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# RADIO

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# WORLD

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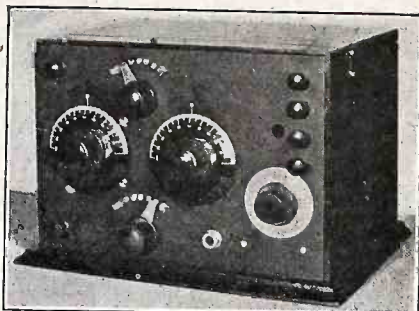
(C. Kadel and Herbert)

Directions for Building a Portable Loop for Summer Portage  
Some Good Radio Kinks for the Yachtsman  
Wigwagging with Sharps and Flats  
How to Buck the Bugaboo of Summer Static



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RADIO WORLD



# RADIO WORLD

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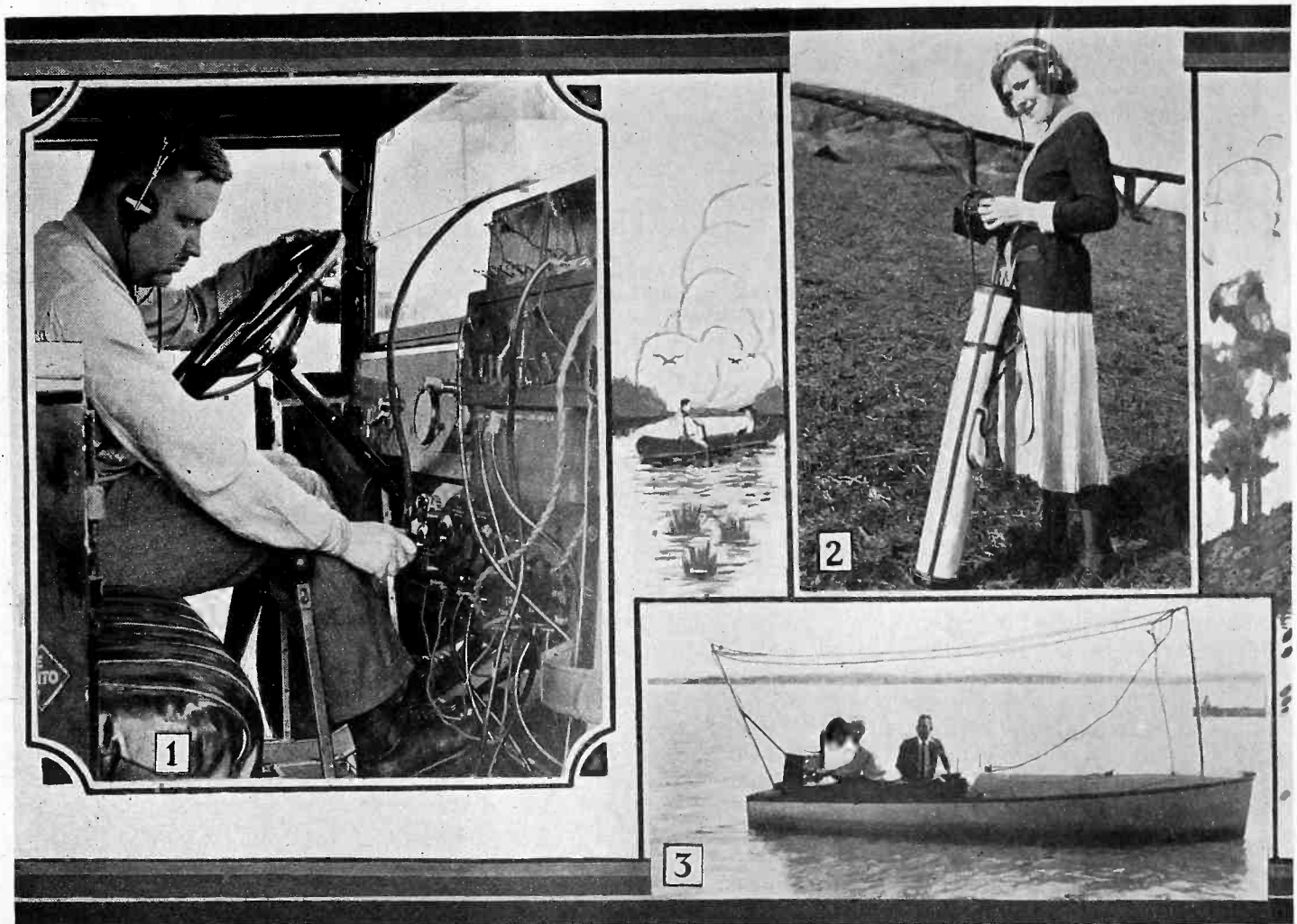
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## Pack Your Radio In Your Old Kit Bag— And Smile, Smile, Smile!

**V**ACATION TIME—the time we all look forward to! The time we shake the dust of the cities from our shoes and prepare to inhale the sweet odor of new-mown hay and put away our troubles and accumulate a good coat of tan.

radio sets. A great many are building special sets to put on their boats and take away to camp with them.

Can you imagine anything nicer than sitting around the campfire with the glow of the flames jumping up and casting weird shadows into the dark places, and



(Photos copyrighted by Fotograms, N. Y., and International Newsreel)

No. 1. Who says we can't go radiomoting? Here is how a rabid enthusiast installed his five-tube set with antenna atop the car so that he wouldn't miss a single thing while going up to the mountains.

No. 2. Did you slice it? Well, just take along that portable tube set, and get a lesson on control from station XZZ and let the next one

No matter where you go, farm, woods, mountains, seashore, boating, think of the fun you can have by taking your radio set along with you and not missing your favorite program or concert, and at the same time have the laugh on the folks obliged to stay and swelter in the city.

All you need to do these spring days is to walk through some of the residential sections, or near any private garage, or boat house, and you will see the owners busily equipping their cars and boats with

land plump on the green for a birdie. This is "radio golf" for fair!

No. 3. Atta boy, Petey! Charm those fish with a selection from Faust and then they'll bite without even coaxing. Even at that, isn't it more pleasant to listen to a vocal solo than the "Put-put-put-put" of that dinky motor?

at the same time listening to Miss Vaughn de Leath and her original radio boys playing "You Gotta See Mamma" or listening to the Symphony in G minor played by Paderewski while sitting comfortably on the porch of your hotel while the crickets and locusts announce the fact that it's going to be a "corking warm day tomorrow"?

Don't just think about it, fan! Look at the pictures on this page and get busy. It won't take you very long to do it, and think of the fun you can have.

# Wigwagging With Sharps and Flats

By J. E. Anderson, M. A.

**D**URING the last three years the writer has been experimenting with a system of signalling which may be called acoustic wigwagging. In certain respects it resembles the system recently announced by General Squier of the Signal Corps of the Army, but instead of using a variation of the intensity of the signal to represent dots and dashes, a variation of the frequency of signal tone has been employed. For instance, the dot is represented by a short duration of a certain audible frequency, and the dash with an equal duration of a somewhat lower frequency. Thus a message consists of a sequence of ups and downs of the pitch of the signal tone. At times a third reference frequency lying midway between the other two has been used to facilitate aural reception, in which case the dot is given by a sudden increase in this frequency and the dash by a sudden decrease. Thus signalling becomes a type of wigwagging about the middle reference tone.

The advantage of this method is especially noticeable in aural reception. Most ears, even if they are not highly musical, are capable of differentiating between two musical tones separated by a fairly small interval, and a coincident variation in the intensity is not a serious matter. The power of the ear to distinguish between two tones is es-

pecially great when there is a third frequency with which to compare them. It is easy to tell a sudden drop in a 1,000-cycle frequency to 950, or a sudden rise to 1,050. It is still easier to tell the same absolute variation when the middle reference frequency is a hundred cycles per second. In high speed signalling this auxiliary frequency becomes confusing and it is best not to send it in the body of the message; that is, between dots and dashes and between letters and words. It is still useful, however, at the beginning of signalling after a moment of interruption, and when tuning in on the transmitting station.

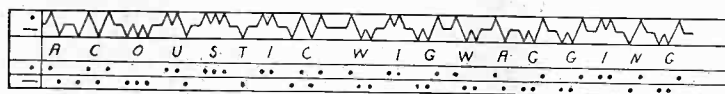
When using a variation in the intensity of the signal to represent dots and dashes the ear is unable to differentiate between two intensities unless their ratio differs considerably from unity, and it is impossible to tell whether a sudden change in the intensity is intentional or due to an abrupt change in the attenuation characteristic of the electrical circuit.

This system of acoustic wigwagging is applicable to direct and carrier transmission alike. If instrumental reception is used as well as aural, the frequencies available for use range from the lowest audible to the highest radio for both carrier and direct transmission.

The transmitter for such a system does not differ greatly from the ordinary. The chief difference lies in the oscillator generating the signal frequencies. If the reference frequency is not transmitted the controlling key is a single pole double throw switch by means of which one of two condensers may be thrown in parallel with the oscillating coil, the capacities of these being so proportioned as to give the desired frequency interval. It may also be accomplished with a series-parallel switch whereby the two condensers are first either connected in series or in parallel before being connected across the coil. If the reference frequency is transmitted three condensers are used, and the key so arranged that any one of them may be picked up and connected to the oscillating coil. The smallest of

these condensers will give the dots, the middle the reference tone, and the largest the dashes.

The circuit used in aural reception is an ordinary receiver and needs no further comment. But when it is desired to render the signals visible, or to record them on a tape, the receiver is somewhat more complicated. The reference frequency is now undesirable and is not used. A tuned circuit is used for each of the signal frequencies. The incoming oscillations are first detected, and then the two signal frequencies are selected by the tuned circuits and separately amplified. The output of the two amplifiers is then used to operate the recording devices. For this purpose a siphon recorder may be used and so arranged that one amplifier pulls the writing point to one side of a median line and the other amplifier in the opposite. A galvanometer in conjunction with a photographic recording device may be also used in the same manner. A better way is to print the message in dots on either side of the median line of a tape. A dot above the line would be a dot in the code and a dot below the line would represent a dash. To operate the printing points local relays are necessary, which are controlled by the incoming signal frequencies. The printing may also be done photographically



Punched tape and recording tape used in "Acoustic Wigwagging." The upper is the received signal and the lower the perforated tape to be sent through the transmitter.

in which the relays operate two shutters. The two methods of recording a message are illustrated in the accompanying drawing.

The use of the system described here would increase the possible speed of signalling. The English alphabet as expressed in the International Morse code contains 178 units of time, divided into 38 dashes, 44 dots and 56 spaces. Of these 38 units, or half the units allotted to dashes, are saved. Then assuming that the dots and dashes are equally distributed in a message, there would be an increase in the possible speed of 27 per cent. In the transmission of numerals there would be an increase of 22 per cent., or they could be transmitted in .78 of the original time. A considerably greater increase could be effected by rearranging the alphabet in accordance with the frequency of occurrence of the letters in average English discourse. That is, the two single unit characters should be assigned to the two letters occurring most frequently, the four two unit characters to the four next letters occurring the greatest number of times, and so on.

In ordinary dot and dash transmission, and in the intensity variation system there is only one signal tone. In the system described here there are at least two. An objection has therefore been raised that it takes a wider wave band and is wasteful to the available spectrum. For low frequencies this may be a real objection, but for radio frequencies it is of no consequence. Suppose communication is carried on with a wave length of 400 meters or a frequency of 750 kilocycles. Let the signalling tones be 750 and 1,250 cycles per second. They are separated by an interval sufficiently great to allow complete separation by reasonably selective circuits, and yet when they are modulated with the radio frequency current the total width of the sideband is only one part in 1,500. This would lie well within the resonance characteristic of the radio frequency tuned circuit, and many such channels could be used on the same carrier before it would interfere.

# Highly Selective Loose Coupled Circuit Receiver

By C. White, Consulting Engineer

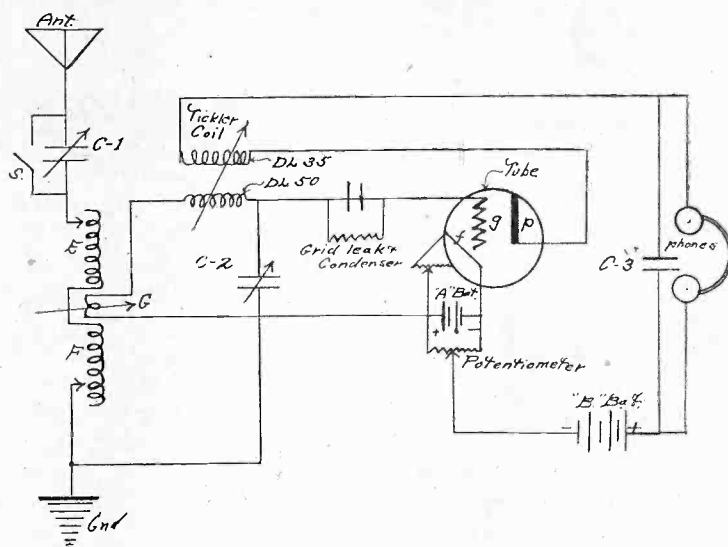
THERE has been quite a lot of interest taken of late in coupled circuits of various types. And there has been a lot of misunderstanding and exaggerations as to the benefits of a double and triple circuit receiver. Many have claimed wonderful selectivity with coupled circuits while others have obtained only mediocre results. If two stations are operating on exactly the same wave length and they come in with the same intensity there is no circuit yet developed that will enable you to select one from the other. It is true that we can resort to different tricks to reduce the intensity of one and augment the intensity of the other. One of the most common methods of doing this is to resort to a directional antenna or loop if the two stations happen not to lie in the same direction from the receiver. But it is generally the case that the two are not exactly on the same actual wave length and differentiation or selection can be accomplished by means of a more sensitively tuned or resonant circuit. Then again, if they are on the same wave length, one is most likely louder than the other in audibility to an appreciable extent, thus allowing the coupling to differentiate between the two if the tuner is of the coupled circuit type.

I shall not go into the theory of coupled circuits for Mr. Thompson in previous issues of RADIO WORLD has well covered the subject. But some users of coupled circuits have failed to get the theoretically good results they should because the coupling has been entirely too critical or tight. Then again, the fit between the rotor and stator has been so close that electrostatic coupling has existed when the electromagnetic coupling was zero. Which fact is quite easily explained since the turns on the rotor and stator of the coupler form a condenser whose capacity is not by any means negligible especially when the clearance between the two is very small. There are several methods in vogue to keep this undesirable capacity as low as possible. One method is to make the clearance very large relatively, and another is to place only a few turns on the rotor and have the amount of inductance needed to supply resonance in the secondary circuit added external to the rotor by means of another inductance coil. This fact cannot only be taken advantage of to get the loose coupling, but the tickler coil can be made to feed back into this fixed added inductance. The advantage to be gained by the latter is smooth and even regeneration with more independence of control. With the old, or I should say the more common, system the tickler coil feeds back directly to the secondary rotor and the amount of regeneration was very much dependent upon the coupling and tuning of the primary circuit. It is a great help to be able to set your regeneration to a maximum and then go ahead and finish the fine points in the final tuning in, without the disagreeable annoyance of the tube jumping into sudden oscillation or spilling over.

In the accompanying illustration is shown the essential connections of the circuit. The unit E, F, G is the main tuning unit. The coils E and F form the stator of the element. The coil E consists of 25 turns tapped every five turns while the coil F consists of 25 turns the last 10 of which are tapped every two turns to allow finer adjustment of inductance. The whole stator is wound on a four inch bakelite or formica tube with No. 18 D.C.C. magnet wire. The coils should be wound with a piece of string between each turn to assure a spacing between any two adjacent wires of each coil.

The spacing between the coils E and F should be ample enough to allow room for the rotor shaft to pass through with sufficient clearance on each side. The rotor (G) should be wound on a good insulated form and have only five turns of No. 18 D.C.C. wire, spaced in a similar manner as the stator turns. After the coils are wound with the string between each turn they can be coated with coil cement and upon drying the string can be removed. The reason for using No. 18 wire is to keep the resistance of the tuning circuit as low as possible and the reason for spacing the turns is to keep the amount of distributed capacity of the coils at a minimum. Of course, a smaller size of wire could have been employed for the rotor coil G, but why go to the trouble and expense of purchasing another size wire? A honeycomb coil (DL50) is used to complete the inductance quota for the secondary while a honeycomb (DL35) is inductively coupled to the former to obtain regeneration. These two coils should be provided with satisfactory mounts in order gradually to adjust the coupling. If a DL35 coil is not easily procurable a DL50 can be substituted.

The condenser C-1 of the primary tuning circuit is an



Do you want selectivity? Then construct this set and you will get it.

ordinary 11 plate air variable shunted with a short-circuit switch to allow the primary to operate untuned if such is preferable. The condenser C-2 is of similar type and size and is used to tune the secondary circuit. Some prefer to operate with the secondary untuned and the primary tuned, but if the condenser is placed in the circuit the amateur will have his choice and can easily weigh the merits of each method. The grid leak resistance and the grid leak condenser will depend solely upon the kind of vacuum tube employed as a detector. Generally two megohms and .00025 mfd. capacity will suffice for most cases. The condenser C-3 is a mica by-pass condenser of .001 mfd. A potentiometer is provided in order to furnish a further fine adjustment of regeneration.

Those fans who have tried out the regular single circuit regenerative outfit and now wish to change their circuit and experiment will do well to investigate the loose coupled type of receiver. In construction care should be taken to see that the DL50 coil is mounted at right angles and some little distance away from the stator E and F so as to prevent electromagnetic coupling where it is not wanted.



# Some Good Radio Kinks for Yachtsmen

By Arthur S. Gordon

SOME years ago yacht owners awoke to the fact that it was quite possible to take a victrola to sea without running any risk of pounding the records to small bits on the bounding billows. As a result, the laziness of long cruises was somewhat relieved by a snatch or two of music. At the present day, cabin cruisers and houseboats have talking machines built in the cabin woodwork as a matter of course. Now along comes radio with its intense fascination, and progressive yachtsmen are considerably upset. While they haven't as yet ordered radio sets made a part of their boat, like the rudder or the anchor, they are

roomy, comfortable houseboat, for example, or a moderately spacious cabin cruiser, for not having at least a radio receiver on board?

Aside from everything else, the important question with yachtsmen has been, "Is it possible on a small boat, say from 30 to 40 feet over all, to erect an antenna that will function satisfactorily with a moderately priced and easily operated receiver?" The answer is an emphatic "Yes!" Take houseboats, or cabin cruisers, for example. The problem of an antenna on craft of their nature is easily solved. There is always a tall mast afore or abaft the wheelhouse, and this may be used as the high point of the installation. From the masthead a flat top or cage aerial may extend both forward and aft to the jack and flagstaff, respectively, with the lead-in coming from the end nearest to the location of the apparatus. Fig. 1 shows the typical aerial installation on a popular make of cabin cruiser.

Another type of marine antenna, and one that is perhaps seen the most, takes advantage of the crosstree yardarm on the mast. An insulator is hung from each end, and the aerial wires are suspended from them, coming to a point at both the bow and the stern. This is illustrated in Fig. 2. Still another type is that found on auxiliary cruisers with two or more masts. This type resembles more closely than the others the aerial construction on cargo and passenger vessels of the Merchant Marine, and may be either of flat top or cage design. In this case, the lead-in should come down the mast, running either inside the mast hoops or otherwise well clear of any tackle that concerns only the sails of the vessel. This is illustrated in Fig. 3.

The greatest care should be taken in insulating the shipboard aerial. No part of it should touch the vessel. No part of it should be left free to swing or sag against any of the standing or running rigging. This rule of perfect insulation is inflexible where boat aerials are concerned, for it must be remembered that when the yacht is wet from either heavy seas or rain, it is practically grounded.

Otherwise an instrument ground is provided by

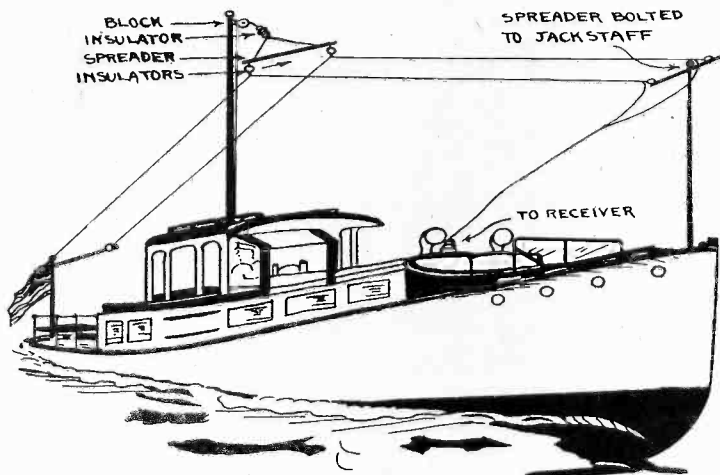
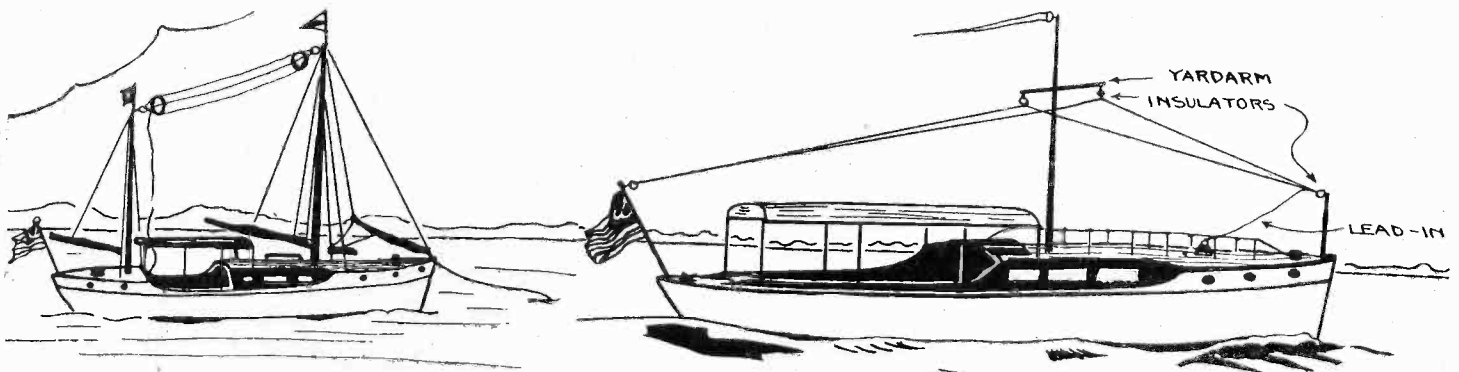


Fig. 1. The antenna installation on a typical cabin cruiser. This not only serves as an antenna, but gives the cruiser a sub-chaser aspect.

wondering why it can't be done—and the answer is, "It can!"

Of course, it isn't practical to load a three, four or five tube set, with batteries and such complete, within the gunwales of a boat that is scarcely large enough to carry an extra hand when the captain-crew-and-cook is on board. Neither is it the height of good sense to install a radio on a speed shingle like "Miss Margaret"



Figs. 2 and 3. Two other methods of installing antenna on different types of boats. The yawl is very difficult because of the limited space; therefore, a cage type antenna is suggested.

or "Miss Broadway." Racing sloops and yawls are also barred, because when they are under way in a stiff breeze, their proud owners just haven't time to do anything else but handle them. Even if they did manage to snatch a moment at a radio set, the angle of their craft would prevent them from enjoying whatever they might hear. With all these vessels out of the contest, therefore, it remains to be said that on the contrary, there are types of boats that just cry out loud for a radio installation. What excuse has the owner of a

running a wire from the set to a beam or plate in the vessel, providing that this beam or plate is of metal and connects with the hull, also of metal. If all these should be of wood, provide your own plate by screwing an unpainted strip of copper sheeting on either side of the outer hull just above the keel. This strip should be about one foot wide and four or five feet long. Copper is recommended because of its non-corrosive properties. Some vessels are copper-sheathed just be-

(Continued on next page)

(Continued from preceding page)

low the waterline. This sheathing is an ideal radio ground. Others have metal bilge keels and these, too, are suitable. The idea is either to provide a metallic area exposed to the water, or a counterpoise in the form of the paint-insulated metal frame of the vessel itself. Should the metal frame not be insulated from the water, all the better.

The antenna-ground installation is not complete on a small boat without a short circuit switch or an arrester gap shunted across the aerial-ground terminals of the set. If a switch is used, the one employed should be of the single pole, single throw type, and should be connected as shown in Fig. 4. In this diagram, the switch may be replaced by an arrester gap, the only difference being that the gap is automatic, while the switch needs faithful attention, to be at all effective when the time comes for it to function. It will be noticed that the same ground is used for both the gap and the receiver. This is contrary to house practice, but on a boat there are neither legal nor technical objections to such an arrangement.

Although it is not "such a much," the masthead aerial is surely the equal of attic antennae, molding aerials, and the electric lighting circuit. If amateurs can do creditable D X work with these indoor makeshifts,

set is recommended. The conventional regenerative circuit employing one tube as a detector and the other two as amplifiers is quite all right, but if the extra transformers do not complicate matters, it is much more efficient to employ the recently popularized reflex circuit, in which each tube is made to do double duty

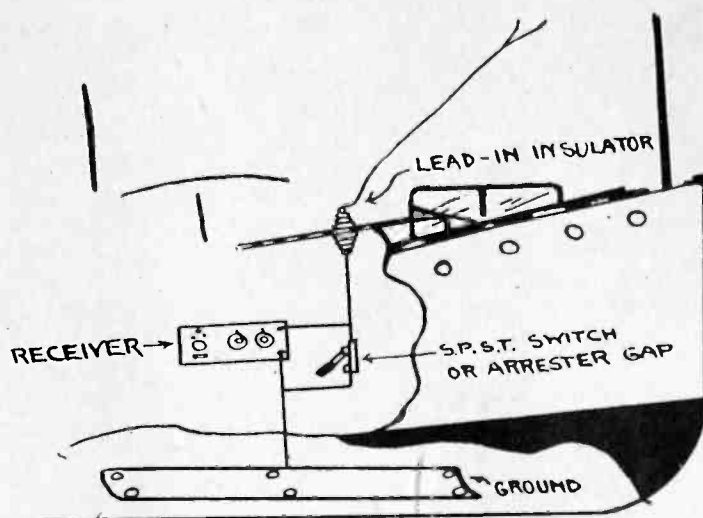


Fig. 4. A safety switch or gap should be provided. The ground can easily be effected by use of a metallic plate, and both instruments and gap are grounded to it.

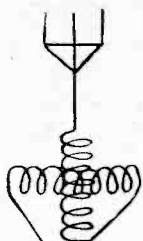
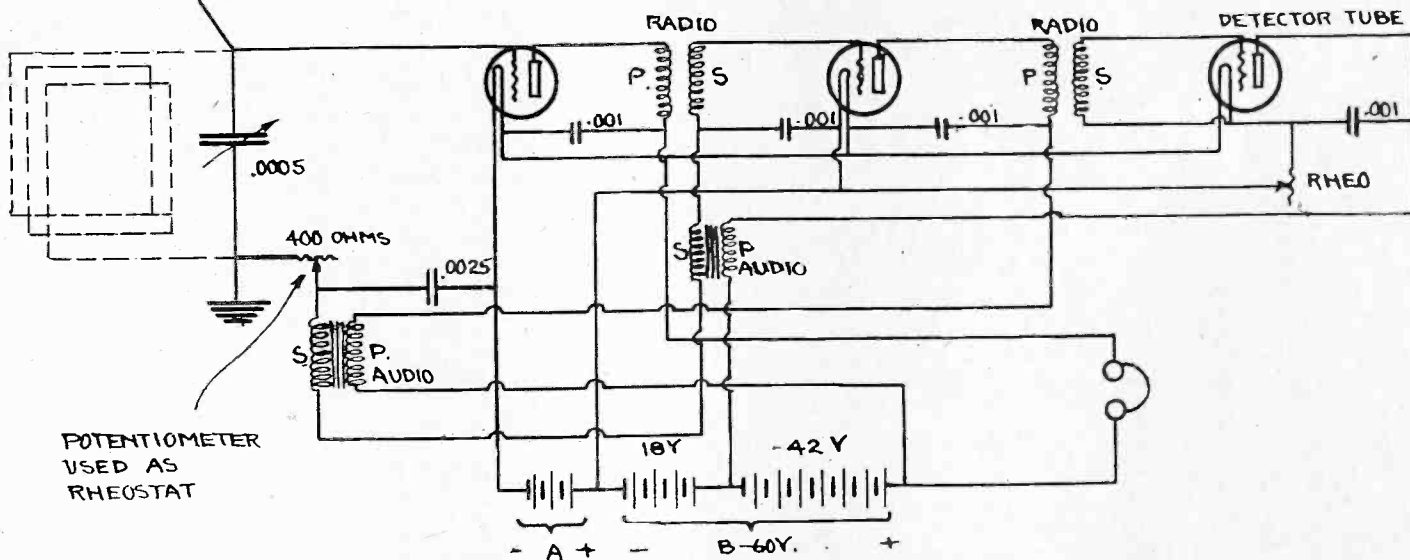


Fig. 5. The circuit advised for the set to be installed. It is the Grimes inverse duplex, and may be used with either antenna or loop as shown. It is simple enough for any one who has a working knowledge of radio to hook up and is the ideal set for the purpose.

as both a radio-frequency and audio-frequency amplifier. Should the reflex circuit be used, it is advisable to use a tube instead of a crystal for a detector—that is, unless the prospective operator has come across a synthetic crystal that needs no adjusting whatever. A suitable circuit of this nature is the Grimes inverse duplex, given in Fig. 5. In this circuit there are three



using only a two or three tube straight audio-frequency hook-up, what is to prevent the yachtsman from doing the same with his miniature aerial? Too many people assume that because a fellow has a boat, he is a millionaire. They also assume that he is of that peculiar breed of human beings who want nothing but the very latest, regardless of the good points possessed by standard and well-tried outfits. Acting under these generous delusions, they recommend to the yacht owner a high-voltage, multi-tube, myriad knob affair that even a radio engineer couldn't handle on dry land, let alone a comparative novice on the deep sea. This, of course, is all wrong. Four or five tubes are not necessary. On the contrary, a single tube receiver stationed in New York harbor and vicinity should bring in the big New York and Newark stations without any trouble whatever.

For off-coast cruisers, however, at least a three tube

tubes, two of which are used in reflex and the third employed solely as a detector. It works surprisingly well with a small shipboard aerial and is therefore suggested as the general type of hook-up which is supremely suited for the yachtsman.

If an owner's fancy runs to loop antennae, and there is room aboard his vessel to swing one, let him select a hook-up in which the loop is not an integral part of the primary tuning system. In other words, a circuit which employs the loop merely as a collector of energy and not as a strongly directional device to tune out one station and bring in another by a mere touch of the loop. Otherwise, he is going to be annoyed by the manner in which the loop turns with the ship's head, and by the irritating regularity with which good concerts suddenly disappear from whence they came. This annoyance is not only present while the yacht is under way, but also while it is swinging at an anchorage.

# A Portable Loop Aerial Receiver

By C. White, Consulting Engineer

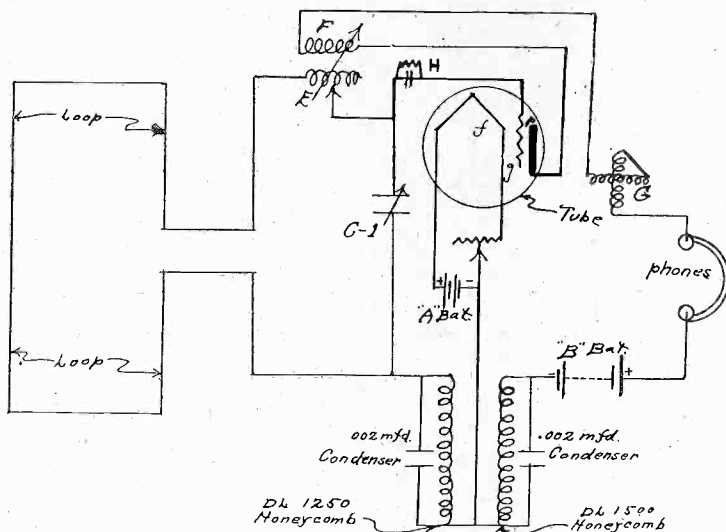
HERE is little doubt in the minds of many radio experts and amateurs that the coming type of antenna will be the loop aerial. The outdoor aerial is not only an excellent collector of atmospherics in the warm weather season, but is equally as proficient in gathering disturbance from Friend Radio Neighbor who does not operate his regenerative receiver properly and generally supplies you with a varied assortment of howls and whistles. Then again, the outside antenna adds little to the selectivity of your outfit and, in fact, in some cases where it is improperly constructed it actually subtracts from the sharpness of tuning. Aside from all these disadvantages it has the added inconvenience of being rather hard to install in most apartment house cities, and does not lend itself to portable radio equipment and field use in summer camps unless exceptional conditions are available. It is, however, many times more efficient than the loop from the standpoint as a collector of radio-frequency signals, but after careful considerations of all its merits and demerits the average fan will agree that it is much

tainable with a loop because of its quiet operation and the fact that the fellow next door can not cause your tube to slip or jump into oscillation.

The schematic connections are clearly shown in the accompanying diagram. The loop is about 30 inches long per side and is square in shape. It should be wound with braided copper ribbon or specially stranded radio-frequency wire so as to cut down the high or radio-frequency resistance in order to increase signal strength and selectivity. The coil should have eight turns in all and the corners of the loop frame which supports the wire of the loop should be made of bakelite so as to prevent or minimize high frequency leakage which would be very large if the wires rested on a wooden support such as the body of the frame. The lead or terminal wires running from the loop to the set proper should be kept as far apart as possible and should be well insulated from each other. Every possible means to conserve the small amount of signal energy collected must be exerted. The cabinet holding the working parts ought to be fully shielded with copper foil and the movable plates of the condenser C-1 are to be connected to the filament side of the tuning circuit, which is grounded to the copper foil shielding. In some cases it is advisable to ground to earth connection the copper foil and the negative side of the "A" battery, but better results are often obtained when the set is operated without ground connection to earth. You can easily try out both methods and determine which case better fulfills your requirements.

The constants for the circuit are as follows: C-1 is an 11 plate air variable with some good reliable sort of vernier adjustment or attachment; E is the stator coil of an ordinary variocoupler, while F is the rotor of the coupler; G is a standard type of variometer; and H is a good grid condenser and a reliable grid leak resistance. The two DL honeycomb coils should be furnished with a substantial mounting in order that the coupling between the two may easily be varied. It is not necessary to go to the expense of purchasing an elaborate variocoupler because only a few turns of the stator of this coupler will be in actual use on short wave reception, owing to the fact that the inductance of the loop alone will almost be sufficient to accomplish the necessary tuning, and the plate variometer G will supply most of the regeneration, while the rotor F will perform a sort of vernier regeneration control. The "super" part is accomplished by means of the coupling between the two honeycomb coils, which is kept very loose (that is with the coils far apart) until the receiver has been completely tuned as a regenerative receiver; then it comes into play. By its use the grid of the tube is biased positive and negative at a high frequency rate. The very fact that the biasing is done with alternating current makes it possible to hold the tube on an extremely critical and sensitive point since the negative impulse tends to push it over and the positive pulls it back from oscillation before it gets a chance to respond to the negative pushing impulse.

Let me repeat that this set can be made extremely compact and readily lends itself to camp and field use. It is almost an ideal set to use for summer work since it can be carried complete with very little trouble. For stations not over 25 or 30 miles distant the reception comes in with the volume of a good regenerative receiver using two stages of audio-frequency amplification and an outside aerial.



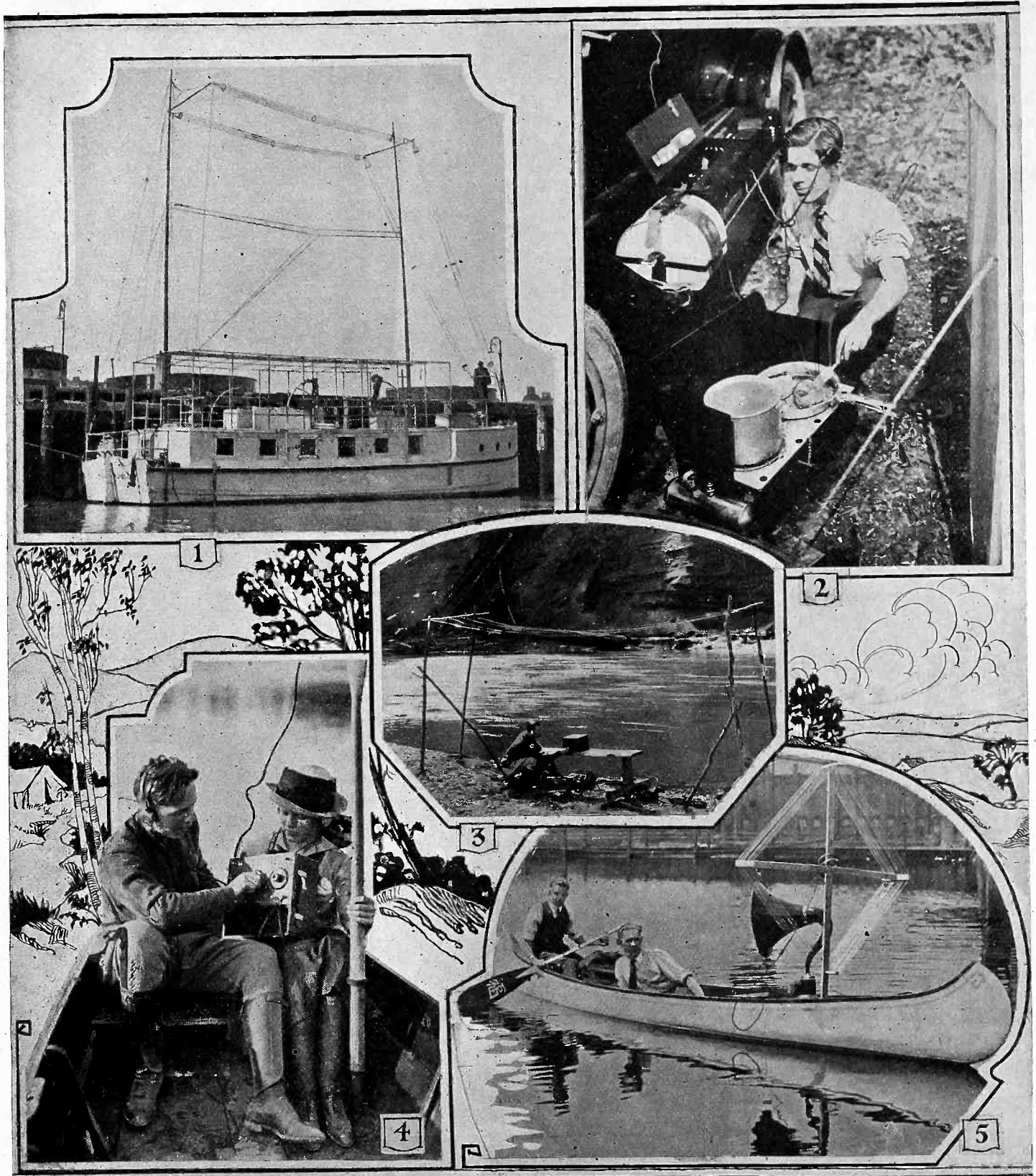
Circuit diagram for a compact loop receiver that can be easily constructed to fit in a small sized suit case or portable cabinet, using the popular dry cell tube.

better to add a tube or change a circuit in order to get rid of it in favor of the loop. If you once get used to the loop with its sharp tuning and quiet operating possibilities you will not for one moment return to the old type of aerial.

It is quite true that a loop aerial can be used on your present regenerative receiver with little or no changes in the circuit you are at present using, but with such an arrangement you cannot hope to pull in the distance that an outside antenna affords. To overcome the low collecting power of the loop we must resort to either radio-frequency, amplification or regeneration on a "super" or "ultra" scale. With the former it will be quite necessary to resort to the use of additional tubes, but by means of the latter we can get remarkable results without the employment of any more tubes than we would have on an ordinary receiver. The circuit that I shall endeavor briefly to outline is nothing more than a modified form of the old "ultra" regenerative circuit. By means of the few modifications it is easier to control and much more flexible to operate than most of the older types which use one tube. Regeneration to an extreme point is easily ob-



# The Infinite Variety of Radio for Summer Pleasure Is Told In These Pictures



(Photographs copyrighted by Underwood and Underwood, Kadel and Herbert, International Newsreel, International Photos, Photonews.)

- No. 1. How one staid vacationist is going to be entertained during his trip on a houseboat is plainly visible. He didn't wait for any suggestions, but just went ahead and "did it."
- No. 2. What could be finer than some nice bacon and eggs and "You Gotta See Mamma Every Night" over the radio while camping via auto this summer? Beats cabaretting!
- No. 3. This is how they do it out in Washington when they go camping along the Green River. Kinda primeval antenna, but it gets KHJ and all the rest, so why worry?
- No. 4. Here's a new one, fellas! Use one of your oars to support the loop and bring 'em in fine.
- No. 5. It used to be "Give Me the Moonlight, etc." Now it's changed to "Give me my canoe, give me my set, and let the sigs roar in."

# Twenty-two More Class A Stations Licensed This Completes List of Class B Stations

**D**URING the past week the Department of Commerce licensed 22 more Class A stations and assigned them special zone waves. One of the stations was new, that of Radio Bug Products Co., Kearney, Neb., and the balance were transferred from Class C to Class A.

There were two new stations added to this class recently—the U. S. Playing Card Co., at Cincinnati, WSAI, and the Union Trust Company of Cleveland, WJAX.

## List of Class A Limited Commercial Broadcasting Stations

Call	Stations	Kcys	Meters	Watts
K F H P	Radio Bug Products Co., (New A), Kearney, Neb.	1220	246	10
W E A I	Cornell University, Ithaca N. Y.	1050	286	500
K F D O	Cutting, H. E., Bozeman, Mont.	1210	248	10
K O P	Detroit Police Dept., Detroit, Mich.	1050	286	500
W C A H	Entrekin Electric Co., Columbus, Ohio	1050	286	100
W W I	Ford Motor Co., Dearborn, Mich.	1100	273	50
K F D P	Hawkeye Radio & Supply Co., Des Moines, Iowa	1080	278	100
W A A B	Jensen, Valdemar, New Orleans, La.	1120	268	100
W P A Z	Koch, John R., Charleston, W. Va.	1100	273	10
K F B L	Lees Bros., Everett, Wash.	1340	224	10
W D A G	Martin J. Laurence, Amarillo, Texas	1140	263	100
W A A M	Nelson Co., I. R., Newark, N. J.	1140	263	250
W E A M	North Plainfield, Boro. of N. Plainfield, N. J.	1190	252	50
K J R	Northwest Radio Service Co., Seattle, Wash.	1110	270	100
K F H B	P. L. Boardwell (A. S. Kolstad, the Rialto Theatre), Hood River, Ore.	1070	280	280
K F E P	Radio Equipment Co. (Jos. L. Turre), Denver, Col.	1250	240	10
K F F A	Shelton, Dr. R. O., San Diego, Calif.	1240	242	50
W P A L	Superior Radio & Tel. Co., Columbus, Ohio	1050	286	100
W K A W	United Battery Service Co., Montgomery, Ala.	1330	226	20
W H A G	University of Cincinnati, Cincinnati, Ohio	1350	222	100
W J H	White & Boyer Company, Washington, D. C.	1100	273	50
W B A N	Wireless Phone Corp., Paterson, N. J.	1230	244	100

The official list of Class B Stations with their special waves as announced by the Department of Commerce, May 19, includes 36 regular stations and two special broadcasters.

## Class B Broadcasting Stations—Wave Lengths in Meters

Call	Station	Wave
W E A F	American Tel. & Tel. Co., New York City	492
W G M	Atlanta Constitution, Atlanta, Ga.	429
W S B	Atlanta Journal, Atlanta, Ga.	429
W M A Q	Chicago Daily News, Chicago, Ill.	448
W J A Z	Chicago Radio Laboratory, Chicago, Ill.	448
W M C	Commercial Pub. Co., Memphis, Tenn.	500
W H A S	Courier Journal & Louisville Times, Louisville, Ky.	400
W L A G	Cutting & Washington Radio Corp., Minneapolis, Minn.	417
W F A A	Dallas News and Journal, Dallas, Texas	476
W C X	Detroit Free Press, Detroit, Mich.	517
W W J	Detroit News, Detroit, Mich.	517
K F I	Earle C. Anthony, Inc., Los Angeles, Calif.	469
W G Y	General Electric Co., Schenectady, N. Y.	380
W I P	Gimbel Bros., Philadelphia, Pa.	509
K P O	Hale Bros., Inc., San Francisco, Calif.	423
W O O	John Wanamaker, Philadelphia, Pa.	509
W D A F	Kansas City Star, Kansas City, Mo.	411
W C A E	Kaufman & Baer Co., Pittsburgh, Pa.	462
W O R	L. Bamberger & Co., Newark, N. J.	405
W D A R	Litt Bros., Philadelphia, Pa.	395
K F D B	Mercantile Trust Co. of California, San Francisco, Calif.	509
W O C	Palmer School of Chiropractic, Davenport, Iowa	484
K G W	Portland Oregonian, Portland, Oregon	492
K S D	Pulitzer Pub. Co., Post Dispatch, St. Louis, Mo.	546
W J Y	Radio Corp. of America, Aeolian Hall, New York	405
W J Z	Radio Corp. of America, Aeolian Hall, New York	455
W R A Z	Rensselaer Polytechnic Inst., Troy, N. Y.	380
W F I	Strawbridge & Clothier, Philadelphia, Pa.	395
W H B	Sweeney School Co., Kansas City, Mo.	411
K H J	Times Mirror, Los Angeles, Calif.	395
W B A Y	Western Electric Co., New York, N. Y.	492
K Y W	Westinghouse Elect. & Mfg. Co., Chicago, Ill.	345
W B Z	Westinghouse Elect. & Mfg. Co., Springfield, Mass.	337
W B A P	Wortham-Carter Pub. Co., Star Telegram, Fort Worth, Texas	476
W S A I	U. S. Playing Card Co., Cincinnati, Ohio	309
W J A X	Union Trust Co., Cleveland, Ohio	390

### Specials

N A A	Naval Station, Arlington, Va.	435
K D K A	Westinghouse Elec. Mfg. Co., Pittsburgh, Pa.	326

## “Before This Wonder Distance Shrinks”

By Grace Isabel Colbron

Written for the opening of Broadcast Central, the new station at Aeolian Hall, New York

**F**LINGING free from the guardian wires, into the blue alone,  
The human voices goes soaring forth, the simple spoken tone  
Bridging the breadth of the sea's expanse, the mountains' cloud-capt height,  
Over the fertile prairies broad, the forests' fragrant night.  
Calling across from land to land the greetings of friendship go,

With the intimate touch of the spoken word, its warm and human glow.  
Before this Wonder the distance shrinks and a listening world draws close,  
Its petty envies and hates forgot as the sense of Brotherhood grows.  
Before this Wonder the past gleams pale, but the future with promise bright,  
For the spoken word on the Radio heralds a New Dawn's light.



# How to Buck the Bugaboo of Summer Static

## A Properly Installed Aerial Offers Better Protection Than a Lightning Rod

By Kenneth Malcolm, A. I. R. E.

AS the summer months approach, the embryo radio fan will be introduced to a phenomenon which he may consider entirely unnecessary and unwelcome. It makes itself known as a continuous or interrupted series of cracklings and snappings and is known as "strays," "atmospherics," or more commonly, "static."

Hitherto, static has always been a bugbear to the amateur and commercial operator alike. Its nature was only partly known, and efficient methods for eliminating it or reducing it were not available. Every summer, however, finds new progress and today, with modern developments, for most work it can be eliminated. The broadcast listener need have very little trouble with it, if he will only observe a few precautions.

First, let us look at its nature; and by finding its cause we will be better able to prescribe a remedy.

Dry air is a very good insulator. Clouds are partial conductors. When clouds are blown by the winds over charged earth, or even through supposedly uncharged air, they acquire a charge of electricity of their own, due to friction and induction. If the air is damp and humid this charge tends to leak off, with the result that finally the potential is entirely gone and the earth-cloud system is perfectly balanced.

But when the air is dry, the cloud and its surrounding atmosphere retain the charge and possibly increase it. It can't leak off, because there is an almost impenetrable insulator between it and the oppositely charged earth. However, when a cloud comes near to the earth or near to an oppositely charged cloud, and the charge is great enough, the air will be completely disrupted. Such a discharge we see as lightning, and the following crash we call thunder. Lightning generally occurs after the rain has started to fall, for then the resistance of the air is lowest.

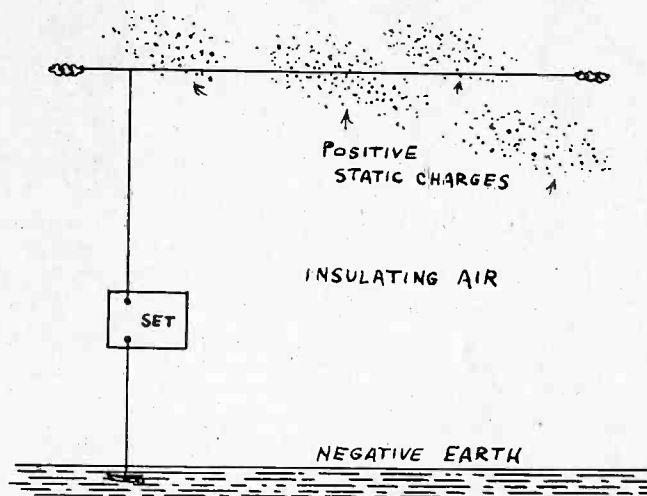
Miniature lightning has been produced artificially by Tesla and Steinmetz in their famed high-potential experimental laboratories, the difference being only in the potential. Natural lightning ranges up in the millions and hundreds of millions of volts.

While charges of lightning potential accumulate only in certain widely separated sections, lesser charges are present most of the time. These lesser charges are generally the cause of static. Your aerial is suspended high in the air, and one end, through your set, is grounded. The charges floating in the air find in your aerial an easy means to reach the earth, with the result that you hear them discharging through your set. Sometimes distant lightning discharges propagate waves somewhat similar to the waves sent from a radio station, and this is another cause of the disagreeable noises.

Is an aerial strung over your house a lightning menace? Emphatically not! A properly installed aerial, with a lightning switch or an approved lightning arrester, will offer as much, if not greater, protection

as the old-fashioned lightning rod. Communities equipped with many high-strung antennae ought to be perfectly free from any lightning danger. The notion that a little aerial wire would *attract* lightning is absolutely absurd. Metal chimneys, tin roofs, metal leaders, and steel clothes lines could be condemned with greater justification.

Now let us consider the methods that may be used to reduce static so that reception may be enjoyed as much in the summer time as in the winter—let's not pack our sets in camphor balls this season. The first suggestion is that you reduce the height and length of



Diagrammatic representation of atmospheric conditions producing static effects.

your aerial during the summer months—for the nearer the earth, the less static; and the shorter the aerial the less foot-hold it can get. Do this within reasonable limits, however; don't make the aerial so short and so low that reception is impossible with the particular set you have. An aerial about 80 feet long and 20 feet high might be a good size. If this cuts your wave length range down too much, a small loading coil can be added to compensate. If the roof of your house is not of metal, you can string the aerial in your attic, or in the space usually provided between the roof and the ceiling of the top story, with a considerable static reduction.

For those who live in the open country, the ground antenna might be a fit solution to the static problem. Much data has been published on this type of aerial and no more than mention need be given here. It consists, essentially, of heavily insulated wires buried in long shallow troughs in the earth.

The loop is perhaps the most ideal form of static eliminator. The main disadvantage is that with such an aerial reception over any but very short distances must usually be done with the aid of radio-frequency

(Continued on next page)

# Elementary Instruction for the New Army of Radio Beginners

Constantly Used Terms Explained  
in Plain Language for the New  
Radio Enthusiast

By Lynn Brooks

**VARIABLE CONDENSER:** It has been found in radio telegraphy and telephony that capacity is a very necessary element in the tuning of a set. Therefore in order to increase the range of such capacitance and increase its usefulness, it has been made variable over a large scale. The variable condensers most commonly used consist of a number of fixed plates, semicircular in shape, and held in place a certain definite space apart, by means of long bolts and washers. Between the spaces of these plates are another set of semicircular plates which are slightly smaller in size, so as to allow them to rotate freely inside the first without touching the washer. The number of plates in such condensers varies from three to as high as 60, depending upon the use to which they are to be put. Their method of variation is to rotate the inner plates. When the plates of the rotor are all intermeshed with the plates of the stationary set, the capacity is at a maximum. As the plates are rotated and more of the surface of the rotating plates is withdrawn the lower the capacity becomes, until when the plates are exactly opposite the capacity is at its minimum. Another and quite common form of variable condenser is that using the surface of two large plates. One of them is stationary and the second can increase or decrease the distance between the flat sur-

face of both by means of a very fine machine screw. In order to prevent short circuiting, it is generally the custom to insulate one of the plates by means of a very thin sheet of mica, or coating one of the plates with some other thin insulating compound. As the distance between these two plates is varied the capacity is accordingly varied. The closer the plates the higher the capacity, and the maximum is reached when there is no air space between the two, and only the thin insulator is separating them.

**FIXED CONDENSER:** In many places in a circuit it is necessary to use capacity, but because of the fact that the capacity does not need to vary a fixed condenser is used. A fixed condenser is one whose construction does not permit of variance. It is generally made of a number of metallic plates separated by a suitable dielectric. These plates are of fixed size and arranged in a pile, one on top of the other, and with a suitable binder to hold them together. The determining factors in such a condenser are the number of plates, the thickness of the dielectric, the total area of plate surface on one side and the dielectric constant for the particular insulating media used.

**GRID LEAK:** As we have before stated, the grid in a vacuum tube acts as a gate to let the negative electrons pass, or hold them back, depending upon the condition of the grid. As the polarity of the grid has to change, some method of allowing the negative electrons to pass off around the condenser must be had. To do this what is known as a grid leak is provided. This is a very high resistance (non-inductive) over which the electrons can pass when sufficient have accumulated and done their work on the grid. Numerous methods of making a grid leak are found. The commonest is to soak a piece of paper or cardboard in India ink, letting it dry and then placing it in the circuit. Other methods consist of making a pencil mark on paper and using that, or using graphite in the form of a paste in a tube. In most of the tubes used at the present time, the conditions call for a variable grid leak for the proper manipulation of the tube. In the pencil mark type this is accomplished by erasing the lines or making them heavier. In the India ink type it is accomplished by either lengthening or shortening the paper, or using a slider for one end of the contact.

(Concluded from preceding page)

amplification. However, with some of the new super-regenerative and reflex circuits this trouble may to a large extent be done away with. Within 15 or 20 miles a loop may be used with even a plain single tube regenerative set.

The simplest loop set can be made by connecting the loop terminals at the point where the terminals of the secondary of a variocoupler would be placed in the regular three-circuit regenerative set. A vernier variable condenser is used for the tuning. Such an arrangement offers great selectivity as well as freedom from static, and will work well over moderate distances.

The single tube super-regenerator is quite good for loop reception and, on account of its greater ease of control, the single tube reflex circuit is a trifle better. These two types are dandy for portable sets, in connection with dry cell tubes.

Of course, the regular radio-frequency amplification sets may be used with positive results. They are both very dependable and selective. For those who can afford them they are the best buy. Use one, two, three, or as many stages as you need to cover your distance. The two and three tube "super" and reflex sets are not to be forgotten.

If you use a regular crystal or vacuum tube circuit, with a regular aerial, you may reduce static considerably by avoiding series condensers. These tend to

store the energy and discharge at the most inopportune times. Reducing the coupling between the coils of your variocoupler or variable condenser may help considerably. Static charges are not as willing as radio waves to jump between coils that are magnetically coupled.

A number of balanced tuners and balanced aeri-als have been devised from time to time, and with more or less success, but they are of interest to the commercial operator and engineer more than to the broadcast listener, because of their complexity and comparative cost.

Static is more than a nuisance; it is a fiend that costs the radio companies millions of dollars annually.

Why is it that an amateur can span the Atlantic with 100 watts, whereas the big trans-Atlantic commercial stations fling out an energy 2,000 times this amount? And an amateur's aerial can be a measly 100 feet, while the commercial giant must have an aerial of five miles? The answer is simply "static!" When the amateurs and the broadcasting stations get across, the air is most free from this pest. But commercial stations must carry on continuous service, with the result that they must bang and batter their way through the static barrier—and at an expense of hundreds of times the energy that would otherwise be required. A satisfactory solution to this problem means a fortune to the inventor.



# RADIOGRAMS

WORLD NEWS HAPPENINGS BRIEFLY PHRASED FOR BUSY READERS

**Sir Samuel Hoare**, Air Minister of Great Britain, was informed of the appointment of Stanley Baldwin as Premier by wireless telephone as he was on his way by airplane from London to Cologne.

\* \* \*

The **Minneapolis Journal** not long ago announced a need of \$5,000 for a radio fund for the unfortunate patients of the Glenlake Tuberculosis Sanitarium. In three days over 1,000 persons voluntarily sent \$7,741 to the Journal.

\* \* \*

**A. Frederick Collins**, author of a number of scientific works and several books on wireless telegraphy, has been elected a Fellow of the Royal Astronomical Society and a member of the Radio Society of Great Britain.

\* \* \*

**Dr. Samuel Wesley Stratton**, formerly Director of the Bureau of Standards at Washington, D. C., will be inaugurated as President of the Massachusetts Institute of Technology in Symphony Hall, Boston, on the morning of June 11.

\* \* \*

**Engineering extension** courses by radio may be established at Pennsylvania State College. The engineering extension department, Dean Sackett is quoted as saying, already reaches 9,000 industrial employees each year, with class and home study courses.

\* \* \*

**Georges De Launay**, a well-known pianist and conductor of the Paris Orchestra, recently made a formal protest against the installation of a wireless telephone transmitter in the concert hall where he was to play and refused to begin the concert if it was used.

\* \* \*

**Guynemer Post** of the American Legion, of New York, composed of veterans of the air and radio services, claims to have been the first post to broadcast its meeting announcements by radio. This was done in 1919 before there were any commercial broadcasting stations.

\* \* \*

The **naval radio** station established at Cape May, N. J., during the war has been dismantled and the equipment will be installed at Lewes, Del. The naval radio compass station at Cape May will remain there, but hereafter all naval vessels will flash their radios to the new station.

**Radio signals** are believed by some scientists to travel forever in the infinite. If this is true, the signals made in Marconi's original experiments are still on their way following those generated earlier by Tesla and others.

\* \* \*

**Wireless broadcasting** of religious services should be confined to week-days so that Sunday may be left for public worship, according to an address delivered at Minneapolis, Minn., by the Rev. Phillips E. Osgood, rector of St. Mark's Protestant Episcopal Church.

\* \* \*

**Harris J. Ryan**, professor of electrical engineering at Stanford University, California, was elected president of the American Institute of Electrical Engineers at the recent annual business meeting held in New York City. The total membership of the institute on April 30 was 15,298.

\* \* \*

**Kurt Hildeheimer** informs RADIO WORLD that a few weeks ago the first German amateur radio club was organized in Berlin. It will devote its energies to popularizing radio. The address is Deutsche Radio Club, Berlin C2, An der Stechbahn 1, Germany. Mr. Hildeheimer writes: "Let us hope that the international science of broadcasting will help overcome some of the artificial barriers between the world's nations."

\* \* \*

**Edward J. Nally**, managing director of International Relations for the Radio Corporation of America, returned last week from a trip to South America and reported that the construction of the huge wireless sending station a few miles south of Buenos Aires will place South America in touch with the entire world. He said that the new station would be completed in August and other stations would then be constructed at Rio de Janeiro and Pernambuco.

\* \* \*

The **Eiffel Tower** wireless transmitting station in Paris was put out of commission by lightning one day recently, when a bolt struck the antennae, 1,000 feet above ground, and the entire apparatus crashed to earth. While rush repairs were being made the station was silent and thousands of radio fans missed their daily broadcasting program and evening concert as well as the time signal which is given every noon. Another wireless station near Tours substituted part of the time for the Eiffel Tower station.

## Schedule of Standard Wave Length Tests from Station 1XM

**STATION 1XM**, at the Massachusetts Institute of Technology, Cambridge, Mass., will broadcast standard wave length test signals at the hours and dates enumerated in the schedule below. The time used is Eastern daylight saving time. Eastern amateurs and station operators are thus afforded an unusual opportunity to calibrate their wave meters and sets.

The schedule follows:

Time P. M.	Wave Lengths in Meters	
	June 4	June 11
7 00	220	380
7 05	210	360
7 10	200	340
7 15	190	320
7 20	180	300
7 25	170	280
7 30	160	260
7 35	150	240
7 40	140	220

Time P. M.	Wave Lengths in Meters	
	June 4	June 11
7 45	130	...
7 50	120	...
7 55	110	...
10 00	...	110
10 05	...	100
10 10	...	90
10 15	...	80
10 20	...	70
10 25	...	60
10 30	...	50
10 35	...	40

During the first minute of each five the wave will be announced in code. During the next two minutes the wave will be indicated by dashes corresponding to the figures; that is, 320 meters will be indicated by three dashes, two dashes and one long dash; 380 will be indicated by three dashes, eight dashes, and one long dash, and so on down the scale.

# Directions for Building a Portable Loop for Summer Portage

By Arthur G. Shirt

GOING camping this summer? Canoeing? Or cruising up the coast to Maine or down it to Miami? Going to take a radio along? If so, you'll need a portable antenna that will fold up like an army cot, that will fit under your arm, across your back, in your canoe and that, when unfolded, will bring in the broadcasters from seven states, with the minimum of interference and atmospheric. You'll need something that, notwithstanding its collapsible nature, is strong and sturdy, so that it will stand the rough usage of the camp and country. A loop, for instance, designed especially for vacation use by an expert in loop construction—one that you can make yourself, that doesn't cost a fortune to build, and so on.

boats, whose unsteady veerings would otherwise interfere with continuous reception.

Making a loop is not as easy as it looks. Amateurs who have tried it know the unstable botch that results when certain vulnerable spots in frame construction have been neglected. The particular difficulties in making a portable loop are first of all, to make it a practical asset to the receiving set and not an irritable annoyance; then to make it so that its component parts fit as well when spread out for reception as they do when folded for portage. If the plans given herewith are followed reasonably close, the above-mentioned difficulties will be smoothed out with no trouble at all.

Procure a strip of light wood  $\frac{3}{4}$ -inch thick,  $1\frac{1}{2}$

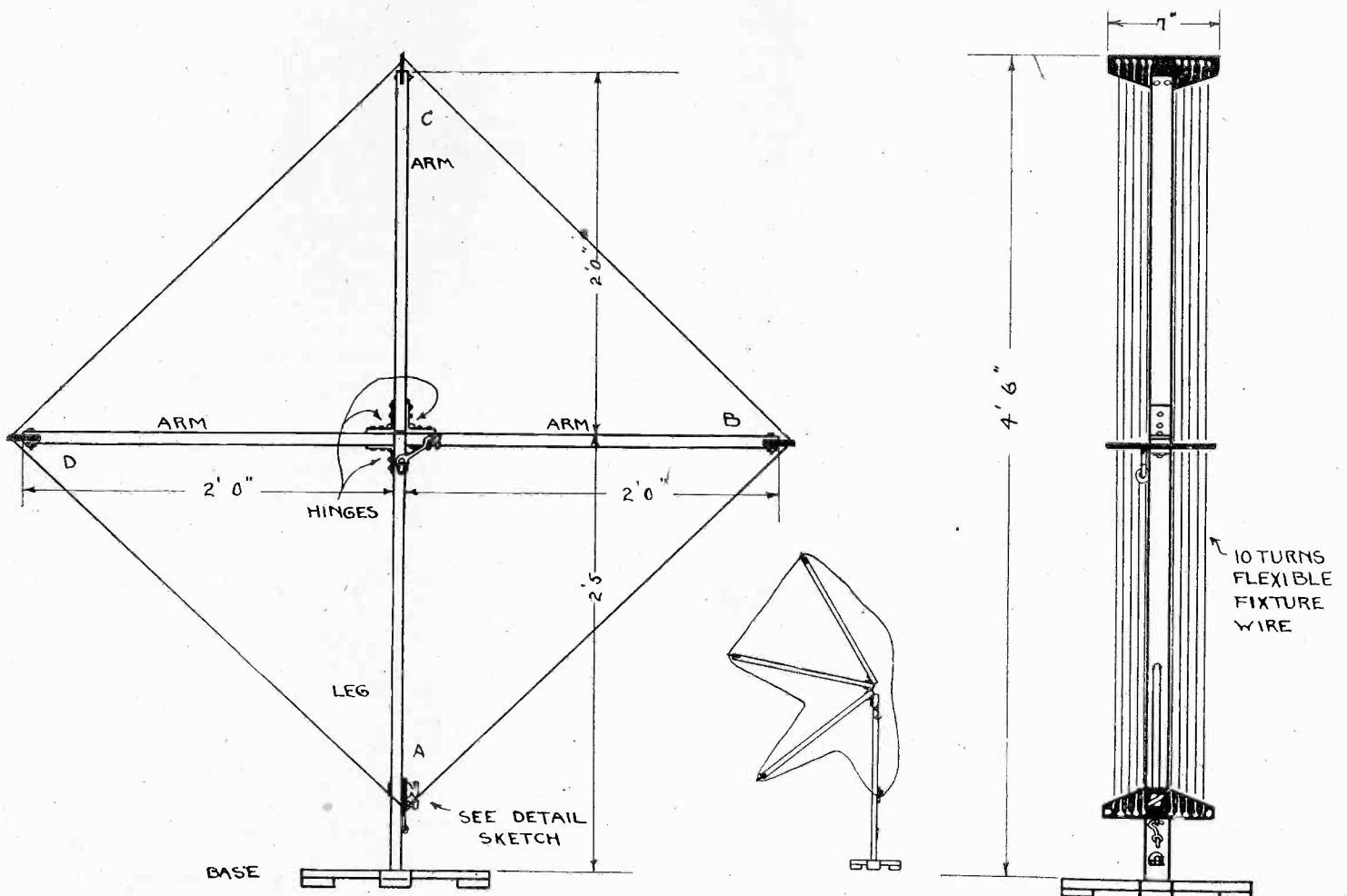


Fig. 1—The assembly of the collapsible loop. It has ten turns of No. 18 flexible fixture wire and folds in the manner shown in the smaller sketch.

Well, here it is. The folding loop antenna described and illustrated in this article is just what you are looking for. When closed, it fits neatly into a canvas bag, and can be carried on canoe and hiking trips with no trouble at all. When open for business, it is in no way inferior to an outside aerial; in fact, if the set with which it is used is a single tube super-regenerator, or a single or multitube reflex circuit, it is actually preferable. When used in a circuit which employs a variable condenser to control the wave length, it is suitable for broadcast reception over the entire range of wave lengths now allocated to broadcast work. It is directional, of course, but not extremely so, and this loose characteristic makes it ideal for small pleasure

inches wide and nine feet long. White wood is recommended, but if this is not obtainable, any soft and not too heavy wood will do. Soft wood is used because of the ease with which it is worked. Saw the nine-foot strip into four pieces, one  $2\frac{1}{2}$  feet long and three others two feet long. The longest piece of wood is the leg of the loop frame, to which the base is fastened and on which the other three lengths, called arms, revolve.

Riveted to the end of each arm is a spreader made of hard rubber, fibre, or any other good insulating material. Wood will do, provided it is ash or oak; otherwise a wooden spreader is very apt to split when subjected to the strain of repeated collapses while the loop

(Continued on next page)



(Continued from preceding page)

is in use. These three spreaders are immovable. There is a sliding spreader, however, attached to the leg, and this has its peculiar use in slackening the turns whenever the loop is to be folded.

The hardware needed in constructing this portable loop consists of three suitable hinges, two hooks and eyes, a thumb screw, a number of copper rivets, six 8/32-inch brass bolts, a 1/4-inch bolt with washers and nuts, and two brass or copper plates one inch square. The use and place of all this material is apparent from a study of Fig. 1, which is an assembly view of the completed antenna, but they will be mentioned again in detail as the description progresses.

The four spreaders are all of the same dimensions, two inches wide by seven inches long. The fixed spreaders are mortised into the end of the three arms, and are fastened there by two 8/32 brass bolts. (See Fig. 2.) Ten holes are drilled in each spreader, five on each side of the frame arm. The first hole is drilled 1/2-inch from each end, and the others at 1/2-inch intervals. These holes should be large enough to take the wire used in winding the loop, which in this case is No. 18 flexible fixture wire, braid insulated.

The details of the movable spreader are given in Fig. 3. Like the fixed spreaders, it has ten holes spaced 1/2-inch apart, and in addition, two others to take the two binding posts needed. On its lower edge it has a small eyebolt by which it can be hooked down into place. The slot in which the spreader slides up and down is 3/8 of an inch wide, and is cut in the wide face of the leg from just above the hook to a point 14 inches high. A thumb screw guides the motion of the spreader in this slot and also tightens it wherever needed.

The leg is fastened to the base by a 1/4-inch bolt inserted up through the base and into the end of the leg. A hole is drilled and its lower half flattened out, so as to permit a wrench grip on the nut while tightening up. The base itself is merely two strips of wood dovetailed at the center and fitted with blocks two inches square at the ends.

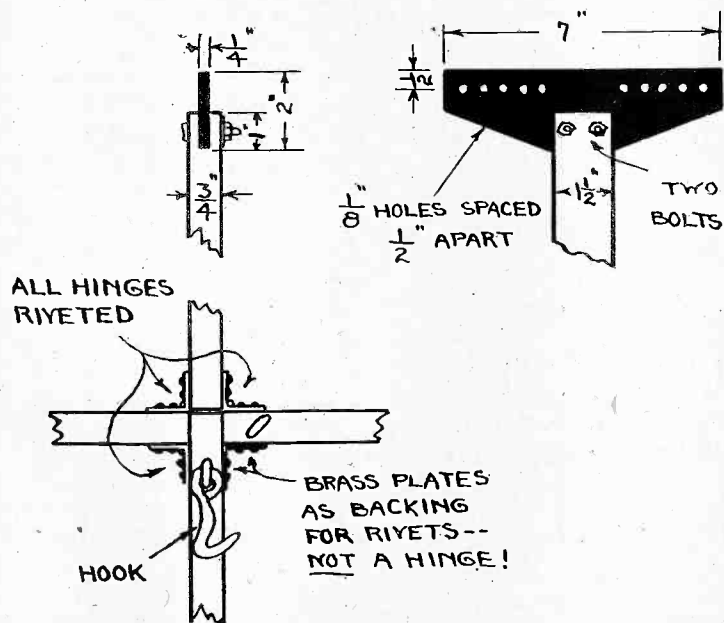


Fig. 2—Details of the center arrangement of hinges which allow the folding of the arms.

When the leg and arms are ready for assembly, hinge them together at the center as shown in Fig. 2. This is the most important detail of the whole job, for most of the loop's sturdiness depends upon the thoroughness with which the center arrangement of three hinges and one hook is carried out. The hinges should be riveted and not screwed to the ends of the arms. Where there

is no metallic backing for the rivets, supply the brass plates as shown. The leg should project beyond so that its end is on a level with the upper sides of the cross arms. This allows the leg to act as a check upon the hinges. The hook is to hold the three arms in place after they are spread out.

The loop is wound with 10 turns of No. 18 insulated fixture wire. Fixture wire is flexible and therefore is readily adaptable to the needs of a folding loop. To wind properly, unhook the movable spreader from its final position and make it fast about one inch above that position. Take one end of the fixture wire through the first hole, connect that end to a binding post and wind the other around the loop, taking the entire amount of wire through each hole in turn. This takes some time and patience, but when finished, has its advantages, especially in this case, where the collapsible

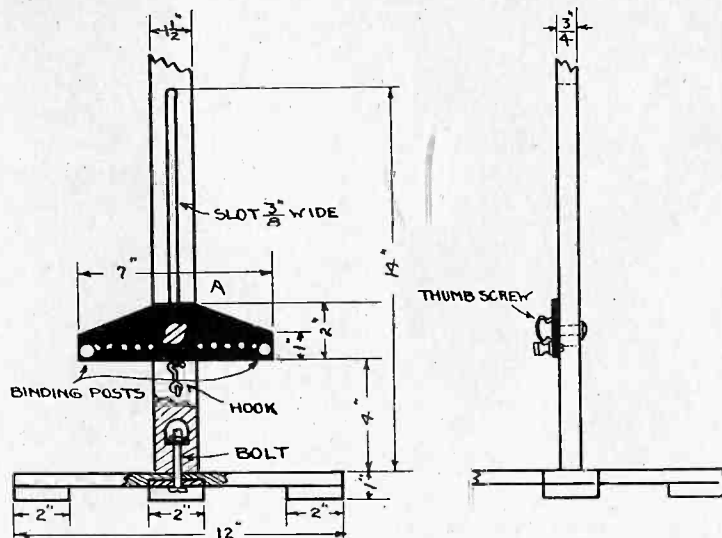


Fig. 3—Lower frame leg which is drilled to take the bolt fastening to the base. It is slotted so that the spreader can be moved up and down as required.

feature is so important. Connect the end of the last turn to the second binding post, and as you force the movable spreader to its hook again, you take all the slack out of the turns and the result is a very neat and attractive solenoid loop.

At this stage of the construction, try to fold up the antenna, and you will discover at once the reason why the lower spreader is movable. The turns must be slackened up considerably before arm B will swing alongside arm C, and this slackening is done by raising the movable spreader. The loop is folded as indicated in the small sketch in Fig. 1, and a leather strap is put around the four lengths to keep them together.

The particular loop described is somewhat of an antenna. It stands 4 1/2 feet high and takes 120 feet of wire. With it, a single tube set can be operated satisfactorily for local and moderately distant work, but if the amateur is thinking of taking along a three or four tube set, either standard or special circuit, the loop can be cut down to half the size. In such case, of course, the features of the construction would be in no way altered.

## The Radio Wise Man

THERE is a man in our town and he is wondrous wise;  
 He sits before a knobby box and pulls music from the skies;  
 He fools around with wires and tubes and other funny things,  
 And when he gets quite through with it—dad blame it all, it sings!

# A Fine Portable One Tube Reflex Set

By W. S. Thompson, E. E.

WHEN spring arrives and summer is near at hand, there are always some "old-timers" who advise the radio fan to put aside his receiver until the cold weather again puts in an appearance. This advice, although well meant in the majority of cases, leaves a wrong impression with the inexperienced. Reception during the summer is not equal to that during the winter but there is no reason for setting aside the pleasure of tuning in stations just because the atmosphere is not absolutely clear of noises. In fact, the writer believes, the summer is the time to get the greatest pleasure out of radio. Imagine yourself floating along in a canoe and carrying with you a complete receiving set to supply music suitable for the occasion. And again, it is in the summer that we usually lack amusement in the form of plays, opera, etc., for their season is in the winter. In the summer one goes on a vacation back on the farm, to the mountains or to some other place which usually does not have very many facilities for amusement during the

wonderful reception over long distances. Due to these fine qualities the writer has incorporated it into a very convenient outfit which ought to enable any experimenter to have music wherever he goes. Fig. 1 shows the wiring diagram for this portable set connected to a loop. The parts are lettered and are as follows: C—Three mica condensers 0.002 mfd.; C1—Variable air condenser 0.0005 mfd.; R1—Filament rheostat; R2—Potentiometer 400 ohms; J—Jack for phones; D—Crystal detector (synthetic); A-B—Batteries.

The potentiometer should be non-inductive such as the carbon pile type which is on the market. A wire potentiometer usually has its turns wound in the form of a coil so that any adjustment will change the inductance of any circuit in which it is connected. This is undesirable because it requires a readjustment of the tuning control. The purpose of the potentiometer is to suppress oscillations. After a station has been tuned in the potentiometer is adjusted much the same as the tickler coil of the regenerative receivers; that is, until the signal strength is maximum without distortion.

The crystal detector D is specified synthetic because there are some crystals sold today which are sensitive all over their surface so that there is no necessity for critical adjustments trying to find a sensitive spot. Due to this fact a permanent setting can be made and not be again touched for quite a while, depending upon the care with which the set is handled. The parts of the circuit marked A and G should be connected to a jack so that the loop may have its leads connected to the set by plugging in this jack. By this means attaching the loop may be made very convenient and allows for connecting an antenna and a ground to the circuit. If an antenna is handy or if the builder puts one up, it can be plugged in the same as the loop, providing a separate inductance has been hooked in series. This inductance may be a honeycomb coil, a variometer or any form of inductance. A honeycomb coil can very easily be carried in the case for there is ample room for one or two.

Fig. 2 shows the front view of the set when the hinged cover is open. The casing can very easily be made by anyone handy with carpenter's tools for the joints do not have to be dovetailed nor does the set have to look pretty. If care is taken to sandpaper well before varnishing, the casing will give a neat appearance, even though it is not made by a cabinet maker. As will be noted from the dimensions given, the wood specified throughout is  $\frac{1}{4}$ -inch thick, so the dimensions to the cabinet by two small inexpensive brass hinges which can be purchased at any hardware store. Inside this cover is a handy place for maps and other papers the vacationer may carry. Ample space has been allowed for four small size B batteries, although this number is not absolutely necessary. By cutting the number down to two or three, a couple of honeycomb coils may be carried in order to increase the wave length range of the set, although, as it stands, all the broadcasters may be tuned in. The phones may be carried in a space provided for them so that every item necessary for reception can go with the set.

Fig. 3 is a top view of the set, giving some idea of the arrangement of the parts back of the panel. The parts are all lettered to correspond to the lettering of Fig. 1, making it difficult to go wrong in the wiring.

(Continued on next page)

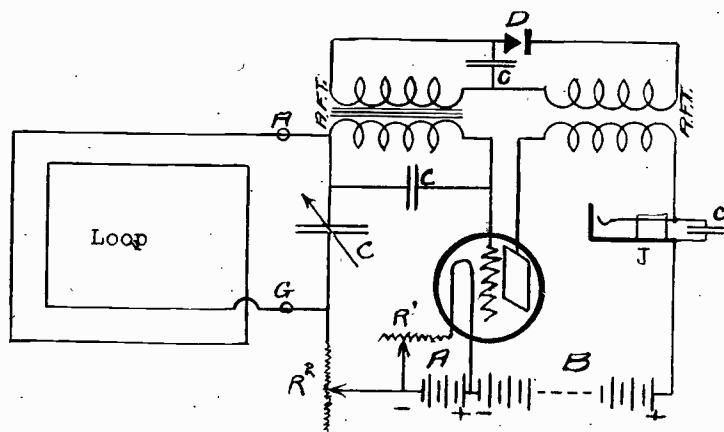


Fig. 1. Single tube reflex circuit used in the compact receiver. With a sensitive crystal detector this circuit is equivalent to a three tube set.

evenings. Then it is that the radio set comes into its own.

For summer reception there are several pointers regarding antennae to be kept in mind if the best reception is desired. Atmospheric are, of course, the biggest obstacle to overcome, but if one uses a loop or a short, low antenna such as can be put up in a half-hour or so, reception can be made remarkably clear. For an antenna a single wire 50 feet long stretched from the top of a tree to one's camp or house will serve remarkably well. A loop, such as described herein, can also be used and carried about with very little difficulty.

A few years ago when dry cell tubes could not be obtained, the vacationer usually left his radio set behind unless he owned a truck to take the necessary storage battery and plate batteries with him. However, today there are several tubes on the market which require only one dry cell for filament lighting so there is no reason for leaving a receiver behind because a storage battery is unhandy. The dry cell tubes are very efficient detectors and amplifiers, and can be depended upon to give just as fine reception as the larger tubes, so any one contemplating building the set described below may feel sure that he will have a really fine one tube portable receiver.

One of the most popular circuits which has recently been called to the attention of the public is the one tube reflex. This is a remarkable circuit and gives

(Concluded from preceding page)

In constructing the set a hinged door should be made over the tube socket to allow replacing of burnt out tubes or an adjustment of the detector D. This door may be just large enough to allow the hand to go in, but the whole top may be hinged if so desired. In any event, a catch of some kind will have to be made to keep this door shut. A hook which fastens over a small brass screw will do very well for both this door and for the hinged cover. The condensers C are held in place by the wiring so that no special mounting is necessary. When building the set the panel and the partition below it should be left out until the last of the assembly. The partition acts as the base for the apparatus so that all the wiring and assembling can be done on the panel and the base before placing in the casing. After the assembling has been done, the panel and the base should be put into place and fastened there with brass screws. All the joints of the case should be made using brass screws, thus making a very neat appearing job.

Fig. 4 shows a loop which may be carried with the set for it can be folded up and removed from the base. No dimensions are given on the drawing for they will depend upon the size loop the builder wishes to make. The square formed by the wires should not be less than eighteen inches for good reception and not more than thirty-six inches for good portability. A very convenient and efficient loop may be made by having the cross pieces eighteen and nineteen inches long, the longer one being vertical. The cross pieces may be made from one-half inch by one-half inch wood, being sure that it is hard and well seasoned. The bottom of the vertical piece should be rounded and fitted snugly into a hole in the base, allowing the removal of the base at any time. A good base may be made from a piece of wood seven inches square by one inch thick;

When the parts of the loop are finished, they should be assembled and the wire wound in the slots, fastening each end to the bottom of the vertical cross piece. These two leads may then be attached to a telephone cord and the cord to the plug which goes into the loop jack of the set. To carry the loop all that is necessary is to remove the bolt at the center, spring the two cross pieces apart and then turn them until they are parallel, making a convenient bundle. During this turning process, the wires are very liable to come loose

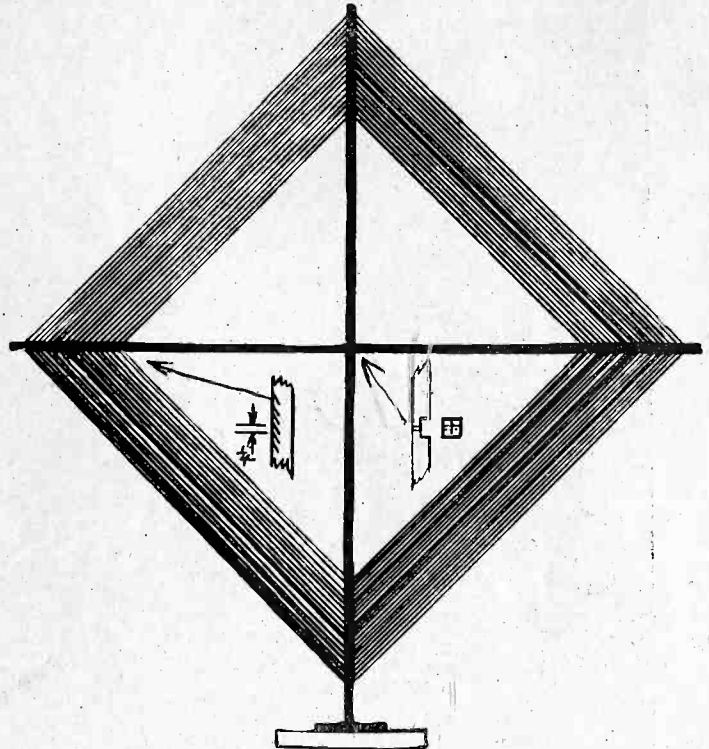
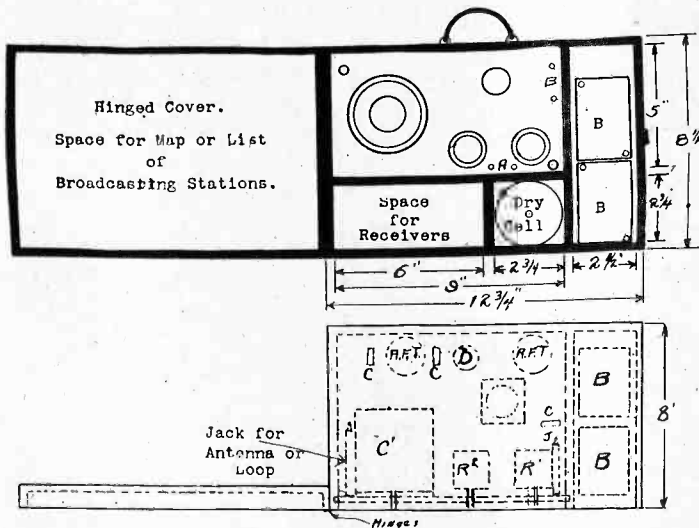


Fig. 4. Collapsible loop used with the portable receiver.



Figs. 2 and 3. Side and top views of the portable set showing the placing of all apparatus. A set similar to this can easily be taken anywhere you go, as it is self-contained.

from the slots so a thin piece of insulating material should be fastened over them, preventing any wires from slipping out. Precaution must be taken to prevent the wires from tangling up and kinking. If a stranded cable is used, this difficulty is avoided because the wires may be tied firmly to the rods without danger of permanent kinks.

With this set one may have entertainment this summer, no matter where one may be, and it is the hope of the writer that nobody will find it too much trouble to build.

**Get the  
BASEBALL SCORES ALL SUMMER  
Take a Radio Set along with you.**

### Coming! New List of Broadcasters!

While the Department of Commerce has assigned wave lengths for each of the broadcasting zones established by the recent Second National Radio Conference, individual assignments of station wave lengths have not been completed. They are being allocated as rapidly as possible and as soon as finished **A COMPLETE, UP-TO-DATE LIST OF BROADCASTERS** will be published by **RADIO WORLD**.

The allocation of wave lengths for new groups of stations appears in this issue of **RADIO WORLD**.

drilling a one-half inch hole in the center for the loop standard. At the point where the two cross pieces intersect, each should be sawed half way through one-half inch apart, as shown in Fig. 4. This allows the two pieces to cross and still have their sides flush. They should be held together with a small brass bolt with a wing nut. The wires are held in slots cut at the ends of each cross piece one-fourth inch apart and slanting towards the center. As shown in Fig. 4, the slots should be cut just deep enough so that there is no chance of the wires coming loose when the loop is in use. For the size loop specified, eighteen turns of wire will allow the set to tune in all broadcasting stations except some of those operated by the government.



# Radio Completes the Pleas

Captions by R



(Photos Copyrighted by Fotograms, N. Y.; Kadel & Herbert; Underwood & Underwood; Wide World Photos.)

No. 1. The vacation radio spirit in London. This young radio enthusiast, leaving London for the season, determined to take his set along and get ZLO all summer. Atta boy!

No. 2. When you take wife fishing, carry along your radio set. This will give you a chance to catch some fish and keep wife busy.

No. 3. What could be sweeter than sitting on the lawn in a nice comfy chair and bathing suit listening to WJY play some good jazz like this young lady is doing?

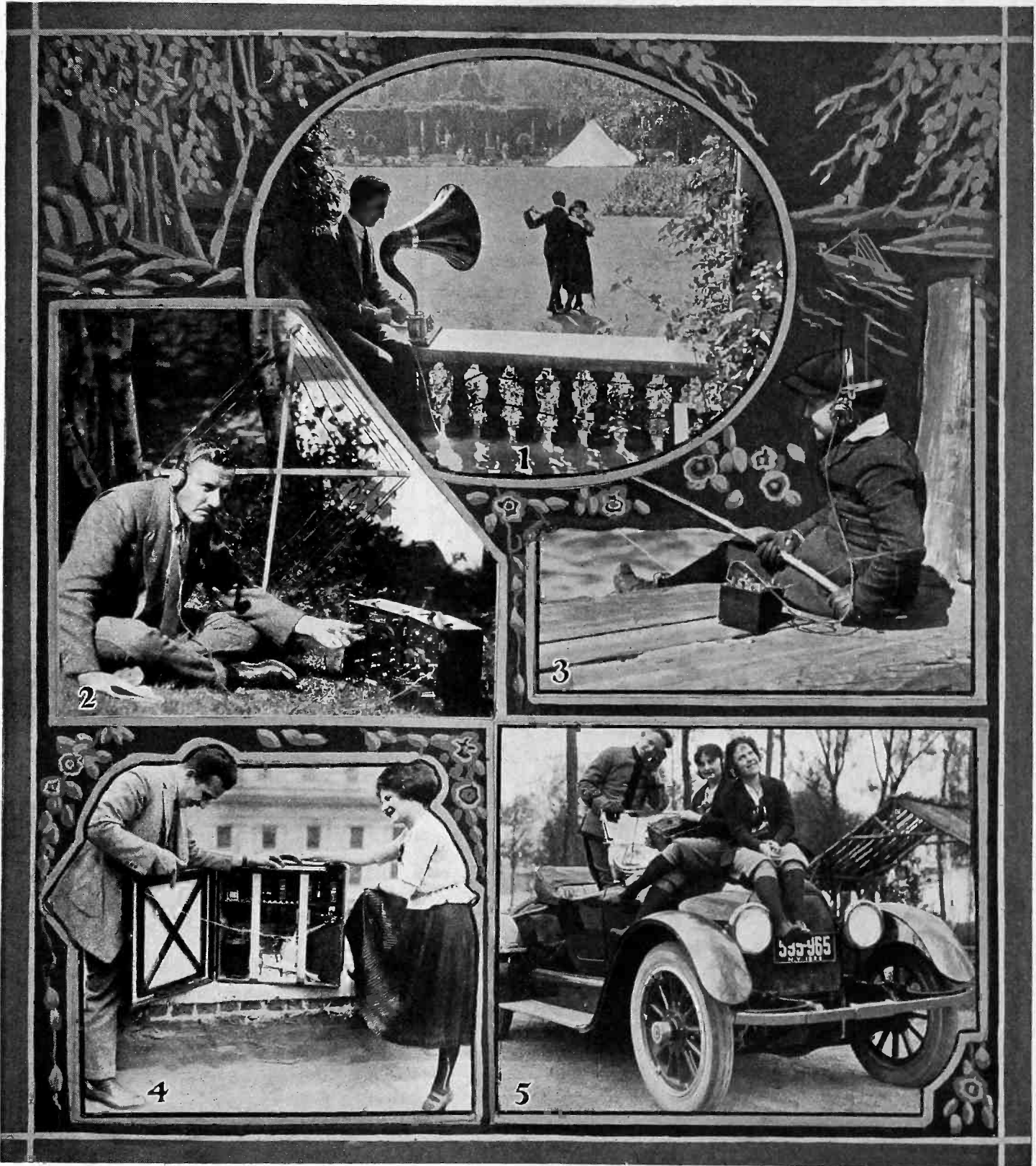
No. 4. Doesn't this make you hungry for the beach? When you go, take along your set and give the girls something to listen to besides "What Are the Wild Waves Saying?"

No. 5. While hubby goes for gas, you can be listening in, if you prevail upon him to install a nice loop set like this one has done. It doesn't take up space, and think of the comfort.

No. 6. Sometimes the fish don't feel like nibbling, so you have to wait. While waiting why not listen to some good radio concert?

# ures of the Great Outdoors

ort L. Dougherty



(Photos Copyrighted by Wide World Photos; Kadel & Herbert; Fotograms, N. Y.; Westinghouse Elec. & Mfg. Co.)

No. 1. Take along your set and be assured of your favorite dance orchestra, whether it be Isham Jones, or Vaughn de Leath's Original Radio Boys.

No. 2. Camping in the Maine Woods with radio. Plenty of chance to use it up there, especially when you like to get an advance slant on the weather.

No. 3. Here's one fisherman who isn't going to be bored waiting for bites. A wire strung around the dock serves as an antenna, while a tin can on a wire is a good ground. Try that on your patience.

No. 4. Just ready for the trip—all equipped with their suitcase loop set, which is self-contained. It has three bulbs, too, and make believe they won't get distance way up in the mountains!

No. 5. If you are only going week-ending with the old bus, take your radio and enjoy the woods to the tune of Chopin's Etude in E minor. It's also a great help when a shoe goes—especially for the women, because waiting is so tiresome.



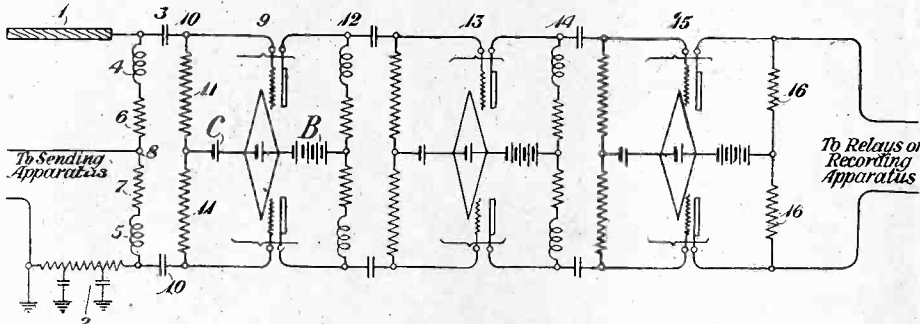
# Latest Radio Patents

## Receiving Circuits for Weak Signal Currents

No. 1,450,969: Patented April 10, 1923. Patentee: John R. Carson, New York City.

This invention relates to signal transmitting systems and is concerned especially with the receiving end of transmission lines in which there is a considerable amount of distortion and attenuation,

the original form of the current impulses though adding to the attenuation, and then to amplify the faint but corrected impulses by an amplifier of the thermionic type in which large amplification, without substantial distortion, can be secured. It has also been proposed to connect



John R. Carson's method of boosting weak currents in retransmitting signals.

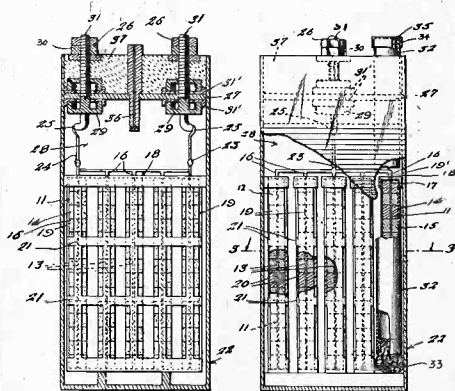
as in long submarine cables. It is well known that in signaling over lines of the character mentioned, the speed is very limited because of the characteristics of the line and many efforts have been made to overcome this difficulty. It has recently been proposed to combine with circuits of this sort correcting networks which restore, to a considerable extent,

correcting networks and amplifiers alternately in the circuit so that both the correcting and amplifying are done in successive stages. By this means improved results are obtainable. It is the object of the present invention to provide an efficient circuit of this type suitable for duplex operation. The principle involved can be applied to radio or line work.

## Storage Battery

No. 1,451,347: Patented April 10, 1923. Patentee: William H. Thorpe, Mount Vernon, N. Y.

This invention relates to small storage batteries and its object is to provide a comparatively inexpensive storage battery suitable for delivering small current outputs, but having a large ampere-hour capacity for a given weight of active material, a minimum amount of local action and a reasonable length of life, that is,



Battery delivering small current out-put but having large ampere-hour capacity.

cycles of charge and discharge, and a minimum amount of deterioration while standing idle. Also included in this invention is an improved method of filling the battery with water or electrolyte and an improved method for the prevention of terminal corrosion.

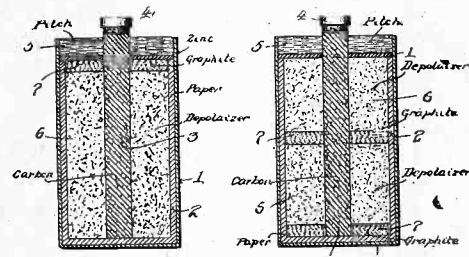
I have herein described one embodiment of my invention which is the best of which I am at present advised, but this embodiment is used in an illustrative sense and not a limiting one for obviously many embodiments can be devised which will be within the spirit and scope of the invention.

## High-Power Dry Battery

No. 1,452,230: Patented April 17, 1923. Patentee: Alfred A. Wells, Montclair, N. J.

This invention relates to dry batteries and relates especially to batteries of the Leclanche type composed of a zinc cup having a central carbon pencil or electrode surrounded by a depolarizing mass of carbon and manganese dioxide, but the invention is not wholly restricted to the particular type of battery herein described for illustrative purposes.

In the present invention it is the object to produce a battery having a high amperage or current output and also in some cases to secure a higher voltage.



New method of constructing a high power dry cell.

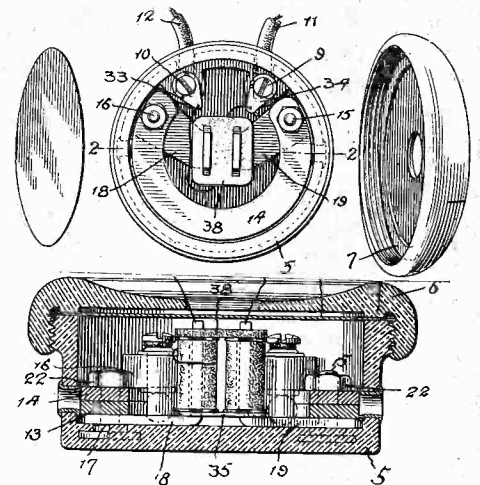
The invention as carried out in its preferred form involves the introduction into some portion of the depolarizing mass of a layer or restricted zone of graphite, carbon or similar conducting material, preferably without any manganese dioxide or other depolarizing agent present (although the latter may be introduced in case the conductivity is not materially affected). The restricted zone of conducting material, which will be herein-after referred to for illustrative purposes, simply as graphite, may be a layer thereof of one-eighth to one-fourth inch or more in thickness, preferably extending from

the carbon electrode or pencil to the paper, cloth or other insulating material present between the depolarizing mass and the zinc container. Preferably the layer of graphite is placed over the depolarizing mass and is securely tamped in place, but it is also possible to have such layer in the middle or at the bottom, or elsewhere, in the depolarizing mass. Delaminated graphite is especially useful for the purpose and although of a bulky character, on pressure it packs to a dense mass, appearing almost like a solid block of graphite, and this material fills in compactly around the carbon pencil, making a continuous conducting mass between the latter and the zinc electrode.

## Telephone Receiver

No. 1,452,334: Patented April 17, 1923. Patentee: Charles T. Baisley, North Edgecomb, Maine.

This invention relates to telephone receivers, and particularly to receivers of the watch-case type. The particular ob-



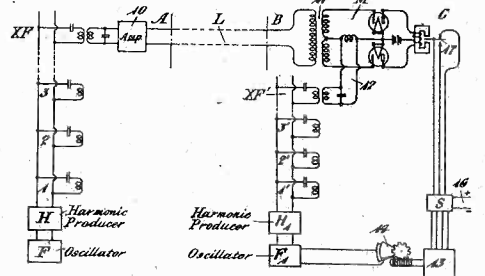
Improved method of constructing a telephone receiver.

ject of my invention is to provide a receiving magnet unit of improved construction which facilitates its manufacture and its assembly with the related elements of the receiver.

## Synchronizing System

No. 1,450,966: Patented April 10, 1923. Patentee: Herman A. Affel, Brooklyn, N. Y.

This invention relates to means for producing synchronism and isochronism between the alternating currents supplied



Means of synchronizing alternating currents independently supplied.

from independent sources. One of the features of the invention resides in the provision of means whereby the current supplied from one alternating current source may be automatically maintained at the same frequency and in the same phase relation with respect to currents supplied from another source. Another feature of the invention resides in the provision of means whereby the frequency and phase angle of a locally supplied alternating current adapted to be used in connection with the production of carrier frequencies for a multiplex system may be maintained.



THINK of your Radio receiving set as a kind of camera whose "film" is sensitive to sound waves instead of light.

Developing this "film" into real "sound pictures" is the whole art of Radio usefulness and enjoyment.

For this, no apparatus has ever been evolved which gives results equal to those produced by Magnavox Equipment.

**R2 Magnavox Radio**  
(With 18-inch horn)

This instrument is intended for those who wish the utmost in amplifying power; for clubs, hotels, dance halls, large audiences, etc. It requires only .6 of an ampere for the field. Price \$60.00

**R3 Magnavox Radio**  
(With 14-inch horn)

*As illustrated*

The ideal instrument for use in homes, offices, amateur stations, etc. Same in principle and construction as Type R2.

Price \$35.00

**Model C Magnavox Power Amplifier**

*As illustrated*

For use with the Magnavox Radio and insures getting the largest possible power input.

AC-2-C, 2-stage, \$55.00  
AC-3-C, 3-stage, \$75.00

Magnavox Reproducers and Power Amplifiers can be used with any receiving set of good quality. Without Magnavox, no receiving set is complete.



*These two devices have revolutionized Radio"*

The Magnavox Reproducer and the Magnavox Power Amplifier

THE efficiency of Magnavox Radio apparatus is best realized by comparison with other instruments constructed on less modern scientific principles.

*Magnavox products can be had of good dealers everywhere. Send for copy of unusual booklet.*

The Magnavox Co., Oakland, California  
New York: 370 Seventh Avenue

**MAGNAVOX**  
*Radio*  
*The Reproducer Supreme*

# Answers to Readers of Radio World

In RADIO WORLD for March 17 you published an article with a circuit diagram by Mr. Shideler. I have constructed the set and have tried to get it to work but without success. All that I can seem to get is a persistent hum in the receivers. This is more insistent when I hold my thumb on any of the switch points and pull the switch arm away from the contact. I am using  $16\frac{1}{2}$  to  $22\frac{1}{2}$  volts on the plate and outside of using No. 20 instead of the No. 26 wire I have made it exactly as described. What is my trouble?—Edward MacDowell, 450 N. Queen Street, Lancaster, Pa.

From your description and the fact that you get the hum even when your primary is out of the circuit, you evidently have a broken line somewhere. Go over your wiring very carefully and trace all your lines. Examine the connections on the tickler and see that everything is connected properly. This insistent hum is an indication of a break somewhere in the circuit. Find the break and you will find your trouble.

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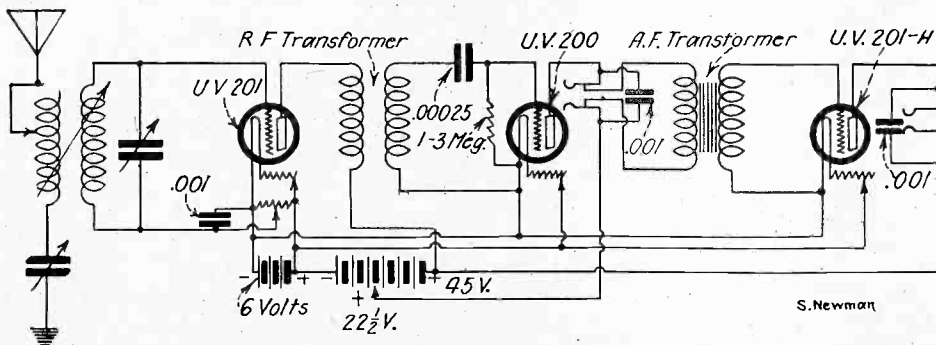
I constructed the set described in your issue of April 7, by F. J. Rumford and followed all his directions, but cannot get rid of a whistle that is very noticeable and sometimes is unbearable.

I get local stations, but there is always this steam whistle blowing in the phones. How can I remedy it?—Walter Moore, 14 S. Spring Ave., St. Louis, Mo.

Do not burn your tube so high. Cut down on the filament current. You are forcing your tube. Use a larger grid condenser (.0004 or .0005). Reverse the leads on your tickler coil. Decrease your B battery and see if that doesn't stop it. Jump the minus B across to the plus of the A instead of the minus as you have shown it in the diagram.

\*\*\*

Kindly publish a diagram for one stage of radio-frequency, detector and one stage of audio-frequency using the following apparatus: One vario-coupler, one U. V. 201A, one 200, one 201, one 1714 radio-frequency transformer, one 712 audio-frequency transformer, two vernier rheostats, one straight rheostat, one 200 ohm potentiometer, three Dubilier .001 fixed condensers,



Hook-up published in answer to a request by John Bakersmith using the apparatus called for by him. The first and second rheostats are vernier and the audio-frequency amplifier rheostat is straight control. The potentiometer can be either 200 or 400 ohms.

one 17 plate variable, three sockets, two jacks, phones and batteries. What will I be able to receive on such apparatus and the circuit you are giving me?—John Bakersmith, 3202 R. I. Ave., Mount Rainier, Ind.

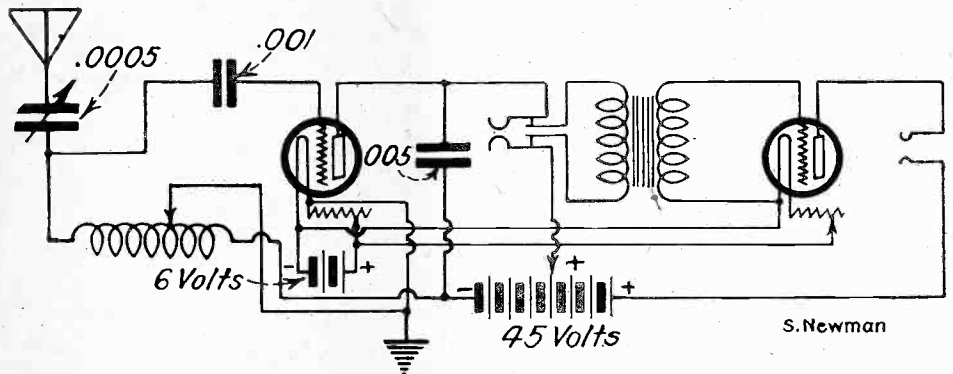
The diagram you desire is published herewith. It is impossible to state definitely the range of any receiving set, as there are too many conditions that are to be dealt with in the reception.

Kindly send me, or publish, a circuit diagram for a 10 watt CW or phone set that will give me good results.—H. G. Armstrong, La Tuque, Quebec.

We refer you to the article published in RADIO WORLD for May 26 by R. W. E. Decker on a low power two tube transmitter.

\*\*\*

Kindly give me a hook-up embodying one stage of audio-frequency with the "pup" circuit. Does the antenna condenser increase or decrease the wave length when increased from zero to full capacity?—Edw. H. Bitner, 1510 Catherine St., Harrisburg, Pa.



The "Pup" circuit with one stage of audio frequency amplification requested by E. H. Bitner. If the new U. V. 199 is used, the second tube should have a grid bias battery in the grid lead for proper operation.

The circuit you want is herewith published. As you increase the capacity you increase the wave length. When the condenser is at zero the lowest wave lengths will be responded to. When at the full capacity, the highest wave length will be responded to.

\*\*\*

I recently purchased a John Firth five-tube set—two stages of radio-frequency, detector and two of audio. There are only two rheostats controlling the five tubes. One is marked R. F. and the other Det. There is no rheostat for the audio-frequency, but the last two tubes are controlled by an independent switch. Is this correct? Should not there be some control

What are the sizes of the coils used with A. Riddel's DX hook-up published in RADIO WORLD for March 10?—J. S. McKibben, 3522 Washington Ave., St. Louis, Mo.

You can use 35, 50, 75 DL coils with this circuit using the 50 as primary, the 75 as secondary and the 35 as tickler. This will allow you to get the broadcast program if your antenna is not too long. It would be well to get a set of DL coils of the following sizes in order to enable you to experiment and find out just which suits your needs best for each particular wave. 25, 35, 50, 75, 100.

I recently constructed one of the sets described by W. S. Thompson in RADIO WORLD for March 3. I am referring to diagram No. 3 on page 4. I have had excellent results with it, but desire to put in permanently a loose coupler and antenna and ground, as I cannot get sharp enough tuning with a loop. I sometimes have two and three stations on together. I can also take the catwhisker off the crystal and hear signals. Why is this? Will I be able to use the new U. V. 199 tubes with this circuit successfully?—J. D. McGee, 214 East 11th Street, New York City.

You can incorporate the loose coupler and antenna and ground by hooking the primary up as usual and putting the secondary leads in place of the loop leads. A loop generally gives much sharper tuning than a vario-coupler or loose coupler because of its directive effects. Your set should not operate when you remove your catwhisker. You must have leakage somewhere. It often occurs in reflex sets that one of the tubes can be removed and the set will function at a very low state of efficiency, but the fact that you can get signals without your detector proves that through some channel you are using one of your tubes as a detector. Examine your leads and see that they cross at right angles, and are well insulated. Do not bunch them.

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Enclosed please find picture of a set. Kindly let me know what type of circuit it is and also just what apparatus I would need to construct it.—Edward Weick, 115 Striker Ave., Woodside, L. I.

The set shown is a straight three step radio, detector and two steps of audio-frequency. The apparatus necessary to construct it would be six tubes, six sockets, three radio-frequency transformers, two audio-frequency transformers, one grid leak and condenser, five fixed condensers (two .0005, two .001 and one .00025), necessary binding posts and batteries.

for the last two tubes?—I. F. KKrause, 350 Broadway, New York City.

There is no mistake in this circuit. It is designed to operate as either two stages of radio-frequency and detector, or radio-frequency, detector and two of audio. The fact that there is no control for each separate tube is just to simplify the controls. Because of the fact that audio-frequency is not critical, there need not be a filament control to these two tubes.

# Play These DX Nite Owl Records on Your Radio

## Get Out Your Glasses and Adding Machine

From Leland Whitelock, 408 Ninth St., Petersburg, Ind.

I HAVE seen many good records in your DX department and thought I would send in mine: KGW, about 2,500 miles; KMO, about 2,500 miles; KHJ, 1,775 miles; KFI, 1,775 miles; KOG, 1,775 miles; KWH, 1,775 miles; San Pedro, Catalina Islands, 1,780 miles; KZM, 1,335 miles; PWX, 1,325 miles; WKAQ, 1,325 miles; KDKA, WGY, WOS, WPA, WEAH, WBAK, WWJ, WAH, WDAJ, WBZ, WLAG, WJAG, KSD, WOZ, WDAF, WCAU, WCAA, WIAH, WDAF, 2XI, WLK, WHAM, WIAO, CFCE (about 1,300), WGM, KYW, WOAF, WBT, WJT, WJK, WHAS, WBAP, WMAQ, WJAX, WFO, WGAS, WHB, WOI, WOAI, WCAP, WLAT, WGR, WOH, WSX, WJZ, WOR, WOO, WAAY, WSB, WJAZ, WMAZ, WHAJ, 5ZA (about 1,500), WCX, WOC, WWI, WIP, WBAY, WLAP, WLW, WGA, WMAK, WMAV, WCK, 8YM, WOK, WCAF, WDZ, WJAP, WKAM, WLAL, WHK, WKN, WPAL, KFAF, WEAB, WBL, WHAI, WBAV, WDAO, WEA, WCAF, KLZ, 5ZY, WFAA, CFCA, NOF, 8XS, WSY, 2XB, WEA, WNA, WGF, 3JM, WAAP, WGA, WJAM, WBAH, WPA, WNA, WCA, WCAV, WMA, WAA, WDA, WNA, WIA, WCA, WDAY, WDAG, WLB, WRP, WKAS, 9ZAF, WFAT, WQAA, WOAL, WIAR, WMH, WOA, WEA, WEA, WMA, WOE, WEAS, WCA, 8XR, 5XAJ, WJAN, WNAD, WCAS, WPA, WIA, WTA, WCM, KOP, WWZ, WIZ, WMA, WAAC, WGA, 4EB, WOO, 4ET, 2XAP, WMAJ, WKY, WRW, WFA, WIA, WHAB, WAAR, WGI, WOAN, WOA, WAA, WNA, 8XH, WPG, WJAF, WVP, WAA, WOA, WHA, WRR, WDA, WTAS, KFDL, WWAY, WHA, WDAL, CFCF, WHAZ, WAA, WCA, WBA, WBAO, 8XT, WCA, KFFO, WQA, WGV, WEA, WGA, WCN, WAI, WIA, 9DMB, 9DIS, 9BYT, 9KS, CKCE, WFA, KFDB (about 2,000 miles), WABA, FGC, 9EJB, 9DLR, WPA, WDA, 9DZM.

This list of phone stations includes 211 stations in 36 States, three provinces in Canada, Cuba and Porto Rico. All these stations have been received since December.

The receiver is a home-made single-circuit set with detector only. The type C 300 detector tube was used.

Come on in, the water's fine. (This is for you other DXers.)

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## And Still They Come

From Gerald R. Duncan, Fayette, Iowa

IN response to your request for DX results, I am herewith sending mine. I am using Mays' capacity coupled circuit. I have heard fifty-eight stations since hooking it up. I heard the following in one evening, in about four hours' time:

WHAZ, WOC, WMC, WBAV, WSY, KDKA, WCAE, WBAM, WSD, WSAA, WOS, WGY, KDYS, WCAS, KFAF, WLW, WBL, WBAP, WGM, WLAG, WDAJ, WBA, KFEL, KFI, KHJ, KGW.

The limits of the set so far has been KGW, WOR, WSAV, WOAI, CHCQ, WDAJ, CFCA.

My aerial is two wires 65 feet long, thirty feet high, stretched between two trees. The only change I have made in the hook-up given by May is to put a 17-plate vernier in series with the aerial.

THE Editor of RADIO WORLD will be pleased to receive sketches of hook-ups drawn carefully in black ink or heavy pencil from the "DX Nite Owls" who send in records with a view to publishing them.

Send hook-ups of your sets, provided they contain something unusual. Send, also, the names of the various makes of apparatus you are using.

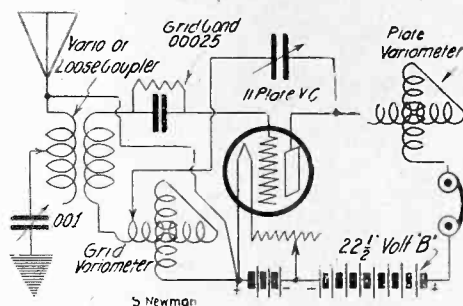
Make your letters brief and informative. Write on one side of the paper only.

The letters and hook-ups will be published in the earliest possible numbers of RADIO WORLD.

## Here's One to Try Out

From Myrle Wood, Star Route, Rhinelander, Wis.

I AM sending you a hook-up that I am using, and I am getting some remarkable results with it. With this hook-up I have heard nearly 100 stations. The most distant ones are: PWX, Havana, Cuba; WKAQ, San Juan, Porto Rico; KHJ, KFI, KDZF, Los Angeles, Cal.; KFC, Seattle, Wash.; KGW, Portland, Ore.; WPAT, El Paso, Teas; WOAI, San Antonio, Texas; WFAA, WGR, Dallas, Texas; WBAP, Fort Worth, Texas; KFAF, Denver, Colo.; WSB and WGM, Atlanta, Ga.; WDAJ, College Park, Ga.; WEA, New York City; WGY, New York.



Myrle Wood's one tube hook-up. Note the connection on the grid variometer. Tap off on the outside connection of the stator and bring it around to the plate variometer—and, "Oh, what a grand and glorious feelin'!"

WOC, WCX and WGY can be heard all over the room some nights on the one tube. The tube is a WD-11. The wire running from the aerial to the positive of the dry cell (A battery) does away with a lot of capacity effect. When connecting up the 11-plate variable condenser between the two variometers be sure that one wire from the condenser connects with the plate wire that runs to one side of the variometer and the other wire from the condenser should be connected to the side of the variometer that the secondary wire is connected to. Very fine tuning can be accomplished with this circuit, and it is very good for DX work. I have heard WLAG, Minneapolis, with no aerial and no ground and I hear WSB, Atlanta, Ga.; WJZ, Newark, N. J., and others on a loop aerial. And I have heard as far as Fort Worth, Texas, during the day. I am a steady reader of your magazine and think it is fine.

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## You'll Have to Step Some to Catch This Boy—I'll Tell It!

From Don Smith, Graford, Texas

I AM a six months' crystal fan. My set consists of one two-slider tuner, crystal detector, and one pair 3,000-ohm phones. My aerial is a single wire 100 ft. long and 30 ft. high. I have a total of 23 stations,

the farthest being KHJ at Los Angeles, a distance of 1,250 miles, which I believe is not bad for a crystal. My single night record is 11 stations: WMC, Memphis, Tenn.; WOS, Jefferson City, Mo.; WCAI, San Antonio, Tex.; WEAY, Houston, Tex.; WMAB, Oklahoma City; WHAN, Wichita, Kan.; KSD, St. Louis, Mo.; WHA, Madison, Wis.; WFAA, Dallas, Tex.; WDAO, Dallas, Tex.; WPA, Fort Worth, Tex.

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## Another Nice Record

From C. C. Barber, Villa Alta, Colonial Heights, Yonkers, N. Y.

BEING particularly interested in your DX page I thought I would send in my record and would be greatly pleased if you would publish it. The hook-up that I am using is a modified Colpitts with variometer tuner and a WD-11 tube. I have picked up Chicago and Atlanta on an aerial around the molding of my room.

The following is a list of the stations: WJZ, WOR, WAAM, WBS, WBAN, WEA, WHN, WRW, WGY, WHAZ, WBZ, WGI, WIP, WDA, WOO, WCAE, KDKA, WBT, WMC, WNAV, KSD, WOS, WOC, WDAF, WAAZ, WPA, WJAZ, KYW, WLAG, WWJ, CKCE, CHYC, CKAC, WLK, WLAK, WGR, WFI, WIZ, WBA, WSB, WBAY, WFA, and four amateur stations.

## Another Golfer in the Rough

From C. L. Hobart Company, Grants Pass, Oregon

HAVING read in the radio journals of "Radio Golf" and on March 20th, as atmospheric conditions were favorable, decided to try it with the following results:

Station	Location	Miles away
BEI	Camp Lewis, Wash.	375
KSD	St. Louis, Mo.	1,825
KDYL	Salt Lake City	600
KOY	Portland, Ore.	250
KFI	Los Angeles	700
WHB	Kansas City	1,600
KHJ	Los Angeles	700
	Catalina Telephone	700
KZR	Bellingham, Wash.	450
KFAU	Boise Idaho	365
KFCF	Walla Walla, Wash.	365
KNT	Aberdeen, Wash.	325
WBAP	Fort Worth, Texas	1,600
WCX	Detroit, Mich.	2,125
WOAI	San Antonio, Texas	1,725
CHBC	Calgary, Canada	800
KFFO	Hillsboro, Oreg.	240
KWG	Stockton, Calif.	350
KMJ	Fresno, Calif.	500
		19 stations. 15,595 total mileage.

Two hours and ten minutes, nineteen stations, with a total of 15,595 miles, from three points of the compass. Used a modified Flewelling "flivver" circuit with one peanut tube.

## These One-Tube Babies Get 'Em!

From W. F. Gray, 5145 Terry Ave., St. Louis, Mo.

HAVING read the DX records in your magazine for some time I thought I would give you my list of stations.

These stations have been heard from January 1, 1923, to March 17. They are as follows: PWX, KHJ, KFI, WOAI, WFAA, WBAP, WCAR, WQAA, WIP, KDKA, WWZ, WGY, WCX, WWJ, WBAD, WLAG, WHA, WFAC, WBT, WGM, WSB, WDAJ, WDAF, WMAQ, KYW, WBL, WAAP, WOC, WHB, WDAF, WHAH, WOS, WOAL, KZL, KFDL, WOR, WLW, WNAV, WMC, WHAS. Local—KSD, WCK, WRAO, WMAY.

The hook-up is a one-tube set, homemade.



"When you come right down to it a profitable business is principally dependent upon two things—a salable article of quality, and advertising."—William Wrigley, Jr.

# Radio Merchandising

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

Telephone Bryant 4796

## Radio Literature Wanted

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

- Frank Ameel, Jr., 88 Grand Ave., Mt. Clemens, Mich.  
 Ray McCarthy, 111 Cass Ave., Mt. Clemens, Mich.  
 Bud Prevost, 368 Cass Ave., Mt. Clemens, Mich.  
 Howard Smith, 982 State St., Appleton, Wis.  
 Radio Shop, 1070 Elizabeth Ave., Elizabeth, N. J. (Retailers and distributors.)  
 A. R. Reimsnyder, Dorsey, Md.  
 Jas. H. L. Jewell, 76 Livingston Ave., Albany, N. Y. (Retailer)  
 K. D. Miller, Johnstown, N. Y.  
 H. L. Conrath, 355 North Craig St., Pittsburgh, Pa. (Wants a three tube receiver.)  
 Frank J. Franzreb, 132 Van Duzer St., Tompkinsville, S. I., N. Y.  
 John Vaughney, Sr., St. Marks Place, Tompkinsville, S. I., N. Y.  
 Chas. Enderes, 660 Bay St., Stapleton, S. I., N. Y.  
 Stephen Storey, 2221 Fairfield Ave., Fort Wayne, Ind.  
 W. B. Powell, Eustis, Fla.  
 Arthur O. Halley, 53 Thorndike St., Arlington Mass.  
 Herbert W. Jones, 85 Draper St., Dorchester, Mass.  
 Chas. Fisher, Box 492, Mitchell, Neb.  
 M. J. Geer, Box 62, Sabetha, Kan.  
 Harold Kutzeley, 11 Twelfth St., Toledo, O.  
 Salamanca Electric Co., Inc., 12 Main St., Salamanca, N. Y. (Retailer.)  
 Chas. W. Gray, Brisben, N. Y. (Retailer.)  
 Chas. G. Rose, Post Office, Lorain, O.  
 John Orsznlak, 183 Goodyear Ave., Buffalo, N. Y.  
 Elmer Zimdors, 1060 Richards St., Milwaukee, Wis.  
 A. B. Watson, 2760 Cherry St., Kansas City, Mo.  
 Carolina Radio Co., 306 N. Tryon St., Charlotte, N. C. (Manufacturers, distributors and jobbers.)  
 Fred D. Alexander, P. O. Box 593, Pikesville, Ky. (Will open at once a radio and small specialties shop in Dayton, O.)  
 H. G. Bradford, 95 Hansel St., Atlanta, Ga.  
 William D. Snow, 303 Sherburne Ave., St. Paul, Minn.  
 George Slocomb, Engineering Dept., Southern California Edison Co., Los Angeles, Calif.  
 John F. McKiernan, 76 West St., New Haven, Conn.  
 Percy W. Shepard, New Albany, Pa.  
 Howard W. Root, Derby Line, Vt. (Will stock a line of radio supplies.)  
 A. G. Walden, Tech. Sgt., Q. M. C., Fort McPherson, Ga.  
 Dr. Frank Lamb Willson, 815 Hill St., Suite 704, Los Angeles, Calif.  
 E. Eddy, 213 Grant Ave., Millvale, Pa.  
 Edward L. Fitzgerald, Hebron, Neb. (Intends to sell sets and parts.)  
 William O. Wulffe, Walcott Lathe Co., Jackson, Mich. (Is building sets for sale.)  
 Luman Long, 1003 Park Street, Rolla, Mo.  
 Thomas A. Moore, 557 Walnut Street, Elizabeth, N. J.  
 Jackson & Son, Como, Miss. (In market to buy set.)  
 T. J. Thompson, 301 West 110th Street, New York City. (Dealer.)

## Brandes Add to Factory Space

**C**BRANDES, INC., manufacturers of Brandes matched tone headsets, 237 Lafayette Street, New York City, have recently added another 5,000 square feet of floor space and a great deal of machine equipment to their assembly plant in order to handle the increase in business. Mr. Frederick Dietrich, president, states that the future seems to hold forth every prospect of a decidedly successful year.

## Son of Theatrical Attorney Wins Radio Prize

**A**BNER H. BEREZNIAK, son of Leon A. Berezniak, prominent Chicago theatrical attorney, won first prize in a Chicago radio contest last week.

Station WPAD conducted by the Wieboldt Store, Chicago, announced that they would give five prizes to the five best entries submitted in what they called a "Radio Suggestion Contest." The people listening in were to send in suggestions for a contest which WPAD could use in the near future. The entries were to also include a means for distributing twenty prizes.

Young Abner, who is 17 and an ardent radio "fan," submitted his entry for a "Musical Memory Contest." His suggestion briefly was for WPAD to broadcast for two weeks previous to the night of the contest various classical and popular pieces. The night of the contest they were to broadcast twenty of the pieces which had been played before, picking these pieces at random, and the "listeners in" were to send in the names of the pieces they believed had been broadcast.

The unique part of his idea was that the answers were to be sent in in story or poetry form. The people submitting entries were to write up the names in some form which could be broadcast and make interesting "listening."

The prize he won was an Olympian phonograph donated by a Chicago musical store. The "Musical Memory Contest" is being broadcast this week over WPAD.

## Of Interest to Dealers

**T**HE New York Coil Company announces for distribution a new receiving set at a medium price, a new inductance switch and a new vernier condenser, all of which will go into quantity production at once to supply a demand created by the company's other well known radio products. New descriptive literature has been prepared and will be mailed upon request to the New York Coil Company, 338 Pearl street, New York City.

## Radio Manufacturer Publishes His Own Music

**A**s a result of the controversy between the broadcasting stations and an association controlling the copyrights of certain musical compositions the Crosley Publishing Company, of Cincinnati, has just issued, in printed form, a copy of "Somebody Else Is Stealing My Sweetie's Kisses," which was made popular by presentation to radio audiences through broadcasting station WLW, of the Crosley Manufacturing Company, Cincinnati.

## Wants Crystal Detectors

**J**AMES A. HAMILL, Mercer and Colgate Streets, Jersey City, N. J., informs RADIO WORLD that he is in the market for a considerable number of good crystal detectors of the fixed or semi-fixed type.

## Policy Committee of the Radio Trade Association

President Henry M. Shaw, of the Radio Trade Association, 1133 Broadway, New York City, has appointed the following Committee on Policy of the association: Raymond Francis Yates, Electrical Corporation of America.

Harry M. Konwiser, *The Radio Dealer*.

H. Gernsback, *Radio News*.

Roland Burke Hennessy, RADIO WORLD.

Questions regarding the policy of the association as brought up by individual members will be discussed by this committee and transmitted to the board of Directors for final decision.

## Coming Events

**ANNUAL HOME AND CITY BEAUTIFUL EXPOSITION**, featuring radio exhibits, Atlantic City, N. J., June 16 to September 8, 1923.

**NATIONAL ELECTRIC LIGHT ASSOCIATION**, New York City, June 4-8, 1923; M. H. Aylesworth, executive manager, 29 West Thirty-ninth Street, New York.

**PACIFIC COAST ELECTRICAL ASSOCIATION**, San Francisco, Calif., June 19-22, 1923; S. H. Taylor, secretary, 527 Rialto Building, San Francisco, Calif.

## Moves to Larger Quarters

**T**HE Federal Radio Equipment Corporation, that has been located at 11 Broadway, New York City, has moved to new and larger quarters at 6 Murray Street where they have taken over an entire floor for the distribution of Pathfinder Products. Meanwhile at the laboratory, research work continues under the direction of Mr. Verner Hendrickson, (IBKA—also IXAK) who is an old time wireless amateur. It is the Pathfinder intention, at least whenever possible, to give aid and assistance to the amateur and novice whenever he has need of such for the future development of radio. When these plans are completed announcement will be made.

## A New Bradleystat

**T**HE Allen-Bradley Co., 286 Greenfield Avenue, Milwaukee, Wisconsin, have recently placed upon the market a new model of the well known Bradleystat which can be used with all detector and amplifier tubes. The new model, known as the Universal Bradleystat with three terminals, provides extremely wide control in three ranges obtainable by using the proper pair of terminal connections. By means of the new Universal Bradleystat, radio enthusiasts and radio manufacturers can use one rheostat for all tubes and enjoy the same wide range of stepless, noiseless control which the older Bradleystat models provided for a limited number of tubes. The use of scientifically treated discs enables the Allen-Bradley Co. to guarantee the Universal Bradleystat to give perfect filament control for all tubes.

## New List of Boys' and Girls' Summer Camps

**F**OLLOWING is a list of names and addresses of directors of boys' and girls' summer camps, each of whom should be a potential purchaser of radio sets for camp and vacation use. This installment completes the list.

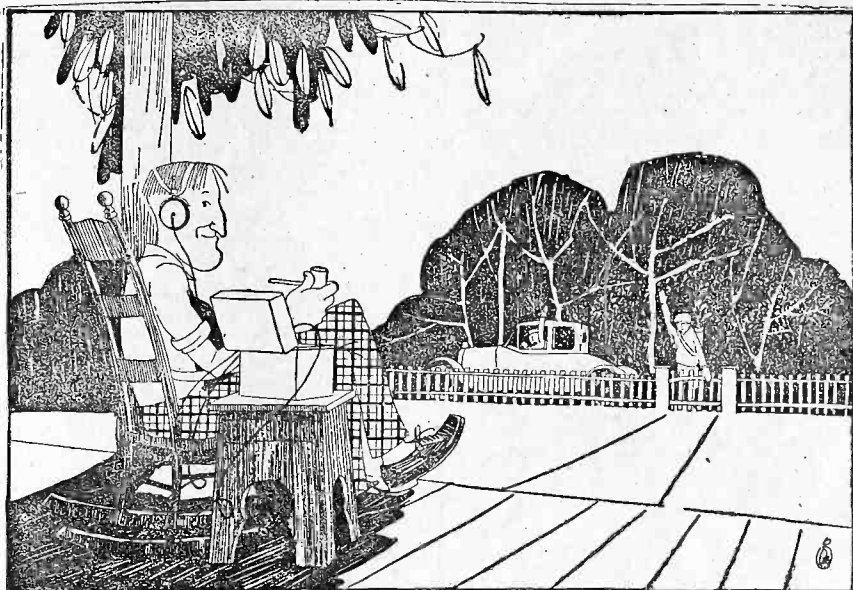
- John P. Sprague, 825 Lincoln St., Evanston, Ill.  
 F. E. Bachhuber, Minocqua, Wis.  
 Wm. F. Thorpe, Thorpe Acad., Lake Forest, Ill.  
 G. A. Roger, 700 West Euclid Ave., Detroit, Mich.  
 Lotta Broadbridge, The Palms Apt., Detroit, Mich.  
 Homer L. Thomas, 1304 29th St., N. Birmingham, Ala.  
 H. R. Crook, 5964 N. Hermitage Ave., Chicago, Ill.  
 A. O. Kelley, Soldan High School, St. Louis, Mo.  
 A. G. Whitney, Syracuse Univ., Syracuse, N. Y.  
 Roy S. Claycomb, 14 Clifford St., E. Orange, N. J.  
 E. A. Chapaan, St. Andrew's College, Toronto, Canada.  
 A. S. Gregg Clarke, Washington, Conn.  
 Edward Soles, 308 W. 93d St., New York.  
 W. L. Wise, Bordentown, N. J.  
 C. V. P. Young, Cornell Univ., Ithaca, N. Y.  
 W. L. Childs, New Trier H. S., Kenilworth, Ill.  
 J. Beach Cragun, Univ. of Chicago, Chicago, Ill.  
 A. L. Cochran, Upper Canada College, Toronto, Canada.  
 Miss Chris Marie Noble, P. O. Box 421, Santa Barbara, Cal.  
 Miss Sally Joy Leadbetter, P. O. Box 481, Santa Barbara, Calif.  
 Miss Cecilia C. Kays, 741 New Hampshire Ave., Los Angeles, Calif.  
 Miss Mollie E. Utz, 158 N. Main St., Salt Lake City, Utah.  
 Wm. B. McKingert, Berkeley, Calif.  
 Miss Portia M. Swett, (Winter) Carmel-by-Sea, Colo.  
 Mrs. Wm. E. Sargent, New Bedford, Mass.  
 Wm. H. Brown, 311 W. 83d St., New York.  
 Harry R. Dane, 548 Parkview Ave., Detroit, Mich.  
 John Linker, 175 E. 79th St., New York.  
 Elmer Huppert, M. D., 116 W. 59th St., New York.  
 Martin B. Cohn, 220 W. 98th St., New York.  
 Maj. Wm. K. Gunn, University School, Cleveland, Ohio.  
 E. C. Cook, Annandale-on-Hudson, N. Y.  
 Mr. and Mrs. C. P. Hulbert, 77 Addington Rd., Brookline, Mass.  
 Lyman B. Tobin, 29 W. 55th St., New York.  
 W. W. Elder, 39 Draper Terrace, Montclair, N. J.  
 Leo Bernheim, 880 Southern Boulevard, New York.  
 D. Ralph Starry, 1309 Denmark Rd., Plainfield, N. J.  
 S. W. Berry, 311 W. 93d St., New York.  
 William Zelenko, 850 E. 161st St., New York.  
 Walter Hullahan, Newark, Del.  
 Frank F. Hooper, Chattanooga, Tenn.  
 L. E. Crouch, Noel Block, Nashville, Tenn.  
 T. G. Russell, Staunton Military Acad., Staunton, Va.  
 Henry E. Polley, 34 Park St., Oshkosh, Wis.  
 W. J. Monilaw, M. D., University of Chicago, Chicago, Ill.  
 F. G. Mueller, Camp Indianola, Madison, Wis.  
 F. H. Everhardt, M. D., 5204 Kensington Ave., St. Louis, Mo.  
 W. O. Greene, Kirkwood, Mo.  
 Frank Hamsher, Webster Groves, Mo.  
 Louis J. T. Lahrs, 327 W. Ferry St., Buffalo, N. Y.  
 John J. Mackay, 934 Yale Station, New Haven, Conn.  
 Erwin S. Spink, Woodland School, Phoenicia, N. Y.  
 George Jackson, Asheville School, Asheville, N. C.  
 Reese Combs, Miami, Fla.  
 Irving M. Fish, Haworth, N. J.  
 George B. Young, Bushkill, Pa.  
 Daniel C. Beard, Flushing, Long Island, N. Y.  
 B. M. Slater, Box 82, Long Valley, N. J.  
 Wm. Mitchell, 920 Cauldwell Ave., New York.  
 Mr. and Mrs. E. W. Sipple, 350 W. Duval St., Philadelphia, Pa.  
 Ernest L. Noone, 350 W. Duval St., Philadelphia, Pa.  
 Maxwell A. Croche, 2121 Foster Ave., Brooklyn, N. Y.  
 Robert E. Beaton, 349 Walnut St., Sewickley, Pa.  
 Col. L. L. Rice, Lebanon, Tenn.  
 Wm. R. Webb, Jr., Bell Buckle, Tenn.  
 J. V. Brown, Pres., San Marcos (Tex.) Academy.  
 Byron N. Clark, Y. M. C. A. Bldg., Burlington, Vt.  
 A. C. Hurd, White River Junction, Vt.  
 H. J. Wyckoff, Haverford School, Haverford, Pa.  
 Mrs. Wm. E. Sargent, New Bedford, Mass.  
 Chas. H. Farnsworth, Teachers' College, N. Y.  
 Mrs. C. H. Farnsworth, 509 W. 121st St., New York.  
 Miss Louise Green, Cass Technical School, Detroit, Mich.  
 Mr. and Mrs. F. M. Chubb, 130 Maplewood Ave., N. J.  
 Miss Mabel L. Evans, 618 Union Boulevard, St. Louis, Mo.

## Broadcast Bill's Radiolays

By William E. Douglass

**S**OME people like to do one thing an' some folks like another, but fer be it from me to judge my neighbor or his brother. A funny place to live in this old world of ours would be if everybody like to do the same as you er me. There's Hezekiah Singletree who plays the clarinet. I'll bet he's practiced twenty years an' can't play nothin' yet. He tunes up every mornin' an' I hear him every night. I' spect in fifty years or so he'll learn to play it right. Ol' Hezekiah's youngest

burnin' gasoline I'm sitting there at home a takin' life real easy with a headset on my dome. I hear the chapel service from a big broadcastin' station er mebbe sacred concerts from half way across our nation. I can't afford a high priced care to tour the country wide, ner do I care to bat a ball around the mountain side; and as fer homemade music—well I'd rather have the brand that's broadcast some evenin's by that military band. So while these stations send out news an'



"I'll just keep right on 'listnin' in."

son what went away to school, has got a new game started here he calls "Cow pasture pool." He sez I ought to try fer he knows I'd like it fine; I told him nothin' doin', none of that fool game fer mine. My next door neighbor Silas Brown has bought a brand new bus, it's what he calls a coopie and it don't have room fer us. On Sundays him an' Lil start out,—sometimes they're gone all day, but I don't think I'd like it much to spend my time that way. While he's out

music superfine, I'm pilin' up my jitneys in that savin's bank of mine, fer I don't have no bills to pay fer oil er gasoline, an tires aren't expenses fer a radio machine. Some people like to do one thing an' some folks like another, so fer be it from me to judge my neighbor er his brother. I'll just keep right on "listnin' in" an' pilin' up my rocks, an' there'll always be tobacco in my old tobacco box.

(Copyright, 1923, Westinghouse Electric & Manufacturing Company.)

- Mr. and Mrs. H. D. Sleeper, 76 Crescent St., Northampton, Mass.  
 Frank L. Bryant, 466 E. 17th St., Brooklyn, N. Y.  
 W. W. Clendinin, 120 Vista Pl., Mount Vernon, N. Y.  
 Miss Anna Dodge, North Thetford, Vt.  
 Miss Gertrude E. Clarkson, 84 Lorimer Ave., Providence, R. I.  
 Mr. and Mrs. C. A. Roys, 10 Bowdoin St., Cambridge, Mass.  
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## A Pleased Reader Sends Thanks from the Depths

Editor Radio World:—The article in May 12th Radio World by C. H. Stoup is the best of its kind I've seen since radio "came in." The circuit, of course, is good but his instructions as to tuning deserve to be reprinted and sent to every owner of such a set.

I began two years ago with a regenerative set. We are from 50 to 200 feet below sea level here and the summer heat is 110 to 125 degrees. We have static that is static and dust storms that paralyze our tubes. We have tried everything we ever heard of once. We get good results up to 1,500 miles and in cool weather as far as PWX and WGY. The only way to get results is to follow, word for word, Mr. Stoup's instructions. He certainly knows what he is writing about. This article two years ago would have saved me a lot of grief. Thanking you and Mr. Stoup.

Yours truly,

DR. W. M. CLARK.

Coachella, California.

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## What Western Fans Like in Broadcasting

By Alice L. Webb

A QUESTIONNAIRE was sent out to all radio fans who had written in to the operator reporting hearing station KFAE, State College of Washington, at Pullman, Wash. Answers were received from 89 of these, of whom 14 were farmers, nine high school set operators. Reports that the signals were unsatisfactory came from two, while 69 said they came in clear and strong, and three that they were too strong. Music was preferred or more of it desired by 17, while 28 wanted more lectures, and 20 reported the present program arrangements satisfactory.

Of those desiring more lectures, a number requested special subjects, particularly radio, both theory and practice. One farmer asked for market and crop reports, another for lectures on history, ancient and modern, and another on language, Spanish or French.

Trouble with tubes and batteries has caused some interruption with recent programs, but that is now rectified, and distance tests will be made to see how far the broadcast is heard. A Saskatchewan fan won the book offered to the first one 500 miles or more away who reported hearing the book news broadcast.

## First Chilean Electric Locomotive

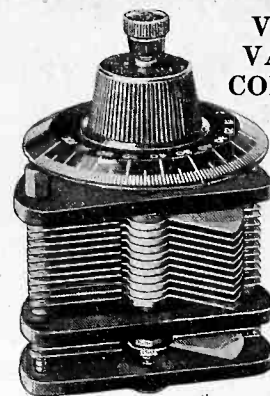
AT the preliminary trial of the first electric locomotive to be run on the Chile State Railways an old woman crossed herself, threw stones at the Baldwin-Westinghouse electric locomotive, and cursed it as the work of the devil. The children who were present threw flowers in the path of the passenger locomotive as it slowly moved down the track. These two demonstrations illustrate how easily the younger generation takes to new ideas. President Alessandri, of Chile, at the official trial several days later, acted as engineer and his American ambassador as assistant as the electric locomotive pulled the first train from Santiago to Tiltill and return. The main artery of the Chilean State Railways is now being electrified. The order for the necessary apparatus, including 33 locomotives and equipment for three substations, totaling \$7,000,000, which was awarded in 1921 to the Westinghouse Electric & Manufacturing Co., was the largest foreign order ever received for railway electrification apparatus by any one firm in Europe or America.

## New RCA Official in Washington

MR. F. P. GUTHRIE, until recently head of the Radio Division of the Shipping Board, has been appointed district manager for the Radio Corporation of America, with headquarters in Washington, D. C. Mr. Guthrie has followed radio for years and during the war served as a commissioned officer in the Naval Communication Service. It is understood that he will have charge of the corporation's new broadcasting station soon to be opened in Washington, D. C., as well as the commercial work.

Mr. A. H. Morton, who has been in charge of the corporation's commercial station at Washington for some time, has been transferred to New York where he will take up organization duties in that district.

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All Insulation Hard Rubber Aluminum Plates and Washers.

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Complete wiring diagram, instructions, etc. sent in special container with patented essential parts. Three NEUTROFORMER COILS

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Or send 25c for Neutrodyne Constructor which shows "How to Make the Neutrodyne"

FREED-EISEMANN RADIO CORPORATION

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Reflex Circuits .....	Feb. 24
Flowing Super Circuit .....	Feb. 24
Multi-tube Reflex Circuits .....	March 3
One tube Superregenerative .....	March 3
Lewis Three Tube Circuit .....	March 10
Regenerative Radio Frequency circuit for 5 tubes .....	March 24
Hazeltine Neutrodyne Receiver .....	March 31
2VK'S Transmitter circuit .....	April 21
Compact Universal Receiver .....	April 28
Stockelburg Pup receiver .....	May 5
Cockaday receiver .....	May 12
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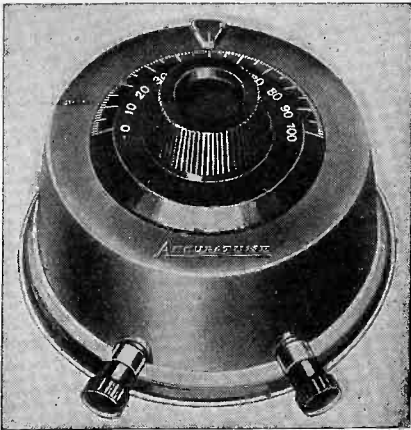
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**GUARANTEED TO IMPROVE YOUR SET OR MONEY REFUNDED.**

**RADIO MULTI-PARTS**  
897 17th Street Newark, N. J.

## Tubes Replacing Spark Transmitters in Navy

THE Navy communication service both afloat and ashore is rapidly abandoning its spark transmitting sets for new vacuum tube sets, in accordance with recommendations of the Radio Division of the Bureau of Engineering.

Recent experiments indicated that tube sets give excellent results and are far superior to the old sparks. A comparative test between the 100 KW spark set at Arlington, NAA, and a new six KW tube installed there, demonstrated that the new tube will be satisfactory. Naval stations at San Juan, New Orleans, Balboa, San Diego and ships in the Atlantic and Pacific advised that the tube signals were read more easily and had slightly more audibility. The tube set showed harmonics, one of which was on about 350 meters, but with modifications it is hoped that these can be eliminated.

A further successful test between the six KW tube set and the 30 KW arc at NAA was made recently, in which the tube set showed up well. It is probable that arc sets will eventually be discarded, but at present only new stations will get tubes except in replacements.

## Two New Radio Manuals

THE E. I. Company, New York City, has just issued two radio manuals under the titles "How to Tune Your Radio Set" and "100 Radio Hook-Ups." Each retails for 25 cents. The author is Maurice L. Muhleman, of the staff of *Radio News*.

In the manual on tuning the author begins by giving the reader a concise outline of just what should be done to tune different types of vacuum tube receiving sets so that he may get the most out of his own outfit. The first step is a thorough understanding of radio waves, and these the author proceeds to explain in a clear and simple manner, assisted by several diagrams.

The manual on hook-ups contains 100 clearly drawn diagrams of circuits, as well as a number of explanatory diagrams, and a schedule of symbols used in the hook-up drawings. Instruments used in the reception of radio telegraph and telephone messages are described briefly.

## Amateur Station Heard 11,000 Miles Away

ANNOUNCEMENT was made at Hartford, Conn., recently that an amateur wireless station had succeeded in transmitting signals approximately half way around the world, establishing a new long distance record. A ship operator reports he heard the station operated by E. W. Rouse at Galveston when he was 100 miles southeast of Ceylon in the Indian Ocean, a distance of 11,000 miles.

## Construction of New Type Transatlantic Receiving Sets

By M. B. SLEEPER  
Fully Illustrated. Price 75 Cents  
In addition to the listening to ships and broadcasting stations on short wave lengths there is a peculiar fascination about listening to the high-power telegraph stations of England, France, Germany, Russia and Italy as well as those located in the Pacific Ocean and the Oriental Countries. It is much easier to do this than most people imagine. The sending is very slow, a feature of assistance to the beginner in telegraphy. Several types of receiving sets for this task are described. Detectors, amplifiers, oscillators, etc., for long distance reception are also described. Suggestions for the operation of relays by the signals and the reproduction of them on a phonograph are given. In addition there is some valuable data on home made wavemeters for testing and experimenting.

Sent P. P., prepaid, on receipt of price, by **THE COLUMBIA PRINT**  
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Style No. 924—6½ inches, 50c at hardware stores, or direct from our factory.

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"Red Devil" Tools—American Made  
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60 Amps.	
6 Volt	12.50
80 Amps.	
6 Volt	14.50
100 Amps.	
6 Volt	16.00
120 Amps.	

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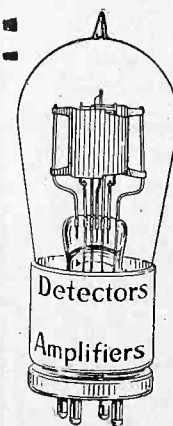
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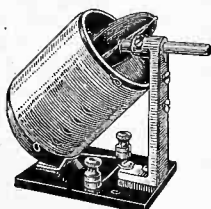


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Fits Standard Sockets. Vernier Condenser—23 Plate,  
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Will-Fred Electrical Manufacturing Corp.; \$20,000; W. O. and B. A. Feldman, E. F. Caines. (Attorneys, Mann & Buxbaum, 886 Broadway, Brooklyn, N. Y.)

Chapman Marine and Industrial Supply Co.; make electric merchandise, \$10,000; W. C. Chapman, H. J. and E. O. Baitinger. (Attorney, E. Schwartz, 165 Broadway, New York City.)

Radio Engineering Co., New York, has increased its capital stock from \$50,000 to \$3,500,000.

Independent Radio Manufacturers, Del., 50 shares common stock, no par value; reprs., S. B. Howard and G. V. Reilly, 65 Cedar Street, New York City.

Reliable Electric Motor Co., New York City, has increased its capital stock from \$5,000 to \$25,000.

Spitler Electric Co., New York City, \$15,000; R. W. Spitler, H. H. Roberts, J. Bachran. (Attorney, N. O. Suskind, 15 William Street.)

Power Construction & Engineering Corp., Albany, N. Y., \$10,000; A. S. Lyon, J. C. Looby, B. J. Savage. (Attorneys, Tracey, Cooper & Savage, Albany.)

Port Chester Battery and Ignition Corp., Port Chester, N. Y., \$15,000; F. A. and C. H. Post, C. G. Pryor. (Attorney, S. F. Swinburne, New Rochelle.)

Electrical Testing Laboratories, New York City, has increased its capital stock from \$240,000 to \$480,000.

Stahot Electric Corp., New York City, electrical appliances, \$1,500,000; A. B. Meserlyn, E. A. Jones, R. B. Larkin, New York. (Registrar and Transfer Co.)

Hallowell Radio and Electric Corp., Dover, Del., \$500,000. (Corporation Guarantee and Trust Co.)

United Battery Corp., Wilmington, manufacture storage batteries, \$3,000,000. (Corporation Trust Co. of America.)

**New York's Silver Jubilee  
Announcement Broadcast**

Grover A. Whalen, Commissioner of Plant and Structures for the City of New York, recently broadcast through Station WJZ an extended announcement of the Silver Jubilee which the city will celebrate from May 26 to June 23. In response to a request for those who had heard the speech to acknowledge the fact, letters were received, among many others, from the following:

T. Ahearn, 584 Laurier Ave., West, Ottawa, Canada.

W. Gibson, 40 Barker Ave., White Plains, N. Y.

Abigail A. Banton, 67 Palm St., Bangor, Me.

Clendenin Eckert, Ellidore, Stamford, Conn.

L. M. McCormack, Martinsburg, W. Va.

W. R. Dickinson, Erlanger, Ky.

**Standardization of Discounts in  
the Radio Industry**

**T**HE Radio Trade Association of New York City has appointed a Committee on Standardization of Discounts in the radio industry. Members have been requested to communicate to the committee their views on proper discounts to retailers, jobbers, manufacturers' agents, department stores and manufacturers on complete sets, parts and machine screw parts. This information will form the basis of the committee's final report.

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Static  
Overcome**

"Good-bye Aerial"



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*No aerial or antenna needed*

All outside wiring, aerial, lightning arresters, switches and other inconveniences so inductive to static are eliminated.

Merely plug Antenella in any light socket and you can enjoy all Radio pleasures in any room in your home, apartment or hotel. No current consumed.

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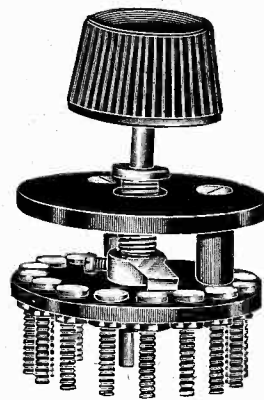
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**SPECIAL AETACO 7 Plate**

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Phones and all .....\$12.50

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5 Watt Power Tubes, \$4.00

Refilled Tubes Always in Stock

*Our repaired tubes speak for themselves*

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776 Broad Street Newark, N. J., U. S. A.

## Radio Books to Read on Your Vacation

THERE will be hours of lounging and taking it easy on your vacation that profitably and agreeably may be employed in radio reading. Following is a short list of books which will afford interest and information to the radio enthusiast who is genuinely fond of the art:

"Letters of a Radio-Engineer to His Son," by John Mills, of the Western Electric Company's engineering department. New York, Harcourt, Brace & Co. This is a popular account for real boys of the fundamental principles of radio communication, written by one who knows his subject thoroughly and has the happy knack of imparting his knowledge to others. 265 pp., fully illustrated.

"Radio Reception," by Harry J. Marx, technical editor, The Radio Digest, and Adrian Van Muffling, consulting engineer. New York, G. P. Putnam's Sons. 241 pp., 129 illustrations and diagrams, including many hook-ups. Special reference is made by the authors to practical tuning and to radio and audio-frequency amplification. Every effort has been made to cover only the essentials necessary to convey to the reader a clear conception of the fundamental principles of radio reception.

"Elements of Radio Telephony," by William C. Ballard, Jr., Assistant Professor of Electrical Engineering, Cornell University. New York, The Columbia Print, 1493 Broadway. Over 140 pp., many illustrations. The reader with a technical background will find this book exactly fulfills its purpose, which is to give in an authoritative manner a clear and accurate exposition of radio telephony and its underlying principles.

"Radio," by John R. Irwin. New York, Edward J. Clode. 280 pp., many diagrams and profuse definitions. Lieutenant Irwin begins his book with a preliminary discussion of radio and its history and follows with a complete, concise, practical radio course. The latter part of the book is made up of a series of questions and answers which cover almost every conceivable radio problem.

"The Book of Radio," by Charles William Taussig, Associate Member, Institute of Radio Engineers. New York, D. Appleton & Co. 447 pp., 181 illustrations. This book reviews the field of present-day radio development in a popular and practical fashion. It is full of information on the construction and manipulation of radio apparatus and discusses the public and private uses to which radio is being put. In a certain degree, the many aspects of radio are here treated as in no other book of its kind.

## DeForest Stock Subject of Suit

A SUIT claiming that 86 per cent of the stock of the De Forest Radio Telephone and Telegraph Company had been sold to Edward H. Jewett of Detroit and his associates for \$670,000 has been filed in the Supreme Court of New York by Abram C. Wisner of Toronto and Wiley R. Reynolds of Jackson, Mich., against Lee De Forest, Charles Gilbert and Randall M. Keator of New York City. The complaint asks \$44,500 on the ground that the defendants controlled the stock and that they had agreed to sell to the plaintiffs for \$656,500. Wisner and Reynolds claim that they paid \$31,000 on account of the stock, and spent \$13,500 interesting other purchasers, and finally induced Mr. Jewett and his friends to buy it. It was said that he had paid \$158,000 on account. The plaintiffs seek to recover the money they paid on the stock and their expenses.

Not an adaptation of old methods of current control, but distinctly designed to utilize the great tuning possibilities of the vacuum tube itself.



## Ideal Control For All Tubes—

Especially U. V. 199's and all dry cell tubes, permits accurate and superfine adjustment necessary at critical operating point. Regulated at the factory to the ideal "off" point for all tubes obviating the necessity of tampering with any screws or adjustments.

## —triple tested

Fil-Ko-Stats are not just fabricated and assembled. Each one is triple tested by an expert—carefully calibrated—then actually operated on a tube.

Reliability and durability backed by the manufacturer's guarantee. There are no disks to break or chip.

### What FIL-KO-STAT means to YOU

- stations you never heard before.
- absolutely noiseless operation.
- complete control of electronic flow in the tube.
- the assurance of laboratory tests that you have the best filament control for any make of tube.
- filament control eighteen times greater than with a wire rheostat and many times that of any other so-called filament controls.
- lengthened life for your tubes.

\$  
**2.00**  
at  
*Dealers  
Everywhere*

The filament kontrol

of infinite adjustment

# FIL-KO-STAT

### GUARANTEED

by the maker that it will be replaced if broken within one year.

DX Instrument Co.  
Harrisburg, Pa.

Replaces the rheostat. Occupies little space on panel. No re-drilling necessary. If your dealer has none in stock send his name and your remittance direct to

### RADIO STORES CORPORATION

Sole International Distributors

Dept. R.W.62, 218-222 West 34th Street, New York



## SUMMER RADIO "ANCHOR" Lightning Protector

Approved by National Board of Fire Underwriters No. E-5815.  
For indoor or outdoor use

Attractive Discounts to Dealers and Jobbers.

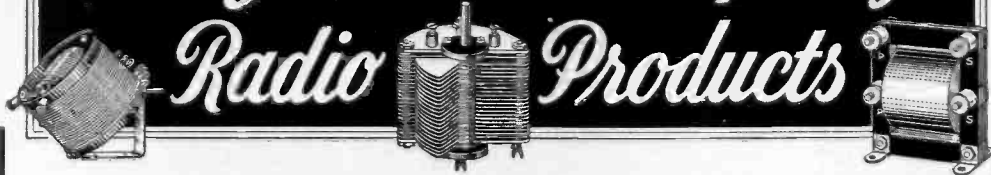
### Radio Accessories Co.

59 Bank Street  
New York

List Price  
**\$1.50**



# New York Coil Company's Radio Products



Perfect Radio satisfaction throughout entire Summer with loop or indoor aerial with two stages Radio Frequency, employing our new Radio Frequency Transformers at but \$4.00 each. Totally unlike any other. All difficulties eliminated. Regardless of previous disappointments, these Transformers will do what others claim. No extravagant, unsubstantiated claims. Money back guarantee. A few dollars will construct a Set equal or superior to any made, and you can build it.

- A NEW RECEIVING SET AT \$18.00
- A NEW INDUCTANCE SWITCH AT \$1.50
- A NEW VERNIER CONDENSER AT \$1.00

All described in new literature.

"THE LINE OF NO DISAPPOINTMENTS"

## NEW YORK COIL COMPANY

338 PEARL STREET

NEW YORK CITY, N. Y.

# "GRANOLITE"

## UNIVERSAL LOUD SPEAKER RADIO HORNS

THE ALL-WOOD, PERFECT REPRODUCING  
HORN YOU HAVE BEEN LOOKING FOR

*They will not warp, crack or peel*

"GRANOLITE" Universal Radio Horns are positively superior to all others because we have embodied in their construction perfect acoustic qualities, careful workmanship, high grade, carefully selected materials, strength and beauty of design. The base construction and equipment is universal, permitting the installation and use of any of the standard and well known loudspeakers and receivers.

### LIST PRICES

- No. 1 Horn, 15" high..... \$8.00
- No. 2 Horn, 19" high..... \$10.00
- No. 3 Horn, 25" high..... \$12.00

Immediate Delivery Prepaid on Receipt of price. Above prices apply to horn and base only. If horn is wanted complete with receiver add \$6.00.

Dealers, write for own special trade proposition.

Granolite Horns Are Manufactured Solely by

## Granolite Art Products Co.

222-224 4th STREET

MILWAUKEE, WIS.



"Granolite"

Made in three sizes.

- No. 1 with - 71 inch bell; height, 15 inches.
- No. 2 with - 91 inch bell; height, 19 inches.
- No. 3 with - 14 inch bell; height, 25 inches.

FILL OUT AND MAIL NOW  
SUBSCRIPTION BLANK

# RADIO WORLD

RADIO WORLD

1493 Broadway, New York City

Please send me RADIO WORLD for ..... months, for which please find enclosed \$.....

### SUBSCRIPTION RATES:

- Single Copy ..... \$ .15
- Three Months ..... 1.50
- Six Months ..... 3.00
- One Year, 52 Issues ..... 6.00
- Add \$1.00 a Year to Foreign Postage; 50c for Canadian Post-

## Westinghouse Has A Satisfactory Year

THE net income of the Westinghouse Electric & Manufacturing Company for the year ending March 31, 1923, was \$12,263,485 as shown by the company's annual report. The dividend requirements were \$6,033,428, so that over twice this amount was earned and more than six million dollars added to the surplus. Gross sales for the year were \$125,000,000, which represents an increase of \$25,000,000 over the sales of last year. The cash position of the company is a strong one, the current assets totalling over \$106,000,000 and the current liabilities less than \$17,000,000.

"The bookings of new business steadily increased during the year," states Guy E. Tripp, Chairman of the Board of Directors, "and the value of unfilled orders at the close of the year was \$61,914,237, as compared with \$50,740,696 at the close of the previous year. The relations between the company and its employees are satisfactory. Under the company's Insurance and Savings Plan, two-thirds of the employees owned insurance of \$500 or more each. The deposits by the employees in the Savings Fund are accumulating at a rate in excess of \$100,000 a month, and the total savings to date are in excess of \$2,000,000. The savings are invested for the benefit of the employees and are not used in any way in the company's operations."

A plant located at Sharon, near Pittsburgh, Pa., was acquired during the year, and it is planned to concentrate the manufacture of transformers there. Two hundred dwelling houses, located near the company's South Philadelphia Works and formerly the property of the Emergency Fleet Corporation, were purchased and are being sold to employees.

## Some Hints for Radio Happiness

DON'T expect your loud speaker to give much satisfaction on one tube. It can't be done.

Burn your bulbs up high and cut off about two-thirds of their useful life. They always give better satisfaction if burnt lower.

When you get your set, immediately get a screwdriver, pliers and hammer. Open it up to see what makes the wheels go round and if you can't make it work better than it originally did, take it back and try and collect your money.

Leave your tubes burning all night. It makes a nice, bright light, and doesn't run up the electric bills. Dad will appreciate it.

When you hear about a new tube circuit or piece of apparatus, always knock it, whether you understand it or not. People will then know that you are a newcomer and don't understand radio, and you won't have to disguise yourself.

## Radio Definitions—But Different!

Loud speaker—A politician standing on a soap box.

Amplifier—A female scandalmonger.

Detector—A wife's inspecting kiss when you arrive home late.

Oscillator—A woman in a hat shop with Paris creations—and hubby's bank-roll.

Receiver—Friend wife every pay day.

Antenna—Those funny things on a butterfly's head.

Ground—What is left in the coffee pot.

Transformer—Paint, powder and a permanent wave.

Converter—A Salvation Army lassie

# BUY DIRECT

AND

## Save the Difference

Pall Mall 150-600 Meter  
180° Vario-Coupler

Green Wire—All Parts Highly Nickel Plated—  
The Pall Mall is the Coupler That Makes a  
Good Set Better.  
WORTH \$5.00 DIRECT \$2.00

**Essex Special**  
Audio Transformer.  
The Transformer That  
Gives More Volume  
with Any Tube.  
LIST \$5.00  
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**Pall Mall**  
150-600 Meter Radio  
Frequency Transformer.  
Guaranteed to Operate  
with All Makes of  
Tubes.  
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**Essex Standard Radiofones**  
2300 ohms

The Phones with the Giant Grip—Magnets  
Guaranteed for One Year.  
List \$6.00 DIRECT \$4.65

ASK OUR EXPERTS TO SOLVE YOUR  
PROBLEMS—HOOKUPS FREE

— SPECIALS —		
	List	Direct
C R L Variable Grid Leak.....	\$1.50	\$1.15
43 Plate Condenser, Mold Heads..	4.50	1.75
23 Plate Condensers, Mold Heads..	3.75	1.45
3" Molded Dials.....	1.00	.19
Taper Knob Switches.....	.75	.15
Bakelite Sockets.....	1.00	.45

WE CARRY A COMPLETE LINE—GET OUR  
PRICES ON ITEMS NOT LISTED HERE

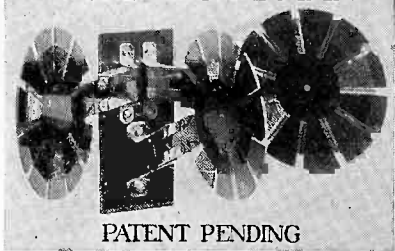
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All Merchandise Sold with a Money-Back  
Guarantee

## ESSEX MFG. CO.

Established 1907

117 Mulberry St. Newark, N. J.

## THE GOODMAN



PATENT PENDING

The Niftiest Short Wave Tuner on the Market  
Only \$6.00 & PP on 1 lb. Send for pamphlet.

**L. W. GOODMAN**  
DREXEL HILL, PA.

The GOODMAN is really a high grade instrument,  
well and sturdily constructed. The PANEL and  
FANS are GENUINE BAKELITE—the best material  
known for the purpose.

## ATLANTIC & PACIFIC

U.M.E. OF PERFECTION

131 W. 37th St. **RADIO CO.** NEW YORK  
\$8 PHONES \$2.25  
Headsets in original sealed boxes  
Guaranteed to give Satisfaction

**ELECTRIC**  
Soldering Iron, \$2.25

Guaranteed for One Year  
RADIO FREQUENCY TRANSFORMERS, 95¢.  
Highly Efficient for R. F. and Reflex Hookups  
Mail orders with money orders.  
Postage must accompany mail orders.

**\$25 A DAY**  
*Selling Shirts*

Large shirt manufacturer wants agents  
to sell complete line of shirts, pajamas,  
and nightshirts direct to wearer. Ad-  
vertised brand—exclusive patterns—easy  
to sell. No experience or capital re-  
quired. Entirely new proposition.  
Write for free samples.  
Madison Shirt Co., 603 Broadway, N.Y.C.

# RADIO WORLD

TELEPHONE, BRYANT 4796  
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SATURDAY OF SAME WEEK)  
FROM PUBLICATION OFFICE,  
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Entered as second-class matter, March 28, 1923,  
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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  
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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.

## Radio Can't Save Sinners, Says Cardinal Dubois

SERMONS broadcast by radio can  
never convert sinners, Cardinal Du-  
bois, Archbishop of Paris, believes, ac-  
cording to a despatch to the New York  
World. The Cardinal is himself a radio  
enthusiast and has a receiving station in  
the Archiepiscopal Palace.

"I find wireless most interesting," he  
said, "but broadcast sermons cannot be  
expected to convert any one. Wireless  
is too dry and cold to have an effect.  
I have listened to wireless speeches by  
famous orators and admired their fine  
phraseology and style, but they left me  
unmoved.

"Personal magnetism is lacking. A  
speaker conquers his audience by the  
eyes, gestures, intonation, personality. If  
wireless ever transmits simultaneously  
with the words a living image of the  
orator, then I may revise my opinion."

## Horoscopes Read by Radio from WOR

BELLE BART, astrologist, who has  
foretold accurately many important  
events and who is well known to readers  
of the leading newspapers in this country,  
will broadcast from WOR, Newark, N. J.,  
every Monday evening at 9:15 p. m.  
Members of the radio audience desiring  
to have their horoscopes read can have  
this done by writing to Belle Bart giving  
date of birth and initials and three ques-  
tions they desire answers to.

Remarkable  
Regenerative  
Receivers



Ace Model V  
\$20  
Formerly known as  
Crosley Model Vc

This one tube receiver is as-  
tounding the radio world with  
its wonderful achievements.  
Stations more than 1000 miles  
away are being regularly cop-  
ied on this set. In comparison  
to its price, there is no receiver  
on the market today to equal it  
in performance.

Licensed under Armstrong U. S. Pat-  
ent No. 1,113,149. The trade name  
Crosley is used by permission of the  
Crosley Mfg. Co.

Live Jobbers and Dealers are eagerly  
taking advantage of the sales this  
instrument and the rest of the Pre-  
cision instruments and parts bring  
them.

Free Catalog on Request.

THE PRECISION EQUIPMENT CO.  
*Powel Crosley Jr. President*  
6401 GILBERT AVENUE CINCINNATI, OHIO



## WE REPAIR

WD-11, \$3.50

AND POSTAGE

Also other vacuum  
tubes, excepting  
VT-1 and VT-2.

Mail orders solicited and  
promptly attended to.

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

514 Clinton Avenue Newark, N. J.

## Cockaday Circuit TUNER COILS

Complete as per specifications.

No. 18 Wire Used—D Coil  
Bankwound. Price, \$2.75

Hook-up, directions and material list  
furnished free with each set of coils.

MAIL ORDERS FILLED

Dealers, Communicate

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22 Warren Street, New York, N. Y.

## Cram's Radio Broadcasting Map of the UNITED STATES AND CANADA

Scale 100 miles to the Inch

In two colors—Size 34x28"

PRINTED ON HIGH-GRADE MAP PAPER  
UP-TO-THE-MINUTE INFORMATION  
INDICATING ALL AMATEUR AND STAND-  
ARD BROADCASTING STATIONS  
WITH COMPLETE INDEX OF STATIONS  
35c (POSTPAID)


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**W.T.501 DETECTOR  
TUBE**

For tube sets, use our  
special Adaptor, 75c extra.  
To convert crystal sets  
into tube sets, use spe-  
cial socket, 40c extra.  
Radio Research Guild  
40 Clinton Street  
Newark, N. J.


\$2



**Pruden Reliable for Good Results Radio Specialties**

Dealers write today for our interesting proposition.

**FREDERICK H. PRUDEN, Inc.**  
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Variable High Resistance Leak.....75c  
With .00025 Condenser .....\$1.00

**Arthur Pudlin Engineering Co.**  
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**The Nation's Choice**  
Diamond De Luxe Phones are made with watchmaker's precision and rigidly tested. Fit the head comfortably. A large disc gives greater volume and splendid tone. Permanently magnetized. 3000 ohms. Broadly guaranteed.

**RETAIL PRICE \$3.60**  
Salesmen wanted. Good commissions. Made by the manufacturers of the famous Diamond B Batteries. If your dealer cannot supply you, write us.

**Diamond Electric Specialties Corp.**  
101 S. Orange Ave. Newark, N. J.

## Broadcasting Station FOR SALE

**Complete 50-Watt Output Radio Telephone**

RCA UV-203, 50-watt oscillator, modulator and speech amplifier with 2-stage Studio Amplifier, for

300 } **Meter Operation**  
360  
600

250-watt, 1000-volt Westinghouse Motor Generator Set, reported heard in Texas, Kentucky, Maine and Missouri.

**EDWIN C. LEWIS, Inc.**  
121 Federal Street Boston, Mass.

### Effect of Storm on Aerial

As an illustration of how an aerial acts in a storm, a writer in the New York Globe recounts a personal experience at a summer camp where the antenna system was the highest and most conspicuous thing for miles around. Soon after midnight one August morning, a most terrific electrical storm broke out. It was of such violence that for the first time in his radio experience the writer feared that the aerial would be struck. Half a dozen bolts struck trees all around the camp, some as close as four hundred yards, yet the high wires were not even touched! When the storm had abated somewhat the writer ventured forth and carefully touched the lightning arrester and the lead wires; they were positively hot, which shows that the aerial was actually grounding the heavy atmospheric charges.

### Radio Develops a Mean One

Smith—Jones has been tormenting me since he left for Cuba. If it's meant for a joke, it's a poor one.  
Canford—What's he been doing?  
Smith—He's been sending me radio messages stating: "Please find inclosed two cases of Scotch."—New York Sun.




**Smallest and Lightest Dependable Long-Range Receiving Set in the World**

Complete with Phones, Tube, Both Batteries, and a 150-foot Braid Antenna.

**\$45.00**  
Dealers, Write.

**RADIO PANEL SHOP**  
JUNCTION CITY, KANSAS  
(Western Branch, Payson, Utah)

### JUNE SPECIALS

Code	List	Special Price
Practice Sets (key, buzzer and switches mounted on attractive base)		\$1.75
Three Coil Honeycomb Mounting	\$4.50	3.25
Honeycomb Coils (Mounted) 50-75 Turns	1.60	.98
<b>STANDARD VARIABLE CONDENSERS:</b>		
21 plate, with vernier, knob and dial	\$5.00	\$3.75
41 plate, with vernier, knob and dial	6.00	4.20
Standard Variometers 150-750 meters	5.50	3.75
Standard Variocouplers, 180° variation	5.00	3.50
Standard Hydrometer	.75	.55
Standard Rheostats	1.00	.60
Antenna Equipment (complete in box)	7.50	4.95

**"BETTER GOODS—BETTER SERVICE"**  
DEALERS: Write for special proposition.  
**C. W. THOMPSON COMPANY**  
MATTOON, ILLINOIS

## Cockaday Circuit

The newest and most startling development in radio

Exceedingly Selective. Simple to Operate. Highly Sensitive. Verified C.W. Range of 1200 Miles. Telephone Range of 2400 Miles. Complete Parts for This Circuit.

# \$12.71

Include the following:

1 Special Coil	3.25
2 Variable Condensers (Bakelite Ends)	3.00
1 Socket (Genuine Condensite)	.50
1 Vernier Rheostat (Cutler-Hammer)	1.30
1 Panel (Genuine Bakelite), 7 x 18	2.50
1 Grid Condenser, Mica Duplicator .00025	.35
1 Switch Lever, 7 Points, 2 Stops	.31
8 Binding Posts	.40
1 Grid Leak (Cartridge Type) and Bakelite Holder	.60
2 Dials, 3 Inch	.50
<b>Total</b>	<b>\$12.71</b>

One Stage Amplifying Unit to This Set, Additional \$5.00  
Two Stages, Additional 11.00

Cabinets, Piano Mahogany Finish, One Bulb Set \$3.75  
Two and Three Bulb Set 4.75

Complete Parts for Flewelling and Reflex Circuits.

U. V. 200 Tubes	\$3.95
DeForest DV6A. Wonderful as an amplifying tube	6.00
22 1/2 Volt "B" Battery	.89
Nathaniel Baldwin Type C, Double Phones	8.50
Nathaniel Baldwin Type C, Single Phones	4.50
Brandes (Superior) Phones	5.95
45 V. "B" Batteries (each)	2.25

All orders must be accompanied with a money order postage included.

**GRAND RADIO CO.**  
1789 Third Ave. 1714 Second Ave.  
NEW YORK CITY

THE ANNIVERSARY NUMBER of Radio World was increased in size and is an exceptional issue. A few copies left at 15c. each, or you may start your subscription with that number. RADIO WORLD, 1493 Broadway, New York.

# DO YOU WANT RADIO FREQUENCY MAXIMUM DISTANCE ON ONE TUBE?

**LOOK THESE OVER**

Following are a few of the many DX stations received with this **COAST COUPLER**, and detector tube only, at Long Beach, California:

PWX, Havana, Cuba	WDAP, Chicago, Ill.
WWJ, Detroit, Mich.	CFCN, Calgary, Can.
WSB, Atlanta, Ga.	WBAP, Ft. Worth, Texas
And Many More.	



Only one hook-up will do this. Only one tube is necessary if this Coast Coupler is used.

Coast Coupler and diagram mailed within the United States upon receipt of Five Dollars.

Satisfaction or Money Back Guarantee.

Make All Remittances Payable to

# COAST COUPLER COMPANY

321 WEST SEVENTH ST. LONG BEACH, CALIFORNIA



**Staten Island Residents Form Men's Radio Club of Richmond Borough**

A GROUP of radio enthusiasts of Staten Island, N. Y., has recently organized the Men's Radio Club of Richmond Borough. It is an outgrowth of the Castleton Community Council and meets every week in Public School No. 29.

Membership in the club is restricted to residents of Staten Island, 18 years of age or over. A Junior Club, under the supervision of the Men's Club, is in process of formation. Its membership will consist of residents under 18 years of age.

Much interesting work has been laid out for the future in the form of lectures, experimentation and entertainment. "Un-technical Talks on Technical Subjects" have already been given by C. A. Stephen and H. Luyre.

The officers are: President, C. A. Stephen; vice-president, Rudolph Neumann; secretary, F. H. Horenburger; treasurer, H. Luyre; librarian, T. Norton. With all of Richmond County to draw from, a large membership is anticipated.

**Important Decision Favors Public Utility Companies**

RATES for public service corporations which fail to take into consideration the cost of reproduction at prevailing prices will not be approved by the United States Supreme Court as now constituted. Justice McReynolds delivered such a decision last week in a suit brought by the Southwestern Bell Telephone Company in Missouri.

"It is impossible," the majority opinion of the court said, "to ascertain what will amount to a fair return upon properties devoted to public service without giving consideration to the cost of labor, supplies, etc., at the time the investigation is made."

**The Indoor League Likes Radio Sermons**

RADIO has invaded the country grocery store. Round-the-stove conferences once devoted to the discussion of national political issues have been suspended in favor of radio broadcast entertainment, addresses and sermons.

A sermon delivered by the Rev. Dr. Philip Frick, pastor of the First Methodist Church in Schenectady, N. Y., was broadcast by WGY, the General Electric Company station. Dr. Frick received the following letter from "Bill" Davenport, of Hillside Farm, Jefferson, New Hampshire:

"You will see by the heading of this letter I am way up in the White Hills, right under Mount Washington. Today, Sunday, I had occasion to go to the store of F. O. Giddon and while there I heard a sermon preached by you which I enjoyed very much. In fact, it is the first one I have heard in 35 years. So you will see I am not much of a churchgoer, and to think you, away off in New York, should be the first one to catch me. The sermon was very distinct and the singing was fine. In our little town we have three churches, but there are quite a few of us old hardshells who rather go to the store and discuss whatever has transpired through the week. I just wish you could have looked in on the bunch while you were preaching. We were all held spellbound. You could have heard a pin drop anywhere in the room. Hope you will not think we are all heathens up here in the mountains. I should be very glad, if you ever came this way, to have you for my guest for a few days. Hope I may be able to hear another one of your sermons."

**MAKE YOUR SET A VACATION SET**

Reduce STATIC and other interference by using



(Pat. Pending)

The Short Cut Antenna is so arranged that it can be made a part of your set, either by being mounted on the panel or elsewhere. It replaces loops, aeriels, electric light plugs, etc. Eliminates lightning dangers. Brings clearer signals and truer tone. Works on all standard vacuum tube sets.

**Postpaid anywhere for \$5.00**

Satisfaction guaranteed or money refunded

If your dealer cannot supply you, order direct from us, giving dealer's name and address.

**SHORT CUT RADIO CORP.**

No. 243 West 54th Street

New York City

*Young Sunday*

**Greenwich Radio Co.**

185 GREENWICH STREET

NEW YORK, N. Y.

**TUBES**

Genuine Western Electric VT 2, \$8.00

**PATHE LOUD SPEAKER**

The New Type, at only.....\$17.50

**COCKADAY CIRCUIT**

4 Tuner Coil according to specifications .....\$2.75

**PHONES**

Nerco, 2200 Ohms, sensitive...\$2.75  
Stromberg Carlson .....\$4.95

ALL RADIO PARTS IN STOCK—SEND MONEY ORDER, INCLUDING POSTAGE

**CORRESPONDENTS WANTED BY RADIO WORLD ALL OVER THE UNITED STATES AND CANADA**

Send us your name and address and say that you want to become our correspondent. We will show you how you can represent RADIO WORLD in your locality and at the same time make money for yourself. We would particularly like to hear from those who are handling the "Saturday Evening Post."

Address Correspondent Editor, Radio World, 1493 Broadway, New York

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In order to materially increase our subscription list we are offering for a limited time a special subscription of eight issues of Radio World for \$1.00. You may begin your subscription now, or have us start sending the first issue on this subscription offer when you go out of town.

**CUT OUT THIS TODAY SO THAT YOU WILL NOT FORGET ABOUT IT Radio World's Special Summer Subscription Offer**

Radio World,  
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New York City

Enclosed find \$1.00, for which send me Radio World for eight issues, beginning with your number dated.....

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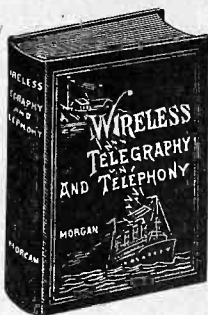
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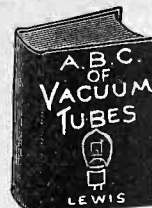
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WHN New York, N. Y. ....	0	31	29½
WGY Schenectady, N. Y. ....	10	35	33
WDAR Philadelphia, Pa. ....	12	36	34
WOR Newark, N. J. ....	20	40	40
WBZ Springfield, Mass. ....	22	24½	23
WGM Atlanta, Ga. ....	28	49	49
WJAZ Chicago, Ill. ....	31	53	51
WJY New York, N. Y. ....	35	55	55
WEAF New York, N. Y. ....	45	64	64
WOO Philadelphia, Pa. ....	49	71	69
WCX Detroit, Mich. ....	54½	72½	74
KSD St. Louis, Mo. ....	60	84	84

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