

Tuned Bridge Set Construction Det.
Gold Cup Standing; KFRU in Pictures

Radio

EVERY
WEEK

PROG
DIGEST

REG. U. S. PAT. OFF.

Vol. XIV

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SATURDAY,

SENDS POWER BY RADIO?

NEW TRANSMITTER AIRS VOICE OF DIXIE

WSB DEDICATES PLANT IN
LARGE ATLANTA HOTEL

Pioneer Georgia Station Grows from
100 to 2,500 Watts Since
1922 Opening

ATLANTA, Ga.—The Atlanta Journal's third transmitter, an entirely new type of Western Electric station, was dedicated formally at its palatial new quarters in the seven-million-dollar Atlanta Biltmore hotel, Monday, July 13.

Beginning in the spring of 1922 with a homemade 100-watt plant, the first newspaper station in Dixie, WSB, was equipped with the second 500-watt Western Electric transmitter in America in June of the same year and figured prominently as a pioneer trail blazer of the ether.

The new installation gives the "Voice of the South" a power range of from 1,000 to 2,500 watts and is reported to embody refinements in modulation, keenness and clarity heretofore unknown.

The premier broadcast was a gala affair in which every civic interest in Atlanta took part. The governor, mayor, chamber of commerce, musicians' union, fraternal orders and a battalion of nearly 300 entertainers, who have helped maintain WSB's three-year service, joined in the

(Continued on page 6)

Another reason why we look forward to vision by Radio is Frances Reynolds (center), a Ziegfeld "Follies" beauty who took part in WGCE's opening program.



IMPOSSIBILITY NOW BELIEVED A POSSIBILITY

Italian Invents System

Makes Use of Unexplored Wave
Band—May Revolutionize
Future Power Industry

Electric trains without third rail or trolley! Ships propelled by power from shore, and electric power available in the wilderness where it is impossible to run wire lines!

These are the almost certain results from the experiments of the Italian scientist Midali, who has had favorable results in endeavoring to transmit electric energy via wireless. That this work of many years has more to it than usual and is capable of commercial development is evidenced by the fact that the department of commerce had a report of the tests translated from the Italian and forwarded to Radio Digest.

Pioneers in Unknown Field

To accomplish this long desired result it was necessary for Signor Midali to work with wave lengths and frequencies never before attempted by the scientific world, and listed as unknown and unexplored.

(Continued on page 2)

Left, Edwina LaMonte Burchett, heard frequently from the Chicago stations, KFW and WQJ. Below is Marie Provost of movie fame, snapped recently at KFWB.



CONSENSUS OF OPINION VOTE

Send to Radio Digest, 510 N. Dearborn Street, Chicago
To be forwarded by Radio Digest to the Department of Commerce for the attention of members of Congress.

- 1. Do you want less class B (500 watts or more power) stations?
2. Shall B stations be reduced to 94 in number, so that they can be accommodated satisfactorily in the "ether roadways" now available for the use of broadcasting stations?
3. How far away, approximately, is the nearest class B station?
4. Are you troubled by B stations heterodyning and interfering with one another?
5. Have you read a description of the Kintner plan?
6. Are you in favor of it or some similar plan which will help clear the air of the present "traffic" congestion?
7. Do you favor the appointment of an unbiased, non-partisan broadcasting control board for the settlement of all differences pertaining to broadcasting and the interpretation of present or future Radio legislation?
8. Include separately a list of five stations you like most and five you dislike most.

How many members in your family? Name
Address
Are all of the same mind as yourself? City, County, State.
(7-18-25)

McNAMEE DOUBLES LEAD OVER GEO. HAY

TOPS GOLD CUP LIST FOR 3RD CONSECUTIVE WEEK

Other Contestants Would Help McNamee But Editor Rules This Unfair

With the coming of hot weather the 1925 Radio Digest Gold Cup race is becoming hotter with the leading contestants nearing the last turn to dash down the stretch to victory for and the title of "World's Most Popular Announcer." Graham McNamee hangs on to top place, having more than doubled his last week's lead over George D. Hay.

A concentrated effort in the East has kept the "Sage" in the lead for three consecutive weeks, but there is no telling how many votes are apt to come out of the great open spaces west of WLS towers to pull the "Old Judge" through when the leaders turn into the stretch.

McNamee has 27,861 votes and George Hay has 21,346, the easterner's lead being 6,515 votes. Will the Central West nose out the East in the final spurt or will a black horse come up from below with a lot of bonus votes and beat the present leaders to the wire?

They Still See-Saw

Faithful down the list the first change to be noted over last week's standing is where "Bill" Hay jumped over Lambdin Kay into the eighth position. Other changes show N. Dean Cole and Barnett again changing position down at eleven and twelve, O. E. Becker passing Robert Emery at the fourteen-fifteen mark, and Jerry Sullivan coming up from the field to take "Uncle John" Daggett's place at sixteen.

That Graham McNamee has some ardent supporters in the list of leading announcers is shown by the efforts of two of these, Stanley Barnett of WOC and Robert E. Emery of WBEI, to withdraw from the contest and have their votes credited to the WCAP favorite. But this cannot be done. It would not be fair to the listeners who have already cast their ballots for Barnett or Emery. Perhaps these listeners might not desire to cast their votes for McNamee for second choice. Their next choice might be George Hay, Gene Rouse or still some other candidate.

For that reason it will be necessary to keep the names of Barnett and Emery in the contest. Those votes cast, or any future ballots made out in favor of these two men, must stand. If their friends wish to support Mr. McNamee, their future ballots must be so marked. So rules the Gold Cup Award editor, in whose hands all such decisions rest.

Standing of Sixteen Leaders

The standing of the sixteen leaders, with the total number of votes accredited to date, at the close of the week is as follows:

Table with 3 columns: Position, Name and Station, Votes. Lists top 16 contestants and their vote counts.

How to Vote and Get Bonus

Don't miss a single ballot, for when these are turned into Radio Digest in a

group of CONSECUTIVE numbers, extra bonus votes are allowed the announcer for whom you are voting.

The ballots, top of page two, numbered consecutively, will appear in each issue of the Radio Digest until the close of the contest, with the August 22 number.

Each of these ballots will count for one vote when sent in separately. You can hold these ballots until you have 4 that are consecutively numbered, and when they are sent in a bonus of 8 votes will be allowed for your favorite announcer.

For each 8 consecutively numbered ballots your candidates will receive a bonus of 20 votes. For each 12 consecutively numbered ballots, 30 votes. For each 16 consecutively numbered ballots, 40 votes. For each 20 consecutively numbered bal-

lots, 50 votes, and for each 22 consecutively numbered ballots, 60 votes bonus will be allowed.

Send nominations or ballots to the GOLD CUP AWARD EDITOR, Radio Digest, 510 N. Dearborn St., Chicago.

Gen. Lord Reads Radio Policy

WASHINGTON, D. C.—General Lord, director of the budget, now has before him the government Radio policy as drawn up by the Interdepartmental Radio advisory committee. Some changes have been suggested by General Lord and these have been made. It is expected that the general policy will be brought to the attention of the president for the issuance of a proclamation or such other action as he sees fit.

CONTENTS

Radio Digest, Illustrated, Volume XIV, Number 2, published Chicago, Illinois, July 18, 1925. Published weekly by Radio Digest Publishing Company, 510 N. Dearborn Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign Postage One Dollar additional; single copies Ten Cents. Entered as second class matter at the post office at Chicago, Illinois, under the Act of March 3, 1879.

List of contents including: All the Live News of Radio, KFRU, "The Voice of Oklahoma", Advance Programs for the Week, An Evening at Home with the Listener In, Editorials, Recent Advances in Tuned Radio Frequency Amplification, A. B. C. Course in Radio Fundamentals, Portable and Phonograph Super-Heterodyne, Simple Short Wave Receiver, Directory of Radiophone Broadcasting Stations.

Looking Ahead

A Low Cost Filament Lighting Alternating Current Power Unit, for reflex sets and amplifier tubes, can be built cheaply and easily if the directions of William D. Cope, to be given next week, are followed. This article is complete in one part and should be of interest to many set owners.

Encasing the Portable or Phonograph Super will be described by Mr. Ryan in his third and concluding article next week. He will also tell how to arrange the loud speaker horn and operate the set.

WKRC, Kodel Radio Corporation, Cincinnati, is one of the few stations which use two waves alternately. Starting originally as 8MB, it was a pioneer in Radio-casting. Read about its staff and history and see it pictured in next week's issue.

Five More Ballots and Who Will Win? Can George Hay regain his lead in the Radio Digest Gold Cup Award standing? Will he be crowned king of announcers for 1925 as well as 1924? Or will Graham McNamee earn the title? Predictions cannot safely be made. Watch the weekly standing.

"Damped" and "Undamped" Waves were terms more often heard previous to the great increase in Radio popularity as a result of broadcasting. Damped waves were the first used. Undamped are used by the broadcast stations. Professor Moreton's "A B C's" will tell more about waves next week.

Newsstands Don't Always Have One Left

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher Radio Digest, 510 N. Dearborn St., Chicago, Illinois.

Please send enclosed check M. O. for Five Dollars (Six Dollars for One Year's Subscription to Radio Digest, Illustrated).

Name
Address
City State

SEND POWER BY RADIO

(Continued from page 1)

Apparatus for measuring such minute wave lengths has been unknown and there were no pioneers before him to leave precedents on which to work. Such science, however. When the known phenomena fail to produce the desired end, the trained mind goes out to new fields in search of the solution of a problem.

As any Radio listener knows, the programs are sent out on invisible currents with wave lengths between 200 and 550 meters long. Other Radio transmission is carried on with wave lengths down to 50, and even, occasionally, 5 meters. Recently it has been found that Radio waves can even be propagated at fractions of a meter length.

Band Explored by Midall

A centimeter is 1/100 of a meter, and we find that when waves get down in length to 2/100 of a centimeter, color is reached known as infra red. The human eye cannot see this color, but scientific apparatus proves its existence. The waves between 38/1,000,000 and 73/1,000,000 of a centimeter register on the human eye as the colors from red to purple and, when slightly shorter, are known as ultra violet. This brings us to the known region of waves around one millimouth of a centimeter long in which Midall has made such important discoveries.

To quote from the Italian's own report as translated by the department of commerce:

"The result obtained is that of transmitting electric energy in the form of alternating current, without excessive losses, but in reality the electric energy is not transmitted as such. The system transforms the electric energy emanating from any source in the form of alternating current, at frequency and tension (voltage) generally employed in industry, into very short electromagnetic waves of about 1,000,000 of a centimeter."

Now the important points in that very concise statement are "without excessive losses," which implies that practically all of the radiated energy arrives where you wish it, and "at frequency and tension generally employed in industry." This latter wording suggests that plain ordinary house lighting current of 110 or 500 volts is utilized.

Not Exactly Like Hertzian Waves

Reading still further in his report we find, "these waves must be of about the size of light waves, and have nothing in common with the Hertzian waves used for Radio communication. These waves, that ought to be called vibrations of the electrons, constitute the means by which the electric energy is transmitted to a distant receiving system, which in turn transforms them into electric current of identical characteristics of that used by the transmitting system."

Midall is correct in his belief that, at these short wave lengths, the transmitted movement might better be called vibrations, because it is doubtful whether, at the unheard of high frequencies employed, there would be any great movement of other particles out of their positions. The transmitted energy would pass more as a vibration of the individual particles making up space rather than as a wave motion involving an up and down movement of the particles above and below their normal stationary position.

Simple Analogy Explains System

To make this clearer, imagine a small lake whose surface is covered with a single layer of oranges tightly packed together. Now, if a wave is started at one side, the oranges will move up and down, but will still be in the same position after the up and down movement has passed. That is equivalent to Radio.

(Continued on page 6)

NEWS BRIEFS FROM THE BROADCASTERS

'KING OF IVORIES' BACK ON AIR ONCE AGAIN

"Roxy" Tours Canada.—Ash is Regular KYW Feature.—Duncan Sisters Are Home

Harry M. Snodgrass, famous "King of the Ivories," who was formerly heard from Station WOS in Jefferson City, Mo., was again heard over the air on June 26. Snodgrass has been signed up by the Keith vaudeville circuit for two years with the stipulation that he was not to broadcast with the exception of a few specified times. He was heard from Station KFJE at Marshalltown, Iowa.

Charlie Wellman, announcer and entertainer at the movie station, KFWE in Hollywood, is making a series of Brunswick records of his songs that have proved so popular via the ether route. His friends will now be able to enjoy his singing from the discs as well as over the air.

"Roxy and His Gang," which is the familiar title given by thousands of Radio fans, throughout the country to S. L. Rothafel, and his group of broadcasting artists of the Capitol theater, are away from New York on a three weeks' tour of the Province of Ontario as guests of the Ontario government. They are broadcasting in Toronto.

Two new members have been added to staff of WIBO, Nelson Brothers, Chicago. Joe Allabough, with his ukulele, and Carl Linner, pianist are the new men. Mr. Allabough, although a new voice on Radio, has already gained a multitude of friends and admirers. Mr. Linner, has already been heard over Chicago stations.

A summer feature of Westinghouse Station KYW, Chicago, is the broadcasting of Paul Ash's entertainment right from the stage of McVickers theater each Wednesday and Friday evening.

Paul A. Greene, manager of Station WSAI, the United States Playing Card company, Cincinnati, is arranging to broadcast a series of talks by leading golf professionals. The "pros" will inform the Radio audience of the intricacies of the ancient game. They will tell how to whale out 300-yard drives, sink 40-yard putts and virtually everything about the sport, save how to find lost golf balls.

A "Welcome Back to Chicago" reception was given to the Duncan sisters, Topsy and Eva, on Monday noon, June 29, at Westinghouse Station KYW, at which time they made their greetings to the Radio fans with whom they became endeared during their daily broadcasts over KYW on their last Chicago engagement.

KSD is broadcasting from the Garden theater each Tuesday night beginning at 8 o'clock, Central time, and sends out the entire performance, music and dialogue, each time. A special broadcasting "hut" has been erected off stage at the theater for the apparatus and announcer, and in cases where the action is not accompanied by words a running description is given by the announcer at the same time the music is being broadcast.

Edwin Goldman, conductor of the famous Goldman Concert band, has made elaborate arrangements in order that the concerts may be broadcast from WEAF, New York, in the event of rain, which would otherwise prevent any concert or audience. After prevailing upon New York university, on whose campus the summer series of concerts is being given, Mr. Goldman secured consent to use the gymnasium building in case rain should fall.

Restore Old Station 2LO for Use in Emergencies

LONDON.—The old transmitting apparatus of Station 2LO at Marconi house here, which was partially dismantled when the change over to the aerial on Selfridge's department store took place, has now been restored as a precautionary measure against any breakdown such as recently when the London station, thrice went out of commission, depriving listeners in the metropolis of Radio entertainment.

Remodel WKRC Studios

CINCINNATI.—Work has been started on the new WKRC studios at the Kodel Radio corporation here. These will include orchestration, solo, lounge and reception rooms in the new \$5,000,000 Hotel Aims on Victory boulevard.

Mystery Tenor Adds Soprano to Mask Act

NEW YORK.—"The Silver Masked Tenor," the mysterious soloist with the Silvertown Cord orchestra, will soon be assisted by a coloratura soprano. This artist is a newcomer, not only to the Radio audience, but also to Mr.—almost let the cat out of the bag that time—her father, who was introduced to her for the first time on June 29.

Although only seven pounds in weight, this little soprano possesses a voice so powerful that helpful neighbors suggested that the "silver mask" be used as a muffler to produce a "blessed golden silence." Everybody knows how temperamental these sopranos are, even at such a tender age.

The proud father from now on will be heard in "Everybody Loves My Baby, But My Baby Don't Love Nobody But Me," as a feature of the Silvertown programs from WEAF and the usual chain of stations.

WWJ Uses New Transmitter

DETROIT.—WWJ, the Detroit News station, is now on the air with latest type Western Electric 1,000-watt transmitter. The News station, the pioneer newspaper broadcaster of the world, is rated as one of the best due largely to the very high class programs scheduled by E. L. Tyson, program director.

Natalie Brigham (below) becomes bride of G. C. Arnoux (right) after Radio romance. (Mrs. Arnoux photo by Shrader, Little Rock)



"HOODOO thirteen" holds nothing but charms for G. C. Arnoux, director-announcer of the New Arlington hotel, Hot Springs, Ark. Station KTHS, December 13, last year, was the date KTHS took the air in its initial unannounced official test. The test was highly successful on the air and in other ways. The principal performing artist, Miss Natalie Adeline Brigham, violinist, was a visitor from Wauwatosa, Wis. She enjoyed the distinction of sending out the

PLAYS SAXO'S WAIL FROM GLOOMY JAIL

MINNEAPOLIS, Minn.—While Paul Biese, famous Victor artist, was booked to appear at WAMD here, he had to go to jail for not paying his wife something like \$8,000 back alimony. The management of the station overcame the difficulty by running remote control lines to Biese's cell in the Ramsay county jail and at the appointed hour Paul played "Sobbing Blues" on the saxophone so as not to disappoint fans.

NEW DIRECTOR



WEAF OPERA MAKES BIG BROADCAST HIT

'WORTHY OF FINEST OPERA HOUSE' WRITE FANS

Seven Station Chain to Air "Norma" Pronounced Ideal for Radio Use

NEW YORK.—Music lovers of the audience of WEAF have written to say that they consider the productions of the WEAF Grand Opera company worthy of the finest opera house, and that these weekly tabloid versions fill the long-felt void which usually occurs during the summer between the regular operatic seasons.

After hearing their presentation of "Samson and Delilah" on a friend's Radio set, a celebrated music critic and composer enthusiastically telephoned WEAF to say he never realized musical features of such high quality were "on the air."

Seven Station Hook-up
On Tuesday evening, July 21, at 10 p. m. Eastern daylight saving time, Mr. Cesare Sodero, who has been so successful in conducting the previous presentations, will direct "Norma" in the studio of WEAF. Besides the New York station, WEAF, Boston, Mass., WFI, Philadelphia, Pa., WCAB, Pittsburgh, Pa., WGR, Buffalo, N. Y., WWJ, Detroit, Mich., and WCCO, St. Paul-Minneapolis, Minn., will broadcast it.

Features Clear Simplicity
Those who weary of the declamatory modern opera in which the music is constantly changing in agreement with the most swift and subtle moods that emotion throws upon the stage, at the expense of clearly defined melody, will have no quarrel with the simplicity of Bellini's opera, "Norma." The technique of the work is that of the older Italian Opera School, in which airs and ensemble numbers, based on the simplest harmonic and melodic architecture, are plentiful enough. This does not mean, however, that emotional quality is absent, or even meager; and such numbers as "Casta Diva" or the duet in the final scene are remarkable for their sincerity of emotional expression, notwithstanding their clear simplicity of style.

FIND STATION SILENT AND RECEIVE PRESENT

WHAS to Keep Air Busy on Third Birthday

LOUISVILLE, Ky.—In order to prove its right to the slogan, "The Snappiest Radiophone Station in the United States," WHAS here is offering a book of "Foster's Ten Best Songs" to all persons writing the station that they caught the station's microphone silent as long as four seconds during its third birthday program which takes place between 7:30 and 9 Saturday, July 18. Accidents on account of thunderstorms and unavoidable breakdowns are to be counted exceptions.

The book has been prepared especially for WHAS and any little slip in the program may mean the payment of several thousand books. However, the station officials are sure they can put the show over without a hitch and like all true Kentuckians are willing to take a chance.

Governors' Conference First WCSH Broadcast

PORTLAND, Me.—A new broadcasting station entered the New England field when this city was first heard from on the air, on the occasion of the recent governors' conference here.

This station has the call letters WCSH and was erected by the Congress Square Hotel company. The CSH in the signal stands for the initials of the Congress Square hotel. A power of 500 watts and wave length of 256 meters are used.

Programs will be broadcast under the direction of William Foss, former power house superintendent and a well-known Radio engineer.

Old Zion Outfit Now Heard from New Milwaukee Plant

MILWAUKEE.—Using the set operated at Zion, Ill., before WCBF installed their new 5,000-watt outfit, WSOE, the School of Engineering-Wisconsin News station opened its dedicatory program July 7 with a seven-hour program. Many novelties were introduced on the inaugural program and a group of leading Milwaukeeans was present to greet the artists.

Two studios are maintained by WSOE, both being Celotex sound proofed and having heavy plate glass windows to enable visitors to look into the studios from the main reception room. Heavy rugs, artistic floor lamps and draperies add to the attractiveness of both studios.

New Stations

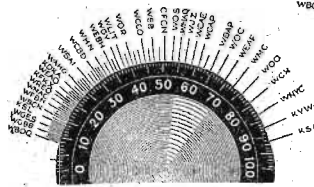
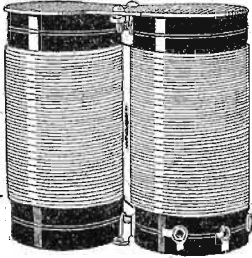
Port Wayne, Ind., is to have a 500-watt class "A" station using the call WQWO. This station, owned by the Main Auto Supply company, will operate on 227 meters. Other stations licensed last week are: WABC, Asheville, N. C., 10 watts, 245 meters; WJBA, Joliet, Ill., 50 watts, 206.3 meters; WJBB, St. Petersburg, Fla., 10 watts, 206.3 meters; WIBR, Weirton, W. Va., 50 watts, 246 meters; WIBQ, Farina, Ill., 5 watts, 205.4 meters.

Acting Secretary at WHT

CHICAGO.—Judge Stephen B. Davis, acting secretary of commerce in the absence of Secretary Hoover, visited the WHT studio here recently and was driven to the transmission plant at Deerfield, Ill., by George E. Carlson, general manager of WHT, and H. J. Bligh, commercial manager of the toll station.

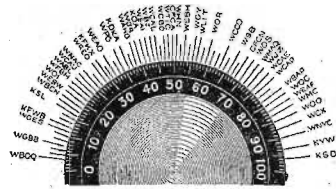
Before leaving the WHT studio he commented on the beauty of the Wrighty building studio and classed it as one of the most beautiful studios he had ever visited. Judge Davis also was impressed with the transmission cottage of WHT.

Grebe Binocular Coils prevent local interference and thus give that "selective sensitivity" which means maximum pleasure in reception.

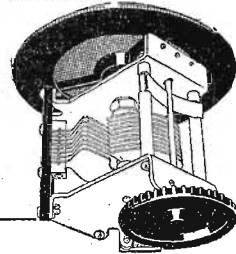


Usual Dial

Low-wave stations crowded onto lower dial numbers



Grebe Dial on S-L-F Condenser
All stations have equal spacing around the dial, making tuning easy and quick.



Get the Station You Want —shut out the rest

THE KEYNOTE of radio enjoyment is "selective sensitivity" —to get the desired station clear, as loud as pleases you, and free from those, undertones from other stations which are so annoying.

It is for this sort of reception that the Synchronphase has won such signal favor everywhere. Exclusive Grebe features —*Binocular Coils, S-L-F Condensers, Volume Control*— are responsible.

And this power of selectivity is enduring because of the accurate construction of every part.

Ask your dealer to prove to you how selective the Synchronphase is

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THE GREBE SYNCHROPHASE

TRADE MARK
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This company owns and operates stations WAHG and WBOQ; also marine and mobile low-wave re-broadcasting stations.

All Grebe apparatus is covered by patents granted and pending.

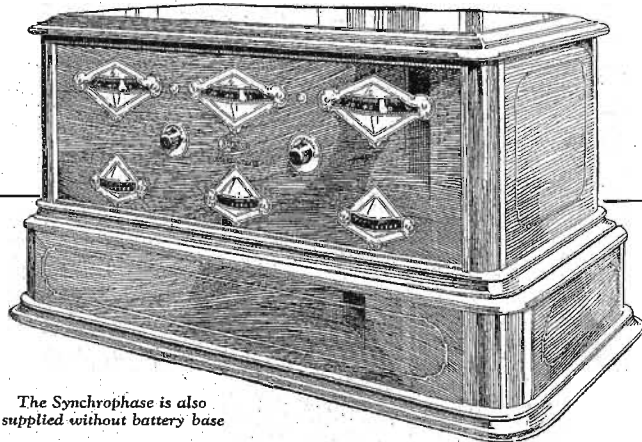


TRADE MARK
Reg. U. S. Pat. Off.



Only that will endure which has within itself sound construction.

Doctor M.A.



The Synchronphase is also supplied without battery base

KFRU, the "Voice of Oklahoma"



Jimmie Wilson's famous KFRU Catfish String band. This is one of the most popular KFRU features and the boys draw a huge flood of letters and applause with each program.



Above, E. O. Booth, general manager of the Ethereal Radio company, owners of KFRU.

The man with the long beard and the two-bit mouth organ is Uncle Tom Mares, one of the best known harmonica players in the country.

The man at the organ manual is P. J. Craker, musical director of KFRU. He is also staff organist and accompanist.

VERY few people outside of the state had ever heard of Bristow, Oklahoma, until KFRU broke through the ether one night last winter. Since then this little city of 10,000 is heard from nightly by those who make the trip around the dial. Since its twelve-hour inaugural program on January 16, 1925, this station has never missed a schedule, and but twice has been more than five minutes late, unless due to weather conditions. Unlike the majority of the stations which are located in large cities, KFRU finds it necessary to transport talent from all over the state and often from even longer distances.

"The Voice of Oklahoma" has an executive staff of only four people. Roy C. Griffin, known to the Radio world as the "Oklahoma Pepperbird," manager and director, is the man responsible for the popular programs and policy of the station. Mr. Griffin was in newspaper work in Texas and chamber of commerce work in Oklahoma prior to going into the Radio field. His training along these lines has given him the vision, the acquaintance, the experience, and the psychology so necessary in the construction of original and worth-while programs.

Frank S. Lane is the regular announcer and his clear, distinct, well-modulated voice has helped win for him and KFRU one of the largest Radio audiences in America. Mr. Lane's training was for the theatrical profession and stands him in good stead with the "mike." Lane is only twenty, but has the judgment and tact of a natural born announcer.

E. E. Sams, chief operator, is a Radio engineer with years of training in this country and one year abroad.

Miss Ruth Wright, secretary to the Pepperbird and station hostess, fills a responsible position with "The Voice of Oklahoma." It is her job to greet the visiting artists and extend to them the hospitality and conveniences of the station on behalf of the Ethereal Radio company. She also prepares the stock market schedules and lays out the news and police items, and the general run of daylight service programs. These four are known to the Radio world (Continued on page 6)



Above is Frank S. Lane, announcer at KFRU. He is a great believer in brevity in announcing.



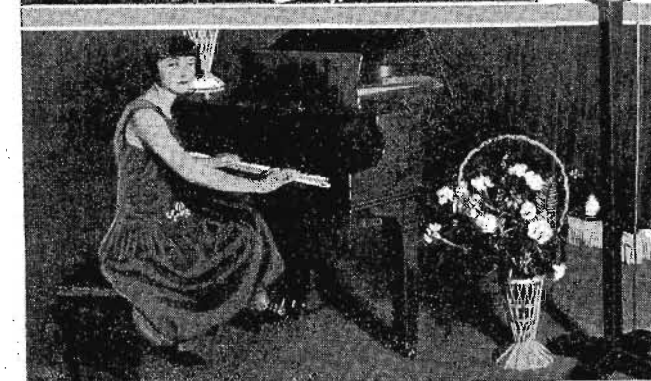
Above is Marie Nichols, soprano. She is a frequent and well-liked entertainer at KFRU.



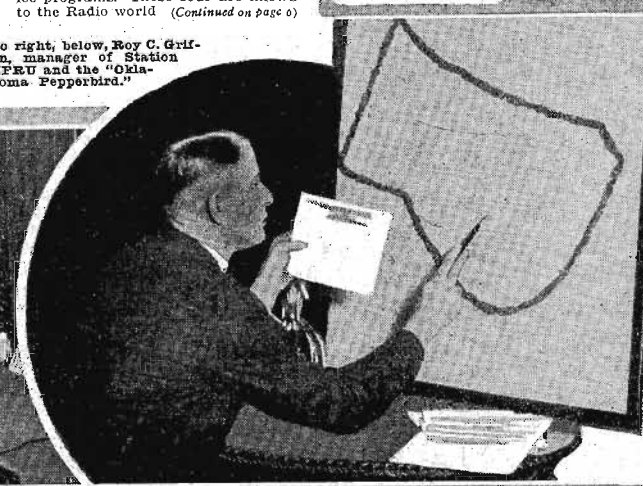
Above is Roy (Hi-Grade) Cunningham, one of Oklahoma's favorite baritones and a regular artist at KFRU.



Below, seated at piano is Mrs. Zola Mascho, staff accompanist. She is also a soprano and violinist of much ability and a wide popularity.



To right, below, Roy C. Griffin, manager of Station KFRU and the "Oklahoma Pepperbird."



HOPE TO BROADCAST LEAGUE OF NATIONS

BELIEVE COMMITTEE WILL ACCEPT NEW PROPOSAL

European Stations All Favor Proposed Plan as Means of Stimulating Popular Interest

GENEVA.—The whole of Europe may be able to listen in on the proceedings of the League of Nations next fall, if the committee accepts the offers that have been made by nearly all of the leading stations to put themselves at the disposal of that body. The station of the Postes, Telegraphes, et Telephones and the Eiffel Tower station in Paris, the Brosnan, Frankfurt, and Munich stations in Germany, the stations in Rome and Vienna have all offered to broadcast to their millions of listeners all interesting speeches and items which may come up. As announced some weeks ago, there will be an international exposition of Radio telephony and telegraphy at Geneva at the same time as the fall meeting of the league. It will open on September 23 and close on October 4. An authorization has already been obtained from the secretary of the league to transmit the proceedings of the assembly throughout the exposition by means of powerful loud speakers.

SEND POWER BY RADIO

(Continued from page 2)

On the other hand, if a tremble is imparted to several oranges at one side, the tremor or "wriggle," will be passed onward to those adjoining, and so on across the lake. At no time, however, will any orange be in any position other than it was before the tremor. That is the equivalent to the vibration transmission of Signor Midali.

One important point, of utmost importance to the engineering world, and one which is most desirable, is found in another paragraph of the statement: "I do not use high tension (voltage) . . . no difference of potential (voltage) is noticeable between the aerial and the earth, not even by using highly sensitive electromagnetical, electro-dynamical or electrostatic instruments."

Heretofore all radiation of energy for Radio communication has been accomplished by means of very high voltages that really force the energy off the antenna and ground connection. It is only natural that this could not be measured or shown because one is no longer concerned with electrical pressures, as such, but now must needs measure "light pressure" or "ultra light" pressures, if such they might be called. That there must be pressure of some sort, stands to reason.

Power Radiation Is Found

The system has much of the qualities of light about it as is evidenced by another part of the report, "the electrical vibrations created by the transmitting system travel in a straight line toward an ideal 'focus' according to the directions imparted them by the systems of condensers which form the aerial; they converge in a point X in which the ideal lines of the aerial condensers of the receiving system converge. When this condition is not fulfilled, transmission cannot initiate."

This would suggest that the aerial units are placed in a semicircle or parabola and must all be pointed toward the spot at which power is desired. At the receiving end, an equal number of antenna units with directional qualities must be pointed exactly at the transmitting units, yet converging on a central collecting agency. This is much as if we had three cannons on a semicircle all pointing at one spot and, to collect the missiles fired, we set up three large tubes at the receiving end, one pointing squarely at each cannon. If all three cannons are fired simultaneously, the three projectiles will come together and enter the tubes at one spot.

Energy Receiver May Move About

Once transmission has been started or set off, the positions of the aeriels, and even of the transmitter and receiver in relation to each other, does not matter. So says Midali. If this be true the project permits of power transmission from a central station to moving trains, boats, automobiles, airplanes and submarines.

The ultimate dream of scientists will have been reached. No more will electric cars and locomotives be bothered with the cumbersome trolley wires or third rails. Ships at sea, submarines and even airplanes and dirigibles will obtain their motive power from a central Radio power station. Individuals may perhaps fly about in small, heavier-than-air machines or balloons, obtaining their power from the same station.

The dream may be carried far into the realm of seeming impossibility, but still all these things will come true, providing Midali has, as reports would indicate, solved the mystery of directed Radio energy transmission without losses.

VIOLIN GIFT TO BOY WHO AMUSED HIM

NEW YORK.—Murray Lindy, violinist who plays at WHN every Friday evening tells a very interesting story. When thirteen, he played on a concert tour, in England. After a recital he received a note asking him to call at a certain address. Arriving there, he was met by a very old man who had heard him play and had invited him to his home to play for him. He brought forth a violin, requesting Lindy to try it. The first stroke told him he was fondling a prized instrument. For the three full hours he played, the old man never moved a muscle. Fatigued, the boy sat down, and started to examine this violin, the likes of which he had never heard. As Lindy now expresses it—he fell in love with it, and the old man presented it to him.

Various experts have appraised it since—and they concur that it is a genuine Del Jesu Guarnerius, with the date 1672 still evident. It is valued at upwards of \$75,000.

"VOICE OF OKLAHOMA"

(Continued from page 5)

as the "Ether Family." The station, a 500-watt Western Electric, shares time on a wave length of 394.5 meters with Station WOAI at San Antonio, Texas.

It is now a national pastime to go fishing with KFUR and the Wilson Catfish band every Tuesday evening at 10:30.

Another original idea from this station is the Blue Monday or Washday programs presented every Monday, at which time Mrs. Ted Mascho and Mr. "Higrade" Cunningham entertain with baritone, soprano, piano and vocal duets. Mr. Paul Craker, staff organist, presents a concert every Thursday evening at 10:30 and a 6:00 a. m. breakfast program on Sundays and Tuesdays.

KFUR has its own orchestra of eight pieces, which entertains during daylight and after midnight, as the station policy is against too much jazz music on the main evening programs. The station has one remote control studio at A. & M. college at Stillwater, a distance of 100 miles, which it uses every Monday night. In addition to this remote control studio,

they are equipped with a portable, presenting remote control programs at distances ranging from 50 to 300 miles.

The Ethical Radio company owns and operates this station. E. H. Rolleston of Bristow, Oklahoma, a prominent young millionaire of the state, is president of the company, and R. O. Booth is general manager.

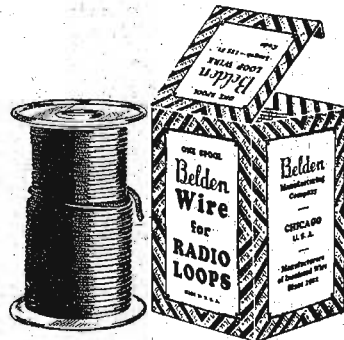
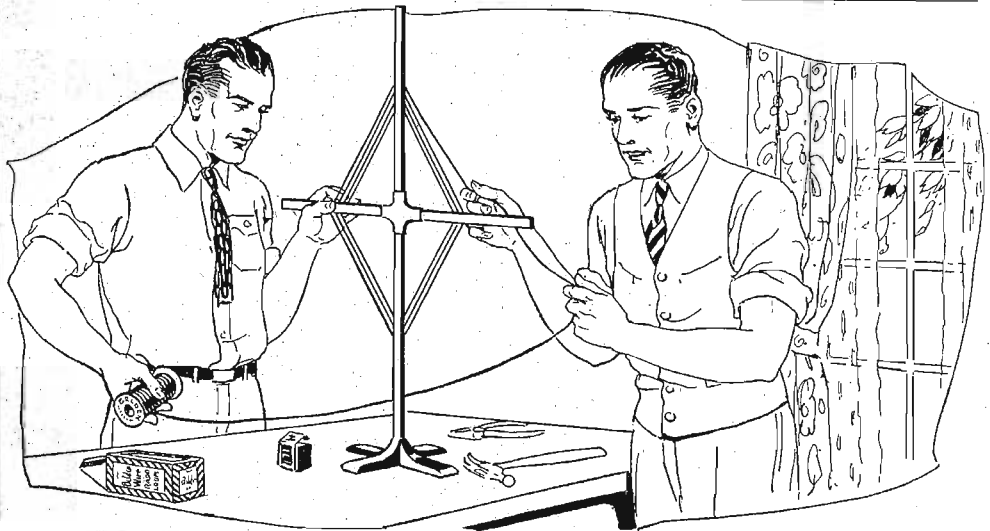
NEW WSB HAS OPENING

(Continued from page 1)

Jubilant. The broadcast was a marathon affair starting at noon and riding the air until far into the next morning.

Although on the Atlanta Biltmore hotel, the Atlanta Journal still holds total ownership and control of the station. No change or modification of the policy, atmosphere, or traditions identified with WSB will be considered, according to Labbin Kay, veteran director and announcer.

It is far better to clamp a long soldering lug to a fixed condenser by means of a short brass machine screw and nut than to solder directly to any part of the condenser.



BELDEN LOOP WIRE is made in two types:

60 strands of No. 38 Copper Wire and 5 strands No. 36 specially treated copper wire to prevent sag. Insulated with two layers of cotton, 125 feet per spool.

60 strands of No. 38 Copper Wire and 5 strands No. 36 specially treated copper wire to prevent sag. Insulated with cotton and covered with artificial silk braid, 125 feet per spool.



BELDENAMEL AERIAL WIRE is made in two types:

7 strands of No. 22 Beldenamel Stranded or 16 strands of No. 28 Beldenamel Braided. Sold in cartons containing 100 ft. or 150 ft. coils.

Specify
Belden Wire
for Loops and Outdoor Aerials

Radio fans, who have built their own receiving sets, know the value of a good antenna, whether they use an indoor loop or an outdoor aerial.

For indoor loops, Belden Loop Wire assures maximum efficiency, because it is made of a large number of fine copper wires to reduce high-frequency losses. It is carefully insulated and does not sag or stretch.

For outdoor aerials, Beldenamel Aerial Wire outclasses all other types of aerial conductors. Its baked enamel coating on the stranded conductors provides protection against corrosion and insures a highly-efficient aerial that suffers no deterioration from smoke and fumes.

All radio set owners should use Belden Wire for maximum set efficiency. Ask your dealer about it, or send for our "Helpful Hints for Radio Fans."

Belden Manufacturing Company

Electrical Wire, Cable
and Cordage

2310A So. Western Ave., Chicago

Manufacturers of Insulated Wire since 1902

AGREE ON RADIO TILT SO MACMILLAN GOES

RADIO HISTORY MAKING
STARTS IMMEDIATELY

Northern Lights Do Not Interfere with
First Low Wave Transmission
Tests

Explorer MacMillan is sailing northward, all is silent along the Potomac, and the Navy Department-MacMillan Radio tilt is a busted daily press sensation bubble. The expedition is carrying the equipment furnished by the naval authorities and is doing so because it wants to do so and not because it was forced to by Washington, according to word received by wire from Nova Scotia.

Radio history is in the making on the low wave lengths by the polar venturers. They have already held voice and voice communications from Nova Scotia with stations in New Orleans, New York and Florida. If the experiments continue successful a new language will be put on the air from the frozen wastes of the far North. This language will be Eskimaun, the speech of those who eat gum drops and live in ice houses.

Will Broadcast Voice of Eskimo

More details of the expedition's Radio progress are told in a telegram sent by Commander F. McDonald, Jr., in charge of Radio on the expedition. It follows: "We have started making Radio history last evening using voice repeat voice. Using forty meters, we talked with and were distinctly heard by Station 5NL, New Orleans, for twenty minutes. Then Station 2ACQ in Milton, N. Y., seventy miles from New York city on the Hudson, called us and said our voice volume was equal to WGY, Schenectady. Station VXE in Winter Park, Fla., called us stating had been listening to our voice for fifty minutes.

"I become more confident each day that we will put the voice of the Eskimo back to civilization. The northern lights, which will soon be south of us, were vivid last evening but did not interfere with transmission. By Radio we have our newspaper twice a day.

Receives Navy Set

"The navy spark set, about which there has been so much commotion in the newspapers, arrived yesterday. Contrary this was sent at our request merely for experimental purposes and will be set up when we reach Etah. We will probably find it will not work any more than the 180-meter set which we are taking along merely for the purpose of proving it will not work. The spark set is an old obsolete model of the Battleship Florida. After we get north of sixty-six latitude we will be unable to communicate with anything but forty and twenty meters.

"We are all happy and anxious to be on our way north down the Labrador, as they speak of going north in this vicinity."

Eveready's Prepare Summer Schedules

Will Not Follow Regular Program
Until the Fall

NEW YORK—Although the Eveready group will not appear in its entirety during the Eveready Hour programs of July and August, individual members of this popular ensemble are appearing in solo numbers during the course of the orchestral programs every Tuesday by the Eveready chamber symphony orchestra, with Max Jacobs leading, or the Eveready Salon orchestra, Nathaniel Shilkret, leading.

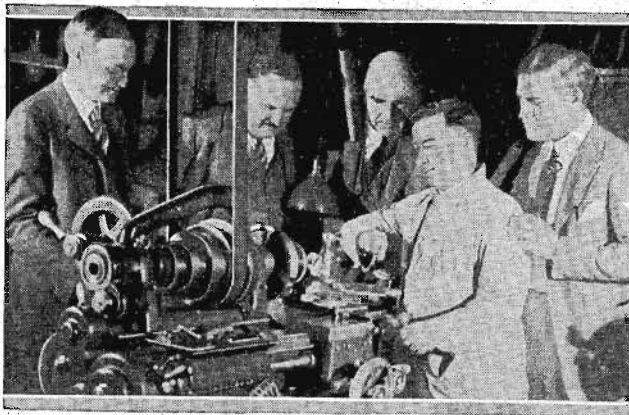
Prior to their reassembling as a group in the fall, the familiar Eveready artists will sing during the summer according to the following schedule:

July 21, Eveready Salon orchestra, Betsy Ayres and Wendell Hall; July 28, Eveready chamber symphony, Rose Bryant, Wilfred Glenn and Wendell Hall; August 4, Eveready Salon orchestra, Charles Harrison; August 11, Eveready chamber symphony, Wilfred Glenn; August 18, Eveready Salon orchestra, Eveready male quartet; August 25, Eveready chamber symphony, Rose Bryant and Betsy Ayres; September 1, Eveready chamber symphony, Eveready mixed quartet.

Los Angeles Amateur Show Breaks Attendance Record

LOS ANGELES.—For the first time in Radio history, a strictly amateur Radio show and contest was recently held in Los Angeles, in the large auditorium of the National Automobile & Electrical School. Interest in the show and exhibits were very great, and practically every Radio fan in southern California attended, as is evidenced by the attendance records, which have broken all Radio show records on the Pacific coast. Primarily, the purpose of the show was to foster the interests of the man "who builds his own."

HE HAS NOT LOST HIS OLD SKILL



Twenty years ago, Schwab, the steel king, discovered John Finnegan (in jumpers) at the lathe and put him in concert work. Now the famous tenor of WABG is proving to A. H. Grebe, president of A. H. Grebe & Co., Inc., Douglas Eigney, Burr McIntosh and Thornton Fisher that singing has not impaired his old mechanical skill.

A miniature 6-volt lamp placed in parallel in the A battery circuit and set just behind a bezel hole will advise at all times whether the tubes are lit and warns one not to go to bed leaving the set drawing current.

YOUR LARYNX GONE? JUST BUY ANOTHER!

TELEPHONE MEN INVENT A
NEW SPEECH RESTORER

Sergius P. Grace Demonstrates Remarkable Instrument at Station WCX, Detroit

DETROIT.—If your larynx has been removed by an operation or in some manner been put out of commission, there's no need to worry longer. You'll soon be able to buy a ready made one that will work almost as well as the one you had.

That this is now possible was recently demonstrated by Sergius P. Grace, commercial development engineer of the Bell Telephone company at Station WCX here. Using a bellows instead of lungs as a person deprived of the larynx would, Grace spoke words and phrases through the mechanical device.

The artificial larynx was invented in the Bell laboratories as a result of a consultation with a physician who stated that while removal of the organ saved lives, it deprived the patient of voice. He asked if the Bell engineers could not do something to give voices to these unfortunates.

While the tone of the artificial larynx is not particularly pleasing it is understandable, and according to Grace, of sufficient utility so that the average voiceless person will overlook minor flaws in favor of its greater good points.

Which door
will you open?

DAY-FAN is a house with a hundred doors. Each different Radio station sends you its music, through a certain one of those doors.

With other Radio sets you must run from door to door, wondering through which one your music will arrive.

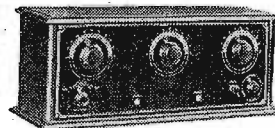
Day-Fan tells you in advance that the Drake Hotel always comes through door 40, that the Chicago Daily News always comes through door 31, that the St. Louis Post-Dispatch always comes through door 84.

The doors—which are the numbers on the dial—are always the same, for all Day-Fans, everywhere. So we give you their numbers in the Day-Fan Air Telephone Directory. No other set made can do this. Radio people call it "pre-logging." You will call it making Radio easy to enjoy.

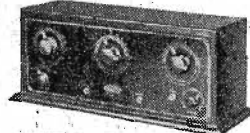
When you want a station just open its proper door (by turning the dial to that number) and the music, the speech, the song, floods in. Marvelous—but all Day-Fan owners take it for granted.

Turn out the lights and listen in the dark. The announcer opens the door of your room and speaks to you in the chair. The speaker lays his arm on your mantelpiece and talks to you from across the room. The violinist plays to you from the corner, and the dance orchestra syncopates from outside in your hall. This is no Radio! This is the song, the story, at your very side, loud or soft as you desire.

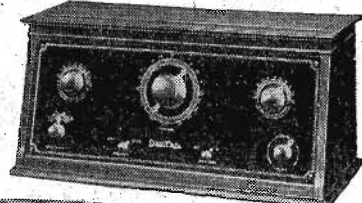
Go hear a Day-Fan today and prove these things to yourself right away. If you do not know who is your nearest Day-Fan dealer, drop us a line and we will tell you.



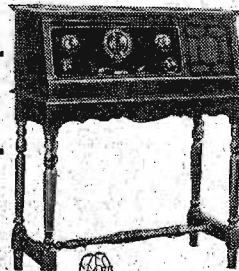
OEM 12, 4 TUBE, \$75.00



OEM 7, 4 TUBE, \$98.00



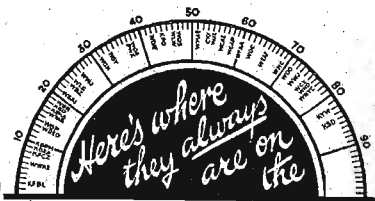
DAY-FAN 5, 5 TUBE, \$115.00



DAY CRAFT
5 TUBE
\$145.00

With Legs
\$165.00

Legs Separate, \$20.00



Day-Fan

RADIO
Dial



THE DAYTON FAN & MOTOR COMPANY

Dayton, Ohio
For 36 Years Manufacturers of High Grade Electrical Apparatus



TRAFFIC TRIAL BROADCAST BY WGY

Monday, July 20

(Continued from page 9)

hour: 6, baseball scores; 6:02, sport talk; 6:45, F. and J. Fantasy; 9, baseball scores.

WDAF, Kansas City, Mo. (358.5), 6-7 p. m., piano tuning-in number on the Duo-Art; Cecil Burton, reader; children's information program; Plantation players, 8-9, among the piano duo; WDAF, 11:45-11:55 p. m., Merry Old Chief and Plantation Players; Charles Brantley's Kansas City Athletic club orchestra.

WFAA, Dallas, Tex. (475.9), 6:30-7:30 p. m., Artie

Goebel; 8:30, talk, "The Art of the Dance," Mikhail Mordey, assisted by Ruth Hollister; 9:30-10:30, Miriam Frankin Sierstorff, soprano, with Rene Wyn RHR; 10:30-10:45, Barber Shop Ballads; Dr. Sigismund Susskind, Ring Lardner, humorist; 11, studio program; Buffalo, N. Y. (319), 2:30-3:30 p. m., WOI's afternoon program; 6:30-7:30, Vincent Lopez, Hotel Statler orchestra; Harold Glezer, Director; 8-11, Society with WDAF, including Gold Dust Twins, Broadway hour and the grand opera, "Naxos";

WHAR, Atlantic City, N. J. (275), 7:30 p. m., book review; Mrs. James Lord; 8, Resaide hotel trio; 9, Shubburg hotel concert orchestra; 10, Vincent Lopez Junior dance orchestra; 11, Strand theater, organ recital.

WHN, New York, N. Y. (361.2), 2:15-4 p. m., recitation and vaudeville from Loew's State theater; 7:15-7:30,

WEAR, Cleveland, Ohio (389.4), Marjorie Moore and Charles Martin, baritone; 7:30, Marjorie Moore and Charles Martin, baritone; 8:30, Marjorie Moore and Charles Martin, baritone; 9:30, Marjorie Moore and Charles Martin, baritone; 10:30, Marjorie Moore and Charles Martin, baritone; 11:30, Marjorie Moore and Charles Martin, baritone.

WGL, Chicago, Ill. (447.5), 7-8 p. m., Rainin Gardens; 8:30, Rainin Gardens; 9:30, Rainin Gardens; 10:30, Rainin Gardens; 11:30, Rainin Gardens.

WIBC, Washington, D. C. (463), 7:30 p. m., Philharmonic concert; 10, Meyer Davis Society orchestra; 11:45, organ recital, Crandall's Tivoli theater.

WSAI, Cincinnati, Ohio (220), 6:30 p. m., chime concert; Robert Dudley; 8, Evening hour of music, New York studio; 9, program, featuring Russian songs; Ida Blackson, Cincinnati male quartet.

WSS, Atlanta, Ga. (228.3), 5-6 p. m., Bonnie Barranville, chime; 7:30, piano; 8:30, piano; 9:30, piano; 10:30, piano; 11:30, piano.

WTAB, Cleveland, Ohio (389.4), 6-7 p. m., Hotel Statler concert orchestra.

WTAS, Elgin, Ill. (302.8), 8-10:30 p. m., Purdie Gracie orchestra; Herbie Mintz; Violet Eaton; Ronald Hinchin.

WTC, Hartford, Conn. (346.0), 6 p. m., Tractors Orchestra; 8:45, baseball scores; 9:30, piano; 10:30, piano; 11:30, piano.

WVLA, Louisville, Ky. (359.8), 7:30-9 p. m., Carl Schmitt, pianist; 9:30, Carl Schmitt, pianist; 10:30, Carl Schmitt, pianist; 11:30, Carl Schmitt, pianist.



Collins and his orchestra; 8:30-9:30, Young Women's Christian Association chime club recital.

WHD, Milwaukee, Wis. (212), 6:30 p. m., Arthur Richter, organist; 8-10, Marquette university studio program.

WHD, Des Moines, Iowa (262), 7:30-9 p. m., Stewart Watson, baritone; Myrtle Williams, soprano; Helen Birmingham, accompanist; 8, artist; 9, artist; 10, artist; 11-12, corn Sugar orchestra, Dean Holmes Cooper; 11-12, corn Sugar orchestra, Dean Holmes Cooper; 11-12, corn Sugar orchestra, Dean Holmes Cooper.

WMC, Memphis, Tenn. (499.7), 8:30 p. m., concert, Eufel Gavoso orchestra.

WDAW, Omaha, Neb. (528), 6 p. m., Phyllis Griswold, organist; 6:30, baseball; Mickey's popular period; 6:35, orchestra; 7, Glenn Miller; 8, Glenn Miller; 9, Glenn Miller; 10, Glenn Miller; 11, Glenn Miller; 12, Glenn Miller.

WOS, Jefferson City, Mo. (410), 8-10 p. m., old time fiddlin', Louis Barton, Bryan Williams.

WSMB, New Orleans, La. (310), 6:30-7:30 p. m., dinner program; 8:30-10:30, Leslie George's Zante Royal orchestra; Fuzzy Wuzzy Twins.

Mountain Standard Time Stations

KFW, Ogden, Utah (261), 9-11 p. m., varied entertainment.

KOA, Denver, Colo. (322.4), 6:30 p. m., Herbert White and his Silver State orchestra; 7:30, Sunday's hour; 8, Maudie Frazee, soprano; "Clarence," Ovi players.

Pacific Standard Time Stations

KFOA, Seattle, Wash. (454.3), 6-6:15 p. m., baseball scores; Olympic band concert orchestra; 8:45-9:15, program, Sherman Clay & Co.; 9:30-10, Seattle Times, dance music.

KFWB, Hollywood, Calif. (252), 6-7 p. m., children's hour, Big Brother of KFWB; 8-9, program, Check-Nut Coffee company; 9:10, Glenn Miller; 10:10, Glenn Miller; 11:10, Glenn Miller; 12:10, Glenn Miller.

KGO, Oakland, Calif. (381.2), 6-7 p. m., dinner concert, Kohler center; 8:15, opera; 9:15, opera; 10:15, opera; 11:15, opera; 12:15, opera.

Central Standard Time Stations

KDKA, Pittsburgh, Pa. (482), 6-7 p. m., Wier-Ritter piano concert studio; 6:15, opera; 7:15, opera; 8:15, opera; 9:15, opera; 10:15, opera; 11:15, opera; 12:15, opera.

KYW, 6:30, KYW; 7:30, KYW; 8:30, KYW; 9:30, KYW; 10:30, KYW; 11:30, KYW; 12:30, KYW.

Eastern Standard or Central Daylight Saving Time Stations

Saturday, July 18: 2, WGY; 2:30, KDKA; 3:45, KDKA; WMAQ; 3, KDKA; 4:15, KDKA; 5:30, WEAQ; 6:45, WEAQ; 7:45, WEAQ; 8:45, WEAQ; 9:45, WEAQ; 10:45, WEAQ; 11:45, WEAQ; 12:45, WEAQ.

Sunday, July 19: 6:30, WBEZ; 6:55, WTC; 7:15, WTC; 8:15, WTC; 9:15, WTC; 10:15, WTC; 11:15, WTC; 12:15, WTC.

Mountain Standard Time Stations

Monday, July 20: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Tuesday, July 21: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

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Pacific Standard Time Stations

Monday, July 20: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Tuesday, July 21: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Central Standard Time Stations

Monday, July 20: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Tuesday, July 21: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Mountain Standard Time Stations

Monday, July 20: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Tuesday, July 21: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Pacific Standard Time Stations

Monday, July 20: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Tuesday, July 21: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Baseball Scores

TABULATED below is a time table of the stations giving baseball scores this week. Stations are divided into the different standard times in use. The hours are given in the kind of time in use at each listed station:

Atlantic or Eastern Daylight Saving Time Stations

Saturday, July 18: 4:30, WJZ; 5:30, WJZ; 6:40, WJZ; 7:15, WOR; 7:25, WNYC; 8, WJZ.

Monday, July 20: 4, WJZ; 4:30, WJZ; 5:30, WJZ; 7:15, WJZ; 7:15, WOR; 7:25, WNYC; 8, WJZ.

Tuesday, July 21: 4, 4:30, 5, 5:30, 6, 7, 7:15, WOR; 7:25, WNYC; 7:45, WBEI; 8, WJZ.

Wednesday, July 22: 4, 4:30, 5, 5:30, 6, 7, 7:15, WOR; 7:25, WNYC; 7:45, WBEI; 8, WJZ.

Thursday, July 23: 4, 4:30, 5, 5:30, 6, 7, 7:15, WOR; 7:25, WNYC; 7:45, WBEI; 8, WJZ.

Friday, July 24: 4, 4:30, 5, 5:30, 6, 7, 7:15, WOR; 7:25, WNYC; 7:45, WBEI; 8, WJZ.

Eastern Standard or Central Daylight Saving Time Stations

Saturday, July 18: 2, WGY; 2:30, KDKA; 3:45, KDKA; WMAQ; 3, KDKA; 4:15, KDKA; 5:30, WEAQ; 6:45, WEAQ; 7:45, WEAQ; 8:45, WEAQ; 9:45, WEAQ; 10:45, WEAQ; 11:45, WEAQ; 12:45, WEAQ.

Sunday, July 19: 6:30, WBEZ; 6:55, WTC; 7:15, WTC; 8:15, WTC; 9:15, WTC; 10:15, WTC; 11:15, WTC; 12:15, WTC.

Monday, July 20: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Tuesday, July 21: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Wednesday, July 22: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Thursday, July 23: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Friday, July 24: 2, WRC; 2:45, WMAQ; 3:20, KDKA; KYW; 3:45, WEAQ; 4:30, KYW; 5:30, WEAQ; 6:30, WEAQ; 7:30, WEAQ; 8:30, WEAQ; 9:30, WEAQ; 10:30, WEAQ; 11:30, WEAQ; 12:30, WEAQ.

Central Standard Time Stations

Saturday, July 18: 3:15, WHAS; 3:30, WDAF; 4:30, WDAF; 4:30, WDAF; 6, WCCO; WDAF, WOC; 6:20, WOAW; 6:30, WSMB; 9, WCCO; 9:15, KTHS.

Sunday, July 19: 3:30, 4, WDAF; 4:30, WDAF; 5, WDAF; 5:05, WOS; 6:45, WOC; 9, WCCO; 9:15, KTHS.

Monday, July 20: 3:15, WHAS; 3:30, WDAF; 4:30, WDAF; 4:30, WDAF; 6, WCCO; WDAF, WOC; 6:20, WOAW; 6:30, WSMB; 9, WCCO; 9:15, KTHS.

Tuesday, July 21: 3:30, 4, WDAF; 4:30, WDAF; 5, WDAF; 5:05, WOS; 6:45, WOC; 9, WCCO; 9:15, KTHS.

Wednesday, July 22: 3:15, WHAS; 3:30, WDAF; 4:30, WDAF; 4:30, WDAF; 6, WCCO; WDAF, WOC; 6:20, WOAW; 6:30, WSMB; 9, WCCO; 9:15, KTHS.

Thursday, July 23: 3, WDAF; 3:15, WHAS; 4:30, WDAF; 4:30, WDAF; 6, WCCO; WDAF, WOC; 6:20, WOAW; 6:30, WSMB; 9, WCCO; 9:15, KTHS.

Friday, July 24: 3, WDAF; 3:15, WHAS; 4:30, WDAF; 4:30, WDAF; 6, WCCO; WDAF, WOC; 6:20, WOAW; 6:30, WSMB; 9, WCCO; 9:15, KTHS.

Mountain Standard Time Stations

Monday, July 20: 6, KOA.

Tuesday, July 21: 6, KOA.

Wednesday, July 22: 6, KOA.

Thursday, July 23: 6, KOA.

Friday, July 24: 6, KOA.

Pacific Standard Time Stations

Saturday, July 18: 2:30, KNX; 6, KFI; 8, KFI; 9, KFI; 10, KFI; 11, KFI; 12, KFI.

Sunday, July 19: 6:30, KFI; 8, KFI; 9, KFI; 10, KFI; 11, KFI; 12, KFI.

Monday, July 20: 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Tuesday, July 21: 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Wednesday, July 22: 2, 3, 4, KNX; 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Thursday, July 23: 2, 3, 4, KNX; 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Friday, July 24: 2, 3, 4, KNX; 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Central Standard Time Stations

Saturday, July 18: 2:30, KNX; 6, KFI; 8, KFI; 9, KFI; 10, KFI; 11, KFI; 12, KFI.

Sunday, July 19: 6:30, KFI; 8, KFI; 9, KFI; 10, KFI; 11, KFI; 12, KFI.

Monday, July 20: 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Tuesday, July 21: 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Wednesday, July 22: 2, 3, 4, KNX; 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Thursday, July 23: 2, 3, 4, KNX; 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Friday, July 24: 2, 3, 4, KNX; 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Mountain Standard Time Stations

Monday, July 20: 6, KOA.

Tuesday, July 21: 6, KOA.

Wednesday, July 22: 6, KOA.

Thursday, July 23: 6, KOA.

Friday, July 24: 6, KOA.

Pacific Standard Time Stations

Saturday, July 18: 2:30, KNX; 6, KFI; 8, KFI; 9, KFI; 10, KFI; 11, KFI; 12, KFI.

Sunday, July 19: 6:30, KFI; 8, KFI; 9, KFI; 10, KFI; 11, KFI; 12, KFI.

Monday, July 20: 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Tuesday, July 21: 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Wednesday, July 22: 2, 3, 4, KNX; 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Thursday, July 23: 2, 3, 4, KNX; 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Friday, July 24: 2, 3, 4, KNX; 6, KFOA; 6:15, KFOA; 6:45, KGO; 7:30, KGW; 8, KFWB.

Baseball Scores

TABULATED below is a time table of the stations giving baseball scores this week. Stations are divided into the different standard times in use. The hours are given in the kind of time in use at each listed station:

Atlantic or Eastern Daylight Saving Time Stations

Saturday, July 18: 4:30, WJZ; 5:30, WJZ; 6:40, WJZ; 7:15, WOR; 7:25, WNYC; 8, WJZ.

Monday, July 20: 4, WJZ; 4:30, WJZ; 5:30, WJZ; 7:15, WJZ; 7:15, WOR; 7:25, WNYC; 8, WJZ.

Tuesday, July 21: 4, 4:30, 5, 5:30, 6, 7, 7:15, WOR; 7:25, WNYC; 7:45, WBEI; 8, WJZ.

Wednesday, July 22: 4, 4:30, 5, 5:30, 6, 7, 7:15, WOR; 7:25, WNYC; 7:45, WBEI; 8, WJZ.

Thursday, July 23: 4, 4:30, 5, 5:30, 6, 7, 7:15, WOR; 7:25, WNYC; 7:45, WBEI; 8, WJZ.

Friday, July 24: 4, 4:30, 5, 5:30, 6, 7, 7:15, WOR; 7:25, WNYC; 7:45, WBEI; 8, WJZ.

Eastern Standard or Central Daylight Saving Time Stations

Saturday, July 18: 2, WGY; 2:30, KDKA; 3:45, KDKA; WMAQ; 3, KDKA; 4:15, KDKA; 5:30, WEAQ; 6:45, WEAQ; 7:45, WEAQ; 8:45, WEAQ; 9:45, WEAQ; 10:45, WEAQ; 11:45, WEAQ; 12:45, WEAQ.

Sunday, July 19: 6:30, WBEZ; 6:55, WTC; 7:15, WTC; 8:15, WTC; 9:15, WTC; 10:15, WTC; 11:15, WTC; 12:15, WTC.

PUGILIST-VIOLINIST TO PLAY AT WAHG

Tuesday, July 21

(Continued from page 10)

talk, Myer Siegel, Jr.; 8-10, KXN feature program; 10-12, music night at the Ambassador, also Louisa's Coconut Grove dance orchestra; Town Circle introduces celebrities over microphone.

KPD, San Francisco, Calif. (428.3), 8-10-7 p. m., Waldemar Lind and the States Restaurant orchestra; 7-30, Rudy Selig's Famous Hotel orchestra; 8-0, Russian program, Madame Pearl Hossack Whitcomb; Esther Sakowitz, director; 8-10, program, Evelyn Frencher; 10-11, Johnny Bulck's Cantatas.

Wednesday, July 22

Wednesday, silent night for: CKAC, CNRT, KFDM, KGF, KIDS, WEA, WGBR, WGB, WDFW, WFAA, WFL, WGBS, WGY, WJAZ, WJOP, WMAK, WMC, WQAW, WORD, WPG, WRBC, WRC, WRFO.

Atlantic or Eastern Daylight Saving Time Stations

CNRM, Montreal, Can. (411), 9 p. m., orchestra, Whitel Star-Dominion line.

CNRD, Ottawa, Can. (435), 8 p. m., Chateau Laurier concert orchestra; 9, Casino quartet; 9-10, Bugles, banions; saxophone quintet; C. McDermott, tenor; Mrs. A. S. Ponting, soprano; Chateau Laurier dance orchestra.

WAHG, Richmond Hill, N. Y. (316), 7:30-7:45 p. m.,

theater orchestra; 7:15-7:30, sports talk, Bill Wathen; 7:30-8, Vincent Lopez orchestra; 8-10, "Tones of the Day," Spencer Armstrong; 8:30-9:45, talk, Dr. Frank H. Viscosity.

Eastern Standard or Central Daylight Saving Time Stations

KDKA, Pittsburgh, Pa. (309.1), 7 p. m., baseball; 8:45, Day Six, hour of music; 9-30, baseball.

KY.W. Chicago, Ill. (535.4), 6:30 p. m., baseball scores; 6:55-7, "Healing story," Uncle Bob; 7-7:30, dinner concert; 7:37-7:43, "Entertaining Plans," Viretta Gorman; 8-9, Marie Demore, soprano; Catherine Johnson, soprano; Bryce Talbot, baritone; Ned Santis, tenor; 10-12:30, midnight revue; Paul Whiteham's Collegians; Albert Hay Malotte, organist.

program; 7, dinner concert, Hotel Gibson orchestra; Robert Visconti, director; 7:30, feature talk, Brookmore Economic service; 10, Cino male quartet; 10:30, Orpheus instrumental trio; 11, organ recital, Johanna Groos; 12, midnight melodies, Gene Johnson; 12:15 a. m., Helvey's Symphonio Troubadours.

WMAQ, Chicago, Ill. (447.5), 4 p. m., baseball scores; 6, Chicago theater organ recital; 6:30, Chapman's orchestra; 8, Jack Chapman's orchestra; 8:30, lecture, Northwestern university; 8:55, Marceus Schmitt, pianist; 9:15, WMAQ players.

WMBB, Chicago, Ill. (250), 7-8:30 p. m., Triton ensemble; Rebecca Aquilino, concert pianist; Albert Caesbauer, cellist; Phyllis Harris, soprano; Charles Aker, trumpeter; Carlos Alarini, baritone; 8:30-10:30, Woodlawn theater orchestra; Triton orchestra; Florence Turner, blues singer; Harold Stokes, accordionist;

8, musical program; 9, baseball scores; 10, Dick Long's Nankin cafe orchestra; 11:30, organ recital, Gladie Dunstedter.

WDAF, Kansas City, Mo. (365.6), 6-7 p. m., address, speaker, auspices Health Conservation association address, speaker, Health Council of Greater Kansas City; children's information period; Plantation players; 8-9:15, Star's Radio orchestra; 11:15-1 a. m., Merry Old Chief; Carl Nordberg's Plantation players; Charles Dornberger's Kansas City Athletic club orchestra.

WHAD, Milwaukee, Wis. (275), 6-7 p. m., Arthur Richter, organist; 8, band concert; 11:30-12:30 a. m., Stagnant Pitch, organist.

WHAS, Louisville, Ky. (398.8), 7:30-9 p. m., Thirty-minute concert; Stevie Davison & L. Terzani; Railroad orchestra; concert, Madge Whitel, director.

WHO, Des Moines, Ia. (328), 6:30-7:30 p. m., Banbers Life trio; 7:30-9, Merry Mads; Harry Scott and his banjo band; Edward Higgs, violinist; Helen Dawson, pianist; 9-10, "Rinky-Dinky"; 10-11:30, Barrett-Pfeilrock orchestra.

WOC, Des Moines, Iowa (484), 9-10 p. m., Ervin Swietel, organist; Ray E. Dean, tenor.

WOS, Jefferson City, Mo. (410.9), 8 p. m., religious songs, Rev. J. O. Humphreys.

WSMB, New Orleans, La. (318), 8:30-7:50 p. m., dinner musicale; 8:30-10:30, talks, entertainment; 10:30-12:30, Dixieland orchestra.

Mountain Standard Time Stations

KFWA, Aspen, Utah (215), 9-11 p. m., old time music, KFWA trio; 11-12, Whoopee club.

KOA, Denver, Colo. (322.4), 6:30 p. m., Herbert White quartet; 8-9, Charles Beuchamp, tenor; Miller's International Music reception, Vice-president Charles G. Dawes; Twelfth Field Artillery band; "Should the Senate Change Its Mind," Vice-president Dawes.

Pacific Standard Time Stations

KFOA, Seattle, Wash. (434.3), 6-6:45, baseball results; Olympic hotel concert orchestra; 6:45-8:15, Emporium company, studio program; 8:30-10, Seattle Times, studio program.



Althea Tibbetts, whistler, has received more than one bird with her artistry. Tune in for WBZ, Monday, July 20. Marcia Green, right, is a vocal soloist. She will sing Monday evening at KOA.

Madame Katerina Malova, soprano, will sing arias from "Cavalleria Rusticana" Saturday evening, July 18, at Station KGO, Oakland.

Margaret M. Mansfield, violinist; 7:45-8, sports talk, Thornton Fisher; 8-8:15, Anna Russo, soprano; 8:15-8:45, Jean A. Salvatore, novelty pianist; 8:45-9:15, Raymond Maher, baritone; 9:15-9:30, Anna Russo; 9:30-9:45, John A. Salvatore; 9:45-10, Raymond Maher; 10-10:15, dance music; 11:00-11:30, dance orchestra.

WDAE, Pittsburgh, Pa. (481.3), 6:30 p. m., William Penn hotel; 8, recital, Fred Kallers, solo; Elizabeth Sanderson; 11, Lopez's Aladdin theater.

WGAU, Philadelphia, Pa. (278), 8 p. m., Hotel Pennsylvania concert orchestra; 8, recital; 10:30, Jack Myers' Musical architect dance orchestra.

WEAF, New York, N. Y. (278), 4-4:45 p. m., Leonard's Blossom Health savanders; 4:45-5, "Swimming and Life Saving," Captain B. Sculler; 6-7, dinner music, Althea Tibbetts; 7-7:30, Willard Carter, baritone; Dorothy Hoyle, violinist; 7:30-9, concert, U. S. Navy band, direction of Lieutenant Charles Denton; 9-10, Ipana Troubadours; 10-11, Apollo concert ensemble; 11-12, Hotel Bossert Marine roof orchestra.

WEHJ, New York, N. Y. (272.8), 8:30-9 p. m., Ohio Virginia orchestra; 9:45-9, Philip Krumpholtz, tenor; 9-9:15, Kathryn Campbell, soprano; 9:15-9:30, songs, Red White and Blue; 9:30-10, The Brothers duo; 10-10:15, Ipana Troubadours; 10-11, Apollo concert ensemble; 11-12, Hotel Bossert Marine roof orchestra.

WEI, Boston, Mass. (476), 7 p. m., Jim Brothers duo; 7:15, baseball; 8, Traveler Stage concert; 8:30, Radio Entertainment concert; 9, musicale.

WFL, Philadelphia, Pa. (384.3), 8 p. m., "Animals in the Hot Weather"; 8:45, Belvoir Stratford roof garden orchestra.

WGR, Buffalo, N. Y. (319), 2:30-4:30 p. m., WGR's afternoon program; 6:30-7:30, two piano recital, Gessel Methodists; 9-9:15, piano, Jeanita Amstein; 9:15-11, Olympic dance orchestra; 11-1 a. m., supper dance music, Vincent Lopez Hotel Statler dance orchestra, Harold Gleason, director.

WHN, New York, N. Y. (381.2), 7-7:30 p. m., Barry Richmond and his club; 7:30-8, Harry Richmond, tenor; 8-8:15, Danzig's variety society orchestra; 8:15-11, Palisades Amusement Park orchestra; 10:30-11, Ipana band dance orchestra.

WIP, Philadelphia, Pa. (388.2), 3 p. m., "Song of the Surf"; 3:30, Concert's philharmonic orchestra; 4:30, Bonamia Franklin concert orchestra; 7, Marie Vignas, ballroom stories.

WJAR, Providence, R. I. (305.9), 7:30 p. m., program from New York.

WJZ, New York, N. Y. (430.4), 4:30-5 p. m., Metropolitan station; 7:30-8, daily reports; 7-7:30, Cafe Boulevard orchestra; 7:30-8:30, actual proceedings of a night traffic court from Schenectady court; 8:30-9:30, N. Y. Edison news; 9:30-10:30, Billy Hayes, Greenwich Village Inn orchestra.

WKAQ, San Juan, P. R. (340.7), 4-10 p. m., Municipal band concert.

WLIT, Philadelphia, Pa. (394.5), 6-6 p. m., Minerva North, pianist; 7:30, Irene Dady's ballroom stories; 8, sports talk; 9, auto talk; 10, Arcadia cafe dance orchestra.

WMAA, New York, N. Y. (340.7), 4-5 p. m., Original Indian Five orchestra; 6:30-7:30, Ernie Gold and his Hotel Michigan orchestra; 8:15-10:15, Law Krueger's Aladdin orchestra; 9-11, Broadway Night Lights.

PWX, Havana, Cuba (400), 8:30 p. m., General Staff band.

WBBM, Chicago, Ill. (226), 8:10 p. m., Samovar orchestra, Maurice Silverman, Dave Nutelein, Harold Anderson, Marie Winters, J. Kelly Smith, Eugene male quartet, Charlie Garrison, Jerry Cronach; 12-2, Samovar orchestra.

WEZ, Springfield, Mass. (333.1), 6 p. m., dinner concert, Hotel Kimball trio; 6:30, baseball results; 6:32, native story, Thornton W. Burgess; 8, piano recital, Lovetta Chausagne; 8:15, John W. S. Shiver, humorist; 9:30, Bernice Renhall, trumpeter; Miss Lindsay, cornetist; 9, Hotel Drumswick orchestra; 9:30, baseball results.

WCEE, Elgin, Ill. (275), 10:30-12, midnight, Purple Grackle orchestra, male; 10:30-12, midnight, Purple Grackle orchestra, male; 10:30-12, midnight, Purple Grackle orchestra, male; 10:30-12, midnight, Purple Grackle orchestra, male.

WCX, Detroit, Mich. (318.9), 6 p. m., dinner concert, Book-Cadillac hotel; 7:30, hand concert, Belle Islet; 8:30, musical program.

WEAR, Cleveland, Ohio (389.4), 7-8 p. m., dinner concert, Hotel Cleveland orchestra, Ivan Francis, director.

WFBH, Chicago, Ill. (370.2), 7:30-8:20 p. m., Oriole concert orchestra, "Books of the Day," Leveilyn Jones; Florence Behrend, soprano; baseball scores; 9:30-10:30, Oriole dance orchestra; Robert York, tenor; songs, Correll and Gosselin; Oriole dance orchestra; Robert York, tenor; Oriole orchestra quintet.

WGN, Chicago, Ill. (370.2), 6:30-7:30 p. m., Drake studio program; 10:30-11:30, Drake Hotel Terrace Garden program.

WJY, Schenectady, N. Y. (329.5), 5:30 p. m., children's program; 7:30-8:30, dance orchestra; 8:30-9:30, dance orchestra; 9:30-10:30, dance orchestra; 10:30-11:30, dance orchestra; 11:30-12:30, dance orchestra; 12:30-1:30, dance orchestra; 1:30-2:30, dance orchestra; 2:30-3:30, dance orchestra; 3:30-4:30, dance orchestra; 4:30-5:30, dance orchestra; 5:30-6:30, dance orchestra; 6:30-7:30, dance orchestra; 7:30-8:30, dance orchestra; 8:30-9:30, dance orchestra; 9:30-10:30, dance orchestra; 10:30-11:30, dance orchestra; 11:30-12:30, dance orchestra; 12:30-1:30, dance orchestra; 1:30-2:30, dance orchestra; 2:30-3:30, dance orchestra; 3:30-4:30, dance orchestra; 4:30-5:30, dance orchestra; 5:30-6:30, dance orchestra; 6:30-7:30, dance orchestra; 7:30-8:30, dance orchestra; 8:30-9:30, dance orchestra; 9:30-10:30, dance orchestra; 10:30-11:30, dance orchestra; 11:30-12:30, dance orchestra; 12:30-1:30, dance orchestra; 1:30-2:30, dance orchestra; 2:30-3:30, dance orchestra; 3:30-4:30, dance orchestra; 4:30-5:30, dance orchestra; 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5:30-6:30, dance orchestra;

KENTUCKY SONGS FEATURE OF WHA

Index to Popular Concerts

TABULATED below is a time table of the stations giving popular concerts this week. Stations are divided into the four different standard times in use. The hours are given in the kind of time in use at each listed station. By using this table as an index and referring to the complete programs below, full information will be obtained.

Popular

Atlantic or Eastern Daylight Saving Time Stations

Saturday, July 18: 7:30, WHAR: 8:15, WEAF; 8:45, WTP.
Sunday, July 19: 7:30, WCAE, WEAF, WEEL; 9, WNYC; 10, WHN, WNYC.

Monday, July 20: 6:45, WFI; 7:30, WEEL; 7:45, WHHG; 8:15, WAHG; 9, WEAF, WMCA, WOR; 9:15, WAHG; 10, WMCA; 10:30, WMCA; 11, WOR; 12, WHN.

Tuesday, July 21: 6:15, WFI; 7:15, WHN; 7:30, WCAE, WHN; 7:45, WEAF; 8, WHAR; 8:10, WEAF; 8:15, WEEL; 8:30, WCAE, WEEL, WFI; 8:45, WTP; 9, WGBS; 10, WGBS; 10:30, WGBS.

Wednesday, July 22: 6:45, WFI; 7, WHN; 8, WAHG; 8:45, WEEL; 9:15, WEEL; 10:15, WNYC; 11, WCAE; 12, WMCA.

Thursday, July 23: 6:30, WHN; 6:45, WFI; 7:30, WEAF, WHAR; 8, WHAR, WHN; 8:45, WTP; 10:15, WHN; 10:30, WJZ.

Friday, July 24: 6:30, WGBS; 6:45, WFI; 7, WGR; 7:45, WAHG; 8, WEAF, WEEL, WLT; 8:30, WEEL; 8:45, WAHG, WLT; 9, WFO; 9:30, WHN; 10, WLT; 10:30, WEAF.

Eastern Standard or Central Daylight Saving Time Stations

Saturday, July 18: 8, WBBM, WHT, WLS, WTAS; 8:30, WMBB; 9, WBBM, WLS; 9:30, WMBB, WJZ; 9:30, WMBB, WJZ; 10:30, WCEB, WGES, WHT, WJZ; 11, WBBM, WGES, WJZ; 11:30, WCEB, WJZ; 12, WHT, WJZ, WRBO, WSAI; 1, WJZ.

Sunday, July 19: 6:20, WJZ; 8, WBBM, WTAS; 8:30, WMBB; 9, WBBM, WTAS; 9:15, WHT; 9:30, WMBB, WTAS; 10:30, WGES; 11, WGES, WTAS; 12, WBBM, WJZ; 1, WJZ.

Monday, July 20: 6, WBBM; 8, WLV, WTAS; 8:30, WTAS; 9:30, WJZ; 10:15, WHT; 10:30, WCEB, WJZ; 11, WHT; 11:30, WCEB, WHT, WJZ; 12, WHT, WJZ.

Tuesday, July 21: 6, WBBM, WTAS; 8:30, WMBB; 9, WBBM, WHT, WTAS; 9:30, WBBM, WMBB; 10, WBBM, WLS, WJZ; 10:30, WCEB, WBBB, WJZ; 11, WBBM, WHT, WLS; 11:30, WCEB, WBBB, WGES, WHT, WJZ, WJZ; 12, WBO, WLS; 12:30, WBBB, WJZ; 1, WBO, WJZ; 2, WJZ.

Wednesday, July 22: 8, KFOA, WLS, WTAS; 8:30, WBBM, WMBB; 9, WBBM, WTAS; 9:30, WBBM, WMBB; 10, KYW, WHT, WJZ; 10:30, WCEB, WBBB, WGN, WHT, WJZ; 11, KYW, WGES, WHT, WJZ; 10, WLS, WJZ, WSAI; 11:30, WCEB, WBBB, WJZ; 1, WGBS, WJZ; 12:30, WBBB, WJZ; 1, WBO, WJZ; 2, WJZ.

Thursday, July 23: 8, WBBM, WTAS; 8:30, WMBB; 9, WBBM, WTAS; 9:30, WBBB, WMBB; 10, WJZ, WLS, KYW, WGES, WHT, WJZ; 11, WHT, WJZ, WTAS; 12, WHT, WJZ, WTAS.

Central Standard Time Stations

Saturday, July 18: 7, KSD; 8:30, WSWB; 9, KFRU, WOAW; 9:30, WSMB; 10, KFRU, KIVE; 10:45, WSB; 11, KFAB, KFRU, KFVE, WOAW; 11:45, WJZ.

Sunday, July 19: 7:30, WFAA.
Monday, July 20: 6:34, WCCO; 7:30, KFAB; 8, KFRU; 8:30, KFAB, WSMB; 9, KFRU; 9:30, WSMB; 10, WFAA.

Tuesday, July 21: 6:30, WFAA, WOC; 8, WCCO, WSB; 10:30, KFRU, WOAW; 10:45, WSB; 11, KFAB, WLS; 11:30, KFRU; 11:45, WDAF.

Wednesday, July 22: 7:30, KFAB, WHO; 8, KFRU; 8:30, KFAB, WSMB; 9, KFRU, WOAW; 9:30, WSMB; 10, KFRU; 10:45, WSB; 11:45, WDAF.

Thursday, July 23: 8, WCCO; 9, WFAA; 11:45, WDAF.
Friday, July 24: 6:30, WFAA; 7:30, KFAB; 8, WDAF; 8:30, KFAB; 9, WFO; 10:45, WSB; 11, KFRU; 11:45, WDAF; 12, KFRU.

Mountain Standard Time Stations

Saturday, July 18: 8, KOA.
Sunday, July 19: 8, KPNA.
Monday, July 20: 8, KOA; 9, KPWA.
Tuesday, July 21: 8, KOA; 9, CNRR; 9, CNRR.

Wednesday, July 22: 8, KOA; 9, KPWA.
Thursday, July 23: 9, CNRR; 10, CNRR.
Friday, July 24: 8, KOA; 8:30, CNRR.

Pacific Standard Time Stations

Saturday, July 18: 6, KFOA, KHJ; 6:30, KNX; 6:45, KFOA; 7:30, KHJ, KNX; 8, KHJ, KNX; 9, KHJ, KNX; 10, KHJ, KNX; 11, KHJ, KNX; 12, KHJ, KNX; 1, KHJ, KNX; 2, KHJ, KNX.

Sunday, July 19: 6:30, KHJ; 6:35, KPO; 7, KHJ, KNX; 8, KNX, KPO; 9, KGW, KXN; 10, KFOA, KGW; 11, KHJ, KNX; 12, KHJ, KNX; 1, KHJ, KNX; 2, KHJ, KNX.

Monday, July 20: 6, KFOA, KGW; 6:45, KFOA; 7:30, KFAE, KNX; 8:30, KFAB; 9, KPO.
Tuesday, July 21: 6, KFOA, KHJ; 6:30, KNX; 6:40, KPO; 6:45, KFOA; 7:45, KFWE; 8, KGO, KPO; 8:30, KFOA; 9, KGW; 9:15, KPO; 10, KGW.

Wednesday, July 22: 6, KFOA, KHJ; 6:45, KFOA; 7, KNX; 7:30, KFAB; 8, KNX, KPO; 8:30, KFAB, KFOA, KHJ; 9, KNX, KPO.
Thursday, July 23: 6, KFOA, KHJ; 6:30, KNX; 8, KGW, KPO; 9, KNX, KGW, KNX.

Friday, July 24: 6, KFOA, KHJ; 6:15, KPO; 6:45, KFOA; 7:30, KHJ, KNX; 8, KNX, KGW; 8:30, KFAB; 9, KGW, KNX.



Anna S. Gordon, violinist, may be heard from WFL, Philadelphia, Monday, July 20. Wanda Gall (right), is the cheerful blues singer appearing Tuesdays at WJZD, Mooseheart.

7:30, U. S. Marine band; 9, Royal hour, Hungarian music

WFL, Deerfield, Ill. (399.8), 7-1:30 p. m., classical program. Tony'Connor, tenor; Margaret Garrity, pianist; 7:30-8, harmony, Wilkins and Martins; 8:00-8:15, vocal solo; 8:15-8:30, classical organ music; Al Carney, (288 meters), 8:45-10:15, Elmer Kaiser's Riverport Fair Ballroom orchestra; 10:15-11:30, Agatha Karlen, leader; Sandy Meek, tenor; Al Carney, organist; 11:30-12, Si Berg, ukulele soloist; Walter Donovan, tenor; Julie Peterson, 10:45, concert. WLV, Deerfield, Ill. (344.8), 8:30 p. m., Ralph Emerson, organist; Gladys Weigman, contralto; 7:15, Rex's Carnubus; 8:35, E. Warren K. Howe's classical program; Esther Ghio, soprano; William Hayden, tenor; 8:45, concert. WLV, Deerfield, Ill. (344.8), 8:30 p. m., Ralph Emerson, organist; Gladys Weigman, contralto; 7:15, Rex's Carnubus; 8:35, E. Warren K. Howe's classical program; Esther Ghio, soprano; William Hayden, tenor; 8:45, concert. WLV, Deerfield, Ill. (344.8), 8:30 p. m., Ralph Emerson, organist; Gladys Weigman, contralto; 7:15, Rex's Carnubus; 8:35, E. Warren K. Howe's classical program; Esther Ghio, soprano; William Hayden, tenor; 8:45, concert.

WMAK, Chicago, Ill. (447.5), 4 p. m., piano recital; Adelaide Aptol; J. d'Amico, concert; 7:30, talk. Dr. C. N. Kaufman, oculist; 7:35, Secretary Hawkins; 7:45, Mrs. J. J. McLaughlin, piano; 8:00, talk on education; John Jullier; 9, The Jolly Boys; 9:30, Chapman's orchestra.

WMAK, Chicago, Ill. (447.5), 7-8:30 p. m., German national semi-classical program, Triano ensemble; Marie Caruso, soprano; Wanda Gall, contralto; 8:30, talk on education; John Jullier; 9, The Jolly Boys; 9:30, Chapman's orchestra.

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DANCING

(Central Time)

Saturday, July 18: 8, KGW, WLS; 8:30, WLS; 9, WLS; 9:30, WLS; 10, WLS; 11, WLS; 12, WLS; 1, WLS; 2, WLS.

WCOO, Minneapolis-St. Paul, Minn. (416.4), 4 p. m., baseball scores; 4:45, Reuters club; 6, baseball scores; 6:30, WEAF program; 8, baseball scores; 8:30, WEAF program; 9, baseball scores; 9:30, WEAF program; 10, WEAF program; 10:30, WEAF program; 11, WEAF program; 11:30, WEAF program; 12, WEAF program; 1, WEAF program; 2, WEAF program.

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Thursday, July 23

(Continued from page 11)

WEEL, Boston, Mass. (429), 7:45 p. m., baseball; 8, music; 9, A. Walter Kent British artists; 10, Goodrich Silverton Pop orchestra.

WFL, Philadelphia, Pa. (394.5), 7 p. m., health talk; 7:10, talk, Independent Magazine; 7:30-7:35, Nonstop Radio exchange, director, Mabel Swift; 7:45, 8:15, Baltimore Stratford Band; 8:30, 8:45, Trading with music; 9:15, 9:30, A. Walter Kent Radio artists; 10, Goodrich Silverton Pop orchestra.

WGBS, New York, N. Y. (315.6), 6-6:30 p. m., Uncle George; 6:30-7, Helene Orban Assizes Harmonica; 7:10-7:15, talk, Independent Magazine; 7:30-7:35, Helene Orban; 7:45-7:50, vocal solos; Edna Egan and Ed Sheeran; 7:55-8:15, Paula Domingo, tenor; 8:15-8:30, vocal solo; 8:30-8:45, vocal solo; 8:45-9, vocal solo; 9:15-9:30, vocal solo; 9:30-9:45, vocal solo; 9:45-10, vocal solo; 10:15-10:30, vocal solo; 10:30-10:45, vocal solo; 10:45-11, vocal solo; 11:15-11:30, vocal solo; 11:30-11:45, vocal solo; 11:45-12, vocal solo; 12:30-1, vocal solo; 1:15-1:30, vocal solo; 1:30-1:45, vocal solo; 1:45-2, vocal solo; 2:15-2:30, vocal solo; 2:30-2:45, vocal solo; 2:45-3, vocal solo; 3:15-3:30, vocal solo; 3:30-3:45, vocal solo; 3:45-4, vocal solo; 4:15-4:30, vocal solo; 4:30-4:45, vocal solo; 4:45-5, vocal solo; 5:15-5:30, vocal solo; 5:30-5:45, vocal solo; 5:45-6, vocal solo; 6:15-6:30, vocal solo; 6:30-6:45, vocal solo; 6:45-7, vocal solo; 7:15-7:30, vocal solo; 7:30-7:45, vocal solo; 7:45-8, vocal solo; 8:15-8:30, vocal solo; 8:30-8:45, vocal solo; 8:45-9, vocal solo; 9:15-9:30, vocal solo; 9:30-9:45, vocal solo; 9:45-10, vocal solo; 10:15-10:30, vocal solo; 10:30-10:45, vocal solo; 10:45-11, vocal solo; 11:15-11:30, vocal solo; 11:30-11:45, vocal solo; 11:45-12, vocal solo; 12:30-1, vocal solo; 1:15-1:30, vocal solo; 1:30-1:45, vocal solo; 1:45-2, vocal solo; 2:15-2:30, vocal solo; 2:30-2:45, vocal solo; 2:45-3, vocal solo; 3:15-3:30, vocal solo; 3:30-3:45, vocal solo; 3:45-4, vocal solo; 4:15-4:30, vocal solo; 4:30-4:45, vocal solo; 4:45-5, vocal solo; 5:15-5:30, vocal solo; 5:30-5:45, vocal solo; 5:45-6, vocal solo; 6:15-6:30, vocal solo; 6:30-6:45, vocal solo; 6:45-7, vocal solo; 7:15-7:30, vocal solo; 7:30-7:45, vocal solo; 7:45-8, vocal solo; 8:15-8:30, vocal solo; 8:30-8:45, vocal solo; 8:45-9, vocal solo; 9:15-9:30, vocal solo; 9:30-9:45, vocal solo; 9:45-10, vocal solo; 10:15-10:30, vocal solo; 10:30-10:45, vocal solo; 10:45-11, vocal solo; 11:15-11:30, vocal solo; 11:30-11:45, vocal solo; 11:45-12, vocal solo; 12:30-1, vocal solo; 1:15-1:30, vocal solo; 1:30-1:45, vocal solo; 1:45-2, vocal solo; 2:15-2:30, vocal solo; 2:30-2:45, vocal solo; 2:45-3, vocal solo; 3:15-3:30, vocal solo; 3:30-3:45, vocal solo; 3:45-4, vocal solo; 4:15-4:30, vocal solo; 4:30-4:45, vocal solo; 4:45-5, vocal solo; 5:15-5:30, vocal solo;

An Evening at Home with the Listener In

STATIONS IN ORDER OF WAVE LENGTHS USED

(FOR PACIFIC TIME)

Meters Call	Meters Call	Meters Call	Meters Call	Meters Call	Meters Call
226 WBRM	275.3 KJWB	315.6 KFDN	365.6 WDAF	405.2 WOR	468.5 WCAP
226 WBOB	278 KWVG	315.6 WAHG	365.6 WHB	405.2 WBAR	468.5 WRC
240 KFAB	278 WCAU	315.6 WGBS	370.2 CYB	410.7 CKAC	476.9 WBP
240 KNYE	278 WLDL	319 WGR	370.2 WBE	421 WCCO	476.9 WBEI
243.8 WAMD	278 WREB	319 WSMB	370.2 WGM	421 WYVA	476.9 WFAA
250 WGS	280.2 WNAC	322.4 KOA	374.8 KTHS	422.3 KIAP	480 CYC
250 WMBB	282.8 WQAN	326.9 WSAI	379.5 WGY	428.3 WBS	483.8 WOL
252 KFNB	285.5 WKAR	326.9 WKRC	379.5 WHAZ	428.3 KPO	483.6 WSUI
252 WGPC	285.5 WRO	330.0 CYX	384.4 CKY	434.5 CNRO	491.5 KGW
261 KFWA	289.9 KJIS	336.9 RNK	384.4 KJR	434.5 NAA	491.5 WMC
265.5 WMAK	293.9 WBAV	340.7 WKAQ	389.4 WEAR	434.5 CFNC	508.2 KLN
266 KFNF	293.9 WFAO	340.7 WJCA	389.4 WTAM	440.9 KLDL	508.2 WIP
266 WBN	296.9 KPRC	344.6 WCLD	394.5 KFRU	440.9 WDR	508.2 WOO
272 WFB	299.8 KMG	344.6 WDS	394.5 WFI	440.9 WOS	516.9 CJCA
272.6 WBEJ	299.8 KSL	344.6 WLS	394.5 WFL	447.6 WMAQ	516.9 WJX
272.6 WFBH	299.8 WPD	348.6 KFAE	394.5 WLIT	447.6 WQJ	526 WHO
273 WRW	302.8 WJG	348.6 WVIC	394.5 WOI	454.3 KFOA	526 WNYC
275 KFAU	302.8 WTAS	352.7 WVVJ	399.8 WHAS	454.3 WIZ	526 WOAW
275 WABL	305.9 KTCI	352.7 WJW	399.8 WHS	454.3 KNY	526 WYX
275 WHAD	305.9 WJAR	352.7 CHNC	400.0 PWX	454.3 WJW	526 WYX
275 WHAR	309.1 KDKA	361.2 KGO	405.2 KJY	461.3 WCAE	545.1 KSD
275 WORD	313.0 CNRA	361.2 WHN	405.2 WJH	467 KFI	545.1 KSD

Call	Met.	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Met.	Call	
ATF	435	Silent	3:00-4:00	Silent	Silent	Silent	5:00-7:55	Silent	435	ATF	
CFCA	359.9	Silent	4:00-5:00	Silent	Silent	5:15-6:15	Silent	5:15-6:15	Silent	359.9	CFCA
CFNC	484.9	9:00-11:00	Silent	Silent	Silent	Silent	7:00-8:00	Silent	484.9	CFNC	
CFNB	356.9	Silent	4:00-5:00	Silent	Silent	Silent	7:00-8:00	Silent	356.9	CFNB	
CJCA	516.9	9:00-10:00	6:30-7:30	Silent	Silent	Silent	8:00-10:00	Silent	516.9	CJCA	
CKAC	410.7	4:30-5:30	1:30-2:30	Silent	4:30-5:30	Silent	4:30-5:30	Silent	410.7	CKAC	
CKY	384.4	Silent	5:00-7:45	Silent	5:00-7:45	Silent	5:00-7:45	Silent	384.4	CKY	
CKY	384.4	Silent	5:00-7:45	Silent	5:00-7:45	Silent	5:00-7:45	Silent	384.4	CKY	
CNRO	434.5	3:00-9:30	Silent	Silent	Silent	Silent	4:30-9:30	Silent	434.5	CNRO	
CYB	407	8:15-9:45	Silent	Silent	Silent	Silent	Silent	Silent	407	CYB	
CYL	480	Silent	Silent	Silent	8:00-9:30	Silent	Silent	8:00-9:30	480	CYL	
CYX	380	Silent	Silent	7:15-8:30	Silent	Silent	Silent	7:15-8:30	380	CYX	
KDKA	240	5:45-6:55	12:00-4:30	5:45-6:55	5:45-6:55	5:45-6:55	5:00-8:30	5:45-6:55	240	KDKA	
KFAB	309.1	Silent	2:30-4:00	Silent	Silent	Silent	7:30-9:00	Silent	309.1	KFAB	
KFAE	348.6	Silent	Silent	Silent	Silent	Silent	Silent	Silent	348.6	KFAE	
KFAU	275	Silent	7:00-8:00	Silent	Silent	Silent	Silent	Silent	275	KFAU	
KFNB	252	Silent	6:00-7:00	Silent	6:00-7:00	Silent	Silent	6:00-7:00	252	KFNB	
KFI	427	6:15-12:00	4:00-11:00	6:15-11:00	6:15-11:00	6:15-11:00	6:15-11:00	6:15-11:00	427	KFI	
KFMW	209.8	Silent	Silent	Silent	7:00-8:00	Silent	Silent	7:00-8:00	209.8	KFMW	
KFNF	266	5:30-6:30	4:30-8:00	5:30-6:30	5:30-6:30	5:30-6:30	5:30-6:30	5:30-6:30	266	KFNF	
KFOA	454.3	6:00-11:00	Silent	6:00-11:00	6:00-11:00	6:00-11:00	6:00-11:00	6:00-11:00	454.3	KFOA	
KFRU	394.5	5:30-10:00	Silent	5:30-10:00	5:30-10:00	5:30-10:00	5:30-10:00	5:30-10:00	394.5	KFRU	
KFDL	447.6	Silent	6:15-7:15	Silent	Silent	Silent	Silent	Silent	447.6	KFDL	
KFVE	240	Silent	8:00-10:00	Silent	8:00-10:00	Silent	Silent	8:00-10:00	240	KFVE	
KFWA	261	Silent	7:00-10:00	Silent	7:00-10:00	Silent	Silent	7:00-10:00	261	KFWA	
KFWB	292	7:00-11:00	9:00-11:00	7:00-11:00	7:00-11:00	7:00-11:00	7:00-11:00	7:00-11:00	292	KFWB	
KGW	410.7	8:00-1:00	3:00-9:00	8:00-1:00	8:00-1:00	8:00-1:00	8:00-1:00	8:00-1:00	410.7	KGW	
KHJ	405.2	6:30-11:00	8:00-11:00	7:00-1:30	5:50-11:00	5:50-11:00	5:50-11:00	5:50-11:00	405.2	KHJ	
KIAF	421	Silent	7:00-8:00	7:00-8:00	7:00-8:00	7:00-8:00	7:00-8:00	7:00-8:00	421	KIAF	
KJIS	384.4	Silent	7:00-8:00	6:00-10:00	Silent	8:30-10:00	10:30-12:00	8:30-10:00	384.4	KJIS	
KJR	384.4	Silent	7:00-8:00	6:00-10:00	Silent	8:30-10:00	10:30-12:00	8:30-10:00	384.4	KJR	
KJWB	275.3	Silent	7:15-8:30	Silent	8:00-9:00	Silent	8:00-9:00	Silent	275.3	KJWB	
KJWB	275.3	Silent	7:15-8:30	Silent	8:00-9:00	Silent	8:00-9:00	Silent	275.3	KJWB	
KLDL	508.2	Silent	4:30-6:00	Silent	4:30-6:00	Silent	4:30-6:00	Silent	508.2	KLDL	
KLN	508.2	Silent	4:30-6:00	Silent	4:30-6:00	Silent	4:30-6:00	Silent	508.2	KLN	
KNNX	339.9	8:00-2:00	5:00-11:00	6:30-12:00	6:30-12:00	7:00-10:00	6:30-12:00	6:30-12:00	339.9	KNNX	
KOA	322.4	Silent	3:00-8:00	5:30-8:00	Silent	5:30-8:00	Silent	5:30-8:00	322.4	KOA	
KPO	428.3	6:00-12:30	6:00-12:30	6:00-12:30	6:00-12:30	6:00-12:30	6:00-12:30	6:00-12:30	428.3	KPO	
KPRC	269.9	6:00-7:30	6:00-7:30	6:00-7:30	6:00-7:30	6:00-7:30	6:00-7:30	6:00-7:30	269.9	KPRC	
KRC	348.6	6:00-7:30	6:00-7:30	6:00-7:30	6:00-7:30	6:00-7:30	6:00-7:30	6:00-7:30	348.6	KRC	
KSL	299.8	7:00-10:00	8:00-10:00	7:00-10:00	8:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	299.8	KSL	
KTHS	374.8	7:25-8:25	7:25-8:25	7:25-8:25	7:25-8:25	7:25-8:25	7:25-8:25	7:25-8:25	374.8	KTHS	
KTW	478	Silent	7:00-8:30	Silent	Silent	Silent	Silent	Silent	478	KTW	
KWVG	278	6:30-7:30	Silent	Silent	6:30-7:30	Silent	Silent	Silent	278	KWVG	
KWVJ	352.4	4:00-10:30	1:00-9:00	Silent	4:00-8:30	4:00-10:30	4:00-10:30	4:00-10:30	352.4	KWVJ	
NAA	434.5	Silent	Silent	4:45-5:00	4:45-5:00	4:45-5:00	4:45-5:00	4:45-5:00	434.5	NAA	
PWX	400	Silent	Silent	4:00-6:00	Silent	Silent	Silent	Silent	400	PWX	
WABL	275	Silent	Silent	4:00-6:00	Silent	Silent	Silent	Silent	275	WABL	
WAGB	315.6	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	315.6	WAGB	
WAMJ	243.8	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	243.8	WAMJ	
WBAR	405	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	405	WBAR	
WBAV	293.9	Silent	3:00-9:00	7:00-8:00	Silent	Silent	Silent	5:00-6:00	293.9	WBAV	
WBBM	226	5:00-9:00	1:00-11:30	Silent	5:00-9:00	5:00-9:00	5:00-9:00	5:00-9:00	226	WBBM	
WBBR	272.6	4:00-5:00	4:00-5:00	Silent	4:00-5:00	Silent	4:00-5:00	Silent	272.6	WBBR	
WBZ	266	6:00-10:00	2:00-9:00	Silent	6:00-12:30	6:00-12:30	6:00-12:30	6:00-12:30	266	WBZ	
WBZ	266	6:00-10:00	2:00-9:00	Silent	6:00-12:30	6:00-12:30	6:00-12:30	6:00-12:30	266	WBZ	
WCAE	461.3	4:00-5:30	2:30-5:30	4:00-5:30	4:00-5:30	4:00-5:30	4:00-5:30	4:00-5:30	461.3	WCAE	
WCAP	468.5	Silent	1:00-6:15	4:20-7:00	Silent	3:45-7:00	Silent	3:45-7:00	468.5	WCAP	
WCB	275	Silent	1:00-6:15	4:20-7:00	Silent	3:45-7:00	Silent	3:45-7:00	275	WCB	
WCCO	416.4	4:00-9:00	3:20-8:15	4:00-7:00	4:00-7:00	4:00-7:00	4:00-7:00	4:00-7:00	416.4	WCCO	
WCX	516.9	3:00-4:00	3:00-4:00	3:00-4:00	3:00-4:00	3:00-4:00	3:00-4:00	3:00-4:00	516.9	WCX	
WDAF	365.6	4:00-11:00	3:00-3:30	4:00-11:00	4:00-11:00	4:00-11:00	4:00-11:00	4:00-11:00	365.6	WDAF	
WDWF	459.9	Silent	1:00-2:45	Silent	4:30-5:30	Silent	Silent	Silent	459.9	WDWF	
WDR	421	2:00-8:00	2:00-8:00	2:00-8:00	2:00-8:00	2:00-8:00	2:00-8:00	2:00-8:00	421	WDR	
WEAO	299.8	Silent	Silent	Silent	Silent	Silent	Silent	Silent	299.8	WEAO	
WEAR	384.4	4:00-12:00	12:30-7:00	4:00-8:00	4:00-8:00	4:00-8:00	4:00-8:00	4:00-8:00	384.4	WEAR	
WEBS	370.2	4:30-9:30	4:00-8:00	Silent	4:30-9:30	4:30-9:30	4:30-9:30	4:30-9:30	370.2	WEBS	
WEBS	370.2	4:30-9:30	4:00-8:00	Silent	4:30-9:30	4:30-9:30	4:30-9:30	4:30-9:30	370.2	WEBS	
WEEL	478	Silent	3:20-6:30	Silent	4:00-7:00	Silent	Silent	Silent	478	WEEL	
WFAP	478	6:30-10:00	4:20-9:00	4:00-7:00	4:00-7:00	4:00-7:00	4:00-7:00	4:00-7:00	478	WFAP	
WFBB	272.6	7:30-10:00	1:00-4:00	7:30-10:00	7:30-10:00	7:30-10:00	7:30-10:00	7:30-10:00	272.6	WFBB	
WFI	315.6	2:00-3:45	12:30-4:30	Silent	2:45-3:45	2:45-3:45	2:45-3:45	2:45-3:45	315.6	WFI	
WFO	226	2:00-3:45	12:30-4:30	Silent	2:45-3:45	2:45-3:45	2:45-3:45	2:45-3:45	226	WFO	
WGBS	315.6	Silent	3:30-8:00	3:30-8:00	Silent	3:30-8:00	Silent	3:30-8:00	315.6	WGBS	
WGES	250	7:30-11:00	7:30-11:00	Silent	7:30-11:00	7:30-11:00	7:30-11:00	7:30-11:00	250	WGES	
WGN	370.2	3:30-8:30	6:00-7:00	Silent	3:30-8:30	3:30-8:30	3:30-8:30	3:30-8:30	370.2	WGN	
WGR	319	4:45-6:15	11:00-12:30	4:00-9:00	4:00-9:00	4:00-9:00	4:00-9:00	4:00-9:00	319	WGR	
WJW	374.8	6:00-9:00	3:30-8:00	6:00-9:00	6:00-9:00	6:00-9:00	6:00-9:00	6:00-9:00	374.8	WJW	
WHAD	275	4:00-5:00	Silent	3:00-8:00	4:00-5:00	4:00-5:00	4:00-5:00	4:00-5:00	275	WHAD	
WHAR	275	4:00-5:00	Silent	3:00-8:00	4:00-5:00	4:00-5:00	4:00-5:00	4:00-5:00	275	WHAR	
WHAS	399.8	5:00-7:00	9:00-9:30	Silent	5:00-7:00	5:00-7:00	5:00-7:00	5:00-7:00	399.8	WHAS	
WHAZ	379.5	Silent	Silent	6:00-8:00	Silent	Silent	Silent	Silent	379.5	WHAZ	
WHB	326.9	Silent	6:00-11:00	6:00-11:00	Silent	Silent	Silent	Silent	326.9	WHB	
WHN	391	Silent	3:00-8:00	Silent	3:00-8:00	Silent	Silent	Silent	391	WHN	
WHO	526	Silent	5:30-7:30	5:30-7:30	5:30-7:30	5:30-7:30	5:30-7:30	5:30-7:30	526	WHO	
WHQ	399.8	4:00-10:00	9:00-7:30	4:00-10:00	4:00-10:00	4:00-10:00	4:00-10:00	4:00-10:00	399.8	WHQ	
WHY	226	2:00-3:00	3:00-4:00	Silent	3:00-4:00	3:00-4:00	3:00-4:00	3:00-4:0			

An Evening at Home with the Listener In

(FOR CENTRAL TIME)

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(FOR EASTERN TIME Or Cities Using Central Daylight Saving Time)

Call	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Call	Location	Met.	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Call	
AT9	Silent	6:00-8:00	Silent	Silent	Silent	7:00-8:30	Silent	AT9	Fort Bragg, N. C.	435	Silent	6:00-7:00	Silent	Silent	Silent	8:00-9:55	Silent	AT9	
CFCA	Silent	6:00-7:00	Silent	7:15-8:15	7:15-8:15	7:15-8:15	Silent	CFCA	Toronto, Ont.	356.9	Silent	7:00-8:00	Silent	8:15-9:15	8:15-9:15	8:15-9:15	Silent	CFCA	
CFGN	11:30-1:00	Silent	Silent	Silent	Silent	8:40-10:00	Silent	CFGN	Calgary, Alta.	454.8	12:00-2:00	Silent	Silent	Silent	Silent	Silent	Silent	CFGN	
CHNC	Silent	Silent	6:30-7:30	Silent	Silent	Silent	Silent	CHNC	Toronto, Ont.	356.0	Silent	7:30-8:30	Silent	Silent	Silent	Silent	Silent	CHNC	
CJCA	10:00-12:00	8:30-9:30	8:30-10:30	8:30-9:30	7:00-9:00	10:00-12:00	9:30-12:00	CJCA	Edmonton, Can.	616.8	11:00-1:00	0:30-1:30	0:30-1:30	0:30-1:30	8:00-10:00	11:00-1:00	10:30-1:00	CJCA	
CKAC	10:00-12:00	8:30-9:30	8:30-10:30	8:30-9:30	7:00-9:00	10:00-12:00	9:30-12:00	CKAC	Montreal, Que.	410.7	11:00-1:00	0:30-1:30	0:30-1:30	0:30-1:30	8:00-10:00	11:00-1:00	10:30-1:00	CKAC	
CKY	Silent	7:00-9:45	Silent	Silent	8:30-10:45	8:00-9:00	8:30-9:45	CKY	Winnipeg, Man.	384.4	Silent	8:00-10:45	Silent	Silent	9:30-11:45	9:00-10:00	9:30-10:45	CKY	
CNRA	Silent	Silent	Silent	6:30-7:30	Silent	Silent	6:30-7:30	CNRA	Moncton, Can.	313	Silent	Silent	Silent	7:30-8:30	Silent	Silent	Silent	CNRA	
CFBO	6:30-11:30	Silent	Silent	Silent	6:30-11:30	Silent	Silent	CFBO	Ottawa, Ont.	424.3	7:30-12:30	Silent	Silent	Silent	7:30-12:30	Silent	Silent	Silent	CFBO
CYB	10:30-11:45	Silent	Silent	10:15-10:45	Silent	Silent	Silent	CYB	Mexico City, Mex.	870	11:30-12:15	Silent	Silent	Silent	10:15-11:15	Silent	Silent	Silent	CYB
CYV	Silent	Silent	Silent	10:00-11:50	Silent	Silent	10:00-11:50	CYV	Mexico City, Mex.	400	Silent	Silent	Silent	11:00-11:50	Silent	Silent	11:00-12:30	CYV	
CXK	Silent	Silent	9:15-10:15	Silent	Silent	Silent	9:15-10:15	CXK	Mexico City, Mex.	330	Silent	Silent	Silent	Silent	Silent	Silent	11:00-12:30	CXK	
KOKA	7:45-8:55	2:00-3:00	7:15-8:15	7:45-10:30	7:45-8:55	7:00-10:30	7:45-8:55	KOKA	Pittsburgh, Pa.	300.1	8:45-9:55	3:00-7:30	3:00-7:30	Silent	8:45-9:55	9:30-11:30	8:45-9:55	KOKA	
KFAB	Silent	6:00-8:00	Silent	Silent	Silent	Silent	Silent	KFAB	Lincoln, Neb.	240	Silent	5:00-6:00	5:00-6:00	5:00-6:00	8:30-11:30	Silent	Silent	KFAB	
KFAE	Silent	Silent	Silent	Silent	Silent	Silent	Silent	KFAE	Pullman, Wash.	348.6	Silent	Silent	Silent	Silent	10:30-12:00	Silent	Silent	KFAE	
KFAU	Silent	Silent	Silent	9:00-10:00	Silent	Silent	Silent	KFAU	Baunton, Tex.	315.8	Silent	Silent	Silent	10:00-11:00	Silent	Silent	Silent	KFAU	
KFDM	Silent	8:00-9:00	Silent	8:00-10:30	Silent	Silent	Silent	KFDM	Los Angeles, Calif.	467	9:45-3:00	7:00-8:00	9:45-2:00	9:45-2:00	9:45-2:00	9:45-2:00	9:45-2:00	KFDM	
KFI	8:45-2:00	6:00-1:00	8:45-1:00	8:45-1:00	8:45-1:00	8:45-1:00	8:45-1:00	KFI	Fayetteville, Ark.	299.3	Silent	Silent	Silent	10:00-11:00	Silent	Silent	Silent	KFI	
KFMQ	Silent	Silent	Silent	8:00-10:00	7:30-8:30	Silent	Silent	KFMQ	Shenandoah, Ia.	258	8:30-9:30	7:30-11:00	8:30-9:30	Silent	8:30-9:30	8:30-9:30	8:30-9:30	KFMQ	
KFNH	8:00-8:30	5:00-10:00	7:30-8:30	Silent	7:30-8:30	7:30-8:30	7:30-8:30	KFNH	Sheffield, Wash.	454.3	8:30-9:30	8:00-9:00	8:00-9:00	8:00-9:00	8:00-9:00	8:00-9:00	8:00-9:00	KFNH	
KFRU	8:00-1:30	5:00-10:00	7:30-8:30	Silent	7:30-8:30	7:30-8:30	7:30-8:30	KFRU	St. Louis, Mo.	545.1	Silent	6:00-8:00	6:00-8:00	6:00-8:00	6:00-8:00	6:00-8:00	6:00-8:00	KFRU	
KFOU	7:30-12:00	5:00-10:00	7:30-8:30	10:30-12:00	10:30-12:00	10:30-12:00	10:30-12:00	KFOU	University City, Mo.	240	11:00-1:00	Silent	11:00-1:00	11:00-1:00	11:00-1:00	11:00-1:00	11:00-1:00	KFOU	
KFVE	Silent	8:15-9:15	8:00-9:00	Silent	9:15-10:15	Silent	Silent	KFVE	Ogden, Utah	281	Silent	10:00-1:00	11:00-1:00	11:00-1:00	11:00-1:00	11:00-1:00	11:00-1:00	11:00-1:00	KFVE
KFUA	10:00-12:00	Silent	10:00-12:00	10:00-12:00	10:00-12:00	Silent	10:00-12:00	KFUA	Hollywood, Calif.	274	Silent	4:00-5:00	4:00-5:00	4:00-5:00	4:00-5:00	4:00-5:00	4:00-5:00	KFUA	
KFWA	Silent	9:30-1:00	11:00-1:00	8:30-1:00	9:00-1:00	9:00-1:00	9:00-1:00	KFWA	Oakland, Calif.	381.2	11:00-4:00	11:00-4:00	11:00-4:00	11:00-4:00	11:00-4:00	11:00-4:00	11:00-4:00	KFWA	
KGD	10:30-3:00	10:00-3:00	10:00-3:00	10:00-3:00	10:00-3:00	10:00-3:00	10:00-3:00	KGD	Portland, Ore.	401.5	9:00-3:00	10:45-12:30	9:00-2:00	11:00-3:00	11:00-3:00	11:00-3:00	11:00-3:00	11:00-3:00	KGD
KGW	8:00-2:30	9:45-11:00	9:00-1:00	10:00-2:00	10:00-2:00	10:00-2:00	10:00-2:00	KGW	Los Angeles, Calif.	405.2	8:30-2:00	9:00-2:00	8:30-2:00	8:30-2:00	8:30-2:00	8:30-2:00	8:30-2:00	KGW	
KHJ	7:30-1:30	8:00-1:00	8:00-3:30	7:30-1:30	7:30-1:30	7:30-1:30	7:30-1:30	KHJ	Los Angeles, Calif.	405.2	8:30-2:00	9:00-2:00	8:30-2:00	8:30-2:00	8:30-2:00	8:30-2:00	8:30-2:00	KHJ	
KIAP	Silent	4:00-5:00	9:00-10:00	Silent	9:00-10:00	Silent	9:00-10:00	KIAP	Sittka, Wash.	421	Silent	3:00-4:00	8:00-9:00	Silent	Silent	Silent	Silent	Silent	KIAP
KIR	9:00-11:00	8:00-1:00	8:00-1:00	Silent	8:00-1:00	8:00-1:00	8:00-1:00	KIR	Seattle, Wash.	235.9	Silent	10:00-11:00	8:00-1:00	Silent	11:30-1:00	11:30-1:00	11:30-1:00	KIR	
KIS	Silent	9:15-11:30	Silent	10:00-11:00	Silent	10:00-11:00	Silent	KIS	Independence, Mo.	408.9	Silent	7:30-11:00	Silent	9:00-1:00	9:00-1:00	9:00-1:00	9:00-1:00	KIS	
KKLD	Silent	6:30-10:00	Silent	3:00-9:00	Silent	8:00-9:00	Silent	KKLD	Oakland, Calif.	509.2	Silent	7:30-11:00	Silent	9:00-2:00	9:00-2:00	9:00-2:00	9:00-2:00	KKLD	
KLX	Silent	9:00-1:00	Silent	8:00-1:00	Silent	8:00-1:00	8:00-1:00	KLX	Hollywood, Calif.	355.1	Silent	8:00-2:00	8:00-2:00	8:00-2:00	8:00-2:00	8:00-2:00	8:00-2:00	KLX	
KMX	10:00-4:00	8:00-2:00	8:00-2:00	8:00-2:00	8:00-2:00	8:00-2:00	8:00-2:00	KMX	San Francisco, Calif.	428.3	9:25-3:00	9:30-2:00	9:30-2:00	9:30-2:00	9:30-2:00	9:30-2:00	9:30-2:00	KMX	
KPO	8:35-2:00	8:30-12:00	8:30-1:00	8:30-1:00	8:30-1:00	8:30-1:00	8:30-1:00	KPO	Houston, Texas	206.9	9:00-10:10	8:45-9:00	8:45-9:00	8:45-9:00	8:45-9:00	8:45-9:00	8:45-9:00	KPO	
KPHC	8:30-6:30	7:45-9:00	8:30-9:30	8:30-9:30	8:30-9:30	8:30-9:30	8:30-9:30	KPHC	St. Louis, Mo.	545.1	8:00-10:30	Silent	8:00-10:30	8:00-10:30	8:00-10:30	8:00-10:30	8:00-10:30	KPHC	
KSD	7:00-9:30	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	8:00-11:00	KSD	St. Louis, Mo.	208.0	10:00-12:00	Silent	10:00-12:00	10:00-12:00	10:00-12:00	10:00-12:00	10:00-12:00	KSD	
KSL	9:00-12:00	10:00-12:00	10:00-12:00	10:00-12:00	10:00-12:00	10:00-12:00	10:00-12:00	KSL	Seattle, Wash.	305.9	Silent	10:00-12:00	11:00-3:00	11:00-3:00	11:00-3:00	11:00-3:00	11:00-3:00	KSL	
KTCL	9:30-11:15	9:30-11:15	9:30-11:15	9:30-11:15	9:30-11:15	9:30-11:15	9:30-11:15	KTCL	Hart Springs, Ark.	374.8	10:25-11:25	10:25-11:25	10:25-11:25	10:25-11:25	10:25-11:25	10:25-11:25	10:25-11:25	KTCL	
KTHS	9:35-10:25	9:35-10:25	9:35-10:25	9:35-10:25	9:35-10:25	9:35-10:25	9:35-10:25	KTHS	Brownsville, Texas	478	9:30-10:30	Silent	Silent	Silent	Silent	Silent	Silent	Silent	KTHS
KWVG	8:30-9:30	Silent	Silent	8:30-9:30	Silent	Silent	Silent	KWVG	Seattle, Wash.	455	Silent	10:00-12:30	Silent	Silent	Silent	Silent	Silent	Silent	KWVG
KTW	8:00-12:30	8:00-12:30	Silent	8:00-12:30	8:00-12:30	8:00-12:30	8:00-12:30	KTW	Chicago, Ill.	535.4	7:00-1:30	8:00-1:30	8:00-1:30	8:00-1:30	8:00-1:30	8:00-1:30	8:00-1:30	KTW	
KWY	Silent	6:15-7:00	Silent	6:15-7:00	6:15-7:00	6:15-7:00	6:15-7:00	KWY	Havana, Cuba	400	8:30-11:00	Silent	Silent	Silent	Silent	Silent	Silent	Silent	KWY
PWX	7:30-10:00	Silent	Silent	7:30-10:00	Silent	Silent	Silent	PWX	Sters, Conn.	275	Silent	7:00-9:00	Silent	7:00-9:00	Silent	7:00-9:00	7:00-9:00	PWX	
WABL	11:00-1:00	Silent	6:00-8:00	Silent	6:00-8:00	Silent	6:00-8:00	WABL	Minneapolis, Minn.	243.8	11:00-12:00	Silent	7:00-9:00	Silent	7:00-9:00	7:00-9:00	7:00-9:00	7:00-9:00	WABL
WAMD	10:00-11:00	2:00-10:00	Silent	10:00-11:00	10:00-11:30	10:00-11:30	10:00-11:30	WAMD	Fort Worth, Texas	475.8	8:00-9:00	12:00-1:00	8:00-2:00	8:30-11:45	8:30-11:45	8:30-11:45	8:30-11:45	8:30-11:45	WAMD
WAP	7:00-8:30	11:00-12:00	7:30-12:00	7:30-10:45	7:30-10:45	7:30-10:45	7:30-10:45	WAP	Shirley, Wis.	408	Silent	11:00-12:00	10:00-11:00	10:00-11:00	10:00-11:00	10:00-11:00	10:00-11:00	10:00-11:00	WAP
WBAR	Silent	10:00-11:00	10:00-11:00	Silent	8:00-9:00	8:00-9:00	8:00-9:00	WBAR	Champaign, Ill.	222	8:00-12:00	3:00-2:00	Silent	8:00-12:00	8:00-10:00	8:00-12:00	8:00-10:00	8:00-10:00	WBAR
WBY	Silent	7:00-9:00	Silent	7:00-9:00	Silent	7:00-9:00	7:00-9:00	WBY	Chicago, Ill.	222	8:00-12:00	3:00-2:00	Silent	8:00-12:00	8:00-10:00	8:00-12:00	8:00-10:00	8:00-10:00	WBY
WDBM	7:00-11:00	3:00-1:00	Silent	7:00-11:00	7:00-11:00	7:00-11:00	7:00-9:00	WDBM	Chicago, Ill.	222	8:00-12:00	3:00-2:00	Silent	8:00-12:00	8:00-10:00	8:00-12:00	8:00-10:00	8:00-10:00	WDBM
WDBR	6:00-7:00	9:00-7:30	Silent	6:00-7:00	6:00-7:00	6:00-7:00	6:00-7:00	WDBR	Springfield, Mass.	331.1	9:00-1:00	5:00-15:00	Silent	9:00-2:00	9:00-2:00	9:00-2:00	9:00-2:00	9:00-2:00	WDBR
WBCN	10:00-12:00	4:00-11:00	Silent	8:00-2:00	7:00-11:00														

Recent Advances in Tuned R.F. Amplification

Part VIII—Constructional Details

By Milo Gurney

WHILE I greatly appreciate the very complimentary interest taken in this series of articles, and now regret that I did not furnish more reference works and added types of bridge structures, I still hope that the information given has been such as will prompt many of you to dig deep into the subject, as without question, bridge structures well constructed, offer a control over every desired feature of Radio construction on and beyond all circuit theories to date. We may well expect an advance in this field in the next year or so that will be very illuminating. Nothing is impossible, something is possible, and if you feel the field is so crowded that there remains little opportunity you may as well be content to get out of line and let Gunga Din do it. For illustration, at the present time considerable interest is being shown in the air core tuned transformers and some quite commendable results have been secured.

Air Core Transformer History

You may look on this work as a somewhat recent development, yet when I tell you that it was my pleasure to see less than two weeks ago a photostat copy of a patent application for air core transformers made in 1834, or over thirty-five years ago, it will then dawn upon you that someone has been working some few years toward their improvement. While I am not privileged to divulge the inside story at this time, yet within the next thirty

very much your duty to climb upon the roof now, while you think of it, and look the old antenna over. Also, it is equally unfair to blame old man static for much of your troubles when you openly offer him every opportunity to bother you. Hence, it is my thought that a few suggestions upon the subject may even help builders of Wheatstone bridge circuits.

There is one hard and fast ironclad rule relative to antenna construction that should be followed if possible, and that refers to its height. Never go over 30 feet or under 25 feet if you can avoid it. Why? Primarily, because old man static seldom bothers excessively at these heights. Another rule that is not quite so ironclad, but should be, is this: Receiving antennas for 200 to 550 meters should be single enamel or insulated wire and not exceed 100 feet in length, or 125 feet with lead-in included. Why? Primarily, because such a length will very materially improve the selectivity of the modern receiver you are using, as it will possess a fundamental wave length value of its own more close to the average broadcast band. Secondly, enamel or insulated wire is not subject to corrosion and offers added protection in its insulating qualities.

While it is generally known that radio frequency currents travel over the outer circumference or surface of the wire, it is still less understood apparently that, as dust, dirt and the carbon element of

telephone nickel slot machine trouble and high leakages were eliminated.

Set Built by the Writer

In concluding my articles I have felt that many of you would be interested in visualizing methods for attaining short cuts in wiring and in layouts. I have therefore designed a receiver using the input circuit shown in figure 38, merely offering it as a suggestion. The front view, figure 41, shows a panel 7x21 with all controls in horizontal line and, while the entire assembly is panel mounted, only four screws appear upon its surface, and these have been touched up with black enamel so that they are not noticeable except upon close inspection.

speaker and automatically lights the tubes. Of greater interest, however, is figure 43, which is also a rear view, and shows all low potential leads cabled in compliance with my earlier suggestion to you.

The assembly's total depth is seven inches while the horizontal assembly is twenty inches in order that it may be used with a 7x21x3 inch cabinet and, as the entire assembly is self supporting, panel strength was of no moment, hence one-eighth stock was used. The total cost of parts, including panel and using \$7.00 transformers and \$8.00 condensers, was under \$35.00 list. Therefore, to those of you who have felt it foolish to buy the

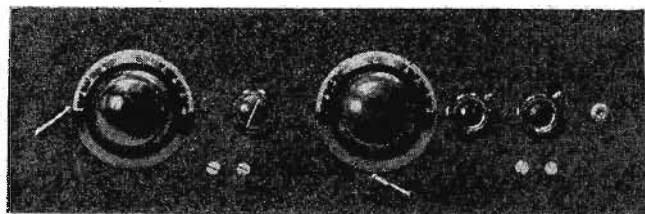


Figure 41

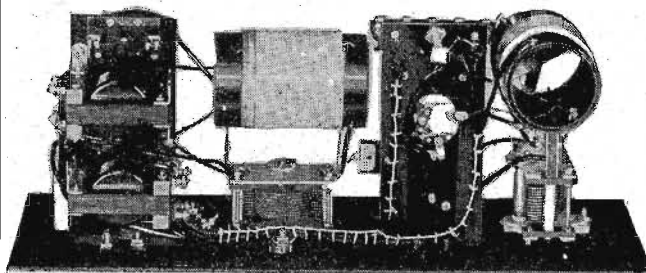


Figure 43

Figure 42 shows a rear view looking down from the top and is pictured first in order that you may visualize the schematic layout. Particular attention is called to the placement of metallic parts in their relation to the inductances, there being a full two and one-half inch separation maintained throughout the assembly. No item in the total assembly is other than standard with the exception of the two sub panels supporting the sockets, etc. All battery and line connections are removed from the face of the panel while a three spring jack controls the output to

best, let me say that I believe you too would arrive at a total cost of \$35.00. I would be ungrateful did I not acknowledge my thanks to the many who have sent me letters of appreciation, and to several of the engineering fraternity who have so considerably let me pester them for added information. After all, this old world has so many master minds who are content to hide their light under a bushel that I hope soon for the day to come when they, in conference assembled, will establish a code of standards in order that the

(Continued on page 20)

days I shall have a set operating which will use an even new type of inductance which will be so superior to present types as to truly create a furor. I am not the inventor of it, but I do believe in patting any fellow on the back who builds a better mouse trap and, when ready, you shall have the entire story in Radio Digest if you want it.

Several have asked whether it is possible to secure a desirable compensation without resorting to the use of true bridge structures. I think it is, although the word desirable should be used advisedly since it is doubtful whether any circuit, which will not permit of control to the point wherein incoming and outgoing impulses can be totally isolated each from the other, will be as efficient.

Circuits can and are designed, however, which prove quite satisfactory and are decided improvements over much that is now offered. Once the theory is understood there can be no reason why much better compensating mediums may not be developed for the control of regeneration.

Antenna and Ground Important

May I, with the above, pass on to the subject of antennas and grounds, as no circuit is any better than its supply medium and it is deplorable to realize that, irrespective of the improvement in both transmitting stations and receiving apparatus, the same antenna and the same old ground that we put up two or three years ago seems good enough for 99 4/10 per cent of Radio users. This is wrong, totally wrong, and not fair to either the station, your receiver or yourself. You must not complain relative to interference and the congestion of the air until after you have done your part toward modernizing your total equipment to meet this new order of things. The horse and buggy days of Radio are over and it is

the air deposit equally upon the insulators as well as on the wire, this accumulation will, in time, be sufficient to create a high resistance path at low frequencies. A consequent absorption to ground thus very materially decreases the efficiency of your antenna as a collecting medium. Will you not then treat your antenna insulators to a bath periodically, scrubbing them thoroughly, and I then believe you will agree that the effort repaid you well.

Upon the subject of grounds, everyone, with but surprisingly few exceptions, runs a wire to the cold water pipe and lets it go at that. While it is to be regretted that ideal grounds are quite beyond the hope of most of us, yet there is much we can do that will be of real benefit. First, your ground wire should not be smaller than No. 14, and preferably of copper, but of greater importance is the method of fastening it to the cold water pipe. If handy with tools, shut off the water, then drill and tap the pipe inserting a tapped cross plug and solder your ground to this. To those who cannot do this, my advice is then to scrape the pipe thoroughly and fasten to it a substantial ground clamp to which your ground wire is fastened. Now comes the most important part of your work: secure some tin foil, all cigar stores have it, and, as soon as the ground clamp is installed, wrap it thoroughly with the tin foil. This finished you should then thoroughly tape over the tin foil and you will be possessed of a ground that others can envy. It cannot oxidize.

As I write this, I can visualize that many readers will feel such thoroughness is not required. Very well, though before you decry it let me tell you that it was only after we had learned how to make good grounds that 40 per cent of

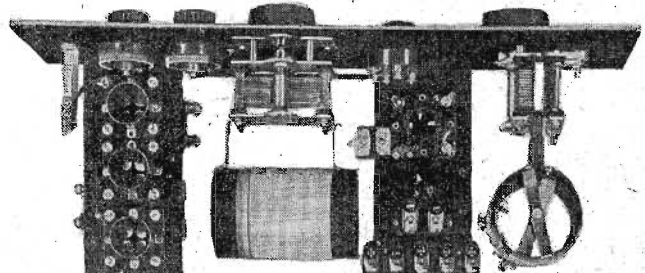


Figure 42

No Technical Knowledge Necessary





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A. B. C. Course in Radio Fundamentals

Chapter XVII—Electromagnetic Radiation

By David Penn Moreton

A CLEAR understanding of the transmission of electromagnetic waves can be had if the reader understands the fundamental properties of magnetic and electric fields.

A magnetic field will be produced about a conductor in which there is an electric current. The direction of this magnetic field will be clockwise about the conductor as you look along the conductor in the direction of the current, and the strength of the field will vary in value as the value of the current changes. The presence of a magnetic field about the conductor in which there is a current can be verified by passing the conductor through a piece of cardboard, which is

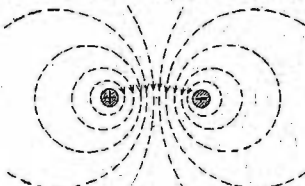


Figure 68

placed in a horizontal position, and sprinkling some fine iron filings on the board. These filings will arrange themselves in concentric circles about the conductor, if the cardboard is jarred a little.

The magnetic field surrounding two parallel conductors is shown in figure 68. The magnetic lines of the field form closed curves around the conductors whose cross sections are shown by the heavy circles. The current in the left hand conductor is toward the paper and the current in the right hand conductor is away from the paper as represented by the plus (+) and minus (-) signs respectively. The crowding of the magnetic lines between the conductors will produce a force

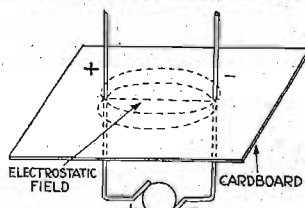


Figure 69

tending to separate the conductors. The fact that there is a force acting between the two conductors is proof of the presence of energy in the magnetic field.

Electrostatic Field Mapping
If a source of high electrical pressure be connected to two wires as shown in figure 69 an electrostatic or electric field will be produced between the two conductors. The presence of this electric field can be verified by sprinkling powdered mica on the cardboard. The particles of mica will arrange themselves in more or less regular lines corresponding in direction to the direction of the electric field. A map of such an electric field is shown in figure 70. The lines originate

at one conductor and terminate on the other. There is a tension in these lines which tends to draw the two conductors together. The fact that there is a force acting between the two is proof of the presence of energy in the electric field.

By superimposing figure 68 on figure 70 a combined map of the electrostatic and electromagnetic fields is the result, as shown in figure 71. An examination of this map shows that the magnetic lines are at right angles to the electrostatic lines. The magnetic field shown in figure 68 was produced when there was a current in the conductors in opposite directions and the electrostatic field was determined when the circuit was open and under these conditions no magnetic field surrounds the conductors. The relative positions of the two fields in space is clearly shown in figure 71, but the physical relation between the two is not apparent. Suppose two electrically charged bodies A and B, be connected by two conductors CD and EF as shown in figure 72. So long as the ends D and F are kept separate, an electrostatic field exists between the charged bodies and between the two conductors. When, however, the two ends D and F are brought into contact the electrostatic lines are allowed to shrink or collapse, their two ends being drawn together, that is, the ends of the

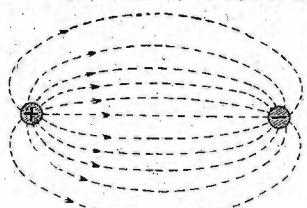


Figure 70

lines slide along the conductors toward the ends D and F. These lines terminate at electric charges and these charges move along the conductors when the ends D and F are connected.

Magnetic and Electric Lines

Now the movement of these charges in the conductors results in an electric current being produced in the conductors. As a result of this current in the conductors, there will be a magnetic field produced which will encircle the conductors whose plane will be at right angles to the axis of the conductors. Hence, in general, the movement of the electric lines along the conductor is accompanied by a magnetic field whose lines are at right angles to the direction of motion of the electric lines and at the same time these magnetic lines have a direction at right angles to the direction of the electric lines. Energy cannot pass from one point to another unless these two fields exist together. If a source of constant electrical pressure be connected to the points A and B, the electric lines will be developed at a constant rate and their motion will be accompanied by a magnetic field of constant strength.

The electric and magnetic fields of radiation are in space quadrature, that is, they are at right angles to each other, but they are, at all times, in phase with each other. In addition to the above relations there is a fixed relation between the magnetic and electric fields at any instant which is based upon the fact, that, in

order for the waves of electromagnetic disturbance to exist in space, the energy per cent of volume of the medium, possessed by the electric field, must be equal to the energy per cent of volume possessed by the magnetic field. The total amount of energy at any point and instant is equal to twice the energy possessed by either field. The value of this energy is changing as the strengths of the two fields change, and as a matter of fact, the energy is being transferred from one point to the next by the elastic properties of the medium in which the disturbance travels. This is similar to the

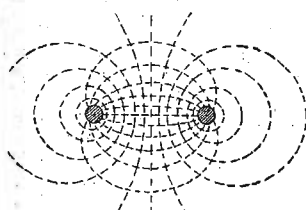


Figure 71

case of water waves, where, at any point, the potential energy per cent of volume is equal to the kinetic energy in the direction of the wave travel, and the total amount of energy is transferred from point to point within the medium, thus bringing about the condition of wave motion.

Transformation of Energy Types

In the case of water waves or electromagnetic waves if, at any point, some of the energy in one of the two forms, potential and kinetic for the water, and electric and magnetic for the electromagnetic waves, be withdrawn from the space wherein the wave exists, part of the energy in the other form will be immediately transformed into the former. This results in the two forms of energy still being equal, but the crests and troughs of the water waves will not be

as high as before, nor will the amplitude of the electric and magnetic field intensities be as large as before.

The reader must appreciate the fact that this phenomenon is different from that of the creation of the ordinary magnetic or electric field around the conductor, which never reaches far from the conductor with appreciable intensity, and does not represent energy permanently removed from the conductor since the variation of this field induces electromotive forces in the conductor, and thus an exchange of energy is kept up between the conductor and the field. A field of this kind is known as an "induction field" to distinguish it from the "radiating field" in which we are more vitally interested.

In the case of the "radiating field," at any point such as P (see figure 73) the magnetic field would be acting along the line PC, and the electric field along the line PD at right angles to PC, while the disturbance would travel to the right and at right angles to both the magnetic and electric fields. These fields will both change in value and in direction, in accordance with the current in the conductor producing the disturbance.

At some point, such as P₁, the disturbance will arrive a little later than at P, which results in the fields at P and P₁ being out of phase. This difference in

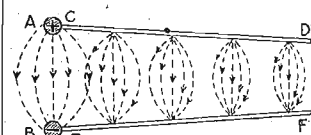


Figure 72

phase will depend upon the distance between the two points, the frequency of the wave and the velocity at which it travels.

Relations of Wave Components

Let us consider the magnetic field, which may be represented by a curve as shown in figure 74 and applies to a par-

(Continued on page 20)

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Part II—Assembly and Wiring

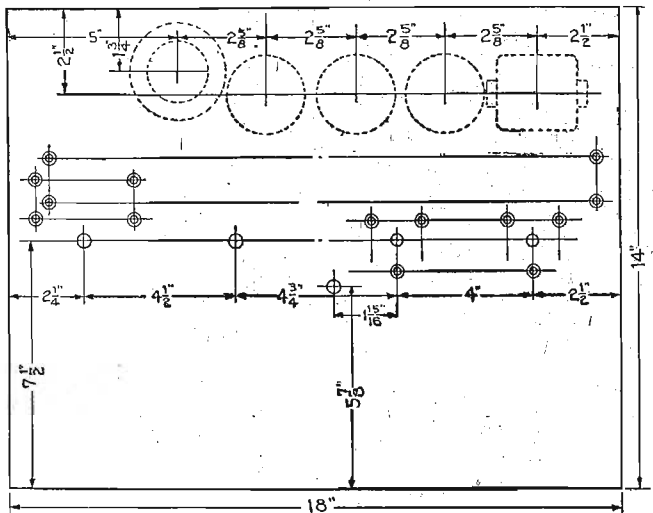
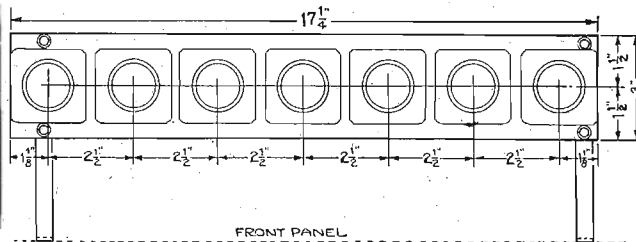
By John G. Ryan.

PRESUMING that the reader has all of the parts specified in the list published with last week's article we are now ready to drill the panel and assemble the various units. The panel drilling diagram is given herewith, as is the diagram for the tube shelf.

The best way to proceed would be to cut a piece of paper 18" x 14" to represent the front panel. Lay this flat on the table so that the parts can be moved around on it to fit. The center points given in the layout should be marked on the piece of paper and the various parts then placed on the paper in the position in which they will later be mounted. Since most of the

mark through the mounting holes on to the paper and the paper can then be used as a drilling template when centerpunching the panel. In the drilling layout it will be noted that there are four large holes on a horizontal line about midway of the panel height. The two holes to the left are for the shafts of the variable condensers while the two holes to the right are for the potentiometer and rheostat.

The condensers should be placed in their proper position on the piece of paper and the brackets which will support the tube shelf can then be moved about on the paper so they will not interfere with the



Front Panel Layout

kits and rheostats are smaller than those used by the writer, the reader should have no difficulty getting the various units to go in their proper place without touching. No center point is given for the oscillator coupler but $3\frac{1}{8}$ " is allowed at the upper left hand corner of the panel for this unit. The filter transformer which comes with your kit may not take the form of the one shown but there will be plenty of room for it.

Use of Paper as Template

With all of the parts in the upper row in their proper places, take a pencil and

condensers. They should be so placed that the upper surface of the tube shelf will be $3\frac{1}{8}$ " from the upper edge of the panel. The height of a 199 tube in the average socket is $3\frac{3}{8}$ " from the surface on which the socket rests. The approximate position of the bracket holes is shown, but without dimensions. Since the tube shelf is 17" long the outer edges of the brackets will be $1\frac{1}{8}$ " apart. With the type of oscillator coupler and filter transformer shown in the photographs, two much smaller brackets about 2" in depth are necessary, but if these two units are built on the style of intermediate transformers they can be secured directly to the front panel in the same manner as the intermediate and the audio transformer. The comparatively large hole in the center of the panel, and $1\frac{3}{8}$ " below the condenser shaft holes, is for the filament switch. No holes for the screws which fasten the brackets for the lower shelf are shown as each builder will have his own ideas as to brackets or those available in different communities will vary in both size and design.

Tube Socket Shelf

The way in which this shelf was mounted by the writer is clearly shown in the photographs, however. The layout for the tube shelf is correct for sockets measuring $2\frac{1}{2}$ " on each side. If your sockets are a little less than $2\frac{1}{2}$ " there will be a little more space between each one. The idea is to get the seven sockets on the shelf and spaced equally apart with the outer edges of the end sockets flush with the ends of the shelf. Since the shelf is $2\frac{1}{2}$ " wide, and the brackets are to be $6\frac{1}{2}$ " deep, there will be a distance of $3\frac{1}{8}$ " or $3\frac{3}{8}$ " between the front edge of the tube shelf and the back surface of the front panel.

It will be noted that the brackets supporting the tube shelf have not been shown the same distance from the two ends of the shelf. It happened that with the kit used by the writer it was necessary to place one of the smaller brackets, which is used to support the oscillator coupler, outside of the left bracket supporting the tube shelf, which accounts for the fact that the left bracket is secured to the shelf considerably farther from the edge than is the right bracket.

Drilling from Layout

Once the location of the various parts has been decided upon, and the mounting holes marked on the surface of the paper, the paper can be clamped or pasted to the panel and the mounting holes punched through. The drilling should be done from the front so that any tendency to chip will occur at the rear surface of the panel.

After mounting holes have been ac-

curately marked, the mounting of the various parts will be the easiest part of the work. The writer should have mentioned before that, when manoeuvring the intermediate frequency transformers on the paper, they should be so turned that the grid binding post on each one will be towards the bottom which will later bring it within an inch of the binding post on the socket to which it is to be connected. Connecting the filament terminals of the various sockets will be found very easy, as a single piece of spaghetti covered bus bar can be laid along the front edges of the sockets and another can be laid along the rear edges and it is only necessary to solder short $3\frac{1}{8}$ " pieces of bus bar on to the soldering lug on each filament terminal on the socket. The bus bar along the front edges of the sockets should now be connected to the rheostat and the other side of the rheostat should be connected to the potentiometer and also to the filament switch. The rear piece of bus bar connecting the filaments should now be connected to the other side of the potentiometer. The grid leak and condenser clips are mounted on the under side of the tube shelf close to the front edge directly below the second and sixth tube sockets. In this position they are readily accessible for changing grid leaks, yet are not in the way and out of sight.

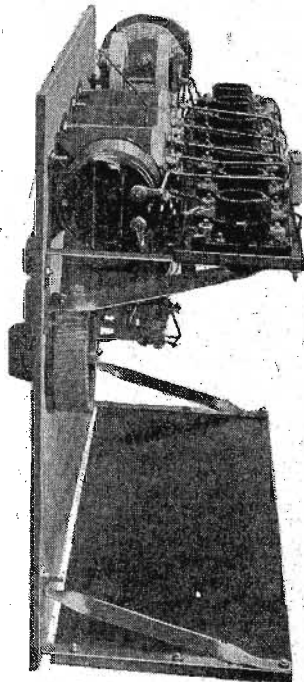
Since the oscillator coupler is at the

left end of the row, the oscillator condenser directly below it and the oscillator tube socket number one at the left on the tube shelf, the oscillator leads will be conveniently short. If the grid binding posts on the intermediate transformers are mounted at the bottom, the plate binding posts will, of course, be at the top, and pieces of bus bar about $2\frac{3}{8}$ " long are used to connect the plate binding posts to the plate terminals of the sockets. These are clearly shown in the end view presented with this article.

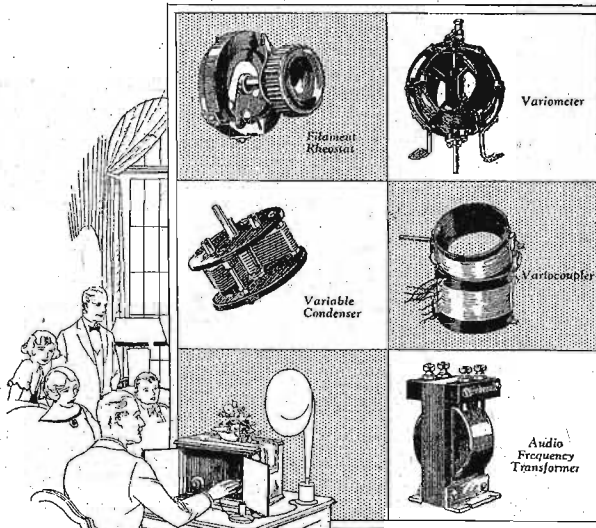
Since the writer used a filament switch of the jack type, and mounted the switch with the frame uppermost, the frame formed a shelf on which the C battery fitted nicely. The plus end of the battery is at the bottom and a wire connects it to the center terminal of the potentiometer. The negative end of the battery is connected to the grid return lead common to three transformers. The grid return from the audio frequency transformer is tapped in so that it will be three volts negative.

The .5 mfd. bypass condenser is hung on the wiring directly behind the potentiometer and one side is connected to the plus filament bus bar at the point where it connects to the potentiometer, while the other side is connected to the point where

(Continued on page 20)



View from Right End of Completed Set, Showing Plate Circuit Wiring



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(Continued from page 19)

the three grid returns join together. Thus, this condenser bypasses both the C battery and the potentiometer.

The position of the .006 mfd. fixed condenser, which bypasses in the plate circuit of the second detector tube, should be clearly seen from the photograph of the rear which was presented with the first article. Placed directly against the socket, which is number 6 from the left, it provides the shortest possible bypass from the plate to the filament terminal of the socket. The .002 mfd. condenser is hung on the wiring in the space between the front edge of the tube shelf and the back of the panel.

Although both sides of the filter coupler are shown shunted with a fixed condenser in the wiring diagram, this is the case on very few of the filter couplers which are part of the super-heterodyne kits on the market. With that one point in exception the wiring diagram, as shown, is correct for most of the kits available. The dealer from whom you purchase apparatus will be glad to point out any minor differences between the diagram which accompanies the kit and the diagram provided with the first article.

The mounting screws which hold the intermediate transformers and the audio transformer to the panel, providing a ready means of grounding the cases on the transformers and their cores. A piece of wire can be slipped under one of the mounting screws of each transformer and extended right across the panel. It should then be bent at a right angle and connected to any convenient point on the negative filament circuit.

A long flexible lead is connected to the plate terminal of the last tube socket and connected to the loud speaker unit, the mounting of which will be shown in the third article. Admittedly there are a number of details which have had to be sketched over and left to the reader's own judgment but this is necessary, since the kits on the market all vary in construction detail, as do also the variable condensers on the market. However, the reader who has constructed one or two sets before, and is even the least bit familiar with wiring diagrams and Radio symbols, will find little trouble with this. (The construction of a loud speaker horn for use with this set, and some suggestions for mounting not only the loud speaker in the set but also the set in the cabinet, will be described in the third article. Mr. Ryan will complete the series next week, including testing instructions and operating suggestions.—Editor's Note.)

A. B. C. RADIO COURSE

(Continued from page 18)

ticular distance from the conductor and a particular instant of time. A little later the field would be represented by the curve B, that is the intensity at every point in space has changed from a value

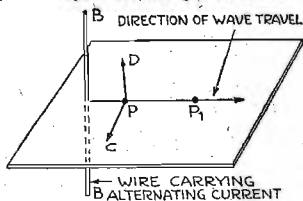


Figure 73

corresponding to curve A to a value corresponding to the curve B. The wave has shifted to the right by an amount equal to the distance C. Additional curves

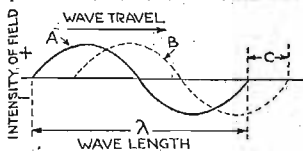


Figure 74

may be drawn for successive points along the line of travel and different intervals of time and finally the magnetic field has completed a cycle and starts to repeat itself.

If we let λ equal the wave length in centimeters, v equal the velocity of travel in centimeters per second, and f equal the frequency of the field in cycles per second, then the time for one complete cycle will

be equal to $\frac{1}{f}$ and the wave length λ will

be equal to $\frac{1}{f} v$, and the velocity v will be equal to λf , which is the fundamental relation for any wave transmission.

The velocity at which electromagnetic waves are transmitted is equal to the velocity of light when the wave is being transmitted through air, but in general we have the following relations:
 v = the velocity of light in a vacuum.

v = velocity of transmission of the wave in any uniform medium.
 μ = magnetic permeability of the medium, that is, its ability to conduct magnetic lines in comparison to air.
 k = specific inductive capacity of the medium.

$$v = \frac{v}{\sqrt{\mu k}}$$

Now for air $\mu=1$ and $k=1$, then $v=V$. The above expression for v neglects all losses occurring in the medium, such as hysteresis and dielectric losses. As the wave travels outward, some of the energy is absorbed by the medium in which the wave is being transmitted and, as a result of these losses, a distance is finally reached where practically no more energy is available and the disturbance ceases to be transmitted with a measurable intensity any further. The distance over which a certain amount of energy may be transmitted through air is greater than through solid substances or even liquid, due to the fact that the losses are greater than in air.

Various types of electromagnetic waves may be sent out by a radiating or transmitting station depending upon the kind of current used to produce the waves. There are two systems of Radio transmission in use at the present time which are known by the two different kinds of waves. These are the "undamped wave" and the "damped wave" systems and they will be discussed more fully in the next chapter.

(From Professor Moreton's next article you will readily understand why spark transmitters, and many types of tube stations, are hard to tune out. Their waves can be either of the two types mentioned, but "damped" transmission is very broad.—Editor's Note.)

TUNED R.F. ADVANCES

(Continued from page 17)

most innocent customer may purchase Radio parts with an assurance of their merit or demerit. For illustration, I desire sockets graded as A, B and C and priced accordingly. I do not want my neighbor to read a glaring "full-of-untruth" advertisement about coast to coast reception, or double compound low loss this and that, and then curse Radio because he cannot get California or his money back. All I ask to see is about a dozen manufacturers who believe the ultimate purchaser is entitled to like their products well enough to buy again, for after all "merchandising, whether it be in Radio or any other line, is merely the process of selling merchandise that will not come back to customers who will and, if this be strictly adhered to, it then becomes successful merchandising."

The Reader's View

Down With the "Air Hogs"

Have been a regular reader of your paper for a long time and think it the very best of all Radio papers—and I really do admire the way you are going after the "Air Hogs" near Chicago.

The sooner the dealers and manufacturers realize the conditions, the better it will be for all of us. I am sure every person in Chicago who enjoys Radio is with you.

It is getting time to clean house. Keep it up, thank you, and if I can be of any assistance in any way I would be glad to help.—F. E. Smith, Chicago.

We Are Not Coercing

First of all as a qualification as a critic I travel from coast to coast by auto, and for three years have carried a set.

In only two cities have I had real trouble with interference, although with less selective sets I might have had more trouble. Philadelphia is bad mainly because of WLIT, WFJ and WIP having too broad waves, and another reason is their incessant operation.

The other city is San Francisco where KFO "hogs" the air from early 'till late.

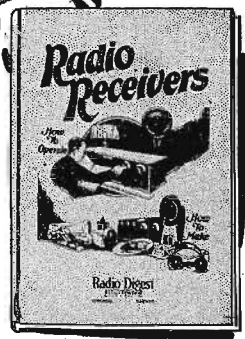
But why leave it all up to Hoover? When a station has to operate every day and night in the week because it has to be on a paying basis, why should Radio Digest feature their programs with free advertising? That is what I cannot understand. I believe Radio Digest has the standing and backing to omit such stations. That the omission is at least to the extent of showing detailed programs would be appreciated, goes without saying.

Again, if I may ask, why give publicity of free detailed programs to toll stations unless you are paid to publish them?

Listing only stations in the Radio Digest which are off the air at least one night a week will do more to stop bad practices than all the petitions to Hoover you can ever collect.

Think over dropping "Air Hogs" from your detailed programs and replacing them with clean, nice, little stations in detail. Then see if you don't exercise a mighty influence in inducing some of them to have one silent night. At least you would not be abetting what you say you are trying to stop.—F. M. Wallace, San Francisco, Calif.

The NEW Radio Book



How to understand radio, assemble circuits, improve reception, operate sets,

EVERY phase of Radio reception gathered into one book at last! Explanation of elementary principles, directions for constructing parts, detailed how-to-build articles for the assembly of sets, operating directions on popular manufactured outfits.

Haven't you often wondered what all the spirals, wriggly lines and zig-zag lines were about on diagrams? A big chart shows you a picture of the part as you see it and, beside the picture, the symbol used in diagrams. Other articles show clearly just what happens within the mysterious little vacuum tubes that glow hour after hour within your set, apparently without change, yet pass every note of a jazz orchestra or soprano.

Antennas, for whose erection there are seemingly no rules, are covered fully; the reason for a long wire in some locations and a short one in others, is readily grasped by anyone. Crystal sets, one tubers, two tube reflexes, three tube regenerative and reflex outfits, four tube R. F. and neutrodynes, five tube assemblies—all types are presented up to the nine tube "super," king of the air.

For the Man That Bought His Set

For the non-technically inclined there is a two-color broadcast map of the country, operating schedules of all the leading stations, call letters and power rating of every station on the air, suggestions for the care of batteries and tubes.

No matter what type of receiver you own, there are dozens of valuable suggestions on tuning, trouble shooting and operating. Your head receivers, loud speaker, antenna and certain parts within the set, require frequent cleaning, adjusting and care. Interference and its remedies are factors you should understand even though you care nothing about "what makes it go."

Compiled by the technical staff of Radio Digest, it represents the high lights of the past twelve months in the Radio field. All this data is indexed for ready reference and logically arranged. Only a few thousand have been printed and this offer will stand for a limited time. The only book of its kind and is FREE with one year's subscription to Radio Digest. This offer good only on subscriptions sent directly to this office, not through agents or agencies.

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Short Wave Receiver Not Difficult

Average Experimenter Has Enough Parts Now

Many experimenters have been putting off the building of a short wave receiver for some time because they thought that such a set was difficult to construct and required too much apparatus.

WORKSHOP KINKS EARN A DOLLAR—

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

RADIO KINKS DEPARTMENT
Radio Digest,
610 North Dearborn St., Chicago

The hook-up that I am submitting is very simple as may be seen by the diagram. Most of the apparatus can be found lying around the average experimenter's shop. The parts needed are: one .001 mfd. variable condenser, one .0005 mfd. variable condenser, one low loss coil, one variable grid leak, tube, socket, rheostat and batteries.

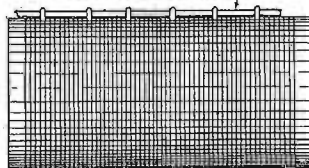
The low loss coil consists of 17 feet of No. 24 dec. wire wound in a spider web fashion as shown. After the coil is wound, insulating cement is applied and the coil removed from the form by pulling out the pegs.

In hooking up the set, care must be

Convenient Taps for Coils

In winding a coil for taps run on the number of turns to the first tap, then place a strip of thin wood 1/4 inch wide under the wire. Fruit basket material makes good strips. When the place for

WOODEN STRIP 1/4" WIDE

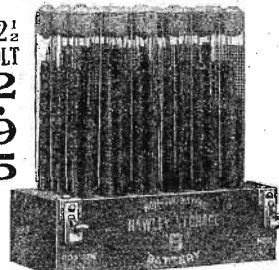


the second tap is reached push the strip of wood through to catch the turn of wire, and so on until the coil is complete. A little binding placed on the wire over the wood and allowed to dry aids in removing the insulation for soldering the tap lead to the coil.—George McCracken, New Castle, Pa.

Night Range of Static

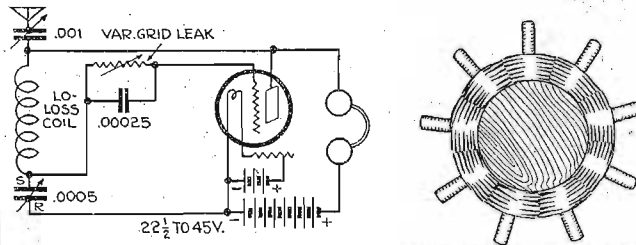
Static may seem worse at night than during the day, through the summer months because the range for both Radio and static is about five times as great late at night as during the afternoon. Thus in the afternoon the set may be picking up static over a radius only 200 miles in extent, while at night the area over which such disturbances are heard may have a radius of 1,000 miles.

22 1/2 VOLT \$2.95



It's OUT—Complete everlasting ready to run non-seal, non-sulfating 22 1/2 volt rechargeable "sp" storage battery, \$2.95. Includes chemical. Does not lose its charge standing idle. Special 2-22 1/2 volts (45 volts) \$5.25; 30 volts \$10.00; 1.25 volts \$12.00; 125 volts \$14.75; 157 1/2 volts \$18.00. Nearly 8 years sold on a non-rechargeable basis with complete refund if not thoroughly satisfied. Further guaranteed 2 years. Knock-down kits at still greater savings. Complete ready to run "sp" battery charger \$2.75. Sample set \$5. Order direct—send no money—simply pay expressman's cost on delivery, or write for my free literature, testimonials and guarantee. Same day shipments. My large 20-page radio goods catalogue 10c. R. D. Smith, 31 Washington Ave., Danbury, Conn.

HOOK-UP FOR SHORT WAVE SET

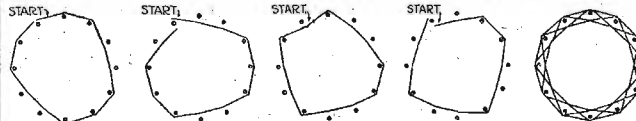


taken in attaching the rotor plates of the .0005 mfd. condenser to the ground. This eliminates body capacity to a great extent.

With this set, using one type UV-199 tube, the author has heard many stations on and below 100 meters. Station 2XK (WGY) testing on phone on 100 meters came in with fine volume and many amateurs on 50 meters have been logged. Considerable work is being done on short waves now and it would pay any experimenter to build one of these short wave sets.—Lee H. Bolen, Hamilton, Mont.

Puzzle in Coil Winding

As a matter of diversion the winding of a low loss coil presents a good puzzle. The object of this puzzle is to draw the figure as shown without lifting the pencil



from the paper, reversing direction, or going over a line the second time. The answer is shown.—M. S. Smith, Topeka, Kansas.

Use of Spaghetti Okeh

Spaghetti insulation is not as detrimental as some claim. In fact, it would be very difficult to prove, other than theoretically, that there is any difference between operation when using it and omitting it. It has these advantages: it can be used in different colors to identify high and low potential and grid leads; and protects against accidental short circuits or grounds.

Joints of an antenna should be first soldered and then wrapped with several layers of tinfoil and then a layer of waterproof tape.



Oh boy

KESTER

Rosin Core

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Originators and World's Largest Manufacturers of Self Fluxing Solder

Your Dealer Can Supply You

Cleaning Jack Contacts

Much of the frying and sizzling noises produced in headphones and loud speakers are produced by dirty contacts in phone jacks. The easiest way to clean them is

to spread the springs slightly, insert a piece of fine sandpaper between the contacts and let them close on the paper. Pull the sandpaper back and forth several times or just pull it out and insert again. Do this three or four times and turn the paper over. Emery paper cannot be used, but fine grades of sandpaper are ideal for the purpose. Emery paper contains that which will produce leakage and losses.

Leaving Grid Leak Setting Alone

Despite experiences seemingly to the contrary, a variable grid leak or one using cartridges should be left alone once the correct adjustment has been found. Since most sets now use hard tubes as detectors, this matter of adjustment is not as critical as it once was, anyway. Keep the A battery charged and do not attempt to force the operation on weak B batteries and there will be no need to play with the grid leak.

Where Radio Frequency Helps

Radio frequency amplification will increase the range, but will hardly affect the volume on programs within 100 miles. Beyond that distance it does. Audio frequency amplification has no effect on the range but is used entirely to increase the volume.

What becomes of the bass notes in your set?



While the better transformers amplify notes evenly over the entire lower and middle registers of the musical scale, from about 60 cycles downward there is a pronounced loss of amplification, as indicated above. Proper transformers begin to drop off in amplification even higher on the scale with the result that lowest notes disappear entirely.

There is no variation in amplification over the entire range of musical frequencies with Thordarson Autoformers. No note is too low—no note is too high to be lost by the Autoformer. In addition there are three other advantages.

Four Great Improvements!

FULL amplification of those bass notes hitherto largely "lost"! Greater clarity on all signals! Improved reception of distant programs! Better volume control!

These are the four advantages achieved by this latest Thordarson development—the Autoformer. Thordarson has succeeded in utilizing, for the benefit of your radio set, the same principle used in the line amplifiers adopted by the more recent high-powered broadcasting stations. The excellent quality of these stations (due to perfect amplification) offers conclusive proof of Autoformer effectiveness.

Unconditionally Guaranteed

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All Frequency Amplifier

Autoformer amplification is for those who seek the finest reproduction of programs to be had. It may be used with any set in place of the regular audio transformer hook-up. Full directions, with diagrams, for building a Thordarson Autoformer Amplifier are supplied with each instrument. Or

Write for the Autoformer Hook-up Bulletin—Just Out!

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The "Goode" Two-o-One A Tube amplifier or detector. It is a quarter ampere, 8vo volts, standard base silvered tube.

Send express or postal money order—New York draft—or personal check to—
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Questions and Answers

Receiving Range

(14090) AS, Akron, Colo.
 Q.—I happened to pick up an old copy of Radio Digest, April 18, 1925, and found a hook-up in the Q. & A. Department that interested me. I would like to ask a few questions about it. Could two audio frequency transformers, ratio three to one, be used in this set and if not what ratio is better? Using UV-139 tubes what would be the voltage of A and B batteries? What is the average receiving range on loud speaker on this set.
 A.—Two audio transformers of three to one ratio can certainly be used in the hook-up on the Q. & A. page of our April 18 issue. Using 139 tubes the A battery voltage should be 4½, the B battery voltage should be .45 on the detector plate and 90 on the amplifier plates while the C battery should have 4½ volts. The tuning unit should be either a Davenport, made by Davenport Radio Laboratory at Davenport, Iowa, an Uncle Sam tuning unit or an Ambassador unit, both of which are widely advertised. It would be impossible to state the receiving range, as given a good location in winter time one might get both coasts while given a poor location in summer time the only station you might hear would be KOA at Denver, Colo.

Tube Current Draw

(14100) B & L, Chillicothe, Texas.
 Q.—Please settle this argument. My partner, who is an electrician, says that there is just the same current used no matter where you set the rheostat of the battery control on a radio. Please decide this for us as we agreed to leave it to you.
 A.—The discussion cannot be settled on the phrase "Just the same current used." The same amount of current is used by the tube at all times but the amount of current drawn from the batteries will vary with every setting of the rheostat. This can be readily seen by the application of Ohm's law. Current equal voltage over resistance, and since the resistance of a 139 filament is 50 ohms and the voltage applied by three dry cells is 4½, the current drawn will be .09 amperes. If a 30-ohm resistance is connected in series with the filament, and all of the resistance is in, the total resistance becomes 80, and if 4.5 is divided by 80 it shows that the current draw is .05 amperes. When all of the resistance is in, the tube does not get enough current since it requires .06 amperes, but if all of the resistance is out it gets .09 amperes, which is too much. It is the function of the rheostat to control the amount of current through it to approximately .055 or .06, at which current draw the tube will function best.

"Recognized" Manufacturers

(14093) JEN, North Platte, Nebr.
 Q.—I would like the name of some Radio publication or some kind of a list from which I can obtain the names of different standard and recognized Radio manufacturers. I notice a new one in your issue of June 20, the Sun Manufacturing company of Louisville. I think I have also noticed in your paper the Amerex of New York and the Randolph corp. of Chicago. What I want is a list of the recognized concerns and also a list of all other reliable manufacturers.
 A.—You ask for the impossible. There is no individual or organization that could determine whether a Radio manufacturer was "recognized" or not, as there are many large manufacturers guilty of sharp practice in their dealings with the

public, and also of errors in design and construction, while there are many smaller concerns, not so widely known, whose integrity is very high and whose product is high in efficiency. As to advertisers in Radio Digest we wish to advise that the credit standing and financial rating of all advertisers is looked into carefully before their product is permitted in our columns, and they must also give satisfaction to all purchasers of apparatus, and uphold their guarantees and their good faith with the public, or their advertising is eliminated. It is not exaggerating to state that this policy of ours has cost us close to \$200,000 in the last few years but we have kept the faith of our readers, which has resulted in our large circulation.

Bridge Kits to Come

(14082) EES, Blanton, Fla.
 Q.—I am interested in the Wheatstone bridge now being described by Mr. Gurney in Radio Digest. I want to purchase one of these bridges to be installed in my 5 tube tuned radio frequency receiver. Will you kindly tell me where I can purchase one or who I can get to build one for me?
 A.—It is plain that you have not carefully read the article by Milo Gurney as it was certainly clearly stated that the circuits under discussion are based on the idea of a Wheatstone bridge which is a device used by the electrical engineer for measuring apparatus.

There is no bridge that one can purchase to put in a receiver, as a receiver itself, and all of the parts used, must be designed especially for that purpose and on the principle of balancing out an undesired capacity by means of a bridge principle. Mr. Gurney is now designing a kit for a local manufacturer so that coils and other apparatus necessary will shortly be on the market with which builders can construct bridge circuits.

Radiola Super

(14097) FBM, Albuquerque, N. Mex.
 Q.—I wonder if you will answer a few questions for me. I have a Radiola Super and it seems to be using more A battery than usual and does not seem as sensitive as it used to be even though allowance has been made for summer time and interference. I depend on WOAI, KOA and KFL although WOAI comes in somewhat inferior to the other two. Denver always fades so badly that we cannot enjoy them any more.
 A.—Relative to the Radiola Super you state that it seems to be using more A battery than usual. We presume by this you mean that the rheostat has to be turned over a little further before full volume is obtained. Since the dry batteries which supply A battery current will gradually wear down, this is only natural and very soon you will have to turn the rheostat clear over to get signals at all. When that point is reached you will have to get new A batteries. Then, too, there

is the probability that your B batteries are also gradually going down and it would be necessary to use a higher rheostat setting to obtain equal results, if this is the case. Either of these points will reduce the volume and a deprecating battery will also produce the fading effect which you mention. It is also probable that your 139 tubes have depreciated to some extent and it will be necessary to reactivate them or get new ones. The Jefferson Tube Rejuvenator, is a reactivating device which throws about 8 to 10 volts onto the filaments for a short period of time and then puts 5 to 6 volts on the filaments for several minutes. This will boil out the filament and bring a new layer of thorium to the surface and the tubes will be restored to full strength for a useful life of about 60 per cent as long as the useful life obtained when new.

Men to build radio sets in spare time. Leon Lambert, Wichita, Kansas.

Four Filter Super Trouble

(14085) MS, Elm Grove, W. Va.
 Having built the Four Filter Super as shown in your articles in Radio Digest, I wish some further advice. I used 139 tubes and sockets; all material is of good quality. I used the 3-inch tube oscillator wound as per instructions and it is the part that does not work. The oscillator condenser can be turned all in or all out, and not make any difference in reception. I can also take the oscillator tube out of the socket and it does not make much of a difference. The antenna condenser tunes very sharp, cutting out KDKA on one-half of one division on vernier dial.
 I first connected everything as per your hook-up, but all I could get was a sharp whistle. Then I tried 45 volts instead of 90 volts and it began to work. Then I put 90 volts on the oscillator and audio tubes, which stopped the whistling but did not improve the oscillator control.
 The midget condensers are all about the same position for best reception; the potentiometer is very close. It is 400 ohms, but I can't move it more than ¼ inch of the circumference. The regeneration control seems to work alright. My tubes are all new and tested; also tested in a Radiola Super. I can get KDKA on the loop or outside antenna. WCAE I can just hear on the outside antenna. I hope from the above you can give me some information that will clear up my trouble.

As I have been watching all the popular magazines for two years for just such an article and yours was the only one that I ever found that the author did not have some particular part to sell you before it would work, and as your instructions were so clear I feel that I have overlooked something. I have seven tubes and can use the oscillator in second audio with good results on KDKA.

A.—Relative to the trouble you have of not getting the oscillator to oscillate properly, there is not much that we can say except that there is a broken lead somewhere or one of your socket springs is not making contact with the tube. When two coils of the proper size are connected across a variable condenser and the outer end of one is connected to the plate of the tube while the other end of the other is connected to the grid, you are certainly going to get oscillation with 45 volts on the plate. Possibly your bypass condenser has become shorted and this point should be looked into. Your tube will function satisfactorily as an audio frequency amplifier but that does not indicate that it would make a good oscillator since practically any tube will amplify at audio frequencies. If you will invest in one more tube so that you have a little more flexibility in switching them around in the sockets, and examine not only the connections but the socket springs, we are sure that the difficulty will come to light. The articles and also the diagrams were correct in every detail.

Bubbling of Storage Batteries

A moderate boiling or bubbling at the surface of the electrolyte after a storage battery has been on charge some time is nothing to be alarmed over. This is a natural part of the change in chemical content of the battery toward the end of the charge. The boiling should not be too violent, so that large drops are thrown out, but a fine spray is nothing to fear.

Salesmen calling on radio dealers wanted to handle Radio Tubes as a side line. Thoria Tube Company, Dept "D," Middletown, Ohio.

PATENT ATTORNEYS

PATENTS. Booklet free. Highest references. Best results. WATSON E. COLEMAN, Patent Lawyer, 634 G Street, Washington, D. C.

Men to build radio sets in spare time. Leon Lambert, Wichita, Kansas.

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 New Copyrighted Plans, \$1.00
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Buy Tubes by Name

WD-11 Radiotron
 It isn't a genuine WD-11 unless it's a Radiotron

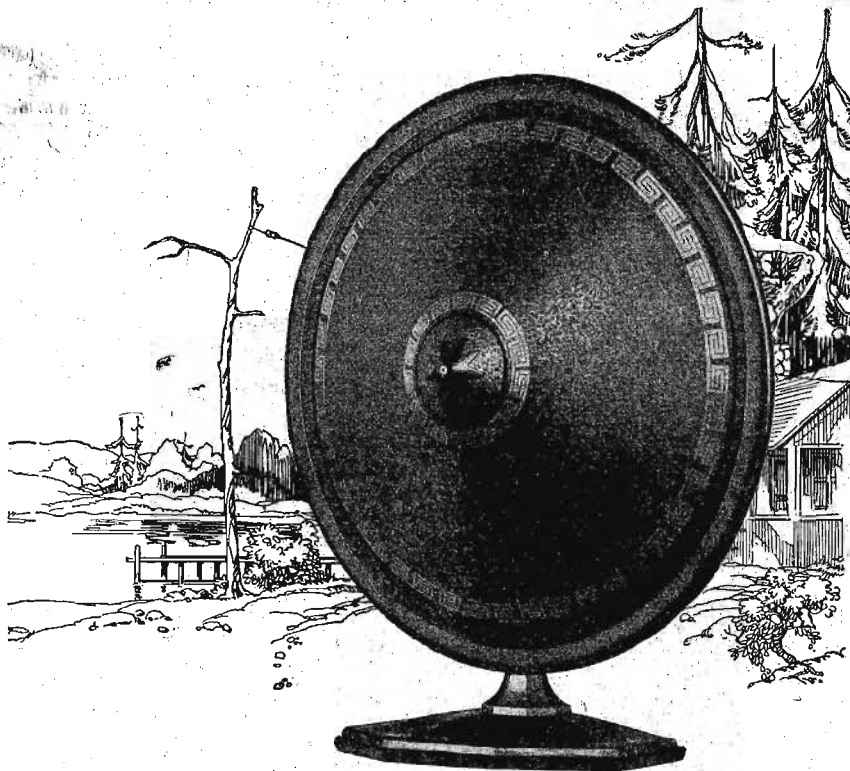
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 Economy and performance unheard of before. Recharged at a negligible cost. Approved and listed as Standard by leading Radio Authorities, including Pop Radio Laboratories, Pop, Sci, Line, Standard, Radio News, Life, Let's, Inc. and other important institutions. Equipped with Solid Rubber Caps, an insulating case with built-in carrying handles. Heavy, plated plates. Order yours today!
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 Make your set selective—separate the interfering stations by simply putting the Traffic Cop on guard. The Ferband Wave Trap will tune out interfering stations, no matter how troublesome. Never reduces, but nearly always increases volume. Add a Ferband Wave Trap to your set and "police" your reception. Regulate the traffic.
 Designed and manufactured completely by us after years of careful experimenting. It is not to be confused with imitations, hastily assembled from ordinary parts. Price is \$8.00. Shipment is made Parcel Post, C. O. D. plus postage, or prepaid on receipt of price. Order today.
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Apex Super 5
 This highly efficient tuned radio frequency receiver is the most advanced in design and construction. It is an instrument that meets every critical expectation of the seasoned radio enthusiast.
 Buy the Apex Super 5. You will have a radio receiver that brings in distant stations clear and distinct. Select the station you desire in your log book, turn the marvelous Apex Vernier Dials to that number, and there you are—perfect reception. No greater selectivity can be had than is easily obtained with the Apex Super Five.
 Housed in a highly finished walnut cabinet, complete with Jones Multi-Plug Battery Carriers. All settings highly complicated. Sells for \$25 complete excepting accessories.
 At All Good Dealers
Apex Elec. Mfg. Co.
 1417 W. 59th St. Dept. 705-A Chicago

on the dot



The Crosley Musicone

a startling improvement in looks and tone over loud-speakers
Already replacing thousands

In camp or home, this remarkable development of radio reproduction will greatly increase the delight in radio.

It is a new idea. It diffuses the sound. Upon hearing it for the first time one is at loss to locate the source of the music. Its perfection of reproduction is uncannily real.

Its price, like all Crosley products, is very low because of the half-million production plans under which it is being built. Hear it at all Crosley dealers now.

Crosley owns and operates station W.L.W., Cincinnati, the first remotely controlled super-power broadcasting station.

Crosley manufactures receiving sets which are licensed under Armstrong U. S. Patent No. 1,113,149, and priced from \$14.50 to \$65, without accessories.

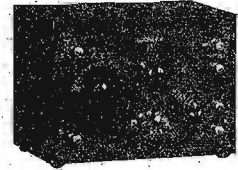
The Crosley Radio Corporation
Powel Crosley, Jr., President
7493 Sassafras Street, Cincinnati

\$17⁵⁰
Add 10% West
of Rocky
Mountains

CROSLEY
Better—Costs Less

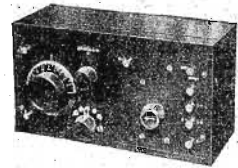
The Marvels of Radio!

*Incredible to those
who don't know!*



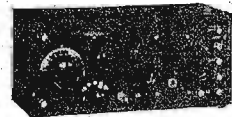
The Crosley 1-Tube 50

Crosley's development of the famous Armstrong regenerative circuit enables you to "roam" the country and enjoy the thrill of picking up distant stations just as though you owned a multi-tube set,—all with one tube and at \$14.50, without accessories.



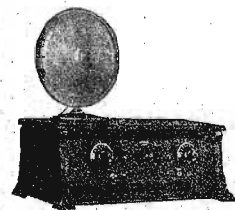
2-Tube Crosley 51

Same as wonderful Crosley 50 with additional tube amplifier. Local and nearby stations on loud-speaker always and distance up to 1500 miles under average conditions. Much greater range with head phones. \$18.50, without accessories.



3-Tube Crosley 52

A larger set for those who want greater reception range on the loud-speaker. Operates on three tubes, using wet or dry batteries. Consistent loud-speaker range 1500 miles or more. \$30, without accessories.



The Crosley Trirdyn Special

3 Tubes do the work of 5
A unique circuit combining tuned radio frequency, regeneration and reflexed amplification that equals in results the work of 5 and 6 tubes. None re-radiating. \$65, without accessories.