.
A. F. amplifier			Pair.	Fairly good
	and the second	,		

As these terms are somewhat the cost per hour is one-half cent. vague, it is necessary to explain that but as audio amplifiers the 201A will rather high average, since the macive results infinitely superior to any jority of folks use A C chargers, conof the others, and is really the only tube to use where real loud speaker juice per charge. Then the cost per reception is desired.

incapable of furnishing sufficient volume for dependable loud speaker If four dry cells are used for a and consequent distortion of the sume, but compared to the 201A

operate a loud speaker at full vol- requires some attention, which feaume or contemplates adding ampli- tures cause it to be passed up by purpose the use of storage battery and greater satisfaction in more imfiends who insist on the very last plained. mile of distance a soft detector tube

a storage battery. Dry cells are light than with dry cells. in weight, clean to handle, require no attention and can be procured al-storage battery is needed; in fact most anywhere.

nish, however, is decidedly inferior are strictly limited. to that supplied by storage batteries. Dry cells are primarily intended for open circuit work; that is, supply ing small currents for short periods of time with comparatively long rests intervening. Under such conditions they seem to recuperate their strength during the idle intervals, and will give satisfactory service and ampere hour capacity. When used continuously, however, or for large coverents or both, they are subject to ranid deterioration, their voltage drops, internal resistance increases and they become unfit for use.

Interpreting this quantitatively we find that a standard 6 inch dry cell must never be called upon to deliver more than 4 ampere, and should not be used at this rate for more than two or three hours a day. When o used, with a WD 11, for example, we may expect a useful life of 60 to 80 hours which is not an accurate estimate, however, as it depends on and variocouplers. They may be and used to furnish the same cur- counter article. G. M. C. rent their life will be more than doubled and, likewise, if used for shorter periods the useful life will be A New Use for Sealing Wax. more than proportionately increased, all because of the partiality of the and finish of a coil will hold the wires These are not the characteristics broaden tuning -G. M. C.

dry cell to small currents and inter- firmly and make it possible to avoid

terminal voltage or ampere hour ca-As to the economy of dry cells let 35 cent dry cell with a single WD

The life per charge of an 80 amdetectors there is wide to choose 261A will be 320 hours and the cost between them, although the 200 is of recharging may vary from 5 to lest; as radio frequency amplifiers 80 cents, depending on the method. only the 261A and 199 are suitable; &c. Let us say 40 cents, which is a salming less than 10 cents worth of hour of lighting the 201A is only It is important to note that in the 1% cent. And yet the 201A conmajority of cases dry cell tubes are sumes more than four times the power of the WD.

operation on the regulation two 281A the cost per hour will be 2 stages without overloading the tube cents, compared to % cent for the storage batery. These figures are music and shortening of filament striking and conclusive and show life. Of course, they will do much how the storage battery saves money more than their share considering for its owners, in spite of its high inithe much smaller power they con- tial cost. The saving is still more pronounced when several tubes are their results are very unsatisfactory. used for many hours each day. How-This being the case, our conclusion ever, the storage battery is heavy must be that wherever one wishes to and bulky, apt to become dirty and fication at a later date for the same many people to whom its superiority Buffalo tubes is advisable. Also for DX portant matters have not been ex. Schenectady

UV 199's consume so little current and storage battery is essential. For that dry cells give very efficient serpractically all other purposes the dry vice with them; they are the most economical tubes made, and for port-Now, assuming that we are satis- able sets they have no equal. But fied with the volume that dry cell many persons do not realize that a tubes produce, let us investigate the storage battery can be used to operate economy and convenience of dry these or any other low voltage tubes batteries. A dry cell costs but 35 cents, by inserting proper resistances, and compared to the \$10 to \$20 price of the current will be much steadier

For most power amplification a The current that dry batteries fur- ate any tube, but with dry cells we

Now to summarize: The proper field of the dry

2. In localities having no storage battery recharging facilities. 3. Where the initial cost must be kept down.

4. For owners unable or unwill-Notice:—We still have in stock a quantity of ing to give the storage battery the SHAMROCK DX SPECIALS which is a single attention it requires. 5. Where power amplification tickler. Complete, including tube and

using 110 voit current supply sys- batteries tems is employed. In all other cases the storage bat tery is preferable and is highly recommended by the writer.

"Pigtails" Improve Poor

Variometers and Couplers Avoid sliding, friction or pressure contacts in condensers, variometers many other conditions. Toward the tight when you get them, but they emi of this period it becomes neces- are bound to wear and get loose and sary to advance the rheostat more this will make them noisy. If you and more, until finally the signals buy instruments made up in that received become so weak, with all the way use flexible wire to put a pigtail resistance out, that the owner de- around each such contact. It's easily des to purchase a new battery, done, costs little and often makes If two cells be connected in paral- an Al instrument out of a bargain

> . A drop of sealing wax at the start use of shellac or other dopes, which



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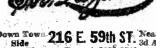
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(Continued from preceding page.).

wire for the primary and sixty-five for the secondary. A 3%-inch tube is required for the primary winding and a 3%-inch tube for the secondary. The secondary should fit snugly over the primary. The secondary is tapped at the fifteenth turn for the neutralizing capacity connection, and the entire secondary winding is shunted by the variable condenser, C2, which should be a seventeen plate, but may be a twenty-three plate condenser. The neutralizing capacity used is variable instead of the conventional fixed type, and for this reason: Those who are familiar with the neutrodyne know that the Hazeltine method of neutralizing the capacity of the tubes is a delicate operation—so delicate, in fact, that very few eyer succeed in doing it properly, with the result that the circuit does oscillate on some wave lengths, and on others reception is poor. By using a variable capacity here, controlled from the front of the panel, we can neutralize the capacity of the tube at will and on all wave lengths. A small three plate vernier condenser will serve our purpose here, but the capacity of this will probably be too great, and it will be necessary to cut away some of the rotor plate. How much to cut away depends upon the size of the plates, but a little experimenting will give you the right amount. Now we come to the detector, of

which the only thing to comment on is the grid leak and condenser. The grid condenser should be mica and of .00025 capacity, and the grid leak should be glass inclosed and of half to one megohans resistance. As U V 199s are recommended throughout in this circuit the detector tube will not be critical and you'll never know its there, but if you try to obtain regeneration by putting a variometer in the plate circuit your troubles will begin. Take the writer's word for it and don't try it. Not only does it not work well but it seems that it doesn't work at all, so leave it alone.

Thus far we have concerned ourelves with catching and detecting the signal, and it looks as though we have done it pretty thoroughly and efficiently. Now we will concern purselves with amplifying the recified signal to appreciable propor ions. We could follow the line of least resistance and tack on two stages of audio frequency amplification and let it go at that, but that would be getting away from the thing we are striving for, namely, perfection. We used all the genius at our command designing the amplifier ahead of the detector, let it oe an inspiration to us in designing the amplifier behind the detector. Why have half the circuit efficient and the other half inefficient? Two straight stages of audio frequency amplification would give volume aplenty, there is no doubt, but we are looking for something more than volume in this circuit; we want fidelity of reproduction, and we are even willing to sacrifice some volume in order to get that reproduction. So we are going to use push-pull amplification, or, rather, a modifica-

Push Pull Gives Volume.

The standard push-pull amplifier employs two tapped audio frequency transformers, one in the grid circuits of the tubes, as shown in the drawing, where the secondary is tapped and not the primary, and one in the plate circuits, where the primary is tapped and not the secondary. The by pass condenser, C4, should have a capacity of .002 mfd. In the plate circuits of the tubes in our drawing we use two phone units instead of another transformer for two reasons. One is that were we to use another transformer we would require a special loud speaker, and the other reason is that by eliminating this transformer we eliminate still further the chances of distortion, because always when you step up you ncrease the possibilities of distorion through lag between primary ind secondary.

Push-pull transformers are on the market and can be purchased at your dealer's. The phones may be two loud speaking units, or you may use your present standard phones by taking off the cord and rewiring them so that you can get a middle connection. The drawing shows 90 volts on the plates of the audio frequency amplifier tubes, but if you use 201As this may be considerably increased. Also the drawing shows 90 volts on the plate of the radio frequency amplifier tube, which may be too much, and should, if necessary, be decreased.





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YOUR LABORATORY SCRAP BOOK

Q. No. 13.

A. No. 13.

Aerial wires, although adjacent, if unconnected to the

earth do not affect reception, but when connected to

receivers both detrimental and beneficial effects have

been noticed, these effects being dependent upon the

type of receiver used and the proximity of the aerials.

This is the first of several "Scraps" on this subject.

Effects, as noticed by the writer while conducting

some experiments, are given herewith. The receivers

used consisted of one single circuit, with ticker coil in

the plate circuit, and another double circuit receiver

with a variometer tuned plate. The aerials were of the

single wire type, fifty-five feet long, lead in forty-five

feet, approximately eighty feet from the ground, parallel

to each other and fourteen feet apart. Separate ground

leads to the heating system of the building were used.

With this separation it was possible to detune the

double circuit receiver by adjusting the regeneration

control on the single circuit receiver to maximum and

varying the tuning control. On the other hand it was

possible to increase the intensity by the same method.

The detuning effect was greater than the increase in

signal intensity. By varying the primary circuit of the

double circuit receiver it was possible to detune the

single circuit receiver, but not to such an extent as

when the single circuit regiver tuning was varied and

the double circuit maintained constant., Both the de-

tuning and the signal increase effect were overcome by

locating the aerials at an angle of 50 or more degrees of

each other. This subject will be discussed in future

Q. No. 14.

Is a noticeable gain in signal strength obtainable by increasing the plate voltage in an amplifier utilizing UV 201As or C301As?—Fred Corlear, Jersey City.

A. No. 14.

creasing plate voltage is an interesting one, but it

cannot be definitely decided, due to the variation in

tube characteristics. However, an average may be

struck by noting the effects of increased plate voltage

upon a certain number of tubes whose signal input is

maintained constant. The following are the results of

experiments conducted with the tubes you mention:

Using UV 201As, with the filament voltage maintained

at the proper value, the increase in signal strength

when the plate voltage was increased from 45 to 671/2

was barely perceptible and not worth the outlay, but

a marked increase was noted when the plate voltage

was increased from 671/2 to 105 volts and a further

increase when another 221/2 volts were added. The

addition of another block of 221/2 volts, making a total

of approximately 150 volts, this value being the limit

for that tube, did not afford the increase in signal

strength that would justify the outlay for that block.

hence the maximum plate voltage should be approxi-

With plate voltages up to 671/2 volts the C battery

may be omitted, since the required grid bias may be

obtained by properly connecting the grid return of

the negative lead of the A battery. One and a half

volts proved a satisfactory value of C battery for a

plate voltage up to 90 volts and from 3 to 41/2 volts

Q. No. 15.

Are the filaments of the various low filament cur-rent amplifying tubes critical in operation?

A. No. 15.

I presume reference is being made to the C301A-

UV201A and the DV2. It is to be regretted that the

superiority of the present day low filament current am-

plifying tubes over their predecessors is not visible to

the radio fan. The filament is made of tungsten and

has an extremely thin coating of thorium. It is this

substance that affords the greatest electronic emission

while the filament is maintained at a low temperature-

i. e., low incandescence. The filament control of these

tubes is not critical, providing the voltage and current

values are maintained at or below the figures specified

by the manufacturer. This value is 5 volts and .25

of an ampere for the first two tubes and 5 volts and

30 of an ampere for the DV2. The number of elec-

trons emitted by the filament when maintained at these

values is more than is required for average operation.

Excellent results can be obtained with the tubes when

the filament voltage is only 4 volts. This reduction

of voltage and current not only increases the life of

the thorium coating on the filament, but also increases

the life of the A battery. To accomplish the reduction

it will be necessary to use a rheostat of from 8 to.

or, if one desires, a separate external rheostat may

be connected into either of the leads directly at the

- 10 ohms in place of the regular 4 to 5 ohm rheostat,

storage battery terminal.

mately 120 to 125 volts.

for voltages up to 125 volts.

The question of increasing signal strength by in-

The receivers were approximately thirty feet apart.

Future ones will discuss it in greater detail.

Do adjacent aerials affect reception?

Q. No. 16.

What is the best layout for an aerial when one is close to power lines and other lines that carry elec-

A. No. 16.

The elimination of various kinds of induced noises from power lines, arc lights and other such equipment has not yet been accomplished, but in many instances it has been minimized. Anyway the constructor must give the question of his aerial proper consideration if he is in proximity to any of these sources of induced interference. In the erection of aerials in cases of this kind one must forget the directional effects of the aerial in respect to reception and give his attention to the minimization of this induced interference. The simplest and most feasible method that may be followed by the average radio fan is to erect a single wire aerial and locate the wire in such position that it is at right angles, or as near as possible at right angles, to the lighting or power wires. The electric wires need not be power lines carrying 10,000 or 20,000 volts; a feed line with 110 or 220 volts flowing through it is of sufficient magnitude to cause bad interference of various kinds, such as generator hum, clicks due to sparking at the

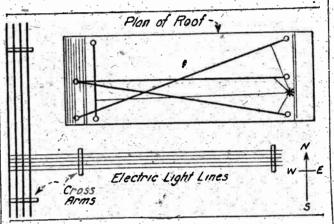


Figure 1 shows the location of various aerials in respect to two sets of lines carrying electric current. The proper location for the aerial may be theoretically determined, but it must be checked by actual experiment. Some electric lines, although running parallel to the aerial, will not cause any interference, whereas others will be extremely powerful sources. Figure 1 shows two sets of power lines. The aerial, C, as erected, is parallel with one of the two systems of lines and at right angles to the other. Theoretically it should be free from interference from the lines south of the building and strongly interfered with by the lines on the left of it. Interference was bad, and another aerial, B. at an angle to both, was erected. This minimized the interference somewhat; that which still persisted in being present seemed to come from wires on the left of the building. The aerial was therefore shifted into the location shown by A. The interference was further reduced, and finally the aerial was shifted into the position shown by D and the induced interference from the lines west was practically eliminated, but a slight hum due to the lines south was noticeable. This hum was not bothersome, but was reduced by raising the aerial wire to a height higher than the electric wires. This trying. Although interference from electric wires was reduced, that due to an X-ray machine under no circumstances could be eliminated or minimized. The same is true of sputters due to are lights. Those fans who are unfortunate enough to be annoyed by such interference must make the best of it. In some instances a loop helps, but that cannot be guaranteed.

Do You Know-

That the velocity of the radio wave is the same as that of light—186,000 miles a second—and that this is equivalent to 300,000,000 meters a second?

That some of the terms used in electricity and radio are parts of the names of the earlier experimenters? Examples of these are the VOLT, after Volta; the AMPERE, after Ampere; the OHM, after Ohm; the FARAD, after Faraday.

That the terms microfarad and millihenry mean exactly what the prefix denotes-microfarad, a millionth part of a farad (a farad is the unit of capacity); a millihenry, a thousandth part of a henry (a henry is the unit of inductance)? Other terms in the same category are micro-microfarad, microhenry.

That a receiver need not tune sharply in order to he selective?

That the term 80 ampere hour stamped on storage batteries does not mean that you can light the filament of four 5 volt 1/4 ampere tubes for 80 hours? It is merely a rating. Using the tubes just mentioned, the storage battery would need recharging after approximately 56 hours of service.

That the mere fact that the filament lights does not necessarily indicate that the tube is in good condition? Either the grid or plate lead within the tube may be broken or short circuited.

Q. No. 15.

Copyright by John F. Rider.

A page for the radio fan who

needs the results of actual labo-

ratory tests, but who, for lack of

equipment, must shape his course from conclusions reached by

I am obtaining satisfactory results with my receiver, but have been advised by one friend to substitute spider web coils in place of my variocoupler and by another to insert honeycomb coils. Is the change worth while? Is one type of coil really more efficient than the other?

A. No. 15.

When one obtains satisfactory results why net leave well enough alone? Considered from a theoretical standpoint every coil has its salient features and practically every type of winding is more efficient than the single layer arrangement used in variocouplers, but the latter is the most simple and the easiest to wind and for that reason is most popular. Further, it is doubtful if the substitution of another type of winding when good results are being obtained with the single layer coils will show a difference that would justify the outlay of the money required to effect the change. The difference may be there, but it would not be discernible to the human ear when used in this type of work.

The spider web and other types of coils which have a very low distributed capacity are excellent and are heartily recommended, but why should the change be made if the equipment on hand is satisfactory? However, if one is experimentally inclined, nothing better than these coils can be used as subjects. It is up to the person constructing the receiver to decide upon the type of coils he is to use. If it were possible to arrange the varying controls for the spider web and honeycomb coils so that they would not require more space than the ordinary variocoupler control they would be more

O. No. 16.

I have a three tube receiving set using the small dry cell tubes and am obtaining satisfactory results on distant reception but not enough volume on the loud speaker. I am desirous of effecting a change that would afford me greater volume on both local and % distant signals. I do not care to reconstruct the receiver. What is the method of procedure?

A. No. 16.

The situation as set forth above constitutes a perplexing problem for many fans, but its solution is not difficult. In accordance with the above conditions it consists in the replacement of the small dry cell tubes with their larger brothers. The first step is the determination from a standpoint of economy of the types of tubes that will be used. The filament terminal voltage and current consumption are the important factors, for upon these depends the selection of the storage battery.

The following three types of tubes are recommended as economical and excellent amplifiers and fair detectors: the UV201A, the C301A and the De Forest DV2. The filament terminal voltage for all of these tubes is five volts and all may be operated from a six volt storage battery. The filament current consumption of the last named tube is slightly greater than that of the others, but this additional drain is so small as to be negligible. In view of the small current drain the storage battery need not be larger than a 6 volt 60 ampere hour or, at maximum, an 80 ampere hour for sets using as many as five tubes. If one desires to use a detector tube in place of an amplifier as a detector either the UV200 or the C300 or, if possible and preferably so, a VT1, also known as the "J" tube, may be used. The rheostats as contained in the receiver need not

be changed since they will function with the larger tubes. The "B" battery voltage should be increased to about 90 or 120 volts. If the owner already possesses enough batteries to supply the above mentioned plate potential they can be used and additional "B" batteries will not be necessary. With the increase in "B" battery voltage it may also be necessary to increase the value of the "C" battery. Additional "C" batteries should not be purchased until those on hand have been fried. Very often the same value of "C" battery suffices for both types of tubes. If "C" batteries have not been used in the previous amplifier they should be incorporated with the insertion of the new tubes.

The audio frequency amplifying transformers need not be changed. If they functioned satisfactorily with the dry cell tubes they will in all probability function as well with the larger tubes. The plate to filament impedance of the smaller tubes is practically the same as that of the larger ones. Changes in the wiring due to the insertion of the different tubes are unnecessary, for the larger tubes will operate in any circuit in which the dry cell tubes have been used. Two slight changes may be necessary—the insertion of a new grid condenser when the new detector tube is used, i. e., to increase the capacity value from .0005 mfd. to .0005 mfd. But, as in the case of the "grid bias," the one in the receiver should not be removed until it has been tried. The other change will be a new value of grid leak.

World Radio History

proposition as outlined above for the Neutro-dyne purchase com-plete necessary parts from us for \$37.50 and

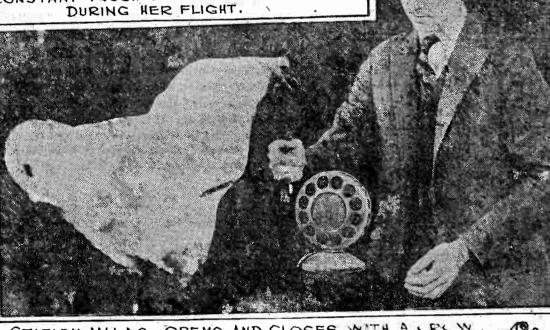
Radio News and Developments in Pictures



WASHINGTON HAS CONSTRUCTED A SET SMALLER THAN A CIGARET



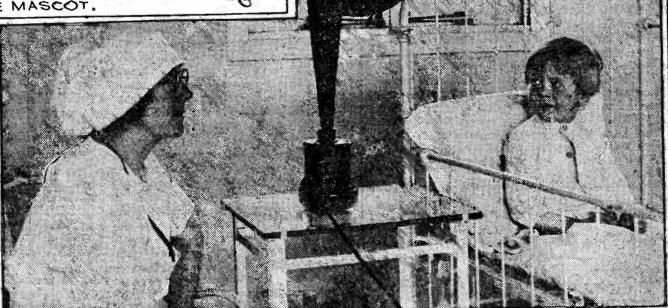
DR S. PARKES CADMAN (Right) WELL KNOWN TO THOUSANDS OF LISTENERS



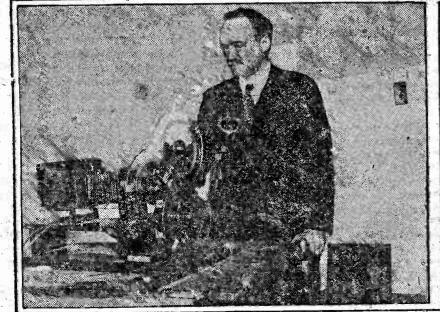
STATION W.LAG OPENS AND CLOSES WITH A CREW FROM BILLY, THE MASCOT.



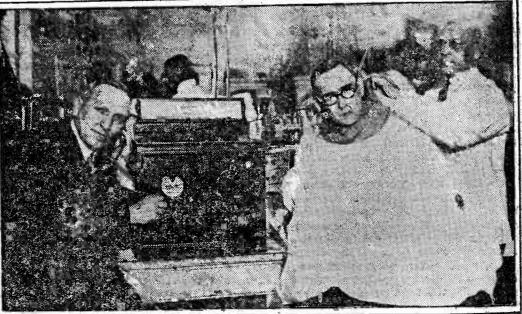
JOHN ROBERTSON, RADIO OPERATOR OF THE SHENANDOAH DURING HER RUNAWAY FLIGHT



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C. FRANCIS JENKINS AND HIS NEW DEVICE FOR SENDING PICTURES BY RADIO @KEYSTONE



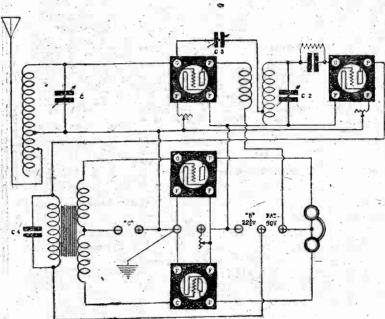
RADIO HAS AT LAST REACHED THE NICKEL-IN-THE- SLOT MACHINE STAGE.

This May Be the Ideal Set

It Has Possibilities, but Results Have Yet to Be · Determined.

change the capacity of fixed con- did not improve volume on local stadensers, add a touch of refinement tions, and they said that transformer here and a touch there, always hoping that the results immediately following the last manipulation will they can't deny it, because many of have the long desired and dreamed of them published statements to that effect. We started with a single tube effect. and ended with ten tubes, and in the One Staged Tuned R. F. light of proportionate results we In the drawing you will find one were no more satisfied with the ten stage of tuned radio frequency amthan we were with the one. We plification, and we have borrowed learned that there were two tremen- from Mr. Hazeltine for the most dously important divisions in radio efficient method of amplifying at reception-radio frequency and audio radio frequency. We use only one frequency amplifications. There is, stage, because we have found that

IKE Diogenes ever searching, of radio frequency amplification was for an honest man we search necessary to improve upon the re- sleep instruction tests at Pensacola, crease receiving speed, but he knows crashed to the ground not more than sults that could be obtained with a One night, after sending at high it will get the students up at four twenty feet from where Mr. Lambert constantly for the perfect cir-We wind and rewind coils, that radio frequency amplification



Many fundamental circuits are incorporated in the one above.

of course, also rectification or detect, taking everything into consideration, tion, but it is of minor importance one stage is better than two. This when radio frequency amplification we know is a bold statement, and is employed ahead of it, and radio we will explain it later. First let us frequency amplification must be em- take up radio frequency transformer

ployed for worth while results. If with all our experimenting we

oncerned. To be able to reproduce worth working for.

are indebted to Mr. Reinartz for its the results obtained with the other.

the switch lever. alent of one stage of radio frequency amplification and a detector, and some even went so far as to say that it was the equal of one stage of radio.

The variable radio frequency that variable radio frequency is the description. rash statements in those days! They said that at least three stages (Continued on following page.)

amplification. Those who are familiar with the

have not yet discovered the perfect construction of radio frequency cheuit who can say that we are not transformers know that they consist every day in every way getting of two small coils placed in inductive nearer to it? At least we know what relation to each other, one coil servwe are after, and that is half the ing to tune the plate circuit of a game. We must devise a circuit tube and the other serving to tune that will be selective to the point of the grid circuit of the succeeding tuning in distant stations to the ex- tube. Sometimes an iron core, and clusion of local ones. We must, and even an iron shell is used to broaden we will, some day devise a circuit the tuning. Now, it does not take a that is capable of getting anything Steinmetz to figure out that, as these that is in the air, no matter where coils are fixed they cannot operate it comes from, because the waves are properly on all wave lengths. They in the air all around us, but we have are bound to have one wave length not yet learned how to catch the peak on which they respond best, and all wave lengths above and be-We must devise an audio fre- low that beak must necessarily sufquency circuit that is capable of fer. A potentiometer is used to aid amplifying the signal after if is tuning and to control the oscillations cought and rectified, and it must that are set up when the antenna amplify without distortion. Less at- circuit is tuned to the lower wave tention has been paid to this part of lengths, but the function of the poradio reception than to coaxing the tentiometer is to control the grid signal out of the air, and in many bias, and if you give the grid less ways it is probably more important potential than it must have to oper in so far as music and speech are ate at maximum efficiency just to with volume all frequencies without readily be understood that his method distortion or blemish is a consumma- of radio frequency amplification tion devoutly to be wished and well leaves much to be desired in the way of efficiency. Of course we know In the accompanying drawing we that three stages of transformer liope we are a little nearer the per- coupled radio frequency amplificafect circuit. Let us analyze it step tion will produce some results, but by step and see what conclusions we it is the writer's belief that these can draw. First we have the tuning results are obtained through sheer element, and here is where our selectorics excitation, and that one stage tivity comes in. The circuit we use of tuned radio frequency as shown is of the semi-aperiodic type, and wa in the drawing will equal or surpass

origination. Those who have used it is agreed by almost every one know that its selectivity leaves that more than two stages of tuned nothing to be desired; it separates that more than two stages of times radio frequency amplification is impractical, but the writer is going a step further and state that more joy forever. It consists of seventy turns on a 3½-inch turbe, tapped every five turns for twenty turns, and the remainder untapped. The The writer has found that what you variable condenser, C1, is connected across the untapped portion of the coil, while the aerial is connected to efficient another stage of tuned radio Next we come to the radio frequency transformer part of the circuit, and therein lies an argument.

They used to tell us that a single tube regenerative set was the equiverable of one stage of radio frequency.

frequency amplification, a detector transformer shown in the drawing and one stage of audio frequency is of the conventional neutrodyne amplification. Yea, verily, they made type and consists of fifteen turns of

Army Radio Operators Wake Up by Radio

station, where radio operators are up; it's five fifty-five!" Much to his station, where radio operators are surprise, the snoring ceased, three of trained, the new rangled psychologi- the men awoke, and in a few mincal method of increasing speed in utes the other fourteen rolled out, from the Shenandoun to lighten the code reception, while the partly asking what was the matter. The ship in its flight in the storm. While trained gobs sleep, is being used with flabbergasted petry officer now ad- observing the course of the Shenanas great success as met the initial mits night code practice may in- doah over his home a tool chest

speed to seventeen sleeping embryo bells.

operators, equipped in "ear muffs," Chest From Shenandoah a petty officer ended his watch with To House Radio Set At the Great Lakes Naval training the code message: "Hey gobs, get A radio set will be built soon in the



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research, we now offer a new and wonderful two tube receiver consisting of Armstrong regenerative detector and one stage of audio frequency amplification, giving loud speaker volume on local stations at all times and on distant stations under fair receiving conditions. Otherwise head phones should be used for instant reception. This instrument, known as the Crosley Model 51, sells at the remarkably low price of \$18.50. It has been the remarkably taked has been thoroughly tested in our laboratories and its satisfactory performances have even surprised us.

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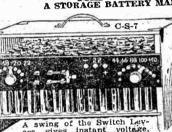
Methods of Winding and Mounting Inductance Will Be of Great Assistance

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three (3)-main terminals to connect.

Type A-100 volt, with variable detector, from 16-22 volts, \$20.50.

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Public Health Service To Be Broadcast

If a plan now contemplated by the United States Public Health Service broadcasting stations in various parts of the United States, partly Government stations and partly privately owned, will be linked together for the dissemination of information on health and hygiene, according to a prediction made this week by John M. Dobson of Chicago, Medical Association.

Mr. Dobson, in his report on the Medical Congress of America, recently published, paid a high tribute to radio as already a factor in public health education. He said that New York. Chicago.

Philadelphia, Pittsburgh and other cities are already using radio under the direction of State health authorities. He looks to the Pcbic Health Service headquarteres in Washington to provide direction for the present haphazard, desultory efforts, however.

"It is only a matter of time." he "when sending out health hints and bulletins will be a portion of the important work of the

broadcasting stations." Mr. Dobson, who was authorized by the American Medical Association to investigate and report on the use and availability of radio in relation to public health, pointed to the unbelievable rapidity with which the United States is installing family radio receiving sets and reported that shortly, as far as laymen weré concerned, radio would provide a more effective field for the distribution of knowledge than the printed word.

"It is likely." he said. "that in the near future there will be ten or twelve radio broadcasting stations linked together for diffusing advice as to how to keep well in the mass and how to guard against and treat smallpox, diphtheria. scarlet fever and other diseases. Other subjects such as care of infants, prenatal care of mothers and industrial hygiene will be topics of discussion by State and Federal specialists."—L. B.

Fix Your Aerial.

If you put up an outside aerial last fall it would be a good idea right now to lower it and look at the insulators. If they are covered with soot and dirt clean them thoroughly with a brush, gasoline or whatever will clean them best. A layer of soot on aerial, along the insulators to the pulley and thence to the pole or other support allows a lot of energy o leak off the aerial. If you can afford it, it would be a good investment to replace the corroded and blackened aerial wire with bright new wire. Enameled wire won't corrodo and is well worth while. G.

Excellent for DX Work

Vernier controls often spell success or failure in distance work. A four inch dial with a mechanical Vernier applied to its rim is almost equal to a stage of radio frequency when you are after the distant signals. They enable tuning to the peak of the wave, which is where you find the DX stuff. A Vernier condenser with a sliding plate, however, is not usually very satisfactory, as often the friction contact causes noises in the receiver.—G. M. C.

Good Potentiometers Help To Reduce Noises

When you buy a potentiometer the wire wound type look it over Be sure the wire is fine, firmly held to the support, that it is evenly wound, with no "lumpy" places and that the contact arm rides smoothly from end to end of the winding. Any defect in a potentiometer is reproduced in noise in the headphones or loud speaker. The best is none too good.-G. M. C.

How to Use a Potentiometer. A potentiometer across the A battery, with the middle point, or contact arm, connected to the minus B battery lead is a good investment in any set. It will clear up mushy signal and help in getting that elusive DX station. In a 6-vok tube circuit variation. In any event, the ability to vary the plate current will be found valuable in DX hunting -G. · 《大學院本演員為公司各種的問題與學院與董樂學的



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Manhattan 16.50 Murdock plug.

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includes the wall of the cabinet and the procure a ball of waxed twine. Cut some baseboard. Next use a condenser of low losses. Then a good socket must be used. For reducing the antenna resistance one should use loose coupling and a small coil. In other words, use an untuned primary coil.

Ordinary Circuit Good.

To make the tuner simple and one that will not radiate a strong signal, the author has chosen a two circuit regenerative tuner, with regeneration obtained in a set of coils that is not coupled to the antenna circuit. The circuit for this | These two coils comprise the secondary.

tuner is given in Fig. 1. As will be seen

The list of parts of this tuner will be

seen to be similar to that for any other

1 tube, UV-200, 201A, WD-12, UV-

1 socket and rheostat to fit tube

11/2 pounds of No. 16 double cotton

2 one inch lengths of 31/2 inch com-

10 2% inch lengths of % inch wide

12 inches of 1/2 inch by 1/8 inch

15 inches of 1/4 inch fiber tubing

1 composition tube, 2% inches in

1/4 pound No. 26 single cotton cov-

Now to the construction of the coils:

Besides the parts given in the list one

will need fifteen round wooden pegs, 41/2

inches long and 3-16 inch in diameter.

These may be obtained in any carpenter

shop. They make up the form upon

Upon a board draw a circle 31/2 inches

in diameter. Mark off on this circle

fifteen equidistant points. At each of

these points drill a hole into which the

pegs can be fitted tightly. Then on the

inside of this circle draw another one

21/2 inches in diameter. Mark off fifteen

equidistant points and again drill for the

Winding the Coils.

Push the pegs into the holes of the

Be sure in winding the coil that the

is pulled tight after being carried around

diameter and 21/2 inches long.

1 grid leak condenser.

which the coil is wound.

1 23 plate low loss condenser.

it is a standard tuner.

covered wire.

brass strip.

for shafts.

position tubing.

composition strips.

set except for the coupler.

HEN starting to build a tuner that is self-supporting, of large wire has been wound on the coil cut the wire drilled. Then the strips are cut as shown that will bring in stations hundary and kept clear of all other parts. This and fasten it as in the beginning when of this twine into lengths that will go around the width of the coil. With this twine the coil is tied firmly, as follows:

Pass one end of the twine underneath the coil and pull up over the top. Then tie both ends together tightly. The twine should be tied between each two nails, in the place where the coil is thinnest. The pegs should then be carefully pulled out of the holes and the coil removed. The pegs are then replaced and a second coil of the same number of turns is wound in the same manner as the one just finished.

Fig. 2

take a 6-32 bolt. Then in the center of the tubes, on each side, drill two more holes, same size, for mounting the brass The brass strip is now divided into four three inch strips and each strip is drilled for bolt holes. Drill the holes as follows: One at each end and one-quarter of an inch from the end. Then, one inch from one end make a right angle bend as shown in Fig. 5. The tubes may then be fixed up with the brass strips and the composition strips as shown in Fig. 6-

Then on the two tubes mark off four

equal parts of the tube. on the circum-

ference. At each mark, one-quurter of

an inch in from one edge, drill a hole to

Mounting the Parts.

tightly the coil is put on.

that is, exclusive of the coil. When the

strips are mounted and bolted down

Before mounting the two strips that have holes in them on one of the tubes place in the center the coil that has the fiber tube mounted in it. Then mount the strips having the hole in the center, as follows: Slip the hole over the tube and bolt. Then do the same with the other strip. This leaves the coil so that it can be rotated by turning the fiber tube

The second tube is mounted with all strips and then the second fiber tube is filed with the large hole as the former was and in the same place. Then the tube that is the tickler is held in position so that when the fiber tube is pushed through the holes in the strips it also passes through the holes in the composition tube. This places the coil so that it also can be rotated by turning the fiber

Two fifteen inch lengths of flexible wire must be bought for flexible leads to the two rotating coils. These lengths are cut in half and two pieces are pushed through the end of the fiber tubes and out through the holes in the tube as shown in Fig. 3. This is perfectly all right for the tickler coil, but when it comes to the other coil, which is the primary, it is advisable that the flexible wire be just fastened to the ends of the coil and left to swing in midair. The leads on the primary may be pushed through the tube, but the resistance will go up so much more. However,

When a poor coil is used a poor condenser may be used, but if a good coil is used Fig.l.

dreds of miles away and be

selective, the fan of to-day will figure on

using some form of amplification that

calls for from three to eight tubes. "The

more tubes the better the set" seems to be

the general idea. But as this does not

always come true and as a great number

of radio fans in the country cannot

afford so many tubes, it would be advisa-

ble for them to build an efficient regen-

It is possible to build a one tube set

that will run circles around any tuner

that is on the market and that will equal

in results any tuner outside of a well

constructed neutrodyne or a super-hetero-

dyne. It is even possible for a tuner

such as described in this article to

equal some of the homemade neutrodynes.

in range and selectivity is resistance.

The question will arise among those of

you who have studied the theory of re-

generation that the regenerative action

of the tuner lowers the resistance of

the secondary circuit. This is true; but

regeneration does not make a poor sec-

ondary circuit a good one. In other

words, the signal strength of a station

can be brought up by regeneration but it

can never be as high as it would be in

a low loss secondary. Also the tuning

of a poor secondary circuit is never as

a poor tuner and these will be taken un

before entering into the constructural de-

tails of the set in order that the reader

will understand just why certain things

are done. The following information will

also aid one in designing his own tuner:

The first form of resistance is the coil

resistance. That is, the resistance of the

wire itself, if No. 16 or larger is used. The

resistance is in the parts near the wire,

the tube upon which the wire is wound,

the varnish on the coil and the apparatus

mounted near the coil. The perfect coil

would be one that has no form and is

air insulated. This is impossible, but if

a basket weave self-supporting coil, such

as will be described is used, one will

come very near the ideal. Tapping a coil

also introduces a large amount of resist-

ance in the tuning circuit. Leave out all

The next item is the condenser loss.

tuning coils in the set. This is not in the

Coil Forms Resistance.

There are several things that make for

sharp as the tuning of a good one.

The factor that limits a receiving set

erative set.

a poor condenser will make the tuner as inefficient as if both a poor coil and a poor condenser were used. There is a big difference between a poor and a good condenser. The increase in efficiency is not manifested in stronger signals but in an increase in the number of stations that are heard.

There are no set rules for a good condenser. But those having good insulation, and mighty little of that, are generally all right for a circuit in combination with a low loss tuner.

larger circle and place the coil of No. 16 wire so that it may be easily unwound. Now, if one makes a good tuner and Fasten the end of the wire to one of the uses a low loss condenser the entire effipegs by running it around one of them ciency of the set can be ruined by using twice. Then wind the coil as follows, and a poor socket. The best socket is one that as is shown in Fig. 2. Carry the wire is made of porcelain and is of rugged around one peg on the outside, then construction. The contacts of the socket around the next peg on the inside, from must be good and preferably make conhere to the third peg and around on the tact on the side of the tube prongs. outside. The fourth peg is wired on the Another way of decreasing the efficiency inside, and so on. This gives a coil a of a good tuner is to couple it to another neat appearance and one that is highly circuit that is high in resistance. As the antenna circuit is one circuit that is efficient. hard to make near perfect, that is the wire is kept taut at all times and that it one that will bring resistance in through every third peg. Wind on this coil thirty-

Now to eliminate all the resistance possible, one should have a tuning coil five turns. When this number of turns

After winding the second coil the pegs are placed in the holes in the smaller circle and another coil wound in a slightly different manner. When five turns have been wound on the coil stop winding and cut the fiber tube into two equal pieces. One of these pieces must be prepared according to that in Fig. 3. This is done as follows: Two inches from one end file away almost half of the tube until a big hole is obtained that leads into the inside hole of the tube.

The Primary Winding.

Lay this tube on the unfinished coil so that it cuts the coil exactly in half. Mark on the tube just where the wire touches it on each side and then file the tube at these places on each side so that it looks similar to the tube shown in Fig. 3. Then place the tube on the coil, in the center, with the notches down on the wire. Continue winding and wind into the top notches on the tube. When five more turns have been wound on cut the wire and tie the coil as was done with the others. When tying around include the tube in the tying so that it will be made more solid. Remove the pegs and set completed coil aside. This

is the primary coil. The next coil to be wound is the tickler coil. This is wound on the composition tube that is 2% inches in diameter. In the center of the tube, and on each side of the tube, a hole is drilled. This should be a quarter-inch hole for the shaft to go through. This hole in the center divides the tube into two halves and on each half wind thirty-two turns of the No. 26 single cotton covered wire. This is, of course, a continued winding-that is, the thirty-third turn is the ending of the thirty-second, and the beginning of the thirty-fourth turn is three-quarters

of an inch from the thirty-second. The next step is the preparation of the composition tubes and strips for mounting. First come the strips. These are prepared as shown in Fig. 4. Drill a hole one inch and a quarter from the end; this hole should be one that will enable the fiber tube to pass through. Then in the end from which the measurement for this hole was taken drill a hole to take a 6-32 brass bolt. Drill this hole as close to the

edge as possible. The center hole, or rather the hole one and one-quarter inches from the end, is remaining four have only the end holes

B A = Coit C = Brass Mounting D = Inner Coil E = Mounting Strips

this is a point for each individual to de-

After this has been done the next step is to mount the coils on the tubes. This is simple. Simply force the small ends of the composition strips into the open places in the coils. That is, the places where the pegs were. It will be necessary to force the coils on the strips and they will be pulled slightly at the points where the strips enter the coils, but this s perfectly all right.

After this is done the couplers are finished and the set is ready to be mounted on a panel. A 7x14 panel is the best size to use for a one tube set. If the constructor has special ways of mounting the coupler its is well to remember that the length of the brass strip is the length which controls the height of the coupler dials. But do not use a shorter length of leg, as this would bring the coils too close to the baseboard.

The wiring diagram for the set is given in Fig. 1 and should be followed to a "T." Due to the fact that the tuning of

this set will be sharper than any other tuner the constructor may have had it only drilled in four of the strips. The | will prove slightly unsatisfactory until

Highly Efficient Set Necessary for Proper Reception on Loop Aerial

Outside Antenna Is Generally Far Better, Especially for Distant Stations.

By WILLIAM M. HENDERSON.

O many fans an aerial is either an impossibility or an undesirable part of a radio set. This state of affairs is, of course, due to two things: either the landlord has an aversion to aerials or the fan himself has. In these cases it is necessary to use a loop and a special receiver to bring in the sta-

In using a loop receiving set it must be remembered that the amount of energy that is picked up on the small frame of wire is extremely small and has to have sensitive tuners to bring in stations and a sensitive arrangement of the tubes. Crystal sets cannot be used.

All loop receivers have certain limitations. The greatest of these is the fact that broadcasting of stations that are far away from the set cannot be received with any certainty. Nor can they be counted on as coming in with great volume. There are cases, of course, where loop receiving sets have done wonderful distance work, and some of it even on the loud speaker. But this article is to take up receivers as a general case, and these exceptions will therefore be ignored.

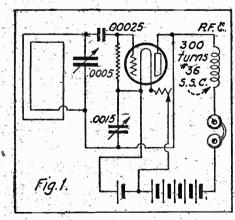
The first type to be taken up will be three receiving sets that will work on a loop for local stations. Each one is easy to build and usually will work without any playing around with special parts of the circuit. The fourth receiver is a popular reflex that, if constructed properly, will bring in stations that are fairly distant. The fifth and last is a three stage radio frequency amplifier and two stage audio frequency amplifier. With this receiver it will be possible to do more distant work than on any of the others, but one should not count on too much, as loop reception is nothing one can guarantee.

Before entering into a description of any of the receivers there is one thing to be emphasized. That is the matter of equipment. One of the first things stated in this article was the fact that loop receivers deal with minute currents. And this is one fact that should be kept in mind when buying equipment.

What Makes a Good Loop.

The two units that are of great importance are the loop and the tuning condenser. The loop in all its forms is hard to make efficient, therefore one should procure one that is well insulated, has large wire and of good diameter.

The condenser should be one of extremely low losses. There are many on the market to-day and it should be easy to get one. Do not use condensers that have molded end plates or that have metal end plates that are part of the stationary plates. The end plates should be metal and be part of the rotary plates. The remaining parts of the set must be of the best-sockets, rheostats and trans-



formers. The fixed condensers must be of the best and accurate.

The diagram given in Fig. 1 is of a one tube circuit that will bring in stations within ten miles from the position of the set. The condenser across the loop is the tuning condenser, while the .0015 condenser from the plate to the filament controls the feedback of energy from the plate to grid circuit. The choke coil in the plate circuit is an absolute necessity for efficient operation. It is made of 300 turns of No. 36 single silk covered wire wound on a one inch spool. This the tube. No. 24 SCC wire is used coil keeps the radio frequency energy throughout from coming through the phones and forces it back to the grid circuit.

be either a UV-200 or a 201A for best densers that are used to tune the circuits if shifted from one side to the other.

results. The dry cell tubes may operate the set, but it is doubtful. For the 200 use 221/2 volts on the plate. For the 201A the plate voltage must be played with to obtain the best results.

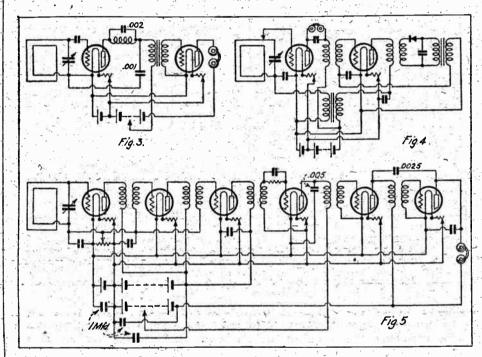
Fig. 2 shoms a more efficient tuner than that in Fig. 1. It will be possible to use this tuner a slightly greater distance from a broadcasting station. The tuning of the loop is the same as in the former set, but the amplification is obtained through the use of tuned radio frequency amplification. The variometer is used in this capacity. It is positively necessary that this variometer be one that will respond to the high wave stations, otherwise the set will only receive stations.

Must Be Efficient.

It will be possible to substitute a variable condenser connected in shunt to a coil of about fifty turns of wire in place of the variometer, but this is not suggested because it is easier to get an efficient variometer than an efficient condenser and coil. That is, the efficiency of a variometer, if of good construction, tube circuit that will work well on local stations. This set obtains its sensitiveness through a slight superregenerative effect through the use of the honeycomb coil and the condenser across it, as shown in the plate circuit of the detector tube. The second tube is an ordinary audio

It is extremely important that the fixed condensers in this set be good ones. The capacity of them, though given herein, might well be experimented with in order that the best values be found. There closing this set out. That is the detector tube. It is preferable that this tube be a UV-200, and that it be one that will take more than 221/2 volts. The more plate voltage that can be placed on the tube the greater the volume.

The circuit given in Fig. 4 is a popular reflex set that has found much favor of late. This is a two tube reflex that employs a crystal detector for rectification. This is an advantage due to the fact that the crystal gives perfect reproduction of the transmitted speech or music.



Following the general layout of this tuner it is possible to carry the amplifier to any number of stages. It is not wise, however, to use more than three stages.

The condenser connected from the middle leg of the potentiometer to the negative filament is a necessity. It is used to lower the resistance than the potentiometer offers in the circuit. Without this condenser the set will not be selective. | set are critical and should be of the best

The capacities of the fixed condensers are not given, as it is a positive necessity that one find the best values for eachposition. One should start off with a neutral value of .0005 and use all the variable condensers in the house as shunt ca pacities to these. The correct working capacity can then be found and fixed condensers of the correct capacity my be put in place. This procedure should be followed in every reflex set that is built.

The radio frequency transformers and

An Experimental Circuit

a set for any length of time to wish to try something new and difficult

The circuit given herewith is theoretically perfect and practical. The set will work with the winding data given, but it may be found that a few turns more or less will materially aid it to become more efficient.

The main part of the circuit is the tuning coil. This is somewhat similar to the four circuit tuner. The aerial coil is of forty turn coil wound on a three inch tube. It is tapped every five turns. The condenser in series with the ground and the coil is one of .001 caparity, but may be eliminated without iffecting the circuit any.

The grid and plate coils are exactly the same and are wound on the same tube. The tube which is used as the form for this tuner is three inches in diameter and five inches long. Starting at one end, fifty turns are wound on

The plate coil is wound one-quarter of an inch away from the grid coil and The tube to use in this circuit would in the same direction. The two con-

HERE seems to be a general feeling | are both .0005 mfd. in capacity. The among radio fans who have had single turn around the grid coil must be wound in the same direction as the grid coil and near the end of the coil that is connected to the grid.

The condenser across the phones has a decided value, but it may be made a fixed condenser of .0005 mfd. capacity if a variable condenser is not handy. The grid leak and condenser are the

same as in any receiving set.

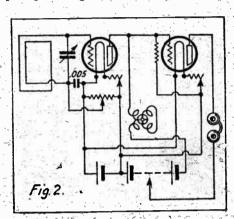
As to the type tube to use that must be left up to the experimenter, as the set may be built around any tube that it is desired. It is probable however. that the UV-201A tube will give good results on the small drain from the A battery, but the UV-200 will be the best

In the tuning of the set, if it is found that it is not possible to bring the plate condenser up to the highest point of volume without the set howling, then a small fixed condenser connected between the plate and grid coils will elim-

Just where this condenser is to be connected will be doubtful, but the right tap on each coil will be easily found with a little experimenting. The lead to the filament of the tube is also something that might improve the set greatly

Fig. 3 is a diagram of a simple two | Unfortunately the transformers control the working of the set, and unless are used the set will not do much in the way of distant reception.

The tapped loop is a necessity. The tapping controls the amount of energy



lating. For local stations it will be found that the tap switch will be near the center of the loop, while for distant stations the tap switch will be at the outside of

Fig. 5 shows a diagram of the best three stage radio frequency amplifier that can be built outside of the superheterodyne. With this set the clearest reproduction of broadcast speech and music is possible. For distant reception it is not possible to accurately state just what the this line have done extremely well, while others have failed to do better than 100

For efficiency the transformers should pe of the best. The fixed condensers across the batteries must be of rugged construction. They are used to climinate some of the battery noises that arise in a set of this number of tubes. The condensers across the potentiometer are also necessary for sharp tuning. The fixed condenser from the plate of the first audio amplifier to the plate of the second audio amplifier is used as a clearance condenser and is of great aid in clearing up signals. The one-quarter megohm grid leaks across the secondary of the audio transformers should be used if positive clarity is desired. These take up the small crackling noises that are so prev-

What Tubes to Use.

The tubes that should be used in any of the above sets, except where otherwise specified, are the UV-201A or the C-301A. These tubes will give the best results as amplifiers. The UV-200 or the C-300 is

Dry cell tubes are not as efficient as radio or audio amplifiers because of their small wattage. This limits the output of each ube, and consequently the set could never be as loud or get as much distant stuff as the storage battery tubes. Of the two dry cell tubes the UV-199 or the C-299 is the better for radio frequency amplification.

Remember that the loop is one of the tuning controls and should be turned with its plane pointing toward the station to be received. In this position the greatest signal strength will be obtained.

There are a few points in the construction of a radio frequency amplifier, and these hold true of every set that should be read, marked and inwardly digested. The first is to connect the condensers so that there is no hand capacity in order that one will not have to shield the panel.

Second, make the leads short as possible. That is, mount the instruments in such a manner that the leads will naturally be short. Mount the transformers in such a position, i. e., at right angles, to each other, that there is no feedback coupling between them. This is necessary in order that the potentiometer may be made more negative for volume. If the transformers are mounted in a row the set will howl and be difficult to control.

When using a loop do not use long battery leads. Long leads will detract from the directional properties of the loop and make the tuning broader. Be sure that all batteries are fully charged and well up in voltage for best results.

200 Meters and Less

of the Second District Execu- Don't forget this tive Council will take place quite an affair. This is their fourth convention, and nearly every radio fan knows the crowds that it draws. be glad to welcome him to the air. vania, the same as last year, but this time the council has secured the ballroom, which is more convenient

The admission to the show is 50 cents, which includes a magazine ferent location, perhaps only next program. Nearly fifty manufacturers have taken space, and the the different booths. On Wednesday night the banquet and hamfest tikes place. If it is anything like last year there will be fun for all, and plenty of it, too. The price of the banquet this year is \$5, which includes a season's pass. A visit to WEAF and WJZ is also included in this ticket. Many of the prominent amateur stations will be visited, also. Make your reservations to Executive at the amateur radio office must Radio Council, 120 Liberty street.

2 VH since changing his trans- Morris? mitter is much louder. Have you increased your power as yet, Om? Heard that you intended to put in

The RAGNY of New York city new have a transmitter and use the call 2 CNR They are using at the present two five watters, DC CW.

They say that 2 CHY, new that he is a code instructor, is very careful how he sends on the air. HI. Watch to burn you up with fast sending Plenty of fast boys on the air, MIM

Notice that many stations are still an accurate wavemeter at the shack and check up on most of the boys. I am glad to see, though, that the tendency of most of the hams is to shows that the talks and lectures paigns by the different amateur. the Government is good enough to our appreciation by obeying the law to the letter. What say, men?

I haven't heard 2 KU on the ether in some time now, and wonder if he transmitter. What you doing now, TOM? Hope you haven't turned to be appreciated by the writer. receiving altogether, as some of the

2 CEI Heard in England.

transmitter, as no sign of his fa- ceiving as well as transmitting. He miliar sigs are heard on the air to uses a superheterodyne and has

one. No, Kenneth Hewitt has his old real transmitting and am sure tha call again. I guess every one has you will do some more with your set heard 2 RK and knows the DX It has some kick. which this well known station has

2 FZ seems to stick at the key each evening. At first thought that he would not be on so much, Best luck with it.

- 2RL seems to be doing some good Your note is good, Om.

1MO. is on the air, but what has I could visit him this summer. happened to 1AW? This well known

1XU certainly comes through The last time he was working he strong at times though he is not used a 500 cycle set, which was very consistent. Who are the operators QSA (very strong). How are the

is there with the dx work. I think the kindness of some neighbors, who we all have heard his ether buster thought they would get rid of the of a CW transmitter. FB, Glaser, transmitter. Well, I notice that 2

All the attention is at present on a failure. the low waves and nearly every I know a certain spark hound in night some new station is heard The Bronx that has to CQ to raise a down there. Wonder what the dif-station. This is great recommenda ference will be when all the gang tion for the cement mixer. Say, OM, try a hand at it? Here's the impor- I know a great resting place for that tant part of the testing. Get per- spark set; but the only fish who mission from the radio inspector would go after it would be a sucker.

HE radio show and convention wave band between 150 and 200.

2ADE has been reassigned to J Morrow, 547 West Fiftieth street, It's a strange thing about locations sometimes. A set will work fine at

2CNO Talks Spark.

one place and when moved to a dif-

door, will perform in a different

watter, again talks about putting in a spark set. Can't you see the folly of putting in a cement mixer, Om? If you want noise why not work in a boiler factory? HI and

2BQS has not been heard in some time now, but guess that the work keep you busy. How about that

2BNL, the fone expert, is still working his set though he has little time to be on at night. Hope they change your hours, OM, as I know with that 100 watt transmitter.

Heard 2ATF up in Westchester recently. Too bad that you don't get more time to work-that "P" tube OM. You sure come through strong.

2DJ had the good fortune to ge

900 cycle spark set and it is just

he thing to run two fifties, but gues 9MC is starting to come through Haven't heard him in some time and thought he had dropped out entirly.

Hope you stay with us now, MC.

go below the 200 meter wave. This on the CW. The CW transmitter i very steady and I couldn't have said given by radio clubs and the cam- the same of the spark. The old rock crusher faded at every opportunity. If there is a station in and near Poughkeepsie working would be very pleased to hear from them. I have had several messages on the hook for Hudson, Poughkeepsie and nearby points. It is time that we organized a Hudson River relay line again. would shortly come back with a big How about it, fellows? Who is on n that direction? A letter would

9BP is off for a vacation, so it is a s a good chance for some other station to work WNP. MCix must hear some DX up there in the north. He Understand that 2 CEI has been is fortunate in not having some heard in England several times in single circuit dial twister near him the last month, and all on one fifty to create QRM. If we would only watter. He seems to favor the low find some of these squawkers ! waves, as many of the prominent would be a good idea to make them take out a transmitting license.

copied more foreign stations than Many have written to me inquir- any other amateur. Great work, ng if the call 2 RK is a reassigned OM! Have heard you doing some

F 8 AB Is Star Station.

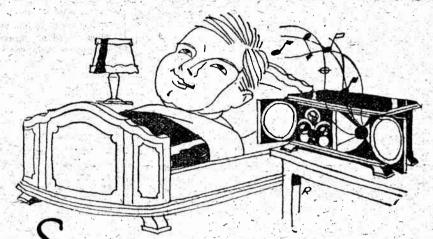
Listening down near 100 meters

recently I heard 1 MO work English 2 KF several times. While the Britbut recently his signals are there ish boys are not as loud as the each night. By the way, OM, how's French and Dutch stations they are the radio convention coming along? quite steady. French 8 AB has the reputation, though(, of being the star foreign DX station. It seems he is work with a pair of fifty watters. reported every time he pushes the key. He started to use two tubes 111, located in Rhode Island, seems but recently is only using one and to be getting through fine. He has he still is very strong. We congratrebuilt his transmitter and has done ulate French 8 AB upon having a better work since tearing it down. real amateur transmitter. Only wish

2KV must be working on station seems to be without an oper- new set again, as his signals have disappeared from the ether again. at this station? - The fists are very BCLs treating you in Bronxville? KV had the misfortune of losing his 2BRB, only using a fifty watter, counterpoise one evening through KV is still on the air, so the plan was

first because our heerises call for the HI, how's that for a slam?

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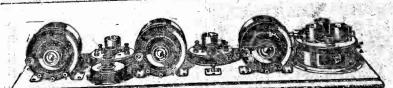
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1976 BROADWAY

American Amateur Hears Canadian Gold Miner

The element of surprise is ger rally conceded to be one of the mar fascinations of radio, When one puts a record on a phonograph he knows exactly what he will hear. He may have listened to the same tune namy times. On the other hand the idio receiver, like Pandora's Box, full of mystery. When one turns the dials on his set he opens the door to the unexpected. Reception of programs is being standardized. out that point is not yet reached.

This phase of philosophy of radio was emphasized here recently when Edward C. Jones, Jr., district superintendent of the American Radio Relay League, the national association of radio amateurs, picked up his phones and heard a Canadian amateur station calling. Jones replied with his code transmitter. The surprise came when the Canadian, located in northern Ontario, suddenly shifted from code to phone and a voice from the air called: "Hello, United States, &SP. This is Canadian

In a few minutes Jones learned that he had communicated with radio fan in the gold mining area so far north that the Canuck, instead of giving his town and street address, called out his latitude and longitude, Not every fan can get a thrill like that—out of the air anyway.

While the average listener would have been overcome with astonishment, Jones had an added advantage. He could talk back. He has one of the finest transmitting stations in this section and has been copied repeatedly in England and France, as well as many times by ships in the North Sea, Pacific ocean and South American waters. Amateurs in Holland, Hawaii and Mexico have reported 8SP's signals.

The station, which is also operated by Albert G. Kisner, has many unique features in its construction and layout. The transmitter has a power of 150 watts, three 50 watt UV203's in parallel, with about 1,200 volts rectified A. C. on the plates. The sockets are arranged or the circumference of a circle, with grid and plate leads bunched and exactly the same length and as short as possi-

Radio Is Considered a Luxury in Germany

German interests desiring a monopoly, or at least control of radio, assert that it is a "luxury" and should be subject to taxation, contending that it will only be possible to finance good broadcasting if the control remains with the Government. Recently, however, the Post Office has granted permission to special companies to construct broadcasting stations and given private persons licenses to buy receivers.

Those who approve of private operation say such control will discourage initiative and that it will be impossible to enforce regulations without spying out home made sets. The system of Government control will, however, be continued temporarily, and those who listen in must use outside antennæ and purchase sets stamped by the Government as well as possess a Post Office license, costing 25 gold marks a year. The first broadcaster licensed in Frankfort was the Sudwestdeutsche Rund funkdienst, A. G., which will operate exclusively within a radius of 150

How to Improve Your Aerial

If you have to splice wires in you aerial, lead or ground, don't let it go with a simple twisting of the wires together. If possible have the lead in and aerial one continuous solid wire from furthermost insulator to the set. In case of making splice lay the wires side by side, wist each free end along the other wire for at least two inches, and then make a soldered connection.-

It Does Not Pay to Overload Tubes

One of the most common traits f a person with his first radio set to persist in turning up the tubes to a certain point increasing the filament temperature by turning up the rheostat brings an increase in signal strength. Beyond that the signal gets mushy, and further increase in DON'T NEED Miles Away. I can show you how to get them current won't take out the mush or produce any louder or clearer signal. It may burn out the tube if the minimum resistance of the rheostat is low enough, C. M. C. 1339 So. Volutslag Wichita, Kan



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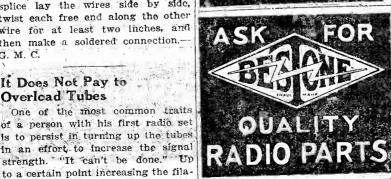


with those terrible induction

noises from nearby lines. This

This diagram shows the utter simplicity of connections.

new FILTER cuts them out.



dressed envelope for picture of my set.



TO OUR OFFICE

R. A. C. Radio Co. 366 Canal St., N. Y. C. Distributors for AMSCO PRODUCTS

THE NEW YORK HERALD RADIO MAGAZINE, SUNDAY, FEBRUARY 10, 1924. 7 11

Basic Theory of Radio Dates Back to Ancient Times With the Discovery of Sparks

People Once Believed That Peculiar Actions of Amber Were Caused by Hunger

By THURLOW EDSON

variable condenser you control in a scientific way a small portion of the stuff that goes to make up a thunderbolt. It is called static elec-

"I get three stations within five degrees on my dial," announces the proud owner of a DX receiver, which is good at reaching out into space and picking up Dallas, Texas; Denver, Col., or perhaps Los Angeles, Cal. He has the thing down to a science, and, weather permitting, he can turn the dial any night and pick up the three stations. His tuning is scientifically accurate.

If he built this set himself he can in all probability tell you that the condenser has one-thousandth of a microfarad capacity. This means that its forty-three plates, separated by thin layers of air, will hold a certain electrical charge rated technically as .001 mfds. His twenty-three plate condenser has a rating of .0005 mfds, and his fixed condensers are rated in a similar man-

The technical man can calculate the proper amount of capacity needed to make the set oscillate to waves of broadcasting length, and he is apparently still more scientific, but not even the most technical man can tell you just what it is that he is gauging. He knows the theory and practice of static electricity.

o It is believed that o each atom may be oo the center of a o o electrons revolving about if as the planets revolve about the sun.

but no matter how technical he may be he still wonders what is at the bottom of it all.

The best of technical men recently gave a certain amount of credit to a theory that all static electricity which is uncontrolable came from the mountains of

Such are the vague theories which go about among the millions of Americans who have suddenly turned to the highly technical subject of radio. This latest theory comes from a radio operator who had made a few trips to Mexico and had observed on each trip what he thought was an unusual crashing in his phones, caused by natural elements which interfered greatly with the reception of messages. The crashing was no doubt caused by some kind of electrical discharge in the air, such as that which takes place between clouds or between the earth and certain charged clouds during a thunderstorm; but to say that the Mexican mountains were the source of all such static noises was one of the many wrong statements which pass for scienific theories to-day.

Do Not Understand Static.

Static electricity is found everywhere in the world to-day. We do not yet understand it. We merely know that it will produce certain results when treated in a definite manner. It may be at the origin of the Northern Lights, at which we stand in wonder, and when we say that it makes its chief home in the Mexican mountains we are like those ancient monks of about two thousand years ago who mistook static electricity for appetite in a piece of amber-

The monks, the guardians of all learning at that time, had both forms of electricity which are necessary to radio, but they could not interpret them. They could understand the mystery of appetite in a way, but they could not make their minds grasp the nature of two kinds of electricity—that produced by their magnets, as described last week, and that which was attendant upon the friction of a piece of amber against a

When they rubbed the amber they noted that it attracted bits of dry leaves, and their explanation was that the amber was hungry for vegetable food. When nature forms amber she free tive charge.

HEN you turn the dial of your | quently entraps leaves and insects with it in such a way that they are fossilized explanation of the monks was that the piece of hard rubber is touched to a

The negative

charge of

When a body with such a charge on it touches another body of matter it may and preserved inside the amber. The communicate a part of its charge. If the

The positive charge

How a pith spider "oscillates" between a body charged with a glass rod which has been rubbed with silk and an object at negative or ground potential.

leaves slowly, and that when it was exercised by rubbing it became hungry for more and attracted bits of dry leaves

Theory Is Sound.

We may be as far away from the truth in explaining the "hunger" of the amber as the monks were, but we have a theory which is sound when it is applied in many other ways. It is the electron theory, and it is broad enough to explain all such static electricity effects. In brief, it assumes that the smallest amount of matter which may be separated by chemical means, the atom, has a number of tiny bodies called electrons associated with it, and the static charge of any substance depends upon whether its atoms have their allotted number of

Electrons are considered to be definite quantities of electricity which do not change, and they are said to have a negative or minus charge. As unlike charges of electricity attract each other and like charges repel, the atom is assumed to times, however, before the condenser is

mber was digesting the insects and pith ball the ball will at once take on a negative charge. It will then fly away from the rod, because its negative charge repels the negative charge of the rod. If the ball then comes in contact with an object which is positively charged, such as a glass rod which has been rubbed with silk, it assumes a positive charge, and will tend again to fly toward the Hard rubber rod.

What High Frequency Is.

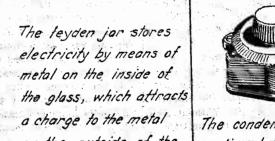
This action of electrons in moving back and forth from a postively charged body to one which is negatively charged produces the high frequency or oscillating current necessary for radio waves, and the radio part which helps them to perform in this manner is the condenser. The condenser consists of two plates of metal, separated usually by air or mica. One plate or set of plates has a positive charge, while the other has a negative charge, and at the proper time the electrons flow from one plate to the other in an effort to neutralize the plates. They must surge back and forth a great many

on the other.

the other. In the present day Leyden jar the plates are formed by metal sheets'

The plate on the inside of the glass, receiving a charge of electricity attracts an opposite charge from the ground to the plate on the other side of the glass, acting as a storehouse for elec-

The leyden jor stores electricity by means of metal on the inside of the glass, which attracts a charge to the metal The condenser of the



have a positive charge. The atom, neutralized. They surge across the through this positive charge, attracts enough electrons, of negative charge, to neutralize itself. The relation is disturbed when two objects are rubbed together, and one of the objects may acquire more than its normal amount of electrons, becoming negatively charged, while the other body will retain less than its usual amount and be positively

Two materials which are more common than the amber of long ago are hard bubber and cat's fur. The fur of the cat, no doubt, produced electrostatic sparks ages ago, but at that time man did little more than idly wonder. To-day, through observation of such apparently insignificant revelations of nature, the condenser in a radio set is. made to take on a charge like that of the cat's fur and to throw off that charge to produce the necessary oscillations of

If a piece of hard rubber is rubbed with cat's fur it takes on a negative electrostatic charge because it apparently has the power of drawing electrons away from the cat's fur in the process of rubbing. This leaves the fur with a post-

plates over a million times in a second, and this makes the high frequency current of radio.

of plates to secure a

greater surface.

The action of a condenser is demonstrated by a pith ball or similar light object, as suspended by a fine thread. If threads are attached to the ball so that they will look like the legs of a spider they can be animated by an electric charge. When suspended between two oppositely charged bottles the spider will fly from one to the other, touching its legs to the objects for an instant and then drawing them away as though the object were hot.

The positive body may be a glass rod, rubbed with silk, and the negative body may be any object which connects with the earth, which is assumed to have a negative charge continuously. When the spider approaches the glass rod its legs reach out toward the rod, attracted by the positive charge. The instant they touch the rod, however, they become positively charged, and the charge they then carry is repelled by the positive charge of the glass. This causes the spider to fly away from the rod toward the object which is connected to the earth, where it goes through a similar damp rag J. L. Rifkin,

performance before it again returns to the rod. It will continue its antics until the charge upon the glass rod has been

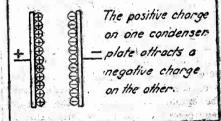
The Forerunner of Radio.

It was not so long ago that such a jumping spider was as popular in a parlor in the homes of some serious minded men as the radio set is to-day. It was popular because it had something to co with the mysterious electric fluid that men were talking about.

In Europe a machine was invented which would rub a glass ball continuously by revolving it against silk pads, and the first man to be shocked by such a device was as much startled as the first to hear a radio message actually traveling through the air. Fakers went about Europe selling shocks to the ignorant country folk for so much apiece.

It was not long after the discovery of the shock that men found a way of "bottling" the "electric fluid." They filled a bottle with water, corked the bottle tightly and thrust a metal rod through the cork into the water. They found then, that they could place a charge of electricity in the water by touching the metal rod with a charged body, or by connecting a wire between the metal rod and one side of the machine which produced shocks.

This bottle was the first condenser, and it survives yet in the form of the Leyden jar. The water inside the bottle served as one plate of the condenser and the table upon which it rested formed



inside and outside of the glass.

Next week the method of making electrical charges flow along a wire will be described, together with the first discoveries of substances which act like the modern battery. The much used "volt" will be explained, together with practical hints on how to employ it in operating our radio set.

Mounting Condensers.

If condensers are not mounted on the panel correctly the shaft will be crooked and the dial will turn unevenly, rubbing against the panel and causing microphonic noises in the tube. This condition is found in many home made sets because of the difficulty of locating the holes for the mounting screws of the condenser when drilling the panel. A few manufacturers are considerate enough to furnish cardboard or paper templates with their instruments, but the great majority of the condensers now sold are not provided with any such templates.

A simple method of locating the holes for the mounting screws after the hole for the shaft is drilled is to put the mounting screws into their holes in the condenser and cover their heads with a light colored paint or paste. The shaft of the condenser then being pushe 1 through the hole drilled for it in the panel, the condenser is firmly pressed down upon the panel in the position it is to be mounted and is then carefully removed

If this process is followed carefully little spots of the paint or paste will remain on the panel, indicating the points where the screw holes should be drilled. After the holes are drilled any. surplus paint can be wiped off with a

Radio Comes to the East Side

P until quite recently Mr. Abromovitch was not exactly what you would call a radio fan. In fact, he was distinctly averse to radio.

Radio, he would declare, was a foolishment on which his son Izzie spent hard earned dollars, and for what? For speeches? Bah! you could hear all the speeches you wanted free for nothing by the speecher on the corner. Music, you tell me? Don't talk no foolishness. Even a \$3.98 phonograph gives better music than what the radio gives. And with the phonograph all you got to do is wind it up and it plays just like you want it should play. You ain't got no bother with no dials and electric lights and batteries, which you need new ones every time, and you don't got to be afraid that some other music or dit-dah-dah things will butt in like what they do in the radio. No. sir. you ain't going to see me playing around with that radio thing. And Mr. Ahromovitch would wag his

beard with an air of finality and put the Second Hungarian Rhapsody on the

But he's changed. Now before he goes to work, after he comes back from work while he eats supper, after supper, and until he goes to sleep he talks radio with Izzie. He changed his family paper because another Yiddish daily had a radio column every day. Together with his son Izzie he built two stages of audio frequency. He even gave up the phonographa nd uses its sound box as a loud. speaker.

And here's what caused the whole

One night Izzie had crept up behind his father and put the ear phones on his head. His father had listened a while, an expression of great awe and wonderment spreading over his face Finally he had taken the phones from his ears and gazed at them long and silently. Then, waking from his temporary

stupor, he had called loudly for his wife. "Hannah! Hannah! Quick come here! There's a chazan (cantor) on the radio! Come quick here!"

His wife came running up from her dishwashing, wiping her hands on her greasy apron.

"Nu, what's the matter? What's so much excitement about?"

RECEIVER

The term "Neutrostage" is registered in

the U. S. Patent Office as the EXCLU-

- SIVE property of the Freed-Eisemann

In addition to the patent and trade-

mark rights, the panel design of all

Freed-Eisemann apparatus is rully pro-

The practise of parties selling as

"Freed-Eisemann Receivers" sets which

they have built from Freed-Eisemann

Obviously, if anyone purchased certain Packard parts from the Packard Motor Car Co. it would be illegal to build these parts into a motor car and sell it as a "Packard."

The distinguishing marks by which the public can protect itself against imitations of the genuine "Freed-Eisemann" Receiver are here shown.

\$100.00 Reward will be paid

for information furnished to

us resulting in the arrest and

conviction of any party mak-

ing fraudulent use of the

name FREED-EISEMANN.

Radio Corporation.

parts is prohibited.

Mr. Abromovitch placed the phones

"Listen to it!" he commanded.

She held the phones to her ears and listened, her head bent forward. A surprised smile came over her face and then abruptly disappeared.

"It's stopped already," she announced. "Listen a minute. It'll begin again soon." Izzie reassured her.

She listened, and her face lit up again as the silence in the phones was broken. Then, with an impatient exclamation, she began to take the phones from her head.

"Oh, they're saying WJZ something.

Who knows what they're talking about!

Go already with your radio and your WJZ. I got to wash the dishes, better." "But listen a little more, momma!" Izzie implored. "Wait till he starts sing-

ing again. You'll like it, I tell you." Mrs. Abromovitch, still taking the phones from her head, suddenly stopped and pushed them back tightly over her ears. A wondering, delighted smile

"Oy, oy, oy," she crooned, nodding her head from side to side. Then she snatched the phones from her ears and extended them eagerly to her husband. "Listen, Moishe, there's a lady singing Eli-Eli! Quick, before she stops!"

She hugged Izzie to her. "Oy, such a wonderful boy I got! All by himself he makes a radio with chazans and Eli-Eli and everything!"

Mr. Abromovitch, absorbed in a new

song of the cantor and his choir, motioned frantically to her to keep still. "Keep quiet yet a minute and let

me hear something, too!" During the remainder of the program Mr. and Mrs. Abromovitch took turns in listening to the cantor and his choir and to the lady who sang the Jewish songs, while Izzie sat at the set, pride and importance and happiness shining

out of his grinning face. "Nu. Hannah." Mr. Abromovitch said at the end of the program, "isn't that a miracle. A chazan sings at Fortysecond street and the whole world can hear him on the radio! Isn't it a

And Mrs. Abromovitch agreed that it was something very unusual indeed. That is why, if you visit Mr. Abromovitch any night except Friday night, which is Sabbath eve, you will find him with Izzie deep in the plans for adding three stages or radio frequency to his present set. *

offered as Freed-Eisemann Receivers.

The tremendous demand has caused a temporary

shortage in the supply and the insistence on the

part of prospective purchasers has led to imita-

Every genuine Freed-Eisemann Receiver has the

name Freed-Eisemann engraved in white letters

tions being offered to the public.

His pet dream is to hear Russia on

British Tune In All Night Long

New York Herald Bureau, London, Jan. 25.

LTHOUGH the first new year's rush to renew expiring licenses has now slackened, and the excitement of hearing America has temporarily died down, interest in wireless is still as great as ever and thousands of new licenses are being taken out every month. The British Broadcasting Company, anticipating a record year in wireless development, is preparing several novel features in addition to the usual broadcasting of speeches and concerts. "We have already broadcast several wireless plays written specially for us by well known authors," an official of the broadcasting company told THE NEW YORK HERALD yesterday, "and we shall con. tinue this feature. In a short time we expect to begin broadcasting lessons for school children every Friday afternoonmusic, languages and other subjects will be included in the program—and several prominent educators have been enrolled for this purpose. We have now one of the largest orchestras in London and have just completed a new transmitting studio, so our musical programs ought to be better and clearer than ever.

"The Pittsburgh program which we broadcast at the end of the year did much to stimulate interest in America and probably induced many operators to take out licenses in the hope of hearing the United States."

May Hear Commons.

Transatlantic telephonic transmission is still pretty uncertain, even with the sytsem of reception and retransmission employed by the big companies. Capt. A. G. D. West of the British Broadcasting Company, who first heard and relayed the Pittsburgh station KDKA on December 27, spent many nights in his hut on the North Downs before he was finally successful. When the program did come through, however, it was remarkably clear and caused great excitement and enthusiasm among the many fans who heard it. The last concert from the United States came from station WGY in Schenectady. It was received on January 5 by the Metropolitan Vickers Company of Manchester and transmitted to thousands of delighted enthusiasts.

The refusal of the Baldwin Government

Another distinguishing feature is the seal at the

Our guarantee is 100% back of every Receiver,

but if the seal is broken the guarantee does not

hold. The letters F-E in script are stamped on

lower right hand corner of the panel.

ence to THE NEW YORK HERALD . to allow the King's speech to be broadcast on the ground that it was without precedent came as a great disappointment to radio fans all over the country. There is at present considerable agitation for the broadcasting of debates in the House of Commons. Exponents of the plan argue that it will make the public much more keenly alive to questions of the day if they hear them thrashed out on the floor of the House instead of merely reading about them in the newspapers. There seems to be considerable objection to the plan, and it is quite possible that the question may be cause for heated controversy.

Radio fans in North Surrey whose nightly pleasure it is to listen to the programs broadcast by the B. B. C. have been roused to fury lately by the activities of an unknown operator of the "hooligan" type. This "gentleman" has a violent dislike for any kind of music except jazz and any kind of lectures that do not contain spicy stories and jests, and whenever the program does not suit him, which is most of the time, he sets up a loud buzzing and howling from his oscillating set which drowns out everything else in the vicinity. The local radio fans would give anything to locate the unknown disturber of the peace, but so far he has been able to escape detection. Steps have been taken to track him to his lair, however. Four members of the Radio Society are now almost constantly listening for the culprit, and a motor truck equipped with receiving apparatus and frame aerial has been pressed into service. If the enemy indulges in any more lengthy howling the truck will be rushed to the amateur nearest the noise, whence it is hoped to locate the outlaw station with the frame aerial. If the howler is run down he may expect little pleasure from his meeting with the other members of the radio mad community.

The "uncles" and "aunts" who tell bedtime stories, sing funny songs and dispense homely wisdom from the Aberdeenstation are very popular with their mary nephews and nieces, if the presents they received at Christmas and New Year's can be taken as a criterion of popularity. Nineteen black cats, thirty-six pounds of candy, twenty-eight pounds of fish (from the Lord Provost of Aberdeen), eighteen pounds of shortbread, 200 calendars, three bottles of port and one of whisky were only a few of the many gifts they re-

Freed-Eisemann

AN IDEAL

Master Radio Craftsmen, not mere as-

semblers, build the Freed-Eisemann Re-

ceiver. The elaborate testing department

and equipment used during construc-

tion and the testing apparatus which

fixes the standard of performance be-

fore shipment are devoted to the most

rigid and uncompromising ideals of

Every man employed in its construc-

tion is proud of it-just as he is proud

of this organization having been se-

lected as the builders of new receivers

This pride extends itself to every

That the model NR-5, five tube.

That the model NR-5, five tube, non-reflex Freed-Eisemann Receiver is the last word in the Radio art is a compliment paid not only by thousands of enthusiastic amateurs but by such critics as well known radio engineers, radio editors and experimenters whose experience covers the whole field of modern radio.

Naturally the supply is limited. No sacrifice of quality will ever be made to gain quantity production.

BROOKLYN, NEW YORK

for the United States Government.

Answers to Questions

Indoor Aerial.

Edw. Nordman-I live in Connecticut and have put up an indoor aerial, but it does not seem to work. Is it possible that an indoor aerial cannot be used in this part of the

Answer-It is more possible that your set is not capable of operating on the small amount of current that is received on an indoor aerial.

Aeriola Circuit.

Paul Jackson-I am interested in the set constructed along the line of the Aeriola senior. All hookups given for this tuner differ. Is the one shown in the radio section of Janon the panel be connected to the positive side of the filament?

Answer-The diagram given in the radio section was an efficient one and good results will be obtained from it. Do not shield the panel. Connect he parts in the proper manner. That is, reverse connections to all shaft parts if there is any ca-

A. C. on Tubes.

Ralph J. Aveta-What transformers and what tubes should be used to operate a neutrodyne circuit from A. C. and D. C.?

Answer-We do not recommend that you attempt to operate any receiving set from the house current, if you intend to try and construct Battery supply is much more satisfactory. Any hard tube will do.

R. F. on Honey Comb Set. David Geffer-Please publish a

diagram for using the honeycomb tuner with two stages of radio frequency amplification and two stages of audio frequency amplification. Answer-The diagram for which

you have asked is given on this page. The tuning of the unit will be difficult at first, but perserverance will conquer that. Diagram is given in No. 27.

Inverse Duplex Circuit. Edwin Knaack-Please print a

ceiver using UV-201A tubes. Answer-The diagram is given herewith. Suggest that you experiment with the by-pass condensers for best results. These are very

Wants Wave Trap.

Wm. D. Gosnell--Can the wave trap described by Macilvain be bought in any radio store?

Answer-It is not possible to buy this particular type of wave trap.

Push Pull Amplifier,

F. E. Sanburn-Is it necessary to push pull amplifier? I wish to add a push pull amplifier to my detector without the addition of an external stage of audio.

Answer-Though the push pull

Troublesome Hand Capacity.

Irving Biren-I am greatly troubled with hand capacity. Is there any way in which this may be eliminated? Answer-If you will reverse the

connections to the condenser that causes the hand capacity you will probably eliminate the trouble. Experiences Interference.

two ariometer vario-coupler set size rheostat for this tube? and have trouble in eliminating unnoving to say the least.

desired stations with this set. The drop across the filament it is necesfirst is the inability of the operator to tune the set properly, and the second is the size of the instruments. For the first one there is only one thing to do-learn to tune the set. For the second the best method of repairing would be to shunt the entire secondary circuit with a small fixed condenser, and also the plate variometer with a condenser of the

Adding a One Step.

quency amplification will not add

any mileage to the present range of the set, but it will aid in making the signals now received loud enough to understand and enjoy. Suggest the

UV-201A tube for loudest signals. Wants a Call Book.

Fred F. Wakerly-Where may one obtain a complete list of the broadcasting stations of the United States? Answer-If you will purchase a call book in a radio store you will find most of the stations listed.

One Stage of Radio.

Henry R. Metzger-Please inform me whether I can put one stage of tuned radio frequency amplification uary 13 the best? Should the shield on a single circuit regenerative

Answer-There is only one way in which this may be done. Do not use a transformer, but put a ten turn coil in the plate circuit of the amplifier and place this coil in close to the primary of the tuner.

Superdyne Information.

S. H. Turner-Where may one obtain more information on the super

Answer-If you send 50 cents to the C. D. Tuska Company at Hartford, Conn., they will send you the latest booklet on this circuit.

Grounding a Battery.

A Fan-I have built the three ionevcomb coil tuner as described in the radio section a few weeks ago the rectifier or the transformer. The set works fine, but I have a few uestions I would like to ask. First, have been told that if the negative side of the filament is grounded the set will work better; is this true? Answer-Grounding the negative

of the filament sometimes improves reception some, but it is all a case of individual operation. You might try if and see if you get any better re-

"C" Battery on WD-12 Tubes. Harold Weyser-Would I gain in

olume or distance by adding one stage of radio frequency amplification to the vario coupler, condenser variometer circuit? Is it preferable diagram for the Inverse Duplex re- to use separate batteries for the amplifler and the detector? Is a "C" battery necessary for WD-12 tube? Answer-One stage of amplification at radio frequency will not give enough volume or increased distance reception to compensate for the additional tuning controls, the added drain on the battery or the extra cost. A "C" battery is not necessary on WD-12 tubes when used as audio

Burns Out a Fuse.

Louis Samber-When I tried to use the electric light socket on my cryshave a one stage amplifier before a tal set as an aerial I blew out the fuse and since then I have not been able to receive signals. What could have happened?

Answer-When you connected the amplifier, as you wish to build it, making two tubes will work fairly either burned out the phones, the crystal or the coil. Test each one for a broken section. Try a new crystal and an outside aerial.

Facts on the U V 199.

.George E. Pray-I intend building the set described by Harriman in the radio section, and wish to ask some questions about it. What is the correct capacity for the grid condenser? What resistance should the grid leak have? This for a UV-199 tube. What "B" battery voltage should be used. Dan Napoli+I have constructed What "A" battery voltage? What

Answer-The grid condenser should wanted stations. The tone and have a capacity of 00025 mfd. The quality of the reproduction cannot be leak should have a resistance of located, but the interference is an- about 4 megohms. The "B" battery voltage should be varied for best re-Answer-There are only two sults from 221/2 to 45. The filament causes for the interference from un- voltage is three volts. To obtain this sary to use three dry cells in series. A 30 ohm rheostat should be used.

> Changing the Single Circuit. Harry Mayerhoff-How is a single circuit tuner changed to a double circuit tuner? Are any extra parts nec

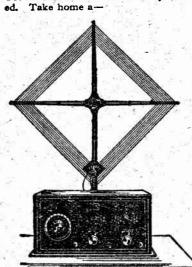
Answer-If you buy a variomete and change the hookup as follows you will have a two circuit tuner Use the secondary of the present coupler as the grid filament coil. Joseph N. Snyder-Will the addi- Place a variable condenser across it tion of a one step amplifier add to and then put the variometer in series the range of my single circuit tuner? with the plate and the phones. The If so, what tube should I use for best primary of the coupler is used to tune the aerial and has no connec-Answer-One stage of audio fre- tion with the other parts of the cir-

When You Get the Radio Fever

HOW TO CHOOSE A RADIO RECEIVING SET

It grips you. You can hardly wait to get your set home. Then you find that there are wires to put up. The landlord balks. Or there isn't any tree or pole within convenient distance. Friends are consulted—the electrician called in A day or two slips by-perhaps a week At last you get the outfit rigged. You listen in. Nothing happens. The trouble

Yet all this trouble can be easily avoided. Take home a-



-and you can listen in to all the stations you will want to hear before you go to bed tonight.

There are no outdoor wires to put up-no ground connections. You work directly from a loop and to your ear phones or loud speaker. It takes you less than half an hour to hook up and you can hear at once.

What you hear, moreover, is much more worth hearing than any program you will ever bring in through the sets that would take you days to rig.

Volume? Sets with twice as many tubes can't give you more. Clarity and tone? There's nothing to compare with Sleeper Monotrol. Distance? Count the stations you will hear. Compare them with the stations heard by any other set in your vicinity. Ease of tuning? If other sets knocked off a dozen of their knobs they could not tune as easily. And if they added to their knobs they could not give you such a crystal-clear and interferencefree reception.

Have your dealer send a Monotrol to your home to try tonight.

SLEEPER RADIO CORPORATION 88 PARK PLACE, NEW YORK

Booklet on request NEW YORK CITY DISTRIBUTORS

MANHATTAN ELECTRICAL SUPPLY CO., 17 PARK PLACE.

TIMES APPLIANCE COMPANY, INC., 145 WEST 45TH STREET.

THE MOST PERFECT RADIO SET IN AMERICA

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874 Columbus Ave. at 103 St. 22East 125thSt.at Mad.Ave. WE HAVE A FOLLOWING! Because

We have never been out of stock on advertised merchandise, never refused to refund money, nor have we ever made a promise that wasn't kept: ONLY GENUINE TUBES SOLD HERE VT1-VT2-\$6.50 (one to a customer).

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Built to your order. Professional Workmanship.

IF YOU CAN GET A SET AT ANY PRICE that will give you greater volume or distance, return ours at no loss to you. TEN DAY TRIAL FREE!

TUBE 5 AMP.

CHARGER



With Cabinet, 2,000 Miles Guaranteed With back panel mounting, binding posts, \$3.50 extra. Complete Fada Parts......\$65.60

INSIST

5—201A Tubes, Yale 60 Amp. Storage Battery, 90v. B Battery, Brandes Table Talker..... CABINETS—PANELS Mah.-fin. Grade "A" BRP, 41/2 V. "C"'...\$0.50

R. A. C. Radio Co.

366 Canal St., N. Y. C.

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Panels & Dials

Special prices on all sizes of Bakelite tubing. DEALERS SUPPLIED AT COLUMBUS AV. STORE ONLY.

60-80 Storage Bat. 11.50 90-110 Storage Bat. 14.50 120-150 Storage Bat. 18.50 Exide and Yale storage battery distributor.

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UPON

THE TUSKA Superdyne

And Other Standard Lines.

Make Your Set a Super-Set

List Price, \$3.00

DEMAND

the new type S. & S. 180

Couplers, with soldered leads

Also demand S. & S. Variometer

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Manufactured and Distributed

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Receiver (Registered Trade Mark)

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DAVID KILLOCH **COMPANY**

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SPERRY BUILDING

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and Preserving a Good Name

Our attention has been called to many cases in which imitations have

public is cautioned to beware of spurious imitations which are being

been sold as genuine Freed-Eisemann Receivers—and therefore—the

The Freed-Eisemann Sales Policy comprises one wholesale distributor in each city. Our exclusive

Before You Buy a Radio Set Be Sure to See and Hear the Ware.

Its Purity and Clarity of Tone, its ability to Select the Desired Station and cut out the others (even those in close proximity), make it a source of delight to the novice and deep satisfaction to the expert.

Its operation is simplicity itself. You turn the dials to a known combination, and there is your station, whether nearby or thousands of miles distant.

> Beautiful piano-finished Cabinet of Walnut; using five vacuum tubes-2 Radio, Detector, 2 Audio-Indoor or Outdoor Aerial. Batteries self-contained. For extreme distance, storage battery is used outside of

Compare with Ware and avoid regret.

If your dealer does not carry the Ware Neutrodyne, we will tell you where you can see it, and send descriptive booklet.

Price \$160, without accessories.

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Licensed by the Independent Radio Manufacturers, Inc., under Hazeltine Patent No. 1,450,080 and patents pending, and the trade mark "Neutrodyne," registered in the U. S. Patent Office, certificate No. 172,137.

IMMEDIATE DELIVERY TypeW Receiver Manufactured, sold, installed, serviced by technical men, holding diplomas signed by Prof. L. A. HAZELTINE

TECHNICAL DEVELOPMENT CORPORATION 437 FIFTH AVENUE NEW YORK CITY

ETIME TRADEAT

TATION AND THE STATE OF THE STA	
The Kind of Values You Find At ALL-AMERICAN	Our Low Overhead Enables Low Prices on Quality
0-50 Voltmeter \$.95 Ambassador Tuning Coil 5.50 Cockaday Coils 1.45 Bradleystats 1.59 Ambassador Phones 2.95 23 Pl. Condenser .0005 .95 17 Pl. Telco Condenser .90035 .95 11 Pl. Telco Condenser .00025 .85 Rasla Radio Transformer 3.75 Modern 10-1 4.25 AmerTran Transformers 5.95 AMSCO PRODUCTS IN STOCK.	Merchandise. You can save yourself money when buying radio supplies by couning to ALL-AMERICAN. Inspect the quality of our stock—the many popular lines we handle—and then ask for our prices. We are confident you'll not only get whatever you need immediately, but also take home other supplies—that's how forcefully our LOW COSTS impress customers.
R. C. A. TUBES W. D. 11. W. D. 12. W	We build sets; repair them. Our long experience in this work has brought to in contact with every type of problem. Ask us. No on-

W. B. 11. W. B. 12. V. V. 199. \$3.95

Answers to **Questions**

A Good Regenerative Set. Morris Guth-Please give me diagram for the set as described b A. C. Brady in the radio section. What is the best tube to use? What s the best grid condenser and leak

Answer-The best detector tube hat can be used is the UV-200 of the C-300. For these two tubes the grid condenser should have a value of 00025 mfd. and the leak a value of 1 or 2 megohms. The diagram for the circuit is given herewith.

Radio and Audio Amplifiers. Walter S. Murgatroyd-Please give diagram for a set employing both radio frequency amplification and audio frequency amplification.

Answer-The diagram for which you ask is published in reply to another question. However, it suits your needs, and you will probably get good results from the set if properly constructed. The diagram 1 No. 27.

Untuned Radio Frequency. Arthur J. Howard-Please print diagram for a transformer coupled amplifier radio frequency amplifica-

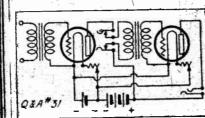
Answer-The diagram for a two stage amplifier and detector is given on this page. Remember, in making this set not to expect to hear much further than you would with a regular efficient regenerative set, unless you use low loss apparatus.

Phone Condenser Necessary.

R. A. Funke, Yonkers-I have found that my three circuit regenerative receiver will not oscillate properly when using an amplifier, but have had excellent results with the same receiver when using only one tube. What change would you suggest in my receiver?

Answer-The condenser capacity between the primary terminals of an amplifying transformer is much less than that of a pair of phones, and therefore in order to make the receiver oscillate properly when using an amplifier it is necessary to connect a fixed condenser across the primary of the transformer. The capacity of the condenser should be out .902 mfd.

Two Step Amplifier.



R. Flauerbach-Please give me pokup for a two step amplifier to add to a one tube set.

Answer-The circuit for this ampliffer is given on this page, No. 31. The input posts of the amplifier are connected to the phone posts on the one tube set.

Rheostat for UV199.

G. W. Stern, N. Y. C.-Can UV199 tube be operated from a six volt storage battery, and if so, what size rheostat should be used?

Answer-Yes, the UV199 tube can be operated from a six volt storage battery provided a 50 ohm. rheostat s placed in series with the filament.

Use of C Battery.

Francis Baker, Hartford, Conn.-Kindly explain the effect of a C battery on a two stage audio ampliffer using UV201A tubes.

Answer-In cases where more than 45 volts of B battery are used n an audio amplifier the addition a C battery will reduce the distortion and lengthen the life of the B battery. The C battery is connected between the common filament terminal of the audio amplifying transformers and the negative of the A battery, the negative of the C battery being connected to the

amplifying transformers. The following table gives an approximation of the C battery voltage necessary when various plate voltages are used. This table is approximately correct for all standard

late volts Grid volts
0
70 1.0 to 3.0
30 3.0 to 4.5
004.5 to 6.0
20 6.0 ta 9.0
50 9.0 to 12.0
0012.0 to 20.0
5020.0 to 25.0

UPON For Real Bargains in Radio Sets see-Radio

Exchange Page 26

Neutrodyne—the set which can reach the coast—Fada Co. manufactures a five tube set and sells it to us unassembled. HERE IS OUR OFFER:

You purchase the Fada parts here at

regular price, \$65.60 and we will

assemble set for you FREE, and besides guarantee it to work. No

strings attached here nor do we throw any extras in to make sale,

but you will receive genuine Fada parts plus good workmanship.

Here's the log sheet of the Hotel Babchin, Lakewood, N. J., one

WALTHAL ELECTRIC CO. - 61 CORTLANDT ST.

WHY NOT YOU?

The Radio Engineer does not regard mere statements of superiority

The Radio Engineer knows the vital necessity for having the right

Variable Condenser. He anticipates definite results before design-

ing his set. He banks on the performance of the individual

The Radie Engineer knows that no Variable Condenser can be

better than the tools, dies and materials used in the manufacture

The Radio Engineer must have precision. That's why he specifies

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Manufactured by the

COMMERCIAL SCREW MACHINE PRODUCTS CORP.

Why not use the same tests he does? You, too, can tool-test a

Run your fingers over the exposed metal edges of the movable

and stationery plates. ROUGH AND RAGGED EDGES

CREATE UNEVEN VARIATION OF CAPACITY. You can't

tune sharp with an instrument of that kind. You can't obtain

the maximum volume your set is capable of producing with an

SAY TO YOUR DEALER

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of this essential instrument.

Variable Condenser-it's simple.

ordinary condenser.

AIR CONDENSERS

or the question of price when buying a Variable Condense

of our many satisfied customers:

Broadcasting Notes by Mel. A. Shauer

TTELLO, everybody!

Almost any evening, in one jaunt across the dials of our sets, we can ment. pick up at will vocal or instrumental No music is more completely enrecitals, symphonic concerts, opera thrailing than that of the church. or popular dance music.

To most of us it is no longer a question of the mechanics of radio afternoon services. The program's the thing!

This column will deal with music ether. Each week we shall discuss ropolitan Opera prima donna. It some of the high lights of harmony which we hope you, too, have heard WOR announced a postponement. I

Every one loves music. And much of the melody which flits so mysteriously out to us is worthy of repethe continuation of the kind of music we like best. What better way could our own enthusiasm to the broad-

The program's the thing! We should feel grateful, too, to the artists whose labors make our listening in so real a pleasure.

As a novel way to determine just what to write about first I decided to ciose my eyes and to tell you about the very first music I turned in by chance. My first air fortunes in the luxe, plays classical music. He has brought to me the wonders of Beethoven's Symphony No. 9.

This symphony is so well known it was rendered by the New York Symphony Orchestra, conducted by Mr. Walter Damrosch. Station direct from Carnegie Hall.

Radio Helps Thousands.

have had the thrills of hearing the New York Symphony Orchestra. Many times that number were eager but unable to do so until radio made it possible. Look for the reappearance of this kind of music. It is a orivilege to hear it.

The Oratorio Society of New York Richard Crooks were the soloists.

short song recitals. Among other again. things she sang "Annie Laurie," emitted and her diction unusually terfly Etude" as a solo.

As I write I am listening to Vincent Lopez and his dance orchestra. This is a regular feature from WEAF. The Lopez orchestrations make symphony of jazz. Generosity in the number of dances played is Symphony Band. notable during this hour of entertainment

Dance programs from WGY, Schenectady, are excellent, but would be more enjoyable if they did not fade out at intervals.

For those who would trip the light fantastic through the wee sma' hours of morning more distant stations furnish good inspiration. Have succeeded in locating lively orchestras from WTAM, Cleveland, and KYW, Chicago, hearing both in quick suc-

WJY gave every one a real treat last Sunday afternoon, transmitting direct from Carnegie Hall the violin recital of Manuel Quiroga, the most eminent violinist in all of sunny

Has Interesting Experience. Body Capacity Can Be

tered. Mozart's Rondo was voted by plates to grid and rotary plates to those of us present as the most ap- ground. In either case it keeps the

We radio enthusiasts to our great nation into deep mourning day are able to tune in on should have affected the spirits of varied musical offerings. The devel- both entertainers and listeners duropment of broadcasting has given us ing the remainder of Sunday's prothe chance to discriminate in the grams. Some of the broadcasting stations quickly changed their plans

> Sunday's programs abound with the splendors of organ and choir incidental to the morning and early

I had looked forward particultly which has been sent forth over the Cecil Aaron, mezzo-soprano and Met-

trust this great pleasure will not long be deferred to radio audiences Have you heard the Ever Ready Trio? WEAF can justly be proud tition. We all want to encourage of them. You'll appreciate "Puccini-ana," their own medley of the most popular Puccini arias from there be than to follow the radio "La Tosca," "Madame Butterfly" and performances closely and to convey "La Boheme." They seem to specialize in home classics. You will know and enjoy everything they play.

The Classic Saxophone.

saxophone, but at the same time kept it too definitely limited to that usage. Jascha Gurewich, saxaphonist de

interest of "Broadcasting Notes" already appeared in recital and can be heard again at Acolian Hall, March 6, according to WEAF's announcement. Certainly Gurewich's that it is only necessary to tell you two fifteen minute groups at WEAF were full of novelty and surprise. The famous Orientale was beautifully weird. Kreisler's "Schon Ros WEAF broadcast the whole concert marin," Brahms's Hungarian dance No. 1, and a ballet, a waltz and a tango of his own creation made up Gurewich's diversified proof that the Hundreds of thousands of people sax and the dance floor are not en-

tirely synonymous.

WOR, Newark-Zimbler Trio, Albert Sanders Bureau of Entertainers. WEAF, New York-C. F. Springer American contralto.

Use the Proper Rheostat.

of the resistance which may be at-

I heard this recital in Spring Val- Reduced by Proper Wiring

shaft at or near ground potential,

This is the same as the rule applied Every tone seemed perfectly regis- to condensers to connect stationary

and toned down the gayety of their programs to the sadness of the mo

to the Monday evening appearance of was hence quite disappointing when

The dance craze nourished the

one tube regenerative set for the price of a good crystal re-ceiver. Complete with UV 199 Tube, Adapter, Head Phones and A and B Batteries. price \$38.35.

Ida Gurewich deserves credit for her splendid accompaniments. They

added just the right touch. Gurewich has espoused a worthy cause. The tonic beauty of the saxophone is ample foundation for its elevation to higher musical spheres. sang the choral finale, written to His originals are pleasing, but I Schiller's "Ode to Joy." Ruth Rod- think he should put his saxophonis gers, Mabel Ritch, Fred Patton and the art and abilities above the desire to popularize his own material. None From WOR Anna Hamlin, soprano, the less his offerings were a delight of New York city, gave a series of and I hope he will broadcast soon

Being unable, of course, to listen "Down in the Forest" and "Voices of to all the music sent out, I shall Spring," which three selections I mention each week those programs liked most. Her voice is freely which I believe should be encouraged to repeat. Not having heard them, I am assuming that they were sent paninst. She played Chopin's "But out as scheduled. It seems only right to mention them and to try to tune them in if and when they go

WSAI, Cincinnati-Musical program by faculty and students of the Cincinnati Conservatory of Music. KDKA, Pittsburgh-Westinghouse

WJZ, New York-Mayor Hyland's People's Concert.

Regardless of tube and regardless

tributed to the rheostat, don't use a rheostat that will cause the tube to flash up to full operating voltage as soon as the contact arm touches the first turn of wire. It is best to use a rheostat that is half way "open" when the tube is operating at the proper operating voltage. G.M. C.

ley, N. Y. A brand new five tube Two variometer-variocoupler sets neutrodyne receiving set was enter- which howl from hand capacity can taining a family group of eight peo- be quieted by making sure that the ple, most of whom had never is lead from the grid goes to the stator tened in before. The expressions on side of the grid variometer and that the faces in that room bore excellent the plu B battery lead goes to the witness to the enchanting powers of rotor side of the plate variometer.

Haynes-Griffin
Radio Service, Inc.
41 West 43rd Street

FINAL CLEARANCE The last few days of the Haynes-Griffin quarterly sale of

demonstrations sets. Twenty-three different makes and models of the world's best radio sets still left—but only one or two of a kind.

Two days more of selling will sell these out-especially at these new low prices. Every set guaranteed absolutely perfect in every respect. Most of them have been used for window display purposes only-and you save 25 to 50% simply because they have been unpacked from their original packages.

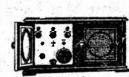
The sets listed below require no detailed description or illustration. The experienced radio fan will recognize them instantly for the truly remarkable values they represent.

LIST PRICE SALE PRICE	L IST PRICE SALE PRICE
\$175.00 GREBE CR 12\$122.50	\$105.50 CROSLEY
Particularly adapted to indoor aerial reception.	MODEL X \$79.50
68.60 AERIOLA	Four Tube Set, Complete, Ready to Operate.
SENIOR 41.60	100.00 CROSLEY XX 71.50
Complete with tube, phones, and A and B Batteries.	Four Tube Set With Built in Loud Speaker.
275.00 RADIOLA IV 192.50	80.00 CROSLEY XVJ 56.00
Complete, Ready to Operate.	OU.UU CHODIEH A VO DO.OO.
116.35 CROSLEY XJ 82.75	50.00 CROSLEY
Four Tube Set, Complete.	ACE 3B 35.00
142.50 RADIOLA V 99.75	Three tube regenerative Set
With Tubes and Loud Speaker.	
- 245.75 RADIOLA VI 130.80	235.00 KENNEDY T 220
No outside aerial required. Sale price includes tubes,	& AMPLIFIER 146.75
phones, storage battery, B Batteries, Manhatten Loud	115.00 PARAGON RA
Speaker and Radium Loop.	10 WITH DA 2
350.00 RADIOLA GRAND 267.00	10 11 11 11 11 11
Complete, Ready to Operate.	AMPLIFIER 91.75
i e e e e e e e e e e e e e e e e e e e	





A four tube set constructed in beautiful mahogany finished cabinet. An efficient Radio Set and a



Crosley Ace 3 C

A completely self-contained recabinet. Built-in Loud Speaker, List price \$125. Sale

LOUD SPEAKERS

J. ANDREW WHITE Loud Speaker LIST PRICE

\$12.50 SALE PRICE 9.35

used for demonstration purposes: Some are practically perfect. A few are slightly scratched or marred. For quick disposal we have marked 25% of the regular list price. These prices do not apply to new stock in the orig-LIST PRICE

\$10.00 HAYNES-GRIFFIN (Adjustable) \$7.50 MANHATTAN 18.75 With the New Concert Modulator.
BRANDES TABLE TALKER.... 15 Other Well Known Makes Also Included.

HAYNES-GRIFFIN RADIO SERVICE. Inc., Between 5th and 6th Aves. 41 West 43d St.,



The Ideal Audio for

FORD MICA COMPANY, Inc.

Every Neutrodyne Supertrans have won recognition

set requires audio transformers which are specially de-signed for this circuit. Build right by selecting super-trans first! Greatest Volume. Least

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other high grade United Cigar Stores. Haynes-Griffin. L. H. Hardy & Sons. R. A. C. Radio Company

from the world fa-

mous radio experts.

Ask for them at any

of the following or

New York.

Insist on the Genuine Supertrans—

POTENTIOMETERS FOR ALL TYPES OF TUBES SCOTT COMBINATION CRYSTAL DETECTOR

For Reflex or Crystal Set. Reception loud and beautifully clear. Will not burn out. Lasts indefinitely, Price \$2.00,
SEND FOR FREE HOOKUPS. G. S. SCOTT, Roum 701, 342 Madison Av., a: 43d St.

RADIO CRYSTAL

Entire Surface Sensitive
The Recognized Standard Crystal
Rectifier
Used all Over The World
Iundreds of Thousands of Satisfied Users
Rusonite Has Revolutionized Crystal Radio

COPTION THE PERFECT SYNTHETIC CRYSTAL"

Guaranteed
Price mounted 5ec
RUSOMITE CATWHISKER 14K. COLD
Supersensitive; will not oxidize
Price 35e

Order from your dealer or direct from Rusonite Products Corporation: 15 Park Row, New York, N. Y.



WEAF-NEW YORK-492. 2:45 P. M.—Interdenominational services under auspices of the New York Federation of Churches; Mr. William B. Millar, generger auspices of the Accordance of Churches; Mr. William B. Millar, general secretary, will preside over the meeting; address by Dr. J. Percival Huget, pastor of the Tompkins Avenue Congregational Church, Brooklyn, N. Y. Violincelle solo by Stephen Somogyi—"Dedication (Popper); "Onward, Christian Solders", (Sullivan), "The Son of God Goes Forth to Was" (Cutler), by the Federation Radio Choir, Scripture, "I Need Thee Every-Hour" (Lowry), by the Federation Choir, Prayer, "Christ in Flanders" (Stephene), by Arthur Billings Hunt, Barytone, Address by Dr. J. Percival Huget, pastor of the Tompkins Avenue Congregational Church, Brooklyn, N. Y.; subject, "The First American." "Take the Name of Jesus With You" (Doane), by the Federation Radio Choir, Benediction, "Am I a Soldier?" (Arne), by the Federation Radio Choir, Sunday Men's Conference of Conferenc

Radio Choir.

1:45 P. M.—Regular. Sunday Men's Conference in the Bedford Branch Young Men's Christian Association, Brooklyn; Mr. Halsey Hamond, branch secretary, will preside over the meeting. Address by Dr. S. Parkes Cadman. Music by Gloria Trump-

eters:
7:20 P. M.—Special musical program direct from the Capitol Theater; New York city, by courteey of the Capitol Theater management and Mr. S. L. Rothafel (Roxy). The first part of the program will be taken direct from the stage of the Capitol Theater and will consist of music by Grand Orchestra and selections by the featured artists. The second part of the program will consist of a special presentation by Mr. Rothafel of Capitol Theater vocal and instrumental artists direct from the broadcasting studio in the theater.

WJZ-NEW YORK-455. 11:80 A. M.—Church service direct from St. Thomas's Episcopal Church; sermon by Rev. Dr. E. A. Stires. 1:60 P. M.—'Bubble Book Stories' by Raigh ble Book Stories' by Ralph M.—Recital by Rose Gabriel Tobib, planist. 8:00 P. M.- "The Annalist's Talk for Business Men."
8:15 P. M.—Sunday evening concert by the
Hotel Commodore Orchestra, under the personal direction of Bernhard Levitow, direct
from the Hotel Commodore.
10:00 P. M.—Lois Miller, soprano, accompanled by Mme. Clara M. Davies.

WJY-NEW YORK-455. 3:30 P. M.—Radio Bible Class; Bible address and missical program.

3:30 P. M.—Jewel Farrington, Soprano.

4:00 P. M.—Max Schwartzman, tenor.

1:0 P. M.—Max Schwartzman, tenor. 1: 0 P. M.—Max Schwartzman, tenor. 8:45 P. M.—Sunday evening concert by the Waldorf-Astoria Symphonic Orchestra, Jo-seph Knecht director, directly from the Waldorf-Astoria Hotel. 10:00 P. M.—Recital by James R. Cooley,

WHN-NEW YORK-360, 3:00-5:00—Christian Endeavor program. 3:00-5:15 P. M.—John D. Flynn of the Na-tional Security League in talk. 5:15-6:00 P. M.—Tempo Club Orchestra. 9:45-11:00 P. M.—Operatic program. 11:00-12:00 P. M.—Dance selections.

WQAO-NEW YORK-360. 10:30 A. M.—Church service from the Calvery Baptist Church. 7:45 P. M.—Chapel service.

MIN-PHILADELPHIA-589.

11-00 A. M.—Morning service from Holy
Trinity Church, Rittenbouse square.

4:00 P. M.—Direct broadcast from the Germantown Theater of a meeting being held
under the auspices of the Germantown Y.

M. C. A. WIP-PHILADELPHIA-509. WFI-PHILADELPHIA-395.

10:30 A. M. Services of the Arch Street Presbyterian Church; sermon, "The Pres-ent Crisis in the Church," by Rev. Clarence Edward Macarney, D.D. 1:30 P. M.—Chapel services conducted by

WDAR-PHILADELPHIA-395. .—Sunday afternoon musical program le Arcadia Concert Orchestra. M.—Special National Scout program

WSAD-PROVIDENCE-261. 2:00 P. M.-Concert by the Rathskeller Trio.

of St. Paul.

2:00 P. M.-Cohcert program, arranged by 9:55 P. M.-Time signals and weather fore

6:45 P. M.—Service. 8:30 P. M.—Copley Plaza Cor WGI-MEDEURD 4:00 P. M.—"Adventure Hour," Musicale. 3:30 P. M.—"World Unity," Musicale. WBZ_SPRINGFIELD-334.

\$:45 P. M.—Sunday vespers on the Spring field Municipal Chimes. 8:30 P. M.—Church services conducted by Warren B. Grant. KDKA-PITTSBURGH-326.

8:30 P. M.—Dinner concert. 7:45 P. M.—Services of the First Baptis

WGY-SCHENECTADY-389. 8:30 P. M.-Program by WGY Symphon 3:45 P. M.—Service of the Madison Aven

WDAP-CHICAGO-360. \$:00 P. M.-Organ concerts. KYW-CHICAGO-536.

7:30 P. M.—Excerpts from the New Testa-ment—an American translation by Prof. E. J. Goodspeed, read by William Ziegler Nourse. 8:00 P. M.—Chicago, Sunday Evening Club

WCAP-WASHINGTON, D. C.-469 7:20 P. M.—Capitol Theater program. 9:00 P. M.—Skinner organ company recital

M.-St. Paul's Episcopal Cathedral M.-The Detroit News Orchestra. WOC-DAVENPORT-484.

M.—Organ recital. WOAW-OMAHA-526.

M.—Bible Study Hour.
M.—Musical Chapel Service. WHAS-LOUISVILLE-400.

3:00 P. M.-Concert: WOS-JEFFERSON CITY, MO.-441. 8:30 P. M.-First Presbyterian Church WFAA-DALLAS-476.

7:00 P. M.—Bible Class. 10:00 P. M.—Address, "Christianity, a World 11.00 P. M.—Popular dance music program. WLW-CINCINNATI-309.

3:45 P. M. Services of the Church of the Covenant, Dr. Frank Stevenson minister. WCX-DETROIT-517. 4:00 P. M .- Chapel service

WIP-PHILADELPHIA-509. 3:00 P. M.—Recital by the Haydn String. Quariet. 4:00 P. M.—"The Perfect Tribute," a reading by Mary Edith Lessig in honor of Lin-coln's birthday. WHR-KANSAS CITY-411. 3:00 P. M.—Sunday afternoon musical concert by the Sweeney Radio Orchestra.

3:15 P. M.—Services by the Tabernacle Eaplifet Church.

WGAW-ALTOONA, PA.-261.

CKAC-MONTREAL-430. :30 P. M.-Violin, 'cello, vocal selection WCAE-PITTSBURGH, PA.-426. M .- Organ recital

M .- Church music WMAY-ST. LOUIS, MO.-280 WIAG-ST. PAUL-417

WOAM-MIAMI-360.

M .- Church program. KFDZ-MINNEAPOLIS-231. eion P. M.-Pine organ. WTAW-COLLEGE STATIONS, TEX,-28 4:00 P. M.—Band concert

WRR-DALLAS-360.

WMAY-ST. LOUIS-280.

WCAL-ST. OLAF COLLEGE-360. KGG-PORTLAND, ORE.-360. 12:00 P. M.-New phonograph re KFI-LOS ANGELES-469.

M. Embassador Hotel concer KHI_IOS ANGELES-395. 10:30 A. M.-Organ recital, Arthur Blak

6KW-TUINUCU, CUBA-332. 10:30 P. M .- Municipal program.

MONDAY

WEAF-NEW YORK-492

4:30 P. M.—Kittie Storms, contraito.
4:45 P. M.—Gertrude Bonime, planist.
5:00 P. M.—Program for Jewish Mothers,"
under the auspices of the Women's League
of the United Synagogue of America. Program: Hebrew song, "Hagidi Li Sa" Moch"
(Idelson), by Morris Nathanson. Address
by Prof. Patty Hill of Columbia. University,
"Importance of Childhood," "I Sing Thee
Songs of Araby" (Clay), by Morris Nathanson. thanson.
7 P. M.—"Personality Chat" between Brooke Johns and Nanette Kutner.
135 P. M.—"Recognized"

hns and Nanette Kutner.

P. M.—"Recognized Authority on the e of Light in Medical Treatment," by Edgar Mayer.

P. M.—United Daily Sport Talk.

P. M.—Ruth Chase, soprano, accompany."Mus.

7:50 P. M.—''Duty to Daughters,'' by J. Frank Birdsell.
1:00 P. M.—''Summary of the course. Frank Birdsell.

3:00 P. M., "Summary of the course.

Browning's true value. How the methods of investigation used in this course may be applied to the study of poetry in general," the tenth and last of a series of lectures on "Robert Browning" by Hoxie Neale

Fairchild.

1:20 P. M.—Ruth Chase, soprano. Program:
"Vissi d'Arte," from "La Tosca" (Puccini); "Thank God for a Garden" (Del.
Riego); "The Answer" (Terry).

1:40 P. M.—"What You Should Know About P. M.—What You Smooth Know About tches," by Lawrence S. Mayers. P. M.—Faculty concert, Program: ing trio, "Divertisemento" (Mozart); mnet Petrarka" (Liot); "Rigoletto"

Iantasie (Liot).
9:30 P. M.—Talk in connection with "Anniversary Week" of Boy Scouts of America, by Dr. John H. Finley.
9:40 P. M.—Faculty concert, continued. WJZ-NEW YORK-455.

WJZ-NEW YORK-455,

3:30 P. M.—Second Children's Concert by the
American Orchestral Society, composed of
picked members of the New York Philharmonic Orchestra, direct from Aeolian Hall,

5:30 P. M.—Closing reports of the New York
State Department of Farms and Markets;
closing quotations of the New York Stock
Exchange; foreign exchange quotations;
National Industrial Conference Hoard reports.

on P. M.—"The Story Book Lady" will

station NAA at Arlington. cert: Orchestra: 10:00 P. M.—Dinner of the Grand Street Boys

WHN-NEW YORK-360.

Dance Orchestra... 8:45-8:55 P. M.—Dorothy Wallace Portingall, 8:20 saxophone and vocal solos. 25-10:00 P. M.—"Broadway Melodies; playing dance mesic. 0:15-10:45 P. M.—"Original Ideal Novelty. Five," Eddie Di Lalla, leader. 1:30-11:45 P. M.—Richard Douglas, tenor.

WOR-NEWARK-465 M.—Joseph Lord, tenor.
M.—Muriel E. Williams,
M.—Talk and song recit

Olga Petrova.

3:30 P. M.—Joseph Lord, tenor.

3:30 P. M.—Wuriel E. Williams, planist.

6:15 P. M.—"Music While You' Dine," Harry
Cox and his Hotel Robert Treat Orchestra.

8:00 P. M.—"Current Motion Pictures," by
"Holywood" McCosker. 8:15 P. M.—Arthur Gordon Huson, baryto

8:15 P. M.—Arthur Gordon Huson, barytone, concert artist and recitalist, accompanied by James R. Phillipson.
8:30 P. M.—"Jolly Bill Steinke" in his weekly lesson on "Radio Cartooning."
8:45 P. M.—Arthur Gordon Huson, barytone, acompanied by James R. Phillipson.
9:00 P. M.—Senator Frank W. Willis, speaking on "Lincoln."
9:30 P. M.—Mme. Josephine Schaeffer Bettinetti. soprano. tinetti, soprano.
45 P. M.-Alice Durell Stueck of the Na-tional Society, United States Daughters of 1812, speaking on 'The Significance of Our

1512, speaking on 'The Significance of Our National Banner.''
10:00 P. M.—Concert by Marks's War Vet-erans' Band of New York, under direction of Lieut. E. P. Ressegule, assisted by Helen Watson Huking, soprano.

WOO-PHILADELPHIA-509. WFI-PHILADELPHIA-395.

3.30 P. M.—Meyer Davis concert orchestra. 3.30 P. M.—The Hon. W. Freeland Kendrick Mayor of Philadelphia, will address mem bers of the Strawbridge & Clothier Relie WDAR-PHILADELPHIA-395.

9:00 P. M.—Artist recital. 10:10 P. M.—Howard Lanin's Dance 9:00 P. M.-Special program.

WBAP-FORT WORTH-476

WIAR-PROVIDENCE-360. 8:00 P. M.—The annual meeting and dinn of the Brown Club of Providence. WRW_TARRYTOWN-273.

10:15 P. M.-Dance music. WNAC-BOSTON-278 M.-W. N. A. C. dinner dance. M.-Broadcast from the Shu WGI-MEDFORD HILLSIDE, MASS .- 360

6:00 P. M.-"Just Boy." WRZ_SPRINGETELD-337. 6:00 P. M.—Dinner concert. 7:00 P. M.—This week in history: 7:30 P. M.—Bedtime story for the kiddles. 8:00 P. M.—Concert by the WBZ Trio and Werner Josten, planist; Margaret Farnam. soprane. 9:90 P. M. Bedtime story for grown-ups by Orison S. Marden.

KDKA-PITTSBURGH-328. 7:30 P. M.—Radio Girl Scout meeting, con-ducted by Laura Hölland. 3:15 P. M.—"Activities of the Public Depart-

WGY-SCHENECTADY-380, M.—Music and address. "The Stor Valentine," Mrs. Katherine V. Steer WHAZ-TROY-380. M .- Musical program.

KYW-CHICAGO-536. 9:30 A. M.-Late news and comment of the financial and commercial markets. 1:35 A. M.—Table talk by Mrs. Anna J. Peterson, 130 P. M.—News, financial and final marke and sport summary.

WRC-WASHINGTON, D. C.-469. 3:15 P. M.—Beatrice Wainwright, soprano. 3:30 P. M.—"Abraham Lincoln," by the Ho 8:45 P. M.—Piano recital 9:00 P. M.—The Political Situati 9:15 P. M.—Concert by Trio.

WGR-BUFFALO-319.

WWJ-DETROIT-517 WOC-DAVENPORT-484. M.—Sandman's visit.
M.—Educational lecture

WOAW-OMAHA-526. L-Dinner program, WMC-MEMPHIS-500.

M.-Gayoso Hotel Orchestra WSB-ATLANTA, GA.-429. 1.—Popular concert. M.—Transcontinental Enterta WCBD-ZION, ILL,-345.

WOS-JRFFERSON CITY, MO.-449. WFAA-DALLAS-476. 30 P. M.-Musical recital WLW-CINCINNATI-309.

3:00 P. M.-Concert arranged by Miss Minni KSD-ST. LOUIS-540.

30 P. M.-Vocal and instrumental specis WDAF_RANSAS CITY-411. P. M.—Address from the University insas; the Children's story and Infor

WHB-KANSAS CITY-411. M.—Ladies' Hour Program

sical and Popular Music. 100 P. M.—Educational program especially for the younger folks, given by Miss Lenore WPAB-STATE COLLEGE, PA.-283.

M.—Agricultural talks.
M.—State Student Orchestra program WDBC-LANCASTER, PA.-258.

WCAE-PITTSBURGH-4%. M.—Dinner concert.
M.—Uncle Kaybes.
M.—Dancing lesson.
M.—Musical program. WABI-STORRS, CONN.-283.

. M.-Market reports. WCAO-BALTIMORE-360. M .- "In the Air with Henry on P. M .-Concert. WQAE-SPRINGFIELD, VT.-275.

30 P. M.—Concert. WHAZ-TROY-380. 9:00 P. M. Scotch concert, Troy Burns Club.
Address by representative of New York
State Conservation Commission. Midnight,
program of popular music by the Campus
Serenaders and Rensselaer Polytechnic Institute Students Glee Club.

WPAK-FARGO, N. D.-360. P. M.-Educational addresses. WJAM-CEDAR RAPIDS, IA.-268. on P M -- Regular program WIAO-MILWAUKEE, WIS.-360.

:00 P. M.-Special talks and musi WOAG-NEW ORLEANS, LA .- 268. 100 P. M .- St. Charles Hotel Orchestra. WQAM-MIAMI, FLA.-360. WRR-DALLAS-360. :00 P. M.-Music WSAC-CLEMSON COLLEGE, S.

:00 P. M.-Educational add KPO-SAN FRANCISCO-123. :00 P. M.—Organ recital. KFAE-PULLMAN, WASH.-330. 0:30 P. M.-Lincoln's Birthday program. WPAH-WAUPACA, WIS.-360 KOB-STATE COLLEGE, N. M.-485,

WOAN-LAWRENCEBURG-360. 8:30 P. M.-Music.

WMAK-LOCKPORT-360. 8:00 P. M.—Popular music by Hulshoff 6KW-TUINUCU, CUBA-332. KFI-LOS ANGELES: 469.

M.—Evening Herald concert.

M.—Examiner concert.

M.—Cocoanut Grove Orchestra. KMO-TACOMA, WASH.-360 KEFO-COLORADO SPRINGS, COL. KGG-PORTLAND ORE 360 :30 P. M.—Phonograph selections. 0:30 P. M.—Press bulletins. KZN-SALT LAKE CITY, UTAH-485.

TUESDAY

11:00 P. M .- Music, talks, stories.

WEAF-NEW YORK-492. 'Einstein's Theory of Departments of Agriculturist.

can Agriculturist.

3:30 P. M.—Alumni service at Columbia University Chapel, with address by Judge John
Bassett Moore and organ recital.

4:45 P. M.—'Abraham Lincoln,'' a talk by
Edward S. Beach.

11:00 I ### Hand And Andread A

WJZ-NEW YORK-455. :15 P. M .- Luncheon under the ausp the Women's National Republican Club rect from the Grand Ballroom of the Ho Plaza. Speeches by Hon. Walter F. Brot Hon. H. Ed. Marshall and Senator Frank 3:30 P. M.—Recital by Julita Comin, soprano accompanied by C. Allen.

3:45 P. M.—Bernard Frank, harmonica.

4:00 P. M.—Harper's Bazaar fashions.

4:15 P. M.—Recital by Julita Comin, soprano, accompanied by C. Allen.

4:30 P. M.—Richard Douglas, songs with :00 P. M.-Joseph Sherman, harmonica. 1:10 P. M.—Joseph Sherman, hardening, 1:15 P. M.—Shirley Hess," "Recitations." 1:15 P. M.—Closing reports of the New York State Department of Farms and Markets; closing quotations of the New York Stock Exchange; foreign exchange quotations.

Martin. 15 P. M.—Supper music by Paul Specht and

WJY-NEW YORK-455. M.-Etiquette talk by Doubleday Page. Company.
7:40 P. M.—Edincoln program under the auspices of the Abraham Lincoln Picture.
8:40 P. M.—Carlyle Straub, poems.
9:15 P. M.—China. Society dinner. Speeches by Prof. Henry Fairfield Osborn, chairman of the American Museum of Natural History and Roy Chapman Andrews; Gen. J. WOR-405 METERS-746 KILOCYCLES.

M.—"The Lawyer Lincoln." Hertz, attorney.

L-Continuation of contralto solos

sey Miller and his orchestra, :30-7:00 P. M.—"Man in the Moon Stories M.-"Music While You Dine." Hal

WOO-PHILADELPHIA-509. 4:45 P. M.-Grand organ and trumpets. WDAR-PHILADELPHIA-395.

:50 P. M.-Play review by Arnold Abbott WIP-PHILADELPHIA-509, M.-Popular program by the Scran

10:15 P."M:-Ted Weems and his Cafe L'Air

James Hotel Orchestra WFI-PHILADELPHIA-395. 5:30 P. M.—Meyer Davis, Bellevue-Stratfor Hotel Concert Orchestra. 8:00 P. M.—Program by the Haddenfield La dies Choral Society

:30 P M.-Concert by the old time bane Midiothian. 1:30 P. M.—Concert by the Floydada, Texas WMAK-LOCKPORT-360.

:00 P. M .- Popular music by Hulshof WJAR-PROVIDENCE-360. M.—The Republican Club bar from the Waldorf-Astoria - F WSAD-PROVIDENCE-261.

M.—Musical program.
M.—Children's features by "Foster's Lady." Mrs. Bessie Archer Ander 3:30 P. M.-Musical program continued. WNAC-BOSTON-278. 8:00 P. M.-Band concert. WGI-MEDFORD HILLSIDE-360.

:00 P. M.-Lincoln's Birthday program WBZ-SPRINGFIELD-337. M.-Bedtime story for the kidd 8:00 P. M.—Concert. 9:00 P. M.—Bedtime story. 9:05 P. M.—Arlington time signals KDKA-PITTSBURGH-326. 6:15 P. M.—Dinner concert.
7:30 P. M.—Dinner concert.
7:30 P. M.—'Industry and Our Educational Institutions." Dr. William M. Davidson.
7:45 P. M.—Special "Lincoln" program by Alexander Dunbar.
8:30 P. M.—'Abraham Lincoln, the Great American," by L. H. Gardner.
11:30 P. M.—Special Concert by the Queen City Orchestra.

WGY-SCHENECTADY-380. M.—Music and Household Hints.
M.—Dinner music.
M.—Program by Turner Male Choru WDAP-CHICAGO-360.

All Schedules Eastern Standard Time

modore orchestra, under the personal rection of Bernhard Levitow, direct from

Dr. Frank J. Monaghan, Commissioner of the Department of Health. 8:45 P. M. - Recital by Irving Oblo, tenor, ac-companied by Mrs. Oblo. 9:00 P. M.—'Using Gelatine for Health and Pleasure,' by Anne Liewie Pierce.

the Pan-American Union. 0:45 P. M.—Recital by Jean Smith, planist.

WHN-NEW YORK-360

WOR-NEWARK-405.

WAAM-NEWARK-263.

WOO-PHILADELPHIA-509.

WDAR-PHILADEIPHIA-395.

WBAP-FORT WORTH-476.

0:30 P. M.-Concert by George Freeman's

WFI-PHILADELPHIA-395.

30 P. M.-Meyer Davis, Bellevue-Stratfor

WIP-PHILADELPHIA-509.

WRW-TARRYTOWN-273.

WEDNESDAY, FEBRUARY 13.

WNAC-BOSTON-278.

WGI-MEDFORD HILLSIDE, MASS.-360.

WBZ-SPRINGFIELD-337.

KDKA-PITTSBURGH-326.

WGY-SCHENECTADY-380

WDPA-CHICAGO-360.

KYW-CHICAGO-536.

WCAP-WASHINGTON-469

WRC-WASHINGTON, D. C.-469.

orchestra under the direction of Roy Value.

8:45 P. M.—Song recital by Tr.

contraite.

00 P.

:00 P. M.—Song recital by Mabel C. Lat-

imer, soprano. :15 P. M.—Duets by Elizabeth Lindsay Day-

ton and Margaret Callahan. :30 P. M.-Concert by the Interstate Com-merce Band.

WGR-BUFFALO-319.

WWJ-DETROIT-517.

WJAZ-CHICAGO-449

1:00 P. M.-Musical program.
:00 A. M.-Program broadcast to Bald

WHAS-LOUISVILLE-100

WTAM-CLEVELAND-390.

WOS-JEFFERSON CITY-441.

9:00 P. M.-Dance program by string trio. WLW-CINCINNATI-309.

KSD-ST. LOUIS-546.

WCAE-PITTSBURGH-426

WDAF-KANSAS CITY-411.

WLAG-ST. PAUL-417.

KFI-LOS ANGELES-469.

WJAM-CEDAR RAPIDS, IA.-968.

WPAB-STATE COLLEGE, PA.-283,

KZN-SALT LAKE CITY, UTAH-485.

M .- Evening Herald concert.

9:00 P. M.—The Tenth Infantry Ba Fort Thomas, directed by Ernest G. I

8:00 P. M.—Abergh's concert ensemble 10:00 P. M.—Bong program.

:30 P. M.—Special concert. WSB-ATLANTA-429.

3:06' P. M:-Classical music.

6:30 P. M.—Dinner concert. 7:30 P. M.—Popular songs. 8:30 P. M.—Musical program

M .- Orchestra.

9:00 P. M.— 11:45 P. I

8:45 P. M.—Ballroom banquet. 9:30 P. M.—Musical program:

8:30 P. M .- Banjo-violin duet.

M.—Musical program.
M.—Midnight revue.

M .- Concert program.

6:30 P. M.-"Adventure Story."

11:00 P. M.—Organ concert.

M.—"Science Up to Date."
M.—Drama, "The Sea Guil."

11:00 P. M.-Program of chamber music.

:05 P. M.-Warren Minnerly, popular

selections. 9:45 P. M.—Richard W. Douglas. 10:00 P. M.—Warren Minnerly.

30 P. M. Concert by B. U. Taylor,

M.—Recital from studio.

M.—Talk by Mr. Samuel Lacier;

30 to 5:00 P. M.—Popular songs. 30 to 12:00 Mid.—Popular concer

M.—Musical program.
M.—Concert.
M.—Musical program.
M.—Dance music.

:00 to 10:30 P. M. Popular concer

M.—Dinner music. M.—Tom Daly, poet.

M.—Orchestra. M.—Grand organ recital.

M.-U. S. army night. M.-T. S. Rowe, director general

WDAF-KANSAS CITY-411. :00 P. M.-Address, E. O. Moffatt; address, J. Frank Smith. The children's story and information period. Music.

KYW-CHICAGO-336. -News, financial and final mar ket and sport summary. 8:10 P. M.—Clyde Doerr and his orchestra. 9:01 P. M.—Program furnished by the Ame ican Farm Eureau Federation. 9:30 P. M.—Musical program. WRC-WASHINGTON, D. C .- 469

5:15 P. M.-Instruction in Interna 3.00 P. M.—Stories for children by Peggy WWJ-DETROIT-817. M.—Philharmonic Quartet

WGR BUFFALO-319, M.—Dinner music.
M.—Broadcasting of all daily WOAW-OMAHA-528.

WMC-MEMPHIS-500 M .- Lecture by Dr. S. Parkes Cad-M .-- The Frolic.

WJAZ-CHICAGO-448. M .- Musical program. WHAS-LOUISVILLE-400. M -Concert. Dance program. WSB-ATLANTA-429.

WOS-JEFFERSON CITY-441. P. M.-Inauguration program, Line WFAA-DALLAS-476. M.—Musical recital. M.—Popular dance music program. WLW-CINCINNATI-309.

M.—Special Odd Fellow program. KSD-ST, LOUIS-546. M -Tincoln Day banquet; KSD-ST, LOUIS-546. M.—Recital by Mrs. William is, soprano; address, "Weeds I icine." O. S. Ledman.

WHB-KANSAS CITY-411. M.—Educational program. M.—Regular Tuesday eve WCAE-PITTSBURGH-426. M.—Dinner concert. M.—Uncle "Kaybee." M.—Address.

M.-Address. WDBC-LANCASTER, PA.-258. WQAN-SCRANTON, PA.-286. WJAX-CLEVELAND-390-

WOAN-LAWRENCEVILLE-366 130 P. M.-Music WQAE-SPRINGFIELD, VT.-275.

7:30 P. M.—Concert. 10:30 P. M.—Concert WQAM-MIAMI, FLA.-360. WRR-DALLAS-360,

8:00 P. M.—Music. CKAC—MONTREAL—430. M .- Vocal numbers. KFEX-MINNEAPOLIS-261.

WDAG-AMARILLO, TEX.-263. WIAO-MILWAUKEE. WIS .- 366. 8:00 P. M.-Special talks and music WLAG-MINNEAPOLIS AND ST. PAUL-417

WHAH-JOPLIN, MO.-283. 10.00 P M -Vocal and instrumental music WMAY-ST. LOUIS. MO .- 280. WMAQ-CHICAGO-448.

9:30 P. M.—'Lincoln," by Mrs. Eleanor Gridley; the Gettysburg address. 10:15 P. M.—La Salle Hotel Dance Orchestra. KZN—SALT LAKE CITY, UTAH—485. 8:00 P. M.—Educational lecture. 9:00 P. M.—Musical program. 11:00 P. M.—Musical program. :00 P M .- Music talks, stories. KLX-OAKLAND, CAL.-509.

KFAY-MADFORD, ORE.-283. KPO-SAN FRANCISCO-423. M.-Palace Hotel Dance Orche KIT-LOS ANGELES-469.

:00 P. M.—Cocoanut Grove Orchestra :00 P. M.—Examiner concert. :00 A. M.—Movie program. KGG-PORTLAND, ORE.-360

30 P. M.—Phonograph selections. KMO-WACUMA, WASH,-360. KHJ-LOS ANGELES-395.

> KGO-OAKLAND-312. M .- Musical program.

WEDNESDAY

:00 P. M.—Address, weekly health talk Program by faculty of the Kansas Cit University. 12:45 A. M.—Novelty-Singing Orchestra. WEAF-NEW YORK-492. 1:00 A. M.—Health talk; talk by Columbia University; consolidated market and weather reports by United States and New York State departments of Agriculture and American Agriculture. 2:00 Noon—Chapel services direct from Columbia University chapel, with address by Chapaley Knox and anthems by the choir. lumbia University chapel, with address by Chaplain Knox and anthems by the choir. 14:00 P. M.—Michael Harapi, Hawaiian guitar player; Morton Sherdahl, barytone; Marguerite Gilbert, soprano; children's hour, stories and songs.

7:00 P. M.—Religious services under the auspices of the United Synagogue of America; united daily sport talk; Fanny Wilson Palmer, pianist; talk; under the auspices of American Agriculturist; talks; Somph Kulmayer, violinist, accompanied 00 A. M.-Cocoanut Grove Orchestra 1:00 P. M.-Regular program. uspices of American Agriculturist; talks Joseph Kulmayer, violinist, accompanie by Meredith Manning; Harold Land, bary 10:00 P. M.-Music, talks, stories. with assisting artists.

WJZ-NEW YORK-455. WMAQ-CHICAGO-148. M.—Francisco Sanchez, tenor. 8:00 P.
M.—Recital by Adaline Cross, 8:30 P. KFAE-PULIMAN. WASH.-320.

WGAW-ALTOONA, PA.-261,

WSAC-CLEMSON COLLEGT, S. C. 360. WARL-STORRS, CONN.-283. WBL-ANTHONY, KAN.-261.

rection of Bernhard Levitow, the Hotel Commodore.
30 P. M.—Closing reports of the New York
bearing the Department of Farms and Markets;
closing quotations M.-Music WCAO-BALTIMORE-360. M.—Concert. M.—Program of popular music 7,35 P. M.—Dance program by Irving Selzer and his Cafe Boulevard Orchestra.
7,45 P. M.—"The Progress of the World." a "Review of Reviews" talk.
7,00 P. M.—Dance program by Irving Selzer and his Cafe Boulevard Orchestra. KMO-TACOMA, WASH -360. 15 P M .- Artists' program. WQAE-SPRINGFIELD, VT.-275. o ms Cafe Boulevard Orchestra.
P. M.—A city officials series talk by
Frank J. Monaghan.

CKAC-MONTREAL-430.

KHJ-LOS ANGELES-395. M. Broadcasting Art Elckmans' Or WFAV-LINCOLN, NEB.-275.

KOB-STATE COLLEGE, N. M.-485. 30 P. M. Concerts, lectures and information WOAN-LAWRENCEBURG-360. WHA-UNIVERSITY OF WISCONSIN-380 8:30 P. M. Educational and agricultural WTAW-COLLEGE STATION, TEX.-280

HPO SAN FRANCISCO 423.

11:00 P. M.-B. Max Bradfield's W. Band. KGG-PORTLAND, ORE.-360.

WPAK-FARGO, N. D.-360. KIX-OAKLAND, CAL.-509 KFFQ-COLORADO SPRINGS, COL.-360 00 A. M.-International concer

THURSDAY

WEAF-NEW YORK-492. A. M.—Popular Thursday morning with Consolidated Market and her reports by U. S. and N. Y. State riments of Agriculture and American 100 P. M.—Vernice Gay, planist, and Mary Louise Gale, violinist; Rose Ferris, sorprano; Billy Cripps, tenor.
100 P. M.—Midweek service under the auspices of the New York Federation of Churches; United Daily Sport talk. Lilliebelle Barton, soprano, and Sherman Small, barytone; talk; Concert by the Thrane Trio direct from Hunter College. "Corumbia Recorders." Old Rashloned Southern Minstrel by the Eveready Entertainers.

by prominent person in connection "Father and Son". week. Vincent 2 and his oroniestra from the grill e Hotel Pennsylvania. WJZ-NEW YORK-455.

30 P. M.—Closing reports of the New York State Department of Farms and Markets: Farm and Home reports; closing quota-tions of the New York Stock Exchange foreign exchange quotations. 00 P. M.—"Jack Rabbit Stories" by David

Cory.
7:30 P. M.—Song recital by Capt. R. D.
Jones, barytone, of the S. S. Berengaria,
Cunard Line.
7:45 P. M.—The world's work.
8:00 P. M.—Song recital by Capt. R. D.
Jones, barytone, of the S. S. Berengaria,
8:15 P. M.—Evening organ recital on the
Auditorium organ, direct from the Wanaretransmitted from ton NAA at Arlington.
P. M.—Recital by Creighton Allen,

pianist. 0:30 P. M.—Dance program by the Hotel modore Orchestra, under the personal ction of Bernhard Levitow, direct from WJY-NEW YORK-455.

7:30 P. M.—Program by the New York School of Music. 8:30 P. M.—"Golf," by Innis Brown. 8:45 P. M.—Emerson program direct from the Emerson Recording Laboratories. 10:00 P. M.—"Home Building," by William Harman Reers. M.—Estelle Fuerstenberg, M.—Charlotte Woodruff, I

by Charlotte Wooden as 3.35 P. M.—Estelle Fuerstenberg, violinist. 3.45 P. M.—Helen Lowell. 6.15 P. M.—St. Valentine's Day readings for children by Constance Irwin. 6.30 P. M.—"Music While You Dine." featured by Tom Cooper's Country Club Orured by Tom Cooper's Country Club Orure. weather reports by the United States an New York State departments of agriculture 4:00 P. M.—Marguerité Eckenroth, soprana accompanied by Katherine Eckenroth, Recital by the Banjo Trio. Children's Houst of the Control of the Contro WOO-PHILADELPHIA-509.

2:00 M.-Luncheon music by the Tea Room Orchestra. 4:45 P. M.—Grand organ and trumpets. WDAR-PHILADELPHIA-395. P. M.—Artist recital.
P. M.—Dream Daddy with the boys and WIP-PHILADELPHIA-509.

facturers' Club. 11:15 P. M.—Ted Weems and his Cafe L'Aig-WFI-PHILADELPHIA-509.

WBAP-FORT WORTH-476.
M -Concert by the Fort Worth High M.—Concert by the North Side Man-Club Orchestra WSAD-PROVIDENCE-261 M.—Musical program.
M.—Children's features, by "Foster Lady," Mrs. Bessie Archer Ander

8:15 P. M.—Concert by the String Orchestra of the Women's College in Brown Uni-

WNAC-BOSTON-278. M.-WNAC dinner dance. M.—Organ recital. M.—Concert program. WGI-MEDFORD HILLSIDE-360. on P. M.-Concert. WBZ-SPRINGFIELD-337. **OO P. M.—Concert by the Springfield Con1:00 P. M.—Concert by the

6:15 P. M.—Dinner concert. 8:30 P. M.—Concert by the KDKA Little Symphony Orchestra. 11:30 P. M.—Special late concert. WGY-SCHENECTADY-380. :30 P. M.-Dinner music by Romano's Or

chestra. 7:45 P. M.-Musical program. Address, Few Moments with New Books." WDAP-CHICAGO-366 M.-Organ concerts.

7.30 P. M.—Dinner music.
8:00 P. M.—Wisner music.
8:15 P. M.—Wisnes setting of Longfellow's
"King Robert of Sicily."
8:30 P. M.—Special musical program,
9:15 P. M.—Grand organ recital.
10:03 P. M.—Kentucky Kernels Dance Or KWY_CHICAGO-536. 9 20 P. M.—Musicar 10:15 P. M.—Program. announced by radiophy WRC-WASHINGTON, D. C.-469. 5:15 P. M.—Instruction in international code 6:00 P. M.—Stories for children, by Pegg

WGR_BUFFALO-319. 6:30 P. M.—Dinner music. 7:30 P. M.—Digest of the day's news. I dustrial employment bulletin. The Ame WWJ_DETROIT_517 M .- The Detroit News Orcchestra M.—Dance music.
M.—The Detroit News Orchestra.

WOC-DAVENPORT 484. —Sandman's visit. —Musical program. WMC-MEMPHIS-500

KSD-ST LOUIS-546

WDAF-KANSAS CITY-411

WHB KANSAS CITY-411.

WCAE-PITTSBURGH-426

M .- Uncle "Kaybee" Talk.

WDBC-LANCASTER-258

WRAW-READING, PA.-238

WJAX-CLEVELAND-390

WQAE-SPRINGFIELD, VT.-275.

WEAO-COLUMBUS-369.

CKAC-MONTREAL-425.

30 P. M.-Canadian Pacific Railway

chestra; talk. 10:30 P. M.-Jos. C. Smith and his Mo-

WMAQ-CHICAGO-448.

7:30 P. M.—Boy Scouts Weekly Talk. 8:30 P. M.—La Salle Hotel Dance Orchestra 9:15 P. M.—Acollan Male Cartet.

WLAG-MINN. AND ST. PAUL-417.

KPO-SAN FRANCISCO-423.

KFI-LOS ANGELES 469.

KGO-OAKLAND-312.

KHJ-LOS ANGELES-395.

1:00 A. M.—Program arranged by Harry Knox, flutist, broadcasting Art Hickma

FRIDAY

WEAF-NEW YORK-492.

stories and songs. 15 P. M.—Beatrice Lilly and Jack Bu-chanan, singing comedians. United daily, sport talk; Ted Schmidt and Harry Regan, resolver singers. Battery Instruction Talk

sport talk; Ted Schmid: and Harry Responder singers; Battery Instruction Taby George Furness. "The Happiness Boys Billy Jones and Ernest Hare; music by t World Mutual Instrument Trio, and a ten the "Care and Safe Operation of Atomobiles" by Major A. A. Stewart; Fischer, Dance Orchestra.

W.IZ-NEW YORK-455.

12:15 P. M.—Noon Hour of Music from the Brick Presbyterian Church.
3:00. P. M.—Organ recital played by Leo Riggs on the Hotel Astor organ.
5:00 P. M.—The. Larger Aspect of World Affairs." by the International Interpreter.
5:30. P. M.—Closing Reports of the New York State Department of Farms and Markets; farm and home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; "The Condition of the Leading Businesses."
7:00 P. M.—MacDowell program, under the auspices of the Music Study Club of Newark.

ark. 30 P. M.-Burr McIntosh, the Cheerfu

Philosopher. 7:50 P. M.—MacDowell program, under the auspices of the Music Study Club of New

ark.

8:15 P. M.—Looseleaf Current Topics.

8:30 P. M.—Concert by the Amherst College Musical Clubs, direct from the Grand Ballroom of the Ritz-Carlton Hotel.

16:30 P. M.—Dance program by Paul Specht and his Alamac Hotel Orchestra, direct from the Congo Room of the Alamac Hotel.

WJY-NEW YORK-455.

Orchestra. 8:15 P. M.—The Honorable Julius Berg, "The Work of the New York Assembly." 8:30 P. M.—Program by the Brooklyn Edison

M.—Frank Shevitt, "Income Taxes M.—Program by the Brooklyn Edise

12:15 P. M.-Noon Hour of Music from

:00 A. M.-Lecture by Dr. Walter rosch, direct from Town Hall, New

M.—Ambassador Hotel concert.
M.—"Examiner" concert.

M.—Organ.

V.—May Bradfield's dance orchest

M.-Orchestra.

M .- Educational talks, concerts,

M.—Special program; Strubinski,

30 P. M.-Music

9:05 P. M.-Victor Wilbur in request popu M .- Chisca Philharmonic Ore! 15 P. M.-WRW Trio 9:10 F. M.—Boy Scout Activities. 9:30 P. M.—Boy Scout Activities. 9:45 P. M.—Flute solos by Norman Hastings. 10:00 P. M.—Victor Wilbur in popular songs. WIAZ-CHTCAGO-448 M .- Musical program WHAS-LOUISVILLE-406

WSAD_PROVIDENCE-261. M.—Musical program.
M.—Children's features by "Foster's
M.—Children's features by "Foster's
M.—Children's features by "Foster's 9:00 P. M.-Music. 11:45 P. M.-Special program for 6:30 P. M.-Musical program continued, WFAA-DALLAS-476. WNAC-BOSTON-278. 9:30 P. M.—Musical program. WLW—CINCINNATI—309. 6:30 P. M. WNAC dinner dance. 8:00 P. M. Concert program. To be nounced by radiophone.

WGI-MEDFORD HILLSIDE-360. 30 P. M.-Verses; health talk; musicale, 15 P. M.-Boy Scout oath, :00 P. M.-Glee Club of Shurtleff College WBZ-SPRINGFIELD-337. :00 P. M.-Address: the children's story information period; music. 2:45 A. M.—Novelty Singing Orchestra; pipe organ recital by Miss Norma Mannering. KDKA-PITTSBURGH-326.

M.—Musical program by the Con Musical Clubs of Lafayette Colle

Castern Pennsylvania. P. M.—'Music While You Dine,' Ben

configuren, 190-7130 P. M.—"Music While You Dine" by Ben Friedman Entertainers, augmented by George Perry's Singing Orchestra.

WOO-PHILADELPHIA-509.

WDAR-PHILADELPHIA-395.

30 P. M .- Program of dance music, by

WIP-PHILADELPHIA-509.

WJAR-PROVIDENCE-509

WBAP-FORT WORTH-476.

WRW-TARRYTOWN-273.

Band. Concert of novelty nature.

3:30 P. M.—Bellevus Street

0:10 P. M.-Howard Lanin's Dance Or-

-Artist recital -Dinner music by the Jordan nea Orchestra.

P. M.—Popular dance program by the Trank R. Marks Orchestra and the Swee-WGY-SCHENECTADY-380. WDAP-CHICAGO-360. 1:00 P. M.-Organ concerts

KYW-CHICAGO-536. M.-Dinner concert, WRC-WASHINGTON, D. C.-469 M.—Piano recital.

M.—A talk on the navy by Admiral

M,-Concert by the United States WGR-BUFFALO-319. WWJ-DETROTT-517.

8:30 P. M.—The Detroit News Oren WOC-DAVENPORT-484. M.—Sandman's visit.
M.—Sunday school lesson.
M.—Musical program. WOAW-OMAHA-526.

-Dinner program. -Independent Order B'nai B'rith WMC-MEMPHIS-500. Miss Gladys Sarber.

Burl Grant's entertainers WJAZ-CHICAGO-448. WHAS-LOUISVILLE-400. 8:30 P. M. Concert given by students

WSB-ATLANTA-429. 9:00 P. M.—Popular music. 11:45 P. M.—Transcontinental WOS-JEFFERSON CITY-441. WFAA-DALLAS-476,

9:30-Musical variet KSD_ST. LOUIS_546. 9:00 P. M .- Concert by Civic Orchestra. WANSAS CITY-411. 00 P. M.-The children's story and formation period; music. 3:00 P. M.—Classical program. 12:45 A. M.—Novelty singing of WHB-KANSAS CITY-411. on P. M.-Piano solos and songs

KZN-SALT LAKE CITY-485. M P M -Music talk, stories. CKAC-MONTREAL-425 M.-Weather, news, stock repor M.-Mount Royal Hotel Dance

WMAQ-CHICAGO-448. _...Wide Awake" Club program 1.—Music memory contest.
1.—La Salle Hotel Dance Orchestra KHJ-LOS ANGELES-395. P. M.-Program arranged by Floryane Thompson, soprano. 300 A. M.—Broadcasting Art Hickman ETS_OAKTAND-360.

M.—Musical entertainment WRR-DALLAS-360. KFI-LOS ANGELES 469 M.—Evening Herald concert. M.—Examiner concert. M.—Examiner concert.
M.—Vocal and instrumental c.
M.—Cocoanut Grove Orchestra. KFAY-MEDFORD, ORE,-283.

WPAB-STATE COLLEGE, PA.-283 KEX-OAKLAND-509. M.—Studio program. WHK—CLEVELAND—360.

M. Concert and dance music KMO-TACOMA-360. A.—Popular program. M.—Artists' program. WOAN-SCRANTON-280 WLAG-MINN, AND ST. PAUL-417. SATURDAY

WEAF-NEW YORK-492. Friedman Entertainers.

30 P. M.—Foreign Policy Association luncheon direct from Hotel Astor, New York Processing Policy Association and Processing Policy Astor, New York Processing Policy Association Processing Policy York city. Dance program by the Carolinians Orchestra: Helen Albus, soprano. 130 P. M.—W. C. Fields, comedian monolog-ist: David Franklin, planist, and Tom Butler, barytone: "The Chiclet Trio," Myra Butler, barytone; The Chiclet Trio," Myra Burtis Bindenberger, contratto, accom-panied by George Vause. Recital by George Vause, planist; Bernard Ahrens, barytone, Vincent Lopez and his ovchestra, direct from the Grill of the Hotel Pennsylvania.

WJZ-NEW YORK-455. :00 P. M.—Charles Phillips, planist. 30 P. M.—Charles Phillips, planist. leader; direct from the balcony of the 1c.
Room of the Hotel-Belmont.
100 P. M.—Famous Fain Orchestra.
100 P. M.—Glosing reports of the New Yor
State Department of Farms and Markets
farm and home reports: closing guidation
of the New York Stock Exchange; foreig
synthesis motoling Prizabetries's financia

report. :00 P. M.—"Uncle Wiggily Stories," by Howard Garis, 8, 200 P. M.—"The Asset Value of the Ocean Liner to a Port," by Emerson E. Parvin, 8:40 P. M.—Dr. Alfred N. Goldsmith, director of Research of the Radio Corporation of America; "Applying the Golden Rule in Radio"; one of the "Highlights of, Modern Radio Broadcasting" series of talks. talks. 15 P. M.—"In a Persian Garden" (quarfet), accompanied by Creighton Allen.

9:45 P. M.—Harold Lieberman, violinist, accompanied by C. Allen.

9:55 P. M.—Time signals and weather forecast retransmitted from the Government. cast retransmitted from the Government station NAA at Arlington.

ccompanied by C. Allen. 20 P. M.—"English Folk Songs," Kenneth WOR-NEWARK-403. 2:30 P. M.—Troadcasting from Radio Ex-position, L. Bamberger & Co. 2:30 P. M.—Frank Dailey's Meadowbrock Dance Orchestra.

3.10 P. M.—Baroness Leja de Torinoff in a short talk on "The Russlan Revolution from a Woman's Viewpoint." Talk to be followed by a group of Russian folk songs.

3.30 P. M.—Frank Dailey's Meadhwhicolk Dance Orchestra.

6:15 P. M.— "Music While You Dine." Paul.

Van Loan and Iris Cinderella Dance Orchestra of New York. Fred J. Bendel h.
his weekly talk on "Sporting News-Up-tothe-Minute."

8:00 P. M.—Gene Ingraham and his Bell.

Record Orchestra.

"What America Owes Europe."
9:45 P. M. Joint program by Miss Mary Dell Dowman, soprano; Lorraino man, violinist; International Trio. WOO-PHILADELPHIA-503. WDAR-PHILADELPHIA-395.

Record Orchestra.
9:00 P. M.—Second talk on the Law and

Income Tax by John Armstrong. 9:15 P. M.-J. Bernard Walker speaking on

1:30 P. M.-Dream Daddy with the boys and WSAD-PROVIDENCE-261. 6:00 P. M.-Dance 6:30 P. M.—Bellevue-Stratford Hotel Concern Orchestra. 10:10 P. M.—Charlie Kerr's Orchestra.

WIP-PHILADELPHIA-508 3:00 P. M.—Paul Whiteman Orchestra 6:05 P. M.—Dinner music by the Gre Village Serenaders 10:15 P. M.—Ted Weems and his Cafe L'Aig. WJAR-PROVIDENCE-509.

WBAP-FORT WORTH-476.
M. - Interdenominational 8:00 P. M. Interdenominational school lesson and radio Bible cle WNAC-BOSTON-278. 6:30 P. M.—WNAC dinner dance. 8:00 P. M.—Program to be announced by

9:00 P. M.-Dance music WGI-MEDFORD HILLSIDE-360. 7:30 P. M.-Ballroom dancing lesson; must WBZ-SPRINGFIELD-377. 7:00 P. M. Dinner concert. 8:00 P. M. Concert by Harry Knight, same

KDKA-PITTSBURGH-326 for Small Incomes," Robert D. Ayars. 8:30 P. M.—Concert by the Westinghouse

WGY-SCHENECTADY-380. 9:30 P. M.-Dance music, by Jack Symones' WDAP-CHICAGO-360. M.—Organ concert; popular musica KYW—CHICAGO—536.

WRC-WASHINGTON, D. C.-469. :00 P. M .- Stories for Children, by Perry WGR-BUFFALO-319

WOC-DAVENPORT-484 4.-Sandman's Visit. -Orchestra program WMC-MEMPHIS-500 M.-Old Time selections. WJAZ-CHICAGO-448

1:00 P. M.-Musical program, by Origin WHAS-LOUISVILLE-400 8:30 P. M.-Classical concert. WSB-ATLANTA-129.

:00 P. M.—Music. 1:45 P. M.—Late entertainment WTAM-CLEVELAND-396. M.—Dance music.
WFAA—DALLAS—476 :00 P. M.-Recital by Southern Methods

2:00 M.-Dance music program KSD-ST, LOUIS-546. 0:00 P. M.—Orchestra concert, organ recital, vocal and instrumental specialties. WDAF-KANSAS CITY-411.

WCAE-PITTSBURGH-126.

:00 P. M.—Address, Edgar A. Linton, write and lecturer; the children's story and to formation period; music, (2:45 A. M.—Novelw Singing Orchestra. WOAE-SPRINGFIELD. VT.-275. 30 P. M.-Concert. WGAW-ALTOONA, PA.-261,

:00 P. M .- Program.

M.—Dinner concert... M.—Uncle "Kaybee." KFGC-BATON ROUGE, LA.-254 9:00 P. M .- Debate. L. S. U. Band.

A Device for Measuring the Per-Stage Audio Amplification

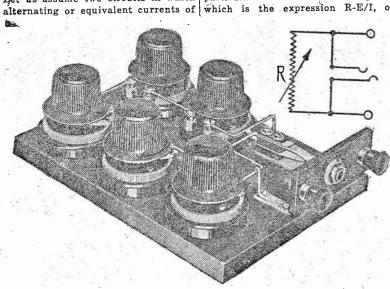
With Simple Apparatus It Is Possible to Approximate the Effectiveness of the Audio Amplifier of Any Set Using Jacks

By Zeh Bouck

Engineer, Amsco Products, Inc. T IS often desirable for experi- signal I found 150 ohms to be suffimental purposes or personal sat- cient.) isfaction to measure the per The accompanying illustration sugstage amplification of an audio fre. gests a neat and efficient way of arquency amplifier. The "experimental ranging the rheostats. The terminals purpose" to which this measurement of the open circuit jack are wired to purpose to which this measurement the two binding posts, and the five wave rectifying system. The differthe average enthusiast is the comparison of various tubes or transformer, the jack. If the telephone receivers in the characteristic of the output resistor and impedance coupled are now plugged into the jack and the stages. While most laboratory measurements are fraught with mechanical plug, this simple apparatus is ready the total output current with a full and theoretical complexities, the obticle are easily made on any amplifier of the first stage of a three-step reticle are easily made on any amplifier equipped with jacks and with auxiliary apparatus no more involved than a pair of telephone receivers and a bank of five-thirty-ohm rheostats. The cision test, several elements of error

it provides an approximation adequate for its purpose. If a more accurate determination of intensification is desired it will of the shunt is now noted. This can of the output current is that of only be necessary to measure carefully the various constants of the tube and circuit and to calculate according to amplification formulas—a complete operation far more involved than the simple system to be outlined. Voltage Amplification amplifier we are testing.

The average fan is interested in the voltage or current amplification first stage output, which, in this par(the same thing) of his amplifier. ticular set, the shunt resistance is can be omitted. Many fans believe Therefore, if the effective alternating 20 ohms. For greater accuracy these that the reason for the filter circuit currents in the plate circuits of two lower values should be measured. is because half-wave rectification is adjacent amplifying stages (detector | (The resistance of any circuit is al- used. The output of all such rectiand first stage or first and second ways equal to the voltage divided by fiers must be filtered if satisfactory stages) can be determined, the com- the current or R-E/I. The resistance D. C. is desired. The ordinary out parison of one over the other will of the shunt may easily be determined put of a rectifying system is not indicate the amount of amplification. in accordance with this expression of D. C. but pulsating D. C., which cur-By the theory of shunt circuits it ohm's law, as already suggested. The rent if applied to the plates of the is possible to state the relative resistors are disconnected from the various tubes in a receiving system values of alternating currents in two receivers, the phone plug removed would be entirely useless as D. C. or more circuits in terms of a unit and the rheostats wired in series with plate potential. Hence filter circuits



the same frequency are flowing. The 1.5/.075-20 ohms, the resistance of than the current in circuit No. 2. We now have sufficient data to cal-The difference in current strength culate the amount of amplification in plugged into the respective circuits. The formula is I-Ip(R1+R2)/R2, Philharmonic to Play Novelty The sound in one case will be louder where I is the effective alternating than in the other. Now, if we shunt plate current, Ip the portion of I A novelty will be introduced into the telephone receivers with a vari- passing through the telephone receiv- the program of the New York Philable resistance we can in each cir- ers, R1 the resistance of the phones, harmonic Orchestra's concert from cuit reduce the current through the and R2 the value of the shunt re- the Lewisohn Stadium to be broadreceivers until the sound is just au- sistor. The resistance of the tele- cast by station WJZ at 8:30 Wednesdible. Quite naturally, we shall cut phone receivers used by the author day night. The name of this compoless resistance into the second circuit was 2,000 ohms. Therefore, in the sition is "Andante," a selection writthan into the first in reducing to this detector circuit I-Ip(R1+R2)/R2-Ip ten by Roy Harris, and this will be minimum signal intensity. Then, by (2,000+140)/140-2,140Ip/140-15.31p. the first time that the work has been a comparison of the various known In the first amplifying stages we rendered by the Philharmonic Orchesresistance values in each circuit, we have I-Ip(R1+R2)/R2-2,020Ip/20-101 tra in New York City. Another comare able to calculate how much more Ip. intense the current is in one circuit The amplification is, of course, the at that time will be the Symphony in than in the other without actually current in the second circuit of the D minor of Cesar Franck. This will knowing the amperage flowing in current in the first circuit, or 101Ip/ be the third concert of the 1926

It is analogous to the instance of The same procedure is followed out van Hoogstraten will wield the contwo moving bodies—automobiles per- in comparing other stages. However, ductor's baton. haps-one of which covers a given in measuring the higher steps of amdistance in half the time required by plification, the input should be rethe other. It is obvious, regardless duced by detuning until a minimum of their actual speeds in miles per signal is obtained, on the lower of hour, that one car is moving twice as the stages to be compared, with a shunt resistance of over 130 ohms.

Appli ing the Idea "Side-Cutters" Handy Tool The variable resistance for the purpose of the fan may conveniently be There is a tool known as "sidefive or more rheostats connected in cutters" which looks very much like series. Rheostats having accurate a pair of pliers, except that instead values will facilitate measurements. of having flat gripping noses the two The author chose five 30-ohm theo- jaws are sharpened to cutting edges stats manufactured by the Amsco and taper together to a half round Products, Inc. (If it is impossible to front. It is designed entirely for obtain adequate signal adjustment on wire cutting, and is more convenient the detector artput, more rheo tats than a regular pair of pliers with can be added I wever, on a good the cutting blades below the nose.

Some Data on Radio 'B' Battery Eliminators

A large number of radio fans are under the impression that a full wave "B" battery eliminator supplies an output current twice that of a half wave unit. This idea is especially prevalent among fans who use two rectifying tubes in a full wave rectifying system and only one tube in a half-wave rectifier,

That impression, however, is erroneous. A full wave rectifying systwice the value obtained with a half We shall measure the amplification that obtainable with a half-wave

the rheostats adjusted until a signal The reason for the non-doubling of minimum audibility is heard. The of the output of the full wave rectiresistors should be adjusted again and fier is in the phenomena that each again to accustom the ear exactly to half of the full wave is rectified entering into the system. However, this intensity. (In making this ob- alternately. At no time do both servation the detector tube should be units in a full wave rectifying sysoscillating, giving a low beat note on tem function simultaneously. Hence an incoming signal.) The resistance at any moment the approximate value be measured with a milliammeter and one tube. So we see that a halfa dry cell if desired, or, with good wave rectifier will supply almost as rheostats, merely observed. If four much current as a full wave unit, rheostats are all the way in, and the but the output current of a full wave fifth two-thirds in, the resistance will rectifier is much smoother and more be 140 ohms, as was the case in the closely approximates the desired D.C.

Now with respect to filters, the A similar reading is made on the use of a full wave rectification does common to each without actually a new dry cell and a milliameter. are essential if D. C. is desired, irremeasuring the current in amperes. The current reading is noted. In this spective of the type of rectification Let us assume two circuits in which particular instance it is .075 amperes, being employed.

Peerless Male Quartet in

Twentieth Birthday Program The Peerless Male Quartet, comoosed of Albert Campbell, first tenor; Henry Moeller, second tenor; John Meyer, barytone, and Frank Croxton, basso, will celebrate its twentieth birthday since its organization with an anniversary program from WFBH

Albert Campbell is the originator of the group, having organized it wenty years ago, while John Meyer follows with fifteen years' connection with the quartet, and Frank Croxton, twelve. The quartet has been recording for Victor, Brunswick, Columbia and other companies for the last fif-

Their program to-night will include Come Where My Love Lies Dreamng," "O, Suzanna," "Old Black Joe," 'Camptown Races," a medley of Stephen Foster songs and Victor Herbert's "Gypsy Love Song," a bass solo by Frank Croxton

"Andante," First Time Here position which the orchestra will play series at the stadium and Willem

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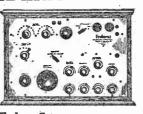


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Herald York Tribune RADIO MAGAZINE

SECTION IX

maintained over a given distance with the

expenditure of much less power. By in-

troducing the signaling key into appropriate circuits where low current values

prevail, exceedingly high signaling speeds can be attained, thus enabling the

stations to handle more traffic and con-

ferring upon the service a measure of

Probably one of the most extensive,

fastest and highly developed and organ-

ized networks of radio telegraph communi-

cation in the world is that at present in

operation between Great Britain and Con-

tinental Europe. This network has grown

up within the last few years, and is

steadily expanding. It is operated and

controlled from London by the Marconi

Company, and at the various European

terminal stations by associates of that

company, which also controls from Lon-

don a high speed trans-Atlantic service,

operated and controlled on this side of the

Atlantic by the Radio Corporation of

The Nerve Center

There are at present five European serv-

ices in operation between London and the

following capitals: Paris, Berne, Madrid,

Barcelona and Vienna, and a license has

been granted for the extension of the

America.

SUNDAY, JULY 11, 1926

Britain Has High Speed Radio Telegraph Service With Continent

Automatic Transmitters Make Possible Sending Messages at a Rate of 100 Words a Minute

By A. DINSDALE

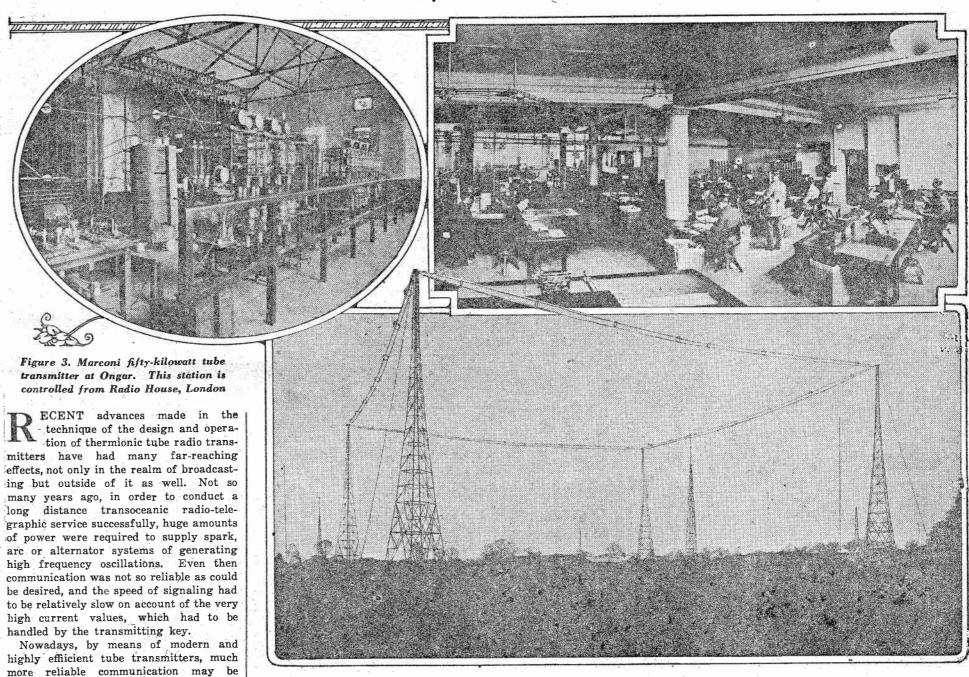


Figure 2, above—Panoramic view of the central telegraph office at Radio House. Figure 4, below—The Marconi receiving station at Brentwood, Essex. The four main towers carry the Trans-Atlantic aerial system.

with Bulgaria, Denmark, Finland, Greece, | the receiving station is worked duplex and | units. Figure 2 is a panoramic view of Turkey.

All the existing services, including the trans-Atlantic, are entirely operated from one central office, known as Radio House, which is located in the heart of the city of London, and as new services are opened these also will be controlled from the same office. This policy of centralization has also been carried out in the case of the actual transmitting and receiving stations, the former being located at Ongar and the latter at Brentwood, both of which places are about thirty miles from London in a northeasterly direction. Land lines connect both Ongar and

Brentwood with Radio House, over which all outgoing and incoming traffic is relaved to and from the transmitting and receiving stations. The relative positions of Radio House, Brentwood and Ongar are shown on the map accompanying this article, while the other diagram illustrates the manner in which the three centers are linked together, but for the sake of simplicity the land lines required for operating one service only are shown. service to include direct communication | The land line between the control office and | and may be considered as standard control

Portugal, Russia, Jugoslavia, Sweden and over this line are relayed the incoming the control room in Radio House, showing signals, while the control of the transmitter is effected through a simplex extension from the receiving station to the transmitting station.

Control Apparatus

The method employed requires close cooperation between the transmitting and receiving operators at the control center, which is facilitated by the arrangement on a common table of the automatic transmitting and receiving apparatus under their charge. Provision is also made for immediate communication between these operators and the attendants at the transmitting and receiving stations. The receiving operator can thus, through the transmitting operator, control the speed of operation of the distant transmitter, while the cause of defective signals may be promptly located and remedied.

The automatic transmitting and receiving apparatus for each service is located on a separate control table fitted with an indicator of the particular service being carried out. These tables are identical

the European circuits on the right and the trans-Atlantic circuits on the left.

The system utilizes the international (Continental) Morse code and consists essentially of the perforator for the preparation of the paper tape which controls the signals sent out, and the transmitter, which sends out signals in accordance with the perforated tape.

Electrically operated keyboard perforators are employed which permit of the tape being prepared at speeds up to eighty words per minute. This perforator utilizes a standard typewriter keyboard, but perforates paper tape with the Morso characters it is desired to transmit, instead of printing the familiar typewritter characters on a sheet of paper. The tape is then passed through a Wheatstone transmitter, the output impulses of which operate the relay of the transmitting ap-

The speed of the tape through the transmitter is controlled by means of the electric driving motor, which permits of

Continued on page five

Additional Radio News Will Be Found in Another Section of To-day's Herald Tribune

Improving the Appearance of the Radio **B** Battery Eliminator

Mounting the B-Power Unit in an Auto Tool Box Makes It Look Like a Commercial Product

By R. C. HITCHCOCK

HE comparatively new B-power unit | wood base was carefully fitted inside and or battery eliminator, taking ordinary house alternating current and delivering rectified direct current suitable for radio sets, is proving satisfactory to its many users. The majority of construction articles on the B-power units have been of the laboratory type or board style of apparatus. It is probably simpler. to construct a piece of apparatus where all parts are readily accessible; and there is no doubt that an instrument so built is as effective as a more compact one. This article departs from the usual practice by presenting the details of making a Bunit which will compete in looks, as well as in performance, with the commercial product.

If you intend to experiment with the B unit it is perhaps advisable to put it on a board at first; it will then be easier to try the effect of larger condensers, different chokes, etc. But if you are making a B unit from instructions given by the manufacturers of the component parts, or have already a board model of a unit which is giving satisfaction, the present article will show a simple and easy way of improving the appearance of the B unit. so that one may feel justified in placing it in a conspicuous place on the radio table, and not feel that it should be hidden from view because of its unfinished

The illustrations, Figures 1 and 2, show how the B-power unit may be mounted in a storage battery box, automobile runningboard style, and its appearance compares favorably with the factory-built units. The baked enamel finish is easy to keep clean, certainly much easier than trying to keep a board type of instrument free from dust.

Tool Box Suitable

A pressed steel auto tool box would also prove suitable for housing a B unit, and the dimensions of the apparatus involved will determine the size and type of box which is secured. If the eliminator is long and narrow, the tool box might be preferable; but if you desire the unit to be more compact, the construction of Fig. 4, using a sub-base, may be employed. For the unit shown in the illustration the auto battery box was found to be deeper than was necessary, and the first operation was to cut off three inches from the lower part of the box. This is perhaps the hardest part of the whole business, and if you do not want to bother with the cutting down, the box may be used with its original depth.

However, by scratching a guide line accurately around the box and using a long hack-saw blade in a wide frame it will be found that with a little care and time the sheet steel can be cut neatly. It is unlikely that tin shears would provide a bend and the enamel would be cracked off

Figure 2. This picture shows how the apparatus used in the construction of

the B battery eliminator may be arranged inside the automobile tool box

secured by heavy round-head (blued) wood screws, three on each side and two on each end. Four "domes of silence," or rubber bumpers, were pounded into the four corners of the wood base to prevent scratching by the cut metal, thus completing the base.

The switches, shown on the end of the box in Fig. 1, are of standard types, and may be purchased at any elctrical store. Some B units will require only the "off-on" switch, so do not buy both switches until you make sure that both are required for your particular unit. The battery eliminator described here employs the Acme full wave transformer which has two taps on the house current side, one for high and one for low voltage; so a switch was necessary to change from one to the other of these connections. A regular three-way switch is the proper one to use for connecting either of two taps. The three-way switch has, as one would expect from its name, three terminals. The end that has only one terminal is the place to connect the wire going to the "off-on" switch (see Fig. 3), and the other two terminals connect to the high and low taps on the transformer, T. By carefully inspecting the switch mechanism it can be found which connection should go to the "high" and which to the "low" ap, and the switch buttons marked appropriately, or the switch plate could be en- leave. These can be installed if the builder

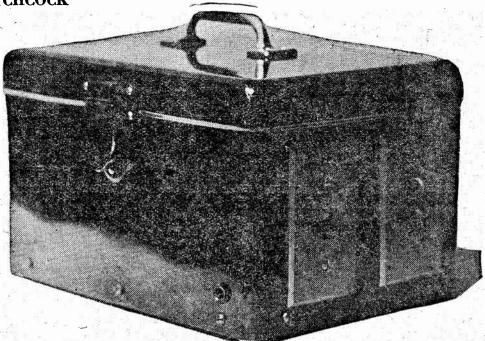


Figure 1. An external view of the B battery eliminator, housed in an auto-

"on" are engraved in white on the tog- | which are resistors in this case, R 1 and gle lever, the position of the switch at any | R 3 of Fig. 3 are shown in Fig. 4. The time can be noted at a glance.

Flush type switches, such as these two are, ordinarily are mounted in wall outlet boxes made of sheet iron with round "knockouts" for the wires to enter and

style of binding posts recommended is one which has the name engraved in white on the cap and whose tops do not come off. This latter feature makes it impossible for the caps to become interchanged, and perhaps applying the amplifier voltage to

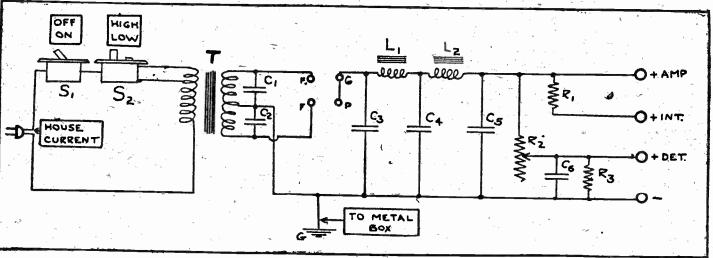


Figure 3. The wiring diagram of the raytheon B battery eliminator circuit employed in the construction of this device

of sturdy sheet meal, the outlet boxes may

be dispensed with and holes cut in the

metal box just large enough for the por-

celain part of the switches and the

mechanism bolted to the box. This is done

by marking lines about one-eighth of an

inch larger than the porcelain part of the

lest of the straight portion. The hori-

zontal cuts will have to be bored along

their entire length unless a hacksaw with

a wide frame is available and the blade

set at right angles to the frame. After

graved. The arrangement on the writer's | so desires. However, as the whole box is | a detector tube, with disastrous results if set was as follows: When the higher voltage was wanted, the upper button was pressed, and when the lower voltage was wanted the lower button was pressed.

The "On-Off" Switch

The "off-on" switch was purposely chosen to be of a different type from the | switch, boring several small holes on the "high-low" switch, to prevent possible operated to turn off the B unit. A toggle switch was the style chosen for the "off-After cutting the bottom off the box, a on" switch, and as the words "off" and

> cutting these holes for the switches it is a good plan to smooth off with a file the sharp edges left by the drilled holes. The variable resistance, shown by R 2 of Fig. 3, may be mounted on the outside of the box, but in the model shown it was put inside the box between the two choke

Mounting Insulated Bushings

A small hole to let in the wires which connect to the house current is drilled near the edge of the box. In this hole is inserted a small insulating bushing, such as is used for drop cord lamp sockets. The hole may be drilled small and tapped with a one-eighth-inch pipe tap to fit the bushing thread, or it may simply be drilled large enough for the bushing to pass through freely, and then rubber cement or shellac applied to keep it in place.

The outlets for the direct current to pass out of the container to the radio set are similar to that which lets in the house current just described. The outfit has four binding posts: (1) Amplifier plus, (2) intermediate (90 volts) plus, (3) detector (22 volts variable) plus, and (4) the common negative lead. These connections and the mounting of the grid leaks, a soft detector tube was being used.

The complete wiring diagram showing the switch connections is given in Fig. 3. This is the regular wiring scheme using the Raytheon tube and the Acme transformer, with the addition of the connecline, then inserting a hacksaw to cut the tion, G, of the negative post to the metal box housing the B unit. Also—and this is important-a portion of the containers of the condensers and chokes should be scraped clean and bright and a wire solnected together to the common negative terminal. These wires were omitted from Fig. 3 in simplifying it as much as possible.

Necessary Parts

dered to each, all these wires being con-

In wiring the general precautions of regular radio practice should be observed, especially that of keeping wires far apart; remember that some of the wires carry over 200 volts of direct current. Use rosin flux for soldering and tinned bus wire for connections. Spaghetti need not be used on the negative terminal, but it is wise to use it on the higher voltage wires to insure proper insulation. Spaghetti also may be used on all wires to improve the general appearance of the unit, using red for positive wires and black for the common negative

One Auto battery or tool box.

ne toggle "off-on" switch and plate (S1).

One three-way switch and plate (S2).

One Raytheon tube and socket.

One Acme full-way transformer (T).

Six Tube filter condensers of the following capacities: C1, 0.1 mfd.; C2, 0.1 mfd.; C3, 2 mfds.; C4, 2 mfds.; C5, 8 mfds.; C6, 1 mfd. (Net: A B block may be used instead of separate condensers for C 3, 4, 5.

Two Acme 30 henry choke coils (L1, L2).

Two Bradley unit resistances (R1, 15,000; R3, 10,000).

One 15,000 to 100,000 ohm Bradley variable resistor (R2).

One hard rubber binding post panel. istor (H2), One hard rubber binding post panel, Four marked binding posts, Five insulating bushings, lamp socket **type**, Wire, spaghetti, screws, etc.

Public Utilities Utilize Radio Broadcasting to Advantage

Good Will Publicity, Which May Be Included in Carefully Selected Programs, Is a Good Type of Advertising for Firms of This Class

By Martin P. Rice Director of Broadcasting, Advertising and Publicity, General Electric Company

The following are abstracts of an address delivered before the utility section of the Associated Advertising Clubs of the World during a recent convention at Philadelphia.

HE early days of public utility companies were necessarily occupied largely with problems of the production and distribution of gas and electricity or the operation of cars. Central station with its customers. It is endeavoring men went diligently about their business-financing, improved genera- to maintain these friendly relations tion of power and light, better methods of distribution and greater by giving good service. reliability and increased safety. The number of customers increased rapidly, and personal acquaintance, which results in mutual understanding, became more and more difficult. The public did not enjoy the utility companies' full confidence, and an unfriendly feeling began to entertainment is a friendly feeling develop. Even an announcement of plans designed to render improved for this company. Our prosperity service was likely to be received with suspicion as to the real motive. is dependent upon this relationship, to play against the Radio Corpora- duty" battery is recommended, and Those were the days when people spoke of "soulless corporations."

The last two decades have witnessed no greater accomplishment town of, say, 1,000 inhabitants, will dependent upon our prosperity." than the building up of friendly rela- transmit an item of interest to that

lic utility slogan. 3. Complete publicity.

4. Customer ownership.

tions must be maintained.

it has personality.

Growth of the Industry

there are nearly 600 in the United States, and the applications for new stations for which no wave lengths are available are a serious embarasement to the Department of Commerce. The number of receiving sets five years ago was possibly a few thousand, mostly home made and crude. To day there are millions of receiving sets highly perfected for quality, sensitiveness and selectivity. Many of them are designed as "period" furniture to ornament the home. The radio audience is variously estimated at ten to twenty million, and quite possibly it waries "period" furniture to twenty million, and quite possibly it waries within these limits, depending upon the importance and character of the program. In some respect radio broadcasting reminds one of the most primitive method of circulating news in amening, goasibly. It is found to solution and not a soulless corporation. We are nearly 3,000 people even managing officer, or at the nine program in the content of the possibly it waries within these limits, depending upon the importance and character of the program in some respects radio.

**Company of Boston) by President or managing officer, or at the nine type of a newspaper report probable most actually assembled the tentor of an endergor received in the possibly it varies within these limits, depending upon the importance and character of the program in some respects radio.

**Company of Boston) by President Provided by Victor Respects and the program in some respects radio and for the most primitive method of circulating news in amenity, goasib, it is found to a soulless corporate the program any the cost of the possibly it was an expect to the program in the following paragraphs from the dedicatory address at the opening of the possibly it varies within these limits, depending upon the importance and character of the program. In some respects radio and contact the program in the following paragraphs from the following paragraphs from the following paragraphs from the following paragraphs from the following paragraphs tions were almost unknown. To-day president or managing officer, or at more than it expects to pay the cost THE GREATEST QUALITY BUY TO-DAY

vast audiences directly or indirectly.

principles; namely, complete pub the art is really too new to warrant ever had." licity, and it should be unnecessary definite or final conclusions. Broad- A similar view is expressed by Vice- tector tube. In the statement re to point out that in a business which casting will probably not be employed President Arthur Williams of the leased by the company they say: "In expands so rapidly as the public in direct selling until some plan is New York Edison Company, which sensitivity the new tube fully excels utility business, there are always new provided by which such advertising customers to reach as well as older can be definitely segregated from all in broadcasting. "We do not look when the latter tube is critically customers with whom friendly rela- other programs. One point seems to upon broadcasting as an advertising adjusted. In the CX300A extreme

Two New Agencies for Publicity
In times past the printing press
has furnished the only method of speak to vast audiences simultane
discussions on broadcasting in advertising. Radio has supplied us with the personal touch that was possible between the company and the customer in the early days."

teat adjustment either of the financial for the printing press to the personal touch that was possible between the company and the customer in the early days." reaching great masses of people ously. This new medium already has tomer in the early days." With its aid the great structure of been used widely for entertainment, modern advertising has been built education, the dissemination of news, A third instance of the use of that no change in the wiring or cirup, and it has been employed ef- the presentation of political opinions, broadcasting by public utilities is cuit design is necessary. But some fectively by public utilities in telling the extension of church services, found in Canada. Sir Henry Thorn- slight improvement in performance their story. In modern public util- financial, market and stock reports ton, president of the Canadian Na- will be noticed if the grid return is ity advertising we find sincerity, and detailed accounts of athletic tional Railways, addressing members changed and connected to the negafrankness, and a conscientious desire events. It already has been em- of the Canadian National Railways tive filament lead. to render service all expressed in ployed successfully in institutional Association, said: a friendly fashion which invites ac- or good-will advertising. Many of "It is about three years since we quaintance and inspires confidence. the applications for broadcasting sta- went into the broadcasting business. Science and inventive genius have re- tions now pending in Washington un- Three years ago it was thought to be the radio receiver donated by the cently contributed two new agencies doubtedly arose from the desire to a mild form of madness from which Freed-Eisemann Radio Corporation as for reaching the public, so that in employ broadcasting in this way. The I, the president, was suffering. Suf- first prize in the music appreciation addition to the printing press we extent to which broadcasting may be fice it to say that the Canadian Na- contest held in the schools of New now have two other important factors utilized in advertising will depend tional was the first in this field, just York City. in influencing public opinion. They ultimately upon the facilities avail- as it has been and will be the first in are the motion picture film and radio able and on the adaptability and in- everything. The people of Canada

Broadcasting is an example of one an entirely new medium. of the few ideas that did not have to In the field of public utility adver- our trains." . . . be sold to the public. From the time tising broadcasting seems to be par- On October 21, 1925 eighteen broad- art of 1927. that C. Q. D. messages were flashed ticularly valuable. Aside from the casting stations participated in the This set is of the totally shielded from the steamship Republic and fact that it is a development of the celebration of "Electric Night" to type. This means that there is full resulted in the dramatic rescue of a electrical industry which underlies commemorate the forty-sixth anni-shielding of the tubes and coils and shipload of passengers, every one has the operation of most of our public versary of the incandescent lamp and on the audio stages. been interested in radio. Boys con- utilities to-day and therefore seems to pay tribute to Thomas A. Edison | The new model, along with another structed home-made transmitting and to be an appropriate agent to employ, for this his greatest contribution to new set, the Fada 6, will supplement receiving sets, learned the code and it has the peculiar advantage of ex mankind. Executive officers of the present line of those manufaccarried on a truly remarkable system pressing personality, and it reaches twenty-two public utility companies turers, but will not replace a single of communication. When the radio- the customers of a public utility in as well as officials of the government item, since every model now being phone came into existence, doing their homes when they are at leisure made appropriate addresses on this made will be continued throughout away with the necessity of code, and their minds are receptive. Noth-occasion. broadcasting became popular in ing proves so discouraging to an indi- It is hoped that no one infers that nearly every home. Every one is fa- vidual when he has a real or fancied broadcasting is presented as a submiliar with the characteristics which grievance as doing business with an stitute for older forms of advertising resulted in this unparalleled interest. impersonal corporation. He finds it and publicity. There seems to be no Radio broadcasting is instantaneous; impossible to conceive of such an warrant for such assumption. Broadit travels almost everywhere, know- organization as having human sympa- casting is a new agency which has ing no inaccessibility; it is free, and thies and understanding. Successful been received into millions of Amer-

"In order to help you realize we are real human beings we are planning, through this new radio station, to have the friendly voice of Edison Light as well as the friendly glow of our electric service reach you regularly through the week. If you get pleasure from the programs which we shall broadcast, if our voice coming to you nightly through the air has a cheery tone, as we mean that it shall, we shall have accomplished our purpose. A happy human voice sunshine than a friendly light. We ment of this new broaccasting station than that of humanizing ourselves to continue big. A big public service soft and low or loud and can be regucorporation like the Boston Edison company wants friendly relations with the phonograph.

"It intends through this new broadcasting station to give you good entertainment, and the price we hope you will be willing to pay for this Recreation Park, Springfield, L. I.

This address was given in Septemtions and mutual confidence between town so effectively that within ber, 1924, and its expectations have splendid showing in its effort to is used the extra battery should be public utility companies and the pub- twenty-four hours every one will undoubtedly been fulfilled, for in a obtain leadership in the Industrial wired in series with the plus lead lic whom they serve. This accom- know of it. It is unreasonable to recent statement of J. B. Groco, head League of the metropolitan district, to the amplifier. When the amplifier plishment was brought about by the suppose that the entire population of the public relations bureau, he of which they are members. The is transformer or impedance coupled adoption of a few fundamental prin- hears the message directly from the speaks of how strongly the station team is under the management of it is more economical and quite effifew receiving sets, and therefore we has established itself in the life of Jack Zatulove. 1. Absolute honesty as the only must assume that gossip spreads the the community and he refers to thou. It is expected that a large crowd news. In any event it is generally sands of letters from customers and will witness the game, as both teams speaker. 2. "Service to Customers," the pub- admitted that broadcasting reaches listeners expressing their apprecia- have a large following. tion. He says, "I think you will agree with me that the broadcasting station has been the greatest builder This article is concerned chiefly The use of broadcasting in adver- of good will for the Edison company announced a new alkali vapor tube, with the third of these fundamental tising has been widely discussed, but in our large territory which we have the Cunningham CX300A, specially

designed for service only as a dehave been overlooked in some of the discussions on broadcasting in adver-

A Third Instance

genuity of advertisers to make use of appreciate our broadcasting stations and the radio receiving equipment on a new eight-tube receiver, the Fada

modern corporations have created ican homes, and it has inherent perpersonality for themselves. The char-sonality. The public has not been acteristics which they display in their educated to believe that it should pay Five years ago broadcasting sta- dealings are usually those of their the cost of broadcast programs any

A Way to Increase **News and Notes** The Voltage of a of the Radio Trade

Grimes radio receiving sets.

Rival Radio Teams to Clash

Battery Eliminator The majority of B battery elimi-Combines Phonograph and Radio In exact antithesis to the familiar use to-day were not designed to sunadio attachments which enable one ply voltages sufficiently high for adeto use the horn of a phonograph as quate power amplification. By "adea loud speaker is the gradeon, an instrument that combines phonograph quate power amplication" is meant can often spread more happiness and and radio. With the gradeon the sufficient volume without tube distortones from the phonograph records tion to fill the average living room. have no other motive in the establish- pass through the electric vacuum With the production of power tubes tubes of the radio and emerge with requiring from 150 to 180 volts on remarkable tone depth and volume It includes the advantages of both the plate for the most efficient operato-day must humanize itself in order phonograph and radio. As with the tion the inadequacy of the 90 to 130 radio, the music can be played either volt line power devices is emphasized.

However, the discarding of the old lated to play slowly or rapidly, as equipment and the purchasing of new design is a proposition unattractive This instrument is the invention of E. O. Thompson, head of the research financially. A simple and efficient exdepartment of David Grimes, Inc., 151 pedient suggesting itself as a substi-Bay Street, Jersey City, makers of tute for a high-voltage eliminator is to connect a 45-volt B battery in series with the plate supply. This will add the voltage of the battery The Freshman Masterpiece nine is to the plate potential. A "heavy and the continued growth of this tion of America baseball aggregation the negative terminal should always great community is in a measure on Tuesday afternoon at 5:45 at be connected to the plus side of the line power arrangement. The former team is making

If a resistance coupled amplifier

E. T. Cunningham, Inc., have just

6 Warren Street Sleeper MINERY

Another advantage of the tube is Crosley Trirdyn "Special" 3 R 3 T. R. F. amplification, regenerative detector reflexed back on the first tube, and an ad-REG. \$75 dittonal stage of audio frequency amplification which gives the effect of at least 5, although there are but 3 tubes.

Public School 23 is the winner

\$60 Super-Trirdyn Special. \$21.25 \$50 Super-Trirdyn Regular. 16.95 \$60 T.R.F. Set. 5-Tube....\$12.95 \$60 T.R.F. 6-Tube......14.95 \$27.50 Paragon "Two" (B.C.) 5.99 \$65 Paragon "Four"....14.99

Federal Suitable for Radio Set or Phonograph. 14.95

18 in. Cone Speakers Exquisite tone and ample volume, containing special adjustable unit. Operates en any set without distortion; at-5.95 Reg. \$15

Radio Exchange

Rate, 40 cents a line. Ads. accepted until 12 o'clock noon Friday. PHONE PENNSYLVANIA 4000

Parts and Equipment

the year.

Winner of Radio Receiver

Fada 1927 Models

F. A. D. Andrea, Inc., has announced

8. as their contribution to the radio

Parts and Equipment

World Radio Histor

Ten Commandments for the Radio Broadcast Listener

Best Long Distance Records Made in Winter; Fans Should Be Reasonable and Should Get the **Best There Is During All Seasons**

By Alred N. Goldsmith

Chief Broadcast Engineer, the Radio Corporation of America HILE excellent radio reception is frequently possible during The electrical operation of the outfit the summer months, yet the best long distance records is not affected by this separation, come in the winter. Signals are not quite so loud in the but the general appearance of the summer, and electrical disturbances are naturally more common in the summer and interfere occasionally with concerts, particularly those received from distant points. A reasonable attitude will help the listener here. He should remember that he cannot expect every act in even the best vaudeville performance to be tremendously amusing and just what he wants, nor can he expect the weather every day ers of private houses frequently drill

summer storm may interfere with the occasion of the most severe sional inspection they require. get the best there is in radio during evening among static-battered sigall seasons, and, above all, he should nais from weak distant stations.

If the listener lives rather far away even on the lawn, using an approseveral things he can do. He can lengthen his aerial wires and increase cast listeners: of these measures make the signals louder, as a general rule. He can good programs from the nearer stacourse, he aiready has this instru- 2. Do not be disappointed if an ocment. He can also increase the volt- casional disobliging storm interferes age of his B battery, or plate battery. can use a more sensitive loud speaker or content himself with head-set operation. He should also tune more carefully, so as to get the very loudof giving. If there is a tickler adest signal which his set is capable how to use it so as to get full volume of signals. And he should remember of signals. And he should remember erate-sized room should be enough should use the ugly black wires ususults in the winter.

ful broadcasting station he may get generally less pleasant than moderate. The thin, Christmas tree wire is sugexcessively loud signals from that signals, particularly during the gested for this purpose. R. H. up other stations when the nearby 5. If your local station comes in station is in operation, particularly if too loudly and drowns others out a his receiver is not very selective. In smaller aerial will help in tuning extreme cases it is not possible to get him out, with a small condenser conthe distant station at all under such nected between aerial and ground. circumstances any more than it is Or a simple wave trap may do the possible to hear a whisper from a trick. And if all measures to get distance when some one else is shout- rid of the local station fail why no. ing nearby. Still a good deal can be enjoy his concerts? He is working accomplished by some of the follow- hard for you, and it is nobody's fault ing measures which should be tried. that you are so close to him that

The listener can cut down the size you are bound to hear him. Broadof his antenna or use a small indoor cast stations have to be closer to antenna having a length of between some people than to oth a few feet and, say, 30 to 50 feet. A 6. In selecting your evening's profew trials may be necessary to find gram try for the higher-powered the best length of indoor antenna in broadcasting stations. They were desuch cases. When an antenna less signed to give better summer-time than 30 feet in length is used, a small service, and you generally will find fixed condenser of five ten-thou- that they do. sandths of a microfarad (0.0005 mfd.) 7. A little patience in learning to should be connected between the handle your receiver yields rich reaerial and ground binding posts or turns in satisfaction from fine sigterminals of his set. This will per- nals. Remember that "Rome wasn't mit the reception of signals of the built in a day" and keep on getting same wave length as is possible with more and more familiar with your an outdoor antenna. Or he may use set and how it works. a large antenna and add to his set any 8. It is a good idea to read the of the better wave traps now avail- radio column of a newspaper or a able which will greatly aid in cutting good radio magazine or two: It helps

out an undesired station. you to know how your set works The listener should experiment and keeps you up to date in radio. until he gets the best signals and the Information of this sort is an aid greatest ease of choice of one station or another. A little patience is reer another. A little patience is re9. Ask your radio dealer for advice; quired to get the desired results in he probably can tell you what you some cases. It should be remembered want to know and will be glad to that no one ever learned in five min- do so. The manufacturer of your utes to run an automobile skillfully set also is willing to help you get the through heavy traffic. Sometimes the "traffic" in the ether is heavy, and it may not be easy at first to pilot the tion sheets or booklet that came with desired signals through the receiver.
Paderewski took quite a little time to
all such material carefully now and learn to play the piano, but it was then and follow the suggestions worth while. So is time spent in mas- which are given. If you have lost tering the capabilities of the receivdealer or manufacturer for another

Miscellaneous Hints

copy. The direction sheets answer

First of all, it is not wise to invite most of the questions which have a large group of critical people to a been puzzling you and preventing you party at your home some definite from getting the best out of your set,

Battery Removal Aids Appearance Of Installation

NEW YORK HERALD TRIBUNE RADIO MAGAZINE, SUNDAY, JULY 11, 1926

for most radio receivers need not be kept directly beneath the table holding the set, but may be hidden behind some convenient piece of furniture in the room and then connected properly by means of flexible extension wires.

ranged diagonally across a corner and hear them Similarly, he must not expect every night next week with the promise wires directly to the cellar, where system. day to be just right for long-distance that they will positively hear a cer- the batteries are out of sight but corroded it should be replaced with battery whether it needs it or not. radio reception. Now and then a tain program. That evening may be still readily accessible for the occa- new. Enameled wire is always de- The usual life of this latter battery

lightning storm this summer, and A total of four or five wires both picnics and radio. The listener your audience will be disappointed necessary for the extension, two for will prevent corresion. should become acquainted with his During the summer radio listeners the A current and two or three for local stations or with the nearest should be prepared to take "pot luck." the B. For the A cable standard part of the entenna system, should "super-power" stations and enjoy You will also find it a good idea to double flexible lamp cord is ideal, be thoroughly examined. The earth tempted to present a general outline them during the summer, and be sat- concentrate summertime reception on as it is plenty heavy enough electriisfied with the long-distance records the higher power stations or those cally and easily handled mechanically. nearest to you. It is best to take One wire of such double cord has aerial itself. A cold water pipe is he has made or will make in the their programs and which come to a red marker string running through generally considered a good ground winter. In other words, he should you clearly rather than to "fish" all it, which acts as an indicator; this connection. However, it is possible

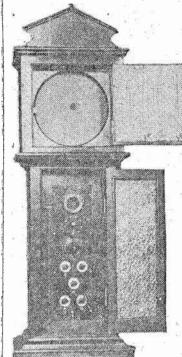
Sometimes delightful summertime reception can be secured by taking sold for Christmas tree fixtures is In such instances the clamp should best, as it is thin and does not occupy be replaced with a new one. the loudspeaker out on the porch or much space. Single flexible lamp cord from all radio broadcasting stations priately longer cord to connect the is also available, but it is much heavreceiving set. Radio concerts gain ier than the other material and forms ground connection it might also be addition to supporting the six-wire

There are ten good rules for broadbroadcasting from Australia in midsummer. Be satisfied to enjoy the prevent accidental short circuits con- the ground post of the radio set. with your summer radio evenings. There are many fine concerts coming.

Lamp cord is obtainable in dozens of different colors of insulation, and 3. If you want louder signals use if you visit a large supply store you a longer aerial, more tubes, higher match your woodwork exactly. Apply leads; there is no reason why you to give satisfaction. Musically such a signal is ideal. It is not worth

while producing signals which deafen be extended by means of a flexible wire and located wherever it happens sist on tremendous signals, which are to look best or give the best results.

Grandfather's Radio



Henry S. Gruger, of Lancaster, Pa., a cabinetmaker and radio fan, has produced this unique radio set which is housed in a grandfather's clock. It is a big improvement on Longfellow's "Clock on the Stair," whose vocabulary was limited to "For-

ever-Never

Summer Is the Ideal Time to Fix Up the Radio Set for Fall

The A and B batteries required Once Every Year a Receiver Should Be Thoroughly Examined, Tested and Repaired to Assure **Satisfactory Operation**

By Elmer M. Wakefield

YOW that the warm days of summer are upon us it seems a fitting time for radio fans to improve their radio receiving apparatus. The radio receiver, like every other mechanical appliance for it is an electrical machine needs a thorough over-

The coming fall and winter has many things in store for the radio fan. There are to be tests, excellent programs and hosts of other things which will make the ardent fan burn with desire to

wire should be regarded as the A the ground clamp which connects the WJZ's Transmitting Towers wire to the pipe has become loose.

a rather bulky cable if several strands a good plan to attach a connection to "T" type cage antenna used in broadother grounded objects, such as vent casting from this station, they also with pieces of string every foot or wire or copper strip, should be tried. United States air mail flyers to their edge of the floor by means of U- connected to the earth in any manner miles distant from the transmitter. shaped tacks known as "staples." To whatsoever should be connected to Before the erection of the transmit-

The logical way to start is to re-

have collected during the preceding absorption are insulated at the base. ground wires as well as to the battery winter. This may be done with a They acquire a heavy charge of radioapt to have a disastrous effect on the is in operation. This charge is so efficiency of the apparatus. When it great that even when the base (the dust) becomes moist it becomes insulators are shorted to "ground" a conductor of radio frequency cur- the towers, a severe high frequency rents. This naturally reduces the burn can be received by touching efficiency of the set. In some in- them. The task of placing markers stances it has been known to cause to distinguish the towers in daylight

chanical connections, such as binding ors were placed in such a manner on posts and clips. Sandpaper is very each tower to reflect the beam of effective for this purpose. Also the searchlights located on the ground prongs of the vacuum tubes should sending rays of red light into the be cleaned. The solder on the tips evening heavens. is corrosive. The black corrosion which forms on them is a fairly good Monterey Society Orchestra insulator. These may be cleaned with

The dust which collects between

If contact to the rotary plates of Orchestra, which has just opened its the variable condenser is made first shore season, will broadcast to through a sliding bushing the bush- thousands of WOR fans throughout ing should be cleaned as an insurance the East during the warm summer that good contact is being made. If months. a "pigtail" connection is used for By tuning in to WOR on Monday at this purpose it should be examined 10 p. m., Wednesday at 9:45 p. m. to see whether or not it is making and Saturday nights at 10:30 p. m., the necessary connection. One point this organization may be heard with to remember in this connection is its lilting dance tunes. never to use oil for lubricating the Elmer Cook, who conducts the

Next, all soldered connections should be given the "once over." If a poor connection is discovered it should be resoldered.

The battery leads to the set also should be examined, especially those which lead to the storage battery. The fumes from the sulphuric acid in the battery solution acts upon the copper wire in such a way that it their houses by drilling a hole causes it to corrode. The chemical through the window sill for the leadaction which takes place makes the in will find that a board may be set wire brittle and often causes it to in the sill under the sash. A piece of

a radio set; 221/2-volt B batteries defacing the house.

A good plan to follow for the over- often become noisy when they drop hauling is to start with the antenna below 17 volts and 47-volt batteries

Guide Mail Flyers to Field The additional ground connections Hadly Air Mail Field were forced to receiver binding posts first and secure may not make any noticeable differ. use makeshift guide posts to lead the ends at the batteries later. Tag ence on the reception of local sta- the planes "home," but as soon as the various wires properly before tions. By local stations we mean they discovered the two 300-foot bunching them together, so that you those within a radius of about 100 structural steel towers rising into the will have no difficulty in identifying miles. The improved ground connectationsphere, they immediately ar-

move all signs of dust which may towers are of steel and to prevent The next step is to clean all me- to light them at night. Red reflect-

Opens First Shore Season In a setting that breathes the air also should be removed. A pipe the New Monterey Hotel, Asbury cleaner may be used for this purpose. Park, N. J., the Monterey Society

bushings of a variable condenser. Oil orchestra in this atmospheric setting, takes the form of an insulating film is extremely popular among the colon the contact surfaces, spacing them legiate set. His orchestra was one a fraction of an inch apart. Although of the first choices among Princeton this distance is not very great, never-students at a recent "frat" dance, and theless it insulates the two points he has helped make enjoyable many "hops" at universities and colleges throughout the East. It was likewise this orchestra which played at the inaugural ball when Governor A. Harry Moore took the reins of the State of New Jersey.

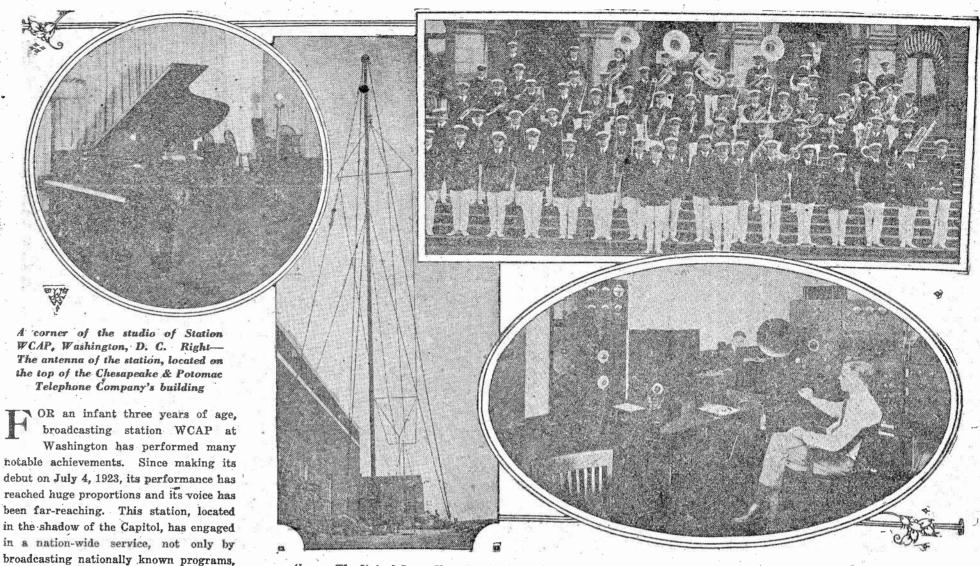
> Novel Lead-In Arrangement Those who do not want to deface

wood the width of the window and If dry-cell B batteries are used about three inches high will answer they should be tested with a volt- the purpose admirably well. As many meter. Poor B batteries are often holes may be drilled in such a board the cause of many queer noises in for the insulators as desired without

WCAP, at Age of Four Years, Has Memory of Many Events of National Interest

A List of This Station's Programs Includes the Most Important Broadcasts in History of Radio

By JAMES E. CARTIER



Above-The United States Navy Band, which is frequently broadcast by Station WCAP. Below-The station room of WCAP, showing transmitting equipment

Among the principal addresses of national importance made by the President have been the mid-year meetings of the Chamber of Commerce of the United States, the annual conventions of the American National Red Cross and the annual and semi-annual meetings of the Bureau of the Budget. At the latter meetings, General H. M. Lord, Director of the Budget, has also talked, discussing the affairs of the business organization of the government for the edification of the pub-

but in picking up and transmitting to

other stations features of outstanding

activities on the part of the President, his

Cabinet and other high officials of the

The first lusty output of WCAP was

the broadcasting of a joint Fourth of July

station WEAF, New York. Since that

time it has been on its own for many im-

portant performances, while in other cases

it has been on the air jointly with

stations located from coast to coast and

border to border throughout the United

Its first hook-up of national importance

was the broadcasting of the President's

message to Congress, December 6, 1923,

when WCAP, in conjunction with WEAF.

New York; WJAR, Providence; WDAF.

Kansas City; WFAA, Dallas, and ESD,

St. Louis, connected by long distance tele-

phone lines, carried the voice of the Presi-

dent to millions of people scattered from

the Atlantic Coast to the Rocky Moun-

tains. With the broadcasting of this mes-

sage to Congress, a new era in communi-

cations was established. The President

spoke into the microphone of WCAP in

the House of Representatives at Washing-

ton and his voice was picked up and

carried over telephone circuits to the radio

stations in various sections of the country

where it was broadcast simultaneously to

Another Big Hook-Up

WCAP participated occurred February 28,

1924, when California and Cuba were tied

program, arranged for and presided over

by General John J. Carty, vice-president

of the American Telephone and Telegraph

Company, New York, called the roll of

radio stations, extending from Havana to

San Francisco, was broadcast over the

WCAP has had the distinct privilege of

broadcasting the addresses of the Presi-

dent of the United States on numerous oc-

casions, while two former Presidents have

made a number of talks before its micro-

phone. The voice of President Coolidge

has undoubtedly been heard by more

people-due entirely to the radio and its

telephone connections—than any other one

man in the history of the world. His

talks from Washington are generally

long distance lines with WCAP.

Western Hemisphere.

in by long distance telephone lines and a

The next national hook-up in which

the people of the country at large.

program with its sister Bell operating

government.

Wilson's Last Appearance

Former President Wilson made his last public appearance at the Armistice Day celebration in the Arlington National Cemetery, November 11, 1923. This address, picked up and broadcast by WCAP and other stations, was heard far and wide, judging from the hundreds and hundreds of letters of appreciation and commendation on this memorial message to the American people by the war President which have been received by the management of WCAP.

The funeral service of former President Woodrow Wilson, held February 5, 1924, in the Washington Cathedral, as well as the funeral service of President Harding, were broadcast by WCAP.

Chief Justice and former President Taft has also talked before the microphone of WCAP on a number of occasions. Notable among the outstanding events was the ceremony incident to the laying of the cornerstone of the George Washington Masonic Memorial at Alexandria, Va., November 1, 1923, and the dedication of the United States Chamber of Commerce at Washington, May 20, 1925.

The National Defense Day programs of September 12, 1924, and July 4, 1925, were picked up by WCAP and transmitted by long distance telephone circuits to other broadcasting stations throughout the country, making it possible for millions and millions of people to hear these patriotic programs.

Nominees Speak Frequently

In 1924, when the political campaign was warming up and at its height, the nominees for President and Vice-President made frequent addresses from WCAP. President Coolidge, John W. Davis, Demobroadcast by other stations connected by cratic nominee, and Senator La Follette. running on an independent ticket, as well

as General Dawes and Senator Wheeler, 1 President has delivered the principal adtalked frequently from this station. The program incident to the inauguration, March 4, 1925, was picked up by WCAP and transmitted to a chain of stations that broadcast this national event to every section of the country.

Outstanding sports, including the world series ball games, football games of national interest and hundreds of other features, have been put on the air for the entertainment and edification of the people of the North American Continent.

One of the features of universal importance broadcast by WCAP was the proram of the National Holy Name convenion held at the Monument Grounds, Washington, September 21, 1924. The estimated attendance at the ceremony was 125,000 persons. President Coolidge addressed the assembly. He was followed by his eminence, Cardinal O'Connell, of Boston, legate of the Holy Father, and the Rev. Michael J. Curley, Archbishop of Baltimore.

The Lincoln Day program of February 12, 1926, brought together many extraordinary features. It was the first time in history that so great a number of notable statesmen had been brought together in the studio of any broadcasting station.

Among the speakers who eulogized the great war President were Herbert Hoover, Secretary of Commerce; William M. Jardine, Secretary of Agriculture; Herbert Work. Secretary of the Interior; Theodore Douglas Robinson, Assistant Secretary of the Navy; John Barton Payne, chairman of the American National Red Cross and formerly Secretary of the Interior; James E. Watson, United States Senator from Indiana; the Hon. C. W. Ramsmeyer, of Iowa; Mrs. Anthony Wayne Cook, president general Daughters of the American Revolution, and Mrs. John D. Sherman, president of the American Federation of Women's Clubs.

U. S. Army Orchestra Plays

An added feature of the program was music of the time of Lincoln by the United States Army Music School Orchestra. The ceremony was opened by the grand march Germania," which was one of the numbers played at the inaugural bail of President Lincoln, March 5, 1861,

The Memorial Day services from the Arlington National Cemetery, at which the people.

dress during 1924, 1925 and 1926, have also been broadcast by WCAP and other stations. In addition the Maine Memorial exercises have also been put on the air for three successive years by this station.

The Educational Week program of February 21, 1926, as well as the oratorical contests of 1925 and 1926, in which high school students from every section of the United States have met in competitive orations, have been put on the air by

The Kentucky Derbies, as announced by the sports editor of "The Washington Post," of 1925 and 1926 have also broadcast from the studio of WCAP. On May 13, 1925, the program of the National Conference on State Parks, at which Judge John Barton Payne was the principal speaker, was put on the air from this

Other outstanding features have inorganizations as the United States Marine Band, Captain William H. Santleman, leader; the United States Army Band, Captain R. G. Sherman, commanding, and Captain William J. Stannard, leader, and the United States Navy Band, Lieutenant Charles Benter, leader.

Civic Programs Broadcast

In addition to the above features, national and otherwise, station WCAP has had the distinct privilege of picking up and transmitting from its studio or in the field all civic programs that would be and have been of general interest to the public.

During the present session of Congress "matters before the House" have been discussed almost weekly by members of Congress, while other officials of the government have talked on various and sundry subjects of interest to the people of the country at large.

Each Sunday at 11 o'clock this station broadcasts the service from a Washington Church and at 4 o'clock Sunday afternoon it puts on the air the service of the Washington Cathedral. In addition, through an arrangement with WEAF of the Broadcasting Company of America, New York, it puts on the air the program of the Capitol Theater, New York City, and the Atwater Kent radio hour, outstanding musical features that have brought pleasure and entertainment to millions of

World Radio History

New Circuit With Uniform Energy Transfer on All Waves Solves Important Problem

Combination of Electromagnetic and Electrostatic Couplings Works Out to Advantage in Radio

By FULTON H. CRAWFORD

radio-frequency broadcast receiver was placed on the market one of the biggest engineering problems facing the radio industry has been the development of a circuit which would have a uniform energy transfer characteristic throughout the entire wave band of 200 to 600 meters. As the exact meaning of the last phrase in the above sentence may not be appreciated by the non-technical reader of this article, an attempt will be made to explain and illustrate its importance and significance. Also, a new curcuit. which, it is claimed, overcomes many of the undesirable characteristics present in most tuned radio-frequency curcuits, will

Before discussing the question any further it might be wise to explain, so that home builders who may contemplate the construction of a receiver using this circuit will not be disappointed, that no attempt will be made in this article to give detailed directions for making a set of the type to be described. At the present it is the writer's sole purpose to give data on a development in radio which may in time effect an improvement in radio receivers. The fundamental circuit of the receiver, however, will be found on this page, and those who are experimentally inclined will find sufficient information to enable them to investigate the possibilities of the circuit and design a set employing it.

To explain the undesirable effect of ununiform energy transfer in a radio receiver, the simplest type of tuned radiofrequency set will be considered, i. e., the type of circuit which employs two or more stages of tuned radio-frequency amplification in cascade where each stage consists of a three-element vacuum tube and an inductively coupled transformer with a fixed primary winding and a capacity tuned secondary winding, and where stabilization is maintained by a "losser," such as a high resistance in the grid circuit. When operating this type of set one of two things will be discovered: either the set will not oscillate on any wave length, but will give best results on the low waves, or the set will oscillate easily and will be very hard to control on the low waves. In the first case the set is not efficient and for this reason will not produce satisfactory results. In the second case the receiver is efficient but unstable, and as a result the signal may be distorted by too much regeneration, the set will be found more difficult to tune and it is apt to cause interference in nearby receiving sets due to its radiating characteristics. All of the objectionable features mentioned above may be traced to one funhigher waves. To make the efficiency equal on all waves some kind of a compensator is inserted in the circuit and this variable control causes instability.

In addition to the type of radio-frequency circuit mentioned above there are also circuits in which oscillations and instability are prevented by a fixed balanced circuit. In properly adjusted receivers of this type oscillations will not occur, but the set is most efficient on the wave length to which it was balanced, and on the other wave lengths a certain amount of regeneration is present, which might cause distortion. Two other disadvantages of receivers of this type are: first, the wave length range must necessarily be very limited, and, second, to obtain highest efficiency the set must be balanced for the particular tube with which it is to be used.

A circuit without the objectionable characteristics mentioned above has recently been announced by Edward H. Loftin, a consulting engineer of New York City. Six important claims are made for this circuit, which are as follows:

1. It, may be constructed so that the energy transfer throughout the entire broadcast wave band is uniform rather than greatest on the high frequencies and falling off as the frequency is decreased.

2. The tendency to oscillate as a result of the coupling through the tubes is evercome by a method that is independent of

VER since the first multi-tube tuned | the capacity of the internal elements of | audio-frequency amplification. It is a |

3. The possible wave length range of the receiver is greatly increased, without increasing the maximum capacity of the variable tuning condenser or inductance of the coil, by the form of coupling employed, which decreases the distributed capacity of the circuit.

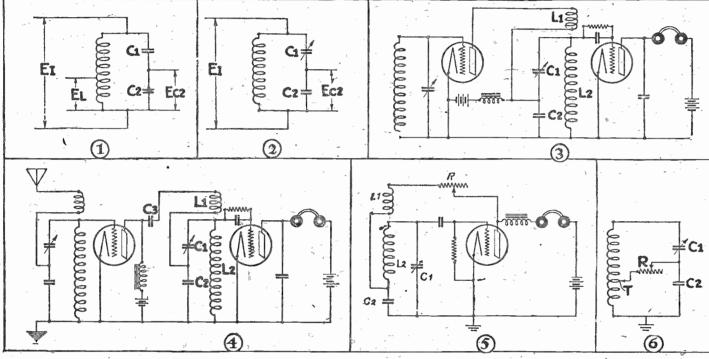
4. The quality of reproduction is improved by the complete elimination of regeneration and oscillations.

5. Positive interstage regenerative couplings that may be produced in the construction of the receiver may be overcome by the production negative regeneration through the tube capacities.

the tubes used in the radio-frequency three stages of tuned radio-frequency amplification, a detector and two stages of batteries, in a cabinet measuring only 16 length tuning dial there are only three the front of the panel. The set is also so in value with the number of turns in the designed that it may be operated with either dry cell or storage battery tubes.

For a technical description of the circuit no more authoritative data could be entitled "Combined Electromag-

the oscillatory circuit shown in Figure 1. one control set and aside from the wave any desired fraction of this voltage may be obtained by tapping the inductive leg, rheostat knobs and a battery switch on resulting in a voltage EL, which increases tapped portion of the inductance. Similarly, the capacity leg may be tapped by dividing its capacity into two series portions, as is shown by condensers C1 and obtained than that presented by the in- | C2. Assuming a resonant condition, the ventor. The following are abstracts of a voltage developed across C2 will be in versely proportional to its ratio with C1. netic and Electrostatic Coupling and Some | For example, if C1 and C2 are equal, then Uses of the Combination," which was read | the voltage EC2 will be just half the im-



Six diagrams used in describing the new circuit discussed on this page

for use with one set of tubes it may be used with any other set of tubes without making any further adjustments. This makes it possible for a manufacturer to provide a receiver which will operate efficiently with all available tubes and it enables the owner to use either dry cell or storage battery tubes, as he desires.

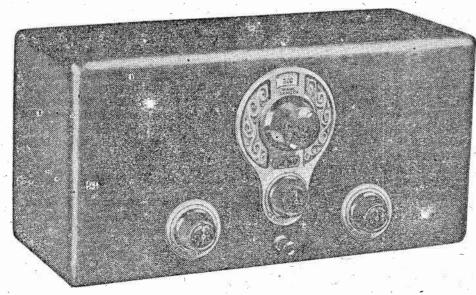
In addition to the advantages just enumerated, there are other interesting features of the circuit from the manufan's viewpoint. The circuit adapts itself excellently to single wave length control operation, which is very desirable in these days of simplified tuning. Also because of the unusual stability of the circuit it damental cause, namely, the energy trans- is possible to construct a single control of the more salient of our observations fer, and therefore the efficiency, is greater | set employing as many as three stages of | during these investigations, as well as

Hartman Electrical Manufacturing Company, Mansfield, Ohio, provides an excellent example of how simple a six-tube receiver of this type may appear. This set, which is shown in the accompanying halfception of the loud speaker, antenna and | desired manner with frequency.

gineers by Edward H. Loftin and S. Young White on June 30, 1926:

"The energy transfer characteristic of the normal forms of coupling employed in radio receivers is well known to all of us and in the usual forms transfers energy more readily at higher frequency than lower. This characteristic makes for higher efficiency and consequently greater tendency toward instability of commercial vacuum tube receivers on the high-frequency portion of the broadcast band.

"Our investigations of the combination of electromagnetic and electrostatic couplings were for the purpose of removing this objectionable characteristic, and we undertake in this article to outline some A commercial receiver employing this of these features is the use of a coupling circuit, namely, the Hartman Single-Six | means which has its frequency character-Compact, which is manufactured by the istic reversed in that its most efficient energy transfer takes place at the lowest frequency. By suitably combining this coupling means with a coupling having the usual characteristic we are enabled to so design the combined coupling that tone, is completely housed, with the ex- the total energy transfer will vary in any



This picture shows the commercial receiver employing the circuit referred to in this

6. After the receiver has been stabilized | at a meeting of the Institute of Radio En- | pressed voltage E1. If C2 is larger than C1 it will have proportionally less voltage across it, and vice versa.

> "Keeping these voltage relations in mind, let us examine Figure 2. In this circuit C1 has been made variable, while C2 remains fixed. It is evident that C1 has now become the variable tuning condenser for the system. However, in varying C1 we find that we continuously vary its ratio with C2. The larger C1 becomes in its relation to C2, the higher will be the voltage EC2. However, when C1 is maximum, the frequency to which the system is resonant is minimum, and we have the condition that the voltage EC2 is maximum when the frequency is minimum, and this voltage can be made any desired portion of E1 by adjusting the capacity ratio of C2 and C1.

> is shown in Figure 3, where the arrangement of Figure 2 is used as a portion of an interstage coupling for a three-electrode vacuum tube amplifier system of the so-called tuned radio-frequency type. The principal addition lies in the use of a coil L1, through which the output of the tube passes before reaching the branch. point of the two condensers C1-C2. The energy transfer due to L1 has the normal characteristic of increasing with an increase of frequency, while the coupling due to the varying reactance of C2 with variations of tuning condenser C1 has the reverse characteristic.

> "It is obvious that the electromagnetic coupling, due to L1, may be combined with the electrostatic coupling due to C2 in either an opposing or an aiding phase. If they are combined in an opposing phase there will be some point in the frequency band where they will be equal, and since they oppose, a balance will obtain at this point and no energy transfer will take place. It is, therefore, obvious that an adjustment of this kind would be of no value in receivers.

> "To satisfy the requirements of receivers that must cover wide ranges of frequencies, such as broadcast receivers covering the broadcast band, we have found that by combining electromagnetic and electrostatic couplings to transfer

> > Continued on page five

Radio as a Profession for the Young and Old Men of America

One Must Have a Keen Ear, a Quick Eye and Skill at Manipulation to Qualify as an Engineer

By BORIS S. NAIMARK

HERE is no doubt that large numbers of boys and young men are at this very time considering "radio" as a profession. Many of these have just left grade and high schools and are trying to find a place for themselves in the world-a place which would offer the opportunities that youth well deserves.

What is it that prompts the average young American to turn his attention to radio as a profession?

Spanning the world in a single second, taking pictures, voice and music through the air with the speed of light, radio today has changed our very mode of living.

The first radio program was broadcast in Pittsburgh about 1920. To-day there are about 600 broadcasting stations in the United States alone. In 1920, when broadcasting just started, there were only seven manufacturers of radio equipment; there are probably over 3,000 to-day. There are about 10,000,000 completely equipped receiving outfits in daily use in the United

It took the automobile industry fifteen years, the talking machine industry twenty-five years, to cover the same ground of industrial development that the radio industry has covered within the last five years. Within this short period of time radio has grown from a \$2,000,000 a year industry to one in which probably not less than \$500,000,000 is spent yearly. There are over two score magazines devoted exclusively to the subject of radio. Radio has grown at a terrific pace, yet

who will deny that there is still plenty of room for improvement and expansion? More likely than not it is this restless

activity of a new and fast moving industry that attracts large numbers of young men to the radio engineering profession.

Young Read Advertisements

Young people read advertisements of various radio correspondence schools, some good, some not so good, in which the enterprising publicity and advertising managers of the respective institutions make it a point to misinform the reader and prospective student that radio offers any young (or old) man who takes their course (at \$5 down and \$5 a month) the opportunity of making money easier than he ever made it in his life.

"Why," the "educators" exclaim in a paroxysm of prospective business, "it is easy to make big money in radio-\$50 to \$250 a week, \$3,000 to \$10,000 a year," and when the stunned yet conscious youth inquires "What Price Glory?" he will be cheerfully informed that the only prerequisite knowledge for taking the "radio expert's" course is just the ability to read and write and that if he carefully studies their easy-to-learn-big-pay-course he should within less than a year (why, many radio expert, a master of not one but every branch of radio.

In other words, the whole process of becoming a radio expert in all branches is reduced to a formula as simple as A B C; simply "tune in" on a big pay radio job-choose any position you want! Ridiculous!

One cannot deny that real opportunities exist in the radio engineering profession and that radio to-day is urgently in need of trained radio experts. But one cannot fit himself quickly for success in this new field, and one must have an aptitude for mathematical and physical sciences and a taste for mechanical and electrical contrivances and devices if one expects to succeed at all. It must be noted in this connection that the greatest obstacle to success experienced by the youth who has the ability to fight his way upward from the levels of a trade position is usually the meager nature of his general educa-

* Radio Engineering

Radio engineering consists of a large number of very important phases; any one who knows anything about engineering at all will tell you that no one engineer can hope to attain success in all its branches, since every branch requires a great-amount of specialized knowledge, as well as great amounts of minute detail

Dr. Alfred N. Goldsmith, chief broad- | reading the best journals which he can i less than one hundred telegraph and teleeast engineer of the Radio Corporation of America and editor in chief of "The Proceedings of the Institute of Radio Engineers" and who is by far one of America's most prominent radio engineers, in a statement to this writer had the following to say in the form of advice to young men who aspire to take up radio as their life's

"Before entering the radio field a young man should ask himself these questions: Have I a keen ear, a quick eye and some skill at manipulation? Do I quickly grasp scientific facts about machinery and electrical devices? Am I willing to study nights? Am I prepared to spend several years working my way up from the bottom in a radio factory, a broadcasting station or a trans-oceanic or marine station? And will I be at home in an engineering

"If he can answer all of these questions sincerely and positively in the affirmative he may consider radio as a profession. There are two ways to get into the radio field. One of them is to study electrical engineering and finally concentrating on radio engineering. He can then enter a radio company in an assistant engineering capacity and work his way up. "The other method largely involves self-

tuition. It is a harder way and a longer way and requires real grit and unusual aptitude. The prospective radio engineer must study at home the best available books on elementary and advanced physics, algebra, some trigonometry, some good books on direct and alternating current machinery, and a succession of radio engineering textbooks, starting with the more elementary and ending up with the most advanced books which he can find. At the same time, or shortly thereafter, he will do well first to assemble a number of radio sets himself at his home, and then to get a job in the assembly of radio sets or in the test or serving of sets with a reliable and up-to-date radio concern. By sticking to this job and keeping his eyes and ears open there is no reason why he should not within a few years secure a fairly responsible engineering position in

"He should also keep in touch with other engineers and attend meetings of engineering societies, at the same time

This form of coupling is also used between

stages of a radio-frequency amplifier

denser C1 for single control receivers and

"The phenomena so far discussed allow

designing circuits which will permit a

vacuum tube amplifier or detector type of

receiving set to oscillate at the upper or

lower or at all dial settings. Figure 6

shows an arrangement which allows oscil-

lation at any one intermediate dial set-

"As we have observed before, the point

between the two capacities C1, C2 is at a

potential difference to the grounded side

of the system, which is determined by the

ratio of C1 to C2. Whatever value this

voltage has we can also always find a point

T on the inductance of exactly the same

potential to ground. If we join these

points with a resistance R of any value

no current will flow through R, since both

points are at equal potential to ground.

If we now vary C1, as in tuning, we find

that a potential difference develops across

R, since point T remains at substantially

the same voltage, while the potential

across C2 varies. This potential difference

Lecomes greater as we vary C1 either up

or down from the value at which we bal-

anced the system. If we balance midway

of the dial reading of C1, we find that

to be the only spot where the absorbing

action of R has no effect, and if this Fig-

ure 6 arrangement is placed across the

New Circuit With Uniform Energy Transfer

Continued from page five

in a positive phase. The variable resist- cuit is sufficiently reactive to allow of os-

ance R controls the amount of feedback. | cillation throughout the frequency band,

where it is necessary to ground the con- | damping action of R will increase with

secure. It is only in this way that he can keep up to date in the radio art. "Radio engineering is a splendid pro-

fession for a moderate number of ambitious young Americans, but it has no place for the man who is waiting for life to hand him its rewards on a gold platter. He will have to learn his job and stick to it to make a success in radio." During his teaching years Dr. Gold-

smith has inspired and instructed some of the best known radio engineers of today. At the College of the City of New York he gave the first regulation engineering course in this country, and, judging by the caliber of the engineers that he has turned out it was one of the best any-

Pressure of professional and other responsibilities have prevented the continuation of these radio engineering classes five years after their inception in 1913. At the time Dr. Goldsmith gave up teaching entirely-this was at the end of 1924 -he was an associate professor, in charge of the Department of Electrical Engineering at the College of the City of New

Dr. Goldsmith is a charter member and one of the founders of the Institute of Radio Engineers, and in addition to being editor of the "Proceedings" since 1912 he has also been the secretary of the instituté since 1918.

When one considers the fact that the doctor is only thirty-eight years young, one cannot help but be inspired to greater

College Education Not Necessary

Dr. Donald McNicol, president of the Institute of Radio Engineers, author of American Telegraph Practice," the standard textbook on telegraphy, and inventor of several telegraph and telephone devices, is, like Dr. Goldsmith, of the opinion that college training, while desirable, is not absolutely necessary to succeed in the art, especially where there is a capacity for learning, ambition and facilities for experimentation.

Dr. McNicol's statement to this writer in full follows: "In judging the employment future for radio engineers and radio technicians it is helpful to recall that twenty-five years ago there were perhaps

R can be so adjusted as to stop oscilla-

If we balance at the lowest frequency, the

portion of the inductance below T to form

"While we have investigated and used

phone engineers employed in this country. It was stated then that electric communication did not offer a field for more than very limited number of engineers. But to-day there are more than two thousand

York City alone.

"Radio is a profession which I believe will offer to the student and engineer a useful future at rates of income comparing very favorably with other lines of en-

communication engineers employed in New

"The colleges are now giving thorough instruction in radio science, and from this source will likely come the men who will excel in research work.

"Of course, the fellow who is not in a position to secure a college training may still make good progress in the art. Systematic study of radio books and journals, together with as much experimentation as can be carried on, paves the way to position and salary."

Required Technical Knowledge

It is this writer's opinion that the amount of technical knowledge required by one to have a chance to succeed in radio will depend largely upon what branch of the radio industry one has chosen to specialize in. College training is more important to one who expects to specialize in radio research and engineering; it is of less importance to the operator, manufacturer and publisher, and sometimes has very little, if any, value to the radio salesman whose main qualification is the ability to sell. The latter statement does not, of course, apply to the salesman who has to cater to the engineering fraternity.

The idea that radio offers a short cut to wealth to all, irrespective of ability, knowledge or amount of work, should be dismissed at once by all who seriously consider radio as a vocation. This is the warning that Dr. J. H. Dellinger, chief of radio laboratory of the Bureau of Standards, issues to the radio student. Dr. Dellinger says: "In each of its branches no one should expect great returns from radio unless he has some aptitude or some service to put into it.'

It has been the writer's experience that entirely too often young people select radio as their life's work without due deliberation and without a thorough analysis of their "personal equation" as well as of the opportunities that radio may or may not offer as compared with the opportunities presented by other professions. One must have more than a liking for radio to succeed in it professionally, and one must bear in mind that "radio as a vocation is very different from radio as tion at all points except the balance point.

Dr. Dellinger says: "Radio is an estabned industry, or set of industries, and the frequency, and can be adjusted to pre- its future growth is inevitable. The pervent oscillation throughout the band. Preson who seriously considers it as a vocacaution should be taken that R does not | tion must weigh both the service which he reach a sufficiently low value to allow the can render it and the satisfaction it can return to him. We are living in a whizzing age, and radio is taken as the most conspicuous example of the rapidity of numerous other applications of the above, our times. Many a young man who wants those we have outlined are considered sufto keep up with the times concludes, thereficient to illustrate the principles infore, that radio is the line for him. It is certainly worth while coolly to pause and examine what returns you are likely to get, and perhaps even more worth while to consider what service you can render." To illustrate that radio is not a field where one may at will get rich over night. Dr. Dellinger says: "I am told (I do not vouch for it) that only one in a thousand of the radio patents that are filed are of any value to radio, and only a fraction of that fraction brings returns to their in-

> To sum up, if you are seriously considring radio as a profession von must sweep aside the mere glamour that radio derives from its newness and its patent narvels." Before making any final decision read some books relative to engineering as a profession; this will help you to determine if you will be at home in an engineering profession, such as is radio. And, above all, remember that "radio has no place for the man who is waiting for life to hand him its rewards on a gold platter."

Joseph Richter to Play on

a resonant circuit with C2.

200-Year-Old Seidel Violin Those who listen in at station WHN tomorrow from 4:30 to 4:50 p.m. will hear the strains of a 200-year-old Seidel violin, played by Joseph Richter, accompanied on the piano by Arthur Kuester. Richter is a native of Bohemia and has been here for twenty years. He has studied under Krakan and Zolynsky in Poland, and for years was concert master in the Austrian army. His violin was passed down to him from ancestors who played it before many members of European royal families. Once he left it in the hallway of his home, and on awakening in the morning was shocked to find it missing from its customary place. His wife had put it safely away, however. Both men are well known in German circles around the city for their input of a vacuum tube whose plate cir- | musical abilities.

plied to the plates of the oscillators is

approximately eighty amperes.

to work Glace Bay, Canada.

fourteen kilowatt and the aerial current

The fourth transmitter, for the Vienna

service, is of fifty kilowatt rating, and has

an aerial extended over three 300 foot

towers. A single cage antenna is used.

as against a double cage for the other

services, and the wires are spaced round

It is this 50 kilowatt transmitter which

is illustrated in Fig. 3, and besides com-

municating with Austria, it is also used

Power Arrangement

The generating plant for the supply of

power to these various transmitters and

their auxiliary apparatus is installed in

a separate building, each transmitting

station being connected to the generating

The prime movers consist of three sets

of semi-Diesel oil engines direct coupled

to 50 kilowatt 220 volt direct current

generators. A battery of 1,600 ampere-

hours capacity is connected across the

busbars of a direct current switchboard.

and constancy of potential on the busbars

is maintained by means of an automatic

reversible booster controlled by an auto-

Eight motor alternator sets are in-

stalled for the supply of power to the out-

lying stations, these taking their power

from the 220-volt direct current main bus-

bars. They generate single-phase alternat-

ing current at 1,000 volts 350 cycles. Four

of these sets, each rated at 25 kilowatts

are provided to supply power to the

tubes of all the main oscillation genera-

tors, or power amplifiers. The remain-

ing four sets, each rated at 15 kilowatts

are provided to supply power to the tubes

of the independent drive, and also current

for the filaments of all the tubes in each

transmitting station, the potential being

transformed down to the required voltage.

large storage battery is connected to

"float" across the direct current busbars.

and the current for running the motor

alternators is supplied by two only of the

direct current generators. Generally, three

only of each set of four motor alternator

Under normal working conditions the

station by underground cables.

matic pressure regulator.

spreaders twenty-five feet in diameter.

"Lead-In" Wire Forms Part of

the horizontal one in the respect that a nice horizontal wire about sixty remedy for the trouble is a trimming Most radio fans are accustomed to it is non-directional and receives or seventy feet long on his roof and of the aerial.

be added to that of the latter in the length of the lead-in into consid- of the aerial wires and the selectivity short, but with any standard types determining the overall dimensions eration is responsible for many com- of the receiver. The first factor he of tuned radio frequency receivers plaints of broad tuning. A man liv- cannot control at all, and the third they provide entirely satisfactory re-As a matter of fact, the vertical ing on the second floor, for instance, is dependent to a not inconsiderable ception with a minimum of inter-Antenna System As a matter of fact, the vertical ing on the second noor, for instance, is dependent to a not included a ference.

Antenna System wire is a more effective "aerial" than of an eight-story house will erect extent on the second, so the simplest ference.

thinking of the radio "aerial" as the equally well from all directions; a will then drop a lead-in of about Residents of the lower floors of tall thinking of the radio aerial as the equally well from an directions, a will then drop a lead-in of about Residents of the lower floors of tall In cleaning copper wire from which horizontal wire stretched on the roof flat-top aerial with the lead-in fas- sixty feet down to his apartment houses really need not worry about the insulation has been stripped tened at one extreme end, as is usu- window, making a total length of at installing wires on the roof at all, scrape with the back of a knife blade, ally done, receives markedly better least 120 feet or more, depending on especially if the building exceeds not with the sharp cutting edge. If tical connecting section, the "lead-in," any gone, receives markedly better least 120 leet or more, depending on especially in the building exceeds not with the sale saving the tical connecting section, the "lead-in," from the direction in which the leadas a separate part of the antenna in end points than from any other. house. If he lives in the city near do is to hang single vertical wires good edge and at the same time makas a separate part of the antenna in end points than from any other nouse. If he have not the city near of the condition of large bodies of any one of the dozen or more power-over the side of the roof directly ing a better job of the cleaning, for any one of the dozen or more power-over the side of the roof directly ing a better job of the cleaning, for system. This impression is entirely the proximity of large bodies of any one of the dozen or more power- over the side of the roof directly ling a better job of the cleaning, for erroneous, as the vertical wire acts metal affects this directional prop- ful broadcasters he undoubtedly will down to their windows, and if the dull back edge has less of a

flat top portion, and its length must. The failure of set owners to take his exact location, the total stretch tems. Such aerials may seem rather

Use Back of Knife

In cleaning copper wire from which

erroneous, as the vertical wire acts metal affects this directional prop- la broadcasters he undoubtedly with down to their windows, and if the dull back edge has less of a tendency to pare the soft copper wire drop is equal to fifty feet or more tendency to pare the soft copper wire ing up radio impulses as does the true. Additional Herald Tribune Radio Programs for the Week Ending July 17

Continued from preceding page 590k-WIP-PHILADELPHIA-508m 3 p. m.—Studio brussic.
6:55 p. m.—Dinner music.
6:50 p. m.—Department of Agriculture.
7 p. m.—Roll Call and Birthday List.
8 p. m.—Ambassador Orchestra.
8:30 p. m.—Dance Orchestra.
9 p. m.—Ambassador Concert Orchestra.
9:30 p. m.—Tred Weems' Novelty Dance Orchestra. 10:30 p. m.—Johnny Hamp's Kentucki-

ans.

11 p. m.—Shelburne Dance Orchestra.
11:30 p. m.—Silver Slipper Dance Orchestra. 1080k-WCAU-PHILADELPHIA-278m 6:30 p. m.—Billy Hays's Orchestra. 7:30 p. m.—Snellenburg Symphony hestra.
p. m.—Josh Saddler's Serenaders. 8 p. m.—Josh Saddler's Serenaders.
8:30 p. m.—Clifton's Anglers.
8:45 p. m.—Dick Jackson, Margaret
Ellis, radio sweethearts.
9 p. m.—Barry O'Moore, tenor.
9:30 p. m.—The Musical Chefs.
9:45 p. m.—Professor Doolittle.
10 p. m.—Frank Worthington, barytone.
10:30 p. m.—Eddie Campbell's Orchestra.

10 p. m.—Frank Worthington, Saryton 10:30 p. m.—Eddie Campbell's Orchestra. 1090k—WHAR—ATLANTIC CITY—275m 1090k—WHALL

2 p. m.—Seaside Trio.

7:30 p. m.—Lecture period.

9 p. m.—Seaside Trio.

2 p. m.—Seaside Trio.

p. m.—Studio concert.
p. m.—Follies Bergere Dance Orchestra
10k—WPG—ATLANTIC CITY—300m 6:15 p. m.—Sports tank. 6:45 p. m.—Organ recital. 7 p. m.—Morton dinner 7:45—Annassadul martin 18:30—Dance orchestra 9 p. m.—Ambassador Concert Orchestra 9:30 p. m.—Traymore Concert Orchestra 10 p. m.—Ted Weems's Dante Orchestra 10:30 p. m.—Johnny Hamp's Kentuck

ians.

11 p. m.—Shelburne Dance Orchestra.

11:30 p. m.—Silver Club Dance Orches ra. /90k-WGY-SCHENECTADY-380m 12:30 p. m.—Reports. 2 p. m.—Music; fashion talk, Robert

Smith.
6 p. m.—Stock reports.
6:30 p. m.—Program by Jack Denny's 6:30 p. III.

Orchestra.
7:25 p. m.—Baseball scores.
7:30 p. m.—"WGY Book Chat," L. L.
Hopkins.
7:45 p. m.—WGY Orchestra.
7:45 p. m.—WGY Orchestra.
8:30 p. iii.
940k—WGR—BUFFALO—319m
940k—WGR—BUFFALO—319m

a. m.—"The Meaning Health," Helen Monsch. 0 p. m.—Dinner music.

Health, Helen monstrainer Health, Helen monstrainer Health, Helen monstrainer Health, Helen Miss. 8-11 p. m.—Jointly with Station WEAF. 1145 a. m.—Stock market reports. 6:30-7:30 p. m.—Dinner trio. 9-10 p. m.—Vocal soloiets. 1080k—WHAM—ROCHESTER—278m. 1080k—WHAM—ROCHESTER—778m. 330 p. m.—Eastman Theater Orches 5 p. m.—Eastman Theater organ. 7.25 p. m.—Baseball scores, weather. 130 p. m.—WGY book talk.

m.-Dance program. 10 p. m.—Dance precitaling 11:30 p. m.—Organ recitaling 630k—WTIC—HARTFORD—476m 8 p.m.—"Scottie" Millar. 9 p.m.—For-an-to Melody Makers; Man-chester Male Quartet. 10 p.m.—Emil Helmberger's Dance Or-

tra.

860k—WEEL—BOSTON—Sasm
10:15 a. m.—Anne Bradford.
10:45 a. m.—Events of the Day.
12:45 p. m.—Events of the Day.
12:45 p. m.—Events of the day.
3 p. m.—Eugene's Singing Orchestra.
5:55 p. m.—Market, business news.
5:55 p. m.—Lost and found.
6 p. m.—Keith's radio review.
6:10 p. m.—Events of the day.
7:30 p. m.—Michael Ahern, barytone.
7:45 p. m.—Musicals.
11:p. m.—Program from WEAF.
900k—WBZ—SPRINGFIELD—333m
7 p. m.—Kimball Trio.

7 p. m.—Kimball Trio.
7:33 p. m.—Lenox Ensemble.
7:45 p. m.—'Mental and
Health," Dr. Frank Stanton. 9 p. m.—Organ recital. 9:30 p. m.—Program by the

Studios.

10 p. m.—Liberty Drum Corps.

10:30 p. m.—Dance orchestra.

10:70k.—WNAC—BOSTON—280m 1 p. m.—Luncheon concert. 4 p. m.—Shepard Colonial tea dance. 4:20 p. m.—Vocal selections.

4 p. m.—Vocal selection—
6 p. m.—The Smilers.
6:30 p. m.—The Smilers.
6:30 p. m.—Dinner dance.
7 p. m.—'What's Going On To-night.'
7:36 p. m.—Talk, auspices Associated Pharmacists of Massachusetts.
7:45 p m.—The Golf Question Box.
8 p. m.—Program arranged by July Pashody.

nse reabody.

m.—Victor's Band of New York.

p. m.—Dok Eisenbourg's Sinfonian m.—Dance music. —WRC—WASHINGTON—469m

2 p. m.—Mayflower Orchestra.
8 p. m.—Rayflower Orchestra.
8 p. m.—Radio movie presentation.
8:30 p. m.—U. S. Marine Band.
10 p. m.—The Royal Salon Orchestra.
10:30 p. m.—The WRC Players.
11:30 p. m.—Meyer Davis's Swanee Syn copators. 1220k—WBAL—BALTIMORE—246m

7 p. m.—WBAL Sandman Circle, 7:30 p. m.—WBAL Dinner Orchestra. 8:30 p. m.—WBAL Mixed Quartet. 9 p. m.—WBAL Trio, John Wilbourn tenor. 10 p. m.—WBAL Dance Orchestra. 970k—KDKA—PITTSBURGH—309m

6:30 p. m.—Dinner concert. 8:40 p. m.—Special farm program. 9 p. m.—Stockman Farmer news. 9 p. m.—Stockman Farmer news. 9:30 p. m.—Symphony Players. 10 p. m.—Symphony Players; Ward Whitney, barytone. 11:05 p. m.—Pittsburgh Post dance pro-

FRIDAY

610k—WEAF—NEW YORK—192m 6:45, 7, 7:20 a. m.—Health exercises. 7:45-8 a. m.—Morning prayer services. 11 a. m.—Music. 11:15 a. m.—'Hints to Housekeepers, 11:45 a. m.—Talk.
12 noon—Market and weather reports.
12:15-1:15 p. m.—Rolfe's Palais d'Or Orchestra.

4 p. m.—Marentze Nielson; soprano.

15 p. m.—Lucille Blabe, planist.

130 p. m.—"Interpretation of Standard
Song Literature;" Professor H. L.

Butler.

4:46 p. m.—William Stearns, tenor.
5 p. m.—New Yorkers' Dance Orchestra.
6 p. m.—Dinner music.
6:55 p. m.—Baseball scores.
7 p. m.—Gene Ingraham's Orchestra.
7:30 p. m.—Bernard Ahrens, barytone.
7:45 p. m.—"Winged Enemies of Man,"
Dr. I. Goldston.
8 p. m.—The Happiness Novs.

8:30 p. m.—The Wandering Minstrels.
9 p. m.—La France Orchestra.
9:30 p. m.—Musical program.
10 p. m.—Whittall Anglo-Persians.
10:30 p. m.—Jack Albin's Orchestra.
11-12 p. m.—Pelham Heath Inn Orchestra. 660k-WJZ-NEW YORK-455m

660k—WJZ—Nkw Tolki p m.—Ambassador Trio. p m.—Weather; news service. 4:35, 5:30, 7, p m.—Baseball reports 4:35, 5:30, 7, 10 p. m.—News service. 4 p. m.—"Your Daily Menu." 4:15 p. m.—"They Are Wearing" 4:25 p. m.—"Solving, Candy Problems. 5:32 p. m.—Market quotations. 5:35 p. m.—Financial summary.

m.—Cotton quotations.
m.—Farm market reports.
m.—George Olsen's Orchestre.
n.—Sanford Florida sunshine hour.
m.—Sundial Shoe Serenaders and 9 p. m.—Sundial Shoe Serenaders a Bonnie Laddles. 10:30 p. m.—Harold Stern's Orchestra. 950k—WGBS—NEW YORK—316m

1:45 p. m.—Walter Croft, barytone.
1:55 p. m.—Rudh Alvoy.
2:05 p. m.—Radio gym class.
2:15 p. m.—Walter Croft, barytone.
3 p. m.—Cousin Eleanor's New York
Evening World Kiddie Klub program.
3:20 p. m.—Fashion talk.
3:30 p. m.—Gerald Goldwater, barytone.
3:40 p. m.—Piano lessons.
3:50 p. m.—Gerald Goldwater, barytone.

3:50 p. m.—Gerald Goobee.
6:80 p. m.—Uncle Geebee.
6:80 p. m.—Joe Gross's Blues Chasers.
7 p. m.—Herman Bernard, "What's Your Radio Problem?"
7:10-p. m.—Blues Chasers.
7:15 p. m.—Baseball and news items
New York Herald Tribune.
7:20 p. m.—Blues Chasers. 1250k—WHAP—NEW YORK—240m 330 p. m.—Holmes String Ensemble. 120 p. m.—Kitty Cheatham, recital.

7.55 p. m.—News digest. 8:15 p. m.—John String Quartet. 8:40 p. m.—Kitty Cheatham, "The Grace of God." of God."

9 p. m.—John Ingram String Quartet.

9:25 p. m.—Franklin Ford, "Roman

and Americanism Contrasted."
9:45 p. m.—WHAP mixed quartet. 1100k—WFBH—NEW YORK—273m 4 p. m.—"Care of the Hair and Skin." 4:30 p. m.—Black Diamond Serenaders.

mons.

mons.

m.—Majestic String Ensemble.

p. m.—Radio Ramblers.

30 p. m.—Horace J. Taylor, reader.

145 p. m.—Troubadour's Tavern

chestra.
10:30 p. m.—George Quicci, pianist.
11 p. m.—Billy Day, popular ballads.
11:30 p. m.—Connie's Inn Orchestra. 830k—WHN—NEW YORK—361m 2:15 p. m.—Bob Schaefer, songs 2:25 p. m.—Gertrude Baker, songs and

plano. Edw. Browne's Orchestra. 2:35 p. m.—Edw. Browne's Orchestra.
3 p. m.—Prince Piotti, entertainer.
3:10 p. m.—News, racing and baseball.
3:45 p. m.—Al. Wilson's Playmates.
4 n. m.—News, racing and baseball.
4:10 p. m.—Arabelle Merrifreed, contraito; Samuel Shankman, planist.
4:30 p. m.—Uncle Robert's Pais.
5 p. m.—News, racing and baseball.
5:10 p. m.—Peola Reed, soprano.
5:25 p. m.—News, racing and baseball.
7:30 p. m.—Uncle Robert's Chat.

5.25 p. m.—News, facing and reference of the control of the contro

1100k—WEBJ-NEW YORK—273m p. m.—Blue Bell Serenaders. 30 p. m.—Luna's Knickerbocker Grif Orchestra.
p. m.—Al Becker, ragtime banjoist.
15 p. m.—Isabel Henderson, soprano
30 p. m.—Luna's Marine Band. 1160k-WRNY-NEW YORK-258m

15 p. m.—Pauline McDonald, sopra 12:30 p. m.—Raunne McDonald, sopranc
12:35 p. m.—Edison Man, "Electrifying
the Cellar."
7 p. m.—Sport rays.
7:30 p. m.—Helen Halprin, pianist.
7:35 p. m.—Helen Halprin, pianist.
7:45 p. m.—Alfred McCann, "Foods."
8 p. m.—Herald Square Quartet.
8:30 p. m.—Helene Rubinstein, "Birdseye View of the History of Beauty Culture."

ture." :45 p. m.—"Voice Sounds in Radio,"

Sylvan Harris.
p. m.—Odierno Quartet.
30 p. m.—Starlight Park novelty.
45 p. m.—Czech program with Jose

Checkova. 0:15 p. m.—Novelty night, "Punch and Judy Show."

Judy Show."

880k—WMCA—NEW YORK—341m

10:30, 11:30:a. m., 12:30, 1:30, 2:30 and
3:30 p. m.—Market reports.

11 a. m.—Food Bureau program.

1 p. m.—Olcot Vall's String Ensemble.

2 p. m.—Oderno Ladies' Trio.

3 p. m.—Minnie Weil, planist.

4 p. m.—Book review.

4:45 p. m.—W. Curtis Nicholson, "The
Right Word."

5:45 and T-p. m.—Employment opportunitiess.

tunitiess.
p. m.—Shelburne Orchestra.
30 p. m.—Ernie Golden's Orchestra.
30 p. m.—Alfred Orner, tenor.
45 p. m.—Elliot Pflomm, bass-barytone 7.45 p.Blliot Pflomm, bass-barytone 8 p. m.—Alfred Orner, tenor. 8.15 p. m.—Elliot Pflomm, barytone. 8.40 p. m.—Talk, T. R. Weyant. 8.50 p. m.—Broadway Association talk. 9 p. m.—Paul Whiteman's Players. 9.30 p. m.—Klein's Serenading Shoemak

ers.
10 p. m.—Norman Pearce, readings.
10 p. m.—Manhattan Serenaders.
11 p. m.—Jack Denny's Orchestra.
11 p. m.—Brighton Orchestra.
12 p. m.—McAlpin Entertainers. 570k-WNYC-NEW YORK-526m

6 p. m.—Plano selections.
6:10 p. m.—Market high spots.
6:20 p. m.—Plano selections.
6:30 p. m.—Elementary French lessor 7 p. m.—Advanced French lessons.
7:30 p. m.—Police alarms.
7:35 p. m.—Juliet Bartlett, soprano.
7:50 p. m.—"Timely Summer He Hints" 11118. 7:55 p. m.—Baseball results. 3:15 p. m.—Harry Pates, Frank Pop

o boys.
. m.—"How the District Attorney's
. Operates," John E. McGeehan. 9 p. m.—Piano selections. 9:15 p. m.—Talk, "Know Your City." 9:30 p. m.—Manhattan Double Quartet 10:15 p. m.—Piano selections. 10:30 p. m.—Police alarms; weather. 950k—WAHG-RICHMOND HILL—316m 12:00 noon—Musical program. 1:00 p. m.—Musical program. 7:30 p. m.—Sylvia Solow, violinist.

7:45 p. m.—George Wooley, saxophone soloist.

8:00_p. m.—Helen Morris, soprano.

8:30 p. m.—Orpheus Mixed Qartet.

9:00 p. m.—The Gondóliers.

9:40 p. m.—Montelair Harmony Four.

10:00 p. m.—Shell Beach Trio.

10:20 p. m.—Duke Donaldson's Orches-

tra. 1:02 p. m.—Duke Donaldson's Orches-1230h-WGBB-FREEPORT-244 1230k—WGBB—FREEDOMIT—222 \$:00 p. m.—Shirly Fulton, pianist. 8:15 p. m.—Milton Aronson, violinist. 8:30 p. m.—Rev. Henry Medd, songs. 8:45 p. m.—Dorothy Sakes, soprano. 9:00 p. m.—Cooper Boyd, violinist. 9:15 p. m.—Jack Mauersberger, tenor. 9:30 p. m.—Paul Hoffman, entertainers. m.—Antoinette Marino, soprano.
m.—George Comer, basso.
m.—Orchestra.
m.—Lesser's Nite Owls.

1390k—WRST—BAY SHORE—216m 7:00 p. m.—Brewster Theater Hour. 3:30 p. m.—Rexford's Original Orche 740k-WOR-NEWARK-405m

7:15-7:45 a. m.—Gym class. p. m.—Theo Alban, tenor. p. m.—Edward Swayze, pianist

1190k—WNJ—NEWARK—252m 0 p. m.—Tivoli Symphony Orches 0 p. m.—Vincent Lopez Orchestra. 1190k—WGCP—NEWARK—252m p. m.—Mae Ensenat, contraito. 1140k—WAAM—NEWARK—263m 10:30 a. m.—Happy Hour Program. 11:00 p. m.—Public service cooking

son. 11:30 p. m.—Happy Hour program. 3:00 p. m.—Freddie O'Brien's Orchestra 7:00 p. m.—Review of sports, Lieutenan Joe Kunze. 115 p. m.—Shark River Island Joy Boys. 100 p. m.—Roger Murphy, tenor. 130 p. m.—Organ recital through C. of

C.

9:00 p. m.—C. of C. music hour.

10:30 p. m.—Wallie Osborne's Orchestra

1340k.—WODA.—PATERSON—224m

12 noon—Dance music.

12:20 p. m.—News flashes.

12:30 p. m.—Vocat selections.

12:45 p. m.—Dance music.

5 p. m.—Studio program.
5:30 p. m.—News of the day.
5:50 p. m.—Sport talk.
6 p. m.—Dinner music.
8:45 p. m.—Mildred Feltman, Grace Mey er, sopranos. 9:15 p. m.—Christian Harmonic Orches 10 p. m.—The Meyers Sisters, duets.

1:09 p. m.—Tea room ensemble. 3 p. m.—Program from studio of Sesqui-centennial Exposition.

6:40 p. m.—Baseball scores. WLIT—PHILADELPHIA—395m 12:40 p. m.—Religious service. 2 p. m.—Arcadia Concert Orchestra.

sults.
7:30 p. m.—Dream Daddy.
8 p. m.—Studio program.
8:15 p. m.—Pioneer Storage Battery Com-8:15 p. m.—Proneer Storage Battery Confi-pany entertainers. 9 p. m.—Shickerkling Artists. 10 p. m.—Arcadia Cafe Dance Orchestra. 10:30 p. m.—Rufus and Rastus. 11 p. m.—Freshman Masterpiece Radio

Hour. 590k—WIP—PHILADELPHIA—508m --Studio program

p. m.—Dinner music.
p. m.—Baseball scores.
- Department of Agriculture. . m.—Bedtime Story: roll call. Dk—WCAU—PHILADELPHIA—278m 45 p. m.—Clarence Seaman's Orchestra 30 p. m.—Snellenburg Instrumenta Trio; Stephen Knopf; Pauline Waters soprano; Clyde Dengier, tenor. p. m.—Sullivan Brothers.

m.-Dwight Strickland, orian. p. m.—Regina Crooners. 115 p. m.—Nasco. 145 p. m.—Jack and Juki, songs. 10 p. m.—Archie Lloyd, Irene

songs. 10:30 p. m.—Jack Myers' Musical Archi- 10:30 p. m.—Astor Roof Orchestra. tects. 090k—WHAR—ATLANTIC CITY—275m 2 p. m.—Seaside Trio.
7:45 p. m.—Billy Baxter, "Horticultural p. m. Seaside Trio. 1000k—WPG—ATLANTIC CITY—300m

130 p. m.—Morton luncheon music. 145 p. m.—Organ recital. 7 p. m.—Ambassador dinner music. 145 m. m.—Shelburne dinner music. 1340 p. m.—Organ rectail.

p. m.—Ambassador dinner music.

1345 ps. m.—Shelburne dinner music.

1315 p. m.—Organ and vocal recital.

p. m.—Ambassador concert orchestra.

130 p. m.—Traymore concert orchestra.

10:30 p. m.—Traymore Grill dance orchestra.

orchestra.

11 p. m.—Olson's Dance Orchestra.

11 p. m.—Organ recital.

790k.—WGY.—SCHENECTADY.—380m

12:30 p. m.—Reports.

2 p. m.—Asia Club Orchestra.

2:30 p. m.—Music; one-act play by WGY p. m.—Asia Club Orcnestra. 130 p. m.—Music; one-act play by WGY Matinee Players. 3 p. m.—Stock reports, news, scores. 3 p. m.—International Sunday School

. m.—Dinner program. 5 p. m.—Baseball score

Sacrifice."
10:30 p. m.—Plano recital by Lillian
Snook and J. Austin Springer.
940k—WGR—BUFFALO—319m
9 p. m.—Jointly with station WEAF. p. m.—Jointly with station WEAF. :30 p. m.—Recital. 0 p. m.—Jointly with station WEAF. p. m.-1 a. m.—Supper music. 1130k—WMAK—BUFFALO—266m 30 p. m.—Dinner music.
30 p. m.—Musical WGY Orchestra.
15-10:30 p. m.—WGY Players.
1080k—WHAM—ROCHESTER—273m 130 p. m.—Eastman Theater Orchestra, p. m.—Eastman Theater Organ. :80#8:30 p. m.—Dinner concert. :15 p. m.—Two one-act plays given by

WGY Players.
630k—WTIC—HARTFORD—476m 630g—WILL—HARDING
noon—Travelers Orchestra.
0 p. m.—Emil Heimberger's Trio.
5 p. m.—"Safety", Robert Hurley.
5 m.—Piano recital, Laura C. Gaudet.
5 p. m.—"Fiddle an' Bee;"
0 p. m.—Colt Park Municipal Dance 8:30 p. m.—Colt Park Municipal Dance Orchestra. 9:30 p. m.—First Presbyterian Church Quartet. 10:30 p. m.—WTIC's Mail Bag. 10:45 p. m.—"Debutants" period. 9:45 p. m.—Jimmy Clarke, pianist. 10 p. m.—WMCA Trio.

10:30 a. m.-Women's Club talks; news;

1 p. m.—Luncheon concert.
4 p. m.—Tea dance.
4:20 p. m.—Vocal and piano selections.
6 p. m.—Kiddies' Klub.
6:30 p. m.—Shepard Colonial dinner dance.
7 p. m.—"Vocations in New England."
7 p. m.—"Vocations in New England." 55 p. m.—Dok Eisenbourg's Sinfonians.
56 p. m.—Victor's Band of New York.
16 p. m.—Musical program.
17 p. m.—Concert by St. Joseph's Band.
18 p. m.—Dance music.

860k-WEEI-BOSTON-349m 10:45 a. m.—Events of the Day.
12:45 p. m.—Events of the Day.
3 p. m.—Events of the Day.
4 p. m.—Roy Phillips's Orchestra.
5:45 p. m.—Stock market and b

news. 5.55 p. m.—Lost and Found. 6 p. m.—Keith's Radio Review. 7.30 b. m.—Hiram and the Dairy Maid p. m.—Neapolitan Dutch Girls' uintet.

m.—La France Orchestra.

p. m.—The Musical Chef.

m.—Whittall Anglo-Persians.

p. m.—Ed Andrews's Orchestra.

900k-WBZ-SPRINGFIELD-333m 7 p. m.—Lenox Ensemble.
7.33 p. m.—Kimball Trio.
9 p. m.—Tuesday Morning Music Club.
10 p. m.—"Preludinoff." planist.
10:30 p. m.—Brunswick Orchestra. 640k-WRC-WASHINGTON-469m

p. m.—Organ recital.
p. m.—Meyer Davis's Orchestra.
145 p. m.—Book Reviews, Mrs. Nina Reed. 640k—WCAP—WASHINGTON—469m is a. m.—"Tower Health Exercises. Musical program.

"Science News of the Week."

m.—Studio program.

"Whitali Anglo-Persians."

nst. 0 p. m.—City Park Orchestra. 970k—KDKA—PITTSBURGH—309m 6:30 p. m.—Dinner concert.
7:15 p. m.—Baseball scores.
9 p. m.—Stockman Farmer news.
9:30 p. m.—Concert by faculty of Pitts-burgh Musical Institute.

SATURDAY 610k—WEAF—NEW YORK—492m 1:45, 7 and 7:20 a. m.—Health exercises. 1:45-8 a. m.—Morning prayer service. 2:15-1:15 p. m.—Waldorf-Astoria Orchestra.
4-5 p. m.—Elmer Grosso's Orchestra.
5-6 p. m.—New Yorkers Dance Orchestra.
6 p. m.—Dinner music.
6:55 p. m.—Baseball scores.
7 p. m.—Leo J. F. Bartunique, barytone.
7 dynamics vicinist

7 p. m.—Leo J. F. Bartunique, parytone.
7:15 p. m.—Dora Gutentog, pianist.
7:30 p. m.—Musical comedy hits by the
WEAF Musical Comedy Troupe.
8:30 p. m.—Goldman Band concert, Wagner program; Olive Cornell, Soprano.
10:15 p. m.—Ben Bernie's Orchestra.
11-12 p. m.—Rolfe's Palais d'Or Orchestra.

questions and answers.
p. m.—Peerless Male Quartet.
30 p. m.—Odierno Ladies' Trio.
p. m.—Popular Four—male quartet.
m.—Connie's Inn Orchestra. 660k-WJZ-NEW YORK-455m 1 p. m.—Park Lane Luncheon Orchestra. 2 p. m.—Weather; news service. 4. 4:35, 5:30, 7 p. m.—Baseball reports.

5:32 p. m.—Market quotations.
5:35 p. m.—Financial summary.
5:40 p. m.—Cotton quotations.
5:50 p. m.—State and Federal marke reports.
7:05 p. m.—Waldorf-Astoria Orchestra.
8:25 p. m.—Stadium Philharmonic con-

950k-WGBS-NEW YORK-316m

p. m.—Dance music, p. m.—Uncle Geebee.
30 p. m.—Vincent Sorey's Concert Trio.
15 p. m.—Baseball and news items, New York Herald Tribune.
20 p. m.—J. A. Mendler, soprano.
130 p. m.—W. H. Black, "Outline of Travels."
7:45 p. m.—George Hall's Arcadians.
8:45 p. m.—Cinford Cheasley, "Philosophy of Numbers."
9 p. m.—William Chosnyk's music mer p. m.—William Chosh-ory violin recital. 15 p. m.—WGBS String Ensemble.

9:30 p. m.—Odierno Ladies Vocal Tro, Jacob Forstat, cellist. 10 p. m.—Alexander Kadison, "Women of History." 10:15 p. m.—Paula Passier-Fuchs, pian-iste; Sadie Rosen, soprano. 10:30 p. m.—Arrowhead Dance Orchestra. 130 p. m.—Arrownead Dance Orchestr 1160k—WRNY—NEW YORK—258m (noon)—MacDowell Sisters. 115 p. m.—John von Aspe, tenor. 130 p. m.—MacDowell Sisters.

:30 p. m.—MacDowell Sisters.
:45 p. m.—Lillian Flosbach, soprano.
p. m.—Sport Rays.
10 p. m.—Commercial Digest.
15 p. m.—"Your Name," Ephrain cross. 30 p. m.—Orlando's Concert Orchests

joists.
9 p. m.—Dawing room players, Tschalkowsky.
9:30 p. m.—Schulman's national stage children. children. 10 p. m.—Leon Carson, tenor. 10:15 p. m.—Constance Carr, soprano. 880k—WMCA—NEW YORK—341m 0:30, 11:30 a. m., 12:30, 1:30, 2:30 an 3:30 p. m.—Market reports. 11 a. m.—Music. 1 p. m.—Olcott Vail's String Ensemble 5:45-6:30 p. m.—Employment opportu

ties. :40 p. m.—Ruth Jackson, soprano. 7 p. m.—Tappen's Orchestra.
7 p. m.—Tappen's Orchestra.
7 p. m.—Billy King, songs.
7 p. m.—Murlon Ross, soprano.
8 p. m.—Music.
8 p. m.—Music.
8 p. m.—Husic.
9 p. m.—Husic.
9 p. m.—Husic.

570k-WNYC-NEW YORK-526m

7 p. m.—Piano selections.
7:10 p. m.—Anita Gribbon, soprano.
7:30 p. m.—Police alarms.
7:35 p. m.—Fitzpatrick Brothers, "Old—Time Songs."
7:55 p. m.—Baseball results.
8. p. m.—Gertrude and Harry Dudley. p. m:—Gertrude harmony duo. p. m.—The Kelly Trio, jigs and reels. 10:30 p. m.—Police alarms; weather.

1100k—WBBR—STATEN ISLAND—273m 8 p. m.—Professor Charles Rohner, violinist. 8:10 p. m.—Fred Twaroschk, tenor. 8:25 p. m.—Bible questions and answers. 8:45 p. m.—Professor Charles Rohner,

950k-WAHG-RICHMOND HILL-316m 2 noon—International Trio. 2:30 p. m.—Ralph DeStefani's Orchestra. p. m.—Ralph DeStefani's Orchestra, 2 midnight—Midnight variety program. 740k—WOR—NEWARK—405m
6:45-7:15-7:45 a. m.—Gym Class.
2:30 p. m.—Frances Breck, pianist.
2:45 p. m.—Mercedes Fehley, soprano.
3 p. m.—Frances Breck planist.
1:15 p. m.—Mercedes Fehley, soprano.
1:30 p. m.—Berkley-Cartaret Concert Quintet.

130 p. m.—Berkley-Cartaret Concert

Quintet.
135 p. m.—Jacques Jacobs's Ensemble.
145 p. m.—Bill Wathey, "Sports."
15 p. m.—Jacques Jacobs's Ensemble.
15 p. m.—Jacques Jacobs's Ensemble.
15 p. m.—Oreste's Queensland Or15 p. m.—Berkley-Cartaret Concert
15 p. m.—Berkley-Cartaret
15 p. m.—Jacques Jacobs's Ensemble.
15 p. m.—Bill Wathey, "Sports."
16 p. m.—Bill Wathey, "Sports."
16 p. m.—Bill Wathey, "Sports."
17 p. m.—Jacques Jacobs's Ensemble.
17 p. m.—Jacques Jacobs's Ensemble.
18 p. m.—Tacques Jacobs's Ensemble.
18 p. m.—Ta

7.30 p. m.—Oreste's Queensame of chestra.

8 p. m.—Madeleine Hulsizer, soprano;
William Lockwood, violinist.

9.30 p. m.—Arthur Pryor's Band.

9.15 p. m.—Casino Orchestra.

9.45 p. m.—Berkeley-Cartaret Concert.

Orchestra.

10.15 p. m.—Special feature.

10.30 p. m.—Montery Society Orchestra.

11.15 p. m.—Ben Bernie's Orchestra.

1190k—WGCP—NEWARK—252m

130 p. m.—Piano récital.

8:30 p. m.—Piano recital. 8:45 p. m.—Harold Fries, barytone. 9 p. m.—Whitehead and Everiss, piano duo. :15 p. m.—Alice Laurie, soprano. :30 p. m.—Whitehead and Everiss, piano

duo.

9:45 p. m.—Alice Laurie, soprano.

10 p. m.—Mary Speedie, contraito.

10:15 p. m.—Paramount Mixed Quartet.

10:45 p. m.—Gertrude Conrad, pianist.

11 p. m.—Llewellyn and Browne, harmony

11 30 p. m.—Studio program. 1140k—WAAM—NEWARK—263m p. m.—Dorn-Bauer Orchestra. :30 p. m.—"Where Shali We Spend Our Nacation?"

8:35 p. m.—Dorn-Bauer Orchestra.

7 p. m.—Sport talk by Lieutenant Joe Kunze. 15 p. m.—To be announced. 15 p. m.—Walter Seltman, talk.

p. m.—Walter Sellman, p. m.—Silk City Plectral Quartet 8:30 p. m.—Silk City Fleeting Quartet.
9: p. m.—Orpheus Mixed Quartet.
9:30 p. m.—Cydne Vida, soprano; Gustav
Bischoff, planist.
10 p. m.—Four Towers Orchestra.
1840k—WODA—PATERSON—224m noon—Dance music. :20 p. m.—News flashes; songs. :45 p. m.—Dance music.

p. m.—Dance music. 760k—WFI—PHILADELPHIA—395m p. m.—Episodic drama, "Freedom, from the Sesquicentennial Exposition, 590k—WIP—PHILADELPHIA—508m a. m.—Setting-up exercises. 0:30 a. m.—Reducing exercises. p. m.—Organ recital.

p. m.—Organ rectal.
3 ps.m.—Concert.
3:05 p. m.—Dinner music.
3:05 p. m.—Department of Agriculture.
7 p. m.—Bedtime story and roll call.
8 p. m.—Sports corner.
3:15 p. m.—Ambassador Orchestra.
8:30 p. m.—Marine studio. Orchestra. 1:30 p. m.—Shelbourne Dance Orchestra. 1:090k—WHAR—ATLANTIC CITY—275m

2 p. m.—Seaside Trio. 7:30 p. m.—Lecture period. 8 p. m.—Seaside Trio. 1000k—WPG—ATLANTIC CITY—300m

1000k—WFG—ATLARTIC
6.45 p. m.—Organ recital.
7 p. m.—Morton dinner music.
8 p. m.—Shelburne dinner music.
8 p. m.—Ambassador dinner concert.
8:30 p. m.—Studio program.
9 p. m.—Traymore Concert Orchestra.
9:45 p. m.—Emmett Weich's Minstrels.
10:15 p. m.—Dance orchestra. 9:40 p. m.—Emmett weich's Minstreis. 10:15 p. m.—Dance orchestra. 10:45 p. m.—Ted Weems's Novelty Dance

Orchestra. 1:30 p. m.—Shelburne Dance Orchestra. 790k—WGY—SCHENECTADY—380m 2:30 p. m.—Reports. :30 p. m.—Onondaga Orchestra. :30 p. m.—Buffalo Theater and WMAK studio programs.
0:30 p. m.—Dance program.
940k—WGR—BUFFALO—319m

8:30-10 p. m.—Joint broadcasting wis station WEAF, Goldman Band concer 1080k—WHAM—ROCHESTER—273m 130 p. m.—Eastman Theater Orchestra.
p. m.—Eastman Theater Orchestra.
p. m.—Dinner concert.
130 p. m.—Program from Sheas Theater. 8:30 p. m.—Baseball scores: weather 1130k—WMAK—BUFFALO—266m

1130k—WAIAK
6:30 p. m.—Dinner music.
7:30 p. m.—Musical from stage of Shea's
Buffalo Theater.
8:30 p. m.—Pearce & Pearce, Inc.
9:30 p. m.—Musical.
9:00k—WBZ—SPRINGFIELD—333m p. m.—Theater Orchestra.
p. m.—Musical program.
go p. m.—Max Krulee's Orchestra 10 p. m.—Musical program.
1070k.—WNAC—BOSTON—280m
6. p. m.—The Smilers.
6:30 p. m.—Dinner dance.
7 p. m.—"What's Going on To-night."

3:30 p. m.—Vocal selections p. m.—Irving Rogers—songs.
p. m.—Musical program.
05 p. m.—Dance music.
640k—WRC—WASHINGTON—469m . m.—Organ recital. . m.—Mayflower Orchestra. 2 p. m.—To be announced.
8:30 p. m.—Stadium concert by the New York Philharmonic Oreffestra.
11 p. m.—Kitt Hour of Music.

11 p. m.—Kitt Hour of Music. 12 midnight—Organ recital. 12 midnight—Organ recital. 13 p. m.—Westinghouse Employe Band. Band, 5 p. m.—Baseball scores. 7 p. m.—Concert by the Westinghouse Britain Has High Speed Telegraph Service

Continued from first page

speeds of transmission varying between 10 and 150 words a minute. A speedometer calibrated in words a minute is fitted to the Wheatstone for the purpose of indicating to the operator the speed at

which he is transmitting. The high speed receiving apparatus, apart from the purely radio reception apparatus, consists of a Creed receiver, which perforates a tape with a replica of

the Wheatstone tape in use at the distant transmitter, and the Creed printer, which prints the received message on a strip of tape in plain type and at the speed at which the messages are received. The printed slip is then drawn through an automatic gumming machine and affixed in suitable lengths to a form ready for

delivery to the addressee. In addition to this printing apparatus, each table is equipped with an undulator, or trailing syphon recorder. This instrument is connected in parallel with the receiving perforator and consists essentially of a relay carrying a light ink syphon in addition to the usual tongue, the latter being used to operate a sounder in the local circuit. Paper tape is fed steadily forward by a motor driving through a continuously variable gear, permitting the speed of the tape to be adjusted in accordance with the speed of the incoming

signals. The undulator is capable of recording signals at speeds up to 200 words per minute and is used to replace the printing apparatus when atmospheric conditions cause mutilation of signals. The record of signals takes the shape of a wavy line, the waves of which take the form of the Morse code. This record is subsequently

transcribed by typist-telegraphists. A "hand speed" telegraph key is also fitted to the control table to enable the receiving operator to "break in" with short service remarks. A second key and sounder are used for communicating with-Ongar and Brentwood over a land line

reserved for that specific purpose.

The Transmitting Center There are at present four transmitters located at Ongar, the general equipment of which may be taken as representative of that used at all the other terminal stations. There is room on the site for

ruture additions to the service. The aerial systems closely resemble one another and consist generally of one or two circular cages of four wires, each suspended from two or three 300 foot selfsupporting lattice towers. These aerials are not directly grounded, but are connected to counterpoise systems comprising a number of insulated wires supported on a thirty-foot lattice masts. These counterpoises are arranged parallel to and extending beyond the horizontal portion of their appropriate aerials. This system has been found to give more efficient results than the more usual buried ground

With modern methods of radio frequency and audio frequency tuning, the efficacy of a transmitting station and the legibility of the signals under bad atmospheric conditions depend largely upon the steadiness of the transmitted wave. In this connection it is worthy of note that the receiving apparatus installed at Berne has tuning and filter circuits so selective that a change of only two meters in a wave length of 3,000 meters used by the English

station reduces the output energy of the I nected across the coupling coil in the grid

receiver to approximately one-fourth. It will be realized, therefore, that constancy of the transmitted wave is of primary importance if the receiving station is to utilize efficiently the means available for reducing atmospheric disturbances and special precautions are taken at the Ongar transmitters to keep the emitted waves constant.

circuit of the oscillation generator. As a comparatively light relay suffices for this purpose speeds of over 100 words per

minute can easily be attained. The independent drive, or master oscillator circuit, when set in oscillation with the signaling key contacts open, introduces an oscillating current of a predetermined frequency into the regeneration coil of the main oscillator, and thus forces the main

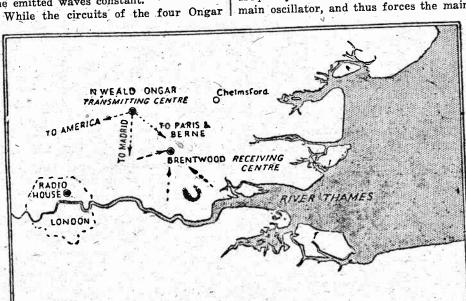


Figure 1. Map showing positions of Ongar, Brentwood and Radio House

transmitters and the auxiliary apparatus are identical, there is a difference in the size and number of tubes used in each set, but the following remarks are applicable to each transmitter.

The Transmitting Apparatus An outstanding feature of each transmitter is the "independent drive," or master oscillator system, which, besides other advantages mentioned later, simplifies the high speed signaling apparatus by dispensing with heavy contacts and blowers for cooling purposes. As is well known, the fundamental principle of this system is to control the main oscillatory amplifier system through the medium of a separate low power oscillation generator

adjusted to the required wave length. In Figure 3 the left hand tube panel is the master oscillator, the panel on the extreme right being the power amplifier. The two units are inductively coupled together by means of variometers which can be seen in the illustration. This system permits of great constancy

of radiated wave length, as the wave length is unaffected by alteration of capacity due to any swaying movement of the aerial system.

A high speed signaling switch is con-

oscillating system to oscillate at the same

frequency as the drive unit. In order to prevent undue rise of poten tial on the smoothing condenser of the main oscillator, and thus forces the main the intervals the drive coupling coil is short-circuited by the signaling key, a power absorbing unit is connected as a shunt across the terminals of the con-

The main oscillation panel for the Paris service utilizes four tubes for rectifying purposes and four tubes as oscillators. The high tension plate potential for the tubes is applied at 10,000 volts. The power supplied to the plate circuit is approximately three kilowatt and the antenna current is about twenty-five am-

The main oscillation panel for the Berne service utilizes four tubes for rectifying purposes and six tubes as oscillators, the tubes being of the same size as those of the Paris transmitter. The power in this case is about six kilowatt, and the aerial current about thirty-six

amperes. In the case of the Madrid transmitter. there are ten rectifying tubes and ten oscillator tubes, both sorts of tubes being somewhat larger than those used for the

sets are in use at one time, one set being spare for main amplifier supply, and one set for the independent drives and filament lighting. Such is the equipment of the Ongar transmitting center as it is to-day, but it is constantly being added to as new services are opened, so that it bids fair one day to be the transmitting center for one

of the most extensive networks of radiotelegraph communication in the world. The only other transmitting center operated by the Marconi Company is the station at Carnarvon, in Wales, and this is also controlled and operated from Radio House, London. There are two transmitters at Carnarvon, both high power tube transmitters, one being used for commercial radiotelegraphic communication with this country. The other transmitter is occupied with the newly instituted photoradiogram London and New York, and is at present kept quite busy transmitting photographs and pictures of all sorts across the

Atlantic.

Different kinds of tape used for transmission and reception of radio signals at Radio House. Above—Wheatstone perforator, Creed printer and Creed recorder New Circuit With Uniform Energy Transfer on All Waves Solves Problem

UNITED STATES AUSTRALASIA SOUTH AMERICA WEST INDIES

energy in phase, and using at the same time the reverse characteristics of these two couplings properly adjusted, most satisfactory results are obtained in the production of a total energy transfer, which will, if desired and by proper adjustment, increase with frequency increase, decrease with frequency increase, or remain substantially constant throughout the fre-

quency band. "Again considering Figure 3, we find that by judicious proportioning of constants we can so adjust the coupling that at any point throughout the frequency range there is the correct amount of inductive reactance in the plate circuit to maintain the tube in a condition of critical regeneration. The tube can also be made to oscillate or to regenerate slightly throughout the band, as desired. It will be noted that the plate circuit is energized through a radio-frequency choke. Any actual design of this type of receiver must take into consideration the amount and phasing of stray feedbacks, if operation with extreme regeneration is required. The frequency band covered by this combination is quite large, larger than usual, pacity in either sense.

due to extreme loose coupling at the high-

est frequencies. "A commercial application of the coupling is shown in Figure 4, and it will be noted that the system is similar to that described in Figure 3, with the exception

of condenser C3. "The principal cause of oscillation in a radio-frequency amplifier system is feedback through the capacity between electrodes of the tube. It is necessary that this feedback energy be in phase with the impressed grid voltage in order to produce regeneration and oscillation. It has been found that this positive feedback occurs only when the plate circuit is predominantly inductively reactive. If the plate circuit reactance is predominantly capacitive energy will also be fed back through the tube capacity, but in a negative phase. However, if the inductive and capacitive reactances of the plate circuit are equal they create a non-reactive condition, leaving only a resistive plate circuit, which will not feed back through the tube ca-

Continued from page four "When this non-reactive condition ex-

ists the plate circuit becomes quite independent of the tube characteristics, since no feedback can occur through the tube capacity. In actual practice commercial models are designed for this condition, so that tubes of any type or make can be used with no tendency toward regenera-

tion or oscillation. "In Figure 4 the condenser C3 is in series with the plate to provide the required capacity reactance to balance the inductive reactance due to the coupling means. Since the capacity of C3 is fixed, its reactance varies inversely with the frequency, so it is necessary to design the coupling to provide an inductive reaction which also varies inversely as the frequency, and to the same degree. This is accomplished by properly proportioning the couplings and values of C1, C2, C3, L1 and L2. In actual practice, it is occasionally found desirable to leave the plate circuit with slight predominance of capacitive reactance, since under these conditions a slight negative feedback will ex-

ist in the tube, which will oppose any stray positive interstage feedbacks. In other words, the relative values of C1, C2, C3, L1 and L2 vary in different styles of

assemblies. "The automatic variation of the anenna coupling is also employed. This allows the coupling at the highest frequency o be quite loose, which is found to widen the frequency band covered by the tuned circuit associated with the antenna. The so-called absorption hump, which occurs when the antenna tune falls in the reception band, is also much reduced in effect.

"A variation of the circuit is shown in Figure 5, where it is used to couple the plate circuit of a regenerative detector directly to the grid circuit, to produce either regeneration or oscillation throughout the band. If a coupling similar to that previously discussed is used, it is found that the instantaneous polarity of the fedback energy is in a negative sense, which necessitates the rearrangement shown, which allows direct capacitative feedback

Continued on page nine



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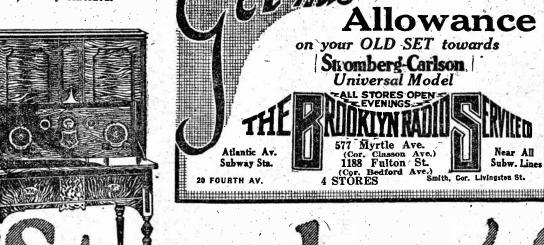
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Herald York Tribune RADIO MAGAZINE

SUNDAY, JUNE 20, 1926

TWELVE PAGES

Simple Directions for Constructing a Sound Board Cone Speaker

This Unit Is Easy to Build With Apparatus Which Is Now Generally Available

By JOHN F. TRAVER

. These drawings clearly illustrate the construction of the sound board

cone loud speaker described in this article

that a free edge was necessary for a cone | unit. Now, if my soundboard were suffi-

terred manufacturers from attempting to sound vibrations the above arrangement

use a soundboard. However, one concern | would give me an instrument incorporat-

had overcome the difficulty, it seemed, so | ing the free edge cone principal, and in

natural reproduction of all the musical tones via radio one is apt to

SECTION IX

overlook the fact that it is necessary for all links in the chain, from broadcasting station to loud speaker, to be so designed that they will pass correctly all of these

The modern broadcasting station has made very good progress in striving for this ideal, and furthermore it is entirely outside of the broadcast listener's control, so we will consider only the receiving

A little thought will show that a welldesigned audio amplifier will not pass high notes if the radio frequency stages have already cut off these high impulses. Carrying this thought a bit further, it is evident that a high-priced loud speaker designed to bring out the low tones is a useless expense if the set and audio amplifier fail to pass these lew notes.

My object in giving the above introduction is to explain the following suggestion: If your set is not capable of correctly amplifying and passing all notes in the musical range don't begin with this article which has to do with a loud speaker, but look for a good article which will tell you how to remedy the faults in your set. The loud speaker to be described will then be of more benefit to you.

I have been interested particularly in audio amplification and sound reproduction for several years, and among other things have built quite a number of cone type speakers. Some gave very pleasing results, while I will admit that others were

Cone Requires More Power

Cone type and horn type speakers have been compared and discussed at length, so I won't attempt it here, except to point out two facts which I do not find emphasized elsewhere. It has been my experience that a good cone speaker requires a more powerful unit to operate it satisfactorily than is necessary with the average speaker of the horn type. With a cone speaker it is also advisable, if not absolutely necessary, to use a power tube and feed it with a more powerful signal.

Failure to take care of these matters has caused many to be dissatisfied and anjustly criticize their cone speakers. Another cause for complaint is the tendency of this type to bring out low frequency noises, defects and distortion prevalent in a poor receiving set.

As I am an experimenter by inclination, I like to make my own equipment, as far as possible, and endeavor to improve on the marketed variety. In this work my greatest trouble lay in the fact that until recently no powerful, satisfactory unit was available to the public.

In view of this fact, I was very much interested when, a short time ago a number of New York stores offered complete parts for building cone speakers, including a powerful unit designed for the particular purpose. A little later an even better unit appeared, which, it is claimed, is identical to the one used in one or more of the better commercial cone speakers. I investigated these offers of cone parts, and while I was pleased with the parts | However, it seemed to me that a better themselves I thought most of the plans register of the low notes and greater

pending the cone unmounted or leave the mounting to the purchaser's ingenuity.

About this time I was attracted by one of the better class of radio manufacturers bringing out a cone speaker which incorporated a wooden soundboard. I had peen thinking of the theoretical advantages of a soundboard in connection with this type of speaker and had thought it strange that the principle was not used.

to vibrate properly. This may have de-

I was pretty well convinced of the

superiority of the free edge principle.

Vibrations set up at the center should be

allowed to build up without undue damp-

ing at the edge, which would be the case

This was my first problem, and one over

which I spent quite a bit of thought. If

the soundboard was to be held in a ver-

tical position the most accepted solution

would be to support the cone from a point

on the edge of the top, in order to take

the strain off the pin from the unit, and

cushion the rest of the edge against the

soundboard with felt, rubber or other

suitable material. This solution naturally

occurred to me first, but I did not accept

it. for one reason-vibrations set up by

the unit would be transmitted directly to

the cone by the unit pin, but the sound-

board would receive these vibrations only

through the movement of the air pocket

between the cone and the board. That

does not mean, of course, that the sound-

board would thus fail to perform its func-

tion. On the contrary, it would be more

truly a soundboard in such an arrange-

ment than if actuated directly by the unit.

for assembling were very crude. In fact, volume and fidelity over the entire scale used to cut out the circle. However, you

if the edge was held firm.

I decided to try.

Most of the data had been to the effect the soundboard directly in back of the

cone were caused to vibrate more as a single unit.

The Construction Plan

This thought led me to the following plan: I would mount the unit on the soundboard at the center and between the board and the cone. I would attach the edges of the cone and soundboard together and support the whole from a point on

Method of Assembly

ciently thin to respond readily to the

addition a soundboard vibrating in abso-

I tried it, and I can assure you I was

more than pleased with the result. The

instrument is very easy to build, and if

care is taken with the construction it will

be exceedingly attractive looking as well

Perhaps the hardest piece of work in-

volved is cutting out the circular sound-

board. A section of veneer board or pan-

eling should be obtained from a carpenter

shop or cabinetmaker. These sections

usually come, I believe, about twenty-

four inches wide and a little over thirty

inches long and about one-quarter inch

thick. At any rate, such a section will be large enough to enable you to put a circle

between twenty-three and twenty-four

inches in diameter. Such a board is

three-ply, which will insure against warp-

ing, and the two surfaces are of wood

having an attractive grain. This latter

feature is a decided advantage, as the

back of your soundboard will be open to

A twelve-inch piece of cord, with a tack

at one end and a pencil at the other, may

be used to mark out your circle. A cheap

iron frame scroll saw may be obtained

at the hardware store for a few cents and

lute harmony with the cone.

as efficient in operation.

IN AN attempt to create a full and most of the stores either recommend sus- might be expected if the soundboard and will find it easier to first cut your board down to a square just outside of the circle and then cut off the four corners. This will bring the edges of the board down pretty close to the circle and then the scroll saw may be used with much greater ease. Having cut out the circle file and sandpaper the edge smooth.

Mounting the Unit

The unit, mentioned earlier in this article, has a large horseshoe magnet, which is very powerful. The coil is located between the poles, and the armature is of the balanced type, adjustable by means of a small screw in the back. From this armature a pin some six inches in length projects for connection to the cone. The unit has a flat shield-shaped aluminum back for mounting. In this back is located the screw for adjusting the armature and also two threaded holes for machine screws to be used in mounting. From a point on this back directly in the rear of the pin these are located as follows: Mounting hole, seven-eighths-inch to the right; mounting hole, seveneighths-inch to the left, and adjusting screw, seven-eighths-inch below.

Check up these measurements, and then, making sure that the pin of the unit will be directly over the center of the soundboard, drill holes for the mounting screws large enough to accommodate them comfortably and another hole about threeeights inch, located so it will come directly over the adjusting screw. Also drill another three-eighths-inch hole far enough above the center to completely clear the unit. This is to be used for bringing out the cord from the unit. This board from the rear will look as shown in Fig. 1.

We now come to the mounting block. Details are shown in Fig. 3. This block should be cut from tough wood, which is not inclined to split, and should measure about 2%x14x1/2 inches. Two holes should be drilled so as to directly coincide with the mounting holes in the unit and soundboard. Between these holes, but not on a line with them, holes are to whose length should be about 11/2 inches. Arrangements should be made to countersink the heads of these screws, as that side of the block is to fit flush against the soundboard. Nuts are then put over these

screws and turned down tight. Before assembling all wooden portions those already described, as well as the stand and upright to be described later. should be rubbed down with fine sandpaper, then stained and varnished or stained and lacquered, preferably the latter.

Now place the unit in position on one side of the soundboard and the mounting block on the other. Insert the mounting screws through the block and board to the unit, and by tightening up bring the three firmly together. (Note.-It is important that the block should not cover up the hole in the soundboard opposite the unit adjusting screw.)

We next come to the cone itself. These are sold in two sizes, 18 and 36 inches. It will be necessary to buy the large size and cut it down, so that when glued into cone shape it will be about three-quarter inch larger than the soundboard. An adjustable connection is also provided for

(Continued on page eleven)

Radio News Will Be F

in Another Section of To-day's Herald Tribune

Add'

Another Batteryless Set

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The simplest, and what is said by

radio engineers to be the most effi-

Rheostat Connection

A filament rheostat should be con-

nected in the negative lead of the A

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hattery wire to the tube.

Data on the Construction of a One-Control Five-Tube Radio Receiver

This Set Employs Two Stages of Efficient Tuned Radio-Frequency Amplification

By WILLIAM M. HENDERSON

ESPITE the off-trail steps taken in the forward trend of receiver design the final achievement, single control, has never been lost sight of. Coincident with the improvement in quality, part design and circuit advancement there has been a consistent reduction of the number of tuning controls.

The introduction of the gang condenser in which two, three and more variable condenser units are mounted on one shaft has placed before the experimenter a means of building his own single control receiver. Such an accomplishment has heretofore been impossible because of thedifficulty encountered in getting proper gears or pulleys to couple several condensers together.

The gang condenser solves for the constructor the problem of getting similar condensers to tune the various circuits. It must be remembered here that positive single control is not possible unless the complete set be made so sensitive that a. small coil can be used as an energy col-

Aerials and loops will not permit of the design of a receiver without some compensating member to take care of the wave length variations inherent in these collectors with a change in tuning. But one compensating control that operates in such a manner that its setting is regular with the change in main dial setting is far from objectionable.

The single control receiver described here has one main tuning control with a small compensating condenser that has a regular increase of capacity change with the tuning of the triple condenser unit to the higher wave stations.

Parts Required

Such accomplishments no doubt fill the bill, and we can now get on to the actual constructional data on the set. The first is the list of parts. .The following is the apparatus used by the writer in his re-

General Instrument triple condenser (each section .00035 mfd. straight line frequency type).
 Set of three General Instrument radio frequency

1 Set of three General Instrument radio fre transformers.
2 Precise audio frequency transformers.
1 Electrad resistance coupler.
1 Electrad resistance, 250,000 ohms.
1 Daven grid leak mounting.
1 Hammarlund midget condenser.
3 General Instrument 20-ohm rheostats.
6 Radion UX-type sockets.
1 Dubilier-1 mfd. by-pass condenser.
1 Dubilier : 00025 mfd. grid condenser.
1 Dubilier : 005 mfd. fixed condenser.
1 Radion 24x7x inch panel.
1 Baseboard 23x8x inches.
1 BMS single circuit jack.
1 Radion dial. 1 Radion dial.
1 Radion binding post strip.
8 Eby Binding posts.

Triple Condensers Used

The construction of single control receivers using double or triple condensers has been greatly hampered by the general impression that balancing of the circuits would be an impossibility for the average individual to accomplish. This is an erroneous opinion and should be discarded. The balancing of the second stage and the detector circuit in this particular set will not take more than fifteen minutes at the most; that is, providing the coils are made carefully in as far as keeping even tension on the wire while winding and using the correct number of turns.

As it is usual to enumerate the various

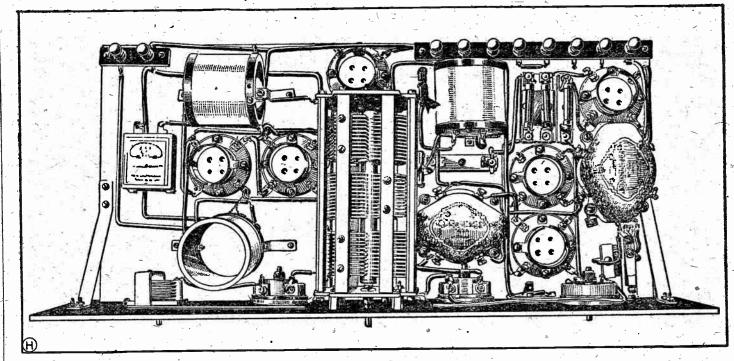
the author finds it incumbent upon him to do so also. There are no glaring headlines to be written about this particular set. It is simple to build, works well, gets plenty of distance, and gives good quality and to this may be added, the decided advantage of having single control tuning. Could anything more be desired?

The radio-frequency transformers, of which there are two, are both wound the

This coil has one single layer winding of seventy turns of No. 26 D. C. C. wire. | tuning. This is far from essential, but as The antenna tap is taken off at the fifteenth turn, counting from the filament end of the coil.

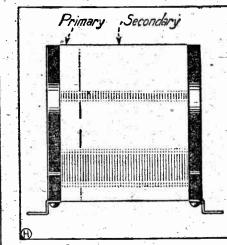
In all three of these coils it will be found advantageous to drill the ends of the forms to take small 6-32 machine serews and make the coil terminals secure to lugs. Use two lugs for each terminal, be made by the constructor.

of being described in a radio magazine, input so that there will be no interference. I noticed that all leads are down on the baseboard and are covered with cambric a neater appearance is presented when the cabinet cover is raised this system of wiring was used. It is much easier, however, to leave off the insulating tubing and to separate the low potential leads more. The operation of the set will not be effected by any change in wiring that may



Drawing showing how the parts of the writer's one-control receiver are arranged on the subbase panel

same. The secondary coil is wound adjacent to the primary and in the same direction. The primary coil consists of ten wire space wound; that is. separated by about half the thickness of the wire. The secondary coil consists of seventy-six turns. No. 26 D. C. C. wire s used for both coils. The end of the secondary that is over the primary is the



Coil construction details

filament end of the coil. The start of the primary is the "B" terminal and the end the plate connection. They are wound on a tube 21/2 inches in diameter.

The antenna coil does not have a separate primary coil. A tap connection on the grid coil is employed in this circuit because of the increased signal strength obtained. The rest of the set; that is, the two stages of amplification, are selecfeatures of a set undergoing the operation | tive enough to take care of the broad

connecting to the circuit. If one lug is used for both purposes there is a possibility of the coil end coming loose when making the circuit connection.

do is drill the panel. The layout is prob-

ably best shown in the drawings given on this page. The multiple condenser is mounted in the center of the panel and four inches from the bottom. The midget condenser and the detector rheostat are mounted 41/2 inches from the

for the rheostat. The radio-frequency rheostat and the audio-frequency rheostat are mounted two inches from the bottom and seven inches from the left and right ends of the panel. respectively. The jack is mounted two

After the original model was built it was found that the detector rheostat and audio-amplifier rheostat were unnecessary and could be eliminated. To control the filaments of these tubes any of the automatic resistances can be used, one rheostat

The baseboard layout that is shown in another drawing should be followed. Changes can be made if necessary, but this arrangement of apparatus gives the most direct leads. With the parts all mounted and the panel secured to the baseboard by means of brackets, as shown in the drawings, the set can be wired according to the diagram given in Figure 1.

In the set shown in drawings, it will be

The wiring diagram of the fre-tube, one-control tuned radio frequency rever constructed by the writer

one for the coil ends and the other for One hint in wiring the tuning circuits that should be remembered is that one lead to the rotor plates, or frame, of the condenser is all that is necessary, and that should connect to the negative filament. Then the filament ends of the With the coils wound, the next thing to

When the set has been wired and the batteries connected and the tubes placed in their respective sockets a local station should first be tuned in. If the coils have been made as per specifications and the wiring is correct no trouble should be enedges and three inches from the top, the countered in getting several stations beleft end for the midget and the right end

inches from the bottom of the panel and two inches from the right end.

can control them all.

Matching the Coils

coils can be wired directly to the negative

fore any attempt at balancing is done.

If by any possibility no stations are

received and the set sounds alive, connect

the aerial directly to the grid terminal of

the detector coil. If a signal is picked up

then, change the aerial to the plate termi-

By successively changing this lead from

the detector to the aerial post in the above

manner poor connections or a bad tube

will be located. The next step is the

matching of circuits. This may and may

not be necessary, depending upon the care

taken in winding the coils and the quality

To match the detector and second stage

circuits it will be necessary to first obtain

a large coil form and wind fifteen turns

of wire on it. A fifteen turn basket-weave

coil is admirable for this purpose. The

coil should be connected to the aerial and

ground leads, which are, of course, not

of the multiple condenser used.

connected to the set.

side of the tube socket.

nal of that transformer.

This antenna coil is placed about seven inches from the detector tube coil and the two radio-frequency tubes are turned out. Tune in any station that is operating and record the dial setting.

Then take the first radio-frequency amplifying tube out of its socket and light the other one. The antenna coil should now be placed exactly the same distance from this coil as it was from the detector coil; the separation is not critical as long as the same distance is maintained in both instances.

Tune in the same station again. If the station has two peaks, that is, has two loud points, then one or the other of the coils is out of tune. Pick one of them as a standard. Remebering the detector dial setting it will be found that the second setting giving the second peak signal will be that for the amplifier.

If this amplifier setting is above that of

(Continued on page five)

Novel Radio Coils Made With Jars and Bottles

Small, smooth, round glass bottles and jars used to hold jam, mayonnaise, olives, pickles and cosmetics of various sorts make excellent experimental coil forms, being highly efficient electrically and absolutely non-shrinkable mechanically. The ends of the wire wound on them can be held down with a few drops of sealing or candle wax.

The "pickle-bottle" shape of winding, which is merely hexagonal in outline, derived its name from the exploit of an experimenter in winding a coil around an actual pickle

Constructing a Sound **Board Cone Speaker**

(Continued from page one)

attaching the unit pin to the point this week in exhibition room No. 4 of the cone. Form your cone, glue of the Hotel Pennsylvania and repreit and put a weight on the glued strip sentatives of the press and the radio while it is drying. Then fit the con- trade were invited to attend. nection, mentioned above, into the The new sets are being placed on point of the cone and tighten it into the market in two models, the "Uni-

one-half-inch cuts in the edge of Electric," a four-tube, two-control re- trade I should like to issue this warnyour cone, spaced about every three ceiver. Both of the sets may be ing: Do not dump obsolete models inches. Then bend forward these operated direct from the standard 110- abroad." three-inch pieces a trifle, so that volt. 60-cycle, house supply without they will follow around the edge of the use of batteries. The plate curthe soundboard. The pin from the rent for the tubes is supplied by a A new batteryless radio receiver, unit should now project through the B battery eliminator, employing a which derives its power from the alconnection at the point of the cone UX-213 rectifier, which is contained in ternating house current lighting

wide may be cut from the parchment these are heated with a three-volt Broadway, a consulting engineer. left over when the large cone was alternating current, which is ob- The set comprises two stages of cut down. This strip is to be fitted tained from a step-down transformer, tuned radio, detector and two stages around the cone to cover up the cut which is also contained in the cabi- of audio-frequency amplification. It edge and held in place by brass net. The circuit used in the set is has been named "Perpetuel" by its thumb tacks spaced about three said to employ a one-stage of tuned, designer. inches apart. Fig. 2 will give you an transformer-coupled, radio-frequency All the tube filaments are operated

structed. It is shown in Figs. 4 and quency amplifier. The set has been to balance out the sixty-cycle "hum." 5. The base is cut from some heavy designed for use with an outdoor wood and should measure about 8x61/2 antenna. xl inch. For the sake of appearance it is well to bevel the upper edges. Cut a slot in the upper face of this block to accommodate the upright. It and it is located toward the back of in their "full automatic" line. They reason for this should be quite ap- Charger Switch and the "Full-Autothe upright.

edges of this upright may also be the charger. be directly in the rear of the unit ad- and the B eliminator is turned off. justing screw. This will allow a screwdriver to be inserted through it and through the similar hole in the soundboard and the unit adjusted at been working for two years to sell

inch at the bottom of this upright, the Far East and all over the world and force it into place in the slot cut down to New Zealand and South in the base block.

A soft cork or rubber button is attached to the front of the upright near the bottom of the soundboard thoroughly covering the Dominion. In for it to lean against. This will re- London a branch takes care of the lieve the strain of the rather heavy British and Continental radio trade. cone speaker upon its stand, which might tend to warp the upright. The assembly of the speaker is

wasners on both sides of the upright when bolting to the mounting block. Argentine, this company turned their washers on both sides of the upright a mahogany stain applied and several world—the Orient. If the work has been carefully done, coats of lacquer applied and well

erably an orchestra selection, and, ining screw, adjust the unit to the beat age, with 139 days of actual travel, operating point.

List of Parts

The following is the list of parts South Africa, China, Japan, India and 11 Mercer St., New York, N. Y. actually selected by the writer and the Philippines. employed in the construction of the R. M. Klein, general manager of soundhoard cone loud speaker. Vari- F. A. D. Andrea, Inc., in discussing ous other parts of the type described the foreign policy, of his company in this article may be substituted if said in part:

They started with Canada, where

When Fada radio was established in Mexico, Cuba and South America by The assembly of the speaker is shown in Fig. 4. It is well to place the farthest trading posts in the attention to the other side of the

erary are New Zealand, Australia, American Hard Rubber Co.

"While our policy of sending direct desired:

1 DDH 86-in, parchment for cone.

1 DDH adjustable attachment for connecting parchment cone to unit.

1 DDH cone speaker unit.

1 hardwood baseboard, 8 in. x 6½ in. x there is an added element of benefit there is an added element of benefit. 1 in. 1 hardwood upright, 15 in. x 2½ in. z to the entire industry, to the nation 1 hardwood mounting block, 2% in x at large, and, indeed, to international 1% in. % in.

News and Notes of the Radio Trade



versal Electric," a four-tube, single-Now, with a pair of seissors, make control receiver, and the "Standard planning to go after foreign radio Wilfred Glenn, basso." the cabinet. McCullough A. C. re- mains, was announced last week by A circular strip about one-half inch ceiving tubes are used in the set and its designer, Francis R. Hoyt, of 1841 amplifier, a detector and a two-stage directly from alternating current, a A suitable stand must now be con- of transformer coupled audio-fre- balancing resistance being employed

Power and Charger Switch

The Liberty Bell Manufacturing nating apparatus is included in the should be one-half inch wide, one- Company, of Minerva, Ohio, have two same cabinet with the receiving aphalf inch deep and 2% inches long, interesting pieces of radio apparatus paratus. the clock, as shown in Fig. 4. The are the "Full-Automatic" Trickle parent, as the entire weight of the matic" Power Switch. The trickler cone speaker is located in front of charger switch is connected in series cient, method of controlling the volwith the set and storage battery. ume of a radio receiver is accom-When the switch on the set is snapped plished by inserting an ordinary The upright measures 1/2 x2 1/4 x15 on it automatically cuts off the variable condenser in series with the inches and may be rounded slightly trickle charger. When the set is aerial lead wires to the set. Maxiat the top if you so desire. The turned off, it automatically cuts in mum reading on the dial will give

the greatest volume, and minimum the beveled. Three holes are to be The power switch controls the B least. Such an arrangement does not drilled near the top. Two are for the eliminator and trickle charger change characteristics of the set, machine screws projecting from the either or both. When it is snapped which would be apt to destroy the back of the mounting block and on it automatically turns on the B quality of reproduction. should be sized and spaced accord- eliminator and cuts off the trickle ingly. The third hole, three-eighths charger; when the set is turned on inch, should be placed so that it will the trickle charger is again connected

Radio and Foreign Trade

The F. A. D. Andrea Company have Now put glue on the last, one-half Africa.

they opened a branch factory

The ambassador selected for the Panel, dial coats of lacquer applied and well rubbed down the instrument will be decidedly attractive in appearance.

After connecting the speaker to your set tune in a strong signal, prefactly and binding post strip are world traveler, to whom the pathways of the East are thoroughly familiar. La Brie's journey takes him more control. than twice around the world in mileand will keep him away for about direct. a year. The high spots of his itin-

1½ in ½ in.

1 vernier board at least 24 in. square and not more than ¼ in. thick.

1 cory or rubber busson.

26 brass thumb tacks.

2 ½ in. machine screws 1½ in. long with 4 nuts to fit.

The second of the summertime programs of the Eveready Hour will be broadcast on Tuesday evening

through WEAF, WEEI, WFI, WCAE, WGR. WWJ, WOC, KSD, WJAR, WCCO. WTAG, WGN, WTAM and WSAI beginning at 9 o'clock. A program of well-known instrumental selections will be offered by the Everready Chamber Symphony Orchestra under the direction of Max Jacobs. The opening selection will be the well-known and spirited "Marche Militaire" by Schubert. All together there will be about a dozen selections units and of parts that enter into rendered, of which the overture "The The Greater Atlantic and Pacific them and accessories that go with Bat" by Strauss; "The First Move-Radio Corporation of New York City them. Another is that of blazing a ment" of Beethoven's, "Fifth Symhave just announced a new line of trail in many instances for the indus- phony," the "Spring Song," by Menelectric radio receivers. A demonstration of the new sets was held trade. From the standpoint of the Toyland," by Victor Herbert, are the national good there is the building best known. Max Jacobs, the conducup and strengthening of American tor of the orchestra, and a gifted viocommerce over the Seven Seas and linist, will be heard in two instruthe establishment of a firmer and mental solos, one, "Romance," by more friendly foreign relationship, Wieniawski, and the other, the Air which latter touches and explains the for the G string, by Bach. The reference to international good will. Eveready vocal soloist who will be "For the information of others heard during this program will be

Symphony Orchestra Under

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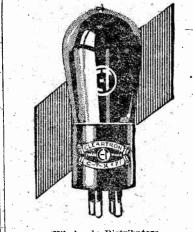
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Parts and Equipment

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Complete, ready to run "B" storage and economy in charging. Don't be sterry charger, \$2.75. This may be used as trickle "A" battery charger. Complete sample cell, 30c prepaid.

All goods sold on understanding that they give satisfaction, and can be returned in 80 days for complete refund. Further guaranteed 2 years. Order direct—send no money—simply pay expressions of the complete sample cell, 30c prepaid.

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All goods sold on understanding that they give satisfaction, and can be refund. Further guaranteed 2 years. Order direct—send no money—simply pay expressions of the preparation of the positive pressure the properties and contains some mighty interesting matter. B. HAWLEY SMITH, 810 Washington Ave., Danbury.

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By Peter J. Dolin, S. J.

HERE was a school debate, some twenty years ago, in which "we of the affirmative" maintained that "Nowadays, Oratory 1,300 ballots thus received, from exercises a greater force for good than Journalism." One of the cogent arguments of the gentlemen of the negative which palpably confronted us in our preparation, and almost overwhelmingly in the rebuttal, was that the efforts of an orator were necessarily circumscribed. He could reach only the limited few who came within the sound of his voice, while the field of the journalist was practically unlimited, his influence for good as far-reaching as the world that runs

Pioneer Station of the South

pioneers. Their unique station is

I may mention, incidentally, that musical and other features, a talk is the protagonists of the forum won given on some current topic by the New York City. The station, with its the debate not, of course, without Rev. Edward G. Garesche, S. J. Each twin towers 225 feet high, is equipped a struggle. But, were we to assemble day at 11 a. m. and 4 p. m. the "Jour- to use 5,000 watts, and represents ar to-night on that same college stage nal" studio broadcasts music, news, investment of over \$190,000. Its inand re-enact the scene, the victory market reports and talks by promi- stallation was directed by the Rev. would be ours, hands down. The op- nent individuals. The "programs of James F. Cronin, C. S. P., who is in ern day of radio would intimate that columns of the "Journal" and have sponsible for the refined and varied the written word can carry further elicited acknowledgments from listen- programs that have been broadcast, than "the throbbing, pulsating plea ers in every state in the Union, and beginning with the evening when, acgether out of consideration the microphone, the transmitter, the aerial tower and the hundred and one other elements that have combined to revo-Intionize the transmission of the

Hadio Has Changed the Earth

earth. It has opened up possibilities operate was forthwith granted, and Choristers, whose efficiency as radio which even a generation ago would that same evening Louisianians who artists is attributed to the skill of have been deemed as ridiculous as possessed radio sets heard the first their director, the Rev. William J were the prophecies of Mother Ship- radio concert ever given in the Southton. I suppose that in the usual or- land. When the university launched the Rev. James M. Gillis, C. S. P. der of things the Catholic Church, its building campaign to raise conducts a "question box" hour, supas the undying foe of scientific prog- \$1,500,000, the appeal which was made plemented by a discussion of civic or ress in general, has been cited here by wireless brought valuable results. and there as an adversary of the Later the station enabled Loyola to is set apart for treatment of literaradio in particular. Yet in the at open a radio school. Completely re- ture, public affairs and the arts. Remosphere in which were reared the built and brought up to date, WWL ports have been forthcoming from all famous Ampere, a devout Catholic; broadcasts regularly once a week, parts of the United States and from Galvani, a Tertiary of St. Francis; furnishing musical programs and in- various provinces of Canada of the Ohm, a teacher in a Jesuit college, cidental educational talks. and Volta, a man who began each day The Benedictine Fathers in charge and of the grateful delight with by hearing mass and ended it, after of St. Martin's College, Lacey, Wash-which its services have been received has its place in circles professedly KGY, the outgrowth of an amateur and there about the country, by ar Catholic, and that it is serving as radio telegraph station installed by rangement with stations purely secua veritable handmaid of the Catholic Father Stanislaus Ruth, O. S. B., lar in their management, for the

which is now known as WEW-was pended with the entrance of the country into the war, when the government utilized its facilities in the training of radio operators for the United States Signal Corps. With the removal of war-time restrictions mer programs, and in April, 1921, the scope of its usefulness was extended by the introduction of a radiotelephone for the transmission of the United States Weather Bureau reports, market and crop estimates. In made." March, 1924, WEW began to broadeast Sunday afternoon lectures on doctrinal subjects. The divine origin of the Church, the marks of the giate radio activity was Holy Cross day the complete vespers' service Church, the infallibility of the Pope, College, Worcester, Mass., which be the sacraments, the priesthood, con- gan broadcasting in the fall of 1924, fession, the Holy Eucharist, marriage, first with the news of football games. etc., were among the topics which Through the provision of its owner, have been explained. Every Sunday Theodore T. Ellis, a generous beneafternoon at 2 o'clock answers are factor of Holy Cross, "The Worcesgiven to the difficulties submitted by ter Telegram and Gazette" utilized University, Omaha, Neb., was broadof Missouri, which has appropriated vided connections with the college Drama, fiction, athletics, public speak-\$25,000 for the purpose, it is an auditorium and students' memorial ing, law, dentistry, medicine, sciences, watt station, is now to have a 1,000- enabled to enjoy all the lectures, lar viewpoint.

In the last of 1921 the Kev. John B. etc., intended primarily for the un-Aremer, S. J., nead of the department dergraduates' benefit. The following continues to grow in efficiency and of physics at Marquette University, summer, under the supervision of the practicability. Its advent has brought Milwaukee, outfitted, largely with Rev. Daniel H. Sullivan, S. J., various undreamed-of encouragement to those equipment of his own making, a 100watt station at the university. Under
his manipulation programs were
broadcast once a week until a little over a year ago, when the power was Manufacturing Company, the facil- even greater reason than did the inincreased to 1,000 watts and "The Milwaukee Journal" combined with Boston, WBZ and WBZA, were achievement for one to exclaim: Marquette in operating the station. placed at the disposal of Holy Cross. "What hath God wrought!"-It is located in the tower of the new Since last November the college has "America." Science and Administration Building broadcast one Sunday night each of the university, but remote control month a full evening's program programs can be broadcast from the through WBZ, which will transmit, new \$2,000,000 plant of "The Journal" during the present month, "Twelfth as well as from several other points Night," the Shakespearian play schedthroughout the city. WHAD operates uled for production this year. It is on a wave length of 275 meters, and said that this is the first time that with few changes could be readily in- Shakespeare had been thus broadcreased to 1,000 watts. The Mar- cast. And what again was claimed quette studio is on the air only on by press critics to be the first time Monday nights, when, in addition to such use has been made of the wire-

debaters radiocast their arguments in Boston. The decision was rendered only after the listening public had submitted its vote by telegram, Bontreal. Washington. Cincinnat and practically every city in New England, was significant of the wide-

Newer than all the foregoing, and second to none in its equipment, is station WLWL, opened last October by the Paulist Fathers at their headquarters, West Fifty-ninth Street, quality" are advertised through the charge of the plant and largely refrom points as remote as the Tahiti cording to press comments, an listened to the opening address of His

spread interest excited by the nove!

Islands, 6,000 miles from Milwaukee. audience of at least one million Credit for establishing the pioneer Eminence, Cardinal Hayes. WLWL is broadcasting station of the South be- on the air three evenings each week. human voice and of artificial sounds longs to Loyola University, New The Sunday program is a purely re-Orleans, which applied to the govern- ligious one, affording the listening ment authorities April 2, 1922, for a public the incidental opportunity of Radio has changed the face of the broadcasting license. Authority to hearing the world-renewned Paulist spiritual interest. Thursday evening

he had visited the Blessed Sacrament, ington, "out where the cedars meet An altogether distinct article might by saying his rosary, one would be the sea," received in April, 1923, a be written of the widespread use of disappointed not to find that the radio broadcasting license for station the radio which has been made, here religion in aiding the dissemination eight years previously and inter- broadcasting of Catholic interests. rupted only by the restrictions of Thus in Chicago on the second Sun-One of the first broadcasting sta- wartime. Three evenings each week day of January Cardinal Mundelein tions in the United States—that a varied program is broadcast, with was listened to, not merely by the concerts, debates, plays, lectures, re- members of the Holy Name Society installed at St. Louis University in citals and college news in variety, before whom His Eminence appeared 1910 by Brother George Rueppel, S. J. Although until very recently only a in his cathedral, but by the thousands Its pioneer efforts were only sus- five-watt station it is now operating to whom "The Chicago Tribune" on fifty watts twenty-three differ- broadcast the services through its ent states have been heard from in station WGN. In the same city for appreciation of the programs of the last several years the Rev. Claude KGY, with particular praise for the Pernin, S. J., professor of homiletics renditions of operas, etc., produced in the Archdiocesan Seminary, has through the use of Victor records, been giving weekly readings in literathe station in 1919 resumed its for- with supplementary explanations and ture from KYW, a Westinghouse descriptions. In this form of broad-station.

casting the fathers at St. Mary's were Over the General Electric Company's station KOA, at Denver, housed in a log cabin, which, like al! January 31, the pontifical mass cele of the apparatus used, was "homebrated by Bishop Tihen in the Cathedral of the Immacuiate Conception, the sermon by the rector, an after-The next center to develop colle- noon organ recital and later in the

On February 6 the first of a series of half-hour lectures to be given every Saturday night by teachers in the various faculties of Creighton listeners. Thanks to the generosity its station, WCTS (now WTAG) for cast through WOAW, the local of the Catholic Laymen's Association the football program and later pro- station of the Woodmen of the World. nounced that WEW, heretofore a 100- chapel. Thus the radio audience was etc., are to be treated from the popu-

organ recitals, glee club and orches-In the fall of 1921 the Rev. John B. tra concerts, intercollegiate debates, vehicle for the carrying of truth and





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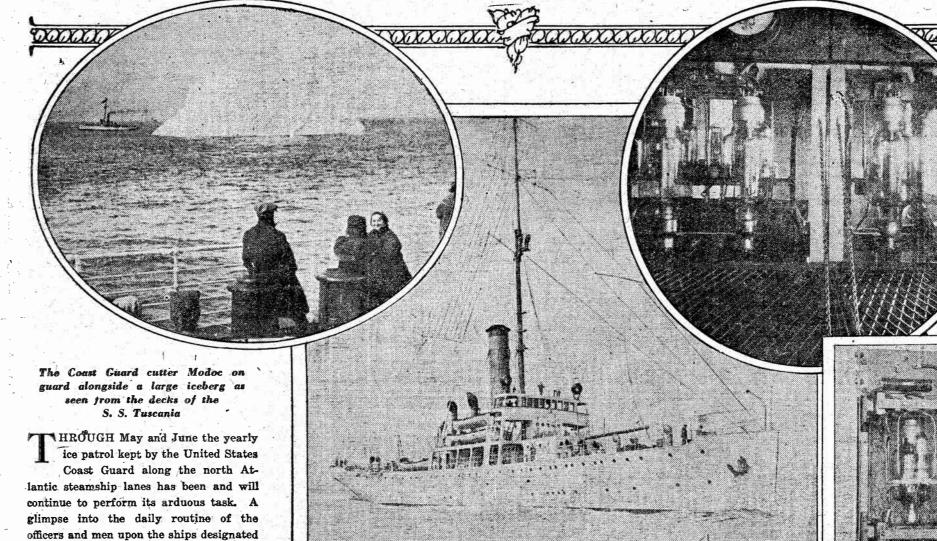
Is Your Set in Trouble? Look at the Radio Magazine for the Names of Good Repairmen



How Radio Helps the U.S. Coast Guard Keep Tabs on the Ice Menace

Cutters Are Well Equipped With Wireless Apparatus; Positions of Icebergs Charted Regularly

By A. GORDON SHIRT



The U. S. S. Tampa, the first electric Coast Guard cutter. (Insert.) A view of the radio transmitter used on the U. S. Coast Guard cutters. Right—The radio telephone attachment used in connection with the radio transmitter,

situation, for the benefit of ships who are | west, adding that it was not responsive to listening in for the first time. This evening report is sent out on a 600-meter wave length, and is repeated twice, with an interval of two minutes between the messages. East coast amateurs listening in at 6 p. m. during the months of the ice visitation may intercept the report, and if they are ambitious enough to spot the icebergs on a school map they will have in duplicate the problem of the trans-Atlantic navigator that night, minus the anxiety and the worry. Many a cautious skipper has been enabled to give his whole attention to the fog on the radio assurance from the ice patrol that no icebergs lie

for the purpose reveals that radio plays

the major part in the work. In fact, were

it not for radio, the service would be prac-

The cruising cutters of the Coast Guard

are well equipped with radio. The nature

of their work compels them to be, else

how could they receive information of

shipwreck and danger in time to be of

practical assistance? And they find con-

stant use for all that they have. At sea,

the vessels of the Coast Guard send in

their daily noon position to headquarters,

and keep a constant and vigilant radio

watch for orders rushing them to spots

along the coast to aid in the relief work

The cutters likewise put their radio

compass to good use. In the first place,

it is possible for them to navigate in the

thickest fogs with a considerable degree of

safety. Instances are on record where

Coast Guard vessels in ports along the

coast have been enabled to proceed to sea

in dense fogs and to locate stranded ves-

sels by means of the radio compass, espe-

cially if the distressed craft is a steam-

vessel lying still and sending out radio im-

pulses is readily located by the cutters and

the work of rescue facilitated sometimes

Radio Routine Strict

The radio routine as outlined in orders

from headquarters is exceedingly strict.

Before even a glint of the morning sun

warms the backs of the playful seals on

the plateaus of the icebergs, a complete

diagnosis of the icy regions must go for-

ward by radio to the hydrographic office. Not to the main office in Washington, al-

though the message finally arrives there

for publication in the daily memorandum,

but to the branch office in New York City.

so that the big shipper, the controlling

stockholder, and the members of the Mari-

time Exchange may know the moment they

come to their desks the extent of the ice

menace out there on the Banks. Further-

more, the station at Arlington broadcasts

this report-known to the service as the

4 a. m.—and doubtless reaches vessels

that somehow or other would have entered

Just before the darkness intensifies the

dread of the Newfoundland fogs, there is

broadcast from the patrol ships a gen-

eral ice report. It contains all the in-

formation secured that day with reference

the ice field unguided.

ship equipped with radio. The disabled

tically impossible.

of some disaster.

in his path for the next eight hours. All Ships Asked to Give Aid

In addition to these general reports, a reach asking them to report their positions, courses and speed, water temperatures and general ice information to the cutter. This request goes out every four hours. It brings in the greatest volume of business; in fact, the responses make up the bulk of the radio work of the cutter.

Upon the receipt of this request, which is a way of informing vessels that there is skilled protection to be had for the asking, all ships who wish to take advantage of it send in their name, geographical position, their course and speed. On board the Coast Guard cutter, the positions are plotted on the commander's chart, and the courses are laid down and examined to see whether or not they are clear. After a week or so of work, this chart comes to be a moving diagram of ocean shipping, as more and more ships send in their positions and indicate the direction in which they are going, and as more and more dots are hourly brought forward on the

The constant reports of these vessels constitute considerable radio traffic in themselves. In 1923, over 945 vessels reported themselves 2,646 times. The steamship Strathearn, for example, to take at random one of the hundred ships that performed similar services in late years, reported the presence of a large to the positions of bergs and ice fields, to- berg in latitude 42 degrees 10 minutes

the fog whistle and therefore particularly dangerous to navigation.

When this information was received aboard the cutter it was not only made the subject of a specially broadcast warning, but was examined with reference to the score or more ships following in the wake of the Strathearn. If it was apparent that any one or more of them were heading into danger, that vessel or vessels were made the recipients of a special direct report.

Routine of the Work

The routine of the work, as it might be expected, has lost its thrill for the active chief of the ice patrol. He dispenses with warnings and information as methodically as though he were laying down his course for home. He awaits developwith a calmness that would have done credit to Napoleon. But in spite of his uncomplaining exterior, he is often supremely tired. This work taxes a man to the limit. Two days of dismal nose-poking into a whirling fog, blasting constantly on the nerve-racking whistle and coming so close to what they were looking for that at times only a prompt shift of helm averted a crash and a cold, cold grave.

He looks at the radio officer, who has silently appeared in the doorway. Another man who has not rested for days.

"The master of the S. S. Noord would like to know if a straight course from latitude 41 degrees 44 minutes north, longitude 46 degrees 43 minutes west, could be laid toward Cape Breton, or would it be advisable to round Sable Island and proceed from the west."

"Tell him to proceed with caution," replies the commander. "He cannot make Cape Breton without meeting ice on either course he mentions. Give him position of the nearest bergs . . here, numbers five and seven . . with their approximate drift. Ask him to give us his position and water temperatures every four hours. Another?"

"Yes, sir. Steamship Yamahill reports large iceberg in 41 degrees 12 minutes north, 53 degrees 34 minutes west in shape like a broken tooth. It is 400 feet | danger, for the present year at least, is gether with a complete summary of the north, longitude 46 degrees 53 minutes long and 100 feet high, with a broad over-

"Ummm, let's see. That's there." making a dot on the chart at the reported latitude and longitude. "That is to be southeast of five-tenths of a mile per hour-Make the usual broadcast warning, Mr. K.; notify the hydrographic office at New York in the 4 a. m. report, and get in touch directly with the ships Senweild and Bethelridge, advising a change of course to the southward and warning them to proceed with caution."

"Yes, sir." "And, Mr. K." "Thank the Yamahill."

And so the work goes on . . neither the radio operators nor the ship's navigating officers getting an overdose of sleep. While the battle with the ice field is taking place, the trans-Atlantic steamship lanes are shifted to the southward one degree. This change takes steamers below the southernmost edge of the ice field. During these months the Coast Guard cutters keep constant watch over the field, following and marking its southern limits, and tracking like sleuths the paths of individual and isolated bergs. June is the receding period, when the field goes back to the northward, and around about the last days of June or the first week in July the steamship lanes are again

freed from the menace, the ships are

withdrawn from the patrol, and the

The Announcer Leaves His Microphone Open, With Interesting Results

By HILLIARD BOOTH

"Sh!" Albert Gaines, pro-

fessor of Greek at Biltwell College, motioned his elderly sister to silence as he adjusted the dials of his radio receiver. "They're broadcasting the Biltwell-Brown football game."

"This is the end of the second period," came the announcer's voice through the loud speaker. "The feature of the first half was the brilliant playing of Buck Rogers, of Biltwell. I'll let you listen to the band during the intermission, while I go out for a drink of-nothing stronger than black coffee, I assure you. Please stand

"Stella?" The youngish professor turned to his sister. "Why, Stella went to see you, Rachel."

has probably gone to the football game." "No, I forbade her to go. I'm trying to

"Small hope!"

were wonderful!"

you look good!'

exclaimed Gaines.

Rachel. "Sh!"

if he can."

herself."

by pleading with him?"

came Rogers's voice.

human being out of him!"

"I only have a moment, Stella." The

deep voice which came to them over the

air was that of Buck Rogers. "Gee, but

gasped Gaines, "with Buck Rogers!"

suppose it's open, do you?"

"And broadcasting over the radio!"

"It's Stella at the football game!"

"Oh, we're right in front of the micro-

"They're on the air and don't know it!"

"Listen, Buck. If you don't pass your

Greek exam to-morrow you won't be al-

lowed to play in the big game with Staf-

ford. Uncle Albert's found out you care

for me and he's furious. He'll flunk you

"Won't your Aunt Rachel help us out

"Mixed pickles! Aunt Rachel went sour

on everything in plus-fours since she

failed to land a pair of bell-bottoms for

Rachel shook her fist at the loud

"What's your uncle got against me?"

"He's sore on the love game, too. Some

girl by the name of Alice turned him

down. He keeps her picture on his dresser.

Uncle has an independent income. I wish

some girl would grab him and make a

"I have it!" boomed Rogers's voice.

"We'll announce our engagement and

Professor Gaines can't flunk me. If he

does, every one will say he did it out of

The sound that followed and filled the

speaker. "This is abominable!"

phone!" came Stella's voice, "you don't

Stella!" "Wait till I mark Rogers's exam paper!" The professor's voice was grim. "Do you mean to tell me, Albert Gaines,

"They've gone!" Rachel shut off the

radio. "Wait till I get my hands on

OOD afternoon, Albert. Where of a brass band filled the loud speaker. | hands full of telegrams. The professor groaned as they started to open them. "'Kansas City. Hot Saphho, give Buck Rogers 100 per cent on that kiss, Profes-

"'New Orleans,' " read Rachel, "'your love is just my wave-length. Marry Stella off to Buck and I'll take care of your in-

"'Baltimore,'" read Gaines. "'Tell Rachel she can have my plus-fours if

Buck passes his Greek exam." "All right. But it's signed 'Alice Deer-"Flunk him on the examination!" cried

"Alice Deering?" The professor, excited, snatched it out of Rogers's hands

everything in plus-fours! Good after-

noon!" She went out and slammed the

A smile broke over Buck Rogers's face

"I don't wish to listen to it. I've heard

enough of those atrocious wires. Tear it

as he opened one of the telegrams. "Listen

"Uncle dear,"— began Stella.

door after her.

"Not another word!"

to this one, professor."

and read it quickly. "Why, it's Alice Deering's picture which

you keep on your dresser," said Stella. "Listen, Stella!" The professor's voice trembled with excitement as he read the message. "'Heard Stella and Rogers over radio. Is it true you keep my picture on your dresser? Yours is on mine. If you



that you still keep Alice Deering's picture , Rachel, as the door-bell rang again.

The telephone and door-bell, ringing simultaneously, saved Gaines from a reply. He took up the 'phone as Rachel went to answer the door.

"Hello! . . Yes; I'm Professor Gaines. You are who? . . . Tootsie "Not a chance of it," Buck's voice La Rue, of the Follies? You'll-what? reached them. "Mike is mute during the come is big enough? Ha!" He banged up the receiver as Rachel entered the room with three telegrams. "Stella is speaking again," warned

"Three wires for you, Albert! Cousin Maria must be dead!"

Gaines tore open one of the telegrams and read:

"'New York. Oh, you sugar daddy! Wait for mamma! Am leaving on the 5:03." The paper fell from the professor's nerveless hands. "Rachel, what does it mean?"

"Mean? It means that Stella and Buck broadcast your name and the fact that you are an eligible bachelor. The wires are all addressed to Biltwell College. Open the others." She tore one open herself as Gaines opened the other.

"'Rochester,' he read; 'will exchange widowed state for bonds of matrimony, or what bonds have you?"

"This is from Chicago," said Rachel. 'Don't be a crab. Shoot Buck through his Greek. I have an extra pair of bellbottoms. What size does Rachel wear?" She tore the paper to bits. "Abominable!" The door-bell and the 'phone both rang

"Hello!" Gaines spoke into the 'phone "What color is my hair? . . . Do I object to cats? No; this is not Professor Gaines! He's not home—he wen't be home to-night!" He put down the requiet room was unmistakably that of a criver, but left it off the hook. Rachel rekiss. The voices died away and the strains trened from the front door with both

"I will," snapped the professor. By the time Stella returned home the table was piled high with telegrams, many of them still unopened. On either side of the table sat the professor and his sister, grimly waiting.

"Hello, Aunt Rachel!" cried Stella gayly as she ran into the room, followed diffi- cried Stella, jubilant. dently by Buck Rogers; "what are all the telegrams about?"

"Many of them," replied the Professor sternly as he looked from Stella to Rogers, "are about the kiss which you and Mr. Rogers shot around the world this afternoon, some are offers of bell-bottoms to your Aunt Rachel, and most of them are proposals of marriage to me! The microphone in front of which you discussed love, Greek and your family this afternoon was

"The mike open? Great heavens!" "For the love o' Mike!" exclaimed Rogers, startled.

"This message is for you, Mr. Rogers." Gaines handed it to Buck. "'St. Louis,'" read Buck. "'Use a crib

for your exam.' "How vulgar," cried Stella, "but that reminds me, Uncle, Buck and I have something to tell you. We're engaged to be

married!" "Engaged so I can't flunk Mr. Rogers in his Greek exam. Yes, together with about half the country, I heard you mention the fact. But I can assure you, Mr. Rogers"—the professor's tone was emphatic—"that unless your Greek paper is of a high order of excellence, I will flunk you, and with a great deal of satisfac-

"Aunt Rachel," cried Stella, "you plead with Uncle."

"Mixed pickles!" exclaimed Rachel sharply. "You forget I've gone sour on signal. Z. B.

FIRBANIN answered my last letter I never got it.

Alice Deering.' "She still loves you, Uncle Albert!"

"I did answer her letter. It must have been lost. It's like a miracle. Where's my hat?" The professor searched for it frantically. "I'll go send her a wire at once. I'm the happiest man in the world."

"Just a minute, professor," Rogers detained him, "don't you think there's any chance of my passing that Greek exam.

"Greek exam? Ah-eh-yes-just so!" Gaines beamed on Rogers. "If you know any Greek at all, certainly you'll pass it! Why, if it hadn't been for you and Stella I wouldn't have found Alice! Heaven bless you both!" He hurried out of the room and was gone.

"You'll pass the exam and be allowed to play in the big game with Stafford,"

"It was my love for you that brought it all about," said Buck. "Nonsense! It wasn't your love for me,

it was the microphone!' "For the love o' Mike!" Buck took

Stella in his arms.

How to Locate Losses Due to Poor Dielectric

Dielectric losses refer to the power dissipated in insulating material and which evidences itself as heat. (Of course, only in extreme cases is a temperature rise appreciable.) Such losses occur in panels, cabinets, baseboards. winding forms, supports in fact, in any insulating material included in electric

In some materials the losses are greater than in others. The phenomenon of dielectric losses and a comparison of the dielectric efficiency of different insulating materials may be demonstrated by any fan possessing a loosely coupled receiver. By loosely coupled reference is had to the space between any two radio frequency circuits across which energy is transformed.

The substance to be tested, a sheet of pasteboard, or perhaps a panel, is placed between the two adjacent coils. Note should be made of any variation in signal strength. If the dielectric is highly efficient, the interposition of the material will have no appreciable effect upon the

Use of Power Tubes and Why Needed in Audio Amplifiers with the ordinary filament and plate voltages.

ume, but to Withstand High Currents and **Thereby Prevent Distortion**

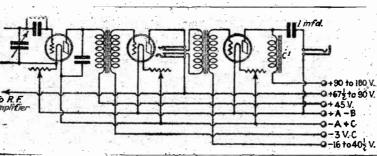
By A. J. Haynes

Haynes-Griffin Radio Service, Inc.

URING the last eight or nine months noteworthy progress has for various plate potentials are as been made in the development of "special purpose" tubes for use in specific parts of the radio receiver. Special detector tubes of improved design, radio frequency tubes with greater amplification, and power tubes for use in the last audio stage of the set-all these have come within a period of less than a year, and as a result the set owner has been able to improve the range, volume and tone quality of his receiver by replacing his old type tubes with new and improved ones as the old ones became inoperative or as he felt the Bureau of Standards desire to make the small investment required.

Most of the attention of laboratory @ workers and tube experts has been your final output tube begins to overdevoted to the perfecting of power load. Beyond this point, the quality tubes for use in the last audio stage. will begin to disappear. The re- of standard frequency transmissions, ceiving the broadcast programs. The netic field and double refraction for There is a very good reason for this production will become raspy and according to the "Radio Service Bulconcentrated effort. To any one who blurred. Speech will be muffled. letin" of the Department of Com-

is familiar with vacuum tube theory That clean-cut natural quality will



and operation, the necessity of a be lost, and the louder the signal is special tube for the output or final made, the worse this condition will audio stage is perfectly apparent. become.

By far, the greatest single source

The popular conception of a power the grid. tube seems to be a tube which is designed to give great volume. This is it is necessary to use a higher value not necessarily true. An overwhelm- of "C" battery voltage between the ing volume of sound from a radio grid and filament of the final tube set is seldom needed or desirable. All than the signal voltage which is bewe ask of a good power tube is to ing impressed on it. provide a comfortable and reasonable degree of volume without blasting or distortion. However, this requirement is not as simple as it sounds. The vacuum tube is a voltage operwhich is built to withstand an exated device with the grid as the controlling element. When properly connected in an amplifying circuit it converts any voltage impulse, impressed on its grid, into a surge of tial of 425 volts and a grid bias of 35

electrical power in its plate circuit. It is then the function of the so-

not amplify, but an actual and appreciable amount of energy is always lost and dissipated in the transformer. The best we can do is to use an efficient transformer and lose as little energy as possible.

The point to remember is that the only parts of a radio set that do any amplifying are the tubes themselves. When the signal is intercepted by

the antenna and delivered to the radio receiver, it is in the form of a very weak voltage surge, having almost no power behind it. This initial voltage is amplified as it passes through the succeeding tubes of the receiving set.

By the time the signal has reached the final tube in the receiver it has been built up and amplified tremendously.

We find that the actual voltage of this signal when it is passed to the last tube is usually in the neighborhood of fifteen volts for just an average comfortable signal response in the loud speaker. To fill a large room it is often necessary to increase this voltage to twenty-five or thirty volts. This is regulated, of course, with the tuning and volume control on the receiver.

Try This Test

To understand this action thor oughly, try it out on your own set. Tune in a good station and retard the volume control (this control should be on the R. F. end of the set ahead of the detector-usually the R. F. rheostat). Start with the signal barely audible, and then increase the volume slowly. If you have a high quality audio amplifier in your set and a good speaker, your reproduction will be excellent until you reach a certain point—the point where use of a high "C" battery voltage

Several such tubes have recently super power tube, type CTX 171.

The characteristics of this new

ube are as follows: Filament volts5.0 Plate voltage90-180 Negative grid volts, 16 1/2-40 1/2 The proper negative grid voltages

157½33

ards is considering the termination of improving the apparatus for re-propagation along the earth's mag-

Since March, 1923, the bureau has radio signals of definitely announced tion 6XBM, Stanford University, Cali- tions is now available. The reason for discontinuing this

What is actually happening is that By far, the greatest single source of distortion in radio reproduction the grid of the last tube is overtesting service from a number of problem of the radio-wave vagaries until arrival at a point where they of distortion in radio reproduction arises from an overloaded grid at the loading and we no longer obtain an accurate duplication, in the plate circles and on the last tube is one for whose investigation we have received. The character of this beautifully simple transmission could be the problem of the radio-wave raging of the radio-wave raging in the problem of the radio-wave raging is one for whose investigation we were received. The character of this beautifully simple transmission could be the problem of the radio-wave raging in the problem of the radio-wa tions which are being delivered to standard frequency transmissions settled. were inaugurated. -

In order to overcome this condition The standard frequency transmisof the service after that date in order

ilar to the 201A type may be used its termination, says the bulletin.

The 210 type tube is an example of this. It operates at a plate potenvolts. Such a tube is merely a large edition of a 210A and requires a procalled amplifying transformer to con- portionately larger filament voltage of broadcast signals. A short, low high radio frequencies. (either radio or audio) not only does which operates at reasonable battery tions as readily as a larger one.

Dance Charleston to Radio Music

The members of the Kittredge Foundation for Girls at their Bear Mountain summer camp have become

proficient in dancing the Charleston by utilizing the dance music broadcast by New York City radio

stations for practicing on every possible occasion

potentials, but which has a specially constructed grid which will allow the Behavior of Radio Waves Is Chief Problem to Solve

Such Tubes Are Not Designed to Give Greater Vol- which is known as the Cleartron Attracting Wide Attention of Scientists; First Problem of Radio Dealt With Apparatus; Waves Suffer Changes Which Cause Fading

By Dr. J. H. Dillinger

Chief, Radio Division, United States Bureau of Standards NTIL recently the problems and difficulties of radio were wrapped up with apparatus and currents. Now the chief limitation on progress is the erratic behavior of the waves. And because of this, radio-wave behavior is attracting widespread attention, for it is the unsolved problem, the difficult job, the frontier of conquest, which challenges people's interest.

The history of radio in our day? turns on three major problems. The description of the accepted theory: first was the problem of five years The magneto-ionic hypotheses ago, when broadcasting began, and it whereby the electronic phase velocity May Discontinue Signals had to do with apparatus and cir- is so modified that there is a rotation The United States Bureau of Stand- cuits. Every one felt the crying need of the plane of polarization for ideal and goal of those who devoted transmission at right angles thereto. themselves to radio's problems was The cat is now out of the bag and the development of receiving sets we have only to fill in details. with which programs could be re- In a sense we know much less been transmitting, twice a month, ceived with the full volume and quality of the original, by the mere waves now than we did ten years ago. frequencies for use by the public in touching of a single control, without We then had a comfortable explanastandardizing frequency meters (wave unsightly antennas or batteries, dials, tion of the known phenomena in meters) and transmitting and re- wires, complications, static and in- terms of wave motion in the ether, ceiving apparatus. The signals are terference of all kinds. By and large, The ether is a strictly homogeneous

The second great problem of radio service is that other means for ob- is to-day's problem of how to con- understanding radio wave action just taining standard frequencies have be- trol or circumvent the vagaries of come increasingly available. The radio waves and the improvement of other means referred to are the use reception thereby. The first probof piezo oscillators, and the wide lem, that of yesterday, was a probavailability of reliable standards and lem solved by the engineer. To-day's tions, meeting no obstacles or changes these means were available when the sure I don't know that it will not be readily be predetermined by theoret-

The subject of radio-wave vagaries sion schedule already amounced, ex- timeliness, but because noteworthy out. The Bureau of Standards is now progress is being made in the underannouncing the possible termination ble mysteries. There are some notethat persons who depend upon the tance of this problem. For instance, worthy manifestations of the impor-There are two methods of meeting service in any special way may inthis requirement. First: A tube sim- form the bureau of any objection to of the last winter were notorious and stimulated universal inquiry. Some

tremely high plate voltage with a cor- Use Small Antenna in Summer cleared up, and the scientific radio To Reduce Volume of Static world is as excited now over the de-Static, which is frequently heard veloping explanations of radio-wave the waves spread out farther and bein radio receiving sets this time of behavior as the practical radio world year, may be greatly reduced by was two years ago over the newly using a shorter aerial for reception discovered potentialities of the very

vert this electrical power surge into and current to operate it. It is far aerial will not be as acceptable to To be sure, the explanations cover a higher voltage which, in turn, is from being an economical arrange- static noises as a larger one. Dur- a relatively small part of what is passed on to the grid of the succeed- ment and requires special power ing the summer an aerial about fifty known, for as the explanations deing tube. This action is the same equipment to furnish the necessary feet in length and suspended about velop the complexity and extent of whether the tube is used as a radio high voltages for its filament and twenty feet above the earth will be known radio phenomena increase still excellent for receiving local sta- faster. A flood of theory and expla-The second method by which dis- tions. However, it must be remem- nations is appearing in current radio The term "amplifying transformer" tortion in the final output stage can bered that a short antenna is not literaure. The way our ignorance is is an unfortunate one. A transformer be eliminated is by designing a tube capable of picking up distant stal camouflaged may be handsomely illustrated by the following complete

transmitted by the bureau Station this ideal has been realized. Appa- something filling all space, and its WWV, Washington, and from Starratus which meets all these condi-sole function is to transmit electrical actions. To be sure, Einstein and some other scientists declare that the ether doesn't exist, but the idea

> including the air and the earth. The atmosphere is by no means uniform. electrically speaking, but contains electrical particles of varied characsubject to the various sorts of varia-

Vagaries of Reception

The vagaries to which radio recepion are subject include: (1) intensity variation; (2) fading, or fluctuation of received signal; (3) atmospherics, or static; (4) variation of wave direction and polarization; (5) interference of various kinds.

The chief practical question that arises out of all this is the question Mark Twain asked about the weather, "What are you going to do about it?" The only answer is that radio wave vagaries, like the weather, are phenomena of nature, and since we cannot remove them we only can go ound them. Each proved fact the sure answer to the problem it ealses, for it thereby determines a fixed element of calculation. The hitherto elusive problems of radio waves are now being clarified and solved through experimental determination of the facts and through their interpretation by a reasonable heory.

'The Big Brother and the

Children's Court" by Boyle "The Big Brother and the Chillren's Court" will be the subject of an address delivered before WEAF'S microphone by Judge Edward F. Boyle, of the Children's Court of New York City, on Saturday evening at 7:15

Judge Boyle has been for some time Justice in the Children's Court and has given particular attention to juvenile cases. He is known as a popular and accomplished speaker.

'Lucia di Lammermoor'' by WEAF Grand Opera Co.

At 10:30, instead of 10 o'clock, as is usually the case, the weekly tabloid grand opera by the WEAF Grand Opera Company will be broadcast through WEAF, WOO, WCAP, WTAG. KSD, WTIC and WSAI to-morrow evening. The presentation of the evening, which will be under the customary direction of Cesare Sodero, will be the famous opera by Donizetti. "Lucia di Lammermoor."

Additional Radio Programs for the Week

Continued from preceding page 570k—WNYC—NEW YORK—526m 10 p. m.—"Keeping Fit," Joe Ruddy, 10 p. m.—Mirnie Elias, pianist. 10 p. m.—Market high spots. .—Songs. m.—John .Fish, flutist. 7:15 p. m.—John Fish, Rutist.
7:30 p. m.—Police alarms.
7:35 p. m.—Talk by Winter Russell.
7:55 p. m.—Violin solo.
8:10 p. m.—Baseball results.
8:15 p. m.—Instrumental program.
10:15 p. m.—Wollie Gould, soprano.
10:30 p. m.—Police alarms; weather. 1430-WBNY-NEW YORK-2101

m.—Trio.
m.—Orchestra.
p. m.—J. Vincent Moore, Ro Fisher.

8:45 p. m.—Milton Yokeman, tenor.

9 p. m.—Orchestra.

9:30 p. m.—Silver-volced tenor.

9:45 p. m.—Lauretta Reynolds, tongs.

10 p. m.—Studio program.

10:45 p. m.—Milton Yokeman, tenor. 1100k-WBBR-STATEN ISLAND-2781 3 p. m.—Joseph Bonaccorso, violinist. 8:10 p. m.—Walter Stoll, tenor. 3:20 p. m.—Bible lecture, R. S. Sekle 950k-WHAG-RICHMOND HILL-316m

1390k-WRST-BAY SHORE-216m harmonica. 8:30 p. m.—Billy Sternau, pianist. 740k—WOR—NEWARK—405m 6.45, 7:15, 7:45 a. m.—Gym class. 2:30 p. m.—Harold Cutler, violinist. 2:45 p. m.—"The Ruby," Dr. George

Little. — Regrit Dr. George S. p. m.—Harold Cutler, violinist. S:15 p. m.—Crystal Palace Orchestra. 6:15 p. m.—Jacques Jacobs's Ensemble. 6:45 p. m.—Bill Wathey, "Sports." 7:25 p. m.—News bullette 1140k—WAAM—NEWARK—263m m.—Happy hour program. m.—Ernie Krickett's Orchestra.

7 p. m.—Sport review. 1190k—WGCP—NEWARK—252m 8:30 p. m.—Walt Riggin's Orchestra 9:30 p. m.—Rivera Park program. 1340k-WODA-PATERSON-224m

12 noon—Dance music.
12:30 p. m.—Popular songs.
5 p. m.—Musicale.
5 p. m.—Musicale.
6 p. m.—Pat Cristello's N.ght Owls.
8 p. m.—St. George's School Choir.
8:45 p. m.—"Are You a Jay Walker?"
9 p. m.—Lena Hempstead, contralto.
9:15 p. m.—Fred Meyer, tenor.
9:30 p. m.—F. Wildman, songs.
9:46 p. m.—Rozeboom Trio.
10:30 p. m.—Colonial Inn Entertainers. 760k-WLIT-PHILADELPHIA-395m

Orchestra.

2 p. m.—Arcadia Concert Orchestra.

7.30 p. m.—Benjamin Franklin Co.
Orchestra. 590k-WIP-PHILADELPHIA-508m . m.—Setting-up exercises.
. m.—Luncheon music;
5 p. m.—Dinner music;
6 p. m.—Department of Agriculture.
. m.—Roll call and birthday list.
. m.—Ambassador Orchestra.

3:30 p. m.—Studio program. 3:46 p. m.—Creatore and his band. 9:30 p. m.—Traymore Concert Orchestra 10 p. m.—Traymore Grill Dance Orches 10:30 p. m.—Weish Male Chorus. 11:30 p. m.—Eddie McKnight's Danc chestra. k—WCAU—PHILADELPHIA—278n

8 p. m. Saddler's plantation Serenaders 8:30 p. m.—Gaddler's plantation Serenade 8:30 p. m.—Clifton's Anglera 8:45 p. m.—The Kandy Klds. 9 p. m.—Barry O'Moore, tenor 9:30 p. m.—Hhe Musical Chefs. 9:45 p. m.—Comedy Lesson, Professor, Declittle.

10 p. m.—Dick Jackson, Margaret Ellis 760k-WFI-PHILADELPHIA-395m :00 p. m.—Tea Room Ensemble

760k—WFI—PHILADELPHIA—395m
1:00 p. m.—Tea Room Ensemble.
1:40 p. m.—Tea Room Ensemble.
3 p. m.—Instrumental Quartette.
6:45 p. m.—Dance Orchestra.
7:15 p. m.—Keystone Automobile Club
feature.
8 p. m.—Program from WEAF.
8:15 p. m.—Hire's Harvesters.
9 p. m.—Cligauot Club Eskimos

1090k—WHAR—ATLANTIC CITY—275m

1000k-WPG-ATLANTIC CITY-3001 1000k WPG ATLANTE CITY-300m 6:15 p. m.—Sports talk. 6:45 p. m.—Organ recital. 7:20 p. m.—Morton dipner music. 7:20 p. m.—Ambassador dinner music. 8 p. m.—Address by W. H. Fulweiler. 8:10 p. m.—Traymore dinner music. 8:30 p. m.—Musical pageant, "America." 8:30 p. m.—Musical pageant, "America."

11 p. m.—Dance Orchestra.

790k—WGY—SCHENECTADY—380m
12:30 p. m.—Reports.
2 p. m.—Music; Cornell talk,
6 p. m.—Stock reports.
6:30 p. m.—Jack Denny's Orchestra.
7:25 p. m.—Bascball scores.
7:45 p. m.—WGY Orchestra.

dale, tenor. m.—Organ recital. 940k-WGR-BUFFALO-319n 11 a. m.—Lecture from the Ne State College. 6:30 p. m.—Dinner music. 8-11 p. m.—Jointly with WEAF. 1080k-WHAM-ROCHESTER-278m

8:30 p. m.—Eastman Theater Orches 5 p. m.—Eastman Theater organ. 7:30 p. m.—Outdoor talk. 7:45° p. m.—Program from studio WGY. 11:30 p. m.—Organ recital. 1460k—WIBX—UTICA—205m 6:30 p. m.—Dinner dance music. 7:30 p. m.—Talks.

1:05 p. m.—Studio program. 1:45 p. m.—Talk; scores. 3 p. m.—Hudson-Esser Orchestra. 9-11 p. m.—Program from WEAF. 630k—WTIC—HARTFORD—476n

quartet.

10 p. m.—Emil Heimberger's dance or lestra. 1070k—WNAC—BOSTON—280m

1670k—WNAC—BOSTON—28
10:30 a. m.—Women's Club;
songs; news;
1 p. m.—Luncheon concert.
4 p. m.—Tea dance,
4:20 p. m.—Vocal selections.
6 p. m.—The Smilers.
6:30 p. m.—Dinner dance.
7:35 p. m.—Associated Pharms
Messachusetts

7:35 p. m.—Associated Pharmacists
Massachusetts.
7:45 p. m.—The Golf Question Box.
8 p. m.—Concert program.
9 p. m.—Victory's Band.
9:15 p. m.—Dok Eisenbourg's Sinfonis
10:05 p. m.—Doknec music.
860k.—WEEL—BOSTON—349m 860k—WEEL—BOSTON—349m
10:15 a. m.—Anne Bradford.
12 noon—Keith's Radio Review.
3:45 p. m.—Mickey Alpert, songs.
4 p. m.—Eugene's Singing Orchestra
5 p. m.—Ellot Daniel, planist.
6 p. m.—Keith's Radio Review.
6:45 p. m.—Eugh Brother Club.
7:30 p. m.—Bay Brother Club.
8-11 p. m.—Ps: gam from WEAF:

900k—WBZ—SPRING'D, MASS.—333m p. m.—Bob Patterson's Trio. :33 p. m.—Hotel Lenox Ensemble. 45 p. m.—"Mental and Physical Health," by Frank Stanton.

9 p. m.—Spaiding Sextet.
10:30 p. m.—Fretted Instrument Quartet.
1120k—WTAG—WORCESTER—268m
12:05 p. m.—Musical selections; health talk. talk.
4:30 p. m.—WTAG Indoor Sports Club.
5:15 p. m.—Story teller.
8 p. m.—To be announced.
9-11 p. m.—From WEAF.
640k—WRC—WASHINGTON—469m

1 p. m.—Organ recital,
2 p. m.—Mayflower Orchestra.
3 p. m.—Play-by-play account Washington-Philadelphia baseball game.
8 p. m.—Radio "movie" presentation.
8:30 p. m.—Concert by U. S. Marine Band. Band. 10 p. m.—The Royal Salon Orchestra. 10:30 p. m.—The WRC Players. 11:30 p. m.—Meyer Davis Swanee Synco

pators. 1220k—WBAL—BALTIMORE—246m m.—Dinner Orchestra. m.—WBAL Sandman Circle. p. m.—Organ recital. :30 p. m.—WBAL Mixed Quartet. p.m.—WBAL Trio. 870k—KDKA—PITTSBURGH—309m

6:30 p. m.—Dinner concert. 8:40 p. m.—Special farm program. 9:30 p. m.—Love songs of the world and nphony players.
m.—Concert by the Symphony play ers. p. m.—Pittsburgh Post Dance program. 650k—WCAE—PITTSBURGH—461m 6:30 p. m,—Dinner concert. 7:30 p. m.—Address. 8:15-11 p. m.—Program from WEAF

FRIDAY 660k-WJZ-NEW YORK-455m

660k—WJZ—NEW YORK—455m

p. m.—Ambassador Trio.

p. m.—News service and weather.

4.35, 7:30, p. m.—Baseball reports.

4.435, 7:30, 10:30 p. m.—News service.

p. m.—Your Daily Menu."

4:15 p. m.—"They Are Wearing"

4:25 p. m.—"Solving Candy Problems."

4:25 p. m.—Solving Candy Problems."

4:25 p. m.—Market quotations.

5:35 p. m.—Market quotations.

5:35 p. m.—Financial summary.

5:40 p. m.—Cotten quotations.

5:50 p. m.—Farm market réports.

7 p. m.—George Olsen's Orchestra.

8 p. m.—Sundal Shoe Serenaders.

8:30 p. m.—Bonnie Laddies.

9 p. m.—Sunder's hour.

10:30 p. m.—Harold Stern's Orchestra.

610k—WEAF—NEW YORK—492m

Health exercises.

610k—WEAF—NEW YORK—492n 3:45, 7; 7:20 a. m.—Health exercises.

45, 7, 7:20 a. m.—Health exercises.
45 a. m.—Prayer services.
1 a. m.—Dora Gutentog, pianist.
1:15 a. m.—'Shoes to Match Your Costume," Lucy. Park.
1:30 a. m.—Dora Gutentog, pianist.
1:40 a. m.—'Doveloping Your Unused
Talend," E. R. Wylle.
1:55 a. m.—Dora Gutentog, pianist:
2:noon—Market and weather reports.
2:15-1:15 p. m.—Rolfe's Palais D'Or Orchestra.

Orchestra.
p. m.—Louise Smith contralto.
15 p. m.—Barbara Haverman, pianist
30 p. m.—"Latest Trend in Dress," 50 p. m.— Lates Zayda Ysuff. 45 p. m.—Warren Scofield, barytone. p. m.—New Yorkers' Dance Orchestra

p. m.—Dinner music.

55 p. m.—Baseball scores.
p. m.—Aristocrats Dance Orchestra.

30 p. m.—Veb Lawindurst, planist.

45 p. m.—Bickers corner.
p. m.—Beatrice Oliver's Symphon Orchestra.

30 p. m.—Goldman Band concert
Waino Kauppi, cornet soloist.
p. m.—La France Orchestra.

Players.

10 p. m.—Whittail Anglo-Persians.

10:30 p. m.—Jack Albin's Bossert Or chestra. 1-12 midnight—Pelham Heath Inn Or-

chestra.

350k—WGBS—NEW YORK—316m

10 a. m.—Housekeeping on a big ship.

10:10 a. m.—Joseph Rodin, barytone.

10:15 a. m.—Radio gym class; solos.

10:35 a. in.—"Fashlon Review"; songs.

10:50 a. m.—"Housefurnishing Review."

1:36 p. m.—Scripture reading.

1:35 p. m.—Bob Nielsen, Eddie Woods,

p. m.—Special program for Roslyn schools.
p. m.—Robert Chanlers "Decorative Art."

10 p. m.—Hebron Treble Clof Trio.

Art."

10 p. m.—Hebron Treble Clef Trio.
20 p. m.—Hebron Treble Clef Trio.
30 p. m.—Hebron Treble Clef Trio.
40 p. m.—Plano lessons; trio.
50 p. m.—Swanee River Orchestra.
61 p. m.—What's Your Radio Problem?"
62 p. m.—Ny Herard Tribune newspaulietins.

bulletins.

1,100k—WERJ—NEW YORK—273m

1,100k—WERJ—NEW YORK—273m

1,20 p. m.—Luna's Knickerbocker Orchestra.

1, p. m.—A Valaia Funeral in Darkest Africa," Carl von Hoffman.

1:10 p. m.—J. Bocco and G. Levey, ukulele and guitar duets.

1:30 p. m.—Luna's Marine Band. 30 p. m.—Luna's Marine Band. 830k—WHN—NEW YORK—361m

p. m.—Olga Pincula, songs.
p. m.—Elytra Gelger, planist.
p. m.—Pasquita Cortez, songs.
p. m.—Eleanor Edison, songs.
m.—Prince Plotti, entertainer.
p. m.—News, racing, baseball.
p. m.—Dames Curtis, songs.
m.—News, racing, baseball.
p. m.—David Newman, tenor.
p. m.—Edna Fries, child pianist.
p. m.—Uncle Robert's Pals.
m.—News, racing results.
p. m.—Knoll and Lang, mando

110 p. m.—Knoll and Lang, mandon and tipple.

125 p. m.—News, racing, baseball.

p. m.—Charm Club Orchestra.

130 p. m.—Uncle Robert's chat.

135 p. m.—Frank H. Ochs, tenor.

p. m.—Treasureland Ensemble.

130 p. m.—'Poems," by N. T. G.

145 p. m.—Louse Ramese, accordion.

p. m.—Loew's Coney Island Theate

Orchestra. orchestra.

0:30 p. m.—Coney Island Stadium bouts.

0:30 p. m.—Palisades Amusement Park

Orchestra.

Orchestra.

11 p. m.—Strand Roof Orchestra.

11 130 p. m.—Roseland Dance Orchestr.

12 (midnight)—Silver Silpper Orchestr.

1160k.—WBNY-NEW YORK.—258m.

1.455 a. m.—Electrical talk, Edison man 145 a. m.—Electrical talk, Edison ma (noon)—Raiph Christman, planist, 15 p. m.—Bob McDonald, ukulele, 30 p. m.—Pauline McDonald, ukulele, 45 p. m.—Bob McDonald, ukulele.

2:45 p. m.—Bob McDonald, ukulele. p. m.—Sport rays. 1:10 p. m.—Commercial digest. 1:15 p. m.—Minna Krakowsky, violinist 1:30 p. m.—Elsa Clement, children :30 p. m.—Elsa Clement, childressongs. :45 p. m.—Alfred McCann, "Foods."

sesquicentennial."

9 p. m.—Grafman Violin Studio.

9:30 p. m.—Whuman Form Beautiful.

Dorothy Barbour.

9:45 p. m.—Constantino Ensemble.

10:15 p. m.—Novelty Night—Czechoslovak Night. 1250k-WHAP-NEW YORK-240m

1250k—WHAP—NEW YORK—240m :30 p. m.—Holmes's String Ensemble. :10 p. m.—Mary Pinney, planist. :25 p. m.—Kitty Cheatham. :55 p. m.—News digest. :15 p. m.—Norwegian Christian Male Chorus. 8:40 p. m.—M. Winter, "A Liberated Mexico." Mexico."

p. m.—Norwegian Christian Male
Chorus.

20 p. m.—Franklin Ford, "American-

880k-WMCA-NEW YORK-341m 10:15 a. m.—Employment opportunities. 10:30 a. m.-3;30 p. m.—Hourly market reports, 11 a. m.—Food Bureau program. 12 (noon)—Olcott Vail's String Ense

ble.

2 p. m.—Odierno Ladies' Trio.

3 p. m.—Minnie Weil's pupils.

4 p. m.—Book review.—

4:45 p. m.—W. Curtis Nicholson, "The Right Word."

5 p. m.—Entertainers.

6:80 p. m:—Ernie Golden's Orchestra.

5:45; 7 p. m.—Employment opportunities.

ties.
7.30 p. m.—Ernie Golden's Orchestra.
7.30 p. m.—Sachs Quality Boys.
8 p. m.—Alfred Orner, tenor.
8.30 p. m.—Cousin's Shoe Style talk.
8.40 p. m.—"Muscle Shoels." p. m.—Paul Whiteman's Piccadil Players, 9:30 p. m.—Klein's Serenading Sho

makers.

10 p. m.—Norman Pearce, readings.

10:30 p. m.—Helen Parisi, soprano.

11 p. m.—Jack Denny's Orchestra.

11:30 p. m.—Billy Day, songs.

11:45 p. m.—Jack Cohen, planist.

12 (midnight)—McAlpin Entertainers. 1100k-WFBH-NEW YORK-273m

n.—Orchestra.
n.—Studio program.
p. m.—Sam A. Perry, piano.
n.—Eddie Woods, barytone.
p. m.—Jeanne A'Dair, composer.
p. m.—Joe Davis, songs.
p. m.—Michael Simmons, "movi chat.

6 p. m.—Katherine Kent, sopranc.

6:15 p. m.—Judge Clarise M. Baright.

6:30 p. m.—Talk, Nervo-Rumat.

6:35 p. m.—Cupid Dance Orchestra.

11:30 p. m.—Connie's Orchestra.

570k-WNYC-NEW YORK-526m 570k—WNYC—NEW YORK—526m 6 p. m.—Herman Neuman, planist. 6:10 p. m.—Market high spots. 6:30 p. m.—Elementary French lessons. 7 p. m.—Advanced French lessons. 7:30 p. m.—Police alarms. 7:35 p. m.—Hida Reich, soprano. 7:35 p. m.—"Books," Prof. J. G. Carter

8:10 p. m.—Baseball results.
8:15 p. m.—Dramatic reading,
Weems m .- Abraham Samilowitz, vic

linist.
9 p. m.—Selma Slotkin, pianist.
9:30 p. m.—WNYC Quartet.
10:30 p. m.—Police alarms; weather.
1430k.—WBNY—NEW YORK—210m 1:15 p. m.—Jack Davis, barytone. 1:30 p. m.—Jessie Borock, songs. 1:30 p. m.—Sioux City Six. 1:30 p. m.—Martha Kovacs, violinist.

n.—Sloux City Six.
p. m.—Martha Kovacs, violinist.
p. m.,—Sloux City Six. 950k-WAHG-RICH, HILL, N. Y.-316n noon—Musical program.

) p. m:—Studio program.

m.—Edwin Seder, organist.

m.—Orpheus Mixed Quartet.

p. m:—The Gondollers. 10 p. m.—The Gondollers. 10 p. m.—Montelair Harmony Four. 10:20 p. m.—Duke Donaldson's Orch 11:02 p. m.—Duke Donaldson's Orch

1230k—WGBB—FREEPORT—244m
). m.—Shirley Fulton, pianist.
5 p. m.—Rev. Hienry Medd, songs.
10 p. m.—May Velton, entertainer.
15 p. m.—Cooper Boyd, violinist.
p. m.—Dorothy Sakes, soprano.
15 p. m.—South Shore Revelers.
16 p. m.—Menkin's Orchestra.
p. m.—Lynbrooklyns.
145 p. m.—George Comer, basso.
p. m.—Lesser's Nite Owls. 1230k--WGBB--FREEPORT-244m

1390-WEST-BAY SHORE-216m organ recital. 200 p. m.—Rexford's Original Villa 740k—WOR—NEWARK—405m

-7:15-7:45 a. m.—Gym class.
p. m.—Aristonian's Orchestra.
p. m.—S. S. Windrow, Us

n.—Aristonian's Orchestra. 1140k-WAAM-NEWARK-

30 a. m.—Happy hour program.
a. m.—Public Service Cooking Scho
30 a. m.—Happy hour program.
b. m.—Tom Cooper's Orchestra.
b. m.—Sport talk. m.—Shark River Island Joy ioys.
m.—Monroe Calculating Company.
m.—Four Towers Orchestra.
p. m.—Wallie Osborne's Orchestra.
1190k—WGCP—NEWARK—252m

p. m.—Harry Winner's Orchestra.
p. m.—Jack and Jill from Radio H.
15 p. m.—Josephine Levandoski, s 1340k—WODA—PATERSON—224m noon—Dance music, :30 p. m.—Concert selections. p. m.—Studio program.

1:30 p. m.—Clifford Lodge Frolic, 590k—WIF—PHILADELPHIA—508n p. m.—Setting-up exercip. m.—Luncheon music. p. m.—Studio program

day list. 760k—WLIT—PHILADELPHIA—395m

12 noon—Organ recital.
2 p. m.—Cohcert orchestra.
4.35 p. m.—Artist recital.
7.30 p. m.—Dream Daddy.
8 p. m.—The Pioneer Entertainers.
9 p. m.—Schickerling Artista.
10 p. m.—Arcadia Cafe Orchestra.
10:30 p. m.—Rufus and Rastus.
11 p. m.—Freshman masterpiece radio 11 p. m.—Freshman masterpiece radit 1989k—WCAU—PHILADELPHIA—278m 6:45 p. m.—Clarence Seaman's Orchestra 7:15 p. m.—Peter Rabbit. 1:30 p. m.—Snellenburg Instrumental Trio.

-Sullivan Brothers, ukuleles. 3:15 p. m.—Enrico Aresoni, tenor./ 3:30 p. m.—The Singing Groundhog. 8:45 p. m.—Dwight Strickland, "Poe

p. m.—The Regina Crooners. 15 p. m.—Nasco Johy Four. 45 p. m.—Jack and Jill, songs. p. m.—Archie Lloyd, Tillia Shapiro 0:30 p. m.—Jack Myers' Musical A 760k—WFI—PHILADELPHIA—395m n.—Tea room ensemble. m.—Sesquicentennial Internation

WHAR—ATLANTIC CITY—275 p. m.—Seaside Trio. :45 p. m.—Jimmy Baxter, "Horticul-tural Question Box." p. m.—Seaside Trio. 00k—WPG—ATLANTIC CITY—300m

p. m.—Morton luncheon u p. m.—Organ recital. m.—Morton dinner music. :30 p. m.—Traymore dinner :45 p. m.—Creatore's Band. tra.

D. p. m.—Ted Weems's Dance Orchestra

0:30 p. m.—Dance orchestra:

0:30 p. m.—Organ recital.

790k.—WGY.—SCHENECTADY.—380m

12:30 p. m.—Market repure.
2 p. m.—Asia Orchestra.
2 p. m.—Asia Orchestra.
2:30 p. m.—Music; one-act play, "The Game," by Lloyd Thanhauser.
Stock reports; news. m ...Dinner program.

ism vs. Romanism."

9:40 p. m.—WHAP Mixed Quartet.
10 p. m.—WHOY O

8:15 p. m.—WGY O

Kitty." by Lee Sv

ery, soprano; C. Allen, Darl Behmann.

10:30 p. m.—Rice

Kitty." by Lee Sv

Reardon, harpist.

940k—WGR—BUFFALO—319m
6:30 p. m.—Bernice Riggs, planist.
7 p. m.—Winger's Crescent Park
tertainers.
8:15 p. m.—Reading, "Lavinsky at the
Wedding," Mrs. J. Belanger.
8:30 p. m.—Ethyold McMullen
and friends.

friends.

9 p. m.—Jointly with Station WEAF.

9 p. m.—Solow's Soloists.

10 p. m.—Jointly with WEAF.

10:30 p. m.—Mrs. Albert Messersmith,
planist; Mrs. Harriett Shire, soprano.

11 p. m.-1 a. m.—Vincent Lopez's Dance
Orchestra. 1080k-WHAM-ROCHESTER-278m 30 p. m.—Eastman Theater Orchestra.
p. m.—Eastman Theater organ.
35 p. m.—WGY Orchestra.
15 p. m.—Comedy, "The Arrival of

1130k-WMAK-BUFFALO-266m 30 p. m.—Dinner music. 30-10:30 p. m.—Musical program. 1460k-WIBX-UTICA-2-1 p. m.—Olympic Theater organ.

30 p. m.—Dinner music.

15-10:15 p. m.—Olympic Theater Or

chestra.

0:15 p. m.—Soloists and entertainers.
980k.—WJAR.—PROVIDENCE.—306m.
1:05 p. m.—Arthur and Jack Ballou.
1:05 p. m.—Musical program.
0 p. m.—From WEAF.
1 p. m.—Biltmore Dance Orchestra. 630k-WTIC-HARTFORD-476m (noon)—Travelers Orchestra. 0 p. m.—Emil Helmberger's Trio. 5 p. m.—Safety talk, William Bro-

smith.
750 p. m.—Piano recital, Laura Gaudet.
8:30 p. m.—Colt's Park Dance Orchestra.
0:30 p. m.—Shelton Post, American
Legion program.
10:30 p. m.—WTIC's Mail Bas.
10:45 p. m.—The Debutants. 860k—WEEI—BOSTON—349m (noon)—Keith's Radio Review 15 p. m.—George Joy, Nell Ca

songs.

4 p. m.—Ray McKittrick's Orchestra.

6 p. m.—Keith's Radio Review.

6:10 p. m.—Even's of the day.

6:45 p. m.—Big Brother Club.

7:30 p. m.—Whiting's Four Merry Mill m.—Garden talk.

10:30 a. m.—Women's Club taray,
1 p. m.—Luncheon concert.
2 p. m.—Vea Dance.
4 p. m.—Vea Dance.
5 p. m.—Wodal and piano selections.
5 p. m.—Kiddles Klub.
6:30 p. m.—Sam Blum's Orchestra.
7 p. m.—Dok Eisenbourg's Sinfonians.
7 p. m.—Victory's Band.
8 p. m.—Concert program.
8:30 p. m.—Chamber of Commerce Restaurant. -Whittridge Radio-Motor Club.

900k—WBZ—SPRINGFIELD—333m 900k—WBZ—SPRINGFIELD—SS: 7 p. m.—Lenox Ensemble. 7:30 p. m.—Baseball results. 7:33 p. m.—Bob Patterson's Trio. 9 p. m.—Bert Dolan's Orchestra. 10 p. m.—Maude Murray, contralto,

10 p. m.—Maude Murray, contraito, wit sassisting artists.
10:30 p. m.—Brunswick Orchestra.
1:120k—WTAG—WORCESTER—268m
12:05 p. m.—Musical selections.
2 p. m.—Daily news.
7:15 p. m.—Story teller.
8:15 p. m.—Puzzle Corner Editor.
10 p. m.—Whittall Anglo-Persians.
6:10k—WRC—WASHINGTON—469m s, m.—Organ recital. p. m.—Meyer Davis's Orchestra. 5 p. m.—Book reviews by Mrs. Reed. 640k—WCAP—WASHINGTON—469m 6:45-7:45 a. m.—Tower Health Exer

8-10 p. m.—Baseball News of the Day; market summaries -Whittall Anglo-Persians. 10 p. m.—Whittall Anglo-Perstans. 10730 p. m.—Studio program. 1220k.—WBAL—BALTIMORE—246m 7:30 p. m.—WBAL Dinner Orchestra. 8:30 p. m.—WBAL Sandman Circle. 9 p. m.—Musical program.

8:30 p. m.—WBAL Sandman Circle.
9 p. m.—Musical program.
10 p. m.—Municipal Band of Baltimore.
970k—KDKA—PITTSBURGH—309m
6:30 p. m.—Dinner concert.
9 p. m.—Stockman-Farmer news.
9:30 p. m.—Concert by the Edgar Thomson Minstrels.
6:30 p. m.—Dinner concert.
7:30 p. m.—Dinner concert.
7:30 p. m.—Dinner concert.
7:30 p. m.—Children's period.
7:45 p. m.—Address.
8 p. m.—Studio program.
9 p. m.—Faul West's Collegiate Aces.
10 p. m.—Whittall Angio Persians.

SATURDAY 610k-WEAF-NEW YORK-492m noon-Raiph Christman, pianist. 610k—WEAF—NEW YORK—492m
12 noon—Ralph Christman, pianist.
12:15 p. m.—Alfred Hall, barytone.
12:30 p. m.—Doris Tauber, pianist.
12:45 p. m.—Alfred Hall, barytone.
7 p. m.—Sport Rays.
7:10 p. m.—Commercial Digest.
7:15 p. m.—Charles Premma@ tenor.
7:30 p. m.—Oriando's Concert Orchestra.
8 p. m.—Helena Rubinstein: "Your Face."
8:15 p. m.—Arfists' debut hour.
9 p. m.—Gluseppe Adami, violinist.
9:45 p. m.—Drawing Room Players.

610k-WEAF-NEW YORK-6100m chestra.
to 5 p. m.—Dance music.
to 6 p. m.—The New Yorkers,

m.—Dinner music.
p. m.—Baseball scores 155 p. m.—Baseball scores.
p. m.—John Allegra, barytone.
115 p. m.—"Typical Cases in the Children's Court." Judge Boyle.
130 p. m.—Musical comedy Troupe.
130 p. m.—Goldman Band concert; :30 p. m.—Goldman Band concer-grand opera program; Emily Day, so

prano.
0 p. m.—Ben Bernie's Orchestra.
1 to 12 p. m.—Vincent Lopez's Orch 660k-WJZ-NEW VORK-455m

660k—WJZ—NEW YORK—455m
2 p. m.—Weather; news service,
4, 4:30 and 7:30 p. m.—Baseball reports,
4, 4:30, 7:30 and 11 p. m.—News service
5:32 p. m.—Market quotations,
5:30 p. m.—Financial summary.
5:40 p. m.—Cotton quotations,
6:50 p. m.—Farm market reports,
7 p. m.—Madison Concert Orchestra,
8 p. m.—Congressional forum from WRC
10:30 p. m.—The Record Boys,
11 p. m.—Mayflower Dance Orchestra. 950k-WGBS-NEW YORK-316n i. m.—Burier Eins, readings.
i. m.—Fashion talk.
m.—Scripture readings.
m.—Alice Harper, soprano.
m.—Charlotte Lindner, planist.
m.—Isamu Naguchi, "Sculpture
m.—Alice Harper, soprano.
"Charlotte Lidager."

2.Au p. m.—Charlotte Lindner.
3 p. m.—Central Boys' Division Branch of the Y. M. C. A.
6 p. m.—Uncle Geebee.
8:30 p. m.—incent Sorey Concert Trio.
7:15 p. m.—New York Herald Tribune news bulletins.
30 p. m.—William Black, "Outline of Travels." 7:45 p. m.—William C. Pike's Orchestra. 8:45 p. m.—Clifford Cheasley, "Numerp. m.—William Chosnyk's music mem ory recital.

9:30 p. m.—Lola Fruzzetti, soprano.

9:40 p. m.—Hindu play, "Sakuntala

ties.
3:40 p. m.—Belle Brooks.
7 p. m.—Tappen's Orchestra.
7:30 p. m.—Hansen and Howard.
7:45 p. m.—Musical program.
3:30 p. m.—Time-O-Stat musical program.

9 p. m.—Debate, Senator W. L. Love and Warden Lawes, "Capital Punishment."

10 p. m.—Anne Lucille, soprano.

10:15 p. m.—Edward Morris, pianist.

10:30 p. m.—Stauch's Orchestra.

11 p. m.—Ernie Golden's Orchestra.

12 midnight—McAlpin Entertainers.

1100k—WFBH—NEW YORK—273m

1100k—WFBH—NEW YORK—273me
1 p. m.—Studio program.
2 p. m.—Studio program.
3 p. m.—Marion Harfman, soprano.
115 p. m.—Bert Johnson, songs.
130 p. m.—Ed Berlin's Orchestra.
130 p. m.—Edle Osborne, songs.
135 p. m.—Belle Osborne, songs.
135 p. m.—Belle Osborne, songs.
130 p. m.—Golf lessons.
145 p. m.—Golf lessons.
145 p. m.—Majestic String Ensemble.
145 p. m.—Investment questions answers. answers. 30 p. m.—Studio program. 570k-WNYC-NEW YORK-526m

m.—Herman Neuman, planist.
p. m.—Fred Ehrenberg, musical saw,
p. m.—Police alarms.
p. m.—Concert program by colored 7.35 p. m.—Concert program by colored artists.
8:10 p. m.—Baseball results.
8:15 p. m.—Jacobs Chamber Symphody Orchestra.
9:30 p. m.—Max Wechsler, violinist.
10 p. m.—Police Entertainers.
10:15 p. m.—Harold Fowler, tenor,
10:30 p. m.—Eloice alarms; weather,
10:35 p. m.—Louis Rubin, ptanist,
1100k.—WBBR—STATEN ISLAND.—278m
8 p. m.—Dr. Hans Hasg, violinist.

8 p. m.—Dr. Hans Haag, violinist. 8:20 p. m.—Bible questions and answers. 8:45 p. m.—Fred Twaroschk, tenor. 950k WAHG RICH. HILL, N. Y.—316m midnight-Variety progr

12 midnight—Variety program.

740k—WOB—NEWARK—405m
6:45, 7:15, 7:45 a. m.—Gym Class.
2:30 p. m.—La Savoie Orchestra.
3:30 p. m.—Ben Bernie's Orchestra.
6:15 p. m.—Jacques Jacobs's Ensemble.
6:15 p. m.—Bill Wathey, "Sports."
7 p. m.—Jacques Jacobs's Ensemble.
7 p. m.—Jacques Jacobs's Ensemble.
7 p. m.—Bretton Hall String Trio.
7 p. m.—Nicolas Globatcheff, basso; Virginia Richards. soorano. :30 p. m.—Nicolas Globatchess Virginia Richards, soprano. :15 p. m.—Casino Orchestra. :45 p. m.—Berkeley - Carteret Orchestra.

930 p. m.—Beraciey Cartos Orchestra. 0:15 p. m.—Brass quartet. 0:30 p. m.—Monterey Society Orchestra. 1:15 p. m.—Ben Bernie's Orchestra. 1140k—WAAM—NEWARK—263m p. m.—Dorn-Bauer Orchestra.
p. m.—Sport review, Major Tate.
15 p. m.—Norma Tucker, soprano.
30 p. m.—Roy Churchill, Bob Rutan. 30 p.m.—Roy Churchill, Bob and banjoists.
45 p.m.—Norma Tucker, soprano.
p.m.—Ophelia Tirico, violinist.
115 p.m.—Ellite Quartet.
145,p.m.—Ophelia Tirico, violinist.

45 p. m.—Alice Laurie, soprano. —Piano duo. m.—Wm. Eichelsdoerfer, violinist. m.—Mary Speedle, contraito. m.—Esther Krom, pianist.

p. m.—Paramount Trio. :15 p. m.—Studio program. :30 p. m.—Paramount Mixed Quartet. p. m.—Orchestra. 1340k—WODA—PATERSON—224m noon—Dance music; songs. p. m.—Entertainment, 30 p. m.—News; sport talk. :30 p. m.—News; sport talk.
p. m.—Dinner music.
590k—WIP—PHILADELPHIA—508m

3 p. m.—Studio program.
6:05 p. m.—Dinner music.
6:50 p. m.—Department of Agriculture.
7 p. m.—Bedtime story and roll call; violin solos.
8 p. m.—Sports Corner.
8:15 p. m.—Concert.
8:30 p. m.—Studio program.
8:45 p. m.—Creatore and his Band.
9:30 p. m.—Dance orchestra.
10 p. m.—Dance orchestra.
10:45 p. m.—Dance orchestra.
11:05 p. m.—Organ recital.
760k—WFI—FHIADELPHIA—295ma
1 p. m.—Tea Room Ensemble. 1 p. m.—Tea Room Ensemble.
3 p. m.—WFI Instrumental Trio.
645 p. m.—Dance orchestra.
8 p. m.—Sesquicentennial International Exhibition.
1990k—WHAR—ATLANTIC CITY—275m

p. m.—Seaside Trle. :30 p. m.—Lecture period. 8 p. m.—Seasing
1600k—WPG—ATLANTAL
16:45 p. m.—Organ recital,
7 p. m.—Morton dinner music,
17:20 p. m.—Emmett Welch's Minstrela,
8 p. m.—Ambassador dinner music,
—Marine Studio,
—Marine Studio,

45 p. m.—Creatore and His Band, Steel :30 p. m.—Dance orchestra. m.—Dance orchestra, Garden Pier.
p. m.—Dance orchestra.
p. m.—Elks Home Dance Orchestra.
c—WGY.—SCHENECTADY.—380m

799k—WGY—SCHENEULAUI—Soul 12:30 p. m.—Stock market report. 6:30 p. m.—Dinner program. 7:30-p. m.—Program from Buffalo. 10:30 p. m.—Dance program. 1130k—WMAK—BUFFALO—266m 7:15 p. m.—Daily news items. 7:30-10 p. m.—Musical program. 1080k—WHAM—ROCHESTER—278m. 30 p. m.—Eastman Theater Orch p. m.—Eastman Theater organ.

6:30-7:30 p. m.—Dinner dance music. 11 p. m.-1 a. m.—WIBX Funfest and -WJAR-PROVIDENCE-306m

1:05 p. m.—Musical program.

860k.—WEEI.—BOSTON.—349m

12 noon.—Keith's radio review.

3:15 p. m.—Musicale.

3:10 p. m.—Events; scores.

7:40 p. m.—Lucerne-in-Maine Quintet.

news.

p. m.—Luncheon concert.

p. m.—Vocal selections.

p. m.—Shepard Colonial tea dance.

p. m.—The Smilers.

30 p. m.—Dinner dance.

p. m.—Concert program.

p. m.—Musical program.

0.05 p. m.—Dance music. p. m.—Bance music. 0:05 p. m.—Dance music. 0:08—WBZ—SP'GFFELD, MASS—333m 7 p. m.—Capitol Theater Orchestra. 1:30 p. m.—Max I, Krulee's Orchestra. 10 p. m.—Mildred Abbey Johnson, so

prano.

10:15 p. m.—Fred Conant, planist.

11:20k.—WTAG.—WORCESTER.—268m.

12:05 p. m.—Musical selections.

2 p. m.—Daily news.

5:15 p. m.—Story teller.

640k.—WRC.—WASHINGTON.—469m. 10 p. m.—Natic Body of Music.
12 midnight—Organ recital.
12 midnight—Organ recital.
13 70k—NDKA—PITTSBURGH—309m
6:30 p. m.—Dinner concert.
9:30 p. m.—Westinghouse-Band.
650k—WCAE—PITTSBURGH—461m

7:30 p. m.—Sunshine Girl. 8:15 p. m.—Studio program

Electric Power Company Uses Radio Set To Detect Periods of Darkness

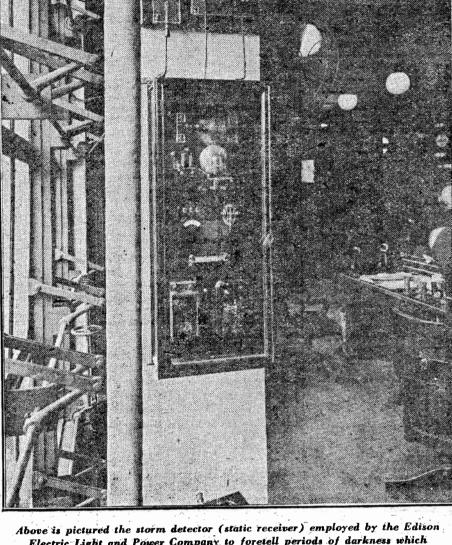
A Receiver Designed to Pick Up Static Increases Efficiency of Lighting Station

By ROBERT HERTZBERG

T SEEMS that static, which has been glorified by tradition as the bugaboo of radio, has been fooling us for many years, and really performs some function other than that of producing strange growling, scratching and sizzling disturbances in loud speakers. A recent bulletin issued by the Department of Agriculture contains the information that the Forest Service is finding static useful in predicting thunder storms and in forecasting periods of low humidity, while investigation in local engineering circles discloses the fact that the Edison Company in New York has for years been using a unique storm detector, depending entirely on static for its operation in anticipating spells of darkness over the city and subsequent increased demands for electric power.

It has been discovered that while radio engineers sprout gray hairs in efforts to keep static out of radio receivers, the electrical engineers of the immense Waterside power generating station, at Thirtyeighth Street and the East River, welcome it with open arms and embrace it as a friend. For the last fifteen years they have, almost unknown to the outside world, been employing a special radio set whose sole object is to pick up static and to make a noise. They have swung an aerial 400 feet long between the big black chimneys of the power house, which stand 350 feet high, and they don't care a bit about DX or tone quality or selectivity as long as they can pick up static and static only. Radio listeners may stand aghast at this strange perference, but there is a good reason for it.

Electricity in such quantities as are required in New York City cannot be stored and made available for instant use any time in the future, but must be generated as it is required. The demand for current may be doubled within a few minutes during a sudden period of darkness in business hours, for 1,000,000 people may at the same moment press buttons for electric light. The power generating station must be ready for such sudden loads long before they occur, because the huge turbo-generators, which convert quire approximately an hour to warm up less detector at Waterside to ring inter- fully prepared to supply the increased able assistance it has rendered him.—R. H.



Electric Light and Power Company to foretell periods of darkness which accompany storms of electrical character

and to be ready for service. The storm detector is the device which enables the station engineers to forecast the demand by warning them of the approach of a storm hours before it actually hits the

A heavy storm is invariably preceded by atmospheric electrical disturbances in other words, static-which affect a radio receiver many miles in advance of the squall. A storm headed for New York steam energy into electrical energy, re- and still fifty miles away causes the wire-

done—the first is to change the aerial and

the second to remember the position of

hand before starting to change the coil.

mittently and somewhat quietly, at which signal the engineer in charge of the control room passes word along to the boiler and generating room crews so that they may prepare to put more generating equipment into service. As the storm sweeps closer to the city the detector rings more loudly and steadily, and the engineer, or "system operator," as he is known, orders more boilers and generators put into use. By the time the black clouds descend on New York the power house is like a friend and thanks it for the invalu-

amount of current for all the lights that will be switched on.

The Waterside system operator is connected by land telephone to numerous observors at sub-stations scattered around the metropolitan district, who report to him local conditions and influences. Sometimes the storm detector will register on a strong storm that will merely skirt the city and affect some suburban section, and unless its direction is checked by the outlying observors in co-operation with the Waterside operator, expensive and entirely unnecessary preparations will be made in the Waterside boiler rooms.

The storm detector itself is a rather simple device. It consists of short circuiting switch, which grounds the aerial and thereby protects it from lightning discharges when a storm breaks overhead; a spark gap; a coherer; a relay and battery, and a bell. The coherer is a rather ancient type of detector, corresponding to the crystals and bulbs used in broadcast receivers, but is used because it is permanent, requires practically no adjustment, and largely because a bell is involved in its operation. The latter is the only indicating device of the affair, there being no earphones or loud speaker.

The antenna, being freely exposed, is susceptible to static discharges. If a storm is near by, the wires will accumulate a charge of static, the atmospheric conditions which produce static being the same that cause the storm. The charge must be fairly strong, for it must leap a short break in the receiving circuit at the spark gap before it can affect the coherer, or detector. A direct connection between the aerial and the latter is not employed, because then slight static charges caused by distant storms which never reach New York would operate the device and cause a false alarm.

The action of the static electricity on the coherer causes a bell to ring. The bell serves the double purpose of agitating the coherer slightly so as to restore it to operating condition after a static impulse has gone through it, and to warn the system operator that all is not quiet up in the sky. That vigilant individual judges the nearness of the storm by the violence of the ringing and prepares for the emergency load which will follow shortly. Radio fans may be saying unprintable things about the static, but he treats it

Directions for Building a Five-Tube Set

(Continued from page two)

the detector a turn or two will have to be removed from the amplifier input coil. If it is below the detector dial setting it would be best to remove a turn or two from the detector coil instead of winding

more wire on the amplifier coil. When these two coils have been matched up, the next thing to do is to find out whether the antenna used is affecting the aerial coil. Tune in any station with the aerial and ground connected in their proper posts and notice the setting of the

midget condenser for loudest response. If a long-wave station is being received and the midget condenser is either all the way in, all the way out, or is at about half setting it will be necessary to change the inductance of the antenna coil. In the first case, unless the station being received is at the top of the broadcast band, the antenna coil will have to be cut down until the midget condenser plates are about in the same position as the main tuning condenser plates.

Adjusting Antenna Coil

In every case it will be necessary to change the aerial coil until the midget condenser moves with a change in wave length so that the two condensers are almost identical with respect to the position of the rotor plates. That is, the midget condenser rotor plates should be half engaged when the multiple condenser rotors are, and so on throughout the tuning range of the receiver. In a few cases it will be found that the setting of the midget con- | As a general rule it will be found that this uneven setting of the midget condenser denser is erratic with changes in wave will in no way affect the efficiency of the set if it is once adjusted as explained This is caused by the aerial and not by above for regular locations. the set. In such cases two things can be

same results from the set as one would erraticism and just make the antenna coil from a three-dial set. In fact, it will be so that the midget condenser will take care of all antenna changes over the entire This is easier to do if the operator will take a little time and tune over the entire

found that distant stations are easier to pick up because of the single-dial control. This set was specifically designed for loud-speaker operation; that is the reason for the last stage of audio, and therefore

there should be no difficulty in getting the

This drawing shows how the apparatus should be arranged on the front panel of the one-control receiver described in this article

no detector jack is necessary. On three dial sets it is sometimes necessary to use head phones to tune in out-of-town stations because of the possibility of passing the station by moving one dial too far. Such a thing cannot happen with this receiver. A detector jack can be inserted, however, if desired. Once the circuits have been matched

A Horn and Cone Speaker

Combination While a good cone type speaker is distinctly superior to the average horn. there is no reason why the latter should be discarded upon the acquisition of the

The predominant contrast between a cone and a horn is the efficiency with which the former reproduces the low notes and the manner in which the horn emphasizes the higher frequencies. And it is also true that the average good cone loses somewhat on the high notes. An appreciation of these facts suggests a combination of the two speakers for reproduction superior to the individual capability of either speaker

As a matter of fact, the connection of two such loudspeakers in series (positive of the first to the negative of the second and the positive of the second to the B battery, when polarities are indicated) will generally improve reproduction to an extent immediately appreciable to the discriminating ear.

World Radio History

The Herald Tribune Daily Broadcasting Programs for Week Ending June 26

TO-DAY

610k-WEAF-NEW YORK-492m p. m.—Interdenominational services; idress and musical program. 30 p. m.—Instrument program of sacred music.

4:30-5:30 p. m.—Musical vespers by the Federation Mixed Quartet.

5:30 p. m.—Louis Eddin, violinist; Mathide Harding, pianist.

5 p. m.—Orchestral concert; Giuseppe Di Benedetto, tenor; Frances Sobel, soprano.

7:20 p. m.—Capitol Theater family.

9:15 p. m.—Atwater Kent hour; Allen Moduke, tenor, and orchestra.

McQuhae, tenor, and orchestra. 9:45-10:15 p. m.—Goldman Band concert, New York University campus; Waino Kauppi, cornetist. 660k-WJZ-NEW YORK-455m n.—Children's hour, n.—Charles Yoder, barytone, m.—Park Avenue Baptist Churc

p. m.—Park Avenue Baptillo.
Carillon.
7:20 p. m.—Pennsylvania concert orchestra.
8 p. m.—Leon Simon, barytone; Wyman
Miller, cellist; Louis Lane, pianist.
8:30 p. m.—Madison concert orchestra.
9:30 p. m.—Godfry Ludlow, violinist. 950k WGBS NEW YORK—316m
p. m.—Arrowhead Inn tea orchestra.
130 p. m.—Moscow Art Musical Studio Ensemble; violin recital with sixteen assisting vocalists; folk music symphonic
accompaniment.

10:30 p. m.—Jacob Forstat, cellist. 10:45 p. m.—Daca, cowboy singer 830k-WHN-NEW YORK-361m 11:30-12:30 p. m.-Calvary morning ices. 12:30-1 p. m.—Loew's Theater organ rem .- Queens County Christian En-

deavor program.

4:30 p. m.—Inspiration hour.

4:30-4:40 p. m.—News flashes, racing,
baseball.

5-5:30 p. m.—Roseland dance orchestra.

5:30-5:40 p. m.—News, racing, baseball.

7:30-9:45 p. m.—Calvary Baptist Church,
evening services. evening services. 10:45-11:15 p. m.—Janssen's Hofbrau or 880k-WMCA-NEW YORK-341m

380k—WICA—NEW YORK—341M
10:45 a. m.—Employment opportunities,
11 a. m.—Services, Seventh Church
Christ Scientist.
7 p. m.—Ernie Golden's orchestra.
7:30 p. m.—Reginald Erskine, barytone.
8 p. m.—Talk by H. L. Stratton.
8:02 p. m.—Minnie Weil, pianist.
8:30 p. m.—Musical program.
9 p. m.—Jewish Forward hour.
1250k—WHAP—NEW YORK—240m
2:30 p. m.—Selections from Bible. "Science

0 p. m.—Selections from Bible, "Science and Health."
p. m.—Concert of sacred music, choir 1100k-WFBH-NEW YORK-273m 5 p. m.—Lyons Concert Entertainers. 5:30 p. m.—Franklin Four. 6 p. m.—World Masonic news. 6:15 p. m.—Eddie Woods, barytone. 6:30 p. m.—Fima Fidelmann, violinist 6:55 p. m.—Talk, Walter & Co. 7 p. m.—Libby entertainment.

1430k-WBNY-NEW YORK-210m p. m.—Bamby Breadwinners.
p. m.—Orchestra.
p. m.—Milton Yokeman, tenor.
p. m.—Martin Miller, zither. 8:30 p. m.—Martin Miller, zither., s. 18:45 p. m.—Charlotte Salisbury, compos p. m.—Lauretta Reynolds, songs. 4:15 p. m.—Harmony Boys. 4:30 p. m.—Silver-Voiced Tenor. 4:45 p. m.—Harmony Boys. 5 p. m.—Lew Attell, songs. 5:15 p. m.—Martin Muller, zither. 6:15 p. m.—Original Harmony Boys.

1100k-WBBR-STATEN ISLAND-278 10 a. m.—Watchtower Trio.
10:20 a. m.—L. Marion Brown, soprano.
10:30 a. m.—Bible lecture, S. M. V. Sipma.
11 a. m.—Choral singers.

11:25 a. m.—Sunday school lesson.
11:40 a. m.—Choral singers; trio.
2 p. m.—Watchtower Orchestra.
2:20 p. m.—L. Marion Brown, soprano.
2:30 p. m.—L. Marion Brown, soprano.
3 p. m.—L. Marion Brown, soprano.
3:10 p. m.—Bible instruction, John Daw-

son. 8:25 p. m.—L. Marion Brown, soprano. 8:40 p. m.—Watchtower Orchestra. 9 p. m.—Watchtower Violin Choir. 9:25 p. m.—Bible questions and answers. 1230k—WGBB—FREEPORT, N. Y.—244m 10:40 a. m.—Freeport Methodist Church

1390k WRST BAY SHORE 216m

1140k—WAAM—NEWARK—263m a. m.—Services of the Second Presby-erlan Church. 1190k—WGCP—NEWARK—252m m.—Marinello Lady.
p. m.—Malatesta hour.
p. m.—Frances Handler, violinist.
p. m.—Grace Woydich; soprano.
m.—Pligrim String Ensemble.
p. m.—Wm. Eichelsdoerfer, voilini
m.—Etta Helies, contralto.
m.—Mother Goose Girl.
Limnic Sheerer

m.—Jimmie Shearer. m.—Gustave Bischoff, planist. 9:15 p. m.—Paramount Trio. 1340k—WODA—PATEHSON—224m 10:30 a. m.—First Baptist Church service 590k—WIP—PHILADELPHIA—508m

9 p. m.—Anivappearing 15 p. m.—Concert. 760k—WFI—PHILADELPHIA—395m. 1 7:30 p. m.—Service from Arch Street Presbyterian Church. 1080k—WCAU—PHILADELPHIA—278m 10 a.m.—First Unitarian Church services.
5 p. m.—Recital; Radio Church srevices,
Rev. John W. Stockwell.
6:45 p. m.—Clarence Seaman's Orchestra.
7:45 p. m.—Cathay Concert Orchestra.
8:30 p. m.—Barry O'Moore; Bonwit Teller

insemble.

1000k—WPG—ATLANTIC CITY—300m 1000k—WFU—ALMANIA

1:15 p. m.—Organ recital.

1:15 p. m.—Community vocal and instrumental recital.

9 p. m.—News flashes and scores.

9:15 p. m.—Traymore Concert Orchestra

9:45 p. m.—Concert program.

10:30 p. m.—Organ and vocal recital.

1090k—WHAR—ATLANTIC CITY—275m 7:50 p. m.—Evening service.

9 p. m.—An hour with the classics, Sea.

11 a. m.—Service of St. George's Epis-copal Church. 7:30 p. m.—Service of St. George's Epis-copal Church. 9 p. m.—Madison Orchestra. 9 p. m.—Madison Orchestra. 8:30 p. m.—Miscellaneous program. 10 p. m.—Violin recital by Godfrey Lud

ow. 1130k—WMAK—BUFFALO—266m m.—Evening service, Churchill Tabel 940k-WGR-BUFFALO-319m

10:45 a. m.—Morning service. 7:45 p. m.—Evening service. 9:15-9:45 p. m.—Jointly with WEAF. 1460k—WIBX—UTICA—265m 4-5 p. m.—Chamber music. 980k—WJAR—PROVIDENCE—306m 7:20 p. m:—Capitol Family. 630k—WTIC—HARTFORD—476m

9:45 p. m.—Goldman Band concert. 10:15 p. m.—Keith's Radio Review.

630k—WTIC—HARTFORD—476m

5 p. m.—Organ recital, Yale University,
860k—WEEI—BOSTON—349m

p. m.—Jordan Marsh Company's Sparkling Diamonds.
7:20 p. m.—Capitol Family,
9:15 p. m.—Atwater Kent Radio Hour.

15 p. in.—Evening service. 900k—WBZ—SPRINGFIELD, MASS.— 333m

10:50 a. m.—Trinity Church Services.

B. p. m.—Copley Plaza Concert.

B:30 p. m.—Golden Rule Hour.

B:30 p. m.—Concert by the Sacred Hear

Choir.

1120k—WTAG—WORCESTER—268m

:20-9:15 p. m.—"Capitol Family."

:15-10:15 p. m.—From WEAF, Goldman 15-10:15 p. m.—From WRAF, Goldman, Band.
640k.—WCAP.—WASHINGTON.—469m
1 (noon)—Service from Rhode Island Avenue M. P. Church.
5 p. m.—Service at the Peace Cross.
7:20-9:15 p. m.—Capitol Theater Family.
9:15 p. m.—"Atwater Kent Radio Hour."
9:45 p. m.—"Vesper Hour of Music."
1220k.—WBAL—BALTIMORE—246m
8:30 p. m.—WBAL Concert Orchestra

n.—Church Service.

—Organ recital.

m.—Vesper service.

m.—Baseball scores.

m.—Chimes; Church Service.

k.—WCAE.—PITTSBURGH—461m (20 p. m.—Chimes; Church Service. 650k—WCAE—PITTSBURGH—461 6:30 p. m.—Dinner concert. 7:20 p. m.—Capitol Theater Family.

MONDAY

660k-WJZ-NEW YORK-455m p. m.—Meyer Davis Orchestra.

p. m.—Weather; news service.

4:35, 5:30, 7, p. m.—Baseball reports.

4:35, 5:30, 7, ll p. m.—News service.

p. m.—"Your Daily Menu," Mrs. Julia

140 p. m.—Cotton quotations.
150 p. m.—Farm market reports.
p. m.—Madison Dinner Concert.
155 p. m.—John B. Kennedy.
p. m.—Maxwell House Ensemble.
p. m.—Annual budget talk by Presiden
Coolidge and General Lord.
0 p. m.—Reading Railroad Revelers.
1 p. m.—Waldorf-Astoria Roof Orchestra

610k—WEAF—NEW YORK—610m 6:45, 7 and 7:20 a. m.—Health exercises. 7:45 a. m.—Prayer services. 11 a. m.—Warren Scoffeld, barytone. 11:15 a. m.—'Good Manners for Children, 11:10 a. m.—"Good Manners for Children Elsie Meade. 11:30 a. m.—Warren Scofield, barytone. 11:40 p. m.—"Hooked Rugs." 12:100n—Market and weather reports. 12:15-1:15 p. m.—Rolfe's Palais d'Or Control

chestra.
4 p. m.—Seville String Ensemble.
4:30 p. m.—"Current Art Exhibitions, Rose Berry. 45 p. m.—Seville String Ensemble. p. m.—Blanche Fink, soprano. 15 p. m.—Esther Ostroff, planist. 30 p. m.—Tea music. 45 p. m.—Jonas Butenas, barytone. p. m.—Dinner music.

p. m.—Dinner music. 55 p. m.—Baseball scores. p. m.—Raymond Maher, barytone. 15 p. m.—Joseph Auslander, author, 7:15 p. m.—Joseph Auslander, author, The Knockout."
7:30 p. m.—Walter Chapman, planist.
7:45 p. m.—Elaine Horton, contralto, 8 p. m.—Meyer Davis Orchestra.
8:30 p. m.—Semi-annual meeting of the Bureau of the Budget; music by the U. S. Navy Band; address by Calvin Coolidge; report on "The National Budget," by Brigadier General H. M. Lord, 10:30 p. m.—Grand opera, "Lucia di Lammermoor."

mermoor. 11:30-12 midnight—Rolfe's Palais d'Or Or-950k-WGBS-NEW YORK-316m 950k—WGBS—NEW YORK—316m
10 a. m.—Ship Week program: "Hous
keeping on a Big Ship."
10:10 a. m.—Jack Cohen, planist.
10:15 a. m.—Radjo Gym Class; planist.
10:35 a. m.—Fashion talk; planist.
13:30 p. m.—Scripture reading.
1:35 p. m.—Bob Brandes, singer.
1:45 p. m.—Y. M. C. A. camp talk.
1:55 p. m.—Adele Trides, soprano.
2:05 p. m.—Willette Wilbourne, planist.
2:15 p. m.—Bob Brandes,
2:25 p. m.—Adele Trides.
2:25 p. m.—Willette Wilbourne,
3 p. m.—Interview with Edith Catl

p. m.—Interview with Edita Phelps. 3:10 p. m.—Betty Chandler, singer. 3:20 p. m.—Lillian Eichler, "Well-Bred English." :30 p. m.—Betty Chandler, singer. :40 p. m.—M. Post, "Equipping an Ocean

8 p. m.—Uncle Geebee. \
8:30 p. m.—Starlight Park Military Band. 8:50 p. m.—Gladys Mathew, soprano. 7 p. m.—Joseph T. Shipley, "The Electric Age in Poetry." (10 p. m.—Starlight Park Band. 7:15 p. m.—N, Y. Herald Tribune news

880k-WMCA-NEW YORK-341zn 10:15 a, m.—Employment opportunities. 10:30 a. m.-3:30 p. m.—Hourly market

ports.

11 a. m.—Jack Cohen, planist.

12 nooh.—Olcott Vail's String Ensemble.

2 p. m.—Thee Alban, tenor.

3 p. m.—Harrison Stevens, planist.

4 p. m.—Book review.

4:30 p. m.—Ukulele Bob McDonald.

4:40 p. m.—Radio Shopper.

5 p. m.—Direct to Consumer Entertainer.

p. m.—Sam Coslow, songs.
p. m.—Employment opportunities.
p. m.—Ernle Golden's Orchestrs.
m.—Talk by H. L. Stratton.
p. m.—Employment opportunities. m .- Hardman Hour of Music.

115 p. m.—Hardman Hour of Music. 10:15 p. m.—Esther Adie, soprano. 10:30 p. m.—Woodmanston Orchestra. 11 p. m.—Jack Denny's Orchestra. 11:30 p. m.—Manhattan Serenaders. 12:15 a. m.—Stauch's Orchestra. 830k—WHN—NEW YORK—361m 5 p. m.—Pasqualino Sciarrillo tenev

p. m.—Pasqualino Sciarrillo, tenor... p. m.—Max Shrebnik, whistler. p. m.—Helen Zalu, songs. p. m.—Consuelo Rivero, plano solos, m.—Jimmy Clarke's Entertainers. 3 p. m.—Jimmy Clarke's Entertainers.
3:10 p. m.—News, racing, baseball.
3:45 p. m.—Laurie Fisher, tenor.
4 p. m.—News, racing, baseball.
4:10 p. m.—Haines Good News Party.
4:30 p. m.—Sylvia Schatz, pianist.
4:40 p. m.—Nan Warner, Florence Henkel

4:40 p. m.—Nan Warner, Florence Henke popular ballads.
5 p. m.—News flashes, racing, baseball.
5:10 p. m.—Beauty Talk," Mme. Polly, 5:15 p. m.—Eddie Gillis, barytone.
6:30 p. m.—Eddie Gillis, barytone.
6:30 p. m.—WHN Radio Movie Club.
7:30 p. m.—Joe Ward's Swanee Enter tainers.
8 p. m.—Roseland Dance Orchestra.
8:25 p. m.—"Storage Batteries," H. E. Shontz.

Shontz, 8:30 p. m.—"George's Surprise." 9 p. m.—Leverich Three and "Peter to Great."

Great."

9:30 p. m.—Loew's Theater Orchestra.

10 p. m.—Palisades Amusement Park Orchestra.

10:30 p. m.—Leroy Smith's Orchestra.

11:30 p. m.—Alabam Orchestra.

12 midnight—Silver Slipper Orchestra.

1160k—WRNY—NEW. YORK—258m

12 n.pon—Len Saxon and Harry Squires songs. 12 n.on—Len Saxon and Harry Squires, songs.
12:15 p. m.—Eunice Howard, planist.
12:30 p. m.—Eunice Howard, planist.
12:35 p. m.—Eunice Howard, planist.
7 p. m.—Sport rays.
7:10 p. m.—Commercial digest.
7:15 p. m.—Dick Hughes, ukulele.
7:39 p. m.—Orlando's Concert Orchestra.
8 n. m.—Frances Patter, sourano.

139 p. m.—Orlando's Concert Orchestra.
p. m.—Frances Peper, soprano.
115 p. m.—Ben Bernie's Orchestra.
p. H.—'Scientific Paradoxes," H. Gernsback.
115 p. m.—H. Merle, violin.
30 p. m.—Florence Gerringer, piano.
45 p. m.—Judith Roth, soprano.
0 p. m.—Billy Martin's Orchestra.

570k-WNYC-NEW VORK-526m 570m—WNYL—NEW YORK—522m
p. m.—Herman Neuman, planist.
10 p. m.—Market high spots.
20 p. m.—Plano selection.
30 p. m.—Elementary German lessons.
30 p. m.—Advanced German lessons.
30 p. m.—Police alarms.
35 p. m.—Isadore Franzblau, planist.
10 p. m.—Baseball results.
15 p. m.—Sylvia Meyers, violinist.
25 p. m.—Address by Judge Pet
Schmuck.
50 p. m.—Joseph Davies, barytone.
20 p. m.—Richmond Versatile Orchesty.

1040k-WLWL-NEW YORK-288n

1040k—WLWI—NEW

1. m.—Question box.

10 p. m.—Florine Trio.

10 p. m.—Odette Le Fonienay, soprano;

115 p. m.—Corinne Ray, violinist.

1125 p. m.—Henry Condon, tenor.

1250k—WHAP—NEW YORK—240m

120 p. m.—Holmes String Ensemble. 30 p. m.—Holmes String Ensemble 15 p. m.—John Erb, organ recital.

naire,"

8:5 p. m.—Ruth Montgomery, soprano.

8:5 p. m.—Sibyl Marvin Huse, speaker,

9:15 p. m.—Sylvan String Trio.

9:30 p. m.—James P. Hyndman, "American
System of Measures."

9:50 p. m.—Sylvan String Trio.

8:35 p. m.—Ruth Montgomery, soprano.
men's quartet; Dorothy Hoyle, violinist
Vida Milholland, soprano; Steel Jamison
tenor.

tenor. 2 midnight—Classical hour: Christian Thaulow, violinist: Darl Bethmann arytone; Steel Jamison, tenor, 1100k—WFBH—NEW YORK—273m

m.—Orchestra.
m.—Studio program.
p. m.—Bert Johnston, songs.
p. m.—Jeanne A'Dair, composer.
p. m.—Jack Cohen, planist.
p. m.—Laurette E. Adams, songs.
p. m.—Greystone Trio.
m.—American Laglon nows. p. m.—American Legion news. 15. p. m.—Volley Endriss, contralto. 30 p. m.—Ceorless Four. 130 p. m.—Connie's Orchestra. 1430k.—WBNY—NEW YORK—210m

1430k—WBNY—NEW YORK—210m
7 p. m.—Trio.
8 p. m.—Trio.
8 p. m.—Drawing Room Players.
8:45 p. m.—Drawing Room Players.
8:45 p. m.—Ona Welsh, songs.
9 p. m.—Blue Crest Collegians.
9:45 p. m.—Lew Saxon, songs.
10:15 p. m.—Blue Crest Collegians.
10:15 p. m.—Blue Crest Collegians.
10:45 p. m.—Lauretta Reynolds, planist.
1100k—WBBR—STATEN ISLAND—273m
8 p. m.—Irene Kleinneter. songan. p. m.—Irene Kleinpeter, soprano, :125 p. m.—World news digest, :25 p. m.—Irene Kleinpeter, Fred Twar-oschk, duets. :35 p. m.—Bible instruction.

:35 p. m.—Bible instruction. :45 p. m.—Fred Twaroschk, tenor. 950k—WAHG—RICH. HILL, N. Y.—316m 950k—WAHG—RICH. HILL, N. Y.—316m 2 noon—Grebe Matinee Trio. :02 p. m.—Sophie Thies, soprano. :30 p. m.—Walter Iooss, pianist. :45 p. m.—Hazel Kent, soprano. p. m.—Synchrophase Hour. p. m.—Major Dent Atkinson, lecturer. :15 p. m.—Laurence Ballou, barytone; Walter Johnson, tenor; Edna Zitzmann, planist

water banson, each, side water planist.

9:40 p. m.—John and Harry Diehl, zither, plano duets.

10 p. m.—The Two Bobs: a

10:20 p. m.—Frank Tremer's Orionites.

11:02 p. m.—Frank Tremer's Orionites.

12 midnight—Ferrucci's Society Orchestra.

12:30 a. m.—Ferrucci's Radio/Raiders.

12:30k—WGBB—FREEPORT—244m m.—Lawson and Ho 5 p. m.—McGinn-Bluett, fecifal p. m.—Baerenklau-Hart serenaders, 10 p. m.—Sheide's Serenaders, 13 p. m.—Koreans Dance Orchestra, 1390k—WRST—BAY SHORE—216m

p. m.—Brewster Theater hour, 45 p. m.—Percy's Country Club Orches tra. 740k—WOR—NEWARK—405m
6:45-7:15-7:45 a. m.—Gym class.
2:30 p. m.—Hotsy Totsy Boys.
2:45 p. m.—Timely food topic.
3 p. m.—Hotsy Totsy Boys.
3:15 p. m.—Crystal Palace Orchestra.
6:15 p. m.—Jacques Jacobs's Ensemble.
6:45 p. m.—Bill Wathey, "Sports."
7 p. m.—Jacques Jacobs's Ensemble.
7:50 p. m.—Brooklyn Daily Eagle gram.

Band. 145 p. m.—Helen Schafmelster, planist; Feland Gannon, barytone. 10:30 p. m.—Five Messner Brothers. 1140k—WAAM—NEWARK—263m 1149k—WAAM—NEWARK—263m
p. m.—Wallie Osborne's Orchestra,
p. m.—Review of sports.
140 p. m.—Jo Davis, songs.
140 p. m.—Mayor of Holly Park,
p. m.—String Trio.
130 p. m.—Turner Male Quartet.
p. m.—Joe Brown's Orchestra.
140 p. m.—Gene Sneden, ukulele.
150 p. m.—Four Towers Orchestra.
1190k—WGGP—NEWARK—252m
p. m.—Perisi and Tedesco, violin

5 piano.

6:15 p. m.—Wall Street news.

6:30 p. m.—Fischer Dough Boys.

8:30 p. m.—Betty Chandler, soprano.

8:45 p. m.—Howard Shirley's Orchestra.

9:45 p. m.—Studlo program.

10 p. m.—Harold Polk, barytone.

10:15 p. m.—Kathryn Dwyer, soprapo.

0:30 p. m.—George Bahery, tenor. 0:45 p. m.—Terrace Orchestra. 1340—WODA—PATERSON—224m

1340-WODA-PATERSON12 noon-WODA Trior
12:30 p. m.—String Ensemble.
5 p. m.—Studio program.
5:30 p. m.—News; sport talk.
6 p. m.—Bill Walsh's Orchestra.
8:15 p. m.—Plays Worth While.
8:30 p. m.—Safety League talk.
8:45 p. m.—Entertainment. m .- Rheinhardt Newhauser

tina. 9:30 p. m.—M. E. K.'s Gang. 10 p. m.—Dance music. 10:30 p. m.—Selegsen Sisters, Sam Cohe. songs. 760k—WLIT—PHILADELPHIA—395m 5 p. m.—Peirce School talk.
5:15 p. m.—Sesquicentennial program.
5:50 p. m.—Sport fiashes.
7:30 p. m.—Sport fiashes.
7:30 p. m.—Dream Daddy.
8 p. m.—Short Aero-Waves.
8:30 p. m.—Starr Piano Company Artists.
9 p. m.—Stanley Theater Hour.
0 p. m.—Acadia Dance Orchestra.
0:30 p. m.—Vaudeville. m.—Setting-up exercises.
m.—Luncheon music.
m.—Studio program.
m.—Market Hints to Housewives.
p. m.—"Home Gardening," Cha

10 p. m.— hollowell.
50 p. m.—Department of Agriculture.
p. m.—Roll call; birthday list; piane 5010. 1080k—WCAU—PHILADELPHIA—278m 130 p. m.—Recital.

p. m.—Carolyn Thomas, soprano.

130 p. m.—The Hood Boys.

145 p. m.—The Merry Minstrels.

130 p. m.—Roy Tracy, tenor.

145 p. m.—Chaifont sisters, songs.

1 p. m.—Madrigal Mixed Quartet.

160k—WFI—PHILADELPHIA—395m 100k—WFI-PHILADELPHIA—395m p. m.—Tea Room Ensemple. p. m.—Artists' recital. 145 p. m.—Dance orchestra. 1000k—WFG—ATLANTIC CITY—300m 145 p. m.—Organ recital. p. m.—Morton dinner music. 150 p. m.—Talk by Arthur Eldred. p. m.—Traymore dinner music. Wallace."

9 m.—Ambassador Concert Orchestra.

9:30 p. m.—Traymore Concert Orchestra.

10 p. m.—Ted Weems's Dance Orchestra.

Steel Pier.

10:30 p. m.—Studio program.

11 p. m.—Silver Slipper Dance Orchestra.

1090k-WHAR-ATLANTIC CITY-275m p. m.—Seaside Hotel Trio. 7:30 p. m.—Book review, Frances McMul-

790k—WGY—SCHENECTADY—380m 2:30 p. m.—Reports.

Four.

8:15 p. m:—Agricultural program.

9 p. m:—Budget Talks," by President
Calvin Coolidge and General Herbert M. Lord.

1130k—WMAK—BUFFALO—266m
6:16-7:15 p. m.—Dinner music.
7:30-8:15 p. m.—Mrs. Harry Roberts and friends. friends. \$1.5-9 p. m.—Agricultural program. 9-9:35 p. m.—Russian String Trio. 9:30-10 p. m.—Oral Thomas, Raiph Stew art and friends. 10-11 p. m.—Beaver hour. 940k—WGR—BUFFALO—319m

940k—WGR—BUFFALO—\$19m 6:80 p. m.—Dinner music. 8 p. m.—Tom Thomas, cornetist; voc soloist. 8:30 p. m.—Jointly with WEAF. 10:30 p. m.—Woodside Male Chorus. 11:30 p. m.—Supper music. 1080k—WHAM—RGCHESTER—278m

1080k—WHAM—ROCHESTER—278m
10 a. m.—Commencement exercises of the University of Rochester; Eastman Orchestra; address by Dr. Shaller Mathews
3:30 p. m.—Eastman Theater Orchestra.
5 p. m.—Eastman Theater organ:
7:50 p. m.—Radio Four."
8:15 p. m.—Agricultural program.
790k—WHAZ—TROY, N. Y.—380m
9:30 p. m.—Old-Time Melodies by Trorade
Quartet and artists; harmonica solos.
980k—WJAR—PROVIDENCE—306m
1:05 p. m.—Studio program.

10 p. m. Grand opera hour. 630k—WTIC—HARTFORD—476M 12 nom—Travelers Club Orchestra. 6:30 p. m.—Hub Trio. 6:15 p. m.—Yale Glee and Banjo Clubs 8:15 p. m.—Yale Glee and Banjo Clubs' commencement concert.
9:45 p. m.—Mrs. W. C. Sisson, soprano.
10 p. m.—Grand opera hour.
11 p. m.—Capitol Theater organ.
10:30 a. m.—Women's Club talks; songs; news.
1 p. m.—Luncheon concert.
3:10 p. m.—Broadcast from Braves' Field, Braves vs. Brooklyn.

7 p. m.—Dinner dance.
8 p. m.—Metropolitan Theater studio.
9:15 p. m.—Theater—Stage presentations and musical accompaniment.
10:20 p. m.—Dance music; vocal selections.
11:30 p. m.—Theater organ recital.
860k—WEEI—BOSTON—349m

10:15 a. m.—From Houghton & Dutt Studio. 12 noon—Keith's Radio Review. 2 noon—Keith's Kadio Keview.

45 p. m.—Talk.

15 p m.—Ray Carpenter's Orchestra.
p. m.—Rainbow Stars.
p. m.—Keith's Radio Review.

20 p. m.—Keith's Radio Review.

130 p. m.—Big Brother Club.

130 p. m.—Musicales.

130 p. m.—Budget Bureau program; U. S.
Army Band; speech by President Coolidge; Brigadier General Lord.

10:30 p. m.—Ed Andrew's Dance Orchestra.

chestra. 900k—WBZ—SPRINGFIELD—333m m.—Lenox Ensemble. o. m.—Bob Patterson's Trio. o.—Capitol Theater Orchestra p. m.—Capitol Theater Occidents. 30 p. m.—Organ recital. p. m.—Budget talk by President Cool-idge and General Lord. 0 p. m.—The Eighteenth Century Sym-phony Orchestra.

phony Orchestra. 1120k—WTAG—WORCESTER—268m 12:05 p. m.—Musical selections; near talk.

1:30 p. m.—Chester Gaylord, planist.

7:15 p. m.—Twilight Scouts.

8 p. m.—"Preservation of Raspberries."

8:30 p. m.—WTAG Entertainers.

9 p. m.—The Gaylords.

9:30 p. m.—Program to be announced.

10 p. m.—From WEAF, grand opera.

640k—WRC—WASHINGTON—469m

p. m.—Organ recital.
p. m.—Raleigh Hotel Orchestra.
-7:30 p. m.—United States Navy Band.
640k—WCAP—WASHINGTON—469m tudio program.

10-10:30 p. m.—Meeting of business organization of the government; addresses by the President of the United States and by General H. M. Lord; United States Navy Band.

[0:30 p. m.—Grand opera, "Lucia di Lamermont"]

[1:30 p. m.—Michel Barroy, Gypsy songs with guitar.

[2:45 p. m.—Huarte's Spanish Ensemble.

[1:50 p. m.—'Audio Frequency Amplifiers," Clyde Fitch.

[10:30 p. m.—Anita Browne's Musicale.

mermoor."
1220k—WBAL—BALTIMORE—246m m.—WBAL Dinner Orchestra. m.—WBAL Sandman Circle.) p. m.—WBAL Sandman Circle. 9 p. m.—Organ recital. 9:30 p. m.—WBAL Male Quartet. 10 p. m.—Talk by Robert Garland. 10:15 p. m.—WBAL Trio; Edward Jendrek.

970k—KDKA—PITTSBURGH—309m 30 p. m.—Dinner concert. p. m.—Stockmen-farmer news.) p. m.—Concert. 650k—WCAE—PITTSBURGH—461m p. m.—Meeting of Bureau of Budget, with address by President Coolidge.

TUESDAY

570k-WNYC-NEW YORK-526m or white-new lotte-orom p. m.—Herman Neuman, planist.
p. m.—Market high spots.
p. m.—Christopher Meehan, tenor.
p. m.—Civil Service announcemer.
p. m.—Cimino Instrumental Trio.
p. m.—Police alarms. m.—Songs. m.—Talk by Dr. Shirley W. Wynne. 3:10 p. m.—Baseball results. 3:15 p. m.—Instrumental program. 10:15 p. m.—Helen Laufenburg, soprano. 10:30 p. m.—Police alarms; weather.

TO-DAY

Station length Orchestra

WHN 361 Janssen's

MONDAY, JUNE 21

Percey's C. Club Meyer Davis's Roseland Ben Bernie's Howard Shirley's Joe Brown's Rich. Versatile Dance music Ted Weems's

Arcadia Cafe Billy Martin's

Terrace Waldorf-Astoria

Silver Slipper Follies Bergere

Connie's Rolfe's Pal. D'or Dance music Stauch's

Wave

Daylight Saving Time

610k-WEAF-NEW YORK-492m 880k-WMCA-NEW YORK-341m 16:15 a. m.—Employment Opportunities. 10:30 a. m.-3:30 p. m.—Hourly market ports. 11 a. m.—Music. 12 midnight—Olcott Vail's String Ense 6:45-7-7:20 a.m.—Health exercise. 7:45 a.m.—Morning prayer services. 11 a.m.—Wanda Norman, planist. 11:10 a.m.—"Holland," Mrs. Annie Ba

ble.

2 p. m.—Dorothy Kolb, violinist.

2 15 p. m.—Carlton Arnott, tenor.

3 p. m.—Ukulele Dick Hughes.

3 15 p. m.—Ray Klages, songs.

4 p. m.—Bock Review.

4 15 p. m.—O. G. Van Campen, 'Publi chestra.

p. m.—Warren Lee Terry, tenor.

15 p. m.—Musical pragram.

130 p. m.—Women's League.

5 p. m.—Bertha Weber, planist; Blanche 5 p. m.
Speaking."
p. m.—Entertainers.
Prank Malosei, songs.

5 p. m.—Entertainers.
5:30 p. m.—Frank Malosei, songs.
5:45-6:30 p. m.—Employment opportunities
6:40 p. m.—The Radio Bobs.
6:58 p. m.—Talk, H. L. Stratton.
7 p. m.—Hofbrau Haus Entertainers.
7:30 p. m.—Sach's Quality Boys.
8 p. m.—Development of Berlant Park.
8:15 p. m.—Wuscle Shoals."
8:30 p. m.—Timg-O-Stat Musical program.
9 p. m.—Paul Whiteman's Piccadilly Players. p. m.—Bertha Weber, planist; Blancne, Fink, soprano.
530 p. m.—May Breen, Peter de Rose, banjo and plano.
6 p. m.—Baseball scores.
7 p. m.—Justin Lawrie, tenor.
7:10 p. m.—Columbia University French lecture. :30 p. m.—Salon concert; Devora Maders.
9:30 p. m.—Columbia Park Entertainers.
10:05 p. m.—Jack Windrow, ukulele

worney.

8 p. m.—The Grand Prize Eurekas.

8 p. m.—The Gold Dust Twins.

9 p. m.—Eveready Hour.

10 p. m.—Variety half hour.

10:30 p. m.—Jack Albin's Bossert Orchestra.

11:30-12 p. m.—The Buffalodians Dance humorous monologues.
10:15 p. m.—Eureka Exterminating Proc.
10:30 p. m.—Musical program.
10:m.—Erale Golden's Orchestra.
12 p. m.—McAlpin Entertainers. 1 p. m.—Ernie Golden s.
2 p. m.—McAlpin Entertainers.
1040k—WLWI—NEW YORK—288m
9 p. m.—Magnhild Styhr, pianist.
9:15 p. m.—Mercedes Fehley, soprano.
9:30 p. m.—Grenville Lewis, violinist.
9:45 p. m.—Premier Male Quartet.
10 p. m.—Talk by Bernard J. Fagan.
10:15 p. m.—Fremier Male Quartet.
10:30 p. m.—George Shuster, talk.
10:45 p. m.—Alec Compinsky, cellist. 660k-WJZ-NEW YORK-455m 1 p. m.—Pennsylvania luncheon music. 2 p. m.—Weather; news service. 44:30-7:30 p. m.—Baseball reports. 44:30-7:30-10:45 p. m.—News service. 4 p. m.—"Your Daily Menu," Mrs. Julian Heath

-Vera Ross, contralto

p. m.—Arrowhead Concert Orchestra. :15 p. m.—N. Y. Herald Tribune News

bulletins.
p. m.—Play: "The Maker of Dreams,"
px Oliphant Down. Charlynne Courtland, Albert Hyde and Rexford Kendrick;

music.
8:30 p. m.—Jon Dunbar, tenor; Leonard
Lonquist, planist.
9 p. m.—"Teeftallow," T. S. Stribling.
9:10 p. m.—Anita Hayward, musical impersonations.
9:30 p. m.—Corradetti Vocal Studio En-

9:30 p. m.—Corradett vocal studio in semble.

10 P. M.—Floremee Cathcart, "Weaving."

10:10 p. m.—Willard Robison, "The Voice From the South."

10:30 P. M.—Arrowhead Dance Orchestra.

11:15 p. m.—Evelyn Hirsch, planist.

12:30 p. m.—Evelyn Hirsch, planist.

12:30 p. m.—Charlotte Salesbury, songs.

7 p. m.—Sport Rays,

7:10 p. m.—Commercial Digest.

7:15 p. m.—Lawrence Gardner, xylophone,

7:30 p. m.—Human Form Beautiful, Dorothy Knapp.

othy Knapp.
7:45 p. m.—Orlando's Concert Orchestra.
8:15 p. m.—"How News and Photos are
Transmitted to Newspapers," H. Winfield Secor.
8:30 p. m.—New York Edison hour.
9:30 p. m.—Michel Barroy, Gypsy songs-

1,100k—WEBJ—NEW YORK—278m
p. m.—Raymond Orchestra.
(30 p. m.—Luna's Knickerbocker Orchestra.

chestra.
p. m.—Railroad talk, Garrow T. Geer.
10 p. m.—Sal Angarola, songs.
20 p. m.—Henryetta Turner, Ukulel

830k—WHN.—NEW YORK.—361m
12:30 p. m.—Loew's Theater Organ Recital.
2 p. m.—Overture and Vaudeville.
3:10 p. m.—News, racing, baseball.
3:20 p. m.—Loew's Theater Orchestra.
4 p. m.—News, racing, baseball.
5:10 p. m.—Melvin Chapman, barytone.

5:10 p. m.—Meivin Chapman, parytone. 5:25 p. m.—News, racing, baseball. 6:30 p. m.—Everglades Orchestra. 7 p. m.—Isabelle Henderson, soprano. 7:45 p. m.—Farone and Varicke, according duets. 7:30 p. m.—Will Oakland's Chatheau. 8 p. m.—Treasureland Home Owners' En-

semble. 8:30 p. m.—"A Few Moments With the Poets."

3:45 p. m.—Prince Plotti, entertainer, p. m.—O'Brien Brothers, mandolin

9 p. m.—O'Brien Brothers, mandolin and guitar. 9:15 p. m.—Frank Mansfield, tenor. 9:30 p. m.—Loew's Theater Orchestra. 10 p. m.—Universal Trio. 10:20 p. m.—Perry Bradford's Enter-tainers. 10:30 p. m.—Strand Roof Orchestra. 12 midnight—Charm Club Orchestra.

WEDNESDAY, JUNE 23

WEBJ WODA WGY WBNY WBAL WHN WFI WCAU WGBS WJZ WODA WIZ WODA WIP WPG 12 WEAF

WRST WEBJ

WCAU WOR WAAM WLIT WTIC WGBB WHN WAHG WMCA

8:30 p. m.—Luna's Marine Band.

4.130-7:30-10:45 p. m.—News service.
4 p. m.—"Your Daily Menu," Mrs. Julian
Heath.
4:15 p. m.—"A Beautiful Skin."
4:25 p. m.—Olive Hyde Foster.
5:32 p. m.—Financial summary.
5:40 p. m.—Financial summary.
5:40 p. m.—Cotton quotations.
5:50 p. m.—Frank Dole, of the New York
Herald Tribune, "Dogs."
7:15 p. m.—Harold Leonard's Orchestra.
8 p. m.—One-Up Cut-Ups.
8:30 p. m.—The Deltah Pearl hour, "Gems of Romance."
10:30 p. m.—William Ballyn, "Sea Songs."
10:45 p. m.—George Olsen's Orchestra.
950k—WGBS—NEW YORK—316m 10:45 p. m.—Alec Compinsky, cellist.

1100k—WFBH—NEW YORK—278m
3 p. m.—Studio program.

2 p. m.—Harry Kirsch, Joe Davis, songs
4:30 p. m.—Prince Piotti, Madelyn Hardy
5 p. m.—Sherman and Neill.
5:15 p. m.—Grace Smith, soprano.
5:30 p. m.—Edwin Danielson, barytone.
6:15 p. m.—Rādio talk, Bill Schudt Jr.
6:30 p. m.—Talk on Nervo-Rumat.
6:35 p. m.—Majestic String Ensemble.
9 p. m.—Majestic String Ensemble.
9 p. m.—Araateur night and public at dition.

1430k-WBNY-NEW YORK-210m 950k-WGBS-NEW YORK-316m

1430k—WBNY—NEW YORK—210m
7 p. m.—Trio.
8 p. mi.—Joseck "Himself."
8:15 p. m.—Ona Weish, songs.
8:30 p. m.—Tracey-Daugherty, songs.
8:45 p. m.—Tracey-Daugherty, songs.
8:45 p. m.—Rose Fisher, pianist.
9 p. m.—Ruth Jackson, soprano.
9:15 p. m.—Savoy Dance Orchestra.
9:45 p. m.—Ruth Jackson, soprano.
10:15 p. m.—Lauretta Reynolds, pianist.
10:30 p. m.—Savoy Dance Orchestra. 850k—WGBS—NEW TORK—10.

10:15 a. m.—Gym class; plano.

10:15 a. m.—Recipes; plano solos.

1:30 p. m.—Scripfure Reading.

1:35 p. m.—William Choseyk, violinist.

1:45 p. m.—Ray Lev, planist.

2:30 p. m.—"Art," Murdock Pemberton.

3 p. m.—Interview with Robert Aitken.

3:10 p. m.—Clara Edwards' compositions.

3:20 p. m.—Placement Talks for Wome! 950k-WAHG-RICH. HILL, N. Y.-316 1390k—WRST—BAY SHORE—216m 8-10 p. m.—Central Islip State Hospi p. m.—Lois Bennett.
m.—Untle Geebee.
p. m.—Scholastic sports, Ted Granik.
p. m.—Paul Eldridge, "The Week's

hestra. 740k—WOR—NEWARK—405m 11:45 p. m.—New York-New Jersey-Virginia reception to Lieutenant Commander Richard R. Byrd.

2:15 p. m.—Crystal Palace Orchestra.

6:15 p. m.—News bulletin.

6:25 p. m.—Bill Wathey, "Sporta."

6:40 p. m.—Bretton Hall String Quartet.

1140k—WAAM—NEWARK—263

11 a. m.—Public Service Cooking Scho 11:30 a. m.—Happy hour program. 8 p. m.—Frank Dalley's Orchestra. 7 p. m.—Sport talk, Major Tate. 7:15 p. m.—James Browning, tenor. 7:30 p. m.—The Mando Wops. 7:45 p. m.—Carl Bannwart, talk. 8 p. m.—Mando Wops. 8:15 p. m.—James Browning, tenor. 8:30 p. m.—Thelma Wilkes's String semble. semble.
9 p. m.—Y. M. C. A. hour of music.
Naught's Collegians.

n. m.—Red Naught's Collegians,
1190k—WGCP—NEWARK—252m
m.—Edwin Bent hour.
m.—Venetian Four.
p. m.—Edna Glass, pianist.
1340k—WODA—PATERSON—224m 100n) —Dance music; songs.

1. —Popuar songs.

1. —Popuar songs.

2. — News; sport talk.

2. — Jimmy Love's Orchestra.

2. — Safety League, talk.

2. — Marion Peruzi, soprano.

2. — Marion Peruzi, soprano.

3. — Marion Peruzi, soprano.

3. — Marion Peruzi, soprano.

4. — Schneider and Gordon, pi di violin.

p. m.—Richard Philippo, tenor m.—Mr. and Mrs. Leo Wood m.—Mr. and Mrs. 100 k Val at the plano.
p. m.—Magnos Merrymakers.
m.—Dance music.
p. m.—Clifford Lodge frolic. p. m.—Clifford Lodge frolic. —WLIT—PHILADELPHIA—395m 18 m.—Organ.
12:20 p. m.—Religious service.
12:35 p. m.—Arcada Concert Orches
2 p. m.—Arcada Concert Orches
4:35 p. m.—Republican Women

sylvania; artist/recital.
7:30 p. m.—El Patio Dance Orchestra.
590k—WIP—PHILADELPHIA—508m 7 a. m.—Setting-up exercises.
1 p. m.—Organ recital.
3 p. m.—Studio program.
6:05 p. m.—Monte Cross, "Ol -Department of

7 p. m.—Department of Agricultu 7 p. m.—Roll call; birthday list; song 8 p. m.—Studdo program. 8:30 p. m.—Murphy's Minstrels. 9 p. m.—Hall Dual, Trio. 10:30 p. m.—Emo's movie broadcast. 10:30 p. m.—Popular and classic precital. ing."

1:55 p. m.—Beulah La Verde Duffy.

2:05 p. m.—Jeanette Eberhard.

2:15 p. m.—Beulah La Verde Duffy.

3 p. m.—Interview with F. Luis Mora.

3:10 p. m.—Ruth Alvoy, singing.

3:20 p. m.—Visitors' Association progra

recital. 11 p. m.—Dance orchestra. 11:30 p. m.—Eddie McKnight's Dance Or chestra. 760k—WFI—PHILADELPHIA—395m 1 p. m.—Tearoom ensemble.
3 p. m.—Solos and readings.
6:45 p. m.—Dance orchestra.
7:15 p. m.—Sesquicentennial Exposition.
8 p. m.—Program from WEAF.
10 p. m.—Variety half hour.
10:30 p. m.—Jack Albin's Orchestra.
11 p. m.—The Buffalodians Dance Orchestra.

THURSDAY, JUNE 24

FRIDAY, JUNE 25

THURSDAY,
WEAF 492
WRNY 258
WJAR 306
WGCP 250
WBNY 210
WMCA 341
WTIC 476
WIP 508
WNAC 280
WGBB 316
WGBB 316
WGY 3861
WEAF 492
WMCA 341
WJZ 455
WPG 300
WHAR 275
WRC 468

WEAF WEBJ WGY WTIC

Dance music Vincent Lopez's Dance music Pelham Heath Connie's Silver Slipper

Meyer Davis's
Ben Bernie's
Hudson-Essex
Walt Riggins's
Dance music
Woodmansten
E. Heimberger's
Traymore Grill
Dance music
Wm: C. Pike's
WGY Orchestra
Dance music
Huffalodians
E. Golden's
Swanee

Swanee Silver Slipper Follies Bergere Meyer Davis's

Aristocrats Luna's Knicker, WGY Orchestra Colt's Park

1080k-WCAU-PHILADELPHIA-278m 7:30 p. m.—Snellenburg Instrumental Trio. 8 a.m.—The Theater Digest. 8:10 p. m.—The Three Brothers. 8:25 p. m.—Peter Ricci, barytone. 8:45 p. m.—Charles Higgins, Joe Burke, songs.

songs.

9 p. m.—Kuehnie's artists.

9:30 p. m.—Robert Fraser, singer.

10 p. m.—Giovanni Medori, pianist; Francisco Ponti, tenor.

10:15 p. m.—Bidle Malle's Entertainers.

10:30 p. m.—Billy Hays' Orchestra. 2 p. m.—Seaside Trio. 7:30 p. m.—"Glimpses Through the Stage!

Door."
p. m.—Seaside Trio. 1000k-WPG-ATLANTIC CITY-300m 30 p. m.—Ambassador luncheon music.

45 p. m.—Organ recital.

7 p. m.—Ambassador dinner music.

7 p. m.—Ethel Fowler's fashion flashes.

3:30 p. m.—Murphy's Minstrels.

9 p. m.—Chalfonte-Haddon Hall Dual 10 p. m.—Creatore's Band. 10:30 p. m.—Popula

Burpee. 12 non-Market and weather reports. 12:15-1:15 p. m.—Rolfe's Paleis D'Or cital:
11 p. m.—Dance orchestra.
11:30 p. m.—Silver Slipper

1 p. m.—Dance orchestra.

1:30 p. m.—Silver Slipper Dance Orchestra.

1:30 p. m.—Silver Slipper Dance Orchestra.

2:30 p. m.—Reports.

2:30 p. m.—Reports.

2:30 p. m.—Music; talk, "Daily Health Rules for Children."

2:30 p. m.—Stock reports; news.

6:30 p. m.—Dinner program.

7:30 p. m.—Stock reports; news.

6:30 p. m.—Dinner program.

7:30 p. m.—WGY Orchestra.

7:45 p. m.—WGY Orchestra.

7:45 p. m.—Briarcliff Dance Orchestra.

7:45 p. m.—Briarcliff Dance Orchestra.

7:46 p. m.—Briarcliff Dance Orchestra.

7:45 p. m.—Briarcliff Dance Orchestra.

7:46 p. m.—Briarcliff Dance Orchestra.

7:45 p. m.—Briarcliff Dance Orchestra.

7:46 p. m.—Briarcliff Dance Orchestra.

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7:45 p. m.—Briarcliff Dance Orchestra.

7:46 p. m.—Briarcliff Dance Orchestra.

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7:46 p. m.—Briarcliff Dance Orchestra.

7:45 p. m.—Briarcliff Dance Orchestra.

110:45 p. m.—Briarcliff Dance Orchestra.

11

1080k-WHAM-ROCHESTER-278m p. m.—Eastman Theater Orches m.—Eastman Theater organ, m.—Dinner concert n.—Dinner concert.

1460k—WIBX—UTICA—205m
p. m.—Harold Albert's Serenaders 6:30 p. m.—Harold Alberts. 7:30 p. m.—Talks. 7:35 p. m.—Soloists and entertainers. p. m.—Concert Ensemble.
p. m.—Musical program.
p. m.—Program from WEAF.

830k—WHN—NEW YORK—361m

1:30 p. m.—Loew's vaudeville.
3:10 p. m.—News, racing, basebail.
3:46 p. m.—"The Two Bills," songs.
4 p. m.—Wews, racing, basebail.
4:10 p. m.—Chas. Pollard, tenor.
4:15 p. m.—Edna Tholen' and compare.
4:30 p. m.—Uncle Robert's Pals.
5 p. m.—Edna Tholen' and compare.
4:30 p. m.—Uncle Robert's Pals.
5:10 p. m.—News, racing, basebail.
5:10 p. m.—News, racing, basebail.
6:45 p. m.—Frances Sper, contraito.
7 p. m.—Mark Daiton, planist.
7:15 p. m.—Arthur Calace, violinist.
7:30 p. m.—Loew's theater organ.
8 p. m.—Mr. and Mrs. Leo Woods, songs.
8:30 p. m.—Murray Spalter, violinist.
8:45 p. m.—Martin Walsh, singing.
9 p. m.—Loew's New York Theater Ochestra. 630k-WTIC-HARTFORD-476m m.—Baseball game, Harvard vs. Yale. 1070k—WNAC—BOSTON—280m a. m.—Women's Club talks; songs; news.

1 p. m.—Luncheon concert.
4 p. m.—Metropolitan Theater; musical.
6 p. m.—The Smilers.
6 p. m.—Jim Hardy's Collegians.
8 p. m.—Musical program.
8 p. m.—Musical program.
8 130 p. m.—The New Hotel Kenmon Ensemble.

Ensemble.
p. m.—Concert program.
30 p. m.—Musical program.
0:05 p. m.—Dance music. 860k—WEEL—BOSTON—349m 10:15 a. m.—Anne Bradford. 12 m.—Keith's Radio Review.

:45 p. m.—Gus Leonard's Orchestra :15 p. m.—Miss Mahoney, soprano. :16 p. m.—Eddie Diggs's Five I Aces.
6 p. m.—Keith's Radio Review.
6:10 p. m.—Events; scores.
6:20 p. m.—George Joy, Nell

6:20 p. m.—George Joy, Nell Cantor songs.
6:45 p. m.—Big Brother Club.
7:30 p. m.—Musicale.
8:11 p. m.—Program from WEAF.
900k—WBZ—SPRGFLD, MASS.—383m
7 p. m.—Bob Patterson's Kimball Trio.
7:33 p. m.—Copley Plaza Orchestra.
9 p. m.—WBZ Radio Movie Club.
10 p. m.—WBZ Radio Movie Club.
1120k—WTAG—WORCESTER—268m
12:05 1 m.—Musical selections: talk. 12:05 m.—Musical selections; talk.
1:30 p. m.—Chester Gaylord, pianist.
5:15 p. m.—Story teller.
5-8:30 p. m.—Grand Prize Eurekas.
9-11 p. m.—From WEAF,
640k—WRC—WASHINGTON—469m

8:10 p. m.—Baseball results. 8:15 p. m.—Jacques Franny, tenor. 8:40 p. m.—Salvatore Cusenza, mandol 9 p. m.—"The Steamboat." Dr. Frank p. m.—Radio School of Internations.

8 p. m.—Radio School of Internations.

8:30 p. m.—"Gems of Romance."

10 p. m.—The Grand Tour."

10:30 p. m.—To be announced.

11:30 p. m.—Meyer Davie's Band.

12:20k—WBAL—BALTIMORE—246m

7:20 p. m.—Dinner Orchestra.

6:30 p. m.—Dinner concert. 8-11 p. m.—Program from WEAF.

WEDNESDAY

950k-WGBS-NEW YORK-316m

n.—Ship Week program.
a. m.—Mabel Gray, soprano.
a. m.—Woman's Hour.

140 p. in.—2.
Pictures."
6 p. m.—Uncle Geebee
6:30 p. m.—Fess Williams's Orchestra.
7 p. m.—C. W. A. Cannon, "Child

SATURDAY, JUNE 26

La France
Menkin's
Arcadia Cafe
Dance music
Duke Donaldsor
Ed Andrews's
Jack Abbin's
Harold Stein's
Vincent Lopez's
Jack Demon's
Biltmore

O. Queensland Washington Max I. Krulee's

Monterey Society Dance music Vincent Lopez's Mayflower

9:00 WEAF 492
9:30 WEEI 349
9:30 WGBB 244
10:00 WLIT 395
10:11 WPG 300
10:20 WAHG 316
10:30 WEEI 349
10:30 WEAF 492
10:30 WJZ 455
11:1 WGR 310
11:00 WMCA 341
11:00 WMCA 341
11:100 WHO 361
11:12:30 WHN 361
11:30 WFBH 273

WOR WRC WBZ WOR WINAC WRNAC WROY WMCA WGY WOR WCA WGZ WIEX WIEX WGCP

10:30 a. m.-3:30 p. m. (hourly)—Market 10:30 a. m.-3:30 p. m. (hourly)—Marports.
11 a. m.—Bernard Cohen, planist.
12 noon—Olcott Vall's String Enseml
2 p. m.—Cecile Arnold, soprano;
Odierno, barytone.
3 p. m.—Joe Davis, songs.
3 p. m.—Joe Davis, songs.
4 p. m.—Book review.
4:30 p. m.—Bob Schafer, songs.
5:35 p. m.—Entertainers.
5:36 p. m.—Bob Schafer, songs.
5:45, 7 p. m.—Employment oppore 1220k—WBAD—BALTIMUND—246m
7:30 p. m.—Dinner Orchestra.
8:30 p. m.—WBAL Sandman Circle.
9 p. m.—Musical program by artists.
10 p. m.—City Park Orchestra.
970k—KDKA—PITTSBURGH—309m 970k—KDKA—FITISBURGER 8:30 p. m.—Dinner concert. 9:30 p. m.—Stockman-Farmer reports. 9:30 p. m.—Sacred song half hour. 10 p. m.—Concert by Mathilda Filmn. 11:35 p. m.—Concert from Grand Theater. 650k—WOAE—PITISBURGH—461m

5:36 p. m.—Bob Schafer, songs.
5:45, 7 p. m.—Employment opporeunities.
6 p. m.—Senator Love, "Prisons vs. Reformers."
6:30 p. m.—Ernie Golden's Orchestra.
7:10 p. m.—Ernie Golden's Orchestra.
7:30 p. m.—Tappen's Orchestra.
8:30 p. m.—Meister Homemakers.
9 p. m.—Mamaroneck Night.
9:30 p. m.—Woodmansten Orchestra.
10 p. m.—E. A. Ebel, barytone; Ethel Ebel,

10 p. m.—E. A. Ebel, barytons, — soprano. 10:30 p. m.—Stauch's Orchestra. 11 p. m.—Jack Denny's Orchestra. 11:30 p. m.—Ray Klages, Jesse Greer, har 1160k-WRNY-NEW YORK-258m 12 noon—Bob Schaeffer, songs. 12:15 p. m.—Clifford Odets, reade

3:10 p. m.—Ruth Alvoy, singing.
3:20 p. m.—Visitors' Association program;
3:00 p. m.—Wisitors' Association program;
3:00 p. m.—Hamilton String Quartet.
3:00 p. m.—Human Form Beautiful;" Dorothy Dilly.
4:00 p. m.—Uncle Geebee

8:15 p. m.—Charles D. Isaacson's free cono p. m.—Uncle Geebee
6:30 p. m.—Fess Williams's Orchestra.
7 p. m.—C. W. A. Cannon, "Child Welfare."
7:10 p. m.—Fess Williams's Orchestra.
7:10 p. m.—Samuel Polonsky, violinist.
10 p. m.—Ann Gold's Dancers.
10:15 p. m.—N. Y. Herald Tribune news
10:15 p. m.—18th Infantry Band.

1430k-WBNY-NEW YORK-210m 7 p. m.—Trio.
8 p. m.—Leroy Montesanto, tenor.
8 p. m.—Leroy Montesanto, tenor.
8:15 p. m.—Radio Bobs, entertainment,
8:30 p. m.—Rover Reciter.
8:45 p. m.—Issabel Henderson, songs.
9 p. m.—Andy Razof and Paul Dennik,
9:30 p. m.—Lillian Flosbach, soprano.
9:45 p. m.—Frank Gallasi, artist.
10 p. m.—Orchestra.
10:45 p. m.—Orchestra.

1250k—WHAP—NEW YORK—240m :30 p. m.—Holmes String Ensemble. :10 p. m.—Winifred Bauer, "Piano M

Bruga."

8:35 p. m.—Lillian Fuchs, violinist; Marion
Kerner, soprano; Steel Jamison, tenor.

9:10 p. m.—Hickman Price, speaker.

9:30 p. m.—Augusta E. Stetson, reading.

10:15 p. m.—Steel Jamison, tenor; Lillian

Fuchs, violinist; Marion Kener, soprano;

Darl Bethmann, barytone.

11:00:15

10:30 1100k-WFBH-NEW YORK-273m n...—Black Diamond Serenaders.
b. m...—Black Diamond Serenaders.
b. m...—The Hour of Meditation.
b. m...—Studio program.
b. m...—Evelyn Lewenthal, soprano.
b. m...—Tracy and Dougherty.
b. m...—Belle Osborne, songs.

m.—Big Brother Movement. —Local Merchants' Hour. p. m.—Orchestra.
p. m.—Beauty talk, Ervin Weiss.
m.—Majestic String Ensemble.
p. m.—Talk on Nervo-Rumat.
p. m.—Wm. Freeman's Orchestra
p. m.—Connie's Orchestra

660k-WJZ-NEW YORK-455m 1040k-WLWL-NEW YORK-288m p. m.—Madison Concert Orchestra.
p. m.—Wadher; news service.
4:35, 7:30 p. m.—Baseball reports.
4:35, 7:30, 10:30 p. m.—News service.
1:05 p. m.—"Your Dáily Menu;" M
Julian Heath.
4:25 p. m.—Butterick fashion talk.

610k-WEAF-NEW YORK-492r

145, 7, 7:20 a. m.—Health exercises.
145-8 a. m.—Morning prayer services.
1 a. m.—Raiph Rose, violinist.
1:15 a. m.—Health talk.
1:30 a. m.—Raiph Rose, violinist.
1:40 p. m.—"Vacation Games," Roy

chestra.

p. m.—Rulle's Palais D'C

p. m.—Marentze Nielsen, soprano.

15 p. m.—Willand Pohlano.

830k-WHN-NEW YORK-361m

chestra.

10 p. m.—Loew's Theater concert.

10 p. m.—Roseland Dance Orchestra.

10:30 p. m.—Palisades Orchestra.

11:30 p. m.—Silver Silpper Orchestra.

570k-WNYC-NEW YORK-526m 11:30 a. m.—Elizabeth Doherty, sopran 14:45 a. m.—"Home Economics," Mrs. I Weizmiller.

8:30 p. m.—Hearthside Harmonizers.
9:15 p. m.—Carl Schlegel Recital.
9:45 p. m.—Program.
10 p. m.—Talk.
10:10 p. m.—Aready Dubensky, violinist.
10:25 p. m.—Margaret Leary, soprano.
10:35 p. m.—Castleton Instrumental Trio. P50k—WAHG—RICH. HILL, N. Y.—316m

11:02 p. m.—Dance music.

1230k—WGBB—FREEPORT—244m

8 p. m.—Sarah Johnson, elbcutlonist.

8:15 p. m.—Barbara Neger, soprano.

8:30 p. m.—Barrett-Rauch, recital.

8:45 p. m.—Hazel Rogers, soprano.

9 p. m.—Brockett-Terrell, duo.

79:15 p. m.—Scandifio Brothers, ukulele.

9:30 p. m.—Faulhaber-McMahon, duet.

9:45 p. m.—Corpell Gilles recital.

1890k—WRST—BAY SHORE—216m 7 p. m.—Brewster Theater hour. 145 p. m.—Joe and Al Hardenburg. 5 p. m.—Briarcliff Dance Orchestra.

1100k—WEBJ—NEW YORK—278m
p. m.—Ed Berlin's Orchestra.
145 p. m.—Ben Ruty, Michael Savino, Hawaiian guitar duets.
p. m.—Maria Pasquale, pianist.
10 p. m.—Kathieen Martyn, old English ballads.
20 p. m.—Original Melville Five.
2890k—WHN NEW YORK 2818—1140k—WAAM—NEWARK—263m
11 a. m.—Happy hour program.

1140k—WAAM—NEWARK—263m
11 a.m.—Happy hour program.
6 p. m.—Montroyal Orchestra:
7 p. m.—Sport-talk.
7:15 p. m.—William McMurray, tenor.
7:30 p. m.—Henry Slevers, zither.
8 p. m.—Talk; zither solos.
8:30 p. m.—Jane Millward, soprano; Harrie Haellam, contralto.
9 p. m.—Wallie Osborne's Orchestra,
9:30 p. m.—Busy Beavers.
10 p. m.—Bill McWalters, songs.

1190k—WGCP—NEWARK—252m
7 p. m.—De Vita's Orchestra.
8 p. m.—H. C. Sievers, zither.
8:15 p. m.—Marie Ensenat, contraito. 1340k—WODA—PATERSON—224m
2 (noon)—Dance music.
2.180 p.m.—Operatic selections.
13.0 p.m.—News; sport talk.
13.0 p.m.—Dinner music.

6 p. m.—Dinner music.

760k—WLIT—PHILADELPHIA—395m
12 noon—Organ recital.
2 p. m.—Concert orchestra.
4:35 p. m.—Talk; artist recital.
7:30 p. m.—Dream Daddy.
18 p. m.—Advertising Convention.
8:30 p. m.—Progress Paint Company.
19 p. m.—Monttco artists.
10 p. m.—Accadia Dance Orchestra.
10 p. m.—Monttco artists. 590k-WIP-PHILADELPHIA-508m

Weizmiller.

12 noon—Reception to Meutenant Commander Richard E. Byrd.

Speakers, Mayor James J. Walker.

Richard E. Byrd, Grover A. Whalen.

"Star-Spängled Banner," Municipal Band.

6 p. m.—Merman Neuman, planist.

6:10 p. m.—Market high spots.

6:30 p. m.—Elementary Spanish leasons.

7 p. m.—Advanced Spanish lessons.

7 p. m.—Advanced Spanish lessons.

7 p. m.—Police alarms.

7:35 p. m.—Police alarms.

8:10 p. m.—Beachall results.

1.35 p. m.—Folice atarms.
1.35 p. m.—Trend of, the Times," by Dr.
S. N. Ussher.
1.55 p. m.—Rose Greenberg, pianist.
1.51 p. m.—Baseball results.
1.52 p. m.—Jacques Franny, tenor.
1.53 p. m.—Jacques Franny, tenor.
1.54 p. m.—Salvatore Cusenza, mandolinist.
1.55 p. m.—Miller piano period.
1.55 p. m.—Eddle White, Jack Mazer, songs.
1.55 p. m.—Senator Hassenpfeffer.
1.50 p. m.—Helen Hoel, soprano.
1.50 p. m.—Senator Hassenpfeffer.
1.50 p. m.—Senator Hassenpfeffer.
1.50 p. m.—Maurice Patton, tenor; Harry
1.55 p. m.—Frank Cook, songs.
1.50 p. m.—Frank Cook, songs.
1.50 p. m.—Artie Bitton's Cheer-ups.
1.50 p. m.—Artie Bitton's Cheer-ups.
1.50 p. m.—Artie Bitton's Cheer-ups.

760k—WFI—PHILADELPHIA—395m

le.
Raiph

16.
Raiph

17.
Raiph

18.
Raiph 6:30 p. m.—Dinner music. 7:30 p. m.—Eastman Theater program. 8:30 p. m.—WHAM studio program.

p. m.—Jointly with WEAF.

10 p. m.—Musical program.
11-12 midnight—Vincent Lopez's Orchestr
1080k—WHAM—ROCHESTER—278m
3:30 p. m.—Eastman Theater Orchestra.
7:30 p. m.—Eastman Theater Orchestra.
980k—WJAR—PROVIDENCE—306m 1:05 p. m.—Al Billincoft's Orcnestra.
7:30 p. m.—Chamber musicale.
8 p. m.—Two and One Man and the
Shinola Boys.
8:30 p. m.—Davis's Saxophone Octet.
9:05 p. m.—Musical program.
10 p. m.—Tabloid musicale.
630k—WTIC—HARTFORD—476m.
10:20 a m.—Yale commencement and

630k-WTIC-HARTFORD-476m
10:30 a. m.-Yale commencement a
alumni luncheon.
6:30 p. m.-Emil Helmberger's Trio.
8:30 p. m.-Capitol Theater Orchestra.
8:50 p. m.-Talk.
9 p. m.-Travelers' Jongleurs.
10 p. m.-Carroll's Dance Orchestra.
1070k-WNAC-BOSTON-280m
10:30 a. m.-Women's Club, talks access

0:30 a. m.—Women's Club; talks; songs news.
p. m.—Luncheon concert,
p. m.—Perley Stevens's Orchestra
p. m.—Kiddies' Klub.

:30 p. m.—Dinner dance.
:35 p. m.—Address by Samuel Lindsley of Brockline.
p. m.—The Hearthside Harmonizers.
:30 p. m.—Playlet, WNAC Players.
p. m.—Bill Dodge's Sailors.
0:05 p. m.—'Jimmie'' Gallagher's Orchestra.
:60k—WEEI—BOSTON—349m
0:15 a. m.—Anne Bradford.

10:15 a. m.—Anne Bradford.

12 m.—Keith's radio review.
2:45 p. m.—Mental hygiene talk.
3:15 p. m.—Musicale.
6 p. m.—Keith's radio review.
6:10 p. m.—Events of the day.
6:45 p. m.—Big Brother Club.
7:30 p. m.—Musicale.
7:45 p. m.—Misicale.
8-11 p. m.—Program from WEAF.
1900k—WBZ—SPRINGFIEID, MASS—3381
7 p. m.—Joly half hour, Musical Mirt.
Makers.
7:45 p. m.—M. A. C. radio forum.
8:30 p. m.—Radio Nature Beague.
9 p. m.—Max I. Krulee's Orchestra.
9:30 p. m.—Jimmie Buckner, comedian
Jock Carson, piper.

Jock Carson, piper.
p. m.—Almanzoe Gosselin, soprano.
15 p. m.—Joseph Clements, vocalist.
130 p. m.—Organ recital.
1120k—WYAG—WORCESTER—268m 1126k—WTAG—WORGESTER—268m:
:05 p. m.—Musical selections; talk.
45 p. m.—Interesting talk, Robert Shaw.
p. m.—Astronomy talk, Fred Aldrich.
15 p. m.—Story teller.
40 p. m.—To be announced.
p. m.—The Shinolas.
30 p. m.—Davis's Saxophone Octet.
p. m.—WEAF Light Opera Company.
640k—WRC—WASHINGTON—469m

p. m.—Organ recital.

p. m.—Irving Boernstein's Orchestra.

p. m.—Play-by-play account of the
Washington-Philadelphia baseball game.

7:30 p. m.—United States Marine Band.

640k—WCAP—WASHINGTON—469m
6:45-7;45 a. m.—Tower health exercises.
6:25-6:30 p. m.—Baseball news of the day.
6:30-7 p. m.—Matters before the House.
8 p. m.—The Shinola Merrymakers.
8 p. m.—United States Army Band.
9 p. m.—Lipana Troubadours.
10 p. m.—Light opera by the WEAP.
11 p. m.—1 a. m.—Dance music. 370k-KDKA-PITTSBURGH-309m

30 p. m.—Dinner concert.
p. m.—"Stockman-Farmer" news.
p. m.—Florence Schwartz, soprandl
Christine Adams, cellist; Robert Owrers
barytone. 650k-WCAE-PITTSBURGH-461n 6:30 p. m.—Dinner concert.

8 p. m.—Shinola Merrymakers.

8:30 p. m.—Davis's Saxophone Octet.

9 p. m.—Concert.

10 p. m.—Company opera from WEAF.

THURSDAY

610k-WEAF-NEW YORK 492m 6:45, 7, 7:20 a. m.—Health exercises.
7:45-8 a. m.—Morning prayer services.
11:10 a. m.—Talk on "Fish."
11:20 a. m.—Mayfair Extension talk.
11:30 a. m.—Norma MacCauley, soprand.
11:40 a. m.—Wayfair Extension talk.
11:30 a. m.—Wayfair Extension talk.
11:30 a. m.—Wayfair Extension talk.
11:40 a. m.—Wayfair Extension talk.
11:40 a. m.—Wayfair Extension talk.
12:45 a. m.—Pianist.
12:45-1:45 p. m.—Pianist.
12:45-1:45 p. m.—Waldorf-Astoria Compensation.

12:45-1:45 p. m.—Waldorf-Astoria Octobestra.

chestra.

p. m.—Bernard Ahrens, harytone,

4:15 p. m.—Pearl Beards, planist.

4:30 p. m.—Irena Schneiker, entertained,

4:45 p. m.—Estelle Patton, soprano.

p. m.—The New Yorkers Dance Octobestra.

6:55 p. m.—Baseball scores.

7. p. m.—Midweek Hymn Sing.

7:30 p. m.—Meyer Davis's Orchestra.

8 p. m.—James E. Phillips, basso.

8:15 p. m.—Hires Harvesters.

9 p. m.—Cilicquot Club Eskimos.

10 p. m.—Silvertown Cord Orchestra.

0 p. m.—Silvertown Cord Orchestra.
1 p. m.-12 midnight—The Buffalodians
Dance Orchestra. 660k-WIZ-NEW VORK-AKK p. m .- Pennsylvania Luncheon Orches

tra.

2 p. m.—News service and weather.

4, 4:35, 7:30 p. m.—Baseball reports.

4, 4:35, 7:30, 10:30 p. m.—News service.

4, p. m. "Your Dally Menu."

4:15 p. m.—"Wallpaper Room by Room. 4

4:25 p. m.—Stock market quotations.

5:35 p. m.—Stock market quotations.

5:35 p. m.—Financial summary.

5:40 p. m.—Cotton quotations.

5:50 p. m.—Farm market reports.

7:50 p. m.—"Sporting News." Paul White.

8 p. m.—"Vanderbilt Orchestra.

7:50 p. m.—"Sporting News." Paul White.

8 p. m.—"Voice of the Silent Drama."

8:30 p. m.—United States Marine Band.

9:30 p. m.—Royal Saion Orchestra.

11 p. m.—Swanee Dance Orchestra.

950k—WGBS—NEW YORK—316m

950k_WCRS_NEW VORK_316m 10 a. m.—Housekeeping on a big ship.
10:10 a. m.—Mary Bongert, soprano.
10:15 a. m.—Radio gym class; songs.
10:35 a. m.—Alice clark Barnhill, bets
ter homes and gardens.
1:30 p. m.—Scripture reading.
1:35 p. m.—Blanche Outwater, soprano.
1:45 p. m.—Interview with Gaetane

Cercero, 1:55 p. m.—William Pollard, tenor. 2:05 p. m.—Interview with C. D. Badge ley.
2:15 p. m.—Songs.
3 p. m.—H. Rittenberg, "Portrait Paints

ing."
3:10 p. m.—Eva Fields, planist.
3:20 p. m.—Women in the Home Hour.
6 p. m.—Uncle Geebee.
6:35 p. m.—'What the World is Doing. series.

6.45 p. m.—William C. Pike's Orchestra.

7.15 p. m.—New York Herald Tribune
news bulletins.

7.45 n. m.—Patricia Collinge, monologues.

logues.

p. m.—Mme. Julia Shustakewich.
Ukrainian songs.

8:15 p. m.—Puzant Gabriel, barytone.

8:30 p. m.—Footlight and Lamplight.

p. m.—Leon Lenzer, violin virtuosog.

Florence de Cromer, pianist.

9:30 p. m.—Chamberlain Women's Quarante tet.

10 p. m.—Martin Muller, zither.

10:15 p. m.—George Hall's Arcadiansi
William C. Pike's Orchestra.

830k-WHN-NEW YORK-361m 12:30-1 p. m.-Loew's Theater organ re-3:10 p. m.—News flashes, racing, bases ball,
4:10 p. m.—News liasnes, racing, baseball,
4:10 p. m.—Betty Morris, songs.
5:25 p. m.—News, racing baseball.
6:30 p. m.—Metropolitan Trfo.
7 p. m.—National Junior Order Night.
7:30 p. m.—Johanna Stern, contralto.
7:45 p. m.—Charles Tobias, tenor.
8 p. m.—Will Oakland's Chateau.
8:30 p. m.—Loew's overture and vauded
ville.
9 p. m.—Fitzpatrick Brothers old-time

9 p. m.—Fitzpatrick Brothers, old-time melodies. melodies.
9:15 p. m.—"Cookie" and Madelyn
Hardy, pianist.
9:30 p. m.—Loew's Theater Orchestra.
10 p. m.—Clarence Williams Radio Trie.
10:30 p. m.—Leroy Smith's Orchestra.
11 p. m.—Club Alabam Orchestra.
11:50 p. m.—Everglades Orchestra.

1160k—WRNY—NEW YORK—258n 1160k—WRNY—NEW YORK—258m

12 noon—Daisy Mebling, soprano.

12:15, p. m.—Bob Schafer, songs.

12:30 p. m.—Francis Peper, soprano.

12:45 p. m.—Harper's book review.

7 p. m.—Sports Rays.

7:15 p. m.—Commercial Digest.

7:15 p. m.—Gormercial Digest.

7:15 p. m.—Gormercial Digest.

7:15 p. m.—Gormercial Digest.

7:15 p. m.—Gormercial Digest.

7:15 p. m.—Anna Ruta, pianist.

7:45 p. m.—Ben Bernie's Orchestra.

8:15 p. m.—Radio Questions.

8:30 p. m.—Helena Rubinstein, "Your Face."

Face."
8:45 p. m.—Lorna Lea, love song girl.
9 p. m.—Volga Trio, Around the World 9 p. m.—Volga Trio, Around the World Music. 9:30 p. m.—Lancelotti song series. 10 p. m.—Corradetti's hour of music. 10:15 p. m.—Employment opportunities. 10:30 s. m.—Market reports, hourly

3:30 p. m.—Radio shopper.

11:10 a. m.—Radio shopper.

12 noon.—Olcott Vail's String Enseme ble.

1 p. m.—Radio Bobs.
3 p. m.—Le Roy Montesanto, tenor.
4 p. m.—Book review.
4:30 p. m.—Happy Girl.
5 p. m.—Entertainers.
5:45-6:30 p. m.—Employment opportus

5:45-6:30 p. m.—Employment oppolenites.
nities.
6:40 p. m.—Harvey Brown, pianist.
7 p. m.—Hofbrau Haus Entertainers.
7:30 p. m.—Helen Koster, contralto.
8 p. m.—Roemars Homers.
9 p. m.—Solow Soloists.
9:30 p. m.—Columbia Park Entertainers.
10 p. m.—Woodmansten Orchestra.
10:30 p. m.—Musical program.
11 p. m.—Ernie Golden's Orchestra.
12 midnight—Broadway Night.

1100k-WFBH-NEW YORK-273m

2 p. m.—Orchestra.
3 p. m.—Studio program.
4:30 p. m.—Murray Schwartz, plane,
5 p. m.—Eddie Gillis, barytone.
5:15 p. m.—William Hirschmann.
5:30 p. m.—Martin Wallach, plane.
6 p. m.—Dotty McLean and Lee Ford.
6:15 p. m.—Automobile route, H.
Maples. Maples. 6:30 p. m.—Majestic String Ensemble. 7 p. m.—Yorkville Radio Eentertainer 7 p. m.—Yorkville Radio Eentertainers.

1040k—WLWL—NEW YORK—288ms

8:30 p. m.—McEnery's Entertainers.

9 p. m.—Question box.

130 p. m.—William Lawlor, barytone.

140 p. m.—Harding String Ensemble.

10 p. m.—"Books," by Walter Cavigan.

10.15 p. m.—Grace Stevenson, harpist.

Charles Schuyler, tenor.

Continued on next page

World Radio History

Dance Orchestras for This Week

Luna's Knicker Jerry La Salle's WGY Orchestra

WGY Orchestra Savoy City Park Dance music Strand.Roof Dance music Billy Hays's Arrowhead Inn George Olsen's Dance music E. Golden's Dance music

Briarcliff
Ed Berlin's
Clar. Seaman's
Dance music
Wallie Osborne'
Arcadia
Carroll's
Dance music
Roseland
Dance music

Elementary Information For the Radio Novice Broadcast Program

Interference in Radio Receivers Is Very Often Caused by Some Household Appliance; Static Is Not as Bad as It Has Been Painted

This is the twenty-second of a series of twenty-four lectures for the radio layman, which are being broadcast through KDKA, the Westinghouse Electric and Manufacturing Company's station at East Pittsburgh, Pa.

By James W. H. Weir

Technical Editor, "The National Stockman and Farmer"

HERE it is again, that scratching, frying, clicking, grinding noise ada was more or less of an experithat is forever marring radio reception. Interference it surely is ment. The artists were not at all of some type or another and the average radio user classifies sure how they would like it, or how this particular difficulty as "static." By the way, how many of you it would affect their other plans, but are familiar with what the word "static" really stands for? The word they were eager to have a part in self is a short term used to express "static electricity." In truth the making the best music available to static electricity or the small deposits of static electrical charges on the antenna causes but a very small portion of the interference we are forever complaining about.

Perhaps it has already occurred to elimination of this interference becisely the truth.

Man-made Interference

dustrial and domestic use to-day trans- direct current machinery these interinated, while that produced by the machine terminals. In some other Canada not reached by the network. scatic charges of nature, as far as is cases the connecting of large controuble in your neighborhoods. First insulators, lightning arrestors, transformers, generators and motors. Sec- when they become hot and thus proondly the industrial appliances, in- duce radio interference. Domestic cluding arc lights, telephone and tele- and industrial appliances as mengraph lines, telephone ringers, street tioned earlier in this text all are apt cars and electric railroads, factory to cause the greater or lesser amount motors, store motors and barber shop of interference noises and mar radio appliances, smoke and dust precipitators and electric sign flashers. Third, domestic appliances including door rectly in the receiving set itself. This electric refrigerators, dish washing machines, kitchen mixers, violet ray teries and a sulphated A battery are outfits and heater pads, and lastly, a to be found. miscellaneous group including X-ray machines, storage battery chargers, electric elevators, annunciator systems, automobiles, stationary gas engines, tickers and dentists' motors thing you should do is to discover These are but a few of the direct causes of interference, and doubtless there are many others of similar nature that are equally as bad. There is not the slightest doubt but that terference from such sources.

Naturally there are exceptions to ence you are getting originates within Sunday, April 18, through WEAF and every rule and there are some causes the set. If, on the other hand, the fourteen other stations. of interference that may not be elimreceiver is in good condition, perfect
For the season of 1926-1927, beand dust precipitators, door bells, your neighborhood, especially those ists from the Metropolitan. light switches, a variety of motordriven devices, violet ray outfits.

from the power line in the vicinity.

Sparks Cause Trouble

interference with radio, but fre- set sparks may be very minute, but parts of the community and at speci- Detroit.

companies are anxious to aid in the their own lighting plants.

A. Atwater Kent to

The broadcasting of noted singers and instrumtalists has proved so popular with the public and so successful from the standpoint of the artists themselves that A. Atwater Kent, the radio manufacturer, has decided to continue his broadcasting plans on an even greater scale in the future.

Last fall, when the present series of concerts known as the Atwater Kent Radio Hour was started, the idea of broadcasting famous artists over an area comprising the greater part of the United States and Can-

Mr. Kent was convinced that the public wanted music of this type when he scheduled thirty consecutive Sunday evening concerts, beginning some of you that this so-called cause it is nothing more or less than October 4 and ending April 25. These "static" may be the product of man's a waste of their power. Generators concerts have been heard through fifown creation and that many devices and motors also may cause interfer- teen broadcasting stations as far of electrical nature are responsible ence even though in perfect operat- West as Minneapolis, Davenport and in whole or in part for that great ing condition. This is due to the St. Louis, and as far East as Washbugbear "interference." This is pre- sparking in the commutator or slip- ington, New York and Boston. It is rings. In fact, any spark of this na- impossible to say how many people ture produces a high frequency cur- have listened to them, but judging rent, while the wire in the circuit from the number of letters received It is an absolute fact that many acts as an antenna and radiates the and other signs of interest the total pieces of electrical equipment in in- electrical energy. In some cases with undoubtedly runs into the millions. mitters of electrical waves, and these ferences can be stopped by putting a have gone over the network of fifteen waves are the very things that are large choke coil in the wires con- stations, several concerts have been causing the trouble. Such interfer- necting the machine to the power given through broadcasting stations ence, if located, can often be elim- circuit. These must be put in at the in parts of the United States and

A few weeks ago, several of the known at present, cannot be cured densers directly across the terminals artists who have been particularly Let me give you a list of the things of the machine will eliminate to some enthusiastic about the results of here that may be causing you extent the interference produced. their broadcasting in the Atwater Other instances are the variable take power circuits, including lines, contacts in the heating elements of a heating pad. These may spark would be in the nature of a gala evening. This concert will be heard over the network of fifteen stations on Sunday evening, May 2. It will begin at the usual time, 9:15 Eastern time, 8:15 Central time, but will last an hour and a half instead of an reception. Again, sometimes the hour. Those who will participate are source of interference originates di-Frances Alda, soprano; Josef Hofbells, light switches, sewing mais especially true in home-made sets tralto; Kathayn Meisle, contralto; mann, pianist; Louise Homer, conchines, vacuum cleaners, flat irons, where bad contacts, poor or no solder-Allen McQuhae, tenor; John Powell, ing, broken down wires, weak B batpianist, and Albert Spalding, violinist This will perhaps be the most distinguished group of artists ever assembled in a broadcasting studio. The concert will be specially ap-When you begin to be troubled propriate at this time, for May 2 with interference, about the first

marks the beginning of Music Week. The public having signified its apwhether or not the interference origpreciation of the appearance of the inates in the set itself. To test for finest artists in radio concerts, Mr. this connect the antenna and ground Kent has made arrangements with terminals of the receiver together the Metropolitan Opera Company is not the slightest doubt but that if all the electric circuits and installations were kept in perfect order trick prevents any voltages in the another which will make available many of the singers of this great organization. stallations were kept in perfect order trick prevents any voltages in the air the singers of this great organization. there would be very little radio inset. If your noises still continue it under this arrangement is Mme. is safe to assume that the interfer- Frances Alda, who sang the night of

inated even though the installation silence in the head set or loud ginning in October, Mr. Kent is planand the apparatus are perfect. Among speaker will be had. If the noise ning a series of Sunday evening conthese may be included lightning ar- ceases with this test the next thing certs to include not only most of the restors on power lines, telephone to do is to make an observation of artists who have appeared this searingers, some types of motors, smoke the electric power devices used in son, but additional distinguished art-

X-ray machines, storage battery Such devices as violet ray machines, somewhat lighter type through the chargers, annunciator systems and coffee and tea percolators, electric summer. So, with the closing of the gas engines with electric ignition.
All such devices mentioned in the above may be said to cause inter
such devices over which the power such devices over the power ference even when in perfect oper-company has no control cause much ating condition.

| Such devices of the direction of the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the summer with a series of the company has no control cause much through the company has no control cause source and interference will be found tion of the Irish-American tenor, The electric power line for in- to originate from a device such as Allen McQuhae. These will be broad-The electric power line for in-stance, in itself is not the cause of just named in close proximity to your cast through the following eight stations: WEAF, New York; WEEI, Bosquently in some parts of the power Probably the best way to find this ton; WSAI, Cincinnati; WCAP, Washsystem there develops a poor contact out is to engage the service of a ington; WCCO, Minneapolis-St. Paul; which produces a spark. These number of your friends in different WGN, Chicago; WGR, Buffalo; WWJ,

nevertheless create considerable dis- fied times make tests to find out Allen McQuhae, well known as an turbance. The remedy of course, is whether they get the same type of oratorio singer and also for his rento locate the spark and repair the interference at the same time. By dition of Irish ballads and other folk condition which causes its product the proces of elimination you may songs, has had an extraordinary tion. This source of disturbance de- gradually find out the location or career. He was a ranchman, a Klonvelops in the power line through source of trouble and from this point dike miner, an engine wiper and a "leaky" insulators, or in other words, on it may be run down by means vaudeville and cabaret singer before insulators that do not permit a per- of a small loop receiver and head undertaking a musical career. He fect insulation, but allow the power set. From letters received regarding was singing in a cabaret in Cleveland to creep off in small jumps. Some- interference troubles it has been when Felix Hughes, the barytone and times when the power line touches found that based on 100 reports about teacher, heard him and persuaded tree branches, interference is also 25 per cent of the interference comes him to study. Within two years he noted. Other sources of trouble may from telephone bell ringers. Gas was appearing as soloist with leading be found in the transformer in the engine plants run a close second with orchestras and had more oratorio enrecinity of your home, these often 21 per cent. In the country these gagements than he could fill. Then being located on poles near your resitive features are most troublesome, he went to war as a private, wen a as the bell ringer telephone is still commission and two citations and re-It is only natural that the power in use and many of the farmers have turned to the United States to re







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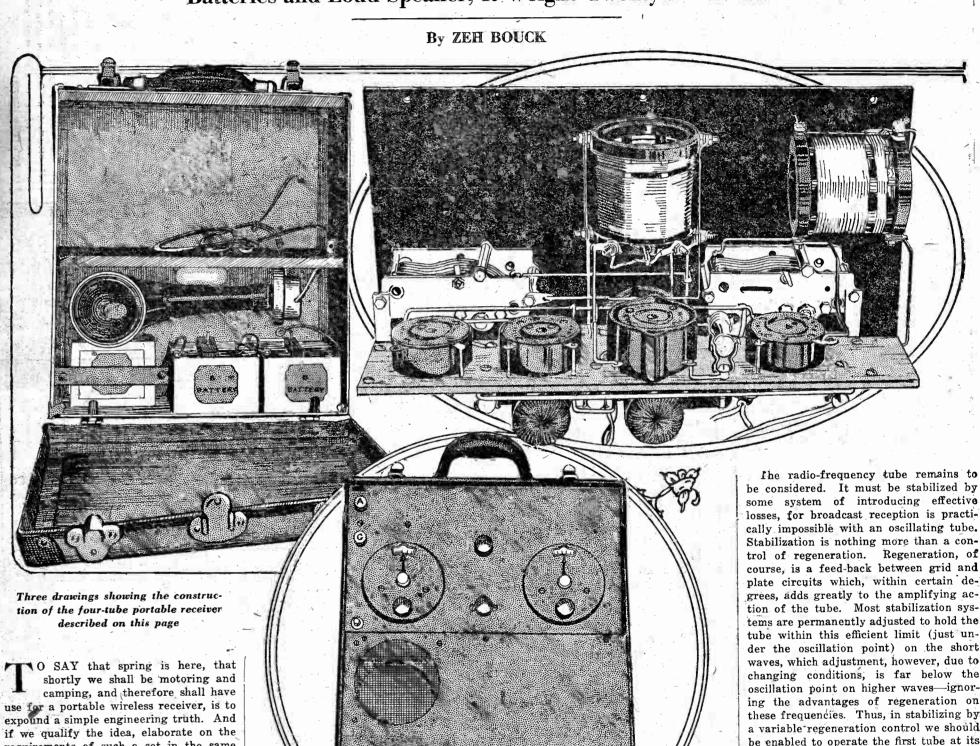
THE NEW YORK HERALD NewVorkssärähme

SECTION TEN

SUNDAY, APRIL 25, 1926

This Season's First Portable Set

The Four-Tube Receiver Discussed Is Housed in a Small Carrying Case, Which Also Holds the Batteries and Loud Speaker; It Weighs Twenty-two Pounds



requirements of such a set in the same simple logic, we shall have achieved an end and a moral recommended to the attention of many "designing engineers." There are two systems-two ways of making portable receivers. One is to mount a handle, wheels or skis-depend-

ing more or less on geographical conveniences-on your present receiver, and the other is deliberately to design a set with the exigencies of portability in mind. I, personally, recommend the latter system, and should go about it somewhat as follows: To be portable within the most convenient possibilities of the word, every-

thing essential to operation-batteries, loud speaker, antenna wire and the receiver proper-must be carried within a single case or container, and this last must not exceed reasonable dimensions or weight. Considering the accessories, certainly not more than half of the available space can be devoted to the receiver proper-the coils, tube sockets, transformers,

Four-Tube Set Best

These considerations will generally cation. eliminate the five-tube two-stage tuned r. f. arrangements. For passable efficiency such systems must as a rule be trical efficiency in the audio-frequency of several efficient ready-made units.

spread out with comparatively large | amplifier. In passing we note mentally spaces between components. Four tubes, therefore, are as high as we can efficiently go in the average portable equipment, and it remains to make the most of the four tubes to which we are limited. These are one radio-frequency tube, the detector and two stages of audio amplifi-

Two transformer coupled stages immediately satisfy the conditions of high elec- | lem resolves itself into the buying of one

grees, adds greatly to the amplifying action of the tube. Most stabilization systems are permanently adjusted to hold the tube within this efficient limit (just under the oscillation point) on the short waves, which adjustment, however, due to changing conditions, is far below the oscillation point on higher waves-ignoring the advantages of regeneration on these frequencies. Thus, in stabilizing by be enabled to operate the first tube at its highest efficiency over the entire tuning range. A variable by-passed resistance, such as the Electrad Royalty Type C or the Centralab, in the plate circuit of the r. f. tube will effect this desirable condition. The choice of this system of stabilization again simplifies matters by making possible the use of any standard r. f. primary and secondary coils. And so, quite logically, we arrive at the electrical system diagramed in Figure 1.

Running from right to left, T1 is a standard antenna coupler, T2 a three-circuit tuner, T3 and T4 audio-frequency amplifving transformers. R1 is the regeneration control resistance in the plate circuit of the r. f. tube. The remaining parts are self explanatory or labeled.

Throughout the design and construction of the receiver compactness and the concomitant necessity for small parts should be kept in mind. This consideration leads the writer to recommend such parts as Amsco sockets and S. L. F. condensers, Amperites at R2, R3, R4 and R5 n place of rheostats, Hedgehog audiofrequency transformers and Bruno coils.

This circuit is the starting point of an efficient portable receiver. Though the

(Continued on page four)

Additional Radio News Will Be Found in Another Section of To-day's Herald Tribune

These drawings were made from photographs of the receiver described

the desirability of small transformers.

Continuing our inverse order, but pro-

gressing from the obvious to the more

abstruse, we come to the detector circuit.

By employing regeneration we shall make

the most of our possible detecting effi-

ciency, and by achieving this desirable

feed-back by means of the conventional

rotating tickler coil the mechanical prob-

A Four-Tube, Single-Control Set Using Two Stages of Tuned Radio Frequency

The Compensated Triple Condenser Employed Tunes Three Circuits Simultaneously

By JAMES E. CARTIER

panel. That is to say, the larger the panel and the more knobs and dials the better the set. Nowadays things are The resistance coupling units are small different and the real fan is more likely to and compact to fit in on the lay-out with boast of his set because of its compactness and efficiency than ever before. Super-heterodyne sets were formerly measured off by the yard, now a two-foot panel is plenty.

Of course, the panel manufacturers aren't making as much money, but look at what the relief amounts to on the fan's pocketbook. Right at the start, then, this set was laid out to use the smallest convenient panel possible without stretching the lay-out too much toward the rear. The result was a seven by fifteen inch panel, without the slightest crowding of the con-

Wave Length Range

The next question that came up in the design and lay-out was the problem of wave length range. So far the tuning range of a coil and a variable condenser has been sufficient to cover the ordinary broadcasting band. There is this difficulty, however, that the same efficiency and selectivity are not obtained over the lower wave length range. In addition, there is a decided trend for lower wave lengths which are beyond the range of the ordinary set. A number of fans would like to listen in to the low wave experimental

To take care of these conditions, interchangeable coils are used. This means that for the regular wave length band one set of coils is sufficient, but if lower wave lengths are to be received, different coils are simply plugged in on the coil mounts without any rewiring or changing of the circuit. This has been done without any sacrifice of any sort, but, on the contrary, adds considerably to the advantages of the

The Circuit

The circuit is standard and simple. Two stages of tuned radio frequency, detector and three stages of resistance coupling combine to guarantee selectivity; volume and quality. The three secondary circuits are tuned with a single rotor triple condenser that has two small side knobs for compensation adjustments. This condenser has the standard semi-circular plates, but the use of a straight line frequency dial separates the lower wave lengths for the dial settings and simplifies the tuning and logging problem. The two radio frequency tubes are controlled with one ten ohm rheostat, the detector with a twenty ohm rheostat and the three resistance coupled stages have the filaments controlled with another ten ohm rheostat. A variable grid leak is used to control

HERE was a time when radio sets | selected for efficiency and compactness in | tuning and the separation of the stations | sibility for using the soldering iron. No usually firm contact with the tube prongs. the minimum possible space requirements.

List of Parts Required

One front panel 3-16x7x15 inches. One subpanel or baseboard %x10%x14

One binding post strip 3-16x1x14 inches. Three general radio coils, Type 277-D. Three general radio bases with jacks, Type 274-B.

Twelve general radio contact plugs, Type 274-P. One U. S. L. compensated multiple con-

denser.00035 mfd.

One Radiall Tune-Rite dial. Six C. R. C. four-twin sockets No. 310. Three U. S. L. rheostadts, two 10 ohms

and one 20 ohms. One electrad resistance coupled kit No.

One electrad variohm-base mount. One electrad grid condenser, Type VS .00025 mfd.

One electrad fixed condenser 10005 mfd. Seven binding posts, Eby. Fifty feet black flexible celetsite wire. One Carter battery switch. One Carter open circuit jack, One cabinet to suit.

The question of the selection of apparatus to be used is one that should not be neglected. The performance of any cir-

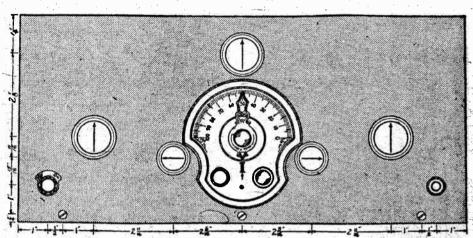
Miscellaneous nuts, lugs, screws, etc.

were judged by the size of the assembly. Even the tube sockets have the on the dial, a straight line frequency condouble feature of spring mounting and un- verter dial is necessary. The dial named only make a confused picture. With the above just fits in and allows room for the compensator knob on each side.

The resistance coupled amplifier consists of three units, each with its condenser, two resistances and mounting, and

units all in the proper place, take a sharp, long pointed pencil and mark all the mounting holes on the baseboard.

A mahogany baseboard was used in the original set and with a hard wood of this



A suggested panel layout for the receiver herein described

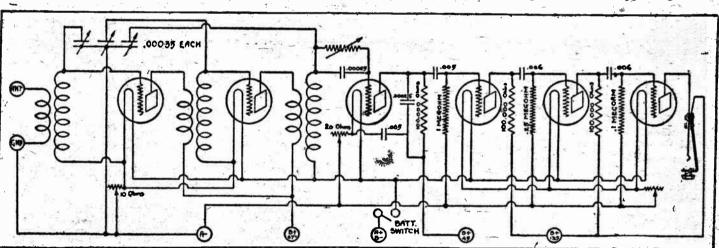
efficient and make the wiring a simple mat- started and to avoid splitting the board.

The Panel Layout

The layout of the front panel is shown in Figure 2. This shows the simplicity of arrangement and emphasizes the ease of tuning. The battery switch and the plug-in jack are in the two lower cor- connect the lugs to the terminals as shown ners, where they are out of the way in the picture in the upper right hand

also the extra .00025 mfd. condenser and | sort, it was necessary to drill small holes mounting clip. These units are compact, for the wood screws in order to get them Don't put the coils into the mounts, as they are only in the way.

The four contact plugs have to be mounted in the four holes in the base of each of the coupling coils. The terminal lugs that are furnished with the plugs should be on the inside of the coils. Then



The wiring diagram of the six-tube tuned radio-frequency receiver constructed by the author

cuit is dependent on the quality of the | of the hands when turning the receiver. | corner of the baseboard, Figure 3. The apparatus that is used in the set. Theresure to select equally efficient substitutes.

units that are mounted on the front panel | can be used. Plug jacks will be required | the right hand one takes care of the three for these extra coils. They will fit into proper potential on the grid of the de- the base mounts as used in the set. The tector. The resistance coupling furnishes | compensated multiple condenser should maximum volume with the best tone have a capacity of .00035 microfarad in quality possible. All the parts have been each section. In order to get the vernier

00

ANT.

GND.

B+45 B+67-

The above diagram shows how the parts should be arranged on the baseboard

A+B-

A-

fore, if the parts named are not used be do not interfere with the tuning, still are convenient for adjustment when it is de-For wave lengths from 100 to 300 sired to cut down the volume or clear up In order to avoid putting in the coils. meters the coupling coils type 277-D1/2 reception. The one on the left controls facing the wrong way (no harm would be should be used, and if a range from 50 to the radio-frequency tubes, the one in the done), it would be advisable to pur some A jack and a battery switch complete the | 150 meters is desired the type 277-D 1/4 center on top is the detector rheostat, and mark on the baseboard or the mounting audio tubes.

> The knob on the right of the dial/controls the compensating adjustment of the first tuning stage of the condenser. The left one takes care of the adjustment on the tuning of the second stage. The dial has a small knob on the right side that controls the rotation of the condenser shaft and the movement of the pointer in

The dimensions of the centerlines for the shafts of units are given along the left and lower edges of the panel. The three rheostats are of the single mounting hole type. With each of the multiple condensers there is furnished a drilling template which can be used for locating the three extra holes for mounting the condenser, as well as the main shaft and the two compensator shafts holes. Two sevensixteenths holes are drilled for the jack and switch. Three countersunk holes sholud be drilled, as indicated, for fastening the baseboard to the panel.

Baseboard Assembly

Before starting on the baseboard assembly, as pictured in Figure 3, it would be advisable to lay the units on the baseboard in the positions shown. This should be done with the front panel in place and the apparatus mounted on the panel. Keep all the terminals in the position indicated. but see that there is ample room for running the wiring and sufficient acces-

MARK I DOMESTIC DECEMBER OF THE FOR THE STATE OF THE STATE OF

The rheostats are placed so that they | tap at the center of the secondary winding is not used, so just disregard it. All three coils are connected the same way. to indicate which way the coils should face. If they are put in wrong it would simply mean the primary and secondary are interchanged and reception would be weak and limited to very low wave lengths. The two terminals on the coil in a straight vertical line, or above one another, should always face toward the variable condenser.

Wiring Instructions

After the apparatus on the baseboard has been screwed down and the panel mounted, the wiring of the set is to be considered. Study the hook-up, Figure 1.

First put in all the negative "A" leads, as these branch out to more terminals than any of the others. Note that the rotor terminal of the condenser is connected to this. The ground post is also connected to the negative "A." The next step is to make the connections from the three rheostats to the respective tubes. Note that the grid returns of the secondary of each of the first two coupling coils is connected inside the rheostat (tube side) of the negative filament.

Now connect the A plus and B minus binding post to the battery switch, then make all the A plus connections from the other side of the battery switch. The grid return of the secondary of the third coupling coil is made to this A plus lead. The connections from the antenna and

(Continued on page eleven)

News and Notes of the Radio Trade

By-pass Condenser

The Polymet Manufacturing Cor- cal and electrical contact. poration, 599 Broadway, New York City, has recently announced their new line of by-pass condensers, which are now in production on a latest, most improved apparatus, in capacities from 1 to 4 microfarads. A



maximum durability and long life and absolutely prevents leakage. These condensers are made in spe cial sizes for manufacturers according to specifications submitted. They are put up in standard cans, for distributors and dealers.

Loop and Battery Cable

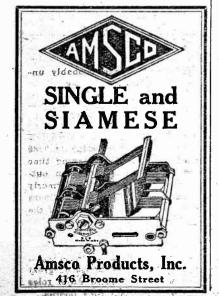
The Becker Loop Lead is a new radio product designed to obviate the loss of efficiency to loop sets direction without affecting the spac- of the detector rheostat. ing of the wires. The cables are of copper and the rubber casing makes the lead acid proof, which is an ad be kept short as possible. Make sure vantage when the lead is likely to that each terminal is well tightened come in contact with the storage bat- down and that every joint is firmly tery. There is also a five conductor soldered with a good electrical concord to be used as a battery cable. These leads are very compact, the sistance into the circuit, which means loop lead being only three-sixteenth of that tuning will be broad and selecan inch thick, permitting it to be tivity poor. Check up the conneceasily slipped into the cabinet under tions to the fixed plates of each of the cover or through a hole smaller the sections of the multiple con-

the market.

Re-enters Radio Field

radio shop in New York City two nal on the detector tube. years ago, are again active in the radio field. They now have a large plant at Ely and Payntar Avenues,

Resistance Coupling Unit



ufacture, into a permanent mechani- from the A plus 45 and try the same Service Organization

large scale. Polymet by-pass con-densers are manufactured with the sixteen months, is at present plansupply sales people with a service and ground connections, plug in the including installations and main- loud speaker on the jack and have Distortion Approximately one hundred men, customed to the set and give it a fully conversant with actual service chance. work, have been enrolled for this Tune in a local station first. Keep organization already, and in addition the little compensator knobs turned proper use of the amplifier. If it is obtain satisfactory results.

A Four-Tube Single Control Set

Continued from page two ground binding posts to the first coil

mount can now be made. There are three B plus binding quarter of an inch apart. It can, therefore, be moved in any possible by plus 45 lead to the A minus inside A Holf House & Management

The next step is to put in all of the grid and plate leads. These must nection. A poor joint introduces regram, so as to get the proper arconnect to the grid circuit of the first tube. The last section, farthest away circuit. The lower terminal on the

Checking Up After the wiring has been complet-Long Island City, for the manufac- ed it is best to check over to see that

and the positive side to the B plus How to Eliminate light. If so, there is a wrong connection and wiring should be checked up. Remove the positive battery lead thing when connected to the B plus 671/2 and also the 135 binding posts. charge of all factory activities of the might be the case if the B battery

Tuning In

them, there will also be inside as shown in the panel view. The distorted music, the owner should repair men and two laboratory tech- radio-frequency rheostat should be not attempt to correct the design of nicians. The location of the new turned about three-quarters on, the the amplifier, as in most cases this detector half way and the audio three-quarters way. Now turn the knob on the dial slowly until reception is heard. Rotate back and forth until maximum volume is reached. Now try turning the left compensator knob until a new maximum point of volume is reached. If the volume is too great, just turn down the left rheostat knob. Do the same thing with the right compensator. posts, one for 45 volts for the de tector plate circuit, another of 671/2 compensators in mind, as they will volts for the radio-frequency plate not alter much for the various wave circuit, and a third, 135 volts, for the lengths. These having been adjusted, connecting the loop with the set. It resistance coupled audio amplifier then the main dial knob can be stages. These connections should all turned for farther reception, making bedded in rubber and spaced one- be added in now. Then wire in the any little adjustments of the com-

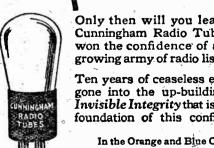
A Half Hour of Music of

The Far East on Friday On Friday evening the radio audience of WEAF's chain will again be wafted upon the magic rug to the not be determined accurately in adwill be "A Review of the Radio Search for at the hour of 10 o'clock, Eastern Daylight Saving Time, the Whittall Anglo-Persians will be heard in their WCAP, WJAR, WOO, WGR, WEEI, change the voltage required by the WTAG, WCAE, WOC, WDAF, WCCO. tubes. WWJ, KSD, WEAR and WGN. This than would be necessary for a round denser with the picture wiring dia-Whittall Anglo-Persians, is under the more of B battery is used on the The Ralph Becker Company, of rangement. The first section of direction of Louis Katzman, an ex-Cleveland, has placed these leads on fixed plates, nearest the front panel, pert in the rendition of music of the Far East. The program will include the selections "In the Sudan" by Sefrom the panel, is the detector grid bek, "Loves Dream After the Ball" by Czibulka, "My Little Persian Rose" Harold Herbert, Inc., owners of a Variohm connects to the grid termi- by Friendland and "Under the Leaves" by Thomas.

'Macbeth' Last Shakespeare

Play Presented by WEAF Murder, intrigue and the ultimate ture of radio receivers. Mr. Herbert all connections have been correctly triumph of right over wrong are all is the designer of the Whitestone and made. A simple way of doing this is woven into Shakespeare's immortal Kismet sets and was also production to put six tubes in the sockets and play, "Macbeth," which will be premanager for G. Boissonault Company. then connect the A battery to the sented in tabloid form under the di-The officers of the company are Har- proper binding posts. Now, without rection of Katherine Emmet this old Herbert, president; William adding any B battery, turn the bat- evening, as the farewell performance Schatzkin, treasurer and vice-presi- tery switch on. Turn on the left of the WEAF Shakespearean Players, dent and N. H. Herbert, secretary, rheostat knob and see if the two beginning at 6 o'clock, Eastern Day-Mr. Herbert states that plans are radio-frequency tubes light up. If light Saving Time, and to be heard under way for the production of 20, the other knobs are turned off no from WEAF, WGR, WFI and WSAI. 000 five-tube receivers for the new other tubes should light. Then turn These weekly tabloid productions. the knob of the center rheostat and formerly a Saturday evening feature see that the detector lights up. Last at WEAF, have met with great favor turn the right or audio rheostat from radio listeners. Outstanding

Resistance Coupling Unit Amseo Products, Inc. are the manufacturers of a new coupling unit, for use in resistive coupled audio frequency amplifiers. It departs from the conventional design in the arrangement of the binding posts which are so placed that the "couplers' are lined up before the sockets, rather than between them. Connections are lined up before the sockets by soldering directly log to the sockets by soldering connections are made to the grid and plate post of the sockets by soldering directly log to the sockets by soldering directly log to the sockets by soldering condenser of the conjustic soldering to the sockets by soldering condenser of the conjustic soldering to the sockets by soldering condenses of charges and distance to the constructional advantage to the constructional advantages, this arrangement results in compactness not otherwise possible, cutting three inches from the average panel. A coupling condenser of the sockets are proposed at lating to the sockets and place to the constructional advantage to the sockets by soldering condenser of the sockets and the sockets are soldered to the constructional advantage to the sockets are soldered to the sockets by soldering condenser of the sockets and the sockets are soldered to the constructional advantage to the sockets are soldered to the sockets and the sockets are soldered to the sockets and the sockets are soldered to the sockets and the sockets are soldered to t



Ten years of ceaseless effort has

gone into the up-building of an Invisible Integrity that is the sure foundation of this confidence.

> In the Orange and Blue Carton Types C&CX



Distortion in the

ceiver. However, in most instances, it will be found that a factory built set be featured in particular by the will give satisfactory reproduction

quaint, mystic cities of the Far East, vance, and these must be found by son at the Bedford Branch." experimentation. The reason for this is that such things as the degree of half hour concert through WEAF, ance of the audio transformers can

It should be remembered, however, that in all cases where 90 volts or plates of the audio frequency amplifier tubes, a C battery must be employed if quality of reproduction is desired. This battery consists o from one to four dry cells, connected Mica Condensers n series with the grid circuit with the negative potential applied to the grid. The voltage of this battery should be varied with the B batery potential.

Another cause of distortion is overloading the last stage of amplification. This can be corrected by using a small power tube in that stage. These tubes are now available for use in receivers, and aside from insert-

that stage no other change need be made in that stage.

Audio Amplifier Rasping sounds in receivers are frequently caused by the use of high ratio audio frequency transformers. The audio frequency amplifier of If it is not desired to change the This gives an accurate check without a radio receiver has a far greater transformer to one of the proper A. W. Gruno, who has been in danger of blowing out the tubes, as effect on the quality of reproduction ratio, the trouble can be corrected than many persons realize. If this fixed condenser across the primary part of the set is efficient, it will winding of the transformer or by make a good program very enjoyable, shunting the secondary winding with ning a service organization. This organization is intended not only to pleted make all the checking is combut if it distorts signals it will make a high resistance. The condenser the same program almost impossible should have a capacity of approxitenance but a laboratory service for the set ready for operation. Don't amplifier may be divided into two leak will answer the requirements. Distortion in an audio frequency is used, a one or two megohm grid taking measurements, etc., as well. try for distance right away, get acclasses, that which is caused by the In some extreme cases it will be poor design of the amplifier itself, found necessary to use both the reand that which is caused by the im- sistance and condenser in order to

Delegations to Attend Last Session of Men's Conference The last session of the Men's Con-

ference at the Bedford Branch Y. M.

when the audio amplifier is properly Council, Junior Order of American Mechanics, of Kearny, N. J. In adthe chief causes of poor reproduction. more than 100 Masons from the Didition there will be a delegation of battery that has been over dis- M., of New York City. Practically charged, may cause noises and howling sounds to be heard in the reence will be broadcast by WEAF, tery having insufficient voltage will WTAF, beginning at 4 o'clock Eastresult in a lack of volume and poor ern daylight saving time. The The voltage required to heat the Rev. Dr. S. Parkes Cadman, pastor filament of a vacuum tube, is printed of the Central Congregational Church, on the box in which the tube is sold, Brooklyn, president of the Federal and in operating a receiver it is es- Council of Churches of Christ in sential that the tube be operated at America and a nationally known this voltage. The required voltage preacher. Dr. Cadman's subject for for the "B" and "C" batteries canthe closing session of the conference



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How Radio Tubes Are Made in Germany

(Continued from page three)

Different manufacturers adopt various means of obtaining the very degree of vacuum necessary in a thermionic tube, but in principle the methods are all very much alike.

In the plant under review bright emitters and dull emitters are dealt with in different ways, for reasons which will be explained.

To do this the gas jets are trained on a spot just below the pinch, while the thin tubing to be attached is introduced inside the foot. Within a short space of time sufficient heat is brought to bear to cause fusion between the tube and the foot, and in order to clear an air passage through this point a blast of compressed air is blown up through the thin tubing. This air blast blows a small hole through the semi-molten glass at the point of fusion.

The constituent parts of the foot nd. the completed article for both tip and tipless valves are illustrated in Fig. 2.

The final process in the manufacture of the foot is when the operator bends the filament, grid and plate supporting wires to the correct angles and then cuts them off to exactly the required length by means of a special machine.

In the case of bright-emitters, when the vacuum has reached a certain degree of hardness the filaments are heated to a high temperature and a high voltage is applied to the grid and plate, which are temporarily connected. The high voltage is adjusted to such a value that a powerful electronic bombardment of the grid and plate is set up, so these elements are raised in temperature to a dull red heat. This bombardment is kept up for some time till all the occluded gas within the metal of the electrodes is expelled and the vacuum of the tube arrives at the required degree of hardness.

In the case of dull-emitters, however, such a process would be harmful to the fine wire filament, so the elements of this class of tube have to be heated by other means. One method which immediately suggests itself is by inclosing the tube in some kind of furnace, but any such method also would heat up the glass bulb and cause it to collapse, so some other: method which will only affect the metallic elements of the tube must be found.

actual building of the receiver must

necessarily vary in individual cases, a list

of the exact electrical parts used in the

receiver designed by the author will be of

assistance to the enthusiast desiring to

List of Parts

One Bruno antenna coupler..... 3.00

One Bruno three-circuit unit..... 5.00

cating condensers at \$4.25..... 8.50

C 1.50

One by-pass condenser, .0025 mfd. . .40

One by-pass condenser, .006 mfd... .75

One Baldwin unit...... 6.40

transformers at \$3.50......\$7.00

Two Hedgehog audio-frequency 1:5

Two Amsco .0005 mfd. S. L. F. allo-

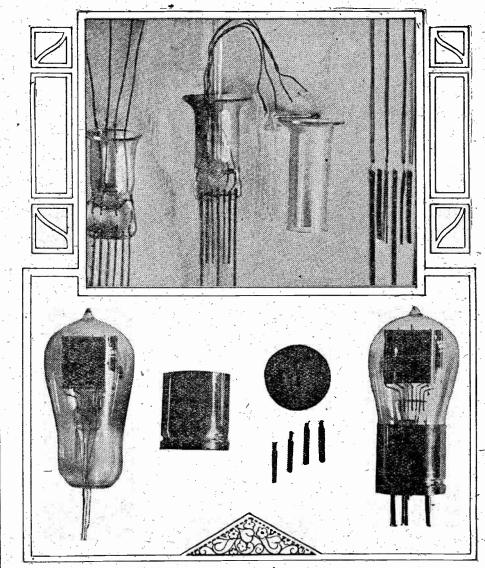
Three Amsco Universal sockets at

One Amsco "floating" socket (for

Four Amperites for UX199 tubes

One Polymat grid condenser with

build a receiver similar to it.



Vacuum tubes in several stages of completion

a temperature sufficient for the purpose.

the degree of vacuum by bringing into with neon or Geissler tubes.

One satisfactory solution to the prob- | contact with the glass feed tubes a highly lem is to inclose the tube to be exhausted | charged rod. This rod has an insulated within coils of wire, through which are | handle to protect the user from shocks sent powerful high-frequency currents. In and is fed from an induction coil. On this way the elements are heated by in- coming into contact with the glass tubes duced eddy currents and can be raised to | leading to the valves under exhaustion a glow occurs within them, such as is fa-From time to time the operator tests | miliar to those who have experimented

This glow indicates to the operator in a rough-and-ready fashion how much gas still is left in the tubes.

In the final stages, in the case of dullemitters, the exhaustion process is sometimes hastened by means of magnesium. A small piece of this substance, previously welded to the plate of the tube, is volatilized by increasing the power of the high-frequency currents in the heating coils till the temperature of the plate is raised sufficiently to cause this to happen.

The sudden volatilization of the magnesium consumes the last remaining mi nute quantity of gas within the bulb, and in so doing the volatilized magnesium is deposited in a thin film over the inside of the glass bulb. This is the explanation of that silvery appearance of many tubes. which readers undoubtedly will have remarked and wondered about.

When finally exhausted the thin tube connecting the valve to the pumps is heated near the bulb and the valve sealed off. This process leaves the tube with the well known tip on top. In the case of pipeless tubes the pip is concealed within

Mounting and Aging

The tube is now ready for mounting in its base. After the leads from the tube have been soldered to the pins the base is sealed to the bulb by means of a special compound, which is supplied from a

The next process is that of aging the tube. This process consists simply of running the tube under its normal operating conditions in order that it may settle down and attain stability. For this purpose the tubes are put into large racks.

The final operation in the manufacturing process is that of testing. In the factory herein described every tube is tested before being sent out to insure that each and every one of them shall possess the required standard characteristics.

The Radioroehrenfabrik factory in Hamburg employs 150 persons, and the writer was informed that each tube during the entire manufacturing process passes through the hands of thirty opera-

This Season's First Portable Receiver

(Continued from page one)

As suggested, the actual building of , place by brackets to the condensers, are the receiver must vary somewhat in individual sets, the changes in design being formers and filament resistors. occasioned mostly by variations in carrying cases. The writer can at best designate the major points in the construction of his particular set.

The carrying case measured 1514 inches high, 13% inches wide and 6 inches deep. A partition divides the interior into equal compartments, one reserved for the set proper and the other for the batteries and loud speaker. A Baldwin unit A small Radion horn serves as a resoing the battery compartment.

Figure 2 shows the simple tuning panel layout. The exact size of the panel will, | 22½-volt C battery, a UX 120 tube may of course, vary with the dimensions of the

The back of panel construction may be observed in photograph, Figure 3, which also illustrates the compartment arrange- as the Eveready 771, connected in paralment of the case. On the subpanel, 121/2 | lel, may be used. Total\$41.20 inches long by 2½ inches wide, held in

mounted the sockets, amplifying trans-

Figure 4 is a photograph of the portable set mounted and ready to carry away. Antenna and ground posts are provided on the front of the tuning panel. The use of small knobs and flat dials provides for greater room behind the panel. The weight of the set completely equipped is twenty-two pounds.

The portable set described is, of course, designed for operation from dry cell tubes, preferably the UX199. (However, if the receiver is to be transported condetector tube) 1.00 nance chamber. A four-inch circle, the sistently by car, arrangements can be One Electrad Royalty resistor, Type size of the bell, is cut in the panel cover- made for the lighting of six-volt tubes from the starting battery.) If there is room in the battery compartment for a be used in the output stage.

Standard dry cells are the preferred A battery. However, if justified by the economy of space, three C batteries, such

Needless to say, the smallest 22½ or 45

volt blocks are used to supply the plate

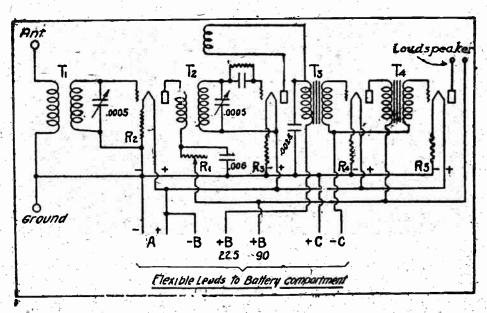
potentials. Three volt and four and a half volt than the standard C batteries and can be placed in the set compartment if the space thus saved is consequential.

Two 100-foot coils of insulated wire are recommended as a pick-up system for the portable receiver. One wire should be stretched in the usual fashion as an antenna. It may be run from the receiver to the top of a tree or in any fashion that utilizes the highest available point.

The second coil should be connected to the ground post and unrolled on the ground underneath the antenna. It is neither necessary nor desirable that this second wire be grounded. The experi enced fan is familiar with this use of a counterpoise.

If more convenient, the receiver may be grounded in the usual way-to a fence, a rod driven into the ground or to tin cans thrown into a well or lake.

And thus do we in the spring divert the young man's fancy from its rhymed and



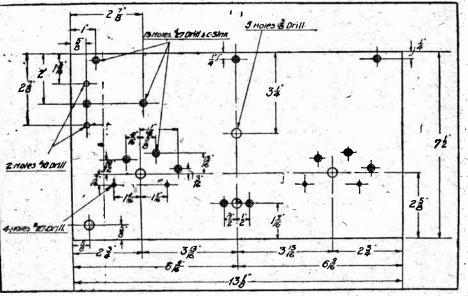


Figure 2-The panel lay-out employed by the author in the construction

The Right Way to Listen In; Compendium on Radio Etiquette

First Important Principle Is to Invite Several Guests, Selecting the Evening Having Had the Best Programs Announced

By Charles Roland

HERE are several ways of listening in over the radio, but there materials are also often used for is only one right way, just as there is only one right way of doing the detection of radio signals. anything. The writer will endeavor to set down a few rules | Galena is generally found to be governing the right way to listen in, issuing a sort of compendium on the most sensitive. However, this ever radio is known. Many power units using trickle chargers have been wireless eitquette

nounced for broadcasting. You instruct your wife to prepare a collawhisker" used to make contact with pense of trickle chargers in most cases is too great. tion, to be served when the guests show signs of hunger or thirst. This the mineral is usually a light tension Here is an automatic A. C. filament may occur anywhere from ten to twenty minutes after their arrival,

Another Catastrophe

but was cut off.

The honored guests, Mr. Grumble &-Smith, Mrs. Wordy Smith, and their pect of forcing a stalemate. Black all intents and purposes, so far as moves.

donnas is that they do not know how into the discard when your own wife, adjust. to arrange their songs to meet the not Mrs. Smith, takes up the conver- Silver or nickel colored pyrite is, justed to the requirements of the Only a screw driver is needed to demands of the conversation. Galli- sation, reminding the guests hos- in general, much more sensitive than receiver being used, it is never dis- assemble this new A. C. current sup-Curci having left the microphone at pitably that the sandwiches are ready the dulled, somewhat copper-colored charged; hence there is no need of ply, and the total cost, it is esti-8:15 and your guests now being Will Young Nuisance please pass the pyrite. Not like galena, differences seated, you tune in on the station cookies, hold the cup of tea on his in place of origin have not been broadcasting an address on the World lap, and help himself to lemon and known to give characteristic differ-

"I was just talking about the World "It seems there were a Senator and a The lemon falls on the chair, the firm contact, and therefore is used

"Certainly will listen. Comes over trousers.

The little Smith boy, aptly named for justice, and you take it good na-Nuisance, has meanwhile stolen over turedly as you, the long suffering crystal detector be kept perfectly to the receiving set and twisted the one, hear the denunciatory exclamaclean. Its surface should never be dials. There is a groan, a splutter and four shrieks as the kaleidescopic sance Smith, Mr. Grumble Smith, Mrs. destroy its sensitiveness. If under cross-section of radio activities hits Wordy Smith, and even your wife, any circumstances it should come in the ear. Nuisance is so well pleased who seems to have deserted into the with the result that he repeats the enemy's camp. Whatever came of loose its sensitiveness, it should be

Mrs. Smith's New Hat

describing the latest mode in Span- quently celebrated. John Barrymore ish hats, introduced so fetchingly by is going to read portions from Ham-Raquel Meller. Unfortunately Mrs. Smith does not have the eyes that Mlle. Meller brought with her from Juliet. Paris, but the hat is a wonderful thing if one does have wonderful isn't he?" Mr. Smith asks. "These Electric Storms Cause Static

"My husband was telling me only but they don't measure up nohow, do yesterday," Mrs. Smith laughed, "that they? This here Bernard Shaw, a charges in clouds. These cause nuhe'd flirt with me if he was a strange smart Aleck, eh? And Eugene man. But, of course, he couldn'tit's not a lady, it's only his wife. much sad stuff. Give me Shakespeare the spring and summer when electric

You laugh with Mrs. Smith, not That man certainly knew the English hilariously, but politely enough to language. These here modern probhilariously, but politely enough to prove you are with her. Meanwhile a little patient tuning restores the broadcasting station, now featuring broadcasting station stations are stationary features.

repeated this information eleven

can sing circles around him."

"I don't agree with you."

this, however. Young Nuisance has You know my cousin's daughter-in- his anatomy. made himself at home on the floor, law, don't you? Wears those red hats The moral of this recital is quite regardless of size. the Smith heir bumps into the table of beauty, so-called, to wear." full force. The receiving set lands

Mr. Smith lectures his son vocifer- | Jones family so far as the frequency of a radio room. ously, and Mrs. Wordy Smith advises of this type of listener is concerned. Just why this should be is not yet duce objectionable noises going diyou on the technique of putting a And still you are not relieved of determined. The fact has been estrectly into the radio receiver. The Americanization Day at WEAF quired a nasal quality and a surrep- set. It doesn't work right." titious squawk.

clearly, with his exciting, warm voice, knocked it over. describing a wildly exhilarating chess game between "Kid" Rubenstein and "radio ain't so good." "Knockout" Lombozzi. You grip your chair tensely as MacNamee shouts, grams." "White checks black, with every pros-

"They don't give you good pro

"What's

Interesting Facts About Properties Of Radio Crystals

terial is used as the detector in many radio receiving sets. The most common and important crystalline ma terials used for this purpose are galena and pyrite (iron pyrites). Carborundum, silicon, sincite, molybdenite and many other crystalline

weather and removing of hats and leaps the barriers and rescues the a single piece of the mineral varies condenser in a B battery eliminator. cause the excess current will be abcoats will render this prize number fainting queen from this scene of greatly in sensitiveness at different Because it is not possible to regulate sorbed by the battery, nevertheless, of the week null and void, so that, for havoc. I predict checkmate in three points on its surface. It is, there- the current flow at such a low volt- by adjusting the flow to the exact fore, necessary to test each fragment age as 6 volts with a condenser, the current necessary, current is saved you are concerned, Galli-Curci did This impending crisis, which you to determine its suitability for radio battery, being of six-volt capacity, and battery life greatly increased. not sing at all, but merely emitted want to follow, play by play, at least reception. This mineral does, how- stores the current and permits a reg- The cost of operation of this new to learn whether white mated black, ever, have a great many sensitive plar flow at this low voltage. The trouble with many prima or vice versa, is thrown altogether "spots" and is one of the easiest to

minute crystals scattered throughout

sugar settles over the rug, the cup in a number of fixed crystal detec-Congressman"

"But this is especially good, Mr. of tea jiggles in the saucer until you smith," you remind him. "I'd like grasp it from him, only to upset some of the boiling liquid on Nuisance's solder, whereas galena requires a This never was much of a world special metal of low melting tem-

It is highly important that the rocess. that chess game? Only Graham Mac-washed with soap and water.

"Mother, listen," he shouts. "Ain't listen," he shouts. "Ai

If galena crystals become badly Ah, well, the luncheon is over. The difficult to find, it may be chipped so scratched and the "sensitive spot" is radio piece de resistance soon will Mrs. Smith nods beamingly and come over the air. Shakespeare's new surface is exposed. This new surface will be found to have a continues her report to the hostess, birthday is being widely and elo-

Mountings for the crystals should cover a large area of the mineral. It let and Macbeth, while Jane Cowl is evident that the mounting should recites the affectionate lines given to come in contact with a sensitive point as well as the "catwhisker." "This Shakespeare is pretty good,

here modern fellows try to beat him, Static disturbances usually are caused by electrical charges and dis-O'Neill gives me the creeps. Too every time. He's deep. He's learned. storms frequent this territory.

brondcasting station, now featuring maintain silence. Inis unexpected And besides, what do you think which is optional and need not be real Robeson at the microphone, single learning "I'm a Motherless Child."

And besides, what do you think which is optional and need not be heartfelt admiration. Alas! you they're going to do about prohibition? g "I'm a Motherless Unitd."

"That's Robeson, is it?" Mr. Smith quickly discover she demanded si- Any chance of amending the amend- the Kodel filtering choke, which from "That's Robeson, is it?" Mr. Smith quiety discover one demanded significantly discover and dence only to get the floor for herself. It's bad one way and worse out all irregularities before the curinquires, after the announcer has lence only to get the floor for herself. "It was so strange," she reports to the other. I can't make any sense rent passes on to the radio receiver. broadcast transmission was reported

your wife. "So unlike him. And yet out of it." imes.

"Yes. He's wonderful, isn't he?"

your wite. Bo unitke nim. And yet to the General Electric to the General Electric the wouldn't marry the girl. It really thus far you take a flavor delight in the content of the company from Perth, west-"I don't know. Rosamond Johnson was heartbreaking. I did what I thus far, you take a fierce delight in not necessary, accessories. Inasmuch could to make them see the light, ruining it to the last bitter drop. as the A battery acts only as a regubut you know how these things are. You agree with Mr. Smith, persistent-lator and the charger operates only Schenectady. Calcolin, signer of the "Well, anyway, I never did care Why, my cousin's daughter-in-law ly, flatter Mrs. Wordy Smith ma- while the set is in operation the bat- cable, reported reception at 7:15 "Well, anyway, I never did care with the licitude of the battery, therefore, is a superior of the battery. There is no necessity for doing but that didn't make any difference. administer a panning elsewhere on almost everlasting. Any kind of a broadcast at 6:15 o'clock the evening

Putting the Set Together Again in silence rather than betray them to drawing room, dining room or bar- out transformer hum. While you pick up the pieces, the this self-same Smith family, which room feel they violate no social laws | Current leaving the light socket is arctic Circle. wife goes to the kitchen for the eats | might be known as the Brown or by disregarding the social obligations | rectified by the A. C. bulb, but still

set together. By adopting opposite the tragedy of the evening. The tablished, however, that etiquette filtering choke levels all irregular. Americanization Day will be apmeasures you do, luckily, get the set heaviest blow comes when Mr. Smith not having been authoritatively ties until the current is a smooth proprietally observed by WEAF at 7 bothers to meet the exigencies of the as a fully charged battery. cargo as one may find.

How to Make an Automatic A.C. Filament Power Supply Unit

A small piece of crystalline ma- This Device Is Said to Give Constant Supply to the Receiver Without Hum; May Be Assembled in the Home at Low Cost

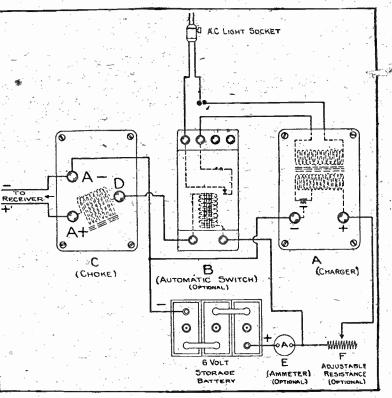
By Perry V. Ogden

HE demand that current for the operation of any radio receiver be taken direct from the light socket without depending upon trickle chargers to keep A batteries charged is universal whermineral, in spite of its sensitiveness, offered to radio set owners and builders, but the fan demands that curdoes not maintain its adjustment for rent be sent directly from the light socket to the receiver. Trickle home, selecting an evening in which the very best programs are anlargely due to the fact that the "cat- operation is continuous whenever the set is not in operation, the ex-

the rectified current properly ad- hour the set is operated.

spring, and the slightest jar is likely power supply for tube filament that into the power supply from the light to throw it off the sensitive spot. is in no way a trickle charger and socket. This facilitates leaving the Galena is a very common ore and gives perfect reception without the light socket permanently connected, little son, Nuisance, will arrive at 8 retreats to the queen's row, fencing is found in many parts of the United faintest trace of hum or noise. While while trickle chargers are constantly o'clock promptly, just when Galli- for time. White's pawn attacks States. Different specimens vary a battery is used the battery acts charging when the set is turned off. Curci begins to sing. The exchange black's bishop, threatening the castle widely in sensitiveness, even when only as a regulator of the current While no harm will result from of greetings, remarks anent the at the same time, but black's knight taken from the same mine. In fact, flow, assuming the same duty as a more current than is necessary, be-

Once the battery is charged and three-quarters of a cent for every



leaving this new automatic A. C. mated, will be less than \$25. The filament supply on the line, because life of this new device, however, as the current flows direct from the has been pointed out, is almost forlight socket to the tube filament and ever and the operating cost is less the battery always remains the same. than a trickle charger or charging

Necessary Apparatus In the illustration, units A B and C is in operation, and it is not neces-

are simply hooked up with your pres- sary to store current at any times ent six-volt A storage battery as in- Similar devices, already assembled. dicated. A is a standard 21/2-ampere will undoubtedly be offered to the Curci and Graham MacNamee and Crescent or Eclipse charger; item B radio public this summer, but at An ammeter (E) and regulating by cable letter to the General Elec-

playing with Baby, the French poodle. and earrings—smart effect although, immoral. If you want to hear a This power supply may be built Schenectady and Perth is thirteen In the pursuit of Baby by Nuisance, heaven knows, it's not for her type good radio program betake your around any bulb or electrolytic-type hours east and eleven hours west. self to the woods and shut out charger. However, the new Kodel, The shortest path from Schenectady Abruptly you turn off the radio for all neighbors, friends, relations and Crescent or Eclipse type bulb charg- to Perth would carry the signal on the floor, hurting Nuisance, unfor the night. John Barrymore and Jane acquaintances. -Persons who have ers have been designed especially for through the Arctic Circle. If the Cowl notwithstanding, you will suffer the most elegant manners in the this type of work and operate with- signal followed the path of darkness

has irregularities which would pro- General Joyce to Speak on

is turned off and no current comes ance of Americanization Day.

battery with three cells may be used, of April 12 on 32.79 meters wave length. The time difference between

with a battery charger, because cur-

rent is consumed only when the set

In Australia, 11,498 Miles

What is believed to be a record

working again, although it has ac tells you, "I don't think much of your established in this field, no one even flow, producing the same results o'clock, Eastern daylight saving time. Tuesday, when General Walter Irving It would work right, you remind occasion. If you needs must invite If desired, the automatic series Joyce, the founder of the National Despite these handicaps, Graham him, if his duplicate personality, some one to a radio evening invite switch designed for this power sup- Americanization Committee of the MacNamee comes across the ether young Nuisance, would not have your enemies, not your friends, and, ply may be used. This switch auto- Veterans of Foreign Wars of the preferably, invite the dumbest of the matically turns on the power supply United States, is heard in a short ad "But, anyway," says Mr. Smith, enemies. Perhaps you'll have a as soon as the set is turned on. All dress. It will be remembered by the chance to hear the ether unload its operations are automatic, directly radio audience of WEAF that Gencargo of music, oratory and jazz, from the switch and on the set. The eral Joyce spoke through WEAF last which, after all, is as enjoyable a instant the set is turned off the power year on the occasion of the observ(CLEARTRON ("Any Cleartron Tube will be replaced by your dealer at any time if it has not given

satisfactory results."



England's Long-Distance R. F. Tube

Compare a Cleartron R. F. Tube with the tubes you are using in the radio frequency stages of your

Note the increased volume a Cleartron gives on weak signals. Note the increased sensitivity and range of your set. EXCLUSIVE DISTRIBUTORS
FOR METROPOLITAN NEW YORK 20th Century Radio Corp.

(C)CLEARTRON (C)

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LATEST PARAGON FOUR A New Circuit!

NEW PARAGON TWO

ERUSLEY SETS \$60 Special Super-Trirdyn \$21.99 \$35 Reg. Super Trirdyn . 16.50 \$9.75. "P U P".....







Think of it-a 5 tube nationally advertised T.R.F. receiver with an inexcelled record for performancebeautiful in appearance and with a

Mail orders cheerfully filled. Send money orders, which must include postage.

4-Tube Portable Receiver as described in this issue by Zeh Bouckh

Used in the



Amateurs Invite Radio Public to Share Their Joys

That the American radio amateur has extended the hand of welcome to his cousin, the broadcast listener-experimenter, and is undertaking to how him how easy it is to engage

two-way telegraphic communication with the far distant places of the earth, is shown in a statement just issued by Hiram Percy Maxim, president of the American Radio Relay League, the national association of amateurs and experimenters.

Commenting upon the tribute paid he American amateur by Judge Stephen B. Davis, of the Department of Commerce, recently, Mr. Maxim said: "Judge Davis's very splendid trib-

ite comes at a time when the amateur is more than ever in the public eye. At this moment three separate Arctic expeditions are in the Far North depending almost entirely upon amateur contact via short-wave radio elegraphy for their communication with civilization. The success of two successive MacMillan expeditions with amateur communication has con vinced explorers generally that no other type of communication is so certain or so effective.

representative of your true Ameri- inside a vacuum tube. 102 Flatbush Ave., Brooklyn, N. Y. retired manufacturer; the other a quency amplification. nechanic, but class is no barrier.

> "Pernaps the explanation of the remendous growth in amateur two- the new multiple tube is the Loewe | The first tube mentioned, the deway communication lately is that high vacuum resistances. These con- tector and audio frequency amplifier, different sections of the United people are learning that there is sist of rods coated with a deposit of will amplify 1,500 times on frequen- States, wholly independent of the nothing difficult about the game; no fine metallic compound film, which cies between 50 and 10,000 cycles. demand for skill or knowledge other serve as the resisting element. This The purpose of Mr. Loewe's visit to be appointed by the President with than that already possessed by the element is enclosed in the glass part this country is to attempt to induce the approval of the Senate, is pro-

published in the April issue of "QST" transmitter, costing approximately also said that it will not vary with of Berlin. \$25, but capable of effecting communication over many hundreds of miles. This was written primarily Simultaneous Musicale To to demonstrate that such a set required no extraordinary skill in conhad no idea that it would bring the April 27, at 8 p. mf.

"The radio public is just beginning Orchestra, playing from the palm The report further states that in able additional expense. Moreover, to realize what has long been the room of the Hotel Roosevelt, Madison continuation of its policy to secure boards and commissions, by their dikeynote of amateur radio's popular. Avenue and Forty-fifth Street, will world-wide protection for neutrodyne vided authority have always been a ity—that is, the tremendous fascina- be heard in a half hour program of apparatus, components and auxiliaries failure in administration; they are tion of being able to effect two-way classical music. conversations with other individuals

This will be the first time that ters patent have been filed in foreign cial determinations. The tendency to scattered the length and breadth of air synchronization has ever been countries located in both of the American terminations. the earth, and this on apparatus of attempted, and every precaution will icas, Europe, Asia, Africa and Aus- agencies whose administrative func-

nightly communication? Never!'-

munication is to-day quietly working

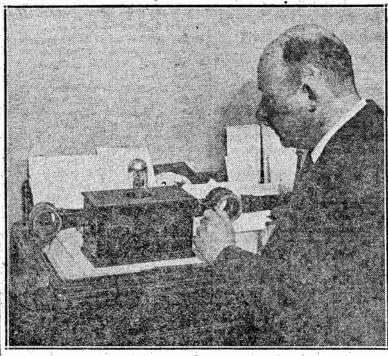
one's own construction. To-day the be taken by the engineers of WRNY tralasia. In addition to the inventions are outside the control of the amateur can truthfully say that there to have a perfect balance of volume tions of Professor Hazeltine, the res no earthly distance over which it in the different instruments. port states, "Your company is also bad. I believe the staff of the Des not possible for him to communi- To accomplish this feat the "out- the owner of the John Scott Taggart partment has performed a great sercate. The antipodes have been linked put" of the WRNY speech amplifiers patent in Great Britain and corre- vice in development of the radio art

nental communication now comes un- organist at the church, who will and Canada. These patents were ac- and regulation in a new field. So far "With international communication also that of the Orlando Orchestra. John Scott Taggart. matter of nightly occurrence, ama- Another direct line to the palm The report also discloses that the ties and conflicts in the situation are teur radio stands to-day as one of the room feeds the amplifier output of Hazelting Corporation owns 80 per such that we will be well satisfied to most powerful forces working for the organ to the orchestra director, cent of the capital stock of the La- see radio administered by any other

world peace. In this connection, who, by wearing headphones, monitour Corporation. The latter in turn department which can probably unthere is no more significant statement tors the organ and directs his or- owns "the entire right, title and in- dertake its regulation." than that made recently by one of chestra.

oward world peace by bringing about Shielding Should Be Grounded Spain, two in Argentina and one each Company. She is an artist of great international understanding and fel- All shielding in radio receivers in Australia, Brazil and Czechosle promise and has occupied major roles should be grounded.

German Radio Engineer Visits | Hoover Discusses The U.S. to Demonstrate Tube



David L. Loewe, of Berlin, demonstrating a receiver employing his

deed they are although they may a "radio frequency amplifer." This resistance coupled amplifier is the determination of who may an ever have seen each other before. latter tube contains the necessary tube is desired to a life is the determination of who may broadcast. This is a discretionary or never have seen each other before. latter tube contains the necessary tube is designed to amplify signals One of them may be a wealthy and elements for two stages of radio fre-

The underlying basic element in signals to a great degree. ated.

our members, a retired Army officer. Herbert Soman, conductor of Or- Professor Marius C. A. Latour, of 'Do you think, he said, 'that any poli- lando's Concert Orchestra, and Rock France, so far as the United States tician can stampede me into declar. Ferriss, organist, will wear head and Cuba are concerned. These in- The artist to be heard in WEAF's ing war on my friends in other coun-phones that will enable them to play ventions are covered by sixteen is salon concert on Wednesday at 7:30 tries-friends with whom I hold the same notes at the same time. sued patents and seventy applica- o'clock Eastern daylight saving time

private two-way telegraphic com- vice versa, joined in harmony.

vakia.

David Loewe, of Berlin, brother of the temperature. The resistance equally applicable to the amateurs, the famous scientist, Dr. Sigmund units will withstand 1 watt under and any of these services are open to "The average citizen, hearing of the Loewe, has just arrived in the United continuous load and . watt inter- incursion by the others and any staimportant tasks which the amateur States with a phenominal radio tube mittingly. Mr. Loewe stated only fron may be attacked by its neighbor has undertaken, no doubt visualizes which is really three tubes and the after this type of resistance had If stations proceed to select their a class of clannish, serious workers other apparatus necessary for an been developed was it possible to own wave lengths and choose their wrapped up in their hobby to the ex- audio or radio frequency amplifier build the new multi-element tube. own time, considering only their own

is not so. No class of people is more words a complete amplifier is housed contain two double grid units. This service will be at an end. gives a low internal ohmic resistance can; no organization is more demo- These tubes are made in two types. which makes possible the use of re- the needed authority. The White bill cratic in spirit and operation than One contains a detector, a stage of the amateur's organization, the Ameraudio amplification and a stage of plification. Furthermore, due to the passed the House, gives the powers. ican Radio Relay League. At our power amplification. Resistance fact that the elements are located There have been suggestions that this amateur conventions it is not an un- coupled audio amplification is em- inside the tube, the connecting wires authority should be administered encommon sight to see the eighteen-ployed. The resistance and necessary are as short as possible, which reyear-old schoolboy in heated argu- condensers are contained inside the duces capacity effect to a minimum, Commerce by a special commission ment with a fifty-year-old business tube. All that is necessary for a The mica coupling condensers are set up for the purpose. man. Two men at the same convencomplete receiving set with such a also contained in the tube. The mica tion will hail each other with the fature are the tuning elements for such has been so treated that it will have tions which must be performed by miliarity of old friends which in a circuit. The other tube is termed no effect on the vacuum of the tube. some Government agency. The first

length as high as desired. Another wave lengths is the use of public Mr. Loewe claims that the tubes interesting feature is that the tubes Such incidents are duplicated time are non-microphonic, absolutely may be connected to any detector property, and that the determination are non-microphonic, absolutely may be connected to any detector of who should have use should not noiseless and will last indefinitely. circuit allowing the amplification of be in the hands of any one person but

from capacity and will therefore not time the only manufacturer of these expense. description of a low-power amateur retain any electrical charge. It is tubes is the Loewe-Audione Company

43 of Hazeltine's Patents

amateur radio communication, but we cast will come from WRNY Tuesday, tine relating to the neutrodyne These last two functions are essentiated and of the industry. method of radio reception and trans- tially administrative, and in my view huge response it did. A manufactory At that time the organ, playing mission have been granted in foreign should rest in one of the executive

more than 250 applications for let- desirable for discretionary or judiinnumerable times, and transcontic must be fed by direct line to the sponding patents in the United States and developing the method of control monitor both his own program and quired directly from the inventor, as the Department of Commerce is

terest in and to the inventions of

n the Zenith radio case. "The court has refused to impose

clusion of outside interests, but this contained within a vacuum. In other The radio frequency amplifier tubes selfish advantage, effective public

average home-constructor of broad- of the tube which is highly evacu- some American tube manufacturer to vided for in the White bill. This take out a license to manufacture board will not need to be in continu-"In this connection we recently The resistance is said to be free these multiple tubes. At the present ous session and will imply but little

Be Broadcast From WRNY
What is believed to be the first

Granted in Foreign Countries
The third is the furthering of development of the art in the interest of struction or operation. We expected synchronized air musicale ever broad inventions of Professor L. A. Hazel the listeners and of the industry.

turer who has undertaken to supply parts for this set reports that he has been literally overwhelmed by orders.

At that time the organ, playing countries, according to a statement in the annual report of the Hazeltine Corporation.

In WEAF's Salon Concert Songs of the classical numbers they tions, some of which have effective will be Devora Nadworney, an out-"As the telephone, the railroad and will play are arranged for short solos. priority dates as far back as 1915." | standing contralto, who was formerly the automobile have brought some At this time, if Mr. Ferriss's organ An analysis of the foreign patents a member of the WEAF Grand Opera national understanding that to-day is thundering forth in a triumphal covering the neutrodyne inventions Company and is now a member of the makes another civil war a virtual im- outburst instantly Mr. Soman's or- shows that five each have issued in Chicago Civic Opera Company but possibility in these United States, so chestra will pick up the music and Great Britain, Italy and Mexico; four singing at WEAF in the tabloid each in Belgium, Canada, France, New grand opera productions by special Zealand and South Africa; three in permission of the Chicago Civic Opera in many of the outstanding operas.

Situation Created **By Court Decision**

The following statement relative to he wave length piracy case in which the United States government sued the Zenith Radio Corporation of Chicago for not complying with the stipulations made in its license was issued by Secretary Hoover upon his eturn to Washington last Tuesday:

"I have now (upon my return to Washington) had an opportunity to discuss the situation created in radio by the decision of Judge Wilkerson

penalty upon a concern which adnittedly was operating at a time and upon a wave length not authorized under its license. While the holding is in conflict with an earlier ruling n the District of Columbia, it is apparent that under the present law of 1912, as now construed, no one has authority to protect the listening public against utter chaos in the service upon which it has come to rely. The Chicago decision denies the authority of the Secretary of Commerce to assign either wave lengths or time of operation. It does not affect broadcasting alone, but is

"Congress has full power to confer

should be placed in the hands of a Commission, representative of the Department. Such a Commission to

"The second important function lies in the administration of the decisions of this commission and the minimizing of interference from

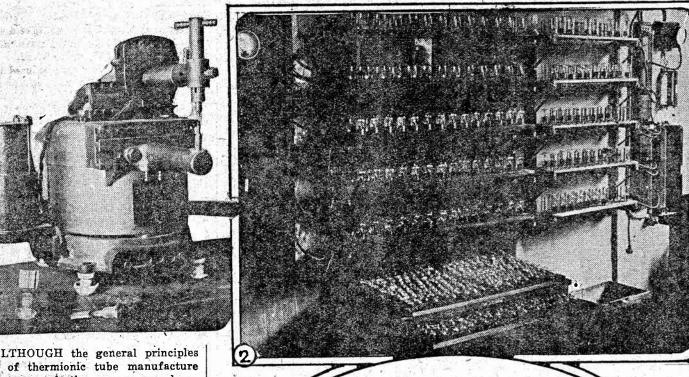
concerned the extraordinary difficul-

Devora Nadworney to Sing

How Vacuum Tubes Are Manufactured in a German Radio Factory

Each Valve Goes Through More Than a Score of Hands Before It Is Completed

By A. DINSDALE



are much the same everywhere, the individual methods and processes of the different makers vary considerably. It is thought, therefore, that the writer's tour of a foreign factory may be of interest to American readers. The factory visited was that of the

Radioroehrenfabrik G. m. b. H., of Hamburg, Germany, the parent firm of which has been established for many years in the manufacture of X-ray tubes and associated apparatus. They are at present engaged in the production of seven different types of radio receiving tubes for all purposes, and also of transmitting tubes of various powers up to 500 watts.

In all cases, but particularly in the case of the transmitting tubes, the writer was struck by the extraordinary neatness, strength and regularity of construction.

In the case of receiving tubes, these are all of the tipless variety, with the sole exception of the loud speaker power tube, thus making them particularly attractive in appearance and less liable to damage. The necessary glassware is supplied to the factory in three forms—the bulbs, blown approximately to required size and shape; long lengths of tubing about five-eighths of an inch in diameter, for making the "foot," and lengths of quarter-inch tubing for sealing the bulbs to the pumps.

Lead glass is used throughout and it is annealed after each heat process.

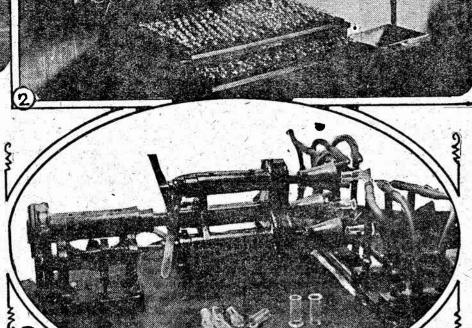
Preparing the Glassware

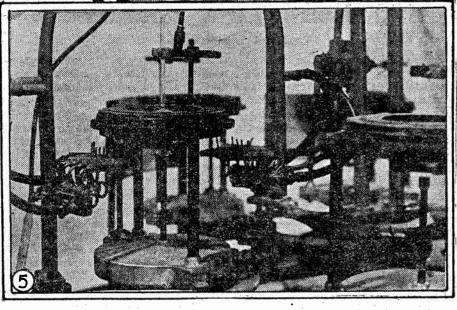
The first operation in connection with the bulbs, as received from the glassblower, is to wash them in water to free them from accumulated dust and dirt. The next operation is to reduce or extend the opening into which the foot is inserted till it is of the correct size. This could, of course, be done by the glassblower at the time of manufacture, but to insure that every bulb shall be blown to just the exact size would prove too expensive a matter, and the process of correcting irregularly shaped bulbs is a simple one.

The bulb is mounted in a kind of lathe, and while the foot opening is being heated in a gas flame the bulb is slowly rotated. and the operator either distends or contracts the opening by pressing against short distance and then stops for about a number of turns has been wound. either the inside or outside with a metal Meanwhile the tubing for the foot is being cut up into lengths about two and

one-half inches long. These lengths are then mounted in the machine pictured above, which slowly rotates the tube while the end projects into the concentrated flame of the six gas jets. When the correct temperature has been reached the operator then bells out the end to the correct size for entering the bulb opening by holding against it a curved metal rod. The process is similar to metal turning in a lathe, only instead of the work being cut to size and shape it is pressed while in a semi-molten state.

The next step is the insertion and sealing into the foot of the connecting wires and, in the case of tipless tubes, the thin glass tube used for sealing the completed tube on the pumps.





These pictures show the apparatus used in the manufacture of vacuum tubes. 1-The electric welding machine used for welding the grids and plates to their supports. 2-The aging racks where the tubes are run under normal operating conditions for stabilizing purposes. 3-The apparatus which supplies the compound for sealing the base to the tube. 4-The machine for shaping the foot. 5—The device used for fitting the bulb to the foot.

table, about eight feet in diameter, round which sit three operators. Part of the be, the winding machine being arrranged table revolves at regular intervals for a to stop automatically when the required minute or less. These movements are under the control of the operator in charge. Around the edge of the machine are regularly spaced holders, or jigs, which accommodate the glass tubes and connecting wires. As they regularly revolve from one series of fixed gas jets to another the tubes become heated, shaped and finally pinched into the completed foot, with the wires all properly arranged and sealed in. In the case of tipless valves, the attachment of the exhausting tube is the final process performed by this machine.

Making Grids and Plates

The plates for the various tubes made in this German factory are either cylindrical or rectangular, and in each case they are stamped from the sheet nickel and rolled to shape.

The grids also are either cylindrical or

The machine used for this purpose is | of winding is the same. The requisite extremely interesting. It is a circular | number of turns is wound upon a former, cylindrical or rectangular, as the case may

The spacing is arranged for by feeding the nickel wire from the bobbin through a slot in a block, which moves along a threaded revolving rod, the threads of which are arranged to give the requisite spacing.

Before the wire is cut and the tension relieved the strengthening rib or ribs are laid along the winding and welded to each turn separately. The former, by a special arrangement, is then slightly contracted in diameter and the completed grid slipped off.

At the assembly benches the filaments and completed grids and plates are then welded to their supports by means of the electric welding machine shown in Fig. 4. This machine is foot operated, so that the operator may have both hands free to arrange the parts in their proper position on the lower welding electrode. On pressrectangular, but in each case the method I ing the foot pedal the top electrode comes

down and the joint is instantly welded.

Dull-Emitter Filaments

The method of introducing the filament into dull-emitter tubes is unusually simple and interesting. The dull-emitters made by the Radioroehrenfabrik have grids and plates of the cylindrical type, and these two elements are fitted to the foot first; the introduction of the filament is the last operation. Readers will appreciate the necessity for this and for the great care and special methods required in the handling of the flament when it is remembered that dull-emitter filament wire is of the order of .015 millimeter

The end of this extremely fragile wire is kept threaded through a thin steel tube, in appearance more like an oversize darning needle. The tube is introduced into the space inclosed by the grid, and by means of it the projecting end of filament wire is held in contact with the left-hand filament support. The operator then depresses the foot pedal and that end of the filament is welded to its support.

The steel tube is then withdrawn, sliding along the filament wire until the latter can be brought into contact with the right-hand support and welded. The wire is then cut off close to the support, but in such a manner as to leave a short length projecting ready for the next operation.

Welding the Foot

We now come to the last operation in connection with the glasswork—that of introducing the foot, complete with filament, grid and plate, into the bulb and welding the two together.

The foot is slipped over the central iron rod and the bulb placed over it and held there in a jig which grips the exhausting tube. In the tipless type of tube the central iron rod carrying the foot takes the form of a tube, into which the glass exhausting tube is inserted to protect it from the heat, while the bulb is held by a different form of jig.

When the parts are in position the table is moved round so that gas jets play on the bulb at the point where fusion is to take place. There are eight such jigs on this machine, and as they are loaded up with tubes the table rotates them from one set of gas jets to another until by the time they have nearly completed one revolution the glass has been sufficiently heated to cause fusion between the belled out portion of the foot and the encircling lower edge of the bulb.

While still in a semi-molten state an operator pulls away the surplus glass with a thin iron rod, and thus the joint is left clean and free from jagged edges.

The Exhausting Process

The completed tubes are now ready for exhaustion and are passed on to the pumping room. Here the thin exhausting tubes are sealed on to the pump mains and pumping is commenced.

(Continued on page four)



1100k-WFBH-NEW YORK-273m

m.—Orchestra.
m.—Volly Endriss, contralto.
p. m.—Mae Sims, songs.
p. m.—"The Hour of Meditation."

3:30 p. m.—"The Hour of Meditation."

p. m.—Natzy Marino's Orchestra.

p. m.—Warner Theater Hour.

p. m.—Haisey Mohr, composer.

1:15 p. m.—Radio Ramblers.

1:45 p. m.—Beauty talk, Ervin Weiss.

p. m.—Twin Oaks Orchestra.

1:30 p. m.—Majestic String Ensemble.

11:30 p. m.—Savoy Baliroom Orchestra.

1436k---WBNY---NEW YORK---210m

1040k-WLWL-NEW YORK-288n

Reiss, soloist. 9:30 p. m.—Alfred Werthelm, violinist; Eva Nora Lyon, pianiste. 10:02 p. m.—John von Aspe, tenor. 10:30 p. m.—Utopia Dance Orchestra.

TO-DAY

610k—WEAF—NEW YORK—492m gram.

3 p. m.—Young People's Conference; address by Dr. Daniel Poling.
4 p. m.—Men's Conference at the Y. M.
C. A.; address by Dr. S. Parkes Cadman; music by Gloris Trumbaters Goods.

130 p. m.—Concert. C. A.; address by Dr. S. Parkes Cadman; music by Gloria Trumpeters, George Betts, Mr. and Mrs. Howard Kimsey. 5:30 p. m.—Norman Curtis, pianist. 6 p. m.—Shakespearean hour, "Macbeth." 7:20 p. m.—Capitol Theater Family. 9:15-10:15 p. m.—Atwater Kent Hour; Schola Cantorum.

660k-WJZ-NEW YORK-455m

a. m.—Children's Hour.

1. a. m.—St. Thomas's Episcopal Church.

2:30 p. m.—Sunday Symphonic Society.

30 p. m.—Sunday Radio Forum.

30 p. m.—Viado Kolitsch's Orchestra.

55 p. m.—St. George's Vesper Service.

p. m.—Pennsylvania Concert Orchestra.

Teller." Teller.

9 p. m.—Commodore Concert Orchestra.
10 p. m.—Godfrey Ludlow, violinist; Lo
lita Cabrera Gainsborg, planist. 950k-WGBS-NEW YORK-316m

8:30 p. m.-Arrowhead Tes Dance Orchestra. \$:30 p. m.—Play: Dramatic biography of Ludwig von Beethoven, with symphonic orchestra; music of the master, with professional cast, including Maida Crai-

gen. 10:30 p. m.—Tosti and Denza; melodies; Vincenzo Paladino, mandolin; Maria Luna, piano; Sisto Luna, voice. 830k—WHN—NEW YORK—361m 11:30 a. m.-12:30 p. m.—Calvary mornin service.

12:30 p.·m.—Loew's organ recital.

2-3 p. m.—Christian Endeavor program.

3-4:30 p. m.—Radio Bible Class.

5-5:30 p. m.—Roseland Dance Orchestra.

7:30-9:45 p. m.—Lalvary evening service.

10:45 p. m.—Jansen's Orchestra.

12 midnight—Sophie Tucker's Playground.

880k-WMCA-NEW YORK-341m

11 a. m.—Christian Science service. 2:50 p. m.—News Items. 3 p. m.—Minot Simons. 3:30 p. m.—Donald Flamm's Frolickers. 5 p. m.—News Items. 5:30 p. m.—Halpert & Fryxell Buck-A-

Neers.

6 p. m.—Roemer's Homers.

7 p. m.—Ernie Golden's Orchestra.

7:30 p. m.—Olcott Vail's Ensemble.

8 p. m.—Mayollans.

8:30 p. m.—California Rambiers.

9 p. m.—Twin Oaks Orchestra.

9:30 p. m.—Boxing Writers' Association banquet; Mayor Walker; Boxing Commissions; Broadway theatrical and cabaret stars.

1250k—WHAP—NEW YORK—240m 0 p. m.—Concert of sacred music; c. 2:30 p. m.—Concert of sacred music, can and soloists. 3:45 p. m.—Mary Pinney, organ recital.

3:45 p. m.—Mary Pinney, organ recital.

1100k—WFBH—NEW YORK—273m
5 p. m.—Savoy Ballroom Orchestra.
5:30 p. m.—Franklin Four.
6 p. m.—Talk.
6:30 p. m.—Perfection Pete's Pals.
7 p. m.—World Masonic news. 7 p. m.—World Masonic 7:15 p. m.—Melody Aces.

1160k—WRNY—NEW YORK—258m to 2 a. m.—DX Hound Hour. 30 p. m.—Bar Mitzvah—Jewish Con-firmation, Rabbi Joseph Hoffman and choir. 3:30 p. m.—Odierno Quartet. 4 p. m.—Christian Reisner's Hour of Re ligion.
5 p. m.—Corradetti Verdi Hour.

1040k-WLWI-NEW YORK-288m 1430k-WBNY-NEW YORK-210m

o, m.—Blue Crest Collegians, b, m.—Consuelo Rivero, pianist. m.—Milton Yokeman, 'tenor. b, m.—Harmonica Trio. c, m.—Bamby Breadwinners, b, m.—Blue Crest Collegians, 3:40 p. m.—Blue Crest Collegians.
4 p. m.—Miss Consuelo Rivero, pianist.
4:10 p. m.—Cecelia L. Rivero, soprano.
4:30 p. m.—Collegians; Harmony Boys.
5:30 p. m.—Collegians; Harmony Boys.
5:30 p. m.—Coretto Reynolds, planist.
5:40 p. m.—Olive May.
5:50 p. m.—Miton Yokeman. tenor.
1290k—WOKO—NEW KORK—283m

Episcopal Church.
7:30 p. m.—Services from Chelsea M. E. Church. Church.
100k-WBBR-STATEN ISLAND-273m

1100k.—WBBR.—STATEN ISLAND—273m
10 a. m.—Watchtower Trio.
10:15 a. m.—L. Marion Brown, soprano.
10:25 a. m.—Sunday School lesson.
10:25 p. m.—Watchtower Trio.
10:50 a. m.—Choral Singers.
11 a. m.—Bible lecture, R. S. Emery.
11:30 a. m.—Choral Singers; Trio.
2 p. m.—Watchtower Orchestra.
2:20 p. m.—L. Marion Brown, soprano.
2:30 p. m.—Bible Lecture, R. S. Emery.
3 p. m.—L. Marion Brown, soprano.
3:10 p. m.—Carl Pierzschatsky, trombonist.
3:25 p. m.—Bible Instruction, Martip Hartman; L. Marion Prown, soprano.
3:45 p. m.—Watchtower Orchestra.
9 p. m.—Watchtower Trio.

9 p. m.—Watchtower 1710. 9:20 p. m.—Bible questions and answers. 1140k—WAAM—NEWARK—263m 190k-WGCP-NEWARK-252m noon—Elgy Mayer, soprano. 15 p. m.—Jimmy Farrell's Orchestra 5 p. m.—Jimmy Farrell's Trio. 5 m.—'Care of the Skin.'

2 p. m.—"Care of the Skin."
2:15 p. m.—Frank von Neer Artists' Hour.
3:15 p. m.—Gertrude Hale Artists' Hour.
4:15 p: m.—Paramount Vocal Trio.
4:45 p. m.—James Prescott, tenor.
5 p. m.—Walter A. Cobb, organist.
7 p. m.—Jimmy Shearer, songs.
8 p. m.—Marinello Entertainers.
8 p. m.—Marinello Entertainers. 8:30 p. m.—Nevin Clark, tenor. 8:45 p. m.—Wm. Eichelsdoerfer, violinist. 9 p. m.—Esther Krohn, planist. 6:15 p. m.—Paramount Vocal Trio. 1150k.—WEAM.—PLAINFIELD—261m

7 p. m.—Special hymn service; Epwo League chorus, 1340k—WODA—PATERSON—224m 10:30 a. m.—Communion breakfast. 7:30 p. m.—Market Street M. E. Church

service. 760k—WLIT—PHILADELPHIA—395m m.—Concert orchestra. 4:30 p. m.—Chapel service. Ep. m.—Shakespeare Hour, "Macbeth." p. m.—Shakespeare Hour,
p. m.—Service,
55 p. m.—Atwater Kent Radio Hour,
590k—WIP—PHILADELPHIA—508m

m.—Germantown Gospel Mission.
p. m.—Evening service.
p. m.—Ben Stad's Symphony Orchestra. 596k—WOO—PHILADELPHIA—508m 10:45 a. m.—Morning services. 3:30 p. m.—Musical exercises. 8 p. m.—Sacred recital. 1000k—WPG—ATLANTIC CITY—300m

8:13 p. m.—Organ recital. 4:15 p. m.—Community vocal and instrumental recital.

b. m.—Last-minute news flashes.

5 p. m.—Traymore Concert Orchestra.

10:15 p. m.—Organ recital.

1090k—WHAR—ATLANTIC CITY—275m

10:45 a. m.—Morning service.

2:15 p. m.—Short sacred recital.

2:45 p. m.—Sermon, Rev. Harold G. Gaunt.

7:50 p. m.—Evening service.

9 p. m.—"An Hour With the Classics."

Sacside ensemble. Seaside ensemble.
790k—WGY—SCHENECTADY—380m
11:30 a. m.—Service of First Baptist Church.

Church.

12:30 p. m.—Symphony Society Concert.
4 p. m.—Musical program.
8:30 p. m.—Service of First Baptist Church.
10-11 p. m.—Godfrey Ludlow, violinist.
940k—WGR—BUFFALO—319m 10:45 a. m.—Morning service. 6-7:30 p. m.—Shakespearean program. 7:45 p. m.—Evening service. 9:16-10:15 p. m.—Jointly with WEAF.

1130k-WMAK-BUFFALO-266m 10:25 a. m.—Morning service: 7:30 p. m.—Evening service: 1080k—WHAM—ROCHESTER—278m 3:30 p. m.—Chapel service; program fr WFBL. 9:30 p. m.—L'asical program.

980k-WJAR-PROVIDENCE-306m 7:20 p. m.-"Capitol Family." 1070k-WNAC-BOSTO N-280m a. m.—Morning service.
b. m.—Concert.
c. m.—'The Fireside Hour';

:30 p. m.—News bulletins. 6:35 p. m.—Evening service.

860k—WEEI—BOSTON—349m

2 p. m.—Sager's Hour of Hospitality.
3 p. m.—Musicale.
4 p. m.—Dr. S. Parkes Cadman. n.--Capitol Theater Family.

m.—Atwater Kent Hour. —WBZ—SPRINGFIELD—333m 50 a. m.—Community Church.

5. m.—Golden Rule hour of music.

6. m.—Sunday evening dinner concert

7. m.—Combined musical clubs of Ho ross College. 120k-WTAG-WORCESTER-268m 5:30 p. m.—Program to be announce 30 p. m.—Program same as WEAF. 15 p. m.—Program same as WEAF. 1220k.—WBAL—BALTIMORE—246m

a. m.—Church service. 0.9:15 p. m.—Capitol Theater family. 5 p. m.—"Atwater Keht Radio Hour 970k—KDKA—PITTSBURGH—399m

Church service.
Organ recital.

4 p. ni.—Dr. S. P. Cadman. 6:30 p. mi.—Dinner concert. 7:20 p. mi.—Capitol Theater family. 9:15 p. mi.—Atwater Kent.

MONDAY

610k-WEAF-NEW YORK-492m Barron.

1:30 a. m.—Benea Duffey, pianist.

1:40 a. m.—Columbia University lecture.

2 noon—Market and weather reports.

p. m.—Bitta Kabram, Pauline Sternlicht, piano duo.

130 p. m.—Eart Little, basso.

145 p. m.—Talk by Mrs. Clarence—

Hyde.

n.—Vincent Lopez's Orchestra. p. m.—Dinner music.
p. m.—Columbia University lecture.
220 p. m.—Marie Davis, pianist.
30 p. m.—'The Lullaby Lady.'
p. m.—Rence Schleber, soprano' Blanc

Perls.
3:15 p. m.—Leonora Speyer, poetess.
3:30 p. m.—Rosella Sheiner, violinist.
3:45 p. m.—Musical program.
p. m.—"A. and P. Gypsies."
0 p. m.—Grand Opera, "Martha," by
WEAF Grand Opera Company.
11-12 p. m.—Ben Bernie's Orchestra. 660k-WJZ-NEW YORK-455m

neath. 5 p. m.—Flower-making course. 5 p. m.—"Shopping Service," Mrs. Gra Hill. 4:30, 5:30, 7:30, 10:30 p. m.—News. 4:35 p. m.—Commodore Control

p. m.—Commodore Concert Orchest p. m.—Market quotations. p. m.—Finical summary. p. m.—Cotton quotations. p. m.—Farn market reports. n.—Commodore dinner concert.
b. m.—John B. Kennedy. p. m.—Astor Orcrestra.
p. m.—Reading Seashore Band.
p. m.—Moorland Hour. Sasha Culber
son and String Quartet.
0.45 p. m.—Harry Leonard's Orchestra.

10 a. m.—Winirfed Gordon, soprano, 15 a. m.—Radio gym class. 20 a. m.—Perfumes and Personality. 40 a. m.—Fashien talk. 35 p. m.—Scripture reading. 40 p. m.—Mercedes Fehley, sopr. George Schwiler, Abe Samellowitz, v.

duets.

30 p. m.—Educational Camp Exhibition.
p. m.—Program by Women's Activities p. m.—Program o, Exhibit. :10 p. m.—Bess Wingwald, contraito. :20 p. m.—Lillian Eichler, "Well-bred

m.—Uncle Geebee. p. m.—Uncle Geebee.
30 p. m.—Association of Reformed Rab-bis. Simon R. Cohen, Cantor Fine.
p. m.—Rollo Lloyd.
35 p. m.—Music.
15 p. m.—Educational Camp Exhibition Series: Capt. Fercy Creed.

2:15 p. m.—Al Wilson's Playmates.
2:30 p. m.—Laura Binder, planist.
2:40 p. m.—Mme. Claire De Leon, soprano.
2:50 p. m.—Wolff Kaufman, musical saw.
3 p. m.—Jimmy. Clarke's Entertainers.
3:45 p. m.—Dr. Kara Lubin, talk,
3:55 p. m.—Haines Good News Party.
4:16 p. m.—Belle Osborne, contraito.
4:30 p. m.—Nat Mattiff's Orchestra.
5 p. m.—Belle Osborne, contraito.
5 p. m.—Beddie Gillis, baritone.
7 p. m.—Max Genesin, tenor.
7:15 p. m.—Betty Morris, songs.
7:30 p. m.—Ose Ward's Entertainers.
8 p. m.—"Storage Batteries," H. B. Shontz,
8:05 p. m.—Roseland Dance Orchestra.
8:30 p. m.—George's Surprise.
9 p. m.—"The Two Bills," songs.

and violin.

30 p. m. Loew's New York Orchestra.
p. m.—Olive May, soprano.

15 p. m.—Griffin and Morgan, songs.

30 p. m.—Leroy Smith's Orchestra.
p, m.—Dance orchestra.

midnight—Dance orchestra. 880k—WMCA—NEW YORK—341m

20 a. m.—N. Y. Stock Exchange
a. m.—Jack Cehen, planist.
30 a. m.—Market reports (hourley).
noon—United States Department

griculture.
5 p. m.—Olcott Vail's String Ensemble.

griculture.

5 p. m.—Olcott Vail's String Ensemble.

m.—Entertainers, Theo Alban. tenor.

m.—Sam Coslow, songs.

0 p. m.—News items.

0 p. m.—Entertainers.

8 p. m.—Bob Brandes, songs.

15 p. m.—Lost and found department.

30 p. m.—Musical program.

5:25 p. m.—News items.

p. m.—Olcott Vail's String Ensemble.

30 p. m.—Ernie Golden's Orchestra.

p. m.—Grove Wilson. talk.

30 p. m.—Ernie Golden's Orchestra.

p. m.—Termisval music hour.

p. m.—Christian Science lecture.

0:15 p. m.—McAipin News Editor.

1 p. m.—McAipin News Editor.

1 p. m.—McAipin Program.

1:30 p. m.—Jack Denny's Orchestra.

2 p. m.—McAipin Entertainers.

2 p. m.—McAipin Entertainers. 1040k-WLWL-NEW YORK-288m

p. m.—Chamber music.
m.—Question Box.
ps. m.—Schickerling concert.
b. m.—Study Club.
5 p. m.—Coletta Reims, harpist.
5 p. m.—E. F. O'Connor, barytone.
0 p. m.—Emerald Instrumental T 123 p. m.—E. F. O'Connor, barytone, 40 p. m.—Emeraid Instrumental Tric 1290k—WOKO—NEW YORK—233m p. m.—Anne Diamond, pianist, 10 p. m.—Hermance Sorp, soprano, 30 p. m.—Sunshine Sonny, p. m.—Mathida Zimbler, cellolst. 3 0p. m.—Viet Kaufman's Serenaders. p. m.—Vanity Orchestra.

1410k-WMSG-NEW YORK-213m

570k-WNYC-NEW YORK-526m

570k—WNYC-NEW YORK—526m
6:10 p. m.—Market High Spots.
6:20 p. m.—Plano selections.
6:20 p. m.—Plano selections.
7 p. m.—Advanced German lessons.
7 p. m.—Advanced German lessons.
7:30 p. m.—Police alarms.
7:35 p. m.—Male quartet.
8 p. m.—Baseball, John B. Foster.
8:15 p. m.—Wincent Lopez's Orchestration of the selection of the s

naire."

1345 p. m.—Soprano and tenor solo.

145 p. m.—Sibyl Huse, speaker.

105 p. m.—Sylvan String Trio.

130 p. m.—Talk, James P. B. Hyndman.

140 p. m.—Sylvan String Trio.

155 p. m.—WHAP men's quartet.

10:10 p. m.—Listener's variety; Lucile Wilkin, Dorothy Hoyle, Dart Bethmann, Phyllis Kraeuter, Ruth Montgomery. 1160k-WRNY-NEW YORK-258m

a. m.—Musical Courier says: 11-15 a. m.—Musical Courier says:
11-30 a. m.—Musical Courier says:
11-30 a. m.—Irene Ayres, soprano.
11-45 a. m.—Studio artist.
12-15 p. m.—Harvey Schloeman, songs.
12-30 p. m.—Betty Lang, soprano.
12-45 p. m.—Jack Fuld, planologues.
13-45 p. m.—Jack Fuld, planologues.
13-45 p. m.—Jack Fuld, planologues.
13-10 p. m.—Hadio Theater Index
13-20 p. m.—Jack Fuld, planologues.
13-30 p. m.—Jack Fuld, planologues.
13-30 p. m.—Jack Fuld, planologues.
13-5 p. m.—Haskell Propper, saxophone.
13-5 p. m.—Amateurs' debut hour.
13-6 p. m.—Mino Cooper, soprano.
13-30 p. m.—Florence Gorringer, planist.
13-30 p. m.—Florence Gorringer, planist.
13-30 p. m.—Florence Gorringer, planist.
14-30 p. m.—Sofferman's Milo Orchestra.
15-31 p. m.—Radio Theater Players.
11-31 p. m.—Radio Theater Players.
11-31 p. m.—Jack Ohnesorg's Orchestra.

45 p. m.—Frank Ramph, barytone, p. m.—Red Lion Orchestra.
p. m.—Warner Theater Hour.

p. m.—American Legion news. 15 p. m.—Ehris Meehan, tendr Holstein. 45 p. m.—Nita Nadine. 1:30 p. m.—Twin Oaks Orchestra. 2 midnight—Alvin E. Hauser, at party. 1430k-WBNY-NEW YORK-210m 5 p. m.—Movie Talk. . m.—U. S. Army Hour.

8 p. m.—U. S. Army Hour.
9 p. m.—Harmony Boys.
9:15 p. m.—Drawing Room Players.
9:45 p. m.—Evelyn Langwell, pianist.
10 p. m.—Orchestra.
10:15 p. m.—Louis Bring Entertainers.
10:30 p. m.—Blue Bird Songsters.
1100k—WBBE—STATEN ISLAND—273m 3 p. m.—Irene Kleinpeter, soprano.

5:10 p. m.—Grene Kleinpeter, soprano.

5:10 p. m.—Grene Twaroschk, pianist,

5:20 p. m.—"Radio in the Treatment o

Disease," Dr. Mae Work.

5:40 p. m.—George Twaroschk, pianist,

5:50 p. m.—Irene Kleinpeter, soprano.

950k.—WAHG—RICHMOND HILL—316m

950k.—WAHG—RICHMOND HILL—316m 2:02 p. m.—Grebe Matinee Trio.
30 p. m.—Walter Iooss, planist.
45 p. m.—Martha Brauninger, soprano.
p. m.—Synchrophase Hour.
p. m.—Abroad with Major Dent Atkin

son. 15 p. m.—Walter Leary, barytone 10:15 p. m.—Walter Leary, barytone.
10:02 p. m.—Helen Jacobs, violinist.
10:20 p. m.—Ferrucci's Radio Raiders.
12 midnight—The Orionites.

740k—WOR—NEWARK—405m
6:45, 7:15, 7:45 a. m.—Gym class.
2:30 p. m.—Laura Emond, soprano.
2:45 p. m.—Howard Mallen's Frolics.
3 p. m.—Laura Emond, soprano.
3:15 p. m.—Johnny Cantwell, songs.
3:30 p. m.—Hsyry Jentes, planist.
3:45 p. m.—Charm Magazine, "French Provincial Furniture." 145 p. m.—Charm Magazine, "French Provincial Furniture."
115 p. m.—Bill Wathey, "Sports."
130 p. m.—Jacques Jacobe's Ensemble.
130 p. m.—Copenhagen Quartet.
p. m.—"Current Topics" lecture, H.

p. m.—"Current topics
Kaltenborn.
8:30 p. m.—Gloria Gordon, songs.
8:45 p. m.—Boatmen Balalaka Orchestrs
9 p. m.—Louis Chartier, barytone,
9:30 p. m.—Jascha Gurewich, saxaphone. 5 p. m.—Hofbrau Haus Orchestra. 9 p. m.—News bulletins. 5 p. m.—Fifth Avenue Orchestra. 1140k—WAAM—NEWARK—263m 1140k—WAAM—NEWARK—Zoom
a. m.—Happy Hour program.
. m.—Ben Goldfarb's Orchestra
b. m.—Hesume of sports.
c. m.—Sunshine Assembly.
c. m.—Rev. MacPherson's Fellowship

9 p. m.—Chamber of Commerce.
10 p. m.—Joe Brown's Orchestra.
1190k—WGCP—NEWARK—252m 6 n.—Daniel Patrone, violinist.
5:15 p. m.—'Making Ice Cream at Home."
6:30 p. m.—Plano duetists.
8:30 p. m.—Pvano duetists.
8:30 p. m.—Vesuvian Four.
9 p. m.—Bradley and Blackwell, songs.
10:15 p. m.—Betty Nemerson, soprano.
10:30 p. m.—Bradley and Blackwell, novelties. novelties.

10:45 p. m.—Betty Nemerson, soprano.

11 p. m.—Llewellyn and Browne, harmo

boys.
1:15 p. m.—Hiawatha Orchestra.
1340k—WODA—PATERSON—224m 2 noon-Studio trio; concert mus p. m.—Populaf songs; news, 50 p. m.—Sport talk. p. m.—Stanley Todd's Orchestra, 50 p. m.—"Plays Worth While," Gilbert. m.—Madoc Association; talk. p. m.—Norman Strutt's Orchestr p. m.—Norman Strutt's Orchest p. m.—Dance music. p. m.—The Volstead act; talk. p. m.—M. E. K.'s gang.

10 p. m.—Popular songs.
760k—WILT—PHILADELPHIA 295m
12:65 p. m.—Organ recital; religious service.

2:35 p. m.—Concert Orchestra.

2 p. m.—Concert Orchestra.

2:30 p. m.—Heart talk; news.

3:35 p. m.—Artist recttal.

5 p. m.—Talk, auspices Peirce School.

5 p. m.—Talk, auspices Peirce School.
5:15 p. m.—Sesquelcentennial program.
7:30 p. m.—Dream Daddy.
8 p. m.—Short argo waves.
8:15 p. m.—Arcadia Concert Orchestra.
9 p. m.—Stanley Theater hour.
10 p. m.—Arcadia Dance Orchestra.
10:30 p. m.—El Patio Dance Orchestra.
590k—WOO—PHILADELPHIA.—508m a. m.—Grand organ. (noon)—Luncheon music. :45 p. m.—Grand organ and trumpets, 30 p. m.—Dinner music.
p. m.—Grand organ recital.
30 p. m.—Address, the Rev. Forest Dager,
p. m.—Music by Gypsies.
0 p. m.—Grand opera, "Martha."
590k—WIP—PHILADELPHIA—508m m.—Luncheon music m.—Violin recital, m.—Market hints

4 p. m.—Market hints,
4:15 p. m.—'Home Gardening.''
6:05 p. m.—Dinner music.
7 p. m.—Roll call and dancing lesson.
760k—WFI-PHILADELPHIA—395m
10:30 a. m.—Civic Pride Association.
10:40 a. m.—Home service talk.
1 p. m.—Tea Room Ensemble.
3 p. m.—Josh Saddler's Serenaders.
6:30 p. m.—Concert Orchestra.
7 p. m.—Dance orchestra.

1080k-WCAU-PHILALELPHIA-278m 080k.—WCAU—PHILALELPHIA—278m

30 p. m.—Recital by artists.
p. m.—Carolyn Thomas, soprano.

30 p. m.—The Hood Boys.

45 p. m.—Enright's Gems.
p. m.—The Merry Minstrels.

30 p. m.—Jackson and Ellis, radio
sweethearts.

0 p. m.—Madrigal Mixed Quartet.

1090k-WHAR-ATLANTIC CITY-275m p. m.—seaside 1710.
30 p. m.—Book review.
45 p. m.—Industrial talk.
p. m.—Seaside Trio.
p. m.—Bergere Dance Orchestra.

1000k-WPG-ATLANTIC CITY-300m ok—WPG—ATIANTIC CITY—300m
p. m.—Tea music.
p. m.—Tea music.
m.—Talk by Arthur Eldred.
p. m.—Morton dinner music.
m.—Children's hour.
p. m.—'The Care of Children's Feet.'
p. m.—Plano recital, Alice Hachse.
m.—Ambassador Concert Orchestra
arry Loventhal, director.
m.—Vocai recital.

m.—Vocal recital.
p. m.—Tall Cedars of Leband band concert and frolic. :15 p. m.—Eddie McKnight's Danc 790k—WHAZ—TROY, N. Y.—380m p. m.—Concert by Students' Band. 30 p. m.—Address, Professor F. Abbul. 345 p. m.—R. P. I. Glee Club. 790k-WGY-SCHENECTADY-380n 30 p. m.-Reports

790k—WGY—SCHENECTADY—380m
2:30 p. m.—Reports.
p. m.—Asia Orchestra.
:30 p. m.—Music; "Cooking Lesson";
Cornell talk.
p. m.—Stock reports; news.
:30 p. m.—Dinner program.
:30 p. m.—Baseball scores.
:35 p. m.—Mary Krause; WGY Orchestra.
:15 p. m.—WGY Orchestra. m.—WGY Orchestra. 1130k—WMAK—BUFFALO—266m 15 p. m.—Daily news.
30 to 8 p. m.—Murray Whiteman's Ser

o 9 p. m.—S. Kinney and friends. to 11 p. m.—Musical program. 940k—WGR—BUFFALO—319m 940k—WGR—BUFFALO—319m
6:30 p. m.—Dinner music.
8 p. m.—Buffalo State Normal Sch
musical organizations.
9 p. m.—Musical program.
10 p. m.—Temple Beth Zion choir.
11 p. m.-1 a. m.—Vincent Lopez's Orch

tra. 1080k---WHAM---ROCHESTER---278m .05 p. m.—Musical program. .45 p. m.—Musical program. p. m.—A. and P. Gypsies. p. m.—Grand Opera Hour. .630k—WTIC—HARTFORD—476m

15 a. m.—Medical talk. 25 a. m.—Vtolin solos, Beatrcie Torgar 30 a. m.—WTIC's Housewives' Forum 05 p. m.—Travelers Orchestra. 0 p. m.—The children's entertainer. 6:50 p. m.—The children's entertain 6:50 p. m.—Hub Trio. 8:15 p. m.—Solos, George. Harvey. 8:30 p. m.—Capitol Theater Orchestra 8:45 p. m.—'Running Your Farm Profit."

Profit."
9 p. in.—Selections from opera, "Patience."
high school students.
9:30 p. m.—Emil Heinberger's Dance Orchestra.

D. m.—Grand Opera Hour.

D. m.—Travelers Symphonic Ensemble.

1070—WNAC—BOSTON—280m m .- Women's Club talks; music news. :15 p. m.—Organ recital.

p. m.—I.uncheon concert. 55 p. in.—Play by play reports, Brave vs. Brooklyn.
6 p. m.—Krazy Kat Kiddies' Club.
6:30 p. m.—Lido Venice dinner dance.
8 p. m.—Metropolitan Theater studio concert.
9 p. m.—Metropolitan Grand Orchestra.
10 p. m.—"The Associated Press in For-

oncert.

p. m.—Metropolitan Grand Orchestra

p. m.—Metropolitan Grand Orchestra

10 p. m.—"The Associated Press in leign Fields," F. E. Williamson.

11:30 p. m.—Orkan recital.

860k—WEEI—BOSTON—349m m.—Events of the day.
p. m.—Bert Arnold's Orchestra.
m.—Rainbow Ramblers.

m.—Rainbow Ramblers.
p. m.—Stock market; business no p. m.—Lost and found.
p. m.—Lost and found.
p. m.—Big Brother Club.
p. m.—Big Brother Club.
p. m.—Betic Walker.
p. m.—Poetic Walker.
p. m.—Musicale.
i. p. m.—Burdett College talk.
m.—A. and P. Gypsies.
p. m.—Joe Rines's Orchestra.
0 p. m.—Joe Rines's Orchestra.
0 p. m.—E. B. Rideout, meteorologo.
m.—Lenox Ensemble.
p. m.—'Theatrical Gossip," in the control of the college of the college

wren.
p. ni.—Capitol Theater Orchestra.

anniversary.

10:30 p. m.—Leo Reisman's Orchestra.

1120k—WTAG—WORCESTER—268r 120R—WTAG—WOLLSTIER—com
10:30 a. m.—Musical selections; talk.
12:05-2 p. m.—Luncheon music.
7 p. m.—Science talk.
7:10 p. m.—"Twilight Scouts."
7:45 p. m.—Official Boy Scout.
8:30-9 p. m.—Program to be announced.
9-10 p. m.—"Robin Hoood" hour of music.
10:11 m. m.—"Robin Hoood" hour of music. 9-10 p. m.—"Robin Hoood" nour of mus 10-11 p. m.—Grand opera. 640k—WRC—WASHINGTON—469m 12 noon—"Fifty Farm Flashes." 12:30 p. m.—Organ recital. 1 p. m.—Raleigh Orchestra. 5:45 p. m.—"Things Talked About." 640k—WCAP—WASHINGTON—469m

640k—WCAP—WASHINGTON—469m
46 a. m.—Tower health exercises.
to 11 p. m.—Program from studio; pr
gram from WEAF.
1220—WBAL—BALTIMORE—246m
p. m.—WBAL Sandman Circle.
30-7:30 p. m.—Dinner orchestra.
30 to 8 p. m.—Organ recital.
to 9 p. m.—Musical program by artis
to 9:10 p. m.—Talk by Dr. L. Miles. 10 p. m.—Musical program.
—WCAE—PITTSBURGH—461n

Wave

MONDAY, APRIL 26

Twin Oaks

Astor
Norman Strutt's
V. Lopez
Capitol
WGY Orchestra
Heimberger's
Arcadla
Sofferman's
Vanity
Leroy Smith
Paul Specht's
Leo Reisman's
H. Leonard's/
Hofbrau
Ben Bernie's
V. Lopez
Adelphia
Bergere's

Bergere's
Fifth Avenue
Hiawatha
Dance music
Jack Denny's

361 Janssen's

Station length

WMCA 341

WJZ 254
WNYC 2526
WTIC 476
WGY 380
WTIC 476
WLIT 395
WRNY 253
WHN 361
WSG 213
WBZ 900
WJZ 455
WOR 405
WGAF 319
WOO 586
WHAR 275
WOR 405
WGP 252
WFBH 273
WMCA 341

WHN

9:00 10:45

11:15 11:30 11:30

10 p. m.—Grand opera. 11:05 p. m.—Dance orchestra.

m.—Orchestra. . m.—Housekeepers' half hour

TUESDAY,
WHN 361
WODA 224
WGY 300
WPG 300
WAAM 262
WCAU 278
WRC 469
WGBS 316
WFI 395
WMSG 213
WNYC 528
WJZ 455
WPG 300
WEAF 300
WFBH 273

WGBS 316
WJZ 455
WOR 405
WCAU 278
WAAM 263
WEBJ 273
WNYC 526
WHN 361
WLIT 395
WMCA 341
WAHG 316
WMSG 213

WEDNESDAY, APRIL 28

Daylight Saving Time

1040k.—WLWL—NEW YORK—288m 9 p. m.—Florence Freeman, pianist. 9:15 p. m.—"Speedwriting." 9:30 p. m.—Premier Male Quartette. 9:45 p. m.—Edith Fay, soprano. 10 p. m.—"Timely Topics", Rev. Jar 970k-KDKA-PITTSBURGH-809n 6:30 p. m.—Dinner concert. 8 p. m.—News and market period. 8:15 p. m.—University of Pittsburgh acdress.

TUESDAY

660k-WJZ-NEW YORK-455m m.—Pennsylvania luncheon music.

Arden.
4.25 p. m. "Vines, Hardy and Tender,"
Olive Foster.
4.35 p. m. — Commodore tea concert.
5.32 p. m. — Market quotations.

5:32 p. m.—Market quotations.
5:35 p. m.—Financial summary.
5:40 p. m.—Prices and quotations.
5:50 p. m.—Farm market reports.
7 p. m.—Frank Dole, of the New York
Herald Tribune, "Manchester and Bellington Terriers."
7:30 p. m.—U. S. Marine Band.
8:30 p. m.—The Deltah Pearl Hour, "Aquamarine" marine."

10 p. m.—The Grand Tour, 'Northern Ireland."

10:45 p. m.—George Olsen's Orckestra. 610k-WEAF-NEW YORK-492m

1:25 a. m.—Meieanor Greene, soprano.
1:35 a. m.—Motion picture forecast.
1:50 a. m.—Eleanor Greene, soprano.
2 (noon)—Market and weather reports.
p. m.—Forest Hills Ensemble:
30 p. m.—Women's program, United
Synagogne of America.
p. m.—Vincent Lopes's Orchestra.

570k—WNYC—NEW YORK—528m 6:45 p. m.—Market High Spots. 6:55 p. m.—Piano selections. 7:05 p. m.—'Americanization,'' Hern

artists.

8 p. m.— "The Grand Prize Eurekas."

8 p. m.— "The Gold Dust Twins."

9 p. m.— "Eveready Hour."

10 p. m.— "Variety Hair-Hour."

10:30 p. m.— Vincent Lopez's Orchestra. 950k-WGBS-NEW YORK-316m

p. m.—Whall dayer, singer.

10 p. m.—Margaret Mayer, singer.

20 p. m.—French lessons; songs.

40 p. m.—Plano lessons; songs.

p. m.—Uncle Geebee.

30 p. m.—Theo Alban, tenor.

45 p. m.—Educational camp exhibiti

830k-WHN-NEW YORK-361m

p. m.—Loew's Edward of the chestra.

9:80 p. m.—Isabelle Henderson, soprano.

9:45 p. m.—Giles O'Connor, ukulelei

10 p. m.—O'Brien Brothers, mandoiin a guitar.

(0:16 p. m.—Frances Sper, contralto.

(0:30 p. m.—Anatol Friedland.

(11 p. m.—Loew's Lexington Organ Recital.

11:30 p. m.—Sophie Tucker's Playground.

12 midnight—Harry Richman's Enter-

riment and melody,
330 p. m.—Leonard O'Hara, vocal solo.
335 p. m.—James MacDonald, baritone.
345 p. m.—Boys' band.

1100k-WFBH-NEW YORK-273m 3 p. m.—Housekeepers' half hour.

3:30 p. m.—Original Interstate Orchestra

4:30 p. m.—Lou Henkel, songs.

4:45 p. m.—Adeline K. Bierman, songs.

5 p. m.—Warner Theatre hour...

6 p. m.—Katherine Connelly, songs.

6:15 p. m.—Radio talk, Bill Schudt.

6:30 p. m.—Majestic String Ensemble.

11:30 p. m.—Connies' Inn Orchestra.

10 p. m.—"Timely Topics", Rev. o M. Gillis. 10:15 p. m.—Premier Male Quartette. 10:30 p. m.—The Commonweal. 10:45 p. m.—Sara Dunn, soprano.

880k—WMCA—NEW YORK—341m 10:15 a. m.—Morning News Letter;

1:30 a. m.—Maraet 3:30 p. m. 12 noon—"Making a New Face."

reports.
a. m.—Ida Allen's Homemakers' Club.
30 a. m.—Market reports (hourly to

m.—Entertainers.
p. m.—Closing reports; news items.
p. m.—Entertainers, Charles Purcel
m.—News items.
m.—String Ensemble.
p. in.—To be announced.
m. Twin Oaks Orchestra.
p. m.—Sach's Quality Boys.
p. m.—Palmer, Pen Lesson.
p. m.—California Rambiers.
m.—Musical program.
p. m.—Harry T. Ralness, "How tive."

Drive."
0 p. m.—Musical program.
0:30 p. m.—Tango Garden Orchestra.
1 p. m.—Ernie Golden's Orchestra.
2 midnight—McAlpin Entertainers.

1410—WMSG—NEW YORK—213m
30 p. m.—Dance orchestra.
p. m.—Sport talk.
15 p. m.—Dorothy Chapman, soprano.
30 p. m.—Theo Alban, tenor.
45 p. m.—Horace Taylor, recitations.
p. m.—Jayne and Kathryn Donovan.
15 p. m.—Dorothy Chapman, soprano.
130 p. m.—Donovan Sisters.
145 p. m.—Orchestra.
16 20 p. m.—Paul Specht's Dance Orchest

35 p. m.—Orchestra. 30 p. m.—Paul Specht's Dance Orche

p. m.—Americanization, atourette.

5 p. m.—E. Ahlers, soprano.

9 p. m.—Police alarms.

5 p. m.—Pilno, "Winter Russell.

9 p. m.—Plano selections,

9 p. m.—Baseball results,

95 p. m.—Piano recital, Selma Slotkin,

30 p. m.—Cantor Calman Spivack's Chr

130 p. m.—Cantor Calman Spivack's Choir Sol Fuchs, barytone. p. m.—"Thoughts of Education and Lan guage;" Joseph V. Crowne. 1:20 p. m.—Oxby Male Quartet. 10:10 p. m.—"Venice," Henry R. Fritz. 10:30 p. m.—Police alarms; weather. 10:30 p. m.—Imperial Orchestra.

1160k-WRNY-NEW YORK-258m

1480k-WBNY-NEW YORK-210m

m.—Joseck "Himself."
p. m.—Dramatic talk.
p. m.—Babe Adler, songs.
p. m.—Bagmar Dance Orchestra.
p. m.—Sterc Andrews, uke.
m.—Rose Fisher, pianist.
p. m.—Ruth Jackson, soprano.
p. m.—Dagmar Orchestra.
p. m.—Dagmar Orchestra.
p. m.—Dagmar Orchestra.

950k-WAHG-RICHMOND HILL-3

n.—Trio. n.—Joseck "Himself."

11 a. m.—Millinery trend.
11:15 a. m.—Club Women's Hour.
12: noon.—Organ recital.
6:50 a. m.—Law series—Amy Wren.
7: p. m.—Sports, commerce.
7:20 p. m.—Wolfe Kaufman—musical
7:30 p. m.—Lester Bingley, Clara Mathduet.

1410-WMSG-NEW YORK-213m

on—'Making a Mariculture.

n.—Department of Agriculture.

n. m.—Olcott Vail's String Ensem.—Sherman and Neale, songs.

m.—News service.
, 5:30, 7:30, 10:30 p. m.—News service.
m.—"Your Daily Menu."
p. m.—"A Beautiful Skin," Elizabeth

45, 7, 7, 20 a. m.—Health exercises. 45 a. m.—Prayer services. 1 a. m.—Eleanor Greene, soprano. 1 a. m.—"My Job," Winter Russell.

p. m.—Vincent Lopez's Orchestra.
p. m.—Dinner music.
50 p. m.—Marion Cara, soprano.
p. m.—"Americantzation Day," Walter p. m.—"Americanization Day," Walter Joyce.
:10 p. m.—Columbia University French course. 30 p. m.—Mabelanna Corby and assisting

950k—WGBS—NEW YORK, 310m.
10 a. m.—Timely Talks with Terese,
10:10 a. m.—Laura Remsberg, soprano.
10:15 a. m.—Radio gym class; songs.
1:35 a. m.—Salads and sandwiches; songs.
1:35 p. m.—Stripture reading.
1:40 p. m.—Irving Rose, songs.
1:50 p. m.—Hansen and Howard, duets.
1:10 p. m.—Hansen and Howard, songs.
1:30 p. m.—Educational camp exhibition.
3 p. m.—William Carroll, "Young Men in Democracy."

7:30 p. m.—Lester Bingley, Clara Mather—duet.
7:45 p. m.—'What diseases and habits are inheritable," by H. Winfield Secor.
8 p. m.—First time in America, simultaneous musicale or orchestra and organ, separated by four miles, orchestra at Hotel Roosevelt, organ at West Side Unitarian Church.
8:45 p. m.—Oscar Saenger Opera Company

pany.

9:15 p. m.—Huarte's Spanish Ensemble.

9:45 p. m.—'What We Know of Frequencies,' Leon L. Adelman.

10 p. m.—Anita Browne's Musicale.

11 p. m.—Up and Down Broadway. 2:30 p. m.—Loew's Organ Recital.

3:15 p. m.—Overture and vaudeville from
Loew's State Theater.

15-4:30 p. m.—Loew's Lexington Orchestra.

3:15-4:39 p. m.—Leona Hogarth, singing.
6:15 p. m.—Leona Hogarth, singing.
6:30 p. m.—Everglades Orchestra.
7 p. m.—Vincent Lopez Iceland Orchestra.
7:30 p. m.—Will Oakland's Chatheau.
8 p. m.—Treasure Neighbors.
8:30 p. m.—Eva Rothenberg, planist.
8:45 p. m.—Prince Piotti, songs.
9 p. m.—Loew's Eighty-third Street Orchestra.

950k—WAHG—RICHMOND HILL—316 2:02 p. m.—Musical program. 740k—WOR—NEWARK—405m 3:45-7:15-7:45 a. m.—Gym class. 2:30 p. m.—Vivian Sherwood, contrals Le Roy Montesanto, tenor. 1:30 p. m.—Children's violin recital. 2:30 p. m.—Bill Wathey. "Sports." 2:30 p. m.—Bill Wathey. "Sports." p. m.—Bretton Hall String Quar 1140k—WAAM—NEWARK—263

iners.

1100k—WEBJ—NEW YORM—
BOYS' Hand.

115 p. m.—'The Boy in His Home and Church."

8:34 p. m.—James MacDonaid, barytone.
7:25 p. m.—Edward Feldbauer, violin solo.
7:35 p. m.—Double quartette of clubs.
7:45 p. m.—'The Boy and His School."
7:50 p. m.—Frank Trautman, entertainer.
8 p. m.—Constanza De Salvo, cornet solo.
2:05 p. m.—'Boy and His Recreation."

Double quartette.

Double quartette.

Citizenship and

7 p. m.—Danny Lewis.
7:10 p. m.—Danny Lewis.
7:45 p. m.—'Building a Skyscraper, fessor H. N. Cummings.
8 p. m.—'The Place of Trees in Men's Affairs."
9 p. m.—Y. M. C. A. hour of music.
10 p. m.—Red Naught's Collegians.
1199k—WGCP—NEWARK—252m
7:15 p. m.—Lucy West, planiste.
7:30 p. m.—Wytile McMichael, soprano.
7:15 p. m.—Lucy West, planiste.
7:30 p. m.—William E. Needham, bary tone.

Beatrice Cowie, contraito.

tone.

45 p. m.—Beatrice Cowie, contraito.

p. m.—Gene Sneden, songs.

15 p. m.—May Ensenat, soprano.

1340k—WODA—PATERSON—224m 1340k—WUDA—PATEKSUN—224m
5:30 p. m.—News; sport talk.
6 p. m.—Jimmy Love's Orchestra.
7 p. m.—A. B. C. period.
8 p. m.—Local happenings; talk.
8:15 p. m.—Jerry La Salle's Orchestra.
9 p. m.—Citizens Trust Company.
9:15 p. m.—Entertainment.
9:30 p. m.—Seligson Sisters, Sam Cohsongs. 9:30 p. m.—Seligson Sisters, songs. 10 p. m.—Edwin Becker, barytone, 10:45 p. m.—Orchestra, 11 p. m.—Clifford Lodge Frolic.

THURSDAY, APRIL 29

WMCA 341
WEAF 492
WOO 508
WRNY 258
WPG 300
WJAR 306
WOKO 233
WMSG 213
WJZ 455
WGBS 316
WHN 361
WEAF 492
WIP 508
WMCA 341
WHAR 275
WHN 361
WGOP 252

WEAF

George Olsen's H. Barrett's Fifth Avenue

APRIL 29
Dance music
Adelphia
Ben Bernie's
Dance music
Robert Powers
Vanity
Paul Specht's
Freddie Rich's
Arcadia
Leroy Smith
V. Lopez
Leviathan
E. Golden's
Bergere's
Everglades
Lyric

Markel's
Dance music
Blue Bell
Dance music
Arcadia
Dance music

760k-WLIT-PHILADELPHIA-395m 11 a. m.—Organ recital.
12:20 p. m.—Religious service.
12:35 p. m.—Orchestra.
2 p. m.—Concert orchestra.
2:30 p. m.—"Household Hints."
4:30 p. m.—Republican news flashes.
4:35 p. m.—Women of Pennsylvania

7:30 p. m.—Dream Daddy. 7:50 p. m.—Plays reviewed. 760k—WFI—PHILADELPHIA—395m p. m.—Tea Room Ensemble.
p. m.—Studio program.
30 p. m.—Concert orchestra.
p. m.—Dance orchestra.
to 11 p. m.—Program from WEAF.
590k—WOO—PHILADELPHIA—508m

12 (noon)—Luncheon music.
445 p. m.—Grand organ and trumpets.
7:30 p. m.—Philadelphia Sesquicentennial.
8100k—WCAU—PHILADELPHIA—278m
6:30 p. m.—The Parodians.
7:30 p. m.—Shellenburg Instrumental Trio.
8 p. m.—The Theater Digest.
8:10 p. m.—The Theater Digest.
8:25 p. m.—Peter Ricci, barytone.
8:25 p. m.—Peter Ricci, barytone.
8:45 p. m.—Peter Ricci, barytone. 45 p. m.—Charles Higgins, Joe Burke,

songs.

p. m.—The Blind Gospel Singer.

130 p. m.—Esther Lawrence's Players.

0 p. m.—Eddie Malle, Danny Dougherty, songs. 10:30 p. m.—Billy Hays's Orchestra. 590k—WIP—PHILADELPHIA—508m 590k—WIR—PHILADELPHIA—508m

1 p. m.—Organ recital.

3 p. m.—'Victory Over Death.''

3 p. m.—Velvetone Saxophone Sextet.

6:05 p. m.—Monte Cross, "Oldtimer."

6:15 p. m.—S. S. Leviathan Orchestra.

7 p. m.—Plane solo.

8 p. m.—Dramatic reviews.

8:15 p. m.—University of Pennsylvan Orchestra.

15 p. m.—Schmidt String Quartet. 0:05 p. m.—'Emo's Movie Broadcast.
0:30 p. m.—Little Jack Little.
11 p. m.—El Patio Orchestra.
1090k—WHAR—ATLANTIC CITY—275m

p. m.—Seaside Trio. :30 p. m.—"Glimpses Through the Stage 4:3 p. m.—Seaside Trio. 1000k—WPG—ATLANTIC CITY—300m

1000k—WPG—ATLANTIC CITY—300
1330 p. m.—Luncheon music.
6:45 p. m.—Organ recital.
7 p. m.—Traymore dinner music.
7:45 p. m.—Fashion flashes.
8 p. m.—Plaza artists.
9 p. m.—Hall Dual Trio.
10 p. m.—Dance orchestra.
10:30 p. m.—Piano recital.
11 p. m.—Eddie McKnight's Dance chestra.

1:30 p. m.—Organ recital.
3 p. m.—Stock reports; news.
1:30 p. m.—Vań Curler Orchestra
1:30 p. m.—Baseball scores.
1:35 p. m.—Address, "How Ole
Barth?"

land," from WJZ. 1130k-WMAK-BUFFALO-366m 5 p. m.—Dinner music.
5 p. m.—Daily news.
10 p. m.—Sunday school council.
5 p. m.—Lecture at First Church
Christ Scientist rist Scientist.
940k—WGR—BUFFALO—319m

M.—Home economics talk.
m.—Dinner music.
m.—Dinner with WEAF. p. m.—Eastman Theater m.—Recital.
p. m.—Baseball scores.
m.—Dinner concert. m.—Baseball scores. 980k—WJAR—PROVIDENCE—806m

1:05 p. m.—Concert ensemble. 7:30 p. m.Musical program. 8-10 p. m.—Program from WEAF. 1070k—WNAC—BOSTON—280m 10:30 a. m.—Women's Club talks; news.
12:15 p. nr.—Noon service.
1 p. m.—Shepard Colonial luncheon co . m.—Broadcast from Metropolitan The

ater.
6 p. m.—The Smilers.
6:30 p. m.—Dinner dance.
8 p. m.—The Radiant Ensemble. m.—Musical program. 860k—WEEI—BOSTON—349m -11 p. m.—Program from WEAF.

900k—WBZ—SPRINGFIELD—333m p. m.—Farm Flashes, 15 p. m.—Kimball Trio. 10:20 p. m.—Gordon Hampson, planist.

880k—WMCA—NEW YORK—341m
10:15 a. m.—Morning news letter; mar reports.
11 a. m.—Housewife period.
11:30 a. m.—Market reports (hourly to 1120k-WTAG-WORCESTER-268m

to 8;30 p. m.—Selected topics from 3:10 p. m.—New nited States History by H. Allan Dickie, f. p. m.—News to 11 p. m.—Program same as WEAF.

640k—WRC—WASHINGTON—469m

United States History by H. Allan Dickie, 9 to 11 p. m.—Program same as WEAF, 640k—WRC—WASHINGTON—469m

1 p. m.—Washington Orchestra.

7 p. m.—Radio School of International Relations.

7 p. m.—Lost and Found Department 5-5:25 p. m.—News items.

8 p. m.—Clost with Ensemble.

8 p. m.—Clost vail's Ensemble.

8 p. m.—Clost Vail's Ensemble.

8 p. m.—Clost vail's Ensemble.

8 p. m.—Errie Golden's Orchestra.

9 p. m.—To be announced.

10 p. m.—To be announced.

10 p. m.—To be announced.

10 p. m.—Tango Garden Orchestra.

10 p. m.—Tango Garden Orchestra.

11 p. m.—Music.

120 p. m.—Lost and Found Department 5-5:25 p. m.—News items.

9 p. m.—Errie Golden's Orchestra.

10 p. m.—Mamaroneck Night.

10 p. m.—Tango Garden Orchestra.

11 p. m.—Mamaroneck Night.

10 p. m.—Tango Garden Orchestra.

11 p. m.—Hofbrau Haus Entertainers.

11 p. m.—Hofbrau Haus Entertainers.

11 p. m.—Musica program.

9 p. m.—Jack Denny's Orchestra.

12 p. m.—Mostor principles.

11 p. m.—Almon and Bower. violin recital 8.45 p. m.—Monon Morgan, excerpts of Shakespeare.

9 p. m.—Vitali Koretsky, tenor.

10 p. m.—Washington Orchestra.

10 p. m.—Vitali Koretsky, tenor.

10 p. m.—Washington Orchestra.

10 p. m.—Vitali Koretsky, tenor.

10 p. m.—Washington Orchestra.

11 p. m.—Almon and Bower. violin recital 8.70 p. m.—Vitali Koretsky, tenor.

10 p. m.—Paymond Maher, barytone.

10 p. m.—Washington Orchestra.

10 p. m.—Almon and Bower. violin recital 8.45 p. m.—Monon Morgan, excerpts of 9 p. m.—Vitali Koretsky, tenor.

10 p. m.—Musica.

Dance Orchestras for This Week

Roseland Lorraine Grill Southland Paul Specht's

Ben Devis's

Aeolian Connies' Jack Denny's Dance music Humming

Dance music Arcadia Cosey Adelphia Ben Bernie's Dance music Vanity Dance music Raderman's Carroll's

SATURDAY, MAY 1

WPG WGBS WFBH WOO WRNY WPG WOKO WIP WEAF WTIC WJZ WGBS WMSG

WMSG WMCA WGCP WEAF

7:30 7:30 7:30 7:30 8:15 10:00 10:05 10:30 10:30 10:30 10:30 10:30 11:00 11:00

WGY Orchestra

570k—WNYC—NEW YORK—526m 30 p. m.—Commonwealth Quarter m.—Instrumental program. p. m.—Songs. p. m.—"Alfred Noyes," Alex. Coleman. 3:10 p. m.—Market High Spots. p. m.—Plano selections.
p. m.—Elementary Spanish
m.—Advanced Spanish lesson m.—Advanced Spanish lessons.

'p. m.—Police alarms.

p. m.—Max Kalfus, tenor.

m.—Baseball results.

p. m.—Fishing, John J. Brawley.

p. m.—Phyllis Wagner, soprano.

p. m.—Civil Service Announcemer 9 p. m.—Flute, John A. Biggs.
9;20 p. m.—Pearl Miller, soprano.
9;35 p. m.—St. George Society Orchestra.
10:10 p. m.—'Trend of the Times," S. N.
Ussher.
10:30 p. m.—Police alarms; weather forecasts.
10:35 p. m.—St. George Society Orchestra.
10:37 p. m.—Plano recital.
10:38 p. m.—Organ recital.

1250k—NEW YORK—240m
3:30 p. m.—Holmes String Ensemble.
1:15 p. m.—Winifred Bauer, pianist.
1:40 p. m.—Vida Milholland, "Spiritual Politics." 10 p. m.—Vida Milholiand, "Spiritual Politics."

Politics."

p. in.—WHAP Madrigal Singers.

15 p. m.—News digest.

15 p. m.—Marion Kener, soprano.

15 p. m.—Heickman Price, "Overcoming Fear."

10 p. m.—Phyllis Kraeuter, 'cellist; Dari Bethmann, barytone.

130 p. m.—Augusta Stetson, reading. 1:15 p. m.—News digest. 1:35 p. m.—Marion Kener, soprano. 1:50 p. m.—Hickman Price, "Overcompart, and the second Bethmann, barytone.

130 p. m.—Augusta Stetson, reading.

10 p. m.—Mary Pinney, organ recital.

115 p. m.—John Warren Erb, planist; 8:30 p. m.—Playlet, "The One Woman, Phyllis Kraeuter, 'cellist; Marion C. WNAC Players.

150 Kener, soprano; Earl Palmer, tenor.

151 p. m.—Greater Boston Federation of Churches, and Churches,

970k—KDKA—PITTSBURGH—309m 8 p. m.—Dinner concert. 8 p. m.—Stockman-farmer news. 8:15 p. n.—University of Pittsburgh 30 p. m.—Phil Phillips, Sam Ward, e tertainers. : 45 p. m.—Jules de Vorzon, violinist. dress. 3:30 p. m.—Sacred songs by quartet. 1:35 p. m.—Grand Theater concert. 650k—WCAE—PITTSBURGH—461m 9 p. m.—"Community Civics." 9:10 p. m.—Robert Soffer, planologue. 9:20 p. m.—Al Peaches, solos; Jo Moglie, guitar. 9:30 p. m.—Original Melville Five.

WEDNESDAY 610k-WEAF-NEW YORK-492m 5-7-7:20 a. m.—Health exercises. 5 a. m.—Prayer services. 45 a. m.—Home Service Talk. 11:15 a. m.—Health Talk.

11:30 a. m.—Irving Cresse, planist.

11:40 a. m.—Columbia University lectur.

12 (noon)—Market and weather reports.

1:15 p. m.—Advertising Club luncheon speaker, Colonel Theodore Roosevelt.

4 p. m.—Parnassus String Trio.

4:30 p. m.—Elizabeth Smyth, soprano.

4:45 p. m.—New York Public Library stor

7 p. m.—Trio.
8 p. m.—Leroy Montesanto, tenor.
8 p. m.—Leroy Montesanto, tenor.
8:15 p. m.—Studio program.
8:45 p. m.—The Rover reciter.
9 p. m.—Andy Razof, Paul Denniker.
9:30 p. m.—Lillian Flosbach, soprano.
9:45 p. m.—Bob Brandes, songs. . m.-Vincent Lopez's Orchestra. p. m.—Vinner music.
p. m.—Synagogue services: talk, Char
Hofman; Manuel Comtinsky, violinist
30 p. m.—Chamber musicale.
p. m.—"The Shinola Merrymakers a
Gentleman of the 2 in 1." 950k—WAHG-RICH. HILL—316m 12:02 p. m.—Musicāl program. 7:30 p. m.—Margie Make-believe. 7:45 p. m.—Adeline Blermann, soprano. 8 p. n.—Beatrice Anthony, pianiste. 8:15 p. m.—Serenaders Plectrum Quintet. 8:55 p. m.—Old-fashioned quartet; Alber Reiss. soloist.

p. m.—Ipana Tronbadours.

D. m.—'Madame Angot,'' WEAF Light
Opera Company.

1-12 p. m.—Lou Roderman's Orchestra. 660k-WJZ-NEW YORK-455m m .- American News Service.

10:32 p. m.—Market quotations.
5:35 p. m.—Financial summary.
5:40 p. m.—Cotton quotations.
5:50 p. m.—Market reports.
7:50 p. m.—New York University.
7:30 p. m.—Market's Orchestra.
8:30 p. m.—Imperial Imps.
8:30 p. m.—Lewisohn Free Chamber Music concert.
9:50 p. m.—"Associated Press," H. Blakesee.
Blakesee.
10:30 p. m.—Utopia Dance Orchestra.
6:45-7:15-7:45 a. m.—Gym class.
2:30 p. m.—Janet Winters, soprano.
3:15 p. m.—Janet Winters, soprano.
3:15 p. m.—Janet Winters, soprano.
3:15 p. m.—Bill Wathey, "Sports."
6:30 p. m.—Jil Wathey, "Sports."
6:30 p. m.—Jil Wathey, "Sports."
6:30 p. m.—Til Orchestra.
6:45-7:15-7:45 a. m.—Gym class.
6:45-7:15-7:45 a. m.—Gym class 7 p. m.—Farm market reports.
7 p. m.—New York University.
7:30 p. m.—Markel's Orchestra.
8 p. m.—Imperial Imps.
8:30 p. m.—Lewisohn Free Chamber

10:45 p. m.—George Olsen's Orchestra.

950k—WGBS—NEW YORK—316m
10:10 a. m.—Louise Rice Women's Hour;
Willette Wilburn, singer.
1:35 p. m.—Scripture reading.
1:40 p. m.—Patricia Mason, soprano.
1:50 p. m.—Frank Galassi, uke and songs.
2:10 p. m.—Patricia. Mason and Fred Os-11:05 p. m.—Horace Taylor, reader.
1:55 p. m.—Patricia. Mason and Fred Os-11:05 p. m.—Fitth Avenue Orchestra.

the borne.

1,140k.—WAAM—NEWARK—263m
1,140k.—WAAM—NEWARM—NEWARM
1,140k.—WAAM—NEWARM—NEWARM
1,140k.—WAAM—NEWARM—NEWARM—NEWARM
1,140k.—WAAM—NEWARM—NEWARM
1,140k.—WAAM—NEWARM Earth?"

(46 p. m.—Marine Band.

(330 p. m.—Deltah hour of romance, "Aquamarine."

(3.20 p. m.—Roxano Erb, contralto.

(3.20 p. m.—Woldinano Tolo, m.—Welland Tolo, m.—Roxano Erb, contralto.

(3.20 p. m.—Mayor Witten, "Adventures in 9. m.—Roxano Erb, contralto.

(3.20 p. m.—Woldinano Tolo, m.—Welland Tolo, m.—Resume of 7.00 p. m.—Roxano Erb, contralto.

(4.50 p. m.—Woly or chestra; Isabelle Lenz, contralto.

(5.50 p. m.—Moly or chestra; Isabelle Lenz, contralto.

(5.50 p. m.—Woly or chestra; Isabelle Lenz, contralto.

(6.50 p. m.—Woly or chestra; Isabelle Lenz, contralto.

(7.50 p. m.—Welland Savoy Or chestra; Isabelle Lenz, contralto.

(7.50 p. m.—Welland Savoy Or chestra; Isabelle Lenz, contralto.

(7.50 p. m.—Welland Savoy Or chestra; Isabelle Lenz, contralto.

(7.50 p. m.—Welland Savoy Or chestra; Isabelle Lenz, contralto.

(7.50 p. m.—Welland Savoy Or chestra; Isabelle Lenz, contralto.

(7.50 p. m.—Welland Savoy Or chestra; Isabelle Lenz, contralto.

(7.50 p. m.—Welland) p. m.—Violinist.
) p. m.—George Brown, tenor.

m.—Busy Beavers.
m.—Verdure lawn and garden talk.
) p. m.—Wallie Osborne's Orchestra.
p. m.—Bill McWalters, songs.
1,190k.—WGCP—NEWARK—252m

7:10 p. m.—Williams Savoy Orchestra. 7:20 p. m.—Al Rosenberg, "Marathon Runm.—Tom Cooper's Orchestra.
m.—Beatrice Boehm, songs.
p. m.—Marion P. Duren, 830k-WHN-NEW YORK-361m 1 830k—WHN—NEW YORK—361m
1:30-3 p. m.—Loew's Metropolitan or
ture and vaudeville.
3:45 p. m.—Leon Berger's Orchestra.
4:10 p. m.—James Curtis, songs.
4:20 p. m.—Miriam Davis, soprano.
4:30 p. m.—Unic Robert's Pals.
5 p. m.—Ely Well, violinist.
7 p. m.—Kit Kat Entertainers.
7:30 p. m.—Loew's organ recital.
8 p. m.—Entertainers.
9 p. m.—Loew's New York Orchestra.
9:30 p. m.—Knoll and Lang, mandolin tipple. 1.340k-WODA-PATERSON-224m 2 noon—Dance musie.
2:30 p. m.—Concert selections.
p. m.—Studio program.
3:30 p. m.—News; sport talk.
p. m.—The Arcadians. 760k—WLIT—PHILADELPHIA—395m

7:30 p. m.—Loew's New York Orchestra.
9 p. m.—Loew's New York Orchestra.
9:30 p. m.—Knoll and Lang, mandolin and tipple.
9:45 p. m.—Mr. and Mrs. Leo Wood, songs.
10 p. m.—Roseland Dance Orchestra.
11:30 p. m.—Dram Daddy.
11:30 p. m.—Marguerite Barr Quartet.
11:40 WENT NEW WORK AREA. o p. m.—Arcadia Dance Orchestra.

760k—WFI—PHILADELPHIA—395n 1160k-WRNY-NEW YORK-258m 1160k—WRNY—NEW YORK—258m
1 a. m.—Arts and Decoration.
1:15 a. m.—Melledge's Women's Hour.
2: noon—Bob Schaeffer, songs.
2:15 p. m.—Pollack & Dorn, songs.
2:30 p. m.—Clifford Odets, reader.
2:45 p. m.—Mac & Lennie, songs.
30 p. m.—Al Lacks Dance Orchestra.
15 p. m.—Radio Theater Index,
20 p. m.—Viola Blanchey, soprano.
30 p. m.—Norman Secon, planist.
45 p. m.—Rose Laurent, Americ p. m.—Music; home service, p. m.—Tea room ensemble, p. m.—Studio program; Presbyterian. Training School.

0 p. m.—Concert

Training School.

30 p. m.—Concert orchestra.

p. m.—Dance orchestra.

590k—WOO—PHILADELPHIA—508m

1 a. m.—Grand organ.

2 noon—Luncheon music.

45 p. m.—Grand organ; trumpets.

30 p. m.—Dinner dance music. 5 p. m.—Ross songstress. m.—John Kallengger, concertina 8 p. m.—Dinner dance music.
8 p. m.—'Mystery Merrymakers.''
8:30 p. m.—Davis Saxophone Octet.
9 p. m.—Ipana hour.
10 p. m.—Fox Theater studio program.
10:30 p. m.—Dance music.
590k—WIP—PHILADELPHIA—508m.

p. m.—Roll call; songs. 1080k—WCAU PHILADELPHIA—278m

1 p. m.—King Cheerlo, Artie Bittong and his two hours of cheer.

190k—WGY—SCHENECTADY—380m

2:30 p. m.—Reports.

3:30 p. m.—Children's bed-time story.

1:50 p. m.—'Keeping History Up to Date,'
Russell Hathaway.
p. m.—'Book of Knowledge."

1:30 p. m.—Baseball scores.

1:35 p. m.—Onondaga Orchestra.

1:30 p. m.—Program from Eastman Theatre. p. m.—Musical program. 1130k—WMAK—BUFFALO—266m 7:15 p. m.—Daily news. 7:30-10:30 p., m.—Musical. 940k—WGR—BUFFALO—319m 3:30 p. m.—Dinner music.

3: to 10 p. m.—Jointly with WEAF.

10 p. m.—Patricia Boyle, planist.

11 to 12 midnight—Murray Whitema

Serenaders. 1080k—WHAM—ROCHESTER 278m p. m.—Theater organ.
p. m.—Baseball scores.
p. m.—Weather forecast.
p. m.—Eastman Theater Orchestra :05 p. m.—Al Billincoff's Orchestra.
:30 p. m.—Chamber musical.
p. m.—2-and-1 Man and the Shine
Boys.

30 p. m.—Davis's Saxophone Octette.
p. m.—Musical program.

5:50 p. m.—Stock market, business nev 5:13 p. m.—Joe Rines's Orchestra. 5:45 p. m.—Big Brother Club. 7:30 p. m.—Peerless Tours, Joe Toye, 3-11 p. m.—Program same as WEAF.

900k.—WBZ.—SPRING FIELD.—33m 7 p. m.—Kimball Trio. 7.15 p. m.—Lenox Ensemble. 7.30 p. m.—"The Music Mirth Makers." 8 p. m.—Radio Nature League. 8:30 p. m.—WBZ Concert Company. 9:30 p. m.—The Holyoke Hour." 10:30 p. m.—To be announced. 1120k-WTAG-WOLCESTER-268n 10:30 a. m.—Musical selections; talk, 12:05-2 p. m.—Noon day luncheon music, 4:45 p. m.—Talk, Robert K. Shaw, 7:15 p. m.—Twinkle Twinkle Story Teller, 7:40 p. m.—To be announced, 8-11 p. m.—Program same as WEAF, 640k.—WRC.—WASHINGTON—469m, 12 (noon)—"Fifty Farm Flashes."

2 (noon)—"Fitty Farm Flashes."
2:20 p. m.—Organ recital.
p. m.—Lee House Trio.
15 p. m.—Meyer Davis's Band.
p. m.—"Housekeepers' Half Hour."
5:20 p. m.—Organ recital. 640k-WCAP-WASHINGTON-469m 145 a. m.—"Tower Health Exercises." 130-11 p. m.—"Matters Before the House"; program from WEAF, 970k—KDKA—PITTSBURGH—309m :30 p. m.—Dinner concert.
p. m.—"Stockman-Farmer" news.
:15 p. m.—University of Pittsburgh address.

dress.
8:30 p. m. — Mary Redmond, violinist;
9:Gladys Landefeld, soprano; David Ewing;
barytone; Adalaine Merrill Biddle;
Franklin Biddle, reader,
6:50k-WCAE-PITTSBURGH-461m 6:30 p. m.—Dinner concert; 8 p. m.—Sinola Boys, 330 p. m.—Davis Saxaphone Octet, 9 p. m.—Studio concert. p. m.-Kramer's Orchestra

THURSDAY

610k-WEAF-NEW YORK-492m 45-7:20 a.m.—Health exercises. 45 a.m.—Prayer services. 1 a.m.—Emilie Underhill, soprano. 1:10 a.m.—"A. New Dress for Spring

Fish."
11:20 a. m.—"Margarine," by Esther L. Branch.
11:30 a. m.—Emille Underhill, soprano.
11:40 a. m.—Columbia University lecture. 11:40 a. m.—Columbia University lecture, 12 (noon)—Market and weather reports. 12 (noon)—Market and weather reports. 14 p. m.—Felice String Quartet. 1:15 p. m.—Evelyn Siedle, contralto. 1:30 p. m.—Felice String Quartet. 1:45 p. m.—Talk. 5 p. m.—Vincent Lopez's Orchestra. 6 p. m.—Dinner music. 7 p. m.—Mid-week hymn sing. 1:30 p. m.—Dance music. 7:30 p. m.—Dance music.
8 p. m.—Sally Caskin, planist.
8:15 p. m.—'Hres's Harvesters."
9 p. m.—'Clicquot Club Eskimos."
10 p. m.—Silvertown Cord Orchestra.
11 p. m.—Vincent Lopez's Orchestra.
660k—WJZ—NEW YORK—455m

11 p. m.—Vincent Lopez's Orchestra.

660k—WJZ—NEW YORK—455m

1 p. m.—Pennsylvania Luncheon Orchestra.

2 p. m.—Weather balloon news.

4:30-5:30-7:30-10:30 p. m.—News service.

3:30 p. m.—Orchestral Closing Concert.

5 p. m.—Commodore tea music.

5:32 p. m.—Harket quotations.

5:35 p. m.—Financial summary.

5:40 p. m.—Cotton quotations.

5:50 p. m.—Farm market reports.

7 p. m.—Vanderbilt Orchestra.

7:30 p. m.—Judge jr.

7:45 p. m.—'Unidge jr.

7:45 p. m.—'Unidge jr.

7:45 p. m.—'United States Army Band.

8:30 p. m.—'Volicical Situation in Washington," Frederick Wile.

8 p. m.—United States Army Band.

8:30 p. m.—'Volce of the Silent Drama,"

"The Greater Glory."

9 p. m.—Royal Salon Orchestra.

10 p. m.—The Record Boys.

10:30 p. m.—Freddie Rich's Orchestra.

12 p. m.—Weather, balloon news.

950k—WGBS—NEW YOLK—316m

10 a. m.—Timely talks with Terese.

10 a. m.—Timely talks with Terese.
10:10 a. m.—Rose Elias, soprano.
10:15 a. m.—Radio gym class; soprano 10:35 a. m.—"Better Homes and Gar-

dens."

1:30 p. m.—Scripture reading.

1:30 p. m.—Manhattan String Trio.

2:30 p. m.—Educational Camp Exhibition.

3 p. m.—Woman in the Home program.

6 p. m.—Uncle Geebee.

3 p. m.—woman in the Home program.
6 p. m.—Uncle Geebee.
6:30 p. m.—Arcadia Orchestra.
7 p. m.—'What the World Is oDing."
7:15 p. m.—Irene Weir; B. F. A.; Yale
University; "Good Taste."
7:25 p. m.—Music.
7:30 p. m.—Educational Camp Exhibition.
*
7:45 p. m.—"I Interview Myself." Kilbourne Gordon.
8 p. m.—William Mullaly "Jiggs and Reels on the Concertina."
8:10 p. m.—Charles MacMillan, bag pipe solos. solos. 8:20 p. m.—John Cassidy, barytone. 8:30 p. m.—'Footlight and Lampligh 9 p. m.—"Footlight and Lamplight."
9 p. m.—Male choir of St. Mary's.
9:30 p. m.—"Investment Trusts in America."
9:40 p. m.—Chefleigh and Swenson.
10 p. in.—Gertrude Krantz, soprano; Elizabeth Nanda, contralto; Francis Parsons, pianist; vocal duets.
10:10 z. m.—Adeline Bierman.

10 p. m.—Harry Bortman's Trio.
10:15 p. m.—Maurice Patton, fenor; Harry
Reudy, baritone.
10:30 p. m.—Carl Zoehrns, Lou Hirscher.
songs.
11 p. m.—King Cheerio, Artie Bittong and ble two hours of phere. chestra.

6:30 p. m.—Leon Berger's orchestra.
7 p. m.—Vincent Lopez's orchestra.
7:30 p. m.—Health talk, Dr. Percival.
7:45 p. m.—Chappy O'Donnell, contralto.
8 p. m.—Will Oakland's chatheau.
8:30 p. m.—Al Herman's entertainment bureau.

9:15 p. m.—Frank Galassi, songs and 9:15 p. m.—Frank Galassi, songs and ukuléle.
9:30 p. m.—Loew's orchestra.
10 p. m.—Martin and Schwartz, songs.
10:15 p. m.—Leon Goldman, violinist.
10:30 p. m.—Leroy Smith's orchestra.
11 p. m.—Joe Ward's Swanee Entertai

ers.
11:30 p. m.—Everglades orchestra.
12 mid.—Sophie Tucker's playground.
1160k—WRNY—NEW YORK—25 11 a. m.—Art appreciation. 11:15 a. m.—Kudisch string quartetta 2 noon—Bernice Hardy.

12:30 p. m.—Frances Peper, soprano.

12:45 p. m.—Violin solo.

6:45 p. m.—Chick Winter's orchestra.

7:30 p. m.—Catholic circle.

7:45 p. m.—Ben Bernie's orchestra.

8:15 p. m.—Ben Bernie's orchestra.

8:15 p. m.—Radio questions and answeal

8:30 p. m.—Rock Ferris's organ recital.

9 p. m.—Pauline Watson, violinist.

9:15 p. m.—Lorna Lea, love song girl.

9:30 p. m.—Frances Callow, Anita Self.

harp and voice.

harp and voice.

10:30 p. m.—Lancellotti's song series.

11: p. m.—Win Unger's entertainers.

14:10k.—WMSG—NEW YORK—213m 7:30 p. m.—Dance orchestra. 8 p. m.—Sport talk. 8:15 p. m.—Willard Robinson, voice. 8:45 p. m.—Harry Hershfield. 8:45 p. m.—Harry Hershfield.

9 p. m.—Mme. Eugenie Bauman, soprano; Henry Bauman, barytone,

9:45 p. m.—Charles Wold, musical glasses,

10 p. m.—Mm Holoua's Royal Hawaiians,

10:30 p. m.—Paul Specht's dance orches

tra. 1430k—WBNY—NEW YORK—210m 1430k—WENY—NEW YORK—210m
7 p. m.—Hy Smith's Orchestra.
8 p. m.—Colonial Orchestra.
8:45 p. m.—Colonial Club Orchestra.
9 p. m.—Milton Yokeman, tenor.
9:15 p. m.—Colonial Club Orchestra.
9:45 p. m.—Milton Yokeman, tenor.
10 p. m.—Lauretta Reynolds, songs.
10:15 p. m.—Orchestra.
10:30 p. m.—Bob Brandes, songs.
10:40 p. m.—Orchestra. (Continued on next page)

World Radio History

APRIL 27
V. Lopez
Jerry La Salle's
WGY Orchestra
Dance music
Naught's
V. Lopez
Billy Hay's
W. S. Tupman
Arrowhead Inn
V. Lopez
Paul Specht's
Dance music
George Olsen's
E. McKnight's
El Patio
Ross Gorman's
Traymore
Connies'

Savoy Markel's Zit's C. Seaman's Osborne's Melville Five St. George's Roseland

1250k-WHAP-NEW YORK-240m

1300K-WHAF-ALW IUAK-230M 6:30 p. m.—Holmes String Ensemble. 7:10 p. m.—Mary Pinney, planist. 7:25 p. m.—Neitry Cheatham. 7:55 p. m.—Philharmonic Woodwind En-

1100k-WEBJ-NEW YORK-273m

1160k-WRNY-NEW YORK-258m

1410k-WMSG-NEW YORK-213m

4.30 p. m.—Dance ordestra.

8. p. m.—Sport talk.

8.15 p. m.—William McCarthy, barytone

8.30 p. m.—Adler. Weil, Herman Trio

8.45 p. m.—Max Berman, tenor.

9 p. m.—Sidney Raphael, piano.

9.30 p. m.—Mixed quartet.

10 p. m.—Belle Brooks, Jack Lauria

entertainers. 10:30 p. m.—Paul Specht's Orchestra.

2 p. m.—Warner Theater.
3.30 p. m.—Housekeepers' half hour.
3.30 p. m.—Bob Flemings's Orchestra.
4 p. m.—Murray Schwartz, piano.
4.36 p. m.—Nita Nadine, songs.
4.45 p. m.—Frances Sper, songs.
5 p. m.—Warner Theater Hour.
6 p. m.—Wonld & Lang, harmonists.
6.15 p. m.—Judge Clarise M. Baright.
6.30 p. m.—Monroe Fleck's Orchestra.
11.30 p. m.—Connie's Inn Orchestra.
12 midnight—Twin Oaks Orchestra.

1430k-WBNY-NEW YORK-210m

p. m.-Warner Theater.

1100k-WFBH-NEW YORK-273m

:30 p. m.—Dance orchestra.

Additional Radio Programs for the Week

(Continued from preceding page) 880k-WMCA-NEW YORK-341m 10:15 a. m.—News letter; market report 11 a. m.—Housewife period. 11:15 a. m.—Gardening. 11:20 a. m.—Market reports (hourly to 3:30 p. m.) 12:noon—Elizabeth Bohn, food bureau. 12 noon—Elizabeth Bohn, food bureau.
12:30 p. m.—Market reports.
1 p. m.—Dept. of Agriculture.
1:15 p. m.—Olcott Vall's string ensemble
2 p. m.—Entertainers.
3 p. m.—Musical program.
3:10-4 p. m.—News items.
4:15 p. m.—Lost and found department
4:30 p. m.—Charles Purcell, tenor.
5:04 p. m.—Ida Allen's tea parties.

p. m.—News items.
m.—Olcott Vall's string ensemble.
m.—Twin Oaks orchestra.
p. m.—Klein's Serenading Shoe

makers.

8 p. m.—Pace Institute program.

8 p. m.—Snedden Weir, barytone.

8:30 p. m.—Musical program.

9 p. m.—Mathan Straus Serenaders.

10 p. m.—Tango Palace Orchestra.

10:30 p. m.—California Ramblers.

11 p.m.—Ernie Golden's Orchestra.

12 p. m.—Broadway Night. 570k-WNYC-NEW YORK-526m

570k—WNYC—NEW YORK—526m
.66:30 p. m.—"Rosotti's Sister Helen,"
Lewis Mott.
6:40 p. m.—Market high spots.
7 p. m.—Plano selections.
7:15 p. m.—"Keeping Fit," Joe Ruddy.
7:30 p. m.—Police alarms.
35 p. m.—Police alarms.
Board of Estimate.
8 p. m.—Baseball results.
8:30 p. m.—Annual Concert of Edison
Glee Club. Soloists: William Lockwood, violinist; Alma Filstead, soprano.

prano.

10 p. m.—Piano selections.

10:10 p. m.—"Algeria."

10:30 p. m.—Police alarms. 1100k-WFBH-NEW YORK-273m m.—Orchestra.
m.—Studio program.
p. m.—Eddie Gilles, barytona. p. m.—Jeanee A'Dair, songs. m.—Radioviews, Mrs. Owen Kildar

Miller.
4:45 p. m.—Eddie Woods, songs.
5 p. m.—Warner Theater Hour.
5 p. m.—Dotty McLean, Leo Ford, songs
5:15 p. m.—Automobile Routes, H. K.
Naples. Naples.

30 p. m.—Majestic String Ensemble.

45 p. m.—Lela Longtin, tenor.

p. m.—Yorkville Radio Entertainers

7 p. m.—Yorkville Radio Entertainers.
1040k—WLWL.—NEW YORK.—288m
8:30 p. m.—McEnery's Entertainers.
9 p. m.—Question box.
9:30 p. m.—Harold Noble, tenor.
10 p. m.—"Books," Walter V. Gavigan.
10:15 p. m.—Margaret Lyons, contraito,
Gerard Dunn, violinist.
40:30 p. m.—Organ recital, Eugene Sul-

1290k—WOKO—NEW YORK—233m

1100k-WBBR-STATEN ISLAND-273

8:50 p. m.—Jubilee Trumpeters.

850k—WAHG—RICHMOND HILL—316m
12:02 p. m.—Grebe Matinee Trio.

740k—WOR—NEWARK—405m
8:45, 7:15, 7:45 a. m.—Gym class.
2:30 p. m.—Ralph Leigh, tenor.
2:45 p. m.—"The Boston Bull Terrier."
8 p. m.—Blanche Outwater, soprano.
8:15 p. m.—Ralph Leigh, tenor.
8:30 p. m.—Theo Alban, barytone.
8:45 p. m.—Blanche Outwater, soprano.
6:15 p. m.—Blil Wathey, "Sports."
6:30 p. m.—Bell Wathey, "Sports."
6:30 p. m.—News bulletin. 1140k-WAAM-NEWARK-263m

n. m.—Happy hour program.
m.—Ernie Krickett's Artists.
m.—Talk on sports by Major Tate 1190k-WGCP-NEWARK-252m 8:80 p. m.—Night Owl Orchestra.
9:30 p. m.—Colvoy Male Quartet.
10 p. m.—Irving Rudman, pianist.
10:16 p. m.—Novelty entertainers.
12:midnight—Llewelly and Browne.
12:30 p. m.—Lyric Orchestra.

1340k-WODA-PATERSON-224m 1340k—WODA—FATERSON—228m
12 (noon)—Dance music; songs.
5 p. m.—Musicale.
5 p. m.—News; sport talk.
6 p. m.—Colonial Orchestra.
8:15 p. m.—Midweek devotional service
9 p. m.—Blue Moon Serenaders.
9:50 p. m.—Paul C. Mail, barytone.
10:15 p. m.—The Volstead Act," talk.
10:30 p. m.—Bill Walsh's Orchestra.
10:30 p. m.—Jimmy Murphy's Owls.
1 a. m.—Silk City Rendezvous.

590k-WIP-PHILADELPHIA-508m

America. 8:45 p. m.—Concert from Institute of Musical Art.
10:10 p. m.—A talk by Elder
Roberts.
10:30 p. m.—Little Jack Little.
11 p. m.—Leviathan Orchestra.

760k-WLIT-PHILADELPHIA-395m chestra.
p. m.—Arcadia Concert Orchestra.
4:30 p. m.—News fiashes; artist re
7:30 p. m.—Dream Daddy.

7.30. p. m.—Dream Daddy.
760k—WFI—PHILADELPHIA—395m
1 b. m.—Tea Room Ensemble.
1.40 p. m.—Tea Room Ensemble.
3 p. m.—Sorosis of Langhorne.
6.30 p. m.—Concert orchestra.
7 p. m.—Dance orchestra.
7.15 p. m.—Feature by Keystone Automobile Club.
D. m.—Sally Caskin, planist.
6.15 p. m.—Program from WEAF.

500k—WOO—PHILADELPHIA—508m 11 a. m.—Grand organ. 12 noon—Luncheon music. 12 noon—Luncheon music. 4:45 p. m.—Grand organ, trumpets. 7:30 p. m.—Dinner dance music.

7:30 p. m.—Dinner dance music.

1080k—WCAC—PHILA*PHIA—273m

5:30 p. m.—Billy Hays's Orchestra.

7:30 p. m.—Snellenburg Symphony Orch.

5 p. m.—The Eight Bright Shoe Boys.

5:30 p. m.—Norman Barr, barytone.

6:45 p. m.—The Kandy Kids.

9 p. m.—Barry O'Moore, tenor.

9:30 p. m.—The Musical Chefs.

9:45 p. m.—Comedy lesson, Prof. Doo
little.

10 p. m.—Sesquicentennial Hour. 11 p. m.—Parodian's Orchestra. 11:30 p. m.—Madrid Revus. 10:10 p. m.—Instrumentar yeather.

830k—WHN—NEW YORK—361m
2:15 p. m.—Clarence Profit, plano solos
Oswald Edinborough, songs.
2:30 p. m.—May Gartwin, soprano.
2:45 p. m.—Chester Podsiadlo, violinist.
3 p. m.—Prince Pietti, songs.
3:45 p. m.—Wirginia Dance Orchestra.
4:20 p. m.—Muriel Ellis, recitations.
4:20 p. m.—Muriel Ellis, recitations.
4:30 p. m.—Urasia Orchestra.
7 p. m.—Eurasia Orchestra.
7 p. m.—Harry Richman's Entertainers
7:30 p. m.—Treasureland Neighbors.
8 p. m.—Uncle Robert's Chat.
8:05 p. m.—George's Surprise.
9 p. m.—Washington Heights Eentertainers. 100k—WPG—ATLANTIC CITY—300m 8:15 p. m.—Sports talk; news flashes an baseball scores; Press-Union Publish

baseball scores; Press-Union Publish ing Company.

6:45 p. in.—Organ recital.

7 p. m.—Dinner music.

7 p. m.—Dinner music.

8 p. m.—Dance orchestra.

8:30 p. m.—Auction Bridge game.

9 p. m.—Traymore Concert Orchestra.

10 p. m.—Million Dollar Pier Orchestra.

10 m. m.—Traymore Dance Orchestra. 10:3 p. m.—Traymore Dance Orchestr 790k—WGY—SCHENECTADY—380m

790k—WGY—SCHENECTADY—380m
12:30 p. m.—Reports.
2 p. m.—Music; talk, "Why Eat Eggs?"
6 p. m.—Stock reports; news.
330 p. m.—Dinner program.
7:30 p. m.—Baseball scores.
7:35 p. m.—WGY Book Chat." L. L. Hopkins.
7.45 p. m.—Syracuse University program.
9 p.m.—Royal Salon-Orchestra.
10 p. m.—'A Night in the Country Store With the Corn Huskers Orchestra."
11.30 p. m.—Organ recital.

940k—WGR—BUFFALO—319m 6:30 p. m.—Dinner music 8 to 11 p. m.—Jointly with WEAF. 1080k-WHAM-ROCHESTER-278m 3:30 p. m.—Eastman Theater organ, 6:35 p. m.—cok chat from WGY, 6:45 p. m.—Program from WFBL, 8 p. m.—Baseball scores. 980k-WJAR-PROVIDENCE-306m 10:30 a. m.—Priscilla of the Mayflowe

Stores.

1:05 p. m.—Studio program; talk.

8 p. m.—Robert Powers's Orchestra.

9-11 p. m.—Program from WEAF.

1070k—WANC—BOSTON—280m semble.
6:30 p. m.—Croic Golden's Orchestra.
7:30 p. m.—Sach's Quality Boys.
8 p. m.—To be announced.
8:30 p. m.—Cousins Shoe Style Talk.
8:50 p. m.—Broadway Association.
9 p. m.—Hardman Hour of Music.
10 p. m.—Donald Flarm, critic and guest celebrity.
11 p. m.—Hofbrau Haus Entertainers.
11:36 p. m.—Jack-Denny's Orchestra.
12 midnight—McAlpin Entertainers. 10:30 a. m.—Women's Club talks;

10:30 a. m.—women's Club talks, news, music.

12:15 p. m.—Noon service.

1 p. m.—Luncheon concert.

2:55 p. m.—Play by play report, Braves vs. New York Glants.

6 p. m.—The Smilers.

6:30 p. m.—Talkt, J. D. Mitchell.

7:40 p. m.—Talkt, J. D. Mitchell.

7:40 p. m.—The Golf Question Box.

8 p. m.—Concert program.

9:30 p. m.—Varied program.

10 p. m.—Lido Venice dinner dance.

860k.—WEELT_BOSTON—349m.

10 p. m.—Lido Ventee dinner dance.

860k_WEEL_BOSTON_349m

10:15 a. m.—Anne Bradford.
12:45 p. m.—Boston Farmers' Report.
2 p. m.—Earl Cummings's Orchestra.
3 p. m.—Events of the Day.
4 p. m.—Eugene's Singing Orchestra.
5:50 p. m.—Events of the Day.
6:05 p. m.—Events of the Day.
6:05 p. m.—Lost and Found.
6:45 p. m.—Big Brother Club.
7:30 p. m.—Musicale.
8:15-11 p. m.—Program same as WEAF.
900k_WBZ_SPRINGFIELD_333m

900k-WBZ-SPRINGFIELD-333m 7:30 p. m.—Lenox Ensemble.

8 p. m.—Musical program.

9 p. m.—Gertrude Goldberg, violinist;
Nora Gladden Winton, contraito.

9:30 p. m.—Organ recital.

10:30 p. m.—Edward McEnelly's Organization.

640k—WRC—WASHINGTON—469m 12 noon—Fifty farm flashes. 12:20 p. m.—Organ recital. p. m.—Mayflower Orchestra. p. m.—New York-Washington

p. m.—New Willard Orchestra. 45 p. m.—"The Political Situat Washington.": 05 p. m.—To be announced. 8:30 p. m.—Radio-movie present from W JZ 9 p. m.—Royal Salon Orchestra. 10 p. m.—The Record Boys. 10:30 p. m.—Weyer Davis's Band.

10:30 p. m.—Meyer Davis's Band.
970k—KDKA—PITTSBURGH—309m
6:30 p. m.—Dinner concert.
8 p. m.—Stockman-farmer news.
8:15 p. m.—Farm program.
8:30 p. m.—Joseph Haydn, composer, and
KDKA Little Symphony Orchestra.
9 p. m.—Joseph Haydn music, withoratorio quartet, Symphony Orchestra.
11 p. m.—Concert from "Post" studio.

p. m.—Concert from "Post" studio. 650k—WCAE—PITTSBURGH—461m 650k—WCAE—FITT 535 CM—1512 6:30 p. m.—Dinner concert. 7:30 p. m.—Children's period. 8 p. m.—Concert. 8:30 p. m.—Hire's Harvesters. 9 p. m.—Cliquot Eskimos. 10 p. m.—Silvertown Cord Orchestra.

FRIDAY

610k—WEAF—NEW YORK—492m 13 p. m.—Talk. 130 a. m.—Raymond Maher, barytone. 140 p. m.—Columbia University lecture noon—Market and weather reports. noon-Market and weather reports, p. m.—Aletta Crump, entertainer.

5 p. m.—Haymond Trundy, planist.

30 p. m.—John Butler jr., tenor.

5 p. m.—Talk.

p. m.—Vincent Lopez's Orchestra.

p. m.—Dinner music.

p. m.—Michael Markel's Society (

p. m.—Trio.
p. m.—Clifford Odets dramatic review 8 p. m.—Clifford Odets dramatic review.

8:15 p. m.—Olive May, "Sunshine Girl."

8:36 p. m.—Jack Davis, barytone.

8:46 p. m.—Jeanne Adair, songs.

9 p. m.—U. S. Navy Band.

9:30 p. m.—Martha Kovacs, violinist.

10 p. m.—Emma Held.

10:15 p. m.—Orchestra selections.

9 p. m.—"Robin Hood's Forest," Wirt Barkitz. 9:15 p. m.—Madeleine Southworth, con-traito; William Detlef, planist. 9:45 p. m.—"A Tale of Chinatown," Sax Rohmer Whitell Anglo-Persians. 950k-WAHG-RICHMOND HILL-3161 Rohmer.
10 p. m.—Whittall Anglo-Persians.
10:30 p. m.—May Singhi Breen, banjoist;
Peter De Rose, planist.
11-12 p. m.—Ben Bernie's Orchestra.

10:25 a. m.—United women below talk.
League talk.
10:35 a. m.—Adeline Bierman, songs.
10:45 a. m.—Housefurnishing Review.

p. m.—Swimming to be be. p. m.—Iris Gruber. p. m.—Theory lessons; music. m.—Uncle Geebee.

p. m.—Uncle Geebee.
30 p. m.—Orpheus Ensemble.
p. m.—'What's Your Radio Problem
p. m.—'Bducation camp exhibition.

7:15 p. m.—Education camp exhibition.

570k—WNYC—NEW YORK—526m

510 p. m.—Market high spots.

5120 p. m.—Piano selections.

5130 p. m.—Elementary lessons.

5130 p. m.—Advanced French lessons.

5130 p. m.—Police Alarms.

5135 p. m.—'Matthew Arnold,'' Prof. J.

61. Troop.

35 p. m.—Matthew G. Troop. 55 p. m.—Plano selections. p. m.—Baseball results. 30 p. m.—Rudolph Joskowitz, violinist. 30 p. m.—Joseph Wohlman, pianist. p. m.—"Only a Chair," Dr. Frank H,

y p. m.—"Only a Chair, br. vizetelly.
9:15 p. m.—Hjalmar Kober, pianist;
Charles Werner, barytone.
10:10 p. m.—Instrumental program.
10:30 p. m.—Police Alarms; weather.

fainers. 15 p. m.—Frank H. Ochs, Morris Pearl-

man.
9:30 p. m.—Loew's Organ Recital.
10 p. m.—Roseland Dance Orchestra.
10:30 p. m.—Aratoi Friedland.
11:30 p. m.—Kit Kat Entertainers.
12 midnight—Dance orchestra.

950k.—WAHG—KICHMOND HILL—316; 12:02 p. m.—Musical program. 7:30 p. m.—Edna Bockstein, pianiste. 8 p. m.—"Great Artist" organ recital. 9 p. m.—William Sweeney, barytone. 9:15 p. m.—Henrietta Mastin, soprano. 9:30 p. m.—Leon Goldman, violinist. 10:02 p. m.—The Gondoliers. 10:30 p. m.—Southland Dance Orchestra 11-12 p. m.—Ben Bernie's Orchestra660k—WJZ—NEW YORK—455m
1 p. m.—Ambassador Trio,
2 p. m.—Weather and balloon news.
4 p. m.—"Your Daily Menu," Mrs. Julian
Heath.
4:15 p. m.—"They Are Wearing," Suzanne 740k-WOB-NEWARK-405m 6:45, 7:15, 7:45 a. m.—Gym class. 2:30 p. m.—Robert Wyatt, tenor. 2:30 p. m.—Robert Wyatt, tenor.
2:45 p. m.—Lillian Ring, soprano.
3 p. m.—Frances Pehl, pianist.
3:15 p. m.—Robert Wyatt, tenor.
5:30 p. m.—Harry Humphrey, entertainer.
3:45 p. m.—Frances Pehl, pianist.
6:16 p. m.—Bill Wathey, "Sports,"
6:30 p. m.—News bulletin.
6:40 p. m.—Bretton Hall String Quartet. 4:15 p. m.—"They are wearing. Suzzaine Brown.

4:25 p. m.—"Solving Candy Problems."

4:35 p. m.—Astor Tea Orchestra.

5:32 p. m.—Market quotations.

5:35 p. m.—Financial summary.

5:40 p. m.—Cotton quotations.

5:40 p. m.—Cotton quotations.

5:50 p. m.—Farm market reports.

7 p. m.—Commodore Concert Orchestra.

8 p. m.—Sundial Shoe Serenagers.

8:30 p. m.—Bonnie Laddies.

10:30 p. m.—Lorraine Grill Orchestra.

10:30 p. m.—Lorraine Grill Orchestra.

10:30 p. m.—Lorraine Augusta Salvaine Salvain

1140k-WAAM-NEWARK-263m 10:30 a. m.—Happy hour program. 11 a. m.—Cooking school. 11:30 a. m.—Happy hour program. 6 p. m.—Norman Gehrie's Orchestra. 950k-WGBS-NEW YORK-316m 10 a.m.—Timely talks with Terese.
10:10 a.m.—Adeline Bierman, soprano.
10:15 a.m.—Radio gym class.
10:25 a.m.—United Women's Wear

7:10 p. m.—Arthur Greenfield, tenor,
7:30 p. m.—Talk on Newark.
7:50 p. m.—Walth on Newark.
7:50 p. m.—Mildred Tenbrook, songs.
8:15 p. m.—Mildred Huntoon, talk.
9:30 p. m.—Salvatore Villani, tenor; Rina Cuindani, pianist, and David Valillio, violinist.
9 p. m.—Walth Calent :30 p. m.—Scripture reading. :40 p. m.—Carl Smith, tenor; Andy Bovie 10 p. m.—Wallie Osborne, orchestra. Boyle.—Henrietta Mayer, soprano.

p. m.—Program for Roslyn, L. I., public schools.

1:30 p. m.—Educational camp exhibition.

1:40 p. m.—E. F. Massey, tenor.

1:50 p. m.—Henrietta Mayer, soprano.

p. m.—Midred Easton, "How to Live."

1:10 p. m.—Iris Gruber, soprano.

20 p. m.—Swimming lessons.

1190k-WGCP-NEWABK-252m p. m.—Alice Laurie, soprano. 15 p. m.—Blanche Darvo, songs. :30 p. m.—Alice Laurie, soprano p. m.—Wolgemuth and Bertram, plane duets. 8.15 p. m.—William Boyd, bird imita-tions. 12 p. m.—Humming Bird Orchestra. 1a. m.—Eagle Serenaders.

1340k-WODA-PATERSON-224m noon-Dance music; opera. 5 p. m.—Studio program.
5:30 p. m.—News; sport talk.
6 p. m.—Phoenix Orchestra..
8:45 p. m.—Call essay contest.
9:30 p. m.—Cornet solos.
9:45 p. m.—Uke Pete, uke and songs.
10 p. m.—Harry Lange's guitar.
10:30 p. m.—Wsterious violinist.
11:30 p. m.—Clifford Lodge frolic.

750k—WFI—PHILADELPHIA—395m 0:80 a. m.—Music; home service talk. p. m.—Tea room ensemble. p. m.—Sesquicentennial. m.—Concert orchestra.
—Dance orchestra.

7 p. m.—Dance orchestra.

760k—WLIT—PHILADELPHIA—395m

12:05 p. m.—Organ recital:

12:20 p. m.—Religious service; orchestra

2 p. m.—Concert orchestra.

2:30 p. m.—Playlet.

4:30 p. m.—News flashes.

4:35 p. m.—Artist recital.

7:30 p. m.—Dream Daddy.

8 p. m.—The Career of a Singer.

8:10 p. m.—Studio program.

9:30 p. m.—Studio program.

9:30 p. m.—Schickerling artists.

10 p. m.—Arcadla Dance Orchestra.

10:30 p. m.—Rufus and Rastus.

11 p. m.—Freshman radio hour.

12 p. m.—Musical comedy and theatrical stars.

590k—WOO—PHILADELPHIA—508m

stars.

590k—WOO—PHILADELPHIA—508m

11 a. m.—Grand organ.
12 noon—Luncheon music.
445 p. m.—Grand organ; trumpets.

7:30 p. m.—"Sir Hobgoblin." 12 noon—Luncheon music.
4:45 p. m.—Grand organ; trumpets.
7:30 p. m.—"Sir Hobgoblin."
7:45 p. m.—Bance music.
8 p. m.—"The newspaper and the leges." Harvey Watts.
8:15 p. m.—WOO Orchestra series.
9:25 p. m.—Fox Theater studio prog
10 p. m.—Whittall Anglo-Persians.

880k—WMCA—NEW YORK—341m
10:15. p. m.—News letter; market reports
11 a. m.—Housewife Period.
11:30 a. m.—Market reports (hourly to 3:30 p. m.)

890k—WIP PHILADELPHIA—508m
6:45 a. m.—"Start the day right."
3 p. m.—"The Permanent Court of International Justice," Roland S. Morris.
6:05 p. m.—Dinner music. 11 a. m.—Housewite Period.

11:39 a. m.—Market reports (hourly to 3:30 p. m.)

12 noon—Musical program.

1 p. m.—Department of Agriculture.

1:15 p. m.—Olcott Vail's String Ensemble

2 p. m.—Musical program.

3 p. m.—Musical program.

3:10-4 p. m.—News items.

4:08 p. m.—Theo Alban, tenor.

4:15 p. m.—Lost and Found Department.

4:30 p. m.—Music.

5-5:25 p. m.—Olcott Vail's String Ensemble. 6:05 p. m.—Dinner music. 6:50 p. m.—Market reports. 7 p. m.—Bedtime story; songs.

1000k-WPG-ATLANTIC CITY-300m 1:80 p. m.—Luncheon music.
4:30 p. m.—Tea music.
6:45 p. m.—Organ recital.
7 p. m.—Hotel Traymore dinner music.
7:30 p. m.—Dance orchestra.
8 p. m.—Educational series.
8:15 p. m.—Studio program.
8:30 p. m.—Dance orchestra.

790k—WGY—SUREMAN

12:30 p. m.—Reports.
2 p. m.—Asia Orchestra.
2:30 p. m.—Music; "Health Notes."
6 p. m.—Stock reports; news.
6:30 p. m.—Sunday school lesson.
7 p. m:—Van Curler Orchestra.
7 p. m:—Van Curler Orchestra. 790k-WGY-SCHENECTADY-380m 7.30 p. m.—van Curler Orchestra.
7.30 p. m.—Baseball scores; health talk,
7.40 p. m.—"French by Radio."
8.15 p. m.—Ninth episode of play, "A
Step on the Stairs."
8.30 p. m.—"Enoch Arden," play in five :45 p. m.—Hugh Adams, "Immigration

acts.

10 p. m.—Vassar Alumnæ Association.

11 p. m.—WYG Orchestra. p. m.—Philharmonic Woodwind Ensemble. 940k-WGR-BUFFALO-319m semble.
9:30 p. m.—Franklin Ford, "Protestantism."
9:45 p. m.—WHAP mixed quartet.
10 p. m.—Dorothy Hoyle, violinist; Vida Milholland, soprano; Rebekah Beam, contralto; Lucile Wilkin, pianist; Ruth Montgomery, soprano.
10:45 p. m.—John Erb, organist. 6:30 p. m.—Dinner music.
7:30 p. m.—Jointly with WEAF.
8 p. m.—Audubon Terrace Meadow Larks.
8:30 p. m.—"The Joint Charities and Community Fund."
9 p. m.—Winger's Crescent Entertainers.
9:30 p. m.—Violin, vocal and piano recital.

10:30 p. m.—Whittall Anglo-Persians.

10:30 p. m.—Hewitt Humorists.

11 p. m.-1 a. m.—Vincent Lopez's Dance

7 p. m.—Blenheim Theater Ensemble. 7:45 p. m.—Kathryn Connolly, soprano. 8 p. m.—Clarence Williams Trio. 8:25 p. m.—Original Blue Bell Sere-980k-WJAR-PROVIDENCE-306m 8 p. m.—Howard & Harris.
8 p. m.—Musical program.
8:20 p. m.—Health talk.
8:30 p. m.—Gorman's Jolly Bakers.
9 p. m.—Musical program.
10 p. m.—Whittall's Anglo-Persians.
11 p. m.—Biltmore Dance Orchestra. 11 a. m.—King's Life Lead's Hour. 11:45 a. m.—Ralph Christman, planist. 12 noon—Musical Courier Says— 12:15 p. m.—Bob MacDonald, ukelele. 12:30 p. m.—Pauline MacDonald, soprano

1070k—WNAC—BOSTON—280m 10:30 a. m.—Women's Club talks; music 12:45 p. m.—J. Caplin, tenor. 5:15 p. m.—Temple Emanu-El Frida; night services. news. 12:15 p. m.—Noon service. 7 p. m.—Sports.
7:10 p. m.—Commerce of the day.
7:15 p. m.—Radio Theater Index.
7:20 p. m.—Marjorie Stuart, songs.
7:30 p. m.—Margery McRay, soprano.
7:45 p. m.—Alfred W. McCann, "Foods."
8 p. m.—Gordon Hampson Opera Comp. m.—Luncheon concert.
p. m.—Tea dance.
p. m.—Kiddies' Klub.
:30 p. m.—Dinner dance.
:30 p. m.—Boston Better Business Com-

mission.

8 p. m.—The Kitchen Canaries.

8:30 p. m.—Radio Skit.

9 p. m.—Concert.

10 p. m.—Dance music; popular selections. pany.
8 45 p. m.—'New Lights on Spiritualism," J. H. Kraus.
9 p. m.—Graffman's violin recital.
9:30 p. m.—Constantino Ensemble.
10:15 p. m.—Novelty Night.
11:15 p. m.—Aeolian Orchestra. tions.

860k—WEEL—BOSTON—349m

1 p. m.—Brighton High School senior play, "Thank You."

3 p. m.—Events of the Day,

3:10 p. m.—George Joy, Nell Cantor,

3:10 p. m.—George 309, New Songs.
4 p. m.—Trueman Carewe's Orchestra.
5:50 p. m.—Business news.
6:13 p. m.—Joe Rines's Orchestra.
6:45 p. m.—Big Brother Club.
7:30 p. m.—Whiting program.
8 p. m.—Garden talk.
8:30 p. m.—Neapolitan program.
9 p. m.—Musicale.
9:30 p. m.—Musicale.
9:30 p. m.—Whittall Anglo Persians.

900k-WBZ-SPRINGFIELD-333m p. m.—Kimball Trio.
30 p. m.—Lenox Ensemble.
45 p. m.—Course in Economics.
15 p. m.—Edward J. McEnelly's Or chestra.

'45 p. m.—Program arranged by Russel Burbank.

'15 p. m.—Quartet of the Second Church.

0'15 p. m.—To be announced.

640k—WRC—WASHINGTON—169m

2 p. m.—Play-by-play, New York-WashIngton baseball game.
3:30 p. m.—U. S. Marine Band Orchestra.
5 p. m.—W. Spencer Tupman's Orchestra.
5 p. m.—Book reviews, Mrs. Nina Reed.
6:45 p. m.—Book reviews, Mrs. Nina Reed.
6:45 a. m.—"Tower Health Exercises."
6:11 p. m.—Mozart String Quintet, story
teller; market summaries; playlet;
music and popular science talk; program from WEAF.
11 p. m.—Dance music.
970k-KDKA—PITTSBURGH—309m
6:30 p. m.—Dinner concert.

6:30 p. m.—Dinner concert. 8 p. m.—Stockman-farmer news. 8:15 p. m.—University of Pittsbur dress, healt htalk. dress, healt htalk. 8:30 p. m.—Westinghouse Band. 9:55 p. m.—Time signals; weather 10:05 p. m.—Teaberry time.

SATURDAY

610k—WEAF—NEW YORK—492m i5, 7, 7:20 a. m.—Health exercises, i5 a. m.—Prayer services. 1710 p. m.—Reteles Torman, participate 10gue.
7.30 p. m.—Pattison Coates, barytone.
7.45 p. m.—WEAF musical comedy.
8.15 p. m.—Pattison Coates, barytone.
8.30 p. m.—Chaminade Trio.
9 p. m.—Boy Scout program from D. A.
R. Continental Memorial Hall; music by the United States Marine Band; addresses by President Calvin Coolidge, Sir Robert Baden-Powell; service medals presentation.
10:15 p. m.—Lou Raderman's Orchestra.
11:15-12 p. m.—Vincent Lopez's Orchestra.
11:15-12 p. m.—Vincent Lopez's Orchestra. 660k—WJZ—NEW YORK—455m

660k—w32—132 p. m.—Knickerbocker Orchestra. p. m.—Weather; balloon news. 1:30 p. m.—Lorraine Grill Orchestra. 1:30-5:30-7:30-\$10:30 p. m.—News ser 1:32 p. —Market quotations. 4:30-5:30-7:30-30.30 p.m.
5:32 p. .—Market quotations.
5:33 p. m.—Financiał summary.
5:40 p. m.—Cotfon quotations.
5:50 p. m.—Farm market reports.
7 p. m.—Commodore Concert Orchestra.
7:45 p. m.—Comgressional Forum.
8:30 p. m.—Madison Concert Orchestra.
10:30 p. m.—Vanderbilt Della Robia Orchestra.
12 p. m.—Weather; balloon news. 880k-WMAC-NEW YORK-341m 11 a. m.—Housewife period. 1:30 p. m.—Harket reports, hourly 1:30 p. m. 1:30 p. m.
12 noon—Musical program.
1 p. m.—Department of Agriculture.
1:16 p. m.—Olcott Vail's String En semble.
6 p. m.—Olcott Vali's String Ensemble
6 p. m.—Musical program.
8 p. m.—Current events.
9:30 p. m.—Musical program.
10 p. m.—Norman Pearce, readings.
10:30 p. m.—McAlpin news editor.
11 p. m.—Ernie Golden's Orchestra.
12 midnight—McAlpin Entertainers. 570k—WNYC—NEW YORK—526m p. m.—Hilda Reich, soprano. 15 p. m.—Fitzpatrick brothers, songs. 30 p. m.—Police alarms. 7:35 p. m.—Dinner music. 8:40 p. m.—'New York's Largest Flower Garden," by Dr. C. Stuart Gager. 9 p. m.—Lawrence Metcalf, whistler. 9:15 p. m.—Kessler Trio and Quartet. 9:55 p. m.—Songs.

Weems. 10:30 p. m.—Police alarms; weather.

Andrew Roth, planist.

19 p. m—Vanity rchestra.

1290k-WOKO-NEW YORK-233m

950k-WGBS-NEW YORK-316

ntertainers. 1:40 p. m.—Hansen and Howard, plano 2:40 p. m.—Hansen and Howard, plano twins.
3 p. m.—Radio Fashion Show, models on exhibition, gowns described by Hall Deanfe.
3:10 p. m.—Robert Greenbaum, violinist.
3:20 p. m.—Child Health talk.
3:30 p. m.—Child Health talk.
3:30 p. m.—Pobert Greenhaum, Ted Coughlin.
6 p. m.—Uncle Geebee.
6:30 p. m.—Vincent Sorev Concert Trio.
7:15 p. m.—Herman Black "Outlines of Travels."
7:30 p. m.—Arcadia Baliroom Orchestra.
8:30 p. m.—Clifford Cheasiey, Numerology."
8:45 p. m.—Florence Loftus, soprano; Germaine Gerard, violin.
9 p. m.—Educational Camp Exhibition series.

series.
9.15 p. m.—Meyer Glass, barytone.
9.30 p. m.—Walter Hartwig, "Little Theaters."
9.45 p. m.—Two piano recitals.
10 p. m.—EMO's weekly movie broadcast.
10.15 p. m.—Andradea Lindsey, Lydia Mason.

Mason. 10:30 p. m.—Arrowhead Dance Orchestra. 11060k—WRNY—NEW YORK—258m 1 a. m.—Anita Browne's Symposium. 1:45 a. m.—Block's mental hygiene ad

1410k-WMSG-NEW YORK-213m

songs.
p. m.—Former Secretary of Interior
William C. Redfield.
Well Quartette William C. Redfield.

9:15 p. m.—Amphion Mare Quartette

9:30 p. m.—Mme Edna Frandini.

9:45 p. m.—Michael and Edythe Lamberti, cellist.

10 p. m.—Jack Heller, uke.

10:15 p. m.—Michael and Edythe Lazz

nerti. 10:30 p. m.—Paul Specht's Orchestra. 1100k-WFBH-NEW YORK-278m p. m.—Bert Lowes' Orchestra. p. m.—Kismet Dance Orchestra. 3 p. m.—Rismet Dance Ortoscus.
4 p. m.—Popular Trio.
4:15 p. m.—John McAllister, songs.
4:30 p. m.—Evercharge Battery Service
5 p. m.—Studio Program.
6 p. m.—Florence Hynes, songs.
6:15 p. m.—Charlotte Trystman, plan.

1100k-WBBR-STAT. ISLAND-316m 950k—WAHG—RICH HILL—316m

740k—WOR—NEWARK—105m 6:45-7:15 a. m.—Gym class. 2:30 p. m.—Alma Slunt, soprano. 2:45 p. m.—"A New Vision for I Generations." Generations."

3 p. m.—Alma Slunt, soprano.

3 p. m.—Zit's tea music

6:15 p. m.—'Sports," Bill Wathey.

6:30 p. m.—Jacques Jacobs's Ensembla

7:30 p. m.—Van's Collegians.

8 p. m.—Orange Chamber of Commerce

8 p. m.—Orange Chamber of Commerce program.
8:45 p. m.—Copenhagen Quartet.
9:15 p. m.—La Forge-Berumen musicale.
10 p. m.—Leon Wood, organ recital.
10:30 p. m.—"A Step on the Stairs," mystery play.
11 p. m.—News bulletin.
11:05 p. m.—The Messner brothers.

11:00 p. m.—The Messier British 1190k.—WGCP—NEWARK—252m 8:30 p. m.—Hilda White Kay, contralto Cliff Orchestra. 9:45 p. m.—Mortensen and Morgap, 9:45 p. m.—Mortensen and Morgan, banjoists, 10 p. m:—George Camfield, uke and

7, 7:20 a. m.—Health exercises, a. m.—Prayer services.
2. m.—Vincent Lopez's Orchestra.
3. m.—Vincent Lopez's Orchestra.
4. m.—The Moscow Stage Revival.
5. m.—Helene Hoffman, piano10. m.—Helene Hoffman, piano11. p. m.—De Vita's Orchestra.
1140k—WAAM—NEWARK—263m
6 p. m.—Danny Hope's Paradise Five.
7 p. m.—Sport talk, Major Tate.
7:10 p. m.—Carl Smith, tenor.
8:30 p. m.—Anna Robetson, soprano,
8:50 p. m.—Musical Three.
9:30 p. m.—Orpheus Mixed Quartefte,
10 p. m.—Organ recital.

p. m.—Dinner music. 760k—WFI—PHILADELPHIA—395m p. m.—Tea Room Ensemble. p. m.—Talk, "May Day—Its Purpose." 0 p. m.—Ray Elrae Orchestra. 10 p. m.—Ray Elrae Orchestra.
3 p. m.—Concert orchestra.
3 p. m.—Program from WEAF.
599k—WOO—PHILADELPHIA—508m
11 a. m.—Grand organ.
2 (noon)—Luncheon music.
145 p. m.—Grand organ and trumpets.
130 p. m.—Dinner dance music.
160k—WLIT—PHILADELPHIA—395m

Leavitt.
2:10 p. m.—Mickey Guy's Orchestra.
4:30 p. m.—News flashes.
4:35 p. m.—Arcadia Syncopators.
5:50 p. m.—Baseball scores; sports.
7:30 p. m.—Concert orchestra.
5:00k.—WIF.—PHILADELPHIA.—508m n.—Organ recital. .—Dal Ruch and his Arcadians.

8 p. m.—Sports corner. 8:15 p. m.—University Instribuental Trio. 9 p. m.—Mother Moore, Chaplain Pick-ens and the boys of the navy yard. 10:05 p. m.—Dance music. p. m.—Organ recital. —WGY—SCHENECTADY—380m 2:30 p. m.—Reports.
30 p. m.—Dinner program.
15 p. m.—Rice Augmented Orghacra,
0:30 to 12 midnight—Dance program.
1070k—WNAC—BOSTON—228-7

m.—Concert program. m.—Radio Tour of Home Beautiful Show.
30 p. m.—Musical program.
n. m.—Dance music; vocal selections

950k—WGBS—NEW YORK—316m

10 a. m.—Radio Fashion Show models on sxhibition, gowns described by Hall Deance.

10:10 a. m.—Kiddie Club program.

10:40 — a. m.—Florence Carrol, pianist.

10:50 a. m.—Timely talks with Terese.

1:30 p. m.—Scripture reading.

1:40 p. m.—Hansen and Howard, songs.

2 p. m.—Jack Lauria, Belle Brooks, entertainers.

2:10 p. m.—The Piano Twins.

2:20 p. m.—Babe Adler, blues singer.

2:30 p. m.—Jack Lauria, Belle Brooks, entertainers.

11:45 a. m.—Block's mental hygiene au vice.

12 noon—Organ recital.

1 p. m.—Bernice Hardy.

6:45 p. m.—Friction.

7 p. m.—Sports, commerce talks.

7:15 p. m.—Stella Rose, songs.

7:20 p. m.—Stella Rose, songs.

7:30 p. m.—Orlando's Concert Orchestra,

8 p. m.—Anna Russo, "Oddtime Songs."

8:15 p. m.—Ben Bernie's Orchestra,

9 p. m.—Gluseppi Adami, violinist,

9:15 p. m.—Drawing Room Players.

9:45 p. m.—Isabel Austin Musicale,

10:15 p. m.—Union City Four.

12. p. m.—DX hound hour.

1410k—Wildschaft and Control of the State of

6:30 p. m.—Child Health Talk. 6:45 p. m.—Majestic String Ensemble 7:15 p. m.—Investment Questions. 7:30 p. m.—Cosey Orchestra.

12:02 (noon)—Musical Program. 12 p. m.—Midnight Novelty Program.

gongs.
10:15 p. m.—Studio program.
10:30 p. m.—Helen Huking, soprano.
10:45 p. m.—Margaret Seidel, pianista.
11 p. m.—De Vita's Orchestra.

1340k—WODA—PATERSON—224m noon—Dance music; songs, p. m.—Entertainment. 10 p. m.—News; sport talk, p. m.—Dinner music

760k—WLIT—FILE 12:05 p. m.—Organ recital. 2 p. m.—'Child Training," Dr. Frederic

0 p. m.—Dance music; vocal selections 1 p. m.—Lambert Brothers, Orchestra. 970k—KDKA—PITTSBURGH—309m :45 p. m.—Daddy Wibkum, Post studio. 8 p. m.—Concert 8 p. m.—Farm program. 8:80 p.sm.—Concert 8:80 p.sm.—Concert

The Transmitting Set's Relation to Musical Quality of Radio Reception

Correct Modulation of the Broadcasting Station's Signals Is Important

By ALFRED N. GOLDSMITH Chief Broadcast Engineer, Radio Corporation of America

TN THE preceding article of this series on "Radio Music in the Home" there have been presented in considerable detail, the reasons why unusual fidelity of reproduction is required in radio recention if the listener is to enjoy the full benefits of modern broadcasting, with its frequently excellent programs and individual performers of unsual merit. High quality reproduction, depending as it does on acoustic synchronizing or the production in the home of sound waves exactly duplicating those in the studio, is therefore one of the most essential factors in modern broadcasting transmission and reception. The possible contribution to complete acoustic synchronizing which can be given by a well-designed and carefully operated transmitting station is so considerable that it merits special consideration. Fortunately for broadcasting, there are

to-day a number of transmitting stations which have apparatus capable of sending out a wave which faithfully carries the program and which are operated by skilled engineers and announcers, so that the musical balance of the orchestra and other features giving "finish" to the program are not neglected.

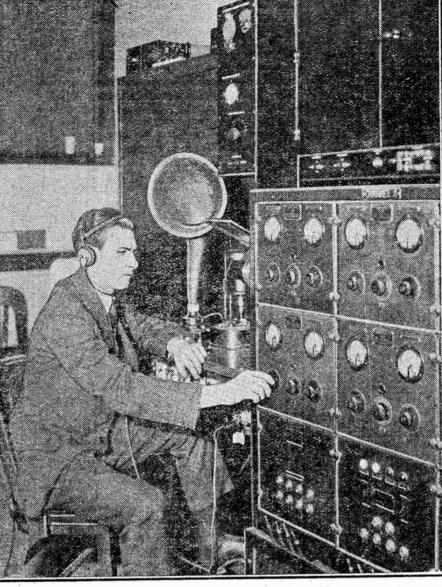
The ideal transmitting station is one having sufficient power to give interference free signals even at considerable distances and sending out radio waves which carry an accurate impress of the music or speech corresponding to the studio performance. Otherwise stated, the broadcasting transmitter must be omnitonal or capable of controlling or modulating the broadcast wave at all frequencies or pitches of sound from the lowest to the highest. It must also be equitonal or impartial in its treatment of notes of all pitches, exaggerating none and suppressing none, but giving to each its proportionate volume, and, as hinted above, it must radiate sufficient energy to give a clear signal, riding above all disturbances in the home of the listener and capable of being amplified to any reasonable volume in the receiving set without introducing disturbing noises or other inter-

ference. Some of the defects which may result from defective transmitting equipment or careless use, even of good equipment are worth considering, as well as the precautions taken at high-grade broadcasting stations to avoid imperfect operation.

Studio Has Problems

The broadcasting studio presents a whole series of problems in itself. It would not do to take a large echoing room and use it as a broadcasting studio. The such a room blurs the sharpness of broadcast speech or music and produces an unsatisfactory effect in the listener's home. In order to keep such an echo effect, or "room resonance," as it is more technically known, within satisfactory limits, it is necessary to muffle the studio acoustically by hanging heavy drapery or special materials around the walls, ceiling and floor. While an accoustically correct broadcast studio sounds "dead" to the artists performing in it, nevertheless in the listener's home there is a sharp definition to music from such studios which is missing in the case of broadcasting from an ordinary room. The reverberating effect here mentioned is particularly conspicuous in the case of the broadcasting of sermons from certain churches where, unfortunately, the confusing effect of the building echo at times almost destroys the

intelligibility of the sermons. Broadcasting microphones have become a familiar article to American newspaper readers. The broadcasting microphone has to be a particularly precise form of telephone transmitter. Not only must it be omnitonal and equitonal, which is in itself a most difficult requirement, but it must be silent in operation. Some microphones produce a more or less steady hiss or background noise which detracts appreciably from the quality of music, particularly in the softer portions of a selection when the music does not stand out above microphone noise. Furthermore, microphones must have an unusual reserve capacity to avoid "blasting" or rattling when an extremely loud sound is pro-



Constant supervision of quality of output is necessary in the control room of WJZ handling amplifier

Proper placing of the microphone in studio of WJZ is important

duced in the studio in their vicinity, for , the "ether oscillations" which we call example, at a musical climax or at | radio waves. In other words, the oscila particularly emphatic portion of a broadcast speech. It is also necessary to place the microphone relative to the orchestra, performer or speaker with great discretion in order that the best and most natural effect is produced. As is here hinted, broadcasting is an art as well as

a science. When we leave the microphone in sending out a broadcasting program we next encounter vacuum tube amplifiers which tremendously increase the electric output of the microphone. As usual these amplifiers also should be omnitonal and equitonal and should be provided with vacuum tubes having an ample capacity reverberation which inevitably occurs in to carry the largest outputs which may be

drawn from them. In every broadcasting station there are certain tubes which are known as oscilwhich pump electricity into the antenna or aerial wire system and permit it to flow out of the system with many alternations during each second. It is these electric vibrations in the antenna which produce

lator tubes produce a steady flow of wave energy which pours from the transmitting antenna, flowing outward with the speed of light to the listeners on distant horizons. However, somewhere in the transmitter

there must also be what are known as modulator tubes. These tubes mold or control the output of the oscillator tubes, turning it on or off in accordance with the forms of the sound waves in the studio. This results in the radio wave being modulated or shaped so that it carries an accurate outline of the sound waves which fall upon the microphone. Obviously, this is a delicate process and one which must be carefully controlled, If the modulation is low—that is, if the outgoing waves are but slightly controlled by the microphone—speech or n that is, the control of the outgoing wave is too extreme and violent—the quality of the music suffers badly and various forms of distortion and rattling appear in the listener's home. The accurate control of

which is by no means universal. Modulating Power And suitable modulation also requires constant vigilance on the part of the station engineers since the variations in

modulation requires having ample modu-

lator tube control available-a feature

sound intensity which must be transmitted by radio are indeed great, varying from those corresponding to a whisper to those of a shout. Low power stations, carelessly administered, frequently overmodulate in a futile attempt to span great distances. The quality of reproduction under such conditions is execrable and utterly unfair to those desiring to promote broadcasting development. Some of the otherwise highest grade stations, on the other hand, become so cautious in their attempt to avoid overmodulation that they overdo the precaution and undermodulate. In many receiving sets this results in "choking" or "blocking" the detector tube and producing a different form of distortion and even a howling

Many miscellaneous precautions are re-

quired in the transmitting station. The vacuum tubes used must be extremely free from gas, so that the operation of the station may be quiet and without hiss or clicking effects. All batteries and electric generators used must similarly be silent in operation. The studio personnel must be careful to keep objectionable noises out of the studio. In some cases special problems arise, such as picking up other stations' programs on the control lines of a broadcasting station. For example, a broadcasting station situated in the central part of New York City and broadcasting from points in the same neighborhood is very likely to pick up powerful enough radio signals on its control lines from other nearby broadcasting stations to cause it to send out not only its own program, but those of several others. This can be avoided only by proper precaution in choosing the remote control lines and also by inserting radio frequency blocking circuits into the control lines to avoid this form of interference. Another peculiar feature which broadcast listeners should keep in mind is that it is not fair to judge the quality of distant stations by direct comparison with that of nearby stations. Static or other disturbances which are frequently present in distant reception greatly detract from musical quality. Furthermore, the comparatively faint signals from distant stations are incapable of producing a sufficiently strong response in the receiving set properly to actuate the loud speaker, so that the effect is not so natural as that from nearby stations.

It is also not generally appreciated that fading of the received signal is frequently accompanied by a marked distor lators. These tubes produce the ex- be faint in the receiving station. If, on | tion of musical quality which cannot be tremely high frequency electric vibrations | the other hand, modulation is excessive | charged either to the transmitting or receiving station. Listeners should be very suspicious of the quality of rapidly fading signals since rapid fading is frequently accompanied by quality distortion. It is a common experience to have a broadcasting station blamed by distant listeners, for its supposedly poor quality, although nearby listeners will insist, and entirely properly, that the quality is excellent. Unless a steady and clear signal is being produced it is unfair to judge the quality

of a broadcasting station. The introduction of superpower broadcasting stations having at least several tens of kilowatts in their antennas will greatly improve service where fading is not too great, since the more powerful signals produced by such a superpower station will override static or other disturbances at any reasonable distance most

Leaving the transmitting station, in the next article of this series we shall consider and explain the various possible faults in receiver; which may prevent acoustic synchronizing and consequent high quality reproduction. While the receiver can contribute a great deal to acoustic synchronizing, it must also be remembered that the listeners owe a great debt to the high quality broadcasting transmitting stations, where a tremendous amount of energy and money has been spent to produce perfect results.

Horld Radio Histor



radio power from your house current

Philco offers you either or both

DHILCO "A" and "B" Socket Powers are plugged permanently into a lamp or wall socket. They change your bumpy alternating house current into the smooth, hum-free direct current necessary for your radio.

One switch controls everything—"A" power, "B" power, even the radio itself. Snap it ON and you get a strong, uniform flow of both "A" and "B" power. Snap it OFF and your power is shut off—your radio is silent and current feeds gently back into Socket Power "A" from your light wires.

No high voltage transformers—no moving parts no hum—no distortion—no falling off in reception. As dependable as your electric current. Turned on exactly like an electric light.

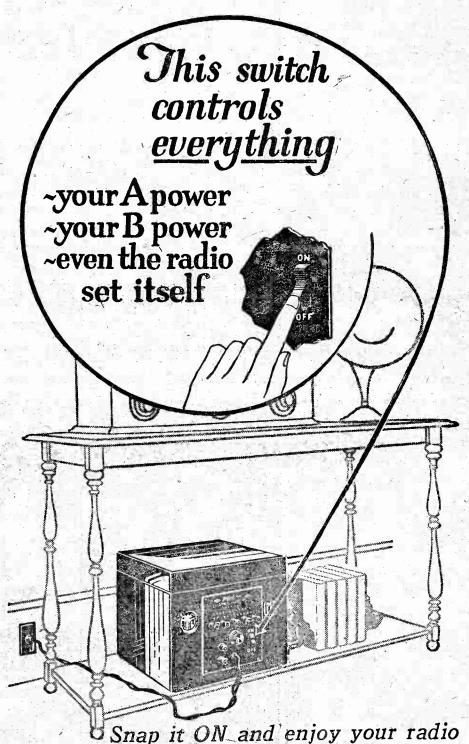
Philco "A" and "B" Socket Powers are built into one cabinet for dry-cell tube sets—and in separate cabinets for storage battery tube sets. If you now have a good storage "A" battery and charger, buy Philco Socket Power "B" It can be used on any set.

Once you connect Philco Socket Power to your radio you never need change a single wire. You forget all about getting wires mixed and burning out the tubes of your set. You forget that radio is mysterious and technical. You just enjoy it.

Sold and demonstrated by leading radio and music stores and by Philco Diamond-Grid Battery Dealers.

Philadelphia Storage Battery Company, Philadelphia

New York Office-824 Liggett Building, 41 E. 42nd Street (Phone: Vanderbilt 1051)



For Radiola Super-Heterodyne

Snap it OFF and go to bed

(old and new models) and other sets using 3-volt drycell tubes, buy Philco Socket Power "AB" shown above. Both "A" and "B" power built into one cabinet, satinfinished in brown mahogany. Connect permanently to your Radio-plug into a light socket-then turn your radio switch "on" and leave it "on." Thereafter nothing more to think about but the one Socket Power switch. Snap it "ON" and enjoy your radio. Snap it "OFF" and go to bed. For 50-60 cycle 105-125 volt \$65.00 alternating current

(No rectifying tubes to buy) Socket Power "B" (see below) may be used on any set where house current "B" power alone is \$47.50 desired, at only

For Storage Battery (6 volt) Tubes

buy Socket Powers "A" and "B" in individual cases. Socket Power "A" permanently connects to a light socket, and, without any thought about recharging, automatically supplies "A" battery current. Socket Power "B" eliminates "B" batteries and does away with all recharging and all bother and expense of replacing worn • out dry cells. Either "A" or "B" may be used alone, but for maximum convenience, use both together. Plug the "B" into the built-in socket on the "A." Plug the "A" into your house current. Both "A" and "B" (and the radio set as well) are then controlled by the one "A" switch. Snap it "ON" and enjoy your radio. Snap it "OFF" and go to bed.

Socket Power "A" for 50-60 cycle 105-125 volt alternating current.....

Socket Power "B" for 50-60 cycle 105-125 volt alternating current.....

(No rectifying tubes to buy)

\$47.50

RADIO A AND B SOCKET POWERS

\$42.50

THE NEW YORK HERALD NewYork & Tribune RADIO MAGAZINE

SECTION TWELVE

SUNDAY, NOVEMBER 8, 1925

Administration of Radio in Canada

How Our Northerly Neighbor Regards and Controls Broadcasting; Co-operation With United States Officials; Attitude on Advertising; Tax on Receivers



Operating room at Station CNRO, Ottawa, Ont., capital of Canada

N THE eve of the Fourth National Radio Conference, which opens tomorrow at Washington, a review of conditions regarding wireless as they exist elsewhere should prove of interest, and with that thought in mind it is the purpose of this article to deal with the istration is undertaken in the Dominion of Canada. While the conference at Washington is national in character, yet questions are bound to arise which will possess a far-reaching international bearing, and Canada is so keenly interested in this aspect of the conference as to have appointed the administrative chief of the radio branch of the Department of Marine and Fisheries, Lieutenant Commander C. P. Edwards, O. B. E., F. I. R. E., A. M. E. I. C., as official representative, and in such capacity he will be present during the meetings and discussions in

In answer to any question which may arise in the mind of a reader as to Canada's interest in the conference and to clear any doubt as to any interest on the part of those attending the conference in Canadian radio matters, a word of explanation will not be amiss. Without desiring to suggest a lesson in geography, it must be remembered that the northern part of this continent is shared by two peoples, and that the most populous sections of each country are those which touch upon and approach the international boundary, the latter a straggling line of marks stretching across North America from the Atlantic to the Pacific.

in brief, there exists an absolute reci- | ators in charge of stations and the faculprocity between the United States and I ties of engineers who have designed and Radio broadcasting recognizes no boundaries, acknowledges no border inspectors, nor pays impost to any protective tariff;

nadian National Railways. It is equipped for receiving and broadcasting and is used to check up local conditions on any part of the system

That is a very fine state of affairs, but and effective working agreement between the two countries regarding wireless, annoyance can arise. Therefore, it is essential to maintain friendly co-operation between the recognized authorities on each side of the great boundary which stretches across the girth of this continent

It is, then, the purpose of this article to deal with conditions in Canada, the and the relationship between the department responsible for such control and the public in general, and that section of the public in particular as represented by the owners of receiving sets.

Canada was a pioneer in wireless control and its official representatives were the real leaders in the movement to clear the broadcast band of waves from interference from ships and coast stations, a principle to which all maritime nations, with the exception of France, have agreed to, and which, indeed, will soon become unanimous. Canada was the first country to recognize the rights and privilege of owners of receiving sets and manifested this recognition by using the money accruing from the collection of the modest license fee to finance adequate inspection of broadcasting, and to establish an efficient check on causes of interference due to power line leaks or any of the thousand and one mysterious influences which make their presence apparent in a re-

Broadcasting in Canada comes under the administration of the radiotelegraph service of the Department of Marine and Fisheries, more popularly known as the Radio Branch, the branch being in charge of Lieutenant Commander C. P. Edwards, as mentioned in the foregoing, with the

(Continued on page four)

Canada, in so far as wireless is concerned, constructed stations the impulses from to the extent of the technical skill of oper- which flow freely under two flags.

Towers and antenna at CNRA, the Canadian National Railways' broadcasting

station at Moncton, N. B., Canada, the most easterly of all broadcasting stations

in North America. CNRA is powerful enough to transmit across the Atlantic to

the British Isles and Europe

Collecting a Bogus Note Via Radio

By Using His Radio "Invention," J. Y Hampton Collects What Was Thought To Be a Worthless Obligation Thirty Years After It Was Issued

By C. K. THEOBALD

HIRTY years after date I promise to pay to John Y. Hampton Three Thousand Dollars with interest at ten per cent.'

That was the way the note read. There was no date and the legal phrase, "for value received." was omitted. It was

George Hampton returned the note across the polished mahogany table to his father. "That represents a pile of money," he averred-"three thousand dollars, with interest at ten per cent-if it can be collected.

They were comfortably seated, father and son, in the spacious library of John Hampton's southern home. George Hampton, thirty, unmarried and too fond of adventure to think seriously of women, had just arrived from Chicago to spend his annual summer vacation with his father. Hampton senior, sixty years young-nobody ever called J. Y. Hampton old-drew the chair containing his long and aristocratic figure nearer the table and struck a match to a fresh cigar.

"More than \$50,000," he asserted. "And the only 'if' barring its collection will be if Aleck Smartley isn't worth it. Not having that much, we—for I want you to help me-will take all he has."

"I can see Aleck Smartley's finish, all right, J. Y., when you go after his hide." George Hampton, like the rest of Vicksburg's 30,000 population, always called

"He can dig up fifty thousand, I think, but he won't be worth as much as a dead B battery afterward; which, incidentally, would rid the radio industry of a firstclass crook. His business methods are not well liked in Chicago. But tell me how did you ever come to get such a note from Aleck Smartley?"

How, indeed! For thirty years John Hampton had held an interest in Aleck Smartley; never-to-be-forgotten bitter memories of a clinging past, hateful recollections of a misplaced confidence in his early twenties, which he could not forget. Now that the old memories had again been revived, the suppressed incident of his youth craved expression

The Story of the Note

"I'll tell you the story briefly, George," he said at length: "Thirty years ago, when you were a baby, I was employed by Aleck Smartley, who owned the old Levee Street light-plant. Smartley was apparently everybodys' friend—and a loyal patron of Vicksburg's many saloons. But he was not alone in the last respect. Nearly every little grocery had its bar then, as you, when a boy, may well recall. It seemed quite proper to find a jug of whiskey in the home of every one who

"Well, it was Smartley that induced me to take my first drink of whiskey, and taught me how to drink it straight. A hail-fellow-well-met was Aleck Smartley, the big man of the little town. But he was practically bankrupt, which I was later to learn to my sorrow.

"It was then that my father died, leaving your mother and me a few hundred dollars and the old homestead. Smartley needed this little money and the property. knowing that he could readily convert the latter into cash, so he made me what appeared to be an alluring offer. Through the friendship which he claimed he held for my father he would give me a third interest in his so-called lucrative business for the small sum of \$3,000. He would also make me manager of the plant. Trusting him completely, I accepted his offer blindly and, I might add, drunkenly, over the few strong drinks which he had cunningly prepared in advance for the occasion.

Had Been Robbed

"The sequel is the same as all such stories," the father went on. "A few weeks later I saw that I had been robbed. I demanded restitution, and Smartley as good as laughed in my face. We were in his office at the time and I had taken a few more drinks than was good for me. But I had come for my rights, and, show rooms on the top floor of one of Chicago's steal it as he had previous ones. Anyway,

"VICKSBURG, Miss.—18,— | ing a revolver in his face, I demanded my | skyscrapers. A sign, in keeping with the | he had best feel the inventor out. So he money back then and there. I meant business and Smartley knew it, so he changed his tactics. It was impossible, he told me, to raise \$3,000 on the instant, nor the tall and slender new tenant to grow could he procure it to-morrow. But he showed me where he had personal assets -false, of course-of many times the affect a cough, which seemed to have its amount. He would give me his thirty-day note, with interest at 10 per cent. And Aleck Smartley judged correctly that I was too drunk and excited when he gave

me the note to read it aright. "I did not discover the fraud until the following day," John Hampton concluded, "when I learned that Smartley had absconded and that he had no personal assets. I never heard of him again until you mentioned in your letter six months Chicago,'

"That was a raw deal, J. Y.," the son condoled. "But tell me, how do you propose to make him pay the note, and how

"I am going to take \$50,000 away from Aleck Smartley," John Hampton declared, "the principal and interest on that bogus note, the same way in which he robbed me of \$3,000 thirty years ago. I am going

George Hampton looked at his father in utter astonishment. "Steal \$50,000 from Aleck Smartley, you and I, J. Y.?" he

Will Keep Within the Law

"Oh, we'll keep well within the law," the father smiling assured, rising to return the note to the safe.

George Hampton knew his father to be a resourceful and determined man. He had known him to accomplish many worthwhile things by his shrewdness and discernment, things which many other men would not have dared to start. And he had never known him to begin anything that he had not successfully finished. But this little matter of subtracting \$50.-000 from Aleck Smartley's bank account,

John Hampton must have discerned the doubt in his son's countenance, for he said: "I have my reasons for counting on success, George. To begin with, from what you have told me of Aleck Smartlev's exploits in Chicago he is as fond of his drink as ever-and the continued use of booze doesn't tend to sharpen one's wits. Then, besides being egotistical, he is a thief at heart. Smartley is a man who glories in putting over a crooked deal and keeping out of jail, since you tell me that he has stolen at least two radio patents and is flourishing now on the fruits of his victims' labors.

"Well," the elder Hampton continued, "when you first wrote me that Smartley was in Chicago; I set about building, for a most wonderful radio instrument. It is complete now, all packed and ready for shipment to Chicago, else I would let you see it."

"Why did you pack it so soon?" George Hampton grumbled his disappointment. "If I may not see it, tell me about it, at east."

"That can keep until some other time. Just now I want to tell you how I propose educing Aleck Smartley's pocketbook \$50,000 and how I want you to help me."

Unfolds His Scheme

John Hampton now unfolded a scheme which had his son's full sanction, as was evidenced by the look of approval he bestowed upon his father.

"Of course, George," the father said in conclusion, "it is important that Aleck Smartley does not recognize me; and I do not think he will, with the flesh I have lost in the past thirty years and the beard I have taken the trouble to grow in the last six months. And I think you have told me that he does not know you. Good. It is equally important, too, that we assume other names in our coup with Smartley, which aliases we will decide

upon in the Windy City." So it came to pass, a few months later, that one J. Yerger Jamison rented, for an indefinate period, a cheap suite of office

price of the rooms, on the reception-room door, apprised the public that Mr. Jamison was a patent lawyer. Just as it had suited a full beard prior to his advent in the city, he had deemed it expedient now to origin in the very depths of his lungs. Also, before he opened his doors for business which he never expected to get, it befitted his purpose, in view of forthcoming events, to make the place appear as though its owner had endured many struggling years in his calling. Not until he had satisfied himself that all of this was perfect, did Mr. J. Yerger Jamison hire a freckled faced office boy whose hardest job would be to draw his

Also in the city of Chicago, and at about this same time, Aleck Smartley, selfish, egotistical, domineering, and never as smart as he thought himself to be-but prosperous withal-sat complacently fat and comfortable in the warmth of his private office. As was his early morning habit, he indulged in his pre-war drink of red liquor. Then he took up his mail.

Aleck Smartly "Bites"

Assorting the letters bearing first-class postage, he came across a legal-size envelope addressed, "Mr. S. S. Smith, care of Smartley Radio Company." This was one of many other letters which, during the past few months, had been passing through his hands for this S. S. Smith. Smartley recalled having given this Smith fellow a job in the factory awhile back. He had come well recommended and the foreman's reports showed that he was well worth his hire. This fellow must be working on some radio invention, Smartley surmised, since the envelope bore the return address of one J. Yerger Jamison, Patent Attorney. It might be to his best interest to make sure of this, and Smartley did not argue with his conscience in the least when he slit the envelope with his paper-knife. But first he marked it "opened by mistake," indicating previous experience in this direction.

"My Dear Friend Sam": Smartey began reading, "Relative to your 'Non Static Radio Receiver,' if the invention functions as you claim—and I certainly have no reason to believe otherwise, since you say you have it in successful operation—you have at once advanced the science of radio telephony many years and made yourself

"You say that you need money too badly for other purposes to go ahead with the patent. I. too, am so penniless, due to heavy expenses attending my shattered health, that I cannot even supply the Patent Office advance fees. But this invention is of such importance that you should experience no trouble in securing funds for its development. I should like to see and hear your device in operation, also to have talk with you regarding these money matters. With this end in view. I will thank you to inform me when I may have an appointment with you. Yours "J. YERGER JAMISON."

He Calls S. S. Smith

Aleck Smartley thought long and pensively over this perusal. He was not well acquainted with the technical end of radio, but he did know that a successful invention of this nature would be worth millions. This S. S. Smith, he thought. was just one more deluded inventor or he had stumbled onto something that radio engineers had long been tryinf to solve. Smartey was inclined to believe the latter. as was Smith's attorney friend, according to the letter he had just read. Who was this patent lawyer anyhow, this J. Yerger Jamison. Smartley did not know him, but no doubt there were many patent lawyers

in Chicago of whom he had not heard. Smith needed money and needed it badly, Smartley mused, as he mechanically slid the letter into its envelope. And Smartley needed this invention, if it were genuine. Possibly a few thousand dollars would buy the patent. Probably he could

promptly summoned S. S. Smith to his

imposing presence. "Sorry to have disturbed you in your work," Smartley suavely apologized, when Smith, cap in hand and hair unkempt, entered the office, "but I am due to beg your pardon. I opened this through mistake," and he handed over the letter.

"That's er all right, Mr. Smartley," Smith managed to say, apparently embarrassed in the presence of so much grandeur. "It's nice-it's good of you to look after my mail, and I am sorry it has, annoyed you." With which he was for immediately departing, when Smartley checked him in the doorway.

It Was a Mistake

"I must tell you, Smith, that I read the greater part of your letter before I discovered my grave error. You see, I have considerable dealings with patent lawyers, and I really thought this letter was mine.'

As Smith turned in his steps Smartley's thoughts, for some cause or other, sped back thirty years into the past. He recalled now how easily he had robbed a young greenhorn then of \$3,000-Hampton, yes, that was the name; he had almost forgotten it. Smartley's smooth tongue had done the trick then. Well, he still had that requisite.

"If you have discovered a means whereby we can eliminate static," Smartley continued patronizingly as Smith reached the desk and accepted a proffered seat, "I will say that you have accomplished considerable—that your device will be of much value to us." He might have said "invaluable" to the radio industry, did he not have a selfish purpose in mind.

"My invention will do more than cut out static," Smith asserted proudly. "It also positively excludes local interference from lighting transformers, X-ray machines, spark coils and the like, which is such an annoyance to the city listeners-in. And the beauty of it is its simplicity."

"I should very much like to see this invention." Smartley's interest was genuine in this respect. "I wouldn't steal it," he laughed jokingly. "Even though you haven't applied for patents," he added tentatively. "You no doubt have your original sketches and descriptive matter as proof of your first conceived ideas."

He Saves the Drawings

Smith stuck his thumbs in his overall straps. "I'll say I have," he assured with an air of shrewdness. "I have every scrap of writing and drawing since I first conceived my idea, six months ago. I have filed these for safe keeping with Mr. Jamison, who was a good friend of my father's. so I feel perfectly safe in that respect. But even so, I'd trust you completely, Mr. Smartley, and I'd like to give you a demonstration of my device."

Here was disappointment for Aleck Smartley—the safeguarding of those papers though he did not let his counte-

"Your caution is to be commended in protecting your evidence," he congratulated, and then went on to say that he would be pleased to see this radio marvel in operation.

"That's very kind of you, Mr. Smartley," Smith responded. "I wonder if you could go this evening after supper?"

The radio dealer glanced out of the window to note the unfavorable weather conditions, but Smith forestalled his objection with:

"The worse the weather, the better lemonstration I can give. Mr. Jamison wants to see the invention, too, and perhaps we can all arrange to go to my house together. Mind if I call him on the phone?"

Such an arrangement would be very satisfactory to Aleck Smartley. It might be to his advantage to meet this patent lawyer, who, like his client, was badly in need of money. And Mr. Jamison, when Smith got him on the phone, would be glad to go along if some conveyance could be sent for him.

(Continued on page four)

Radio Presents Play for new distance and get it interest that just this has been done in Europe. In England, for instance, Superior /

Brandes Experts in radio acoustics

since 1908



Kurz-Kasch Aristocrat

Rheostat -- Potentiometer

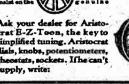


A solid piece of mould-ed Bakelite—Kurz-Kasch quality and work-Rheostat made in 4-6-

Potentiometers 200-400 ohms. Single hole







The Kurz-Kasch Company Largest Exclusive Moulders of Bai Dayton, Ohio



Yes, We have PHILCO Socket Powers Radio A&B Drynamic Batteries

News and Notes Complex Problem of the Radio Trade

Continued from page eleven

ime is that perfection cannot be

over most of England.

ing released from material restraints.

Radio is a conspicuous element of

that human differences are the minor

instead of the larger facts of life.

While radio's functions may include

some extension of the scope of formal

education, it is likely to be most

valuable as a supplement to the edu-

cation of the schools. Just such gen-

tion of this transition are of mechan-

ical conquest; it will tend to prevent

In presenting these thoughts I have

strayed from the beaten path of

technical work with which I am ordi-

narily concerned. I have done so

because I believe the present time

opportune to remind the radio audi-

ence of the partial approach to per-

fection radio has already made, and

to indicate the problems and difficul-

to End Waterman Series

In keeping with Armistice Day

the final "Waterman's Points of

Progress" on Wednesday at 9 p. m.,

broadcast by WEAF, WOO, WCAP,

and WCCO, will treat "The Treaty of

Versailles" which ended the World

War. A program of songs popular

during the late war will be given be-

fore the talk.

WGR. WCAE, WJAR, WEEI, WWJ

'The Treaty of Versailles'

ties of carrying it forward.

exclusive devotion to the material

experienced in reception at such dis-Opens New Haven Factory ances, and so the effective service Due to their rapidly increasing business, the Bruno Radio Corpora small area around it. No stone is tion, of 223 Fulton Street, New York being left unturned and no technical City, has opened a large factory at expedient is neglected in the efforts 38 Canal Street, New Haven, Conn. mechanism embodying straight line expedient is neglected in the efforts being made to conquer fading and working day and night, as well as working day and night, as well as xtend this service area. If all else Saturday and Sunday, to accommodite other features. It is in a beautiful date their jobbers. Besides the line hardwood case and requires no out fails, great distances can be reasonable date their jobbers. Desides the line hardwood case and requires no out of Quartzite coils, the Bruno Radio (longer waves), but this requires Corporation manufactures the Bruno used outside of the set or inside, very high power. It is also questionable whether the radio public of Bruno Magic Dial and ultra-vario out of sight. America would agree to putting Bruno Magic Dial and ultra-vario broadcasting in among the ship and condensers, and will shortly bring who have offices in the Longacre verland message traffic that now out a new type of condenser.

To Test Sets

the country, on a frequency of 190 a product of the Liberty Transformer kilocycles (1,600 meters), delivers Con pany of Chicago. It is a unique programs to owners of crystal sets and ingenious device that permits putting four radio receiving sets or While radio is already rendering loudspeakers to the test of comparinoteworthy service, it will, of course, son at one time. The four different distant stations. be made to do far more than at sets or two or three sets, or speak present. It is expected that programs ers, if desired-may be attached to from across the seas will be re- the comparometer, and by merely broadcast from American stations. throwing the switch, any one of the The development of this undertaking sets or loudspeakers attached may from the crude beginnings it has be instantly placed in circuit. It is already had to satisfactory perfection possible to switch from one set or is a considerable undertaking, but it speaker to another without interis going on. Another advance which ruption and thus definitely distinis more remote, but which I believe guish the minutest difference in tone will come, is supplementing radio by quality, volume and clarity.

some form of appeal to the eye. It also shows at a glance the cur-Prophecies that we should have radio rent consumption, thus indicating motion pictures have already been whether or not a set can be operated fulfilled. They have been achieved in economically or whether it consumes

New Coil Forms

Radio is a conspicuous element of this mechanical paradise; it has rendered communication instantaneous and unlimited.

But there is still greater satisfaction in the thought that radio is also helping to usher in the mental or spiritual era. I am not qualified to estimate the potential social effects

That has been done and in the standard, in that in the standard, in the standard in the sta Radio fans desirous of constructing of radio. That has been done and differs from the standard, in that will be done by poets and statesmen. there are several ribs molded on an Certainly radio is a great force of ordinary smooth piece of tubing. A nator for A. C. Complete instructions, \$1. enlightenment. By it, vast numbers coil wound on these forms will of people receive a flood of light on found to have many of the advantof people receive a mood of result is ages of an air core and yet retain such light as removes misunderstand the strength of standard wound inings, cleans out prejudices, and reveals ductances.

> Exhibit at Radio Show The Freed-Eisemann Radio Corporation has announced some inter esting new sets which will form part

eral enlightenment may be the salva-5-TUBE SET



Take B. M. T. Sea Beach Express 59th St. Station Many Other Bargains Open until 11 P. M.

RIX RADIO SUPPLY HOUSE, INC. 5505 Fourth Ave. _ Brooklyn, N. Y. _

f their exhibit at the forthcoming Fourt National Radio Exposition, in neutrodyne, they will show the new nection. Latour circuit receivers, one of which is operated on dry cells. They will also introduce the use of six tubes in the neutrodyne receivers NR-45 and NR-7. The NR-45 is inclosed in a cabinet.

The new model Operadio, known as the Consolette, has a very new

Building, report that many of the on order have obtained them, and in A new and interesting invention many cases the original samples have 30-kilowatt station in the center of called the Liberty Comparometer, is already been delivered.

> Slow Adjustment for DX Slow adjustment of tuning dials is the only kind which brings in long

A Good Ground The steel girder or frame of a Chicago. Besides their well known building makes a good ground con-

Anything in Radio and Always the Best

Washington Heights' Oldest RADIO SETS OF QUALITY TO MEET THE POCKETBOOK OF EVERYONE-

TIME PAYMENTS ARRANGED

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FREE INSTALLATION ONE YEAR GUARANTEE SATISFACTION

Radio Exchange

Rate, 40 cents a line. Ads. accepted until 12 o'clock

PHONE PENNSYLVANIA 4000

Parts and Equipment

motion pictures have already been fulfilled. They have been achieved in very glementary form, but it will probably be a long time until they reach anything like a real service basis; and some less direct solution of this problem may be developed. At present the radio listener reads the newspaper or uses his eyes on something else wholly unrelated to the sounds that come over the air, and thus loses much of the effect through dividing his attention—or else he concentrates on the radio by shutting his eyes. Now when I do that I am pretty likely to go to sleep. There seems to be a need of the development of some sort of appear to the eye concurrent with music received by radio, just as the motion picture has very successfully compensated for its silence through the concurrent playing of appropriate music.

Radio Is Conspicuous Element

The present time is one of marvelous fruition (and it may be of climax) of scientific development along mechanical lines. It will be realized much more ten years hence than it is now how fully we are being released from material restraints.

Radio Is conspicuous element of the ease of real gratitude.

New Coll Forms

Radio fans desirous of constructing

whether or not a set can be operated conomically or whether it consumes and excessive amount of battery current decommination to instance and the probably that it will give over accalled the battery current devices.

After 30 days trial if you do not consider it the birgest buy of the battery current.

After 30 days trial if you do not consider it the birgest buy of the battery current.

After 30 days trial if you do not consider it the birgest buy of the battery current devices.

Ratio Service Stations

Radio Service Stations

The free radio service stations, cate the feet the country, are becoming most popular. The same of real variety of the same of real variety of the same of real variety current devices.

They are useful not only in aiding set owners to deal with a variety of the same of real variety current devices. The country

LOOK UP

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SUPER - HETERODYNE SPECIALIST.
BUILDING, REPAIRS, ETC.
NO CHARGE FOR CONSULTATION
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AUTHORIZED AMBASSADOR SERVICE For real selectivity we build the famous 4-tube Ambassador, using all genuine Ambassador parts.
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OPEN EVENINGS. MELROSE 4632

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A limited number of factory built

Erla sets at special prices.

REPAIRING, REMODELING, REWIRING
all circuits. Also carry Erla parts.

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BATTERIES FULLY CHARGED, 35c Called for and delivered. Batteries rented and repaired. Plaza 2069. Spencer Battery Service, 888 1st av. (50th).

PHONES, LOUD SPEAKERS RE

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Parts and Equipment

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With Every Complete 100-Voit Battery

There are three types of "B" batteries;
the dry cell, the lead storage battery and
the alkaline battery using Edison elements.
The Edison element "B" battery has long
been the marvel of battery users, thereby
a surpassing all others. Can he short-circuited, overcharged or discharged without
tis being damaged in the least. The SeeJay battery is constructed from genuine
alkaline elements and connected with a
non-corresive connector. Connectors crimped
to on under heavy pressure. Each battery
guaranteed or money refunded. No red
tape. 100-Voit unit consisting of 78 pairs
cohnected elements, 78 heavy glass cells,
78 perforated separators and two pounds
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potassium hydroxide, \$5.00. Complete assembled 100-voit battery in beautiful fintished oak cabinet, \$12; 140-voit, \$16.
Factory made Universal "B" battery
s charger, \$1.75. Order direct; no arencies.
Send 20c for sample cell and FREE LITERATURE. SEE-JAY BATTERY CO, 915
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h on money, Pay on delivery. All orders
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New York Herald Tribune

Notes on Stabilizing Tuned Radio-Frequency Amplifiers for Wireless Reception

Oscillation in This Type of Magnifier Causes Interference, but May Be Easily Controlled

By WILLIAM H. FORTINGTON

a congested city area is the squeal of some | losser methods are quite good, while others one else's receiver. Scarcely a night passes but what some listener residing "a la apartment" is roused out of the reverie imposed by one of the many excellent radio instrumental trios through the howls and squeals of a regenerative (?) receiver. But why always blame the regenerative set of the single circuit variety, when at least 30 per cent of the howling is caused by supposedly non-regenerative

The truth of the matter is that too many of these "inherently neutralized" tuned radio frequency receivers suffer badly from oscillation in the radio frequency part of the set, due to faulty design in so many respects that it would require pages to enumerate them.

Radio Industry Has "Botchers"

The radio industry, like the automobile industry in its infancy, suffered at the hands of the "botcher," and with so many of these botched sets in use to-day, it would be difficult to say who are and who are not the offenders. There are, no doubt, many users of tuned radio frequency sets who are somewhat disgusted. Their disgust may be allayed somewhat, however, by following the points outlined in this article, which deals solely with stabilizing tuned radio frequency re-

set that will not squeal. Some of these

ERHAPS one of the most annoying | facturer has introduced losses to such | method used at (c) is quite good where | design of the R. F. transformer itself. interruptions one encounters when a degree as will enable him to build a an infinitely variable resistance is used shunting the inductance. The inductance is, of course, tightly coupled to the grid circuit inductance, and the variable resistance serves to increase or decrease the

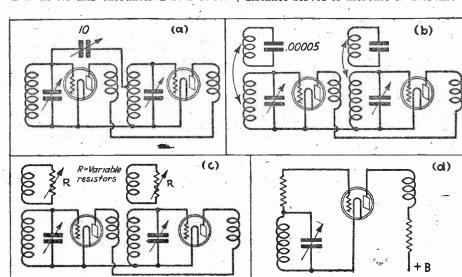


Fig. 2—Four circuits used in present day receivers, (a) The Neutrodyne circuit, (b) An absorption circuit. (c) An absorption circuit for high-wave reception. (d) A method for controlling parastic oscillations.

ing two or more stages of tuned radio | loss set up by eddy currents in the abfrequency amplification, in which the sorption coil. With such a device weak losses due to stabilizing methods employed | signals may be brought up to reasonable were so great that no appreciable benefit from the radio frequency amplifier could be observed. It is quite obvious, there-Stabilizing, as applied to the radio art | fore, that two stages of well neutralized | method of controlling parasitic oscillation. some years ago, meant essentially pre- T. R. F. are better than four stages

volume: that is, until the amplifier is

At Fig. 1d will be seen a much used Resistance inserted either in the plate or

Fig. 4 represents a radio frequency transformer such as is commonly used. All coils necessarily contain inductance capacity and resistance. Now it is fairly common knowledge that as the number of turns in the primary winding of a radio frequency transformer is increased, the period, or to be more correct, the wave length of the coil, also increases. We find then that if the inductance value of the primary is increased to that of the secondary, the frequency of the two coils will be the same. All experimenters who have played with the old time regenerative sets enploying a variometer in the plate circuit know that when the plate and grid circuits are near resonance the tube

The above condition also applies to tubes in radio frequency cascade coupling, but to a much more pronounced degree; and it is quite obvious, therefore, that the primary winding must not be in resonance with the secondary, neither must it be in resonance with any close harmonic frequencies of the secondary. Consequently, the number of turns of wire permissible in the primary is strictly limited.

Transformer Windings

In sets of the neutrodyne type we find that although the number of turns emploved in the secondary is perhaps sixtyfive, the number of turns in the primary seldom exceeds eight; in fact, some manufacturers use only six. Again, the num-

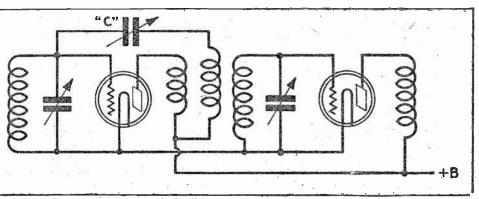


Fig. 3—A wiring diagram showing the reverse feed-back method of preventing oscillatoins

"stabilizing" is more of a slogan, meaning "Stop-'em-from-squealing - and - annoyingyour-neighbors." Many radio fans are under the impression that no matter how | This method was used extensively in Britmuch a T. R. F. set squeals, the squeals | ish aircraft receivers as early as 1916, are not annoying their neighbors. This, | and even to-day there are still some enhowever, is not the case in the majority gineers who advecate its use. of instances, for although some howling might be confined to the set, the best part of it may be heard outside.

As previously mentioned, the methods

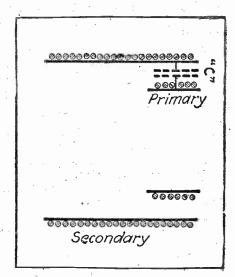


Fig. 4-A diagram showing the effect of capacity between coils

of stabilizing radio frequency amplifiers are many, and it remains for the fan to select the methods which he considers the most applicable to his particular case.

Eighty per cent of the inherently utilized receivers on the market to-day are stabilized by what are known as losser methods. In other words, to secure quiet and flexible operation of his set, the manu-

venting oscillation without losses. To-day of badly neutralized amplification. At Fig. 1 will be seen perhaps what is the oldest method in existence of con-

trolling oscillation in R. F. amplifiers.

Perhaps an examination of this method would not be out of place. At Fig. 1, which devicts a three-stage R. F. amplifier, it will be seen that a potentiometer is connected across the "A" battery or filament supply, the moving arm, or free contact, being connected to the grid circuit of the amplifier tube. This sliding arm allows a varying positive potential to be applied to the grids of the tubes, which produces damping in the grid circuit through the establishment of grid current a thing which is to be avoided. This method, of course, is now superseded by many improved and more recent ideas, of which perhaps the following will be found to be in fairly common use.

Fig. 2 depicts schematically four methods such as are commonly used in present day receivers, the first (a) is the well known neutrodyne method of Professor Hazeltine which was the forerunner of the many methods discovered thereafter. The Hazeltine method deals solely with neutralizing the inherent tube capacity, and it is by no means a preventive of oscillation where badly designed T. R. F. transformers are concerned.

Two manufacturers use methods depicted at (b) and (c), in which an inductance is shunted either by a resistance or capacity, forming an absorption circuit which is just sufficient to control oscillation at the lowest wave length. At the higher wave lengths it is, of course, found that the set is usually quite stable. The legion, the chief of which is due to bad ohms in series with the positive B wire.

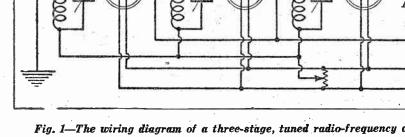


Fig. 1—The wiring diagram of a three-stage, tuned radio-frequency amplifier with a potentiometer grid control

the field of the coil, so that the eddy current flow in the end plate of the condenser is sufficient to set up losses which will restrain the circuit from oscillating. The coupling relation between the grounded end plate and the inductance is usually variable, so that adjustment may be made at the lower wave lengths, at which is encountered most of the trouble. This method has assumed a commercial name known as the Foucault system.

Reverse Feedback Method

Yet another method, somewhat different from the others, is shown at Fig 3. This has been referred to as the reverse feedback. Users of this system speak highly of it, especially where short wave work is encountered. It will be seen that the primary winding of the radio frequency transformer is duplicated, the second winding being reversely coupled to the first. The small variable condenser (c) makes possible very fine adjustments, and when the minimum capacity is in circuit the feedback is practically at zero. As the capacity is increased, the control over oscillation becomes more pronounced, accompanied, of course, by a decrease in signal volume.

After analyzing the foregoing methods what causes oscillation in the average twostage T. R. F. set. As previously stated,

grid circuits (or both) of the tube tend, ber of turns allowable in the primary is to limit the functioning of the tube as an limited somewhat due to the inherent amplifier. In other words, the circuits are | capacity coupling existing between the two circuits, as shown by the dotted condenser Perhaps one of the commonest methods | (c) at Fig. 4. Many methods of winding used in cheap T. R. F. sets is the earthed the primary to reduce capacity coupling eddy current system, which takes the form | have been tried out, it being found that of placing the variable condenser end the method shown at Fig. 5 is quite sucplate, which is usually grounded, within cessful inasmuch as the existing capacity effect between the coils is very low, while the coefficient of coupling is reasonably high. The writer has used T. R. F. trans-

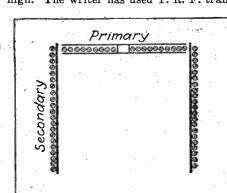


Fig. 5-A diagram showing a method of reducing capacity between coils

formers of this type with as many as sixteen turns in the primary without the slightest trouble from oscillation

There are, no doubt, many radio fans who are to-day using B battery eliminators and who have found that their receivers oscillate badly, a thing not apparent when ordinary batteries were used. This, it will be found, is due to the effective resistance of stabilization, the reader might ask of the batteries being removed from the plate circuit when a B eliminator is used. This trouble may be overcome by insertthe number of causes of oscillation is ing a non-inductive resistance of say 50

Administration of Radio in Canada

title of director. The activities of the Radio Branch comprise in the main:

(1) Administration of the radiotelegraph act and regulations issued thereunder. (2) Construction and operation of radio stations.

The administration of radio throughout the Dominion, as presented in the radiotelegraph act, chapter 43, statutes 1913, has, with the establishment of the Department of National Defence, been transferred from the late Department of Naval Services to the Department of Marine and Fisheries.

This administration comprises:

(a) The licensing of all classes of radio stations in Canada, including those on ships of Canadian registry, and on air-

(b) The inspection of such stations to ascertain that they are equipped and operated in accordance with the radiotelegraph act and regulations and with the provisions of their respective licenses.

(c) The examination, for certificate of proficiency in radio, of the operating staffs at such stations.

(d) The inspection of all ships, Canadian and foreign, leaving Canadian ports fitted with radio, to insure their compliance with the radiotelegraph act so far as it affects them, more particularly that section which prescribes that certain passenger ships must be equipped with an efficient transmitting and receiving equipment.

The department has twenty-nine stations on the Great Lakes and the Atlantic coast and eight stations on the Pacific coast, some being operated directly as aids to navigation, others as direction finding stations, while service is also prowided for nine private commercial stations installed by owners of lumber camps, canneries, paper mills, etc., on the British Columbia coast.

Canada subscribes to the International Radio Convention which controls the international working of radio.

Other matters which concern the department include the question of an imperial chain of government-owned high power radio stations to interconnect the different dominions of the Empire and at the same time with the United Kingdom. This is rather apart, yet not entirely so, from the purpose of article, and in this connection it may be pointed out that in 1902 the government of the day, realizing the potential value of trans-Atlantic radio service, subsidized the affiliated Marconi Companies to erect the first trans-Atlantic station in the world at Glace Bay, Nova Scotia. This station was duly established, and, while improved practically out of recognition in the matter of apparatus and efficiency, is in operation to-day and giving service to the Canadian people. Licenses have been granted to the Canadian Marconi Company for the installation of super highpower stations at Montreal and Vancouver, the Vancouver station to work a demonstration. It was just such a night with Australia and the Orient, and Mont- as this, only there was more lightning in day is indeed a busy one, and crowded real with Europe. These stations cost | the clouds. But there was not the least approximately \$300,000 each.

Mention of the date 1902 recalls a coincidence. It was in 1902 that Sir Ernest Rutherford, then professor of physics at McGill University, carried out a most successful demonstration of his theory that communication could be established between a station and a fast moving train by means of electric waves. That experiment was carried out in the vicinity of Montreal and to-day the chief transcontinental and international trains of the Canadian National Railways which dash by the little station of St. Dominique. carry receiving sets as part of their equipment, offering news and entertainment on a scale worthy of the eminent scientist who conceived the thought.

The public, generally speaking, is more directly interested in the problem of radiotelephonic broadcasting, and it is concerning that particular phase of wireless that there is an immediate interest between Canada and the United States, and one which prevails to a greater extent than is generally appreciated. The question as to the wave-length band reserved for broadcasting stations in the Dominion has been very seriously discussed and has been the subject of compromise between authorities in the United States

There is a considerable difference in the

(Continued from page one)

operated in the United States, and that | the offending station; if in the United difference would follow somewhat pro rata on the basis of population. There were at most recent report eighty licensed stations in Canada, of which twenty were marked as inactive, and of those included in the remaining twelve are "phantom" stations—that is, stations which are leased on certain occasions and then operated under a call letter different from that of the actual station.

Location of Stations

The greater number of these active stations naturally will be found in the cities of Montreal, Toronto and their adjacent communities, and lesser numbers in the Western cities, culminating with powerful stations in Moncton. New Brunswick, the most easterly of all North American stations, and Vancouver, B. C.

A glance at a map will show in a graphic manner the proximity of these Canadian stations to well populated stretches of territory in the United States, and immediately indicates the evil effect that would follow unrestricted broadcasting. As it is the channels in use on each side of the line closely approach each other, and the slightest divergence will at once set up a bothersome condition. For the control and protection of broadcasting the radio branch of the Department of Marine and Fisheries maintains constant and adequate protection, using inspectors in every town. These inspectors listen in on the air, check up any interference present and take steps to remedy the same.

These inspectors do not confine their activities to Canadian stations, and any deviation, no matter how slight, from the States, with an immediate message to the district inspector and a follow-up to Washington. It may be said that this method of "policing" the air has proved satisfactory, and on a recent visit to the offices of the branch at Ottawa it was stated that very little trouble had been experienced on either side of the line, and it was further stated that managers of stations co-operated most sympathetically in rectifying any unusual condition.

Ship Interference

One other international matter of serious consequence which has been referred to previously is the inter-departmental arrangements which have been made with the United States to clear the broadcast band of waves from interference from United States and Canadian ships and coast stations, with a view to helping broadcast conditions. To aid itself in this work the department has replaced all old type interfering spark apparatus at the stations in Quebec, Montreal, Toronto, Vancouver, Victoria and Prince Rupert with new type continuous wave equipment. and, generally, has taken all possible steps to eliminate all controlable interference with broadcasting by other stations, including those on the Great Lakes.

One other action taken has been a money grant to the Research Council for the purpose of conducting an investigation into noises caused by power lines, etc., with a view to seeing what can be done to reduce interference emanating from this source.

Mention has been made of the fact that owners of receiving sets in Canada are liable to an annual license fee of one dollar, the penalty being forfeiture of the set. assigned wave length is reported on in- It was reported recently that the number stantly in Canada, with a direct call on of licenses issued to the end of the fiscal

Collecting a Note Via Radio

(Continued from page two)

drive out to Smith's living quarters that evening in Smartley's car, the latter to bring along one of his best portable radio sets, to be used in a test with Smith's "non-static receiver."

During the drive Smith occupied the front seat with the radio dealer. Mr. J. Yerger Jamison sat in the rear, which was rather to Smartley's liking, for the tall and anæmic-looking patent lawyer had a most annoying cough.

Incident to the drive. Smith had occasion to remark to Smartley: "A few days ago I showed my invention to a friend of mine, George Ogle. Ogle, you know, is chief engineer of the Consolidated Radio Association." Smartley did not know, but he took it for granted. "George could hardly believe his eyes when I made bit of static in my set. George says I have a fortune in my invention, and he should know. He told me he would feel C. R. A. out about it. Turn to the right here, Mr. Smartley, and you'll avoid some heavy traffic. I should have gotten a letter from George to-day. He says he never dreamed that I would ever make such an important discovery." And Smith continued to enthuse about his invention, interspersing his remarks with the hope of lining up with C. R. A. until the trio

It was an East Side rooming house with a dingy drug store on the ground floor, toward which Smith led his companions, himself lugging Smartley's radio instrument. J. Yerger Jamison and his irritating cough brought up the rear. while wicked little lightning flashes served to light them to the doorway.

reached their destination.

In the drug store, where Jamison delayed his companions to buy cough tablets, Smartley was impressed with a bit of fraud on the patent lawver's part. Jamison gave the sleepy-looking clerk a onedollar bill in payment for the medicine. The clerk returned change for five, which mistake, Smartley noted, Jamison adroitly took advantage of. It was a glaring error, and the radio dealer wondered why the clerk did not detect it. It was none of Smartley's business, however, though he was glad it had happened, as it gave in the Dominion and those licensed and | character. He tucked the incident away | is confined absolutely to concerts.

So it was arranged that the three would | in his mind for possible future use, not once suspecting the affair, carefully prearranged, was now to be staged for his never necessary. special benefit.

> This story will be concluded in next week's issue of the New York Herald Tribune Radio Magazine.

The Pope Uses Radio

From the icebound circles at the North Pole to the warmer climates of South America, from the easternmost part of the world to the point opposite, radio is providing the comfort and solace of life. This has been proved by the various dispatches of late telling of the use of radio and the pleasures derived.

Now comes a message from the Vatican at Rome, which states that although his with many duties, the Pone finds tim practically every evening to listen in. The programs are confined to concerts broadcast from Rome and Milan, from Paris, London, Berlin and other European capi-

From the time the Church first took over the Vatican no Pope has been known to leave its confines. The grounds consist of several acres, but nowhere in the history of the Church has it been shown that once chosen head of the Roman Catholic Church a Pope has ever left the premises.

The Pope's day starts at 6 o'clock in the morning and is not concluded until after midnight. His every minute is so scheduled as to provide certain duties at certain periods of the day. Receiving pilgrims, saying mass and meetings with his various attaches take up a greater part of the time. However, there has been included in his daily program several periods to be devoted to study.

In the evening the Pope devotes a portion of these study periods to the reception of radio. His programs are undoubtedly selected in advance from the schedules of the numerous European capitals, and it is a small matter to adjust the dials so that a concert being broadcast in Paris, in London or Berlin may be easily brought into the study of the Vatican. It has been announced that while the recognized head of the Roman Catholic Church tive. It is with these thoughts in mind number of stations licensed and operated him an insight into the patent lawyer's uses the radio receiving set his diversion that the Canadian representatives will at-

year had been 91,000, approximately, and that the succeeding months had shown increases in the numbers of licenses granted. It is not pretended that there are only 91.000 sets in Canada but it is hoped that eventually the great majority of owners will appreciate what is being done for them and come forward and show anpreciation of the service rendered by paying the modest dollar fee with greater spontaneity and punctuality. There really is a service rendered for

the dollar fee and the value of that service can be increased when every owner of a set pays his share. The proceeds of the license fees are used for the payment of the inspectors who keep watch on the ether and for the maintenance of a specially trained "induction squad." This squad has at its disposal properly equippedcars to proceed to any locality to deal with trouble. The car bodies are made of insulating material, and the ignitor and battery charging system have been adequately screened to prevent interference from this source. Such cars carry as part of the permanent equipment two specially designed superheterodyne receivers, two portable receivers, loops and other special apparatus developed to locate the different classes of interference.

The subject of advertising has been left to the very end. In Canada, as elsewhere, the question of advertising as a source of revenue for broadcasting stations has been the subject of much discussion; it divides itself into two general classes: "direct" and "indirect," such as, for instance, the renting of a station to extoll the virtues of an automobile or any commodity; or the renting of a station by some organization with the mention that the entertainment offered was being given through the courtesy of # commercial organization

It was decided to allow stations to undertake advertising and to check up the results. After the experience of one year it was found that the owners of stations were favorable to the indirect rather than to the direct method and the problem solved itself without any great difficulty. As it is the Radio Branch allows direct advertising from any station up to 6 o'clock p. m., but after that hour no direct statement may go out without an immediate reprimand, but, indeed, that is

Broadcasting stations operating in Canada may be divided into classes as to ownership, into stations operated by newspapers and intended to exploit these particular journals; stations operated by corporations directly interested in the manufacture and sale of wireless and electrical apparatus and appliances and those owned and operated by the Canadian National Railways.

From none of these stations is the listener-in disturbed by the direct appeal. it being considered sufficient for publicity purposes to mention the name of the corporation or the company furnishing the broadcast. In the case of the Canadian National Railways the purpose it threefold, to obtain publicity by indirect means, to serve a large and scattered population in the rural districts and to obtain adequate entertainment and bulletin service for the convenience and comfort of travelers using their principal trains all of which are equipped with receiving apparatus.

Neighborly Problems

In view of the apparently increasing demand in the United States for additional broadcasting privileges, the position of Canada becomes more difficult in retaining channels which will be free from those required across the border, but, again, it is believed that this situation will rectify itself, not at once, perhaps, but in the early future.

It is becoming more evident each day that broadcasting to be of any service to owners of stations must be conducted along broad lines and by means of powerful statistics. It is obvious that the cost of an adequate station is such as tobe prohibitive to individuals or companies who merely want to play with radio and the consequent conclusion is that in wireless, as in many other things in life, the survival of the fittest will lead to better broadcasting, improved programs and to a complete advance in appreciation of the wonders of this science.

In Canada, as in other countries, the problems resemble those of the neighbor and it is the hope of those in authority that the measures taken will prove effectend the conference at Washington.

ceiver employing all modern improve-

tised Licensed Regenerative

Armstrong Patent

Manufactured by Clapp Eastham Co.,

the oldest manufacturers of Radio

Equipment in the world. Every one of

these sets fully guaranteed by the

RESULTS-ANYTHING WITHIN 1,500 MILES

Sets are in original Sealed Factory cartons

These prices are for cash only

GREAT VOLUME WITH

REMARKABLE CLARITY

Genuine Bakelite Panel-handsomely engraved.

SET ONLY

manufacturers.

High grade cabinet.

Circuit - Armstrong re-

generative double tuner. Tubes— 3— either dry

cell or storage battery.

Battery cable ready to
attach to batteries.

Only two controls—very

No posts or wires front of cabinet.

To sum up the whole situation is may be said that tone quality and selectivity are the two features most looked for by purchasers of radio receivers at the present time. It is also possible to say that there are sets available in which these two features exist to as great an extent as could be asked for. Ability to receiva distant stations, a non-radiating circuit and volume enough to satisfactorily reproduce signals on a loud speaker are three other very essential features, but these may almost be classed as prerequisites, for they are possessed by practically every receiver.

ments is very nearly perfect.

The price of the complete set is no longer as important a feature as it was, for people have found that they receive just about what they pay for. However, although the price of the average complete set has greatly increased, greater value is given for the money received.

Two features which may or may not be considered important, depending entirely upon the person buying the set, are: ability to receive signals with a loop antenna and pleasing appearance. As both of these usually necessitate the investment of more money and as they are not necessarily essential to the reception of good signals they are not always desired. It is believed, however, that they will increase in popularity in

The two remaining features-namely, ease of control and ease of maintainance—are still being perfected. and for this reason many seem doubtful as to their merits. Without doubt, however, before long they will be incorporated in most of the more expensive receivers.

AMATEUR **** **IZICKBACKS**

On Monday, November 9, Secretary Hoover will call the Fourth Annual Radio Conference at Washington for the purpose of discussing problems of general interest to the radio industry. It is probable the conference will discuss the amateur's problems and other questions of extreme importance.

This clan of experimenters will be well represented by men prominent in the radio field, and it is expected they will do all in their power to present matters of importance to the radio amateur.

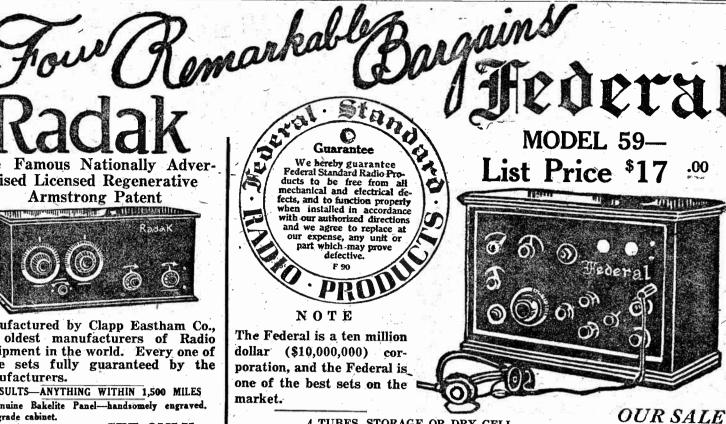
At last year's conference the amateur was allotted a number of new wave bands. Therefore it is likely that again this year something will be said about this question. Under the present wave length assignments the "ham" has only one legal wave band,

merce has recognized this and has, whenever possible, favored this class of experimenters.

It was the amateur who demon strated the efficiency of the high frequencies (low waves). Much of the success of present-day broadcasting may be attributed to him. Therefore the outcome of the Annual Radio Conference will be of extreme interest to every one interested in radio.

During recent months there has been much comment on the fact that the transmitting amateurs are not using the high wave band (200 meters). This is not true. In spite of the fact that many members of this fraternity are interested in short wave communication, there still remains a great deal of interest in the high waves. The short waves make local communication almost impossible, due to their peculiar radiating qualities. If amateurs cannot communicate with neighboring "hams" the "game" will tend to lose the fraternal spirit which now prevails.

2CRD has returned to the air after a long silence. This station has apparently either increased power or improved the apparatus, as it seems to have a greater "kick" than ever before. Last year this station did excellent work with one five - watt



4 TUBES, STORAGE OR DRY CELL

The receiver comprises one stage of radio detector and two stages of audio frequency amplification with a control which allows the degree of amplification to be varied between wide limits. Genuine Mahogany Cabinet, 15 in. high, 22 in. wide, 11 in. deep. 🧣 🕥 Panel and dials genuine Bakelite. Antenna—A primary condenser switch provides for adjustment of the receiver to suit any type of antenna from the indoor wire to the larger outdoor an-

FREE including in the purchase of this set we will give ABSOLUTELY FREE a \$7 Federal Head Set and an 80c Phone Plug

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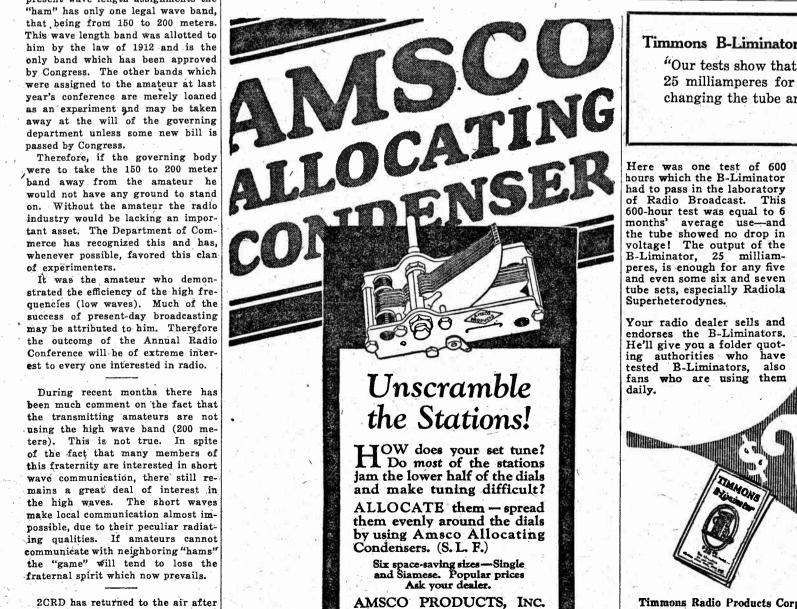
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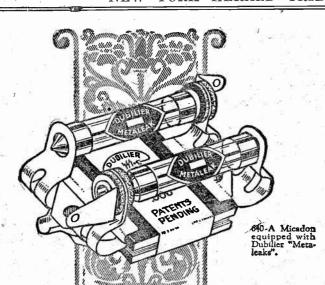
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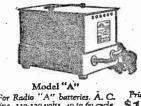
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How and Why Radio Receiving Sets Have Changed in Design

The Up-to-Date Wireless Receiver May Have as Many as Eleven Features, All of Which Should Be Considered by the Purchaser

By Dudley F. Walford Jr.

ANY persons are constantly accusing radio manufacturers of trying to stimulate the sale of wireless apparatus by making a practice of frequently redesigning their products. The fact that these accusations have been impressed on the minds of many prospective buyers of radio sets has done much to retard the growth of the industry. That it is chiefly the desire of the public, and not of the manufacturer, that the design of radio apparatus be changed from time to time may easily be seen by any one who seriously considers the situation. The public states the type of equipment it will purchase, and the manufacturer tries to produce equipment that will answer the requirements. In this connection it might be of interest to point out just how and why the design of radio sets has changed since the early days of broadcasting as this should aid one in selecting up-to-date apparatus.

When station WJZ first opened in Newark the newspaper publicity given the station excited curiosity and caused a great local demand for number the interference caused by radio apparatus. As the average lay- radiation from regenerative receivers man did not know very much about became a very serious problem. The the benefit to be derived from radio neutrodyne, a five-tube tuned-radio at that time he did not wish to in- frequency receiver which is incapable vest much money in a receiving set, of causing radiation interference, was and immediately the crystal set be- developed to overcome this menace, came popular among broadcast lis- and shortly after many other non-

The One-Feature Set

of to-day know, is the simplest provements have since been made. aside from the prerequisite of being able to receive radio signals, is pos-

earned that with comparativley inexpensive equipment amateurs were production able to hear the Chicago station, been a movement on foot to remove wished to do the same. This repensive, sensitive receiver, and to the cne-tube regenerative of the single circuit type.

The regenerative receiver remained popular for a long time and still is used by many. However the one-tube receiver was soon found to be inadequate. When it was generally known that the music supplied by radio stations could be amplified and was carried to a much greater exaudio amplifier in the receiver.

first called for when the broadcasting wave length the condensers which stations in this country had increased | control the circuit fall at exactly the in number to such an extent that the same place on the dial. In a set of Department of Commerce found it this type it can easily be seen how necessary to assign two wave lengths, it is possible to couple the shafts of namely, 360 and 400 meters, to broad- the condensers together mechanical casting. This problem was first and tune the entire set with one dial. solved by the use of wave traps, because they were inexpensive, but when more and more wave lengths be discussed in this article is ease were given over to broadcasting sta- of maintenance. Receivers in which tions a selective receiver was found this feature is exemplified are those necessary. Two and three circuit re- which operate direct from the 110 generative receivers were first used volts alternating current house supand later untuned and tuned radio- ply without the use of batteries. At

frequency sets were introduced. The use of receivers employing satisfactory receivers of this type radio frequency amplification made available; however, there is still much possible sets which operate from a research work to be done in this dioop antenna. These sets are not as rection. Nevertheless, it is probable popular yet as they probably will be, that in the very near future either nowever. They first attracted atten-tubes, which will operate direct from tion at this time. There are three the house supply, or battery eliminareasons for this and they are: first, tors, which may be connected to any loop operated sets may be made more standard receiver, will be available. selective; second, they are more por-

static problem to some extent. The introduction of tuned radio-frequency amplification may also dustry since the first crystal set was be held responsible for starting sold. However, now conditions are DV-5 Tube, 2.49 work in the direction of making sets more economical to operate. This was because a five-tube set employing the old "1-amp" tubes cost many new development. At the present times as much to operate as do our present sets. The demand for econ-likened to the automobile industry. omy was first answered by the pres- Changes and improvements will be entation of three new types of made in the future, but none of these vacuum tubes, the WD-11, the UV-199 will be capable of reducing the utility and the UV-201a. An endeavor is of present apparatus, nor will they be still being made to reduce the cost radical in their nature. A radio reof operating receivers, and many advances have been made recently.

As the number of radio fans located in cities continued to increase in radiating receivers were introduced. This type of receiver is still one of The crystal set, as most radio fans | the most popular, though many im-Eliminating

The use of non-radiating receivers with non-oscillating detector tubes sesses but one feature, namely, low first started work on the elimination absolutely uniform. Uncondi price. As this article progresses it of distortion and improvement of tionally guaranteed by world's will point out how the radio public tone quality in audio-frequency oldest and largest exclusive demanded that manufacturers add ten amplifiers. This was because it is transformer makers. The opening of station KYW in Chicago marks the beginning of the second era of broadcasting. When this station started operating interest in radio broadcasting had interest detector, and it was never fully realized that great improvement could be made in the guality of reproduction.

Impossible to optain distortionless amplification with a receiver employing a regenerative detector, and it was never fully realized that great improvement could be made in the quality of reproduction.

Thormal distortionless amplification with a receiver employing a regenerative detector, and it was never fully realized that great improvement could be made in the quality of reproduction.

Thormal distortionless amplification with a receiver employing application with a receiver employing and the commended by best dealers. Audio panel or top mounting) 2-1, \$5:3%-1,\$4:50, Power Amplify's, pair \$13, Interstage Power Amp., \$3 arch. Autoformers, \$5 each. Send for latest hook-up bulletins.

THORDARSON ELECTRIC MFG. CO., CHICAGO impossible to obtain distortionless n radio broadcasting had increased quality of reproduction. Much reonsiderably in the vicinity of New search work is still being conducted or the comparative view of the direction, and to-day some of the best sets have almost perfect re-

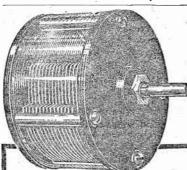
sulted in a demand for an inexsult receivers of improved appearsatisfy this manufacturers introduced ance have been in demand. Manufacturers have found that many people are glad to spend from \$100 to \$200 more for the same set if i appearance, and this explains why most sets are now supplied in sev-

feature of a radio receiver for which used for dancing, etc., the two and manufacturers have found that the three-tube regenerative receiver be- public is willing to pay, and sets came popular and everybody wanted possessing this characteristic are just circuits that would give volume. This beginning to appear on the market. Most of these receivers employ standtreme than it is to-day, and many ard circuits, but may be operated with even went so far as to use a two- one dial instead of two or three. stage power amplifier and power This feature is incorporated in a speaker in addition to the two-stage | radio set by standardizing the three tuning instruments to such an extent Sets possessing selectivity were that when they are tuned to a given

Batteryless Sets The last feature of a radio set to the present time there are several

table, and third, they help solve the From what has already been pointed out it may be seen that many changes





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The Radio Hub of New York

Continued on next page

Elementary Information for Radio Novices Magnetism and Electricity as Applied to Radio By JAMES W. H. WEIR

This is the third of a series of lectures for the radio layman which is being broadcast through KDKA, the Westinghouse Electric and Manufacturing Company's station at East

Pittsburgh, Pa.

LTHOUGH our course in radio is not intended to develop scientists and engineers in this field, it is necessary for us to at least mention in some degree the scientific phenomena that are involved in the art of radio communication. The first of these to be considered is magnetism. By definition magnetisim is that property possessed by a substance giving it the power to attract

How many of you remember the days when as boys you bought yourself one of those little horseshoe magnets? They were U-shaped and nearly always painted red. Remember the fun you used to have chasing pins and needles across your desk at school and how proudly you used to fish your jackknife out of the well simply by tying this little horseshoe contrivance to a string and bringing it near the knife. You didn't know why the knife was picked up and perhaps you didn't care, just so it worked and you were happy. Well, this little piece of iron that you purchased was magnetized. In other words, it possessed the power of attracting other pieces of iron and steel to it. I am not going to go into detail regarding the "whys" and the "wherefores" because it would make my story too long. That you are all able to recognize a magnet when you see it by its action is sufficient for our purpose.

Many Different Types

Now, all magnets are not necessarily U-shaped, nor do they all attract iron and steel objects at all times. In the crude or natural state a certain kind of iron ore possessed this power of attraction and was termed "lodestone." Sometimes we find cylnindrical pieces of iron or steel wrapped with a coil of wire, through which an lectrical current is passing. The action of the electricity enables the pieces of steel or iron to attract other pieces of iron and steel and they are termed with, for it is this type of magnet that enters into the science of radio, making it possible for us to hear the wonderful programs that are being broadcast daily. The most common use of the electromagnet perhaps is in the headphone and in some types of loud speakers.

Around all magnets, no matter what their shape or size, there is an invisible field of force or power. If we were to study the subject of magnetism we would learn a lot about the "magnetic flux" or "field" that exists about a magnet. This field, although invisible, is always present, and for those of you who are interested in seeing it I suggest the following experi-

An Interesting Experiment

Take any magnet—the little red horseshoe type will do-and over it lay a sheet of white paper. Now, take a handful of fine iron filings and lightly sprinkle them over the sheet. Almost instantly you will see the filings arrange themselves in well defined lines over the spot on the paper under which the magnet is concealed. Before you is a picture of the "magnetic flux" or "invisible field of force" that surrounds the poles or ends of all magnets.

Let us leave the magnet for a while and take up that other very importan phenomena-namely, electricity. If I were I wonder how many of you could give me an answer. Not one, I assure you, berenowned scientist, who could answer that question, "What is electricity?" In spite of this fact, electricity is used everywhere by man. It is harnessed to all manner of machines, both domestic and industrial. It makes possible many things without which mankind would suffer. In other words, electricity, although it cannot be seen, heard or smelled, is man's greatest friend, and is recognized by what

To the scientist, the engineer and the layman electricity makes its presence felt

really the type we are most concerned | Again we know that electricity is present. It makes its presence known to us by some definite action either beneficial or harmful.

> Science has divided electricty into classes, mention of which will perhaps be of help to you when the radio set is being discussed. The two main classes are static or frictional electricity and current or electricity in motion. Each of these classes are subdivided into minor groups, as will now be explained. Static or frictional electricity, as its

name implies, is produced by friction. Some of us may have noticed that in combing our hair on a dry day a crackling noise is heard and little blue sparks play about the comb and our hair. This is static electricity, produced by the friction between the rubber comb and our dry hair. Atmospheric electricity, such as lightning, is also static electricity, and it is such disturbances caused by electricity in the air that we call "static" in the language of radio. Atmospheric electricity is of three important types, the first of which is the continual slight electrification of the air best observed in fair weather; secondly, the familiar phenomena of the thunder storm, and lastly, the aurora borealis. In brief it may be said that atmospheric electricity is caused by the evaporation of water by the sun's heat and the friction

AC and DC Electricity

Our chief concern in the radio science, however, is current electricity or electricity in motion. It is divided into two main subdivisions-namely, direct and alternating. Direct current electricity or DC, as it is termed, flows in one direction only. It is not a steady stream, but a rapid succession of electrical impulses all moving in the same direction. Alternating current electricity or AC, as its name tells you, alternates; that is, it changes the direction of its flow first in one direction and then in the opposite direction

Current electricity is produced in a number of ways. It can be obtained from by certain definite actions. We throw a a battery as a result of a chemical action. switch and a hundred lamps light. We | This type is direct and termed voltaic. If know that electricity accomplished the re- | produced by heating two dissimilar metals, | the most satisfactory results from our "electro-magnets." Electro-magnets are sult. We press a button and a bell rings. such as antimony and bismuth, it is radio receiving sets.

termed thermo-electricity. Created by moving a coil of wire in a magnetic field. such as we mentioned some time ago, it is termed induced electricity. Induced electricity plays a very important part in radio, and the coupler and audio transformer are perhaps the best examples of apparatus that function on induced electricity. In these examples, however, it is the field about the wire carrying the electric current that does the work. Further comment on this subject will be given

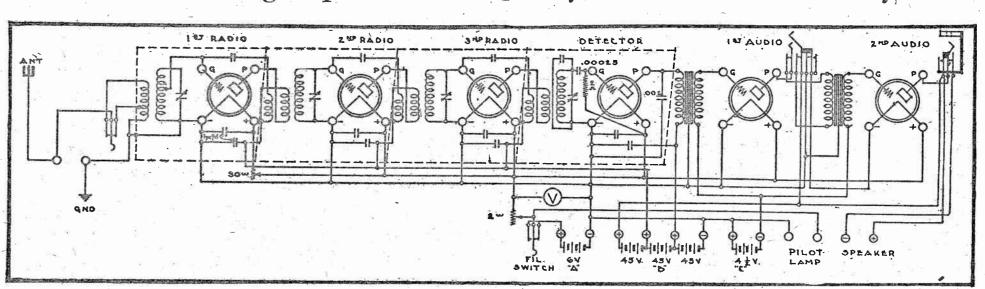
Inasmuch as we are dependent upon certain effects for our assurance that electricity is present, it will be well for us to know a little more about these effects. / A few positive tests that electricity is present are as follows:

Tests for Electricity

If a straight wire carrying an electric current is brought near a small magnet. such as a compass needle, and the compass needle so placed that the axis about which it turns is parallel to the axis of the wire the needle will be deflected somewhat. It long as the current flowing in the wire does not vary; secondly, a wire that has a current passing through it, if measured with a sensitive thermometer, will be found to have a higher temperature than when no current is flowing. In the ordinary incandescent lamp the rise in temperature is so great that the filament of the lamp glows and gives light. Lastly, if the wire carrying the electric current is such as copper sulphate or bluestone solution, as it is commonly known, there will be a chemical change in the solution accompanied by a deposition of metal copper on one of the wire ends. Such, then, are a few positive experiments proving the presence of the electricity.

In our next lesson we shall learn a little about the electrical circuit, the sources of electricity and the simple methods of measuring the strength of the current we employ. This is important because in radio it is necessary to employ certain

Total Shielding Improves Tone Quality, Distance and Selectivity



The wiring diagram of a three-stage balanced radio frequency receiver which is employed in a commercial receiver of the total shielding type

HEN vacuum tube receivers first came into popularity the only form of shielding used was that placed behind the dials of tuning condensers or behind the panel of regenerative receivers to prevent body capacity from producing howls and squeals. Shielding is still used for this purpose, but so great has essential and efficient factor than it was in the early days of radio.

There are many different methods of However, the "total shielding" method which is being employed by some manufacturers of multi-stage tuned radio-frequency receivers is exciting interest at the present time. This method has helped during the past year; namely, distance, selectivity and tone quality. Early experiments in the use of receiv-

ers employing more than two stages of radio-frequency amplification proved decidedly unsatisfactory because of the inability to stabilize the amplifier. The proper use of "total shielding," however, been the advance in this field that an up- prevents all tendency to oscillate or reto-date method of shielding is a far more generate and thereby insures complete stability. So perfectly have some threestage radio-frequency receivers been designed that an average amplification as shielding employed in radio receivers. high as ten per stage has been obtained in some cases. With such a receiver distance is made an almost unlimited pos-

Maximum selectivity is also obtained through the use of shielding. This is beto solve three problems which have been | cause no signal is able to enter the re- | fall. This receiver employs three stages

and as the signal must pass through four tuning systems in series before it reaches the detector tube interference is practically eliminated and powerful local stations of but slightly different wave lengths can be easily and completely tuned out.

The problem of improving tone quality has also been partially solved by the use of total shielding. By insuring stability and by preventing all tendency to oscillate or regenerate, the quality of the signal is not impaired by this cause, as it is in many radio-frequency receivers.

Experimenters interested in building a multi-stage tuned radio-frequency receiver of the total shielded type will find an excellent example of the art of shielding in the new Stromberg-Carlson six-tube receiver, which made its appearance this

uppermost in the minds of manufacturers | ceiver unless it comes from the antenna, | of tuned radio frequency, a detector and two stages of-transformer coupled frequency amplification. The antenna transformer is tuned by one variable condenser. The three radio-frequency transformers coupling the first, second and third stage and the detector are tuned by a triple condenser. This reduces the number of controls from four to two. The radio frequency stages are balanced by the capacity method, as will be noted in the diagram accompanying this article. Each of the radio-frequency stages and the detector tube are shielded from the other. Also the condenser and transformer of each stage are shielded from the tube. These refinements of the set make possible the prevention of oscillation and regeneration.

(Continued on page six)

World Radio History

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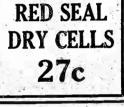
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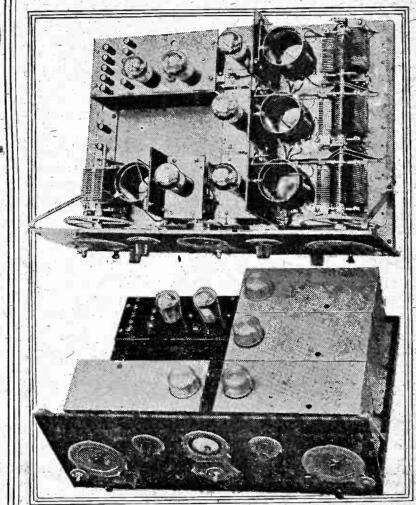
Continued from page five

former coupled audio amplifier.

coupling unit. This consists of an in- As the receiver just described is

erior view of the receiver with the this unit does not require shielding. hields removed, and it can be seen The photograph in Fig. 2 shows the place. It will be noticed that they are Four of these units consist of a va- box-like in shape and cover the enriable condenser, a radio-frequency tire unit. A small hole is placed in transformer and a tube, while the the top of each to allow changing the fifth contains the two stage trans- tubes without removing the shield. However, the tube is completely The unit on the extreme left near shielded by a cap placed over the the front of the panel is the antenna tube after it has been inserted.

ductively coupled transformer with a commercial product it possesses a semi-aperiodic primary and a sec- several characteristics which it would ondary tuned by a variable condenser. be impossible, or at least very diffi-This condenser is not coupled to the cult, for the amateur experimenter triple condenser and requires sepa- to duplicate. Accomplishing the tun-



rate adjustment, as different sized ing of the three radio frequency

vacuum tube. The triple condenser is employed. unlike most on the market, inasmuch One solution is to use three standas it consists of three separate con- ard variable condensers mounted densers coupled to the same shaft, horizontally to the panel, and cou-The condensers are spaced some dis- pled by a belt system. This is not tance apart to make it possible for a quite as satisfactory as the arrangeshield to be slipped between them. It ment just described, because it rewill also be noted that in these three quires frequent readjustment. Howunits, and also in the antenna coup- ever, this is easily accomplished. Anling unit, a shield has been placed be- other solution is to do away with the

set would be impossible to balance.

tween the vacuum tube and the trans- single control idea and employ three former. Without this, it is said, the tuning dials. The unit in the rear on the left all the advantages are to be had ontains the audio amplifier. As all from a shielded radio-frequency reof the circuits containing radio fre- ceiver, at least three radio-frequency

Secretary Hoover to Tell Proceedings of Conference

The most important event of the proceedings from an authoritative works. source as quickly as possible, Herbert Hoover, the Secretary of Com- 2d Original Musical Comedy merce, who will be the most promi- By Rice and Hobart Thursday nent figure at the conference, has WJZ and WRC.

Eliminating Noises

cleaning connections to storage bat- Around the World" series. Sugar Day Sand Fred west

The price of loud speakers ranges Never connect an aerial to from \$7 to \$200.

antennas would affect the tuning of transformers with a single control will probably be found the most dif-The three units on the right of the ficult problem for the experimenter. set are the three radio-frequency As each of the condensers must be amplifier units. Each contains one completely shielded, the standard section of a triple condenser and also triple condenser cannot be used, and a radio-frequency transformer and a therefore some other method must be

In closing, it should be said that if

quency currents are entirely shielded, stages must be employed.

Verdi's "Rigoletto" To Be Presented by WEAF "Rigoletto," Verdi's famous tragic

oming week in the radio field will opera, will be presented by the WEAF be the big radio conference to be held Grand Opera Company at 10 p. m. toin Washington on November 8, 9, 10 morrow and broadcast by WEAF, and 11 between the broadcasting in- WOO, WTAG, WJAR, WCAP and terests, the listening public, amateurs WCAE. Although it precedes _"II and the Secretary of Commerce, Her- Trovatore" and "La Traviata" by two bert Hoover. The outcome of the years, it is generally classed with "confab" is awaited eagerly by all them as representing one, if not the concerned, inasmuch as many radical final, high-water mark in Verdi's dechanges are expected. Unfortunately, velopment, for it possesses beauties very few of the listening audience of melody, harmony and orchestrawill be able to be present in person, tion and subtleties in the presentbut in order to let them know of the ment of character beyond his previous

agreed to tell of the proceedings The second original radio musical through stations WJZ and WRC from comedy by the "Goodrich Zippers" the Department of Commerce Build- from the studio of WEAF for a chain ing in Washington. The date set for of thirteen stations (WEAF, WEFI. this talk by Mr. Hoover is 9 o'clock WSAI, WGR, WWJ, WCCO, WOC. Thursday evening, November 12, and WEI, WCAE, WJAR, WADC, WTAG the stations broadcasting it will be and KSD) will be presented on Thursday at 10 p. m. Lieutenant Gitz Rice and George V. Hobart, two of Broadway's cleverest lyricists and A scratchy noise is sometimes due song writers, have laid the scene on a to corrosion at points of contact. It trans-Atlantic steamer voyaging from can frequently be eliminated by New York to Europe in the "Whirl

Aerial to Light Pole electric light pole.

Radio Presents a Complex Problem to the Government

In Limited Time and Places Radio Paradise or Perfection May Be Found; Overcrowding of the Ether One of the Greatest Problems

By Dr. J. H. Dillinger

Chief of Radio Laboratory, Bureau of Standards

Following is an abstract of an address delivered by Dr. J. H. Dillinger through WRC, the broadcasting station of the Radio Corporation of America, Washington, D. C.

ERFECTION is a rare thing in this world. When you experience it-perhaps in the beauty of a flower, the flash of light from a dewdrop or a jewel, the smooth, silent might of an efficient machine, the polished perfection of exalted art-in any of these things, you may see a corner of paradise. Radio paradise is that condition under which radio attains perfection. Will we ever get there? How do we get there? Are we there now? Many a disillusioned radio fan will rise up here and say: "Oh, foolish question!"

The wives of some fans will say that purgatory is the name of the Europe may supply proof that there place, not paradise. There are people must be iron-handed limitation of the whose experience with radio is such number of stations. There is to-day that they cannot possibly take serious interference among the broad-riously a man who talks of radio and casting stations of Europe; to cure paradise in the same breath. Nevertheless, I would remind you that two rate frequency would require that or three years ago to the man in the broadcasting have all the waves from street the promise of radio and the millenium seemed to be just about the same thing. Was this promise entirely vain?

Thousand Years to Paradise in some very remote time or place. whole of radio; away with the ama-We speak of the millennium; a thou- teurs, away with ship communication, sand years from now we shall reach away with radio aids to navigation. perfection. However, just as there Such a proposal is unthinkable. Faced is a religious philosophy which de- by this, a conference of the radio clares that paradise can be entered engineers of Europe, which just met here and now, so we can say that in at Geneva, has taken the bold step of limited times and places radio para- agreeing and declaring that the only dise, or perfection, can already be solution of broadcast station congesfound. We approximate this contion is to get rid of some of the dition. While listening with a first- stations. Whether America, through class receiving set to some of the the forthcoming Fourth National fine musical programs or nationally Radio Conference, will take so drastic important events broadcast from a a step remains to be seen, but it is local station with no other closer clear that a definite program of some than a hundred miles to offer inter- kind must and will be adopted to preference, it would be a dead soul that serve radio from the choking of the never got a thrill from the expe-ether channels. rience. On such occasions one can Another present limitation upon participate, at a distance, in the radio perfection, also arising out of in these experiences, is close indeed of soap, bonbons and typewriters in challenge to enlarge and extend the places and the times of such achievement, and to bring about the conditions that will let more people participate. For it is evident that radio has a high mission, a promise of

great contribution to progress. In order to increase the area of radio paradise what must be done? imperfections of this class which Is it possible for the government, for confront radio are serious at the moexample, to rearrange the broadcasting system so that every one who be seen, but there is no question that chooses may know the thrill of listening in on perfection? While the difficulties.

Few people of the problem radio presents to the tener with ample intensity, undisgovernment, on which rests the re- turbed by atmospheric (static) and sponsibility of guiding its develop- electrical interference. Technical ment. This complexity arises funda- progress will bring about increases of mentally because of interference of power and a proper distribution of one radio wave with another. All the broadcasting stations until this the radio signals are conveyed along same grade of reception prevails quite a single track, the ether, and very generally. It will at the same time skillful dispatching is required to provide proper separations of freavoid collisions. At the present time quency and distance so that these every conceivable interest wants to stations will not interfere with each broadcast, simply because radio is other or with the small stations opthe best means of publicity yet de- erated for local purposes. vised. It would not be nearly so bad if every one wanted to start a newspaper because the printing of one newspaper does not get in the way illusion of paradise when listening to of the printing of another; but in radio programs until the quality of radio only so many can operate at sound delivered by the receiving set one time. When this physical con- is greatly improved. This can be dition, which unfortunately the scien- done. Some of the more expensive tist cannot alter, is generally realized, sets now give substantially perfect people will perhaps be at least as quality, with volume as great as the willing to hold back from erecting original performance. These sets stations as from starting newspapers. readily tune in a desired station Not every one who has a message without disturbance from any other. for the public starts a newspaper; he It remains to bring apparatus of such usually uses for his purpose the perfection within reach of the ornewspapers already existing.

Overcrowding the Ether

way of radio perfection just now is radio engineers at present. That is this overcrowding of the ether be- fading, or the irregular fluctuation cause too many kind souls aspire to of received signal strength which you serve the public through the owner- notice when listening to programs ship of broadcasting stations. If from distances of fifty miles or more America is not convinced from her The only answer at the present own experiences in the way of radio traffic jams, what is happening in Continued on page fifteen

500 to 2000 kilocycles (600 to 150 meters), and in addition all those from 100 to 375 kilocycles (3000 to 800 meters). To seriously sugges this would be to propose, in essence, It is usual to think of paradise as that broadcasting monopolize the

excitement of a world's series; or, the hitherto unlimited freedom of again, all the power and majesty of broadcasting, is its commercializamusical art is actually brought to tion. Listeners are beginning to be one's own fireside. The role of radio, uneasy over the too rude intrusion to perfection. There is, therefore, a the midst of otherwise beautiful programs. The ruthless hand of commercialism is seen also in the occasional announcement that a perform ance has to be interrupted because of a demand for exorbitant royalties from the holder of copyright on some musical selection. The problems and ment, and the exact solution cannot time will solve them. Except for the type of difficulties

answer is no, of course, this goal is have mentioned, most of the limitabeing steadily pursued. Some of the tions of radio are being steadily overdifficulties that block the way to a come by scientific and technical prograpid reaching of the goal are quite ress. It is the radio engineer who interesting, and I am happy to say forges the keys to radio paradise for that there are hopeful means of an ever-growing number of people meeting and overcoming all these At present there is only a small area, a few miles, around each station in xity which the radio waves reach the lis

For most people there can be no dinary pocketbook, and there are steady advances in that direction.

The thing that most stands in the There is one problem which baffles

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=

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The big game is on. Tens of thousands will see it from the stadium but

hundreds of thousands can and will hear it via Radio. Play-by-play, the story will throb thru the air.

- -That wonderful pass. -A half-back circling
- the end. -That deceptive
- delayed buck. -The full-back ripping the line wide open.

-That fumble and

hole story - hot from the Grid-Iron - complete, clear, uninterrupted,



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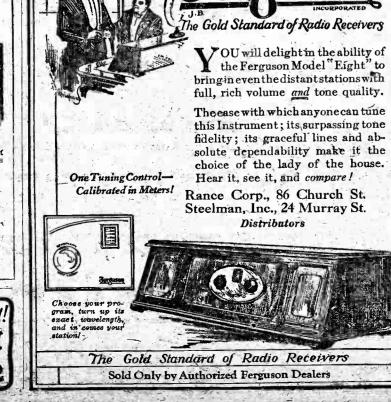
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Continued from page five

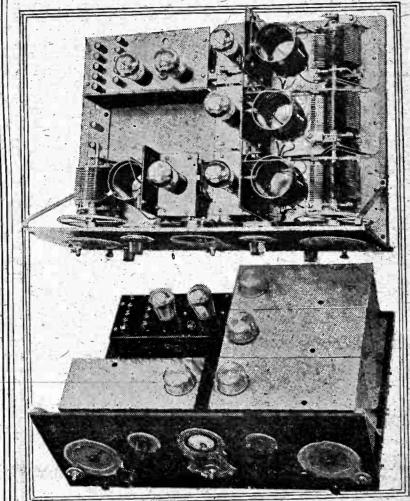
hields removed, and it can be seen. The photograph in Fig. 2 shows the that the set is made up of five units.

Four of these units consist of a vabox-like in shape and cover the enriable condenser, a radio-frequency tire unit. A small hole is placed in transformer and a tube, while the the top of each to allow changing the fifth contains the two stage trans- tubes without removing the shield. former coupled audio amplifier.

The unit on the extreme left near shielded by a cap placed over the the front of the panel is the antenna tube after it has been inserted. coupling unit. This consists of an in- As the receiver just described is triple condenser and requires sepa- to duplicate. Accomplishing the tun-

erior view of the receiver with the this unit does not require shielding same receiver with the shields in However, the tube is completely

ductively coupled transformer with a commercial product it possesses a semi-aperiodic primary and a sec- several characteristics which it would ondary tuned by a variable condenset, be impossible, or at least very diffi-This condenser is not coupled to the cult, for the amateur experimenter



rate adjustment, as different sized ing of the three radio t equency

a radio-frequency transformer and a therefore some other method must be vacuum tube. The triple condenser is employed. former. Without this, it is said, the tuning dials. set would be impossible to balance. In closing, it should be said that if

ntennas would affect the tuning of transformers with single control will probably be found the most dif-The three units on the right of the ficult problem for the experimenter. set are the three radio-frequency As each of the condensers must be amplifier units. Each contains one completely shielded, the standard section of a triple condenser and also triple condenser cannot be used, and

unlike most on the market, inasmuch One solution is to use three standas it consists of three separate con- ard variable condensers mounted densers coupled to the same shaft. horizontally to the panel, and cou-The condensers are spaced some dis- pled by a belt system. This is not tance apart to make it possible for a quite as satisfactory as the arrangeshield to be slipped between them. It ment just described, because it rewill also be noted that in these three quires frequent readjustment. Howunits, and also in the antenna coup- ever, this is easily accomplished. Anling unit, a shield has been placed be- other solution is to do away with the ween the vacuum tube and the trans- single control idea and employ three

The unit in the rear on the left all the advantages are to be had contains the audio amplifier. As all from a shielded radio-frequency reof the circuits containing radio fre- ceiver, at least three radio-frequency quency currents are entirely shielded, stages must be empl

Secretary Hoover to Tell Proceedings of Conference The most important event of the coming week in the radio field will opera, will be presented by the WEAF be the big radio conference to be held Grand Opera Company at 10 p. m. toin Washington on November 8, 9, 10 morrow and broadcast by WEAF, and 11 between the broadcasting in- WOO, WTAG, WJAR, WCAP and terests, the listening public, amateurs WCAE. Although it precedes "Il and the Secretary of Commerce, Her- Trovatore" and "La Traviata" by two bert Hoover. The outcome of the years, it is generally classed with "confab" is awaited eagerly by all them as representing one, if not the concerned, inasmuch as many radical final, high-water mark in Verdi's dechanges are expected. Unfortunately, velopment, for it possesses beauties very few of the listening audience of melody, harmony and orchestrawill be able to be present in person, tion and subtleties in the presentbut in order to let them know of the ment of character beyond his previous. proceedings from an authoritative works. source as quickly as possible. Her-bert Hoover, the Secretary of Com-2d Original Musical Comedy merce, who will be the most prominent figure at the conference, has agreed to tell of the proceedings through stations WJZ and WRC from comedy by the "Goodrich Zippers" the Department of Commerce Build- from the studio of WEAF for a chain ing in Washington. The date set for of thirteen stations (WEAF, WEEI, this talk by Mr. Hoover is 9 o'clock WSAI, WGR, WWJ, WCCO, WCC, Thursday evening, November 12, and WEI, WCAE, WJAR, WADC, WTAG the stations broadcasting it will be and KSD) will be presented on Thursday at 10 p. m. Lieutenant WJZ and WRC.

Eliminating Noises

to take a series and an experience to see the termination of the second

teries.

Verdi's "Rigoletto" To Be

Presented by WEAF "Rigoletto," Verdi's famous tragic

Gitz Rice and George V. Hobart, two of Broadway's cleverest lyricists and A scratchy noise is sometimes due song writers, have laid the scene on a to corrosion at points of contact. It trans-Atlantic steamer voyaging from can frequently be eliminated by New York to Europe in the "Whirl cleaning connections to storage bat. Around the World" series.

Aerial to Light Pole The price of loud speakers ranges Never connect an aerial to an electric light pole.

Radio Presents a Complex Problem to the Government

In Limited Time and Places Radio Paradise or Perfection May Be Found; Overcrowding of the Ether One of the Greatest Problems

By Dr. J. H. Dillinger

Chief of Radio Laboratory, Bureau of Standards

Following is an abstract of an address delivered by Dr. J. H. Dillinger through WRC, the broadcasting station of the Radio Corporation of America, Washington, D. C.

Therefore is a pare thing in this world. When you experience it—perhaps in the beauty of a flower, the flash of light from a dewdrop or a jewel, the smooth, silent might of an efficient machine, the polished perfection of exalted art-in any of these things, you may see a corner of paradise. Radio paradise is that condition under which radio attains perfection. Will we ever get there? How do we get there? Are we there now? Many a disillusioned radio fan will rise up here and say: "Oh, foolish question!"

The wives of some fans will say >that purgatory is the name of the Europe may supply proof that there place, not paradise. There are people must be iron-handed limitation of the whose experience with radio is such number of stations. There is to-day that they cannot possibly take serious interference among the broad-riously a man who talks of radio and casting stations of Europe; to cure the same thing. Was this promise entirely vain?

Thousand Years to Paradise never got a thrill from the expe- ether channels. again, all the power and majesty of challenge to enlarge and extend the places and the times of such achievement, and to bring about the conditions that will let more people participate. For it is evident that radio has a high mission, a promise of great contribution to progress.

In order to increase the area of radio paradise what must be done? Is it possible for the government, for example, to rearrange the broadcasting system so that every one who chooses may know the thrill of listening in on perfection? While the answer is no, of course, this goal is rapid reaching of the goal are quite interesting, and I am happy to say forges the keys to radio paradise for

Few people realize the complexity which the radio waves reach the lisof the problem radio presents to the tener with ample intensity, undisgovernment, on which rests the re- turbed by atmospheric (static) and sponsibility of guiding, its develop- electrical interference. Technical ment. This complexity arises funda- progress will bring about increases of mentally because of interference of power and a proper distribution of one radio wave with another. All the broadcasting stations until this the radio signals are conveyed along same grade of reception prevails quite a single track, the ether, and very generally. It will at the same time skillful dispatching is required to provide proper separations of freavoid collisions. At the present time quency and distance so that these every conceivable interest wants to stations will not interfere with each broadcast, simply because radio is other or with the small stations opthe best means of publicity yet de- erated for local purposes. vised. It would not be nearly so bad if every one wanted to start a newspaper because the printing of one newspaper does not get in the way illusion of paradise when listening to of the printing of another; but in radio programs until the quality of radio only so many can operate at sound delivered by the receiving set one time. When this physical con- is greatly improved. This can be dition, which unfortunately the scien- done. Some of the more expensive tist cannot alter, is generally realized, sets now give substantially perfect people will perhaps be at least as quality, with volume as great as the willing to hold back from erecting original performance. These sets stations as from starting newspapers. readily tune in a desired station Not every one who has a message without disturbance from any other. for the public starts a newspaper; he It remains to bring apparatus of suchusually uses for his purpose the perfection within reach of the ornewspapers already existing.

Overcrowding the Ether America is not convinced from her The only answer at the present own experiences in the way of radio traffic jams, what is happening in Continued on page fifteen

paradise in the same breath. Neverthis by giving every station a sepatheless, I would remind you that two rate frequency would require that or three years ago to the man in the broadcasting have all the waves from street the promise of radio and the 500 to 2000 kilocycles (600 to 150 millenium seemed to be just about meters), and in addition all those from 100 to 375 kilocycles (3000 to 800 meters). To seriously sugges this would be to propose, in essence It is usual to think of paradise as that broadcasting monopolize the in some very remote time or place. whole of radio; away with the ama-We speak of the millennium; a thou- teurs, away with ship communication, sand years from now we shall reach away with radio aids to navigation. perfection. However, just as there Such a proposal is unthinkable. Faced is a religious philosophy which de- by this, a conference of the radio clares that paradise can be entered engineers of Europe, which just met here and now, so we can say that in at Geneva, has taken the bold step of limited times and places radio para- agreeing and declaring that the only dise, or perfection, can already be solution of broadcast station congesfound. We approximate this con- tion is to get rid of some of the dition. While listening with a first-stations. Whether America, through class receiving set to some of the the forthcoming Fourth National fine musical programs or nationally Radio Conference, will take so drastic important events broadcast from a a step remains to be seen, but it is local station with no other closer clear that a definite program of some than a hundred miles to offer inter- kind must and will be adopted to pre ference, it would be a dead soul that serve radio from the choking of the rience. On such occasions one can Another present limitation upon

participate, at a distance, in the radio perfection, also arising out of excitement of a world's series; or, the hitherto unlimited freedom of broadcasting, is its commercializamusical art is actually brought to tion. Listeners are beginning to be one's own fireside. The role of radio, uneasy over the too rude intrusion in these experiences, is close indeed of seap, bonbons and typewriters it to perfection. There is, therefore, a the midst of otherwise beautiful programs. The ruthless hand of com mercialism is seen also in the occasional announcement that a perform ance has to be interrupted because of a demand for exorbitant royalties from the holder of copyright on some musical selection. The problems and imperfections of this class which confront radio are serious at the moment, and the exact solution cannot be seen, but there is no question that time will solve them.

Except for the type of difficulties I have mentioned, most of the limitabeing steadily pursued. Some of the tions of radio are being steadily over difficulties that block the way to a come by scientific and technical progthat there are hopeful means of an ever-growing number of people. meeting and overcoming all these At present there is only a small area, a few miles, around each station in

Illusion of Paradise For most people there can be no dinary pocketbook, and there are steady advances in that direction. The thing that most stands in the There is one problem which baffles way of radio perfection just now is radio engineers at present. That is this overcrowding of the ether be- fading, or the irregular fluctuation cause too many kind souls aspire to of received signal strength which you serve the public through the owner- notice when listening to programs ship of broadcasting stations. If from distances of fifty miles or more.

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country as the

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ment in Radio con-

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-That deceptive delayed buck.

-The full-back ripping the line wide open. -That fumble and quick recovery.



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Additional Radio Programs for the Week

(Continued from preceding page) WOR-NEWARK-405 WOR—NEWARK—405
6:45, 7:15, 7:45 p, m.—Gym class.
2:30 p. m.—Alfred Dulin, pianist.
2:45 p. m.—Dr. George Little, "I Samoyede."
3 p. m.—Alfred Dulin, pianist.
3:15 p. m.—Archie Slater's Orchestra.
6:15 p. m.—"Words Mispronounced."
6:17 p. m.—"Sports," Bill Wathey.
6:30 p. m.—Shelton Dinner Music.
7:20 p. m.—News bulletin.

WGCP-NEWARK-252
—Elvirá Geiger, pianist.
m.—Bill Mendex, orchestra
—Hughle Woolford, pianist. . m.—Studio program.
. m.—Bert Dagmar, songs.
. m.—Sylvia Schatz, pianist WAAM-NEWARK-263

—Happy Hour. —Jack Smith's Orchestra. m.—To be announced.

WOO—PHILADELPHIA—508

m.—Grand organ;
oon)—Luncheon music.
p. m.—Grand organ; trumpets. WIP—PHILADELPHIA—508

m.—Setting-up exercises.

m.—Luncheon music.

m.—Artist recital.

p. m.—Pagoda Orchestra.

m.—Roll call and birthday list.

m.—The Sesqui Centennial.

p. m.—The Etude Period.

m.—The Lyrie Trio.

p. m.—Joe Ray's Night Hawks.

WFI.—PHILADELPHIA—395 m.—Tea room ensemble.
m.—Hathaway Shakespeare Club.
p. m.—Concert orchestra.
m.—Dance orchestra.
m.—Dance wEAF.
WLIT—PHILADELPHIA—395
p. m.—Concert orchestra.
p. m.—Concert orchestra.

.-Concert orchestra; artist cital.
4:30 p. m.—Artist recital.
7:30 p. m.—Dream Daddy.
WCAU—PHILADELPHIA—278
6:30 p. m.—Billy Hayes's Orchestra.
7:30 p. m.—Recital.
8 p. m.—Ethel Brooks, soprano.
9 p. m.—Barry O'Moore, tenor.
9:15 p. m.—Central Radio Syncopators
9:30 p. m.—Frank Cook, songs.
10 p. m.—Sesqui Centennial hour.
WHAR—ATLANTIC CITY—275
2 p. m.—Seaside Trio.

WHAR—ATLANTAU

p. m.—Seaside Trio.

7:30 p. m.—Health talk.

p. m.—Studio concert

WPG—ATLANTIC CITY—300

— Luncheoh music; J. Leonard 1.80 p. m.—Luncheon music; J. Leon Lewis, director. 4.30 p. m.—Hall Trio. 6.30 p. m.—"Billy" Rocap, "Sports." 6.45 p. m.—Organ recital. 7.6. m.—Dinner music.

15 p. m.—Concert.
p. m.—Dance orchestra.
WGY—SCHENECTADY—380
1. m.—Music; talk.
0 p. m.—Dinner music.
1 p. m.—WGY Book Chat."
1 p. m.—WGY Book Chat."
1 p. m.—WGY Book Chat."
2 p. m.—WGH Book Chat."
3 p. m.—WGH Book Chat."
4 p. m.—"Earthquakes," Dr. Regir

m.—Royal Salon Orchestra. p. m.—Organ recital. WRW—TABRYTOWN—273 p. m.—Dick Tobin, planist.
p. m.—Robertson and Doonen.
p. m.—Caledonian Pipe Band.
p. m.—Dick Tobin, planist.
p. m.—Pipe Major Andrew Gre

soloist. 11:05 p. m.—Caledonian Pipe Band. WGR—BUFFALO—319 6:30 p. m.—Dinner music. 8-11 p. m.—Program from WEAF. WTIC—HARTFORD, CONN.—476

WTIC—HARTFORD, CONN.—476
6:30 p. m.—Dinner music.
7 p. m.—Dinner music.
8 p. m.—Joe McNamara's Orchestra.
8 p. m.—Musical program.
9 p. m.—Acett Power's Orchestra.
10 p. m.—The "Zippera."
WEEI—BOSTON—349
6:43 a. m.—Health exercises.
7:45 a. m.—Morning watch.
1 p. m.—Assembly luncheon.
3 p. m.—Yhotographing the Stars."
3:15 p. m.—Jay Riseman's Orchestra.
6:50 p. m.—Loost and found; weather.
7:45 p. m.—Hearvard Observatory talk
8:11 p. m.—Program from WEAF.
WAC—BOSTON—250
12:15 p. m.—Noon service.
1 p. m.—Luncheon concert.
1:50 p. m.—Loost and Club.
12:15 p. m.—Popular songs.
4 p. m.—Morey's Pearl Rambiers.
6 p. m.—Now WNAC Radio Club.
6:30 p. m.—Dinner dance.
8 p. m.—Concert program.

WBZ—SPRINGFIELD, MASS.—333

p. m.—To be announced, m.—Market reports. p. m.—English literature course, p. m.—Mrs. Hazel King, soprano. m.—Musical program.
m.—Evening of opera.
5 p. m.—McEnelly's Singing Orche WCTS-WORCESTER, MASS.—268

a. m.—Radio char. oon)—Market and weather reports. -2 n. m.—Luncheon music. 4:30 p. m.—Ratio ellertainteles."
5:15 p. m.—Story teller.
8-8:30 p. m.—"The Larkinities."
8:30-9 p. m.—"Pop" concert.
9-10 p. m.—Same as WEAF.
10-11 p. m.—The "Zippers."
WRC.—WASHINGTON—489

WRC—WASHINGTON—46
10 a. m.—Women's hour from W
12 (noon)—Organ recital.
1 p. m.—Washington Orchestra.
7 p. m.—Lee House Trio.
7:45 p. m.—Smithsonian talk.
8:05 p. m.—U. S. Army Band.
9 p. m.—Two-piano recital.
9:30 p. m.—Royal Salon Orchestra.
10:30 p. m.—Meyer Davis's Band. p. m.—Meyer Davis's Band. KDKA—PITTSBURGH—309

WEBH—CHICAGO—370

10:30 p. m.—Police alarms; weather.

WMCA—NEW YORK CITY—341
6 p. m.—Olcott Vail's String Ensembl
6:30 p. m.—Ernie Golden's Orchestra.
8 p. m.—Fred Ruzicka, violinist.
8:50 p. m.—Talk, Arthur Williams.
9 p. m.—Hardman hour of music.
10 p. m.—Orchestra selections.
11:15 p. m.—Donald Flamm, critic. WEBJ_NEW YORK CITY-273 m.—Bienheim Theater Ensemble. p. m.—Michele Bontempo, baryto p. m.—Carrie Cohen, pianist. no."

8 p. m.—Farm program.

8:30 p. m.—KDKA Liftle Symphony O.
chestra; Edith Palmer, contraito.

9-b. m.—Little Symphony Orchestra.

11 p. m.—Midnight concert.

WCAE—FITTSBURGH—461 8:25 p. m.—Recreation Orchestra.
WHN—NEW YORK CITY—361
2:15 p. m.—Judith Roth, songs.
2:30 p. m.—Hock and Jerome, songs.
2:45 p. m.—Music. 130 p. m.—Dinner concert.
130 p. m.—Uncle Kaybee.
130 p. m.—Larkin period.
10 p. m.—The Zeppers.
WADC—AKRON, OHIO—258 p. m.—Music.
p. m.—Bobby Grey, songs.
p. m.—Silvio Dirienzo, planist.
m.—Herman Streger's Players.
p. m.—Uncle Robert's Pals.
m.—Gus Gold's Orchestra.
m.—Dinner music.
m.—Richman Entertainers.

6:30 p. m.—Concert orcnes 9:30 p. m.—Artists' recital. m.—Zippers, WTAM—CLEVELAND—390 6 p. m.—Dinner hour music. WEAR—CLEVELAND—399 7 p. m.—Dinner concert.
WEAR—CLEVELAND—390 7 p. m.—Dinner concert.
3 p. m.—R. T. L. program.
9 p. m.—Dutch master artists.
10 p. m.—Organ recital.
WSAI—CINCINNATI—309

7 p. m.—Richman Entertainers.
7:30 p. m.—Meiody Orchestra.
8 p. m.—Bert Dagmar, barytone.
8:15 p. m.—Margaret Leary, soprano.
8:30 p. m.—Harold Von der Heide, (La Ruffa.
8:45 p. m.—Steel and Hegmey, songs.
10 p. m.—Billy Wynne's Orchestra.
10:30 p. m.—Roseland Dance Orchestra.
11:30 p. m.—Caravan Orchestra.
11:30 p. m.—Alabam Orchestra.
11:30 p. m.—Silver, Silvper Orchestra. 8:10 p. m.—Program same as WEAF. WLW—CINCINNATI—326 a. m.—Silver, Slipper Orchestra.
WFBH—NEW YORK CITY—273 3 p. m.—Dinner concert. 1:03 p. m.—Doherty Melody %oys. 1:55 p. m.—Crosley-Solon orchestra 2 p. m.—Orchestra selections. 3 p. m.—Studio program. 3:45 p. m.—Elizabeth Arrighi, m.—Bow-Wows. WKRC—CINCINNATI—326 11 p. m.—Post-Wurlitzer classic 12 midnight—Mixed program. WJR—DETROIT—517

3:45 p. m.—Phano recital.
4:30 p. m.—Piano recital.
4:30 p. m.—Tra Table talk.
5 p. m.—Harry Leslan's Orchestra.
6 p. m.—Grace Angelo, contralto.
6:15 p. m.—Yama Yama Boys.
6:30 p. m.—Tierney Chefs. 9 p. m.—Serenaders and soloists. 11:30 p. m.—Fordham Orchestra. WAHG-RICHMOND HILL, N. Y.—316 WAHG-RICHMOND HILL, N. 1.—316
12 noon—Musical program.
7:30 p. m.—Maurice E. Connolly,
7:45 p. m.—Emma May, soprano.
8 p. m.—Guy Filkins, organist.
9 p. m.—Emma May, soprano.
9:15 p. m.—Rainbow Saxophone Quartet.
9:30 p. m.—William Bellham, reader.
9:45 p. m.—Rainbow Saxophone Quartet.
10 p. m.—Radio talk.
10:15 p. m.—Benton Harbor Orchestra.
WKCB—BROOKLYN, N. Y.—249
8:30-9730 p. m.—Recital. 11 p. m.—Dutch Masters. WWJ—DERTOIT—353 m.—Dinner concert. m.—Program same as WEAF. WREO—LANSING, MICH.—286 8:15 p. m.—Orchestra, quartet, Instru

WRNY-NEW YORK CITY-259 WRNY-NEW YORK CITY-259
10:30 a. m.—Reducing exercises.
10:45 a. m.—Dr. Harry Finkel. "Diet."
11 a. m.—"Woman in Business."
12 (noon)—Trinity Six, music.
4:15 p. m.—Afternoon program.
7 p. m.—"Whose Birthday To-day."
7:05 p. m.—Telegraph Sport-flash.
7:15 p. m.—Commerce of the Day.
7:20 p. m.—Code Lesson.
7:45 p. m.—Alfred W. McCann, "Foods."
8 p. m.—Aschenfelder Opera Co.
8:30 p. m.—"The Horoscope Humbug."
8:45 p. m.—DeMacchi Opera Company.
9:30 p. m.—"Science Finds Creative Expression." pression."
0:45 p. m.—Concert.
0:15 p. m.—Novelty Night—Simultan
eous Music.

m.—Concert hour. m.-2 a. m.—Musical features. WGN—CHICAGO—370

m.—Dinner music.
m.—The classic hour.
m.—Dance music

KYW—CHCAGO—536

8 p. m.—Dinner concert.
8:33 p. m.—Farm speeches.
9 p. m.—'Good Reading.''
9:30 p. m.—'Musical Program,'' talk,
11 p. m.—'Evening-at Home.''

10 p. m.—Lecture, songs. 10:40 p. m.—League of Nations

7:15 p. m.—Organ, Woodshed WHT—CHICAGO—400

tures. 10:30 p. m.—Entertainers.

7 p. m.—Classical program. 8:45 p. m. (238 meters)—Musical

1 p. m.-1 a. m.—Concert: WCBD—ZION, ILL_345

6:45 p. m.—Chimes concert. 8 p. m.—Program from WEAF. 12 midnight—Dance music.

p. m.—Saxophone Quintet and WOC—DAVENPORT—484

WMAQ—CHICAGO—448

WENR-CHICAGO-266

n.—Dinner concert. m:—All-American Pioneers. WQJ—CHICAGO—448

WLS-CHICAGO-345

WJAZ-CHICAGO-322

FRIDAY

WJZ-NEW YORK CITY-455 m.—Wews.
5 a. m.—"Arts and Decorations."

11:05 a. m.—"Arts and Decorations."
1 p. m.—Ambassador Trio.
2, 4, 5:30, 7:30 and 10:25 p. m.—News.
4:05 p. m.—Bianche Fink, soprano.
4:20 p. m.—Beter Trotta, Joseph Pandok, guitar and mandolin.
4:30 p. m.—Astor Tea Orchestra.
5:32 p. m.—Market quotations.
5:50 p. m.—Financial summary.
6:30 p. m.—N. Y. University course, "Money." Professor Reid L. McClung.
7 p. m.—Bernhard Levitow's Dinner Orchestra.

7 p. m.—Bernhard Levitow's Dinner Or chestra. 8 p. m.—Museum talk. 8:15 p. m.—George Segers, barytone. 8:30 p. m.—Colgate program. 9:30 p. m.—"State Police," H. Schwarz

WJY-NEW YORK CITY-405 p. m.—Irwin Abrams's Orchestra

WEAF-NEW YORK CITY-492

4. p. m.—leila Trojand-Gardner, Neglo spirituals.
4:15 p. m.—Leila Trojand-Gardner.
4:30 p. m.—Leila Trojand-Gardner.
4:45 p. m.—Persian Art," Mme. Khan.
6 p. m.—Dinner music.
7 p. m.—Edgar Gruen, barytone.
7:15 p. m.—Iris Torn, planist.
7:30 p. m.—Story teller.
7:45 p. m.—Iris Torn, planist.
8 p. m.—Tris Torn, planist.
8 p. m.—The Happiness Boys.
8:30 p. m.—Eagle Trio.
9 p. m.—"Roxy's Gang."
10 p. m.—Talk.
10:10 p. m.—Jascha Gurewich's Saxophone Ensemble.
10:35 p. m.—Moment musical.
11-12 p. m.—Meyer Davis's Orchestra.
WGBS—NEW YORK CITY—316

11-12 p. m.—Meyer Davis's Orchestra.

WGBS—NEW YORK CITY—316

10 a. m.—Timely talks with Terese.
10:10 a. m.—June Warren, pianist.
10:29 a. m.—Household economy.
10:30 a. m.—June Warren, pianist.
10:40 a. m.—June Warren, pianist.
10:50 a. m.—June Warren, pianist.
10:50 a. m.—June Warren, pianist.
1:30 p. m.—Scripture reading.
1:35 p. m.—Monica Smith, soprano.
2 p. m.—Midred Burks, Fred Ottignor duets.

2 p. m.—Mildred Burke, Fred Ottignon duets.
3 p. m.—Interview with Lillian Lauferty
3:10 p. m.—Edith Gutterman, soprano.

3 p. m.—interview with Limin Battle 3:10 p. m.—Edith Gutterman, soprane. 3:40 p. m.—Alfred G. Robyn. 3:50 p. m.—Edith Gutterman, soprano. 6 p. m.—Uncla Geebee. 6:30 p. m.—Jule Anzel's Orchestra. 7 p. m.—'What's Your Radio Problem' 7:10 p. m.—Jule Anzel's Orchestra.

WNYC-NEW YORK CITY-526

a. m.—"Decorative Floors. :15 a. m.—Morning concert. :45 a. m.—Joe Schmitt's recipes.

noon-Luncheon concert.

10 p. m.-Market high spots.

9:45 p. m.—To be announced. 10:30 p. m.—Lorraine Orchestra

-Rainbow orchestra. -Williams' orchestra, recital.

m.—La Salle orchestra.

—Garden talk, Boy Scouts.

m.—Association of Comm

WGBB-FREEPORT, N. Y.-244

brooklyns.

WOR—NEWARK—405
6:45-7:15-7:45 a. m.—Gym exercises.
2:30 p. m.—B. P. Adams, "Samuel Coleridge."
2:45 p. m.—Miriam Williams, soprano.
3 p. m.—Inaugural exercises.
6:15 p. m.—Words Mispronounced."
6:17 p. m.—"Sports," Bill Wathey.
6:30 p. m.—Man in the Moon Stories.
6:55 p. m.—Swelton dinner music.
7:20 p. m.—News bulletins. WGCP-NEWARK-252

WGCP—NEWARK—252
3 p. m.—Songs by artists.
4 p. m.—Hugo Angelo, tenor.
4:15 p. m.—Charol de Thomee, planist.
4:30 p. m.—Clarence Profit, entertainer.
4:45 p. m.—Janet Levy, singer.
6 p. m.—Orchestra selections.
6:15 p. m.—Daddy Winkum's rhymemachine.
6:30 p. m.—Orchestra selections.
7 p. m.—Orchestra selections.
8:05 p. m.—Mitton Yokeman, tenor.
8:15 p. m.—Clarence Williams Trio.
8:35 p. m.—Serger Klibansky's entertainers.

ainers.

one m.—Ukulele Bob McDonald.

one m.—Eva Rothenberg, planist.

p. m.—Jimmy Flynn, songs.

p. m.—Strickland's Orchestra.

one m.—Ritz Orchestra.

one m.—Bob Murphy's entertain

p. m.—Connie's Orchestra.

WAAM-NEWARK-263 WAAM—NEWARK—263

11 a. m.—Happy hour.

11:15 a. m.—Cocking School.

3 p. m.—Hope's Melody Boys.

3 p. m.—Heina Parriil, soprano.

1:30 p. m.—The Sport Oracle.

1:45 p. m.—Fred Tinkel, planist.

1:55 p. m.—Perth Amboy Night.

1:55 p. m.—Hilda Kay, contralto.

0:20 p. m.—Ann. Shaw Harmony WIP-PHILADELPHIA-508 n.—Setting-up exe n.—Luncheon music. 1.—Artist recital.

WOO-PHILADELPHIA-508 12 noon—Luncheon music.
4:45 p. m.—Grand organ and trumpets.
7:30 p. m.—Dinner music.
8 p. m.—Address, Mrs. Walter Price.
8:15 p. m.—U. S. Navy Band.
8:50 p. m.—U. S. Navy Band.
8:50 p. m.—Dr. Charles Furey.
9 p. m.—W. O. O. Orchestra.
10 p. m.—Address, by E. J. Cattell.
10:15 p. m.—Helen Boyle, pianist.
10:30 p. m.—Art Landryōs Orchestra;
Berta Levin, string ensemble; Henry Nosco, violinist; Ennio Bolognini, cello; Florence Wightman, harp.
11 p. m.—Dance music. WEAF—NEW YORK CITY—492
6:45 to 7:45 a. m.—Health experiences.
10:45 a. m.—Music.
11:05 a. m.—Music.
11:15 a. m.—Talk.
11:30 a. m.—Music.
11:40 a. m.—Talk.
11:55 a. m.—Music.
2 (noon)—Market and weather reports.
p. m.—Lella Troland-Gardner, Negro spirituals.

WFI-PHILADELPHIA-395 10:30 a. m.—Solos. 10:40 a. m.—Home service talk. 1 n. m.—Tea room ensemble. 3 p. m.—Readings and musical program. 3.45 p. m.—Eleanor Gunn fashion feature. 6.30 p. m.—Concert orchestra. 7 p. m.—Dance orchestra.

WLIT—PHILADELPHIA—395 playlet,
p. m.—Dance music.
p. m.—Dream Daddy,
m.—"Philadelphia Leads America."

p. m.—Concert orchestra.

p. m.—Artist recital.

m.—Morning Glory Club; dance orchestra.

10:30 p. m.—Rufus and Rastus.

11 p. m.—Popular program. WCAU-PHILADELPHIA-278 Billy's Saxophone m.-Ed Kieffer, humorist

0 p. m.—Dancing Academy Orche
WHAR—ATLANTIC CITY—275 p. m.—Seaside Trio.

30 p. m.—Football forecast.

p. m.—Seaside Trio.

1:15 p. m.—Strand Organ Recital.

WPG—ATLANTIC CITY—300 WPG—ATLANTIC CITY—300
6:45 p. m.—Organ recital.
7 p. m.—Trio dinner music.
8 p. m.—Educational series.
8:55 p. m.—Weekly Line of Cheer."
9 p. m.—The Traymore Concert Orches tra.

6:20 p. m.—Piano selections.
6:30 p. m.—Elementary French lessons.
7: p. m.—Advanced French lessons.
7:30 p. m.—Police alarms.
7:35 p. m.—Meeting of Board of Estimate; resume. m.—Organ recital.
WGY—SCHENECTADY—380 2 p. m.—Asia Orchestra. 2:30 p. m.—Music; health talk. 6:30 p. m.—Sunday School lesso m -Albany Strand Theater Orches

8 p. m.—American marine week program; orchestra; address by Colonel E. H. Simmons.
9 p. m.—Allea Behr; Ruth Burton, songs.
9:15 p. m.—Hilda Reich, soprano.
9:30 p. m.—Kessler Ensemble.
10:10 p. m.—"Books," Professor J. G. Carter Troop.
10:30 p. m.—Police alarms; weather. tra.
7:30 p. m.—Health talk.
7:35 p. m.—Ollle G. Yettru, planist.
8 p. m.—Festival Choir of the Schene
tady Conservatory of Music; orchesti
9:20 p. m.—The Radio Four.
Company "The Dover Road." p. m.—Comedy, "The Dover Road."
WRW—TARRYTOWN, N. Y.—273
05 p. m.—Musical program; talk.

9:05 p. m.—Musical program; talk.

145 p. m.—Almo entertainers.

10:35 p. m.—Dance orchestra.

10:30 p. m.—Almo entertainers.

10:45 p. m.—James Fitzpatric, harmonic.

1:05 p. m.—Dance orchestra. 10:45 a. m.—Home Service talk. 6:30 p. m.—Dinner music. 7:30 p. m.—Talk.

0 p. m.—Dinner mass.

0 p. m.—Talk.

p. m.—Winger's Entertainers.

30 p. m.—Margaret Garrison, pianist.

10 p. m.—American Hawalian Quartette.

1:30 p. m.—Something Different.

1 p. m.—I a. m.—Supper music.

WHAM.—ROCHESTER, N. Y.—278

1:30 p. m.—Eastman Theater Orchestra

5 p. m.—Student recital.

7 p. m.—Theater orchestra.

7:30 p. m.—Weather forecast; market. WCAC—MANSFIELD, CONN.—275

45 p. m.—Program of music. WTIC—HARTFORD, CONN.—476

p. m.—Binner music.
p. m.—'Hoodoo Night,"
p. m.—Dance music.
p. m.—Popular Half Hour.
WJAR—PROVIDENCE—

WJAR—PROVIDENCE— 1:05 p. m.—Woodstock Entertainers 8 p. m.—Musical program. 9 p. m.—Maine Hour.

WEEI-BOSTON-349

8:45 a. m.—Health exercises.
7:45 a. m.—Horning watch.
10:45 a. m.—Horning watch.
10:45 a. m.—Horne Service Talk.
3:15 p. m.—Art Rubin's Orchestra.
8:50 p. m.—Lost and Found; weather.
7 p. m.—Big Brother Club.
7:45 p. m.—Musicale.
8 p. m.—Neapolitan program.
8:30 p. m.—Half Hour of Hospitality.
9 p. m.—Musicale.
10 p. m.—Marimba and Orchestra.
WNAC—BOSTON—280
10:30 a. m.—Bible reading; club tall
12:15 p. m.—Noon service.
1 p. m.—Luncheon concert.
4 p. m.—Tea dance. 4:20 p. m.—Tea dance. 4:20 p. m.—Ray Sinatra, pianist. 6 p. m.—Kiddies Klub. 6:30 p. m.—Dinner dance. 8 p. m.—Musical program.

WBZ—SPRINGFIELD, MASS.—333 30 p. m.—Leo Reisman's E p. m.—Market reports. :05 p. m.—Violin recital. p. m.—Pianist and reader.

8 30 p. m.—Rita Equi, soprano; St. Claire, contralto. 9 p. m.—"Whatdoyoucallit Club." WRC-WASHINGTON-469
WRC-WASHINGTON-WJZ. WRNY-NEW YORK CITY-259 n-Organ recital WCAP-WASHINGTON-469

:45.7:45:a. m.—Health exercises. :20 p. m.—Daily market summaries. :45 p. m.—"Age of Synthetic Produ 9 p. m.—Hood College Glee Club. 9:20 p. m.—Wardman Park Trio. KDKA-PITTSBURGH-309 m.—Dinner concert.
m.—Daddy Winkum.
m.—The Rhodes Scholarships

WCAE_PITTSBURGH_461 30 p. m.—Dinner concert. 30 p. m.—Uncle Kaybee. 45 p. m.—Address. m.—Alabama Bice Blowers. WADC—ARRON, OHIO—258

p. m.—Portage Quintet.
p. m.—Studio program.
WTAM—CLEVELAND—399 WEAR-CLEVELAND 390 -Children -Talks. 'm.—Dance music.
WWJ—DETROIT—353 p. m.—Dinner concert.
p. m.—Orchestra and soloists.

m.—Dance music. WJR—PONTIAC, MICH.—317 m.—Musical program. WREO—LANSING, MICH.—286 8 p. m.—Dinner concert.

WGJ—CHICAGO—488

8 p. m.—Dinner concert.

11 p. m.—Rainbow Skylarks.

2 a. m.—The Ginger Hour.

WMAQ—CHICAGO—448

7:30 p. m.—Wide-Awake Club.

9 p. m.—Mr. and Mrs. Oberndorfer.

9:30 p. m.—Whitney Trio.

10 p. m.—University of Chicago footba conference: songs.

10:45 p. m.—Christian Endea.

WEBH—CHICAGO—370 8 p. m.—Oriole Orchestra; songs.
10 p. m.—Dance music; Light
Company.

12-2 a. m.—Dance music; recital. WGN—CHICAGO—370 m.—Dinner music.
m.—The Classic Hour.
m.—Dance music.
WHT—CHICAGO—460 m.—Classical program.
m.—Melody Master (238 meter
p. m.—Recital.
—Your Hour League.
WOK—CHICAGO—217

p. m.—Concert hour. p. m.-2 a. m.—Musical features. WLS—CHICAGO—345 7:15-12 p. m.—Organ; story; farm gram; Rodeheaver hour; Ford KYW-CHICAGO-536

-Dinner concert. -Musical program. -Midnight revue. Organiogue.

"Insomnia Club."

WENR—CHICAGO—266 m.—Popular program.
m.—Midnight Frolic.
WOC—DAVENPORT—484

SATURDAY

WEAF-NEW YORK CITY-492 :45, 7, 7:20 a. m.—Health exercises. 7, 7:20 a. m.—Health exercises.
p. m.—Princeton-Yale football gar
p. m.—Cliff Crest Society Orchest p. m.—Dinner music.
p. m.—Light Opera Quartet.
15 p. m.—Light Opera Quartet.
30 p. m.—Light Opera Quartet.
45 p. m.—Aaron Hirsch, violinist.
p. m.—"Taking a Hint From Henry

9:25 p. m.—Wood's Jubilee Singers.
9:35 p. m.—Parnassus String Trio.
9:55 p. m.—Jan Van Bommel, barytone.
10:10 p. m.—May S. Breen, banjoist
Peter De Rose, pianist.
10:25 p. m.—Gordon Male Quartet.
10:40 p. m.—May S. Breen, banjoist;
Peter De Rose, pianist.
10:50 p. m.—Gordon Male Quartet.
11-12 p. m.—Vincent Lopez dance music.

WJZ-NEW YORK CITY-455 1, 2, 5, 6, 7, 7:30 and 10:55 p. m.—News 1:15 p. m.—Irwin Abrams's Orchestra. 2:30 p. m.—Football game, Yale Univer-

p. m.-Dinner orchestra. p. m.—Dance orchestra. 3:25 p. m.—Philharmonic Society studen concert.

9 p.m.—Pathe News banquet; V.
President Dawes, speaker.
10:30 p.m.—To be announced.
11 p.m.—Jacques Green's Orchestra;

WGBS-NEW YORK CITY-316 WGBS—NEW YORK CITY—316
10 a. m.—Timely talks with Terese.
10:10 a. m.—Kiddie Klub program.
10:40 a. m.—Midred Tabak, pianist.
10:50 a. m.—Fashion talk.
1:30 p. m.—Scripture reading.
1:35 p. m.—Broadhurst and Mathias.
3 p. m.—Interview with Fanny Ward.
3:10 p. m.—Augusta Rennick, soprano.
1:20 p. m.—Interview with Louella Parsons.

sons. 3:30 p. m.—Augusta Rennick, soprano. 3:40 p. m.—Furniture talk. 3:50 p. m.—Augusta Rennick. B p. m.—Uncle Geebee.

8 p. m.—Uncle Geebee.

6:30-p. m.—Orchestra.
7 p. m.—Ballréom instruction.
7:10 p. m.—Ballréom instruction.
7:30 p. m.—Hattie Strauss, soprano,
7:40 p. m.—Paul Weber, violinist.
8 p. m.—"Personality of Insects."
8:10 p. m.—Orpheus Mixed Quartet.
8:20 p. m.—Lyra Nicholas, pianist.
8:30 p. m.—Orpheus Mixed Quartet.
8:40 p. m.—Lyra Nicholas, pianist.
8:50 p. m.—Orpheus Mixed Quartet.
8:50 p. m.—Cyra Nicholas, pianist.
8:50 p. m.—Cyra nicholas, pianist.

8:50 p. m.—Orpheus miles 449 9 p. m.—Carmine Coppola. 9:20 p. m.—Warner's Theater program. WNYC-NEW YORK CITY-526 7 p. m.—Dance orchestra.
7:30 p. m.—Police alarms.
7:35 p. m.—Police alarms.
8 p. m.—Football results.
8:30 p. m.—Police Quartet.
8:30 p. m.—Regina Besner, planist.
9 p. m.—Emily Harford Avery concert
10:10 p. m.—"Heroes of Medicine.
Weinstein.
10:30 p. m.—Police alarms; weather.

WKCB-BROOKLYN-240

WFBH-NEW YORK CITY-273 p. m.-Bert Lowe's Entertainers -Bert Lowe's Entertal -Studio program. -Ed Berlin's Orchestra -Carabaldi Arrighi Singers. p. m.—Chris Meehan, tenor.
p. m.—Katherine Connelly, soprano,
m.—Orchestra selections,
p. m.—Yorkville Trio.

10:30 a. m.—Reducing exercises 10:45 a. m.—Women's Hour. 12 noon—Trinity Six music. 12 noon—Trinity Six music.
4:15 p. m.—Afternoon program.
4:30 p. m.—Symphony Society notes.
4:45 p. m.—Rita's Kiddie music party
7 p. m.—"Whose Birthday To-day?"
7:05 p. m.—Telegraph sportfiash.
7:15 p. m.—Commerce of the Day.

7:15 p. m.—Commerce of the Day.
7:20 p. m.—Cataline Noack.
7:35 p. m.—'St. Vitus Dance.'
7:45 p. m.—Concert orchestra.
8:15 p. m.—Ginseppe Adami, violinist...
8:30 p. m.—Ben Bernie's Orchestra.
9:15 p. m.—Labor and Capital.''
9:30 p. m.—Bernstein Trio.
10 p. m.—Fiction.
10:30 p. m.—Judith Roth, soprano.
11 p. m.—Motion picture review. Richard Bartheimess and others.
12 midnight—DX Hound Hour; Ferrucci's Orchestra.

WOLO.NEW YORK CITY—233

WORO-NEW YORK CITY-233
8:15 p. m.—Kate Rubin, planist.
8:35 p. m.—Beatrice Meisler, recita-8:50 p. m.—Sarah Sommers, whistler. 9:05 p. m.—Vladlmir Tobachnik, bary-

WBBR—STATEN ISLAND, N. Y.—273
8 p. m.—Fred Ehrenberg, musical saw.
8:10 p. m.—L. Marion Brown, soprano.
8:20 p. m.—Bible questions and answers.
8:40 p. m.—Ebye destions and answers.
8:50 p. m.—Fred Ehrenberg, musical WARG-RICHMOND HILL, N. Y .- \$16

WGBB—FREEPORT, N. Y.—244 WOR-NEWARK-405 6:45-7:15-7:45 s.m.—Gym class. 2:30 p.m.—Maxine Brown. 2:45 p.m.—Mrs. Gibson Arnoldi, "Mind

2:30 p. m.—Maxine Brown.
2:45 p. m.—Mrs. Gibson Arnoldi, "Mind and Matter."
3 p. m.—Maxine Brown, "Sweetheart of the Air."
3:15 p. m.—Zit's tea music.
6:15 p. m.—Words Mispronounced."
6:17 p. m.—"Words Mispronounced."
6:30 p. m.—Shelton dinner music.
7:30 p. m.—Shelton dinner music.
7:30 p. m.—Van's Collegians.
8 p. m.—"An Appreciation of 'Stephen Crane,' "Don C. Seitz.
8:30 p. m.—Josephine Evans Quartet.
8:30 p. m.—Clara Auwell, harpist.
8:45 p. m.—Clara Auwell, harpist.
9 p. m.—Arthur Baecht, violinist.
9:15 p. m.—Arthur Baecht, violinist.
10:50 p. m.—Arthur Reeve, "Mystery."
9:45 p. m.—Arthur Baecht, violinist.
10 p. m.—News bulletin.
10:15 p. m.—Julius Koehl, pianist.
10:30 p. m.—Arthur McCormick, bary-tone.

10:45 p. m.—Julius Koehl. planist. 11 p. m.—Eddie Elkins's Orchestr WGCP-NEWARK-252 n.—Henry Rogers, planist. p. m.—20th Century Entertainers. p. m.—Jack Davis. songs. p. m.—Rust and Henrichsen, banjo-

4:05 p. m.—Johanna Cohen, ukulele. 4:10 p. m.—Shirley Herman, singer. 4:20 p. m.—Richard Cheatham's Band. WFI-PHILADELPHIA-395

p. m.-To be announced: WAAM-NEWARK-263 6 p. m.—To be announced. 7 p. m.—Joe Chickene's Orchestra. 8 p. m.—Jolly Bill Steinke. 8:15 p. m.—Sarah Hellman, soprano. 8:35 p. m.—Entertainers. 9 p. m.—Entertainers. 9 p. m.—Samuel Silverberg, reader. 9:20 p. m.—Andrew Hayes, tenor. 9:40 p. m.—Entertainers. 10 p. m.—Hartley Joy Boys.

WLIT-PHILADELPHIA-395 2.05 p. m.—Organ recital. 2:30 p. m.—Concert orchestra. :30 p. m.—Dance music. p. m.—Concert orchestra.
WHAR—ATLANTIC CITY—275

WOO-PHILADELPHIA-508 wip—Philadelphia—508

6:45 a. m.—Setting-up exercises.
1 p. m.—Organ rectial.
3 p. m.—Football game, University of Pennsylvania and University of Pittsburgh. WPG-ATLANTIC CITY-300

wpg_ATLANTIC CITY_300 11 p. m.—Dance orchestra. WGY—SCHENECTADY—380

Princeton. 7:45 p. m.—Half-hour bridge lesson. 8:15 p. m.—Football results. 8:30 p. m.—Philharmonic Students' Concert. 10:20 p. m.—Football results

10:30 p. m.—Footoair results.

10:30 p. m.—Dance program.

WRW—TARRYTOWN, N. Y.—273

9:05 p. m.—Entertainment.

9:40 p. m.—Eukelele Woodle.

10:05 p. m.—Johnson and Johnson.

10:30 p. m.—Dance orchestra. p. m.—Dance orchestra. WGR—BUFFALO, N. Y.—319

no p. m.—Intercollegiate football gam Princeton vs. Yale. WHAM.—ROCHESTER, N. Y.—278 1:45 p. m.—Inte 30 p. m.—Football scores; weather WMAK—LOCKPORT, N. Y.—266

9-10 p. m.—Musical program,
WJAR—PROVIDENCE—306
1745 p. m.—Princeton-Yale football game.
8:20 p. m.—New York Philharmonic Orchestra. weel—Boston—349 6:45 a. m.—Tower health exercises.
7:45 a. m.—Morning watch.
WNAC—BOSTON—280
10:30 a. m.—Bible readings; club talks.
1 p. m.—Luncheon concert.
1:35 p. m.—Popular program.
1:45 p. m.—Harvard vs. Brown football

4:35 p. m.—Tea dance. 6 p. m.—New WNAC Radio Club WBZ—SPRINGFIELD, MASS.—333

0 p. m.-Yale-Princeton football gam WCTS-WORCESTER, MASS.-268 0:30 a. m.—Miscellaneous program. 2:05-2 p. m.—Luncheon music. :30 p. m.—Holy Cross vs. Rutgers University football game. :15 p. m.—Story teller. WRC—WASHINGTON—469 2 (noon) Organ recitat. n. m.—New Willard Orchestra

2 (noon) - Organ tertal.
p. m.—New Willard Orchestr.
p. m.—Washington orchestra.
45 p. m. Zoological talk.
p. m.—Bible talk.
115 p. m.—Musical program.
0.30 p. m.—"Crandall's
Nighters." Saturday Nighters.
12 (midnight)—Colonial Room Orchestra.
WCAP—WASHINGTON—469 :45-7:45 a. m.—Health exercises. :45 p. m.—Princeton vs. Yale Football KDKA-PITTSBURGH-309

6:15 p. m.—Dinner concert. 7:30 p. m.—Westinghouse Band.

New Rectifier Developed Which the baseboard as shown in the wiring by cleaning the contact areas with the same way, taking care that diagram Fig. 1 and in the photograph of the completed instrument, Fig. 2. should be fastened to the right-hand the proper order be maintained; keep of the completed instrument, Fig. 2. Each part should be firmly fastened end of the baseboard as shown in the eliminator a foot or more from Gives Full-Wave Rectification Each part should be firmly fastened to the baseboard with wood screws. Fig. 2. The variable resistance R1 the set, make sure that one terminal By bending the small tabs fastened should be mounted upon it as shown, of the A battery is grounded and to the cases of the condensers at and the three posts should be labeled insert a plug into the receptacle at right angles to their usual position, "B Amplifier," "B Detector" and "B the left and connect by means of This Tube, Which Operates on the Same Gas Conit is possible to screw the condensers | Negative" from top to bottom, re- a cord with the nearest electric light to the board in an upright position, spectively, as in Fig. 1. The elimi- socket. The eliminator is now operwhich will be found the most con- nator should be wired spaghetti cov- ative. In order to lower the value

A soldering lug should be put under gram. one of the screws holding each of the instruments to the board, and In order to place the B battery The voltage which the eliminator these should be connected to the neg- eliminator in operation insert the delivers is higher than that ordinaative B lead. Make sure that this tube in the socket, connect the posts rily employed, so the C battery voltlug is in good electrical contact with marked "B Negative," "B Detector" age should be increased correspondpiece of electrical apparatus. Its component parts must be the result of painstaking development. Contrary to popular opinion, it is the metal case of the instrument and "B Amplifier" on the eliminator ingly.

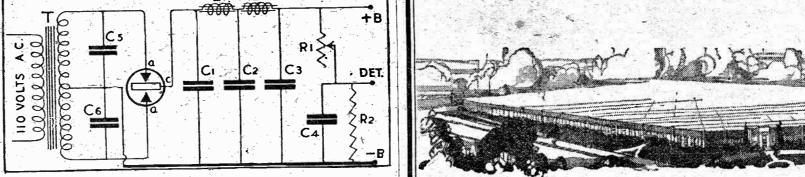
the baseboard as shown in the wiring by cleaning the contact areas with to the posts on the receiver marked venient position for wiring purposes. ered bus bar, as shown in the dia- of voltage applied to the detector

Wiring Instructions

tube, screw the knob of the variable

resistance.





0000

Model 20 Compact

Price, \$80

Note

Model 10 (without tubes,

Price, \$80

Brooklyn, New York

Figure 1-Wiring diagram of the full-wave rectifier herein described THE LEGEND

ductance Principles as the S Tube, May Be

Used in B Battery Eliminators

By Edwin E. Turner

O REPLACE B batteries successfully an eliminator must pos-

not possible to construct a satisfactory eliminator by the compounding

of the usual three-element tube, a Ford spark coil and a stray con-

denser. These parts do not lend themselves to the work. Special parts,

theon Manufacturing Company, of which gives the type numbers of the

Cambridge, Mass., has produced a new respective instruments. The elimina-

tube rectifier, designed particularly tor will require one transformer. At

for use in B battery eliminators. Its least two of the manufacturers but

use in conjunction with transform- out the two choke coils in a single

ers, choke coils and condensers, de- case. Only one of these is required

signed for use with it by equally for the construction of an eliminator.

progressive concerns, makes possible Where single chokes are used two

a B battery eliminator of unusual ex- will be required. The number needed

sess certain definite characteristics which make of it a specialized

T, special step-up transformer with split secondary winding.

C5, C6, .1 Mfd. condenser

U O

designed for the purpose, are required.

Cognizant of this fact, the Ray-

, a*, the Anodes of the rectifier tube. Ct, the cathode of the rectifier tube. C1, C2, 2 Mfd. condenser.

C3, 8 Mfd. condenser.
L1, L2, iron core choke coils.
R1, variable carbon resistance, 10,000 to 100,000 ohms.
R2, fixed resistance—10,000 ohms, 15

*The anodes of the rectifier tube connect to the filament terminals of standard socket, the cathode of the rectifier tube connect to the plate terminal of a standard cellence. The faults of the ther- of each manufacture is noted here-

mionic and electrolytic rectifiers, with: heretofore used for the purpose, are said to be wholly lacking in the new Raytheon tube.

All-American Radio Corporation, Chicago, Ill.

Bi claimed that the new rectifier makes possible the construction of an eliminator which operates without hum or noise of any kind, one which maintains its high voltage on receivers using as many as twelve ceivers using as many as twelve standard tubes, one which delivers equal quality and equal or more one which is more economical to B battery eliminator was designed

S tube, as it operates on the same gas conduction principles which are responsible for the success of that devices. There is no outproved the impossible to the success of that the impossible to the success of that the impossible to the success of that the impossible to the impossible to the success of that device. There is no filament in the trace of hum with either the head tube to burn out or to become ex-hausted by constant use, so the life of the tube is almost immessionable second stage of audio amplification. the tube is almost immeasureable. Full wave rectification is accom-

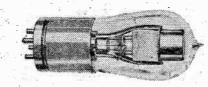


Figure 3 - A tube which is capable of accomplishing full more rectification

plished in the one tube. That is to say, both halves of the alternating B battery eliminator the following current cycle are rectified, resulting parts will be required: in less operating expense and better 1 quality of reproduction. Also the tube handles large loads without a marked falling off in voltage. As a result a higher voltage is applied to the B battery posts of the receiver particularly with multi-tube sets, giving greater volume and clearer tone.

Special transformers and chokes, particularly designed for use with the new tube, have been placed on the warder hy several manufacturers.

I fixed Resistance Rf. 10,000 ohms (must be able to carry 15 milliamperes).

Fixed Condensers 2 microfarads each. Fixed Condensers 4 microfarads each. Fixed Condensers 4 microfarads each. Fixed Condensers 4 microfarads each. Fixed Condensers 10.1 microfarads each. Fixed Resistance Rf. 10,000 ohms (must be able to carry 15 milliamperes).

I fixed Resistance Rf. 10,000 ohms (must be able to carry 15 milliamperes).

Fixed Condensers 2 microfarads each. Fixed Condensers 4 microfarads each. Fixed Condensers 2 microfarads each. Fixed C result a higher voltage is applied to

market by several manufacturers. They are given in the following table, The parts should be laid out

Transformer Choke
Type Type Manufacturer
Acme Apparatus Co, Cambridge, Mass
All-American Radio Cor-. B3 B1 514 *366 *356 R196

*The two choke coils are included in The filter circuit used in the new operate than dry or storage B bat- by Professor F. S. Dellenbaugh jr., The tube is an outgrowth of the Technology, one of the foremost

> It is not generally recognized that, in addition to the elimination of the hum, an eliminator is a very important contributor to the quality which the receiver delivers. That is to say, by proper design an eliminator will have the reserve power an capacity to insure richer and clearer reception than the best B batteries properly constructed eliminator using the Raytheon tube, as shown Figures 1 and 2, is one of the few which comply with this requirement

List of Parts In order to construct the Raytheon

Raytheon Type B rectifier tube. Baseboard.
Transformer (see list).
Choke colls (see list).
Variable Resistance, 10,000 to 100,000 ohms. 1 Fixed Resistance Rf. 10,000 ohms (must

Figure 2—This photograph shows how the parts of the B battery eliminator may be assembled

Larger than ten football fields T TERE IS the factory that stands behind our recommendation of Atwater Kent Sets and Radio Speakers. It covers more ground than ten football fields or sixty-four baseball

> diamonds. It was built large to meet the demand for Atwater Kent Radio and because this company is in Radio to stay.

> Eventually, many radio manufacturers may disappear. The survivors will be those who have the soundest product and know their business.

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at 9:15 o'clock (Eastern Standard Time) through stations-WGR . . Buffalo WOC . Davenport WTAG . Worcester KSD . St. Louis

New York City

WJAR , Providence WEEI . Boston WFI \ Philadelphia WOO | alternating

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New York City

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Davega features Atwater Kent Radio in the finest cabinet line in New York

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The Herald Tribune Daily Broadcasting Programs for Week Ending November 14

TO-DAY

WJZ-NEW YORK CITY-455 m.-Children's hour; stories, mu comic stories.

11 a. m.—Children's hour; stories, music:
11 a. m.—St. Thomas's Episcopal Church 11 a. m.—St. Thomas's Episcopal
services.
12:30 p. m.—Rivoli Sunday, concert.
2:30 p. m.—Sunday radio forum.
4 p. m.—St. George's Episcopal Church
services. Mozelle Bennett, violinist;
Rebecca Pharo, soprano; George Bag-Renecca Pharo, soprano; George Bag-dasarian, tenor
5,45 p. m.—"The Outposts of Peace,"
Literary Vespers, by Edgar Burrell.
7-p. m.—Carillon from Park Avenue Bap-tist Church.
7:30 p. m.—Nathan Abas's Concert
Orchestra.

Orchestra.

8 p. m.—Dextra Male Chorus.

8 80 p. m.—Program from Steinway Hall.
Orchestra, violin recital.

10 p. m.—Josephine Evan's concert quartet.

WJY—NEW YORK CITY—405

8:15 p. m.—Bernhard Levitow's Concert 8:15 p. m.—Bernhard Levitow's Concer Orchestra. 10 p. m.—"Reminiscences of a Reporter," William H. Crawford.

WEAF—NEW YORK CITY—492 m.—"Sunday Hymn Sing." dress by the new than Brass Quartet.

3:45-5:30 p. m.—Men's conference from Y. M. C. A. Address by Dr. S. Parkes Cadman; Gloria Trumpeters.

6:45-7:20 p. m.—Addresses given at 200th anniversary of first New York newspaper. antiversary of first New Tota newspaper at Newspaper Club.
7:20 p. m.—Musical program Capitol
Theater Family.
7:15-10:16 p. m.—Atwater Kent
Eva Gauthier, soprano; John Powell, WGBS-NEW YORK CITY-316 b, m,—Program from Warner's 8:30 p. m.—Program from Warner's Theater.
9:30 p. m.—Opera, "La Forza del Destino."

1 p. m.—Organ recital.
2.3 p. m.—Queens County Christian Endeavor program.
3 p. m.—Popular song review.
3 p. m.—Popular song review.
3.20 p. m.—Dr. Stratton Scofield's Bible
WSUI—10WA CITY—484
7.30 p. m.—Symphony orchestra. Class; answering questions
4 p. m.—Address by Judge Ralston.
5 p. m.—Dance orchestra.
7:30-10 p. m.—Calvary Baptist Church service. 10:45 p. m.—Janssen's Orchestra. 12 midnight—Richman Orchestra

WNYC-NEW YORK CITY-526 o. m.—Cornerstone ceremonic Hospital. Speakers and cho WRNY-NEW YORK CITY-259 2:45 p. m.—Body fit talks.

8 p. m.—"Music of All Religions."

8:45 p. m.—Bible reading to music.

1. Lane Miller. p. m.—Dr. J. Lane Miller. p. m.—Becker String Quartet. 8:15 p. m.—Charles D. Isaacson's concert Rita Maginot, Latayette Quartet, Lorn Lee, Joseph Diskay.

WMCA-NEW YORK CITY-341 11 a. m.—Christian Science services. 5:30 p. m.—Cosmopolitan Trio. 6 p. m.—Roemer's Homers. 7:35 p. m.—Dloott Vail's String Ensemble 7:35 p. m.—Oloott Vail's String Ensemble WFBH—NEW YORK CITY—273

30 p. m.—Franklin Four. WLWL—NEW YORK CITY—288 8 p. m.—Paulist Choristers, Serman Rev. Francis P. Duffy; benediction WBBR-STATEN ISLAND, N. Y.-273 10 a. m.—Watchtower Orchestra. 10:20 a. m.—Fred Twaroschk, tenor. 10:30 a. m.—Bible lecture, W. N. worth.
11 a. m.—Fred Twaroschk, tenor; orches-

tra.

p. m.—Choral singers.

9:10 p. m.—Violin duet.

9:15 p. m.—Bible lecture, F. W. Frantz.

9:45 p. m.—Choral singers; violin duet. WGBB—FREEPORT, N. Y,—244

WGBB—FREEPORT, N. Y.—244

10:40 a. m.—Church services.

WGCP—NEWARK—252

8 p. m.—Charlotte Trystmann, pianist.
8:15 p. m.—Arline Felker's Entertainers.
6:45 p. m.—Dick's ukulele club.
9:05 p. m.—Isabelle Henderson, soprano.
9:20 p. m.—Frank Kaltman, violinist.
9:35 p. m.—Leslie McLeod, tenor.
9:50 p. m.—Sylvia Schatz, pianist.
10 p. m.—Strickland's Orchestra. WOO-PHILADELPHIA-508

m.—Services. n.—Musical exercises opening Sunm.—Sacred recital.
WIP—PHILADELPHIA—508 7:15 p. in.—Evening service. 9:30 p. m.—Ben Stad's Symphony wfi—PHILADELPHIA—395

9:15° p. m.—Services.
9:15° p. m.—Atwater Kent hour.
WLIT—PHILADELPHIA—395 WLIT—FHILADELFHIA—S90
2:04 p. in.—Arcadia Concert Orchestra.
WCAU—PHILADELPHIA—278
5 p. m.—Mrs. Paul Jones, soprano.
5:15 p. m.—Radio church service.
5:25 p. m.—Recital.
5:35 p. m.—Recital. 6:30 p. m.—Pennsylvania Concert chestra.

chestra.

10:15 p. m.—Jaffe's Collegians.

WHAR—ATLANTIC CITY—275 WHAR—ALDATAN

10:45 a. m.—Morning service.

2:15 p. m.—Short sacred recital.

2:45 p. m.—Sermon, Philip Howard.

7:50 p. m.—Evening service.

9 p. m.—Seaside Hotel Trio. 11:15 p. m.—Strand organ recital. WPG—ATLANTIC CITY—300

8:15 p. m.—Organ recital. 4:15 p. m.—Vocal and instrumental 9 p. m.—Traymore Concert Orchestra.
10 p. m.—Organ radial WGY-SCHENECTADY-380

WGY—SCHENECTADY—380
9:45 s. m.—Service.
12:30 p. m.—Rivoli Theater Orchestra.
7 p. m.—Carillon program.
7:30 p. m.—Pennsylvania Orchestra.
8 p. m.—Vocal solist.
8:30 p. m.—Steniway Series.
10 p. m.—Josephine Evans, concert quartet. WRW-TARRYTOWN) N. Y.-273

8 p. m.—Services.

10:30 p. m.—Musical program.

WBG—BUFFALO—319

8 p. m.—Vesper services.

7:45 p. m.—Evening services.

9:15-10:15 p. m.—Atwater Kent hour.

WHAM—ROCHESTER, N. Y.—278 8:15 p. m.—Radio Chapel services.

WMAK—LOCKPORT, N. Y.—266

10:30 a. m.—Service.
7:30 p. m.—Service.
WEEL—BOSTON—349 WERL—BUSTUN—529
10:50 a. m.—Morning service.
4:45 p. m.—Dr. S. Parkes Cadman.
7:20 p. m.—Capitol Theater Family.
9:15 p. m.—Atwater-Kent Hour.
WNAC—BOSTON—280

1:30 p. m.—Concert. 4 p. m.—Varied musical program. 115 p. m.-Carillon concert and WJAR-PROVIDENCE-306

7:20 p. m.—Capitol Theater Family. 9:15 p. m.—Atwater-Kent hour. WBZ—SPRINGFIELD, MASS.—333 10:55 a. m.—Church services. Choir twenty-four voices.
8:30 p. m.—Musical program from Stel way Hali, New York, from WJZ.

WCTS-WORCESTER, MASS.—268
3:45 p. m.—Men's conference from WEAF
7:20 p. m.—Capitol Theater Family,
9:15 p. m.—Program from WEAF
WCAP—WASHINGTON—469 WUAF—WASAN

11 a. m.—Services.

2 p. m.—Services.

7:20-9:15 p. m.—Capitol Theater Family.

9:15-10:15 p. m.—Atwater-Kent hour. KDKA-PITTSBURGH-309 m.—Church service.

Organ recital.

n.—Vesper services.

n.—Dinner concert WCAE—PITTSBURGH—461 m.—Dinner concert.
m.—Capitol Theater Family,

p. m.—Atwater-Kent hour. WADC—AKRON OHIO—258 WEAR—CLEVELAND—390 . m.—Studio program.
WLW—CINCINNATI—422

7:45 p. m.—Songs and service.
11 p. m.—Classical program by artists
WJR—PONTIAC, MICH—517 8:30 p. m.—Radio frolic. WSAI—CINCINNATI—326 7:25 p. m.—Capitol Theater Family WREO—LANSING—286

S. p. m.—Church service. KYW—CHICAGO—536 KYW—oncert.
—Studio concert.
—Church service.
WLS—CHICAGO—345
—Organ solos; Little Brow 9 p. m.—Mixed quartet and organ.
WHT—CHICAGO—400
7:30 p. m.—Tabernacle band and choir.
10:30 p. m.—Request program.
11:30 p. m.—Back home hour.
WOK—CHICAGO—217
Concert and dance mu

7:30-9:30 p. m.—Concert and dance 2 a. m.—Musical program. WQJ—CHICAGO—47 9-11 p. m.—Rainbow Orchestra; WEBH—CHICAGO—370 8-10 p. m.—Selected artists program.
WOC—DAVENPORT—484

10:15 p. m.—Familiar hymns. KFMX—NORTHFIELD, MINN.—337 WCCO ST. PAUL 116 9:15 p. m.—Program from WEAF. WCAL—NORTHFIELD, MINN.—337 KTHS—HOT SPRINGS—375 p. m. Singing orchestra.

WOAW OMAHA 526

MONDAY

WEAF—NEW YORK CITY—492
6:45-7:45 a. m.—Health Exercises,
10:45 a. m.—Cameron Emsile, planist.
11:05 a. m.—Cameron Emsile, planist.
11:30 a. m.—Calumbia University Lecture.
12 noon—Market and Weather Reports.
3:30 p. m.—Ceremony in connection with laying of the corner stone of the nave of the Cathedral of St. John the Divine.
Speakers: Governor Alfred E. Smith,
Ellhu Root, Rev. James E. Freeman,
Rev. S. Parkes Cadman, Sir Campbell
Stuart and Hishop William T. Manning,
Music by combined choirs of the Cathedral and Trinity Church.
4:30 p. m.—John Hepler, planist.
4:45 p. m.—Waulter Scott, wiolinist.
7:30 p. m.—Jeanne Kramer, planist.
7:30 p. m.—Jeanne Kramer, planist.
7:30 p. m.—Jeanne Kramer, planist.
7:30 p. m.—Walter Scott, violinist.

7.45 p. m.—"Your Hour." 8:30 p. m.—Walter Scott, violinist. 8:45 p. m.—Health Talk. 8 p. m.—Music by Gypsies. 10 p. m.—Grand Opera, "Rigoletto." 11-12 p. m.—Ben Bernie's Orchestra. WJZ-NEW YORK CITY-455

10 a. m.—Women's Hour.
11 a. m.—News.
1 p. m.—Meyer Davis' Music.
2, 4, 5:30, 7:30 and 10:25 p. m.—News.
4:05 p. m.—Sylvia Adolphi, soprano.
4:15 p. m.—Lou Allen, guitar.
4:30 p. m.—Trio.
5:32 p. m.—Market Quotations.
5:50 p. m.—Financial Summary.
6:30 p. m.—N. Y. University Course.
7 p. m.—Dinner Concert.

8 p. m.—Reveiers. 9 p. m.—"Hour with Ohic Society." 10 p. m.—Hyman Tashoff, violinist. 10:30 p. m.—Joseph Knecht's Orchestra WGRS-NEW YORK CITY-316 10:10 a. m.—Jack Cohen, planist. 10:20 a. m.—Helen Hill, "Truth in Adv

10:30 a. m.—Jack Cohen, pianist.
10:40 a. m.—Fashion talk; planist.
1:35 p. m.—Scripture reading.
1:35 p. m.—Bob Platz.
3 p. m.—Bob Platz.
3 p. m.—Interview with Joseph Mullen.
3:10 p. m.—Beatrice Trihell.
3:40 p. m.—Beatrice Trihell.
6 p. m.—Uncle Geebee.
6:30 p. m.—Premier Orchestra.
7 p. m.—'The New Astrology."
7:10 p. m.—Premier Orchestra.

WHN-NEW YORK CITY-361 2:25 n m - Mae Bellin song 2:30 p. m.—Frank Mansfield, tenor; trio. 3 p. m.—Andy Razaf, tenor.

3 p. m.—Andy Razaf, tenor.

3:45 p. m.—Hugo Angelo, tenor.

3:55 p. m.—Al Wilson's Playmates.

4:05 p. m.—Haines and Scott.

1:15 p. m.—Frank Galassi, pianist.

4:25 p. m.—William J. Rietz, tenor.

4:35 p. m.—Miller, Piotti, Val, songs.

4:45 p. m.—Harry Stone's Orchestra.

6 p. m.—Dinner music.

7 p. m.—Marlboro State Trio. 230 p. m.—Swanee Orchestra.
p. m.—"Storage Batteries," H. B. Sh.
205 p. m.—Roseland Dance Orchestra :30 p. m.—Guardian Entertainers.

9 p. m.—Petry and Russell,
9:20 p. m.—Billie and Marie Van, singers.
10 p. m.—Billy Wynne's Orchestra.
11 p. m.—Dance orchestra.
11:30 p. m.—Silver Slipper Orchestra.
12 midnight—Ted Lewis's Orchestra.

WRNY—NEW YORK CITY—259
10:30 a. m.—Reducing exercises.
10:45 a. m.—New books in review.
11 a. m.—Charlotte Ruellau, songs.
11:15 a. m.—Wauscal Courier" says12.,(noon)—Trinity Six hour of music.
1:15 p. m.—Brayton Eddy, "Water mals."

4:15 p. m.—Brayton Eddy, "Water Animals."

4:30 p. m.—Henry Rogers, pianist.

7 p. m.—'Whose Birthday To-day?"

7:05 p. m.—Telegraph Sportflash.

7:15 p. m.—Commerce of the day.

7:20 p. m.—Code lesson.

7:45 p. m.—Major, Dent Atkinson.

8 p. m.—Ferrucci's Orchestra.

8:15 p. m.—"Evolution of Jazz."

8:30 p. m.—'Evolution of Jazz."

8:45 p. m.—''Evolution of Jazz."

9 p. m.—'The radio experimenter."

9 p. m.—'The radio experimenter."

9:16 p. m.—Music Travelogue,

9:30 p. m.—Svanhilde.

9:45 p. m.—John Agostini, 'Violin Dances.

10 p. m.—Lillian Browne, 'Poetry.''

10:10 p. m.—The Body,' Dr. Bolton.

10:30 p. m.—Popular Songs.

10:30 p. m.—Rose Dréeben, "Poet Peas ant."

ant."
0:45 p. m.—Florence Gerringer, pianist.
1:15 p. m.—Radio Theater Players, WMCA-NEW YORK CITY-341 m.—Olcott Vail's String Binsemble wMCA—NEW YORK CITY—341
i. p. m.—Olcott Vall's String Hisemble.
i:30 p. m.—Ernie Golden's Orchestra.
i:30 p. m.—Lullaby music.
i. p. m.—Knickerbocker Family Circle.
i:30 p. m.—Judith Roth, soprano.
p. m.—Lecture on Christian Science.
0:15 p. m.—Entertainers.
1:30 p. m.—Jack Cohen, planist.

WKCB BROOKLYN, N. Y .- 240

WGX-SCHENECTADY, A. x.-5
2.50 p. m.—Music, cooking lesson, (6,30 p. m.—Dinner proxam.
7 p. m.—Farmer's program.
7.25 p. m.—WGY orchestra, Er
Bates, soprano, and George A. 7
ley, cornetist, literary series.

11 a. m.—"Decorative Floors." 11:15 a. m.—Morning concert. 11:45 a. m.—Joe Schmitt's rec 12 noon—Luncheon concert.
6:10 p. m.—Market high spots.
6:20 p. m.—Plano selections.
6:30 p. m.—Elementary German lesson 7 p. m.—Advanced German lessons.
7:30 p. m.—Police alarms.
7:35 p. m.—Lehigh Serenaders.
8:20 p. m.—Claire Higerins planies.

8:30 p. m.—Christopher Meenan, tenor. 8:30 p. m.—Claire Higgins, planist. 8:40 p. m.—Christopher Meehan, tenor. 8:50 p. m.—Claire Higgins, planist. 9 p. m.—Irving Cohen, violinist; Harol. Noble, barytone; Mabel Emple, sopranc 10:10 p. m.—'Scotland,' William Sloane. 10:30 p. m.—Police alarms: weather. WFBH—NEW YORK CITY—273

2 p. m.—Orchestra.
3 p. m.—Studio program.
4 p. m.—Piano recital.
4:30 p. m.—Yama Yama Boys.
5 p. m.—Norman Secon, planist.
5:30 p. m.—Grace Angelo, contralto.
5:45 p. m.—Theo Alban, tenor. 15 p. m.—Majestic String Ensemble. 130 p. m.—The Pinewalders. 130 p. m.—Alvin Hauser's at Home Part a. m.—Charles Kerr's Orchestra. WOKO-NEW YORK CITY-233

3:15 p. m.—Mandolin and guitar. 3:35 p. m.—Semalina Stevenson, soprano 8:50 p. m.—Will Hubing's Orchestra. WLWL-NEW YORK CITY-288 m .- Leo J Bartinique, barytone 9:20 p. m.—Leo J Bartinique, oarytone.
9:30 p. m.—Question box.
9:45 p. m.—Bernardine Carnelli, soprano.
9:55 p. m.—WLWL Trio.
10:05 p. m.—Leo J Bartinique, barytone.
10:15 p. m.—Talk on citizenship.
10:35 p. m.—String Quartet.

WBBR-STATEN ISLAND, N. Y.-273 p. m.—Irene Kleinpeter, soprano. 10 p. m.—World News Digest. 25 p. m.—Carl Park, violinist. 35 p. m.—Bible instruction. 45 p. m.—Irene Kleinpeter, soprano. 55 p. m.—Carl Park, violinist. WARG-RICHMOND HILL, N. Y.-316 12 noon—Musical program.
7.30 p. m.—Maurice E. Connolly.
7.45 p. m.—Synchrophase Trio.
8.15 p. m.—Edgar Gruen, barytone.
8.30 p. m.—Von der Heide, La Ruffa.,
8.45 p. m.—Horace Taylor, recitations.
9 p. m.—Joe Zimmerman, planist. 9:15 p. m.—Joe Zimmerman, pianist.
9:15 p. m.—Syncrophase Trlo.
9:30 p. m.—Edgar Gruen, barytone.
9:45 p. m.—Edgar Zimmerman, pianist.
10 p. m.—Von der Heide, La Ruffa.
10:15 p. m.—Glenn Smith's Orchestra.

WGBB-FREEPORT, N. Y.-244 8 p. m.—Crescent City Trio.
8:30 p. m.—Elsa Bodie, soprano.
8:46 p. m.—Walter Blaile, planist.
9 p. m.—Philip Inglima, violinist.
9:15 p. m.—Lillian Allen, songs.
9:30 p. m.—Bob Hildenbrand's. Orch
WOR—NEWARK—405 6:45-7:15-7:45 a. m.—Gym class. 2:30 p. m.—Brace Conning, Camelia Camp bells Charles La Torre, "Shakespearea

p. m.—Sadye Gann, pianisse.
m.—"Shakespearean Readings."
p. m.—Mario Alverez, barytone.
p. m.—Sadye Gann, planiste.
p. m.—"Bread, Its Place in the Diet."
p. m.—"Words Mispronounced."
p. m.—"Sports," Bill Wathey."
) p. m.—Shelton dinner music.
) p. m.—Eddie Rikins's Orchestra.
m.—"Battle Hymn of the Republic

chow." 9:45 p. m.—Ballin and Race, piano duo. 10 p m.—News Bulletin.
10:15 p. m.—Ballin and Race, piano duo.
10:30 p. m.—Archie Slater's Orchestra.
11 p. m.—Frances Pehl, pianiste.
11:15 p. m.—Suzanne Richmond soprano.

3 p. m.—Eva Rothenberg, planiste. 3:15 p. m.—Andy Pendleton's Band. 4:15 p. m.—Shirley Herman, singer. 4:30 p. m.—Uncle Robert's pals. 4:30 p. m.—Uncle Robert's pals.

8 p. m.—Orchestra selection.

6:15 p. m.—Daddy Winkum.

6:30 p. m.—Orchestra selections.

8:15 p. m.—George Hirose, pianist.

8:15 p. m.—George Hirose, barytone.

8:30 p. m.—Perry Bradford's entertainer

8:50 p. m.—Bob Ward's little wards.

9:10 p. m.—Ona Welsh, pianiste.

9:30 p. m.—Studio program.

9:10 p. m.—Only weish, planiste.
9:30 p. m.—Studjo program.
10 p. m.—Strickland's Orchestra.
11 p. m.—Ritz Orchestra.
11:30 p. m.—Bob Murphy's entertainers
12 p. m.—Connie's Orchestra.

WAAM—NEWARK—263 1 a. m.—Happy hour. p. m.—Ben Goldfarb's Orchestra.

m.—Ben Groundin's Orenesta.

m.—Jee Brown, tenor.

p. m.—The Sport Oracle.

p. m.—Arthur Ackerman, planist.

m.—Ella Dowd, soprano.

p. m.—Arthur Ackerman, planist.

p. m.—Osephine Swanwick, sopra

p. m.—C. E. Craik, tenor.

6:05 p. m.—Dinier music:
7 p. m.—Bedtime story; dancing lesson.

WOO—PHILADELPHIA—508

11 a. m.—Grand organ.
12 (noon)—Luncheon music by Golden's Crystal Tea Room Orchestra.
4:45 p. m.—Grand organ; trumpets,
7:30 p. m.—Dinner music.
8 p. m.—Your Hour."
8:30 p. m.—Walter Scott, violinist.
8:45 p. m.—Carl Rollins, barytone,
9 p. m.—Music by Gypsies.
10 p. m.—Grand opera, "Rigoletto."
11 p. m.—Dance music.

m.—Dance music.
WFI—PHILADELPHIA—395

WIT-PHILADELPHIA—395
10:30 p.m.—Solos.
10:40 a.m.—Home Service Talk.
11 p.m.—Tea Room Ensemble.
3 p.m.—Talk, J. Rodger; recital.
3:45 p.m.—Fashion Feature.
6:30 p.m.—Concert Orchestra.
7 p.m.—Dance Orchestra.
12:05 p.m.—Organ recital; concert chestra.
2-3 p. m.—Concert orchestra; recital,
4:30 p. m.—"Magazine Corner."
4:35 p. m.—Talk, John Loughran;

cital.
7:30 p. m.—Dream Daddy.
8 p. m.—Short Agro-Waves.
8:15 p. m.—Concert orchestra.
8:30 p. m.—Artist recital.
9 p. m.—Stanley Theatre Movie Review;
orchestra; ofgan recital.
10 p. m.—Dance orchestra.
10:20 p. m.—Vandeville features.
10:40 p. m.—Vandeville features. :40 p. m.—Lanin's Dance orchestra. WCAU—PHILADELPHIA—278
p. m.—Weekly theater chat.
10 p. m.—Carelyn Thomas, soprano, p. m.—The Amsterdam girl.

0 p. m.—The Amsterdam girl.
9:10 p. m.—Danny Dougherty, songs.
9:30 p. m.—Delaware Serenaders.
10 p. m.—Freedman and Travaline, so.
10:15 p. m.—James Loughrey, tenor.
-WHAR—ATLANTIC CITY—275. p. m.—Seaside Trio.

WPG—ATLANTIC CITY—300

:30 p. m.—Tea music.

:45 p. m.—Organ recital.

p. m.—Dinner music.

p. m.—Children's hour.

p. m.—Billy Buckley's Crew.
p. m.—Ambassador Concert Orchestra.
p. m.—Studio concert. p. m.—Dance orchestra. WGY—SCHENECTADY, N. Y.—380

WRW—TARRYTOWN, N. Y.—273 p. m.—Children's stories; music. 05 p. m.—Entertainment. 30 p. m.—Talk. 45 p. m.—Galaxy stars. 105 p. m.—Xicolas Koenig's orchestra. 10:39 p. m.—Nicolas Koenig's orchestra. 10:39 p. m.—Galaxy stars. 11:05 p. m.—Nicolas Koenig's orchestra. WGR—BUFFALO. N. Y.—319

6:30 p. m.—Dinner music. 8:30 p. m.—Dutch Master's program. 9 p. m.—Allen's Saxaphone Band. p. in.-1 a. m.—Supper music. WHAM—ROCHESTER, N. Y.—278 3:30 p. m.—Eastman Theater Orchestra.

5 p. m.—Theater organ.

7 p. m.—Eastman Theater orchestra.

7:30 p. m.—Weather forecast; market.

WHAZ—TROY, N. Y.—380

9 p. m.—Father and son night; instrumental, vocal selections, short talks.

8:30 p. m. "Red Cross Roll Call," Corneliu: Burns.

10:15 p. m.—"Anthracite Coal Substitute" Professor E. A. Fessenden:

11 p. m.—Campus Serenaders, soloisfs.

WMAK—LOCKPORT, N. Y.—266
3-9 p. m.—Murray Whiteman's Serena 8-9 p. m.—Murray Whiteman's Serenad 9-10 p. m.—Musical program. WCAC—MANSFIELD, CONN,—275 :25 p. m.—Market reports, :30 p. m.—Dairy farming course. :45 p. m.—Program or music. WTIC—HARTFORD, CONN.—476 :30 p. m.—Dinner music. :45 p. m.—"Good Factories and Farms

0 a. m.—Housewives' exchange, 105 p. m.—Studio program, p. m.—Berry spring time, 130 p. m.—Musical program, 150 p. m.—American Led Cross; 6:45 a. m.—Health exercises. 7:45 a. m.—Morning watch. 10:45 a. m.—Home service talk.

2 p. m.—Happy Hawkins's Orchestra, 3 p. m.—Talk, A. J. Philpott, 6:50 p. m.—Lost and found; weather port,
7 p. m.—Big Brother Club.
7 p. m.—Big Brother Club.
7 p. m.—Levey A. Dennett, violinist.
8 p. m.—Anonymous Orchestra.
8:45 p. m.—Program from WEAF.
10 p. m.—Orchestra and band.
WNAC—BOSTON—280
10:30 a. m.—Bible reading.
12:15 p. m.—Organ recital.
1 p. m.—Luncheon orchestra.

p. m.—Luncheon orchestra.
p. m.—Copley Plaza Trio.
p. m.—Kiddles' Klub.
i30 p. m.—T. D. Cook's dinner dance.
i35 p. m.—T.ak. :40 p. m.—Concert.
p. m.—Suzanne Pipe, soprano; Frankly
McManus, barytone. WBZ—SPRINGFIELD, MASS.—333 130 p. m.—Organ recital.
130 p. m.—Organ recital.
130 p. m.—Lecture in psychology.
130 p. m.—Capitol Theater Orchestra.
130 p. m.—Edward Boyle's Orchestra.
130 p. m.—Elsa Evans, soprano.
140 p. m.—Aleppo Drum Corps.
130 p. m.—The "Riviera Four."

-Concert program. WRC-WASHINGTON-469

0 a. m.—Women's hour from 2 noon—Organ recital, p. m.—Shoreham Orchestra. m.—Musical program. WCAP—WASHINGTON—469 WUAF—WASHINGIUN—409
7.45 a. m.—Setting up exercises
p. m.—Dally market summaries,
p. m.—Apollo chorus.
p. m.—Health talk,
p. m.—Music by Gypsies,
p. m.—Operatic concert. KDKA—PITTSBURGH—309

6:15 p. m.—Children's period. 7:45 p. m.—"International Art." p. m.—Happy nome nour. WCAE—PITISBURGH—461 m.—Dinner concert.
m.—Uncle Kaybee.
m.—American Red Cross.
m.—Nixon orchestra. 11 p. m.—Loew's Aldine Theater. WADC—AKRON, OHIO—253

6:30 p. m.—Dinner concert.
WEAR—CLEVELAND—390 — Allen Theater program.
WTAM—CLEVELAND—390 n.—Dinner music. n.—Radio show. n.—Concert. 9 p. m.—Concert. 11 p. m.-1 a. m.—Dance music. WKRC—CINCINNATI—422 7:15 p. m.—Dinner dance. 8 p. m.—Freda Sanker's orchestra.

10 p. m.—American Legion program.
12 midnight—Theatrical stars.
1 a.m.—Popular orchestra.
WSAI—CINCINNATI—326 11 p. m.-1 p. m.—Concert. WLW—CINCINNATI—422 m.—"Times-Star" concert orchest: WJR—PONTIAC/MICH.—517 m.—Orchestra, soloists. m.—Musical program.

WWJ-DETROIT-353 6 p.m.—Dinner concert.
8 p. m.—Orchestra and gypsies.
WREO—LANSING, MICH.—286 WMAQ—CHICAGO—448

7:30 p. m.—La Salle orchestra. 7:40 p. m.—Family Altar Lengue. WOK—CHICAGO—217 8 p. m.-2 a. m.-Musical features.
WHT-CHICAGO 400
7 p. m.-Classics.
8 p. m.-Classics.

TUESDAY

WJY-NEW YORK CITY-405 7:30 p. m.—Ambassador Trio. 10 p. m.—To be announced. 10 P. M.—Charles Dettborn, Hawailan guitar.
10 p. m.—Paul Specht's Orchestra.
WEBJ—NEW YORK CITY—273 7 p. m.—Dan Barnett's Orchestra. 7.45 p. m.—Two-act play, "My Educate Children." Children."

8 p. m.—Railroad talk, Garrow Geer.

8:10 p. m.—Railo chats.

8:20 p. m.—Milton Yokeman, tenor.

8:35 p. m.—Rudolph Joskowitz, violinist

Wave Station Length Orchestra

Strickland's Jaffe's

Janssen's Richman's

Campus

MONDAY, NOVEMBER 9

WGCP WCAU WHN WHN

WNYC

WNYC WTIC WMAK WHN WGBB WHN 30 WGCP WAHG WJZ WOR WLIT WEAF WHAZ

11-72;30 WHN 11-1 WGR 11:30 WOR

10:30

11:30

Eastern Standard Time

5:30 p. m.—Anna Balthy, soprano, 5:45 p. m.—Chris Meehan, tenor, 6 p. m.—Garibaldi Arrighi Singers. 6:30 p. m.—Bossert Lumberjacks.

11:30 p. m.—Fordham Orchestra. WKCB—BROOKLYN, N. Y.—240

12 noon—Joe Zimmerman, planist.

WOR—NEWARK—405

1:45-7:15-7:45 a. m.—Gym Class.
1:30 p. m.—Prof. J. P. Santam

"Paris."

2.45 p. m.—Jack Smith, entertainer.

3 p. m.—Leo Carillo, Italian dialect stor

3.15 p. m.—Fred Koester's Orchestra.

3.16 p. m.—Words Mispronounced."

3.17 p. m.—"Sports," Bill Wathey.

3.30 p. m.—"Man in the Moon Stories."

3.55 p. m.—Shelton dinner mysic.

WGCP—NEWARK—252

WGCP—NEWARK—252
3 p. m.—Songs.
3:30 p. m.—Isabelle Henderson, soprano.
3:45 p. m.—Plano and violin solos.
4 p. m.—Leslie McLeod. tenor.
4:15 p. m.—Jack Davis, songs.
4:30 p. m.—Gertrude Guarente, planiste,
4:45 p. m.—J. Moore tenor.
WAAM—NEWARK—263

WAAM—NEWARK—26311 a. m.—Happy Hour.
6 p. m.—Al Makon's orchestra.
7 p. m.—Joe Chickene's orchestra.
7 p. m.—Beal' Ryno, soprano.
8 p. m.—Harl' Ryno, soprano.
9 p. m.—Montclair night;
11 p. m.—Bill McWalters, tenor.
WOO—PHILADELPHIA—508.

1 a. m.—Grand organ 2 (noon)—Luncheon music. :45 p. m.—Grand organ and trump :30 p. m.—Davis Saxophone Octet. WIP—PHILADELPHIA—508

WFI—PHILADELETHA—555
p. m.—Tea room ensemble,
p. m.—Philadelphia Music Club, Presi
dent's Day. String ensemble: the Ma
jestic Quartet and artists.
30 p. m.—Concert orchestra.
p. m.—Dance orchestra.

1-p m—Program same as WEAF WLIT—PHILADELPHIA—395

30 p. m.—Billy Hayes's Orchestra.
WHAR—ATLANTIC CITY—275

p. m.—Seaside Trio.
p. m.—Boy Scouts of America.
115 p. m.—Strand Organ Recital.
WPG—ATIANTO CITY—300

p. m.—Fasiion flashes.

15 p. m.—Plaza Hotel artists.

p. m.—Hall Dual Trio.

p. m.—Students of L. Powell Evans.

2 p. m.—Music; one-act play, "Charming Leander,"
2:30 p. m.—Organ recital,
6:30 p. m.—Dinner music,
7:30 p. m.—"Water Supply Engineering,"
Professor Warren Taylor,
7:45 p. m.—Stephen St. John Plectrum

Club.

0 p. m.—"The Grand Tour."

0:30 p. m.—Mayflower Orchestra.

WRW—TARRYTOWN, N. Y.—273

p. m.—Sterling Orchestra. WGR—BUFFALO, N. Y.—319

p. m.—Theater orchestra.
 p. m.—Weather forgcast; market.
 p. m.—Gustav Tinlot, violinist; F
 Kefer, cellist.
 WTIC—HARTFORD, CONN.—476

:05 p. m.—Roth Serenaders.
:30 p. m.—Radio prize contest.
:45 p. m.—Frank Johnson, planist.
0:05 p. m.—Orchestra.
0:30 p. m.—Roth Entertainers.

p. m.—Seaside Trio. 10 p. m.—Book review. p. m.—Seaside Trio.

1:30 p. m.—Luncheon music. 6:45 p. m.—Organ recital. 7 p. m.—Trio dinner music.

:45 a. m.—Setting up p. m.—Organ recital.

6-7 p. m.—Dinner music. WAHG—RICHMOND HILL, N. Y.—316

WJZ-NEW YORK CITY-455 a. m.—Women's hour. a. m.—News.

music.

4:05 p. m.—Miltonella Beardsley, planist.

4:20 p. m.—Jeanne a' Dair, soprano.

4:30 p. m.—Bernhard Levitow's tea music.

5:32 p. m.—Market quotations.

5:50 p. m.—Financial summary.

6:30 p. m.—New York University course:

"Nature of Sound and Light," Professor H. Sheldon.

fessor H. Sheldon.
7 p. m.—"St. Bernard," by Frank Dole, of
the Herald Tribune.
7:15 p. m.—Vanderblit Orchestra.
8 p. m.—Musicale.
9 p. m.—New York Edison hour.
10 p. m.—"The Grand Tour—Holland."
10:30 p. m.—Mayflower Orchestra. WEAF-NEW YORK CITY-492

:45-7:45 a. m.—Health exercises. 1 a. m.—Maria Saumell, planist. 1:10 a. m.—Lecture. 1:15 a. m.—Maria Saumell, pianist 11:19 a. m.—Motion picture forecast.
11:25 a. m.—Motion picture forecast.
11:45 a. m.—Maria Saumeil, planist.
12 (non)—Market and weather repe
4 p. m.—Joseph Blers, barytone.
4:15 p. m.—Thomas Hughes, planist.
4:30 p. m.—Women's program.
6 p. m.—Dinner music.

4:30 p. m.—Women's program.

6 p. m.—Dinner music.

7 p. m.—Florence Johnson, contralto.

7:10 p. m.—Columbia University lecture.

7:30 p. m.—Davis Saxophone Octet.

8 p. m.—"Financial Events," Dudl Fowler.

8:10 p. m.—Ross Gorman's Orchestra.

8:30 p. m.—"The Gold Dust Twina."

9 p. m.—"Eveready Hour,"

10 p. m.—"Auction Bridge Instruction."

10 p. m.—Yucent Lopez's Orchestra.

11-12 p. m.—Meyer Davis's Orchestra.

WGBS—NLEW YORK CITY—316 WGBS-NEW YORK CITY-316

1 p. m.—Organ recital.
3 p. m.—Artist recital.
6.05 p. m.—Joe Ray's Night Hawks.
7 p. m.—Roll call; birthday list.
8 p. m.—Elliott Lester, critic.
8:15 p. m.—Elliott Lester, critic.
8:15 p. m.—Armistice Night: Speakers include Joseph W. Price, Douglas MacArthur, Admiral Scales, Clarence Franklin and Richard V. Lancaster.
10:05 p. m.—Movie broadcast.
10:30 p. m.—Pagoda Orchestra.
WFI—PHILADELPHIA—S95 10 a. m.—Timely Talks with Terese. 10:10 a. m.—Helen Armstrong, songs. 10:20 a. m.—Household talk. 10:30 a. m.—Helen Armstrong, songs. 130 p. m.—Scripture reading.—
135 p. m.—Scripture reading.—
135 p. m.—Jean Thoma, soprano.
p. m.—Gertrude Seldenman, pianist.
p. m.—"Industrial Conditions in Egyp
110 p. m.—Betty Nemerson; Ida Wysoc

3:20 p. m.—Driving lessons.
3:30 p. m.—Betty Nemerson, Ida Wysocki.
3:40 p. m.—Alfred G. Robyn.
3:50 p. m.—Betty Nemerson, Ida Wysocki.
6 p. m.—Uncle Geebee.
6:30 p. m.—Boys' program.
6:50 p. m.—Charles Jones, "Salesman-11 a. m.—Organ recital.
12:30 p. m.—Concert orchestra; recital.
2-3 p. m.—Concent orchestra; recital.
4:30 p. m.—Talk; artist recital.
7:30 p. m.—Dream Daddy.
7:50 p. m.—"Both Sides the Footlights.
WCAU—PHILADELPHIA—278

ship."

7 p. m.—Arrowhead Orchestra.
8 p. m.—Vocational forum.
8:15 p. m.—Quartet of Woman's Voices;
duets.
8:50 p. m.—"Personality of Water Animals."
9 p. m.—Agnes Verbeckmoes, soprano.
9:10 p. m.—Florence Church, pianist.
9:40 p. m.—Straub and Lambrecht, guitar duets.
10 p. m.—Irving Argay, violinist.
10:30 p. m.—Arrowhead Orchestra. 7:30 p. m.—Recital. 8 p. m.—Barartm Male Quartet. 9 p. m.—Rev. John W. Stockwell

WHN-NEW YORK CITY-361 12:30 p. m.—Organ recital.
2:15 to 3:15 p. m.—Overture and vaudeville from Loew's. State.
3:15 p. m.—Lexington Theater Orchestra.
6:40 p. m.—Sunshine Talks.
7 p. m.—Iceland Orchestra.

6:40 p. m.—Sunshine Talks,
7 p. m.—Iceland Orchestra.
7:30 p. m.—Oakland's Chateau Shanley.
8 p. m.—Alice Brady interviewed.
8:15 p. m.—Miller, Piotti, Val, 'songs.
8:30 p. m.—Francis Capouilliez, barytone.
8:45 p. m.—Alfred Dulin, planist.
9 p. m.—Chris Meehan, tenor.
9:15 p. m.—Clarence Williams's Trio.
9:45 p. m.—Bob Schaefer, song writer.
11 p. m.—Caravan Orchestra.
11:30 p. m.—Rodeo Orchestra.
12 a. m.—Kentucky Revue and Orchestra.
WNYC—NEW YORK CITY—526

WAXU-NEW YORK CITY-526

7 p. m.—Market high spots.
7:10 p. m.—The Canadians.
7:30 p. m.—Police alarms.
7:35 p. m.—The Canadians.
8 p. m.—American Marine Week; Brooklyn Band, Durward H. Primrose.
9 p. m.—Dinner to Hon. Charles E. Hughes, Irving T. Bush, Elihu Root, Charles E. Hughes.
10:45 p. m.—Police alarmeters.

Hughes.
10:45 p. m.—Police alarms; weather
10:48 p. m.—Harry Ash's Orchestra. WRNY-NEW YORK CITY-259 WKN 1—NEW YORK COLUMN 10:30 a. m.—Reducing exercises.
10:45 a. m.—"Arts and Decorations."
12 noon—Trinity Six Hour of Music.
4:15 p. m.—H. N. Foster, "Quick Supper 4:30 p. m.—"Studio program.
6:45 p. m.—"Scholastic Sports."
7 p. m.—"Whose Birthday To-day?"

7:05 p. m.—"Whose Birthday To-day?"
7:05 p. m.—Telegraph sportfash.
7:15 p. m.—Commerce of the day.
7:20 p. m.—Emory Buckner, law series.
7:30 p. m.—Kiddie light opera dances.
7:45 p. m.—Concert orchestra.
8:15 p. m.—"Radio Show."
8:30 p. m.—I-3-2-1 7.45 p. m.—Concert orchestra.
8.15 p. m.—Concert orchestra.
8.15 p. m.—Light opera singers.
9 p. m.—Sadrian Trio.
9.15 p. m.—Sadrian Trio.
9.30 p. m.—Sadrian Trio.
9.45 p. m.—Whoto Transmission."

m.—Current theater.
p. m.—Irving Players, "One Word n -- "Town in Review."

11 p. m.—"Town in Review."

WMCA—NEW YORK CITY—341

[0:30 a. m.—Talk by Vera M. McGowan.

11 a. m.—Ida Allen's "Homemaker's Hour"

1 p. m.—Olcott Vail's String Ensemble.

1:30 p. m.—Frank Gebbis's Orchestra.

p. m.—Jack Wilbur's Personalities.

p. m.—Hattle Matthews, soprano; Fred
A, Semmens. barytone. A. Semmens. barytone, 8:30 p. m.—Henry Burbig; Henry Kaye. 9 p. m.—Minnie Weil, pianist. 9:30 p. m.—Catherine Harvey, soprano. 10 p. m.—South American Troubadours. p. m.—George Davis, tenor, p. m.—Fred Mensing, zither. m.—Ernie Golden's Orchestra. WFBH-NEW YORK CITY-273 n.—Bob Fleming's Orcnestra.
n.—Studio program.
p. m.—Judith Roth, soprano.
p. m.—Tea Table Talk.
p. m.—Marie Levandusky, soprano.
m.—Ford and McLean.

WGCP 252 WFBH 273

WRW WJY WEAF WJZ WGBS

TUESDAY, NOVEMBER 10

WEDNESDAY, NOVEMBER 11

p. m.—Dinner music m.—Barytone solos. 7 p. m.—Barytone solos.
7:20 p. m.—Dinner music; barytone so
8 p. m.—Studio program. 'Eveready hour."
WEEI-BOSTON-349 6:45 a. m.—Health exerc 2 p. m.—Joe Rine's Orchestra.
3:15 p. m.—'Books and Plays."
5:50 p. m.—Lost and found; weather.
7 p. m.—Big Brother Club.
7:45 p. m.—Harvard Observatory talk.
8 p. m.—Ross Gorman's Orchestra.
8:30-11 p. m.—Program from WEAF.
WNAC—BOSTON—230
m.—Blble readings. WNAC—BOSTON—280

10:30 a. m.—Bible readings.

10:40 a. m.—Women's Club talks.

12:15 p. m.—Noon service.

1 p. m.—Luncheon concert.

4 p. m.—Music to picture.

6 p. m.—New WNAC Radio Club.

6:30 p. m.—Dinner dance.

7:35 p. m.—Talk, Charles Donelan.

7:45 n. m.—Braddisk concert. Some 7:45 p. m.—Broadcast concert, Somervi Players. 8:15 p. m.—Boston American orchestra. 11 p. m.—Dance music.

THURSDAY, NOVEMBER 12

6:30 p. m.—Leo Reisman's Ensemble.
7 p. m.—Market report.
7:05 p. m.—To be announced.
8 p. m.—Mrs. John R. Fausey, soprano.
8:15 p. m.—Special theatrical program.
9:30 p. m.—Alandale Minstrels.
WCTS—WORCESTER, MASS.—268 WCTS—WORCESTER, MASS.—268
10:30 a. m.—Radio chat; music.
12 p. m.—Market and weather reports.
12:2 p. m.—Story Teller."
8-8:30 p. m.—Ross Gorman's Orchestra.
8:30-9 p. m.—Vecal selections.
9-10-p. m.—"Eveready Hour."
10 p. m.—To be announced.

9-10-p. m.—Eveready Hour."

10 p. m.—To be announced.

10:30 p. m.—Program from W.EAF.

WRC—WASHINGTON—469

10 a. m.—Women's Hour from WJZ.

12 noon—Organ recital.

1 p. m.—New Willard Orchestra.

6.50 p. n.—"Show Shopping." Leor

Hall. p. m.—Shoreham Orchestra.
p. m.—Wurlitzer Musicale. p. m.—"Edison Hour."

p. m.—"Edison Hour."

p. m.—"The Grand Tour."

1:30 p. m.—W. Spencer Tupman's

chestra. KDKA—PITTSBURGH—309 ## WEBJ—NEW YORK CITY—278

8 p. m.—Daddy Winkum.

7:30 p. m.—Daddy Winkum.

7:30 p. m.—Musical settings by Little Symphony Orchestra.

8 p. m.—Musical settings by Little Symphony Orchestra.

9 a. m.—Little Symphony Orchestra:

10 p. m.—Dinner concert.

115 p. m.—Uncle Kaybee.

1265 p. m.—Jungle Kaybee.

1275 p. m.—Jungle Kaybee.

1285 p. m.—Jungle Robert's Pals.

1285 p. m.—Uncle Robert's Pals.

1285 p. m.—Uncle Robert's Pals.

1285 p. m.—Uncle Robert's Pals.

139 p. m.—Brand opera.

130 p. m.—Dinner music.

130 p. m.—Citton Orchestra.

130 p. m.—Dinner music.

130 p. m.—Dinner music.

130 p. m.—Dinner music.

130 p. m.—Dinner music.

130 p. m.—Brand opera.

130 p. m.—Leroy Fontesanto; tenor.

130 p. m.—Leroy Fontesanto; tenor.

130 p. m.—Helen Carner, planists.

130 p. m.—Luttle Robert's Pals.

131 p. m.—Jungle Robert 6:30 p. m.—Dinner concert.
7:15 p. m.—Uncle Kaybee.
7:30 p. m.—Program from WEAF.
8:30 p. m.—"The Gold Dust Twins."
9 p. m.—"The Eveready Hour."
10 p. m.—Grand opera.
WADC—AKKON, OHIO—253

6:30 p. m.—Dinner concert.
8 p. m.—Binning's Rambiers.
10 p. m.—Times-Press Hour.
WTAM—CLEVELAND—390 WSAI—CINCINNATI—326

:45 p. m.—Chimes concert,

p. m.—Eveready hour.

p. m.—Eveready hour.

p. m.—"Anction Bridge Games."

Concert from studio. 10:30 p. m.—Concert from studio.

WLW—CINCINNATI—422
3:30 p. m.—O. Henry play.
9 p. m.—Orchestra.
9:20 p. m.—Musical program.

0 p. m.—Formica Orchestra.

WKRC—CINCINNATI—423
1 p. m.—Dance music; songs.
2 midnight—"Doc" Howard's Enterti WJR-PONTIAC, MICH:-517 p. m.—Orchestra; soloists.
p. m.—Serenaders; soloists,
WWJ-DETROIT—517

-Dinner concert.
m.—Band, glee club, artists.
WHT-CHICAGO-400 7 p. m.—Classical program. 8:45 p. m. (238 meters)—Musical featur 10:30 p. m.—Entertainers. 11:10 p. m.—Dance music. WMAQ—CHICAGO—448

WMAQ—CHICAGO—220

7:30 p. m.—La Salle Orchestra.
9 p. m.—Literary Sidelight; songs.
9:40 p. m.—Travel talk.
10 p. m.—University of Chicago, lecture
10:20 p. m.—Musical program.

WLS—CHICAGO—345 7:15 p. m.—Organ; story; songs of Italy.

KYW—CHICAGO—536 KYW-CHICAGO—

8 p. m.—Dinner concert.

9 p. m.—Musical program.

10 p. m.—Concert program.

11 p. m.—"Evening at Home."

2 a. m.—"Insomnia Club.

"Insomnia Club. WEBH--CHICAGO-370 Dinner concert.
Dance selections: theater bits. 7:30 p. m.—Dinner music. 9:30 p. m.—Classic hour.

1:30 p. m.—Dance music. WOK—CHICAGO—217 Dinner concert. --i.—Popular program. WQJ—CHICAGO—448 8 p. m.—Dinner concert.
11 p. m.—Rainbow Skylarks.
2 a. m.—The Ginger Hour.
WCBD—ZION, ILL.—345

Summerall; "The Memory of the I the Rev. Father Francis P. Duffy. 10:30 p. m.—Virginians.

WGBS-NEW YORK CITY-316

Dance music Benton Harbor Dance music

Lorraine Dance music Meyer Davis's

Dance music Dance music

Presseman's Ben Bernie's Dance music Crandall's Dance music

Arrowhead

Arrownead
Dance music
Eddie Elkins's
Ernie Golden's
Vincent Lopez's
J. Green's
Ferrucci's

WCAU WEAF WJAR WGR WFBH WGCP

7:00 WYC 528
8:00 WJZ 455
8:11 WGBB 244
8:80 WRNY 259
10:05 WIP 508
10:30 WRW 273
10:30 WGW 273
10:30 WGB 316
10:30 WGB 316
10:30 WGY 405
11:00 WMC 405

SATURDAY, NOVEMBER 14.

9 p. m.—Clarinet quartet and celectric WOC—DAVENPORT—484

110 p. m.—Emma Kneiles, songs.
130 p. m.—Lou Lockett, Norman Secon
p. m.—Jerry Antone's Orchestra.
p. m.—Anita Bunn, soprano.
115 p. m.—Majestic String Ensemble.
p. m.—Jack Smith, songs.
p. m.—Limericks.
130 p. m.—Fred Fisher, Bob Schaffer.
1130 p. m.—Bal Masque Orchestra. WEDNESDAY WJZ-NEW YORK CITY-455 a. m.—Women's hour.
a. m.—News service.
b. m.—Irwin Abrams's Orchestra.
5:30, 7:30 and 10:30 p. m.—News.
b. m.—Kathleen Phillips, soprano. WHAG-RICHMOND HILL, N. Y.-316 WHAG—RICHMOAD HALL, A. I.—
2 noon—Musical program.
23 p. m.—Billy, Eisenhuth's "Lynbrook10-11 p. m.—"Ipana Troubadours."
KDKA—PITTSBURGH—309 p. m.-John Flynn, angling lore.

4:00 p. m.—Kathleen Phillips, soprano.
4:20 p. m.—John Daniel, readings.
4:30 p. m.—John Daniel, readings.
4:30 p. m.—John Caton, tenor.
5:32 p. m.—Market quotations.
5:50 p. m.—Frank Lauria, violinist.
5:50 p. m.—N. Y. University course: "Success in Various Professions," Professor James E. Lough.

7 m.—Donner orchestra. WGBB-FREEPORT, N. Y.-244

S. 8 p. m.—Antonetta Longo, planist.
P. 8:15 p. m.—Cherrie Harrison, soprano.
d, 8:30 p. m.—John Hartnedy, Mrs. H nedy.

9 p. m.—Shirley Fulton, pianist.

9:15 p. m.—Frances Kiernan, soprano.

9:30 p. m.—Harold Davison's Ramblers. 10:10 a. m.—Betty Anthony, soprano.
10:20 a. m.—Beauty talk; songs.
10:40 a. m.—Housefurnishing talk; songs.
1:30 p. m.—Scripture reading.
2 p. m.—John Von Aspe, tenor.
3 p. m.—Hospital request program: Interview with Royal Dixon; Florence Loftus, soprano; Murray Miller and Bob Platz, duets; Lorna Long and Letty Smiles, duets.
3 p. m.—Uncle Geebee.
3:30 p. m.—Words mispronounced.
6:15 p. m.—Words mispronounced.
6:17 p. m.—Words mispronounced.
6:18 p. m.—Words mispronounced.
6:19 p. m.—Words mispronounced.
6:10 p. m.—Words mispronounced.
6:11 p. m.—Words mispronounced.
6:12 p. m.—Words mispronounced.
6:13 p. m.—Words mispronounced.
6:14 p. m.—Words mispronounced.
6:15 p. m.—Words mispronounced.
6:16 p. m.—Words mispronounced.
6:17 p. m.—Words mispronounced.
6:18 p. m.—Words mispronounced.
6:19 p. m.—Words mispronounced.
6:19 p. m.—Words mispronounced.
6:11 p. m.—Words mispronounced.
6:12 p. m.—Words mispronounced.
6:13 p. m.—Words mispronounced.
6:14 p. m.—Words mispronounced.
6:15 p. m.—Words mispronounced.
6:15 p. m.—Words mispronounced.
6:16 p. m.—Words mispronounced.
6:17 p. m.—Words mispronounced.
6:18 p. m.—Words mispronounced.
6:19 p. m.—Words mispronounced.
6:18 p. m.—Words mispronounced.
6:19 p. m.—Words mispronounced.
6:18 p. m.—Words mispronounced.
6:19 p. m.—William Burke, tenor.
7:30 p. m.—William Burk

"Idioms."

'Idioms."

'Idioms." WGCP-NEWARK-252

—Songs by artists.

m.—Clarence Williams Trio.

m.—Good News Party. m.—Charlotte Trystmann, pian p. m.—Charlotte Trystmann, pianist m.—Orchestra. p. m.—Daddy Winkum's Rhyme Maline. p. m.—Musical program. p. m.—Midnight revue. inc. p. m.—Orchestra selections. WGN—CHICAGO—370 -Richman Entertainers. WAAM-NEWARK-263

m.—Happy hour program.
a. m.—East Orange and Monto
th School football game.
m.—Wallie Osborne's Orchestra.
m.—Elmer Nippes's Orchestra.
p. m.—Sport oracle.
p. m.—Sport oracle.
m.—Cora Morris, soprane.

WEAF—NEW YORK CITY—492 6:45-7:45 a. m.—Health exercises. "Armistice Day Program" 10:35 a. m.—Church chimes; announ 8:20 p. m.—Alice Yinck, violinist; Florence Yerdy, soprano. 9 p. m.—Merchants program. e-9:30 p. m.—To be announced. 10 p. m.—Orchestra. 10:35 a. m.—Church chimes; announcements.

10:39 a. m.—Caroline Andrews, soprano.
10:42 a. m.—Address by the Rev. Dr. S. Parkes Cadman.
10:52 a. m.—Redferne Hollinshead, tenor.
10:56 a. m.—Chimea.
10:59 a. m.—Bugle call to silence.
11 a. m.—Two minutes silence; taps.
11:03 a. m.—Myro Glass, barytone.
11:05 a. m.—Myro Glass, barytone.
11:30 a. m.—Columbla University lecture.
12:20 p. m.—Market and weather reports.
12:20 p. m.—Market and weather reports.
14:45 p. m.—Pom with musical accompániment.
14:55 p. m.—Pom with musical accompániment.
15 p. m.—Dinner music.
16 p. m.—Orchestra.
16 p. m.—Orchestra.
17:30 p. m.—Orchestra.
18:40 p. m.—Orchestra.
19:00 p. m.—Orchestra.
10 p. m.—Orchestra.
11 a. m.—Orchestra.
11 a. m.—Orchestra.
12 p. m.—Luncheon music.
12 p. m.—Dinner music.
13 p. m.—Orchestra.
14 a. m.—Orchestra.
14 p. m.—Orchestra.
15 p. m.—Orchestra.
16 p. m.—Orchestra.
16 p. m.—Orchestra.
11 a. m.—Orchestra.
12 noon—Luncheon music.
12 p. m.—Dinner music.
13 p. m.—Dinner music.
14 p. m.—Orchestra.
14 a. m.—Orchestra.
15 p. m.—Orchestra.
16 p. m.—Orchestra.
10 p. m.—Orchestra.
10 p. m.—Orchestra.
11 a. m.—Orchestra.
12 noon—Luncheon music.
12 p. m.—Dinner music.
13 p. m.—Dinner music.
14 p. m.—Orchestra.
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14 p. m.—Orchestra.
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16 p. m.—Orchestra.
16 p. m.—Orchestra.
17 p. m.—Orchestra.
18 p. m.—Orchestra.
19 p. m.—Orchestra.
10 p. m.—Orchestra.
11 a. m.—Organ recital.
12 p. m.—Dinner music.
11 noon—Luncheon music.
12 p. m.—Pooley concert.
11 p. m.—Vaternam's Points of Prog
10 p. m.—Organ recital.
12 p. m.—Dinner music.
10 p. m.—Organ recital.
11 noon—Luncheon music.
11 noon—Luncheon music.
11 noon—Luncheon music.
11 noon—Luncheon music.
12 p. m.—Organ recital.
12 p. m.—Dinner music.
10 p. m.—Organ recital.
11 noon—Luncheon music.
11 noon—Chapel services.
12 noon—Artist recital.
11 noon—Chapel services.
12 noon—Artist recital.
13 noon—Organ recital.
14 noon—Organ recital.
14 noon—

Leonard

Description

Leonard

Description

Leonard

Description

Desc

WFI-PHILADELPHIA—395
10:30 a. m.—Solos.
10:40 a. m.—Home service talk.
1 p. m.—Tea room ensemble.
1:50 p. m.—Heports.
3 p. m.—Armistice program talk; musical program.
3:45 p. m.—Eleanor Gunn's fashion feature.
6:30 p. m.—Concert orchestra.
7 p. m.—Dance orchestra.
WLIT—PHILADELPHIA—395 WEBJ-NEW YORK CITY-278 *:au p. m.—Talk, Julia Abbott; recits 7:30 p. m.—Dream Daddy.
8 p. m.—Talk, "Current Events.".
8:15 p. m.—Program by Red Cross.
10 p. m.—Dance orchestra.

WCAU—PHIEADELPHIA—278
7:30 p. m.—Lew Chanman's Cochestra.

7:30 p. m.—Lew Chapman's Orchestr 8 p. m.—Stage dancing lesson. 8:15 p. m.—William H. Moore, tenor.

songs. 3:30 p. m.—Talk. :30—Program for children. :45 p. m.—Albany Strand Theater Orche 7:30 p. m.—! Book of Knowledge."
9 p. m.—Armistice program; School ba

p. In-Armston property of the WNYC-NEW YORK CITY-526 gast.

11:15 a. m.—Morning concert.

11:45 a. m.—Joe Schmitt's recipes.

12 noon—Luncheon concert.

3:30 p. m.—Seventh anniversary of signing armistice.

3:30 p. m.—Celebration, from Central Park.

Investion, Sours by school, children. 10:45 a. m.—Home Service Talk.

7 p. m.—Murray Whiteman Serenade.
9-11 p. m.—Broadcasting with WEAI

3:30 p. m.—Celebration, from Central Park
Invocation. Songs by school children.
Salutation Army Chorus. Prominent
speakers. Prayer.
1:00 p. m.—Market high spots.
1:20 p. m.—Plano selections.
1:20 p. m.—Elementary Spanish lessons.
7:35 p. m.—Elementary Spanish lessons.
7:35 p. m.—The Red Cross Roll Call."
7:50 p. m.—Cremons Stringed Trio.
Songs: address by Joseph Thompson
Fife, Drum and Bugle Corps.
10:25 p. m.—Lawrence Metcalf, whistler.
10:30 p. m.—Police alarms: weather.

WHAM—ROCHESTER, N. Y.—2
3:30 p. m.—Theater organ.
1:p. m.—Theater organ. 7:45 p. m.—Program of music. WTIC—HARTFORD, CONN.—476

1:05 p. m.—Studio program.
7:30 p. m.—U. S. Army Band.
9 p. m.—Waterman's Points of Progress WRNY-NEW YORK CITY-259 10:30 a. m.—Reducing exercises. 10:45 a. m.—Health advice. 11 a. m.—"Gardening Lore." 12 noon—Trinity Six Hour of Music. WEEI-BOSTON-349

,8:45 A. M.—Health exercises.

7:45 a. m.—Morning Watch.
10:45 a. m.—Horning Watch.
10:45 a. m.—Horning Bowles' Orchestra.
6:50 p. m.—Lost and Found; weather.

7 p. m.—Big Brother Club.
7:45 p. m.—Musicale.
8:00 p. m.—Ben Bon Buddies.
8:30 p. m.—Fogram of music.
9 p. m.—Waterman's Points of Progress
10 p. m.—Upana Troubadours.
11 p. m.—Chamber of Commerce Organ.

WNAC—BOSTON—280

10:30 a. m.—Bible reading; club talks. z noon—Trinity Six Hour of Music. 15 p. m.—Samnel Bernard, "Timeol 30 p. m.—Miriam Rose. ps m.— "Whose Birthday To-day?" 05 p. m.— "Telegraph Sportflash." 15 p. m.—"Commerce of the Day." m.—Code lesson,
m.—Merryle_Ruckeyser, "Finance

m.—James Beaver, songs. —Mario Curci, songs. 8:30 p. m.—Talk. 8:45 p. m.—"A to Z Plano Classics." p. m.—"Transoceanic Telephony."

15 p. m.—Harvey Corbett, "Adventure."

120 p. m.—Francine Vyde, repertoire.

130 p. m.—Anna Drittel, cello.

145 p. m.—Chevaller de Lancellotti, songs.

0.15 p. m.—Biography.

WMCA—NEW YORK CITY—341
6 p. m.—Olcott Vall's String Ensemble.
6:30 p. m.—Ernie Golden's Orchestra.
7:30 p. m.—Edward French, planist.
7:50 p. m.—Services from Northmins

8 p. m:—Services
Church,
9 p. m:—Joseph Wetzel, tenor.
9:30 p. m.—Frank Wadsworth, "Your Job.'
10 p. m.—Aandy Asclutto's Orchestra.
11 p. m.—Entertainers.
11:30 p. m.—Jack Smith, songs. m.—Special Armistice Day program WCTS—WORCESTER, MASS.—268. 10:30 a. m.—Radio chats.
12 p. m.—Market and Weather Report.
12:05-2 p. m.—Luncheon music.
7:15 p. m.—"Story Teller."
8 p. m.—Lesson in Spanish.
8:15 p. m.—Concert program.
WRC—WASHINGTON—469

o a. m.—Women's hour from non—Organ recital.
p. m.—Washington Orchestra. m.—Musical program.
WCAP—WASHINGTON—469 m.—Market summaries

wbz—Springfield, MASS.—333

WFI-PHILADELPHIA-395

p. m.-1 a. m.—Supper music. WHAM—ROCHESTER, N. Y.—278

10 p. m.—Sattler String Quartet. WCAC—MANSFIELD, CONN.—275

6:15 p. m.—Dinner concert. 7:30 p. m.—Children's period. 8:45 p. m.—Criminology talk. 9 p. m.—Hour of music.
WCAE—PITTSBURGH—461 6:30 p. m.—Dinner concert. 7:30 p. m.—The Sunshine Girl. p. m.—Pooley concert.
m.—Waterman hour, New York,
WADC—AKRON, OHIO—258 WTAM—CLEVELAND—390 m.—Dinner music. m.—Radio Show program.

m.—Dance music.
WEAR—CLEVELAND—390 WKRC-CINCINNATI-422 n.—Book review.

o. m.—Dance music. 10:15 p. m.—Dance music.
WSAI—CINCINNATI—326
8:45 p. m.—Art talk:
11 p. m.—Quartet and soloists.
WLW—CINCINNATI—422

midnight-Organ concert. WWJ-DETROIT-353 -Orchestra and soloists.

ists.
9 p. m.—Burroughs hour.
11:30 p. m.—Jesters.
WREO—LANSING—286 6-7 p. m. Dinner concert.
WEBH-CHICAGO 370 WEBH-CHICAGO 370

8 p. m.—Concert orchestra; songs,

10 p. m.—Dance music; songs,

12-2 a. m.—Dance music; rectal,

KYW—CHICAGO 536

8 p. m.—Dinner concert.

8:30 p. m.—Talks.

8:30 p. m.—Dinner concert. 10:30 p. m.—The classic hour. 12:30 a. m.—Dinner music. 7 p. m.—Dinner concert. 19-11 p. m.—Popular program. 1-3 a. m.—All American Picco WQJ—CHICAGO—448

8 p. m.—Rainbow Orchestra. 11 p. m.—Musical program. 7:15 p. m. 1 a. m. Organ; story; tice Day program; concert. WMAQ CHICAGO 448 7 p. m.—Vorgan recital; story,
9 p. m.—Northwestern University lectur
9:30 p. m.—Indian musical program.
10 p. m.—WMAQ Players. THURSDAY

WJZ-NEW YORK CITY-455 10 s. m.—Women's program.
11 s. m.—News.
1 p. m.—Nathan Abas's luncheon music.
2, 4, 5:30, 7:30 and 10:30 p. m.—News.
4:05 p. m.—Beryl Rennie, soprano.
4:30 p. m.—Bernhard Levitow's Orches-

1812.

5:32 p. m.—Market quotations.
5:50 p. m.—Financial summary.
6:30 p. m.—N. Y. University course.
7 p. m.—Bernhard Levitow's Dinner Orchestra.
8 p. m.—U. S. Army Band.
9 p. m.—Helen Howison, soprano.
9:30 p. m.—Royal Salon Orchestra.
10:30 p. m.—Ben Glaser's Orchestra.

WJY-NEW YORK CITY-405 7:30 p. m.—Vanderbilt Orchestra. 8:15 p. m.—"The National Horse Show," John McE. Bowman.

WEAF-NEW YORK CITY-492 6:45-7:45 a. m.—"Health Exercises," to WEAF, WEEI, WCAP.

6:45-7:45 a. m.—"Heafth Exercises," to WEAF, WEEL, WCAP, 11-12 a. m.—"Housewives Hour"; speak-ers, music.
12:noon—Market and weather reports,
4:15 p. m.—Charles Phillips, pianist.
4:15 p. m.—Alma Wesstrom, soprano.
4:30 p. m.—Charles Phillips, pianist.
4:45 p. m.—Talk.
5 p. m.—Talk.
5 p. m.—Talk.
6 p. m.—Wid-week services: Federation Quartet; address by Rev. Arthur Bruce Moss.
7:30 p. m.—Serenaders.
8 p. m.—'The Larkinites."
8:30 p. m.—'Touring," George Cooley.
9 p. m.—Address by Secretary Hoover before the Fourth Annual Radio Conference.
9:30 p. m.—Music.
10 p. m.—The "Zippers."
11-12 p. m.—Vincent Lopez's Orchestra.
WGBS—NEW YORK CITY—316 p. m.—Instrumental trio.
10 p. m.—Moe and Joe, popular dittles.
10 p. m.—Morris Wager, songs.
10 p. m.—Penndashery Collegians.
10 WGY—SCHENECTADY, N. Y.—380

WGBS—NEW YORK CITY—318

10 a. m.—Timely talks with Terese.
10:10 a. m.—Don Clark's "Song Factory."
10:20 a. m.—Furniture talk; songs.
1:30 p. m.—Scripture reading.
1:35 p. m.—Rosalle Blanchard, Walter Croft, duets.
1:40 p. m.—Leonard Garfunkle, pianist.
2 p. m.—Nat Katy's Orchestra.
3 p. m.—"Woman in the Home."
6 p. m.—Uncle Geebee.
6:30 p. m.—Pearl Smith, animal interpretations.

6:40 p. m.—"What the World Is Doing." 6:40 p. m.—"What the World Is
7 p. m.—Harry Voltaire hour:
8 p. m.—Dance orchestra.
8:30 p. m.—"Fiji Islands," Walter Aller 8:50 p. m.—Elizabeth Baumann, soprano.
9 p. m.—Paul Edwards, tenor.
9:10 p. m.—Elizabeth Baumann, soprano.
9:20 p. m.—Jack Wehrlen, Paul Edwards.
9:30 p. m.—Y. M. C. A. program, Glee Club.

10 p. m.—Norman Secon, planist. 10:10 p. m.—Paul Lowenkron, violinist. 10:20 p. m.—Norman Secon, planist. 10:30 p. m.—Arrowhead Orchestra.

6 p. m.—Dinner music. 7 p. m.—Market high spots. 7 p. m.—Market high spots,
7:10 p. m.—Dance program.
7:30 p. m.—Police alarms.
7:35 p. m.—Police alarms.
7:45 p. m.—Haskell Proper, saxophone.
8 p. m.—'Football,'' John B. Foster.
8:15 p. m.—Samuel Gray, barytone.
8:30 p. m.—Gedney and Magee, banjoists.
9 p. m.—Samuel Gray, barytone.
9:15 p. m.—New York Zither Trio.
9:45 p. m.—Harold Lieberman, violinist.
10:10 p. m.—'Trend of the Times.''
10:30 p. m.—Police alarms; weather.

WHN-NEW YORK CITY-361 12:30 p. m.—Lexington organ recital. 3/15 p. m.—Lexington Orchestra. 6:40 p. m.—Sunshine talk, Billy B. Van. 7 p. m.—Iceland Orchestra.

6:40 p. m.—Cuand Orchestra.
7 p. m.—Iceland Orchestra.
7:30 p. m.—Music.
8 p. m.—Oakland's Chateau Shanley.
8:30 p. m.—Guardian Entertainers.
9 p. m.—Jimmy Clarke's Entertainers.
9:20 p. m.—Old time songs.
10:30 p. m.—Kentucky Orchestra.
11 p. m.—Swanee Orchestra.
11:30 p. m.—Rodeo Orchestra.
12 a. m.—Ted Lewis's Orchestra. WRNY-NEW YORK CITY-259 10:30 a. m.—Reducing Exercises. 10:45 a. m.—Mrs. Rose Berry, "Paint-

10:45 a. m.—Mrs. Rose Berry, "Painting."

11 a. m.—"New Books."

11:16 a. m.—"Musical Courier Says"—

12 noon—Trinity six-hour of music.

4:15 p. m.—Afternoon program.

7 p. m.—"Whose Birthday To-day?"

7:05 p. m.—Telegraph sportflash.

7:15 p. m.—Commerce of the day,

7:20 p. m.—Chef Cretaux chats.

7:30 p. m.—Geoffrey O'Hara, songs.

7:45 p. m.—Dr. George J. Fisher.

8 p. m.—Concert Orchestra.

8:30 p. m.—Radio questions and answers.

8:45 p. m.—Life's jokes.

8:30 p. m.—Rauto questions and answerse,
8:45 p. m.—Life's jokes.
9 p. m.—Talk, Estelle Sternberger,
9:15 p. m.—Lorna Lee, songs,
9:30 p. m.—Essays (g. philosophy,
9:35 p. m.—Bill Riets, songs,
145 p. m.—Resta Crowell's Classic 7.45 p. m.—Resta Crowel Theater. 10 p. m.—Volga Trio. 11 p. m.—Radio Art Theater.

WMCA—NEW YORK CITY—341
6 p. m.—Olcott Vall's String Ensemble.
6:30 p. m.—Robert Soffer, planist.
7 p. m.—Ukelele Hob McDonald.
7:15 p. m.—Lecture program.
7:30 p. m.—Lanson's Orchestra.
8 p. m.—'Hale and Hearty.''
8:30 p. m.—Alexander Dellerson, barytone. tone.

8:45 p. m.—Idalia Hare, soprano.

9 p. m.—Alexander Dellerson, barytone.

9:15 p. m.—Idalia Hare, soprano.

9:30 p. m.—George Kohlmeirer's Orches-

10 p. m.—"How to Drive Automobiles," 10:05 p. m.—George Kohlmeirer's Orchestra.
).10:30 p. m.—Dr. Carl Tannert, cellist;
Frederick Seifert, barytone.
11 p. m.—Ernie Golden's Orchestra. WFBH-NEW YORK CITY-273

WFBH—NEW YORK CITX—278

2 p. m.—Sextet.
3 p. m.—Johnny Gerhardt's-Orchestra.
4 p. m.—Radiovues, Mrs. Owen Kildare,
4:30 p. m.—Billy Cohen's Hottentots.
5:30 p. m.—Wolly Endriss, contralto.
5:45 p. m.—Wurray Schwartz, planist.
6:15 p. m.—Helen Muller, songs
6:30 p. m.—Helen Muller, songs
6:30 p. m.—Helen Muller, songs
7:00 p. m.—Health Talk, Dr. H.
Rubin.
7:35 p. m.—Paul Epps's Revelers.
WINTY—NEW YORK CITY—288

WLWL-NEW YORK CITY-280 WLWL-NEW YORK CITY-288

9 p. m.—Lotta Madden, soprano.,
9:10 p. m.—WLWL Trio.
9:20 p. m.—James J. Byrne, bass.
9:30 p. m.—Talk.
9:45 p. m.—Lotta Madden, soprano.
9:35 p. m.—WLWL Trio.
10:05 p. m.—James J. Byrne, bass.
10:15 p. m.—'Marriage and Divorc Mgr. McMahon.
10:35 p. m.—WLWL Trio.
10:35 p. m.—WLWL Trio.
10:50 p. m.—Organ recital.
WOKO—NEW YORK CITY-288

WOKO-NEW YORK CITY-280 8:15 p. m.—Bertha Pinco, soprano, 8:35 p. m.—Charles Reed, tenor, 8:50 p. m.—Blilly Inleedd, planist. 9:10 p. m.—Dance orchestra. WKCB-BROOKLYN-240

WBBR-STATEN ISLAND, N. Y.-27 8 p. m.—Instrumental trio. 8:10 p. m.—Barbara Jonasch, sopran o. 8:20 p. m.—Sunday-school lesson. 8:40 p. m.—Barbara Jonasch, souran o. 8:50 p. m.—Instrumental trio. WAHG-RICHMOND HILL, N. Y .- 316

(Continued on next page)

Robert Powers's Dance music Kohlmeler's Joe Ray's McEnelly's Arrowhead Dance music Ben Glaser's Meyer Davis's Ernie Golden's Vincent Lopez's Ted Lewis's WJAR WOKO WMCA WEP WBZ WGBS WHN WJZ WMCA WEAF WHN Lehigh Dance music M. Whiteman's Roseland Hildenbrand's Billy Wynne's Dance music Glenn Smith's J. Knecht's Archie Slater's Dance music Ben Bernie's Cammus FRIDAY, NOVEMBER 13 Recreation Eisenbruth's Dance music Dance music Dance music Secenaders

World Radio History

Ridgely's

Connie's Charles Kerr's

Paul Specht's
Vincent Lopez's
Mayflower
Arrowhead
Dance music
Harry Ash's

Dance Orchestras for This Week

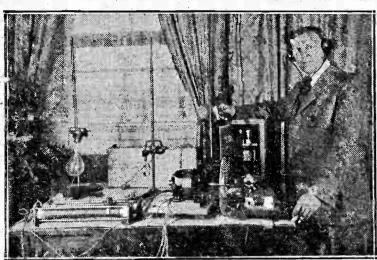
Engineers Tussel

College Prof. Makes Electron Sing for WGY's Radio Audience

illustration, a photo-electric cell was by uncovering all four rows he seconnected to the broadcast circuit, cured notes of good organ quality.

physics at Union College, when he introduced the radio audience of with twenty-four holes. By covering first the inside with the elements to send forth the carning of the electron.

With the elements to send forth the carning of the electron of the sensitive microphones a matter of course. Frequently in broadcasting outside events rain, group of bells, the largest of their were not enough to fully protect the were not enough to fully protect the sensitive microphones and deflected the wind. But there were not enough to fully protect the sensitive microphones are matter of course. Frequently in broadcasting outside events rain, group of bells, the largest of their were not enough to fully protect the sensitive microphones and deflected the wind. the fourth of a series of talks on row and then the last-he produced As shown in the accompanying rows he obtained two notes, and then For the construction of an organ



Dr. Peter I. Wold using his apparatus for making electrons sing. At right is the photoelectric cell and left is the light. At rear is the amplifying unit.

forations was placed between the cell, the ingenious experimenter would and a light source. The photo-elec, need only to have rotating discs with tric cell is coated on its inside sur- rows of holes of the right numbers face with metal potassium, which is and arranged so that the light could very sensitive to light. At the center pass through the holes to the photoof the cell is a plate of tungsten. electric cell. Any row or combination A battery of 135 volts has its nega- of rows could be uncovered by small tive terminal connected to the potas- slides operated from a keyboard, and sium coating and its positive termi- the loudness of the notes might be nal to the tungsten plate. When light controlled conveniently by regulating falls on the potassium coating electithe brightness of a lamp. A loud trons are given off and travel to the speaker could be used to convert tungsten plate, thus constituting a the electrical vibrations into sound current. By means of a motor the vibrations. One of the important features of the photo-electric cell is disk with circular rows of holes was rotated between the light and the that it is practically instantaneous cell. When the disc was revolved in its action. It does not require slowly a low-pitched note was given time to build up, as in the case of off, rising gradually as the speed of some other electric musical instrumen'ts.

"Roxy" With New Members | A Short Wave Broadcasting His "Gang" on Wednesday "Roxy and his Gang" will be heard

during the coming week on Wednesday night from 9 to 10, to be broad- Insurance Company at Hartford. cast by WEAF and a chain of stations direct from the studio at 195 Broadway, New York City.

"The Gang," many of whom are members of the old group, such as signals from 1XG at 5 o'clock the Doug Stanbury, "Gamby," Frank morning of August 26 at the time Moulan and Florence Mulholland, has the IXG was calling a man down in been augmented by many new entertainers, including Duke Yellman and his orchestra, Jack Oakley, barytone; eseph Wetzel, tenor; Adrien da Silva, tenor; Max Terr, accompanist; Olive and nuts is recommended for fixed Cornell, colorature soprano (formerly condenser connections. a member of the WEAF Grand Opera Company); Phoebe Crosby, soprano; Jessica Dragonette, soprano; Frederic Fradkin, violinist; Joseph Stopak, violinist: Geoffry O'Hara, noted

singer-composer, and others, Beginning Thursday evening, No vember 26, "Roxy and his Gang" will be heard regularly through WEAF and a chain of stations.







The possibility of creating a new musical instrument by utilizing the photo-electric effect was brought out by Dr. Peter I. Wold, professor of the third with thirty and the inside whysics at Union College, when he with the other photoses and the photo-electric effect was brought out by Dr. Peter I. Wold, professor of the third with thirty and the inside with the elements to send forth the photoses at Union College, when he with the elements to send forth the listener takes as Church or reat precautions had to be when he with the discontained four rows of holes. Although the average listener may the church bells has been found to be the most satisfactory place for the microphones. In the case of the premier broadcasting of the new with the elements to send forth the carrying blankets, coats and other which the listener takes as Church or reat precautions had to be the major chord. By uncovering two

Station Heard in Australia

1XG, the experimental and short

wave station of WTIC, the Travelers

Conn., has been heard in Australia.

Ernest J. Lord, of Bowen Hills, Bris-

bane, Queensland, Australia, owner

and operator of A-2SL, picked up

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Brownsville, Tex.

unpleasant sound to be transmitted. ments did their work.

With Elements to extraneous noises enter into the placing of the "mics" was a dan-Broadcast Chimes practically all of the broadcasts of After the microphones had been bells thus far attempted the roof of placed the wind howled around the Although the average listener may the church beneath the tower which diaphrams, keeping up a constant achail and even the wind has to be kind in the world, are hung in a "mics," so they shed their overcoats considered. Recently, when broad- tower, the smaller bells at the top and added them to the pile of procasting the carillon of the Park Ave- and the heavier lower down, where tecting cloth and the broadcast went nue Baptist Church, the engineers a firmer foundation is found. Plac- on. And so the next time you sit were nearly swept to their deaths ing the microphone was a big probfrom the roof of the church when lem. High in the tower only the favorite program give a thought to attempting to place several micro higher pitched bells registered with those who toil to make all this phones there to pick up the sound the heavier tones in the background. possible, and be a little more thank-At a lower level the rumble of the ful for your radio set. Any broadcasting of bells is a deep bells monopolized the microdifficult engineering feat, for the rea- phones with the higher bells jingling son that if the microphones are in the background. Again the roof placed too near the bells the vibra- of the church proved to be the solutions of the clappers will cause an tion, and here was where the ele-

On the other hand, if the microphones On the night of the first broad-tions.

(are placed too far from the chimes | cast an eighty-mile an hour gale or carillon, as the case may be, swept the roof of the edifice, and the broadcast and ruin the effect. In street awaiting a single misstep.

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ATWATER KENTModel 20 less \$80 RED SEAL 26c DRYCELLS 26c

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THE NEW YORK HERALD NewDorkswiesTribune RADIO MAGAZINE

SECTION TWELVE

SUNDAY, NOVEMBER 15, 1925

Radio Problems Discussed at Capital

Sec. of Commerce Summarizes Fourth Conference Recommends **Work of Committees Important Changes**

By HERBERT C. HOOVER*

66 TY E have just completed the Fourth National Radio Conference in Washington. As I have been the chairman of that conference, I have been requested to report the results of the conference to the radio listeners, for you are the people most vitally concerned in its conclusions. You, the listeners, were represented at the conference through listeners' clubs in different parts of the country and through the radio press, who to a great degree reflect your views. The conference also included representatives of the broadcasting stations; it included representatives of the manufacturers of equipment; it included representatives of many government departments, that is, the army, the navy, agricultural, postoffice, the merchant marine and the Department of Commerce; it included representatives of neighboring for-

eign governments. Some 500 men and homes and business fairs in all parts f the country to and three days in hard work, searching for solution of

ect of this whole three-day conference was interference. In the practical terms of the listener interference is the different howls, growls, noises and whistles that come along with

programs. We know from the experience of the last few years in this new art that many of these noises can be done away with, but the doing away with them takes us into a dozen varied difficult fields. It involves questions of legislation by Congress to further control the traffic in the ether. It involves treaties with foreign governments to eliminate interference of code signals from their ships at sea and to co-ordinate the broadcasting in foreign countries with our own. It involves many complicated and complex questions in the operation of broadcasting stations. It involves co-operation from the electric light and power companies, that electric currents will not go astray. It involves co-operation of the listeners themselves that they shall keep their own receiving sets so that they do

sets, and thereby disturb their neighbors. "All radio listeners know that messages over the radio are carried on a specific wave length. They also know that there is only a certain band of these wave lengths from about 200 to 650 meters which can be used for telephone broadcasting. Many of you, perhaps, do not realize the enormous amount of commercial and other radio work that is carried on outside of the broadcasting band.

not occasionally make them into sending

"But in the broadcasting band there are only a certain number of paths over which broadcasting messages can travel from the station to the ears of the listener; and only one of these paths can be used by one station at one time, unless they are a long way apart. Some of these paths are used by our neighbors in Canada for Canadian stations, and ours have come to be an integral part of a single network. To speak in actual figures for all the broadcasting in the United States there are practically eighty-eight wave

'An address delivered November 12, 1925, at Washington D. C., through the stations of the American Telephone & Telegraph Company, and the Radio Corporation of America.

By EDGAR H. FELIX

TTACKING with marked courage and decisiveness the complex problems now facing radio broadcasting, the Fourth Annual Radio Conference, held in Washington last week, formulated the basic principles upon which the development of the art shall be founded. Briefly, it advocated heroic measures to reduce the number of broadcasting stations, it established the basic principle that public service and not private ambition shall determine the extension of the broadcasting privilege, it condemned the manufacture of radiating receivers, it deprecated the use of radio broadcasting for direct advertising, it recommended the removal of broadcasting stations from congested districts and it defined a sound principle upon which the differences between holders of copyrights and broadcasters may be settled.

ing before the Department of Commerce over 175 applications for new licenses. . . Heretofore it has been possible to duplicate channels geographically to a large extent among those using 500 watts, but, with the increase of power, this system becomes more and more difficult, for the borderland of interfer-

ence is wider spread. ... It is a physical fact that we have no more channels. It is not possible to furnish them under the present state of

technical development. It takes no argument to demonstrate that eighty-eight wave lengths (and no more are available) cannot be made to serve innumerable stations, no matter how ingenious we may be in arranging time divisions and geographical separations."

The recommendations of the committee on operating regulations, under the chairmanship of Major General Charles M. Saltzman, which grappled with this problem, were accepted with almost entire unanimity by the conference. The committee reported "that the band of frequencies now assigned to broadcasting is overcrowded, causing serious interference. Therefore, the committée recommends, in the interest of public service, that no new stations be licensed until, through discontinuance, the number of stations is reduced and until it shall be in the interest of public service to add new stations." As a substitute for the doctrine of "free-

dom of the air." under which licenses were granted to all who applied, until the present congested condition of the ether arose, the committee formulated a new doctrine "that public interest, as represented by service to the listener, shall be the basis for the broadcasting privilege." As a precaution to prevent the erection of stations for which there are no wave lengths available, a resolution was adopted by the conference requiring a permit from the Department of Commerce before actual construction is begun. Representatives of several such stations, erected despite warnings from the Department of Commerce that there would be no wave lengths available for their use, made impassioned pleas before the conference, pointing to the injustice occasioned by the fact that their large investment in broad-

Photograph by Pacific and Atlantic Hon. Herbert C. Hoover broadcasting his address at the close of the 4th annual National Radio Conference from his office in the Chamber of Commerce of the U. S. Building, Washington, D. C. Perhaps no single problem received

erable conditions of overcrowding now dis-

turbing broadcast listeners. In the words

of the Secretary of Commerce, within

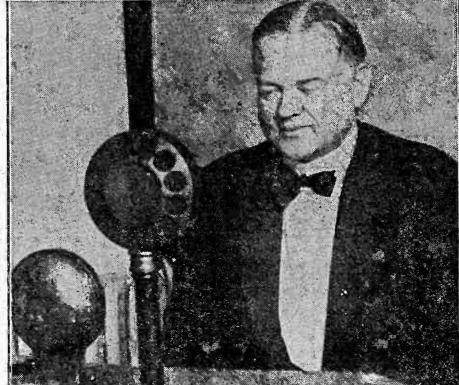
whose jurisdiction all problems of radio

communication lie, "of the 578 stations 197

are using at least 500 watts of power, and

(Continued on page four)





lengths which can be used at the present development of the art, and we now have greater attention than the present intolnearly 600 broadcasting stations clamoring for their use.

"The air to-day is overcrowded. And even worse, we are faced with the desires

(Continued on page four)

Collecting a Bogus Note Via Radio

By Using His Radio "Invention" J. Y. Hampton Collects What Was Thought To Be a Worthless Obligation Thirty Years After It Was Issued

By C. K. THEOBALD

The first installment of this story told how Aleck Smartley robbed J. Y. Hampton of \$3,000 by plying him with liquor and then giving him a bogus note for his money. After this incident Smartley was not heard from until thirty years later, when George Hampton found him manufacturing radio apparatus in Chicago. As the note was of no value, Hampton planned to extract \$3,000 with interest at 10 per cent from Smartley by some other means. He and his son went to Chicago and assumed the names of J. Yerger Jamison and S. S. Smith. Jamison established himself as a patent lawyer and Smith obtained employment with Smartley and ted the latter to believe that he had invented a non-static receiver.

This installment of the story starts with Smith about to demonstrate his invention to his employer and patent

MITH led his companions up a creaky flight of stairs, then along a mustysmelling hall to the rear of the building, where he opened a padlocked

"This is my shop," he explained, relocking the door when the three had entered the room. "And this," he added proudly, pointing out an instrument on a table in the middle of the room, "is my non-static radio receiver.'

The instrument referred to, as Smartley and the patent attorney viewed it, was not out of the ordinary, and the set was externally connected to a loud speaker of popular make. But most unusual was a silvery looking ball, probably six inches in diameter, suspended in the aerial just above the instrument. The entire surface of the sphere was thickly studded with small, round-head projections, resembling a ball of yarn made into a pin cushion.

"It's the ball that does the trick, gentlemen," the inventor announced with pride. "That and what's inside of it-together with a peculiar circuit within the set. And now," turning to Smartley, "we'll hook up your set first, on the table here, by the side of mine and compare the reception of the two instruments."

Smith at once proceeded to make this "hook-up," removing the aerial and ground wires from his own instrument and connecting them to Smartlev's.

"I'll remove the silvered ball now," he explained, speaking rather more to the patent attorney, who had just completed another spell of coughing, than to Smartley. "The ball, as you know, Mr. Jamison, is the static collector and will not function on Mr. Smartley's set without changing the interior circuit. And now," to Smartley, who stood willing to be convinced, "you had better tune in yourself. being familiar with your set."

"Little chance of picking up anything on such a night," Smartley complained, though he sat down graciously enough for one of his importance, and began to tune in.

The static was worse than bad. It was deafening. However, after considerable and patient manipulation of the dials, Smartley reached a point where he could bring in Zion City and Memphis at will. But such popping and cracking and spluttering was there, that the sacred music in Zion City was much like the jazz band from WMC. He tried a few more stations, with no better results, and finally gave up in disgust.

"That was good, Mr. Smartley," Smith confront you." encouraged, "considering the weather. Now let's see if I can do any better on my set." He was expertly changing connections from one set to the other as he spoke. Smartley the while trod in a complete circle around the instrument, it. specting it from all angles, but it gave out no secrets. J. Yerger Jamison, his cough having subsided as his expectation arose, followed Smartley's lead.

The Invention Works

At the first turn of the dial when Smith began to tune in the silvery sphere above his instrument became alive with miniature lightning, the vivid little flashes silently chasing one another in zigzag fashion around the globe.

"There's your static, Mr. Smartley," Smith explained with a knowing smile.

He moved another dial and there issued from the loud speaker a slight grating noise, followed by a violin solo that came in as clear as a bell. Now he brought in half a dozen other stations in as many minutes-lectures, jazz, bedtime stories, instrumental and vocal selections, all under perfect control. Here was real reception, the like of

which Aleck Smartley had never heard before, though Mr. Jamison seemed to take it as a matter of course. No squeaking, no howling, no crashing from static, even with the incessant flashing of lightning outdoors. Moreover, there was no interference when Smith, by way of experiment, turned on a high-tension sparkcoil within a few feet of the instrument.

"Do I win?" Smith shut off the dials and looked from Smartley to Jamison with a what-did-I-tell-you air of self pride.

"You do," Smartley admitted, "and I. like to make arrangements with you to finance the invention."

"I'd like to get in on it myself if I had the money and the ethics of my profession did not forbid it." Mr. Jamison concluded this interjection with another brief period of coughing.

"I appreciate your offer," Smith replied, addressing Smartley, "but I have promised George Ogle to give the Consolidated Radio Association first considera-

Aleck Smartley was plainly disturbed in mind, though he held a poker-playing face. Here, he thought, was a fortune before his eyes and about to slip through his fingers. Without a doubt C. R. A. with their millions behind them, would gobble up this invention without undue loss of time. As yet the device had not seen the patent office, and this emaciated J. Yerger Jamison had in his possession all data pertaining to it—even the rough sketches and the first conceived ideas of

Smartley Puzzled

Smartley could not fathom the principle of the thing, the remarkable performance of which he had just heard. Even though he did know the secret and should steal the idea, he must first be able, in the event of future litigation, to show first conception of the device. He must obtain those papers, and he thought he saw a way: he recalled the incident of Jamison's thievery in the drugstore downstairs, and his own experience in knavery placed him in a good position to believe that a man who would steal a little would

In their drive back to the city, Smith having been left at home. Smartley took immediate opportunity to feel his companion out.

"Incky dog, this Smith, eh. Jamison?" he led off with. "He'll make more out of I My proposition is simple: I have learned this invention than you and I could accomulate if we had several more lives

"I'll say he's lucky. Here am I, sixty, broken in health and should have sufficient money to retire on, when along comes a man who will pay me in fees a few paltry dollars to help make him a millionaire at thirty. But so it goes!" And Mr. Jamison coughed out a sigh.

"Perhaps," Smartley suavely suggested, you, like most of us, have not taken full advantage of your opportunities or you do not see your opportunities when they

"Meaning just what, Mr. Smartley?" From the tone of Jamison's voice. Smartley felt that he could safely make a hold suggestion. "I mean." he asserted that opportunity is knocking at your door this very instant—and at mine. Why should you not make more than your fees in this particular instance, when you have the power to put me in control of Smith's

Just here Mr. Jamison took occasion to ough more severely than ever. "I don't quite see this fortunate turn of affairs confronting me," he equivocated, when he had again caught his breath. "It would have to be a fifty-thousand-dollar opportunity to enable me to retire. I am open to a proposition involving that amount of money, which I will be glad to have you moments with a handful of papers.

after supper, in my office. Just now I think I had best get out of this wet weather, if you will be good enough to drive me to my rooms."

The following morning, in his office, Aleck Smartley felt that he might well congratulate himself on having so shrewdly discovered that Jamison was open to a shady proposition. Also, he felt entitled to two drinks of pre-war liquor instead of his customary one. Then he went through his mail, to discover another letter addressed to S. S. Smith. He lost no time in slitting the envelope.

"My dear old chum:" Smartley read, "it is a great pleasure to inform you that C. R. A. is so favorably impressed with your invention that I have been empowered to enter into negotiations with you for an outright purchase, with royalty remunerations attached. We can do nothing, of course, until you have applied for patents, and I will be in Chicago next week to give you all necessary aid in this

"Sincerely your friend,

"George Ogle." Once again Smartley took a drink of whisky to his own success, this time on having been lucky enough to intercept this important bit of news.

"This is Tuesday," he reflected, "and this George Ogle will be here next week -possibly Monday. I must get busy and bring matters to a quick close with Jami-

Jamison and Smartley Plan

When Smartley arrived at Jamison's office that night he found the door closed and he began to fear that the patent attorney may be too ill to keep his appointment. His fears were groundless, however, for after the lapse of half an hour his quarry came coughing down the cor-

The usual commonplace greetings over and the office door locked behind them, Jamison conducted his guest into a disorderly little room, the door of which was marked "Private." When they were seated near a large table littered with drawings, letters, small models and what-nots. Smartley plunged at once into the matter n hand.

"We were speaking of opportunities last night," he began, "and now we" "We are just a pair of crooks," Jamison curtly interrupted, much to his confederate's surprise. "Let us be plain.

There is no longer any need to chase the devil around a stump. You intimated last evening that you desire control of Smith's invention. I need money to regain my health: you want fame. State your proposition briefly and plainly."

"My dear Jamison!" Smartley effused, 'you're a man after my own heart. I see from Smith that you are in possession of the secret of his invention, including all drawings, sketches and certified dates of his first conceived ideas. These documents will be worth to me-er-thirtyfive-thousand dollars," with which he had his wallet half way from his pocket.

Jamison waved the purse aside. "Not so fast, Smartley," he said. "We have met here for the express purpose of stealing Sam Smith's invention, and I don't propose to have you steal fifteen-thousand dollars from me. Particularly not when the invention will be worth millions to you. I told you last evening that I could not retire on less than fifty thousand. If you are not prepared to give me that much in cash-no incriminating checks," he declared with unmistakable determination-"I do not care to waste any more breath on the subject.

Smartley waited impatiently until the disturbance had subsided. "I did not quite understand," he lied glibly, "that fifty thousand would be your price. But I happen to have that much with me. I'll give it," he agreed reluctantly, for he had found it necessary to borrow beyond his means that morning in order to raise the amount.

"Then I can afford to waste more breath." Jamison continued. He arose and went to the safe, returning in a few

"Last is as near as it will ever get to explain later on say, to-morrow evening "These sketches and drawings," he explained, handing the package to his fellow conspirator, "are Smith's first conceived ideas of his device. Look them

Smartley Ohtains the Papers

Smartley spread the papers on the table and examined them carefully, noting that each and every sketch and all descriptive matter had been properly witnessed and sealed with the signature of

"With these documents destroyed," the patent lawyer informed, "Smith wouldn't stand a ghost of a chance in a lawsuit to establish his rights.

"Simple as A B C," Smartley averred, though he did not quite understand it, "but I never would have thought it possible if I had not seen and heard it last

"Simplicity is the backbone of all great inventions," said Jamison. "And now"he paused to gather up the documents from the table and slip a rubber band about them - before I hand you this in exchange for your money I want to give you some advice, which is part of every service I render my clients. First, fire Smith. Do this as soon as he comes to work in the morning. Give him a month's pay instead of notice. Let your other employees know—all of them—that you have discharged him because he has been trying to steal a valuable radio invention on which you are working. You can realize that this would prove of much value in court should future litigation arise, which event I do not at all anticipate. Secondly, make copies of Smith's invention—and make them with your own hands. Have some crooked notary—you should know best where to buy one date your copies prior to Smith's, and have him properly, however wrongly, sign and seal them. Then immediately destroy Smith's documents. Next, board the fastest train you can catch for Washington and hire the best attorney you can find there to rush your official drawings into the Patent Office. This done, you can make your model and be sitting pretty

Not once from the time he had first surreptitiously opened S. S. Smith's letter until the present psychological moment did Aleck Smartley entertain any doubt but that he was well on the way to fame and fortune. He had seen revealed in the sketches which this dishonest patent lawyer had just shown him the simple secret of a remarkable radio device. True, he did not understand it, but he had radio experts in his employ who would.

Reasoning thus, Aleck Smartley did not hesitate to hand over to J. Yerger Jamison \$50,000 in good United States money and receive in return a packet of papers which would, he felt sure, soon material-

A few hours later J. Yerger Jamison and S. S. Smith, both previously and properly christened Hampton, were comfortably seated in the smoker of a southbound passenger train, leaving the Windy City behind them at the rate of fifty miles or so an hour.

"Here is something I overlooked, George, in our coup with Smartley," John Hampton remarked with a sigh of mock regret, tendering his son an open letter. "I forgot to mail it in Chicago. Read it," he requested. "It's the last letter that the late J. Yerger Jamison ever wrote-and probably ever will."

"My dear Mr. Smartley," the erstwhile inventor read, "I trust you will pardon my oversight in overlooking last evening some very important details concerning the non-static radio receiver. I can only blame my negligence on the distressing state of my health, which now, thanks to the magic power of sudden wealth, I have quite fully and permanently regained. It is a pleasure to give you this tardy information now.

"To function best the receiving set should be electrically connected to a highgrade phonograph. The foud speaker. though apparently connected with the receiving set, is really in direct electrical contact with the talking-machine adapter. "I must not forget to mention that the

(Continued on page six)



Six models, including console units \$12 to \$42.50. Write for "Amplior edigree" and dealer's address. THE AMPLION CORPORATION OF AMERICA Kurz-Kasch Aristocrats







The choice of the big majority of leading set manufacturers. Write for folder of complete line. For sale by leading dealers.

The Kurz-Kasch Company Largest Exclusive Moulders of Bakelite Dayton, Ohio

Don't Miss This-

Tune in on WMCA at 10.30, Sunday Evening Bernays Johnson Daven Orchestra Something new in Radio



Exchange anything in Radio Daddy's Only Son."

New Reproducing **Device Presented** At Aeolian Hall

Before a distinguished audience of ientists, musicians and men and vomen prominent in society, the panatrope, a new musical reproducing instrument which is said for the first time to utilize the electrical principle of reproduction of sound, which involves radio principles, was esented at Aeolian Hall Wedneslay, November 11, at 4 o'clock. The panatrope has been perfected by scintists of the Radio Corporation of America, the General Electric Company, the Westinghouse Electric and Manufacturing Company and the Brunswick-Balke-Collender Company. Dr. Goldsmith, who spoke to the udience, described the instrument as "The mechanical method of phono-

graph recording has been superseded the panatrope by electric recording. Here an entirely different method used. The singer stands in front of a device which is analogous to the inest broadcasting microphones. This extremely accurate telephone transnitter produces electric currents which are amplified by vacuum tubes like those in a radio receiving set and the final output of these vacuum tubes operates a most precise cutting tool which makes the master record. Note the absence of the sound-distorting horn and the fact panatrope system.

month of the reproduction as used in the panatrope system.

"On the reproducing end of the panatrope there are used entirely new devices. In the mechanical phonograph we have had what was known as a sound box and a horn. The sound box and a horn. The sound box has a diaphragm or a sheet of thin material which is vibrated by a lever attached to a needle which rests in the record groove. All the energy for vibrating the diaphragm passes through and is influenced by the horn. Even the best of horns is not omnitonal nor equitonal. And the volume of sound which can be reproduced in this way without serious distortion is limited.

"In electric reproduction, as used in the panatrope, a very different process is employed. There is no to good."

Here is how the Brooklynite has achieved a wonderful reputation for his achieved an wonderful reputation for his achieved a wonderful reputation for his achieved in this same offe "On the reproducing end of the thing is not so good."

the modern radiotrons. In most of tubes is fed into a remarkably loud speaker of the free-edge cone type. It is a device which is much more nearly omnitonal and equitonal than the horns, and which has the nossibility of producing a tremendous volume of sound.

"In electrical reproduction cound therefore we do not depend upon the record to supply the energy o produce the sound, but we leave that (as we should) to the nower plant, or the batteries. And all the anahilities of modern amplifiers and oud speakers for the production of high-quality music of any desired six days a week is in use at the King volume are here utilized for the first Quality Products radio plant at

"By the Light of the Silvery Moon" ing broadcasting. and "Dear Old Rose," two old time At the King plant it is necessary and nine other stations (WEEI, WFI, of the King laboratories, built WCCO, KSD).

Use the Radio Exchange Col. Own Backyard," two old "mammy"

275 Meters Is the Most Popular Wave

More radio broadcasting stations are operating on 275 meters (1090 Kc) than any other wave length. There are twenty-six in all. One has a power of 5,000 watts, twelve have a power of 500 watts or more and thirteen use less than 500 watts. The most powerful station of erating on this wave length i

WORD, the People's Pulpit Asso ciation, Batavia, Ill. The lowest power station is WOCL, the Hotel Jamestown, Jamestown, N. Y. which has a power of 15 watts. Stations operating on 275 meters are located in twenty-one different states. Louisiana has three stations operating on this wave length, and New York, Pennsylvania and Illinois each has two stations. The remaining seventeen states have one station each. The next most congested wave

length is 250 meters (1200 Kc), on which twenty-four broadcasting stations are operating, five of which employ 500 watts or more.

Brooklyn Radio Fan Solves DX Problem

one of the most embarrassing prob- the active public service electric comlems that confront proud owners of panies which have volunteered to

de luxe receivers. It is one of the mysteries of radio that the energy for cutting the record that fifty stations might come rolling no longer comes from the voice of in one night and the very next evethe singer, but on the contrary from ning reception at any great range the electric generators or batteries is unsatisfactory or quite impossible. feeding the vacuum tubes. Every one This circumstance is not the fault knows how perfect such a system of the apparatus or the operator in an be from our experiences with most instances. It is due to atmosigh-grade broadcasting stations. pheric conditions and applies more Electric recording; therefore, is the to the summer than the winter. Howonly suitable method of making ever, even in the winter many nights sound records for public use, and the are a great deal superior for DX electrically cut record represents an than the average. "And," the fans entirely new grade of performance. hum in chorus, "those are the nights So much for the recording end of the the neighbors aren't here to listen to the radio! When say come every-

This is his secret:

Select a test station about 800 about 800 to 500 miles away that is consistently secret, the needle resting in the record groove actuates a tiny strip of metal in what is known as the electrical pick-up, a small device inclossing the needle holder. The vibrations of a metal strip produce electrical currents, which then pass through a powerful vacuum tube amplifier using the needle holder. The vibrations of a metal strip produce electrical currents, which then pass through a powerful vacuum tube amplifier using the needle holder. The vibrations of a metal strip produce electrical currents, which then pass through a powerful vacuum tube amplifier using the needle holder. The vibrations of a metal strip produce electrical currents, which then pass through a powerful vacuum tube amplifier using the needle holder. The vibrations of the vibration about 800 perting cells as well as other material for supporting cells as well as other material for simple with four follows. Spage folder of simple complete instructions, written by the originator, beautifulary powerful vacuum tube amplifier using to forty other stations by midnight or before. Then I phone the growd. these instruments the entire ampliand they troop in to hear, probably these instruments the entire amplifier is operated from alternating current from the house lighting supply.

The amplified output of the vacuum

The amplified output of the vacuum output of the vacuum output of the vacuum output o I hear these stations and others every night, but unless they come in extra stockage Batteries Carried in volume I cannot thrill the folks, and so I do not ask them around until KDKA is whisking in—and, of course, with the DX season on that happens about six nights a week! FOR \$6 you can build a GOOD "B" Ellim mater for A. C. Complete instructions, \$ Ferrand, \$90 E. 26th St., Paterson, N.

"So get your test stations and see how it works in your part of the

Buffalo Has One of Smallest

Radio Broadcasting Stations One of the smallest practical broadcasting stations and one which works Buffalo, N. Y., and possibly duplicates of it are in use by this time in other Stay in Your Own Back Yard' localities. It was put in service to And Other Antiques Tuesday meet an insistent demand for morn

popular ballads of a decade or so to begin giving receiving sets their ago will be the numbers which the final tuning up early in the morning amous "revivalists," "Goldy" and before any of the large broadcasting "Dusty," have unearthed for their stations with their varied programs RADIO CABINETS and consoles mad half hour of entertainment on Tues- are on the air. To meet the difficulty day at 8:30 p. m., broadcast by WEAF Howard A. Gates, in charge of one WCAE, WGR, WWJ, WOC, WOR, miniature broadcaster, mounting it

WCCO, KSD).

From the repertoire of old Negro and ministrel senge they have chosen to an Phonograph for morning testing.

"Georgia Lullaby," "Stay In Your Own Backyard," two old "mammy" from 200 to 600 meters and a range songs which were written long before of about a black. However, this he days of Al Johson, and "I'm My Daddy's Only Son."

In the station has a wave length of With Tubes and Cabinet. 17.95 With Tubes and Cabinet. 20.95 (1.795 about a black. However, this trange is sufficient since the acrials of the King testing department are umn if you want to Buy, Sell or songs which were written long before of about a black. However, this the days of Al Jolson, and "I'm My range is sufficient since the acrisis

Since the installation of this baby dealers have been so impressed with the idea that they have built similar ones in order to give early morning A New Design Inductance Coil demonstrations as well as comparative tests of various receiving sets. recently heen produced by the Reich-An added advantage is that the hearer in a dealer's store may listen to both as the Doughnut Coil. The new coil the original matter being broadcasted. and its reception by the King set at Reichmann.

Radio Supervisor Thanks the

Arthur Batcheller, United States supervisor of radio for the second district, New York, has sent a letter

one of the first to engage in this place in a radio receiver where & important work and that your activituning inductance is required. ties in this connection have been voluntary, your main objective being that of rendering public service. The commendable and for two years I ing at the United States Patent have included in my annual report Office in Washington. A Brooklyn radio fan has solved the name of your company as one of take up this work.

to you my fullest appreciation of the generative set.

on the roof just above the final test | splendid work you have done in this broadcast listeners feel greatly inbroadcasting station several King debted for the good you have accomplished."

15

A new design of low-loss coil has mann Company, of Chicago, known was developed and designed by Frank

The principle it operates under is new to the radio broadcast field. The coil, which is wound in a rather pe-P. S. Co. of N. J. for Their Help culiar manner, is intended to confine all its magnetic lines of force in the field of the secondary coil included in the mounting. It is said the peto R. N. Conwell, transmission engi- culiar type of winding produces a neer of the Public Service Electric good radio of resistance to inducand Gas Company, a part of which tance and minimizes energy losses in inductance. It is also said the doughnut coil will not have to be placed which your engineers have had in at different angles to insure stable locating and terminating many in- and selective operation, because there terferences affecting broadcast recep- is no intercoupling between the coils tion. I believe your company was The new coil may be employed any

2000 Patent Applications work of your company is indeed most cations for radio patents now pende

Vernier for Detector Often a vernier attachment on the detector rheostat will add distance "I take this opportunity to express and clarity to the reception of a re-

Radio Exchange Rate, 40 cents a line. Ads. accepted until 12 o'clock

PHONE PENNSYLVANIA 4000

BUILD YOUR OWN "B" Battery. Nick and iron elements and all supplie Roberts, 1122 Myrtle av., Brooklyn.

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or any 3, 4 or 5-tube set for \$5.
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Enla-sets at special prices.
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Does Your Radio Give You Froubles.
S. LEVY—RADIO EXPERT,
will adjust your set and solve your
problems. Charges reasonable. Phone
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ELECTRODYNE CO., 2278 8d Ave., spe cializing Mica; By-Pass Condensers Harlem 2048. BATTERIES FULLY CHARGED, 856. Called for and delivered. Batteries rented and repaired Plaza 2089, Spencer Battery Bervice, 888 1st av. (50th).

INSPECTION, installations, repairs, in radio since 1808; reasonable rates. Mar-don, Dayton 1531, 1869 West Farms R& RADIO SETS, Parts and Jewelry bought and sold. King, 821 6th av. Bryant 8198.

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Radio panufacturers in need of financing or concerns desiring to increase their production can obtain additional apital. We are prepared to finance any radio

proposition of merit.
Thirty years experience enables us to give prompt service. Reasonable rates.
Consult us as to plan without obliga-STANDARD TRADING CO., Commercial Bankers, 191-493 Broadway. Canal 7849-7

Help Wanted

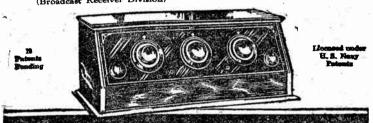
TRINITY SIX is the First Radio Set **Built by Production Engineering Methods**

Before Trinity Six could be offered to the public at the astounding price of \$50.00, our modern factory had to be equipped with special automatic machinery. There is not a single item (with the exception of one or two

small patented parts) in the Trinity Six on which you pay more than one manufacturing profit. That is one reason why, at \$50,00, Trinity Six is unequalled by sets costing \$100. Another reason is that elimination of dozens of hand-solder ing operations, with their possibilities of electrical trouble, also eliminates hand-labor costs, which make many sets expensive

Free booklet, "The Value Only Beacon Can Give," sent on request, gives Sold only by "Trinity" Dealers. Manufactured by

BEACON RADIO MFG. CO. 325 Berry St., Brooklyn, N. Y.



Dubilier Devices Micadon-the 35c to 75c By-Pass Condenser—smooths out fluctuations of "B" battery current. 75c to \$3.75 Ducon-the stand ard antenna socket plug. . . \$1.50 Metaleak-the as-40c and 65c New Filter Condenser-for use tors-for high voltage \$1.25 to \$7.00

If you want to buy, sell or exchange your 5,000. Germany is the chief source the blaring saxophone, is now doing radio sets or parts the Radio Exchange will ket. A small amount is also immusic is now being broadcast every help you.

British Listeners Find They Enjoy Classical Music

By Frank J. McEniry News Bureau, Station KOA

being uplifted and are radio listeners swinging over to the classics?

"Yes!" is the emphatic answer of radio world would do well to take a liminator you buy a B battery eliminator to that is time tested. music critic of the British Broad- graph Company. casting Company, with headquarters In a discussion of recent radio dedally telling of betin London, who is on a tour of

ven was born in 1770, but for thou- into the field. sands he was only born in 1900 or 1910, when phonographs or repromind and has no foundation in fact," haps as late as 1925, when many of gives to the steel industry. us first acquired radio receiving

Substantiating the experience of staff members at KOA, Denver, he pointed out that marked changes in little short of marvelous. the public attitude toward music of a higher standard have taken place one's imagination.

the greatest event in the history of well as the minds of the public. manifold broadcasting activities is British experience is sure to be the its own broadcast. American experience give listeners

Less than eighteen months ago, he the hundreds charged that Bach, Beethoven and Wagner were acceptable "highbrows who like to swank

erage listener had little or no time brought nothing but self-desire to for music by composers with unpro- the industry; they hoaxed the mernounceable names ending in 'sky,' as chants and the public through their one listener expressed it. A great selfishness and specious merchandise, many persons demanded a few 'nice and now they find their game is run. sentimental songs' or some 'honest In my opinion the pessimism existing lmerican jazz.'

British listeners are learning to adcertainly regret it, and they are talkmire works of classical composers, ing loud enough to make others bemusic that has artistic impulse. On lieve that all radio is in the same the other hand, they are not averse boat they find themselves in. what we call 'amusement music.'

As music critic for the British broadcasting organization, Mr. Scholes's duties consist principally of International Radio Week a fortnightly review of the leading musical events of London. This is broadcast from the London station, at regular intervals.

Songs, Pep Meetings, Frat

programs ever arranged by the Eveready impresario, Mr. Paul Stacy,

laid in a typical college town on the all.

stadium for the last few minutes at develop new possibilities in this the finest reproduction of programs the thrilling close of the game, which feature of the science and to draw the thrilling close of the game, which the radio fans of the various countries are \$5 each at dealers'. Namee in his inimitable style just as tries into closer connection. if he were actually present. The part that the "Red Grange" of one of the have the endorsement of the official team plays in the final result will be beads of many nations, and will be observed annually. revealed on Tuesday night.

Radio in Its Infancy in Finland Radio is in its infancy in Finland, the number of receiving sets used in that country having grown, during 1924, from very few to approximately out the stigma usually attached to of supply for the Finnish radio mar- missionary work in Cincinnati, for its ported from England, Sweden and Tuesday evening at 7:30 through other European countries. Radio WSAI, as well as WEAF, New York; dealers and enthusiasts in Finland WCAE, Pittsburgh, and WOO, Philaappreciate the quality of American- delphia. This will occur on Novemmade radio equipment

Radio Should Try Gary's Optimism, Says Jewett

Those individuals who at the present time happen to be leaders in the In the Timmons B Is musical taste and appreciation radio world would do well to take a Liminator you buy Percy A. Scholes, widely known dent of the Jewett Radio and Phono- Thousands are now

velopment and its immediate future, ter receptions and "For example," he observed, "we Mr. Jewett described the spirit of greater distance read in musical history that Beetho- pessimism that has recently crept "This pessimism is only a state of

ducing pianos came into our homes. he said. "The industry would be And for millions more Beetnoven much better off if it were imbued was only born in 1921, 1923 or per- with such a spirit as Judge Gary "If any segment of the business

world ever had reason to be happy it is radio. "Its progress up to date has been

"Its future is doubtless beyond "I can think of no other industry "Introduction of broadcasting was which has so captured the hearts as

"No other industry is talked about America should have developed such as much, written about as much or possessed of such a wonderful pubmatter for congratulations. Our licity medium as radio possesses in

"Everything is in its favor and yet plenty of fine music and they will there has latterly crept into the industry this spirit of pessimism. Its existence is so utterly unfounded on recalled, English radio enthusiasts by any real, basic cause that its source can be traced only to one point. Therein one finds reason to brighten

"Radio: not unlike other new in dustrial developments, attracted quite a few get-rich-quick persons. They to-day in radio is to be traced di-"These attacks have virtually rectly to this brand of parasites. eased," he continued. "At last They find their game is up; they

"It is not true. Radio's future was the sort that enjoys a life of about never so bright as it is this autumn, two years and then falls into oblivand it is going to get brighter all the time. Radio is young and youth will not despair.

Radio interests the world over are linked with all other stations of the already beginning to focus their atcountry, and requires approximately tention on International Radio Week, fifteen minutes. In addition, critics to be observed January 24-30, 1926, of books, dramas and films are heard when it is expected that many startling disclosures in the business methods and scientific advance of the Dance in "College Night" industry, of interest to every coun-One of the most unusual continuity try, will be made known to the world. Hook-Up

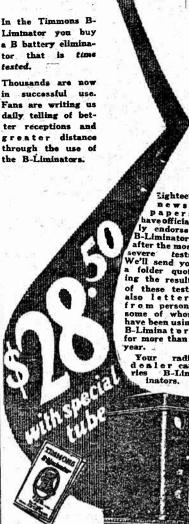
Leaders behind the movement to in which Graham McNamee, sport- weld the nations of the world into ing announcer, will describe part of a common bond of understanding for an imaginary football game, will be the progress of radio, declare that "College Night," to be staged in the the principal results it is hoped to studio of WEAF on Tuesday at 9 accomplish will be to unify business p. m. and broadcast by WEAF and methods for simplifying export and the usual chain of stations, including import, and to compare the scientific WEEL, WFL, WCAE, WGR, WWJ, advance of radio as it applies to the various countries, with the idea of allowing one nation to profit by an-WTAG, WOO, WJAR, WCCO, KSD various countries, with the idea of The "scene" of the hour will be other's experience for the benefit of

eve of a great intersectional foot. Many organizations have already ball game at which representatives come out with whole-hearted support of all large colleges of the East and of the movement. Among the first West are present. Snatches of col- of these was The Radio Manufacturlege songs from the dormitories, pep ers' Association, which contributed 2 Greater clarity on all notes meetings, a dinner dance in one of a check for \$500 as an initial donathe "Frat" houses and street scenes tion toward the support of Internain which fist fights and wagering de- tional Radio Week. It is planned 4 Better volume control pict the enthusiasm of the rooters, during the week to conduct many Latest development of the world's will be presented one after the other. broadcasting tests of an interna-The scene then shifts to the tional nature, which are expected to of transformers. For those who wish

Davis Saxophone Octet

Playing in Cincinnati The Davis Saxophone Octet, whose director, Clyde Doerr, hopes to wine

"The Tummons B'Liminator has passed be acid test of daily average use for more than a year in thousands of homes."—Newark, N. J., Call.



Timmons Radio Products Germantown, Philadelphia, Pa.



All Frequency Amplifier

It Gives You Full amplification of those base

THORDARSON ELECTRIC MFE. CO., CHICAGO

overwhelming majority of the leading se makers. You are sure of the quality of a

Formica panels and tubes. Panels are sold in neat individual trade marked envel-

opes by all leading parts dealers. THE FORMICA INSULATION CO. 50 Church St., New York, N. Y.

A Four-Tube Radio Receiver Which Employs One Stage of R. F. Amplification

The Author Claims Excellent Volume and Selectivity With Only Two Controls

By GEORGE M. MEYER

Wiring diagram of a four-tube R. F. receiver herein described

OW would you like to build a four-tube set that would give volume almost equal to any fivereceiver on the market? It can be The receiver about to be described may be constructed without the use of "low loss" parts or trick wound coils. It is an excellent receiver and as for volume and clarity of reception, nothing more could be desired. An actual test of this outfit over a period of about one year resulted in the writer adopting this circuit for his own radio set, which is at present connected up in a discarded victrola cabinet, the shelves having been removed for the housing of the set and B battery eliminator described in the New York Herald Tribune Radio Magazine March 15, 1925, by the writer.

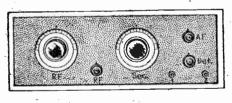
In order to use a small panel for this two-control outfit to enable it to fit in the cabinet of the talking machine, the amplifier circuit was placed in back of the radiofrequency and detector apparatus. This called for deep baseboard. The front panel measured eighteen inches long and seven inches high. Small strips of wood were screwed to the sides of the former music compartment so the set on the baseboard could be removed. This was done so changing the tubes or battery connections could be easily accomplished.

The circuit makes use of a stage of radio-frequency amplification which seems to supply tremendous volume to the de-

Radio-Frequency Circuit

It is the writer's opinion that greater radio-frequency amplification per stage can be obtained when the circuit is tuned in single circuit fashion; that is, with a condenser connected in series with the antenna tuning coil rather than across a coil having an untuned primary winding. In past experience with receivers employing a stage of tuned radio-frequency ahead of the detector results have shown that greater amplification of radio-frequency currents is possible with the series circuit. In fact this type of circuit has been known to produce as much amplification as two stages of tuned radio-frequency employing condensers shunted across secondary coils and non-tuned primaries. It is for this reason that this four-tube set will much DX as some five-tube tuned radiofrequency recivers.

Special couplers or coils are not neces



A suggested panel layout

sary, as the two coils in this receiver may be home-made. Below is a list of the parts required to complete the set: One panel.

Two .0005 variable condenser. One .00025 grid condenser with mount-

One four megohm leak.

One .002 fixed condenser. One tube 3 inches diameter, 4 inches

One tube 3 inches diameter, 41/2 inches long.

One pair of audio transformers. Seven binding posts. Four sockets.

Two single jacks. Two 20 ohm rheostats. One 10 ohm rheostat.

A careful selection of the parts is esential: Those having a wide reputation and well known to sets builders should be Obtain the best parts money can buy and be sure of a good set of vacuum tubes. Have them tested before using.

Battery Wiring

Designers of some of the highest class receiving sets have specified flexible stranded copper wire for all filament and plate battery connections. These leads

are all bunched together and tied to keep

them out of the radio-frequency circuit.

The wires running to the sockets, binding

posts and rheostats should be kept near

the baseboard of the set. A receiver wired

in this fashion will not be subject to

squeals or high pitched notes common to a

great many home-made sets in which the

A and B battery circuit is allowed to

This flexible stranded rubber-covered

wire is appearing at many radio shops.

If it is not available, use flexible lamp cord

and strip the outer cotton covered insula-

tion off until the rubber shows. This is a

trifle larger in diameter than is used in

practice, but will answer the purpose

The set may not appear to be wired as

neatly as if bus bar wire were used, but

Secondary Tuning Coil

The secondary tuning coil which feeds

he letector tube should be carefully made

and wound tightly with No. 24 D. C. C. or

D. S. C. copper magnet wire. There are

three separate windings on this coil, one

for the plate of the radio-frequency tube,

the secondary and the plate coil of the de-

tector circuit. The tube should be three

inches in diameter and four and one-half

inches long. Start about half an inch

from one end and wind nine turns of

wire, being careful to prevent the wire

of this small winding through small holes

Then in the reverse direction wind the

secondary coil with forty-three turns of

wire. Leave one-quarter of an inch be-

tween the first winding and the secondary.

Remainer the secondary coil is wound di-

rectly opposite to the nine turn coil.

Both ends of the secondary winding should

be fastened through holes in the tubing.

Skip a half inch and wind nine more

turns of wire in the same direction as the

forty-three turn winding. You now have

completed the coil. It may be mounted in

back of the secondary tuning condenser

and placed at right angles to the antenna

If the antenna coil is mounted upright

from the base (as shown in the sketch)

the coil with the three windings should be

mounted parallel to the baseboard. The

two coils should be a half inch apart.

from coming unwound. Fasten each e

made in the tubing.

traverse the tuning circuit.

it will probably work better.

brackets or by means of small blocks of wood fastened to the baseboard.

The secondary of this coil is shunted by .0005 variable condenser. The reversed winding is in the plate circuit of the radio-frequency tube. The end nearest the secondary connects to the B battery of the detector tube. The outer end connects to the plate terminal of the radio-frequency amplifier tube. After the set has been tested, it may be well to try revers-

ing these connections. The nine-turn winding which follows the direction of the secondary is connected in the plate circuit of the detector tube.

When the circuit is under test, if it re-

generates or squeals, this coil is wound

too near the secondary. There are two

methods of overcoming the regeneration.

One is to slide this coil away from the

secondary another quarter inch or about

circuit three to five turns. This will pre-

vent the regeneration to the extent of

stopping oscillation. There will still be a

certain percentage of regeneration present

which is necessary in order that the re-

ceiver function on distant stations. How-

ver, the set should not squeal on any

wave length. It will not radiate, due to

the blocking effect of the stage of tuned

Audio Amplification

In building this receiver the writer

chose a good set of transformers and used

the old reliable transformer coupled

audio amplifier circuit. The quality of

reproduction on the loud speaker is en-

tirely governed by the audio amplifiers.

Should poor transformers be used distor-

tion may be expected. Never neglect this

part of the receiver, but use good trans-

formers. It is a foolish move to purchase

two poor transformers. The writer sug-

gests getting a 5 or 6 to 1 ratio for the

first stage and a 3 or 2 to 1 for the se-

A C battery seems to be in style, and so

one has been included in the circuit. It

will improve reception as well as prevent

excessive drain on the plate batteries

Ninety volts of B battery will require a

C battery of 4.5 volts. If one of the new

RCA power tubes is used in the last stage

a great increase in volume over the 201A

There is no use putting in a jack for

the detector tube, as headphones are very

seldom used. A jack has been provided

after the first stage of audio so reduced

volume on local reception may be ob-

tained. Two stages are not always neces-

sary except for the weaker stations. The

jack for the first stage is of the closed

circuit type, connected as shown in the

The output jack for the last stage is of

the single circuit type. The plate of the

last stage tube is connected to the upper

contact of the jack and the B battery 90

volts to the other terminal. It is some-

times necessary to place a .002 fixed con-

denser across the output terminals of the

Tuning Controls

A word or two of explanation concern-

nable those who have constructed similar

ing the tuning of this receiver is given to

outfits to obtain the best of results. There

are but two controls as far as actual

those who use cone type speakers.

last stage jack. This is recommended for

radio frequency.

ond step.

will be obtained.

diagram.

The latter may be mounted on brass I left of the panel is employed to tune the first stage of radio-frequency and the antenna circuit. The second tuning condenser is used to tune the detector circuit. This adjustment is in control of the wave lengths and may be called the "station selected," as it is used to pick out the stations. If the set has been properly constructed, this tuning dial should be fairly sharp on all stations. It may be logged; that is, the dial settings may be taken down on a card and used for future reference. The readings should never change unless the station is assigned another wave length.

Antenna Coil

The radio frequency coil is wound on a three-inch tube about six inches long. No. 24 double cotton or silk-covered wire is required for the winding. The entire coil contains ninety turns of wire, with four taps take-off at intervals. Start the winding about half an inch from the end of the tube, and before taking the first tap, wind fifty turns of wire. Make a loop or twist which may be cleaned later for connections. Continue winding the coil in the same direction until the seventieth turn. Take another twist and proceed to the eightieth, where another tap is taken, Finish the coil at the ninetieth turn and leave a short end for connecting the bus

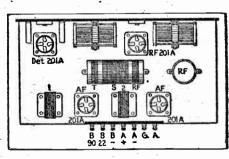
Two small brass braces can be screwed to the bottom of the coil for holding it in an upright position on the baseboard. A block of wood may be fastened to the sides of the form and this screwed to the baseboard in place of the brass braces. The coil should be rigid. Clean the tap twists and run a little solder down the wires to keep them stiff and in shape for tapping

This coil should be placed directly in back of the aerial tuning condenser and about an inch away. The .0005 variable condenser which tunes this coil is connected to the top turn. This should be made to the fixed or stationary plates of the condenser, in order to avoid any possible "body capacity." The rotar plate connection goes to the antenna binding post on a strip at the rear of the baseboard.

The top of the coil also connects to the grid terminal on the radio-frequency tube socket. Make the lead as short as possible and direct to the socket, avoiding bends and fancy shaped wires.

The socket should be a good one, preferably of glass construction with heavy springs, or a good sturdy composition socket. Side-wiping socket spring prongs

The antenna series condenser aids in bringing about resonance between the detector circuit. The adjustment of this dial may not be so critical as the other dial across the secondary tuning condenser. It may be well to experiment



How parts may be arranged behind

with the taps on the coil winding. Pick out a tap which will give a dial reading on the antenna condenser which takes in wave lengths between 200 and 550 meters. It is difficult to state offhand which tap will be correct. Once the proper turn is located the lead wire to the condenser may be fixed permanently. In some cases, however, it will be found more efficient to try a few less turns when tuning to some of the stations around 250 meters or thereabouts. Too many turns may cause tuning on the shorter waves to be a trifle sharp for some persons. It is possible to log this dial as well as the tuning is concerned. One of these to the bother.

Sec. of Commerce Summarizes Conference

and demands of nearly 200 new broadcasters who wish to erect stations and to force their way into the already congested lanes. There are now more vehicles on the road than there is room for and more are crowding it. Unless something is done the whole traffic will be jammed.

"This was the primary problem with which the conference had to deal. It is the cause of major interference. It faced it boldly. It looked at it solely from the attitude of the listener, exclusively from the viewpoint that it was the duty of every one to think and act with one goal in view; that is, that a clear, intelligible valuable signal, free from conflict with other stations should reach the ear of the listener.

"The conference declared that the public interest, as represented by service to the listener, should be the basis for every broadcasting privilege. And it therefore determined that it would ask the Congress of the United States to enact legislation in your interest to the effect that there must be a legal limit upon the total number of broadcasting stations until the art further develops new channels.

Manufacturers at Conference

"I take pride in the fact that in this conference, made up as it was not only of representatives of the listeners, the amateurs, the great newspaper and magazines of the United States, but of the manufacturers and broadcasters, with millions of dollars invested in their enterprises and at stake in this situation, not a dissenting voice was raised against the resolution by which they formally recognized that your interests are dominant in the whole situation.

"It was significant to me that the resolution which so declared was introduced and advocated by a high official of one of the greatest radio companies in the United States, and I want to assure you that this resolution represents the real sentiment of the conference. It is honest and it is

"I think, therefore, that if I were asked what are the two outstanding results of the conference, I would say that they lie, first, in the recognition of the listeners' dominant interests in radio, and second, as a corollary, in the determination that the amount of interference must be reduced. That means fewer stations and better ones. or at least no increase in numbers, and it must result in more efficient service and better programs. This request to Congress was that these stations are to be under strict governmental regulation; that each one shall obtain his license from the Department of Commerce, and before he does so he must demonstrate that his operation will serve the public interest. His license may be canceled or revoked at any time for violation of its terms or infraction of law. He must conform to law and regulations. He must perform the

(Continued from page one) service which he had promised or his life

"It may be that we shall hear a great deal about freedom of the air from some of the people who want to broadcast and who will not be able to show that their desires accord with your interests. But air. and to freedom of speech, for that matter. There is the speechmaker and the listener. Certainly in radio I believe in freedom for the listener. He has much less option upon what he can reject, for the other fellow is occupying his receiving set. The listener's only option is to abandon his right to use his receiver. Freedom cannot mean a license to every person or corporation who wishes to broadcast his name or his wares and thus

as a broadcaster will end.

"We do not get much freedom of speech if fifty people speak at the same place at the same time, nor is there any freedom in a right to come into my sitting room to make a speech, whether I like it or not. So far as opportunity goes to explain one's views upon questions of controversy-political, religious or social-it would seem that 600 independent stations. many competing in each locality, might give ample opportunity for great latitude in remarks. And in any event, without trying out all this question, we can surely agree that no one can raise a cry of deprivation of free speech merely because he is compelled to prove that there is something more than naked commercial selfishness in his purpose.

monopolize the listener's set.

"The ether is a public medium, and its use must be for public benefit. The use of a radio channel is justified only if there is public benefit. The dominant element for consideration is in the radio field and always will be, the great body of the listening public, millions in number.

Distinction Wiped Out

"At the outset of the conference, I think there was some fear on the part of the small stations, which serve chiefly local communities, lest they were to be crowded out by the larger and more powerful stations. There was some feeling as between the Class A stations on the one side and the Class B stations on the other. It was soon found that any such fear was groundless. The distinction between Class A and Class B is wholly arbitrary. It goes back to ancient times in radio history of four years ago when the favorite occupation of the broadcaster was the transmission of phonograph music. Some of the more progressive stations declared that there was a higher form of entertainment and they were put into a separate class, designated as Class B, on the condition that they would provide bet-

"The conference, therefore, resolved to wipe out this arbitary distinction between the two classes. From now on, all stations will be on the same basis. There is to be only one test, if Congress passes the necessary legislation, that is, service to the listener and this test will be apthere are two parties to freedom of the | plied to every station, big or little. There is full recognition of the fact that many of the smaller stations perform a real service to their communities which can be given in no other way and there is no

Wave Band Unchanged

desire on the part of anybody to disturb

"It was suggested that we might make room for more stations if we widened the broadcasting band. Your instruments would not cover new stations outside the present band, and if this suggestion were adopted it would mean that we should have to invade the band which has been assigned to amateurs, of whom there are thousands. The conference agreed with me that radio has a useful contribution to the fine development of the American boy. None of us wish to minimize his position in growing American life and therefore the conference confirmed here

"While the recommendations of the conference should utimately result in tremendous betterment to broadcasting, we must not expect radical improvement too soon. The conference was merely an advisory body. It had no final power. It expressed the views of every one interested in radio. Before most of its recommendations can become effective they must be enacted into law by the Congress of the United States. I hope that this legislation will be given us by Congress at its next session. I hope, likewise, that it will impose regulation only to the extent absolutely essential. It has been the pride of the radio industry that it has been largely self-governing and I believe this condition may well continue. I know of no finer example of the true spirit of American industry than the voluntary recognition by the men engaged in radio communication of the public interest in their enterprises. That sentiment has characterized radio since its birth.

"Radio has grown up in the spirit of service. It has been the world's greatest example of self-government in business. It has needed no czar, no iron hand of control. There is, of course, a return in publicity to be had from broadcasting. Broadcast stations are not and do not necessarily claim to be philanthropists. They, like the great magazines and newspapers, are a great public service. Let us give the broadcast managers their full meed of praise for having created and freely given to us a radio service better than in any country in the world.

"The problems of those radio listeners,

isolated from the city communities, were especially considered in the conference. Methods were recommended by which we can secure an extension and improvement of the service to our farmers. There is no greater purpose of radio than to bring to our farmers a mass of information that may be of use to them in the conduct of their work, but it is of equal importance to bring into their homes the majority of those things by way of entertainment which have for so many years been limited to those who live in the

"The navy must have wave lengths by which they communicate with their ships at sea. They must have wave lengths by which they communicate with their aeroplanes in the air.

"The army must have wave lengths by which they communicate with forces in the field and with their airplanes. We must have wave lengths assigned for international telegraph, for we are now in daily radio communication by code with every important country in the world. One of the greatest services radio has performed is communication between ships and shore and between ships at sea. Radio has enormously reduced the loss of human life at sea, and we must provide full facilities for that at all times. There has been a very wonderful invention called "the radio compass" which takes the place of the old magnetic compass by which ships have been navigated for centuries. We must provide wave lengths for use on the ships.

"We must bear in mind that radio broad casting is the birth of the last five years and that our previous conferences have been largely concerned with trying to get the service established; to create an effective service that could reach every home. The agency is now established. When I called the first conference only thirty people were present. There were then only two or three broadcasting stations and only a few hundred thousand listeners. To-day there are nearly 600 stations and about 25,000,000 listeners. The problem of the present conference was to perfect that service.

Must Be Legislation

"In general the conference, representing every phase of this question, was unanimous that there must be new legislation to give more control in the protection of public interest and in the perfection of the service. The conference recognized that radio has introduced a new element in the American life, that it possesses great values in home entertainment. in education and the spirit of religious thought; that it contains a great moral purpose not only to bring many new things into the lives of our people but to cement them together in a greater common understanding, and that the obligation of the industry is to provide these services."

executive chairman of the National As-

Up to this time many stations have the situation to a crisis. The conference of differences which may ultimately

Copyright Report

"Whereas, There can be no continuation

"Whereas, An insistent demand from the public requires that music be made the principal part of broadcast entertainment.

"Whereas, Practically all of this music is held by copyright proprietors and is not available to broadcasters except on

"Whereas. The broadcasters recognize sitions and are willing to pay a fair and equitable maximum fee for each broadcast

(Continued on page six)

News and Notes of the Radio Trade

B Battery Construction

It has been announced by the National Carbon Company, makers of Eveready batteries, that a new "layerbilt" method of battery construction. the result of years of intensive development work, will soon be utilized in the larger sizes of radio B batteries manufactured by that concern. It is claimed that the new type batteries, some 30,000 of which have been tested under service conditions during the last two years, give from \$5 to 50 per cent longer life than cylindrical cell types of the same overall dimensions.

New Condenser

A new type of variable condenser is being manufactured by the Allen D. Cardwell Manufacturing Corporation. It affords SLF tuning but re tains the standard or semi-circular shaped plates. This condenser, known as type E, secures straight line tuning by using plates whose thickness is tapered, so that as the plates are revolved they tend to dovetail more closely, due to the variable thickness of both stator and rotor.

This fundamental idea will afford all the conveniences of straight-line tuning without increasing the overall of the standard condenser in any

Sets on Display

The new line of Federal Ortho-Sonic receivers is being exhibited at all the principal radio shows throughout the country. There are nine Pederal Ortho-Sonic models comprising a variety of artistic cabinet styles. Loud speaker sets contain the Federal loud speaker unit.

Rapid Rise of Sales

According to a statement issued by the Charles Freshman Company, Inc. manufacturers of the Freshman Masterpiece receiving sets, the sales for the one month of October, 1925. approximated 60 per cent of the entire amount of business done in the year 1924. The net sales of the company for September, 1925, were an increase of more than 300 per cent over the corresponding month of 1924 and the net sales for October, 1925, were almost twice those of the preceding month.

New Additions to Staff J. Louis Reynolds, for five and a half years with the transmission engineering department of the American Telephone and Telegraph Company, is now in charge of the techni-

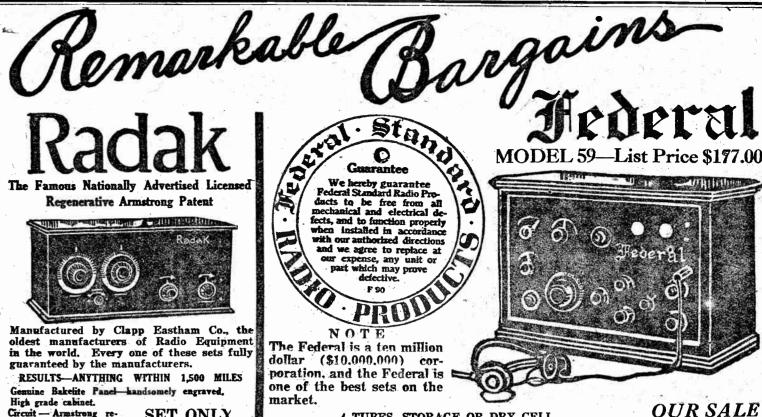
Clever Window Display

A very effective window display has been on view during the last week at the electrical appliance store of Charles W. Down at 711 Eighth Avenue. Mr. Down had a Ferguson eight on view with a live "wax figure." The lighting effects were clever and the display has attracted a great deal of interest.

"The Larkinites" Program

Includes Indian Love Songs An excellent varied program has been prepared by "The Larkinites" for their broadcasting from WEAF, WEEL WGR. WOC, WFL WWJ. WCAE, WCCO, WSAI, WTAG, WJAR and KSD on Thursday at 8 p. m. It will include selections from "The Pink Lady," "Lohengrin" and Finden's "Indian Love Songs," played by the orchestra, as well as "Oft in the Stilly Night," by the male quartet, and "Sentimental Me," a tenor solo by Franklyn Bauer, tenor of the quartet, who is also tenor soloist at the Park Avenue Baptist Church, in New York City.

Only 550 Active Stations Of the 1,180 broadcasting stations which have been "on the air" since September, 1921, only 550 are active



4 TUBES, STORAGE OR DRY CELL

The receiver comprises one stage of radio detector and two stages of audio frequency amplification with a control which allows the degree of amplification to be varied between wide limits. Genuine Mahogany Cabinet, 15 in. high, 22 in. wide, 11 in. deep. Panel and dials genuine Bakelite. Antenna-A primary condenser switch provides for adjustment of the receiver to suit any type of antenna from the indoor wire to the larger outdoor an-

FREE ABSOLUTELY FREE a \$7 Federal Head Set and

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oldest manufacturers of Radio Equipment

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RESULTS-ANYTHING WITHIN 1,500 MILES

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guaranteed by the manufacturers.

High grade cabinet.

Circuit — Armstrong re-

generative double tuner. Tubes— 3— either dry

Battery cable ready to

Only two controls—ver

simple to operate.







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Come and take your pick

FREE 1 Hydrom eter and 1 Rubber with each

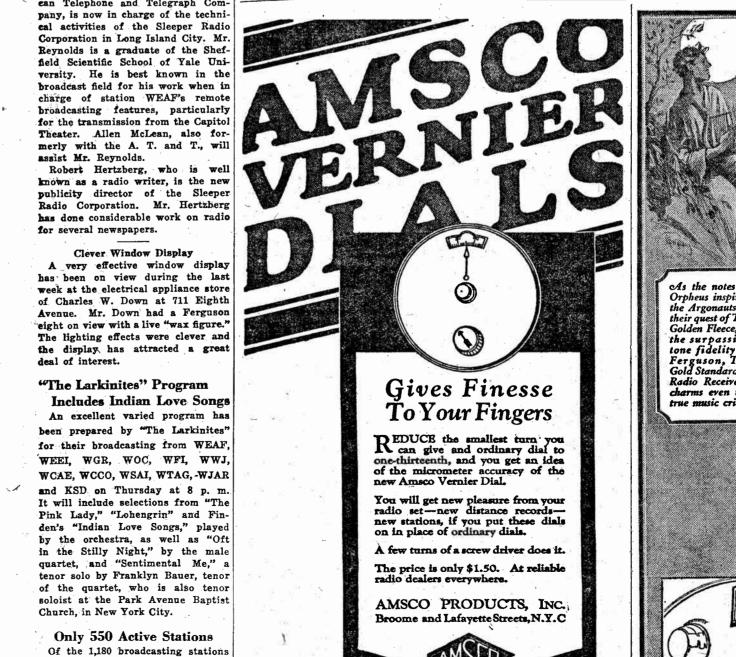
Storage Battery

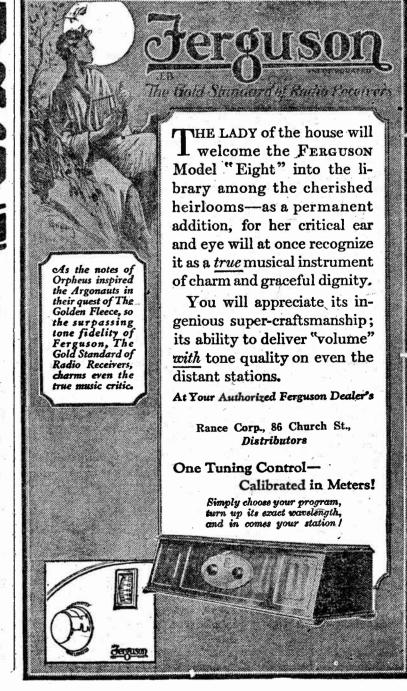
DEALERS GET IN TOUCH WITH US FOR SPECIAL PRICES ON THESE SETS AND ANY OTHER RADIO SETS OR PARTS

BROOKLYN

577 MYRTLE AVENUE

SMITH AND LIVINGSTON STS





Conference Recommends Important Changes Fourth

casting equipment is useless without a wave length. But so crystallized was the sentiment of the conference against the licensing of a single additional broadcastunanimous vote, a proposed amendment which would permit the Secretary of Commerce to license broadcasting stations provided channels could be found which would not cause "appreciable interference."

No Wave Length Changes

All recommendations for the broadening of the broadcasting band by invading the amateur territory were met with firm opposition on the part of both amateurs and radio manufacturers. Proposals were made by representatives of broadcasting stations seeking licenses that the broadcasting band be extended downward to 150 meters, but it was contended that this would render obsolete radio equipment of immense value now in the hands of listeners and multiply the problems of receiver design without providing a sufficient number of broadcasting channels to meet all of the applications now pending. Another alternative—further divisions of time so that several stations can use the same channel at different hours was condemned by the conference as being a wasteful duplication of equipment and personnel without commensurate improvement of broadcasting service.

The adoption of these various measures by the conference is considered by those competent to judge the situation as a momentous step forward in the improvement of broadcasting conditions. Secre(Continued from page one)

ing station that it refused, by a nearly there are two parties to freedom of the air and to freedom of speech for that matter. There is the speech maker and the listener. Certainly, in radio, I believe in freedom for the listener. He has much less option upon what he can reject, for the other fellow is occupying his receiving set. The listener's only option is to abandon his right to use his receiver. Freedom cannot mean a license to every person or corporation who wishes to broadcast his name or his wares and thus monopolize_the listener's set . . .

"We do not get much freedom of speech if fifty people speak at the same place at the same time, nor is there any freedom in a right to come into my sitting room to make a speech whether I like it or not. So far as opportunity goes to explain one's views upon questions of controversy, political, religious or social, it would seem that 578 independent stations, many competing in each locality, might give ample opportunity for great latitude in remarks.

tary Hoover's remarks at the opening of ferees cited instances of disregard of broadcasters was Mr. Paul B. Klugh,

the conference aptly set forth the situa- | wave length assignment either by reason tion when he stated that "we hear a great of defective transmitting equipment or deal about the freedom of the air. But careless adjustment of The committee on

Listener vs. B

One of the measures which it is expected will reduce heterodyning of carrier waves, which evidences itself in the receiving set by a continuous whistle, is the enforcement of a plea, made by John V. L. Hogan, one of the foremost radio engineers of the country, for closer adherence to assigned frequencies. Many of the concon-

allocation made no changes which have bearing on the broadcasting situation. Amateurs of the Hawaiian Islands, however, may resent the loss of the upper half of their transmitting band in favor of a commercial inter-island radio telephone service. This was vigorously opposed by the amateurs until it was pointed out by engineers that these wave lengths, from 171 to 200 meters, are the only ones upon

which reliable commercial co can be had. Upon assurance that no other encroachments upon their field were contemplated, the amateurs yielded graciously. Other changes in wave-length allocations concerned only government and marine services.

Interest in Copyright

A tense interest was maintained in the deliberations of the committee on copyright relations to broadcasting, which conducted its fiery deliberations under the able chairmanship of Wallace H. White. The copyright situation is fraught with tremendous significance. The very foundations of broadcasting will be threatened if the demands of copyright holders, who were represented by Mr. E. C. Mills, of the American Society

of Composers, Authors and Rublishers,

should become too heavy for broadcast-

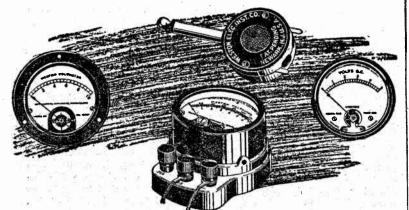
ing stations to bear. Defending the

sociation of Broadcasters.

taken out short term licenses for a blanket fee and it is alleged that the constantly increasing fees demanded have brought was not empowered to settle these questions, but the committee handling this problem outlined a principle of settlement furnish a satisfactory conclusion to this long standing argument. So important is this matter to the future of radio broadcasting and so ably did the committee set forth the situation, that it is quoted in full:

of broadcasting unless musical compositions are made available to broadcasters upon a fair, equitable and permanent basis, and

prohibitive and unstable terms, and the right of the copyright proprietors to compensation for the use of their compo-



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WITH these new Weston quality products, specially designed and built for radio service, you secure a new pleasure in

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Drain on batteries is insignificant because of the especially high internal resistance of Weston Voltmeters.

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CHAS. GOODNOUGH, 1823 Mohegan Ave., Bronx, says:
undard, which I bought about 2½ years ago, is still giving the same marvelous I am getting every night when x tune for the far Weet, stations like KGO, roles, KFI, a small Rocky Mountain station, usually considered hard to get, thing it very often. I have in my log 180 distant stations to which I can tune y time. I am getting Chicago station at 3,0 clock in afternoon, Alex San Juan

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WESTON quality radio products | Nine Committees Report to Washington Radio Conference

(Continued from page seven)

orbidden field of censorship. ubmit the following report:

(1) Existing Federal statutes are any license for failure to maintain nadequate to permit proper adminis- regular operation of a transmitting. tration of radio communication activi- station without just cause.

States is empowered by the statutes stations, broadcasting stations, ama

the | a license to operate a broadcasting transmitting station, the character As to the specific matters referred of which is to be defined in the act, this committee, we respectfully shall be not to exceed five years, with the privilege of renewal for like It is the opinion of this committee periods, and provided further, that the Secretary may suspend or revoke

(7) That the act should define the (2) The Congress of the United following terms, to wit: Commercial

Table of Ware Longth Allocation

ycles 95-120	Meters 3156-2499	Transmission CW and ICW CW and ICW	Service Government only. Marine and aircraft	Remarks
120-153	2499-1960	(.	only.	Transmeters
125 153-165	2399 1960-1817	CW and ICW	Point to point, ma- rine and aircraft	Non-exclusive.
155 165-190	1934 1817-1578	CW and ICW CW and ICW	only. Government. Point to point and	Non-exclusive.
175	1713	CW and ICW	marine only Government.	Non-exclusive.
90-230	1578-1304	CW and ICW	Government only.	(Ice patrol, Br'cast,&c.)
30-285	1304-1276	CW and ICW	Univ. and college. Experimental only.	
245 275 285-500 -	1224 1090 1052-600	CW and ICW CW and ICW	Government. Government. Marine, coastal and	Non-exclusive. Non-exclusive.
300	1000	CW and ICW	government only. Beacons only.	
315 343	952 874	CW and ICW	Government only. Marine only.	
375 410	800 731	CW and ICW CW, ICW,	Compass only. Marine only.	
425	706	cw, icw,	Marine only.	
445 454	674 660	CW and ICW CW, ICW.	Government. Marine only.	Non-exclusive.
500	600	CW ICW,	Calling and distress	
		spark, phone	and messages re- lating thereto only.	
500-550	600-545	CW, ICW,	Aircraft and fixed safety of life sta.	Non-exclusive.
50-1500 00-2000	545-200 200-150	Phone CW, ICW,	Broadcasting only. Amateur only.	
00-2200	150-133	phone		Non-exclusive.
50-2300	133-130 130-109	.,	Aircraft only. Mobile and govern-	
00-2750			Mobile and govern- ment mobile only. Relay broadcasting	
50-2850	109-105		only. Public toll service,	
60-8500	105-85.7		government mo-	,
			bile and point to point communi-	`
			cations by elec- tric power supply	·
			utilities and point to point and	
	ŕ		multiple address message service	
			by press organ— zations.	
00-4000	85.7-75.0		Amateur, army,	
	5511-1510		mobile, naval air- craft and naval	
		• •	vessels working aircraft only.	N
00-4525	75.0-66.3		Public toll service, mobile, govern-	Non-exclusive.
			ment point to point and point	
			to point public utilities.	
25-5000	66.3-60.0		Relay broadcasting	. 1
00-5500	60.0-54.5		Public toll service	_
500-5700	54.5-52.6		Relay broadcasting only.	
700-7000	52.6-42.8		Point to point only. Amateur and army	
000-8000	42.8-37.5		mobile only.	Non-exclusive
900- 9050	87.5-83.1		Public toll, service, mobile, govern- ment point to	••
	1.11		point and poir to point public	it
0-10000	33.1-30.0		utilities. Relay broadcasting	
0-11000	80,0-27.8		only. Public toll service	
7	27.3-26.8		only. Relay broadcasting	
0-11400			only. Public service, mo-	Non-exclusive
0-14009	26.3-21.4		bile and govern- ment point to	
0-16000	21.4-18.7		point. Amateur only.	
0-18100	18.7-16.6		Public toll service, mobile and gov- ernment point to	Non-exclusive
00-56000	16.6-5.85		point. Experimental.	
00-64000 0-400000	5.35-4.69 4.69-0.7496		Amateur. Experimental.	
,- 1 00000	0.7498-0.7477		Amateur.	

vide s

collowing principles:

(1) That the administration of (9) That rebroadcasting of proradio legislation shall be vested in grams shall be prohibited except with shall make and enforce rules and station.

such legislation. (2) Such administration shall be may be necessary to prevent interexercised by the Secretary through ference to radio reception emanatthe officers or employees of the De- ing from radio sources. partment of Commerce, except that the Secretary may appoint such Cuban Consul General to boards or committees as he may consider necessary or desirable to assist | Senor Felipe Taboada, Cuban Conhim in an advisory capacity in the sul General, in New York, and chair-

speech be held inviolate. roadcasting shall be permitted. (5) That the legislation shall con- night.

final decisions of the Secretary of Senor Taboada and ex-President Commerce to the appropriate court. | Zayas, of Cuba, will broadcast from mental stations, the Secretary shall the importance of the Cuban Exposibe empowered to classify all stations tion to Americans. and to fix and ssign call letters, wave length, power, location, time of operation, character of emission and duration of license.

(3) Present conditions and the public interest require that such legis- the power to revoke or suspend any license whenever he shall determine Your committee therefore recom- that the licensee has violated any mends that Congress do enact such of the terms of his license, regulalegislation, incorporating therein the tion of the Secretary, Federal radio

the Secretary of Commerce, who the permission of the originating regulations necessary to the proper (10) The Secretary of Commerce administration of the provisions of shall be empowered to make and enforce such rules and regulations as

Discuss Cuban Exposition administration of problems of na- man of the Cuban Exposition which opens to-morrow at the Pennsyl-(3) That the doctrine of free vania Hotel and closes next Saturday, will broadcast over Station (4) That no monopoly in radio WMCA during Cuban Night at the McAlpin Hotel, on Thursday, at mid-

ain provisions for due appeal from The following night, at 6:45 p. m (6) Except in the case of govern- the same station. Both will talk on

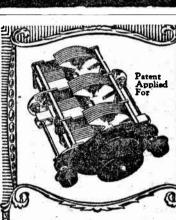
Aerials for Crystals Crystal receiving sets do not give satisfactory results when used in Provided, further, that the term of connection with indoor aerials.



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BACH RADIO.

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Almira11 New York Sirl. builds

her own radio receiver.

POTOGRAMI

Children

at the Sydney Australia dity m155101, hearing their first

radio concert



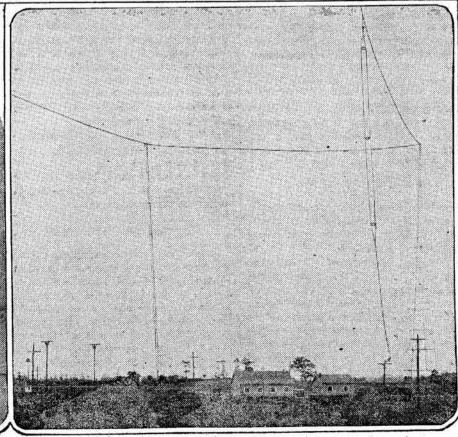
radio tan on one transconinental trains on the Canadian National Railways

vouthful





Lecturers of the air college faculty. N.Y.U., left to right: Prof. Horne, Dean Lough, Prof. Sheldon and Prof. Mclund



Antenna system at Station WGY used in comparative tests on horizontal and vertical radiation,

Elementary Information for Radio Novices

The Electrical Circuit and Its Measurements

By JAMES W. H. WEIR Technical Editor, The National Stockman and Farmer

This is the fourth of a series of twenty-four lectures for the radio layman which is being broadcast through KDKA, the Westinghouse Electric and Manufacturing Company station of East Pittsburgh, Pa.

ITH the study of the electric circuit we actually cuit we actually enter the portals of practical radio, due to the fact that, no matter where electricity is used, there must exist a complete electric circuit if electricity is to flow. In its simplest form the electric circuit consists of two things namely, a source of electrical supply and a pathway over which the supplied electricty may travel. To those unfamiliar with electricity it is helpful to liken the simple circuit to a closed pathway of pipe running into and out of a pump, which is inserted to circulate the water. In this case the pump takes the place occupied by the unit supplying the electricity and the pipe replaces the wire

Now, the creation of electric power originates from either of two sources. First, it may be obtained from a dynamo whose operation depends on the magentic effect of the electric current; secondly, it may be obtained from batteries of chemical cells. For the present we shall confine ourselves to the chemical cell only, as the dynamo takes little part in the operation of the simple radio receiving set.

Chemical Batteries

The production of electricity by chemical means was discovered long before the dynamo, and for many years the chemical means was the only source of power supply. Naturally, the cost of producing electricity for commercial use by this method was very high. In radio, however. despite the cost, it is often more advantageous to use batteries, as there are but few sets on the market capable of operating without them, and such sets are exceedingly high in price.

In our electric circuit then we will use

a battery of chemical cells as the source | tremely simplified by means of voltmeters of nower. Inasmuch as we are dealing with radio let us consider the circuit of the vacuum tube filament. This circuit is composed of a battery, a switch, a pathway of wire, a rheostat and a vacuum tube. The switch represents the break and make in the metallic pathway to and from the battery. Its purpose is to open and close the circuit, permitting the current to flow to light and extinguish the filament of the tube. The rheostat is a resistance or opposing force to the current flow from the battery and is used to control the temperature of the filament.

Let us picture the circuit for a moment. A wire is attached to one terminal of the battery and connected to one side of the tube filament. The other side of the tube filament is then connected to one side of the rheostat. From the other side of the rheostat a wire is led to one side of the switch and finally from the other side of the switch a wire is connected to the remaining terminal of the battery. The flow of electricity does not commence until we throw the switch, thus completing the wire pathway. The filament of the tube opposes the flow of the electric current to such an extent that it becomes hot to the point of incandescence, and in this condition it is said to be lit.

Electric Circuit

Such is the fundamental construction of any electric circuit. Keep in mind that it always embodies, first, a source of electrical supply, and second, a metallic pathway, over which the electricity may flow. The pathway will more than likely include the apparatus upon which the electric power operates, a means of control, and a make-and-break arrangement which is known as a switch.

Now in radio, as well as in the study of electricity, it is often of value to know how fast the current is flowing, the amount of push behind it and the opposition to its flow. The work entailed in

and ammeters. In spite of this, however, all radio fans should be acquainted with the basic principles of determining these measurements. These principles are all to be in found in "Ohm's Law."

Before taking up "Ohm's Law," however, it will be necessary for us to learn a little regarding the units in which electric power and energy are expressed. Let us go back a moment to our water pipe system. At this point insert a water motor in the water circuit, in addition to the pump. Now, the power necessary to operate this motor will depend on the flow of water through it, the opposition afforded by the size of pipe and the pressure acting between the inlet and outlet circuit the rate of water flow is measured in gallons per second, while in electricity the rate of current flow is termed amperes per second. The pressure in water in the water pipe circuit is measured in pounds per square inch, while in electricity it is measured in volts. The amount of power in the water system is usually designated in terms of horsepower, while in electricity it is measured in watts or kilowatts. Energy in the water analogy is measured in horsepower hours, while in electricity it is measured in kilowatt hours.

Professor Ohm's Discovery

If the pressure in our pipe line is increased the flow of water through it in gallons per minute is increased. Professor Ohm found that an increase in voltage applied to a given conductor or wire path would also cause a strictly proportional increase in the current flow. Applying this discovery he worked out a series of rules which I shall now give you:

- (1) To find the resistance in any electrical circuit divide the pressure by the current flow or rate.
- (2) To find the voltage in any elecmaking these measurements has been ex- , the current flow.

(3) To find the current flow in the circuit divide the pressure by the resistance. To simplify these rules the pressure is termed voltage, the resistance ohms and the rate of current flow amperes.

The power furnished by electricity to any electrical apparatus depends on the amount of turrent flow and the pressure or voltage. In other words, if we mulpower in watts. To be more specific, if a motor takes five amperes and operates on 110 volts it uses 550 watts. The cost of electrical service is based on kilowatt hours. For instance, if the motor used three kilowatts of power per hour in eight hours it would use twenty-four kilowatt

Practical Problem

Now, let me give you a practical problem illustrating the use of "Ohm's Law." Let us go back to our vacuum tube circuit. The battery we are using, let us say, is rated at six volts. Assuming that the resistance of the rheostat, the conductor and the vacuum tube totals twenty-four ohms, what will be the current flow in amperes? Applying the third section of "Ohm's Law," which states that the number of amperes flowing equals the voltage divided by the number of ohms resistance, we have six volts, divided by twenty-four ohms, or twenty-five hundredths amperes. The power being used is six volts times .25 amperes, or 1.5 watts.

Of course, to operate a radio set all this calculation is unnecessary, but it is always well to be familiar with the law of Ohm. Every radio set owner should be provided with a voltmeter and an ammeter in order that the strength of his batteries may be determined from time to time, as this procedure will guarantee perfect reception at

about alternating current and will begin trical circuit multiply the resistance by our study of the phenomena surrounding the propagation of the radio waves.

Fourth Conference Recommends Important Changes

rendition of each copyright musical num-

ber, and "Whereas, Broadcasters believe that copyright owners should have the sole. complete and entire right to withhold their property from all broadcasting if they so desire; but that if a copyrighted number is released by the owner thereof to one or more broadcasters, then such number shall become available to all broadcasters, and

"Whereas, The present conditions threaten the entire broadcasting structure and the continuation and permanence of broadcasting depends upon this problem, and

"Whereas, All attempted solutions through negotiation between the parties have proved unavailing; now, therefore,

"Resolved, That it is the sense of this conference that the only possible solution lies in the enactment of suitable legislation based upon the above principles, and it is the recommendation of this conference to the Secretary of Commerce that such legislation be suggested to Congress."

Advertising by Radio

A problem upon which practical unanimity obtained was the question of advertising by radio. The committee on advertising drafted a resolution which stated that "the best interests of the listening public, of the radio industry and of the broadcaster are all served by that form of broadcasting which provides a meritorious program of entertainment and educational nature and which limits itself to the building of good will for the sponsor of the program whether he be the owner of the station or a subscriber utilizing its facilities. . . The conference deprecates the use of radio broadcasting for direct sales effort, and any form of special pleading for the broadcaster or his products, which forms are entirely appropriate when printed or through direct ad(Continued from page four)

itself rather than by mandatory legislation, and it urged upon every broadcasting station the adoption of a code of standards which would safeguard radio pro- shall be sought. grams from objectionable matter.

The committee heard the appeal of Mr. Schubel, representing station WHN, to the effect that he considered notices of bargain sales in various stores and descriptions of products on sale a part of his station's function of disseminating useful informaion to the public, and that this kind of information is acceptable to the radio audience and a benefit to the country at large by reason of the resultant stimulation of business. Mr. Schubel's remarks. however, aroused no enthusiasm on the part of the committee, so contrary were they to the almost unanimous consensus of opinion upon the subject. The radio microphone is an invitation to the broadcast listener's home, and a sales appeal by the broadcaster is considered by most of those in a position to judge an imposition which not only antagonizes but threatens the popularity of radio broadcasting if it were generally indulged in.

Report on Interference

A group of recommendations made by the committee on interference, under the leadership of Major General George O. Souier. presented a series of resolutions to the conference which were accepted almost without modification, with regard to existing radiating receivers. Its report stated that the elimination should "preferably take the form of persuasion rather than coercion." It urged the use of vigorous publicity to educate the users of radiating receivers and urgently recommended "that at some definite and reasonable future date the manufacture and sale of all radiating receivers for broadcast reception be discontinued. Because vertising mediums." The conference also of the benefits which will accrue to the approved the recommendation that this radio public from the suppression of the for five years instead of for ninety days,

problem should be solved by the industry | radiating receiver it is urgently recommended that if the manufacture and sale of such receivers be not discontinued within a reasonable period, legislation to that end

The Fight

Objection to the committee's report was cffered by Powell Crosley jr., who maintained that it discriminated against regenerative receivers, to the advantage of other types which also may radiate due to defective adjustments. Arising after manufacture or to inherent characteristics of design. He also pointed out that radiation is entirely controllable with regenerative receivers, that listeners could be educated to prevent radiation with such receivers, that their lower cost made radio available to thousands who could not otherwise enjoy the benefits of radio reception, and that the annoyance caused by occasional accidental radiation is highly exaggerated. The final report of the committee was modified as a result of Mr. Crosley's remarks so that its wording does not discriminate against the regenerative receiver as the only type which radiates. The conference, however, did not withdraw is recommendation leading to the ultimate prohibition of the manufacture of highly radiative types of receivers.

Scores of proposals were adopted by the conference which will contribute to the betterment of radio conditions. It was learned that radio amateurs voluntarily recommended the abandonment of spark telegraphy in their band of wavelengths, that successful negotiations had been concluded with certain foreign governments reducing or eliminating spark telegraph communication within 250 miles of our shores which will interfere with broadcast reception; and recommendations were adopted to the effect that high power broadcasting transmitters should be removed from congested areas, that licenses should be issued to broadcasting stations

as at present; that rebroadcasting of programs without consent of the original broadcasting stations should be prohibited by law, that legislation should be passed which permits appeal from decisions of the Secretary of Commerce to an appropriate court, and numerous other significant proposals.

Firms Represented

The proceedings of the conference were marked by a spirit of co-operation and fair consideration to the numerous diverse interests involved. Representation was magazines, newspapers having radio sections, press associations, organizations of broadcast listeners, commercial radio companies, manufacturers of radio apparatus. amateur organizations, radio trade associations and governmental departments.

Collecting a Note Via Radio (Continued from page two)

'static collector'-the silvery ball affairis operated by a high-tension spark coil connected with the aerial.

"To obtain the best illusionary effect all external wires should be concealed and the phonograph and spark coil should be nowhere m evidence.

"I sincerely trust that you will not think me presuming on your ignorance in giving you the foregoing information. "Incidentally, and in concrusion, an old

friend of yours requests me to send you the inclosed note, which, through some slight oversight on your part, you did not pay thirty years ago. You will no doubt be pleased to observe that the note is marked 'Paid.' "Cordially yours,

"J. YERGER JAMISON." George Hampton laughed as he returned the missive to his father. "That's what I call rubbing it in, J. Y. What are

you going to do with the letter?" "Mail it, together with the note, when our train makes the next stop." THE END

Five Men at WKRC Have Same Name

KICKBACKS The Fourth National Radio Conference closed last Thursday evening without hampering with the amateur wave band assignments, thanks to Hiram Percey Maxim, the representative of the American Radio Relay League and the transmitting amateur. The argument favoring no change of wave length assignments was that the amateur succeeded in operating so well during the past year that

AMATEUR ****

there was no need for change in wave bands for this fraternity of experiever, that radio manufacturers should discontinue the manufacture of regenerative receivers. Apparently nothing was said about what wave lengths, prohibition of this type receiver was to be effective. For broadcast reception, where the require-

ments of the receiver are to receive

modulated signals, this is an exceed-

ingly excellent idea. It is said that interference caused by radiating receivers is one of the greatest problems in radio broadcast reception. Now it will be eliminated. However, we are wondering if this will apply to amateur wave lengths. The amateur will be almost lost without a regenerative receiver. As a matter of fact at the present time this is the only type of set adapted to his work. Receivers which are not regenerative are difficult to handle on short waves where the quickest possible means of covering the entire wave band in the shortest length of time is required for successful operation. The fact that the amateur employs a receiver which is capable of radiating will not interfere with the

However, if this regulation applies to amateur bands the amateur will find a means of making a receiver that will not radiate and will be equally efficient for his needs.

reception of broadcast signals.

2LZ recently remounted his transmitter and is operating on both 150 and 75 meters. He succeeds in working stations to the north and south of him with regularity, but has difficulty in reaching the west. His transmitter employs one five-watt tube.

2XBF is evidently keeping a late schedule, as we have heard him on the air on several occasions during the last week. He seems to handle all messages which are given to him with remarkable speed. He receives them during the day at XBF and relays them at night at his own sta-

2CQZ is operating on both 40 and 180 meters. At the present time he is rebuilding his short wave trans-

After buying two perfectly good five-watt tubes, 2LZ had the misfortune of dropping one of them. The remaining tube is being used on both 175 and 80 meters, and excellent results are being obtained.

The consistency with which Amerinations marks, in our mind, the opening of an excellent DX season in which almost unbelievable things will happen as far as amateur radio is concerned. Already the static has fled as if overpowered by its enemy

On both the 40 and 80 meter bands British, French and other amateurs located in the western portion of Europe may be heard as early as 5 o'clock in the evening. This insures regular communication, because most American amateurs are home for dinner about this time and usually find a few minutes afterward to "pound brass."

However, if one desires to communicate with amateurs located in the southern Pacific waters he will have to be an early riser, as their stations are seldom heard before 3 o'clock in the morning. (It may happen that some amateurs do not come home till this hour.) In spite of the hour we have heard amateurs communicating with Australia and New Zealand amateurs quite frequently.

Communication can be maintained until the sun comes above the horizon and seemingly blots out these distant signals with its rays.

2BIR, who recently put a fortymeter set in operation, has worked his first foreign station. At this writing we do not know the call letters of the station, but we do know that it is French, and BIR is quite

"Eugene" is not a common name, by any means, but when five men are together every night in one studio with the same name, there is some confusion. Station WKRC, the K del Radio Corporation, has five "Eugenes" at their station; Eugene Mittendorf, studio director; Eugene Perazzo, musical director: Eugene Schmidt, tenor soloist of the Cincinnati Conservatory of Music; Eugene Wesselman and Eugene Huber, operators. And so they have been given a number; Eugene Mittendorf is "Number One." and so on down the line. The five "Genes" challenge any other radio station in the world to produce five men with the same name, even though the name be "John," who are permanently at the studio and on programs.

School Classes to Recite to | day's topic. The topics in their cor-| town High School; "Agriculture in

Station WJZ will co-operate with the Know-Your-School Day, Community Violin and Organ Recital to Board of Education of New York and Health Day and For God and Follow St. George's Vespers City in bringing the subject of edu- Country Day. cation into the homes of the radio Monday, November 16-Program in audience. To this end the hour of charge of Dr. Benjamin Veit, dis-2 to 3 in the afternoon of the week trict superintendent of junior high Church at 4 o'clock this afternoon of November 16 has been turned over schools. Music and class recitations In addition to Mascagni's Intermease to the Board of Education by the sta- by pupils of junior high schools in which Miss Bennett will play as tion for their use, and educational New York City. programs will be presented. The Tuesday, November 17-Class reci-Board of Education has arranged to tation by pupils of Richmond Hill organ recital will follow immediately bring to the studio entire classes, High School; junior high school orand recitations will be held there just chestra; lecture by Alfred C. Bos- Kemmer at the organ. At this time as they are in the schools. By this som. method the radio audience will have Wednesday, November 18-Program of Gluck, arranged for violin by the opportunity to listen in on the in charge of Hugo Newman, principal Kreisler and "The Old Refrain." Mr. daily lessons being taught in the av- of New York Training School for Kemmer's organ solo will be erage public school in the city, and Teachers, and program by pupils of at the end of the week should have his school. a better understanding of the type Thursday, November 19-Flushing of education the children are receiv- High School Orchestra; talk by the ing. Each day of the week has been Hon. George J. Ryan, president of and of the efficiency of the set plus

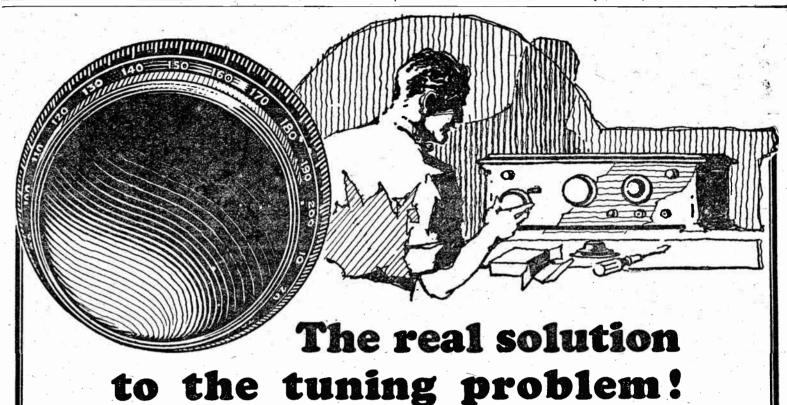
Microphone in Education Week
The week of November 16, is known

The week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the week of November 16, is known the as American Education Week, and Day, Conservation and Thrift Day,

reciting on that day will discuss the tion in Agriculture by pupils of New-| Secretary Hoover.

Viclin solos by Miss Mozelle Benafter the vespers with Mr. George Miss Rennett will play the Melodis Thee Is Joy," by Bach.

"Radio Golf is an exercise of skill given a particular topic, and classes the Board of Education; class recita- a gamble on the radio weather," says



MAKE your radio a 1926 model. Replace your present Dials with Rathbun Straight Line Frequency Converters which spread all stations within the range of your receiver uniformly around the whole circle of 360°. All stations are a uniform distance apart on these new Converters. This is the ideal tuning condition.

Why be satisfied with Dials or Condensers which are limited to 180° or only half the dial? Why stop at 180° when there are 360° in the circle? There are no gears with their back lash, no friction with its slippage in Rathbun Straight Line Frequency Converters—only two moving parts, a variable cam and a lever. Easily and quickly installed on any set-it is not necessary to cut Condenser

The Rathbun Straight Line Frequency Converter is one of the few really new things in Radio during the past three years.

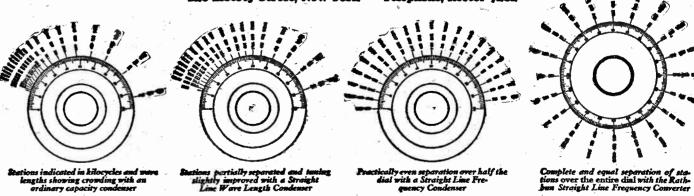
Don't forget that we build the Rathbun Single Hole Mounting Condenser with genuine Bakelite ends. This year's models are all enclosed with transparent pyralin dust bands which preserve their high efficiency for life. Small, light, rugged, handsome and none lower loss or higher in efficiency. Reasonably priced.

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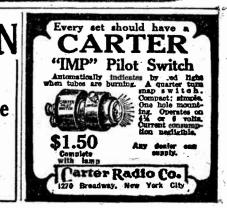
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Committees Report to Radio Conference

Additional Radio Programs for the Week

(Continued from preceding page) WOR—NEWARK—405
6:45-7:15-7:45 a. m.—Gym class.—
2:30 p. m.—Brace Conning, Camelia Campbell, scenes from "Romeo and Juliet."
2:45 p. m.—Al Wilson and Playmates.
5 p. m.—Brace Couning, Camelia Campbell. \$15 p. m.—Al Wilson's Playmates. m.—Al Wilson's Playmates.
m.—Shirley Booth, songs.
m.—"The Doberman Pinscher.
m.—"Words Mispronounced."
m.—"Sports," Bill Wathey.
m.—Shelton dinner music.
m.—News bulletin. WGCP-NEWARK-252 m.—Elvira Geiger, pianist. b. m.—Bert Dagmar, songs. p. m.—Eller and Aronson, enter-3:45 p. m.—Hughle Woolford, planist. . —Studio program.
. m.—Harry Spear, songs.
. m.—Sylvia Schatz, pianist. WFI-PHILADELPHIA-395 -Phoenixville Club. m.—Phoenixville Club.
p. m.—Fashion feature.
p. m.—Concert orchestra.
m.—Dance orchestra.
m.—The Larkinites.
p. m.—'Pop'' concert.
m.—Address by President Coolidge.
m.—'Zippers.'' WLIT—PHILADELPHIA—395.
5 p. m.—Organ recital; religious vice. 12:30 p. m.—Concert orchestra. m .- Concert orchestra; artist r

4:30 p. m.—Artist recital. WCAU—PHILADELPHIA—278

m.—Snellendus
m.—Recital.
m.—Barry O'Moore, tenor.
p. m.—Central Radio Syncopators.
p. m.—Musical chefs.
Sasqui-Centennial hour. . m.—Setting-up exercises. n.—Luncheon music. a.—Artist recital. b. m.—Pagoda Orchestra. a.—"The Sesqui-Centennial. I p. m.—"The Sesqui-Centennia. 8:15 p. m.—Services. 9 p. m.—Talk. 8:15 p. m.—Fraternity night features. 19:86 p. m.—Joe Ray's Night Hawks.

WOO--PHILADELPHIA--508 a. m.—Grand organ.

noon—Luncheon music.

p. m.—Grand organ and trumpets. WPG-ATLANTIC CITY-300 p. m.—Luncheon music.
p. m.—Tea music.
p. m.—"Billy" Rocap, sports
p. m.—Organ recital.

WHAR—ATLANTIC CITY—275 m.—Seaside Trio.
p. m.—Health talks.
m.—Seaside Trio.
WGY—SCHENECTADY—380

p. m.—Music; talk.

30 p. m.—Dinner program.

30 p. m.—WGY book chat.

45 p. m.—Address, "Conservation and hrift Day," Dr. A. R. Brubaker.

p. m.—United States Army Band.

p. m.—Address by President Coolidge.

p. m.—Royal Salon Orchestra. WRW—TARRYTOWN, N. Y.—273 9:05 p. m.—Dick Tobin, pianist. 9:15 p. m.—Arcadian Serenaders. 9:45 p. m.—Joseph Davis, saxophonist.

m.—Joseph Davis, saxophonist. m.—Westchester Rambiers. WGR—BUFFALO—319 p. m.—Dinner music. p. m.—Program same as WEAF. WTIC—HARTFORD. CONN.—476 -Dinner music. -"Education in Connecticut.

WJAR—PROVIDENCE—306 WEEI-BOSTON-349 WÉEI-BOSTON-349
6:45 a. m.—Health exercises
7:45 a. m.—Organ studio watch.
1 p. m.—Assembly lancheon.
3 p. m.—Jos Herman's Orchestra.
6:50 p. m.—Lost and found; weather.
7 p. m.—Big Brother Club.
7:45 p. m.—Talk.
8-11 p. m.—Program same as WEAF.
WNAC-BOSTON-280

m.—Program same as WEAF.
WNAC—BOSTON—280 WNAC-BOSTON-280
10:30 a. m.—Bible readings; Women's
Club talks.
12:15 p. m.—Noon service.
1 p. m.—Luncheon orchestra.
1:50 p. n.—Popular songs.
4 p. m.—Morey Pearl's Ramblers.
6 p. m.—New WNAC Radio Club.

3:30 p. m.—Dinner dance. D. m.—Musical program. WBZ—SPRINGFIELD, MASS.—333

WEZ-SPRINGFIELD, MASS.—333
6:30 p. m.—To be announced.
7 p. m.—Market reports.
7:05 p. m.—Westet reports.
8: Charlton Black.
7:30 p. m.—Kimball dance orchestra.
8: p. m.—Musical program.
9: p. m.—Opera, "Rigoletto."
10:05 p. m.—William Anderson program.
WTAG-WORCESTER. MASS.—268
10:30 a. m.—Radio Chats.
12:05-2 p. m.—Luncheon music.
4:30 p. m.—Radio entertainment.
5:15 p. m.—"Story Teller."
8-11 p. m.—Program same as WEAF.
WEC-WASHINGTON—469
10 a. m.—Women's-Hour from WJZ.

10 a. m.—Women's Hour from V 12 noon—Organ recital. 1 p. m.—Washington Orchestra. 7 p. m.—Lee House Trio 7 p. m.—Lee House Trio.
7:45 p. m.—Smithsonian Talk.
8 p. m.—United States Army Band.
9-10 p. m.—Annual dinner of the Chamber of Commerce; address by President Coolidge.
10 p. m.—Royal Salon Orchestra.
11-12—Meyer Davis Band.

KDKA—PITTSBURGH—309
6-15 p. m.—Dinner concert.

6:15 p. m.—Dinner concert.
7 p. m.—Uncle Ed.
7 to m.—Current events. 7.43 p. in.—Current over the second of the s WCAE—PITTSBURGH—461

WCAR—FILLIAND

8:80 p. m.—Dinner concert.

7:30 p. m.—Children's period.

8 p. m.—Larkin period.

10 p. m.—The Zippers.

WTAM—CLEVELAND—390 6-7 p. m.—Dinner music. WEAR—CLEVELAND—390 p. m.—Organ recital WADC—AKRON, OHIO—258

6:30 p. m.—Dinner music. 9:30 p. m.—Artists' recital. m.—Artists recita... m.—Silvertown Orchestra. WSAI—CINCINNATI—326 WSAI—CINCINNATI—326 8-10 p. m.—Program same as WE WLW—CINCINNATI—422 8 p. m.—Dinner concert; talk.
10 p. m.—Recital.
11:03 p. m.—Doherty Melody Boys; ten

and organ some.

12:15 a. m.—Orchestra selections.

1:15 a. m.—Midnight Bow-Wows.

WKRC—CINCINNATI—422

Oct-Wurlitzer classical

11 p. m.—Post-Wurlitzer classical ser 12 midnight—Mixed program. WJH—PONTIAC, MICH.—517 p. m.—Goldkette's Ochestra; soloist. WWJ-DETROIT-353 m.—Program same as WEAF. WREO—LANSING, MICH.—28 prano. 6:30 p. m Tierney Chers. 11:30 p. w Fordham Orchestra. \$ p. m.—Dinner concert; enser

p. m.—Artists' recital. m.—Artists' recital. m.-2 a. m.—Artists and orchestra WEBH-CHICAGO-370 n.—Dinner concert; songs. m.—Dance music; songs. . m.—Dance orchestra; artists. WGN-CHICAGO-370 m.-Dinner dance music m.—Dinner dance mus m.—The classic hour.

WLS-CHICAGO-345 7:15 p. m.-Organ; story; Salvati WMAQ-CHICAGO-448 7 p. m.—Organ recital; orchestra. 9 p. m.—Garden talk; financial talks. 10 p. m.—University of Chicago lect 10:40 p. m.—League of Nations Asso

WQJ—CHICAGO—448 8 p. m.—Rainbow Orchestra: 11 p. m.—Musical program. 2 a. m.—Ginger hour. WHT-CHICAGO-400 ...—Classical program. m. (238 meters)—Orchestra p. m.—Jelke Entertainers.

KYW-CHICAGO-536 m.—Dinner concert.
p. m.—Farm speeches.
m.—"Good Reading." p. m.—"Good Reading.

20 p. m.—Musical program.

1 p. m.—"Evening at Home."

3 a. m.—"Insomnia Club." WJAZ-CHICAGO-322

WCBD—ZION, ILL.—345 WENR-CHICAGO-266 n.—Dinner concert.
. m.—Rauland Lyric Trio.
. WOC—DAVENPORT—484 WOC—DAVENPORT—484
6:45 p. m.—Chimes concert.
8-11 p. m.—Program from WEAF.
12 midnight—Le Claire Orchestra.

FRIDAY

WEAF-NEW_YORK_CITY-492 WEAT—NEW JOHN 6:45-7:45 a. m.—Health Exercises, 10:45 a. m.—Home Service Talk, 11:05 a. m.—Ruth Friedman, planist m.—Talk.
. m.—Columbia University Lecture.
2 (noon)—Market and Weather reports. p. m.—Dora Gutentog, Sadie Zucker-

man, pianists.
4:15 p. m.—Harriet Youngs, soprano.
4:35 p. m.—Dora Gutentog, Sadie Zucker-4:35 p. m.—Dora Gutentog, Sadie Zuckeman, duets.

45 p. m.—'What Do Fishes Eat?''
6 p. m.—Gene Ingraham's Orchestra.

7:30 p. m.—Story Teller.

7:45 p. m.—Minnie Weil, planist.
8 p. m.—The Happiness Boys.

8:30 p. m.—Eagle Neutrodyne Trio.
9 p. m.—Home Entertainera.''
10 p. m.—John Drew, actor.

10:15 p. m.—Musical program.

10:30 p. m.—David Berend, banjoist.

10:45 p. m.—Musical program.

11-12 p. m.—Meyer Davis' Orchestrs.

WINNEW YORK CUTY. 455.

WJZ-NEW YORK CITY-455 0 a. m.—Women's program. 1 a. m.—News. 1:05 a. m.—"Arts and Decorations. p. m.—Ambassador Trio: 4, 5:30, 7:30 and 10:25 p. m.—New

2, 4, 5:30, 7:30 and 10:25 p. m.—News sorvice.
3 p. m.—Educational program.
4:05 p. m.—Ethel Rea, soprano.
4:15 p. m.—Charies Phillips, pianist.
4:30 p. m.—Astor Tea Orchestra.
5:32 p. m.—Market quotations.
5:50 p. m.—Financial summary.
6:30 p. m.—N. Y. University Course;
"Banking," Prof. Reid L. McClnng.
7 p. m.—Bernhard Levitow's Orchestra.
8 p. m.—Museum talk.
8:15 p. m.—To be announced.
10:30 p. m.—Lorraine Orchestra.
WJY—NEW YORK CITY—465

WJY-NEW YORK CITY-405 WGBS-NEW YORK CITY-316

WGBS—NEW YORK UIX—319
10 a. m.—American Education Week;
Mary Miller, pianiste.
1.30 p. m.—Scripture reading.
1.35 p. m.—Mabel Bornkessel, soprano.
2 p. m.—Mildred Silverman, pianiste.
p. m.—Dr. John H. Finley, "The Blind."
3:10 p. m.—Leroy Montesanto, tenor.
3:20 p. m.—"Value of the Drama," Everatt Hackess. ett Hackess.

3:30 p. m.—Value of the Drama," Everett Hackess.

3:30 p. m.—Leroy Montesanto, tenor.

3:40 p. m.—Dr. Alfred G. Robyn.

3:50 p. m.—Leroy Montesanto, tenor.

6 p. m.—Uncle Geebee.

6:30 p. m.—Jule Anzel's Orchestra.

6:50 p. m.—What's Your Radio Problem".

-Ohio State football rally. Ted 7 p. m.—Ohio State football rally. Te Lewis, cheer leader, and band. WNYC—NEW YORK CITY—526 6:10 p. m.—Market high spots. 6:20 p. m.—Piano selections. 6:30 p. m.—Elementary French lessons.

/ p. m.—Advanced 17:30 p m.—Police alarms.
7:30 p m.—Police alarms.
7:35 p. m.—Board of Estimate meeting resume.

8 p. m.—Concert by Patterson's Artists: Clarabel Nordholm, Lillian Freedman, Augusta Ludwig, Hortense Rabinovich, Mrs. Lester Miller, Eugene Frey.

9 p. m.—Rudolph Joskowitz, violinist.

9:30 p. m.—Recital; talk, Herman Neu-

man, 19:10 p. m.—'Books'' Prof. I. G. Track 10:30 p. m.—Police alarms; weather. 10:35 p. m.—Colonial Dance Orchestra WHN-NEW YORK CITY-361 215 p. m.—June Lee, singing. 230 p. m.—Hock and Jerome, songs. 245 p. m.—Arnold Zeitler, violinist. 3 p. m.—Max Hitrig, Jack Val, Lev Piotti songs.

tti, songs.
p. m.—Judith Roth, soprano. Flotti, songs.

3:45 p. m.—Judith Roth, soprano.

4 p. m.—Herman Streger, planist.

4:30 p. m.—Uncle Robert's Pals.

5 p. m.—Gus Gold's Orchestra.

6 p. m.—Dinner Music.

6:15 p. m.—Daddy Winkum's Machine.

6:30 p. m.—Litman's Dinner Music.

7 p. m.—Harry Richman's Entertainers.

7:30 p. m.—Melody Orchestra.

8 p. m.—Frank Galassi, planist,

8:15 p. m.—Marie Leder, Edith Higgins,

singers.

singers.
330 p. m.—Barnet Ginsberg, violinist. 8:30 p. m.—Barnet Ginsberg, violinist 8:45 p. m.—Johnny Tucker, singing. 9 p. m.—Henrietta Turner, songs. 9:15 p. m.—Martin Walsh, singing. 10:30 p. m.—Dance orchestra. 11 p. m.—Caravan's Orchestra. 11:30 p. m.—Alabam Orchestra. 12 midnight—Revue and orchestra.

WRNY-NEW YORK CITY-259
10:30 a. m.—Reducing 10:30 a. m.—Reducing exercises.
10:45 a. m.—Dr. Harry Finkel, "Diet."
11 a. m.—Women in Business."
12 m.—Hour of music.
4:15 p. m.—Afternoon program.
4:30 p. m.—Symphony Society notes.
6 p. m.—Hour of music.

n.—Hour of music.
m.—'Whose Birthday Today?''
b. m.—Telegraph sportflash.
c. m.—Commerce of the day. 7:10 p. m.—Commerce of the day.
7:15 p. m.—Opera notes.
7:20 p. m.—Code lesson.
7:45 p. m.—Alfred McCann, "Foods."
8 p. m.—Taverna Opera Company.
8:45 p. m.—Eugene Fry, songs.
9:15 p. m.—Band concert.
9:45 p. m.—"Science Finds Creative Expression."

pression."
10 p. m.—Ralph Christman, opera story.
10:15 p. m.—Novelty Night, German WFBH—NEW YORK CITY—273 WFBH—New Action of the program.

p. m.—Orchestra.
p. m.—Studio program.

130 p. m.—Murray Schwartz, planist.
i p. m.—Judith Roth, soprano.
130 p. m.—Tea table talks.
145 p. m.—Irma Sachs; soprano.
5 p. m.—Bob Fleming's Orchestra.
6 p. m.—Educational talk.
6:15 p. m.—Katherine Connolly, prano.

WMCA—NEW YORK CITY—341
p. m.—Olcott Vail's String Ensemble.
30 p. m.—Ernie Golden's Orchestra.
30 p. m.—Talk on Education Week. 1:30 p. m.—Tałk on Education Weda.,
Albert Renna, violinist.
8:15 p. m.—Marion Lindsay, soprano.
8:50 p. m.—"The Municipal Housewife,"
Fred M. Zittell.
9 p. m.—Hardman Hour of Music.
10 p. m.—Elsa Gray, soprano.
10:30 p. m.—May Singhi Breen, Peter De
Rose, four Jack Roses.
11 p. m.—Edward French, pianist.
11:15 p. m.—Donald Flamm. critic.

WEBJ-NEW YORK CITY-273 3:25 p. m.—Roth Instrumental Trio. WKCB-BROOKLYN, N. Y.-240 WAHG-RICHMOND HILL, N. Y.-316

12 (noon)—Musical program.
7:30 p. m.—Maurice E. Connolly.
7:45 p. m.—Alvin Genesen, Sid Cohen. p. m.—Organ recital, p. m.—Alvin Genesen and Sid Cohen. 9 p. m.—Alvin Genesen and Sid Conen. 9:15 p. m.—Metropolitan Serenaders. 9:30 p. m.—Martha Brauninger, soprano. 9:45 p. m.—Metropolitan Serenaders. 10 p. m.—Professor Mayne, "Speech." 10:15 p. m.—Kentucky Ramblers.

WOR—NEWARK—405
6:45-7:15-7:45 a. m.—Gym class.
2:30 p. m.—Alice Raymond, violinist.
2:45 p. m.—"Ralph Waldo Emerson, op. m.—Alice Raymond, violinist.
for. m.—"Ralph Waldo Emerson
p. P. Adams.
m.—Alice Raymond, violinist.
p. m.—Archie Slater's Orchestra.
p. m.—"Words Mispronounced."
p. m.—"Sports," Bill Wathey.
p. m.—Man in the Moon Stories.
p. m.—News bulletin.

WAAM NEWLEN. WAAM-NEWARK-262

WAAM—NEWARK—262

11 a. m.—Happy, hour cocking school.

6 p. m.—Danny Hope's Boys.

7 p. m.—Joe Chickene's Orchestra.

7:30 p. m.—The Sport Oracle.

7:45 p. m.—Mildred Germaine, pianist.

8 p. m.—John Mark, violinist.

8:20 p. m.—MagGregor Brown, barytone.

8:35 p. m.—Agnes Kernochan, contraitor

8:50 p. m.—Ag. MacGregor Brown, barytone. op. m.—New Brunswick Night.

WGCP-NEWARK-252 m.—Studio program.
p. m.—Tenor and concert pianist.
m.—Orchestra.
p. m.—Daddy Winkum's rhyme machine. 3:30 p. m.—Orchestra. 7 p. m.—Richman Entertainers. 7 p. m.—Richman Entertainers. 7:30 p. m.—Studio program. 8:15 p. m.—Clarence Williams Trio. 8:35 p. m.—Charles Rosencranz Orches-

tra. 9:05 p. m.—Shirley Herman, songs. 9:15 p. m.—Ukelele Bob McDonald 9:30 p. m.—Ukelele Bob McDonald. 9:30 p. m.—Eva Rothenberg, planist. 9:45 p. m.—Plotti and Val. songs. 10 p. m.—Strickland's Orchestra. 11:30 p. m.—Bob Murphy's entertain 12 (midnight)—Connie's Orchestra. WFI-PHILADELPHIA-395

10:30 a. m.—Solos.
10:40 a. m.—Home Service Talk.
1 p. m.—Tea room ensemble.
3 p. m.—Conservation and Thrift D. musical selections.
3:45 p. m.—Fashion feature.
6:30 p. m.—Concert orchestra.
7 p. m.—Dance orchestrs. WLIT—PHILADELPHIA—395

WLIZ-PHILADELPHIA—395
12:05 p. m.—Organ recital; religious services; orchestra.
2-4 p. m.—Concert orchestra; playlet.
4:30 p. m.—Dance music.
7:30 p. m.—Dream Daddy.
8 p. m.—"Philadelphia Leads America.'
8:10 p. m.—Sports talk.
8:25 p. m.—Artist recital.
8:45 p. m.—Philadelphia spelling bee.
10 p. m.—Dance orchestra, Frank Desio, director. director. 30 p. m.—Rufus and Rastus.

WCAU-PHILDELPHIA-278 9 p. m.—Hill's Instrumental Trio.
130 p. m.—Billy's saxophore.
145 p. m.—F3 WIP-PHILADELPHIA-508

WOO-PHILADELPHIA-508 1 a. m.—Grand organ.
2 noon—Luncheon music.
145 p. m.—Grand organ and trumpet.
130 p. m.—Dinner music. p. m.—Dinner music.
m.—To-day's topics.
p. m.—J. W. C. I. Band.
p. m.—Nicolletti Harp Ensen
p. m.—Fox Theater Orchestra.

p. m.—Comedy Boys. :10 p. m.—Organ recital.

10 p. m.—Organ recital.
WHAR—ATLANTIC CITY—275 p. m.—Football forecast. m.—Seaside Trio. p. m.—Strand organ recital. WCY—SCHENECTADY—380

p. m.—Asia Orchestra. :30 p. m.—Music; one-act play, 'False Colors."
6:30 p. m.—Sunday school lesson.
7 p. m.—Albany Strand Theater \(\omega \) p. m.—Albany chestra.

1:30 p. m.—Health talk.

7:40 p. m.—"Know Your School Day,"
Dr. George M. Wiley.

7:50 p. m.—Comedy-drama, "The Taming of the Shrew."

m.—One-act play, "The Violing the Shrew."

30 p. m.—Vocal program by pupils. WRW—TARRYTOWN, N. Y.—273 105 p. m.—Melody Boys' Orchestra.
130 p. m.—Almo Entertainers.
145 p. m.—Frank Johnson, planist.
1015 p. m.—Melody Boys' Orchestra.
1015 p. m.—Almo Entertainers.
1015 p. m.—Nicolas Koenig's Orchestra.
1015 p. m.—Frank Johnson, planist.
1015 p. m.—Nicholas Koenig's Orchestra.

chestra.
WGR—BUFFALO—319 WGR—BUFFALO—319
10.45 p. m.—Radio cooking school.
6:30 p. m.—Dinner music.
7:30 p. m.—Tialk by Santa Claus.
8:25 p. m.—Niagara School of Music.
8:55 p. m.—"Honey," R. B, Willson. p. m.—Winger's Entertainers.

30 p. m.—Buffalo Arts Club.

30 p. m.—"Something Different."

p. m.— something Different."
p. m.-1 a. m.—Supper music.
WHAM—RGCHESTER, N. Y.—278
30 p. m.—Bastman Theater Orchestr
p. m.—Student recital.
p. m.—Eastman Theater Orchestra.
10 p. m.—Weather forecast: market :30 p. m.—Weather forecast; marke WMAK—LOCKPORT, N. Y.—266 o 10 p. m.—Six-ply balloon hour. WCAC-MANSFIELD, CONN.—275 7:20 p. m.—Music; reports.
7:30 p. m.—Poultry course.
7:45 p. m.—Musical program.
WTIC—HARTFORD, CONN.—476
6:30 p. m.—Young People's Hour.
7 p. m.—Dinner music.

p. m.—Dinner music.

15 p. m.—Margretta Purves, soprano.

30 p. m.—Travelers' quartet and artists.

0 p. m.—Dance music.

1:30 p. m.—Popular half hour.

WJAR—PROVIDENCE—306 WJAR-PROVIDENCE-306
10 a. m.—Housewives' exchange.
1:05 p. m.—Woodstock Entertainers.
8 p. m.—Margaret Reid,
8:15 p. m.—Beethoven Quartet,
9 p. m.—"Rozy's Gang."
11 p. m.—Bittmore Danne Orchestra.

6:45 a. m.—Health exercises.
7:45 a. m.—Health exercises.
7:45 a. m.—Home Serwice Talk.
3 p. m.—Dornen Studio watch.
3 p. m.—Dr. H. J. Broughton.
3:15 p. m.—Dance Orchestra.
6:50 p. m.—Lost and found; weather.
7 p. m.—Big Brother Club.
7:50 p. m.—Mrs. Blatt, reader.
8 p. m.—Neapolitan Musicale.
8:30 p. m.—Sager's Hospitality.
9 p. m.—Musicale.
10 p. m.—Orchestra.

WNAC-BOSTON-280 10:30 a. m.—Bible reading. 12:15 p. m.—Noon service. 2:13 p. m.—Noon service.
p. m.—Luncheon concert.
p. m.—Tea dance.
1:20 p. m.—Ray Sinatra, Perley Stevens.
p. m.—Kiddies' Club.
1:30 p. m.—Checker Inn Dinner Dance.
p. m.—Varied program.
1 p. m.—Harvard-Yale dance.

WBZ—SPRINGFIELD, MASS.—333 p. m.—Leo Reisman's Ensemble. n.—Market reports p. m.—"Civil Service Examination 105 p.m.—"Civil Service Examinations."
115 p.m.—Choir of First-Baptist Church
p.m.—To be announced.
10 p.m.—Francis O'Donnell, tenor
Elleen Kennedy, violinist.
p.m.—Lloyd Broome, Valmond Cyr, or
gan recital gan recital.
9:45 p. m.—Stanley Cross; bass.
10:05 p. m.—McEnelly's Singing Orches-WTAG-WORCESTER, MASS.-268

WTAG—WORCESTER, MASS.—268 1:30 a. m.—Radio chats, 2 p. m.—Market and weather report. 1:05-2 p. m.—Luncheon music. 1:5 p. m.—"Story Teller." p. m.—Concert program. WRC-WASHINGTON-169 a. m.—Women's hour from WJZ.
noon—Organ recital.
n.—Hamitton Orchestra.
m.—WRC's Foolish Entertaine.
m.—Book reviews. WCAP—WASHINGTON, 469
:45-7:45 a. m.—Setting-up exercises.
p. m.—Market summaries.
:45 p. m.—Modern Refrigerating D

m.—Almas Chanter's Male Chorus p. m.—Dance music. KDKA—PITTSBURGH—309 p. m.—Dinner concert.
p. m.—Daddy Winkum,
b. m.—Radio chat.
p. m.—Dutch master half hour. m.—Teaberry time WCAE—PITTSBURGH—461

6:30 p. m.—Dinner concert. 7:30 p. m.—Children's period. 8:30 p. m.—Concert. WTAM—CLEVELAND—390 WEAR—CLEVELAND—390 m.—Singing Syncopators, p. m.—Kindergarten hour. m.—Community Fund. m.—Radio travelogue and talks. WADC—AKRON, OHIO—253 p. m.—Dinner concert.
m.—Studio concert.
WWJ—DETROIT—353

6 p. m.—Dinner concert. 8 p. m.—Orchestra and soloists. m.—Dance music. WJR—PONTIAC, MICH.—517 m.—Musical program. WREO—LANSING, MICH.—286 WQJ—CHICAGO—448

WMAQ—CHICAGO—448 7 p. m.—Organ; Family Altar League, 7:30 p. m.—Wide-Awake Club, 9 p. m.—Wisconsin football rally, 10 p. m.—University of Chicago, football erence.
p. m.—Elizabeth Stokes, soprano
p. m.—Christian Endeavor topics.
WGN—CHICAGO—370 m.—Dinner music. m.—The classic hour.

m.—Classical program., p.m.—Alamo Orchestra (238 10:30 p. m.—Dutch masters. -Your Hour League. WOK-CHICAGO-217

11 p. m.-2 a. m.—Vocal and orchestra webh--chicago-370 8 p. m.—Orchestra; songs; violinist.
10 p. m.—Light Opera Company.
12-2 a. m.—Dance orchestra; songs.
WLS—CHICAGO—345 115 p. m.-12 midnight—organ; story Unversity of Indiana homecoming Rodehaver recital; farm talks. KYW—CHICAGO—536

n.—Dinner concert.
m.—Musical program.
m.—Midnight revue. 2-3 a. m.—Insomnia Club. WENR—CHICAGO 9-11 p. m.—Popular program. 1-3 a. m.—Midnight froilc. WOC—DAVENPORT—184 6:45 p. m.—Chime conce 9 p. m.—Band concert.

SATURDAY

WEAF-NEW YORK CITY-492 6 p. m.—Dinner music. 7 p. m.—Ethel and Dorothea Ponce, singers.
7:15 p. m.—J. J. Derwin, banjoist.
7:25 p. m.—Warren Scofield, barytone.
7:40 p. m.—J. J. Derwin, banjoist.
7:50 p. m.—Ethel and Dorothea Ponce,

7:50 p. m.—Ethel and Dorothea Ponce, singers.

8 p. m.—"The Marvel of an Eye-glass Lense."

8:10 p. m.—Edward Steele, pianist.

8:25 p. m.—Edward Steele, pianist.

8:26 p. m.—Edward Steele, pianist.

8:50 p. m.—Edward Steele, pianist.

8:55 p. m.—Edward Steele, pianist.

9:05 p. m.—Edward Steele, pianist.

9:05 p. m.—Edward Steele, pianist.

9:00 p. m.—Apollo Orchestra and the Radio Dream Girl.

10 p. m.—Musical program.

11-12 p. m.—Vincent Lopez's Orchestra.

WJZ—NEW YORK CITY—455

1:10, 5, 6, 7:30 and 10:30 p. m.—News.

1:10, 5, 6, 7:30 and 10:30 p. m.—News. 1:15 p. m.—Irwin Abrams's Orchestra. 2 p. m.—Football game, Yale vs Har vard. p. m.-Lorraine Dance Orchestra,

5 p. m.—Lorraine Dance Orchestra.
6:02 p. m.—Market quotations.
6:10 p. m.—Farm market reports.
6:20 p. m.—Financial summary.
7 p. m.—Bernhard Levitow's Orchestra.
8 p. m.—Two piano concerto.
8:30 p. m.—Dance orchestra.
9 p. m.—U. S. Navy Night:
10:15 p. m.—Marion Ledos, soprano.
10:30 p. m.—Paul Specht's Orchestra.
WGBS—NEW YORK CITY—316
10 a. m.—Timely Talks with Terese.
10:10 a. m.—Ethel Derner pianist.
10:50 a. m.—Ethel Derner pianist.
10:50 a. m.—Ethel Derner Reading.
1:35 p. m.—Agnes Verbeckmes, soprano. prano.
1:40 p. m.—Orchestra.
3 p. m.—Talk, "Education After Mar

3 p. m.—Talk, Education riage."
3:10 p. m.—Frieda and Lillian Drellich, mianists. planists.
120 p. m.—Interview with Royal Dixon.
130 p. m.—Frieda and Lillian Drellich.
140 p. m.—Bible Story.
150 p. m.—Frieda and Lillian Drellich.
150 p. m.—Uncle Geebee. 6 p. m.—Uncle Geebee.
6:30 p. m.—Concert Trio.
7 p. m.—Baliroom dancing instructions.
7:10 p. m.—Rose Karasik, soprano.
7:30 p. m.—William Williams, tenor;
Ina Grange, coach. Adele Klaer and
David Kobinson, monologues.
7:50 p. m.—James Brown, "Journalism."
9 p. m.—Irving Argay, violinist.
9:20 p. m.—Warner's Theater.
10:30 p. m.—Arrowhead Orchestra.

WRNY-NEW YORK CITY-259 WRNY-NEW. IUBN CAR10:30 a. m.—Reducing exercises.
10:45 a. m.—Women's Haur.
12 m.—Hour of Music.
4:15 p. m.—Philharmonic society notes.
4:30 p. m.—Symphony society notes.
6:55 p. m.—New York's Neighborhoods.
7 p. m.—'Whose Birthday To-day?'
7:05 n. m.—Telegraph sportfiesh.

Committee on Allocation

of Frequency Makes No

Changes Whatever in

Broadcast Wave Band

On November 9 Herbert C. Hoover,

Secretary of Commerce, called the

Fourth National Radio Conference in

the Chamber of Commerce Building,

Washington, D. C. After delivering

an address which outlined the work to

be accomplished by the conference,

nine committees were appointed to

study conditions and recommend the

necessary changes. The committees

are as follows: Committee No. 1, on

allocation of frequency or wave-

length bands, Dr. J. H. Dellinger,

chairman; J. F. Dieler, secretary.

Committee No. 2, on advertising and

publicity, Commissioner D. B. Car-

son, chairman; E. A. Beane; secre-

tary. Committee No. 3, licenses and

classification, Deputy Commissioner

A. J. Tyrer, chairman; S. W. Ed-

wards, secretary. Committee No. 4.

operating regulations. General

Charles McK. Saltzman, chairman;

Arthur Batcheller, secretary. Com-

mittee No. 5, marine problems, Cap-

tain Ridley McLean, chairman; C. C.

Closter, secretary. Committee No. 6.

amateur problems, Hiram Percy

Maxim, chairman; R. Y. Cadmus.

secretary. Committee No. 7, inter-

chairman; O. R. Redfern, secretary.

Davis, chairman; W. Van Nostrand,

Committee No. 1

General Allocation of Frequency

The table showing the allocation

of the various frequency or wave-

bands to various forms of radio serv-

ice will be found accompanying the

Committee No. 2

Advertising and Publicity

or publicity, into three classes:

1. Direct advertising.

2. Mixed advertising.

3. Indirect advertising.

report.

Deiler, secretary.

Page 1 by E. H. Felix.

7 p. m.—"Whose Bitthday To-day?"
7:05 p. m.—Telegraph sportflesh.
7:10 p. m.—Commerce of the day.
7:15 p. m.—Opeta notes.
7:20 p. m.—John Martin, Fairy Tales.
7:35 p. m.—Dental series.
7:45 p. m.—Concert orchestra.
8:15 p. m.—Romantic plano series.
8:30 p. m.—Bernesto Orchestra.
9:15 p. m.—Bernesto Trio.
9:30 p. m.—Bernestin Trio.
10 p. m.—Bernestin Trio.
10 p. m.—Fiction," Margerite Glant. 10 p. m.—"Fiction," Margerite Glant, 10:15 p. m.—Judith Roth, soprano, 10:30 p. m.—Catalina Noack, songs, 11 p. m.—Motion picture review and stars. stars. 12 midnight—DX Hound Hour; Fer-WMCA-NEW YORK CITY-341

WMCA—NEW YORK CITY—341

6 p. m.—Olcott Vali's String nsemble.
6:30 p. m.—Frank Wunderlich's
Orchestra.
7:30 p. m.—To be announced.
8:45 p. m.—Joyce Meredith, readings.
9 p. m.—Sneddon Weir, barytone.
9:15 p. m.—Joyce Meredith, readings.
9:30 p. m.—Cinderella Dance Orchestra. 10 p. m.—George Remmel, pianist. 10:30 p. m.—Erva Giles, soprano. 11 p. m.—Ernie Golden's Orchestra. WNYC-NEW YORK CITY-526

WNYC-NEW YORK CITY-526
7 p. m.—Dinner concert.
7:30 p. m.—Police alarms.
7:35 p. m.—Police alarms.
8: p. m.—Football scores.
8: p. m.—Bothall scores.
8: p. m.—Robert Campbell, barytone,
9 p. m.—Police Quartet.
9: 30 p. m.—Fred Ehrenberg, musical saw.
9: 40 p. m.—Frenk Griffin, accordion.
9: 50 p. m.—Fred Ehrenberg, musical saw.
10 p. m.—Pred Ehrenberg, musical saw.
10 p. m.—Fred Ehrenberg, musical saw.
10 p. m.—Police alarms, weather.
10:30 p. m.—Dance program.

WOKO—NEW YORK CITY—233
8:15 p. m.—Mme. Cecella Rivere, so-prano.
8:35 p. m.—Regalbutp Sisters.
9:06 p. m.—De Keller Stamey, recitations.
9:20 p. m.—Kenneth Meltz, tenor. 9:20 p. m.—Kenneth Meitz, tenor.

WFBH—NEW YORK CITY—273

2 p. m.—Football game between Fordham College and Georgetown College.

5 p. m.—Garabaldi Arright Singers,

5:30 p. m.—Education talk.

6 p. m.—Orchestra.

7 p. m.—Majestic String Ensemble.

WKCB—BROOKLYN, N. Y.—240

6-7 p. m.—Dinner music.

6-7 p. m.—Dinner music.
WBBR—STATEN ISLAND, N. Y.—273 8 p. m.—Charles Rohner, violnist. 8:10 p. m.—Fred Twaroschk, tenor. 8:20 p. m.—Bible questions and answers. 8:40 p. m.—Fred Twaroschk, tenor. 8:50 p. m.—Charles Rohner, violnist. WAHG—RICHMOND HILL, N. V.—316

WOR—NEWARK—405 6:45-7:15-7:45 a. m.—Gym class. 2:30 p. m.—Dorothy Drummon, planist. 2:45 p. m.—"The Columbine," a one-act 2:45 p. m.—"The Columbine," a one-act playlet.

3 p. m.—Dorothy Drummon, pianist.

3:16 p. m.—Zit's music.

6:15 p. m.—"Words Mispronounced."

6:17 p. m.—"Sports," Bill Wathey.

6:30 p. m.—Shelton dinner music.

7:30 p. m.—War's Collegians.

8 p. m.—Michael Salpeter, violinist.

8:15 p. m.—"Hunting the Wild Tapir."

8:30 p. m.—Michael Salpeter, violinist.

8:45 p. m.—Alfred Dulin, pianist.

9 p. m.—Bernstein Sisters Trio.

9:30 p. m.—Albert Newland, barytone. 9 p. m.—Bernstein Sisters Trio.
9:30 p. m.—Albret Newland, barytone.
9:45 p. m.—Alfred Dulin, pianist.
10 p. m.—News bulletin.
10:10 p. m.—Emma Keller May, soprano.
10:30 p. m.—Clarence Williams's Trio.
11 p. m.—Eddie Elkins's Orchestra.

WAAM—NEWARK—263

2:30 p. m.—Football game broadcast 6 p. m.—Ernie Krickett's Orchestra 6 p. m.—Ernle Krickett's Orchestra.
7 p. m.—The Gill Family.
7:20 p. m.—Horace Beaver, readings.
7:30 p. m.—Al Pfister's Orchestra.
8 p. m.—Jolly Bill Steinke.
8:15 p. m.—Hida Kay, contraito.
8:45 p. m.—Hida Kay, contraito.
8:45 p. m.—Fanny Horowitz, planist.
9 p. m.—Samuel Silverberg, reader.
8:20 p. m.—Hida Kay, contraito.
9:40 p. m.—Entertainers.
10 p. m.—Hartley Joy Boys.

—Hartley Joy Boys. WGCP—NEW-ARK—252 p. m.—Cheatham's Band. WFI—PHILADELPHIA—395 1 p. m.—Tea Room Ensemble, 1:45 p. m.—Football game, Harvard vs. Yale.
6:30 p. m.—Concert orchestra.
7 p. m.—Dance orchestra from the grill

8 p. m.—Talk.
WLIT—PHILADELPHIA—395 4:30 p. m.—Dance music. 7:30 p. m.—Concert orchestra. WCAU—PHILADELPHIA—278

7:30 p. m.—Lew Chapman's Orchestra.

8 p. m.—Stage Dancing Lesson.

8:15 p. m.—Girls' Vocal Trio.

9 p. m.—Hill's Instrumental Trio.

9:40 p. m.—Moe and Joe, Dittles; Micky
Marr at the piano.

10 p. m.—Hall Chase's Collegians.

10:30 p. m.—Songs.

WIP—PHILADELPHIA—508

3 p. m.—Dal Ruch's Arcadians. 8 p. m.—Popular science lecture. 8:15 p. m.—Artist recital. 9:30 p. m.—"Good Cheer," D. L. Ander

son. 10:05 p. m.—Dance music. WPG—ATLANTIC CITY—30 m.—Dinner Music. m.—Studio Concert.

m.—Seaside Trio.
p. m.—Lecture Period.
m.—Seaside Trio.
WGY—SCHENECTADY—380 vard.
5:30 p. m.—"Community and Health
Day," Daniel Chase.
5:40 p. m.—Football scores.
5:45 p. m.—Dance program.
WRW—TARRYTOWN, N. Y.—273

9:45 p. m.—Gordon MacMunn, songs, 10:05 p. m.—Sunnyside Serenaders, 10:20 p. m.—Nicolas Koenig's Orchestra, 10:40 p. m.—Johnson and Watson, 11:05 p. m.—Nicolas Koenig's Orchestra, WGR—BUFFALO—319
1:45 p. m.—Intercollegiate football game, Harvard vs. Yale game, Harvard vs. Yale. WHAM—ROCHESTER—278 p. m.—Eastman Theater Organ p. m.—Eastman Theater Orches 7 p. m.—Eastman Theater Orchestra. 7:30 p. m.—Football scores; weather WMAK—LOCKPORT, N. Y.—266

7:30-8 p. m.—Piano Recital. 8-9 p. m.—Musical Program. 9-10 p. m.—Musical Program. WJAR—PROVIDENCE—306 WJAK—PROVIDENCE—306

1:45 p. m.—Yale-Harvard football game.
WNAC—BOSTON—280

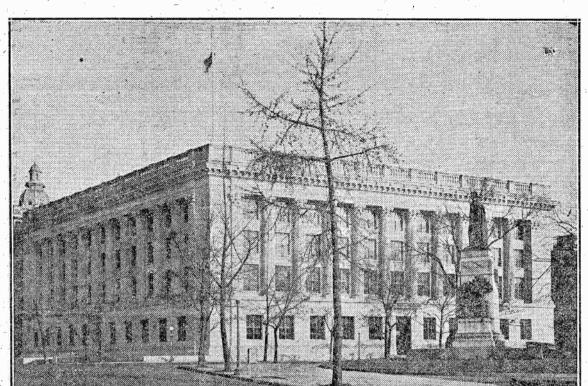
1:45 p. m.—Harvard vs. Yale football game.
4:35 p. m.—Copley Plaza tea dance
6 p. m.—New WNAC Radio Club. 6 p. m.—New WNAL Raule 6:30 p. m.—Dinner dance. 7:50 p. m.—Broadcast from Opera House, "The Miracle." WBZ—SPRINGFIELD, MASS.—333 Woward-Vale football game.

m.—Harvard-Yale football game WRC—WASHINGTON—469 Nighters."
WCAP—WASHINGTON—469 6:45-7:45 a. m.—Setting-up exercises. 1:45 p. m.—Harvard vs. Yale football game. KDKA—PITTSBURGH—309 6:15 p. m.—Dinner concert.
7:30 p. m.—Helps to Sunday School
teachers.
9:30 p. m. The opera "Martha", KDKA
Symptony Orchestra.

Resolved. That the conference dep- ing station. ing for direct sales effort, and any this committee that, with a view to terference. broadcaster or his products, which groups of listeners, the Department mends that at some definite and reality of their transmission the situa-

casting stations:

those to whom it is addressed.



The building of the Chamber of Commerce of the United States, Washington, D. C., in which the fourth annual National Radio Conference and all committee meetings were held.

ference, General George O. Squier, printed or through direct advertising mediums. Committee No. 8, legislation, Stephen

Resolved, That the conference concurs in the suggestion of the Secresecretary. Committee No. 9, copy- tary of Commerce that the problems right relation to broadcasting, Hon. of radio publicity should be solved Wallace H. White, chairman: T. J. by the industry itself and not by government compulsion or by legisla-Following this will be found ab- tion. stracts from the committee reports

Resolved, That the conference urges which apply to broadcasting. It will upon all owners of radio broadcastbe noticed that the reports of coming stations the importance of safemittees 5 and 6 have been left out guarding their programs against the entirely, as they have no relation to intrusion of that publicity which is broadcasting problems. The report objectionable to the listener and conof Committee No 9 also is omitted, sequently detrimental to others in as this is included in the article on the industry as well as to the reputation of the individual broadcasting station.

Committee No. 3

In view of the fact that radio de-Licenses and Classification velopment during the last year has Exhaustive discussion by your combeen in general harmony with the mittee and others attending the meetallocation of communication channels ing was given to discontinuing the suggested by the Third National distinction between Classes A and B Radio Conference, the present com- as applied to broadcasting stations. mittee has had to recommend only Consideration was given to the fact minor changes in that allocation. The that the present distinction between discussions have involved three major Classes A and B is purely artificial and based originally on the proposi-The first of these is the matter tion that Class B stations could not of extending the band of frequencies broadcast phonograph music. Your

assigned to broadcasting. The com- committee recommends that the Demittee recognizes that extensions of partment of Commerce discontinue this kind would permit the operation the terminology A and B as applied of additional broadcasting stations, to classification, and allow the presor the relief to some degree of the ent classification, based on power, present condition of overcrowding. wave length assignments and the re-Nevertheless, no additional channels quirements of the Department of were found available for broadcast Commerce, to stand. ing except by sacrifice of the major In view of the very considerable rious interference. Therefore the subjects as the education of a portion of marine stations which habitually

slight. Furthermore, any such change mits by the Secretary of Commerce add new stations. in broadcasting channels would in- for the construction of such new stafit proportionate to the certain damage could be found, and consequently the Secretary of Commerce authority Resolved, That this conference broadcast listeners' clubs which have which may be erected.

Committee No. 4

Operating Regulations the Department of Commerce should speculating in wave lengths. The committee divided advertising, decline to grant any more licenses until the present number of broadcasting stations shall have been sub-

stantially reduced. It was the consensus of opinion this committee that duplication of apparatus. The elimination of in- equipped with apparatus suitable for that both direct and mixed advertis- frequencies in the present broadcast terference from radiating receivers finding interferences and making regulation to keep open the traffic ing were objectionable to the listen- band should not be permitted in the already in use should preferably take measurements necessary to good radio lanes is absolutely essential and that ing public. In fact, indirect advertis- case of stations of greater than 500 the form of persuasion rather than broadcast service. ing could be made defrimental to the watts, and that in the case of stations coercion. It is felt that one of the interests of both the public and the of 500 watts or lower duplication most effective means of eliminating interferences, the increase of power Federal government, which must have Advertising to achieve its best re- rated by a sufficient electrical dis- to methods of operating receivers in to solve the radio interference prob- control of power, assignment of wave sults must create the good will of tance to avoid beat notes or interfer- such a manner that they will not lem. ence in the territory covered.

The following resolution has been unanimously adopted by this committee for the guidance of all broad programs should be prohibited except ganization of broadcast listeners to improvement of equipment but is in the Secretary of Commerce, as it with the permission of the originat- assist each district supervisor, there- still rather serious in isolated cases. is to a limited degree at present. But

and sale of all radiating receivers gested.

radio service.

service to the public.

Hon. Herbert C. Hoover, Secretary of Commerce, who presided at the Fourth Annual National Radio Conference.

broadcasting stations, use discrimicenters.

monic radiation. -this committee that the band of radio interference problem, in so far that this frequency is used as little frequencies now assigned to broad- as the solution seems to be possible as possible in establishing communicasting is overcrowded, causing se- at this time, apparently involves such cation without reducing the number wave-length band used by the ama expense attached to the construction committee recommends, in the in- of the public in all parts of the listen on this frequency. teurs; and careful analysis showed of broadcasting and commercial land terest of public service, that no new United States and the co-operation In view of the great congestion that even if this entire band were to stations and the difficulty of secur- stations be licensed until through with companies and individuals who which exists at the present time be transferred to broadcasting, the ing wave lengths for such stations, discontinuance, the number of stacontribution toward the reduction of your committee considered the detions is reduced and until it shall be cation services. In other words, it quencies, it is urgently recommended

Resolved, That it is the view of this public. evitably render at least partially tions, in order that the owner thereof committee that public interest as This education of and action by tion to this end. obsolete the millions of broadcasting might have assurance that when his represented by service to the listener the listening public can be brought receiving sets now in use. No bene- station was completed he may be shall be the basis for the broadcast- about, as has been found experimen-

the broadcasting waveband was not to limit the number of new stations views with considerable apprehen- been guided by information from sion and disfavor any practice con- those who have made a special study templating the sale of a wavelength of the subject. and that we earnestly recommend The establishment and maintenance this conference that further division kind be scrutinized most carefully conducted radio clubs in all commuof time among stations is not in the by the Department of Commerce so nities should serve as a fundamental interest of public service, and that as to eliminate the possibility of factor for solving this and other

Committee No. 7 Interference

One form of interference to broadcast reception is that which may be each district be supplied with suf-Resolved, That it is the sense of caused by certain types of receiving ficient personnel and an automobile should be permitted; stations sepa- such interference is to give publicity at broadcasting stations should help the right through issue of licenses, radiate.

recommends that rebroadcasting of the press might stimulate the or- is gradually being reduced by the tion. This power should be vested by forming a clearing house for the If the number of damped wave trans- governmental authority should not be recates the use of radio broadcast- Resolved, That it be the sense of local elimination of sources of in- mitting sets can be gradually re- extended to mere matters of station

forms are entirely appropriate when of Commerce shall, in licensing all sonable future date the manufacture tion will be still further improved,

Interference Committee Says Public Should Be Educated in the Use of Regenerative Sets

with little hardship to the owners of such stations.

Unquestionably much interference now experienced is the result of using higher transmitting power than necessary. There is a noticeable tendency to provide sufficient power to maintain communication under unfavorable conditions and then to continue with that power through all the more favorable seasons. The happy medium between maximum power and insufficient power can only be achieved by constant supervision of operations by the responsible management, assisted so far as possible by government inspectors.

Interference from careless testing is similar to that from the use of excessive power in that it is usually under the direct control of an operator without due appreciation or respect for the rights of others. Care on the part of responsible managements that their operators are properly instructed in testing methods, combined with vigilance, and report to supervisors on the part of all cognizant of such abuses are about the only remedies which can be sug-

for broadcast reception be discontin- The fear which was felt a year ago ued. Because of the benefits which that high power would adversely afwill accrue to the radio public from fect the reception of a large number the suppression of radiating receiv- of listeners has been shown to be ers it is urgently recommended that without foundation. The increase of if the manufacture and sale of such power by transmitting stations has receivers be not discontinued within improved general conditions of rereasonable period legislation to ception. It is recommended that the present attitude of the Department Frequency allocations have been of Commerce of authorizing experimade on the basis of narrow margins mental development of high power between adjacent stations, and this broadcasting stations be continued. calls for maintenance of frequency It is also recommended that all fuwithin the closest possible limits. A ture stations which radiate frequenbetter check on the use of unauthor- cies within the broadcasting band ized frequencies is being provided. be located away from congested cen-Regular measurements and reports ters of population, the distance deshould be made of the frequencies pending on the field strength proactually used by radio transmitting duced in the congested area.

stations throughout the United States. It is recommended that the Depart-Work of this character is a proper ment of Commerce endeavor to secure duty of the Department of Commerce the enactment of legislation which Apparatus is now available for form regulations regarding the use of maintaining and checking the frequency of transmitting stations. It radio transmitters by ships in ports is recommended that the Department of Commerce require all stations to use some means of frequently check- covering the use of radio by ships in ing their transmitted frequencies the vicinity of the United States. with a properly calibrated instrument.

The recommendation of the Third National Radio Conference that 500 It is recommended that all offending transmitting stations emitting kc (600 meters) be reserved for callnation looking towards the locating harmonics shall be compelled to in- ing and distress only has materially of such stations outside of congested stall suitable means to suppress har reduced interference. This could be carried still further through adoption Resolved, That it is the sense of The solution of this portion of the of uniform methods of operation so

interference would be relatively sirability of requiring in advance per- in the interest of public service to is a matter for self-service and helpful co-operation on the part of the hold further licenses within these limits, pending Congressional legisla

> Committee No. 8 Legislation It has been the pride of the radio

industry that it has been to a large extent self-regulating, most of the regulatory features necessary for its Resolved, That it is the opinion of that all future propositions of this of systematically and conservatively and agreed upon at these annual conferences rather than imposed by governmental authority. It is highly desirable that this condition shall conradio problems that have to do. with tinue to the greatest measure posthe giving of the best possible radio sible. Nevertheless, it must be recognized that in the widespread network In addition, it is recommended that of stations that now exist throughout the country, each a potential destrover of the messages of the other. regulation can be imposed efficiently lengths and other appropriate The interference resulting from measures, to handle as a whole the Resolved, That this committee The committee also believes that the use of damped wave transmitters interstate and international situsduced and the remaining sets of this management, not affecting service or form of special pleading for the minimizing interference to large This committee urgently recom- class gradually improved in the qual- creating interference, nor should it

(Continued on page twelve)

The Herald Tribune Daily Broadcasting Programs for Week Ending November 21

TO-DAY

Manager and the second of the

- WEAF-NEW YORK CITY-492 p. m.—"Sunday Hymn Sing."

 p. m.—Interdenominational services. Address by the Rev. Thomas H. MacKenzie; Aida Brass Quartet.
 45-6:30 p. m.—Men's Conference from
 Y. M. C. A.; address by Dr. S. Parkes
 Cadman; Gloria Trumpeters.
 20 p. m.—Capitol Theater Family.
 165-10.15 p. m.—Atwater Kent hour;
 Mabel Garrison, soprano; Dalsy Kennedy.

 WISOURISE. wjz_new york city_455 wjz_new york city_455 m_-Children's hour; stories; music;
- services.

 12:30 p. m.—Rivoli Sunday concert.

 2:30 p. m.—Sunday Radio Forum; Dixie I
 Jubilee Singers; Metropolitan Brass I
 Quartet.

 3:30 p. m.—Belgian Quartet.

 4 p. m.—St. George's Episcopal Church

 4 p. m.—St. George's Episcopal Church Quartet.

 20 p. m.—Belgian Quartet.
 21 p. m.—St. George's Episcopal Church
 22 e. m.—Musical program.
 23 c. m.—Musical program.
 24 c. m.—Musical program.
 25 c. m.—Musical program.
 26 c. m.—Musical program.
 27 c. 30-9:30 p. m.—ChicAGO—247
 28 c. m.—Musical program.
 29 c. m.—Musical program.
 20 c. m.—Rainbow Orchestra; artista.
 20 c. m.—Rainbow Orchestra; artista. sarian, tenor.
 46 p. m.—Literary vespers; "The Trail of Rapture," Edgar Burrell.
 p. m.—Carillon of Park Avenue Baptist
- p. m.—Nathan Abas's Orchestra. m.—Ellie Ebeling, soprano. 1:39 p. m.—Nathan Abas's Orchestra.

 8 p. m.—Eillie Ebeling, soprano.

 8:15 p. m.—Copenhagen Quartet.

 9:15 p. m.—To be announced.

 10 p. m.—Godfrey Luddow, violinist.

 WJY—NEW YORK CITY—405

 8:15 p. m.—Bernhard Levitow's Concert.

 Orchestra.

 10 p. m.—Reminiscences of a Reporter, william H. Crawford.
- WGBS_NEW YORK CITY_316
 3:30 p. m.—Warner's Theater.
 9:30 p. m.—Thomas Franco; String Ensemble: Vera Netti, soprano. emble: Vera Nettl, soprano.

 WHN_NEW YORK CITY—361

 m.—Organ recital.

 p. m.—Queens County Christian En
 p. m.—Queens County Christian En
 10 p. m.—Evening chapel service.
- 2-3 p. m.—queens deavor program.
 8-4 p. m.—Church services.
 5 p. m.—Roseland Dance Orchestra.
 7:30-10 p. m.—Church services.
 10:45 p. m.—Janseen's Orchestra.
 12 midnight—Harry Richman's Enter-WENY-NEW YORK CITY-259 2:45 p. m.—Body Fit. Talks.
 3 p. m.—Music of all religions.
 3:45 p. m.—Bible reading to music.
 4 p. m.—Dr. Christian Reisner's hour.
 5 p. m.—Becker's String Quartet.
 8:15 p. m.—Isaacson concert from DeWitt
- WMCA-NEW YORK CITY-341
- WFBH-NEW YORK CITY-273
- WIWL NEW YORK CITY—235

 p. m.—Paulist Choristers; sermon by the Rev. W. J. Duane; benediction.

 WHHE STATEN ISLAND, N. Y.—273

 10 a. m.—Watchtower Orchestra.

 10:20 a. m.—Bible lecture, R. H. Barber.

 11 a. m.—Soprano and orchestra.

 9 p. m.—Choral singers; violin choir.

 9:15 p. m.—Choral singers; violin choir.

 9:15 p. m.—Choral singers; violin choir.
- WGBB FREEPORT, N. Y 244
 10:40 a. m. Church service. WFI-PHILADELPHIA-395 10:20 a. m.—Services. 4:30 p. m.—Chapel services. WIIT—PHILADELPHIA—395
- 2-4 p. m.—Special Sunday concert: 8:20 p. m.—"The Round Table Form WIP—PHILADELPHIA—508 10:45 a. m.—Morning service.
 WOO—PHILADELPHIA—508
 WOO—PHILADELPHIA—508
- 2:30 p. m.—Musical exercises opening day school.
 6 p. m.—Sacred recital.
 7:45 p. m.—Evening services.
 9:15 p. m.—"Atwater Kent Hour."
 WCAU—PHILADELPHIA—278 5 p. m.—Recital. 5:15 p. m.—Church service. 5:25 p. m.—'Books," by the Rev. John
- Stockwell.

 5:35 p. m.—Recital.

 5:35 p. m.—Recital.

 5:45 p. m.—The Rev. John W. Stockwell.

 6:30 p. m.—Pennsylvania Trio.

 7:30 p. m.—Cathay Concert Orchestra.

 8:30 p. m.—Recital. WPG—ATLANTIC ITY—300 8:15 p. m.—Organ recital.
 4:15 p. m.—Vocal and instrumental recital
- WHAR—ATLANTIC CITY—275
- 10:45 p. m.—Morning service.
 2:15 p. m.—Short sacred recital.
 2:45 p. m.—Sermon, C. E. Deppe.
 7:50 p. m.—Evening service.
 9 p. m.—Seaside Trio.
 11:15 p. m.—Strand organ recital.
 WEW TARRYTOWN, N. Y.—273
- 8 p. m.—Services10:30 p. m.—Musical program.
 11:05 p. m.—Dance Orchestra.
 WGY—SCHENECTADY—380
 11 a. m.—Choral celebration.
 12:30 p. m.—Rivoii Theater Orchestra.
 4 p. m.—Choral Evensong.
 7 p. m.—Carillon program from WJZ.
 7:30 p. m.—WJZ studio program.
 WGR—BUFFALO—319
 8 p. m.—Vesper services.
- 8 p. m.—Vesper services. 7.45 p. m.—Evening service. 9:15-10:16 p. m.—Program same as WEAF WHAM—ROCHESTER, N. Y.—278
- WHAM—ROCHESTER, N. 12-86
 3:16 p. m.—Radio chapel service.
 10:30 s. m.—Morning service.
 7:30 p. m.—Evening service.
 7:30 p. m.—Evening service.
 7:20 p. m.—Capitol Theater Family.
 9:15 p. m.—Atwater Kent hour.
 WEEL—BOSTON—349
- 10:50 a. m.—Morning service.
 2:45 b. m.—Dr. S. Parkes Cadman.
 7:20 p. m.—Capitol Theater Family.
 3:15 p. m.—Atwater Kent hour
 WEAF. WNAC-BOSTON-280 10:53 a. m.—Morning service. 1:30 p. m.—Concert. 8:15 p. m.—Old South Meeting
- Forum.
 6:15 p. m.—Evening service.
 WBZ—SPRINGFIELD, MASS—333
- 10:50 a. m.—Rabbi Stephen S. Wise,
 Self Isolation."
 WTAG—WORCESTER, MASS—268
 2:45 p. m.—Program from WEAF.
 7:20 p. m.—Capitol Theater Family.
 9:15 p. m.—Program from WEAF.
 WCAP—WASHINGTON—469
 —Service.
- WCAP-WASHINGTON—469

 11 a. m.—Service.
 4 p. m.—Service.
 4 p. m.—Service.
 7:20-9:15 p. m.—Capitol Theater Family.
 9:15-10:15 p. m.—Atwater Kent hour.
 KDKA—PITTSBURGH—309

 10:45 a. m.—Church service.
 4 p. m.—Organ recital.
 4:45 p. m.—Vesper services.
 6:30 p. m.—Dinner concert.
 7:25 p. m.—Church service.
 8:45 p. m.—Dr. S. P. Cadman from WEAF.
 6:30 p. m.—Dinner concert.
 7:20 p. m.—Capitol Theater Family.
 9:15 p. m.—Atwater Kent hour.
 WADC—AKRON, OHIO—258

 6:30 p. m.—Dinner music.
 WADC—AKRON, OHIO—258
- m.—Dinner music. WEAR—CLEVELAND—390 7 p. m.—Theater orchestra 8 p. m.—Fireside hour from radio show. 9 p. m.—Organ recital. WLW—CINCINNATI—423

8 p. m.—Services. 9 p. m.—Orchestra and soloists.

- p. m.—Songs and service. m.—Classical program by artists. WJR—PONTIAC, MICH.—517 WSAI—CINCINNATI—326
- 8:30 p. m.—Church, service,
 KYW—CHICAGO—536
 8 p. m.—Club service,
 10:30 p. m.—Edison intisical,
 WLS—CHICAGO—345
 7:30 p. m.—Organ solos; Little
 Church, WCRD—ZON CITY
- m.—Children's hour; stories; music; Church: WCBD—ZION CITY
 nic stories.
 m.—West End Presbyterian Church 9 p. m.—Ladies chorus and bras
 WHT—CHICAGO—400 7:30 p. m.—Tabernacle band and choir, 10:30 p. m.—Request program. 11:30 p. m.—Back home hour WOK—CHICAGO—217
 - 10:30 p. m.—Popular program. WIBO—CHICAGO—226 Popular program. WEBH—CHICAGO—370 6-7 p. m.—Twilight musicale. 8-10 p. m.—Selected artists program. WOC—DAVENPORT—484 7:30 p. m.—Church service. 9:15 p. m.—Program from WEAF. 10:45 p. m.—Symphony orchestre. WSUI—IOWA CITY—484
 - 10:15 p. m.—Familiar hymns. KFMX—NORTHFIELD, MINN.—337 8 p. m.—College vesper service.
 WCCO_ST. PAUL_416
 9:15 p. m.—Program from WEAF.
 WCAL_NOETHFIELD, MINN.—337 10 p. m.—Sacred program
 KTHS—HOT SPRINGS 575

MONDAY

WEAF—NEW YORK CITY—492
6:45-7-7:20 a.m.—"Health Exercises."
10:45 a.m.—Home Service Talk.
11:05 p.m.—Iris Torn, planist.
11:15 a.m.—Rome Service Talk.
11:30 a.m.—Columbia University lecture,
Dr. Kenyon.
12 noon—Market and weather reports.
4 p.m.—Grace Pauze, planist.
4:15 p.m.—Blanche Finis, soprano.
4:30 p.m.—Grace Pauze, planist.
4:45 p.m.—Grace Pauze, planist.
4:45 p.m.—Thinner music.
7 p.m.—The Radio Dream Girt."
7:10 p.m.—Eksabeth Kuntzer, planiste.
7:25 p.m.—Carl Rollins, barytone.
7:35 p.m.—Grace Rollins, barytone.
7:45 p.m.—Carl Rollins, barytone.
7:45 p.m.—Carl Rollins, barytone.
8 p.m.—"American Citizenship; Its Benefits and Obligations," Henry W. Taft.
8:20 p.m.—Colonial Aces, Hawailan Trice
8:55 p.m.—"Tower Health Talk."
9 p.m.—Them Bernle's Orchestra.
WIZ—New YORK CITY—455
10 s.m.—Women's program.

WJZ-NEW YORK CITY-455

10 s. m.—Women's program.

11 a. m.—News service.

11 705 a. m.—'Honey Week," R. B. Willso

1 p. m.—Meyer Davis's Orchestra.

2 p. m.—Educational week program.

3 p. m.—Orchestra selections.

4:05 p. m.—Adaline Baker, contraito.

4:05 p. m.—Adaline Baker, contraito.

4:20 p. m.—William Hollman, "Charact.

Tonic Talka."

4:30 p. m.—Trio concert.

5:32 p. m.—Market quotations.

5:40 p. m.—Francial summary.

6:30 p. m.—Francial summary.

6:30 p. m.—New York University cours.

The Problem of Religion," Prof. Charle.

Gray Shaw.

7 p. m.—Bernhard Levitow's Music.

8 p. m.—Revelers.

9 p. m.—C. E. Griffith, violinist.

9:20 p. m.—Joseph Knecht's Orchestra.

WGBS—NEW YORK CITY—316

WGBS—NEW YORK CITY—316

10 a. m.—Timely Talks with Terese.
10:10 a. m.—Truth in Advertising.
10:30 a. m.—Truth in Advertising.
10:30 a. m.—Eashion talk; piano.
1:30 p. m.—Scripture reading.
1:35 p. m.—Celinda Bates, soprano.
1:40 p. m.—William Williams, tenor.
3:00 p. m.—American Education W

program. 6:00 p. m.—Uncle Geebee. 6:30 p. m.—Premier Orche WRNY-NEW YORK CITY-259

WRNY—NEW YORK CITY—259

10:30 a. m.—Reducing exercises.

10:45 a. m.—"Six New Books."

11:15 a. m.—"Musical Courier Says"—

12: m.—Hour of music.

4:35 p. m.—Radio reminiscences.

4:30 p. m.—Eve Rothenberg, planist.

6 p. m.—Hour of music.

7 p. m.—"Whose Birthday To-day?"

7:55 x. m.—Telegraph Snortflash.

m.—"Whose Birthday Ito-day'
p. m.—Telegraph Sportflash.
p. m.—Commerce of the day.
p. m.—Opers notes.
p. m.—Major Atkinson—"Travel."
p. m.—Lullaby Lady.
p. m.—Ferrucci's Orchestra. 8:00 p. m.—Ferrucci's Orchestra.
8:15 p. m.—Evolution of Jazz.
8:30 p. m.—Celeanor Dugas: "Painting."
8:40 p. m.—Ferrucci's Orchestra.
8:45 p. m.—'Jazzing Melody in F."
9 p. m.—Power by Radio.
9:15 p. m.—Musical travelogue—England
9:30 p. m.—Moods in music.
9:35 p. m.—Tillie Sper, plano dances.
10 p. m.—Poetry Post.
10:10 p. m.—Myron Brooks, musical saw
11:15 p. m.—Radio Theater Players.

WHN-NEW YORK CITY-361

WHN—NEW YORK CITY—361
2:15 p. m.—Evelyn Ryan, planist.
2:25 p. m.—William Hallman, "Crane
Tonic Talks."
2:35 p. m.—Dorothy Darrath, soprano.
2:35 p. m.—Derothy Darrath, soprano.
2:46 p. m.—Bernard Seaman, planist.
3:45 p. m.—Bernard Seaman, planist.
3:55 p. m.—Hugo Angelo, tenor.
4:05 p. m.—William Riets, tenor.
4:25 p. m.—William Riets, tenor.
4:30 p. m.—Stanley Cowan, songs.
4:46 p. m.—Harry Stone's Orchestra.
6 p. m.—Littmann's Dinner Music.
6:16 p. m.—Daddy Winkum's Machine.
6:30 p. m.—Littmann's Dinner Music.
7 p. m.—Marlboro State Trio.
7:30 p. m.—Swanee Orchestra.
8:05 p. m.—Storage Battery Talk.
8:05 p. m.—Rogar Duffy, baritone.
9:15 p. m.—Edgar Duffy, baritone.
9:15 p. m.—Edgar Duffy, baritone.
9:15 p. m.—Billie and Marie Van, duet
9:30 p. m.—Chyline Krumholtz baritone.

9:30 p. m.—O'Brien Brothers, guitar, mandolin.
9:45 p. m.—Philip Krumholtz, baritone.
11 p. m.—Cotton Orchestra.
11:30 p. m.—Silver Slipper Orchestra.
12 a. m.—Ted Lewis' Orchestra.
14 d. p. m.—Olcott Vall's String Ensemble.
6:30 p. m.—Ernie Golden's Orchestra.
7:30 p. m.—Lullaby Music.
8 p. m.—Whickerbocker Family Circle
8:30 p. m.—Educational Talk.
8:45 p. m.—Musical program.
9 p. m.—Lecture on Christian Science.
10:15 p. m.—Entertainers.
11:15 p. m.—Dance orchestra.
12 (midnight)—"Cuban Exposition," Sen Felipe Taboada. WHAM—ROCHESTER—278
3:30 p. m.—Eastman Theater Orchestra.
5 p. m.—Theater organ,
7 p. m.—Theater orchestra.
7:30 p. m.—Weather forecast; markets.
8:25 p. m.—Flonzaley Quartet.
WHAZ—TROY. N. Y.—380
9 p. m.—Concert by artists and Hawaiian guitars. elipe Taboada.
WNYC_NE WYORK CITY_526

6:10 p. m.—Market High Spots.
6:20 p. m.—Plano selections.
6:30 p. m.—Elementary German lessons.
7 p. m.—Advanced German lessons.
7;30 p. m.—Police Alarms.
7;35 p. m.—Harry Smith's Orchestra.
8:30 p. m.—Frank Maloney, baritone; Eliz 7:30 p. m.—Folice Alarms.
7:35 p. m.—Harry Smith's Orchestra.
8:30 p. m.—Frank Maloney, baritone; Elizbeth Neusch, soprano.
9 p. m.—Virginia La Bett, violinist; Joseph Davies, baritone.
10:10 p. m.—Egypt," Charles Crossman.
10:30 p. m.—Police alarms, weather.

WFBH—NEW YORK CITY—278

2 p. m.—Bernard's N. Y. Six.

3 p. m.—Charles West, ukelele.

3:15 p. m.—Studio program.

4 p. m.—Orchestra.

4:25 p. m.—Irma Sachs, soprano.

5:15 p. m.—Educational talk.

5:39 p. m.—Katherine Work, planiste.

6 p. m.—Elizabeth Hesion, contraito.

6:15 p. m.—Alma Danzig, plano.

6:30 p. m.—The Pinewalders.

11:30 p. m.—Alyin Hauser's "At Hoperty"

WORD—NEW YORK CITY—223

WOKO-NEW YORK CITY-283 8 p. m.—Anna Diamond, pianist.
8:15 p. m.—Fenten sisters, songs.
8:35 p. m.—Joseph Harrington, tenor.
8:50 p. m.—Louise Lysaght, soprance.
9:05 p. m.—Ferdinand LaCascio's Orches

WLWL-NEW YORK CITY-288 Gillis.

9:50 p. m.—William Carney, tenor.

10 p. m.—Instrumental Trio.

10:05 p. m.—William Carney, tenor.

10:15 p. m.—Talk on education.

10:30 p. m.—Instrumental Trio.

10:40 p. m.—Organ recital. WKCB-BROOKLYN, N. Y,-240

WBBR-STATEN ISLAND, N. Y.-273 8 p. m.—Jubilee entertainers. 8:10 p. m.—World News Digest. 8:20 p. m.—Jubilee entertainers. 8:30 p. m.—Bible instruction. 8:40 p. m.—Jubilee entertainers. WAHO RICHMOND HILL, N. Y .- \$16

10:15 p. m.—Glenn Smith's Orchestra.

WOR—NEW ARK—465
6:45, 7:15, 7:45 a. m.—Gym class.
2:30 p. m.—Oreste's Queensland Orches.
3:30 p. m.—Mario Alverez, barytona.
3:30 p. m.—Wario Alverez, barytona.
3:45 p. m.—Mario Alverez, barytona.
6:15 p. m.—"Words Mispronounced.
6:17 p. m.—"Sports," Bil Wathey.
6:20 p. m.—Shelton dinner music.
7:30 p. m.—Eddie Biking Orchestra.
8 p. m.—"Current Topics."
8:30 p. m.—"Al Reid's Hour."
9:30 p. m.—"Cities Once Great—Legrad."
9:45 p. m.—Fred Ruzicka, violinist. grad.". Fred Ruzicka, violinist.

1:35 p. m.—Fred Ruzham 10 p. m.—News bulletin 10:10 p. m.—Sol Sabino, mandolinist. 10:30 p. m.—Archie Siater's Orchestra. 11 p. m.—Fred Ruzicka, violinist. 11:15 p. m.—Ballin and Race—plane dp. 11:20 p. m.—Irying Aronson's Crusaders WAAM-NEWARK-263 m.—Happy hour.
m.—Ben Goldfarb's Orchestra.
m.—Joe Chickene's Orchestra.
p. m.—The Sport Oracle.
p. m.—Thomas G. Porteous, baryt
m.—Cathedral Choral Club.

WGCP-NEWARK-252

3 p. m.—Eva Rothenberg, planiste
3:15 p. m.—Andy Fendleton's Band.
4:15 p. m.—Shirley Herman, songs.
4:30 p. m.—Uncle Robert's cousing.
6 p. m.—Littamann's Orchestra.
6:16 p. m.—Daddy Winkum's rhyme chine.

6:30 p. m.—Orchestra.

8 p. m.—Charles Phillips, pianist.

8:15 p. m.—Perry Bradford's entertainer

8:50 p. m.—Bob Ward's little Wards.

9:25 p. m.—Strickland's Orchestra.

11:30 p. m.—Bob Murphy's entertainer

12 p. m.—Connie's Orchestra.

WFI-PHILADELPHIA-395 WKI—PHILADELPHIA—395
10:30 a. m.—Solos.
10:40 a. m.—Home service talk.
1 p. m.—Tea room ensemble.
2 p. m.—Pupl' of Mabel Parker.
3:45 p. m.—Fashion feature.
6:30 p. m.—Concert orchestra.
WLIT—PHILADELPHIA—395

12:05 p. m.—Organ recital; religious 2-8 p. m.—Goncert orchestra; heart talk artist recital.
4.30 p. m.—Artist recital.
5 p. m.—Talk on Sesqui-Centennial.
7:30 p. m.—Bream Daddy.
8 p. m.—Short Agro-Waves.
8:15 p. m.—"Current Events"; ex

orchestra.
5:30 p. m.—Artist recital.
9 p. m.—Stanley Theatre movie review.
10 p. m.—Dance orchestra.
10:20 p. m.—Vandeville features. id p. m.—Lanin's Dance Orchestra.

WCAU—PHILADELPHIA—278

p. m.—Recital.

p. m.—Nokol Man.

30 p. m.—Delaware Serenadera.

p. m.—Freedman and Travaline, songa

11 a. m.—Organ recital.
12 noon—Luncheon music.
4:45 p. m.—Grand organ, trumpets.
7:30 p. m.—Dinner music:
8 p. m.—'American Citizenship," Henry p. m.—' W. Taft. 8:30 p. m.—Hawaiian Trio. .45 p. m.—"The Radio Dream Girl."
p. m.—Music by Gypsics
0 p. m.—Grand opera, "I Pagliacci."
1 p. m.—Dance music.
WIP.—PHILADELPHIA—508

WIP—FHILADELITH—908
145 a. m.—Setting-up exercises.
1 p. m.—Luncheon music.
2 p. m.—Artist recital.
105 p. m.—Dinner music.
145 p. m.—Market reports.
1 p. m.—Bedtime story; dancing lessen.
WFG—ATLANTIO CITY—809 30 p. m.—Tea music. 45 p. m.—Organ recital. p. m.—Trio dinner music. whar—atlantic city—275

p. m.—Seaside Trio. :30 p. m.—Fashion review. p. m.—Seaside Trio. WGY—SCHENECTADY—380 WGY-SCHENECTADY-380

2 p. m.—Asis Orchestra.
2:30 p. m.—Music; cooking lesson.
6:30 p. m.—Dinner program.
7 p. m.—Talks and news items.
7:45 p. m.—'Constitution Day," Ellis Staley.
8 p. m.—State College Chorus; address,
"Literary Appreciations: John Burronghs, Earth's Lover."
WRW—TARRYTOWN, N. Y.—273 p. m.—Children's stories. 30 p. m.—Musical program. 05 p. m.—Entertainment: talk. 9:05 p. m.—Entertainment; tail.
9:40 p. m.—Galaxy program.
10:05 p. m.—Brown's Orchestra.
10:30 p. m.—Songe.
10:45 p. m.—Galaxy program.
11:05 p. m.—Brown's Orchestra.
WGR—BUFFALO—319

WCAC-MANSFIELD, CONN.-275 7:20 p. m.—Music; reports.
7:25 p. m.—Reports.
7:30 p. m.—Dairy farming course.
7:45 p. m.—Musical program.
WTIC—HARTFORD, CONN.—476

WMC4—NEW YORK CITY—341
10:30 a. m.—Vera McGowan's house

11 a. m.—Ida Allen's Hour.

8 p. m.—Olcott Vail's String Ensemble.

6:30 p. m.—Cinderella Dance Orchestra.

6:45 p. m.—"Cuban Exposition."

7 p. m.—Jack Wilbur's personalities.

8 p. m.—Lecture program.

8:15 p. m.—Educational talk.

9 p. m.—Educational talk.

9 p. m.—Polka Dot Orchestra.

10 p. m.—South American Troubadours.

10:10 p. m.—South American Troubadours.

10:13 p. m.—Jose Bohr, songs.

10:30 p. m.—Manhattan Serenaders.

11 p. m.—Ernie Golden's Orchestra.

WNYC—NEW YORK CITY—526

7 p. m.—Market high spots.

WFBH-NEW YORK CLTY-273

2 p. m.—Bob Fieming's Orchestra.
3 p. m.—Agnès Brennan, soprano.
3:15 p. m.—Orchestra.
3:45 p. m.—Educational Talk.
4 p. m.—Studio progràmme.
4:30 p. m.—Tea Table Talk.
5 p. m.—Dot McLean, Leo Ford, songs.

WEBJ—NEW YORK CITY—273
7 p. m.—Original Mobile Quintet.
7:45 p. m.—Joe-Sherman and Lew Pollack
8 p. m.—Raliroad talk, G. T. Geer,
8:10 p. m.—Sara Turits, soprano.
8:20 p. m.—Mystery Radio Talk.
8:25 p. m.—International Dance Orchestra

7 p. m.—"Whose Birthday To-day 7:05 p. m.—Telegraph sportflash, 7:10 p. m.—Commerce of the day. 7:15 p. m.—Copera hotes. 7:20 p. m.—Law series. 7:30 p. m.—"Theater Costume."

WKCB-BROOKLYN. N. Y-240

WEDNESDAY, NOVEMBER 18

wor. p. m.—Dinner music.

WOR—NEWARK—105
6:45-7:15-7:45 a. m.—Gym class.
2:80 p. m.—Dorothy Paca, soprano.
2:45 p. m.—The Stage Vilialness."
3 p. m.—Dorothy Paca, soprano.

1 a. m.—Ida Allen's Hour.

30 p. m.—Dinner music. 45 p. m.—"Artificial Rubber." WJAR—PROVIDENCE—306) a. m.—Housewives' exchange.

105 p. m.—Studio program.

106 p. m.—Studio program.

107 p. m.—Horry Spring Time."

108 p. m.—Home Care of the Sick."

109 p. m.—Gypsies.

100 p. m.—Grand oberg company. WEET-BOSTON-349 6:45 a. m.—Health exerci-7:45 a. m.—Organ studio. 10:45 a. m.—Home service

port.

7 p. m.—Big Brother Club.

7 p. m.—J. Norton Binkley, tenor.

8 p. m.—Anonymous orchestra.

8 p. m.—Tower health talk.

9 p. m.—Music by Gypsies. p. m.—Orchestra WNAC—BOSTON—280

WNAC-BOSTON—280

10:30 a. m.—Bible readings; club talks.
12:15 p. m.—Organ recital.

1 p. m.—Luncheon concert.
4 p. m.—Copley's Plaza Trio.
5:50 p. m.—T. D. Cook's dinner dance.
7:35 p. m.—T. D. Cook's dinner dance.
7:35 p. m.—Bostonia Trio.
6 p. m.—Metropolitan Theater Orchest.
WBZ—SPRINGFIELD, MASS.—333
6:30 p. m.—Organ recital. WBZ—SPRINGFIELD, MASS.—353
5:30 p. m.—Organ recital.
7 p. m.—Market reports.
7:06 p. m.—'Feychology." Professor Abra
ham Myerson.
7:30 p. m.—Capitol Theater Orchestra.
8:30 p. m.—W. Edward Boyle's Orchestra.
8:30 p. m.—Br. Lawrence Obrey, tenor,
9 p. m.—Aleppe Drum Corps.
9:30 p. m.—Florentine Trio,
10:05 p. m.—Brunswick Orchestra.
WTAG—WORCESTEE, MASS.—263
10:30 a. m.—Radio chats,
12:05-3 p. m.—Luncheon music.
7 p. m.—Science talk.
7 p. m.—Science talk.
7:45 p. m.—Boy Scout announcements.
8:10 p. m.—Concert program.
10:11 p. m.—Crand opers from WEAF.
WRC—WASHINGTON—469
10 a. m.—Women's hour from WJZ.

WRC—WASHINGTON—469
0 a. m.—Women's hour from WJ:
2 (noon)—Organ recital,
p. m.—Shoreham Orchestra.
30 p. m.—Musical program.
WCAP—WASHINGTON—469

6:45-7:45 p. m.—Setting up exercises.
7 p. m.—Market summaries.
7:10 p. m.—Trumpet of quartet and choir of clarinets.
7:45 p. m.— Washington, Nation's Capip. m.—Tower health talk. p. m.—Music by gypsies. 6:15 p. m.—Dinner concert.
7:30 p. m.—Childrens' period.
7:45 p. m.—"International Art,"

—Allen Theater program.

—Community Fund program

WTAM—CLEVELAND—390 Dinner music.
m.—Ladies' ensemble and Marth.
Club.
1-1 a. m.—Dance music.
WLW—CINCINNATI—422 7:15 p. m.—Dinner dance,
9 p. m.—Freda Sankers's Orchestra.
10 p. m.—American Legion program,
12 midnight—Theatrical stars,
11:80 a. m.—Helvey's Troubadours,
WSAI—CINCINNATI—326

11 p. m.-1 p. m.—Concert.
WLW—CINNCINNATI—422 p. m.—Orchestra, soloista, p. m.—Musical program. 1:30 p. m.—Jewett Jesters. WWJ—DETROIT—353 m.—Dinner concert.
m.—Band and gypsies.
WEEO—LANSING, MICH.—286

WERO—LANSING, MICH—236
6 p. m.—Dinner concert.
7:30 p. m.—La Salle Orchestra.
7:40 p. m.—Family Altar League.
WOK—CHICAGO—217
8 p. m.—2 a. m.—Musical features.
WHT—CHICAGO—400
7 p. m.—Classical program.
8 p. m.—Classics.

WEAF—NEW YORK CITY—492 3:45-7:45 a.m.—Health exercises: 11 a.m.—Mrs. Miranda Marguglia, planist. 11:10 a.m.—Lecture; planist. 11:35 a.m.—Motion picture forecast. 1:10 a. m.—Lecture; planist.
1:35 a. m.—Motion picture forecast.
1:50 a. m.—Bee and honey talk.
2 noon—Market and weather reports.
p. m.—Dorothy Mueller, contraite.
1:50 p. m.—Dorothy Wilder, planist.
1:50 p. m.—Women's program: "Education for Peace," by Katherine Blake; An Hialy, soprano,
p. m.—Dinner music,
p. m.—Dinner music,
p. m.—Columbia University lecture.
1:0 p. m.—Columbia University lecture.
1:0 p. m.—Trinancial Eventa," Dudley Fowler
1:10 p. m.—Ross Gorman's Orchestra.
1:0 p. m.—Tvour Hour."
10:30 p. m.—Your Hour."
10:30 p. m.—Your Hour."
10:30 p. m.—Your Hour."
10:30 p. m.—Your Hour."
10:30 p. m.—Weyer Davis's Orchestra.
11-12 p. m.—Meyer Davis's Orchestra.
11-12 p. m.—Meyer Davis's Orchestra. WJY-NEW YORK CUTY-408 WJY—NEW YORK CFTY—405
7:30 p. m.—Ambassador Trio.
8:10 p. m.—"Savings Account," W
Knox.
8:20 p. m.—Louise Voccoli, soprano.
8:20 p. m.—To be announced.
10 p. m.—Paul Specht's Orchestra.

Station Length Orchestra
WHN 861 Janssen's
WRW 273 Dance music

Harry Smith's
Roseland
Melodette
Dance music
Delaware County
Strickland's

Strickland's
Brown's
Glenn Smith's
Slater's
J. Knecht's
Palladino
Lannin's
Ben Bernie's
Dance music
Dance music
Dance music
Connee music
Lrying Aronson's
Connie's

WRW 273 Dance music

MONDAY, NOYEMBER 16

WNYC 526 Harry Smith'
WHN 361 Roseland
WMAK 266 Melodette
WOKO 233 Dance music
WCAU 278 Delaware Co
WGCP 252 Strickland's
WAHG 316 Glenn Smith'
WOR 405 Slater's
WHAZ 380 Palladino
WLIT 385 Lannin's
WHAZ 380 Palladino
WLIT 385 Lannin's
WHAZ 482 Ben Bernie's
WHAZ 482 Dance music
WGR 319 Dance music
WGR 319 Dance music
WGR 405 Irving Arons
WGCP 252 Connie's
THESDAY NOVEMBER 17

TUESDAY, NOVEMBER 17

Eastern Standard Time

WARG-RICHMOND HILL, N. Y.—816 WAHG-RICHMOND HILL, N. Y.—S.

12 (noon)—Joe Zimmerman, pianist.

WAAM—NEWARK—263

1 a. m.—Happy hour; cooking school.

6 p. m.—Al: Makon's Orchestra.

7 p. m.—Joe Brown's Orchestra.

7 p. m.—Waldo Emery, barytone.

8 p. m.—118th Intantry Band.

9-11 p. m.—Plainfield Night.

11 p. m.—Bill McWalters, tenor. WJZ-NEW YORK CITY-455 . m.—Women's hour. 11 a. m.—News; talk.
1 p. m.—Nathan Abas's Muyle.
2. 4. 5. 530, 7:30 and 10:30 p., m.—News.
2 p. m.—Educational week program.
4:05 p. m.—Nickels Trio.
4:20 p. m.—Bernhard Levitow's Orchestri
5:32 p. m.—Market quotations.
5:50 p. m.—Financial summary.
6:30 p. m.—Financial summary. p. m.—Sill McWalters tellow WGCP—NEWARK—253 p. m.—Ona Welsh, plaulat. 15 p. m.—Osborne Meredith, songs. 35 p. m.—Isabelle Henderson, soprat 45 p. m.—Ukulele Bob McDonald. p. m.—Leslle McLeod, tenor. 15 p. m.—Streger entertainers. 5:32 p. m.—Market quotations.
5:50 p. m.—Financial summary.
6:30 p. m.—Financial summary.
6:30 p. m.—Wew York University cot
"The X-Ray," Professor H. Sheldon.
7 p. m.—'Dachshunds," Frank Dola.
7:16 p. m.—Vanderbilt Orchestra.
8 p. m.—To be announced.
8 p. m.—New York Edison Hour.
10 p. m.—The Grand Tour. "The Rhin
10:30 p. m.—Mayflower Orchestra. WFI-PHILADELPHIA-395 WGBS-NEW YORK CITY-316 1.45 p. m.—Fashion feature.

1.45 p. m.—Concert orchestra.

7 p. m.—Dance orchestra.

8-11 p. m.—Program same as WEAF. WLIT-PHILADELPHIA-395

chestra.

3 p. m.—Concert orchestra; artists.

30 p. m.—Talk; artist recital.

80 p. m.—Dream Daddy.

50 p. m.—Plays and players. 140 p. m.—Ted Meredili, Nat Ossorie, songs.

p. m.—Music education program; Andrades Lindsay, Lydia Mason, plano duets.

p. m.—Uncle Geebee.

130 p. m.—Uncle Geebee.

130 p. m.—Uncle Geebee.

130 p. m.—William Reits, songs.

150 p. m.—William Reits, songs. WCAU-PHILADEIPHIA 278
p. m.—Recital by quartet,
m.—Building and loan talk,
p. m.—Three Brothers,
p. m.—Recital,
p. m.—Robert Fraser, singer,
p. m.—Harry Link, Willie Hore

ship."
p. m.—Arrowhead Orchestra.
p. m.—Y. M. H. A. Vecational Forum.
15 p. m.—Frieda and Lillian Drellici 80 p. m.—Billy Haves's Orchestra. duets,
30 p. m.— Classic Saxophone Sextet,
40 p. m.— Mary Zoller, xylophone,
50 p. m.— Istelligence of Nature."
50 p. m.— Classic Saxophone Sextet; Mar WHN-NEW YORK CITY-361

7:30 p. m.—Davis Saxonhone Octet.

WIP.—PHILADELPHIA—503.

1:45 a. m.—Setting-up exercises.

1:p. m.—Organ recital.

3:p. m.—Artist recital.

5:05 p. m.—Joe Ray's Night Hawks.

7:p. m.—Roll call; songs.

8:15 p. m.—Billioft Lester, critic.

8:15 p. m.—Works of Negro compose WHN—NEW YORK CITY—361

12:30 p. m.—Organ recital:
2:35 p. m.—Overture and vandeville.
3:15 p. m.—Ueximpton Orchestra.
6:30 p. m.—Leximpton Orchestra.
6:30 p. m.—Leximpton Orchestra.
7 p. m.—Dance Orchestra.
7 p. m.—Dance Orchestra.
7 p. m.—Dance Orchestra.
7 p. m.—Dance Orchestra.
8 p. m.—Herman Streger's Players.
8 p. m.—Herman Streger's Players.
8:30 p. m.—Charles Guglieri, musical saw.
9 p. m.—Judith Roth, soprano.
9:15 p. m.—Joseph Turkel, tenor.
9:30 p. m.—Ciarence Williams Trio.
11 p. m.—Caravan Orchestra.
11:30 p. m.—Rodes Orchestra.
12 midnight—Kentucky Revus and Orchestra. WPG_ATLANTIC CITY

1:30 p. m.—Luncheon music.

3:45 p. m.—Organ recital.

7 p. m.—Frio Dinner Music.

8 p. m.—Frio Dinner Music.

8 p. m.—Frio Dinner Music.

9 p. m.—Frio Dinner Music.

10 p. m.—WPG Male Quartet.

10 p. m.—WPG male Quartet.

11 p. m.—Dance orchestra.

WHAR—ATLANTIC CITY—275

7:30 p. m.—"Water Purification." Prof. 7: Taylor. 7: Ta

WGE BUFFALA, S.
6:30 p. m.—Dipner music.
8-11 p. m.—Program same as WEAF.
WHAM—ROGHESTER, N. Y.—278
3:30 p. m.—Eastman Theater Orchestra.
5 p. m.—Theater organ.
7 p. m.—Eastman Theater Orchestra.

orchestra.

9:30 p. m.—Organ recital.

WJAR—PROVIDENCE—306

1:05 p. m.—Bilimore Concert Orchestra.

7:30 p. m.—Mueical program.

8 p. m.—Safety talk. WJZ_NEW YORK GIFY.—acc

10 a. m.—Wonien's hour.

11 a. m.—News.

1:15 p. m.—Irwin Abrams's Orchestra.

2 p. m.—Educational week program.

4:05 p. m.—Joseph Kartzmar, violinist.

4:20 p. m.—Joseph Knecht's Orchestra.

6:32 2. m.—Market quotations.

5:40 p. m.—Market reporta.

5:50 p. m.—Financial summary.

6:22 n. m.—New York University course.

talks. 2:15 p. m.—Noon service. 12:13 p. m.—Noon service.

1 p. m.—Colonial luncheon concert.

4 p. m.—Metropolitan Theater music.

6 p. m.—New WNAC Radio Club.

6:30 p. m.—Dinner dance.

7:35 p. m.—Vikissimee Shores, Florida.

7:45 p. m.—Somerville Players' Orchestra.

10 p. m.—Radió auction bridge.

WEEL—BOSTON—349
6:45° a. m.—Tower Health Exercises.
7:45 a. m.—Morning Watch.
2 p. m.—Joe Rine's Radio Artista.
6:50 p. m.—Lost and Found; weather.
7 p. m.—Hig Brother Clüb.
7:45 p. m.—Talk.
8:11 p. m.—Forgram same as WEAF.
WBT—SPRINGFIELD, MASS. 333
6:30 p. m.—Los Reisman's Ensemble.
7 p. m.—Market reports.
7:20 p. m.—Kimball Dance Orchestra.
7:20 p. m.—Frank Davis, tener.
7:25 p. m.—Kimball Dance Orchestra.
7:26 p. m.—Frank Davis, tener.
7:25 p. m.—Frank Davis, tener.
7:25 p. m.—Frank Davis, tener.
7:26 p. m.—Frank Davis, tener.
7:26 p. m.—Alardale hour.
WTAG—WORCESTER. MASS.—268
10:30 a. m.—Radio chats.
12:06-2 p. m.—Luncheon music.
5:15 p. m.—Special theatrical program.
8 p. m.—Roes Gorman's Orchestra.
8 p. m.—Roes Gorman's Orchestra.
8 p. m.—Eveready Hour.
13:30 p. m.—Vincent Lopez's Orchestra.

THUESDAY, NOVEMBER 19

THURSDAY, NOVEMBER 19

8:00 WGBS 316 Dance music

8:30 WMCA 341 Cinderella,

9:15 WRW 273 Arcadian

9:25 WOKO 233 Band

0:05 WTP 508 Joe Ray's

0:30 WGBS 316 Arrowhead

0:30 WGBS 316 Arrowhead

0:30 WGBS 316 Arrowhead

1:00 WRC 469 Meyer Davis's

1:00 WMCA 451 Ernie Golden's

1:00 WJZ 455 J. Green's

1:00 WFG 492 Vincent Loper's

1:00 WFG 493 Vincent Loper

FRIDAY, NOVEMBER 20

WRW 278 Meledy Boys
WMCA 341 Metropolitan
WGCP 252 Metropolitan
WLIT 395 Dance music
WTIC 349 Dance music
WCAP 469 Dance music
WMCA 341 Ky. Ramblers

Vincent Lopez's Vincent Lopez's Dance music Ted Lewis's

WRC—WASHINGTON—469

10 a. m.—Women's Hour from WJZ.

12 noon—Organ recital.

1 p. m.—New Willard Orchestra.

6:40 p. m.—Agricultural reports.

6:50 p. m.—"Show Shopping," Leon.

Hall. Hall.
7 p. m.—Shoreham Orchestra.
8 p. m.—Wurlitzer musicale.
9 p. m.—Eveready Hour.
10 p. m.—"The Grand Tour."
10:30 p. m.—Spenner Tunman's Orchestr

KDKA-PITTSBURGH-809 KDKA—PITTSBURGH—309
6:15 p. m.—Dinner concert
7:30 p. m.—Daddy Winkum
7:45 p. m.—Thas Education Made Good?
7 p. m.—Dance orchestra.
8 p. m.—World cruise by radio; musical settings by KDKA Symphony Orchestra.
9 p. m.—KDKA Symphony Orchestra.
11:35 p. m.—Theater cencert.

WCAE—PITTSBURGH—461
8:30 p. m.—Dinner concert.
8:35 p. m.—Lwolfe Gilbert, Abel Baseling. songs.

9 p. m.—Ridgley's Versatile Serenaders.

10 p. m.—Roseland Dance Orchestra.

11 p. m.—Silver Slipper Orchestra.

11:30 p. m.—Melody Orchestra.

12 midnight—Harry Richman's Enter.

WADC-AKRON, OHIO-258 WEAR-CLEVELAND-390

WNYC-NEW YORK CITY-526
6:10 p. m.—Market high spots.
6:20 p. m.—Plano selections.
6:30 p. m.—Elementary Spanish lessons.
7 p. m.—Advanced Spanish lessons.
7:30 p. m.—Police alarms.
7:35 p. m.—Dance orchestra.
8:15 p. m.—Martha Weiss, pianiste.
8:25 p. m.—Albert Bauernfield, violinist.
8:45 p. m.—Martha Weiss, pianiste.
9 p. m.—Jamaica Jewish Center mixe choir, Cantors Cal Spivack and Struchs. m.—Chimes concert.
n.—Eveready hour.
m.—'Auction Bridge Games."
p. m.—Concert from studio. m.—Concert from \$1440.

WI.W.—CINCINNATI.—423
m.—Trirdyn Tric; soprano.
m.—Crosley Corkers.
m.—Fornica Orchestra.
WKBO—CINCINNATI.—423

tainers.

WJB—PONTIAC, MICH.—517

p. mt—Orchestra; soloista.
p. mt—Serenaders; soloista.
WWJ—DETROIT.—517 6 p. m.—Dinner concert. 8 p. m.—Frogram from WEAF. WRDO_LANSING_304 6 p. m.—Dinner concert. 8:15 p. m.—Band, glee club, artists. WHT—CHICAGO_400

7:30 p. m.—La Salle Orchestra:
9 p. m.—Listerary Stdelight; songs.
9:40 p. m.—Travel talk.
10 p. m.—University of Chicago, lecture.
10:20 p. m.—Musical program.
WLS—CHICAGO 345
Organ: story; WLS Trio.

7:15 p. m.—Organ; story; WLS Tric.

RYW—CHICAGO—536

8 p. m.—Dinner concert:
8:33 p. m.—American farm speeches.
9 p. m.—Musical program.
10 p. m.—Concert program.
11 p. m.—"Evening at Home." 2 a. m.—Insomnia Club.
WEBH—CHICAGO—378
8-9 p. m.—Dinner concert; songs; talk.
10 p. m.—Dance selections; theater bits.
12-2 a. m.—Dance music; songs.
WGN—CHICAGO—370

WEDNESDAY

6 p. m.—Dinner music.
7 p. m.—Synegogue services.
7:30 p. m.—United States Army Band.
v. m.—The Buddles.
8:30 p. m.—"Pooley concert."
10 p. m.—"Ipana Troubadours."
11-12 p. m.—Ben Bernie's Orchestra.

5-50 p m—Financial summary.

6-30 p. m—New York University c

7 p. m.—Bernhard Levitow's music.

8 p. m.—Zoological Society series.

8-15 p. m.—The Texans, songa.

8-30 p. m.—Hunter College chamber in Dr. Henry C. Pieck.

9-50 p. m.—Harry Lowes, basso.

19-10 p. m.—To be announced.

10-20 p. m.—Virginlans.

WGHS NEW YORK CITY—\$16

a. m.—Timely talks with Terese.
0:10 a. m.—June Warren, planist.
0:20 a. m.—Beauty talk.
0:40 a. m.—Household equipment; planist.
0:50 p. m.—Scripture reading.
135 p. m.—Murray Miller, planist.
140 p. m.—Mabel Etgon, soprano.
150 p. m.—American education week; Geo
Junior Republic; Maude von Steu
Young, soprano.

Junjor Republic; Mauds von Steul Young, soprano. 6 p. m.—Uncle Geebee. 6:30 p. m.—Julie Wintz's Collegians. 7 p. m.—Norbert Lunk; Movie Sidelight 7:10 p. m.—Julie Wintz's Collegians.

WJZ-NEW YORK CITY-455

9:15 p. m.—Harvey Corbett, "Archit ture." 9:20 p. m.—Jack Smith, barytone. 9:30 p. m.—Aviation talk. 10 p. m.—Crescent Quartet. WFBH—NEW YORK CITY—273 7:80 p. m.—Dinner music. 9:80 p. m.—Classic hour. 11:30 p. m.—Dahce music. WOK—CHICAGO—217 WFBH-NEW YORK GATE-2.6

2 p. m.—Dave Brown's Orchestra.

3 p. m.—Educational talk.

3:15 p. m.—Tommy Lorraine's Orchestra.

1:15 p. m.—Knickerbocker Hospital tall.

3:30 p. m.—Studio program.

5 p. m.—Jerry Antone's Orchestra.

6 p. m.—Mario Alvarez, tenor.

6:30 p. m.—Yorkville Radio Trio.

7:30 p. m.—Limericka.

7:35 p. m.—Limericka.

7:35 p. m.—Majestic String Ensemble. 7 p. m.—Artists.
11 p. m.—Artists.
11 p. m.—Musical features.
WENR—CHICAGO—266
7 p. m.—Dinner concert.
9-11 p. m.—Popular program.
WQJ—CHICAGO—448
8 p. m.—Dinner concert.
12 midnight—Rainbow Skylarks.
2 a: m.—The Ginger Hour.
WGBD—ZION, ILI.—345
9 p. m.—Mixed quartet and celestial
WOC—DAYENPORT—464
8 p. m.—Educational farm talks.

WAHG-RICHMOND HILL, N. Y.-816

noon—Musical program. pns.

5 p. m.—Dorothy and Jean Davison.

5 p. m.—Alma Henken, pianist.

5 p. m.—Michael Lamberti, 'cellist.

m.—Constance Menkel, soprano.

5 p. m.—Dorothy and Jean Davison.

p m.—Alma Henken, pianist.

p m.—Michael Lamberti, cellist.

m.—Constance Menkel, soprano.

5 p. m.—Joe Zimmermans' Orchestra WEAF—NEW YORK CITY—452
:45-7:45 a. m.—"Health Exercises."
0:45 a. m.—Home service talk.
1:05 a. m.—Talk.
1:20 a. m.—Columbia University lecture
2 noon—Market and weather reports.
p. m.—Ray Nichols's Orchestra.
45 p. m.—"The Worry Complex."
p. m.—Dinner music.
p. m.—Dinner music.

tainers. 12:30 a. m.—Ted Lewis's Orchestra.

WNYC-NEW YORK CITY-526

WMCA-NEW YORK CITY-341

6 p. m.—Olcott Vall's Ensemble. 6:30 p. m.—Ernie Golden's Orchestra. 7:30 p. m.—Talk on "Education Week." 7:45 p. m.—Violet Kaye, "Happy Girl." 8 p. m.—Services from Northminst

6:45-7:15-7:45 a. m.—Gym class, 2:30 p. m.—Dords Nadeau, contrain, 2:45 p. m.—"The Citizen and Pub. Health." Nealth.

D. m.—Dorris Nadeau, contraito.

15 p. m.—Concert Orchestra.

15 p. m.—Words mispronounced.

17 p. m.—"Sports," Bill Wathey.

30 p. m.—Shelton dinner music.

30 p. m.—Ledward Breck, pianist.

p. m.—Edward Breck, pianist.

p. m.—"Topics of the Day."

15 p. m.—Madelaine Huisizer, soprano.

30 p. m.—William Lockwood, violinist.

45 p. m.—"Lighter and Heavier Aircraft," Captain Anton Hèinen.

pm.—William Lockwood, violinist.

Vizetelly. 9:80 p. m. Madelaine Hulsizer, soprano. p. m.—News Bullelin.
10 p. m.—Paragon Novelty Trio.
0 p. m.—Bora Damon, cornetist.
45 p. m.—Paragon Novelty Trio.
p. m.—Vincent Lopez's Orchestra.

WAAM-NEWARK-263 WAMM—NEWARK—203

a. m.—Happy Hour.
b. m.—Gus Steck's Orchestra.
c. m.—Sport Oracle.
c. m.—Sport Oracle.
c. m.—Helen Bataille, soprano.
c. p. m.—Roger Mürphy, tenor.
c. p. m.—Arthur Fischer, violinist.
c. m.—Roger Murphy, tenor.
c. p. m.—Arthur Fischer, violinist.
c. m.—Naborhood Merchants program
c. m.—E. Camphell's profile.

MGCP—NEWARK—253

m.—Pianist and barytone.
p. m.—Clarence Williams p. m.—Jack Davis, songs.
p. m.—Haines's Good News Party.
p. m.—Charlotte Trystmann, planist.
m.—Orchestra.
p. m.—Daddy Winhum's rhyme ma

hine.

D. m.—Orchestra.

D. m.—Hock and Jerome, songs.

D. m.—Charol de Thornee, pianist.

D. m.—Stonge by artista.

D. m.—Stonge Entertainers.

D. m.—Connie's Orchestra.

D. m.—Strickland's Orchestra.

D. m.—Richman Entertainers. WFI-PHILADELPHIA-894

WLIT-PHILADELPHIA-895 WOO-PHILADELPHIA-508 a. m.—Grand organ.
noon—Luncheon music.
p. m.—Grand organ and trumps
p. m.—Dinner music.
m.—United States Army Band.
p. m.—Pooley, Period.
m.—Roxy's Gang.
p. m.—Fox Theater program.

WIP-PHILADELTHIA-508 3:45 a. m.—Setting-up exercises.
0:30 a. m.—Reducing exercises.
1 p. m.—Luncheon music.
3 p. m.—Artist recital.
5:05 p. m.—Dinner music.
7 p. m.—Bedtime story.

WGY-SCHENECTADY-380 WRY-TARRYTOWN, N. Y.-278 :05 p. m.—Orawumpum Gardens

chestra. 10:30 p. m.—Euke Duo. 10:45 p. m.—Frankie Brown, songs. 11:05 p. m.—Orawumpum Gardens WGR_BUFFALO_319

WGE SUFFALO 319

10.45 a. m.—Home service talk.
6.30 p. m.—Dinner music.
8.30 p. m.—Two-piano recital.
9 p. m.—Concert.
10 p. m.—Ipana Troubadours.
11 p. m.—Ia. m.—Supper music. WHAM-ROCHESTER-278 WMAK-LOCKPORT, N. Y.—266 WCAC-MANSFIELD, CONN-275

WJAR-PROVIDENCE-306 0 s. m. Housewives's radio exchange.

105 p. m. Studio program.

130 p. m.—United States Army Band.

105 p. m.—Roxy's Gang.

7:45 p. m.—Violet Kaye, "Happy Girl."

8 p. m.—Services from Northminster
Church.

9 p. m.—O. G. Van Campen, "Public Speaking."

9:15 p. m.—'Two Hot Knights"

9:30 p. m.—Audubon Theater.

10 p. m.—Andy Asciutto's Orchestra.

11 p. m.—Entertainers.

11 p. m.—Entertainers.

12 midnight—Serenaders.

WENY_NEW YORK CITY_259

2 WRNY_NEW YORK CITY_259

2 WNAC_HOSTON_280

WNAC-BOSTON-280 m.—Bible readings;

WRNY—NEW YORK CITY—259

10:30 a. m.—Reducing exercises.

10:45 a. m.—Health Advice.

11 a. m.—Princess Lubov Schetinin.

12 noon—Hour of music.

14:15 p. m.—Afternoon musicale.

4:30 p. m.—Symphony Society notes.

6 p. m.—Hour of music.

7:05 p. m.—Whose Birthday To-day**

7:05 p. m.—Telegraph Sportfash.

7:10 p. m.—Commerce of the Day.

7:15 p. m.—Opera notes.

7:20 p. m.—Princess Lubov Schetinin.

8 p. m.—Dr. Spach's Artista.

8:30 p. m.—Pictorial Review says—"

8:45 p. m.—Samuel Polansky, violinist.

9 p. m.—Teinters on 'DK' Reception."

A. P. Peck.

9:15 p. m.—Harvey Corbett, "Architecture." WBZ-SPRINGFIELD, MASS.-333

6:30 p. m.—Lee Reisman's Ensemble.
7 p. m.—Market reports.
7 p. m.—Market reports.
7:30 p. m.—Market reports.
7:30 p. m.—Radio Nature Story.
8 p. m.—Cibbs piano concert.
9 p. m.—Mae Sheppard-Hayward, soprano;
Hazel Clark-Leonard, violinist, and
Edith Greene, pianist.
WTAG—WORCESTER, MASS.—268 WRC-WASHINGTON-469

WCAP—WASHINGTON—469 -7:45 a. m.—Setting-up exercises.
m.—Market summaries.
p. m.—U. S. Army Band.
m.—The Buddies.
p. m.—U. S. Army Band.
p. m.—Roxy's Gang.

m.—Dinner music. n.—The KDKA mailbox. m.—"Oil and Gas" talk.

m.—Children's period.
m.—Pollce reports.
—Father and son talks,
m.—Pooley concert.
—Roxy's Gang. WADC-AKRON, OHTO-258

m.—Portage Quintet.
WTAM—CLEVELAND—390 WEAR-CLEVELAND-390

WKRC-CINCINNATI-422 WSAI-CINCINNATI-326

WLW—CINCINNATI—422 9:15 p. m.—Concert orchestra.
10:30 p. m.—Mary Cheney, soprano.
11 p. m.—Pep concert.
11:30 p. m.—Male quartet.
12:15 a. m.—Trio concert.

D. m.—Dinner concert.

D. m.—Orchestra and soloista

D. m.—Same as WEAP. WJB PONTIAC, MICH.-517 Goldkette's Orches
Burroughs Hour,
m. Jewett Jesters, WREO-LANSING-280

KYW-CHICAGO-536 p. m.—Dinner concert.

5 p. m.—Talke.

5 p. m.—Musical program.

9 m.—Midnight revue.

6 8 m.—"Insomnia Club."

WGN—CHICAGO—870

30 p. m.—Dinner music.
0:30 p. m.—The classic hour.
2:30 a. m.—Dinner music. wQJ_CHICAGO 447
p. m.—Rainbow Orchestra.
p. m.—Musical program.

WEBH—CHICAGO—879

8 p. m.—Dinner concert; songs; talk.

10 p. m.—Dance selections.

11 to 2 a. m.—Dance music; impro 7:15 p. m.-1 a. m.—Organ; stor music hour; Ford and Glenn. WENR—CHICAGO—266 8 to 11 p. m.—Popular program. 1 to 3 a. m.—Midnight frolic. WMAQ-CHICAGO-448

WHT-CHICAGO-400

7 p. m.—Classical program, 8:46 p. m. (238 meters)—Alamo Orclestrs 10:30 p. m.—Organ recifal 10 a. m.—Your Hour League. WOK—CHICAGO—217
7 p. m.—Artists and orchestra.

WSUI-IOWA CITY-484 WOC DAVENPORT 184
6:45 p. m.—Chimes concert.
16 p. m.—Program same as WEAF.
11 p. m.—Musical program.

THURSDAY

STREET STREET CORP. A. AN COLOR DESCRIPTION OF

WEAF-NEW YORK CITY-492 6:45-7:45 a. m.—Health Exercises. 11:10 a. m.—Margaret Hamilton, soprano. 11:25 a. m.—Beauty and the Fish. 11:25 a. m.—Golumbia University Lec-11:30 a. m.—Columbia University Lecture, "Cookery."
12 noon—Market and Weather Reports.
4 p. m.—Perla Floridia, planist.
4:15 p. m.—Christine Church, soprano.
4:30 p. m.—Perla Floridia, planist.
4:45 p. m.—'Cut Gems," Heien Ballard.
6 p. m.—Dinner Music.
7 p. m.—Mid-Week Services: Duet; Address by Rev. Winfred R. Ackert.
7:30 p. m.—Serenaders.
8 p. m.—'The Larkinites."
8:30 p. m.—'Touring," George Cooley.
9 p. m.—Address by President Calvin Coolidge at the Chamber of Commerce dinner.
10 p. m.—The Zippers.
11-12 p. m.—Vincent Lopez's Orchestra.
WJZ—NEW YORK CITY—455

W.IZ_NEW YORK CITY-455

10 a. m.—Women's Hour.

11 a. m.—News.

11:05 a. m.—'Be Your Own Decorator.''

1 p. m.—Nathan Abas' Orchestra.

2 p. m.—Educational week program.

3 p. m.—Educational Program.

4:05 p. m.—Frioda Rochen, soprano.

4:15 p. m.—Beroda Rochen, soprano.

4:15 p. m.—Bernhard Levitow's Music.

5:32 p. m.—Market quotationa.

5:50 p. m.—Frinacial summary.

6:30 p. m.—N. Y. University Course—

"Greek and Roman History Relation to Modern Times," Prof. Ralph V. D.

Magoffin.

7 p. m.—Judge, Jr. Magoffin,
7:20 p. m.—Shoreham Concert Orchestra.
8 p. m.—U. S. Army Band.
9 p. m.—President Coolidge at annual banquet of Chamber of Commerce.
10 p. m.—Royal Salon Orchestra.
11 p. m.—Jacques Green's Orchestra;
Colonial Aces.

WJY-NEW YORK CITY-405
7:30 p. m.—Vanderbilt Orchestra.
8:25 p. m.—Harriet /Youngs, soprame.
8:45 p. m.—"A \$300,000,000 idea," Herbert Rawli.

8:45 p. m.—"A \$300,000,000 Idea." Herbert Rawll.

WGES—NEW YORK CITY—316

10 a. m.—Threly talks with Teress.
10:10 a. m.—Don Clark, song factory.
10:20 a. m.—Household talks; songs.
10:40 a. m.—Better. Homes and
Gardens."

10:50 a. m.—Don Clark, songs.
1:30 p. m.—Scripture reading.
1:35 p. m.—Marlan Mottram, soprane.
1:40 p. m.—T. E. Schewe, planist.
2 p. m.—Educational program.
5 p. m.—Uncle Geebee
6:30 p. m.—Interview with Laura Crews.
6:40 p. m.—Finch and Friedley, songs.
6:50 p. m.—What the World is Doing.
6:50 p. m.—What the World is Doing.
8:50 p. m.—William Allerton, "China."
8:40 p. m.—William Allerton, "China."

WHN-NEW YORK CITY-S61

WHN—NEW YORK CITY—361

12:30 p. m.—Organ recital.

3:15-4:30 p. m.—Lexington Orchestra.

6:30 p. m.—Jack Cohen, pianist.

7 p. m.—Sunshine taik, Billy Yan.

7 p. m.—Iceland Orchestra.

7:30 p. m.—George Dowd, tenor.

7:45 p. m.—Eleanor King, pianist.

8 p. m.—Oakland's Chateau Shanley.

8:30 p. m.—Guardian Entertainers.

9 p. m.—Joe Sherman, songs.

9:15 p. m.—Abraham Burg, violinist.

10:30 p. m.—Kentucky Orchestra.

11:30 p. m.—Swanee Orchestra.

12:midnight—Ted Lewis's Orchestra.

WNYC—NEW YORK CITY—528 12 midnight—Ted Lewis's Orchestra.

WNYC—NEW YORK CITY—526
6-50 p. m.—Market high spote.
7 p. m.—Dinner concert.
7:30 p. m.—Police alarms.
7:35 p. m.—Dinner concert.
8 p. m.—"Football," by John B. Fost.
8 p. m.—"Football," by John B. Fost.
9 p. m.—Ralph Parker, tene
Dorothy Taylor, contraito.
9 p. m.—Joseph Wohlmann, pianist.
9:30 p. m.—The Allen Trio.
10:10 p. m.—"Trend of the Times,"
10:30 p. m.—Police alarms; weather.

WENY—NEW YORK CITY—259

10:10 p. m.—"Trend of the Times."
10:30 p. m.—Police alarms; weather.

WRNY—NEW YORK CITY—259
10:30 a. m.—Reducing exercises.
10:45 a. m.—"Appreciation of Pictures."
11 a. m.—"Advantages of the College Education."
11:15 a. m.—"Musical Courier Says"—
12 noon—Hour of music.
4:15 p. m.—Philharmonic Society notes.
6:45 p. m.—Jewish Circle, Isaac Landmas.
7-p. m.—"Whose Birthday To-day?"
7:05 p. m.—Telegraph sportflash.
7:10 p. m.—Commerce of the day.
7:15 p. m.—Opera notes.
7:20 p. m.—Chef Cretaux's chais.
7:30 p. m.—Isaiah Seligman.
7:45 p. m.—Kewanis Family Christmas."
8 p. m.—Concert orchestra.
8:30 p. m.—Radio questions and answers.
8:45 p. m.—Circ's jokes.

 Concert orchestra.
 m.—Radio questions and answers.
 m.—Life's jokes.
 m.—Alex Chigrinsky, planist. 9:30 p. m.—Essays on philoso 9:35 p. m.—Bill Rietz, songs. 9:45 p. m.—Classic Theater. 11:15 p. m.—Radio Art Players.

11:15 p. m.—Radio Art Players.

WMCA—NEW YORK CITY—341

6 p. m.—Olcott Vail's String Ensemble.
6:30 p. m.—Frank Gebbia's Orchestra.
7 p. m.—'Ukulele' Bob McDonald.
7:15 p. m.—Lecture program.
7:17 p. m.—'Ukulele' Bob McDonald.
7:30 p. m.—Lanson's Orchestra.
8 p. m.—'Hale and Hearty.''
8:30 p. m.—Emdine Bosse, soprano.
9:30 p. m.—Education Week talk.
9:45 p. m.—W. Curtts Nicholsen. "The
Right Word."
10 p. m.—Bw. Curts Nicholsen.
Right Word."
10:55 p. m.—Theodore Wright, barytone;
Robert Borsig, tenor.
10:30 p. m.—David Seigel, violinist:
11. p. m.—Ernie Golden's Orchestra.
12 midnight—'Broadway Night."

WFEH—NEW YORK CITY—273

12 midnight— Broadway Night."

WFHH—NEW YORK CITY—273

p. m.—Studio program.

2:45 p. m.—Educational talk.

p. m.—John Gerhard's Orchestra.

p. m.—Radiovues, Mrs. Owen Kildara.

4:15 p. m.—Bully Cohen's Hottentots.

4:30 p. m.—Billy Cohen's Hottentots.

6:30 p. m.—Flo and Dick Bernard.

6 p. m.—Stanley's Society Serenaders.

7 p. m.—Majestic String Ensemble.

7:36 p. m.—Health talk, Dr. H. H. Rubia.

7:35 p. m.—Entertainers. WOKO—NEW YORK CITY 353
8 p. m.—Herbert Link, planist.
8:15 p. m.—Horbert Cynche, planist.
8:35 p. m.—Larry Rosenkrantz's Band.
9:05 p. m.—Doyle Sisters.
9:25 p. m.—Larry Rosenkrantz's Band.

WLWL-NEW YORK CITY-283
9 p. m.—Dorothy MacDonough, soprane,
9:10 p. m.—Instrumental Tric,
9:30 p. m.—Talk
9:45 p. m.—Dorothy MacDonough, prano.

9:55 p. m.—Instrumental Trio.

9:55 p. m.—Instrumental Trio.

10:15 p. m.—Warriage and Divorce,

10:35 p. m.—Instrumental Trio.

10:45 p. m.—Organ recital,

WBBR-STATEN ISLAND, N. V. 778

8 p. m.—Carl Park, violinist.

8:10 p. m.—Heraid Male Quartet.

8:20 p. m.—Sunday School lesson.

8:40 p. m.—Heraid Male Quartet.

8:50 p. m.—Carl Park, violinist.

WAHG-RICHMOND HILL, N. V. 778

12 noon—Musical program.

12 noon—Musical program.

WAM—NEWARK—263

11 a. m.—Happy Hour program.

6 p. m.—Fred Smith's Orchestra. (Continued on next page)

Locser's
Lorraine
Dance music
Colonial
Biltmore
Meyer Davis's
Dance music
Fordham
Dance music

Van's
Dance music
Ben Bernic's
Serenaders
Cinderella
Dance music
Hai'chase's
Dance music
Crandall's
Paul Specht's
Arrowhead
Dance music
Eddie Elking's
Vincent Lopez's
Ernic Geiden's
Dance music
Ferracci's

NOVEMBER 21

Dance Orchestras for This Week

the A. R. R. L. that its efforts to have

a separate traffic division to comprise

the entire second radio district have

been officially approved at a recent

board of directors meeting of the league. This announcement is the

organization of the league that such

formations has been undertaken. Can-

ager will be announced at a later

a change in geographical division

didates for the new division man-

Cornish Male Chorus To Be

WHZ Will Broadcast 6. A. R. Convention

Grand Army veterans the country

Radio

Receiving Set~

0 0 -0-

Freshman 6. Inc.

Ask your Dealer for a demonstration or write for complete literature

literature ~~~~

Broadcast by Station WJZ

Radio Fans and Blueprints

The Skill, Judgment and Integrity of the Organization Back of the Print Responsible for Efficiency

By LIEUT. VICTOR GREIFF, M. I. R. E. Designer and Consulting Engineer, Receptrad Products

a matter of common knowledge that when he uses a co-ordinated set of secure their own traffic and league the average man finds in the building carefully tested parts and the con- organization. end of it and that, while the home- creasing popularity of the super- amateurs. With the formation of the made radio set a bare year ago was heterodyne and reflex circuits—the new division, however, amateurs of a humorously crude affair, to-day skill, judgment, integrity and facili- this district will have full sway in amateurs are building themselves the ties of the organization back of the their new division. The name "Hudmost advanced and powerful sets and the success of the highly efficient ignated for this new division, which producing results never before circuits of to-day and to-morrow. thought possible. Back of this and responsible for it is the widely popu- New Broadcasting lar radio blueprint, and back of the blueprint there is a world of scientific endeavor, production and service. The respect of the fan for the blueprint is notorious and sometimes amusing. thier, Philadelphia, has just installed One sometimes receives a letter ask- the latest and most improved type of ing for an explanation of an acci- Western Electric broadcasting outdental spot on the print. The fans fits. This is the first installation of dental spot on the print the with this new type of equipment in the Radio Bible Class by station WJZ fanatical zeal. Now, why is this and try being in Chicago, at Station WLS.

print and make." In the days of crysset will work." In the days of cryspression of harmonics, changes which debut in America at that time. The set will work. The permit transmission of the lower fre-Cornish Male Chorus, every member rections used to read greater fidelity, and elimination of England, has an international reperally, as Haennigsen shows in a cartoon, where the amateur was tapping prised of the antenna and a variable will constitute their first radio aptuning inductores to adjust the days are passed, and as the radio art tenna circuit to the primary or oscildays are passed, and develops more efficient windings, later-frequency. Under these condiparts and specialized units are de- tions the harmonics are not transmanded, until to-day, thousands of ferred to the antenna circuit, hence fans build readily from specialized parts receivers that would have taxed the facilities of a Navy Yard five behind the blueprint are to be pair the engine failed. The launch

hook-up service "back of the blue- thought himself of the telegraphic WEAF's program on Thursday eveprint" meant the design of a coupler code, learned in his early amateur ning. Mr. DuBois is an instructor in that would operate freely at all wave days and kept up during his connection public speaking at New York Unithe without adjustment; accu- tion with F. A. D. Andrea, Inc., as gen- versity. rately tuned filters for the long wave eral manager. Before him was the lengths unknown outside of naval horn of the launch. Grasping the radio stations and university labora- button, he started sending out the tories; measurements of wave lengths S O S call over the troubled waters. that could not be checked by any lo- The piercing shriek of the Klaxon cal standardizing laboratories re- was heard by a fishing boat, which quiring the development of original quickly placed a towline on the launch standards and the development of and pulled it into Sheepshead Bay. new types of transformers. Of course, the transformer for radio or audio is the simplest device to connect and from which the most is re- the first radio talk in this country quired in a number of ways. The to be made by a famous woman aviamplifying transformer must be de- atrix. Mile. Andre Peyre, dainty signed for different tubes, different French aerial dare-devil and holder hattery connections, different intensi- of a number of women's airplane recties of incoming signals, different ords, has no intention of trying to wave lengths, varying in different induce young girls to leave home to cases from two hundred meters to join her new profession. On the twelve thousand meters, and bands contrary, when she talks at WEBJ of musical tones from the lowest on Tuesday she will almost guarantee to the highest in order to obtain to straighten the permanent waves the foremost requirement of the of her listeners when she tells of her listener-true reproduction of tone, airplane thrills. no matter what the power of the cir-

The keynote in all the functions back of the blueprint is much the same requirement that has made amateur photography possible; that islatitude. The blueprint and the parts together must give results under the widely varying conditions that are possible outside the laboratory, and here is where the skill and judgment of the designer are really shown. Hundreds of circuits have been proposed together with complete instructions for building the popular and powerful reflex and super-

WHILE the radio fan has been a heterodyne circuits; but the amafavorite of the jokesmiths, it is teur's chance, whether he be begin- behalf of the amateurs of the sec-

radio set a wonderful nection blueprint for them with or- Heretofore the second district was wonderful reward at the ganization skill and service behind a part of the Atlantic Division and them. This is the secret of the in- had no official vote in A. R. R. L.

Station WFI, Strawbridge & Clo-

The height of the new masts is 170 feet. The distance between masts is sented by the Church Community The experienced tasks your 232 feet. The length of the antenna Chorus, under the direction of Clartells the beginner to "follow your is 200 feet. The tells the beginner to long your is 200 feet. The new features incorprint and make clean splices and your porated are apparatus for the constant when the direction of Clarporated are apparatus for the sup- nish Male Chorus will make its radic to read something as quencies of the musical scale with of which is a native of Cornwall. the motor-generator hum to a point utation as religious and classica' that is considered practically negli- singers, and its appearance in the

a second tuned circuit, which is com- New York Federation of Churches

Knowledge of Code Brings

Aid to Disabled Launch held in Boston, officials of that mili-Knowledge of the Continental code tary organization have granted exin a disabled power launch off the house company and the G. A. R. were two days off the New Jersey shore A. R. The convention will be held aboard the Brown Betty and were on event of interest which transpires their way back when the engine went during its session will be sent out assembly and can go no dead. A nasty choppy sea confused into the air by WBZ for old veterans further; production control, research by a long swell was running before and sons of veterans unable to be laboratory and information service a stiff wind. Desperate efforts to re- in actual attendance. behind the blueprint are was about six miles southeast of Long thanked for the coordination and Reach Night was fact approaching Beach. Night was fast approaching. It was at this stage, when things Speakers," the title of an address by In the aristocratic super-heterodyne looked pretty bad, that Mr. Klein be- Warren C. DuBois, is a feature of

The Greatest Value ever offered in a Andre Peyre at WEBJ "Flying for the Movies" will be FRESHMAN MASTERPIECE 5 Tube Tuned Radio Frequency

Radiola Super-Heterodyne, Radiola 3A, Radiola 3, Radiola Bal. Amplifier in stock De Forest D 12, latest model in stock

SHEARN 1122 Madison Av., at 84th St. Butterfield 0450 Closes 7 P. M.

8 E. Fordham Road

Kellogg 6005 Closes 10 P.

New York Amateurs Form A New Radio Division The Second District Executive Radio Council has just been advised by

Across the Pacific with a Haynes Simplified Super-Heterodyne

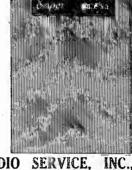
From Mandurama, New South Wales, Australia, across the Pacific Ocean to Oakland, California-a straight-line distance of over 7,000 miles—is the latest record of the Haynes Simplified Super-Heterodyne.

Using an aerial loosely coupled to a loop, Mr. R. J. Fagan, of "Sunny Ridge," Mandurama, brings in Station KGO on the loud speaker with considerable volume. This reception is remarkable, of course. No radio receiver can be expected to operate consistently over a distance of 7,000 miles. But the record does show what the

Mr. Fagan's letter telling of his reception is on our bulletin board. Come in and read it.

Haynes "Super" can accomplish under the best of con-

Read "SUPER SUCCESS" By A. J. Haynes



GRIFFIN



WITH THE MANUFACTURER

DIRECT AND SAVE MONEY
Insure yourself for BETTER SERVICE and GREATER
SATISFACTION, HIGH QUALITY and LOW PRICE.

RECEIVES LONG DISTANCE ON INDOOR AERIAL

KNOCK-DOWN

SPECIAL A & P KIT FOR 5-TUBE NEUTRODYNE needed to BUILD this A & P NEUTRODYNE is needed to BUILD this A & P NEUTRODYNE is needed in this KIT at the REMARKABLY LOW PRICE of Postage Extra

All parts to BUILD one like our STANDARD NEUTRODYNE......\$32.50

IMPROVED SUPER-HETERODYNE THE FAMOUS A & P 8-TUBE SET

THE I ANYLOUS A CL I STICHE SEE IN THE IMPORTANCE on the LOUD SPEAKER without the use of any ANTENNA WHAT-SOEVER, like a LOOP—either EXPOSED or CONCEALED, or GROUND. The only connections are from the set to the batterles.

Its operation is remarkably simple—only two dials control the tuning. LOCAL STATIONS can be Cut Out for distance even at the slightest difference in wave length.

Practically FREE FROM INTERFERENCE BY CODE OR WEATHER CONNITTIONS. It is the only set of its kind that reproduces MUSIC and SPIEECH with just as CLEAR TONE as performed. Everyone who listens to this instrument agrees that it plays with a finer tonal quality than they have ever heard. It is as though you were present at the performance. A GREAT SET!

CASH OR DEFERRED PAYMENTS

Cheerfully Arranged

OPEN UNTIL 9 P. M.

ATLANTIC & PACIFIC RADIO CORP.

THE HERALD TRIBUNE is broadcasting every Sunday in the RADIO EXCHANGE exceptional buys in Radio parts and equipment. Tune in every Sunday and receive service, sound advertising and low

THE NEW YORK HERALD New York and Tribune RADIO MAGAZINE

SECTION NINE

SUNDAY, AUGUST 10, 1924

16 PAGES

What Women Think of Radio in the Home

The Radio Receiver Should Be Considered as Family Equipment; Suggestions for Program Valuable to the Housewife; More Home Material Wanted

By MRS. CHRISTINE FREDERICK



OME time ago an enraged woman, not. Isn't it time, then, that the full ad become a raving radio fan, who forgot he had a wife or that his home was not a laboratory.

What has radio done to the home, and what do we wives think about it?

The funny papers have made us believe that the men and boys of the family never give the poor radio receiver a rest and that wifey can't pry hubby away from it for an evening out. The learned professors are solemnly of the opinion that hubby is "sublimating" himself away from wine, women and song via radio, and is now the most domesticated animal in captivity.

But why assume that the men and the flappers of the family are the only ones who get anything out of radio? Why not consider radio as a family equipment and look into the subject of what Mrs. Radio Fan is thinking about the little black box and its magic properties? After all, she is the one who has to sweep up the dirt and work over the rug on which the battery acid leaked! Well. I'll tell you what we women think

who have studied this new thing which has come into the home. We think it is a piece of household equipment which ranks with the sewing machine or the washing machine; ranks far higher, in fact, than anything that has ever been put into a home. But we think that, man-like, the people who run the radio business have rather overlooked the woman end of itthe home possibilities of it. After all, there are others than men and boys in the family, and the women folk are in the home all day long. Moreover, it is the woman in the home whose isolation is the most pronounced, and who, therefore, has most to gain from radio. Men have con- | features now being broadcast seem extacts in their daily work and a change | tremely unsuited to an extensive audience; of thought and ideas, whereas women have while some touch on such important sub-

round of possibilities of radio are looked greater value to the home if given in a at and that women be given the share of radio attention that the situation calls

Home Cooking Lessons by Radio

Out in Chicago, at my suggestion, a great public utility company which desired to interest more women in home cooking began to broadcast cooking talks at 11 o'clock in the morning, with the result that the idea was a big success Now these talks are a daily feature, and what's more, women take study courses in cooking by radio and receive certificates after having "passed" in this study course. There are special memorandum books supplied to women listeners-in, and the broadcast recipes are written into these memorandum books. "Radio teas" were also started in the afternoon hours. so that women could listen in and feel themselves part of a group. These radio teas have been hige successes, literally hundreds of thousands of women "attend-

ing" them. I mention this instance of advanced service to women to prove that we have only begun to tap the home possibilities of radio. After all, jazz isn't everything! And the fun of tuning in stations far away is, after all, short lived. I suppose men used to play with telephones like that when they were first installed—thrill over how far away they could talk. But the telephone got down to its real business of daily service after a while, and so must radio. We must have good, useful stuff coming by radio during the daysomething women can get value from.

What are the possible and practical adaptations of radio to the home? Many

jects that I feel they would render much continuous series and at a regular hour, thus developing automatically expectant listeners-in. If I knew, for example, that there would be a "first aid" lecture at 4 p. m. on each Thursday for successive weeks, or a household talk given every morning at 9, my interest would be more keen; and with a number of such series operating the listeners would segregate particular feature and thus develop a cumulative interest. In short, the sooner radio broadcasting adopts the definite schedules of subjects and hours common to institutions, or always found in a Chautauqua program, the more greatly will the public benefit.

Suggested Radio Programs

Taking for granted that the instruments used and the broadcasting facilities be developed will be within the reach of every one. I believe that the following outline of subjects would answer the needs of the majority of women and families and provide them with a service which will put them in touch with the world of thought, progress and amusement: 1-Physical Education:

- a Daily "setting up" exercises.
- b "First aid" instruction.
- c Health talks.
- d Beauty hints. 2-Junior Features:
- a Little children's hour.
- b Woodcraft and animal stories. c Adventure and history tales. d Activities of Boy Scouts and Camp
- Fire Girls. -Household Interests:
- a Housekeeping and cooking. b Market reports.
- c Care and hygiene of children. d Home decoration and furnishing. 4—Cultural Topics:
- terest in it even after the war. Radio will be able to make vivid and helpful to still greater numbers of people lessons on the

one, two, three, four!" etc.

b Musical programs.

Social Interests:

a Current events.

c News of sports.

d Worship services.

c Drama and book reviews.

b Public affairs and politics.

e Home finance and thrift.

f Club and organization activities.

I have suggested "setting up" exer-

cises as a daily radio feature because

I think it will answer the oft expressed

wish that we could bring the gymnasium

spirit into the house. Every one agrees

that we should all perform daily gymnas-

tics, but which of us finds pleasure in

taking exercise alone? And it is a well

known fact that we cannot derive full

henefit from something we do not enjoy

doing. It will be easily possible to broad-

cast the instructions for such a drill as

guided by the voice of a physical direc-

tor. A most desirable period would be be-

tween 6 and 7 a. m., repeating at fifteen

minute intervals so that different families

could have a choice as to the most con-

venient time. It would not be difficult to

set an alarm clock for the exact hour at

which the entire family preferred to wake

up and participate as a group in this

stimulating drill. The first sound coming

from the radio might well be the bugle

reveille: "Ta tah ta ta tah-ta tum!" fol-

lowed a moment later by the greeting and

command. "Good morning, everybody!

Now for a good start. Snap in! All to-

gether now, hands on shoulders-place-

The popularity and value of "first aid"

instruction was proved by the active in-

d Fashion and dress discussions

Continued on page six

Six-Tube Portable Radio Receiver of Excellent Design

A Small Size Suitca se Contains the Set and All Accessories

By FRANCIS J. ARMSTRONG

TN THE early days of broadcasting, when the programs consisted principally of the playing of a few phonograph records, the reading by the wireless operator from some book of history or selections played by an unknown artist simply to fill up the allotted time. the listener certainly had to be a "radio bug" to sit through more than one pro-

But now, when the air is full of intensely interesting entertainment from the solo by a noted soprano to the "news as it happens" or from speeches by the world's famous men to the broadcasting of the current sporting events, the average person is brought to a realization that radio has become an important part of his daily life.

The mechanical genius who found sheer joy in the working of the apparatus, regardless of the program, is giving way to the discriminating person who listens to

try. The broadcasting of the coming po-

litical campaign will be a great stimulus

New Attitude Affects Design

However, the present buyer of a radio

set is faced with the problem of selecting

the apparatus that will best keep him in

touch with the daily changing program,

no matter where he may be, in his city or

country home, office or even touring in

his motor. This changing demand on the

part of the radio public has stimulated

the development of complete radio receiv-

ers in portable form, which development.

with its consequent elimination of roof

antennas, has in turn increased the de-

The portable radio, as perfected under

the trade name, "Karryadio," has now

made its appearance in form suitable to

be carried about ready for immediate re-

Karryadio is a completely equipped re-

ceiving set made by the Armley Radio

Corporation, so compact as to be entirely

ception of the broadcast of the hour.

mand for radio sets in general.

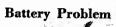
to radio in general.

controls.

only seventeen inches long, fourteen | with the horn at times pointed away from | quality was the dominating keynote in inches wide and only five and one-half inches thick.

Within the case is an ingeniously arranged set from speaker to batteries and loop, available for instant use. Any portable set to be of real value must be as powerful and as selective as its more cumbersome brothers, and the restriction of space makes the problem of design and construction much more difficult than in the production of ordinary sets where bulk is not a serious consideration. For instance, the elimination of outside roof antennæ is only possible by the use of

signers is the automatic battery connector, which permits the changing of the battery cells without disconnecting a single wire, and makes impossible the reversing of positive and negative poles. This feature will be appreciated particularly by women, as they can change batteries themselves without expert assist-



the listener. The pivoting cover, on the

contrary, permits the finest adjustment to

be made at the touch of a finger and quite

independent of the position of the case.

Simplicity Necessary

Simplicity, not only of operation but of

maintenance, is greatly desired by the rap-

idly growing class of radio owners who

care nothing for the method of reception,

but only for the results. An interesting

example of the degree to which this type

of owner has been considered by the de-

In many portables the smallest size batteries are used, but in this set the medium sizes were found to give more

The "A" battery problem was difficult to solve, principally because of the variety of types of batteries available for this

> The circuit used is the old standby transformer-coupled, three steps of radiofrequency, tube detector, and two transformer-coupled audio steps. Patents are pending on the unique features described. The radio dealer at the present time is

designing this set, the best of each piece

of apparatus was used regardless of cost.

This fact will be recognized by an ex-

amination of the following list of material

Parts Used in Set

1. The tuning condenser is a Hammar-

2. The radio-frequency transformers

3. The fixed condensers used are also

4. The audio-frequency transformers

5. The rheostat and potentiometer used

6. The tube sockets are the latest of the

non-microphonic type, and manufactured

7. Loud speaker is an English unit, the

amplion, made by Alfred Graham Com-

Not only have the best parts been used

throughout but electric connections be-

tween these elements are carefully made

by fine spaghetti-covered heavy wire with

soldered, nickle plated terminal lugs at

every connection, firmly secured by lock

washers. Lock washers were found to be

a necessity, particularly in a portable set

where the machine receives considerable

The finish on the outside of the case is

the best grade of du Pont fabricoid and

makes a handsome suitcase.

by the Benjamin Electric Company.

are of Federal manufacture.

used are Duratrans.

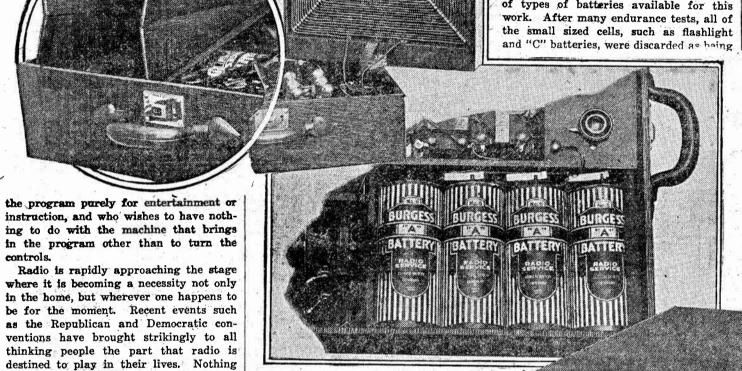
made by Dubilier.

are Amertrans.

pany, England.

handling.

faced with a problem to which he should give deep consideration. The good merchandiser wishes nothing but satisfied customers. The question therefore comes up as to what set should the dealer recommend to the average customer-a selfcontained portable, or the more cumbersome stationary set? The average person cannot afford and does not want two sets. But every one, at some time or other



destined to play in their lives. Nothing connected with the art of radio itself is high amplification of the original radio more fascinating than the realization on waves, which in a limited space is a probthe part of many persons that the radio lem to be approached with care. After will be to them not only a source of enmonths of work, the designers of Karrytertainment, but also a means of keeping adio obtained six stages of amplification them in touch with all the great current condensed into a space ten inches square events taking place throughout the coun-

efficiency.

Carrying Case

It was also borne in mind that a portable radio must not look like a radio set This new public attitude toward radio when being carried, for the discriminating has naturally had its effect on radio debuyer does not like to be made conspicuous signs, and the manufacturers are realizing or to attract attention to himself through that radio is not comparable to the phonoa case which with its outside controls radigraph, but is more closely related to the ates "there goes a radio set." This fact newspaper and telephone. In fact, it was always kept in sight by the designers would not be stretching the imagination with the result that no unsightly controls to say that the future might see some conmar the beautiful lines of the case. nection between the telephone and the ra-

A characteristic of well designed luggage is its thinness, which permits carrying with the least inconvenience and fatique. The experienced traveler will welcome the extreme reduction in this dimension obtained in the set by its collapsible sound amplifier, which gives the equivalent of the ordinary "loud speaker" in volume but occupies little space when

Another feature which makes an instant appeal is the remarkable simplicity of the loop aerial. Realizing that the set must be at all times available for instant use, all forms of detachable loops were discarded and a loop antenna built into the case cover so arranged that it pivots for directional reception as soon as the case is opened.

The loop itself would have been as efficient if placed in an ordinary hinged cessitated movement of the entire case paratus must be used throughout. And as to be ever present for such occasions. self-contained in a suitcase measuring

inadequate, and the ordinary dry cell decided upon.

As UV-199 or C-299 tubes are used. three batteries in series are required for proper voltage. Two sets of three, making six altogether, made the best combination, but brought the weight of the entire machine up to the point where the user might find it too cumbersome. Three cells. therefore, were specified, but the unique idea was adopted of providing a reserve cell, which allows the working of the cells in rotation, thus giving each cell a chance to recuperate and greatly prolonging its

Dry cells are similar to humans in this respect. If both are not overworked and have a chance to rest much greater work and longer life are assured. In the factory tests it was found that four cells rotated at one-half hour intervals, so that no one battery had more than one and one-half hours continuous service, lasted as long as six batteries in the circuit all the time The automatic battery connector makes it

Regardless of the form in which a radio cover, but its adjustment would have ne- set is assembled, the highest quality ap- Only a portable radio can be relied upon

vishes for a set which can be readily rarried from place to place. Perhaps, merely moving from one apartment to another, or perhaps, for use on the weekend trip, or the months spent in the coun-

Certainly, the ordinary stationary set is not readily portable, but the portable receiver can easily fulfill the requirements of the stationary set if nothing is lacking to make it a regular machine.

Karryadio has been equipped with an antenna and ground connection so that it may be used with an outside antenna and give as good results as the larger and more cumbersome stationary sets. Portable radios in general are coming

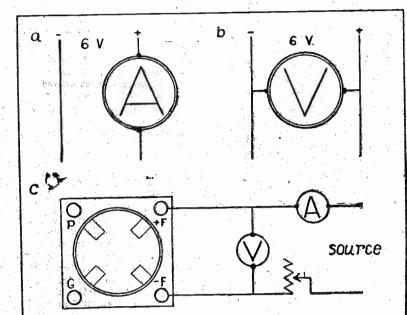
to be recognized, not as a fad, but as a real necessity. If one happens to be in the country without a phonograph and a new record comes on the market it can always be obtained later and replayed at will: but a speech, for instance, by a great man over the radio, if not heard at the time of broadcasting will be lost in so far as easy to change the batteries from time to the personality of the man is projected in his voice. Reproduction of the speech in cold print cannot be as satisfactory.

Proper Connections for Ammeters and Voltmeters

First, the ammeter. The connect- tery posts. ing of an ammeter in a circuit is The circuit given in Fig. c for the mont and Aqueduct tracks. always the same, no matter whether ammeter is for measuring one tube's Epinard, the famous four-year-old Hartford to Have a New

wish to have either a voltmeter, an ammeter or both. These instruments are either to be placed on the anel of a set and are to be permanently of the set of the second cricket eleven for two sets as the second cricket eleven for two sets as the set of the second cricket eleven for two sets as the set of the second cricket eleven for two sets as the set of the second cricket eleven for two sets as the set of the second cricket eleven for two sets as the set of the second cricket eleven for two sets as the second cricket eleven for two second cricket connected to the receiver or are to of the entire circuit is to be meas- Aqueduct on September 4 and 27, for years and in 1892 made 211 runs for

the amount of current to be meas- amperage only. For use on all tubes which Pierre Wertheimer has re-



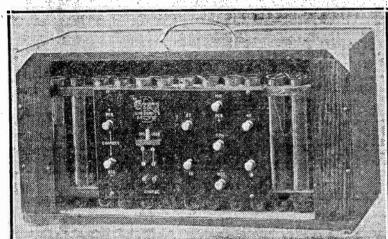
ter is always connected in series with binding post and the rest of the country in just one-third the time, the source of current before it gets circuit. That is, the "A" battery and as result the DX fans will get to the load. For simplicity the dia- positive lead goes first to the am- their much needed rest. In a telegram given accompanying this story meter and then to the filaments of gram to WGY Mr. Edwards reported shows how to use the instruments the tubes. on a six-volt battery for use in a The scale reading for an ammeter gredients: "Three acts of Polly-

either a plus sign or stamped "Posi- be as low as one-half an ampere. simultaneously." tive." This terminal is connected to The same for a WD 11 or 12. For a the positive battery lead, and the 199 tube no ammeter is necessary. Determining Cost of

or one million amperes. The amme- series with the positive "A" battery sible to log all the stations in the

last few months. The latest of these indefinitely either charged or dist forty-mile radius. As there are is the Gray Endurance B Battery charged without any diminution of about 700,000 homes in the same

made by the Gray Electro-Chemical capacity.



method of treating the metal ele- rosive, nor inflammable ments which, it is claimed, indefi- Severe vibration does not nitely prolongs their life, is the the battery. work by Dr. F. C. Gray and Paul with excessive rates of current. Wandelt

.The manufacturers, who express faith in their product by giving a two radio reception is obtained. year guarantee to each purchaser, It is absolutely noiseless in opera-

It can be short-circuited, over- can be made ready for use within charged, or charged in reverse directen minutes after unpacking.

Horse Races To Be

wish to have either a voltmeter, an as negative that has no identifying progress of the horses, even though was educated at Marlborough College, be used as external trouble shooters ured or just the voltage across one through the co-operation of Major Marlborough College against the fa-In either case it is well for the filament. If just the voltage improspective purchaser of these introduction on the pressed upon one tube is to be meastruments to know just how they ured, then connect the voltmeter as should be used and how to onnect the connect the entire circuit.

the Radio Corporation of America qualified as a university candidate for connect the voltmeter to the "A" batof both races direct from the Bel-

ured is one-millionth of an ampere the ammeter should be connected in cently brought to this country, and which is now in training for the series of three races scheduled for the early fall, will be the star attraction of the first racing broadcasting in history, and the best horses of this country will be "seen" in competition with the foreign favorite by radio listeners. J. Andrew White, who has described every type of sporting event which the radio has so far carried to the distant fans, will be at WJZ's microphone in the judges' stand, and direct Western Union wires, specially installed for the event, will carry his voice to the broadcasting studio on West Forty-second Street, New York, where it will be "put on the air."

A Novel Method of Tuning In Broadcasting Stations

DX fans who require the entire evening to call the roll of the nation's broadcasting stations will be envious of C. B. Edwards, of Kingston, R. I., who has discovered a method of bringing in three stations at once. If three stations may be brought in at one time it will be posa radio hash of the following inwill depend upon the amount of cur- anna' from WGY, a KDKA concert Every ammeter has two terminals, rent flowing in a circuit. For testing from East Pittsburgh and a prize-These two are marked as to polarity, the drain of a set employing one fight from WBZ, Springfield, were all That is, one of them is marked with UV-102A tube the scale reading can received by me on a crystal to-night

territory, this estimate would indi-Company, of Bayonne, N. J. A special Its gases are neither noxious, cor- cate that there are 610,000 homes in Chicago and vicinity which are potential purchasers of radio receivers.

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Broadcasting Station The New York Herald Tribune Radio Magazine is informed that the Travel-



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Captain Percy Redfern Creed, faing station of its own. The company Broadcast by WJZ mous newspaper magazine writer and special correspondent to "The London large and handsome office building, For the first time since horse racing Daily Mail," will address WEAF's surmounted by a tail tower, in which,



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the positive battery lead, and the other terminal is connected to the positive battery lead, and the other terminal is connected to the positive far battery lead, and the other terminal is connected to the seem that the ammeter is in series with the positive "A" battery lead.

The voltameter is used to determine the battery lead.

The voltameter is used to determine the voltage, or potential difference, in a battery, in a circuit or in part of a circuit, it is always connected across the circuit, whether the voltage of measurement be large or small. This is shown in Fig. b.

The voltameter always connected to the seem that are marked positive and negative. The positive is marked by a plus sign or the word "Positive". The positive is marked by looking for the **Center of the circuit.**

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The demaid for rechargeable set storage B battery

The demaid for rechargeable set storage B battery manufacture and the positive of the battery. The battery lead and the circuit.

The battery lead and the correct scale reading near the positive of the voltage of the terminal merced to be used to

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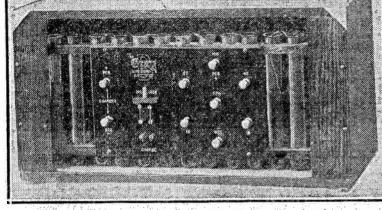
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VOLT UNIT KNOCKDOWN \$1. ELEMENTS, 6c A PAIR; GLASS CELLS, 3c
EACH; SEPARATORS, 1c BACH; PURE
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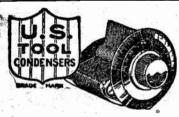
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Broadcast Bands Are Crowded

Interdepartmental Radio Committee Doing Its Best to Curb Interference, but Broadcasters Increase in Number

By THOMAS STEVENSON

WASHINGTON.—In the absence of with the departments. Its recommen- Monday night we have the broad- twenty minutes with him, feeling that egislation authorizing the Secretary dations have no binding effect and it last by WOR of the concert a good investment was made, f Commerce to regulate radio, all does not of itself undertake new du- given by the newly formed Newark government departments are co-opties. In spite of this, the Interderating to keep interference down to partmental Radio Advisory Commit-Philharmonic Band. This is WOR's the lowest possible minimum and tee exercises a big influence on radio first experience with outside broad- monic Band Concert, WOR's mixture promote harmony among the broad- activities. It co-operates with Chief casts, but we have found that they for the week is a little lean. We can-

Interdepartmental Radio Advisory tangles resulting from misunder-Committee, a body of which the gen- standings among broadcasters. in order to work out an agreement of wave lengths to the various types Wagner program will be played. among the government departments of stations. Here are the present as to the use of certain frequencies allocations above 75 kilocycles (berecommended for government broad- low 4,000 meters) to commercial, govcommittee dealt only with broadcast- mony prevails among the broadcast-

mornings, at which reports are re- pacity. ed for study. The committee has sev- Radio Advisory Committee is giving and legislation and material for problem would be additional legislabroadcasting.

icy of meantime to keep things running

It has been	the general poli
e committee	to leave final dec
equency, locycles	Wave Length, Meters
75-94	4,000-8,190
95-120	8,156-2,499
121-150	2,478-2,000
190-230	1,579-1,304
230-235	1.804-1.277
235-250 250	1.277-1.200
250-275	1,200 1,200-1,090
275-285	1,090-1,053
285-315	1,053-952
815	952
815-240	952-800
375 375-445	800
445	800-674 674
445-550	674-545
50-1,350	545-223
50-2,000	222-150
00-2.100	150-143
00-2.300	142-130

Ilo, International Radio Language

O. C. Roos, of Boston, president of "Rails," makes these statements about

"It may interest your readers to learn that, so far, the following ra- twofold purpose. First, it will mark diophone broadcasting stations are the rapid progress made by the inworking with CKAC, La Presse, dustry during the last year, and secin Ilo, the perfect radio auxiliary in- the radio interests of the world in a ernational language: KYW and WMAQ, Chicago; WNAC, Boston; WBZ, Springfield; WGR, Buffalo; WGI, Medford Hillside; WLW, Cincinnati; PWX, Cuba. Many others are joining the army.

"The following Hists are well known radio engineers and officers of power of wireless communication. 'Rails' (Radio Auxiliary International Language Society): E. F. W. Alexanderson, chief radio engineer, Radio spheres which now enjoy the ben-Corporation of America; Major Gen-efits of radio will indicate in unmiseral G. O. Squier, inventor 'wired wireless' and line casting'; John S. Stone, a great mathematician and radio inventor; John Hays Hammond radio inventor; John Hays Hammond also that it has been an invaluable pedo control by radio and of the influence in bringing the nations of 'scrambled' system of radio; George the world in closer relationship, as Lewis, assistant to Powel Crosley, well as affording people in all walks radio manufacturer; John V. L. Ho- of life, of every class, creed and gan, author of 'Outline of Radio,' color, a medium destined to enterwhich is to be translated into Ilo. tain, edify and instruct. Two of these Ilists have been past As executive chairman, the writer presidents of the Institute of Radio cannot urge too strongly that every Engineers, of which I was a founder. co-operation be given the Interna-The amateur interest is represented tional Radio Week committee for the

and aircraft stations. 2,700 commercial ships. 38 shore stations. Also foreign ships. 525 broadcasting stations. 17,000 amateur stations. 1333 experimental stations. 11 point to point commercial. 12 government land stations. 13 point to point commercial.

International

Radio Week By Powel Crosley Jr. Executive Chairman

International Radio Week, to be held November 23 to 30, will serve a ond, it will be the means of uniting great international exposition. Reports received at this time indicate that virtually every country interested in radio will aid in the forthcoming event, with a view to showing the keen interest being taken in the science and to prove the world-wide

It will be a period when the nations of the Eastern and Western hemi-

by Irving Vermilya, running three success of the fortcoming event. By If you want to buy, sell or stations in New Bedford, Mass., and strengthening the foundation now laid visor of Radio, 1st District, United benefit of mankind, who regard radio in the world's history.

The New Week on the Radio By Pioneer

which was accomplished in January, are dissatisfied with their present cast on the night of the 13th and the allocations. With the increased use latter on the night of the 12th. The The committee is composed of of radio on commercial ships, more members from the various govern— wave lengths are being required for Philharmonic concert should have a Marine Band will play again through ment departments interested in radio them. The government radio stations trifle more than the usual interest WEAF. This band actually plays in activities. The chairman of it is are now doing a larger business than attached to it, for the final elimina- Washington, but WEAF's wire trans-Judge S. B. Davis, solicitor for the ever before and they are demanding tion contest for the soloist will be think it was in the studio of this Department of Commerce, and the more wave lengths. New broadcast-carried out. Six contestants who first-class broadcaster. If we were secretary is L. E. Whitemore, radio ing stations are licensed every week expert of the Bureau of Standards. and all of the wave lengths allocated have been chosen from a large numerous ever forced to admit our conclusions as to who is the best technical broad-Meetings are held on alternate Friday for that purpose are crowded to ca- ber of applicants will be entered in as to who is the best technical broadthe contest. We have no advance thinking and listening to decide that ceived and discussed from its sub- This is one of the immediate prob- data relative to the program of the the honor did not rest at 195 Broadcommittees which have been present- lems to which the Interdepartmental University, but they have been so way. eral standing subcommittees, such as its thought and attention. While the consistently good in the past that those on technical problems, opera- members of the committee are con- there is little risk in holding that

> tion, they are doing their best in the (Copyright 1924) Chorus, which sings sacred and clas-Use.
> 13 government, 5 commercial.
> Government exclusive. 20 land stations, 31 by the New York Federation of spect that it deserves. Government exclusive. 20 land stations, 31 py the New York Total Federations.
>
> Commercial point to point. 109 commercial and 5 Govt. stations.
>
> Government exclusive. 43 land stations, 109 would have us believe that this choshina. rus is known from Palestine to Cali- Tuesday night. Here is another dis-Marine phone.
>
> 18 ship stations.
>
> Marine phone. 12 ships on 1,100 meters.
>
> Mississippi-Warrior service. 4 point to point thoughts. We are quite sure, howfornia, but we don't share his appointment-proof event. tations.
>
> darine phone. Also 1 point to point station.
>
> addio beacons. 13 stations.
>
> dever, that the singing of the chorus who in our humble estimation is will be enjoyable for those who like radio's greatest whistler, will be at Marine phone.
> Radio compass.
> Marine phone.
> Government exclusive. 50 land and 25 ship and aircraft stations. sacred music.

We don't know of a lecturer who the microphone. However, Sybil Fahas been more interesting on a large gen's work has been consistently number of occasions than George La- pleasing. val Chesterton. Chesterton, being English, usually talks about things in WEAF's new program that we English. On Thursday night he would mention in this column withchats about the "Slums of London." out a feeling of guilt.

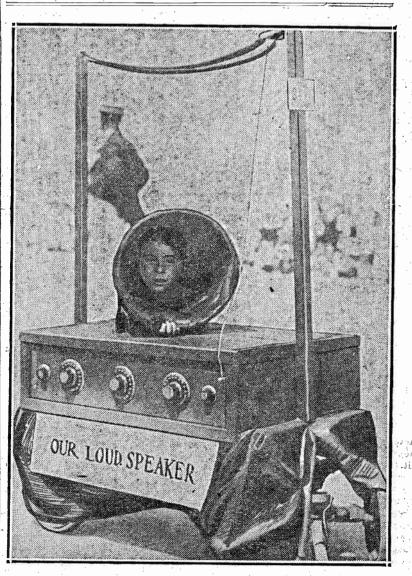
LTHOUGH the new week does We have found Chesterton's expresnot boast of many new features, we find enough of the mal being with a little interest in the old ones to make it interesting. On world of affairs can spend fifteen or

Aside from the Newark Philhar-

Radio Supervisor Terrill, who is a are making a very creditable job of not find one outstanding event on it. The center of these activities is the member of it, in straightening out it and it compares quite favorably In fact, if we are to consider the fact with the Goldman Band broadcast that Holly McCosker has discontinued eral public has heard little or noth- The seriousness of the broadcasting through WJZ. The Goldman affair, his "I See by the Papers" for the hot ing. The committee was organized situation can only be realized when a by the way, will be continued on Fri- weather, WOR's program is a bit in April, 1922, by Secretary Hoover study has been made of the allocation day night of this week and an all- worse than it has been for the last of all manner of talks and lectures Some of the other stable features about things of little interest. Yascha casting by the first national radio ernment and private radio stations: that will be continued through the about the best musical event offered conference. In the beginning the As readily can be seen, unless harnew week are the New York Philharaside from the Philharmonic band. ing, but successive methods devel- ers, serious interference will result. monic and the concert from the New Next on the list we would place the oped the desirability of extending Most of the wave lengths are now York University Summer School of concert orchestra of the S. S. Leviathe scope to include a wider field, crowded to capacity. The amateurs Music. The former will be broad- than That will broadcast on Wednes-

tion, mobile radio, government policy vinced that the real solution of the they will continue to remain good. | ways proven so restrain that we always like to mention them before-This afternoon the Cornish Male | hand when they appear with the advance data. The Rev. Hans Dresse! will play his cello on Tuesday night. sical music, will broadcast from WJZ WEAF has never failed to treat the in connection with the program given radio master instrument with the re-

WEAF. Whistling is perhaps about the most difficult kind of music to broadcast, so easily is it distorted by



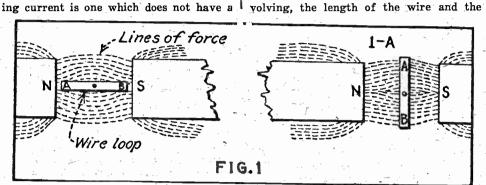
William Rand, "Radio on Wheels," wins prize in Bradley Beach parade

An Explanation of the Difference Between AC and DC Current

A Simple Description of Elementary Generators for the Two Types of Commercial Electrical Energy

By GEORGE HOPPERT

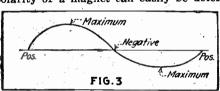
T SEEMS very difficult for most, that it intercepts or "cuts" lines of force | tact with the wire. However, in most in- | tator used for this machine would consist writers to explain clearly the dif- of a permanent magnet, an electric presference between alternating and sure or electro-motive force (emf) will be direct current. Not so long ago I read set up in the wire. This electro-motive an article giving the definition of alter- force or voltage will depend on three facnating current as follows: "An alternat- | tors—the speed at which the wire is re-



which, according to the above definition, would become an alternating current. The purpose of this article is, therefore, not only to give an understandable definition, but also to show the reason for the difference between the two kinds of electricity.

Where electrical energy is required for heavy duty, such as house lighting and for power purposes, it is obtained by revolving coils of wire in a magnetic field. Where the current drain is comparatively small, as in your radio set or automobile. it is obtained from either primary (dry) cells or secondary (storage) batteries.

Certain bodies (especially iron and steel) have the property of attraction or repulsion known as magnetism. Where no external energy is used to induce this magnetism, the metal possessing it is known as a permanent magnet. Every magnet, permanent or temporary, has two poles, a north pole and a south pole. The polarity of a magnet can easily be deter-



mined by suspending it so that it can move freely and by allowing it to come to rest. One end will always point toward the north. This end is called the north pole: the opposite end is called the south

Now, if we take two of the permanent magnets and bring them together we will find that the north pole of one will attract the south pole of the other and vice versa, but that if we bring the north poles of both magnets together there is no attraction, but rather a repulsion. Every magnet, whether permanent or temporary, has what is known as a magnetic field. This magnetic field is the area in which its magnetism exists and it can be determined by the old test with a bar magnet, a piece of paper and some iron filings. The magnet is laid on a table and the paper placed over it. The iron filings are then sprinkled over the paper. By touching the edge of the paper rather sharply the filings will fall into an arrangement showing exactly the magnetic field of the bar magnet. It will be noticed that the filings arrange themselves in lines, and these lines are known as lines of force of the magnet.

A current of electricity flowing through a wire is surrounded by lines of force just as in the bar magnet. When a coil of wire is wound around an iron bar or, better still, a bundle of soft iron wires, and current passed through it, these lines of force will pass through the bar as well as around the entire coil of wire and the bar becomes strongly magnetized. When a magnet takes this form it is called an electro-magnet and retains its magnetic property only as long as the current is flowing through the wire.

Current Production

It was shown in the last paragraph that it is possible for a body to become a magnet by intercepting and collecting "lines of force" set up by a current of electricity flowing through a coil. This is also true if the process is reversed; i. e.,

steady now." Partially this is true, but | strength of the magnetic field. If all we also have a fluctuating direct current | three are favorable a flow of current will

> Let us analyze this flow of current: Figure 1 shows a section of the wire loop between the north and south poles of two permanent magnets. If the loop is revolved the sides of the loop A and B will cut the lines of force flowing between the poles and an emf is generated in each side. When the loop has reached the position shown in Fig. 1-A neither side is cutting any lines of force, but is traveling parallel to them, and no emf is generated, but as soon as this point is passed the sides begin to cut the lines of force again, this time in the opposite direction, so that the direction of the emf generated is reversed. It can be seen that in its path from the horizontal to the vertical position the wire cuts fewer and fewer lines of force until in the vertical position it cuts none at all. Inasmuch as the number of lines of force is a factor-in determining the pressure, or emf, it is evident that as the wire nears the vertical position the emf becomes less and less until it is at absolute zero. It necessarily follows that as it again reaches the horizontal position, this time with ends reversed and consequently flow of current reversed, it cuts more and more lines of force until it reaches its maximum at the horizontal position. This accounts for the surging pressure or voltage in an alternating

> It isn't always necessary to have the wire moving and so cut the lines of force. The same effect can be gained by having a bar magnet inside the loop or wire and the magnet revolving. In this case the lines of force are traveling with the mag-

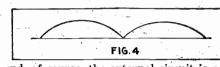
stances, for practical reasons, the magnets are stationary.

In Fig. 2 we have an illustration of the very simplest form of alternating current generator. L is the wire loop fastened to the axis P so that it can be revolved between the poles N and S of the magnet. The ends of the loop are connected to the rings A, which are known as "slip-rings," and to these the external circuit is connected by brushes B. When the loop is turned both sides will cut the lines of force passing between the poles of the magnet and generate an emf which will cause a current to flow in the external circuit. In the position shown the loop is not cutting any lines of force, as has bèen previously explained.

A quarter of a revolution further on the sides of the wire are in the center of the poles of the magnet and the emf wave is at its maximum point. From this point. for a quarter of a revolution, it will decrease until it reaches zero, then the direction is reversed and it inceases to negative maximum, from which it decreases to zero again. At this point a complete revolution of the loop has been made. The direction of the current in the external circuit was reversed every half revelu-

Fig. 2 shows what happened in the ex-

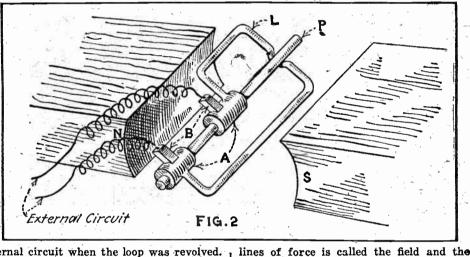
of two metal segments in place of the two slip-rings A as shown in Fig. 2. They are in the form of half a slip-ring and are insulated from each other, generally with mica. To these the ends of the loop are connected. Two brushes rest on this commutator directly opposite each other



and, of course, the external circuit is connected to the brushes.

When the loop is revolved the two segments of the commutator move around so that at the position where the loop is not cutting any lines of force, i. e., the vertical position, the brushes touch both commutator segments. When this point is passed the brush which was formerly in connection with one of the segments and consequently with one end of the loop is now connected to the other segment or other end of the loop and vice versa with the other brush. So that the direction of the loop, will remain the same in the outside circuit. Fig. 4 shows the current wave generated by this machine in one revolution

The part of a generator furnishing the



this machine it is necessary to employ a

ternal circuit when the loop was revolved. The complete curve is a cycle or an alternation. The horizontal line is known as the "base-line" and represents the zero of emf. During the first half of the revolution the current was flowing from positive to negative and during the second half of the revolution from negative to positive.

In order to obtain direct current from net and are cut when they come into con- device called a commutator. The commu-

Regeneration Can Now Be Measured

The Bureau of Standards has devised a method of calculating the amplification produced by the "tickler" method of regeneration. This discovery, in the opinion of experts, marks another milestone along the road to a perfect radio-receiving set.

The importance of the discovery can be stimated only when the necessity of amplification is understood. Amplification is needed to strengthen weak signals, and also to operate a loud speaker. Obviously, if amplification can be calculated in adance, it will result in clearer signals, as too much amplification is just as bad as not enough, since distortion results.

Hitherto, while it was well understood how to amplify radio signals by regeneration in electron tube circuits, there were very few data on the amplification produced by this method of regeneration. "The amplification of received radio sig-

nals by regeneration in electron-tube circuits is well known," said the Bureau of Standards in announcing the discovery. "One method of regeneration is the feeding back of alternating current power by means of inductively coupled coils in the two circuits, from the plate circuit to the tuned circuit connected to the grid of the electron tube. This method has been used if a wire is rotated in a magnetic field so extensively in modern radio-receiving sets said:

and is known as the 'tickler' method of regeneration. However, very few quantitative data have been available on the amplification produced by this method of regeneration.

"By means of a simple alternating-current theory an equation has been derived from which the amplification produced by inductive feedback ean be calculated. This equation shows that regeneration can be considered as producing a reduction in the resistance of the tuned circuit and so increasing the current. The equation derived was completely verified by experi-

An unusual feature about the discovery is that a woman participated actively in the experiments. Dr. C. B. Jolliffe and Miss J. A. Rodman, of the Bureau of Standards, are given credit for the dis-

Another step is being taken by the government which, it is believed, will eventually lead to the standardization of all radio equipment. The Bureau of Standards is conducting a series of tests to determine the most acceptable types of dry cells for use by government purchasformulated specifications for a standard

part which cuts these lines of forces and generates the pressure is called the armature. Of course, commercial apparatus assumes a very different appearance from the very simple model illustrated in Fig. 2, but it operates on exactly the same principle. The armature in a large generator consists of coils of wire wound around an iron core. The field is excited with electro-magnets, the electrical energy either being fed by the generator itself or from an outside source. Because an alternating current would change the polarity of the field magnets, only direct clectro-magnets operated by their own current. You can see now why it is impossible to charge a storage battery on alternating current without some sort of rectifier in the circuit because, due to the reversals in the current flow as much energy would be taken out as was put in. In your radio set alternating current is flowing right up to the grid of your detector tube. After the detector tube you have a pulsating direct current which varies with the variation of the incoming signal. While this is a varying current, it is not alternating, as one would be led to believe from the definition given at the beginning of this article. The chief difference is that though the pulsating direct current may also have a "wave" similar in appearance to the alternating current line, the direct current wave never goes below the base-line, which in altenating current indicates a reversal of the flow.

This may, and I hope it will, settle a number of questions that have arisen since the radio fan was compelled to become further acquainted with the mysteries of alternating and direct current. It might be well to add that the only way we can secure a steady flow of direct current is ing officers. The government has already from a battery, primary or secondary, and even the slight variations are caused receiving tube and is compiling data on by local action within the battery itself. transmitting tubes. In announcing the These variations, however, are very slight, dry-cell tests the Bureau of Standards and for ordinary purposes it can be assumed that the flow is steady.

What Every Fan Should Know About Radio Receiving Circuits

There Are Few Standard Circuits but Many Variations

By SIDNEY ELBER

PART III.

TYPEN we enter the field of regenerative circuits and begin discussing their histories and adventures in radio wonderland, we are taking up a most interesting subject. Regenerative circuits in general are so very flexible and pliant that we could rant here about a thousand and one so-called different circuits and still have enough material left for several weeks of incessant chatter. The writer is limiting the present article to only the best known of our present-day arrangements, to prevent confusion and to save time.

It must be definitely understood that the basic and underlying action of all regenerative circuits was first discovered in the aerial circuit is without question | doubtedly served its purpose as a simple | a dozen other tuning coils, with the red, the favorite trick resorted to by all circut chasers. In the variometer set this is due easily enough by replacing the regular vario-coupler by a fixed one having a primary (P) of a few turns (not more than fifteen) placed on the same tube as the larger secondary winding (S). This gives us Figure 3. The result is the elimination of one control without an appreciable loss in signal strength.

As far as can be recalled, Lawrence Cockaday was the first to use such an arrangement and to make it known publicly. Not only did he chop off the primary, but he also mounted the variometer bodily against the end of the secondary, thus obtaining regeneration by straight tickler feed back as well as by plate tuning. This was a clever stunt and worked out very nicely.

The untuned primary-variometer re-

concert receiver. Of course, there is nothing startling about it. The plate variometer is still present and is not even disguised. The tuning circuit is most unpretentious. It uses only a tapped coil and a variable condenser, which tune the aerial and grid circuits at the same time, as in the RC set.

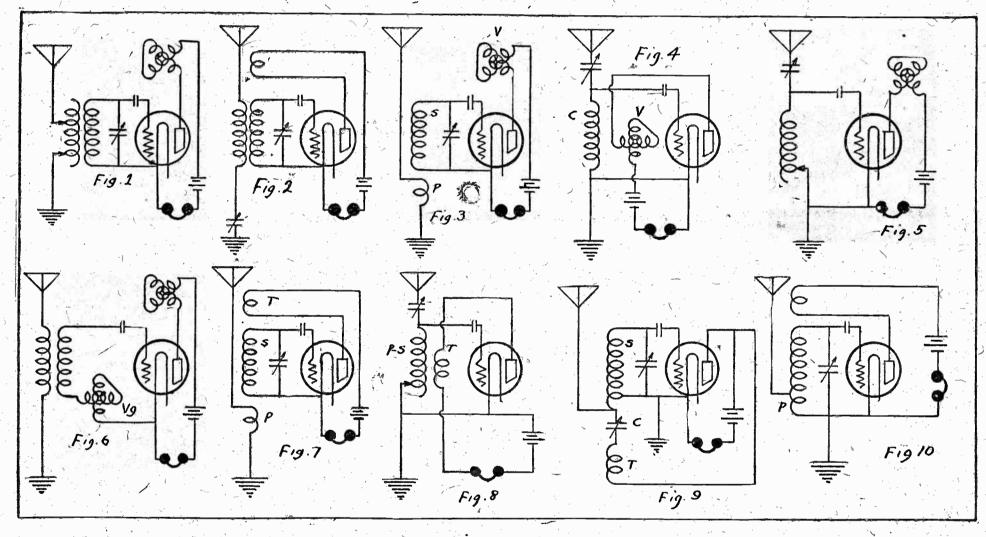
Variometer or Condenser

It has been mentioned that the variable funing condenser across the secondary of the vario-coupler in a váriometer regenerster can be replaced by another variometer similar to the one already present by inserting it in the wire leading from the top end of the secondary to the grid. This rives us the two-variometer receiver.

Nothing is gained by this substitution,

white, blue, pink and baby-blue wire? They are all exactly alike and all use the same circuit, the one shown in Figure 7. There is the untuned primary, P, wound next to the secondary, S, with a rotating tickler, T, fitted to the secondary end of the winding form.

These coils are widely used, for they work so smoothly and satisfactorily. Well, why shouldn't they? It is generally acknowledged that the tickler method of regeneration is the best one; add to the tickler dial only another for a tuning condenser, and you have a set that will bring in, with the aid of only one stage of audio amplification everything that is worth hearing in the broadcast field. It will not be quite as reliable on distance as the more complicated radio frequency sets, but it will pull the DX'ers in all right, and except in the matter of appearance. Ex- | pull them in nicely. This circuit by the



his own investigations. It is true that it to a not so distant town, and convinced much important development work was accomplished by the later men. and all credit is due them for it, but there also fan got a lot of free publicity, but it didn't have been many palpable fakers who unabashedly labelled the labors of others as their own. The writer does not wish to invite libel suits by openly mentioning names, but the reader can peer between the lines and draw his own conclusions. Murder will out, anyway.

As mentioned in a previous article, the variometer and tickler regenerative methods have been most freely adapted to "new" sets. Two definite sets, the variometer-vario-coupler and the three-coil honeycomb (Figures 1 and 2), because of the length and time they have been used and known, will be regarded here as the foundation ones from which the variations are obtained. These receivers were employed long before broadcasting became the gigantic service that it is to-day, so the wisdom of their choice as criterions for younger affairs will not be questioned.

Variometer Circuit

Let's start with the variometer outfit. The regenerative action results from the presence of the variometer in the plate circuit, so that fixes that instrument. All the changing must be done on the grid side of the tube; in other words, in the

Getting rid of the tuned primary coil

by Armstrong. The work of the many | generator worked beautifully and was | perience has proved that there is nothing way, is not "three circuit," as one ignoa young and unsophisticated radio editor that it was his very own brain child. Said last long. Murder, etc.

Single Circuit

The circuit of Figure 4 may look vaguely familiar to quite a few persons. It should, for it is the fundamental circuit of the onetime famous and now departed "RC" set. (May it rest in eternal peace and solitude!) Regeneration was produced in it by a variometer (V) in the plate circuit, also coupled to the grid (C). The big dial up on top turned both the variometer rotor, and also the aerial tuning condenser. Why, we don't know. The combination was not a particularly wonderful one, as the tuning was broad and the regeneration adjustment rather coarse.

This was a single-circuit set-"single" because the aerial and tube circuits were combined and used the same tuning devices. Its one advantage was its simplicity of operation, but even this was superficial. It was so simple that everything came in at once on it.

The circuit of Figure 5 is similar to that of Figure 4, but the mechanical positions of the parts are different. This is. or rather was, a popular circuit among New England fans. It was introduced about two years ago, and at the time un-

scores of incidental experimenters did not | widely copied. One shameless radio fan | to choose between condenser and variome- | rant manufacturer seems to think. It is tages of each method just about balance, as do the actual results; which count more than anything else.

> Now not so long ago the writer read with amazement in a Western paper one of the boldest and most foolish radio stories he has ever seen. Some local radio "engineer" (so the credit line said) apparently had devised, after long and tedious labor, a marvelous and epochal receiving circuit which would do everything but sprinkle the front lawn. After wading through several columns of autobiographic wishwash we finally came to the description of the circuit, and, lo and behold! it made use of two variometers, a variooupler and the usual accessories! The claim for originality was made on the sole fact that the secondary tuning variometer, instead of being placed between the secondary and the grid, were most brilliantly installed between the secondary and the filament. This is about as different from the first scheme as the dancing of one Tiller girl is from that of any one of her partners.

Tickler feed back circuits are not one bit less changeable than variometer ones. Again there is the tendency to eliminate the aerial tuning circuit, and instead of finding the helpful, movable primary coil of the honeycomb set, we find five and ten turn untuned primaries.

Who hasn't seen the "Ambassador," "Air King," "Yankee," "Uncle Sam" and | all radio fans are interested in.)

Other tickler circuits can be recognized easily enough. In Figure 8 is the old single circuiter with a vario-coupler and riable condenser. This squealer is now about obsolete. It brings in a lot of interference and generates almost as much itself for others. Its passing is not mourned.

Figure 10 shows a circuit similar to that of Figure 7, but not as good as it. The bottom of the secondary winding is used as a primary instead of a separate coil. It is seen around occasionally.

Reinartz Tuner

Figure 9 commands immediate respect. It is the Reinartz, not Reinhartz, Rheinartz. Rheinhartz, or Rineharts, and it probably created more furore in its time than any other. Truthfully, it is not an original circuit either, but to rush to the defense of Reinartz, it must be stated that that prolific experimenter fully acknowleaged the fact that his circuit was but an adaptation of the Weagant system of shunt tickler feed back when he first described it in QST.

The tickler coil in the Reinartz is connected across the plate circuit rather than in series with it, as in the other sets just described. It is usually kept fixed, the regeneration being controlled by the condenser C.

(The next installment will deal with audio-frequency amplifier circuits, which

Neutrodyne Broadcast Recital

Stein put the set in his automobile paid the bill by check, and was able

a stranger entered the hall, picked car for Canada immediately upon broadcasting. up the receiver and exclaimed;

The hall man, hearing the remark, this concert may bring forth. thought the stranger was with Mr. Stein and did not interfere. The intruder quickly disappeared in the man was instituted. But the set was his father was professor of the piano, a dummy used for catalogue photo- and from him he receved his early ing end of the station. public and private recitals.

Radio Editors **Brings Collector** And the Thief Alphonse Bohrer, the well-known To Operate WEEI Quick to see the advantages of ra-

composer and pianist, whose WJZ re-Somewhere in New York there is a citals have been among the outstand- ing station of Edison Light, Boston, urban populations, Edna K. Barker is The campaign conducted by the disillusioned crook bitterly bemoan- ing features of the winter radio pro- will open early in September. It will offering another foreign language Radio Section of the Associated Maning his luck. In fact, so far as he is grams, returns to the radio audience transmit on a wave length of 303 course to the KPO listeners-in. The ufacturers of Electrical Supplies to equicerned, all the joy has been taken in a special radio recital from that meters. Two Boston radio editors radio course in Spanish, which rose make the summer of 1924 a radio out of his business. It happened this station on Monday evening. Mr. Boh- who for many months have been so rapidly in favor under Mrs. Barkway: Harold Stein, general manager of "Foto Topics," was called to Newof "Foto Topics," was called to Newcerts, for immediately after he conark, N. J., to get a neutrodyne re-cluded his last appearance before the portunity to practice what they have tical. The coming classes in French, ceiver from the Eagle Radio Company WJZ microphone a bill collector preached, for they will have com- however, are already more popular to be photographed for the catalogue dashed into the studio with a bill of plete charge of the policy and opera- with the general public as well as \$2.45 which be claimed was a year tion of WEEI. overdue. Bohrer fortunately had and drove to his office in New York the next day to show the alert agent The Herald-Traveler, will be super- at 8:20, Pacific time, August 26.

Violoncellist at WEAF

Charles Burton, radio editor of City. He got out, carried the set into his canceled check. In the evening of intendent of the broadcasting de- Tune in and take it. Write in and the lobby of the building, together with some other bundles, and laid it on the floor, near the hall man, while on the floor, near the hall man, while on the floor, near the hall man, while hood days whom he had not seen or the floor of "The Boston O'Brien, Station KPO, Hale Bros." In thousands of the smaller than the will broadcast just previous to partment of Edison Light. Lewis S. whiteomb, better known as "Whit," Edna K. Barker, or Ada Morgan broadcast in the screen of the smaller than the station of the smaller than the station of the smaller than the section of the smaller than the station of he spoke to an acquaintance who had heard from for over fifteen years. Post," will be director of publicity Inc., San Francisco. The course is accosted him. As they were talking Mr. Bohrer plans to leave by motor and assistant superintendent of free. concluding his program on the 11th, Bob Emery, formerly of Amrad,

"Oh, all right. I'll take it along!" for he is not sure just what result will be program director of the new station. He will be assisted by E. station, and a general search for the Dressel was born in London, where charge of the technical and operat-

insides. What the thief said when he the rudiments of music and appeared E. I. for Edison Electric Illuminating tra will be broadcast, in conjunction conventions came in many quarters examined his loot would undoubtedly at an early age as a pianist at both Company, are incorporated in the with WJZ, from the Lewisohn Stad- as a revelation of the power and design

KPO Adds French Lessons To Scholastic Program

WEEI, the new 500-watt broadcast- dio education, both to rural and with educators and students of economie and social life.

The KPO French course commences

WGY Will Broadcast

Schenectady, N. Y., every Wednesday States, the usual summertime atmos-The eminent violoncellist Rev. was his assistant at WGI, and by Fans who can tune in on this station but little with the enjoyment of radio crewd on the street with his precious Hans Dressel will play a solo concert Miss Marjorie Drew, who was chief will be provided with an unusual reception. Letters from public offibundle. As soon as he had discov- as the leading feature of WEAF'S clerk of WGI's broadcasting depart. musical program. The Filipino or- cials, educators and clergymen emered his loss Stein called up a police program on Tuesday evening. Mr. ment. Clarence V. Purssell will have chestra of the U. S. S. Leviathan and phasize the fact that, in addition to a radio address by Captain Herbert, these entertainment features, radio Hartley will be broadcast from 7:30 has become an indispensable public to 9 p. m. At 9 p. m. a concert by service. The broadcasting of the graphing purposes only. It had no musical training. He soon mastered Edison Light's official initials, E. the New York Philharmonic Orches- Democratic and Republican national ium, College of the City of New York, tiny of radio in the home.

Summertime Radio Has Big Season

er's organization and direction, was equipment, service and programs, has

gathering of neighbors and friends for an evening of music or for an informal dance.

Due to the notable improvements in receiving apparatus as well as the On Wednesday Evening greater power and range of many The usual silence of station WGY, broadcasting stations in the United Lewis Dunham ("Uncle Eddie"), who night will be abolished on August 13. pheric disturbances have interfered

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The recent national Republican joyed by many thousands who never before had come to a realization of what a wonderful miracle radio added to the ever growing list of fans to whom life would be dull and ncomplete without their radio.

Even more thrilling than the conventions will be the campaign speeches. These warm weather days are stirring days in the political field, where party lines are being strained and broken. Entertainment for those interested

n sports is also plentiful. Baseball scores from the big leagues and prize fight returns are among the attractions in the athletic world. All things considered, if one is contemplating a radio at all, there

is everything to justify getting it A glance at the following list of things available by radio row wil

further support this conclusion. Things You Will Miss by Not Having a Radio This Summer

Presidential campaign speeches baseball scores, prize fight returns, church services, camping and moto If you want to buy, sell or talks, hotel dance orchestras, Philner music, hot weather food sugges-



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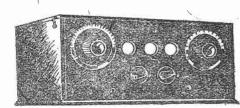
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Last Week on the Radio

is impossible to find space for but Code interruptions are much less than It is fortunate for the new art a very small portion of it in this last year. Occasionally one breaks that he is. There is more in the column. Those who do not find their through every wave length. opinions aired can anticipate the ap- I have a 3 tuber, vintage of 1922, phrase than is realized. Radio owes pearance of their letters in next but since replacing tubes with 201A a larger part of its development to I get New York, Newark and Philathis so-called "fooling" than can ever

from Elbert B. Hamlin, who does not (all except WJZ, which comes in badly perts and engineers. agree with us concerning WJZ's "Fi- and requires amplification). WJY

a paragraph by you in The Herald and compare with your reports. Tribune of July 19, in which you criticized 'The Financial Developments of the Day' as broadcast by

are of interest from day to day, have occasion to read it. to be able thus to get reliable information is not only of interest but of secretary of the American Radio Asparation. We say encouraging because it shows that the association ing radio, in common with all other the entertainment appeals more to ferred to: the other members of the household, New England Steamship Company, must have more rather than less of of listeners-in, is in receipt of many such material. Before writing this complaints of code (QRM) interfer"Radio widows" and the general this service more or less regularly rectly to your ships plying Long sit up half the night "fooling with and offered to write WJZ to this Island Sound and to the land station the radio." The wife of the chief effect. I have frequently myself in Brooklyn with which they work engineer of an important transformer made purchases or sales because of Broadcasting stations go to great ex- | manufacturer which maintains one it. Its broadcasting does not detract pense to send out good programs, but of the leading research laboratories from the sales of newspapers, be- while this code is being sent it is in the industry told the writer recause one must always get details absolutely useless for any one within cently that her husband stays up as, for example, I have often heard broadcast programs.

however, it simply increases the mo- lengths. offered from this source.

column. Not that it helps the matter in the least, but some people like to compare notes. Here is one comparison:

My Dear Pioneers and other things, and comparing with and that the courage displayed by the audience, for on that date the final my own, I conclude that static is, as A. R. A. has been commendable. The elimination contest for soloist of the General Hancock said of the tariff, a A. R. A., let us mention, is a non- Philharmonic will be incorporated in

times think flashes from the third too.

We accumulated so much interest-, rail of the Long Island Railroad may

Our first letter has been received not using the two amplifying tubes tion on the one tube. I shall here-"Sir: I venture to comment upon after note the hours of disturbance

Respectfully,

been received, and in some cases we speed all day on radio problems of "I doubt if you can realize the are actually reprimanded for having one kind and another start in as value of this broadcasting to a large mentioned that there was any static number of people. You say that it at all. Perhaps this is our own soon as they have had their dinne: can be of interest only to those enwriters, for we have neglected to home. gaged in the brokerage business. I mention that static is not strictly doubt if it is of any interest to that universal. Like thunder showers, it class of persons, because they have is more often local, and when we their tickers. But it is of interest complain about it it does not mean their "strange" conduct is that they to a large number of us who are actively interested in financial matactively interested in financial matters and who like to know what has trouble while the downtown section the "movies" or to be taken out in happened before we get our newspaper for the full cetails the following morning. With an apology for the contradiction, the 'small changes' that there are present writer, whose letter is printed above, appreciates this fact. We can only hope the contradiction, the 'small changes' that those who doubted our word will ments of the last five years have

sional trader or investor. A person's We have received a very encourage culties, to increase its range, and, interest is where his treasure is, and ing letter from Alfred E. Caddell, above all, to perfect the quality and value. Broadcasting needs more is alert to its function in protect- great public utilities, to new stages 'meat and taters' to appeal to the ing the interests of radio listeners. of efficiency and usefulness.

I have asked the opinion of feurteen ence which have been lodged by ex- public need not waste any sympathy people locally. Of these twelve use perienced operators and traced di- on either experts or amateurs who from the papers. It stimulates rather a range of twenty to fifty miles of till 12 and 1 o'clock several nights than decreases sales of newspapers. Long Island Sound to try to enjoy a week experimenting with the set in

bit of news the details of which Undoubtedly you know that there But I do not feel sorry for him," may not find in one paper, and is a national regulation that speci- she observed. "It does not tire him. have then bought another paper to fies that all communication must be It is not the actual amount of work find it. To people who have already carried on with the least power possi- which one does that tires. Fatigue read their evening paper on the way ble, but qualified observers who have and happiness in one's work do not home from business this feature logged this Sound traffic report that go together. In fact, I do not think might not appeal, but such people your operators use a considerable ex- my husband gets as tired as some are the minority of listeners. I cess of power. And this, combined men who work far fewer hours, but therefore solicit your encouragement with the obsolete spark system em- who do not have work which so abof this feature and those similar ployed, results in a very coarse, sorbs all their faculties and creative

Financial Developments of the Day bending every effort to bring about him so deeply, operates with a degree profit by it, but we wondered if the spectfully ask that you co-operate person's." number was sufficiently large to jus- with the ARA to put an end to this Pre-eminent among the problems tify the amount of time consumed abominable nuisance. There is no ex- cf radio development on which 1.0vcally in the broadcasting of this cuse for its continuation and it simply ices and research experts alike are event. After reading Mr. Hamlin's must cease—we would, of course, like now working is improving the clarity letter we have decided that WJZ had to see you stop it voluntarily. One and purity of tone in receiving setsbetter continue with its work and way to better conditions immediately to secure amplification without disnot mind our cantankerous rantings, would be to instruct your operators tortion. Without good tonal quality for if the event attracts the atten- to use their heads in carrying on any set, whatever may be its range tion of a few people who derive as traffic and keep it off the air in the of power, falls short of the ideal of much service from it as Mr. Hamlin early evening hours if they cannot perfected operation. Accurate and its position should be secure. To us, help trespassing on broadcast wave rure reproduction of the voice or

all of our financial news in the morn- being sent to Herbert Hoover, Secre- upon proper amplification, in which ing paper, and we find that it is quite tary of Commerce, and to the news- the sound is multiplied but not disas complete and authoritative as that papers, for the situation warrants torted. action. However, in the event that you remedy the present intolerable Elimination Contest From W.IZ We have made a habit of reporting conditions, the fullest publicity will

ALFRED M. CADDELL,

"Fooling With The Radio"

kolds to-day when the whereabouts ing correspondence last week that it be a cause, and that you, too, may of father or son are sought, is, "Oh,

> delphia as loud as I can bear the be estimated—not only "fooling" by headphones on the one tube receiver, father and other novices, but by ex-

seems all right from the same loca- man who has been busy in a store or office all day is glad to get home at night and "fool with the radio." It makes him forget the cares of H. B. SALISBURY. the day. But it is not quite so easy to understand why radio experts and Many letters like the above have research men who have worked at top

> but, of course, the real answer for it simpler, to eliminate minor diff-

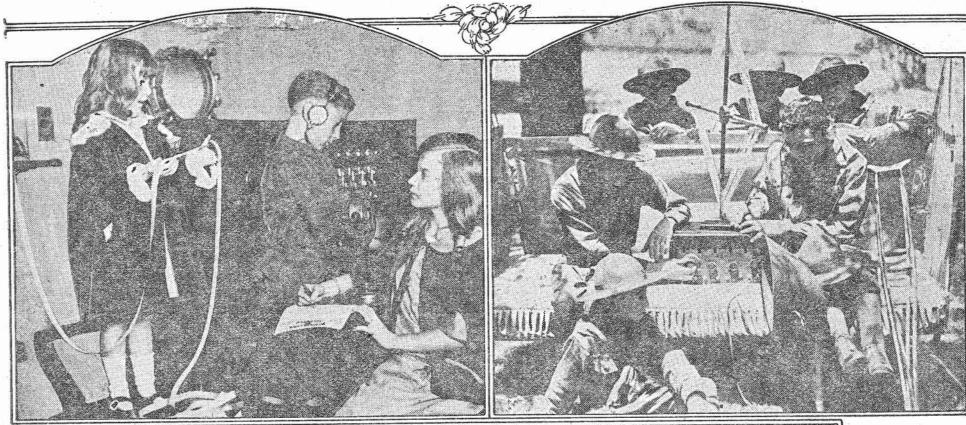
rian who pays for the equipment; Here is the copy of the letter re- Recently great strides have been This financial feature is one of the Pier 14, North River, New York City. reflex set has only one knob to tune few that appeal to the business man. Gentlemen: The American Radio with, and a new station can be To establish stability broadcasting Association, a national organization brought in by every turn of a few

poorly tuned signal that blankets the instincts. Probably the reason that upper scale of broadcast wave lengths | Edison can live on so few hours of and hashes up the finest programs. | sleep a night is that his trained brain. When we wrote our criticism of The American Radio Association is working on problems which interest ast reception, and we re- of fatigue far below the

o: the musical instrument in a radio notony of broadcasting, for we read A copy of this communication is set depends, in the last analysis,

An event of no small importance on the condition of static in the daily be given your efforts. Yours very truly, in the New York musical world will make the stadium concert by the Secretary. New York Philharmonic Orchestra, In addressing a letter of this na- which stations WJZ, New York City. ture to this particular concern we and WGY, Schenectady, are to broadbelieve that the first gun has been cast simultaneously on Wednesday. Noting your experience with static fired in the battle of interference one of unusual attraction to the radio commercial body of broadcast listen- the regular stadium concert. The six Your receiving station is about ers who pay \$1 a year for the privi- soloists who will be heard by the twelve miles from mine, yet often lege of having a part in the activities listeners are the ones selected from when you complain of static I have of the association. Since these ac- hundreds of applicants, having been none, and again when you note "heav- tivities have to do with matters like chosen after a series of eliminations enly stillness of the ether" I receive the above, every listener should be which has lasted all summer, and crashes denoting disturbance. I some- proud to share them. Numbers count, represent the foremost of the younger artists of this country.

Up-to-the-Minute News of Radio in Pictures



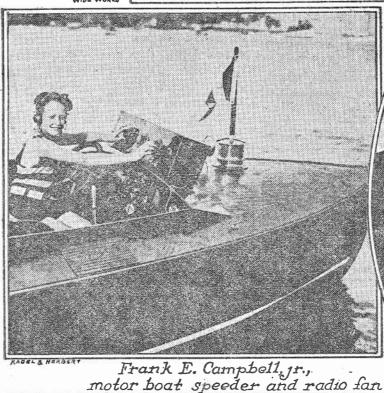
The Erbstein children operate father's broadcasting Station near Elgin, III.



Walter Reed Hospital, Washington D.C., Serves 900 Head Phones and three Loud Speakers



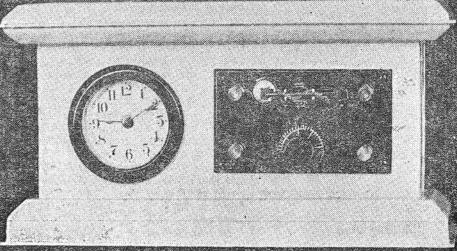
Boy Scouts appreciate



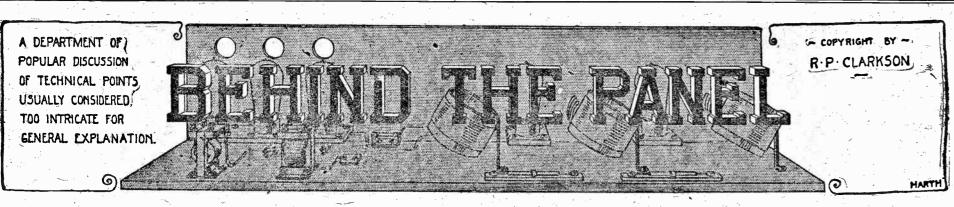


Roxie", alias S.I.Rothafel, Members of 212 L Leader of the Capitol MAnti-aircraft regiment Theatre "Sang": Study Radio





The Announcers at Station WGY, Schenectady NY Combined Clock and Crystal Radio Receiver for Travelers.



matters, such as radio, which are presented to the public. There must always waking up to the subject, and in that period the glamour and marvel of it all is so stressed that it becomes increasingly difficult to undo that sort of impression. No doubt all scientific things are wonderful. All new things appear marvelous and the less the observer knows about them the more he is mystified. The more he is mystified, the greater the marvel to

Some self-constituted authority listed the "seven wonders of the world" some years ago, setting down such things as Niagara Falls, the Pyramids of Egypt, the Handing Gardens of Babylon, the Colossus of Rhodes, the Great Wall of China and such things, as I recall them from memory, mixing together natural wonders with man-made wonders. Then only recently, in a contest conceived by "The Scientific American," a list of scientific wonders of the world was compiled by the public votes, and in this list, I believe, were only mentioned man's inventions, such as the airplane, wireless telegraphy and telephony, the X-ray and others which I have forgotten. By our own lack of intellectual breadth, or, to put it more bluntly, we don't realize our own ignorance. We are mystified by anything complex because we don't take the time nor the trouble to resolve it into its individual parts. To use an old saying, "we can't see the trees because of the forest." We frequently put the accent in the wrong place.

Magician's Skill

We appreciate Houdini and marvel at the things he does because we don't understand them, but reason tells us they must be simple and easily explained. The thing we should marvel at is his wonderful skill in doing them and in fooling us. The fact that a sleight-of-hand performer can stand openly and do a thing, and, in spite of being keyed up with every sense alert, we can't see him do it is most astounding, but the answer is simple. As they express it at the side shows, the hand is quicker than the eye.

Familiarity surely breeds contempt as these things witness. What can be or is more marvelous than the simplest things of life? What is more mysterious, for example, than fire, probably the first great contribution to civilization when primitive man sometimes, somewhere seized a burning brand from the forest fired by a lightning flash and fed its flame as he carried it back to the tribal home and there continued to keep it burning? What a magnificent courage it must have taken to do this, and what a growth must have occurred in that tribe, for now there was heat as the winter snows came, and no necessity for going southward in the fall. Now there was light during the long, dark night. There was protection from wild beasts. By and by when by accident some food was spilled into and rescued from the fire, cooking started.

It is not hard to understand why there became a race of fire worshipers. Those who live in the open to-day come very near to glorifying fire.

Making Fire

Yet time went on for centuries, and if the fire went out there was no way of starting it except by borrowing a burning coal from another fire somewhere. Then

T IS often quite a shock to any one of | it was noticed that sparks from striking | what the buyer wants and what can radio | reception. Personally, I believe that disus to learn how simple things are stones resembled the sparks from the fire, give him to-day. Are we going to have in fundamentally, especially in those and presumably some men became skilled in lighting pith that way. Friction was have? Are we going to have short haul found to develop heat and we find the be an initial period when the public is twirling stick developed. These things show brains. They show reasoning from | and the same programs from one district cause to effect

Even in old New England days there

was no further progress in fire making. The flint and steel and tinder box were king, and the borrowing of burning coals from a neighbor a mile or two away was not uncommon. Then matches made their appearance. I'd like to write a prospectus for a match factory. Think of being a partner in the making of those little scratch sticks, for want of which untold millions must have died in ages past. Yet probably not ten people who read this page have the slightest idea of what happens when you strike a match, except that you may get a flame. Most of you gentle readers don't care what happers. All you want is a light.

Radio is rapidly getting to that same standpoint. The great buying public are beginning to care less and less about how marvelous radio is and beginning to think along the lines of what will radio do and how well will it do it, and what shall I buy for the most complete satisfaction? The buyer is more critical in the matter of quality. He wants results for every dollar expended.

What Is Wanted?

radio the same problem as the railroads sets and trunk line outfit? Are we going to have the country divided into districts to another just as on the vaudeville cir-

Assuming that some day we are going to secure quality reception, and I am frank to say that we have a long way to travel in that direction, must the set break through the local barrier and pick up distance, or will it be sold as an entertainment proposition and with three or four or a dozen local stations the owner will be satisfied?

The direction in which radio progresses from now on depends entirely upon the answers to these questions. The science and scientific discoveries to be made in radio will depend largely upon what the public wants. If local reception is all that will be demanded this year, next year and the years to come, the problem to be attacked is, first, quality, and second. economy of operation. After those matters will come simplification, especially of controls, and then the artist-designer will step in and beautify it all.

If cutting through the local programs to reach out to the far distant stations is continually to be desired, something brand new will have to be developed. We have That opens the door to a discussion of | not yet scratched the surface on distant

Distance Reception

What Women Think of Radio in the Home

Continued from page one

slight accidents, or any "first aid" information which it is just as necessary to know in order to handle the emergencies of everyday peace time living as it was in days of war. Health talks would cooperate in and strengthen the orders of the Department of Health, not only in habits of daily hygiene but particularly in periods of epidemic where advance precautions, made emphatic by the personal command of health officials via radio, would do much toward lessening any serious spread of the disease. While considerable provision from the

very first has been made for entertaining little children with a bedtime story hour there is still much opportunity to satisfy the needs of the older boy and girl. ics like woodcraft, camp life, electricity, chemistry and directions for many mechanical constructions which the boy is eager to make at home would be keenly listened to and would exert a marked educational influence on the young mind. Short talks of adventure, biographies of famous characters living or dead, deeds of mythological heroes, would all stir the imagination if retold by the magic voice

No one but a woman knows how wearisome is the daily problem of "What shall we have for dinner to-night?" A pleasant, intelligent voice over the air making suggestions is sure to be welcome. "It's rather hot and sultry to-day," I can hear such a voice say, "and why not, therefore, try a meat aspic to-day? In case you don't know what a meat aspic is like, I'll tell you how to make one. The men will like it"—and so forth. And on another occasion this broadcaster could tell women what they perhaps have not noticed, that there's a glut of peaches in the market and they're cheap. "Why not make some peach pie?" she'll say. "I heard a wonderful recipe from a famous pie cook the

other day"—etc, etc. As a matter of fact, I speak from experience, because I've radio broadcast just such material myself, and have had splendid response from it. It's all in the way it's done and the practical nature of

care of the sick, what to do in case of | have. Nothing is more elusive than a radio audience-you "get the switch" mighty quickly, especially from women,

if you're not "there with the goods." Radio Advice on Home Tasks

But radiophone service for the housekeeper will not be confined merely to the preparation of food. I have worked out detailed plans for the most efficient timeand-motion saving methods of doing each day's work. I can explain simply and clearly, on Sunday morning, just the best and quickest way of getting Monday's washing done. On Monday moning I can give a little talk on efficiency methods for ironing day. By giving these talks on the day preceding each task the housewife hears and adjust the general labor-saving suggestions to her particular problems.

Fifteen or twenty minutes will be the program, and there's almost no housewife who can't afford that much time between 9 and 10 in the morning, especially if she's getting first aid for the rest of her day's work. After the children and the man of the house have left for school and business, respectively, there's always a bit of a lull before beginning the day's special activity. The average housewife probably spends at least fifteen or twenty minutes every morning gossiping with a neighbor over the backyard fence or the ordinary telephone. She can take as much time for her radiophone service without neglecting

But I'm just giving the high-spots of this matter of radio and home service, Educational work is important in the home; politics is certain to be important this fall especially; and therefore we women are interested in getting material by radio that will make for character and development. Just jazz, small time vaudeville, advertising talks, appeals for girls to come and be chorus girls-that's pretty thin value to pipe into your home over the magic route of the air, when there's such a great wealth of value that could be provided! I want women to bestir themselves and demand more attenthe help you give—also the voice you tion from broadcasters to home material.

tant reception is the whole lure of radio to millions of listeners. I have been in dozens, perhaps hundreds, of homes and I have had mail running as high as 3,000 letters in one month. I have taken counsel with many buyers and prospective buyers, and more than a majority of times have I heard them distinctly say, "I don't want distance. I want good reception of our nearby programs." In New York they'll add, "We've got the best stations in the country, and they have good things every night. I guess we'll be satisfied with home stations."

Yet I have never seen a set of any kind whatever installed for any person, man, woman or child; rich or poor; old or young, but what immediately after showing how the set is operated, tuning in a nearby station and listening awhile, some one says. "Can you get so and so on this? How far will it receive?" and a multitude of similar questions, ending up in an endeavor to haul in some station a thousand miles or more away. Moreover, I have never seen a customer satisfied until he had received distance, and I have never seen an owner show off a set to friends without pulling in distance or apologizing for the set, or offering some alibi.

If this distance-getting is essential we are bound to see several years more of struggle, dissension, legal entanglements, freak circuits and spasmodic buying, unless in some way the ironing out of the broadcasting tangle itself shows the way to the listener-in.

Skilled Operation

I hold no brief for any manufacturer. I have no connection with any of them, and have never had nor have I now any financial interest in any set or circuit whatroever. I don't care whether one tube or ten is used in a set or whether this, that or the other scheme becomes popular. For that reason I can say without reservation that I do not believe we are anywhere near the ultimate result in broadcasting reception. No set will fulfill the requirements of the bulk of purchasers, and yet I do not know of any set on the market that will not give entire satisfaction in the hands of an experienced operator. It is this necessity for skilled operation that must be obviated in the set of the future.

I believe the success of the neutrodyne in the past was due to the fact that purchasers believed that all you needed to do was to set the dials and the door to distance would open itself. There is no reason why the super-heterodyne, properly constructed, shouldn't operate in the same way, but it didn't, probably due to the number of tubes and the necessity for all of them to be good, which they weren't. Neither of these sets as developed will beat a good regenerative set in the proper hands, but either of them would be more satisfactory to the average handler.

Just what place the reflex principle will have in the future it is impossible to tell. It doesn't seem to produce the results it should do theoretically. Maybe the trouble is in the tubes, as it seems to have been in all other circuits. Certain circuits seem to require certain tube characteristics for reasons gradually becoming more or less well known. The development of the reflex idea was probably less for the purpose of saving tubes than for the purpose of saving the current the extra tubes required, and, with the low-current consuming tubes, this advantage

JUESTIONS KDKA to Transmit ANSWERS Broadcasts to VDM, S. S. Arctic

length of 120 meters.

the Arctic may be received in civ-

equip two of the Hudson Bay Com-

pany boats, the Bayeskime and Nas-

copie, with Canadian Westinghouse

special receivers, designed not only

to pick up KDKA's special wave, but

also the signals from the Arctic. It

sages from the Arctic through the

Hudson Bay Company's boats to the

Labrador coast stations and then on

to G. A. Wendt, of the Canadian

Westinghouse Company, at Montreal

or straight through to KDKA. It is

anticipated that the Arctic, through

its transmitting equipment, will be

able to keep in communication with

KDKA, although it is quite possible

The Arctic is in charge of Captain

Questions

M. H. McGee-I am contemplating the construction of a receiving set of plement of special radio equipment either five or more tubes. Please give me your opinion on a five-tube from KDKA, East Pittsburgh, Pa. neutrodyne as compared with a seven or eight tube super-heterodyne.

Answer-This is something which one of which is for delivery to Donis almost impossible to do and give ald Mix, radio operator of the Mcjustice to the many receivers of each Millan expedition, somewhere along type that are now in use and giving the Greenland coast. The other set satisfaction. However, the general is for use aboard the Arctic. Both faults and advantages of each set are designed to receive special sigwill be given and then you may choose for yourself.

The main fault of the super-heterodyne is to get one to operate as well turing Company every Monday night as it is claimed to operate. The number of tubes, the parts and the battery drain are all drawbacks, and the tery drain are all drawbacks, and the big problem of getting parts that three transmitting sets, one standard will operate efficiently goes a long 1/2 kw. 600 meter spark set, one 1 kw. way in making the set unpopular. In 2,100 meter ICW set and one 2 kw. our opinion, unless the transformers | 120 meter ICW set. are wound at home and tested with a wayemeter to make them all alike, and unless it is built with each stage shielded from the others, then the C. P. Edwards, in charge of the Raneutrodyne is the better; also con- diotelegraph Branch of the Dominion sumes a lot of B battery current.

The advantages of the super are Communications for the Arctic and the two tuning controls, the loop the parents of the two radio operaerial, the fairly accurate calibration ators on board will be sent to KDKA of dials, providing the batteries are for transmission. kept up, and the fact that when a distant station is tuned it comes in coast of Greenland she will have been

usually loud enough to enjoy. The faults of a neutrodyne are East Pittsburgh station. It is exthat a set is liable to become deneutralized, with a consequent distortion of signals and difficulty of tun- touch with Donald Mix, radio opering; they must be operated on an ator with the McMillan expedition, aerial and consume a lot of B battery either on his 2,100 ICW set or on

The advantages of the neutrodyne KDKA's signals can be relayed from are the ease of tuning, selectivity and the Arctic to the Bowdoin. It is exvolume. It is easier to construct than pected that the two boats will be able the super, providing the parts used are of good manufacture and instructions used followed to the letter.

With the above information should be possible for you to pick the voice to the McMillan ship. set you wish to build. Suggest, however, that no matter which one is chosen only the best parts be used in ilization, it has been arranged to the construction and that care be taken in the assembly and wiring.

Push-Pull Amplifier J. T. C .- I wish to build a push-pull amplifier and would like to know whether it is necessary to have one stage of amplification before the push is hoped by this means to relay mespull amplifier or not?

Answer-It is advisable that stage of straight audio-frequency amplification be placed before a pushpull amplifier in order that full benefit from the push-pull amplifier be obtained,

N. Jordan-I have made a wavemeter using a dry cell tube as an that the ship's signals may be lost. oscillator, but find that the tube does not oscillate very strong and, even J. W. Bernier, Canada's veteran Arcwhen it does, only in spots. How can tic explorer. Captain Bernier, though

Answer—Some dry cell tubes are, most active men aboard ship, and nfortunately, difficult to get in an when going through ice packs he dioscillating condition. To make them rects the operation of the ship from oscillate it will be necessary to conthe crow's nest, which is ninety-two nect a piece of flexible wire to the feet above the deck level. grid post of the socket and another to The radio operators on board are the plate post. Then these two are William Choat, chief operator and J. twisted together. These pieces of Finnie, assistant operator. Mr. Choat wire should, be three inches long. is one of the best known radio ama-Tape the finished connection and be teurs in Canada and was intrusted sure that the ends of the wires do with the mission of carrying on the not touch. It is best when using this Arctic's communication because of form of oscillator force that the flex- his long service with the amateurs. ible wires be fastened permanently The Arctic is a three-masted to the baseboard of the set to pre-schooner with an auxiliary steam envent a change in calibration. Regine. She was designed particularly member when using a dry cell tube for polar expeditions. The hull is of the dull emitter class that con- 36 inches thick, consisting of an outstant oscillation will decrease the er layer of 12 inch pitch pine, the life of the tube materially. second layer of 12 inch green heart

Transformer Connections

J. Smith-I have an audio fre- Between the various layers are 6 quency transformer that has had the inches of heat insulating material connection markers removed and Between the decks there is about 6 therefore cannot use it because I inches of cork insulation to prevent do not know how to connect it in a heat radiating from the vessel. circuit. The primary and secondary In addition to the Canadian Westare clearly marked, but which ter- inghouse Company's short wave set minal is which is not.

nected to the filament negative.

the Arctic is carrying a large amount Answer-The primary coil is con- of mail for McMillan, with special nected as follows: The outside or letters from the officials of the Caend of the primary coil is connected nadian Westinghouse Company which to the plate of the tube. The in- will give operator Mix full instrucside, or start, of the coil is connected tions regarding short wave reception. to the B battery positive. The outside, or end, of the secondary coil is connected to the grid of the second

547 Broadcasters Now A list compiled on August 1 shows amplifying tube, and the outside, or 547 broadcasting stations in the start, of the secondary coil is con- United States, as compared with 530 on July 1, 1924.

and an inner layer of 12 inch oak



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Easy to put this set together.

No technical knowledge or workshop required

TOU no longer need to put off making a radio, for lack of a workshop or technical knowledge. The new Acmeflex Kitset has changed all that. A screwdriver and a pair of pliers are the only tools you need and they are given you with the kit. The front porch is workshop enough, and the complete directions for putting the set together, which are included with it, take the place of technical

Everything needed for the set is in the box. The only accessories to get are tubes, batteries, loudspeaker and cabinet. You can put it together in one evening and have a set as good as anyone's—a famous 4-TUBE ACME "REFLEX." You can hear everything on a loudspeaker and have "all the year 'round radio."

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>>> KITSET-



-R A D I O----FOR YOUR VACATION DE POREST D. V. 3 TUBES..... AEBIAL EQUIPMENT....

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means of their use. Since the ama- the trouble. teur demonstrated what could be done on the high frequencies commercial was invited to participate in their in- Corps and is operated by Ted Wil-United States, Canada, France and at 2BRB. From reports, good results it is the best for amateur radio. Italy asked them to co-operate in are being obtained. short-wave tests. The amateur, always hungry for new experiences, has proved to be of great assistance in this, as in every case, and will probably continue to be.

This coming winter he will again have an opportunity to show his abilhave an opportunity to show his addi-ity when the Canadian government's air with renewed interest ofter they the Second District, a majority of exploration steamer, the Arctie, equipped with a transmitter to oper ate on 120 meters, is frozen in the ice zon for many months at a time.

allotted the use of four new short That station also has a good clear Division, which was governed by wave bands it ought to be an easy note. matter not only to keep in communication with the Arctic but to carry 2XBF has been doing some fine stations in the division. on tests with amateurs and govern- work in daylight with his CW and ments in all parts of the civilized ICW set. He has a good ICW note probably only solution to the above world. Make it your duty to keep that sounds something like an audio outlined conditions is that the amaposted on the schedules of these im- frequency oscillator. Is that what teurs in small towns throughout ortant tests.

2CUA is using a new W. E. 50-watt 2ACD has been heard occasionally sented in the Second Radio District tube with 1,000 volts of rectified AC handling traffic in fine style. We Executive Council. In this way it on the plate. With three thermo- understand the transmitter has been should be possible for the operators coupled amperes going in the an-overhauled and it is expected that of active amateur stations throughtenna reports have been received some excellent results will be ob out the division to make known from England and all districts but tained this coming fall. the seventh.

Another station doing good work is bad, but in spite of this every one is let you know how the first district tric broadcast transmitter. Two sets are mounted on a panel 5 feet 6 inches high and 24 inches wide. The lowtubes and a "sink" rectifier to supply the other evening. the DC plate voltage. The high power set has provisions for a 250fore the cold weather sets in.

may be heard most any time of the to enable you to operate below 80 evening working local stations as meters. though he had no less than a 50-watt

spark a number of times of late. It not be so many failing to raise the uncoupled Hartley. sounds like old times to hear it, but station known as CQ. There would 11V is another station doing fine

The station of John M. High jr., located at Riverdale, N. Y., better known to the amateur as 2GR, is now using a new remotely controlled onekw. CW transmitter. He has been heard in Hawaii. France. Holland and England, as well as working every state in the Union.

fairly good results have been ob- the plate. tained. He also has good modula-

trouble in getting his transmitter to old "sink" gap. It sounds fine for age, which went dead with use. The operate on a legal wavelength spark these days, but it is expected battery was a contribution received However, after many stunts were that a CW set will be in operation from 2BEE, and take my word that tried the set "perks" fine on 190 by fall. meters.

2BAW is using sixty-cycle AC on nese ship that was signing the call tery saw some service. The station the plate of his fifty-watt tube again. of JUPU. The ship was something will be on the air, with the good will He seems to be able to raise the like fifty miles west of San Fran- of God, in about a week. A fivelocal stations much better but deesn't cisco. 9DP was using three fifty- watter, with as much on the plate as seem to be doing as good DX as he watt tubes in his transmitter and I can get, will be used, 73's. did with his chemical rectifier. He 3,000 volts on the plate.

A new station at Governor's Island

We understand that 2BT and 2ADK have been visiting amateur stations in the Middle West, of which 9ATO the greatest amateur radio district. was one, as well as many others. In the opinion of the writer and Both these stations will be on the many other prominent amateurs in

where the sun sinks behind the hori- with low power is 2AEL. He seems the adio clubs of Greater New York to be on the air almost any time of will be unable to meet the needs of Now that the amateur has been day and is working 'em in fine style. these stations as well as the Atlantic

2CJ. The present transmitter is doing his best to keep the messages fellows are getting along. I had some

The amateur no longer has to work meters. The new wave lengths asstation that hasn't been heard 40 to 43 meters, 20 to 22 meters and in our own district. By the way, the for some time is 2AZA. Rumor had 4 to 5 meters, zu to zz meters and paper they read for the amateur news it that he was trying to get a CW set be restricted to CW transmission they say it is the berries. in operation, but as yet we have not only and there will be no more quiet heard the call on the air. When are hours on wave lengths of 80 or bemy good time in the first district is you coming back, OM? We miss your low. On the new short waves it is my good time in the new thort waves it is 1AVW. He is using a five-watter required that the coupled type trans- with 500 volts on the plate in a 2KA is another station that obtains mitter be used. It is also necessary good results from spark coil CW. He to have your license changed so as

in carrying on two-way communica- using a coupled Hartley circuit. tion with amateurs in the first and lASR just changed his address, and

cases the power does not exceed goes. FB OM sure glad to hear it. can dig up. HI!

A ninth district station heard in been in operation only a short time with 1,200 volts of rectified AC on of them just now, so I guess that is

9NQ is still pounding through with station: his old spark set. He is using an 2AAJ has been off for some time 2AGD has been having considerable old half KW transformer with an because of the loss of his huge store

On May 31, 9DP worked a Japa- thank him, nevertheless, as the bat-

8AGP was heard to say he has a new mast built of lath and 2 x 2 posts. With a new antenna he has made many new D records for his

The American Radio Relay League

has decided to comply with the request of the Second Radio District Executive Council that the territory HERE has been a remarkable says things have gone completely included in the 2d Government Radio increase in interest in the wrong, his radiation has dropped District be removed from the Atshorter wave length all over the from five amperes to two and his lantic Division of the A. R. R. L. world since last fall, when amateurs rectifier refuses to work at all. He and caused to constitute a new divifirst began to work across the ocean is going to rebuild his whole trans- sion, the Hudson Division. The reand many other distant points by mitter and hopes this will remedy sult of this change will be that the policy of the amateurs in the Second Radio District will be governed by companies, experimenters and govern- operating under the call of 2MO has cated in New York City. While this ments have shown a new interest in been recently opened. The station is probably the desire of the majorthem. For this reason the amateur is owned by a captain of the Signal ity in this district inasmuch as a vote was taken by the A. R. R. L. vestigations. The governments of the son 2IK, formerly a second operator there is some question as to whether New York City may be one of the

> contain some of the greatest men and industries, but it could not be the amateur stations that carry on Another station doing good work disticts, and a district governed by men operating under the same conditions as the majority of the active

greatest cities in the world and may

What seems to be the best and New York and New Jersey form radio clubs and have themselves repretheir desires.

moving. FB, keep up the good work. spare time last week, and I thought I might drop around to some of the Another Brooklyn station back and stations in Connecticut during my power transmitter, which is used for ready for the coming DX weather is brief stay in Bridgeport. I am of the local work, employs three 5-watt 2AX. His CW has plenty of kick and opinion that I couldn't have found a tubes with "S" tubes as a rectifier, will probably carry well. He was better bunch of amateurs anywhere The larger one uses two 50-watt heard handling traffic in good style in the country. They sure did treat me fine, and wherever I went I was received cordially. There was one funny thing I noticed everywhere, and watt tube, which may be installed be- on the narrow band of 150 to 200 that was that most all the first district men knew more about second district news than some of the men is The New York Herald Tribune, and

coupled Hartley circuit, and is doing remarkable work, being heard in England and working every district in the United States and some in Canada. The old boy had some If a few more amateurs would equip trouble with the B. C. L's on account their stations with a good short of key clicks, but straightened the 2BNI has been heard on his old wave low-loss tuner there would matter out by coupling his heretofore

what happened to that nice CW set be more stations worked and the work with a 50-watt tube and 1,000 you had working for a while, OM? result would be better traffic reports. warming the plate. England, France, Holland and all United States dis With two five-watt tubes 2BEO tricts worked tells its own story of finds not the least bit of difficulty good operating. Another station

third districts in daylight. FB OM. | so hasn't got the set going yet. Come on. OM, don't allow the back yard The last 2CEV has begun to as garden to keep you away from the air. semble his new CW set. He says aH 1AVT is another station tempora-2CWO and 2CLA are doing some that is needed now is the tubes and rily off the air because of insufficient very fine DX and traffic handling of a new antenna system. Let's hope he funds. The OM has a position as late. They have worked the Pacific gets them soon, as the sooner they radio engineer now, and soon expects Coast a number of times. In both are obtained the sooner the spark to be on with as much power as he

1AJP has a fine station-among the best I have ever seen. I am sorry I A ninth district station heard in couldn't meet him, but what I have seen of his station from the outside employing two five-watt tubes in punch is 9DRC. The transmitter tells me it must be very fine, indeed. parallel. Although the station has employs a single fifty-watt bottle I met many others, but I can't think

all the first district news I have for you. Here is some "dope" on my own

anything that old boy 2BEE gives away isn't worth taking, HI! I will HARRY DOETLER 2AAL

By Marconi's New "Beam" System

attached here to the announcement of Postmaster General Vernon Hartshorn in the House of Commons that the government is prepared to cooperate with the Marconi company in the development of directional wireless. This is considered a striking

Marconi is to be allowed to erect in Great Britain a station for communication with Canada by short-wave, lower-power, directional telegraphy. Marconi's experiments with the beam ray have convinced him that it is faster and cheaper than the high power stations, besides providing comparative secrecy and avoiding "jamming." Now the British government is going to give him a chance to prove his claims.

Australia and South Africa seem inclined to co-operate and to share Marconi's confidence that the beam system will make the high power station obsolete. India is more conservative and appears to favor the high power station.

Postmaster General Hartshorn seems to think that the beam system will only work well at night and that it will be mainly used for the transmission of "deferred matter." In his view the gigantic high power station that the British government is building at Rugby is still indispensable.

the notion that large intervening faithful reproduction.

out of business before it is finished. the elements of the vacuum tubes, its name. The Postmaster General says no. He considers it absolutely essential that Great Britain should possess at least one first class wireless station capable of communicating directly with the most outlying parts of the British Empire and able to broadcast messages simultaneously to ships and stations in all parts of the world.

Dame Clara Butt recently had the honor of being the first to sing directly to all Great Britain. Her voice was broadcast from the new high power station, 5XX, at Chelmsford, without lower power stations acting as middlemen.

It was not a complete success and session of local stations for the pres- the circuit itself. soon had to be used, but as far north prevent oscillation have served to also placed with relation to one an- only a single wire; the primary havas Aberdeen, in Scotland, the concert complicate the construction and oper- other, so that the proportions and ing been cut off at the seventh turn. no fading or sudden increases in was heard without interference. A ation of the circuit. At the same interrelations throughout the set The outer end of the secondary is volume. power of 16 kilowatts was employed. paratus often distorted and reduced wave band to be covered.

Atlantic wireless, which took place at cuit. Signal Hill, Newfoundland, is to be represented in the Wembley Pageant. The scene will reproduce as faith- duces a new principle in radio receperer and should the Garod. The neutrodyne produced fully as possible the eventful trials tion that seems to possess decided which is bracketed on the back of be mounted 5% inches from center the low tones of the basses just as Marconi made in December, 1901. G. advantages over present types of each of the tuning condensers. The to center on the panel. The audio-clear and just as natural as it did the S. Kemp, who assisted Marconi in the tuned radio-frequency circuits. The shelf should be two inches wide and frequency amplifier is standard and high tones of the violins in the previ-Signal Hill experiments, will take the circuit is the product of nearly two should extend to the rear of the does not differ from that used in ously mentioned test, giving the same part at Wembley that he did at years of experimental work on the cabinet. A transformer should be other radio receivers, UV 201-A or proper balance to the top and bottom Newfoundland, more than a score of part of E. A. Beane, radio super- mounted on the rear of each shelf in C 301-A tubes may be used through- of the production. years ago.

India to Have Powerful

A new and powerful wireless sta- and is free from howls and squeals, ers should run in the same direction. sumption. tion will soon be erected in India to be connected with the imperial wirethe Department of Commerce from

England to Canada The Deresnadyne Tuned R. F. Circuit Uses Neutrodyne

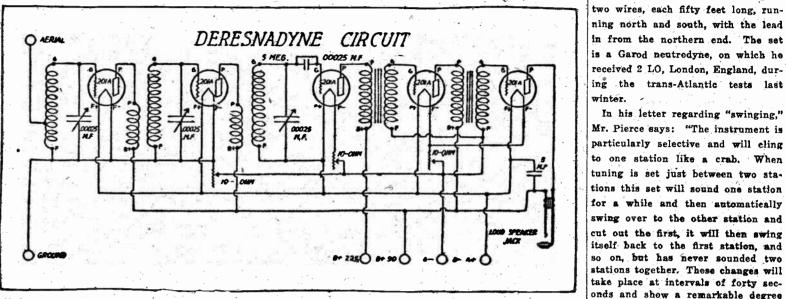
LONDON.—The greatest interest is A New Type of Tuned Radio Frequency That Gives **Good Results**

By JAMES E. CARTIER

UTOMOBILE buyers in the is highly selective, is quiet in opera- How Transformers Are Wound · past were satisfied with a tion and has a quality of reproducperformance of forty miles tion that is superior to previous dyne are wound on flat spider web forms of tuned radio-frequency cir- forms, four inches in diameter. An ing" has been a puzzle to scientists victory for Senator Marconi and his an hour. To-day they demand sixty cuits, and it is at least the equal in uneven number of slots should be ever since continuous waves were miles an hour, together with other ability to reach out and bring in the cut in the form radiating out from a first produced.

The transformers for the Deresna-

The arrangement provides that factors, such as smoothness and distant signals with great volume. hub in the center, consisting of a The circuit will not oscillate. This circle 1% inches in diameter. The is accomplished through proper de- primary winding consists of seven located in an exceptionally bad spot The radio fan of yesteryear was signing, proportioning and placing of turns of No. 28 double silk covered close to a large electric power house. satisfied with a receiver that would the apparatus rather than by the ad- wire. The secondary winding con-



It is generally admitted that the intensity of wireless signals tends to casionally with volume sufficient to parts.

short wave transmissions. His ex- in radio is in the direction of tuned ent types.

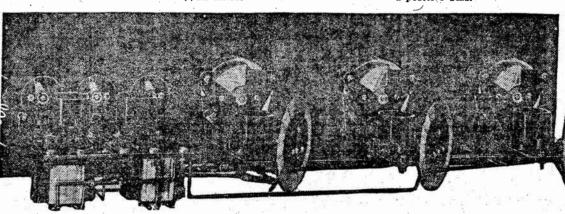
coni would not accept this limitation to-day is seeking not only improved ods are employed to prevent oscilla- coupling the antenna to the first tube excerpts from his notes taken at the of the possibility of his favorite beam range and volume but also the ad- tion. No neutralizing condensers are has only one winding of sixty-two ments from Poldhu, Cornwall, have sence of howls and squeals, and ance the capacity of the tubes as in from the inner end for the antenna tracts of land interfere seriously with The obvious trend of development grievous fault with many of the pres- winding, the inner end being con-

perience goes to show that short wave radio-frequency amplification. A In the Deresnadyne circuit the spe- The grid return connections of the land, on a wave length of 380 meters

size wire. diminish in sunlight hours. But Mar-operate a loud speaker. The fan of No resistances or absorption meth-

the neutrodyne. The receiver will connection. The grid of the first judged from reception in Cincinnati. not radiate energy from the antenna, tube connects to the outer end of the

number of difficulties have con- cially designed radio-frequency trans- first two radio-frequency transform- between 6 and 6:30 p. m., central Then, of course, there is the confronted the engineer in the perfect structed for low impedance. This line, while the last transformer is record of the date, but it corretroversy as to whether the beam sys- tion of this form of amplification constitutes the deresonated plate cir- connected to the positive filament sponded with the newspapers of that tem is going to put the Rugby plant due to the inherent coupling between cuit from which the received derives line in order to give the detector tube date, and as the incident was imme-



there is little danger of the super- the transformers, and the wiring of The plate circuit, which includes In winding the coils, the primary noises and no distortion.

time the use of the additional anthe strength of the signal, and de-

New Circuit Appears

visor for the ninth district, and E. a vertical position with its plane set out, or a UV 200 may be used for a Company of Chicago.

less chain, according to a report to Tennis Championships To Be Broadcast ships will be broadcast on Saturday on Monday evening, for he is the the Department of Commerce from Vice-Consul W. H. Scott at Bombay. A novelty in radio programs and on Labor Day, September 1, both at Only artist of foreign fame who has the Democratic National Committee, The station will be erected by a com- an interesting sports feature as well 4 p. m. All of America's great tennis ever requested that no advance no- is enthusiastic about the idea of uspany which has just organized under have been arranged for WEAF's lis- stars, including winners in the Olym- tices containing his past career be ing radio in the national Presidential the name of the Indian Telegraph teners for the afternoons of August pic games, will participate in this sent to the press. Officials of Broad-campaign. He has announced that national tennis classic. This is the cast Central have had so few geniuses he will inquire into the possibilities 000,000 rupees (about \$9,200,000). final matches of the national women's first occasion that a courtside de who preferred to hide their past light of so arranging the tour of John W. The report stated that F. M. Chiney tennis championships will be broad- scription of tennis games will have under the basket of secrecy that they Davis through the West as to reach & Co., of Bombay, are organizing the cast, beginning at 4 p. m. These been broadcast. project and have obtained all rights matches will take place at the West from Marconi's Wireless Telegraph Side Tennis Club stadium, Forest Sava Tcherny at WJZ Company, Ltd., of London. The pro- Hills, L. I. A tennis expert, whose posed station, it is said, will be one name will be announced at a later of the most powerful in the world date, will give a vivid description of and able to transmit messages all the lightning game. It is also an artist" certainly belongs to a young am not good, why tell them I am environs will be appealed to through nounced that the semi-final of the foreign violinist who is to play be- beforehand?"

eliminate oscillation over the entire connected to the grid, the inner end | "The most difficult tones for a set

ray. He considers that his experiditional qualities of quietness, ab used and no attempt is made to bal-

nected to the filament minus lead. from the Hotel Savoy, London, Eng-

a positive bias.

diately reported to Mr. Bolles, of the Bolles-Brendamour Company, Cincinnati, there is no question that my reception was synchronous with the foreign program. This program came in loud and clear on the phones and also on the loud speaker. All four tubes were used and with a little further adjustment the strong basses could be heard just as clearly as the violins and flute. The general tone of the orchestra was a little different from what we are used to in America, probably due to the fact that they ase the English concerting and have

In Fading Tests;

The marked tendency of radio

transmitting stations to "swing" off

their scheduled wave length in regu-

lar periods has been detected in a

novel manner by Joseph Otis Pierce,

The receiver used by Mr. Pierce is

two wires, each fifty feet long, run-

In his letter regarding "swinging,"

Mr. Pierce says: "The instrument is

particularly selective and will eling

In addition to reporting his latest

time he heard London. These show

a remarkable critical analysis of the

timber of the British orchestration as

"I picked up the orchestra concert

a chemical engineer of Cincinnati.

Gets London

orchestra an organ-like quality which is very pleasing. There were no the primary of the transformer, is de- and the secondary may be wound on "This program was heard just at ent. Atmospherics interfered so much Straight radio-frequency amplificawith the reception in London, Cardiff tion has hitherto been very unstable, closely to resonance at broadcasting wound on with the wire double, then concert for thirty minutes I turned and Newcastle that land transmission and the various methods employed to wave lengths. The transformers are fifty-five turns are wound on with it off and went down to supper. The

four or six of them playing with the

other instruments. This gives the

to the filament closs to the tube to pick up are the bass tuba and the The construction of the set is with- socket. The outer end of the primary string basses of the orchestra, owing Marconi's first experiment in trans- creased the selectivity of the cir- in the range of a novice. The rear winding is connected to the plate, to the low frequency of their vibrapanel view will give a fairly good the inner connection to the 90-volt tions. In a large number of good idea of the manner in which the ap- plus terminal of the B battery. The Deresnadyne receiver intro- paratus is arranged. The transform- The three tuning condensers should the bass instruments; not so with

"The neutrodyne is a remarkable F. Andrews, of the Andrews Radio at an angle of approximately 55 dedetector. A C battery of from two set for clear, clean, natural reception grees from that of the front panel. to six volts may be used in the audio and was selected by me after testing Broadcasting Station The receiver is absolutely stable The windings of all three transform- amplifier to reduce the B battery conout four other sets of different

men's national lawn tennis champion- fore the microphone of Station WJ7 Democrats to Use

Radio in Campaign Clem L. Shaver, new chairman o are still quite dumfounded. The a maximum audience by radio with violinist's name is Sava Tcherny, a minimum of speeches. If the Daviswhich is all that he wishes said Bryan campaign can be so adjusted, Refuses Publicity about himself. In his own words: it will take these candidates only to "If I am good the listeners will know comparatively few centers throughit when I play over the radio; if I out the country and the surrounding the ether.

The Herald Tribune Daily Broadcasting Programs for Week Ending August 16

TO-DAY :

*WEAF—NEW YORK CITY—492
1-4 p. m.—"Sunday Hymn Sing."
1-5 p. m.—Interdenominational services auspices of Greater New York Federation of Churches. Music by the Federation Radio Choir; Carlos Abba, harpist; 10 p. George Vause, planist, and Arthur Billings Hunt, harytone and musical director. Address by Rev. Henry T. Sell, 10.30.

10.30. author-lecturer.

L. Robinson.

3:10 p. m.—Cornish Male Chorus.

3:30 p. m.—Church Community Chorus.

4 p. m.—Talk.

4:15 p. m.—Barytone.

7 p. m.—Nathan Abas's Pennsylvania Or-

chestra. 8:25 p. m.—New York Philharmonic Orchestra. WJY—NEW YORK CITY—405 8:15 p. m.—Concert orchestra.
•WFBH—NEW YORK CITY—273 6 to 8 p. m.—Sunday concert:

*WBBR—STATEN ISLAND, N. Y.—273
9:10 p. m.—I. B. S. A. Quartet.
9:25 p. m.—Bible lecture, Judge J. F.
Rutherford.

*WHN—NEW YORK

10-11 p. m.—Paul Specht's orchestra.

*WHAR—ATLANTIC CITY—275

2:45 p. m.—Hotel orchestra.

*p. m.—Sermon.

*WIP—PHILADELPHIA—509 •WGR-BUFFALO-319

m.—Organ recital.
•WGY—SCHENECTADY—380 *WGY—SCHENRATADIT—Sould 13:30 a.m.—Church service.
3 p.m.—Concert by Schenectady's Sym-for phony Orchestra.
3:30 p.m.—Concert, by the New York Philamonic Orchestra.
4:00 p.m.—Concert by the New York Philamonic Orchestra.
4:00 p.m.—Concert by the New York Philamonic Orchestra.
5:00 p.m.—Concert by the New York Philamonic Orchestra.
6:00 p.m.—View York (New York Philamonic Orchestra).
6:00 p.m.—View York Philamonic O

11 a. m.—Eentire church service.
3:30 p. m.—Stone's military band.
6:45 p. m.—Entire service.

WBZ—SPRINGFIELD, MASS.—331 9 p. m.—Organ recital. 9:30 p. m.—To be announced. •WJAR—PROVIDENCE—360 7:20-9:15 p| m.—Musical program fr the Capitol Theater. 9:15-10:15 p, m.—Organ recital. •WKBF.—PROVIDENCE.—286 10 to 11:15 p. m.—Organ recital; soloists •KDKA.—PITTSBURGH.—326

**RDKA—PITTSBURGH—326
\$:45 p. m.—Concert.
6:15 p. m.—Baseball scores.
6:30 p. m.—Dinner concert.
8 p. m.—Church services.
**WCAE—PITTSBURGH—462
2:30 p. m.—Radio church services. 2:30 p. m.—Radio church 7 p. m.—Dinner concert. WCAP—WASHINGTON—469 11 a. m.—Church services.
4 p. m.—Open air services.
6:20 to 8:15 p. m.—Musical programent the Capitol Theater.
8:15 p. m.—Organ recital.
WHAS—LOUISVILLE—400

10:57 a. m.—Organ music, 5 p. m.—Concert. WSB—ATLANTA—429 6 p. m.—Methodist Church services. 8:30 p. m.—Wesley Church services. WQAM—MIAMI, FLA.—283 p. m.—Musical talent from church WEAP—MOBILE, ALA.—300

8 p. m.—Vesper service.
12 midnight—Musical concert.
WLW—CINCINNATI—423 WLW—Carry by the Western Southern Orchestra.

WWJ—DETROIT—517

Southern at St. Paul's 7:30 p. m.—Services at a pai Cathedral. meman's Concert Band.

m.—Orchestra selections.
WCX—DETROIT—517 on quartet.

WHAA—IOWA CITY—484

m.—Familiar hymns by Vance Mo p. m.—san.... on, barytone. WOC—DAVENPORT—484

10:30 p. m.—Musical program.

WHO—DES MOINES, IOWA—526 WMAY—ST. LOUIS—546 m.—Dedication of the Carl 8:30 p. m.—Dedication of the Berglund Memorial Tablet.
WDAF—KANSAS CITY—411
Theater program.

8:30 p. m.—Open air religious Missouri State Prison Band. WEBH—CHICAGO—370 WLS-CHICAGO-345 federation.

KYW—CHICAGO—536

11 a. m.—Church services. 2:30 p. m.—Chapel service. WDAP—CHICAGO—360 WDAP—CHICAGO—360
6 p. m.—Organ recital.
10:15 p. m.—Concert by Drake Cor
Ensemble.
WQJ—CHICAGO—443
8 to 10 p. m.—Raiph Williame's Orche
7 to 9 p. m.—Artist series program.
WTAS—ELGIN, II.L.—286
8:30 p. m.—Bedtime story.
8:55 p. m.—Dell Lampe's Ballroom
chastrs.

wear—New York CITY—492

p. m.—Miriam Witkin, soprano, accompanied by Winifred T. Barr.

115 p. m.—William Chosnyk, violinist.

130 p. m.—Women's program.

p. m.—Waldorf Astoria dinner music.

730 p. m.—John C. Smith's Orchestra.

115 p. m.—'Inheritance Taxes," J. Elliott

Hail. Hall,

8:25 p. m.—James Haupt, tenor,

8:30-10 p. m.—Concert by the United

States Marine Band,

*WJZ—NEW YORK CITY—455

1 p. m.—Nathan Abas's Orchestra,

4 p. m.—Eleanor Gunn's fashion talk,

4:16 p. m.—Daily menu,

4:16 p. m.—J. Palmer Gibson, "Boya"

4:16 p. m.—Fred Hall's Orchestra,

4:10 p. m.—Tralk by Frederic J. F

9:30 p. m.—Professor Gasper Ps orchestra.

WQAK—SPRINGFIELD, VT.—275
7:30 p. m.—Musical program.
10:30 p. m.—Concert.

WQAM—MIAMI, FLA.—283 ay.

p. m.—Concert Orchestra.
m.—Estey Organ Recital. b. in.—Lstey Organ Recital.

10:30 p. m.—Concert.

WQAM—MIAMI, FLA.—283

p. m.—Sava Tcherny, violinist; Keith

McLeod, accompanist.

10:10 p. m.—Major L. D. Gardner, "Round

11:10:10 p. m.—Major L. D. Gardner, "Round

11:10:10 p. m.—Sava Tcherny, violinist.

10:10 p. m.—Schmeman's Concert.

WWJ—DETROIT—517

10:30 p. m.—Schmeman's Concert.

WWJ—DETROIT—517 8:20 p. m.—Schmeman's Concert 9:30 p. m.—Orchestra selections. WCX—DETROIT—517 6 p. m.—Dinner concert. n.—Musical program. -Jackie Coogan. WOC-DAVENPORT-484 p. m.—Musical program.
p. m.—Bernie Schultz's Orchestra,
WHO—DES MONIES, IOWA—526

m.—Organ recital.
—Musical program.
WFAA—DALLAS—476

KFI—LOS ANGELES—469

TUESDAY

*WEAF-NEW YORK CITY-192

a.m.—Emanuele Stieri, barytone. 1:10 a. m.—"Feeding the Family," Dr. Mary D. Rose. 1:35 a. m.—Motion picture, Adele Wood-

ard. 1:50 a. m.—Market and weather reports.

*WJZ-NEW YORK CITY-455

Tribune. 20 p. m.—Financial developments of the

*WJY-NEW YORK CITY-405

230 p. m.—Billy Wynne's Inn Orchestra. 15 p. m.—'Lessons From Roman His-tory,'' Professor Kraemer. 30 p. m.—New York Philharmonic Or-chestra.

*WFBH_NEW YORK CITY_273

bitt.
1:30 p. m.—Bernard & Robinson.
1 p. m.—Marion Doran, soprano.
1:16 p. m.—Violin recital, Frank J. Herel
1:30 p. m.—Joseph C. Wolff, barytone.
4 p. m.—Pupils of Alviene School.
4:30 p. m.—Elizabeth Topping, piano re

*WHN—NEW ORK CITY—360

11 a. m.—World news.
11:30 a. m.—World news.
11:30 a. m.—Woman's hour.
12 m.—Orchestra selections.
2 p. m.—Alvin Hauser, piano selecti
2:15 p. m.—Reading, Helen Reynolds

m.--Kiddies' period.

ings Hunt, harytone and musical direction.

tor. Address by Rev. Henry T. Sell, D.D., author-lecturer.

5 p. m.—'Songs of Faith," by Professor Herbert B. Howe.

7:20-9:15 p. m.—Musical program from Capitol Theater. The first part will consist of music by featured artists and selections by the Capitol Grand Orchestra. The second part will consist of a special presentation by Mr. Rothafel of vocal and instrumental artists.

2:15-10:15 p. m.—Organ recital.

2:15-10:15 p. m.—Organ recital.

2:15-10:15 p. m.—Organ recital.

2:15-10:15 p. m.—Organ recital.

2:15 p. m.—Alvin Hauser, piano meiodies.

2:16 p. m.—Bay Scout program.

2:16 p. m.—Bay Scout program.

2:16 p. m.—Bay Scout program.

3:10 p. m.—Radio Bible Class, Rev. Millard L. Robinson.

3:10 p. m.—Curlis Male Chorus.

3:30 p. m.—Chack CITY—360

2:15 p. m.—Orchestra selections.

2:16 p. m.—Orchestra selections.

2:17 p. m.—Orchestra selections.

2:18 p. m.—Jimmy Clarke's Entertainers. m.—Musical program,
m.—Orchestra selections.
WOS—JEFFERSON CITY—441 WOS-JEFFERSON CITY-441

9 p. m.—Addresses.
9:30 p. m.—Popular dance music.
KSD—ST. LOUIS-546

9:30 p. m.—Popular dance music.
KSD—ST. LOUIS-546

9:30 p. m.—Concert by Crow's Band.
KYW—CHICAGO—536

6:18 p. m.—Concert by Crow's Band.
KYW—CHICAGO—486

6:18 p. m.—Children's story.
WMAQ—CHICAGO—448

6 p. m.—Theater organ recital.
6:30 p. m.—LaSalle Orchestra.
WOAW—OMAHA—526

7:30 p. m.—LaSalle Orchestra.
10 p. m.—Artist numbers.
WGAZ—SOUTH BEND, IND.—360

8:10 p. m.—Big Five Orchestra; Indis
Four Quartet.
KFKX—HASTINGS, NEB.—286

6:15 p. m.—Organ recital.
9 p. m.—Musical program

*WHN—NEW YORK CITY—360
2:15 p. m.—Jimmy Clarke's Entertainers
2:45 p. m.—Gus Ackerman, planist.
3 p. m.—Wright and Bessinger.
3:45 p. m.—Chat with children.
4 p. m.—Leon Stein, barytone.
4:15 p. m.—Song recital, Charlott Schaefer, soprano; Adelaide Travers contraito.
4:45 p. m.—Marguerite Ackerman, soloist 5 p. m.—Gene Austin, barytone.
5:15 p. m.—Music.
6:30-7:30 p. m.—Olcott Vail's trio; Pan Specht's dance orchestra.
8 p. m.—Roseland Dancing Academy. :30 p. m.—Songs by artists. KGO—OAKLAND, CAL—312 Specht's dance orchestra.

9 p. m.—Roseland Dancing Academy.
9 p. m.—Palisares Park orchestra.
10 p. m.—Talk and musical program.
12 p. m.—2 a. m.—Midnight Bohemia show

*WBBR—STATEN ISLAND, N. Y.—273
8 p. m.—Irene Klinepeter. sonram. 11 p. m.—Dance orchestra.
1 a. m.—Cocoanut Grove Orchestra.
CKAC—MONTREAL—425
1:45 p. m.—Luncheon concert.

8:45 p. m.—Irene Klinepeter.

*WOR_NEWARK.—405
2:30 p. m.—Helen Arzinger, soprano.
2:45 p. m.—'Cosmopolitan New York,'
Chester Mr. Knight.
3 p. m.—Helen Arzinger, soprano.
3:30 p. m.—Helen Arzinger, soprano.
3:30 p. m.—Fashion talk, Miss Doroth,
Mines.
3:45 p. m.—Tenor solos, James R. Cooley.
6:15 p. m.—Elite Orchestra.
7:15 p. m.—Today's sports.
8 p. m.—Gustav H. Brasch, basso.
8:15 p. m.—Newark Philharmonic Concer
Band of fity.
9:15 p. m.—Gustav H. Brasch, basso.
9:30 p. m.—'WOR Monday Nighters."
10 p. m.—The Carolinians' concert.

*WAAM.—NEWARK.—263
11 a. m.—Plano recital.

*WGI-MEDFORD, MASS.—360

5 p. m.—"Adventure Hour": musicale; talk.

*WMAF—S. DARTMOUTH, MASS.—363

7:20 p. m.—Remarks, by Joseph Plunkett.

7:25 p. m.—Musical program from the stage of Mark Strand Theater.

8:20 to 10 p. m.—Special program by featured vocal and instrumental artists.

*WTAT—BOSTON—244

8 to 11 p. m.—Special orchestra concert: to the stage of Mark Doston—278

11 a. m.—Eentire church service. WHAR-ATLANTIC CITY-275 ... m.—Orchestra selections,
... m.—Orchestra selections,
0. m.—James Burt, radio talk.
... m.—Leda Goforth, soprano.
*WOO—PHILADELPHIA—509
s. m.—Organ recital.
m.—Luncheon music.

11:50 a. m.—Market and weather reports
4 p. m.—Alma G. Slunt, soprano, accmon
panied by Marian Rasmussen.
4:10 p. m.—Arthur Behim, singer.
4:20 p. m.—Arthur Behim, singer.
4:20 p. m.—Arthur Behim, singer.
4:40 p. m.—Stories for children.
5 p. m.—Waldorf-Astoria dinner music.
7:30 p. m.—Duets and solos, Elsie McGal
Persons: William H. Stamm, accompani
ed by Winifred T. Barr.
7:45 p. m.—Rev. H. C. Dressel, cellist.
8 p. m.—Duets and solos.
8:15 p. m.—Rev. H. C. Dressel, cellist.
5:20 p. m.—The Twins."
9-10 p. m.—May Singhi Breen's Syncopators. 1:45 p. m.—Grand organ; trumpets 1:30 p. m.—Sports results; police = dinner music dinner music.

5:30 p. m.—Musical program: Hel
Thomas, soprano; Raymond L. Yeak
accompanist; E. B. Eckhardt tenor.

9:10 p. m.—Theater Grand Orchestra.

10 p. m.—Grand organ recital.

10:30 p. m.—Dance program, Candelor orchestra 11:03 p m.—Continuation of dance pr *WIP—PHILADELPHIA—509 10 a. m.—Seashore gossip. Health ts 3 p. m.—"What Wild Waves Say." 3:05 p. m.—Visiting artists; chats. 3:30 p. m.—Comfort's Philharmon

chestra. :05 p. m.—Dinner music by Frisco *WFI—PHILADELPHIA—395 p. m.—Meyer Davis's Orchestra
1:05 p. m.—Valera C. Harlan, soprano
Caroline Hoffman, pianist.
1:30 p. m.—Meyer Davis's Concert Or
chestra.
**WDAR—PHILADELPHIA—395

sau.

8 p. m.—Concert orchestra.

8:30 p. m.—Artist recital.

9:30 p. m.—Stanley Theater feature orchestras and Minstrels.

WGR—BUFFALO—319 *WGE—BUFFAAA

12:30 p. m.—Organ recital.
6:30 p. m.—Vincent Lopez's orchestra.
7:30 p. m.—News; scores.
9-11 p. m.—Musical program.
11 p. m.—Vincent Lopez's dance orci

*WGY—SCHENECTADY—380 WHAZ—TROY, N. Y.—380

10 p. m.—Popular dance music, Anthony
J. Flush's Syncopators; Ostario Cantanucci, barytone; Frank Davis, soloist;
elocution pupils of Gretta M McOmber.
*WMAF—S. DARTMOUTH, MASS—363

B. m.—Dipper music

6:30 p. m.—Dinner concert.
7:30 p. m.—Unner concert.
9:30 p. m.—Uncle Kaybee; scores.
9 p. m.—Ukulele lesson, C. Martin
9:30 p. m.—Musical program.
11-p. m.—Late concert.
WRC—WASHINGTON—469

2-3:15 p. m.—Overture and vaudeville 3:45 p. m.—Irving Miller, barytone. p. m.—Dinner music.

25 p. m.—John C. Smith's Orchestra.

25 p. m.—James Haupt, tenor.

30 to 10 p. m.—United States Marin *WNAC-BOSTON-278 *WNAC—BOSTON—278
p. fn.—Orchestra selections.
p. m.—Copley Plaza trio.
p. m.—Children's half-hour.
i:30 p. m.—WNAC dinner dance.
p. m.—Notifications by Senator Walsh,
of Montana; selections by the band,
John W. Davis's speech of acceptance.
*WBZ—SPRINGFIELD, MASS.—337
b. m.—Dinner concert

*WAM—NEWARK—268

11 a. m.—Piano recital.

11:10 a. m.—Radio cooking school.

11:30 a. m.—Florence Doobner, soprano.

7:30 p. m.—Lillian Spitzer, planist; Alie
Rincke, violinist.

9 p. m.—James V. Moore and Al Lang

8:15 p. m.—Sterling Melvdy Boys.

9:15 p. m.—Sterling Melvdy Boys.

10 p. m.—Bob Schaefer.

10:30 p. m.—Jimmy Shearer.

10:30 p. m.—Jimmy Shearer.

11 a. m.—Organ recital.

12 noon—Luncheon music.

145 p. m.—Grand organ: trumpets.

4:45 p. m.—Grand organ; trumpets

m.—Meyer Davis's Orchestra.

m.—Mayer Davis's Orchestra.

m.—Musical program: Elizabeth larp Cornog, soprano; Irene Guest oog, violinist; Marguerite Barr, contalto; Caroline Hoffman, planist.

m.—Meyer Davis's Orchestra.

m.—Fairmount Park Symphony Orchestra.

chestra.
*WIP—PHILADELPHIA—509

10 a. m.—Seashore gossip; health talk.

1:05 p. m.—Organ recital.

3 p. m.—'What Wild Waves Say."

3:05 p. m.—Visiting artists' chats.

3:30 p. m.—Comfort's Philharmonic

chestra.
6:05 p. m.—Ehrenzeller's Concert C
7 chestra.
7 chestra.
8 p. m.—Comfort's Philharmonic C
6:05 p. m.—'What Wild Waves Say.''
8:50 p. m.—'What Wild Waves Say.''
8:50 p. m.—Vessella's Concert Band.
10 p. m.—Bob Leman's Dance Orchest
*WDAR—PHILADELPHIA—395
12 noon—Organ recital; features; concert 2 noon—Organ recital; features; orchestra.
to 3 p. m.—Concert orchestra.
:30 p. m.—Artist recital. p. m.—Baseball scores.
WHAR—ATLANTIC CITY—275

2 p. m.—Orchestra selections.
8 p. m.—Selections.
*WGR.—BUFFALO.—319
12:80 p. m.—Organ recital.
6:30 p. m.—Vincent Lopez's orchestra. . m.—News. scores. *WGY—SCHENECTADY—380 8:45 p. m.—Musical program by Jaha Goldberg, pianist; Ernest Bliss, barytone *WMAF—S. DARTMOUTH, MASS.—363 *WMAF—B. DARTMOUTH, MASS.—303 5 m.—Dinner music. 7 p. m.—Duets and solos by Elsie McGall Persons, soprano; William H. Stamm, tenor, accompanied by Winifred T. Barr. 7:45 p. m.—The Rev. H. C. Dressel, cel-8 p. m.—Duets and solos. 8:15 p. m.—The Rev. H. C. Dressel, cel-

list, :30 p. m.—Judith Roth, singer.

*WBZ-SPRINGFIELD, MASS.--337 *WJAR_PROVDENCE_360 :30 p. m.—Talk by J. Henry MacDuff.

*WKBF.—PROVIDENCE—360
to 10:30 p. m.—Paul Whiteman's

*KDKA—PITTSBURGH—326 7 p. m.—Scores; concert. 1:30 p. m.—The children's period. 7:45 p. m.—News bulletins. 8:15 p. m.—University of Pittsburgh edu

). m.—Trio concert.

11 p. m.—Concert.

*WCAE—PITTSBURGH—462

6:30 p. m.—Dinner concert.

6:30 p. m.—Dinner concert.

7:30 p. m.—Dinner concert.

7:30 p. m.—Musical program.

9:20 p. m.—Musical program.

11 p. m.—Cancert.

*WCAE—PITTSBURGH—462

6:30 p. m.—Dinner concert.

7:30 p. m.—Musical program.

9:30 p. m.—Musical program.

11 p. m.—Cancert.

*WCAE—PITTSBURGH—462

6:30 p. m.—Dinner concert.

7:30 p. m.—Musical program.

9:30 p. m.—Late concert by 'Sid's' gang.

WCAE—PITTSBURGH—462 p. m.—'Tashions of the Stage," Cora 5:15 p.

day,
130 p. m.—Hotel Vanderbilt Orchestra.
130 p. m.—New York University summer
130 p. m.—Iving Boernstein's Trio.
130 p. m.—Iving Boernstein's Trio.
140 p. m.—Iving Boernstein's Trio.
150 p. m.—Irving Boernstein's Trio.
150 p. m.—Happy Hoosier Harm p. m.—Song recital.
p. m.—A political talk, John E. Nev.
15 p. m.—Irving Boernstein's Trio.
WHAS—LOUISVILLE, KY.—400

WMC-MEMPHIS-500 m.—Organ recital.
m.—Midnight frolic.
WLW—CINCINNATI—423 Dance program.

Special features. n.—Bernie Cummins's orchestra.
p. m.—Jake Rutz's orchestra.
p. m.—Chubb-Steinberg orchestra.
WJAX—CLEVELAND—390 —Schmeman's concert to Concert to

p. m.—Dinner concert.
d p. m.—Red Apple Club.
WOC—DAVENPORT—484
5:45 p. m.—Chimes concert.
WHAA—IOWA CITY—484
Concert. by Williamsburg KYW-CHICAGO-536 :45 p. m.—Children's bedtime story.

p. m.—Dinner concert, by Joska De Babary's and Paul Whiteman's "Collegians."

p. m.—Musical program, by artists. 50 p. m.—Musical program. to 11:30 p. m.—"At Home" program. WLS—CHICAGO—345 30 to 12 p. m.—Mus WMAQ_CHICAGO_448 Major.

4:46 p. m.—Loretto C. Lynch, "Tea Time Talk"

5 p. m.—Original St. Louis Rhythm Kings. 5:30-7:30 p. m.—Olicott Vall's Trio, Paul Specht's Dance Orchestra.

9:30 p. m.—Palisades Park Orchestra.

10 p. m.—Bertram J. Goodman's orchestra.

10:45 p. m.—Ber Gordon tenor; Bell Hecht, pianist.

11 p. m.—Judith Roth and Al Wilson.

11:15 p. m.—Rush Fowler, barytone.

11:30 p. m.—Club Alabam revue.

WEBH—NEW YORK CITY—273

7 p. m.—Blybrun's Motion Picture Revue.

7:10 p. m.—Henryetta Turner, ukulele wdar-oldert.
p. m.—Organ concert.
p. m.—Chapman's Dance Orchestra.
wdd-CHICAGO—448
a. m. to 2 p. m.—Ralph Williams' Or

Time Wave
P.M. Station length Orchestra
2-3 WBS 360 Sterling
10-11 WHN 360 Paul Spechts

6:15 WOR 405 Elite

6:05 WIP

6:30 WGR

MONDAY, AUGUST 11 WJZ 455 Fred Hall's

6:30 WGR 319 Vincent Lopez
6:30 WNAC 278 Westminster
6:40 WFBH 273 Majestic
7:30 WEAF 492 John C. Smith's.
8:00 WHN 360 Resetand
8:00 WAAM 263 Garden State
8:45 WGY 280 Ft. Orange Soc.
9:00 WHN 360 Palisades Park
10:00 WDAR 569 Arcadia
10:30 WJZ 455 Ernie Golden's
10:30 WGR 319 Vincent Lopes
11:08 WGO 509 Candelori's

360 Vail's and Specht's

319 Vincent Lopez

* Means Daylight Saving Time

All Other Programs Are in Eastern Standard Time

KFAF—DENVER—278 . m.—Evening, musical program. WGAZ—SOUTH BEND, IND,—360 m. to 1 a. m.—Orchestra selectic KFKX—HASTINGS, NEB.—286 :30 p. m.—Midnight concert. KGO—OAKLAND, CALIF—312 i p. m.—Arion Trio. to 4 a. m.—Henry Halstead's Dar Orchestra.

KFI-LOS ANGELES-469

Crove Orchestr ...-Cocoanut Grove Orchestr ---Organ recital. *CKAC---MONTREAL---425 p. m.—Kiddies stories. (:30 p. m.—Rex Battle's Orchestra 1:30 p. m.—Studio program. 10:30 p. m.—Joseph C. Smith's Orch

WEDNESDAY

*WEAF-NEW YORK CITY-492 a. m.—Minnie Well, planist, 10 a. m.—"Young Mother's Program," Talks by Eleanor P. Brown. 50 a. m.—Market and weather reports. -4:40 p. m. — Moonlight Instrumental Trio, James Palmerie, Sam Fontano, Hyman Richman.
 :40-5 p. m.—Walter H. Preston, barytone.
 p. m.—Waldorf Astoria dinner music. 7:30 p. m.—Joint recitat, Airred Corner, William Liebling.
7:50 p. m.—Farm talk, by H. E. Cook.
8 p. m.—Sybil Sanderson Fagen, whistler.
8:15 p. m.—Joint recitat.
8:35 p. m.—Joint recitat. 2:45 p. m.—Charles Wold, player of musi-

cal glasses.
p. m.—Trio.
45 p. m.—Charles Wold *WJZ_NEW YORK CITY_455 "WJZ—NEW YORK CITY—455
p. m.—Hotel Astor Trio.
p. m.—Eleanor Gunn's fashion talk.
10 p. m.—Daily menu.
15 p. m.—Talk by John C. Cutting.
30 p. m.—"Education," by Marietta Johnson.—Market reports.

30 p. m.—Market reports.

p. m.—Cafe Ensemble.

22 p. m.—Financial developments
day.

7:20 p. m.—Financial developments of the day.
7:30 p. m.—Cafe Ensemble.
8 p. m.—"Problems of Retailing."
8:25 p. m.—New York Philharmonic Or chestra. Contest between six soloist picked for Stadium concerts.
10:30 p. m.—Billy Wynne's orchestra.
**WFBH—NEW YORK (LTY—273*
11 a. m.—Woman's Hour.
12 m.—Orchestra selections.
2 p. m.—Bob Schafer, Mrs. Bob Schafer James Brennan.
2:30 p. m.—Marion Stanton, soprano.
2:45 p. m.—Piano rectial, Jack Horn.
3:30 p. m.—Jeanette Sheldon, elocutionist 1:45 p. m.—Popular songs A. Wilson.
4 p. m.—Jack Little and Tommy Maile.
4:30 p. m.—Nelson Van Horn, plano recital.
5 p. m.—Kiddleg' period.

p. m.—Kiddies' period. :16 p. m.—Reading, Helen Reynolds Bai ont.
30 p. m.—Rita Melvia, soprano.
45 p. m.—Jack Kemberly, barytone.
p. m.—Panchard Orchestra.
30 p. m.—Edouard Panchard, hotel trav

alogues.

5 p. m.—Orchestra selections.

30 p. m.—Musical 130 p. m.—Musical program.
 *WBBR_STATEN ISLAND, N. Y.—273
 p. m.—Male duet, Fred Franz and Fred Twaroschk.
 1.5 p. m. — "Rebuilding Jerusalem," by

Victor Achmidt.

145 p. m.—Maie duet.

*WHN—NEW YORK CITY—360

115 p. m.—Samuel Weber, pianist.

130 p. m.—Harry Hock's entertainers.

145 p. m.—Original Louisiana Five.

145 p. m.—Vincent Lane, tenor.

15 p. m.—Maffeed Jackson, impersonator.

15 p. m.—Mafeline Groff, soprano.; Mile.

Jeanne La Mar, dramatic soprano.

130 p. m.—Alonel Adams, readings.

15 p. m.—Lionel Adams, readings.

15 p. m.—Tom Bracken and Bob King.

130 p. m.—Olcott Vall's trio; Paul Specht's dance orchestra.

130 p. m.—Billy Page's syncopators.

1 p. m.—William E. Krigger, barytone.

1 p. m.—William E. Krigger, barytone.

1 p. m.—Henny Cogert and Charles Hirst, songs.

songs. 9:20 p. m.—Palisades Park orchestra. 9:45 p. m.—Boys' period. tor. :30 p. m.—Lena Kaufman, violinist.

3:45 p. m.—Leah Seley, soprano. 6:15 p. m.—Bandestel's Park Orchestra. 55 p. m.—The Day's Sports, Bill Steinke.
p. m.—"Advertising—Those Who Make
It—What It Is—Who Uses It," Gilbert
P. Farrar.

**Bill Steinke.

WHAS—LOUISVILLE—400

8:30-10 p. m.—Concert by Mrs. Harmon

WLW—CINCINNATI—423 It—What It Is—Who Uses It," Gilbert P. Farrar.
115 p. m.—Matilda Rosenstrauch, planist.
180 p. m.—Frederic H. Gummic, tenor;
Clara Altman, contralto,
145 p. m.—Rudolph Hopf, barytone,
p. m.—Concert Orchestra of the S. S.

TUESDAY, AUGUST 12
WHN 360
WFBH 273
Wajestic
WHN 360
WGR 319
Wincent Lopez
WNAC 278
WORA 405
WGR 405
WGR 405
WGR 405
WHN 360
WAAM 263
WEAF 492
WHN 360

Panchard's Vail's and Specht's

vairs and Spechr Vincent Lopez Shepard Colonial Majestic Billy Page's Dance Music Woodlawn Palisades Park Clover Gardens Billy Wynne's

WEDNESDAY, AUGUST 13
WFBH 273 Panchard's
WHN 360 Vail's and Spec
WGR 319 Vincent Lopez
WNAC 273 Shepard Coloni
WFBH 273 Majestic
WHN 360 Billy Page's
WAAM 263 Woodlawn
WHN 360 Palisades Park
WHN 360 Clover Gardens
WHZ 455 Billy Wynne's

3:45 p. m.—Rudolph HopI, barytone.

9 p. m.—Concert Orchestra of the S g
Leviathan.

9:45 p. m.—Matiida Rosenstrauch, pianist.

10 p. m.—Frederic H. Gummic, tenor;
Clara Altman, contraito.

10:15 p. m.—Frank J. Shipman, "Your American Merchant Marine."

10:30 p. m.—Barytone solos, Rudolph Hopf.

10:45 p. m.—Manhattan Serenaders.

WHAR—ATLANTIC CITY—275

7:30 p. m.—Orchestra selections.

WHOC—DAVENPORT, IOWA—484

9 p. m.—Organ recital.

WHO—DES MOINES, IOWA—526

12 midnight—Musical program.

WOS—JEFFERSON CITY, MO—441

9 p. m.—Address.

9:20 p. m.—Barn dance tunes.

WDAF—KANSAS CITY—411

9 p. m.—Artists' program.

12:45 a. m.—Nighthawk frolic.

Dance Orchestras for This Week

*WFI—PHILADELPHIA—395

1 p. m.—Meyer Davis's Concert Orche
3:05 p. m.—Dance music, Sol Zaleb.
6:30 p. m.—Meyer Davis's Orchestra.
*WIP—PHILADELPHIA—509

0 a. m.—Seashore gossip.
p. m.—"What Wild Waves Say."
105 p. m.—Visiting artists; chats.
3:30 p. m.—Comfort's Philharmonic

n. m.—Talk by Dr. Frank E. Ebaugh :15 p. m.—Bob Leman's Dance Orchest :05 p. m.—Eddie Elkins' Orchestra.

m.—Bedtime stories.
*WDAR—PHILADELPHIA—395

2 hoon—Organ recital; religious servic concert orchestra. 2 to 3 p. m.—Concert orchestra; Mrs. Le

will talk.
1:30 p. m.—Artist recital.
1:45 p. m.—Baseball scores.
1:30 p. m.—Dream Daddy.
8-p. m.—Arnoid Abbott; dance m.
*WGR—BUFFALO—319

*WGR-BUFFALO-319
12:30 p. m.—Organ recital.
6:30 p. m.—Vincent Lopez's orchestra.
7:30 p. m.—News; scores.
9-11 p. m.—Musical program.
11 p. m.—Vincent Lopez's orchestra.
*WGY—SCHENECTADY—380

5:30 p. m.—Adventure story. 7:30 to 9 p. m.—Musical program by Fil

pino orchestra.
p. m.—New York Philharmonic Orchestra.
•WBZ—SPRINGFIELD, MASS.—337

p. m.—Baseball results.

30 p. m.—Bedtime story.

40 p. m.—Mrs. Alexander Thomson, contraits.

15 p. m.—Special French program.

p. m.—Joint reception at Cadet Armor

130 p. m.—Leo Reisman's orchestr.

*wNAC—BOSTON—278

0.30 a. m.—WNAC Women's Club talk

p. m.—WNAC dinner dance. p. m.—To be announced. •WJAR—PROVIDENCE—360

ay."

m.—Studio program.

m.—Joint recital, Alfred Or

William Liebling, barytone.

n.—Sybii Fagen, whistler.

m.—Joint recital continued.

m.—Sybii Fagen, whistler.

m.—Charles Wold.

Stars.
30 p. m.—Dorothy Hoyle, violinist.
45 p. m.—Bernard and Robinson.
to 10 p. m.—West End Ladies Trio.
**HDKA—PITTSHURGH—326

*HDKA—PITISISURGH—520
12:15 p. in.—Daugherty's Orchestra.
3:15 p. m.—Scores, inning by inning.
5:30 p. m.—Dinner concert.
7 p. m.—Scores; dinner concert.
7:20 p. m.—The children's period.
8:15 p. m.—Jackie Coogan.

p. m.—Dinner concert.
p. m.—The Sunshine Girls; scores
p. m.—Musical program.
WCAP—WASHINGTON—469

m.—To be announced. WRC—WASHINGTON—469

report.
1:30 p. m.—Song recital.
1:45 p. m.—Piano recital. Eleanor Glynn
1:50 p. m.—Current topics.
4 p. m.—Song recital.
1:15 p. m.—Instruction in Internationa
Code.

m.—Schmeman's Concert Band. m.—Orchestra selections. WCX—DETROIT—517

10:45 WOR 405 Man. Serenaders 11:66 WGR 319 Vincent Lopes

THURSDAY, AUGUST 14

FRIDAY, AUGUST 15

L. Partridge's
Ky. Serenaders
Harry Cox's
Vail's and Specht's
Westminster
Vincent Lopez
Hotel Majestic
Elmer Grosso's
Elmer Grosso's

Elmer Grosso's
Al Reiser's
Palisades Park
Vincent Lopez
Roseland
Waldorf-Astoria

p. m.—Baseball results.

9 p. m.—Silverman's Orchestra.

WEBH—CHICAGO—370
7:30 p. m.—George Foster, planis
8:30-10:30 p. m.—Reader, steel
dance orchestra rchestra. KYW—CHIAGO—536 5:45 p. m.—Children's bedtime story
7 p. m.—Dinner concert by Jos
Babary's and Paul Whiteman's
gians."
7:30 p. m.—Studlo program.
8-8:58 p. m.—Musical program by a
9:15 p. m.—Talk by H. Archibald
9:45 p. m.—Midnight revue.

WLS—CHICAGO—345
5:30-11 p. m.—Mignic luftleny time.

KSD-ST. LOUIS-546

*WAAM—NEWARK—263
7:30 p. m.—Josephine Lehmann, pianis
8:30 p. m.—Ben Friedman, tenor.
8:45 p. m.—Woodlawn Dance Orchestr
145 p. m.—Judith Roth.
10 p. m.—Al Wilson.
10:15 p. m.—Herman Engler, popul m.—Theater organ recital.
p. m.—Stories for children.
p. m.—Program by Walther League.
KFKX—HASTINGS, NEB.—286 *WOO-PHILADELPHIA-509 6:15 p. m.—Dinner concert.
WGAZ—SOUTH BEND, IND.—369 11 a. m.—Organ recital.
12 noon—Luncheon music.
145 p. m.—Grand organ trumpets.
7:30 p. m.—Sports results; police reports dinner music by A. Candelori's Orches tra.
8:15 p. m.—Grand organ recital, Harriett G. Ridley.
9 p. m.—WOO Orchestra; Dr. A. Maltset Russian tenor.

*CHAC-MONTREAL-425 1:4b p. m.—Classic concert.
4 p. m.—Weather; news.
PWX—HAVANA—400
8:30-11 p. m.—Concert by Cuban Army.

THURSDAY

*WEAF-NEW YORK CITY-492 nard H. Smith. 1:50 a. m.—Market and weather ports.

p. m.—Elsie Peck, soprano,

10 p. m.—Slylvia Schachter, pianist.

20 p. m.—Elsie Peck, soprano,

30 p. m.—Sylvia Schachter, pianist.

40 p. m.—Stories for children.

p. m.—Waldorf-Astoria dinner music.

m.—Mid-week services, Federat 7 p. m.—Wid-week services, Federation Radio Choir; prayer; solo by Arthur Billings Hunt, barytone; address by Rev. George Adams, Ph.D., D.D. 7430 p. m.—"Some Confessions of Veteran Speakers," Warren C. Du Bois, 7440 p. m.—Elmer Grosso's Dance Orchestra. tra. :15 p. m.—"International Polo and the Coming Matches," Capt. Percy Redfern Creed. :30 p. m.—Elmer Grosso's Dance Orchestra.

10 p. m.—Program to be announced.

11 p. m.—Vincent Lopez's Orchestra. *WJZ-NEW YORK CITY-455 m.—Nathan Abas's Orchestra. m.—Eleanor Gunn's Fashion Talk.

4:10 p. m.—Daily menu. 4:15 p. m.—Daily menu. 4:15 p. m.—The Progress of the World." 5:30 p. m.—Market reports. 7 p. m.—Concert orchestra. 7:20 p. m.—Financial Developments of the Day.

30 p. m.—Concert orchestra.
p. m.—Weekly French lesson.

30 p. m.—New York Philha chestra.
10:15 p. m.—"Slums of London," George
Laval Chesterton.
10:30 p. m.—Waldorf-Astoria Roof Orches-

*WJY-NEW YORK CITY-405 7:30 p. m.—Piedmont Trio. 8:45 p. m.—Book Review, Grace Colbron. 11 a. m.—Morning music.
11:30 a. m.—Mildred V. Feldman.
12 noon—Leonardo Orchestra.
12 p. m.—Lives of Great Men, Par Present.

Present.

2:30 p. m.—Alvin Hauser, pianist.

2:45 p. m.—Rose Stanton, soprano.

3 p. m.—Mildred Gardner, soprano.

3:15 p. m.—Judith Roth, Al Wilson a
Herman Engler.

3:30 p. m.—Miss Singe Wygren, songs.

3:45 p. m.—Robert Walker, tenor.

4.16 p. m.—Metropolitan Trio.

biso p. m.—Ida Fenielsen and Ann Dedrick, songs.

6 p. m.—Fernando Villa, tenor.

6:15 p. m.—Hotel orchestra.

6:30 p. m.—Jack Delaney, humor.

6:45 p. m.—Hotel orchestra.

7 p. m.—Marcia Stanton, soprano.

7:15 p. m.—Orchestra selections.

11:20 p. m. to 2 a. m.—Midnight Rendes

*WHN_NEW YORK CITY—360

Talk...

5 p. m.—Leonard Partridge's Orchestra...

6 i.30-7:30 p. m.—Olcott Vall's Trio; Paul Specht's Dance Orchestra...

9:30 p. m.—Palisades Park Orchestra...

10 p. m.—Vlncent Lane, tenor...

10:15 p. m.—Sara V. Turits, soprano...

10:30 p. m.—Roseland Ballroom Orchestra...

11 p. m.—Harry Hock's entertainers...

11:15 p. m.—Gene Austin, barytone...

11:30 p. m.—Jack Kelly's Orchestra...

11:30 p. m.—Jack Kelly's Orchestra...

12:10 p. m.—Vocal selections...

1esson. —Instrumental selections.

**WOR—NEWARK—405

2:30 p. m.—Castle Edward's Orchestra
3 p. m.—Kamerica, the Paradise for Women," Helen Jerome.

3:15 p. m.—Reading by Earl Chapin May.

3:30 p. m.—Castle Erward's Orchestra.

6:15 p. m.—Albert E. Sonn, "Radio for the E. Layman."

1. Layman 130 p. m.—Harry Cox's Orchestra.

1:20 p. m.—Harry Cox's Orchestra.
7:20 p. m.—Resume of day's sports.
*WAAM—NEWARK—263

11:10 a. m.—Ada Bessie Swan, Radio Cooking School.
11:30 a. m.—Florence Doebner, soprano.
6:30 p. m.—Ray Southwick's Orchestra.
7:30 p. m.—James Vincent Moore's entertainers. tainers.

8 p. m.—Walter Storey, "Motion Pictures.

8 p. m.—Harry Knox's Entertainers.

10 p. m.—Catello's Radio Entertainers.

Leonard Nelson's
Ernie Golden's
Young's and Fry
B. Fischer's
Candelori's
Harold Stern's
Roseland
V. Lopez
Candelori's
Sam Wooding's
Casmer's

Waldorf-Astoria

Astor

SATURDAY, AUGUST 16

6:15 WOR 405 Charley Storm's 6:30 WHN 360 Vail's and Specht's

7:30 WJZ 455 Waldorf-Aste
7:30 WFBH 272 Leonardo's
8:15 WNAC 278 Westminster
9:20 WNAC 278 Copley Plaza
10:11 WEAF 492 Vincent Lope
10:20 WJZ 455 Astor
10:30 WJZ 455 Astor
11:20 WHN 360 Roseland

7:30 WJY 7:20 WJZ 8:15 WDAR 9:00 WEAF 9:40 WEAF 10:00 WOO 10:30 WJZ 10:30 WHN 11:03 WOO 11:30 WHN 11:03 WOO 11:30 WHY

7:00 WJZ

*WOO-PHILADELPHIA-509 p. m.—Sports results; police re-Orchestra. s.8:55 p. m.—Talk by Harry L. Wymond.

12 m.—Organ recital; featu orchestra. 2-3 p. m.—Concert orchestra. 3:30 p. m.—Artist recital. *WIP—PHILADELPHIA—509 tions.

3 p. m.—'What Wild Waves Say"
3:05 p. m.—Radio baby clinic.
3:30 p. m.—Comfort's Philharmonic chestra.
6:05 p. m.—Kentucky Serenaders.
7 p. m.—Bedtime stories.
8 p. m.—'Timely Talks to Motorists."
8:15 p. m.—Comfort's Philharmonic chestra.

chestra. :45 p. m.—"What Wild Waves Say." :50 p. m.—Performance of Murp Minstrels. :80 p. m.—Concert by Vassella's Band. WHAR—ATLANTIC CITY—275

m.—Orchestra selections, m.—Orchestra numbers, *WGR—BUFFALO—319 12:30 p. m.—Organ recital. 6:30 p. m.—Vincent Lopez's Orchestra. *WMAF-S. DARTMOUTH, MASS.-363

chestra,
9:10 p. m.—To be announced

*WNAC—BOSTON—278

p. m.—Orchestra selections,
i. p. m.—Orchestra selections,
i. p. m.—WNAC dinner dance,

strong.
5:40 p. m.—Leo Reisman Orchestra.
7:05 p. m.—Market reports.
7:30 p. m.—Bedčime story.
9 p. m.—Recital by Mildred Teitelbaum,
pianist.
9:30 p. m.—To be announced.
*KDKA—PITTSBURGH—326 30 p. m.—The children.
15 p. m.—Farm program.
p. m.—Concert, KDKA Symphony Or
p. m.—Concert, KDKA Symphony Or

chestra; Virginia Kendrick, contralto Leonard W. Siegel, basso-cantante; Man garet McCartney. m.—Concert. *WCAE—PITTSBURGH—462

3:20 p. m.— Beauty and Elsie Pierce. 3:25 p. m.—Current topics. 3:35 p. m.—Piano recital. 4 p. m.—Song recital. 6 p. m.—Stories and songs for children.
WHAS—LOUISVILLE, KY.—400
8:30 to 10 p. m.—Ella Sharrard Violi Quartet. WLW—CINCINNATI—423 p. m.—Popular program.
WJAX—CLEVELAND—390

p. m.—Songs, violin selection numbers.

WMC—MEMPHIS—500 9:30 p. m.—Program by Mrs. Ethel WCX—DETROIT—517 7 p. m.—Musical program. WWJ—DETROIT—517

7 p. m.—Musical WWJ—DETROIT—517
8:30 p. m.—Schmeman's Concert Band.
9:30 p. m.—Orchestra selections.
10 p. m.—Dance music by Jean Goldkette'
Orchestra.
11 p. m.—Orchestra selections.
WOC—DAVENPORT—484
10 p. m.—Orchestra program.
WDAF—KANSAS CITY—411
7 n. m.—Plano selections; address; cl

artists. 9:20 p. m. "Safety First," Z. C. Elkin. 10 to 11:30 p. m.—"At Home" program WLS—CHICAGO—345 6:30 to 10 p. m.—Music; vaudeville lullaby time; farm talks.

WMAQ—CHICAGO—448 6:30 p. m.—La Salle Orchestra.
9:15 p. m.—To be announced.
WEBH—CHICAGO—270
7:30 p. m.—Louis Perlman, violinist; concert selections.
9:30 p. m.—Tenor and dance selections.
11:30 p. m.—Soprano, popular and dance selections.

WDAP—CHICAGO—360

Dinner concert; Drake. p. m.—Dinner concert; Drake.
p. m.—Organ recital; quartet.
WFAA—DALLAS—476 9:30 p. m.—Music box illustration.
12 midnight—Meirose Orchestra.
WOAW—OMAHA—526
7 p. m.—Story hour.
7:30 p. m.—Yost's Orchestra.

. m.—To be announced.

KGO—OAKIAND; CAL.—312

m.—A four-act drama, "Passers

KFI—LOS ANGELES—469 11 p. m.—Cocoahut Grove Orchestra.
a. m.—Lillian Martin concert.
*CKAC—MONTREAL—425
p. m.—Weather, news.
p. m.—Leased to CNRM.

FRIDAY *WEAF—NEW YORK CITY—492 Ever Before," Cameron Rogers.

11:25 a. m.—"Roses in Summer," Kenneth R. Boynton.

11:50 a. m.—Market and weather reports.

4 p. m.—Forest Huff's Orchestra.

4 p. m.—Forest Huff's Orchestra.

4 p. m.—Forest Huff's Orchestra.

5 p. m.—Waldorf-Astoria dinner music.

7:30 p. m.—When Story of the Enchanted Cattais," Blanche E. Wade.

7:45 p. m.—Henry White, barytone.

8 p. m.—Marion Lindquist, humorous and dramatic reader.

8 p. m.—Henry White, barytone.

8:16 p. m.—Henry White, barytone.

8:30 p. m.—Henry White, barytone.

8:45 p. m.—Marion Lindquist,

9 p. m.—B. Fischer's Dance Orchestra.

9:30 p. m.—Talk.

9:40 p. m.—Dance Orchestra continued.

WHJZ-NEW YORK CITY—455

1 p. m.—Hotel Ambassador Trio.

4 p. m.—Eleanor Gunn's fashion talk.

4:10 p. m.—Daily menu.

4:15 p. m.—Arts and decorations.

4:20 p. m.—Organ recital.

5:30 p. m.—Ernie Golden's orchestra.

7:26 p. m.—Financial developments of the day.

7:30 p. m.—Ernis Golden's orchestra.

8 p. m.—Current topics, by Dr. William
H. Allen.
8:10 p. m.—Goldman Band concert, Wagner program; Genia Fonariova, soprano.
10 p. m.—Time pop question game.
10:30 p. m.—Harold Stern's orchestra.

*WJY—NEW YORK CITY—405
7:30 p. m.—Leonard Nelson's orchestra. *WJY-NEW YORK CITY-405
7:30 p. m.—Leonard Nelson's orchestra.
8:15 p. m.—Eugenie Proion, pianist.
9 p. m.—Saliors concert by officers of
the White Star liner Majestic; Frank
Butcher, Stanley Thornton, banjo duets;
Gordon Wilson, tenor; Harold Williams,
cello; Austin Rigby, accompanist; talk
by Fred E. Marble.

*WHN-NEW YORK CITY-360
2:15 p. m.—Judith Roth, Al Wilson, songs.
2:30 p. m.—Jimmy Flynn, Bob Miller,
songs.

2:30 p. m.—Jimmy Flynn, Bob Miller,
songs.
2:45 p. m.—Fred Hughes, tenor.
3 p. m.—Vincent D. Daniels.
3:45 p. m.—Chat with children.
4 p. m.—Jos. C. Wolfe, barytone.
4:15 p. m.—Mabel Livingston.
4:30 p. m.—Ross Fowler, barytone.
6:30-7:30 p. m.—Olcott Vail's String Trio;
Specht's Dance Orchestra.
9:30-10 p. m.—Pallisades Park Dance Orchestra. chestra.

10:15 p. m.—Baseball statistics. 10:20 p. m.—Tom Bracken and Bob King, songs. 10:30 p. m.—Roseland Ballroom Orchestra. *WFBH-NEW YORK CITY-273

*WFBH—NEW YORK CITY—273

11 a. m.—Science, by Jack Niles.

11 :30 a. m.—Marion Doran, soprano.

12 noon—Orchestra selections.

2 p. m.—Bay Park orchestra.

2:30 p. m.—Marcia Stanton, soprano.

2:45 p. m.—Program of music.

3 p. m.—Bay Park orchestra.

3:15 p. m.—Bernard and Robinson.

3:30 p. m.—World neighborhood news.

4 p. m.—Jos. C. Wolff, barytone.

4:30 p. m.—Kiddies period.

5:15 p. m.—John Barton, barytone.

6:30 p. m.—Rita Melvia, soprano.

6:45 p. m.—Frank J. Herel, violin reci

6 p. m.—Cholly Storm's orchestra.

*WEBJ—NEW YORK CITY—273

*WEBJ-NEW YORK CITY-273 7 p. m.—Blybruvis review of new plays.
7:10 p. m.—Edith Quisenberry, soprano.
7:20 p. m.—Plano solio, Alan Morgan.
7:25 p. m.—Vairplane Travelogue,"
Captain Richard R. Blythe.
7:25 p. m.—Harrison Marshall, tenor.
7:46 p. m.—Kathleen Hughes, soprano.
7:56 p. m.—Talk, Dr. Dorothy Bocker.
8:66 p. m.—Edith Quisenberry, soprano.
8:15 p. m.—Novelty.

m.—Novelty.
m.—Harrison Marshall, tenor.
m.—Kathleen Hughes, soprance 145 p. m.—Piano solo. 150 p. m.—Henrietta Turner, µkelele girl, WHAR-ATLANTIC CITY-275

p. m.—Orchestra selections. :30 p. m.—John A. Watt, "The Care Radio Batteries." Radio Batteries."

8 p. m.—Orchestra numbers.

*WOR.—NEWARK—405

2:30 p. m.—Recital, by Elizabeth Niemeyer, soprano.

2:45 p. m.—Solos, by Mme. M. Blazejewicz-Ullman, pianist.

2 p. m.—Talk, by Zoe Beckley.

3:15 p. m.—Talk, by Raiph Morgan.

3:30 p. m.—Elizabeth Niemeyer, soprano.

3:46 p. m.—Solos, by Mme. M. Blazejewicz-Ullman.

6:15 p. m.—Agnes Leonard, songs for children.

*WFI-PHILADELPHIA—395

1 p. m.—Meyer Davis's Concert Orchestra.
3:05 p. m.—Russian program, by Samuel Zalmanoff; Zina Kolibree, soprano; Bessie Presswine, pianist; Samuel Zalmanoff, tenor.
6:30 p. m.—Meyer Davis's Orchestra.
*WIP-PHILADELPHIA—509

10 a. m.—Seashore gossip; health talk.
3 p. m.—What Wild Wayes Say."
3:05 p. m.—Visiting artists; chats.
3:30 p. m.—Comfort's Philharmonic Orchestra. chestra. 5:05 p. m.—Eddie Elkins's Orchestra. 7 p. m.—Redtime stories . m.—Bedtime stories. *WDAR—PHILADELPHIA—395

*WGR—BUFFALO—319

12:30 p. m.—Organ recital.
6:30 p. m.—Vineent Lopez's Orchestra.
7:30 p. m.—News. scores.
9-11 p. m.—Concert program.
11 p. m.—Vincent Lopez's Orchestra.
*WGY—SCHENECTADY—380

p. m .- International Sunday School Les son. —Goldman Band concert.
10 p. m.—Radio drama, "His Chance."
11:30 p. m.—Dance program.
*WNAC—BOSTON—278

*WNAC—BOSTON—278

1 p. m.—Orchestra selections.

4 p. m.—Orchestra selections.

6 p. m.—Children's half hour.

6:30 p. m.—Shepard Colonial Orchestra.

8 p. m.—To be announced.

*WBZ—SPRINGFIELD, MASS—337 *WBZ-SPRINGFIELD, MASS—337
6 p. m.—Dinner concert.
7:30 p. m.—Bedtime story.
10 p. m.—Concert by Vera H. Colburn, soprano; Henry Cohen, cellist; Doris H. Tirrell, accompanist.
11 p. m.—Concert by the WBZ Trio.
*WMAF—S. DAETMOUTH, MASS.—363
8:15 p. m.—Jimmie Clark, jazz pianist,
8:30 p. m.—Henry White, barytone.
8:46 p. m.—Marion Lindquist.
9 to 10 p. m.—Hotel quartet.
*WJAR—PROVIDENCE—360
8 p. m.—Scores.

3 p. m.—Scores. 3:05 p. m.—J. Herbert Taylor, barytone. m.—Biltmore Orchestra.
*KDKA—PITTSBURGH—326 7 p. m.—Scores; dinner concert. 7:30 p. m.—The childrens period, Unc

7:46 p. m.—News bulletins,
8:40 p. m.—Stockman report.
9 p. m.—Concert, KDKA Jazz Quartet.
• WCAE.—PITTSBURGH.—462
7:30 p. m.—Uncle Kaybee.
9:30 p. m.—Musical program.
WEC.—WASHINGTON—469 WRC—WASHINGTON—469
1:45 p. m.—A Talk on Motoring.
8 p. m.—Musical program.
9 p. m.—Band concert.
WHAS—LOUISVILLE, KY—400
10 p. m.—Tropical Hawaiian

8:30 to 10 p. m.—Tropac...
Quartet.

WLW—CINCINNATI—423

Value recital. 4 p. m.—Plano recital.

9:30 p. m.—Britling's Cacteria.
Orchestra.
42 midnight—Midnight=Frolic.
WCK.—DETROIT—517

7:30 p. m.—Musical program.

WWJ—DETROIT—517
8:30 p. m.—Schmeman's Concert Band.
9:30 p. m.—Orchestra selections.

WOS—JEFFERSON CITY—441 9 p. m.—Address.
9:20/p. m.—Varied program.
KSD—ST. LOUIS—546
2 p. m.—Abergh's concert ensemble; Arne Arnesen, violinist.
11 p. m.—Dance music, by Dodemich's erchestra.

WOC-DAVENPORT-484 MUNICAL PROGRAM.
WDAF—KANSAS CITY—411 WDAF-KANSAS CITY-411

9 p. m.—Orchestra selections and minstrels.

12:45 a. m.—Nighthawk frolic.

6:46 p. m.—Children's bedtime story.

7:30 p. m.—Studio program.

8:20 p. m.—Farm speeches.

9 p. m. to 12:30 a. m.—Midnight revue.

WLS-CHICAGO-345

6:30 to 11 p. m.—Music; lullaby time; farm talks. talks

WMAQ—CHICAGO—448

6 p. m.—Theater organ recital.
6:30 p. m.—La Salle orchestra.
9:15 p. m.—To be announced.
WEBH—CHICAGO—370 wDAP—CHICAGO—360
11 p. m.—Jack Chapman's Orchestr

SATURDAY

*WEAF—NEW YORK CITY—492 to 5 p. m.—Courtside description of final matches of women's national lawn ten-nis championship. is championship.

p. m.—Waldorf-Astoria dinner music. p. m.—Ruth Donaldson, soprano.
p. m.—Metropolitan Male Chorus.
p. m.—Halsey K. Mohr, pianist.
p. m.—Ruth Donaldson, soprano.
p. m.—Halsey K. Mohr, compose 8:30 p. m.—Halsey K. Mohr, composerpianist.
8:40 p. m.—Metropolitan Male Chorus.
9 p. m.—Edward Avis, bird whistler.
9:15 p. m.—Eva Welcher, violinist, accompanied by Arnold Block.
9:30 p. m.—Metropolitan Male Chorus.
9:40 p. m.—Eva Welcher, violinist.
10 to 11 p. m.—Vincent Lopez'S Orchestra.
*WJZ—NEW YORK CITY—455 p. m.—Vanderbilt Orchestra.
p. m.—Evan D. Thomas, bass-barytone.
130 p. m.—Roger Wolfe's Orchestra.
130 p. m.—Market reports.
p. m.—Waldorf-Astoria Orchestra.
15 p. m.—School High Spot Contest.
130 p. m.—N. Y. Philharmonic Orchestra.
15 p. m.—School High Spot Contest.
130 p. m.—N. Y. Philharmonic Orchestra.
130 p. m.—Talk by Fred Fletcher.
10:30 p. m.—Astor Roof Orchestra.

WFRH—NEW YORK CITY—273
9 a. m.—Children's program.

• WFBH—NEW YORK CITY—273

9 a. m—Children's program.

10 a. m.—Religious services.

2 p. m.—Music and readings.

2 30 p. m.—John Kimberly, barytone, Irens.

Arderin, piano.

2:45 p. m.—Jimmie Ciark's Entertainers.

3 p. m.—Panchard Orchestra.

3:30 p. m.—Betty Murphy, contraito.

3:46 p. m.—Alvin Hauser, old songs.

1:15 p. m.—Nelson Van Horn, piano.

1:45 p. m.—Jack Niles and Ellsworth. 4:45 p. m.—Jack Niles
Morss.
5 p. m.—Kiddies' period.
5:16 p. m.—Katherine Connolly, songs.
5:30 p. m.—Fred Hughes, tenor.
6 p. m.—Orchestra selections.
7 p. m.—Dr. Eugene Christian, health helps.
7:30 p. m.—Leonardo's Orchestra.
*WHN—NEW YORK CITY—360
2:15 p. m.—Henny Cogert, Chas. Hirst songsters.
2:30 p. m.—Britt and Frinch, singers.
2:45 p. m.—Tom Banks's orchestra.
4 p. m.—Ellen Montague Cross concert.

2:46 p. m.—Solos, by Mme. M. Blazejewicz
Ullman, pianist.
2 p. m.—Talk, by Ralph Morgan.
3:30 p. m.—Elizabeth Niemeyer, soprano.
3:46 p. m.—Solos, by Mme. M. Blazejewicz-jewicz-Ullman.
6:15 p. m.—Agnes Leonard, songs for children.
6:30 p. m.—'Man in the Moon' stories for children.
7 p. m.—Drucilla Harrington, reader and planist.
7:20 p. m.—Resume of day's sports.

**WOO—PHILADELPHIA—509
11 a. m.—Organ recital.
12 noon—Luncheon music.
4:46 p. m.—Grand organ, trumpets.
7:30 p. m.—Sports results; police reports; dinner music.
8:30 p. m.—Sports results; police reports; dinner music.
9:16 p. m.—Grand organ recital, Harriette G. Ridley; Gertrude Schultz, contraito.
10 p. m.—Dance program, Candelori's Orchestra.
11:03 p. m.—Continuation of dance program.

*WFI—PHILADELPHIA—395
1 p. m.—Meyer Davi's Concest Orchestra.
2:30 p. m.—Bilde Montague Cross concert.
4:15 p. m.—Ble Montague Cross concert.
4:15 p. m.—Ble Montague Cross concert.
4:15 p. m.—Ble Montague Cross concert.
4:15 p. m.—Ellen Montague Cross concert.
4:15 p. m.—Ble Montague Cross concert.
4:15 p. m.—Ellen Montague Cross concert.
4:15 p. m.—Ellen Montague Cross concert.
4:15 p. m.—Ble Airanyossy, violinist;
5:40 p. m.—Catello's entersiners.
5:30-7:30 p. m.—Cloctt Vail's Trio, Paul Specht's orchestra.
7:30 p. m.—Philip J. Cortesi, tenor; John B. Cole, planio.
8:46 p. m.—Houvelville stars.
9:16 p. m.—Bled Montague Cross concert.
4:15 p. m.—Halex Aranyossy, violinist;
8:20 p. m.—Catello's entersiners.
8:20 p. m.—Catello's entersiners.
8:20 p. m.—Heyer Refith's harmonists.
8:20 p. m.—Philip J. Cortesi, tenor; John B. Cole, planio.
8:46 p. m.—Philip J. Cortesi, tenor; John B. Cole, planio.
8:46 p. m.—Hilly Manis Allerian Special Mallrom orchestra.
9:16 p. m.—Bled Montague Cross concert.
1:17 p. m.—Wester Hall Maringher.
1:18 p. m.—Illem Montague Cross concert.
1:19 p. m.—Bled Morgan Cross concert.
1:19 p. m.—Bled

C. E. Park, violinist; C. H. Haughn, planist.

8:15 p. m.—Bible questions and answers by Judge J. F. Rutherford.

8:45 p. m.—I. B. S. A. Trio.

*WOR—NEWARK—405

7:15 p. m.—Resume of day's sports.

8 p. m.—Lilyan Mae Challenger, contraito.

8:15 p. m.—Vascha Fishberg, violinist.

8:30 p. m.—Orchestra of the S. S. President Harding.

9:16 p. m.—Lilyan Mae Challenger, contraito. traito.

9:30 p. m.—Yascha Fishberg, violinist.
9:35 p. m.—Talk by Robert Wilderfore
10 p. m.—Ben Friedman's Entertainer
*WFI—PHILADELPHIA—395

p. m.—Fairmount Park Symphony Or-chestra; musical notes by Samuel Lacier.

*WIP—PHILADELPHIA—509 chestra.
6:05 p. m.—Kentucky Serenaders.
7 p. m.—Bedtime stories.
8 p. m.—Comfort's Philharmonic Orchestra.
8:45 p. m.—'What Wild Waves Say.''
8:50 p. m.—'Vessella's Concert Band

*WHAR_ATLANTIC CITY—275 2 p. m.—Orchestra selections.
7:30 p. m.—Dr. Grafton Tyler Brown on
"Asthma and Hay Fever."
8 p. m.—Orchestra selections.
*WCR—BUFFALO—319 12:30 p. m.—Organ recital, *WGY—SCHENECTADY—380 10:36 p. m.—Dance music, Joseph A. Chickene's Orchestra.

WBZ—SPRINGFIELD, MASS.—337

7:30 p. m.—Bedtime story,
7:40 p. m.—Concert Hotel Kimball Tric
9 p. m.—To be announced. 3:15 p. m.—Westminster Roof Garden

chestra.
9:30 p. m.—Copley Plaza ochestra.
*WPAR—PROVIDENCE—360
1:05 p. m.—Bittmore orderstra.
7:10 p. m.—Musical program
*KDKA—PITTSBUKGH—326
7:45 p. m.—Helps to teachers of

classes.

3 p. m.—Baseball scores.

3 p. m.—Westing house Band.

*WCAE—PITTSHURGH—462

7:30 p. m.—Uncle Kaybee; scores.

9:30 p. m.—Musical program.

WRC—WASHINGTON—469

"Dance Drogram. p. m.—Dance program.

145 p. m.—Musical program.

WHAS—LOUISVILLE, KY.—400 7:30-10 p. m — Concert by Carolyn Pell.
WMC—MEMPHIS—500
9:30 p. m.—St. John's Male Quartet.
WCX—DETROIT—517
6 p. m.—Dinner concert.
WWJ—DETROIT—517
7:30 p. m.—Schmeman's Concert Band.
KSD—ST. LOUIS—546
9 p. m.—Missouri Theater Orchestra.
WOC—DAVENPORT—484

10 p. m.—Orchestra program.

KYW—CHICAGO—536

KYW—CHICAGO—536 KYW-CHICAGO-536

8 p. m.—Musical program by artists.

9 p. m.—Talk, by Vivette Gorman.

9:05 p. m.—Short stories, articles; hur
ous sketches.

WLS—CHICAGO-345 WLS—CHICAGO—340
7:45 p. m.—Lullaby time; farm sumfhary;
national barn dance; Husk O'Hare's College Inn Orchestra.
WMAQ—CHICAGO—448
a. m.—To be announced.

Arne 7:30 p. m.—Plano and concert selections. 9:30 p. m.—Stories; soprano and dance selections. 11:30 p. m.—Tenor and dance selections.

World Radio History

radio power from your Cuffent

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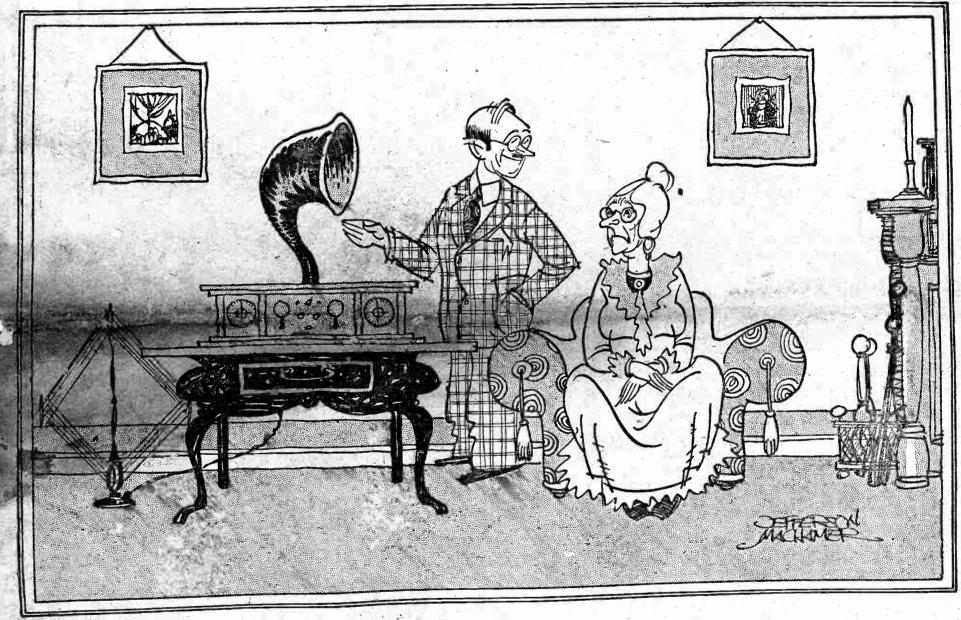
SECTION SIX

SUNDAY, OCTOBER 11, 1925

Mr. Bink's Radio

The Author Discusses Feelingly the Different Types of Radio Fans and Radio's Effect on Grandma and Caesar, the Wailing Dog

By ELLIS PARKER-BUTLER
Author of "Pigs Is Pigs," Etc.



thing when radio became no longer a mere knit-sweater affair but could be bought in a box and brought home like a dozen fried oysters or a pint of ice cream.

By "knit-sweater affair" I mean that sort of radio that comes through the air with a message that is about as interesting to the average man as is the page in the women's magazine telling how to knit a sweater. You know how that goes -"Knit four, purl three, skip one, knit two, purl three, skip two-" and so on for line after line.

The old-style radio used to come-and still comes that way. "Dah-he-de-dahdah-de-dah." "Code," is what the technical fellows call it, and it still spits in your ear now and then when you are trying to hear Patagonia or Peru or Peoria.

The "spitter" we have most of here near New York is the one Mr. Binks calls "Navy Yard." Whether it is the Navy Yard or not I don't know, and—as far as that goes neither does Mr. Binks, but that is what he calls it.

The Navy Yard if it is the Navy Yard and if you have Mr. Binks's sort of "takehome-a-radio-in-a-box"-lurks at the far side of the dial. The concerts are mostly

then "Navy Yard" gets lonely at the far side and comes sneaking over to the concert-and-lecture side, but it knows it does not belong there and it says "dah-de-dedah" in a faint little voice and goes away again. Then, sometimes, Mr. Binks says -to show off, perhaps-"That's Navy Yard," and, just to show you, he swings his dial hand to the far end of the dial and "Navy Yard" is right at home there.

"ZANG — ZANG — A — ZANGY — ZANG!" "Navy Yard" shrieks then, spitting sharp pointed gravel into your ear as if shooting it out of a machine gun at three yards' distance, and Mr. Binks grins and says:

"That's Navy Yard, sending code. May be talking to a battleship in the Indian Ocean or the China Sea. Strong, ain't it?"

Then Mr. Binks shifts back to the near end of the dial, and you get: "-tull Annie Laurie, I wuh-hu-hud-la-hay-me-he dowhoun-un-hund dee," or, faint and far, that beloved refrain: "'The-e At-lan-tah Journall.' Dong-dong-dong!" or, from Ridgewood, the cheery announcement: "The next-number on our program, played by the Hit-'Em-in-the-Eye Jazzbo Six, of Brooklyn, New York, is the 'Don't-Bite-Your-Garter-If-You - Have - False - Teeth'

For radio has become all things to all men. You can tune in at one white line on your dial and be asked to support the

T WAS, unquestionably, a wonderful | at the near side of the dial. Now and | ing irons to the suffering natives of Zan- | L. I., and hear a tiny, squeaky little voice, and hear "And little Tootsie took the hand of the great big bear and went into the wood-chuck's house." or move to the next white line and hear "This is WVJ signing off. One minute, please. Good-night!" You can hear anything from a symphony orchestra of 300 pieces to a frightened amateur playing "Dood-dah, doo-dah," on one of these jewsharps that bites the tongue that caresses it. It's wonderful.

And Mr. Binks thought so. Mr. Binks was an enthusiast. It is one of the amazing things about radio-in-a-box that every one who possesses one is an enthusiast. A man can buy a phonograph or a grand piano or an elephant and be quite calm and normal about it. He can say "Yes, this is my elephant. He's fair to middling. He isn't a Jumbo, by any means, but I'm rather fond of him in some ways," and let it go at that, but for some reason a man can't own a radio-in-a-box without getting all keyed up and excited and telling his neighbors and-in a general way-behaving as if he had discovered the moon and had to call everybody to come and see it, and brag about it, and feel fussed if any one seems to think it isn't a perfectly wonderful moon and the greatest thing ever discovered. That's the kind of enthusiast Mr. Binks was.

And that is all right, too. It is a wonderful thing to sit down and turn a couple movement for supplying second-hand curl- of knobs in your own home in Westcote,

cake of very hard ice, say "This is Kansas City." But-I ask you, as man to man, is a man who happens into a shop and buys a radio outfit as he would buy a pound of cheese entitled to swell up and strut around as if he had invented radio and patented it and given it alone and unaided to a waiting world? The answer seems to be "Yes." The ayes have it, so to speak. That is just what a man does seem entitled to do and feel. That's how I did and felt about the box of radio I brought home. Until Binks bought his and swelled and bragged and jawed until was ashamed of him.

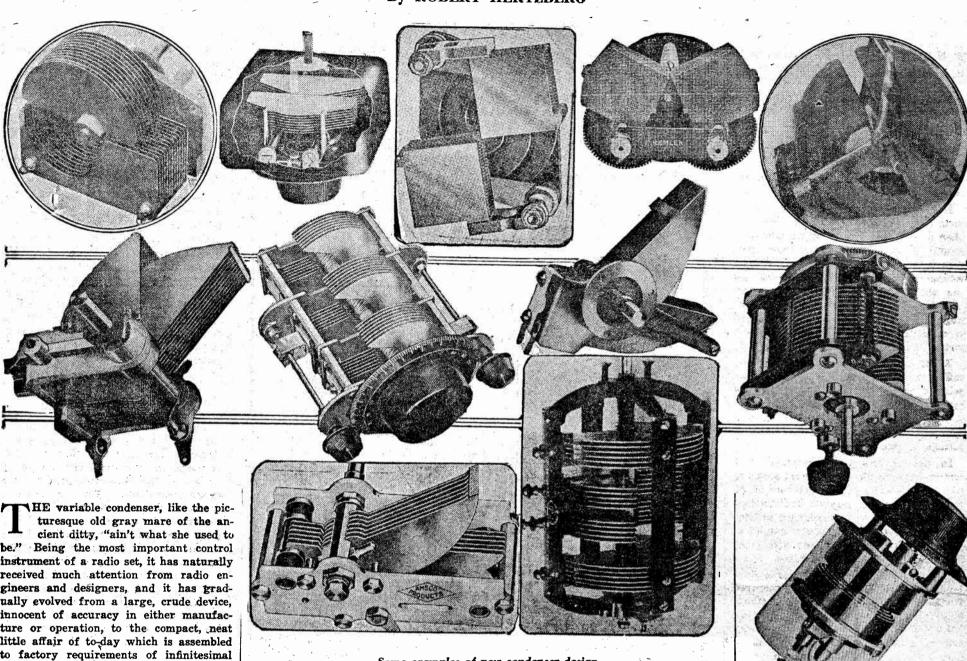
Yes, nearly all the men I know are that way about radio—except one. Dodson Bates is different. Dodson Bates is a stout, red-faced man, and he has one of these small, wiry wives that I call pinprickers. Always pricking and prodding otherwise comfortable husbands to do this and do that. And for twenty-three years. every Sunday morning, just when Dodson Bates had settled down with the Sunday newspapers, his wife would begin prodding and pricking him to get ready to go to church. For twenty-three years, every Sunday morning, Dodson Bates did go to church, too, and sat in the pew fighting to keep his eyes open during the long sermon, and suffiring as only a man does

(Cont ued on page six)

Interesting Information on the Mechanical **Evolution of Variable Condensers**

New Types Employ the Same Fundamental Principle of Construction, but Are Greatly Improved

By ROBERT HERTZBERG



be." Being the most important control instrument of a radio set, it has naturally received much attention from radio engineers and designers, and it has gradually evolved from a large, crude device, innocent of accuracy in either manufacture or operation, to the compact, neat little affair of to-day which is assembled to factory requirements of infinitesimal thousandths of an inch, and which operates with uncompromising precision. Just how much it has been improved and rethe instruments available on the market at the present time.

types, for the total number of instruments is great to the point of confusion. They all display the same fundamental idea in construction; that is, the employment of two adjacent metal surfaces closely spaced in air or other insulating material, but not actually touching, and with some means of regulating the total active area of facing plates; however, the effect is achieved in four different mechanical fashions, so each must be considered individually.

The first system involves the use of a closed saucer of molded insulation, divided into two sections by means of a sheet of mica. Small wells in the sides of the disk hold mercury in such a fashion that when the knob of the device is turned the two portions meet each other but remain unmixed because of the intervening mica. The more mercury in the facing wells the greater the capacity, and vice versa.

This particular type of condenser is mentioned only as a matter of interest. Being highly sensitive to jars and other vibratory disturbances, it never was a success, and enjoyed but a short-lived vogue about two years ago.

The Tube Type

The second type makes use of round metal tubes, usually brass, telescoping into each other, but not actually touching. The larger tube remains stationary, while the other, arranged on a suitable slider. rack and pinion, or screw, travels in and out of it. the capacity increasing as the two tubes engage and decreasing as they separate. This is known as the "Billi" type of condenser.

Condensers of this type were widely used many years ago on ship radio receivers. but it was not until within the last few months that the construction was applied to broadcast apparatus. There is now being made a very novel and unusual condenser embodying the principle. How-

employed, there are two brass spirals, wound up like the springs of a clock; one fined can be seen from an examination of | is fixed to the frame of the instrument, and mounts against the back of the panel in actual service, while the other is at-It is necessary to classify the various | tached to a round plate which allows it to mesh and unmesh with the first spiral by means of a heavy screw passing through the centers of both springs and out through the front of the frame.

> The device incorporates the straight line frequency principle and a 350 degree dial: that is, the movement from minimum to maximum capacity is made through a complete turn of the dial instead of a half, giving a fine vernier effect. The action is smooth and free of back-lash, the weight of the moving member being perfectly balanced.

The third classification embraces the 'book" type. The designation is derived from the fact that the active metal plates, instead of meeting each other with surfaces parallel and in the same plane, fold together like the leaves of a book. There are only two plates, one fixed in such a manner that it is at right angles to the panel when the condenser is mounted, and the other moving on a hinge and opening away from the far edge of the first. The position of the adjustable plate is controlled by a heart-shaped cam operating against the tension of a spring which tends to keep the plates separated. The capacity varies inversely in proportion to the distance between the plates.

The book-type condenser is extensively used by one of the largest radio manufacturers in the country. It works effectively and is both cheap and simple in construction.

The fourth category is by far the most important, as it comprises the majority of the condensers made to-day. It is the meshing plate class, and in it are found scores of instruments of interesting

In its oldest and most common form the meshing plate condenser consists of two spaced stacks of semi-circular metal

ranged in such a fashion that its plates enter between the fixed plates, but at no point touch them. The capacity is thus varied simply by turning a knob attached to the end of the round shaft. The stator plants are clamped between two heads of some insulating material like hard rubber or bakelite, which also serve as bearings for the protruding ends of

In this elemental form the meshing plate condenser has survived through twenty years of service, a record which in itself is proof of the design's general desirability. It is still giving good service, but it has undergone extensive mechanical improvement, as the following description | the knob is turned the two gears move in of some of the 1926 models will indicate:

First there is the grounded frame "lowloss" type. This species is instantly recognizable because of its all-metai frame and usual skeleton appearance. The entire support of the instrument is of metal, the stator plates being insulated from the rotor and the rest of the metal work by means of small pieces of insulating material strategically placed at such points where the electric "field" of the condenser is weakest and least troublesome.

Mechanical Schemes

The number of these condensers is legion. A thick book could be filled with the details of the various ingenious mechanical schemes devised by the engineers to hold the parts together. One instrument is built inside a heavy Ushaped yoke, with a single small strip of insulation, preventing short circuit between the rotor and stator. A good many "low-loss" condensers are assembled betwen two skeleton work end frames, with the insulation inserted between the latter and the end plates of the stator unit. Several makes provide a single strong forward frame with a heavy forward bearing, and leave the back entirely open. Still another type is drum-like in appearance, with four-pronged end frames held together by four narrow strips of insulation, from which in turn the stator plates are suspended. Some condensers ever, instead of two straight tubes being | plates. One stack is stationary, while the | are limited in movement to a half circle,

have built-in verniers in ratios as high as 200:1. Some are equipped with balancing counter-weights. Some are built of brass, most of them of aluminum and one of silver-plated brass.

An important variation of the meshing plate condenser is found in the twin rotor type. Here there are two sets of square plates, both movable. In one make they are actuated by two meshing bakelite gears of equal size, one of which in turn is operated by a third small gear coupled to the external control knob. As opposite directions and either close or open the square plates. In a second the plates are actuated by short levers which travel in two grooves cut spiral shape in an insulating disk, the disk being revolved in turn by the outside dial. The spiral is of such shape that a movement of the disk causes a smooth opening or closing action on the plates.

360 Degrees Rotation

These unusual condensers provide 360degree scale movements, freedom from back-lash and absolute removal of "live" current-carrying metal from the panel and from the operator's hand.

In two other meshing plate condensers rotary movement of the plates is replaced by linear movement; that is, one set remains stationary, but the other slides in and out of it. In one of the instruments the plates are built at right angles to their mounting frame, with the moving ones next to the panel. A threaded shaft attached to the end of the latter plates passes through the center of a special knob threaded to receive it. As the knob is turned the shaft moves in and out. carrying the plates with it and thereby varying the capacity. In the other type the plates are parallel with the panel. The moving unit is operated by a rack and pinion system, the small gear

(Continued on page six)

Be Described by employ, for the listener to enjoy. "Thanks to radio I experienced con-

schedules of the important intercolnew technique A co-operative obto describe the Army-Notre Dame time with it." game, while McNamee will work with him in observing the details of the FREE! play.

Thermiodyne

GLØBE

Deresnadyne

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\$12 Wester Elèc, Loud Speaker Un

\$4.95

de forest

DV-5 Tube \$2.49

\$4 Frost Fones

2000 ohms

\$2.45

country

WEAF has the unique distinction of having two announcers equally capable of handling a sports assignment, and the advantages of having both on the scene are many. In the will be able to pick out the essential the ordinary observer who might be Dame game, Carlin will announce the to their destinations. Yale-Army contest, and so will be Although transmission across the

most builders of really line sets are mighty particular to install only the best transformers, regardless of price. That is why, year after year, they use more Thordarsons than all competitive makes combined. Follow their lead—build or replace with Thordarsons. Unconditionally guaranteed. Recommended by best dealers. Audio frequency: 2-1, 35; 34-1,34; 3-1; 34: 30. Power Amplify's, pair 313. Interstage Power Amp.; 33. Autoformers, 35. Write for Labert Building.

have an opportunity to clear this con- ing a Belgian amateur station, BK2,

Fear Radio Rivalry tric flatiron

Radio's role in furthering the cause of good music in America has won the praise of musicians.

Goldenburg, of Cincinnati, makes this wire becomes coated with soot, which broad statement:

less to fear from radio competition, that also causes losses. The wire I believe, than they seem to think used should be of the best grade The motion picture did not supersede copper. Stranded wire of the same the spoken drama. In fact, opinions size as ordinarily round wire is theoo the contrary notwithstanding, the retically better, but in actual receivtheater of America never has thrived ing practice it is hard to tell its suas it does to-day, in spite of the in- periority. Teaming number of houses devoted clusively to the silent drama. Mr. Goldenburg, in a letter to the Freed-Eisemann Radio Corporation,

> "Vocal and instrumental virtuos who broadcast frequently will find their prestige heightened, their clientele surprisingly widened, when they go on tour. The legion of radio listeners constitutes a potential army of music lovers. Through appreciatory development, accomplished via radio, they may be attracted to the concert

further states:

"Radio broadcasting never will take the place of the concert hall, for nothing can quite compensate for the loss of personal contact with the artist, but radio can be made a great educational factor in the cause of music; the quality of radio entertainment can be raised to a high artistic standard that will entitle it to the consideration of serious-minded folk who prefer cultural entertainment to trivial amusement. That this purpose is nearing consummation cannot be doubted when such artists as Reinald Werrenrath sing for millions of radio fans.

"The messages of the great composers of music, heretofore available only in the larger cities, by means of radio now reach into the remote places. Through hearing such concerts as that which was broadcast Sunday night, millions of listeners, unacquainted with fine music, are laying the foundation of a liberal

Football Games To musical education. Radio is just and New Booklet for the other instrument for the artist to New Booklet for the

Carlin, McNamee cert hall enjoyment in my own drawing room, and I heard a great artist An interesting contribution to curips Carlin and Graham McNamee, a thing as a miracle, but radio ap- page booklet by the King Quality the soul. From a critic it is an ad- from the pen of Frank A. Hinners

serving and ann/uncing. On Saturday, October 17, beginning at 2:45 tion that interests me. Radio is does not confuse the mind of the lay p. m., Phillips Carlin will be at the reaching out into the lofty places reader with any discussion of the where I shall hope to spend much less important details in improve-

L. I. Amateur Gets

first place, since both are experienced den City, N. Y., using only a single booklet is published in convenient announcers and know what is neces- five-watt transmitting tube, received pocket size and is for free distribusary for a vivid description of the and acknowledged a long message to the King Quality Products, Inc., game, the one acting as observer from Commander S. C. Hooper, former Rano Street, Buffalo, N. Y. Director of Communications, United States Navy, from the U. S. S. A new insignia for United States carried away by the excitement of Seattle off Tahiti, a distance of ap naval radio electricians, until recently the game or by a feeling of partisan-ship. Next, since each will see all the games on WEAF's schedule, the ment made public last week. After adopted for uniform wear, familiarity and knowledge of the relaying Commander Hooper's mesteams will grow accumulatively with sage, directed to a friend in Boston, each succeeding game. For example, the amateur station relayed additwo weeks after the Army-Notre tional messages which were forwarded

extremely familiar with the Army Pacific by amateurs is becoming a It is evident that the success of tion direct from the South Sea Isles the announcing will be practically de- to Garden City is unusual in two rependent on both men. The man at spects. Using only a single five-watt the "mike" will observe the distance tube, the acknowledgment traveled gained and the type of the play, 3,000 miles over land, as well as 6,000 while the observer will pick out the miles across the Pacific, a somewhat

at Brussels, while the American station was using but five watts of Musicians Need Not power, which is but one-fiftieth of 5-TUBE MASTERTONE SET COMPLETE the energy used by the average elec-

Enamel Aerial Wire Enameled aerial wire has been proved by many tests to be the best The composer-critic, William Smith for use in building aerials. Bare causes certain electrical losses, and "Professional musicians have much fabric-covered wires absorb moisture

> Life of Storage Battery When handled with care a storage battery should last at least five or six years.



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Radio Amateur

The WEAF twin announcers, Philmiles distant. There may not be such made in the publication of a twentylips Carlin and Graham McNamee, proaches close.

What is a proaches close.

Products Company, of Ruffalo. It is proaches close.

"An honest confession is good for called "The Radio Quest," and comes of the perfect reproduction qualities of legiate football games, employed for mission signifying a change of heart, member of the Institute of Radio legiate football games, employed for the first time in sports, announcing but I freely repeat, and without Engineers. In the booklet Mr. Hineux technique A cooperative obradio broadcasting and reception steps that have been taken in the

> number during the last few years. The booklet is intended primarily for the amateur, and the man who South Sea Island has only the vaguest idea of how reception comes about, with the more important principles. Technical terms Amateur radio Station 2GY, of Gar- and descriptions are avoided. The

OUR radios contain features peo-ple demand

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while the observer will pick out the name of the man carrying the ball, the opponent who tackles him and the other details necessary for a clear understanding of what is going on.

Phillips Carlin, whose description of the Davis Tennis Cup Matches last year, and one of the football games, demonstrated his ability as a sports announcer, and whose voice is familiar to hosts who have heard the Happiness Candy Boys," "Ipana Troubadours," the "Bossert Voyages" and other WEAF features, has a voice which the casual listener often confuses with Graham McNamee's. In this series of games the listener will have an opportunity to clear this confused with a large of the man carrying the ball, more difficult feat than transmission tenters and entirely over water.

Station 2GY is powered with heavy clear the pattery using Editors of the great difficulties in very short the great difficulties in very s

BIGGEST SENSATION IN RADIO One Year Written Guarantee

ncluding: Set in solid Walnut or Mahog-my cabinet, 5 201-A tubes; A and B bat-eries; loud speaker; aerial equipment— lothing else to buy! Demonstration Cheerfully Given

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PARTS CARRIED IN STOCK. WHOLE-BALE AND RETAIL SEND FOR LITERATURE. ROMCO STORAGE BATTERY CO., 146 WEST 68TH ST. PHONE TRAFALGAR 5826.

new dial arrangement, giving correct time one-half world; ornaments most beautiful sets; know when to tune in, no guessing; Waterbury clock; by mail, 35. Agents wanted; send for literature, G. B. Gardner, 923A Hutchinson Court,

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AMBASSADOR, 4 Tube, 1 Tuned R. F. \$25,95; 3 Tube, \$17.95, with tubes, cabinet. Edzin Radio, 675 6th Ave. Chick. 10385. Open evenings. Sundays.

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FREED-EISEMANN 5 tube, home-built set, perfect condition, wonderful selec-tivity and distance. Make offer, Y 101, Herald Tribune Bidg.





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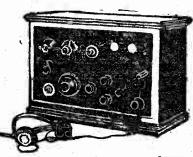
We advertised 1,400 sets of type 110 Federal Receivers in this newspaper the past few weeks. EVERY SET WAS SOLD.

SET WAS SOLD.

Here's a bargain that is even more remarkable. Type 59 Federal Set. hard—a very hard job getting
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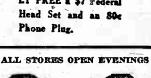


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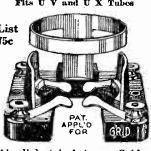


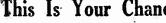
Plate prevents formation of closed circuit, absorption of Current, in tercoupling of circuits and reduces undesirable capacity to a mini-mum—resulting in more stable circuit—sharper t u n i n g—clearer

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Improper Arrangement of Parts Results in Poor Selectivity

S. L. F. Condensers Improve Tuning; Ratio of Coils Length and Diameter Important; Methods of Eliminating Body Capacity Effects

H. N. Henderson-What will cause / Answer-In no case is one allowed a radio receiver to have poor selecto use a transmitting set without a tivity and operate poorly in general? license. Two licenses are required. Answer-There are many possible One for the station and another for reasons why a set will not function the operator. The former gives the properly, most of which lie in the station a legal call, while the latter general layout of the apparatus. One insures that the station is in compeof the most common faults in con- tent hands while on the air. Further struction of the home-built radio information may be obtained from receiver is the improper location of the Radio Supervisor's office at the

First, we have the home-built coil, which usually has a far greater diamelarge diameter usually have a large covering the entire broadcasting external field. The field of such coils range? will usually come in contact with some other instrument that has tenna coil should have about thirty To obtain the tuning accurnothing to do with the field of the turns wound on a 21/2-inch diameter. coil, such as a variable condenser. The secondary should consist of about This results in stray currents flowing sixty turns wound on a 3-inch diamabout the circuit of the receiver in eter tube. For covering the broad- densers. places where they are not desired. casting range, if this coil is of the

It seems to be the general opinion denser (.00035 mfd) should be emthat the proper ratio between the ployed for tuning. The tickler coil length of the winding of a coil and should have about fifty turns of fine the diameter should be between 1:1 wire wound on a 21/2-inch tube. The ratio and the theoretical ratio of coils should all be wound in the same 1:2.45. Coils having ratios between direction. For the primary and secthese two standards will not have an ondary No. 18 or 16 wire will answer extremely large field. Also by locat- the purpose. The tickler need not ing the coils and instruments in the be a low loss coil and No. 30 wire set two or more inches apart stray will therefore suffice for this purcurrents may be reduced to a mini- pose. The tickler should be variably mum. Incidentally, such placing of coupled to the secondary. Although SAN FRANCISCO CHICAGO NEW YORK the apparatus will greatly reduce it is not necessary, the primary coil "body capacity" effects.

construction of home-built radio re- is possible to obtain more selective ceivers is trying to cramp the instru- tuning. ments in small quarters and the use of metal fixtures for the mounting. A safe rule to follow is keep each piece of apparatus at least two inches of a blocking condenser in the radio or more away from its neighbor. receiver circuit? Coils and other inductances in the radio-frequency circuit should be placed as far to the rear and away from other pieces of apparatus as age battery current. These conden-

F. J Watson-What advantages are not a part of the tuning circuit. gained by the use of straight-line requency variable condensers for

tuning a radio receiver? Answer-The main advantage of this type of condenser is that it does not crowd stations operating on the lower end of the broadcasting range should one shield be employed for in a few degrees on the condenser the entire receiver? dial. In other words, it broadens the tuning on the higher frequencies. receiver will reduce hand capacity ef-The reason for this is obvious. At fects to a minimum. It has, however, the high end of the scale of the been found that in a well designed broadcasting band of wave lengths and constructed set, hand capacity there are fewer kilocycles to the effects are absent. meters or thereabouts.

Coil Ratio

ratio between the length and diameter of a coil for maximum value of inductance?

the ratio between the length of the a regenerative receiver if the stacoil and the diameter is theoretically tionary plates are insulated and the 2.45 to 1. However, it seems to make rotary plates grounded to the frame little difference whether the coil is of the instrument? exactly this ratio in actual practice. Answer—In a condenser of the with a ratio of 1:1, while others with a ratio of 3:1. For ordinary radio broadcasting purposes a coil between

Secondary Tuning

G. B. Gray-What capacity variable condenser should be employed for tuning the secondary of a three-circuit tuner?

Answer-The proper size of a condenser depends largely on the type are coupled by induction. That is, of coil with which it is used. A well two coils are placed in such a mandesigned coil may be made to cover ner that the external field of the coils the broadcast wave bands with intersect and thereby causing induc-.00035 mfds condenser connected in tion between the two. Conductively shunt with it, while a poorly designed coupled circuits are those which are coil may require a condenser of coupled by a direct connection. .0005 mfds for the broadcast band. A typical example of the forme capacity will suffice.

Transmitting Regulations to construct a small transmitting set is the single circuit receiver. The and operate it while he is learning antenna and grid circuits are both

Coil Data

Custom House, New York City.

Answer-The primary coil or an-As a result poor tuning is obtained. low-loss type, a 17-plate variable conmay also be variably coupled to the Another mistake often made in the secondary. By coupling this coil it

> The Blocking Condenser H. C. Kent-What is the purpos

Answer-This condenser allows the passage of radio frequency currents, but breaks the circuit for high voltsers usually have a capacity greater than .001 mfd and may be fixed. There is no advantage in having them Straight-Line Frequency Condensers variable, as this condenser is usually

Capacity Effects

G. L. Smith-Will metal shielding eliminate capacity effects in a regenerative receiver? Should each in strument be shielded separately or

Answer-A metal shield in a radio

meter than at the low end of the Either of the two methods in the Inasmuch as selectivity is above question will accomplish the based on kilocycle variation, it is not purpose. In either case the shields difficult to see that the straight-line should be connected to the ground frequency condenser would tend to terminal of the set. It must be rebroaden out the number of degrees membered that shielding in a rebetween stations operating on 250 generative receiver tends to increase the capacity between the ground and the instruments, with a result of a slight sacrifice in efficency.

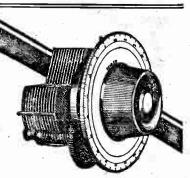
K. V. Fisher-Should the stationary or rotary places of a low loss variable condenser be connected to Answer—For maximum inductance the grid terminal of the detector of

above design when used to tune the secondary circuit of a regenerative receiver, the stationary plates should these two latter ratios will operate rotary plates to the grid return to be connected to the grid, and the the filament of the detector.

Coupling H. N. Kreger-What is the difference between inductive and conduc tive coupling?

Answer-Just as the name implies. inductive coupling is where circuits

However, in most cases the former type of coupling is the primary and secondary circuit of a three-circuit tuner. The antenna (primary) is coupled to the grid circuit (second-D. M. Walters-Is a novice allowed ary). An example of the latter type tuned by means of the same coil.



Closer **Tuning**

W. L. Nash-What size should the Closer tuning gives the dister than necessary. Coils with a coils of a three-circuit tuner be for tance and the selectivity which mean so much in radio reception.

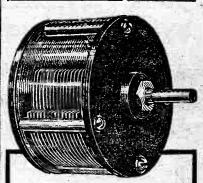
> acy you want, you should use Remler Twin-Rotor Con-

Type 630 Maximum .00035 Type 631 Maximum .0005

Complete with Dial

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Something New in Audio Frequency Amplification for Radio Reception

The Author Claims Complete Absence of Distortion When Receiving From a High-Class Station

By A. DINSDALE Member, Radio Society of Great Britain

N THE early days of broadcasting in this country the craze among broadcast listeners was all for noise, and yet more noise, the quality of reproduction receiving no attention at all. Happily, these days are over. Nowadays every one strives to improve the quality of his reception, so that the output of his loud speaker shall resemble as faithfully as possible the input sounds at the microphone end of the circuit.

In an endeavor to achieve this end all sorts of corrective devices have been applied to the usual forms of transformercoupled A. F. amplifiers, and tubes have been worked well within their limits-i. e., volume has been reduced. Extensive use has also been made of resistance and capacity as a means of coupling A. F. stages, for, as is well known, this method of coupling introduces no appreciable distortion if properly arranged and handled.

Resistance-capacity coupling, however, suffers from the disadvantage, from the point of view of the impecunious, that the same degree of amplification per tube cannot be obtained as with transformer coupling, and a higher value of B battery voltage is necessary.

In view of the above remarks, it is strange that no particular effort seems to have been made by manufacturers of A. F. transformers to produce a distortionless instrument, or by designers to produce some alternative means of amplification which will combine purity with great volume, using a minimum of tubes.

Great advances have been made in England, both in the matter of improved transformers and in alternative methods of amplification, and in the present article the writer will endeavor to describe a very promising A. F. amplification circuit.

Pierce's Trigger Circuit

The underlying principles of the new circuit are covered by two British patents, one being due to G. W. Pierce and the other to E. W. B. Gill. Pierce's original circuit is shown in Fig. 1, and Gill's modification of it in Fig. 2.

Referring to Fig. 1, it will be seen that the method of coupling the two tubes is by means of a battery, the positive terminal of which is connected to the plate of the first tube, while the negative terminal

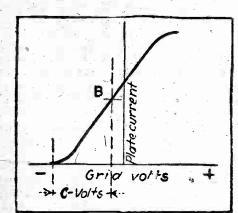


Figure 5—The characteristic curve of the second tube prior to the arrival of a signal. Point B is the operating point at a negative potential on the grid.

is connected to the grid of the second tube. Since the completed circuit of this battery goes through the plate-filament path of the first tube, the actual voltage applied to the grid of the second tube depends upon the conductivity of the first tube.

Thus, as signals arrive on the grid of the first tube, varying its conductivity, so the potential applied to the grid of the second tube is varied, and corresponding changes of plate current occur in its plate circuit, and, consequently, in the telephones connected therein. In this way, therefore, it will be seen that a kind of trigger action results, the incoming signals impressed on the grid of the first tube producing effects which cause great changes in the plate current of the second

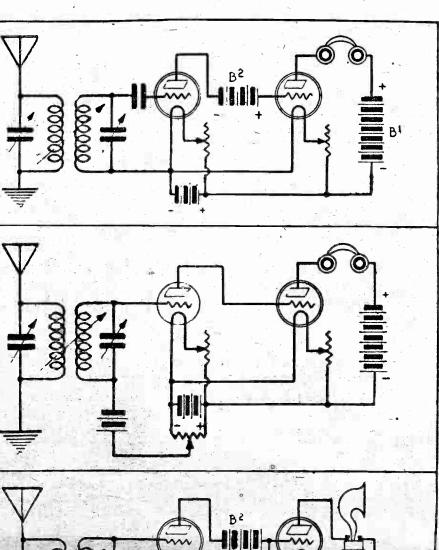


Figure 1-Top: Pierce's original circuit. Figure 2-Middle: Gill's modification of the circuit shown in Figure 1. Figure 3-Below: The circuit combining the trigger action with the limiting action.

Gill's circuit, shown in Fig. 2, is very siderable success, and is therefore of insimilar to Fig. 1, the only differences be- | terest to all readers of an experimental ing that the battery between the plate of the first tube and the grid of the second has been eliminated, and potentiometer control of the grid of the first tube has

The important point in connection with plate current of the second tube is reduced. This follows because, as the conductivity of the first tube is increased, so the grid of the second tube becomes more negative, and all users of negative grid bias know that increasing the biasing voltage results in reducing the plate cur-

Prince's Modification

A circuit combining the trigger action of Pierce's circuit with the limiting action of Gill's circuit is due to Major C. E. the first tube is made less negative, and if Prince, and is shown in Fig. 3. This cir- the signal is sufficiently strong the tube cuit has been used on telephony with con-

turn of mind. The theoretical considerations of the circuit are as follows:

We will assume that the grid of the first tube (Fig. 3) has been made sufficiently negative by means of the potentiometer and grid bias to render the tube this circuit is that as the voltage on the non-conductive. This means that the battery B2 is open circuited. The grid of the second tube is, therefore, to all intents and purposes, free and will have impressed upon it some fairly high and steady value of negative potential, the exact value of which will depend upon the characteristics of the tube in use.

Under such conditions, prior to the arrival of any signal, a certain value of steady current will flow through the plate circuit of the second tube, and this is really the "normal" plate circuit.

Upon the arrival of a signal the grid of will be made conductive, as far as the bat-

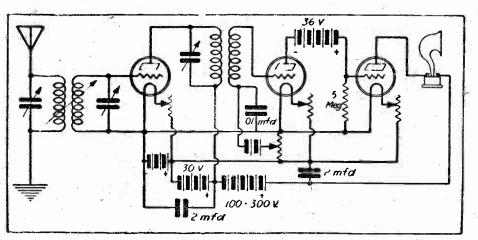


Figure 6-A three-tube circuit which has one stage of R. F. amplification

tery B2 is concerned. A current from B2 will flow through the circuit, and the effect of this will be to greatly increase the negative potential on the grid of the second tube. This large increase in negative bias will cause a correspondingly large reduction in the plate current of the second tube.

The action of the two tubes is shown graphically in Figs. 4 and 5. In Fig. 4 the point "A" on the characteristic curve shows the condition of the first tube when the grid is initially made negative prior to the arrival of any signal.

Fig. 5 shows the characteristic curve of the second tube, "B" being the operating point at the negative potential obtaining on the grid prior to the arrival of a signal. When the first tube is made conductive by the application of signal voltage to its grid an increase of "C" volts in the negative bias impressed on the grid of the second tube will cause the plate current to drop to zero, as shown.

Choice of Tubes Important

The trigger action of the circuit can easily be comprehended when it is considered that with the normal currents carried by the first tube (i e., when no signal is arriving) the plate-to-filament resistance is comparatively low in comparison to the filament-to-grid resistance of the second tube. Thus, as soon as the first tube becomes conductive practically the full voltage of the battery B2 is applied between the filament and grid of the second tube and its plate current falls to

It is therefore possible by this means to arrange for a reduction in plate current which will be many times greater than any plate current change which could be effected by applying the original signal voltage directly to the grid of the second

It necessarily follows, then, that in order to obtain maximum results the normal plate current of the second tube should be as large as possible. It follows also that since at the end of each signal impulse the grid of the tube will be left with an excessive negative charge upon it means of escape must be provided, so that the grid shall immediately return to a fit

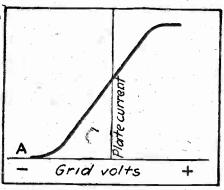


Figure 4-Point A on the curve shows the condition of the first tube when the grid is negative before the reception of a signal

state to deal with the next signal impulse. This may be arranged by introducing a grid leak, as shown in Fig. 3.

It will be apparent that much of the success of the trigger action will be dependent upon a sharp and sudden change in the first tube from a non-conducting to a conducting state. This requirement can be met by employing a tube with a sharp bend at the bottom of the characteristic, and any tube designed to act as a detector answers this requirement. Naturally, the sharper the bend of the characteristic the better, and the sharpest bends can be obtained from soft tubes. A soft tube, therefore, is recommended for carrying out this particular function, while a small power tube (say 5 watt) is recommended for the amplification stage.

As the trigger of a rifle requires a certain definite minimum amount of energy to pull it off and release the enormous power contained in the cartridge, so does the circuit under consideration require a

(Continued on page four)

A Two-Tube Reflex Radio Receiver Which Will Not Howl

By Adding Audio Frequency Amplification Loud Speaker Volume May Be Obtained

By PETER MOMBELLO

OST reflex sets have failed to give satisfaction because no prosign of the coils to prevent howling when the set was in resonance. In cases where more than one tube was used, necessitating more than one circuit, the usual type of coils caused feedbacks, due to their stray fields. Naturally if it is possible to design coils having a very concentrated field, then interstage coupling, feedback and such troubles can be done away with. This is accomplished by the coils used in this set, the forms of which will make a very efficient radio-frequency set if two stages of RF are used. The constants, of course, will not be the same as those given for this set, but the windings

The astatic windings are used, the simple form of which is shown in Figure 1. This may be used if desired and a cardboard tube used as the form with a slot cut at the proper place. But for the most efficient results a combination of the basket weave and astatic windings is used, as shown in Figure 2. The coils in that case will be of the best low-loss type for

The coil winder used to make these coils must have an even number of pegs, preferably fourteen. This insures the same number of pegs on each side so that it will be the same as the basic winding using the slot in the cardboard tube. The winder should have an inside diameter

Method of Winding

The method of winding is clearly shown in Figure 2, but a little explanation is necessary. Start the wire at Point 1 and wind in the direction of the arrows. The

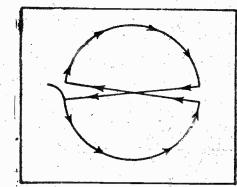


Figure 1-Simple form of astatic

method of winding is over two, under one, over two, etc., until the Point 2 is reached. Then the wire is passed to Point 3 and the process repeated, over two, under one, which the wire is passed to Point 1, thus | turns No. 20 DCC, there being only one ompleting one turn. At this point the econd turn must not coincide with the first, so that the wire is passed over only one peg, then under one, then followed by the regular process until the wire is stretched to 3. At this part there must

The relation between the secondary and the primary on the coils will depend entirely on the location in which the set is operated. If great selectivity is not needed the primary may be interwound not be any coincidence, so that the wire with the secondary. The No. 18 and No.

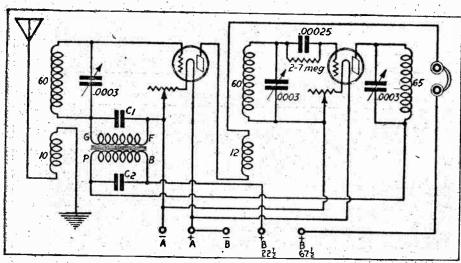


Figure 3—The wiring diagram for the receiver herein described

over two, etc., until Point 4 is reached, at | 20 wire are held together in the hand and goes over only one peg instead of two like the turn under it. This may sound complicated, but it can be very easily explained. When the corners 1 and 3 are reached, the builder should notice the previous turn. If the wire passes over two pegs in the previous turn, then he must make the next turn go over only one peg. Conversely if the wire goes over only one peg in the previous turn, then the next turn must go over two pegs. This principle is carried in every turn of the coil. If the wire inevitably conincides at the corner, then a mistake has been made in the round part of the coil in the fast turn. This method immediately checks up mistakes in the winding as soon as they are made. Even without practice this winding procedure is easy once the principle is

These coils have all the advantages of low-loss coils and they have the added advantage of a concentrated field so that no leakage can take place through several coils of this type when used in a set.

Constants of Coils

For use in this receiver three such coils must be made having the following constants as shown in the diagram in Figure 3. The first coil has ten turns No. 18 DCC wire on the primary and sixty turns No. 20 DCC on the secondary. The second coil has twelve turns No. 18 DCC on the primary, same number as the first coil on the secondary. The third coil has sixty-five

wound simultaneously. When the required turns for the primary are wound the wire is brought down temporarily to the bottom of the coil winder, and the secondary wire is continued by itself until its required turns are completed. This is the best method of winding, but for selectivity the primary and secondary must be wound by themselves and then separated by onehalf inch or more to obtain the required degree of selectivity. In this latter case

ings to give them support and maintain the separation. These pegs should be long and even so that the coils may be made to stand upright on the baseboard. The set as shown was designed for earphone reception, but a loud speaker may

a few wooden pegs are left in the wind-

tion is first added. The following parts will be needed to make the tuner alone. The best pieces of apparatus should be used throughout:

be used provided the necessary amplifica-

One pound No. 20 DCC wire, one-half pound No. 18 DCC wire. Three low-loss .0003 variable con

One audio-frequency transformer, 6:1

Two rheostats to fit tubes used. One panel, 7x18 inches; one baseboard

8x16 inches. Three medium ratio dials.

condenser and leak. Nine initial binding posts. Two sockets.

Two .002 fixed condensers. One grid

neat by putting one of the variable conon the extreme left and right of the panel. The two rheostats come on a lower level near the baseboard between the condensers. The coils are placed upright behind their respective condensers and as far apart as possible from one another. Care should be taken to see that the socalled "slot" in the astatic windings is in the same line for all the coils running from left to right, parallel to the plane of the panel. The two sockets are placed in a plane behind the coils and in a line with the rheostats. The audio transformer

The panel arrangement may be made

ward through the back of the cabinet. When wiring the set either large enameled copper wire or bus bar may be used. All battery connections should be made first. The grid and plate wires should-be as high up as possible and at right angles to each other. To avoid hand-capacity effects connect the rotor of the condensers to the low potential or

is mounted behind the first rheostat.

The binding post strip is placed in the

back center with the post pointing out-

If there is sufficient capacity effect between transformer windings, the removal of condenser C2 may sometimes improve reception. This should be experimented with. Condenser C1 is usually necessary

On the question of tubes for this set, the UV-199 are recommended because of their slight tendency to coscillate, due to heir small internal capacity.

When tuning the set, put the condenser across the plate coil at a reading between and 5 and slowly rotate the other two condensers simultaneously until a station

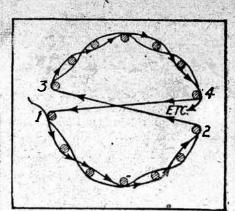


Figure 2 - Method of winding the combination astatic and basket-

is found. Then the value of the plate condenser is increased. Station may be logged on the first two dials. The last dial need not be logged, since this controls

Something New in Audio Frequency Amplification

certain minimum amount of signal energy to operate it.

As a rough guide to requirements, if a circuit similar to Fig. 3 is used without any regeneration or R. F. amplification, the signals delivered by the detector alone must equal in strength what may be termed "loud and clear" headphone reception on a crystal detector.

If signals are of a strength which make it possible to just distinguish speech without straining the hearing, then it will be necessary to add one stage of some form of R. F. amplification before the detector.

Signals which are barely audible on the detector alone will require probably two stages of R. F. to render them sufficiently strong to operate the trigger. It will therefore be seen that it is a good idea to arrange a phone jack so that phones may be plugged into the detector circuit as a guide in tuning, the grid of the second tube being temporarily shorted to the filament through the telephone windings.

Once the requisite minimum signal energy has been arranged for to operate the trigger, practically the only limits to the degree of A. F. amplification obtainable or 3 volts. are the capacity of the power bulb used . The potentials of the B batteries will as possible.

(Continued from page three)

and the value of the B battery potential. | also depend on the types of tubes used. This method of A. F. amplification may | The makers' stated requirements for the be applied to almost any existing receiver (tubes will give a very good indication of possessed by the reader. It is only necessary to cut out the A. F. portion, leaving the R. F. circuits as they are. In the detector circuit the grid condenser and leak should be eliminated or short-circuited during experiments, and a suitable type of | desired and the depth of the experimentdetector tube substituted for the one in er's pocket.

As pointed out above, the detector tube has to operate at, or very near, the lower | the battery B2. bend of the characteristic, and this bend should be sharp. To bring the operating point to the lower bend, negative grid bias may be applied, but a tube possessing a grid of very fine mesh will require less bias and will function better.

As a general guide to the method of arrangement, a three-tube circuit is given in Fig. 6 which has one stage of R. F. amplification, coupled in the orthodox manner. With a suitable detector tube the grid bias should not be more than 2

what is required, and small experimental variations on either side of these values will soon clear up these points. In the case of the power tube, the voltage required depends greatly upon the volume

An important matter requiring serious attention is the position and insulation of

This battery, it must be remembered, is in the grid circuit of the power tube, and on broadcasting wavelengths the capacity of this grid to ground, and also stray capacities from the battery B2, may cause paralyzation of the power tube before full advantage can be taken of the enormous amplification obtainable. Efforts to eliminate capacity effects should, therefore, be made, and also, in view of the unique position of the battery in the circuit, it should be well insulated from ground and connected to both tubes by as short leads

If, in operation, it is found that signals are so strong that paralization of the power tube results, this may be corrected by reducing the output energy from the detector circuit. De-tuning or dimming the detector filament will accomplish this.

Another way out is to alter the value of the power tube grid leak till a value is found which prevents paralysis. Alteration of the potential of B1 will also assist in achieving the same result. If the circuit is switched on for the

first time with a loud speaker in circuit it will very likely appear to be quite dead, and nothing will alter this condition till some station providing the correct amount of signal strength to operate the trigger is tuned in. For this reason it is advisable to tune in first with head phones in the detector circuit.

Once the correct adjustments have been found the circuit will suddenly jump to life in a most startling fashion.

Considerable experimentation may be necessary at first in order to find the correct adjustments of all the circuits and

(Continued on page six)

agencies in the past to encourage 1924 an increase of over 400 per people to visit the scenic centers of cent.

all, radio has instilled a deep interest and at the rate that orders are being Church Conference in Stockholm. He in their country and Denmark was and "Fatima," which, as their names in other places, and men and women entered it is believed that sales for who have had no previous desire to each of the next six months will show take trains and steamers are now a corresponding increase. anxious to see for themselves the 10- Although the company recently

calities from which they have heard opened a large new factory in the Bronx, New York, and another large "Thousands upon thousands of factory in Chicago, negotiations are radio listeners, who in the past have now under way to triple the present regarded Atlanta, Davenport, Detroit Chicago facilities. As soon as this and scores of smaller places simply latter arrangement is consummated as spots on the map," declares Joseph the company will use the Chicago fac-D. R. Freed, president of the Freed- tory for its central shipping point, Eisemann Radio Corporation, "are thus relieving the New York factories visiting, or will visit at first chance, of the burden of shipping to the Centhe cities in which the broadcasting tral states. Additional factories are stations they hear are located. So planned in the near future in San I assume from statements made to me Francisco and Toronto, Canada. by scores of friends who have de-

veloped an intensive desire to trave! Toscha Seidel's First Radio through hearing about these cities by Concert To-night From WEAF

Toscha Seidel, famous Russian vio-"California and Florida are, or linist, will be featured during the course, centers of special interest at second "Atwater Kent Radio Hour" all times, but radio has been of the and will play in the studio of WEAF utmost assistance in their drives to this evening from 9:15 to 10:15 p. m. bring Easterners and Northerners to This is the first time in radio histheir sunny skies. Any fan, almost tory that weekly concerts by Metrowill admit that he 'never heard of' politan Opera stars and other leading some of these towns which are now artists of the musical world have being so well advertised by radio. been given for radio broadcasting. Look at the roster of stations and The first concert was given the preyou will find places that in the past ceding Sunday evening by Reinald "This situation is a splendid thing tone. Werrenrath, famous American bary-

were unfamiliar names.

as 'the university of the air.'

WEAF, WEEI and WCAP.

Testing Batteries

should test at least 17 volts.

for the country, bringing all sections These recitals are exactly the same closer together in mutual admiration as would be given in a concert hall and respect. What we hear by radio with the artist playing several groups leads us to seek further information. of solos with piano or organ for acand thus we may truly regard radio companiment. On this evening Ar-"Just as most of us are keen to and organ. Mr. Loesser, besides acthur Loesser will assist at the piano find out, in early life, particularly. companying Mr. Seidel, will play two what the inside of a watch looks like piano solos. The chain of stations sometimes with disastrous results, so linked with WEAF for the broadcastpeople are not content to hear music from a distinct city, they want to age Washington; WJAR, Providence: WEEL, Boston; WCAE, Pittsburgh; WLWL to Shield Church From WOC, Davenport; WCCO, St. Paul-Field of Their Antenna Minneapolis; WGR, Buffalo, and The high resistance of the ground WOO, Philadelphia. connection at Station WLWL, the

Paulist League station in New York Radio to Get Hoover's Speech

City, has made it necessary to shield At R. R. and Utility Conference the church from the field of the an-The speech of Secretary of Com-This has been accomplished by the Public Interest Requires Local running a cable along the gable of Rather Than Federal Regulation of the church roof and at equal disthe Electrical Public Utilities" will tances down the side running strands be broadcast direct from the Hotel of No. 14 copper wire parallel to Mayflower, in Washington, D. C., at 8 the top cable. These wires are connected together by means of copper chain of stations, including WEEL. strips, and the entire system is con- WCAP, WJAR, WOO, WCAE, WSAI, WGR, WTIC, WCCO and WCTS. Sec-

It is hoped by the engineers of this section that when this shielding ference of the National Association of Railroad and Utilities Commismaterially reduce the resistance of the earth connection, which has Interstate Commerce Commissions of sions, at which representatives of the caused trouble in making the set each state attend, and which is the most important meeting of the year in determining the policies in con-Next Subject of Health Talk

nection with the public utilities. Will Be "Louis Pasteur" Louis Pasteur, probably the great- Selections of Gypsy Camp Fire est figure in the history of medicine, Music in Harry Horlick's Hour

will be the subject of the "Tower Harry Horlick, with his A. and P. Health Talk" to-morrow at 8:45 p. m., Gypsies, will introduce some of the given by Dr. Iago Galdston through selections which he imported from Europe during the last summer in his The life of Louis Pasteur is as hour of music to-morrow, broadcast dramatic as that of any general or at 9 p. m., by WEAF and six other military character. His life struggle stations. Besides these pieces, for to prove to the world and his fellow which written scores are used, there scientists the truth of the germ the- are many gypsy numbers used by ory of disease was replete with thrill- these artists for which no music is ing incidents. It resulted in the con- necessary, the musicians playing the gnering of the dread rabies, small- pieces entirely from memory. These pox and was the beginning of the selections are of the type which would process of the vaccination which in be heard around the camp fire of a the last five years has resulted in troup of wandering gypsies and are a practical diminution of the danger the distinguishing features which of diphtheria by the diphtheria im- characterize these unusual hours given every Monday night.

the operating chamber by antiseptic Members of International methods and being the father of Dance Orchestra All Veterans modern bacteriology, Pasteur was Every member of the Internationa

also instrumental in wiping out the Dance Orchestra, which plays under destructive cattle and sheep disease the direction of Edward Behringer at which was rampant in his native land, WEBJ, saw action in the American France, and checked the disease which Army during the war. They have was ruining the famous wine grapes. changed their program from shrapnel to saxophones and will broadcast a series of dance tunes, beginning at Contrary to the popular notion, dry 8:15 Tuesday evening.

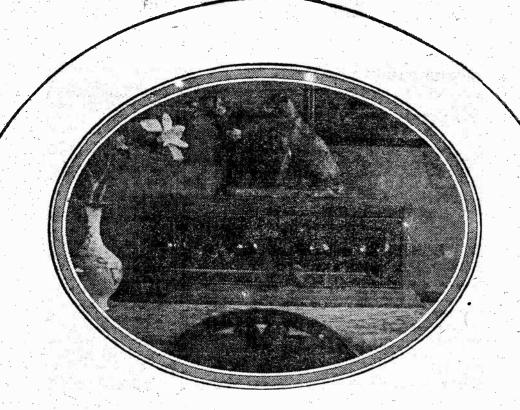
batteries should not be tested with an ammeter, but with a voltmeter. Missionary to Build Sets The test should be made while the Receiving sets are to be distributed tubes are turned on. Each cell of A by a British missionary to natives ir battery should test at least 1.1 volts the South Sea Islands. Cocoanu and each 22% volt block of B battery palms, 80 to 90 feet high, are to be used for acrial masts.

Manufacturer Says RadioManufacturer Radio Increases Reports 400% Sales Desire to Travel Charles Freshman Company, Inc., has accomplished more in support of the movement to "see America Company and the radio day. Every Sunday from 3:45 to Charles Freshman Composer, recognized as Composer, is of the movement to "see America Masterpiece receiver, report gross day. Every Sunday from 3:45 to the facts that are keeping the na-

possesses a keenly analytical mind most cordial.

first" than the combined propagands sales for the month of September, of cities railroads and educational 1925, of \$690,708.89, as against \$163, the sessions of the men's conferences, ginning of a process of reintegration music, and a special orchestra will of cities, railroads and educational 630.38 for the month of September, now starting on their twenty-second which will ultimately bind the nagive a program of his own pieces. tions in peaceful and lasting har-Dr. Cadman has recently returned mony. It was the first time he had tiana," termed an "Egyptian foxthe United States rather than to rush the Company further reports an two months' tour of Europe, met his German brethren in the mintrot," followed by "The Call of the
to Europe at first opportunity. Above enormous smount of unfilled orders,
where he attended the International istry since the war, and the welcome Sphinx," an Oriental waltz; "Saloma"

indicate, are Oriental dances;



DERESNADYNE II

A superlative 5-tube receiver at little more than a cheap set

OR those who want a radio receiver second to none the Deresna-I dyne will settle the question of which radio set to buy. It does not choose between tone quality and volume, nor between distance and selectivity. It combines them.

The Deresnadyne is remarkable for its purity of tone. And tone is what counts after you've owned a set a while. It is non-oscillatingextraneous noises are absent.

The Deresnadyne is remarkable for its selectivity. In this respect it acknowledges no superior.

The Deresnadyne is remarkable for distance. Operating from Chicago where the interference is very great, owners have reported the reception of Calgary, Havana, Los Angeles and Springfield, Mass., in

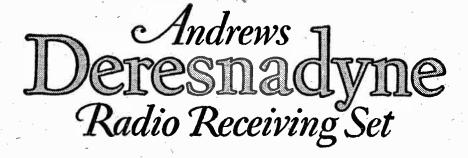
The Deresnadyne is remarkable for volume. During International week, operating from Chicago, it brought in European stations loud and clear over the loud speaker.

The Deresnadyne is not a Neutrodyne. It is not a Heterodyne. It is different in principle as well as results. DERESNADYNE II, illustrated above, makes available to those

who already own battery and speaker equipment the same performance as Deresnadyne I and III, which operate from the light socket. Specially priced at \$125.

DERESNADYNE III—a complete 5-tube receiver operating from the light socket. Deresnadyne III is the last word in radio convenience. It is equipped with permanent guaranteed power units and operates from the lighting circuit. Built-in loud speaker. All equipment included in the cabinet. Price complete with matched tubes—\$285.

AT YOUR DEALER'S



ANDREWS RADIO CORPORATION . 1414 S. WABASH AVENUE . CHICAGO BRANCH OFFICE - J. P. RAINBAULT, 50 CHURCH STREET, NEW YORK CITY

Are the Sentinels

-ever alert -always on duty

which guard radio reception from tone distortion and discord.

Enlist them for long faithful service in every socket of your broadcast receiver.

> Since 1915-Standard for all sets

Types C-301-A, C-299, C-300, C-11, C-12



METROPOLITAN DISTRIBUTORS

Our Dealer Service is unexcelled—immediate deliveries on all tubes, including the new types.

VICTORY ELECTRICAL SUPPLY COME

1207 Bedford Avenue—Corner Hancock Street, Brooklyn, N. Y Telephone Decatur 8000-8001

"Our Laboratory Has Tested and Approved the Timmons B-Liminator"

Think of the tests that Radio Broadcast (published by Doubleday, Page Company) subjected the B-Liminator to before put-

In writing of these tests, Keith Henny, Director of Radio Broadcast Laboratories, said that during the entire 600-hour tube test, the B-Liminator delivered max-imum output without the slightest drop

This is equal to more than six months' severe use on your set. And the tube was apparently as good as new.

Seventeen other radio publications spapers have put their OK on the B-Liminator. Many of them stressed the improvement in tone, others volume, others sensitivity, and still others the added distance it gave to most sets.



If you want to buy, sell or exchange your radio sets or parts the Radio Exchange will help you.

The Sound Caused by Electrons To Be Broadcast by Prof. Wold

quainted with a particle so small that million years to complete, and at the countless millions of them could meet end of that time the original piece of on a pin point and not be over- uranium would have lost a few per-

The opportunity of listening to the metallic lead.

LECTRONS fired by a decom- audible to a large public. This posing chemical element will "speed" of decoming the speed of decoming th speak to the audience of WGY. the accepted sense because the proc-The radio listener will thus ess in the case of a little piece of have an opportunity of getting ac- uranium would require five thousand cent of its weight and left some

electron will be given during the first The experiment, in connection with of four talks on the electron, its Professor Wold's address, will be conhabits and uses, to be delivered Tues- ducted with uranium, a highly radioday evening, October 13, by Professor active element. The moving charges Peter L Wold, head of the physics of the electrons from a small piece department of Union College, Schenetady, N. Y. Professor Wold's first small, tight metal chamber inclosing talk will be on the discovery of the two charged electrodes and will go electron. The subjects of the other through the metal walls into the air



By means of this apparatus listeners of WCY will hear the voice of the electron during an address on electrons by Dr. Peter I. Wold, head of the department of physics of Union College. A small piece of uranium, a radio-active element, is held before a tight metal chamber inclosing two charged electrodes. The uranium, which is in a constant state of disintegration or decay, gives off electrons which ionize the air between the electrodes. This ionization is detected by a type of radio amplifier system and becomes audible through a loud speaker directly or may be carried to the broadcasting station control room and passed through the usual stages of amplification and finally put on the air.

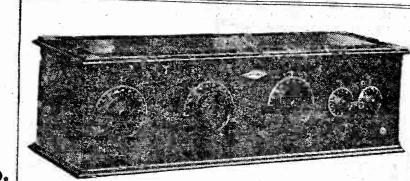
Practical Applications."

osition of matter, as fundamental radio transmitting apparatus to the heories undergo change, scientists of ears of those tuned to the station. the research laboratory of the General Electric Company have developed 'Craig Kennedy on the Farm,'

or heavy elements which are decaying freshment for his soul in the peaceprocess is measurable, can be made tip to the effect that even in these visible and by the apparatus de- rural scenes Kennedy continues to veloped by the scientists of the Gen-find full opportunity for the exercise eral Electric Company, can be made of his peculiar talent.

talks to follow on successive Tuesday inside. The omitted ions from the evenings will be "Measurements on uranium will ionize the air between Electrons," "Effects of Electron Dis- the electrodes, and this ionization will covery on Scientific Theories" and be detected by a type of radio ampli-Sources of Electrons and Their fier system and conveyed to the control room of WGY, where it will be In their investigations of the com- again amplified and carried on to the

apparatus whereby the electron, the smallest known particle of matter, beShh! Quick! The earphones! comes audible and it is a compara- Arthur B. Reeve, alias Craig Kentively simple matter for the radio en-nedy, speaks from WOR on Saturday gineer' with the equipment now at evening. The celebrated father of the hand so to amplify the sound of the fiction detective will confide to a milsingle electron that it may be heard lion or more radio listeners, some inside stuff concerning "Craig Kennedy There are a few very complicated on the Farm," where he seeks reor going to pieces so fast that the ful countryside. We have an advance



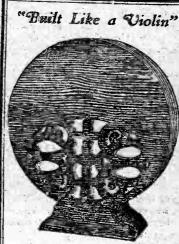
Above is pictured the new Splitdorf "Polonaise" Receiver. It is a five-tube set employing two stages of tuned radio-frequency amplification, a detector and two stages of audio-frequency amplification, which sells at a price within the means of the average buyer. It is attractive in appearance and has a metal panel with a crackle



at once be struck with its beauty and work-On examining it you plit bushing method



The Kurz-Kasch Company Dayton, Ohio



TELETONE CABINET SPEAKER

Beautifully finished in walnut, it stands 15 inches high, and is only 31/4 inches deep. Makes any radio receiver sound better.

\$3250

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At all good dealers.

TELETONE CORPORATION 449 West 42nd St., New York City



A. H. WAAGE

6 Reade Street, New York

Up-to-the-Minute News of Radio in Pictures



Mr. Bink's Radio

who has played eighteen holes of golf Saturday afternoon and then read until 1 or 2 a. m. and who has to sit and listen to a sermon in a hot church.

About the middle of the twenty-fourth year Dodson Bates's wife passed on to a better climate, and it was when she had been an angel for about six months that I managed to coax Dodson Bates to come to my house and listen to my radio. I had to coax him for two months, and then he came reluctantly, and all we got that night was static and squeals. Dodson Bates came five times and all we got was static and squeals, and he got plumb disgusted and said he wouldn't have one of those radio machines in his house for a million dollars. He said he could not be hired to have one, and nobody could get him to listen in again for any amount of money.

That's how things were when we were coming out from town one afternoon on the 5:15 train, and four of us were playing 500-Bink and Dodson Bates and Joe Minch and I—and Joe Minch happened to mention that he had just bought a radio outfit. He said it was one of the sort that is built like a phonograph cabinet, like a Victrola.

"And it's wonderful," he said. "Why, last Sunday I sat there in my own livingroom and heard a whole church service. right direct from the church."

Dodson Bates looked up instantly. "With the sermon?" he asked. "Could you hear the sermon, too?"

"Absolutely!" Joe Minch said. "Clear as anything. Every word."

"And your radio is built like a Victrola? About four feet high, say?" asked Dodson Bates, getting more and more excited.

"That's right," Joe Minch told him. Dodson Bates threw down his cards and

"What's the matter?" I asked.

got out into the aisle.

"Matter!" Dodson Bates exclaimed. "Matter? I'm going to get off this train at the next station, and I'm going back to town and I'm going to buy one of those radio machines like Joe Minch's. Yes, sil! I'm going to have it sent to my house and I'm going to rig it up, and next Sunday morning I'm going to turn on the sermon and pull my biggest and easiest easy chair up to that machine, and I'm going to put the ear things on my ears and sit down in that chair and put my feet on top of that radio cabinet and go to sleep! And every Sunday morning for the next twenty-four years I'm going to turn on that sermon and sleep right spang through it from start to finish!"

And I shouldn't wonder if he did. He has always been very bitter about ser-

Talking About Bink

But what I wanted to say was that some of these people do annoy a radio enthusiast dreadfully. I remember what Dodson Bates told Joe Minch about me. Time and again, as I have told you, I invited Dodson Bates to my house to hear my radio and he said to Joe Minch:

"This is how it works. Ellis comes to

me and he begins grabbing about getting concerts and talks from Honolulu and the moon and further-from San Francisco and Poduk and Chicago and forty-eleven other places. And every night, too. He just goes home about 10:30 p. m. and turns the knobs and hears the King of Siam and Galli Curci and Napoleon Bonaparte and Skagway and Havana and Patagonia, all as clear as a bell and just as if they were in the next room. So I let him coax me to go and hear it. So I go. He sits me down on a sofa and says: 'Now! Now we'll see what we get!' And he turns sixteen knobs and all I hear out of the thing are grunts from some pig yard and then a couple of cats screeching on a back fence, and then one of the pigs gets caught under a gate and squeals bloody murder. That keeps up from 10:30 o'clock till 1:30 a. m., and then he says, 'I'll just use the ear phones until I get tuned in right.' So he new he ear phones to his ears and twists the knobs, and all at once his face lights with a glow of utter bliss and he turns his eyes to the ceiling and whispers with awe, 'Chicago!' Chicago!' And he hands the ear things to me and I put them on and what I hear is, Psst! Psst! Ugh! Ugh! Yeow!' Same old cats and dogs and razor-back hogs. Ain't it

Some of your friends are like that always, but I know only two other individuals quite as unsatisfactory as Dodson (Continued from page one)

able to get any satisfaction out of my radio whatever. 'I'll put her in a chair in front of my horn and shout—we have to shout at grandmother at the tops of our voices, she is so deaf.

"Now, grandmother, this is the great tenor, Rosario Bossi."

Grandmother will listen. She will keen herself up and strain her ears and fold her hands across her stomach and close her eyes and just concentrate for all she is worth, and in a minute she will say:

"It ain't no use, Ellis; it ain't no useit don't sound to me like nothin' but a log yowling." Then I'll try her with the celebrated

Boomberay Marine Band of one hundred and eight pieces and she'll say: "It ain't no use, Ellis; it ain't no uset don't sound to me like nothin' but a dog

other is Mr. Bink's dog. Grandmother Butts or whatever great soprano happens is a dear old soul, but she has never been | to be singing that night, and all grandmother says is:

> "It ain't no use, Ellis; it ain't no useit don't sound to me like nothin' but a dog yowling."

That is mighty discouraging to a man who loves his radio and is eager and tremulous to have all his family and friends enjoy it, but, after all, a grandmother is a grandmother and you have to treat her kindly. As I said to Bink:

"Even if a grandmother does make mean remarks about a man's best radio efforts, he can't take her out and shoot her for it, as if she was a dog. But," I said, "if I had a dog like yours I certainly would take it out and shoot it."

Bink's dog-it is the other individual that does not appreciate radio-is what I would call an anti-radio hound, if I did not call it something worse. I don't know what is the matter with that dog unless it has invented a new disease that might Then I'll try grandmother with Galli- be called radiophobia. The dog-his name Curci or Maria Forlorna or Ethel Bethel | is Cæsar-is a large, yellowish dog with

The Evolution of Condensers

(Continued from page two)

the moving plates being fastened to a shaft on which the usual external dial is

The "straight line frequency" condenser, so much in the public eye at the moment. is one whose plates are of such shape that when the instrument is properly matched to a correctly designed coil the broadcasting stations are spread evenly over the dial according to their kilocycle (frequency) figures. The effect is accomplished by cutting away either the rotary or stationary plates in a certain geometric

The regular condenser using semi-circular plates is said to be of the "straight" line capacity" type, its capacity, independent of its effect on the rest of an associated circuit, varying directly according to its setting. Thus, if the capacity is a certain amount at a dial reading of 10, it is twice as much at 20, three times as much at 30, and so forth. There is also a "straight line wave length" condenser, similar in its plate shape to the straight line frequency condenser, which, when used under the proper conditions, separates wave length figures evenly over the dial just as the latter distributes the frequency figures.

S. L. F. Type Popular

Practically every condenser manufacturer is making an S. L. F. condenser to meet the popular demand. One very prominent firm, however, believes that true straight line frequency conditions are dif- exhibits in this year's show will be the ficult of attainment in actual practice with most extensive ever shown in one place," coils selected at random, and that S. L. F. Mr. Williams states. "Several of the most condensers possess mechanical defects, so instead of marketing an S. L. F. condenser it offers a unique dial which gives a straight line wave length effect with an ordinary straight line capacity condenser. The same company does have, though, a condenser whose rotary plates are cut away slightly to furnish a more gradual capacity increase at the lower end of the scale than its standrard model permits.

Many of the new condensers can be obtained in nests of two, three and four stators with a common rotor, for use in controlling several tuned radio-frequency stages at once. Some of the single condensers are so built that they can be connected in tandem if desired, the makers supplying special supporting brackets and coupling joints for the purpose. Others have special little pulleys provided on their shafts so that they can be turned together when mounted separately on a panel by means of a fish-line coupling.

Many of the other improved details of condenser construction as exemplified in the latest models can be given only slight mention. There are conveniences such as one-hole panel mounts; reduced over-all sizes; dependable gear and friction verniers; stronger pig-tail connections and better wiping contacts; absence of troublesome back-lash; 360-degree scale move-

In general, the improvements that have been made have been mechanical, but im-Bates. One is my grandmother and the provements in electrical efficiencies have to be.

which meshes with the flat rack holding | invariably resulted at the same time. So widespread has the betterment been that even the very cheapest affairs display highly acceptable characteristics; it is difficult, in fact, to purchase a really poor condenser nowadays.

Radio Exhibits at **Electrical Show**

Everything new electrically, from the latest innovations in electro-therapeutics to electric kitchenmaids, from four-wheel tractors to curling irons and from the most advanced discoveries in the radio world to the newest fireless cooker, will be publicly exhibited and demonstrated in the Grand Central Palace October 14

Electrical authorities are united in the opinion that this year's exposition will be the most comprehensive electric show ever held. The last year has seen remarkable strides in the invention and perfection of electrical devices. Indeed, so many devices have been developed recently that, together with the new models of electrical equipment already well known to the public, three entire floors of the Grand Central Palace will be occupied by the expo-

The radio exhibits alone should make the coming electrical exposition the most comprehensive and the most interesting ever held, according to Arthur Williams, vice-president commercial relations of the New York Edison Company. "The radio important of these exhibits will be under the direction of the radio division of the navy and the Signal Corps of the army. Indications are that every type of radio device now in use anywhere in the world, from the simple crystal set to the newest devices for transmitting photographs by radio, will be publicly demonstrated."

Something New in

Audio Amplification (Continued from page four)

component values, but, once these have been found, they need never be altered, and the set will henceforward be foolproof. Uusing only a detector and one small

power tube, loud speaker signals can be obtained which will be audible 100 vards away or more, for a modulated output of seven milliamps or more can be obtained. The crystal purity of the reproduction given by this unique circuit is truly remarkable, and will surprise those who have become used to the imperfections of iron-core transformer coupled A. F. am-

The absolutely complete absence of distortion when receiving from a high-class broadcasting station is almost uncanny, and will serve to prove to doubters that the modern loud speaker is by no means so imperfect as it is generally made out

sad eyes and burrs in his tail, and I think the trouble with him is that his liver overamplifies and gives forth too much of the static he seems to be full of. As soon as Bink or any of Bink's family goes to the radio receiver, Cæsar gets as close as possible in front of it, or behind it, or under it, if he happens to be in the cellar, and raises his head and rolls his eyes and opens his mouth and utters a loud. long, tremulous wail that is like the wail a soul in torture would utter if it was an especially loud utterer and in especially painful torture.

Cæsar's wail begins with a sad but gentle wail, increasing and becoming sadder and sadder until it shakes the house and makes the dishes rattle in the house next door. Then Cæsar pauses for breath and begins again and tries to beat all records for sadness and blood-curdlingness and loudness-and does it. Then he pauses for breath again and does it again, louder than before. People who hear Caesar wail to the radio a couple of times want to rush out and commit suicide before they have to hear him wail again.

And it does not seem to make any difference what comes out of the radio horn: one thing is as good as another to Caesar. A high-class soprano solo and a wad of static and a lecture on baked beans are all the same to Cæsar. A link of fat code that sounds like sausages frying and a few remarks by a Boy Scout person are both equally disagreeable to Cæsar. A broadcast fox trot from Denver that yields nothing but the "Thum-thum-thum" of the drum, and a thousand-dollar-a night barytone from Newark give him equal pains in his howler. No matter what is turned on the etheric waves seem to penetrate to Cæsar's secret inwards and make him let loose all the agony of soul that has been accumulated by all his ancestors since the time of Adam and Eve. I told Bink quite frankly that if I had a dog like that I would shoot him. But Bink is fond of the dog.

On this particular night Bink came over to my house and dear old grandma was sitting in front of my loud speaker saying:

"It ain't no use, Ellis; it ain't no useit don't sound to me like nothin' but a dog yowling."

I saw a look of fiendish triumph come over Bink's face: the look of a man who thinks he has a better radio set than

"I don't wonder," he said. "That set of yours never did sound like anything but a dog yowling. Miserable loud-speaker you've got. Now mine"____

Grandma and Bink

He turned to grandma and shouted at the top of his voice:

'Grandma, you ought to come over and hear my radio. I've got a good radio. Not like this. I say NOT LIKE THIS. I say, come over and hear mine."

"I'd be pleased to," grandma said. "This one never sounds to me like anything but a dog yowling."

So there she went after all the trouble I had taken for weeks and weeks to make enjoy my radio, trotting over to Bink's house.

He took her in the living room and set chair for her and eased her into it, and she folded her hands across her stomach and closed her eyes and leaned back in the chair. Bink picked up a newspaper and looked at the broadcast programs, and that dog of his-that miserable anti-radio hound, Cæsar-got up and walked over to the loud speaker and put his tail between his legs and raised his nose and got ready to pour forth his agony in sound. Then Bink went over to grandma and shouted to her:

"I'm going to get WKX first, grandma," he shouted. "WKX. I say I'm going to get WKX first. Singing! I say it will be singing! It's Ethel Bethel Butts singing, grandma. It's Ethel Bethel Butts, the great soprano, singing. From WKX,"

"Yes, yes! I hear you," grandma said. "Ethel Bethel Butts, the soprano, singing." So Bink walked over to his radio and turned on the knobs. It was a bad night -a static night-and nothing came out but spits and fizzes. But that was enough for Cæsar. He sat down on his haunches and elevated his nose and yowled ten times louder than a steam siren and forty times as sadly. And in an instant two big tear drops welled into grandma's eyes and trickled down her dear old cheeks and

she gave a sigh of satisfaction and said: "My, my! I hear her perfectly. Ain't she got a lovely sweet, sad voice?"

Qualitize

getting maximum set performance because:

ating at maximum efficiency.

out shock-absorbers.

ductive losses.

1. True Blue Tubes are absolutely

uniform-each tube is perfect-oper-

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times longer than ordinary tubes-

special Mament gives longer filament life.

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4. True Blue Tubes have silver con-

tacts and non-conductive bakelite

bases. There are no corrosion or con-

Price \$3.50 each

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Victory Electric Supply Co. 1207 Bedford Ave., Brooklyn

North American Radio Supply Co 1845 Broadway, New York

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For Clearest Reception

No other loud speaker offers you

clearer reception of broadcast voice

and music than does MUSETTE,

with the silver voice from the bake-

lite bell. Your dealer can supply

you. Order from him today. Musette, Black Crackle Finish, list - \$12.50

FROST-FONES

Best for Your Radio Receiving Set

Also a full line of accessories and parts

-Plugs, Jacks, Adapters, Extension Cords, Rheostats and Potentiometers.

HERBERT H. FROST, Inc., Chicago

FROST-RADIO Loudspeaker

FROST-

FONES

[Two Chicago Hotels] In Guests' Rooms YOUR RADIO SET!

Radio means so much to many people, once they become "addicted" to it, that it has lead many hotels YOU can't use a 1920 Model Radio Tube in to it, that it has lead many he throughout the country to st radio service for their guests. throughout the country to supply

It was after considering many maximum performance. Qualitize your Radio Set! Brightson True Blue Radio Tubes insure your hotels as the Drake and the Blackstone, in Chicago; the new Roosevelt, in New York; the Copley-Plaza, in Boston; the Benjamin Franklin, in-Philadelphia, and others adopted the Operadio. The set is entirely self-contained.

This means that there are no outside connections to be made—not even aerial or ground. The instrument uses six tubes, which means that the guest can obtain as great a volume as can be desired. When the instrument is delivered the radio man, or in some cases the bell-boy delivering it, shows the guest how it is operated. This takes but two or three minutes. He shows, for instance, that the little meter on the panel is to be used as a guide when turning on the current, so that too much will not be turned on. He then demonstrates that all that is necessary is to turn the two controls in unison to change from one program to another. This is all there is to it. To turn the in-BRIGHTSON LABORATORIES. Inc. strument off, the guest merely has to turn the little wheel to the left.

In the big cities selectivity is a very important constideration because of the proximity of several broadcasting `stations. In Chicago, the powerful Drake Hotel-Tribune broadcasting station is on the roof of the Drake Hotel. With many sets it is literally impossible to tune out this station, but the Operadio met this severe test of cutting out this station, WGN, and tuning in others.

Thus, the guest who has occasion to travel can spend a quiet evening in his room, and at the same time enjoy wonderful programs from the leading radio stations. The great demand for this radio service in the hotels which adopted it, is the best indication of the desire on the part of the traveling public to enjoy radio even when away from home.

List of Morning Features of

Special Interest to Women At 10:45, on Columbus Day, the Betty Crocker Gold Medal Home Service Talk will tell of an "Aristocratic Vegetable." Two worth-while addresses will be made: Dr. Harry J. Carmen, professor of history at Columbia University, on "Causes of the Discovery of America," and Mr. Winter Russell, prominent New York lawyer and an eloquent speaker, on 'The Will Spring."

Tuesday will bring a musical program, a lecture by Mr. Kemble under the auspices of the Board of Education, and a motion picture forecast on the new "movies" by Adele Woodard. president of the National Motion Picture League. On Wednesday Betty Crocker will continue her menus, "To Eat and Grow Thin." Besides a musical program there will be a talk for mothers and a health lecture.

During the Housewives' Hour WEAF on Thursday Mrs. Lilly Haxworth Wallace, writer, lecturer and food specialist, well known to the American woman for her practical and helpful methods of teaching, will Celebration," This will be of help in planning hallowe'en parties. Vee Lawnhurst, popular pianist, will play. Mary E. Pennington will speak under the auspices of the National Association of Ice Industries on "Household Refrigeration."

On Friday Betty Crocker will tell how to make a "Waffle Breakfast." The second talk in the series by Mrs. Charles Gregory, New York State Chairman of the New York State Federation of Women's Clubs, will be "The Homes of New York," a plea for better homes. Mrs. Rollin Lynde Hartt, formerly Miss Helen Harrington, of the Coburn Players and lecturer of note, will continue her series of talks under the auspices of the United Parents' Association on "Ourselves and Our Children."

De Witt Clinton Hall Concerts To Be Broadcast by WRNY WRNY announces that it wil broadcast all the Charles D. Isaacson concerts at De Witt Clinton Hall Sunday nights at 8:15 to 10:15. The opening event brings the Norfleet Trio, Cornelia Zuccarri, operatic soprano; Lorna Lea, "The Love Song Girl," and others.

Charles D. Isaacson is program di-If you want to buy, sell or exchange your rector of WRNY and his concerts radio sets or parts the Radio Exchange will under the suspices of the City of New York are now in their tenth year and have totaled over 4,000 in number.



Beacon Radio Mfg. Co., Inc., the Radio Receiver Division of "the world's greatest parts plant," announces to the radio public three of the outstanding achievements in the TRINITY SIX

The elimination of the main cause of set trouble, even in the costliest receivers (connections soldered by inexperienced workers), is achieved by Beacon construction. The use of continuous %-in. wide nickeled phosphor-bronze strips, eyeleted to a canvas-bakelite sub-panel by special Beacondesigned machinery, eliminates practically all soldered connections in TRINITY SIX, saving labor for us, and trouble and

The elimination of all profits to outside manufacturers, Beacon feature. Even the cabinet and panel of TRINITY SIX are "Beacon-Built" from raw stock. So, also, are the straight-line frequency condensers. Every special nut, bolt and screw in the TRINITY SIX is made by Beacon.

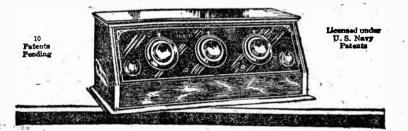
3 TRINITY SIX is the first production-engineered radio set. The Beacon receiver plant was planned and built solely to turn out the TRINITY SIX. Neither TRINITY SIX nor any part embodied in it is a side line of any other business. Beacon

What Beacon Gives You For Fifty Dollars

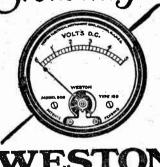
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World Radio History

help you.

Additional Radio Programs for the Week

WHAP-BROOKLYN, N. Y.-240

WNYC-NEW YORK CITY-526

30 p. m.—Flementary French lessons.
b. m.—Advanced French lessons.
c. p. m.—Police alarms.
c. p. m.—Resume of meeting of Board
c. Estimate.
c. m.—Joseph

m.—Isaiah Seligman, pianist. m.—Dorothy Taylor, contralto. m.—The Allan Trio.

-Joseph Davies, barytone.

9:40 p. m.—Dance Orchestra.
10:10 p. m.—The Book of the Hour.'
10:30 p. m.—Police alarms; weather.
10:35 p. m.—Colonia vince Orchestra.

Music concert.
WLWL—NEW YORK CITY—288

p. m.—Ann Wolcott, planist. 10 p. m.—Agnes Brennan, soprano. 30 p. m.—Talk, Michael Williams.

9:50 p. m.—Paulist Choristers. WEBJ—NEW YORK CITY—273 7 p. m.—Blenheim Theater Ensemble. 7:45 p. m.—A. Wayne, entertaining

1:30 n. m.—Fordham Orches'ra.

WRNY—NEW YORK CITY—258
45 a. m.—News Flashes.
1:15 a. m.—Women's Hour.

10:30 a. m.—Reducing exercises. 10:45 a. m.—"Diet," Dr. Harry Finkel. 12:30 p. m.—Luncheon hour entertain

(Continued from page nine)

WRNY—NEW YORK CITY—258
5 a. m.—News flashes.
15 a. m.—Women's Hour.
30 a. m.—Reducing exercises.
45 a. m.—"Practical Interior Decora m.-Emma Keller, soprano. p. m.-Luncheon hour er ment.

4:15 p. m.—Afternoon program.

7 p. m.—"Whose Birthday To-day?"

7:05 p. m.—Telegraph sport flash.

7:20 p. m.—Chef Cretaux Chats.

7:30 p. m.—Chef Cretaux Chats.

7:30 p. m.—Ria's Music Party.

7:45 p. m.—Mrs. Harriet Seymour.

8 p. m.—Rossevelt Concert Orchestra.

8:15 p. m.—Lorna Lea, love songs.

8:30 p. m.—Radio Questions and Answers

8:45 p. m.—Life's Jokes, with Robert Sherwood, Chas. Dana Gibson, Robert Henchley.

Sherwood, Chas. Pana Benchley.

8:15 p. m.—Yama-Yama Boys.

9:30 p. m.—Essays on Philosophy.

9:35 p. m.—Ludith Roth, songs.

9:45 p. m.—Resta Crowell's Theater.

10 p. m.—olga Trio.

m.—Concert pianist. m.—Cable Montgomery, sopra m.—Violin solos.
—Raymond Maher, barytone.
m.—The Amphions. WHAP—BROOKLYN—240 WBBR—STATEN ISLAND—273 8 p. m.—Instrumental Trio. 8:15 p. m.—Barbara Jonsch, soprano. 8:25 p. m.—Sunday school lesson. 8:25 p. m.—Soprano; trio solos. WHAG—RICHMOND HILL, N. Y.—316

WOR—NEWARK—405 6:45-7:15-7:45 a. m.—Gym class. 2:30 p. m.—William Rietz, entertainer. 2:45 p. m.—George Little, "The Chihurbus" hua."
3-p.m.—Fred Koester's Orchestra.
8:30 p.m.—Herbert Fields, Richard Rodgers and Lorenz Hart, songs.
8:45 p.m.—Fred Koester's Orchestra.
6:16 p.m.—"Words Mispronounced:"
6:17 p.m.—Shelton Dinner Music.
7:15 p.m.—"Sports," Bill Wathey.

WGCP—NEWARK—252 3 p. m.—Piano solo; race resul 5 p. m.—Fiano 8010; Fave toward hourly).

3:15 p. m.—De Rienzo and Barry.

3:45 p. m.—Richard Douglas, songs.

4 p. m.—Hughie Woolford, pianist.

4:30 p. m.—Sylvia Schatz, elocutionist.

4:45 p. m.—Theo Alban, tenor.

WAAM—NEWARK—263 11 a. m.—Happy Höur, John A. So WOO--PHILADELPHIA--508

 a. m.—Grand Organ.
 noon—Luncheon Music by Golden's Crystal Tea Room Orchestra.
 45 p. m.—Grand Organ; Trumpets.
 7:30 p. m.—Dinner music. WIP—PHILADELPHIA—508 6:45 a m.—Setting-up exercises.
1 p. m.—Luncheon music.
8 p. m.—Artist recital.
8:05 p. m.—Pagoda Orchestra.
8:05 p. m.—Pagoda Orchestra.
8:30 p. m.—The La Stelia Male Quartet.
9:15 p. m.—Recital with composers.
10:05 p. m.—Joe Ray's Night Hawks.

WLIT-PHILADELPHIA-395 p. m.-Organ recital; Concert O chestra.
2-3 p. m.—Concert Orchestra.
4:30 p. m.—Artist recital.
4:45 p. m.—Talk, Colonel Alice Herron.
5:50 p. m.—Scores, sports results.
7:30 p. m.—Dream Daddy. WFI—PHILADELPHIA—395

WFI—PHILADELPHIA—395

1 p. m.—Tea Room Ensemble.

5 p. m.—Women's Club of Swarthmore addresses and recital.

2:45 p. m.—Fashion feature.

6:45 p. m.—Concert Orchestra.

5 p. m.—Featuring WEAF Artists.

WCAU—Philadelphia—278

6:30 p. m.—Billy Hayes's orchestra.

7:30 p. m.—Male quartet.

8 p. m.—Vocal and instrumentalists.

9 p. m.—Barry O'Moore, tenor.

9:15 p. m.—Central Radio Artists.

9:30 p. m.—Frank Cook, songs.

10 p. m.—Centennial Hour. WPG—ATLANTIC CITY—300

WPG—ATLANTIC CITY—300

1:30 p. m.—Luncheon music, J. Leo
Lewis, director.

2 p. m.—World series game.

4:30 p. m.—Hall Trio.

6:30 p. m.—"Hall Prio.

6:30 p. m.—"Grgan recital.

8 p. in.—Scaside Trio.
9 p. m.—Studio concert.

WGY—SCHENECTADY—380
2 p. m.—Music; talk.
6:30 p. m.—Dinner program.
7:30 p. m.—WGY Book Chat."
7:45 p. m.—Mrs. William J. Breslin,

-Pan-American program. p. m.—Organ recital.
WRW—TARRYTOWN—273 m.—Sports.
m.—WRW entertainers WGR—BUFFALO—319

6:30 p. m.—Dinner music. 8-11 p. m.—Program same as WEAF. WHAM—ROCHESTER, N. Y.—278 WJAR-PROVIDENCE-306

WTIC-HARTFORD, CONN.-476 m.—Dinner music.
m.—Weather report; scores.
m.—Talk.
m.—Dinner music.

7.45 p. m.—Dinner music.

WEEL—BOSTON—349

7.45 a. m.—Health exercises.

7.5 p. m.—Assembly luncheon.

7.5 p. m.—Lost and found; weather.

7.6 p. m.—Big Brother Club.

7.7 p. m.—Farl Alpine, barytone.

7.8 p. m.—Pop concert.

7.9 p. m.—Radio artists.

7.0 p. m.—Silvertown Orchestra.

2, 4, 5:15, 8 and 10:25 p. m.—News.
4-6 p. m.—Scores, racing returns.
4:05 p. m.—Christopher Meehan, tenor.
4:20 p. m.—Astor Tea Music.
5:15 p. m.—News, baseball, racing.
5:26 p. m.—Market reports.
5:50 p. m.—Financial summary.
6:01 p. m.—Beseball, racing returns.
6:30 p. m.—N. Y. University Course.
7 p. m.—Bernhard Levitow's Orchestrs
8 p. m.—Scores and racing returns.
8:15 p. m.—Museum of History talk.
8:30 p. m.—Cotaget program. WNAC-BOSTON-280 8:30 p. m.—Colgate program, 9:30 p. m.—To be announced. 10:30 p. m.—Ben Glaser's Orchestra, WJY—NEW YORK CITY—405 1 p. m.—Concert Orchestra.

1:50 p. m.—Popular songs, Ted and Dick
Waterson.

4 p. m.—Dance orchestra from the radio edy by WGY Players.
WGBS—NEW YORK CITY—316 10 a. m.—Timely talk with Terese.
10:10 a. m.—Lodima Lockwood, soprano.
10:20 a. m.—Sewing talk.
10:30 a. m.—Lodima Lockwood, soprano.
10:40 a. m.—Furniture talk; song.
1:30 p. m.—Scripture reading.
1:35 p. m.—Ida Rowley soprano.
3:10 p. m.—Flano harmony lessons.

3:30 p. m.—WNAC dinner dance p. m.—Beacon entertainment radio show. p. m.—Musical program. WBZ-SPRINGFIELD, MASS.-333

dren.
6 p. m.—Uncle Geebee.
6:30 p. m.—Jule Anzel's Orchestra
7 p. m.—''What's Your Radio Proble 7:45 p. m.—Daniel J. Morgan, tenor. 8 p. m.—Musical program. 9 p. m.—Evening of opera, "Aida."

7 p. m.—"What's Your Radio Problem?"
7:10 p. m.—Jule Anzel's Orchestra.
2:15-3:15 p. m.—Musical program.
3:45 p. m.—Jack Smith, barytone.
4 p. m.—Silvio Dirienzo, pianist.
4:15 p. m.—Joe Sherman, songs.
4:30 p. m.—Herman Streger's Players.
6:40 p. ni.—"Sunshine Talks."
7 p. m.—Richman Entertainers.
7:30 p. m.—Burr McIntosh, philosopher.
8 p. m.—"Colonial Aces,"
8:30 p. m.—Francis Capuilliez, barytone.
8:45 p. m.—Grossman and Meredith, songs. WCTS—WORCESTER—268

33 a. m.—Radio chats.

2 to 2 p. m.—Luncheon music.

33 p. m.—Radio entertainment.

34 f.

4 f.

4 f.

4 f.

4 f.

4 f.

4 f.

5 p. m.—Story teller; scores.

4 to 11 p. m.—Program same as WEAF.

WRC—WASHINGTON—469

10 a. m.—Women's Hour, from WJZ.

12 noon—Organ recital.

1 p. m.—Washington Orchestra.

7 p. m.—Shoreham Orchestra.

8 p. m:—'Pan-American Night," Guy

D. Goff and Dr. Leo S. Rowe, speak
ers; Army Band and recitals.

10 p. m.—Royal Hcfr of Music.

11 p. m.—Meyer Davis's Mand. songs.

9 p. m.—John Cassidy, barytone.
10:30 p. m.—Roseiand Orchestra.
11:30 p. m.—Revue and orchestra.
12 p. m.—Revue and orchestra.

WCAZ-PITTSBURGH-461 p. m.—Dinner concert.
p. m.—Uncle Kaybee.
n.—Larkin period.
m.—Radio artists. m.—Silvertown Orchestra. KDKA—PITTSBURGH—309 . m.—Dinner concert.
. m.—Children's period.
. m.—KDKA Symptony

wabc-Akron, ohio-258
p. m.—Concert orchestra. 6:30 p. m.—Concert orchestra.
9:30 p. m.—Artists' recital.
WTAM—CLEVELAND—390 7 p. m.—Statler Orchestra.
WEAR—CLEVELAND—390

WEAR—CLEVELAND—390

7 p. m.—Dinner concert.
8 p. m.—R. T. L. program.
9 p. m.—Chauncey Lee's Orchestra.
10 p m.—Organ recital.
WSAI—CINCINNATI—309
8-11 p. m.—Program same as WEAF.
WLW—CINCINNATI—326 10:30 p. m.—Police alarms; weather.
10:35 p. m.—Colonia; pance Orchestra.
WMCA—NEW YORK CITY—341
12 (noon)—Olcot Vail's Ensemble.
6 p. m.—Olcot Vail's Ensemble.
6:30 p. m.—Brine Golden's Orchestra.
7:30 p. m.—Brine Golden's Orchestra.
7:30 p. m.—Wr. Curtis Nicholson, "The Right Word."
7:40 p. m.—Hye Sorensen. barytone.
8 p. m.—"We Women," Betty Brainerd.
8:15 p. m.—Ruth Friedman, pianist.
8:50 p. m.—Wherald Square," R. R. Moore. 3 p. m.—Dinner concert.
11:03 p. m.—Doherty Melody Boys.
11:45 p. m.—Songs, concert, orchestra.
1 a. m.—"Bow Wows." WKRC—CINCINNATI—326 WJR-DETROIT-517

WJR—DETROIT—517

7 p. m.—Jean Goldkette's Orch soloist.
90 p. m.—Serenaders and soloists.
10 p. m.—Dance orchestra.
WWJ—DETROIT—353 m.—Dinner concert.
m.—Same as WEAF.
WREO—LANSING, MICH.—286 p. m.—Dinner concert. 1:15 p. m.—Orchestra, quartet, inst

mental solos. Quartet, instr. WOK—CHICAGO—217
7 p. m.—Artists recital. 11 p. m.—2 a. m.—Artists and orchestr selections. WGN—CHICAGO—870 WGN—CHICAGO—870 8:30 p. in.—Dinner music. 10:30 p. in.—The classic hour. 12:30 a. in.—Dance music. m.—Dance music: WMAQ—CHICAGO—448

WMAQ—CHIUAGO—426
7:30 p. m.—La Salle Orchestra.
9 p. m.—Garden talk.
9:15 p. m.—Musical program.
9:30 p. m.—Financial talk.
9:35 p. m.—Golden Gate concert. —Lecture; music. WQJ—CHICAGO—448 3 p. m.—Rainbó Orchestra. 11 p. m.—Musical program. 2 a. m.—Ginger hour. -Ginger hour.
WLS CHICAGO 345 p. m.—Organ; story; Salvation Band.

WHT-CHICAGO-400 p. m.—Classical program. 3:45 p. m. (238 meters)—Music gram.
1 a. m.—Your Hour League.

KYW—CHICAGO—536 8 p. m.—Dinner concert.
8:33 p. m.—Farm speeches.
9 p. m.—"Good Reading."
9:20 p. m.—Musical program.
11 p. m.—"Evening at Home."
WTAS—ELGIN, ILL.—302
9 p. m.—Purple Gregitle Boye.

p. m.—Purple Grackle Boys.
WCBD—ZION, ILL.—345 p. m.—Clarinet quantity and organ.
WJAZ—CHICAGO—322
—Concert. WJAZ—CRICAGO—322

11 p. m.-1 a. m.—Concert.

WOC—DAVENPORT—484

6:45 p. m.—Chimes concert.

8 p. m.—Program from WEAF.

12 (midnight)—Dance music.

WDAF—KANSAS CITY—366

12:45 p. m.—Nighthawk froic.

WCCO—MINNEAPOLIS-ST. PAUL—416
6:30 p. m.—Children's hour.
8 p. m.—Program from WEAF. M.—Songs. KTHS—HOT SPRINGS—375 10 p. m.—Violin and piano solos. 11:10 p. m.—Dance music. WOAW—OMAHA—526

p. m.—Classical.
p. m.—Randall's Orchestra. WMC—MEMPHIS—500 9:30 p. m.—Musical program. WHAS—LOUISVILLE—400 8:30 p. n.—Concert.
WSB—ATLANTA—428 45 p. in.—Fortlight Frolic. KPRC—HOUSTON, TEX.—297

m.—Dance music. un.—Faculty of Heights Conserva-WFAA-DALLAS-476 night) - Trent Syncopate CFCA-TORONTO-356

9 p. m.—Artists. 10:45 p. m.—Gilbert Watson's Orchestra

WEAF-NEW YORK CITY-493 16:45, 7, 7:20, 7:45 a. m.-Health Exer-

11:05 a. m.—Music. 11:15 a. m.—'The Homer of New York.' 1:30 a. m.—'Talk to Women.

) p. m.—Dinner music.

p. m.—Michael Markels's Orchestra.

130 p. m.—Story Teller.

145 p. m.—Carl Roeder, Hannah Klein,

h. m.—The Happiness Boys.

130 p. m.—Eagle Trio.
p. m.—To be announced.

115 p. m.—Hannah Klein, planist.

130 p. m.—The York Trio.

0 p. m.—Oriental Hour.

10 p. m.—Oriental Hour. 11-12 p. m.—Meyer Davis's Orchestra WJZ—NEW YORK CITY—455

1 a. m.—News. 1:05 a. m.—'Arts and Decorations.

1 p. m.—Ambassador Trio. 2, 4, 5:15, 8 and 10:25 p. m.—News.

m.—Piano harmony lessons m.—Songs and stories for

cises.

10:45 a. m.—Home Service Talk.

11:05 a. m.—Music

4:15 p. m.—Profit and Patty Carter, entertainers.
4:30 p. m.—William J Rietz, songs.
4:35 p. m.—Charol de Thomee, pianist.
8 p. m.—Radio Hour.
9:05 p. m.—Shirley Herman, singer.
9:15 p. m.—Jimuny Flynn, songs.
9:25 p. m.—Eva Rothenberg, pianologue.
9:40 p. m.—Frank Gallasi, songs.
9:50 p. m.—Prank Gallasi, songs.
10 p. m.—Strickland's Orchestra.
11 p. m.—Ritz Orchestra.
11:30 p. m.—Rodeo Eentertainer.
WAAM—NEWARK—263
11 a. m.—Happy Hour, John A. Scott. n.—Happy Hour, John A. Scott ..—Danny Hope's Melody Boys. .—To be announced. 11:30 a. m.—Music.
11:40 a. m.—Talk to Women.
11:55 a. m.—Music.
12 noon—Market and Weather Reports.
4 p. m.—Margaret Schilling, soprano.
4:30 p. m.—Margaret Schilling, soprano.
4:35 p. m.—Thomas Hughes, pianist.
4:45 p. m.—Polsonous Fishes."

m.—To be announced.
p. m.—The Sport Oracle.
p. m.—Helena Parell, soprano.
p. m.—Helena Travis.
p. m.—Jack Smith, barytone.
p. m.—Entertainers.
m.—Hida Kay, contraito.
p. m.—Entertainers. m.—Entertainers.
m.—Hilda Kay, contralto.
m.—Talk on New Jersey.
..—Walter A. Cobb, pianist.
m.—Andrew Hays, tenor WIP—PHILADELPHIA—508 6:45 a. m.

3 p. m.—Artist recitai.
3 05 p. m.—Dinner music.
4 p. m.—Bedtime story.
WOO—PHILADELPHIA—508 —Artist recital. 11 a. m.—Grand organ. 12 noon—Grand organ and trumpets.

0 p. m.—Program by quartette. 0:30 p. m.—Dance music. WFI—PHILADELPHIA—395 10:30 a. in.—Solos.
10:40 a. m.—Home service talk.
1 p. m.—Ensemble music.
3 p. m.—Talk; recital. p. m.—Concert orchestra. WLIT—PHILADELPHIA—395

WLIT—PHILADELPHIA—395.

12:05 p. m.—Organ recital; orchestra.
2-3 p. m.—Concert orchestra; playlet.
4:30 p. m.—Dance music.
5:50 p. m.—Scores; sports results.
7:30 p. m.—Dream Daddy.
8 p. m.—Talk:
8:10 p. m.—To be announced.
10 p. m.—Dance orchestra.
10:30 p. m.—Rufus and Rastus.
11 p. m.—Popular program.

WCAU—PHILADELPHIA—278
7:55 p. m.—Scores.

p. m.—Scores.
m.—Music League hour.
m.—Hill Harmony Four.
p. m.—Rennie Cormack, songs. 130 p. m.—Rennie Cormack, songa.
1:30 p. m.—Loeser's Dance Orchestr
WFG—ATLANTIC CITY—300
145 p. m.—Organ recital.
p. m.—Trio dinner music.
p. m.—"Educational Series."
15 p. m.—Studio program.
p. m.—Concert orchestra.
0 p. m.—To be announced.
0:30 p. m.—Dance orchestra.

WHAR-ATLANTIC CITY-275 p. m.—Seaside Trio. 1:30 p. m.—Fashion talk. 3 p. m.—Seaside Trio. 1:15 p. m.—Strand organ recital. WGY—SCHENECTADY—380

WGY—SUMENCULADI—oov

2 p. m.—Music; talk.

6:30 p. m.—Sunday School Lesson.

7 p. m.—Strand Theater Orchestra.

7:30 p. m.—Health talk.

7:40 p. m.—Musical comedy, three acts.

"The Hidden Idol."

10:30 p. m.—WGY Orchestra; E. Arthur

Hannay tenor. Hannay, tenor WHAM-ROCHESTER, N. Y.-27 3:30 p. m.—Eastman Theater Orchestra 5-6 p. m.—Eastman Theater organ. 7 p. m.—Eastman Theater Orchestra.

WRW—TARRYTOWN, N. Y.—273 m .- Almo Entertainers. p. m.—WRW Orchestra. p. m.—Almo Entertainers.

WGR-BUFFALO-319 9 p. m.—Winger's Entertain.
9:30 p. m.—Mission program.
10:30 p. m.—Musicai program.
11 p. m.-1 a. m.—Supper music. WJAR-PROVIDENCE-306

) a. m.—Housewives Radio Excha :05 p. m.—Woodstock Entertainers m .- Maine Hou and pupils.

p. m.—Edgar Allen Poe, readings; mu

p. m.—Hardman hour of music: Dr. Barnabas Istok, violinist; Dr. Vassilly sic. 10:05 p. m.—Dance music. m.-Popular half hour. WEEI-BOSTON-349 Zavadsky, pianist, and trio.
p. m.—"How to Drive," Harry Rainess. WEEI-HOSTON 349
6:45 a. m.—Health exercises.
7:45 a. m.—Morning watch.
10:45 a. m.—Home Service Talk, 'Waffie Breakfast.'
2-4 p. m.—Concert from Radio Show.
6:25 p. m.—Lost and Found; weather.
6:30 p. m.—Big Brother Club.
7:30 p. m.—Witting's program.
8 p. m.—Neapolitan program.
8 p. m.—Neapolitan brogram.
8 30 n. m.—Sagra Half Hous. 3 p. m.—Neapolitan program.
3:30 p. m.—Sager's Half Hour.
9 p. m.—E. H. Band's artists.
10 p. m.—Band and Scotty Holmes's

chestra.

10:30 p. m.—Radio forecasting.

WNAC—BOSTON—280

10:30 a. m.—Bible readings.

10:40 a. m.—Women's Club talks.

12:15 p. m.—Noon service.

1 p. m.—Concert orchestra.

4 p. m.—Vocal and instrumental artists.

4:35 p. m.—From Radio Show; vocal and piano solos. 7.45 p. m.—A. Wayne, entertaining reporter.
8.10 p. m.—Edith Law, soprano.
8.30 p. m.—Original Mobile Quintet.
WFBH—NEW YORK CTTY—273.
2 p. m.—Eddie Meyers's Orchestra.
3 p. m.—Studio program.
3.45 p. m.—Elizabeth Arrighl, songs.
4 p. m.—Knickerbocker Hospital talk.
4.15 p. m.—William Sullivan, barytone.
4.30 p. m.—Wrs. Matty Levine, plano.
5 p. m.—Pete Leonard's Orchestra.
6 p. m.—Flame Moore, soprano.
6.15 p. m.—Billy Johnston's Orchestra.
11.30 p. m.—Billy Johnston's Orchestra. p. m.—Concert program.

330 p. m.—From new Metropolita
Theater, opening night performance

with orchestra and organ selections, WBZ—SPRINGFIELD, MASS.—333 WBZ—SPRINGFIRM, MARSO
6:30 p. m.—Lenox Ensemble.
7 p. m.—Market reports.
7:05 p. m.—Artists.
7:30 p. m.—Rubert Whitcomb, pianist;
Mrs. E. B. Heywood, soprano; Daniel Devons, barytone.
8 p. m.—Isabel Steele, pianist.
8:15 p. m.—Mrs. Margaret MacFarlane, soprano.

ment.
4:15 p. m.—Atternoon program.
7 p. m.—Whose Birthday To-day?
7:05 p. m.—Telegraph sport flashes.
7:15 p. m.—Irwin Kurtz; talk.
7:25 p. m.—Code Lesson.
7:45 p. m.—Gedy Spielter, pianist.
8 p. m.—Opera, "Manon" company, with Cornwell, Riehl and others.
8:30 p. m.—"Weather Proverbs and Paradoxes."
8:45 p. m.—Operas "Declaration" m.—"Whatdoyoucallit" Club. WCTS—WORCESTER—268 WCTS-WORCESTER-268
10:30 a. m.—Radio chat; music.
12-2 p. m.—Luncheon music.
7:15 p. m.—Story teller.
8 p. m.—Concert.
WRC-WASHINGTON—469
10 a. m.—Women's hour from WJZ.
12 noon—Organ recital.
1 p. m.—New Willard Orchestra.
5 p. m.—"WRC's Foolish Entertainers.
6 p. m.—Book reviews.

8:45 p. m.—Operas, "Pagliacci" and "Cavalleria," with Zuccarri, Forbert and others.

9:30 p. m.—"Science and Democacy,"
William Grunstein.

9:45 p. m.—Band concert.

10:15 p. m.—Novelty night; artists' sup-WCAP-WAS UNGTON-469 m.—Health exercises. m.—Market summaries 7:45-8 p. m.— During Danger."
8-9 p. m.—Men's Club at All Saint
Church: weekly political review.
9:15-9:45 p. m.—Wardman Park Trio.
10-12 p. m.—Dance music. per.

WAHG—RICHMOND HILL, N. 1.—

12 (noon)—Musical program.

7:30 p. m.—Prof. Mayne, "Speech."

7:45 p. m.—Humor by artists: Evan
Davies, Arthur Feldman, Cliff Ulrich,
Fay Meisel, Bert Lowe.

10 p. m.—Radio Question Box.

10:15 p. m.—Andy Asciutto's Orchestra.

8:30 p. m.—Clore Kaybee.

8:30 p. m.—Address.

8:30 p. m.—Address.

8:30 p. m.—Dinner concert.

KDKA—PITTSBURGH—309

KDKA—PITTSBURGH—309

KDKA—PITTSBURGH—309 WAHG—RICHMOND HILL, N. Y.—316

WOR—NEWARK—405
6:45-7:15-7:45 a. m.—Gym class.
2:30 p. m.—Joe E. Brown, songs.
2:46 p. m.—Prof. J. P. Santamarina.
3 p. m.—Archie Slater's Orchestra.
3:45 p. m.—B. P. Adams, "Shelley."
6:15 p. m.—Words mispronounced.
6:17 p. m.—Words mispronounced.
6:17 p. m.—"Sports," Bill Wathey.
6:30 p. m.—"Man in the Moon" stories.
7 p. m.—Shelton dinner music.
WGCP—NEWARK—252
3 p. m.—Songs; race results (half hourly).
3:15 p. m.—Leslie McLeod, tenor.
4 p. m.—Sam Weber, planist.
4:15 p. m.—Profit and Patty Carter, entertainers. m.—Dinner concert.
m.—Children's period.
m.—Talk.
m.—Teaberry time.

SATURDAY

WEAF-NEW YORK CITY-492 45-7:45 a.m.—Health exercises. 45 p.m.—Army vs. Notre Dame for ball game, play by play. 5 p.m.—Ray Nichols's Orchestra.

ball game, havy by pres,

5 p. m.—Ray Nichols's Orchestra.

1 p. m.—Doiner music.

1 p. m.—Doiner music.

1 p. m.—Louis Caton, tenor.

1 15 p. m.—Opera Quartet.

1 14 p. m.—Opera Quartet.

1 p. m.—Grosskopf String Trio.

1 p. m.—Constitution Week': address by Secretary Wilbur of Navy;

1 mobert Hilliard.

1 p. m.—Dixie Jubilee Singers.

1 p. m.—Apollo Orchestra.

1 p. m.—12 midnight—Vincert Lopez': Orchestra.

1 Orchestra. p. m.-12 midnigni-Orchestra. WJZ-NEW YORK CITY-455 WJZ-New Abrams's Ochestra

1:15 p. m.—Irwin Abrams's Ochestra. 2, 4, 5:15, 8 and 10:30 p. m.—News. 2:30 p. m.—Football game; United State Military Academy vs. Notre Dame. Military Academy vs. Notre Dame.
5 p. m.—Tea music.
6 p. m.—News, baseball and racing returns; market reports.
7 p. m.—Dinner concert.
8 p. m.—Baseball, football and racing returns.
8:15 p. m.—United States Army Night; band; General Charles P. Summerall.
9:30 p. m.—To be anonymeed.

9:30 p. m.—To be anonunced. 10 p. m.—The Texans, songs. WNYC-NEW YORK CITY-526 :30 p. m.—Police alarms. :35 p. m.—Sarah Paris, Ethel Leitman

nets.

m.—Football scores.

p. m.—Helen Laufenberg, contralto 8 p. m.—Football scores.
8:05 p. m.—Helen Laufenberg, contralto.
8:20 p. m.—Police quartet.
8:50 p. m.—Bellice quartet.
8:50 p. m.—Kessler Ensemble.
9:30 p. m.—Banquet of the Jewish War Veterans. Speakers: David A. Brown, Charles P. Summerail, the Rev. Dr. Edward Liseman, Father Francis P. Duffy, George P. Nicholson, Morris Florea. Professor Prampin's Orchestra.
10:30 p. m.—Alarms; weather forecasts.
10:35 p. m.—Banquet resumed.
WGBS—NEW YORK CITY—316 WGBS-NEW YORK CITY-316

10 a. m.—Timely talk with Terese.
10:10 a. m.—Kiddie Klub.
10:40 a. m.—Harold Andrews, tenor.
10:50 a. m.—Fashion quizz.
1:30 p. m.—Scripture reading.
1:35 p. m.—Julia Stodeli soprano.
2 p. m.—Bob Kruh's Orchestra.

1:35 p. m.—Juna Stodell soprano.

2 p. m.—Bob Kruh's Orchestra.

3 p. m.—Laying of cornerstone for Level Club; Inez Quick, soprano.

6 p. m.—Uncle Geebee.

6:30 p. m.—The Dulcimerians; Crystal Ramblers.

7 p. m.—Dance instructions.

7:10 p. m.—The Dulcimerians; Crystal Ramblers.

7:30 p. m.—Dave Elman, burlesques.

7:30 p. m.—Winifred Vogelius, contraito.

8 p. m.—Rebstock String Trio.

8:10 p. m.—Winifred Vogelius.

8:20 p. m.—Marguerite Stern, soprano.

8:40 p. m.—Marguerite Stern, soprano.

8:40 p. m.—Marguerite Stern, soprano.

9 p. m.—Rosella Sheiner, violiniste.

9:10 p. m.—Crete Carton, nonsense ingles.

9:20 p. m.—Rosella Sheiner violiniste. jingles.
9:20 p. m.—Rosella Sheiner violiniste.
9:30 p. m.—Warners's Theater program
10:30 p. m.—Dance Orchestra.
WFBH—NEW YORK CITY—273

WFBH—NEW YORK CITY—273
2:00 p. m.—Sunlite Serenaders,
3:00 p. m.—Bert Lowe's Enfertainers,
4:00 p. m.—Montana Ramblers,
5:15 p. m.—irna Sachs, soprano,
5:36 p. m.—Marjorie Wall, soprano,
6:00 p. m.—Southern Serenaders,
7:00 p. m.—Radio Ramblers,
11:30 p. m.—Bronx Orchestra,
WOKO—NEW YORK CITY—233
8 p. m.—Caristine Thompson, planist,

8:35 p. m.—Christine Thompson, pianist. 8:50 p. m.—Vladimir Tobachnik, bary-

wMCA—NEW YORK CITY—341
6:00 p. m.—Olcott Vail's String Ensemble.
6:30 p. m.—Olcott Vail's String Ensemble.
6:30 p. m.—Joyce Meredith, readings.
7:00 p. m.—The Amphions.
8:00 p. m.—What's Happening Now."
8:15 . m.—Erva Giles, soprano.
8:30 p. m.—Leonard Hoenninger, barytone
8:45 p. m.—Erva Giles, soprano.
9:00 p. m.—Mario Alvarez, tenor.
9:15 p. m.—Leonard Hoenninger, barytone
9:30 p. m.—Mario Alvarez, tenor.
9:30 p. m.—Harvey Officer, planist.
10:00 p. m.—Ukulele Bob McDonald.
10:15 p. m.—Theo Hot Knights.
10:30 p. m.—Ukulele Bob McDonald.
10:45 p. m.—Patrick O'Connor, Theo Halleran, flutes.

10:35 p. m.—Patrick O'Connor, Theo Heleran, flutes.

11-12 p. m.—Ernie Golden's Orchestra. WRNY-NEW YORK CITY-258 145 a. m.—News flashes.
19:15 a. m.—Women's hour.
19:30 a. m.—"Exercises for Thin Women."
12:30 p. m.—Luncheon hour entertain-

12:30 p. m.—Luncheon hour entertainment.
2:30 p. m.—Radio matinee.
2:35 p. m.—Huismann Sisters, planistes.
2:45 p. m.—Deborah Lipson, soprano.
4:15 p. m.—Afternoon program.
7:00 p. m.—"Whose Birthday Today?"
7:05 p. m.—Telegraph sport flash.
7:20 p. m.—Commerce of the day.
7:20 p. m.—Fairy Tales, Gregory Harts-wick. wick.
7:40 p. m.—"Health," Dr. Siegfried Block.
7:45 p. m.—Concert orchestes

7:45 p. m.—Concert orchestra. 8:15 p. m.—Chas. Houbiel's Plano Series. 8:30 p. m.—Ben Bernie's Orchestra. 9:15 p. m.—"Labor - Capital," Matthew Woll. Woll.
9:30 p. m.—Bernstein Trio.
10:00 p. m.—'Harriet Beecher Stowe."
12-1 a. m.—DX Hound Hour with Ferruci's Orchestra on the Toonerville
Trolley.

WHAP—BROOKLYN—240
6.7 p. m.—Dinner music.

6-7 p. m.—Dinner music.

WBBR—STATEN ISLAND—273

When herg. musical 90 p. ni.—Fred Ehrenberg, musical saw 10 p. m.—L. Marion Brown, soprano. 20 p. m.—Bible questions and answers 40 p. m.—Soprano; musical saw. /AHG—RICHMOND HILL, N. Y.—316

WAHG-RICHMOND HILL. N. Y.—316
12 (noon)—Musical program.
12 (midnight)—Benfon Harbor Orchestra
WOR—NEWARK—405
6:45, 7:15, 7:45 a. m.—Gym Class.
2:30 p. m.—Banjo Boys.
2:45 p. m.—Talk. Eleanore Browne.
3 p. m.—Banjo Boys.
3:15 p. m.—Words Mispronounced."
6:17 p. m.—Shelton Dinner Music.
7:15 p. m.—"Sports." Bill Wathey.
7:30 p. m.—Van's Collegians.
8 p. m.—Talk. Arthur B. Reeve.
8:35 p. m.—Beatrice MacCue, contraito.
8:35 p. m.—Richard C. Hartt, barytone.
8:45 p. m.—Arthur Bascht, violinist.
9:15 p. m.—Arthur Bascht, violinist.
9:15 p. m.—Richard C. Hartt, barytone.
9:20 p. m.—Arthur Bascht, violinist.
9:15 p. m.—Richard C. Hartt, barytone.
11 p. m.—Arthur Bascht, violinist.
12 p. m.—Arthur Bascht, violinist.
13 p. m.—Richard C. Hartt, barytone.
14 p. m.—Arthur Bascht, violinist.
15 p. m.—Arthur Bascht, violinist.
16 p. m.—Arthur Bascht, violinist.
17 p. m.—Arthur Bascht, violinist.
18 p. m.—Arthur Bascht, violinist.
19 p. m.—Arthur Bascht, violinist.

tertainers.

9:45 p. m.—Arthur Baecht, violinist.

10 p. m.—Dick and Flo Bernard, entertainers.

10:15 p. m.—Mount Vernon Quartet.

10:30 p. m.—Clarence Williams Trio.

11 p. m.—Eddie Elkins's Orchestra.

WGCP—NEWARK—252

3 p. m.—Planist; race results (half hourly). 5 p. m.—Planist; race results (half hourly);
3:15 p. m.—Ukelele; Lou Hayes.
3:30 p. m.—Henrietta Cross, Maurice Abraham, songs.
3:45 p. m.—Ona Welch, planist.
4 p. m.—Rust, Henrichsen, banjoists.
4:15 p. m.—Cheatham's Orchestra.
WAAM—NEWARK—263
6 p. m.—Gus Steck's Orchestra.

WAAM—NEWARK—ZUJ
6 p. m.—Gus Steck's Orchestra.
7 p. m.—William Hohmyer, Elmer
Everiss, piano duetists.
7.15 p. m.—Alice Lauri, soprano.
7.35 p. m.—Jolly Bill Steinke.
7.50 p. m.—William Hohmyer and Elmer Everiss. 8:05 p. m.—Webster Quartet. 8:25 p. m.—Gill Family, musical novel-

p. m.—Gill Family, musical nov s; orchestra. p. m.—Sam Silverburg, reader. p. m.—Webster Quartet. p. m.—The Gill Family. m.—Hartley Joy Boys. WIP—PHILADELPHIA—508

6:45 a. m.—Setting-up exercises.
10:30 a. m.—Reducing exercises.
1 p. m.—Organ Recital.
3 p. m.—Dal Ruchis Arcadians. 6:05 p. m.—Dinner music.
7 p. m.—Bedtime Story.
8 p. m.—'Sports' Corner.''
8:15 p. m.—'The Music of the World."'
10:05 p. m.—Dance Music.
11:05 p. m.—Organ Regres! WOO-PHILADELPHIA 50 11 a. m.—Grard Organ. 12 (noon)—Luucheon Music. 4:45 p. m.—Grand Organ; Trumpets. WLIT—PHILADELPHIA—395

12:05 p. m.—Organ recital.

12:30 p. m.—Organ recital.

12:30 p. m.—Concert Orchestra.

2-3 p. m.—Concert Orchestra.

4:30 p. m.—Dance music.

7:30 p. m.—Concert Orchestra.

WFI—PHILADELPHIA—395

1 p. m.—Tea Room Ensemble.

2:45 p. m.—Football game, Army vs.

Notre Dame.

6:45 p. m.—Concert Orchestra.

8 p. m.—Tea Room Ensemble; artists.

WPG—ATLANTIC CITY—300

1:30 p. m.—Morton Luncheon Music.

6:45 p. m.—Organ recital.

1:30 p. m.—Morton Luncheor 6:45 p. m.—Organ recital. 7 p. m.—Dinner Music.

8 p. m.—Seaside Trio.

WGY—SCHENECTADY—380
3 p. m.—Football game: Army vs. Notre Dame, 8:15 p. m.—Army School Band Program. 30 p. m.—Dance program.
WRW—TARRYTOWN, N. Y.—273 9:05 p. m.—Musical program. 9:30 p. m.—Westchester County Charten 9:30 p. m.—Westenester County Cas George Slater. 10:05 p. m.—Serenaders. 10:30 p. m.—Johnson and Johnson. 11:05 p. m.—Dance Orchestra. WGR.—BUFFALO—319 2:45 p. m.—Football game: Arm

Notre Dame.
WHAM—ROCHESTER, N. Y.—278
Theater Orchestr :30 p. m.—Eastman Theater Orchestra.
-6 p. m.—Eastman Theater Orchestra.
-6 p. m.—Eastman Theater Orchestra.
-30 p. m.—Football scores; weather forecast; market report.
WJAR—PROVIDENCE—306 WJAR—PROVIDENCE—306
2:45 p. m.—Army-Notre Dame game.
WNAO—BOSTON—280
2:15 p. m.—Harvard vs. Holy Cross football game.
6:30 p. m.—WNAC dinner dance.
8 p. m.—Concert program.
10 p. m.—Dance music.
WEEI—BOSTON—349
1:45 p. m.—Health exercises.

p. m.—Dok Eisenbourgs' Orchestra.
WBZ—SPRINGFIELD, MASS.—333
p. m.—Play by play account of the count of the c 3 p. m.—Play by play account of the Harvard-Holy Cross football game.

WCTS—WORCESTER—263

10:30 a. m.—Radio chat; market report.

5:15 p. m.—Story teller.

WRC—WASHINGTON—469 p. m.—New Willard Orchestra p. m.—Washington Orchestra. p. m.—Bible talk. 15 p. m.—Musical program.

WCAP-WASHINGTON-469 3:45 a. m.—Health exercises. 3:30 p. m.—Navy-Princeton football game given play by play. WCAE-PITTSBURGH-461 6:30 p. m.—Dinner concert. 7:30 p. m.—Uncle Kaybee. 8:30 p. m.—Concert.

KDKA-PITTSBURGH-309

AMATEUR WICKBACKS

During the last three months many amateurs in the United States have still trying to make their sets oscil-

late on these short waves, equipment has been the cause of poor results. It is obvious that it is almost impossible to have a short wave transmitter operate on a wave length far below the fundamental of the antenna used in connection with the set. Although it is possible to operate the set on a harmonic of the antenna's wave length, for amateur operation this method is prohibited by law. Frankly, although many engineers claim this is an excellent means of utilizing the short waves, it does not appear to us that as much energy can be radiated as if the set were to operate on the fundamntal.

We know of a number of amateurs who have attempted to operate their stations on a short wave band with the antenna formerly employed for the 150 and 200 meter assignment. The outcome has been, in most cases, poor results, with the exception of a few who had an antenna with harmonics on the particular wave length they desired to employ.

With regard to the proper length of the antenna and counterpoise for 40 meter transmission, the general concensus of opinion seems to call for a thirty-five foot length for both. In most cases best results have been obtained with this antenna supported in a vertical position. It is a well established fact that a vertical antenna is ideal for transmission.

As for the correct number of wires in a short wave transmitting aerial, there is a difference of opinion. Some say a small cage is best, while others indorse the single wire antenna. We are inclined to favor the latter type. It is the easiest to erect and reports from stations employing the single wire antenna indicate that results are being obtained. The greater the number of wires in the antenna the greater the capacity. Again the old statement comes to our mind "where there is capacity there is wave length." Therefore, it would not be possible to build an antenna as high or as large if more than one wire were to be used. This would necessitate a lower antenna. It is always desirable to have an antenna

as high as possible. In spite of the agitation of a certain band of amateurs who are employing the use of the high waves exclusively it cannot be denied that ultra short waves are excellent for long distance transmission. By this we do not mean to say that the high waves are useless-for they are far from it. For local communication there is nothing like them. It has come to be known as the "rag chewers" band. Rag chewing is not objectionable. On the contrary it should be encouraged, as it tends to promote a fraternal spirit among the transmitting amateurs of the country. However, the short waves have demonstrated their ability for covering great distances, and should be tried by every transmitting amateur who has a set in operation.

Another station which was recently converted to short wave transmission is 2BIR. The first night of operation a Pacific Coast station was worked on 40 meters. The transmitter at 2BIR employs a fifty-watt tube with 700 volts at 100 milliamperes on the plate. The antenna current at 39 meters is a little greater than three-quarters of an ampere All districts have been worked during the past week.

Announcement was made by the Radio World's Fair of the presentation of a silver cup trophy to Donald S. C. Comstock, of East Hartford Conn., for his contribution to radio science and the cause of exploration. Comstock heard the MacMillan ex-

pedition more than any other operator in America. He is a broadcast listener who became a "ham." The American Radio Relay League was in charge of the contest, and through K. B. Warner sent this telegram relative to Comstock's record:

"Three years ago he became interested in transmitting amateur radio work. Known as a prosperous tobacco planter and packer in his native Connecticut Valley, he has created an enviable record in pursuit of his fascinating hobby, amateur radio, working on short wave lengths-20 and 40 meters-from his station, which is known as 1MY.

A Four-Element Vacuum Tube | contains a regular filament and plate, | plate, being connected to the plus of | WEBJ Offers Hour Program Available to British Fans but has two grids instead of one. The the B battery in amplifier circuits. A real four-element vacuum tube, extra element is placed between the

something known in the United States its external terminal in the form of Selections From Polly, by Gay the benefit of "shut-ins." Around 8 only to a few laboratory experi- a flexible wire, which is independent The Cherry Lane Players will o'clock A. Wayne, the entertaining British radio fans and finds employ- base.

The novel bulb, made in the wired to each. The extra element is "The Beggar's Opera," also by Mr. play a half-hour of peppy dance famous Mullard works in London, also used in one arrangement as a Gay.

For 'Shut-Ins' Friday Evening radio musical selections from their reporter, will flood the ether with ment by the latter in unusual circuits, The two grids are connected to ad- lightful eighteenth century operetta, Law will sing love songs and at 8:30 current revival of John Gay's de- entortaining nonsense. At 8:10 Edith operate on 40 meters or below. While according to the National Radio vantage to obtain double regenera- at 11:30 from WGBS. It is a coinci- the original Mobile Quintet, under tion with the aid of tickler coils dence that "Polly" is the sequel to two lirection of Joseph Leyser, will music. Good-night will be said at 9,

the set and amateurs to operate their ve band with ployed for ignment. cases, Bramdes

A COUSTICS is the science of

11 sound. Radio acoustics is the

science of transforming electrical

impulses into audible sound—the

absorbing study of radio repro-

duction. And in this field Brandes

Brandes recently announced a new,

complete line of speakers that

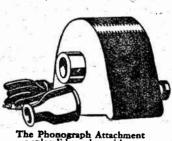
bring out a wealth of tones that

heretofore were muffled and lost.

have been pioneers since 1908.

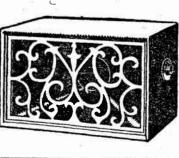


The Type H—a simple horn of graceful lines and antique green and black finish. Great in volume—true in tone. Adjustable by the turn of a thumbscrew.





The Brandes Cabinet of mahogany finished in walnut brown. The same unit, quality of tone, and even greater volumethan





Yes, really better radio!

In the middle register—the speaking voice—most of the good speakers are thoroughly satisfactory.

But—and this is the real test—tune in a piano solo. Listen to the high notes. And the low. Listen to the piano accompaniment of a song or a violin solo. You'll notice that a Brandes brings out a full range of perfectly natural tones. A mellow, complete harmony-with not a trace of nasal tone.

Test these speakers yourself

There's really only one way to buy a radio speaker. Hear as many as you choose. Test them thoroughly. You will find that the Brandes Speakers have more tones, fuller harmonies, wider range—and that they speak and sing with a very definite and satisfying







The Audio-Transfor

EXPERTS IN RADIO ACOUSTICS SINCE 1908

THE TAX TO THE TAX TO

The Herald Tribune Daily Broadcasting Programs for Week Ending October 17

TO-DAY WJZ-NEW YORK CITY-455 9 a. m.—Children's hour: Stories, music, comic stories. 11 a m.—St. Thomas's Episcopal Churca services; Rt. Rev. Frank Du Moulin. 12:30 p. m.—Rivoii Theater Concert, orchestra and soloists, Dr. Hugo Riesonfield, conductor. 13:30 p. m.—World Series Baseball Game; Major J. Andrew White announcing. 7 p. m.—Nathan Abas's Concert Orchestra. 8 p. m.—Baseball results. 8:35 p. m.—Reminiscences of a Reporter, William H. Crawford. 8:30 p. m.—Reminiscences of a Reporter, 8:30 p. m.—Reminiscence of a Reporter, Stories, music

J. m.— Reiningsenos Iliam H. Crawford, n.m.—Prince Mohiuddin, 'cellist; William H. Crawford.

8:30 p. m.—Prince Mohiuddin, 'cellist;
Kazel Leitner, acompanist,
p. m.— Broadcast of "The
Prince," with lise Marvenga,
Marsh and a chorus.

10 p. m.—Godfrey Ludlow, violinist,

WJY—NEW YORK CITY—405
10 p. m.—Sunday Radio Forum; Dr. Isaac
Ward, barytone; Joe Wexel, tenor.
10 p. m.—Mario Calati, 'cellist; Lucille BisO p. m.—Mario Calati, Cellist; Euclide Black, accompanist.

p. m.—St. George's Episcopal Church Vesper services; Dr. Karl Reiland, rector; George Kommer, organist; Mozelle Bennett, violinist; George Bagdasarian. tenor. 8:15 p. m.—Bernhard Levitow's Concert Or-

stra. n.—Morris L. Courtright, barytone. 10 p. m.—Morris L. Courtright, barytone,
WEAF—NEW YORK CITY—492
2 p. m.—'Sunday Hymn Sing."
2:45-3:45 p. m.—Interdenom.national Services; address by Rev. Charles H. Sears; Federation Quartet; Brass Quartet.
6:45-5:30 p. m.—Men's Conference in Y. M. C. A.; address by Dr. S. Parkes Cadman, Gloria Trumpeters.
7:30-9:15 p. m.—'Capito! Theater Family."
7:15-10:15 p. m.—'Atwater Kent Hour";
Toscha Seidel, violinist.
WGRS—NEW YORK CITY—116 WGBS-NEW YORK CITY-316

p. m.—Wa.no: S Theater p. ogram.
p. m.—New York String Ensemble.
o. m.—Massenet: "Manon."
m.—New York String Ensemble. WMCA-NEW YORK CITY-341 n. — Christian Science Service p. ni.—Symphonia String Quartet m.—Roemer's Homers, m.—Ernie Golden's Orchestra. p. in a cott Val. s. s. ing Ensemble.
WNYC-NEW YORK CITY-526
m.-Play by play description of the WENY-NEW YORK CITY-258

245 p. in.—Physical-Spiritual concert.
250 p. in.—Physical-Spiritual concert.
250 p. in.—Meta Christenson, Irving Quartet.
250 p. in.—Dr. Reisner's Hour.
251 p. in.—"Law Enforcement." Emory F.
252 Buckner. Buckner.
4:30 p. m.—Dr. Reisner. "Cost of Success."
5 p. m.—New York Quintette, Fidelman, Gunzberg, Stillinan, Ocko and Shuk.
5:15 p. m.—Chades D. Isnacson's concerts from De Witt Clinton High School; Norfieet T to. Lound Lea. Co. nelia Zuccarri and others.

whn.—NEW YORK CITY.—361

1 p. m.—Marsh McCurdy, organist.

2:30-3:30 p. m.—Queens County Christian
Endeavor program.

7:30-10 p. m.—Calvary Baptist Church WEBH—NEW YORK CITY—273

n.—Fleid Artillery Band,
m.—Masonic news.
p. m.—Arright Choir Singers.
p. m.—Bossert Lumber Jacks.
m.—Talk.
p. m.—Franklin Four.
WBBR—Staten Island—273
m.—Waichtower Ornberts

ford.

11 a. m.—Tenor; orchestra. 9 p. m.—Choral Singers. 9:15 p. m.—String Quartet. 9:30 p. m.—Bible lecture, Judge Ruthe 10 p. m.—Quartet; singers. WGCP—Newark—253

WGCP—Newark—25\$

8 p. m.—Charlotte Trystmann, pianist, 8:15 p. m.—Raiph Hersh, Violinist. 8:30 p. m.—Milton Yokeman, tenor. 8:45 p. m.—Ona Welsh, pianist. 9 p. m.—Mildred Newman, soprano, 9:15 p. m.—Billy Rhodes, tenor. 9:30 p. m.—Benstein Trio. 10:15 p. m.—Bernstein Trio. 10:15 p. m.—Strickland's Orchestra. WIP—Philadelphis—508 7:45 p. m.—Evening service. 9:30 p. m.—Ben Stad's Orchestra.

WOO-Philadelphia—508
10:45 a. m.—Morning services.
1:40 p. m.—World series game.
2:30 p. m.—Musical exercises.
6 p. m.—Sacred organ recital. WLIT-Philadelphia-395 WFI—Philadelphia—395 m.—Chapel service.

WCAU-Philadelphia-278 n.—Frederick Robinson, soprance, b. m.—Talk, the Rev. John W. Stock-5:85 p. m.—Recital .

WPG—Atlantic City—300

2 p. m.—World series game.
4:15 p. m.—Vocal and instrumental recital. WHAR-Atlantic City-275 p. m.—Short sacred recital.
p. m.—Evening service.
m.—Seaside Hotel Trio.
p. m.—Strand organ recital. WGY-SCHENECTADY-380 0:80 a. m.—Service Theater Orchestra.
2:30 p. m.—Rivoli Theater Orchestra.
440 p. m.—World series game.
39 p. m.—First Lutheran Church.
p. m.—Address. "The Daughters of Revolution."

Revolution."

9:15 p. m.—Broadcast from WJZ of "Th Student Prince."

10 p. m.—Godfrey Ludlow, violinist. WBW-TARRYTOWN, N. Y.-273 8:05 p. m.—Services. 10:30 p. m.—Musical program.

WGR—BUFFALO—319
2:30 p. m.—World series game.
8 p. m.—Evening service.
9:15-10:15 p. m.—Toscha Seidel, violin WIAR--PROVIDENCE—306

1:40 p. m.—World settles baseball game,
7:20 p. m.—Capitol Theater.
9:15 p. m.—Atwater-Kent radio hour. WTIC-HARTFORD, CONN.-476 1:40 p. m.-World's series plan WNAC-BOSTON-280

1:40 p. m.—World series game. 7:20 p. m.—Capitol Theater Family. 9:15 p. m.—Toscha Seidel, violinist. WBZ—SPRINGFIELD, MASS.—333 10:45 p. m.—Church services, 8 p. m.—Holy Cross College program.

wCTS—WORCESTER—268

1:40 p. m.—World series baseball game,
3:45-6:30 p. m.—Address by Dr. S.
Cadman; music,
7:20-9:15 p. m.—Capitol Theater Family,
9:15 p. m.—Toscha Seidel, violinist, WCAP—WASHINGTON—409 m.—services. . m.—World series baseball game

1:40 p. m.—volu. 4 p. m.—Service. 7:20-9:15 p. m.—"Capitol Family." 9:15 p. m.—Toscha Seidel, violinist. KDKA--PITTSBURGH-309 . m.—Church service.
m.—World series game.
m.—Vesper service.
m.—Church service. WCAE-PITTSBURGH-461

...-People's church services. m.—Dinner concert. m.—Capitol Theater Gang.

6:30 p. m. Dinner mist.

WEAR—CLEVELAND—390 m.--Theater orcnestra.

b. m,--Mixed quartet; instrumen quartet. WLW-CINCINNATI-122

p. m.—Concert. WKRC—CINCINNATI—326 7:45 p. m.—Sorgs and service.
11 p. m.—Classical program by artists.
WSAI—CINCINNATI—326
3:45 p. m.—Program from WEAF
8:30 p. m.—Sermonette chime concert.
WWJ—DETROIT—353 7:20 p. m.—Capitol Theater program. WREO—LANSING—286

8 p. m.—Club service.
WLS—CHICAGO—345 7:30 p. m.—Organ solos.
8 p. m.—Little Brown Church.
WCBD—ZION CITY—345
9 p. m.—Male quartet and celestial 1
WHT—CHICAGO—400
7:30 p. m.—Tabernacie and choir.
10:30 p. m.—Request program.

9-11 p. m.—Rainbow Gardens Orc WOC—DAVENPORT—484 9:15 p. m.—Program from WEAF. 10:45 p. m.—Symphony orchestra. WSUI—IOWA CITY—484 10:15 p. m.—Familiar hymns.

KFMX—NORTHFIELD, MINN—337 p. m.—College vesper service. WCCO—ST. I'AUL—416 10:20 p. m.-Classical convert. KTHS-HOT SPRINGS-275 10 p. m.—Arlington Orchestra.
11 p. m.—Baxter's Singing Orchestra.
WOAW—OMAHA—526
10 p. m.—Evening chapel service.

MONDAY

WEAF-NEW YORK CITY-482 45-7:00 and 7:20-7:45 a. m.—Health ex ercises. 0:45 a. m.—Home Service talk. 1:06 a. m.—Musical program. 11:15 a. m.—"The Will Spring," W

:30 a. m.—Music. :35 a. m.—Talk, Henry Carmen. 1:35 a. m.—Talk, Henry Carmen.
1:55 a. m.—Music.
2:000—Market and weather reports.
2:40 p. m.—World Series baseball game.
2:40 p. m.—Harriet Mittelstaedt, soprano.
1:0 p. m.—Harniet Mittelstaedt, soprano.
1:0 p. m.—Famous Players Orchestra.
1:25 p. m.—Famous Players Orchestra.
1:0 p. m.—Columbus, Jan J. Carlee.
p. m.—Christopher Columbus.
1:15 p. m.—Musical program from Strand Theater; remarks by Joseph Plunkett; vocal and instrumental artists.
30 p. m.—Rudoiph Joskowitz, violinist
1:46 p. m.—"Tower Health Talk."
1:50 p. m.—Busic by Gypsics.
1:50 p. m.—Ben Bernie's Orchestra.

WJZ-NEW YORK CITY-455
a. m.—Women's hour.
p. m.—Meyer Davis's Music.
4. 6:15, 8 and 10:30 p. m.—News.
30 p. m.—World Series game.
to 6 p. m.—Scores, racing (half hourly)
:20 p. m.—Meyer Davis's Orchestra.
:15 p. m.—News, baseball, racing.
:25 p. m.—Market reports.
:5:50 p. m.—Financial summary.
:6:01 p. m.—Baseball, racing returns.
7 p. m.—Bernhard Levitow's Concert.
8 p. m.—Scores, racing returns.
8:10 p. m.—Philip Steele, barytone.
8:30 p. m.—Phogram from Landay H;
9:30 p. m.—Program from Landay H;
9:35 p. m.—Minnie Weil, planist.
10 p. m.—Do announced.

9:45 p. m.—Minnie Well, planist.

10 p. m.—To be ahnounced.

10:15 p. m.—Minnie Well, planist.

10:30 p. m.—Minnie Well, planist.

10:30 p. m.—Joseph Knecht's Onchestra.

WGBS—NEW YORK CITY—316

10:10 a. m.—Timely talk with Terese.

10:10 a. m.—Fashion talk; plano solos.

10:40 a. m.—Feducing talk; plano solos.

10:30 p. m.—Scripture reading.

1:35 p. m.—Gertrude de Verney, soprano.

2 p. m.—Alois Van Megen. tenor.

3 p. m.—Interview with Maurice Schwartz.

3:10 p. m.—Choir from prologue of "King Saul."

3:10 p. m.—Choir from prologue of "King Saul."

3:20 p. m.—Interview with Samson Raphaeison.

3:30 p. m.—Wking Saul" Choir.

3:35 p. m.—Deborah Lipson. soprano.

3:40 p. m.—Elizabeth B. Collier, "Amendments to the State Constitution."

3:50 p. m.—Deborah Lipson. soprano.

6 p. m.—Uncle Geebee.

6:30 p. m.—Premier Orchestra.

7 p. m.—Belle Bart, talk.

7:10 p. m.—Premier Orchestra.

WRNY-NEW YORK CITY-258

Deer.

12:30 p. m.—Eve Rothenburg, planist.

1 p. m.—Warren Burns, harmonica.

1:15 p. m.—Judith Roth, songs.

4:15 p. m.—Radio reminiscenses.

4:30 p. m.—Frank Garborino, accordion.

4:45 p. m.—Jeanette Sterns, planist.

7 p. m.—"Whose Birthday To-day?"

7:05 p. m.—Telegraph sport flash.

7:15 p. m.—Code Lesson, Radio Rex.

7:20 p. m.—Code Lesson, Radio Rex.

7:45 p. m.—Major Dent Atkinson.

8 p. m.—Ferruci's Orchestra.

8:05 p. m.—Ferruci's orchestra.

8:05 p. m.—Fullator's series.

8:30 p. m.—Painters' series.
8:45 p. m.—Ferruci's Orchestra.
8:45 p. m.—Jazzing Andanie Cantabile.
9 p. m.—"Interfiex Circuit."
9:15 p. m.—Music travelogue.
9:45 p. m.—Paul Bernard, violin dances.
10 p. m.—The Petery Post.
10:10 p. m.—"The Body." by Dr. Bolton.
10:15 p. m.—Popula's songs.
10:30 p. m.—Ross Dreeben, "Poet-Peasant.
10:45 p. m.—Florence Gerringer, pianist. WMCA-NEW YORK CITY-341 (noon)—Olcott Vail's String Ensemble 00 p. m.—Olcott Vail's String Ensemble 30 p. m.—Ernie Golden's Orchestra.

WLWL—NEW YORK CITY—288 30 p. m.—Columbus Day commemors exercises at Carnegle Hall, K. of C. Club. Speakers—John J. Crosby Congressman Frank B. Oliver. WNYC-NEW YORK CITY-526

30 p. m.—Elementary Germany lesso 00 p. m.—Advanced German lessons. Firmin. 8:30 p. m.—Commendatore Godono tenor. 8:50 p. m.—Virginia Pinner, soprano. 9:10 p. m.—Commendatore Gadono tenor

30 p. m.—Virginia Pinner, soprano. 50 p. m.—St. George Dance Orchestra. 0.30 p. m.—Police alarms; weather. 0.35 p. m.—St. George Dance Orchestra. WHN-NEW YORK CITY-361

WHN—NEW YORK CITY—361
2:15 p. m.—Evelyn Ryan, pianiste
2:25 p. m.—Bob McDonald, songs.
2:35 p. m.—Marce! Doublier, solos.
2:45 p. m.—Judith Roth, soprano.
3:00 p. m.—Albert Rossback, barytone.
3:45 p. solos.
3:45 p. m.—To be announced.
3:30 p. m.—Loslie McLeod, tenor.
3:40 p. m.—'Sunshine Talks," Billy Van.
7:00 p. m.—Marlboro State Trio.
7:30 p. m.—Swanee Orchestra.
8:05 p. m.—'Storage Battery," H. B. Shontz.
8:30 p. m.—Perry and Russell, two-man or-:30 p. m.-Perry and Russell, two-man or 8:39 p. m.—rerry and Russen, two-man of chestra.
8:50 p. m.—Gertrude Sf. Clair, soprano.
9:00 p. m.—"Lanias Hawaiians,"
9:30 p. m.—Philip Krumholtz, barytone.
9:45 p. m.—Mr. and Mrs. Leo Wood, songs.
11:00 p. m.—Marsh McCurdy, organist,
11:30 p. m.—Revue and orchestra.
12:00 p. m.—Ted Lewis's Orchestra.

WFBH-NEW YORK CITY-273 2 p. m.—Orchestra. 2:80 p. m.—Garibaldi Arrighi Singers. 3 p. m.—William Sullivan, barytone. 3:15 p. m.—Marcedes Hauser, soprano. 3:45 p. m.—Labolle Evans, soprano. 4 p. m.—Orchestra. 4:45 p. m.—Marjorie Wall, songs. p. in.—Marjoite wan, songs.

p. in.—Theo. Alban, tenor.

30 p. m.—Knickerbocker Hospital Talk

245 p. m.—Mrs. Matty Levine, songs.

115 p. m.—Majestic String Ensemble.

1130 p. m.—Alvin Hauser's "At Home

Party."

WHAP—BROOKLYN—240

7-8 p. m.—Dinner music.
WBBR—STATEN ISLAND—273

8:50 p. m.—Vocal Duets.
WAHG—RICHMOND HILL, N. Y.—316
12 noon—Musical program.
7:30 p. m.—Louise Rebman, Ethel Jamgotchian, plano duets.
7:45 p. m.—Samuel Gray, barytone.
8 p. m.—Martha Brauninger, soprano.
8:15 p. m.—Synchrophase Trio.
8:45 p. m.—Horace Taylor, reader.
9 p. m.—Artists.
9:30 p. m.—Synchrophase Trio.
10:05 p. m.—Glenn Smith's Orchestra.
WOR—NEWARK—405
6:45-7:15-7:45 a. m.—Gym Class.
2 p. m.—Reserved for World Series Game.
3:15 p. m.—Words Mispronounced."
3:17 p. m.—Shelton Dinner Music.
7:15 p. m.—Sports, Bill Wathey.
1:30 p. m.—Frances Williams, Al Wohlman and Eddie Elkins' orchestra.
9 p. m.—Marle LeViness, soprano.
8:15 p. m.—George Gilmore "American Archaeology".
1:30 p. m.—Edward H., Bierstadt "Crete."
1:35 p. m.—Ballin and Race, piano due.
10:30 p. m.—Joseph M. Barnett, barytone.
10:15 p. m.—Archle Slater's Orchestra.
11 p. m.—Joseph M. Barnett, barytone.
11:15 p. m.—Fallin and Race, piano due.
10:30 p. m.—Archle Slater's Orchestra.
11 p. m.—Joseph M. Barnett, barytone.
11:15 p. m.—Fallin and Race, piano due.
10:15 p. m.—Helen Ford and Charles Purcell, songs.
WAAM—NEWARK—263

Purcell, songs.
WAAM—NEWARK—263 a. m.—Happy hour program, John

p. m.—Ben Goldfarb's Orchestra. m.—Entertainers.
p. m.—The Sport Oracle.
m.—Philip Hochberg, violinist.
p. m.—Taix by Vice-President Charic
Dawes from Elizabeth Y. M. C. A. n.—Philip Hochberg, violinist b. m.—Arline Felker's pupils. m.—Smiles and Giggles. p. m.—Herman Zieglor's Orchestr WGCP—NEWARK—252 WGCP—NEWARK—252

m.—Andy Pendleton's Band; race reults (half hourly).

p. m.—Eva Rothenberg, pianologue.

p. m.—Eva Rothenberg, pianologue.

p. m.—Sie Ross, harmonica.

p. m.—Shirley Herman, blue singer.

p. m.—Ona Welch, pianist,

m.—Silvio De Rienzò, pianist,

m.—Scilvio De Rienzò, pianist,

p. m.—Cecil Kenndy Quintet,

p. m.—Bob Ward's little Wards,

m.—Strickland's Orchestra,

p. m.—Radio Hour,

p. m.—Ritz Orchestra.

1 a. m.—Organ recttal.
2 noon—Luncheon music.
3 to p. m.—Organ organ; trumpets.
5 p. m.—Musical program from New York
Strand Theater.
8 30 p. m.—Rudolph Joskowitz, violinist.
8 45 p. m.—Ralph C. Wentworth, barytone,
9 p. m.—Music by Gypsies.
10 p. m.—Your Hour.
10:30 p. m.—Pance music. n.—Dance music. WIP—PHILADELPHIA—508 WIP—PHILADELFHIA

8:45 p. m.—Setting-up exercises.

1 p. m.—Luncheon music,

8:05 p. m.—Dinner music,

7 p. m.—Bedtime Story; dancing lessons,

WFI—PHILADELPHIA—395

WKI-F SEASON 10:30 a. m.—Solos.
10:40 a. m.—Home Service Talk.
1 p. m.—Tea Room Ensemble.
3 p. m.—Plano solos; talk; violin solos.
3,45 p. m.—Fashion Feature. m.—Concert orchestra. WLIT—PHILADELPHIA—395

WCAU—PHILADELPHIA—278 30 p. m.—Leedom Sisters, barytone.
50 p. m.—Glovanni Pasquale, barytone.
50 p. m.—Music Appreciation."
p. m.—The Amsterdam Girl.
10 p. m.—Danny Dougherty, songs.
40 p. m.—Freedman and Travaline, songs.
wPG—ATLANTIC CITY—299
p. m.—World Series same.

p. m.—Trio dinner music.
p. m.—Columbus Day talk.
5:15 p. m.—Studio program.
p. m.—Ambassador Concert Orchestra p. m.—Dance orchestra. WHAR—ATLANTIC CITY—275

p. m.—Seaside Trio: 30 p. m.—Stories for little folks. WGY—SCHENECTADY—380 m.—World series baseball game.
p. m.—Asia Orchestra.
p. m.—Dinner program.
p. m.—'Bulbs for the Home."
p. m.—'Bulbs for the Home."
p. m.—Italian program by WGY Or.
stra; Karl Nygren, soprano, Literary
p. cciation series.

WRW-TARRYTOWN, N. Y.-273 n.—Child en's stories. in.—Musical program. m.—Musicale. WGR—BUFFALO, N. Y.—319 a. m.—Home service talk.

WGR—BUFF Sarvice talk.
2:30 p. m.—World series game.
6:30 p. m.—Dinner music.
9 p. m.—Edna Hurd, soprano.
9:15-10:15 p. m.—Choir of church.
11 p. m.-1 a. m.—Supper music. WHAM—ROCHESTER, N. Y.—278 p. m.—Eastman Theater Orchestra p. m.—Eastman Theater organ. m.—Eastman Theater Orchestra. p. m.—Weather forecast; markets

WHAZ-TROY, N. Y. 380

D. m.—Concert by Martha Geiser, soprano; Georgine Lasher, contraito; Alexander Bouchard, tenor; Albert Geiser,
barytone; Mrs. James McGiffert, Annette
Levesque, accompanists.

11 p. m.—Campus Serenaders. 1 p. m.—Campus Serenaders.

WJAR—PROVIDENCE—306

10 a. m.—Housewives Radio Exchange.
1:40 p. m.—World series game.
8 p. m.—Berry spring time.
8:50 p. m.—Musical program.
8:50 p. m.—'American Red Cross."
9 p. m.—A. & P. Gypsles.
10 p. m.—Orchest a selections.

WTIC-HARTFORD, CONN.-478 wTitc-Hartrond, CONN.—478
2 p. m.—World's series, play by play,
5:30 p. m.—Emil Heimberger's Trio.
5:45 p. m.—Weather report; scores,
7:45 p. m.—Talk,
6 p. m.—Dinner music. WNAC-BOSTON-280 WNAC—BOSTON—280

2 p. m.—From the Radio Show, Morey
Pearl's Ramblers.
2.45 p. m.—Columbus Day celebration.
6 p. m.—Kiddies' Klub.
6:30 p. m.—WNAC dinner dance.
7.35 p. m.—Jeff Lazarus.
7.45 p. m.—Copley Plaza Orchestra.
8 p. m.—Knights of Columbus program
from the Radio Show. WEET—BOSTON—349

6:45 a. m.—Tower health exercises.

10:45 a. m.—Home Service talks.

2-4 p. m.—Concert from radio show.

6:20 p. m.—Lost and Found; weather.

6:30 p. m.—Hig Brother Club.

7:20 p. m.—'1925 Air Races.''

7:30 p. m.—'1925 Air Races.''

8:30 p. m.—Tower health talk.

8:45 p. m.—Eith Chapman, soioist.

9 p. m.—Gypsies. WBZ-SPRINGFIELD, MASS.-333

p. m.—Program in observance of lumbus Day; Elks' quartet; addres Thomas J. Collins; songs. 0 p: m.—Leo Reisman's Orchestra. WCTS-WORCESTER-268 12-2 p. m.—Luncheon music. 7:15 p. m.—Story Teller. 7:45 p. m.—Statistical report. 8 p. m.—Concert.

WRC-WASHINGTON-469 WCAP—WASHINGTON—469 8:45-7:45 a. m:—Health exercises.
7:15 p. m.—Dally market summaries
7:45-8:45 p. m.—Gloria Trumpeters;
d ess by D. S. Pa. kes Cadman.
8:45 p. m.—Health talk.
9-10 p. m.—Music by Gypsies. KDKA-PITTSBURGH-309

m.—Dinner concert.
m.—The children's period.
m.—Book chat.
m.—Happy Home Hour. WCAE—PITTSBURGH—461 m.—Dinner concert. m.—Uncle Kaybee. Gypsies.
Loew's Aldine Theater. WADC-AKRON, OHIO-258

WEAR-CLEVELAND-390 WTAM-CLEVELAND-396 n.—Dinner music. . m.—Musical program. m.—Dance music. WKRC-CINCINNATI-326

m.—Dinner dance.

m.—Freda Sanker's Orchestra.
idnight)—American Legion prog

m.—Tneatrical stars; orchestra. WSAI CINCINNATI -326 WLW-CINCINNATI-422

WJR-DETROIT-517 m.—Orchestra; soloists, m.—Goldkette's Serenaders; WWJ-DETROIT-353 8 p. m.—Dinner concert. 8 p. m.—Band and Gypsies. WREO-LANSING, MICH.-286

WMAQ CHICAGO 448 wsui-lowa city-484
p. m.—College of the Air.
m.—Faculty of School of Music.

KSD-ST. LOUIS 545 WDAF-KANSAS CITY-366 p. m.—School of the Air.
p. m.—"Around the Town."
2:45-2 a. m.—Nighthawk Frolic.

WCCO-MINNEAPOLIS-ST. PAUL 416 7:45 p. m.-F. and R. Family; farm lec ture. 9:15 p. m.—Church organ recital. 11:05 p. m.—Songa. KTHS HOT SPRINGS 375
10 p. m.—Orchestra dance music; solos.
10:45 p. m.—Organ recital

WOAW—OMAHA—526

7 p. m.—Organ recital. 7:50 p. m.—Popular song period. 5 p. m.—Orchestra. 10 p. m.—Skeen Trio; orchestra. WMC_MEMPHIS_500 WSB-ATLANTA-428

WCAO-BALTIMORE-275 p. m.—Vocal and instrumental music. p. m.—Murphy's dance music. KPRC—HOUSTON, TEX.—297 p. m.—Record's Ramblers. p. m.—Band.

WFAA-DALLAS-476 7:30 p. m.—Ford and Glenn. 9:30 p. m.—Agricultural program.

TUESDAY

WJZ-NEW YORK CITY-455 1 a. m.—News.
1 05 a. m.—"Housekeeping," talk.
p. m.—Nathan Abas's music.
4, 5:15, 8 and 10:30 p. m.—News.
6 p. m.—Scores, racing (half hourly).
120 p. m.—Bernhard Levitow's mus.

WHN—NEW YORK CITY—361

2:15-3:15 p. m.—Marsh McCurdy, organist.

2:15-3:15 p. m.—Overture, and vaudeville.

3:15 p. m.—Uncle Robert's Pals.

4:30 p. m.—Lexington Theater-Orchestra.

4:45 p. m.—Isidore Levine, violinist.

7 p. m.—Iceland Orchestra.

3:0 p. m.—Uncle Robert's Pals.

4:00 p. m.—Lexington Theater Orchestra.

3:0 p. m.—Uncle Robert's Pals.

4:00 p. m.—Uncle Robert's Pals.

4:00 p. m.—Welle Besser, tenor.

7:20 p. m.—Welle Besser, tenor.

7:20 p. m.—Malle quartet, ladies' quartet all orchestra.

9:30 p. m.—Organ recital.

WEEL—BOSTON—349

6:45 a. m.—Tower Health Exercises.

4:4 p. m.—Joe Rines's artists.

6:25 p. m.—Lost and Found; weather.

6:30 p. m.—Big Brother Clut.

7:30 p. m.—Big Brother Clut.

7:30 p. m.—Eliot Daniel, planist.

7:45 p. m.—Verna Ruben, soprano.

8 p. m.—Ross Gorman's Orchestra. 5-15 p. m.—News, baseball, racing.
5-26 p. m.—Market quotations.
5-50 p. m.—Baseball, racing returns.
6-30 p. m.—N. Y. University course.
7 p. m.—'Russian Wolf Hounds:" Frank
Doie, of the Herald Tribune.
7-15 p. m.—'Vanderbilt Concert Orchestra.
8 p. m.—Scores, racing returns.
8-05 p. m.—Musicale.
9-20 p. m.—Warner Hawkins, planist.
10 p. m.—Over the Seven Seas.
10:30 p. m.—Mayflower Orchestra.
WIV—NEW YORK CITY. WJY—NEW YORK CITY—405 7:30 p. m.—Ambassador Trio. 8:10 p. m.—To be announced.

Eastern Standard Time

WOR-NEWARK-405

WGCF—NEWARK—252

3 p. m.—Songs; race results (half hourl
3:15 p. m.—Slivio De Rienzo, pianist.
3:30 p. m.—Larry Roline, songs.
3:45 p. m.—Piano solo.
4 p. m.—Sam Silver's Troubadors.
4:30 p. m.—Wm J. Rietz, songs.
4:45 p. m.—Della Riordan, barytone.

4:45 p. m.—Della Riordan, barytone, WAAM—NEWARK—263
11 a. m.—Happy Hour, 11:15 a. m.—Cooking lesson; Happy continued

p. m.—The Blackstone Orchestra, p. m.—Alice Downs, contralto.

9:45 p. m.—Talk on New Jersey.
10 p. m.—Will McWalters; songa.

W60—PHILADELPHIA—568
11 A. M.—Grand organ,
12 (noon).—Luncheon music.
4:45 p. m.—Grand organ; trumpets.
7:30 p. m.—Saxophons octet.

WIP.—PHILADELPHIA—568
6:45 a. m.—Setting-up exercises.

WPG ATLANTIC CITY-300

-World Series Came

WGY—SCHENECTADY—380
p. m.—World series game.
30 p. m.—Organ recital.
30 p. m.—Organ recital.
30 p. m.—Dinner program.
30 p. m.—Widscovery of Electrons.
45 p. m.—WGY Orchestra; Frank

tenor.

10 p. m.—Travel talk.

10 30 p. m.—Tupman's Mayflower

WRW-TARRYTOWN, N. Y .- 273

WHAM-ROCHESTER, N. Y .- 278

wJAR—PROVIDENCE—306
p. m. World series game.
p. m.—Musical program.
p. m.—Gold Dust Twins.
m.—"E eyready Hour."

8:30 p. m.—"Trip Through a Radio Sta-tion," Fred. J. Turner. WEAF—NEW YORK CITY—492 6:45-7:45 a. m.—"Tower Health Exer cises," to WEAF, WEEI, WCAP. 11 a. m.—Musical program to be an m .- Railroad Talk, Garrow T. Geer. nounceu. :10 a. m.—Lecture. WAHG-RICHMOND HILL, N. Y.—316

11:25 a. m.—Music.
11:35 a. m.—Motion Picture Forecast.
11:35 a. m.—Motion Picture Forecast.
11:30 a. m.—Music.
12 noon—Market and Weather Reports.
4 p. m.—Frederic Carter, barytone.
4:15 p. m.—Constance Huismann, piani
4:30 p. m.—Women's program: Addres
Mrs. Ida Bernardick, songs.
6 p. m.—Dinner music.

Mrs. Ida Bernardick, songs.
6 p. m.—Dinner music.
7 p. m.—Lillian Milier, gypsy songs.
7:10 p. m.—Columbia University Lectur
7:30 p. m.—Davis Savophone Octette.
8 p. m.—Financial Eventa.
8:10 p. m.—Ross Gorman's Orchestra.
8:30 p. m.—The Twins.
9 p. m.—Eveready Hour.
10 p. m.—Grand Opera, "Samson Delilah."
11-12 p. m.—Meyer Davis's Orchestra.
WGRS—NEW YORK CITY—316 WGBS-NEW YORK CITY-316 WGBS-NEW YORK CITY-316
10 a. m.—Timely Talk with Terese.
10:10 a. m.—Catherine Robinson, soprano.
10:20 a. m.—Thirt talk; songs.
1:30 p. m.—Scripture reading.
1:35 p. m.—Thomasina de Leon, soprano.
2 p. m.—Beethoven program.
3 p. m.—Interview with Helen Spring and John Seymour.

John Seymour.

3:10 p. m.—Friedel Scott-Hansen, songs.

3:20 p. m.—Furniture talk; songs.

3:40 p. m.—"Modern Piano Technique"

3:40 p. m.—"Modern Piano Technique";
songs.
6 p. m.—Uncle Geebee.
6:30 p. m.—Yerkes's Orchestra.
7 p. m.—Concert orchestra.
8 p. m.—Y. M. H. A. Vocational Forum.
9:15 p. m.—Alice Heller, whistling.
8:25 p. m.—Hazel Hildred, soprano.
8:25 p. m.—William Edeison, basso.
8:45 p. m.—William Edeison, basso.
8:45 p. m.—Elchard Douglas, songs.
9 p. m.—Lovat Pipe Band.
9:36 p. m.—Edward Lanka, violinist.
9:40 p. m.—Edward Lanka, violinist.
9:50 p. m.—Edward Lanka,
10 p. m.—Rose Karasik.
10:10 p. m.—Coppola Trio.
10:30 p. m.—Dance orchestra.
11:30 p. m.—Dance orchestra.
11:30 p. m.—Members of the Cherry Lane

WIP-PHILADELPHIA-568
6:45 a, m.—Setting-up exercises.
10 a. m.—"Menu," Mrs. Anna R. Scott.
1 p. m.—Organ recitat.
6:05 p. m.—Joe Ray's Night Hawka.
7 p. m.—Roll call and Birthday Listent deams.
8 p. m.—Elliott Lester, critic.
8:15 p. m.—Talk, S. M. Swaab.
8:30 p. m.—Arist recital.
9:15 p. m.—A novelty by players.
10:05 p. m.—Pagoda Orchestra.
WFI--PHILADELPHIA-395
1 p. m.—Tea Room Ensemble. WRNY-NEW YORK CITY-258 i p. m.—Tea Room Ensemble.

p m.—Talk, Burton Konkle; recital.

p m.—Fashion feature. talk.
6:45 p. m.—Concert orchestra.
6:45 p. m.—Ross Gorman's Orches

songs.

4:45 p. m.—Sabrina Retig, planist.
7 p. m.— 'Whose Birthday To-day?''
7:05 p. m.—Telegraph sport flash.
7:15 p. m.—'Commerce of the Day.''
1:20 p. m.—Law series, "Constitutional League."
7:25 p. m.—Address by Frank D. Waterman. 8 p. m.—Ross Gorman 8 8 p. m.—Ross Gorman 9 p. m.—The Twins.
9 p. m.—Eveready Hour.
10 p. m.—Grand opera from WEAF.

man, Tables by Frank D. Water-7:45 p. m.—Kiddy light opera dances. 8 p. m.—Concert orchestra. 8:15 p. m.—"How to Avoid Auto Acci-dents." denta."

8:30 p. m.—"Pirates of Penzance," Mme. Parker Singers.

9:45 p. m.—Light opera ensemble.

9 p. m.—Sadrian Trio.

9:05 p. m.—The Rose Maid" and "The Strollers."

9:20 p. m.—"Theater Magazine."

9:40 p. m.—Alexandre Zeitlin, "Sculpture."

9:45 p. m.—"Radio, Man's Swittest Messenger." 5:50 p. m.—Scores, sports results. 7:30 p. m.—Dream Daddy.

b m.—rays and payers reviewed.

WCAU_PHILADELPHIA—278

p. m.—Recitat.

m.—Civic Music League hour.

m.—"Psychology," the Rev. Stockwe

p. m.—Harry Link, songs.

p. m.—Billy Hayer's Orchestra. senger."

p. m.—"Current Theater."

p. m.—"Town in Review," Beau Broad p. m.—Organ recital,
m.—Trio dinner music,
m.—Fashion talks,
p. m.—Studio concert,
m.—Dual Trio,
p. m.—Organ recital, WMCA-NEW YORK CITY-341 WHAR-ATLANTIC CITY-275

WMCA—NEW YORK CITY—341

11-12 a. m.—Ida Allen's hour.
12 noon—Olcott Vail's Ensemble.
6 p. m.—Olcott Vail's Ensemble.
6 30 p. m.—Frank Gibbia's Orchestra.
7 p. m.—Jack Wilbur's "Personalities."
8 p. m.—Daveh Morel, soprano.
8:30 p. m.—Sheppard Knapp musical.
9 p. m.—Samuel Shahkman, planist.
9:15 p. m.—Heagney and Steele, songs.
9:30 p. m.—Samuel Shahkman, planist.
9:45 p. m.—Agnes Macpeake, soprano.
10 p. m.—Soi J. Lavner, barytone.
10:15 p. m.—Agnes Macpeake, soprano.
10:30 p. m.—Soi J. Lavner, barytone.
10:30 p. m.—Soi J. Lavner, barytone.
10:45 p. m.—Ukulele.Bob McDonald.
11 p. m.—Ernie Golden's Orchestra.
WLWIL—NEW YORK CITY—228 WLWL-NEW YORK CITY-288

WLWI-NEW YORK CITY-288

p. m.—Sara Dunn, soprano.
8:15 p. m.—Morine Louden, violinist.
8:30 p. m.—"Question Box," the Rev.
M. Gillis...
8:45 p. m.—Organ solos, Father Finn.
ip. m.—Sara Dunn, soprano.
9:15 p. m.—Talk, "Citizenship."
9:30 p. m.—Morine Louden, violinist.
9:45 p. m.—Talk.

9:45 p. m.—Talk.

WNYC—NEW YORK CITY—526

7 p. m.—Market high spots.
7:30 p. m.—The Canadians.
7:30 p. m.—Dolice alarms.
7:35 p. m.—The Canadians.
8 p. m.—Inez Reynolds, recitations.
8:15 p. m.—Josef Wohlmann, pianist.
8:55 p. m.—Choir of Temple Emanuel:
Cantor Sol Fuchs, barytone; Cantor
Louis Waldman. tenor.
10:10 p. m.—Health talk, George A. Keane.
10:30 p. m.—Alarms; weather forecasts.
10:35 p. m.—Harry Asl.'s Orchestra.

WHN—NEW YORK CITY.

WHN-NEW YORK CITY-361

WNAC-BOSTON-280

0:30 a. m.—Bible readings. 0:40 a. m.—Women's Club talk. 2:15 p. m.—Noon service. p. m.—Concert orchestra. p. m.—From Radio Show; WEBJ-NEW YORK CITY-273

chestra.

30 p. m.—WNAC dinner dance.

35 p. m.—Talk by Thomas C. O'Brien.

45 p. m.—The Somerville Players.

15 p. m.—Boston American Orchestr
from the radio show. WBZ.—SPBINGFIELD, MASS.—333 530 p. m.—Leo Reisman's Ensemble. 7 p. m.—Market reports. 535 p. m.—Musical program. 515 p. m.—Charles Hector's Orchestra. 530 p. m.—Goldie Shour, violinist. WCTS-WORCESTER-268

WOR—NEWARK—105
6:45-7:45 a. m.—Uym class.
2 p. m.—Reserved for World Series gam
6:15 p. m.—"Words Mispronounced."
6:17 p. m.—"Sports," Bill Wathey.
6:30 p. m.—"Man in the Moon" stories.
7 p. m.—Shelton dinner music.
WGCP—NEWARK—252 WCTS—WORCESTER-10:30 a. m.—Radio chats. 12-2 p. m.—Luncheon music. 115 p. m.—Story teller. 3-11 p. m.—Same as WEAF. WRC-WASHINGTON-40
0 a. m.-Women's hour from WJ
2 noon-Organ recital.
p. m.-Mayflower Orchestra.
p. m.-Shoreham Orchestra. p. m.—Musicale. p. m.—"Political Situation in

ton."

130 p. m.—Musical program.

0 p. m.—"Over the Seven Seas
10:30 p. m.—Spencer Tupman's WCAP—WASHINGTON—469 3:45-7:45 a. m.—Health exercises. 1:45 p. m.—World series baseball game. KDKA-PITTSEURGH-309

WTAM-CLEVELAND-390 WEAR-CLEVELAND-390 p. m.—Organ recital.
p. m.—Lesco hour.
p. m.—Low's Theater program.
p. m.—The Bohemian Girl,"
WEAR opera.

WSAI-CINCINNATI-326 8:45 p. m.—Chimes concert. 9 p. m.—Eveready hour. WLW-CINCINNATI-422 7:80 p. m.—instrumental trio.
9 p. m.—Orchestral novelty;
Quartet.
9:40 p. m.—"Hello Boys."
10 p. m.—Formica Orchestra.

WKRC—CINCINNATI—326 m.—Artists' recital. WJR-DETROIT-517 WWJ-DETROIT-517

-Program from WEAF. n.—Band, glee club and artists. WHT-CHICAGO-400

7 p. m.—Classical program.
8:45 p. m. (238 meters)—Melody
10:30 p. m.—Jelks Eentertainers.
1 a. m.—Your Hour League.
WMAQ—CHICAGO—448 WLS-CHICAGO-345

KYW—CHICAGO—536

5 p. m.—Dinner concert.
9 p. m.—Musical program.
9:20 p. m.—Farm speeches; musical pro gram.
11 p. m.—"Evening at Home."
12:05 p. m.—Applesauce Club.

m.—Applesauce Club.
WGN—CHICAGO—379 WOR-CHICAGO-217 p. m.—Artists.

p. m.—Rushmore Ensemble Singers. WQJ-CHICAGO-448

p. m.—Junior Chorus and artists. WOC-DAVENPORT-484 m.-Musical program.

KSD-ST. LOUIS-545 n.—Aberg's Concert Ensemble. WDAF-KANSAS CITY-366 KFMX—NORTHFIELD, MINN,—337 WCCO-MINNEAPOLIS-ST. PAUL-416 10:10 p. m.-"Mountaineering," Dr. Anm.—Program from WEAF.

WOAW-OMAHA-526 KTHS-HOT SPRINGS-375 WMC-MEMPHIS -500

9:30 p. m. Musical program. 12 p. m. - Midnight Frolic. WHAS—LOUISVILLE, KY.—406 8:30 p. m.—Edd'e Rosson's Orchestra. KPRC—HOUSTON, TEX.—297 WFAA-DALLAS-476

WEDNESDAY WEAF-NEW YORK CITY-492 45-7-7:20 a. m. Health exercises WEAF, WEEI, and WCAP.

a, 11:55 a. m.—Hazel Dudley, soprano.

12 (Noon)—Market and weather reports.

15 p. m.—Ray Nichole's Orchestra.

16 p. m.—Dinner music.

17 p. m.—Synagogue services.

18 p. m.—Medress: "Why the Public Interest Requires Local Rather Than Federal Regulation of Electrical Public Utilities."

18:30 p. m.—"Pooley Period."

19 p. m.—Waice man's Points of Progress.

10 p. m.—"Ipana Troubadours."

11-12 p. m.—Ben Bernie's Orchestra.

WJZ—NEW YORK CITY—455 11-12 p. m.—Hen Bernie's Orchestra.

WJZ—NEW YORK CITY—455

10 a. m.—Women's hour.

1:15 p. m.—Irwin Abrams' Orchestra.

2-4-5:16-8-10:25 p. m.—News.

4-6 p. m.—Stores, racing (half-hourly.)

5:10 p. m.—News, basebail, racing.

5:26 p. m.—Market quorations.

5:00 p. m.—Handrial shimmary.

6:30 p. m.—Henmard levitow's Concert.

1 p. m.—Henmard Levitow's Concert.

8 p. m.—Scores, racing returns.
5:15 p. m.—Snew York Edison Hour.
5:30 p. m.—New York Edison Hour.
5:30 p. m.—Monie Carlo Virginians.

KDKA—PITTSEURGH—369
6:15 p. m.—Dinner concert.
7:30 p. m.—Chidren's period.
7:45 p. m.—"Modern Physics."
8:30 p. m.—World cruise by radio; or-lo:20 a. m.—Lon Clark, songs.
10:20 a. m.—Lon Clark, songs.
10:30 p. m.—Dinner concert.
7:30 p. m.—Lon Lastics Stewart, spirituals.
2 p. m.—Ben Hymn, planist, 3 p. m.—Interview with reare de Cordoba.
3:10 p. m.—Robert Murray, planist; lecture recital on "The Classica."
6 p. m.—Hour of music.
6:30 p. m.—Sorey Concert and Dance Orchestra.

chestra.
7 p. m.—Norbert Lusk, "Movie Sidelights
7:10 p. m.—Sorey Orchestra. 7:10 p. m.—Sorey Orchestra.

WHN—NEW YOLK CITY—361
2:15 p. m.—Jimmy Clarke's Entertaine
2:45 p. m.—Gladys Hartman, soprano.
3 p. m.—Frank Galassi, planist.

3 p. m.—Frank Galassi, planist, atta-p. m.—Lartes riosencians a Aces. by 4:15 p. m.—Harman Streger's Players, 4:30 p. m.—Harman Streger's Players, 4:30 p. m.—Harman Streger's Players, 5:30 p. m.—Baly and Foy, entertainers, 8:30 p. m.—Garence Williams's Tr.o. 9:15 p. m.—Harold Von der Heide, Charlia Ruffa, banjo. 9:30 p. m.—Hack and Jerome, songs, 16:36 p. m.—Hack and Jerome, songs, 16:36 p. m.—Roseland Orchestra. 11:30 p. m.—Ted Lewis's Orchestra. 11:30 p. m.—Ted Lewis's Orchestra. 12:2 midnight—Harry Richman's Entertainers.

WMCA—NEW YORK CITY—341
12 noon—Olcott Vail's String Rusemble
5 p. m.—Olcott Vail's ensemble.
6:30 p. m.—K. nle Golden's Olcohestra.
7:30 p. m.—Midred Perry, soprano.
5 p. m.—Dr. Geolge King's Northmin

s p. m.—Dr. George King's Northminste services.
9 p. m.—Philmort Orchestra .
10 p. m.—George Flanders, planist.
10 15 p. m.—Anna Daiy, vicinist; Willia .
10 15 p. m.—Catherine Harvey, soprano.
11 p. m.—Harvey Officer, songa.
11:30-12 p. m.—Sack Smith, barytone
WENY—NEW YORK CITY—258
9:45 a. m.—News flashes.

WENY-NEW YORK CITY-258
0:36 a. m.—News fisshes.
10:36 a. m.—News fisshes.
10:36 a. m.—Women's reducing exercises.
10:36 a. m.—Women's reducing exercises.
11 a. m.—J. Van Cleft Cooper, songs.
12:30 p. m.—Luncheon entertainment.
4 la p. m.—Emma Keiter, soprano.
4 ta p. m.—Emma Keiter, soprano.
7 p. m.—"Whose Birthday To-day?"
7:05 p. m.—Telegraph sport fissh.
7:13 p. m.—Commerce of the day.
7:20 p. m.—Code lesson, by Radio Rez.
7:20 p. m.—Common Sense of Money."
7:46 p. m.—Joseph iseaver, song series.
8 p. m.—Mario Curci's song series.
8 p. m.—Mario Curci's song series.
8 p. m.—A to Z plano classics.
9 p. m.—'Low Wave Bioadcasting." W. F.
Arvis.

Arvin.

15 p. m.—Harvey Corbett, "Architecture." ture."
9 20 p. m.—Francine Vyde, repertoire.
9 20 p. m.—Anna Drittel, cello.
9 45 p. m.—Chev. de Lancellotti's, songs.
10 15 p. m.—Biography—"Donisetti."
10 30 p. m.—Becker String Quartet.
WNYC—NEW YORK CITY—526

0:30 a. m.—Radio chat; music.
12 noon-2 p. m.—Luncheon music.
7:15 p. m.—Story teller.
8 p. m.—Concert program. WNYC—NEW YORK CRIX—020
110 p. nr.—Market high spots.
120 p. nr.—Herman Neuman, pianist.
130 p. nr.—Elementary Spanish lessons.
130 p. nr.—Poirce alarms.
130 p. nr.—Poirce alarms.
135 p. nr.—Robert F. Campbell, barytone.
136 p. nr.—Florence Loftus, soprano
10 a. nr.
12 (noon 12 p. nr.)
135 p. nr.—Lawrence Metcaif, whistle

wuld-washington-469
solos.
s. 20 p. m.—Max Wechsler, violinist.
s. 40 p. m.—Acolian Waldon, soprano.
s. 55 p. m.—Max Wechsler, violinist.
s. 16 p. m.—Acolian Waldon, soprano.
s. 50 p. m.—Lux Wechsler, violinist.
s. 17:15 p. m.—Dally market summaries.
p. m.—Address by Herbert Hoover.
s. 50 p. m.—Ul. S. Army Band concert.
p. m.—Waterman's Points of Progress.
10-11 p. m.—Ipana Troubadours.
10-11 p. m.—Dance music. drew J. Gilmour. 10:30 p. m.—Police alarms; weather. 10:35 p. m.—Pyramid Entertainers. WEBJ-NEW YORK CITY-273

8 p. m.—Jimmy Clark's Entertainers. 5:30 p. m.—Kathryn Connolly, soprano. 6:45 p. m.—Thomas Frytherch, tenor. 6:65 p. m.—Rudolph Joskowitz, violinist. p. m.--Kayo Syncopators WFBH-NEW YORK CITY 273 . m.—Orchestra. . m.—Studio program. I p. m.—Bob Schaffer, Fred Fisher. 4:30° p. m.—Bob Schaffer, Fred Fisher.

5 p. m.—Jerry Antone's Orchestra.

6 p. m.—Majestic String Ensemble.

7 p. m.—Everglades Orchestra.

7:30 p. m.—Arthur Kraus's Orchestra.

WAHG—RICHMOND HILL, N. Y.—316

phone.

10:05 p. m.—Judith Roth, soprano.

10:15 p. m.—Zimmerman's Orchestra.

WOR—NEWARK—405

8:45, 7:15, 7:45 a. m.—Gym class.

2:30 p. m.—Theo. Alban, tenor.

2:45 p. m.—Talk, Mrs. Gibson Arnoldi.

3 p. m.—Theo. Alban, tenor.

3:15 p. m.—Deep River Orchestra.

6:15 p. m.—Words Mispronounced.*

6:17 p. m.—Shelton dinner music.

8:30 p. m.—Ralph Reichenthal, pianist. n.—Bergen Quartet. -Richard MacCarteney, barytone 9 p. m.—Cadillac Berstein Trio.
9:45 p. m.—Cadillac Berstein Trio.
9:45 p. m.—Ralph Reichenthal, planist.
10 p. m.—Sam Stegel, mandolin.
10:15 p. m.—Colvoy Male Quartet.
10:30 p. m.—Talk, Leander de Cordova.
10:45 p. m.—Colvoy Male Quartet.
11 p. m.—Zit's Orchestra. WGCP-NEWARK-252

.—Pianist, race results (half hot m.—Waller-Banks-Razaf Trio WAAM-NEW ARK-263 m.—Happy Hour, —Elmer Nippes's Orchestra. . m.—The Sport Oracle. . m.—Elmer Nippes's Orchestr

8:05 p. m.—Mrs. J. M. Morris, soprano.
8:25 p. m.—A. MacGregor Brown, barytone.
6:45 p. m.—Alice Rinck, violinist; Florence Yordy, soprano.
3:30 p. m.—Joe Furtner, zither; Anthony Schreck, guitar.
10 p. m.—Claude Rhys's Orchestra.
9:30 p. m.—Musical program.
10 p. m.—Claude Rhys's Orchestra.
9:30 p. m.—Musical program.
10 p. m.—Organ recital.
10 a. m.—Your Hour League.

WIP-PHILADELPHIA-508

7:00 p. in.—Bedtime story.

WOO—PHILADELPHIA—508

11:00 a. m.—G. and organ.
12 (noon)—Lunchbon music.
1:45 p. m.—Grand organ and trumpets.
7:30 p. m.—Dinner music.
3:00 p. m.—Address by Herbert Hoover.
3:00 p. m.—"Pooley Period."
3:00 p. m.—Waterman's Points of Progre
0:00 p. m.—Organ recital.
10:30 p. m.—Dance music.

3:45 p. m.—Fashion feature. 3:45 p. m.—Concert orchestra

WLIT—PHILADELPHIA—395 2:30 p. m.—Concert orchestra.

WCAU—PHHADELPHIA—278 7:30 p. m.—Lew Chapman's Griches 1:00 p. m.—Stage dancing lesson. 8:15 p. m.—Puccini Trio. 9 p. m.—Hill Instrumental Trio. 9:30 p. m.—Hellt talk. 9:30 p. m.—Eddie Malle's Masters.

WPG-ATLANTIC CITY-300 WGY—SCHENECTADY—380 6:30 p. m.—Program for children. 6:45 p. m.—Strand Theater Orchestr 7:30 p. m.—"Book of Knowledge." WRW-TARRYTOWN, N. Y.—273

WGR-BUFFALO-319 WGR—BUFFALO—318
10:45 a. m.—Home service talk.

5 p. m.—Address by Herbert Hoover.
9-11 p. m.—Broadcasting with WEAF.
11 p. m.—I a. m.—Supper music.
WHAM—ROCHESTER, N. Y.—278 p. m.—Eastman Theater Orchests, m.—Eastman Theater organ, m.—Eastman Theater Orchestra, p. m.—Weather forecast; report.

WJAB-PROVIDENCE-308 WTIC-HARTFORD, CONN.-476

chestra. :80 p. m.—Program by artists.

WBZ-SPRINGFIELD, MASS-333

WCTS-WORCESTER-268

WRC-WASHINGTON-469

WCAP-WASHINGTON-469

WCAE-PITTSBURGH-461

KDKA-PITTSBURGH-309

WTAM—CLEVELAND—390

WEAR-CLEVELAND-390

WKRC-CINCINNATI-422

WSAI-CINCINNATI-326

WLW-CINCINNATI-422

WWJ--DETROIT---353

WREO-LANSING-286

KYW-CHICAGO-536

WGN-CHICAGO-370

WMAQ-CHICAGO-448

n.—Organ recital; story.

M.—Northwestern University

. m.—Dinner concert.

I p. m.—"Entertaining Plans."

m.—Musical program.

p. m.—Midnight revue.

1:30 p. m.—Dinner music. 0:30 p. m.—The classic hour. 2:30 a. m.—Dinner music.

-15-11-20

wQJ—CHICAGO—447
p. m.—Rainbow Orchestra.
p. m.—Musical program.
a. m.—Ginger hour.

o. m.—Dinner concert.
o. m.—Orchestra and solvists.
o. m.—Dance music.

WJR-DETROIT-517

p. m.—Dinner concert.
p. m.—Cino Male Quartet.
30 p. m.—Songs; trio.

Dinner music.
Organ recital; artists.
Concert program.
M.—Dance music.

Ruin."

8 p. m.—Scores; racing returns.

8:05 p. m.—Pan-American program.

10 p. m.—Royal hour of music.

11 p. m.—Jacques Greens's Orchestra.

Clark's Hawallans. :30 p. m.—Dinner music. :45 p. m.—Weather report; scores. WJY.—NEW YORK CITY.—405 7:30 p. m.—Vanderbilt Orchestra. 8:15 p. m.—To be announced. 9 p. m.—Sport talk. WEEL-BOSTON-349

9 p. m.—Sport talk.

WEAF—NEW YORK CITY—493
6:45-7-7:20 a. m.—Health exercisea.
11-12 (noon)—"Housewive's hour": Vee
Laundhurst, planist; speakers.
12 (noon)—Market and weather reports.
4 p. m.—Malabota Pupils: Marie Falsetta, Anthony Cash, Rose Muto, soprane; James Butler.
4:45 p. m.—Book review, John Farrar,
6 p. m.—Duner music.
7 p. m.—Mid-week services; hymns and songs; address by Rev. Dr. Isaac Ward.
7:30 p. m.—Serenaders.
8 p. m.—"The Larkinites."
8:30 p. m.—"Touring," George Cooley.
9 p. m.—Concert Ensemble and assisting artists. WNAC-BOSTON—280

10:30 a. m.—Bible readings.
10:40 a. m.—Ciub talks.
12:15 p. m.—Noon service.
1-p. m.—Concert Orchestra.
4 p. m.—Concestra.
6 p. m.—Kiddles Klub.
6:20 p. m.—WNAC dinner dance.
7:35 p. m.—Jeff Lazarus.
8 p. m.—From Radio Show; concert chestra.

artists.

10 p. m.—Silvertown Orchestra.

11-12 p. m.—Vincent Lopez' Orchestra. WGBS-NEW YORK CITY-316 WGBS—NEW YORK CITY—316
10 a. m.—Timely Talk with Terese.
10 10 p. m.—Fank Galassi, pinnist,
10 20 a. m.—Frank Galassi, pinnist,
10 20 a. m.—Frank Galassi, pinnist,
10 40 a. m.—Readings; piano solos.
1:30 p. m.—Scripture reading.
1:35 p. m.—Leona Borrum, contralto.
2 p. m.—Juliet Strahl, soprano.
3 p. m.—Twoman in the Home Hour.
6 p. m.—Uncle Geebee.
6:30 p. m.—Ted Snyder, Bill Heima,
songs.

WOR-CHICAGO-217 WOR—CHICAGO—217
7 p. m.—Artists
11 p. m.—Artists and orchestra.
WTAS—ELGIN, ILL.—303
9 to 11:30 p. m.—Purple Grackie Boys.

WSUI—IOWA CITY—484 m:—College of the Air. WOC—DAVENPORT—484

KSD ST. LOUIS 545 m.—Benjamin Rader's Orchestra.

6:45 p. m.—Chime concert.

8 p. m.—Orchestra.

10 p. m.—Program from WEAF.

11 p. m.—Musical program.

WDAF—KANSAS CITY—366
7 p. m.—School of the Air.
9 p. m.—Star's Orchestra.
12:45 to 2 a. m.—Nighthawk Frolic

8 p. m.—Church service.
9 p. m.—Program from WEAF,
1:10 p. m.—Dance orchestra,
12:30 p. m.—Organ recital.

WSB_ATLANTA-428

KFMX—NORTHFIELD, MINN,—337 10 p. m.—Musical program.

WCCO-MINNEAPOLIS-ST. PAUL-419

WOS JEFFERSON CITY, MO. 441
p. m. Address; musical program.

WHAS LOUISVILLE 400

WCAO-BALTIMORE 275

m.—Vocal, instrumental music. b. m.—Dance music. KPRC—HOUSTON, TEX.—297

CNRO-OTTAWA-135 8 p. m.—Concert orchestra. 9 p. m.—Vocal solos; dance music,

THURSDAY

WJZ-NEW YORK CITY-455

WJZ-NEW YORK CITY-455
10 a. m.—Women's hour.
11 a. m.—News.
11:05 a. m.—Book review.
1 p. m.—Nathan Abas's Orchestra.
2-4-5:15-8 and 11 p. m.—News.
4-6 p. m.—Scores; racing returns.
4:05 p. m.—Testime music.
5:15 p. m.—Testime music.
5:15 p. m.—Wews, baseball, racing.
5:26 p. m.—Merket quotations.
5:50 p. m.—Hinancial summary.
6:01 p. m.—Baseball; racing returns.
6:30 p. m.—New York University Course.
7 p. m.—Dinner concert.
7 p. m.—Dinner concert.
7 p. m.—Testime music.
8:00 p. m.—The Road from Rum to Ruin."
8 p. m.—Scores; racing returns.

10:45 p. m.—Watson's Orchestra

RTHS—HOT SPRINGS—375

10 p. m.—Orchestra, cornet, quartet,
10;45 p. m.—Artists' recital.

8:45 p. n

8:50 p. m

songs. 6:40 p. m.—Rosalie Blanchard, Walter Croft, duets. 6:50 p. m.—"What the World Is Doing." 7 p. m.—Voltaire hour of music. 8 p. m.—Crystal Palace Orchestra.
8:30 p. m.—'Footlight and Lamplight."

p. m.—Stamboul Quartet.

WHN-NEW YORK CITY-361 12:30 p. m.—Organ recital.

8:15 p. m.—Lexington There.

4:30 p. m.—Willer, Plotti and Val.

6:30 p. m.—Leslie McLeed, tenor.

6:40 p. m.—'Sunshine Talks.' Billy Van.

7 p. m.—Iceland Orchestra. 7 p. m.—Iceland Orchestra. 7:30 p. m.—Kennedy's Quintet. 8 p. m.—Will Oakland's Shanley. 8:30 p. m.—Kennedy Quintet. 8:45 p. m.—Perry Bradford's Entertain-

m.—Dinner concert.
m.—Children's period.
m.—Criminology, talk No. 2.
m.—Hour of music. ers.

9 p. m.—Jimmy Clark's Entertainers.

9 p. m.—Tom Butler, tenor.

9:45 p. m.—Vaudeville entertainers.

10 p. m.—Caravan Orchestra.

10:30 p. m.—Kentucky Revue and WADC-AKRON, OHIO-258 hestra.
p. m.—Swanee Orchestra. 11:30 p. m.—Revue and orchestra. 12 p. m.—Ted Lewis's Orchestra.

WNYC-NEW YORK CITY-526 WNYC-NEW YORK CITY-526
7 p. m.—Market high spots.
7:10 p. m.—Arcady Orchestra.
7:30 p. m.—Police alarms.
7:35 p. m.—World Series Review,"
Frederick G. Lieb.
8 p. m.—Neapolitan and Italian folk songs; Godone, tenor; Gina Santella, soprano; Gluseppe Milano, barytone; Irea Vermerout soprano; Ada Amault. soprano; Giuseppe Milano, Darytono, Irena Vemeroni, soprano; Ada Amauli,

Irena vemerom, september 18 soprano.
9:30 p. m.—Anniversary dinner of the Metropolitan Hospital; speakers, Mayor John F. Hylan, Royal F. Copeland, Alfred J. Talley, Bird S. Coler, the Rev. John L. Davis, Agnes S. Ward.
10:45—Police alarms; weather. WMCA-NEW YORY CITY-341 12 noon—Olcott Vail's String Ensemble.
6 p. m.—Olcott Vail's Ensemble.
6 p. m.—Olcott Vail's Ensemble.
6:30 p. m.—Joseph Wetzel, tenor.
7 p. m.—Sunnyside Orchestra.
7 p. m.—Ende Rochen. soprano.
8:30 p. m.—Nickels Trio.
9:30 p. m.—Nickels Trio.
9:30 p. m.—Snedden Welr. barytone.
10 p. m.—Manhattan Serenaders.
10:30 p. m.—Herman Weinstein, violinist.
11 p. m.—Ermie Golden's Orchestra.
12-1 a. m.—'Broadway Nite.'

wfbH—New York City—273 b. m.—A thur Kraus's Orchestra, p. m.—Radiovues by Mrs. Owen Kil-3:30 p. m .-- Johnny Gerhardt's Orchestra. WLS—CHICAGO—345
) p. m.—Organ; story; syncopaur; community chorus; orchestra.

7 p. m.—Eunice Erdley, soprano. 7:15 p. m.—Studio program. 12 p. m.—Everglades Orchestra.

Dance Orchestras for This Week

			The state of the s	(IC)					LO		T TITO	* *	C		8.85	
e ()	Station WIP WGCP WHN IONDAY, WNYC	508 252 361	Ben Stad's Strickland's Janssen's	8:15 8:20 10:30 10:30 10:35 11-12 11:00		833 273 278 508 455 526 492 341	Hector's International Billy Hayer's Pagoda Mayflower Harry Ash's Meyer Davis's Ernie Golden's	7:10 10:00 10:05 10:80 10:80	the same of the same of the	361 AY, 526 361 341 508 316 300	OCTOBER 15 Arcady Caravan Manhattan Joe Ray's Arrowhead	10:30 10:35 11:00 11:00 11:05 11:1 11:30	WHN WNYC WJAR WEAF WGCP WRW WGR WHN	361 526 306 492 252 273 319 361	Rodeo Coionial Dance music Meyer Davis's Ritz WRW Vincent Lopes's Alabam	
	WEEL	476	Eisenbourg's	11:00	WHN	861	Rodeo	11:00	WHN	861	Swanee	11:80	WFBH	273	Fordham	
5	WHN	861	Roseland	11:05	WRW	273	Oriole	11:00	WEAF	455 492	Jacques Green's		SATURD	AY, O	CTOBER 17	
?	WGCP	252	Strickland's	12:00	WHN	861	Kentucky	11:00	WMCA	841	Vincent Lopez's Ernie Golden's	7:00	WNYC	526	Dance music	
	WNYC	526	St. George	2.00	WEDNES			11:00	WRC	469	Meyer Davis's	7:80	WOR :	405	Van's Collegians	
	WCAU	278	Jaffe's	7:30	WHN	861	Caravan	11:30	WHN	861	Dance music	8:30	WRNY	258	Dance musio	
		841 895	Messner Brothers	7:30	WFBH	273	Arthur Kraus's	12:00	WFBH	273	Everglades	9:00	WEEL	849	Eisenbourg's	
	WLIT. WAHG	816	Dance music	9:00	WMCA	341	Philmort	CONTRACTOR OF THE PARTY OF THE			CTOBER 16	9:30	WGY	880	Dance music	
	WOR	405	Glenn Smith's Slater's	9:30	WEBJ	273	Kalo	12.42				10:00	WEAF	492	Apollo	
`	WEAF	492	Ben Bernie's	10:00	WHN	361	Roseland	7:10	WGBS	816		10:05	WIP	508	Dance music	
ί.	WJZ	455	J. Knecht's	10:00	WLIT	895	Dance music	7:80	WJY	405		10:80	WGBS	816	Dance music	
í	WPG .	300	Dance music	10:00	WTIC	476	Dance music	9:40	WNYC	528	Dance music	10:30	WPG	800	Dance music	
	WHAZ	380	Campus	10:15	WAHG	316	Zimmerman's	10:12	WCAP	469		10:30	WRC	469	Crandall's	
•	WILLIA	900	Serenaders	10:30	WOO	455 508	Virginians	10:00	WGCP	252	Strickland's	11:00	WEAF	492	Vincent Lopez's	
	woo	508	Dance musio	10:30	WCAP	469	Dance music	10:00	WLIT	895	Dance music	11:00	WMCA	841	Ernle Golden's	
	WGR	819	Vincent Loper's	11:00	WOR	405	Dance music	10:05	WTIC	508	Dance music	11:00	WOR	405	Eddie Elkins	
	WOR	405	Aronson's	11:00	WEAF	492	Ben Bernie's	10:15	WAHG	816		11:05	WRW	273	WRW	
	WHN	261	Dance music	11:00	WHN	861	Dance music	10:30	WCAU	278	Loeser's	11:30	WFBH	273	Bronx	
	WHN -	861	Ted Lewis's	11:05	WRW	273	Koenig's	10:30	WJZ	508 455	Dance music Ben Glaser's	12:00	WRNY	259 316	Ferrucci's	
	100		The same of the sa		24 17	P 3		10,00		200	TOU GITTER BEL B	12:00	WAHG	210	Benton Harbor	

5 6	THURSD	AY. C	CTORER 15	10 35	WNYC	526	Colonial
7:10	WNYC	526		11:00	WJAR	306	Dance mus
10:00				11:00	WEAF	492	Meyer Dav
10:00				11:00	WGCP	252	Ritz
10:05				11:05	WRW	273	WRW
				11:1	WGR	319	Vincent Lo
				11:30	WHN	361	Alabam
11:00				11:80	WFBH	273	Fordham
11:00	WJZ	455	Jacques Green's	1	SATURD	AY, O	CTOBER 1
				7:00	WNYC	526	Dance mus
							Van's Colle
				8:30			Dance mus
				9:00			Eisenbourg
				9:30	WGY		Dance mus
- Istories		X, UC	TOBER 16	10:00	WEAF		Apollo
		816	Jule Anzel's	10:05	WIP		Dance mus
		405	Irwin Abrams's	10:30	WGBS		Dance mus
		528	Dance music	10:30	WPG		Dance mus
		469	Dance music	10:30	WRC		Crandall's
		252	Strickland's	11:00	WEAF	492	Vincent Lo
		895	Dance music	11:00	WMCA		Ernle Gold
		508	Dance music	111:00	WOR		Eddie Elk
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10:30	WJZ	455	Ben Glaser's	12:00		316	Benton Ha
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WGY to Use Super-Banks Kennedy, Well Known Power Twice Each

or disadvantages. WGY has been authorized by the Department of Commerce to use fifty kilowatts on its antenna twice a week for regular WSM Station at Nashville Has broadcasting. This authorization is granted subject to withdrawal if high power causes interference.

WGY is the first station in the country to use superpower in reg- mitter of the National Life and Acciular broadcasting, and it was the dent Insurance Company, Inc., Nashfirst station in the world to broad- ville, Tenn., adds its voice to Dixie's cast on fifty kilowatts. The regular broadcasters on Monday night, Octoprograms of Saturday and Sunday ber 5, the station will be unique in evenings will be broadcast on super- that it will have in active charge of power, beginning October 3.

heretofore have been made under the Miss Bonnie Barnhardt, formerly greater distances will be possible time stories. will be more pronounced generally.

have been made in the transmitter, and with the tests just completed an entirely new antenna system was used. Other changes probably will be made from time to time to transmitter and antenna as the engineers, aided by the observations of fans, find that transmission can be im-Super-power is only one phase of

extensive developmental work in transmission which is being carried out by the General Electric engineers at the developmental laboratory. At this great laboratory, covering fiftyfour acres of ground, engineers and research men are working on problems which it is hoped will result in improved transmission and ultimately in greater enjoyment of broadcast programs by the listeners. Simultaneously with the work on super-power, engineers are experimenting with short and long waves. Transmitters and antenna systems have been devised for broadcasting

on twenty meters and forty meters. There is another transmitter for 109meter signals and a fourth for 1,560. All programs of WGY except noon and evening market reports and Sunday services are broadcast on all these wave lengths and reports are received from special stations throughout the country.

Bureau of Standards Warns Dealers About Radio Batteries

The Bureau of Standards again warns that dealers and factory representatives must not use its name in connection with the sale of dry batteries for radio receiving sets.

"The attention of the bureau has again been called to the frequent misuse of its name in connection with the sale of dry batteries for radio receiving sets," says the announcement. "Claims have been made by some dealers and factory representatives that the superiority of their particular brands of batteries has been shown by tests made at the Bureau of Standards. Tests of batteries, including dry cell A and B batteries for radio cordance with government specifications. These tests are made to aid the departments of the government in the purchase of batteries and to help each manufacturer to improve his product. The hureau does not publish the results of its tests, nor does it inform any manufacturer of the results of its tests on other manufacturers' batteries. Therefore statements that any make or brand of battery is superior as shown by tests at the Bureau of Standards are

Charles Garland, Song Writer, Becomes Director of WBBM

Charlie Garland, song writer, barytone and pianist, has been made both program and studio director of Radio Station WBBM, it was announced by Ralph and Leslie Atlass, co-directors of the station.

Garland has been with WBBM since early this year, and "appeared" over other Chicago radio stations, and was a "movie" organist in this city prior to that time.

He is the writer of the words and music of several popular songs, including "Mississippi Blues," his latest, "Sweet Mother Mine," and "Want a Little Love."

His latest contribution to radio is a series of radio musical comedies. which he is now writing to be pu before the microphone of WBBM, beginning shortly

Organist, Joins WOK Staff

Banks Kennedy, former organist at the Capitol Theater, Chicago, has Week in Future signed up as a regular member of the staff of Station WOK. Kennedy's or-Listeners throughout the country gan playing has long been considered will be able to make further observa- a special feature of the program tions on super-power, its advantages wherever he has appeared, and his

Woman Program Director When WSM, the powerful new-type 1,000-watt Western Electric transprograms one of the few women pro-Tests on high power through WGY gram directors in the radio world.

worst possible atmospheric condi- of WSB Atlanta, Ga., has accepted tions. The first series of tests were the post of program director and conducted in July, the second in Au- radio editor of the Nashville station. gust and the third were completed Miss Bonnie is beloved of countless this week. It is expected that with thousands of little folk and grown-ups

Radio Helps Develop Stars for the Stage

Radio continues developing stars

for the stage. Last week while the famous Duncan Sisters, playing in "Topsy and Eva," were singing at station WGN, Chicago, they heard Vernon Rickard, the handsome staff tenor of the studio, rehearsing some ballads. They were so taken with the appearance voice and dramatic possibilities of the young singer that after one try-out he was given a one-year contract with their company to sing the leading role. After filling Middle West engagements, the company goes to London. Rickard. since his graduation from Notre Dame University in 1924, has been assistant announcer and tenor

world will learn of the city often WGY Programs Return This referred to as "The Athens of the Week to Eastern Standard Time

the cooler weather of the fall season for her Southern lullables and bed- lowed the popular policy of adapting hour during the period of the year

Nighthawk Organizer Leaves 27. The evening musical program Kansas City for WJR, Detroit will start at approximately 7:30

his bag and good cheer and moving eastward. He is leaving "The Kansas City Star's" station, where as one of the real pioneers he helped to put broadcasting on the map, and on September 28 he joins the staff of the new Jewett Radio and Phonograph Company's station, WJR, o

Detroit and Pontiac, Mich. The "Merry Old Chief," or Led Fitzpatrick, as he is known outside the radio world, has a personality that has endeared itself to millions of listeners in. To him is due the amazing growth of that popular radio organization known as the Night hawks. There are now 250,000 of them, and the membership keeps or growing. He organized the Night hawks, and his merry good nature has been the food on which the membership grew.

WGY, the Eastern station of the General Electric Company, which ad-The National Company has fol- vanced the time of its program one its call letters to its slogan "We when daylight saving time was, in ef-

The "Merry Old Chief" is packing o'clock, instead of 6:30 Eastern Standard time.

WHEN WINTER COMES!

TWENTY-FIVE of the world's leading opera singers and other musical stars will enliven dreary winter evenings with their radio entertainment. All brought within the confines of our home with a

Stromberg-Carlson

SPECIALS
ATWATER KENT MODEL 20 \$115 FADA Neutrolette Five \$122 DE FOREST MODEL DIZ \$145 RADIOLA SUPER HETERODYNE \$116 WARE COMPLETE \$85

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The Operadio may be purchased in the mahogany Consolette model shown above, or in a smart looking carrying case, which may be closed and taken with you anywhere. For those who want the beauty of a furniture model combined with the convenience of absolute portability, a distinguished walnut cabinet-The Tudor-is available for housing the portable set in

> Prices without tubes or batteries, Portable \$160; Consolette \$180; Tudor Cabinet (for housing portable) \$68.

the home.

The Operadio idea was conceived sixteen years ago when J. M. Stone built the first successful self-contained radio receiving set, using a kite to carry the aerial wire aloft. The accompanying sketch was made from a photograph taken in 1909.

The compactness of this jewel-like set makes it the ideal radio for home. The rich beauty of its dark mahogany case will appeal particularly to women. Think of it! A completely self-

in performance—that have made the

Operadio so phenomenal a success

during the past two years, are now

offered in the new Consolette, a semi-

portable cabinet model.

contained instrument. No wires or connections; no visible touch to mar communion with the invisible. No

THE OPERADIO 8 So. Dearborn St.

The advantages—in convenience and awkward horn, no ugly wet batteries to be seen. So clear, so perfect, so easy to tune. The radio which makes the whole world speak and sing and play to us!

> And—no less important and desirable—a set you can pick up and carry to any part of the house. Always ready, always dependable—the very finest quality of radio reception you ever listened to.

Hear this marvelous instrument at your dealer's. Or ask him to bring an Operadio to your home, where you may see how it en hances the beauty of your drawing room.

CORPORATION Chicago, Illinois



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THE NEW YORK HERALD NewYorksing Tribune RADIO MAGAZINE

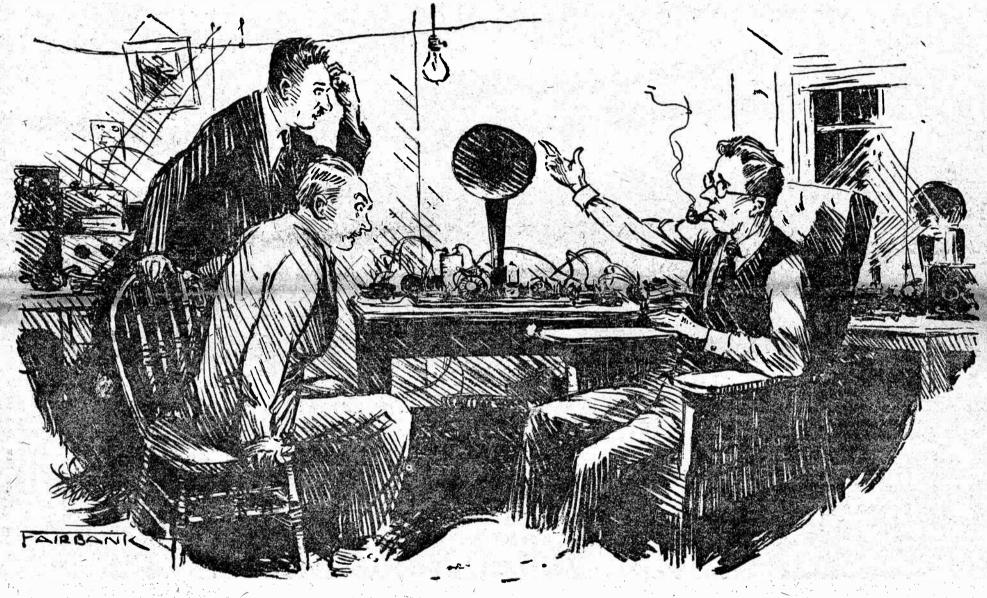
SECTION SIX

SUNDAY, SEPTEMBER 27, 1925

The Radio Discovery of the Century

Bill Johnson Deve lops a Theory, Puts It Into Practice and Astonishes Two Fellow Fans; "So Simple as To Be Ridiculous," Says One

By EDWIN KEEN CORTRIGHT



"The effect of hearing this quiet inventor casually dicsuss the greatest discovery of the century was simply overwhelming."

work. Of that there can be no doubt, and for its accuracy both Dick Parsons and myself will furnish affidavits. Whether or not it is true that after he secures his patents on the Johnson Electdo-Conductive Switch there will be but one type of radio receiving set used in America must remain to be seen. How it and how he worked out his idea must be | tions. left to better heads than mine to determine. The fact remains that Bill Johnson's one-tube set, equipped with his new switch, consistently brings in such stations as KGO, 2LO and PP.

From early boyhood Bill had always been known as a genius around his home town of Newton Center. At an early age his mechanical ability had been apparent. As he grew older his favorite delight became the overhauling of discarded flivvers and motorcycles. Be assured, in most cases, no matter how decrepit the tin Lizzie, Bill, by some mysterious means, would succeed in restoring much of its

asting, however, that Bill came into his ondary coil, with one secondary giving | the condenser dial, Bill this matter may be, Bill made it own. Here it was he struck his pace; all his previous existence seemed as a trance in view of his present activity. Coils and condensers, inductances and capacities, henries and ohms, all were easy for Bill. Instinct and nature had so endowed his faculties and constructed his brain that for him every radio set was a case of love at first sight. Subconsciously Bill would was that Bill ever happened on the theory | grasp its technical merits and complica-

Bill Is a Radio Bug

To estimate how many sets this radio marvel had constructed and repaired would be a most interesting study. To my knowledge he has built more than twenty-five sets for his personal enjoyment. At the present time, however, Bill is satisfied the ultimate has been reached and is convinced from now on most of the experimental work will be done in perfecting the television apparatus in connection with radio reception.

How readily that rainy, foggy evening comes to mind when Dick Parsons and I accepted Bill's invitation to inspect his new set! Only three months had passed It was with the advent of radio broad- since Bill had patented his double sec- ment radiated from Dick's face. Shifting

increased voltage and one increased ampere. Consequently the current gossip of some new stunt developed by Bill served as a stimulant to our curiosity.

As we passed to the workshop on the third floor the sound of bagpipes met our

"Black Watch pipers from 2LO," vol-

Just then, turning the only condenser dial, he brought in the nasal tones of the Eiffel Tower announcer.

"Station PP." said Bill with a grin.

"I guess they struck it right down at the hardware store when they said you had a new wrinkle, Bill," said Dick after

"Well, I don't know but that we have landed something out of the ordinary," Bill drawled; "but come closer and look

Eagerly Dick and I pressed toward the set. There was very little to see. One variable condenser, one tube, a peculiar arrangement of four metallic strips near the terminals of a multi-cell battery and a loud speaker; that, substantially, was all. And to think that on this one-tube set we had just heard London and Paris! Amaze-

that Bill shut off the set and give us a detailed account of how he had happened on such a revolutionary change in radio construction.

tion to station across the United States,

bringing in KGO with the clarity and

As hour after hour went by our curi-

osity increased more and more. How on

earth did he do it? Finally we demanded

volume of the locals.

Stretching himself out in the Morris chair, Bill began:

"Well, you see, for some time past I've had an inkling radio reception was not progressing along the correct path. Being considered an electrical development. t has been handled in the light of our electrical theories derived from our experience with dynamic electricity. As a matter of fact, radio is not an electrical development but an entirely new division of electrical phenomena. Consequently we have been all wrong in building radio apparatus designed from our knowledge of dynamic electricity.

"Heretofore all our efforts have been concentrated on taking a tiny electric current from the air; then, by means of coils, tubes and transformers, amplifying this minute signal until it has strength enough to operate a loud speaker."

While Bill paused, Dick and I ex-

(Continued on page four)

September, broadcasting stations

in this country that were using

clocks back one hour and start

operating on local standard time

Also starting to-day, all radi

Tribune will be in Eastern stand

Notre Dame, Yankee Stadium, N. Y.

Saturday, November 7-Harvard

Saturday, November 14-Princeto

Army, New Haven, Conn.

Princeton, Princeton, N. J.

s. Yale, New Haven, Conn.

s. Yale, Cambridge, Mass.

Navy, Polo Grounds, N. Y.

New National Fraternal

Body of Broadcast Listeners

A national fraternal body of radio

ment issued from its headquarters

The organization, known as the

matters, either local or national,

to serve on its honorary committee

essay will be "Magna Charta," a sur-

Field, Philadelphia.

in Acolian Hall.

Improvements Stations to Go Back to On the Neutrodyne Standard Time To-day Receiving Circuit This being the last Sunday in

By Jack Binns

One of the outstanding features of the New York radio show was the appearance of a completely shielded three-stage neutrodyne receiver with maximum voltage amplification per stage. Incorporated in this instrument are several engineering devel opments of major importance.

The design of the receiver is the 12 Big Games on culmination of eighteen months concentrated experimental work by the engineers in the research laboratories of the Hazeltine Corporation and its licensees. The chief characteristics of the receiver are:

Practically uniform amplification over the entire wave length band-195 to 555 meters.

of the ten per stage in the radio tions in the chain. They include frequency circuits, which is said to some of the biggest games of season, tric and other factors. be the greatest yet obtained over the such as the Harvard-Priceton-Yale operating range with more than two classic trio, the famous Army-Navy certain wave lengths, and even to-day Complete stability through the

elimination of all tendency to oscillate or regenerate. Increased over-all selectivity.

The elimination of distortion through the radio frequency circuit design which permits the passage of the audible frequencies.

The new receiver was evolved a the direct result of deliberately planned research. The early experi ments showed that it was not only necessary to shield the radio frequency circuits but also to include the vacuum tubes themselves within the shields. In this respect an interesting fact asserted itself. With the tubes left outside the shields their plates acted as small capacity antenna, collecting energy and passing it into the system through the coupling transformers. This phenomenon destroyed all stability and

set up uncontrollable oscillations. This experience showed that even with the circuits shielded but with the tubes exposed it would not be voltage amplification than five per stage with three-stage sets. On receivers employing four or five radio frequency stages the amplification per stage would be less, with the consequence that five tubes would

be doing the work of only three. formers so they would give more uniform amplification at the different people, many of whom have agreed wave lengths. frequencies involved. This was successfully achieved, so that now the ratio of amplification between the Isaacson, well known musical imlower and higher wave lengths is 10

presario and director of Station to 9, where it previously was 14 to 7. WRNY; Alfred J. McCosker, of

a ten-foot antenna average normal apparatus," said W. Howard Judson, supporting a hop vine.

first radio frequency tube. This is fans." so arranged that an antenna can be used without the possibility of para- Medieval Music Selected lyzing the detector tube on local signals. In this manner it is not necessary to change over aerials to bring

New Program Schedule for Station WMCA Thursday

On Thursday Station WMCA's fall vey of that document which was the months' schedule will become effectivery first to recognize the right of magnetism a long time if a piece of tive. The broadcasting hours during the plain people to liberty and the this period will be as follows: Mon-pursuit of happiness, and which day through Saturday from 11 a. m. established a precedent which was to to 1 p. m.; from 2 to 5 p. m. and find real culmination in the American 6-to 12 p. m.; and on Sundays from Declaration of Independence several 11 a. m. to 12:15 p. m. and from 6 centuries later. It touches, of course,

Station WMCA has planned for the on Richard the Lion-Hearted and the winter months programs of interest to women, men and children. The morning programs will be devoted barons who forced him to hear the solely to women. Musical and novel voice of the people at Runnymede. events have been arranged for the afternoons and evenings, such as Mr. Hector Fuller, and, like all of the complete operas, playlets, stars from essays in the "Points of Progress" Broadway shows, dinner and dance series, will have as a background music by celebrated orchestras and specially selected music recalling the the Gala Sunday Night Broadway historical period with which the es-Bright Lights' Period with prominent say deals, the music of chivalry and theatrical celebrities as participants, the tournaments.

Where Pioneers of

By Frank Reichmann

President Reichmann Corporation MacMillan Arctic expedition. With daylight saving time will set their We can low begin to see where the very few exceptions all transmission pioneers of radio started on the east of the Allegheny Mountains has wrong path in a great many things. been carried on extremely short wave rograms published in the Herald the number of plates they contained and not by the maximum capacity at WEAF Schedule which they were rated.

Football, the great American sport, ber of plates is just like marking barwill have a prominent place on the rels by the number of staves instead lowing is the schedule of the various hold. An eleven-plate condenser low power, that station transmitted will begin at 2:45 o'clock and last

football matches which will be broad may have any capacity from zero to and received messages for over an until 4:30. An average voltage amplification cast through WEAF and other sta- infinity, depending on the size of the plates, the thickness of the dielec-Broadcasting stations are placed on

> contest and others which delight the the position of a station is given in hearts of the football enthusiasts. A meters, while actually the stations running description of the plays will are placed at equal divisions of frebe broadcast direct from the scene of quency. The condensers were accordingly made to tune by equal Saturday, October 17-Army vs. changes in wave length. The frequency difference of two stations on Saturday, October 24-University a low wave may be ten kilocycles, of Pennsylvania vs. University of yet they both may be located within Chicago, Franklin Field, Philadelphia. a band of two meters. If these two Saturday, October 31-Yale vs. stations were located on high waves and separated by ten kilocycles the wave length of the two might be five or six meters apart. This makes the Saturday, November 21-Harvard tions on the high waves are just as Thursday, November 26 Cornell vs. close together, and, in fact, every University of Pennsylvania, Franklin available frequency band has been oc-Saturday, November 28 Army vs. cupied by one or more stations.

This matter is now being corrected by designing condensers that tune by equal variations in frequency, rather than changes of capacity or wave length. The best new condenser has broadcast listeners, the first of its a straight-line frequency calibration kind in the country, is being formed curve that changes the tuning of the possible to obtain a greater average by a number of New York radio en circuit in approximately ten kilocythusiasts, according to an announce- cles for each division on the dial. Stations are spread over the dia equally, with stations on the lower National Radio Service League, will high-wave-length stations crowded to

take an active interest in legislative gether a great deal more than on ordinary condenser dials. This makes Having demonstrated the necessity which will affect the welfare of the tuning easier and eliminates the need of complete shielding the next step millions of owners of radio receiving for hair-line tuning devices and verwas to improve the coupling trans- sets. The movement has received the nier controls and helps to clear up hearty commendation of prominent the apparent congestion on the lower

Among them are Dr. Charles D. Hop Vine Spoils Radio Reception

Anything in Radio and Always the Bost Washington Heights Headquarters De Forest Music Master Freed-Eisemann Kellogg Wavemaster R. C. A. Radiolas Farrand Godley Speakers

SATISFACTION Phone Building. Tel. Bradhurst 4482

MacMillan's 40-Meter Waves | hour on the forty-meter wave length. Reach Only 1 Station in East although other stations of greater Radio Started on A peculiar phenomenon has been power located in the East at approxobserved by radio amateurs in the imately the same distance from the expedition's base are compelled to use The Wrong Path eastern sections of the United States the seventeen-meter wave length to as a result of attempts to communi- accomplish the same feat. cate by short-wave radio with the

peculiar condition.

Dr. Cadman to Conduct Non-Sectarian Services for WSAI Non-sectarian church services for Sunday afternoons for the coming fall lengths, in the neighborhod of sevendensers, for example. The early man-teen meters. At the same time in the of WSAI programs. Through the New Central West the forty-meter wave York hook-up, Paul A. Greene, manlength has proved most effective. Scientists are at a loss to explain this Parkes Cadman, pastor of Central The one notable exception has been Congregational Church, Brooklyn, and the successful exchange of messages widely known scholar, minister and between the polar expedition and the orator, to broadcast from the New Radio Broadcast-Eveready short-wave York studio church services beginprogram of WEAF this fall. The fol- of the amount of material they will Garden City, L. I. Using very throughout the winter The services



Radio Exchange

Rate. 40 cents a line; minimum, 3 lines. Agate caps and white space only display permitted. Ads. accepted until 12 o'clock noon Friday.

titled "Points of Progress." The electrical impulses.

BACH RADIO

PHONE PENNSYLVANIA 4000

Parts and Equipment

to 9, where it previously was 14 to 7.

As a result of the complete shielding it is possible to employ broader tuning circuits, since there is no local pick-up of signals by the coils, and over-all selectivity is increased by the additional stage. This allows the audible frequency components of the carrier wave to pass through the amplifier, thereby eliminating the possibility of distortion which might ensue through cutting off the side bands.

The receiver is stable without antenna average normal properties and connections. With a ten-foot antenna average normal properties and connections and arrector of Station of Station (Station of Station of Station (Station of Station (Station of Station of Station of Station (Station of Station of Station

Berneth puzzled over the affliction of his receiver.

Apparently the music, bedtime stories, health talks and traveloppes.

And by M. \$6.75

BUYS 100 - VOLT KNOCKED - DOWN STORAGE B BATTERY UNIT. INCLUDING CABBIET, CONSISTING OF EDISON ELEMENTS WITH NEW TYPE CONNECTOR. ALL OTHER

SPEAKERS AND SETS Repaired-adjusted-exchanged Repaired—adjusted—exchangen
We carry in stock one of the largest
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BUY DIRECT—FIVE-TUBE RECEIVERS In solid mahogany cabinets with battery compartment; bokelite panels and parts; natented circuit employing regeneration or extreme distance; 135 to 550 meters;

SETS—4-tube Ambassador, \$25.95; 8-tube Ambassador, \$17.95, each with tubes, cabinet; 1-tube sets, \$2.95 up. EDZIN RADIO, 675 6th av., N. Y. C., near 39th st.; phone Chick 10385; open Sundays, evenings.

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We will wire or rewire any Ambassador or any 3, 4 or 5-tube set for \$5. AUTHORIZED AMBASSADOR SERVICE For real selectivity we build the facuus 4-tube Ambassador, using all gen

mous 4-tube Ambassador, using an gen-uine Ambassador parts. 5-tube radio frequency set with high-class equipment, \$45 complete. RADIO SERVICE SHOP, 762 MELROSE AVE. OPEN EVENINGS. MELROSE 4632. ERLA SERVICE STATION

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REPAIRING, REMODELING, REWIRING all circuits. Also carry Erla
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123 Liberty St. Rector BATTERIES FULLY CHARGED, 35c.

PHONES, LOUD SPEAKERS REPAIRED. remagnetized; sets repaired; weak tubes that light revived, 50c. Roy's, 100 West 46th st. Byrant 0985. INSPECTION, installations, repairs, in radio since 1908; reasonable rates. Mardon Dayton 1531, 1309 West Farms Rd.

Adopting Alternating Current for the Plate Supply of the Radio Receiver

A Simple B Battery Eliminator May Be Constructed From Toy and Bell Ringing Transformers

By JOHN F. TRAVER

been suggested for using rectified and filtered alternating current for the plate currents in radio receiving sets. Many of these ideas are excellent.

There are also a number of factorybuilt rectifiers on the market which are designed for use with the average set. However, most of them are not as flexible as one might wish. They usually supply two voltages, 45 volts for the detector and 90 volts for the amplifiers. Naturally this does not suit every one.

Some of us use as many as four different voltages 45 volts on the detector, 671/2 volts on the radio-frequency amplifiers, 135 volts on resistance coupled audiofrequency amplifiers and perhaps 90 volts on the loud speaker. Perhaps this is an extreme case, but certainly with the popularity of resistance coupling and the advent of the new power tubes for the source of plate current limited to 90 volts. This does not mean, however, that the 90 volt tap can be discarded, for some of our amplifying tubes will undoubtedly require this potential.

Many articles have been written and some excellent data given for building a B eliminator and, if a plan is selected which will give an output of 150 volts, a fair substitute for B batteries will probably result. A suitable high resistance can be inserted in the output and taps

taken for any voltage desired, below 150. Unfortunately most of these plans in clude the necessity of making a power transformer for stepping up the voltage of the house current before passing it to the rectifying and filtering equipment. This is a task any one without experience may well hesitate to attempt.

A Simple Eliminator

True, one very simple type of eliminator has been suggested which obviates the necessity of such a transformer, but it is not very satisfactory, in my opinion. In this plan a toy transformer is used to step down the house current to heat the filament of the rectifying tube and the house current of 110 volts is passed directly through this tube and then filtered. The plan is a bit dangerous and in addition, when we only start with 110 volts the drop across the tube and the filter will result in too low a voltage in our output to be at all satisfactory...

Because of the situation outlined above the writer decided to do some experimenting and discovered that, for a set whose plate current drain is not too heavy, a very satisfactory substitute for B batteries could be built, using a toy transformer more or less as a foundation. These little transformers, generally used to operate electric toys, trains, etc., are readily obtainable and are very useful.

There are, of course, a number of different makes, but they are generally somewhat similar. The one used is rated at 75 watts. A rough sketch is shown in Fig. 1. The primary is connected to the 110-volt house current. The secondary has three taps, A, B and C. There is a lever L, with six possible positions, as shown. These are in effect taps on one section of the secondary. When the lever is placed on tap 1 there will be a potential of 21/2 volts between B and C and 15 volts between A and B. When L is placed on tap 2 these voltages will jump to 5 and 17%, respectively. In other words, the taps increase these voltages in

GOOD many different ideas have | steps of 21/2 volts. A and C are con- | and a 2-mfd. condenser as shown. The | would be "Why not use this for our audio nected to the untapped portion of the secondary, and there will always be a constant potential between them of 12

Bell Ringing Transformer Used

Now let us look at the usual two-coilbell ringing transformer. It is usually designed to step the 110-volt house current down to about 8 volts. You have probably learned from your radio experience that the voltage output of a transformer is in proportion, theoretically, with the turn ratio of the secondary to latter may not be necessary, but if any tubes?" But it cannot be done. A glance alternating hum is noticed this condenser will eliminate it. Of course, still other voltages may be obtained by inserting other resistances in series with CL.

at the diagram of the plate current unit

will show the reason. The high potential

from the filament of the rectifier tube.

is all that is needed.

side of the plate current supply comes

However, the list price of the toy trans-

former described above is only \$3.50, so

another one of them and a potentiometer

The only change necessary in the receiv-

ing set will be in the grid returns of the

tubes to be operated with alternating cur-

rent on the filaments. You will readily

understand that when so operated the two

ends of the filaments become alternately

positive and negative. Now, if the grid

return were made to either of these points

the grid would have an alternating poten-

tial impressed upon it which would be

amplified by the tube along with the signal.

If, however, the grid return is made to the

arm of a potentiometer which is across

the filament connection, the arm of the

potentiometer may be moved until a point

from the two ends of the circuit balance

out each other, which will result in no

In the usual audio frequency amplifier,

B batteries are incorporated in the grid

circuits; the grid return is made to the

C minus and the C plus is connected to the

A minus. In order to adapt this to the

alternating current arrangement leave

the grid return attached to the C minus.

but break the connection between the C

plus and A minus and instead bring a

lead from the C to the center arm of the

The bottom sketch in Figure 2 shows the

arrangement for supplying low voltage

alternating current for the above pur-

pose. A2 is the second toy transformer

and P is the potentiometer, giving the two

A connections to the filaments, and the

counter connection, GR, for the grid re-

We now have what really amounts to

two separate units, but there is no reason

why they should not be built into the same

cabinet. One 7 by 18 inches will hold all

Do not think that you have to use com-

position or hard rubber for the panel. If

it is more convenient for you to use wood. by all means do so. This instrument does

not handle high frequency currents and

special dielectric materials suitable for

high frequencies are entirely unnecessary.

As a matter of fact the necessity for high

dielectrics in panels is greatly exagger-

ated. Unless taps for radio frequency

inductances are to be set into a panel or a

grid leak mounted on the panel, there is

little to be said in favor of one dielectric

tendency to warp, and this can be pre-

vented by proper bracing. Both from the

point of view of appearance and cost there

The best location for the potentiometer

would be in the receiving set so that it

could be connected directly across the

filament of the tube in whose circuit it is

as against another. The only dis tage in using a wooden panel is its

is much to be said in its favor.

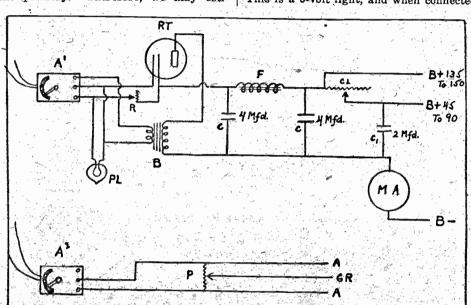
of the equipment easily.

alterations reaching the grid.

s found where the alternating potentials

Pilot Light Used

Two other instruments are included in this diagram which are not at all necessary, but which are, it seems to the writer. well worth while. When using B batteries, turning off the A battery switch is all that is necessary when leaving the set. In this case, however, the house current also must be disconnected from the unit. and in order to avoid forgetting this, it is well to incorporate the pilot light, PL. the primary. Therefore, we may esti- This is a 6-volt light, and when connected



mate that the turn ratio of the bell ring- , to the 5-volt terminals of the toy transing transformer must be a little over 1 to 131/2. If we apply 110 yolts to the primary we take off 8 volts from the secondary. Now, if we reverse this operation, the same rule will apply. If we run 8 volts through the secondary we can take off 110 volts from the primary. In this way we would be running it as

have a 5-volt potential between B and C. which is sufficient to heat the filament of a tube to be used as a rectifier. We will also have a potential of 171/2 volts between A and B. If we apply this to the (using it as a step-up transformer) we will find its primary supplying 240 volts. Of course this is only an approximate

Use of Taps

From the above we see that we have supplied the two voltages necessary: the high voltage to be carried through the rectifier and filter to the set; the low voltage for heating the filament of the rectifying tube. Furthermore, these voltages are quite flexible. By shifting the lever to tap 3 we obtain 7.1/2 volts for the filament and 275 volts to be rectified. Or we can make the latter independent of the lever position by connecting the secondary of the bell ringing transformer to A and C, and in this way obtain 165 volts. In most cases, however, the other arrangement, with the lever on tap 2, will

be found preferable. A wiring diagram is shown in Fig 2 The upper section is for supplying the plate currents. A is the toy transformer, B is the bell-ringing transformer. fier. CC are two fixed condensers of 4 mfd. capacity; F is a choke coil, which may be the primary of a second bell-ring-RT the rectifying tube, R a rheostat controlling the filament current of the rectiing transformer. This is all there is to the main part of the device, which will give a resulting voltage of between 135 and 150. To step this voltage down to,

and will, therefore, last for a long time. operation of the set. A good looking arrangement is to mount the pilot light just

over the milliammeter in your panel. Referring again to Fig. 1: If we place | happened to have an old audio transformer

winding will make an excellent choke.

secondary of the bell ringing transformer is in the bell-ringing transformer. Most 18 milliamperes, 3 or 4 of which will prob-

From this you can see that it is advisable to buy the larger size of bell-ring-

large output could be obtained, but it is not feasible. The secondary of the toy transformer is built with a low impedence for a large output and if this were inserted into the secondary circuit of the first tov transformer, overloading of the latter would immediately take place. This is evidenced by the shell becoming extremely hot. Such a condition is dangerous and if continued for any length of time

would probably burn out the coils. For the above reason no transformer having an output of more than 20 to 25 watts should be used in this step-up stage.

A C on Filaments

Now, since we have tapped the house current for our plate potentials, we might just as well use it to heat the filaments of our audio tubes, or at least the last audio tube. This will enable us to use a power tube in the last stage.

We have already arranged for a low say, 90, insert a variable resistance, CL, rectifier tube and the natural thought preferable.

Figure 2-The wiring diagram for the B battery eliminator herein described former, will not burn to its full capacity A milliammeter, MA, is also shown. As mentioned above, it is not necessary, but it will indicate indirectly the voltages you are using, and will tell more about the

> Other choke coils may be used instead of the one mentioned above. The writer specially designed for very low frequencies and having a heavy core. The secondary

Possible Cause of Trouble The place where trouble is most likely to be encountered in building such a unit of these transformers have a decidedly small output, some even less than 4 watts. ably be taken up in your rectifier and

By substituting a second toy transformer in place of the bell transformer a

ceiving set. voltage supply for the filament of our for the purpose and will be found

Figure 1 - Sketch of a typical toy transformer to be used. The writer has shown it as a part of the separate unit because, in most cases, it will be found inconvenient

In closing let me make one more suggestion: Do not use the usual receiving tube as a rectifier if you can obtain a regular rectifier. The latter is designed

to add it to a previously constructed re-

a ten-foot antenna average normal reception is obtained.

Control of volume is achieved by a separate filament rheostat on the first radio frequency tube. This is so arranged that an antenna can be used without the possibility of paralyzing the detector tube on local signals. In this manner it is not neces-

On Wednesday evening at 9 o'clock his receiver. will be broadcast from stations Apparently the music, bedtime EDISON ELEMENTS WITH NEW YORK; WEAF, New York; WJAR, Provisive satisfactory loud speaker signals without antenna or ground on local witerations without antenna or ground on local without antenna or g will be broadcast from stations Pittsburgh; WGR, Buffalo; WWJ, of the vine attained a useful age. Detroit, and WCCO, Minneapolis, the The antenna, freed from its load, is second of the historical series en- now doing full duty in intercepting

> A permanent magnet will retain its steel is kept across the poles.

Time Payments Arranged

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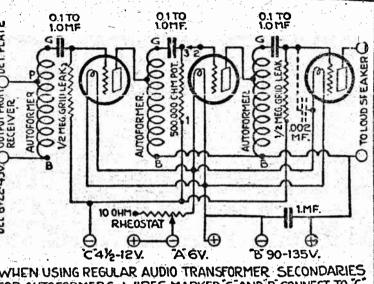


An Impedance Amplifier

the sacrifice of tone and quality. This amplifier.

The demand of radio fans and manufacturers alike has been for an improvement in the quality of radio reception. Broadcasting stations have reached a stage of perfection where a crystal receiver or the detector stage of a tube set gives realistic and clear results.

The output of multitube receivers, however, often lacks the full, rounded tones and the deep notes of the detector and rounded tones and the deep notes of the detector from any radio dealer. Full, clear wides of the auto-transformer shown in the the auto-transformer shown in the diagram, the plate leads, instead of the auto-transformer shown in the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the grammanum of the diagram, the plate leads, instead of the plane of the G terminal, as it is almost impossible to tap the secondary coil of a standard transformer. Tapping the coil is not absolutely necessary to obtain good results. If no old burned out audio-like the plane of the pla rounded tones and the deep notes of from any radio dealer. Full, clear the bass instruments. Amplification, notes and absolutely undistorted to a more or less degree, has been at music will be had with this type of has been inevitable because many! Jacks should not be used in this



WHEN USING REGULAR AUDIO TRANSFORMER SECONDARIES FOR AUTOFORMERS. WIRES MARKED G'AND P'CONNECT TO G WIRE B TO OTHER SECONDARY TERMINAL

nakes of audio-frequency transform- circuit. The surge of current caused ers favor certain notes above others, by the sudden opening or closing of and amplify them with greater vol- the circuit will frequently burn out ume to the partial exclusion of notes the windings of the choke coil. Also outside their range. The notes of the volume can only be controlled in the organ, tuba, bass viol, etc., below steps, and in many cases the listener 100 cycles are amplified imperfectly will want to get in between the secdification over the entire audible ohm potentiometer in the grid cirrange is pointed out by the engineers cuit of the second tube. In this manof Centralab, Milwaukee. Standard ner any desired degree of volume audio transformers in which the pri- can be obtained and adjustments mary windings have been burned out made without any annoying noises.

o secure full volume. ard type audio transformer as the tube well worth while.

r not at all by many transformers. ond and third stages. This can best An excellent method to obtain am- be accomplished by using a 500,000-

can be used for choke coils in a cir- Three stages of this form of amcuit similar to resistance amplifica- plification will give slightly greater tion, but without the need of high B volume than two stages of transbattery voltages or as many stages former-coupled amplification, but the wonderful increase in tone quality In using the secondary of a stand- makes the expenditure for another

Brooklyn Radio Show Announced

More than ordinary interest is centered around the announcement air races to be held at Mitchel Field, WAHG—RICHMOND HILL, N. Y.—316 made last week that a radio con- Garden City, L. I., on October 8, 9 12:05 p. m.—Musical program. 12 midnight-2 a. m.—Dance music. trolled airplane, which is perhaps the latest sensational development in this rapidly growing industry, will be shown for the first time to the public at the second annual Radio on Saturday evening at 7:05 and the Exposition, to be held in the 23d Regiment Armory, Brooklyn, for one week, beginning October 17. This use to airplane is seven feet from tip to the day before the Pulitzer race, tip and about five feet beam.

Tamidight-2 a. m.—Dance music.

WOR.—NEWARK—406
6:45-7:15-7:45-a. m.—Gym class.

B. p. m.—Dedication exercises. Salaam Temple. Newark: Mayor Kendrick.

Speaker.
6:17 p. m.—Shelton Ensemble.
7:15 p. m.—The Van Yorx Hour of Song": artists and quartet.
7:15 p. m.—Serenaders Quintet.
7:16 p. m.—Serenaders Quintet.
7:17 p. m.—Serenaders Quintet.
7:18 p. m.—The Van Yorx Hour of Song": artists and quartet.
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7:18 p. m.—The Van Yorx Hour of Song": artists and quartet.
7:18 p. m.—Serenaders Quintet.
7:18 p. m.—Serenaders Quintet.
7: trolled airplane, which is perhaps and 10, Station WOR will broadcast tip and about five feet beam.

With practically all available space made for the speakers who will give these talks, and the list includes the control of the most available was already taken this year's show these talks, and the list includes the control of the most available was already taken this year's show these talks, and the list includes the control of the most available was already taken this year's show these talks, and the list includes the control of the most available was already taken this year's show these talks, and the list includes the control of the most available was already taken this year's show these talks, and the list includes the control of the most available was already taken this year's show the control of the control o promises to be one of the most suc- Lieutenant Walter Hinton, U. S. N.; 7 p. m.—Blackstone

offered by the Remler Twin- and evening on a specially construct- the close of the great conflict he has Rotor Condenser with the ed stage and studio at the end of the maintained his activities in aerothe entire week.

> Saturday afternoon, October 17, by one. All schools, radio clubs and other organizations, together with manufacturers, jobbers, distributors and facturers, jobbers, distributors and speed record and the American 1:055 p.m.—Dance Orchestra.
>
> 1:05 p.m.—Dance Orchestra.
>
> 1:05 p.m.—Dance Orchestra.
>
> WWW—TABLET AUVIS.
>
> 9:05 p.m.—Musical program; scores.
>
> 9:40 p.m.—Johnson and Johnson.
>
> 1:05 p.m.—Dance Orchestra.
>
> WGR—BUFFALO, N. Y.—319

for the best constructed set, the most record. unique type set and the set that is

Airmen to Talk **During Air Races**

cessful radio exhibitions ever held Captain E. Rickenbacker, Lieutenant More than 60,000 feet of floor space A. Macready, U. S. A.; Lieutenant R. will be devoted entirely to exhibits L. Maughan, U. S. A.; James A. Dooof everything that is new in radio. little, U. S. A.; Al Williams, U. S. N., Manufacturers, dealers and distribu- and Captain St. Clair Street, U. S. A.

tors from all over the United States | Captain Eddie Rickenbacker, said who have progressed in the develop- to be America's greatest ace in the ment of their particular product have World War, has assured WOR offiards of tuning accuracy areso engaged space in the auditorium. cials of his presence. Captain Rick-Practically all the metropolitan enbacker was a famous automobile proadcasting stations will broadcast racing driver, and entered aviation from the exposition both afternoon for Uncle Sam during the war. Since auditorium. Many of the leading nautics, seeking always the medium Broadway radio artists have already providing the greatest speed. He had 3 p. 1 signified their willingness to take many thrilling experiences in his part, and indications are that there serial combats during the World will not be an idle moment during War, and the relationship of these events and his views on the big air The exposition will be opened meet should be interesting to every

> Borough President Joseph A. Guider | Another who is scheduled for a and will be open to the public every radio appearance at WOR during the afternoon and evening until the closing, Saturday evening, October 24.
>
> Williams. His talk will perhaps be
> 9:30 p. m.—Dance program.
> WRW—TARRYTOWN, N. Y.—278 afternoon and evening until the clos- air meet next week is Lieutenant Al applying to the Brooklyn Radio Ex- been selected to fly the special Cur- 2:30-4:30 p. m.—Radio Trades tiss navy racer in the big event and Amateur contests will be conducted will go after a new world speed

> unique type set and the set that is capable of reaching the greatest distance. Amateur speed contests will aeriat take care that all kinks and s.15 p. m.—Concert program.
>
> When laying out wires for the 9:30 p. m.—Dance music.
>
> WCTS—WORCESTER, MASS.—283
>
> 1:5 p. m.—Concert program.
>
> 9:30 p. m.—Concert program.
>
> 9:30 p. m.—Dance music.
>
> WCTS—WORCESTER, MASS.—283
>
> 1:5 p. m.—Story Teller", scores. also be held Among the exhibits in twists are avoided, and if formed these contests will be specially built they should be straightened out carelow-wave sending and receiving con- fully in order not to weaken the

(Continued from page nine) WEAF-NEW YORK CITY-498 45-7:45 a. m.—Health exercises. 5 p. m.—Ray Nichols's Orchestra.

Radio Programs

11-12 p. m.—Vincent Lopez's Orchestra

W3Z—NEW YORK CITY—455
1:15 p. m.—Irwin Abrams's Orchestra.
2, 4, 5:20, 8, 10:30 p. m.—News.
-6 p. m.—Scores, racing (haif hourly).
2:30 p. m.—Amherst College vs. Princeton University football game.
5:20 p. m.—News, baseball, racing.
5:26 p. m.—Market reports.
5:26 p. m.—Market reports.
5:26 p. m.—Financial summary.
6:01 p. m.—Baseball, racing.
7 p. m.—Dinner music.
8 p. m.—Scores, racing results.
8:05 p. m.—Tenor solos.
8:45 p. m.—Radio Franks.
10:30 p. m.—Waldorf-Astoria Roof Orchestra.

WMCA-NEW YORK CITY-141

p. m.—Leonard Hoenninger, bary 15 p. m.—Erva Giles, soprano. 30 p. m.—Ukulele Bob McDonald. 4 p. m.—Erva Giles, soprano. 0 p. m.—Ukulele Bob McDonald. 1 p. m., 12 m.—Ernie Golden's Orche WNYC-NEW YORK CITY-526

83W.

9 p. m.—Police Quartet.

8:30 p. m.—Emily Avery concert, w
Maribel Pratt, Norma MacAulay a
Roger Bird.

10:80 p. m.—Police alarms; weather.

WOKO—NEW YORK CITY—233

6:15 p. m.—Flores Found annua.

12 m.—Luncheon entertainment.
12:30 p. m.—Trio.
1 p. m.—Radio industry hour.
1:30 p. m.—Pauline Bronner, songa.
2:30 p. m.—Radio matinee.
2:35 p. m.—Alex Chigrinsky, plants.
Chris Meehan, tenor.
7 p. m.—Whose Birthday To-day?
7:06 p. m.—High spots in sporta.
7:15 p. m.—Commerce of the day.
7:20 p. m.—Fairy tales.
7:30 p. m.—Herman Schwartzma.
plantst.

8.15 p. m.—Orchestra.
8.15 p. m.—Motion picture series.
8.20 p. m.—Gluseppe Adami, violinist.
8.45 p. m.—Matonic on the Radio."
9 p. m.—Feminine news.
9.15 p. m.—Studio feature.
9.20 p. m.—Bernstein Trio.
10 p. m.—Photographing the Family."
10:15 p. m.—"It Dancing Essential?"

WFBH—NEW YORK CITY—278

m.—Serenadera
m.—Bert Lowe's Entertainera
m.—Maud Edens, contraito
p. m.—Scores (quarter hourly)
p. m.—Montana Ramblera
p. m.—Suzanne Hackett, soprano
ton Yokemann, tenor, Renee Schiesoprano

ber, soprano.

6 p. m.—Southern Serenadera.

7 p. m.—Friedman and Finch, songa. p. m.—Syncopators. p. m.—Bronz program.

WHAP-BROOKLYN, N. Y .- 240 wbbr-staten island-273 In connection with the New York 8 40 p. m.—Soprano, clarinet soles.

8:30 p. m.—Thad. H. Conick, tendes. 8:50 p. m.—Alice Laurie's Trio. 9:05 p. m.—Bloomfield Ridge Boys. 9:30 p. m.—Bloomfield Ridge Boys. 9:50 p. m.—Bloomfield Ridge Boys. 10:20 p. m.—Hartley Joy Boys. WGCP—NEWARK—252
2:45 p. m.—Vocal and instrument cital; race results.
4:30 p. m.—Indianans Orchestra.

WLIT—PHILADELPHIA—396 m.—Concert orchestra; recital p. m.—Dance music, p. m.—Concert orchestra. WOO—PHILADELPHIA—508

p. m.—Organ recital. WHAR—ATLANTIC CITY—275 p. m.—Lecture Period. m.—Seaside Trio. WPG—ATLANTIC CITY—300

Concert. WHAM-ROCHESTER, N. Y.-278

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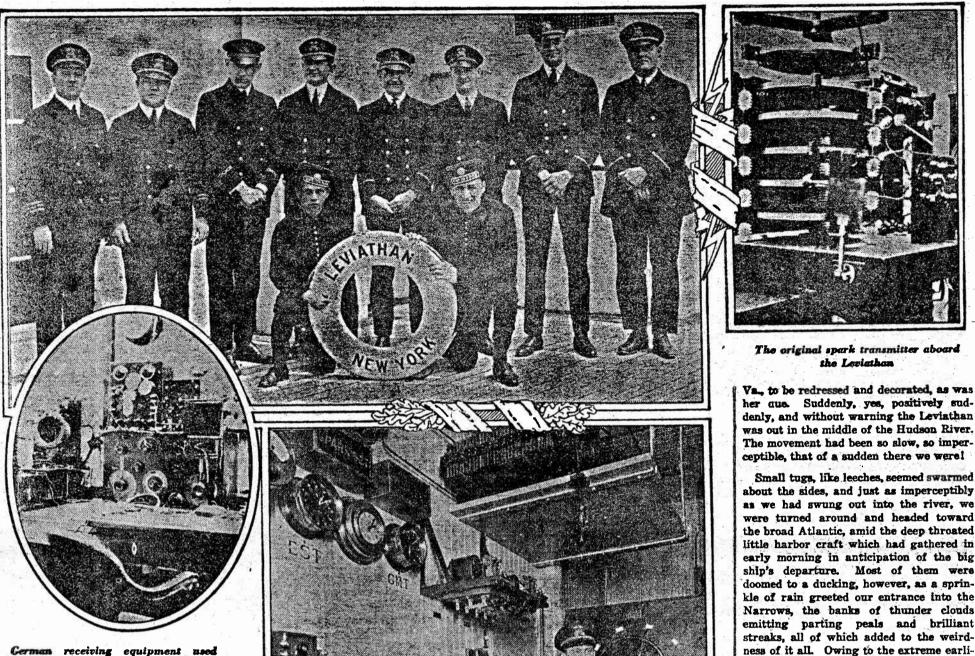


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The First Commercial Trip of the Leviathan Under the Stars and Stripes

Writer Depicts Thrill of Being One of the First American Operators Aboard the Liner

By ROBERT H. HORNING



during the voyage herein described

HE Leviathan was actually slipping out of her berth in the North River. Without ceremony, the big craft slid as easily from her long resting place as she had slid in, years before, exploding rumors of long standing that she could never be moved; that she had so far rusted that her engines could never be turned over; that the mud had settled in about her hull, that this and that was so, wellshe never could be moved, that was all! People actually believed all this, but she was moving and her own engines were moving her out of her berth.

This all happened on the rather dull and most unauspicious morning of April 7, 1922. The sun was hidden behind early morning thunder clouds which formed a serene background for the lofty lower New York skyline. So at two bells the ropes holding the mighty craft to her drab army dock in Hoboken were loosed, and without a quiver the former pride of the German merchant marine began to move. Slowly, almost imperceptibly, the pier began to recede, then faster and faster, and of a sudden the realization that the ship was in the center of the | tion took months, and not without a con-

First American Crew Thus began a voyage which will linger

in the memories of each of the 1,000 members of the crew of the Leviathan. Each was an American, and each had a particular duty assigned him to perform. That was his part of the taking of that giant vessel on its first trip as a commercial vessel under the Stars and Stripes from the port of New York to the port of Newport News, Va. At Newport News is situated the plant of the Newport News Shipbuilding Company, to which the contract for redecorating and rebuilding the Leviathan had been let, after years of uncertainty as to the disposition of the craft.

Congress had at last consented to place poperators assigned to the Leviathan's the vessel in the active list. But in order to deliver the giant to the shipbuilding

The draft of the Levisthan is in the neighborhood of thirty-six feet, light. The harbor at Newport News, Va., could not permit a vessel of this draft to enter without first dredging a channel. This operasiderable expense.

company there were certain obstacles to

How was the Leviathan to be got into the harbor in the first place? To have towed a steamer of that size would have presented tremendous problems, always with the danger of the tow lines breaking and of leaving the huge craft at the mercy of the sea.

There remained, however, American ability to man and run the Leviathan under her own steam! The engines hadn't been turned over in years, true. The steam pipes would leak, the water pipes would leak, the electrical controls had to be thoroughly gone over, the oil steering apparatus needed attention, and there were a thousand and one other details.

As one of the first three commercial

radio staff it was our privilege to view the vessel after years of inactivity, following upon a mighty and most commendable war career. None of the ship's equipment had as yet been transferred to American manufacture, and each piece of apparatus still bore the German name plates, just as the Germans had installed them, prior to that memorable August of 1914. It must also be admitted that a feeling

of pride crept over one to know that both above and below and in each corner of that tremendous boat there was an American on the job, each thoroughly trained in his particular duty.

Sails After Four Years' Rest

So, on April 7, 1922, just four years to the day since the entry of the United States into the World War, we of the radio department, and it might equally be said of the other officers and crew of the United States steamship Leviathan, that our hearts beat just a trifle quicker with the thoughts that the new pride of the American merchant marine had been intrusted to us, to take safely to Newport News,

when everything seemed to be going fine, a stiff breeze sprang up, coming in directly from the sea, causing something of a fog, and also causing the tops of the rather Above—The operating staff of the present-day Leviathan. Below—The radio heavy swells of "the bay to be wafted diroom as it now appears. The panel in the background houses the tube transmitter. rectly over the tugs. The last tug turned back after a while of fruitless pursuit of a hidden sun and with a last deep toot, as of bon voyage, we were off! But alas-after rounding the tip of Fort Hancock, better known as Sandy Hook, where Uncle Sam stores some of his champion loud speakers, the fog grew thicker, and in an amazingly short interval resembled something of a London pea soup variety. This caused a halt in further operations, and rather than take unnecessary chances Commander W. J. Bernard, U. S. N. in command. ordered the anchor into the deep.

Halts for Fog

ness of the hour of departure, only a few

of the early morning New Yorkers and

commuters from New Jersey, viewed the Leviathan as she majestically steamed

past the ferry slips, lower New York, and

finally the Battery. On all sides of the

big ship were tugs, steaming apparently

for all they were worth, in a vain en-

deavor to keep abreast of the boat. One or perhaps several of the smaller craft

bore batches of newspaper men, and one

could see plenty of camera men trying to

snap the big craft in the early morning

haze of the Lower Bay. Most of these

men must have been terribly disappointed,

hard luck seemingly following them from

the start. First, it was too dark; then

Most fortunately, the anchor went over fust in time. Due to the breeze which had sprung up from the east, the fog lifted after a halt of perhaps two hours, and much as a curtain on the stage would lift to reveal the chorus, there were stretched out in front of us, hardly a quarter of a mile away, batches of small fishing dories, sprinkled here and there with larger excursion fishing smacks. These craft lay directly in our path, and though we may have wormed our way through them with-

Continued on page four)

The First Commercial Trip of the Leviathan

out incident-our whistle sounding regularly-it seemed well worth the while to have anchored, especially as the Leviathan is so enormously large.

Once the curtain of fog had lifted sufficiently to permit further safe navigation, the anchors were immediately hauled in and the trip resumed. There were numerous rumors aboard that Commander Bernard would try something at speed. These were soon dispelled when an unofficial statement was reported giving the speed as eighteen knots, and that speed would be maintained throughout. The statement continued to state the motors as working perfectly, the steering apparatus working perfectly and everything as satisfactory. Unfortunately, the entire trip was made under leaden skies, and most uncomfortably cool ocean breezes. The entrance to Newport News, however, was harpily accompanied with warm sunshine.

Value of Radio Bearings

Due to the inability of the deck officers to observe the sun, or "shoot the sun," as it is popularly known at sea, in order to determine the exact position of the vessel, it was necessary to call upon the radio department for frequent bearings from the land compass stations. The land compass stations dot the shores of the United States and are maintained by the Navy Department. By means of these stations a vessel plying up and down the coast is constantly aware of its position, regardless of the weather conditions. The use of the radio compass stations is not necessary when the deck officers can observe the sun or any of the more important stars. In foggy or inclement weather conditions the radio bearings, no doubt, have averted numerous collisions and have warned many a vessel commander of his proximity to shore. Commander Bernard was not taking any chances with his charge, judging by the number of bearings

Inasmuch as the Leviathan was still under a Shipping Board classification. most of the messages received and transmitted were headed S. B., or Shipping Board, and indicated that they were "riding" free. Regardless of whether or not they were free, there were no words left out which may have confused the reading of those messages consequently each, sent or received, with the usual exceptions, numbered over 100 words. Most of these messages pertained to the condition of the tide, weather, channels, winds, barometric pressures and other information essential to the safe operation of a skiff the size of the former Vaterland.

After the ship had been successfully moored at its Newport News home Commander Bernard personally congratulated and thanked the radio personnel for the efficient and expedient manner in which they had handled messages to and from the vessel especially the radio bearings, upon which he had apparently relied so much and had set his course.

Preparations Before Sailing

For two weeks prior to the actual sail-

to run the transmitters was furnished by

a German motor generator, located in a

peculiar room, full of big motors, directly

in back of the operating room. To get

into this room one had to crawl on all

fours through a small aperture. He then

found himself in a dimly lighted motor

room. Just what all the motors were for

we never found out; in fact, it took con-

siderable time to discover which one be-

longed to the radio department. They

were all of German manufacture, and.

naturally, hardly resembled anything we

know even in outside appearance. Find-

ing our machine to be in perfect running

condition, we replenished its supply of oil

and it was not necessary to revisit it

A neat hand-controlled reactance regu-

lated the speed of the machine and a most

clever German frequency meter indicated

when the machine reached a 500-cvcle

pitch. Little black beads appear to rise

from a straight line under the frequency

indicating the velocity. A maximum

radiation of nine amperes was noted in the

antenna circuit at sea, although more were

registered at dock in Hoboken. The steel

pier was probably absorbing the extra cur-

rent. Everything about the apparatus

was thoroughly German. The leyden jars,

several in number, were several feet in

height and much narrower than the

American type. It must be said, however,

that German apparatus is well built and

The personnel of the radio department

of this memorable voyage consisted of

Messrs. Kay, Newell and Horning, Kay

acting as chief and deserving a lot of

credit for efficiency. Before leaving New

York watches were drawn, in which the

12 to 4 was drawn by Horning, the 4 to 8

by Newell and the 8 to 12 by Kay. Re-

ceiving watch was started at 12 midnight

of April 6 while the ship still lay at her

berth in the North River. Watch was

closed shortly after her arrival at the pier

The entire trip was most enjoyable from

all angles. The first night after leaving

the city found Kay and the writer, after

dinner in the main dining saloon, pacing

the promenade deck, once around which is

equivalent to a quarter mile. How many

times we paced this deck is a conjecture;

sufficient to state that the wind was tear-

ing through most everything, and a most

Upon entering the harbor of Newport

News we were accorded a rousing recep-

tion, in which all the harbor craft joined

in a vociferous welcome. We were met

near the entrance by a fleet of tugs and

several aircraft, and from the decks, look-

bracing sea air it was!

in Newport News Shipbuilding Yards.

designed with a view toward accessibility.

ment's call. The delay in the actual sailing of the big ship was due to Newport News dredging operations which were undertaken to provide a channel which would permit the Leviathan to enter withcut fear of grounding. Even so, careful measurements of the tide had to be taken, and the entrance of the Leviathan into the harbor was carefully planned to take place at a certain time. How well this was planned is indicated by the fact that there was no delay whatsoever, from the rounding of the first sea buoy till the time the giant was finally berthed.

The call to duty aboard the Leviathan came on April 5, 1922. As was to be expected, the apparatus aboard consisted or a five-kilowatt Telefunken spark transmitter, with a scaled resistance at two kilowatts, which somewhat handicapped us, in smuch as the big antenna had been dismantled and a dummy had been strung from the rear smokestack to the middle stack, this fairly short antenna probably feeling most of our antenna input directly back into the steel work of the ship. For receiving, the former Telefunken cryscal receiver, with its myriad of different value coils, inserted to receive either long or short frequencies, acted as a last resort. For our more commercial and modern purposes, a navy type, long and short wave receiver, together with an open core type two-stage audio frequency amplifier,

At our backs, mounted on the wall, was small auxiliary half-kilowatt spark transmitter, of undoubtedly Telefunken manufacture. This machine was somewhat out of order and more or less dilapidated in condition. No attempt was made to put this machine in operation, since all of our combined energies were needed to clean the apparatus, which had had no care whatsoever for nearly three years. It was stated some of the officers stationed aboard during the ship's period of inactivity were in the habit of using the crystal receiver to listen in on some of the local radio concerts.

The first arduous task which befell the radio man was that of cleaning off verdigis and other oxidation transforming highly polished copper leads into sordid black bars. This chore was accomplished with much rubbing with sandpaper and an eventual polishing rub-down. High overhead was the skylight through which the lead-in from the antenna entered, and directly underneath were some huge knife switches rigged up with ropes attached to handles and pulleys, reminding one somewhat of a barn with a hay hoist. These "jiggers" proved a most trying bit

of apparatus to clean, but, like everything else, were eventually conquered, oiled and finally one could tug again at a handle and have the switches above open and close at

The room inclosing this mysterious apparatus resembled a butcher's refrigerator, just about as thick, and having handles just like those big brass things and ing of the Leviathan we were told to little windows to peer through. Evidently ing shoreward, the entire city waterfront breakage of this necessary item is highly hold ourselves in readiness for a mo- intended to be soundproof. They were. | was, to put it mildly, simply lined. These | essential to a ship at sea.

people realized that the contract garnered by the local shipbuilding plant was to At our backs, as we sat facing the reprove a lifesaver for most of them. They ceiving equipment and desk, were the conare nearly without exception all workers trols and telephone connections with the in the shipyards, and work had been bridge and other departments of the ship. scarce for a long time. How well they did They were most conveniently located and their job can be gleaned from a tour of were in perfect working order, as was the inspection of the mighty Leviathan at her apparatus, although a trifle dusty. Power New York pier, near Eighty-sixth Strect.

Description of Photographs

In the views accompanying this article, the writer was fortunate in obtaining a recent photograph of the Leviathan's chief radio officer, Mr. Pickerell, who may be seen standing alongside of the very latest type equipment with which the vessel is equipped. Both long and short wave lengths are now used, together with a complete broadcast transmitter. Along the shelf in the foreground are the receiving instruments, direction finding equipment, and typewriters, by means of which the operators transcribe from code to words in one operation. To the right of Mr. Pickerell's head are located relays, while over his head is suspended a spark transmitter with its quenched gaps protruding. Directly in back is the highpowered tube transmitter which does most of the actual work in transmission. The radio room is located on the top deck, between the first and second funnels.

The group of officers standing on the promenade deck constitute the present day nersonnel of the radio department of the Leviathan. This is somewhat in contrast to the first trip with but three officers assigned to this duty.

It is interesting to note the difference in the apparatus. In April of 1922 all of the former German apparatus was still aboard and in use, as the accompanying photographs show. The view of the receiving apparatus shows an American Navy type long and short wave receiver, a De Forest navy type amplifier located atop the receiver. This was installed in as much as the German receiver visible on the left operated by the old fashioned crystal, and was not stable in operation. Over the top of the receiver are four large German high frequency meters mounted on the wall and indicate the power supply to the transmitter.

Though we would consider most of this apparatus of antiquity to-day, it was never out of order on the entire trip, and really did remarkable work. In the view of the transmitter the tuning helices of Telefunken manufacture occupy the most prominent view, though to the right may be seen the wave change over switch, and directly in back, like long four-inch pipes, are the Telefunken condensers. These are also known as Leyden jars, and are peculiar because of their length, about five feet tall. They are made of glass jars and coated with copper both inside and out. There were six of these large condensers. It is possible to build a condenser with greater efficiency to-day, occupying a space of approximately half foot square and which is not breakable. Space and

The Radio Discovery of the Century

changed glances, each eager to learn where this tide of thought was carrying the other.

"Did you read last week of that large blast at Chimney Rock Quarry?" suddenly queried Bill.

"Sure was some blast," commented Dick.

"Ten tons of dynamite were exploded when the foreman applied the current." "But, Bill, why the dynamite in connection with radio?" I ventured.

"Not too fast, Jim; give me a chance," retorted Bill. "What I am anxious to get into your head is that the results of this dynamite blast were in no wise in proportion to the foreman's physical effort in applying the electric current to explode the dynamite. The electric current was simply the means by which the explosive force of the dynamite was liberated. Generally speaking, the force of the blast was dependent only on the amount of explosive

former corresponds to the voltage imis the tiny signal brought into your set | that it is simply a question of battery and | ate with an accuracy of one in a million.

(Continued from page one)

through the aerial. As you fellows well I loud speaker size as to what volume can know, the number of watts required to | be produced. Give me the proper mateoperate a loud speaker with great volume is very small. In fact, an ordinary battery has sufficient energy to operate a loud speaker over a long period. Please notice, then, the entire problem resolves itself around the possibility of working had fallen and he was staring at Bill in out a switch device capable of opening and closing a battery circuit in the same ratio as the alternations or frequencies of the incoming signal."

"Bill," I insisted, "do you mean to tell me your set uses only that small battery unit standing there to bring in London and Paris?

Uses Mighty Little Juice

"I certainly do," asserted Bill. "In fact am compelled to use a small shunting device to reduce the current sent to the loud speaker. What I want you to understand clearly, Jim, is the fact that I use "Now, then, Jim, for the analogy be- the weak incoming signal simply as a tween the dynamite and our radio. The | means to operate my electro-conductive switch. As you have seen demonstrated, pressed on the loud speaker and the elec- the switch is sensitive enough to operate tric current used to explode the dynamite on a signal received from Paris; after

rials and I can make that London program heard all over Newton Center."

Frankly, beads of perspiration covered my forehead. Feeling mentally faint, I cast a helpless look at Dick. His lower jaw bewilderment. We were taken off our feet. The effect of hearing this quiet inventor casually discuss the greatest discovery of the century was simply overwhelming. Several moments of silence elapsed, then Dick recovered sufficiently to remark:

"Say, Bill, assuming what you say is true, where on earth did you discover a switch delicate enough to operate on a millionth of a volt?"

As Bill quietly knocked the ashes from his pipe, a broad beam of satisfaction settled on his face.

"Dick, have you ever heard of the wonderful apparatus these astronomers use? Their thermopiles are so sensitive they measure the heat given off by a candle two miles distant? Their spectroscopes, equatorials, in fact, all their instruments, operCan you suggest any reason why the same accuracy and sensitiveness cannot be obtained with radio apparatus?

"But to get back to our story. Of course we all know that different metals possess different intrinsic characteristics such as weight, specific heat, melting point, coefficient of expansion and, most important from our point of view, different electrical conductivity. Several months ago the idea occurred to me that this quality of different electrical conductivities could be used as a basis for the switch I had in mind. Since then I have made literally hundreds of experiments in connection with the opening and closing of high frequency circuits through the juxtaposition of different metals with various conductivities. Certain results early in my experiments led me to believe I was on the right track. Had it been otherwise I can assure you discouragement would have conquered me. Later in my experiments I became convinced by the voltmeter action that cadmium and zinc were the proper metals for the positive terminals and ground connection. But how on earth to find the others? At length,

(Continued on page six)

Nations May Discuss Wireless | More Information Problems at Paris This Fall On the Seven-Tube Super - Heterodyne

The International Telegraph Conference at Paris and the Washington International Radio Conference Both to Discuss Same Problems

By P. E. D. Nagel

Assistant Chief Transportation Division; Chief Communication Divi- I feel that a few remarks are in sion, Bureau of Foreign and Domestic Commerce, United States order. Department of Commerce

The United States government accepted the invitation of the French government to attend the International Telegraph Conference now in session at Paris and the following information has been prepared to show the relation this conference has to radio.

THE Paris Conference is a regular meeting of the International squealing. Condensers do not tune. Telegraph Union of which nearly all of the principal countries One neophyte was sure his tuner of the world and most of the smaller countries are members, oscillated all night, but couldn't make The United States is not a member of the union and is attending only it squeal! on the direct invitation of the French government.

The International Telegraph Convention is a general treaty which has been enforced in one form or another since 1879 throughout nearly all the world, except, as I have said, in the United States. The treaty discharges to the detector tube), and itself provides for further conferences to be held at intervals to make connect them to the antenna and the necessary modifications, but due to the war there was no meeting ground. We thus have an ordinary between 1908, which was held in Lisbon, and the coming Paris meeting. three-circuit tuner with two steps of

In general the treaty is designed >to provide standard methods for the exchange of cablegrams and telegrams throughout the world. The delegates are always government officials; that is, representatives of the signatory governments, but private operating companies are requested to attend and to make suggestions or recommendations, although the United States, not being a member of the Telegraph Union, is not bound by the treaty and its private cable and telegraph companies are not obliged to comply with it. The general provisions of the treaty are followed as a matter of business practice by the American companies themselves. It is obvious that there must be some recognized international standard so that a message originating in the United States will be treated the same way in any distant foreign country as would a message originating in any other part of the world, and conversely messages filed abroad must be treated in some standard method in the United States. This is

value of the telegraph treaty. Now in regard to radio, at the time national Radio Conference at London produced an International Radio Congraph convention and quoted verbaundertaking.

Transoceanic radio telegraphy and international radio conference at well as cable messages. Washington.

many nations in replying to the invi- set for the spring of 1926. tation submitted proposals for the modification of the telegraph convention which included various phases of radio. The handling of international each part of the service.

difficult to make distinct rules for rotating dial calibrated in the times In general, any world-wide treaty States, as well as London, Hawaii and radio operator on board the United to govern either telegraph or radio Alaska. To determine how time in States cruiser Seattle while the vessel telegraph separates itself naturally any of the above-mentioned places was approaching Australia, virtually into three parts, the first being gov- compares with that of any part of half way around the world. ernmental, political and economic in the United States, the rotating dial terests, etc.; the second, matters of is set at standard time in the time general policy and standard methods zone it is being used. By looking at for the exchange of business, and the the rotating dial it is possible to tell ing set to headphones in another third purely technical operating ques- the hour at any other point in the room it is possible for persons some tions. The third section of a tech-world. Inasmuch as the minutes are distance from the set to enjoy connical nature would be very limited in the same in all zones, it is possible to certs. When confined to bed by illa telegraph convention, but very ex- tell the exact minute of the hour at ness or permanent injury this is an tensive in a radio convention.

As examples of regulations to these giebe.

Some builders of this set state that it far surpasses any claims, and others that they can barely get locals. No one yet has reported merely indifferent results.

WHT to Maintain Staff

Of Radio Reporters A staff of radio reporters, or expert receptionists, located in every large city in America, is being rganized by station WHT through its engineering research department, in charge of Chief Engineer kler can be connected either way. Reeve O. Strock, for compilation Audio-frequency difficulties have been of technical data to aid in correcttoo frequently discussed to necesne faulty transmission and to insitate my going into them here. sure uniform quality of reception

throughout the dominant broadeasting range of the station. Each WHT reporter will for ward a weekly report to the research department and these reports will be checked one against he other at the weekly conference of the WHT operators and it is beieved that much valuable informathe general purpose and the chief three different classes I might say tuning the spiderweb's condenser for

that in the first class would come such a provision as "The governments back and forth, moving it less and Now in regard to radio, at the time signatory to this treaty agree to take less each time until the best setthat the Lisbon conference was held—all means within their power to pro-that is, 1908—the use of radio on a commercial basis was limited to mes-sages between ship and shore to very few ships. In 1912 the first Inter- an article as "The sender of any obtained:

tion will be obtained.

3.000 meters). radio telephony in all its forms have that the telegraph conference at critical, and the wiring may be done really come into existence only since Paris will deal only with those ques- any convenient way.

Regardless of any action taken at It will save a lot of time and

A Novel Device

messages at the present time involves Gardner, a Brooklyn printer. It con- the time spent. the use of cables, telegraph lines and sists of a black dial, calibrated in radio telegraph stations for the same hours, the same as an ordinary clock. message in so many cases that it is On the black clock dial is a smaller a place on the opposite side of the excellent means of bringing enter-

By Herbert N. French

Due to the widely varying reports received by me relative to results obtained on the 7-tube receiver I described in the New York Herald Tribune Radio Magazine, July 5, 1925,

Some of the complaints are as follows: No distance. No volume on locals. Uncontrollable squealing. No

My first and most important sug-

restion is to disconnect the two ends of the primary, or small winding, of the tuner (the secondary of which audio-frequency amplifications, and trouble will be much more readily located. If the spiderweb form of tuner is used, or one in which the tickler moves only through a right angle, the tickler can be connected only through a right angle, the tickler can be connected only one waythe right way. If the detector refuses to squeal, reverse these leads. With such tuners, in which the tickler can be continuously rotated, the

If this connection works satisfactorily, and the condenser covers the wave-length range, reconnect the tuner primary as shown in the original diagram, and disconnect the primary of the second spiderweb coil, connecting antenna and ground to its loose ends. The builder should now read carefully the operating instructions I gave in my article. If the last three tubes have been checked as above, and are working satisfactorily, a local should be heard. In maximum squeal, swing it smartly

message may prepay the reply in If, on the other hand, no station which case the letters RP followed can be heard, it is possible that the vention along the lines of the telebe placed at the head of the message wrong, an easy mistake to make, as graph convention and quoted verba-tim many of the provisions of the before the address." In the third it is difficult to distinguish the leads tim many of the provisions of the section under a radio convention from the inside of this coil. Posagreement, however, related only to would appear the provision that sibly the fixed condensers are shorted. agreement, nowever, related only to stations engaged in international tele- Test in the usual manner. Check oceanic radio telegraphy being then graph service between fixed points socket contacts and turn builts way non-existent and radio telephony shall use frequencies of less than 100 up. As I stated in my article, it is being unknown except as a laboratory kilocycles (wave lengths in excess of almost impossible to go wrong, as fixed condenser, variable resistance There is every reason to believe and choke-evil values are not at all

the war. An attempt was made in tions in regard to radio which rethe war. An attempt was made in quire an international understand successful up to this point, reconnect graph conventions in a single document with the title of the Universal Electrical Communication Union. For various reasons, however, una- the meaning of the different symbols for condenser sizes used. Also poor For various reasons, nowever, una-nimity of opinion could never be and abbreviations placed on messages, tubes or not burning them bright secured among the nations, and it was finally decided to hold the telegraph conference in Paris in accordsages, etc., are in the nature of standdoubt, too much tickler coil, with the ance with the provisions of the telegraph convention and later to hold an the greater part to radio messages as continually. The RF tubes cannot oscillate, so don't look there.

Paris, it is probable that everything trouble to buy, ready wound, induc-The decision to hold a telegraph in any way connected with radio will tances designed expressly for the conference, however, was reached conbe taken up at the International size condensers you are using. That siderably in advance of the arrange- Radio Conference at Washington, the element of uncertainty is eliminated, ment for a radio conference, so that date for which has been tentatively and other possibilities of trouble are few and easily met.

Let me repeat: This set is worth the trouble. Check up your wiring A new novel time-finding device has and parts carefully, and tune per in-recently been devised by George B. structions, and you will not regret

Amateur Makes Record Gerald Marcuse, an amateur radio operator in Gaterham, England, says of the various parts of the United he has talked from his home with a

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as you live. This is not just advertising talk, but a statement of Fact Which cannot Be Contested, Disputed or Doubted. Please note—We advertised 1,400 of these sets in The Herald Tribune the past few weeks. Hundreds bought from all over the country. They're going fast—very fast. First come, first served. This is positively the last time you'll be able to pur-



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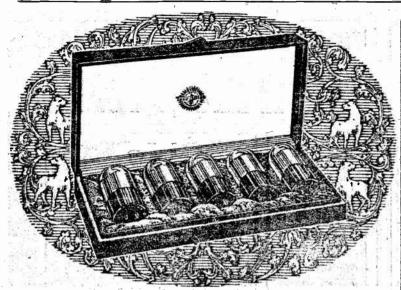
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WORD-OF-MOUTH endorsements have played an enormous part in making radio sales. The numerous technical radio terms combined with the plentiful claims for "marvelous, outstanding, wonderful achievements in radio" have left the radio purchaser in a daze amid a heap of radio literature. So he's gone to his neighbors and his friends and purchased radio equipment on their advice because he knew the value of their word.

When True Blue Tubes were first advertised "The Finest Radio Tube in the World" no one could prove such a claim. It was necessary to have faith in the product.

Today an ever increasing army of True Blue ssers will testify to the truth in True Blue advertising. Ask your neighbor True Blue user-he knows the value of our word. Price \$3,50 each.

> BRIGHTSON LABORATORIES, Inc. 16 West 34th Street, New York City



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highly efficient Radio frequency, detector and 2 stages of Audio frequency. Bakelite panel, shielded metal cabinet and workmanship that only FEDERAL is capable of pro-

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TIME PAYMENTS Arranged on all Sets Purchased at the Shack

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The RADIO - 163 Greenwich St. Bet. Cortlandt and

"It's Guaranteed-If Bought at the Radio Shack"

If you want to buy, sell cr exchange your that it reaches during the night be- casting depends for success on a decline the invitation to act as a radio sets or parts the Radio Exchange will fore descending to us. On this as- happy union of atmospheric condi- matrimonial agency. But the rehelp you.

The Relation of Air and Atmosphere to Radio Waves

Radio Signals May Possibly Rise to Great Heights Above the Earth Before They Are Picked Up by the Antenna

By Howard G. Lapsley

ADIO reception tests in New York City and nearby vicinity have of particular interest, only to be demonstrated the notably local characteristics of static. Broad- greeted by a flood of jumbled harshcast programs that have been literally smashed to pieces ness belching from the horn of the have been received with but slight static disturbance in adjacent towns, loud speaker? It interferes with the and programs which were practically impossible of reception in these program, it grates upon the nerves nearby towns were reported as being well received in New York. These of the listener and tries the patience contrary conditions obtained, not for short periods of three or four of those people who desire quality minutes, but for an hour or two. As these tests were made twenty reception unaccompanied by this obto twenty-five miles apart by air line, and as the broadcasting was jectionable noise. from New York City stations, two conditions have been demonstrated; By understanding the reasons for First, that static disturbances are sometimes definitely localized; sec- the various noises, you may obviate ond, that static interference apparently affects reception from the air, disappointments and obtain a quality rather than delivery into the air, of radio messages or music.

ble of at night.

mospheric electricity.

life spells expansion.

If we accept the theory that radio

It is always easy to wander from the realm of physics into the realm during the daytime which it is capaof metaphysics and to turn from a page of definite data to a mystic dream of indefinite hypothesis, so we must wander off into the indefinite, the question arises: What brings them when we ask: where does the radio back to earth and our earthly antenna? which originate at the broadcasting message or music go, when it leaves To every action there is an equal station. Noisy microphones cause a tion, before it comes home to us on some etherial reaction which brings voice of the artist. Programs picked the headphones or loud speaker? Does these man-made impulses back to up outside of the studio and carried it reach heaven before it reaches our earth. This reaction may be gravity, overland by wire for broadcasting trators picture the radio flashing ity affecting either man-made or at- duction from neighboring wires and short courses. Maybe the impulse does take the short, straight course, but it is unlikely.

The path of least resistance is natural to electricity as well as man, ticles in suspension almost indefiso we may assume that radio im- nitely. Moisture may be in the air all stations, and continues until the pulses follow this course, and instead months before it descends as rain. broadcasting is finished and the staof zooming along the earth's surface, Volcanic dust has been known to fall tions sign off the air. When this octhere is little or no resistance.

Air is reasonably heavy on the sur- minutely divided forms of electricity the light air and free space above?

Power of Radio Impulses

course is usually vertical and not horizontal. It is true that radio imthrough fifty feet of coal strata, earth. but the audibility has fallen off rapidly as this distance was increased. have apparently gone by way of the ters of our thunder storms occur in super-heterodyne receivers.

Clear spots and dead spots of re- the sullen, sultry summer air is hotception are of common occurrence, ter than before the electrical storm, or less suppositious. The regularity spoils of the atmospheric battle, a with which the signals from certain little of the coolness of the upper

The more one ponders on science, which we live rises in sharp peaks hesitates to make a statement with and low pressure. The radio signal taken of each individual cell.

Noises are semetimes caus

dency to be purely local. A careful Diving toward earth in a parabola tion is found. study of your barometer may indi- the radio signal would pass through cate 29.86, with severe static inter- vortices of low resistance and peak Of Possible Interest to a ference. The barometer near the areas of high resistance, mixing in sending station may indicate 30.06- its course with atmospheric electricbarometer reads 30.04 may have no electrical sound impulse.

atmospheric electricity. The differ- radio signal comes through with what should be good looking and very ence between mid-day and midnight appears to be a definite, recognizable lonely. Probably she needed prereception may be accounted for by beat. the theory that the heat of the sun's How high the arc may be which the order to be fitted for the life prorays stretches the elastic belt of air radio impulse traverses before it ful- posed for her. around the earth's surface to twice fills its mission in our machines it is WCCO is not prepared to admit its nightly proportions, forcing the hard to conceive. Regardless of its that there is anything it cannot de, radio signal to reach twice the height course, however, present-day broad- but for reasons of policy it had to sumption the average receiving set tions as demonstrated by the barom- quest suggests infinite possibilities would get about half the distance eter and thermometer.

Cause of PoorRadio Reception Laid to **Induction Noises**

Radio reception has not yet reached that foolproof stage where it is only necessary to turn a switch to secure continuous satisfactory production.

How many times have you looked forward to some broadcast program

of tonal value that will be a continual delight, says the service department of the Freed-Eisemann Radio Corporation

Let us consider the sources of thes

signals start up vertically into space First, we have the studio noises, and opposite reaction, so there is steady hiss which often blurs the but it is difficult to conceive of grav- are usually excessively noisy by insteady, rushing sound, especially no-Air has the electro-chemical power ticeable when the receiver is tuned to divide liquids and solids into the to resonance, is caused by the genmost minute particles. Air has the erator which supplies the plate poadditional power to hold these par- tential to the transmitter tubes. This fly up into the thin, high ether, where a year or two after the eruption curs the rushing sound suddenly diswhich created it. Radio impulses are appears.

face of the earth and very, very light to start with, and possibly they are medium may be defined as those above it. Now, the question is, will still more minutely divided by the sounds which are caused by electrical radio impulses spend their slight air or atmospheric electricity which disturbances between the broadcaststrength, in piercing the thick sur- they pass through. Electricity in- ing station and the receiver itself. face stratum, or will they follow the herently resists all confinement and In this group are found the disturbine of least resistance and rise into restriction. It seeks immediate ac- ing influences of high tension power tion, whether controlled or uncon lines, violet and X-ray machines, trolled. Electricity may not be life leaky transformers, electrically oper-It is fair to assume that their but it is the antithesis of death, for ated elevators, sparking motors and generators, trolley and elevated rail-Man produces electricity generally way systems and telephone and telenorizontal. It is true that radio impulses will penetrate practically any electricity by means of heat. The air produces graph wires. Electrical impulses thing. In coal mine experiments radio signals have been distinctly heard sents the escape of heat from the usually occur at short wave lengths and are picked up by sensitive receivers. Static also comes in this In June, July and August-our hot class and is more or less prevalent Also there is little or no directional months—the air, becoming warmer throughout the summer months. control of radio signals, and, while and warmer, rises to unknown Many satisfactory programs are sudthey will penetrate, they also pick heights. The frigid upper spaces reddenly broken up by a series of untheir own route. Some radio signals sent the intrusion of this warmth familiar clicks and in many cases sent from Nauen, Germany, to Aus- into the domain of coldness, and it is are interrupted entirely for short tralia have apparently gone by way driven back to earth forcibly, by periods. Those are caused by imof the North Pole, while other signals lightning and thunder. Three-quar properly operated regenerative and

In the third class are the noises these three hot months. Sometimes which are caused by the receiver itself or by the equipment which is ception are of common occurrence, ter than before the electrical storm, used in connection with the same. but the whys and wherefores are more and sometimes it brings to earth, as Discharged B batteries become noisy and are usually the cause of a high stations surge and fade away causes regions. However, the so-called vaone to wonder if all the messages cant spaces above us always appear operating on the second audio stage. and music we receive on our machines to win the argument, and the hot These batteries should be discarded does not travel a long, arcing route through the high spaces before it reaches us.

The goar of the radio listener. The sea of air at the bottom of this case are caused by one or more either pure or applied, the more one and descends in deep valleys of high tected unless a voltmeter reading is

to some listeners who have spent rect, having reached its maximum asmany hours at the midnight radio cension, is forced back to earth. In identical in appearance, it sometimes vigif, with acutely sensitive ears, that the downward descent it must sink happens that their internal elements radio signals may possibly rise to readily into these valleys of low- are not rigidly supported, and any great heights above the earth before, describing a parabola, they come down on our antenna, like a drop of trating through a high peak of air vibrate. This defect in construction dew, which we must magnify in our with greater registance, deliver to us machines until we hear a recognization weak signal. A low barometric condition would indicate an air valley the program. This may be overcome In this supposition may he part immediately overhead and a high by shifting the tubes about in the of the answer to static and its ten- barometer would indicate an air peak. sockets until a satisfactory combina-

Good Looking, Lonely Girl There is no apparent limit to what a difference of 20 points. Another ity which may entirely demolish or radio broadcasting is expected to acreceiving set in an area where the render unrecognizable the original complish nowadays. The other day a request came to CCO from a man static disturbance. A close study of When these peaks and vortices of in western Canada asking the station the barometer may give us more air are fairly regular in area and al- to find him a suitable wife. The knowledge than we now possess about ternate high and low resistance the only stipulations were that the girl vious experience with loneliness in

Up-to-the-Minute News of Radio in Pictures



The Radio Beginners Series By R. P. Clarkson By (Copyright by the Author)

HERE was nothing radically new shown at the shows, as we prespring. Storage and dry batteries for tube filament heating and for plate voltage are still the rage, but there were many types of devices for using the lighting circuit for tube operation. A number of sets were shown again, as many were a year ago, for operation from lighting circuits. In every case, however, such a set is merely some convenient and compact combination of the ordinary set, with one or more of the ordinary battery eliminators. It is a case of putting the whole works into one cabinet.

The thing which most impresses me in looking over commercial sets is the tendency to put everything in one basket. set, batteries, speaker. Some three or four years ago two or three manufacturers did this. In fact, back in 1920 there was a set which combined everything in a single cabinet, the first model (and the last, I believe) which that manufacturer brought out. That idea died out completely and was revived by the multitude of portable sets which came into being a summer or two ago. Strangely enough, several of the portable sets have abandoned the compact idea and home sets are fast taking it up. It seems to me that it has become more popular than the low price console type of cet, the latter arrangement being reserved for high priced outfits.

Modern Tendencies

Another tendency is to do away with the mechanical or machine appearance of the front of the set. In many cases everything is wiped off the front of the cabinet except the outlet for the speaker. In one case, and approximately in several others, the controls are hidden away in the scrolls and fretwork of the speaker mouth, so that the entire set looks like simply a cabinet speaker. In spite of this tendency there was a complete absence of freak cabinets, no sets disguised as clocks, lamps, lighthouses, Eiffel towers or Woolworth buildings. I'm sorry about this. I always had a desire to see some one bring out a set disguised as a train of cars and so arranged that you could crawl into the cab of the locomotive to work the controls, while the tender behind carried the storage battery, the smokestack gave out speech and trailing along one by block of B batteries, all connections being made through the track, and perhaps overhead trolleys.

In parts there was nothing new and little of interest. The tendency seems to be to make the regular standard stuff, but to make it better, more dependable, lower priced and sometimes a little more compact. There were coils wound on forms. self-supporting coils and coils imbedded in various materials, mostly transparent. Spaced winding is more frequently used. Large sized wire is even less used than a year ago. There was little appeal to the broadcast listener by any low wave material, although it showed occasionally. Loops have undergone no change, and it seemed to me, and I may be wrong about this, that there were fewer loop sets than at any show of recent years. I wonder if loops are not making the headway we expected. Certainly it is the ultimate aim to have a completely self-contained set, whether with batteries or lamp socket operation, and for this the loop is essential. Possibly the reason is the number of tubes required, unless reflex is used, and, strangely enough, the five and six

tubes cheapening in price.

Changes in Sockets

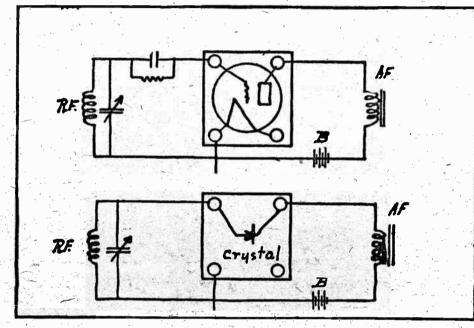
In sockets at last there are a number of radical changes, and mostly for the better. Interrupted bases, forming an air gap between plate and grid: elimination of the metal shell in favor of a narrow support- in a self-inclosed set. Most of the sets ing ribbon; better support for the contact where everything is in a single cabinet springs, and several minor changes, all | used the horn type, as do all of the cabispell greater socket values. To take a net speakers, I believe. leaf from the stock market reports, we might say "Prices remain firm."

ers. grid leaks, condensers, binding posts and small parts generally show no external change and no more than expected increased perfection in manufacture. Panels seem to be wavering. Metal panels and metal backed panels are talked of, but | method of friction cams or gears.

tube sets seem to be the limit, in spite of | don't all mold them, as they do loud | There are a tremendous number of gang speaker horns.

> Speaking of loud speakers, few new models were shown. Horns are still in evidence and make up most of the models. Cones and barrels are constantly increasing, however, and decorative models are many. I saw only one cone type speaker

In dials I received the impression that every one was making a vernier type. Rheostats, potentiometers, transform- There must have been twenty or thirty, all pretty much alike and all very attractive. One, at least, was devised to perforr the astounding feat of changing a straight line capacity condenser into a straight line frequency type, by some



The method of substituting a crystal for a vacuum tube detector

hard rubber and phenolic compounds still seem to hold their own for the present. Subpanels of insulation are universal. Hardly any one builds on the base of the cabinet. Even the cabinets are molded in

Condenser of the variable tuning variety were prominent, but sets, of course, overshadowed parts. Straight line frequency and straight line wave length types were most frequent, but it did not seem to me a few instances. I do not see why they that the majority of sets were using them.

The Radio Discovery of the Century

(Continued from page four)

after many weary hours of work, a fortunate combination of cadmium, silver, lithium and zinc gave the desired result.

"As for the remainder of the set, as

von already know, it is simplicity itself and that, gentlemen, in a nutshell is the story of the Johnson Electro-Conductive Switch."

Dick drew a long breath and a look of relaxed tension crossed his face. .. "Bill, your fortune is made."

"Well, boys," Bill smiled, "I wouldn't want it known, but the Inductance Corporation has made me an offer of one thousand grand per year during the life of my patents."

coats after thanking him for a most in- new turns up. Now, let us turn to deteresting evening. As I left Dick in front of his home he remarked again on the simplicity of Bill's new switch.

"Dick." said I. "it strikes me the whole affair is so simple as to be ridiculous."



Two large transmitting vacuum tubes which are now on exhibition at Albert Hall, London, England. These are the tubes used at the new Station 5XX, Daventry. They are known as the Holybdenus Electro Valves, have a power of 1 kilowatt, and cost £60.

condensers, where a single shaft activated anywhere from two to a half dozen rotors.

I think the general conclusion of ob-

servers is that to a large extent the shows from now on will be, like the auto shows, a yearly display of new models of sets. Of course, we all know that during the last two years the set business has grown from being 20 per cent of the business to being 80 per cent of the industry. The business has grown, too, and while parts are now only 20 per cent, the total value of parts sold yearly has increased. Parts sales to manufacturers have increased, but this is not taken account of here.

tendencies. What about hook-ups? The answer there is the same. Not a new hook-up has raised its head in many moons. Commercial sets are all tuned radio-frequency. I say all. That isn't strictly true, but just an impression. Actually there are some regenerative sets, some reflex sets, some super-heterodynes. There is an occasional set using one or two stages of R. F. fixed transformer coupling, with perhaps one of tuned radio

So much for the new parts and new

With this condition we have no quarrel. It does not indicate anything at all. Many fans have the idea that because almost every one is making tuned radio frequency it must be best. But they have forgotten the patent situation. Admittedly the patent situation on circuits is hopelessly muddled, but the fact remains that if a manufacturer makes a set using regeneration or super-heterodyne he is almost sure to be mixed up in litigation because some one owns those patents and licenses are not granted. The tuned R. F. in its ramifications seems to be completely owned, and into this opening most of the manufacturers who have recently gone into set building have forged.

The fan who builds his own is not handicapped by any patent fear. He can make any set he likes so long as the patent owners maintain their present atti tude, and the fan usually has something regenerative about the house. Many have super-heterodynes which they have made. Many have reflex sets. Many have crystal sets and thousands have four, five and six tube R. F. sets, tuned and untuned.

No matter what your set, the audiorequency side of the detector is the same. That is, all audio amplifiers are identical. regardless of what detector and R. F. hook-up they are used with. We have Congratulating Bill, we pulled on our | finished with amplifiers until something

> For a detector you have two choices a crystal or a tube. There are a number of different crystals and there are a number of different tubes. There is only one main crystal hook-up, of the crystal itself, but there are two ways of using the tube as a detector, one regenerative and one not. Wherever you use a tube as a detector and it is not regenerative you can substitute a crystal to advantage in some particular and to some disadvantage in other particulars. Any one using a tubs as a detector should try a crystal. It can usually be done by taking out the tube and not disconnecting the socket, but connecting the crystal across from grid to filament, using a crystal which will stand the B voltage and short circuiting the detector grid condenser. The result will he as indicated briefly in the diagram.

The way to tell whether or not your tube: detector is regenerative is to look in the plate circuit. If the plate terminal of the detector tube goes direct to the audio transformer without passing through some form of coil, such as a variometer or a tickler, then it is non-regenerative. In some sets, of course, it will go to the jack and then to the transformer. That is a mere convenience. No detector is recentrative without some form of coil in the plate circuit.

How Electrical Terms Used in Radio Received Their Names

Units of Standard Value Called After Prominent Experimenters: Joseph Henry Responsible for Foundation of Present-Day Radio

By Sidney Elbert

SK any radio fan if he ever heard of the words "volt," "ampere, "ohm," "farad" and "henry," and he will immediately respond with, "Sure; what radio bug who reads a radio publication providing binding posts in the rear hasn't?" Ask him if he ever heard of gentlemen by the names of of the set for the loud speaker con-Alessandro Volta, Andre Ampere, Georg Ohm, Michael Faraday and Joseph Henry, and he will look you blankly in the face and shake his head in negation. If given a moment or two to compare the words and the names, he will forthwith appreciate that there is some connection between the two apparently irrelevent questions.

The history behind the derivations of these five units of electrical measurement, so commonly employed in radio practice of all kinds, is but infrequently recounted, yet it invarienthusiast because he probably has been frequently puzzled by them. It incidentally brings to light some earliest scientific knowledge of wirephases of other epoch-making accom- ducting mediums; in other words, the former core.

trical pressure, was designated in electric are and for a substance which honor of a famous Italian physicist is the base of aniline dyes. named Count Alessandro Volta, who The Count, who received his title "henry," the unit of coil size, is from the illustrious Napoleon Bona- named. Henry, an unpretentious nawas one of the earliest experimenters as a founder of this age of electricity. with electricity, and is known to pos- yet he is comparatively unknown. He terity as the inventor of the electric certainly did more to develop the cell. This device, first called a "vol- science than any other American. taic battery," he announced to the Franklin and Edison not excluded. Royal Society of England early in

man to burn gases in a closed cham- been possible. ber by means of an electric spark. This he succeeded in doing just at the very time a handful of British colonists in a far-off land known as his discovery of a system of producpendence; he little realized that he famous Faraday by several years. All was giving unborn automobile engineers a dependable ignition system ployed in electrical and radio practice would not appear for 125 years.

Marie Ampere, a distinguished French scholar and physicist for whom the scholar and physicist for whom the "ampere." or unit of electric flow, is named. Radio is indebted to Ampere for his observations on the relation to the relation and electricity, and she, in 1842, who discovered that the pressure arm, which does not make

who passed through high school, is did not seem to realize the trementact arm on the resistance.

The did not seem to realize the trementact arm on the resistance.

When connected in an auditact arm on the resistance. man scientist who followed slightly but at any event he anticipated a fying circuit, as shown by the acafter Volta and Ampere. He evolved similiar discovery on the part of the companying diagram, the modulator the law while experimenting with better-publicized Hertz by at least gives noiseless adjustment to any devarious metals to determine the ease thirty years. With his other work sired tone volume from a whisper to with which they carried electricity, on electrical induction and this on and it now herves as the basis for all oscillatory discharge he naturally

was adopted in 1881 as the unit of the resistance of electricity-conducting materials. The unit "mho" (pronounced "moe"), so frequently seen in tion that the resistance of head- of R. P. Clarkson, well known to

Life of Faraday

The "farad," and its hybrid, the microfarad," or "mfd.," is a shortenstarted his career as an assistant in siderable size.

The most interesting story is that

It was Henry who developed the the year of 1800, and following short- electro-magnet, improving greatly on ly thereafter a learned member of the fundamental idea of an earlier that erudite organization voiced the Englishman. He wound bars of iron conviction that the "voltaic battery with copper wire insulated with strips was an alarm bell to experimenters of silk his wife tore from her wedin every part of Europe." It was ding gown, and he obtained magnets tricity for many of the startling in- In 1831 he sent a current of elecventions that changed the entire life tricity through a mile of wire and regulation is secured. of the civilized world. Volta's orig- caused an electro-magnet to actuate inal battery in its fundamental aspect a signal bell, thereby creating the with a fixed resistance across the has survived through a century and first telegraph. Morse is generally secondary of the transformer, and a quarter of time, and even now regarded as the inventor of this great volume controlled by using a variable high school sophomores immerse boon to humanity, but it was Henry center contact like a potentiometer, plates of zinc and copper in beakers who really was responsible for it connecting this contact to the grid of sulphuric acid as their first physi- Morse had an idea, but he made no of the next tube. Approximately ics experiment in the generation of headway on it until he read of the 500,000 ohms puts the proper load on As an interesting sidelight it might telegraph relay, without which long zero to the maximum resistance. be mentioned that Volta was the first distance telegraphy would not have

Henry Responsible for Motor Henry's greatest contribution was for self-propelling vehicles that Henry also is authoratively credited

electrical theory and measurement. laid the rock-bottom foundation for Mechanics Institute Opens In the German's memory the "ohm" radio as we have it to-day.

Head Phone Ohms

terials.

Connect in Series

ing of the name of Michael Faraday, one time by connecting them in available to students and others. Approbably the most brilliant scientific series. In this way dance music may plication for information or enrollexperimenter of all time. The son of be received sufficiently loud to be ment should be made to the secretary a humble Loudon blacksmith, Faraday heard all over a dance hall of con- by mail or in person at the institute

How to Control The Volume of A. F. Amplifiers

The general use of multi-tube re ivers and superpower broadcastng station has done much to liminate the old system of using several jacks in a radio set. The latest receivers are using only one lack at the most, to which the loud speaker can be connected. Many of them are eliminating all jacks and

The elimination of plugs and jacks s ridding receivers of two very com-

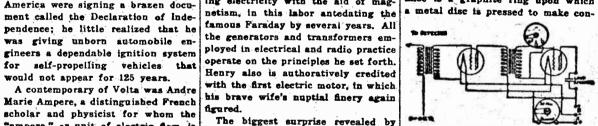
Any receiver is better off without jacks, for that matter. Wiring is greatly simplified, capacity of the wiring is reduced, and the front panel enowed Royal Society, and displayed is improved in appearance. The use uch genius that he finally rose to of jacks where any audio transhe exalted position of director. His former is used with high primary imstry alone were prodigious, but he low ratio audio transformers that are s best known for his discovery that becoming more and more popular, is a magnet moving inside a coil of wire hazardous. The sudden surge of curproduces a current of electricity in rent caused by the opening or closing that coil and for his measurement of of a jack circuit is likely to burn out less communication and of certain the effects of electricity on non-con- fine wire used in winding the transmeasurement of condensers. The A serious problem presents itself

period of his work was about 1831. Faraday also is responsible for the The volume of the receiver must be however, when jacks are eliminated. controlled. If the rheostats are turned low, volume will be reduced. was born in 1745 and died in 1827. of Joseph Henry, for whom the turned too low, distortion results. from the illustrious Napoleon bolla- named. Eventy, an appropriate because of his great discoveries. tive of Albany, ranks with Faraday efficient setting of the rheostat, is broadcasting, however, such a procedure will result in interference be-

Engineers have been working to devise means of softening the tone without destroying quality. Resistary windings of transformers are sometimes used, as well as a bank o more than that: it supplied the elec- stronger than any ever dreamed of output of the last tube, proving en-

inventions of Henry and applied the the transformer for best results. latter's electro-magnets. Henry, fur- while the variable arm must have thermore, was the inventor of the perfectly smooth regulation from

this purpose. This is supplied with three terminals, precisely like a potentiometer except that the resist-America were signing a brazen docu-



and electricity, and the electrical discharge of a Leyden the electrical contact and therefore science in general for his theories on jar (a large fixed condenser) was onterrestrial electricity. He was the cillatory, and also that it could inservice. The resistance strip resistance of the cillatory of th inventor of a device on which the duce similar discharges in circuits a mains unburt by the pressure considerable distance away; this, in tact of the disc, whereas the usual ern electrical meters is founded.

"Ohm's law," familiar to every man effect of wireless telegraphy. Henry

When connected in an audio ampli-

Radio Class Again This Year Again this year the radio class at

the Mechanics Institute, 20 West Many people have the mistaken no- Forty-fourth Street, will be in charge connection with vacuum tube ratings, phones is a measure of their quality. Herald Tribune readers through his is simply "ohim" spelled backward, Actually, radio headphones of 2,500 Radio Beginners' Series. The Meand mathematically is the reciprocal ohms resistance may be much better chanics Institute School was started of the ohm. The latter term is in than others of 5,000 ohms resistance. in 1820, and the present year is the everyday use as a designation for The resistance is determined by the 105th of its operation by the General rheostats, potentiometers and grid length, size and kind of wire used in Society of Mechanics and Tradesmen, leaks; for the last named the "meg- their construction. Their perform- which this year celebrates its 140th ehm," or million-ohms, is more con- ance is a matter of proper engineer- birthday. Tuition is free to any male venient for the rather high values ing design and the use of good ma- employed during the day. Classes in all subjects taught opened this week, the first meeting of the radio class being Friday night at 7:20. Several speakers may be used at A library of over 100,000 volumes is building.

Lunningham RADIO TUBES

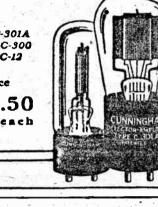
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Standard for

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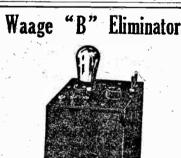


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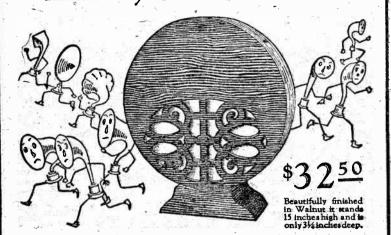
RIX RADIO SUPPLY HOUSE, INC. 5505 Fourth Ave. Brooklyn, N. Y.



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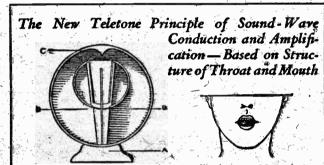
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TELETQNE'S supreme mastery of tone reproduction will be a revelation to you when you hear it — at any of the dealers' listed below. It is based on a newly-found principle of sound-wave conduction and amplification. It brings whatever is broadcast nearer and clearer than you ever heard it before. This is why—



Refer to the above sectional view of Teletone. Note that a sound-wave coming from the sound producing unit "A" (the human vocal cords) is amplified through the orifice "B" (the human larynx) until it reaches the conducting area "C" (the back of the throat), whence it is again conducted to the point of greatest amplification "D" (the correctly formed and opened mouth of the singer).

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816 Amsterdam Ave.
Riverside Radio Shop,
200 W. 84th St.
West End Radio Co., Inc.,
2471 Broadway.
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Mielke Eberhardt,
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2760 Broadway.
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184 Main St., White

Cardinal Hayes Opens the New | Paulist Fathers' Radio Station

There Is a Large Opportunity Nowadays for the Broadcasting Station to Offer Moral and Spiritual Service to Listeners

The following is an abstract from the address delivered by Cardinal Hayes on the occasion of the opening of WLWL, the new broadcasting station of the Paulist Fathers, New York City, Sep-

ELIGION to-night, in the dedication of this new station of the Paulist Fathers, WLWL, willingly and gladly wishes to pay tribute to science. Religion praises the Creator of the universe for the advance and broadening vision of science and rejoices that, in His providence, another page of the Book of Nature has been unrolled revealing to mankind the wonders of the radio. Religion and science reverence profoundly the truth that revelation after revelation of God's vonderful handiwork in creation will continue until the crack of doom.

To-night we offer a tribute of praise & dedicate their lives to the advance- regard to them, is part of the comlaboratory and the machine shop, on comes to be published we shall find earth and sea, and in the air, they win the younger members of the famhave toiled at their self-imposed ily back to the fireside for their rectasks that all mankind might enter reation, to keep them off the streets into the fruits of their labor and to give them (and, perhaps, their share the secrets of their new for questionable amusements and which I trust lies close to the heart amazing knowledge.

Within the memory of this generation, physical science has contributed

radio, and therefore the new station, WLWL, which we are opening to-day. people of this immense city and, I blest musical compositions ever pro- I am given to understand that you may say, of this whole country of ours, upon the inauguration of an the Paulists have shown themselves much help. Especially it can assist bility more than a million. Consider worthy sons of their founder; for scene—the dedication of the twin the teacher reinforces the lesson of towers of steel that overlook the Paulist Church here at Fifty-ninth imagination, impresses the memory. Street—as an agency for the spread Instruction by radio, therefore, reof truth and wisdom!

Power vs. Responsibility

Now, the possession of power al- educational instrument not to be devays involves responsibility, and the spised. gravity of our responsibility is meas- In the things of the spirit as well according to a prominent San Franured by the greatness of our power. as in things practical man needs cisco radio dealer in a letter to KGO. This is, of course, an old familiar stimulus, encouragement, guidance. yet fully appreciate the bearing of the school of experience, those who always size him up to see if he is a the old principle on the new situa- have absorbed the wisdom of the 'jazz hound' or not, and when dem-

Here, harnessed in our service and young, the undisciplined, the over- thing he likes. I have found that the bedient to our command, is a force venturesome. Here, more than in any man who dislikes jazz may refuse to that seems to recognize no barrier other respect, perhaps, we may look buy if jazz happens to come along at and no boundary. It crosses land and for the radio to exercise a beneficent a moment when he is still in doubt. sea in all directions; it penetrates influence on the listening millions. A woman's talk on fashions or cosevery public auditorium and every private home, in the crowded cen-

sponsible for our use of it. We must problems are submitted to the judgharm; but, further, we are strictly should I be moral?" "What sanctity fruitful. Whoever would be great order?" "Is there any solid basis for

letic sports, games, puzzles-things They need counsel. Obviously those the panel, cut a piece of mica and such as these have their places in who speak to the public on the radio place between the rheostat and the he average normal life. To promote should minister to this need.

and gratitude to our scientists, to interest in them, to stamp them with those devoted servants of truth who approval, to convey information with mon daily service which radio can ment of human knowledge. Patiently, give the public. Probably when the unselfishly, perseveringly, in the unwritten chapter of human service dangerous associations.

Cultural Influence

in finished fashion some of the no- the instrumentality of radio. duced by man.

one of his five senses. The voice of of our fellow countrymen? peating and confirming what the solitary student reads in his book, is an

of morals, but men may not Those who have been graduated in store to buy a receiver," he wrote, "I ages, can be of no little help to the onstrating a set I try to tune in the

Spiritual Service ters of civilization and in the far away corners of the earth. The energy which can do this is immeasur- which opens to-night is dedicated in of that stuff in my house, is just as ably great; no less is the responsibilas special sense. There is large op- likely as not to be the verdict. ity of those who use it. If for the portunity nowadays for such service. spoken word and the printed page The most important human interests point of view to which customers man must one day render an account, are being constantly discussed in may tune in is undoubtedly music, equally must he answer for the message which he broadcasts over the riage, the right of life, the origin of brow nor too low. Music is not only sage which he broadcasts over the riage, the right of incomplete will, the wide world to millions and millions man, suicide, education, free will, the pleasing in itself, but has the merit of immortal souls. We who employ radio, then, are rematters involving complex moral versal. It hurts no one and gives a take care that we use it not for ment of the average reader. "Why body. bound to use it for good, to make it attaches to the existing social must serve. He who has power must the principle of authority?" "Are gineers throughout the country it has turn it to the welfare of his fellows.

Let us consider what a broadcasting station such as this might aim to deeper consideration than can be door aerials are from 10 to 15 per Among the useful functions of a given by the average busy man or cent as efficient. roadcasting station is that of con- woman. And you perceive at once tributing good, clean and wholesome that under penalty of grave disaster entertainment for the individual and men and women must be prevented for the family. Harmless fun, ath- from jumping to rash conclusions. rheostat shorting on the shield on

2 Stations Play Same Song at Same Time

One of the metropolitan radio audience happened upon an unusual coincidence in broadcast programs and in recognition of the feat demands the award of the "brown derby." His letter, which explains the incident in detail, is

"I was enjoying, on WJZ, an offering entitled 'June Brings Roses.' I tuned in on WEAF for a moment and heard June Brings Roses.' By tuning back to WJZ and humming the air in WEAF's tempo during the operation. landed precisely on the same note at WJZ. I repeated, going this time back to WEAF with the same result. A difference of only a few seconds delay in WEAF's announcer from WJZ's permitted me to hear that each had been an encore. If you will be kind enough to check me up, and in the event that this occurrence was not manipulated, will you be good enough to award me the brown derby' for picking up the unusual n programs?"

Let it be said that the check-up has been made and that the incident was not intentional and the brown derby" has found its proper owner.

of every one of you-the service which radio can perform for our country as a whole. We have puzzling Again, as a cultural influence the social and industrial problems to be enormously to human comfort and opportunities of radio are innumer solved. We have high ideals of pahealth and life. Indirectly our dis- able. This very week we have read triotism and good citizenship with covery of the buried history and of in the public press that during the which we must familiarize the young. the secret laws of the physical unicoming season the most distinguished More important still, there are verse has brought us even greater artists of every nation will broadcast lessons of sympathetic understanding, penefits. Things seen, as St. Paul the best music in the world. This is of mutual good will, of tolerance and says, are an evidence of things un- good news. I am convinced that the charity that all of us must learn. seen. Each fresh revelation of public has a need, and has a right, And here, perhaps more than in any science makes it less and less reason- to be made familiar with what is best other field I mention, this new broadable to deny the existence of the in human culture. Standards must casting station should have a disbe set, the critical faculty must be tinctive function. The history of the There is a further acknowledgment trained, taste must be instilled. Can United States shows that in this you imagine any instrument that will climate intolerance and bigotry do Among the most recent and most do this on a larger scale or do it more not strike deep root or live long. wonderful gifts of science comes the effectively for the many than radio? Every fresh attempt to set class I hope that in the field of culture against class and religion against rethis new station WLWL will find a higion has perished quickly, has been As Cardinal Archbishop of New York, special opportunity. With regard to soon forgotten. Yet I believe that congratulate the Paulist Fathers music, for example, the Faulist Chor- in this respect also there is much isters, whose singing we have just progress still to be made, progress apon the great work which they have listers, whose singing we have just progress still to be made, progress undertaken. I congratulate also the listened to, will surely render for us which I trust will be aided through

Above: Interior of the studio of

Station WHAZ with an orchestra

playing. Right: The transmitting

equipment. The panel on the left

is the main transmitter. Below:

The antenna system on the roof of

the engineering building of the col-

enterprise so admirable. May I add Also in matters more strictly aca-ment number quite certainly hunthat in the building of this station demic and intellectual radio can give dreds of thousands and in all probathose readers and students who are the influence on you and on me of nothing was more characteristic of far removed from the resources com- this present experience. Is it not the first Paulist, Isaac Hecker, than monly accessible in cities and uniclear that similar experiences, conhis readiness to utilize every new instrument of good. How his noble gogy proclaims the advantage of the inner consciousness and then the soul would rejoice to witness this teaching the pupil through more than external conduct of tens of millions

Sales Assistant

A radio program, coming in at the moment a set is being demonstrated has a lot to do with making the sale, "When a customer comes to my

metics may ruin the sale to a man.

Loop Aerials

From the experience of radio en-

Preventing Shorts If there is a possibility of the

No. 10-WHAZ, Troy, N. Y. NIQUE among American a year for the last three years. This as Peru, first Far East program by Cuba listened to a program he ar Every radio fan has heard of "body"

tinent for approximately forty weeks dents which was heard as far south him. Receivers in the British Isles 2SZ and 2CDC.

day evening, September 14. It is Europe. general broadcasting, February, 1923, of the first in America to be heard many others.

selaer Polytechnic Institution, Troy, 30,000 letters and messages attest, microphone of the same bell with Seas, 5,000 miles from Troy. The Most of them would have better understanding of N. Y., the first of the Class B sta- from coast to coast, from Alaska to which Professor Joseph Henry in postmaster at Wailuku, Hawaii, and if they had a better understanding of observed its third anniversary MonAmerica, England and Continental magnet, forerunner of the telephone, telegraph and radio, and the first unique not alone from the fact that This station had not been on the radio pageant on the sesqui-centenit established in the early days of air many weeks when it became one nial of the Revolution were among

the long distance transmission record of more than one third the way of more than one third the way are not mere chance "pick-" which the call letters were the norm of Canada, Guba and Ber-

same night. A Boy Scout commisbroadcasting station is rastation has been heard with great
diophone WHAZ at the Rensdiophone WHAZ at the Rensdiophone WHAZ at the Rensdiophone who is the result of the last three years.

Chinese, Japanese and Siamese students, first concert by all blind performers, the ringing before the heard on shipboard in the South has had his own troubles with it. vessels often report concerts heard effects? while passing through the Caribbean Body capacity, or hand capacity, is around the earth, nearly 10,000 miles ly, in December following. Two- ups," in which the call letters were muda. "Personality" is put into the to the variable condensers in a reto New Zealand, accomplished under way radio telephone communication made out laboriously and the rest station by the program and partici- ceiving set it has an extremely small

Student Broadcasts

are mads as continuous as possible.

Naturally the programs by the stu-Institute on the last Monday evening hand is in contact with it. Then you of each month, with a midnight pro- know too well what happens. gram on the second Monday, have become a popular feature of WHAZ Orchestra, Glee Club and individual students participating. While the find an important place in the broad- Body capacity, while small enough in casts in a way that makes them interesting as well as instructive. Members of the faculty contribute prac- build anything from a pocket crystal jects of current interest in the sciennishes no regular news, sports or market services.

electrical engineering in charge of Attempts have been made to elimeach of whom has been engaged in the set, with a metallic shield. overlooking the Hudson River at the properly grounded. head of tidewater navigation, 150 miles from New York, is most ad- circuit, the stator end is connected vantageous. The remarkable success to the grid; in the plate circuit the of the station is credited chiefly to stator end is connected to the plate. the superior skill of the engineering Where a tickler is at the end of an experts in charge of its operation, inductance, which is the case with The studio is attractive and in excellent taste, its walls being covered coil farthest from the tickler end ily carpeted and ceiling with a dougram director and announcer since the station was opened. -

electrical and communication endio department has a remarkable equipment embracing practically every variety of apparatus. There are numerous long and short wave every regular Class B broadcasting more than 2000 miles overland, a feat an unintelligible jumble. Four suctransmitters and receivers. Transcondition at its regular wave length not duylicated, was carried at the cessive broadcasts were heard in New mission and experimentation is alof 379.5 meters and with only 500 will of the operators between WHAZ, Troy, and CFCN, Calgary, Alberta, wastes power, but through a love watts power, but through a long Canada, in January, 1923. The pro- quested a special program by the equipment ever sold—an old DeFor- tuning dials. These disks may be series of unusual radio tests carried gram director has always sought un | Campus Serenaders, students' dance est set-by means of which Professor cut from aluminum and should be out by the electrical communication usual programs and unique features orchestra, and sixty Indians danced Williams delivered a lecture to stu- about 4 inches in diameter. It is also department of the oldest college of in radio, as becomes a college ex- to the music at the ranch. A college dents as far back as 1910, long be- important that they be connected department of the oldest college of perimental station, and by dint of engineering and science in America, numerous experiments has intro- Islands, danced to music from the thing of radio broadcasting. There tive of the B battery. For more comwhich cerebrated its centennial last duced many novelties, some now be Troy studio, and at another time a is a Marconi wireless telegraph set plete protection against body capacity October. Although regularly "on the come regular features of radio pro- group of cowboys in western Ne- of 1902, including a coherer of the effects the entire panel may be air" only from two to four hours grams. The first minstrel show braska. One graduate of the insti- original type, a German Telefunken shielded with a metal plate or an broadcast was in the WHAZ studio, tute makes it a point to entertain system wireless outfit, and all the in- "anti-capacity" panel, which is a every Monday evening, aside from first Boy Scouts program, first pro- the public of his native city, San finite variety of apparatus that has hard rubber panel with a metal shield its elaborate experimental work, this gram of old-time songs, one of the Salvador, Central America, with stu- been developed in the intervening vulcanized in place, may be used. station has earned the title of the earliest radio plays and introduced dent programs from his alma mater years down to the very latst im- When any of these methods are

Popular American Broadcasting Stations reported hearing WHAZ programs on seven successive Monday nights last winter, and sixteen listeners in dif-Effects May Be ferent English towns reported fairly complete logs of the program on the Reduced in Sets

a graduate with his family in the what it really is. What is this mysfriends on more than one occasion finest tuning with unruly squeals, and with programs from WHAZ. Navy what is the best way to prevent its

has been reported from every state the human body which makes it act pants rather than the announcer, capacity. The trouble is that even an who merely tries to make what is extremely small variation in either going on in the studio intelligible capacity or inductance of a set can o the audience, and the programs throw fine tuning out of adjustment. Each time the operator's hand takes hold or lets go of a knob in the process of tuning the capacity of the set varies by a small amount, belents of the Rensselaer Polytechnic cause some of the body capacity is

A very fine adjustment of the total broadcasts, with the Symphony Or- with modern vernier knobs for rotatcapacity of a set can be obtained chestra, Campus Serenaders' Dance ing the parts of the condensers, which supply practically all of the capacity purpose of this radiophone is not very fine adjustment of the total inof the circuit. In the same way a merely to entertain, it has done that ductance is obtained by rotating the so well as to receive the commendation of every type of radio listener all of the inductance in the circuit. through its always varied and unua Thus these two elements in the set sual programs. Educational features itself can be very closely controlled.

itself, is quite beyond control.

Some radio enthusiasts, who can

tical and non-technical talks on sub- set to a superheterodyne, do not tific and engineering field, and promi- capacity and inductance values is so know just why this adjustment of nent speakers are frequently heard on important in its effect on reception. topics of the day. The station fur- The reason, technically, is that when these values are properly related to each other for any given wave length Of the broadcasting apparatus it is the equivalent resistivity, or total sufficient to state that it is the equivalent resistance, of the circuit standard Western Electric 500-watt is reduced to he minimum. As the outfit, complete in every detail, and voltage supplied to the set by batwas installed through a gift of the teries or lighting circuit is constant, Roeblings, graduates of the Troy minimum resistance means maximum Tech, famous as builders of the current. With the maximum current Brooklyn Bridge. WHAZ is under flowing through the set you have the direction of Professor Wynant reached the point of resonance—the J. Williams, associate professor of point at which signals are strongest.

the course in communication engin- inate body capacity by various metheering, with a corps of instructor- ods, but the most effective has been operators, Harry B. Mimno, Hiram B. the protection of the panel, or, in Harris and Bertram H. Cramer jr., some cases, of individual parts of

radio experimentation from boyhood. In order to make shielding thor-In physical equipment station WHAZ oughly effective care must be used in is similar to many other leading making connections in the circuit. broadcasting stations of the country. The grid and plate terminals are most Its ideal location on the top of the sensitive to body capacity effects. big Sage building, one of the largest Keep the parts of the coil or appacollege electrical and mechanical ratus to which the grid or plate is laboratories in the country, at the connected as far as possible from the crest of the beautiful hilltop campus, panel. The filament circuit must be

With a variometer in the secondar many variocouplers, the end of the

In locating the sockets keep the ble perforated covering preventing grid and plate terminals farthest from the panel and place the filament a fine plane and other necessary musical and pick-up devices. Rutherford Hayner has been the sole proful to shunt the phones with a fixed condenser of .001 or .002 mfd. ca-As an engineering college in which connect a fixed condenser across the gineering is one of the major courses, and the negative side of the B batplate terminal of the detector tube tery. In neutrodyne circuits it is very desirable to shield the neutroformers to avoid intercoil coupling.

There are several ways in which a body capacity. One is by placing

"Transcontinental and International the "Hearies," in which the play was by means of a loud speaker. A proved devices. Many radio ama- used it is essential that none of the "Transcontinental and International re-written and adapted for radio as Harry Lauder imitator notified relatives in Scotland that he would sing abroad are familiar with the call let-tact with the metal of the shield, and broadcasts have spanned the con- ish program by Latin-American stu- on a certain night, and they heard ters of the institute stations, 2XAP, also, if best results are to be obtained, the shield must be grounded.



Eastern Standard Time

WFI-PHILADELPHIA-395

0.30 a. m.—Solos.
p. m.—Orchestra.
p. m.—Talk; solos.
:45 p. m.—Concert orchestra.
:41 p. m.—Concert orchestra.

a. m.—Organ recital. 30 p. m.—Concert orchestra. 3 p. m.—Concert orchestra; recital.

30 p. m.—Artist recital. 30 p. m.—Dream Daddy. 50 p. m.—Chat on plays

WLIT-PHILADELPHIA-395

WCAU-PHILADELPHIA-278

m.—Recital,
n.—Rev. John W. Stockwell,
p. m.—Harry Link, songs.
p. m.—Billy Hayes's Orchestra.

WPG-ATLANTIC CITY-300

director.
3:30 p. m.—Hall Dual Trio.
3:30 p. m.—Banquet of American Wemen
Bankers' Association.
10:30 p. m.—Organ recital; male quartet.

WHAR-ATLANTIC CITY-275 p. m.—Seaside Trio.
30 p. m.—Book review.
5. m.—Seaside Trio.
115 p. m.—Strand organ recital.

p. m.—Travel talk. p. m.—Tupman's Mayflower Orchestra.

WRW—TARRYTOWN, N. Y.—273
9:05 p. m.—Musical program; scores.
9:40 p. m.—John Fulton, tenor.
10:05 p. m.—Eleanor Ward, soprano; songs.
11:05 p. m.—Oriole Orchestra.

WGR-BUFFALO, N. Y.-319

40 p. m.—Pasmon talks.
11 p. m.—Program same as WEAF.
WHAM—ROCHESTEE, N. Y.—278
30 p. m.—Eastman Theater Orchestra

p. m.—The Twins, m.—"Eveready Hour." p. m.—Al Mitchell's Orchestra. WTIC—HARTFORD, CONN.—476

6:30 p. m.—Big Brother Club.
7:20 p. m.—Lost and Found; Scores.
7:30 p. m.—Emily McKenzie, soprano.
7-11 p. m.—Program same as WEAF.
WNAC—BOSTON—280

WNAU—BURIAN

1 p. m.—Concert orchestra.

1:50 p. m.—Morey Pearl's Ramblers.

2:50 p. m.—Ray Sinatra, pianist.

4 p. m.—Dance orchestra.

6:30 p. m.—WNAC dinner dance.

7:45 p. m.—Concert, the Somerville

WBZ—SPRINGFIELD, MASS.—333

6:30 p. m.—Lenox Ensemble.
8:00 p. m.—Evelyn Marcil, contraito.
8:30 p. m.—Copicy Plaza Orchestra.
9 p. m.—George Albanese, ukulele.
WCTS—WORCESTER, MASS.—268
10:30 a. m.—Radio chats.
12-2 p. m.—Luncheon music.
12-2 p. m.—Story Teller, scores.
8-11 p. m.—Program same as WEAF.

WRC-WASHINGTON-469

p. m.—Shoreham Orchestra.
p. m.—'The Political Situation."
m.—Musical Program.
m.—Tupman's Mayflower Orche
KDKA—PITTSBURGH—309

WEDNESDAY

WEAF—NEW YORK CITY—492 5-7:45 a. m.—Health exercises.

WEAF—NEW YORK CITY—492
3:45-7:45 a. m.—Health exercises,
10:45 a. m.—Bessie Dodge, soprano,
11:05 a. m.—Bessie Dodge, soprano,
11:a. m.—Home service talk; songs,
11:15 a. m.—Health talk; sings,
11:35 a. m.—"Educational High Spots,"
W. H. Allen,
2 noon—Market and weather reports.
4 n. m.—Ray Nichols's Orchestra.

Education."

4:45 p. m.—"Dahdas," Dr. M. A. Howe.

6 p. m.—Dinner music.

7 p. m.—United States Army Band.

8 p. m.—Foremost Four.

8:30 p. m.—Foremost Four.

9 p. m.—Waterman's Points of Progress.

11-12 p. m.—Ben Bernie's Orchestra. WJZ—NEW YORK CITY—455

p. m.-Ipana Troubadours

11 a. m.—Grand organ.
12 noon—Luncheon music by Golden's
12 noon—Luncheon music by Golden's
13 noon—Luncheon music by Golden's
14 p. m.—Grand organ; trumpets.
15 p. m.—Grand organ; trumpets.
16 a. m.—Severs, book review.
11 a. m.—News, book review.
11 a. m.—News, book review.
11 a. m.—News, book review.
11 b. m.—News.
12 p. m.—Philladell. phila—508
13 p. m.—Grand organ; trumpets.
15 p. m.—Setting-up exercises.
1 p. m.—Organ recital.
15 p. m.—Ed Brown's Rambiers.
16 p. m.—Billott Lester, critic.
16 p. m.—Elliott Lester, critic.
17 p. m.—Elliott Lester, critic.
18 p. m.—Elliott Lester, critic.
18 p. m.—Elliott Lester, critic.
19 p. m.—Artist recital.
10 cos p. m.—'Emo's "movie" broadcast.
10 cos m.—Women's program.
11 a. m.—News, book review.
11 b. m.—News, book review.
11 cos m.—News.
12 cos m.—Women's program.
11 cos m.—News, book review.
11 cos m.—News, book review.
11 cos m.—News, book review.
11 cos m.—News.
12 co

12 noon—Market and weather reports.
4 p. m.—Ray Nichols's Orchestra.
4:15 p. m.—Talk to parents, "Religious Education."
4:15 p. m.—"Dahstas." Dr. M. A. Howe.
4:45 p. m.—"Sports," Bill Wathey.
7:30 p. m.—"Sports," Bill Wathey.
7:30 p. m.—"Sports," Bill Wathey.

2:30-6 p. m.—Scores (half hourly). 3:15 p. m.—Dinner Concert. 7:30 p. m.—Children's Period. 9:30 p. m.—Mandolin Club.

10:30 p. m.—Grand Theater Concert

15 p. m.—Organ recital.

2 (noon) - Organ Recital.
p. m. - Mayflower Orchestra.
p. m. - "Over the Seven Seas

30 p. m.—Dinner music. 45 p. m.—Fashion talks.

30 p. m.—Eastman Theate 6 p. m.—Theater organ. 15 p. m.—Dinner concert. p. m.—Theater organ.

WJAR—PROVALINA 1:05 p. m.—Concert orchestra. 7:30 p. m.—"Musik Tawkalog." 8: m.—Safety Council. 8:10 p. m.—Elton Cook, soloist. 8:30 p. m.—The Twins,

WGY-SCHENECTADY 380
p. m.—Music; talk; "It Might Ha
by players.
30 p. m.—Organ recital;
30 p. m.—Dinner program.
35 p. m.—WGY Orchestra.

:30 p. m.—Luncheon music. :40 p. m.—Scores; organ recital. p. m.—Dinner music, J. Leonard

WGBS-NEW YORK CITY-316 0 a. m.—Timely talks with Terese. 0:10 a. m.—Malvina Edness, soprano. 0:20 a. m.—Decoration talk; songs. 0:40 a. m.—Etiquette talk; songs.

10:20 a. m.—Decoration talk; sungs.
10:40 a. m.—Etiquette talk; songs.
1:30 p. m.—Scripture reading.
1:35 p. m.—Henry Rogers, pianist; Strand
Orchestra.
3 p. m.—Interview with Clare Tree Major.
3:20 p. m.—Florence Wells, soprano.
3:20 p. m.—History of the pianoforte.
3:40 p. m.—Florence Wells, soprano.
6 p. m.—Uncle Geebee.
6:30 p. m.—Yerkes's Orchestra.
7 p. m.—N. Lusk, "Movies Sidelight."
7:10 p. m.—Yerkes's Orchestra.
WHN—NEW YORK CITY—361

7:10 p. m.—Yerkes's Orchestra.

WHN—NEW YORK CITY—361
2:15-3:15 p. m.—Musical program.
3:45 p. m.—Joi Sherman, Songs.
4:45 p. m.—Joe Sherman, Songs.
4:45 p. m.—Lulu Quinn Weyant, Songs.

145 p. m.—Lulu Quinn Weyant, son j. p. m.—Children's hour.
115 p. m.—Lulu Weyant, songs.
136 p. m.—Edna Josephs, pianist.
145 p. m.—Eugene West, song writ g. p. m.—"Lanais Hawaiiana."
130 p. m.—Taik.
140 p. m.—Bella Walzer, soprano.

p. m.—Silver Slipper Revue. 30 p. m.—Ted Lewis's Orchestra.

WNYC-NEW YORK CITY-526 p. m.-Market high spots. 10 p. m.-Harry Ash's Orchestra.

10:30 p. m.—Police alarms; weather.

WMCA—NEW YORK CITY—341

12 noon—Cloott Vall's String Ensemble.
6 p. m.—Olcott Vall's String Ensemble.
6 p. m.—Ernie Golden's Orchestra.
7:30 p. m.—Joseph Wetzel, tenor.
8 p. m.—Joseph Wetzel, tenor.
8 p. m.—Anne Ritz, soprano.
8:15 p. m.—Lulu Weyant, songs.
8:30 p. m.—Annen Ritz, soprano.
8:45 p. m.—Musical entertainment.
p. |m.—Sol Lavner, Jewish songs.
9:15 p. m.—Banjo Boys.
9:30 p. m.—Sol Lavner, barytone.
9:45 p. m.—Serenaders.
10:15 p. m.—Minnie Well, planist,
10:45 p. m.—Catherine Harvey, soprano.
11 p. m.—Hida Goldmeyer, readings.
11:15 p. m.—Catherine Harvey, soprano.
11:30-12 p. m.—Jack Smith, barytone.

WEBJ—NEW YORK CITY—273

WEBJ-NEW YORK CITY-273 p. m.—Norman Hennefeld, pianist. 3:15 p. m.—Joe Sherman, Morty Howar.

8:35 p. m.—Edith Law soprano. 9 p. m.—Thomas Prytherch, teno 9:20 p. m.—Selbert's Serenaders.

WRNY-NEW YORK CITY-259

-Radio industry hour.

02 p. m.—Sports.
10 p. m.—Studio program.
p. m.—'Whose Birthday To-day?''
05 p. m.—Sports; commerce reports.
15 p. m.—Code lesson.

7:15 p. m.—Code lesson.
7:35 p. m.—Finance.
7:45 p. m.—Finance.
7:45 p. m.—Joseph Beaver, songs.
8:30 p. m.—Hitcin: "Tolstoy."
8:45 p. m.—Rita Maginot plane classics.
9 p. m.—"Radio and Explorer."
9:15 p. m.—Architecture, Harvey Corbett.
9:20 p. m.—Francine Vyde repertoire.
9:30 p. m.—Anna Drittel, cello.
9:45 p. m.—Chev. ce Lancellotti, songs.
10:15 p. m.—Biography series.
10:30 p. m.—Becker Siring Quartet.
WEFH.—NEW VORUS CATAY.

10:30 p. m.—Becker String Quartet.

WFBH—NEW YORK CITY—273

2 p. m.—Kraus's Orcestra.
3-4 p. m.—Studio program.
4 p. m.—Studio program.
5 p. m.—Studio program.
6 p. m.—Jerry Antone's Orchestra.
6 p. m.—Anita Bunn, soprano.
6:15 p. m.—Majestic String Ensemble.
6:50 p. m.—Majestic String Ensemble.
7 p. m.—Albert C. Cohn.
7:15 p. m.—Kraus's Orchestra.
9 p. m.—Diamond Anniversary. Dinner
The Imigrant Industrial Savings Bank.
WAHG—RICHMOND HILL N V.—216

WAHG-RICHMOND HILL, N. Y.-316

WANG-RICHMOND HILL, N. Y.—316
12:05 p. m.—Almon & Bower, violin
7:30 p. m.—Sports talk.
7:45 p. m.—Joe Zimmerman, pianist.
8 p. m.—Mrs. Allen, soprano.
8:15 p. m.—Clinford Kilby, banjoist.
8:30 p. m.—John P. Simpson, barytone.
8:45 p. m.—Joe Zimmerman, pianist.
9 p. m.—Stellario Cambria, mandolinist.
9:15 p. m.—Stellario Cambria, mandolinist.
10:05 p. m.—Stellario Cambria, mandolinist.
10:15-11:30 p. m.—Zimmerman; orchestra

WOR-NEWARK-405

8 p. m.—Vincent Lopez Orchestra.

8 p. m.—"Topics of the Day."

8:20 p. m.—Music of "Phantom of the Opera"; "Hollywood" McCosker, prologuist.

8:50 p. m.—Carmen Concert Trio.

9:30 p. m.—"Selecting a Career."

9:45 p. m.—Ballin and P.

130 p. m.—"Selecting a Career."
145 p. m.—Ballin and Race, piano duo.
0 p. m.—Sam Siegel, mandolin.
0.15 p. m.—Julius Seebach, barytone.
0.30 p. m.—Ballin and Race, piano duo.

2:45 p. m.—Sam Siegel, mandelin. p. m.—Flo Richardson's Orchestra.

WAAM-NEWARK-263

11 a. m.—Happy Hour program.
7 p. m.— Elmer Nippes's Orchestra;
"Sports."
8:20 p. m.—Helen Bataille, soprano,
8:20 p. m.—Mrs. J. M. Morris, soprano;
Alice Rinck, violin.
9:10 p. m.—Webster Quartet.
9:30 p. m.—'Finding Youth."
9:45 p. m.—Webster Quartet.
10:15 p. m.—Joe Further, zither; Anthony
Schreck, guitar.

a. m.—Happy Hour program. p. m. — Elmer Nippes's

6:45-7:15-7:45 a, m.—Gym cla s. 2:30 p. m.—"Voice of the South." 2:45 p. m.—Mrs. Sol Marx, contralto, 3 p. m.—Willard Robison.

m.—Harry Ash's Orchestra.

m.—Bella Walzer, soprano.
 m.—Jack Smith, barytone.
 m.—O'Brien brothers, guitars.
 m.—Billie and Marie Van, sin
 m.—Bobe Blase, barytone.
 m.—Roseland Dance Orchestra.

TO-DAY

WJY-NEW YORK CITY-405. 8:15 p. m.—Frank Gostovsky, tenor.
8:30 p. m.—To be announced.
8:45 p. m.—Frank Gostovsky, tenor. WEAF-NEW YORK CITY-492

8:00-4:00 p. m.—"Sunday Hymn Sing."
4:00-5:00 p. m.—Interdenomination services; Address by Rev. Charles W. Dane Federation Quartet; Aida Brass Quartet 7:20-9:15 p. m.—"Capitol Theater Gang."
9:15-10:15 p. m.—Symphony Orchestra.

WGBS—NEW YORK CITY—316 \$:30 p. m .- Program from Warner's Thes ter.

8 p. m.—Gay's Famous "Beggar's Opera.

9:15 p. m.—Werner Janssen, songs.

9:80 p. m.—Gusinah String Quartet.

WHN-NEW YORK CITY-361 1 p. m.—Marsh McCurdy, organist. 2:30-3:30 p. m.—Christian Endeavor gram.

5 p. m.—Roseland Dance Orchestra.

7:30-10 p. m.—Church service.

10:45-11:15 p. m.—Janssen's Orchestra.

WNYC—NEW YORK CITY—526

8:50 p. m.—Baseball results.

9 p. m.—Program from stage and studio
Brooklyn Strand Theater.

WMCA—NEW YORK CITY—341
11 a. m.-12:15 p. m.—Christian Science B

ices.
6 p. m.—Roemer's Homers.
7 p. m.—Ernie Golden's Orchestra.
7.35-8 p. m.—Olcott Vail's String Ensemble
WRNN—NEW YORK CITY—259
2.45 p. m.—Physical-Spiritual Sunday con-

cert.
2:50 p. m.—Hulsman's talks.
3 p. m.—Ladies' Quartet.
3:30 p. m.—Edith Spieler, pianist.
3:45 p. m.—Eadies' Quartet.
4 p. m.—Dr. Christian Reisner: "Value Difficulties." WLWI-NEW YORK CITY-288

WFBH-NEW YORK CITY-273 5 p. m.—104th Artillery Band. 6 p. m.—Masonic news. 6:15 p. m.—Arighi Choir Singers. 6:30 p. m.—Bossert Lumber Jacks. 7 p. m.—Talk. 7:05 p. m.—Orchestra. WBBR-STATEN ISLAND-273

a. m.—Watchtower Orchestra. 20 a. m.—Fred Twaroschk, teno 30 a. m.—Bible lecture, Judge ford.

11 a. m.—Tenor; orchestra.

9 p. m.—Choral Singers.

9:10 p. m.—String Quartet.

9:20 p. m.—Fred Frans, tenor.

9:30 p. m.—Bible lecture, Judge Ruti

ford.

10 p. m.—Singers; quartet; singers.

WGCP—NEWARK—405

WGCP—NEWARK—405

8 p. m.—Charlotte Trystmann, planist,
8:15, p. m.—Ralph Hersh; violinist,
8:30 p. m.—Vincent Laine, tenor,
8:45 p. m.—Strickland's Orchestra,
9 p. m.—Henry Segal, tenor,
9:16 p. m.—Hilly Rhodes, contraite,
3:30 p. m.—Billy Rhodes, tenor,
9:45 p. m.—Bernstein Trio,
10:15 p. m.—Strickland's Orchestra, WIP-PHILADELPHIA-508 7:45 p. m.—Evening service.
WOO PHILADELPHIA—508

WFI—PHILADELPHIA—395 WLIT—PHILADELPHIA—395 WCAU—PHILADELPHIA—278 5 p. m.—Frank H. Black, tenor. 5:15 p. m.— Undenominational Radi

Church.
5:35 p. m.—Recital.
6 p. m.—Concert orchestra. WPG-ATLANTIC CITY-300 4:15 p. m.—Vocal and instrum 9 p. m.—Concert band, 10:30 p. m.—Organ recital. WHAR-ATLANTIC CITY-275

WHAR-ATLANTIC CITY-Zis
2:30 p. m.—Short sacred recital.
2:45 p. m.—Sermon, Rev. James Lord.
7:50 p. m.—Evening service.
9 p. m.—Seaside Trio.
11:15 p. m.—Strand organ recital.
WRW—TARRYTOWN, N. Y.—273 8:05 p. m.—Services. 10:30 p. m.—Studio program. 11:05 p. m.—Musical program

WGY-SCHENECTADY-380 12 noon—Service.

8 p. m.—Yom Kippur service.

9 n. m.—Godfrey Ludlow, violinist. WHAM-ROCHESTER-278

WGR—BUFFALO—319
...—Vesper services,
...—Evening service, WJAR PROVIDENCE 306 7:20-9:15 p. m.—Capitol Theater p 9:15 p. m.—Musical program.

7:20 p, m.—Capitol Theater program. WLS—CHICAGO—345

7:30 p. m.—Organ solos. 8 p. m.—Little Brown Church. WCBD—ZION CITY, ILL.—345

p. m.—Celestial bells; male ch WHT—CHICAGO—400

WNAC-BOSTON-280 m.—Concert.
m.—Evening service.

7:20 p. m.—Evening service:

WEEL—BOSTON—349
7:20 p. m.—"Capitol Theater Gang."
9:15 p. m.—Musical program.

WBZ—SPRINGFIELD, MASS.—333
10:45 a. m.—Church services.
8 p. m.—Vincent Spolzino, tenor; Lena I Knox, organist.
8:30 p. m.—Southern metodies.
9 p. m.—Organ recital.

WCTS-WORCESTER-MASS.-268 7:20 p. m.-"Capitol Theater Gang." 9-11 p. m.-Symphony orchestra. WCAP-WASHINGTON-469 1 a. ni.—Service.
1:20-9:15 p. m.—Capitol Theater pro
1:15 n. m.—To be announced.

KDKA--PITTSBURGH-309 9:45 a. m.—Church service. 5 p. m.—Baseball scores (half hourly). 6:45 n. m.—Church service. WCAE_PITTSBURGH-461 6:30 p. m.—Dinner concert. 7:20 p. m.—Capitol Theater program. 9 p. m.—Symphony Orchestra. WEAR-CLEVELAND-390

8 p. m.—Theater orchestra.
9 p. m.—Safety Congress reception
WLW—CINCINNATI—422 9 p. m.—Concert. WKRC—CINCINNATI—326 WAAM-NEWARK-263 7:45 p. m.—Songs and service.
11 p. m.—Classical program.
12 midnight—McKay's Orchestra.
WSAI—CINCINNATI—326 4 p. m.—Sermonette; chime conc WWJ—DETROIT—353

WGCF—SEW GAMA

2:45 p. m.—Vocal and instruments

race results (half hourly).

3:30 p. m.—Louisville Jazz Band.

4 p. m.—Songs.

8 p. m.—Half hour of music. 7:30 p. m.—Tabernacle band and choir.
10:15 p. m.—Request program.
11:30 p. m.—Back Home hour.
WOJ.—CHICAGO—448

11 p. m.—Rainbow Gardens Orchestra

MONDAY

WEAF-NEW YORK CITY-492 plano.

11:40 s. m.—Talk, Ethel Peyser.

12 noon—Market and weather reports

4 p. m.—Joseph Bier, barytone.

4:15 p. m.—Weligious Education."

4:30 p. m.—Milton Gershenson, planist

4:45 p. m.—Talk, Maida Craigen.

4.45 p. m.—Talk, Maida Craigen.
6 p. m.—Dinner music.
7 p. m.—Arion Male Chorus.
7 p. m.—Musical program from Str
Theater; remarks by Joseph Plunk
vocal and instrumental artists.
8:30 p. m.—Health falk.
8:45 p. m.—Irwin Hassell, planist.
9 p. m.—Music by Gypsies.
10 p. m.—Joseph Diskay, tenor.
10:15 p. m.—Irwin Hassell, planist.
10:30-11:30 p. m.—Ben Bernie's Orches WJZ-NEW YORK CITY-455

WJZ-NEW YORK CITY-198

10 a. m.—Women's hour.

11 a. m.—Wowes, 1

2 4, 5:20, 8, 10:30 p. m.—News, 4-6 p. m.—Scores and racing (half-hour 4:10 p. m.—Scores and racing (half-hour 4:10 p. m.—Financial summary, 6:26 p. m.—Financial summary, 6:50 p. m.—Francial summary, 6:50 p. m.—Francial summary, 6:50 p. m.—Gran recital, 6:00 p. m.—Scores and racing, 6:10 p. m.—The Texnus, 7:30 p. m.—Landay Hall program, 10:35 p. m.—Waldorf-Astoria dance mu WGBS-NEW YORK CITY-316

WGBS-NEW YORK CITY-316 10 a. m.—Timely talks with Terese. 19:10 a. m.—Jack Cohen, pianist. 10:20 a. m.—Reducing talk; pianist. 10:40 a. m.—Fashion talk; pianist. 1:30 p. m.—Scripture reading. 1:35 p. m.—Jee Graher, pianist. 2 p. m.—Willard Robison.

-Interview with Ethel and Al Elliott.
3:16 p. m.—Caroline Rea, soprano.
3:20 p. m.—Dancing lessons.
3:30 p. m.—Caroline Rea, soprano.
3:40 p. m.—Lesque of Womgn Voters.
3:50 p. m.—Caroline Rea, soprano.
5:50 p. m.—Caroline Rea, soprano.
5 p. m.—Uncie Geebee.
3:30 p. m.—Premier Orchestra.
7 p. m.—"The New Astrology."
5:10 p. m.—Premier Orchestra.

WHN-NEW YORK CITY-361

8:35 p. m.—Fred Steele, Billy Hegmey, songs,
8:45 p. m.—Harriet Turner, songs,
9 p. m.—Billy Woods, Charles Zettler and
Billy Daly, songs,
9:15 p. m.—Marconi Prothers, accordions,
9:30 p. m.—John Hartnedy, tenor,
9:45 p. m.—Mr. and Mrs. Lee Wood, songs,
11 p. m.—Marsh McCurdy; organist,
11:30 p. m.—Silver Slinper Revue,
11:30 p. m.—Silver Slinper Revue,
12 midnichi—Tas Lawis's Orchestra. midnight-Ted Lewis's Orchestra

WMCA-NEW YORK CITY-341 WMCA—NEW YORK CITY—341

12 noon—Olcott Vail's Ensemble.
6 p. m.—Olcott Vail's Ensemble.
6 30 p. m.—Ernie Golden's Orchestra.
7:30 p. m.—Lullaby music.
7:50 p. m.—Unitaby music.
7:50 p. m.—Lucture on Christian Science.
9 p. m.—Lecture on Christian Science.
9 p. m.—Daveh Morel, soprano; Joseph Haydon, barytone.
9:30 p. m.—Anna Daily, violinist; William Bonner, tenor.
10 p. m.—Carl Tannert, cellist; Frederick Seifer, barytone.
10:30-11:30 p. m.—Messner Dance Orchestra.

WRNY-NEW YORK CITY-259

WRNY—NEW YORK CITY—259

12:02 p. m.—Trio.
1 p. m.—Radio industry hour.
1:02 p. m.—Sports.
1:10 p. m.—Studio features.
1:45 p. m.—William J. Reitz, songs.
7 p. m.—William J. Reitz, songs.
7 p. m.—Whose Birthday To-day?"
7:05 p. m.—Sports.
7:15 p. m.—Commerce of the day.
7:20 p. m.—Code lessoh.
7:20 p. m.—Code lessoh.
7:45 p. m.—Ferrucci's Orchestra.
8:10 p. m.—Ferrucci's Orchestra.
8:10 p. m.—Painting series.
8:20 p. m.—Painting series.
8:40 p. m.—Ferrucci's Orchestra.
8:44 p. m.—"Jazzing Fantaiste Oriental."
9 p. m.—Wentaitty of Inventors."
9:15 p. m.—Mentaitty of Inventors."
9:16 p. m.—English Speaking Union Dinner in honor of the British Delegation.
WNYC—NEW YORK CITY—826

WNYC-NEW YORK CITY-526 WNYC-NEW
. m.—Market high spots.
Stony Brook Orchestra.

7 p. m.—Market high spots.
7:10 p. m.—Stony Brook Orchestra.
7:30 p. m.—Police alarms.
7:35 p. m.—Stony Brook Orchestra.
7:55 p. m.—Baseball results.
8 p. m.—Lessons in German.
8:30 p. m.—Advanced lessons in Gerg p. m.—Advanced lessons in Gerg p. m.—George King, planist.
9:15 p. m.—George King, planist.
9:30 p. m.—Bergen Male Quartet.
9:45 p. m.—Haskell Proper, saxophone.
10 p. m.—Bergen Male Quartet.

10 p. m.—Bergen Male Quartet.
10:15 p. m.—Inez Keene contralto.
10:30 p. m.—Police alarms; weather.
10:35 p. m.—St. George Orchestra. WOKO-NEW YORK CITY-233 WORD—MEW LOAD CAA—
1:15 p. m.—Queen City Four.
1:55 p. m.—Marguerite McCann, sopra:
1:55 p. m.—Queen City Four.
1:55 p. m.—Bill Hubing's Orchestra.
1:50 p. m.—Mabel Webb, soprano.
1:50 p. m.—Bill Hubing's Orchestra.
1:50 p. m.—Bill Hubing's Orchestra. WFBH-NEW YORK CITY-273

WFBH—NEW YORK CHIL—2.6
p. m.—Studio program
p. m.—Bob Ferone's Orchestra.
p. m.—Scores (half hourly).
103 p. m.—Studio program.
p. m.—Hauser and Cross, two pianos.
p. m.—Majestic String Ensemble.
1:30 p. m.—Basebail resume.
1:30 p. m.—Majestic String Ensemble.
1:30 p. m.—Alvin Hauser's "At Ho

WHAP-BROOKLYN-240 p. m.—Dinner music.
WBBR—STATEN ISLAND—273 p. m.—Irene Kteinpeter, soprano. 110 p. m.—Health talk. 130 p. m.—Charles Rohner violinist. 145 p. m.—Bible instruction. WHAG-RICHMOND HILL, N. Y.-316 2 (noon)—Musical program. 7:30 p. m.—Sport talk. 7:45 p. m.—Ulrich, Prendergast and Webb,

145 p. m.—Ulrich, 1-10 to 15 p. m.—Harry J. Caffrey, tenor.
115 p. m.—Synchrophase Trio.
145 p. m.—Horace J. Taylor, readings.
15 p. m.—Harry J. Caffrey, tenor.
115 p. m.—Ulrich, Prendergast and Webb. songs.

Education."

1:30 p. m.—Women's program; Abe Rosenthal. tenor; talk on "Succoth."

6 p. m.—Dinner music.

7 p. m.—Florence Johnson, contralto.

7:10 p. m.—Columbla University lecture.

7:30 p. m.—Jesse Covington, planist.

7:45 p. m.—Florence Johnson, contralto.

8 p. m.—Ross Gorman's Orchestra.

8:30 p. m.—The Twins.

9 p. m.—Eveready hour.

10 p. m.—Gala concert.

11-12 p. m.—Meyer Davis's Orchestra. 8 p. m.—Half hour of music. 8:30 p. m.—Lou Lefebvre, jazzologist, 8:45 p. m.—Vincent Laine, tenor. 9 p. m.—Lillian Gordone, contraito, 9:15 p. m.—Kennedy Harmony Quintei 9:30 p. m.—Songs by artists. 10 p. m.—Strickland's Orchestra.

WOR—NEWARK—405
6:45-7:15-7:45 a. m.—Gym class.
2:30 p. m.—Samuel Tinney, tenor.
2:45 p. m.—Wankind Listening In."
3 p. m.—Al Wilson's Playmates.
3:15 p. m.—Samuel Tinney, tenor.
3:30 p. m.—Al Wilson's Playmates.
3:45 p. m.—Talk on "Draperies."
6:15 p. m.—"Words Mispronounced."
6:17 p. m.—"Words Mispronounced."
6:17 p. m.—"Sports," Bill Wathey.
7:30 p. m.—Ralph Reichenthal, piani

WJY-NEW YORK CITY-405

WGBS-NEW YORK CITY-316

10 a. m.—Timely talks with Terese.
10:10 a. m.—Catherine Robinson, sopran
10:20 a. m.—Home economies talk; sons
10:40 a. m.—Talk on furniture; songs.
1:30 p. m.—Scripture reading.
1:35 p. m.—Blossom Heath Serenaders.
3 p. m.—Interview with Joyce Bushel.
3:10 n. m.—Hottle Strause sonyan

3 p. m.—Interview with Jayce Bushel.
3:10 p. m.—Hattle Strauss, soprano.
3:20 p. m.—Beauty talk; songs.
3:40 p. m.—Plano lessons; songs.
6 p. m.—Uncle Geebee.
6:30 p. m.—Jule Anzel's Orchestra.
7 p. m.—Arrowhead Orchestra.
8 p. m.—Miss Crump, Negro spirituals.
8:30 p. m.—China Society program.
6:30 p. m.—China Society program.
9:40 p. m.—Ruth Friedman, planist.
9:50 p. m.—Joe Flanagan, solos.
10 p. m.—Ruth Friedman, planiste.

5:50 p. m.—Joe Flanagan, solos.
10 p. m.—Ruth Friedman, planiste.
10:10 p. m.—Katherine Connolly, soprano.
10:20 p. m.—Joe Flanagan, Charley
Bender.

WNYC-NEW YORK CITY-6526

WNYC-NEW YORK CITY-528

7 p. m.—Market high spots.
7:10 p. m.—The Canadians; police alarms.
8 p. m.—'Knotty Basebail Problems."
8:15 p. m.—Jeanette Uhle Quartet.
8:45 p. m.—Neapolitan and Italian songs
by artists.
9:30 p. m.—Herman Strager's Players.
10:30 p. m.—Police alarmis; weather.
WOHO—NEW YORK CITY-233
8:30-11 p. m.—Rike races; band.

WHN-NEW YORK CITY-361

WHN-NEW YORK CITY-361

12:30 p. m.—Marsh
2:15 p. m.—Overture and vaudeville.

2:15 p. m.—Cverture and vaudeville.

3:15 p. m.—Lexington Theater orchestra.

4:30 p. m.—Goodman and Geller, songs.

4:45 p. m.—Uncle Robert's Pals.

7:30 p. m.—Chr's Meehan, tenor.

8:15 p. m.—Chr's Meehan, tenor.

8:15 p. m.—Habelle Henderson, soprano.

8:30 p. m.—Miller, Piottl and Val, songs.

8:45 p. m.—Royal Jazz Band.

9:15 p. m.—Della Riordon, barytone.

9:30 p. m.—"Talisman Trio."

10 p. m.—Kathrvne C n. olly, sourano.

10:15 p. m.—Edgar Duffy, barytone.

10:30 p. m.—William West's Orchestra.

11:30 p. m.—Club Rodeo.

12 midnight—Kentucky Orchestra.

WMCA—NEW YORK CITY—341

12 midnight—Kentucky Orchestra.

WMCA—NEW YORK CITY—341

11-12 a. m.—Ida Allen's Hour.
12 (noon)—Olcott Vail's Ensemble.
6 p. m.—Olcott Vail's Ensemble.
6:30 p. m.—Marjorie Crossland.
7 p. m.—Jack Wilbur's personalities.
8 p. m.—Alfred Orner, tenor.
8:30 p. m.—Sheppard Knapp Musicale.
9 p. m.—Samuel Shankman, pianist.
9:15 p. m.—Heagney and Steele, songs.
9:30 p. m.—Samuel Shankman, pianist.
9:45 p. m.—Harvey Officer, songs.
9:45 p. m.—Philmort Orchestra.
11-12 p. m.—Ernie Golden's Orchestra.
WILWIL—NEW YORK CITY—202

WLWL-NEW YORK CITY-288 m.-Question box; study club;

WEBJ-NEW YORK CITY-273

WRNY-NEW YORK CITY-259

p. m.—Dan Barnett's Orchestra. 145 p. m.—Carrie Cohen, pianist. 3 p. m.—Rallroad talk, Garrow Geer 110 p. m.—A Wayne, entertainin

m.—Radio industry hour.

F. p. m.—Radio industry hour.

1:02 p. m.—Sports,
1:10 p. m.—Studio program.

7 p. m.—"Whose Birthday To-day?"

7:05 p. m.—Sports; commerce reports.

7:20 p. m.—Law series.

7:30 p. m.—History of the world.

7:45 p. m.—Plerre Remington; basso.

8 p. m.—Roosevelt Orchestra.

8 p. m.—Roosevelt Orchestra.

o. m.—Roosevelt Orchestra. 15 p. m.—Opera minature, "Mikado." 30 p. m.—"Avoid Electric Shocks." 45 p. m.—Opera ensemble, "Mikado."

8:45 p. m.—Opera ensemble, "Mikado."
9 p. m.—Sadrian Trio.
9 p. m.—Sadrian Trio.
9:10 p. m.—'The Pink Lady."
9:15 p. m.—'Theater Magazine."
9:30 p. m.—Sadrian Trio.
9:40 p. m.—Alexander Zeitlin, sculpture.
9:40 p. m.—International Golden Rule.
Dinner.

WFBH-NEW YORK CITY-273

WFBH-NEW YORK UTI-613

p. m.—Studio program.

p. m.—Studio program.

p. m.—Johnny Baselone's Orchestra.

p. m.—Lee Ford's Entertainers.

5:30 p. m.—Orchestra.

6:30 p. m.—Bossert Lumber Jacks.

WHAP-BROOKLYN-240

3:17 p. m.—"Sports," Bill Wathey.
3:30 p. m.—"Man in the Moon Stories
7 p. m.—Shelton Ensemble.

7 p. m.—Alice Dowds, contraito.
7 p. m.—Blue Dlamond Orchestra.
8:10 p. m.—Ella Dawds, soprano.
8:20 p. m.—Ella Dawds, soprano.
8:35 p. m.—Ella Dowds, soprano.
8:35 p. m.—Ella Dowds, soprano.
8:35 p. m.—Bla Dowds, soprano.
9:36 p. m.—Frank Chapman, tenor.
9:36 p. m.—Frank Chapman, tenor.
9:37 p. m.—Transcontinental tour.
10 p. m.—Jimmy Shearer, songs.
WOO—PHILADELPHIA—508
11 a. m.—Grand organ.
12 noon—Luncheon music by Gold
Crystal Tes Room Orchestra.
4:45 p. m.—Grand organ; trumpets.
7:30 p. m.—Dinner music.

cital; race results (half hourly)
WAAM—NEWARK—263

WGCP-NEWARK-252

p. m.—Question box; study and instrumental numbers.

porter. :25 p. m.--Kayo Syncopators.

10:80 p. m.-Arrowhead Orchestra

7:30 p. m.—Ambassador Trio. 8:15 p. m.—Zoological Society series. 9:15 p. m.—Sport talk.

WIP—PHILADELPHIA—508 p. m.—Bedtime story; roll call. WOO—PHILADELPHIA—508

12 noon—Luncheon music.
4:45 p. m.—Grand organ; trumpets.
7:30 p. m.—Dinner music.
8 p. m.—Musical program from New Strand Theater.
8:30 p. m.—Arlon Male Chorus.
8:45 p. m.—Irwin Hassell, planist. 9 p. m.—Irwin Hassell, planist.
9 p. m.—Music by Gypsies.
10 p. m.—Joseph Disksy, tenor.
10:15 p. m.—Irwin Hassell, planist.
10:30 p. m.—Dance orchestra.

WFI—PHILADELPHIA—395 p. m.—Orchestra. p. m.—Recital. 15 p. m.—Fashion feature WLIT—PHILADELPHIA—395 WLIT—PHILADELPHIA—395
12:05 p. m.—Organ; concert orchestra
2-3 p. m.—Concert orchestra recital.
4:30 p. m.—Magazine corner; songs.
5 p. m.—Educational talk.
7:30 p. m.—Dream Daddy.
8 p. m.—Short Agro-waves.
8:15 p. m.—Concert orchestra; recital.
9 p. m.—'Movie' review.
9:10 p. m.—Stanley Theater overture;
gan recital.
10 p. m.—Arcadia Dance Orchestra.
10:30 p. m.—Vaudeville features.
WCAU—PHILADELPHIA—278
8 p. m.—Recital.

p. m.—Recital. p. m.—Danny Dougherty, songs. p. m.—Dance music.
WPG—ATLANTIC CITY—300

4:30 p. m.—Tea music. 6:40 p. m.—Baseball scores; organ rec 7 p. m.—Dinner music. 8 p. m.—Baseball scores. p. m.—Margaret Irwin, pianiste m.—Concert orchestra m.—Studio program. WHAR—ATLANTIC CITY—275 p. m.—Seaside Trio. 30 p. m.—Stories for littlé folks. n.—Seaside Trio.
WGY—SCHENECTADY—380

30 p. m.—Dinner program, 15 p. m.—Address, "Marketing of Wool." 35 p. m.—WGY Orchestra; Mary Nally, WRW-TARRYTOWN, N. Y.—273 7:05 p. m.—Children's stories; music. 9:05 p. m.—Musical program; scores

sports.
10:05 p. m.—Entertainment.
11:05 p. m.—Elite Orchestra.
WGE—BUFFALO—319
Dinner music. WGR—BUFFALO 319
6:30 p. m.—Dinner music.
9-10;30 p. m.—Buescher Saxaphone Band.
11 p. m.—1 a. m.—Statler Orchestra.
WHAM—ROCHESTER—278.
3:30 p. m.—Eastman Theater Orchestra.
5-6 p. m.—Theater organ.

p. m.—Ruth Madsen, soprano; ir Berger, violinist; p. m.—Winter's Dance Orchestra. WJAR—PROVIDENCE—306 WJAK—FRUYIDENUI—

10 a.m.—Housewives' Exchange.

1:05 p. m.—Studio program.

5 p. m.—Berry Time.

8:50 p. m.—Mrs. Harrop.

9 p. m.—Music by Gypsies.

p. m.—Orchestra selection. WTIC—HARTFORD, CONN.—476 WTIC—HARIFURI, OURN.—210
6:30 p. m.—Dinner music.
6:45 p. m.—Weather; scores.
7:45 p. m.—Talk.
8 p. m.—Dinner music.
WEEI—BOSTON—349
6:30 p. m.—Big Brother Club.
7:20 p. m.—Lost and Found; scores.
7:30 p. m.—Ray Corcoran, Edna (sones.

WHAP—BROOKLYN—240
6-7 p. m.—Dinner music,
WAHG—Richmond Hill, N. Y.—316
12:05 p. m.—Harry Dudley, songs,
WOR—NEWARK—405
6:45-7:15-7:45 a. m.—Gym class,
2:30 p. m.—Catherine Evans, recitations,
2:45 p. m.—Emanuel Ritter, tenor,
3: p. m.—Emanuel Ritter, tenor,
3: p. m.—Emanuel Ritter, tenor,
3:30 p. m.—'Stories and Recitations,"
3:45 p. m.—Mrs. Ermoloff, soprano,
6:15 p. m.—'Words Mispronounced."
6:17 p. m.—'Sports," Bill Wathey, songs.
p. m.—Eisenbourg's Orchestra.
130 p. m.—Program from WEAF.
0 p. m.—Talk.
0:10 p. m:—Marimba Band. m.-American Legion P WNAC-BOSTON-280

WNAC—BUSION—Zeo

10:30 a. m.—Bible readings; club talks.

1 p. m.—Concert orchestra.

4 p. m.—Copley Plaza Trio.

6 p. m.—Kiddies' Club. 8 p. m.—Kiddies' Club.
8:30 p. m.—WNAC dinner dance.
7:05 p. m.—Male chorus.
7:35 p. m.—Ray Stewartson's Orchestra.
8:15 p. m.—Opera, "Alda."
9:15 p. m.—Babe Herman and Honeyboy WBZ—SPRINGFIELD, MASS.—333

8:30 p. m.—Violin and piano recital.
9 p. m.—H. F. Keeney. hamonica.
9:30 p. m.—D. Edwards, barytone.
10:20 p. m.—Brunswick Orchestra.
WCTS—WORCESTER, MASS.—268
10:30 a. m.—Radio chats.
12-2 p. m.—Luncheon music.
7:15 p. m.—Story Teller; scores. wrc-Washington-469 m.-Women's hour, from WJZ.

WCAP-WASHINGTON 7:30 p. m.—Welcome banquet to Washing ton team.
8:30 p. m.—Health talk.
9 p. m.—Music by Gypsies. .—Music by Gypsies. KDKA—PITTSBURGH—326 2:30-6 p. m.—Scores (half hour 6:11 p. m.—Dinner concert. 9:30 p. m.—Happy Hour.

TUESDAY

WJZ-NEW YORK CITY-455 w32—NEW YORK CITY—458
a. m.—Women's hour.
1 a. m.—News.
p. m.—Luncheon music.
4. 5:20, 8 and 10:30 p. m.—News.
6 p. m.—Scores, racing (half hourly).
26 p. m.—Market reports.
50 p. m.—Financial summary.
01 p. m.—Baseball and racing.
p. m.—"Scottish Terriers," Frank Dol
of the Herald Tribune. f the Herald Tribune. 5 p. m.—Vanderbilt Orchestra. 7:15 p. m.—Vanderbitt Orchestra.

8 p. m.—Scores, racing results.

9:10 p. m.—Musicale.

9:10 p. m.—Leon Carson, tenor.

10 p. m.—"Over the Seven Seas."

11 p. m.—Mayflower Orchestra.

WEAF-NEW YORK CITY—492

6:45-7:45 a. m.—Health exercises.

11 a. m.—Henry Dart, pianist.

11:10 a. m.—Lecture: piano solos.

11:35 a. m.—Motion picture forecast; piano 22 noon—Market and weather reports.

4 p. m.—Julius Behrendt, barytone.

4:15 p. m.—Talk to parents, "Religiou Education."

4:30 p. m.—Women's program; Abe Rosen

TO-DAY Wave P. M. Station Length Orchestra 8:45 10:15 10:45 Strickland's Strickland's Janssen's 252 252 361 MONDAY, SEPTEMBER 28 Roseland Hubing's Winter's Strickland's Smith's Dance music Slater's
Messner's
Ben Bernie's
Waldorf-Astoria
St. George's
Statler
Ted Lewis's
Dance music

Ress Gorman's
Kayo
Royal Jazz Band
Al Mitchell's
Tupman's
Arrowhead
William West's
Pagoda
Mayflower
Meyer Davis's
Ernie Golden's
Oriole WEDNESDAY, SEPTEMBER 30 Seibert's
Dance music
Serenaders
Dance music
Roseland
Koenig's
Zimmerman's WEBJ WTIC WMCA WLIT WHN WRW WAHG WGCP 273 476 341 395 361 273 316 252

WJZ WOO WEAF WOR WGR WHN THURSDAY, OCTOBER 1 WEBH WMCA WNYC WMCA WIP WRNY Ramblers Lanson's Arcady Manhattan Kentucky St. George Ernie Golder Arrowhead Serenaders Rodeo FRIDAY, OCTOBER 2 WJY 405 I. Abrams's WNYC 526 Colonial

Meyer Davis's SATURDAY, OCTOBER 3 Syncopator's
Flo Richardson'
Gorham's
Dance music
Al Ritter's
Dance music
Waldorf-Astoris
Dance music
Vincent Lopez's
Ernie-Golden's
Ferrucie's

WGCP-NEWARK-252 recital; 7:50 p. m.—"Hackney Horses." 2
8:45 p. m.—Port Authorities Association 2
banquet from steamship Majestic. Speak- 6
ers: Governor Smith, Governor Silzer and 7
Sir Harry G. Armstrong. p. m.—Vocal and instrumental recise results (half hourly).
p. m.—Clarence Williams's Trio.
p. m.—Bob Ward's Little Wards. n .- Ukulele Lou Hayes, WGBS—NEW YORK CITY—316
a. m.—Timely talks with Terese.
10 a. m.—Monica Smith, soprano.
20 a. m.—Hazel Lee, readings.
30 a. m.—Monica Smith, soprano.

8:15 p. m.—Concert. 8:30 p. m.—Concert. 8:30 p. m.—Songs. 9:15 p. m.—Indianans Orchestra. 10 p. m.—Sam Williams, Al Piantodosi. 10:15 p. m.—Strickland's Orchestra. WIP-PHILADELPHIA-508 45 a. m.—Setting-up exercises.
0:30 a. m.—Setting-up exercises.
0:30 p. m.—Luncheon music.
0:30 p. m.—Male quartet.
0:30 p. m.—Dinner music.

WOO-PHILADELPHIA-508

WFI-PHILAD LPHIA-398

3 p. m.—Dance music.
3:45 p. m.—Fashion feature.
6:45 p. m.—Fashion feature.
6:45 p. m.—Fashion feature.
6:45 p. m.—Goof Garden broadcast.
WLIT—PHILADELPHIA—395
12:05 p. m.—Organ; religious service; chestra.
2-3 p. m.—Concert orchestra; recital.
4:30 p. m.—Talks; recital.
7:30 p. m.—Talks; recital.
8:15 p. m.—Concert orchestra.
8:15 p. m.—Concert orchestra.
8:30 p. m.—Arist recital.
10 p. m.—Dance orchestra.
11 p. m.—Organ recital.
WCAU—PHILADELPHIA—278
7 p. m.—Lessons in dancing.
8:45 p. m.—Kenneth Carney, guitar.
9:15 p. m.—Kenneth Carney, guitar.
9:15 p. m.—Kenneth Carney, guitar.
9:15 p. m.—Musical revue.

9:45 p. m.—Musical revue. WGY—SCHENECTADY—380 WGY-SCHENECTADY-380
6:30 p. m.—Program for children,
6:45 p. m.—Strand Theater Grchestra,
7:35 p. m.—Yrogram for children,
10:30 p. m.—Gram for children,
10:30 p. m.—Koenig's Orchestra,
10:30 p. m.—Koenig's Orchestra,
10:30 p. m.—Goordon Munn, tenor,
10:45 p. m.—Dick Tobin, planist,
11:05 p. m.—Woenig's Orchestra,
WGR—BUFFALO, N. Y.—319
9-11 p. m.—Joint program with WEAF,
11 p. m.—I. a. m.—Vincent Lope's Orchestra
WHAM—ROCHESTER, N. Y.—278
3.30 p. m.—Eastman Theater Orchestra.

11 p. m.-12 m.—Eerife Golden's Orchest

WNYO—NEW YORK CITY—526

7.10 p. m.—Market High Spots.
7.30 p. m.—Police Alarma.
7.35 p. m.—Police Alarma.
7.35 p. m.—Arcady Orchestra.
8.5 p. m.—Illawerstry Quartet.
8.45 p. m.—Clara Rosenzweig, planist.
9 p. m.—Virginia Pinner, soprano.
9.15 p. m.—Virginia Pinner, soprano.
9.25 p. m.—Virginia Pinner, soprano.
9.25 p. m.—Virginia Pinner, soprano.
9.26 p. m.—Virginia Pinner, soprano.
9.27 p. m.—Virginia Pinner, soprano.
9.28 p. m.—Virginia Pinner, soprano.
9.29 p. m.—Virginia Pinner, soprano.
9.20 p. m.—The Trio Unique.
10.10 p. m.—"Frend of the Times."
10.35 p. m.—Str George Orchestra.

WOKO—NEW YORK CITY—233 m.—Theater organ.
m.—Theater organ.
p. m.—Scores; weather; markets.
WJAR—PROVIDENCE—306
m.—Housewives Exchange.

10 a. m.—Housewives Exchange. 1:05 p. m.—Studio program. 7:30-9 p. m.—U. S. Army Band. 9-10 p. m.—Waterman's Points of m.—"Your Hour."
WTIC—HARTFORD—476

WIIC—HARTFORD—476

6:30 p. m.—Dinner music.
6:45 p. m.—Weather.
7:20 p. m.—Dinner music.
9:30 p. m.—Dance music.
WEET—BOSTON—349
7:20 p. m.—Lost and found; scores.
7:30 p. m.—Musicale.
8:
7:30 p. m.—Musicale.
8:
1 p. m.—Program same as WEAF.
1 p. m.—Bible readings; club taks.
1 p. m.—Concert orchestra.
4 p. m.—Dance orchestra.
4 p. m.—Dance orchestra.
4 p. m.—Dance orchestra.
6 p. m.—Vocal and plano solos.
6 p. m.—Kiddies Klub.
6:30 p. m.—WNAC Dinner Dance.
7 p. m.—Musical Interpretations.
7 p. m.—Musical Interpretations.
7 p. m.—Wening American Orchestra.

8:10 p. m.—Evening American Orchestra WBZ—SPRINGFIELD, MASS.—333 WHZ—SPRINGFIELD, MASS.—333
6:30 p. m.—Dinner concert.
7:30 p. m.—Radio nature story.
8:00 p. m.—Radio nature story.
8:30 p. m.—Contraito recital.
8:45 p. m.—Contraito recital.
8:45 p. m.—John Roberts, barytone.
9:15 p. m.—John Roberts, barytone.
9:15 p. m.—Alandale Höur.
WCTS—WORCESTER, MASS.—268

WCTS-WORCESTER, MASS.—2
10:30 a. m.—Radio chât; music.
12 noon-2 p. m.—Luncheon music,
7:15 p. m.—Story teller; scorea.
8 p. m.—Concept:
WRC—WASHINGTON—469
10 a. m.—Women's hour from WJZ.
12 (noon)—Organ recital.
1 p. m.—Washington Orchestra.
WCAP—WASHINGTON—469
7:30 p. m.—U. S. Army Band

7:30 p. m.—U. S. Army Ban 8 p. m.—The Foremost Four. 8:30 p. m.—U. S. Army Band. 0 p. m.—Ipana Troubadours. KDKA—PITTSBURGH—326 2:30-6 p. m.—Scores (half-hourly). 6:15 p. m.—Dinner concert. 7:30 p. m.—Children's period. 8:30 p. m.—Concert.

THURSDAY

WJZ_NEW YORK CITY-455 m.-News. p. m.—Pennsylyania Ord 4, 5:20, 8 and 11 p. m.--6 p. m.—Scores, racing (half hourly). :26 p. m.—Market reports. :50 p. m.—Financial summary. :01 p. m.—Baseball and racing returns. :55 p. m.—"How the Wasters Play." 3.5 p. m.— Now the wasters Flay.

3.05 p. m.—Pan-American program;

General James G. Harbord, speaker; United
States Army Band; Saxophone Sextet.

10 p. m.—Royal hour of music. ; Gen-United tet. 7:15 p. m.—"Sports," Bill Wathey. WGCP—NEWARK—252 m.—Vocal and instrume cital; race results. WEAF—NEW YORK CITY—492

WEAF—NEW YORK CITY—492 3:45-7:45 a.m.—Health exercises. 11-12 a.m.—"Housewives Hour," speak ers, and Dorothy Mueller, contraito. 12 (noon)—Market and weather reports. 4 p.m.—Harry Planten, painist. 4:15 p.m.—Talk to parents, "Religion Education."

4:15 p. m.—Talk to parame, Education."

4:30 p. m.—Caroline Thomas, violinist.

4:45 p. m.—Country Houses."

6 p. m.—Dinner music.

7 p. m.—Mid-week services; duets; address by the Rev. S. C. Benson.

7:30 p. m.—Serenaders.

8 p. m.—The Larkinites.

8:30 p. m.—"Touring." George Cooley.

9 p. m.—Radio artists.

10 n. m.—Silvertown's Orchestra. 10 p. m.—Silvertown's Orchestra. 11-12 p. m.—Dance orchestra.

2 noon—Luncheon music. (35 p. m.—Grand organ; trumpeta. (30 p. m.—Dinner music. WIP—PHILADELPHIA.—508 Dance Orchestras for This Week

13 p. m.—Artists' recital.
15:05 p. m.—Pagoda Orchestra.
17 p. m.—Roli call; birthday list.
18 p. m.—Illustrated music talk.
18:30 p. m.—The Melody Trio.
10:15 p. m.—The Melody Trio.
10:15 p. m.—Darice music.
10:20 p. m.—Darice music.
18:30 a. m.—Solos.
18:30 a. m.—Tochestra.

WNYC-NEW YORK CITY-526
7 p. m.—Market high spots.
7:10 p. m.—M. J. Hamer, barytone.
7:30 p. m.—Police alarms.
7:35 p. m.—Board of Estimate meeting.
7:55 p. m.—Baseball results.
8 p. m.—Elementary French lessons.
8:30 p. m.—Advanced French lessons.
9 p. m.—Sigmund Bassell, planist.
9:20 p. m.—Trio Sono.
9:45 p. m.—Colonial Dance Orchestra.
10:10 p. m.—"Books," J. G. Carter Troop
10:30 p. m.—Police alarms; weather.
10:35 p. m.—Colonial Dance Orchestra.
WOKO-NEW YORK CITY-233 n.—Orchestra,
p. m.—Agricultural reports,
m.—Talk by Mrs. Elmer E. Melic
p. m.—Eleanor Gunn fashion featr
p. m.—Baseball scores,
p. m.—Roof Garden broadcast.
m.—The "Larkinites."
p. m.—'Pop' Concert.
m.—Atwater Kent Radio Artists,
m.—The Silvertown Cord Orches WLIT—PHILADELPHIA—395 Word."
7:40 p. m.—Queen Trafford, soprano,
8 p. m.—"Better Reception."
8:10 p. m.—Melo Dance Orchestra.
8:50 p. m.—"Traffic on Broadway."
9 p. m.—Hardman hour; Marguerita Callejo, Count Paul von Ehrenfels, duets;
Bernard Mann, pianist, and trio.
10 p. m.—"How to Drive Automobiles."
10:30 p. m.—Ruth Friedman, pianist.
10:30 p. m.—Asciatto's Dance Orchestra.
11:15 p. m.—Donald Flamm, critic.

WEBJ—NEW YORK CITY—273

W.H.T.—FRIHADELIFINA—JOS p. m.—Organ recital; orchestra. m.—Concert orchestra; recital. p. m.—Artist recital. p. m.—Dream Daddy. WCAU—PHILADELPHIA—278 m.—Rilly Howars Orchastre. WCAU—PHILADELPHIA—278

30 p. m.—Billy Hayes's Orchestra.

30 p. m.—Snellenburg's Trio.

p. m.—Instrumental artists.

p. m.—Barry O'Moore, tenor.

30 p. m.—Frank Cook, songs.

p. m.—Sesqui Hour.

WPG—ATIANTIC CITY—300

30 p. m.—Lunchen mysel

:30 p. m.—Luncheon music. :30 p. m.—Chalfonte-Haddon Trio. :30 p. m.—Billy? Rocap, "Sports," :40 p. m.—Scores; organ rectal. p. m.—Traymore Dinner Music. :15 p. m.—Organ recital, Dora Willian p. m.—Ambassador Concert Orchestra. 30 p. m.—Dance orchestra.

WGY-SCHENECTADY-380 35 p. m.—'WGY BOOK CHAI,
45 p. m.—William Fay, barytor
p. m.—Program from WJZ.
p. m.—Royal hour of music.
30 p. m.—Organ recital.

WRW-TARRYTOWN, N. Y.-273 0:30 a. m.—Monica Sintin, 30.7. a. 130 p. m.—Entertainment. 130 p. m.—Ross Karasik, soprano; Leroy 10:05 p. m.—Euke Trio; orchestra. 11:05 p. m.—Royal ochestra. WGR-BUFFALO, N. Y.-319 p. m.—Dinner music p. m.—Fashion talks, p. m.—Program same as WEAF. WHAM—ROCHESTER, N. Y.—278

1:35 p. m.—Rose Karasik, soprano; Leroyi Montesanto, tenor.
3 p. m.—"Women In the Home" program; songs.
6 p. m.—Uncle Geebee.
6:30 p. m.—Burr Barnett, barytone.
6:40 p. m.—Interview with Joe Brown.
6:50 p. m.—Weekly news review.
7 p. m.—Hour of music.
9 p. m.—Y. M. C. A. half hour.
8:30 p. m.—Book and play review.
9 p. m.—'The Old Time Minstrels."
10 p. m.—Theodore Saidenberg, pianist;
Danlel Saidenberg, cellist. o.—Thea'er organ, b. m.—Scores; weather, market. WJAR—PROVIDENCE—306

Daniel Saldenberg, cellist.
Daniel Saldenberg, cellist.
1:50 p. m.—Doris Mackay, soprano.
L.p. m.—Arrowhead Orchestra.

WMCA-NEW YORK CITY-341

WMCA—NEW YORE CITY—341

2 noon—Olcott Vail's Ensemble.

3 p. m.—Cleott Vail's Ensemble.

130 p. m.—Elvina Bock, stories.

150 p. m.—Elvina Bock, stories.

150 p. m.—Harvey Officer, planist.

2 p. m.—Sunnyside Orchestra.

3 p. m.—Lanson's Orchestra.

3 p. m.—Shedden Weir, barytone.

3 p. m.—Bessie Dodge, soprano.

3 p. m.—Messie Dodge, soprano.

3 p. m.—Musical program.

1 p. m.—Musical program.

1 p. m.—12 m.—Ermie Golden's Orchestra.

WOKO—NEW YORK CITY—233
8:15 p. m.—Harold Noble, tenor.
8:35 p. m.—Harold Noble, tenor.
8:50 p. m.—Jessica Silver, songs.
9:05 p. m.—Billy Ihler barytone,
8:35 p. m.—Billy Ihler mphions.

2:02 p. m.—Trie.

WRNY-NEW YC SITY-259

19p. m.—Radio Industry Hour.
1:02 p. m.—High spots in sports.
1:10 p. m.—Roger Kahn's Orchestra.
1:10 p. m.—Charleston Lesson.
1:10 p. m.—Charleston Lesson.
1:10 p. m.—Whose Birthday To-day?"
1:10 p. m.—Storts; commerce reports.
1:20 p. m.—Chef Creteaux Chats.
1:30 p. m.—Rita's Kiddie Music Party.
1:45 p. m.—Music chats.
1:5 p. m.—Roosevelt Orchestra.
1:5 p. m.—Lorna Lee, Song Girl.
1:30 p. m.—Radio Questions and Answer.
1:45 p. m.—Banjo Bob McDonald.
1:45 p. m.—Banjo Bob McDonald.
1:5 p. m.—Kings of Sports.

8:45 p. m.—Banjo Bob McDonald.

9 p. m.—Kings of Sports.

9:05 p. m.—Debut Hour.

9:15 p. m.—Bill Deaver, planist.

9:30 p. m.—Essays, "Philosophy."

9:35 p. m.—William J. Rietz, songs.

9:45 p. m.—The Doll's House."

10 p. m.—Volga Trio.

10:30 p. m.—California Orchestra.

WFBH—NEW YORK CFTY.—273

2 p. m.—Orchestra.
3 p. m.—Studio program.
13:30 p. m.—Radiovues; songs.
4 p. m.—Scores (quarter hourly),
4:15 p. m.—Wm. Sullivan, baryto
ard Douglas, ukuleie; Irma S

Brd Douglas, prano.

5 p. m.—Flo and Dick Bernard.

5:30 p. m.—The Melody Girls.

6 p. m.—Theo. Alban, tenor.

6:30 p. m.—Hock and Jerome, songs.

7 p. m.—Blucher Trio.

7:30 p. m.—Radio Ramblers.

WHAP—BROOKLYN—240

6-7 p. m.—Dinner music.
WBBR—STATEN ISLAND—273

WOR—NEWARK—405

145-7:15-7:45 a. m.—Gym class.
130 p. m.—Frances Pehl, planist.
145 p. m.—'Toga.' George W. Little.
15 p. m.—Frances Pehl, planist.
115 p. m.—Deep River Orchestra.

"Words Mispronounced

m.—Paul Denniker's Orchestra. m.—Theo. Alban, tenor.

WAAM-NEWARK-263

11 a. m.—Happy Hour.
WHAR—ATLANTIC CITY—275

p. m.—Studio concert. WOO—PHILADELPHIA—508

a. m.—Grand organ. noon—Luncheon music.

:45-7:15-7:4:

WHN—NEW YORK CITY—361

2:30 p. m.—Marsh McCurdy, organist.
3:15 p. m.—Lexington Theater Orchestra.
4:30 p. m.—Bob Miller, Lewis Piotti and Jack Val.
5 p. m.—All Wilson's Playmates.
7:30 p. m.—Kennedy's Quintet.
9 p. m.—Cakland's Chauteau Shanley.
8:40 p. m.—Talk by Edmont Haines.
8:40 p. m.—Ethet West, soprano.
8:50 p. m.—Jimmy Clarke's Entertainers.
8:40 p. m.—Seef B. Pobiner, tenor.
9:45 p. m.—Weather; sores.
7:45 p. m.—Big Brother Club.
7:20 p. m.—Raymond Koon, barytone.
8:10 p. m.—Soret B. Pobiner, tenor.
8:11 p. m.—Porviam samie as WEAF.
8:11 p. m.—Concert orchestra.
10:15 p. m.—Loew's vaudeville headliners.
10:30 p. m.—Kentucky Orchestra.
11 p. m.—Swanee Revue and Orchestra.
11 p. m.—Swanee Revue and Orchestra.
12 p. m.—Survettor.
13 p. m.—Survettor.
14 p. m.—Sivvettor.
15 p. m.—Sivvettor.
16 p. m.—Sivvettor.
16 p. m.—Sivvettor.
17 p. m.—Sivvettor.
18 p. m.—Dinner music.
18 p. m.—Weather; scores.
17 p. m.—Weather; scores.
17 p. m.—Big Brother Club.
18 p. m.—Big Brother Club.
19 p. m.—Raymond Koon, barytone.
19 p. m.—Raymond Koon, barytone.
19 p. m.—Raymond Koon, barytone.
10 p. m.—Concert orchestra.
10 p. m.—WNAC dinner dance.
19 p. m.—Concert orchestra.
19 p. m.—Weather; scores.
10 p. m.—Weather; scores.
10 p. m.—Big Brother Club.
10 p. m.—Big Brother Club.
10 p. m.—Big Brother Club.
10 p. m.—Raymond Koon, barytone.
10 p. m.—Porveram samie as WEAF.
10 p. m.—Porveram samie as WEAF.
10 p. m.—WNAC—BOSTON—280
10 p. m.—WNAC—BOSTON—280
10 p. m.—Weather; scores.
10 p. m.—Weather; scores.
10 p. m.—Weather scor

30 p. m.—Suffolk A. A. Show; Jim Mal ney and King Solomon bout. WBZ.—SPIRNGFIELD, MASS.—333 50 p. m.—Lenox Ensemble. p. m.—Clarence Smith, soprano: Marie 6.17 Dutton, comedienne; Laura Jones, vio-6:30

linist.

45 p. m.—Instrumental trio.

30 p. m.—'Passing of the Old West."

0:20 p. m.—McEnelly's Singing Orchestri

WCTS—WORCESTER, MASS.—268

FRIDAY

1:40 a. m.—'China," C. H. Richardson planistes.
2 noon—Market and weather reports.
p. m.—Florence Johnson, contralto.
1:15 p. m.—William Brielofsky, violinist.
1:30 p. m.—Thomas Wallace, barytone.
1:45 p. m.—Hawaiian Trio.
1 p. m.—Dinner music.
1:30 p. m.—Story teller.
1:45 p. m.—Minnie Well, planiste.
3 p. m.—The Happiness Boys.
3:30 p. m.—Eagle Trio.
9 p. m.—The lrvine Players.
3:50 p. m.—The lrvine Players.
3:50 p. m.—Wedding Ring."
3:51:520 p. m.—Soi Deutsch, violinist Lewis Zeidler, tenor.
10 p. m.—Soi Deutsch, violinist; tenusolos.

10:20 p. m.—Vee Lawnhurst, pianiste. 11-12 p. m.—Meyer Davis's Orchestra.

WJZ—NEW YORK CITY—455

10 a. m.—Women's hour,
11 a. m.—News.
1 p. m.—Ambassador Trio,
2-4-5:20-8-10:30 p. m.—News.
4-6 p. m.—Scores, racing (haif-hourly).
5:28 p. m.—Market report,
5:50 p. m.—Financial summary,
6:01 p. m.—Baseball, racing returns.
8 p. m.—Scores, racing returns.
8:30 p. m.—Trio concert.
10 p. m.—The Texans, songs.
10:30 p. m.—Ben Glaser's Orchestra,
WJY—NEW YORK CITY—405

WJY—NEW YORK CITY—405
30 p. m.—Irwin Abrams's Orchestra
50 p. m.—Sport talk,
45 p. m.—Frank Gostovsky, tenor.
p. m.—To be announced.

WNYC-NEW YORK CITY-526

WOKO-NEW YORK CITY-233 8:30-11 p. m.—Bike races; band,

WMCA-NEW YORK CITY-341

WJZ-NEW YORK CITY-455

2:45-5 p. m.—Vocal and instrumental results, race results (haif hourly), 18 p. m.—Steele and Heageny, composers, 8:15 p. m.—Emma May, soprane, 8:36 p. m.—Bob Ward's little Wards, 8:45 p. m.—Songs, 10 p. m.—Strickland's Orchestra, 10:15 p. m.—Jack Smith, personalited 10:30 p. m.—Lou Hayes, ukelele, 10:45 p. m.—Strickland's Orchestra, 10:45 p. m.—Strickl Army Band; artista.

10 p. m.—Meyer Davis's Band.

RDKA—PITTSBURGH—309.

2:30-6 p. m.—Scores (half hourly).

6:11 p. m.—Dinner concert.

7:30 p. m.—Children's period.

3:30 p. m.—KDKA Symphony Orchestra. WFI—PHILADELPHIA—395

3 p. m.—Recital; travel talk. 3:45 p. m.—Fashion feature. 6:45 p. m.—Roof garden broadcast. WLIT-PHILADELPHIA-395 WEAF—NEW YORK CITY—492 45-7:45 a. m.—Healij. YA s. 45 a. m.—Home service talk. :05 a. m.—Constance and Helen Huls man, planistes.

1:15 a. m.—'Co-operation of Child and Parent"; planistes.

1:40 a. m.—'China," C. H. Richardson; planistes.

1:40 a. m.—'China," C. H. Richardson; planistes.

WLWI_NEW YORK CITY_288
p. m.—Talk on literature and talk on Evolution and Catholicism."

WRNY-NEW YORK CITY-259

WRNY-NEW YORK CITY-259

12:02 p.m.—Trio.

1 p. m.—Radio industry hour.

1:02 p. m.—High spots.

1:10 p. m.—High spots.

1:10 p. m.—Studio program.

7 p. m.—Whose Birthday To-day?"

7:05 p. m.—Sport; commerce reports.

7:20 p. m.—Code lesson.

7:45 p. m.—Huismann Trio.

8 p. m.—Grand opers duets.

8:30 p. m.—"Grand opers duets.

8:30 p. m.—"Opera "Rigoletto," with Zaccarl, Astinesti, Forbert.

9:36 p. m.—"The Age of Science Builds."

9:45 p. m.—Band concert.

10:15 p. m.—Novelty night, "Prodigles," geniuses under twilve years.

WFBH—NEW YORK CITY-273

2 p. m.—Eddie Meyers's Orchestra.

2 p. m.—Eddie Meyer's Orchestra.
3 p. m.—Studio program.
4:05 p. m.—Scores (quarter-hourly).
4:30 p. m.—Arrighi Female Trio.
5 p. m.—Mario Alvarez, tenor.
5:30 p. m.—Judih Roth, soprano.
5:45 p. m.—'Shall America Be Blue?**
6 p. m.—Kraus's Orchestra.

WHAP—BROOKLYN—246
8:30 p. m.—Beglin OKLYN—246

WHAG—RICHMOND HILL, N. Y.—318

12:05 p. m.—Groen and Perry, duckmer.
7:30 p. m.—Groen and Perry, duckmer.
7:35 p. m.—George Wooley, saxophone.
8 p. m.—Mary Killoran, soprano.
8:15 p. m.—W. Grayson, pianist.
8:30 p. m.—Professor Mayne, "Speech,"
9 p. m.—Artisits' recital.
10:05 p. m.—Radio Question Box.
10:20 p. m.—Frank Lauria's Orchestra.

WOR—NEWARK—405

6:45-7:15-7:45 a. m.—Gym class.
2:30 p. m.—Ida Groeber, planist.
2:45 p. m.—Professor J. Santamarina,
"Through the Panama."

3 p. m.—William Burke, tenor; plane
solos; tenor.
3:45 p. m.—B. P. Adams, "Longfellow."
6:15 p. m.—"Words Mispropounced."

WAAM-NEWARK-263

WGCP—NEWARK—252 2:45-5 p. m.—Vocal and instrumental re-

8:25 p. m.—Andrew Hayes, tenor. 8:45 p. m.—Arthur Johnston, barytone. 9:05 p. m.—Hilda Kay, contraito. 9:45 p. m.—Transcontinetal tour. 10 p. m.—Werner Ziegler's Orchestra.

WOO-PHILADELHIA-508

WCAU-PHILADELPHIA-278 WHAR—ATLANTIC CITY—275

1:15 p. m .- Strand organ recital. WPG-ATLANTIC CITY-300

7 p. m.—Morton Trio dinner 1 8:05 p. m.—Hawalian melodies. 9 p. m.—Concert orchestra. 10 p. m.—Studio program. 10:30 p. m.—Dance orchestra. WGY-SCHENECTADY-380 p. m.—Music; fashion talk.

130 p. m.—Sunday school lesson.
p. m.—Strand Theater Orchestra.

130 p. m.—Scores; health talk.

145 p. m.—Comedy, "The Rainbow."

130 p. m.—WGY Orchestra;

James, soprano. WRW—TARRYTOWN, N. Y.—273 m.—WRW Orchestra.
WGR—BUFFALO—319 WGR—BUFFALO—319
7:45 p. m.—Fashion talks.
9 p. m.—Nu Tymer's Orchestra.
10:30 p. m.—Anna Anderson, planist.
11 p. m.-1 a. m.—Statler Orchestra.
WHAM—ROCHESTER—278 WGBS—NEW YORK CITY—316
10 a. m.—Timely talks with Terese.
10:10 a. m.—Mildred Marsh, soprano.
10:20 a. m.—Furniture talk; songs.
10:40 a. m.—Talks on marriage.
10:50 a. m.—Mildred Marsh, soprano.
1:30 p. m.—Scripture reading.
1:35 p. m.—Marion Newriter, contralto.
2 p. m.—Lillian Lorcher, soprano.
3 p. m.—Interview with Kate MacLaurin.
3:10 p. m.—Helen Dowdy, soprano.
3:20 p. m.—"Better Homes and Gardens."

m.—Theater organ.
p. m.—Scores: weather: market.
WJAR—PROVIDENCE—306
WJAR—PROVIDENCE—306

p. m.—Helen Dowdy, soprano.
10 p. m.—Helen Dowdy, soprano.
20 p. m.—Helen Dowdy, soprano.
30 p. m.—Helen Dowdy, soprano.
40 p. m.—Piano harmony; songs.
p. m.—Uncle Geebee.
30 p. m.—Sorey Concert and Dance Orthogonal Control of the Community Night.
10 p. m.—Popular half holr.
11:30 p. m.—Popular half holr.
11:30 p. m.—Popular half holr.
11:30 p. m.—Popular half holr. chestra.
7 p. m.—"What's Your Radio Problem?"
7:10 p. m.—Sorex Orchestra. WNAC—BUSAUN

6 p. m.—Kitty Klub.

6:30 p. m.—WNAC dinner dance

8 p. m.—Musical program.

9 p. m.—Dance music.

WEEL-BOSTON—\$49

7:20 p. m.—Whiting's program.

7:10 p. m.—Sorey Orchestra.

WHN—NEW YORK CITY—361

1:15-3:15 p. m.—Musical program.

1:45-5:30 p. m.—Musical program.

1:30 p. m.—Burr McIntosh. "Philosophei

p. m.—Matty Levine, pianist.

1:50 p. m.—Abraham Burg, violinist.

1:30 p. m.—Jack Davis, barytone.

1:45 p. m.—Lina Wright, soprano; E'

Hodgkins, soprano; Eva Steiner, pianii

p. m.—Clarence Williams's Trio.

1:50 p. m.—Grossman and Osborne, song.

0:50 p. m.—Frank May, violinist.

0:15 p. m.—Ukelele Lou Hayes, songs.

0:30 p. m.—Roseland Dance Orchestra.

1:50 p. m.—Alabam Orchestra.

2-12:30 p. m.—Sliver Slipper Revue.

WNYC—NEW YORK CITY—526 p. m.-Marimba Band; Scotty's Or-

chestra.
WBZ—SPRINGFIELD, MASS.—333 p. m.—Musical instrument selections.
45 p. m.—Bertha Macfarlane, planist.
p. m.—Poultry flock management ours.
15 p. m.—'Whatdoyoucallit' Club.
WRC—WASHINGTON—469

m.—'WRC's Foolish Entertainers'."

m.—Book Reviews; scores.

WCAP—WASHINGTON—469 p. m.—Dance program. KDKA—PITTSBURGH—326

SATURDAY

WGBS—NEW YORK CITY—316 a. m.—Timely talks with Terese 10 a. m.—Timely talks with Terei 10:10 a. m.—Kiddie Klub program. 10:40 s. m.—Ethel Brophy, sopram 10:50 a. m.—Fashion talk. 1:30 p. m.—Scripture reading. 1:35 p. m.—Alfred Long, tenor. -Arthur Koffman's Serenaders 2 p. m.—Arthur Koffman's Serenaders.
3 p. m.—Spanish lessons; piano.
3:20 p. m.—Auto driving lessons; piano.
3:40 p. m.—Furniture talk; piano.
6 p. m.—Uncle Geebee.
6:30 p. m.—Dulcimerian's Orchestra.
7 p. m.—Psychology talk.
7:10 p. m.—Dulcimerian's Orchestra.
7:30 p. m.—Paul Porchesi, Mme. Porchesi, songs.

rejo, Count Paul von Ehrenfels, duets;
Bernard Mann, planist, and trio.
10 p. m.—'How to Drive Automobiles."
10:30 p. m.—Ruth Friedman, planist.
10:30 p. m.—Asciatto's Dance Orchestra.
11:15 p. m.—Donald Flamm, critic.

WEBJ—NEW YORK CITY—273
7 p. m.—Red Lion Orchestra.
7:45 p. m.—Rudolph Joskowitz, violin.
8:30 p. m.—Address by Lleutenant Elliott.
8:45 p. m.—Kathryn Connolly, soprano.

7:46 p. m.—John McNally, seprano.
7:40 p. m.—John McNally, seprano.
7:40 p. m.—John McNally, seprano.
7:50 p. m.—John McNally, seprano.
7:40 p. m.—John McNally, seprano.
7:50 p. m.—John McNally, seprano.
7:40 p. m.—John McNally, seprano.
7:50 p. m.—Abble Mitchell, spirituals;
Vincent de Sola, planist.
9:10 p. m.—Abble Mitchell, spirituals;
Vincent de Sola, planist.
9:10 p. m.—Abble Mitchell, spirituals;
Vincent de Sola, planist.
9:10 p. m.—Abble Mitchell, spirituals;
Vincent de Sola, planist.
9:10 p. m.—Abble Mitchell, spirituals;
Vincent de Sola, planist.
9:10 p. m.—Abble Mitchell, spirituals;
Vincent de Sola, planist.
9:10 p. m.—Abble Mitchell, spirituals;
Vincent de Sola, planist.
9:10 p. m.—Abble Mitchell, spirituals;
Vincent de Sola, planist.
9:10 p. m.—Abble Mitchell, spirituals;
Vincent de Sola, planist.
9:10 p. m.—Abble Mitchell, spirituals;
Vincent de Sola, planist.
9:10 p. m.—Abble Mitchell, spirituals;
Vincent de Sola

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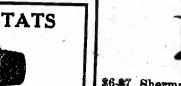


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type G. \$6.45 7.50 Royalphone \$2.95 8.00 N. K. \$3.95 5.00 Murdock \$2.69 3.00 Scientific \$1.95 5.00 Blue Streak \$2.85 5.00 Frost \$2.75 7.50 Navy Phones \$3.45	12.00 Nath. Baldwin,	
7.50 Royalphone \$2.95 8.00 N. K. \$3.95 5.00 Murdock \$2.69 3.00 Scientific \$1.95 5.00 Blue Streak \$2.85 5.00 Frost \$2.75 7.50 Navy Phones \$3.45	type G\$6.45	,
8.00 N. K	7.50 Royalphone \$2.95	
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With its pavements baked by the sun, And I hied me to the mountain glades, Where hill streams rippling run.

And there I camped in a shady grove Touched by the twilight's glow,

And once we had our supper made—

Oh, I rambled far of a summer month With a kit, a tent and a car, And wherever the nighttime found me I camped with the evening star; And many a virgin trail I found Whose ways few come to know,

on Old Broadway

I take them with me,

STOWE

There was a time when I w That I left the good behind, And speeches and orchestra

UTDOORS HIIM RADIO

Oh, I took me to the northern shore, Where the beach gleams long and white, Where the surge of the sea sang in my ears And pavements were out of sight; I hiked and swam the whole day long, But when the sun was low I listened again to the songs of home

Ву LELAND

ON NINE Enhances SUNDAY, JULY 20, 1924 acation easures

16 PAGES

Constructing a Unit From Which Any Circuit May Be Obtained

By Means of Phone Tips and Jacks Connections May Be Made Which Will Give Any Regenerative Tuner

By JAMES E. CARTIER

ECAUSE all radio magazines de- be only necessary to take another flexible | figure. That is, the rotor and stator are | A two-step amplifier may be added pend upon new things to keep the nterest of the radio fans centered upon those magazines it is necessary for them to obtain and print articles describing new circuits, or old circuits revamped. And because of this demand for new circuits and other new things in the radio field, the radio men who are supplying the magazines with copy are continually experimenting with new circuits to place before the radio public.

As a consequence of all this experimenting better circuits are constantly being developed and given the fan to build and use. Many of these circuits are better than those being used by the fan. But to build the new set means a few new parts or at least a new panel. Therefore, the purpose of this article is to describe a method of making a set that can be changed to any circuit which the constructor may wish to have at any time. It also will be possible for the owner of such a set to develop his own circuits, as will be seen later on.

The only drawback to this set is the original cost, but when the changeability cost is really nothing, because the first cost can be the last cost. Of course, adaptations can be made to the set that will but will be mentioned, and also those that will occur to the constructor in the course of construction.

Panel Size

The panel for a one-tube unit of this type should be seventeen inches high by twenty inches long If a two-step ampliwill be suggested later, then increase the length of the panel to twenty-seven

For a unit that will take care of nearly every regenerative circuit that could be thought of that would use standard parts two variable condensers, having a capacity of .0005 mid. two large variometers and a standard variocoupler should be obtained Another coupler having an untuned primary and fixed coupling should also be obtained as its uses are manifold. This may be made at home or procured at any radio store.

To make this unit at home use a threeand-one-half-inch tube for winding the primary, twenty turns, and the secondary. forty turns, coils on. The tickler coil should have thirty-six or forty turns wound on a tube that will rotate inside the other; about two and five-eighths inches is right.

How Set is Used

the set will be given. The main idea is that no circuit is reade in the set. Each part is mounted on the panel and connections to the terminals of each part are made to the panel by means of the phone tip jacks that can now be bought in any radio store. Thus each instrument is separate from the rest and can be connected to any other instrument by means

0-11-0

Variometer

Fixed Condenser

lead and connect it to one of the phone posts and to the other variometer jack. This would place a variometer in the plate circuit of the detector tube.

Each instrument will have a certain number of jacks to make the required connections. For variable condensers two jacks will be necessary, for fixed condensers, two; for variometers, four: couplers, six, and for the special coupler mentioned, eight. Rheostats require two jacks, binding posts each one jack, two for the "A" battery posts.

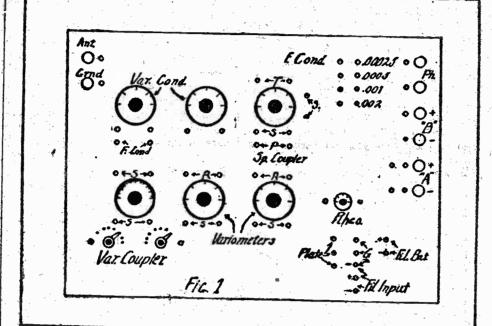
The detector tube requires quite a few jacks, as will be noted. The plate, three; the grid, two, and the filaments, three jacks. For connectors between instruments a half pound of flexible stranded double cotton covered wire, equal to number eighteen B & S gauge in size should be obtained. Two phone sips are necessary for each connector. About ten connectors will be required for most circuits;; it would be therefore advisable to make several extra ones. The length of each will depend upon its use. Those of the unit is taken into consideration the for battery and phone connections and other standard uses should be cut to fit the distance between the jacks and then used for that only. As these connectors not be entered into constructionally herein | will wear out in time, keep the extra wire on the spool to make new ones

Mounting Parts

Mount the parts on the panel, as shown in Fig. 1. Then drill for the jacks, as suggested in the drawing, the jacks being represented by circles near the dials. fier is to be incorporated into the unit, as | Sometimes it will be necessary in some

separated and connected separately. When used in the circuit as straight cabinet. Do not attempt to add radio tuning variometers, one rotor jack and I frequency to the set and make connections

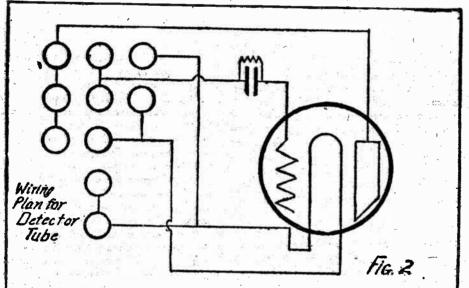
either in the set or on a separate



one stator jack are connected together, to the various parts by means of the the other two jacks being used to connect the variometer in the external circuit.

Variocouplers are connected to six jacks, as shown. Four are connected to the rotor coil, named S in figure, and two to the switch levers. The switch points being soldered to the taps on the stator in the standard manner.

The special coupler has eight jacks, two for the primary, named P in figure; exceptional freakish circuits to use more four for the secondary, named S in



to one instrument. In this case it will be simple to drill for another jack and connect it in parallel to those already in

In connecting up the variable and fixed condensers one jack is connected to the rotor plates and one to the fixed plates. The variometers should be changed from the way they are bought, so that they

Rheostet constructor wishes

Those jacks marked down the right hand side of the panel as fixed con- that the constructor desires to favor densers are of various capacities from .00025 to .002 mfd. A .005 may be added if the constructor desires. These may be connected in the circuit at any place that a circuit calls for a fixed con-

plate of the tube, as shown in Fig. 2, and are shown, two jacks are connected to jacks. When more jacks are needed that specified and plenty of space is left the other into one of the jacks connected | the rotor coil, named R in the figure, and | they are connected in parallel to those

plug and jack system. It will not operate

type may be used. However, care must for the tube used and also that the proper "A" and "B" battery voltages are

The two-variometer circuit is very

coupler is then connected to one of the rotor leads of the nearest variometer. A connector is used to connect one rotor and one stator together. The other jack to this variometer is then plugged into the jack connecting to the grid condenser and grid.

The other variometer has one jack connected to the plate and another to the phones, a connector being used to connect the rotor and stator coils as before. The other phone jack is then connected to the "B" battery positive. The "B" battery negative is then connected to the "A" battery, either positive or negative.

The rheostat jacks are connected into the set will be ready to bring in music.

In this manner it is easy to change the circuit in a few minutes to any one with his attention for a while. If one does not work well, then another one

wishes to state that only the bare necessities for a simple set of this type have been given. It is for the constructor to add such improvements as he sees fit. Additional parts may be added at any time if the panel is made larger than at the right hand end of the panel for

wid dis aftanoon?" is the questionnaire.

The New Week on the Radio

WOR has never broadcast out-of. interference. studio events through the remote! harmonic Concert Band will play first and second choice.

minute too long for those who like a dash of the weird music of the East.

We have always said that it takes a good soprano to draw complimentary comment from us. Those who like sopranos over the air-we don't -will probably enjoy Dorothy Heyden, soprano, who sings from WOR on Tuesday afternoon.

When Georges Carpentier and Gene Tunney have their clouting match on Thursday, July 24, Major J. Andrew White will be at the ringside to give

We do not besitate in saying that the U. S. Marine Band offers the best

of the ten best radio technical men pitiful thing to listen to on the radio ton. The South African heard 2XI in the United States to-day, broad- or any other place, for that matter. from 2:45 to 5:30 a. m., his time.

V. L. Hogan, consulting radio engi- will be mostly speech, but it is hoped man also picked up 2XI April 22 and tute of Radio Engineers, beider the evening.

WEAF's microphone, concluded with The wave length wil be 1,600 me. low frequency, but the absence of a request for specific data regard pers. The power will be announced atmospherics was so marked that he interference difficulties experienced later; it will not be less than 15 was able to use an additional high WEAF's listeners. These has a light contraction of the contraction by WEAF's listeners. These have biswatts. The station call is 5-XX. frequency valve to build up the inyielded very valuable figures regard- disteners are cordially invited to coming signal. ing the problems to be met before Basen for this station and write to Johannesburg is 8,043 miles from radio's ills are entirely cured.

which were rated as the worst source cancel or change these arrangements the warm weather at the transmitof interference by 39 per cent with any particular, as it is to be ting end and the heavy static that those complying with Mr. Hogan's re- understood that these transmissions has to be penetrated to reach southquest. Whistles came second, watches purely of an experimental char- ern Africa, now experiencing the win-31.4 per cent, and cross talk (that is actor. They are not a part of the ter season. interference from other broadcastick regular program. stations). 29.6 per cent,

the evening of July 25. The Brean second place in the second choice and licenses and wave lengths. the evening of July 25. The Breau second place in the second choice and intenses and wave lengths.

Canada are now turning their attended of tubes. The farther away a trobias Minstrels will broadcast on third place in the third choice. Steps The familiar station is WGY, which tion to the Pacific Ocean for the pure station is that has been received the that evening. We never have listened of interference to a minimum. Alto them, but Hellywood McCocker th though whistles hold only second the snerr-wave station ZAI, which swears that they are good, and we place in the first choice, the analysis goes on the air with 107-meter waves, in Australasia and New Zealand. Two code can regularly receive signals are consequently risking the men shows them to be quite preponderant broadcasting the same programs that ten-day periods, one in August and from the Eiffel Tower and from as the second worst cause of trouble. Ere put on the air from WGY. The the other in September, have been set Namen, Germany. Signals from

control system. Perhaps there is not length were made cross talk was, 2XAZ, operating on 160 meters. a great deal of opportunity for such perhaps, the most serious dufficulty, work in Newark. However, there is but improvements in the design of going to be an opportunity for it sets and increased experience on the use practically any power up to ten and of the year. All of the trans-

weekly in the Bound Brook Park. Arrangements are being made with WOR, at last coming out of its stu- the principal radio telegraph compadie shell, will broadcast the event on nies for reducing the amount of traf- but 250 watts. Transmitting set and in somewhat restricted from the Monday nights, beginning this week. fix handled on wave lengths which are for portability through the streets of it is expected that there will be a This should be more than a mild mu- likely to interfere with broadcast resical event if WOR'S first attempt at ception. Considerable progress has truck. The truck is used in connect operators on the sir to make the test ouside work is successful, and we been made and transmitters of coast tion with what is termed remote con- successful. Many American amateurs

turns follows:

his always interesting account of the dividual votes, the letters having tween church, hall or theater and the fracas. This is an extra brilliant come from practically the entire control room. In other words, there Eastern half of the United States.

The sources of greatest interfer giving details of their results,

Radio listeners ware also requested. F. E. Passonno at WEAF were the second cause of interference and leace on Tuesday evening. Mr. Band of fifty-two pieces plays a conon 43 per cent of the questionnaires. Passanno is making a very active cert from Branch Brook Park, Newspark on 37 per cent and cross talk campaign throughout the state and ark, under the direction of Carl D. on 20 per cent. Third choice was as expects to poll a very strong vote as Bethel. The concert will be broadsigned to cross talk by 60 per cent, an indication of suppost of the poli- cast from 8:15 to 9:15 p. m. and will

WGY Has a Portable Radio Transmitter

66 THO'S dat lady I seen you by 17.5 per cent of those replying to Few radio fans are aware that the same radio program may frequently rections with amateur radio telethe time-honored inquiry quite notable, spark interference three different General Electric stathe time-honored inquiry quite notable, spark interference three different General Electric sta-

Educational campaigns are necessary third station, familiar only within a aside. For some reason unknown to us to remove the cause of this source of radius of fifty miles of Schenectady. This test is being arranged by the easily be picked up. Ships thousands and then only to ewners of sets American Radio Relay League at the of miles away can be copied at regu-When the first changes in wave capable of picking up short waves, is request of C. D. Maclurcan, president lar intervals. We ask you—where is

Transmitter Goes to Concert

successfully in long distance trans- short waves. stations located near metropolitan troi. When programs originate out are being heard in Australia on the Oriental music has not been over- The wave length conference in of twenty-five miles of the transmit- Announcement was made at the broadcast, and for this reason we Washington several months ago ting station, the truck may be sent A. B. R. L. headquarters that the first mention a concert to be given by the placed into effect a plan of wave- out to the scene of the program— transmitting period will be from Au-Filipino orchestra of the S. S. Levia- length distribution which has re-church, theater or public hall. It is gust 10th through the 20th, and the than. It will be a forty-five-minute suited in a great improvement in the there connected to the amplifying second from September 7th through unit, which in turn is connected to the 16th. Australian and New Zea-A tabulation of Mr. Hogan's re- the microphone used to pick up land amateurs will listen from 3:00 speech or music. The portable sta- to 3:30 a. m., E. S. S., and they will tion then transmits by radio the electransmit from 3.30 to 4:80 a.m., Whistles...........31.4 per cent been converted at 100-meter waves tempted daily starting at 4:00 a. m., Cross talks.........29.6 per cent are received by a very sensitive re- E. S. T. ceowing set and from that point While the amateurs in the United Cross talk per cent and sent on the transmitting apparatue, which puts these on the air on

Cross talk per cent a wave length of 380 meters. This is a summary of over 5,000 in- usual practice in remote control beis a radio link in place of a wire

Experiments by 2XI on the shor We have never heard of the Navy wave length and by the use of high music of the kind that we can ever Band of the Virgin Islands, but WJY power have produced some very un-

music of the kind that we can ever expect to hear on the air. Although it plays in a park near the Potomac River in Washington, its notes seem to suffer little for their journey over to suffer little for their journey over the 200 miles of telephone wire connecting that point with WEAP's local studio. The band will give another program on Monday evening.

Serious listeners who like popular lectures or science might enjoy professor Charles L. Harrington when heb broadcasts "A Very Small Microbe and a Very Large Star" from WEAP and a Very Large Star" from WEAP to the evening program, but we will probably have to listen to tips on the making of salad dressing instead.

Band of the Virgin Islands, but WJY is the broadcast its music to-night and all of our navy bands that we have lusted some very unusual results.

In the early spring 2XI was heard on the Pacific Coast with loud speaker strength, and this when daylight entry sold on an associative strength, and this when daylight entry sold on an associative strength, and this when daylight entry strength, and be in order. We can only hope that publication was interested to such WJY will live up to the spirit of its an extent that they cabled the Gen-Some time ago John V. L. Hogan, promise by having only colored per- eral Electric Company, prepaying rewhom we would put down on a list formers. Counterfeit dialect is a ply, to check the claims of Mr. Dal-

coated technics for the less able of Chelmsford, England, High- reception I have ever had. It was the Mr. Dalton stated: "It is the best the listeners. He ended the series Powered Station on the Air best I have yet experienced, both as with a promise to return at a later The B. B. C. high-powered station regards charity and strength. We no date with data on interference and at Chelmsford, England, opened for its prevention. Here is what WEAF's experimental work on July 9. The muffled or musky. The same also appropriate that the spoken word sounded experimental work on July 9. publicity man has to say about his hours of transmission provisionally plies to the choral singing, but the final talk to be given from WEAR'S hard are 11:30 a. m. to 12:30 p. m.; solo and duet voices were particularly 4 to 5 p. m., and 7:30 to 8:30 p. m. good; throughout we could distin-The final talk of the series by John The morning and afternoon programs guish the text." The Johannesburg guish the text." The Johannesburg
man also picked up 2XI April 22 and
May 15. He used a four-valve set,
one high frequency detector and two
low frequency, but the absence of a peur low frequency, but the absence of a peur low frequency. neer and past president of the Institutes; some music will be played dur. May 15. He used a four-valve set,

> the British Broadcasting Company Schenectady. This is a record distance for the station. The reception The B. C. reserves the right to was the more remarkable because of

WOR Uses Remote Control to indicate their second and third Frank & Passonne, Socialist can be broadcast by WOR will be sent The first remote control feature to to indicate their second and third Frank R Passonne. Socialist can be broadcast by WOR will be sent the choice as to the most troublesone distance for the Governor of the State over the air on Menday evening when sources of interference. Whister of Nork, will address WEAF's the Newark Philhermonic Concert seating, mailting, etc. Box 319, 22 Sources of interference and season on Tuesday evening. Mr. Band of fifty two pieces by Concert seating. Mr. J. City.

Two-Way Test With Australia

Having communicated in both di-

of the Australian Radio Relay there a greater thrill for the DX League, in a determined effort to exhaund? 2XAZ, like 2XI, is an experimental tablish two-way radio contact with license. Station 2XI is licensed to North American operators before the

mission on short wave lengths. 2XAZ While transmission on wave is the portable radio station, using tengths in the vicinity of 100 meters

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Geouine non-corrosive, size No. 26.
H. BOKER & CO., INC.,
161 Buane st., New York City.

Instruction

Cabineta

h St. New York Cky. PENN. 7779.

CHAS. DOWN,

ators will be working their stations hours will be the same each day. It Planned is suggested that all operators use a code word for purpose of indentifi-

Code Brings Real DX

Canada are now turning their atten- of tubes. The farther away a



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Several of these sets have been sold to dealers who wanted something a little better and clearer on which to demonstrate speakers. That means something. Think it over.

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\$-TUBE FOURNAL

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\$2.25 VOLT (all batteries).

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BDISON Elements for "B" Batteries,
5c. per pair.
All other parts in stock. Mail orders filled.
ROMCO STORAGE BATTERY CO.,
144 W. 68th st. Phone Columbus 1883. All other parts in stock, Mail orders filled.
ROMCO SPORAGE BATTERY CO.,
144 W. 68th St. Phone Columbus 2253. BRAUTIFUL 3-tube set; beats neutro-dyne; cost \$75; seff \$32; cannot be de-pheased. Cohen, 1205 43d St., Brooklyn.

RADIO specialist; batteries recharged, repaired rebuilt, called for delivered.

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NEW LINE OF RADIO CABINETS;
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\$12 East 22d St., New York.

price, 126 ampere; U. S. L. batteries.
THALER BATTERY SERVICE, N. T.
Distributors, 208 West 68th St. Calum-

are phone tips. Thus when one end of a flexible lead is plugged into the jack connected to the

Potentiomera

of flexible leads, upon the ends of which | can be used either as variometers, for long waves or for very short waves, or as coupling devices.

@ Plepresents

Jacks

Fig 3.

offo

Variable Condenser

Variocoupler

Four connections to each variometer to one of the variometers, it will then two to the stator coil, named S in already in use,

Special Coupler

Before drilling the panel the idea of than the given number of connections ; figure, and two for the rotor, named in figure, which can be used as a tickler coil, left out (short-circuited at this time) or used as a coupling device.

The connections for the detector tuba are given in the diagram in Fig. 2. Plenty of space is left around the inserted packs so that at any time more may be added for circuits that are radical departures from the standard.

Jacks are noted on the panel marked fixed condensers. These have a manifold purpose. That under the first condenser to the left of the panel is for raising the capacity of this condenser by connecting the two in parallel, and has a capacity of .0005 mfd., whenever a .001 mid. condenser is necessary for some circuit. Another fixed condenser may be placed below the second condenser if the

In order to facilitate the wiring of the parts several schematic diagrams are given showing how the condensers, couplers and variometers are connected to the

efficiently. Detector Tube The parts used in the set should be

of the best. For the detector tube any be taken to get the proper rheostat

easy to construct from the set. We will use this as an example to show how the set is connected up. First, a connector is plugged into the aerial post, then the other end is plugged into the jack connecting to the ten-turn tap switch on the coupler. The ground post is connected to the unit tap switch in

One jack of the secondary of the

Another jack on the coupler secondary is then connected to the jack on the filament of the tube, either negative or positive, whichever works better for the

the circuit with two connectors, one to the negative "A" jack and the other to the negative filament jack. The positive filament jack is then connected to the positive "A" battery jack. The set is then wired up and when the acrial. ground, batteries and phones are connected to their respective binding posts

can be tried without much loss of time. Before closing the article the author

whistles by 22.5 per cent and spark, case which his party stands for. | consist largely of operatic music.

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The SHURETY is \$1.50 at good radio dealers, or it will be sent anywhere prepaid upon receipt of price.

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Last Week on the Radio

By Pioneer

to the average listener, but it is one of those little things that will help Mr. Hylan's subordinates on his proment. We refer to the pleas for correspondence. But a short time ago our announcers ended practically every verbal bow they made before ured Hollywood McCosker. We pubthe microphone with a solicitation. lish this with the hope that it will "We are sure that Mr. (or Mrs.) So excite Hollywood into dispatching a and-so would be glad to hear from stinging answer which we shall be his (or her) radio audience," etc., glad to publish. was the stock phrase used, and it finally became deadly monotonous. So much so, in fact, that we were driven to protest. Although we cannot credit ourselves with having brought about a reform in radio, we have noticed that a successfully squirmed and that he has acquitted himself of all that had been charged "agin 'im" except the main counts in the indictment, to wit: that he is have noticed that our studio man- an imitator. To these counts he agers have taken steps in the matter pleads guilty. and broadcasting appears to be well I presumed as much the first time

quite entertaining. In reflecting on say that it's a cheap imitation, so I past events we must keep the period wish to repeat, more power to him. programs. The meager supply of talent from which studio impresarios less trite material. I, too, as apdraw usually takes to the country. prentice boy, have been the recipient Yet we have noticed an improvement of emoluments from my one time in broadcasting this summer over last boss, but I wouldn't feel justified by and more entertaining all around. Of and trade names of said employer's course, the summer has not passed business. yet, but it is a little late for the proverbial slip between.

We were pleased beyond words last | Earthquake Report week when a barytones who has noticed our somewhat disparaging reglad to do as much for any other barytone with enough sense to see that he is a nuisance to broadcasting if he insists on singing things that have long since become a bore.

Sir: Is your typewriter upside down cannot be traced. been calling it WNYC. Now, will in them. you please straighten that typewriter out and put those letters in cor- Mark Strand Theater

beginning as you know. ships interfere with it. Now for the Mass. Over telephone wires and love of Mike, take your set and tune cables, the musical program was sent few kilocycles and then you will not New York, thence to Station WMAF, have any trouble from ship code, for which is using a wave length of 364 the writer, who lives in the Bronx, meters and a 500 watt transmitter. has a three-tube regenerator set and Radio fans throughout the East has no trouble from code at all. should have no difficulty in picking

You will also note, if you listened up the programs. to WNYC last night that Mr. Cowan G. J. Podeyn of the American Teleasked for our indulgence before we phone and Telegraph Company, New start to criticize, so therefore I think York, and his staff of assistants are you ought to take the cue. By the in charge of New York details and way, this station will be able to give are devoting their personal attention us music from bands that have not to getting perfect transmission. been broadcasted before, namely the best bands in the city, the Police Department and the Fire Department. so I must defend them and say that it is a real treat to hear something else than military bands and hotel orchestras. Why do you let a little Polymet Manufacturing Company, New paper like "The Bronx Home News" York City. It is of the simplest possible beat you, for they have been an-nouncing the programs of WNYC for venience which should appeal to the the past few days and your program has not even made mention of it?

THE RADIO BUG.

E have noticed a very detary thoughts concerning the broadsirable improvement in casting of political propaganda, but broadcasting in the last the programs were quite mild and few weeks. It is not an improvement reasonable. If Thomas Cowan (ACN) that will revolutionize the art nor is given half a chance, he will make will it make a great deal of difference a broadcasting station of WNYC. If to develop broadcasting as a more smoothly flowing source of entertainfailure of his work.

M. C. Fry again flays the good nat-

on the way to completely throwing I ever heard him "taking the air."

off some of its cheapening traits.

Yet I have real admiration for his knack of getting by with the imita-Last week, taken as a whole, was tion stuff, and it wouldn't be fair to of the year in mind, for that has an However, using his own words, "he important bearing upon broadcasting might perhaps better distinguish himsummer. It has been more exciting that in appropriating the good will

Yours for better broadcasting.

M. C. FRY.

By Radio Denied Captain H. de A. Donisthorpe, repmarks concerning the overworking of resenting the British Marconi Comcertain ballads asked us to supply pany in New York, which company him with a new list of songs. We controls the wireless installation on look upon this as an important event board the Italian steamer Duilio, which may greatly influence broadstates that the story about the radio casting. It may mean that "Tommy equipment and telegraphist on board Lad," "Pale Hands," "Invictus" and a few of the other "favorites" will not be broadcast more than fifty times a week instead of two hundred times. We supplied the gentleman with a list gladly, and we shall be

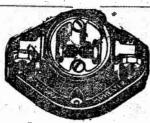
Mr. Franckie, the chief wireless officer of the Duilio never received any such communication regarding an earthquake and it can only be as-Another gentleman asks us why we sumed that some foolish practical lo not have more to say about the joker has been at work. Such a fab-WOR programs. The number of rication is both dangerous and stupid imes a station is mentioned in our and at the same time might have lost column depends entirely upon its im- an old employee of the company like ortance to the broadcasting scheme. Mr. Franckie, his appointment. Unfortunately, the origin of the story

or has the heat affected it, so that | Captain Donisthorpe has in his posyou cannot list the call letters of session all the radio bulletins which our new baby station correctly? You were received on the Duilio during have been calling it WCNY, while her voyage and no such story as has your eminent friend, A. C. N., has appeared in the papers, is contained

rectly, and have mercy upon them broadcasts Through WIVAF for they are only a baby learning to Musical and special concert prorectly, and have mercy upon them Broadcasts Through WMAF crawl. Wait until A. C. N. can get grams of the Mark Strand theater. them ready, then you can start in. New York, will be broadcast every For no station can be perfect at the Sunday night beginning at 7:15 o'clock. The first program was You also stated some time ago, that broadcast last Sunday night through their wave length is too high and the Station WMAF at South Dartmouth, t as Dr. Goldsmith said. Cut out a from the theater to 195 Broadway,

A New Phone Plug

Under the name "Polyplug" a new phone plug for radio receivers has been placed on the market by the fan. The phone tips are pushed into openings in the plug and the cords are criss-crossed in a tension slot, which prevents the tips from accidentally pulling out. There are no We are not guilty of criticizing screws to tighten or loosen, and no WNYC's program. We might have necessity for taking the plug apart registered our none-too-complimen- to insert the phone tips.



Sensory Lightning Arrester

Not the Cheapest but the Best

Approved by National Board of Fire Underwriters.

Distributed by Times Appliance Co. Viking Radio Co. Alby Electric Co. Wolfe Radio Co.



U. S. Tool Company, Inc. Announces the Following

as Sole Distributors in New York Territory for the Coming Year: Continental Radio

& Elec. Corp. R. H. McMann, Inc.
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424 Fulton Street amaica, L. I., N. Y. Wireless Klein Co. On Sale By All Good Dealers U. S. TOOL CO., INC. 126 Mechanic St., Newark, N. J.

RCA. RADIOLA SALE \$350 Radiola Grand, Complete.\$145.00 275 Radiola VII-5 tube set. 155.00 275 Radiola IV-Complete. 145.00 130 Radiola V-3 tube set. 55.00 130 Grebe C. R. 9. 60.00 Music Master Loud Speaker. Malone-Lemmon 43 Ver. Cond. 5.25 U. V. 1716 Transformers.... De Forest D 12 ready for delivery All Standard Sets and

SHEARN 1122 Madison Av., at 84th St.

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For best concerts tune in the MUNICIPAL BROADCASTING STATION

For best prices on radio supplies and sets come to the Municipal Radio Company No. 1 Park Place, N. Y. Tel. Barclay 0382



HAT the average radio set works none was ever advertised—one the basis at all is a never ending source of of low B battery renewal costs.

A DEPARTMENT OF

POPULAR DISCUSSION

OF TECHNICAL POINTS

USUALLY CONSIDERED

TOO INTRICATE FOR

GENERAL EXPLANATION

deal in facts that you can verify. You

amazement to me! It is, of course, unique among the playthings of man in that it has no moving parts except those movable for adjustment or tuning. It is, to that degree, unlike the phonograph, player piano, automobile, motor cycle, bicycle or motor boat. These things are simplicit, themselves compared with a radio set and they deal with known things that you can see. With an automobile or a motor boat, for example, the fundamental problem is the gasoline engine. The requirements for its performance are a proper mixture of gasoline vapor and air and an electric spark at the right time. All of this is physical. You don't have to guess any of it. You

The one-fourth ampere tubes were hailed with delight as cutting down the cost of current for the radio set. They do cut the cost materially, but the A battery upkeep cost does not begin to compare with the B battery upkeep. Investigation of several thousand five-tube sets shows that the average B battery cost is about twice that of the A battery cost, even when allowing for depreciation, repairs and payments to a charging station for recharging and for rental of a loan

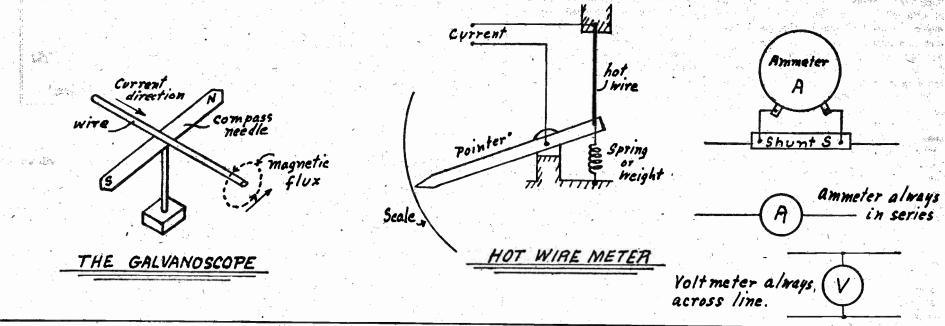
There are, of course, all kinds of meters on the market of various types and for various purposes. Meters, like all measuring instruments, are devices which compare two quantities by showing their relacan see the gasoline and when it flows. Even a scale for measuring length en- mensely, so that there was no need for

there is between various devices and various adjustments you are inclined always to the most economical. When you can't see waste you become careless in spite of printed warnings. I think it was a town in Connecticut where the growth of the town was so great that the matter of water supply became serious. Any one could have water piped to his house and use all he liked at a flat sum per year or per quarter. When the water question took on this new aspect it was decided to put meters in each house, so that those who used more should pay more in proportion, and thus the town could find the money to extend the supply. This was done, but the surprising thing was that when the meters were installed can see the spark and when it occurs. You tive amounts, not their absolute values. the consumption of water dropped im-

ND THE PANEI

inclined to stop it, and when you can see, the force required to turn the needle for yourself what difference in economy | through varying degrees may be readily measured. Knowing this force, we know the force of the field, and the strength of the current producing the field may then be very easily calculated. We do not need to do this, however, as we can place a scale on the device over which the needle can be arranged to move. Then, by sending currents of known strength through the wire, we can calibrate the scale by marking on it the position of the pointer and the strength of the current at that

The use of a needle in an instrument of this kind requires that when no current flowing the instrument must be set so th. the needle is along the wire. To do this the wire must be in the magnetic meridian, because the earth's field will attract the compass needle. In order to be more independent of outside forces the needle may be replaced by a coil and a stationary



the adjustment. You can see the engine go and can see what happens to it as various changes are made. But, go around any boat club in the spring of the year, or, in fact, almost any time, and watch the struggles and efforts made to start some motor boats. It is no unusual thing to work several days to make an engine run when the boats are first put overboard. It is no unusual thing to have to spend an hour or two any time to start a motor boat. Not always, of course, and not all boats, but the cases are not rare.

In view of these things, isn't it little short of miraculous that a radio set dealing in quantities and matters that can't be observed in any way by the human enses, subject to troubles that we can't perceive, affected by a multitude of conditions we know nothing of, having no action to be observed and corrected, reaching out for something the presence of which we can't determine and which, when it is present, is controlled and adjusted by other human beings in some far off stations—isn't it marvelous that such a device can be put in the hands of almost any one without education or training and often lacking entirely in intelligence, and the radio set performs nearly always to his or her satisfaction? Milliameter Needed

The meter most needed, it seems to me, on a radio set is a milliameter in the plate circuit of each tube or, as that is expensive, in the common lead from the B battery negative post, so as to measure the entire drain from the B batteries. I venture to say that if sets were sold on the consumption of B battery, which is the upkeep cost of most sets, just as cars are compared on the basis of miles per gallon of fuel, there are many varieties of radio sets which would disappear from the busy marts of trade. Who would choose a set consuming 60 or 70 milliamperes from the B batteries, as against another set using less than a third as much with as great an ordinary range of distance and substantially the same volume, even if the latter set cost more? Yet I venture to more economically for several reasons.

You can see the carburetor action and see | ables us merely to compare lengths, using | any extension of the supply. The people for our standard some agreed upon length, such as what we call a foot or a yard or a mile. For comparison purposes, it makes no difference whether our scale is exactly a foot or a yard. We can get the relation between any two lengths we measure. To tell others, however, either our measure must be exactly a foot or we must know just how far short or long it is. The reading can then be multiplied by some number to give the correct result in feet, just as we can get the exact time from a watch that is slow or fast if we know how much it is out of the way.

I am inclined to think that there is a certain quality which may or may not be found in people we class as intelligent or in people we characterize as "dumb" which has no apparent connection with education or knowledge. This is a sort | ments are apt to be of this nature. of perception, a combination of close observation and perfect freedom of responsive action. You see it in the worker around your car, your boat, your radio set. You see it in the young fellow who acquires a local reputation as a genius because he can fix any balky set. He simply goes ahead and makes the changes that suggest themselves to him without any thought of what difference those changes may make. While you and I are arguing with ourselves and have finally concluded the thing is impossible he has tried it and made it work. Radio sets work for him as well as or better than they do for us.

A still more surprising feature of radio sets is the fact that, although they deal with electrical phenomena and with unseen forces—things that we can to a certain extent measure but cannot otherwise perceive—it is rare, indeed, to find any kind of measuring instrument on any set built for public consumption. I presume cost is the thing that keeps the manufacturer from supplying instruments, and lack of knowledge of their value is what prevents the public from demanding them It is a fact, however, that meters properly chosen will enable you to operate your set say that no set was ever sold—certainly | When you see waste going on you are | spiral spring to which it is connected, and | circuit with which they are in parallel.

could see that their pocketbooks were affected by leaving the water running.

No instrument can be considered as giving accurate readings at all times, no matter how good it is. Even the finest devices made have their calibration curves to give due allowance to temperature, humidity, pressure, nearness of other objects, drafts and many other effects, depending on the instrument and the degree of accuracy for which it is to be used. In the ordinary radio set great precision is not worth while. On the other hand, the instruments must be good enough so that they will give the same reading continuously under the same conditions. They must be, also, such that the instruments themselves do not consume so much current as to make the results misleading. The cheaper instru-

Electrical measuring instruments, of whatever nature they are, are merely devices for comparison of electrical currents by comparing the effects produced by the flow of the currents. We know that a current flowing has a magnetic effect. We know it has a heating effect. We know if the current passes through an electrolyte it has a chemical effect. Hence, our electrical instruments must utilize one of these three effets. The magnetic effect is most used and the instruments are called electromagnetic instruments. They are usually designed for either d.c. or a.c. separately. Those instruments depending on heating effect are called hot wire instruments and are usually independent of either the alternations or oscillation of the current. The third class of instruments, the electrochemical type, are not normally met with in connection with radio receivers.

In its elementary form each type of instrument is extremely simple. The electromagnetic type as shown is merely a compass needle which when placed in an electromagnetic field tends to point in the direction of the field. The stronger the current the greater the force which will tend to turn the needle in the direction of the field. The needle can be so arranged that it is turned against the pressure of a

magnet used. This is the construction of the most accurate and sensitive galvanometers such as the D'Arsonval type, and is the practice in commercial instruments. The coil is suspended between the poles of the magnet, the field of the permanent magnet being undirectional.

A hot wire instrument is of similarly simple construction and, with care, can be readily made in any one of a multitude of varieties. The idea is that a current sent through a wire will have a heating effect. The rise in temperature of the wire willcause an increase in its length proportional to the rise in temperature. This will cause a deflection by the pointer on the scale.

The instrument, which consists merely of a compass needle ever which a wire and is called a galvanoscope. When fitted with a scale it becomes capable of comparison effects and is called a galvanometer. the oldest instrument used for electrical measurement. Put in portable form it becomes an ammeter, if designed for current measurement, and a voltmeter, if for the measurement of electromotive force. As a matter of fact, all instruments measure current. Obviously, however, the current through any instrument having a constant resistance is proportional to the voltage at the terminals of the instrument, and if the instrument is calibrated for that purpose the reading can be in

Ammeters, being always used in series in a circuit, always are of very low resistance, so that little power is wasted in them, and their use does not change the electrical characteristics of the circuit. Sometimes shunts are employed to accomplish this, the shunt being placed in the circuit and the ammeter arranged in parallel. With an ammeter of resistance A and a shunt of resistance S, the proportion of the total current going through the ammeter is S divided by A+S. Then the actual flow in the circuit is A+S divided by S multiplied by the ammeter reading.

Voltmeters, being always in parallel in the circuit, are made of very high resistance to prevent any great flow of current through them and around the part of the

General Directions for Checking, Adjusting And Operating a "Super"

Part II of an Article Describing a 45,000-Cycle Super-Heterodyne

By LAWRENCE R. BLACKHURST

IN THE July 6 issue of The New York | tuning distant stations the same procedure | or spark transmitters it will often be | tuning in the same station at another Herald Tribune Radio Magazine general eight-tube 45,000-cycle super-heterodyne. This article is a continuation of the former and gives information relative to checking, adjusting and operating the receiver described

ONNECT the loop to the three binding posts on the left end of the panel. The center tap of the loop must be connected to the center binding post. One of the outside loop terminals should be connected to the top binding post and the other to the lower binding post. These two connections may be reversed without affecting the operation of

The B battery unit may consist of two 767 Eveready 45-volt batteries connected in series. Connect the negative terminal of this unit to the binding post marked -AB, the positive 90-volt terminal to the binding post marked 90B and the 45volt terminal where the two batteries are connected in series to the binding post marked +45B.

After this has been done and before the A battery has been connected, plug in the phones and the loud speaker in the jacks provided. Close the filament switch, located on the panel under the voltmeter, and turn the rheostat up a few degrees. Any deflection of the voltmeter indicates an error in the wiring of the filament or B battery circuit. If such an error exists the trouble must be located and eliminated at once. If the voltmeter is not deflected the A battery can next be connected to the terminals marked + 41/4 A and — AB, Fig. 6.

Again turn on the filament switch and note the voltmeter reading, which should be 41/2 volts. If this reading is obtained the wiring of the A and B battery circuit is correct. If the meter should fail to read it is because the filament circuit is open. If the needle is deflected to the end of the scale the B battery voltage is shorted through the filament circuit.

The tubes can now be inserted. First see/that the filament rheostat is turned to the off position and that the volume control rheostat on the right hand end of the panel is turned clear to the right; also that the filament circuit switch is open and that the terminals of all the tubes and the contacts in the sockets are clean. Close the filament switch and turn the filament rheostat until the voltmeter indicates a filament potential of exactly three volts. This value should never be exceeded, as doing so will shorten the life of the tubes and may cause permanent injury to their filaments.

Adjusting and Operating the Set

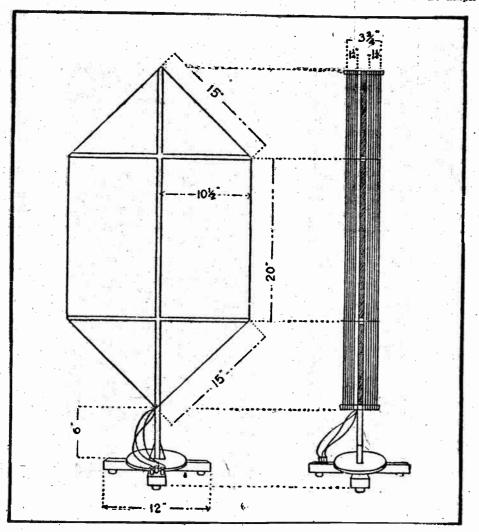
The set is now ready for an actual operating test. This should be done at a time when it is known that a broadcasting station of medium or high power is operating within a range of 100 miles. In normal coeration there are only two variables to adjust, condensers C1 and C2. The rotor of the coupling unit and value of condenser C3 require initial adjustment, but, once set, will probably not need further attention. Set condenser C3 at the position for minimum capacity; that is, so stator and rotor plates are not interspaced. Its final adjustment follows later. Set the rotor coil of the coupling unit half way between the maximum and minimum coupling positions.

To locate a broadcasting station with the tuning controls set the loop condenser, which is the one at the extreme left end of the panel, to the five-degree position, then slowly turn the oscillator condenser from zero to 15 degrees. If no signal is intercepted change the loop condenser setting to 10 degrees and again slowly turn the oscillator condenser from 0 to 20 degrees. This process should be continued until a station is intercepted, changing the setting of the loop condenser about 5 degrees each time and slowly turning the oscillator condenser from a point at least 10 degrees below the loop setting to 10 | phragm being controlled, either directly or

applies, only it will be necessary to make directions were given for building an loop settings every two degrees or even every degree if the signal strength of the station to be received is weak.

found that one gives better results and | time, but to facilitate the location of staless interference than the other.

If the station received is within a radius of four or five hundred miles the ampli-



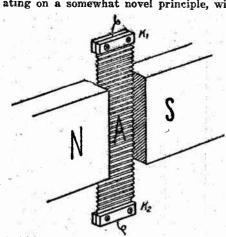
tings of the oscillator condenser, the lowest one on the dial being the adjustment of the oscillator that gives a frequency 45,000 cycles higher than the frequency of the incoming wave. The setting highest on the dial is for the frequency of the oscillator that is 45,000 cycles below the frequency of the incoming wave. Signals should be received with about the same intensity at either of these settings, hut sometimes under conditions of inter-

When a station is picked up it will be | fication obtained in the intermediate amnoted that it can be received at two set- riifier will probably be so great that the audio-frequency amplifier tubes will be overloaded. This undesirable condition can be corrected by turning the volume control rheostat to the left until the volume is sufficiently reduced and distortion eliminated.

After one station has been received it will be fairly easy to pick up additional stations. Each time a station is tuned in its location on both the loop condenser and the oscillator condenser should be ference from other broadcasting stations noted. This is important not only for

Loud Speaker Operates on a Novel Principle

and interests every one associated with the frequencies of the speech currents, broadcast receiving, the following notes on a recently produced loud speaker, operating on a somewhat novel principle, will



be of general interest, says "The Wireless World and Radio Review," London.

The apparatus here described is constructed by the well known firm of Siemens & Halske and has been developed in Germany by two engineers of that company, K. W. Wagner and Luschen.

Nearly every type of loud speaker which has been developed and is of practical value depends for its operation on some means of influencing a diaphragm, the dia-

As the subject of loud-speaker design is | In addition to having to set the diaphragm very much to the fore at the present time | vibrating at frequencies corresponding to there is an expenditure of energy in overcoming the inertia of the diaphragm, and also in moving the mass of air which the diaphragm displaces in vibrating.

Professor Schottky, who has made a theoretical study of the problem, has proved that to obtain maximum efficiency the mass of the diaphragm must not exceed that of the air moved by it, and that it is preferable for the mass of the diaohragm to be less. Hence the necessity arises for the diaphragm itself to be extremely thin and light. In the present loud speaker an arrangement has been adopted which resembles the principle of the Sykes-Round microphone, for, instead of the more usual method of influencing a magnetic field by means of the speech currents and so controlling the movement of the heavy diaphragm, the speech currents are led through the diaphragm itre'f, which is placed in a powerful magnetic field. In the loud speaker illustrated herewith this principle has been adopted. Between the poles of the powerful electromagnet, N S, is stretched an extremely thin waved aluminum foil "A," and the output connections of the radio receiver or amplifier are made to K 1 and K 2. A current carrying conductor placed in the magnetic field is deflected vertically to the direction of the magnetic field, and consequently the aluminum foil will oscillate

tions whose wave lengths are known to be slightly above or below the station for which settings were recorded.

When a station at least 1,000 miles distant has been tuned in the rotor of the coupling unit should be adjusted to as near the minimum coupling position as is possible without causing a decrease in signal strength. Once this adjustment has been made the rotor may be locked in place with the set screw provided for that purpose and need never be changed again throughout the life of the oscillator tube. When a new oscillator tube is inserted in the socket it will be well to readjust the setting of the rotor.

The adjustment of condenser C-3 should be made while a station of low wave length, between 300 and 350 meters if possible and located at a distance of several hundred miles is being received. Under these conditions increasing the capacity of the condenser will cause considerable increase in signal strength. This capacity may be increased as far as possible without causing the first detector tube to oscillate or cause distortion of the received signal. When this adjustment is once made it can remain fixed for the reception of all stations on any wave length.

If, after carefully following these instructions for tuning the circuit, no signals can be received and at a time when it is known that a local broadcasting station is operating, a test should be made to determine whether or not the oscillator tube is oscillating. A good method of doing this is to touch the grid terminal of the oscillator tube or socket. If the tube is oscillating a click will be heard in the phones when the finger touches the terminal and again when it is withdrawn. If it is not oscillating a click will only be heard when the terminal is touched and not when the finger is withdrawn. Failure of the tube to oscillate may be due to incorrect wiring of the oscillator circuit: tube terminals may not be making contact with the socket prongs; or to the use of an old tube that is inoperative. Remedies for such conditions are obvious.

The range of reception depends largely upon the power of the broadcasting station. When the operator has become familiar with the tuning of this set little difficulty will be experienced in receiving 500 watt stations up to a distance of 2,000 miles. Under favorable atmospheric conditions the set is capable of reception across the continent.

Shielding

When the set is to be operated in a radius of a mile or two of a high-powered broadcasting station it is sometimes found advisable to increase selectivity. Static such as is caused by high-tension lines, streetcars, elevator motors, etc., is also considerably lessened by shielding.

The entire inside of the cabinet may, in extreme cases, be shielded. The shielding should be No. 34 guage brass or copper cut into exact sizes to fit bottom, ends. top and back and tacked into place with small flat head brads or brass tacks.

A template should be made to conform with the panel drillings used in mounting the panel instruments. Cut the holes in the shield sufficiently large to clear the condenser and rheostat shafts and any other parts that might cause short circuits. For the jack cut a 1-2 inch hole and insulate the jack from the shield with a thin fiber washer. Since the shield is connected with the negative A and B battery terminals extreme care must be taken to insulate all parts of the mounted apparatus that are common to any part of the circuit other than the negative battery leads below the rheostats.

The Loop

While it is not essential that the exact form of loop shown shall be used, it is important that the general dimensions be adhered to as well as the number of turns and spacing between turns.

It is neessary to take off a center tan which connects to the center binding post on the panel. One of the outside loop in a vertical direction at the rate of fre- terminals connects to the top binding post degrees above the loop setting. When | indirectly, by the received speech currents. | quency of the currents passed through it. | and the remaining one to the botton post.

Electromagnetic Principles

A Simple Explanation of the Magnetic Fields Coils When a Current Flows Through Them

By L. G. Ingram

value, but it is suggested that you two main electrical principles wind a single-layer coil of 250 turns upon which radio communication is the insertion of an iron core on a tube two and a half or three founded. For the student of radio bar of soft iron within the coil. inches in diameter. The wire used telegraphy the importance of these If a direct current of unvarying may be of any size that is handy, though the smaller the better, because it will not take up much room. emphasized. For a clear understand the coil will stand still when the A. Williams-I have a three-tube grounding of these two subjects But if the rate of flow of current receiver that operates very well ex-cept for the fact that regeneration is rather difficult to handle. It will these subjects will be taken up cordingly or, as can be stated in anstop and start at the most incon- briefly but clearly in the next few other manner, as the current invenient times. How can this be rem- articles of this series.

Anwer—This starting and stopping of oscillations probably is caused by the size of your tickler coil or the is placed close to a compass needle. If a coil is wound around the legs of amplification. The set worked perfectly up until a week ago. Upon returning from a week-end trip I tried field. Hence it follows from the above enter the south leg. If a small the set and there was no volume there experiment with the compass needle at all. Charged the "A" battery, but that the flow of current in a wire flowing through the coil the piece of the set and there was no volume there experiment with the compass needle piece of soft iron is placed near the no difference. Can you tell me what must have set up a magnetic field iron will be attracted forcibly to the Answer-It is highly probable that around the wire which has a definite magnet.

the "B" batteries in the set are dead. direction.

Magnetic Field

radio section, to this set? Answer-The resistance coupled tion in each case. amplifier as described in the radio Thus, if the current flow in a consimple solenoid. section may be added to any receiver. ductor is away from the reader, then

JUESTIONS * ANSWERS

Radio-Frequency Choke Coil

Reinartz receiver, and have procured all the parts for same, with the ex-

ception of the radio-frequency choke

coil. Please give me the value of

Smooth Regeneration

the grid leak to some extent.

F. Robbons-I wish to construct a

Five Audio Stages three stages of audio-frequency am-plincation, to which I should like to If the current flow is toward the add two more tubes in a separate reader the lines of force are antiaudio-frequency amplifier. Is this ad- clockwise.

Adding Amplification

Answer-Five stages of straight The magnetic fields around two audio-frequency amplification would parallel conductors are either mutube of no advantage, for many rea- ally attractive or repellent, according magnetic force in the coil have magsons, chiefly because distortion and to the direction of current flow in tube noises would so garble up the each. If the current in two parallel signals as to make them unintelligi- conductors is flowing so that in one the current flows towards the reader

F. J. Eller-I should like to build reader, then the lines of force surthe radio-frequency amplifier as rounding each wire are in opposition shown in a diagram in Mr. Meyer's or repulsion, but if the current in article printed on June 22. Please each is following in the same direcgive me the constructional data on tion, then the magnetic fields will the tuning coil. aid each other and the lines of force

eighty turns of No. 22 single cotton- but will combine and coalesce. covered wire wound on a composition

like to build a loop aerial. I have That is, the lines of force around the form made. It is of the box type each turn will unite with those of resultant magnetic field will be and is three feet in diameter. How the adjacent turns. many turns should I use, and what This uniting of the lines of force

turns to use depends upon the size wire is the same. These long lines This property is made use of in the of the condenser, employed to tune are said to pass through the entire variometer that is so much in use the loop. For a condenser having a helix. These lines pass out of the to-day in the radio receivers. capacity of .0005 mfd. twelve turns a coil at one end and enter at the other meter diameter are put on a loop; end, as was demonstrated with bar that is, twelve or thirteen turns are magnets. used on a loop having a diameter of If the general direction of the lines three feet. The turns should be of force inside this coil is from right set is tuned to exactly the wave spaced about half an inch apart.

M. Blackburn-I have a receiving set south pole. The polarity of a coil and should like to test the efficiency can always be determined if the value. To accurate tune a set, of new parts in some way that will direction of current is known. eliminate expensive testing equip- The rule is as follows: If, when vernier condensers are helpful, but ment. If this can be done, please tell looking at the end of a coil the cur- an even finer venier is better. One

generative set it is comparatively the observer will be the south pole, that will be described herein. With easy for you to get an approximate the other end being the north pole. this vernier one complete revolution efficiency test of parts if care is taken Definition of Solenoid in the testing. The way to test a part is to use the part now in the turns of wire through which current variation as that given by a one deset as a comparison. Tune in a sta- flows is known as a solenoid. And gree variation on the tuning contion. Make note of the tickler or it can easily be seen from the above denser or variometer. variometer setting when station is at paragraphs that a solenoid has the This vernier consists of a loop of greatest volume; also leave coupling same properties as a natural magnet, No. 14 double cotton covered wire control "as is." Then try new part i. e., a north and south pole and made small enough to rotate inside in circuit and again tune in same magnetic lines of force.

the tube holding the secondary tuning station as quickly as possible. Record plate control setting. The part a magnet is that the magnetism of on a wooden shaft cut from a quarter giving the lower setting is the better the solenoid can be placed under con- inch dowel pin. The loop is connected

this coil. Will a honeycomb coil do?

Answer—It is possible to use a tromagnetic induction are the honeycomb coil of large inductance tromagnetic induction are the the magnetizing power of it can be tromagnetic induction are the of turns of wire in the solenoid, but the magnetizing power of it can be increased from 200 to 2,000 times by

> two things cannot be too strongly noid the lines of force surrounding ing of radio a good fundamental flow of current is fully established As was explained in the first decreases the lines of force collapse

resistance of the grid leak. Suggest the needle will be materially affected of a horseshoe magnet and a current that you try fewer turns on the by the wire as long as there is a take to flow through the wire, tickler and increase the resistance of current flowing through the wire. It coil through which the positive side has also been previously mentioned of the battery or current generator A. B. Hanshofo-I have a three- that a magnet suspended so that it is connected, will be the north pole honeycomb-coil tuner with two stages is free to move will tend to place The other leg will be the south pole

Suggest that you have them tested. If the current in a horizontal con-before you attempt making any ductor is flowing toward the north increased from zero to a very high changes in the set. Any radio store and this wire is placed over a com- value the attracting power of the pass the needle will be deflected, so magnet is decreased as the resistance that the north pole of the needle is is increased. Thus demonstrating H. P. Boardman-I have a three-pointing toward the west. If the that the amount of current flowing tube neutrodyne receiver. Will it be wire is under the compass the needle through the coil controls the strength possible for me to add the resistance will be deflected toward the east. If of the magnetic lines of force and coupled amplifier, as described in the the current is reversed, then the the number of the lines emanating needle will take the opposite posi- from the legs of the magnet. This also holds true in the case of

This property is utilized in practhe lines of magnetic force around tical work such as in large electro-J. L. Eyer-I have a four-tube set, the conductor will be in the direc- magnets and in the excitation of the magnets of a dynamo or motor.

If a tempered steel bar be placed inside a solenoid, through which a current is flowing steadily for a few seconds, it will be found upon removal that the bar has become permanent magnet. The lines o

field around a conductor depends upon the direction of flow of cur and in the other away from the rent it is clear that if the current flowing through the above mentioned horseshoe magnet be reversed the

about a solenoid can be varied by fluxes of opposite direction. Thus, i will have not only the same direction two solenoids, wound in opposite di-If a number of turns of wire are rections, are placed in series with covered wire wound on a composition tube three inches in diameter. The coil should be tapped every ten turns.

Loop Construction

Loop Construction

G. M. Launsberg—I have a super-battered year of current through the coil will unite.

Loop Construction

American.

TRANSFORMERS each other and a battery the fluxes will have opposite directions due to the different flow of current in each as the coils are wound opposing.

And since the flux are different in each as the coils are wound opposing.

And since the flux are different their through the coil will unite. fore if the two are telescoped the nearly destroyed.

should the spacing be between turns? tends to form several long lines, con then be regulated by the varia-Answer—The correct number of since the direction of current in each tion of the telescoping of the coils.

It is a well known fact that when a to left, the left hand end will be a length of a transmitting station the north pole, the other end being a signal strength is at its highest verniers are necessary. Small ment. If this can be done, please rent flows around the coil in a of the simplest and most efficient clockwise direction, the end nearest verniers that can be usel is the one of the dial through a ninety degree A helix consisting of a number of arc will give the same wave length

of the two. If this test is made with trol. The strength of the magnetic in series with the end of the coil that care and all new parts properly wired field around a solenoid is propor- it is nearest to. To operate the it will be fairly accurate. | tional to the strength of the current vernier the loop is rotated.



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Opp. Penn. Term

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Insure yourself for BETTER SERVICE and GREATER
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Designed for both indeer and cutdoor aerial.

RECEIVES LONG DISTANCE ON INDOOR AERIAL.

clearly and loudly. Tunes very easily, and always "picks up" stations on the SAME DIAL READINGS.

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ALL parts are carefully constructed in our factory of the best materials obtainable, and are individually guaranteed. NEUTRO colls have silk covered wire wound on genuine BAKELITE. No shellac or varials, which introduce losses. EVERY part that is needed to BUILD this A. & P. NEUTRODYNE is included in this KIT at the REMARKABLY LOW PRICE of

Postage Extra
All parts to BUILD one like our STANDARD NEUTRODYNE......\$32.50
Cabinet Extra

IMPROVED SUPER-HETERODYNE THE FAMOUS A & P-8-TUBE SET

The important features of this famous instrument are that it receives LONG DISTANCE on the LOUD SPEAKER without the use of any ANTENNA WHAT. SOEVER, like a LOOP—either EXPOSED or CONCEALED, nor GROUND. The only connections are from the set to the batteries.

LOCAL STATIONS can be Cut Out for distance even at the slightest difference in wave length.

CONDITIONS.

It is the only set of its kind that reproduces MUSIC and SPEECH with just as CLEAR TONE as performed. Everyone who listens to this instrument agrees that it plays with a finer tonal quality than they have ever heard. It is as though you were present at the performance. A GLEAT SET!

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Ambassador Standard Arc Coil

108 Volts-\$5.90

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\$11.90 Western Elec. 5 Amp. Rectigon \$19.90 \$6.75

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\$119.00

Filled.

No C. O. D.

Include

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The same courteous service—the same Quality Radio Sets and parts—the same reasonable prices

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Have you heard the new D.12? And please note—a few D.10's left at prices which will clear the shelves in no time.

PHONOGRAPH UNIT DICTOGRAND LOUD SPEAKER



SUPERHETERODYNE I 8 Tube RECEPTRAD ON DEMONSTRATION him a close race. Neither 2UA nor 2EX is heard occasionally in spite of the fact he is kept quite busy "In my opinion," said Mr. Stone, of the fact he is kept quite busy "the expansion of radio will follow





TO THE LIMIT

LEGO WONDER FIXED DETECTOR REFLEX & CRYSTAL SETS 100% SENSITIVE.

Designed to withstand high.
Plate Voltage.
For Sale by All Dealers or Sent
Destpaid, Insured \$1.00 Lego Corp., 225 W. 77th St. N.Y.C. AJOR GENERAL SQUIRE'S same fifty-watt tube he used over a proposal to modify the year ago, when last heard from. At as hosts to a large group of radio

speed up transmission over wire, filter are in the course of construccable and radio systems has received tion. wide publicity in radio magazines and varies correspondingly by the time That is a record for miles per watt ment of Lewis J. Selznick, where apelement involved. The new plan that will be hard to beat. nodulates CW with a small amplitude to represent a dot, a medium plitude for a space. To employ this is operated by Irving Korenman, of names of which have not as yet been new code, new methods of operating two five-watt tubes in the Hartley pose as one of broad character in the ng apparatus.

If, however, it were to be adopted appreciated. in commercial practice, it would ventually be used by the amateurs, For this reason it deserves general

with stations in all districts, with the gives satisfactory readings. exception of the sixth and seventh, on his small CW outfit. For local

ever. 2CWP is the outstanding figure, while 2KR and others are running

2CMK mourns the loss of a fivemaking the best of it and is heard as before next fall. often as ever on the remaining tube. Apparently it has not decreased his

There is hardly an hour that goes before fall. by without hearing 2CWP. He does some fine work, too, handling a bulk of messages for New York City.

ter employs a single W. E. five-watt amateur stations. FB OM. tube and the necessary apparatus to make it oscillate is arranged in a The policy of amateurs to maintain business and all its patents.

2KK, the former operator at in the Pennsylvania Railroad tests. | nical supervision." WAAM and probably better known to the amateur fraternity by his husky old spark that was used for a of 8BKY was canceled because he number of years, has returned from did not know how to abide by the

accomplished by a Brooklyn amateur, same fate may befall them. Much credit should go to 2CHY, who was heard in France by F 8CS. CHY district but the seventh .- FB OM.

2AVW says as soon as he can get a time in the morning. position he will break forth with a high powered CW set, probably em-

Numerous stations have been hear- Mim. ng WNP, but none that we know of have worked him since 7DJ accomlished it last April. The latest re- is doing reliable work is 2CJ. This port from 7DJ is he has been able to station was opened in Cranford, N.J., radio fans have received stations near him most every night, but has several months ago, and employs two 1,500 miles away they think that this been unable to communicate with him. special fifty watt tubes in a 1DH is the receiving range of their set,

2BMR has increased power again. within the last week, and better re- will give this mileage. This is the This time it is to the maximum sults were noticed almost imme- wrong way to estimate the range of a amateur power. A 500-watt set has diately. just been constructed and arranged in neat order. Good results have been obtained thus far.

standard telegraph code and present sixty-cycle plate supply is editors and other newspaper men on method of current supply so as to used, but a chemical rectifier and the evening of July 15. The guests

or this reason it deserves general amateurs, has recently remodeled his ing system now being established transmitter and is back on the air. 2CTQ has been literally living on tained. Another feature of the Selznick, prominent in the moving the air. He has been handling traffic station is a homemade ammeter which picture world, is president. Samuel

remarkable distances have been cov- succeeded in waking up a number and president of the Radio Trade Asof the old-timers who up to the pres- sociation. ent time had forgotten there was In discussing the future of the new Of the New York City stations not such a thing as radio. WR's own company Warren S. Stone said that much has been heard. However, traf- station is on the air most every the merger had been formed to share fic seems to be moving as well as morning and handles much of the in what he believed to be the wonder-

they both expect to be operating at WJZ. He is still using a five-watt somewhat along the lines of that tube transmitter with a pure DC experienced in the automobile indus-

he was experimenting with his plate you can't keep a good man down, and think of the wonderful comfort and supply. However, he seems to be he probably will be with us again advantage radio is to the shut-ins of

on two-way communication with sta- No foreign stations have been worked The possibilities of radio expansion tions in the fourth and fifth districts. by him during the last few months, are marvelous. but it is hoped he will do so again

west coast stations in fine style. 3Qv over 300 business concerns have Another promising station, located with a single fifty-watt tube. He has conducting a great deal of their corin Newark, is 2CRD. The transmit- also worked a number of foreign respondence by wireless. One of the

neat fashion. An efficient short-wave regular schedules is almost obsolete, "We also shall manufacture vacuum tuner is used for receiving and no but 8CEO is trying to revive it by tubes for radio purposes. Mr. Shaw trouble is experienced in copying all working regular schedules with 4JR will be in executive charge of this

The official relay station certificate Celebrates Fourth Anniversary the South, where he had been winter- rules and regulations of the United

uses only one five-watt tube and has remarkable work with a lone five. Street, has recently expanded so rapbeen heard in every United States watt tube. He may be heard carry-idly that it has been found necessary ing on two-way communication with to enlarge its store facilities. A re-

A comparatively new station that circuit, "S" tubes have been installed and if asked what the range is they

Another station that has not been day time, between 11 o'clock in the heard in quite some time till recently, morning and 4 o'clock in the afteris 2BOO. He is using two five-watt noon. Stations thant can be picked 2CXE, another old-timer, has re- tubes and a good filter system. Prob- up regularly between these hours are turned to brass pounding again with ably this accounts for the reason the ones upon which the receiving new interest. He is still using the this station reaches out so well. range should be based.

New Radio Concern Gives a Party for Reditors

ated General Radio Manufacturing occupied a block of 135 seats at the Globe Theater and enjoyed the pernewspapers. The Squire proposal Either it must be some fellow's formance of "Keep Kool," in which would differentiate between dots and locations or they must be except an amusing radio skit was in roduced dashes by varying the intensity or tionally lucky. SAPR has worked by Johnny Dooleg and makers of continuous wave alternating current, several seventh district stations and the cast. After the show the party whereas the international Morse code was only using an amplifier tube! adjourned to the Park Avenue apart-

The General Radio Manufacturing

The call of 2CV has been assigned Corporation is an amalgamation of mplitude for a dash and a large amto a promising Brooklyn station. CV twelve existing radio companies, the new system would make necessary a 1465 Sixtieth Street, who is using disclosed. It has announced its pur and new types of sending and received circuit with an "S" tube rectifier. manufacture of radio receivers, tubes Reports on his signals will be greatly and parts, and expects immediately to assume an important position in the radio field. Warren S. Stone, president of the Brotherhood of Locomo-2MJ, one of Staten Island's cldest tive Engineers and head of the bank-Only one five-watt tube is used and labor unions, is chairman of the fairly good results have been ob- board of the new company. Lewis J. R. Stone and Henry M. Shaw are vicepresidents. Mr. Shaw is a well-2WR is still laboring hard to keep known figure in the radio industry as work phone is used occasionally and North Jersey on the map. He has head of the Shaw Insulator Company

ful and immediate development of the radio industry.

try. Practically everybody is going to have a radio receiver. It also is We understand that 2ADM is going possible that some day soon every watt tube which went "west" while to quit amateur radio for good. But home will be radio equipped. Just all classes-bedridden and blind people, those temporarily in hospitals, 2GK is still on the job, working cripples, people in isolated communi-DX range as he is still able to carry all districts with his 500-watt set. ties and, more especially, farmers.

"I thought I knew Cleveland pretty well," continued Mr. Stone, "but I was surprised recently to learn Some stations sure do work the when making certain inquiries that has worked twenty of them so far been for some time in the habit of elements included in our merger is the Wireless Telegraph Company, its

and 9DVW. CEO was also one of department, over which Dr. Young the stations that took an active part will exercise engineering and tech-

ing. He is back on the air with a States government and the require- Electric Company, 66 Cortlandt versary in the radio business the Vim fifty-watt tube and has been doing ments of the A. R. R. L. After nu-Street, New York City, announced an merous warnings he persisted in anniversary sale beginning July 12 the short time it has been in opera- transmitting on 100 meters and sign- and continuing for a week. The reing the false call of SXCW. Other sults of this special event were so stations should be careful to observe gratifying that the Vim company has Another remarkable feat has been the regulations, or otherwise the decided to prolong the sale during the current week. This company, 3APV is another station that does business established on Cortlandt which it is claimed was the first radio amateurs at distant points almost any cent innovation in the company's sales department is the issuing of a guarantee bond with every purchase We were rather surprised the other made. The Vim Electric Company ploying a 250-watt tube. At present morning when we heard 9AUC say also reports that its recent advertisonly a five-watt tube with either 110 he was only using a UV-201A and ra- ing campaign in the New York Herald or a spark coil for plate supply is cating one-tenth of an ampere. He Tribune Radio Magazine has prowas loud, considering the power used duced orders from the Panama Canal Both coasts have been worked; too. Zone to Canada as well as in the metropolitan territory.

Receiving Set Range

Because at one time or another set. The proper method is to see how far the set can receive signals in the

Up-to-the-Minute News of Radio in Pictures



Delegates to London advertising convention listen in abourd S.S. Republic

Radio Receiver in Wardman Preparing to transmit nighting Park swimming pool Washington D.C. gale's song from Danish forest

The Radio Telescope—Using an Indoor Loop for Directional Receiving

Coil Aerial Receiver Is Portable, Convenient to Install and Gives Directional Selectivity

By ALFRED N. GOLDSMITH, Ph. D. Chief Broadcast Engineer, Radio Corporation of America

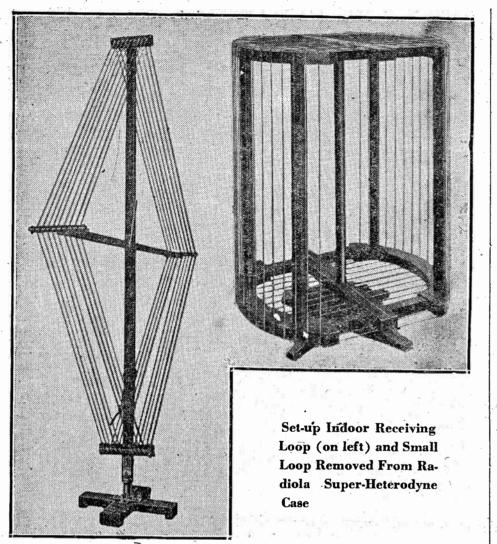
T HAS been pointed out that radio waves are an invisible sort of light waves. They travel outward in all directions from the transmitting station just as the light from a powerful beacon reaches to all quarters of the horizon. For broadcasting purposes this is a great advariage since it enables the radio waves to cover all the territory around the transmitting station practically impartially. (There are some regions around a transmitting station which may be partially shielded from the radio waves by great groups of steel buildings, hills containing metallic ore deposits and the like, but otherwise the waves travel fairly indifferently in all directions and are capable of rendering equally good service at all points which are at the same distance from the transmitting station). It is this feature which gives radio broadcasting its peculiar adaptability for covering an area in contradistinction to wire communication, which, by its nature, is readily adaptable to the connection of two fixed points on land. While it is possible to transmit radio messages, particularly on the higher frequencies or shorter wave lengths, in particular directions, so that they can be received readily only within certain regions or sectors, yet this method of transmission has not been employed up to the present for broadcasting and it is not known whether it would prove practically useful in this field.

Can Receive From Any Point

In view of the way in which radio waves travel in all directions, it is possible for an ordinary receiving station using a wire antenna to receive messages coming from any point of the compass. Every broadcast listener has noted and appreciated the fact that the concerts from cities in all directions can be received equally well on occasion. He has, however, also noticed that messages coming, say, from a land or ship spark station in one direction can easily interfere with concerts on a nearby frequency or wave length coming from a different direction. If one had available a form of radio receiver which could receive messages from a desired direction. instead of being open to reception of messages from all directions, it might be possible to eliminate undesired signals, and net, as usual, by tuning only, but by the use of this directional receiver.

Such a receiver, which would broadly receive messages from a definite direction and fail to-respond at all to messages from some other direction, would be a convenient kind of "radio telescope" and would have interference-reducing capabilities. The simplest form of such a radio telescope is the loop or coil aerial. It consists of a number of turns of wire wound, generally, in square form for convenience and mounted on a frame which can be readily rotated. The side of the square is from about one foot to as much as five or six feet but the smaller sizes are by far. the more convenient. The terminals of the coil are connected in place of the "antenna" and "ground" connection, but an ordinary receiving set will generally not be satisfactory for use with coil aerials because it is not sufficiently sensitive. As a matter of fact, the signal strength which can be delivered by a coil is only a small fraction of what can be obtained by a suitably proportioned antenna system of the straight-wire type, and the difference must be made up by the use of additional amplification in the form of several more radiotrons, since otherwise strong signals

The accompanying drawing shows how the signal strength of a concert received | Accordingly, the simplest way to get | them.



tated. It is supposed that the signal comes from the north. When the loop points north the signal is loud, and as the loop is rotated to the east the signal dies down until, when the loop points due east the signal in a well designed and properly used set of this type has almost entirely disappeared. As the loop is again turned to the south the signal comes back with full strength, to disappear once more when the loop is turned to the west. Three facts are at once evident:

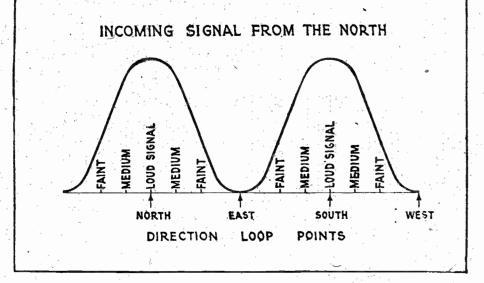
1. The loop receives the strongest signals when it points in the direction of the incoming waves (which, at times, and especially in city locations, may not be the direction of the station which is being received, since the incoming waves may be get rid of the undesired station. swung out of a straight line of travel

by obstacles or reflection). 2. The loop receives little or not at all when it points at right angles to the direc-

tion of the incoming waves. 3. It is possible to tell only the line of location. In steel-frame buildings it is

on a coil aerial changes as the coil is ro- a station loudly, as a matter of practical operation after having picked it up, is to swing the loop until the desired signal disappears, and then to swing it exactly at right angles to the disappearing position. This will be found a little more definite and positive than the more obvious method of pointing the coil by trial in the direction giving the strongest signal. In order to get rid of an undesired station the loop is merely swung until the undesired signal disappears. If the undesired signal comes from a very different direction this method will work; but if the desired and undesired signals come from nearly the same direction, this method of reducing interference will not be effective. Of course, normal tuning is also used to

> The coil aerial receiver has the advantage that no antenna wires need be strung, either outdoor or indoor. This simplifies the installation of the set and enables it to be used in almost any desired



How the signal changes when the coil rotates

direction of the incoming waves from the | advisable to keep such sets near the winscribed that the signals are coming from the north or the south, but one cannot tell whether the true direction is north cr south. Generally this indefiniteness will not cause any practical difficulty.

loop direction, but not the actual direction. dows and not in back of steel columns or Thus one can tell in the case just de- long sections of wall. Stronger signals | given. are generally obtained in the more open locations. Coil aerials also enable portable sets to be readily employed and transported, with minimum delay and inconvenience in setting them up and using

In ordinary antenna sets, because of the different sizes of the antennas employed in various installations, it is not possible to mark on the receiver exact settings for every frequency which will be correct for all users. Using the coil aerial, however, such universally applicable markings or calibrations become possible, with a resulting increase of convenier - in the handling of the receiver.

The coil system of loop receivers may be either external to the set itself or it may be inclosed in the cabinet of the set. A type of rotating loop of high efficiency which is used for external operation with Radiola Super-Heterodyne (and which is also permanently included within the cabinet of Radiola Super-VIII) is shown in the accompanying illustration. This loop is readily rotated by hand manipulation when placed outside the set, or is rotated by a geared control and knob on the operating panel when it is inclosed in the Radiola Super-VIII receiver cabinet. An internal loop, fixed in position, is included within the cabinet of Radiola Super-Heterodyne, and this is the smaller rectangular loop also shown in the illustration. It requires no manipulation. Occasionally the entire set may be shifted slightly to pick up some particular station which happens to be in an unfavorable direction in the usual position of the set. Generally this is hardly necessary.

Loops Get Distant Stations

Another interesting point in connection with loop receivers is that it has been found possible by actual trial to listen to stations many hundreds of miles away, operating on practically the same frequency or wave length as a powerful local broadcasting station by utilizing the difference of direction only. We thus realize not only "tuning selectivity" of the ordinary kind, but also "directional selec-

A few rather curious and interesting effects will be found in the use of such receivers. In the interior rooms of steelframe buildings it will sometimes be found that all signals seem to come from the same direction. The reception is fairly good, but the directions of all signals are the same. This is because the reception is chiefly from the magnetic fields of currents induced by the traveling waves either in the steel or in the electric wiring system of the building.

A nearby wire antenna of considerable length will increase the signal strength on a coil receiver when both are tuned to the same frequency. If the long antenna has with the tickler or intensity control brought well up the scale, it will very greatly increase the strength of the signals on the coil receiver, because regenerative reception actually strengthens the local field of the incoming radio waves.

Coil Receiver Overcomes Fading

Sometimes at night, and particularly in certain country locations, signals from stations roughly a hundred miles away fade markedly and vary rapidly in intensity. When using an ordinary long wire antenna receiver nothing can be done about the fading effect. With the coil receiver, however, it will sometimes be found that when such a signal fades rapidly, swinging the coil approximately 90 degrees to a new position at right angles to the original position will bring the signal back again. This is sometimes a useful way of following the fading effects of an incoming signal, since it has the advantage that it enables holding the signal at a critical moment-for example, when some important statement is being broadcast or when the station signature is being

In view of its portability, directional selectivity and general interest and convenience of installation, the coil aerial receiver or radio telescope is sure to be widely used in modern sets and to have a real sphere of usefulness.

Radio-Equipped Off for South Police Autos Sea Adventure

CHICAGO. Ill.—Having penetrated the Polar regions with MacMillan, men have been caught redhanded by in time to apprehend the perpetratnothing to show the automobiles are reception is used solely, so that the amateur radio is now about to take the radio-equipped police automobiles ors. the opposite extreme and set forth on of Detroit. These new cars, capable \ The automobiles are equipped with to the concealed aerial. The antenna it is broadcast. an adventure in the South Seas.

is preparing to sail from this city in length of 286 meters. E. C. Page, of Evanston, Ill., a young ups, due to their ability to get to trodyne in sensitivity and selectivity an inch thick, and is of bullet-proof p. m. amateur and member of the American Radio Relay League.

Amateur Radio

The selection of Page has been approved by Captain A. J. Dukan, who will be in command of the vessel, following his recommendation by local representatives of the A. R. R. L. He will have for his equipment radio apparatus capable of working on both commercial and amateur wave lengths, including the shorter waves. Page expects to communicate regularly with amateurs. The official radio call assigned to the vessel

From a radio standpoint, much interest is being taken in the expedition, which is being organized and outfitted under the supervision of William Hale Thompson, former Mayor of Chicago. It will offer an opportunity to study the efficiency of the shorter wave lengths in the climate peculiar to southern waters.

The vessel, which has a crew of seven men, will proceed down the Mississippi River, through the Panama Canal, and from thence around the world. It is expected that in addition to operators in the United States, consistent radio communication will be maintained with amateurs in South America, Europe and Australia.

New Zealanders Dance To KGO Orchestra

Although situated on opposite sides of the earth from each other, groups of radio listeners now sway, step and glide in unison to dance music played at KGO. This is shown to-day by letters received at the General Electric Pacific Coast station.

From Waimate, South Island, New Zealand, almost 4,000 miles south of the Equator, comes a letter of appreciation. "Every Sunday evening," writes F. D. Blackwood, "the family dances on the front lawn to KGO music reproduced by our loud speaker. We always look forward to hearing KGO, and there is a disappointed household when the atmospherics are bad," Owing to nineteen hours' difference in time between New Zealand and the United States, music received by the Blackwood family Sunday evening is played at KGO Saturday night.

From the Far North, within fifty miles of the Arctic Circle, another letter has been received. "We have danced to music from KGO on several occasions," writes G. H. Hillman, of Candle, Alaska. "It is certainly great to have dance music carried into the Arctic." Mr. Hillman is the operator of the Candle radi station. "The wireless station installed here this summer," he continued, "is a new thing to people in this section. Most of them have not been outside for twenty-five years and it is hard for them to realize that KGO voices and music come from a distance of over 4,000 miles."

Station WHAR on the Air Station WHAR, Atlantic City, N. J., placed its initial concert on the air June 26. The station, owned and operated by the Seaside House, of Atlantic City, has been experimenting for over a year with a small transmitter to determine the success of radio at the shore. The result was so gratifying that the present equipment was installed-a 200-watt Westinghouse type transmitter, licensed

under the patents of the American Telephone and Telegraph Company. The wave length has been raised from 231 to 275 meters. Remote controls are to be installed in the city so as to broadcast events that have made the resort famous.

WHAR bears the distinction of being the only radio tation in Atlantic City. The following is the daily program, except Sunday and Wednesday afternoons: 2 to 3 p. m., instrumental music, Seaside House orchestra; 7:30 to 8 p. m., market reports, press news, etc.; 8 to 9 p. m., instrumental music, Seaside House orchestra; dance programs, late concerts and special features to be announced.

Catch Hold-Ups police headquarters was promptly broadcast by radio to the police cars, the other local broadcast stations service twenty-four hours a day. Three separate gangs of hold-up at the scene of the attempted crime From outward appearances there is justed to station KOP. Loud speaker

of a speed of eighty miles an hour, special five tube neutrodyne receiv- consists of four wires stretched back are in constant touch with the police ers installed in the back of the front and forth inside the automobile top, The auxiliary ketch, Big Bill, which broadcasting station KOP on a wave seats. The aerial is concealed in the which is of the touring car type. the interests of the Deep Waterways | The automobiles are remarkable in car acts as a counterpoise ground. long. The receiver is fastened per- Symphony Orchestra, will direct the Commission on a two-year trip that many respects, and were designed The neutrodyne system was adopted manently in its compartment back of New York Philharmonic Orchestra as will ultimately take it around the Since their advent they have practiworld will have as it and the batteries are guest conductor in the concert as guest conductor in the con world, will have as its radio operator cally put a stop to all forms of hold-showed the superiority of the neu-

the scene of a crime within a few under the difficult circumstances in glass. Two gun-racks are installed

minutes after receiving the broad- volved. The neutrodyne receiver in the cars fitted on the heel-boards cast from KOP. In each of the three tested successfully went down to the above instances a telephone alarm to low wave-lengths and gave clear, off shot guns are carried in them.

unusual in any manner. This is due crew can hear an alarm immediately

Fritz Reiner at WJZ

permanent top, and the body of the Each of these four wires is nine feet mous conductor of the Cincinnati



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cation factor, which means much louder signal strength than the average tube. Operates equally well for radio or audio frequency amplification.

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FANSTEEL -

The charger may be used while the radio set is in operation. Without added attachments it may also be used to charge "B" storage batteries.



Distance Indoor Loop Receiver, with Self-Contained Batteries and Loud Speaker.

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tuner—the most efficient type of tuner made. It is 180° nonradiating, wound with Litz wire on genuine Bakelite forms. Only six wires to connect and NO

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because—



The Type 620 Coupling Unit has been designed to work with maximum efficiency when used with the Remler Transformers. Remler Super-Parts are designed to give maximum efficiency when used with the C-299 Tube. Remler Super-Parts require no stabilizer.

Dealers who have stocked Remler Super-Parts report a decided jump in sales. Dealers who are not yet acquainted with this business booster line will profit by getting in touch with the following distributors:

SPARTAN ELECTRIC CORP. 99 Chambers Street

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R. H. McMANN, INC. NOYESELECTRICALSUPPLY CORPORATION



Type C-301A V Price \$5.00

O the person contemplating the purchase or construc A tion of a radio receiving set, selecting the most effi-cient, or the one best suited to his individual requirements may prove a perplexing task.

In the selection of vacuum tubes however, even the veriest novice can be full insured against error by insisting upon standard tubes of known origin and established reputation.

Cunningham Radio Tubes are standard for every make and type of receiving set. They are the product of the most advanced research and experimental work by the engineers of the Research Laboratory of the General Electric Co.

There is a type of Cunningham Tube for every radio use. Your dealer will advise you the proper type for your receiving set.



If you want to buy, sell or exchange your radio sets or parts the Radio Exchange will

Radio Notes From England Municipal Station

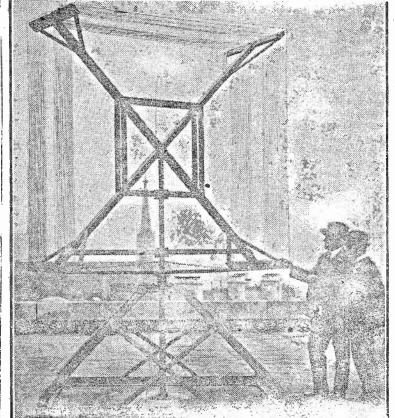
LONDON the existing methods that it fur-

NE of the largest wireless in Europe has just been put up on the roof of the tower of the handsome Bush of the huge outlay they involved, New York Herald Tribune are lecated. expenses." it has been erected by the United doubled the demands of the govern-States Shipping Board to conduct its ment's critics that it should say what ousiness between London and the it is going to do about the buge

The loop was designed by R. E neighborhood of £600,000, but if Redmond, shown in the photograph Marconi is correct, the system to be with his beloved aerial. Mr. Red- installed there is out of date and mond is European Radio Supervisor of the United States Shipping Board.

The Prince of Waler's speech before The aerial is eight feet by eight the Dominion Day die so at the Hotel

the money thrown away.



all 1,536 feet. The receiving appar atus consists of nine valves and messages can be received from places 8,000 miles away.

The most talked of radio event of the week in London was Senstor Marconi's speech on the possibilities of his "beam" system in the rooms

(1) Low power and inexpensive tations (short waves) will maintain firm in Philadelphia direct high-speed services with the the policy of this new state most distant parts of the globe

as only stations within a restricted angle of sector of the beam receive. this gives a comparative secrecy bith: are in New York Musicians of nore erto unobtainable.

in telegraphic rates.

tion at Poldhu, Cornwall, on a 9z. the station's programs will be govern meter waves (21 kilowatts) signaled erned entirely by the letters received so clearly to Buenos Ayres-6,820 from the radio audience nautical miles—that the Argentines | Mr. Gimbel stated in an interview talk of equipping the new system as that to his knowledge there was no able to do in six hours more than station now in operation that was in twice what their present super-nower station can do in twenty. And on ax to grind, that governed programs May 30, when for the first time in- by letters received, or which opened telligible speech was transmitted the studio and operating room to the from Poldhu to Sydney, Australia, public. This is the kind of station the wave length was only 92 and the the new one will be

power 28 kilowatts, though Sydney ... 189,000 wave lengths distant. Marconi's right-hand man, says "to-Marcon's right-hand man, says we erators, control panels and the trans-international Radio Week, an event power of, say, 1,000 kilowatts, will mitter itself will be inclosed in glass. which will be recognized in Great power of, say, 1,000 knowatts, will be a competent radio man which will be recognized in Great give way to one that will have a There will be a competent radio man Britain, France, Australia, Canada maximum power of only about 2f on duty to explain the working of and Cuba. kilowatts. It is obvious that the the transmitter and the function of cost of power alone is a matter of its various parts. very material importance. My company has no intention of building any more high-power stations. Accord. if necessary it can be increased. The famous books by "C. N. and A. M.

turns of aerial wire, measuring it no only lucky for you that I am no woody of northern Michigan, the those before his " at it is lucky for case a the merupuone. His first apthose who are istanting in."

Gimbel Bres. No

The New York store of Gimbel Four main advantages were claimed under the direction of Ellis A Gimby the inventor of the wireless for bel ir. which because of the direchis short-wave directional wireless tor's experience in broadcasting and tion WIP, owns ' and operated by it

nost distant parts of the globe an annovation and income state of the globe.

(2) Far more words can be sent by It is to be a part of the state of the globe. them daily between England and the tion in every sanse of the Peter Scattle Wash July 28 and 29; Portmost distant parts of the globe than ple of all classes are to thoughto by the previously planned powerful call before the microphone and expensive stations.

(3) The system is directional and gardless of creed or political pile. world will be heard whenever they will also broadens. The new station (4) The economy in cost, small will be open for public school

ower and high-speed working should bates, for young musicians to must make possible a substantial reduction their debuts-in short, for any one having something to say or do than In the early part of June the sta is of interest. Last, but not least

realty a public station that had no

The studio and transmitting equipment are to be on the eighth floor of the Cambel New York store and will ond radio anniversary the Capitol be open to public inspection. Gen. Theater will take an active part in

The power of the station will be sufficient to cover a wide range and who is known to every reader of the ing to our present view, our maxi- transmitter is constructed by the Williamson," will deliver a radio talk mum high-power stations will not Western Electric Company. The wave through Station WJZ on Tuesday exceed 25 kilowatts. The cost, both length to be used is 316 meters. It night, commencing at 10:15 o'clock. in respect of capital and mainter is expected that the station will be Her subject will be "Europe's Playnance, is so markedly less than under in opration in about four weeks.

Announcers

Radio fans in this city will soon ecome acquainted with the voice of Washington friends as the man who Building, in which the offices of The both in establishment and running "put the voice in The Voice of the The Senator's revelations have rethusiasts in Washington and the ieen appointed assistant program disuper-power station it is erecting at rector at New York's new municipal Rugby. The station will cost in the tation WNYC.

Lum will "sign off" at the Wash cton station for the last time at he conclusion of Tuesday night's rogram and begin his new duties in Yew Vork at WNYC on Friday With him comes George Oliver, a member of the operating staff at WRC. Olier will join the engineering force at

Entering the radio game in its pioer days as an operator at old staion WJZ in 1922, when it was losted in Newark, N. J., Lum has gradally climbed the ladder of success ind will take over his more responsible position at the New York municial station with the experience of a eteran. When WJZ was moved, in lay, 1923, to Acolian Hall. New York, am went along to do the announcng. Shortly after the opening of as transferred there, and has since hat time he'd down the dual job of enior announcer and publicity repre

The return of Lum and Oliver to ew York will mark the reunion of a riumvirate of former members of he stoff of old WJZ in its early days Newark. Thomas H. Cowan, with hom Lum and Oliver worked at the d Newark station, is now superindent of broadcasting at WNYC.

- Wendell Halls on

Radio Honeymoun Tour Mr. and Mrs. Wendell Hall, the side and bridgeroom of the radio edding on June 4 last, the simplicity and sincerity of which over 4,000,000 e-ple enjoyed.
Following a month's outing in the

sing to make a long steech, he told Everrendy Red Head is answering the pearance a radio since the wedding was a Station WLAG, Minneapolis.

This was the first stop on a honeyo to radio to be that will take the opular entersainer and his bride Similar through the Canadian Northwest, the Pacific Coast and Hawaii, Mr. Half still is ones contract with the Na-

ach of the radio territory which he

w tol Theotor's Anniversary Durin Radio Week . observed November 23 to 30, cording to announcement by the ational Rad . Trade Association. i mark the second anniversary of broadcasting activities of the ap tol Theater, in this city. On Nom'er .5. 123. Richard Strauss's Sin Heldenlesen" was broadcast by ne Capitol Grand Orchestra, this beog the first time in the history of anio that symphonic music was roadcast direct from any theater ince that time radio entertainment as grown beyond all expectations, and "Roxy and his Gang" are now

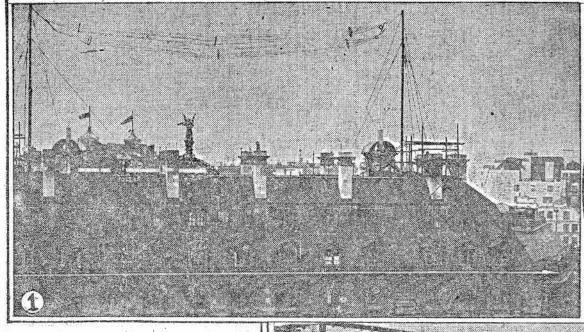
Noted Author at W17.

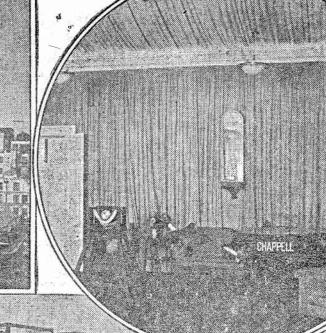
Alice M. Williamson, the "A. M." ground."

Broadcasting Is On a Sound Commercial Basis in Great Britain

The B. B. C. Pay Seven and One-half Per Cent Dividend

By CAPT. H. DE A. DONISTHORPE





fore the public of Great Britain some twelve months after this wonderful application of the science of wireless telegraphy had commenced entertaining the United States of America.

The British government, however, soon realized the infinite possibilities and potentialities of this new method of distributing intelligence, and the result of its perception was to place this science of broadcasting under the control of the

It is an undisputable fact that British broadcasting gained most valuable assistance from the experience obtained by the early broadcasting here in the States and efforts were made to combat the difficulties which were encountered during those early days in the life of this new form of public entertainment. After due consideration and discussion

originating in various conferences held by the government departments and interested parties, it was decided to place the care of establishing a service in England in the hands of a commercial company, known as the British Broadcasting Company (B. B. C.), which was to be directly under government control.

Since the advent of wireless all commercial radio has been in the hands of the British Postoffice and the wireless amateur was also under the care of this office. This department works directly under the jurisdiction of the Admiralty as far as radio matters are concerned, in order to prevent any interference being caused to the wireless service of the navy.

THE B. B. C.

The B B C. is composed of interests from six of the largest radio and electrical corporations of Great Britain, which naturally supply the installations.

At present eight transmitting stations have been erected at different points over the whole of Great Britain, which are so located as to insure that there



All of these stations can be connected together by telephone so they can all broadcast one program at once. This latter feature was found particularly useful when His Majesty King George V opened the Empire Exhibition at Wembley, as his speech vas broadcast from all eight stations simultaneously, thus enabling all those of his subjects in England, in possession of radio sets, to hear

The B. B. C. has, in addition to these eight main stations, one or two minor relay stations which work directly under the control of one of the large stations, with which it is connected by wire, and broadcasts the same program as the master station. This insures areas not served efficiently by the main station of being able to obtain a permanent service, which it would not otherwise be able to do owing to some local effects of screening or blind spots.

The map shows how the stations are located in England.

Naturally the first station to broadcast in England was installed at the capital in London. This station was located at Marconi House, Strand, and was allocated the now famous call letters 2LO (Fig. 1). The illustration shows the aerials on the roof of Marconi House, behind which can be seen the statue located on the top of the Gaiety Theater, and behind that again are noticeable the two flags. on the government building, Somerset House, flying at half-staff in respect to the late President Woodrow Wilson, the Stars and Stripes alongside the Union Jack, the photograph having been taken shortly after the death of the former Presi-

fray the initial cost of the transmitting stations, their upkeep, and last, but not by any means least, the program. This difficulty has been overcome in rather a subtle manner which does not rely on fees accepted for advertising over the radio, as no such form of publicity is permissible.

The scheme for supplying the funds is briefly as follows:

Every person who is in possession of radio set must take out a receiving license from the postoffice authorities. This license costs about \$2 per annum, and a portion of the money so collected is handed over by the government to the British Broadcasting Company, while the remainder is maintained by them for overhead charges and costs of inspection to sets which are periodically carried out by their officials.

This sum alone would in itself be insufficient to cover all the demands on the British Broadcasting Company's purse, and a further scheme is in action where all the sellers of broadcast receivers pay to the company a small license fee on all apparatus sold. The apparatus sold all bears the company's seal, embodying the three letters B. B. C.

This is not, as might appear at first, a hardship to the seller, for as long as a broadcasting service is maintained the radio merchant will always have a market for his apparatus, which includes conrangement has proved a great success, and after only running for about eighteen months the British Broadcasting Company has been able to show a good profit, even to the extent of paying its shareholders a 71/2 per cent dividend on their invested capital.

This fact alone is sufficient to indicate the wonderful impetus which broadcasting has received in Great Britain; and it will be noticed by any traveler on the English railroads that there is hardly a house now which is not adorned with a wireless antenna. The thought that the science of radio has been brought within the reach of all through the agency of broadcasting must give a vast amount of pleasure to the inventor of radio. Senatore Marconi. and having due regard to the rapid progress of this art one hesitates to prophesy. where its usefulness will stop.

English Stations

Aberdeen	ZBD	495 B	lete	3
Birmingham	5IT	475	46	
Bournemouth	6BM	385	· df ·	,
Cardiff	5WA	851	· #	
Glasgow		420	65	
London		265	44	•
Manchester		375	46	
Newcastle		400	M	
		<u> </u>	100	:

microphone is of a special design and it cient funds would be forthcoming to de-

this standard pattern, but is of an experi-

Figure 2 shows the interior of the studio at 2LO, which, it will be seen, is quite spacious. The microphone peculiar to the British Broadcasting Company is located in the center of the room, a closeup of which is shown in Figure 4. This

say that they are of the usual design of radio telephone embodying one or two special features to take care of the variety of acoustics which the microphones are called upon to handle. "From what source does this British broadcasting company derive its income?" This will be one of the first questions

will be seen, is suspended on a thick

wadding of felt in order to take up any

There has been evolved for the use at

some of these transmitting stations a

standard transmitter capable of handling

6 kilowatts. The actual apparatus em-

bodied in this 6 k. w. instrument is shown

in Fig 3. The panels from left to right

are as follows: First, the rectifying

panel; second, the main drive, then the

master oscillator, and, last, the modu-

lating panel. Stations of this type are

installed at Bournemouth, Cardiff, Glas-

gow, Newcastle and Aberdeen; the station

at London (2 LO) is, however, not of

mental nature where new suggestions and

It is not intended in this article to go

into the actual technical description of

these transmitters, but it will suffice to

undesirable vibrations.

inventions are tried out.

of this article. It certainly was a problem that required much discussion when this service was contemplated, as it was difficult to ascertain or foresee from whence suffi-

which will present itself to the readers