

# Radio Digest

EVERY WEEK

# Illustrated

TEN CENTS

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

Vol. VIII

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SATURDAY, JANUARY 26, 1924

No. 3

## TO HEAR INSECTS TALK

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

COMPANY HOLDS ANOTHER  
PATENT AS THREAT

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

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

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

#### Still Covered by Patent?

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

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

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



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

### MICROPHONE OPENS FIELD FOR SCIENCE

Unknown Realm to Be Explored  
by New Radio Glow Dis-  
charge Device

#### First "Ear Microscope"

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

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

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

#### "Our Voices Would be Useless"

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

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

(Continued on page 2)

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

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

## FIRM SEEKS EXCLUSIVE BROADCAST RIGHTS

### Committee Indicates Offer to Handle Cleveland Confab Will Be Accepted

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

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

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

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

## LISTENING IN FROM WAY UP NORTH

By Vera Brady Shipman

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

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

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

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

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

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

### Hunters Toting Sets

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

# NEW "MIKE" UNFOLDS SECRETS OF ENTOMOLOGY



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

(Continued from page 1)

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

### May Revolutionize Ideas

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

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

### How Ultra-Audible Microphone Looks

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

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

### Broadcasting Developed "Mike"

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

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

### No Limit to Vibrations Registered

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

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

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

### Asks for Alaskan Plant

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

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## Looking Ahead

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

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

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

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

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

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

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# PRISON DELIVERIES COST FELONS SETS

## RADIO SUSPECTED AS AID TO FLEEING CONVICTS

Warden of Penitentiary in Philadelphia Finds 200 Receivers Made by Inmates

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

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

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

### Sets Are Confiscated

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

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

### Felons Balk Search

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

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

# SEA TRAGEDY BRINGS MORE COAST STATIONS

## Locate Sites Following Disaster at Point Honda

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

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

# BRAVERY MEDAL TO KAICHIRO YONEMURA

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

# SICK VOYAGER GETS HIS CURE OVER AIR

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

# KDKA'S PROGRAMS SET LONDON AGOG

## 2LO OF LONDON REBROADCASTS PITTSBURGH

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

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

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

### Type of Receiver Used at 2LO

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

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

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

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

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

## Dues Are One Letter a Week in Big Brother Club

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

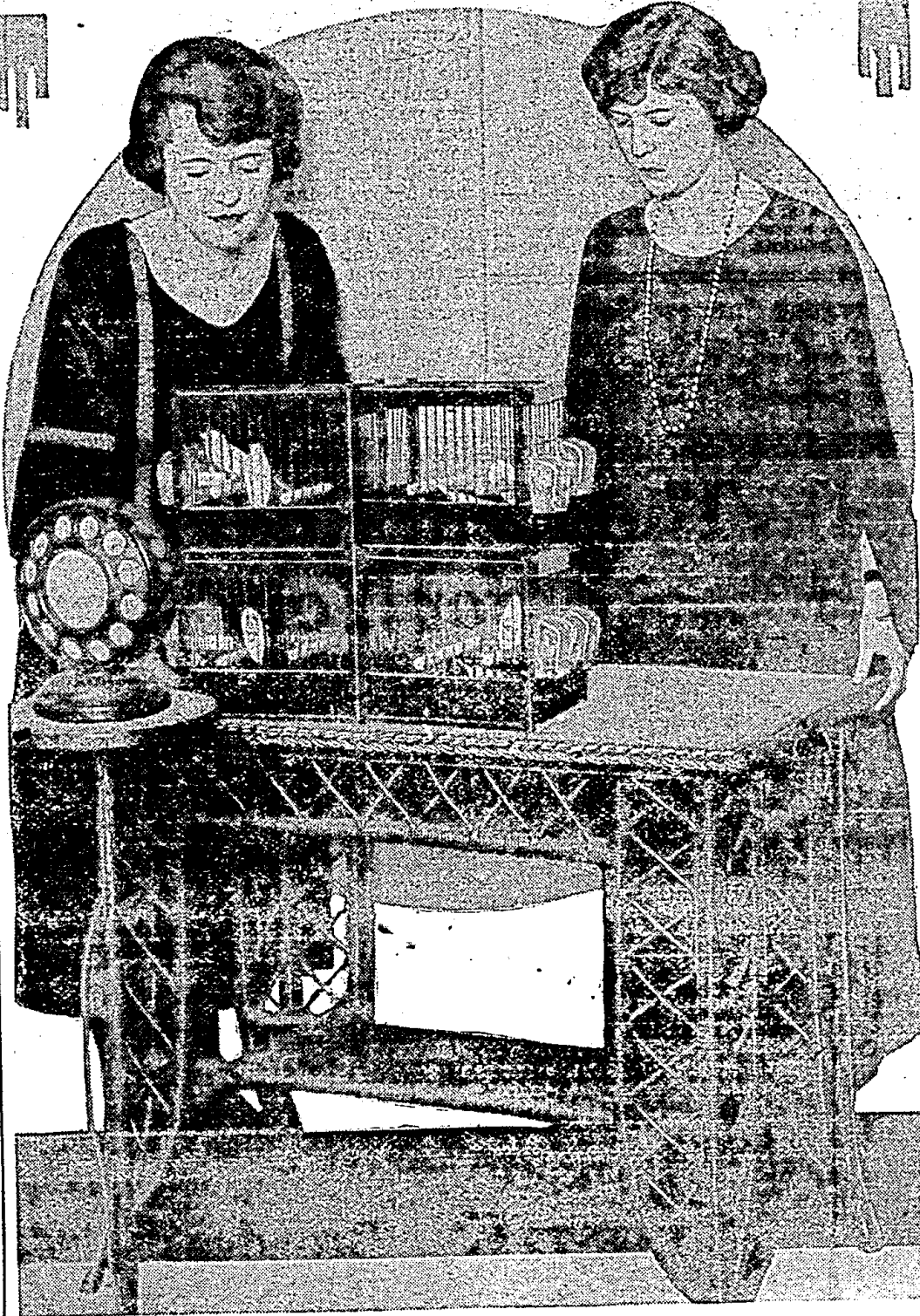
"The Big Brother Club" is not unlike the Boy Scouts and Camp Fire Girls in purpose and principle. It appeals to boys and girls from 9 to 12 years old, and according to the by-laws, "any boy or girl owning or listening in regularly on any receiving set is eligible." The dues are one letter each week to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

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

## New Design Amplifier at WBZ

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

# PUTTING BIRDIES IN THE PHONES



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

# One Loud Speaker and Dance at Detroit Show

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

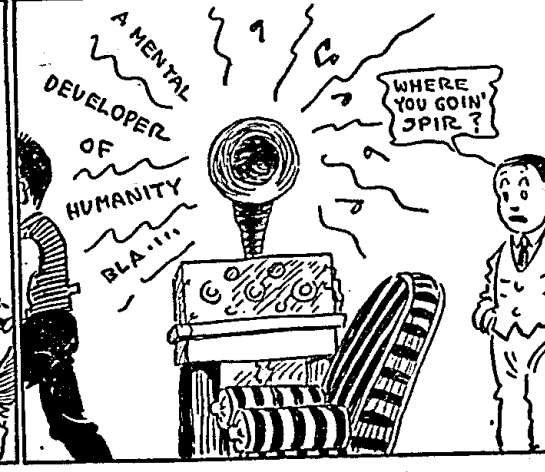
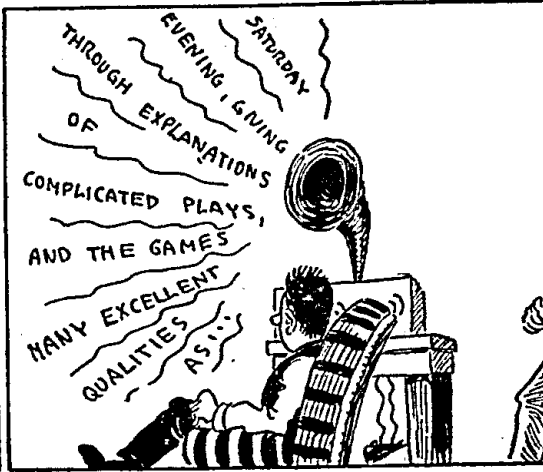
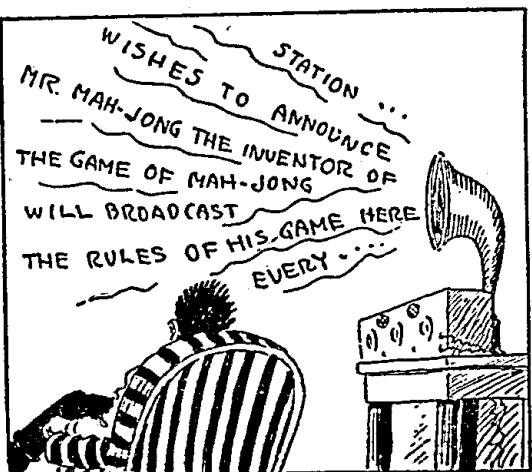
# Taxes for Broadcasting and Listening in Japan

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

THE ANTENNA BROTHERS

Spir L. and Lew P.

Or at a Chop Suey Palace



## WEAF'S POWER RISE PLEASES LISTENERS

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

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

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

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

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

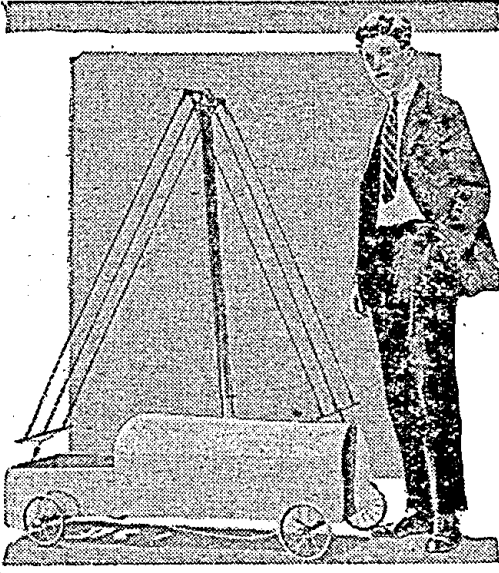
### Remedies for Troubles

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

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

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

## BROOKLYN STUDENT BUILDS RADIO AUTO



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

## Uruguay Interest Grows

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

## Five Microphones Form Chain Strung in Hotel

Elaborate System Furnished for CKAC, Montreal

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

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

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

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

## HOME FOR AGED MEN GETS RECEIVING SET

Club's Gift Takes Away Dullness of Daily Routine

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

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

## Ireland to Lift Ban on Use of Foreign Apparatus

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

# Radio Circuits

The Most Popular American Radio Circuits

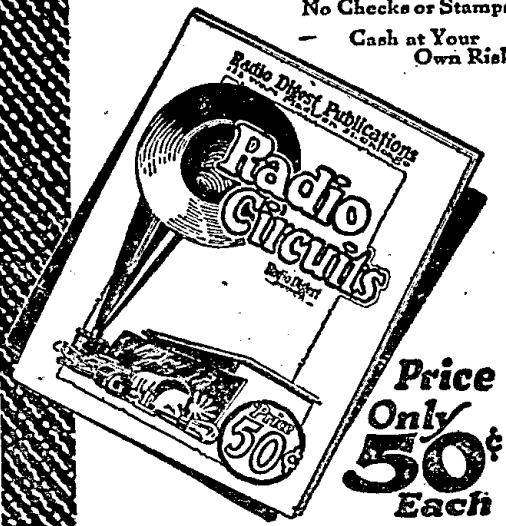
50 Diagrams and Illustrations

- Flewelling Hook-ups
- Single Tube Reflex
- Spiderweb Coil Circuits
- Radio Frequency Amplifier
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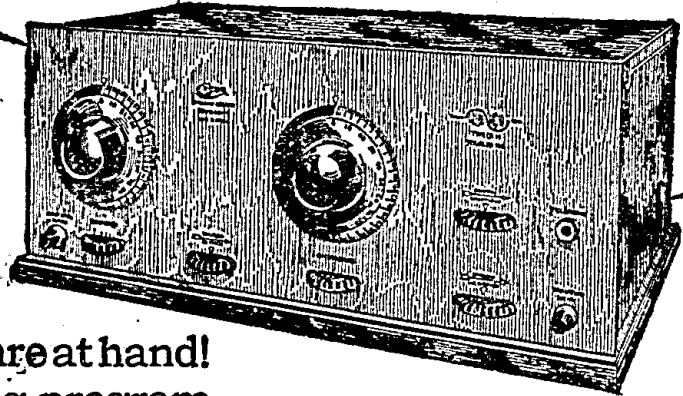
# The Ideal Radio Instrument for Your Home



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— Lao Tzu

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

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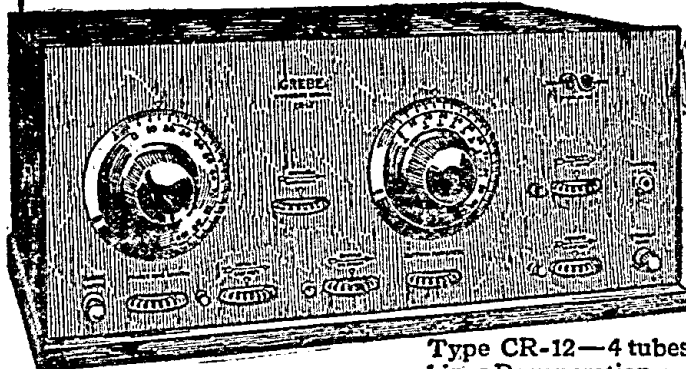
## GREBE Broadcast Receiver

Built in two types, each an Instrument of dependability and beauty—the result of more than ten years of development by the pioneer.

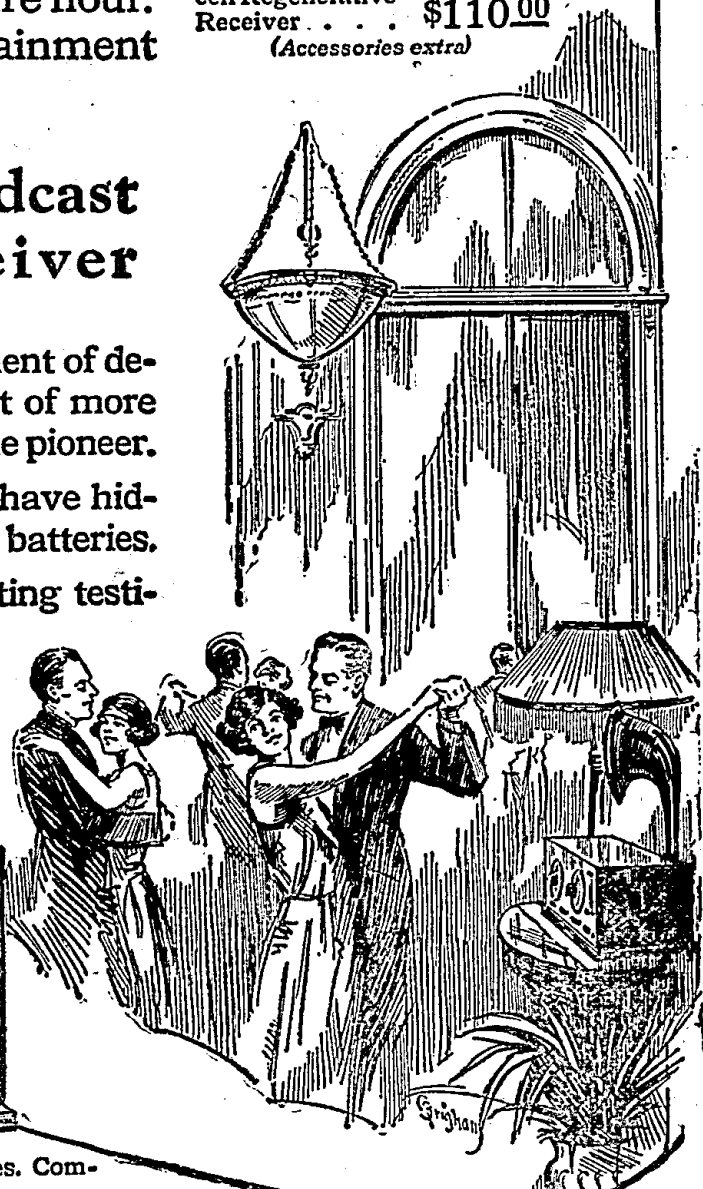
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# WJAZ OPERA STARS PULL LETTERS



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

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

## BROADCAST MEOW OF MYSTERY CAT

"CHAMP" FELINE JOINS KYW STUDIO STAFF

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

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

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



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

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

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

Meow!

## Lecture Course on Meat Industry Given by KYW

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

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

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

## Education Is Aim of New Utah "U" Plant

Plan to Assist in State-Wide Promotion of Learning

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

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

## ANALYZE RESEARCH "DOPE" BY MACHINE

Tabulators Relieve Standards Bureau of Detail

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

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

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

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

## Camden Police Buy Set

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

## AIRWAVE EXPERT TO AID LIGHT KEEPERS

Helps Adapt Radio to Service on Coast

WASHINGTON, D. C.—Radio has come to form so vital a part in the work of the U. S. Lighthouse Service that the aid of a Radio engineer has been secured to apply the best means of Radio communication and position finding in this coastwise service. John L. Preston, who has been

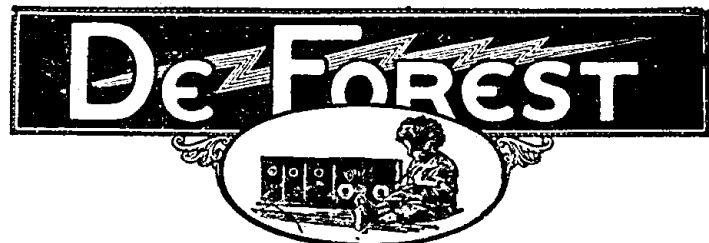
active in the Radio Laboratory of the Bureau of Standards for the past five years, has been transferred to the Lighthouse Service, where he has taken up his new duties.

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

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

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

Authorized agents everywhere.



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

# JACK, A DOG FAN, HAS HIS OWN SET

PAWS OFF PHONES WHEN  
LECTURES BEGUN

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

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

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

### Lectures Make Jack Paw Off Phones

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

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

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

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

## POPULAR ANNOUNCER AS ARTIST SEES HIM



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

### New French Rule Aimed to Aid Amateur Transmitters

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

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

# Genuine E. J. Flewelling PARTS

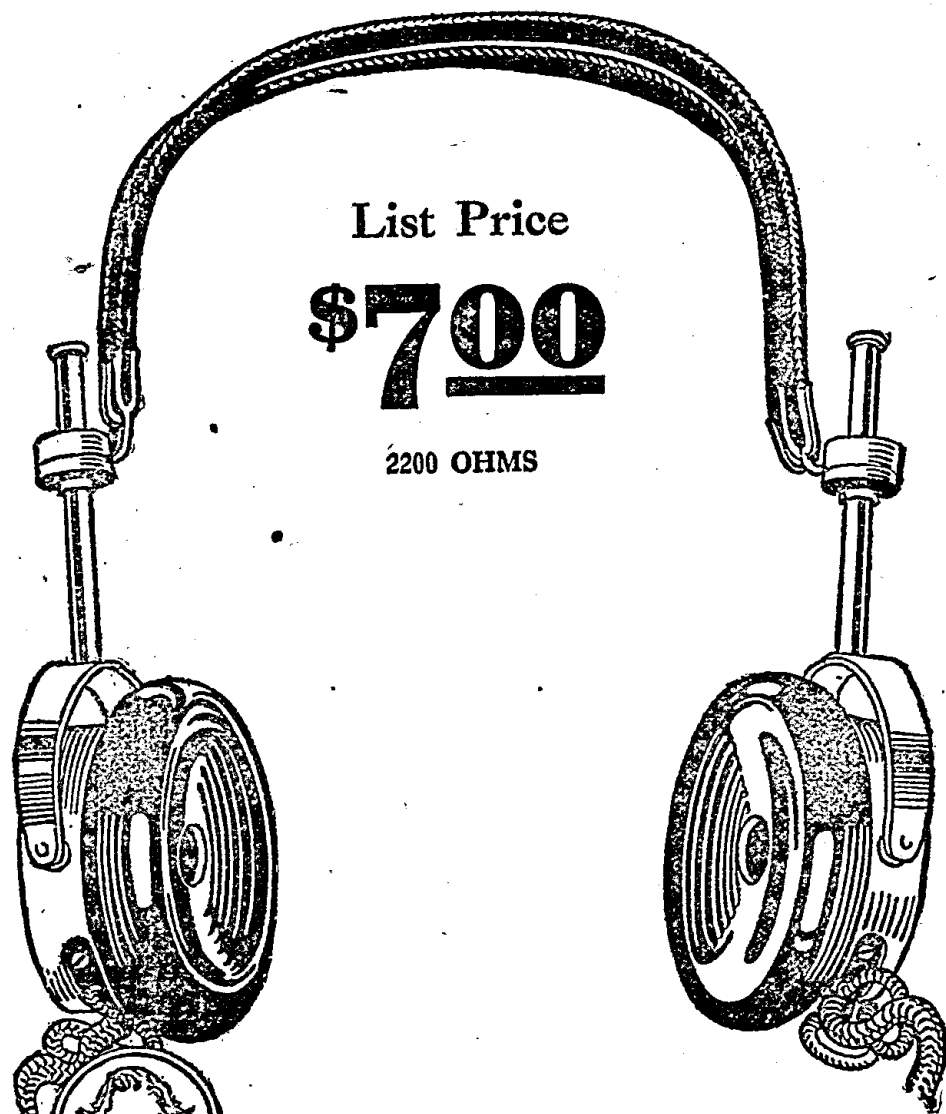
Are manufactured exclusively by the **BUELL MANUFACTURING COMPANY**, under the personal supervision of **Mr. E. T. Flewelling**. Look for the yellow carton and demand the genuine. If it is not manufactured by **BUELL** it is not a **Flewelling part!**

### BUELL MANUFACTURING COMPANY

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**Flewelling  
TUNERS  
\$8.00**

**Flewelling  
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\$1.00**



**Federal**  
Standard **RADIO** Products

## The Gripping Thrills of Radio

are easily obtained when you use Federal Standard Radio parts.

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

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

**Federal Telephone and Telegraph Company**

Factory: Buffalo, N. Y.

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

# BLAMES FADING ON CHANGING WEATHER

## TESTS TRACE SOURCE OF TROUBLES

### Experimenter Believes Atmospheric Pressure Plays Big Part in Condition

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

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

### Finds Weather Plays a Part?

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

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

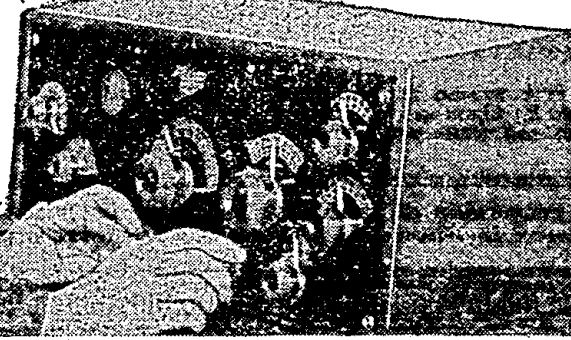
### Believes Waves Travel Isobars Best

"The same is true of Station WTAM, Cleveland. During one of the worst nights I ever experienced, WTAM was tuned in so clearly that it was remarkable. No

# TRANSFORMER PIONEER TUNES IN



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



other station was available; WGY and KDKA could not be heard. In studying the weather map I found an isobar running from Boston direct to Cleveland, the pressure being the same at both places. While there was a difference of 5-10 between here and KDKA and 3-10 between here and WGY. In conclusion I find that when the isobars run from Boston to any distant point, reception is best from that point."

## "King of Dance" Raises Turkeys and Listens In

LOS ANGELES.—Music, speech and other entertainment from both far and near drift into the palatial new home of Fred H. Solomon, known throughout the Southland as the "dance king." With the completion of his new residence in Tépanga Canyon, in the Santa Monica range, Mr. Solomon had installed a magnificent receiving set, equipped with the most in-

tricate and elaborate instruments known to Radio science today, with the result that its receiving qualities are not excelled by any private station in Southern California.

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

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

WASHINGTON, D. C.—A considerable number of inquiries received at the Radio laboratory of the Bureau of Standards call for similar elementary information regarding Radio publications, Radio laws and regulations, station and operator's licenses, and call books. In order to facilitate the handling of these inquiries, Cir-

# HEAR CONCERTS IN TUBE UNDER RIVER

## GROUP CONDUCTS TESTS BENEATH HUDSON

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

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

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

### See Value in Mine Emergencies

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

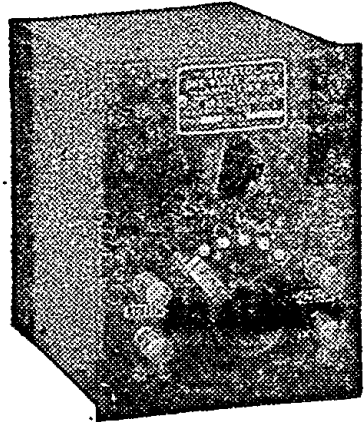
"This convinces us that the future will enable our divers and caisson workers, whose lives often are lost or imperiled when the telephone lines they communicate with are swept away, to carry small portable transmitting and receiving sets which will make them independent of all other means of communication,"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

ular No. 122 was prepared and recently revised. The new addition gives the more important Radio periodicals, lists the important Government Radio publications, and the Radio books of general interest issued by various publishers, gives a brief summary statement regarding the Radio laws and regulations of the United States and Canada, and gives a map showing the inspection districts.

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

# Complete Your Radio Outfit

## Bring Out the Best in Your Receiving Set with a Bristol



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

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

No auxiliary batteries are necessary.

The tone is big, full, and rich, and without that scratchy, tinny noise so often heard in receiving. It can easily be heard all through the house, so

that your own family and friends can enjoy it with you.

The finish is a beautiful, dull gold bronze.

Made in Three Sizes

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

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

Ask for Bulletins Nos. 3006 and AY-3011

# THE BRISTOL COMPANY, Waterbury, Conn.

# RADIO LINKS MEXICO AS TELEGRAMS FAIL

## STATION IN NEWS PLANT GIVES REVOLT DATA

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

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

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

### WBAP First in Mexico

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

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

### Mexicans' Radio Co-operates

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

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

### Link Congress Hotel to KYW with Own Studio

#### Pompeian Room Music Now on Program Every Week

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

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

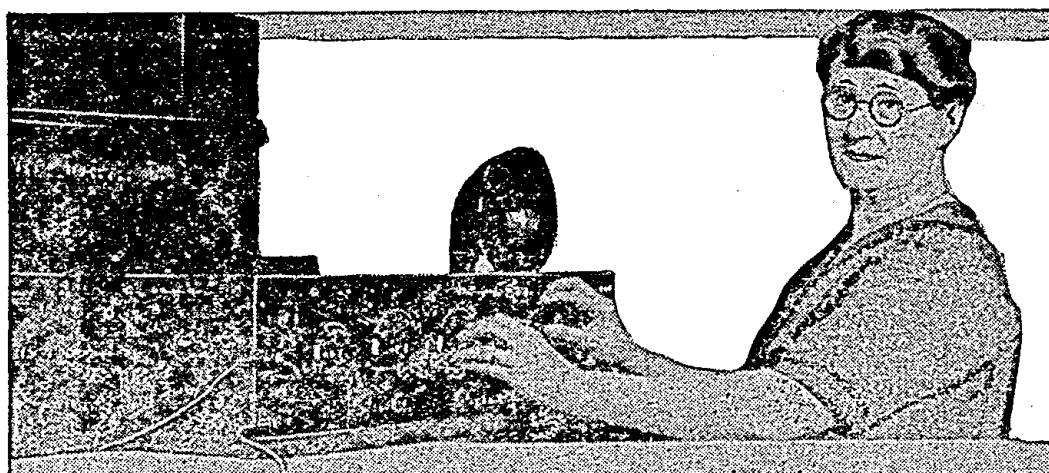
### Pennsylvania's "U" Asked to Teach Radio as Science

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

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

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

## FIRST WOMAN COMMERCIAL "OP"



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

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

## U. S. ADVISES ON ROAD CONDITIONS

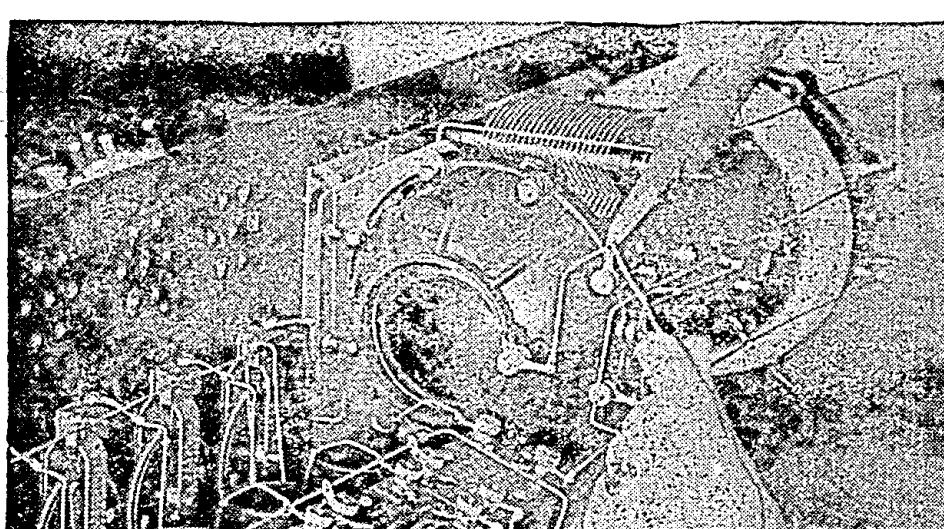
### Agricultural Bureau Adds Other New Features to Regular Service

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

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

# KELLOGG RADIO PARTS

## Easy to Mount to Wire to Solder to Tune



No Fussing or Re-drilling, Just Mount and Solder

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

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

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

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



USE—Is the Test



# KELLOGG SWITCHBOARD & SUPPLY COMPANY

1066 West Adams Street, CHICAGO



# WHAT IS IT WE CALL "STATIC"?

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

By Dr. A. Meissner — Part II

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

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



Dr. A. Meissner.

cloud, and frictional electricity is developed.

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

### How Static Discharge Occurs

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

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

### What Wave Lengths Are Covered

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

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

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

### How Air Strata Clash

For this purpose it is better not to use the conventional weather map. The lines that indicate isobars, wind directions and temperatures on these maps as used in

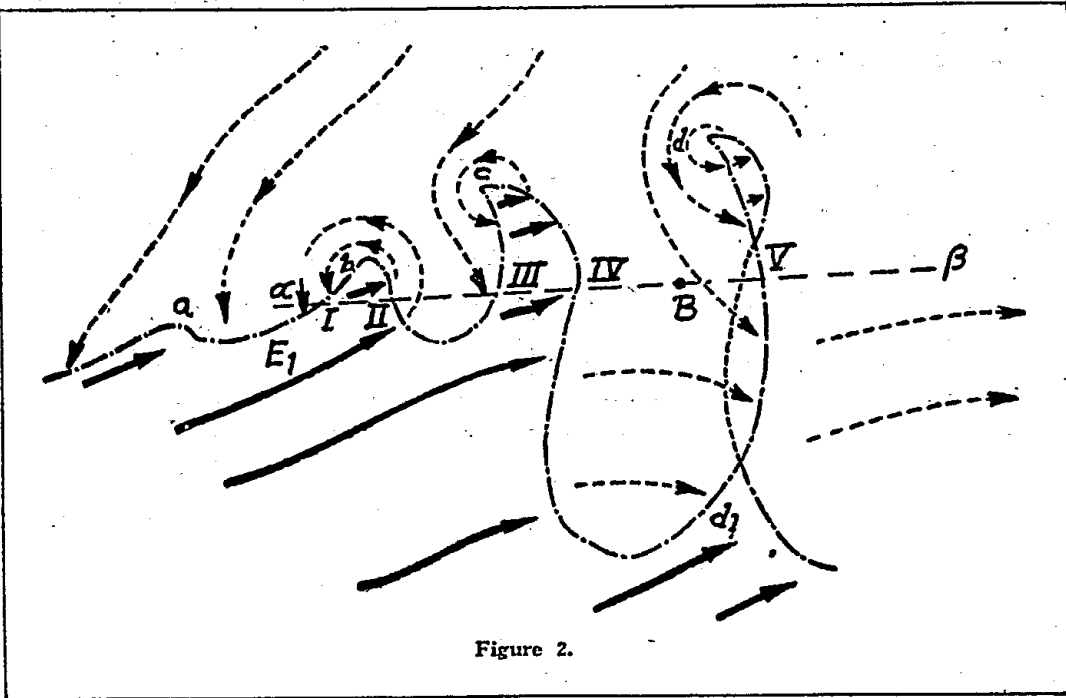


Figure 2.

America and Europe are not satisfactory in this connection. We must represent the conditions so that a cross-section of the air strata is shown passing over a certain place in the direction of flow. This is much more illuminating.

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

drifts with great intensity and pressure over B to the right.

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

### Strata Tightly Pressed Against One Another

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

### Long and Short "Wave" Static

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

If, on the other hand, we consider the

(Continued on page 10)

More than half a million in service



Standard equipment on the better sets

# ALL-AMERICAN Amplifying TRANSFORMERS

Remember!—when you buy an Amplifying Transformer, that

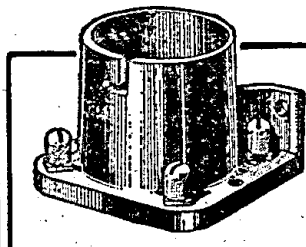
## Every "All-American" is actually tested in a radio circuit before it leaves the factory!

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

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

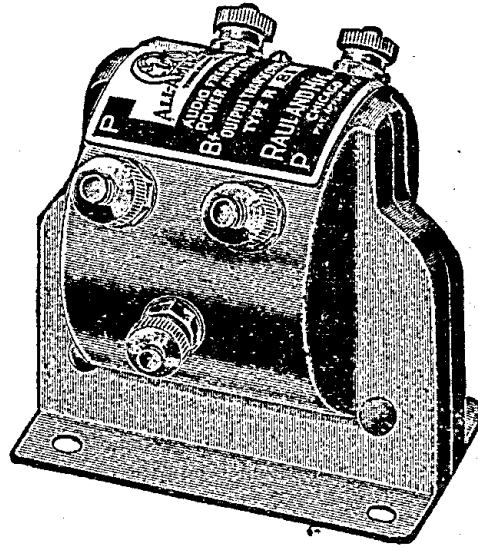
This is just one of the many reasons why—

**ALL THE BETTER Dealers Recommend THE "ALL-AMERICAN"**



### All-American Socket

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



### For Power Amplification!

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

### Neutrodyne Users!—Note

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

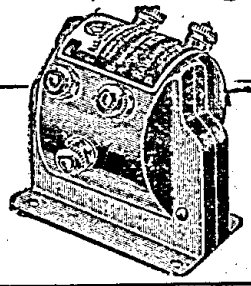
### We Will Send

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

**RAULAND MFG. CO.**

*Pioneers in the Industry*

206 N. Jefferson St., Chicago



### All-American Audio

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

## LARGEST SELLING TRANSFORMERS IN THE WORLD

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

WHAT IS IT WE CALL "STATIC"?

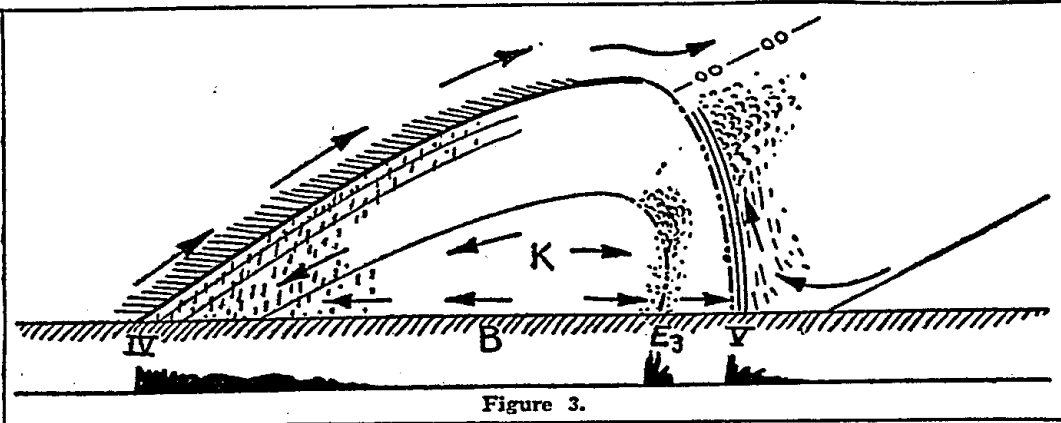


Figure 3.

(Continued from page 9)  
 rear of the minimum (IV, Figure 3) we find, here too, cold and warm air strata, with different velocities, coming together, the velocity of the cold air being much less. It forces the warmer strata above upward with less speed. Here, inversion strata are also encountered—i. e., strata of different speed and temperature, and consequently large quantities of positive and negative electricity develop. But because of the slower movement, these strata are not in so close contact, and neutralization of their opposite charges takes

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

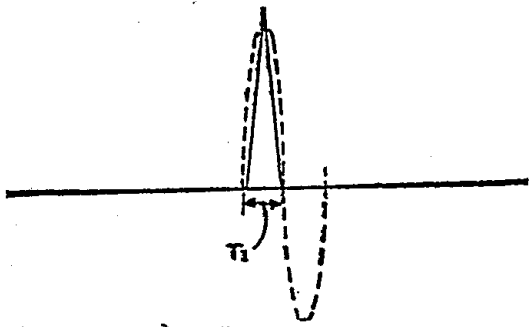


Figure 4.

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

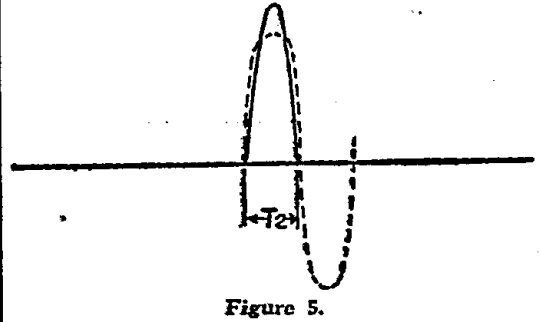


Figure 5.

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

(TO BE CONTINUED.)

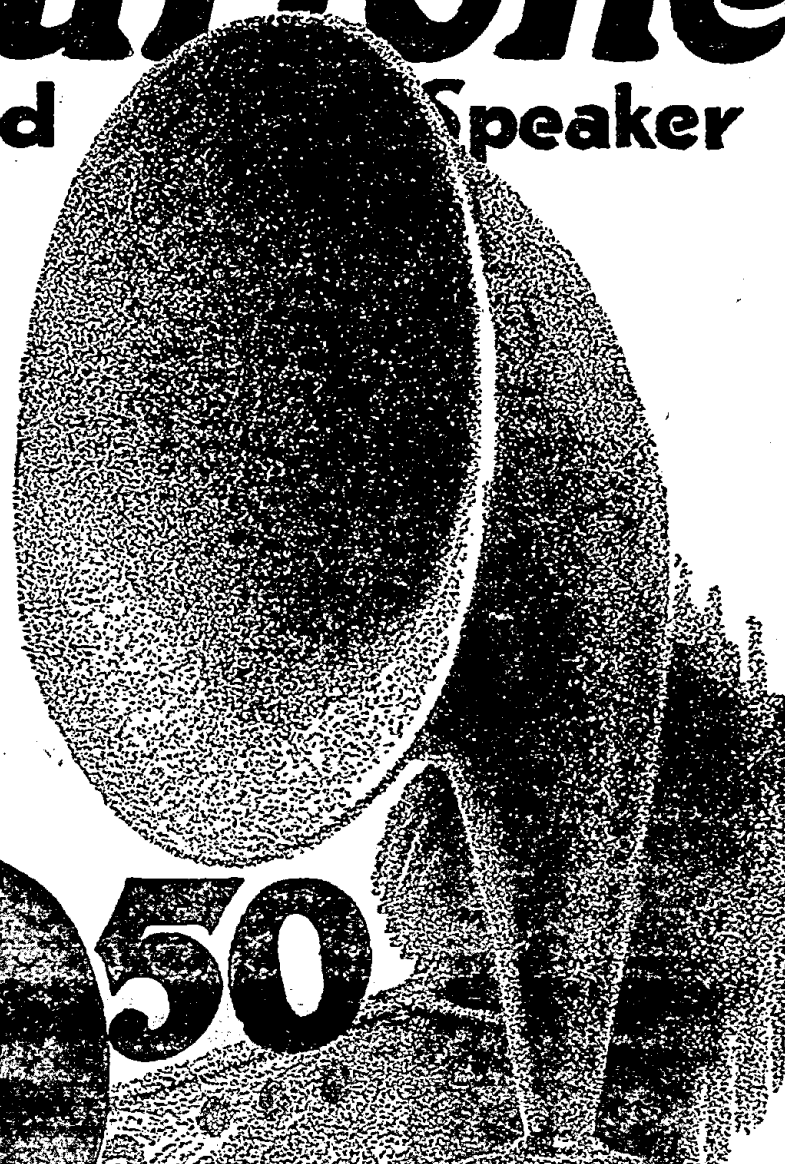
Webster Joins Radio Board

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

THE "FORD" OF LOUD SPEAKERS

TRADE MARK  
**Fultone**  
 Loud Speaker

Special  
 METRO  
 Unit  
 Standard  
 Cord  
 Ready  
 To Use  
 on Your  
 Set



\$9.50

BRINGS IN CLEARLY ALL MUSICAL TONES

THE Fultone Loud Speaker is full throated and brings in, in volume, both music and voice in their natural, full, rich tones, with no distortion or metallic noises. Its performance is matchless and unequaled at any price. Dark black in color with a full rounded symmetry, it is worthy a place in the finest home.

Fultone is constructed of a non-metallic composition, in one piece, and is equipped with a special Metro Unit, together with standard cord all ready for attachment to the finest Radio set. It is fully guaranteed and will match the performance of any loud speaker on the market at any price. It represents

Quality at a Low Price

Facilities for immense production have enabled us to quote you this moderate low price on the quality Fultone loud speaker. No longer need your family miss the concert or speech because you need a good loud speaker. Fultone enables every set owner to make his set talk or sing out loud for the enjoyment of all. Everyone can enjoy the luxury of a completed set by attaching Fultone, the quality speaker at a low price. Fultone can be found at

All good dealers or

sent direct postpaid upon receipt of price

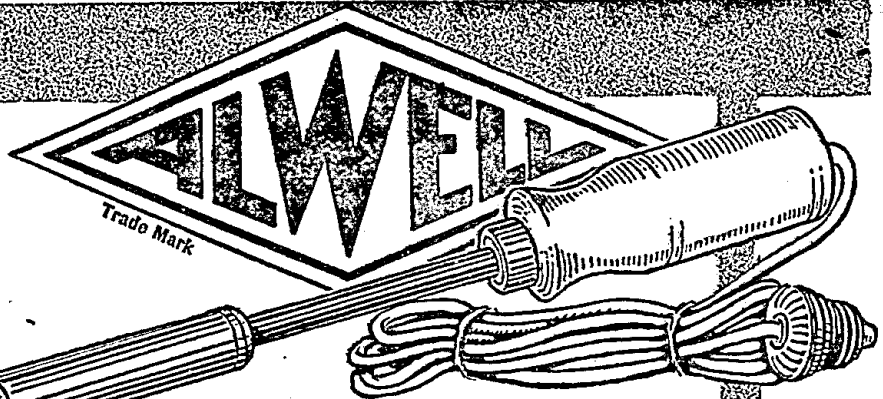
HALL & WELLS

Manufacturers' Representatives and Exclusive Distributors of Fultone Loud Speakers and Metro Units  
 508 S. Dearborn Street, CHICAGO, ILL.

JOBBER DEALERS We have a money-making proposition on Fultone for you. This loud speaker, because of its quality at such a low price, is destined to be the biggest seller in Radio. Better wire today. Prompt and immediate delivery assured.



TRADE MARK



No More Shocks  
 IN USING A NEW  
 Wooden Handle Soldering Iron

THE Alwell soldering iron with its handle made of wood affords the greatest boon to the builder of sets from the sudden and ruthless electric shocks often received from metallic irons. Built substantially of good material, furnished with either the small or large point, and equipped with standard cord and plug, Alwell is long lived and very serviceable. Above all, it offers one of the biggest bargains in Radio at

\$3.00

With Choice of Points

Extra points  
 50c each

At all good dealers or  
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HALL & WELLS

Manufacturers' representatives and exclusive distributors of Alwell Soldering Irons  
 508 South Dearborn Street  
 CHICAGO, ILLINOIS

JOBBER DEALERS Some territory is still open to live jobbers and dealers for this fast and popular Alwell soldering iron. Immediate delivery assured. Better wire.

# OPERATING AND TROUBLE SHOOTING

For the Owner of a

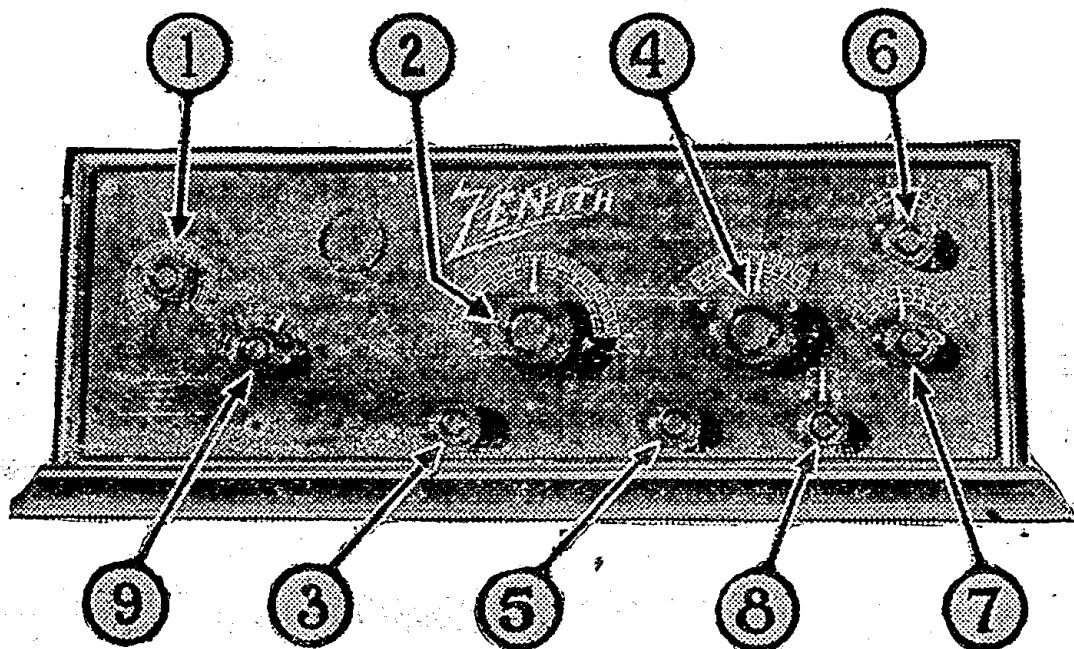


3-R Receiver

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

**Wave Length Range**

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



carried on at wave lengths of between 220 and 580 meters, which band is well within the range of tuning.

**Amplification**

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

**Antenna to Be Used**

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

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

**Long Distance Reception**

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

**Ground Connection**

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

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

will permit and preferably in moist earth. Surface is of utmost importance in securing a good ground.

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

**Grounds on Farms**

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

**Installation of Antenna**

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

**Lead-In Insulation**

The lead-in wire may require support in some cases, and if so, should be sup-

ported at a considerable distance from the side of the building, either by using an insulator similar to one of the antenna insulators, tied by means of a wire or cord, so as to hold it away from the side of the building, or by an insulator fastened to the end of a wooden pole extending from the side of the building.

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

**Lead-In Connections**

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

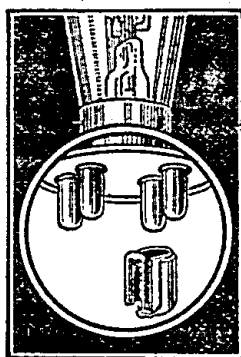
**Loud Speaker**

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

(Continued on page 12)

## FLASH!

Another tube gone—"B" battery wires crossed for only an instant. Radeco Fuses would have saved it—they are saving thousands of tubes for satisfied radio fans. Read this letter



### Radeco Safety Fuses

may be attached in an instant to any standard tube going in any standard socket.

In ordering, specify type of tube used

Price 50c each

At your dealer's or by mail postpaid

### Radio Equipment Co.

Dept. 6, 20 Stuart Street, Boston, Mass.  
New England's Oldest Exclusive Radio House  
DEALERS: Write for our proposition

1358 Washington Street,  
West Newton, Mass.

Radio Equipment Co.  
20 Stuart Street, Boston.

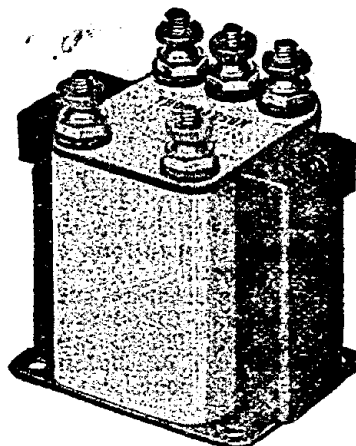
Gentlemen:

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

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

Very truly yours,  
FRANK J. BODAY.

## THORDARSON



### POWER AMPLIFYING TRANSFORMERS

Price per pair, \$13.00

The new Thordarson Power Amplifying Transformers (push pull) are designed for use as third stage audio frequency amplifiers, to provide high power amplification for operating loud speaking devices.

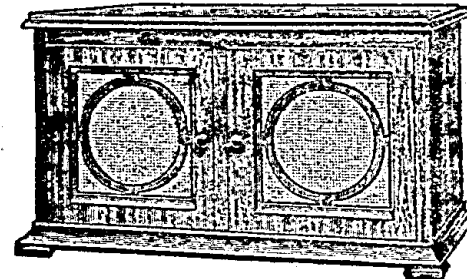
With power amplification, not only is it possible to increase volume, but, since two tubes replace the usual one, the distortion and howling which usually accompany the overloading of a single tube on the third stage is done away with entirely.

The Thordarson Power Amplifying Transformers are well constructed electrically and are capable of indefinitely carrying the additional load without breaking down.

In tonal purity these transformers equal the Thordarson Super Audio Frequency transformer whose rich quality and even amplification has made it the popular transformer of the day.

## THORDARSON ELECT. MFG. CO.

500 W. Huron St. CHICAGO



## ACE Type 3C Console

The Most Satisfactory Radio Set For Real Entertainment

THIS is the last addition to the Ace Family. Has beautiful solid mahogany, wax finished cabinet. Set consists of a regenerative tuner, detector and two stages of amplification with built in loud speaker. Due to the particular method of winding Crosley coils it is exceptionally selective. Has sufficient room inside cabinet for dry batteries making a complete self contained long range receiving outfit. Licensed under Armstrong U. S. Patent No. 1,113,149. Phone jack for tuning with head phones; Crosley multistat; filament switch; engraved Formica panel. Uses all kinds of tubes. An efficient set at a remarkable price, \$125.00—without tubes or batteries.

The Precision Equipment Co.  
Powel Crosley, Jr., President  
127 Vandalia Ave., Cincinnati, Ohio

# OPERATING AND TROUBLE SHOOTING

(Continued from page 11)

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

### Tubes, Resistances to Use

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

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

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

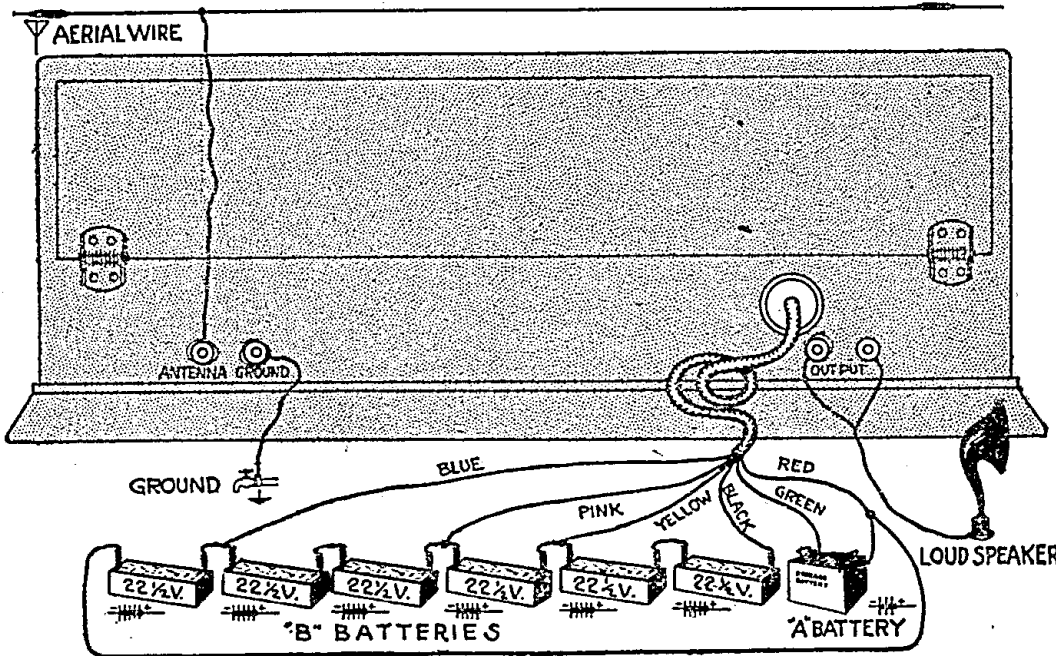
### Use of Loud Speaker or Phones

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

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

### How Tuning Is Done

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



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

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

### Tuning to Wave Length

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

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

Reception of stations at extreme distances is dependent to some extent on weather conditions. There are times at which the maximum of distance cannot be secured through poor weather. This

does not necessarily imply trouble. Before it is assumed that the receiver is not operating properly its operation should be observed over a period of nights.

### Causes of Trouble

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

### Life of Tubes and Batteries

Tubes ordinarily give no trouble unless they are defective when first purchased. If a tube has been used satisfactorily, it should continue to give satisfaction until the filament burns out. If the proper re-

sistance cartridges are used, it should never be possible to burn out the filament of any of the tubes, unless improper connections are made.

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

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

## New Chance for Amateur Song Writers in Radio

### Broadcasters to Use Works Approved by Specht

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

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

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

### Use Air for Health Talks

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

### Mail Orders Address Dept. D-6

Easy to Build Complete instructions for assembling and blueprints for wiring are included with each outfit. Instructions written so everyone can understand them.

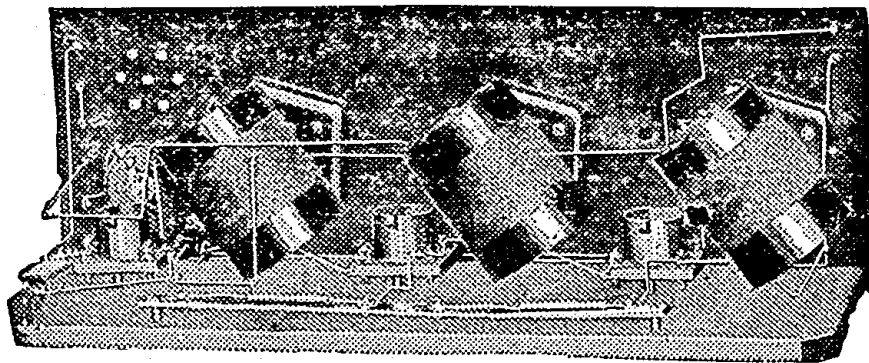


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### Satisfaction Guaranteed

Panels FREE Drilled Specially drilled panels are included with each of the sets illustrated and described below.

## Complete Parts for NEUTRODYNE



### Complete Parts for REINARTZ DETECTOR

Reg. Price	Our Price
\$1.89	\$1.70
1.00 Bakelite Socket....	.45
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Reg. Price	OUR PRICE
\$21.69	\$11.45

Complete parts for Detector and two-step with Vernier Condensers..... \$29.95

### WITH GENUINE FADA OR FREED-EISEMAN PARTS

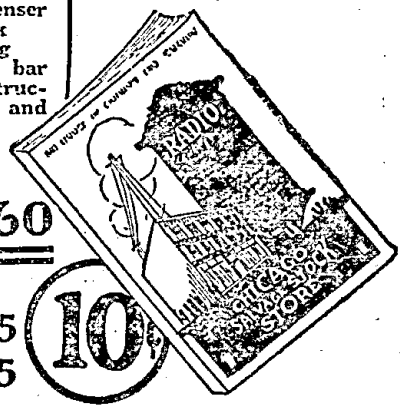
- 1 7x21x3/16 drilled Formica panel
- 1 Howard rheostat
- 3 4-inch Radion dials
- 3 John Firth bakelite sockets
- 8 Binding posts
- 3 23 plate variable condensers
- 1 Wade control neutroformer
- 2 R. F. amp. neutroformers
- 2 Grid neutralizing condensers
- 1 .00025 micron grid condenser
- 1 Marco variable grid leak
- 1 Baseboard for mounting
- 25 feet tinned copper bus bar wire and complete instructions for assembling and wiring.

3 Tube OUR \$28.60 PRICE

4 Tube, \$44.65  
5 " \$46.25

### IT'S READY

Our new 48-page catalog lists, describes and illustrates 10 complete sets like those pictured above. It contains hundreds of bargains in parts that have not and can not be duplicated elsewhere. SEND A DIME FOR YOUR COPY, TODAY!



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In addition to these features, the current issues give you all the live news in Radio. The popular Q. and A. Department, How to Operate Your Set, Advance Broadcasting Stations Programs, and a correct list of all Broadcasting Stations.



Serving as a Radio Reference Library You receive 52 issues with your Subscription and 15 issues in each bound volume Bound Volumes 3, 4, 5, and 6 now ready. Volume 7 ready about February 15. This offer good only in U. S. and Possessions, and Canada. This offer not good through dealers or subscription agencies, but must be sent us direct with the full subscription price. Remittance must be by check, money order or draft.

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# OPERATING AND TROUBLE SHOOTING

## For the Owner of a

# Jones Radio Co. Symphony

## Receiver

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

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

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

given, as all aerials vary as to length. Consequently, as the aerial is lengthened, the number of switch points are correspondingly reduced, or as the aerial is reduced in length, it is necessary to correspondingly increase the number of the switch points. This is a matter that each individual will have to learn for each particular case.

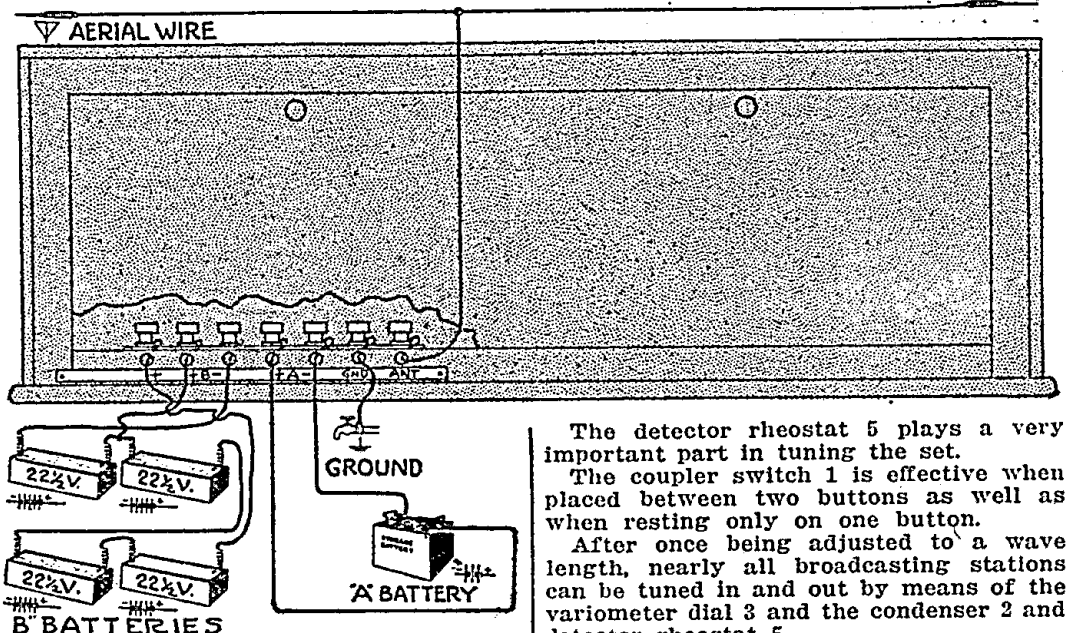
We have now described in detail the meaning and functioning of each element as contained in the set, and will proceed to illustrate the simplest method of tuning in a station, for instance, that is sending on 400 meters.

### Tuning Operation

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

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

Next adjust the regenerator dial 4 at extreme left to the point where the loudest signal is obtained. Follow the same method with the variometer dial 3, which will not only give additional regeneration,



increase the detector rheostat 5 slightly and proceed again. Proceed in this manner until a wave is found and then carefully move each dial until the best reception is obtained. It will be noted that the adjustment on the detector rheostat is delicate.

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

### Refining Adjustments

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

The following points should be remembered in tuning the sets:

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

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

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

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

### Antenna to Use

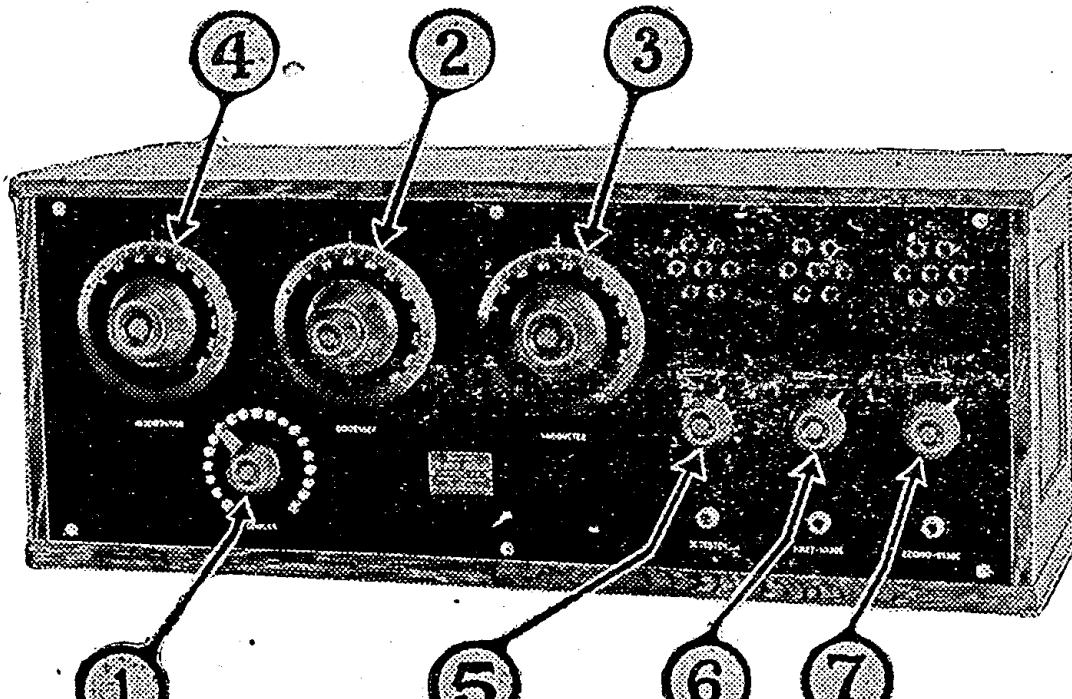
Best results with the receiver have been accomplished by using an aerial with approximate lengths varying from 75 to 150 feet, with an elevation of from 30 to 50 feet or higher.

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

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

### A Battery Suggestions

It is recommended that a 6-volt 120-ampere hour storage battery be used. (Continued on page 14)



functions and what its particular purpose is.

### Explanation of Dials

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

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

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

### Detector Filament Rheostat

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

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

The circle of switch points, number 1, as shown on the bottom line of set at left, marked "coupler," are connected to tapings of the variometer and read from left to right clockwise, number 1 being, of course, at the extreme left. This is known as loading inductance and is employed to arrive at the proper wave length desired, by adding such number of switch points through the medium of the switch passing over them, as may be desired to reach a given wave length. As to the number to be used in any particular instance, absolute data cannot be

but tune out such stations as may be interfering with clear reception. Plug into the detector jack at first with the head phones on the head, afterwards plugging in on the various stages of amplification and regulating the volume and proper amount of filament current through the medium of the respective rheostats (dials 6 and 7).

### Tube Precautions

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

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

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

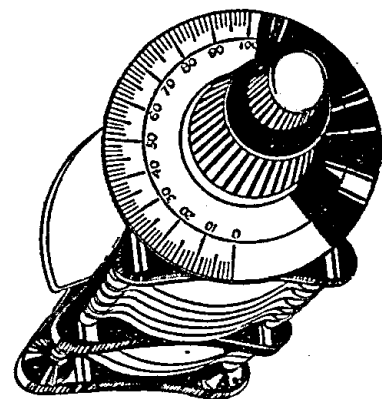
### Arbitrary Tuning Directions

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

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

Make the variometer 3 setting at 90. Now plug the head set in the first stage jack having the rheostats 6 set as explained above. Operate the condenser dial between 0 and 180 slowly and listen for the "whistle" of a broadcasting wave. If results are not yet satisfactory in-

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## COMSCO CONDENSERS

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

and Remember the Bronze Bushings!

Bronze Bushings for Permanent Contact—A Comsco Feature

11 plate plain .....	\$2.00	16 plate vernier .....	\$4.00
17 plate plain .....	2.25	26 plate vernier .....	4.50
23 plate plain .....	2.75	46 plate vernier .....	5.50
43 plate plain .....	3.50	All Tested Instruments	

**YOU CAN DEPEND ON A COMSCO CONDENSER  
IT'S MADE BY THE MAKERS OF  
THE ORIGINAL AUTOMATIC  
BULL DOG GRIP TELEPHONE PLUG**

For One Pair Phones  
**\$1.00**



For Two Pair Phones  
**\$1.50**

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Otherwise send purchase price direct to us and you will be supplied

## GENERAL INSTRUMENT CORP.

123 Liberty Street  
NEW YORK CITY



SEND RADIO POWER FOR SCIENCE MEET

DR. W. R. WHITNEY SHOWS HORNLESS SPEAKER TOO

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

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

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

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

Nearest to Radio Power Transmission

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

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

Radio Offsets Confusion of Babel

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

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

JONES SYMPHONY SET

(Continued from page 13)

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

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

Setting Up the Receiving Set

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

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

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

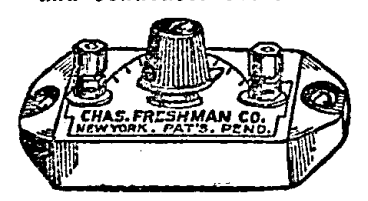
There are several possible connections that will receive any one station, but a certain number of these are found to be best, and of that certain number some will eliminate interference from the local stations while others are highly satisfactory if there is no local broadcasting going on.

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

Table with columns for Station and City, Met., Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday. Lists various stations like CFCN, CKAC, etc. with their respective broadcast times.

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

FRESHMAN Variable Grid Leak and condenser combined



Accepted the World Over as the STANDARD UNIT FOR EVERY TUBE SET

It is the most compact; the most efficient; the most readily adapted to ALL grid circuits and the only one which is entirely sealed and always remains unaffected by any climatic conditions. It is the

ORIGINAL VARIABLE GRID LEAK

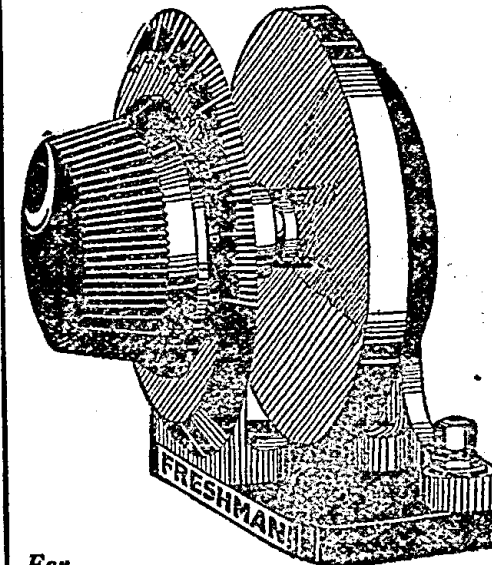
and although it has been steadily improved and made better, there never was a time when it was not the

BEST ON THE MARKET

Complete with either .00025 or .0005 Freshman Condenser.....\$1.00 Without Condenser..... .75 At your dealers, otherwise send purchase price and you will be supplied postpaid.

Chas. Freshman Co. Inc. Radio Condenser Products 106 SEVENTH AVENUE, NEW YORK

A Variable Condenser, the plates of which actually vary in area—an engineering feat never accomplished before—giving especially fine adjustment for selective tuning.



For Transmission or Reception

The highest class Variable Condenser, "FRESHMAN SELECTIVE" Mercury Variable Condenser

Will stand more than 5,000 volts. Plates are dust and dirt proof, thereby eliminating leakage which creates noises. No plate vibrations—absolutely quiet. Compact and attractive in appearance. Mercury Plates give intimate contact with Mica Dielectric.

As Near 100% Efficient as a Variable Condenser. Can be Made

Do not confuse the "Freshman Selective" Mercury Variable Condenser with any other heretofore on the market.

.0003 m.f. (equivalent to 17 plate) All Types \$5 .0005 m.f. (equivalent to 23 plate) .001 m.f. (equivalent to 43 plate) All Molded Parts and Dial of the Finest Bakelite At your dealer, otherwise send purchase price and you will be supplied postpaid

Chas. Freshman Co. Inc. Radio Condenser Products 106 SEVENTH AVE. NEW YORK

RADIO AT N.Y. PRICES Daily Parcel Post

The Prices Quoted Below Deliver Goods to Your Door HOW TO ORDER—Write your order plainly; state number, description and price of items wanted. Send Post Office or Express Money Order, personal check or bank draft. REFERENCES: Dun's, Bradstreet's or Corn Exchange Bank.

DICTOGRAND LOUD SPEAKER

D 201. A rich ebony finish with glistening silvered edges on the bell; small and compact. A mellow, clear and beautiful reproduction with adjustable dial to control volume. Guaranteed in every respect.

FORMERLY \$28.50 OUR PRICE \$16.95 Post Paid

AMPLITONE LOUD SPEAKERS

This speaker will give efficient results when used with any pair of Head Phones; highly nickel plated; 18 inches high. D117 .....\$3.95

VARIOCOUPLER

D77 High Grade 180 Degree Coupler, made of Bakelite tubing wound with green silk wire. Special.....\$2.45 D78 Variometer, same specifications ..... 2.45

BAKELITE TUBE SOCKETS

Moulded of brown bakelite; Binding Post Connections. D99 Standard Type for 201A, 301A, W.D.12.....39c D100 For U.V.199, U.V.299, Socket .....39c D101 For W.D.11, C.I.I.....39c

FILAMENT CONTROL RHEOSTATS

Highest grade of material used, tapered knob. D104— 6 ohm .....\$0.39 D105— 30 ohm ..... .49 D106— 300 ohm Potentiometer. .79 D107— 400 ohm Potentiometer. .79

- MISCELLANEOUS D103 Spaghetti Tubing, per yd.....\$0.09 D104 Synthetic Crystal..... .30 D105 Ground Clamps..... .17 D106 Black Rubber Binding Posts..... .05 D107 Nickel Plated Binding Posts, 2 for..... .05 D108 No. 18 Annunciator Wire, half pound coil..... .39 D109 6 ft. Phone Cord with Tips..... .79 D110 20 ft. Extension Cord with Tips..... 1.85 D111 Wall Insulators, Porcelain..... .05 D112 Tubular Porcelain Lead-in Insulators, 6-in..... 1.45 D113 Rebarrel Coil..... 2.42 D114 Cockaday Coil..... .25 D115 2 in. Dial and Knob..... .95 D116 3 in. Dial and Knob..... .95 D117 4 in. Dial and Knob..... .49

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The highest grade panel on the market. Highly polished finish; cut in the following sizes: D88—7x10 .....\$0.95 D89—7x12 ..... 1.15 D90—7x14 ..... 1.25 D91—7x18 ..... 1.65 D92—7x21 .....\$1.95 D93—7x24 ..... 2.20



71 Cortlandt Street NEW YORK, N. Y. America's Greatest Radio Mail Order House ELEVEN NEW YORK STORES

CURRENT PROGRAMS TO TUNE FOR

Tuesday, January 22

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

Headliners of the Week

Of course, I expect you to listen in this week Thursday and Saturday to the Opera, because these are the last two times this season that the Chicago Civic Opera Company will be heard over the radio.

with toothache or blues, tune in for WDAF somewhere after midnight and be soothed to sleep by Miss Norma Mannerling at the Newman Theater Pipe Organ. The Wednesday Morning Choral Club will be heard from WFAA.

—THE PROGRAM LADY.

Dillard Gunn School of Music; 8:30, WMAQ Orchestra; 9:15, Program, Kiwanis Club. WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Program arranged by Marguerite Storch; 11:00, Midnight Frolic.

Wednesday, January 23

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



Of the Radio artists presented herewith Miss Florence Meermans, at the left, is a newcomer in the field. She is a violinist, as you see, and a pupil of the Cleveland School of Music.



the Good Roads Association of Greater Kansas City; Children's period; Fritz Hanlein's Trianon Ensemble; 11:45-1:00 a. m., Nighthawk Frolic; The Merry Old Chief and Coon-Sanders Novelty-Singing Orchestra.

WJAX, Cleveland, Ohio (Eastern, 390), 7:30 p. m., Program arranged by the Cleveland News-Leader; Bed-time story, E. G. Johnson; 7:45, Musical program

from the Cleveland Automobile Show by "The Melody Maids" and "The Saxophone Sextette." WJAZ, Chicago, Ill. (Central, 447.7), 10:00 p. m.-2:00 a. m., Violet Tall, soprano; June Wise, pianist; Helen Frettsman, cellist; Oriole Orchestra.

vocal instructor; "New Things to Read," Alice L. Webb; Instrumental music. KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Nick Harris Detective Stories; 10:00-11:00, Hollywood-Land Community Orchestra.











# Further Details of the Famous Miloplex Hook-Up

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

By the Mystery Man

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The mere fact that regeneration got a

good start, doesn't mean anything to me other than less work. I like Radio frequency just as well—may be better. This I know—and I also believe some of my Radio frequency circuits (which need air) will be released shortly. And when I do let go of it, I'll put in it a simplified reflex trick you will like.

One can do much when he is sure of eating—more when 3,000 of you say, "keep it up."

Oh, mercy yes, I won't forget tuned impedance. Why neglect so simple a baby? You know the editor told me I could have an inch and a half more space. I'm going to make it two and one-half; what's an inch among friends? Then I'll dare the man that runs the h— box to throw it out—you know what I mean.

Notice that I'm saying nothing about the

late circuits—just sort of laying low to see how you fellows like them. You know it is possible to throw a rose at a maiden fair and have it tossed back smelling like garlic; I tossed you a couple of roses and am this week waiting for the rebound.

You know, I get sort of nervous like when I read about the Dyne family—Super, Auto, Radio, Hetero and their relatives. The Dynes may come and the Dynes may go, but, methinks, some of the old standards are more fun; they will step out if you learn how to drive them. And now that peace and contentment may reign supreme in this my eating house for 1924, I hail, "God save the King—the Queen can take care of herself."

There's no such word as "phail." Let's eat.

(TO BE CONTINUED.)



### UV-201-A

Radiotron UV-201-A is a high-power vacuum tube which, while suitable for a detector, is intended primarily to be used as an amplifier, at either radio or audio frequency.

It is famous for volume, for clearness and for economy of service—drawing but .25 ampere.

Price \$5.00

Radio Corporation of America

Sales Offices—Dept. 311  
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Chicago, Ill.

433 California St.  
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Be sure that every vacuum tube you buy is marked RADIOTRON.



This symbol of quality is your protection.

# Radiotrons

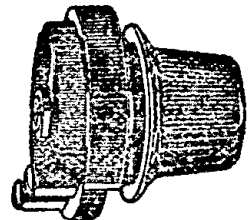
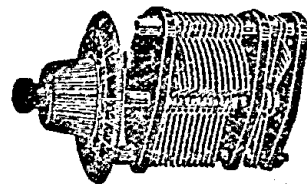
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## WILLARD RADIO COMPANY

291 Broadway

New York City

"The Best for Less"



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3 Plate Variable; value, \$1.75.....	\$1.05
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13 Plate Variable; value, \$2.50.....	1.20
17 Plate Variable; value, \$3.50.....	1.95
23 Plate Variable; value, \$3.50.....	1.35
43 Plate Variable; value, \$4.50.....	1.95
13 Plate VERNIER; value, \$5.50.....	\$3.75
23 Plate VERNIER; value, \$6.00.....	4.00
43 Plate VERNIER; value, \$6.50.....	4.25

BEST QUALITY JACKS, Single Circuit:  
value, 65c; special at.....\$ .30  
Double Circuit; value, 90c; special at..... .45

MULTIPLE POINT INDUCTANCE SWITCH  
with Knob and Dial (15 Switch Points).....\$1.25

LIGHTNING ARRESTERS approved by underwriters.....\$ .90

THREE-INCH DIALS—Unbreakable—heat resisting composition—high finish; special...\$ .30

TWO-INCH DIALS—Same design—for rheostats and potentiometer; special at.....\$ .25

TELEPHONE PLUGS.....\$ .60

Filament Rheostat, 6 ohm.....	\$.65
Filament Rheostat, 20 ohm.....	.80
Filament Rheostat, 50 ohm.....	.90
With 2" Dial, 15c extra.	

Honeycomb Coils, 50 turns mounted...\$ .95

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Reinartz Coils, increased wave-length and mounting..... 1.95

AUDIO FREQUENCY TRANSFORMER—Designed for use with W. D. 11.....\$2.75

Tubes, list, \$4.50; price.....

BALL BEARING INDUCTANCE SWITCH—value, 75c; special.....\$ .25

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EXTRA SPECIAL—Telephone 3000 Ohms Headsets; \$9.00 value; reduced to.....\$3.50

Vernier Dial Adjuster, List, 35c; special.....\$ .25

FRESHMAN VARIABLE RESISTANCE LEAK and MICA CONDENSER Cooled.....\$ .75

### Practical Circuits at Bargain Prices!

#### REINARTZ CIRCUIT EVERY PART COMPLETE

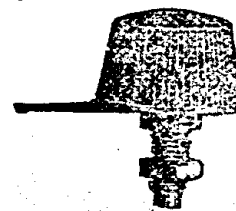
1 Reinartz wound coil, 1 tube socket, 1 rheostat, 1 23-plate .0005 MFD. variable condenser, 1 13-plate .00025 MFD. variable condenser, 3 inductance switches, 23 switch points and nuts, 6 switch stops and nuts, 8 binding posts, 2 3" dials, 1 variable grid leak, 1 .002 MFD. phone condenser, 23 feet bus bar wire, 1 high-grade panel ALREADY DRILLED AS PER DIAGRAM.....\$10.95

Two-Stage Audio Frequency Amplifier—Parts complete in every detail for this Circuit—\$11.00 Specify type of tubes you intend using

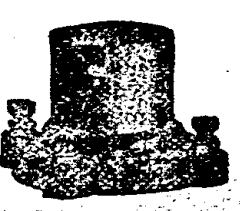
#### FLEWELLING CIRCUIT EVERY PART COMPLETE

2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3 .006 condensers, 1 variable grid leak, 1 grid leak, 1 23-plate .0005 MFD. variable condenser, 1 Vernier rheostat, 1 tube socket, 8 binding posts, 20 feet bus bar wire, 1 3" dial and 1 high-grade panel ALREADY DRILLED as per Diagram in Booklet of instruction sent free.....\$11.95

Two-Stage Audio Frequency Amplifier—Parts complete in every detail for this Circuit—\$11.00 Specify type of tubes you intend using



Every article advertised above is guaranteed by the manufacturer and by us—Mail orders filled immediately—transportation PREPAID on all orders of \$5.00 or over east of the Mississippi River. Send cash, check or money order—absolutely no goods sent C. O. D.



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MAKE PERFECTION YOURS TODAY

**GOLD SEAL HOME CHARGER**

New type—the world's most popular Charger

List \$18.50

**OUR PRICE \$15.50**

LIST	OUR PRICE	Neutrodyne 5 Tube Set
\$18.00 N. & K., 6000 Ohms.....	\$6.50	The Neutrodyne Circuit is the last word in Radio and is the best set made today. Works without aerial or ground. Will receive any American station.
4.50 Murdock, 3000 Ohms.....	3.75	1 Formica Panel 7x24
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8.00 Potter Precision.....	4.50	3 Dials, 4-Inch
6.00 Brandes.....	4.75	1 Amsco Rheostat
		1 Amsco Power Rheostat
		8 Binding Posts with Names
		3 Jacks, 12 ft. Spaghetti
		22 ft. No. 14 Gold Plated Wire
		1 Condenser, .006 Dubilier
		1 Grid Leak and Condenser, Freshman
		1 Dubilier Condenser, .002

Special price for complete licensed parts for 5-tube Neutrodyne set.

**\$32.50**

**PERFECTION RADIO CORP., 22-26 Murray St., N. Y. City**

# Radio Digest

## Illustrated

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### Distance of Transmission

At Times Small Stations Outreach the Larger Ones

ONE of the fascinations of Radio is the reception of distant stations. The uncertainty of the range of Radio transmitting and the freakish manner in which small stations will outreach the more powerful transmitters, keeps everyone guessing.

The range of a broadcasting station is dependent on a large number of factors. It is impossible to predict from one evening to another what is likely to happen. Some of the conditions limiting the range of a station are constant and others are extremely variable.

Hills, tall buildings and other natural barriers all shield a locality. A New York station moved its apparatus from the eastern to a western part of the city. The station is now heard with difficulty in some eastern localities, although in that part of the country west of the Hudson River the station comes in loudly.

The Chicago broadcasting stations are heard in New England more successfully than stations closer to that part of the country. Why? The difference cannot be attributed to greater power or to better efficiency, because in some cases, the weaker and the inefficient transmitters are heard the greater distances. Radio has not yet reached its climax. Some things must be learned before we can tell just the why of this.

### Concentration Essential in Radio

Visualize the Artist While Listening In

FROM entertainment aspects, and more particularly musical entertainment, Radio will be frequently compared with the phonograph, since both cater to the vast number of people who appreciate good music, whether they play any instrument or not.

It was discovered early in the experience with the phonograph that a power to visualize the artist or performing organization while listening to the record greatly aided the listener. On the other hand, when the attention is allowed to wander, and one is only half conscious of the music, the effect is likely to be disagreeable.

In the concert hall it is a simple matter to concentrate on the playing of an orchestra, for instance, because, being seated facing the stage and having the light focused on the artists, it requires an effort to tear the mind off the music.

At home, however, there is nothing to look at except a piece of mahogany furniture, on the one hand, or a set of dials on a black panel, on the other. With the headphones on, more or less concentration is assured, but even then it has been observed that listeners will find they have paid so little attention that they do not know the name of the artist though announced.

It is not necessary to settle down with all the quiet concentration of a clam nestling in its shell, but it is a fact that, heard in noisy surroundings, where the attention is only partly on the music, both the phonograph and the Radiophone are apt to sound mechanical.

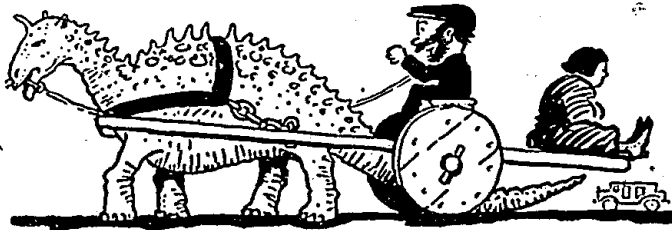
It is obvious that each of these forms of entertainment have their own field, and far from supplanting each other, they are each boosting the sale of the other. But for Radio it is claimed that the music is not merely reproduced, as in the phonograph, but it is the actual work of the performers.

Radio might affect the phonograph business in two ways: First, owners of a Radio set would no longer be interested in their phonographs; or second, persons who like something they hear by Radio, wanting to hear it again, would purchase a phonograph record.

Radio and the phonograph are two different things. Neither is a substitute for the other. If the Prince of Wales or Marshal Foch is talking at a dinner today, the phonograph obviously will not enable one to hear him, while Radio will. But suppose you want to hear Kreisler play a certain selection today. Kreisler is not giving a concert in your town. If he was, that selection might not be on his program. Obviously, the only recourse you have is the phonograph.

The expressed opinion of many others in the phonograph industry agrees substantially with the foregoing. They claim, also, that anything which stimulates an interest in music must react in a demand for more records.

### RADIO INDI-GEST



#### Radioless Race Discovered

(Special Radio Dispatch by Leased Wire)

By SIMPLY WADDLES

YOU'VE heard of the many races that exist in the U. S. A., you've heard perhaps of the Radiobugs who have settled there to stay. And you've heard perhaps of a people rather slightly known—the remarkable Radioless Race who have no Radiophone. Lectures and concerts they cannot hear, so primitive is this race, unless (perhaps a few times a year) they dress and go out some place.

They have no means to tap the air for entertainment galore. A turn of the knob means to them the way of opening a door.

One quaint custom they yet observe, which seems to us a crime, is that of calling Central to get the correct time. To send each one a Digest would prove a nifty plan to civilize the Radioless Race and make each one a Phan.



#### Our Own A. & Q. Dept.

Dear Indi: My pet goat ate my Radio set. Do you think it would help him if I gave him the Radio Digest? D. S. B.  
Answer.—It would help both circulations—his and ours. Tear out all the pictures of the pretty girls and handsome announcers so the goat won't turn cannibal. INDI.

My Friend Indi: Was tuning in the other night shortly between midnight and noon the next day when I heard a most b-oo-oo-oo-tiful solo sung by one person. Please send me the name of the song and the call of the station. The song went something like this: "Tra-la-la-la, tra-la-la-la, tra-la-la-la, tra-la-la-la, tra-la-la-la, tra-la-la-la."  
FIDDLE D. DIAL.

Answer.—If you're sure only one soloist was singing the solo, the tune you so aptly describe must have been Jack Nelson's regular—you know—"Jack Nelson of WDAP himself personally will now sing that popular melody, 'I've Got a Song for Sale that My Sweetie Turned Down,' words and music for which were written by Jack Nelson." INDI.

#### WLAG Gives "Fun on the Air"

WE REMAIN modest! We still love to admit how modest we are and how good we are, all in the same breath. We have been officially notified by one of our leased co-respondents that the "Twin City Station of the Land of Ten Thousand Lakes" has recognized us. Yessirree! Eleanor Poehler's own very good plant is using our stuff to entertain the multitude. Our own Station BLAH of Walla Walla, Station WMU of Washington, D. C., Station WLAG of Minneapolis-St. Paul, and next? The offer still holds—a dollar will be accepted from every Radioknut sending us corrections or additions to this list. INDI.

#### My Radio, She

My Radio's filled  
With sobs and groans;  
It's worth four dollars  
And cost "forty bones,"  
And that's why it's "She" to me.

When I want it to work  
It commences to fussin'  
And keeps gettin' worse  
'Till I give it a cussin'  
And that's why it's "She" to me.

It's chock full of stuff  
That's nifty and fine  
But it always comes through  
With a howl and a whine  
And that's why it's "She" to me.

CACTUS JACK, HOOTCHAGIN, KANSAS.

#### Use 'Em on the Ship Code Ops

Dear Indi: Have the Radioknuts noticed that—  
Getting rid of old safety razor blades is a cinch compared to disposing of defunct B batteries? ARR!

#### Arragh Go Wan

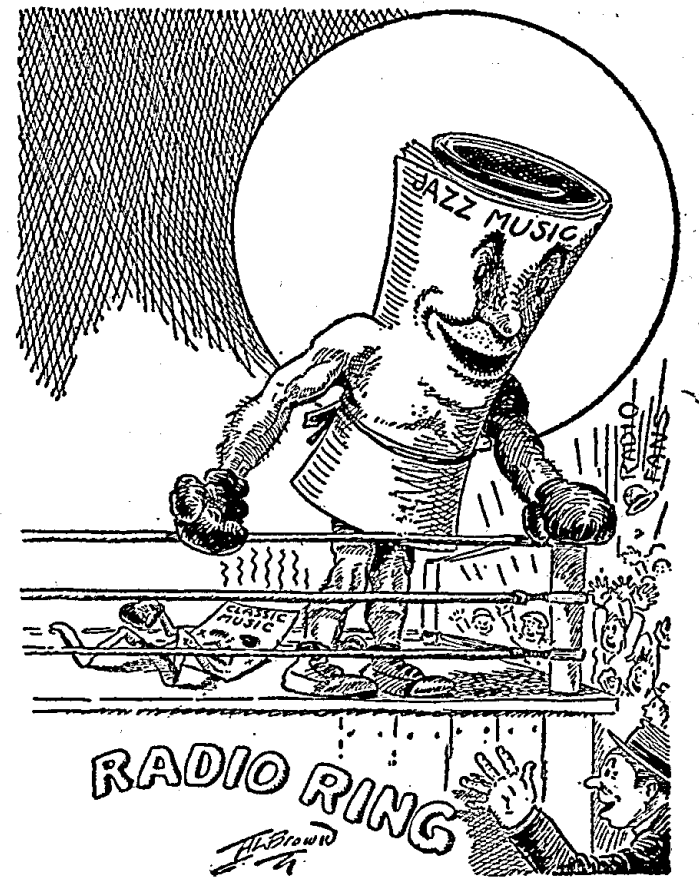
"Mike," said Patrick, "an' have ye heard th' new tillphone boxes they're after calling the Radio set?"  
"I have not," returned Michael indignantly, "an' what's more, I'll have nothin' to do with the devilish things at all. Me boss has one in the parlor, an' he sits there by the hour wid two tillphones to his head, an' lets the noise come in at one ear an' go out the other. Now what good does that do him, at all?" AMERICAN LEGION WEEKLY.

#### B-eautiful L-oving A-and H-andsome

Dear Indi: I have trouble getting your silent announcer at Walla Walla (BLAH) and I think if said announcer would adopt a slogan I could get him better (or worse). It might be like that used by the announcer in "Lap-Land," who says, "Our call letters are WOF which stands for 'Wash Our Face.'" (Lap-Land is where Missouri laps over on the United States.) INS. U. LATON.

#### But 'Tis a Function of the Male

Dearest Indi: How shocking! I didn't even know they were allowing them to send osculations through the mail. The Detroit Free Press (WCX) announcer in signing off recently, read a telegram from a lady in Iowa asking for "A Kiss in the Dark." Announcer stated that if the L. from I would send her address he would give her one. P. A. P.



### Condensed

By DIELECTRIC

Despite the fact that most of the stations now licensed to broadcast are using apparatus far in advance of that in operation a year ago, there are changes continually taking place; altering this and installing that to bring nearer perfection the transmission of sound through the ether. On the Pacific coast one of the best known stations shut down long enough to improve its sending device, installing a harmonic suppressor which confines energy to the prescribed frequency, 750 kilocycles. In New York city, WEAJ experimented with new power tubes and increased energy in the hope that its programs would reach out beyond its former radius. Evidently this was accomplished. One result of a test by experts of the Westinghouse Company was to prove that Radio impulses may be received underground.

What did we ever do before the days of Radio anyway? Burr Macintosh was appealing to the audience at a theater for funds to send disabled soldiers to a mountain camp and during his appeal word came of a number of gifts from outside—the Radio audience. The Christmas season is not so far removed that we cannot allude to it once more. At the regular Sunday afternoon men's conference in the Bedford Branch Y. M. C. A., Brooklyn, Mr. Hammond had two surprises via Radio the Sunday before Christmas. He announced plans for entertaining a large number of children, planning to provide ice cream, candy and cake, and two members of his unseen audience sent word that each would provide one of the items in sufficient quantity to make 500 youngsters happy.

As last year, listeners in on New Year's Eve had their choice of merry parties to tune to, beginning with eastern and continuing through to Pacific time. The Drake Hotel picked up KSD and rebroadcast the doings of the revelers in St. Louis; Trinity Church, New York, chimed out its glorious greeting; watch night services were on the air for all who would listen—Radio's welcome to a promising new year. But nothing compared in impressiveness to the ringing of the bell in the tower of Independence Hall, which station WOO broadcast to the world. I made the suggestion that this be done last Fourth of July. It tolled off the years that have passed since our independence was secured and then struck 1924, in which ceremony was a significance intelligible not alone to us Americans but to others across the sea.

Twice have Brother Elks in this country been privileged to sit in their lodge rooms, or at home, while listening to words spoken by representatives of other lodges, hear their songs, and the Eleventh Hour Toast as broadcast by station WNAC in Boston. This has been a national event in Elkdom. Why, even a member of that notorious crowd, The Red Apple Club of Detroit, was warmly greeted while away from home by those who had set their dials for WCX to get the staid proceedings of this Quaker organization. Would it not be a good thing, of general interest I mean, to have other nationally organized bodies announce Trans-continental Masonic, or Rotary, broadcasting programs?

Can you conceive a more potent agency for disseminating information than Radio broadcasting? I think not. The vastness of its reach, cosmopolitan appeal and the fact that its approach is primarily as an entertainer suffice to place it in the forefront of publicity agencies. This application of Radiophony is by no means new, though I believe its effectiveness is too little realized. Chambers of Commerce in some places have taken advantage of the immense audiences reached in this manner and presented the attractions of their municipalities. One of the latest to do so is the Chamber of Commerce of Hot Springs, Arkansas, which contemplates building its own station.

# How to Make Inexpensive Neutrodyne Receiver

## Part I—Hook-Up and Parts Required

By H. J. Marx

A NUMBER of readers have requested another five tube neutrodyne article but eliminating the anti-capacity switch, the variometer, the battery switch and also the filament control jacks, in an effort to reduce the cost of construction. The set now to be described was therefore laid out and assembled. The test showed very good reception.

### PARTS REQUIRED

- One Panel, 8 by 26 by 3/16 inches.
- One Baseboard, 7 1/2 by 25 by 1/2 inches.
- Five Tube Sockets.
- Two 25-Ohm Rheostats.
- One 6-Ohm Rheostat.
- Two Double Circuit Jacks.
- One Open Circuit Jack.
- Nine Binding Posts.
- One 600-Ohm Potentiometer.
- Two Audio Frequency Transformers.
- One Variable Grid Leak.
- One .00025 Grid Condenser.
- Two .002 Fixed Condensers.
- Three Neutroformers with Condensers.
- Two Neutrocons.
- One Cabinet to Fit.

No effort was made to produce a more compact set. The total cost without cabinet, tubes or battery was about \$60.

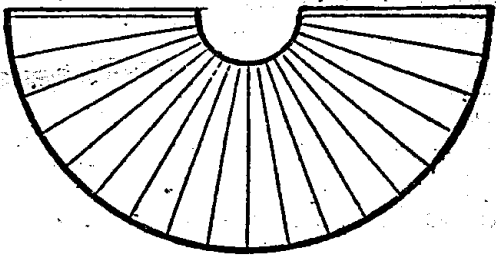
### Apparatus Required

Don't try to save money by using wood-

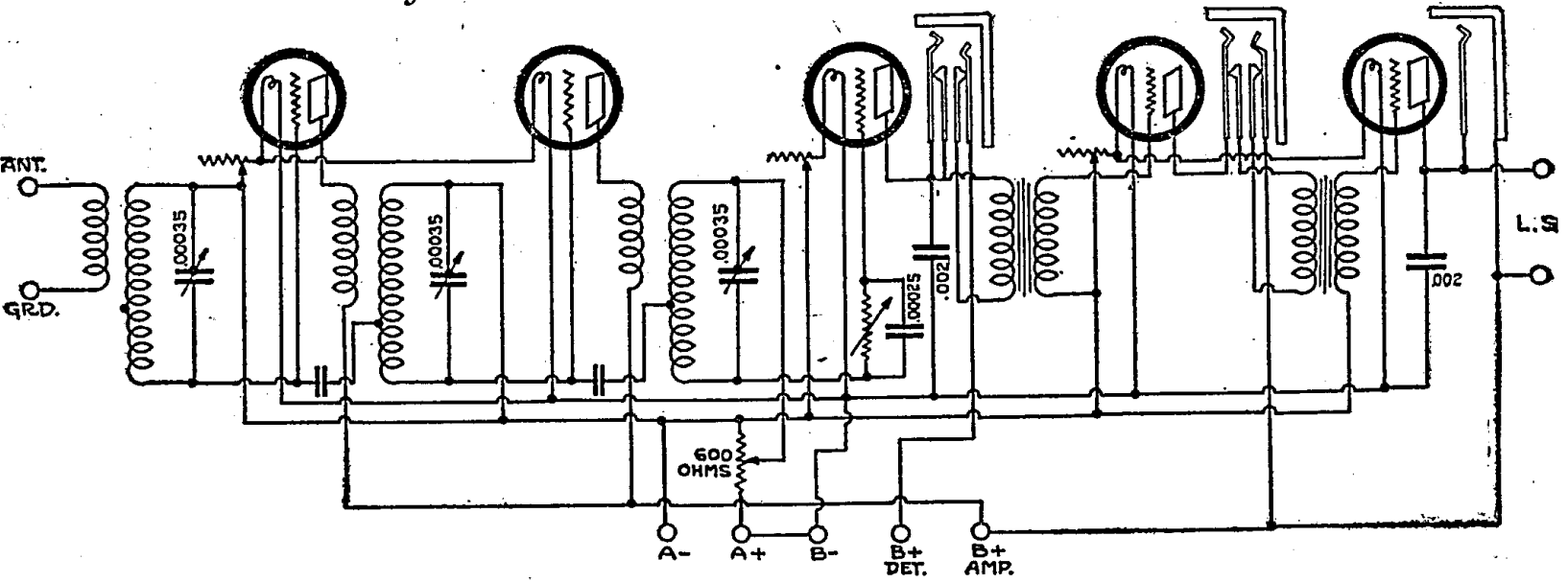
### Scales for Instruments Simply and Easily Made

The following is a description of a method whereby scales for condensers, variometers, etc., may be made easily and cheaply:

First obtain a semicircular celluloid protractor, and place it in a photographic printing frame. Then place some sensi-



tive paper in the frame and take a print of the protractor, using it as a negative. The paper should either be bromide or gas-light, so as to produce black tones. When



en panels, for they are likely to absorb moisture, and this, in turn, not only may cause leakage in the circuit but also effects the balancing. One fan, who used a wooden panel, found that the set never stayed balanced but required constant readjustment. For the wooden baseboard, a hard, kiln-dried wood should be used. It is advisable, also, to give it a coat of very thin shellac. In wiring, the bare leads should not rest on this baseboard.

The two 25-ohm rheostats are used for the amplifiers. A tubes are recommended. The 6-ohm rheostat is for the detector, which should be a soft tube.

In order to simplify the wiring, no filament control jacks are used.

The resistance of the potentiometer should be 400 ohms or over. The higher values will save battery losses, when dry cell tubes are used.

Two, four or five-to-one ratio audio frequency transformers are required. The use of a high ratio transformer in the first audio stage is not recommended, because it often creates distortion, howling and other troubles.

There are numerous grid leaks on the market, most of them fairly good, and fans seem to be well qualified to select the best ones.

The problem of neutroformers is not very serious. The coils all appear to be very efficient, the main difficulty lying with the cheap condensers, for they will do more toward controlling the efficiency of the circuit than any other factor. The neutrodon problem is gradually straightening out, and a decided improve-

ment in the design of this article is noticeable.

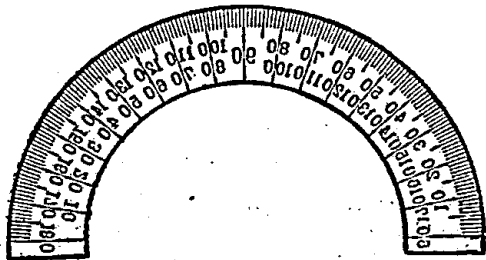
### The Circuit

The circuit requires no special comment except that it conforms very closely to the usual type. Two condensers of .002 mfd. capacity each are used for bypassing Radio frequency strays. They are connected from the plate to the A+ leads of the third and fifth tubes.

The panel layout with photos of the completed set will be shown in the next article.

(TO BE CONTINUED.)

the print is developed, fix and wash in the usual way, and when quite dry cut away the portions not wanted. By careful cut-



ting the worker may provide himself with two scales as shown. Protractors usually have two sets of readings, but for the present purpose it will be advisable to use only those which run in a clockwise direction. These scales, when mounted on ebonite, have a very neat appearance.

### Test Coil of Continuity

Always test a coil for continuity after the winding has been completed. By doing so there can be no possibility of wiring a coil with broken leads into the circuit.



"The best \$65 lever spent"

CROSLY MODEL X-J \$65

That's the unanimous opinion of owners of the Crosley Model X-J Radio Receiver. It is the last word in radio efficiency at a price within the reach of all.

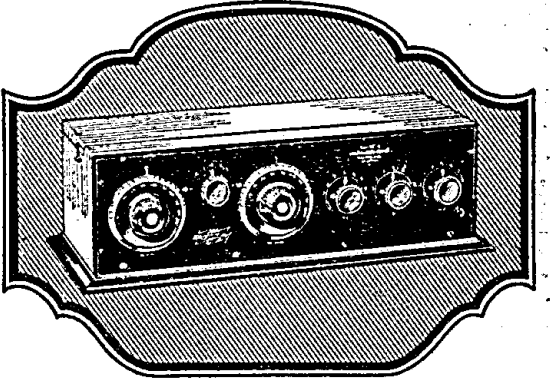
Local interference can be easily tuned out and far distant stations quickly and clearly heard.

This 4-tube set, combining one stage of tuned radio frequency amplification, detector, and two stages of audio frequency amplification, is the best radio receiver ever offered for consistent performance.

Listen in on a Crosley Model X-J for real enjoyment. Then go to any good dealer and purchase this unequalled instrument for just \$65.

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**RADIODYNE**

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NO LOOPS — NO ANTENNA

THE RADIODYNE is operated by simply grounding to a water pipe or radiator, and throwing a few feet of wire on the floor. Uses any standard tubes—dry cell or storage battery. Extremely selective. Simple to operate—only two controls.

Stations within a radius of 2000 miles can be picked up on the loud speaker; any wave length from 200 to 700 meters.

PRICE \$150.00

For use in apartments, boats, automobiles, railroad trains, etc., the RADIODYNE is enjoyable where other receiving sets would not be practical.

When interference, strays, static, etc., make other types of reception utterly useless, the RADIODYNE picks up broadcast programs clear and distinct.

Write for illustrated folder which describes the RADIODYNE in detail. Every radio fan will be interested in this new type (antennaless) receiving set.

Western Coil & Electrical Co.  
312 5th St. Racine, Wisconsin

## 2-LO, LONDON, ENGLAND ON ONE TUBE

Another Record for the

## ELGIN SUPER-REINARTZ

Tuesday, November 27, during the test period between 9 and 9:30 P. M., Rev. E. A. Cole in the residence of J. A. McIver, of Roodhouse, Ill., while operating a set made of materials and in accordance with the hookup furnished by the ELGIN RADIO SUPPLY CO., tuned in 2-LO, London, England, using receivers and but one tube. Later another tube was lighted and the loud speaker used, so that four people could hear the program and concluding announcement. The numbers, time, and the order in which they were played were

### Officially Confirmed

by the St. Louis Post Dispatch in conjunction with the National Association of Broadcasters, who had charge of the tests. (See page 34, St. Louis Post Dispatch, Dec. 2, 1923.) This same hookup has been advertised extensively as the one which brings in stations 2000 miles overland on a loud speaker and one tube; and this has been demonstrated so often as to need no repetition.

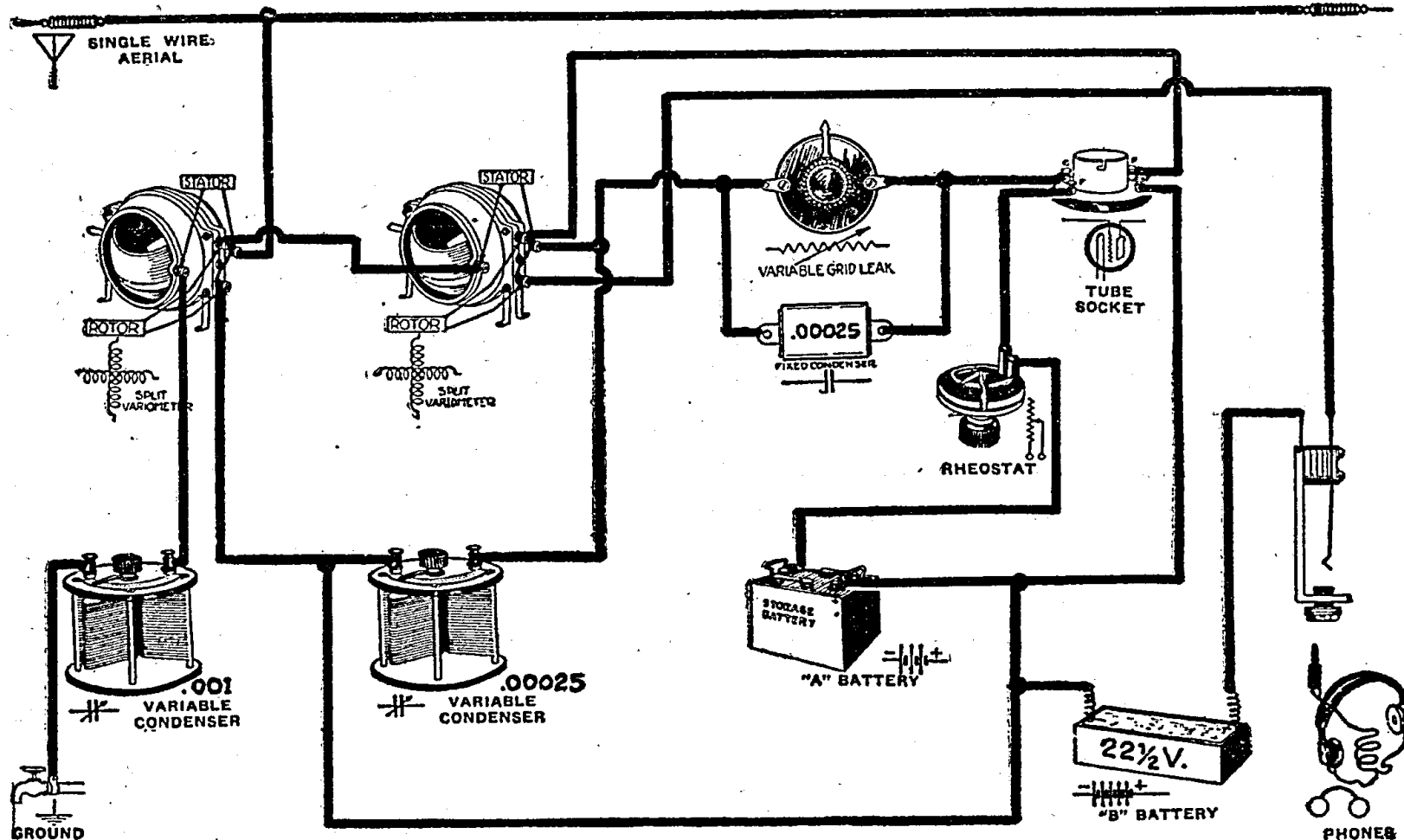
Send a two-cent stamp for circular giving one, two, and three tube hookup, and price list of parts for this remarkable circuit. Address the

ELGIN RADIO SUPPLY CO.

207 Chicago St.

ELGIN, ILL.

**REGENERATIVE SIMPLEX HOOK-UP FOR LONG DISTANCE**



THE last Simplex was a simple one. Here's one a few jumps ahead. We now require two variometers, two variable condensers and a variable grid leak. Then we are all set. The wiring is simple, the circuit is regenerative and it is quite a little bit harder to tune, but you are all set to do some long distance work. The plate circuit is inductively coupled by means of the second variometer to the

grid circuit of the tube. The secondary is inductively coupled to the primary circuit by means of the first variometer. Both these variometers are of the split type, that is, the rotor and stator windings are not connected in series, thus making it equivalent to an untapped coupler with approximately the same inductance value in both windings. The primary circuit is tuned by means of the .001 variable con-

denser. The secondary circuit is tuned by means of the .00025 variable condenser. The grid leak is variable for best adjustment for various tubes. Only 22 1/2 volts are required for the plate battery. This circuit is very selective and efficient in tuning out local broadcasting stations. Audio frequency amplification can be added in the manner usually employed in other hook-ups.

throughout a complete charge, though a second may be needed to complete an exhausted A battery. It is possible to improvise a drip pan to keep up the level of the soda solution. This is a most satisfactory and simple outfit.—Frederick F. Simms, Ettrick P. O., Va.

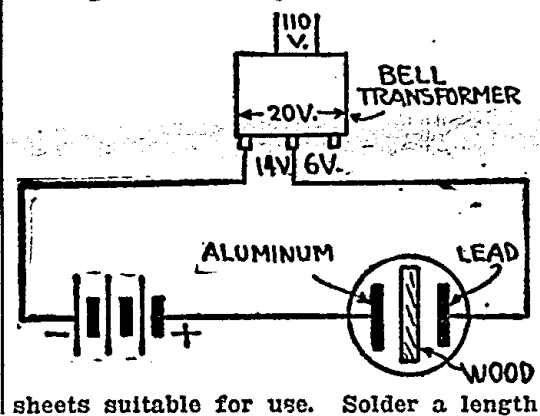
There are a lot of freak circuits out, but the standard circuits are reliable and can be worked by anyone.

**Using Bell Transformer for Charging A Battery**

Where one has alternating current for lighting, a bell transformer will serve both the signal devices about the house, and will efficiently charge the A battery. When installing this transformer, select the 50-watt size with taps for 6, 14 and 20 volts. The taps at 6 or 14 volts are used for the bells, and at 14 and 20 for charging batteries.

Make up a rectifier by filling a quart jar with water to within 1 1/2 inches of top and stir in six heaping tablespoonfuls of baking soda. Cut one 2 by 6-inch sheet each of lead and aluminum. A discarded

cooking utensil will provide a number of



sheets suitable for use. Solder a length

of wire to the lead plate; fasten another with a small brass bolt to the aluminum; cut a wood separator 1/2 inch thick, 2 inches wide and 8 inches long, which is then placed with these plates in the jar of soda solution.

The wire from the aluminum plate is connected to the positive side of the A battery, the lead plate to the transformer, and the negative A battery to the transformer. Use 14 volts from the transformer to start charging and until the hydrometer shows 1.215. To hasten the charge, 20 volts may now be used. Starting at 20 volts will overheat the transformer and melt its sealing compound. As the soda solution boils during charging, it should be replenished with water. One sheet of aluminum should last

**3/4 Actual Size**

**HEGEHOG** TRADE MARK

**PREMIER Audio-Frequency TRANSFORMER**

**\$350** Smallest Most Efficient

WE BACK this little wonder to the very limit. For all around efficiency it is unexcelled. Give it a thorough tryout. Install it in any of the latest hook-ups—(Neutrodyne, Autodyne, Superdyne, Miloplex, Autoplex). Judge it for volume, tone quality and consistent performance. Give it every possible test. Then consider its size and price. If you do not find the "Hegehog" unsurpassed in every way, your money will be gladly refunded. We guarantee it unconditionally. There is nothing superior to the "Hegehog" in efficiency and for compactness. Make this test. Send for FREE Bulletin No. 92. Ratios 1 to 3, 1 to 4, 1 to 5, \$3.50; 1 to 10, \$4.50.

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# Simple Explanation of Radio for Everybody

## Chapter IX, Part II—Audio Frequency Amplification

By M. W. Thompson

THE following article is the eighteenth of a series for Radio beginners, written by Marvin W. Thompson, well known in air-phone circles for his understandable style of approaching his subject. The remaining chapters will be:

- Chapter X—Loud Speakers.
- Chapter XI—Dry Cells and Storage Batteries.

FIGURE 69 shows the circuit in which both filaments are lighted from one source and both plates kept at positive potential by one set of plate batteries. Battery Y is a 22½-volt unit, as is battery Z. If you will trace the circuit from the plate of the detector tube and through the primary of the transformer, you will see that only battery Y supplies the detector plate. Starting at the amplifier plate, however, we find that we must go through the phones and both batteries Y and Z before reaching the filament. The load on Y is double that on Z.

**Jacks**  
This practice of utilizing but two sets of batteries for more than one tube can

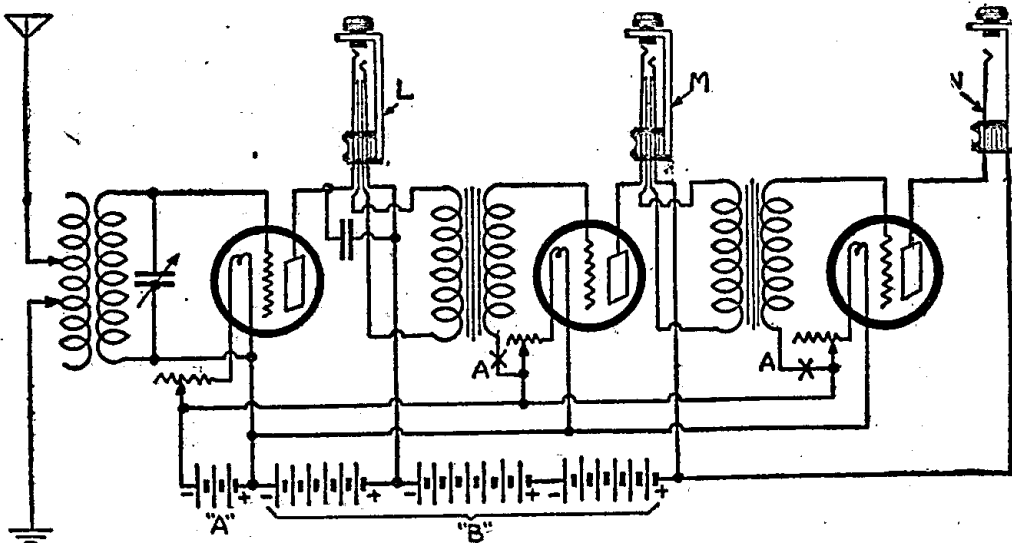


Figure 70—Jacks in each stage of amplification permit ready use of any number of tubes.

a further improvement: Jacks which permit the use of the detector only, one stage of amplification or two stages. A

receivers and may be inserted either in Jack L, Jack M or Jack N. Jacks M and N are known as two-circuit jacks because, when no plug is inserted in Jack M, the plate circuit includes the primary of the first audio frequency transformer; when the phone plug is inserted, the primary is eliminated and the phones substituted for it. Jack N is a single open-circuit jack because, when the plug is out, the single circuit possible is open (not completed). This last may also be a double-circuit jack, in which case the phones are in circuit when the plug is in, and the loud speaker horn is automatically connected when the phone plug is withdrawn. (See Figure 71.)

### The C Battery

Another refinement of audio frequency amplification, and one which is very recent—it came in with the new thoriated-tungsten filament tubes—is the use of a third or C battery. It was found, when using the four tubes UV-201A, C-301A,

UV-199 and C-209, that, if more than 45

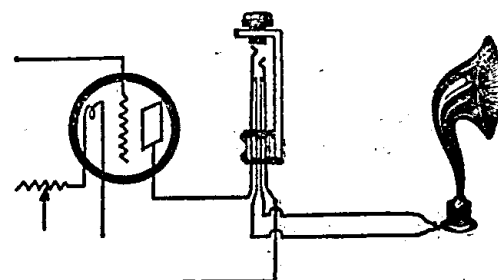


Figure 71—A two circuit jack in the last stage will automatically throw in the loud speaker upon withdrawal of the phone plug.

volts were applied to the plates, distortion was reduced. (Continued on page 24)

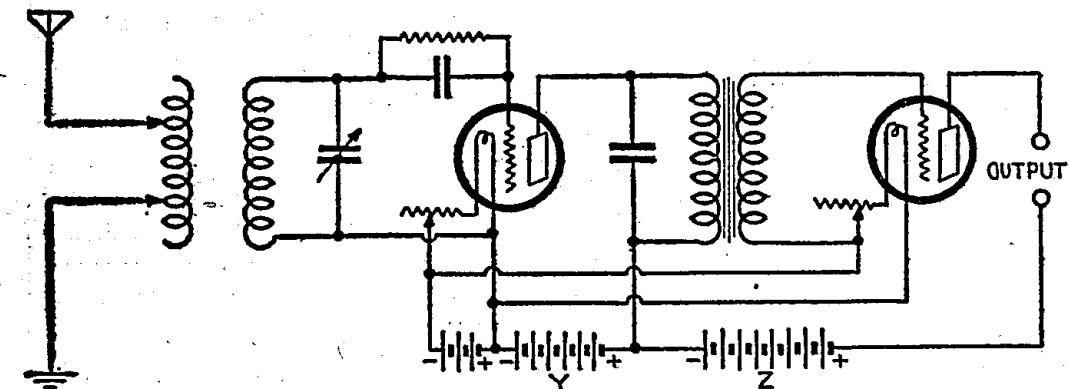


Figure 69—A single A battery and a single B battery may be used for a number of tubes.

be carried out indefinitely, as shown by device known as a phone plug is attached to the tips of the cord of the head re-

## LISTEN-IN RADIO RECORD

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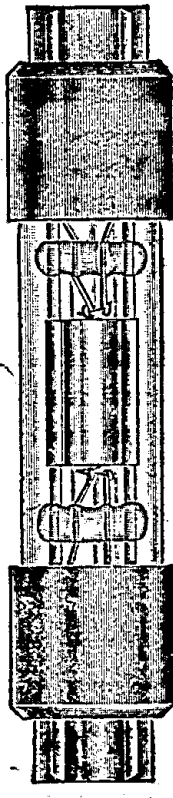
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PRACTICALLY UNBREAKABLE

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EACH Complete with clips ready to mount on your set; no sockets or extra equipment required.

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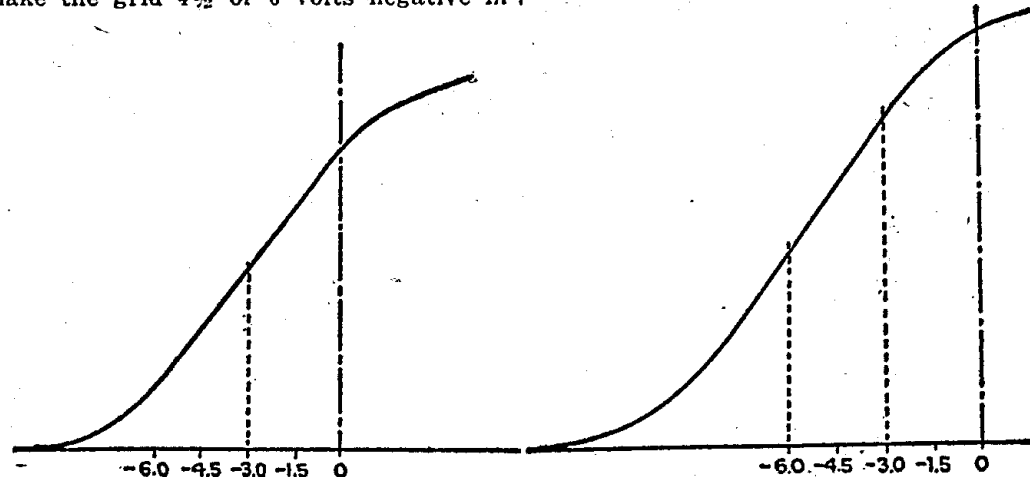
(Continued from page 23)

tion was likely to occur, and a volume less than that expected was produced. Tests and experimentation showed that the insertion of a third battery which would make the grid 4½ or 6 volts negative in

nected to the filament. We then have a total grid bias of 6 volts. (See Figure 73.)

#### 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



Figures 72a and b—Left, with 45 volts on the plate, a negative grid bias of 3 volts is sufficient. Right, when the plate potential is increased to 90 volts, the grid bias must be increased to avoid distortion.

relation to the filament, would help. Reference to Figure 72a will make this clearer. The curve here shown results when 45 volts is used on one of the new tubes. The grid is in its natural relation to the filament—3 volts negative; and this results in operation on the straight portion of the curve, which is essential to clear unblurred amplification. If, now, the plate current is doubled to 90 volts, the curve appears as in Figure 72b. It is just as though we moved the entire curve to the left in relation to the vertical zero grid potential line. It can be seen at a glance that if the tube is operated as an

of the horn, while enjoyably loud and clear, has what Radio men call "whiskers" on it. This term has been applied because the only adjective that suitably describes the phenomenon is "fuzzy." The letters c, s, and z have a peculiar sibilant quality and the higher notes from stringed and reed instruments seem to hang on, instead of breaking off sharply as they should. Since it is usually impossible to determine just what part of the amplifying system is at fault, the two slight additions shown in Figure 74 should be tried separately. First try connecting a small fixed mica condenser of .00025 or .0005-

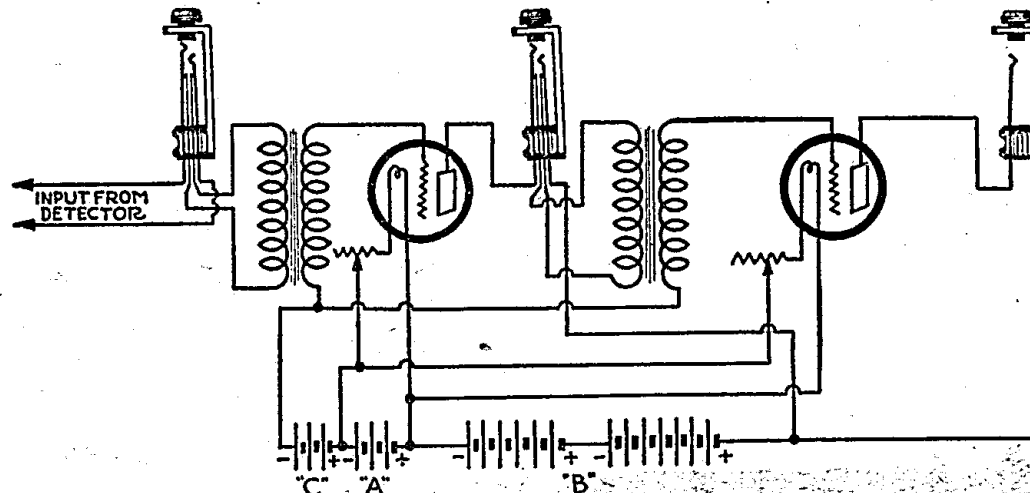


Figure 73—A C battery, used when 45 to 100 volts are put on the plates, will prevent distortion and give more volume.

amplifier with the grid only 3 volts negative, operation will occur at the beginning of the upper bend and distortion appear. Operation should occur at the point where the grid is 6 volts negative, so the grid return is disconnected from the filament and a two-cell 3-volt battery inserted, with its negative end toward the grid and its positive side con-

mfd. capacity across the secondary of the last audio frequency transformer and, if readily available, even a .001. If this does not remedy the objectionable fuzziness, try grid leaks of various values connected across the primary. One or the other of these methods should clear up the reproduction. This may cut down (Continued on page 26)

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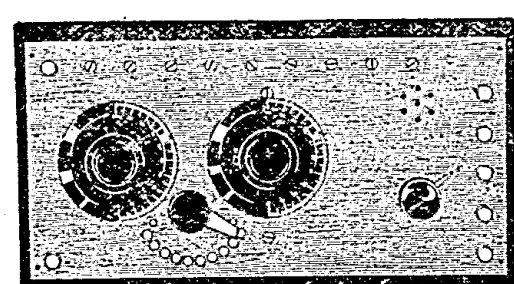
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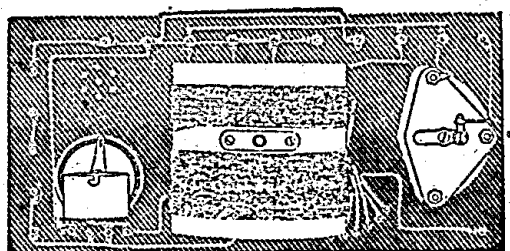
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# How and Why of Super-Heterodyne Receiver

## Chapter II—Special Units Required

By H. J. Marx

**A**FTER the amateur begins to understand the fundamental principles of the super-heterodyne circuits, the problem of parts required is decidedly simplified. The main trouble in the past was that the fan used wholly unsuited apparatus, which not only did not operate well but sometimes refused to function.

The fact will be appreciated that inasmuch as the super-heterodyne is credited with unusual selectivity, this characteristic depends entirely on the efficiency of the apparatus in the circuit.

### The Special Transformers

The special transformers are the first to be considered. Their function is the same as any Radio transformer except that their efficient operation peak is usually somewhere between 3,000 (100,000 cycles) and 10,000 (30,000 cycles) meters. Owing to the lack of special super-heterodyne transformers, long wave Radio frequency transformers, such as the UV-

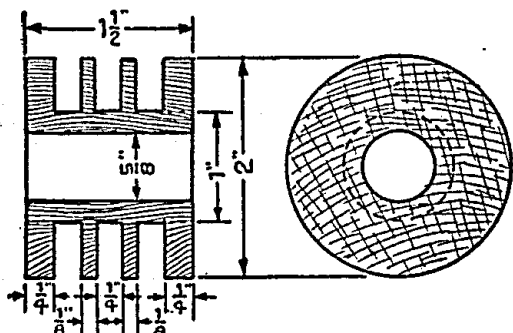


Figure 1.

1716 (no longer available), were used. There is no reason, except lack of patience, why the fan should not construct these transformers himself. Surely the fans in Radio have demonstrated that this is one quality they possess an abundance of. Then why not make them?

It would be a little cheaper and simpler to design them for the lowest possible frequency, but why not make as good a job as possible? The details of construction cover a transformer that operates at a wave length peak of about 10,000 meters or 30,000 cycles' frequency.

### Construction Details

Get some kiln-dried mahogany, or other hard wood, and have a woodturner make three spools as shown in Figure 1. It is customary to have about three or more stages of super-audible amplifiers. The primary consists of 500 turns of

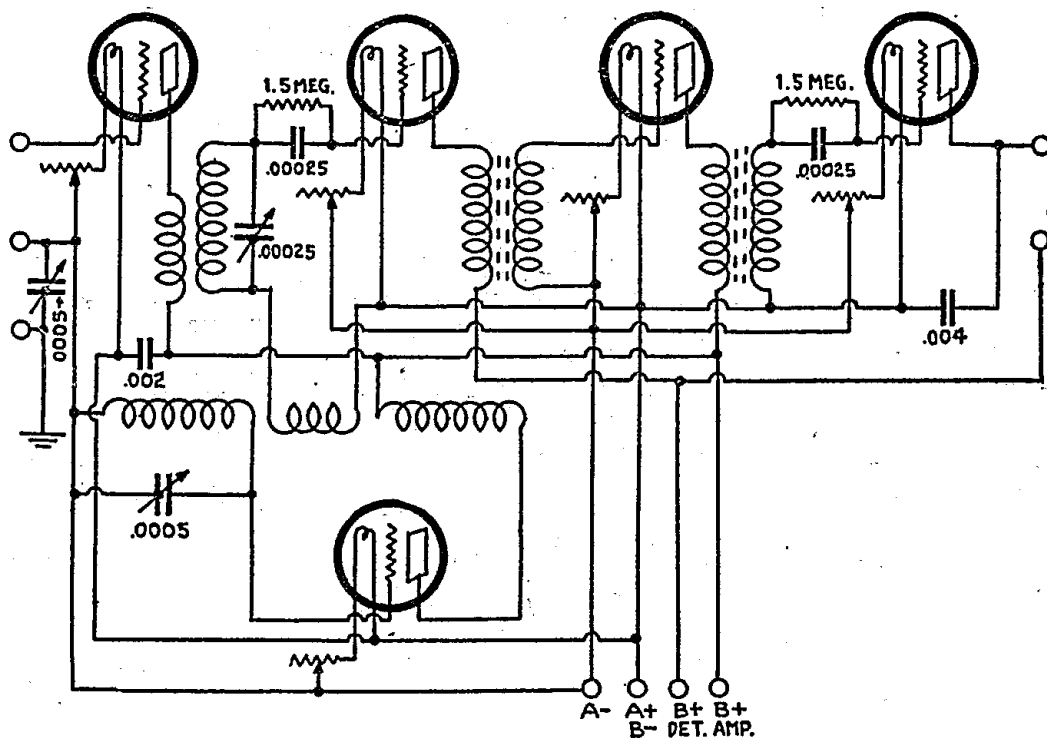


Figure 2.

number 30 dsc. copper wire and is wound on the center groove of the spool. The secondary consists of 2,000 turns of number 36 dsc. copper wire and is divided into two windings of 1,000 turns each in the outside grooves of the spool. All the windings run in the same direction. The ends of the terminals are designated as inside and outside ends. The inside end of the first winding is the grid return or filament lead, the outside end is connected in series with the inside end of the third coil. The outside end of this third coil is the grid terminal.

The inside end of the second, or center, coil is the B+ terminal, while the outer end is the plate terminal.

In handling such fine wire considerable

care should be exercised to avoid breakage in the winding. It is rather difficult to make a good joint if the wire is broken. The spool should be mounted on a piece of panel stock with four terminals, to which the wire should be soldered. Be careful to see that the wire does not burn through when soldering. After this is finished, the coil should be enclosed to avoid its being knocked around, causing the fine wire connections to be broken.

### Adding R. F.

It is quite logical to add Radio frequency amplification before heterodyne action takes place. For this purpose the type of air core Radio frequency transformers used in heterodyne circuits ap-

pears to be best suited. A variable condenser is added to tune the secondary circuit. This adds another tuning control, but since the total is only three for tuning, it doesn't make the apparatus too complicated.

### Five Tube Circuit

A five-tube super-heterodyne circuit is shown in Figure 2. The first tube is purely a Radio frequency amplifier, the second one the first detector, the third a long wave or super-audible amplifier, the fourth the second detector, and the one below is the oscillator.

The first stage can be neutralized if desired. This will materially assist in preventing the tube from persistently going into oscillation. A Radio frequency bypass condenser (.004 mfd. capacity) is added from the plate lead to the positive filament lead of the second detector tube.

The detector plate voltage is either 22 1/2 or 45, depending on the type of tube used. The amplifier plate voltage should be about 90. Audio frequency amplification can be added in the usual manner.

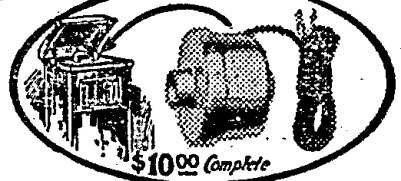
In the next article the construction of the oscillator unit will be described in detail.

(TO BE CONTINUED.)

### Place for the Set

Many experimenters do not know that the lower the Radio set is placed with respect to the aerial the better will be the results. With an antenna 30 feet off the earth the best results are obtained if the receiver is located on the street floor instead of in the attic.

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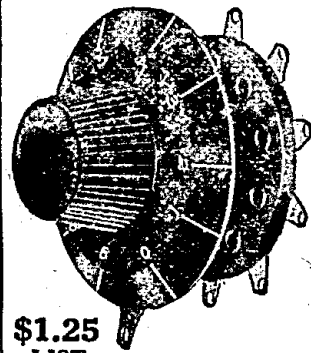
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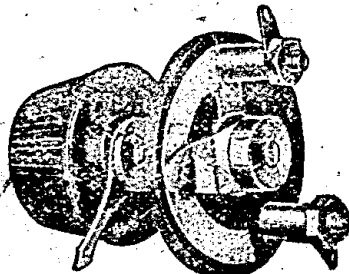


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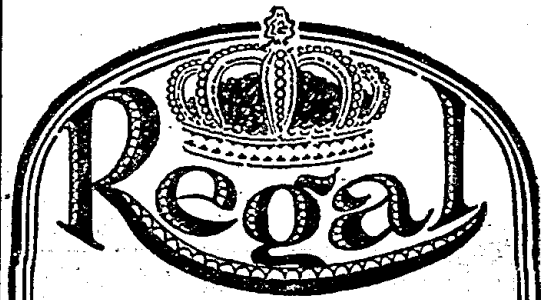
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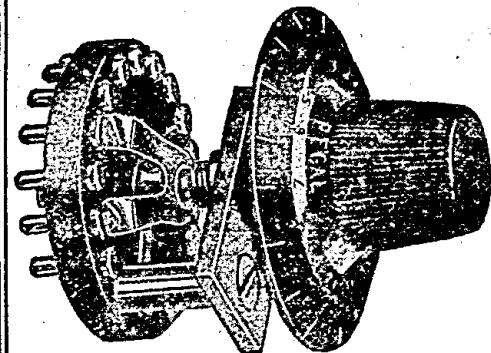
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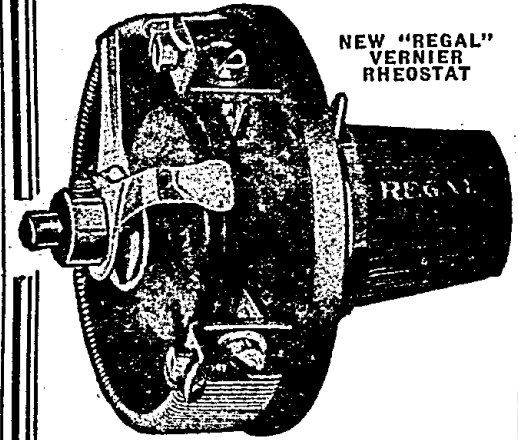


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### RADIO FOR EVERYBODY

(Continued from page 24)

the volume from three to five per cent, but the gain in faithfulness to the original music more than offsets it.

#### The Push-Pull Amplifier

There comes a time to the owner of every high-class receiver when his set

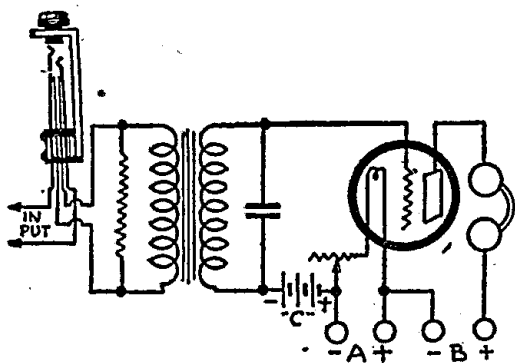


Figure 74—A leak across the primary or a condenser across the secondary will usually clear up reproduction.

will be tuned to a program and it is strong and loud in the headphones with two steps of amplification, but, try as he will, he cannot increase the signals sufficiently to actuate a loud speaker. A third step of amplification distorts the signals—increasing filament brightness

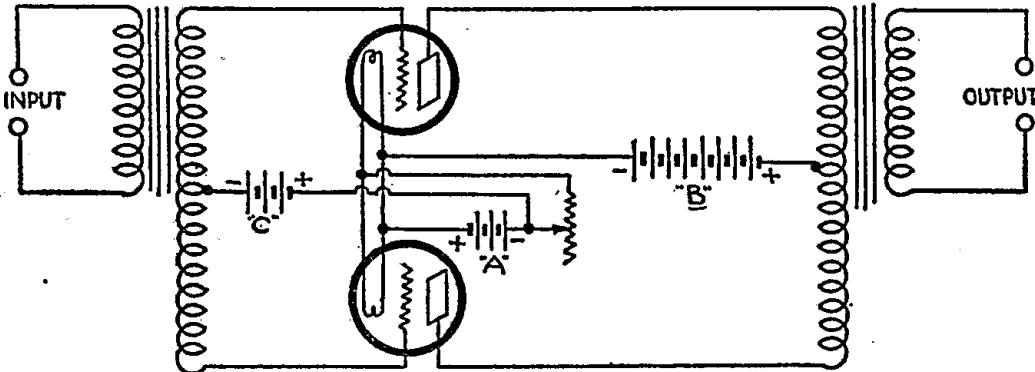


Figure 75—The push-pull amplifier which, because two tubes divide the energy, gives clear reproduction and great volume.

does not help. What is needed is a stage of "push-pull" amplification.

The circuit for the push-pull amplifier is shown in Figure 75. Such a unit is simple to build and operate, the only difficulty being the provision of the special transformers necessary. These are sold

in pairs, as the secondary of one must have a center tap, while it is the primary of the other that must be tapped. In such a unit the incoming energy is divided between two tubes and neither is overcrowded. It will enable its user to increase the strength of local signals to a tremendous volume if necessary, or strengthen distant signals to a satisfactory degree for enjoyment. Adjustment of the C battery is the only point requiring especial care and once this is set, the unit requires no further attention.

(TO BE CONTINUED.)

### A Good Aerial and How It Should Be Erected

What kind of aerial do you use? This is a highly important question and should be given careful consideration by every Radiophan.

The lead-in, even though it is insulated, still acts as a part of the aerial, and if you happen to live near the ground floor of an apartment house and find that it is necessary to use an extremely long lead in to reach the aerial on the roof, you might better forget the aerial altogether and simply use the lead-in.

The ground wire also acts as an aerial, or rather counterpoise in this case, and if you have an extremely long one, just try disconnecting it from the cold water pipe

and see if you do not get practically the same results.

A single straight wire is the best for all around receiving. There is no question about that, but there are different ways of taking off the lead-in. If you take this from the middle it means that

### The Reader's View

#### Improving Broadcasting Studio

I think that anybody who is interested in Radio should help to improve it if possible and I therefore, being a meteorologist, think that the proper amount of humidity which will improve the audibility of the broadcasting room will increase the efficiency. The air of the average room in winter will be found to have about 25 per cent to 30 per cent relative humidity and in my opinion should have at least 65 to 70 per cent in order to increase the audibility.

If you know of a broadcasting room where you can test this theory, just take a watering can and sprinkle the floor half an hour before broadcasting and watch the result. I notice that of a band playing, the instruments nearest the transmitter stand out plainly, the others you can hardly hear.—W. R. Pringle.

#### Fading vs. Spark Stations

I noticed in your December 8 issue that WGR operator says he has found the real cause of fading signals, claiming that it is caused by change of potential in the mains supplying the current for the transformers.

If this is the case, I would like to have

you are really using only about half of the aerial. The rest of the wire is simply holding the aerial up and is not assisting you at all.

It is possible to have the aerial and lead-in all in one length, if you can get a single piece of wire long enough. By running the aerial wire through the eye of the insulator, at the "near end," it is possible to keep right on with this wire and drop it down to the outside of your window, where an insulated wire will have to be attached. By doing it this way, rather than attaching a separate piece of wire to the aerial, you will save one joint and make things just that much easier, for both yourself and the broadcasting.

Every joint in both aerial and ground lead should be carefully soldered.

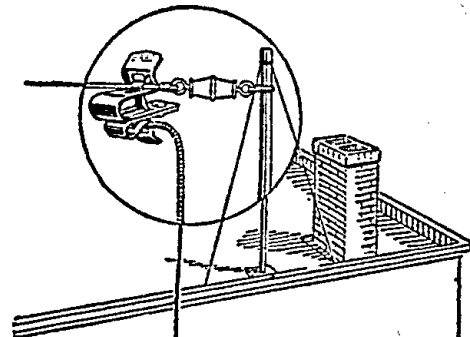
WGR answer the following questions: Why do signals from WTAM, Cleveland, fade as much as other stations (I understand that this station is operated from storage batteries entirely) and their potential is constant?

Now, do the central power stations at these various places maintain their potential in the daytime and then let them vary so much at night? I can't think so. All of these stations begin to fade as soon as my set begins to bring in the more distant stations. Then the code is so bad here that it is impossible to hear any station at night for even one-half hour without fading or having the tubes spill over.

This code interference covers my entire range at least each half hour, sometimes on one wave length and then again on another. It is so bad at times that I miss whole programs.

I have been hoping the government would take this matter up and give us some wave lengths and restrict commercial and ship stations from using these wave lengths. Then, and not until then, will we ever get good reception.—B. C. L., Seymour, Mo.

### FAHNESTOCK'S LATEST RADIO HELP



No. 31

### The Antenna Connector

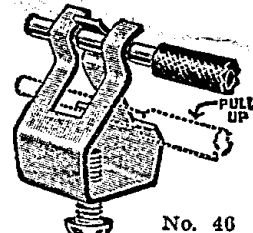
Price 10c

Snap larger connector over Antenna Wire; insert Lead-in Wire into smaller clip and a perfect connection is the result.

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# Selective Three Tube Single Circuit Receiver

## Chapter IV—Changing Other Types of Sets to Grill Hook-Up

By Fred Grill

As mentioned in last week's issue of Radio Digest, I shall devote this chapter to the changing over of other circuits to conform with the hook-up described by me in these articles.

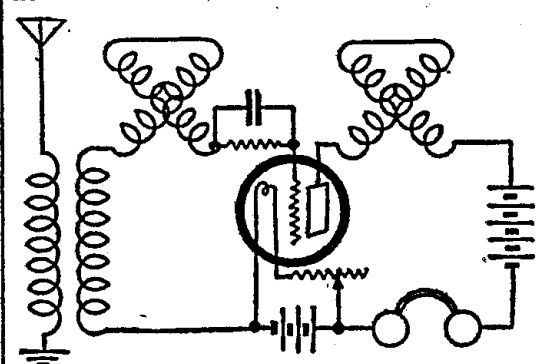
After much investigation I have found that the standard Armstrong regenerative three circuit tuner is about the most generally used. The single circuit regenera-

tion to the mark for amateur as well as broadcast reception.

### Grill in Three Circuit

The standard three circuit set has been chosen first because of its great popularity and second because of the ease in which you may transform your present three circuit tuner to coincide with my hook-up.

This change can be made without the entire disassembling of your now workable set. I know, as no doubt many of you do, that wandering in circuit land surely is a wondrous journey. Many are left in a quandary after a mere stroll through it, but less so that real circuit hound.



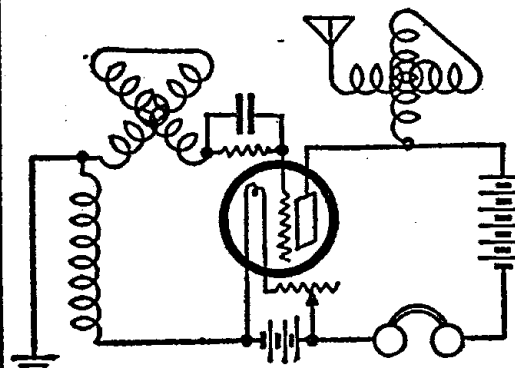
Armstrong three circuit as changed to Grill hook-up.

The first thing you should do in changing your three circuit tuner to the single circuit is to remove all tubes from the

sockets. Next you should take off all battery connections.

### Changing the Connections

Now the real work will begin. Do not let this scare you because the connections to be changed are but very few. They are



The Grill circuit.

the plate variometer, the grid variometer and the primary connections, and you have completed your construction of the Grill receiver. Of course, the object of this article is not to have you discover the value and the causes of satisfaction that will be found while using my circuit and I do not claim that changing the connections in your set as I am about to illustrate will make you a first-class set.

My idea is but to give to the Radio skeptics a mere idea of the possibilities of this circuit. After a trial in the fol-

lowing manner I am sure you will be convinced of its efficiency and will determine to build a receiver utilizing my circuit.

### Parts Necessary

The parts to use are the plate variometer and the grid variometer, and the secondary of the variocoupler can be substituted for the purpose of test, for the plate of the tapped coil mentioned in the original constructional data for the set.

The hook-ups illustrate in a very good way the changes that are to be made. To the experienced Radio bug the diagrams are self-explanatory.

It is to the others that I dedicate the following few lines. The first thing to be done is to take the plate variometer connections off and connect the variometer directly in series with the plate and the antenna. Close the plate circuit where the variometer was connected. Now take the point between the grid variometer and the rotor of the variocoupler, and make a connection to it, which is to be used for the ground connection.

This completes the changing of connections to make a Grill receiver from the ordinary Armstrong three circuit receiver.

### Conclusion

I had intended to answer questions which I hoped to publish as a supplement to this article, but as the time is rather limited, I find that I am forced to answer such questions to me and to the Radio Digest at a later date. Also I may find that it would be advisable for me to publish some of the correspondence from readers if it would help some other Radio fans along this line. Should anyone have any criticism or suggestions, I would welcome them.

(THE END.)

## Hints for Making Tests on Various Instruments

Here are some hints for the Radiophan who wants to go over his set, testing his coils, connections, transformers and condensers and making sure there are no breaks in the circuit. An ordinary dry or storage battery is all the equipment necessary to make sure the circuit is all right.

From one terminal of the battery run a wire of convenient length to one terminal of the head set. Then fasten another wire to the other terminal of the battery and leave the other end open. Put the phones to the ears.

You will now find that you have two open terminals, one from the battery, the other being the open phone tip. Touch these together, and a click in the telephones will be heard. This shows that

the circuit in the receivers is right, and the test on the coils can now be made.

Touch one of the open terminals to one end of the coil and the other open end to the other end of the coil. If the click sounds in the receiver, the coil is all right.

In testing the transformers, the phones should click when the two terminals of the primary or the two terminals of the secondary are touched. The click, however, should not be heard when one of the testing wires is touched to one of the terminals of the primary and the other wire to a terminal of the secondary. In other words, there should be no circuit between the primary and the secondary of a transformer.

When the testing wires are touched to

the terminals of a condenser there should be no click. If a click occurs, the condenser is defective. If a variable condenser, it is probable that the plates are touching. If a fixed condenser, it is defective and may as well be thrown away.

With the phones and the battery hooked up in this fashion, short circuits and all manner of troubles can be detected. Just remember there should be a click when a circuit is supposed to be closed, but no click when the circuit is open. Frequently a circuit can be improved 100 percent by going over it in this fashion.

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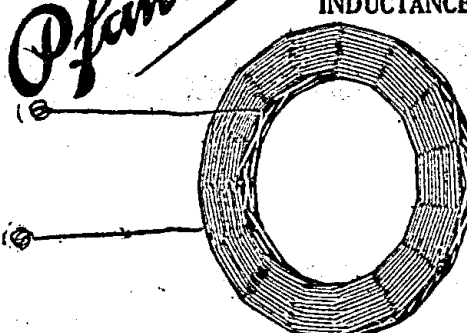


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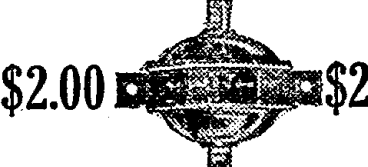
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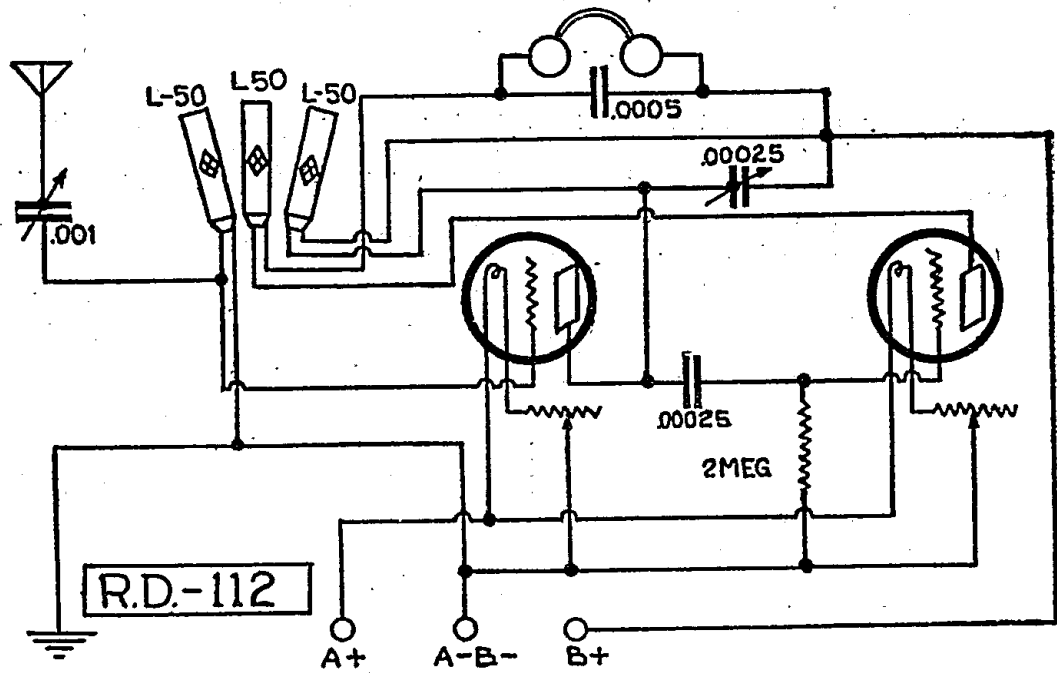
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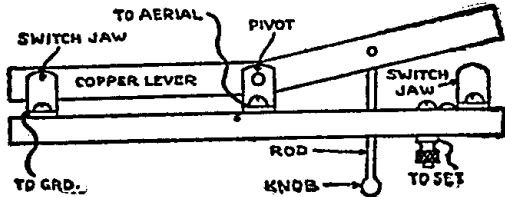
### TRIPLE HONEYCOMB COIL CIRCUIT



HERE'S a circuit, R. D.-112, that uses triple honeycomb coils and will surprise you in its results. It is a combination of tuned Radio frequency coupling with a regenerator or feedback effect. Actually there are only two condenser controls and the adjustment of the honeycomb coil coupling. The circuit is best suited for A tubes with about 45 to 67½ volts on the plate.

### Lightning Switch

Lightning switches are usually inconvenient as they must be operated from outdoors. The illustration shows one that can be operated from within the house. A bar of copper is bent in the exact center and also a small hole is drilled at that point, so that a small angle of metal



may be loosely bolted to it to make a smooth working pivot, as shown. This is then mounted near the center of a piece of wood that will just fit snugly under the window sash when this is closed on

it. Near each end of the lever are mounted an old switch jaw, so that when the lever swings, it makes contact with only one at a time. A rod, with a knob attached, is then put through a hole bored in the wood and fastened loosely to the lever near the center. A binding post is then placed on the inside of the wood near one of the jaws and connected to it on the other side. When this is placed under a closed window, it may be easily operated from the inside of the house and affords a good and neat aerial connection. —C. R. Williams, Janesville, Wis.

### Panel Marking

Neat dial markers may be supplied to any panel mounted receiver by scratching a narrow slot with a knife in the proper place on the panel and then filling the slot with white lead or white water color paint.

### Review of Books

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**An Introduction to Radio.** A real book for the amateur. This treatise comes in two volumes. 96 pages in each volume, fully illustrated, with flexible leather covers. Price, two volumes, \$1.

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**Vacuum Tube Receivers.** By O. F. Hessler. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blueprint. Price, 75 cents.

**The Armstrong Super-Regenerative Circuit.** By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, \$1.00.

**Radio Reception.** By Harry J. Marx, Technical Editor Radio Digest Illustrated, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special attention given to practical tuning. Price, \$2.00.

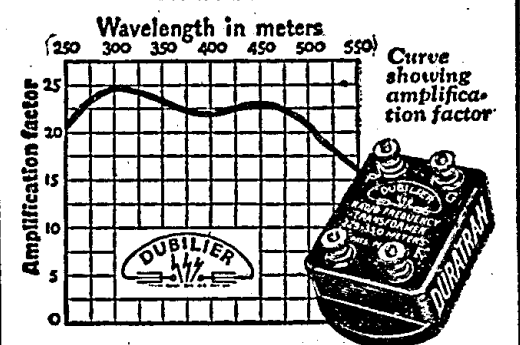
**The A B C Vacuum Tubes.** By E. H. Lewis. Is a book for beginners who have no knowledge of either Radio or electricity and sets forth the elementary principles of theory and operation of the vacuum tube. No attempt has been made in this book to describe all the possible circuit arrangements, but those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

**Elements of Radio Communication.** By Ellery W. Stone. A splendid, well connected, complete, accurate and up-to-date discussion of every phase of Radio telegraphy and Radiotelephony. Written in simple language. The subject is presented

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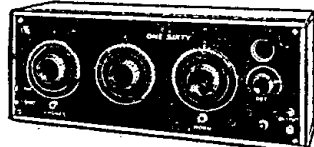
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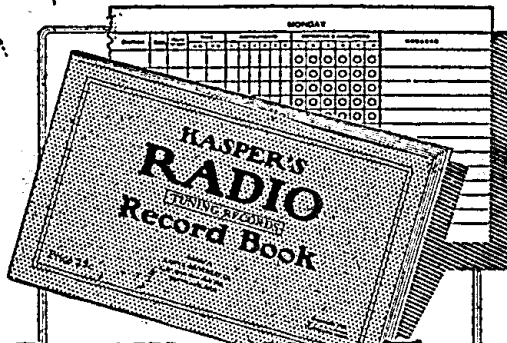
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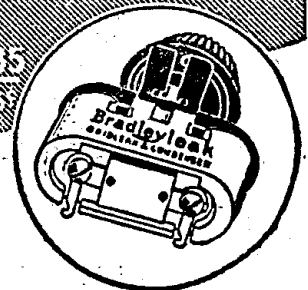
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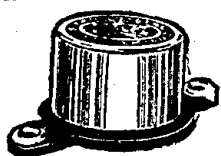
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# Details of the Yeiser One Tube Reflex

## Circuit May Be Used with Loop or Aerial

THERE appeared in the December 29 issue of Radio Digest a new hook-up by J. O. Yeiser which has attracted considerable attention by the way the questions are coming to the editor's desk and

### 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,  
123 W. Madison St., Chicago

to the author of the circuit. To furnish sufficient data to cover all details, the questions asked are given and answered in the following questions and answers:

**Question.**—Will the Yeiser set operate on an aerial?

**Answer.**—Yes. Add a variocoupler, and hook the rotor up just as the loop is shown in the diagram. Aerial and ground are connected to the primary of the coupler in the usual manner.

**Question.**—Is this circuit easy to operate?

**Answer.**—Yes, extremely simple and very selective, but complicated and hard to build, as a marked polarity of coils is obtained, and each coil must be hooked up so that the magnetic "flux" will be in the proper direction. (Use the right-hand rule for determining the north pole of a magnetic field.)

It can be seen that by reversing the leads of coil B, coils A and C will be reversed. Bear this in mind, as there are nine possible ways of hooking up the tri-coil transformer, and only one will work.

**Question.**—Will a 201-A, or 199 work?

**Answer.**—Yes, any hard tube.

**Question.**—What do the circles around the condensers mean?

**Answer.**—These condensers are by-pass condensers and are not critical. The condensers shown in dotted lines are optional. The condenser across coil C should be a .0004 variable, which will tune the R. F. and is a little more efficient. Coil A may also be tuned by a .0004 variable in multiple.

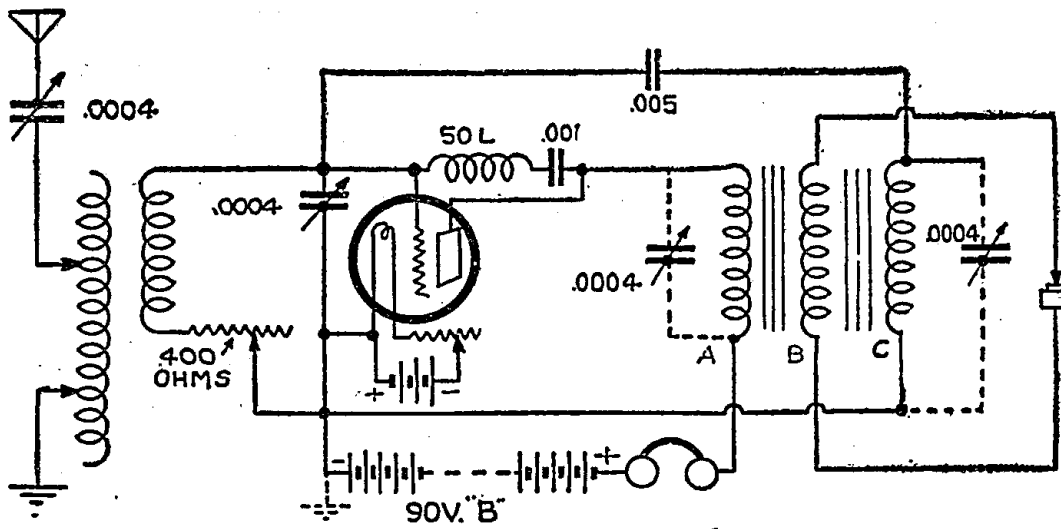
**Question.**—How do you operate this set after assembling?

**Answer.**—It is advisable to remove the .001-mfd. condenser located between the plate and grid to learn the set. After you have adjusted it to work perfectly, add the condenser, and in some cases, I have found that a 50 L honeycomb coil attached to the grid in series with this .001-mfd. condenser greatly simplifies the tuning.

Do not build this set in a permanent cabinet till you have assembled all the parts, arranged them in the particular style which you intend to build them, and adjusted all your leads. Often it happens that a little rearrangement will double the efficiency of any set.

**Question.**—Do you laminate the core of the tri-coil transformer?

## USE OF COIL TRANSFORMER



**Answer.**—Yes, if you use iron foil. However, it may be easier for the average ham to mould the core from soft iron filings which have been very carefully washed and blown, and mixed with shellac. (Iron filings usually are oil-soaked; be sure all the oil has been removed.)

**Question.**—How do you wind your coils?

**Answer.**—Use 38, 40, or 42 silk-covered wire. (Enameled wire is nice and compact, but if you haven't a lathe, you are apt to short-circuit your layers. Silk-covered is more expensive, but safest.) Coil A is the primary winding and should not be over 1,000 ohms.

Coil B is the rectifier coil and should not have a ratio of over 3 to 1 over the coil A. Coil C handles both radio and audio frequency, using coil A as the primary of the radio frequency, and coil B as the primary of the audio frequency circuit. Coil C also acts as a tickler. This coil should not be over 6-to-1 ratio with coil A, or 2-to-1 ratio with coil B.—J. O. Yeiser, Omaha, Neb.

### Selecting Proper Wire

Wire for winding inductances comes in many sizes and different insulations. There are single and double cotton-covered wires, usually listed as sec. and dcc., respectively. And single and double silk-covered wire—ssc. and dsc. There is also a wire with an enamel covering. Any of these wires may be used for coils, but with slightly different results.

The enamel-covered wire takes up the least space for a given length, but it also has the disadvantage of having the greatest distributed capacity, which means that a coil of it would not tune sharply. In regard to space, the silk-covered wire comes next. This wire is very good, but rather expensive. The wire with the cot-

ton covering has the greatest bulk, but is quite cheap and efficient, and most coils are wound with it.

The matter of the double or single covering is one that must be determined by the particular case, depending upon the insulating value, the spacing of the wires and the mechanical strength that is needed.

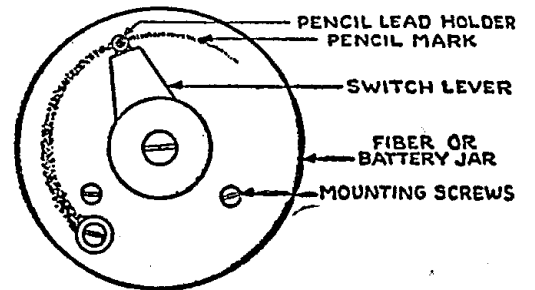
The size of the wire depends upon its use. In the wire gauge that is used for copper wire, the higher the number the smaller the wire. For coils that are to be inserted in the aerial circuit, the size should be preferably between 18 and 22. In the secondary and other circuits, the size may range from 20 to 26. Smaller wire than this would reduce the efficiency.

### Radio Fans Critical

Wise experimenters have already reached the stage where they disregard fancy Radio parts and are looking for rugged, well-built, efficient apparatus.

## Variable Grid Leak for the Flewelling Circuit

Having exhausted all sources of information on the famous Flewelling circuit, I was still at a loss for a means of making a good, simple variable grid leak, but necessity is the mother of invention and I worked out the following idea which functions exceedingly well. To make one, cut a disc from a piece of fiber board or an old storage battery jar; then take a switch lever, cut the end off, bend the remaining part down about 1/4 inch and make it into a circle to hold a piece of lead from a lead pencil, and mount it as shown. Make the pencil line thick at the binding post before assembling the parts. The feature of this idea is that the piece of pencil does not wear out the resistance line. This variable grid leak is adaptable



to panel or base mounting according to the way it is assembled. If a piece of panel is used, the high polish must be removed with a piece of sandpaper before the pencil line is put on. Make the connection to the center part and to the binding post.—P. M. Cummings, Magog, Que.

### Precautions for the New Set

In a new set, never connect the B batteries until the A battery has first been connected and the tube has been tried out to see how it lights. This will avoid danger of burning out the tube.

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# Inductive Wave Trap Plans

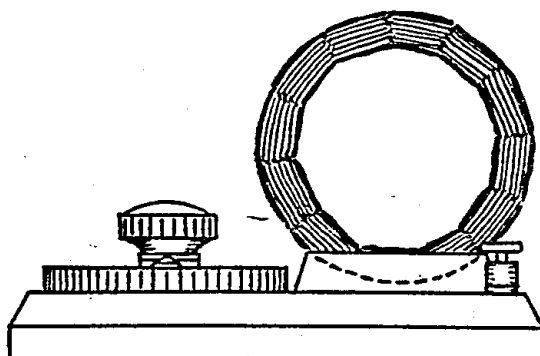
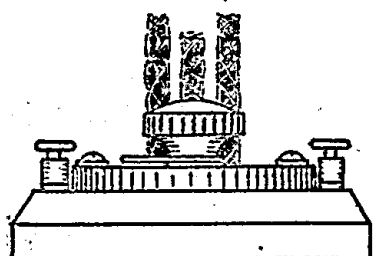
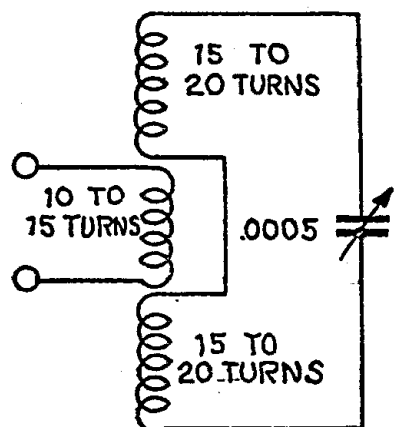
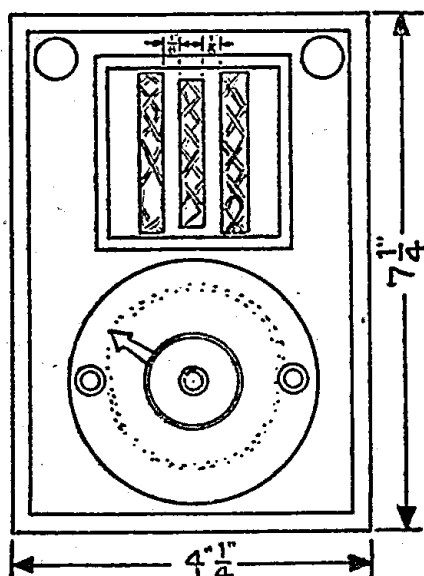
## Giving Constructional Details

**I**N DECIDING on the construction of a wave trap the following factors must be considered: First, efficiency; second, simplicity; third, low cost; fourth, compactness.

In considering the first requirement there is little question or doubt that the inductivity coupled types not only are more efficient, but also are not as apt

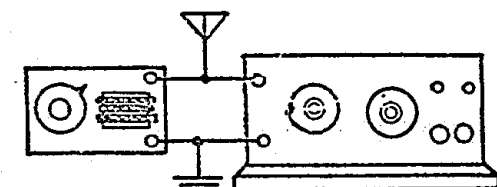
the appearance of a well constructed receiver. The wave trap illustrated should be, then, within the limits of all and affords no serious problems of construction.

Its requirements are a baseboard, a small mounting block for the coils and disc type condenser, two binding posts, three 25-turn special inductances similar to those that have been previously



to have an effect on the tuning range of the receiver. As far as simplicity is concerned there is no question or doubt that Radio in itself has enough complication without introducing more to even increase the difficulty that confronts the new fan. After digging deeply into the pocketbook for an efficient receiver with

described in articles and some connection wire. Inasmuch as these small inductances only come in 25-turn units it will be necessary to remove some of the turns from them. The two outside coils require about 15 to 20 turns, while the inside coil requires about 10 to 15 turns. Best values are determined by a little experimentation with the particular receiver with which the trap is supposed to operate. Undoubtedly it is advisable to remove the wire on the coils only to the maximum number as 15, 20 and 20, then for a trial if the lower wave length range is not suitably covered, some more turns can be removed.

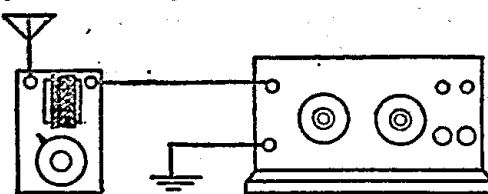


its accessories few feel like investing much more for a wave trap. The receiving set with its batteries present quite a problem as to where they will fit best in a home. Obviously we must avoid adding some more bulky apparatus or parts that would possibly detract from

GOOD Radio Tubes CHEAP; American Radio Tube Works, Blum Street, Newark, N. J.

SINGLE DIAL RADIO SETS. A REVOLUTION OF SIMPLICITY. WRITE BOX 460, WINONA, MINN.

These coils should be mounted on a small block in which three slots or cuts have been made so that the coils are held upward and spaced about 1 inch apart.



The two outside coils are connected together in series. The inner terminal or wire on one side should connect to the outer side of the other coil. The wiring diagram shows how the connections are made to the condenser. It is immaterial which way the binding posts are connected, either to the coil or to the set.

In the two smaller illustrations two methods are shown for connecting the wave trap to the receiving set. The use of this wave trap simply adds one additional control to the set, but is sufficient to eliminate all unpleasant interference.

The ordinary 6-ohm rheostat is not suitable for the new, low current tubes.

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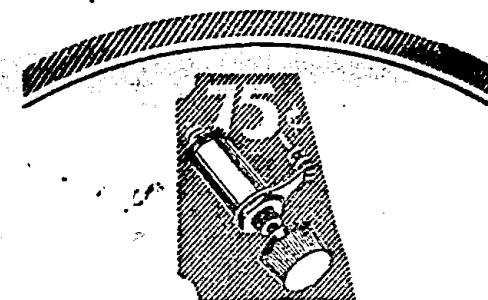
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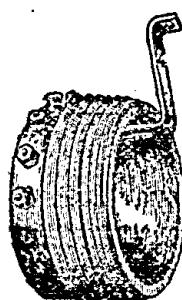
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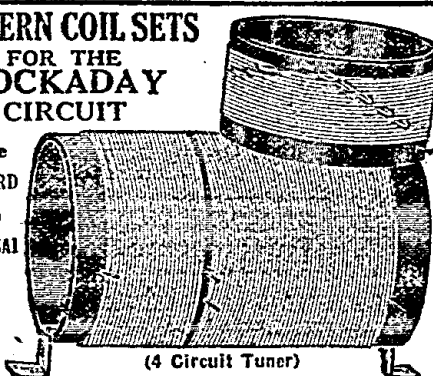
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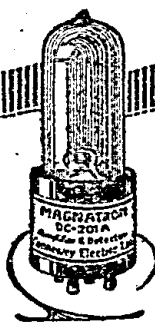
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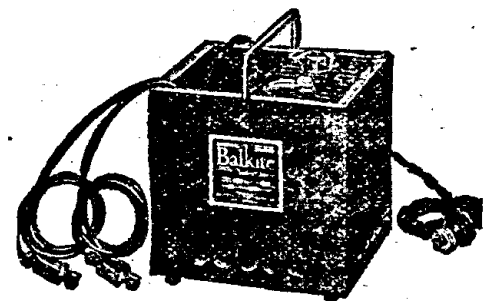
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### Splicing Wires

When making a connection between two wires, do not merely twist the wire ends together. This will sooner or later cause trouble by producing weak signals and other bad effects. When two wires are to be joined, the insulation should be removed from each for a distance of 2 inches. The wire itself should then be scraped so that it shines brightly. A right-angled bend should then be made in each wire at a point about 1/4 inch from the insulation, leaving about 1/4 inch of clean wire between the bend and the tip. By hooking these right-angled bends together, each may be wrapped around the other wire of the pair, care being used to wind each wire tightly on the other. A spliced joint of this kind will be strong mechanically and a good conductor.

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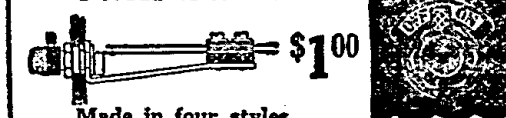
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MY HIGHLY IMPROVED REINARTZ brings in all important stations on this Continent loud, clear and without distortion. We dance to music from Atlanta and Los Angeles.

Build one of these wonderful 3 tube sets from my blueprint and specifications, price 50c, or with a complete and perfect double-wound spiderweb coil \$3.00 by mail. Picture of this set on a glass panel with every order. This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is limited the most. Thousands are in use.

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# Questions and Answers

**Not Enough Volume**  
 (05511) RBS, Baltimore, Md.  
 I was referred to you by the Radio Corporation of America, as the company that could supply me with the best information regarding a Radio hook-up, that would give me the best results. I have built a short wave regenerative set with two stages of audio frequency amplification, in accordance with the Call Book Company plans. This set has a range of

## ULTRA-AUDION QUESTION

Dear Sir:

In your very useful and highly appreciated publication I noticed in the Questions and Answers department a question answered, and I think that I am able to give you a little additional information on the matter discussed. The question is number 5035, and appears in the issue of Oct. 13, 1923, which I have just received.

The set I used during reception was a homemade single tube ultra-audion receiver. I use a 96-degree variocoupler and a 23-plate condenser. The tube used at that time was a UV-200. The ground was made by a connection to the conductor's train valve. I may state that there was absolutely no frictional electricity noticeable in this case.

The stations listened to, with the length of reception, were CJCA from 7:30 p. m. till 8 p. m.; 9CA from 8:00 p. m. till 8:30 p. m., and CJCA again from 8:30 p. m. till 10:00 p. m.

Both these stations are local ones and I should estimate that I was possibly eight miles from the station when they signed off and that I had traveled altogether about 20 miles during the 2½ hours I was listening in.

Yours very sincerely,

W. H. Croft, Edmonton, Canada.

about 1,000 miles with very little volume. I wish to build a new set to increase both distance and volume, and to operate a Music Master loud speaker.

A.—The circuit you have described is capable of operating a loud speaker effectively if functioning normally. If amplifiers are efficient and volume inadequate we would recommend another stage of audio frequency.

## Circuit Noises

(05367) CHK, Grosse Isle, Mich.

I have built one of the Neutrodyne as outlined in your articles in Radio Digest from Fred Eisemann parts, with some changes in the layout, however.

It is a most remarkable set and its range appears unlimited. Yet, I am greatly troubled with crackling noises like static, louder on high frequencies, like KDKA, and not so loud on lower

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 Dept. V, 6 W. 14th St., Kansas City, Mo.

frequencies, like KSD. Connections are well soldered and wet B batteries, dry A batteries are used. The noises are greater at 10 p. m. than at 6 p. m.

I am about to rebuild the set to include an additional R. F. step and a variometer, and wish to know if there are any special precautions in design I can take to lessen this noise.

I use UV-199 tubes for R. F. and 201A for A. F.

A.—It is our opinion that the disturbance encountered in the operation of circuit of the blueprint submitted is due to external rather than internal causes. It is evidenced often that leaking electric systems have definite wave lengths. Yours may be rather low, which would account for audibility experienced on lower wave lengths. This condition can be determined by disconnecting the antenna. If disturbance is greatly lessened, you may conclude it is due to a power leak in your vicinity. If the source of difficulty is not thus located, it is within the set and from the description afforded it would be impossible for us to isolate it.

## Present-Day Apparatus

(05328) WO, Pratt, Kans.

As a personal matter only, what kind of Radio parts, or whose Radio equipment do you consider reliable? Any information you give me will be considered confidential.

Also I wish you would advise me as to where I can get a line upon long distance equipment for receiving sets, and what hook-ups are most generally preferred.

I do not care to experiment or put money out on something that will not bring results. I have a set now with one stage Radio, detector and two stages audio, but it is not in the least satisfactory. Have not as yet been able to get any Canadian stations, northwest from Denver, nor any of eastern coast stations, in fact, nothing east of Atlanta-Chicago line. What is the reason? Have an aerial 125 feet long, 30 foot high, with lead-in from north.

A.—It is contrary to our policy to recommend or discuss the relative merits of manufactured receivers and apparatus. We can say, however, that reliable dealers have standardized their apparatus so that the public may safely accept their verdict and obtain ruggedly constructed apparatus of such electrical perfection as present development can furnish.

Your receiver should be effective and is proving so in many cases. However,

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 Genuine R. C. A. Radiotrons  
 UV199, UV201A, WD11, WD12  
 Guaranteed Firsts in Original Packages

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Bremer Tully Vernier Tuner.....	3.97
3-Amp. Tungar Type Battery Charger, Complete	9.38
"Eria" Reflex or Audio Transformers.....	3.96
All American Transformers (All ratios).....	3.82
"Como Duplex" Push-Pull Transformers (pr.)	9.87
Acme Audio Transformers.....	3.97
23-Pit. Vernier Condensers, Knob and Dial.....	2.13
23-Pit. Variable Condenser.....	1.14
\$25.00 "FADA" Neutrodyne parts.....	19.75
Complete (BREMER-TULLY) parts for 5-tube Neutrodyne set.....	29.89

Cash or C. O. D.—Send for Complete List.  
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 Price 25c  
 Order from your dealer or direct from Rusonite Products Corporation  
 15 Park Row, New York, N. Y.

from your description, it is impossible to determine the source of limitation.

In construction of a receiving set, the writer recommends as very efficient a three-tube Reflex circuit. In the De Luxe Reflex circuit, as shown in issues of May 5, 12, 19 and 26, you would find one that would meet your requirements as to range and quality.

Signal volume will be great, tone quality and selectivity excellent, operation comparatively simple.

Booklet and blueprints for this circuit are now available for 50 cents through our Book Department.

## Miloplex

(05608) CVY, Troy, N. Y.

As a subscriber to the Digest I would like to ask you a few questions with reference to the Miloplex circuit which you have been featuring in your last three issues. I have built and tried out each successive circuit, and have had best results using the first one.

On page 11 of current issue you publish a testimonial in which the writer states he used honeycomb coils. I would like to try this out, and would be pleased to have you inform me what values to use.

The reception I get is considerably interfered with owing to the close proximity of my set to high-tension alternating current lines. Could this be remedied without much experimentation, and if so, how?

I am using a two-wire antenna, about 80 feet long, and 35 feet above ground, with about 35 feet of lead-in. My loca-

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 No. 322B—2½ volt, variable, regularly \$2.25..... **\$1.52**  
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**\$6.50** Per Pair Complete | **\$5.00** Per Pair Complete  
 "Red-Heads" sent prepaid on receipt of price if you are unable to get them at your dealer's.  
**THE NEWMAN-STERN COMPANY**  
 Dept. R. D., Newman-Stern Bldg., Cleveland

tion is only about 20 feet above sea-level. Would a single wire help any?

A.—If desired, honeycomb coils of 50 and 50' or 75 and 75 turns for primary and tickler respectively can be used.

It is necessary to build antenna system at right angles to service lines in vicinity. If this method fails to eliminate interference, you can resort to the use of a counterpoise in place of the ground, which will prove most effective. Reconstruction of your present antenna system to that of a single wire, 100 feet in length if possible, will not only be advantageous in the matter of the interference but also adds selectivity of reception.

## Battery Losses

(06246) WDC, Trumanburg, N. Y.

Will you tell me whether leaving the A and B batteries connected after pulling out the jack runs down either battery or not?

A.—No current is consumed from either A or B battery when the filament of tube is turned off. In using filament control jacks, it is, of course, understood that plugging them in turns on, and removing them turns off the tube filament.

**CRYSTALS**—Make them yourself of cheap material obtainable anywhere. Cost fraction of cent each. Easy to make, very sensitive. Immense profits. Get in now. Guaranteed instructions \$1.00. HOME RADIO SHOP, 736 N. St. Francis, Wichita, Kansas.

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# Radio

## Illustrated



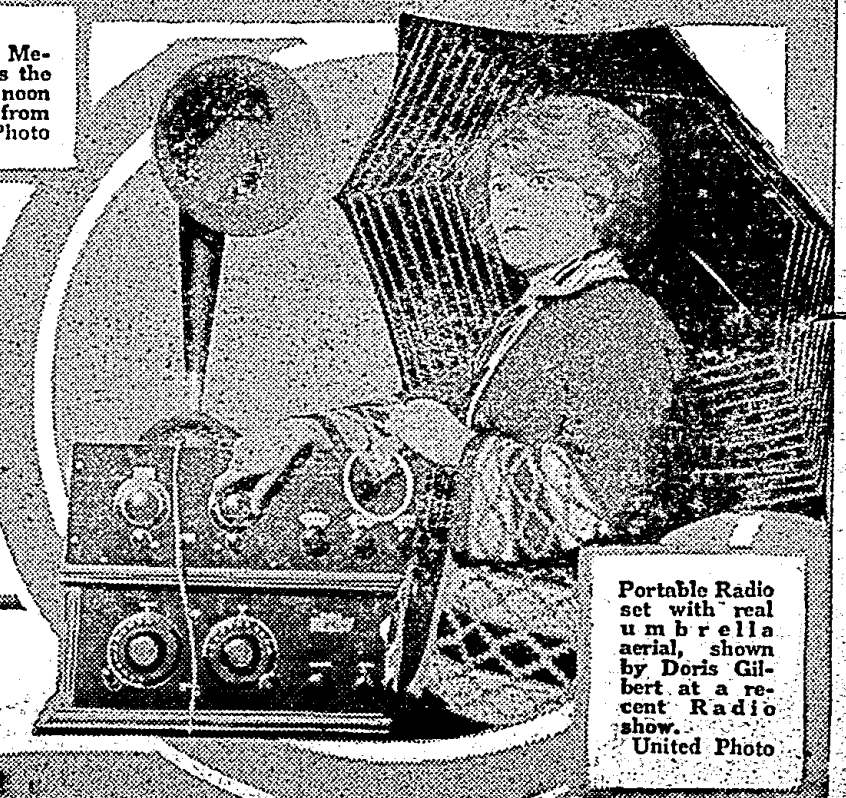
They start them early in Boston, and this little son of that center of culture seems to be very much interested in the program he is receiving, as well he might be, for his native city boasts two of the best broadcasting stations in New England.  
© Keystone



Champion Jack Dempsey has become a Radiophan. Here's wishing him luck in this field too; may he stick to it.  
Keystone Photo



C. J. Waldron, Medusa, N. Y., rings the church bell by noon time signals from WGY. U. & U. Photo



Portable Radio set with real umbrella aerial, shown by Doris Gilbert at a recent Radio show. United Photo