

How to Make New Four Filter Super-Het; Neutralizing First Reflex Tube; Operating and Trouble Shooting the Grebe Synchronphase; Pictures of KFKX

# Radio Digest

EVERY  
WEEK

PROGRAMS  
**Illustrated**



REG. U. S. PAT. OFF. & DOM. OF CANADA

Vol. XII

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SATURDAY, MARCH 14, 1925

No. 10

## OFFERS NEW WAVE PLAN

### PLANE DROPS BOMB, BUT WITHOUT PILOT

BRITAIN SOON TO PERFECT  
WEAPON OF WARFARE

Experiments in Radio Control Have  
Gone on Since 1915—Much  
Secrecy Guards Tests

LONDON, England. — Remarkable results have been obtained in a long series of tests which have been carried out by the British Air Ministry's experts in the Radio control of airplanes. These experiments have been executed with the greatest secrecy in a lonely district on the English south coast.

A small pilotless airplane has been sent on flights of several miles, guided by Radio from an apparatus—which is always closely guarded—and landed safely at will. The machine has been made to perform all the stunts. It does its looping, turning, rolling and spinning just as though an expert pilot is aboard.

Infinitely more has been done in these secret trials than ever before. Dummy bombs, operated by levers, have been dropped on pre-arranged spots with uncanny accuracy. The tests have demonstrated the probability of a terrible weapon of warfare being perfected within a comparatively short time.

Experiments in Radio control have been going on in Britain since 1915, and the many series of trials have been carried out at different places in order to prevent leakage of information.



### BOOST FOUR DIVISION IDEA AS SOLUTION

*S. M. Kintner Is Sponsor*

Westinghouse Engineer Presents  
Scheme to Avoid Station Inter-  
ference and Heterodyning

PITTSBURGH.—S. M. Kintner, research engineer for the Westinghouse Electric and Manufacturing company here, has outlined a new plan of wave length allocation and station classification which may, it is said, eliminate 95 per cent of the present objectionable interference.

Mr. Kintner, one of the best informed men in Radio, insists that reclassification of the broadcasters is very necessary. His opinion is backed by many other prominent leaders.

His plan, briefly, is to have a four-station classification, the most important of which will be known as the super de luxe stations, confined within the wave length range of 300 to 416.6 meters with power varying from 5,000 to 50,000 (50 kilowatts), and limited in number to fifteen.

(Continued on page 2)



Miss Gertrude Bryan, shown above, who plays the leading role in "The Way of the World," at the Princess theater, New York, recently broadcast from Station WOR. Left, Mary Craig, with the Craig sisters, was heard recently in a little close harmony from WLW. Right, Renee Adoree, one of the screen's favorite players, who recently appeared at KFI.

PROPOSED WAVE BAND ASSIGNMENT FOR BROADCASTERS

Table with columns: Station Class—(Waiting List), Number of Channels Available, Power Allowed, Wave Lengths, Number Stations on Same Band, Number of Time Divisions, Number Assignments Possible.

Radio relays on short wave channels in bands of 50 kc. width from reservations 50-55 meters, 60-65 meters and 70-75 meters.

NEW WAVE BAND PLAN

(Continued from page 1)

The accompanying tabulation includes all data pertaining to the new plan which has been designed strictly with the thought in mind of giving the utmost good service to the Radio listener.

In an explanation of the plan Mr. Kintner states:

"In the tabulation the several classes of stations appear in the order of their wave lengths. It will be more readily understood, however, if it is studied in the order of the station classes. Class I is for a limited number of stations that can classify for a de luxe service.

"Each of these stations is assigned an exclusive wave channel of 20 kilocycles breadth and permitted to use larger power, from 5-50 kilowatts. It is expected that general interest will exist in what each of these stations has to offer and it is desirable to protect them from taking or giving interference.

Class II and III Stations

"Class II stations are those of less national importance and yet whose facilities entitle them to be ranked above and given superior opportunities over the stations in the lower classes. The standard

of this class should be maintained and none from lower classes admitted unless fully competent, regardless of the number of vacancies in this class.

"Class III would contain that large number of small stations whose influence is very local. This class of station is limited in power to 100 watts, in order to minimize its interference with other stations on the same wave channel, but located a sufficient distance geographically to cause little or no interference with the large majority of local listeners, i. e., the ones who can logically be assumed to be the regular listeners to that station.

"Class III stations need fulfill a less rigid set of conditions than those of higher classes.

Class IV Is Waiting List

"Class IV is the waiting list. Into this class all newcomers must go and await an opening to a higher class as a vacancy arises.

"A principle that should govern in the selection of applicants for admission to the several classes, is the one of purpose in broadcasting. Are those operating stations interested in developing the art of broadcasting? It must be apparent that the art of broadcasting has a better chance of growing and becoming a more permanent institution if those broadcasting are interested in developing broadcasting equipment and methods rather than simply trying to let you know that some particular article of merchandise entirely foreign to broadcasting is the best of its kind.

"Provision is also made for reservations for Radio relay connections so that it may be possible for some of the Class III or Class IV stations to secure national programs for their use and thus make them available locally to those listeners not equipped with the more sensitive receivers."

Station Changes

With the final reallocation of wave lengths along the Pacific coast, Radiophans may once again log their stations with the fair assurance that they will be heard again on the recorded dial settings. The new lengths are:

KNX, Los Angeles, 336.9; KFAE, Pullman, Wash., 348.6; KGO, Oakland, 361.2; KPOA, Seattle, 384.4; KHJ, Los Angeles, 405.2; KPO, San Francisco, 420.3; KFI, Los Angeles, 468.5; KGW, Portland, Ore., 491.5, and KLX, Oakland, 508.2.

Wave lengths held in reserve in the West for expected stations have also been announced. These are:

Corvallis, Ore., 280.2; Los Angeles, 293.9; Phoenix, Ariz., 299.8; Seattle, Wash., 305.9; Pasadena, Calif., 315.6; Salt Lake City, 333.1; Missoula, Mont., 394.5, and Seattle, 454.3.

Newly licensed class A stations, announced during the past week by the department of commerce, are: KFVF, Clarence B. Juneau, Hollywood, Calif., 208.2 meters; WAMD, Hubbard & Co., Minneapolis, Minn., 244; WAFD, Albert B. Parfet Co., Port Huron, Mich., 233; WHBD, Chas. Howard, Bellefontaine, O., 222; WHBC, Rev. E. P. Graham, Canton, O., 254; WRAK, Economy Light Co., Escanaba, Mich., 256.

WKAQ, the Radio Corporation of Porto Rico at San Juan, has been given a class B license with a wave length of 340.7 meters.

WDAG, Amarillo, Texas, is back on the air after several months with no programs.

CKY, Winnipeg, Manitoba, may change its wave length from 450 meters to 384.4 because of heterodyne interference with a number of American broadcasters.

Broadway's great White Way is now represented by a new station, WMCA, the Hotel McAlpin, New York. It is class B with a 428.6-meter wave length.

London, Madrid Newcastle, Aberdeen--

that's just a few of them

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Foreign Notes

Programs may be expected shortly from a new station which the Norwegian Broadcasting company is constructing, and which should be ready for transmission about the end of March.

The Societe Francaise d'Etudes de T. S. F. have decided to transfer their whole technical laboratory and transmitting sets to an old tugboat which travels up and down the Seine.

News of another long-distance Radio reception record comes from North Borneo. On three different occasions the programs broadcast by the London 2LO station have been heard distinctly, although the distance between the listeners in and the transmitters was approximately ten thousand miles.

An invention by which refrigeration can be broadcast by Radio is claimed by a Scandinavian. His plans include a municipal transmitting station to broadcast the "Radio-ice," and he states that all that is necessary to keep the food cool in the hottest weather, is to keep the receiver tuned in to the central station.

Four months ago, the word "Radio" signified to the average person in Vienna only a newspaper expression, often used to describe the latest craze which had hit America. Today there is an antenna on almost every housetop, and thousands of loops are hidden away in the houses.

There are now four stations in Sweden broadcasting programs regularly. SASA at Stockholm, operating on a wave length of 430 meters; SABS at Goteborg, on 290; SASC at Malmo, on 270; and the station at Boden, transmitting on 2,500 meters.

Although a new station has been erected at Moscow to work on a wave length of 1,200 meters, Russian amateurs do not expect a great deal from the new station. Radio development has been very slow in Russia.

British tube manufacturers have cut the price of their products. The statement issued when the price cut was announced was to the effect that, "it was done in order to encourage the building of tube sets in place of the popular crystal type."

Receiving sets will be installed in the various army barracks by the British government. The army council has recognized the pleasures that may be derived from this form of entertainment.

Spain will open two new broadcast stations in the near future. One will be located at Bilbao, and the other at Cadiz.

A resident of Sevenoaks, Kent, England, advertised in a local newspaper, "wireless in maid's room." The idea was successful.

In order to eliminate personal publicity for members of their staff the British Broadcasting company have lately cut the names of announcers out of programs. Other well-known names are also being less mentioned, especially those of artists in the regular employment of the B. B. C.

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All the Live News of Radio...1 to 8 KFKX—Hastings, Nebraska—Old Bill's Own... 5 An Evening at Home with the Listener In, a chart showing when to listen in for your favorite station... 8 Advance Programs for the Week at All the Larger Stations...9 to 14 Operating the Grebe Synchronphase Receiver... 15 Editorials; Indigest; Condensed by Dielectric... 16 Four Filter Eight Tube Super-Heterodyne, Part II—Construction of the Filters, by Jacques Fournier... 17 Broadcast Listener's Reference Library, Part VI—Audio Frequency Amplification, by E. T. Jones... 19 Neutralizing First Tube in Reflex, by C. K. Beebe... 21 Questions and Answers... 22 Radiophone Broadcasting Stations, Part II... 23

Looking Ahead

Operation of Multi-Tube Receivers will be discussed by Edward T. Jones in his next article, which is part of the Broadcast Listener's Library series. The complicity of such sets makes any suggestions on them of value.

WEEL, Edison Electric Illuminating company of Boston, and WTAT, the only "Seagoing Broadcast Station," together with the people behind the transmissions of both, will be described by word and photograph in the March 21 issue to appear next week. "Big Brother" Emery and "Whit," of course, will be there.

The Remarkable Selectivity of the Fournier Super is due, in part, to the oscillator coupler included. Its construction, and the layout drawings for filter cover and baseboard, are presented in next week's issue.

Another Inductance Article by David B. Arnold is now ready, this time on the use of double silk covered wire. Data is given for sizes 20 to 30 inclusive on three diameters of tubing, to be tuned by any one of three values of condensers.

Newsstands Don't Always Have One Left

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# NEWS OF STATIONS AND THEIR ARTISTS

## A. T. & T. LINK FURNISHES WONDERFUL CONCERTS

### KYW Now Forms "Insomnia Club" to Replace "Midnight Sons"—Bi-Weekly Dance at Denver

Broadcasting simultaneously from ten stations, namely, WEA, New York; WEEI, Boston; WGR, Buffalo; WFI, Philadelphia; WCAE, Pittsburgh; WJAR, Providence; WEAR, Cleveland; WWJ, Detroit; WOC, Davenport, and WCCO, St. Paul-Minneapolis, the Silvertown Cord orchestra is on the air each Tuesday and alternate Thursday evenings. This aggregation of artist musicians, under the direction of Joseph Knecht, brings to the Radio audience one of the highest forms of program presentations.

WOR, Newark, N. J., has inaugurated a novel series of programs called the "Radio Congress of States." Every week a different state will have its sons and daughters broadcast.

Station KSD, St. Louis, Mo., recently paid the St. Louis symphony society \$5,000 for the privilege of broadcasting the season's concerts.

Two new orchestras have been added to the list of WOR's entertainers. They are the Commander's orchestra and a Meyer Davis orchestra.

An intimate picture of Pope Pius XI was broadcast recently from WJY, New York, when William H. Crawford, journalist and author, told of a meeting when the Pope was known as Father Achille Ratti.

Bi-weekly dance music is now being broadcast every Wednesday evening at 10 o'clock from KOA, Denver, Colo., by Joe Mann and his Rainbow-Lane orchestra from the Shirley-Savoy hotel.

"Conversations with a Philosopher" is the subject of the new series of Wednesday night educational talks being broadcast from the University of Pittsburgh studio of Station KDKA.

In keeping with its plan of education promotion, Station WBZ, Springfield, Mass., will begin a new series of university extension courses this month.

"Midnight Sons" are a thing of the past. This was the name of the KYW club which kept fans sitting 'till the wee sma' hours. Now the name has been changed and it is known as the "Insomnia Club." Between the dance numbers, Fred A. Hill acts as announcer. The orchestra is Coon Saunders famous "Nighthawks," and the leader will endeavor to entertain the fans with a little impromptu entertainment during the evening.

A most successful Radio contest has come to a close. Station WAHG recently received more than forty-eight thousand replies from the United States, Canada, Cuba and South America during their St. Valentine contest.

Radio lessons in golf will commence at KGO, Oakland, Calif., March 19, at 7:15 p. m., Pacific time. At eight o'clock, the KGO players will produce "Billy," a comedy in three acts.

Production of the Gilbert and Sullivan opera, "H. M. S. Pinafore" marked the first time that the Buffalo Players, Inc., ever appeared at WGR in a dramatic offering for the station's listeners.

Art Gillham, the "whispering pianist," while broadcasting from WMC, Memphis, Tenn., recently acquired a cat. Not the ordinary kind, he explained, but one derived from the popular pastime of "feeding the kitty."

The Marquette studio of Station WHAD, Milwaukee, Wis., is now open every Monday instead of Wednesday night.

Verdi's opera "Aida," was presented by the Philadelphia National Grand Opera company on March 3, from Station WIP, Philadelphia, Pa. The performance was given for the benefit of the Veterans of Foreign Wars.

A three-hour classical program is broadcast every Sunday afternoon by WGN, Chicago.

## PENCIL THAT WRITES RADIO MUSIC



Of course it doesn't literally write Radio music, but the performance is figuratively carried out by this Radio pencil crystal receiver. Although but a novelty, the small set held by the charming young lady has been known to receive local stations quite efficiently. P. & A. Photo

Station WGY, Schenectady, N. Y., recently celebrated its third birthday. A system of remotely controlled stations can be cut in on the regular program on short notice.

The Boston studio of WBZ, celebrated its first birthday recently, and the features on the program were similar to those broadcast on the dedication program. The program began at 8 o'clock, and ran until midnight.

Billy Sunday, the rip-roaring, devil-defying evangelist, was broadcast by Station WMC during a recent visit to Memphis. During the closing week of his campaign, when the repentant sinners were hitting the sawdust trail to the Municipal auditorium, WMC broadcast his afternoon sermons.

## Wisconsin Girl Winner of Crosley Radio Beauty Test

CINCINNATI.—Phyllis Sacia of Galesville, Wis., received the largest number of telegraphed votes in the recent second annual WLW Radio beauty contest, thus winning first prize of \$300 and title of "Radio Beauty of 1925." Those who listened to the contest will remember her as "number 4" when the entrants were described by Judge J. H. Woeste. Rhoda Bogardus, Warsaw, Ky., won second; Melba Hardert, Cincinnati, third; Mrs. Vera Fisher Webber, Cincinnati, fourth, and Lavera M. Bourgeois, Cincinnati, fifth prize.

Baking an apple pie for a prize was the latest stunt broadcast from WJZ, New York, N. Y.

# MILLIONS LISTEN TO CEREMONY MARCH 4

## INAUGURAL MARKS A NEW RADIO ACHIEVEMENT

### Great Audience Pauses at Work While Chief Executive Is Given the Oath of Office

WASHINGTON.—"Good morning, ladies and gentlemen of the Radio audience," came the familiar voice of Graham McNamee on the eventful morning of March 4, at 11:15 a. m. Eastern Standard time. His voice came through strong and clear, for it was being broadcast simultaneously by over a score of stations scattered from coast to coast, from the Canadian boundary to Texas.

It was the beginning of the first Radio broadcast presidential inauguration ceremony.

It has been estimated that 25,000,000 citizens turned to the loud speaker and listened to this unprecedented achievement. Stores, offices and factories stopped their work for the moment. The employees were numbered in the great invisible audience that was to hear President Coolidge take the oath of president for the next four years.

### Ceremony Simple but Sufficient

The ceremony was simple but sufficient. Following a brief description of the scene before him, Graham McNamee introduced the United States Marine band, which was heard until three minutes to twelve o'clock. At that time a fanfare of trumpets called the assemblage to order and the justices of the Supreme court approached the platform followed by the chief justice, cabinet members and President Coolidge.

At high noon the oath of office was administered. Then followed a short prayer, after which the visible and invisible audiences heard President Coolidge make his inaugural address.

Playing of the "Star Spangled Banner" by the Marine band concluded the ceremony. Mr. McNamee was heard again, this time announcing the calls of the many stations which had participated. All was over.

A new Radio achievement had gone down in history.

## KPO Sees Audience Two Millions of Fans

### Receives 70,000 Communications on Birthday Party Program

SAN FRANCISCO.—That KPO, Hale brothers here, broadcasts to a daily audience of well over 2,000,000, and that this vast audience is located throughout the length and breadth of the land, was the startling disclosure of a novel experiment conducted by the station.

On January 16 KPO celebrated its second birthday with a special program. The staff received the surprise of their lives when on that night 1,551 prepaid telegrams poured into KPO's headquarters. Following these, 68,937 letters and postcards were received.

It has been estimated by broadcasting station directors that only one-half of 1 per cent of their total audience responds to a request for a written communication. Just about one person in fifty that tuned in on KPO took the trouble to respond with birthday greetings. Multiplying 70,000 by fifty gives 3,500,000. Thus the audience of KPO is estimated at well over 2,000,000 people.

In a group of semi-classical selections, the Collegian string trio, of Station WEMC, Berrien Springs, Mich., gave Radiophans a real treat on March 9.



Stage, screen and bookdom shook hands with Radio at the recent opening of New York's latest, WMCA, atop the Hotel McAlpin. Among the notables present were the above. Left to right, Johnny Hines, motion picture star; Arthur Lee, director of WMCA; Col. B. B. McAlpin, proprietor of the hotel; Holbrook Blinn, actor; Irvin S. Cobb, humorist and writer; Major Andrew White, famous sport announcer, and Paul Dumont of WMCA staff. "Eddie" Squires is announcer for WMCA.

# UNIFIED PROGRAM IS E. S. NESBITT'S IDEA

## PLAN TO HOLD ATTENTION OF LISTENERS

### WHB Man Puts "Piggly Wiggly Girls" on with Special Radio Libretto

KANSAS CITY, Mo.—Radio is entering the program development period. Only incidentally is it catering to the distance seeker or the Radiophan of mechanical mind. The people who have been purchasing recently three to five hundred dollar receiving sets are naturally a more critical audience than those with crystal sets. They have spent money freely. Now comes their demand for 100 per cent entertainment in Radio-casts.

Ideas will play a large part in program development. One voice can create as much volume over Radio as a hundred piece orchestra. If the speaker be possessed of sufficiently brilliant ideas, he may furnish better entertainment than his hundred-voiced competitor.

Such is the reasoning of Earle S. Nesbitt, Kansas City, Mo., a newcomer in Radio circles from out the realm of motion pictures and vaudeville. In other



Earle S. Nesbitt

words, Mr. Nesbitt is a showman proceeding to demonstrate that fact over Radio. He is working at present with WHB. And from that station he has proven his point in the presentations prepared for the "Piggly Wiggly Girls."

### Girls Unified in Program

On each Friday afternoon, this trio has been giving programs enhanced in their appeal by ideas. Their first offering was entitled "Versatility," and served as an introduction of the girls under the assumed names of Sue, Prue and May. On that first program, in rhyme and melody, they quarreled for honors before the microphone and incidentally established in the minds of their listeners their names, personalities and ability. Each strove to outdo the other in demonstrating their own talent. The second program was linked to the first by the continued quarreling of the three girls during the intervening week.

Since then many programs have been given and others are to follow, each one with a distinctive idea. "Songs of Yesterdays and Today" will be a diminutive musical history of the various epochs in our country's life.

The programs are illustrative of the point that Mr. Nesbitt is emphasizing; programs with an idea. He points out that once a listener tunes in on such a program, they will stay with it until its close because there is unification of the entire program, a protracted interest; and as well, such listeners will look forward to and pick up promptly the next week's offering.

### Announcers at Kansas City Show to Form Special Club

CHICAGO, Ill.—An attempt was made to form an announcers club by officials of Station WDFW, at Providence, R. I., at the Biltmore hotel on March 2. Owing to the absence of several of the more popular announcers at the Kansas City show, the plan fell through.

It is rumored that the announcers at the Kansas City show will form the nucleus of a similar organization. The decision will be published in a later issue.

Eight marine hospitals located in various parts of the country are now engaged in furnishing medical advice by Radio.

### BROADCAST ANIMAL CALLS; CATS DEPART

DENVER, Colo.—When Chiefs Evergreen Tree and Riding Sun of the Pueblo Indian tribe broadcast their interpretation of wild birds and animals, they caused quite a furore among Radiophans. Cats of every known variety, ranging from the well known great American alley cat to the pedigreed blue bloods, jumped "high and wide," when the program started. Fans complained that during the mimicking of a coyote call, the cats left the house and haven't been seen since. Station officials at KOA are still trying to explain.

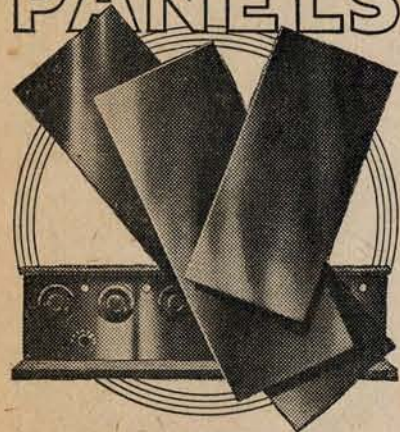
### Medford, Ore., Has Club

MEDFORD, Ore.—The Rogue River Radio club has been formed here to cooperate with telephone, telegraph and power companies to remove sources of interference.

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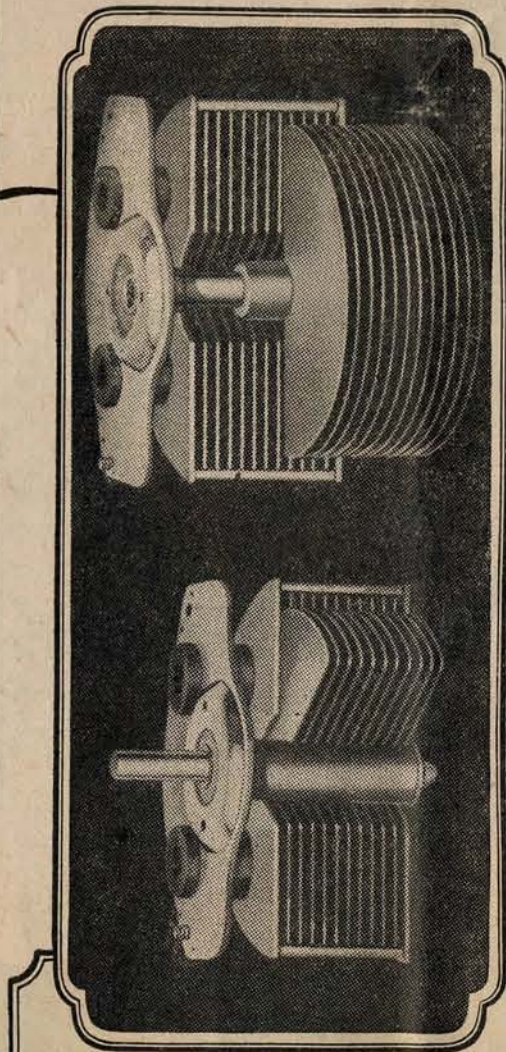
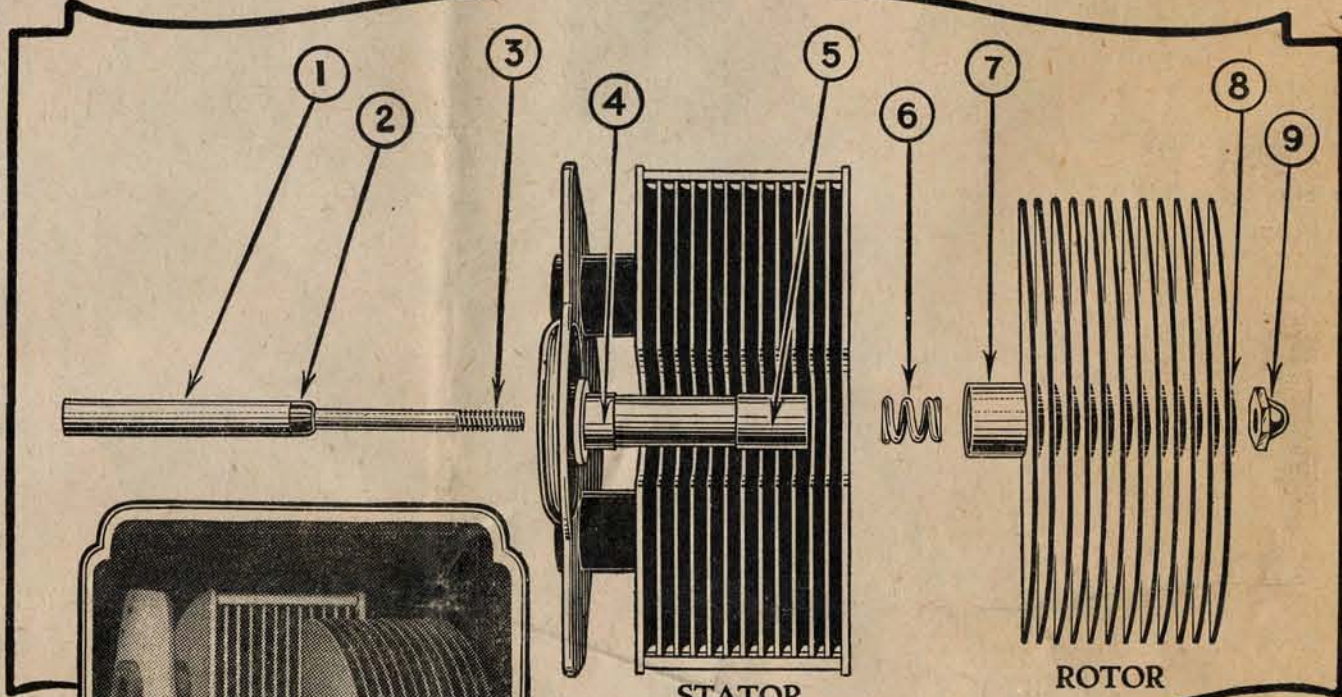
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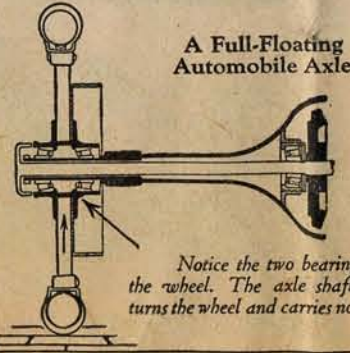


# The Condenser with the "full floating axle"

The striking feature of the Bradleydenser is the rigid double bearing, based on the principle of the "full-floating" automobile axle, that eliminates the usual outer pivot-bearing for the rotor shaft, and still provides a non-sagging support that insures perfect alignment of the rotor plates.

The rotor plates, soldered on a long, hollow tube extending from [7] to [8], revolve on a hollow steel stem provided with two bearings [4] and [5]. The alignment and support of the rotor is independent of the condenser shaft [1], as shown by the first photograph at the left. The shaft [1] merely turns the rotor. It slips through the hollow steel stem and its threaded end [3] is secured to the rotor at [8] with the nut [9] as shown in the second photograph. The spring [6] prevents end-play.

This design, combined with the use of soldered brass plates, results in a rugged, long-life condenser of extremely high efficiency. For superior service use the Bradleydenser.



A Full-Floating Automobile Axle

Notice the two bearings for the wheel. The axle shaft only turns the wheel and carries no load.

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Electric Controlling Apparatus

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# Bradleydenser PERFECT VARIABLE CONDENSER

# KFKX—Hastings, Nebraska—Old Bill's Own



Above, the Hastonians dance orchestra in the studio at Hastings. This orchestra is well known to thousands of fans throughout the country. Left, Miss Clarice Saunders, contralto, and one of Mr. Hay's voice pupils, a favorite at KFKX.

FOUR years ago, William G. Hay (otherwise Bill) and Mrs. Bill arrived in Hastings. Today he is director of the First Methodist church choir, Hastings lyric glee club of twenty men's voices, a chorus of business and professional men and a bulging-houred vocal class. Occasionally Bill sings on the Radio by special request and then always Mrs. Bill is at the piano.

Now Mrs. Bill has an identity all her own as well as being Bill's life partner. Besides being an accomplished musician and accompanist in particular, she handles Bill's personal mail and details of his busy teaching and business career.

KFKX opened on November 15, 1923, primarily as a short-wave rebroadcast from Station KDKA at East Pittsburgh. KFKX belongs to the Westinghouse company and is its "half-way house" to the Pacific coast.

The short-wave signals from KDKA are picked up in a farmhouse about a mile from the main transmitter of KFKX and then sent through telephone wires to the station in the same manner that the program at the studio is sent to the station. A special receiving set is located at this farmhouse together with a special receiving antenna designed to pick up these short waves from the East without any interference from the transmitter of KFKX.

There is no studio at the Hastings station, but the broadcasting studio is located on the second floor of the Gaston Music and Furniture company on Hastings'

main street. KFKX talent is gleaned from local organizations, artist pupils of Bill Hay, colleges and clubs from nearby towns. Many small colleges in eastern Nebraska assist materially in sending frequent evening programs of college timbre to the Hastings studio from their home towns. A weekly farm letter is furnished and read by a Nebraska farm journal.

KFKX has been heard in France; in Hong Kong little Chinese beauties have swayed to the Hastonians dance orchestra and in Uruguay, South America, they report KFKX sopranos coming in fine.

On November 15, 1924, their first anniversary program was given on the air with the same artists appearing who had opened the station. Several hundred telegrams were received and letters from everywhere came for the following two weeks.

Two characteristics are outstanding at KFKX—one is its exceptional clarity in rebroadcast operated by Harold Roess—the other is the voice of its local announcer. Beloved by his listeners, Bill Hay's bi-weekly announcing is within the schedule of the farmer, city man, home fireside, college student and the man about town. Each is a member of his admiring group. This God-fearing Scot whose burr is only noticeable when he gets angry or excited, is a big man with a voice of fine quality and without exception, the best diction on the air today.

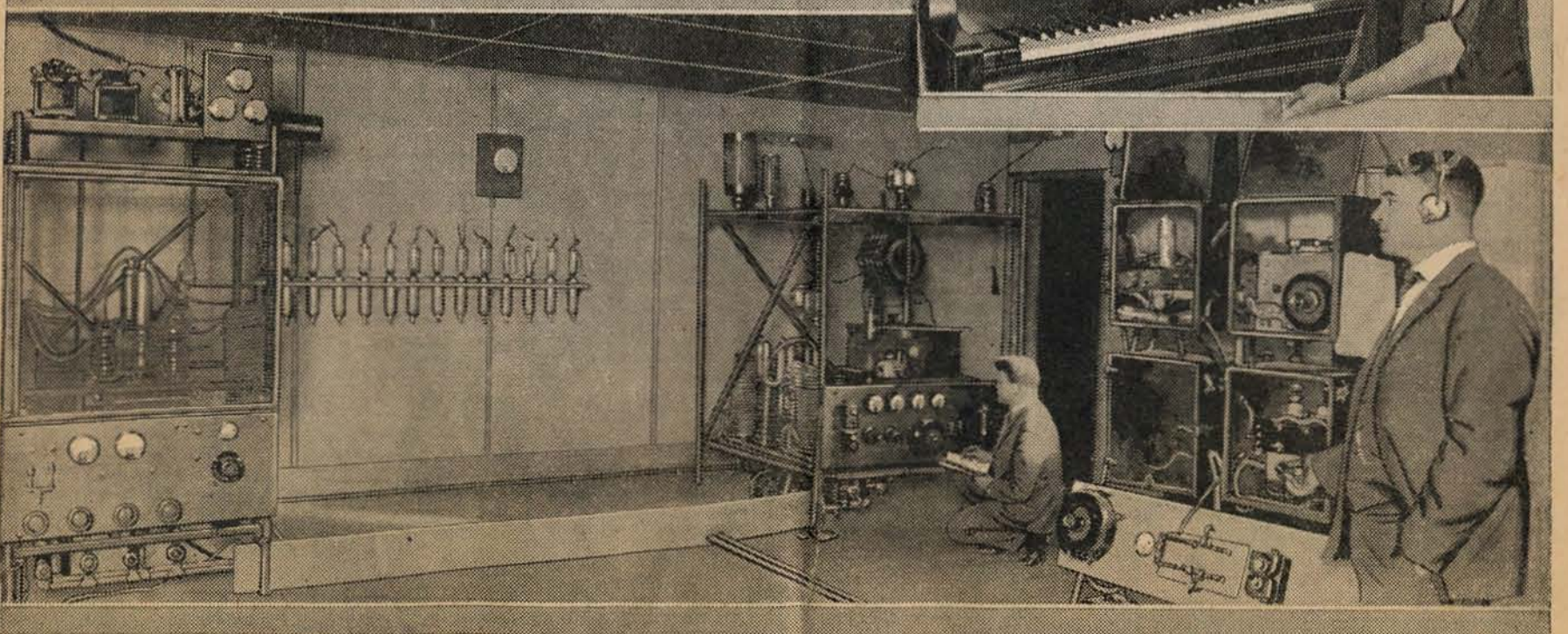
Bill Hay was asked what he considered the first essential of a Radio voice. His answer came as deliberate as he moves: "Be yourself," and then paused to light his pipe. The interviewer felt startled as though he were ac-

(Continued on page 6)

William G. (Bill) Hay, director and announcer at Station KFKX, well known to thousands.



Right, Mrs. "Bill" Hay, whose accompaniments for KFKX artists have won so much favorable comment. Below, interior of KFKX. Kneeling in the corner is Harold Roess, chief engineer.



**VACUUM TUBES OF PAST AND PRESENT**



Here are shown the latest type of vacuum tube and the one used ten years ago. Two filaments were provided in the old tube, a thing unheard of now.

**KFKX — OLD BILL'S OWN**

(Continued from page 5)

cusing him in street parlance of trying to be funny—but his continued remark was reassuring.

"Not more than one voice in a hundred is a real Radio voice," he went on, "and that one sometimes doesn't know how to use it.

"The Radio voice is the properly placed singing or speaking voice, using the same correct tone placement at the microphone as on the platform or stage. And that's why I say to be yourself, for if you are natural and talk naturally your voice will come over the microphone naturally, too."

That's why they ask Bill Hay from way out in California if they may call him Uncle Bill as familiarly as they do their own beloved Uncle John of KHJ.

That's why the shut-in, who is bed-

ridden in a Colorado mining shack and can scarcely write from rheumatic cramp, scrawls a page of appreciation to his Radio friend—Bill Hay.

That's why the man in Missouri wrote "There are three things which put KFKX above every other station—clarity of transmission, unusually high class programs and the best announcer in the world."

They write to Bill Hay in French, Spanish, German and Mexican and a wee note in Scotch as well, as frequently they "murder the king's English!"

Perhaps some college will confer a degree of Doctor of Satisfaction on a Radio announcer. If so, we nominate Bill Hay for an early candidate!

**R. H. L. to Broadcast from WOC with His Contributors**

DAVENPORT, Iowa.—Have you ever read the "Line O' Type" column in the Chicago Tribune? If so, here's your chance to hear the conductor and some of his "contribs" perform in person. Tune in to Station WOC, located in this city, on March 14 and hear them.

Richard Henry Little, better known to the readers of the paper as "R. H. L.," will journey down to Davenport for the occasion and bring his troupe with him. During his appearance at WGN, the station is flooded with telegrams until the end of the program, showing how popular he and his "colyum" really are.

**Will Hold Radio Monopoly Hearings in But Two Cities**

WASHINGTON, D. C.—It is probable that hearings in the Federal trade commission's case against the Radio Corporation of America and others in an alleged monopoly will be held only in New York and Washington, although a final decision on this point has not yet been reached. Edward L. Smith, attorney for the commission in this case, and James A. Horton, his assistant, have left for New York to interview witnesses and gather data in connection with the taking of oral testimony. This is to begin in New York on March 18.

**Radio Recovers Automobile**

SALT LAKE CITY.—Radio assisted the local police here recently when the automobile of Dr. C. F. Pinkerton was stolen. Less than one hour after broadcasting news of the theft the car was recovered.



**Sweep the Ether**

with a Jewett Superspeaker and learn the amazing difference that has led Radio laboratories, the world over, to install this instrument as their standard for measuring all others. Stow away your headphones!

A big, beautiful musical instrument, built by musical instrument makers, of experience and reputation—No extra batteries—Straight throat eliminates bugling—Exclusive adjustment gives you absolute control of volume without detuning. Just try it!

"THERE IS NO SUBSTITUTE FOR THE BEST"

*The*  
**Superspeaker,**  
Trademark Registered

**Jewett Radio & Phonograph Co.**  
DETROIT 5680 Twelfth Street MICHIGAN

**You'll be neighbor to Havana**



Kit Complete PRICE \$35

Licensed under U. S. Patent Office Serial No. 719,264 for Radio Receiver Systems.

This signature—*Samuel Harkness* makes it genuine.



**L**ISTEN to it! Hear the Shamrock-Harkness Two-Tube Reflex for five minutes—notice how distant stations come in as though they were near at hand.

Radio frequency, controlled by variable condensers mounted on air core transformers, gives the Neutrodyne its remarkable distance. The Shamrock-Harkness Two-Tube Reflex uses these transformers (flexo-formers).

Build your own set at half the cost. All parts necessary to make this marvelous set, including full directions, simply told, furnished in Shamrock Kit.

Also Ask to See **THE IMPROVED Shamrock-Harkness Three-Tube Counterflex The Wonder Set \$39.50**

SHAMROCK MANUFACTURING CO. Dept. 26-C, Market St., Newark, N. J.

**SHAMROCK**  
FOR SELECTIVE TUNING

*These for the masses as well as the classes*

SHAMROCK MFG. CO., Dept. 26-C, Market St., Newark, N. J.

Please send me a copy of "Shamrock Radio Builder's Guide Book" containing diagrams and complete instructions for building 10 sets at prices ranging from \$15 to \$50. I enclose 10 cents (U. S. stamps or coin.)

Name.....

Address.....

# WLS DRAMAS HAVE MUSIC BACKGROUND

## RALPH EMERSON ACCOMPANIES PLAYERS

### WOC Drama Leader Says Broadcast Plays Not Easy to Do as the Legitimate Variety

CHICAGO.—Broadcasting Radio plays with musical accompaniment has proven a success over WLS, the Sears-Roebuck station, according to Harry Saddler, who has charge of the productions of the WLS theatrical company. Several tests have been made and several plays produced. The last big production two weeks ago was "In Old Kentucky," the famous race play.

The broadcasting was done from the Barton studio in the Mallers building, with special musical accompaniment by Ralph Emerson at the organ.

Mr. Emerson when at the organ always has a Radio headset on so he can hear his own playing on the air, as well as the lines read by the actors and actresses.

### Broadcast Drama Not So Easy

DAVENPORT, Iowa.—Roy Van Allen, director of the Palmer School (WOC) Dramatic club, rises to say that broadcast plays are not as easy to produce as they might seem. The man on the street thinks it is much easier to act before the microphone than before a crowded house of a theater. But such is not the case.

Mr. Allen stresses the point that the feelings of the audience behind the footlights, which are practically lost to the Radio studio, act as a guide and inspiration to the actor of the legitimate stage. Then, too, the characters in the cast of a legitimate production are always in the costume of the part they are portraying, another aid which Radio drama does not always have. A further hindrance to the histrionic expression of the Radio actor is that he must keep close to and not wander away from the microphone.

So broadcast drama isn't as easy as it looks.

### UNIFORMITY VITAL IN TRANSFORMERS

Experienced set-builders agree that the trouble with most makes of transformers is lack of uniformity. Thordarsons are the exception—they run absolutely alike, absolutely uniform; always "match up" perfectly; always amplify evenly over the entire musical scale. That is one of the big reasons why leading makers use more Thordarsons than all competitive transformers combined. Partial list below:

- ZENITH**
- KENNEDY**
- Radiodyne**
- THERMIODYNE**
- ULTRADYNE**
- MURDOCK**
- QZARKA**
- Pfanstiehl**
- MICHIGAN**
- Deresnadyne**
- MALONE LEMON**
- MASTER RADIO**
- ROYAL**
- Howard**
- Pathe**
- HARTMAN**
- AUDIOLA**
- EAGLE**
- GLOBE AND**
- MANY OTHERS**

# The finest sets have THORDARSON Super TRANSFORMERS

Follow the lead of the leaders—build or replace with Thordarsons. Unconditionally guaranteed. Recommended by best dealers. Audio frequency 2-1, \$5; 3 1/2-1, \$4; 6-1, \$4.50. Power Amplifying, pair, \$15. Interstage Power Amplifying Transformer, \$5. Write for latest bulletins. THORDARSON ELECTRIC MFG. CO. CHICAGO.

## FAN RECEIVES TRIP FROM STATION KTHS



Lloyd H. Jordan

**H**OT SPRINGS, Ark.—The days of fairy dreams and fairy godmothers are not over, at least that's the way Lloyd H. Jordan of Gordon, Neb., who is the first Radiophan in America to be given a de luxe free trip together with entertainment, feels.

When Station KTHS, the New Arlington broadcaster, took the air in December, the Junior Chamber of Commerce decided in order to make the station's slogan, "Kum to Hot Springs," a reality, to bring one Radiophan a month to Hot Springs, with all expenses paid. The New Arlington hotel agreed to entertain the fan and the citizens generally to enter into the plan by providing an elaborate program of entertainment.

He was accompanied on the trip by his father, John Jordan. During his stay here, he talked to Radioland nightly, telling of his impressions of the resort.

## Telephone Subscribers Get Broadcast Service Gratis

PITTSBURGH, Pa.—Engineers of the telephone company are busily engaged combing over the Forest Hills district near this city to ascertain what is causing the trouble with the telephones in the neighborhood.

A short time ago, one of the subscribers picked up a phone to give a number when he was astonished to hear the strains of "It Ain't Gonna Rain No Mo'" played by an orchestra. The theory is that a powerful short wave station in the vicinity is responsible for the trouble.

## Low Loss Equipment Stands Out at Amateur Convention

NEW YORK.—Low loss designs of Radio equipment stood out paramount as the latest development in apparatus at the fifth annual Radio show and convention of the A. R. R. L. executive Radio council held last week at the Hotel Pennsylvania here. Broadcasts from the convention hall were made through Station WJZ Tuesday and Thursday nights.

### Radio at Open House

NORMAN, Okla.—At the University of Oklahoma engineering open house, now on here, and continuing to March 17, a number of Radio tricks and unusual Radio control apparatus are on exhibit. The open house celebrates the opening of the university's new engineering building. All interested are invited to attend.

## WJJD OPENS GAROD STUDIO AT CHICAGO

### ON AIR EVERY NIGHT FROM NEW PALMER HOUSE

### Thirty-seven Miles of Wires in Link to Station of Loyal Order of Moose

CHICAGO.—Heralded by a program par excellence, the Garod studio at the Palmer house here of the Loyal Order of Moose station, WJJD, Mooseheart, Ill., was officially opened on Monday night, March 9. Listeners in tuned to 302.8 meters had a treat not often found on the air.

Notables from every Chicago station, Potter Palmer, proprietor of the Palmer house; Mayor William E. Dever and his official family, Secretary of Labor James J. Davis, opera singers, theatrical lights and representatives of the Radio press were in attendance. News reel motion pictures were taken of the opening ceremonies.

The new studio of WJJD will be heard nightly, beginning at 10:30 p. m., Central time. It is provided by the Garod Radio corporation and the Palmer house in co-operation with the Loyal Order of Moose. Thirty-seven miles of wires connect the studio to the station at Mooseheart, where the equipment is located.

# Earn \$50 to \$200 a Week in RADIO

You can! Hundreds of ambitious men are already earning thousands of dollars in this wonderful new industry—you, too, can get your share. Mail coupon below for Free Book which describes fully the amazing money-making opportunities in Radio and tells you how YOU can earn from \$5,000 to over \$10,000 a year.

**T**he astounding growth of Radio has created thousands of big money opportunities. Millions of dollars were spent during the past year on Radio, and thousands of young men are needed right now to meet the ever-increasing demand of work.

Men are needed to build, sell and install Radio sets—to design, test, repair—as radio engineers and executives—as operators at land stations and on ships traveling the world over—as operators at the hundreds of broadcasting stations. And these are just a few of the wonderful opportunities.

### Easy to Learn Radio at Home in Spare Time

No matter if you know nothing about Radio now, you can quickly become a

Radio expert, by our marvelous new method of practical instruction—instruction which includes all the material for building the latest up-to-date Radio apparatus.

Scores of young men who have taken our course are already earning from \$75 to \$200 a week. Merle Wetzel of Chicago Heights, Ill., advanced from lineman to Radio Engineer, increasing his salary 100%, even while taking our course! Emmett Welch, right after finishing his training, started earning \$300 a month and expenses. Another graduate is now an operator of a broadcasting station—PWX of Havana, Cuba—and earns \$250 a month. Still another graduate, only 16 years old, is averaging \$70 a week in a Radio store.

### Wonderful Opportunities

Hardly a week goes by without our receiving urgent calls for our graduates. "We need the services of a competent Radio Engineer." "We want men with executive ability in addition to Radio knowledge to become our local managers." "We require the services of several resident demonstrators"—these are just a few small indications of the great variety of opportunities open to our graduates.

Take advantage of our practical training and the unusual conditions in Radio to step into a big paying position in this wonderful new field. Radio offers you more money than you probably ever dreamed possible—fascinating, easy work—a chance to travel and see the world if you care to, or to take any one of the many Radio positions all around you at home. And Radio offers you a glorious future!

The National Radio Institute is one of America's Pioneer Radio Schools—established in 1914. Our course is an absolutely complete one which qualifies for a government first-class commercial license. It gets you bigger paying jobs in Radio.

### Send for FREE RADIO BOOK

Learn more about this tremendous new field and its remarkable opportuni-



ties. Learn how you can quickly become a Radio expert and make big money in Radio.

We have just prepared a new 32-page booklet which gives a thorough outline of the field of Radio—and describes our amazing practical training in detail. This Free Book, "Rich Rewards in Radio," will be sent to you without the slightest obligation. Mail coupon for it now!

For a short time we are offering a reduced rate to those who enroll at once. Act promptly and save money.

**National Radio Institute**  
Dept. 55-EB.  
Washington, D. C.



NATIONAL RADIO INSTITUTE, Dept. 55-EB, Washington, D. C.

Please send me without the slightest obligation your Free Book, "Rich Rewards in Radio," and full details of your special Free Employment Service. Please write plainly.

Name..... Age.....  
Address.....  
City..... State.....

**Pay Increases Over \$100 a Month**

I am averaging anywhere from \$75 to \$150 a month more than I was making before enrolling with you. I would not consider \$10,000 too much for the course.

(Signed) A. N. Long, Greensburg, Pa.

**Doubles Salary**

I can very easily make double the amount of money now than before I enrolled with you. Your course has benefited me approximately \$3,000 over and above what I would have earned had I not taken it.

T. Winder, Grand Junction, Colo.

**From \$15.00 to \$80.00 a Week**

Before I enrolled with you I was making \$15 a week on a farm. Now I earn from \$2,080 to \$4,420 a year, and the work is a hundred times easier than before. Since graduating a little over a year ago, I have earned almost \$4,000 and I believe the course will be worth at least \$100,000 to me.

(Signed) Geo. A. Adams, Tamaqua, Pa.

AN EVENING AT HOME WITH THE LISTENER IN IN EASTERN TIME (SEE INSTRUCTIONS FOR USE BELOW)

Table with columns for Station and City, Met., Saturday, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday. Lists various radio stations and their broadcast schedules.

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

STATIONS IN ORDER OF WAVE LENGTHS USED

Table with columns for Meters Call, Meters Call, Meters Call, Meters Call, Meters Call, Meters Call. Lists stations grouped by wave length.

There's more life in Eveready Batteries

EVEREADY HOUR EVERY TUESDAY AT 9 P. M., E. S. T. For real radio enjoyment, tune in the "Eveready Group," Broadcast through stations WEAF New York, WJAR Providence, WEEI Boston, WFI Philadelphia, WCAE Pittsburgh, WGR Buffalo.

BUY Eveready "B" Batteries and you get electricity in its surest, safest and most compact form. They reduce your operating expense. New developments in the Union Carbide and Carbon Research Laboratories, Inc., have been converted into new manufacturing processes in the Eveready factories. Good as they always have been, Eveready "B" Batteries are much better today.

The Eveready achievement of giving you more hours of "B" Battery service for less money has cut the cost of running receivers in half, and in some cases the new Evereadys make "B" Battery expense only a third of what it used to be.

There is an Eveready Radio Battery for every radio use.

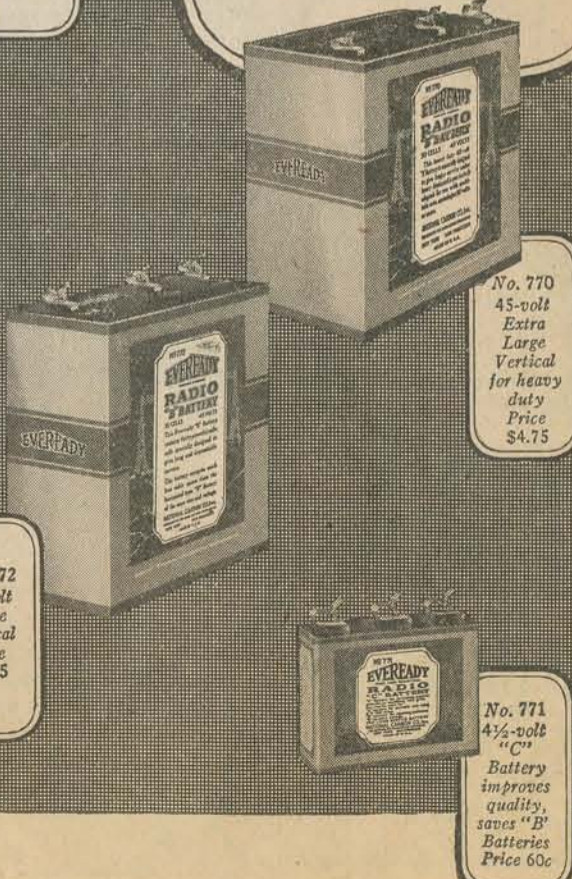
Manufactured and guaranteed by NATIONAL CARBON Co., Inc. Headquarters for Radio Battery Information New York San Francisco Canadian National Carbon Co., Limited Toronto, Ontario

Dry "B" Batteries are an economical, dependable and convenient source of plate current!

No. 7111 1 1/2-volt Dry Cell "A" Battery for all dry cell tubes



EVEREADY Radio Batteries -they last longer



No. 770 45-volt Extra Large Vertical for heavy duty Price \$4.75

No. 772 45-volt Large Vertical Price \$3.75

No. 771 4 1/2-volt "C" Battery improves quality, saves "B" Batteries Price 60c













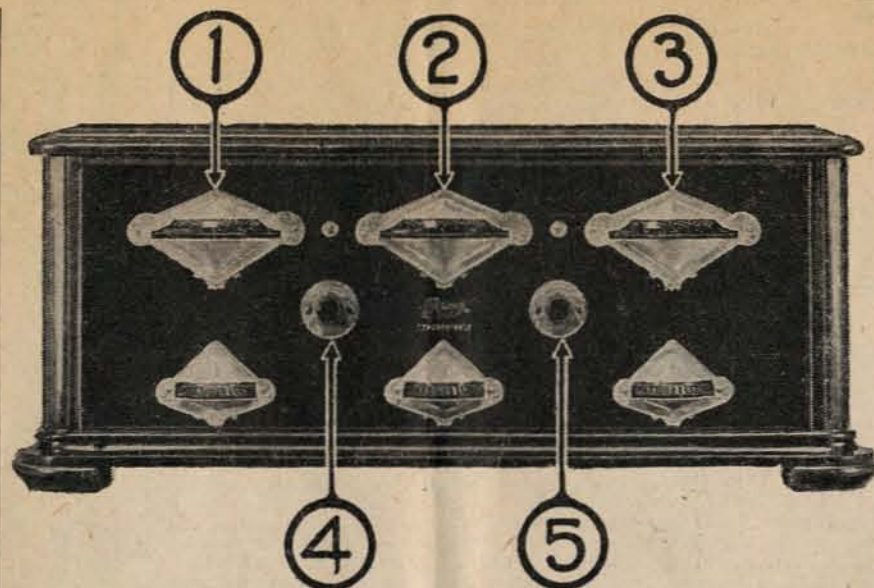
# OPERATING AND TROUBLE SHOOTING

## For the Owner of a Grebe Synchrophase Receiver

THIS receiver possesses several unusual features both as to appearance and construction which make it materially different from any other receiver on the market. While it would come under the general classification of tuned Radio frequency, the transformers used to couple the tubes are radically different from any others and there is an unique volume control provided in the audio frequency part of the set. As can be seen from the illustration there are no dials on the face of the cabinet as is the usual practice but instead A. H. Grebe & company have utilized their well-known method of rheostat control and adapted it to tuning. The shafts of the condensers are vertical instead of horizontal and only the edges of the dials protrude through openings in the panel while, at the bottom of the panel, three knurled discs protrude which can be easily moved with the thumb. There is a vernier action, between the bottom controls and the dials, of about five to one. In the illustration, 1, 2 and 3 are the graduated dials while 4 is the volume control and 5 is the rheostat.

### Connecting Accessories

The equipment required with this set consists of five 201A tubes, one 6-volt storage battery, 96 volts of B battery, one 4½-volt C battery and one loud speaker. This receiver was tested on a 60-foot vertical aerial with a ground that was known to be good, connected to the radiator. If four 22½-volt dry cell B batteries are used they should be connected in series, that is, the positive of one to the negative of the next. This will leave a negative terminal open at one end and a positive terminal at the other. Wires sufficiently long to reach from the batteries to the set should be connected to these open terminals and a third should be connected to the positive terminal of the second battery from the negative end; there should be two B battery units be-



tween the negative terminal and this third wire. In our tests 45-volt storage B units were used of which there were two; thus there was only one jumper wire between units and our third wire was attached to this jumper. Two more wires will be required that will reach from the storage A battery to the set. For this purpose it will be found very convenient to use the five-wire cables which have recently made their appearance on the market. The connections for the accessories will be found on the bottom of this set and it will be necessary to tip the receiver back on its rear edge to connect the wires mentioned above. Before connecting any wires, the rheostat knob 5 should be turned to the extreme left.

The antenna binding post will be found as a Fahnestock clip at the left end of the row, the ground is next, the third is for a loop if used, the unmarked loud speaker wire connects to the fourth, the plus speaker cord goes to the fifth, the B battery plus is next, then the wire from the center of the series of B units and

the minus C connects to the eighth. Plus C and minus A should be attached to the ninth clip while minus B and plus A go to the last one to the right. The C battery should be placed close up behind the cabinet and as it is small it cannot be seen.

### Tuning

Now, with volume control knob 4 at maximum to the right and the rheostat knob 5 turned so the pointer is under the letter A in the word increase, one is

ready to tune for stations. It will be found that dials 2 and 3 run practically identical throughout the scale while dial 1 will not vary from their settings by more than one or two dial divisions.

We first tried for Station WEAH with a wave length of 492 and found it at dial settings of 84.5, 83, 83. Going down the scale, WCAP at Washington, D. C., on 469 was heard with maximum volume at 75, 74, 73 and just why the last dial deviated from the setting of number 2 is hard to say. The selectivity was well demonstrated on WCAP and KFI of Los Angeles, both of which were supposedly on 469 meters, and probably were not more than two meters apart. A turn of all three dials, one-fourth of a division to the left from the WCAP setting, brought in KFI and the Hotel Alexandria orchestra.

Dials 2 and 3 were moved together, one division at a time to the right and dial 1 was kept slightly above them. At settings of 62, 62, 62 we found WDAF of Kansas City on 411 meters. Going further down to 59, 58, 58 the east was heard from through WDAR of Philadelphia on 395 meters.

All this time we were, of course, going through local stations and it was at these points that the volume control came in handy. The energy put into the loud speaker by this set is terrific and, without reduction, is apt to cause distortion due to the inability of the last tube and the speaker to handle it. Once the program from a moderately strong station is tuned in, the volume control can be set at the point where volume and clearness balance for enjoyable reception.

Provision is made for the many types of antennas which purchasers can put

(Continued on page 20)

## The NEWEST Schickerling Tube!

A standard base  
5 volt tube consuming but  
16/100 amperes!

THINK of it! A big husky tube with the equal volume and sensitivity of the quarter ampere tube, yet consuming only 16/100 ampere filament current!

This combined Detector, Oscillator, Amplifier tube is the true economy tube for multi-tube sets. Imagine—a 5 tube set equipped with these new Schickerling tubes will consume only 8/100 of an ampere as against 1¼ amps using the usual ¼ ampere tubes.

Can be used in all sets now using ¼ amp. tubes, with absolutely no changes necessary.

Call at any authorized Schickerling dealer—at our factory—or at any of our branches and listen to an actual demonstration. It's the most convincing test.

Sold with a written 10 day guarantee  
SCHICKERLING PRODUCTS CORP.

Executive Offices and Factory

401-407 Mulberry St., Newark, N. J.

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Jewelers Bldg., 36 West 47th Street

Havemeyer Bldg., Cortlandt at Church Street

Philadelphia Sales Office

Jefferson Bldg., 1015 Chestnut Street

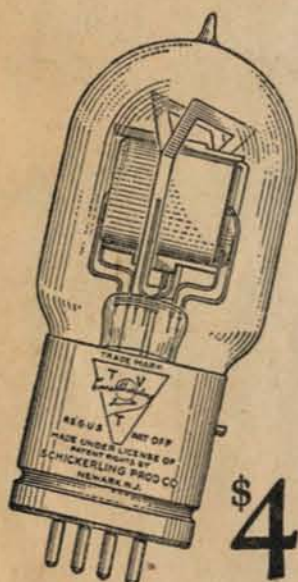
Chicago Sales Office:

220 South State Street

Address all correspondence and mail orders to executive office and factory at Newark or to our nearest branch office.

**SCHICKERLING**  
RADIO TUBES

With the Stabilizing Triangular Plates



MODEL S-1600

a 5 volt, standard base  
16/100 amp., Oscillator,  
Detector, Amplifier, Plate  
voltage, 16 volts to 90  
volts. Operates on a 20  
ohm rheostat with a 6  
volt storage battery or 3  
to 4 dry cell batteries in  
series.

### OTHER MODELS

5 volt—¼ amp. Standard Base  
Model S-200 Detector . . . \$3.00  
Model S-4000 Amplifier . . . \$3.00  
Model S-700 Special Oscil-  
lator and Power Tube for  
all multi-tube sets . . . \$7.00  
3 volt—1/10 amp. Miniature Base  
Model S-600 Det.-Amp. . . \$3.00

Sold only by authorized Schickerling dealers

## Be sure ~ that your transformers are giving you Amplification without Distortion



The Amplification without distortion use ACME transformers in the set you build. Insist on the set you buy every all the year round Radio

The Amplifying Transformer is the Magnifying Glass of Radio

Acme Transformers give maximum of sound, clearly and distinctly

WHEN you put a lot of time and money into a radio set you want to be sure that it will give the best results. You want to know that your set will bring in the stations so that you can enjoy listening and be proud to call in your friends. You want Amplification, but above all you want Amplification without Distortion. Be sure to use amplification transformers that increase the sound without spoiling the quality.

The Acme A-2 Audio Amplifying Transformer is the result of 5 years of research and experimenting. It gives amplification without distortion to any set. Whether you have a neutrodyne, superheterodyne, regenerative or reflex, the addition of the Acme A-2 will make it better.

If you are not getting loud, clear radio try Acme Transformers and note the difference.

Each transformer is tested and carries a guarantee tag. If you want Amplification without Distortion use Acme Transformers in the set you buy and insist on them in the set you buy. (That's one of the big reasons why the Acmelex Kit-set gives such good results—it uses Acme Transformers.) Send for our 40-page booklet which explains how to get the best results by proper amplification and also contains a number of valuable wiring diagrams. It will help you build a set. Mail the coupon with 10 cents.

ACME APPARATUS COMPANY

Transformer and Radio Engineers and Manufacturers

Dept. N-3, Cambridge, Mass.

Have the fun of making your own radio set

**ACME**  
~ for amplification

ACME APPARATUS COMPANY,  
Dept. N-3, Cambridge, Mass.  
Gentlemen: I am enclosing 10 cents (U. S. stamps or coin), for a copy of your book, "Amplification without Distortion."  
Name.....  
Street.....  
City.....State.....



# Four Filter Eight Tube Super-Heterodyne

## Part II—Construction of the Filters

By Jacques Fournier

THE intermediate amplifiers of this receiver are not particularly difficult to make and materials which are available to everyone are used in the construction. The writer has used 1/8-inch thick cardboard, but the man who has a fret saw and a number of cigar boxes can make the necessary discs from them. There will probably be many other fans who have a supply of 1/8-inch fiber or

Item "C" is 1/8-inch cardboard, such as may be found on the back of a writing pad, or it may be cut out from a cardboard box. It is the same diameter as the larger discs. The two slots at one end which are isolated from the rest by item "C" are for the primary windings. Three forms are to be constructed as shown and the fourth one differs from the rest only in that four small discs

2,100 turns for the secondary. Each of the four forms which were made from the discs are to be wound in this way, either clockwise or anti-clockwise, but all windings in same direction. In cutting the threaded brass rod which passes through the center, or when choosing a machine screw on which to stack the discs, a length should be selected which will leave 1/2 inch protruding so that there will be room for a nut on the end, 1/8 inch, to pass through the small panel on which these transformers are mounted, and 1/2 inch for another nut on the other side of the panel; 2 1/2 inches is about right.

capacity of from .00004 mfd. to .00005 mfd.

While the layout for the baseboard of the receiver was promised for this issue, it will have to be held over due to lack of space and the layout for the small panel which makes the cover for the filter box will be presented with it next week.

The box is to be divided into four compartments by three pieces of copper or brass as shown in figure 3. These are

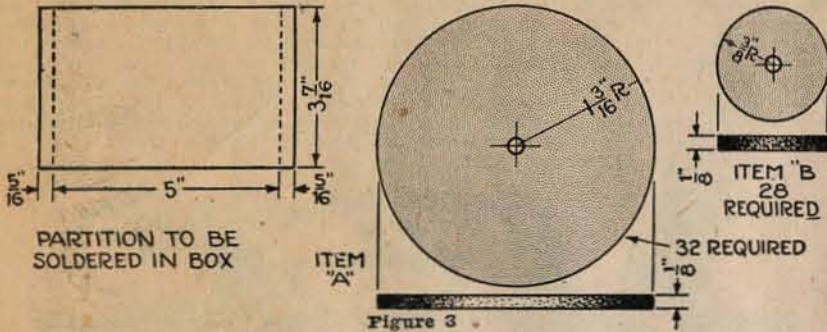


Figure 3

bakelite or hard rubber, and any of these materials are just as good and possibly better than the heavy cardboard.

In figure 3 is shown the dimensions for the discs, and it will be noted that the larger discs are 2 1/2 inches in diameter and 32 are required, while the smaller discs are 28 in diameter and 28 are required. No matter what material these are made from, care should be used in cutting them out and smoothing the edges so that when they are assembled into forms, the small discs will fit together smoothly as the core on which the wire is wound and the larger discs will pack tightly against them with no sharp edges to cut the fine wire to be wound on the forms.

### Transformer Assembly

In figure 4 is shown the assembly for one of the transformers. Each of the discs must have a hole in the center about 3/8 inch in diameter for the 2 1/2-inch threaded brass rod or long machine screw on which the discs are to be stacked.

separate the primary from the secondary instead of the large 1/8-inch disc, item "C." The insertion of these smaller discs moves the primary 1/2 inch from the secondary, which makes for looser coupling in the one transformer. The wire to be used in winding these transformers is number 32 dsc., of which one pound will be enough for the whole job.

Winding of the primary is begun at the end away from the secondary and 525 turns are to be wound in the first slot. The wire is then carried over the large disc and 525 more turns are put in the second slot. This completes the primary, giving a total of 1,050 turns. The winding of the secondary is begun in the end nearest the primary and 525 turns are wound in the first secondary slot, the wire is then carried over into the second slot and 525 more turns wound on. From the second slot it is carried over to the third and from the third it is continued in the fourth slot. Each of these is to be wound with 525 turns, giving a total of

### The Shielding Box

The start of the primary winding which, was an inside end, is to be the B plus connection, while the outside or finishing end of the primary in the second slot is the P or plate connection. The starting or inside end of the secondary winding, which is in the slot nearest the primary, is to be the F connection, while the outside or finishing end at the last slot of the secondary is the G or grid connection. The copper or brass box in which these transformers are to be enclosed is shown in figure 4. This pattern may be enlarged on paper and traced on to the sheet metal or may be laid out directly on the sheet metal itself. As shown in figure 4, the sides and ends are bent up toward the reader and the 1/4 inch flanges are to be bent inwards. The flaps which were left at the ends of the side walls are to be bent in, of course, and are to be soldered to the end walls. When these have been soldered sufficiently to hold the sides and ends together, solder should be run along the corners so that an airtight box will result. The transformers described above, and the four small condensers with which they are to be tuned, will be suspended from the bakelite or hard rubber panel placed on top of the box and the edges will be sealed. There are several small condensers on the market, any make of which may be used to tune the secondaries. These small variable condensers should have a maxi-

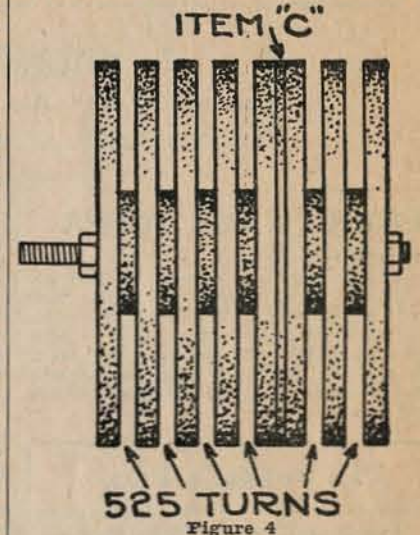


Figure 4

5 by 3 1/2 inches and flaps are provided at each side so they may be bent over at right angles and soldered to the side walls of the box. Copper or brass are specified as solder can be used on these materials. Aluminum might make a lighter and possibly a more workable material, but it is almost impossible for the home builder to solder to it. The points at which the dividing pieces are to be soldered to the side walls are indicated in figure 4, and if soldered as shown, and the small panel

(Continued on page 18)

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"BRISTOL" on the new Bristol's Loud Speakers indicates established responsibility and safeguards the buyer who knows the name.

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Model "S" Audiphone \$25.00  
Horn 14 1/2" diameter. Velvet mat finish of bronze and gold. Classic base.

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LAYOUT FOR FOURNIER FILTER BOX

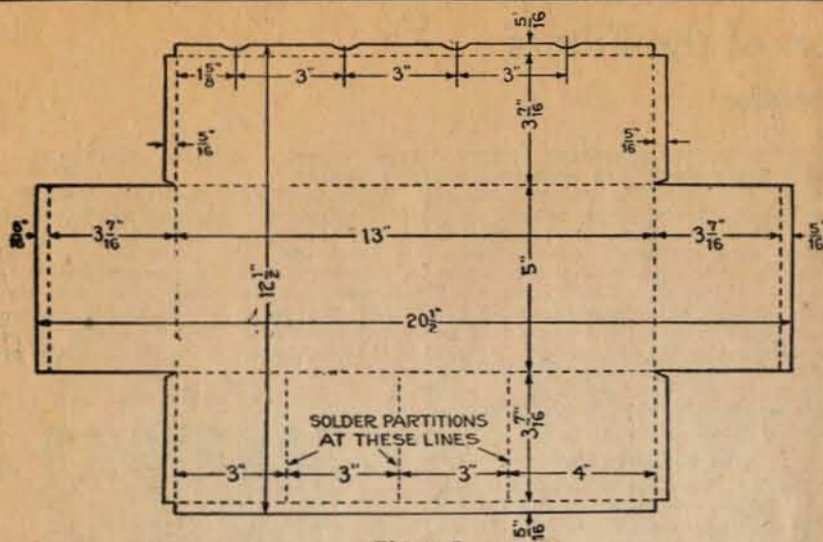


Figure 5

FOUR FILTER SUPER

(Continued from page 17)

layout to be shown next week is followed carefully, the transformers and condensers will fit into their respective compartments with good clearance all around. (The assembly will be gone into next week and the sharpest super made will begin to take tangible form.—Editor's Note.)

The Reader's View

Announcers Reading Telegrams

In your excellent publication, for which I am a subscriber, you have frequently commented editorially upon the station director who fails to announce his station frequently. I heartily concur in your comments.

Realizing that the policy of broadcasters is fixed largely by public opinion and that public opinion can be made known only through the expression of a large number of individual opinions, I am submitting the following for your consideration.

In my opinion the most objectionable feature of present-day broadcasting is the reading of telegrams and telephone messages received, with comments thereon. At some stations this consumes 50 per

cent of the time. I invariably tune them out. I believe that nearly all telegrams sent are sent for egotistical reasons by people who want to hear their names broadcast. (This does not apply to applause cards or letters of appreciation, of which I approve, nor do I object to the sending of telegrams to encourage the artists at the time. It is the broadcasting of them that I object to.) Now, I believe that most stations sincerely try to please their patrons or circle of listeners. Suppose a station has 5,000 listeners on a certain broadcast period and that it receives and reads 50 telegrams. Then for every person they please by reading a telegram they annoy one hundred. I believe these figures are conservative and that the annoyance is much worse.

Another point is the objection raised by music publishers to the broadcasting of their copyrighted music. As one example of the result—yesterday my wife bought six pieces of music. She does this at irregular intervals. All this music is music she has heard over the Radio and music which otherwise she would not have heard or would not have known the name or title, if she had heard it in a movie theater. Multiply this by many thousands and where have the publishers any kick?

Still another point of controversy—the broadcasting of music by opera and other famous stars by the Brunswick and Victor

people. We enjoy hearing them out here but never have an opportunity to hear or see them in person. So our hearing them does not cut down the attendance at the theater. Neither do I believe it reduces the attendance in New York, Boston, Chicago or other large cities. Having heard them by Radio I know that if I were in a city where they were appearing I would go to see them. In other words, in my case, hearing them by Radio gives me enjoyment that otherwise I might never have and increases my desire to hear them and see them in person and to have their records. And I believe my case is typical of many thousands.—Robt. Whitfield, Fort Sam Houston, Texas.

Silent Night for New York

One of the best moves in favor of the DX hound would be a silent night for New York and vicinity. They are having silent nights for the western stations, why can't we follow suit? At present there are over a dozen Radiocasting stations in this locality including Newark and New York city. To receive real distance one has to sit up until most of the locals sign off which usually means one o'clock in the morning. It isn't a case of

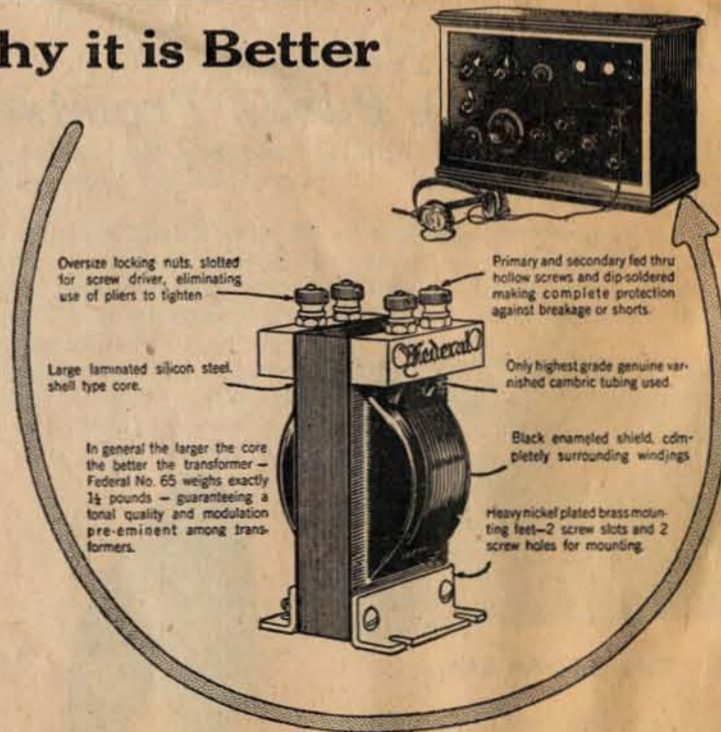
selectivity to tune the locals during the time they're on, to get distance. It is a case though of bringing the long DX stations through with sufficient volume to enable one to about hear the call letters when all locals are going strong. Most DX hams listen in about eleven o'clock for distance. Everyone doesn't want to sit up until one and two o'clock in the morning to get DX. Most of us are tired out and eleven o'clock is the limit.

You may say, what about the poor fellows with crystal sets? They can take care of themselves, one or two of the locals could remain broadcasting for their benefit, those of the weaker stations for instance. One silent night a week would be the limit and surely crystal set users, if they didn't want to do without listening in altogether, could satisfy themselves with the one or two weaker locals which would be on.

I hope the above will be taken into consideration as it is a very vital subject pertaining to the welfare of Radio.

In conclusion I want to say this; everyone should have some interest in the receiving of distant stations as DX lends enchantment and will be Radio's future.—Chas. Stevenson, Hasbrouck Heights, N. J.

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"MASTER of Every Note in the Orchestral Range" is the proven claim of the Federal No. 65 Audio Frequency Transformer! Volume without distortion is the basis for the beauty of Federal Tone.

same engineering skill that has made Federal the recognized leader in electrical communication apparatus since 1890.

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The best Radio Experts made this catalogue—men who devote their entire time to Radio—who are up to the minute with everything new, who tell you the best hook-ups, who have selected for you the best tested parts, who have chosen the best sets—so simple that you yourself can easily install them—so reliable that we guarantee them to give satisfaction.

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# Broadcast Listener's Reference Library

## Part VI—Audio Frequency Amplification

By Edward Thomas Jones, A. I. R. E.

**A**FTER the signals have passed through the detector, they are no longer currents changing their direction of flow at the Radio frequencies of one to three million a second, but are

must be connected to the detector tube, figure 14. This circuit from the antenna and ground to the points A and B is the usual nonregenerative hook-up. While three methods of coupling amplifiers to

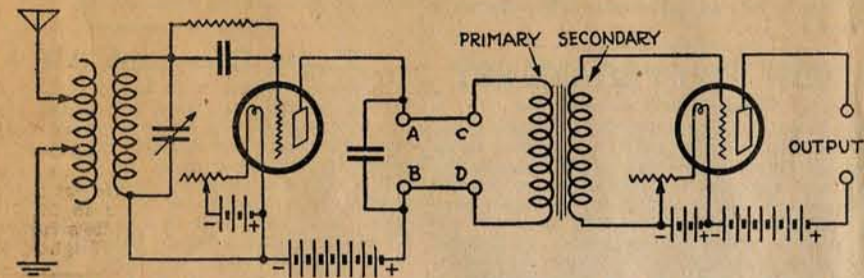


Figure 14—A step of audio frequency amplification added to a three-circuit receiver.

now direct current flowing continuously in one direction and varying in strength from 16 to 20,000 times a second. Passed into the head receivers, they cause the diaphragms to vibrate at this rate which makes air waves following each other at audible frequencies.

### Pulsating Direct Current

The currents to be strengthened then, so that they will actuate a loud speaker,

the detector and to each other, are possible—by resistances, by impedances, and by transformers—we show, and will discuss here, only the transformer method, which is recognized as the simplest and is almost universally used.

### The Audio Frequency Transformer

In figure 14, points A and B are connected to C and D, which are the input terminals of an audio frequency trans-

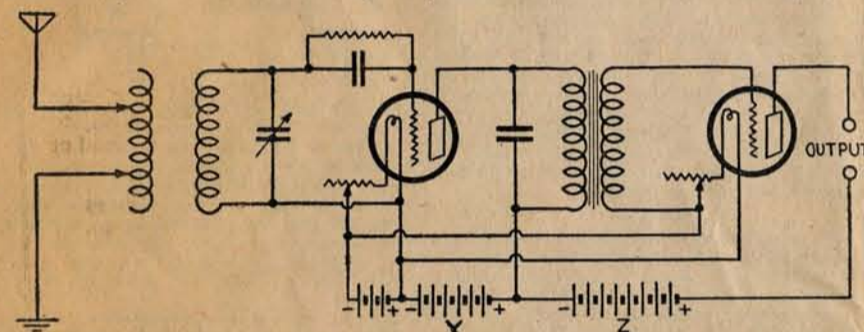


Figure 15—A single A battery and single B battery may be used for a number of tubes.

are not Radio frequency currents but varying direct current. The piece of apparatus which will accomplish this strengthening or amplification is a vacuum tube identical in construction with that used for detection.

Let us consider how this second tube

former. Such a transformer consists of an iron core, made either of iron wire or thin flat strips, on which are wound several layers of fine wire, called the primary, and many thousand additional turns called the secondary. Through the primary flows a steady current, from the

B battery, or 22 or 45 volts. Since only changes in a current are passed from a primary to a secondary, this steady unvarying flow does not affect the secondary. If, now, incoming signals cause this current to vary by one or two volts, this change causes a current in the secondary which has a voltage bearing the same ratio to the change as the ratio of turns between primary and secondary windings. Thus, if it is a three-to-one transformer and the secondary has three times as

which time has developed is the practice of using a single A and a single B battery.

Figure 15 shows the circuit in which both filaments are lighted from one source and both plates kept at positive potential by one set of plate batteries. Battery Y is a 22½ volt unit, as is battery Z. If you will trace the circuit from the plate of the detector tube and through the primary of the transformer, you will see that only battery Y supplies the detector plate. Starting at the amplifier plate, however,

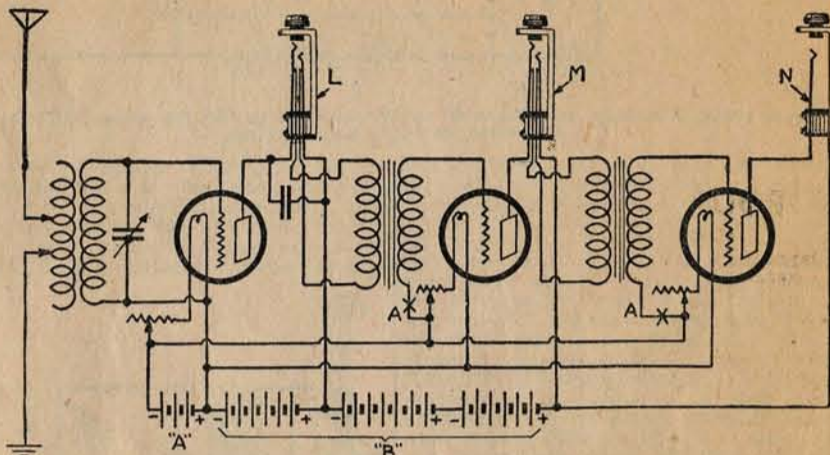


Figure 16—Jacks in each stage of amplification permit use of any number of tubes.

many turns as the primary, the voltage in the secondary will be three when the changes in the direct current in the primary is one volt more or less than normal.

### The Single Current Source

The circuit shown in figure 14 contains two filament or A batteries and two plate or B batteries. Early experimenters naturally connected their current sources in this way, but among other improvements

we find that we must go through the phones and both batteries Y and Z before reaching the filament. The load on Y is double that on Z.

### Jacks

This practice of utilizing but two sets of batteries for more than one tube can be carried out indefinitely, as shown by figure 16. In this diagram we have added (Continued on page 20)

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**Thank You** for the pleasing program heard between 9:30 P.M. and 10 P.M., on Mar 1 1925.

We have a **Crosley "52" Special** Children enjoyed Uncle Bob, Remarks: **Could hear every word** We would appreciate Al Johnson or Eddie Cantor.

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Contains stations, cities, wave lengths, 4 dial settings, remarks, etc. Station list by wave lengths. Distance map. Other valuable information. Very convenient.

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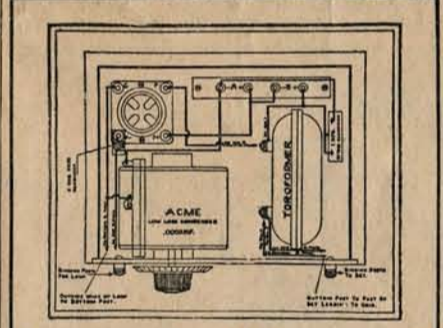
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Or in Kit form for \$18.00

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**REFERENCE LIBRARY**

(Continued from page 19)

a further improvement: jacks which permit the use of the detector only, one stage of amplification or two stages. A device known as a phone plug is attached to the

tive in relation to the filament would help. (See figure 17.)

**To Clear Up Signals**

It will frequently be found, when using two or three stages of audio frequency amplification with 90 volts on the plates, that the voice and music which comes out

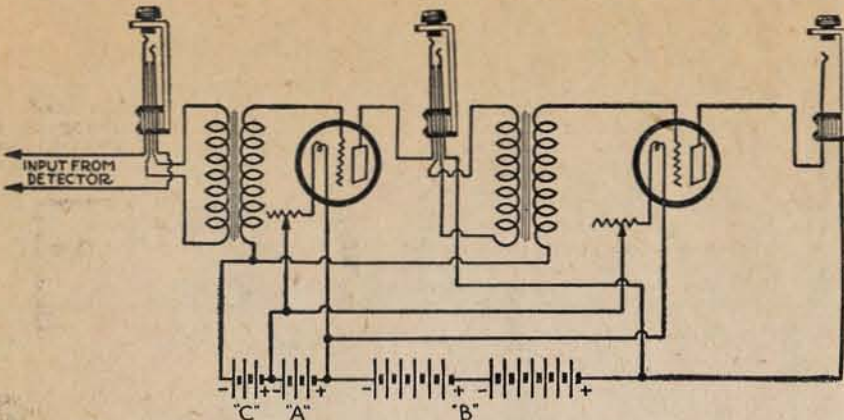


Figure 17—A C battery, used when 45 to 100 volts are put on the plates, will prevent distortion and give more volume.

tips of the cord of the head receivers and may be inserted either in jack L, jack M or jack N. Jacks M and N are known as two-circuit jacks because, when no plug is inserted in jack M, the plate circuit includes the primary of the first audio frequency transformer; when the phone plug is inserted, the primary is eliminated and the phones substituted for it. Jack N is a single open-circuit jack because, when the plug is out, the single circuit which is possible is open (not completed). This last may also be a double-circuit jack, in which case the phones are in circuit when the plug is in, and the loud speaker horn is automatically connected when the phone plug is withdrawn.

**The C Battery**

Another refinement of audio frequency amplification, and one which is very recent—it came in with the thoriated-tungsten filament tubes—is the use of a third or C battery. It was found, when using the four tubes UV-201A, C-301A, UV-199 and C-299, that, if more than 45 volts were applied to the plates, distortion was likely to occur, and a volume less than that expected was produced. Tests and experimentation showed that the insertion of a third battery which would make the grid 4½ or 6 volts nega-

of the horn, while enjoyably loud and clear, has what Radio men call "whiskers" on it. This term has been applied because the only adjective that suitably describes the phenomenon is "fuzzy." The letters c, s, and z have a peculiar sibilant quality

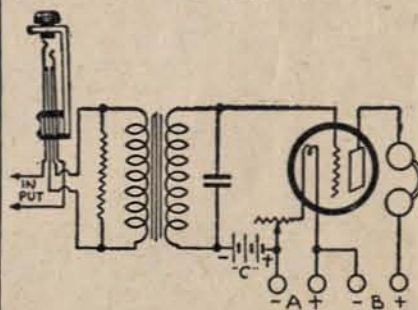


Figure 18—A leak across the primary or a condenser across the secondary will usually clear up reproduction.

and the higher notes from stringed and reed instruments seem to hang on, instead of breaking off sharply as they should. Since it is usually impossible to determine just what part of the amplifying system is at fault, the two slight addi-

tions shown in figure 18 should be tried separately. First try connecting a small fixed mica condenser of .00025 or .0005 mfd. capacity across the secondary of the last audio frequency transformer and, if readily available, even a .001.

If this does not remedy the objectionable fuzziness, try grid leaks of various values connected across the primary. One or the other of these methods should clear up the reproduction. This may cut down the volume from three to five per cent, but the gain in faithfulness to the original music more than offsets it.

(Multi-tube receivers contain many places where trouble may occur, so Mr. Jones will take up the operation and kinks of larger sets in his next article.—Editor's Note.)

**HOW TO OPERATE SET**

(Continued from page 15)

up and the various lengths are taken care of by a link connecting two binding posts on the rear left corner of the baseboard. If the antenna is very long, or one is located unusually close to a high-power broadcast station, this link is to be released from one of the posts. If a short antenna is in use, or the owner is located out in the country, the link should be closed and greater volume will result.

Due to the use of binocular coils, operation on a loop was very successful. There is no external field around these coils and the use of a loop, usually impractical in tuned R. F. sets, because of feedback between coils and loop, is permitted. Another movable link enables the owner of Synchronphase to use either loop or outside antenna. Thrown to the right, the former functions while, to the left, the latter is utilized.

After trying out various combinations of antennas and link positions, we resumed our tuning and, at 41.5, 41, 41.5, found WCAL of Northfield, Minn., with a wave length of 360 meters. WHK of Cleveland uses 283 meters so we swung to them and found their settings to be 23.5, 23, 24. It was plain from the curve we were drawing that this set would go down below the broadcast range so tuning further was unnecessary.

**Trouble**

The construction of this receiver is exceptionally good and it is extremely unlikely that anything will go wrong inside. Should howls or whistles develop, the accessories and connections should be examined carefully before complaint is made to the dealer. High class tubes were found essential to clearness in our tests,

and seven were juggled around from one socket to another before two were eliminated and we were satisfied that the full possibilities in this set were being realized.

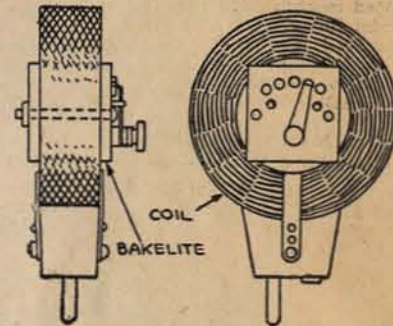
Be sure that corrosion or jar has not produced a poor connection at one of the Fahnestock clips as anything but a perfect electrical contact in any of them will manifest itself as whistles or scratchy sounds in the speaker. Test the A, B and C batteries frequently and recharge or replace before any of them get too low.

Antenna and ground should be examined at frequent intervals, especially if they were not soldered. If they were not, the connections should be scraped and remade at least every three months.

**Tapped Honeycomb Coil**

In experimenting with honeycomb coils I have found a very good coil which may be made at the cost of a very few cents that will work efficiently. The coil is varied by means of taps.

If a coil is desired for the amateur and music wave lengths a 150-turn coil is about the best. This can be made up of a 50-turn coil as a base. The other turns are placed on and taps taken at every



25 turns and at the end. The wire may be wound in the ordinary manner.

A piece of panel material 1½ by 2 inches is placed across the center of the coil. A small switch and five taps are put on the piece. The five wires leading from the coil are soldered to the tap bolts. The connections from the coil are from the open coil end and from the switch lever center.—Walter W. Mulchay, Sparks, Nevada.

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**Lincoln 4-point Tapped Loop \$8.00**

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For any set employing radio frequency amplification. For certain Super-heterodynes requiring a center tap.

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# Neutralizing First Tube in Reflex

## Radiator, Long Battery Leads Cause Trouble

After building a four tube reflex set and had it working very well a certain high-powered station leaked through too much, even on a loop, also the directional

### WORKSHOP KINKS EARN A DOLLAR—

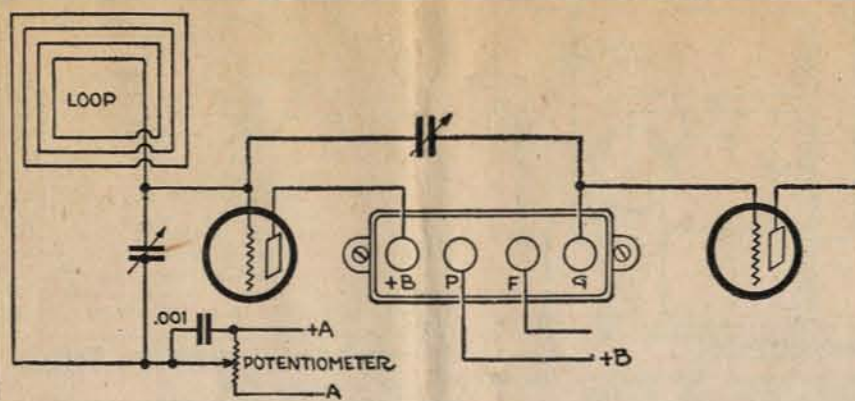
THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. 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,  
510 North Dearborn St., Chicago

effect was not pronounced enough to suit me. This I lay to long battery leads and the close proximity of a large radiator and it was impossible to alter conditions so I approached it in another way which was none other than neutralizing the first tube. This I did and was really astonished at the improvement in selectivity, directional effect and decreased tendency to oscillate.

The neutralization was accomplished in the following manner: The connections on the primary of the first Radio frequency transformer were reversed, i. e., the plate of the first tube was connected to the terminal marked B+ and the B battery was connected to the terminal marked P. It was necessary to do this to make the grid of the second tube out of phase with the grid of the first tube, then a regulation neutralizing condenser of the sleeve type was connected, one side to the grid of the first tube and the other to the grid of the second tube. The filament of the first tube was turned out and the strongest station at home tuned in as loud as possible then the sleeve was moved until the signal entirely disappeared and it really did entirely dis-

## REVERSING CONNECTION TO PLATE



appear. The results were very gratifying. The complete diagram is not shown because it is the regulation four tube reflex hook-up. This same scheme could be used on any set using untuned Radio frequency amplification, although on some transformers it may not be necessary to reverse the primary connections because the grids may be out of phase in their normal conditions.—C. K. Beebe, Chicago, Illinois.

### Space Parts

Electrical losses through improper placement of parts are considerable in many home made sets. Inductances should be placed so that the magnetic fields of no two coils inter-act on each other. This can be done by placing the coils at right angles to each other; but even when so placed, it is advisable to lay the parts out, so that the coils will be as far apart as possible, without too greatly increasing the length of coil leads.

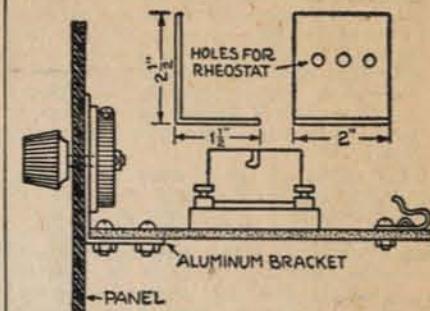
It is not a good policy to construct a three-tube set on a panel that is only large enough for a one-tube set.

### Station or Set at Fault

Noise and distortion are inexcusable faults, but it is well to remember it isn't always the fault of the receiving set. Background noises which can be heard under the voice, as well as certain classes of distortion, are sometimes actually transmitted and there is little you can do to get away from it. This can be checked up by listening in to one or two other stations. If the signals come through clean cut and free from noise, rest assured your set is O. K. and the broadcasting station is at fault.

## Socket Base Mounting Attached to Rheostat

A small sheet of aluminum makes a substantial bracket for mounting a sub base to a panel. The aluminum bracket is held to the panel with the screws that



fasten the rheostat in place. The illustration gives details of its construction.—F. A. Mann, Hinsdale, Ill.

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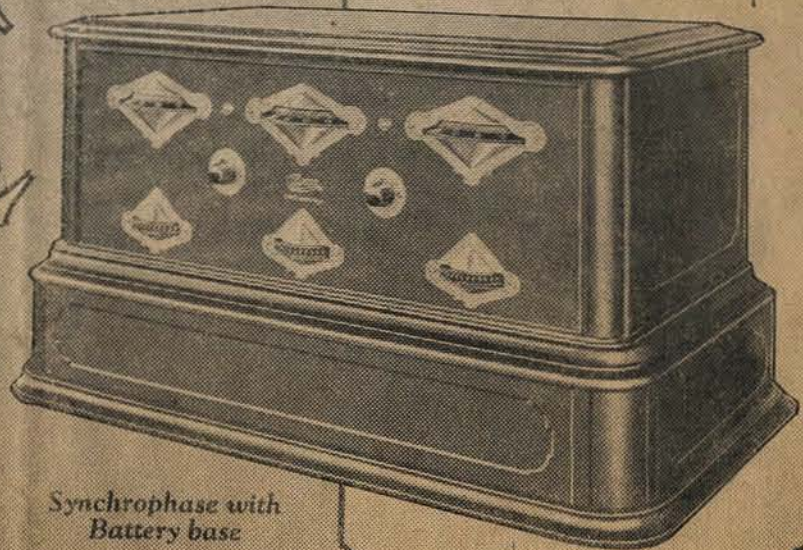
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