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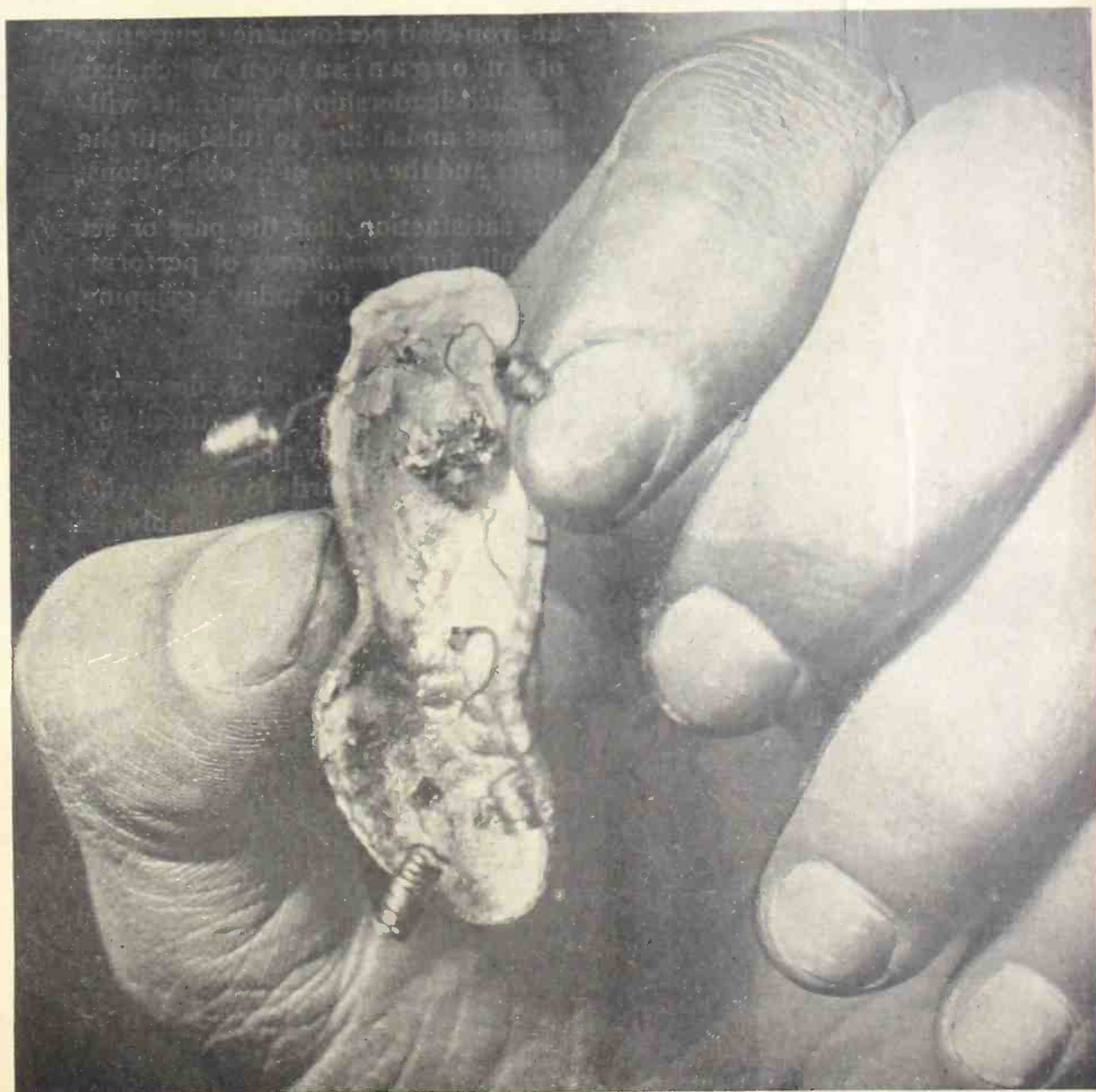
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# RADIO WORLD

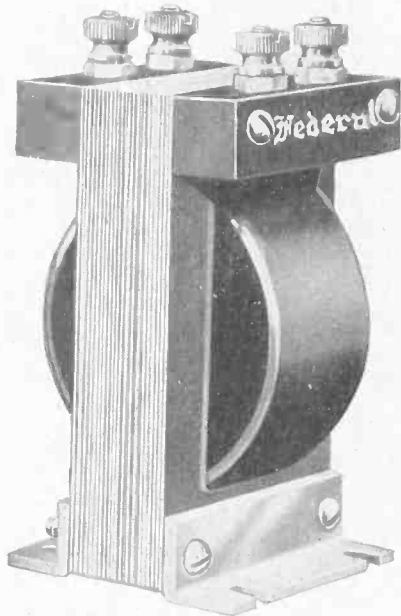
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We have heard of "Peanut Tubes," but here is a "Peanut Set" built by Edward Kilian, of Washington, D. C., out of the empty shell of a tasty goober, some odd pieces of wire, and a sensitive bit of crystal.—(C. International Newsreel)

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# RADIO WORLD

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## A Tuned and Untuned Radio-Frequency Three-Tube Receiver

By C. White, Consulting Engineer

**R**ADIO development plainly points to the final and universal adoption of radio-frequency receivers as the best and most logical type for broadcast reception. The day of regeneration in its ordinary form is fast passing. Not only is clearer reception possible with a radio-frequency receiver but it is possible to manipulate it in any desired way without inflicting punishment on a nearby listener.

It is a great pity that radio-frequency amplification was not fully developed for broadcast use before the regenerative "pest" receivers took such a strong foothold on the market. It is often thought that a radio-frequency receiver is very difficult to operate, but such is not the case, and in reality they are simpler and more positive in action. In fact, a poorly designed and constructed regenerative receiver is harder to operate than any radio-frequency set. At present in the radio-frequency class there are two general divisions of amplification—the tuned and the untuned type. A popular and well known example of the tuned type is the neutrodyne receiver, and the transformer repeated radio-frequency amplifier is the most common type of the untuned.

There are many arguments for each type, but when built properly both styles are very efficient and capable of producing excellent results. It is often claimed that the tuned type is more selective and that the untuned is generally more sensitive, but I can personally say that this is by no means a general rule, since I am of the opinion that these two factors are more dependent upon correct construction than basic theory.

Owing to the fact that most adherents of radio-frequency amplification have been divided into the two camps, those favoring tuned RF and those favoring the untuned, but very few experimenters have tried a combination of the two. By proper construction the combined RF receiver is very selective, yet not too critical for rapid adjustment and is extremely sensitive. Its action is very smooth and positive. There is but a slight tendency to oscillation and often after

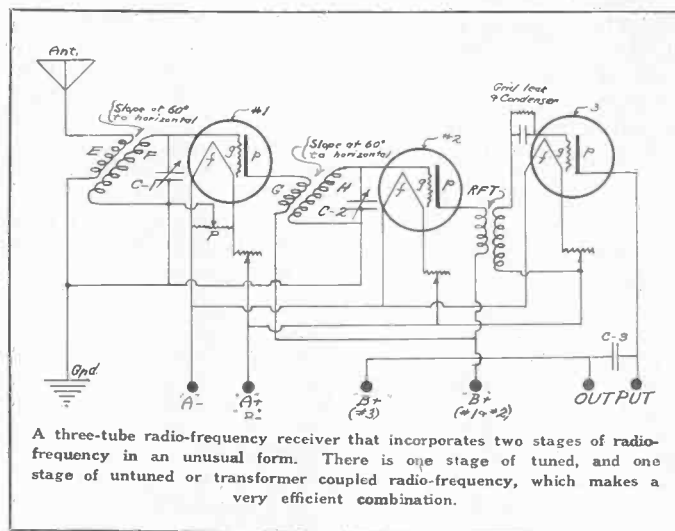
correct construction it is found that the potentiometer (P) need not be moved, but with certain tubes even of the same type, it will be found necessary to vary the setting of the potentiometer in order to secure the best possible results.

Although vacuum tubes today are very uniform, yet in sensitive RF receivers it will be found that they do vary sufficiently to cause a marked difference in performance; hence the old advice to change around the tubes in your receiver until the best possible results are secured. The potentiometer in this circuit allows you to compensate for this difference in tubes when it becomes necessary to replace one or more tubes in the receiver. After the first preliminary adjustment of the filament rheostats and the potentiometer, there are only two main tuning controls, the condensers C-1 and C-2.

This receiver can be logged for the various stations after it is once installed. This fact alone aids in its operation, and also as there are only two tuning controls makes it much easier to log stations

than with a receiver having more controls. As illustrated, the circuit only shows three tubes, two RF amplifiers (Nos. 1 and 2), and a detector (No. 3). Any good audio-frequency amplifier can be added to this set, but it is strongly advised that separate A and B batteries be used in order to preserve the same smooth working qualities. In order to keep expense down a good plan would be to use UV199 or C299 tubes for RF amplifiers and the detector and UV201A or C301A tubes for the AF amplifiers. The 199 tubes can operate from dry cells for A battery supply, while a small storage battery can be used for the 201A tubes. If, however, 201As are used throughout it will be necessary to purchase two storage batteries in order to adhere to the separate A and B battery policy. Moreover, if this plan be followed out, bear in mind that better results are obtainable if real 199 tube sockets are used and not standard sockets with adapters. Then again, do not neglect to ground the A minus terminal of the storage battery for the AF tubes.

(Continued on next page)



# Pointers on Antenna Construction

By Frank Courad

Asst. Chief Engineer, Westinghouse Elec. & Mfg. Co.

THE element of the antenna which determines its ability to pick up or give off signals is its effective height. The term, effective height, does not mean the height from the ground connection to its topmost point, but is more nearly the average height from ground connection to the center of its exposed area. For an antenna consisting only of a straight vertical wire the effective height is about two-thirds its actual height, while for an antenna having a large horizontal top structure the effective height is very nearly the actual height. The only purpose of the horizontal top element of a receiving antenna is to give a greater effective height for a given actual height.

When a regenerative vacuum tube receiver is used the extent to which the signal can be built up by regeneration is independent of the antenna height if all parts of the antenna are equally exposed to the incoming signal. However, the amount of interference which is picked up will be proportionate to the height, and we must, therefore, endeavor to select a location which will permit of minimum height.

As the lower part of the antenna will usually be more or less shielded, it is necessary to make some compromise between signal strength and selectivity. For installation in cities a height of 20 feet with a horizontal top of the same length will usually be found ample for reception of distant signals. For use when interference is slight or in country districts the height may be increased to 30 feet. It is of course assumed that for strictly local reception an indoor antenna will be used.

It is unnecessary to use more than one wire for any part of the antenna and the size of this wire is unimportant. It should be well insulated at the support points and be spaced as far as possible from conducting

objects. If the outer end of the top wire is attached to a tree, a break insulator is placed in the wire well outside the branches. This top wire should not be over or near any objects such as a metal roof, as the effective height of the antenna will probably be about the height of this top wire above the metal roof. If a supporting structure is available, a straight vertical wire without top horizontal part will be satisfactory, or it may extend in a diagonal direction from the side of the building near the receiving set to a point some twenty or thirty feet above on an adjoining building or other support with clear space between.

For the best results the ground connection should be made to some conducting area on about the same level as the receiver. A steam or hot water heating system gives a good ground. Avoid a long ground wire, as this gives height and lack of selectivity without compensating additional signal strength. This is an important point when the receiver is installed in an upper floor of a building such as an apartment. In this latter case the piping system of the building will furnish a good ground. Never run a separate wire down to the ground floor. The wires from antenna and ground where they approach the receiver should be separated as much as possible and the receiver should be placed as near as possible to the point where the antenna wire enters the building. The ground connection should be made to the nearest part of the conducting system which is to form the ground and it is often an advantage to connect to more than one conductor—such as the heating and water or gas pipes.

If your receiving set is not giving the results you think it should, look over your antenna structure to see how it meets the conditions outlined.

(Continued from preceding page)

The coil unit E-F is very similar to a "neutroformer" coil. It is wound up on a piece of 3½" radion tubing about 3½" long. The coils are wound with No. 22 D. C. C. magnet wire. The coil F is first wound on the tube and has 50 turns of wire in all, then the coil E is wound with the same size wire directly over F. The coil E has only 10 turns and a small strip of varnished cambric insulation should be placed between E and F for additional insulation. If, moreover, varnished cambric is not readily procurable for this purpose, then a strip of heavy white paper may be substituted. The unit G-H is exactly identical with E-F; the coil E corresponds to G, and F to H. The condensers C-1 and C-2 are both 11 plate air variables. The units E-F and G-H are mounted on the backs of C-1 and C-2, respectively. C-3 is a .002 mfd. mica bypass condenser. The potentiometer P has a resistance of 200 ohms or more, and it is strongly advised that 30 or 50 ohm rheostats be used for the 199 tubes in order to obtain the correct amount of steady filament control.

If the movable plates of C-1 and C-2 are connected to the ground side of the circuit, shielding will not be absolutely necessary. But if you insist upon shielding place only a small circular piece of copper foil in front of each condenser. Excessive shielding greatly detracts from signal strength. This is one reason complete cabinet shielding is not done with ordinary radio receivers. Do not neglect, however, to connect both circular shields to the ground terminal of the set if you do decide to shield.

A good standard make of radio-frequency transformer (RFT) forms one of the most essential parts of this receiver. A Federal No. 35 RF transformer incorporates all of the desired features this transformer must have. The grid leak and condenser must be of the correct size to go with the particular type of tube used as a detector.

In laying out the parts for this receiver it will be found advantageous to adhere very closely to the layout as shown on the diagram. The terminals for the batteries should be located in the rear of the cabinet and by placing the wires as illustrated all the connections will be very easy to trace out. Do not allow parallel running wires to rest close to each other. A long bus wire insulated with spaghetti and running close to another wire for any distance forms a condenser and the effect of the same might be quite injurious to either sensitivity, selectivity or signal strength, or the entire three. If an AF amplifier is to be used, then the output terminal can be directly connected to the primary or input to the first AF transformer. If no type of AF amplification is to be used then the output can be connected directly to the ear phones.

For an ideal outfit it is advised that the C. White power amplifier (see RADIO WORLD, February 16, 1924) be used in conjunction with this circuit. In wiring up a set you are very liable to accidentally "blow" your tubes while testing out for the first time; therefore, I always recommend that radio set builders prevent this needless loss by placing a small safety fuse on one of the filament legs of each tube.

# How to Build a Neutrodyne Receiver

## PART II.

### Panel Drilling and Layout of Parts

*(Dougherty, 2/24/26)*

**T**HE first item of importance in the constructing of the receiver is the layout of the parts and the drilling of the panel. We will consider the drilling of the panel first, as when the panel is once drilled the parts fit into it almost automatically.

Take the panel, and on the rear draw a line clear across,  $3\frac{1}{2}$ " from the top. This is your center line, and is the

made from the condenser you purchase, or else the template furnished with the condenser.

Finishing off the panel should be done by means of oil and sandpaper, or steel wool and powdered pumice, unless the builder prefers the shiny finish for the instrument.

The next consideration is the mounting of the condensers and the neutroformers. This is plainly shown in

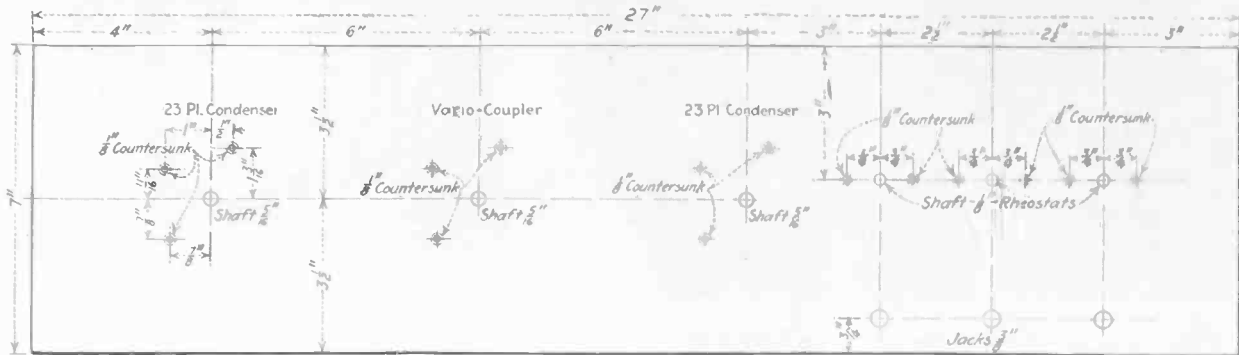


Fig. 1. Panel layout for a neutrodyne receiver. Note the fact that the holes for the condensers allow the condensers to be tilted at an angle of approximately 60 degrees off center.

governing measurement for the location of the condensers and other parts. From the left hand end, measure off 4" along the line, and make a heavy mark. This is the location of the shaft of the first condenser. From that center measure off 6" more, and make another mark. Then repeat, using the second hole as a marker. This completes the marking of the three condenser shaft holes. Mark them deeply but do not drill as yet.

From the right hand side, measure off a line 3" from the top, and with your marker scribe the line. Then 3" from the right hand end make a mark.  $2\frac{1}{2}$ " from this point make another mark, and  $2\frac{1}{2}$ " from the second mark make a third. These represent the center of the rheostats.

The next operation is the location of the holes for the jacks. These are located  $\frac{3}{4}$ " from the bottom, and each one is in direct line with the center hole of each rheostat. This allows one jack for the detector, one for the first stage and one for the second or last stage.

The location of the screw holes for the condensers are plainly shown. It will be noted that they are so located that they tilt the condensers at an angle of approximately 60° off center. Before drilling these, however, it is best to check up on the measurements of the exact condensers you have purchased, as there is often a deviation in the measurements of the various condensers on the market. For this reason do not drill the three mounting holes until you have checked the measurements off from the template

Fig. 2. It will be noted that they are mounted in the exact opposite of that called for in the panel layout, but as this was a set constructed from a panel already drilled, the condensers were mounted in the reverse manner. Fix the neutroformers to the condensers by means of the brackets furnished, if they are not so fixed when they are purchased. In purchasing these parts, if they are of standard manufacture, they will be already affixed to the condensers or else the brackets will be furnished for their mounting. This is another reason for the use of standard licensed parts.

When all the parts are mounted as shown, the set is ready for wiring, which is a simple job. Wire all the filament circuits first, and then the B battery circuits, leaving the neutralizing circuits for the last. It will be noted that the wiring in the set shown was done from the bottom, which is advantageous, as then the leads are out of the way. Follow the diagram closely, and pay attention to the wiring of the neutroformers. The connections for these are marked P-B and G-F, which signifies that the primary wires go to the plate and B battery, and the secondary wires go to the grid and the filament. Before considering the rest of the circuit, make sure that each wire is correct.

*(This is the second installment of the article. The next article will deal with the wiring of the neutroformers and the neutralizing of the receiver.)*

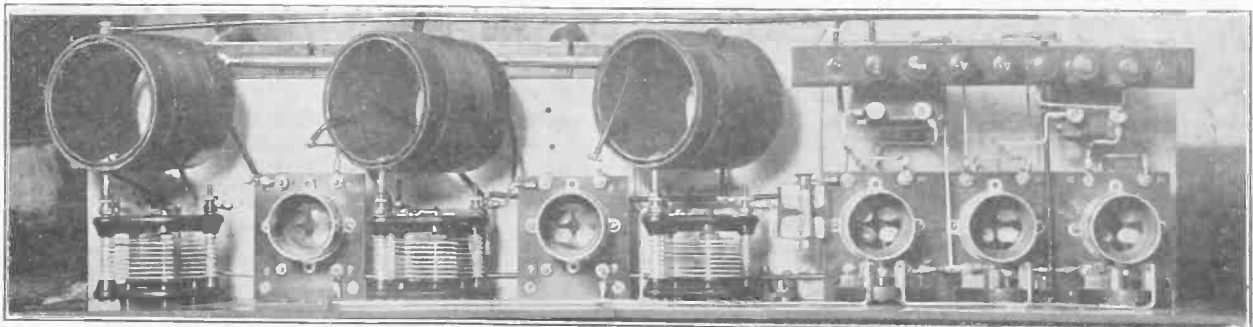
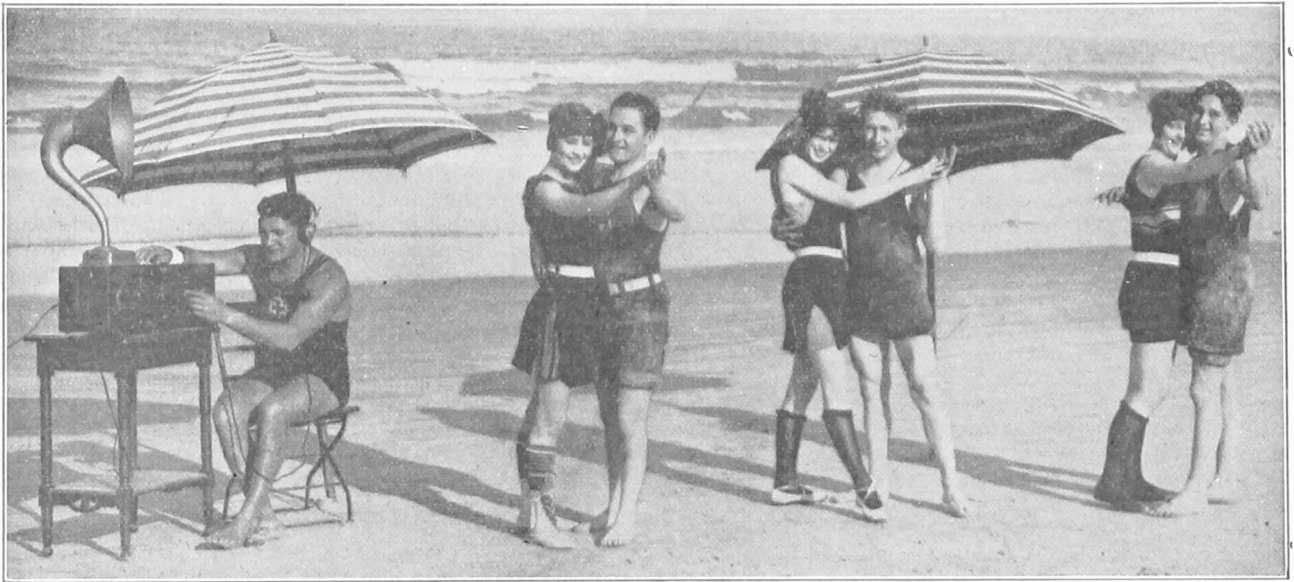


Fig. 2. Top view of experimental set showing location of the parts. Take particular note of the arrangement of the transformers and tube sockets. This arrangement leaves plenty of room for the easy and efficient wiring of the parts.

## Saving Lives—From Dull Care



(C. Fotograms)

Although the regular work of the Volunteer Life Saving Corps is the rescuing of souls from the briny deep, the work also has its bright side, especially at Ormond Beach, Florida, where the husky life guard is the possessor of a fine neodyne receiver and speaker. The beach makes a fine dancing floor, the music is furnished by the best orchestras in the United States, picked at will, and the partners are picked —(?). Between dances, a dip in the briny—and who says that the beach is dull?

## Third Ballot Count on Most Popular Broadcast Entertainer

THE results of the third ballot count in the contest for the most popular broadcast entertainers have shown a decided increase in several cases. The last counting was published in RADIO WORLD for March 8.

This count does not end the contest, so keep on sending in your votes, fellows, as the contest will close soon. Here are the results of the third ballot:

Roxy	WEAF	New York City.....	280
H. Snodgrass	WOS	Jefferson City, Mo.....	238
Old Time Fiddlers	WOS	Jefferson City, Mo.....	212
Thornton Fischer	WEAF	New York City.....	198
Little Symphony Orchestra	KDKA	E. Pittsburgh, Pa.....	187
Vincent Lopez	WEAF	New York City.....	171
Cafe Boulv. Orchestra	WJZ	New York City.....	160
Jerry Sullivan	WDAP	Chicago, Ill.....	158
Wendell Hall	KYW	Chicago, Ill.....	152
McDowell-Sisters	WFAA	Dallas, Texas.....	141
Jack Nelson	WDAP	Chicago, Ill.....	140
The Harmony Girls	WDAP	Chicago, Ill.....	140
Henry Field	WOAW	Omaha, Neb.....	139

Lucky Strike Orch.	WEAF	New York City.....	117
Night Hawk Frolics	WDAP	Kansas City, Mo.....	115
Howard Lannin	WDAR	Philadelphia, Pa.....	115
Alabama Club Orch.	WHN	New York City.....	111
Jack Chapin	WDAP	Chicago, Ill.....	113
E. H. Smith	WGY	Schenectady, N. Y.....	110
Little Orch.	WGY	Schenectady, N. Y.....	98
Hired Hand	WBAP	Fort Worth, Tex.....	97
Daddy Reimer	WLAC	Minneapolis, Minn.....	86
Bob Miller	WMC	Memphis, Tenn.....	81
Ernie Rogers	WSB	Atlanta, Ga.....	79
Deseret Orchestra	KZN	Salt Lake City, Utah...	75
The Hawaiians	WFAA	Dallas, Tex.....	68
Coon Sanders Orchestra	WDAP	Kansas City.....	68
Mary Vogt	WOO	Philadelphia, Pa.....	50
The Prison Band	WOS	Jefferson City.....	50
The Hotel Astor Band	WJZ	New York.....	39
Dr. Cadman	WEAF	New York.....	28
A. E. Sonn	WOR	Newark, N. J.....	25
Eveready Battery Orch.	WEAF	New York.....	22
Uncle John	KHJ	Los Angeles, Cal.....	20
Happiness Boys	WEAF	New York.....	18
KGO Players	KGO	Oakland, Calif.....	9

## Talks Over 7000 Miles Without Aid of Wires

The radio fans who recently listened in on WJZ, KDKA, WGY, KFKX, or KGO, took part in what was one of the most marvelous feats of transmission of the human voice ever attempted.

The occasion for the test was the broadcasting of the proceedings of the Massachusetts Institute of Technology dinner, held at the Waldorf-Astoria, New York. Six broadcasting stations were linked together by radio and broadcast the speeches and talk simultaneously, covering without any great difficulty a distance of over 7,000 miles.

The test brought into use an invention of Frank

Conrad, Assistant Chief Engineer of the Westinghouse Company, at Pittsburgh, which eliminated the use of the ordinary land wires for the re-transmission of broadcasting, and permitted the stations so equipped to broadcast the messages and music.

Reports from London and Manchester, England, and Oakland, Cal., and far off Constantinople, came in, stating that the transmission had been received perfectly. Besides that, the regular pickup station at London, which re-broadcasts KDKA'S music, he picked up the broadcast and re-broadcast it in the usual manner.

# The Golden Rule Receiver Is Ideal

By W. S. Thompson, Jr., E. E.

**P**ROBABLY the greatest drawback to the complete enjoyment of radio reception is interference due to electrical disturbances in the air. Chief among the offenders in this line are the receiving sets which re-radiate. In some congested districts this form of interference is so bad that clear reception has become almost impossible.

The owners of regenerative sets realize this, but are at a loss as to methods of overcoming it. Do not tune by the "beat note method," as you are then interfering with

The grid leak and grid condenser should be chosen to suit the tube used as a detector. This also applies to the two rheostats  $R_1$  and  $R_2$ . The rheostat  $R_1$  should be a vernier for the best results. The rheostat  $R_2$  should have a current carrying capacity sufficient to take care of two tubes.

The condensers  $C_3$  and  $C_4$  add materially to the quality of reception, although they are not absolutely necessary. They should have a capacitance of 1 mfd. The condenser

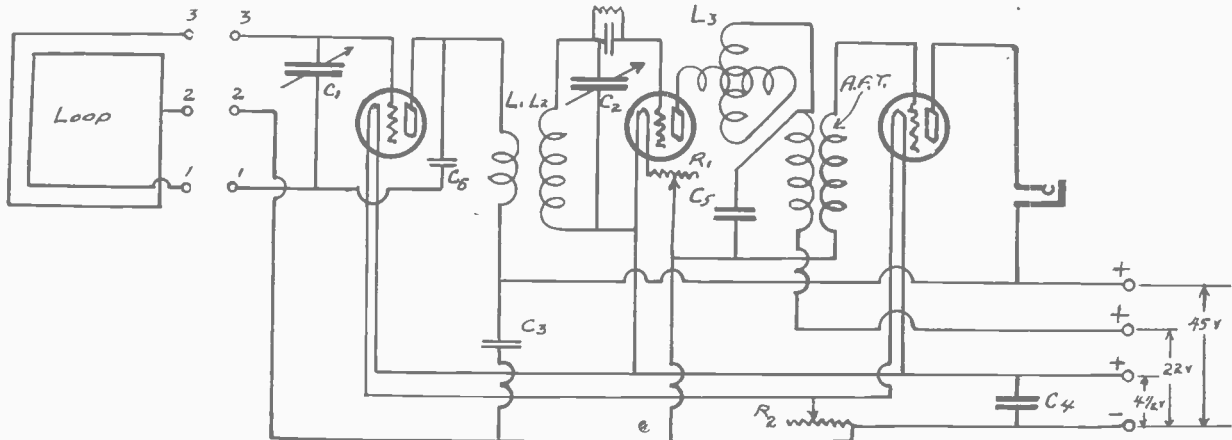


Fig. 1. Schematic diagram of a three-tube receiver that will repay the builder many times in good results, and freedom from squeals and noises that annoy the neighbors.

others within a considerable range. If possible, reconstruct your set so that it can not radiate energy even if a novice is tuning.

The writer has named the set herewith described the "Golden Rule Circuit," because it will not cause interference in any way, and in addition incorporates the advantages of both tuned radio-frequency amplification and regeneration. The method of preventing radiation can be understood by referring to Fig. 1. The first tube is used as a stage of tuned radio-frequency amplification. It is so connected that it will not oscillate and will also prevent the oscillations of the detector tube reaching the loop or antenna. The condenser  $C_6$  plays a most important part in this circuit as its adjustment in connection with that part of the loop between the terminals 1 and 2 prevents the oscillations. This condenser should have a capacitance equal to that of the tube used as the amplifier, and may be purchased or constructed by the builder. The balancing condenser described by the writer in RADIO WORLD for Dec. 29, 1923, will work satisfactorily with the UV199 tubes, for which this set was designed.

The loop should be approximately 2" square and should be wound with 12 turns of No. 18 DCC wire, spacing the turns about  $\frac{3}{4}$ " apart and taking a tap off at the middle point. This middle tap is terminal No. 2 in Fig. 1. The tuning condensers  $C_1$  and  $C_2$  should have a capacitance of .0005 mfd. each, and should have vernier adjustments, preferably by a gear arrangement rather than extra plates.

Fig. 2, shows how this circuit may be adapted to an antenna. The terminals, 1, 2 and 3, are connected to the corresponding terminals as in Fig. 1. The inductances  $L_1$  and  $L_2$  should be wound on a 3" tube as shown in Fig. 3. The inductance  $L_2$  is split into two halves, each with 28 turns, the eight turn primary being wound between these two halves. All windings should be in the same direction with No. 24 DCC wire. The same type of unit is also used as a tuned radio-frequency amplifying transformer as shown in Fig. 1, except then the middle tap (2) is not used.

$C_5$  should be .001 mfd. The variometer  $L_3$  may be of any standard make.

In selecting an audio-frequency transformer, the builder should keep in mind that transformers with a turn ratio of more than five to one are, in general, inferior to those with a lower turn ratio.

After all the various parts have been purchased or constructed, they should be wired temporarily and tested thoroughly before mounting on the panel. To properly

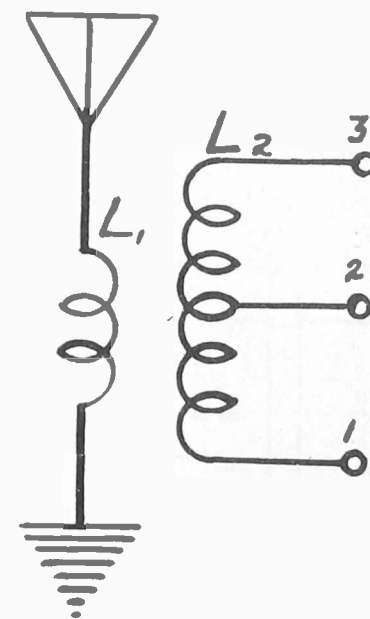


Fig. 2. Diagram showing how the antenna inductance is connected should the builder desire to operate the set on an outside antenna and ground.

(Continued on next page)

balance the condenser  $C_6$ , requires a little patience, but once adjusted it does not need any further attention. First, tune in some powerful transmitter and then remove the first tube from its socket. Place a small piece of paper over one of the filament prongs and replace the tube in the socket. The signals will still be heard, although faint. By adjusting  $C_6$ , the signals may be eliminated entirely and when so balanced the condenser is at its correct setting. Removing the paper and replacing the tube completes the initial setting, and the set is ready.

# Re-Radiation Interference with Radio Reception—Its Cause

By S. M. Kintner

**I**NTERFERENCE, its causes and results, is now a most popular topic of conversation among radio fans. Interference from one cause or another has been experienced by every radio fan, but few of them know the real reasons for this trouble and how to take measures that will assist in reducing it.

These interferences are caused by: (1) another broadcast transmitting station so close or so powerful as to make it difficult to "tune out"; (2) another transmitting station operating on a wave length so near to the one being received as to cause interfering beats at a beat frequency which is sufficiently low to bring it within the audible range; (3) a nearby amateur transmitting station operating on a spark set, or an A. C. tube set; (4) atmospheric disturbances, called "static" and particularly apt to be present during the summer months, and by the interference caused by "birdies," so-called on account of their supposedly bird character of sound. While there are times when quick "tweet" sounds may be heard, I have always thought that the "howling of winter winds" or the "wail of lost souls" as more truly descriptive of the sensations produced by this type of interference.

As "birdies" is the interference produced by one listener with another, I will direct your attention to it in order that you may better understand the cause of it and adopt a plan of tuning which will cause you to interfere with your neighbor as little as possible. Remember that a radio listener tuning in late on a program can be just as much of an annoyance to those near him as can one arriving late at the theater in the middle of an act when carelessly stumbling over things and making a lot of unnecessary noises while finding his seat.

An antenna at a receiving station re-radiates a certain part of what it picks up. This is true, in varying degrees, of all such antennae. When, however, one permits their detecting tube to oscillate, which is done by too much tickler, the radiating tendency of their antenna is increased many fold. When the tube is oscillating the receiving station becomes a transmitting station, sending out waves of frequency at which the tube is oscillating.

As the tube oscillation frequency is controlled by the

tuning of the set it is apparent that when the tuning of the set is changed while the tube is oscillating that the radiations sweep over that band of waves just as the note of a siren is changed as its speed is altered.

This swooping across a wave to which someone else may be listening causes this kind of interference with them, if they are within about a mile of the offending party. In the majority of instances the operator of such a set is unaware that he or she is causing such disturbance.

It is hard to believe that anyone would knowingly drag across the various wave bands to find the beat of the carrier wave of the desired station any more than one would drag his arm over the heads of the occupants of seats in a theater in order to more easily find an empty one. Each act is equally rude although the radio tuner may for a time be excused on the score of ignorance.

The care that should be exercised in tuning to avoid annoying your neighbors depends upon where you live. If you are in the country where radio receiving sets are miles apart, little or no thought need be given to this as a possible cause of interference with someone else. If, however, you are in a city where there are many radio receiving sets near you, you should, as an act of courtesy and consideration, use every care against tuning while your tube is oscillating.

You will want to know two things in your efforts to carry out such a plan of tuning: (1) how to know when your tube is oscillating and (2) how to find the distant station, for this whole practice is associated only with hunting such, without the tube oscillating.

You can always tell when your tube is oscillating by a peculiar change that takes place at the beginning of oscillations. There is a slight swish or rustle as the tickler reaches the oscillation position and it should be backed slightly below this point.

Your search for the distant station should always be made with the tube near to, but always below, the oscillating point, and the tuning can then be done with no inconvenience to anyone. You will recognize the distant station by the sounds of the music or speech, if in operation, or by a slight noise of the transmitter if you chance to hunt it during a quiet period.

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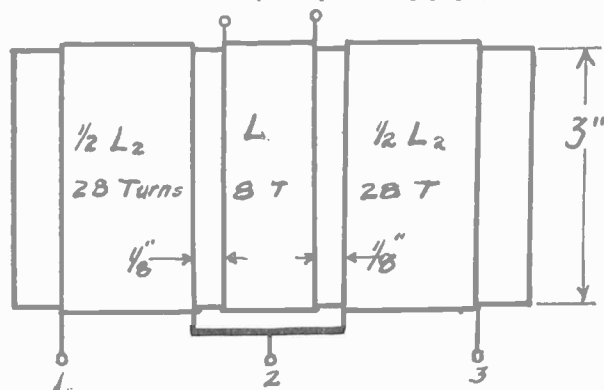


Fig. 3. Details of the construction of the antenna and secondary inductances, showing how they are wound.

The Golden Rule Circuit is particularly well adapted to the fan who wishes to add tuned radio-frequency amplification to his regenerative receiver. The inductances  $L_1$  and  $L_2$  in Fig. 1 can be the primary and secondary of the popular two-circuit set, so that all that is necessary for the change is: a loop or an antenna unit such as shown in Figs. 2 and 3; the condensers  $C_1$  and  $C_0$ ; a tube and socket; a rheostat and connecting wire. By using the tube recommended, any fan can well afford to use the necessary separate batteries for this additional stage.

The writer cannot too strongly emphasize the prevention of "blooping," as re-radiation is sometimes called. If the radio public wishes to avoid drastic governmental measures such as they tried in England, the owners of regenerative receivers should learn to tune without the squeals, or better still prevent in some way radiating of their sets. Let the religion of the radio fans be "Treat others as you would have them treat you."



# A Sure-Fire Transmitter Circuit

By Leroy Western

**T**HE attention and interest of more and more broadcast listeners are being drawn toward the fascinating subject of transmission. The drawback, however, is the cost, as most amateurs are not satisfied with C. W. or I. C. W. transmitters, but desire to have a set allowing them to communicate by radiophone. The majority of the sets are very cumbersome and expensive to build. A circuit is given herewith and a glance suffices to show its simplicity. This circuit has given remarkable results and records show that one amateur was able to cover a distance of 12 miles using a 150-volt "B" battery and a UV201 tube.

Even if you are not interested in transmission yet, some night when you tire of the broadcasting programs tune down to around 175 meters and listen to some of the amateurs. You will undoubtedly be able to receive some amateur phone stations, and if you do this once or twice it won't be long before you get the "bug" yourself and start to put in a transmitter. Then is the time when you will want the diagram given herewith.

You can use either a UV201, a UV201A or a UV202. The latter being a five-watt power tube, usually requires an eight-volt storage battery for its operation. Sometimes good results may be obtained with a six-volt "A" battery. If the latter mentioned tube is used, upward of 350 volts can be applied to the plate, while if the UV201 or the UV201A is used, it is not advisable to use over 150 volts. In the diagram R2 is a standard rheostat, while R1 and C1 are standard grid leak and condensers. These must be of such a value as to allow the tube to oscillate freely. The condenser C is a standard .001 mfd. variable condenser of a type in which the plates are widely spaced to prevent accidental shortcircuiting.

The tuner may be wound on a standard variocoupler form. The stator (L1) should be wound with No. 14 DCC wire. If this cannot be obtained, use No. 14 bare copper wire, spacing each turn the width of one wire. This can be done by winding two strands side by side and then removing one of them. This winding must be equipped with taps so that the wave length can be varied. It is advisable to provide taps at every turn, although every two turns will suffice in a pinch. Directly over the center winding L1 is wound a single turn of No. 14 standard lamp cord, each end of the loop being connected to the microphone. No microphone battery, modulation being effected by the absorption method.

If you have used a vario-coupler form for coil L1,

wind L2 on the rotor, provided it is large enough to contain the winding. This should consist of 50 turns of No. 18 DCC. If the rotor will not hold this wire, obtain a cardboard tube which will fit loosely within L1. It should be about 4" in diameter and the grid coil can then be wound on a tube 3½" in diameter. The same number of turns as mentioned for the rotor may be wound on this smaller tube and mounted within L1 in the standard loose coupler manner. No taps need be taken off this latter coil as it is tuned by the condenser C.

If you intend experimenting with transmission and

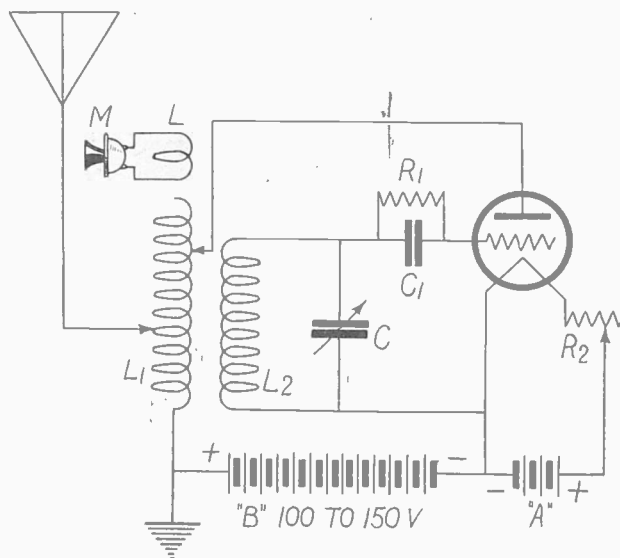


Diagram of a small transmitter which will give satisfactory results if carefully built.

want to do the thing up right, obtain a hot wire radiation meter reading over a scale of from zero to three amperes. This meter should then be connected in series with the antenna and the set put into operation. Adjust the contacts on L1 and the relationship between L1 and L2 and the capacity of condenser C until the best radiation is obtained. Then with a wave meter adjust the wave length of coil L1 with the antenna contact until it is within the required range. It is advisable to tune the set up to about 180 meters.

If trouble is experienced in making the tube oscillate satisfactorily, vary the number of turns on L2 until the tube oscillates freely.

## Amateur's Set Locates Light Interference

**H**ARTFORD, CONN.—As the interruptions to broadcast programs from defective electric lighting circuits are common in nearly every city, the difficulties recently overcome here by radio amateurs in cooperation with the electric light company are of more than local interest. Complaints from listeners became so pronounced that the Radio Club of Hartford named a special committee to run down the source of trouble by means of a loop receiver.

This committee set out upon its task in a business-like manner by preparing first a map of the section

of the city from which it was believed most of the interference came. On the map pins were placed with number flags glued to them. Perry O. Briggs, local amateur who devised the system, then placed a small loop set in an automobile and directed its movements.

These flags were shifted as the "buzzing" sounds came and went until all of the bad spots had been plotted out. When the results were given to the Hartford Electric Light Company it went so far in one case as to replace the entire circuit in one street. The improvement since this was done has been gratifying.

# The Radio Primer

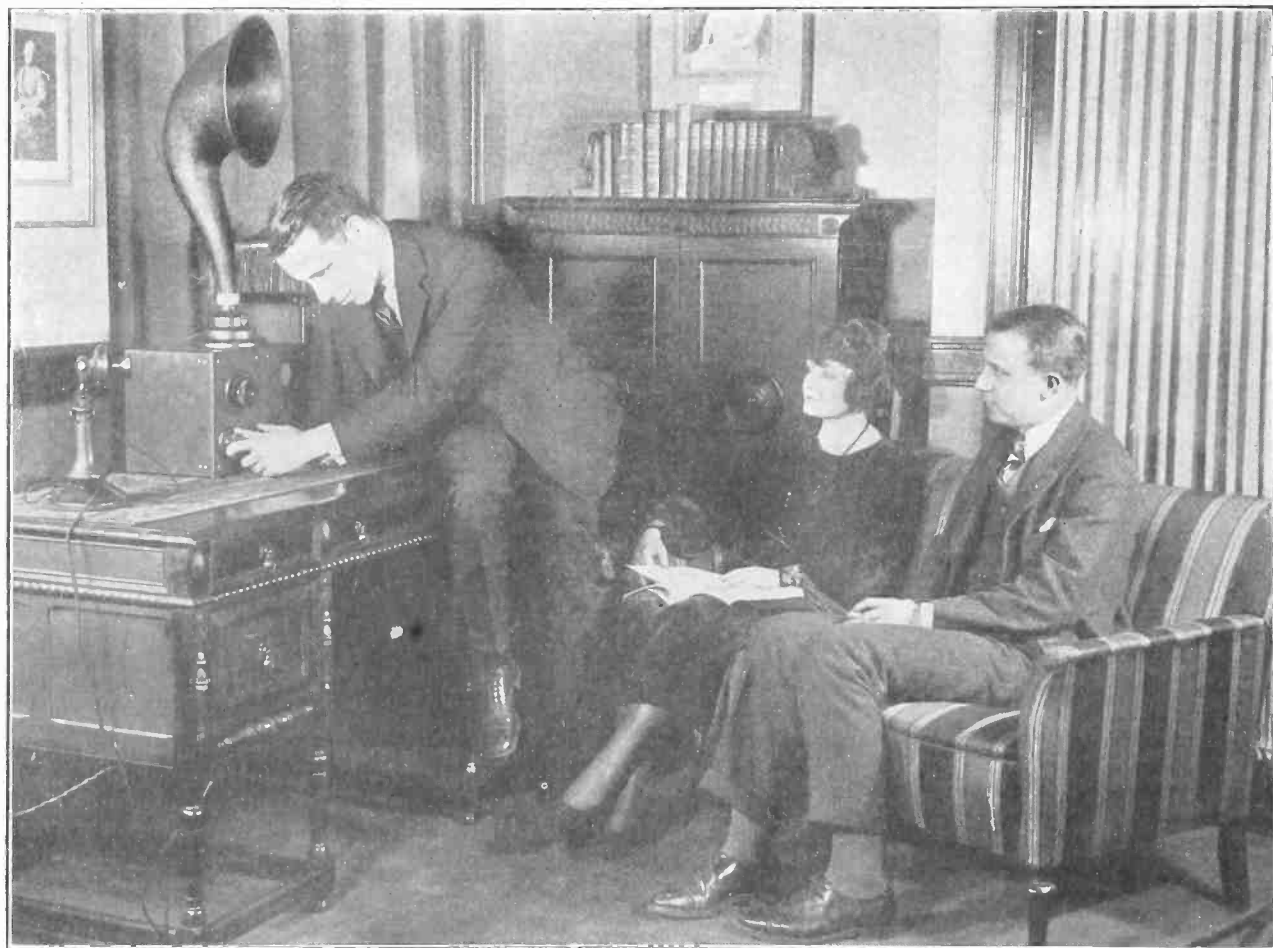
## DETAILS OF IMPORTANCE IN A RECEIVER.

Enthusiasts, unless they are of the advanced type who have experimented quite widely, will often run up against problems that, while they are simple in themselves, are most complex in solution to the uninitiated.

One of these problems and probably the most frequent, is: "What tubes are the best to use in the Squeegee Triple O DX-oflexer?" There is a misunderstood notion among the fans that only one type of tube can be used with each particular circuit. If it happens that it is a regenerative set, experience has taught most people that any tube outside of a bootleg tube will function, but when it comes to the more complex circuits, they are "up a tree."

tube. It has not the volume that the UV201A tube has, but has more volume than the  $1\frac{1}{2}$  volt tube.

Another point of importance is the voltage that should be applied to these tubes. When a hard tube (they are all hard—high vacuum—except the UV or C200) as used as a detector, there is a little latitude allowed the builder in the matter of detector plate supply current. The best method to use, however, is to never apply above 30 volts. Considerably better results will be obtained when voltages around  $19-22\frac{1}{2}$  are used. Of course, experimentation will have to prove this for each particular tube. When used as amplifiers, no more than  $67\frac{1}{2}$  volts are necessary, unless desired. When more than this is used, a C battery of from  $1\frac{1}{2}$  to 5 volts should be used, depending again upon the plate voltage. In most cases it is even advantageous to include a C battery in the second stage no matter



(C. International Newsreel Photos)

A scene that is typical in millions of American homes these evenings. The family gathered around the cozy nook in which the radio set is placed, impatiently waiting for the special features of the evening. In this particular case it is a prize fight. How often can you get two fight fans to stay at home on the eve of a "battle" without the aid of radio? Of course, if a radio set is handy, it is perfectly easy because they can get the same enjoyment, and miss the tusseling mob.

Naturally, the dry cell tubes ( $1\frac{1}{2}$  volt) cannot be used in a circuit that uses radio-frequency. Neither can they be used in the reflex, or other circuits of that type. They can be used in the audio-frequency side of a circuit, where no great volume is desired, or as detectors in other circuits, but in all their greatest service is where no great volume is desired from a simple regenerative circuit.

There is also a mistaken notion that the UV201A and the UV199 will give the same volume, which notion has resulted in quite a few disappointments. This particular tube works well in radio-frequency and as detector and audio-frequency amplifier is a good

what plate voltage is to be used on the amplifiers.

Even when a C battery is used, it is generally necessary to use some means to smooth the second stage out more. This can be effectively done by placing a fixed mica condenser of approximately .0005 to .001 mfd. across the secondary terminals of the second stage. The exact capacity used here is again a matter of experiment, and in some cases a capacity as high as .006 mfd. has been used when a .001 mfd. did not seem to have any effect. These little by-passing condensers can also be used in several other places in the circuit, such as across the phones, around the batteries, across the plate inductance, or across the rheostats, or potentiometers.

### Encouraging Research

**T**HE Rockefeller International Education Board has appropriated \$40,000 to Dr. Niels Bohr's laboratory at the University of Copenhagen so that he can pursue his revolutionary research into the structure of the atom. An American, Robert Andrews Millikan of California, who received the Nobel Prize for Physics in 1923, for his isolation and measurement of the electron, is an outstanding example of the patient and intelligent research worker who delves in the realms of pure science for the benefit of the more practical and commercial inventor. The development of radio was advanced scores of years by the monotonous labors of persistent research workers who studied the atom

### DXer Grows 'em While Waitin'



(C. Photo Topics) Fred Stone, well-known actor, called in the photographer and showed him how he feels when he goes hunting for stations when the announcer does not give the call. Talk about growing whiskers—well, some fans go to the other extreme and lose their hair—by pulling it out in handfuls.

side by side in a cute little two by six New York "modern apartment." They both are the proud possessors of radio receivers—which produces pleasure by the hour—provided that one of the two is not listening in. In that case, it is every man for himself. Willie and Harry both like light music, commonly called "jazz" or dance music. Naturally they both like to hear the best, and when that occurs, it is a general rule that neither of them listens to anything but a lot of howls and squeals.

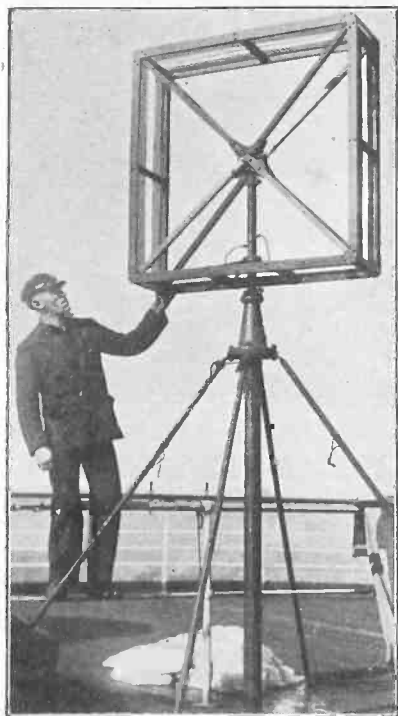
This is entirely unnecessary, as with a little care on the part of each of them, and a little honest reconstruction on their sets, they can be made as quiet as a little lamb.

### KDKA Received on Loop in London



Everybody knows that KDKA is rebroadcast from London, England. Well, here is the loop receiver that they do it with. Captain A. D. West, Assistant Chief Engineer of the British Broadcasting Corporation, in the foreground, and his assistant, Leslie Morrow, are in charge of the experiment which has proved such a remarkable success. The receiver used is a multi-tube radio frequency receiver, needless to say, and the signals are passed through a "tone amplifier" or audio frequency power amplifier, and then used to modulate the transmitter. Not so bad, eh?

### S. S. Leviathan Has a Loop



(C. International) The receiving loop of the S. S. Leviathan which has just been placed on the top of the radio shack of this mightiest of ocean greyhounds. Besides its work in direction finding, the loop will also be useful in emergency cases where the large antenna is unavailable.

### The Golden Rule in Radio Receiving

**W**E occasionally lapse into the realm of the ancients and bring forth axioms that would well be applied to the present-day radio situation. It is without doubt a situation which approximates that existing in Babel just before the muddling of the tongues. To convince yourself of this fact, just pick up a pair of receivers any evening and "listen in" for about ten minutes. It needs but a little imagination to visualize the same conditions as then existed, centuries before radio was even thought about.

Just for example, take Willie Brown and Harry Black, who live

### Radio Fan Fans With a Radio Fan



(C. Keystone Views) Little Mary Nelson, of Philadelphia, and her honest-to-goodness radio fan. The leaves of the fan form the coils, and the coupling is varied by shutting or opening them. The end leaf, coated with tinfoil, is the condenser. Wonder how good it is on a hot evening, if tight coupling has to be used.

and electron solely to discover all they could about these infinitesimal particles of matter. Many American scientists have expressed the hope that the recognition of the importance of research work evidenced by the Rockefeller grant will lead to the establishment and development of more research laboratories in this country. The practical value of research laboratories is recognized by many manufacturing companies in the United States. Two of the finest and best equipped in the world are maintained by American electrical concerns.

### Thought-Waves By Radio?

**E**THER waves were used one night last week by three eminent psychologists in an attempt to transmit thought.

The efforts were made at the Zenith Edgewater Beach Radio Station, WJAZ, Chicago, by Professor Robert H. Gault of Northwestern University, Professor Gardner Murphy of Columbia University and Professor H. B. English of Antioch College.

# America Stirred Over Threats to Close WHN and Other Stations

## New White Law Regulating Radio Now Before Congress

**"I believe it is safe to say, irrespective of claims under patent rights on apparatus, that broadcasting will not cease and neither will our public policy allow it to become monopolized."**—Secretary Hoover.

**P**ROMINENT in the radio discussion of the week has been the statement by Secretary of Commerce Hoover indicating his decided stand against monopoly in the radio field, whether control is brought about through monopoly of patent rights or by the combination of individuals or groups. The statement was

est the question of whether or not the broadcasting is for profit is immaterial. In the licensing system put in force by this department the life of broadcasting licenses is limited to three months so that no vested right can be obtained either in a wave length or a license.

"I believe it is safe to say irrespective

period is portrayed in the report on the occasion of my appearance before the Board of Aldermen of the City of New York.

"On account of the rapid development of radio broadcasting and the general discontent of the radio public Secretary Hoover of the Department of Commerce



(C. Fotograms)

Congressional Committee which is holding its first public hearing to investigate the charges that a large combine is seeking the radio control of the country. Secretary of Commerce Hoover appeared before the committee and recommended the passage of the White Bill which provides for the regulation of radio communication. Those on the committee, reading from left to right: Congressman L. Lazaro, of Louisiana; Congressman S. O. Bland, of Virginia; Congressman O. J. Larson, of Minnesota; Congressman G. W. Lindsay, of New York; Congressman F. R. Lehlbach, of New Jersey; Congressman W. H. White, Jr., of Maine, and Congressman E. L. Davis, of Tennessee.

called forth partly by the numerous requests for an opinion regarding the legal action taken by the officials of New York City against the American Telegraph and Telephone Co. Although Secretary Hoover carefully avoided any direct expression concerning cases pending in the Federal courts or before the Trade Commission, he told in general terms what he thought should be the attitude of the public with reference to monopolistic tendencies in the ever-widening domain of radio.

### Statement by Secretary Hoover

Mr. Hoover says:

"I am in receipt of many requests for my views as to issues now before the courts bearing on the control of radio broadcasting. While it is impossible for me to express any opinion on particular issues that are before the courts or the Federal Trade Commission, I can state emphatically that it would be most unfortunate for the people of this country to whom broadcasting has become an important incident of life if its control should come into the hands of any single corporation, individual, or combination. It would be in principle the same as though the entire press of the country was so controlled.

"The effect would be identical whether this control arose under a patent monopoly or under any form of combination, and from the standpoint of the people's inter-

of claims under patent rights on apparatus that broadcasting will not cease and neither will our public policy allow it to become monopolized."

The present status of litigation is indicated somewhat by the fact that the American Telephone and Telegraph Co. has filed in Newark, N. J., papers in an injunction suit against the North American Co., closely following the recent one against WHN in New York. The arbitrary closing of WHN, it is stated, would lead to the closing of many other broadcasting stations throughout this country, if an adverse court decision is applied rigidly.

New York city's municipal officials are going ahead as far as possible with their plans for the construction of an extensive broadcasting station atop the Municipal Building, the Board of Estimate having appropriated \$50,000 for this purpose. Grover A. Whalen, New York's Commissioner of Plant and Structures, in a letter to the Federal Trade Commission says in part:

"It is only after two years' effort to purchase a radio broadcasting station for the City of New York, during which time I could not but become acquainted with these harmful conditions and their accompanying injurious effects on the development of the radio art, that I deem it my duty to acquaint your honorable commission with my observations.

"The experience of the city during this

issued a call for a radio conference for the purpose of lessening the amount of interference in radio broadcasting, and for the allocation of wave lengths and classification of licenses. The previously formulated policy of this combination of the eight companies cited in your report for violation of the law against unfair competition in trade was clearly illustrated at this conference. The American Telephone and Telegraph Company, represented at this conference by Mr. A. H. Griswold, endeavored to persuade the Secretary to allow this company to erect fifty radio broadcasting stations throughout the country, these stations to be given special exclusive wave lengths, and to be permitted to broadcast on any power they desired. Dr. A. N. Goldsmith, recorded as secretary of the Institute of Radio Engineers, also consulting engineer for the Radio Corporation, supported this plea for exclusive higher power for this combine, stating that the broadcasting stations operated by this group could not function properly if subjected to interference by the smaller stations.

"The conference failed to accept these recommendations in approval of special privileges for this combination. It was the consensus of opinion of the conference that stations should be limited to locally suitable maximum power of not over 1,000 watts. The conference advised the Department of Commerce that it did

(Continued on next page)

# What Happens in the Transformer

By G. E. M. Bertram

Chief Engineer, Acme Apparatus Company.

**T**HERE are many audio-frequency amplifying transformers on the market, but so much information and misinformation have been published that it is difficult at times to decide what type is best.

With an understanding of what happens in an audio-frequency amplifying transformer you can generally judge for yourself whether statements regarding this or that make apply to your work.

The broadcasting station sends out power in the form of an electro-magnetic wave, oscillating at a frequency of from 500,000 to 1,500,000 cycles per second, depending on the licensed frequency of the station. This energy varies in intensity proportionately to the frequency of the singer's voice, the violin's notes or whatever form of sound is made in front of the microphone. This is termed modulation. These sounds vary from 50 to 5,000 cycles per second and are called audio-frequencies because they are audible to the human ear.

Every receiving set must have some form of antenna to pick up this radio frequency energy, which has in it the undistorted voice of the singer or the note of the violin, but in such a form that it cannot be made audible until detected or stripped of its carrier or radio frequency energy. After detection some of the energy from the broadcasting station is passed through head phones or an audio-amplifier with a loud speaker attachment so that people may hear the sounds.

This audio-frequency energy coming from the detector has so much pressure and is passed into the primary of the transformer, and stepped-up or increased. Naturally one would think a transformer with as high a ratio as possible would be the best, and so it would if the pressure didn't vary in frequency. Being an alternating pressure of from 50 to 5,000 cycles per

second other factors of great importance enter into the scheme.

As the ratio of transformation is increased from 1 to 1 upward, the pressure on the grid is increased until when the ratio reaches  $4\frac{1}{4}$  to 1 maximum, amplification without distortion is obtained. Further increases in the ratio increase the amplification slightly but with a greater amount of distortion until when ratios of 10 to 1 are reached both amplification and reproduction suffer. When ratios of over  $4\frac{1}{4}$  to 1 are used, resonance creeps in and at higher ratios distributed capacity, that is, the condenser effect of the windings causes energy to be absorbed in the insulating materials used.

But ratio is not the whole story of an audio transformer. There are other technical factors. There are impedance, iron, air gaps, size wire, short circuited turns, burn outs, losses, etc. Impedance is the resistance a winding has to alternating currents, and in a properly designed audio transformer is the same as that between the plate and filament of the tube. With this fixed, ratios mean something.

Burn outs in amplifying transformers occur at different frequencies with different makes, and the only thing to do when such a thing happens is to send it back to the manufacturer for repair or replacement.

To keep losses a minimum in transformers it takes transformer engineers to design them. They know where they get in and how to keep them out.

People are interested in so-called shields. The only thing they shield is workmanship, good and bad. The magnetic flux created by currents flowing in the windings fortunately finds it about 3,000 times as easy to get along in iron as air, and when sufficient iron is nearby, will stay there.

(Continued from preceding page)

not sponsor or approve direct advertising. The American Telephone and Telegraph Company's chief spokesman at this conference was successful in obtaining the exclusive privilege of securing financial return for supposed services rendered to the public by the stations of this company."

## The Other Side of the Story

On the other hand, the American Telephone and Telegraph Company denies that it has any radio monopoly. President H. B. Thayer says, moreover, that he gives his approval to Secretary Hoover's efforts against individual monopoly. Some of Mr. Thayer's views are as follows:

"We intend to continue to develop radio transmission and probably in connection with that development we shall continue to broadcast. Whether or not we continue to broadcast for hire, we believe that in our own interest as well as the interest of the public others should broadcast and some should broadcast for hire. So, while we intend to maintain our title to our patent rights, we also intend to make it easy for others to use them.

"But until some regulation has been established we shall not encourage the multiplication of broadcasting stations."

## Interesting Features Emphasized

On March 11, Mr. Hoover appeared before the Committee on Merchant Marine and Fisheries in connection with Representa-

tative White's bill covering complete readjustment of the Federal laws for regulating radio. At this hearing some interesting features of the whole subject were brought out in part as follows:

"The problems involved in Government regulation of radio are the most complex and technical that have yet confronted Congress. We must preserve this gradually expanding art in full and free development, but for this very purpose of protecting and enabling this development and its successful use, further legislation is absolutely necessary.

"How profound the changes in this method of communication have been since the regulatory Act of Congress approved in August, 1912, is indicated by the fact that the whole telephonic application is practically a discovery since the act was passed. At that time radio was in considerable use as a telegraphic method of communication, more especially with ships, but there was not a single telephone broadcasting station in the United States. Some indication of the development of the art is shown by the fact that at the time the act was passed 485 American vessels were equipped for transmission of telegraphic messages. There were 123 land stations, of which one was trans-oceanic. There were 1,224 amateur stations, as I have said, all engaged in transmission of telegraphic signals. Today there are 2,723 American vessels equipped with radio. There are 12 trans-oceanic stations, there are 790 other land stations and 16,590 amateur sending stations. Where there were no broadcasting sta-

tions, there are today 561 of them, located in every town of importance in the country. There are certainly three to five million telephonic receiving sets, therefore there is a radio audience of anywhere from ten to twenty million people.

"The year this act was passed the commercial companies extended heartfelt congratulations and paid a bonus to the operator, who, by his skill, reached a nearby station in Porto Rico, whereas today we communicate hourly with reliability a vast amount of commercial messages over both oceans. Twelve years ago the amateur boasted to his friends of his communication over a few hundred miles. Today our amateurs, to whom much of our radio progress is justly due, nightly send messages across the Atlantic Ocean.

"During these 12 years radio has come into use for many other important communications. It is used for communication with air craft and has found a very important development in a practical compass for ships which seems likely to even reduce the cost of Government aids to navigation.

"This increase in use has been due to the tremendous discovery and improvements in the character of apparatus. The discovery of the vacuum tube for amplification has the foundation for all telephonic work. The tuning and assembling apparatus has been improved to such an extent that we are able to confine sending and reception signals to smaller bands of wave lengths than was the case 12 years ago."

# A "Farewell Interference" Outfit

By Byrt C. Caldwell

SINCE the time the first burst of static struck the first radio set, men have been at work trying to eliminate this, and the other evil, QRM, commonly known as interference. They have succeeded in both to a certain degree. During the last year or so we have heard more or less about the resonance wave coil. This coil has been developed by the Signal Corps of the War Department. In its present state, it eliminates static and other interference to a remarkable degree.

In the coil and filter circuit which is used in the outfit described herewith, the coil consists of a cardboard tube, wound the entire length with fine insulated wire. Over one end, there is fitted a brass tube, which may be slid back and forth. It has a slit across it, so that eddy currents cannot form. This is about one fifth the length of the tube. It is called the collector ring. At the other end, is fitted another brass tube, which is about one third the length of the tube. This is called

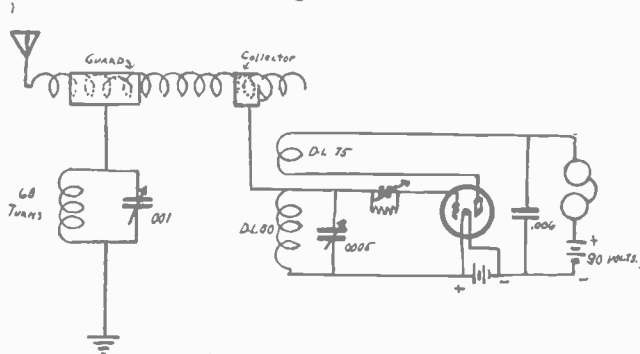


Diagram of a very selective receiver incorporating the "resonance coil" scheme as used by the Signal Corps of the United States Army. The wave trap coupled to the first collector ring makes the cutting out of interference possible.

the guard. In use, the guard is grounded, through the filter circuit, which consists of a variable condenser in parallel with an inductance coil. The collector is connected to the grid side of the tuning inductance. The antenna is connected to one end of the coil.

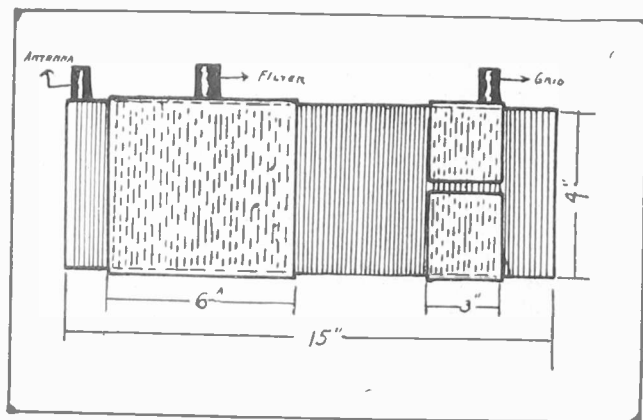
The action of the coil in eliminating interference is as follows: The collector ring is capacitively coupled to the coil. Currents which are then induced in the coil by radio signals, induce currents in the ring, impressing the induced current on the grid of the tube. As this ring is slid back and forth, it picks up different signals from different parts of the coil. The large guard ring also has the power of picking up these signals, and when it is grounded, no signals reach the end of the coil on which the collector ring is placed. This would, of course, eliminate all the signals, but for the fact that the filter circuit, or rejector circuit, is tuned to the frequency of the desired signal. This signal is then allowed to pass on to the collector ring and to the grid of the tube. The greater part of the other signals and of the static is then shorted to the ground. This makes the set extremely selective, and when signals are received from a great distance, it enables the operator to identify the station easily, while without the coil, this would be utterly impossible.

The set which I am going to describe, and which contains the rejector circuit as a built-in feature, is one of the simplified super-regenerative circuits. In this set, the interference eliminator is especially valuable, on account of the great distances over which this set is capable of receiving.

The resonance wave coil is made by winding a cardboard tube, fifteen inches long, by four inches in diameter, the entire length, with No. 30 SC copper wire. A binding post is connected to one end of this. A circular tube of brass, six inches long is slid over one end of this, and one three inches long, with a slit the width of it, is slid over the other end. Binding posts are connected to both of these. A good substitute for the brass is a cardboard tube covered with tinfoil, or copper shielding. The filter circuit consists of a .001 mfd. condenser. This must be good. Buy one, the quality of which has been proven.

An inductance is connected in parallel with this condenser. This is made by winding a cardboard or bakelite form, four inches in diameter, by four inches high, with sixty turns of large copper wire. No. 14 SCC or DCC is best, although up to No. 18 will do. Be sure to make all connections here perfect, soldering them all if possible. The mounts for the inductance coils are in the center of the panel. A DL 50 is used for the tuning inductance, and a DL 75 for the tickler, although it is well to have a 35 and a 100 turn coil on hand also. The tuning condenser is mounted on the right hand side of the panel, and the tube is placed directly behind this. The variable grid leak is connected directly to the grid binding post of the tube. The large blocking condenser should have a mica dielectric. The tube must be a hard one, and the B battery voltage must be high, 60 to 150 volts being about right. As usual, solder every connection, and use large wire.

In tuning this set, first adjust the grid leak. When the filament is lit, a high whistle is heard, which varies as the grid leak is varied. Adjust the leak until the whistle goes up, and just disappears. It is advisable



Details of the construction of the coil, showing the location of the two collecting rings on the coil.

to try the set first without the antenna. If the whistle is audible, and disappears when the antenna is attached, a variable condenser should be connected in series with the antenna. Make sure that the connections to the DL coils are correct by testing them with a compass and a battery. If both deflect the needle in the same direction, when they are both placed in the same relative position, the coils are O.K. When the set has been adjusted correctly, tune the signals in and the interference out by means of the condensers, and the bands on the coil. This is quite simple after a little practice.

If the large fixed condenser is left out, and a ground is made to the bottom side of the small DL coil, the set is a plain regenerative set.

# C. M. White and Those 10,721 Letters From Radio World Readers



Sometime ago there appeared in RADIO WORLD an article signed by Mr. Charles M. White, Consulting Engineer, one of RADIO WORLD'S regular contributors. The name and address of the author were given. As an evidence of the value of RADIO WORLD, and the interest with which its readers peruse its articles, it is only necessary to state that Mr. White has received to date 10,721 letters in answer to this article. Mr. White is shown here reading one day's mail received from RADIO WORLD readers regarding the article mentioned.

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## Tesla Perfects Wireless Power Transmission

**N**IKOLA TESLA, the well-known experimenter and inventor, recently gave out a statement to the effect that the wireless transmission power transmission device on which he has been working for the past few years will be ready for commercial use in the near future.

He stated that up to the present time he had been working along the wrong lines, and after discovering

this, he found the key to the trouble, and is now confident that in the near future it will be possible to transmit power from a central power station, through the air, to houses, ships at sea, airplanes, and in fact to any and all people desiring electrical power, and having the "key to unlock this vast source of hidden power." He did not state, however, how it was to be accomplished.

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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 of patents, priority of claims, the proper working out of technical problems, or other matters that may be printed in good faith and on information furnished by those supposed to be trustworthy. This statement is made in good faith and to save time and controversy in matters over which the publisher cannot possibly have control.

MARCH 22, 1924

## There Must Be No Monopoly of God's Free Air

IN the news pages of this issue of RADIO WORLD there is reflected a general idea of what public officials and the radio public in general think of the effort to restrict broadcasting by a corporation that controls many patents, but which, thank heaven, does not own the air. An unbiased presentation of the news of this condition is given considerable space in our columns, but RADIO WORLD would be obviously wanting in courage and common-sense if it did not record an editorial protest against any move of any nature whatsoever that would lead to a monopoly of broadcasting.

From the beginning of the world it has been a generally accepted fact that even the poorest of mortals had the privilege of breathing and using the air. In fact, an age-old line runs: "Free as the air." Shall these significant words be relegated to the list of things that have been but are not?

Entirely aside from any ques-

tion of ethics, there is the very important matter of public service. The radio public of today is the largest audience known in the history of the world. This audience, a large percentage of which so handsomely supports radio, directly or indirectly, will not brook any arrangement by which this inalienable right to freedom of the air shall be taken away.

And what man or group of men can be considered so divinely trusted that the question of what politics or religion or propaganda shall be set before this audience of many millions?

Washington has spoken, the public has spoken—and it is not conceivable that any monopoly, or anything resembling one, even if called by a fairer name, shall be allowed in the great field of broadcasting.

Those who threaten to bring about a drastic change by which broadcasting shall become a monopoly, even in a so-called beneficent or paternal sense, would do well to keep their ears to the ground and listen-in on the thoughts and determination of the American people.

RADIO WORLD declares that there will not be, because there cannot be, in the very nature of things, a monopoly of the air.

## What Radio Can Do for Our Boys

Justice Cropsey, one of the leading jurists of the State of New York, recently sentenced several young men, some of them scarcely more than boys, to long terms in Sing Sing prison. Justice Cropsey, in making an address from the bench, offered the following plea for our boys:

"We can lessen the crimes in our midst by giving our attention to the youths. They need a man's guiding hand and helpful personality. They need the example of a true man's life in the forming of their character.

"Brooklyn can be made better. Whether it will, depends upon us, its men. Shall we turn our backs and ignore existing conditions, or shall we accept the challenge and lend ourselves to the task? It's a man's job and it needs red-blooded men who will put something of themselves into the undertaking.

"Men, this is a call to us. Are we awake? Do we hear it? Will our conscience let us ignore it? Shall we not help to make better the boys of to-day? Should we not begin at once?"

Radio World now asks a few ques-

tions, supplementing Justice Cropsey's queries from the bench:

Isn't keeping boys at home of nights the best plan in the world for keeping them honest?

Doesn't every youth who owns a radio set stay at home and tune-in?

If you know a boy who is going wrong, wouldn't you endeavor to save him?

And wouldn't the saving process be started if you were to give him a radio set so he would have an added incentive for keeping off the streets and avoiding bad company?

Will you help?

And isn't the answer a quick and generous YES to all these questions?

## Radio for Health

The use of radio receiving sets in hospitals has become fairly common, but it remained for a Massachusetts doctor to prescribe a set for one of the patients he was treating in her home.

For some time he had been the family physician of two middle-aged women living on a rather lonely farm. One of the sisters had been under his care constantly for an obscure condition which seemed to be growing chronic. A consultation of physicians revealed no organic trouble, and the conclusion was reached that the patient's ailment was more mental than physical.

It happened that the doctor was a radio fan, and the thought of a radio set for the patient suggested itself, and he promptly prescribed one.

The price of a complete set, however, seemed prohibitive, so he advised the sisters to build one. They wouldn't have been more surprised if he had asked them to build an aeroplane. But the doctor loaned them his own set until he could go to town and buy the parts for one of them. He chose a four-tube reflex because of its simplicity of construction and ease of operation. He found that one manufacturer had recently issued a booklet with diagrams showing the apparatus connected into sets of various kinds so simply that it was only a question of placing the parts on a board and connecting them piece to piece as shown in the dummy. As they say in novels, the idea "intrigued" the sisters, and with a little help from the doctor, they built the set, got excellent results right off the bat, and they are rapidly becoming ardent radio fans. Meanwhile the sick sister, forgetting herself and her troubles in her absorption in the set, ceased to be sick and is now on the way to a perfectly normal condition.



# Radio on Our American Farms

CHICAGO, ILL.—Replies from 73 Illinois county farm bureaus in a radio survey just completed by the Illinois Agricultural Association reveals that there are 20,845 radio receiving sets on farms in these counties. The survey would indicate that between seven and ten per cent of the rural population of the state have installed receiving sets.

"The survey was made for the purpose of determining the extent of the use of radio on farms, the type of programs most desired, practical benefits of the radio, and for the planning of programs to meet the demands of the constantly growing army of farm radio fans," state I. A. A. officials.

These farm radio sets tune in nightly on stations all over the United States. Chicago, Davenport and St. Louis are mentioned most frequently, because they are near and easy for a small set to pick up, but many reports were given stating that farmers tune in on Kansas City, Dallas, Fort Worth, Jefferson City, Omaha, Pittsburgh, Philadelphia and New York.

The counties near broadcasting stations naturally show the most sets. Madison county, in the vicinity of St. Louis, has 2,550 sets; Rock Island county, near Davenport, has 900, and in Henry county, also near Davenport, the report shows that nearly one-third of the entire farm population has sets.

Only about 25 per cent of the farmers owning radio sets make their own, the rest being manufactured sets, the survey shows.

An increasing number of farm communities use receiving sets for their meeting programs. These are installed in school houses, country churches or community houses. Logan county reports four rural schools having sets. In Greene county there are no regular community sets as yet, but private sets are frequently loaned and installed for community gatherings.

One of the questions asked in the survey was, "What sort of radio programs do such gatherings use the most and like the best?" The almost invariable reply to this was, "Musical programs and occasionally good lectures."

Replies from most of the counties indicate that many farmers tune in on the weekly farm lectures broadcast each Tuesday night from Station KYW, Chicago, under the auspices of the American Farm Bureau Federation.

Individual farmers, farm bureaus and banks tell of practical benefits from the daily market and weather reports. Montgomery county, near St. Louis, furnishes this example:

"The First National Bank of Raymond, Illinois, has a radio set and gets the opening livestock market at 9:30 A.M. The manager of the cooperative shipping association keeps in close touch with the market report at East St. Louis, and several times has received the market report at 9:30, called in one or two cars of hogs and hit a good market at East St. Louis the next day. On several occasions this made the farmers from \$50 to \$100 per car more money for their hogs."

The returns from Madison county state: "The reports keep the farmers in closer touch with the markets and they are not the prey of buyers who may come along and offer below the market for hogs or cattle."

One point that was stressed was the necessity of having farm programs early in the evening, since the ten o'clock programs are rather late for farmers. "Make it snappy," was also the advice given regarding farm programs. Plenty of jazz music, and talks that are short and to the point.

The human interest angle of the farm radio set showed through the survey. One man reported that "the women folks now divide the time formerly spent listening over the telephone with the radio." A report was given of a farmer who was neglecting his farm duties because he sat up so late listening in.

The rapidly increasing popularity of the farm radio is shown by the report from Coles county, which has had 100 sets installed in the last six months. This county is not located near any broadcasting station.

## Status of Broadcasting Stations

ON March 1, there were 548 broadcasting stations licensed to transmit by the Department of Commerce. The returns for February show a gain of 14 stations; twenty-one new stations were licensed and seven were deleted. Eight new Class A stations licensed during the last week in February follow:

### New "A" Broadcasting Stations

Call	Stations	Frequency Kcvs.	Wave Length Meters.	Pwr. Wts.
KFOB	Glenwood Technical Association, Minneapolis, Minn. ....	1340	224	5
KFOC	First Christian Church, Whittier, Calif. ....	1270	236	100
KFOD	Vern Peters, Wallace, Idaho .....	1340	224	10
KFOF	Rohrer Electric Co., Marshfield, Oregon....	1250	240	10
KFOH	The Radio Bungalow, Portland, Oregon .....	1060	283	15
WBBL	Grace Covenant Presbyterian Church, Richmond, Va. ....	1060	283	50
WBBZ	Noble B. Watson, Indianapolis, Ind. ....	1320	227	50
WCBR	University of Mississippi, near Oxford, Miss. ....	1240	242	20

### Transferred Class C to Class A

WGAQ	Glenwood Radio Corp., Shreveport, La. ....	1190	252	150
------	--	------	-----	-----

### Seven Sign Off in February

Call	Stations
KFGJ	National Guards Missouri, 138th Inf., St. Louis, Mo.
KMC	Lindsay, W. W., Jr., Reedley, Calif.
WBBK	Kaufman and Baer Co., Pittsburgh, Pa.
WQAL	Woods, Wm. Evans, Webster Groves, Mo.
WPG	Nushawg Poultry Farm, New Lebanon, Ohio.
WQAH	Brock-Anderson Elect. Eng. Co., Lexington, Ky.
WTAN	Orndorff Radio Shop, Mattoon, Ill.

## Batteries are Important

HOW many times have you had company at the house and at the critical moment, noises, or failure of the set have caused you to make explanations? The solution is to test your B batteries every couple of days, replenishing them when they show wear, and to keep the storage battery fully charged all the time.

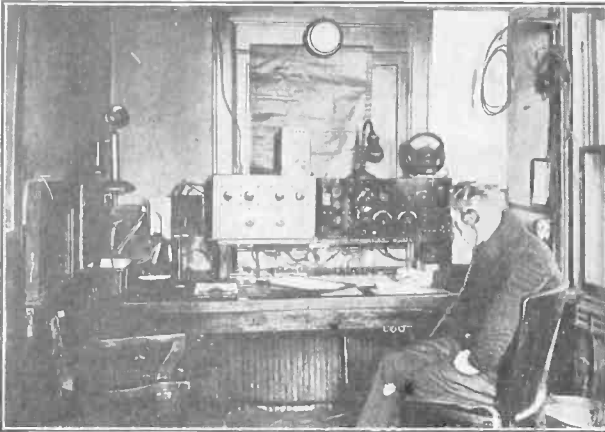
# The Eye of the Camera Catches

THIS FAN COMBINES ETHER AND



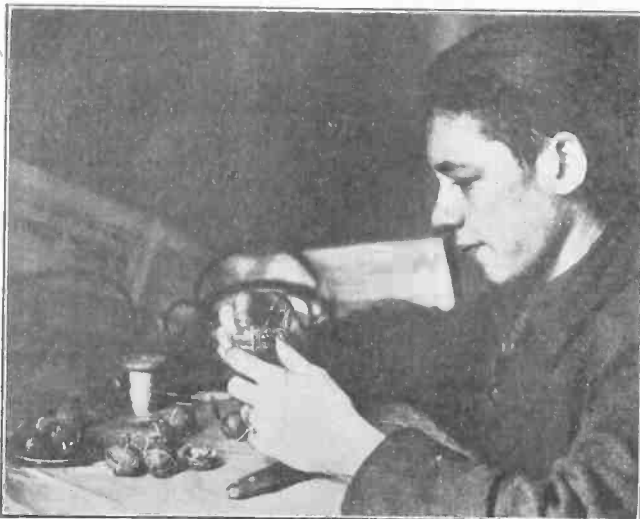
(C. Fotograms)

The operators table at WRC, Washington, D. C. This station is one of the busiest broadcasters on the air at the present time, as important state speeches and all the important functions of state are broadcast through this station.



(C. Williams Service)

The "radio shack" at WNY, which has recently played a big part in treating sick sailors at sea. The operator is in touch with Marine Hospital No. 70, by telephone line, the symptoms are told to the doctors who prescribe treatment, and then the operator advises the captain of the ship, who treats the sailor in accordance with the instructions.



(C. International Newsreel Photo)

William Slye, radio enthusiast, of Norwood, Ohio, who has started in the radio "nut manufacturing" game. He makes radio sets with a few turns of wire and empty walnut shells.



(C. International Newsreel Photo)

Little Lester, Jr., grandson of J. J. Demarest, listening in on mean anything, either there is a poor bed-time story on, or of a go



(C. Harris and Ewing)

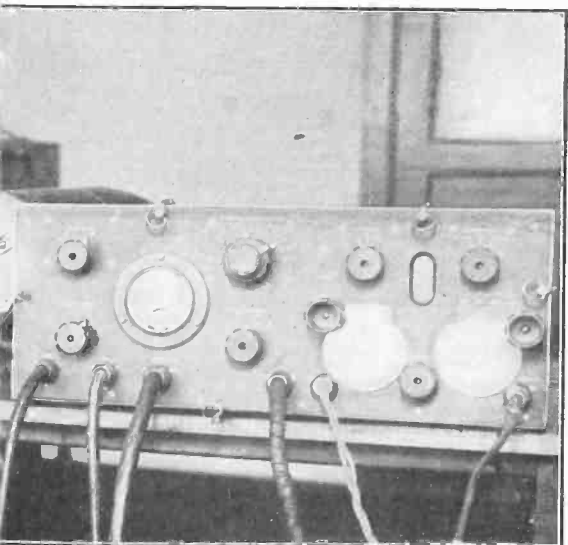
Combined radio transmitter and receiver, enclosed in a water-complete set is shown on the right, with the wind-driven governor, the speed of the wind, deflecting the single prop operated by means of the generator shown, and being ab the plane run into a h

# Radio News from Everywhere

ER WAVES WITH GOOD SUCCESS



loop receiver, down at Palm Beach. If facial expressions of the "Wild Waves" is preventing the full benefit of the broadcast



cabinet, that is to be used on the air-mail planes. The generator is lying next to it on the table. This generator is self-regulating, thus decreasing or increasing its speed. The set is completely water-proof, little damage can be done should it be subjected to fog or rain-storm.



(C. Foto-Topics)  
Louis Heilman, ice-boat enthusiast, and his new innovation in ice-boating. He has equipped his boat with the set shown and strung the antenna along the mast which allows him to speed merrily over the smooth ice of Lake Rorkonkoma. L. I., and listen in to the programs coming through the ether at the same time.



Percy Marmont, Gertrude Short and Ralph E. Bushman getting some concerts over "the air" while out on location on the Metro "lot." By the expression on the face of the gentleman sitting to the left of the speaker, the vocal artist either must have hit a "sour" note, or else the volume is so loud that he must stop his sensitive ears to prevent injury to them.



(C. Foto-Topics)  
J. C. Nonnekens, a Holland experimenter, who recently reported receiving WGY on but a single tube. Three sets are used by Mr. Nonnekens. They are a three-stage radio-frequency receiver, a special naval type combination crystal-tube receiver, and a one-tube long wave receiver, as shown above.

# Here Are Good Broadcast Programs

## Station KDKA, East Pittsburgh, Pa.

**325 Meters (920 Kcys.).** E. S. T. Mar. 21.—9:45 A. M.—Union live stock market reports from the studio of the National Stockman and Farmer. 6:15 P. M.—Organ recital by Lucile Hale of the Cameo Motion Picture Theatre, Pittsburgh, Pa. 8:30 P. M.—Concert broadcast from the Wilmas Club, Wilkingsburg, Pa., to be given by the KDKA Little Symphony Orchestra, Victor Saudek, conductor; Irma Louise Carpenter, soprano; Mrs. Elmer B. Sulzner, contralto; Lillian Meyers, accompanist; Elizabeth Cornfield Boli, soprano; Roy Strayer, tenor.

Mar. 22.—12:00 Noon.—Weather forecast. United States Bureau of Market reports from the studio of National Stockman and Farmer. 12:20 P. M.—Lenten services from Trinity Church, Pittsburgh, Pa., conducted by the Rev. T. J. Bigham, Church of the Advent, Pittsburgh, Pa. 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 direction of T. J. Vastine. 7:15 P. M.—Feature. 7:30 P. M.—Story by Dr. David Lang, of the Shady Ave. Presbyterian Church. 7:45 P. M.—Feature. 8:30 P. M.—Concert by Westinghouse Band, T. J. Vastine, conductor, assisted by Mrs. Jane Stretton Mitchell, soprano; Mrs. Florence Sampson Boggs, contralto.

## Station WOR, Newark, N. J.

**405 Meters (740 Kcys.).** E. S. T. Mar. 21.—2:30 P. M.—Eleanor Klump, soprano. 3:00 P. M.—Roland Young, star of "Beggar on Horseback," narrating his experiences—"From Architect to Actor." 3:45 P. M.—Readings by Anna C. MacDonald. 7:00 P. M.—Mandolin solos by Carlo de Filipis.

Mar. 22.—2:30 P. M.—Howard V. Aaron, bass-baritone. 3:45 P. M.—Joint program by Phil Abrams, pianist; Evelyn Stockman, soprano, and George Koty, banjoist. 6:15 P. M.—Paul Van Loan's Cinderella Orchestra. 7:15 P. M.—Fred J. Bendel in his weekly talk on "Sporting News Up-to-the-Minute."

## Station KGW, Portland, Ore.

**492 Meters (610 Kcys.).** P. T. Mar. 19.—11:15 A. M.—Window shopping. 12:30 P. M.—Concert by Darby's Orchestra of Cottillion Hall. 7:30 P. M.—Weather forecast and market reports. 8 P. M.—Orchestra concert. 10 P. M.—Dance music by Geo. Olsen's Metropolitan Orchestra of Hotel Portland.

Mar. 20.—11:15 A. M.—Window shopping. 12:30 P. M.—Concert courtesy Sherman, Clay & Co. 7:30 P. M.—Weather forecast and market reports. 8 P. M.—Radio play. 10 P. M.—Dance music by George Olsen's Metropolitan Orchestra of the Hotel Portland.

Mar. 21.—11:15 A. M.—Market basket. 3:30 P. M.—Lecture provided by Extension Service, Oregon Agricultural College. 8:15 P. M.—Studio program of dance music by Geo. Olsen's Metropolitan Orchestra of Hotel Portland, Herman Kenin, director. 10:30 P. M.—Hoot Owls with Darby's Orchestra.

Mar. 22.—11:30 A. M.—Weather forecast. 3:30 P. M.—Children's program, story by Aunt Nell. 10 P. M.—Weather forecast and dance music by Geo. Olsen's Metropolitan Orchestra of Hotel Portland, (2 hours).

## Station WOS, Jefferson City, Mo.

**441 Meters (680 Kcys.).** C. S. T. Mar. 21.—8:00 P. M.—Address: "Pastures and Meadows," by S. M. Jordan, lecturer of Missouri State Board of Agriculture. 8:20 P. M.—Debate on a national question by members of the Missouri University Debate Team, F. W. Anderson, Debate Coach.

Mar. 23.—7:30 P. M.—Complete religious service of the Central Evangelical Church, Jefferson City, Mo., the Rev. E. W. Berlekamp, pastor; Prof. F. J. Ziesberg, organist, by line telephony from the church.

Mar. 24.—8:00 P. M.—Dance program by the Missouri State Prison Dance Orchestra, Hugh C. French, director; extraordinary piano solos by Harry M. Snodgrass, the "King of the Ivories."

Mar. 26.—8:00 P. M.—Address: "Forest Protection Week, and Arbor Day," H. F. Major, associate professor of horticulture, College of Agriculture, Columbia, Mo. 8:20 P. M.—Old time "fiddlin'" program presented by Famous String Trio; Louie Barton, lead "fiddle"; Geo. Schrimpf, bass "fiddle"; and Bryan Williams, guitar.

Mar. 28.—8:00 P. M.—Orchestral program by the Miller Theatre Orchestra, E. S. Emerson, conductor, by line telephony from the Miller Theatre.

## Station WGI, Medford Hillside, Mass.

**360 Meters (810 Kcys.).** E. S. T. Mar. 21.—12 M.—Selection on the Ampico in the Chickering, Amrad round table, selections on the Brunswick. 12:40 P. M.—New England weather forecast furnished by the U. S. Weather Bureau. 12:45 P. M.—Closing report on farmers produce market reports. 5:30 P. M.—Closing stock market reports furnished by Elmer H. Bright & Co. 6:15 P. M.—Code practice, lesson No. 254. 7:30 P. M.—Evening program.

Mar. 22.—6:30 P. M.—Meeting of the Amrad Big Brother Club. 6:45 P. M.—Code practice, lesson No. 255. 7:05 P. M.—New England weather forecast furnished by the U. S. Weather Bureau. 8 P. M.—Evening program.

## Station WFAA, Dallas, Tex.

**476 Meters (630 Kcys.).** C. S. T. Mar. 20.—12:30-1 P. M.—Address, Epps G. Knight, pioneer citizen and business man, on "Succeeding Cheerfully." 8:30-9:30 P. M.—Program by talent at Greenville, Texas, broadcast through Station WFAA.

Mar. 21.—12:30-1 P. M.—Address, Dr. Robert Stewart Hyer, Southern Methodist University, Department of Physics, on the Sunday School lesson, "The Reign of Solomon." 8:30-9:30 P. M.—Miss Jessie McKee's Orchestra in popular music recital.

Mar. 22.—12:30-1 P. M.—Address, T. E. Jackson, head Dallas Vocational School, Open Shop. 8:30-9:30 P. M.—Piano recital, presenting Miss Gertrude Mandelstamm, fourth artist performer in series to end with ten-piano recital on May 1. 11-12 P. M.—Adolphus Hotel Orchestra.

Mar. 23.—6-7 P. M.—Radio Bible Class, Dr. Wm. M. Anderson, pastor First Presbyterian Church, teacher; half-hour Bible study and half-hour Gospel song. 7:15-9 P. M.—Service at City Temple Presbyterian Church, Dr. L. D. Young, pastor; Jack A. Davis, pianist; broadcast from the church. 9-9:30 P. M.—Religious address, Dr. Wallace Bassett, pastor Cliff Temple Baptist Church. 9:30-11 P. M.—Britling's Dallas Cafeteria Orchestra.

## Station WOC, Davenport, Ia.

**484 Meters (620 Kcys.).** C. S. T. Mar. 21.—10 A. M.—Opening market quotations, garden and household hints. 8 P. M.—Musical program (1 hour), Erwin Swindell, musical director. Vivian Tallman, pianist; Charles R. Hall, tenor; Mrs. E. W. Marshall, soprano; E. H. Hoad, reader. Wendell Hall and his ukulele.

Mar. 22.—10 A. M.—Opening market quotations, garden and household hints. 10:55 A. M.—Tune signals; 11 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations. 12 M.—Chimes concert. 12:30 P. M.—Closing stocks and markets. 3:30 P. M.—Educational program, musical numbers.

## Station WFAF, New York City

**492 Meters (610 Kcys.).** E. S. T. Mar. 20.—11 A. M.—Popular talks, with consolidated market and weather reports. 4:50-3 P. M.—Margaret Bovard, soprano, accompanied by Helen Hall; Phillip Steel, baritone; Margaret Kopekin, pianist. 6:45-11 P. M.—Talk by American Agriculturist; mid-week services by the New York Federation of Churches; United Cigar Stores Daily Sport Talk by Thornton Fisher; Wm. Detlef, pianist; talk by Harowitz Bros. and Margaret.

Mar. 21.—Lecture by Prof. Chas. Zuehlin, direct from Town Hall, New York City, under auspices of the League for Political Education. 4:50-3 P. M.—Fay Milbar's Society Orchestra; children's hour with stories and songs; Lucile De Mont, soprano, and Jack Morrisse, tenor. 7:30-10:30 P. M.—United Cigar Stores daily sport talk by Thornton Fisher; battery instruction talk by George C. Furness, head of the Radio Division of the National Carbon Co.; "The Happiness Boys," Billy Jones and Ernest Hare.

Mar. 22.—4-5 P. M.—Dance program by Mount Royal Orchestra; Wm. G. Stratz, tenor; Ted Schmidt and Harry Regan, popular songs. 7:30-11 P. M.—Anne B. Tyndall, soprano, and Phillip G. Bogart, tenor, accompanied by Geo. Vause; "The Chiclet Quartette," assisted by the Chiclet Trio of the American Chiclet Company.

## Station PWX, Havana, Cuba

**400 Meters (750 Kcys.).** E. S. T. Mar. 22.—Concert at studio of Station PWX, by Carlos Fernandez, Fausto Alvarez, Gustavo Carrasco and Miss Maria Fantolli, entirely Cuban vocal and instrumental program.

Mar. 26.—Concert at the Malecon Band Stand, by General Staff Band of the Cuban Army, with international music.

Mar. 29.—Concert at the studio of Station PWX, by Paquita Elias, Nena Guerra and Nena Piana, Fausto Alvarez, tenor, and Prof. Carlos Fernandez, accompanist.

## Station KFAE, Pullman, Wash.

**330 Meters (910 Kcys.).** P. T. Mar. 21.—Losses from Impure Seed Grain, Prof. E. G. Schafer, Farm Crops Dept. Piano solos, Irmgard King, Spokane. Farmers' Influence on Production, Prof. R. N. Miller. Whistling solos, Mrs. W. V. Smith (wife of engineering student). Songs, Vay Kerns, Palouse. A talk on new books, Alice Lindsey Webb.

Mar. 24.—Effective Summer Fallowing, Prof. F. J. Sievers, soils specialist. Baritone solos, Paul Christen, Butte, Mont. Geographical History of the Columbia River, Prof. O. P. Jenkins. Piano solos, Lillian Pettibone, Greenacres. Spray poisoning of Bees, Prof. B. A. Slocum, bee specialist. Banjo solos, Ray Treascher, Sunnyside.

## Station WLW, Cincinnati, O.

**309 Meters (970 Kcys.).** C. S. T. Mar. 21.—10:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Market reports. 3 P. M.—Stock quotations. 4 P. M.—Special program.

Mar. 22.—10:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Market reports.

## Station KFI, Los Angeles, Calif.

**469 Meters (640 Kcys.).** P. T. Mar. 19.—4:45 P. M.—Evening Herald news bulletins. 5:15 P. M.—Examiner news bulletins. 6:45 P. M.—Nick Harris detective stories and concert. 8:00 P. M.—Evening Herald concert. 9:00 P. M.—Examiner concert. 10:00 P. M.—Hollywoodland Community Orchestra. 11:00 P. M.—Ambassador-Lyman's Coconut Grove Orchestra.

Mar. 20.—4:45 P. M.—Evening Herald news bulletins. 5:15 P. M.—Examiner news bulletins. 6:45 P. M.—Y. M. C. A. concert; sales lecture, and bedtime story. 8:00 P. M.—Ambassador Hotel concert. 9:00 P. M.—Examiner concert. 10:00 P. M.—Gage Christopher concert.

Mar. 21.—4:45 P. M.—Evening Herald news bulletins. 5:15 P. M.—Examiner news bulletins. 6:45 P. M.—Vocal and instrumental concert. 8:00 P. M.—Evening Herald concert. 9:00 P. M.—Examiner concert. 10:30 P. M.—Frances Mae Maddux concert. 11:00 P. M.—Ambassador-Lyman's Coconut Grove Orchestra.

Mar. 22.—4:45 P. M.—Evening Herald news bulletins. 5:15 P. M.—Examiner news bulletins. 6:45 P. M.—Bedtime story and concert. 8:00 P. M.—Leonard Van Berg, Jimmy Kossel and Barney Weber singing popular songs. 10:00 P. M.—Vocal and instrumental concert. 11:00 P. M.—Ambassador-Lyman's Coconut Grove Orchestra.

## Station WBAP, Fort Worth, Tex.

**476 Meters (620 Kcys.).** C. S. T. Mar. 23.—11 A. M.—12:15 P. M.—Complete services of the First Presbyterian Church, Rev. J. K. Thompson, pastor. 4-5 P. M.—Organ concert by Miss Margaret Agnew White of the Rialto Theatre. 11 P. M.—12 A. M.—Popular concert by Fred Cahoon's WBAP Southern Serenaders Orchestra.

Mar. 24.—7:30-8:30 P. M.—Concert by the 40-piece band of the John Tarleton Agricultural College, Stephenville. 9:30-10:45 P. M.—Concert by Peacock's Fiddle Band of Cleburne, Texas.

Mar. 25.—7:30-8:30 P. M.—James E. King's "University of Eskota" Band. 9:30-10:45 P. M.—Monthly program by Fort Worth Harmony Club.

## Station KGO, Oakland, Calif.

**312 Meters (960 Kcys.).** P. T. Mar. 21.—1:30 P. M.—New York Stock Exchange and U. S. Weather Bureau reports. 3 P. M.—Musical program. An afternoon with American authors and composers. 6:45 P. M.—Final reading, stock exchange and weather reports, and news items.

Mar. 22.—12:30 P. M.—New York Stock Exchange and U. S. Weather Bureau reports. 8 P. M.—Feature numbers furnished by Berkeley Downtown Business Association. 10 P. M.—1 A. M.—Dance music from the orchestra in the St. Francis Hotel ball room, San Francisco.

## Station KSD, St Louis

**546 Meters (550 Kcys.).** C. S. T. Mar. 19.—7:00 P. M.—Program of Aberg's Concert Ensemble, Arne Arnesen, violinist, broadcast direct from Hotel Statler. 9:00 P. M.—Program by quartet of West Presbyterian Church Choir. 11:00 P. M.—Broadcasting direct from Hotel Statler dance music played by Rodemich's Orchestra.

Mar. 20.—8:00 P. M.—Program by members of Standard Oil Band of Wood River, Illinois, under direction of I. L. Roy Stocker.

Mar. 22.—8:30 P. M.—Missouri Theatre Orchestra concert and specialties broadcast direct from the theatre.

## Station WDAF, Kansas City, Mo.

**411 Meters (730 Kcys.).** C. S. T. Mar. 14.—3:30-4:30 P. M.—Regular "request" program by the Leo R. Davis "Radio" orchestra. 6-7 P. M.—Piano tuning-in number on the Duo Art. Marketgram, weather forecast, time signal and road report. Address, speaker, from the Kansas City Children's Bureau. Address, representative of the Orthodoxist Convention, Kansas City. The children's story and information period. Music, Fritz Hanlen's Trianon Ensemble, Hotel Muehlebach. 8-9:15 P. M.—Program arranged and presented by G. B. Nichols, Fort Leavenworth, Kas. 11:45 P. M.—1 A. M.—The "Merry Old Chief" and the Coon-Sanders Novelty Singing Orchestra, Plantation Grill, Hotel Muehlebach.

Mar. 22.—3:30-4:30 P. M.—The Riley Ehrhart Orchestra. 6-7 P. M.—Piano tuning-in number on the Duo-Art. Marketgram, weather forecast, time signal and road report. Address, Edgar A. Linton, writer-lecturer of Kansas City. The children's story and information period. Music, Fritz Hanlen's Trianon Ensemble, Hotel Muehlebach. 11:45 P. M.—1 A. M.—The "Merry Old Chief" and the Coon-Sanders Novelty Singing Orchestra, Plantation Grill, Hotel Muehlebach.

## Station WJZ, New York City

**455 Meters (660 Kcys.).** E. S. T. Mar. 21.—5:15 P. M.—"Systematic Psychology," by Dean James E. Lough of New York University. 7 P. M.—Dance supper music by the Memphis Five of Rosemont. 10:30 P. M.—Dance program by Paul Specht's Alamac Orchestra.

Mar. 22.—2:30 P. M.—Special Saturday Luncheon of the National Democratic Club. 3:30 P. M.—Breaud and Tobias popular program. 5 P. M.—Red and Gray Melody Boys. 7:45 P. M.—Second radio debate between Dr. Charles Francis Potter and Dr. John Roach Stratton; subject, "The Virgin Birth"; direct from Carnegie Hall.

### Station WDAR, Philadelphia

395 Meters (760 Kcys.). E. S. T. Mar. 20.—11:45 A. M.—Daily almanac. 12:02 P. M.—Organ recital from the Stanley. Lenten services from the studio. Arcadia Concert Orchestra, Feri Sarkozi, conductor. 2:00-3:00 P. M.—Arcadia Concert Orchestra; recital; Mrs. Anna B. Scott will talk on "The Market Basket." 4:30 P. M.—Club hour. 7:30 P. M.—Dream Daddy with the boys and girls.

Mar. 21.—11:45 A. M.—Daily almanac. 12:02 P. M.—Organ recital from the Stanley Theatre; Lenten services from the studio; Arcadia Concert Orchestra, Feri Sarkozi, conductor. 2:00-3:00 P. M.—Arcadia Concert Orchestra; playlet by Philadelphia School of Elocution and Oratory. 4:30 P. M.—Program of popular dance music; the weekly news letter. 7:30 P. M.—Dream Daddy with the boys and girls. 8:00 P. M.—Poets and authors corner; book review; playlet, the WDAR Walter Greenough Players; talk; program by the Penn Charter Musical Clubs. 10:10 P. M.—Howard Lanins Dance Orchestra; special entertainment from the studio.

### Station CKAC, Montreal, Can.

425 Meters (710 Kcys.). E. S. T.—Mar. 19.—4:15 P. M.—Mt. Royal Hotel Concert Orchestra. 4 P. M.—Weather, news, stocks. 4:30 P. M.—Mt. Royal Hotel Dance Orchestra.

Mar. 20.—4:00 P. M.—Weather, news, stocks, music. 7:00 P. M.—Kiddies' stories in French and English. 7:30 P. M.—Rex Battle and his Mt. Royal Hotel Concert Orchestra. 8:30 P. M.—Featuring Mrs. Mary Wall Ray, famous American harpist. 10:30 P. M.—Jos. C. Smith and his Mt. Royal Hotel Orchestra.

Mar. 21.—1:45 P. M.—Mt. Royal Hotel Concert Orchestra. 4:00 P. M.—Weather, news, stocks. 4:30 P. M.—Mt. Royal Hotel dance program.

Mar. 22.—7:00 P. M.—Kiddies' stories in French and English. 7:30 P. M.—Rex Battle and his Mt. Royal Hotel Orchestra. 8:30 P. M.—Variety entertainment from studio. 10:30 P. M.—Jos. C. Smith and his Mt. Royal Hotel Orchestra.

Mar. 23.—4:30 P. M.—Sacred concert. Organ, vocal and instrumental.

Mar. 24.—1:45 P. M.—Mt. Royal Hotel Concert Orchestra. 4:00 P. M.—Weather, news, stocks. 4:30 P. M.—Mt. Royal Hotel Dance Orchestra.

Mar. 25.—4:00 P. M.—Weather, news, stocks, music. 7:00 P. M.—Kiddies' stories in French and English. 7:30 P. M.—Rex Battle and his Mt. Royal Hotel Orchestra. 8:30 P. M.—Studio entertainment. 10:30 P. M.—Jos. C. Smith and his Mt. Royal Hotel Orchestra.

### Station WGY, Schenectady, N. Y.

380 Meters (790 Kcys.). E. S. T. Mar. 22.—11:55 A. M.—U. S. Naval Observatory time signal. 12:30 P. M.—Stock market report. 12:40 P. M.—Produce market report. 9:30 P. M.—Dance music by Romano's Orchestra, New Kenmore Hotel, Albany, N. Y.

Mar. 22.—11:55 A. M.—Time signals. 12:30 P. M.—Stock market report. 12:40 P. M.—Produce market report. 12:45 P. M.—Weather forecast. 2 P. M.—Music and talk, "Dress Styles and Materials for the Business Girl." Paul A. Brown. 6 P. M.—Produce and stock market quotations; news bulletins. 6:30 P. M.—Children's program. 7:35 P. M.—Health talk, N. Y. State Department of Health. 7:45 P. M.—Musical program.

### Station WHAZ, Troy, N. Y.

380 Meters (790 Kcys.). E. S. T. Mar. 24.—9:00 P. M.—Program by South American students of Rensselaer Polytechnic Institute, including numbers in Spanish and Portuguese. 10:00 P. M.—Address, "Fort Crailo: Birthplace of Yankee Doodle," by Dr. Alexander C. Flick. 10:15 P. M.—Program by representatives of some of Troy's industries under the auspices of Industrial Club of Troy. 11:15 P. M.—Concert by blind singers and musicians under direction of J. Thompson Courtney.

Mar. 31.—9:00 P. M.—Miss Mildred Lamb, contralto, and Miss Pluma G. MacIntosh, dramatic reader. Garden talk by John Jeannin, Jr., extension lecturer of State Department of Agriculture. 9:45 P. M.—Play, "It Pays to Advertise," by Rensselaer Polytechnic Institute Students' Dramatic Club. 11:00 P. M.—Popular dance music by the Campus Serenaders, Rensselaer Polytechnic Institute Students' Orchestra.

### Station WOAW, Omaha, Neb.

526 Meters (570 Kcys.). C. S. T. Mar. 7.—6:30 P. M.—Dinner program presented by Ackerman's Orchestra of Empress Rustic Garden Dance Palace. 9 P. M.—Hotel Fontenelle Orchestra, C. L. Schuster, director.

Mar. 22.—6:30 P. M.—Dinner program presented by Parrakeet's Orchestra. 9 P. M.—Program by courtesy of the Benevolent and Protective Order of Elks, Omaha Lodge No. 39, featuring the Omaha Elks Band, Henry G. Cox, director. Auspices Merchants National Bank.

### Station KHJ, Los Angeles, Calif.

395 Meters (760 Kcys.). P. T. Mar. 21.—12:30-1:15 P. M.—Music, news items, weather report. 6:40 P. M.—Live stock and vegetable reports. 8-10 P. M.—Program presenting the Studebaker Radio Orchestra of Long Beach.

Mar. 22.—12:30-1:15 P. M.—Music, news items, weather report. 2:30-3:30 P. M.—Matinee musicale through the courtesy of the Southern California Music Company. 10 P. M.—Program presented by Sunkist Trio.

### Station WHN, New York City

360 Meters (610 Kcys.). E. S. T. Mar. 19.—2:20 P. M.—Judith Roth singing "Colorado," "I've Been a Fool" and "Kiss Me With Your Eyes." 2:30 P. M.—Al. Wilson singing "Barefoot Days." 2:45 P. M.—Walter Zinn playing selections from "Moonlight," "Say It Forever," "On Such a Night" and others. 3:00 P. M.—Harry Romaine, tenor, singing "Trippin' Along" and "Mickey Donahue." 3:15 P. M.—Richard Douglas, tenor, popular songs. 4:30 P. M.—Bob Schaefer and his entertainers, assisted by the "Original Georgia Five." 4:40 P. M.—Lewis Piotti singing "Me No Speaka Good English" and "Mr. Radio Man." 4:50 P. M.—James Flynn singing "Arcady" and "Linger Awhile." 5:00 P. M.—Bob Miller singing "Mama Loves Papa." 5:15 P. M.—Al. Novins and Clint Sommer singing "There's Nobody Else But You," "Our Little Home" and "On a Moonlight Night." 5:30 P. M.—Ethel Miller in songs. 10:45 P. M.—Mme. Leola Lucey, dramatic soprano. 10:50 P. M.—Harry Richman of the Wigwag Club. 10:55 P. M.—Don Roberts of the Monte Carlo singing "Marcheta." 11:00 P. M.—John Irving Fisher in piano solos. 11:15 P. M.—Hugo Friedberg, tenor, singing popular songs. 11:30 P. M.—Jack Morrisse, tenor, and Lucille Dumont singing "You Wanted Someone to Play With" and "Happy Go Lucky." 11:45 P. M.—Sammy Fain and Peter Wells in songs.

### Station WHAS, Louisville, Ky.

400 Meters (750 Kcys.). C. S. T. Mar. 19.—1:00-5:00 P. M.—Selections by the Walnut Theatre Orchestra, Walter Davison, conductor. 7:30-9:00 P. M.—Concert by Chester L. Meyer's Orchestra, Chester L. Meyer, piano and director; Bob Atwell, drums and entertainer; Roy Pruitt, banjo; Lowell Nichols, trombone; J. Milburn Stone, saxophone and clarinet; Phil Meyer, saxophone; Charles H. Dannacher, tuba.

Mar. 20.—1:00-5:00 P. M.—Selections by the Strand Theatre Orchestra, Harry S. Currie, conductor. 7:30-9:00 P. M.—Concert under the auspices of Miss Bernice Lake. Four-minute digest of International Sunday-school lesson by Dr. Harris Malinckrodt. Four-minute radio forum talk. Late important news bulletins. Official Central Standard time announced at 9 o'clock.

Mar. 21.—4:00-5:00 P. M.—Selections by the Walnut Theatre Orchestra, Walter Davison, conductor. 5:00 P. M.—Official Central Standard time announced. 7:30-9:00 P. M.—Concert by the Falls Cities Serenaders, Earl Elliott, director and saxophone and violin; Kenneth Robinson, trumpet; Al Kochler, banjo and trombone; Leland Brock, piano; Norton Hassenmiller, trumpet and saxophone; Nig Phillips, bass; Charles Lusic, drums.

### Station WRC, Washington, D. C.

469 Meters (640 Kcys.). E. S. T. Mar. 19.—3:00 P. M.—Fashion Development of the Moment, prepared by Women's Wear. 3:10 P. M.—Song recital to be announced. 3:25 P. M.—Report of the National Conference Board. 4:00 P. M.—Song recital to be announced. 5:15 P. M.—Instruction in international code. 6:00 P. M.—Stories for children by Peggy Albion.

Mar. 21.—3:00 P. M.—Fashion Developments of the Moment, prepared by Women's Wear. 3:10 P. M.—Song recital by Arthur McCormick, baritone. 3:25 P. M.—Current topics by the editor of The Review of Reviews. 3:35 P. M.—Piano recital by Ethel Grant. 3:50 P. M.—The Magazine of Wall Street. 4:00 P. M.—Song recital to be announced. 5:15 P. M.—Re-transmission of time signals and weather forecasts. 6:00 P. M.—Stories and songs for children by Peggy Albion and Mary Frances Glenn.

### Station WAAM, Newark, N. J.

263 Meters (790 Kcys.). E. S. T. Mar. 20.—7:00 P. M.—Allen Strand's Collegiate Orchestra. 7:45 P. M.—"Silver Selection." Talk by Captain George E. Falys, Jr., authority on dining-room etiquette, speaking under auspices of the Alvin Silver Company. 8:00 P. M.—Brunswick Male Quartette, in a reminiscent song-review. 8:15 P. M.—Argulies Trio—David Margulies, violin; Louis Arbogast, cello; Michel Borochowsky, piano. 8:30 P. M.—"Eating Our Way to Health." Talk on the processes of metabolism. By Dr. G. A. Lowenstein, scientific dietitian. 8:45 P. M.—Harry Golub and Jack Palmer in a repertoire of favorite "blues," including "Nobody Loves Me But My Mother," "Mamma's Gone Good-bye," "Headin' for a Weddin' Down in Dixie." 9:00 P. M.—Victor Wilbur, baritone, singing "After All," "Waikiki Is Calling Me," "My Daddy's Dreamtime Lullaby," with Joseph Macy at the piano. 9:15 P. M.—Dr. Arthur W. Brooks, scientific (astrologist and vocational guidance expert, continuing his weekly lectures on "The Turn of the Wheel of Events." 9:45 P. M.—Fritz Leyton, vaudeville headliner, singing "You Left Me Out in the Rain," "That Bran New Man o' Mine" and "I'm Going South." 10:00 P. M.—Frank E. Effinger, radio engineer, talking on "Shooting Trouble in the Receiver." 10:15 P. M.—Program by Carolina Ramblers' Orchestra, under direction of Arthur Richter, offering "Dance Music of Distinction."

### Station WOO, Philadelphia, Pa.

509 Meters (590 Kcys.). E. S. T. Mar. 20.—11:00 A. M.—Grand organ. 11:30 A. M.—United States weather forecast. 11:55 A. M.—United States Naval Observatory time signal. 12:00 Noon—Luncheon music by the Tea Room Orchestra. 4:45 P. M.—Grand organ and trumpets. 5:00 P. M.—Sports results and police reports. 9:55 P. M.—United States Naval Observatory time signal. 10:02 P. M.—United States weather forecast.

Mar. 21.—11:00 A. M.—Grand organ. 11:30 A. M.—United States weather forecast. 11:55 A. M.—United States Naval Observatory time signal. 12:00 Noon—Luncheon music by the Tea Room Orchestra. 4:45 P. M.—Grand organ and trumpets. 5:00 P. M.—Sports results and police reports. 7:30 P. M.—Dinner music from the Hotel Adelphia Concert Orchestra, A. Candelori, director. 8:30 P. M.—Special musical program from the Fox Theatre Studio. 9:15 P. M.—Tom Daly, poet. 9:30 P. M.—Grand organ recital—Mary E. Vogt. 9:55 P. M.—United States Naval Observatory time signal. 10:02 P. M.—United States weather forecast. 10:03 P. M.—Kentucky Kernels Orchestra from Hotel Adelphia.

### Station WJY, New York City

405 Meters (740 Kcys.). E. S. T. Mar. 20.—8:05 P. M.—"Golf," by Innis Brown, editor of "The American Golfer." 8:45 P. M.—"Short Stories of O. Henry." 10:30 P. M.—Roger Wolfe's Hotel Knickerbocker Grill Orchestra. Mar. 21.—7:30 P. M.—J. Vincent Moore's Entertainers. 10 P. M.—Blow-by-blow description of the Joe Lynch-Abe Goldstein bout, direct from the ringside at Madison Square Garden; announcing by J. Andrew White.

### Station WLW, Cincinnati, O.

309 Meters (970 Kcys.). C. S. T. Mar. 23.—9:30 A. M.—School—conducted by the editorial staff of Sunday School Publication of the Methodist Book Concern. 8 P. M.—Special program to be announced. Mar. 24.—10:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Market reports. 3 P. M.—Stock quotations. 4 P. M.—Special program.

## Important Notice to the Radio Public!

Keep on buying radio sets!  
Keep on buying parts and making your own sets!  
Keep up your interest in radio—listen in!

## BECAUSE:

There is not the slightest chance for anybody, anywhere, at any time, to acquire a monopoly on the air or to halt general broadcasting even temporarily.

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# DX Nite Owls Still Sending in Their DX Records

## DX Nite Owls, Attention!

THE DX season is now upon us. All faithful DXers are requested to 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.

## Here Is One on a 15-Foot Antenna

From Leslie Welker, Brownfield, Pa.

Following is a list of stations I have received in two months on an Atwater Kent 5-tube set. My antenna is two wires, 15 feet long in the attic. KFKX, KFGC, KDKA, KYW, KOV, KFMQ, KFI, KSD, KFKB, KFJX, KHJ, KPO, KFJW, KFEL, KFIX, KFMX, KGW, KFLZ, KFIL, KFFZ, KOP, KFFO, KFAF, KFNG, KFNE, KGO, KFGD, KFHD, KFNG, KGG, KJS, KFFZ, WOR, WHAZ, WTAJ, WEAS, WJAK, WTAM, WGY, WJAR, WIAO, WJX, WKAQ, WBT, WCAE, WCAH, WCBD, WEAN, WMAJ, WNAC, WOC, WOS, WMAV, WFI, WOAN, WRC, WCX, WJAF, WIS, WTAS, WCAW, WLAG, WHAS, WNAV, WGL, WBAJ, WJAX, WFAH, WWJ, WSB, WFAF, WHB, WLB, WSAI, WCAI, WOAL, WMC, WCAP, WDAJ, WOO, WABB, WFAA, WABT, WEAM, WSAR, WPAL, WOV, WIAD, WPAQ, WEAY, WPAK, WPAT, WFAH, WFAH, WABM, WWAE, WOAN, WCAJ, WTAR, WHN, WJZ, WHA, WHAH, WWAC, WJAP, WOI, WBL, WNAD, WKY, WKAN, WBBF, WSAC, WGI, WRM, CFCF, CHBC, CKAC, CFCN, CFCA, CHKC, CFCR, PWX, 6KW.

## This Fan Plays Wicked Golf

From H. G. Newland, 274 Blackthorn Avenue, Toronto, Canada.

I am interested in the DX lists given in RADIO WORLD and would like to submit my list for three months with a single circuit, 1R, 215A Peanut Tube (Dry cell 1½ volt, 25 amp.) regenerative receiver. KHJ, Los Angeles, Calif., 2200 miles; WBAJ, Fort Worth, Tex., 1270 miles; WFAA, Dallas, Tex., 1250 miles; KFKX, Hastings, Neb., 1030 miles; WOA, Omaha, Neb., 825 miles; WDAF, Kansas City, Mo., 895 miles; WHB, Kansas City, Mo., 895 miles; WMC, Memphis, Tenn., 840 miles; WSY, Birmingham, Ala., 840 miles; WOS, Jefferson City, Mo., 785 miles; WSB, Atlanta, Ga., 780 miles; WLAG, Minneapolis-St. Paul, Minn., 725 miles; WBAD, Minneapolis, Minn., 725 miles; WCAI, Northfield, Minn., 720 miles; Also: KDKA, WBT, WCBD, WEAN, WGY, WIAD, WJZ, WOC, WRC, WWJ, KOP, WRAY, KSD, WBZ, WDAJ, WEAJ, WBAJ, WIP, WLW, WOO, WSAI, WCAI, WABJ, KYW, WCAE, WDAJ, WFI, WHAZ, WJAZ, WMAK, WOR, WTAS, WJAX, WCK, WBAV, WCAP, WFAF, WGR, WHN, WJY, WNAC, WPAB, WJAM, WHAA, WIAO.

## Here Is an Interesting One

From C. H. Howard, 580 Palmerston Avenue, Toronto, Canada

I am a regular DX NITER and am sending you my record for the past three months, during which time I picked up 108 stations. Until recently I had been using a single-circuit regenerative receiver, but a few days ago I added two stages of audio-frequency amplification. On my single peanut tube I heard 102 stations, including nine over 1,000 miles and three over 2,000 miles. My aerial consists of two strands 100 feet long and about 40 feet high. Here is my list:

CFCA, CJCD, CKCE, Toronto; WGR, Buffalo; KDKA, E. Pittsburgh; WGY, Schenectady; WEAS, Washington; WJZ, New York; WCAE, Pittsburgh; WDAJ, WJAZ, WMAQ, KYW, Chicago; WOC, Davenport; WOS, Jefferson City; WHAS, Louisville; KSD, St. Louis; WMC, Memphis; WOA, Omaha; WWJ, Detroit; WAAM, WOR, Newark; WFAF, New York; WIP, Philadelphia; WCAP, Washington; WBAK, Harrisburg; WSB, Atlanta; WFAA, Dallas; WDAJ, Philadelphia; WBZ, Springfield; WTAM, WJAX, Cleveland; WHAM, Rochester; WBAV, Columbus; WMAK, Lockport; WPAJ, Chicago; WSAI, WLW, Cincinnati; WLAG, St. Paul; WBAH, Minneapolis; WDAF, WHB, Kansas City; WEAR, Baltimore; WTAS, Elgin; WJAO, Topeka; WHA, Madison; WRC, Washington; WHAD, Milwaukee; WFAC, Superior; WSY, Birmingham; WJAR, Providence; WEAM, Plainfield; WSJZ, Pomery; WGI, Medford; Hillside; WFI, Philadelphia; CKAC, Montreal; WCK, St. Louis; WPAF, Waupaca; WHAZ, Troy; KOP, Detroit; WNAV, Knoxville; WCBD, Zion; WFAV, Lincoln; WBAJ, Fort Worth; WWAE, Joliet; WTAQ, Osseo; KFKX, Hastings; WSAD, Prov-

idence; WNAC, Boston; WEAN, Providence; WHN, New York; WJAK, Greentown; KFKB, Milford; CFCR, Sudbury; WOAN, Scranton; WCAI, Northfield; WCAJ, Canton; WABT, Washington, Pa.; WOAN, Lawrenceburg; WHK, Cleveland; WABL, Storrs; WOI, Ames; CHYC, Montreal; WPAB, State College; WJAS, Pittsburgh; WCAH, Columbus; KHJ, Los Angeles; KFI, Independence; KFAU, Boise; WIAO, Milwaukee; KFI, Los Angeles; KDZE, Seattle; KPO, San Francisco; CFCN, Calgary; WIAD, Philadelphia; WJY, New York; WABM, Saginaw; CKOC, Hamilton; WFAJ, Syracuse; WOA, Erie; WCAJ, San Antonio; CFCF, Montreal; WBT, Charlotte; PWX, Havana; WKAQ, San Juan, Porto Rico; 2XB, New York; IOAE, Bowmanville, Ontario; WLAV, Pensacola.

I expect to bring my total up to 150 before the summer. The best I have ever done in one night is 33. I hope you will not think this list too long to publish.

## Just Like the Rest of Our Readers

From J. E. Bradley, Justin, Texas

I enclose my DX record for the last two Sunday nights. They are "coming in" down in Sunny Texas fine these nights. The World is getting better each issue. Could not do without it now.

KDKA, 4:55 p. m., orchestra, Pittsburgh; WTAS, 5:00 p. m., orchestra, Elgin, Ill.; WCAE, 5:30 p. m., preaching, Zion, Ill.; 5AAO, 5:32 p. m., talking to 5KH Whitesboro, Texas; KYW, 6:00 p. m., talk "We Mothers," Chicago; WSB, 6:05 p. m., announce, sign off, Atlanta; WJAZ, 6:27 p. m., violin solo, "Mighty Lak a Rose," Chicago; 5KH, 6:30 p. m., calling CQ at Ft. Worth, Texas, Ardmore, Okla.; WCX, 6:40 p. m., Central M. E. Church services, Detroit; WOA, 6:41 p. m., chapel services, Omaha; WOC, 7:10 p. m., organ recital, Swendell playing, Davenport; 5SP, 7:20 p. m., calling CQ, England, Ark.; WCAP, 7:45 p. m., Capitol Theatre Orchestra, and talent, Washington; WFAF, 7:46 p. m., Capitol Theatre Orchestra, and talent, New York; KFI, 7:50 p. m., announcement, preaching, Independence, Mo.; WHB, 8:06 p. m., orchestra, Kansas City; WLAG, 8:07 p. m., announcement, preaching, Twin City, Minn.; WOS, 8:30 p. m., preaching, First Christian Church, Jefferson City, Mo.; WCAI, 8:55 p. m., preaching, Lutheran Church, Northfield, Minn.; KFI, 9:00 p. m., announcement and piano solo, Los Angeles; CKCN, 9:06 p. m., Song No. 319, lady announces, Calgary; KHJ, 9:23 p. m., children's services, Los Angeles; KSD, 9:50 p. m., orchestra, St. Louis; CYL, 9:55 p. m., soprano solo, violin solo, Mexico City; KPO, 11:00 p. m., pipe organ, orchestra, San Francisco; KGG, 11:10 p. m., duct, song, tenor, soprano, Portland, Ore.; 5RK, 11:15 p. m., talking to 3TJ, near Richmond, Va., Coldwater, Miss.

KFTW, 8:45 p. m., announce, Towanda, Kan.; KFI, 8:47 p. m., announce, Hymn No. 158, Independence, Mo.; WOS, 8:50 p. m., JMIV signs off at 8:51½. Jefferson City, Mo.; WLW, 8:52 p. m., preaching, Covenant Church, Cincinnati; WJAZ, 8:55 p. m., singing, Chicago; WCAP, 8:57 p. m., Skinner organ recital, Washington; KGW, 9:00 p. m., announcement, concert, Portland, Ore.; WFAF, 9:02 p. m., Skinner organ recital, New York; WOC, 9:03 p. m., orchestra, P. S. C., Davenport; CYL, 9:05 p. m., announcements, Mexico City; KFI, 9:15 p. m., soprano solo, Los Angeles; WOA, 9:17 p. m., choir singing, Omaha; KYW, 9:18 p. m., preaching, Chicago; WHB, 9:20 p. m., Sweeney Orchestra, Kansas City; KFDX, 9:25 p. m., announce, sign off First Baptist Church, Shreveport, La.; WEAY, 9:27 p. m., pipe organ, "Scene Pompanus," Houston, Texas; WDAJ, 9:28 p. m., song, "Ashes of Roses," Chicago; WCAI, 9:29 p. m., saxophone solo, "Avia Marie," Northfield, Minn.; WCAE, 9:32 p. m., John D. Thomas sings, Zion, Ill.;

WTAS, 9:36 p. m., a humorous reading the Curse of Drink, Elgin, Ill.; WWAE, 9:42 p. m., orchestra "Alamo Dance Hall," Joliet, Ill.; KLZ, 10:32 p. m., saxophone quartette, Denver; KHJ, 10:50 p. m., a dialogue man and woman, Los Angeles; KPO, 11:00 p. m., Fairmount Hotel Orchestra, San Francisco; KGO, 11:02 p. m., preaching, Oakland, Calif.

## Thank You, Again

From Mr. and Mrs. J. E. Bradley, Justin, Texas

Enclose a copy of our log for February 21 and 22. Radio weather fine in Texas now. Thank you for giving us DXers a page to "spread our stuff."

WWJ, 6:30 p. m., string quartette; WOA, 6:32 p. m., reading-man; WDAF, 6:37 p. m., reading-woman, school of air; WCAE, 6:40 p. m., report on stolen car; KDKA, 6:45 p. m., talk on co-operative dairy marketing; WTAS, 6:50 p. m., woman, song; WLAG, 6:59 p. m., sign off; WHB, 7:00 p. m., cone on fire whistle; WMAQ, 7:10 p. m., talk on golf; WOC, 7:12 p. m., orchestra, Arabiana; WGY, 7:29 p. m., orchestra; WCAJ, 7:40 p. m., announce; WDAJ, 7:50 p. m., announce; WAAW, 8:00 p. m., announce; 12:55 a. m., testing on 360 and 526 meters; WOI, 8:10 p. m., orchestra; WBZ, 8:12 p. m., sign off, WDJ announce; WJAX, 8:30 p. m., orchestra; WOO, 8:55 p. m., orchestra, "I Love You"; WOI, 8:58 p. m., announce, orchestra; WSAI, 8:59 p. m., announce; WDAH, 9:00 p. m., announce, C. of C. program. WHAS, 9:00 p. m., time signals.

WSB, 9:01, song, "Aren't Goin' to Rain Any More"; WMC, 9:06 p. m., orchestra, ladies, Hotel Chisca; KLZ, 9:55 p. m., announce; WJAZ, 10:05 p. m., announce; CYB, 10:07 p. m., sign off; KFKX, 10:08 p. m., announce; KGO, 10:15 p. m., orchestra, fox trot; 5JC, 11:00 p. m., calling 5AAW; WDAJ, 11:08 p. m., announce, lady sings; 5AMK, 11:13 p. m., musical program, piano and phonograph; KFSG, 11:45 p. m., song, Chickering piano used in accompaniment; KFI, 11:50 p. m., orchestra, Examiner program; WKY, 12:00 p. m., Midnite Frolic Orchestra; WLW, 12:05 a. m., Mr. Thurston, the magician, makes a talk on magic; WTAS, 12:15 a. m., signs off; KPO, 12:20 a. m., Palace Hotel Orchestra; KHJ, 12:30 a. m., Art Mickman's Orchestra; WHAA, 12:35 a. m., Chuck Sullivan plays on saxophone; KGW, 12:40 a. m., Madam Rose sings and announces; KHJ, 12:50 a. m., late news items in Spanish for Mexico; WAAW, 12:55 p. m., testing on 360 and 526 meters and calling KFNE, Shenandoah, Iowa; KYW, 1:03½ a. m., The World Crier signs off.

No local stations counted. 40 broadcasting stations, 2 amateur stations, 19 States and Mexico. 6 hours, 35 minutes, using 3 tubes, 1 stage R. F. A. detector and 1 stage A. F. A.

## We'll Consider It as a Start

From Harold E. Perkins, P. O. Box 485, Farmington, New Hampshire

This is my list on a one tube set using a WD12 type Supertron:

WGY, WTAM, WHAZ, WGR, WEAM, WHN, KDKA, WEAA, WJAZ, WBZ, WEAR, WDAJ, WSAI, WFAF, WOR, WJAR, WJZ, WFI, WDAJ, WCAP, WHAS, WIP, WRC, WSAX, CKAC, CKCH, WCAE, CHYZ.

I think this is a pretty good record for one month.

## From the Land of WBAP

From W. E. Brown, 1504 St. Louis Avenue, Fort Worth, Texas

I have a Radiola V using only one stage of amplification. You will note that Fort Worth is unfavorably located for receiving a large number of stations being down in the southwestern part of the United States. On Saturday night, March 1, I tried to see how large a number of stations I could hear. Here is the result:

KDKA, KFLZ, KFJW, KFNE, KFHD, KFNC, KFSG, KFJN, KFKB, KFI, KHJ, KGO, KPO, KGW, KSD, KYW, WDAF, WOA, WOI, WTAJ, WCB, WCAZ, WTAS, WSAI, WDAJ, WRR, WOO, WTAM, WHAS, WSB, WBZ, WCAJ, WFAF, WOC, WWAE, WGY, WLW, WBL, WJAZ, WCAI, WPAL, PWX and CFCN.

# 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.....

Name.....

Street Address.....

City and State.....

# Latest Radio Patents

## Radio Telegraph System

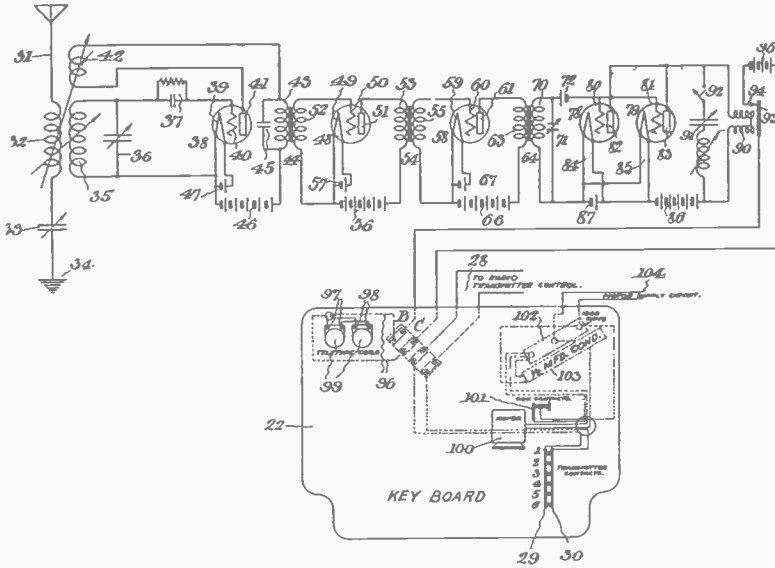
No. 1,485,212: Patented Feb. 26, 1924. Patentee: John R. Brady, Somerset, Md.

This invention relates to the automatic transmission and reception of radio telegraph signals, and more particularly to a system wherein signals may be transmitted upon the operation of a letter keyboard at the transmitter and received simultaneously in printed type at the receiver.

The object of my invention is to provide a system for the control of a radio telegraph transmitter from a manually operated keyboard resembling a typewriter keyboard and to provide means at the receiver for setting down received signals in type.

A further object of my invention is to provide an impulse system of radio transmission and reception as distinguished from the present dot and dash code sys-

tem arranged to be depressed by finger control. Beneath the key levers is arranged a set of five selecting bars arranged to be operated or set by the keys in different combinations. A sixth bar operated by each key controls a clutch by which a contact operating cam shaft is connected to a motor and so rotated through one revolution for each key depressed. The cam shaft is provided with a set of successively operating cams which effect and time the operation of a set of contacts, such operation being so controlled by a set of selecting fingers operated by the selector bars, that the circuit controlled by the contacts is either opened or closed through a definite number, preferably five, of successive definite time intervals for each character transmitted, and each character signal being preceded by a starting interval or impulse. That is to



Radio signalling system so arranged that the automatic reception and transmission of signals is possible from a manually operated keyboard resembling a typewriter.

tems whereby to render substantially secret the messages transmitted.

A further object of the invention is to provide a transmission system which is readily controlled by an operator unskilled in the art of radio telegraphy and to provide a printer receiver which may be operated by one without knowledge of codes as at present required.

A further object of the invention is to provide means whereby code combinations may be readily changed from time to time whereby to render the system substantially secret and the code practically unbreakable.

The transmission system is adaptable for shore or ship station control and in modified form for the control of aircraft radio transmitters from which an observer can communicate to a shore or ship station by operating the lettered keys of a keyboard while the message appears simultaneously in printed type at the receiver.

At the transmitter a keyboard resembling the keyboard of a typewriter is provided. The individual keys of this keyboard are formed in key bars pivoted at the rear of the machine casing and

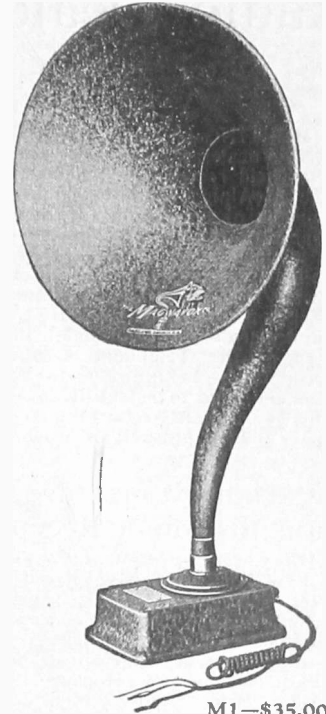
say, the contacts are uniformly operated at the beginning of each signal to form a starting impulse and through the remaining five intervals or units of each signal are either opened or closed to form combinations of impulses representing characters to be transmitted. In the case of a vacuum tube radio transmitter the grid circuit may be opened and closed in accordance with the sequence of the closing of the set of contacts. In the case of an arc transmitter a uniwave key may be controlled radiating impulses and suppressing impulses in succession. In the case of an alternator a magnetic amplifier may be controlled to start and suppress the radiated impulses. This operation causes the radiation of impulses of high frequency energy from an antenna system.

**Important Notice**

NO attention will be paid to communications that do not carry the full name and address of the correspondent.—EDITOR.

# MAGNAVOX

Radio Products



M1—\$35.00

## Magnavox Reproducer for dry battery receiving sets

THIS new semi-dynamic Magnavox Reproducer is particularly recommended for dry battery receiving sets where low voltage and low current consumption tubes are used. The M1 is supreme in its class.

### Magnavox Reproducers

- R2 with 18-inch curvex horn \$50.00
- 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.

**The Magnavox Company**  
Oakland, California  
New York Office: 370 Seventh Avenue  
Canadian Distributors  
Perkins Electric Limited, Montreal

# BUSINESS NEWS OF THE INDUSTRY

## Radio Dealers Hold Meeting of Protest

A MEETING of retail and wholesale radio dealers of New York and vicinity was held recently in the Blue Room of the McAlpin Hotel, to discuss ways and means of combating the threatened monopoly of the air as indicated by the suit instigated by WEA F, American Telephone and Telegraph Company, against WHN, in the Loew's State Theatre Building, controlled by Marcus Loew. Radio dealers are of the opinion that any victory of the Telephone Company in this suit might be injurious to their interests and that to establish an air monopoly would greatly retard the popularity of radio and the progress of broadcasting.

It is understood that radio dealers throughout the United States are being organized to combat the suit and aid Marcus Loew in his fight for the freedom of the air. The suit is of nation-wide interest, inasmuch as its success in the case of WHN could result, it is thought, in automatically putting other stations out of business. Geo. Schubel, representing WHN, offered to permit WEA F officials to state their side of the case as regards the suit from WHN station, providing WEA F would extend the same privilege to WHN. The chairman of the committee of arrangement for the meeting was Harold M. Schwab.

## A Variable Condenser for Transmission or Reception

THE Charles Freshman Co., Inc., of New York City, have placed on the market a condenser of entirely new construction. It has long been conceded that a variable condenser with mercury plates and using mica as a dielectric would be the most efficient and compact condenser for use on either radio receiving or transmitting sets. This can be understood when it is taken into consideration that mica forms a very intimate contact with the mercury.

The dielectric in this condenser is a heavy piece of India mica, and the housing is entirely constructed of Bakelite. The variation is accomplished by rotating the entire structure on shafts, each of which act as a terminal. As the condenser is rotated the mercury rides out of a reservoir into a thin circular chamber about one-sixteenth of an inch thick forming a thin wall of mercury which increases in size until the reservoir is at the top of the casing, when the full capacity is in play.

In the official tests of the Electrical Testing Laboratories, 80th Street and East End Avenue, New York City, the condenser was found to withstand a voltage of 8,000 volts and to have a phase angle loss of less than one minute—the actual loss being too small to be measured accurately.

The condenser is absolutely quiet, having no plate vibration and there is no possibility of short circuit or leakage. All the moulded parts and dial are made from Bakelite. It is furnished in various capacities.

## Convenient Radio Record Book

THE Beadle Printing Co., of Mitchell, South Dakota, have designed a Radio Record Book, which enables the radio fan to record each reception over the radio and to refer to this reception at any time and find it easily in the indexed stations. This book also contains a compartment for keeping track of announcements, new stations, etc., and is becoming very popular with the fans. Fans who like to get distant stations with certainty each evening will find it of value.

## First Edison Radio Show Opens March 22nd

AN interesting exhibit of the latest types of radio receivers will be at the New York Edison Company's first radio show, which opens on Saturday, March 22, and runs until Saturday, March 29, in their showroom, Irving Place and Fifteenth Street. The hours are from 9 A. M. to 10 P. M. daily except Sunday. There is no admission charge.

Besides the regular single and double circuit sets, the reflexes, the various "dyns" will be exhibited, among them being the famous "Neutro" and the still more talked about "Super-hetero." The "Super-heterodyne," manufactured by the Radio Corporation, will be the feature exhibited and demonstrated by the company's leading representatives. To demonstrate the development of this remarkable set, the Continental Radio and Electrical Corporation will exhibit the original Armstrong Super-regenerative units from which the newer receivers were modeled and improved. The various steps of construction will be demonstrated and explained. The Haynes-Griffin Company will exhibit and demonstrate their portable Super-heterodyne designed by A. J. Haynes, in addition to other units of standard design. Of particular interest to amateurs will be the 200 meter set also exhibited.

The C. D. Tuska Company promise to exhibit in addition to their regular models some of more recent development and departure. E. B. Latham Company will offer the Atwater-Kent and Kennedy units, and the U. S. Signal Corps will display the means of radio communication used by the Army.

## Radio-Phonograph Combine

ON March 12 formal announcement was made of a merger of the Radio Corporation of America and the Brunswick-Balke-Collender Company for the purpose of manufacturing a combined receiving set and phonograph. In accordance with the terms of the agreement, the Radio Corporation will be enabled to broadcast the operatic music of prominent singers that are making records.

David Sarnoff, vice president and general manager of the Radio Corporation,

just before going to Washington to attend the hearings on the White radio control bill, issued this statement:

"Through an agreement just signed between the Radio Corporation of America and the Brunswick-Balke-Collender Company, phonograph manufacturers, millions of radio fans throughout the United States will receive for the first time operatic and musical programs rendered by famous artists whose services hitherto have not been available to the broadcasting companies. Under the contract recently concluded, the phonograph company gains the right to install Radiola receiving sets in combination with Brunswick phonographs. In turn, the phonograph company will add its share to the public service now rendered by the principal broadcasting stations and aid the development of free broadcasting to the public, by permitting the stations of the Radio Corporation of America and those of its manufacturing associates, to broadcast from the laboratories of the Brunswick company.

## Coming Events

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

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

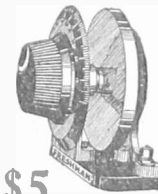
FIRST ANNUAL RADIO SHOW, Convention Hall, Washington, D. C., March 19-26, 1924.

RADIO SHOW, N. Y. Edison Co., Irving Place and 15th St., New York, March 22 to March 29, 9 A. M. to 10 P. M. No admission charge.

RADIO SHOW, New Haven, Conn., March 15-22, 1924. Thomas M. Friscoe, Manager, 30 Congress Ave., New Haven, Conn.

### "FRESHMAN SELECTIVE"

Mercury Variable Condenser



\$5

For  
Transmission  
or  
Reception

It is the only variable condenser the plates of which vary in area—AN ENGINEERING FEAT NEVER ACCOMPLISHED BEFORE—making it most efficient for fine adjustment and selective tuning.

No Leakage.  
Absolutely Quiet.  
No Plate Vibration.  
Cannot Short Circuit.  
Will Stand 5,000 Volts.

.0003 MF (Equiv. to 17 pl.)  
.0005 MF (Equiv. to 23 pl.)  
.001 MF (Equiv. to 43 pl.)

\$5  
each

At your dealer's, otherwise send purchase price and you will be supplied postpaid.

Ask your dealer or write for our free diagrams of Neutrodyne, Tri-Flex, Kaufman and other good circuits.

Chas. Freshman Co. Inc.  
Radio Condenser Products  
106 Seventh Avenue New York



# The Radio University

A Question and Answer Department conducted by the Technical Staff of RADIO WORLD for the information and instruction of its subscribers. A "trouble shooter" is always ready here to help new radio fans.

**INQUIRIES CANNOT BE ANSWERED OVER THE TELEPHONE.**

Please communicate with the Radio University Department by mail, and your inquiry will be answered at as early a date as possible.

*I enclose diagram of my three-circuit regenerative set. I cannot receive any out-of-town stations, try as I will. All that I get is the squeal which denotes a station, but cannot get the voices. What is my trouble?—F. Eierman, 3048 Gladwin Ave., Detroit, Mich.*

From description of your set it seems that there is too much inductance in your grid circuit. Remove or short circuit the grid variometer and do your tuning with the plate variometer, the secondary condenser and the coupling. This should make possible the bringing in of the stations that you cannot get now. Also note that you do not incorporate a grid leak and condenser in the circuit. Place a .00025 condenser in the grid circuit of the tube, shunted by a grid leak. This is necessary as the tube acts as a detector, not as an amplifier. With these two changes (the condenser and grid leak can be placed right in the circuit in place of the grid variometer) you should not have any trouble getting or holding the distant stations.

*I have constructed a set from plans furnished by a radio engineer. He claims it is tuned radio-frequency reflexed and has put his O. K. on the finished set. I cannot get it working properly. He suggested the tube I am using is unsuited for such work, and advised me to use UV199, but I have no better success with it. I enclose diagram of the set. How far should I be able to hear with it? At present my distance is just 600 miles, which my friend does with but one tube on a small antenna, using a Reinartz circuit.—G. Cooke, Bethlehem, Pa.*

The circuit you enclose is correct. It is a reflex circuit using tuned impedance radio frequency and a tube detector. You do not state just what coupler or apparatus you are using, so it is hard to find trouble. The circuit depicted should and does work, all things being equal, and good apparatus being used. Look at the connections, examine the sockets, test the transformer, and look for faulty connections, a variometer that is shackled or a condenser that is faulty or leaky.

*I have constructed the Superdyne receiver using the best parts, following the layout and plans. I get all the local stations, but cannot get any distance. One thing I note is when a station is tuned in and any great increase is made in the condensers that it suddenly disappears only to re-appear after a minute. During this time there is a loud shriek or whistle noise in the speaker, but the moment that it stops, there the station is again. What is my trouble?—M. Zukowski, 5120 Chene, Detroit, Mich.*

You are not manipulating your receiver correctly. You should keep your tickler at right angles to the coil at nearly all times, and when the whistle is heard, decrease it (either to right or left, according to the way you have it wired—in the reverse manner) until the whistle disappears, and then increase it just a bit until the desired volume is gotten. It takes time to learn to tune in the weak stations, but once found out it is a wonderful DX getter. Placing a grid leak from the grid to the filament will make the tuning somewhat easier.

*I am about to install a Super-heterodyne and want to locate my batteries in the basement. This would necessitate running the three B battery and the two A battery leads a distance of several feet, twelve of which would be close together and parallel. The idea is that if it can be done I can have the leads wired in regulation fireproof pipe, and then down to the cellar where the batteries will be out of sight and not able to cause any harm. Is this advisable?—Jerry P. Kershner, 18 South Fourth St., Reading, Pa.*

What you suggest is not feasible in the least. Leads such as would be necessitated by such a procedure are to be strictly guarded against, especially in sets of the super-sensitive type such as this. Locate your batteries as near the set as possible, as on the floor under the set, or immediately in back of the set, where sort leads are possible.

*Please send directions for the making of parts for a radio receiver, and blue prints for the Lighthouse receiver described in RADIO WORLD for July 7, on page 12.—Wayland Taylor, Jennings, Okla., R. R. No. 1, Box 29.*

Blue prints and directions for making parts of receivers are not available. For blue prints of the Lighthouse receiver apply to the Lighthouse Service, U. S. Department of Commerce, Washington,

D. C. They will inform you as to their cost and furnish the prints upon receipt of the price.

*Is the Super-heterodyne a good receiver for a novice of six months to build, provided that he is able to follow directions? About how much should one of the eight-tube type cost?—Harry Tansiger, 211 West 11th St., New York City.*

This receiver is not as difficult to build as it is portended to be, providing that the builder can read and follow instructions closely. It is quite expensive, and one of the type you mention should not cost less than \$200.00 at the very least, for the apparatus. If a good job is made, it will cost more than that, all depending upon the resources of the builder.

*Which broadcasting station in the United States has the longest wave length? Is a four-wire antenna 100' long and 20' high with wires spaced 3' apart better than a single wire antenna 150' long and of the same height? Which makes the best insulators, electrose or porcelain?—Clifford Froberg, Ridgway, Pa.*

KSD is the broadcasting station operating on the longest wave length. This station operates on a wave length of 546 meters or 550 KCYS. For reception there is no material gain in using more than one wire. In transmission, where a greater radiating surface is necessary or desirable, it is useful to have a three- or four-wire antenna. However, perfectly satisfactory results will be obtained by the use of the single wire you mention. 150' is rather long, suggest that you use a single wire about 60' to 100' in length. The naval standard for insulation is Electrose.

*I have constructed the Reinartz receiver after making several other types, and find that while it is not bothered with the whistling that the others have that there is a decided lack of volume. I am using WD11 tubes, and the rest of the parts herewith specified. I find that the set is entirely stable, but if I could only get more volume out of it I would be more satisfied. What can you suggest as a solution to my trouble?—W. H. Cook, RFD No. 3, Route 1.*

You cannot expect much volume considering the tubes you are using. These tubes are not meant for loud speaker work on distant stations, being designed as a tube that could be used in a receiver eliminating the heavy and cumbersome storage battery. The circuit works much better on the UV201A tubes than on the tubes mentioned.

*Is it possible to so arrange a receiver so that it can incorporate two or more circuits, any of which can be used by throwing panel switches? The circuits I have in mind are a neutrodyne, and a superdyne. I want to use the same condensers, tubes, jacks and all apparatus possible and incorporate it in a victrola. I have heard both, and like the neutrodyne for locals and the superdyne for distance, so want both of them. How can it be done?—Marion Lefebre, Baton Rouge, La.*

If you desire two sets, suggest that you build two separate and distinct receivers in separate cabinets. While what you suggest might be possible, the undertaking would entail such a very intricate arrangement of switching and wiring that it would be a physical and mechanical impossibility to accomplish it. This aside from the fact that an arrangement of this type would have to totally disregard the primary law in constructing both these receivers, which is to keep the leads short

and allow sufficient spacing for the apparatus. Do not ask for such highly imaginary circuits or deviations of circuits, or do not worry about them—stick to the conventional manner of placing each set in a cabinet by itself.

*I enclose a circuit diagram of a receiver that has for the past sixteen months given me excellent service. It brings in all the local stations very clear and loud, with enough volume to operate a loud speaker comfortably so that everyone in a fairly large room can hear every word plainly. I have never had the desire for DX except occasionally, but now desire to remake my set so that I can receive the longer distant stations. What can you suggest?—Mark Feldman, 160 Broadway, New York City.*

The set you enclose is a straight regenerative circuit with two stages of amplification. With this same circuit operated under good conditions, distances up to 2,000 miles airline have been covered, and we see no reason why you cannot get the medium distance stations. However, removing the coupler, and replacing it with a radio frequency transformer, and placing the coupler as a two-circuit tuner in the antenna circuit will give you a radio frequency circuit which will allow distance reception. Two stages of radio frequency are preferable, however.

*I recently made a super-regenerative receiver according to plans furnished by a New York concern handling blue prints. I used just the parts mentioned in the list of specifications, even to waiting two weeks to get the power tubes that were stated as being best. The set works on a loop, but I wish to work it on an outside antenna and ground, and after looking it up to such, I get so many rumblings, cracklings, spittings, and general noises that the signals are indistinguishable. Can this type of receiver be operated on an outside antenna and ground?—Harold Strong, Cleveland, Ohio.*

While it is perfectly possible to do as you have attempted, it is not as satisfactory as the loop antenna method. This receiver being super-sensitive, works best on a loop because of the lack of interfering noises that are possible on loop reception. In case of an outdoor antenna, as an experiment, you could connect it to one of the terminals of the main tuning inductance, and the ground to the other, removing the loop. This is not advisable though as the set works most satisfactory when a loop is used as the collecting agent.

*I intend using a 2-tube reflex receiver of the Grimes Inverse Duplex type, which I saw illustrated. What distance is possible with this circuit using UV199 tubes and outside antenna? What distance is possible using a loop antenna? Is this a good reflex receiver?—Gene Ullemeyer, 1511 9th Ave., Rock Island, Ill.*

It is impossible to state distance figures when speaking of receivers. You might as well ask how long will a pair of shoes last if you ride in street cars all day. Reception depends upon too many exterior factors to even give a guess—you might do 2,000 and you might not do 20.

*How can I determine the sensitiveness of my phones? I think that something is wrong with them as they do not seem to work as loud as they did when I purchased them.—Carl Munscher, 114 Evans St., Milwaukee, Wisconsin.*

The most practical way of doing this is to place them in the circuit with another pair of the same make and see which gives the loudest signals. A new pair and yours in the circuit will give you a ready test of their sensitiveness. It might be that your ears are becoming accustomed to the loudness and therefore it seems that the signals are falling off in volume.

*Which set of the following five circuits are considered the best? Which is the easiest to construct? Is there any other type of receiver which is better?—H. D. Miles, 1868 Liberty St., Marinette, Wis.*

As most of the circuits you name are being manufactured and are for sale on the competitive field, it is not possible to state definitely our opinion as to the most efficient one. Go to the nearest radio dealer and get a demonstration of them, under the same conditions, and you will be able to judge for yourself. They are all rather complex circuits, but are being used by amateurs and fans every day. The Super-heterodyne is about the only one not mentioned that is more efficient.

## Join RADIO WORLD'S University Club

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RADIO WORLD, 1493 Broadway, New York City:

Enclosed find \$6.00 for RADIO WORLD for one year (52 nos.) and also consider this as an application to join RADIO WORLD'S University Club, which gives me free information in your Radio University Department for the coming year.

Name.....

Street.....

City and State.....

## THE RASLA REFLEX

The circuit that actually does operate a loud speaker on one tube.

**KNOCKDOWN COMPLETE PARTS**

(Tube and batteries not included)

**\$24.50**

DIAGRAM AND INSTRUCTIONS FOR WIRING

1 7x10 Drilled and Engraved Genuine Bakelite Panel

- 1 6 3/4" Base Board
- 1 Millimeter Jack
- 1 Amco 20 Ohm Rheostat
- 1 Dubilier .00025 Mica Condenser
- 1 Duplex Precision .0005 Var. Condenser
- 1 Standard Bell Socket
- 1 Pathe Variometer, Welded
- 1 Z-T Semi Fixed Crystal Detector
- 1 Modern 10-1 Audio Transformer
- 1 Rasla Radio Transformer
- 8 Eby Engraved Binding Posts
- 2 Genuine Bakelite Dials

Bus Bar, Bolts, Screws and Bakelite Strip for Binding Posts

These Parts are the Best Obtainable. Ask Any Engineer.

Set completely wired in Walnut cabinet \$32.00

Sent prepaid East of the Mississippi. West of the Mississippi and Canada add \$2.00. Also sent parcel post collect. Money cheerfully refunded if dissatisfied. Mail orders only

**Superior Radio Service Co.**  
500 Fifth Avenue Room 405  
New York City

# The "Mike" Downs Mike for the Count

**B**ATTLING in the ring amid the cries of thousands and attempting to deliver a short address over the radio amid the quiet surroundings of a broadcasting studio are altogether different, according to Mike McTigue, world's light heavy-weight champion boxer, who recently visited WGY, the General Electric broadcasting station at Schenectady, N. Y.

Kolin Hager, chief announcer at the

station, recalls it as one of the outstanding humorous events of the two years that the station has been in existence.

"He was scheduled to deliver a few words on boxing," explained Mr. Hager. "Naturally, he was the last man in the world that we expected would suffer a case of 'microphone fright,' but he did. He stepped up to the pick-up device, but he could not talk. 'I would rather face Dempsey than talk into that thing,' he said. The result was that his trainer, who accompanied him to the studio, was compelled to read the written address."

## NEUTRODYNE PARTS

Full set of Neutroformers, Variable Condensers with dials, and Neutrodens **\$13.25**

Above parts are Genuine Workrite Neutroformers, made under Hazeltine patents.

Complete parts for three tube Neutrodyne tuner, (tubes, batteries, or phone not included), drilled panel, tube sockets, rheostats, fixed condensers, jack binding posts, wire, spaghetti, and blue prints.

**COMPLETE FOR \$19.95**

Postage additional on all shipments. Ask for our price list.

Send no money, Order by postcard, Pay the Postman

**RADIO SURPLUS STORES**  
HELENA, MONTANA

## Ackerman

**LOUD SPEAKER, \$9.50**

Complete—Ready for immediate use. Delivered Anywhere in the U. S. A. A Marvelous Speaker for the price of a headset.

Designs and Jobbers Write for Discounts. **ACKERMAN BROS. CO., Inc.**  
301 W. 4th St. (Dept. "RW"), New York, N. Y.



This wonderful fascinating Chinese game, MAH JONG, complete with instructions, characters, counters, racks and dice. Sent postpaid in attractive box on receipt of

**\$1.00**

Canada 25c extra  
Or sent C.O.D.

**ATTRACTIVE PROPOSITION TO DEALERS AND DISTRIBUTORS.**

**Perfect Novelty Co.**  
446 6th Ave., Cor. 27th St.  
New York City



(Actual Size)

## The long-life tube!

Since their inception, radio vacuum tubes have been fragile. To knock or drop one incurred the expense of a new tube. But now there are

## Myers Tubes

*Practically Unbreakable*

—so protected by their unique design that they have been dropped on the floor without injury. But their sturdiness is only one feature. They are the most perfect detectors and amplifiers obtainable. Smaller capacity and no bunched leads mean less interference—more clarity and greater amplification. Actual tests, all over the world, have proved their supremacy. Two types—**Dry Battery** and **Universal** (for storage battery). At your dealer's—or send price and be supplied postpaid. Write for free circuit diagrams.

**\$5** EACH Complete with clips ready to mount on your set; no sockets or extra equipment required.

**F. B. Myers Co. Ltd.**  
*Radio Vacuum Tubes*

240 CRAIG ST. W.  
MONTREAL CANADA



## WE REPAIR RADIO TUBES

WD-11 .. \$3.00	DV-2 .... \$3.00
WD-12 ... 3.50	DV-5A ... 3.00
UV-200 .. 2.75	UV-199 .. 3.00
UV-201 .. 3.00	C-209 .. 3.00
C-300 .... 2.75	UV-201A .. 3.00
C-301 .... 3.00	C-301A .. 3.00
DV-6 ..... 3.00	Marsoul .. 3.00
DV-1 ..... 3.00	Moerhead .. 3.00
6 v. Plain Detector .. 2.75	
6 v. Plain Amplifier .. 3.00	

Mail orders solicited and promptly attended to. Dealers and agents write for special discounts.

**H. & H. RADIO CO.**

P. O. Box 22-B

Clinton-Hill Station Newark, N. J.

# The First National Illustrated Radio Weekly

# RADIO WORLD

## Anniversary Issue April 5th

(Entering Its Third Year)

We want every one of our 75,000 readers to get at least one friend to become a RADIO WORLD reader, too.

This Anniversary issue, written by the greatest radio experts, will tell, illustrate and fully de-

scribe many new and marvelous improvements. RADIO WORLD tells how to improve your set; how to get greater distance; ways to eliminate interference, in fact, all that is new and best.

### RADIO WORLD TELLS IT FIRST

The best—most reliable—fabricators of radio goods make their announcements in RADIO

WORLD. It is the most productive radio advertising medium at the lowest cost.

**RADIO WORLD, 1493 Broadway, New York**

## Broadcasters and Movies Cooperate

WHEN the radio craze first gripped the country, many movie producers and distributors were apprehensive of the effects of the new amusement upon their business future, but after two years of intense interest in the new diversion, they find that it has not harmed them noticeably, but on the contrary, has aided producer, distributor and exhibitor in many ways, particularly by enlisting the radio station as a great medium for broadcasting publicity on the stars and coming productions.

The news reels have recognized the widespread interest in all things pertaining to radio, and Kinograms, one of the leading news reels of the industry, has incorporated in late issues scenes of radio activities. The first experiment was with station WJAZ, Chicago, and consisted of comprehensive scenes taken in this popular mid-west broadcasting station. Announcements were made over the air that the public could see the working of the station in the motion picture, and so numerous were the responses and requests for information as to where the reel could be seen that the publishers of Kinograms next included a picture "interview" with J. Andrew White, veteran radio speaker, who is remembered as the man who broadcast the blow by blow description of the Dempsey-Carpentier fight at Jersey City, and who has also broadcast descriptions of almost every championship boxing event held in New York City since.

The latest item of interest to be included in this news reel is the hitherto un-photographed process of making the vacuum tube. These scenes were photographed in the Westinghouse plant, at East Pittsburgh, Pa.

## Manufacturer Distributes Receivers to Poor Children

THE Porter Manufacturing Co., Detroit, Michigan, has distributed among various crippled children, several of the fixed receivers, manufactured by them. These sets come so tuned that they receive WWJ without adjustment. The entire set, phone and all is enclosed in a Ford hub cap, and needs nothing except the clipping of the wire to some suitable object which may be used as an antenna. This is not always necessary, as the party may use himself or some person nearby as a "collector" and some suitable object as a ground.

The children to which these sets were donated, were selected by the Detroit News, whose officials investigated the cases, and then gave the names to Mr. Porter, the inventor of the receiver, and the head of the Porter Manufacturing Co., who gave the sets and instructed the parties as to use. The receivers are small enough to be held in the palm of the hand, and the clip with the flexible wire can be wound around the cap and the entire device will then fit comfortably in the pocket.

HOWARD



No. 1001  
6 1/2 Ohm Rheostat \$1.10  
25 Ohm Rheostat 1.10  
40 Ohm Rheostat 1.10  
Patd. 870,042

HOWARD



No. 1002  
200 Ohm Potentiometer \$1.50  
400 Ohm Potentiometer 2.00  
Patd. 870,042

HOWARD



No. 1004  
Multi Terminal Receiver Plug.  
In a 6 tube receiver  
as many as six  
pairs of standard  
receiver  
tube pins.  
Patd. Aug. 20,  
1923

HOWARD



No. 1002  
6 1/2 Ohm Micro-meter Rheostat \$1.30  
25 Ohm Micro-meter Rheostat 1.30  
40 Ohm Micro-meter Rheostat 1.30  
Patd. July 16,  
1923

## HOWARD

Ask the man at the counter to show you the Howard line of quality Radio Merchandise. Every piece is sold with the guarantee of satisfactory performance.

**JOBBERS WRITE FOR DISCOUNTS**

Send 2c. stamp for wiring diagram and folder to Dept. J.



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

Ask for Newman's RADIO CONSTRUCTOR Plans and Books at your dealers. Blue prints showing full size templates, wiring connections and instructions, for building the most popular circuits.

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## THE VICTORY

A Socket Built on Merit Electrically and Mechanically Perfect



Genuine Phosphor Bronze Contacts Used for Panel Mounting

List Price Triple, \$2.75; Single, \$1.00.

Insist that your dealer supply you with the genuine VICTORY SOCKET. Triple, \$2.75; single, \$1.00. Expert Drillers and Cutters of Genuine Formica Panels and Tubing. Estimates Cheerfully Given.

UNITED RADIO MFG. CO.  
191 Greenwich Street New York City

## Lattice Coil Specialties



Variometers  
R.F. Transformers  
Micro-Mike Condensers  
Plain Coils  
Tapped Coils

ESTRU LATTICE COIL PRODUCTS have been designed so as to produce as nearly as possible IDEAL INDUCTANCE in various forms. It was not the intention in designing, to produce Miniature Apparatus, the small size being the result of careful electrical design with no UNNECESSARY Mechanical parts which would detract from the electrical efficiency.

YOU will appreciate these facts as set forth in our COMPLETE DESCRIPTIVE LITERATURE, which will be sent on request and in reading our GUARANTEE which goes with all ESTRU PRODUCTS.



2905 WEST MADISON STREET



The Latest in Circuit Designs

## HENLEY'S 222 RADIO CIRCUIT DESIGNS

A Complete and Up-to-Date Collection of Modern Receiving and Transmitting Hook Ups

Written and Edited by a Staff of Radio Engineers of Wide Practical Experience and Thorough Theoretical Training.

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256 Pages.

284 Diagrams and Illustrations Specially made for this book.

AN ENTIRELY new and thoroughly practical book on radio circuit designs which will meet the needs of every radio enthusiast, whether novice or expert, amateur or professional. It is replete with correct and trustworthy radio information from which any one can successfully build and operate any of the circuits given. Contains the largest collection of radio circuits and Hook Ups ever published and includes all the standard types and latest developments.

This new book treats the subject in an entirely different and novel way, as it is the only book that illustrates the complete electrical design of the circuits, showing the electrical values of inductances, capacitances and resistances, with the name of each element on the diagram of the circuit. It surpasses all other books in the scope of the subject matter, in the simplicity and novelty of presentation, and in thoroughness of detail.

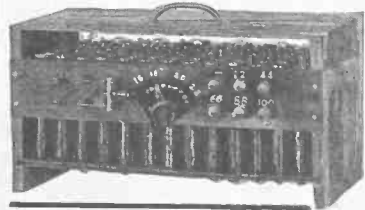
**SPECIAL** Send \$6.00 to RADIO WORLD for a yearly subscription (52 nos.) and the publishers will send you a copy of this book, free, postpaid. If already a subscriber, send renewal for a year. This offer is not retroactive and will be withdrawn March 20.

**THE COLUMBIA PRINT**  
1493 BROADWAY NEW YORK CITY

## Get a Real "B" Battery!

Roberts Rechargeable "B" Battery LASTS A LIFETIME—MADE OF EDISON ELEMENTS SATISFACTION GUARANTEED

No Change of Wiring Necessary Only Three (3) Main Terminals to Connect Powerful—Durable—Rechargeable



↑ Drip Pan ↑

A swing of the switch lever gives instant voltage.  
Type A—100 volt, with variable detector, from 16-22 volts ..... \$23.50  
Type B—100 volt, with variable voltage, from 16-22 volts on detector, and variable voltage from 44 to 100 volts for amplifier... \$23.50  
Type C—140 volt, with variable detector, from 16-22 volts ..... \$23.50  
Type D—140 volt, with variable voltage, from 16-22 volts on detector, and variable voltage, from 44-140 volts for amplifier... \$30.00  
**BATTERY SATISFACTION AT LAST!** Hundreds of enthusiastic owners of Roberts "B" Batteries tell us: "Positively the best battery on the market—I have tried them all." "All my battery troubles are over!"

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**W. ROBERTS STORAGE "B" BATTERY COMPANY**

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## ALL THE HOOK-UPS WORK!

"I have taken RADIO WORLD from my newsdealer every week for over a year and I enjoy it very much.

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**ONE TUBE RECEIVER**

Complete with tube, phones, batteries, aerial, insulators, etc. Ready to work. Quantity limited. Send money order for shipment by return mail. Money back if you want it. Send for Price List.

**\$17.50**

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**PORTER'S COPPER CONNECTOR**

Overcomes poor connections which are 90% of radio troubles. The Porter Connector consists of a flat strip of copper 5/16" wide, perforated every 1/4 inch with 3/16" holes, enabling perfect wiring without soldering.

A diagram of a marvelous Reflex Circuit and enough PORTER'S Copper Connections for your set mailed you prepaid on receipt of 25c.

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50c

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Supremacy Proven by Every Test

**FILKO-STAT**  
THE SCIENTIFICALLY CORRECT  
RADIO RHEOSTAT

Mark Binding Posts for  
Safety

MANY fans dislike to disconnect the batteries from the set because of the liability of connecting the wrong wires, and consequently blowing the tube or tubes "galley tootin' west." One fan had the forethought to use the black composition posts for all his battery posts, but went to the stationers and got a box of those little red and white dots that they paste on things and pasted a red one on each of the B battery posts and a white one on the 6 volt battery posts, and then a half of each kind on the single post that connects the A- and B- of the battery.

Then he got two or three lengths of red silk covered wire and some white silk covered wire, leaving one post open, that last one being the combination A and B-lead. This he connected together at the batteries and brought a white lead up. Then he got some red ink and put some red spots on this white wire. Now he never has a chance of making a mistake, outside of probably connecting the 45 onto the 22½, which shows itself immediately, and can be corrected.

Catalina Island Hears  
WHAZ

THE last February concert program from WHAZ at the Rensselaer Polytechnic Institute in Troy, New York, was heard by the guests of Hotel Atwater at Santa Catalina Island, Avalon, California, according to a letter just received. Major E. E. Fox wrote in part: "Through the courtesy of Hotel Atwater, Santa Catalina Island, I gave a demonstration of a DeForest radiophone. The management of the hotel as well as the Fitzgerald Music Company instruct me to extend their congratulations and hearty thanks for your wonderful part of the demonstration here."

**2,000 MILES**

on Triple Circuit with One Tube  
SET COMPLETE, \$15

Booklet with simplified and schematic drawings and detailed information on how to build the marvelous set, 50c.

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3/16" thick—BLACK—1/4" add 25c.  
Send money order or pay Postman.  
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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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Coast to Coast Reception  
with a

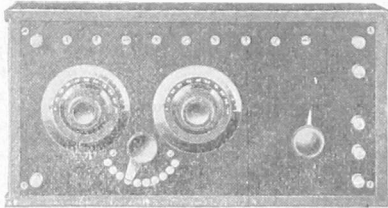
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Write for Illustrated Literature

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711 So. Dearborn St. Chicago, Ill.

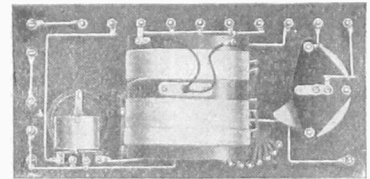
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For Merest Novice or Expert Experimenter



THE "SHEPCO"  
"ALL PURPOSE"  
NON-RADIATING  
RECEIVING SET

(Trade Marked—Patents Granted and Pending)



All Parts Genuine  
The "SHEPCO" "All Purpose" Set contains only best units obtainable — Genuine U. S. Tool Condenser and the genuine, guaranteed "All Wave" Jr. non-radiating DX Coupler with guaranteed wave length of 150 to 1,000 meters, permitting broadcast reception from stations thousands of miles distant.

A Complete One Tube Radio Receiving Set  
Mounted on Genuine Bakelite Panel and  
Encased in a Finely Finished Genuine  
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Complete Interchangeability of Circuits

The "All Purpose" Set May Be Used As:  
A Complete Single Circuit Set As Part of a Plate Variometer Set  
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A Complete Triple Circuit Set A Single Tube Reflex Set  
And As a Tuner in Many Other Circuits

Audio and Radio Frequency Units May Be Added as Desired.

Needless to spend hundreds of dollars on costly experiments. The "SHEPCO" "All Purpose" Set can be the basis for all your experiments with various circuits, at the same time giving you an efficient and beautiful set for immediate operation.

**\$21**

WITHOUT  
ACCESSORIES

ABSOLUTE  
MONEY-BACK  
GUARANTEE

A Course in Radio  
The "All Purpose" Set enables the merest novice, by following our simple, non-technical instructions, to experiment with any hook-up he may desire. All that is necessary is the interchanging of a few wires at the terminals. A practical course in radio. No tools required.

Two Stage Audio Amplifying Unit for use in connection with the "SHEPCO" "All Purpose" Set or any other set.

**\$21**

If your dealer cannot supply you, send us your order and remittance with his name.

SHEPARD-POTTER CO., Inc.  
PLATTSBURGH, N. Y.

Complete instruction and hook-up sheet, showing various circuits that may be used, packed with every set or sent on receipt of ten cents in stamps to cover cost of mailing.

## Heard at the Radio Counter Episode XXIV

"Good day, sir, What can I do for you?"

"Well, I wish to buy a receiver—complete, from A to Z, and as I know but very little about such things, I thought I would stop in and look them over."

"Well, you have come to the right little place to get it. That is our one specialty, complete sets. Now, what type of receiver do you plan on getting, a regular radio set, or a console model?"

"No console models for me—I am going to use it, not put it in the parlor to look at. I tell you one thing, though, the one I buy has to be silent when it is in use."

"Silent when it is in USE? I beg your pardon, sir, did you ever hear one that was silent when it was in use?"

"I mean one that doesn't kick up a fuss every time it is adjusted. A friend of mine has one that cries like a sick cat every time he touches a dial, I believe they are dials—anyway, I don't want that kind of a set. I hear that there is a certain type of receiver that is responsible for these queer noises, and I do not want one of them."

"Well, that cuts any regenerative sets"

"That's what he called it—regeneration! Funny how a word like that gets caught in the corners of your mind and won't be dislodged."

"Yes. Well, that leaves either radio frequency receivers, reflex, or—well, there are several types that I can show you. Will you step into the demonstration room, please? I will attach the antenna and be right in."

"Now listen here, young man, I did not come here to order one today. I simply wanted to explore around"

"That is perfectly O. K. with me. I am here to demonstrate them, and if I do that satisfactorily I will sell you when you do buy. Now, here we have one that is known as one of the best receivers on the market. It has five tubes, fed by a six-volt storage battery, is incapable of squealing and will permit of all the volume you desire over quite a considerable range. Of course, the speaker that you pick out depends upon your personal preference, but I would recommend either a good one like this, or this one over here, which is one of the best that has been turned out up to now. Just for the fun of it we will try both. What say?"

"That's O. K. with me, youngster. Well, switch 'er on, and let's hear some fancy music."

Half hour passes, during which time Mr. Buyer has been selling himself a radio set by being more tickled with each set demonstrated, and finally getting so enthusiastic he forgets his promises.

"Well, after all, I think that that first one we tried was best. Is there any place that I can sign my check around here? Now, that includes the entire thing, even the stringing of the wire on the roof, I suppose. Oh, by the way, you had better put a pair of those head telephones in, and an extra bulb—tubes. Nearly missed it that time, didn't I. Ha-ha! Well, you had better get your man on the job, and get that set up by tomorrow night."

"Well, I can't promise that definitely, but I will try darned hard, 'cause I have found out that promises are bad things. Suppose our man takes sick tomorrow?"

"Ha-ha, you are some smart salesman. Well, I run a bunch of them ragged myself every once in a while. Run up some time when you have a chance, and have a smoke with me—here is my card. Maybe you can give me some lessons on how to run the thing after I get tired of playing around, fooling myself. Well, so long old-timer."

USE

# EVEREADY Radio Batteries

-they last longer

## RADIO TUBES

that have been rebuilt. Also a limited number of new tubes released every month for advertising purposes.

Our written GUARANTEE of full satisfaction is enclosed with every tube we send out. This protects you.

Type 201a.....\$3.00  
Type 12.....3.00  
Type DV1.....3.00

Special prices to dealers.

A. & T. RADIO CO.

Dept. A DANVERS, MASS.

When you see it in RADIO WORLD you know it's news—not a month old.

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Complete parts for Neutrodyne 5-Tube Set...\$25.00  
Complete parts for 1500 Mile One-Tube Set 7.50  
Audio Transformers 3-1 Ratio.....2.25  
New DX Vacuum Tubes, 6 Volt, .25 Amp...2.25  
23 Plate Condensers.....1.25  
Satisfaction guaranteed. Order direct from this Ad. Parcel post Prepaid.

LYCOMING RADIO LABORATORIES  
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# RUSONITE

RADIO CRYSTAL

Entire Surface Sensitive  
The Recognized Standard Crystal Rectifier

Used all Over The World

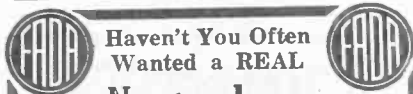
Hundreds of Thousands of Satisfied Users. Rusonite Has Revolutionized Crystal Radio Reception.

"THE PERFECT SYNTHETIC CRYSTAL"

Guaranteed

Price mounted 50c  
RUSONITE CATWHISKER 14K. GOLD  
Supersensitive will not oxidize  
Price 25c

Order from your dealer or direct from  
Rusonite Products Corporation  
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## Haven't You Often Wanted a REAL Neutrodyne

Having specialized in the Neutrodyne since its inception, we unqualifiedly guarantee astounding results, using the ORIGINAL FADA Neutrodyne parts. 2,000 miles on a loud speaker; 500 mile stations only "locals."

All the parts are yours for \$69.50—in addition we give you a beautiful mahogany cabinet—FREE!

We will build it for you—and without charge of any kind, at the same price, \$69.50.

MAHOGANY CABINET F-R-E-E!  
\$69.50 Built for YOU—FREE!

Perfection Radio Corp.

78 Cortlandt St. 119 West 23rd St.  
59 Cortlandt St. 368 Livingston St., Bkn.

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Popular Radio has increased its subscription price from \$2.00 to \$3.00. Radio World has made arrangements by which it is able to offer Radio World and Popular Radio for one year for the price of Radio World alone. Use the accompanying subscription blank. If already a subscriber, send \$6.00 for another year. This offer for new subscribers only.

Special Radio World and Popular  
Radio Sub. Blank

RADIO WORLD,

1493 Broadway, N. Y. C.

Send Radio World beginning.....  
.....and Popular Radio for one year beginning.....  
for the price of Radio World alone, for which I send \$6.00 herewith.

Name.....  
Address.....  
City and State.....

This offer good only until April 1, 1924

## YOUR NAME FREE STAMPED



BOTH  
Inkograph  
and  
Leadograph  
at \$2.00  
Combination  
Price of

Here's an opportunity for those seeking the joy of a perfect writing instrument. Secure both a pen and pencil with your own name on each for less than the usual price of a real fountain pen alone. We are making this unusual offer because we want 5000 new Inkograph and Leadograph users this month. We know it pays to invest in new friends. Satisfied users make our best advertisement. Experience taught us that every pen sold makes new friends. There are over half a million now in use. Act quickly, for we reserve the right to withdraw this offer at any time.

INKOGRAPH IMPROVES WRITING 100 PER CENT. Because of the ease that the ink flows, your writing will be improved 100 per cent. It cannot leak. Eliminate danger of soiling hands or clothing. The automatic feed works freely up and down within writing point.

14 KT. WHITE GOLD POINT AND FEED A very beautifully polished pen of best grade hard rubber, has permanent nickel-plated clip giving it an appearance which compares with pens sold at double the price.

LEADOGRAPH SUPERIORITY Rich in appearance, handsomely chased and highly polished, same as any high grade fountain pen. It is light in weight, will not cause writer's cramp and writes smoothly at all times. Works both ways (propels and retracts). Easily refilled with new Everready or any other standard make leads.

GUARANTEE certificate and full directions with each order.

HOW TO ORDER Print your name and address clearly on coupon below and enclose a two dollar bill. Your Inkograph and Leadograph with your name stamped on each will be sent by return prepaid mail. Or if you prefer, we will ship C. O. D. for \$2.25.

Agents Wanted

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I accept your combination offer for the Inkograph and Leadograph with my name stamped free. Enclosed you will find \$2. in full payment. If you prefer C. O. D. shipment and want to pay the postman \$2.25 on arrival put "X" here

Name.....  
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**Instruments of  
Excellence**

Ballantine Tuned Radio Frequency  
Transformers ..... \$9.60  
and units ..... 15.00

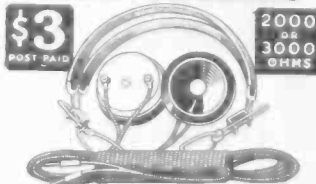
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LANGBEIN & KAUFMAN  
Variometers and Variocouplers ..... 7.90  
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MYERS HI-MU Vacuum Tubes ..... 4.35

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**Edson**  
TONE TESTED  
Radio Headsets



**YOU** can afford to have several at this price. Our guarantee protects you. Equal to any headset on the market in perfect reception of broadcasting. Send \$3.00 by registered mail or money-order. We will ship C. O. D., if you prefer. Prompt shipment—we pay postage. Ask for our Free Catalog of Radio Parts  
**EDSON RADIO SALES CO.**  
13 Elmwood, Providence, R. I.

**Radio Incorporations**

Medo Electric Corp., Buffalo, N. Y., \$5,000; E. and F. A. Metzger, W. Dole. (Attorney, A. M. Plumley, Buffalo.)

Wilsam Battery & Ignition Service, New York City, \$10,000; G. Sheehan, J. Thow, S. T. Stern. (Attorneys, Stern & Stern, 25 West 43d St.)

Demountable Batteries Sales Co. of Long Island, New York City, \$50,000; W. J. Sheehy, F. Schumacher, Jr., G. J. Reich. (Attorney, C. Frankel, 116 Nassau St.)

Dairymple Whitney Radio Corp., New York City, 500 shares preferred stock, \$50 each; 100 common, no par value; W. C. Whitney, E. L. Bassler, J. J. Catalano. (Attorneys, A. and J. Bloch, 99 Nassau St.)

Moore Radio Clinic, New York City, \$5,000; H. and F. Moore, A. Solomon. (Attorney, C. Braunhut, 217 Broadway.)

Radio Manufacturers Representatives, New York City, act as agents, \$10,000; H. A. Carpenter, D. M. Stoner, F. W. Cikaneck. (Attorney, J. C. McChristie, 233 Broadway.)

Gates Auto & Radio Supply Co., Brooklyn, N. Y., \$5,000; L. Lesser, A. Middonick. (Attorney, M. N. Lesser, 299 Broadway.)

Moss Electric Shop, Wilmington, Del., electricians, \$25,000. (Colonial Charter Co.)

Cosmos Radio Corp., New York City, \$10,000; F. Musso, V. T. Atkin, A. M. Sternberg. (Attorneys, Rosenblatt, Enselman & Gribetz, 233 Broadway.)

J. & J. Electric Corp., New York City, \$10,000; J. Zimmerman, J. Golden, P. Gartner. (Attorney, G. A. Honnecker, 105 West 41st St.)

Superior Instrument Co., New York City, radio apparatus, \$10,000; E. Tolmayer, B. T. and J. Zweckly. (Attorney, J. Komito, 196 Centre St.)

(Continued on page 31)

**Sell TIRES**  
DIRECT FROM FACTORY  
We want an auto owner in each locality to advertise Armour Cards. You can make big money and get your own sample Tires Free, by sending us orders from friends and neighbors. No capital or experience needed. We deliver & collect direct. Pay you daily.  
**Most Liberal Tire Guarantee Ever Written**  
Armour Cards guaranteed by Indemnity Bond against Blow Out, Wear and Tear, Stone Bruise, Tread Separation, Blistering and Rim Cut for 12,500 miles. We are actual manufacturers. Write today for great Special Offer to Agents, and low Factory Prices.  
ARMOUR TIRE & RUBBER CO. Ref. 570 Route. 0

Trade-**"THORIO"**-Mark  
**DETECTOR-AMPLIFIER**  
T. No. 1. Detector-Amplifier. 1 1/2 Volt Filament. 1/2 Ampere. Plate Voltage, 22 1/2-90.  
T. No. 3. Detector-Amplifier. 3 Volt Filament. 125 Ampere. Plate Voltage, 22 1/2-90.  
T. No. 5. Detector-Amplifier. 5 Volt Filament. 25 Ampere. Plate Voltage, 22 1/2-90.  
T. No. 7. Detector. 6 Volt Filament. 1/2 Ampere. Plate Voltage, 16-22 1/2.  
Filament licensed under Patent No. 1422010 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

**CORTLANDT RADIO CO.**  
Down Town Up Town  
80 Cortlandt St. © 149 W. 23rd St.  
NEW YORK CITY  
Do You Want the Best for Least Cost ? ! ! !  
Buy a  
**5 TUBE SET NEUTRODYNE for \$44.75**  
Includes a beautiful engraved panel. Cabinets \$3.75 Extra  
—It's the Guaranteed Set—  
As Good as Any Set Valued to \$100.00  
Complete parts for the above set with drilled and beautifully engraved panel..... **\$28.75**  
All Other Merchandise at Lowest Prices.  
MAIL ORDERS PROMPTLY FILLED

**Full List of Broadcasting Stations in Radio World Dated February 16th**

A complete and corrected up-to-the-minute list of broadcasting stations of the United States, Canada, Cuba, and Porto Rico, appeared in RADIO WORLD, Feb. 16. Mailed post paid for 15c. Or start your subscription with that issue.  
**RADIO WORLD, 1493 Broadway, New York City**

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562 So. Valusia Wichita, Kansas

## Radio Incorporations

(Continued from page 30)

Battery Sales & Service Corp., Schenectady, New York, \$10,000; J. A. Haraden, W. E. Seeley, L. J. Desruisseau. (Attorney G. G. Schieffelin, Schenectady.)

Kinodyne Radio Corp., New York City, 1,000 shares preferred stock, \$100 each; 1,500 common, no par value; A. D. Buzby, J. N. Tuttle. (Attorney, E. M. Evarts, 149 Broadway.)

D-Life Radio Service, New York City, \$5,000; J. Shapiro, H. and F. Berlin. (Attorney, M. J. Hoffman, 1328 Broadway.)

Adolphus Electric Co., New York City, \$5,000; J. Kohn, S. and J. Beck. (Attorney, J. P. Fischler, 145 West 45th St.)

Storm King Electric Corp., New York City, \$300,000; R. J. Gorman, H. C. Hand, S. C. Wood. (Attorney, S. Ryan, Albany.)

Planetary Radio Corp., Dover, manufacture, \$5,000,000. (United States Corporation Co.)

Neighborhood Radio Corp., New York City, \$5,000; J. and J. Polak, Jr., A. Kissh. (Attorney, R. Imershein, 5 Beekman St.)

National Radio Service, \$25,000; R. F. Teunis, Rex B. Sheley, W. B. Jaynes, Washington, D. C. (Capital Trust Co. of Delaware.)

Federal Radio Corp., Buffalo, N. Y., 200 shares common stock, no par value; H. Swift, M. Potter, A. R. Martin. (Attorneys, Swift & Potter, Buffalo.)

Federal Radio Equipment Corp., New York City, to Pathfinder Sales Corp.

General Radio Corp., to Music Master Corp., Philadelphia, Pa.

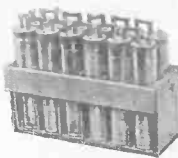
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Bristol Audiophone, Sr., 15-in. Horn. \$32.50  
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Write for Bulletin 3006-W  
**The Bristol Company**  
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FOR YOUR RADIO SET  
MAKE IT RIGID and STRONG  
NO WARPING SPRING NO SHORT CIRCUITS BROKEN WIRES  
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JUST APPLY FLAT MAHOGANY OR PLATE GLASS COVERS TO THE FRAMES

Two or More Frames Required per Set  
Size "A" for 7" panels (6 1/2" x 8")... \$0.85 Each  
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WD-11, WD-12, UV-201A, UV-199 and others for **\$3.00**

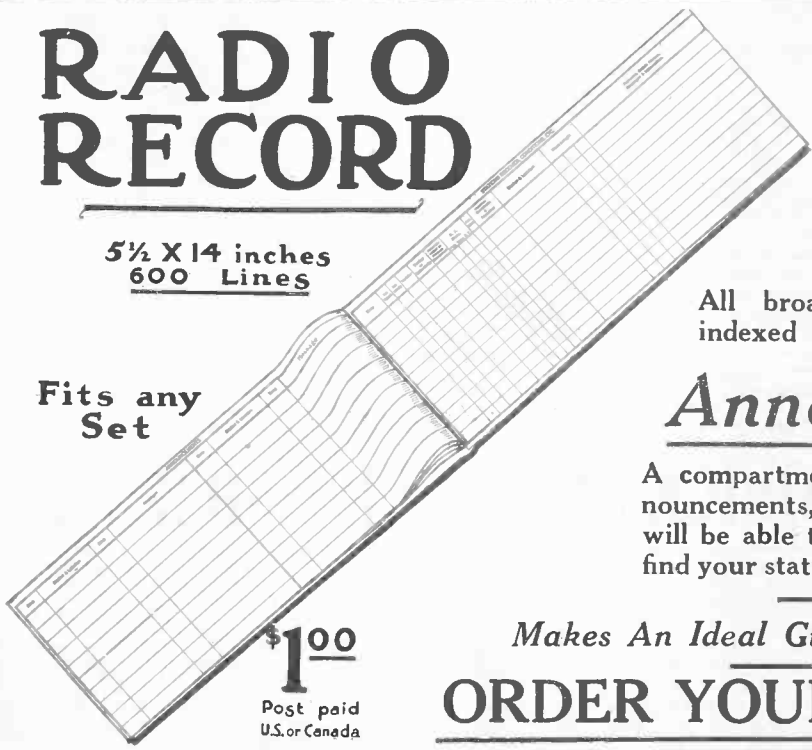
Quick service. All tubes repaired by us guaranteed to work as good as new. Send your dead tubes. We prepay parcel post to you. All you pay is \$3.00 to postman.

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We have prepared a special outfit of parts for making the special coils used in the ULTRADYNE circuit, as described on Page 10 of the Jan. 19th RADIO WORLD. This outfit is complete for making 3 Transformers. Includes Spider Webs, wire, mountings, and bolts.

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IN STANDARD SETS**

ACME four tube reflex set, \$50.00.  
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Cabinets of the finest hand rubbed walnut, panels genuine 1/4 inch Bakelite.  
Truly Radio Sets De Luxe and offered at about one-third actual value.  
Guaranteed new, tested, in fact unconditionally. Only one set of each type on hand.

Sold without equipment.  
Rush remittance or ask for detailed information.

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For 6 Volt, 60 Amps. \$ 8.50	6 Volt, 80 Amps. 10.00
6 Volt, 100 Amps. 13.50	6 Volt, 120 Amps. 14.50
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Send No Money. Just clip this ad and mail with your name and address. The battery you specify will be shipped to you the day your order is received. When the battery arrives, inspect it—read our 2-year guarantee before you pay one penny. Get the "B" Battery and hydrometer FREE. Order today.

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**Radio Lectures on Music**

WITH the engagement of Prof. Robert Elisha Olmsted of Smith College, Northampton, Mass., to deliver and direct the course in musical appreciation to be broadcast from Westinghouse Station WBZ at Springfield, Mass., followers of radio educational courses are assured of a very successful series of interesting and useful lectures.

Prof. Olmsted is perhaps as qualified a person to supervise the course as could possibly be engaged. He is at the present time professor of vocal music at Smith College in Northampton, Mass., and is also actively engaged in personally conducting a studio of vocal teaching in New York City. He has devoted his entire life to the study of music and his education in every phase of this art is exceptionally thorough.

In addition to his private teachings, Prof. Olmsted has been a choral director and a choir master in Philadelphia, New York, Hartford and Northampton on many occasions. He has had a great deal of experience in concerts and recitals and has given many lectures of various kinds and written composition, songs, anthems, pageant music and other forms of musical expression.

The first course to be given will consider in general the self-expression of music, the dance instinct and the song instinct. In his later courses, he will treat all types of music. A syllabus has been prepared for this course by Prof. Olmsted, not only to guide the student in his courses and to furnish him with an outline which will enable him to organize his readings, but also to present him with many interesting and thought-stimulating questions. The lectures, in the main, will be contributions to the discussions of such questions as are raised in the syllabus and the course will follow the syllabus as closely as possible.

A registration fee of one dollar will be charged those wishing to receive the printed material and the syllabus in connection with the course. This fee is used to defray the expenses of the professor giving the course. At the completion of the course those enrolling and desiring to receive a certificate of completion will be required to submit a paper.

Fans who are considerate of the comfort and pleasure of their neighbors and other radio fans in the vicinity should get RADIO WORLD for Dec. 8, Feb. 9, and Feb. 23, and see how they can conquer the squeals in their receivers that are causing so much trouble. 15c per copy, the three issues for 45c., or start your year's subscription with any one of them. RADIO WORLD, 1493 Broadway, New York City.

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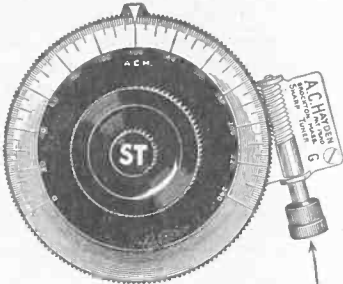
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Will improve any receiving set, making difficult tuning easy  
Money Back Guarantee  
Price 3-inch size, \$2.50 Price 4-inch size, \$5.00  
Regular fitting 5/16 shaft 1/4 and 3/16.

- Extra Advantage of the A. C. H. 5c each extra
1. Can be attached or removed from any instrument.
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- MAIL ORDERS SENT PREPAID IN U. S. A.  
**A. C. Hayden Radio & Research Co.**  
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### WJZ Fans Approve of Theodore at Majestic

WJZ fans found themselves listening to an unexpected surprise last week when they tuned in the orchestra at the Hotel Majestic, New York City, at 10:30, for instead of the Hotel Majestic Orchestra which they have been accustomed to, they heard Theodore's Hotel Majestic Orchestra, which will now be a weekly feature from WJZ. Theodore met with instant approval from the radio dancers, for hardly had his second number been completed when telegrams started pouring in to the studio and the Hotel Majestic welcoming "Teddy" to the ranks of the broadcast favorites. Theodore's Orchestra is no stranger at the Hotel Majestic, for they played there for some nine years, leaving to take a vaudeville trip around the country some time ago. Back again in New York they were at once reinstated at the Majestic, and now many who have heard them during their tour hear them weekly through WJZ.

### Another New Broadcasters List

A REVISED and up-to-date list of all broadcasting stations licensed by the Government will appear in the March issue of the Department of Commerce's "Radio Service Bulletin." This pamphlet will be on sale by the Superintendent of Documents, Government Printing Office, Washington, D. C., about March 12, for five cents.

The February issue of about 20,000 copies, which contained the first complete list of stations broadcasting entertainment issues since last June, was almost immediately exhausted, and at the request of the Public Printer the list is repeated in the March issue and 20,000 copies ordered.

Another feature of the March number is a history of the development of radio with important events listed in chronological order. The yearly subscription to the Service Bulletin is 25 cents.

Come on, Fellows! Let's all build that Super-dyns that appeared in RADIO WORLD for Dec. 15, 22 and 29. It's the best thing that the past year brought out. Start it now!

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WITH the new Shamrock Kit you can build a set that pulls in stations 3,000 miles away. You can do this while the local stations are going full blast—due to the wonderful selective capacity of sets built with this kit. The kit is equipped with two wonder working Shamrock Balancing Condensers (illustrated below). It also contains three Shamrock air core transformers mounted and properly balanced on U. S. Tool condensers—made exclusively for Shamrock.



### Remarkable Balancing Condensers

THESE little condensers embody several exclusive features. They practically eliminate body capacity. Have lock screw adjustment—and are glass enclosed. They enable you to balance a set with ease and precision.

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The Single Jumbo for WD 12 tubes, the Double Jumbo for UV201 A tubes, will each operate 3 tubes four hours daily for forty days—with a renewal cost of 65c and 95c respectively.

This statement is based on the results obtained by thousands of users of Jumbo batteries.

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Jumbo Batteries require no service station or electric current for recharging. Spare renewal plates may be obtained from your dealer or by mail from the factory.

Jumbo battery service dealers will recharge your batteries for you WHILE YOU WAIT.

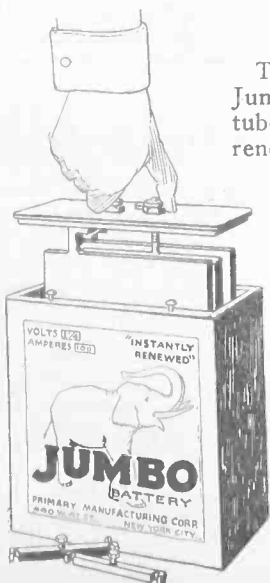
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Kansas farmers are especially extrava-  
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 tical information that will help us in the  
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 business."

"You cannot realize what this 'College  
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 semester, those who successfully pass the  
 written examination will secure a certi-  
 ficate of graduation from the first college  
 courses ever conducted by radio.

**DID YOU HEAR A NEW ONE LAST NIGHT?**  
 Are you still content to guess where they are, or  
 do you want the most complete and up-to-date  
 call list of broadcasting stations in the United  
 States, Canada, Cuba and Porto Rico? Send 15c  
 for RADIO WORLD for Feb. 16, which contained  
 a call list right up to the time of going to press,  
 or start your subscription with that issue.  
 RADIO WORLD, 1493 BROADWAY, NEW YORK.

Valuable Lists

THERE has appeared weekly in  
 RADIO WORLD for several months  
 a list of names of those who have asked  
 for circulars or other reading matter  
 about radio goods. Addresses have ap-  
 peared in all lists.

We can furnish back numbers contain-  
 ing lists for the past six months. These  
 names will total several hundred.

The issues for the past six months (26  
 nos.) will be mailed on receipt of \$3.00.

SEND NOW before any of these back  
 numbers are out of print.

Sub. Dept., RADIO WORLD, 1493  
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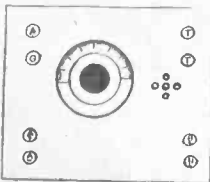
Twelve Famous  
Orchestras Weekly  
from Broadcast Central

ESTABLISHING what is indubitably a record for direct-wire transmission of dance music, stations WJZ and WJY of the Radio Corp. of America's dual installation at Broadcast Central, New York City, has completed arrangements which swell the number of nationally famous New York orchestras which are weekly features on the programs of the twin stations to an even dozen. Listeners-in have long been accustomed to hearing Bernhard Levitow's Hotel Commodore Orchestra, the Waldorf-Astoria Orchestra under Joseph Knecht, and Al Epp's Hotel Astor Orchestra at weekly intervals from one or the other of the stations, and within the last few months Irving Selzer's Cafe Boulevard Orchestra, Paul Specht's famous Hotel Alamac Orchestra, the Hotel Majestic Orchestra and most recently Emil Coleman's Club Trocadero Orchestra have become as eagerly listened for every week. Hereafter the orchestras of the celebrated Rendezvous, the Moulin Rouge, the Hotel Ambassador and the Hotel Pennsylvania will also be weekly features on either WJZ or WJY programs, enabling radio listeners to dance to the music of practically every famous hotel grill and supper club in New York City. Plans are practically completed for similar broadcasting of the Hotel McAlpin Orchestra.

The use of the direct-wire method of pick-up which both WJZ and WJY use to a greater extent than any other station in the country enables the radio audience to hear these famous dance orchestras just as they play in their respective accustomed surroundings, with the inspiration of atmosphere and the dancers right before them. Many of the orchestras could not leave to reach a broadcasting station studio during the most popular radio dance hour, ten-thirty to eleven-thirty, and without the direct-wire system such a succession of leading orchestras would be impossible.

Seventy-five thousand radio "fan" readers look for RADIO WORLD every Wednesday. It is dated Saturday. Its advertising forms close Thursday, nine days in advance of date of issue.

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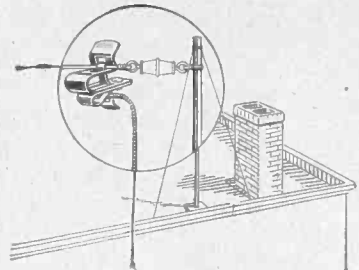
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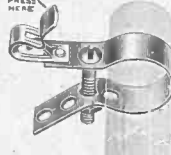
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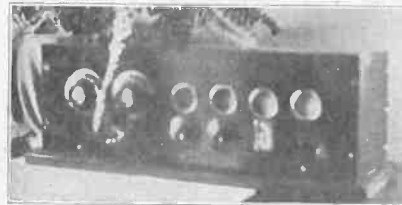
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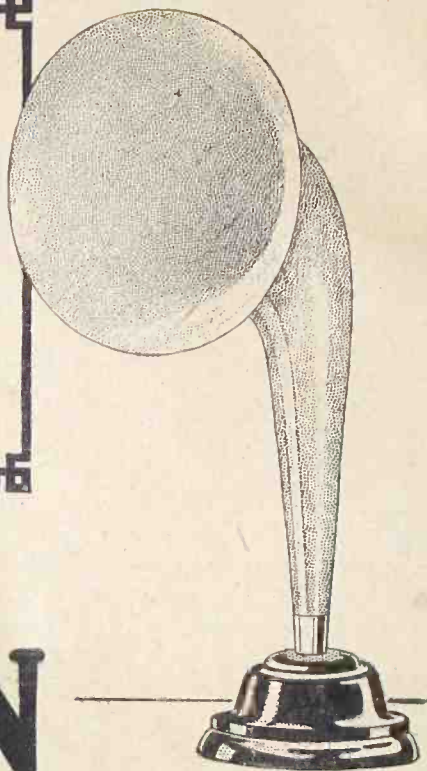
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