

BEST RADIO PROGRAMS  
AN AMPLIFIER FOR THE GREENE RECEIVER (See Inside)

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January 19

1924

# RADIO

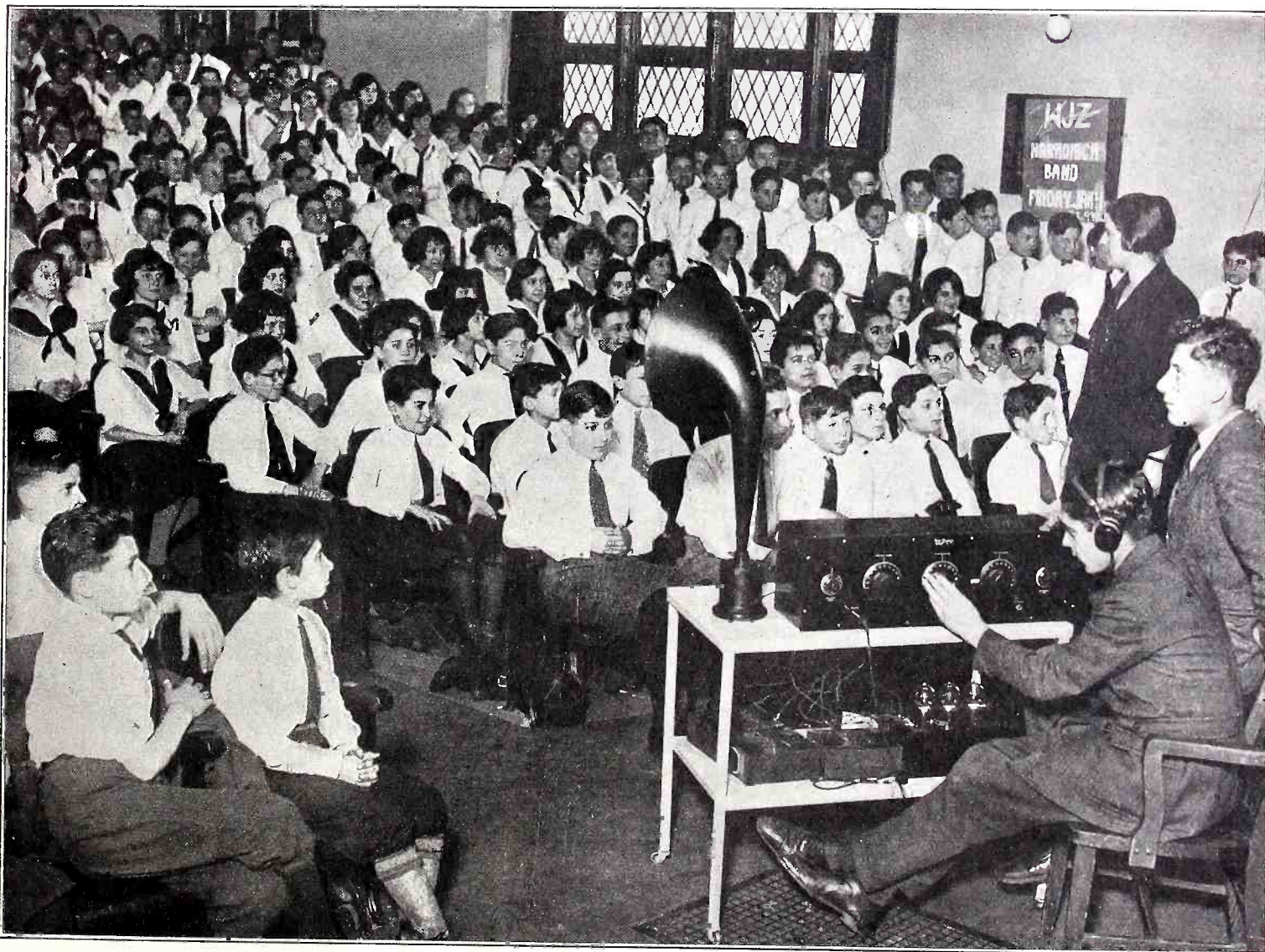
Title Reg. U. S. Pat. Off.

# WORLD

ILLUSTRATED

EVERY WEEK

A MUSIC LESSON BY RADIO IN A NEW YORK CLASSROOM

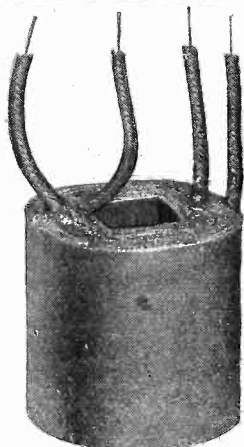


(C. P. & A. Photos)

The illustration above shows a class of pupils in Junior High School 61, New York City, receiving a lesson in music which was broadcast from the Metropolitan Opera House and received in the class room on a loud speaker. Emil Buckwald is operating the receiving set.

SEE RE-RADIATION ANNOUNCEMENT ON PAGE 16

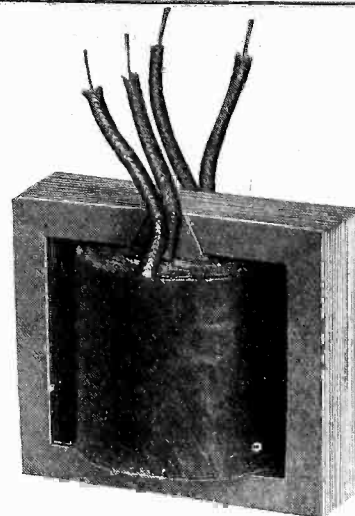
# A Transformer of Real



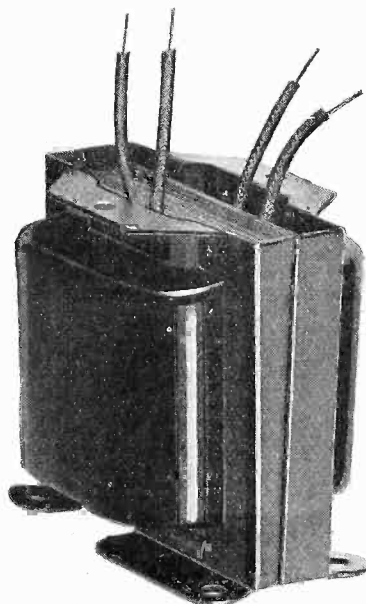
The winding that Kellogg developed, was found to be most efficient for audio frequency transformers. Its problems involved the finding of the proper thickness of paper, the proper kind of insulated wire to provide the proper number of ampere turns, and impedance.

## Merit

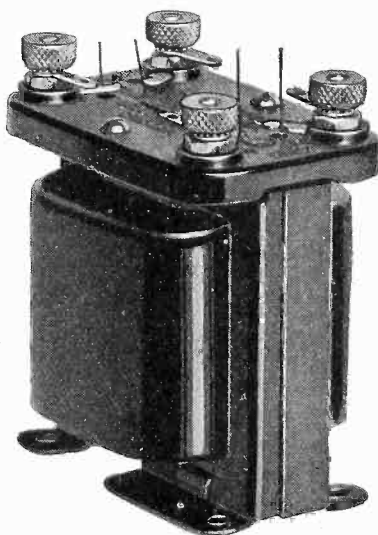
*Amplification  
of Entire  
Musical  
Range  
Free from  
Distortion*



The one-piece laminations of silicon contain no punched holes, which in many other transformers causes eddy currents and losses. The one-piece lamination is exclusively a feature of the Kellogg transformer. It provides an exceptionally true electro-magnetic core.



To correctly shield these transformers that they may be mounted in any position desired without losses, this brass shield was designed. It is so arranged that both sides are interchangeable, locking together at the base. They are finished in a handsome maroon enamel.



The wires extend through the Bakelite top, which affords perfect insulation, and are soldered to the terminals in plain sight, where they may be inspected. This also eliminates any possibility of breakage of transformer leads.



The finished job, of which we are mighty proud. The leads are soldered to tinned terminals, which are under nickel plated nuts over which are placed knurled nuts. Each binding post is plainly marked so that it is impossible to make incorrect connections.



Amplify the pleasure of your radio set by installing Kellogg audio frequency transformers. Second to none in volume, clarity and freedom from distortion.

No. 501—Ratio  $4\frac{1}{2}$  to 1. No. 502—Ratio 3 to 1. Only \$4.50 each

Built and Guaranteed by

## Kellogg Switchboard & Supply Company

1066 West Adams Street, Chicago

# RADIO WORLD

[Entered as second-class matter, March 28, 1922, at the Post Office at New York, N. Y., under the Act of March 3, 1879]

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Vol. IV, No. 17. Whole No. 95

January 19, 1924

15c. per copy, \$6.00 a year

## A Reliable Two-Step Amplifier for the Greene Concert Receiver

By C. White, Consulting Engineer

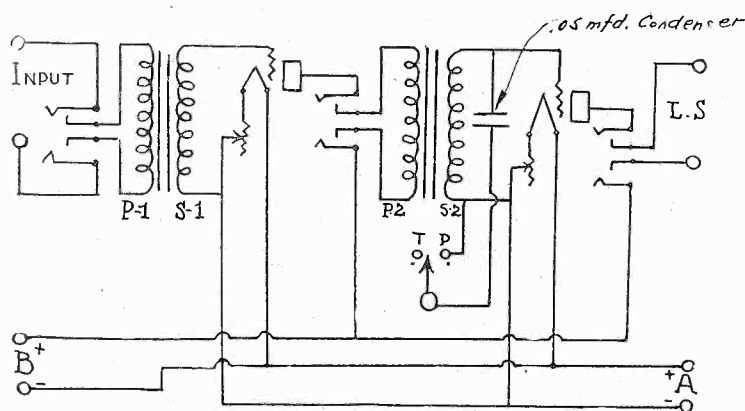


Fig. 1. Circuit diagram of the amplifier to be used with the Greene concert Receiver. Note the switch and condenser across the secondary of the second stage. This eliminates distortion on some stations, yet by the switch you can get the volume that comes without the use of the condenser.

**I**N RADIO WORLD for January 5 I described briefly the construction and operation of the Greene receiver, which represents one of the highest types of regenerative receivers, in that its regenerative action is smooth. In this article I shall endeavor to describe a good two-stage amplifier to go with this unit. This amplifier can also be used with any type of tuner with good results. Many fans who have for the first time completed the construction of a one-tube set for Christmas are now desiring more volume on their phones for distant reception and also good clear loud speaker operation. And, especially for those who are desirous for the first time to make such an amplifier, the constructional drawings herewith will be a great time saver in laying out and drilling the panel. A neat, compact assembly will result if only a little care is exercised to follow the simple instructions.

Recently there has been a lot of talk concerning the ratio of transformation in audio-frequency transformers, but do not be misled by such claims. A good transformer is a good transformer regardless of its ratio, since there are many other factors that go to make a transformer good; such as insulation, care in winding, good core steel, and the proper magnetic circuit. A laboratory test will soon show up a poor transformer which will amplify one frequency to a vastly greater extent than any other. Such a transformer is said to be selective and, since in the reception of music all frequencies must be preserved from 15 to approximately 10,000 cycles per second, a selective audio amplifying transformer will most likely violently distort music and voice. There is no transformer made that will amplify to the same extent all frequencies from 15

to 10,000, but there are some which overcome this fault and do present as near true tone amplification as it is possible for the average ear to detect.

The actual wiring of a two-stage amplifier is really very simple; the big job is drilling the panel and laying out the apparatus. Fig. 1 shows clearly the actual electrical connections involved, and Fig. 2 illustrates the arrangement of the apparatus and the electrical bus wiring. The general relation of the panel front to the assembled amplifier is shown in Fig. 3. In order to save time in panel drilling the plan of the drilling is given in Fig. 4 and it is advised that you purchase your panel and take it to a machine shop and have it drilled in accordance with this plan unless you are equipped for such a job at home. The construction of the supporting bracket for the transformers and tube sockets is given in Fig. 5. It is now possible to purchase strips of sheet metal, either brass or aluminum, already bent in a shape which will serve the purpose just as well. In fact, many radio dealers now are carrying in stock, completely assembled, the two transformer units, including the transformer, socket and rheostat, all mounted on the type of supporting shelf shown in

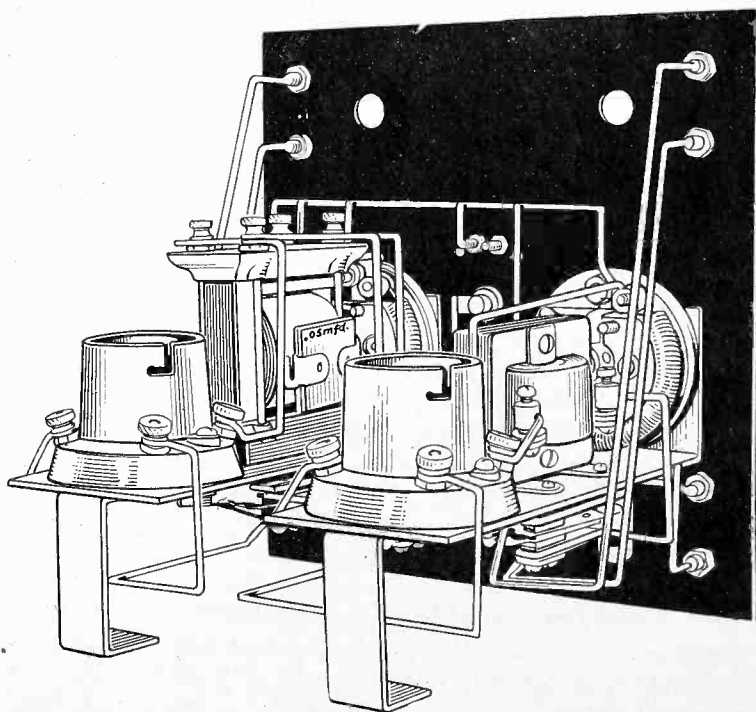


Fig. 2. Back panel view of the completed Greene amplifier. Note the manner in which the sockets, transformers and rheostats are mounted to save space and eliminate the heretofore necessary baseboard.

Fig. 5. Therefore, you can minimize the actual work connected with the assembly by buying these units which sell for only a trifle more than the cost of the parts separately. The complete parts needed for this amplifier are:

1—Panel, 8" x 8" x 1/4".....	\$2.00	(Radion)
3—Telephone Jacks.....	2.40	(Double circuit)
2—Rheostats .....	3.00	(25 ohms)
2—Tube sockets.....	2.00	(Lively contacts)
2—Audio Transformers.....	10.00	(Standard make)
1—.05 mfd. condenser.....	.50	(See following)
2—Metal supports.....	1.00	(See Fig. 5)
—Screws, wire, etc.....	1.60	

Total (without cabinet) ..\$22.50 (Not including tubes & batteries)

The prices quoted above are list prices on standard apparatus, and you can rest assured that \$22.50 will be the maximum price.

Returning to the diagram of the amplifier as shown in Fig. 1 there is only one point wherein this amplifier differs from standard construction practice. That is in the use of a rather high capacity condenser across the secondary of the second audio-frequency amplifying transformer (P-2:S-2). A switch arm mounted on the front of the panel allows the operator to choose whether

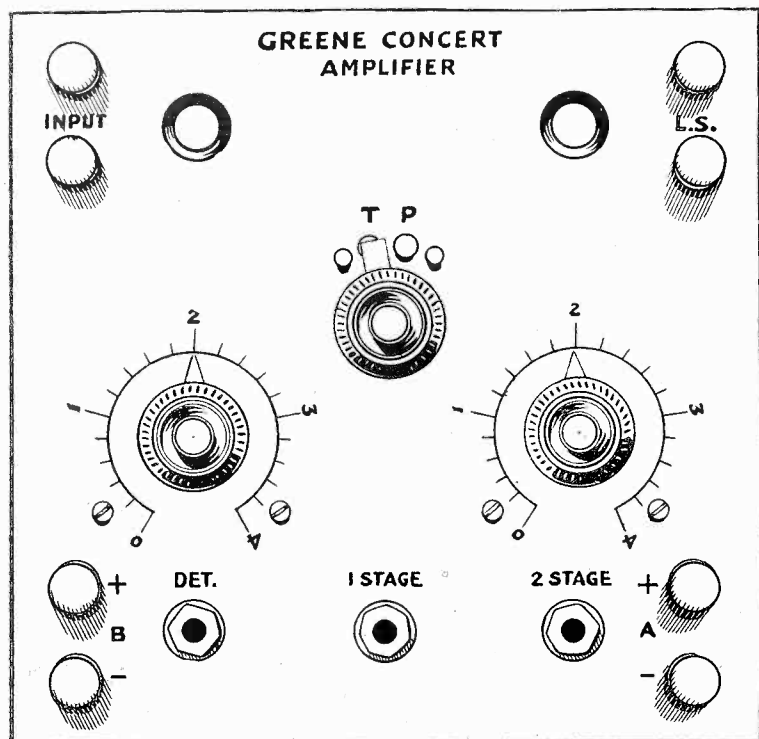


Fig. 3. Front panel view of the Greene amplifier. It is well balanced and can be used on any receiver. The switch for the condenser across the secondary is located directly in the center of the panel, between the two rheostats.

this condenser be shunted across the winding S-2 or be thrown completely out of the circuit. By placing the switch on the tap marked T the condenser is not connected in the secondary circuit, and by placing the switch arm on the tap P the .05 mfd. condenser is electrically in the circuit. This condenser is a special paper insulated telephone type having a capacity of .05 mfd., made by the Federal Tel. & Tel. Co.

In the first part of this article it was mentioned that an ideal transformer for audio-frequency amplification would be one that would amplify all frequencies of music to the same relative extent. But such a transformer is not quite possible since all transformers have a slight tendency to highly amplify the high frequency notes and neglect to properly amplify the very low frequency notes. This defect has been especially noticeable when a second stage of amplification is tried with some transformers, the results being a tin-pan sounding reproduction. The .05 shunting condenser automatically cuts down the amplification of the high

frequency notes while the low frequency notes are allowed to pass on undiminished in amplitude. This produces a nice evening up of the tone train, thus killing the tin-pan sound of the music, and at the same time giving a full tone rounding sound owing to the preservation of the relative magnitude of the various frequencies composed in the music.

Although it is possible to operate this amplifier from the same common "A" and "B" batteries that are employed with the detector unit, I deem it most advisable

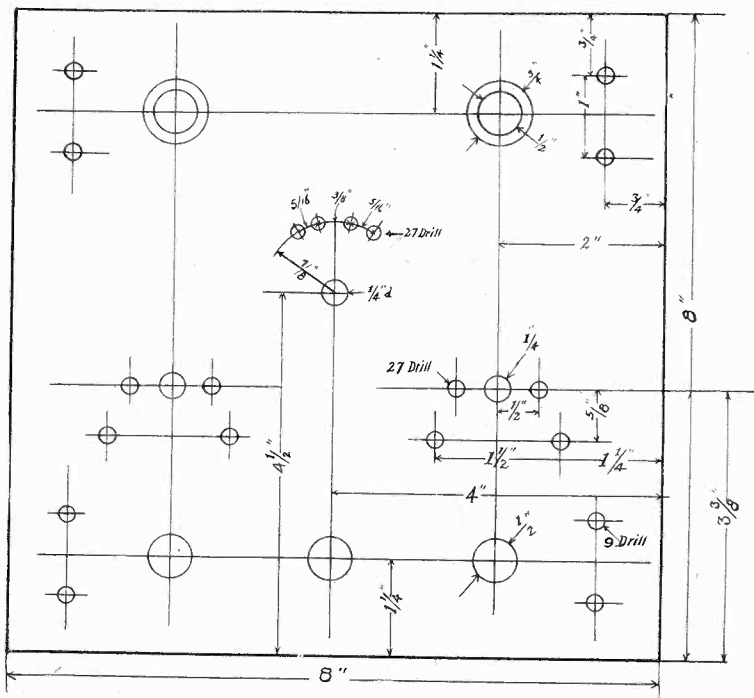


Fig. 4. Panel layout with all dimensions given. This makes a very fine looking panel, and if finished off carefully will give a unit amplifier that is extremely handsome as well as efficient.

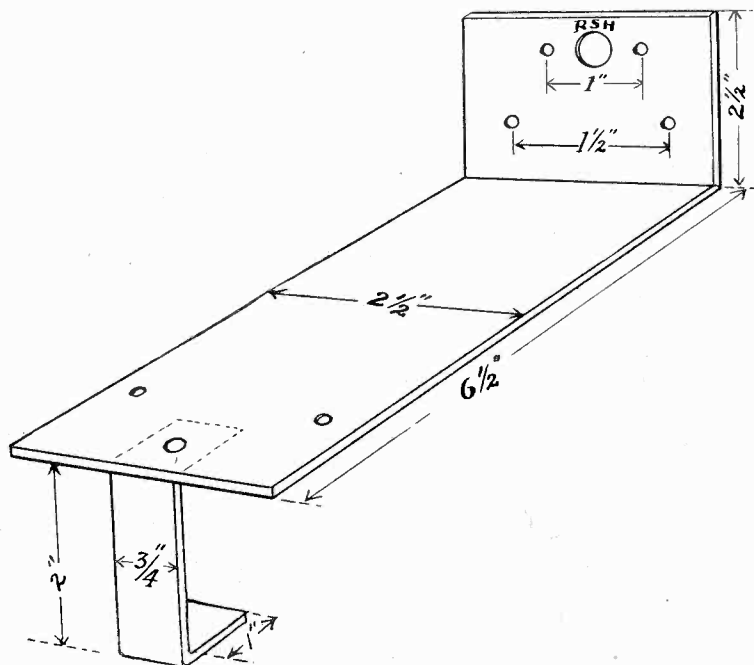


Fig. 5. View of the mounting for the sockets, transformers and rheostat, with all dimensions accurately marked. It should be made of fairly heavy sheet brass or copper.

to operate on a separate set of batteries completely, if it be economically feasible to accomplish the same. This will not only mean sharper tuning, but will mean less extraneous noise and better quality. The cost of separate "B" batteries is not prohibitive since the detector tube generally requires only one 22 1/2 volt block for operation, but the cost of separate storage "A" batteries would entail quite a heavy initial and maintenance charge. To overcome this strong obstacle, I would recommend that the dry cell UV199 or C229 tube be used as a detector.



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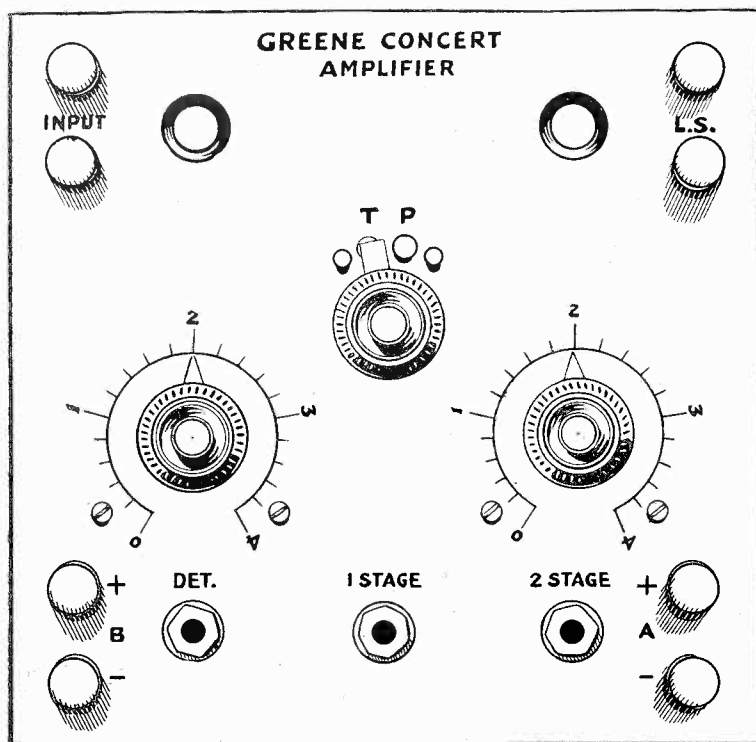


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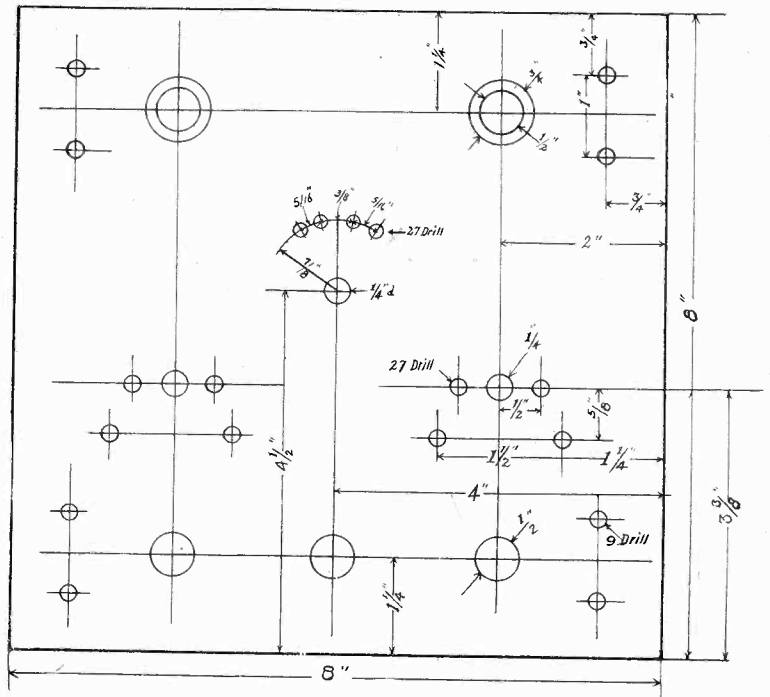


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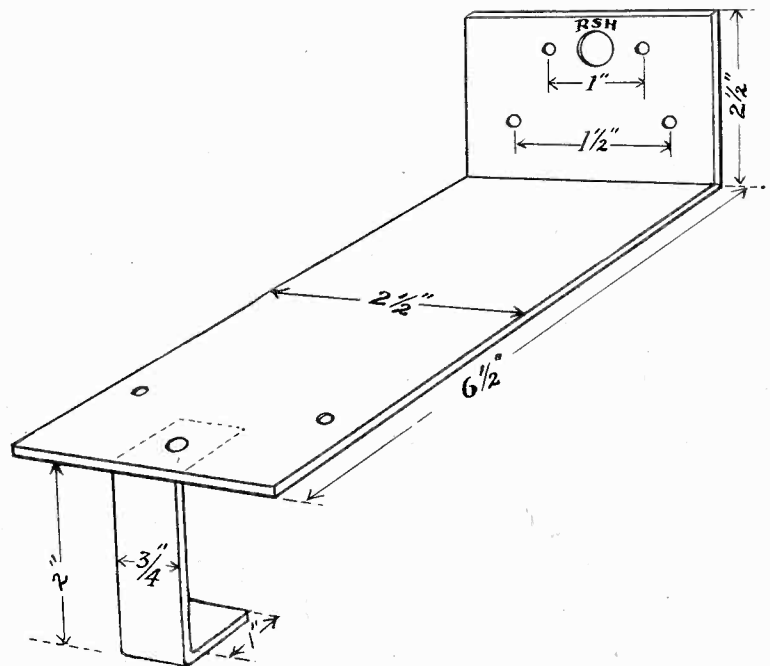


Fig. 5. View of the mounting for the sockets, transformers and rheostat, with all dimensions accurately marked. It should be made of fairly heavy sheet brass or copper.

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# Amplification with the Crystal Detector

By Leroy Western

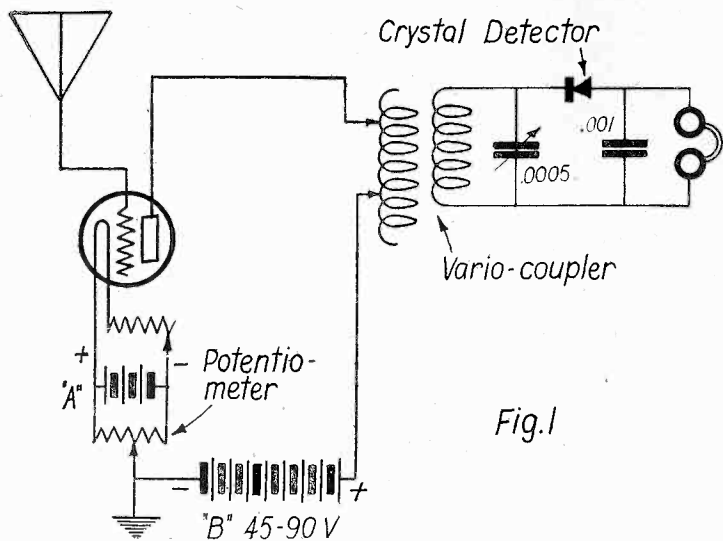


Fig. 1

Fig. 1. One stage of radio-frequency in the form of an untuned vacuum tube circuit, with the tuning being done in the immediate detector circuit. This gives the "common crystal detector" a much greater range.

SINCE the vacuum tube has of late come into a very general use, the crystal detector has practically been discarded for all general purposes where long distance reception or loud signals are desired. This is not as it should be. The vacuum tube detector is a comparatively poor rectifier when it comes to quality of the received signals, although of course it makes them much louder. The crystal detector, in any one of its many forms, will give much clearer and better signals. For this latter reason, the experimenter will find it well worth while to try out one or more of the circuit diagrams illustrated herewith, and the writer assures him that he will be repaid for his trouble.

Before describing the circuits it would be well to mention a few of the crystal detectors which will give good results. Galena, of course, is very sensitive, but has the one drawback of not being very stable in adjustment, as a very fine cat whisker with a slight pressure must be used. However, in the circuits shown in Fig. 1 or Fig. 2 it will give very satisfactory results.

Silicon, which must be of the fused type, may be used to great advantage when the contact is made to it with a sharp point and a fairly heavy pressure. Phonograph needles make a very good contact point for silicon. Carborundum, a product of the electric furnace, is exceedingly stable in adjustment and when a good piece is found, rectifies very well. The bright, grayish-blue crystals usually give the best results. When this material is used, it is well to use several sharp points in simultaneous contact with the surface. Here, again, old phonograph needles will be found very satisfactory.

Another form of detector which combines ruggedness with sensitiveness is that known as the Perikon. This consists of two crystals in contact with each other. They are copper pyrites and zincite. Almost all copper pyrites crystals are sensitive when used in this connection, so only one need be mounted. In the opposing cup, several crystals of zincite should be placed, as they vary somewhat in their detecting qualities.

Another mineral which is not very well known, but which can be obtained fairly readily and which will give

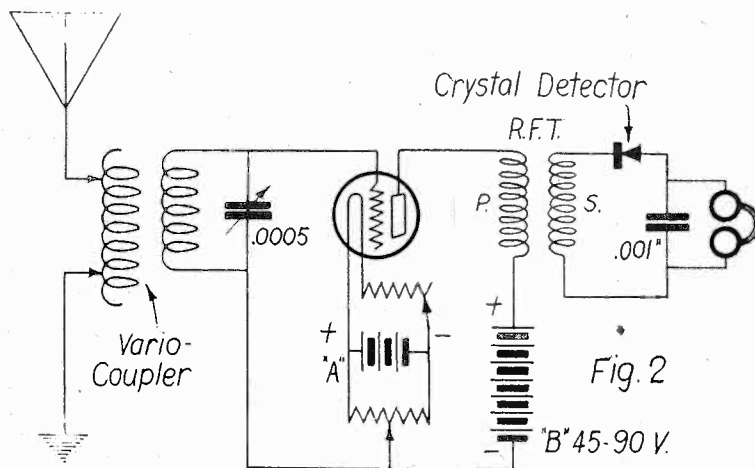


Fig. 2

Fig. 2. A more efficient form of the circuit shown in Fig. 1, but with the tuning done in the tube circuit and a transformer used to step up the signals in the detector circuit.

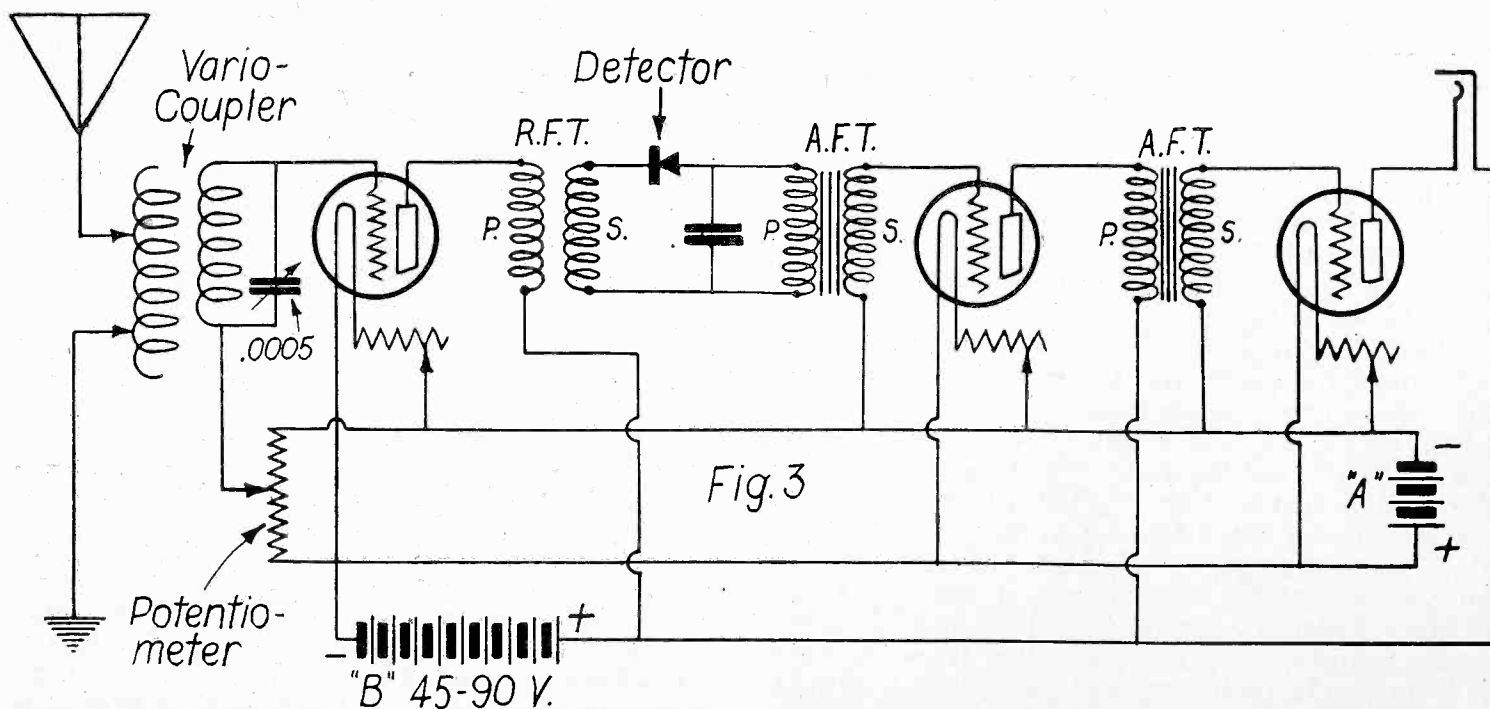


Fig. 3

Fig. 3. A three-tube circuit for fine results. It uses one stage of radio-frequency amplification, crystal detector and two stages of audio-frequency. For better results the condenser in the crystal detector circuit should be variable. Synthetic crystals give good results if a good one is used.

good results under all conditions is that called molybdenite. It resembles very much several layers of lead foil compressed together and in fact the layers can be separated easily. This substance is usually placed between two flat surfaces and tightly compressed, although occasionally a point may be used with good results.

Aside from the crystals mentioned there are, of course, the many synthetic types which have recently found their way into the American market. Any can be satisfactorily used in all circuits, although it has been found that they deteriorate considerably during use. In any event, after a crystal detector has been exposed to the air for a considerable length of time, the surface should be washed with carbon bisulphide or alcohol and allowed to dry. Another point to remember in the use of crystals is not to handle them excessively, as the natural oil of the skin will quickly coat the sensitive surfaces and render the crystals useless until they are washed. Whenever crystals are mounted, solder must not be used, but an alloy fusing at a low temperature should be employed. This metal can be obtained at any radio supply store.

Considering Fig. 1, we find a rather unusual type of radio receiving set, inasmuch as the amplifying vacuum tube is connected directly to the antenna without any tuning device whatsoever. In this circuit it is found that the tube amplifies all incoming signals, which are then tuned by the variocoupler so that the one desired may be selected. In this case, a standard variocoupler of ample size to tune to all the desired wave lengths may be used. In some cases, where the primary is too small for this work, it will be found an advantage to shunt a .0005 mfd. variable condenser across the primary or stator. This will bring up the wave length considerably. When this latter trick is used, a .001 mfd. condenser should be substituted for the one shown in parallel with the rotor. In the circuit shown in Fig. 1, any standard type of amplifying tube may be used. The UV199 dry cell tube will give excellent results, as it is a very good radio-frequency amplifier. The potentiometer is not always necessary in this circuit, but should be tried so that the most efficient results will be found.

In case the experimenter has a radio-frequency ampli-

fying transformer on hand that he may desire to try in connection with a crystal detector, he will find a diagram for the same in Fig. 2. Here a variocoupler is used to tune the antenna circuit and the rotor is connected directly to the radio-frequency amplifying tube. The variable condenser tunes the secondary circuit.

Any standard form of radio-frequency amplifying transformer will give good results in this circuit, but it must be designed to cover the band of wave lengths which can be tuned in with the variocoupler. Some of the transformers on the market to-day are very inefficient in this respect, as they do not begin to cover the band their makers claim for them. It may be necessary to try two or three different radio-frequency transformers before the correct one is hit upon, but when once found and placed in use as shown in Fig. 2, a set will be had which will combine DX reception equal to, and in most cases greater than, that found in an ordinary one-tube set, with the addition that the received signals will be much clearer and free from the distortion usually found when a vacuum tube detector is used.

For an all-round set which will receive over fairly long distances and give good results on a loud speaker, the circuit shown in Fig. 3 should be employed. This makes use of one stage of radio-frequency amplification, a crystal detector and two stages of audio-frequency amplification. A single circuit jack is shown in the last stage of audio-frequency, as most amateurs will desire to use this set complete as shown. With this single circuit jack either a loud speaker or a pair of phones may be plugged into the circuit. The phones should be used in the "wee small hours" of the morning when DX reception is being tried for. The loud speaker can be plugged in when stations within a radius of 1,000 miles are transmitting and it is desired to listen in to their programs.

It is not advisable to use the so-called fixed or permanent detectors in any of these circuits, as in the writer's experience they have not given satisfactory results when used in connection with vacuum tubes. A detector should always be used which can withstand a fairly strong amount of current, as the received signals will be built up to quite a degree by the radio-frequency amplifier.

## Conference to Minimize Spark Interference Held in New York City

**A**RTHUR BATCHELLOR, Radio Supervisor, Second District, called a conference which met on January 11, in Room 328, Custom House, New York City, to consider the interference due to commercial and Government spark stations using the 450 meter wave length for commercial traffic.

Representatives of many of the broadcasting companies, commercial radio telegraph companies, the Canadian Marconi Co., the British Marconi Co., and C. P. Edwards, of the Canadian Department of Marine and Fisheries, and members of the press were present. It was stated that although the broadcasting regulations permit the use of the 450 meter wave for traffic during certain periods, that the use of this wave during the broadcasting hours had been prohibited except on certain occasions. Abandoning this traffic on that wave length was discussed and several suggestions for the general improvement of the situation were called to attention, such as a much wider use of CW instead of the spark, and also the handling of all messages on higher wave lengths.

According to Mr. Batchellor, broadcasting has nearly reached the saturation point, and is now on a firm basis. Interference that was tolerated some months ago can not be permitted now. Immediate action was promised and the near future will see the most efficacious suggestions acted upon in a manner that will remove all interference now being experienced from that source.

## Radio World's Complete List of Broadcasting Stations

In **RADIO WORLD** of January 5th and 12th appeared a complete list of the broadcasting stations of the United States, Canada, Cuba, and Porto Rico, corrected to January 1, 1924.

In our next week's issue, dated January 26, this list will be republished and corrected to the time of going to press.

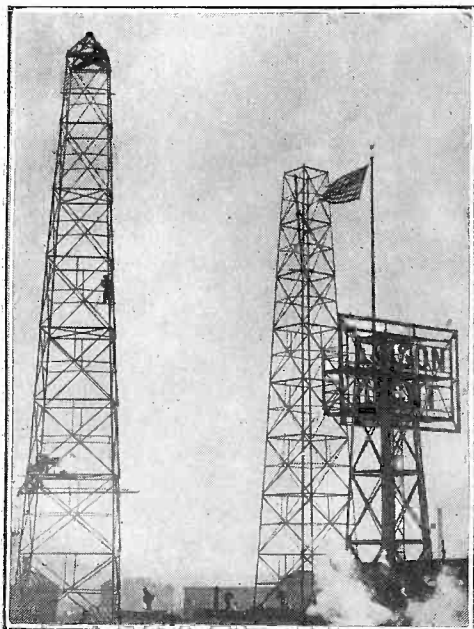
Order next week's issue in advance, and thus be sure of getting the most up-to-date list of broadcasters.



### Amateur Radio Connects Neah Bay to Mainland During Storm

**S**POKANE, WASH.—While the waves sweeping to shore in the teeth of a terrific storm on the northwest Pacific coast were gradually eating away the underpinnings of a cannery located in a lonely stretch of woods at Neah Bay, A. A. McCue, superintendent of the Neah Bay Branch of the Northwestern Fisheries Co., using an amateur radio telegraph station, sought help from the company's main office at Seattle through an amateur radio station in this city.

His urgent call addressed to his father, P. H. McCue, general manager and vice-president of the fisheries, was received here and relayed by way of the Western Union by



(C. International Newsreel)  
Two enormous steel radio towers being erected on the Edison Building, Boston, Mass. These people will erect and maintain one of the largest broadcasting stations in the Eastern part of the United States, supplying the fans with a good variety of fine programs.

another amateur, Carlos Yerian of this city. The scene at Yerian's station, 7GI, from the moment that he caught the first call is graphically described by F. M. Curtis.

"Huh, that's a new one on me," muttered 7GI to himself as he turned on the filaments of his two five-watters preparatory to answering 7IP's (McCue's) general inquiry, which was liberally sprinkled with the word urgent. "Wonder who this bird is anyway? Don't remember hearing his call before. Well, here is where we get acquainted." 7IP, 7IP, 7IP de 7GI, 7GI, 7GI, QRA? QTC? k.

"GM OM QRA, Neah Bay, Wash." came the answer, "vy urgent, bad storm here—all communication cut off. Must get mainland.

"Hr nrl fm A. A. McCue, Neah Bay, Wash. to P. H. McCue, North-



(C. Foto Topics)  
Ann Pennington, of the Ziegfeld Follies, who is conducting a little DX campaign of her own, listening in in the "wee sma' hours" on her new receiver that Santa left on the evening of December 24, 1923. Because of the fact that the steam went down, the fur coat was a necessary adjunct during the recent cold spell.

western Fisheries Co., Seattle, Wash." There followed a long message, giving in detail a description of the damage which was being caused by the storm, added to which was a note saying that the batteries supplying current to the transmitter were giving out.

From his little shack in this city, 7GI joined Neah Bay to the rest of the world and again gave amateur radio a chance to prove its value in an emergency. The message was forwarded immediately.

### Argentina Radio Demand Increasing

**I**NTEREST in radio is active and is increasing in Argentina, according to cable advices from Trade Commissioner Brady at Buenos Aires. The "estancias" in the country districts are asking for the larger types of receiving sets to enable them to listen in on the broadcasting from Buenos Aires.

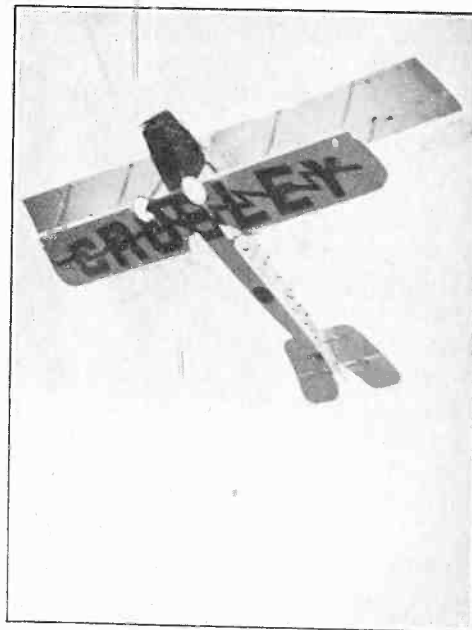


(C. Underwood and Underwood)  
Edward W. Bok, of Philadelphia, retired editor and donor of the famous "Bok Peace Award," broadcasting from WEAJ the winning plan in his \$100,000 prize competition. His speech was broadcast by several stations of the Bell system.

### Mexican Radio Regulations

**I**N Mexico permits are required for erecting transmitting stations, and listeners-in are required to keep "mum" when government messages are heard.

Operation of radio receiving sets in Mexico is still governed by the provisions of the decree of 1916, according to the Mexican Secretary of Communications, says Assistant Trade Commissioner H. B. MacKenzie. A permit must be secured from the Department of Communications before the station can be established, a penalty of 500 to 1,000 pesos and from 1 to 11 months' imprisonment being provided for violation of this requirement. Provision is also made for the punishment of persons who, hearing a trans-



To fittingly celebrate the twentieth anniversary of the flight of the first airplane, the Crosley Mfg. Co., Cincinnati, sent aloft a plane equipped with a high power receiver and loud speaker with power amplifier. While it was hundreds of feet up in the air, it gave the people a radio program from the Crosley station, WLW.

mitted message of the government, disclose it.

### Naval Radio Men Must Be Typists

**M**ODERN radio methods are employed in the Naval Radio Central at Washington, and nine radio men, who recently reported for service with the fleet, found that they had to learn to type messages. Although these men passed speed and accuracy tests of 18 or 19 words in code and 22 to 23 words in plain English, not one of them could copy on a typewriter, believing that the old pencil and paper method was still used. They were soon disillusioned, and set to work learning the standard keyboard so that they could typewrite messages.

# Why Some Receiving Tuners Are Not Selective

By John V. L. Hogan

CONTINUING his popular series of radio talks through station WEAF, New York City, John V. L. Hogan, past president of the Institute of Radio Engineers, recently made an address on the above subject during which he said:

"The coils and condensers in a radio receiver are used to get the effects of electrical tuning, so that the signals arriving at some desired wave frequency can be selected from interfering signals carried by waves of other frequencies. By properly adjusting a variable condenser or a variable inductor (which is the engineering name for a coil) you can cause its circuit to become an easy path for currents produced by the WEAF waves of 610 kilocycles frequency, for example, and at the same time a hard road for currents of other frequencies to traverse. A different setting of the condenser or inductor dial or switch will permit currents of WOR's frequency, 740 kilocycles, to flow easily, and similarly other adjustments correspond to the wave frequencies of other stations.

"The variation of condensers and inductors in a radio set corresponds fairly well to changing the tension and weight of a piano string. Such an adjustment by changing the tuning, changes what is called the 'natural frequency' of the radio tuner or the musical string. This natural frequency is at the rate of vibration which is the easiest for the tuned system. If we tune a piano string to the frequency of 256 cycles per second, which is the pitch of middle C, it will give off a note of that frequency whenever it is disturbed or struck. That happens because tuning the string to 256 cycles is nothing more than making its natural frequency 256 cycles, so that its easiest or natural rate of vibration is 256 cycles per second.

"The most interesting thing about this adjusting of natural frequencies is that it works both ways. Not only does a musical string give off a note of its natural frequency when it is strongly struck or plucked, but it will pick up and start vibrating in resonance with a separately-produced sound of its natural frequency. If you tune two strings of a guitar to the same note, that is, so that they have the same natural frequency, you can make a simple experiment to demonstrate this. Pluck one of the two strings and immediately stop it from vibrating by putting your finger on it; you will then find that the second string has picked up the vibrations of the first and is carrying them on, as you can readily prove by touching the second string with your finger and noting that the sound stops. If you try this experiment with the second string a little out of tune from the first, that is with a somewhat different natural frequency, you will find that the second string does not pick up the vibrations of the first. Of course, that is because the natural frequency of the second or 'receiving' string is then not the same as the sound frequency of the first or 'sending' string.

"You may wonder what this has to do with radio. It is not hard to see how the first string may be compared to a radio sending station, and how the sound waves which the string gives off are in one sense like the radio waves sent out by the radio transmitter. In this same sense, then, the second guitar string is like a tuned radio receiver. This analogy may be clearer

to you if we trace it step by step, so let us consider the sound waves first:

"When the first guitar string is plucked, it vibrates at its natural frequency and produces sound waves of that same frequency. The sound vibrations travel to the second string, if this second string is tuned to the original frequency the arriving waves will set it into resonant vibration at their own frequency. If the natural frequency of the second string is not the same as that of the arriving waves, it will respond relatively feebly or not at all.

"Now for the analogous radio case: When the radio transmitter is operated, it oscillates at its characteristic frequency and produces radio waves of that same frequency. The radio waves travel to the radio receiver; if the receiver is tuned to the original frequency the arriving waves will set it into resonant vibration at their own frequency. If the natural or tuned frequency of the receiver is not the same as that of the arriving waves, it will respond relatively feebly or not at all.

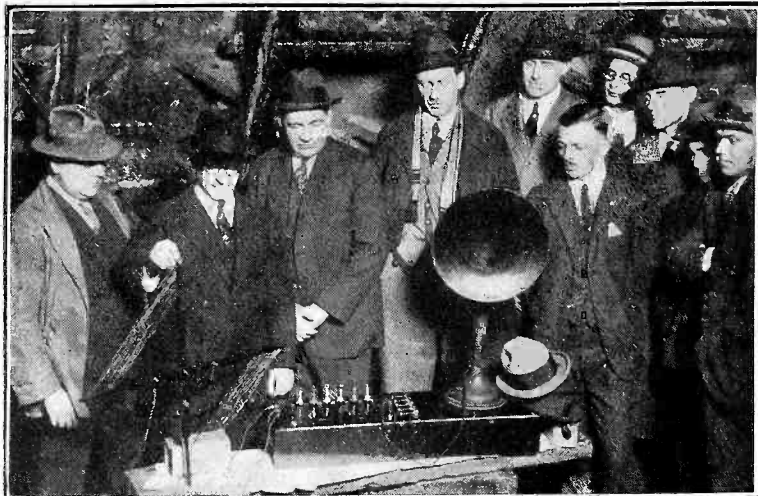
"Thus we have a simple acoustic or musical example of what tuning is and how it can be used to select wave-vibrations of any desired frequency. The principles are the same as those that underlie radio tuning, the only differences being in the details. Sound waves are mechanical and usually occur in air, they are of audible frequencies, or say between 16 cycles and 16,000 cycles per second. Radio waves are electrical and travel through space, not requiring even air to carry them. Their frequencies are ordinarily so high that they cannot be heard directly, or say from 10 or 15 kilocycles on up to thousands of kilocycles.

"The question that naturally comes up now is why, if the musical string will respond resonantly only to a wave of its own frequency, a radio receiver will respond to waves of frequencies different from the one to which it is tuned. We all know that the unfortunate fact is that many radio receivers do bring in interference; a good many of you who are listening to me now are at the same time hearing interfering signals that are carried to you on waves having frequencies quite different from WEAF's value of 610 kilocycles. Yet it is fair to assume that all your receivers are tuned to 610 kilocycles.

"The answer to that question lies in what I called the 'pitch-sense' or selectivity of the receiver. Some receivers are capable of selecting a relatively narrow group of wave frequencies centering about a single definite value; others let in many wave-frequencies in addition to the one which is desired. For instance, a good receiver tuned to 610 kilocycles will admit practically nothing from waves of 600 kilocycles or 620 kilocycles (which are respectively 10 kilocycles below and above the central or resonant value of 610 kilocycles). On the other hand, a poorly selective receiver that is tuned to 610 kilocycles may also admit current from waves as much as 100 kilocycles below and above the resonant value or from 510 to 710 kilocycles. As you can easily see, such a receiver when tuned to WEAF might also pick up signals from WJZ on 660 kilocycles although it would probably exclude interference from WOR on 740 kilocycles."

# RADIOGRAMS

WORLD NEWS HAPPENINGS BRIEFLY PHRASED FOR OUR BUSY READERS



(C. Photonews)

A test was recently made, in the New York Vehicular tunnel now being constructed under the Hudson River, to determine if radio signals would penetrate a solid steel structure many feet under the river's bed. To the surprise of G. Y. Allen, well known radio engineer, and many other radio experts signals were received on a six-tube loop receiver with remarkable volume, and the loop retained its directional effects in part.

What is needed to make life both compact and comfortable is a combination radio set and folding bed.—New York Tribune.

Alexandre Gustave Eiffel, builder of the Eiffel Tower for the Paris Exposition in 1889, died recently in his ninety-second year. The tower was 984 feet high, and for several years past has been used as a radio broadcasting station.

As the result of an arrangement just completed between La Presse, the Montreal French daily, the Mount Royal Hotel and the Marconi Wireless Company of Canada, the wonderful dance music of the Mount Royal Hotel orchestra will be broadcast hereafter through La Presse station, CKAC.

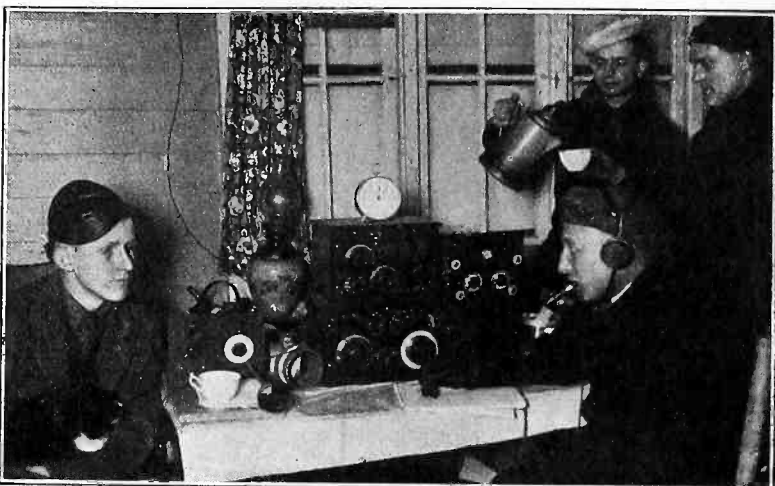
The audience at the Republican National Convention in Cleveland next June is going to be the largest ever to hear proceedings for the selection of a Presidential candidate. Cleveland's Public Hall seats 12,000 to 14,000 and Lincoln G. Dickey, manager, plans a special radio installation to pick up and broadcast every word of the debate.

Angelo Stabile, a wireless operator in the Italian Navy, fell 400 feet from the antenna atop a local station at Rome, but was not seriously hurt. He crashed into the network of supporting wires on which he hung suspended until workmen who rushed to his assistance carried him below. Once on the ground, Stabile was able to walk to a hospital.



(C. Kadel and Herbert)

Miss Helen Dickinson, (seated on the table) got so annoyed at having her programs spoiled by hearing a bunch of "squeals and howls" that she started propaganda of her own, rounded up the radio fans of her neighborhood and made them sign the pledge as shown above. Then she gave all the signers a lecture on how to properly operate their receivers and now reports peace and quiet all night.



(C. Foto Topics)

Members of the Bronx Radio Club, including the one-eyed cat that they rub for luck, sitting in their bungalow at Rockaway Point trying to get English stations. They use a specially erected 600 foot Beverage antenna, and either a Reinartz circuit with one stage of amplification or a three coil honeycomb with one or two stages of audio-frequency amplification. However, the most important adjunct thus far has proved to be the constantly boiling coffee pot, which helps them keep their eyes open.

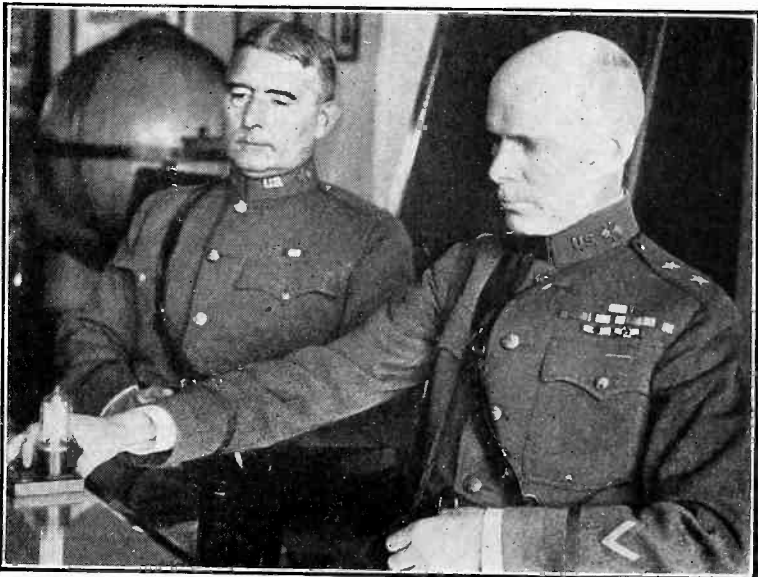
Joseph Fairhall, an amateur radio operator of Danville, Ill., recently assisted police officers in apprehending a murderer by turning over his station to the service of the authorities.

Guy E. Tripp, chairman of the board of the Westinghouse Electric and Manufacturing Company, has left Japan and is on his way to Marseilles, France, via Singapore. He is expected to arrive at Marseilles on January 27.

Lieut. E. M. Webster, Coast Guard, has been appointed to succeed L. J. Heath, of the Public Health Service, as the representative of the Treasury Department on the Interdepartmental Radio Advisory Committee at Washington.

Charles Bell Pearson, of Brooklyn, N. Y., who is older than telegraphy and sang campaign songs for Daniel Webster, recently celebrated his 100th birthday. He has not the slightest difficulty in remembering the first telephone and often listens in on the broadcasting stations with his radio receiver.

Having smoothed out the details of operation through programs broadcast under its test call letters of 2XB, station WEAJ of the American Telephone and Telegraph Company, New York City, came on the air last week for the first time with its new and extremely powerful transmitter, which will supersede the older one so well known to fans all over the country. The new transmitter certainly overpowers many other and weaker stations.



(C. Harris & Ewing)

Major General George O. Squier, who retired after 40 years of service, seated with Col. Charles McK. Saltzman, who succeeds him, assuming the title of Chief Signal Officer with the rank of Major General. It was through the unflinching efforts of Major General George O. Squier that radio attained the importance that it now holds in the army, due to the efficiency that he inculcated.

# The Ultradyne—A Reliable Tuned Radio Frequency Receiver

By Byrt C. Caldwell

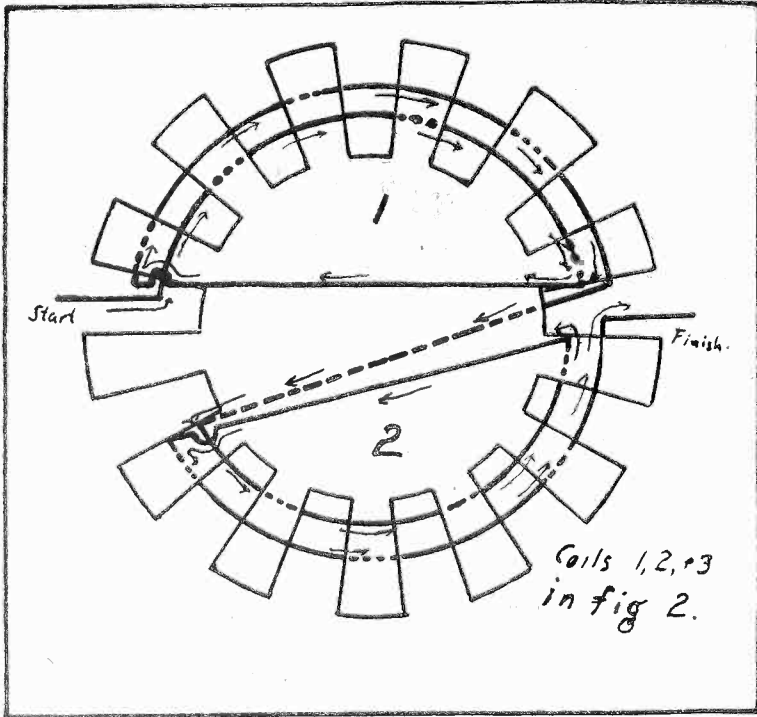


Fig. 1. The former upon which the coils for the radio-frequency circuits are wound, and the method of winding them. Both primary and secondaries are wound on similar forms, the tuning being accomplished by means of condensers in the grid circuits.

that the plate circuits of such an amplifier are resonant. In such circuits, potentiometers are used to stop oscillation. The potentiometer makes it possible to change the grid potential from negative to positive. When oscillations are started, the potentiometer is varied till the oscillations are controlled. In a tuned radio-frequency amplifier, the tuning would be far too complicated if both plate and grid circuits were tuned, and so the primaries of the transformers are made aperiodic. That is, a small number of turns are used, so that the resonant frequency is greater than that of any signal which is likely to be amplified. From this we see that, as the plate circuits of the tuned R.F. amplifiers are aperiodic, the feed-back, due to the capacity of the tube is very small. By using the new UV199 and C299 tubes, which have a very small internal capacity, we should think that neutralizing condensers and potentiometers would be necessary to control oscillation. Such, however, does not seem to be the case. The only explanation, then, for the oscillations, is that there is coupling between the coils of the different radio frequency transformers. The remedy, obviously, is to eliminate the coupling between the transformers. With ordinary solenoid coils, this is an impossibility. By placing them as directed for the neutrodyne, the coupling is reduced to a minimum for that type of coil. But as there is still some feed back which must be neutralized, it is clear that the set is not working at maximum efficiency, for energy is required to neutralize the positive feed-back.

**W**HEN the neutrodyne receiver was introduced a short time ago, it was heralded as the greatest advance in radio in years. On examination, however, we find that the neutrodyne is nothing but the old familiar tuned radio amplifier circuit with the addition of the small neutralizing condensers to neutralize the tube capacity.

Fig. 1 shows the construction of a coil which the writer designed. It is a combination of the spiderweb winding with D-coil winding. D-coils have a closed magnetic field, unlike solenoid coils, and therefore the coupling between two which are separated but a short distance, is almost negligible. These coils can now be bought ready made, but they may be wound by closely following the diagram.

In an ordinary tuned radio-frequency amplifier, the set oscillates whenever it is tuned to resonance. Hazeltine overcame this tendency to oscillate by adding the small condensers, which cause a negative feed back, which in turn neutralizes the positive feed back due to the capacity between the elements of the tube.

It will be noticed that the coil is wound the same as the ordinary spiderweb coil for about half a turn, and is then brought across the coil, and started over again. Thirty turns are wound on the section marked 1, and then the wire is brought across the coil to the other half marked 2, and 30 more turns are wound here, in the opposite direction. This is the secondary.

The trouble in all radio-frequency amplifiers is due to the tendency toward oscillation. In transformer coupled amplifiers, using iron core transformers, this tendency to oscillate is rather strong, due to the fact

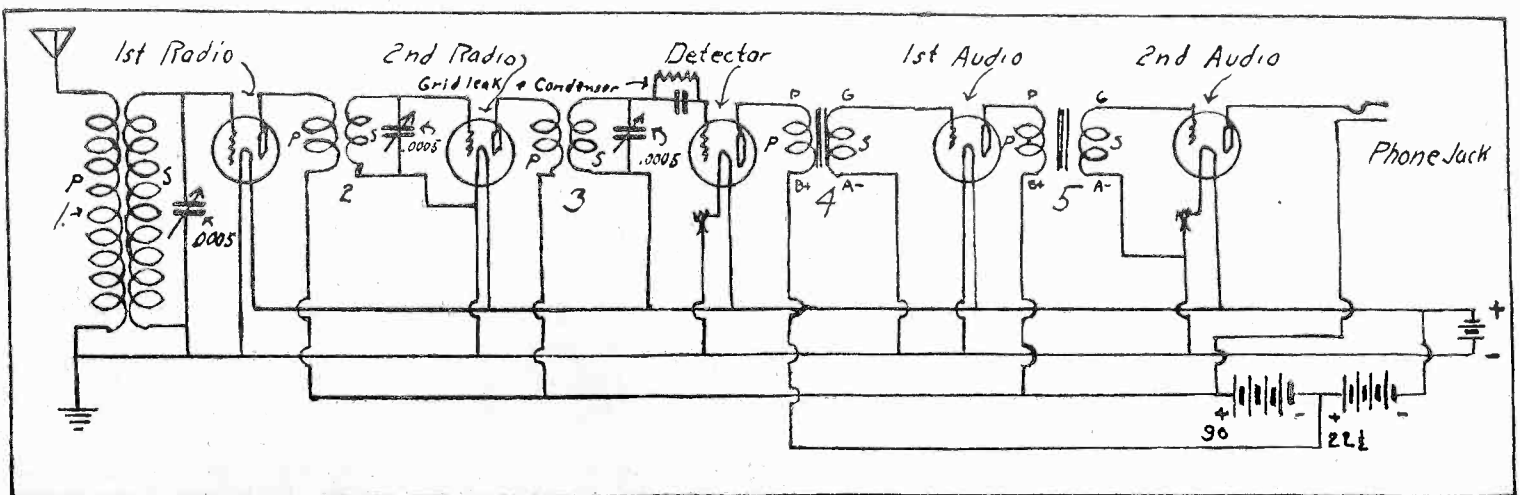


Fig. 2. Diagram of a five-tube set employing the Ultradyne principle, which is nothing more than radio-frequency with special transformers so designed that oscillation of the circuits is not possible. Selective to a great degree and a good distance getter, without the annoying noises that regeneration gives, nor the expense of intricate transformers.

The primary is made in a similar manner, except that but five turns are wound on each half of the coil, 10 in all. The two coils are fastened together by putting a bolt through their centers. Place a piece of paper between them. Be sure that the coils are placed together so that the windings run in the same direction, and so that each half is perfectly over its corresponding half on the other coil. The successful working of this set depends on these coils, so use the utmost care in their construction.

The diagram shows the layout of the panel. The hook-up at just a casual glance looks complicated, due to the number of tubes. It is the simplest hook-up possible. It is the same as the neutrodyne with the condensers left out, which is itself the ordinary tuned radio-frequency circuit.

Little need be said about the construction of the set, due to its simplicity. However, this is no excuse for making it in a haphazard fashion. It is an absolute essential that the greatest care be used. Place the first transformer parallel to the base, and the third one per-

pendicular to both base and panel. It will thus be seen that they are all at right angles to each other. Place them so that the leads to the grids and the plates are as short as possible. Preferably not over  $\frac{1}{2}$ " , and at right angles to each other. Use bus wire, make short, straight connections, and solder every one.

Use UV199 or C299 tubes in their own sockets. Do not use standard sockets with adapters. If it is desired, six-volt tubes may be used as detector and audio amplifier, but the small tubes specified are capable of giving enough volume to satisfy. If this is done, however, it will be necessary to put a high resistance rheostat in the filament circuit of the first two tubes, as they require but three volts, while the other tubes require five.

The tuning of this set is the same as the neutrodyne. It will take but a short time to get used to it. The tuning is extremely sharp, and there is no howling as in regenerative sets. It is extremely sensitive, the audibility of a carefully made set being several times that of the best neutrodyne. Transcontinental loud speaker reception is easily possible in a good locality.

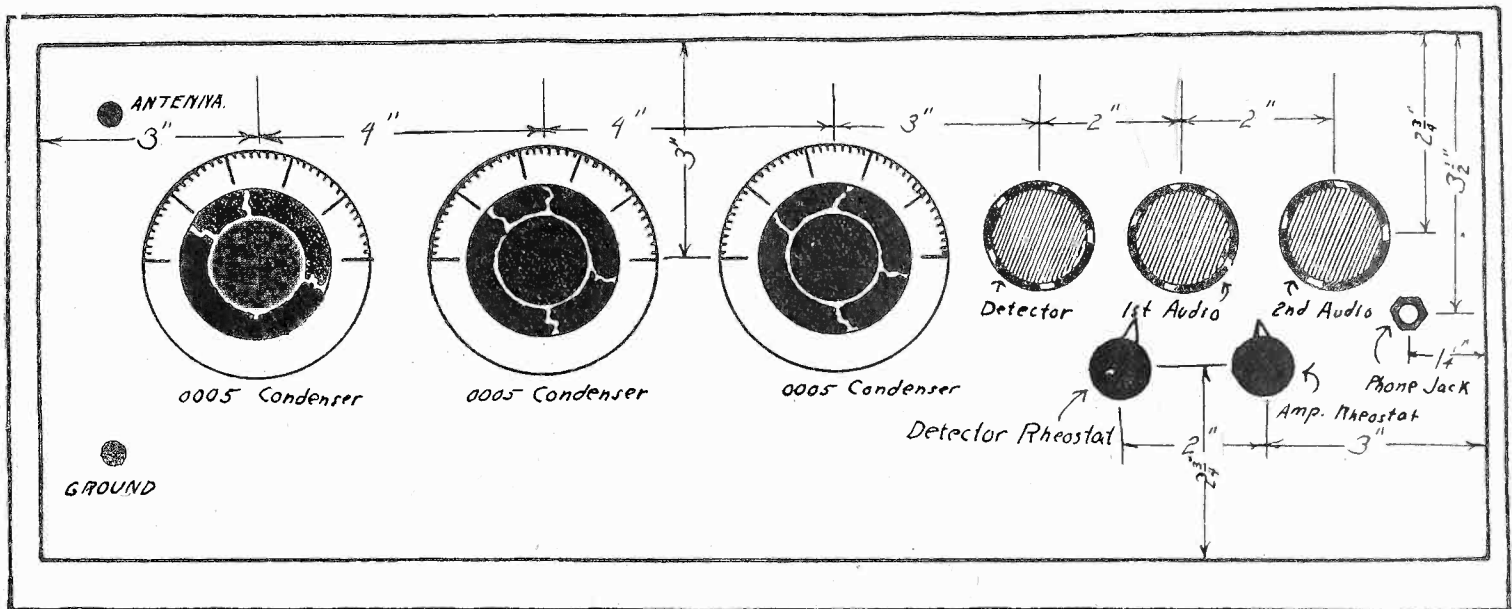


Fig. 3. Front panel layout of the Ultradyne receiver. Tuning is done by means of the three dials and the stations will always be found at the same dial settings, allowing charting of the various calls.

## Two-Way Transatlantic Success Due to Large Antennas with Series Condensers

**H**ARTFORD, Conn.—It is seldom that an amateur radio long distance test is accomplished without there being uncovered some technical truth destined to have a far-reaching effect on amateur transmission and frequently radio communication in general. Recently amateurs in France and Connecticut succeeded in carrying on the first short wave communication between the two continents.

This feat not only meant that the dreams of amateur radio men had been finally realized, but it has also brought to light a number of ideas in connection with short wave radio that may be of important and lasting value. After thoroughly going over the construction of French 8AB and American 1MO, the two stations most prominent during the tests, S. Kruse, technical editor of "QST" has drawn interesting conclusions.

The common opinion that the minimum amount of interference experienced on the wave length of 100 meters used by these stations was mainly responsible for the success of the two-way transoceanic tests is

not true, according to Mr. Kruse in an article, "What the Work with F8AB Teaches the A. R. R. L.," which is to appear in the February issue of "QST".

On the other hand, Mr. Kruse believes the transatlantic success was due primarily to the fact that each station participating, used antennas that are large for the waves they are working.

### WHAT IS "RE-RADIATION"?

**R**E-RADIATION, or more correctly, "interfering radiation," is caused by the generation of a radio-frequency wave due to the persistent oscillation of one or more tubes of a receiving set, which causes interference in other nearby sets by creating a beat note, i. e., by making audible the difference in frequency between the waves radiated by two receivers or by a receiver and a transmitting station's carrier wave.

# "Shenandoah" to Have More Powerful Radio Equipment—Her Call is NERK

WASHINGTON, D. C.—With the materialization of the plans for the polar trip of the Naval Air Cruiser "Shenandoah," or the ZR-1, it has been decided that her original 300-mile radio equipment first described in RADIO WORLD last July, is inadequate and a brand new transmitting unit good for a thousand miles has been developed by naval radio engineers.

If, late in July or August, fans pick up the call "NERK" they may shout with glee, for it will be the "Shenandoah" communicating with one of the far northern radio shore or ship stations, or perhaps one of the navy's three portable stations to be established near the Arctic Circle.

Radio equipment plans for the "Shenandoah" include two transmitting sets, two receiving outfits and a radio compass. The high-powered set which replaces the six 50-watt tubes, includes two 2-KW tubes, with an input of 4-KW, and an output of 2-KW. With this transmitting set it is believed several northern radio stations such as exist in Iceland, Greenland, Spitzbergen, and Russia, or our own Alaskan stations can be reached. With the powerful receiving sets, Annapolis, Cordova, Lafayette, Nauen and other high-powered stations can be copied, or used as points to establish the position of the great airship by means of the radio compass. This instrument is now believed indispensable on this exploration trip from a base at Point Barrow, Alaska, 1,117 miles south of the Pole.

Besides the high-powered transmitting set, an auxiliary medium-range telegraph and telephone set is to be installed aboard the aerial cruiser. The telephone feature will be utilized for communicating with ground stations when landings are being made for the immediate transmission of orders to the ground crew or operators at the mooring masts.

All the radio equipment weighs is 1,023 pounds, which in itself is believed by engineers to be a great ac-

complishment, giving a transmitting radius of approximately a mile per pound. This is very light in comparison to the radio apparatus carried by surface vessels of the navy. The after section of the control car will be used as the radio shack. Some difficulty in locating the radio compass where it will be operative and yet not hinder the progress of the airship and interfere with landings, is being encountered, but this problem will be solved soon, radio experts declare.

The plans call for the use of two base ships in the far north, each of which will be outfitted with a mooring mast and carry radio apparatus for communicating with the "Shenandoah" when she is on voyages. One of these remodelled tankers will be sent to Point Barrow, 70° North, and the other will in all probability be dispatched to Spitzbergen, where it is hoped a temporary radio-compass station can be established. Two other portable radio-compass stations will also be erected as far north as they can be pushed. With the two ships, this will give the "Shenandoah" five radio-compass stations of her own from which to check her position and progress toward the top of the world if she fails to pick up existing radio stations.

As has been pointed out previously, radio will enable the navy to check the position of the airship and if the Pole is reached, to prove it conclusively by cross bearings made aboard. Her positions could be rechecked later by northern stations having radio compasses. This eliminates faking a position not attained and is a new feature in polar exploration made possible by radio. Since the Arctic summer is barely two months in length, and daylight is believed a necessary requisite in this venture to the Pole by air, speed in establishing the temporary radio stations in the north is necessary, so that the airship need never be out of touch with main and auxiliary bases and the airplanes which will accompany her on the first stages of her northward journey.

## Spain Considering International Radio Pact

*By Carl H. Butman*

SPAIN is considering the ratification of the Universal Electrical Communication Union agreement, already accepted by several of the leading powers, at a Spanish national communication conference now in session in Madrid. Local and national radio issues are also being studied. Representatives of all foreign radio telegraph and telephone companies doing business in Spain, except those of the United States, have been invited to participate. Although America has been ignored in this matter, and some communication experts express surprise, it is thought by others that the reason is that no United States corporation is actually operating in Spain. American concerns, however, are selling radio equipment there.

The calling of the national conference by the King of Spain at this time, is thought to be due to the pending invitation of the French government to an international communications conference in Paris this summer or fall, and it is expected that the agreement

will be ratified. The Berne Bureau has been urging upon the world governments the advisability of submitting their suggestions on the Universal Electrical Communication Union at an early date, and the United States is understood to be keeping the international point of view in mind while working out the details of the Pan American pact to be discussed in Mexico City, if local conditions permit, this spring.

In the event that some important nations fail to agree to meet in Paris for a general conference, it seems probable that France, Italy and Spain, will recommend that the matter of world communication be referred to the League of Nations.

What is sought is a joint agreement covering cable, telegraph and telephone and radio communication. National laws passed by Argentine and Chile within the past two months have been along this line, and it is believed that the nations are gradually getting closer together on universal agreements.

# Making Europe Part of the U. S. Radio Audience

By *W. W. Rodgers*

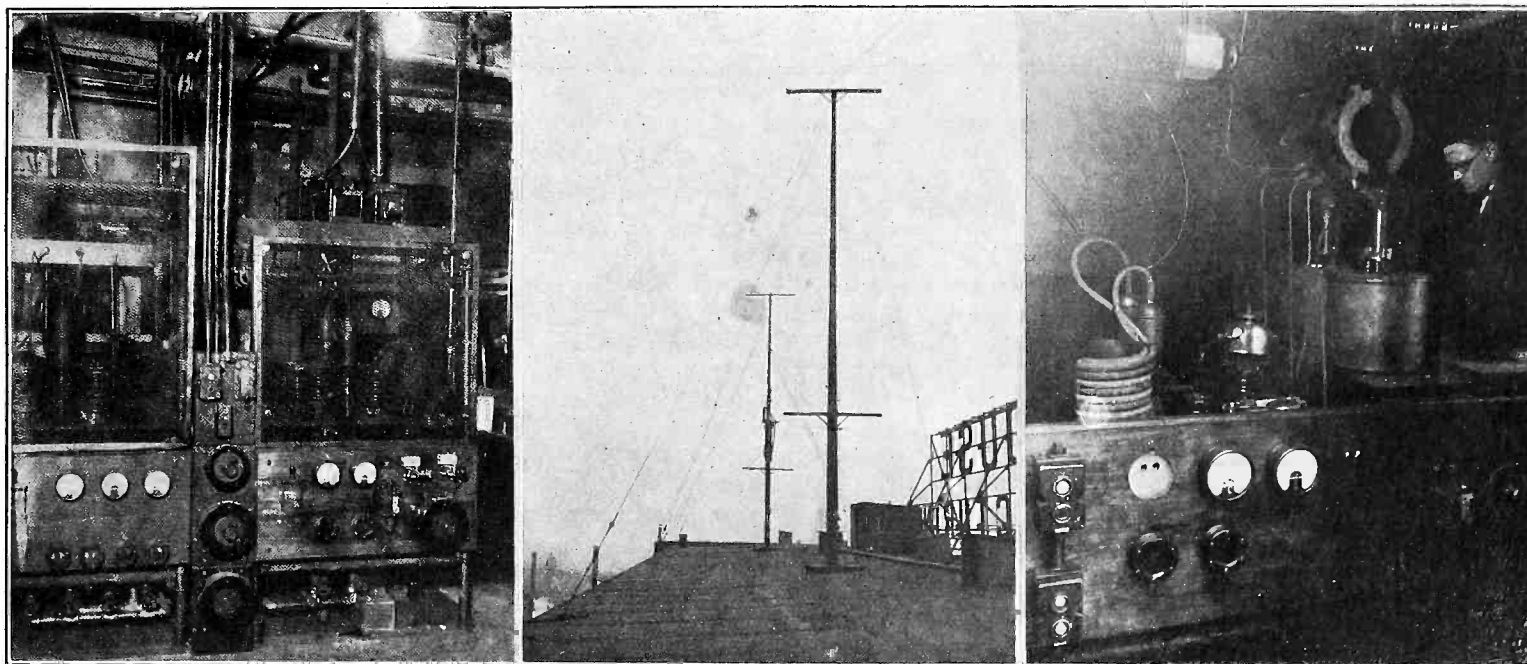
*Westinghouse Electric & Manufacturing Co.*

**E**XPERIMENTS in short wave broadcasting by means of extremely high frequencies have reached a climax in the repeating of American broadcasts by British stations.

The tests whereby American broadcasts are repeated on these short waves and received and re-broadcast by English stations, thus reaching the peoples of Great Britain, France, Germany, Belgium and the Scandinavian countries is the outcome of two years' experimenting and perfecting of high frequency apparatus by Frank Conrad, assistant chief engineer of the Westinghouse Electric & Manufacturing Company, the man who has done, probably, more in an engineering way to perfect radio than anyone else.

frequency receivers—both terms mean the same thing—were installed in the homes of amateurs living in 20 cities or more located so that they covered the country. All holders of these sets reported that reception on short waves was very favorable and that there were none of the drawbacks to broadcast reception on the higher wave lengths.

These experiments covered a period of two years, nearly up to the time when KFKX, the first radio repeating station in the world was started by the Westinghouse Company at Hastings, Nebraska, last October. This repeating station made use of the high frequency broadcasting and reception for the repeating of KDKA's East Pittsburgh, Pa., concerts and actually



New 100 meter broadcasting equipment at Station KDKA, East Pittsburgh, Pa. At the right is shown the transmitter, mounted on springs to eliminate any changes in the modulation or frequency. It is powerful enough to allow the signals to be re-amplified at such places as the Pacific Coast and England. In the center is shown the antenna used. It is mounted on two short masts, the wires are but 35' long, but stretched extremely tight to prevent any chance of a change in the transmitted frequency due to swinging or swaying. At the left is shown a close-up of the control apparatus and the tuners. The remarkable success this station is having on 100 meters proves that high wave lengths are not necessary to long distance transmission.

The interference problem, first brought into prominence about two years ago when so many broadcasting stations had been started and were operating on frequencies very similar, first brought the idea to Mr. Conrad and his associates that extremely high frequencies held many possibilities for the perfecting of broadcasting. He started experimenting with his own station and from a short wave station installed on the roof where the transmitting apparatus of KDKA, the world's pioneer station is located.

The first experimenting with short waves under 100 meters was made between the station at KDKA and amateurs living in the Pittsburgh vicinity. Encouraged by the results of these tests, a receiving and a re-broadcasting station was located in the Westinghouse building at Cleveland. The first of KDKA's broadcasts to be repeated, were transmitted from this station, whose call letters are KDPM. Then tests were made between East Pittsburgh and Springfield, Mass., which, too, were successful and finally, short wave or high

meant that KDKA's concerts were covering the entire country.

The KFKX station operated so successfully that negotiations were started with friendly concerns located in Great Britain to test the reception of high frequency waves. It was found the high frequency signals crossed the Atlantic with the same ease that they crossed the United States. The first test set in Great Britain was located in the plant of the Metropolitan-Vickers Co., at Manchester, England, which made very favorable reports at East Pittsburgh upon the reception of the repeated concerts.

Recently the repeating took place with the British Broadcasting Co., which has a monopoly on broadcasting in Great Britain. Six or seven of this company's stations were tied together by means of telephone lines and the repeating of KDKA's concerts was started. The result of this was the people living in Great Britain and Eastern Europe heard American con-

*(Concluded on next page)*

(Continued from preceding page)

certs as plainly and with the same receiving sets with which they could hear their own stations. It was the greatest triumph that radio had made in the past year and has actually changed the whole future of broadcasting.

The high frequency transmitter which does the repeating is located on the top of a nine-story building in the Westinghouse plant at East Pittsburgh, Pa. Because of the fact that high frequency sets are critical and can be thrown off their wave easily, the whole set is mounted on springs to guard against jars. To prevent the swinging of the antenna, it is drawn taut between its uprights and the down leads consist of copper tubing. The various inductances on the set are wound on rigid forms with copper tubing forming all leads. The transmitting set consists of three panels—the rectifier panel, the modulator panel and the oscillator panel. All the equipment represents the last word in transmitting apparatus with water-cooled tubes and special condensers.

The short wave transmitter is almost an exact duplicate of the big transmitting unit at KDKA with the changes necessary to efficiently work on the high frequencies.

One of the most striking things about the short wave transmitting set is the extremely short antenna used. The antenna at KDKA for use with the short wave receiver is slightly in excess of 35'. When the size

of this antenna is compared to the 200' lengths of the antenna used for regular broadcasts the result is striking. That this small antenna will be sufficient to send broadcasts over the ocean is scarcely believed by many who see it.

In England the law prohibits large antenna with the result that most antenna are under 40'. The result is that radio-frequency receivers are the common apparatus used, so that the reception of the short wave signals is ideal on the continent.

The great difference in frequency between the short wave broadcasts (under 100 meters) and the common wave length band, approximately 360 meters can be noted by comparing the kilocycle frequency of two such waves. East Pittsburgh commonly transmits to England on a wave length of 94 meters which is a frequency of 3,200 kilocycles. At the same time KDKA is broadcasting to its regular broadcast audience on 326 meters, which is a frequency of 960 kilocycles. This difference in frequency tells much of the story of the short wave broadcasting.

Tests have proved that the high frequency broadcasts go farther with the same power input than the ordinary broadcasts waves. It has also been proved that daylight has little effect, if any, on this carrying power. These two qualities of the short waves are what is going to affect the future of broadcasting and bring a new broadcast era in the New Year which has commenced so auspiciously.

## A Year's Radio Work of the Shipping Board

By Carl H. Butman

SHIPPING BOARD vessels established a new long distance radio record in both the Atlantic and Pacific during the past year, according to a recent statement of the board. Successful communication was maintained between Bremerhaven, Germany, and Bar Harbor, Maine; between Shipping Board vessels off the coast of China and San Francisco. The transmission and reception of messages over such long distances have proven very valuable in many ways, especially because of the economy effected by eliminating cable tolls and the expeditious handling of communications, the statement points out.

The maximum distance for reception was approximately 16,000 miles, and transmission 7,000 miles. While on a cruise around the world, the radio operator on board the S.S. "East Wind" kept in almost daily contact with NSS, the navy's high-power station at Annapolis, until almost mid-way across the Indian Ocean. However, as the ship approached this station from the west the signals faded out completely, until the ship was in the Pacific Ocean. While in the Indian Ocean, stations NPM, Honolulu; NPL, San Diego, and NZR, Porto Rico, were also heard by the "East Wind."

Pioneer work in providing radio telephone equipment for marine purposes was undertaken by the board with the result that the master of the "S.S. America" carried on a conversation with the chairman of the board in his office in Washington, while the vessel was over 100 miles from the shore. A radio telephone set was also installed aboard the "S.S. Leviathan", but it has developed that the necessary facilities for radio-phone communication at shore stations were so expensive and the maintenance so high in view of the

few vessels equipped, that it was deemed inadvisable to operate radio-phone shore stations until a larger number of vessels are equipped with radio-phones.

In order to pick up press dispatches and official messages from the naval high-powered stations along the United States coasts, while two ships were in Brazilian and Argentine ports, the S.S. "Pan America" and the S.S. "American Legion" were equipped with amplifiers developed by the Naval Radio Laboratory and the Bureau of Standards. A similar amplifier was set up in the Shipping Board receiving station in London. This office was also equipped with a naval barrage receiver used especially for long-distance reception, as it permits the tuning out of interference from nearby high-powered European transmission stations. The new receiver has made it possible to copy the Annapolis broadcast every day in London without error for several weeks at a stretch.

In the interest of efficient navigation and safety precautions, especially aboard passenger ships, experiments with radio compasses were made and complete sets were installed aboard the S.S. "President McKinley" and the S.S. "Leviathan," operating out of Seattle and New York respectively. This apparatus, it is understood, is very satisfactory when fog is encountered and in certain ports where radical variations of the earth's magnetic field are known to exist. Additional installations will soon be made on other Shipping Board vessels.

Arrangements were made for the installation of an especially designed tube transmitting set for the "Leviathan", after successful tests on a naval battleship. Results with this set were very satisfactory.



# The Radio University

A Question and Answer Department conducted by the Technical Staff of RADIO WORLD for the information and instruction of its subscribers.

I have one of the Aeriola Sr. type receivers with the addition of their two-tube amplifier known as the A-C amplifier. Before using this amplifier, we had very little trouble with interference, as other stations could be tuned out and just heard very faintly when there was a lull in the program of the station we were listening to. Now, when operating the speaker, we can plainly hear the other stations, when the station we have tuned in is standing by. Why is this?—John Olmearer, Smith Street, Brooklyn, N. Y.

As long as you could hear the other stations in the detector circuit alone, it stands to reason that it would be amplified in proportion to the station that is desired. Audio-frequency amplification amplifies every sound that is audible in the detector circuit, both wanted and unwanted sounds, and does not increase your selectivity at all.

Why is it that sometimes in a diagram of a circuit they will show three or four tubes, close together, and then in the picture of the set they will separate them, sometimes putting them at entirely different positions in the cabinet than the diagram would lead you to think? Which should be followed, the diagram or the picture?—F. Melker, 145 West Street, Newark, N. J.

The circuit diagram is just to show the connections—the photographs if they are furnished, are to show plainly the location of the parts. In making the circuit diagrams, for clearness as well as to make the circuit as simple as possible, they generally keep all the parts fixed in certain relation to each other. Thus all the tubes will be shown together, whereas in the actual set they may be several inches apart, or may be on different parts of the panel. A diagram is just for your convenience in connecting, and is not meant to suggest the actual layout of the apparatus. Thus, if a panel layout is given, with a drawing of the location of the various parts, follow the hook-up for the wiring, but the panel layout for the location of the parts.

What does the expression "stand by" signify? If when I am listening to a station, I tune in another station that my neighbor happens to listen to at the same time, do we take anything from one another? Our antennas are separated by about 28' or 30', and do not run parallel, mine running east and west and his running in triangular shape, northwest to southwest and then back at a right angle.—Miller Baynes, Grove Street, Los Angeles, California.

The expression means to wait or hold the air for a few seconds. It is an expression used in wireless telegraphy which meant that the operator was not just ready, but would have something for the listener in a little while and requested him to keep listening for his signals. In broadcasting it is used to tell the listeners that there will be a slight delay in the program. You should not affect each other, unless you have regenerative circuits which are allowed to re-radiate. Then you will create interference with one another, as well as seem to rob some of the energy from one another when you both are listening to one station and your receivers are both tuned to exact resonance. This phenomenon occurs frequently and cannot be helped when regeneration is used.

What is meant by a by-pass condenser? Is it of any use in a regenerative circuit at the places shown in my diagram? I have been advised that such condensers if placed in the circuit will sharpen my tuning, but am in doubt as to their efficacy as the parties that gave the information are but beginners themselves. Is it possible to stop regeneration in a receiver and still get the loud signals that oscillations make possible? Which is the best, a book type condenser or a sliding plate condenser of the type generally sold?—K. S. Donohue, 114 Eleventh Street, Cincinnati, Ohio.

A by-pass condenser is one that will allow the radio-frequency currents to pass around certain inductances and batteries, without the necessity of forcing through them and losing strength. This is done in reflex circuits more than in regenerative circuits, but may be used to great advantage in certain parts of the latter named circuit. You have all the condensers except two marked correctly. There is no need for a condenser across the rheostat or across the tickler. The tickler, if constructed correctly, has ample inductance to cause regeneration, and there will be no advantage gained by the use of a condenser in this part of the circuit. The rest of the condensers are right and will help your circuit. They will sharpen the tuning of the circuit itself by allowing clearer reception. As before stated, they allow the radio-frequency currents to pass by, stopping only the direct or audio-frequency current. It is not pos-

sible to get loud signals due to oscillations. As a matter of fact when your tube starts to oscillate, is the time the mushy signals make themselves known. Regeneration can be pursued up to a certain point. After this point is passed, the amplification ceases and falls, and a mushy quality which renders the signals inaudible takes its place. In a regenerative receiver, when the circuit starts oscillating it is necessary to turn the tube down, and re-tune in order to get the signals in right again. Both types of condensers are good. The book type takes up less space, is mounted easier and is not as liable to short circuit as the sliding vane type, as they are generally made with a sheet of mica insulation between. There are several good types of both on the market today.

Is it possible to install a set in my home so that I can use it in either the upstairs or downstairs rooms, without impairing the efficiency of the machine or its working?—Charles Meyberger, Fort Ticonderoga, N. Y.

It is possible, by the use of extension lines on both the antenna and ground to install the set either on a movable table, such as a tea wagon, or have one of the portable type sets, and by simply plugging in either place, get efficient operation. Such use will not impair the operation or the efficiency of the receiver if care is taken in the wiring of the lead-in, and the cut-off arrangement for the antenna and the ground. See that the antenna is very well insulated throughout.

I recently purchased a home charger for my battery. When I first used it I noticed that the needle on the meter in the center of the machine always went to the right when charging. Lately, since I moved my set to the other room, it goes to the opposite side. Is not this running the current through the machine in the wrong manner?—Lester Bender, 311 West 180th Street, New York City.

This machine has a compensator which takes care of the polarity. You can reverse the polarity of the current in the windings by simply pulling the male section of the plug out of the socket and turning it around so that opposite poles are in the socket. This charger, however, takes care of the polarity, and will not reverse the charge on the battery. The meter, if you will notice, does not state polarity, but is zero in the center, and runs up on either side, denoting that the battery is charging whether the needle points to the right or to the left.

What causes my loud speaker to click after it has been turned off for about five minutes? I have noticed that for several weeks every time I disconnect it from the set, there will be a pronounced metallic click such as is gotten out of a piece of stiff tin when it is bent. This does not occur once, but every time—yet the speaker works as well as it ever did.—Robert Carmento, Ocala, Florida.

This is probably caused by the residual magnetism in the poles of the magnets losing strength and causing the diaphragm to snap back into its natural form. The next time you connect it to the set, note if there is not the same click when it is put into the circuit. The diaphragm has probably warped a slight bit due to heat or some climatic condition and therefore when the magnet exerts its pull on it the plate snaps out, snapping back after the magnets have lost some of their strength.

I have heard it stated that a bed-spring may be used for an antenna. I am located in a hospital, and would like to have a radio in my room. What type of set should I have in order to use my bed-spring?—A RADIO WORLD Reader, Arlington, N. J.

For local work a regenerative detector with one stage of audio-frequency amplification will suffice. This will allow reception over distances of about 100 miles sure, with greater range when you learn to tune the set.

I have had a four-tube receiver made for me by a party who stated that it was a neutrodyne receiver. I have heard it said that this receiver will receive long-distance stations on the loud speaker, but cannot seem to bring in anything beyond New York, Philadelphia, Schenectady or once in a while Pittsburgh. Is this to be understood as long distance reception? I have had the receiver four weeks and think I understand it perfectly, as I have no trouble tuning those stations in when I want them.—Gale Patterson, Sterling Place, Albany, N. Y.

If you can operate the receiver and bring in the stations you mention good and clear, that designates that the receiver is working properly,

and the only trouble is your not knowing the dial settings for the other stations. You will have to keep tuning until you find the correct dial settings for each of the stations. Chart them and put the settings down in a book and you will be able to get them any time you wish. Philadelphia and Pittsburgh are considered DX, but further distances than that have been covered with the receiver you mention. Keep studying your receiver until you get it down right. You cannot understand a neutrodyne in four weeks thoroughly unless you are familiar with the exact dial settings of the receiver in question.

What is the wave length of a receiver when a 23-plate condenser is used in the antenna? Can the wave length of a station be tuned by a receiver?—Joseph Scanlon, 311 East 12th Street, New York City.

Before you can determine that wave length of a receiver, or rather the band of frequencies that it will respond to, you have to know the constants, such as the size of the inductances, capacities of the various condensers used, and also the size of the antenna that is to be used with the receiver. You tune your receiver to make it respond to the frequency of the transmitted wave—you cannot tune any transmitter by a receiver. Tuning your receiver means that you change the frequency to which it will respond. When you make it sensitive to the frequency of a transmitter on 360 meters, or 830 kilocycles, that means that you will hear that particular station, as then your receiver is sensitive to the waves emanating from that transmitter, and which are of the same frequency.

Will you kindly inform me where I can get an exact list of parts for a four-tube set described in RADIO WORLD? I am unable to purchase a by-pass condenser or a crystal synthetic detector.—Jack Croft, Presden, Ohio.

Write a letter to the author of the article in question, addressed to this office, and it will be forwarded to him. Mention the article, date of issue, name of article and the page it appeared on. A by-pass condenser may be obtained from the Federal Tel. and Tel. Co., Buffalo, N. Y., in any capacities used. Synthetic crystal detectors are regularly advertised in our columns.

Will you kindly furnish me the addresses of the following writers for your magazine: H. H. Lerchen, author of article on double feedback; C. White, Consulting Engineer, author of article on "How to Stop Re-radiation on Single Circuit Receivers"; John V. Cull, author of article on "The Autoplex"?—W. H. Young, 3118 West 18th St., Oklahoma City, Okla.

Address all letters to contributors to this office in care of RADIO WORLD. They will be forwarded.

In connection with the building of the "superdyne" receiver I would like some information. What direction are the coils wound in relation to each other? This applies particularly to L and LI. I do not care to use a loud speaker, and have three WD11 tubes on hand. Can they be used with this receiver? What is the range of wave lengths for this receiver using the coils specified?—J. B. Morton, 4725 N. Lincoln St., Chicago, Ill.

Coils L, LI and LFI (the tickler) are wound in the same direction, while coil 12 is wound in the opposite direction. This is done to prevent any chance of inductive feedback occurring. They may be wound in any direction as long as all the coils specified are wound the same and the number of turns is held to. WD11 tubes will not work—use either the UV109 (preferably) or UV201A tubes. The wave length range is from 150 to 600 meters, or 1990 to 500 kcys.

In your article concerning the "superdyne" receiver you stated that short leads should be used. Yet in your diagrammatic sketch of the position occupied by the parts you make some of the leads quite long. One of them is about 13" in length. Why not place this tube right in between the two coils and save time and trouble? Why place the coupler at the extreme left? Why tap at the 20th turn? I constructed it and it works fine, bringing in WOAV on 242 meters with ten points unused on the condenser. Why use 23 plates when it should be so much easier and give better tuning to use a 13?—Dr. F. E. Mayberry, Room 320, Miller Building, Pittsfield, Mass.

While the statement you make is correct in regard to the leads, the governing factor in the length of the leads is that of the batteries. The layout given allows extremely short leads in this part of the circuit, and due to the fact that there is a separation between the rest of the apparatus allows separation of the leads without undue bends in the wire. The inductance values as well as the capacities of the circuit were varied several times to determine the best point and the final results showed that those given acted best over the band of wave length shown. This receiver does not happen to be an overnight production, but has been experimented with for several months before the inventor or designer allowed the publication of his efforts. In the final analysis the inductances shown and the capacities mentioned gave the sharpest and best tuning over the rather wide band, with a minimum of tuning trouble. We advise sticking to the values unless you wish to experiment.

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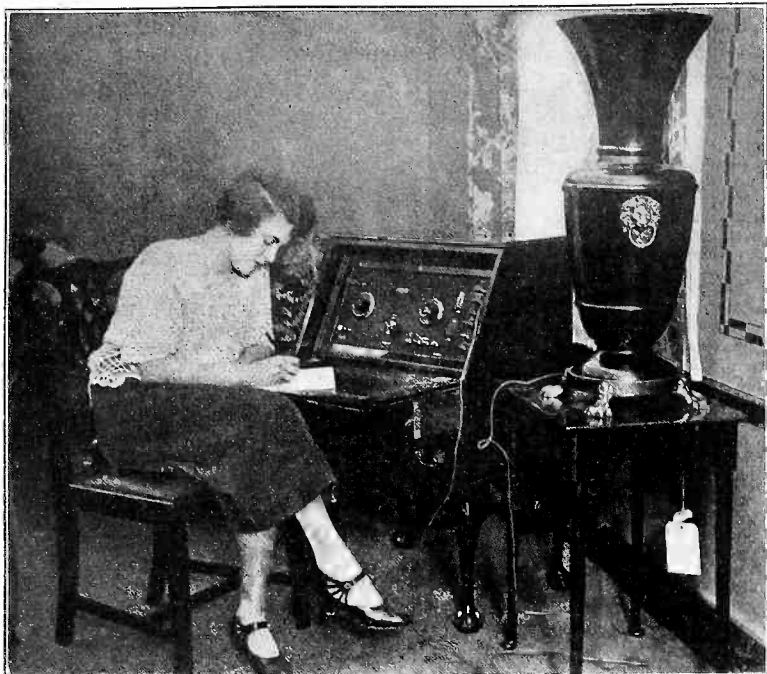
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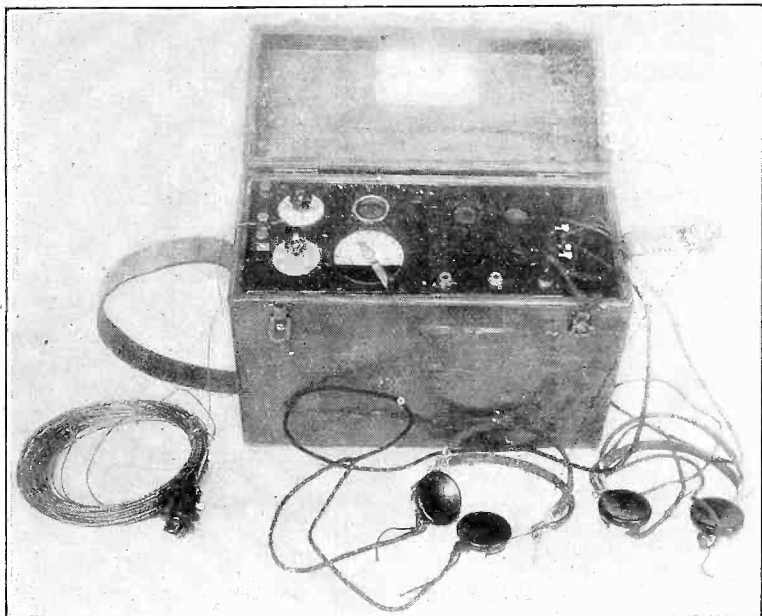
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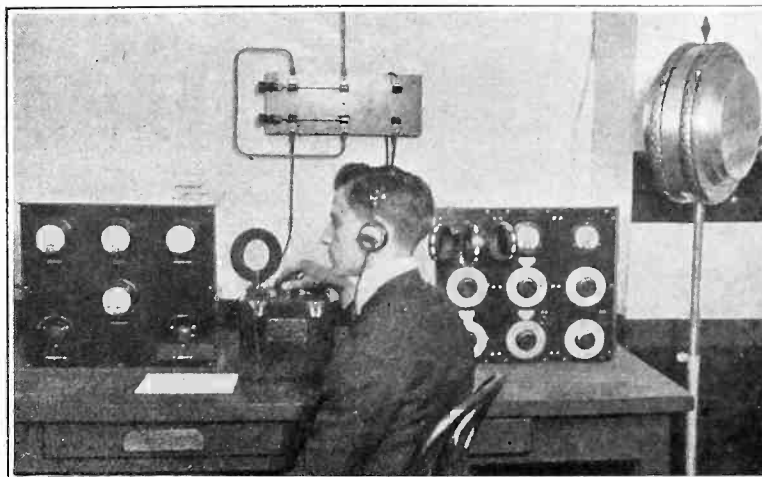


What moving picture stars do "between shots" has been more or less a myth. This photo shows Hoot Gibson, famous Universal star; Eddie Sedgwick, his director; Miss Laura La Plante, and several members of the Hook and Ladder company at Universal City, Calif., listening in while the property men fix up a couple of sets for them to work on.



(C. P & A)

Most of the daily papers these radio days carry at least a column of radio programs or a half page radio section, but the latest idea in that line is radio reporting. Elmer Douglas, reporter of the Chicago "Tribune," listening in with his "mill" right handy, picking up first hand a speech broadcast from Boston, while the city editor looks on and thinks of the carfare saved by not having to send him out to "cover the story."



(C. Kadel & Herbert)

Interior of broadcasting station WJH, Washington, D. C., one of the oldest radio stations in the country. The entire broadcasting apparatus is shown on the table, and constitutes a novel set as both receiver (right) and transmitter (left) are enclosed in glass cabinets. It uses only 100 watts power on a wave length of 273 meters or 1,100 kcys., but its modulation and transmission is considered as among the best in the country.

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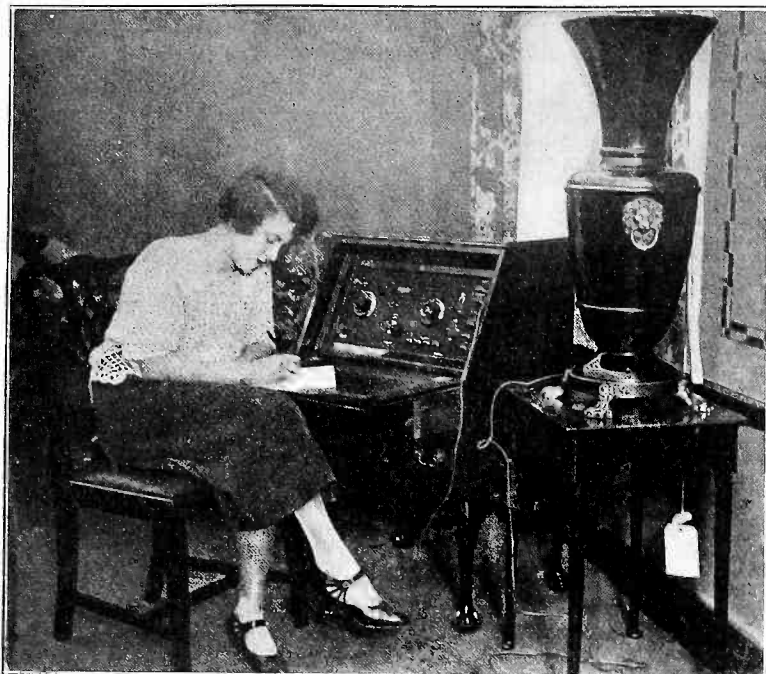
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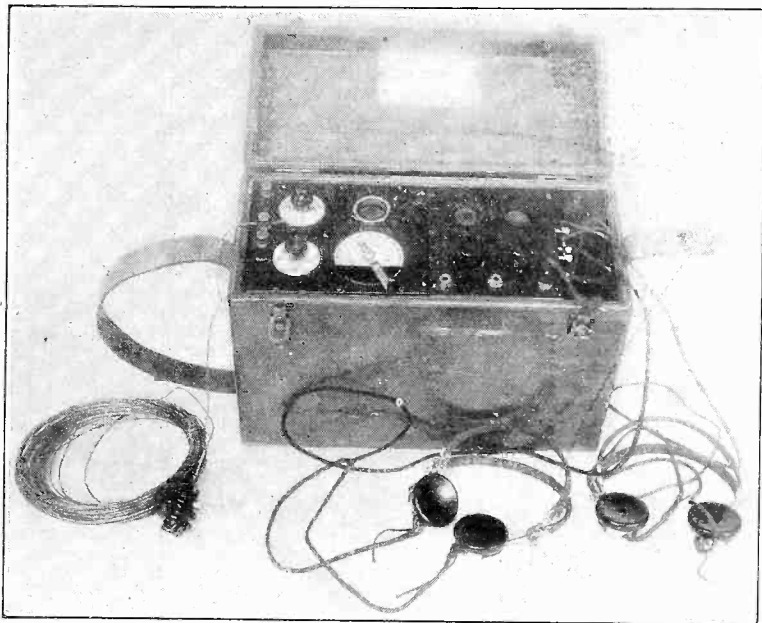
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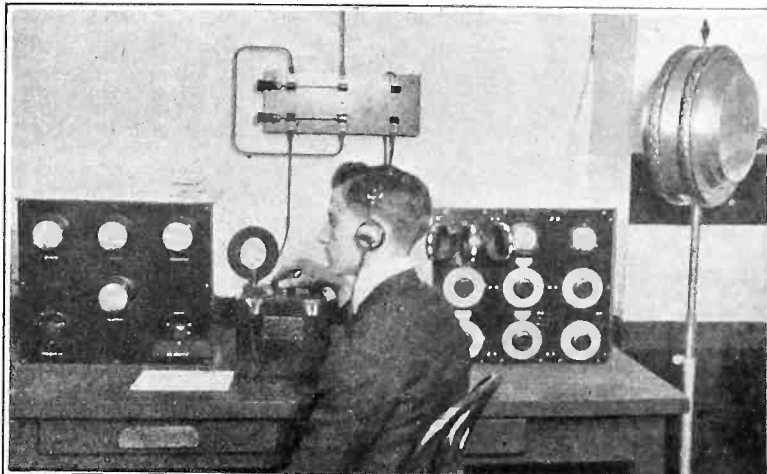


What moving picture stars do "between shots" has been more or less a myth. This photo shows Hoot Gibson, famous Universal star; Eddie Sedgwick, his director; Miss Laura La Plante, and several members of the Hook and Ladder company at Universal City, Calif., listening in while the property men fix up a couple of sets for them to work on.



(C. P & A)

Most of the daily papers these radio days carry at least a column of radio programs or a half page radio section, but the latest idea in that line is radio reporting. Elmer Douglas, reporter of the Chicago "Tribune," listening in with his "mill" right handy, picking up first hand a speech broadcast from Boston, while the city editor looks on and thinks of the carfare saved by not having to send him out to "cover the story."



(C. Kadel & Herbert)

Interior of broadcasting station WJH, Washington, D. C., one of the oldest radio stations in the country. The entire broadcasting apparatus is shown on the table, and constitutes a novel set as both receiver (right) and transmitter (left) are enclosed in glass cabinets. It uses only 100 watts power on a wave length of 273 meters or 1,100 kcys., but its modulation and transmission is considered as among the best in the country.

## RADIO WORLD

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Stephen L. Coles Robert L. Dougherty

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### IMPORTANT NOTICE

While every possible care is taken to state  
correctly matters of fact and opinion in technical  
and general writings covering the radio field, and  
every line printed is gone over with a scrupulous  
regard for the facts, the publisher disclaims any  
responsibility for statements regarding questions  
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This statement is made in good faith and to save  
time and controversy in matters over which the  
publisher cannot possibly have control.

JANUARY 19, 1924

## "Mike" Tests Nerves

**B**BROADCASTING has developed a new test for the nerves, according to several radio broadcast managers. "Stage fright," "movie nerves" and "buck fever" are all well known to the public, but the little metal microphone, "the door to radio land," has sent terror to the hearts of many seasoned entertainers who have performed before packed houses without a tremor.

Appearing for the first time before the "mike" the artists, almost without exception, ask: "How many people will hear this? What tone of voice shall I use? Do you think I have a good voice for this work?", and many other questions indicating nervousness.

Having performed before "mike," who is cold and unresponsive, the artist waits impatiently for letters from the invisible fans, whose faces he could not read, to learn whether or not his act "went over." Unless he receives letters of applause his fever is likely to rise dangerously.

## RADIO WORLD Calls a Conference On the Re-radiation Evil

**I**N order to get well-advised, intelligent and practical action on methods of preventing the re-radiation of regenerative receiving sets, RADIO WORLD has called a conference of radio men at The Engineers' Club, New York City, for a discussion of the problem and its solution.

Those whose cooperation we have requested include the editors of radio magazines, the radio editors of daily newspapers, writers on radio subjects, radio engineers and officials of the Department of Commerce.

Secretary of Commerce Hoover has designated W. D. Terrell, Chief Radio Supervisor, to represent the Department of Commerce at this meeting. District Supervisor Batchellor, of New York City, also will be present.

After thorough discussion of ways and means, a program of action will be adopted and carried

through in the form decided upon by the conference. The campaign will be national in scope and an effort will be made to reach the whole country.

It is probable that the managers of broadcasting stations will be asked to cooperate in spreading the propaganda for "clear air" and they doubtless will respond as it is greatly to their interest to have re-radiation stopped.

RADIO WORLD considers that it is only performing one of its privileged functions, as well as a public duty, in sponsoring such a conference and feels assured that much good will come from the deliberations of the many able men who will participate in it.

Our readers will be kept informed of the progress the movement makes and it is quite possible that they may be called upon to do their bit in the campaign which will be launched when plans are perfected.

## Say "Broadcast"!

**W**E note that some of the broadcast program directors and a few of the radio publicity writers continue to use the word "broadcasted"—and this in spite of our request of several weeks ago to drop the longer and uglier word! Is it possible that they were not convinced by the incontrovertible and authoritative evidence we presented in favor of "broadcast"? That doesn't seem credible—the use of the old word is just the result of habit and, like all habits, is hard to correct. But cheerfully and persistently, we will remind them from time to time and eventually they will join the great majority. Once more, please get into the way of writing "broadcast" and not "broadcasted".

## Fewer Broadcasters

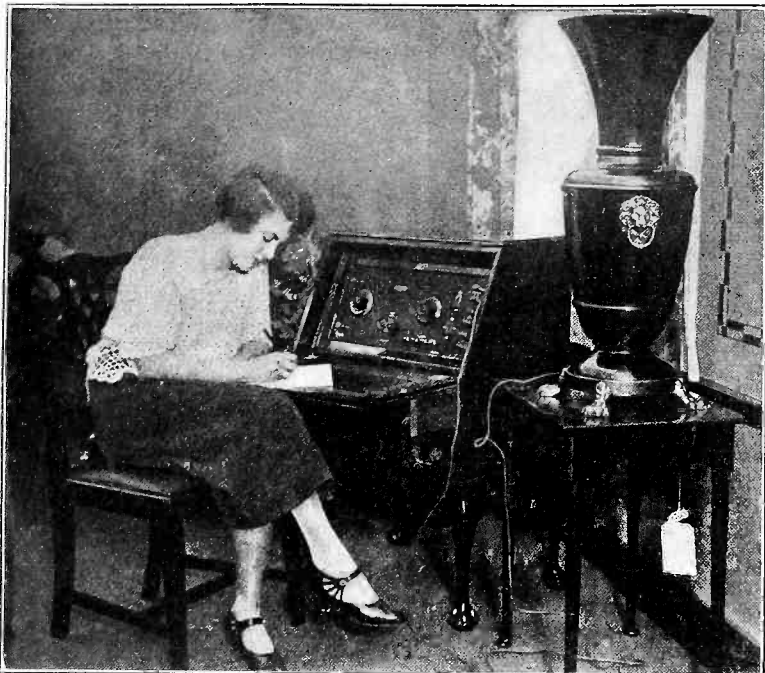
**T**HOSE of our readers who have followed our weekly statistics on radio broadcasting stations will remember that the total number has shown a consistent falling off during the past few months, as we predicted it would. The expense of installing and operating a broadcasting station is considerable and not to be lightly undertaken without a very definite object in view. A few months ago there were 573 broadcasting stations in operation. This number had fallen to 549 on January 1 and we would not be

surprised to see the total go below 500 at any time. Certainly that should be a sufficient number to more than supply the needs of the public in all parts of the country. Instead of the establishment of more new broadcasting stations we look to see a gradual weeding out take place and perhaps the connecting up of chains of three or four by land lines and the interconnection of such groups on special occasions—and all for the betterment of the service.

**R**ECENTLY we have had called to our attention some very interesting figures showing the results obtained by advertisers in radio publications. The returns on the advertising investments made are surprising and, in some cases, astounding. Modesty restrains, but truth compels us to state that RADIO WORLD headed the list in percentages of results on expenditures incurred.

**T**HE reflex receiver, radio-frequency amplification and the perfection of the low power vacuum tube are the three chief contributing causes for the high efficiency of the present day radio receiving set and its ease of manipulation in the hands of the amateur. Is it too much to hope that soon we may have a receiver in which all the necessary controls are combined in one?

# Six Interesting Radio News Pictures



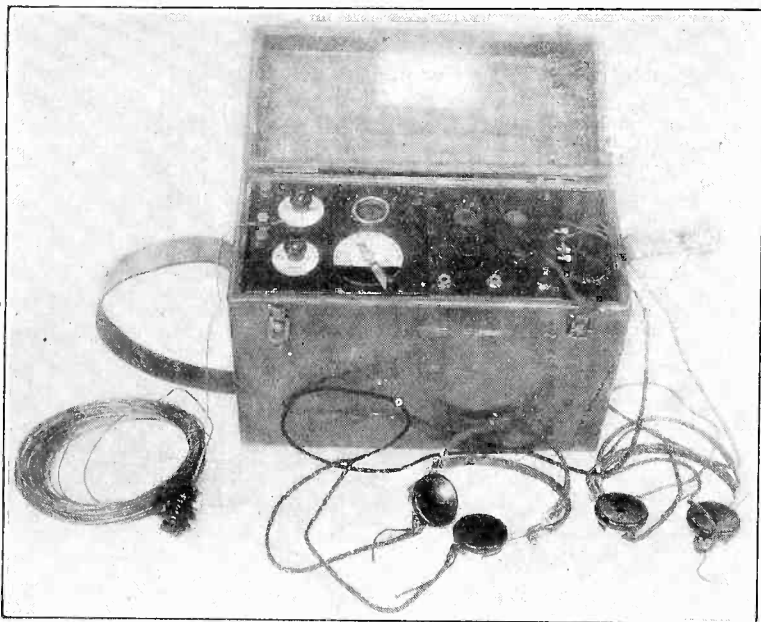
(C. Wide World Photos)

In England they tend toward the furniture idea in cabinets for radio more than they do in America. The illustration shows a radio set in an antique escritoire, with a Grecian urn doing duty as a loud speaker, and a fair British fan checking off some real DX programs. Rather neat, to say the least, isn't it?



(C. Foto Topics)

Louis Epstein, a well-known musician and rabid radio fan, was not satisfied with his loud speaker when operated by his powerful Flexodyne, as the volume made the horn rattle, so he thought that it would be a good idea to try his big horn as a speaker, and was surprised at the volume and tone. There is an idea, fans!



The famous Aeriola, Sr., receiving set with two stages of amplification used by Col. Birdseye in his expedition down the Grand Canyon. This is the very set used and, as can be seen, was packed in a larger water-proof outer case. This set was operated continually during the trip, and was immersed in the waters of the canyon for sometime without harming the instrument a bit.

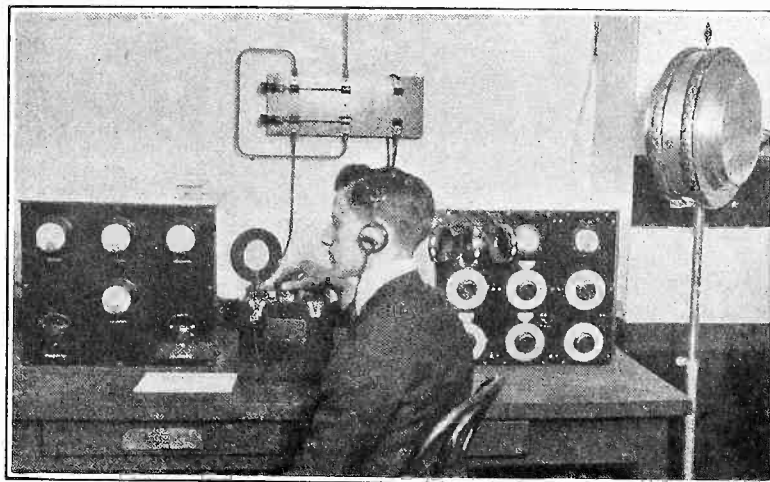


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# Here Are Good Broadcast Programs

## Station KDKA, East Pittsburgh, Pa.

326 Meters (920 Kcys.) E. S. T. Jan. 18.—9:45 A.M.—Union live stock market reports. 11:55 A.M.—Arlington time signals. 12 M.—Weather forecast, and United States Bureau of market reports. 12:10 P.M.—Noon concert by Broudy's Orchestra, Kaufman's Dining Room, Pittsburgh, Pa. 6:15 P.M.—Organ recital by Lucile Hale, from Cameo motion picture theatre, Pittsburgh, Pa. 7:15 P.M.—Radio Boy Scout meeting, conducted by Richard Victor, Scoutmaster. 7:45 P.M.—The Children's Period, 8 P.M.—Market reports. 8:15 P.M.—Sunday School lesson for Jan. 20, presented by Dr. R. L. Lanning. 8:30 P.M.—"Pay-Your-Bills-Promptly Day," being the first prize paper in the Thrift Week Essay contest. 8:40 P.M.—Concert arranged by Edwin P. Riehl, director of Knights of Columbus Opera Company. 9:55 P.M.—Arlington time signals. Weather forecast.

Jan. 19.—9:45 A.M.—Union live stock market reports. 11:55 A.M.—Arlington time signals. 122 M.—Weather forecast, and United States Bureau of Market reports. 1:30 P.M.—Concert by Daugherty's Orchestra from McCreery's Dining Room, Pittsburgh, Pa. 6:15 P.M.—Dinner concert by Westinghouse Band, under the direction of T. J. Vastine. 7:30 P.M.—"Bringing the World to America." 7:45 P.M.—The Children's Period. 8 P.M.—Feature. 8:15 P.M.—"Foreign Trade of the United States," Howard C. Kidd, Professor of Foreign Trade, University of Pittsburgh. 8:30 P.M.—"Share-With-Others Day," Rev. Hugh Thomson Kerr, Pastor of the Shadyside Presbyterian Church, Pittsburgh, being the fourth of the series "Thrift Week" talks. 8:40 P.M.—Concert by Westinghouse Band, conducted by T. J. Vastine. 9:55 P.M.—Arlington time signals. Weather forecast.

## Station WOR, Newark, N. J.

405 Meters (740 Kcys.) E. S. T. Jan. 18.—2:30-3:00 P.M.—Florence Lee, pianist. 3:00-3:30 P.M.—Cecile Preston, on "Making the Grade." 3:30 P.M.—Florence Lee, pianist. 6:15 P.M.—Caroline Thomas, violinist. 6:25 P.M.—Samuel Stanley, baritone. 6:30-7:00 P.M.—"Man in the Moon Stories for the Children." 7:00 P.M.—Violin selections by Caroline Thomas. 7:15 P.M.—Samuel Stanley, baritone.

Jan. 19.—2:30 P.M.—Katherine M. Lockwood, dramatic teacher. 2:45 P.M.—Kathryn Lemmo, soprano. 3:00-3:30 P.M.—Jeanette Brill, Assistant Attorney-General of New York State, on "Thrift." 3:30 P.M.—Dramatic readings, Katherine M. Lockwood. 3:45 P.M.—Kathryn Lemmo, soprano. 6:15-7:15 P.M.—"Music While You Dine"—All American Dance Orchestra. 7:15 P.M.—Fred J. Bendel, "Sporting News Up-to-the-Minute." 8:00 P.M.—Martin Rogers, on "Laugh and Grow Thin." 8:15 P.M.—Aida Brass Quartet. 8:30 P.M.—Mario Cutayer, tenor, and Edythe Connor, harpist. 8:45 P.M.—Belle Bart, astrologist. 9:00 P.M.—Aida Brass Quartet. 9:15 P.M.—Belle Bart, astrologist. 9:30 P.M.—Mario Cutayer, tenor, and Edythe Connor, harpist. 9:45-10:15 P.M.—Hon. E. Meade Whipple of Pennsylvania, on "Invasion by Immigration." 10:15 P.M.—Mario Cutayer, tenor, and Edythe Connor, harpist. 10:30-11:00 P.M.—John A. Patten, baritone.

## Station WBAP, Fort Worth, Texas

476 Meters (630 Kcys.) C. S. T. Daily Features.—10 A.M.—Opening and present quotations on cotton and grain, on the New York, New Orleans and Chicago markets; aviation weather conditions. 11 A.M.—Late cotton and grain quotations; late flashes from the Chicago, St. Louis and Kansas City markets by Department of Agriculture leased wires. Fruits and vegetables division quotations. United States weather forecast and Cotton Region bulletin report. 12 M.—Late market quotations. 12:05 to 12:30 P.M.—Noon day concert. 1 P.M.—Late market quotations. 2 P.M.—Fort Worth cattle market; Fort Worth cash grain markets. Close on grain. 2:20 P.M.—Close on cotton markets. 3 P.M.—Fort Worth's produce markets. Bradstreet's special telegraphic review of the nation's business for the week, on Saturday only. U. S. metal market review, telegraphic report furnished every Thursday by the Engineering and Mining Journal Press. 4 P.M.—Financial review. Dun's special telegraphic review of the nation's business pulse, on Saturday only.

## Station KPO, San Francisco, Calif.

423 Meters (770 Kcys.) P. T. Jan. 19.—8:00-12:00 P.M.—Art Weidner and his dance orchestra, by remote control from the Fairmont Hotel.

Jan. 20.—Radio church services under the direction of the American Bible Society. Undenominational and non-sectarian. Soloist, Victor Vogel, basso.

Jan. 21.—8:00-9:00 P.M.—G. Herold Montague Schulteis at the organ. 9:00-10:00 P.M.—The third of a series of lectures will be given by the San Francisco Conservatory of Music. 10:00-11:00 P.M.—E. Max Bradfield's Palace Hotel Dance Orchestra.

Jan. 22.—Operetta, "The Persian Garden," will be given by the Wiley B. Allen Company from 8:00 to 10:00 P.M. The Palace Hotel Dance Orchestra, 10:00 to 11:00 P.M.

## Station WJZ, New York City

455 Meters (660 Kcys.) E. S. T. Jan. 18.—12:15 P.M.—Friday Noon Hour of Music from the Brick Presbyterian Church. 3:00 P.M.—Organ recital played by Leo Riggs on the Hotel Astor Organ. 4:00 P.M.—New York University Radio Extension Course Lecture. 4:15 P.M.—Dance program by Jules Berkins Rosemont Orchestra. 5:00 P.M.—"The Larger Aspect of World Affairs," by the International Interpreter. 5:30 P.M.—Closing reports of the New York State Department of Farms and Markets; Farm and Home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; "The Conditions of the Leading Businesses"; "Evening Post" news. 7:20 P.M.—"Budgets," by Mrs. Edith McClure Patterson. 7:30 P.M.—Burr McIntosh, the Cheerful Philosopher. 8:05 P.M.—"Looseleaf" Current Topics. 8:30 P.M.—"Four Years in the Rhineland," by General Henry T. Allen, formerly in charge of the American Army of Occupation. 9:30 P.M.—Dinner of the International Benjamin Franklin Association, direct from the Hotel Astor.

Jan. 19.—3:15 P.M.—Recital by Vincent Desantis, violinist. 4:00 P.M.—Tea concert by the Hotel Belmont Stringed Ensemble. 5:00 P.M.—Quality Song Company, popular songs. 5:30 P.M.—Closing reports of the New York State Department of Farms and Markets; Farm and Home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; "Bradstreet's" financial report; "Evening Post" news. 7:00 P.M.—"Uncle Wiggly Stories," by Howard Garis. 7:30 P.M.—Charles Fleischmann, violinist, and Jean Berman, pianist, in joint recital. 8:45 P.M.—"A Million Swings in a Second," one of a series of talks on "Highlights of Modern Radio Broadcasting," by Dr. Alfred N. Goldsmith, Chief Broadcast Engineer of the Radio Corporation of America. 10:00 P.M.—Recital by Elizabeth Gibbs, contralto. 10:30 P.M.—Harold Stern and his Hotel Majestic Orchestra dance program direct from the Hotel Majestic.

Jan. 20.—11:00 A.M. to 1:00 P.M.; 7:00 P.M. to 10:30 P.M.

## Station WOC, Davenport, Iowa

484 Meters (620 Kcys.) C. S. T. Jan. 18.—10:00 A.M.—Opening market quotations and household hints. 10:55 A.M.—Time signals. 11:00 A.M.—Weather and river forecast. 11:05 A.M.—Market Quotations. 12:00 Noon—Chimes concert. 2:00 P.M.—Closing stocks and markets. 3:30 P.M.—Educational program (musical numbers to be announced). Lecture by C. A. Russell, "Water Purification." 5:45 P.M.—Chimes concert. 6:30 P.M.—Sandman's visit. 6:50 P.M.—Sport news and weather forecast. 7:00 P.M.—Educational lecture, "Health, the Nation's Greatest Asset," by A. L. Willis, D. C., a member of the faculty of the Palmer School of Chiropractic. 7:20 P.M.—Sunday School lesson—International lesson for next Sunday discussed by Dr. Frank Willard Court, pastor St. John's Methodist Episcopal Church, Davenport, Iowa. 8:00 P.M.—Musical program (1 hour).

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## Station WFAA, Dallas, Texas

476 Meters (630 Kcys.) C. S. T. Jan. 18.—12:30-1:00 P.M.—Address, Dr. Robert Stewart Hyer, Southern Methodist University, on the Sunday school lesson. 8:30-9:30—Five-minute talk for Safety Council on safety week. Music by St. James Methodist Church choir singers, colored.

Jan. 19.—12:30-1:00 P.M.—Address, William M. Reilly, editor of the Craftsman, on "The Logic of Organization for Labor." 8:30-9:30 P.M.—Five-minute talk for Safety Council on safety week. Musical program by A. Harris & Co.'s Orchestra, Prof. A. Cruze, director. 11:00-12:00 P.M.—Musical program, presenting Evan H. Evans, baritone, and Miss Ruth Abernathy, pianist, in trans-Atlantic recital.

Jan. 20.—6:00-7:00 P.M.—Radio Bible Class. Dr. William M. Anderson, Jr., pastor First Presbyterian Church, teacher; half hour of Bible study, half hour of gospel song. 9:30-10:00 P.M.—Address, Dr. Graham Frank, pastor Central Christian Church, on "Christianity and World Affairs." 10:00-11:00 P.M.—Footwarmers' Orchestra in dance music, Edgar Russel, manager.

## Station KSD, St. Louis, Mo.

546 Meters (550 Kcys.) C. S. T. Jan. 18.—6:30 P.M.—Broadcasting annual banquet of Missouri University Alumni, direct from Hotel Statler.

Jan. 19.—7:15 P.M.—Orchestra concert, organ recital, vocal and instrumental specialties broadcast direct from the Missouri Theatre.

## Station KYW, Chicago, Ill.

536 Meters (560 Kcys.) C. S. T. Jan. 18.—9:30 A.M.—Late news and comment of the financial and commercial markets. (This service is broadcast every half hour during the twenty-four.) 11:35 A.M.—Table talk by Mrs. Anna J. Peterson of Peoples Gas Co. 12:30 P.M.—"The Progress of the World." 6:30 P.M.—News, financial and final market and sport summary. 6:50 P.M.—Children's bedtime story. 10:00-12:30 A.M.—Midnight revue.

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Jan. 20.—11:00 A.M.—Central Church service broadcast from Orchestra Hall, Chicago. Dr. F. F. Shannon, pastor. 6:30 P.M.—Excerpts from the New Testament—An American Translation by Prof. E. J. Goodspeed, read by William Ziegler Nourse. 7:00 P.M.—Chicago Sunday Evening Club service broadcast from Orchestra Hall, Chicago. Special musical program under the direction of Edgar Nelson. Dr. J. Percival Huget will be the speaker of the evening.

## Station WGI, Medford, Mass.

360 Meters (830 Kcys.) E. S. T. Jan. 18.—12 M.—Selection on the Ampico. Amrad Round Table meeting. Selections on the Brunswick console. 12:40 P.M.—Weather forecast. 12:45 P.M.—Closing reports on farmers' produce market. 3 P.M.—Miss Dorothy H. Goodwin on "Wastage in Marketing Produce"; Musicales by the Brunswick console. 3:30 P.M.—Talk by Miss Dorothy Dean, Director, Girl Scouts. 5:30 P.M.—Closing stock market reports; live stock markets report. 6 P.M.—Meeting of the "Big Brother Amrad" Club. 6:15 P.M.—Code Practice, Lesson No. 218. 6:40 P.M.—Boston police reports. 7:30 P.M.—Selected verses by Mr. Charles L. H. Wagner, radio poet. Red Cross health talk by Henry Copley Green. 8:15 P.M.—Talk by Rachel N. Thompson on the "Association of Broadcast Listeners." Musicales by Miss Isabel Kirschen and assisting artist.

Jan. 19.—6:30 P.M.—Meeting of "Big Brother Amrad" Club. 6:45 P.M.—Code Practice, Lesson No. 219. 7:05 P.M.—Weather forecast. New England crop notes. 7:30 P.M.—Talk on New England business problems, by Arthur R. Curnick. Arthur Murray's course in ballroom dancing. Concert by Stram's Orchestra.

Jan. 20.—4 P.M.—"Adventure Hour," conducted by the Youth's Companion. Afternoon musicale. 8:30 P.M.—Talk on "World Unity," under the auspices of the Greater Boston Federation of Churches. Evening's musicale.

## Station WRC, Washington, D. C.

469 Meters (640 Kcys.) E. S. T. Jan. 18.—5:15 P.M.—Instruction in code practice. 6:00 P.M.—Children's Hour, by Peggy Albion. 8:00 P.M.—A Talk on the Coast Guard by Oliver M. Maxam, Chief of the Division of Operations. 8:15 P.M.—Song recital by Agnes Willis, soprano. 8:30 P.M.—Piano recital by Henrietta Howell. 8:45 P.M.—Violin recital by Albert Harris. 9:00 P.M.—"The Political Situation in Washington," by Frederic William Wile. 9:30 P.M.—Song recital by Raymond G. Moore, baritone. 9:45 P.M.—"Robert E. Lee," by Senator Claude A. Swanson, of Virginia. 10:00 P.M.—Concert by Hawaiian Orchestra.

Jan. 19.—3:00 P.M.—Fashion Developments of the Moment. 3:10 P.M.—Piano recital by Ellen Glendale. 3:25 P.M.—Current Events. 3:35 P.M.—Song recital by Rose Newlin, soprano. 3:50 P.M.—The Magazine of Wall Street. 4:00 P.M.—Travel Talk prepared by the National Geographic Society. 5:15 P.M.—Instruction in code practice. 6:00 P.M.—Children's Hour, by Peggy Albion.

## Station WOS, Jefferson City, Mo.

441 Meters (680 Kcys.) C. S. T. Jan. 18.—7:30 P.M.—Evening program. Missouri State Farmers' Week Session at Columbia, Mo., by line telephony.

Jan. 21.—8:00 P.M.—Dance program by the Missouri State Prison Orchestra, Hugh C. French, director.

Jan. 23.—8:00 P.M.—Dance program by S. C. Stancill's Novelty Six Dance Orchestra.

Jan. 25.—8:00 P.M.—Emerson's Orchestra broadcast by remote control from Miller Theatre.

Jan. 27.—7:30 P.M.—Entire services by remote control of the Central Evangelical Church, Rev. E. W. Berlekamp, pastor.

Jan. 28.—8:00 P.M.—Band concert by the "Radio-Famous" Missouri State Prison Concert Band, Virgil W. Combs, bandmaster.

Jan. 30.—8:00 P.M.—Barn Dance Music by the Old Time String Trio, Louie Barton, first fiddle; George Schrimpf, bass fiddle; Bryan Williams, guitar.



# More Good Broadcast Programs

## Station WDAR, Philadelphia, Pa.

395 Meters (760 Kcys.) E. S. T. Jan. 18.—11:45 A. M.—Daily almanac and digest of events of the day. 12:00 Noon—Organ recital from the Stanley Theatre; features from the studio; Arcadia Concert Orchestra. 2:00-3:00 P. M.—Arcadia Concert Orchestra; artist recital from the studio. 4:30 P. M.—Brunswick Dance Orchestra. 7:30 P. M.—Dream Daddy with the boys and girls. 7:50 P. M.—Book review by Robert Bruce. 8:00 P. M.—Poets and authors corner. 8:10 P. M.—Arcadia Concert Orchestra. 8:30 P. M.—"The Daughters of the Confederacy," by Mrs. Edgar Marburg. "See as I knew him," by Dr. Carter Helm Jones. A special program arranged in commemoration of the birth of General Robert E. Lee, on January 19, 1807, under the direction of the Philadelphia chapter, United Daughters of the Confederacy. 10:10 P. M.—Howard Lanin's Dance Orchestra.

Jan. 19.—11:45 A. M.—Daily almanac and digest of events of the day. 12:00 Noon—Organ recital from the Stanley Theatre. 2:00-3:00 P. M.—Dance music by Disherts Palace Dansant Orchestra. 4:30 P. M.—Bobbie Lee and His Cotton Pickers. 7:30 P. M.—Dream Daddy with the boys and girls.

## Station WIP, Philadelphia, Pa.

509 Meters (590 Kcys.) E. S. T. Jan. 18.—1:30 P. M.—Official weather forecast. 3:00 P. M.—Mrs. Ellis A. Schnabel, on "The Home Budget," for Thrift Week. 3:15 P. M.—Artist recital by Ethel Niethammer, soprano; Sara A. Slifer, contralto; Mrs. Frances Babcock, pianist. 6:00 P. M.—Official weather forecast. 6:05 P. M.—Dinner music by Jimmy Campbell's Little Club Studio Orchestra. 7:00 P. M.—Uncle Wip's bedtime stories and roll call for the children.

Jan. 19.—1:00 P. M.—Organ recital by Karl Bonawitz on the Germantown Theatre organ. 1:30 and 6:00 P. M.—Official weather forecast. 3:00 P. M.—"Thrift in Speech," by Mrs. C. I. Purnell. 3:15 P. M.—Popular program by a Paul Whiteman orchestra: "The Rialto Ramblers." 6:05 P. M.—The Greenwich Village Follies Serenaders. 7:00 P. M.—Uncle Wip's bedtime stories and roll call for the children. 8:00 P. M.—"The Aluminum Age," by Prof. Ralph P. Foran. 8:15 P. M.—Intercollegiate debate between Yale and U. of P. broadcast from Houston Hall, U. of P.

## Station WWJ, Detroit, Mich.

517 Meters (580 Kcys.) E. S. T. Jan. 18.—9:30 A. M.—"Tonight's Dinner." Special talk by the Woman's Editor. 9:45 A. M.—Public Health Service bulletins and talks on subjects of general interest. 10:25 A. M.—Official weather forecast. 11:55 A. M.—Arlington time. 12:00 P. M.—Dance music by Jean Goldkette's Orchestra, broadcast from the Graystone Ballroom. 3:00 P. M.—The Detroit News Orchestra. 3:30 P. M.—Official weather forecast. 3:35 P. M.—Market reports. 8:30 P. M.—The Detroit News Orchestra; Anne Campbell, Detroit News poet; Matthew Sallie, baritone.

Jan. 19.—9:30 A. M.—"Tonight's dinner." Special talk by the Woman's Editor. 9:45 A. M.—Public Health Service bulletins and talks on subjects of general interest. 10:25 A. M.—Official weather forecast. 11:55 A. M.—Arlington time. 3:00 P. M.—The Detroit News Orchestra. 3:30 P. M.—Official weather forecast. 3:35 P. M.—Market reports.

Jan. 20.—11:00 A. M.—Services of St. Paul's Episcopal Cathedral broadcast from the cathedral. 5:00 P. M.—The Detroit News Orchestra.

## Station KHJ, Los Angeles, Calif.

395 Meters (760 Kcys.) P. T. Jan. 18.—12:30-1:15 P. M.—News items, music. 2:30-3:30 P. M.—Matinee musicale. 6:40 P. M.—Live stock and market reports. 6:45-7:35 P. M.—Children's program. 8 to 10 P. M.—Program presented by Hollywood Woman's Club Chorus. Hugo Kirchofer, director. 10 to 12 P. M.—Broadcasting Art Hickman's Orchestra by line telephony from the Los Angeles Biltmore Hotel.

Jan. 19.—12:30-1:15 P. M.—Program presenting Ethel Sanborn, pianist-composer. 2:30-3:30 P. M.—Matinee musicale. 6:40 P. M.—Live stock and market reports. 6:45-7:30 P. M.—Children's program. 8-10 P. M.—Harry James Glendale. 10-12 P. M.—Broadcasting Art Hickman's Orchestra by line telephony from the Los Angeles Biltmore Hotel.

## Station WJY, New York City

405 Meters (740 Kcys.) E. S. T. Jan. 17.—8:30 P. M.—Charles D. Isaacson program. 9:30 P. M.—Concert by the Singers Glee Club at Aeolian Hall; forty male voices.

Jan. 18.—7:30 P. M.—Frank Shevit, "Income Taxes" talk. 7:45 P. M.—"The Work of the New York Assembly," by Julius Berg, Assemblyman from the Bronx. 9:00 P. M.—Report of the Wilson-Greb fight by direct wire from Madison Square Garden. 10:30 P. M.—Paul Specht and his Alamac Hotel Orchestra dance program, direct from the Congo Room of the Alamac Hotel.

Jan. 20.—2:30 P. M. to 5:00 P. M.; 8:00 P. M. to 10:30 P. M.

## Station WHAS, Louisville, Ky.

400 Meters (750 Kcys.) C. S. T. Jan. 18.—4:00-5:00 P. M.—Selections by the Strand Theatre Orchestra, Harry S. Currie, conductor. Police bulletins. Weather forecast. "Just Among Home Folks," a daily column appearing in The Courier-Journal. Selections by the Walnut Theatre Orchestra, Walter Davison, conductor. Late important news bulletin. 4:50 P. M.—Local livestock, produce and grain market reports. 5:00 P. M.—Official Central Standard time announced. 7:30-9:00 P. M.—Full concert by the LaGrange Orchestra, Karl Kuresteiner, director. Reading: An Interesting Historical Episode. Late important news bulletins. Official Central Standard time announced at 9 o'clock.

Jan. 19.—4:00-5:00 P. M.—Selections by the Walnut Theatre Orchestra, Walter Davison, conductor. Police bulletins. Weather forecast. "Just Among Home Folks," a daily humorous column appearing in The Courier-Journal. Selections by the Strand Theatre Orchestra, Harry S. Currie, conductor. Late important news bulletins. 4:50 P. M.—Local livestock, produce and grain market reports. 5:00 P. M.—Official Central Standard time announced. 7:30-8:00 P. M.—Georgetown, Indiana, Night, under the auspices of Miss Irma Clipp. Reading: An Interesting Historical Episode. Late important news bulletins. Official Central Standard time announced at 9 o'clock.

## Station WBZ, Springfield, Mass.

337 Meters (890 Kcys.) E. S. T. Jan. 18.—11:55 A. M.—Arlington time signals; weather reports; Boston and Springfield market reports. 6:00 P. M.—Dinner concert by the WBZ Quintette. 7:00 P. M.—"Affre Under Hatches," a dramatized story prepared by the Youth's Companion. 7:30 P. M.—Bedtime story for the kiddies. Current book review by R. A. MacDonald. 7:50 P. M.—Farmers' period—Talk by a member of the Eastern States Farmers' Exchange. 9:55 P. M.—Arlington time signals. 11:00 P. M.—Program of Chamber Music by the WBZ Quintette.

Jan. 19.—11:55 A. M.—Arlington time signals; weather reports; Boston and Springfield market reports. 7:00 P. M.—Dinner concert by the Hotel Kimball Trio direct from the Hotel Kimball dining room; Jan Geerts, director. 7:30 P. M.—Bedtime story for the kiddies. "Bringing the World to America." 8:00 P. M.—Concert by Myrtle Atchinson, pianist, and Alice Mikus, violinist; Irene E. Mikus, accompanist. 9:00 P. M.—Bedtime story for grown-ups by Orison S. Marden. 9:55 P. M.—Arlington time signals.

## Station WJAX, Cleveland, Ohio

390 Meters (770 Kilocycles). Central Standard Time. Condensed Program—9:00 to 9:45 A. M.—Bond gossip, financial news and grain markets. 10:00 to 10:45 A. M.—Quotations upon foreign exchange, live stock, grain, bonds and stocks; financial news bulletins and weather reports. 2:00 to 2:45 P. M.—Quotations upon grain, stock butter, eggs and poultry; foreign exchange and bonds; financial news bulletins and weather reports. 3:00 to 3:45 P. M.—Quotations upon fruits and vegetables, butter, eggs and poultry, live stock, hay and grain, flour and feed, foreign exchange, bonds and stocks; weather reports. This is for Monday, Tuesday, Wednesday, Thursday and Friday each week. First half holds for Saturday morning. Saturday afternoon and Sunday, no broadcasting from WJAX.

## Station CKAC, Montreal, Canada

425 Meters (700 Kcys.) E. S. T. Jan. 18.—1:45 P. M.—Rex Battle and His Mt. Royal Hotel Concert Orchestra. 2:15 P. M.—News. 4:00 P. M.—Weather and stock reports. 4:30 P. M.—Joseph C. Smith and His Mt. Royal Hotel Dance Orchestra. 5:15 P. M.—News.

Jan. 19.—7:00 P. M.—Kiddies' stories in French and English. 7:30 P. M.—Rex Battle and His Mt. Royal Concert Orchestra. 8:30 P. M.—Studio specials. 9:15 P. M.—Silent. 10:30 P. M.—Joseph C. Smith and His Mt. Royal Hotel Dance Orchestra. 11:30 P. M.—Late news. Announcements of weekly radio showers.

## Station WDAP, Chicago

360 Meters (830 Kilocycles). Central Standard Time. Standard Program.—Market reports daily, except Sunday, at 9:35, 10:01, 10:31, 11:01, 11:31 A. M.; 12:01, 12:31, 1:01, 1:25, 6:00, 10:30 P. M. Concert periods—1:35 P. M.—Luncheon concert daily, except Sunday. 7:00 P. M.—Dinner concert daily, except Sunday and Monday. 9:15 P. M.—Sunday only. 10:00 P. M.—Dance program and popular concert daily, except Sunday and Monday.

## Station WKAQ, San Juan, Porto Rico

360 Meters (830 Kilocycles). Porto Rico 1 ne. Standard Program—WKAQ, Radio Corporation of Porto Rico, broadcasts on 360 meters, every Tuesday and Friday, from 9 to 10:30 P. M., and Wednesday from 8 to 9 P. M., Porto Rico time, which is one hour earlier than E. S. T. Slogan: Porto Rico, the Island of Enchantment in the Carribean Sea.

## Station WOS, Jefferson City, Mo.

441 Meters (680 Kilocycles). Central Standard Time. Standard Program.—8:00 A. M.—Estimated receipts at Kansas City, St. Joseph, St. Louis and Chicago; announcements. 9:00 A. M.—Repeating estimated receipts; Chicago hog market; Eastern meat trade conditions; announcements. 10:00 A. M.—Weather forecast; St. Louis and Kansas City hog market; St. Louis and Chicago optional grain opening; announcements. 11:00 A. M.—Kansas City and St. Joseph flashes; St. Louis live stock market report; Chicago live stock market report; St. Louis and Chicago optional grain at 10:30; announcements. 12:00 Noon—Kansas City live stock market report; St. Joseph live stock report; St. Louis and Chicago optional grain at 11:30; announcements. 1:00 P. M.—Poultry, butter and egg report Chicago, New York, St. Louis; announcements. 2:00 P. M.—Advance estimates closing live stock markets Chicago, Kansas City, St. Louis; Chicago and St. Louis cash grain close; announcements. 5:00 P. M.—Music; marketgram; music; address; music; announcements. 8:00-9:30 P. M.—Monday, Wednesday and Friday nights: Concerts, agricultural lectures and public addresses.

## Station KGW, Portland, Oregon

492 Meters (610 Kcys.) P. T. Jan. 18.—3:30 P. M.—Lecture by Margery Smith of Oregon Agricultural College extension service. 7:30 P. M.—Weather forecast and market reports. 8:15 P. M.—George Olsen's Metropolitan Orchestra of the Portland Hotel. 9:00 P. M.—Lecture on "Land Settlement Work Under the Development Program," by A. S. Dudley, executive secretary, Oregon State Chamber of Commerce. 10:30 P. M.—Hoot Owls with Pantages frolic.

Jan. 19.—11:30 A. M.—Weather forecast. 3:30 P. M.—Children's program. Story by Aunt Nell. 7:30 P. M.—Weather forecast and market reports. 10:00 P. M.—Dance music by George Olsen's Metropolitan Orchestra of the Portland Hotel.

## Station WSB, Atlanta, Ga.

429 Meters (700 Kcys.) C. S. T. Jan. 18.—5:25 P. M.—Kiddie program and Burgess bedtime story by Miss Bonnie Bernhardt. 8:00-9:00 P. M.—Entertainment by the Hapeville (Ga.) String Band. 8:30 P. M.—"Highway Conditions in the Southeast," by representative of the Atlanta Motor Club. 10:45 P. M.—Transcontinental Radiowl entertainment.

Jan. 19.—5:15 P. M.—"Foreign Trade and Commerce" message by B. C. Getsinger. 5:25 P. M.—Kiddie program and Burgess bedtime story by Miss Bonnie Bernhardt. 8:00-9:00 P. M.—Musical entertainment. 10:45 P. M.—Transcontinental Radiowl entertainment, and message by Dr. Plato Durham, of Emory University.

## Station WLW, Cincinnati, Ohio

309 Meters (870 Kcys.). C. S. T. Jan. 18.—10:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Market reports. 3 P. M.—Business reports. 4 P. M.—Lecture recital by Mildred Templeton Williams of the Cincinnati Conservatory of Music.

Jan. 19.—10:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Stock exchange and business reports.

Jan. 20.—9:30 A. M.—Sunday School services, conducted by the editorial staff of Sunday School publications, Methodist Book Concern. 11 A. M.—Services of the Church of the Covenant, Rev. Frank Stevenson, minister. 8 P. M.—Reading Road Unitarian Church.

## Station KFI, Los Angeles, Calif.

469 Meters (630 Kilocycles). Pacific Time. Standard Schedule—Remote Control Stations: Los Angeles Evening Herald—5:00 to 5:30 P. M.—Daily except Sunday. 8:00 to 9:00 P. M.—Monday, Wednesday, Friday. Los Angeles Examiner—5:30 to 6:00 P. M.—Daily except Sunday. 9:00 to 10:00 P. M.—Daily. Hotel Ambassador—8:00 to 9:00 P. M.—Sunday, Tuesday, Thursday. 10:00 to 11:00 P. M.—Monday. 11:00 to 12:00 P. M.—Wednesday, Friday, Saturday.

## Station WFI, Philadelphia, Pa.

395 Meters (760 Kilocycles). Eastern Standard Time. Standard Program.—Daily 10:15 A. M.—Produce market and livestock report. 1:00 P. M.—Meyer Davis Bellevue Stratford Hotel Concert Orchestra. 1:50 P. M.—Agricultural report. 5:00 P. M.—Concert. 6:30 P. M.—Meyer Davis Bellevue Stratford Hotel Concert Orchestra. 7:00 P. M.—Talks to children. On Tuesday, Thursday and Saturday evenings special features starting at 8:00 o'clock. On Sunday chapel service at 4:30 P. M., and services of the Arch Street Presbyterian Church, Philadelphia, alternating 10:30

## Station WEF, New York City

492 Meters (610 Kilocycles). Eastern Standard Time. Regular Schedule.—Mornings—Tuesday to Friday, inclusive, 11:00-12:00 A. M. Afternoons—Monday to Saturday. 4:00-5:30 P. M. Evenings—Monday, Tuesday, Wednesday and Friday, 7:30-10:00 P. M.; Thursday, 7:00-12:00 P. M.; Saturday, 7:30-12:00 P. M. Sunday, 2:45-5:30 and 7:20-10:00 P. M.

# A Commercial Receiver That Does Not Re-radiate

By Jonas Leet

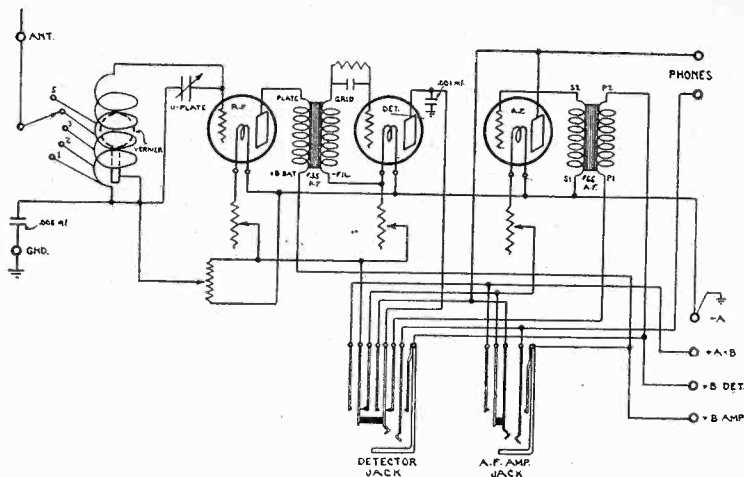


Fig. 1. Diagram of circuit used in the Federal 110 receiver. Due to the peculiar construction of the auto-transformer used as a main tuning inductance the receiver is not prone to creating interfering radiation.

RECEIVING sets of every description are being offered to the radio buying public, which fact presents a problem to these prospective buyers as to just which set will be most efficacious for their purposes. Changes in the style and appearance of receivers and improvements in the design are apparent to any one who takes note of the offerings in the stores.

Keeping up with the trend of the times, this year's buyers will find there are several features which will be embodied in the latest and best receivers. Some of these are: Elimination of re-radiation; adaptability to all makes of vacuum tubes, including the dry battery operated tubes; shock-proofing the sockets to eliminate mechanical noises, due to vibration of the tube; improvement in tone reproduction to allow better loud speaker operation; adaptability to all types of antenna; ease of control and greater selectivity; concealment of binding posts and connectors, thus keeping straggling wires out of sight; cabinets highly finished to conform with furniture; highly polished instrument panels and nicked brass metallic parts; construction of receiver so that dry batteries may be concealed inside of set if necessary. The new Federal receiver, type 110, incorporates these improvements.

The reader might say that these points are well covered, and from a wonderful sales talk for the man behind the counter. Their query is this: "What of the buyer who has in his mind to purchase a set which can easily be used by the children and women of the family?" Manufacturers have realized that the day of radio as a fad for the men of the family—something to be carefully guarded in the den—is gone, and have governed themselves accordingly. The new 110 type receiver with all the previously mentioned points carried out, is as simple to tune as any receiver could be. There is but a single tuning dial to enable the listener to tune stations, with selectivity enough in this one dial movement to satisfy the most exacting. Filament regulation and the radio-frequency amplification control through the potentiometer cannot be rightfully considered a control, as once set it will not have to be touched again.

The manufacturers consider that this machine is a big step in the right direction, considering the evolutionary process that radio is going through just now.

For some time research engineers have made interesting discoveries relating to the clearer reproduction of music and voice. The main trouble in that line seemed to originate in the audio-frequency transformers. A transformer should be able to reproduce the notes of the bass viol, bass drum and the lower notes of the piano and other stringed instruments without any distortion whatever. They have found the means of doing it, and the Federal 110 incorporates the results of their work in the new transformers used.

One feature that is proving more important each day is that of the antenna. Some people cannot erect outside antenna, yet do not want to use a loop; therefore, to be successful, a set should be able to operate on an indoor antenna as well as outdoor. To do this, however, requires certain simple changes. The regulation tuning system cannot be employed with great success. Therefore, in this receiver there is an entirely different type used. It is known as the auto-transformer type, similar in operation to the single circuit coil, but due to its construction it is entirely without the objectional tendency to re-radiate. This is a most important point in any receiver today. The main inductance consists of 48 turns of wire, so disposed that the selectivity switch varies the amount in use with the antenna, by a single turn, three turns, six turns, 10 turns or 15 turns. There are never more than 15 turns in the circuit, nor can there be less than one. Comparing this with the total of 48 turns, it will be seen that this gives a large step-up ratio for the amplification of the received signals with a correspondingly extreme low step-down ratio, preventing the most serious objection to any radio set—the radiation of objectionable oscillations.

Care is often lacking when it comes to the actual finish of the machine. Very seldom is it possible to own a radio set that could be placed in the finest drawing room without looking incongruously out of place. However, given a finely finished dark mahogany cabinet, of good design, a panel highly finished and metal work neatly nicked, no matter where the receiver is placed, it will look as though it belonged there.

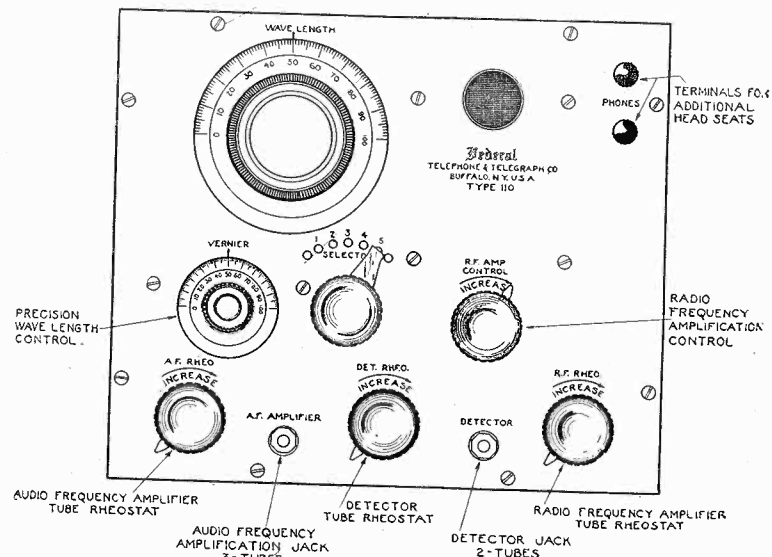


Fig. 2. Front panel view of the Federal receiver. Note the well-balanced appearance and the concentration of the main tuning controls in the upper left hand corner. The vernier in this receiver consists of a small copper plate, rotating in the field of the auto-transformer.

# Here's a Few DX Records That Will Make Your Fingers Itch

## DX Nite Owls, Attention!

THE DX season is now upon us.

All faithful DXers are requested to get ready for the fray and prepare themselves for the night vigil.

Send your records to the DX Editor of RADIO WORLD.

Write only on one side of the paper and write clearly.

Give full particulars of your location, your set, your aerials and other items of interest.

## A New Yorker Does DX

From L. H. Byrne, 720 W. 170th Street, N. Y. C.

The following is a list of stations received in one night, December 7th, from about 7:00 P. M. to 1:00 A. M. Stations picked up practically every night by the majority of sets in New York and needing no confirmation: KDKA, Pittsburgh; WOR, Newark; WJZ, WFAF, WHN, New York; WHK, Cleveland; WHAM, Rochester; WLAH, Syracuse; WGR, Buffalo; WDAP, KYW, WJAZ, Chicago; WRC, Washington; WRW, Tarrytown; WOO, WIP, WDAR, WFI, Philadelphia; WJAR, Providence; WGY, Schenectady; WCAE, Pittsburgh; WNAC, Boston; WBZ, Springfield, Mass.

The following are distant stations or are very small, so I copied one number of their program as a confirmation: WABP, Nashville, Tenn., 8:45, Orchestra, "My Sweetie Went Away"; WOC, Davenport, 9:00, Concert by Kennedy Music Club; WOS, Jefferson City, Mo., 9:37, Announced program by Mopac, Harmony Six of Sedalia, Mo., for following night; WSB, Atlanta, 9:40, Russian tenor solo, "Absence"; WFAA, Dallas, 10:45, End of Band Concert, read weather report; WWJ, Detroit, 9:50, Detroit News Orchestra, "Bebe"; WCBD, Zion, Ill., 10:00, solo "Face to Face"; WTAQ, Osseo, Wisc., 10:10, Acknowledged letters and cards, announced music for Virginia Reel; WBBB, Reading, Pa., 10:30, Orchestra, "Covered Wagon"; WLAG, Minneapolis, 10:50, Piano solo, Quartet; WHB, Kansas City, Public speaking; KOP, Detroit, 11:10, two band selections, announced stand by few minutes; WTAS, Elgin, Ill., 11:30, Caught them as they signed off; WAAE, Chicago, 11:30, announced winners of a prize contest, signed off; WMC, Memphis, 12:20, Orchestra, "Wonderful One"; WDAX, Centerville, Ia., 12:30, Orchestra dance program, gave name of station, but continued music without announcing names of pieces; KFKB, Milford, Kan., 12:35, Song, "Three O'Clock in the Morning"; WDAF, Kansas City, 12:50, voice and orchestra, "I'm Mighty Blue"; KHJ, Los Angeles, 1:05, announced Art Hickman's Orchestra playing from Biltmore Hotel.

I use a five tube Neutrodyne, made it myself, have about fifty feet of aerial on roof and seventy feet of lead in. The majority of the above stations were brought in with local stations going. I get Los Angeles every night the weather is favorable. My list of stations runs well over the hundred mark and I have had my set two months. I rarely ever sit up after 11:30 with it because its selectivity does away with interference from local stations. I do not claim this as a record because I know I can better the above list of stations with a good night.

## Welcome—Keep Your Ears Dry, Though

From Manuel Aronson, 808 Eastern Parkway, Brooklyn, N. Y.

I have been a constant reader of your excellent magazine and I have always taken great interest in the long distance records the fans send in. I have therefore decided to send you my list of stations. The following stations were heard by my brother and myself with the regular three-tube Reinartz circuit tuner, using a hundred foot antennae and twenty-five foot lead-in. I use only one stage of amplification for long distance. The following are the ones I have heard: WBAP, WGM, WSB, WOC, WDAF, WWJ, KYW, KSD, WCK, WMAK, WDAP, WBAK, WIP, WFI, WOO, WDAR, WGR, WGY, WHAZ, WCBD, WGR, WHB, WLAH, WCAE, KDKA, WMAP, WMC, WBT, WLW, WJAX, PWX, WHAS, WMAF, WFAA, WBZ, WJAZ, WOS, TAM, OAW, WRC, WJAR, KFKX, WFAO.

## Application Passed On—Arise, Brother Ham

From Joe Boyd, Box 167, Wynona, Oklahoma.

With your permission I will apply for membership in the DX Night Owls. Here is a list of stations heard by myself, with acknowledgments from most of them. They were all received

on a home constructed receiver: WOAW, WDAP, WSB, WFAA, WWJ, WHB, WPAH, WMAQ, WCX, WOAL, KFCL, WJAZ, KHJ, WMU, KFI, WMC, WDAF, KPO, WTAM, WHA, KLZ, WHAS, WCB, PWX, WOS, WOC, WLAG, WOO, WBAH, WGY, WLAL, WIAC, KFFQ, WSY, WAAW, WDAH, WCK, WEAY, WGR, WOI, WHAZ, WEAF, WLW, WJD, WCAH, KFCL, WSAI, KDKA, also one in Winnipeg, Canada.

This was done using the Light House Receivers, described in RADIO WORLD for August 25, 1923. Of almost two dozen circuits I have tried this is my choice for one tube set. I also have tried out several aerial systems, and my choice is one wire 100 feet long, including lead in and ground running north east and south west, with lead in from north east end. Would like to hear from other fans using this circuit, and will answer all letters if any one is interested. My mileage is 3400 miles—probably not much of a record but I have enjoyed DXing into the small hours—let's hear from all of you.

## Nice Record—This

From C. Mock, 934 Second Avenue, S. E., Le Mars, Iowa

I have been looking over your DX department. And I think that I have a list of stations that will compare with a good many. I have a single circuit all-wave set (from 100 to 4,000 meters). A one wire aerial one hundred and sixty feet long and fifty feet high. My set has been in operation for about two months and a half. I have logged over one hundred and seventy stations. These are all phone stations. The following stations are over one thousand miles from here.

(Station CJCS of Halifax, N. S., is not listed in the latest directories but I picked up a station giving that call and so did a friend of mine. Each time they were giving time signals.)

CJCS, CHBC, CFCN, CFAC, CJE, CJCX, CFCF, KGW, KFI, KHJ, KPO, KFAD, KFAE, KLS, KOB, WEAN, WEAS, WDAS, WEAF, WEAR, WCAP, WJZ, WBAY, WHAZ, WDAR, WWAD, WGY, WMAH, WOO, WRC, WMAP, WMAK, WBZ, WIP, WHN, WBAX, WMAZ, PWX, Havana, Cuba.

There was not one of the stations I have ever picked up that I had to strain my ears to get. I have picked up nearly all of them several times. I have a one stage and use two WD11 tubes.

## Here Is a Chance for Tuska Fans to Get Together

From John J. Doob, 120 West 86th Street, New York City.

I noticed your request for the DX stations received by the readers of your magazine and I therefore send in my list of stations. I have had the set only one month. My list is as follows:

KDKA, WBAK, WBR, KRE, KHJ, KSD, KWY, WAAK, WAAM, WAAZ, WBAN, WBAY, WBS, WBZ, WCAP, WCAU, WCBD, WCX, WDAP, WDAR, WDT, WEAF, WEAM, WEAQ, WFAA, WFAB, WFI, WGB, WGR, WGY, WHA, WHAS, WHAV, WHAZ, WHB, WHN, WIP, WJAX, WJAZ, WJY, WLAP, WLW, WMAK, WMC, WNAC, WOC, WOO, WOR, WQAO, WRAZ, WRW, WSAD, WSAI, WSAP, WSB, WTAS, WRC, WTAM, WWJ.

For local work I have an aerial about 40 feet long and for the DX stations I switch over to a 200 foot antenna. My set is a Tuska regenerative. The regeneration is extremely hard to control. I use UV 200 for detector and UV 201 A for the amplifier. I certainly would appreciate communication from anyone having a Tuska.

## This Fellow Does Some Traveling

From Herbert Wakem, Caribou, Me.

Here is my DX record for the summer, or rather since July 30, on a regenerative receiver with two stages of audio-frequency amplification. All the following stations come in with fine volume on but one stage, and I can hear most all of them plainly on the detector alone.

WGI, WGY, WOO, WBZ, WLAK, WDAR, WJAZ, WJY, WHAZ, KDKA, WCBD, WEAF, KYW, WEAN, WNAC, WGR, WIP, WCX, WSB, WWJ, WLW, WLAG, WHB, WDAF, WMAF, WDAP, WHA, NAA, WJAR, WEAM, WCAE, WFL, WOS, WOO, WOC, WOAW, KSD, WBAV, WHN, WDT, WCAP, WHAM, WBAK, WRC, WTAM, WSAI, WOAV, KFKX, WKAJ, WMAQ, WHK, WAAS, WTAS, WDAC, WFAA, CFCA, CKAC, XXX, WOR, CHCH, CYHC, DA, 6KW, PWX, 9CE, 2XI, 2ZJ, 9ZM.

These are just the most distant stations, and do not include a bunch of others that I do not get steadily. The above are regular visitors at this station, whenever they are on, I can tune them in. My antenna is 175 feet long and 60 feet high. I use a UV200 detector and a Cunningham amplifier. Quite a few of the above stations, even some of the real DX stations, come in on the loud speaker when using two stages—the conditions, of course, permitting such work.

# MAGNAVOX Radio Products



A2-R—\$85.00

## MAGNAVOX Radio Combination Set

A2-R consists of electro-dynamic reproducer and 2-stage Power Amplifier, as illustrated. This instrument insures the utmost in convenient, perfect reproduction with any good receiving set.

### Magnavox Reproducers

R2 with 18-inch curvex horn \$60.00  
R3 with 14-inch curvex horn \$35.00  
M1 with 14-in. curvex horn. Requires no battery for the field \$35.00

### Magnavox Combination Sets

A1-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 1 stage of amplification \$59.00  
A2-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 2 stages of amplification \$85.00

### Magnavox Power Amplifiers

A1—new 1-stage Power Amplifier \$27.50  
AC-2-C—2-stage Power Amplifier \$55.00  
AC-3-C—3-stage Power Amplifier \$75.00

Magnavox products can be had at Registered Magnavox Dealers everywhere. Write for new 32-page catalogue.

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Oakland, California

New York Office: 370 Seventh Avenue  
Canadian Distributors  
Perkins Electric Co., Ltd., Montreal

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Advertising Rates: Display, \$5.00 an inch, \$150.00 a page. Classified Quick-Action Advertising, 5 cents a word. Phones: Lackawanna 6976 and 8003

## "Mahoganite" Is a Trade-Marked Name

THE American Hard Rubber Co., 11 Mercer street, New York City, has issued the following notice to the trade: "Our attention has been directed to the fact that certain manufacturers of radio materials and parts have recently started to use the name 'Mahoganite' on some of their devices. This name is one of our trade marks for radio material and for panels, dials and other radio parts. Realizing that the unauthorized use of this name by others in the past may have been inadvertent, we are taking this occasion to bring to the notice of the trade the fact that we own the exclusive right to the use of the name 'Mahoganite' for radio materials and parts and that we shall look upon as an infringer anyone who uses this name upon similar products."

## New Radio and Electric Firms

Acme Electric Fuse Corp., Wilmington, Del., manufacture, \$100,000. (Colonial Charter Co.)

Tridot Electric Co., New York City, \$5,000; W. B. and M. Schoppler, N. Heyman. (Attorney, C. C. Cormany, 90 West Broadway.)

Harold Herbert, New York City, make radio sets, 50 shares common stock, no par value; S. and N. Herbert, D. Koran. (Attorneys, Bondy & Schloss, 276 Fifth Ave.)

United Electric Co., New York City, radio machinery, 400 shares preferred stock, \$100 each; 300 common, no par value; E. Victorson, J. Kirsch, I. Tahu. (Attorney, M. Reiburn, 160 Broadway.)

Model Electric Co., New York City, \$3,000; L. Bloom, A. Schmall, H. Dolger. (Attorney, J. Goldman, 38 Park Row.)

Electric Tool Kit Co., New York City, 100 shares common stock, no par value; T. A. Kerby, Jr., B. E. McAlveney, T. J. Dady. (Attorney, M. Paterson, 350 Fulton St., Brooklyn.)

United Scientific Laboratories, New York City, \$10,000; D. and S. and P. Wald. (Attorney, A. Wald, 276 5th Ave.)

Hanover Electric Co., New York City, \$10,000; J. B. Bander, F. McManus, I. Cutler. (Attorney, B. Davidson, 217 Broadway.)

## Who Is America's Most Popular Radio Entertainer?

Everybody is interested in this query: Who is America's most popular radio entertainer? You have your favorite. Who is she or he? Let us know your choice, whether a comedian, an opera singer, a jazz band, or a story-teller.

RADIO WORLD wants to be able to tell the world the name of the entertainer who stands highest in the regard of listeners-in.

Use the accompanying blank and mail to Broadcasting Manager, RADIO WORLD. Cut off. Fill out. Mail today.

BROADCASTING MANAGER, RADIO WORLD,  
1493 Broadway, New York City.

Dear Sir:

My favorite entertainer is..... Station.....  
My second choice is.....  
Name.....  
Street Address.....  
City and State.....

## Radiotrons Reduced in Price

THE Radio Corporation of America announced on January 11 that the price of radiotrons WD11, WD12, UV199 and UV201A had been reduced from \$6.50 to \$5.00 each. Manufacturing economies and continued demand were given as reasons for the new price.

## Coming Events

SECOND ANNUAL RADIO SHOW, Biltmore Hotel, Los Angeles, Calif., February 5 to 10, 1924.

INTERNATIONAL RADIO & ELECTRIC SHOW, Baltimore, Md., March, 1924.

DETROIT RADIO SHOW, Arena Gardens, Detroit, Mich., Jan. 15-17, 1924.

Radio will be featured at the electrical exhibition to be held at Melbourne, Australia, in September, 1924.

## 1924 Looks Good to Frank Munsey

FRANK MUNSEY, who is known as an able money maker and man of wealth as well as the proprietor of the "New York Herald," wrote an editorial for his paper on the prospects in 1924, in which he said:

"Nineteen twenty-four should be a good year for the American people generally.

"The New York Herald thinks it will be a good year. Business, economic and financial conditions are sound.

"Our factories are active. We have no idle men. Wages are high. The purchasing power of our people is enormous. With the influx of foreign manufactured goods held down by an efficient economic tariff, American mills and American factories are pushed to meet home demands.

"Everything considered The New York Herald sees no breakers ahead for 1924. The way looks open and the going good for American business prosperity, universal American prosperity, but not boom prosperity, just good sound prosperity."

## Radio Literature Wanted

Manufacturers of and dealers in radio apparatus and accessories are notified that literature and catalogues describing their products have been requested, through the Service Editor of RADIO WORLD, by the following:

General Distributors Co., 806 I St., N. W., Washington, D. C.

Saginaw Valley, Radio Co., 110 S. Hamilton Ave., Saginaw, Mich.

R. K. Judy, The National Bank of Middlesborough, Middlesborough, Ky.

A. A. Robertson, Marlow, Oklahoma (distributor).

Charles C. McDonald, Elstow, Saskatchewan, Canada.

Walter A. Rey, 318 West St., Stillwater, Oklahoma.

Radservus Radio, 986 East 94th St., Brooklyn, N. Y. (Dealers and repairs).

J. E. Jackson, Box 132, Lincoln Place, Pa.

C. G. Besse, 25 Linwood street, Arlington, Mass. (Retailer.)

Theo. Ressler, Mandan, North Dakota.

A. Marachowsky, Mauston, Wis. Jos. R. Coles, Mauston, Wis.

W. F. McGaugh, Box 463, Oromge, Texas.

Maurice Burke, 106 County Street, Monett, Mo.

C. A. Wood, 15 Lawnridge Ave., Albany, N. Y.

David Sherbowski, 174 Grafton Street, Brooklyn, N. Y.

## Amateur Songs to Be Broadcast

PAUL SPECHT, internationally famous 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.

## Radio Trade Note

General Distributors Co., electrical and hardware goods, 860 I street, N. W., Washington, D. C., are putting in a line of radio goods.

## Radio and Electrical Business Opportunities

Rate: 40c a line. Minimum, 3 lines.

INVENTIONS developed, models made. HENRY HERMAN, 11 East 42d St.

RADIO and electric store located in the best section of Brooklyn; must sell on account of health; opportunity for party with small capital to enter established business. Box 333, RADIO WORLD.

HUNGARIAN FILMS, one, three and six reels, offered at reasonable price; money-maker; interesting to lecturer. RADOSEVIC, 162 East 23d St. Phone Gramercy, 1692, 4-6 P. M.

## PATENTS WANTED

### For Manufacturing and Selling

We are desirous of obtaining the manufacturing and selling rights on a patent article for which a broad national demand exists or can be created by sales and advertising effort, preferably one requiring the production facilities of a metal working machine shop.

We are not interested in Wild Experiments, or products which have a limited market. If yours is an article of real merit, we can supply an adequately financed manufacturing and sales organization. Address Mr. G. H. Jackson,

Universal Tobacco Machine Co.  
198 Mt. Pleasant Ave. Newark, N. J.  
Telephone: Humboldt 0410

# VACUUM TUBES REPAIRED

WD-11, WD-12, UV-201A, UV-199 and others for **\$3.00**

Quick service. All tubes repaired by us guaranteed to work as good as new. Send your dead tubes. We prepay parcel post to you. All you pay is \$3.00 to post-man.

**THOMAS BROWN CO.**  
511-519 ORANGE ST. NEWARK, N. J.

# SAVE 50% ON AHLBELL CASE UNLEAKABLE RADIO BATTERIES

HERE is the lowest price and biggest guarantee offer in Radio Batteries today. This extra fine Silver-S specially designed Radio Battery at the wholesale price. Indestructible. Won't spill, leak or injure rugs or clothing. You are fully protected by our ironclad 2-year unconditional guarantee.



## SILVER S BATTERY

You get a new battery if your Silver-S is unsatisfactory for any reason.

### STARTLING PRICE CUTS

- 6 volts, 100 amps. \$13.50
- 6 volts, 120 amps. \$15.50
- 6 volts, 140 amps. \$17.00

SEND NO MONEY—Your battery shipped C.O.D. express, same day order received. Inspect it before you pay one cent. Read your 2-year guarantee. Convince yourself you are protected—that you save 50 per cent. Order today. 5% discount for cash with order.

### SILVER-S BATTERY CO.

1356 Michigan Ave. Dept. RW Chicago, Ill.

## UNCONDITIONAL 2-YR GUARANTEE

### Radio Supplies at Cut Prices

<b>CHARGERS</b>	
Handy (New Type).....	\$12.90
Homcharger.....	13.25
Genuine Tungar.....	15.75
<b>CONDENSERS</b>	
Crosley D.....	1.90
Bremer-Tully No. 23 Vernier.....	3.65
Bremer-Tully No. 43.....	4.39
New York Coil 11.....	1.19
New York Coil 23.....	1.45
New York Coil 43.....	2.25
Kellogg 11 Vernier & Dial.....	4.95
Kellogg 23 Vernier.....	5.65
Kellogg 43 Vernier.....	6.45
<b>COUPLERS AND VARIOMETERS</b>	
Kellogg Couplers.....	5.95
Kellogg Variometer.....	6.45
Dayton Fan Coupler.....	5.95
Dayton Fan Variometer.....	5.45
<b>PHONES</b>	
Western Electric.....	8.50
Baldwin.....	8.45
Blue Streak.....	3.39
Little Tattler.....	2.79
Frost 2000.....	2.85
<b>LOUD SPEAKERS</b>	
Dictogrand, New.....	19.75
R-3 Maganavox.....	24.75
M-1 Maganavox.....	24.90
A-1-R Maganavox.....	44.05
Western Electric 10-D.....	39.50
Western Electric 10-A.....	119.75
Western Electric Victrola Unit.....	8.90
<b>BATTERIES</b>	
Burgess No. 2156, 22 1/2 Volt, Large Size.....	1.85
Burgess No. 5306, 45 Volt, Large Size.....	3.45
Red Seal No. 6.....	.35
<b>TRANSFORMERS</b>	
Acme.....	3.69
All American (All Ratios).....	3.69
Federal, New Style.....	5.19
Bremer-Tully Neutroformer.....	1.39
Dayton Fan.....	3.97
<b>RHEOSTATS</b>	
Jenkins Vernier, 8.5 or 30 Ohm.....	1.29
Pacent, 20 Ohm.....	.73
Dayton Fan, 30 Ohm.....	.63
Marco Vernier.....	1.19
Crosley Multistats.....	.63
<b>MISCELLANEOUS</b>	
Bus Wire, Sq. Tinned, 2 Ft. Lengths.....	.03
Spaghetti, 3 Ft. Lengths.....	.06
UV-199, 201A, WD-12, WD-11.....	5.10
UV-200.....	4.10
<b>SETS</b>	
Bremer-Tully 5 Tube Neutrodyne.....	87.50
Precision Ace.....	14.95
Crosley V.....	21.25
Crosley XJ.....	48.75
Crosley XX.....	73.50
<b>PARTS</b>	
For a 5 Tube Neutrodyne.....	37.50
Write for Agent's Price List	
<b>VALLEY RADIO SUPPLY CO.</b>	
2206 Locust Street ST. LOUIS, MO.	

## High Praise, Indeed!

"I haven't missed a copy of RADIO WORLD for 18 months and 90 per cent. of what I know about radio I attribute to your good magazine. The Radio University is the first thing I read, for there I learn from others' woes."—M. A. Kaminsky, Bayonne, N. J.



## SUNBEAM

12 Years at the Same Spot.

## NEUTRO-DYNE

Complete 5 Tube Neutrodyne Parts for Freed-Eiseman or Fada \$75.00.

Built free of charge.

FROM WHOLESALE DIRECT TO YOU

Rebuild or Remodel Your Set at the Lowest Possible Cost.

Free on Request—Handy

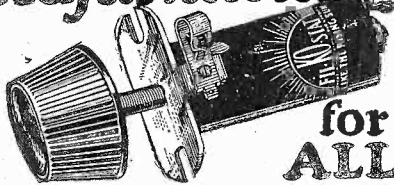
## RADIO RECORD BOOK

SUNBEAM ELECTRIC CO.

71 Third Avenue

New York City

# Infinite Adjustment



for ALL TUBES!

DESIGNED to permit infinite adjustment of currents used in vacuum tube. Gives absolute control of electronic flow and finest tuning possible. Fil-Ko-Stat will bring in DX you never heard before and shut out noise.

30 ohms full resistance. No adjustment to puzzle. No discs to break. No Carbon Powder.

\$2 AT ALL DEALERS

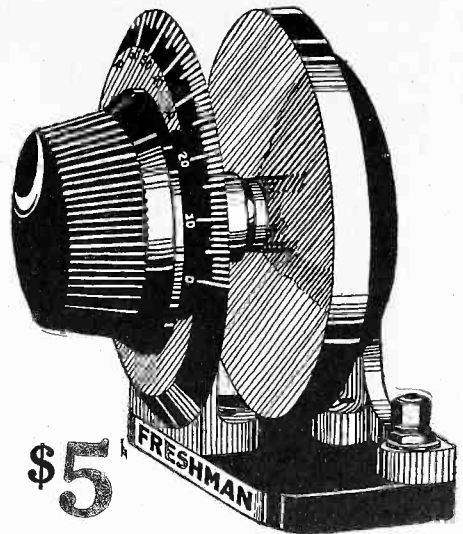
## FILKO-STAT

Made and Guaranteed by DX Instrument Co. Harrisburg, Pa. Radio Stores Corp., 218 W. 34th St., New York Sole International Distributors

Radio World's Quick Action Classified Ads bring results. Five cents a word, minimum 10 words. 10% discount four times.

For Transmission or Reception!

## "FRESHMAN SELECTIVE" Mercury Variable Condenser



It has been conceded by the Foremost Radio Engineers that a Variable Condenser with Mercury plates is the most efficient for fine adjustment and selective tuning. Our engineers, after exhaustive experiments and research work, have developed a Variable Condenser with Mercury plates separated by heavy Mica dielectric. It is the ONLY VARIABLE CONDENSER the plates of which actually vary in area—AN ENGINEERING FEAT NEVER ACCOMPLISHED BEFORE.

No Leakage  
Absolutely quiet  
No plate vibration  
Will stand 5,000 volts  
Compact and attractive  
Plates cannot collect dirt  
Cannot become short circuited

.0003 m. f. (equivalent to 17 plate)  
.0005 m. f. (equivalent to 23 plate) ALL TYPES \$5  
.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 Avenue New York

# KLERETONE

## LOUD SPEAKER



An \$18.00 Value at \$9.45 For Introductory Purposes For THIRTY DAYS ONLY

Radio devotees are beginning to realize that tone reproduction with the beautiful Kleretone horn is the best investment they can make. This horn has been declared by experts to be the equal of loud speakers costing twice as much, and has many advantages peculiar to itself. Fibre upright. Special high grade phone unit with cord. Rivals the human voice for clearness. Unusual volume.....\$9.45 With Adjustable Loud Speaking Unit.....\$12.45

Live Dealers and Side-Line Men: Write for our proposition.

Manufacturers' agents wanted

METAL PRODUCTS CO.

FRONT STREET

BEREA, OHIO

# Radio Expansion in 1924

IT'S rather hard to look ahead in radio. The recent development and present status of the new art of communication are so absorbingly interesting and significant that one is tempted to dwell on its aspects at the moment rather than consider the future.

Yet in spite of the phenomenal strides of radio in efficiency and popular favor during 1923, the advent of the new year finds it on the threshold of even more important expansion and usefulness.

The past year has been notable both in the improvement of local and long dis-

tance service and in the record-breaking increase in the number of builders and buyers of receiving sets.

The most spectacular, though not necessarily the most significant advances, have been in long distance communication. Radio, to be sure, had spanned the Atlantic previous to last year, but only under exceptionally favorable conditions and through experimental stations operated by experts. It remained for 1923 to witness amateurs—some of them with home-made sets—listen in on Europe, not only from the eastern seaboard of the United States, but from as far west as Chicago.

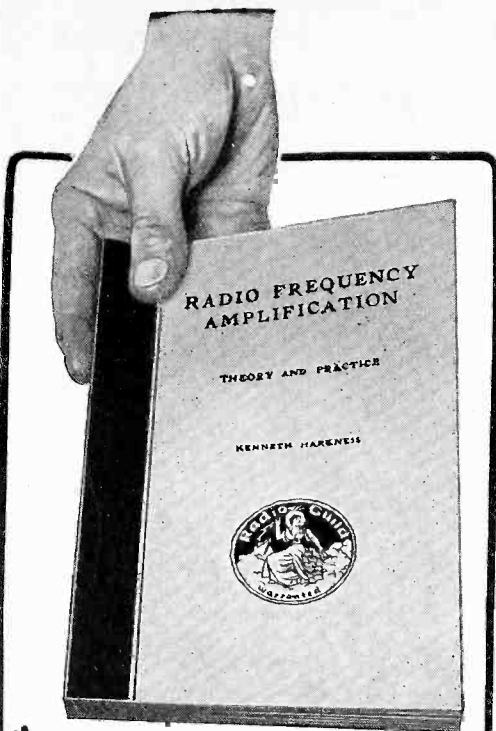
1923 was a wonderful year! Thanks to radio, even the North Pole is now only just around the corner; on Christmas Day, McMillan, the explorer, up in the frigid wastes of the Arctic Circle under the eaves of the world, heard his wife's voice broadcast from the United States!

In 1923 a message of the President of the United States was broadcast for the first time in history—the message of President Coolidge at the opening of Congress.

During the year Uncle Sam equipped his mail planes with radio. Columbia University in New York City began broadcasting regular courses. An enterprising commercial school set hundreds of stenographers to taking shorthand dictation from the air. The programs of education and entertainment from broadcasting stations were richer and more varied than ever before.

What of 1924? No one can safely prophecy the year's increase in the number of receiving sets—any more than they can tell exactly how many new ones

(Concluded on next page)



## "As Interesting as a Novel"

That's how one reader describes Kenneth Harkness' famous book "Radio Frequency Amplification."

"The book is comprehensive, concise, accurate, scientific, interesting as a novel... I wouldn't be without it for 10 times its price" he writes.

## Makes Advanced Radio Easy

This book explains to you in easy-to-grasp language the theory of radio reception from A to Z. It tells you everything you want to know about radio—answers all your questions. Kenneth Harkness wrote this book in your language, the language you use every day—the language you understand. His book fills an open gap in radio literature. He explains advanced radio—hitherto understood by mathematicians only—yet he explains it in simple, easily-understood English.

## Tells how to build Sets

In this book Kenneth Harkness shows you exactly how to build 5 different types of modern radio frequency amplifying receivers. He tells you all about the astonishing new single-tube "Harkness Receiver" which operates a loudspeaker and is consistently receiving stations within a radius of 3000 miles! 175 diagrams, drawings and action photographs banish misunderstanding.

## 5-day Examination Offer

We are so confident you will be delighted with this book that we will send it to you for 5 days' examination and let you judge for yourself. Just fill in and mail the coupon below. When the postman arrives deposit with him only \$1.25 plus a few cents postage. Examine the book for 5 days. Read it from beginning to end. See for yourself how it expands your knowledge of radio. If you are not absolutely satisfied, send the book back and we will refund your money without question. That's fair enough, isn't it? You take no risk; you've nothing to lose and everything to gain—so mail this coupon NOW and get your copy by return.

**Send No Money**  
Just mail this coupon

THE RADIO GUILD, Inc.,  
256 West 34th Street,  
New York, N. Y.

Send me—immediately—Kenneth Harkness' book "Radio Frequency Amplification." I will pay the postman \$1.25 plus a few cents postage with the understanding that if I am not absolutely satisfied I may return the book within 5 days after receipt for a prompt refund of my money.

Name .....

Full Address .....

(BW-1-19-24)

**RADIO CONSTRUCTOR plans make set building EASY!**

**2 Most Popular Circuits**  
(Just off the Press.)

Blue Prints showing Full Size Templates for drilling panel, wiring connections and complete instructions.

Neutralized Receiver (Embodiment of Neurodyne Principle), 3-Tube Cockaday **25c** each

The Radio Constructor hailed by experts as the Book of Wonder, is used by everyone in constructing their sets. It contains full size templates for drilling panel, wiring connections and complete instructions of 7 Popular Circuits. Get your copy today. If your dealer cannot supply you, mail us his address. **50c**

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**MAHOGANITE and BLACK RADION PANELS**

DIALS  
KNOBS  
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MAHOGANITE  
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ALL STOCK SIZES, Also CUT TO ANY SPECIAL SIZE

**HARD RUBBER PANELS (H-R. Grade) ALWAYS IN STOCK**

WHOLESALE *Send for Our Complete Price List.* RETAIL

**N. Y. HARD RUBBER TURNING CO.**  
212 CENTRE STREET Telephone: Canal 8315 NEW YORK, N. Y.

**WEIGHS ONLY 8 OZ**

**The Scientific**

**A \$200,000.00 COMPANY stands squarely back of the guarantee on every Scientific headset**

**SEND NO MONEY!**

20,000 TURNS EQUIVALENT TO 3,000 OHMS

**Order TODAY by Postcard and Pay Postman on arrival**

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**LOUD SPEAKER UNIT \$1.95**

THE PHONE IT TOOK A SOLID YEAR TO DESIGN

**We Guarantee** The Scientific Headset to be the greatest value on the market. Try it for five days. If not satisfactory send it back and your money will be refunded immediately. Circular on request. Dealers wanted.

**THE SCIENTIFIC ELECTRIC WORKS**  
98 Brookline Ave. DEPT. B BOSTON, MASS.

## Radio Expansion in 1924

(Concluded from preceding page)

were put in use in 1923. But today there are not less than two million sets in use in the United States. Is there any reason why there should not be a receiving set in every home in the land—20,000,000 sets instead of the 2,000,000 today? (Incidentally, the great majority of these sets were homemade). There are already 14,500,000 telephones, 12,000,000 phonographs and over 10,000,000 automobiles. In cost and utility, radio ought to have even better chances for as widespread use.

Sets are bound to improve in 1924, even as they have in 1923. Radio-users demand not only long distance reception, but it must come in loud and clear. It is not enough merely to amplify sound; there must be amplification without distortion. The sound must be clear and true, not radio a la racket.

Circuits that are simpler as well as more effective will undoubtedly greatly increase this year. Less complicated apparatus and fewer controls—such circuits for example, as the reflex—will increase the number of radio fans who,

though lacking technical knowledge of circuits, will get 100 per cent. enjoyment from radio.

Further improvement of programs and broadcasting service generally is on the cards for 1924. And Uncle Sam will keep a vigilant eye on the regulation of radio and the minimizing of interference and other obstacles to the development of the best service for the greatest number.

It may safely be predicted, too, that radio users will realize increasingly that amplification is the real key to radio—to all broadcasting, whether from continent to continent or city to city—and insist as never before on amplifying transformers that amplify without distorting.

### Radios of the Better Class

Fada's Neutrodyne Sleeper's Monotrol  
Complete Line  
Parts Sets

### LEDO RADIO CO.

5 Columbus Circle N. Y. City

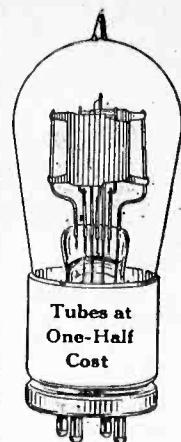
### Trade- "THORIO" -Mark DETECTOR-AMPLIFIER

T. No. 1. Detector-Amplifier. 1½ Volt Filament. ¼ Ampere. Plate Voltage, 22½-90.  
T. No. 3. Detector-Amplifier. 3 Volt Filament. .125 Ampere. Plate Voltage, 22½-90.  
T. No. 5. Detector-Amplifier. 6 Volt Filament. .25 Ampere. Plate Voltage, 22½-90.  
T. No. 7. Detector. 6 Volt Filament. ½ Ampere. Plate Voltage, 16-22½.  
Filament licensed under Patent No. 1422019 July 4th, 1922.

**THORIO TUBES GUARANTEED**  
Superior to any on the market for Volume, Clearness, Distance and lack of Tube Noise. Mailed Post Paid to any address in the United States at \$4.00 each.

### HAYDEN SALES COMPANY

109 GRAND STREET JERSEY CITY, N. J.  
Dealers' orders given prompt attention.



### Guaranteed Tube Repairs

WD-11	.....\$3.50
WD-12	..... 3.50
UV-200	..... 2.75
UV-201	..... 3.00
C-300	..... 2.75
C-301	..... 3.00
UV-201A	..... 3.50
C-301A	..... 3.50
DV-6A	..... 3.50

All tubes positively guaranteed to be satisfactory.

Special discounts to dealers.

Tubes returned P.P., C.O.D.

### HARVARD RADIO LABORATORIES

200-204 Old Colony Ave. So. Boston Mass.

## Radio of Excellence PARAGON

Type RB 2A, \$125.00

BALLANTINE Tuned Radio Frequency Transformer	.....\$0.60
LANGBEIN & KAUFMAN Variometers and Variocouplers	..... 7.00
AMPERITES	..... 1.10
MYERS HI-MU Vacuum Tubes	..... 4.35

Service That Is Certain

### RADIO & MECHANICAL TRADING CORP.

23 Warren St. New York City

### Nath. Baldwin Phones

Reg. \$12.00 Original Packages, Type O. \$8.85  
\$8.00 Brandes Superior Phones..... 4.65

#### Atwater-Kent Units

to build a 3 Tube Set. Wonderful value.

\$8.00 Detector Unit	.....\$4.45
10.00 One Stage	..... 7.85
13.00 Detector, One Stage	..... 9.65
16.50 Detector, Two Stage	..... 12.25
12.00 Coupled Circuit Tuner	..... 6.95
13.00 Mtd. Variocoupler	..... 9.65

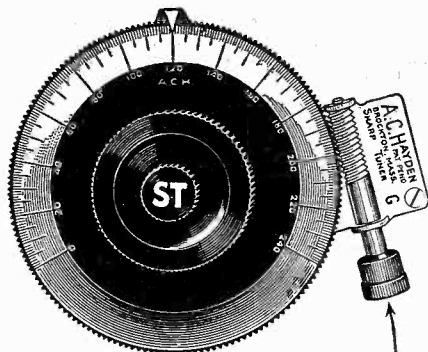
#### 1500 MILES ON ONE TUBE SET

Complete parts ready to be assembled with our connecting diagram, including cabinet, for \$12.85. W.D. 11, W.D. 12, U.V. 109 and U.V. 201A Tubes. Guaranteed Firsts, \$5.50. Everything guaranteed as firsts. Don't delay getting Price List No. 9. Wonderful bargains. We pay postage.

### RADIO SUPPLY STORES

254 W. STIEGEL STREET MANHEIM, PA.

## USE A C H SHARP TUNER DIALS



### Why the A.C.H. is different

3 in. DIAL (156-f0-1)  
4 in. DIAL (215-f0-1)

Rough tuning with dial or one thousandth of an inch in either direction.

#### MONEY BACK GUARANTEE

Price ACH 3" Dial Complete.....\$2.50  
Price ACH 4" Dial Complete.....\$5.00

Regular fitting 5-16" hole, ¼" and 3-16".  
Bushings, 5c. each extra. 10c. for all.

"Kindly accept my thanks for ACH Dial. The shield does away with body capacity, that I have been troubled with before. I only wish I had purchased one month ago." G. E. Allen, Hazardville, Conn.

"Please send me 6 more dials, I am enclosing \$2.00, balance C.O.D. I have had excellent results with the ACH on my set." R. N. Harrah, Rainage, W. Virginia.

To retain your good will you must be satisfied or money back.

The ACH will improve any set.

Send for circular No. 3 on HV Loud Talker and Detector Set. A truly wonderful set.

All ready for you to put together.

### A. C. HAYDEN RADIO & RESEARCH CO.

Brockton, Mass., U. S. A.

Mail Orders sent prepaid in U. S. A.

## Radio Fans—Here Is a Winner



Armstrong Regenerative Set  
Receiving Radius

600 Miles  
\$23.25

Order Direct From This Advertisement.

HERE is a money saving Radio Outfit that will bring the news of the world—concerts, lectures and stock reports—into your home. Sold complete with head set, tube, batteries, aerial and ground wires, for only \$23.25! Connections simple and plainly marked. Easy to tune. Order NOW! Shipping weight, 12 pounds. Shipped from CHICAGO or PHILADELPHIA store.

57RW9366 \$23.25

### Free Radio Catalog

Save on All Radio Supplies.

Save money on your Radio supplies, and get guaranteed quality! Our big FREE Book shows hundreds of bargains in complete sets and parts. Many new hook-ups, complete list of broadcasting stations. Contains "How to Build an Aerial."

Mail coupon today to store nearest you for Free Radio Catalog.



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Chicago - Philadelphia

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# Sears, Roebuck and Co.

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**RADIO BARGAINS**

Your set won't cost you much if you buy your radio parts from us. Our prices are the lowest. We stock only guaranteed standard radio merchandise. Mail Orders solicited. Write for Free Catalog. Largest Eastern Mail Order House. "Everything in Radio."

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**NASSAU CABINETS**  
OCKDOWN SOLID MAHOGANY

14x7x7...\$2.50 26x7x7...\$4.50  
21x7x7... 3.50 36x7x7... 5.50 **ANY Length**  
All other sizes at corresponding **ANY Height**  
prices, minimum \$2.50. Sent **Depth**  
C. O. D. Prompt Deliveries. With screws and hinges.  
**NASSAU CABINET CO., 20 Nassau St., New York**

**Reliable RADIO Goods**

**Results Are Sure With RELIABLE GOODS**  
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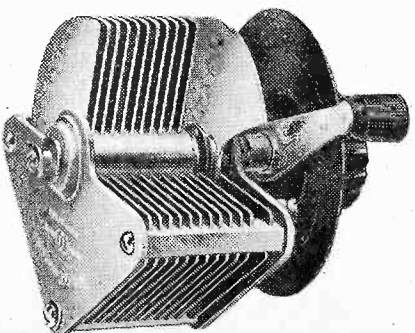
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# OUT OF THE ETHER

## Chats About Broadcasting Stations

By Hirsch M. Kaplan

Margaret Campbell soprano and the Lee House trio entertained us with a number of classical and popular numbers from station WRC, "The Voice of the Nation."

The other evening, after the daily papers had announced the Bok Peace Award, we tuned in on our radio sets and heard no less than five stations from which an address on the peace award was being delivered and every one of the speakers spoke on the same points. Now isn't this boring? Don't you agree with me when I say something ought to be done? Can't the stations be divided into classes, each class broadcasting a different type of program? Of course I leave this to the program directors—this is only a suggestion.

Say, did you folks ever hear a male quartette that had the class the Tiphany Quartette showed in their short but sweet program, rendered from station WOR? Harmony is their middle name. I'm for a return engagement of these vocal artists. Are you?

Everything has its day, even in radio. On Sunday no matter what station you tune in you're bound to hear a sermon; every day in the week, except Sunday at 10 P. M. you hear the broadcasting of time signals; at 5 P. M. you hear farm and market reports; between the hours of 6 and 7:30 you hear child or bed-

time stories; and after 11 you hear your dance orchestras.

Many of us may think that trans-Atlantic tests conducted by broadcasting stations in Europe and America are over, but not so with station W DAR, operated by Lit Bros., Philadelphia. Only the other evening they were tuned while offering Bobby Lee and his Cotton Diggers, who entertained with a very delightful program of dance selections.

Many of you have heard the cracker jack band of Missouri State Prison, but have you heard the new addition to this group of brass artists? They are the Missouri State Prison Dance Orchestra, and let me tell some of those well known orchestras that they'd better look after their laurels or else these striped jazz boys will be on their trail. Both of these popular prison combinations can be heard playing from station WOS.

Julia Tibbits, violinist, accompanied by Harry Seavor at the piano obliged us with a well played program of operatic selections. They were heard through WGY.

Through this column may we offer appreciation to station WOR, for giving our readers and us the opportunity of hearing the voice of the young screen star, "Mickey" Bennett? For a child of seven he certainly could talk. His rendering of the song entitled, "Big Brother" was marvelous.

Miss Irene Franklin, gifted comedian, entertained WJZ listeners with her character impersonations and songs.

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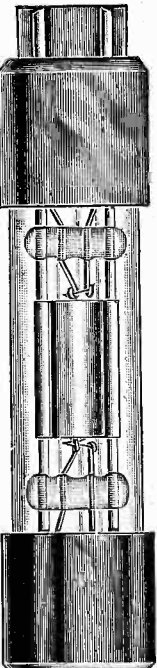
Editor **JOHN E. ANDERSON, A.B., M.A.**  
Formerly with the Western Electric Co.  
**ARTHUR C. C. MILLS, Radio Expert**  
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## A Radio Link With the World

IF it were not for the radio receiving set, which links them unfailingly with the outside world, a little community in the northwest corner of Orr's Island, Maine, would be facing a monotonous winter. Mrs. Dennis L. Wilson, in a letter just received by WGY, the broadcasting station of the General Electric Company at Schenectady, N. Y., gives a suggestion of how radio broadcasting in general, and the programs sent out by WGY in particular, have assured them of a far different winter season from that which they were obliged to go through in the 'old days.'

"We live," she writes, "on the northwest end of Orr's Island, just two families by ourselves, with only five people in all. There is sometimes a week in which we don't see a soul and in which we cannot get to our nearest neighbors, so you see what a comfort radio will be for us."

"I have been very ill, and so my family has all been in the house with me, and my mother-in-law, who is 79 years old, does not get to church very often. She is quite deaf, but she got almost all the service last Sunday night and she said

it did her a lot of good. It came in here as clear as a bell.

"We have only a small radio outfit, one lamp, with three dry cell batteries and two head sets. We have been hearing your concerts night after night, and we are having a feast of music and lectures. We look forward all day to the evening. I never heard so much in the way of good things, as I hear over the radio—things to uplift one and new thoughts."



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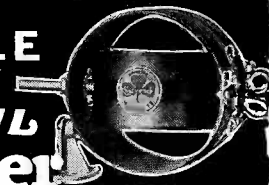
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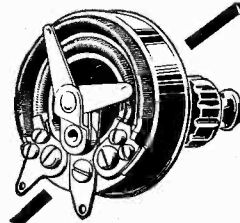
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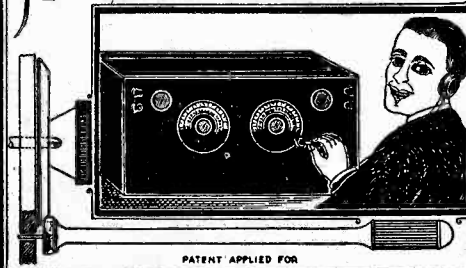
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**BOY** and girl radio fans all over the east are becoming greatly interested in the new broadcasting feature conducted at Station WGI, Medford Hillside, Mass., under the name of "The Big Brother Club." Over 200 boys and girls are enrolled as active 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 are held nightly from 6 to 6:15. Each new member is issued a Certificate of Membership card duly inscribed.

During these meetings by radio interesting letters from members are read and then "Big Brother" opens the discussion of especial interest to children, closing with friendly and timely advice. For instance, at one of the recent meetings, "Big Brother" warned his listeners to be careful while coasting, and to be ever on the watch to prevent accidents, illustrating with concrete examples.

"The Big Brother Club" is a new idea, and is receiving the enthusiastic support of mothers and fathers. It is planned to carry the educational possibilities still further and to conduct spelling bees, history lessons, simple problems in mathematics and geography. These radio 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."

It is expected that Big Brother Clubs will be established at other broadcasting stations in the near future. Address all communications to C. R. Emery, Station WGI, Medford Hillside, Mass.

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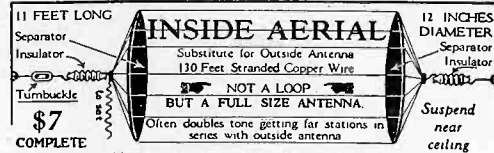
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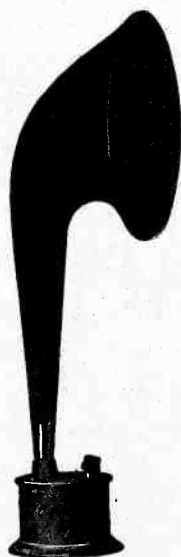
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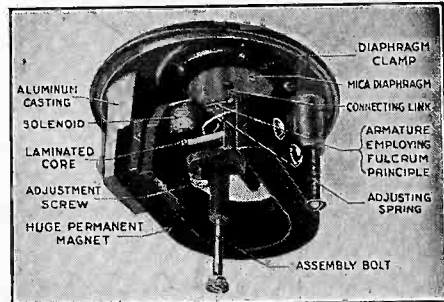
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An ear phone is an ear phone no matter how fancy the horn that covers it may be, and, due to the delicate construction of an ear phone it is utterly incapable of giving true tone reproduction, especially when relatively large currents are passed thru its coils, such as the output of a two-stage or power amplifier.

The Trinity Loud Speaker element embodies the well-proven and tested principles of the phonograph reproducer with the soundest principles of electromagnetic design best adapted for loud speaker operation. It is not an ear phone when placed on a head band and a loud speaker when covered with a horn. It is a sturdy loud-speaking element ALWAYS.

SEND FOR LITERATURE.

**TRINITY RADIO CORPORATION**

446 TREMONT STREET, BOSTON, MASS.

We repair UV 201A or C 301A at the price of \$8.50. No other types accepted. New Tubes. "Bell Tone" 6 volts 1/4 ampere type 201A amplifier and detector \$3.75. All tubes guaranteed and shipped properly packed P. P. C. O. D. Dealers write for special discount.

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**ALL LINES OF RADIO MERCHANDISE ARE IN OUR STOCK**  
New York Prices Direct to You  
Just Tell Us What You Want  
**GLOBE RADIO SHOP**  
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**Cockaday Coil Set \$2.50**  
Including full size blue prints of panel layout, complete picture hookup, and fully illustrated instructions for construction and operation.  
Coils are fully assembled, made exactly as specified by Mr. Cockaday. D coil bank wound. Far more efficient than any home-made coils.  
Standard parts for this sensational circuit—panel, coils, condensers, verniers, variable resistance, vernier, rheostat, socket, double jack, dials, switch, contact points, posts, busbar, wire, spaghetti, etc. (no tubes or phones).  
Complete for \$11.65  
Postage additional on all shipments.  
Send no Money. **PAY THE POSTMAN.**  
All Goods Shipped Parcel Post C. O. D.  
**RADIO SURPLUS STORES**  
HELENA, MONTANA

**Get a REAL "B" Battery One with Power—Rechargeable**  
*Roberts Rechargeable "B" Battery LASTS A LIFETIME*




**Roberts Rechargeable Storage B Battery.**  
A swing of the Switch Levers gives instant voltage, changes on detector and amplifying tubes. No change of wiring necessary. Only three (3) main terminals to connect.  
Type A—100 volts with variable detector from 16-22 volts, \$20.50.  
Type B—100 volts with variable detector from 16-22 volts, and variable voltage from 44-100 volts for amplifier, \$23.50.  
Type C—140 volts with variable detector from 16-22 volts, \$26.50.  
Type D—140 volts with variable detector from 16-22 volts, and variable voltage from 44-140 volts for amplifier, \$30.00.  
Batteries can be obtained from the following dealers:  
Brooklyn Radio Service, 573 Myrtle Ave., Smith and Livingston Sts., B'klyn, 17 John St., N. Y. C.  
Romeo Battery Co., 146 W. 68th St., N. Y. C.  
Stephens Radio Supplies  
6-8 Nassau Road, Roosevelt, L. I.  
or direct from  
**W. Roberts Storage B Battery Co.**  
1120 Myrtle Ave., Brooklyn, N. Y.  
Tel. Pulaski 2023 Open till 9 P. M.  
Dealers write for Terms. Mail Orders Filled.

**Liquid Air Aids In Making Vacuum Tubes**  
RADIO and liquid air at first glance would seem to bear no relation one to the other. Very few, if any, of those who sit so placidly before their radio receiving sets in the evenings listening to opera, symphony concerts, jazz, lectures, sermons and after dinner speeches realize what an important part liquid air plays in radio. In the manufacture of vacuum tubes, the Bell System Laboratories of the Western Electric Company use 150 quarts of liquid air daily which makes necessary the largest liquefying plant in New York City.

To make a good vacuum tube it is necessary to draw out as much of the gas as possible—the more that is pumped out the better the tube. Removing all but a very small amount of the gas prevents the electrons released from the filament from coming in contact with particles of gas thereby upsetting the neat calculations of the radio engineers and wrecking the disposition of the user.  
The pumping of a Western Electric vacuum tube is a very delicate process and employs what might seem to the untutored observer a labyrinth of glass tubing. But every inch and every crook has its purpose. A part of this system is composed of a type of glass pump using mercury vapor as a pumping agent. It is also provided with a mercury trap inserted in the system between the mercury pump and the tubes being exhausted. This trap is surrounded by liquid air which condenses the mercury vapor, freezing it to the walls of the trap as moisture is frozen on our window pane in winter time.  
Liquid air is one of the coldest things known. It never gets warmer than -312; put a beaker full on a cake of ice, the liquid air would boil briskly because the ice, being at say 32 degrees, is quite hot as compared with the liquid air at 312 degrees.

**YOU SAVE 50% OF THE USUAL COST**



**WORLD RADIO Batteries**  
Are Guaranteed 2 years in Writing  
Will ship C. O. D. subject to inspection, or allow 5% discount for cash with order. Orders shipped same day received. **WRITE TODAY.**  
**World Battery Co.**  
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1219 So. Wabash Ave. Chicago, Ill.  
6 Volt, 100 Amps. \$12.50  
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6 Volt. 140 Amps. 16.00

<b>2 VOLT STORAGE BATTERY for</b>	
WD11 — WD12 \$5.00	
6 V., 60 Amps. \$8.50	
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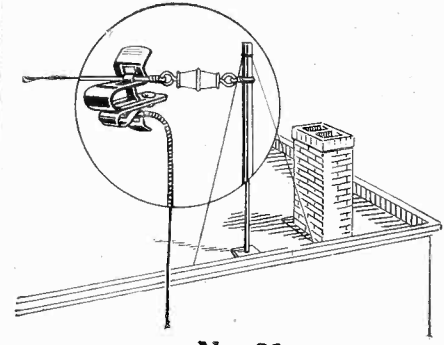
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use the well known  
**Como Duplex Transformers**  
Push-Pull  
Send for literature  
**COMO APPARATUS COMPANY**  
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**SLEEPER-MONOTROL GRIMES INVERSE DUPLEX CIRCUIT**  
One control—no aerial, no ground.  
Four tube set, \$140 Three tube set, \$115  
Booklet on request  
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**NOW \$25 FOR \$10**  
**BEL-CANTO LOUD SPEAKER**  
Delivered direct from factory to you on receipt of only \$10.  
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By Prof. T. O'Connor Sloana. Just issued an entirely new edition brought up to date and greatly enlarged. Price, \$5.00. The Columbia Print, 1493 Broadway, New York.

**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.  
At Your Dealers  
**Fahnestock Elec. Co.**  
LONG ISLAND CITY NEW YORK

DO YOU WANT TO BUY, SELL OR EXCHANGE RADIO OR OTHER GOODS? TRY THIS DEPARTMENT AT 5c A WORD

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**VACUUM TUBE RESULTS FROM A CRYSTAL SET!** A "PT" Ultra-Sensitive Contact will increase the range and audibility of your crystal receiver. The most sensitive catwhisker in the world. It will not jar out. Thousands in use. Record, 1,000 miles on phone; 3,300 miles on spark. Price twenty-five cents in coin. "PT" CRYSTAL CONTACT COMPANY, Box 1641, Boston.

**RADIO CALL CARDS** printed TO ORDER Red Call, black printing 100—\$1.75; 200—\$2.75, prepaid. Color changes 35c extra. **GOVERNMENT POSTALS** 1c extra each card. **LETTERHEADS** 3/2 x 5/2 AND ENVELOPES, 100 EACH \$2.25; 200 EACH, \$3.25. ARRL emblem used on cards or stationery if requested. **SEND TO-DAY.** DEPARTMENT 71C, Radio Printers, Mendota, Illinois.

**BARGAINS—Kennedy Intermediate tuner and detector, 3,000-meter wave length, used three months; perfect condition; \$113.00. New UV201 tubes, \$3.95. Two Willard storage B batteries, used about one month, \$5.00 each. N. W. HILL, HUNTINGDON, PA.**

**EMERSON MOTOR GENERATOR, fifteen hundred volts, \$110.00. Parts for 100-watt—Cheap! Irving Rasmussen (9BCH), 205 Parkway, Oshkosh, Wisconsin.**

**\$100.00 a week to agents. Box 732, New Britain, Conn.**

**MAGNAVOX R3 or M1—Latest nationally advertised reproducers. List, \$35. Introductory, \$25. The factory sealed carton is your guarantee. RADIO CENTRAL, Dept. W., Abilene, Kans.**

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**MARVELOUS** mixture renews old batteries. Cheap, easily made, save money. 25c silver. Bornkey-RW, Lock Box 617, BURNHAM, Pa.

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**TELEGRAPHY IN A WEEK.** A new wonderfully simple system. Patent pending. \$1.00 postpaid. A. U. Medellin, Mesilla Park, New Mexico.

**EXCHANGE JOLLY, INTERESTING LETTERS THROUGH OUR CLUB.** Betty Lee, Inc., 4254 Broadway, New York City. Stamp approx.

# Station WEAF Increases Its Power

THE American Telephone & Telegraph Company last week made the following statement regarding the increase in power of Station WEAF, New York City:

"Continuing its experiment with high power, WEAF will resume broadcasting its regular program on a gradually increasing scale of power. Beginning on Saturday afternoon, January 5, the power was reduced to 500 watts. After two or three days' transmission on this power the new transmitter will be used on its minimum power of one kilowatt and transmission will be continued with this adjustment for several days until full data as to the results with this power are obtained. Power will then be gradually increased, first using two kilowatts and after two days' additional testing four kilowatts.

"The results of the first few days' experiment indicated wide-spread approval on the part of radio listeners in all sections of the country as the exceptional programs offered by WEAF are consistently available over much greater distance than heretofore. An analysis of over 3,000 letters received indicates that approximately 90 per cent. were highly pleased with the new change of equipment. The balance of 10 per cent. were divided as follows: Five per cent. experienced trouble due to overloading of the receiving set and the utilization of too many stages of amplification. These cases are easily remedied by readjustment of the receiving set. Two and one-half per cent. complained of noisy transmission. This will gradually be eliminated as the adjustment of the generators and associated instruments are more perfectly effected. The balance of 2½ per cent. were reports of blanketing of other stations because receiving stations are located within a short distance of the transmitter, and in many cases not sufficiently selective.

"The increase of power WEAF has adopted is caused by the insistent demand on the part of radio listeners for reception of louder volume. Experiments will be continued until a satisfactory level is determined upon.

"At the present time there are several broadcasting stations all somewhat higher powered than the maximum used with the new transmitter operating on regular schedule. This accounts for the excellent reception in New York of Chicago, Pittsburgh and Schenectady stations. It is likely that as soon as receiving sets are adapted to the new conditions, cause for complaint which may exist at present will be remedied. It may be recalled that when two broadcasting channels of 360 and 400 meters were established last spring and later when four channels were established, radio listeners experienced difficulty, but with improvement of sets it was soon found that the new conditions were better than the old.

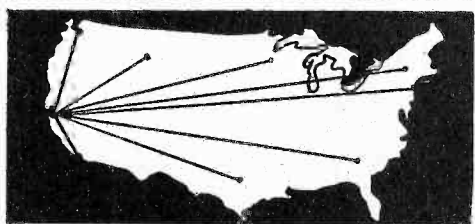
"Since experiments were begun with the new transmitter reports from all parts of the country have been received of consistent reception of WEAF's program at great distances. Perhaps the most interesting of these is a cablegram received from Buenos Aires, 5,000-mile air line distant from New York. The cablegram advised that WEAF was heard from midnight to 1:30 A. M., December 30, with a consistent volume."

Nath. Baldwin Phones with

**SHELTONE**  
LOUD SPEAKER  
COMPLETE \$10.00

Postpaid. Use your headset for 2 purposes—Exceptional combination value—Every pair of phones tested—Guaranteed to give results.

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### ON ONE TUBE

Broadcasting from Atlantic Coast, Mexico, Hawaii, Canada and Cuba heard in California by users of CROSS COUNTRY CIRCUIT. Range due to simplicity of set and only one tuning control. Easily and cheaply built by any novice. Dry cell tubes may be used. All instructions, blueprint panel layout, assembly photo, etc. Postpaid 25c. Stamps accepted.

VESCO RADIO SHOP, BX RW-117, Oakland, Cal.

## LISTEN-IN RADIO RECORD

REGISTERED U.S. PAT. OFF.  
THE ONLY "LISTEN-IN" BOOK

KEEP A RECORD OF STATIONS HEARD, DIAL SETTINGS, RECEIVING CONDITIONS, ETC.

Flexible cloth binding. Gold stamping. 160 pages. Printed on Bond Paper. Contains introductory article "How to Receive Radio Broadcast," by Lloyd C. Greene, Radio editor Boston Globe. Many Radio Hints and Tips. Complete list of Broadcasting Stations and double page map of United States.

PRICE  
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At Your Dealers or Sent Prepaid on Receipt of Price

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## Coast to Coast on One Tube and No Body Capacity

These popular hook-ups use UV-199, WD-11 or WD-12 Tubes. One hook-up gives selectivity and 1,500 miles with absolutely no body capacity, while the other gives the remarkable distance of coast to coast. Both prints postpaid for 50 cents or any of the above tubes postpaid \$5.45. No stamps accepted.

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## The Whole U.S.A. at Your Finger Tips



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**A KENNEDY TUNER**  
PATENT PENDING  
NONE GENUINE WITHOUT THIS SIGNATURE

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### BE CONVINCED WITH YOUR OWN EARS

I give demonstrations each evening at my home, 470 West 159th Street, N. Y. C., of my Tuner, bringing in Stations from New York to Los Angeles.

The Kennedy Tuner has no taps and no switches to turn and only one control to pick Stations with. Volume can be increased or decreased by turning dial on Kennedy Tuner, making receiver so simple anyone in family can operate.

Kennedy Tuner and Diagram ..... \$5.00  
Diagram without Tuner.....\$1.00

Send your check, money order, or pay postman C. O. D. as preferred. Call at 137 West 48th Street by day or 470 West 159th Street evenings.

Satisfaction Guaranteed or Money Refunded

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## G. W. 5 Circuit Radio Plug

PATENT APPLIED FOR



PHONES  
LOUD SPEAKER  
SERIES  
PARALLEL  
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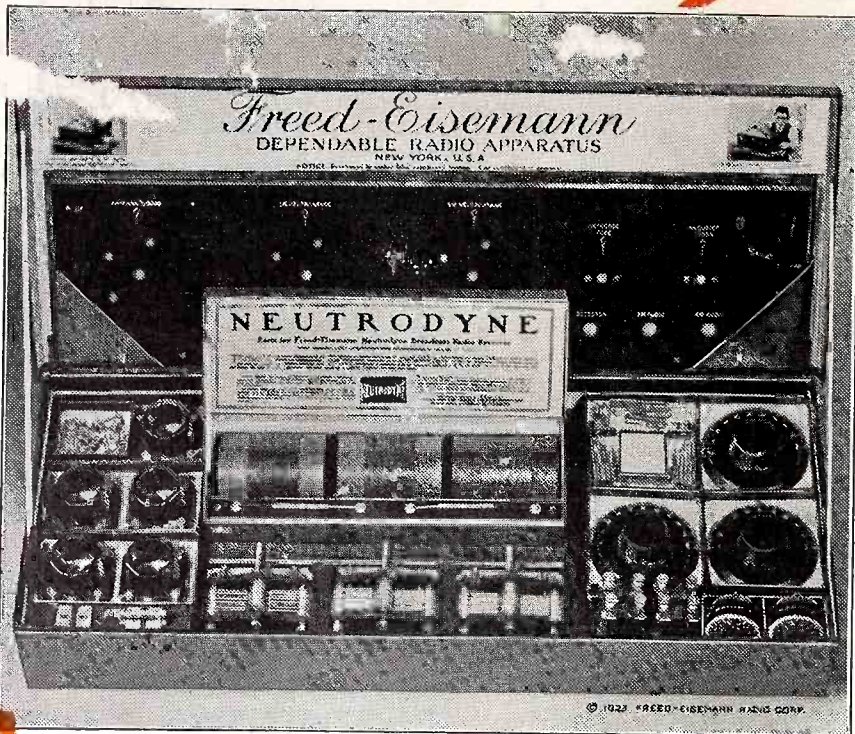
Accommodates Head Set and Loud Speaker or Two Head Sets — permitting instant choice of Five Circuits without removing plug or changing tips.

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MADE OF GENUINE BAKELITE  
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32-PAGE ILLUSTRATED BOOK of instruction on "How to Build the Neutrodyne," with full size pictorial wiring diagram and full size panel and baseboard templates, \$1. At your Radio Dealers.



Unassembled Model KD-50, Freed-Eisemann Neutrodyne Receiver

**NOW** for the first time the opportunity is presented to obtain a complete set of parts, recommended by the manufacturer, to work with each other in building your Neutrodyne set. An illustrated 32-page book on how to build the Neutrodyne with full-sized diagrams and templates included.

Complete  
With Full Instructions

**\$80**

# A FREED-EISEMANN KNOCKDOWN NEUTRODYNE SET

Neutrodyne has taken the country by storm, but owing to the fact that parts designed to work harmoniously with each other were not available, it has not heretofore been easy to build this remarkable distance getting, powerful, non-oscillating and non-whistling receiver.

Many months have been spent in preparing the 32-page book, which answers every question the builder may ask. The panel is accurately drilled. A baseboard is furnished. In fact, everything down to the very last screw and nut, including all necessary parts **excepting the cabinet**.

Besides the book there is furnished schematic blueprints and template for drilling the baseboard, also full-size pictorial perspective wiring diagram, so that it will hardly be possible for the amateur with ordinary care and skill to **make an error**.

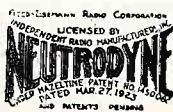
Here are licensed parts. Beware of poorly designed, unlicensed parts. The book and the two full size blueprints which accompany this package have been pronounced to be the most complete and the simplest set of instructions which have ever been prepared for the building of any radio receiver.

Behind all this is the Freed-Eisemann reputation for master craftsmanship and careful engineering. Remember, that this is not a collection of apparatus which is offered trusting to luck that it will assemble properly. Each part is **designed** and fitted to work with each other part in this particular set. The instructions are so complete and the parts so accurately matched that you will be grateful for the manner in which we have eliminated guess work in the amateur construction of this receiver.

For sale by dealers of the better class throughout the country, for amateur and experimental building. Builders are cautioned against attempting to build a Neutrodyne Set with parts which are not recommended and designed by the manufacturer to work with each other.

## Freed-Eisemann Radio Corp.

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Manhattan  
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Brooklyn  
N. Y.



Front View of KD-50  
Neutrodyne Assembled.

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