AUGUST 22 1925
15 CENTS

RADIO WORLD

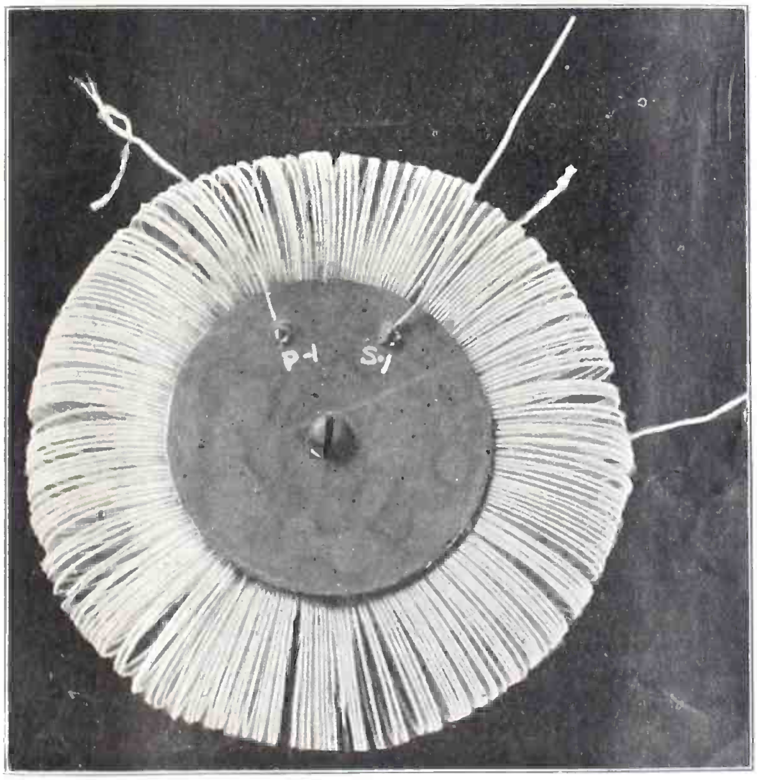
Title Reg. U.S. Pat. Off

Vol. 7. No. 22. ILLUSTRATED Every Week

155-178

CRYSTAL SETS
By *Herman Bernard*

HOW TO MAKE A TOROIDAL COIL



The Completed Toroidal RF Transformer. (See page 6.)

RADIO SECRETS OF THE WAR

APARTMENT HOUSE AERIALS

THE DIAMOND WITH FIVE TUBES

FOUR FULL PAGES OF Q. and A.

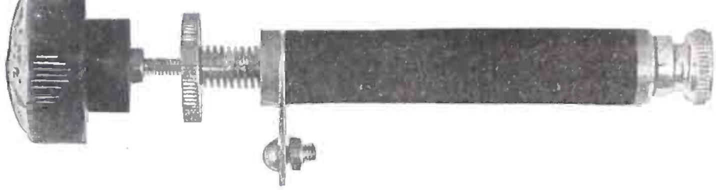
Americans Are Buying Them By the Thousand

NOW you can get it for the first time in America

Used in eighty per cent of all receiving sets in Great Britain

The "BRETWOOD"

Pulls in inaudible stations



Eliminates tube noises

Range 300,000 to 10,000,000 ohms

Variable Grid Leak

Bretwood, Ltd., London, Eng., Sole Patentees and Owners.

The Bretwood Variable Grid Leak used in a detector tube circuit, strengthens weak signals, makes DX easier, eliminates tube noises and internal howling, due to incorrect leakage from the grid of the tube.

By simply turning the knob the carrier wave may be tuned from the silent point to maximum audibility.

The Bretwood is absolutely noiseless in operation and will hold any given setting indefinitely. It is a single-hole panel mount leak.

The Bretwood Variable Grid Leak, tested in the National Physical Laboratory (the official laboratory of Great Britain) and by RADIO WORLD'S Laboratory, proved to be a scientifically accurate instrument. The total range, 9,700,000 ohms, produced by 25 turns of the knob, make a minute adjustment very simple.

The Bretwood Variable Grid Leak is constructed on a different principle and produces better results than any other grid leak. In its specially-constructed barrel is a patented plastic, non-drying resistance material, in which there is a small movable plunger which again moves freely in an absorbent cartridge which gives the setting of the instrument great stability, making it far superior to the graphite, carbon or fibre, compressed or decompressed, resistance elements. It can be used in the most critical circuits with the greatest success.

Sent You on a Money Back Absolute Satisfaction Guarantee

The Bretwood Variable Grid Leak will be immediately shipped on receipt of order to any address in the United States, prepaid for $1.50. After 10 days' trial if it is not 100% better than any grid leak you have ever had and does not in every way substantiate all claims made for it, your money will be refunded without question.

The North American Bretwood Company

Sole Distributors for United States and Canada

1505 BROADWAY, NEW YORK CITY

Dealers and Jobbers Write for Special Trade Terms

THE NORTH AMERICAN BRETWOOD CO.
1505 Broadway, New York City
Room 326

Gentlemen:
Enclosed find $1.50 for which you will please send me one Bretwood Variable Grid Leak prepaid. Satisfaction guaranteed or my money back after trial within ten days of receipt by me.

NAME..

STREET..

CITY.......................... STATE.....................

RADIO WORLD

[Entered as second-class matter, March, 1922, at the post office at New York, N. Y., under the act of March 3, 1879]

A Weekly Paper Published by Hennessey Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Phones: Lackawanna 6976 and 2063

Vol. VII. No. 22. Whole No. 178. August 22, 1925 15c per copy, $6.00 a year

An Attempt to Gild the Lily

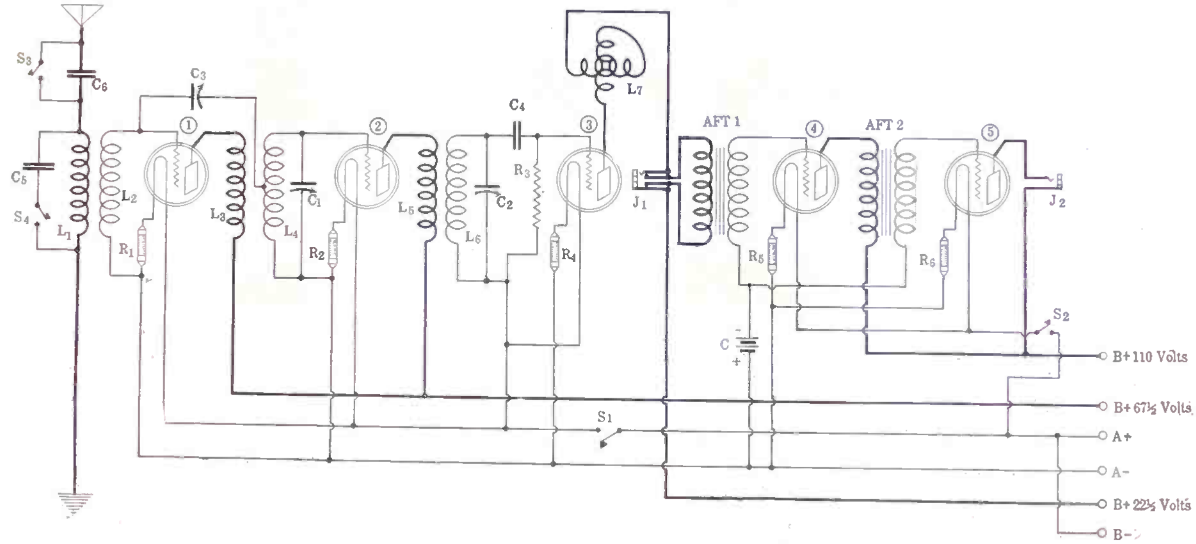


Fig. 1, showing the electrical diagram of the Improved Diamond. There are 5 tubes in this set instead of 4 tubes as in the original Diamond.

Fixed RFT Used for Extra Stage Added to the Fundamental Hookup of The Diamond of the Air—Variometer Controls Regeneration—Author Explains His Theory of Improvement of Bernard's Great Circuit.

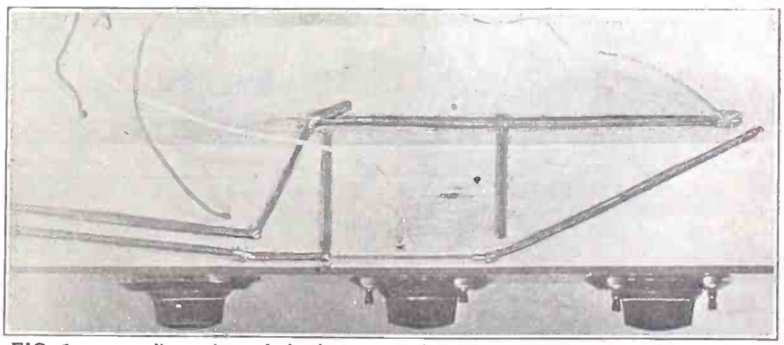


FIG. 5, an excellent view of the bottom of the set. Note the filament leads, identified by the heavy black leads. For the filament wiring use No. 14 insulated wire. Also note the leads coming through the holes in the baseboard, which are connected to the various batteries. DO NOT FORGET TO PUT TAGS ON THE LEADS, so that you won't blow out your tubes.

By Sidney E. Finkelstein

Associate Institute of Radio Engineers

THERE are very few receivers that can boast of being better, so far as volume, selectivity and distance are concerned, than the standard 3-tube regenerative receiver. One of the exceptions is the Super-Heterodyne, and that employs at least 6 tubes. The other exception is The Diamond of the Air, employing only four tubes. The above statement was proved by the intensive tests carried on by me. However, in every receiver there is some room for improvement.

SIDNEY E. FINKELSTEIN

In The Diamond it was pretty difficult to find this room, but I looked long enough and think I found it. The improvement is very small. Of course there is this objection, that I added another step of radio-frequency amplification, which is untuned. This tube can faithfully be called a neutralization tube which stabilizes the regenerative action of the receiver and makes the tuning easier.

The Actual Changes Made in the Set

Take a look at the diagram, Fig. 1. The first change that is noticed is that there is no provision made for a loop. I am not fond of loop reception. The signals are not loud and it is difficult to tune the set. The loop is only good to use where portability is necessary, where it is forbidden to install an antenna, or the looks of the room, on account of the outside wires showing. In series with the antenna lead we have a .001 mfd. fixed condenser, which is shunted by a switch. This switch short-circuits the condenser. The switch is opened when you cannot receive low wave signals. Across the antenna and the ground there is another .001 mfd. fixed condenser, which can be cut in or out of the circuit. This condenser is used when you cannot receive the high wave stations. This is put in use by closing the switch S4.

Uses a Fixed RFT

L1 L2 is a fixed radio-frequency transformer. As you will note in Fig. 2 the tuned type RFT was used, that is, the secondary of this RFT is usually tuned by

Coil and Panel Data for the Set

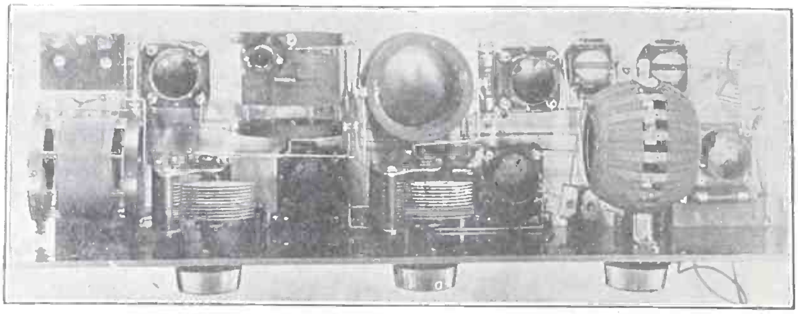


FIG. 3, looking down on the receiver. This photo gives a good idea of how the parts should be placed on the baseboard.

that by using this type of RFT the tuning was sharpened to a great extent. The Duratran RFT, which is of the real fixed type, gave satisfaction also. The signals were louder, but the selectivity was less.

C3 is the neutralization condenser and has a variable capacity, ranging from .000016 to .0000185 mfd.

L7, the variometer, was used instead of the tickler coil, and was found to control regeneration well.

What is Needed to Build the Set

Those who have a Diamond will only have to buy the parts mentioned above, and with the exception of the variometer, place them in a separate cabinet. This cabinet should be 6"x7", with a panel to fit. All that will show on the front will be the 2 switches and the knob of the neutralization condenser.

This data is given for the new Diamond builders. L3 L4 and L5 L6 are both tuned RFT. C1 and C2 are .0005 mfd. variable condensers. To control the filaments of the tubes, automatic filament resistance units are used. The type used is dependent upon the tube. C4 is a .00025 grid condenser. R3 is a 2 or 3 megohm grid leak. S1 is the switch that cuts off the first three-tubes, and S2 is the switch that cuts off the last two tubes. J1 is a double-circuit jack. J2 is a single-circuit jack. AFT 1 and AFT 2 are both low-ratio audio-frequency transformers. Get a 7x24" panel with cabinet to fit. The baseboard is 22" long 5" wide and 1" thick. Five sockets to fit the tubes that you use are required.

How to Drill the Panel

We now come to the drilling of the panel, which is very simple. Fig. 4 gives a very clear picture of how the panel should look when completed. Six inches from the left-hand side of the panel, and 3½" from the top and the bottom, drill a 3/16" hole for the shaft of C1, the variable condenser. Six inches from this hole and also 3½" from the top and the bottom drill another 3-16" hole for the other variable condenser. Six inches from this hole and 3½" from the top and the bottom, drill the final shaft hole for the variometer. Four inches from the left-hand side of the panel and ¾" up from the bottom, drill a 1" hole for S3. Three inches from this hole and in the same line, drill a hole for the other antenna switch S4. Four inches from this hole and ¾" from the bottom, drill a hole for the filament switch that shuts off the first 3-tubes, detector and 2 steps of radio-frequency amplification (S1). Three inches from this hole and in the same line, drill a hole for the other filament switch, S2. The diameters of these holes are all 1". Four inches from the last hole, and ¾" from the bottom, drill a hole for J1, the diameter being 1". Three inches from this hole and on the same line, drill

One-eighth inch from the bottom and 1½" from the left-hand side, drill a hole for the baseboard screw (about 1-8" in diameter). Eight and one-half inches from the left-hand edge, and in the same line as the other screw hole, drill a hole for the other baseboard screw. Seven inches from this hole and in the same line, drill another hole for the other screw. Seven inches from this hole and in the same line, drill the last baseboard screw hole. That is all there is to the drilling of the panel.

How to Place the Parts

Figs. 2 and 3 give clear views of how the parts should be placed. The tuning instruments have already found their places by the panel drilling also the switches and the jacks.

At the extreme right-hand side of the baseboard, close to the edge and to the panel, place the first RFT, which is untuned. Right in back of this coil place on brackets the antenna and the ground terminal posts. Leave ½" and place the first RFT socket. Place the filament posts of the socket to the left, or immediately adjoining the antenna-ground bracket. In between the small space left insert the Amperite. Leave 2" and place the second RFT, which is also on brackets. This should be placed with the circumferences perpendicular to the surfaces of the board. About 1½" from this transformer and in the same line, but at right angles, place the detector coil. In between C1 and C2, place the second RF tube socket. In between C2 and the variometer place the detector tube socket. The filament post of these sockets face the panel. Right in back of the variometer and about 1" separation between the two place the audio-frequency transformers. You will probably have a little trouble placing these AFT, if other type than those are used here. In the same line with the rear of the detector coil, place the first AF tube socket, the filament posts facing the coil. The last socket is placed ¼" from the variometer and 2" from the panel, with the filament post facing the panel. In back of this socket or opposite

LIST OF PARTS

Three TRFT (L1L2, L3L4, L5L6).
Five sockets.
One variometer (L7).
One .00025 grid condenser (C4).
One grid leak, 2 or 3 megohms (R3).
Two .001 mfd. fixed condensers (C5 and C6).
One neutralization condenser (C3).
Five Amperites (R1, R2, R3, R4 and R5).
Two low ratio AFT (AFT1 and 2).
Three dials.
Four switches (single throw, single pole), (S1, S2, S3 and S4).
One double-circuit jack (J1).
One single-circuit jack (J2).
Two .0005 mfd. variable condensers (C1 and C2).

Accessories: Phones, A battery, B batteries, antenna wire, lead-in wire, connecting wire, C battery, 5 tubes, panel, cabinet, baseboard and terminal strip.

the second audio-frequency transformer, place the C battery. This is held in place by a special angle bracket.

How to Wind the Coils

Those desiring to use a plain RFT for L1, L2 may wind it in a very simple manner. As a matter of fact all the RFT are made in same manner, have the same number of turns, and use the same kind of wire. They are all wound on a tubing 3½" in diameter, and 4" high. No. 22 DCC or 24 S over C wire is used. L1 has 10 turns, no space, and L2 has 45 turns. This means that L3 and L5 are the same as L1 and L4 and L6 are the same as L2.

There is no need for any holding material on these coils. L7 is a commercially made variometer. I would not advise any one to try to build this, as it is very difficult. However, there might be some who like to tackle difficult things, and for those folk these data are given; Procure a form 3" in diameter and 4" in length. Wind 28 turns on one side or on 2" of the form, leave a ¼" space and wind 28 more turns. This is the stator. There are 56 turns in all. Where the space was left, drill a hole ¼" in diameter. This is for the purpose of inserting the shaft. The rotor is wound on a form 2" in diameter and 2" high. A regular rotor form is best to use here, as you will find it difficult to wind so many turns, as will be prescribed, on so small a form. There are 36 turns on each half of the form, and a ¼" space left between the windings. Drill a ¼" hole in between the windings on both sides of the form. Connect the ending of the stator to the beginning of the rotor. This will give you two leads. Insert a brass tubing through the two forms where the holes were drill-

FIG. 4, showing the front panel view of the set. The first dial controls the shaft of the variable condenser shunted across the second RFT and the other dial controls the shaft of the condenser shunted across the secondary of the detector coil. The other dial controls the rotor of the variometer.

How to Wire the 5-Tube Set

ed. The diameter of this shaft is ¼". Drop a piece of solder on the shaft, after it enters the stator, before it enters the rotor of the tubing and after it goes through the rotor, close to the tubing. The same is done on the other side of the rotor.

We are now all set to wire up the set. Bring the antenna post to one terminal of the S3 and also to C6. The other end of C6 goes to the beginning of L1 to the end terminal of S3, and to one terminal of C5. The end of L1 goes to one terminal of S4, and at the same time to the ground terminal post.

Those using a commercial fixed RFT, should follow these directions. Plate post to the antenna, B plus post to the ground; Grid post to grid of tube No. 1, and F minus to end terminal of Amperite, which is connected in series with the F minus.

The condensers C5 and C6 can be placed right up against the terminal strip. The end terminal of C5 goes to the left of connection of the switch S4. The beginning of L2 goes to the grid post on the tube No. 1. This also goes to the stator plates of the neutralization condenser C3. The end of L2 goes to the A minus. Note: All the battery leads are brought out through the bottom of the baseboard. They therefore should be marked so that there will be no error when connecting up the batteries. See Fig. 5. Connect the Amperite in series with the F minus, one post going to the F minus post of the socket and one post going to the A minus lead as well as to the other terminal of the Amperite. The beginning of L3 goes to the plate post of tube No. 1, the end going to the B plus 67½ volt lead. The beginning of L4 goes to the grid post of tube No. 2 and also to the stator plates of C1. At the 15th turn make a tap on L4. Here connect the stator plates of the neutralization condenser C3. The end of L4 goes to the rotary plates of the variable condenser, C1. It also goes to the A minus lead. The amperite R2 is connected in the same manner as was R1. The beginning of L5 goes to the plate post on tube No. 2. The end connects the end of L3. The beginning of L6 goes to one side of the fixed condenser R3 and to the stator plates of C2. The end goes to the rotary plates of C2, to the end of the grid leak R3 and to the F plus post on the socket. Connect all the F pluses to one terminal of S1. The other terminal of S1 goes to the A plus lead. The left off terminal of C4 goes to the grid post of tube No. 3 and also to the other terminal of R3. Connect R4 in the same manner as R2 was connected. Bring the rotor winding of the variometer L7 to the plate post on tube No. 3, and the stator winding to the top terminal of J1. The last terminal of J1 goes to the B plus 22½ volt lead. The second terminal from the top goes to the P post on the first AFT. The other terminal goes to the B plus post on the AFT. The two F minus leads of the two AFT go together and thence to the minus of the C battery, the positive side of this battery going to the A minus lead. The grid post on this AFT goes to the grid of tube No. 4. The plate of this same tube is connected to the plate post on AFT 2. The B plus lead goes to the end terminal of J2 and then to the B plus 110 volt lead. The two F plus posts on the sockets go to one portion of S2, the other portion going to the end of S1 (after the switch connection) or A plus lead. The grid post of AFT 2 goes to the grid post on tube No. 3. The plate of this tube goes to the top terminal of the jack J2. The Amperites are connected in the same fashion as were R1, R2, R3. The ends of both go to the A minus lead.

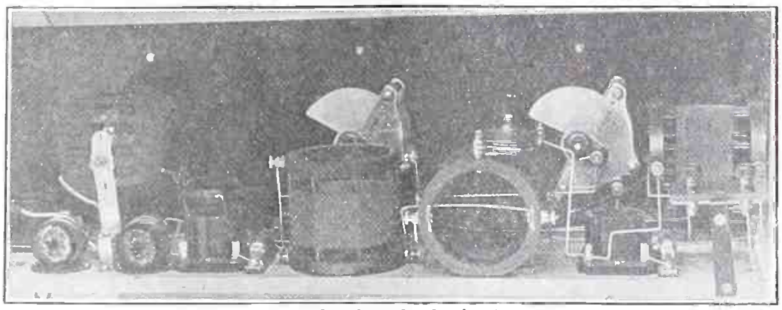


Fig. 2 showing the back view

Bus bar was not used in wiring this set up, even though in the photo it looks as if bus bar was used. No. 14 bare-hard drawn wire was used.

Dry cell tubes may be used with great results.

The set will work as soon as the batteries, the antenna and the ground are connected. Turn the variometer dial over to about 50 on the dial. Now turn both variable condensers (both dials should read the same, or the rotary plates of both condensers should be in the same position). At the extreme lower end of the dial you will hear an extreme loud squawk. This is a sign that the set is working. Another sign, is when you turn the dials as above and you hear a click all the way up the scale. You will note that as you increase the dial readings of the variable condensers beyond a certain point the variometer reading will have to be increased in exact ratio to the readings of the other dials, viz 60, 60, 60. The tuning of this set at the beginning is difficult, but it only takes about 5 minutes to get the knack of tuning. Use a short antenna, about 100 feet including the lead-in will be fine. The ground should be made to a water pipe. Try different tubes in different sockets. This is very essential and the success of the receiver is dependent upon this.

Music Publishers Aided By Radio, Says Lawyer

EDITOR, RADIO WORLD:

As an interested subscriber and reader of RADIO WORLD I wish to state that among the many interesting articles of recent date was the one by Powel Crosley, Jr., in the July 25 issue. I heartily indorse his views.

The attitude of the Society of Composers, Authors & Publishers is certainly to all appearances unreasonable, unfair and ungracious. No organization can exist or long prosper with an attitude of unfair squeezing and penalizing the public, and that is what that amounts to, for eventually the public from whom they derive their revenue must pay.

Now, those people are profiting from radio reception. The indirect advertising that they get is as great in returns, I feel sure, as is derived by radio companies. Before broadcasting, a popular song was years getting introduced, now it is a matter of weeks.

I built my first set and began receiving about a year ago. Since that time I have bought more new popular songs and music heard over the radio than I have in five years previous. I am sure this is true the country over. The radio is proving their greatest advertiser and introducer and they are profiting by it. They should be glad to have their productions used instead of trying to penalize the radio stations and companies for giving them a market. If any consideration is due it should be from that organization to the radio-casters. The fair and ethical thing is for both to co-operate to their mutual advantage. I should like to see statistics, if procurable regarding the sale of popular songs and sheet music the past two years as compared with the five years previous. I am sure it would be enlightening to all who have any interest in the subject.

I am sure the Society must be acquainted with these conditions and cannot feel that they are acting in good faith. Eventually they will disorganize themselves. Even from a strictly selfish motive, they should awake and see the folly of their policy. In business as in other activities the wise participator is coming to know that a "quid pro quo," a something for something, or in other words the Golden Rule is a necessary essential to prosperity and permanence. It is no longer good business to squeeze and penalize because an opportunity seems to present itself. That society is doomed to destruction unless it changes its policy and plays the game on the square—Harry V. Forehand, Attorney-at-Law, Johnson Bldg., Kokomo, Ind.

Query from Wife to Reinartz Reaches Boy Sending to Him

CEDAR RAPIDS, IOWA.

While Arthur A. Collins, fifteen, was in code communication in 20 meters with John L. Reinartz, aboard the MacMillan ship Bowdoin, at Etah, Greenland, Arthur got a land-wire telegram from Reinartz's wife, sent from her home in South Manchester, Conn. As she had not heard from her husband in ten days she was anxious concerning his health. Arthur forwarded the telegraph message and Reinartz wired back all was well and sent love and kisses. Arthur then dispatched the reply to Mrs. Reinartz.

RADIO WORLD

[Entered as second-class matter, March, 1922, at the post office at New York, N. Y., under the act of March 3, 1879]

A Weekly Paper Published by Hennessey Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Phones: Lackawanna 6976 and 2063

Vol. VII. No. 22. Whole No. 178. August 22, 1925 15c per copy, $6.00 a year

An Attempt to Gild the Lily

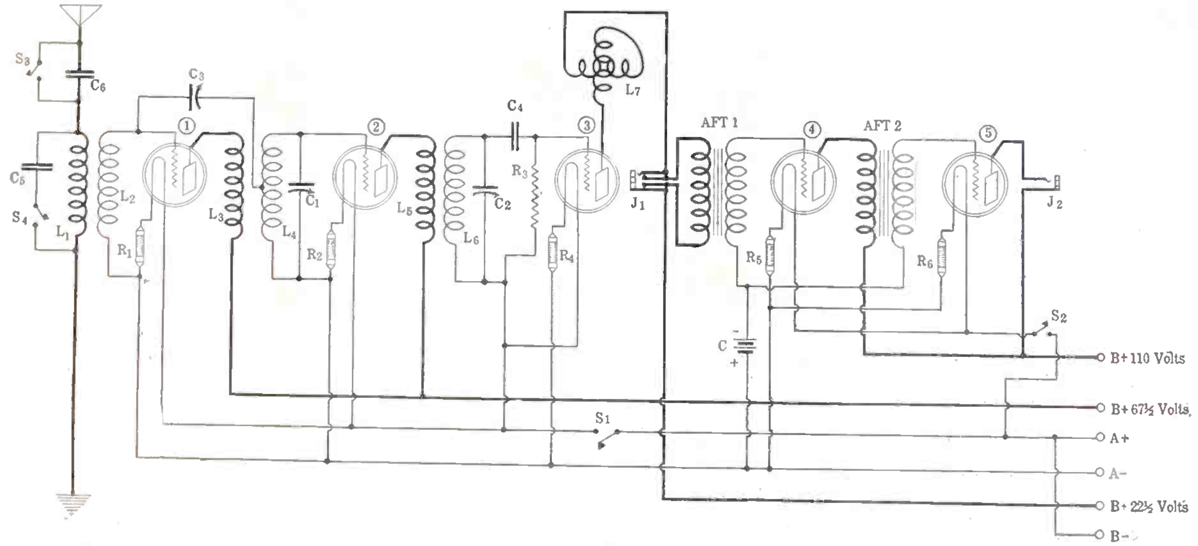


Fig. 1, showing the electrical diagram of the Improved Diamond. There are 5 tubes in this set instead of 4 tubes as in the original Diamond.

Fixed RFT Used for Extra Stage Added to the Fundamental Hookup of The Diamond of the Air—Variometer Controls Regeneration — Author Explains His Theory of Improvement of Bernard's Great Circuit.

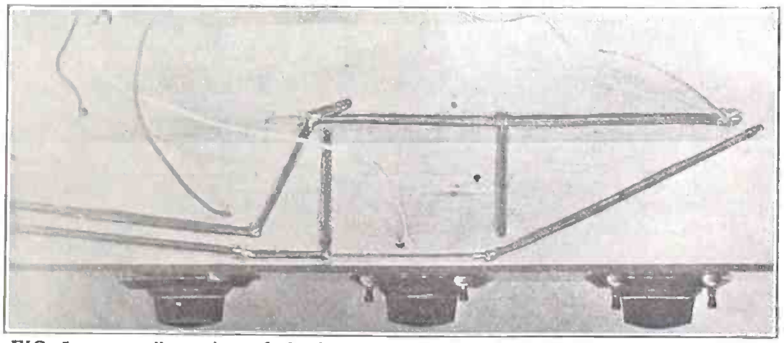


FIG. 5, an excellent view of the bottom of the set. Note the filament leads, identified by the heavy black leads. For the filament wiring use No. 14 insulated wire. Also note the leads coming through the holes in the baseboard, which are connected to the various batteries. DO NOT FORGET TO PUT TAGS ON THE LEADS, so that you won't blow out your tubes.

By Sidney E. Finkelstein

Associate Institute of Radio Engineers

SIDNEY E. FINKELSTEIN

THERE are very few receivers that can boast of being better, so far as volume, selectivity and distance are concerned, than the standard 3-tube regenerative receiver. One of the exceptions is the Super-Heterodyne, and that employs at least 6 tubes. The other exception is The Diamond of the Air, employing only four tubes. The above statement was proved by the intensive tests carried on by me. However, in every receiver there is some room for improvement.

In The Diamond it was pretty difficult to find this room, but I looked long enough and think I found it. The improvement is very small. Of course there is this objection, that I added another step of radio-frequency amplification, which is untuned. This tube can faithfully be called a neutralization tube which stabilizes the regenerative action of the receiver and makes the tuning easier.

The Actual Changes Made in the Set

Take a look at the diagram, Fig. 1. The first change that is noticed is that there is no provision made for a loop. I am not fond of loop reception. The signals are not loud and it is difficult to tune the set. The loop is only good to use where portability is necessary, where it is forbidden to install an antenna, or where the owner does to wish to spoil the looks of the room, on account of the outside wires showing. In series with the antenna lead we have a .001 mfd. fixed condenser, which is shunted by a switch. This switch short-circuits the condenser. The switch is opened when you cannot receive low wave signals. Across the antenna and the ground there is another .001 mfd. fixed condenser, which can be cut in or out of the circuit. This condenser is used when you cannot receive the high wave stations. This is put in use by closing the switch S4.

Uses a Fixed RFT

L1 L2 is a fixed radio-frequency transformer. As you will note in Fig. 2 the tuned type RFT was used, that is, the secondary of this RFT is usually tuned by a .0005 mfd. variable condenser. I found

RADIO WORLD

[Entered as second-class matter, March, 1922, at the post office at New York, N. Y., under the act of March 3, 1879]

A Weekly Paper Published by Hennessey Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Phones: Lackawanna 6976 and 2063

Vol. VII. No. 22. Whole No. 178. August 22, 1925 15c per copy, $6.00 a year

An Attempt to Gild the Lily

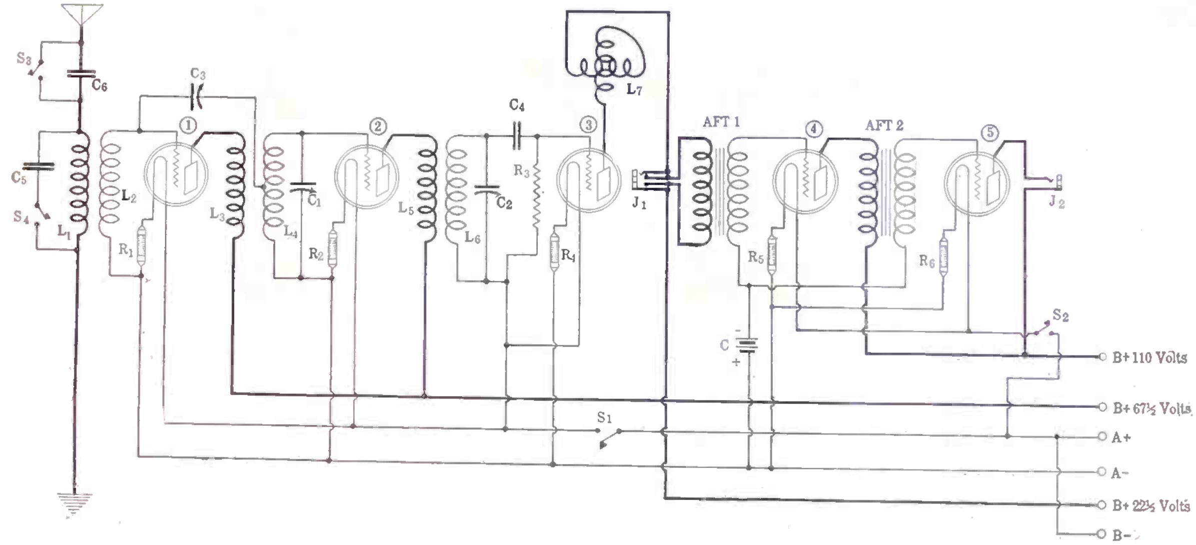


Fig. 1, showing the electrical diagram of the Improved Diamond. There are 5 tubes in this set instead of 4 tubes as in the original Diamond.

Fixed RFT Used for Extra Stage Added to the Fundamental Hookup of The Diamond of the Air—Variometer Controls Regeneration — Author Explains His Theory of Improvement of Bernard's Great Circuit.

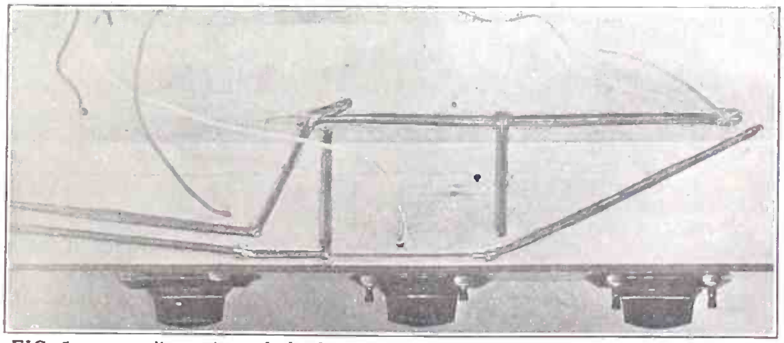


FIG. 5, an excellent view of the bottom of the set. Note the filament leads, identified by the heavy black leads. For the filament wiring use No. 14 insulated wire. Also note the leads coming through the holes in the baseboard, which are connected to the various batteries. DO NOT FORGET TO PUT TAGS ON THE LEADS, so that you won't blow out your tubes.

By Sidney E. Finkelstein

Associate Institute of Radio Engineers

THERE are very few receivers that can boast of being better, so far as volume, selectivity and distance are concerned, than the standard 3-tube regenerative receiver. One of the exceptions is the Super-Heterodyne, and that employs at least 6 tubes. The other exception is The Diamond of the Air, employing only four tubes. The above statement was proved by the intensive tests carried on by me. However, in every receiver there is some room for improvement.

SIDNEY E. FINKELSTEIN

In The Diamond it was pretty difficult to find this room, but I looked long enough and think I found it. The improvement is very small. Of course there is this objection, that I added another step of radio-frequency amplification, which is untuned. This tube can faithfully be called a neutralization tube which stabilizes the regenerative action of the receiver and makes the tuning easier.

The Actual Changes Made in the Set

Take a look at the diagram, Fig. 1. The first change that is noticed is that there is no provision made for a loop. I am not fond of loop reception. The signals are not loud and it is difficult to tune the set. The loop is only good to use where portability is necessary, where it is forbidden to install an antenna, or where the owner does to wish to spoil the looks of the room, on account of the outside wires showing. In series with the antenna lead we have a .001 mfd. fixed condenser, which is shunted by a switch. This switch short-circuits the condenser. The switch is opened when you cannot receive low wave signals. Across the antenna and the ground there is another .001 mfd. fixed condenser, which can be cut in or out of the circuit. This condenser is used when you cannot receive the high wave stations. This is put in use by closing the switch S4.

Uses a Fixed RFT

L1 L2 is a fixed radio-frequency transformer. As you will note in Fig. 2 the tuned type RFT was used, that is, the secondary of this RFT is usually tuned by a .0005 mfd. variable condenser. I found

Coil and Panel Data for the Set

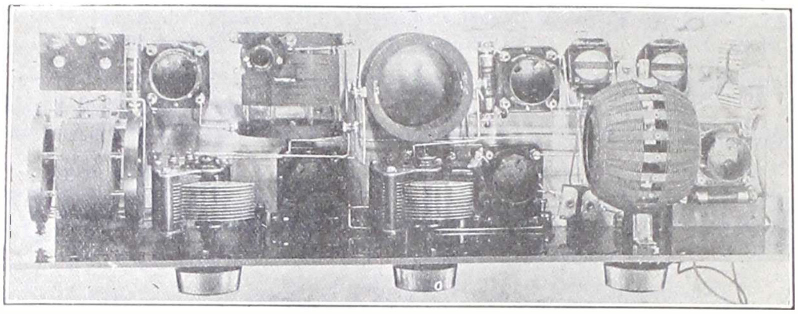


FIG. 3, looking down on the receiver. This photo gives a good idea of how the parts should be placed on the baseboard.

LIST OF PARTS

Three TRFT (L1L2, L3L4, L5L6).
Five sockets.
One variometer (L7).
One .00025 grid condenser (C4).
One grid leak, 2 or 3 megohms (R3).
Two .001 mfd. fixed condensers (C5 and C6).
One neutralization condenser (C3).
Five Amperites (R1, R2, R3, R4 and R5).
Two low ratio AFT (AFT1 and 2).
Three dials.
Four switches (single throw, single pole), (S1, S2, S3 and S4).
One double-circuit jack (J1).
One single-circuit jack (J2).
Two .0005 mfd. variable condensers (C1 and C2).

Accessories: Phones, A battery, B batteries, antenna wire, lead-in wire, connecting wire, C battery, 5 tubes, panel, cabinet, baseboard and terminal strip.

that by using this type of RFT the tuning was sharpened to a great extent. The Duratran RFT, which is of the real fixed type, gave satisfaction also. The signals were louder, but the selectivity was less.

C3 is the neutralization condenser and has a variable capacity, ranging from .000016 to .0000185 mfd.

L7, the variometer, was used instead of the tickler coil, and was found to control regeneration well.

What is Needed to Build the Set

Those who have a Diamond will only have to buy the parts mentioned above, and with the exception of the variometer, place them in a separate cabinet. This cabinet should be 6"x7", with a panel to fit. All that will show on the front will be the 2 switches and the knob of the neutralization condenser.

This data is given for the new Diamond builders. L3 L4 and L5 L6 are both tuned RFT. C1 and C2 are .0005 mfd. variable condensers. To control the filaments of the tubes, automatic filament resistance units are used. The type used is dependent upon the tube. C4 is a .00025 grid condenser. R3 is a 2 or 3 megohm grid leak. S1 is the switch that cuts off the first three-tubes, and S2 is the switch that cuts off the last two tubes. J1 is a double-circuit jack. J2 is a single-circuit jack. AFT 1 and AFT 2 are both low-ratio audio-frequency transformers. Get a 7x24" panel with cabinet to fit. The baseboard is 22" long 5" wide and 1" thick. Five sockets to fit the tubes that you use are required.

How to Drill the Panel

We now come to the drilling of the panel, which is very simple. Fig. 4 gives a very clear picture of how the panel should look when completed. Six inches from the left-hand side of the panel, and 3½" from the top and the bottom, drill a 3/16" hole for the shaft of C1, the variable condenser. Six inches from this hole and also 3½" from the top and the bottom drill another 3-16" hole for the other variable condenser. Six inches from this hole and 3½" from the top and the bottom, drill the final shaft hole for the variometer. Four inches from the left-hand side of the panel and ¾" up from the bottom, drill a 1" hole for S3. Three inches from this hole and in the same line, drill a hole for the other antenna switch S4. Four inches from this hole and ¾" from the bottom, drill a hole for the filament switch that shuts off the first 3-tubes, detector and 2 steps of radio-frequency amplification (S1). Three inches from this hole and in the same line, drill a hole for the other filament switch, S2. The diameters of these holes are all 1". Four inches from the last hole, and ¾" from the bottom, drill a hole for J1, the diameter being 1". Three inches from this hole and on the same line, drill the final hole for J2 (diameter also 1").

One-eighth inch from the bottom and 1½" from the left-hand side, drill a hole for the baseboard screw (about 1-8" in diameter). Eight and one-half inches from the left-hand edge, and in the same line as the other screw hole, drill a hole for the other baseboard screw. Seven inches from this hole and in the same line, drill another hole for the other screw. Seven inches from this hole and in the same line, drill the last baseboard screw hole. That is all there is to the drilling of the panel.

How to Place the Parts

Figs. 2 and 3 give clear views of how the parts should be placed. The tuning instruments have already found their places by the panel drilling also the switches and the jacks.

At the extreme right-hand side of the baseboard, close to the edge and to the panel, place the first RFT, which is untuned. Right in back of this coil place on brackets the antenna and the ground terminal posts. Leave ½" and place the first RFT socket. Place the filament posts of the socket to the left, or immediately adjoining the antenna-ground bracket. In between the small space left insert the Amperite. Leave 2" and place the second RFT, which is also on brackets. This should be placed with the circumferences perpendicular to the surfaces of the board. About 1½" from this transformer and in the same line, but at right angles, place the detector coil. In between C1 and C2, place the second RF tube socket. In between C2 and the variometer place the detector tube socket. The filament post of these sockets face the panel. Right in back of the variometer and about 1" separation between the two place the audio-frequency transformers. You will probably have a little trouble placing these AFT, if other type than those are used here. In the same line with the rear of the detector coil, place the first AF tube socket, the filament posts facing the coil. The last socket is placed ¼" from the variometer and 2" from the panel, with the filament post facing the panel. In back of this socket or opposite the second audio-frequency transformer, place the C battery. This is held in place by a special angle bracket.

How to Wind the Coils

Those desiring to use a plain RFT for L1, L2 may wind it in a very simple manner. As a matter of fact all the RFT are made in same manner, have the same number of turns, and use the same kind of wire. They are all wound on a tubing 3½" in diameter, and 4" high. No. 22 DCC or 24 S over C wire is used. L1 has 10 turns, no space, and L2 has 45 turns. This means that L3 and L5 are the same as L1 and L4 and L6 are the same as L2.

There is no need for any holding material on these coils. L7 is a commercially made variometer. I would not advise any one to try to build this, as it is very difficult. However, there might be some who like to tackle difficult things, and for those folk these data are given; Procure a form 3" in diameter and 4" in length. Wind 28 turns on one side or on 2" of the form, leave a ¼" space and wind 28 more turns. This is the stator. There are 56 turns in all. Where the space was left, drill a hole ¼" in diameter. This is for the purpose of inserting the shaft. The rotor is wound on a form 2" in diameter and 2" high. A regular rotor form is best to use here, as you will find it difficult to wind so many turns, as will be prescribed, on so small a form. There are 36 turns on each half of the form, and a ¼" space left between the windings. Drill a ¼" hole in between the windings on both sides of the form. Connect the ending of the stator to the beginning of the rotor. This will give you two leads. Insert a brass tubing through the two forms where the holes were drill-

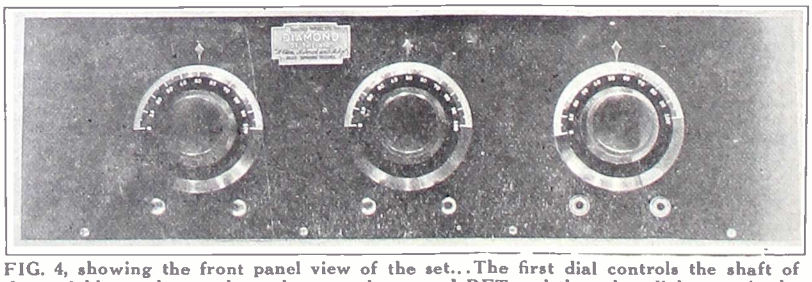


FIG. 4, showing the front panel view of the set...The first dial controls the shaft of the variable condenser shunted across the second RFT and the other dial controls the shaft of the condenser shunted across the secondary of the detector coil. The other dial controls the rotor of the variometer.

How to Wire the 5-Tube Set

ed. The diameter of this shaft is ¼". Drop a piece of solder on the shaft, after it enters the stator, before it enters the rotor of the tubing and after it goes through the rotor, close to the tubing. The same is done on the other side of the rotor.

We are now all set to wire up the set. Bring the antenna post to one terminal of the S3 and also to C6. The other end of C6 goes to the beginning of L1 to the end terminal of S3, and to one terminal of C5. The end of L1 goes to one terminal of S4, and at the same time to the ground terminal post.

Those using a commercial fixed RFT, should follow these directions. Plate post to the antenna, B plus post to the ground; Grid post to grid of tube No. 1, and F minus to end terminal of Amperite, which is connected in series with the F minus.

The condensers C5 and C6 can be placed right up against the terminal strip. The end terminal of C5 goes to the left of connection of the switch S4. The beginning of L2 goes to the grid post on the tube No. 1. This also goes to the stator plates of the neutralization condenser C3. The end of L2 goes to the A minus. Note: All the battery leads are brought out through the bottom of the baseboard. They therefore should be marked so that there will be no error when connecting up the batteries. See Fig. 5. Connect the Amperite in series with the F minus, one post going to the F minus post of the socket and one post going to the A minus lead as well as to the other terminal of the Amperite. The beginning of L3 goes to the plate post of tube No. 1, the end going to the B plus 67½ volt lead. The beginning of L4 goes to the grid post of tube No. 2 and also to the stator plates of C1. At the 15th turn make a tap on L4. Here connect the stator plates of the neutralization condenser C3. The end of L4 goes to the rotary plates of the variable condenser, C1. It also goes to the A minus lead. The amperite R2 is connected in the same manner as was R1. The beginning of L5 goes to the plate post on tube No. 2. The end connects the end of L3. The beginning of L6 goes to one side of the fixed condenser R3 and to the stator plates of C2. The end goes to the rotary plates of C2, to the end of the grid leak R3 and to the F plus post on the socket. Connect all the F pluses to one terminal of S1. The other terminal of S1 goes to the A plus lead. The left off terminal of C4 goes to the grid post of tube No. 3 and also to the other terminal of R3. Connect R4 in the same manner as R2 was connected. Bring the rotor winding of the variometer L7 to the plate post on tube No. 3, and the stator winding to the top terminal of J1. The last terminal of J1 goes to the B plus 22½ volt lead. The second terminal from the top goes to the P post on the first AFT. The other terminal goes to the B plus post on the AFT. The two F minus leads of the two AFT go together and thence to the minus of the C battery, the positive side of this battery going to the A minus lead. The grid post on this AFT goes to the grid of tube No. 4. The plate of this same tube is connected to the plate post on AFT 2. The B plus lead goes to the end terminal of J2 and then to the B plus 110 volt lead. The two F plus posts on the sockets go to one portion of S2, the other portion going to the end of S1 (after the switch connection) or A plus lead. The grid post of AFT 2 goes to the grid post on tube No. 3. The plate of this tube goes to the top terminal of the jack J2. The Amperites are connected in the same fashion as were R1, R2, R3. The ends of both go to the A minus lead.

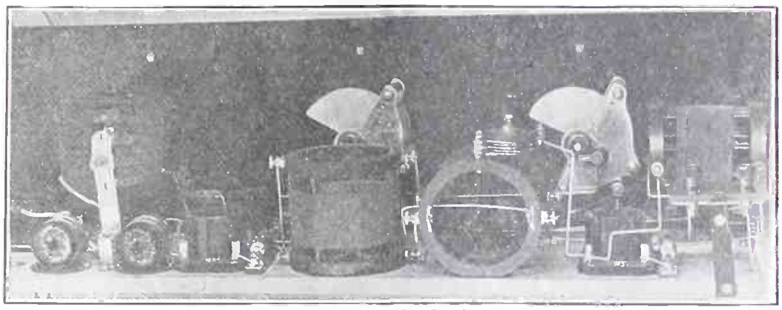


Fig. 2 showing the back view

Bus bar was not used in wiring this set up, even though in the photo it looks as if bus bar was used. No. 14 bare-hard drawn wire was used.

Dry cell tubes may be used with great results.

The set will work as soon as the batteries, the antenna and the ground are connected. Turn the variometer dial over to about 50 on the dial. Now turn both variable condensers (both dials should read the same, or the rotary plates of both condensers should be in the same position). At the extreme lower end of the dial you will hear an extreme loud squawk. This is a sign that the set is working. Another sign, is when you turn the dials as above and you hear a click all the way up the scale. You will note that as you increase the dial readings of the variable condensers beyond a certain point the variometer reading will have to be increased in exact ratio to the readings of the other dials, viz 60, 60, 60. The tuning of this set at the beginning is difficult, but it only takes about 5 minutes to get the knack of tuning. Use a short antenna, about 100 feet including the lead-in will be fine. The ground should be made to a water pipe. Try different tubes in different sockets. This is very essential and the success of the receiver is dependent upon this.

Music Publishers Aided By Radio, Says Lawyer

EDITOR, RADIO WORLD:

As an interested subscriber and reader of RADIO WORLD I wish to state that among the many interesting articles of recent date was the one by Powel Crosley, Jr., in the July 25 issue. I heartily indorse his views.

The attitude of the Society of Composers, Authors & Publishers is certainly to all appearances unreasonable, unfair and ungracious. No organization can exist or long prosper with an attitude of unfair squeezing and penalizing the public, and that is what that amounts to, for eventually the public from whom they derive their revenue must pay.

Now, those people are profiting from radio reception. The indirect advertising that they get is as great in returns, I feel sure, as is derived by radio companies. Before broadcasting, a popular song was years getting introduced, now it is a matter of weeks.

I built my first set and began receiving about a year ago. Since that time I have bought more new popular songs and music heard over the radio than I have in five years previous. I am sure this is true the country over. The radio is proving their greatest advertiser and introducer and they are profiting by it. They should be glad to have their productions used instead of trying to penalize the radio stations and companies for giving them a market. If any consideration is due it should be from that organization to the radio-casters. The fair and ethical thing is for both to co-operate to their mutual advantage. I should like to see statistics, if procurable regarding the sale of popular songs and sheet music the past two years as compared with the five years previous. I am sure it would be enlightening to all who have any interest in the subject.

I am sure the Society must be acquainted with these conditions and cannot feel that they are acting in good faith. Eventually they will disorganize themselves. Even from a strictly selfish motive, they should awake and see the folly of their policy. In business as in other activities the wise participator is coming to know that a "quid pro quo," a something for something, or in other words the Golden Rule is a necessary essential to prosperity and permanence. It is no longer good business to squeeze and penalize because an opportunity seems to present itself. That society is doomed to destruction unless it changes its policy and plays the game on the square—Harry V. Forehand, Attorney-at-Law, Johnson Bldg., Kokomo, Ind.

Query from Wife to Reinartz Reaches Boy Sending to Him

CEDAR RAPIDS, IOWA.

While Arthur A. Collins, fifteen, was in code communication in 20 meters with John L. Reinartz, aboard the MacMillan ship Bowdoin, at Etah, Greenland, Arthur got a land-wire telegram from Reinartz's wife, sent from her home in South Manchester, Conn. As she had not heard from her husband in ten days she was anxious concerning his health. Arthur forwarded the telegraph message and Reinartz wired back all was well and sent love and kisses. Arthur then dispatched the reply to Mrs. Reinartz.

A Home-Made Toroidal Coil

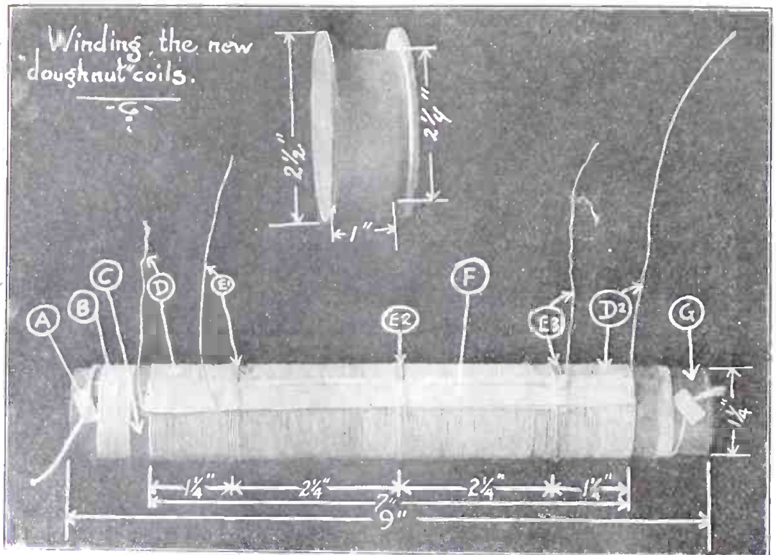


FIG. 1, showing (on top) the spool which constitutes the mount or form on which the coil is placed after being wound, and (lower view) the original form on which the wire is placed prior to removal. The text explains the designations. The completed coil (Fig. 2) is shown on the front cover.

By George B. Hostetter

PROCURE a cardboard tube 1¼" diameter and about 9 or 10" long. (Fig. 1). On this wind a layer of ordinary twine string (B) fastening the end with a tiny piece of adhesive tape (A). Over this wrap a thickness of writing paper. Get a roll of ½" adhesive tape and cut off a piece about 21" long. Split each end of this piece for a distance of 7 or 8". Lay the tape lengthwise on the tube, sticky side out, pushing the split ends into the ends of the tube out of the way. Now wind on 225 turns of No. 24 DC or SCC wire (D1, D2), securing the ends by punching a hole in the tape.

Lay one of the ¼" pieces of tape back over the coil and the opposite ¼" on the other end so as to form a strip ½" wide over the top of the coil.

About ¼" from the end of this winding start the primary, winding 4 turns of the same wire (E1). Do not break the wire but run it along the tape for 2½", then wind four more turns (E2). Run along the tape again for 2¼" and wind four more turns (E3). This makes twelve turns in all for the primary.

Each coil of four turns could be held in place temporarily by small pieces of adhesive tape.

Now take the other two pieces of ¼" tape and stick them tightly in place over the primary as at (F).

Pull the tape (A) loose and unwind the string, pulling it out at the end. This will allow the coil to slip off the tube very easily. Then the layer of writing paper may be removed.

Cut a piece of lightweight cardboard 1" wide and bend it into a ring whose outside diameter is exactly equal to the length of the secondary coil, measured on the tape.

Cut two circles of heavy cardboard 2½" in diameter, glue the ring to these discs, forming a spool.

With a piece of adhesive tape fasten one end of the coil to the spool, bring the other end of the coil around until the ends meet. Fasten with another piece of tape, working between the turns of the coil, which may be straightened back into place after the ends are secured.

You will now have a coil as shown in Fig. 2.

The leads may be brought out through holes punched in the discs as shown.

These coils may be used in any tuned radio-frequency circuit and eliminate the necessity of special placement of coils or the use of a potentiometer or other stabilizing device. The secondary is tuned with a .00035 mfd. variable condenser.

In a regenerative set the coils block radiation.

The Electrostatic Regenerator

By Percy Warren

I DON'T know why it is but I can get more enjoyment out of a 1-tube set than from any other. The more I fool around with them the more I like the 1-tubers. For the novice there is no greater place to obtain trouble-shooting knowledge than in a 1-tube set. I have been making this type of sets for about a year. I always find something different about them. True, none of these sets has anything revolutionary. Those changes which are put in them from week to week have improved the reception. I hope some day to find a 1-tube set that works a speaker.

PERCY WARREN

The set (Fig. 1) is of the regenerative type, employing electrostatic coupling. In the antenna circuit we use a variometer, which also goes to the grid circuit. The plate coil is put in inductive relation to the grid coil. The plate coil L2 is not variable and is tuned by the variable condenser, C2.

A good basket weave variometer L1 is the first instrument required. A straight-

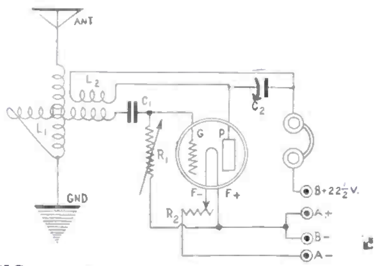


FIG. 1, wiring diagram of the electrostatic regenerator.

line frequency variable air condenser, C2, is also necessary. If you have a plain variable condenser the SL variable condenser need not be purchased. A 7x10" panel and cabinet to fit will house the parts very conveniently. C1 is the .00025 mfd. fixed grid condenser. R1 is the variable grid leak, with a variable resistance from ¼ megohm to 10 megohms. This leak is important and the best is none too good. The tube used is a UV201A. The rheostat R2, has a resistance of 20 ohms. A pair of phones, terminal strip, aerial wire (100 foot length, No. 14, hard drawn copper), ground and lead-in wire (75 feet, No. 14 rubber covered insulated), a ground clamp (good grade copper, with a clip attached), a pair of porcelain insulators, a socket, a pair of phone clips or a jack (a plug is needed for the jack), and connecting wire (No. 18 annunciator wire), are needed to build this set. The actual cost of the parts, excluding the tube, antenna, batteries and phones is $9.50.

The only article that is built at home is the coupling coil, L2. That is wound on a tubing having a diameter of 3½", and being 4" high. Use No. 24 DSC wire for winding. There are 35 turns on this tubing.

Two and three-quarter inches from the left-hand side of the panel, and 3½" from the top and the bottom, drill a hole for the variometer, the diameter being about 3/16". This may vary. Two and three-quarters from the right-hand side and 3½" from the top and the bottom, drill a 3/16" hole for the variable condenser. Five inches from the left and the right hand side, and 1½" from the bottom, drill a hole for the rheostat arm shaft. This is usually 3/16" in diameter also. The dials used are 3½" in diameter.

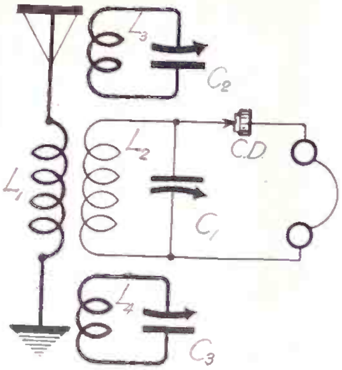
Place the socket in between the condenser and the variometer, or directly behind the rheostat. L2 is placed right next to the stator winding of the variometer, L1.

Bring one terminal of L1 or the stator winding to the antenna. The remaining terminal goes to the ground.

In between the rotor and the stator, or where the rotor and the stator connect

(Concluded on page 24)

Crystal Sets That You Can Log



A SELECTIVE CRYSTAL SET for a point of reception that has a 3-station range. Any one of the three stations may be tuned in by C1, the two others tuned out by the wave traps, L3C2 and L4C3. As the primary L1 is not tuned there is no compensating effect and the set may be logged. (Fig. 1.)

By Herman Bernard

Associate, Institute of Radio Engineers

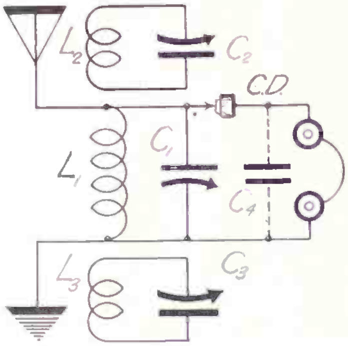
WHENEVER "a selective crystal set" is mentioned radio engineers smile or laugh. Is there any such thing, or can there be? Yes. There is a limit in the selectivity line, in regard to simple crystal sets, due to the stubbornness of the crystal itself in resisting attempts to introduce it into very select society. A crystal set can be made sufficiently selective to be useful in most localities. With any of the circuits, even the most selective, trouble may be expected in congested areas, such as New York City and Chicago. If the set owner lives near a powerful broadcaster he is bound to hear that station virtually all over the dial and can not tune it out to bring in a station farther away that is of the same power. The only other trouble with the best designs in simple crystal receivers is that at least four controls, often even five or six, are used. Also, they can not be logged.

Hence, you can have a selective crystal set, if there is no objection to more than four controls. These sets invariably use tap switches, and the introduction of such devices destroys the possibility of logging. It is conceded that there is no great advantage in having a simple crystal set loggable, since only a few stations will be within the range of the receiver at all, but the loggability feature and the limitation of controls to three were taken as a basis experimentally. No set having less than three controls was found to be worth much.

While with tube receivers it is possible to utilize circuit designs applicable to general demands and needs, regardless of location of the receiver, with the loggable crystal sets it was found advisable to make them to fit the locality.

A 3-Station Range Set

Fig. 1 shows the wiring of a simple crystal set, having three controls, and which is very good for a locality where three stations may be within the constant receiving range. To increase the selectivity slightly a somewhat disproportionately large reduction in volume had to be suffered, due to the electromagnetic method of coupling the antenna circuit to the tuned secondary L2. The two tuned closed oscillatory circuits, C2L3 and C3L4, are wavetraps. Thus C1 is set to tune in the station desired to be heard, while C2 is tuned so as to trap out one interfering station and C3 tuned to trap out the other. It is assumed that the three stations within range are on the air at once. If not, then both C2 and C3 may be set to tune out the one interfering broadcaster, or, if only one is used for a trap, the other circuit may be tuned to any frequency other than that of the incoming signal.



A TUNED IMPEDANCE primary gives more volume than the inductive coupling method shown in Fig. 1, but the set suffers in selectivity. Under certain conditions, explained in the text, this hook-up is very good. (Fig. 2.)

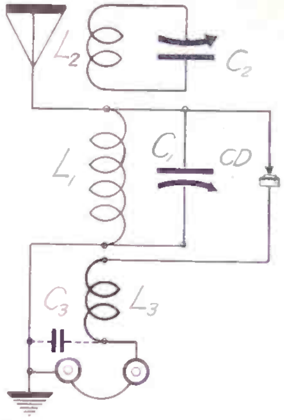
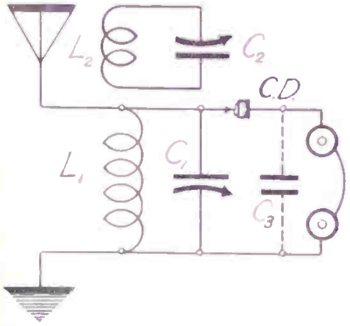


FIG. 3A—How a 3-circuit tuning coil may be employed in a wavetrap crystal hookup. L1 is the rotary coil. L2 is the secondary (large stator winding, used for trap). L3 is the otherwise aperiodic primary. The rotary coil L1 is loosely coupled and left that way.

A great many persons live in localities in the United States that are within crystal range of three stations or less and to them this circuit will prove attractive. However, the first question to determine is how many stations really are within range. For this purpose hook up the receiver shown in Fig. 2, omitting L3C3 and L2C2. This is about the broadest tuning circuit possible to make. Any station that you can hear fairly well may be expected to come in at any setting of the condenser, although the volume will be more or less, depending on how near you set C1 to that ample sweep of dial degrees that represent theoretical resonance with the incoming signal. A station nearby may be very loud and another, further away, will be weaker, or not heard at all, under the circumstances, due to the drowning effect caused by the other. However, a fair idea is obtained of those stations you may expect to hear. If there are three, then the hookup shown in Fig. 1 will be serviceable.



INSTEAD of two wave traps one may be used, but that is efficient only if the receiver has a 2-station range. (Fig. 3.)

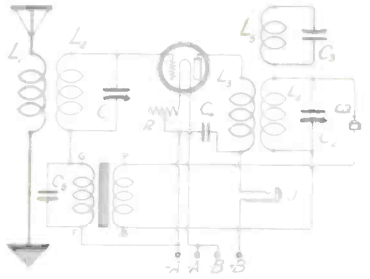
Coupling the Wavetraps

The wavetraps are loosely coupled to the secondary. Have the coupling as loose as is consistent with effectiveness of the traps. If the coupling is too loose there will be no effect; if too tight there will be no trapping, only compensated tuning. With tight coupling, if you add capacity by further engaging the plates of one of the condensers you will have to reduce the capacity of the other by unmeshing its plates. There will be no selectivity gain from such compensated tuning.

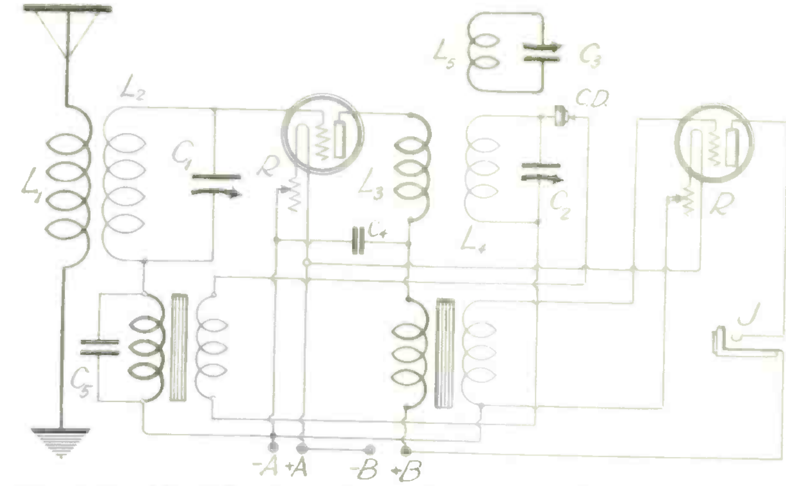
The operation of the wave-trap is on the theory of parallel inductive closed circuits. These are known as rejectors, because their only use is to keep out signals that are not wanted. If the wave-trap is set so that its frequency is the same as that of the receiving circuit, then theoretically the trap will absorb the energy and no sound will be heard in the phones. This is more or less true of more strenuously oscillating circuits—where tubes are employed—but it is not quite so of crystal hookups, for in most cases if the incoming signal is of any good degree of strength the resonant trap will absorb most of the energy, not all of it. If the station is heard rather weakly under best conditions, then even in the crystal hookup the trap may monopolize the signal. This might argue against the effectiveness of the traps when used for their intended purpose, and it might be so, were it not for the drowning effect of the accepted signals.

The opposite method is that of series connection, where one end of the coil (L2 in Fig. 3) would be connected to the antenna side and the other end of the erstwhile trap to the receiver side. This is the acceptor method, and tuning such a circuit to resonance aids the set in receiving the desired signals, instead of hampering or preventing this end. But the help is not such as to constitute a gain in selectivity. The coil L2 could be connected, say to the antenna in Fig. 3, the other side of the coil to one side of C2, and the other side of C2 to the receiver, e.g., to the crystal input. That, too, is series connection, only capacitative coupling is used instead of tuned conductive coupling. Only compensated tuning would

RF Ahead of the Crystal



THE WAVE TRAP idea embodied in a 1-tube reflex. This circuit is good for earphone reception even in congested areas. (Fig. 4.)



ONE STEP FARTHER and we have a reflex set that works a loud speaker and which is selective. The wave trap idea is retained. This is the same as Fig. 4, except that a second stage of audio (this one not reflexed) is added. (Fig. 5.)

result. In fact, by this method of connection for series purposes the coil could be omitted entirely, to represent the idea. The coil across the condenser preserves conductive coupling. Capacitative coupling causes a severe volume drop in crystal sets. Inductive coupling is much better. Greatest volume results from conductive coupling.

The Question of Frequency Range

Fig. 2 shows a conductively coupled circuit. Here the antenna is tuned by C1. L1 is the impedance coil. If the wavetraps are properly distant from the impedance coil L1, so that no compensated tuning results, it would be impossible to cover the broadcast range with any untapped coil in combination with any condenser in general use by fans today. However, it is rarely necessary to cover the whole band, since only a few stations can be received, anyway, and these are assumed not to have such a disparity of wavelengths as to require a greater range than this combination affords.

The reason why the wavelength or frequency range could not be covered, say even in the case of a tube hookup embodying this plan, is due to the introduction of the actual resistance and, more particularly, the capacity of the antenna system into the tuned circuit. A condenser is able to cover the range with a suitable inductance, e.g., L4C2 in Fig. 4, only because the distributed capacity of the coil, part of the plate capacity of the tube, and the capacity of some of the associated wiring and parts are added to the minimum capacity of the condenser. All these additions are not ratable factors, even in comparison with the minimum capacity of good condensers. Thus, broadly speaking, about the same ratio of minimum to maximum capacity of the condenser is maintained as when the condenser is considered alone and apart from any circuit. The maximum capacity must be at least a certain number of times greater than the minimum capacity. This relationship constitutes the ratio. Because the wavelength varies as the square of the capacity, there must be enough difference in capacity between the maximum and the minimum to enable the square of the lowest to bring in the lowest-wave station and the square of the highest to bring in the highest wave station, in conjunction with a coil of proper inductance.

Therefore if you add the aerial capacity to any coil you add that capacity to any condenser connected in parallel with the aerial system. The capacity of different aerials differs greatly. Many aerial systems in use for broadcast reception have a capacity as high as .0005 mfd., some even have .001 mfd. and more, while between .00025 mfd. and .0005 mfd. may be assumed to represent the capacity of the majority of antenna systems used for reception of programs. Add .00025 mfd., for instance, to a condenser that has a minimum of .00005 mfd. and a maximum of .0005 mfd., in other words, 50 to 500 micro-mfd., or 1-to-10. The minimum that was .00005 mfd. (50 micro-mfd.) is increased by .00025 mfd., hence is .0003 mfd., while the maximum is .0005 mfd. + .00025 mfd., or .00075. Is .0003:.00075 ::1:2½?

Is 1:2½ ∝ 1:10?

The ratio is only one-fourth of what

Data on Coils and Condensers

All the variable condensers used in the circuits are presumed to be .0005 mfd. maximum capacity and the inductances were calculated accordingly. If smaller capacity condensers are used, add more turns.

The coils are of three kinds:

(1) Radio-frequency transformer, with exception (a).

(2) Wave trap inductance.

(3) Impedance coil.

All the radio-frequency transformers are wound alike, with the exception (a) of L1L2 in Fig. 1. All the wave trap inductances are wound alike. The impedance coils will vary, according to antenna conditions (capacity, resistance, etc.).

(1) RADIO - FREQUENCY TRANSFORMERS.—These are wound on a tubing 3½" diameter, 4" high, with No. 22 single cotton covered wire. The primary will consist of 10 turns, the terminals being anchored in pinholes punched in the form. Leave ¼" space and wind 45 turns for the secondary. The terminals of the secondary similarly are secured. The exception (a) is that L1L2, Fig. 1, consists of using 22 turns (instead of 10) for the primary L1, leaving ¾" space, or a little more, if experience shows that the circuit will stand it (instead of only ¼"), then winding the regulation secondary, 45 turns.

(2) WAVE TRAP INDUCTANCE.—This consists of 52 turns of No. 22 single cotton covered wire on a 3⅛" diameter tubing at least 3" high.

(3) IMPEDANCE COIL.—This is used conductively coupled to the antenna system. As antennas vary greatly as to capacity, some being as high as .001, others as low as .0001, this capacity is added to the condenser capacity, hence the coil will have to be wound to suit particular conditions. It is good practice to start with 40 turns and remove turns, under test, until satisfactory tuning conditions prevail. The same kind of wire and the same diameter tubing are used.

Those having other wire types on hand may employ what they have. Finer wire necessitates a slight reduction in the number of turns, provided the insulation used is the same as that specified above. If the same kind of wire, No. 22, is used with heavier insulation, such as double cotton covered or silk over cotton, then a few more turns will have to be incorporated.

Coil Key to Diagrams

Fig. 1, L1L2, the exception (1a) noted above; L3 and L4 are in class (2).

Fig. 2, L1 is in class (3) while L2 and L3 are under (2).

Fig. 3, L1L2 and L3L4 under class (1). L5, class (2).

Fig. 4, same as Fig. 3.

Fig. 5, same as Figs. 3 and 4.

Fig. 6, same as Figs. 3, 4 and 5.

Fixed Condenser Key

C4 is .001 mfd. C5 is .0001 mfd. These values are not critical and may be changed, if you have higher or lower capacities on hand.

Where a condenser is shown across the phones it may be .002 mfd. but is not critical, either. Experience will show whether the phone condenser is necessary. usually it is connected with one side to one of the phone tips, or equivalent detector output, and the other side to the other output post of the detector. In Fig. 6 the equivalent condenser is shown across the secondary of the first AFT, where it worked better, and this supplants the normal position across the AFT primary. The .006 mfd. fixed condenser across the batteries in Fig. 5 is entirely optional.

In all cases in testing out crystal detector receivers where tubes are employed, whether for AF or RF or a combination of both, always ground the minus A battery lead experimentally. If volume increases leave the grounding of minus A as a permanent part of the hook-up.

An Analysis of Wave Traps

it was before, and not enough to cover the range.

What might seem to be an exception to this method of reasoning will be found when the lowest wavelength station and the highest wavelength station, granting both are within receiving range, are heard even with the impedance crystal hookup. That would be due to the broad tuning of the circuit enabling signals to crowd through, although on waves above and below those to which the circuit itself is responsive. In other words, the inherent broadness of the crystal causes this phenomenon, which may be regarded as defiant of wavelength, a forcible entry, rather than tuned reception.

The hookup shown in Fig. 3 uses the conductive coupling method, too, with the impedance coil. If a variable series condenser were used here or in Fig. 2 the range could be covered, the desired ratio being re-established by the series condenser's sharp reduction of the minimum capacity present in the tuned receiving circuit. Fig. 3 is good to use if only two stations are within range. A likely plan would be to build this one and then, if another interferer is found, to incorporate the second trap (Fig. 2).

In all cases conductive coupling for crystal receivers will give more volume than any other method.

If an untuned primary is used, as in Fig. 1, and the coupling is close, then part of the aerial capacity, etc., are added to that of the tuned receiving circuit, although to a much smaller degree than by the conductive method. Granting there is a substantial number of turns on the aperiodic primary L1, say 20 or more, this effect may be very noticeable. But as the coil is moved farther away from the secondary the effect diminishes and almost completely disappears. In this case, of course, some account must be paid to the inductive effect, some of the increased period being due to that. This would be well represented were L1 made variable in respect to L2 in Fig. 1. But it has been demonstrated experimentally that the inductive explanation is not complete, by any means, since even if relatively few turns are used on L1 and the coupling made as tight as possible, the wavelength increase resulting is far greater than what could be ascribed merely to the inductive addition. In other words, tighter coupling tends to create the effect of parallel capacity while loose coupling establishes independent capacity. The observations are restricted to simple crystal sets.

Test of the Trap

Some question may arise in the minds of those who have not used wavetraps in conjunction with crystal hookups as to how effective they are. Citing experimental proof, WNYC and WEAF were each five miles distant from the point of reception. The receiver was that shown in Fig. 3 (2-station range). No other receivable station was on the air. WNYC, 526 meters, was using 1,500 watts output, WEAF, 492 meters, 3,500 watts. This is far greater power than that used by 90 per cent. of the stations in the United States and Canada. It is far greater than the power used on stations tuned in usually in testing crystal receivers. To be very certain of the result, four stages of audio-frequency amplification were added to the receiver. These consisted of one transformer-coupled audio stage and three resistance-coupled steps. The reason for all this AF was that sometimes stations can not be heard on earphones, although within theoretical receiving range, the silence being due to absence of sufficient power to actuate the phones. The result of the test was that by turning the wavetrap condenser C2, either one of the two stations could be tuned in and the other tuned out. The success of the experiment was complete and beyond doubt. There was no signal interference whatsoever. Also, the trap functioned as selectively as a 1-tube regenerative set.

It will be noticed that the wavetrap was used not really for tuning but for detuning. As there was a difference of only 34 meters between stations, and the power output of both was high, naturally the receiving circuit, which, as has been mentioned, is one of the broadest tuners you can possibly have, made them both audible together at any point from 0 to 100 on the dial. This cross-talk was eliminated by setting the condenser C2 at 65 to eliminate WEAF, permitting WNYC to perform a "solo," and at 78 to eliminate WNYC and bring in WEAF.

A 1-Control Set

The ineffectiveness of C1 under these circumstances will naturally give rise to the idea of constructing a 1-control receiver for meeting a condition similar to this one. Why tune the input circuit at all? Why not simply have a trap, in inductive-relationship to an untuned coil which has a natural peak say at 500 meters, this being a good compromise point? Why not either wind the requisite number of turns, or use about 25 turns, shunted by a .001 mfd. fixed condenser? This is indeed practical.

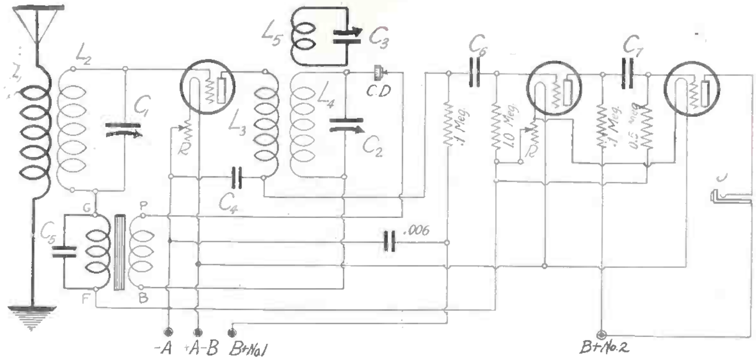
All Trap Detuning

Pursuing the idea a little farther, if there are three stations within receiving range, and the highest no more than about 200 meters removed from the lowest, why not use 15 turns, shunted by a .001 mfd. fixed condenser, for L1C1 in Fig. 2, and have two wave traps, one to eliminate one of the interferers, the other to block the entry of the other cross-talker. That gives two controls. Also, as one extra wavetrap is needed to eliminate each additional station that causes interference, why not three wave traps where four stations are within receiving range? That gives a 3-control set. All this is feasible, but of course disparity of volume may be expected, especially where some receivable stations are on the lower waves, where the permanent inclusion of much extra capacity (the fixed condenser) operates tremendously against the possibility of passing enough of the signal to give volume. Fans should try this method, however, if they are interested in the development of workable crystal receivers.

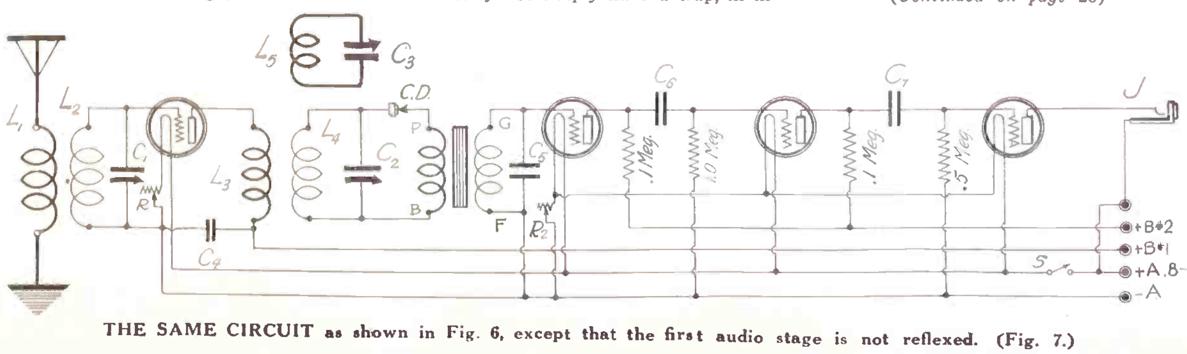
Use of Tubes

Once you include a stage of RF ahead of a crystal detector you have a tube set, not a crystal set. But such inclusion gives you a receiver that is altogether out of the experimental stage, so far as general adaptability to standard use and needs is concerned. Fig. 4 shows a 1-tube reflex, using a wave trap, a good set to tune out a powerful station near the receiver, and which station otherwise would cause a

(Concluded on page 26)

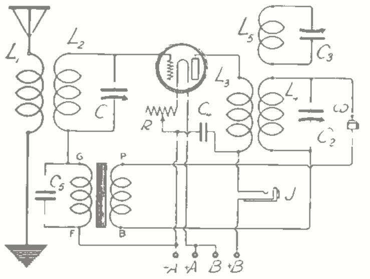


THE SAME fundamental hook-up as is shown in Fig. 5 is presented above, except that the second audio stage is replaced by two stages of resistance-coupled AF for better quality. (Fig. 6.)

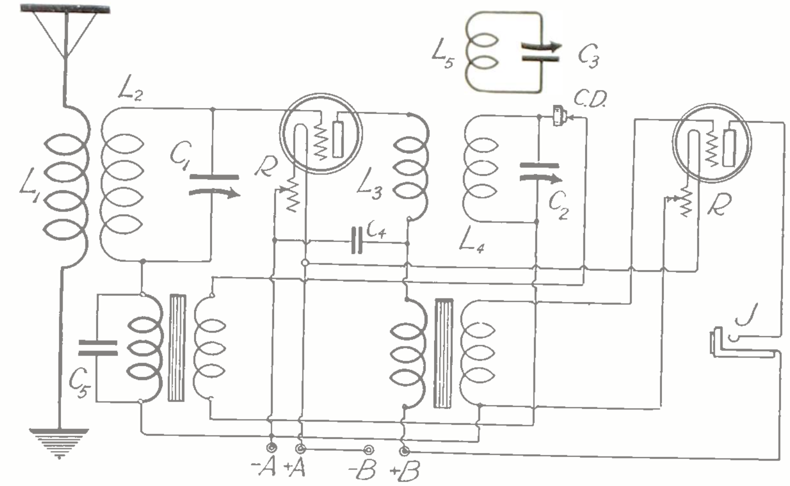


THE SAME CIRCUIT as shown in Fig. 6, except that the first audio stage is not reflexed. (Fig. 7.)

RF Ahead of the Crystal



THE WAVE TRAP idea embodied in a 1-tube reflex. This circuit is good for earphone reception even in congested areas. (Fig. 4.)



ONE STEP FARTHER and we have a reflex set that works a loud speaker and which is selective. The wave trap idea is retained. This is the same as Fig. 4, except that a second stage of audio (this one not reflexed) is added. (Fig. 5.)

result. In fact, by this method of connection for series purposes the coil could be omitted entirely, to represent the idea. The coil across the condenser preserves conductive coupling. Capacitative coupling causes a severe volume drop in crystal sets. Inductive coupling is much better. Greatest volume results from conductive coupling.

The Question of Frequency Range

Fig. 2 shows a conductively coupled circuit. Here the antenna is tuned by C1. L1 is the impedance coil. If the wavetraps are properly distant from the impedance coil L1, so that no compensated tuning results, it would be impossible to cover the broadcast range with any untapped coil in combination with any condenser in general use by fans today. However, it is rarely necessary to cover the whole band, since only a few stations can be received, anyway, and these are assumed not to have such a disparity of wavelengths as to require a greater range than this combination affords.

The reason why the wavelength or frequency range could not be covered, say even in the case of a tube hookup embodying this plan, is due to the introduction of the actual resistance and, more particularly, the capacity of the antenna system into the tuned circuit. A condenser is able to cover the range with a suitable inductance, e.g., L4C2 in Fig. 4, only because the distributed capacity of the coil, part of the plate capacity of the tube, and the capacity of some of the associated wiring and parts are added to the minimum capacity of the condenser. All these additions are not ratable factors, even in comparison with the minimum capacity of good condensers. Thus, broadly speaking, about the same ratio of minimum to maximum capacity of the condenser is maintained as when the condenser is considered alone and apart from any circuit. The maximum capacity must be at least a certain number of times greater than the minimum capacity. This relationship constitutes the ratio. Because the wavelength varies as the square of the capacity, there must be enough difference in capacity between the maximum and the minimum to enable the square of the lowest to bring in the lowest-wave station and the square of the highest to bring in the highest wave station, in conjunction with a coil of proper inductance.

Therefore if you add the aerial capacity to any coil you add that capacity to any condenser connected in parallel with the aerial system. The capacity of different aerials differs greatly. Many aerial systems in use for broadcast reception have a capacity as high as .0005 mfd., some even have .001 mfd. and more, while between .00025 mfd. and .0005 mfd. may be assumed to represent the capacity of the majority of antenna systems used for reception of programs. Add .00025 mfd., for instance, to a condenser that has a minimum of .00005 mfd. and a maximum of .0005 mfd., in other words, 50 to 500 micro-mfd., or 1-to-10. The minimum that was .00005 mfd. (50 micro-mfd.) is increased by .00025 mfd., hence is .0003 mfd., while the maximum is .0005 mfd. + .00025 mfd., or .00075. Is .0003:.00075 ::1:2½?

Is 1:2½ ∝ 1:10?

The ratio is only one-fourth of what

Data on Coils and Condensers

All the variable condensers used in the circuits are presumed to be .0005 mfd. maximum capacity and the inductances were calculated accordingly. If smaller capacity condensers are used, add more turns.

The coils are of three kinds:

(1) Radio-frequency transformer, with exception (a).

(2) Wave trap inductance.

(3) Impedance coil.

All the radio-frequency transformers are wound alike, with the exception (a) of L1L2 in Fig. 1. All the wave trap inductances are wound alike. The impedance coils will vary, according to antenna conditions (capacity, resistance, etc.).

(1) RADIO - FREQUENCY TRANSFORMERS.—These are wound on a tubing 3½" diameter, 4" high, with No. 22 single cotton covered wire. The primary will consist of 10 turns, the terminals being anchored in pinholes punched in the form. Leave ¼" space and wind 45 turns for the secondary. The terminals of the secondary similarly are secured. The exception (a) is that L1L2, Fig. 1, consists of using 22 turns (instead of 10) for the primary L1, leaving ¾" space, or a little more, if experience shows that the circuit will stand it (instead of only ¼"), then winding the regulation secondary, 45 turns.

(2) WAVE TRAP INDUCTANCE.—This consists of 52 turns of No. 22 single cotton covered wire on a 3⅛" diameter tubing at least 3" high.

(3) IMPEDANCE COIL.—This is used conductively coupled to the antenna system. As antennas vary greatly as to capacity, some being as high as .001, others as low as .0001, this capacity is added to the condenser capacity, hence the coil will have to be wound to suit particular conditions. It is good practice to start with 40 turns and remove turns, under test, until satisfactory tuning conditions prevail. The same kind of wire and the same diameter tubing are used.

Those having other wire types on hand may employ what they have. Finer wire necessitates a slight reduction in the number of turns, provided the insulation used is the same as that specified above. If the same kind of wire, No. 22, is used with heavier insulation, such as double cotton covered or silk over cotton, then a few more turns will have to be incorporated.

Coil Key to Diagrams

Fig. 1, L1L2, the exception (1a) noted above; L3 and L4 are in class (2).

Fig. 2, L1 is in class (3) while L2 and L3 are under (2).

Fig. 3, L1L2 and L3L4 under class (1). L5, class (2).

Fig. 4, same as Fig. 3.

Fig. 5, same as Figs. 3 and 4.

Fig. 6, same as Figs. 3, 4 and 5.

Fixed Condenser Key

C4 is .001 mfd. C5 is .0001 mfd. These values are not critical and may be changed, if you have higher or lower capacities on hand.

Where a condenser is shown across the phones it may be .002 mfd. but is not critical, either. Experience will show whether the phone condenser is necessary. usually it is connected with one side to one of the phone tips, or equivalent detector output, and the other side to the other output post of the detector. In Fig. 6 the equivalent condenser is shown across the secondary of the first AFT, where it worked better, and this supplants the normal position across the AFT primary. The .006 mfd. fixed condenser across the batteries in Fig. 5 is entirely optional.

In all cases in testing out crystal detector receivers where tubes are employed, whether for AF or RF or a combination of both, always ground the minus A battery lead experimentally. If volume increases leave the grounding of minus A as a permanent part of the hook-up.

An Analysis of Wave Traps

it was before, and not enough to cover the range.

What might seem to be an exception to this method of reasoning will be found when the lowest wavelength station and the highest wavelength station, granting both are within receiving range, are heard even with the impedance crystal hookup. That would be due to the broad tuning of the circuit enabling signals to crowd through, although on waves above and below those to which the circuit itself is responsive. In other words, the inherent broadness of the crystal causes this phenomenon, which may be regarded as defiant of wavelength, a forcible entry, rather than tuned reception.

The hookup shown in Fig. 3 uses the conductive coupling method, too, with the impedance coil. If a variable series condenser were used here or in Fig. 2 the range could be covered, the desired ratio being re-established by the series condenser's sharp reduction of the minimum capacity present in the tuned receiving circuit. Fig. 3 is good to use if only two stations are within range. A likely plan would be to build this one and then, if another interferer is found, to incorporate the second trap (Fig. 2).

In all cases conductive coupling for crystal receivers will give more volume than any other method.

If an untuned primary is used, as in Fig. 1, and the coupling is close, then part of the aerial capacity, etc., are added to that of the tuned receiving circuit, although to a much smaller degree than by the conductive method. Granting there is a substantial number of turns on the aperiodic primary L1, say 20 or more, this effect may be very noticeable. But as the coil is moved farther away from the secondary the effect diminishes and almost completely disappears. In this case, of course, some account must be paid to the inductive effect, some of the increased period being due to that. This would be well represented were L1 made variable in respect to L2 in Fig. 1. But it has been demonstrated experimentally that the inductive explanation is not complete, by any means, since even if relatively few turns are used on L1 and the coupling made as tight as possible, the wavelength increase resulting is far greater than what could be ascribed merely to the inductive addition. In other words, tighter coupling ends to create the effect of parallel capacity while loose coupling establishes independent capacity. The observations are restricted to simple crystal sets.

Test of the Trap

Some question may arise in the minds of those who have not used wavetraps in conjunction with crystal hookups as to how effective they are. Citing experimental proof, WNYC and WEAF were each five miles distant from the point of reception. The receiver was that shown in Fig. 3 (2-station range). No other receivable station was on the air. WNYC, 526 meters, was using 1,500 watts output, WEAF, 492 meters, 3,500 watts. This is far greater power than that used by 90 per cent. of the stations in the United States and Canada. It is far greater than the power used on stations tuned in usually in testing crystal receivers. To be very certain of the result, four stages of audio-frequency amplification were added to the receiver. These consisted of one transformer-coupled audio stage and three resistance-coupled steps. The reason for all this AF was that sometimes stations can not be heard on earphones, although within theoretical receiving range, the silence being due to absence of sufficient power to actuate the phones. The result of the test was that by turning the wavetrap condenser C2, either one of the two stations could be tuned in and the other tuned out. The success of the experiment was complete and beyond doubt. There was no signal interference whatsoever. Also, the trap functioned as selectively as a 1-tube regenerative set.

It will be noticed that the wavetrap was used not really for tuning but for detuning. As there was a difference of only 34 meters between stations, and the power output of both was high, naturally the receiving circuit, which, as has been mentioned, is one of the broadest tuners you can possibly have, made them both audible together at any point from 0 to 100 on the dial. This cross-talk was eliminated by setting the condenser C2 at 65 to eliminate WEAF, permitting WNYC to perform a "solo," and at 78 to eliminate WNYC and bring in WEAF.

A 1-Control Set

The ineffectiveness of C1 under these circumstances will naturally give rise to the idea of constructing a 1-control receiver for meeting a condition similar to this one. Why tune the input circuit at all? Why not simply have a trap, in inductive-relationship to an untuned coil which has a natural peak say at 500 meters, this being a good compromise point? Why not either wind the requisite number of turns, or use about 25 turns, shunted by a .001 mfd. fixed condenser? This is indeed practical.

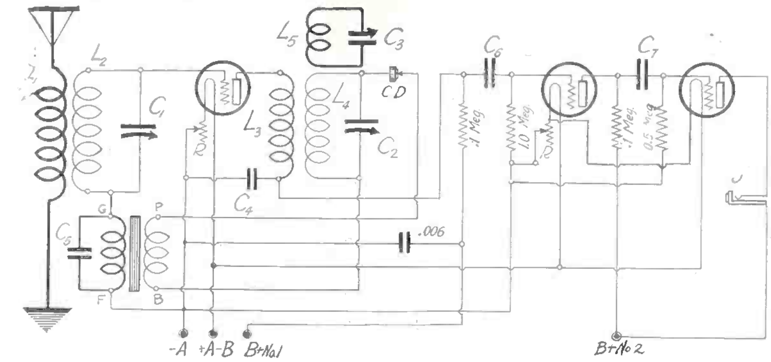
All Trap Detuning

Pursuing the idea a little farther, if there are three stations within receiving range, and the highest no more than about 200 meters removed from the lowest, why not use 15 turns, shunted by a .001 mfd. fixed condenser, for L1C1 in Fig. 2, and have two wave traps, one to eliminate one of the interferers, the other to block the entry of the other cross-talker. That gives two controls. Also, as one extra wavetrap is needed to eliminate each additional station that causes interference, why not three wave traps where four stations are within receiving range? That gives a 3-control set. All this is feasible, but of course disparity of volume may be expected, especially where some receivable stations are on the lower waves, where the permanent inclusion of much extra capacity (the fixed condenser) operates tremendously against the possibility of passing enough of the signal to give volume. Fans should try this method, however, if they are interested in the development of workable crystal receivers.

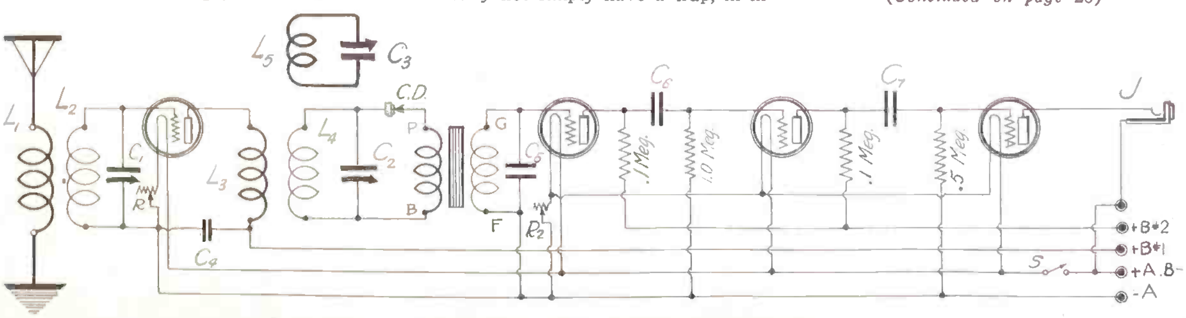
Use of Tubes

Once you include a stage of RF ahead of a crystal detector you have a tube set, not a crystal set. But such inclusion gives you a receiver that is altogether out of the experimental stage, so far as general adaptability to standard use and needs is concerned. Fig. 4 shows a 1-tube reflex, using a wave trap, a good set to tune out a powerful station near the receiver, and which station otherwise would cause a

(*Concluded on page 26*)

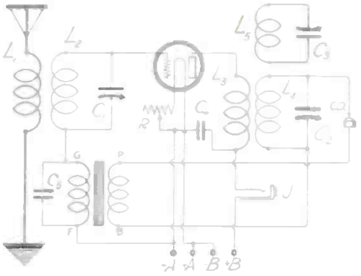


THE SAME fundamental hook-up as is shown in Fig. 5 is presented above, except that the second audio stage is replaced by two stages of resistance-coupled AF for better quality. (Fig. 6.)

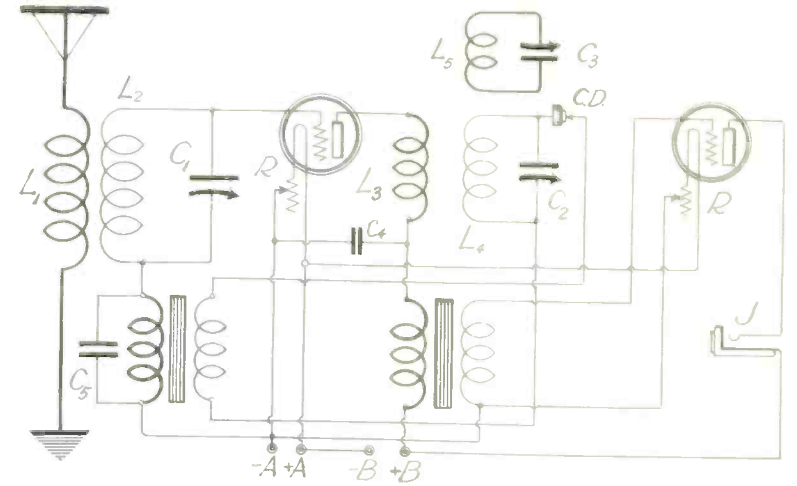


THE SAME CIRCUIT as shown in Fig. 6, except that the first audio stage is not reflexed. (Fig. 7.)

RF Ahead of the Crystal



THE WAVE TRAP idea embodied in a 1-tube reflex. This circuit is good for earphone reception even in congested areas. (Fig. 4.)



ONE STEP FARTHER and we have a reflex set that works a loud speaker and which is selective. The wave trap idea is retained. This is the same as Fig. 4, except that a second stage of audio (this one not reflexed) is added. (Fig. 5.)

result. In fact, by this method of connection for series purposes the coil could be omitted entirely, to represent the idea. The coil across the condenser preserves conductive coupling. Capacitative coupling causes a severe volume drop in crystal sets. Inductive coupling is much better. Greatest volume results from conductive coupling.

The Question of Frequency Range

Fig. 2 shows a conductively coupled circuit. Here the antenna is tuned by C1. L1 is the impedance coil. If the wave-traps are properly distant from the impedance coil L1, so that no compensated tuning results, it would be impossible to cover the broadcast range with any untapped coil in combination with any condenser in general use by fans today. However, it is rarely necessary to cover the whole band, since only a few stations can be received, anyway, and these are assumed not to have such a disparity of wavelengths as to require a greater range than this combination affords.

The reason why the wavelength or frequency range could not be covered, say even in the case of a tube hookup embodying this plan, is due to the introduction of the actual resistance and, more particularly, the capacity of the antenna system into the tuned circuit. A condenser is able to cover the range with a suitable inductance, e.g., L4C2 in Fig. 4, only because the distributed capacity of the coil, part of the plate capacity of the tube, and the capacity of some of the associated wiring and parts are added to the minimum capacity of the condenser. All these additions are not ratable factors, even in comparison with the minimum capacity of good condensers. Thus, broadly speaking, about the same ratio of minimum to maximum capacity of the condenser is maintained as when the condenser is considered alone and apart from any circuit. The maximum capacity must be at least a certain number of times greater than the minimum capacity. This relationship constitutes the ratio. Because the wavelength varies as the square of the capacity, there must be enough difference in capacity between the maximum and the minimum to enable the square of the lowest to bring in the lowest-wave station and the square of the highest to bring in the highest wave station, in conjunction with a coil of proper inductance.

Therefore if you add the aerial capacity to any coil you add that capacity to any condenser connected in parallel with the aerial system. The capacity of different aerials differs greatly. Many aerial systems in use for broadcast reception have a capacity as high as .0005 mfd., some even have .001 mfd. and more, while between .00025 mfd. and .0005 mfd. may be assumed to represent the capacity of the majority of antenna systems used for reception of programs. Add .00025 mfd., for instance, to a condenser that has a minimum of .00005 mfd. and a maximum of .0005 mfd., in other words, 50 to 500 micro-mfd., or 1-to-10. The minimum that was .00005 mfd. (50 micro-mfd.) is increased by .00025 mfd., hence is .0003 mfd., while the maximum is .0005 mfd. + .00025 mfd., or .00075. Is .0003:.00075 ::1:2½?

Is 1:2½ ∝ 1:10?

The ratio is only one-fourth of what

Data on Coils and Condensers

All the variable condensers used in the circuits are presumed to be .0005 mfd. maximum capacity and the inductances were calculated accordingly. If smaller capacity condensers are used, add more turns.

The coils are of three kinds:

(1) Radio-frequency transformer, with exception (a).

(2) Wave trap inductance.

(3) Impedance coil.

All the radio-frequency transformers are wound alike, with the exception (a) of L1L2 in Fig. 1. All the wave trap inductances are wound alike. The impedance coils will vary, according to antenna conditions (capacity, resistance, etc.).

(1) RADIO - FREQUENCY TRANSFORMERS.—These are wound on a tubing 3½" diameter, 4" high, with No. 22 single cotton covered wire. The primary will consist of 10 turns, the terminals being anchored in pinholes punched in the form. Leave ¼" space and wind 45 turns for the secondary. The terminals of the secondary similarly are secured. The exception (a) is that L1L2, Fig. 1, consists of using 22 turns (instead of 10) for the primary L1, leaving ¾" space, or a little more, if experience shows that the circuit will stand it (instead of only ¼"), then winding the regulation secondary, 45 turns.

(2) WAVE TRAP INDUCTANCE.—This consists of 52 turns of No. 22 single cotton covered wire on a 3⅛" diameter tubing at least 3" high.

(3) IMPEDANCE COIL.—This is used conductively coupled to the antenna system. As antennas vary greatly as to capacity, some being as high as .001, others as low as .0001, this capacity is added to the condenser capacity, hence the coil will have to be wound to suit particular conditions. It is good practice to start with 40 turns and remove turns, under test, until satisfactory tuning conditions prevail. The same kind of wire and the same diameter tubing are used.

Those having other wire types on hand may employ what they have. Finer wire necessitates a slight reduction in the number of turns, provided the insulation used is the same as that specified above. If the same kind of wire, No. 22, is used with heavier insulation, such as double cotton covered or silk over cotton, then a few more turns will have to be incorporated.

Coil Key to Diagrams

Fig. 1, L1L2, the exception (1a) noted above; L3 and L4 are in class (2).

Fig. 2, L1 is in class (3) while L2 and L3 are under (2).

Fig. 3, L1L2 and L3L4 under class (1). L5, class (2).

Fig. 4, same as Fig. 3.

Fig. 5, same as Figs. 3 and 4.

Fig. 6, same as Figs. 3, 4 and 5.

Fixed Condenser Key

C4 is .001 mfd. C5 is .0001 mfd. These values are not critical and may be changed, if you have higher or lower capacities on hand.

Where a condenser is shown across the phones it may be .002 mfd. but is not critical, either. Experience will show whether the phone condenser is necessary. usually it is connected with one side to one of the phone tips, or equivalent detector output, and the other side to the other output post of the detector. In Fig. 6 the equivalent condenser is shown across the secondary of the first AFT, where it worked better, and this supplants the normal position across the AFT primary. The .006 mfd. fixed condenser across the batteries in Fig. 5 is entirely optional.

In all cases in testing out crystal detector receivers where tubes are employed, whether for AF or RF or a combination of both, always ground the minus A battery lead experimentally. If volume increases leave the grounding of minus A as a permanent part of the hook-up.

An Analysis of Wave Traps

it was before, and not enough to cover the range.

What might seem to be an exception to this method of reasoning will be found when the lowest wavelength station and the highest wavelength station, granting both are within receiving range, are heard even with the impedance crystal hookup. That would be due to the broad tuning of the circuit enabling signals to crowd through, although on waves above and below those to which the circuit itself is responsive. In other words, the inherent broadness of the crystal causes this phenomenon, which may be regarded as defiant of wavelength, a forcible entry, rather than tuned reception.

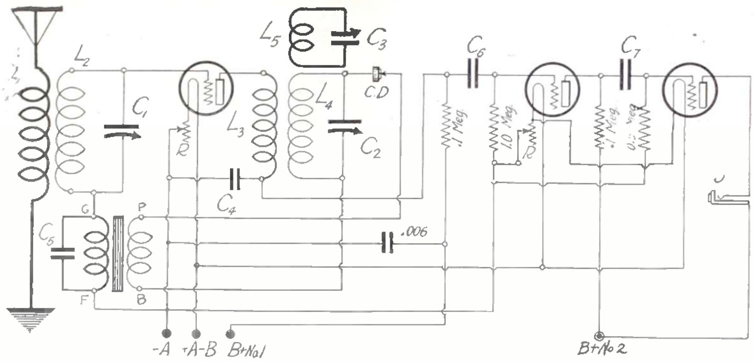
The hookup shown in Fig. 3 uses the conductive coupling method, too, with the impedance coil. If a variable series condenser were used here or in Fig. 2 the range could be covered, the desired ratio being re-established by the series condenser's sharp reduction of the minimum capacity present in the tuned receiving circuit. Fig. 3 is good to use if only two stations are within range. A likely plan would be to build this one and then, if another interferer is found, to incorporate the second trap (Fig. 2).

In all cases conductive coupling for crystal receivers will give more volume than any other method.

If an untuned primary is used, as in Fig. 1, and the coupling is close, then part of the aerial capacity, etc., are added to that of the tuned receiving circuit, although to a much smaller degree than by the conductive method. Granting there is a substantial number of turns on the aperiodic primary L1, say 20 or more, this effect may be very noticeable. But as the coil is moved farther away from the secondary the effect diminishes and almost completely disappears. In this case, of course, some account must be paid to the inductive effect, some of the increased period being due to that. This would be well represented were L1 made variable in respect to L2 in Fig. 1. But it has been demonstrated experimentally that the inductive explanation is not complete, by any means, since even if relatively few turns are used on L1 and the coupling made as tight as possible, the wavelength increase resulting is far greater than what could be ascribed merely to the inductive addition. In other words, tighter coupling nds to create the effect of parallel capacity while loose coupling establishes independent capacity. The observations are restricted to simple crystal sets.

Test of the Trap

Some question may arise in the minds of those who have not used wavetraps in conjunction with crystal hookups as to how effective they are. Citing experimental proof, WNYC and WEAF were each five miles distant from the point of reception The receiver was that shown in Fig 3 (2-station range). No other re-



THE SAME fundamental hook-up as is shown in Fig. 5 is presented above, except that the second audio stage is replaced by two stages of resistance-coupled AF for better quality. (Fig. 6.)

ceivable station was on the air. WNYC, 526 meters, was using 1,500 watts output, WEAF, 492 meters, 3,500 watts. This is far greater power than that used by 90 per cent. of the stations in the United States and Canada. It is far greater than the power used on stations tuned in usually in testing crystal receivers. To be very certain of the result, four stages of audio-frequency amplification were added to the receiver. These consisted of one transformer-coupled audio stage and three resistance-coupled steps. The reason for all this AF was that sometimes stations can not be heard on earphones, although within theoretical receiving range, the silence being due to absence of sufficient power to actuate the phones. The result of the test was that by turning the wavetrap condenser C2, either one of the two stations could be tuned in and the other tuned out. The success of the experiment was complete and beyond doubt. There was no signal interference whatsoever. Also, the trap functioned as selectively as a 1-tube regenerative set.

It will be noticed that the wavetrap was used not really for tuning but for detuning. As there was a difference of only 34 meters between stations, and the power output of both was high, naturally the receiving circuit, which, as has been mentioned, is one of the broadest tuners you can possibly have, made them both audible together at any point from 0 to 100 on the dial. This cross-talk was eliminated by setting the condenser C2 at 65 to eliminate WEAF, permitting WNYC to perform a "solo," and at 78 to eliminate WNYC and bring in WEAF.

A 1-Control Set

The ineffectiveness of C1 under these circumstances will naturally give rise to the idea of constructing a 1-control receiver for meeting a condition similar to this one. Why tune the input circuit at all? Why not simply have a trap, in inductive-relationship to an untuned coil which has a natural peak say at 500 meters, this being a good compromise point? Why not either wind the requisitive number of turns, or use about 25 turns, shunted by a .001 mfd. fixed condenser? This is indeed practical.

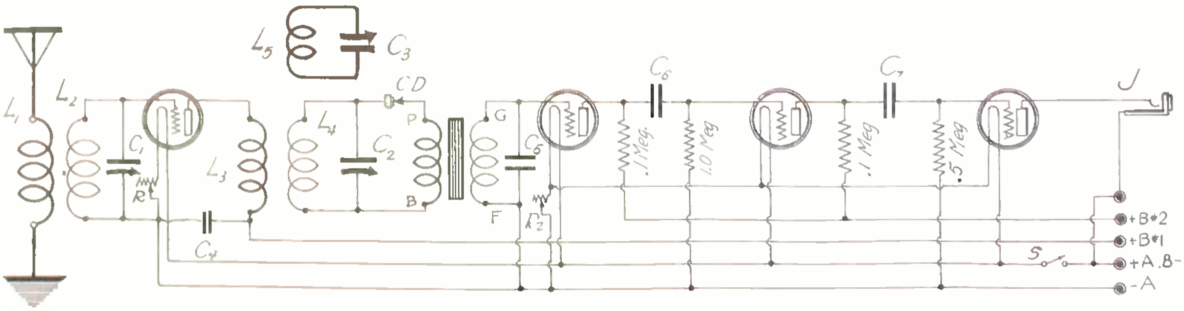
All Trap Detuning

Pursuing the idea a little farther, if there are three stations within receiving range, and the highest no more than about 200 meters removed from the lowest, why not use 15 turns, shunted by a .001 mfd. fixed condenser, for L1C1 in Fig. 2, and have two wave traps, one to eliminate one of the interferers, the other to block the entry of the other cross-talker. That gives two controls. Also, as one extra wavetrap is needed to eliminate each additional station that causes interference, why not three wave traps where four stations are within receiving range? That gives a 3-control set. All this is feasible, but of course disparity of volume may be expected, especially where some receivable stations are on the lower waves, where the permanent inclusion of much extra capacity (the fixed condenser) operates tremendously against the possibility of passing enough of the signal to give volume. Fans should try this method, however, if they are interested in the development of workable crystal receivers.

Use of Tubes

Once you include a stage of RF ahead of a crystal detector you have a tube set, not a crystal set. But such inclusion gives you a receiver that is altogether out of the experimental stage, so far as general adaptability to standard use and needs is concerned. Fig. 4 shows a 1-tube reflex, using a wave trap, a good set to tune out a powerful station near the receiver, and which station otherwise would cause a

(Concluded on page 26)



THE SAME CIRCUIT as shown in Fig. 6, except that the first audio stage is not reflexed. (Fig. 7.)

Efficient Antenna Installation

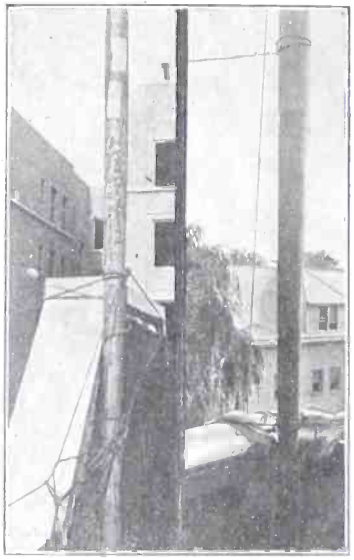


FIG. 1 (left hand photo), showing how one of the poles is held in place. This is at the slanting portion of the roof. Note the large amount of rope holding the pole. Fig. 2 (at right), showing how the poles which is at the cornice of the roof, looks. Note the guy wire coming down from the pole. The slot which is below the wire wrapped around the pole, was purposely left open so that you may observe what it looks like. Also note the peculiar middle section of the pole.

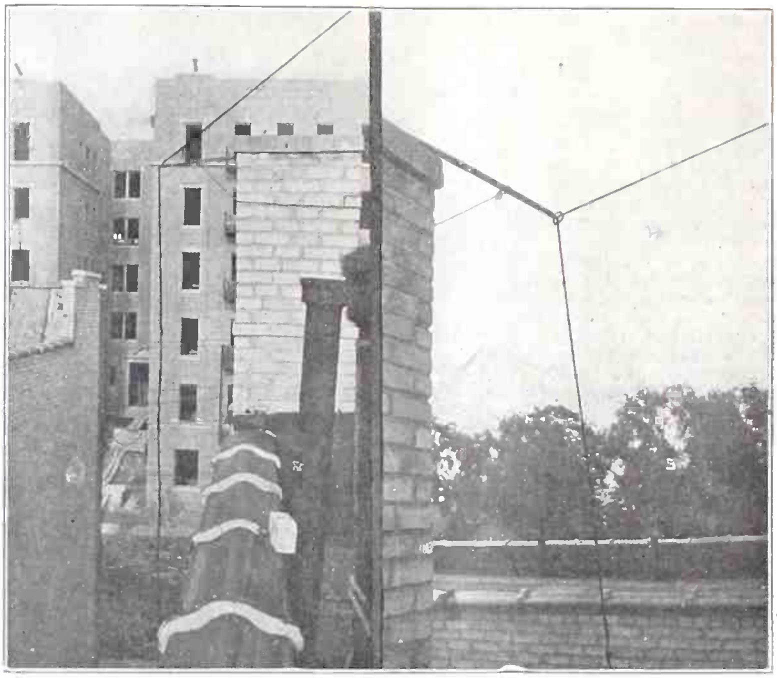


FIG. 3 (at left), showing how the lead-in should be placed. Note how far away from the building the wire is. Fig. 4 (at right), showing another view of the lead-in. Note the eyescrew at the end of the stick. Note how the antenna wire and the lead-in are so joined, that it is difficult to tell where the antenna begins. The other rope which is wound on the stick and described in the text has been left out of the picture, so that a clear view of the lead-in may be had by the reader.

By Lewis Winner

Associate, Institute of Radio Engineers

NO MATTER how good a receiver may be, a poor antenna system will spoil the whole works. It might not seem so, but the antenna is really the heart of the receiver, even though there are many things in the receiver that often receive cardiac honors. Without an antenna you are lost, even if it is a coil antenna (loop).

LEWIS WINNER

A good antenna improves the reception of signals. Now comes the question as to exactly what is the best type of antenna to install and how should it be installed. The best type of antenna, I think, is the V-shaped because the entire length of the aerial is used and the utmost directional effects are obtained. Soldering is also made a convenience. That is, you do not have to climb up to the end of the antenna lead to solder on the lead-in. Some persons solder the connection on before the antenna is tightened. In this way, they have to judge the tightness of the antenna by their eyes, which is a very poor way to do. Notice in Fig. 3 that the lead-in is a part of the antenna proper, and also that the soldering is done after the complete antenna is tightened and put up. Another advantage of this type of antenna is that the aerial wire is never broken at any point, which does away with increased resistance due to poor contact.

The lead-in should be placed in the direction of the station that you prefer to receive most and with greatest volume.

Those employing the L type of antenna always have trouble with a sagging aerial. This is due to the pull that the lead-in has on the antenna. Sagging causes fading of signals.

Poles Are Important

Another consideration of importance are the poles that the antenna is to be attached to.

Ordinary block sticks are most commonly used. This type of pole is usually placed inside of carpets to keep the carpets from unrolling. The popularity is due to the cheapness and ease of obtaining them. These poles bend and warp easily. They are the worst type of aerial poles.

Other types used are broom sticks, which are poor, due to the thin length of wood, causing the wood to bend easily when subjected to a strong pull; iron slats, which are fine, if you have the proper means to put them up. These irons are best installed in the slots of wash poles which are on the tops of roofs of some houses. The next and most elaborate type are the steel poles. These are expensive and require a lot of space for installing. The last, and which I think the best, are the masthead poles. These were used by the navy and are now being discarded, which adds to the advantage of the radio public. They are purchaseable at some stores for a very moderate price, with express charges prepaid. This is one of the season's best buys, and this is a good time to buy, as now is the season for reinstalling or repairing your antenna for the coming winter.

Look to Your Roof

The next thing to consider when installing your antenna is the roof the poles are to be placed on. If it is a tin roof you are in a bad fix, because tin is a wonderful absorber of radio energy. However this can be partly offset by putting up extremely high poles. A tarred roof is the best. Look over the layout of the roof carefully, scrutinizing every nook and corner for the purpose of finding the ideal place to put the poles. They should be put at the opposite ends of the roof. I placed one near the slanting edge of the roof, and the other near a cornice. These places are both clearly shown in Figs. 1 and 2. See if there is a chimney near where the lead-in is to be made. This is for the purpose of placing a long stick so as to place the lead-in away from the wall.

Wooden Poles

When purchasing an antenna pole there are several things to be noted. First, see if you think the pole is high enough (16 feet above roof is average height).

If you have a tin roof, then the poles will have to be much taller, about 22 feet. Tin absorbs radio frequency energy and if the poles are low, which will cause the antenna wire to be low, your signals may be very weak. The weight of the poles is also important. Of course it is difficult to weigh such a large article, especially in a radio store. It can easily be done though. Just take the pole at the center in hand and lift it up and down. If it is fairly easy to lift it is all right in weight. If scales are available the weight of the poles may be thus determined and should not exceed 20 lbs.

Now as to the quality of the wood. Inspect it closely. Note if the wood is hard or soft. This is best done with a pen knife, by notching. The harder the wood the better. See that there are no knots. These prevent convenient drilling. See that the pole is solid. There may be cracks present, but these cracks, if only ¼ to ½" in depth do not weaken the pole.

The construction of the pole is also important. A straight pole is all right,

V-Type Aerial Called Safest

but it gives; that is, when subjected to a strong pull, it will bend. The remedy for this is a pole which looks like that in Fig. 5. Note the peculiar build. It looks like a huge oar. In the center, it is 6" in diameter and decreases to 1½" at the beginning of pole. This is true of both sections. This bulky mid-section gives the pole wonderful resistivity to winds. There should be one notched section in each half of the pole for holding the guy wires.

The Water Test

A good way to see if the poles take to dampness is to put some water on a section of the pole. Wait about two minutes. If the water is mostly on top, the wood is all right. Some wood will hardly absorb moisture at all, but this type has been chemically treated and is expensive. The less a wooden pole absorbs moisture, the longer it will last, as poles which take in moisture rot very quickly.

How to Put the Poles Up

Before putting up the poles all the guy wires, insulators and antenna wire, should be attached thereto. When putting these poles up have some one help you hold them in place so that they can be securely held. Take one pole. At one extreme end, 3 or 4" from the top, screw a hook in. Make it as tight as possible. Now take the insulator run the beginning of antenna wire through one hole and twist the wire, so that a good hold is obtained. Solder the connection of the wires. Through the other hole of insulator run some heavy hemp rope or No. 12 rubber insulated wire. About 1½ feet will do. Twist this wire around the insulator ring tightly. Now run other end through screw eye. Run once through this eye and the other times around the pole twice. When coming around the third time twist around other twisted portion (coming from insulator). Tighten with a pair of pliers.

Run the antenna wire out. Try not to make too many kinks in the wire. Unroll the wire, turn by turn.

Unwrap the wire until you have let out enough wire for it to be pulled through the insulator of the other pole. This means that about 80 feet of wire will be left out, while 20 feet are still in the roll.

In one of the notches (each is 6" wide), wrap five turns of hemp rope and make a loose knot, leaving the rest of the rope dangling. Now measure off the complete length of the guy wire from the top of notch. This measurement should be made to the place where you contemplate placing the clamp. Say it is 10 feet. Then at 7 feet cut the rope.

Insert a turn-buckle at this point. A turn-buckle is a threaded dented bolt 5" long, having a pair of turn-screws. They are situated at the extreme ends of the respected halves of the buckle. One turns in the opposite direction to the other. The holder of these screws is turned, and since they both turn in the opposite direction, the guy wire can be loosened and tightened. Insert the other one-quarter of the rope on the other end of the buckle. Do not make loose connection, as there will not be enough rope left out for tightening.

Clamp is Tightened

Now put a clamp in place on cornice, where you measured the length of the guy wire from the pole. Tighten the clamp. Insert the end of rope in clamp and tie securely. Make strong knots in all cases where the strain is great, as a loose knot, or one that seems tight will quickly break when subjected to any kind of a pull.

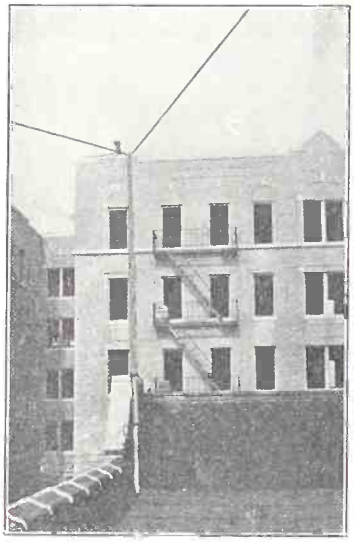


FIG. 5, showing a view of one of the poles. The guy wires are difficult to see, due to the similar background. Note the height of the pole, and how the antenna is continued right through the insulator.

On the other notch place another rope in the same manner. Place another clamp on another cornice of the roof, this one being about 15 feet away from the other one and in a favorable position for holding the pole safely. About five feet from the bottom of the pole drill a hole 1" in diameter. Run some rope through this hole and leave enough rope out for tieing purposes. See Fig. 2. Note that the pole is in the corner of the roof, place a clamp on this end. Run the rope through the clamp twice, then back again on the pole a couple of times. This will give you a secure enough hold. Now take some more rope and wrap it around the pole and the clamp so that the pole holds without any one supporting it. Put the guys up. Tighten the turnbolts. See if the pole wiggles or swings, when subjected to strain. If it does, put more rope around the end of the cornice. Do not be afraid of the fact that this will make an ugly-looking affair, because you will have to depend upon strength there and not looks. You are putting up a couple of strong poles, remember that.

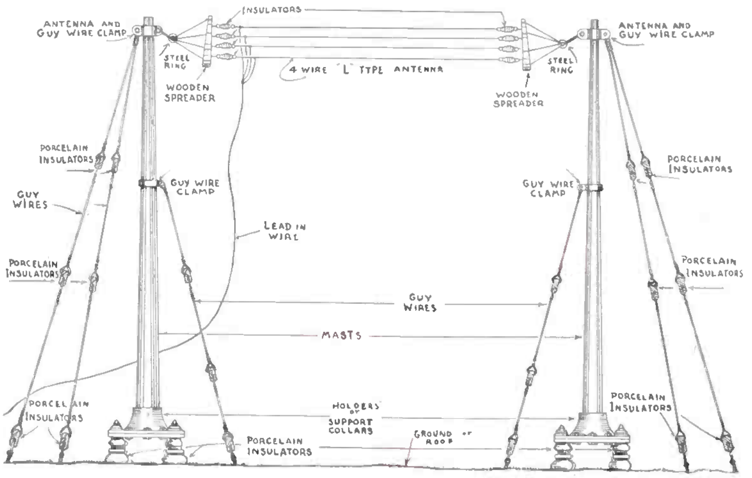
Now for the other pole. According to the picture, Fig. 1, it seems as if I used up all the rope that I could find in the house, but that pole has no chance of falling down regardless of the wind. Guy this pole in the same way that you did the other. Before doing this, though, put a screweye in the pole. Then put the insulator on. Run the antenna wire that you tied to this end of the roof through the insulator and let the wire dangle, having someone hold it until you put the pole up. As soon as the pole is erected tie the wire on some cornice of the roof, watching that there are no kinks present in the wire.

After you have installed both poles test them for their resistivity. This is done by pulling on the antenna wire with a great deal of energy, at least until you have made the wire as tight as you possibly can. The poles should not shake or bend. Watch out for the guy wires or rope and see that they do not snap.

The Lead-in

Now for the lead-in. This should be 3 feet from the wall. Here is where a broomstick comes into use. Drill two holes (1" in diameter) at the extreme top and bottom of the stick. Run a wire through one of the holes and tie. Continue running this wire around the entire top of the chimney until you reach the pole again. Run the wire through the other hole and tie. At the end of

(*Concluded on page 26*)



MANY folks think an antenna having four wires improves the reception of signals. This type of antenna causes very broad tuning, due to the large amount of capacity and effective antenna resistance. A great many of the present day transmitters desire a lot of capacity, due to the high power. In the transmitter the resistance is overcome by the high voltage output, but in the receiver, there is no output it is all coming in and nothing to counteract this resistance. With an antenna the multi-wire type a very small inductance is required, and even then one has to decrease the fundamental wavelength of the receiver by series condensers. Louder signals will be received with this antenna, but then the signals may be heard all over the dials. The shorter the antenna, the sharper the receiver will tune in signals. This type of transmitting antenna is being done away with on board ship. Single wire antennas are rapidly taking 2 and 3 wire aerials. Note the large amount of space this type of antenna requires.

THE RADIO UNIVERSITY

A QUESTION and Answer Department conducted by RADIO WORLD for its Readers by its staff of Experts. Address Letters to The Radio University, RADIO WORLD, 1493 Broadway, New York City.

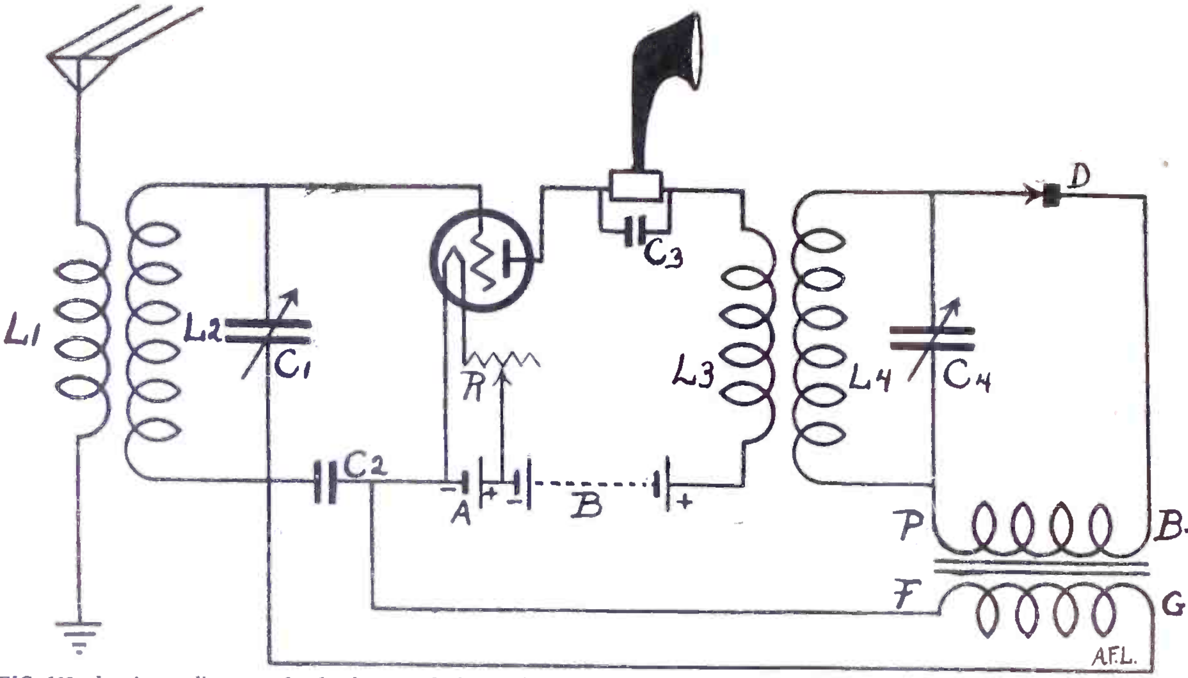


FIG. 182, showing a diagram of a 1-tube set which is reflexed and which gives loud speaker volume on stations up to 15 miles. L1L2 is a spiderweb coil, 5½" outside diameter. L1 has 10 turns wound under one spoke and over one spoke and is wound in the center. The secondary is wound right next to L1 and has 46 turns. L3L4 is wound in the same fashion, but L3 has 13 turns. Use No. 22 DCC wire. C1, C4 are both .0005 mfd. variable condensers. C2 and C3 are both .001 mfd. fixed condensers. D is the crystal detector. R is a 20-ohm rheostat. Use UV201A tubes.

PLEASE GIVE me a diagram of a 1-Tube reflex that gives good volume on local stations; maybe to run a speaker.—H. R. Roxins, Tampa, Fla.

See Fig. 182.

* * *

IN REGARD to the Dynamic Amplifier, published in the July 25 issue of RADIO WORLD. (1) Is it practical to add two straight stages of transformer-coupled audio-frequency amplification to this set? (2) Does the 40-volt battery have to be a separate battery from the 88-volt battery? (3) If an air-core transformer is used, does it have to be tuned by a variable condenser? (4) Does this circuit give good volume?—H. A. Morgan, 1153 Sherburn Ave., St. Paul, Minn.

(1) Yes. (2) No. (3) Yes, preferably. (4) Yes.

* * *

IN REGARD to the 6-tube 1-control set, which appeared in the Radio University. (1) Can I use Acme R2, R3, and R4 RFT for the first, second and third stages of radio-frequency amplification? (2) Can I use Acme A2 AFT for the audio-frequency transformers for the audio stages? (3) What is the ohmic resistance of the filament control (Amperite)?—Dan A. Heidt, Postal Telegraph Co., N. Y. City.

(1) Yes. (2) Yes. (3) This depends upon the type of tube used.

* * *

I HAVE built the 4-Tube Handsome Portable described in the July 4 issue of RADIO WORLD. I would like to know how to get rid of a grinding noise that is always present in the receiver, regardless of what I do. I also would like to know how to get more distance and volume on this set.—Wm. P. Sigmund, 317 Trench St., Atlantic City, N. J.

This grinding noise is cleared up by putting a high resistance across the secondary of the second AFT. This should be in the neighborhood of 100,000 ohms. Decrease the plate voltage, of the detector tube. Reverse the secondary of the fixed RFT. Use 135 volts on the amplifier tubes.

* * *

I DESIRE the wiring of a 2-tube receiver using a tuned aerial and reverse feedback.—Hal G. Volk, Minneapolis, Minn.

See Fig. 183. L1 is the primary of a 3-circuit tuning coil, C1 being .0005 or .001 mfd. L2 is the secondary, L3 the tickler of that tuner. L4 has 35 turns of No. 22 SCC wire on a 3½" diameter tubing. C2 and C3 are .0005 each. C4 is the grid condenser and capacity coupling. R3 is a 2-meg. leak.

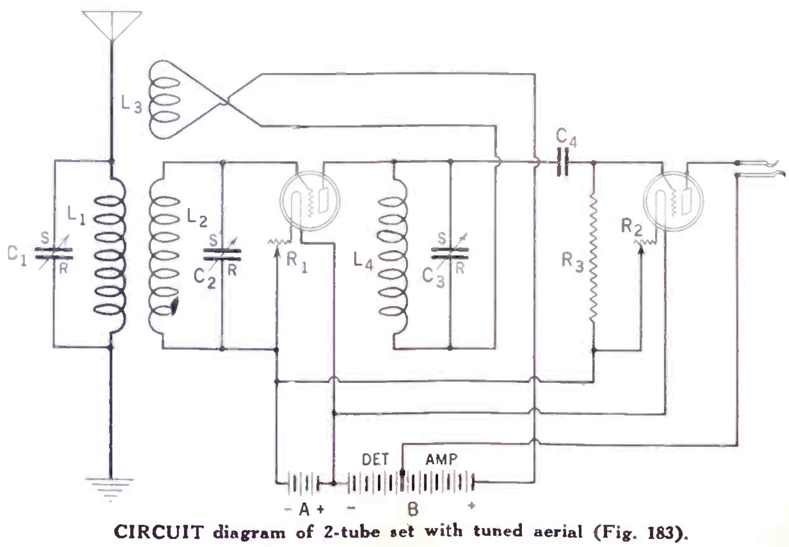
* * *

I AM going to build The Diamond. (1) Would it be preferable to add another stage of RF? (2) Will any good low loss 3-Circuit Tuner be O. K. in this set? (3) Will 23-plate condensers do? I have the Rathbun type. Are they O. K.?—Dr. G. Emery, Hiawatha, Kan.

(1) No. (2) Yes. (3) Yes.

* * *

REFERRING TO the 1-tube, 1-dial set, described by Capt. P. V. O'Rourke in the Dec. 6, 1924 issue, of RADIO WORLD, please tell me how to make the set bring



CIRCUIT diagram of 2-tube set with tuned aerial (Fig. 183).

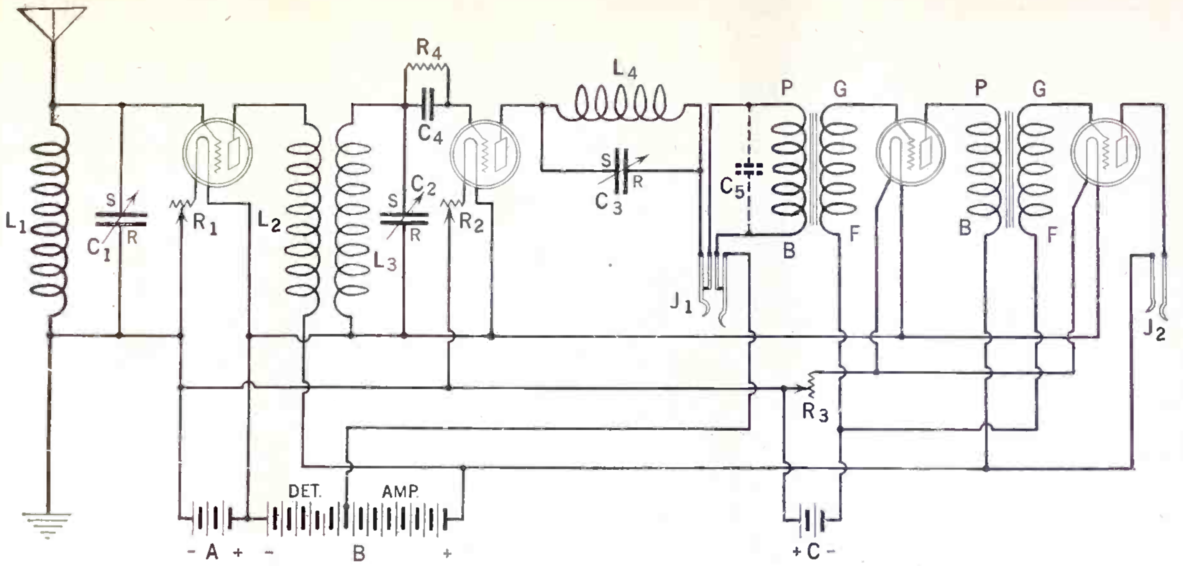
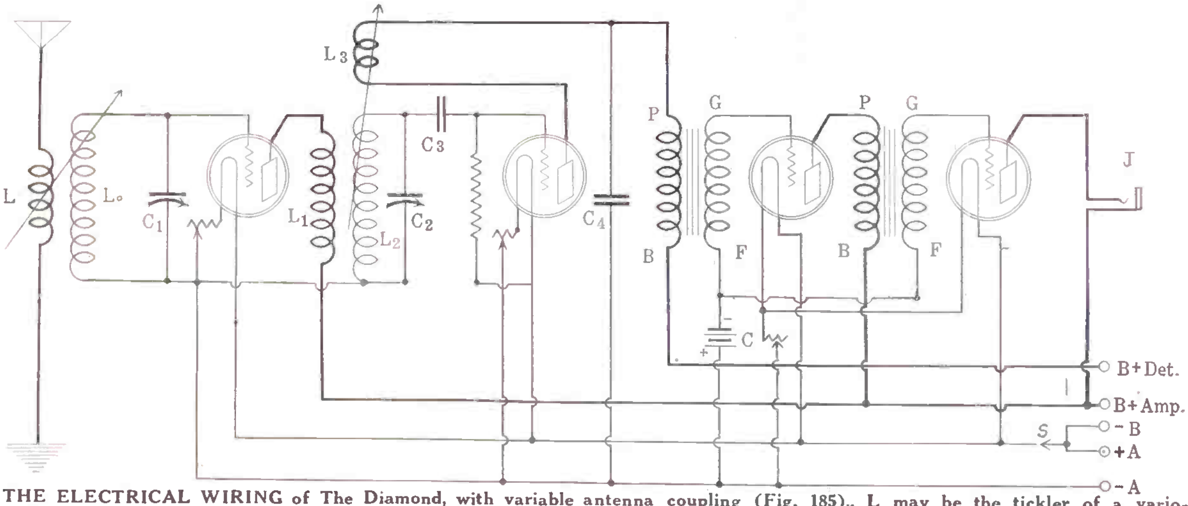


FIG. 184, showing a diagram of a 4-tube receiver, employing a regenerative detector, with a stage of tuned impedance RF ahead of it. L1, the primary, has 30 turns wound on a tubing 3" in diameter, 3" high, using No. 22 DCC wire. L2L3 is wound on a piece of tubing 3½" in diameter, 4" high. L2 has 11 turns, and L3 has 46 turns. Use No. 22 DCC wire. L4 is wound on a tubing 3½" in diameter and contains 35 turns, wound with No. 22 DCC wire. C1, C2, C3 are all .0005 mfd. variable condensers. C5 is a .001 mfd. fixed condenser. C4 is a .00025 grid condenser. R1, R2 are both 10-ohm rheostats. R3 is a 6-ohm rheostat. R4 is a 2-megohm grid leak. J1 is a double-circuit jack. J2 is a single-circuit jack. Use UV201A tubes throughout.



THE ELECTRICAL WIRING of The Diamond, with variable antenna coupling (Fig. 185)., L may be the tickler of a vario-coupler, L0 a secondary made to match the condenser C1. The set will have four controls, unless C1C2 is a double condenser, whereupon there are three controls. L need be varied only occasionally, hence the set would be practically in the 2-control class. Constants are given in the May 23 and July 25 issues of RADIO WORLD.

in stations below 385 meters?—Louis C. Blum, Kenney, Tex.

Put a .001 mfd. fixed condenser in series with the aerial.

* * *

PLEASE GIVE me a diagram of a 4-Tube set employing a regenerative detector with a stage of tuned impedance radio-frequency ahead of it, with two stages of audio-frequency amplification.—G. S. Reyt, Loisburg, Mo.

See Fig. 184.

* * *

PLEASE publish the circuit diagram of The Diamond of the Air, without detector jack, but with a variable antenna coupling, as described by Herbert E. Hayden in the August 15 issue and with three rheostats.—Thos. J. M. Peak, Alberon, N. J.

See Fig. 185.

* * *

HOW DOES Prof. Ginnings' feedback circuit, with two stages of audio-frequency amplification compare with The Diamond as to volume, selectivity and distance? (2) Will both of these sets operate efficiently on WD12 tubes? (3) Can UV201A tubes be operated on four dry cells, connected in series, economically enough?—John H. Ross, 954 Seneca Ave., Brooklyn, N. Y.

The Diamond is louder, the rest about the same. (2) Yes. (3) Yes.

* * *

I WOULD like to know how to obtain an Amateur Transmitting License.—Wm. Carrillo, 716 St. Albans St., Philadelphia, Pa.

In the June 27 issue of RADIO WORLD was published a complete article on this.

* * *

PLEASE TELL me if the Browning-Drake set is better than The Diamond.—A. Baillargeon, 4 Bolduc St., Box 412, Thetford Mines, Quebec, Canada.

They are the same fundamental circuit. The Diamond has lower losses, due to absence of neutralization.

* * *

IN THE July 4 issue of RADIO WORLD there was described a 3-Tube Neutrodyne using the Reflex Plan. In this circuit can I use the standard Neutrodyne coils with the 23 plate condenser? (2) I cannot receive above 455 meters. What is the trouble and what can be done to remedy this?—Paul Schleh, 4237 Barnes Ave., N. Y. City.

(1) Yes. (2) Put a .001 mfd. fixed condenser across the antenna and the ground.

* * *

I AM building The Diamond and am in difficulties. In using a UV201A tube on a 6-volt storage battery, should I use a 6 or 30-ohm rheostat?—R. Sharp, 547 St. Catherine St., West, Montreal, Canada.

Use the 30 ohm rheostat. The regulation valve is 20 ohms.

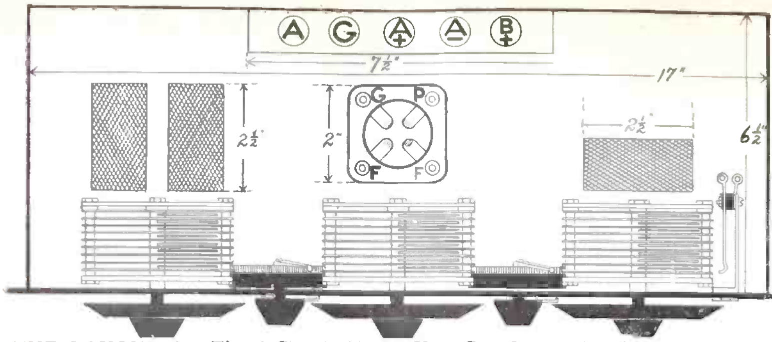
* * *

I WOULD like to use a flashlight battery instead of the ordinary dry cell for a 199 tube or a WD11, or a WD12.—Carl Robbie, Box 913, Missouli, Mont.

The flashlight battery will not last long enough.

* * *

IN REGARD to the Evolution Reflex set, published in the Aug. 11 issue of RADIO WORLD I would like to know if I can build this set by using an Acme R2



THE LAYOUT for The 3-Circuit Tuner You Can Log, using honeycomb coils. (Fig. 186).

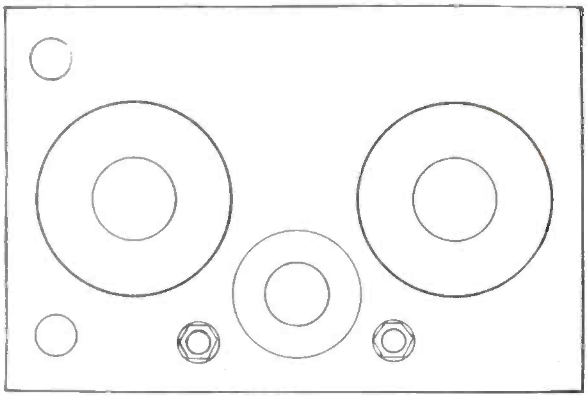
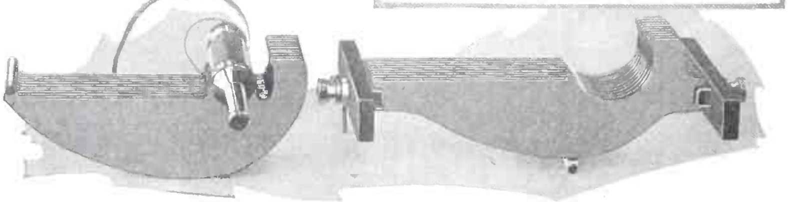


FIG. 187, panel for 3-circuit tuner with one AF.

THE rotor (left) and stator (right) of a straight-line frequency condenser. (Fig. 188). (Radio News.)



and R3 fixed RFT, one RF coil and .0005 mfd. variable condenser.—William J. Simon, 309 E. 70th St., N. Y. City.

No, these RFT have too many turns of wire and cannot be tuned conveniently. The one RF coil may be employed. The variable condensers are O. K.

* * *

PLEASE PUBLISH constructional layout of parts for The 3-Circuit Tuner You Can Log, with tuned aerial, showing a rheostat for two optional audio stages.—B. W. Ring, Akron, O.

The layout is shown in Fig. 186. The honeycomb at left is 50 turns, tuned by the condenser in front of it, whose rotor goes to aerial, stator to ground. The middle condenser tunes the adjoining honeycomb, which is a 75-turn one, with 15 turns removed, leaving 60 turns on. The condenser at right is to tune the HC behind it, which has 60 turns. All condensers are .0005 mfd. By moving the detector tube socket to the left and using small AFT the audio may be incorporated.

* * *

PLEASE SHOW panel for a regulation 3-circuit tuner, with one audio stage and two jacks.—Tom Blowtersk, Wichita, Kan.

The panel (Fig. 187) may be 7x12. Antenna and ground binding posts are at left. The two large circles are the dials, with tickler dial at left. Between them is the rheostat.

* * *

HOW are plates shaped in a straight-line frequency condenser?—J. M. Brad, Elgin, Ill.

See Fig. 188. Imagine the rotor superimposed on the stator. On the lower waves the capacity change is disproportionately small (thereby spreading out the lower-wave stations). The cutting away of the rotor plates (at right in photo at left) mainly accomplishes this.

* * *

I AM building the Ultra-Audion Reflex submitted by Seeley Hopkins in the July 18 issue of RADIO WORLD. (1) a—Is the variable grid-leak across the AFT secondary used in tuning the set just as any other control would be, or is it adjusted to the value suitable to the tube and left there? b—Might a fixed leak be used? c—If so what value should it be? (2) Is a .002 mfd. fixed condenser the correct size to use in series with the grid or will some other size work better?—Gerald Teague, Marietta, Okla.

(1) a—Yes. b—No. (2) Use the .002 mfd.

* * *

I HAVE two .0003 mfd. condensers and a vario-coupler. The stator is 3½" diameter and rotor 3" in diameter. Would you please let me know how many turns I will need on each to use with these condensers to make The Diamond.—F. L. Hanle, 43 Morgan Place, Arlington, N. J.

The stator has 15 turns, the secondary 56 turns, the tickler 45 turns. Use No. 22 DCC wire.

* * *

I WOULD like to build the 4-Tube three-control set as illustrated in the March 21 issue of RADIO WORLD by Capt. Peter V. O'Rourke. I would like to know how I can wind the 3-circuit tuner and radio transformer so as to use .00025 mfd. variable condensers. (2) I have two N. Y. coil 11-plate condensers and I would like to use these if possible. (3) Also have 2RFT wound on a tubing 3" in diameter. The primary has 5¾ turns using No. 22 SSC wire and a secondary of 73 turns. Is it possible for me to use this coil as an RFT?—Albert W. Templeton, 11 Glenwood Ave., Pittsfield, Mass.

(1) Procure a tubing 3½" in diameter, 4" high. Use No. 22 DCC wire. Wind 15 turns for the primary. Leave no space. Wind 56 turns for the secondary. The tickler is wound on a 3" tubing and has 50 turns. (2) Use same tubing and same wire as per above. The primary contains 20 turns and the secondary has 60 turns. The tickler has 50 turns, wound on a 3" tubing.

* * *

HOW DOES the Pressley compare with the Ultradyne for sensitivity, selectivity and volume? (2) Can an outdoor aerial be used on the Ultradyne with much success? (3) Does the Pressley tune very sharp, due to not having a filter transformer. (4) I desire to build a VERY sensitive receiver for use with a loop. What receiver would you recommend? (5) Are the regular Super-Heterodynes, such

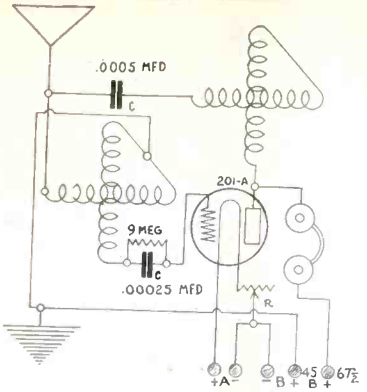


FIG. 189, showing a receiver employing 1-Tube, the grid and plate being tuned by variometers. The rheostat has a resistance of 10 ohms. When building this set, place the variometers no more than 2¾" away from each other. The mid-tap is taken where the rotor and the stator join.

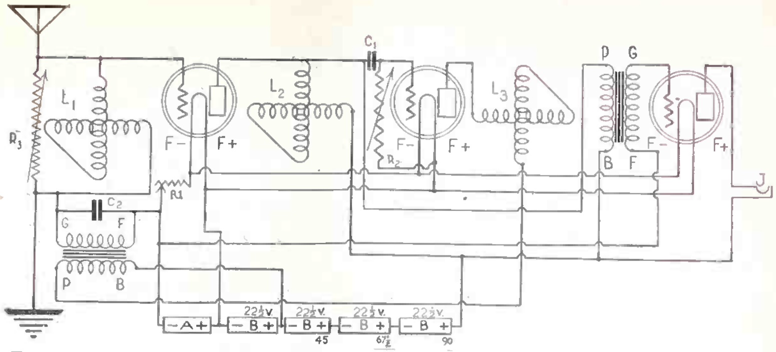


FIG. 190, showing the diagram of a 3-Tube reflex, employing variometers for tuning. This hookup is for experimental purposes only. It will work, but requires a great deal of radio knowledge to get it working right. L1, L2 and L3 are all variometers of standard make. R1 is a variable resistance (from zero to 10,000 ohms). This may be eliminated. The AFT in the extreme left hand corner is a high ratio AFT, while the other one is a low ratio AFT. C1 is a .00025 mfd. grid condenser. C2 is a .001 mfd. fixed condenser. R2 is a variable grid leak. R1 is a 15 ohm rheostat. Use UV201A tubes

as the All-American, Remler, Silver, etc., as satisfactory as the Ultradyne for long distance reception and quality of tone? (6) Which would radiate the most when properly tuned, the Ultra or the Super?—G. R. White, 112 Cemetery Road, Clearfield, Pa.

(1) Both O. K. (2) Yes. (3) Yes. (4) The Diamond. (5) Yes. (6) Both will radiate in the same manner.

* * *

A DIAGRAM of a 1-Tube volume receiver is requested.—E. Turlans, Palm Road, Neb.

See Fig. 189.

* * *

WILL YOU kindly show me a diagram of an experimental 3-Tube receiver employing variometers solely for tuning. I would also like to have this set reflexed.—U. Fasion, Rason, N. D.

See Fig. 190.

* * *

WOULD YOU please give me a diagram of a 1-Tube set, employing no variable condensers. I would like this set to be loud and selective.—P. T. Tishman, Ft. Washington, L. I., N. Y.

See Fig. 191.

* * *

WILL YOU please give me a diagram of a 2-Tube reflex, that can be depended on for plenty of volume.—E. Roshinx, Pittsfield, Pa.

See Fig. 192.

* * *

CAN I use an Ambassador Baby Coil and the Ambassador Antenna Coil for The Diamond? (2) Will you please give the dimensions of a loop for this receiver?—D. Norman, 1812 Montrose St., Philadelphia, Pa.

(1) Yes. (2) Use an 18" square. Wnd 20 turns of No. 18 Annunciator wire on this form. Space the turns ½" apart.

* * *

I AM desirous of building Hayden's 1-A Portable described in the March 28, April 4 and 11 issues RADIO WORLD. In reading over the list of diagrams, I am a bit puzzled. In the March 28 issue on page 3, Figure 2, you give the aerial connections to the set. In "A," "B" and "C" you show "L" as going between 3 and 4. What is "L" and where is it connected in these respective hookups is what I want explained. (2) Could a switch lever and taps be used for the different aerial connections?—Irvin F. Marutz, Freelandville, Indiana.

(1) L goes to shield. (2) Yes. Place one switch arm in the antenna lead and one switch arm to the ground.

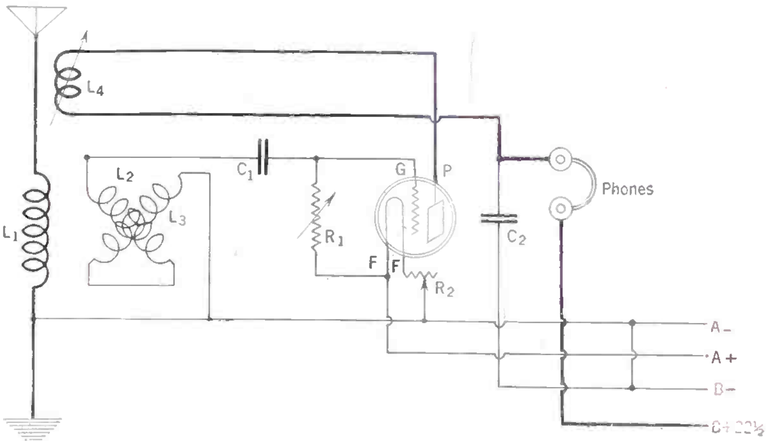


FIG. 191, showing a diagram of a 1-Tube Inductively coupled set. L1 is wound on a form 3" in diameter and 4" in length. Wind 10 turns, using No. 22 DCC wire. L2 is the stator and L3 is the rotor of the variometer, while L4 is the tickler. Take a form, 3" in diameter, and wind 28 turns, leave ½" and wind 28 turns more. This is for the stator. There are 36 turns on each half of the rotor, the form being 2" in diameter. There are then 72 turns in all on the rotor. The stator should be considerably long (8"). Connect the ending of L2 to the beginning of L3, when winding. The tickler L4 is wound on the same kind of a form as was the rotor of the variometer. There are 17 turns on one half and 18 turns on the other half. There is a ½" separation between the windings. The tickler is enclosed in the stator form. C1 is a .00025 mfd. grid condenser. R1 is a variable grid leak. R2 is a 20 ohm rheostat. A UV201A tube is used.

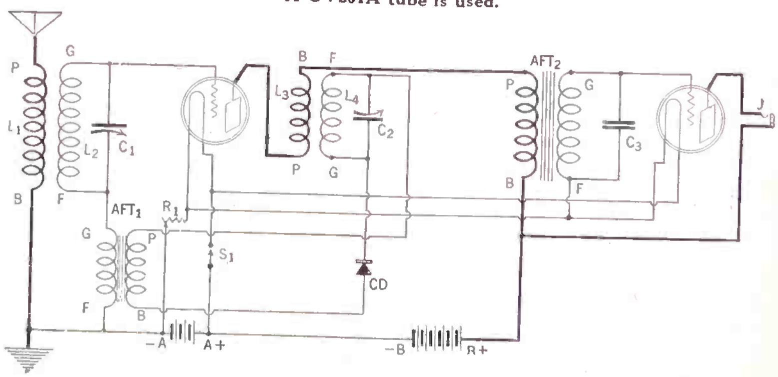


FIG. 192, showing the electrical diagram of a 2-Tube Reflex that packs a kick. L1 is wound on a 3½" form, using No. 22 DCC wire, and contains 10 turns. Leave no space, and wind 46 turns (L2). L3L4 is wound in the same fashion as L1L2 using the same kind of wire and same number of turns respectively. C1C2 are both .0005 mfd. variable condensers. C3 is a .001 mfd. fixed condenser. UV201A tubes are used. AFT 1 is a high ratio AFT, while AFT2 is a low ratio transformer. S1 is a single throw filament switch. R1 is a 10 ohm rheostat. CD is the crystal detector.

Allied Supremacy in Radio

Germans Unaware Until Too Late That Thei Enemy That Used Astoundingly Sensitive Sets Fisher, of British Fleet, Lauds British Enterp Exposes Secrets of Allied Efficiency—Code Founa

By Thomas Stevenson

PART I.

THE deadliest enemy to the German fleet during the World War and which cost it several important battles with heavy casualties was wireless telegraphy.

This has just been revealed by N. Von Koch, of Sweden, who has made a long study of the service of radio intelligence and radio security in the British and German navies during the late war. Von Koch claims that the ability of the British to intercept German wireless signals and by means of direction finders to establish the locality of the sender enabled them to prepare for several attacks, the success of which depended on complete surprise.

Lord Fisher's Analysis

Lord Fisher, Admiral of the British fleet, bears out the statement of Von Koch in his memoirs in which he says:

"Wireless telegraphy is the strong man's weapon. But wireless telegraphy is a dangerous weapon; rightly used: dangerous for the enemy; but carelessly used much more dangerous for one's self. The English recognized that fact, but not so the Germans, even at the beginning of the war, and that is why the English wireless organization became something entirely different from that of the Germans."

"From the very beginning of the World War," says Von Koch, "the listening-in to the wireless communications of the enemy prepared in advance by the English, was in working order. In order that not a single message should be missed, no matter on what wavelength, they had a large number of receivers, to each of which was assigned a certain wave section. Everything received was sent direct to the Admiralty, where a special decoding office for the Allies had been established.

"Thanks to this arrangement of paying attention to everything received, an enormous and extensive mass of material became available, and before long the Associated Nations were masters of the German code just as much as the Germans themselves. This knowledge was augmented by the chance discovery of German secret documents.

The Secret Code Revealed

"For instance, the Russians, after the stranding of the small cruiser Magdeburg near Odensholm, found an iron safe sunk near the cruiser containing several German secret documents and books, including the key to the code, signal books and charts. The collection was increased still further by mine charts of the North sea and the English coast, when about January, 115, the U-31 was driven ashore at Yarmouth, undamaged but with the crew all dead.

"Apart from the listening-in stations referred to, the English as far back as the Fall of 114 were getting good results from wireless directional stations. The directional stations were established at suitable points on the English Coast line and their duty was to get the bearings, the direction of every German sender. These bearings were then forwarded direct to the Admiralty, where they were collated, part of them with each other, by which means the position of the sender was located, and part of them with the message picked up by listening-in, whereby it was usually discovered who the sender was.

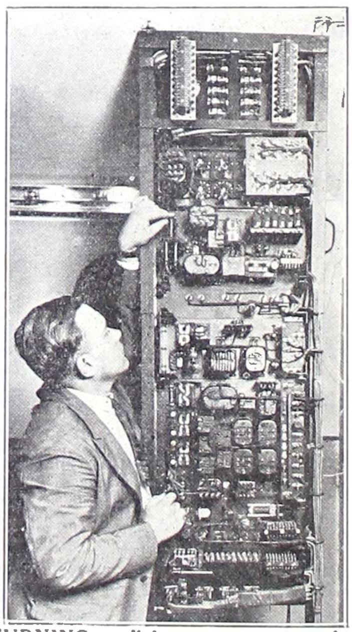
"As to how the organization was worked in detail, so that one could be sure that the bearings determined, notwithstanding the vast number of messages referred to one and the same sender, and also as to how it was possible to fit the bearings to the right message, I have not been able to find any information. But it is hinted that great skill and training on the part of the personnel were essential, and that especially during the first year of the war many mistakes were made.

"But thanks to the energetic work and far-sighted vision the information furnished by the directional stations gradually became absolutely reliable, and Jellicoe observes on this point that in consequence he was able to reduce considerably the scouting forces which the Grand Fleet was obliged to keep at sea. German warships or craft at sea almost invariably betrayed themselves by their wireless signals. All German attacks on a large scale were preceded by a lively wireless conversation, as the Germans, never dreaming anything was wrong, generally issued their preparatory orders by wireless. Consequently, as a general rule, the British knew in advance where the German warships were, and also what they had to expect.

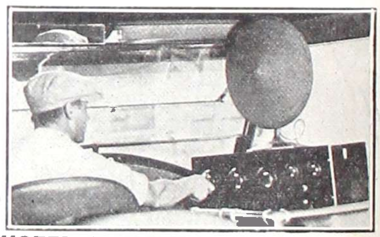
Learned the Whole Works

"In course of time the English operators at the listening-in and directional stations became so familiar with the peculiar features of the various German ships with respect to sound, etc., that as a rule as soon as they heard a German wireless message they were at once able to name the class of the sending vessel and frequently its name as well.

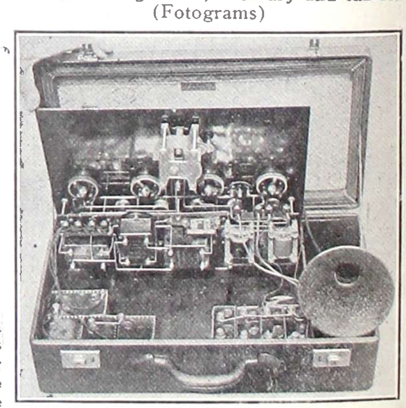
"From the very beginning of the war the British had been cautious in their wireless communications, and the more they learned to profit by the German system the more clearly they saw the necessity of avoiding wireless telegraphy for the transmission of orders and intelligence. In port or anchor the senior (British) commanders were always in connection with the telegraph system on shore. Wire-



TURNING a dial or two to tune in a station is easy enough, but much that is complicated must go into a broadcasting station to render your personal ease possible. W. E. Novy is exposing the back of WRNY's main control panel. This station, operated at the Hotel Roosevelt, New York City, by "Radio News," through the enterprise of Hugo Gernsback, editor, is one of the most compact in the world.



HOTEL McALPIN of N. Y. City, inaugurates a Philadelphia-New York bus service. The buses will be equipped with radio, running water, a library and tables. (Fotograms)



AN INTERIOR view of a 6-tube receiver, employing 3 steps of untuned radio-frequency amplification, a detector and 2 steps of transformer coupled audio-frequency amplification. A .0005 mfd. variable condenser tunes the antenna.

Revealed as Key to Victory

Every Move Was Advertised in Advance to nd Completely Mastered Teutons' Code—Lord ise in Ether—Von Koch, Swedish Historian, in Sunken Safe Dropped From Stranded Cruiser.

s signals were permitted from one ship ly at Scape, the stationary telegraph ip, and these mostly related to flotillas small vessels only, guard ships and the e who did not reply to them.

It Was a Big Task

To keep the Grand Fleet together and ll in hand without using wireless tele- phy was no light task. To render this ssible every attention was devoted to tical signalling using the heliograph in e daytime. For distances at night the itish used low candle power flash lights th beams of very small diameter and a dius of about 500 meters. Gradually e Grand Fleet succeeded in preserving actically absolute wireless silence during scouting expeditions in the North Sea."

While at the outbreak of the war the tish realized the value of listening-in enemy messages and organized a serv- for this purpose, it was late in the r before the Germans capitalized the ue of collecting information from emy communications by wireless.

Admiral Schoor, of the German Navy, his book "German's High Seas Fleet in World War," writes that the British 1914 had received information in ad- ce of a German movement on the coast of England through their directional stations which they had at their disposal even at that time, "whereas we did not have this organization until much later."

"In them the British possessed a considerable advantage in the conduct of the war," says Admiral Schoor, "as by this means they were able to obtain absolutely exact information of the whereabouts of the enemy, whenever the latter sent out wireless signals of any kind."

According to N. Von Koch, who has made a long study of the subject, it was late in the war before the Germans finally got their directional stations into working order.

"They were of slight value," says he, "for taking bearings on the enemy, because of the precautions of the British. Instead of that they were used to send orders for the movements of their own ships and especially airships. This, however, proved a dangerous sport which was never indulged in by the British. Owing to lack of training and practice on the part of the airships in taking exact observations, the British were nearly always warned in advance of their approach and impending attack, and were able to prepare themselves in every possible way for the reception of the unbidden guests. In order to find out the position of the attacking German airships they frequently did not even have to use their own directional stations, but merely required to listen to the reply of the German stations as soon as they had overheard the message asking for a bearing.

"At the outbreak of the war wireless telegraphy was incomparably the most important military means of communication in Germany, not only between the navy and army but also for the transmission of orders, etc., between the various naval authorities on shore. Then, when the Germans began to have a foreboding of the dangers of wireless communications at sea, they certainly did try to reduce the practice as far as possible, at the same time using very low power installations for wireless communications when indispensable between the several units of the naval forces. They also appear to have used the closed aerial circuit for short distance signaling.

British All Ears

"The British listening-in stations on shore, however, were fitted with such extremely sensitive receivers that they were apparently able to pick up even the buzzer signals of the Germans, that is to say, to pick up the messages of a very few dry batteries at a distance of several hundred nautical miles, which seems almost incredible.

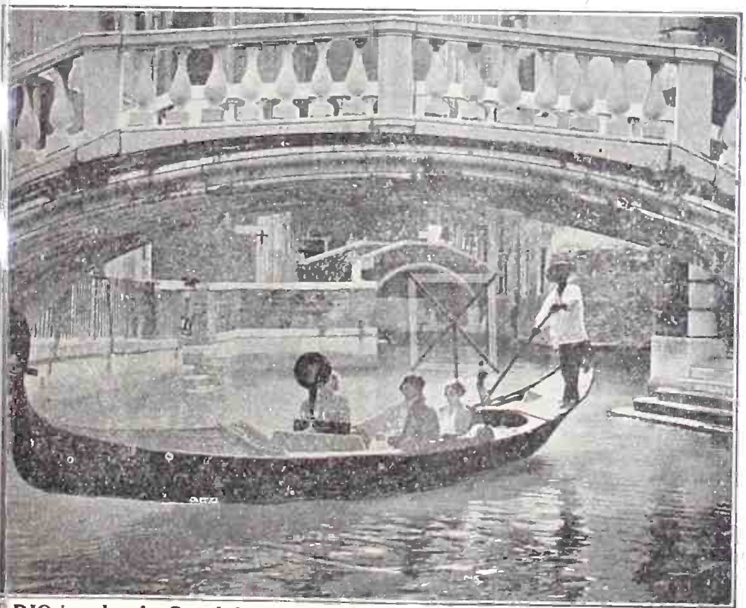
"These limitations to wireless intercourse were effected mainly for the purpose of not betraying the position of the ships to the British directional stations. That the British were even in possession of the German system of codes, etc., appears to be a fact which the Germans did not grasp until a much later date, or about the beginning of 1916, and that is why wireless conversations in port and between the naval authorities continued quite unconcernedly for a long time.

"The German submarines operating in the North Sea gradually learned the wisdom of maintaining almost complete 'wireless silence,' except of course for specially important messages.

Submarines Careless

"The submarines on the west coast of England, on the other hand, felt themselves much safer, and practically every night sent home more or less unnecessary messages, whereby they were many a time located to their own detriment. For the transmission of orders and information to submarines and other vessels, scattered about abroad, the Germans used the high power station at Nauen. From there, at certain stated times and on certain wavelengths, known to all German vessels of war, and which they had to look out for as far as possible, such orders and information were sent out as might be necessary at the moment. No answers were to be given even when a certain order was only intended for a certain ship."

Part II, the conclusion, will be published next week, issue dated August 29.



DIO invades the Grand Canal of Venice. All the gondolas are being fitted with eiving sets, an added inducement to tourists. A loop is used. (Int'l Newsreel).

SEND IN STATION REVIEWS

Now that real radio weather is at hand, send in frank 150-word reviews of programs you liked or disliked greatly. For each one published $1.00 will be paid. Address Review Editor, RADIO WORLD, *1493 Broadway, New York City.*

Allied Supremacy in Radio

Germans Unaware Until Too Late That Thei Enemy That Used Astoundingly Sensitive Sets Fisher, of British Fleet, Lauds British Enterp Exposes Secrets of Allied Efficiency—Code Founa

By Thomas Stevenson

PART I.

THE deadliest enemy to the German fleet during the World War and which cost it several important battles with heavy casualties was wireless telegraphy.

This has just been revealed by N. Von Koch, of Sweden, who has made a long study of the service of radio intelligence and radio security in the British and German navies during the late war. Von Koch claims that the ability of the British to intercept German wireless signals and by means of direction finders to establish the locality of the sender enabled them to prepare for several attacks, the success of which depended on complete surprise.

Lord Fisher's Analysis

Lord Fisher, Admiral of the British fleet, bears out the statement of Von Koch in his memoirs in which he says:

"Wireless telegraphy is the strong man's weapon. But wireless telegraphy is a dangerous weapon; rightly used: dangerous for the enemy; but carelessly used much more dangerous for one's self. The English recognized that fact, but not so the Germans, even at the beginning of the war, and that is why the English wireless organization became something entirely different from that of the Germans."

"From the very beginning of the World War," says Von Koch, "the listening-in to the wireless communications of the enemy prepared in advance by the English, was in working order. In order that not a single message should be missed, no matter on what wavelength, they had a large number of receivers, to each of which was assigned a certain wave section. Everything received was sent direct to the Admiralty, where a special decoding office for the Allies had been established.

"Thanks to this arrangement of paying attention to everything received, an enormous and extensive mass of material became available, and before long the Associated Nations were masters of the German code just as much as the Germans themselves. This knowledge was augmented by the chance discovery of German secret documents.

The Secret Code Revealed

"For instance, the Russians, after the stranding of the small cruiser Magdeburg near Odensholm, found an iron safe sunk near the cruiser containing several German secret documents and books, including the key to the code, signal books and charts. The collection was increased still further by nine charts of the North sea and the English coast, when about January, 115, the U-31 was driven ashore at Yarmouth, undamaged but with the crew all dead.

"Apart from the listening-in stations referred to, the English as far back as the Fall of 114 were getting good results from wireless directional stations. The directional stations were established at suitable points on the English Coast line and their duty was to get the bearings, the direction of every German sender. These bearings were then forwarded direct to the Admiralty, where they were collated, part of them with each other, by which means the position of the sender was located, and part of them with the message picked up by listening-in, whereby it was usually discovered who the sender was.

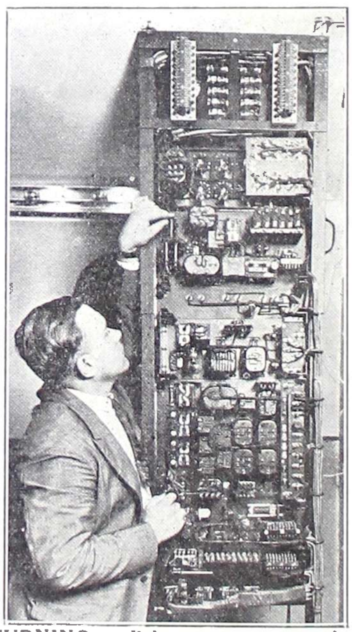
"As to how the organization was worked in detail, so that one could be sure that the bearings determined, notwithstanding the vast number of messages referred to one and the same sender, and also as to how it was possible to fit the bearings to the right message, I have not been able to find any information. But it is hinted that great skill and training on the part of the personnel were essential, and that especially during the first year of the war many mistakes were made.

"But thanks to the energetic work and far-sighted vision the information furnished by the directional stations gradually became absolutely reliable, and Jellicoe observes on this point that in consequence he was able to reduce considerably the scouting forces which the Grand Fleet was obliged to keep at sea. German warships or craft at sea almost invariably betrayed themselves by their wireless signals. All German attacks on a large scale were preceded by a lively wireless conversation, as the Germans, never dreaming anything was wrong, generally issued their preparatory orders by wireless. Consequently, as a general rule, the British knew in advance where the German warships were, and also what they had to expect.

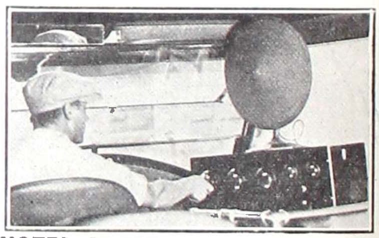
Learned the Whole Works

"In course of time the English oper ators at the listening-in and directiona stations became so familiar with the peculiar features of the various Germa ships with respect to sound, etc., that as a rule as soon as they heard a German wireless message they were at once able to name the class of the sending vessel and frequently its name as well.

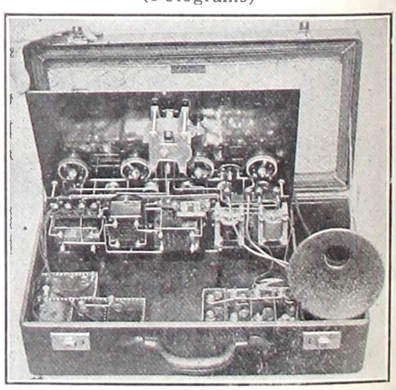
"From the very beginning of the war the British had been cautious in their wireless communications, and the more they learned to profit by the German system the more clearly they saw the necessity of avoiding wireless telegraphy for the transmission of orders and intelligence. In port or anchor the senior (British) commanders were always in connection with the telegraph system on shore. Wire-



TURNING a dial or two to tune in a station is easy enough, but much that is complicated must go into a broadcasting station to render your personal ease possible. W. E. Novy is exposing the back of WRNY's main control panel. This station, operated at the Hotel Roosevelt, New York City, by "Radio News," through the enterprise of Hugo Gernsback, editor, is one of the most compact in the world.



HOTEL McALPIN of N. Y. City, inaugurates a Philadelphia-New York bus service. The buses will be equipped with radio, running water, a library and tables. (Fotograms)



AN INTERIOR view of a 6-tube receiver, employing 3 steps of untuned radio-frequency amplification, a detector and 2 steps of transformer coupled audio-frequency amplification. A .0005 mfd. variable condenser tunes the antenna.

Revealed as Key to Victory

Every Move Was Advertised in Advance to nd Completely Mastered Teutons' Code—Lord ise in Ether—Von Koch, Swedish Historian, in Sunken Safe Dropped From Stranded Cruiser.

ss signals were permitted from one ship ly at Scape, the stationary telegraph ip, and these mostly related to flotillas small vessels only, guard ships and the e who did not reply to them.

It Was a Big Task

"To keep the Grand Fleet together and ll in hand without using wireless tele- aphy was no light task. To render this ssible every attention was devoted to tical signalling using the heliograph in e daytime. For distances at night the itish used low candle power flash lights th beams of very small diameter and a dius of about 500 meters. Gradually e Grand Fleet succeeded in preserving actically absolute wireless silence during scouting expeditions in the North Sea."

While at the outbreak of the war the itish realized the value of listening-in enemy messages and organized a serv- for this purpose, it was late in the r before the Germans capitalized the lue of collecting information from emy communications by wireless.

Admiral Schoor, of the German Navy, his book "German's High Seas Fleet in e World War," writes that the British 1914 had received information in ad- nce of a German movement on the coast of England through their directional stations which they had at their disposal even at that time, "whereas we did not have this organization until much later."

"In them the British possessed a considerable advantage in the conduct of the war," says Admiral Schoor, "as by this means they were able to obtain absolutely exact information of the whereabouts of the enemy, whenever the latter sent out wireless signals of any kind."

According to N. Von Koch, who has made a long study of the subject, it was late in the war before the Germans finally got their directional stations into working order.

"They were of slight value," says he, "for taking bearings on the enemy, because of the precautions of the British. Instead of that they were used to send orders for the movements of their own ships and especially airships. This, however, proved a dangerous sport which was never indulged in by the British. Owing to lack of training and practice on the part of the airships in taking exact observations, the British were nearly always warned in advance of their approach and impending attack, and were able to prepare themselves in every possible way for the reception of the unbidden guests. In order to find out the position of the attacking German airships they frequently did not even have to use their own directional stations, but merely required to listen to the reply of the German stations as soon as they had overheard the message asking for a bearing.

"At the outbreak of the war wireless telegraphy was incomparably the most important military means of communication in Germany, not only between the navy and army but also for the transmission of orders, etc., between the various naval authorities on shore. Then, when the Germans began to have a foreboding of the dangers of wireless communications at sea, they certainly did try to reduce the practice as far as possible, at the same time using very low power installations for wireless communications when indispensable between the several units of the naval forces. They also appear to have used the closed aerial circuit for short distance signaling.

British All Ears

"The British listening-in stations on shore, however, were fitted with such extremely sensitive receivers that they were apparently able to pick up even the buzzer signals of the Germans, that is to say, to pick up the messages of a very few dry batteries at a distance of several hundred nautical miles, which seems almost incredible.

"These limitations to wireless intercourse were effected mainly for the purpose of not betraying the position of the ships to the British directional stations. That the British were even in possession of the German system of codes, etc., appears to be a fact which the Germans did not grasp until a much later date, or about the beginning of 1916, and that is why wireless conversations in port and between the naval authorities continued quite unconcernedly for a long time.

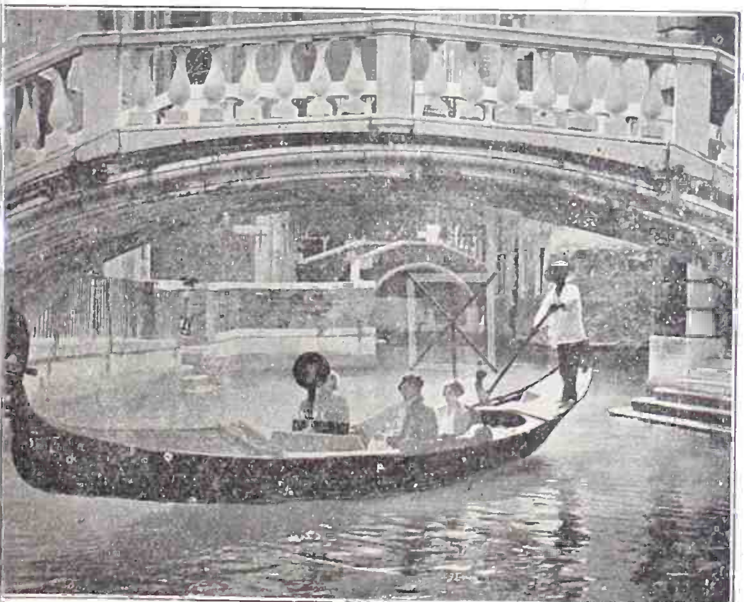
"The German submarines operating in the North Sea gradually learned the wisdom of maintaining almost complete 'wireless silence,' except of course for specially important messages.

Submarines Careless

"The submarines on the west coast of England, on the other hand, felt themselves much safer, and practically every night sent home more or less unnecessary messages, whereby they were many a time located to their own detriment. For the transmission of orders and information to submarines and other vessels, scattered about abroad, the Germans used the high power station at Nauen. From there, at certain stated times and on certain wavelengths, known to all German vessels of war, and which they had to look out for as far as possible, such orders and information were sent out as might be necessary at the moment. No answers were to be given even when a certain order was only intended for a certain ship."

(Copyright, 1925, by Stevenson Radio Syndicate)

Part II, the conclusion, will be published next week, issue dated August 29.



ADIO invades the Grand Canal of Venice. All the gondolas are being fitted with eiving sets, an added inducement to tourists. A loop is used. (Int'l Newsreel).

SEND IN STATION REVIEWS

Now that real radio weather is at hand, send in frank 150-word reviews of programs you liked or disliked greatly. For each one published $1.00 will be paid. Address Review Editor, RADIO WORLD, *1493 Broadway, New York City.*

THE KEY TO THE AIR

KEY

Abbreviations: EST, Eastern Standard Time; CST, Central Standard Time; MST, Mountain Standard Time; PST, Pacific Standard Time; DS, Daylight Saving Time.

How to tune in a desired distant station at just the right time—Choose your station from the list published herewith. See what time division the station is under (EST, CST, etc.); then consult the table below. Add to or subtract, as directed from the time as given on the PROGRAM. The result will be the same BY YOUR CLOCK that you should tune in, unless daylight saving time intervenes, as explained below.—The table:

If you are in	*And want a station in*	*Subtract*	*Add*
EST	CST	..	1 hr.
EST	MST	..	2 hrs.
EST	PST	..	3 hrs.
CST	EST	1 hr.	..
CST	MST	..	1 hr.
CST	PST	..	2 hrs.
MST	EST	2 hrs.	..
MST	CST	1 hr.	..
MST	PST	..	1 hr.
PST	EST	3 hrs.	..
PST	CST	2 hrs.	..
PST	DST	1 hr.	..

If you are under DST and the station you want is under that time, too, or if both are under ST, the above table will hold.

If you are under DST, and the station operates under ST, add one hour to the table result.

If the station uses DST, and you are under ST, subtract one hour from the table result.

FRIDAY, AUGUST 21

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12.
WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 to 1:05 PM; 8 to 12 PM.
WAMD, Minneapolis, Minn., 243.8 (SCT)—12 to 1 PM; 10 to 12.
WBBM, Chicago, Ill., 226 (CST)—8 to 10 PM.
WBBR, New York City, 272.6 (ESTDS)—8 PM to 10.
WBOQ, Richmond Hill, N. Y., 236 (ESTDS)—7:30 PM to 11:30.
WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM to 11.
WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12 M; 1:30 to 4; 5:30 to 10.
WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—12:30 to 1:30 PM; 4:30 to 5:30; 6:30 to 11.
WDAF, Kansas City, Kansas, 365.6 (CST)—3:30 to 7 M; 8 to 10; 11:45 to 1 AM.
WEAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 11 to 12; 4 PM to 5; 6 to 12.
WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 3:30 to 4:10; 8 to 11.
WEAO, Ohio State University, 293.9 (EST)—8 PM to 10.
WEEI, Boston, Mass., 476 (ESTDS)—6:45 AM to 7:45; 2 PM to 3:15; 5:30 to 10.
WEMC, Berrien Springs, Mich., 286 (CST)—9 PM to 11.
WFAA, Dallas, Texas, 475.9 (CST)—10:30 AM to 11:30; 12:30 PM to 1; 2:30 to 6; 6:45 to 7; 8:30 to 9:30.
WFBH, New York City, 272.6 (ESTDS)—2 PM to 6.
WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 PM to 4; 6 to 11.
WGCP, New York City, 252 (ESTDS)—2:30 PM to 5:15; 8 to 11.
WGES, Chicago, Ill., 250 (CSTDS)—5 PM to 7; 10:30 to 1 AM.
WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 5:30 to 11:30.
WGR, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:45 PM; 7:30 to 11.
WGY, Schenectady, N. Y., 379.5 (EST)—1 PM to 2; 5:30 to 10:30.
WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 12:15 PM; 4 to 5; 6 to 7:30; 8:30 to 10.
WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
WHN, New York City, 360 (ESTDS)—12:30 PM to 1; 2:15 to 5; 7 to 11; 12 to 12:30 AM.
WHO, Des Moines, Iowa, 526 (CST)—7 PM to 9; 11 to 12; 12:30 to 1:30; 4:30 to 5:30; 6:30 to 9:30.
WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 8:45 to 10:05; 10:30 to 1 AM.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—7 AM to 8; 1 PM to 2; 3 to 4:50; 6 to 7.
WJY, New York City, 405 (ESTDS)—7:30 PM to 11:30.
WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 6; 7 to 10:30.
WLIT, Philadelphia, Pa., 395 (EST)—12:02 PM to 12:30; 2 to 3; 4:30 to 6; 7:30 to 1 AM.
WLW, Cincinnati, O., 422.3 (EST)—10:45 AM to 12:15; 1:30 PM to 2:30.
WMCA, New York City, 341 (ESTDS)—11 AM to 12M; 6:30 PM to 12.
WNYC, New York City, 526 (ESTDS)—3:45 PM to 4:45; 6:20 to 11.
WOAW, Omaha, Neb., 526 (CST)—12:30 PM to 1; 5:45 to 7:10; 9 to 11.
WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 3 to 3:30; 5:45 to 12.
WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 4; 6:15 to 7.
WPAK, Fargo, N. D., 283 (CST)—7:30 PM to 9.
WPG, Atlantic City, N. J., 299.8 (ESTDS)—7 PM to 8:30; 10 to 12.
WQJ, Chicago, Ill., 448 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 2 AM.
WRC, Washington, D. C., 469 (EST)—4:30 PM to 5; 6:45 to 12.
WREO, Lansing, Michigan, 285.5 (EST)—10 PM to 11.
WRNY, New York City, 258.5 (ESTDS)—11:59 to 2 PM; 7:59 to 9:45.
WSB, Atlanta, Ga., 428.3 (CST)—12 M to 1 PM; 2:30 to 3:30; 5 to 6; 8 to 9; 10:45 to 12.
WSBF, St. Louis, Mo., 273 (CST)—12 M to 1 PM; 3 to 4; 7:30 to 10; 12 PM to 1 AM.
WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30; 3 to 4; 6 to 7; 8 to 10.
KDKA, Pittsburgh, Pa., 309 (EST)—6 AM to 7; 9:45 to 12:20 PM; 1:30 to 3:20; 3:30 to 11.
KFAE, State College of Wash., 348.6 (PST)—7:30 PM to 9.
KFDY, Brookings, S. D., 273 (MST)—8 PM to 9.
KFI, Los Angeles, Cal., 467 (PST)—5 PM to 10.
KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 9:30 to 12.
KFNF, Shenandoah, Iowa, 266 (CST)—12:15 PM to 1:15; 3 to 4; 6:30 to 10.
KFOA, Seattle, Wash., 455 (PST)—12:30 PM to 1:30; 4 to 5:15; 6 to 11.
KGO, Oakland, Cal., 361.2 (PST)—11:10 AM to 1 PM; 1:30 to 3; 4 to 7.
KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30 PM; 5 to 11.
KHJ, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 3:30 PM; 5:30 to 11:30.
KJR, Seattle, Wash., 484.4 (PST)—10:30 AM to 11:30 AM; 1 PM to 6:30; 8:30 to 11.
KNX, Hollywood, Cal., 337 (PST)—11:30 AM to 12:30 PM; 1 to 2; 4 to 5; 6:30 to 12.
KOB, State College of New Mexico, 348.6 (MST)—11:55 AM to 12:30 PM; 7:30 to 8:30; 9:55 to 10:10.
KOIL, Council Bluffs, Iowa, 278 (CST)—7:30 PM to 8:45; 11 to 12 M.
KPO, San Francisco, Cal., 429 (PST)—7:30 AM to 8; 10:30 to 12 M; 1 PM to 2; 4:30 to 11.
KSD, St. Louis, Mo., 545.1 (CST)—4 PM to 5.
KTHS, Hot Springs, Ark., 374.8 (CST)—12:30 PM to 1; 8:20 to 10.
KYW, Chicago, Ill., 536 (CSTDS)—6:30 AM to 7:30; 10:55 to 1 PM; 2:25 to 3:30; 6:02 to 7:20; 9 to 1:30 AM.
CNRA, Moncton, Canada, 313 (EST)—8:30 PM to 10:30.
CNRE, Edmonton, Canada, 516.9 (MST)—8:30 PM to 10:30.
CNRS, Saskatoon, Canada, 400 (MST)—2:30 PM to 3.
CNRT, Toronto, Canada, 357 (EST)—6:30 PM to 11.

SATURDAY, AUGUST 22

WAAM, Newark, N. J., 263 (EST)—7 PM to 11.
WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 to 2 AM.
WAMD, Minneapolis, Minn., 243.8 (CST)—12 M to 1 PM; 10 to 12.
WBBM, Chicago, Ill., 226 (CST)—8 PM to 1 AM.
WBBR, New York City, 272.6 (ESTDS)—8 PM to 9.
WBOQ, Richmond Hill, N. Y., 236 (ESTDS)—3:30 PM to 6:30.
WBZ, Springfield, Mass., 333.1 (ESTDS)—11 AM to 12:30 PM; 7 to 9.
WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—10:45 AM to 12M; 3 PM to 4; 6:30 to 7:30.
WCBD, Zion, Ill., 344.6 (CST)—8 PM to 10.
WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12:30 PM; 2:30 to 5; 6 to 10.
WEAF, New York City 492 (ESTDS)—6:45 AM to 7:45; 4 PM to 5; 6 to 12.
WEEI, Boston, Mass., 476 (ESTDS)—6:45 AM to 7 AM.
WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 3:30 to 4:10; 7 to 8.
WEMC, Berrien Springs, Mich., 286 (CST)—11 AM to 12:30 PM; 8:15 to 11.
WFAA, Dallas, Texas, 475.9 (CST)—12:30 PM to 1; 6 to 7; 8:30 to 9:30; 11 to 12:30 AM.
WFBH, New York City, 272.6 (ESTDS)—2 PM to 7:30; 11:30 to 12:30 AM.
WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 PM to 3; 6 to 12.
WGCP, New York City, 252 (ESTDS)—2:30 PM to 5:15.
WGN, Chicago, Ill., 370 (CST)—9:31 AM to 2:30 PM; 3 to 5:57; 6 to 11:30.
WGR, Buffalo, N. Y., 319 (ESTDS)—8:45 to 10:15 PM, U. S. Army Band.
WGY, Schenectady, N. Y., 379.5 (EST)—7:30 PM to 10.
WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 12:30 PM; 4 to 5; 6 to 7:30.
WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
WHN, New York City, 360 (ESTDS)—2:15 PM to 5; 7:30 to 10.
WHO, Des Moines, Iowa, 526 (CST)—11 AM to 12:30 PM; 4 to 5:30; 7:30 to 8:30.
WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 AM.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—7 AM to 8; 10:20 to 11; 1 PM to 2; 3 to 4; 6 to 11:30.
WJY, New York City, 405 (ESTDS)—2:30 PM to 5; 8 to 10:30.
WJZ, New York City, 455 (ESTDS)—9 AM to 12:30 PM; 2:30 to 4; 7 to 10.
WKRC, Cincinnati, O., 326 (EST)—10 to 12 M.
WLWC, Cincinnati, O., 422.3 (EST)—9:30 AM to 12:30 PM; 7:30 to 10.
WMAK, Lockport, N. Y., 265.5 (EST)—10:25 AM to 12:30 PM.
WMCA, New York City, 341 (ESTDS)—3 to 5 PM; 6:30 to 2.
WNYC, New York City, 526 (ESTDS)—1 to 3 PM; 7 to 11.
WOAW, Omaha, Neb., 526 (CST)—10 AM to 1; 2:15 to 4; 9 to 11.
WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 5:45 to 7:10; 9 to 12.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—11 AM to 1 PM; 4:40 to 5; 10:55 to 11:02.
WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 4; 6:15 to 7:30; 8 to 11.
WQJ, Chicago, Ill., 448 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 3 AM.
WPG, Atlantic City, N. J., 299.8 (CST)—7 PM to 12.
WRC, Washington, D. C., 469 (EST)—4:30 to 5:30 PM; 6:45 to 12.
WREO, Lansing, Michigan, 285.5 (EST)—10 PM to 12.
WRNY, New York City, 258.5 (ESTDS)—11:59 to 2 PM; 7:59 to 9:30; 12 M to 1 AM.
WSB, Atlanta, Ga., 428.3 (CST)—12 M to 1 PM; 3 to 4; 5 to 6; 10:45 to 12.
WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10; 11:55 to 1:30 PM; 3 to 4.
KDKA, Pittsburgh, Pa., 309 (EST)—10 AM to 12:30 PM; 1:30 to 6:30; 8:45 to 10.
KFI, Los Angeles, Cal., 467 (PST)—5 PM to 11.
KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 9:30 to 12:30.
KF..NF, Shenandoah, Iowa, 268 (CST)—12:15 PM to 1:15; 3 to 4; 6:30 to 10:30.
KFOA, Seattle, Wash., 455 (PST)—Silent.
KGO, Oakland, Cal., 361.2 (PST)—11 AM to 12:30 PM; 3:30 to 5:45; 7:30 to 9.
KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30 PM; 6 to 7; 10 to 11.
KHJ, Los Angeles, Cal., 405.2 (ESTDS)—7 AM to 7:30; 10 to 1:30 PM; 2:30 to 3:30; 5:30 to 2 AM.
KJR, Seattle, Wash., 484.4 (PST)—1 PM to 2:45; 6 to 6:30; 8:30 to 10.
KNX, Hollywood, Cal., 337 (PST)—1 PM to 2; 6:30 to 2 AM.
KOA, Denver, Colo., 322.4 (MST)—11:30 AM to 1 PM; 7 to 10.
KOIL, Council Bluffs, Iowa, 278 (CST)—7:30 PM to 9.
KPO, San Francisco, Cal., 429 (PST)—8 AM to 12M; 2 PM to 3; 6 to 10.
KSD, St. Louis, Mo., 545.1 (CST)—7 PM to 8:30.
KTHS, Hot Springs, Ark., 374.8 (CST)—12:30 PM to 1; 8 30 to 10:30.
KYW, Chicago, Ill., 536 (CSTDS)—11 AM to 12:3[illegible] PM; 4 to 5; 7 to 8.
CKAC, Montreal, Canada, 411 (EST)—4:30 PM to 5:30.
CNRO, Ottawa, Ontario, Canada, 435 (EST)—7:3[illegible] PM to 10.
PWX, Havana, Cuba, 400 (EST)—8:30 PM to 11:3[illegible]

SUNDAY, AUGUST 23

WBBM, Chicago, Ill., 226 (CST)—4 PM to 6; 8 to 10.
WBBR, New York City, 272.6 (ESTDS)—10 AM to 12 M; 9 PM to 11.
WCCO, St. Paul and Minneapolis, Minn., 416 (CST)—11 AM to 12:30 PM; 4:10 to 5:10; 7:20 to 10.
WDAF, Kansas City, Kansas, 365.6 (CST)—4 PM to 5:30.
WEAF, New York City, 492 (ESTDS)—3 PM to 5; 7:20 to 10:15.
WEAR, Cleveland, O., 390 (EST)—3:30 PM to 5; 7 to 8; 9 to 10.
WFBH, New York City, 272.6 (ESTDS)—5 PM to 7.
WGBS, New York City, 316 (ESTDS)—3:30 PM to 4:30; 9:30 to 10:30.
WGCP, New York City, 252 (ESTDS)—8 PM to 11.
WGN, Chicago, Ill., 370 (CST)—11 AM to 12:45 PM; 2:30 to 5; 9 to 10.
WGR, Buffalo, N. Y., 379.5 (EST)—9:30 AM; 7:15 to 8 PM.
WGY, Schenectady, N. Y., 379.5 (EST)—9:30 AM to 12:30 PM; 2:35 to 3:45; 6:30 to 10:30.
WHAD, Milwaukee, Wis., 275 (CST)—3:15 PM to 4:15.
WHN, New York City, 360 (ESTDS)—1 PM to 1:30; 3 to 6; 10 to 12.
WHT, Chicago, Ill., 238 (CSTDS)—9:30 AM to 1:15 PM; 5 to 9.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—10:45 AM to 12:30 PM; 4:15 to 5:30.
WKRC, Cincinnati, O., 326 (EST)—6:45 PM to 11.
WMCA, New York City, 341 (ESTDS)—11 AM to 12:15 PM; 7 to 7:30.
WNYC, New York City, 526 (ESTDS)—9 PM to 11.
WOCL, Jamestown, N. Y., 275.1 (EST)—9 PM to 11.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—10:45 AM to 12:30 PM; 2:30 to 4.
WPG, Atlantic City, N. J., 209.8 (ESTDS)—3:15 PM to 5; 9 to 11.
WQJ, Chicago, Ill., 448 (CST)—10:30 AM to 12:30 PM; 3 PM to 4; 8 to 10.
WREO, Lansing, Michigan, 285.5 (EST)—10 AM to 11.
WRNY, New York City, 258.5 (ESTDS)—3 PM to 5; 7:59 to 10.
WSBF, St. Louis, Mo., 273 (CST)—9 to 11 PM.
WWJ, Detroit, Mich., 352.7 (EST)—11 AM to 12:30 PM; 2 to 4; 6:20 to 9.
KDKA, Pittsburgh, Pa., 309 (EST)—9:45 AM to 10:30; 11:55 to 12 M; 2:30 PM to 5:30; 7 to 11.
KFNF, Shenandoah, Iowa, 266 (CST)—10:45 AM to 12:30 PM; 2:30 to 4:30; 6:30 to 10.
KOA, Denver, Col., 322.4 (MST)—10:55 AM to 1 PM; 4 PM to 5:30; 7:45 to 10.
KOIL, Council Bluffs, Iowa, 278 (CST)—11 AM to 12:30 PM; 7:30 to 9.
KGW, Portland, Oregon, 491.5 (PST)—10:30 AM to 12:30 PM; 6 to 9.
KHJ, Los Angeles, Cal., 405.2 (ESTDS)—10 AM to 12:30 PM; 6 to 9.
KJR, Seattle, Wash., 384.4 (PST)—11 AM to 12:30 PM; 3 to 4:30; 7:15 to 9.
KTHS, Hot Springs, Ark., 374.8 (CST)—11 AM to 12:30 PM; 2:30 to 3:40; 8:40 to 11.

MONDAY, AUGUST 24

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12 M; 7 PM to 11.

WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 M to 1:05 PM; 2 to 2 AM.
WAMB, Minneapolis, Minn., 243.8 (CST)—10 PM to 12.
WBBM, Chicago, Ill., 226 (CST)—6 PM to 7.
WBBR, New York City, 272.6 (ESTDS)—8 PM to 9.
WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM 11:30.
WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—12:30 PM to 1:30; 4:30 to 5:30; 6:30 to 12.
WCBD, Zion, Ill., 344.6 (CST)—8 PM to 10.
WCCO, St. Paul and Minneapolis, Minn., 416 (CST)—9:30 AM to 12 M; 1:30 PM to 6:15.
WDAF, Kansas City, Kansas, 365.6 (CST)—3:30 PM to 7; 8 to 10; 11:45 to 1 AM.
WEAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 4 PM to 5; 6 to 11:30.
WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 3:30 to 4:10; 7 to 8.
WEEI, Boston, Mass., 476 (ESTDS)—6:45 AM to 8; 3 PM to 4; 5:30 to 10.
WEMC, Berrien Springs, Mich., 286 (CST)—8:15 PM to 11.
WFAA, Dallas, Texas, 475.9 (EST)—10:30 AM to 11:30; 12:30 PM to 1; 2:30 to 6; 6:45 to 7; 8:30 to 9:30.
WFBH, New York City, 272.6 (ESTDS)—2 PM to 6:30.
WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 to 3:10; 6 to 7:30.
WGES, Chicago, Ill., 250 (CSTDS)—5 PM to 8.
WGCP, New York City, 252 (ESTDS)—2:30 PM to 5:18; 8 to 10:45.
WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 3:30 to 5:57.
R, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:30 PM; 2:30 to 4:30; 7:30 to 11.
VGY, Schenectady, N. Y., 379.5 (EST)—1 PM to 2; 5:30 to 8:30.
AD, Milwaukee, Wis., 275 (CST)—11 AM to 15 PM; 4 to 5; 6 to 7:30; 8 to 10.
AS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 30 to 9.
N, New York City, 360 (ESTDS)—2:15 PM 5; 6:30 to 12.
O, Des Moines, Iowa, 526 (CST)—12:15 PM to 30; 7:30 to 9; 11:15 to 12.
IT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30, 10:30 to 1 AM.
IP, Philadelphia, Pa., 508.2 (ESTDS)—7 AM to ; 1 PM to 2; 3 to 8.
WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 5:30; 6 to 6:30; 7 to 11.
WKRC, Cincinnati, O., 326 (EST)—8 PM to 10.
WLIT, Philadelphia, Pa., 395 (EST)—12:02 PM to 1; 2 to 3; 4:30 to 6; 7:30 to 11:30.
WLW, Cincinnati, O., 422.3 (EST)—10:45 AM to 12:15 PM; 1:30 to 2:30; 3 to 5; 6 to 10.
WMAK, Lockport, N. Y., 265.5 (EST)—8 PM to 12.
WMCA, New York City, 341 (ESTDS)—11 AM to 12 M; 6:30 PM to 12.
WNYC, New York City, 526 (ESTDS)—3:15 PM to 4:15; 6:20 to 11.
WOAW, Omaha, Neb., 526 (CST)—12:30 PM to 1:30; 5:45 to 10:30.
WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 3 to 3:30; 5:45 to 6.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—11 AM to 1 PM; 4:40 to 6; 7:30 to 11.
WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 to 4; 6:15 to 11:30.
WPAK, Fargo, N. D., 283 (CST)—7:30 PM to 9.
WPG, Atlantic City, N. J., 299.8 (ESTDS)—7 PM to 11.
WOJ, Chicago, Ill., 488 (CST)—11 AM to 12 M; 3 PM to 4.
WRC, Washington, D. C., 469 (EST)—1 PM to 2; 4 to 6.
WREO, Lansing, Michigan, 285.5 (EST)—10 PM to 11.
WRNY, New York City, 258.5 (ESTDS)—11:59 AM to 2 PM; 7:30 to 11.
WSB, Atlanta, Ga., 428.3 (CST)—12 M to 1 PM; 2:30 to 3:30; 5 to 6; 8 to 9; 10:45 to 12.
WSBF, St. Louis, Mo., 273 (CST)—12 M to 1 PM; 3 to 4; 7:30 to 10:30; 12 to 1 AM.
WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30 PM; 3 to 4; 6 to 10.
KDKA, Pittsburgh, Pa., 309 (EST)—6 AM to 7; 9:45 to 12:15 PM; 2:30 to 3:20; 5:30 to 10.
KFAE, State College of Wash., 348.6 (PST)—7:30 PM to 9.
KFI, Los Angeles, Cal., 467 (PST)—5 PM to 11.
KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 5:15 to 6:15; 9:30 to 12:30.
KFNF, Shenandoah, Iowa, 266 (CST)—12:15 PM to 1:15; 3 to 4; 6:30 to 10.
KFOA, Seattle, Wash., 455 (PST)—12:45 PM to 1:30; 4 to 5:15; 6 to 10.
KGO, Oakland, Cal., 361.2 (PST)—9 AM to 10:30; 11:30 AM to 1 PM; 1:30 to 6; 6:45 to 7; 8 to 1 AM.
KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30; 5 to 8.
KHJ, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 1:30 PM; 5:30 to 10.
KJR, Seattle, Wash., 384.4 (PST)—1 PM to 2:45; 6 to :30; 7 to 11.
KNX, Hollywood, Cal., 337 (PST)—12 M to 1 PM; 4 to 5; 6:30 to 12.
KOB, State College of New Mexico, 348.6 (MST)—11:55 AM to 12:30 PM; 7:30 to 8:30; 9:55 to 10:10.
KOIL, Council Bluffs, Iowa, 278 (CST)—7:30 PM to 10.
KPO, San Francisco, Cal., 429 (PST)—10:30 AM to 12 M; 1 PM to 2; 2:30 to 3:30; 4:30 to 10.
KSD, St. Louis, Mo., 545.1 (CST)—7:30 PM to 10.
KTHS, Hot Springs, Ark., 374.8 (CST)—12:30 PM to 1; 8:30 to 10.

Features of the Week

FRIDAY, AUGUST 21

WWJ, Detroit, Mich., 352.7 (EST)—8 PM to 9 PM, Goldman's Band concert from N. Y.
WEAF, New York City, 492 (ESTDS)—9:15 to 10:15, Goldman Band Concert.
WHT, Chicago, Ill., 238 (CSTDS)—8:45 to 10:15 PM, Elmer Kaiser's Review Park Ballroom orch.
WGBS, New York City, 315.6 (ESTDS)—7 PM to 7:10, Herman Bernard, "Your Radio Problem."
WIP, Philadelphia, Pa., 508.2 (ESTDS)—3 PM to 4. "Song of the Surf,"—surf sounds of Atlantic Ocean, picked up by special microphone, underneath the breakers of Steel Pier at Atlantic City, N. J.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—7:30 PM to 8:30, dinner music by the Hotel Adelphia Roof Garden orch.

SATURDAY, AUGUST 22

WEAF, New York City, 492 (ESTDS)—11 PM to 12 PM. Vincent Lopez orch.
KGW, Portland, Ore., 491.5 (PST)—10 PM to 12 PM. dance music from Portland Hotel by Jackie Souders' orch.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—3 PM to 4. "Song of the Surf,"—surf sounds of Atlantic Ocean, picked up by special microphone, underneath the breakers of Steel Pier at Atlantic City, N. J.

SUNDAY, AUGUST 23

WEAF, New York City, 492 (ESTDS)—9:15 PM to 10:15, Goldman Band Concert.
WBBM, Chicago, Ill., 226 (CST)—12 PM to 2 AM—Sunday, Midnight Nut Club Feature, Sanovar Orch.

MONDAY, AUGUST 24

WWJ, Detroit, Mich., 352. (EST)—8 PM to 9, Goldman Band Concert from N. Y.
WEAF, New York City, 492 (ESTDS)—9:15 PM to 10:15, Goldman Band concert; 11 to 12, Jack Alhen and his Hotel Bossert orchestra.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—3 PM to 4. "Song of the Surf,"—surf sounds of Atlantic Ocean, picked up by special microphone, underneath the breakers of Steel Pier at Atlantic City, N. J.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—7:30 PM to 8:30, dinner music by the Hotel Adelphia Roof Garden orch.

TUESDAY, AUGUST 25

WIP, Philadelphia, Pa., 508.2 (ESTDS)—3 PM to 4. "Song of the Surf,"—surf sounds of Atlantic Ocean, picked up by special microphone, underneath the breakers of Steel Pier at Atlantic City, N. J.
WEAF, New York City, 492 (ESTDS)—9 PM to 10. "Everday Hour,"; 11 to 12 PM Vincent Lopez Hotel Pennsylvania orchestra.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—7:30 PM to 8:30, dinner music by the Hotel Adelphia Roof Garden orch.
WEEI, Boston, Mass., 476 (ESTDS)—10 PM to 11—From New York, WEAF Grand Opera Company.

WEDNESDAY, AUGUST 26

WHO, Des Moines, Ia., 526 (CST)—10 to 11:30 PM—The Barret-Philbreck Orch.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—3 PM to 4. "Song of the Surf,"—surf sounds of Atlantic Ocean, picked up by special microphone, underneath the breakers of Steel Pier at Atlantic City, N. J.
WEEI, Boston, Mass., 476 (ESTDS)—8:30 PM to 9—"Earl Nelson and His Uke," courtesy Radio Equipment Company.

THURSDAY, AUGUST 27

WEAF, New York City, 492 (ESTDS)—11 PM to 12 PM. Vincent Lopez Hotel Pennsylvania orch.
WGR, Buffalo, N. Y., 319 (ESTDS)—8 to 11 PM—Joint broadcasting with WEAF, N. Y. City, Atwater Kent Radio Artists, and Goodrich Silvertown Chord Orch.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—3 PM to 4. "Song of the Surf,"—surf sounds of Atlantic Ocean, picked up by special microphone, underneath the breakers of Steel Pier at Atlantic City, N. J.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—7:30 PM to 8:30, dinner music by the Hotel Adelphia Roof Garden orch.

KYW, Chicago, Ill., 536 (CSTDS)—6:30 AM to 7:30; 10:55 to 1 PM; 2:15 to 3:30; 6:02 to 7.

TUESDAY, AUGUST 25

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12 M; 7 PM to 11.
WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 PM to 1:05 AM.
WAMB, Minneapolis, Minn., 243.8 (CST)—12 M to 1 PM; 10 to 12.
WBBM, Chicago, Ill., 226 (CST)—8 PM to 12.
WBOQ, Richmond Hill, N. Y., 236 (ESTDS)—3:30 PM to 6:30.
WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM to 11.
WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—12:30 PM to 1:30; 4:30 to 5:30; 6:30 to 11.
WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12 M; 1:30 PM to 4; 5:30 to 10.
WDAF, Kansas City, Kansas, 365.6 (CST)—3:30 PM to 7; 11:45 to 1 AM.
WEAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 11 to 12 M; 4 PM to 5; 6 to 12.
WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 7 to 10; 10 to 11.
WEEI, Boston, Mass., 476 (ESTDS)—6:45 AM to 8; 1 PM to 2; 6:30 to 10.
WFAA, Dallas, Texas, 457.9 (CST)—10:30 AM to 11:30; 12:30 PM to 1; 2:30 to 6; 6:45 to 7; 8:30 to 9:30; 11 to 12.
WFBH, New York City, 272.6 (ESTDS)—2 PM to 6:30; 11:30 to 12:30 AM.
WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 PM to 3; 6 to 11:30.
WGCP, New York City, 252 (ESTDS)—2:30 PM to 5:15.
WGES, Chicago, Ill., 250 (CSTDS)—5 PM to 8; 10:30 to 1 AM.
WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 5:30 to 11:30.
WGR, Buffalo, N. Y., 319 (ESTDS)—11 AM to 12:45 PM; 7:30 to 11.
WGY, Schenectady, N. Y., 379.5 (EST)—11 PM to 2:30; 5:30 to 7:30; 9:15 to 11:30.
WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 12:15 PM; 4 to 5; 6 to 7:30.
WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
WHN, New York City, 360 (ESTDS)—12:30 PM to 1; 2:15 to 3:15; 4 to 5:30; 7:30 to 10:45; 11:30 to 12:30 AM.
WHO, Des Moines, Iowa, 526 (CST)—12:15 PM to 1:30; 7:30 to 9; 11 to 12.
WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 AM.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—7 AM to 8; 1 PM to 2; 3 to 4:30; 6 to 11.
WIY, New York City, 405 (ESTDS)—7:30 PM to 1:30.
WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 6; 7 to 11.
WKRC, Cincinnati, O., 326 (EST)—6 PM to 12.
WLIT, Philadelphia, Pa., 395 (EST)—11 AM to 12:30 PM; 2 to 3; 4:30 to 7.
WLW, Cincinnati, O., 422.3 (EST)—10:45 AM to 1 PM; 1:30 to 2:30; 3 to 5; 6 to 11.
WMCA, New York City, 341 (ESTDS)—11 AM to 12 M; 6:30 PM to 12.
WNYC, New York City, 526 (ESTDS)—3:45 PM to 5; 6:50 to 11.
WOAW, Omaha, Neb., 526 (CST)—12:30 PM to 1:30; 5:45 to 11.
WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 3 to 3:30; 5:45 to 10.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—11 AM to 1 PM; 4:40 to 5; 10:55 to 11:02.
WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 4; 6:15 to 7:30.
WPG, Atlantic City, N. J., 299.8 (ESTDS)—7 PM to 11.
WQJ, Chicago, Ill., 448 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 2 AM.
WRC, Washington, D. C., 469 (EST)—4:30 PM to 5:30; 6:45 to 11.
WREO, Lansing, Michigan, 285.5 (EST)—8:15 PM to 11.
WRNY, New York City, 258.5 (ESTDS)—11:59 AM to 2 PM; 4:30 to 5; 8 to 11.
WSB, Atlanta, Ga., 428.3 (CST)—12 M to 1 PM; 2:30 to 3:30; 5 to 6; 8 to 9; 10:45 to 12.
WSBF, St. Louis, Mo., 273 (CST)—12 M to 1 PM; 3 to 4; 8 to 10; 11:30 to 1 AM.
WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30 PM; 3 to 4; 6 to 10.
KDKA, Pittsburgh, Pa., 309 (EST)—9:45 PM to 12 M; 1:30 PM to 3:20; 5:30 to 10:45.
KFI, Los Angeles, Cal., 467 (PST)—5 PM to 11.
KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 5:15 to 6:15; 9:30 to 12:30.
KFMQ, Fayettville, Ark., 299.8 (CST)—9 PM to 10.
KFOA, Seattle, Wash., 455 (PST)—12:30 PM to 1:30; 4 to 5:15; 6 to 11.
KGO, Oakland, Cal., 361.2 (PST)—11:30 AM to 1 PM; 1:30 to 3; 4 to 6:45; 8 to 1 AM.
KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30 PM; 5 to 11.
KHJ, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 3:20 PM; 5:30 to 11.
KJR, Seattle, Wash., 384.4 (PST)—9 AM to 6:30 PM; 8:30 to 1 AM.
KNX, Hollywood, Cal., 337 (PST)—9 AM to 10; 1 PM to 2; 4 to 5; 6:30 to 12.
KOIL, Council Bluffs, Iowa, 278 (CST)—7:30 PM to 9; 11 to 12 M.
KPO, San Francisco, Cal., 429 (PST)—7 AM to 7:45; 10 to 12 M; 1 PM to 2; 3:30 to 11.
KSD, St. Louis, Mo., 541.1 (CST)—6 PM to 7.
KTHS, Hot Springs, Ark., 374.8 (CST)—12:30 PM to 1; 8:30 to 10:30.
KYW, Chicago, Ill., 536 (CSTDS)—6:30 AM to 7:30; 10:30 to 1 PM; 2:15 to 4; 6:02 to 11:30.
CNRA, Moncton, New Brunswick, Canada, 313 (EST)—9:30 PM to 11.
CNRR, Regina, Saskatchewan, Canada—8 PM to 11.

(Continued on page 30)

A THOUGHT FOR THE WEEK

"When I sit down at our set," says a radio neighbor, "I endeavor sometimes to get distance, but what I really want is good reception and entertainment, whether it comes in from near or far. When my boy sits down he tries to get distance only—no matter how bad it may be. I call his attempts "chowder parties."

RADIO WORLD

Radio World's Slogan: "A radio set for every home."

TELEPHONES: LACKAWANNA 6976 and 2063
PUBLISHED EVERY WEDNESDAY
(Dated Saturday of same week)
FROM PUBLICATION OFFICE
HENNESSY RADIO PUBLICATIONS CORPORATION
ROLAND BURKE HENNESSY, President
M. B. HENNESSY, Vice-President
FRED S. CLARK, Secretary and Manager
1493 BROADWAY, NEW YORK, N. Y.
(Putnam Bldg., Times Square and 43rd Street)
European Representatives: The International News Co., Breams Bldgs., Chancery Lane, London, Eng. Paris, France, Brentano's, 38 Avenue de l'Opera.
San Francisco, Loyd B. Chappell, 656 O'Farrell St.

EDITOR, Roland Burke Hennessy
MANAGING EDITOR, Herman Bernard

SUBSCRIPTION RATES

Fifteen cents a copy. $6.00 a year. $3.00 for six months. $1.50 for three months. Add $1.00 a year extra for foreign postage. Canada, 50 cents.

Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order is automatic acknowledgment of their subscription order. Changes of address should be received at this office two weeks before date of publication. Always give old address also. State whether subscription is new or a renewal.

ADVERTISING RATES

General Advertising

1 Page, 7¼"x11"	462 lines	$300.00
½ Page, 7¼"x5½"	231 lines	150.00
¼ Page, 4½" D. C.	115 lines	75.00
1 Column, 2¼"x11"	154 lines	100.00
1 Inch		10.00
Per Agate line		.75

Times Discount

52 consecutive issues	20%
26 times consecutively or E. O. W. one year	15%
4 consecutive issues	10%

WEEKLY, dated each Saturday, published Wednesday. Advertising forms close Tuesday, eleven days in advance of date of issue.

CLASSIFIED ADVERTISEMENTS

Ten cents per word. Minimum, 10 words. Cash with order. Business Opportunities, 50 cents a line; minimum, $1.00.

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

AUGUST 22, 1925

Indirect Advertising Solves the Pay Problem and Showers Splendid Benefits on Radio

There is no problem any more as to who shall pay for broadcasting. Six months ago debate was raging through the ranks of radio, with many bitter voices raised in protest against the so-called sullying of the microphone. Today little is heard on the subject, since, as if by chemical reaction, it has undergone the process of resolution. Advertising in one form or another pays for broadcasting and should continue to do so, unless the American public is ready to welcome a tax on radio receivers, or the trade is eager for a sales tax, neither alternative having stirred up any enthusiasm yet.

The great fear felt when the debate was hot was that the public would be degraded by being suffered to listen to broadcasting of an advertising nature. In point of fact this has not happened, but advertising broadcasts have contributed substantially to the steady improvement of the quality of programs.

The advertising may be grouped in two broad classes:

First, where a station is operated for the publicity and goodwill that it brings to the owner, such as a radio corporation, a department store, a city or a church.

Second, where some manufacturer or vendor buys time on the air and presents a program calculated to delight the audience, the entertainers being identified somehow by the trade name of the station's client.

Some stations, while deriving the inherent advantages of ownership, do not sell time on the air; they are nevertheless benefiting from the advertising such operation insures. Indeed, were it not for this incentive there would be no stations except those conducted for experimental work of a technical radio nature.

It is well within the province of such stations to adhere to that policy, but it should not be regarded as any extremely sanctimonious form of ethics. It represents nothing more than an honest point of view, for the purchasers of time on the air have done more for the advancement of radio, while still studying the commercial advantages of their venture, than have the stations conducted exclusively for ownership publicity benefits.

Indeed, it would be a sorry state of affairs if direct advertising were countenanced, whereby some one would enumerate articles for sale and give the price asked. The public, aided by the Secretary of Commerce, may be relied on to rise in mighty protest if ever any such monstrosity is attempted. But indirect advertising is of a different nature entirely. An organization that, frankly, is seeking the commercial advancement of its own interests, pays for the privilege of broadcasting. It renders a distinct service in nearly all cases, either of an entertaining, educational or physical nature. It represents a substantial institution that is staking prestige, reputation and perhaps even its existence on thus pleasing the public. Therefore, every inducement exists to have the program as good as possible. Talent is hired at good rates, paid by the broadcaster. Compare the quality of such programs with the feverish efforts of many nondescript "artists" who clogged the air only a few brief months ago. Fortunately the continuous repetition of "amateur night" on the air, due to the absence of any economic solution of the problem of meeting the expense of hiring real artists, is largely a thing of the past.

Quite a few volunteer performers on the radio are decidedly talented. The practice of holding "auditions," where aspirants are given a trial, deserves every encouragement and should be continued even on a greater scale. But every aspect of the situation, even as regards the volunteers, presupposes the ultimate payment of the artist.

Is there any prospect of such artists rising to the heights of paid radio entertainers? Very little indeed. There is no fund from which to pay them.

It is hardly practical to expect continuous service from anybody for nothing. The stations admittedly cannot afford the terrific expense. Where an installation costs, say, 50,000, with an annual upkeep charge equal to the cost of installation, the stations are saddled with a financial burden that is great enough. Some of them, while not selling time on the air, encourage orchestras, singers, etc., to perform for the publicity benefit accruing, and some of those stations put on very good programs. Yet is there not the same element of indirect advertising present? The inducement to the performers is that they will gain public favor and artistic preferment thereby, all of which bears heavily on commercial aspects, nevertheless. The hotel owner whose orchestra broadcasts, while he may not pay the station for the privilege, is paying the musicians and thinking all the time of the additional patrons who will be attracted to his establishment. There is no difference between the hotel owner who does not pay that station and the radio battery company that does pay another station. The fact is that the broadcast clients who pay simply gain a wider audience, as where several stations are interconnected and all transmit the same program.

In surveying the programs one finds that many of the best ones frankly have advertising objectives. One of the most popular weekly events has been the broadcasting by the Capitol Theatre artists each Sunday night, from WEAF and a string of stations, with Roxy as the announcer. Roxy, by the way, won Radio World's 1925 contest to determine the most popular person appearing before the microphone. The theatre benefited greatly from the broadcasts, as attendance records show. Likewise the stations enjoyed the keen advantage from having such splendid talent before the microphone. Roxy has said that there was no monetary consideration on either side.

In somewhat the same class is the broadcasting by Vincent Lopez and his orchestra from the Hotel Pennsylvania, New York City.

Going into the field of actual payment for the privilege of broadcasting, how can one reconcile any hostility toward this system with the great popularity enjoyed by the Happiness Boys, the Gold Dust Twins, the A. and P. Gypsy String Ensemble, Wendell Hall, the Eagle Neutrodyne Trio? Who does not enjoy the Eveready Hour, conducted under the auspices of the National Carbon Company; the Silvertown Cord Orchestra, the Atwater-Kent Hour? Reputations have an uncanny way of attaching themselves to those who deserve them, despite contradictory remarks by the disgruntled.

If the radio audience has been stultified by the mere mention of the names of the concerns that pay for the broadcasting privilege, there has been no evidence of it.

Avoid Trees for Aerial Support if Light Wires Run Through Foliage

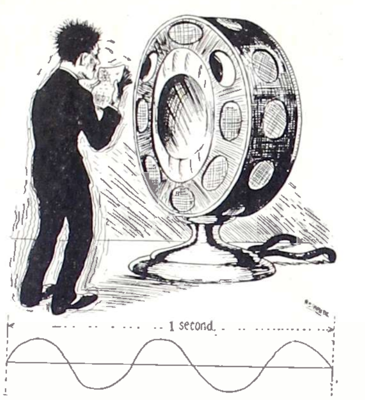
Indiscriminate use of trees as substitutes for radio aerials, advocated by some operators, is unsafe in places where electric light wires are strung through foliage, says W. H. Ude, public relations director of the Washington Water Power Company of Spokane.

"Radio users," he added, "should make sure that there are no such wires passing through or near the trees which they intend to use as aerials, for if the wires do pass through or near the trees and the trees are used as aerials there is a danger of the high voltage completing a circuit through the aerial lead-in wire, bringing the current directly to the radio set, with the possibility of injuring the set and the operator."

IN POLAND IT'S LIKE THIS

The operation and maintaining of broadcasting in Poland requires special concessions. The number of stations, their power and effective area must be determined in the concessions. Persons holding broadcast concessions are permitted to charge broadcast subscription fees, determined by a tariff.

How It Feels To Broadcast



"THE FIRST TIME you broadcast you feel as small as a neutralizing condenser, while the microphone looms as large as a super-power station. . . . Your knees go back on you. . . . They quake. . . . The frequency is as great as 2½ cycles per second."

By Tim Turkey

WHENEVER anybody tries anything before the public for the first time he naturally feels nervous. A first attempt to act on the stage, with an audience staring you in the face and daring you to make them laugh or cry, is one example. But appearing before the microphone is still worse. The fact that your audience is scattered all over the country and a hundred times larger than that of a theatre audience, and yet doing nothing that presents itself to any of your five senses, makes the ordeal all the worse. It is like putting you in solitary confinement. You do feel so "all alone" when you broadcast for the first time. Even the announcer walks out on you, maybe to puff a forbidden cigarette in the control room.

TIM TURKEY

Victim of Imagination

Your imagination starts to work. It always does when you are confronted with a condition you know exists but which you can not hear, see, feel, taste or touch. The audience seems bound to be critical. Half of them may tune you out at once, which is far worse than having half a theatre audience walk out on you, because being deserted by half a thousand isn't as bad as being tuned out by half a hundred thousand. And then, too, you can't tell ust what *is* going on. That makes you suppose that tuning out has become the popular pastime of the moment.

If you are speaking, words have a disloyal habit of failing you at the very moment you need their help most. If you are reading something, the light in the studio is very bad.

And in your moments of misery you have no one to lend you a helping hand. You feel as small as a neutralizing condenser, while the microphone looms as large as a super-power station. The microphone is tantalizing. It moves quickly toward you and then away from you, with an oscillatory motion, although microphones are supposed to be non-oscillatory. Maybe some one looking through the window from the control room suggests to the operator there that it would be a good thing for you to sit down and stop rocking the boat. But you started off with the assumption that you could take your medicine standing. You can't. If you had only sat down. But even then the Windsor chair would become a rocking chair. There is no stopping that nervous motion when you're making your radio debut. I know.

Treacherous Knees

Your knees go back on you. They stood up in proper style even when you went through the ordeal at the altar and the best man fished for the ring that he had kept under his pillow the night before. In the final heat of the quarter-mile race, that memorable event in which you came out victorious some years ago, those knees were good friends and loyal aids. But not so now. There is much of mathematics in that knee motion. You see that great mass of humanity, as if in congregation, with doubting or frowning faces upturned, and much razzing indulged in by the best sports of the nation. Your imagination brings all your captious listeners into the studio to plague you and to supply the voltage for rocking those nervous knees. The frequency is as great as 2½ cycles per second. There is a positive and a negative side to the motion, just to make matters completely inimical to your devout craving for ease of mind. But the huge microphone and the cohorts of critics will not permit you to enjoy poise. You just long to be comfortable, but there is a law against it. Every microphonic debut by every rule of life and action, demands that your knees quake and that your voice falter.

What will the wife think as she listens in? Will she have still another subject with which to plague you in her off moments? And the boys! If any of the poker fraternity are listening, what will be their caustic comment on Saturday night? You wonder when, if ever, the present misery will end, and how long the aftermath must continue.

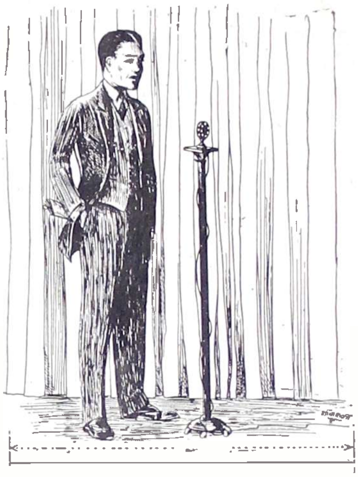
And then you imagine the mail man toting huge sacks of protests to the station. Naturally, the studio director will desire to determine for himself the fan reaction to your broadcast. And what a sour face he will make, what a sassy comment he will pass, when he weighs the results as told by those fateful ballots of letters.

Truant Motion

All this makes your knees work still faster. The energy necessary to actuate them is taken from the same source that supplies your tongue, evidently, for the faster the knees vibrate, the slower do the words come to you, and the less energy you have for meeting the demands of the moment.

Then, when the debut is finished, and the announcer returns to the studio which was your hateful prison for ten minutes of extreme torture, you at least feel something sympathetic even in that perfunctory companionship. He says: "Thank you." Just that. But it makes you feel like living, even that stereotyped expression of courtesy. There may be no thanks in his heart, but the words are soothing.

The announcer reinforms the fans of your identity and the subject of your talk, song or other music. Then he announces the jazz orchestra will be on next. On your honor, you never even noticed those musicians piling into the studio during your talk, carrying their instruments with them.



"FINALLY those knees keep rigid. You have confidence. The microphone's swelling has completely disappeared."

Your imagination may have been doing you an injustice. The audience probably was sympathetic. Probably not a large percentage of listeners tuned you out. Their patience may have been prompted by the knowledge that a jazz orchestra was to follow, but nevertheless the fact, whatever the motive is reassuring.

Voice Not Natural

When you get home the wife says your voice didn't sound so natural as it does when you open the Monday morning mail at home and peruse the bills she has caused to be bequeathed to you. But she could understand every word you said. That is consoling. The poker gang makes acknowledgment of the fact they didn't happen to be listening to that station that night. In fact, outside of your immediate family, or that circles of friends and relatives you specially notified to listen, the world evidently ignored your important debut. So much more thanks you owe an indulgent world. But next time, or the time after that, anybody may listen who cares to—if there is to be a next time. All depends on the studio director or the program director, or whoever the principal person is at the station.

Still on the List

Then, two or three days before your scheduled next appearance, you get a form letter from the station, announcing that your audience will be waiting for you promptly at 7 p. m., and asking you please to fill out the blank and return. This blank has ruled lines after certain questions which pertain to the subject of your next talk, or the songs you will render, and the kind of introduction you would prefer that the announcer make.

When you get over the excitement of not having been canned for your first effort, you come to realize that, after all, you are not being paid for the work, at least not in money. That is the first wholesome sign. It begins to put you in the professional class, because you assume that your services are worth something. That is the first rung in the ladder that you must climb. The top rung represents complete confidence.

On your second appearance at the studio you fare somewhat better. Your sight is restored to you, whereas the first

(*Concluded on page 24*)

THE RADIO TRADE

5,000,000 Sets in U. S. by End of 1925, Says Report, Citing the 100,000 in Use in 1922

Manufacture and sale of radio receivers has established a record for rapid industrial expansion, says the Copper and Brass Research Association, 25 Broadway, New York City. In 1922 there were hardly 100,000 radio sets in use; in 1923 the number had grown to 2,000,000; in 1924 to 3,750,000 and by the end of 1925 it is estimated that the number of sets in use will reach a total of 5,000,000. The retail value of sets and parts has grown from $50,000,000 in 1922 to an estimated $500,000,000 in 1925, one of the most stupendous growths in history.

Public interest in radio has gained rapidly and apparently has continued unabated. Only a year and a half ago the consumer demand was far in excess of the manufacturers' ability to supply. At that time the number of home-made sets exceeded the factory-made, and there was a correspondingly large retail market for radio parts of every description. The last year has seen the beginning of something like stabilization in the industry. The trend of sales is now away from the home-made set and toward the set purchased as a complete unit.

The present rate of manufacture, according to the Association's survey, indicates that 1925 production will be 2,000,000 sets in which the consumption of copper and brass will be about 7,750,000 pounds. These metals are used for aerials, ground connections, coils, condensers, tube sockets, panels and miscellaneous small parts.

Radio now appears to be as universal in its appeal and as much a necessity as the automobile so there is no reason to look for any falling off in sales in the next few years. The radio purchaser is not only a good customer for tubes, batteries, plugs, jacks and other miscellaneous parts, but almost generally he is ready, after using a set a year or two, to scrap it and replace it with another which has a more stylish cabinet or a newer hookup or more tubes. Consequently both replacement and new set markets increase together with the market for parts and accessories.

Beauty Is the Keynote Of the Receivers for 1926

By Samuel Lager

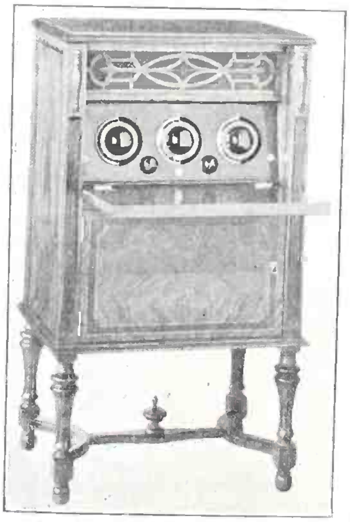
The 1926 models in receivers are being shown privately and will be on public view at the radio shows to be held in the fall, except that some manufacturers already have their sets on display in the distributors' salesrooms.

SAMUEL LAGER

The 1926 line, regarded as a whole, shows that furniture effects represent the chief improvement, enhanced also by better panel symmetry and the creation of "lines" equivalent to the stream line in the automobile trade.

As for circuit development, that is not present, nor need it be expected, for, aside from some slight improvements, the circuits are standard and represent the best that radio has to offer. It would be most risky for any manufacturer to ally himself with any freak hookup.

Better-looking dials, novel designs in switches, the inclusion of voltmeters and even milliameters on some panels, and such fine points are in evidence. The development of period furniture effects in the better class of sets is dominant and the Console design is increasingly prevalent. Undoubtedly 1926 will represent the greatest advance radio has made in handsomeness. Some of the housings are wonderful creations. The trend is toward simplicity of operation, with artistic considerations stressed.



The new Erla DeLuxe Console receiver, in 2-toned finish, quartered walnut. The loudspeaker is built in. The same model is also made in mahogany.

Literature Wanted

THE names of readers of RADIO WORLD who desire literature from radio jobbers and dealers are published in RADIO WORLD on request of the reader. The blank below may be used, or a post card or letter will do instead.

Trade Service Editor,
RADIO WORLD,
1493 Broadway, New York City.

I desire to receive radio literature.

Name ....

City or town ....

State ....

Are you a dealer? ....

If not who is your dealer?

His Name ....

His Address ....

Fred Pressner, 3524 Park Ave., Bronx, N. Y. City.
E. Bingham, 1004 N. Irving Ave., Scranton, Pa.
E. Furman, Paris Island, S. C.
Leonard D. Sumner, Blythe St., Hendersonville, N. C.
Fred Baldif, 4 Clarke St., Binghampton, N. Y.
D. R. Hill, Manito, Ill.
E. S. Drew, Little River, Fla. (Dealer).
G. A. Leber, 1723 Summit Ave., Seattle, Wash.
C F. Cribb, Box 400, G. P. O., Brisbane, Queensland, Australia
Harold W. Leonard, 101 Huntington St., Brockton, Mass.
A. Charnasky, 828 Crest Ave., Charleroi, Pa.
W. N. Hubbard, 354 Wall St., Meriden, Conn.
James C. Wilson, Box 218, Kent, O.
James A. Scott, Vero Beach, Fla. (Dealer).
Floyd Buesinger, Taylorville, Ill.
Wm. Boehn, Sr., 882 Sedgewick St., Brooklyn, N. Y.
John Webb, Waynesburg, Ky.
G. Rose, 175 Elm Ave., Windsor, Ontario, Can.
E. G. Pducha, c/o Howells Battery Station, Howells, Neb.

Coming Events

AUG. 22 to 29—3d Annual Pacific Radio Exposition, Civic Auditorium, San Francisco. Write P. R. E., 905 Mission St., San Francisco.

AUG. 23 to SEPT. 6—Canadian National Expos., Exposition Coliseum, Toronto, Can.

SEPT. 5 to 12—Third annual National Radio Exposition, Ambassador Auditorium, Los Angeles, Cal. Address Waldo K. Tupper.

SEPT. 9 to 20—International Wireless Exposition, Geneva, Switzerland.

SEPT. 12 to 19—Fourth Annual National Radio Exposition, Grand Central Palace, N. Y. C. Write American Radio Exp. Co., 522 Fifth Ave., N. Y. C.

SEPT. 14 to 19—Second Radio World's Fair, 258th Field Artillery Armory, Kingsbridge Road and Jerome Ave., N. Y. C. Write Radio World's Fair, Times Bldg., N. Y. C.

SEPT. 14 to 19—Pittsburgh Radio Show, Motor Square Garden. Write J. A. Simpson, 420 Bessemer Bldg., Pittsburgh, Pa.

SEPT. 14 to 19—Radio Show, Winnipeg, Can., Canadian Expos. Co.

SEPT. 21 to 26—First Annual Radio Expos., Broadcast Listeners' Association, Cadle Tabernacle, Indianapolis, Ind. Write Claude S. Wallin, Hotel Severin.

SEPT. 21 to 29—International Radio Exposition, Steel Pier, Atlantic City, N. J.

SEPT. 28 to OCT. 3—National Radio Exposition, American Exp. Palace, Chicago. Write N. R. E., 440 S. Dearborn St., Chicago, Ill.

SEPT. 28 to OCT. 3—Midwest Radio Week.

OCT. 3 to 10—Radio Exposition, Arena, 46th and Market Streets, Philadelphia, Pa., G. B. Bodenhof, manager, auspices Philadelphia Public Ledger.

OCT. 5 to 10—Second Annual Northwest Radio Exposition, Auditorium, St. Paul, Minn. Write 515 Tribune Annex.

OCT. 5 to 11—Second Annual Radio Show, Convention Hall, Washington, D. C. Write Radio Merchants' Association, 233 Woodward Bldg.

OCT. 10 to 16—National Radio Show, City Auditorium, Denver, Colo.

OCT. 12 to 17—Boston Radio Show, Mechanics' Hall. Write to B. R. S., 209 Massachusetts Ave., Boston, Mass.

OCT. 12 to 17—St. Louis Radio Show, Coliseum. Write Thos. P. Convey, manager, 737 Frisco Bldg., St. Louis, Mo.

OCT. 12 to 17—Radio Show, Montreal, Can., Canadian Expos. Co.

OCT. 17 to 24—Brooklyn Radio Show, 23d Regt. Armory. Write Jos. O'Malley, 1157 Atlantic Ave., Brooklyn, N. Y.

OCT. 19 to 25—Second Annual Cincinnati Radio Exposition, Music Hall. Write to G. B. Bodenhof, care Cincinnati Enquirer.

NOV. 2 to 7—Radio Show, Toronto, Can., Canadian Expos. Co.

NOV. 3 to 8—Radio Trade Association Exposition, Arena Gardens, Detroit. Write Robt. J. Kirschner, chairman.

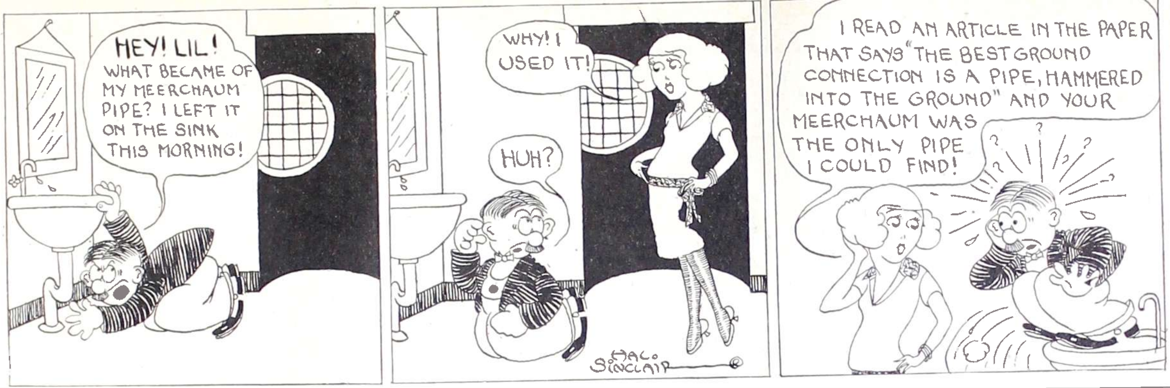
NOV. 19 to 25—Milwaukee Radio Exp., Civic Auditorium. Write Sidney Neu, of J. Andrae & Sons, Milwaukee, Wis.

NOV. 17 to 22—4th Annual Chicago Radio Exp., Coliseum. Write Herrmann & Kerr, Cort Theatre Bldg., Chicago, Ill.

MR. DX HOUND

A Character Created by RADIO WORLD *Artists*

—By HAL SINCLAIR



The Lestron 110-V. Tube

"The one serious problem in radio reception has always been the battery problem," says S. Rubinstein. "Manufacturers have spent many sleepless nights trying to develop a fool-proof device that would eliminate either the A or B battery, or possibly both, and in most cases these devices were very costly and had their weak points," he added.

In solving this problem, a new and untraversed channel of thought was conceived by A. L. Levin, of the Lestein Corporation of American, New York City. His idea was to make the tube itself, which is necessarily of special construction, do the major part of the work and use a simple adaptor, not the ordinary battery eliminator, which will function to eliminate the necessity of rewiring a set that has been in service. Mr. Rubinstein, president of the corporation quotes Mr. Levin:

"Our new tube operates equally well on any 110 volt supply having either direct or alternating characteristics. It contins two electron-emittion surfaces which result in a far richer electronic emission per unit of surface than is obtained in the present storage battery type tube, which in turn tends to prevent the possibility of overloading.

"The filament, which is lit directly from the 110 volt supply, also functions as a heater for an additional element, which when heated, emits electrons. The electronic emission from the filament is used for rectifying purposes and the emission from the new element, surrounding it in the form of a circle, which measures 1/8" in diameter, functions in the same manner as the filament emission from the present day tubes.

"The general size and appearance of this new tube is the same as that of the present day storage battery 201 A type tube. The standard four-prong base is used, and the internal elements are so wired to these prongs that the filament, plate, and grid leads will connect to any standard base socket used with the present day tubes.

"Radio fans can control the workings of their sets without any technical knowledge or annoyance. The adaptor can be easily connected with all radio receiving sets on the market today. The 'Lestron' tube can be used in any radio set wherever radio tubes are used and will eliminate all batteries.

"The reason for the adaptor being enclosed in a small separate cabinet is that radio fans can easily use the Lestron 110 volt tube in their present sets without making any changes whatever in the wiring of their sets. Radio set manufacturers will be able to embody the Lestein hookup in their new sets, which will then eliminate the necessity of using an adaptor."

British Rubber Restrictions Hit American Manufacturers

LONDON.

A manifesto has been submitted to Prime Minister Baldwin by fourteen rubber manufacturing firms for a modification of the Stevenson plan restricting the rubber supply. The scarcity of rubber has an important effect on the radio industry, both here and in the United States, where hard rubber is one of the most popular insulating media.

Oswald Moseley, governing director of the Manchester rubber manufacturing firm bearing his name, who is a former member of the Stevenson committee which framed the restriction scheme, issued a statement emphasizing the vital need for the release of further supplies of rubber if employment in rubber factories is to be maintained.

"Many factories," he said, "are short of rubber and some are working short time and will have to close down altogether, throwing thousands of workers on dole. If the Government does not grant an extra release the Colonies will inevitably take the law into their own hands."

C. H. Strutt, Chairman of the Anglo-Dutch Plantations of Java, said:

"I asked the Chairman of one of the biggest companies in America why they, with the Stevenson scheme staring them in the face, did not buy when rubber was cheaper. He replied that it was owing to the action of the banks, not the manufacturers, the banks refusing to advance money for the purpose. This is not the whole story. A much larger demand from the continent lately has evidently come as a surprise to American buyers.

PANEL COMPANY EXPANDS

With the installation of the newest machinery in addition to their already large plant, the Cortlandt Panel Engraving Company, 81 Cortlandt Street, New York City, are now able to care for the Fall business as well as the increased business which has grown during the past months. Quantity production will be a special; one panel or a thousand with speed and painstaking care. Anything in the line of panels may be had here, and this concern has been very successful in turning out fine panels for Bernard's famous Diamond of the Air, the Pressley and other well-known circuits. Beautiful engraving is one of the branches.

NEW STATION ELIMINATOR

The Tanlake Co., 96 Second Avenue, New York City, has placed on the market a new station eliminator which will be particularly useful to the fan who is troubled with a superfluity of stations. It also functions as a good static reducer. It is a small well-finished article which is quickly attached in the aerial circuit without any trouble and gives good results.

Tested and approved by RADIO WORLD Laboratories.

NEW INCORPORATIONS

Gold Seal Manufacturing Co., Newark, N. J.. radio supplies, $100,000; Alfred C. King, Herman B. Julian, Walter Julian, Newark. (Atty., William Harris, Newark, N. J.)

Lagerholm Electric and Radio Supplies, Brooklyn, N. Y., $10,000; S. B. and E. C. Lagerholm, W. H. Dickson, Jr. (Atty., L. H. Rogers, Jr., 280 Broadway, New York City.)

Newport Radio Corp., Wilmington, Del., wireless electrical apparatus, $27,500,000. (Corporation Service Company, Del.)

Vitalitone Sales Agents

Rossiter & Co., 136 Liberty Street, New York City, announce that they are now sole agents for the Vitalitone Cone Speaker, manufactured and guaranteed by Vitalis Himmer. This speaker is one of the pioneer achievements in the cone speaker field and is noted for the quality of its tone. The manufacturers claim that it really reproduces true beauty of tone and musical quality.

The usual 2" diaphragm generally employed in horn speakers has a rapid fundamental vibration of its own and does not vibrate below a slower rate than about 134 vibrations per second; the base notes or lower vibrations therefore, are not so clearly rendered, said Mr. Himmer. The Vitalitone has two 19" diaphragms having an area of 1,044 square inches, or 336 times larger than the diaphragms in general use on horn speakers.

"The Vitalitone faithfully reproduces every low tone audible to the ear and all the high tones within the musical range up to 5,000 vibrations per second," Mr. Himmer added. "The perfection of tone is enhanced by its diffusion of the sound through the air in all directions through the cone, instead of being concentrated as in the horn type. The cone is constructed of durable parchment, beautifully finished. It lends itself to any scheme of decoration and functions perfectly in any position. In RADIO WORLD laboratories it stood the severest accoustical tests and gave fine tone under heavy power. The new fall models are on demonstration at the showrooms of Rossiter & Co.

Tested and approved by RADIO WORLD Laboratories.

Trouble-Shooting Tips for 1-Tube Regenerator

(*Concluded from page 6*)

to each other, so as to make series winding, connect the ground. This is called the mid-tap. There is one other connection on the variometer and this is the free terminal of the rotor winding, which goes to one terminal of the fixed grid condenser. The end terminal of this condenser goes to one terminal of R1 and the other terminal goes to the Filament plus post on the socket, which also goes to the plus of the A battery. Now for the plate coil. Bring one terminal to the plate, and the other terminal to one phone post. Across this coil, shunt the variable condenser. Put the rotary plates to the plate side. The stationary plates go to the first phone post. The other phone post goes to the B plus 22½" volts. The last connection that is made on the rheostat. Connect the arm of the rheostat to the F minus post on the socket. The resistance of this rheostat goes to the minus of the A battery. Connect the A plus to the B minus.

How to Get the Proper Results

This set should work right off the bat, without any trouble whatsoever. However there is always a possibility that it won't work, and that is where trouble-shooting knowledge comes in handy.

If the tube doesn't oscillate, add on more turns to the plate coil (about 5 more). That doesn't mean that if you add on 10 and the tube oscillates, it should be taken off for fear that you are injuring the tube. To make some tubes oscillate requires a greater number of turns than that stated. I found that the majority of the tubes required 35 turns. Move L2 nearer to the stator of L1. Increase the resistance of R1. The adjustment of the filament temperature is not critical at all. Once it is set there need be no fussing around with it. Increase the number of volts on the plate circuit to about 67½ volts.

Now for the tuning of the set. Turn your variometer until it is at right angles to the stator coil. Now turn the variable condenser. You will find that at a certain point there is an extremely loud click. This proves that the set is working O. K. When a station is on the air, until you learn how to tune the set it will come in with a howl. The condenser dial should be let at one point all the time, while the majority, if not all the tuning, will be done with the variometer. Use an antenna about 85 foot. This is excluding the lead-in. With the lead-in, the length of the complete antenna should not be more than 120 feet. By reversing C2, you may obtain more regeneration. Reverse your A battery for louder signals.

TIM TURKEY

(*Concluded from page 21*)

time you were blind, partly tongue-tied and dreadfully palsied. You know all about those knees, however, and you are afraid that they will go back on you again. And they do. They will quiver less than they did before, but still the hostile motion persists. It has all been figured out on a basis of general average.

The Formula

In fact, the nervous reaction, represented in knee motion, is expressed in a formula:

$$f = \frac{1}{K^2}$$

where f is the frequency of the knee motion in cycles and K is a constant representing the number of times you have broadcast. Expressed prosaically, the frequency varies inversely as the square of the number of times you broadcast.

However, this formula has an exception. Like the straight-line frequency condensers, whose "curve" is a straight line, all cut at the bottom, where there is a bend, the curve for the knee formula at some point, not readily ascertainable, develops straight-line characteristics. This may be assumed theoretically to begin at the tenth time you broadcast. In several cases this has been proven experimentally. When the straight-line develops, then you are yourself. Finally those knees keep rigid. You have confidence. The microphone's swelling has completely disappeared. Your voice is really yours. You have won.

INDEX TO RADIO WORLD

Issues of July 4 to August 15, Inclusive

JULY 4

The Handsome Portable, four tubes, by Herbert E. Hayden.
The Freedom Reflex, a 3-tube free-from-noise receiver, by Capt. P. V. O'Rourke.
An 8-Tube Super-Heterodyne, Part 1 of 2-part article, by A. J. Gelula.
The Meissner Transmitter, with the Heising System of Modulation, by Lewis Winner, Part II of a 4-part article.
Overhauling Your Receiver, by S. W. Goulden.
A 1-Tube Inductance Set for DX, by Percy Warren.

JULY 11

The Baby Super-Heterodyne, a sensitive 4-tube set, by J. E. Anderson (one audio stage).
A 1-Dial, 6-Tube Portable Receiver, by Capt. P. V. O'Rourke.
Transformer Construction for the Meissner Transmitter, by Lewis Winner. (Part III.)
Theories of Radio Wave Propagation, by Leon L. Adelman. ("Radio News" reprint).
A Still More Powerful Diamond, Using Four Tubes, by Herman Bernard.
An 8-Tube Super-Heterodyne, by A. J. Gelula. (Part II, conclusion).

JULY 18

The 6-Tube Baby Super-Heterodyne, by J. E. Anderson; 2 audio stages.
The 3-Tube Marconi Receiver, by Percy Warren.
Tests With The Diamond Aboard a Motorboat, by Capt. P. V. O'Rourke.
Wiring the Meissner Transmitter, by Lewis Winner. (Part IV.)
Summer Operation of Sets, by Dr. A. W. Goldsmith.

JULY 25

A Dynamic Radio Amplifier, a Powerful 3-Tube Set, by P. E. Edelman.
An Anti-Radiation 2-Tube Reflex set, by Capt. P. V. O'Rourke.
Crystal Sets for Use Today, by Lewis Winner.
Construction of The Diamond Described for the Novice, with picture diagrams, by Herman Bernard.
Radio Wave Propagation, by E. F. W. Alexanderson.

AUGUST 1

Receivers for Obtaining Enormous Volume, by Sidney E. Finkelstein.
The Metropolitan Local Set, a 3-Tube Receiver, employing a crystal as a detector, by J. E. Anderson.
A 4-Tube DX Divided Circuit, by Herbert E. Hayden.
Series and Parallel Effects (The Radio Primer), by Herman Bernard.
Tracing Man-Made Static, by Lewis Winner.
Straight-Line Frequency Condensers, by Sylvan Harris. ("Radio News" reprint).

AUGUST 8

The Evolution Reflex Set, two tubes, by Capt. P. V. O'Rourke.
The Midget 3-Tube Set, by Herbert E. Hayden.
How to Build Your First Set (The Radio Primer), by Herman Bernard.
A 2-year-old 4-Tube DX Receiver, by Lewis Winner.
A Home-made Tangent Galvanometer, by Herbert E. Hayden.
Interference by Induction, by Prof. C. M. Jansky.

AUGUST 15

A 2-Tube Speaker Reflex, by Brewster Lee.
My Favorite Audio Amplifier (one transformer, two resistance), by Capt. P. V. O'Rourke.
A 4-Tube Set that Taxes Ingenuity, But Works Great When Built Right, by Lewis Winner.
How to Make a Diamond-Weave Coil, by Herbert E. Hayden.
How to Wire the Loop Jack in The Diamond, by Herman Bernard.
How to Obtain Better Quality, by Sidney E. Finkelstein.
Too Many Stations on the Air; Problem of Pay for Broadcasting is Solved, by Dr. J. H. Dellinger, chief of radio laboratory, Bureau of Standards.

DIAMOND IS PROOF POSITIVE FOR FAN FROM NEW ORLEANS

DIAMOND EDITOR:

I have found that The Diamond of the Air is proof positive that RADIO WORLD is entirely too modest in its claims for the performances of circuits, and if the "gentleman from Columbus" would ransack any Ford garage and construct a Diamond from the loot of the raid, I think he would become sold on the merits of RADIO WORLD's hook-ups. This may be speaking too figuratively, but as a sporting venture I might be inclined to risk it. At any rate, I have constructed a number of RADIO WORLD's circuits, and I have yet to build one that would not work to a satisfactory degree.—A. E. Weston, 1526 Carondelet Street, New Orleans, La.

Crystal Detector Embodied in Tube Sets of Quality

(*Concluded from page* 9)

great deal of trouble. The station, by the way, may be sending code, rather than programs, although this is usually harder to tune out for several reasons. It is not guaranteed, however, that a wavetrap will cut out all powerful stations close by the point of reception. If the set is sensitive enough to work without ground connection, and the trap is included, good results may be expected.

To operate a speaker two stages of transformer-coupled audio are needed, and Fig. 5 shows the same hookup as Fig. 4, but with the speaker power, i.e., a second but unreflexed stage of transformer-coupled audio included.

Fig. 6 affords somewhat better quality, but no more volume than Fig. 5, since two resistance-coupled stages are added to the reflexed audio stage, instead of a second transformer-coupled stage. Note that one extra tube is required. This set works a cone type speaker that is very sensitive to distortion and works it with marvelous sweetness.

In Fig. 7 the same circuit is presented as in Fig. 6, with the same RF, detection and AF, but without resort to reflexing. Thus one extra tube is required, four in all, but for those who possess musical ears and a fine sense of appreciation of quality it is a circuit of great allurement. The B battery voltage for the RF in these hookups may be 45 to 67½, while up to 135 on the resistance-coupled stages will lend further richness to the tone. How to construct the Fig. 7 audio hookup was discussed by Capt. Peter V. O'Rourke in the August 15 issue of RADIO WORLD.

The crystal to be used may be fixed, e.g., the new Carborundum, or may be vernier adjustable, known as the semi-fixed type, e.g., the RUF product.

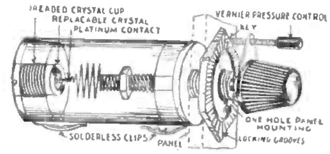


FIG. 8, detail of a semi-fixed crystal detector.

AERIAL PROBLEMS

(*Concluded from page* 11)

the pole a small screweye should be screwed in. Run the antenna wire through this eye. Tape the entire circumference of the eye. Pull the antenna wire again and as soon as you have it very tight (so there is no sag at all) make a twist of the wire and let it dangle. The stick will be loosened by this time. Around the screweye tie a piece of rope, run it back to the other end of the stick and pull until the stick is so tight that you cannot make it budge. Make a good strong knot.

The next and concluding thing to do is to solder the antenna wire on to the lead-in wire. If you cannot solder, wrap the wire around very securely. Put some tin foil over this turn, and the cover with some good strong rubber tape. This is not necessary if soldering is done.

LIST OF PARTS

- Two strong masthead poles.
- Four turnbolts.
- Four porcelain insulators.
- One roll of No. 14 hard-drawn copper wire (100 ft.)
- 100 ft. of No. 14 rubber-insulated copper wire.
- Two roles of hemp rope.
- One broomstick.
- One-half dozen screweyes.
- One roll of tape.
- One roll of solder, paste and soldering iron.
- Four screw clamps.

'CONFERENCE WILL GO ON' SAYS HOOVER

WASHINGTON.

Secretary Hoover announced that the Fourth National Radio Conference will be held at Washington this Fall. For several weeks there has been some doubt as to whether the conference would be held. The date has not yet been set, although it is believed it will be some time in October.

Several of Secretary Hoover's advisers thought that, as the conference can not compel the observance of its plans, there was no use holding it.

REPUBLICAN CLUB IN HYLAN'S DISTRICT WON'T BAR HIS TALKS

Political broadcasting by Mayor Hylan, of New York City, over WNYC, the municipal station, shall not be taboo in the Republican Captains' Club of the Twentieth Assembly District of Brooklyn, at 1382 Bushwick Avenue, the Mayor's own district.

The club held a meeting to determine whether one person to whom the "lectures" were distasteful could tune out the Mayor's words. Such an incident, it was said, occurred the other night, and several of the club's members protested, asserting they wanted to hear "both sides of the

6 DECADES AFTER APPOMATOX RADIO HEALS THE HURT FEELINGS

The South is competing rather strongly with the North in the quality of broadcasting stations. Stations WSB, Atlanta; WFAA, Dallas WBAP, Fort Worth; WOAI, San Antonio; KFRU, Bristow; WSMN, New Orleans, and WMBH, Miami Beach, rank well with any Northern stations. It is believed that the tendency of Northern fans to turn to Southern stations and the fondness of Southern fans for Northern broadcasters may dispel much of the misunderstanding between the two sections that persists.

New Station, 212.6 Meters

Three new class A broadcasting stations were licensed by the Department of Commerce while one station was transferred from class A to B.

CLASS A

Call	Owner Location	Kilocycles	Meters	Watts
KFWV	Wilbur Jerman, Portland, Ore.	1410	212.6	5
WGBU	Florida Cities Finance Co., Fulford By-the-Sea, Florida	1080	278	500
KFWU	Louisiana College, Pineville, La.	1260	238	100
TRANSFER. CLASS A TO CLASS B				
WMBB	American Bond & Mortgage Co., 6201 Cotton Grove, Chicago, Ill.	1200	250	500

SLAV TOWN WITH 145 SETS GETS STATE-OWNED STATION

A large State broadcasting station near Zagreb, Yugoslavia, is planned. It is reported that the apparatus has already been ordered from Germany on reparations account. For the present the station is to be used solely for the State, but it is hoped that later it will be released for general use. There are now 145 receiving sets in Zagreb.

KHQ TO MOVE; POWER UP

Announcement is made by Frank A. Buhlert and Louis Wasmer of Seattle that their Station KHQ, increased from 500 watt to 1000 watt, will be moved from the coast to Spokane, Wash., to be operated as a commercial broadcasting station.

The Diamond is Lauded as an Economical Set; Best of 50, says Another

B BATTERY DRAIN IS PUT AT ONLY 8 MILLIAMPERES

I have constructed Herman Bernard's Diamond of the Air and he more than deserves all the praise he has received for introducing this receiver. I have been building sets since crystal sets were all the rage, with excellent results, but in this set I find the one which most closely approaches my idea of an ideal set.

Possibly my experience with this set will help some prospective builder. I find that the selectivity of this set using the loop closely rivals the average home-constructed Super-Heterodyne and the volume is at least equal to that which is obtainable on the ordinary 3-tube regenerator that uses an outdoor aerial.

Using all four tubes and an outdoor antenna the volume of the Diamond is 25 to 50 per cent. greater than that of a 3-tuber. As for clarity, I don't think it is possible to do better on four tubes, using the same make of transformers for comparison.

To those who build this set and find it difficult to control oscillation I would suggest that they reduce the amount of turns on the tickler coil. This has a stabilizing effect and smooths out the control of the entire circuit. I use 4 volts on the RF tube, 28½ on the detector, 90 (with 4 volts grid bias) on the last two tubes. The B battery drain is approximately 8 milliamperes. Multi-tube reflexes, Super-Hets and Neutrodynes on an average draw at least twice this amount of B battery and none will do twice as much as the Diamond. I think a comparison of the B battery drain of various popular present-day receivers with that of The Diamond would be appreciated by the many readers.

In closing I heartily thank Mr. Bernard and RADIO WORLD for acquainting me with the circuit. To prospective, but hesitating builders my advice is to cash in on this outfit and future high-powered stations will not worry you. It will perform exactly as has been claimed.—Clayton B. Woodman, 175 East 112th St., N. Y. City.

* * *

TRIED OUT FIFTY SETS; DIAMOND SEEMS THE BEST

I have built about fifty sets so far this year and it seems to me The Diamond of the Air is the best all-around set I have tried.—H. M. Shreves, 2721 Meek Ave., Des Moines, Ia.

"HOW TO MAKE—"

The following illustrated constructional articles have appeared in recent issues of RADIO WORLD:

Sept. 6, 1924—A simplified Neutrodyne with Grid-Biased Detector, by J. E. Anderson. A Low-Loss Wave Trap, by Brewster Lee.
Sept. 27—A 1-Tube No Crystal Reflex.
Nov. 15—A Sturdy Low-Loss Coil, by Lieut. P. V. O'Rourke. An Ultra 2-Tube Receiver, by Byrt C. Caldwell.
Dec. 13—The World's Simplest Tube Set, by Lieut. P. V. O'Rourke.
Dec. 20—A 1-Tube DX Wonder, Rich in Tone, by Herman Bernard. An Interchangeable Detector, by Chas. M. White.
Dec. 27—A 2-Tube Variometer Set, by Lieut. P. V. O'Rourke. Gelula's Super Flex.
Jan. 3, 1925—A 3-Tube Portable That Needs No Outdoor Aerial, by Abner J. Gelula.
Jan. 10—A Low-Loss DX Inductance, by Herbert E. Hayden.
Jan. 17—A $25 1-Tube DX Wonder, by Abner J. Gelula.
Jan. 24—A Selective $15 Crystal Set, by Brewster Lee. A Variometer-Tuned Reflex, by Abner J. Gelula. An $18 1-Tube DX Circuit for the Beginner, by Feodor Rofpatkin.
Jan. 31—A Regenerative Neutrodyne for More DX, by Abner J. Gelula. A Transcontinental 2-Tube Set, by H. E. Wright. An Experimental Reflex, by Lieut. P. V. O'Rourke.
Feb. 7—The Bluebird Reflex, by Lieut. P. V. O'Rourke. A $5 Home-Made Loudspeaker, by Herbert E. Hayden.
Feb. 14—A Super-Sensitive Receiver, by Chas. H. M. White. A Honeycomb RFT for DX, by Herbert E. Hayden.
Feb. 21—A 1-Tube Reflex for the Novice, by Feodor Rofpatkin. A Set for Professional Folk, by Lieut. P. V. O'Rourke. A Honeycomb Crystal Receiver, by Raymond B. Wailes.
Feb. 28—A Set That Does the Most Possible, With 6 Tubes, by Thomas W. Benson. Three Resistance Stages of AF on the 3-Circuit Tuner, by Albert Edwin Sonn.
March 7—Storage B Battery, by Herbert E. Hayden. Benson's Super-Heterodyne. Ideal Coils for Best Circuits, by J. E. Anderson.
March 14—The Reflexed 3-Circuit Tuner That You Can Log, by Herman Bernard. The Right Way to Put Coils and Condensers in a Set, By Byrt C. Caldwell.
March 21—A Variable Leak, by Herbert E. Hayden. A 4-Tube, 3-Control Set That Gets the Most DX, by Lieut. P. V. O'Rourke.
March 28—The Improved DX Dandy Set, by Herbert E. Hayden. A 3-Tube Reflex for the Novice, by Feodor Rofpatkin.
April 18—The Diamond of the Air (Part 3), by Herman Bernard. The 7-Tube Pressley Super-Heterodyne (Part 1), by Thomas W. Benson. An Easy D Coil, by Jack Norwood.
April 25—A 3-Tube, 2-Control DX Reflex, by Brewster Lee. Trouble Shooting Article on Diamond of the Air, by Herman Bernard. Wiring the Pressley Set (Part 2), by Thomas W. Benson.
May 2—The Twinplex, by J. E. Anderson.
May 9—A Set to Cut Static, by Feodor Rofpatkin. Toroid Circuit with Resistance AF, by E. I. Sidney. A Push-Pull AF Amplifier, by Lt. Peter V. O'Rourke.
May 16—A 3-Tube Reflexed Neutrodyne, by Percy Warren. The Baby Portable, by Herbert E. Hayden. One Tube More for Quality, by Brewster Lee.
May 23—Powerful 3-Tube Reflex Receiver, by H. E. Wright. The 2-Control Diamond (Part 1), by Herman Bernard.
May 30—Wiring the 2-Control Diamond (Part 2), by Herman Bernard. 1-Control Neutrodyne, by Sidney E. Finkelstein. Making Your Set Tune the Entire Wavelength Band, by J. E. Anderson.
June 6—The Smokestack Portable, by Neal Fitzalan. A and B Battery Eliminators, Using DC (Part 1), by P. E. Edelman. A Wavemeter, by Lewis Winner.
June 13—Simple Short-Wave Circuits, by Herbert E. Hayden. A Simple Push-Pull Rheostat, by A. C. G. Force. A and B Battery Eliminators, Using AC (Part 2), by P. E. Edelman. A Portable Super-Heterodyne, by Wainwright Astor.
June 20—The Diamond as a Reflex, by Herman Bernard. A 2-Tube Protable Reflex, by Herbert E. Hayden. A Reflex for 99 Type Tubes, by L. R. Barbley.
June 27—The Pocketbook Portable, by Burton Lindheim. The Power House Set, by John L. Munson. Lesson on Learning the Code.
July 4—The Handsome Portable, by Herbert E. Hayden. The Freedom Reflex, by Capt. P. V. O'Rourke. 8-Tube Super-Heterodyne, by Abner J. Gelula.
July 11—The Baby "Super," by J. E. Anderson. A 1-Dial Portable Receiver, by Capt. P. V. O'Rourke.
July 18—Anderson's 6-Tube Super-Heterodyne. The 3-Tube Marconi Receiver, by Percy Warren. A Good Battery Connector, by Herbert E. Hayden.
July 25—A Dynamic Radio Amplifier, by P. E. Edelman. An Anti-Radiation Toroid Set, by Capt. P. V. O'Rourke. Crystal Sets for Work Today, by Lewis Winner. Construction of the Diamond Described for the Novice, by Herman Bernard.
Aug. 1—Enormous Volume on DX Stations, by Sidney E. Finklestein. The Metropolitan Local Set, by J. E. Anderson. 4-Tube DX Divided Circuit, by Herbert E. Hayden. Series and Parallel Effects, by Herman Bernard.
Aug. 8—The Evolution Reflex, by Capt. P. V. O'Rourke. The Midget—A 3-Tube Set in Sewing Machine Cabinet, by Herbert E. Hayden. How to Build Your First Set, by Herman Bernard. 2-Year-Old Wins DX Stake, by Lewis Winner. Interference by Induction, by Prof. C. M. Jansky, Jr.

Any copy, 15c. Any 7 copies, $1.00. All these 36 copies for $5.00, or start subscription with any issue. Radio World, 1493 Broadway, N. Y. City.

Attention, Readers and Newsdealers!

READERS: If you are going away on your vacation, and wish to have a complete file of RADIO WORLD, be sure to tell your newsdealer to put aside a copy of each issue until you return.

NEWSDEALERS: Your regular RADIO WORLD customers will undoubtedly want for file copies that they have missed while away on their vacations. The publisher suggests that each week you put aside copies of RADIO WORLD for these customers. They will consider this service.

Readers and newsdealers can get back numbers of any issue for the summer of 1925 at our regular price; or a subscription can be started with any back number published during the summer.

Circulation Manager, RADIO WORLD, 1493 Broadway, New York City.

RESULTS

RESULTS EDITOR:

I constructed the "Three Circuit Tuner You Can Log" as described in the June 27 issue of RADIO WORLD and I'll say its too good a circuit for three tubes. Last night I received the following DX stations on the speaker: WEAR, Cleveland; WPG, Atlantic City; WLW, Cincinnati; WGN, Chicago; KFKX, Hastings, Nebraska; WEMC, Berrien Springs, Michigan. I built several 3-tube sets, but the 3-circuit tuner you can log beats them all. Thanks to RADIO WORLD, I think it's the best radio book I know of.—J. M. Frisco, 235 York St., Brooklyn, N. Y.

* * *

RESULTS EDITOR:

For the last six weeks I have been on the look-out for a circuit for a portable set. In all I tried five circuits, four being taken from your publication. None of them worked. I was exasperated. I could not condemn the magazine because I have tried a large number of your diagrams and have always been well satisfied.

About this time the sin and shame edition came out and I read it, I found it very amusing to think a reader would condemn your efforts after two trials.

After reading this I decided to try again so I carefully wired up the "Three Circuit Tuner That You Can Log." Again no results, not even a murmur. I then found the cause of all my trouble. The two variable condensers which I had used had a wiping contact on the rotor and the binding post screw had come loose on the contact spring in such a way that I had no connection. After I fixed both condensers the set worked fine. I therefore think that E. S. Hancock's trouble is in the set and not the circuit.—Nurthing Bateson, 11619 Detroit Ave., Cleveland, O.

* * *

RESULTS EDITOR:

I was very much amused to see the letter condemning RADIO WORLD hook-ups as a "sin and a shame." I am one of your regular subscribers and have made sets from your hookups. They always have given good results, with the exception of a Super-Het published some time ago. This one was supposed to work on four tubes and not have any detector, but to step the wave up to audible frequencies and amplify it directly with an audio-frequency amplifier. You announced in the article that it wasn't practical, but was in experimental stages.

I am well pleased with RADIO WORLD. I have been a radio "ham" for about four years and I believe I know a little concerning the subject. I like your articles on transmitters. Let's have more of them. —Arthur L. Owens, care C. N. C. St. Ry. Co., Third & Court Streets, Covington, Ky.

THE KEY TO THE AIR

(*Concluded from page 19*)

WEDNESDAY, AUGUST 26

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12 M; 7 PM to 11.
WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 M to 1:05 PM; 8 to 12.
WAMB, Minneapolis, Minn., 243.8 (CST)—12 M to 1 PM; 10 to 12.
WBBM, Chicago, Ill., 226 (CST)—8 PM to 10.
WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM to 11.
WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—12:30 PM to 1:30; 4:30 to 5:30; 6:30 to 11.
WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12 M; 1:30 to 4; 5:30 to 11.
WDAF, Kansas City, Kansas, 365.6 (CST)—3:30 PM to 7; 8 to 9:15; 11:45 to 1 AM.
WEAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 11 to 12 M; 4 PM to 5; 6 to 12.
WEAO, Ohio State University, 293.9 (EST)—8 PM to 10.
WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 3:30 to 4:10; 6:45 to 7:45.
WEEI, Boston, Mass., 476 (ESTDS)—6:45 AM to 8; 3 PM to 4; 5:30 to 10.
WEMC, Berrien Spring, Mich., 266 (CST)—8:15 PM to 11.
WFAA, Dallas, Texas, 475.9 (CST)—10:30 AM to 11:30; 12:30 PM to 1.
WFBH, New York City, 270.6 (ESTDS)—2 PM to 7:30; 12 M to 1 AM.
WGCP, New York City, 252 (ESTDS)—2:30 PM to 5:18; 8 to 10.
WGES, Chicago, Ill., 250 (CSTDS)—5 PM to 7; 10:30 to 1 AM.
WGBS, New York City, 316 (ESTDS)—10 AM to 11 PM; 1:30 to 4; 6 to 7.
WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 5:30 to 11:30.
WGR, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:45 PM; 2:30 to 4:30; 6:30 to 11.
WGY, Schenectady, N. Y., 379.5 (CST)—5:30 PM to 7:30.
WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 12:15 PM; 4 to 5; 6 to 7:30; 8 to 10; 11:30 to 12:30 AM.
WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
WHN, New York City, 368 (ESTDS)—2:15 PM to 5:30; 7:30 to 11; 11:30 to 12:30 AM.
WHO, Des Moines, Iowa, 526 (CST)—12:15 PM to 1:30; 6:30 to 12 M.
WHT, Chicago, Ill., 400 CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 AM.
WIP, Philadelphia, Pa., 568 (ESTDS)—7 AM to 8; 10:20 to 11; 1 PM to 2; 3 to 4; 6 to 8.
WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 6; 6 to 11:30.
WKRC, Cincinnati, Ohio, 326 (EST)—8 PM to 10.
WLIT, Philadelphia, Pa., 395 (EST)—12:02 PM to 12:30; 2 to 3; 4:30 to 6; 7:30 to 9.
WLW, Cincinnati, O., 422.3 (EST)—10:45 AM to 12:15 PM; 1:30 to 2:30; 3 to 5; 6 to 11.
WMCA, New York City, 341 (EST)—10:45 AM to 12 M; 6:30 PM to 12.
WNYC, New York City, 526 (ESTDS)—6:30 PM to 11.
WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 3 to 3:30; 4 to 7:05; 9 to 11.
WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 4; 6:15 to 12 M.
WPAK, Fargo, N. D., 283 (CST)—7:30 PM to 9.
WOJ, Chicago, Ill., 448 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 2 AM.
WRC, Washington, D. C., 469 (EST)—1 PM to 2; 4 to 6:30.
WREO, Lansing, Michigan, 285.5 (EST)—10 PM to 11.
WRNY, New York City, 258.5 (ESTDS)—11:59 AM to 2 PM; 7:59 to 9:55.
WSB, Atlanta, Ga., 428.3 (CST)—12 M to 1 PM; 2:30 to 3:30; 5 to 6; 10:45 to 12.
WSBF, St. Louis, Mo., 273 (CST)—12 M to 1 PM; 3 to 4; 7:30 to 9.
WWJ, Detroit, Mich., 352.7 (EST)—6 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30 PM; 3 to 4; 6 to 7; 8 to 10.
KDKA, Pittsburgh, Pa., 309 (EST)—6 AM to 7; 9:45 to 12:15 PM; 2:30 to 3:20; 5:30 to 11.
KFAE, State College of Wash., 348.6 (PST)—7:30 PM to 9.
KFI, Los Angeles, Cal., 467 (PST)—5 PM to 11.
KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 5:15 to 6:15; 9:30 to 12:30 AM.
KFMQ, Fayettville, Ark., 299.8 (CST)—7:30 PM to 9.
KFNF, Shenandoah, Iowa, 266 (CST)—12:15 PM to 1:15; 3 to 4; 6:30 to 10.
KFOA, Seattle, Wash., 455 (PST)—12:30 PM to 1:30; 4 to 5:15; 6 to 10.
KGO, Oakland, Cal., 361.2 (PST)—11:30 AM to 1 PM; 1:30 to 2:30; 3 to 6:45.
KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30 PM; 5 to 10.
KHJ, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 1:30 PM; 5:30 to 12.
KJR, Seattle, Wash., 484.4 (PST)—9 AM to 1 AM.
KNX, Hollywood, Cal., 337 (PST)—1 PM to 2; 7 to 12.
KOB, State College of New Mexico, 348.6 (MST)—11:55 AM to 12:30 PM; 7:30 to 8:30; 9:55 to 10:10.
KOIL, Council Bluffs, Iowa, 278 (CST)—7:30 PM to 9.
KPO, San Francisco, Cal., 429 (PST)—7 AM to 8; 10:30 to 12 M; 1 PM to 2; 4:30 to 11.
KSD, St. Louis, Mo., 545.1 (CST)—7 PM to 10.
KTHS, Hot Springs, Ark., 374.8 (CST)—8:30 PM to 10.
KYW, Chicago, Ill., 536 (CSTDS)—6:30 AM to 7:30; 10:55 to 1 PM; 2:15 to 4; 6:02 to 11:30.
PWX, Havana, Cuba, 400 (EST)—8:30 PM to 11:30.
CNRM, Montreal, Quebec, Canada, 411 (ESTDS)—9 PM to 11.
CNRO, Ottawa, Ontario, Canada, 435 (EST)—7 PM to 11.

THURSDAY, AUGUST 27

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12 M; 7 PM to 11.
WAHG, Richmond Hill, N. Y., 316 (EST)—12 PM to 1:05.
WAMB, Minneapolis, Minn., 243.8 (CST)—12 M to 1 PM; 10 to 12 M.
WBBM, Chicago, Ill., 226 (CST)—8 PM to 10.
WBOQ, Richmond Hill, N. Y., 236 (ESTDS)—3:30 PM to 6:30.
WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM to 11:45.
WCAE, Pittsburgh, Pa., 461.3 (CSTDS)—12:30 PM to 1:30; 4:30 to 5:30; 6:30 to 11.
WCBD, Zion, Ill., 344.6 (CST)—8 PM to 10.
WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12 M; 1:30 PM to 4; 5:50 to 10.
WEAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 11 to 12 M; 4 PM to 5; 6 to 12.
WEAR, Cleveland, O., 390 (EST)—10:30 AM to 12:10 PM; 3:30 to 4:15; 7 to 11.
WEEI, Boston, Mass., 467 (ESTDS)—6:45 AM to 7:45; 1 PM to 2; 2:30 to 10.
WFAA, Dallas, Texas, 475.9 (CST)—10:30 AM to 11:30; 12:30 PM to 1; 2:30 to 6; 6:45 to 7; 8:30 to 9:30; 11 to 1 AM.
WFBH, New York City, 272.6 (ESTDS)—2 PM to 7:30.
WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 PM to 4; 6 to 7:30.
WGCP, New York City, 252 (ESTDS)—2:30 PM to 5:15.
WGES, Chicago, Ill., 250 (CSTDS)—5 PM to 8; 10:30 to 1 AM.
WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 5:30 to 11:30.
WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 11:30; 6 PM to 7:15; 8:30 to 11.
WGR, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:45 PM; 2 to 4; 7:30 to 11.
WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 12:15 PM; 4 to 5; 6 to 7:30; 8 to 10.
WHAS, Louisville, Ky., 399.6 (CST)—4 PM to 5; 7:30 to 9.
WHN, New York City, 360 (ESTDS)—2:15 PM to 5; 7:30 to 11; 11:30 to 12:30 AM.

(*Continued on next page*)

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

10 CENTS A WORD. 10 WORDS MINIMUM

THE KEY TO THE AIR

(Concluded from preceding page)

WHO, Des Moines, Iowa, 526 (CST)—7:30 PM to 9; 11 to 12.
WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 AM.
WJY, New York City, 405 (ESTDS)—7:30 PM to 11:30.
WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 6; 7 to 12 M.
WLIT, Philadelphia, Pa., 395 (EST)—12:02 PM to 12:30; 2 to 3; 4:30 to 6; 8:30 to 9.
WLW, Cincinnati, O., 422.3 (EST)—10:40 AM to 12:15 PM; 1:30 to 5; 6 to 8; 10 to 11.
WMAK, Lockport, N. Y., 265.5 (EST)—11 PM to 1 AM.
WMCA, New York City, 341 (ESTDS)—11 AM to 12 M; 6:30 PM to 12.
WNYC, New York City, 526 (ESTDS)—3:15 PM to 4:15; 6:50 to 11.
WOAW, Omaha, Neb., 526 (CST)—12:30 PM to 1:30; 5:45 to 11.
WOC, Davenport, Iowa, 484 (CST)—12:57 AM to 2 PM; 3 to 3:30; 4 to 7:10; 8 to 9.
WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 4; 6:15 to 7.
WPG, Atlantic City, N. J., 299.8 (ESTDS)—7 PM to 11.
WQJ, Chicago, Ill., 448 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 2 AM.
WRC, Washington, D. C., 469 (EST)—1 PM to 2; 4 to 6:30.
WREO, Lansing, Michigan, 285.5 (EST)—8:15 PM to 9:45; 10 to 11.
WRNY, New York City, 258.5 (ESTDS)—11:59 AM to 2 PM; 7:39 to 10.
WSB, Atlanta, Ga., 428.3 (CST)—12 M to 1 PM; 2:30 to 3:30; 5 to 6; 8 to 9; 10:45 to 12.
WSBF, St. Louis, Mo., 273 (CST)—12 M to 1 PM; 3 to 4; 8 to 9.
WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30; 3 to 4; 6 to 7; 8 to 9.
KDKA, Pittsburgh, Pa., 309 (EST)—9:45 AM to 12:15 PM; 2:30 to 3:30; 5:30 to 10:15.
KFAE, State College of Washington, 348.6 (PST)—7:30 PM to 9.
KFI, Los Angeles, Cal., 467 (PST)—5 PM to 11.
KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 5:15 to 6:15; 9:30 to 12:30.
KFNF, Shenandoah, Iowa, 266 (CST)—12:15 to 1:15 PM; 3 to 4; 6:30 to 10.
KFOA, Seattle, Wash., 455 (PST)—12:30 PM to 1:30; 4 to 5:15; 6 to 7.
KGO, Oakland, Cal., 361.2 (PST)—11:30 AM to 1 PM; 1:30 to 3; 4 to 6:45; 7:15 to 10
KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30 PM; 5 to 11.
KHJ, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 3:20; 5:30 to 11:30.
KJR, Seattle, Wash., 484.4 (PST)—9 AM to 1 AM.
KNX, Hollywood, Cal., 337 (PST)—11 AM to 12:05 PM; 4 to 5; 6 to 12.
KOIL, Council Bluffs, Iowa, 278 (CST)—7:30 PM to 9.
KPO, San Francisco, Cal., 429 (PST)—7 AM to 8; 10:30 to 12 M; 1 PM to 2; 3:30 to 11.
KSD, St. Louis, Mo., 595.1 (CST)—7:30 PM to 9.
CNRA, Calgary, Alberta, Canada, 435.8 (MST)—9 PM to 11.

One Silent Night a Week For All, Terms of Proposed Bill

CHICAGO.

Many fans in this city are stirred by the violation of the "Silent Monday Night" pact, because stations in suburban areas do not feel bound by it; broadcast furiously and thus defeat the attempts of many to receive distant stations.

Frank H. McDonald, president of the Broadcast Listeners' Association, (Chicago), said:

"Attention has been called to a communication from radio listeners at Aurora, Ill., who advocate the calling of a general strike of radio listeners; that is, to refuse to listen to 'unfair' stations on Monday nights. Whereas this plan does not differ from what fans of the Chicago area have been doing individually, we are heartily in favor of calling it 'a general strike' of listeners for their rights; not a fan to listen to an 'unfair' station on Monday nights."

As a result of a canvass of radio listeners in Chicago showing 98 per cent in favor of a silent night in the metropolitan area of Chicago, the Broadcast Listeners' Association is planning to have submitted to Congress a bill to divide the nation into six radio areas and assign a different quiet night to each. Under this plan Sunday would be "open night."

RADIO'S CROWNING TRIUMPH

THE Lestron 110 Volt TUBE

A. C.
or
D. C.

"fits any standard socket"

"Lestron"——IS

The fulfillment of Radio— Prophecy

A tube that will actually work from lighting Circuit, A.C. or D.C. without hum or overheating. No A. or B. batteries and "No Battery Eliminator Needed"
(Hook up adaptor on old sets)
Fits any Standard set or circuit, without rewiring old set.

DISTRIBUTORS, DEALERS, CONSUMERS

Write at once—for date of demonstration territory, and price.

Lestein Corporation of America
2 Broadway New York City