March 15, 1924
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RADIO PROGRESS

"Always Abreast of the Times"

IN THIS ISSUE:

You Can Improve Your Aerial

A Trouble Proof Radio

How Good a Liar Are YOU?

Storage Battery or Dry Cells?

Re-radiation or Your Neighbor's Pigs

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PAWTUCKET, RHODE ISLAND

RADIO PROGRESS

HORACE V. S. TAYLOR, EDITOR

Volume 1 Number 1

Contents for

MARCH 15, 1924

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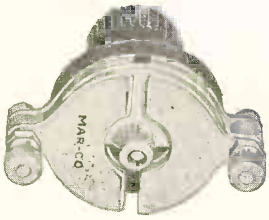

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RADIO PROGRESS

"ALWAYS ABREAST OF THE TIMES"

VOL. I, No. 1 MARCH 15, 1924 15c. PER COPY, $3 PER YEAR

How Do YOU Like Our Policy?

THIS is the first issue of this new magazine. Probably you will say, "What, another Radio paper?" But we don't want it to be just "another" paper. In fact, all our efforts are going to be devoted to trying to make you say, "A different Radio paper." How is it to be different?

In the first place, consider the whole field. There are a good many interesting magazines on Radio, and also some that are quite accurate and technical; but do you know any one that is at the same time so accurate that you feel that you can trust whatever it says, and also so well and interestingly written that you find that every article is a live one? That is what we are aiming at. Human interest is a very good quality to have in any kind of reading, whether it is a love story or an article telling you how to extract the squeals from your latest hook-up.

This is not the place to tell you the details of the issues to come; you will find such announcements in the body of the magazine. But it is the place to say that RADIO PROGRESS will endeavor to tell the romance of this wonderful new art as it develops, keeping always abreast of the times, and it will tell it in a way that will combine the accuracy you have a right to demand with the interest and profit that will hold your attention.

So much for our readers. To possible contributors we say, "Make your articles interesting, but stick right to the facts. It must be facts, first, last, and always." And to advertisers, we suggest that we should be glad to give them engineering co-operation, with the idea that we want to make all our advertisements so reliable that our readers will have no hesitation about buying their goods.

You Can Improve Your Aerial—How?

Have you made any one of these ten common mistakes?

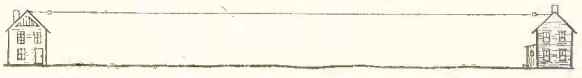
By HORACE V. S. TAYLOR

Mr. Smith calls up the radio store. "Send me out a radio this afternoon," he says, "and hook it up." "All right," is the reply. "What sort of an aerial have you?" "Oh, a crackerjack," says Smith. That sounds all right; so the radio man takes out the set, ready to install. But when he gets there he finds that the aerial isn't very good, after all, and he has to correct it in one or more of the following ways:

"I don't want my aerial to snap in the first severe storm," says Mr. Smith, "so I have left plenty of slack." And, sure enough, so he has. This is mistake No. 1. There should be some slack left in the wire, of course, to allow for the swaying of the pole or tree; and, besides, the less slack you have, the tighter the wire has to be. But if you allow too much, as shown in the sketch, then, when a wind comes up, the wire will swing back and forth. This swaying will change the effective height of the aerial above ground, and this in turn will cause a change in the tuning. So you will hear the station you are listening to fade and then come back with the regularity of the swinging wire. Or, perhaps, if the set is just on the point of squealing, then the swinging will start it going, and you will begin to curse your next-door neighbor for that regular squeal. (And, of course, he's doing the same thing for you.) So you must use judgment in tightening the aerial; do not have it so tight that it will pull apart, nor so loose that it will swing very much.

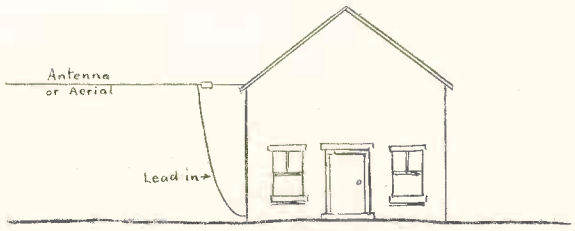
Mistake No. 1

"My aerial can't be beat," says our customer; "it is nearly 250 feet long." That is a big one; in fact, it is mistake No. 2. Of course, that is fine if he is after ship's code, on 600 meter wave, and doesn't care about the broadcasting; but if he wants to get the concerts, then the aerial is too long. Counting the length of the lead-in as part of the aerial, as indeed it really is, then its total length shouldn't exceed 150 feet. As a matter of fact, it is better practice to cut this length to even less than that, say 100 or 125 feet. The reason is that with such a length, and a modern receiving set, the distant stations are as loud as with the longer wire, and, on the other hand, the short wire does not collect as much static and other disturbances as the longer one. It is also easier to tune out local stations if the aerial isn't too long. If the distant support is too far away, an insulator can be placed in the aerial about a hundred feet out, measured from the set, and this will make the effective length of the antenna equal to that distance; the part beyond the insulator will not count.



Mistake No. 2

"I did a neat job bringing the lead-in through the window," says my friend. "There was a crack in the cellar window and I brought it in through that." Yes, it looks neat, but it is mistake No. 3. The radio waves are doing their best to get to ground, and if you let the aerial come very close to ground, then the capacity will partially short circuit your energy, and the result is that your signals are weak. Don't let the aerial come within several feet of the ground if it can be avoided.

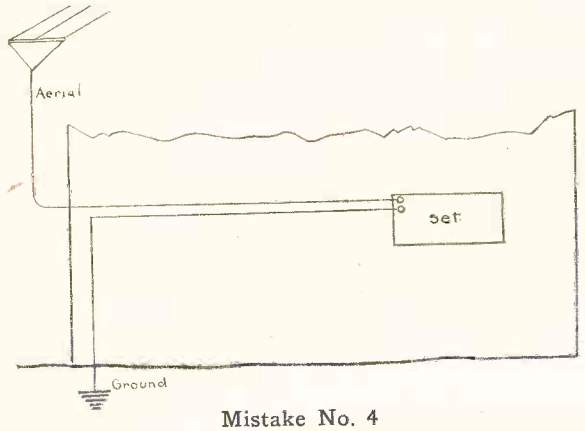


Mistake No. 3

Mistake No. 4 is somewhat similar. The aerial and ground wires are run through the room very close together. Sometimes they are even run through the same hole in the floor or partition. This is very bad, as the condenser action will steal more than half of the energy that is collected by the antenna. These two wires should be kept at least a foot apart, and preferably three feet apart, everywhere except in one place; that is, at the lightning arrester. At that one point they have to approach each other within three or four inches, as both must be connected with the arrester. For a short distance no appreciable harm is done by their close approach, but be careful that it is the only place where they don't keep their distance.

"I have a tree on each side of my house," says Mr. Listner-in. "Shall I hook up the wires like this?" (See mistake No. 5.) Decidedly not. If he does, it will spoil sharp tuning, for you will notice that he has the lead-in about a third of the way from one end of the aerial. It is just like a violin string; it will vibrate as a whole and give a pure tone, or you can touch it lightly in the center, and again it will give a pure tone. But try to divide it

into 3/7 or 5/11, or any other unequal division, and you will not get a clear tone. So, in the present case, he should find the exact center of the aerial and attach the lead-in to that point. The same remarks apply to an indoor antenna. Many such antennas consist of two to four wires, radiating out from the lead-in like the ribs of an umbrella. In constructing such an aerial, take care to have each one of the ribs the same length, measured from the point where the lead-in is attached, for it is only by attention to this point that all of them will vibrate in unison.



Mistake No. 4

A neighbor has two poles near his house which he will use. He has put in his wires as shown. But this is mistake No. 6. The free end (the one farthest from the set) is much more important than the near end of the aerial, as it is the height of the free end which largely determines the effective height of the aerial. It is the same principle as that which obtains in operating a siphon. If you have ever worked a siphon, you will remember that it is the height of the far end of the rubber tube that governs the rate of flow of the water, and that you can raise or lower the center of the tube without affecting materially the speed of the current of water. So in this case it would be a lot better if the lead-in were attached to the low end of the aerial, on the right instead of on the high end. That is, keep the whole aerial as high above the ground as possible, but pay especial attention to the free end.

Mistake No. 5

There is a very elaborate aerial in the block near us. It looks fine from the ground. Passersby naturally say to themselves, "There is an installation which will get San Francisco easily." But, as a matter of fact, this is mistake No. 7.

You will notice in the picture that the aerial is comparatively short and consists of four wires in parallel. If this aerial were designed for sending instead of for receiving, it would be ideal. But for receiving it is unnecessary, and, in fact, undesirable, to use more than one or two wires. If you can get a straight stretch of 75 to 100 feet, it is preferable to use only a single wire; but if your quarters are somewhat cramped, so that a 35 or 40-foot length is all you can put up, in such a case it is better to use two wires in parallel. Each wire will gather in most of the energy of several feet around it. For this reason, it is better not to space the wires closer than three feet apart. It is better still if you can make it five feet apart. From this you can see that having four wires, each spaced two feet away from each other, is not going to do you any good.

Another objection to this practice is that the additional capacity to ground, caused by the larger number of wires, affects the set in such a way that static is more bothersome and is harder to tune out.

Another difficulty is that induction from the nearby trolley wires, high tension wires, and the like, will cause more interference when you are tuning in on a distant station.

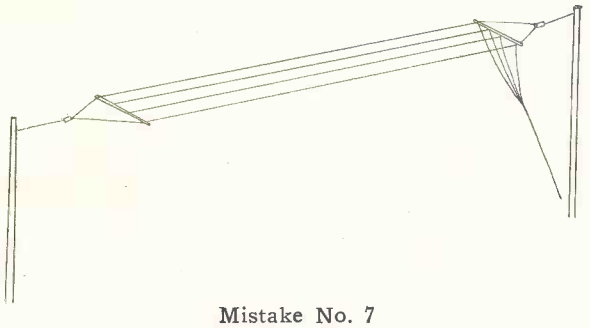
The reason why four wires are used so often in sending is this: A sending station will put anywhere from two to ten amperes into the aerial, and since each wire in the aerial cannot carry satisfactorily more than the smaller current (two amperes), it becomes necessary to use several so that the current will divide among them and not overload any one wire. This also has the effect of cutting down

Mistake No. 6

the resistance of the aerial. In receiving, on the other hand, the greatest current you will ever get is a few one-thousandths of an ampere, and this is almost lost even in a single wire. So, if your aerial is already put up, and it consists of more than two wires, you will get just as good reception and less interference if you take down the middle wires, leaving only the two outside ones.

Here we have a fellow with a very high aerial mast. Of course he has it properly guyed, but unfortunately he has made mistake No. 8. If you will look at the diagram you will see that the guy wires run direct to the ground, without any insulation breaking them up. The trouble with this is that each individual guy wire acts like a receiving aerial and steals more than its share of music out of the air. Every wire or pipe which runs into the air and has the lower end connected to the ground thinks it is an aerial and takes all the energy out of the air that it can get, and the only way we can give it a hint that it is a guy wire and not an aerial is by putting an insulator in the line before it reaches the ground. If the guy wire is not over

10 feet long, a single insulator near the bottom is sufficient, but if it is longer, then it is a good practice to put in one every 10 feet. This breaks the wire up into such short lengths that no section of it will rob any material amount of energy from the aerial.



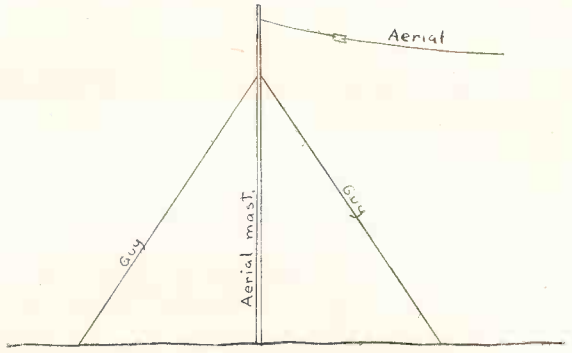
Mistake No. 7

Mistake No. 9 is rather hard to illustrate. Some aerials are made out of solid wire instead of stranded wire. There are two disadvantages of the solid wire. In the first place, the solid wire is very much stiffer than the stranded wire, and so in putting it up it is much more apt to kink. Of course, the kink can be straightened out, but it weakens the wire considerably and leaves a hidden defect, so that the first severe ice storm of the winter breaks the aerial down. The stranded wire, on the other hand, does not kink nearly as easily, and even if it should, being much more flexible, it is not damaged very much in straightening. Besides, the solid wire has a smaller diameter than a stranded wire of the same area, and vibrations of high frequency travel almost exclusively on the outside of the conductor.

As a matter of fact, a pipe with a large hole in the center is just as good a conductor for radio waves as a solid rod with the same outside dimensions, so if you used a No. 14 solid wire there will not be as much outside surface to carry the radio waves as there would be if you used a No. 14 stranded wire. Naturally this mistake is not very serious, and we do not advise you to take down your aerial if you already have a solid wire installed, but if you are thinking of putting up a new aerial, by all means use stranded wire.

The last mistake that is made fairly frequently is in the finish of the aerial used. Tinned copper wire has been very popular, the idea being that the tin coating will prevent attacks of the weather. It is quite true that, with a tin coating, copper is not apt to corrode, but the condition has one decided disadvantage. As was just explained, radio waves travel over the surface of the conductor rather than through the center, so in a tinned wire over 90 per cent. of all the electricity runs through the tin itself, leaving only a small proportion to go through the copper inside. Of course, tin has a very much higher resistance than copper, so that the effect is that the radio waves find just as much resistance as if they were travelling through wires made of tin. The result is that the resistance of the aerial is increased over what it would have been if the tinning had been omitted. This, again, is a rather minor matter, and we do not advise changing your aerial if you already have used tinned wire, but in a new installation you should not use tinned copper wire. The ordinary stranded copper wire, which is obtainable at radio stores, does not deteriorate rapidly when subjected to ordinary weather conditions, and whatever deterioration does occur is caused by copper corroding; but an outside layer of corroded copper is an insulator rather than being a relatively poor conductor like tin, and so the waves do not pass through it at all, but through the layer of bright copper underneath. Naturally, if you wish to have an aerial which will combine the high conductivity of bare copper and weather-resisting qualities of tinned copper, then the thing to use is either rubber-covered copper wire or else enameled copper wire.

Many people wonder how the radio waves reach the wire if it is covered with a layer of insulation, but when you think of it you will realize the air is itself a perfect insulator, and radio waves have the property of going through an insulator like air, rubber or the walls of your house without being interfered with in the least. It is only after the radio waves have struck the aerial and been converted into a high frequency electric alternating current that insulators have any effect in stopping their progress.



Mistake No. 8

All these mistakes that we have mentioned are rather frequently made, and while none of them are fatal to good reception, still any one of them may reduce the loudness of the distant station which you are trying to get to-night. As a matter of fact, the better the radio set, the more necessary it is for you to pay attention to such little points for getting the best reception.

In the next issue we will discuss the ordinary mistakes which we have encountered in making grounds.

Radio Mike
Went out for a hike
To dig up some brand-new stuff.
But all that he got
Was the Dome Teapot,
So he said, "Shut it off. Enough."

—By *Ben.*

HOW MANY RADIO FRIENDS HAVE YOU?

Don't you think you could get most of them to subscribe to RADIO PROGRESS through you? We'll pay you in sets, parts or cash, as you prefer. Send your name and address right away to Subscription Department, RADIO PROGRESS, 8 Temple Street, P. O. Box 728, Providence, R. I.

Three of a Kind -- All Aces

The face behind the voice that comes through the air from Springfield

All radio fans are more or less familiar with the letters WBZ, KDKA, or symbols of other radio broadcasting stations announced at the opening of any evening's program or as the station in hearing is signing off for the night, but how many listeners in fully appreciate the sets of initials which usually accompany the above series of letters?

"Radio Broadcasting Station WBZ signing off for the night. Good-night, folks. MCN."

That is the usual fashion in which a broadcasting station announces to its listeners that the evening's program has come to an end. The "WBZ" is not strange to a tuner in. He or she knows that those initials designate the Westinghouse broadcasting station at Springfield, Mass. But what about the last three letters of the signing off announcement? What are they all about?

Are they additional station symbols, or are they code letters, an abbreviated method of announcing information of a technical nature concerning the broadcasting, or do they mean anything?

They are in truth the initials of the names of the announcers at the Westinghouse Radio Broadcasting Station at Springfield, Mass., the human element behind the microphone which announces what is next on the program to the thousands of interested listeners.

How essential their position is to any broadcasting station can only be appreciated by those who have contact with the crisp censure, tart criticisms, and lavish tributes of which the announcers are the recipients. It is not without consideration for the performing artists to say that a major portion of the success of any evening's broadcasting rests upon the announcers, atmospheric conditions and the health of the transmitting apparatus being good.

WBZ is fortunate in having rounded up such an excellent and widely popular group of announcers as it now has on its staff in Thomas H. McNally, William S. Tilton, and Alwyn E. W. Bach. These three gentlemen close their evening's efforts by signing off as MCN, WST, and AEB, respectively. The following article is written with the purpose of introducing to radio fans the personalities of WBZ's corps of announcers whom most air listeners know only as the custodians of a set of initials.

Thomas H. McNally is the senior announcer of the present staff at WBZ. McNally is known to his immediate

—Photo by Bachrach

THIS IS MCN, WST, AND AEB. THEIR VOICES ARE AS SWEET AT THEIR SMILES

circle of friends as "The Man with the Voice that Smiles," and, no doubt, many radio enthusiasts throughout the country, who have picked up WBZ, have expressed their admiration for McNally's announcing in equally glowing phrases.

"Mac" simply glows over the radio. He has a fortune of personality and he gets every ounce of it into his announcements. Gifted with the faculty of selecting just plain, homely but effective phrases, he brings his listeners close to him before his evening's announcing is five minutes old, and his "Good-night, folks, MCN," uttered when signing off, is always pleasant to the senses, but never welcomed by the tuners in who want "Mac" to continue.

William S. Tilton is the second of the group of announcers at the Westinghouse Radio Station at Springfield, Mass. Like McNally, Tilton also possesses a rare personality and his smooth baritone voice and composure of delivery makes him an ideal person for the announcing staff. Tilton is a singer of considerable merit and has appeared in concert at the local broadcasting station on many occasions. His musical training has come in handy many times at the studio when at a moment's notice he was expected to make a change in one of the artists' programs, entailing familiarity with and ability to pronounce immediately the name of some foreign composition and its author.

Alwyn E. W. Bach, the third personality at WBZ and by no means the lesser light of the announcing group, "goes big" as an announcer. Unless you have had the pleasure of meeting this genial personage, unknown to us, we are willing to wager that your visualization of him is miles wrong. You dreamed that he was light-haired, blue-eyed, short, squatty, middle-aged and otherwise uninteresting. You were more than miles wrong, for Bach is dark in complexion, has dark eyes and dark hair, is tall and unsophisticatingly young. His facial features are clearly defined and he is as handsome as he sounds good over the air.

Now that you know McNally, Tilton and Bach, WBZ's three prize announcers, try to appreciate how extensive are their duties while at work. Besides announcing, they have their hands full, caring for countless other functions. Their's is a he-man's job. The title announcers does not in truth do them justice. In reality, they are stage directors. It is their duty to regulate the distance between the artists and the microphone, and the microphone and the instruments. Playing host to the artists is another of their duties. They must make the artists feel entirely at home, and their smiles and geniality must be perpetual. The correctness of the programs, the comfort of the studio for the artists skillful management of the night's activities, and other countless details worry the announcers besides "getting over" their own clear-cut function of announcing.

RADIO FINANCIAL NEWS

Major General G. Harbord, President of the Radio Corporation of America, made the following statement recently:

"The Radio Corporation will this year pay the seven per cent. dividend on its preferred stock, which is cumulative from the first of January, 1924.

"It is anticipated that at the meeting of the stockholders to be held in May, the charter of the corporation will be amended so as to reduce the number of shares of authorized preferred stock from 5,000,000 to 500,000 and the authorized no par value common stock from 7,500,000 to 1,500,000 shares. The plan is to retain the capitalization of the corporation as at present authorized, but to create a par value of $50 for the preferred stock, to be known as 'A' preferred stock, for which the present preferred stock will be exchangeable at ten shares of the present for one share of the new stock and to exchange the present common stock at the ratio of five shares of the present stock for one share of the new or 'A' common stock.

"The exchange in cases where the present stock is not held in multiples of ten and five shares will be facilitated by the issuance of fractional shares of the new stock.

"The 'A' preferred stock will be entitled to receive seven per cent. dividends, payable quarterly, cumulative from January 1, 1924, the payment for the first two quarters of 1924 to be made in July. Shares of the present preferred stock not converted into the new, and fractional shares resulting from uneven multiples, will receive the seven per cent. dividend, payable, as may be determined by the Board of Directors, but cumulative from January 1, 1924. Stockholders who have not exchanged their preferred stock in time for a particular dividend date on the "A" preferred stock, will be entitled to any accrued and declared dividends on said "A" preferred stock after they make such conversion.

"The dividend rights of the preferred stock over the common stock, and the voting rights of each, will be preserved in this arrangement.

"After this change is effected, application will be made to list the 'A' preferred and the 'A' common stock on the New York Stock Exchange."

PRIZE CONTEST

HOW GOOD A LIAR ARE YOU?

They say a good liar is one who never gets caught. If so, there must be a great many good liars around this section of the country, for we hear some very tall stories from various radio operators. Here is what one chap told us yesterday. He has been working to increase the selectivity and he is now perfecting an attachment, so he says, which when in operation makes the subject so very selective that the police find that they can tune out the lies which their prisoner tell and get only the truth. This, of course, is a great help to the judges in sentencing the guilty parties.

Of course, the above narrator did not tell me it was a lie, but we have some doubts about its truth. What sort of stories can you send to this magazine? To the one who sends in the best story or the biggest lie we will give a prize of a year's subscription to the best radio magazine published. Yes, you have guessed it. We mean RADIO PROGRESS. Tell us whether you wish us to use your name or not.

Why a Loaf of Bread Costs Less

Bread is one of the chief foods in the United States, and when the price of a loaf of bread comes down, every one is interested. You will realize that bread is considerably cheaper now than it was a couple of years ago. Part of this reduction, of course, can be accounted for by the fact that it has fallen in price the same as everything else has. But at least part of the reduction is due to the fact that the spread between what the farmer gets for the wheat and what the baker pays for the flour has been reduced.

THIS STUDIO CUTS $.02 OFF THE PRICE OF YOUR LOAF OF BREAD

This reduction in what the middle man takes for his share has been accomplished very largely through the broadcasting of the prices to farmers, etc. This broadcasting service has been undertaken voluntarily by the Chicago Board of Trade at no cost to the farmers.

This broadcasting grain price quotations by radio from Chicago is an important service to the farmer. Through it he is enabled to keep in close touch with the Chicago Board of Trade, miles distant from his farm. By tuning in on a radio receiving set he is virtually at the market place every half hour of every business day.

The radio service from Station WDAP, owned and operated by the Chicago Board of Trade, starts at the opening gong at 9:30 in the morning. The busy hall of the Grain Exchange is crowded. Overnight orders to buy and sell grain are rapidly executed. Buyers, representing the consumer, seek the lowest price. Sellers, representing the producer, seek the highest prices. The figure at which these two forces meet represents world values.

Over at one side is a man in a glass cage. He is in direct communication with the powerful radio sending station—WDAP. The opening prices are registered. Without the delay of a second these are transmitted to the radio sender at the radio station and broadcasted to the world. Miles away, out in the grain belt, a farmer wants to know whether the time is opportune to ship his grain. He tunes in on his little radio receiver and what he hears runs about as follows:

"WDAP, Chicago. . . . . Opening prices on the Chicago Board of Trade . . . . May wheat . . . . one twelve and a quarter . . . . July wheat . . . . one nine and a half . . . . "

Then follow other quotations on grains and provisions, with important market news comment. At half-hour periods from the opening of the market until the close at 1:15 the quotations are broadcast, and thus made available to a legion of farmers and distributors. It is a milestone in marketing progress.

Hardly had the radio become practical when its value in the dissemination of price quotation was recognized at the centre of world grain trade. A test period of broadcasting was opened. In a short time hundreds of letters and telegrams came pouring into the Board of Trade from scores

of cities, towns and villages commending the service. They came not only from farmers, but country elevators, shippers, banks, business houses and educational institutions that use the quotations in class work.

"The imagination falters in measuring the full significance of radio," commented Henry A. Rumsey, Chairman of the Board of Trade Radio Committee. "Forces of no less promise have written strange history. In the grain and produce market alone, wonders will be accomplished. It will not be long until the farmer in the field follows the course of his daily market as closely as the merchant on the trading floor. And that is precisely what the Board of Trade wants. It has spent a fortune in an effort to give the farmer first-hand information on the ever-shifting world supply and demand. The grain trade is determined to aid the farmer in this end and in every other manner commensurate with sound economics."

As Chicago is the largest grain exchange in the world, the quotations are of vital interest to every one concerned with the production or distribution of these commodities and to persons in scores of related industries. Chicago is the gateway to the great fertile gardens of the central valley. Through this gateway some 400,000,000 bushels of grain are poured each year. For three-quarters of a century the farmer has found at this gateway a continuous market in which he could dispose of his grain at any hour of any business day at prices based on world supply and demand. This market has been provided by the Chicago Board of Trade, and the radio has brought this market to his very door.

Prices are not made by the Board of Trade. The Board of Trade provides a market place and records prices at which commodities are bought and sold. It enforces fair and equitable rules. The machinery which moves the vast quantity of grain handled on the floor of the Exchange is supplemented by the futures market. By its system of futures contracts the Grain Exchange has harnessed speculation and made it serve the public good. The speculative market in grain makes hedging or price insurance possible. Hedged grain is grain which carries insurance against loss by price changes. It is an axiom of economics that there can be no ownership of property without risk. Through the Grain Exchange system of hedging, protection is spread over the raw product from farm to mill. This insurance elsewhere unobtainable is as necessary as insurance on one's house.

The Board of Trade operates under strict government supervision. It complies rigorously with the provisions of the Grain Futures Act. Under this act the Board was designated a contract market by the Department of Agriculture, thus giving the association and the futures market the official stamp of government approval as now operated. The market meets the needs and wishes of the farmer, the distributer and the consumer, and is rendering an invaluable public service.

The radio has placed at the disposal of the farmer all salient features of this machinery of crop information and marketing. It has virtually placed him on a footing with the most enlightened merchant in the world grain and produce markets. The radio magic is his. He merely stretches phantom fingers in the air and pulls it down.

So much for the service WDAP gives in the daytime. In the evening (excepting Monday) we are assured the general radio public is delighted with the excellent programs which are sent out. As a matter of fact, these programs have a double importance, since Chicago is just about the center of the United States, speaking from a broadcasting point, and radio fans use this station as a sort of test to see whether their sets are working properly or not. The illustration of this station shows very clearly the broadcasting studio. You will notice the microphone against the rear wall and the large radio set in the center of the picture. On the right is a globe of the world, showing by pins stuck into it the extreme distances at which Station WDAP has been heard.

—Kadel & Herbert

WORLD'S LARGEST VACUUM TUBE

This picture shows the largest Radio tube that has ever been built. It is on inspection at the Radio Show, Grand Central Palace, New York. It is modelled for the WD-12 Radiotron, which operates on a single dry cell. However, a single dry cell large enough to operate this tube would have to be carried around on a five ton truck. Of course this tube does not actually operate. If it did you would not be able to hear yourself think, it would be so loud.

At the Radio Show it is lighted up, and it certainly makes a very pretty sight. Every one at the show stops to admire and wonder at it, and are thankful that they do not have to replace it if it burns out.

Re-radiation, or Your Neighbor's Pigs

How to keep their squeals at home

(*From an address by* H. V. S. TAYLOR; *broadcast by* WJAR, *the* Outlet Co., Providence, R. I.)

The subject Re-radiation might be translated into "Keeping Your Neighbor's Pigs at Home" or, rather, keeping their squeals at home, since it is mostly the re-radiation from your neighbors' sets that causes the horrible squeals in your own radio. Just what is this thing with the long name, how is it caused, and how avoided?

"Radiation" is the name of what happens when the broadcasting station puts the bedtime story on the air, and "Re-radiation" is the same thing when the radio next door adds a squeal obligato entirely of its own composition. Of course this is a form of relaying. There are two ways of relaying. One kind is practiced by WJAR, the Outlet Company, Providence, R. I. (the Gateway to Southern New England), every Sunday night. By this means we are able to hear our friend Roxy from the Capitol Theatre, New York. Briefly, the method of doing this is to send the music over a special long distance telephone toll line to the sending studio of the local broadcasting station, where it is connected directly with the microphone circuit. In this way the voice current is fed to the sending tubes, just as if it came from the studio a few feet away, instead of from the New York studio, several hundred miles away.

Is Your Set Regenerative?

The other way of relaying is worked by a great many, perhaps most, regenerative sets. A regenerative set, you will remember, is one that has a tickler or feed back, to control the loudness of the music. When such a radio is set with the tickler turned up too high, then it will cause a squeal, not only in that radio, but in all radios within a radius of several blocks. If the feed back is adjusted so that it doesn't quite squeal, it still may radiate a lot of energy at the same wave length as the station that it is tuned to.

Of course *all* listeners within a few blocks are not inconvenienced by this action. Indeed, many fans are delighted by such an occurrence. I refer to crystal set operators. You have all heard of crystal sets which are able to get KDKA (East Pittsburg) or WGY (Schenectady) with fair regularity. Perhaps you are the proud possessor of such a set. If you are, please omit the rest of this paragraph, as I don't want to offend you. It is found that crystal sets cannot receive over 20 or 30 miles. This refers to broadcasting on the 250 to 550 meter band; with code, dots and dashes, at long wave lengths, several hundred miles can be covered. That means that you are not getting broadcasting programs over 30 miles away directly from the sending station, but are getting them relayed from some powerful tube set which is being operated within a few blocks of your own set.

How can I prove it? Well, if you take the best crystal set on board a ship, and then put out to sea thirty miles (first scanning the horizon with a telescope to prove that there is no other set within several miles), you will find that the crystal set is not able to get the most powerful shore station at all. In such a case you know that there is no chance for re-radiation, and so you don't get the distant station.

But, unfortunately, we don't all feel so kindly disposed towards the neighbor's tube set. This is the way it works out: I am listening to a minstrel show being broadcasted from KDKA. The interlocutor addresses the end man:

"Mose, can you tell me why a pretty girl is like a kiss in the dark?"

"No, Mr. Splinks, I can't. Why *is* a pretty girl like a kiss in the dark?"

Why is a Pretty Girl?

"Why, Mose, I am surprised at you; it is because a pretty girl is 'whee-ou-oo-ou-whee whee-oo-squeal-oo-squeak,'" puts in my neighbor's radio, and the result is that I never *do* find out about that pretty girl unless I try it myself.

How can all this disturbance be prevented? Undoubtedly the surest way is to take a .32 calibre Colt in your pocket and shoot that neighbor on sight. However, this is illegal in some states. Even at that, if the jury happened to be composed of radio fans, they would probably bring in a verdict of justifiable homicide.

Another cure for this condition is the substitution of non-radiating sets for the regenerative sets now so popular. The trouble here is that such sets are quite expensive, costing from $175 to $425, and are usually harder to operate. But the worst feature of the situation is that it does you no good at all for *you* to buy such a non-radiating set; by doing so you are helping your neighbor only. To help yourself, you have got to persuade *him* to scrap his old set and pay a few hundred dollars for a new style radio. There is the whole difficulty in a nutshell.

It is needless to say that we can hardly expect all our neighbors suddenly to become so altruistic as that. Some people are now advocating passing a law forbidding the use of regenerative sets, but it seems extremely unlikely that such a law could be passed, or could be enforced even if passed. At least such relief will be a long way in the future.

Another possible way out is the development of some device which may be attached to the radio to prevent its radiation. In general, such a device would probably consist of a radio frequency amplification unit, to be connected ahead of the detector. Such a unit may now be obtained, but its operation is somewhat difficult, and it adds considerable complication to the set. Furthermore, it too has the serious drawback that it doesn't prevent the neighbors from squealing in your ear, but does prevent you from squealing in your neighbor's ear. It is rumored that an attachment of this sort is now being developed; one that will be so low in price and easy in operation that everybody can afford to use one. That would be an ideal solution.

Of course, anything which makes your own set sharper in tuning will help minimize your trouble. But it will not entirely eliminate it for this reason. Suppose you happen to be listening to a station sending on 360 meters. Your neighbor, Bill, starts squealing on the same wave length. Now, if you have a good set, it will bring in anything going at the particular wave length it is adjusted for, so right away you get the full benefit of Bill's solo.

This is too much for you, and you leave the station you had been enjoying and turn your dials so as to get a station at say, 380 meters. That is all right until Bill joyously twirls his dials, too, and takes up his squeal where he had left off a moment before. Driven to desperation, you turn to 420 meters, and, true to form, so does friend Bill. In this way you can play hide and seek with him as long as your patience and his persistence hold out.

In this connection I might mention a friend who asked how to adjust a set so it would be as sharply tuned as his friend John's.

"And how sharp is that?" he was asked.

Tuning Out the Flute

"Why," he replied, "John has a set that works like this: He was listening to WGY playing a violin and flute duet last night. But it so happens that John likes a violin and hates a flute, so he tuned out the flute and got the violin as a solo."

Unfortunately, we were unable to advise him how to tune his set as sharply as that.

One more suggestion: If each operator would master his set, and learn to operate it properly, it would go a long way toward clearing up the trouble. Lots of people do not realize that they are spoiling the enjoyment of everyone around them by having their tickler or feed back turned on too strong. When they have this brought to their attention they are usually willing to change their methods; almost anyone will make a small sacrifice if he knows that by so doing he will add greatly to the happiness of his neighbor.

The proper way to tune in a regenerative set is to turn the wave length dial (the one that picks out the station) right into the middle of the whistle, and then turn back the tickler until a slight additional adjustment on the wave length dial will cause a whistle so low in intensity that it can hardly be heard. Then you will have your set on its most sensitive adjustment, i. e., just on the point of oscillating. And your friends and neighbors will rise up and call you blessed.

In the next issue of RADIO PROGRESS a clear explanation will be given of what happens in a radio when it oscillates, and why.

THE FIRST RADIO INSPECTOR FOR NEW ENGLAND

Harry C. Gawler, for the last three years attached to the Sales Department of the Radio Corporation of America in New York, has severed his connections with this company and entered the employ of the General Radio Company of Cambridge, Mass., in the capacity of sales promotion manager, taking up his new work on November 1.

As a radio man, in both the administrative and technical branches of the service, he is known by engineers, radio operators, amateurs and a host of business men identified with the merchandising of radio apparatus.

Gawler is an advocate of the strenuous life, as his career testifies:

Born in Washington, D. C., 41 years ago, he enlisted in Troop A of the Sixth United States Cavalry, and served during the Boxer War at the age of 17. With a natural leaning towards things electrical, Gawler first made his appearance in radio circles in 1904, when he joined the Communication Division of the Navy. He later entered the employ of Prof. R. Fessenden, remaining as an assistant to this well-known scientist in the radio field until 1910; then he accepted the position of chief operator of the New York Herald wireless station, after which he became a radio inspector for the United States Department of Commerce in the New England District.

As you probably know, Mr. Gawler was the first radio inspector in New England, and won his way to the hearts of amateurs in this district.

A New Language Spoken in America

You talk it yourself, but do you understand it? You will if you read this

By VANCE

You are one of the vast number of radio fans throughout the United States who is interested in radio to such an extent that you are willing to learn a new language to express the thrills that come to you every night about 8:15, when your favorite broadcasting station announces: "This is Station XYZ about to broadcast a program as follows." This new language contains all sorts of terms such as "variocoupler," "grid leak" and "bias-potential." You doubtless are able to talk quite learnedly in these terms, and your friends all put on a wise look and come back to you with similar jargon, but the question is, Would you know a bias-potential if you should meet one in the dark? Would you call a plumber if you suddenly ran into a grid leak?

As an aid to the radio recruits who are not familiar with all of these terms which are ordinarily used on the page, this series of articles is being written with the intention of bringing vividly to your mind the real thing that lies behind each new and unfamiliar term.

How Intelligent Are You?

To begin with, I am going to assume that you are quite intelligent. Do not feel flattered too soon. I am also going to assume that you are ignorant of radio terms, and so I will start at the beginning.

The first thing you see when you turn to the radio page in our newspapers is a reference to "wave length." Are you entirely sure you know just what is meant by a "wave length?" If you go out on the ocean in a small boat when it is rough, your stomach will tell you exactly what "wave length" means. Suppose you and a friend are out fishing in two small boats and the wind is blowing hard enough so that it has kicked up some large waves. You want to measure the wave length and so you keep rowing away from your friend until you get to just the right distance so that when his boat bobs up yours does, too, and when his drops into a hollow so does yours. Now measure the distance between the boats, and this will be the wave length of the ocean.

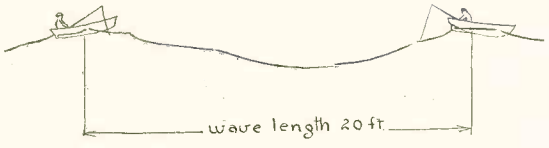


Figure 1. When Both Boats Rise and Fall Together the Wave Length is the Distance Between Them, Here 20 Feet.

Or, to put it another way, if you will measure the distance from one peak to the next peak, or from hollow to hollow, this distance is the wave length expressed in feet. You will notice that in radio magazines instead of expressing wave length in feet, it is always in meters. A meter is about a yard long (to be precise, 39 2/5 inches), so you can immediately translate the term meter into yards.

A station like WDAP, Chicago, having a wave length of 360 meters, might be said to have a wave length of just about 360 yards. This is about one-fifth of a mile. If you could *see* wave lengths coming from this station, every fifth of a mile a wave would come to a peak with valleys in between. These series of peaks and valleys would stretch away out into the air as far as the eye could see. Of course, no one has ever seen a radio wave, so we will put this conception in another way.

Suppose you have in your pocket a little compass, which could spin around just as fast as the radio waves come in, pointing alternately north and south. Let this little compass whirl around at the same speed as the radio wave. Then give a similar compass to a friend and let him walk down the street watching his compass. At an instant when your compass pointed due north, his would probably not point north, but in some other direction, and as he walked further away from you, his compass would diverge more and more until a position would come when his pointed just opposite to yours. Both compasses would be turning all the time, you understand, but at any given instant yours would point north while his pointed south. If he continues to walk still further from you until he reaches a proper distance, he will find a spot where his compass will point north just when yours does, and will keep in step with yours all of the time. If you measure the distance between you now, you will find it is just exactly 360 meters, or one-fifth of a mile. This is because it is a 360 meter station that you are measuring; if it had been WGY (Schenectady) the distance would have been 380 meters.

Try This on Your Clothes Line

Still another illustration of a wave length is seen on a windy Monday, when the washings are taken in off the family clothes line. As you notice the clothes line whipping in the wind, you will see that in general it does not swing as a whole, but sways back and forth in short sections. If the clothes line is, say, 60 feet long it may swing in two 30-foot sections, or perhaps three 20-foot sections. While these waves will not be as clearly defined as the waves on the ocean, still it is easy to see them if you look for them, and in the above case the wave length would be either 30 or 20 feet, depending on how fast the wind was whipping the line.

This brings us immediately to the point of how fast the waves go up and down, or, as it is called, oscillate. Referring again to our clothes line, we find that if the wind is a light one and it swings the line only once every second, the wave length is long, whereas if it is a brisk wind and swings it fast, you will see that it swings in a lot of short sections; correspondingly the wave lengths are short.

A rather pretty illustration can be made at this point by taking a clothes line, tying one end to a post and holding the other in your hand so that you can swing it around and around.

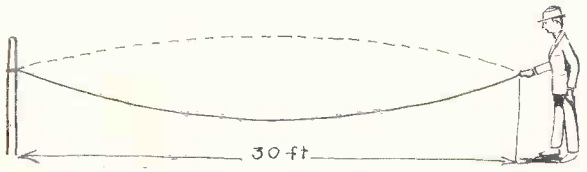


Figure 2. One Wave Per Second, 30 Feet Long.

Referring to figure No. 2, I have in my hand a clothes line 30 feet long and am swinging it around and around once every second. In the picture the full line shows the rope in its lowest position and the dotted line shows it an instant later in its highest position. You see that it makes a single wave, and the wave length as measured from valley to valley, that is, from the pole to my hand, is 30 feet.

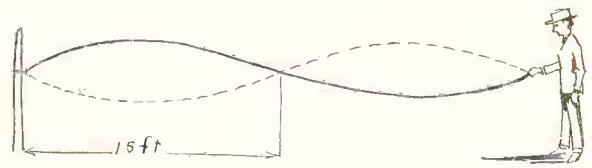


Figure 3. Two Waves Per Second, 15 Feet Long.

Suppose now I spin the rope around just twice as fast; that is, two revolutions per second. What will happen? Look at figure No. 3 and you will notice that the rope now has two waves, each 15 feet long. That is, as we double the speed of vibration we have a wave length half as long. What would happen if we should turn the rope three times as fast, that is, three times per second? I think you will be able to tell me right away what the answer is. Of course it will cut the wave length down to one-third, that is, 10 feet. A glance at figure No. 4 will verify this.

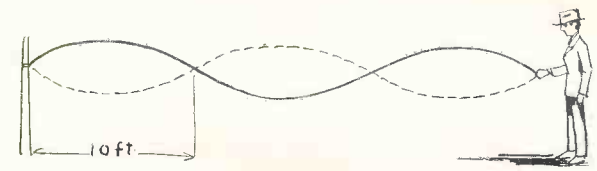


Figure 4. Three Waves Per Second, 10 Feet Long.

You see, then, that by speeding the frequency or rate of vibration up to three times as fast we get a wave length one-third as long. Now this same law holds right straight through the science of radio. Whenever you hear of a station with a short wave length, you know right away that the speed of vibration must be high, whereas a station with a long wave length is one that has a slow vibration.

Take two popular stations, for instance, like WSAD in Providence, which is 261 meters, and WEAF in New York, which is 492 meters. You will notice that the latter has a wave length nearly twice as great as the former. What can we say about the relative speed of vibration? Why, obviously, WSAD is spinning its rope (sending out waves) just about twice as fast as WEAF. As a matter of fact, this is the only difference in the waves which are sent out by these two stations, and when you want to tune to Providence you adjust your radio so that it will vibrate fast, and when you want to get New York, on the other hand, you turn the dial so that your radio will vibrate slowly.

What Do the Letters KC Mean?

You will notice on the radio page that right after wave length you will often find another figure, followed by the letters KC. This is the abbreviation for kilocycles. As an illustration you will notice that KDKA is recorded as 326 meters, or 920 KC. Kilo means thousand. For instance, when you pay your electric light bill each month you will notice it specifies so many kilowatt hours. By this they mean thousands of watt hours. It is easier to say that a certain generator has a capacity of five kilowatts than it is to say its output is 5,000 watts, but they both mean the same thing. So when you say that KDKA has a frequency of 920 KC (or 920 kilocycles) it means that the speed of vibration is 920,000 times per second. To come back to the clothes line illustration, instead of spinning it around three times per second, we are spinning it around 920,000 times per second. This frequency corresponds to a wave length of 326 meters. As you increase the wave length up to 492 meters, of course this cuts down the frequency or rate of vibration in the same proportion and so we will find that a wave length of 492 meters corresponds to a frequency of 610 kilocycles.

Faster Than You Can Think

This brings up the question: Why have they changed the rating of stations on the radio page? The call letters of each station used to be followed by the wave length only, but now they give the kilocycles, too. The reason is that it is much easier to understand the latter. If I tell you I am swinging my clothes line around three times per second. then I bring a definite image to your mind immediately without any previous instruction. If, on the other hand, I tell you the length of the clothes line wave is ten feet, you have to do some mental figuring before you can get an idea of what I am talking about. So when you know that a station like WDAP in Chicago is sending out vibrations so fast that they go up and down 833 thousand times per second (833KC) you can wonder at the tremendous speed and, in fact, get a definite idea of what is happening, but do you realize that I mean the same thing exactly when I tell you the wave length of WDAP station was 360 meters?

This change in rating the stations has been advocated by the Radio Conference recently held under the auspices of Secretary Hoover, and it is hoped that all newspapers and technical magazines will adopt the suggestion as soon as possible.

If you happen to be a radio recruit and find that this discussion makes the matter of wave length and frequency any clearer to you than before, we would appreciate your writing to us giving us a list of terms which you have met in radio which are puzzling to you. If you will do this, you will get a discussion of them along the same lines as this article in a later issue of this magazine.

A Fool Proof Radio

A crystal set without any dials, condensers or sliding contact

Many radio owners having complicated sets, which at times seem to contain a mixture of a life size zoo and a Saraha sandstorm (judging by the sounds) are sometimes interested in a simple crystal set, which is absolutely trouble proof, guaranteed not to squeal, and has nothing but the phones to get out of order. Do you think it can be done? Then try this one:

Make or buy a form for winding a spider web coil. This consists of a fibre disk, five inches in diameter, with thirteen slots cut around the edge, leaving thirteen projecting arms. These disks can be bought for five cents each, but may be cut out of a piece of cardboard with a pair of scissors, if the disks are not obtainable.

To wind the coil use about fifty feet of double cotton covered magnet wire. Either No. 22, 23, or 24, will be equally good. In winding the coil let the wire pass above two arms, then below two arms, then above two arms, then below, etc. By this means considerably more wire may be wound on than if it were put above *one* arm and below *one* arm, etc. Wind on fifteen turns, then make a loop in the wire about one-half an inch long, then wind on five more turns (total twenty), then another loop. Continue this process of making loops every five turns, at 25, 30, 35, and 40 turns. This will leave six half-inch loops projecting out from the coil. These loops should have the insulation removed by scratching the wire with a knife or rubbing with sandpaper, so that connection can be made with a clip, as will be explained in a later paragraph. Now continue to wind the coil until you have reached seventy turns in all. This completes the winding.

For a cabinet to put the coil in, any ordinary cigar box of a size holding fifty cigars, is quite satisfactory. This may be soaked for a short time in water, which will remove all the paper labels. After the box is dry a coat of mahogany stain, obtainable for ten cents, gives the box a nice finish.

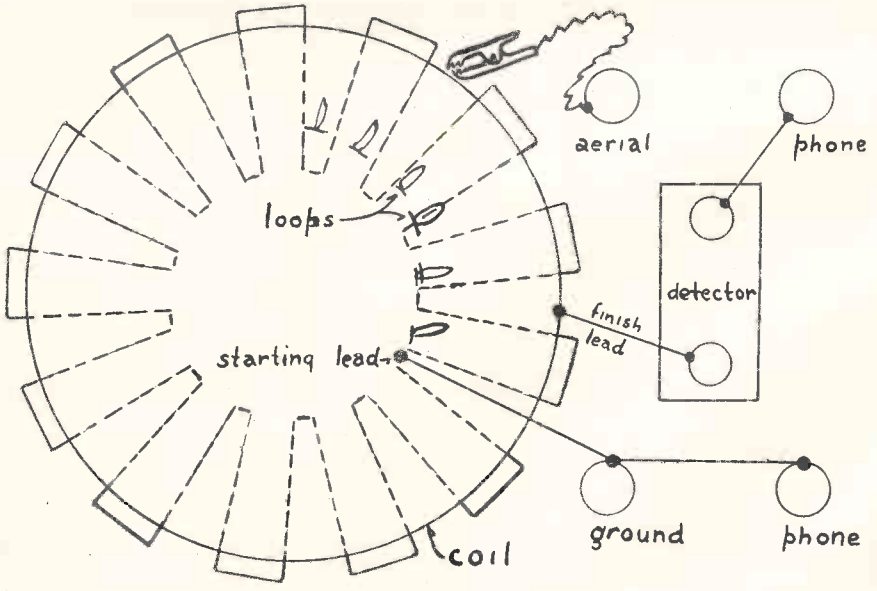
Remove the cover, and put the coil into one end of the box with the half-inch loops projecting up. It makes no difference how the coil is turned around. The coil may be fastened by a few small curtain tacks driven in around the outside. You are now ready to make the connections.

The next requirement is a crystal detector of the style that sells at from ten cents to twenty-five cents and four binding posts. These binding posts may be mounted in the cigar box at the opposite end from the coil; this gives convenient arrangement.

One way which gives a neat appearance is putting the binding posts on the four corners of a square with the crystal detector in the center.

The connections of the set are simple. The two binding posts nearest the coil are for the aerial and ground. It makes no difference which is which. The other binding posts are for the phones. Referring to the diagram, hook up the coil and binding posts as follows: One of the phone terminals runs to one of the detector terminals, the other detector terminal is connected to the finish lead of the coil; the starting lead of the coil is connected to the ground and the other phone post. The aerial post has a short length (about four inches) of flexible wire connected to it. On the other end of this flexible wire solder a small clip. This clip is used to make connection with some one of the six projecting loops, which were left in winding the coil as described above. The radio is now ready to operate.

To adjust the radio, connect your phones to the phone binding post and the aerial and ground to the other two binding posts, as shown in diagram. The wire with the clip



YOU CAN MAKE THIS SET IN LESS THAN AN HOUR

is marked "aerial" and the other "ground," but as a matter of fact it makes no difference which is which. After these connections are made attach the clip to any one of the six projecting loops, and then adjust the cat whisker of your crystal detector. You can tell when you get a sensitive spot because local broadcasting will come in fairly loud through the phones. When you have found such a spot then shift the clip on the flexible wire to one after another of the six loops and you will find your station comes in considerably louder on some one loop than on any of the others. Mark this loop and in the future use only this one for receiving from this particular station. If there is more than one local broadcasting station, you will undoubtedly find each station comes in best on its own particular loop. This, of course, is found by trial.

In general, not more than one or two loops are ever used, but it is necessary to supply several in order to compensate for different lengths of aerial. If you have a long aerial, about 125 or 150 feet, you will use the 15 or 20-turn loops, whereas a short aerial, of say, 40 feet, will require the 35 or 40-turn tap. However, with any one aerial only one tap should ever be used for a given station, once it is found to be the best.

If you use one of the modern crystals, which is sensitive all over, such as the "Audion" Crystal, it is unnecessary to adjust the cat whisker, because it is alive all over. This means that you can leave the set in permanent adjustment all the time, and your little girl, three years old, can hear the bedtime stories in the evening by just slipping the phones over her head.

Although this is a simple set to build and operate, it is considerably louder than most of the crystal sets on the market. The reason is that you will notice there is no sliding arm for adjustment. Such sliding arms have the rather serious defect that they almost invariably short circuit one or more turns of the coil by touching two or three wires at once. Any short circuit on the radio set means less energy, but it is well nigh impossible to balance the sliding arm right on the top of a single turn. As the above set does not have a sliding arm, but depends on a non-sliding clip for its adjustment, it cannot short circuit any turn, and so the result is that the music comes in loud and clear.

"Stand by, Please," for Roxie and "Gang"

One of the most universally interesting events that have taken place in Providence in many moons is the expected arrival of "Roxie" and his famous "Gang," from the Capitol Theatre, on Sunday March 16, when they will give two concerts, at 3 and 8 o'clock p. m., at Emery's Majestic Theatre, the concerts to be broadcast through WJAR, the Outlet Company, and WEAF, New York.

A reception and dinner will be given in their honor at the Shrine Club Sunday evening, and Monday they will be guests of Station WJAR and the Town Criers.

Although these entertainers have never given Providence the thrill of their visit before, one cannot help feeling that they are friends of long standing.

"Roxie," as he is known to his local admirers, holds, as director of the Capitol Theatre, the distinction of being the foremost motion picture exhibitor in America. His magnetic personality has drawn to his side a staff of artists whose personalities are each interesting in their individual way.

David Mendoza, although still in the twenties, enjoys the distinction of conducting the largest theatre orchestra in the world—consisting of seventy-five pieces, a band of symphonic standards. He originally studied the violin under Kneisel, and has had a thorough apprenticeship under Mr. Rothafel's direction in the various theatres on Broadway.

Dr. William Axt, or "Dr. Billy," as he is less conventionally known, is a musician and composer of note, having conducted operas under the regime of Oscar Hammerstein, as well as some of the more stupendous productions directed by Morris Gest. "Dr. Billy" is the unfailing accompanist of all "Roxie's" programs, and his veritable right hand.

The eloquent 'cello of Yascha Bunchuk, solo 'cellist of the Capitol Orchestra, itself speaks for the musicianship of this young artist. Bunchuk is a young Russian who distinguished himself in his studies at the Petrograd Conservatory of Music, and attracted the attention of American officials in Constantinople, who arranged for his coming to the United States.

Eugene Ormandy, concertmaster of the Capitol Theatre Orchestra, has enjoyed association with several of the prominent symphony orchestras in this country.

Among the interesting personalities of the singers is that of Gladys Rice, the clever daughter of the one-time famous vaudeville team of Sally Cohen and John C. Rice, who will be remembered by the older generation of theatre-goers.

Betsy Ayres and Marjorie Harcum are two daughters of the South who came to New York, the Mecca of fortune seeking artists, and although unknown and unaided, by sheer virtue of their merit and personality, won themselves a place in this organization.

Florence Mulholland, contralto, is another artist who achieved her present success in a similar manner.

The rest of the broadcasting group who will be seen and heard in Providence on the 16th include Douglas Stanbury, baritone; Evelyn Herbert, soprano; Peter Harrower, bass ("Peter the Great"); Joseph Wetzel, Ava Bombarger, Susan Dunbar, Alex. Koszegi, viola player, William Robyn, "Wee Willie," a diminutive tenor with a glorious lyric voice, Mlle. Gambarelli, who has been for a period of almost four years premiere danseuse of the Capitol Theatre, and who adds a unique touch to the ensemble, for Miss Gambarelli brings not only her own distinctive and outstanding art, but will also be heard in those quaint Italian pattern songs which have endeared her to her unseen audiences.

Of special interest is the coming of James Parker Coombs, the "Daddy" of "Roxie's" gang, who will be remembered in local annals as an alumnus of Brown University. "Daddy Jim" has had a checkered and interesting career since the days when he sang in the Brown Glee Club, and many of his friends and former associates are looking forward with interest to this reunion.

Those two clever manipulators of the ivories, Phil Ohman and Victor Arden, whose tuneful melodies have added to the enjoyment of "Roxie's" Sunday night programs, are also coming.

Radio's Role at the North Pole

Captain MacMillan tunes in as the earth spins under him

As you sit in the privacy of your home, or at your club, listening to the news of the week being broadcast at midnight, Central Standard Time, every Wednesday, to Dr. Donald B. MacMillan, the Arctic explorer, who is now frozen in within 11 degrees of the North Pole, do you realize that less than a year ago Dr. MacMillan did not know what radio could do for him, and that the Arctic circle was completely cut off from the rest of the world?

On March 21, 1923, Dr. Donald B. MacMillan, F. R. G. S., in Chicago on a lecture tour, sat that evening as guest of honor at a duck dinner given by U. J. (Sport) Herrmann at the Hotel Sherman. He was in the midst of a picked lot of congenial souls, comprising mostly naval officers and yachtsmen.

Captain MacMillan was called upon to tell about the North Pole region. Uppermost in his mind was the contrast, which that very moment presented, to the vacant, tedious and interminable hours that were his lot the while he spent in the Arctic circle. North Pole life held a fascination for him for 16 years of actual sojourning, but all that time he had been beset by a spectre. Here he was thinking of going back on another expedition and he faced the same grim spectre—not the cold, not the lack of food, not any of a long list of privations and hardships common to that region, but the awful solitude—black and intense solitude. He had seen it craze men. He recalled one expedition in particular when this tragic fate befell a number of the crew, and the only way the remainder of the party could get back to safety was to shoot them.

E. F. McDonald, Jr., owner of the powerful Edgewater Beach Hotel Broadcasting Station and President of the National Association of Broadcasters, sat alongside of Captain MacMillan.

What's the Pole Without Radio?

"Why in the world don't you take along a radio receiving set?'" was McDonald's immediate question.

"Haven't room," replied MacMillan.

"Great goodness, man," said McDonald, "do you realize how little space a radio set would take up—and don't you see what it would do? I don't mean a radio equipped with ear-phones, but a set with a big, loud-speaker that could be heard in all parts of the ship. Why, at a single stroke you would eliminate, by your own testimony, the most terrible hardship of your entire voyage. Your men could listen to the same concerts, the same orchestras which they would be hearing if they were at home, could get all the news of the day, could even receive direct messages from their families back in civilization. Give me space no bigger than that"—McDonald measured the limits with his two hands—"and I'll not only furnish the radio that will do all this, but have it installed and let you try it out."

"All the space I've got left," said MacMillan, "is four cubic feet. If you can do it in that, go ahead."

Bowdoin Radio Equipped

This conversation took place in March. Two months later the idea of radio communication had made such an appeal to the explorer that he had arranged to take with him, not only a standard Zenith receiving set, but also a 500 watt Zenith transmitter, and had told the carpenter to rip out four bunks in the forward end of the forecastle to make room for it.

On the 23rd of June the staunch ship Bowdoin, captained by Dr. Donald B. MacMillan and carrying the first radio set to venture into the land of perpetual ice and snow, sailed forth. All the people of the country side turned out to bid the crew God-speed; whistles blew and cannons boomed.

Hiram Percy Maxim, the distinguished inventor, and Messrs. K. B. Warren and Fred Schnell, associated with Mr. Maxim in the American Radio Relay League, temporarily set upon the dock a Zenith receiving set, and for the first five miles or more they used it to receive and transmit messages. To accomplish this latter purpose, they set the secondary tuning on the wave length that the Bowdoin was operating on, threw the tickler into the extreme oscillating position, and by touching the primary circuit with a moistened finger sent back their replies in international Morse code.

Donald H. Mix, radio operator aboard the Bowdoin, was furnished to the expedition by the American Radio Relay League at the league's expense. He was chosen from among a great number of applicants for the coveted position.

So the Bowdoin drove north under sail and motor power, heavily loaded with drums of fuel and oil, and supplies and provisions enough to last several years—and the personnel were the captain, his crew of seven, and E. F. McDonald, Jr., who, as a visitor, went as far as Battle Harbor, Labrador.

McDonald Recounts the Voyage

Upon his return from that memorable trip Mr. McDonald wrote "With MacMillan and Radio North of Civilization," in which he narrated his experiences. In that account he mentions, among other things, of having visited in company with Captain MacMillan, Paraquet Island, famous as a rookery of the puffin, which is known as the "Parrot of the Arctic." The bird is wonderfully colored, has the characteristic parrot bill, and feeds on fish. Millions swarm the island, which is scarcely a mile square. To bring the puffins out of their hiding places it was only necessary to lie on the ground for a few minutes—then the heads began to bob up all around.

Although June, snow was in evidence everywhere on the mountain tops, enormous blocks of ice studded the shore,

and at one point 89 icebergs were visible from the crow's nest.

Several stops were made en route. Wherever the Bowdoin touched shore, the people were agog with excitement over the radio carried on board, and wonderment struck high when they listened to voices and music from the far-away United States, the land which they knew but little and none had seen. Electric lights, telephones and such developments, which have long been "necessities" to us, are of course only names to those people.

On July 4, with the icebergs completely surrounding them, the MacMillan party received the returns of the Dempsey fight.

Mr. McDonald made an interesting allusion to Dr. MacMillan himself. "What I enjoyed as much as, if not more than, anything on the whole trip, was the opportunity to get to know that wonderful optimist, Captain Donald B. MacMillan. To me his optimism is unparalleled. If it rains, it rains. If it is cold, it is cold. If there is a mishap of any kind, it is accepted by Captain MacMillan in contented spirit and in full confidence that, no matter what occurs, it is for the best. He never looks backward, always forward. He sees a bright side to every situation, every occurrence."

When Mr. McDonald bid the explorers goodby they said that the comforting thought over the separation was in realizing that communication would not be cut off, as it had been on previous trips, until their return to civilization, but would be maintained by means of the first radio outfit to be introduced to the land of the Eskimo. And so it has come to pass.

Communication with MacMillan

On the stroke of 12 every Wednesday night a program is broadcast, which for uniqueness is unexcelled in the domain of radio. Within 11 degrees of the North Pole a little band of men at that very hour sit huddled together in the forepart of the schooner Bowdoin, "frozen in" for the winter. They are Dr. Donald B. MacMillan and his exploration party.

The deck of the boat is covered with snow, to shut out the cold and keep within the little heat it is possible to generate. Stretched between the high masts of the Bowdoin is the antenna wire. The look of expectancy brightening the faces of these men and the eagerness with which their eyes are bent on the Zenith radio receiving set in the captain's quarters can readily be imagined. For they are about to get word from home. And, as they hear a familiar voice, "This is Station 9XN" (the experimental call letters of WJAZ) calling station WNP "Wireless North Pole," breaking through the white stillness of the Arctic night, they tremble with delight. As often as the proceeding is repeated Wednesday after Wednesday, the same feeling of uncanniness overpowers them. Wonderful to get word from home once a week! What a change from the previous trips when each day was a year of loneliness and no word reached them except the trite gossip of the Eskimo! Think of being so completely cut off from communication as not to know about the world war until the return home, three years after the war started! But that was before the advent of the Zenith radio.

As these men sit and listen, a highly dramatic performance is going on in Chicago. Four thousand volts and 10 kilowatts are giving the words of Mr. McDonald of the Edgewater Beach Hotel Broadcasting Stations wings to carry them to the North Pole region. First he sends greetings to Dr. MacMillan and the crew. Then he reads to them letters and messages from friends and relatives—messages of weddings, births and deaths; messages of all sorts from home that might be of interest; Dr. MacMillan gets a report from his secretary in Boston; occasionally a friend of the doctor's will make an address. When the personal messages have gone their way over the air lanes, a resume of the week's news—the interesting and outstanding events of the world—is given. This is the weekly program. Station WJAZ and the radio set in the Bowdoin are the means of this remarkable feat of long-distance communication.

MacMillan Radios

Messages, however, are not all emanating from this end. Dr. MacMillan has been on the ether many times himself.

After MacMillan arrived in winter quarters, north of Etah, he radiod that they were near Cape Sabine, where 17 men of the Greeley expedition died of starvation in 1884. Only 24 miles intervened—a six-hour trip by sled. The Bowdoin had been unloaded and the food brought from the States was packed in boxes and stowed away on the shore. Hunting was good. The meat of five walruses was carefully concealed under rocks. They were busy providing for winter. Near by they found a cabin built 70 years before by the first American Arctic explorer, Dr. Elisha Kent Kane, who celebrated his farthest North in Smith Sound by hoisting a flag made from his cap lining and bound to a gun ramrod. They had met old friends of the last 15 years and learned the whereabouts of various members of the tribe. Influenza had played havoc among the Smith Sound natives—one-fifth of them were wiped away, many of Dr. MacMillan's expedition of 1913-1917. The house that Dr. MacMillan lived in for four years on a previous trip had been completely demolished, the site being marked only by scrap iron and rusty tin cans. Since wood is more precious than gold in that section, it was a result to be expected.

This is the substance of the first radiogram. Many others since. Some day they will make fascinating pages of MacMillan's experience in book form.

MacMillan's Defense of Peary

Dr. MacMillan heard that some one had again brought up the question of Peary's right to the title of discovery of the North Pole. He took occasion to broadcast his version of the question. And among other things he stated:

"Peary needs no defense. His record stands for all time and a day. By idomitable courage and everlasting persistency he won the 300 year prize for his country by contending against the best men that England, Norway, Sweden, France, Russia and Italy could produce. He accomplished the great feat not by drifting, or by slight, or by any other method, but by sheer hard work and the overcoming of difficulties too great to be grasped by the layman. The perfection of Peary's work, based upon his 20 years of experience, proved unfortunately to be his worst enemy at

THIS IS A SQUEAL HOUND SIGNING OFF —Kadel & Herbert

home. When compared with the feeble efforts and crude methods of former explorers and contemporaries, his work presented such a striking contrast and was so far superior in every way that the results probably could not be credited by the narrow-chested and narrow-minded men of his own country.

"Peary was honest. He believed he had reached the Pole —not the exact mathematical pin-point, the centre of that great moving field of drift ice which many petty minds maintained must be done (which is absurd and which will never be done except by chance), but the immediate vicinity of the top of the earth, so-called, which justified the claim, ... the proof that Peary reached the Pole is based, first, upon his absolute honesty; second, upon his twenty years of experience; third, on the perfect condition of his sledge and dog equipment; fourth, the condition of the ice of the Polar sea in 1920; fifth, the abundance of his food supply; and sixth, the statements of his white and native assistants . . . . not a single man, native or white, of the 25 who assisted in that Polar march doubts that his commander reached his goal."

Santa and MacMillan Visit

A few days before Christmas, Len Weeks, radio operator at Station 9DKP, Minot, North Dakota, while experimenting with his receiving set late one night, suddenly caught a call from WNP. Donald Mix, Dr. MacMillan's operator, reported that Jack Barnsley, Prince Rupert, British Columbia, through whom he usually relayed his calls, was on vacation, and Mr. Weeks took a message for the little boys and girls of the United States:

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DON'T BE A SQUEAL HOUND

In the underworld a crook has often found that a pal who knows too much may squeal on him. But in radio it is not the one who knows too much, but the one who knows too little that squeals. The interference caused by improperly operated regenerative sets has become so bad that every one is asking how to stop it. One of the most novel and interesting ideas is that started by Miss Helen Dickinson, a radio enthusiast of Yorkville. So great was the trouble in her neighborhood that she personally called on the owners of all radio sets in her vicinity and urged them to sign a pledge that they would not cause any more interference by making their regenerative sets squeal. She also gave instructions on the correct operating of a regenerative set, showing thereby that squealing was unnecessary. The result has been that radio has become enjoyable again in this part of the city. This is a good tip for others: "Don't be a squeal hound."

There are many that squeal intentionally, thinking thereby they can wake the other chap up to the fact that his radio set is wrong, but it does not work out this way. If your neighbor has such a poor ear that he cannot hear his own set squeal, how do you think he can hear yours, which is much fainter, since it is several blocks away? If he is such a dub that he does not know how to tune the squeal out of his own radio, how do you think he knows that you are whirling your dials to give him the hint? As a matter of fact, it is useless to add your squeal to his, thinking thereby that you will get him to shut his off. It just simply can't be done.

TWELVE THOUSAND EDITORS

It is said that every person knows he can do two things well, if he wants to. These are, first, to write a moving picture scenario, and second, to edit a magazine. We do not know much about the moving picture business, but we can tell you here is a chance to help edit a magazine. As a matter of fact, we want twelve thousand Associate Editors for RADIO PROGRESS, and we are counting on you as being one of them.

It is rather easy to sit in a comfortable chair and blue pencil the efforts of somebody else. It is also easy for our radio engineers to write descriptions of various radio hookups as they come out from time to time. WE also find it easy to get pictures of pretty girls with phones on their ears to show you, but the question is, just what do you want?

You Are Elected Editor

As one of the Associate Editors of RADIO PROGRESS we hope you will sit down right now and drop us a line, telling us what you think of the first issue of this magazine, and then go on and tell us what you would like to have us write about in future issues. If we can find out what you want, we have all the facilities for providing it. Unfortunately, we have no gift at all for mind reading; so we hope you will tell us just what you would like. Furthermore, if you have any interesting pictures on radio subjects, or are able to write descriptions of any sets you may have constructed, or can report any special radio happenings, send them in and we will give them publicity. Bear in mind, however, the two absolutely necessary qualities for any contributions: First, it must be interesting, and, second, it must be accurate. Remember, this magazine is going to be different from others, and so if you want to be an editor of a first-class publication, here is your chance.

THE FUTURE OF RADIO

It is a favorite indoor sport to try to predict what is going to happen within the next few years in any line of pronounced progress. Some one has said that a prophet is indeed wise if he leaves out all dates as to when his predictions will come true, because if they do not happen this year, maybe they will inside of one hundred years. He is indeed a bold man who will attempt to tell what radio will do, and put a date on his predictions. However, it is interesting to point out what radio has already done.

To our mind the most wonderful thing about radio is that it makes the world happier. This can not be said about a great many other wonderful inventions. Take the telephone, for instance. Can any one truthfully say that the world is much happier because of the telephone? To be sure, it is a great convenience, and if it were taken away from us now undoubtedly it would make us unhappy. But think back (if you are old enough) to the time when there were no telephones. In those days a fellow would make a date with his girl when he was leaving Sunday night instead of waiting until Wednesday, and then calling her up. If he wanted to invite her to some special party he would hitch up Dobbin and jog over to see her, instead of asking Central for "Lover's Lane 1234." Can we say he is any happier in these days than in the days gone by?

Of course, the business man finds the telephone a wonderful invention, but if you talk to the patriarch at the corner grocery out in the country he will tell you that conditions were much better in his day, fifty years ago, and he will indignantly deny that business is any more honest or better conducted now than it was then.

Matchless Days

Take such a simple necessity as matches. What would we do without them? Yet our grandmothers remember the time when matches were so scarce it was quite essential to keep one light or fire going in the house all of the time.

But when we come to radio the condition is quite different. Here it is not a case of utility, or of speeding up production, or of saving a few minutes. It is a matter of real enjoyment, and enjoyment of the highest type. You will remember that when broadcasting first started about two years ago the music we listened to was rather cheap and common, and the public taste was not what a musician would call very high, but in two short years, you might almost say in one, the character of broadcasting as done by the large stations has undergone a marked improvement.

To be sure, this is partly due to the efforts of the big companies, who are doing their best to put out worth while entertainments. On the other hand, a considerable amount of credit is due to the improvement in public taste. If you will check up with any of the announcers at the broadcasting stations, you will find that the better class of music is more and more in demand all of the time. We do not mean by this that we should not listen to a good jazz piece occasionally, and a lively fox-trot through the air sets our feet going just as it does yours. But if you will hark back to what we were getting a year or two ago you will agree that the public taste is undoubtedly on a much higher plane than it used to be, and this all tends to promote real happiness.

The continued technical development of radio will probably be as rapid and surprising in the future as it has been in the past, but it will be a source of happiness rather than a contest to see how many stations can be brought in each evening.

If you are thirsty, you turn on the water faucet; if you want light, you turn on the electricity; if you feel cold, you turn on the steam; but if you want happiness, you will turn on the radio.

STRETCHING A SILK SHIRT

If you are delighted with your radio and the progress science has made in the last few years, do not think that everybody else has the same feeling. Some people are troubled quite desperately over the way things are working out. Among them may be included the phonograph manufacturers. Of course, it is well known that the sale of radios has diminished the sale of records to a considerable extent. In fact, one of our friends in the business recently told us that his sales have dropped off sixty per cent. and he lays it entirely to radio.

Another class of merchants who are not particularly over enthusiastic are the manufacturers of silk shirts. A few years ago everybody thought he ought to wear a silk shirt to show he was not a minister or a college professor, but as a haberdasher sadly remarked a short time ago, "Them days are gone forever." When it comes to a choice between buying parts for your radio and buying silk shirts, the unanimous choice seems to fall on the radio. Last year's shirt is made to do for this year, so that one can buy a new wave trap for his set. The silk shirt merchants are hoping the time will come when a man can stretch out his radio the way he stretches out his silk shirt.

Station HVST signing off at 4:00 A. M

Lines for Lady Listeners

Edited by Miss Opal A. Mowry

Contributions for this department will be accepted if they are of special interest to women.

BEAUTY BY RADIO

A very unusual beauty contest was recently held by the Crosley Radio Corporation, Station WLW. It is said to be the first of its kind ever held in the United States. Of course it is fairly common to have contests where a number of photographs of pretty girls are shown and the judges are asked to pick out which pictures they think the prettiest. Usually the pictures are all so pretty that it is hard to select one that is more beautiful than the rest. In this particular contest, instead of photographs of the four girls who had been selected, so pretty that any one of them might represent Miss America at Atlantic City, the idea was to give a verbal description over the radio of the particular charms of each girl by number.

The judges in this case were all the radio fans in the United States within listening distance of Station WLW. The only condition which the would-be judge had to fulfill was to send his ballot in by telegraph. In describing various contestants particular attention was given to the following points: Hair, eyes, nose, mouth, lips, complexion, figure, smile, accomplishments, and personality. About the only thing omitted was the size of their shoe. There were nearly a thousand judges in the contest, people who were interested enough to spend money on a telegram to help their favorite win. One thing that helped swell this total was perhaps the fact that all those who voted for the winner were eligible for prizes of candy and cigars.

The winner of the contest was Miss Mathilda Brooks of Cincinnati. Her description as sent out over the radio is as follows: "Hair, raven black; eyes, of a Russian Princess, dark and seductive; nose, full feminine; mouth, with lips full and cherry red; complexion, brunette, decidedly; figure and size, slender, willowy—a replica of Nazimova; smile, full and sympathetic; accomplishments, sings beautifully; personality, 99 and 44-100%."

As a matter of fact, it seems possible that Judge Woeste, who gave her description over the radio, must have been rather partial to this particular type, as we don't see how anybody could hear such a description without voting for the original.

In concluding we should say that the girl most popular with the radio fans is the slender brunette of the Russian princess type.

A RADIO LUNCHEON

Radio is becoming more and more popular in the home and everyone is trying to make some different use of his radio set. Since you know you can in one evening tune to a number of stations and listen to the different programs being broadcasted, why not make it more interesting by having a radio party? A delightful afternoon or evening may be had by many in this way. If the program from one station is not enjoyed by all, tune to another station and another until you find the one which everyone is interested in. Usually there are only two or three musical instruments, if as many as that at a party; probably only a piano and a violin. At the radio party, having the set in operation all during the afternoon or evening and using a loud speaker, the guests will be able to listen to almost any kind of musical instrument.

The menu should be made from recipes heard over the radio. A friend of mine recently had such a party, making the menu from recipes which she heard through the radio. It proved a great success and everyone spent an enjoyable evening.

Every Monday, Wednesday, and Friday morning at 10 o'clock, station WJAR in Providence, broadcasts recipes. I would be interested to hear from persons having tried these recipes and found them very good. Send the selected one or ones in and they will be published in the next issue of this magazine.

WHAT ARE THE WILD WAVES SAYING?

Fishing does not prove as tiresome to the modern fishing women as it has proven before. They do not have to sit quietly and patiently waiting for a bite with nothing to do but wonder just when those fish would show some signs of life. Their radio set entertains them between the bites, and finally when a fish does get curious or hungry enough to try the bait they do not stop to take their ear phones off.

Whether they catch any fish or not, these Atlantic City girls are bound to have a pleasant fishing trip, equipped with their compact but powerful receiving set. They receive music and other features from broadcasting stations while they anxiously await a nibble.

THE RADIO BLUES

As Sung by the Kid at Our House

Our house ain't what it used to be.
You can't have fun no more,
You're not allowed to make a noise.
Life's sure an awful bore.

It's "Don't you dare to blow that horn,"
And "Stop that awful din."
"Now be quiet as a mouse—
I'm trying to tune in."

"Good! W L W's on to-night.
Now, Jackie, run to bed.
You wouldn't understand this—
It's too deep for your head."

Gosh, life ain't what it used to be.
I'll ask you, Ain't that so?
Things sure have changed in our old house
Since we bought a radio.

—Written by Jackie's mother, 1212 Wood Street, Covington Ky., in Crosley Radio Weekly.

DON'T YOU WISH YOU WERE A FISH?

—Kadel & Herbert

Do You Use Storage Battery or Dry Cell

Often you can change your battery without changing your tubes

There are two general divisions of vacuum tubes: Those that use storage batteries, and those that use dry cells. Perhaps the better way of defining them would be to say, those that use a large amount of energy and those that use a small amount in lighting the filament.

To the first class belong the UV 200, C 300, UV 201A and C 301A; while in the latter class fall the UV 199, WD 11, WD 12 and corresponding Cunningham tubes.

We are not going to discuss the tubes themselves or their operations in this article, but merely the battery to be used in operating them. The first type of tube mentioned above requires five volts on the filament and takes a fairly large current, one ampere for the 200 and one-quarter for the 201A. This amount of energy is so large that if dry cells were used to supply it, the expenses entailed would be considerable. For that reason it is not desirable in general to consider using dry cells on a set with these tubes, unless it be for temporary use at a time when the storage battery is unobtainable.

The size of storage battery to be used depends on the number of tubes in your set, and also on the number of hours per week your set is in operation. A battery of the average size, such as is used on an automobile in one of the lighter cars, like the Ford or Overland, contains eleven plates and has about ninety ampere hours capacity when used on a radio set. By 90 ampere hours is meant that you can take one ampere out of it for 90 hours, or two amperes for 45 hours, or three for 30 hours. In other words, the amount of the current in amperes multiplied by the time in hours will give you 90. You can see from this that such a battery will light a UV 200 tube for 90 hours. It will light a set consisting of one UV 200 and two UV 201A tubes (taking a total of one and one-half amperes) for 60 hours. If, on the other hand, you have a larger battery, say of 120 ampere hour capacity, it will light your tubes proportionately longer.

Old Age in Batteries

These figures should be modified in one respect. You know old age sometimes reduces the capacity of a battery. Do you also know that old age can affect the charge itself and reduce it considerably? Whan a battery is charged and put aside on a shelf, even if no wires are connected with it at all, the charge is gradually dissipated by what we might call a slow evaporation. You would not put a dish of water, uncovered, on your pantry shelf and expect to come back in six week and find the dish of water still there? Well, the same thing happens in this case. The charge which you put in your battery six weeks ago will be found on testing to be almost entirely gone. So you can see that if you are so slow in taking the charge out of your battery, that is, you use your radio set so little each week, that it would take seven or eight weeks to reach 90 ampere hours of use, you will be unable to obtain this capacity owing to its being dissipated through age. Strictly speaking, the capacity of a battery is 90 ampere hours only if this energy is used inside of a few days. If it is spread out over several weeks, it will be reduced by a considerable proportion.

The average dry cell is different from the storage cell not only that it can not be recharged, but that the capacity is very much less. It has a pressure of only a volt and one-half, instead of six volts, and as it gets old this voltage runs down to one volt, or even less. The amount of electricity it contains, in other words, the ampere hour capacity, depends largely on the rate at which the cell is used. The harder you use it the less it holds. This ampere hour capacity of the dry cell should not be confused with ampere rate of discharge obtained by testing with an ammeter. The difference between hour capacity and ampere rate is this. Suppose you have a quart bottle and a gallon bottle. Which one will pour out a pint faster? As a matter of fact, it will depend entirely on the size of the neck and not at all on the size of the bottle. If the quart bottle happens to have a big neck and the gallon bottle a small one, you can pour out your pint much faster from the smaller bottle. Now the size of the bottle is measured in quarts, just as the size of the battery is measured in ampere hours. What it really means is, how much electricity can you get out of it? But the size of the neck of the bottle determines how fast you can get the water out and this in the battery is measured in amperes. From this you will see that a battery with only fifteen ampere hours capacity may still give out a current at the rate of 25 or 30 amperes for a few seconds while you are testing it. Just as a big bottle is *likely* to have a large neck, so a battery with a high discharge in amperes is *likely* to have a larger capacity; but this rule does not hold universally, because it is just as easy for a battery manufacturer to fake a battery so that it will give a high discharge rate as it would be for a bottle manufacturer to put an unusually large neck on his quart bottle, so that you would think from the way it poured that it must hold a gallon.

Why Use Dry Cells?

People often ask, Why use dry cells if they have so much smaller capacity than storage batteries? For very much the same reason as you use a quart bottle instead of a gallon carboy. The dry cell is very much smaller and more easily handled then the storage battery. Other advantages of dry cells are that they do not injure your carpet if they get upset, as will the acid in the battery; and they do not give off any fumes at all, whereas the storage battery sometimes gives off sulphuric acid fumes. The dry cell may often be installed in the radio cabinet, owing to its small size. Its big disadvantage, of course, is the relative small amount of energy it contains. If you could get a tube to work on a small enough A battery energy, it would seem that a dry cell was the logical source of current.

What Kind of Tubes Are Suitable for Dry Cell Operation?

The new tubes, WD 11, WD 12, and UV 199 are designed especially for minimum current consumption. The WD tubes take only one quarter of an ampere at a pressure of 1.1 volt. To be sure, this is the same current as taken by a UV 201A tube, but you will notice that the pressure is only 1.1 volt, requiring one cell for the former tube, whereas the latter uses five volts necessitating four dry cells connected in series, or a storage battery. This runs the expense four times as great for A battery on the 201A as on the WD tubes.

When we get to the UV199 tube we find a different condition. This radiotron uses only 1-16 of an ampere at three volts pressure. It requires three dry cells connected in series to furnish this pressure. The dry cells give 1.5 volts when new, but drop below that in use. Since the current is only 1-16 of an ampere, instead of 1-4, the set of batteries will last just four times as long as with the WD tube, but, on the other hand, when they do wear out three cells will have to be bought instead of one. One set of cells will run a single UV 199 tube for about 250 hours at a cost of about $1.20 for the three cells. You see this expense of operation is quite low.

Then Why Use a Storage Battery?

In spite of this some operators prefer storage batteries to dry cells. One of the chief reasons for this preferment is in the behavior of voltage as the set is operated. A dry cell starts out with a voltage of 1½, as remarked above, and falls continually through its life. This necessitates constant readjustment of the rheostat controlling the filament. Such adjustment need not be made as often as every hour, but it should be looked at at least every few hours. A storage battery, on the other hand, gives a voltage so constant throughout its life that the rheostat may be plugged in one position and never touched again. Of course, this is quite an advantage, because the tendency in radio is toward greater and greater simplification, and with a storage battery to operate your set you can, if you like, entirely disregard the rheostat dial once you find its proper position.

The action of the storage battery in giving out its voltage is comparable to the gasoline tank on your automobile. How much faster can you go when your gasoline tank is full? How does the speed fall off when your gasoline tank gets nearly empty? You will realize, of course, there is no change in speed at all, and while the voltage of the battery is not quite so unaffected by the amount of electricity still in it, yet it requires a fairly delicate volt meter to measure the change of voltage as the charge is used up.

Use of Storage Battery on Dry Cell Set

If you contemplate using storage battery power on your dry cell tube set, you will need only one single storage cell to operate a WD 11 or WD 12 tube. Since either of these tubes takes one-quarter of an ampere, it is easy to figure out that a 90 ampere hour cell will give you 360 hours of operation. This size of cell is the same one you remember as is used in the ordinary automobile battery, only the automobile requires three such cells to give six volts.

Since this cell has a pressure of two volts, it is necessary to turn your rheostat back far enough toward the "off" position so that it will absorb about 9-10 of a volt. This being subtracted from the two volts leaves 1.1 volts on the tube. To operate a UV 199 tube will require two cells of storage battery having a pressure of four volts; the rheostat must be adjusted to absorb one volt, which, subtracted from the four, will leave three volts to operate the tube.

To summarize, if you have a storage battery tube set, by all means use a storage battery, but with a dry cell tube set use dry cells for convenience, or else use a storage battery for ease of adjustment and long life.

RADIO ROLE AT THE POLE

Continued from Page 21

"I want the children of the United States and Canada to know that for the first time in the world's history Santa Claus has been interviewed at his home. I have had the honor of doing this myself. Yes, the real Santa, for he lives up here at the top of the world in the land of snow and ice." And so the message runs on, telling how Dr. MacMillan, while driving with the Eskimo dogs and sledge, miles from the ship, looking for polar bears one day, heard the tinkling of sleigh bells and in a few minutes saw six fine reindeer come bounding down the valley. Santa pulled hard on the beautiful sealskin reins and yelled, "Whoa, Snowflake!" and "Whoa, Starlight!" Santa and Dr. MacMillan met. An interesting story of Santa's being taken on the Bowdoin and then inviting Dr. MacMillan to come to his snowy palace, to see where and how the Christmas toys are made.

MacMillan's Sister

Christmas Eve witnessed a special program of Christmas carols and music and the unexpected pleasure of Letitia Fogg, Dr. MacMillan's sister, who, with his two nieces, delivered messages from their own lips and gave greetings for themselves and the friends and relatives of the explorers.

MacMillan Hears Flashlight Explosion Several Thousand Miles Away

One Wednesday night E. F. McDonald, Jr., sat before the microphone reading news to Dr. MacMillan. Then something happened that lifted the occasion into the realm of the truly unique—impressed it, as it were, deafeningly on the ear drums of whatever multitudinous number of the 7,000,000 radio fans of the United States who were listening. It was the flashlight power detonation of a photographer. Right in the midst of Mr. McDonald's reading, the camera man pressed the trigger that exploded the flash.

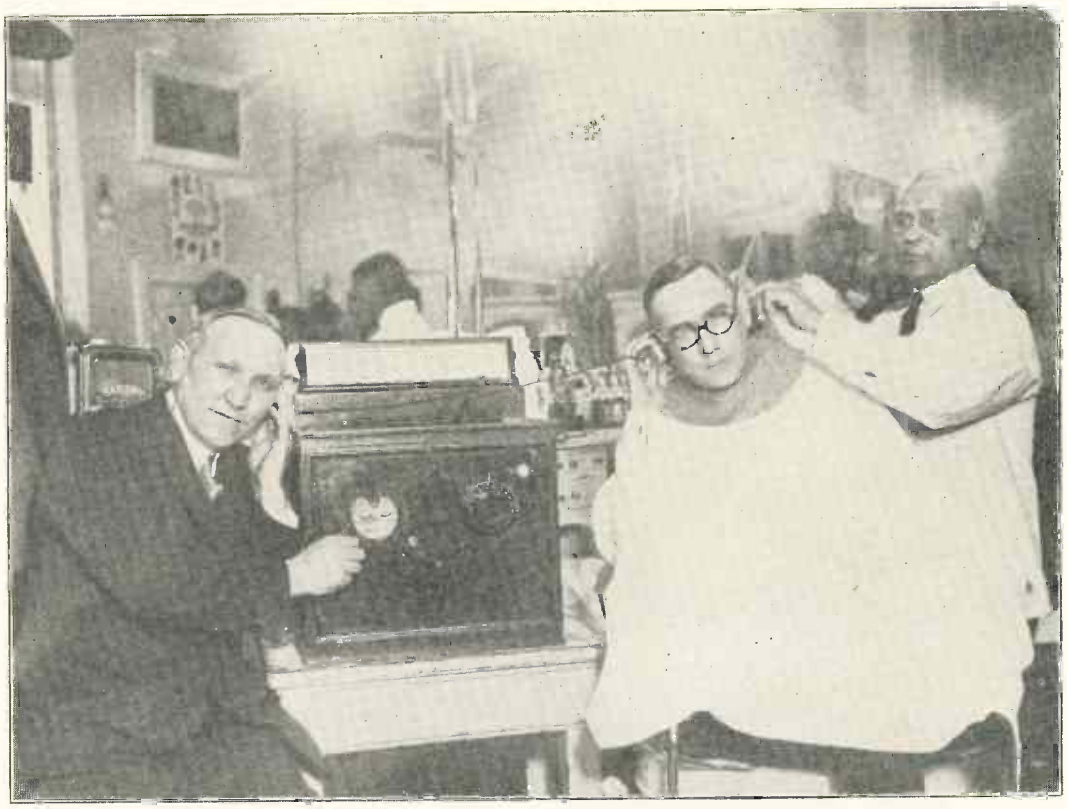
"Did you hear that, Mac?" asked Mr. McDonald.

He waited a second and then:

"That was a flashlight exploded by a photographer."

It was the first time that a flashlight had ever been sent by radio. And it was heard in the eerie stillness of the sparkling ice fields of the frozen North.

There is still solitude at the North Pole—solitude of a sort. But not the rabid, lethal solitude. The malignant type of isolation has been vanquished by radio. The Arctic circle is now a much more livable place.



THEY FORGET THEY ARE "NEXT" AT THIS BARBER SHOP —Foto Topics

SHAVING BY RADIO

It used to be that a deaf mute was the only one who could be safe in a barber shop; that is, safe from having to listen to the barber tell stories of his life. But what a relief now to be able to go in and get a shave without having to hear what the Democrats are going to do to the Republicans in the next election, as discussed by our friend the barber. The man who has given us this freedom is Mr. D. J. Richardson of Washington, D. C. He has invented a nickel-in-the-slot radio machine which will play for five minutes for five cents. You tune to the particular style of entertainment you like and 20 seconds before your time is up a warning is shown that you must drop in another nickel. This allows you an opportunity to hear an uninterrupted account of the fight (pardon me, I mean the concert).

There are some disadvantages to an apparatus of this kind, as it has been reported that one customer got two shaves and three haircuts before he could tear himself away from the entertaining music.

MUSIC IN THE SUBWAY

Some very interesting tests were recently conducted in a New York subway to see how far radio waves would penetrate. Of course, it had been known from war time experience that the waves would actually affect an aerial installed underground, but in this particular case not only did the music have to go through the earth, but also had to find its way through the iron and steel reinforcement in the concrete of which the subway tubes are built. The test was a complete success. The music from outside stations was received with clearness and volume.

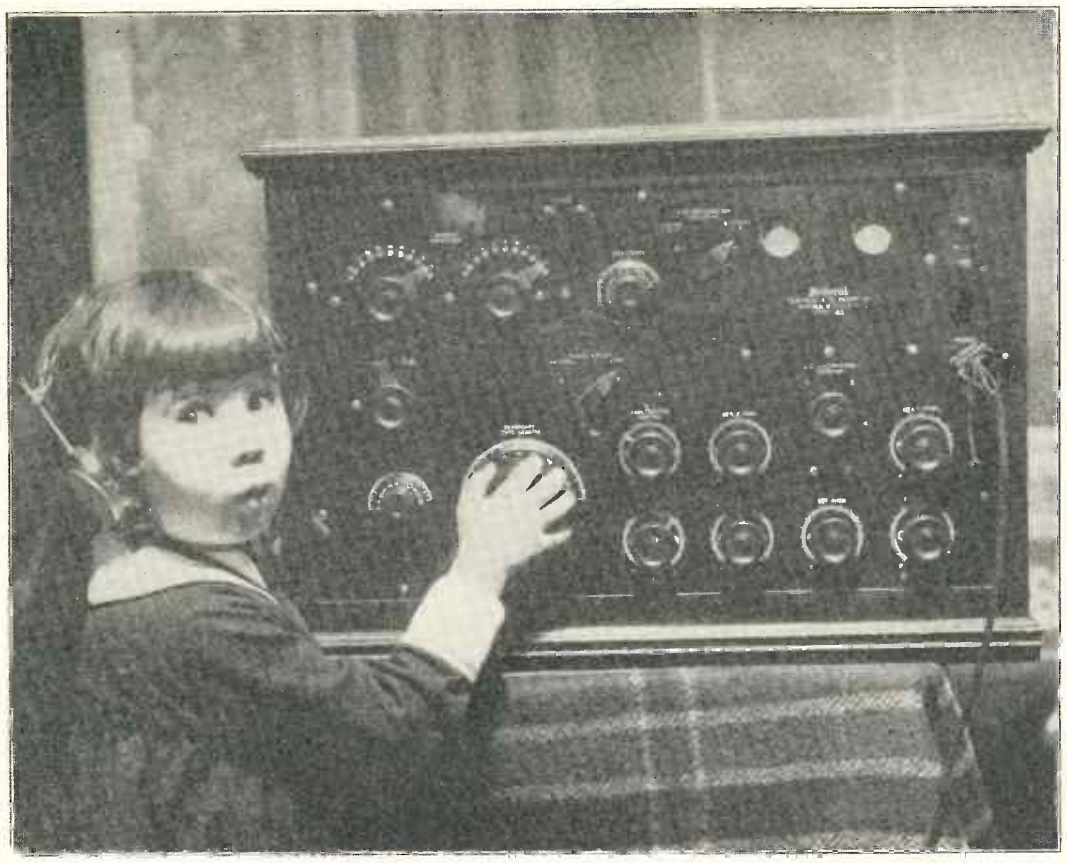
Looking forward to the future, it may be that in time a complete radio service will be given on the subway cars, so that instead of seeing a line of men reading newspapers, you will see them gazing dreamily into space, while listening to the account of their favorite prize fight. In fact, it may even come to the point where the various subway stations will be pronounced (or shall we say mispronounced) by radio.

RADIO IN HOSPITALS

Many hospitals at the present time are installing loud speakers to give entertainment to their patients. While this is a very great improvement on having no radio at all, still it is not the ultimate scheme for hospital use by any means. Some of the patients will want to sleep, perhaps others will prefer to read, and to make every one listen to a loud speaker at the same time is a distinct disadvantage.

The most modern way of giving radio entertainment in the hospital is to run a telephone line to each bed and have this terminate in a jack. This enables the individual to plug in a set of head phones whenever he cares to. Of course, the telephone line is energized by a radio set which may be tuned to the station which a majority vote to be most popular.

The next time you decide to be sick enough to go to a hospital, look around first and make sure that you can get radio entertainment at your favorite hospital



"BABY PEGGY" TUNES IN TO HER FAVORITE STATION —Foto Topics

I THINK THAT IS SAN FRANCISCO

That is what Baby Peggy seems to say as she tunes in. Another title for this picture may be "Radio, what are you doing with Baby Peggy?" Peggy, as you of course know, is the million dollar movie star, and is one of the best known screen artists before the public to-day. In picking out a Radio she selected a set as big as her popularity, so it is naturally a large one.

The set illustrated is a No. 61 Federal, and is the last word in requirements of all kinds. We wish we were listening in as Baby Peggy hears the jazz music coming from WEAF.

RADIO BROADCASTERS DECREASE IN NUMBER

During the last few months the total number of broadcasters in the United States has decreased slightly. Many new stations have been opened to be sure, but on the other hand a number of those already operating have dropped out. This probably is an advantage rather than a detriment, as it is the smaller and weaker stations which have been eliminated. The reason why they have abandoned these stations is doubtless to be found in the tremendous cost of operation. Not only are the charges for interest and depreciation large, but in addition the cost of paying for satisfactory talent amounts to a very considerable sum.

SPAGHETTI FOR LOOKS

Most home made sets use a considerable quantity of spaghetti on the wiring. It is frequently asked whether this is necessary or not. As a matter of fact the use of spaghetti improves the looks of the set a good deal more than it does its operation. If insulated wire is used in connecting the various pieces of apparatus inside the cabinet then of course spaghetti has no use whatsoever, but if the very popular square bus bar wiring is used for this purpose, then there may be a few places where two wires will come so close together that there is danger of touching and so short circuiting. In any such a place, spaghetti is quite useful.

Most connections, however, are so spaced that they do not approach within one-half an inch or more of another wire. To cover such a connection without spaghetti actually does not improve the operation of the set in the least. Indeed the spaghetti has a greater capacity effect than the air it replaces; and so any change in the tuning of the set will be for the worse if any effect at all is noted. This does not mean that you should take the spaghetti off your wire, because the undesirable distributed capacity (the effect of two wires spaced close together) will not be changed more than a fraction of one per cent. If you like the looks of spaghetti (and it certainly does add quite a lot to the appearance of the set), there are two kinds you can use. One is that made of cotton sleeving, which has been dipped in various colored gums, and the other is pure rubber tubing.

Rx DR RADIO PRESCRIBES.

NOTE: In this section the Technical Editor will answer questions of general interest on any radio matters. Any of our readers may ask not more than two questions, and if the subjects are of importance to most radio fans they will be answered free of charge in the magazine. If they are of special interest to the questioner alone, or if a personal answer is desired, a charge of fifty cents will be made for each answer. This will entitle the questioner to a personal answer by letter. However, if the question requires considerable experimental or development work, higher rates will be charged, which may be obtained upon application.

As this is the first issue of this magazine, we will answer a few of the verbal questions which have recently been asked us.

Question. In making a ground on a radio set what are the relative merits of a lead water pipe, an iron water pipe, and a gas pipe?

Answer. Either lead or iron water pipes are satisfactory for a ground provided the ground lead is attached as closely as possible to the point where the connection to the street main is made. This point is usually to be found right at the water meter. It is undesirable to use a gas main as a ground for two reasons. In the first place, gas pipe is usually not screwed up as tight in the joints as water pipe, and so resistance is higher, which, of course, is undesirable. Furthermore, the fire writers require the ground to be made to a water pipe, and not a gas pipe. The idea is that if the gas pipe should leak it would be undesirable to have any wires carrying electricity coming in contact with the pipe because of the chance of igniting the gas at the leak.

Question. How many taps is it desirable to have on a vario coupler for an ordinary single circuit tuner?

Answer. The number of taps which are ordinarily used by the average radio fan is limited to three or four as a general rule. For instance, one tap will take in from 250 to 300 meters, a second from 300 to 350, a third up to 400 and a fourth up to 450 meters. However, you will find more than this number on practically all sets. The reason is this: When you buy your set *you* know the exact aerial length you are to connect it to, but the manufacturer does not have that information when he is building the set. He must produce a piece of apparatus, which will fit your aerial, whether it is a thirty-foot inside aerial or a 150-foot outside aerial. Perhaps you use a good ground, or maybe you do not intend the set to be grounded at all, but have installed a counterpoise. To enable satisfactory operation under so many diverse conditions, it is necessary that a comparatively large number of taps be supplied with each instrument. Once you have installed your radio on your own aerial you will find that probably one-half or two-thirds of these taps are never used. Your neighbor across the way finds the same thing in his set, but in his case the taps which are not used will be the very ones you need most, owing to the fact that his aerial is so different in dimensions from yours. For that reason, if you are building a set which must be transported from place to place, to be able to have it work properly on several different aerials, it is desirable that you use at least eight to ten taps spaced every five to eight turns apart, depending on the size of the tube on which your stator coil is wound.

If on the other hand you install your set and operate it on a single aerial, then you will find that five taps are ample, or at the most seven or eight. In such a case it is sometimes necessary to do a little experimenting to find out the best number of turns per tap. When the set is completed, if it works correctly, you should get the lowest wave length on the first tap and the highest wave length on the last one with intervening wave lengths evenly spaced on the other taps.

Question. Why does a wave trap help increase selectivity on some sets, but not on others?

Answer. The idea of a wave trap is to reduce the loudness of some one station, which is undesirable, in a large measure, while it reduces other stations in a much smaller proportion. The better the wave trap is, the more it will reduce the undesirable station without cutting down the other one too much. You will notice that a wave trap will reduce the desired station to some extent as well as the offending one. Bearing this in mind you will be able to tell right away which sets will be improved by a wave trap, and which will not. If your set is so good at the present time that you can tune out local stations and get distant ones, then the wave trap will be of no value at all. As a matter of fact, it will be a positive hinderance, as it will not help cut down the local station (which is already tuned out) and will reduce the volume of the broadcasting you wish to hear.

Also, if your set is so poor that local broadcasting comes in all the way from zero to 100 on your dial, it will be of no value to you to add a wave trap, no matter how good. The reason is that the wave trap in cutting down the tremendous volume of the local broadcasting, which your poor set allows to come through, will at the same time reduce the wanted station to a point where it will be so low that you can hardly hear it. The only sets which a wave trap will improve very much are those which now operate pretty well, where local broadcasting can be heard over a range of twenty to forty points on your dials. Such a set can be improved greatly as to selectivity by connecting a good wave trap.

Question: Is it better to use a single wire one hundred feet long for an aerial, or to use two fifty foot wires spaced side by side?

Answer: A single wire one hundred feet long is always better than two fifty foot wires, since the two fifty foot wires have the tendency to shield each other. For a further discussion of this question, refer to the article in this issue on Aerials.

Question: I want to change the tubes of my set from UV 200 and 201 A to WD 12 tubes. What changes shall I have to make in the set itself?

Answer: The socket for each of these tubes is the same, therefore no change in base will be needed to accommodate the new tubes. The voltage on the WD 12 is very much lower than on the UV tubes, and for this reason instead of using a six volt storage battery, get one or more dry cells. If more than one is to be used, be sure they are connected in parallel; that is, all the zincs connected to one wire and all the carbons connected to the other wire. If you should connect them in series, the way a doorbell battery is hooked up, that is, zinc to carbon, you would ruin the tubes.

If you are going to use one or more dry cells, as recommended, the same rheostat can be used to control the brightness of the filament. However, if you want to work the set with a storage battery, then a twenty or thirty ohm rheostat should be substituted for the six ohm rheostat now in the set.

"IT AIN'T GONNA RAIN NO MO"

Meet Mr. Wendell W. Hall, or, rather, see what he looks like. Our army of radio fans, recalling the enjoyment of his songs and stories, may have another opportunity of listening to him according to Julius Kaufman of the foundry. Mr. Kaufman, who enjoys a personal friendship with Mr. Hall and has figured in some of his broadcast anecdotes, says that the latter is likely to pay a return visit to Providence in a couple of months or so.—*Universal Windings.*

UNITED STATES BROADCASTING STATIONS ARRANGED ALPHABETICALLY BY CALL LETTERS

Abbreviations: W.L. wave length in meters; K.C., frequencies in kilocycles; W.P., watt power of station.

		W.L.	K.C.	W.P.
KDKA	Westinghouse Elec. & Mfg. Co., East Pittsburgh	326-	920-	1000
KDPM	Westinghouse Elec. & Mfg. Co., Cleveland, O.	270-	1110-	250
KDYM	Savoy Theatre, San Diego, Cal.	280-	1070-	100
KDYQ	Oregon Institute of Technology, Portland, Ore.	360-	833-	100
KDYX	Star Bulletin, Honolulu, Hawaii	360-	833-	100
KDZB	Frank E. Siefert, Bakersfield, Cal.	240-	1250-	100
KDZE	The Rhodes Co., Seattle, Wash.	455-	660-	500
KDZF	Auto. Club of So. Cal., Los Angeles, Cal.	278-	1080-	500
KFAD	McArthur Bros. Mercantile Co., Phoenix, Ariz.	360-	833-	100
KFAE	State College of Washington, Pullman, Wash.	360-	833-	500
KFAJ	University of Colorado, Boulder, Col.	360-	833-	100
KFAQ	City of San Jose, San Jose, Cal.	360-	833-	250
KFAR	Studio Lighting Service Co., Hollywood, Cal.	280-	1070-	200
KFAU	In. Sch'l Dist. of Boise City, Boise H. S., Boise, Id.	360-	833-	150
KFBK	Kimball-Upson Co., Sacramento, Cal.	283-	1060-	100
KFCM	Richmond Radio Shop, Richmond, Cal.	360-	833-	100
KFCZ	Omaha Central High School, Omaha, Neb.	258-	1100-	100
KFDH	University of Arizona, Tucson, Ariz.	360-	833-	150
KFDV	Gilbreth & Stinson, Fayetteville, Ark.	360-	833-	200
KFDX	First Baptist Church, Shreveport, La.	360-	833-	100
KFDY	So. Dakota State College, Brookings, So. Dakota.	360-	833-	100
KFEQ	J. L. Scroggin, Oak, Neb.	360-	833-	150
KFEV	Felix Thompson Radio Shop, Casper, Wyo.	263-	1140-	250
KFEX	Augsburg Seminary, Minneapolis, Minn.	261-	1150-	100
KFEZ	Amer. Society of Mech. Engineers, St. Louis, Mo.	360-	833-	100
KFFQ	Markehoffei Motor Co., Colorado Springs, Col.	360-	833-	100
KFFX	McCray Co., Omaha, Neb.	278-	1080-	100
KFFY	Pinous & Murphey, Alexandria, La.	275-	1090-	100
KFGC	Louisiana State University, Baton Rouge, La.	254-	1180-	100
KFGH	Leland Stanford University, Stanford Univ., Cal.	360-	833-	500
KFGJ	Mo. Natl. Guard, 138th Infantry, St. Louis, Mo.	266-	1130-	250
KFGX	First Presbyterian Church, Orange, Tex	250-	1200-	500
KFHD	Utz Electric Shop Co., St. Joseph, Mo.	226-	1330-	100
KFHF	Central Christian Church, Shreveport, La.	266-	1130-	150
KFHJ	Fallon & Co., Santa Barbara, Cal.	360-	833-	100
KFHX	Robert W. Nelson, Hutchinson, Ks.	229-	1310-	150
KFI	Earle C. Anthony, Inc., Los Angeles, Cal.	469-	640-	500
KFIF	Benson Polytechnic Institute, Portland, Ore.	360-	833-	100
KFIX	R. C. of Jesus Christ of L.D. Sts., Ind'p'nd'n'e, Mo.	240-	1250-	250
KFIZ	Daily C'm'nw'lth & O.A.Heulsm'n, Fond d'L'c,Wis.	273-	1100-	100
KFJC	Seattle Post Intelligencer, Seattle, Wash.	233-	1290-	100
KFJK	Delano Radio and Electric Co., Bristow, Okla.	233-	1290-	100
KFJM	University of N. Dakota, Grand Forks, N. Dak.	280-	1070-	100
KFKB	Brinkley-Jones Hospital Association, Milford, Ks.	286-	1050-	500
KFKQ	Conway Radio Laboratories, Conway, Ark.	224-	1340-	150
KFKX	Westinghouse Elec. & Mfg. Co., Hastings, Neb.	286-	1050-	500
KFLR	University of N. Mexico, Albuquerque, N. M.	254-	1180-	100
KFMQ	University of Arkansas, Fayetteville, Ark.	263-	1140-	100
KFMS	Freimuth Dept. Store, Duluth, Minn.	275-	1090-	100
KFMX	Carleton College, Northfield, Minn.	283-	1060-	500
KGN	Northwestern Radio Mfg. Co., Portland, Ore	360-	833-	100
KGU	Marion A. Mulreny, Honolulu, Hawaii	360-	833-	500
KGW	Portland Morning Oregonian, Portland, Ore.	492-	610-	500
KHJ	Times-Mirror Co., Los Angeles, Cal.	395-	760-	500
KHQ	Louis Wasmer, Seattle, Wash.	360-	833-	100
KJR	Northwest Radio Service Co., Seattle, Wash.	270-	1110-	100
KJS	Bible Institute of Los Angeles, Los Angeles, Cal.	360-	833-	750
KLS	Warner Brothers, Oakland, Cal.	360-	833-	250
KLX	Tribune Publishing Co., Oakland, Cal.	360-	833-	250
KLZ	Reynolds Radio Co., Denver, Col.	360-	833-	500
KNT	Grays Harbor Radio Co., Aberdeen, Wash.	263-	1140-	250
KNV	Radio Supply Co., Los Angeles, Cal.	256-	1179-	100
KNX	Electric Lighting Supply Co., Los Angeles, Cal.	360-	833-	100
KOB	N. M. C. of Agri. & Mech. Arts, State Col., N. M.	360-	833-	500
KOP	Detroit Police Dept., Detroit, Mich.	286-	1050-	500
KPO	Hale Bros., San Francisco, Cal.	423-	710-	500
KQV	Doubleday-Hill Electric Co., Pittsburgh, Pa.	360-	833-	250
KSD	Post Dispatch, St. Louis, Mo.	546-	550-	500
KTW	First Presbyterian Church, Seattle, Wash.	360-	833-	750
KUO	Examiner Printing Co., San Francisco, Cal.	360-	833-	150
KUS	City Dye Works & Laundry Co., L. Angeles, Cal.	360-	833-	100
KWG	Portable Wireless Tel. Co., Stockton, Cal.	360-	833-	100
KWH	Los Angeles Examiner, Los Angeles, Cal.	360-	833-	500
KYW	Westinghouse Elec. & Mfg. Co., Chicago, Ill.	536-	560-	1000
KZN	The Deseret News, Salt Lake City, Utah.	360-	833-	500
WAAB	Valdemar Jensen, New Orleans, La.	268-	1120-	100
WAAC	Tulane University, New Orleans, La.	360-	833-	400
WAAF	Chicago Daily, Drovers Journal, Chicago, Ill.	286-	1050-	200
WAAM	I. R. Nelson Co., Newark, N. J.	263-	1140-	250
WAAW	Omaha Grain Exchange, Omaha, Neb.	360-	833-	200
WAAZ	Hollister-Miller Motor Co., Emporia, Ks.	360-	833-	100
WABA	Lake Forest College, Lake Forest, Ill.	266-	1130-	100
WABE	Young Men's Christian Assn., Washington, D. C.	283-	1060-	100
WABL	Conn. Agri. College, Storrs, Conn.	283-	1060-	100
WABM	F. E. Doherty Auto. & R'dio E. Co., Saginaw, M.	254-	1180-	100
WABN	Ott Radio, Inc., La Crosse, Wis.	244-	1320-	250
WABP	Robert F. Weinig, Dover, Ohio.	266-	1130-	100
WABT	Holliday-Hall, Washington, Pa.	252-	1190-	100
WABU	Victor Talking Machine Co., Camden, N. J.	226-	1330-	100
WABX	Henry B. Joy, Mount Clemens, Mich.	270-	1110-	150
WBAA	Purdue University, West Lafayette, Ind.	360-	833-	250
WBAD	Sterling Electric Co., Minneapolis, Minn.	360-	833-	100

		W.L.	K.C.	W.P.
WBAH	The Dayton Co., Minneapolis, Minn	417-	720-	500
WBAN	Wireless Phone Corp., Paterson, N. J	244-1230-		100
WBAP	Wortham-Carter Pub. Co., Fort Worth, Tex	476-	630-	750
WBAV	Erner & Hopkins Co., Columbus, Ohio	390-	770-	500
WBAW	Marietta College, Marietta, Ohio	246-1220-		250
WBAY	American Tel. & Tel. Co., New York, N. Y	492-	610-	500
WBL	T. & H. Radio Co., Anthony, Ks	261-1150-		100
WBR	Penn State Police, Butler, Pa	286-1050-		250
WBT	Southern Radio Corp., Charlotte, N. C	360-	833-	500
WBU	City of Chicago, Chicago, Ill	286-1050-		500
WBZ	Westinghouse Elec. & Mfg. Co., Springfield, Mass	337-	890-	1000
WCAD	St. Lawrence University, Canton, N. Y	280-1070-		250
WCAE	Kaufmann & Baer Co., Pittsburgh, Pa	462-	650-	500
WCAJ	Nebraska Wesleyan Univ., Univ. Place, Neb	360-	833-	500
WCAL	St. Olaf College, Northfield, Minn	360-	833-	500
WCAM	Villanova College, Villanova, Pa	360-	833-	150
WCAP	Chesapeake & Potomac Tel. Co., Wash'gt'n, D. C	469-	640-	500
WCAR	Alamo Radio Elec. Co., San Antonio, Tex	360-	833-	150
WCAS	W. H. Dunwoody Ind. Inst., Minneapolis, Minn	246-1050-		100
WCAT	S. Dakota State Sch. of Mines, Rapid City, S. D	240-1250-		100
WCAU	Durham & Co., Philadelphia, Pa	286-1050-		100
WCAY	Kesselman-O'Driscoll Co., Milwaukee, Wis	261-1150-		250
WCBD	Wilbur G. Voliva, Zion, Ill	345-	870-	500
WCK	Stix, Baer & Fuller Dry Goods Co.. St. Louis, Mo	360-	833-	100
WCM	University of Texas, Austin, Tex	360-	833-	500
WCX	Detroit Free Press, Detroit, Mich	517-	580-	500
WDAE	Tampa Daily Times, Tampa, Fla	360-	833-	250
WDAF	Kansas City Star, Kansas City, Mo	411-	730-	500
WDAG	J. Laurance Martin, Amarillo, Tex	263-1140-		100
WDAK	The Courant, Hartford, Conn	261-1150-		100
WDAP	Board of Trade, Chicago, Ill	360-	833-	500
WDAR	Lit Brothers, Philadelphia, Pa	395-	760-	500
WDAU	Slocum & Kilburn, New Bedford, Mass	360-	833-	100
WDAX	First National Bank, Centerville, Iowa	360-	833-	100
WEAF	American Tel. & Tel. Co., New York, N. Y	492-	610-	500
WEAI	Cornell University, Ithaca, N. Y	286-1050-		500
WEAJ	University of S. Dakota, Vermillion, S. Dak	283-1060-		200
WEAM	Borough of N. Plainfield, N. Plainfield, N. J	252-1190-		100
WEAN	Shepard Co., Providence. R. I	273-1100-		100
WEAO	Ohio State University, Columbus, Ohio	360-	833-	500
WEAP	Mobile Radio Co., Mobile, Ala	360-	833-	100
WEAS	Hecht Co., Washington, D. C	360-	833-	100
WEAU	Davidson Bros. Co., Sioux City, Iowa	360-	833-	100
WEAY	Iris Theatre, Houston, Tex	360-	833-	250
WEB	Benwood Co., St. Louis, Mo	360-	833-	500
WEW	St. Louis University, St. Louis, Mo	261-1150-		100
WFAA	Dallas News & Dallas Journal, Dallas, Tex	476-	630-	500
WFAB	Carl F. Woese, Syracuse, N. Y	234-1280-		100
WFAH	Electric Supply Co., Port Arthur, Tex	236-1270-		150
WFAN	Hutchinson Elec. Service Co., Hutchinson, Minn	360-	833-	300
WFAV	Univ. of Nebraska, Dept. of E. Eng., Lincoln, Neb	275-1090-		500
WFI	Strawbridge & Clothier, Philadelphia, Pa	395-	760-	500
WGAQ	Glenwood Radio Corp., Shreveport, La	360-	833-	150
WGAW	Ernest C. Albright, Altoona, Pa	261-1150-		100
WGAY	Northwestern Radio Co., Madison, Wis	360-	833-	100
WGI	Am. R'd'o & Res'ch Corp., Medf'rd Hillside, Mass	360-	833-	150
WGL	Thomas F. J. Rowlett, Philadelphia, Pa	360-	833-	500
WGR	Federal Tel. & Tel. Co., Buffalo, N. Y	319-	940-	500
WGV	Interstate Electric Co., New Orleans, La	360-	833-	100
WGY	General Electric Co.. Schenectady, N. Y	380-	790-	1000
WHA	University of Wisconsin, Madison, Wis	360-	833-	500
WHAA	State University of Iowa. Iowa City, Iowa	283-1060-		100
WHAB	Clark W. Thompson, Galveston, Tex	360-	833-	200
WHAD	Marquette University, Milwaukee, Wis	280-1070-		100
WHAG	University of Cincinnati, Cincinnati, Ohio	222-1350-		100
WHAH	Rafer Supply Co.. Joplin, Mo	283-1060-		250
WHAM	University of Rochester, Rochester, N. Y	283-1060-		100
WHAS	Courier-Journal & Louisville Times, Louisville, Ky	400-	750-	500
WHAZ	Rensselaer Polytechnic Institute, Troy, N. Y	380-	790-	500
WHB	Sweeney School Co., Kansas City, Mo	411-	720-	500
WHK	Radiovex Co., Cleveland, Ohio	283-1060-		100
WHN	George Schubel, New York, N. Y	360-	833-	100
WIAC	Galveston Tribune. Galveston, Tex	360-	833-	100
WIAJ	Fox River Valley Radio Supply Co., Neenah, Wis	224-1340-		100
WIAK	Journal-Stockman Co.. Omaha, Neb	273-1080-		200
WIAO	School of Eng. of Milwaukee, Milwaukee, Wis	360-	833-	100
WIAR	Paducah Evening Sun, Paducah, Ky	360-	833-	100
WIAS	Home Electric Co., Burlington, Iowa	360-	833-	100
WIK	K. & L. Electric Co., McKeesport, Pa	234-1280-		500
WIP	Gimbel Brothers, Philadelphia, Pa	509-	590-	500
WJAB	American Electric Co., Lincoln, Neb	360-	833-	500
WJAD	Jackson's Radio Eng. Laboratories, Waco, Tex	360-	833-	150
WJAG	Norfolk Daily News, Norfolk, Neb	283-1060-		250
WJAN	Peoria Star, Peoria, Ill	280-1070-		100
WJAQ	Capper Publications, Topeka, Ks	360-	833-	100
WJAR	The Outlet Co., Providence, R. I	360-	833-	500
WJAS	Pittsburgh Radio Supply House, Pittsburgh, Pa	360-	833-	500
WJAX	Union Trust Co., Cleveland, Ohio	390-	770-	500
WJAZ	Chicago Radio Laboratory, Chicago, Ill	448-	670-	1000
WJX	Deforest Radio Tel. & Tel. Co., N. Y., N. Y	360-	833-	500
WJY	R. C. A., New York, N. Y	405-	740-	500
WJZ	Broadcast Central, New York, N. Y	455-	660-	500
WKAA	H. F. Paar, Cedar Rapids, Iowa	268-1160-		100
WKAF	W. S. Radio Supply Co., Wichita Falls, Tex	360-	833-	100
WKAP	Dutee W. Flint, Cranston, R. I	360-	833-	250
WKAQ	Radio Corp. of Porto Rico, San Juan, P. R	360-	833-	100
WKAR	Michigan Agri. College. E. Lansing, Mich	280-1070-		250
WKY	WKY Radio Shop, Oklahoma, Okla	360-	833-	100
WLAG	Cutting & Wash. Radio Corp., Minneapolis, Min	417-	720-	500
WLAH	Samuel Woodworth, Syracuse, N. Y	234-1280-		100
WLAJ	Waco Electrical Supply Co., Waco, Tex	360-	833-	150
WLAK	Vermont Farm Machine Corp., Bellows Falls, Vt	360-	833-	100
WLAL	Naylor Electrical Co., Tulsa, Okla	360-	833-	100
WLAN	Putnam Hardware Co., Houlton, Me	283-1060-		250
WLAW	Police Dept. City of N. Y., New York, N. Y	360-	833-	500
WLW	Crosley Mfg. Co., Cincinnati, O	309-	970-	500
WMAB	Radio Supply Co., Oklahoma, Okla	360-	833-	100
WMAC	Clive B. Meredith, Cazenovia, N. Y	261-1150-		200
WMAF	Round Hills Radio Corp., Dartmouth, Mass	360-	833-	100- 500
WMAH	General Supply Co., Lincoln, Neb	250-1180-		100
WMAJ	Drovers Telegram Co., Kansas City, Mo	275-1090-		250
WMAK	Norton Laboratories, Lockport, N. Y	360-	833-	500
WMAP	Utility Battery Service, Easton, Pa	246-1220-		150
WMAQ	Chicago Daily News, Chicago, Ill	448-	670-	500
WMAT	Paramount Radio Corp., Duluth, Minn	266-1130-		250
WMAV	Alabama Polytechnic Institute, Auburn, Ala	250-1200-		500
WMAY	Kingshighway Presbyterian Church, St. Louis, Mo	280-1070-		100
WMC	"Commercial Appeal," Memphis, Tenn	500-	600-	500
WNAC	Shepard Stores, Boston, Mass	278-1080-		100
WNAD	University of Oklahoma, Norman, Okla	360-	833-	100
WNAN	Syracuse Radio Telephone Co., Syracuse, N. Y	286-1050-		100
WNAP	Wittenberg College, Springfield, Ohio	360-	833-	100
WNAS	Tex. Radio Corp. & Austin Statesman, Austin, Tex	360-	833-	100
WNAT	Lenning Brothers Co., Philadelphia, Pa	360-	833-	100
WNAV	People's Tel. & Tel. Co., Knoxville, Tenn	236-1270-		500
WNAX	Dakota Radio Apparatus Co., Yankton, S. D	244-1230-		100
WOAG	Apollo Theatre, Belvidere, Ill	224-1340-		100
WOAH	Palmetto Radio Corp. Charleston, S. C	360-	833-	100
WOAI	Southern Equipment Co., San Antonio, Tex	385-	780-	500
WOAL	William E. Woods, Webster Groves, Mo	229-1310-		500
WOAN	Vaughn C'nserv't'ry of Music, Lawrenceb'rg, Tenn	360-	833-	150
WOAV	Penn. Nat'l Guard, 2d Bat, 112th Inf., Erie, Pa	242-1240-		100
WOAW	Woodmen of the World, Omaha, Neb	526-	570-	500
WOAX	Franklyn J. Wolff, Trenton, N. J	240-1250-		500
WOC	Palmer Sch. of Chiropractic, Davenport, Iowa	484-	620-	500
WOI	Iowa State College, Ames, Iowa	360-	833-	100
WOK	Pine Bluff Co., Pine Bluff, Ark	360-	833-	500
WOO	John Wanamaker, Philadelphia, Pa	509-	590-	500
WOQ	Western Radio Co., Kansas City, Mo	360-	833-	500
WOR	L. Bamberger & Co., Newark, N. J	405-	740-	500
WOS	Mo. State Marketing Bureau, Jefferson City, Mo.	441-	680-	500
WPAB	Pennsylvania State College, State College, Pa	283-1060-		500
WPAC	Donaldson Radio Co., Okmulgee, Okla	360-	833-	200
WPAH	Wisconsin Dept. of Markets. Waupaca, Wis	360-	833-	250
WPAK	North Dakota Agri. Col., Agri. College, N. D	360-	833-	250
WPAL	Avery & Loeb Elec. Co., Columbus, Ohio	286-1050-		100
WPAZ	John R. Koch (Dr.), Charleston, W. Va	273-1100-		100
WQAA	Horace A. Beale, Jr., Parkesburg, Pa	360-	833-	500
WQAC	E. B. Gish, Amarillo, Tex	360-	833-	100
WQAM	Electrical Equipment Co., Miami, Fla	360-	833-	100
WQAN	Scranton Times, Scranton, Pa	280-1070-		100
WQAO	Calvary Baptist Church, New York, N. Y	360-	833-	100
WQAQ	Abilene Daily Reporter, Abilene, Tex	360-	833-	100
WQAS	Prince- Walter Co., Lowell, Mass	266-1130-		100
WQAX	Radio Equipment Co., Peoria, Ill	360-	833-	100
WRAA	Rice Institute, Houston, Tex	360-	833-	200
WRAL	No. States Power Co., St. Croix Falls, Wis	248-1210-		100
WRAM	Lombard College, Galesburg, Ill	244-1230-		250
WRAV	Antioch College, Yellow Springs, Ohio	360-	833-	100
WRAX	Flexon's Garage, Gloucester City, N. J	268-1120-		100
WRAY	Radio Sales Corp., Scranton, Pa	280-1070-		100
WRC	Radio Corp. of America, Washington, D. C	460-	640-	500
WRK	Doren Bros. Electric Co., Hamilton, Ohio	360-	833-	200
WRL	Union College, Schenectady, N. Y	360-	833-	500
WRM	University of Illinois, Urbana, Ill	360-	833-	500
WRW	Tarrytown Radio Research Lab., Tarrytown, N. Y	273-1100-		150
WSAB	S. E. Mo. State T'chers' Col., Cape Girardeau, Mo	360-	833-	100
WSAC	Clemson Agri. Col., Clemson College, S. C	360-	833-	500
WSAD	J. A. Foster Co., Providence, R. I	261-1150-		150
WSAH	A. G. Leonard, Jr., Chicago, Ill	248-1210-		500
WSAI	U. S. Playing Card Co., Cincinnati, Ohio	309-	970-	500
WSAJ	Grove City College, Grove City, Pa	360-	833-	250
WSAW	Curtis & McElwee, Canandaigua, N. Y	275-1190-		100
WSAY	Irving Austin, Port Chester, N. Y	233-1290-		100
WSB	Atlanta Journal, Atlanta, Ga	429-	700-	500
WSL	J. & M. Electric Co., Utica, N. Y	273-1100-		100
WSY	Alabama Power Co., Birmingham, Ala	360-	833-	500
WTAM	The Willard Storage B'tt'ry Co., Cleveland, O	390-	770-	1000
WTAN	Orndorff Radio Shop, Mattoon, Ill	240-1250-		100
WTAQ	S. H. Van Gorden & Son, Osseo, Wis	226-1330-		100
WTAR	Reliance Electric Co.. Norfolk, Va	280-1070-		100
WTAS	Charles E. Erbstein, Elgin, Ill., near	286-1050-		500
WTAT	Edison Electric Illum. Co., Boston, Mass	244-1229-		100
WTG	Kansas State Agri. Col., Manhattan, Ks	360-	833-	1000
WWAD	Wright & Wright, Inc., Philadelphia, Pa	360-	833-	100
WWAE	Alamo Dance Hall, Joliet, Ill	227-1320-		500
WWAF	Galvin Radio Supply Co., Camden, N. J	236-1270-		100
WWAO	Michigan College of Mines. Houghton, Mich	244-1230-		250
WWJ	Detroit News, Detroit. Mich	517-	580-	500
WWL	Loyola University, New Orleans, La	280-1070-		100

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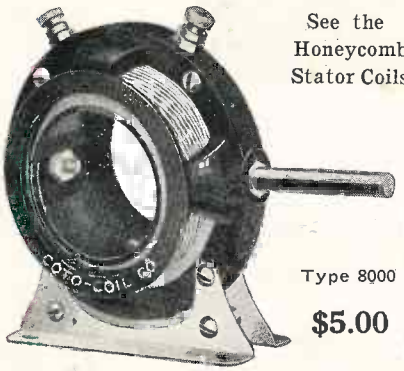

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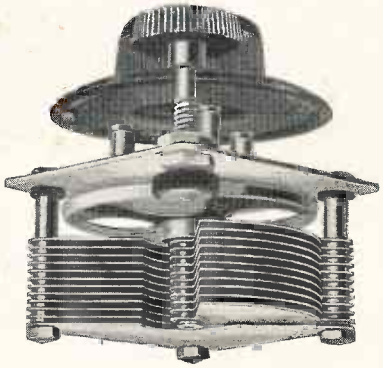

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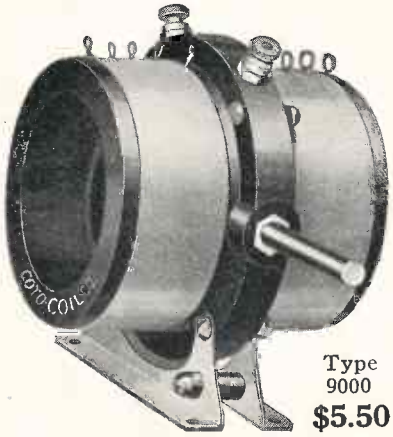

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