

Feb. 7  
15 Cents

1925

ECLIPSE'S EFFECT ON RADIO

SUPERDYNE

Tuning Discussed  
By Herman Bernard

2-TUBE  
SPEAKER  
REFLEX

By Lt. P. V. O'Rourke

Jobbers Hurt  
Radio Business,  
Says Dealer

Latest and Best  
Trade News Articles  
Advance Programs  
Great Q. & A. Dept.

RADIO  
CROSS-WORD  
PUZZLE

# RADIO WORLD

Title Reg. U. S. Pat. Off.

OL. 6. NO. 20.

135-150

ILLUSTRATED

EVERY WEEK

## HOW TO BUILD A \$5 SPEAKER



LIKE THE ONE THIS GIRL HOLDS

# CROSLLEY AGAIN LOWERS PRICES

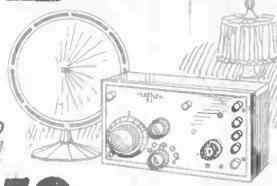
## Big Reduction in Famous Trirdyn and other Radios



**CROSLLEY 50**  
A one-tube radio that easily brings in distance with phones.

**\$14.50**

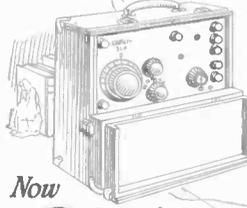
The biggest selling radio in the world



**CROSLLEY 51**

A two-tube set that gives loud speaker reception under fair conditions up to 1000 miles.

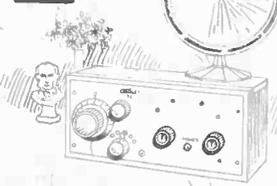
**\$18.50**



**CROSLLEY 51 Portable**

The two-tube utility radio. Let your dealer hook it up in his store.

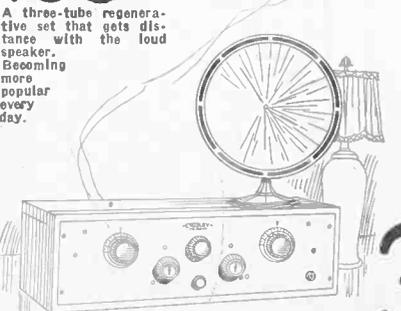
Now **\$23.50**



**CROSLLEY 52**

A three-tube regenerative set that gets distance with the loud speaker. Booming more popular every day.

**\$30**



**CROSLLEY TRIRODYN**

The biggest selling high-grade radio on the market. Distant loud speaker reception under all conditions.

Now **\$50**

The biggest selling high grade receiver on the market—the Crosley Trirdyn—reduced from \$65 to \$50.

The Trirdyn Special—the beautiful Model with cabinet to house batteries—formerly \$75, now \$60.

The Crosley 51-P, a tremendous seller at \$25, reduced to \$23.50.

We unhesitatingly state that these sets, together with the other Crosley Radios, represent the biggest values ever offered.

### CROSLLEY RADIOS JUSTLY POPULAR

Only the less expensive Crosley Radios have exceeded the Trirdyn in sales. This deserved popularity of the entire Crosley line is the result of extraordinary performance at a very low price.

Crosley Radios cost less originally, use fewer tubes and consume much less battery current. At the same time they give results not equalled by receiver costing a great deal more and using two or three additional tubes.

The unique Trirdyn circuit—a combination of Armstrong Regeneration, Radio Frequency Amplification and Reflexed Audio Amplification—has proven beyond a doubt that the features of selectivity, volume and ease of operation can be obtained with three tubes better than heretofore has been possible with five or even six.

Hundreds of voluntary letters have come to us, telling of the unparalleled foreign reception during international test week with Trirdyns and all other Crosley Radios; even the little one-tube Crosley 50 at only \$14.50.

It is this continued remarkable performance that has created such a tremendous demand for Crosley Radios. And it is this great popularity that now allows us to decrease our production costs and pass this large saving along to you.

### NEW CROSLLEY MODELS

In order to allow even a greater selection, three new Crosley Radios have been added to our extensive line. Taking its place with the well known Crosley 50 and Crosley 50-P, is the leatherette covered, one-tube 50 Portable, a utility set in which the dealer can quickly make the necessary connections and allow you to carry it home complete.

The New Crosley 51 Special, a two-tube receiver similar to the Model 51, is housed in a cabinet large enough to hold the necessary batteries and has a sloping panel.

Similar to the Crosley 52, but with sloping panel and cabinet to house the batteries is the new Crosley 52 Special.

These additional receivers make the Crosley line absolutely complete—A radio for all tastes and every pocketbook. See illustrations for prices.

No matter what appeals to you most in a radio, you will find that point outstanding in a Crosley.

Most good dealers handle Crosley Radios.

You Will Make No Mistake in Buying One.

All Crosley Receivers contain the famous Armstrong Regenerative circuit, and are licensed under the Armstrong U. S. Patent No. 1,113,149

As is customary, prices shown do not include tubes, phones, loud speakers or batteries.

Prices West of Rockies add 10%

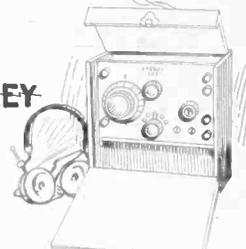
From a small beginning three and a half years ago, Crosley Radio has grown until it now produces more sets than any other concern in the world. The present production—nearly 5000 per day—is probably from two to three times as great as that of any other radio manufacturer.

Crosley owns and operates the new super power WLW Broadcasting Station located at Harrison, Ohio, remotely controlled from studios in one of three large Crosley owned manufacturing plants in Cincinnati.

**3 Tubes do the work of 5**

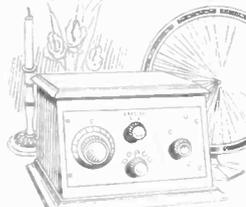


**In a CROSLLEY Trirdyn**



**CROSLLEY 50P**

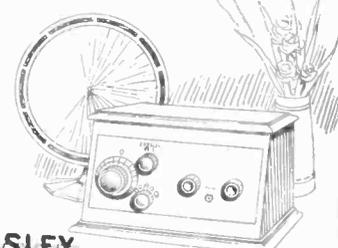
The new leatherette-covered one-tube utility set. Will give the same results as the Crosley 50.



**CROSLLEY 51 Special**

Same as 51 in new sloping panelled cabinet which houses all necessary batteries.

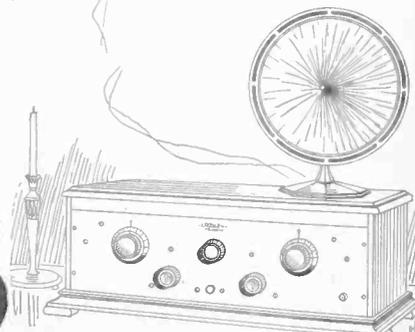
**\$23.50**



**CROSLLEY 52 Special**

The Crosley 52 in new cabinet to house batteries. Has sloping panel.

**\$35**



**CROSLLEY TRIRODYN Special**

Same as the Trirdyn in beautifully finished large cabinet to hold the batteries.

**\$60**

THE LOUD SPEAKER SHOWN IS THE WONDERFUL NEW CROSLLEY LOUD SPEAKER THAT IS TO BE ANNOUNCED IN THE NEAR FUTURE

Write for Complete Catalog

# THE CROSLLEY RADIO CORPORATION

2401 Sassafras Street

Powel Crosley, Jr., President

Cincinnati, Ohio

## FRESHMAN MASTERPIECE

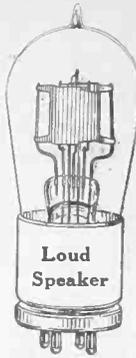
A 5-Tube, Tuned Radio Frequency Receiver that represents the greatest value ever offered in a radio set ..... **\$60**

*Write for particulars.*

**CHAS. FRESHMAN CO., INC.**  
FRESHMAN BUILDING  
240-248 W. 40th ST., NEW YORK

COMMERCIAL TYPE RADIO APPARATUS, by M. B. Sleeper. Mailed on receipt of 75c. The Columbia Print, 1493 Broadway, N. Y. C.

**\$2.00 EACH LOUD SPEAKER RADIO TUBES**



Each tube is guaranteed or your money returned.

WE SPECIALIZE IN Mail Orders

Send No Money, Simply Pay the Postman.

If You Care to Send Cash, I Pay Postage.

Canada, Thirty Cents Extra

**James H. Konkle**  
192 MARKET STREET  
NEWARK, N. J.

## HERCULES Aerial Mast



20 Ft. Mast \$10  
40 Ft. Mast \$25  
80 Ft. Mast \$45

Write for literature and FREE Blueprint

All steel construction complete with guy wires and masthead pulley. We pay freight.

**S. W. HULL & CO., Dept. H51**  
2045 E. 79th St. Cleveland, O.



*Herman Bernard*

*Herman Bernard*

The **Bruno** Ultra-Vario Condenser

Cat. No. 19, is certified by me as the only one used in building RADIO WORLD'S 1925 4-Tube DX Superdyne.

(Signed)

**Ultra-Vario Condensers**  
**Cat.-No. 19, \$7.50**

A multiple tuning condenser of rigid mechanical construction and high electrical efficiency.

Trade Mark



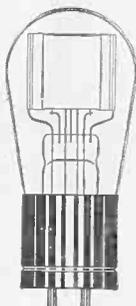
*If your dealer can't supply you, write direct*

## BRUNO RADIO CORP.

300 WATER STREET NEW YORK CITY

## BIG SALE ON TUBES

VERY SPECIAL PRICE **\$2<sup>95</sup>**



These high grade tubes are made in two popular sizes only, and are guaranteed Brand New, quiet in operation and highly sensitive.

No. P. V. 301A Detector and Amplifier Tube with standard base, Only \$2.95

No. P. V. 299 Detector and Amplifier Tube will fit all 199 sockets, Only \$2.95.

Just order quantity wanted by number and pay postman our low price plus postage upon arrival. Or if you prefer send \$2.95 for each tube and we ship prepaid. Prompt service and satisfaction guaranteed.

### FREE CATALOG

Contains most complete line of sensational Bargains in High Grade Radio Apparatus, Parts and Supplies. Write for your free copy today.

**P. VON FRANZIUS**  
608 Diversey Pkwy. D-00, Chicago, Ill.

# RADIO WORLD'S SUPERDYNE EXPERTS SPECIALISTS

We have helped hundreds to success with RADIO WORLD hookups, especially SUPERDYNE—LET US HELP YOU. We are ready with kits and complete parts for BERNARD'S new 4-Tube SUPERDYNE, the premier circuit of 1925. All parts of highest quality—see our guarantee in past issues of RADIO WORLD.

### OUR OWN LOW-LOSS COILS

Correctly wound to cover entire broadcast Range. A Laboratory development, after long experimentation, by our Engineers, which has produced a coil which is Low-Loss in every detail, price complete ..... **\$7.50**

*(This coil is endorsed by Mr. Herman Bernard of RADIO WORLD.)*

Bringing to Earth the Airplane Receiver

### THE PRESSLEY SUPERHETERODYNE

The U. S. Army Airplane Set

COMPLETE SET OF BANGAMO RADIO FREQUENCY TRANSFORMERS..... **\$22.50**

Complete parts for PRESSLEY SUPERHETERODYNE as specified and endorsed by POPULAR RADIO, including drilled panel and genuine mahogany cabinet and loop..... **\$85**

Complete parts for

## BERNARD'S 4-TUBE SUPERDYNE

As Specified and checked over by Herman Bernard

One Superdyne Coupler.....		One Bradleystat.....	\$1.65
One Matched Radio-Frequency Transformer...	\$7.50	One Bradley Push-Pull Battery Switch.....	.60
One Bruno Ultra Vario Condenser No. 19.....	7.50	One 7x24" Black Radion Panel.....	2.85
Two 4" Black Accuratune Dials.....ea.	2.95	One Tri-Jack (Or single-circuit jack).....	.90
One Federal No. 65 Audio-Frequency Transformer..	4.95	Two Silver Eureka Dial Pointers.....ea.	.20
One Federal No. 65A Audio Frequency Transformer..	4.95	Two Lengths of Spaghetti	.25
Four Federal Sockets...ea.	.90	One Terminal Block.....	.60
One .00025 Mfd. Dubilier Grid Condenser.....	.35	Wire, Screws, etc.....	1.00
One Variable Bradleyleak.	1.65		

**\$42.50**

Amrad Low Loss Basket-Ball Variometer, covering entire Broadcast Range, \$3.40

# WALLACE RADIO COMPANY, Inc.

SUPERDYNE ADVICE FREE RESULTS GUARANTEED

IF NOT LISTED ABOVE, WRITE FOR IT. MAIL ORDERS SOLICITED

135 LIBERTY STREET NEW YORK CITY

# RADIO WORLD

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

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

Vol. VI. No. 20. Whole No. 150.

February 7, 1925

15c per copy, \$6.00 a year



## The Bluebird Reflex "For Happiness"

By Lieut. Peter V. O'Rourke

THOSE desiring a set that employs only two tubes, yet operates a speaker, will find that the introduction of the Superdyne principle will aid materially in assuring that economical result. A crystal must be used as the detector, since a detector tube would not lend itself to successful reflexing, and the second tube is better left for a free audio stage.

Constructed along low-loss lines this set

will produce signals of fine quality and normally will bring in stations several hundred miles away, on the speaker.

The inclusion of the tickler is well worth while. Its adjustment governs the amount of negative inductive feedback from the plate of the RF tube to the grid of that tube, the energy transfer being accomplished through the proximity of the tickler to the grid coil (L3 to L2).

Thus by varying the tickler setting the amount of negative feedback is controlled. For a given wavelength there will be a given setting. This effectuates neutralization, because the feedback in a negative direction is controlled so that it equals the positive capacitive feedback through the tube elements, thus creating the equation that constitutes neutralization. Moreover, this condition is met for the entire

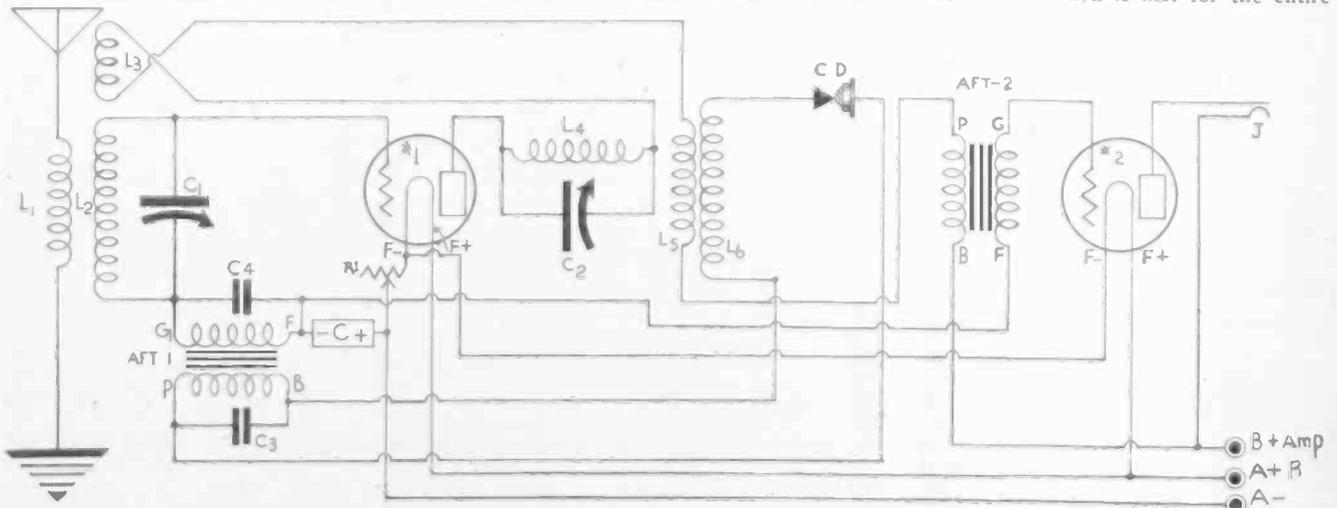


FIG. 1, the circuit network of the 2-tube set that works a loudspeaker. The hookup comprises a stage of tuned radio-frequency amplification, crystal detector, a stage of reflexed audio-frequency amplification and a free audio stage. The oscillations are controlled by the tickler, which embodies the Superdyne principle of neutralization of grid-to-plate capacities. L1, L2, L3 is a 3-circuit variocoupler and may be one of several makes discussed in the text. L4 is a plate coil. L5, L6 is a fixed radio-frequency transformer, used to couple the RF side to the audio side of the circuit. This type of transformer, is sometimes called untuned, although in fact it is tuned to the broadcast band. The crystal detector affords signals of fine quality, the Superdyne principle enhances this quality feature, while the trouble element present in many reflexes is reduced to a minimum.

# Picture Diagram of Wiring the Bluebird Reflex

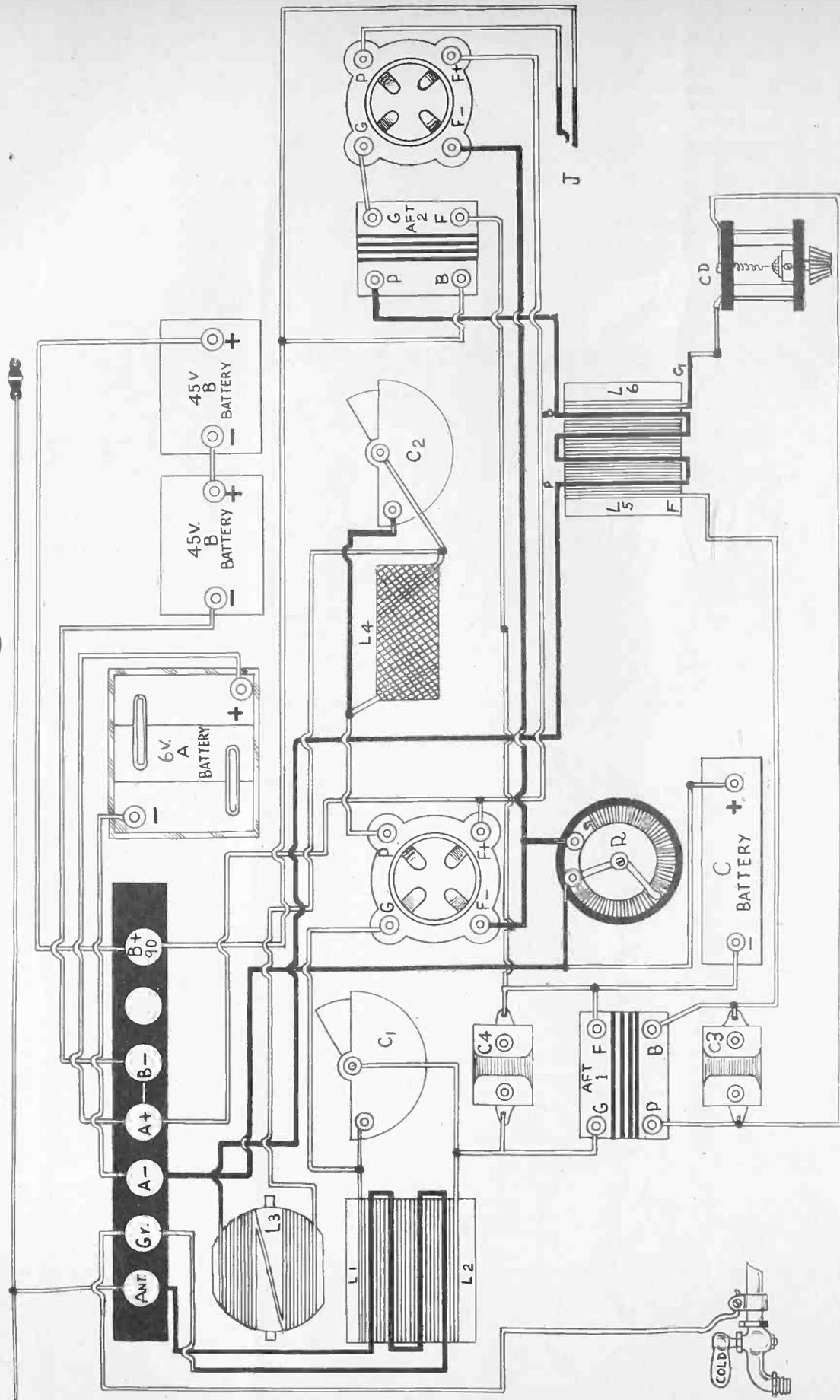


FIG. 2, asymmetrical or picture diagram of the Bluebird Reflex. L1 is represented by black lines, as is L5, while L2 and L6 are shown in light lines. L5 is a fixed radio-frequency transformer, hence the B+ is in reality are not exposed, but only the posts of the RFT, which correspond to those designated above. The vacant post on the terminal strip (usually B+) may be used as C-, or the C battery be connected direct to the AFT.

# Tracing the Signal's Course

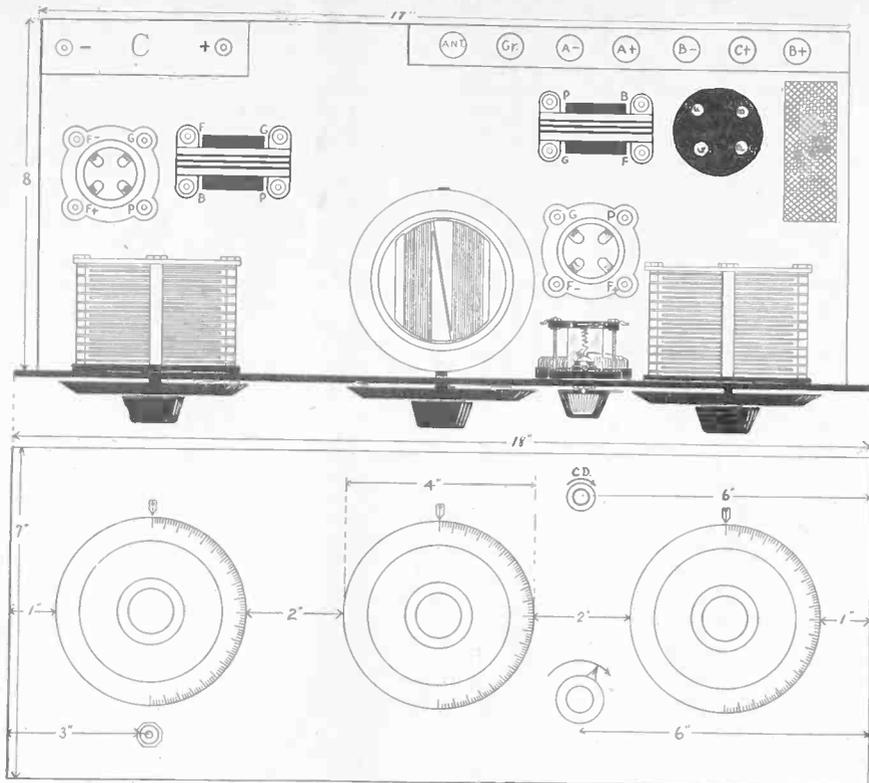


FIG. 3, combined panel layout and assembly plan for the Bluebird Reflex.

broadcast band, which is not always true where the neutralizing condenser method is used.

## The Course of the Signal

The incoming wave is picked up by the aperiodic primary L1 of the variocoupler. The energy is transferred by induction, that is, through the air space between the closely coupled coils L1L2, and undesired waves are rejected and the desired wave passed along by the tuning accomplished with the variable condenser C1. The energy is fed to the grid of the radio-frequency tube. It is passed over to the plate, inside the tube, in the form of electrons (infinitesimal particles of positively-charged electricity) and is conducted through the plate coil L4. As this coil is tuned by a variable condenser, C2, the rejection and acceptance process is repeated here. The effect is the production of regeneration, because tuning the plate to the same wavelength to which the grid is tuned so sensitizes the seals that bind the plate and filament leads inside the tube to enable a greater transfer of energy from grid to plate than would be possible if only the self-capacity of the seals were relied on for this coupling. In other words, the capacity furnished by the plate condenser C2 is added to that of the condenser formed by the seals of the plate and filament leads. It would seem, from a hasty glance, that the condenser C2 really is in series, hence cuts down the wavelength, but in fact it is in parallel, because the B battery, which is in the plate lead, has a common conducting source in the filament (B- and A+). Therefore, the plate condenser really is shunted between plate and one filament lead, just as are the seals inside the tube that constitute the plates of the small fixed condenser whose property is referred to as self-capacity. From the end of L4 the radio current is carried to the END of the tickler L3, to obtain reverse feedback. The plate tuning is necessarily positive feedback and an equal amount of

negative feedback (through the tickler) produces neutralization at resonance.

## What the Crystal Does

The beginning of the tickler coil is connected to the beginning of the primary L5 of the coupling transformer L5L6. This is a regulation radio-frequency transformer of the so-called fixed type. The end of L5 goes to the P post of the second audio transformer, whose B post goes to B+. The object of sending the plate current through these several windings is simply to strike the B+, for radio currents do not get beyond L6. Therefore, the radio or inaudible, alternating current is transferred from L5 to L6, where the radio-current is intercepted by the crystal and broken up, so that only direct current flows thenceforth. This is a pulsating direct current, but not a radio-frequency current. It is audible. The direct current is then fed to the primary of the first audio-frequency transformer (AFT1), across which a fixed condenser of about .002 mfd. may be shunted as a by-pass. The crystal has such a high internal resistance that the path of the current is facilitated by the fixed condenser; also the radio currents are obstructed from passing through the primary winding of the audio transformer, sliding instead across the fixed condenser and being kept from undesirable intermingling with its audible companion current. The audio current is passed by induction from the primary of the AFT1 to the secondary, one post of which is connected to the end of the grid coil L2 (where A- would normally go) and the other post to A-, or, preferably, as in this case, through a C battery. A fixed condenser, C4, should be placed across the secondary of this AFT. This passes the radio currents to the grid return without compelling all of them to travel through the secondary. Yet the audio currents do pass through the secondary, since condensers do not pass audio. For radio-frequency purposes, therefore, the grid return is shorter; for audio purposes

it is through the transformer's secondary winding. The G post of AFT1 is connected to the end of the grid coil, thus making direct metallic contact with the grid, while the F post goes to the grid return. As this same tube, No. 1, is used for a stage of radio-frequency amplification and also for the first stage of audio-frequency amplification (in other words, is reflexed), the grid return must be the same in both instances. It is to C-. This gives a negative bias to the grid, which is highly desirable in amplifier stages, often occasioning greater volume and nearly always cutting distortion to a minimum. The use of a C battery reduces the drain on the B battery almost 50 per cent.

## Path of the Audio

Now the audio currents are fed into the grid of the first tube, just as in any audio stage, and are taken conducted from the plate of that tube to the primary of the second audio transformer. It so happens that the audio current is passed through the windings of the plate coil L4, the tickler L3, the primary of the radio-frequency transformer L5 and through the primary of the second audio transformer. Up to this point the action is that of a stage of tuned radio-frequency amplification, crystal detector and one stage of audio. Now for the last audio stage. This is conventional. The G post of the second AFT is connected to the grid of the second tube, the F post of this AFT to C-. Thus one-stage amplified audio currents are delivered to the grid of the second tube with a high voltage step-up, due to the ratio of the fewer turns on the primary of AFT2 compared with the turns on the secondary. The plate of the last tube furnishes the finished audio product, in conjunction with the circuit-completing B+ lead.

## Some Trouble Hints

The reflex has proven the most troublesome circuit with which experimenters have contended, but if reflexing is confined to one stage, little trouble need be expected that will defy an understanding solution. In fact, a circuit like this one, which is one of the simplest reflexes, in nine cases out of ten will work well right away. The main trouble experienced in reflexes is from howling and failure to reflex. The audio howls often are due to uncontrollable stray regeneration. The tickler serves to stabilize the set, for at resonance there should be no extraneous sound. Failure of the set to reflex is due mainly to incorrect wiring or placement of parts.

Depending somewhat on placement of parts, better results sometimes are obtainable by connecting the plate of tube No. 1 from the end of L4 to the P1 or P of AFT2. P2 or B of AFT goes to B+. The end of L5 (B) then goes direct to B+. L5 is the primary of the fixed or continued RFT.

Special attention should be paid to the fixed condensers, C4 and C3. Usually .002 mfd. will be correct for both, but other capacities, preferably higher, should be tried if the ones instanced do not bring best results. Try omitting the condenser C3. Sometimes better reception will be obtained, due to sufficient capacity effect between transformer windings. C4 may be omitted experimentally, too, but it seldom happens that a reflex functions better, or indeed as well, with this condenser left out.

## The Coils

For L1, L2, L3 the experimenter has a wide choice of variocouplers. They should be of the 3-circuit variety, that is, with  
(Continued on page 26)

# A \$5 Home-Made Loudspeaker

By *Herbert E. Hayden*

Illustrations by the Author

A PERSON can make at home almost everything and anything used in a radio, even unto a loudspeaker. Whether he makes as good-looking a job of it as does a factory staff depends on his own skill, and the likelihood is that he will not. Nor can he be expected to come up to those meticulous requirements that rule in a factory. Yet he can succeed to his own satisfaction, derive a great deal of enjoyment from his work and at the end have a product that really gives results. This applies to a loudspeaker as well as to anything else in connection with a set. For instance, fine volume and tone may be produced from a loudspeaker like the one shown on the front cover of this issue and detailed more fully in Fig. 19, page 9. I do not claim that this speaker is as good as the quality speaker products of expert manufacturers but I do assure you that it is a satisfactory, workable and delightful little instrument.

## Effect on Hayden's Guests

The design is that of a microphone, which is a happy idea, at that. Sometimes when visitors enter my home they may think that I have a broadcasting station there. To be sure, I refer only to visitors unversed in radio. Quite a few of that type are week-end guests at my domicile, but I must confess that I win them over to radio before they motor homeward on Monday morning. I am not so boastful as to say that the speaker is the main thing that converts them, but they are impressed with its simplicity, excellent tone and ability to handle volume. I operate the speaker from a Superdyne, built according to data published in *RADIO WORLD*, issues of January 10, 17 and 24. This is the 1925 4-tube DX Model, famous for its fine tone and great volume, so I presume the speaker falls heir to virtues inherent in the set. But the fact remains that the speaker successfully handles this tremendous volume without a rattle. Some technicians may say that my model has restricted air space. They may bore  $\frac{1}{2}$ " holes in the unit housing to appease themselves. But I know my baby speaker works.

## Handles Volume Well

On the night following the total eclipse of the sun I had particularly good results from distant stations. This was a Sunday evening. The local stations, such as WNYC, WEAF, WJZ, WJY, WHN and WAAM, were going full blast. WNYC was using 1,000 watts, WEAF 2,000 watts. My home is in Brooklyn, about six miles from these two powerful stations. You can imagine the great volume with which my little speaker was taxed, but it stood the strain with unqualified success. Then I tried for some DX and brought in stations in Pittsburgh, Cincinnati, Cleveland,

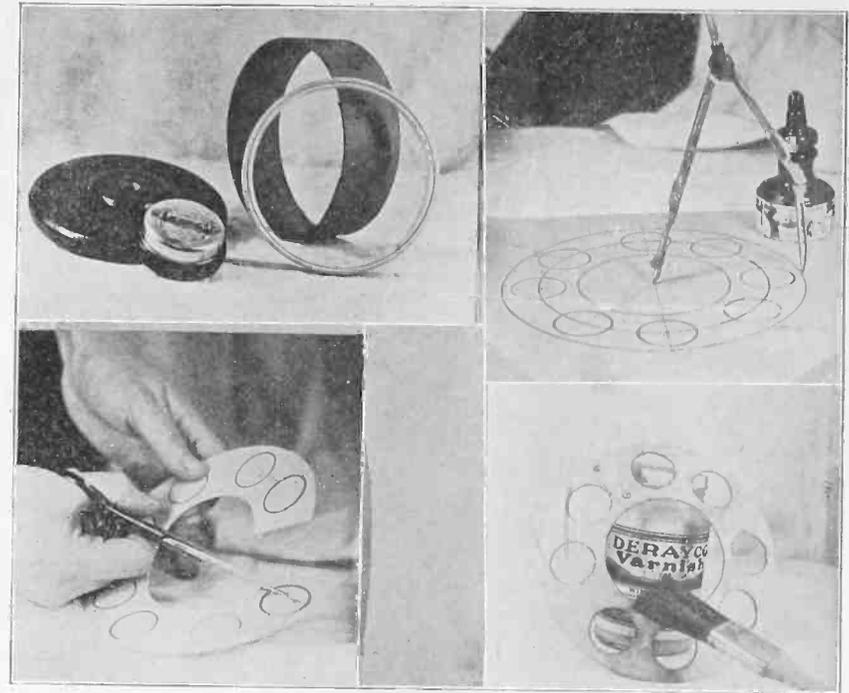


FIG. 1, top, left, shows the unit, base, embroidery hoops and cardboard frame. Fig. 2, top, right, details the method of marking another piece of cardboard, this one a flat piece, for cutting into a form having the final appearance of a microphone. At left, lower, is shown (Fig. 3) how the inside and outside circumferences have been cut, leaving a circular and with eight circles in it. The cardboard is severed, then the ends drawn together so that they overlap slightly. This gives the desired bevelled effect. Varnish, shellac, valspar or collodion is applied for the stiffening effect. (Fig. 4).

Buffalo, Schenectady, Miami and elsewhere. For some reason—maybe the beneficial aftermath of the eclipse, for DX weather certainly ensued—Miami came in with a mighty roar, its volume almost equalling that of WEAF.

## \$5 Does Not Include Unit

The cost of constructing a speaker like the one I mention should not exceed \$5, not including the cost of the unit. On this point I might say that almost any speaker unit may be used. These instruments usually are sold for phonograph attachment, so the phonograph tone chamber may be used as the speaker. However, the Baldwin unit probably would be hard to handle mechanically for the purposes of constructing this speaker, because of the difficulty of soldering to aluminum.

## LIST OF PARTS

Two seven-foot lengths of No. 14 sprung wire (for retaining ring).

Two pieces of parchment, gold gauze, Georgette crepe, China silk or other silk, each 8" square (for two diaphragms).

Six machine screws, size 6/32,  $\frac{1}{2}$ " long; six nuts to match.

Strip of cardboard, 2" wide, 2 feet long.

One foot of flat brass or copper,  $\frac{1}{2}$ "

wide,  $\frac{1}{16}$ " thick, to be used to support the telephone unit.

One piece of cardboard, 8" square.

One wooden base, 6" diameter.

One house pin.

Two sets of 6" embroidery hoops.

Four corks.

Shellac or Collodion, beeswax, solder, glue or cement, telephone cord.

Everything listed is easy to get. I have to laugh when I read some articles telling how easy it is to make a given instrument, and yet to corral all the necessary parts would require intimate importing connections with firms in Samoa and Siberia. To prove to myself that I had picked something easy to assemble from the shopping viewpoint I went visiting some stores, explained what I wanted to do (as if I didn't know) and got what I wanted.

The beeswax may be a puzzler to some. You must use beeswax. A drop from a molten candle will not do. Paraffin will not meet requirements. The drop of beeswax is almost the finishing touch of the speaker construction, hence—where can it be bought? Why, in a hardware store. You know it as well as I. Remember when we were kids how mother used to make the iron slide easier over

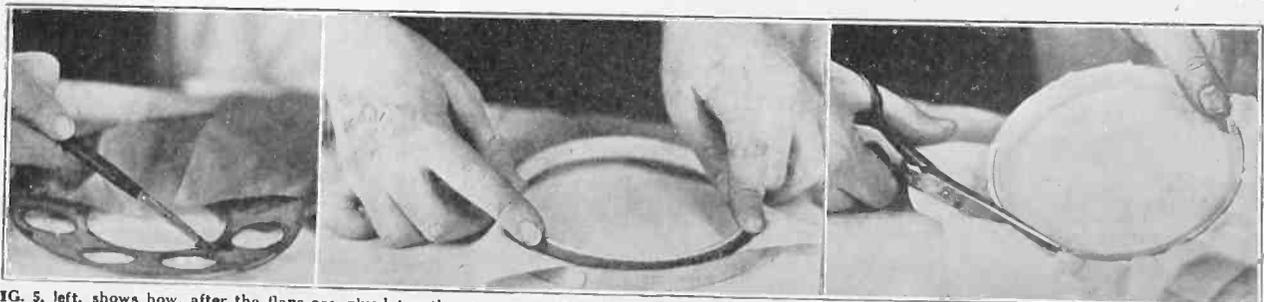
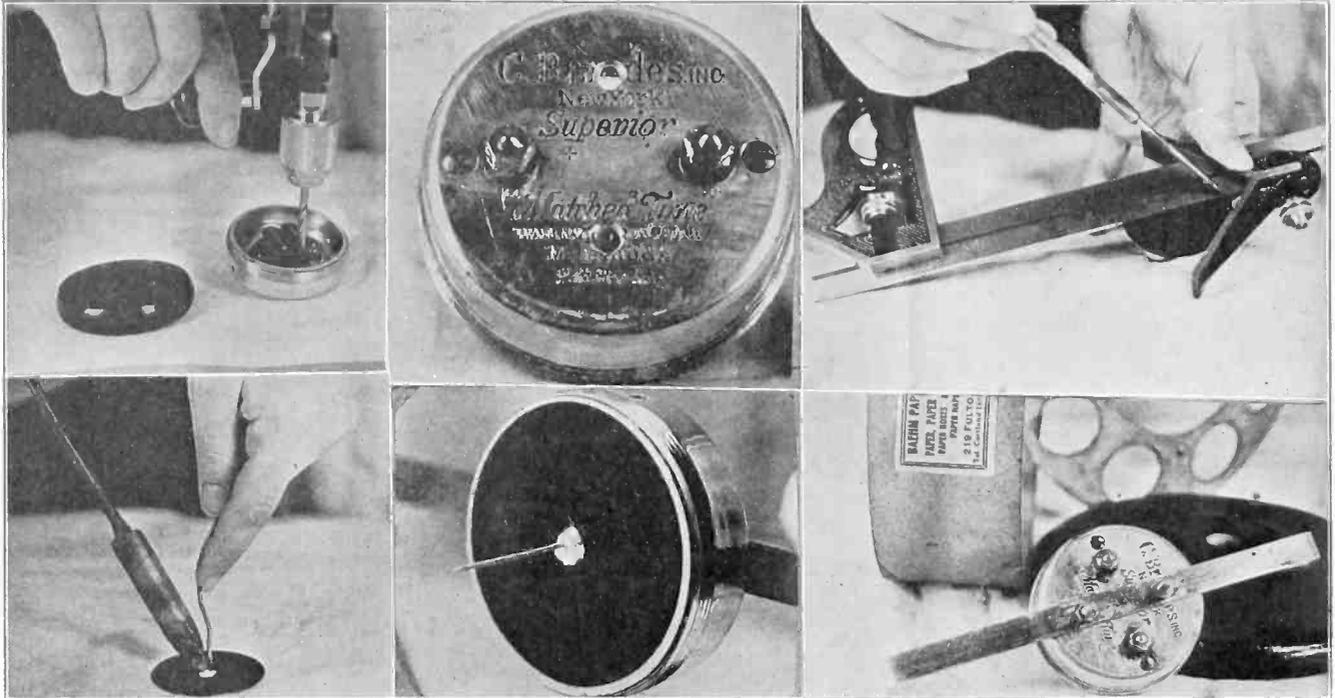


FIG. 5, left, shows how, after the flaps are glued together to restore the cardboard disc to a firm unit, the shellac is applied. Fig. 6, center, shows the method of using the embroidery hoops to enclose the speaker diaphragm, which is parchment, gold gauze, Georgette crepe, China silk or other silk. Bond paper may be used. The excess is cut away. (Fig. 7.).

# Stages of Speaker Construction



THE CAP is removed from the unit (Fig. 8, top, left) and two holes are bored through the casing. The result, as seen from the reverse side, is shown in Fig. 9, top, center. A centering attachment, handy but not vital in this construction work, is revealed in Fig. 10. An ordinary pin (Fig. 11, lower, left) is soldered on the diaphragm of the unit. This is to be distinguished from

the diaphragm of the speaker, which is of parchment, silk or other material. When the unit diaphragm is replaced, with the pin fastened to it, it looks as shown in Fig. 12 (lower center). The brass or copper strip is secured to the housing of the unit, as shown in Fig. 13, lower, right. Two  $\frac{1}{8}$ " machine screws,  $\frac{6}{32}$  size, are then inserted through the holes drilled in the unit

casing and passed through corresponding holes in the brass or copper strip, which is secured to the unit by tightening a nut on each screw. The two other nuts on the unit shown in this photo (Fig. 13) are for the telephone cord connections.

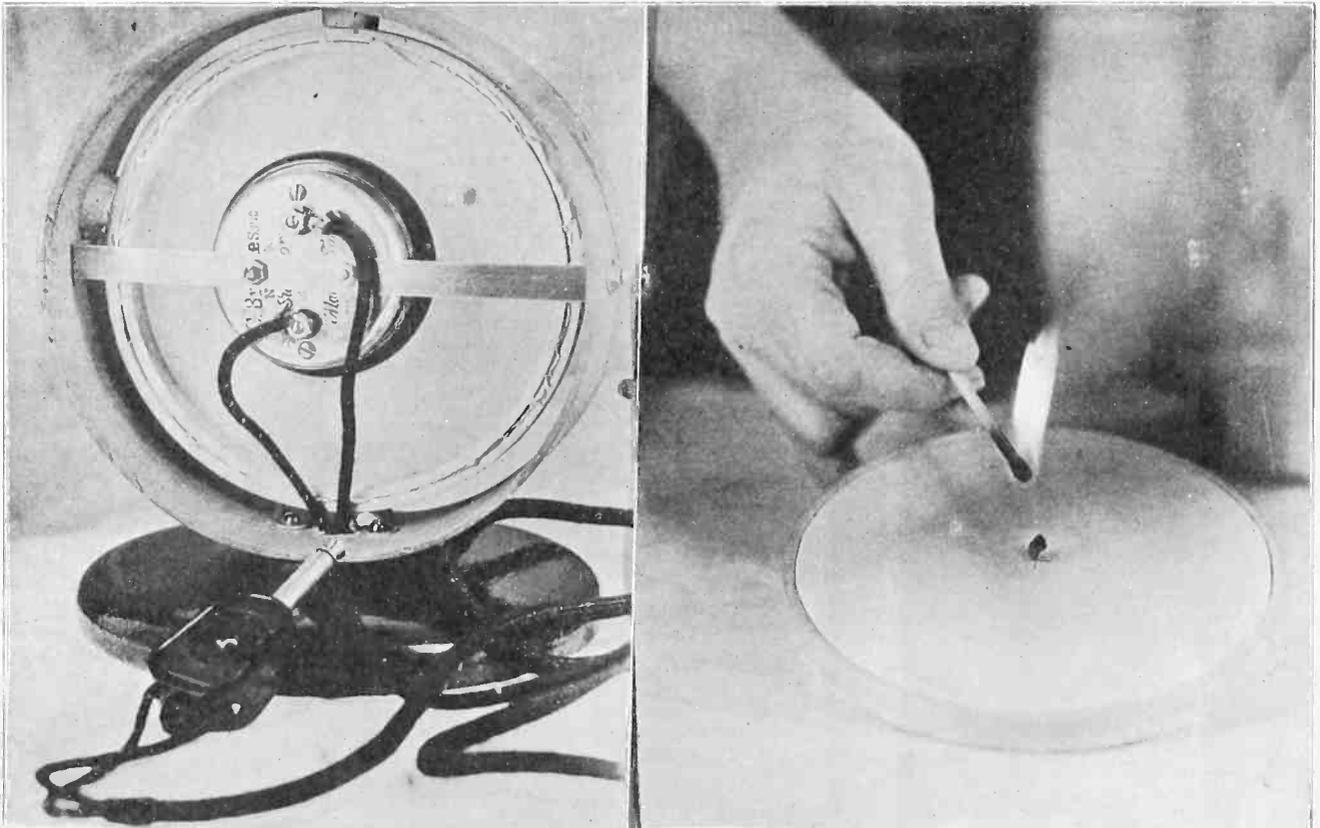


FIG. 17 (left) shows the phone cords attached to the binding posts on the metal housing of the unit. The tipped ends of the cords are passed through a hole drilled in the bottom of the tubular frame or support of the speaker and are connected externally to a phone plug, which is later inserted in the speaker jack of the receiver. Fig. 18, right, shows how a little hard beeswax may be placed on the speaker diaphragm and a lighted match used to melt the wax. The wax flows just grazes the top of the wax. When the wax flows the match is quickly lifted away.

sister's newly-washed dresses by rubbing some beeswax on the hot iron's under surface? Ah, ha! I thought you'd remember. Yes, the wax came in a muslin

jacket. Well, you can buy one of those jacketed portions of beeswax and tear off the jacket. Or perhaps the washwoman, who now comes once a week to

take up the same tasks overburdened mother once performed, will have a fag end of a waxer that she will be glad to give you. As for the diaphragm of the

# The Completed Loudspeaker

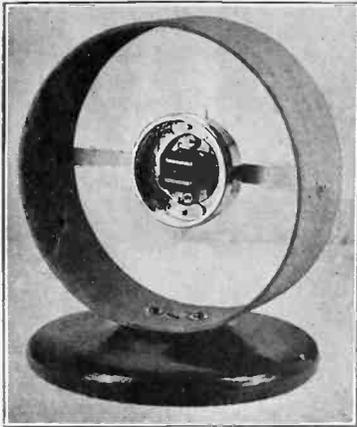


FIG. 14, the wooden base of the speaker, with the tubular frame mounted thereon and the brass or copper rod secured to the tubing. The front of the unit is shown with diaphragm removed.

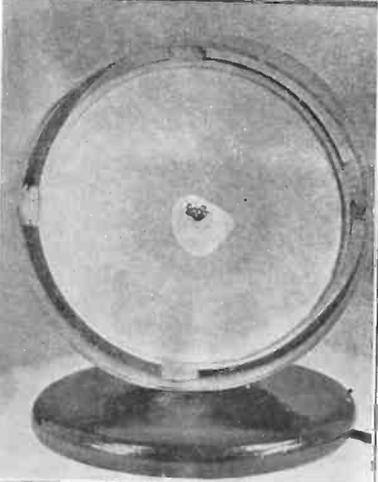
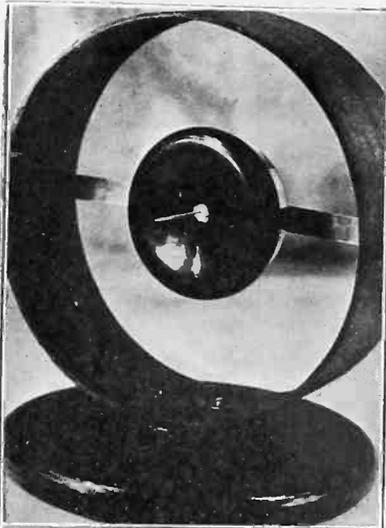
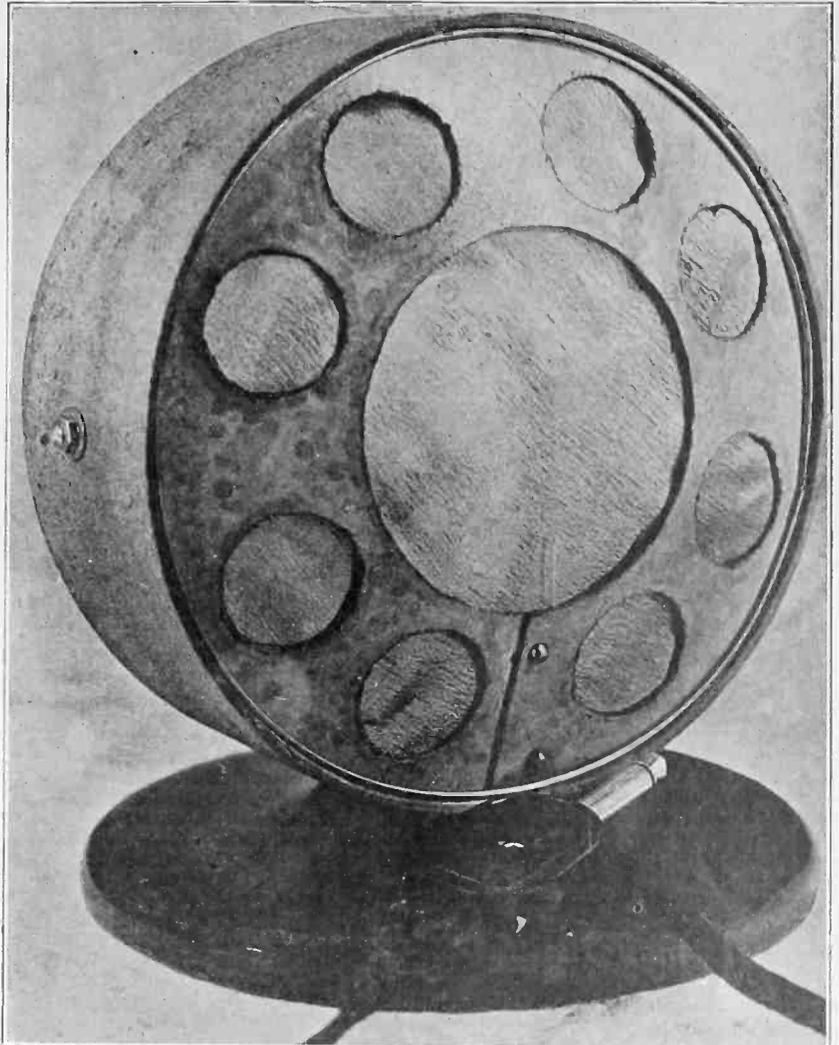


FIG. 15 (top) shows the speaker one stage nearer completion. The diaphragm of the unit, with needle attached, has been fastened by screwing down the rubber cap. The needle protrudes through the natural opening in the cap. The speaker diaphragm is slid on, being punctured by the needle. Beeswax is used to insure solid contact and safeguard against rattles when the speaker is in operation. (Fig. 16, lower).

speaker, that consists of the gold gauze, Georgette crepe or China or other silk. If the men folk renege at buying such feminine stuff for such a masculine purpose as mechanics, then they can spend



THE COMPLETED SPEAKER, showing in detail just how Hayden's finished product appears

a few more dollars for parchment (which is excellent) or use bond paper. An obvious alternative is to send sister to the dry goods store for the silk, or pick some up around the house. The four embroidery hoops may be more than some husky man would care to ask for. By the way, although they are known as 6" hoops, one is just a trifle smaller in diameter, so that the smaller fits into the larger, according to the laws of nature and the revised statutes. The house pin may seem confusing. It is not a pin used to secure a house to the lot, but it's the name, only name I could think of to describe a pin, without some radio fan or engineer imagining I meant some kind of cotter pin. Just an everyday, ordinary, unimaginative pin is meant, the kind that comes in long rows on sky blue paper and which baby is enjoined not to swallow.

Four corks may be obtained in the obvious place.

## About to Begin

Now it's about time to distribute some deft hints about how to convert the list of parts into a speaker.

See Fig. 1 for a view of some of the essentials. The wooden base may be any convenient sort, such as the base of a discarded loop, or the base sold in chain stores for home-constructed loops, or may be resurrected from the store-room where repose the furniture casualties. The em-

broidery hoops being 6" diameter, the cardboard frame that will support the speaker will be 8" diameter. That is the dark-looking tubing in Fig. 1. Therefore first make the speaker supporting frame from the 2" wide cardboard. Using this same 24" cardboard strip, turn it into tubing form, 8" diameter, and bind the ends with glue or cement. The diameter will be large enough to accommodate the hoops. Screws and nuts may be used for additional binding.

Now pay attention to the other piece of cardboard, the one 8" square. Measure the inside diameter of the frame using this as your guide, measure the radius and set your compass temporarily at this radius (half the diameter). Now extend one compass point  $\frac{1}{4}$ ", so the circle to be described will be  $\frac{1}{2}$ " oversized. Now describe this circle on the 8" square cardboard. Draw a diameter, then a line at right angles to that diameter and similarly bisect the four angles. Now you have eight radiating lines. Draw a circle with a radius 1" smaller than the previous circle (2" diameter now). Set the compass at  $\frac{1}{2}$ " radius, drawing 1" circles centered on the radiating lines and the two circumferences. All this is clearly shown in Fig. 2. Cut the cardboard at the outer circumference. Then cut between two of the small circles and use the scissors on the inside diameter. The result and part

(Continued on page 22)

# The Tuning and Operating Theory of the 1925 Superdyne

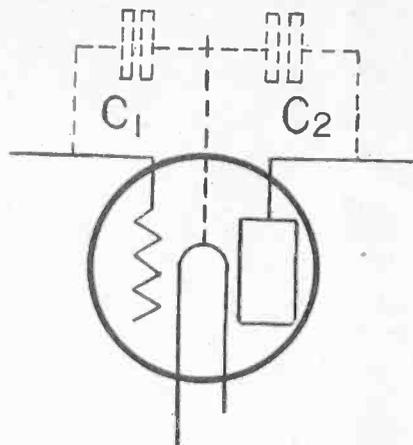


FIG. 1, symbolization of the self-capacity of the tube, sometimes called the internal capacity. The effect of the relationship of the seals above the base of the tube is that of two plates of a condenser. These seals bind the wire leading to the filament, plate and grid in the tube and to the lugs at the base of the tube. The lugs make contact with the socket springs or prongs. It will be seen that there is a double condenser effect, C1, between grid and filament, and C2 between plate and filament. As the filament capacity is common to both plate and grid capacities it can be seen how the feedback within the tube is from plate to grid. When the plate is tuned (as by a variometer or by a variable condenser *and* a coil) to the same wavelength as the grid the effect is that of two tuning forks in resonance—the vibrations of one set up the same vibrations in the other. In the tube this produces regeneration. As over-regeneration produces oscillation, this condition will exist on low waves in RF stages, though the plate is not tuned. Hence some form of neutralization is necessary.

By Herman Bernard

**T**UNING the Superdyne is not nearly as difficult as one would be led to believe. It's all in knowing how.

Just where does the trick lie?

It can not be the condenser that tunes the secondary coil in the radio-frequency stage, i. e., the RF grid coil. That is simply a wavelength control. Anything that merely varies wavelength can not be so difficult to tune, even for the novice. In the Superdyne it is a case of tuning to wavelength, and something else. That "something else" causes the difficulty. It is the reverse feedback.

There are several types of Superdyne circuits, or, rather, several variations of the Superdyne hookup. The one first brought out by RADIO WORLD almost a year ago consisted of a stage of tuned radio-frequency amplification, with a condenser tuning a coil in the plate of the RF tube and the current fed back from the plate to the grid in a reverse fashion, through a tickler or rotary coil inside the variocoupler; then a fixed grid condenser, connected from the plate post of the RF tube to the grid post of the detector tube, carried the RF currents over to the detector, the leak being mounted from the grid post of the detector to the A+. The two audio stages were the conventional transformer-coupled stages.

This circuit had three controls—one the variable condenser tuning the grid coil of the RF tube, another the variable condenser tuning the plate coil and the other the tickler. All Superdyne circuits have the same tuning ease in the first control, the variable condenser tuning the RF grid.

Now, the plate coil condenser was rather critical in its tuning, for two reasons—first, because the dial setting was not altogether independent of the setting of the dial actuating the grid tuning condenser, and second, because the plate condenser and the tickler were not altogether independent of each other, the tickler being used as an adjunctive regeneration control.

The tickler, indeed, might be placed in one position and left there, in any Superdyne, but only at a sacrifice of effectiveness. If fixed coupling were used, one control would be eliminated, but the neutralization would be efficient only over a limited band of wavelengths. The action of the Superdyne is the production of feedback in a positive manner (as in tuning the plate to obtain regeneration) and the negating of this action by a feedback in the reverse direction, through the tickler action. As the negative feedback must be regulated for wavelength variations, the trick in tuning is to have both positive and negative settings in exact opposition, so that the plus and the minus cancel. This is the end achieved in the Neutrodyne by the employment of small capacities to offset, by their negative action, the positive automatic feedback between grid and plate occasioned by the capacitive coupling within the tubes themselves. The filament, plate and grid of each tube is sealed in glass that has virtually the same temperature coefficient as the filament, grid and plate. The bunching of these glass seals constitutes them the plates of a fixed condenser, and thus plate current is fed back to grid current inside the tube. Unless some method is used to overcome this effect, where multi-stage RF is used, or only one regenerative RF stage, oscillation, especially on the lower waves, will get beyond control. Therefore the reverse feedback method is used in the Superdyne to balance even the externally increased regeneration produced by tuning the plate coil.

In tuning such a set, therefore, the coupling of the tickler should be at about two-thirds, that is, an angle of about 30 degrees. This is experimental. The dial of the condenser tuning the RF grid and the one the plate coil are then rotated simultaneously until a whistle is heard, whereupon the tickler setting is varied until the whistle and even the rushing sound of the carrier wave disappear. Then the adjustments of the two condenser settings are slightly varied until volume is maximum without distortion.

All this, however, is rather more than is necessary, if a correctly designed circuit is used, and that was the reason for designing the RADIO WORLD'S 1925 Model 4-Tube DX Superdyne (issues of January 10, 17 and 24; Trouble Shooting article, January 31). Here the condenser-tuned plate coil was eliminated. Instead a radio-frequency coupling transformer was used. Its secondary was tuned by a variable condenser so constituted that with one motion both the RFT secondary and the secondary of the variocoupler were tuned by the one motion. This did not make the tuning any harder, for the condenser operated on coils that were taken out of the critical part of the circuit and included in only so much of the circuit as depended on wavelength. The distinction is that while the tickler is not a wavelength control in any form of

Superdyne or other regenerative set, the feedback is governed by the wavelength. While the set may work fairly well, over the band from 450 to 600 meters, without ever moving the tickler, the amplification factor is inconstant, and full benefit from the feedback is lost. Also, by loosening the coupling the station may be almost completely tuned out in every case, and completely tuned out in other instances, especially on low wavelengths (high frequencies).

Thus in the 1925 model Superdyne there are two controls. The primary of the RFT consists of a few turns, from four up to approximately 16, depending on the diameter of the form, and is therefore called aperiodic. It has a natural wavelength below the lowest wave of the broadcast band, hence is commonly referred to as having no natural period. But the tuning of the secondary of the RFT produces relatively sharp tuning, and the wavelength is transferred by induction back to the primary, which to this extent is aperiodic no more, for the field about these closely coupled windings is of the same wavelength for both. This tuning effect, however, is not so critical as that of a conductively-coupled plate tuned by a variable condenser. It was found that the over-sharpness of conductive tuning was responsible for considerable of the previous difficulty in tuning. Therefore, while the controls were reduced from three to two, at the same time a front attack was made on the second most critical source of tuning, and success resulted, because there was less oscillation to overcome.

The tickler, however, remained unchanged as to its function and utility. Hence, this one source of critical tuning still remains. On the higher waves, however, there is no trouble whatever. The same tickler setting may be used, in most such sets, for stations from 500 to 600 meters, unless the station is several hundred miles away. For DX adjustment of feedback to coincide with the highest amplification factor for that wavelength should be made. That is due to the broad effect of the waves emitted by local stations, the distant ones narrowing down, due to atmospheric and power losses.

Even on the low waves a particular setting of the tickler will be useful in tuning in stations of different wavelengths, except distant stations, hence to a large extent the 1925 model may be operated as 1-dial set. But where maximum volume is desired, tickler adjustment should be made. The possibility is cited, but the 1-dial course is not recommended.

Therefore, the tuning of the 1925 model Superdyne resolves itself into (a) the wavelength setting for the only condenser used in the circuit and (b) the correct adjustment of the tickler. The wavelength setting may be determined in degrees of the dial wholly by experience, or partly by experience and the rest by plotting the curve. This chart or graph was published in the constructional article for given coils and aerial (65-foot aerial, with 30-foot leadin). The chart may vary, even with the use of the same coils, if the aerial is changed. It is all right to use 100 feet over all (aerial plus leadin plus wire connecting to ground) or even 125 feet.

As the wavelength tuning is constant there will be no source of trouble here. Vernier is not absolutely necessary, but

# How the Superdyne Method Excels the Neutrodyne

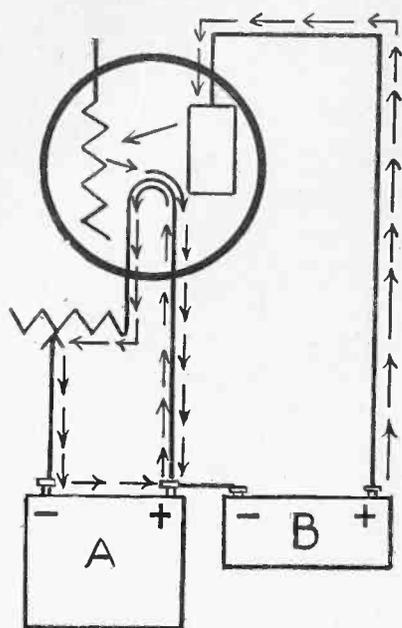


FIG. 2, the path of the direct current in the tube. The current travels from negative to positive. One filament lead (in this case F+) is a common conductor of A and B battery current

highly advisable and was prescribed in the constructional article. The DX tuning is sharp and those desiring the utmost DX of which this set is capable should use vernier. And, by the way, there are few, if any, 4-tube sets that get DX so consistently and with such volume and clarity as does the 1925 model Superdyne. Often DX comes in with almost as much volume as locals.

With all trouble eliminated from the wavelength control let us see how the set operates on the tickler. Tune in a low-wavelength station, say about 300 to 350 meters. Note the dial setting on the tickler. It will be near 45 degrees (zero coupling).

The tickler in respect to the secondary is meant, not the dial setting in degrees. What the dial reading will be depends on whether a clockwise or counterclockwise dial is used. Also, the reversal of the feedback reverses the reading, hence maximum coupling would then be represented by the opposite end. The coupling is tight, full or maximum when the windings on secondary and tickler are parallel.

Now, with the point of highest efficient established for a given low wave, say, 350 meters, you will find that lower waves require looser coupling, and higher waves tighter coupling. Thus major regeneration as well as the degree of negative feedback control are accomplished by use of the tickler. The oscillations are successfully suppressed in the receiver, but this does not necessarily safeguard the set against radiation.

The desired goal is reached when over-regeneration, instead of producing a sharp, whining whistle, causes a low, deep growl. You hear the note of fields pucking each other. Here radiation is at a minimum. Not only is the oscillation suppressed (which always refers to the receiver) but the radiation is blocked by the same neutralizing method (which refers to the neighbors). But if the tuning is mishandled the set will radiate. Correctly tuned, it may radiate, but this can

be kept under safe control. Of course the radiation occurs, if at all, only during the tuning-in process. But if the tuning is done skilfully, which may be accomplished usually after about two weeks' experience, the set may be tuned almost as quietly as the Neutrodyne. The reason why it cannot always come up to the quietness of the Neutrodyne is that the Neutrodon settings are the same for all wavelengths (that is, are measured to the tube capacities on a low wave, rather than to a given wavelength exclusively), while the neutralization in the Superdyne is varied in step with the wavelength. That is one reason why the Superdyne, with four tubes, produces a higher amplification factor than does the Neutrodyne with five tubes. The Superdyne uses regeneration, which is equal to  $1\frac{1}{2}$  or 2 stages of non-regenerative RF, and besides affords a system of oscillation control which operates at maximum efficiency at all waves. In the Neutrodyne the troublesome problem of the low waves is solved, but at some expense to the efficiency of the set on the high waves. Indeed, even with a tuned plate to supply regeneration in a Neutrodyne, the regeneration for this reason is usually ineffective above 450 meters, but very helpful below that in bringing in more DX.

If the Superdyne does produce a whistle the correct tickler dial setting will block the emission of the heterodyned note into the air. The use of the UV200 or C300 tube for the detector enables one to be guided in the tickler setting by the sound in the phones or speaker. With the correct tickler setting the signals come in with that volume and quality for which the Superdyne is famous. Triflingly vary the tickler setting (or the rheostat setting, for there is a compensating effect between them due to electronic flow) and lo—you don't hear a thing save a rushing noise!

Experience at tuning the Superdyne will teach you more than all that ever was written on the subject, but it is helpful to know the operations taking place, for that knowledge serves as a guide.

**This Nameplate  
Sent Free!**



Put it on the panel when you build RADIO WORLD'S 1925 Model 4-Tube DX Superdyne. Send in your order now. As these beautifully colored nameplates are now being manufactured it will take a little time before we can deliver them. They are of the transfer type (decalcomania) and may be put on just as easily after the set is built. Address Superdyne Editor, RADIO WORLD, 1493 Broadway, New York City.

#### GET ON THE LIST

- C. H. Peters, 1630 Washington St., Davenport, Ia.  
John A. Dutra, Box 345, Provincetown, Mass.  
John J. Davis, 812 Washington St., S. Braintree, Mass.  
Leonard Gordon, Jr., 1840 W. 28th St., Cleveland, O.  
Jack Simpson, Box 346, Quanah, Tex.  
G. Calvelli, 2362 Webster Ave., Bronx, N. Y.  
Stanley Twarog, 5120 Ashburn St., New Bedford, Mass.  
S. B. Woodman, 519 E. 12th, Bartlesville, Okla.  
R. Swain, 247 Greenwich St., Brantford, Ont., Canada.  
Dr. J. E. Vassallo, 499 Medford St., Malden, Mass.  
E. Hinkel, 1478 R. Michigan Ave., Columbus, O.  
R. E. Olwine, 3842 Girard Ave., Phila., Pa.  
Edwin F. Hillard, 129 DeKalb Ave., Brooklyn, N. Y.  
H. A. Hallihan, 320 Fairmount Ave., Jersey City, N. J.  
Frank L. Levi, University Shop, Columbia, Mo.  
Deboss Scott, 133 N. Butrick St., Waukegan, Ill.  
Lewis Gewalt, Breckenridge, Minn.  
A. D. Nichols, Springfield, N. J.  
N. F. Beaver, 1447 E. Fulton St., Columbus, O.  
Andrew Lash, 21 Hermann St., S. River, N. J.  
Paul O. Nixon, Toulon, Ill.  
Ed. Sampson, Consol, Ia.  
James Heanck, 830 24th St., Ogden, Utah.  
Hubert B. Love, 118 N. Beaton St., Corsicana, Tex.  
M. H. Dubur, Peoples Shoe Store, Girard, Ill.  
F. B. Wilbur, Havre, Mont.

## 1925 Superdyne Articles Sell Out Bruno's Stock

National Condenser Certified; Also Metric, Used With  
Bremer-Tully Coils

THE Bruno Ultra-Vario condenser, .0005 mfd., used in building the 1925 Model DX Superdyne is very hard to obtain, fans report. Investigation showed that the certification of this condenser for this Superdyne, in articles published in the January 10, 17 and 24 issues, completely sold out Bruno's stock of these condensers, although the firm should be able to catch up with orders before this issue is on sale. Dealers advertising the kit complained of their inability to get the condensers, only six a day being supplied them, while demand was from 30 to 40 a day in some cases, more in others.

The Bruno is a double condenser, i.e., has one rotor and two stators, tuning two coils with one motion. The National

Company makes a similar .0005 condenser. This may be used, or the Bruno condenser, with coils as already certified. These coils include: Wallace, Eastern Coil (pickle bottle); ARC and Globe.

LA .00035 mfd. double condenser is manufactured by the Metric Instrument Co. and is likewise very good for this circuit, but requires more inductance. In conjunction with this condenser the Bremer-Tully coupler and RF transformer are certified for use.

The Metric condenser, despite its lower capacity, if used in conjunction with the Bremer-Tully coils, tunes in the entire wavelength band and 20 meters more. The National and Bruno condensers, used with any of the other coils, tune in the band plus 35 extra meters.

# The Radio University



Question and Answer Department conducted by RADIO WORLD for its Readers by its Staff of Experts. Address Letters to The Radio University, RADIO WORLD, 1483 Broadway, New York City.

an RF amplifier to my Radiola Super-Heterodyne. Can you tell me how?—M. H. Cannell, Westminster Street, at Mathewson, Providence, R. I.  
It is not advisable to add RF ahead of this Super-Heterodyne. You already have three stages of RF.

ON Lieut. O'Rourke's set of Dec. 6, I get fine results but cannot get below 330 meters.—M. M. Silva, Colfax, Calif.

Take off 10 to 12 turns from the secondary winding. Only by experiment can you determine what number of turns will bring it down low enough to cover the lower waveband. You neglected stating how high the set will go in the waveband, but we take it for granted that it goes above 600, since it doesn't go below 330.

I NOW have a 3-tube Erla Reflex. I am considering changing it over to a 5-tuber. Do you think that it will be better for distance and volume? (2) Could I tune this set with my 11 and 23-plate condenser? (3) Are the ratio of

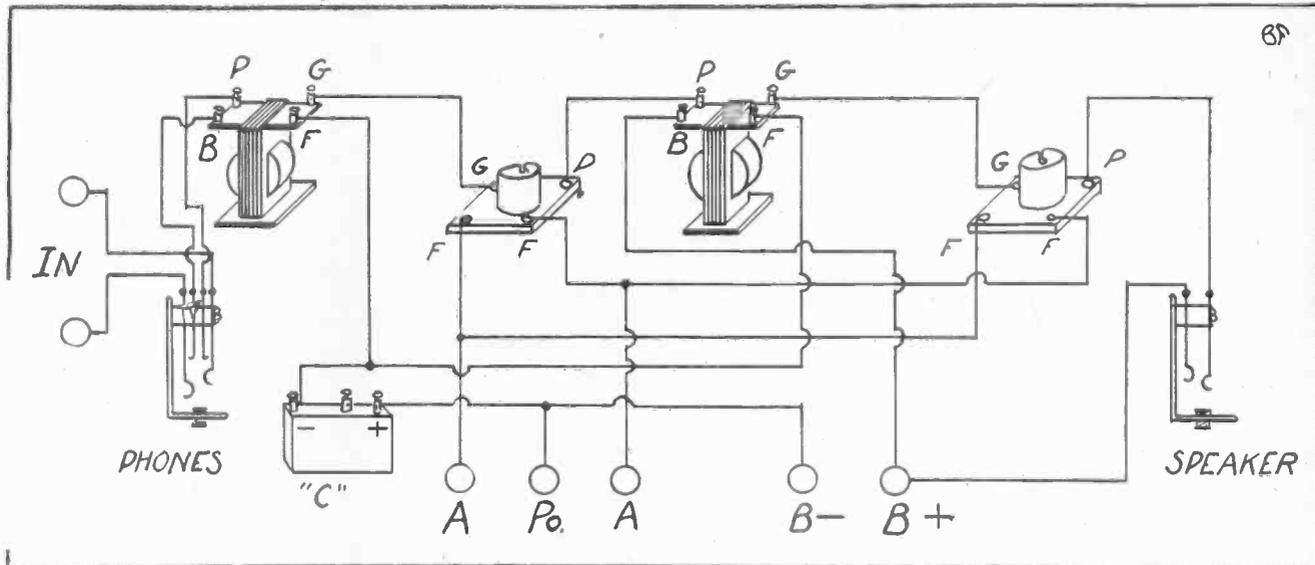


FIG. 77—A 2-stage audio amplifier illustrated. The IN is connected to the plate and plus B detector battery. AC battery should always be used on the amplifier to clear the tone and save the B battery.

WILL YOU give me a diagram of a 2-stage amplifier, giving illustrations of each instrument and the wiring leading from it?—Al. Oberender, 367 75th St., Brooklyn, N. Y.

Fig. 77 is the circuit you request. AC battery is included.

REFERRING to Lt. O'Rourke's "Wiz" as described in the issue of Nov. 29, I wish you would tell me if it would matter if I wind the coils on a bakelite form? (2) Can I use a 23-plate vernier condenser?—Isidore Weiss, 608 E. 9th St., New York City.

(1) Yes. (2) Yes.

I BUILT Milton Hirsch's circuit in the issue of Oct. 25 and find my highest expectations realized. However, I can't get WNYC. Can you tell me the reason?—Gustave Macher, 90 Lockman Ave., Mariners Harbor, S. I., N. Y.

Add a few turns to the secondary.

I BUILT the 4-tube Superdyne designed by J. E. Anderson but the farthest distance that I can get is KOA, Denver, Col. I have heard WBAP and KGO, but the set does not come up to my expectations. Is there any way to eliminate the whistle?—Bernard Brannon, 1318 N. Alden St., Phila., Pa.

Your DX record should satisfy you. You can eliminate the whistle only by correct tuning, immediately upon hearing the station.

HOW can I stop the grating noise on my Ultradyne when I turn the potentiometer? (2) Why will signals come in louder when I touch the grid of the first audio transformer?—T. L. Reynolds, Henryetta, Okla.

The potentiometer probably is not making a through circuit throughout the range. The wire may be corroded, thus destroying the security and smoothness necessary for contact in this instrument. (2) Place a gridleak and condenser across the first audio transformer. However, before trying the gridleak condenser make sure that the increase in volume is not due to a body effect when you place your hand behind the panel.

WILL the standard AF circuit work all right with the Hayden 1-tube DX Dandy as described in the issue of Oct. 4? (2) Will Erla 6-to-1 and 3½-to-1 transformers be all right for the audio? (3) If separate B batteries are used for the detector and amplifiers will this

Wm. C. Pfingsten, 209 S. Jackson St., Belleville, Ill.

(1) Yes. (2) Yes. (3) Yes. (4) A 4.5-volt C battery on the grid return of the amplifier stages.

I AM about to build a Neutrodyne. After reading Hubert E. Hayden's article in the Jan. 10 issue I have decided to follow his instructions. (1) Is the primary wound in the same direction as the secondary? (2) How should these coils be mounted?—Stanley S. Sykora, 4242 Leonard Ave., St. Bernard, O.

(1) Yes. (2) At an angle of 57.3 degrees, mounted on the rear of the condenser.

REFERRING to Caldwell's 5-tube reflex as described in the issue of Dec. 6, would it be all right to use Acme R2 transformers throughout? (2) Would it be all right to use Tri-Coil transformers? (3) Can the coils be wound with smaller wire? (4) How many 4.5-volt B batteries are necessary?—Frank Conklin, 116 Sherman St., Dennison, O.

(1) Not one ratio for all stages, if maximum results are to be attained. (2) Yes, of varying ratios. (3) Yes. (4) One.

WILL you kindly tell me which do your personally think the best, the original Tuska Superdyne, the Anderson Superdyne or the Bernard 1925 Superdyne and why?—M. Santonocito, 15 Globe Ave., Jamaica, N. Y.

Both the Anderson and the Bernard Superdynes are superior to the original Tuska, as is the new Tuska.

WILL you kindly tell me whether or not a small X-Ray machine or Geissler tubes set up an electrical interference?—Wm. A. Croll, 14 Lincoln Ave., Norristown, Pa.

Yes, if any of the high-frequency machines are near radio apparatus you will certainly suffer interference from it.

I BUILT a set similar to the Freshman Masterpiece but the set oscillates to such an extent that I cannot get anything below 285 meters.—N. Kalt, 1264 49th St., Brooklyn, N. Y.

To prevent oscillation the coils must be properly constructed and mounted. Mount them close to the condensers. You may use neutralizing condensers, as in the standard Neutrodyne, by placing one across each RF tube, across the

turns on the RF transformers different? (4) In what stage does a 6-to-1 AF transformer go? (5) Would you recommend a jack after the 3rd tube for local reception?—H. Oran, 2677 W. Euclid Ave., Detroit, Mich.

(1) Yes. (2) Yes. (3) Yes. (4) First. (5) That can be done but is not necessary.

WILL you kindly give more explicit instructions as to the winding of the special 3-circuit tuning inductance in the 3-tube DX Superflex (issue of Dec. 27)?—W. G. Robinson, 268 Alexander St., Rochester, N. Y.

Fig. 82 should clear up the misunderstanding as to the placing of these coils. The primary, L3, is 8 turns of No. 22DCC on a form having a core diameter of 1½"; secondary, wound on the same form, (L4), 50 turns. L5 is on the rotary coil, 35 turns on a form having a core diameter of 1". Both coils, when at maximum, should be as close together as possible. At minimum the coils will be practically side by side, but at maximum the tickler coil will be to the rear of the coupling coils.

DOES the 1-knob set work on the same principle as the Superdyne?—Murray Homler, 876 New Lots Ave., Brooklyn, N. Y.

No.

IN reference to Gelula's Superflex, why do signals come in "mushy," although distance is very good?—Laurence Holloway, Leetonia, O.

See that all coils are wound in the same direction. This is very important. Place a .002 condenser across the primary of the first audio stage.

IN Neutrodyne are both coils wound in the same direction? (2) With .0005 condensers, how many turns should I wind on the coils?—F. Kliverkaltz, Granby, Conn.

(1) Yes. (2) Primary 8 turns; secondary 50 turns on a 3" form.

IS a license necessary for a transmittor using a Ford Spark coil? (2) What ratio AF transformers are best for a Superdyne?—Wilber Erickson, Milaca, Minn.

(1) Don't attempt to transmit with anything without a license. At any rate, don't use a spark coil if you have any consideration for your neighbors within a mile radius. For first stage 5-to-1, second stage 3 or 3½-to-1, work well. But the ratios are not all-important. Two grid 5-to-1 AFT work splendidly.

is a jumble and the voice unintelligible? (2) What ratio transformers should I use if this would be all right? (3) I am using 192 tubes and do not get enough volume. (4) May one stage of impedance-coupled RF amplification be added to a 4-circuit tuner?—J. M. McGuire, Box 34, Clymer, Pa.

(1) Yes, if each transformer is well shielded, separate B batteries are used for each tube and the hookup wired very carefully. (2) 2/4, 3 or 3 1/2 to-1 for all stages, or if an assortment of these ratios is used, 3 1/2 first, 3 second, 2 1/4 last. Success is difficult and advisability doubtful. (3) Yes, but the gain is trivial.

I AM building the 3-tube Superflex by Abner J. Gelula as described in the issue of Dec. 27. Please show by a drawing a clearer view of the relationship between the coils that control the regeneration.—Leo Finkelstein, 213 Broadway, Asheville, N. C.

Fig. 78 gives a clearer view of the coupling coils.

MY Ambassador set works well in Jersey, but at Poughkeepsie, N. Y., it operates very poorly.—Walter T. Tucker, 23 Paterson St., Jersey City, N. J.

The aerial should be 100 feet in length and the cold water pipe used for ground.

WOULD a transmitting license be necessary for a small transmitting station? (2) The author of a transmitting circuit does not give the wavelength; how may this be determined? (3) If I have to get a license, from whom do I get it? (4) What is the cost? What are the requirements to pass the exam? (5) The range of the transmitter is but 5 to 25 miles.—Robert L. Nellis, S. Franklin St., Robinson, Ill.

(1) Yes, for any type of transmitter. (2) Wavelength in transmission may be determined only by experiment. The author can never tell you the wavelength of the transmitter. It may be determined several ways: Set your receiving outfit for 190 to 200-meter reception. When you hear yourself with volume, that is the approximate wave. However, if you can get someone else, at a distance, to listen to your signals, he can better determine the wave and decrement (sharpness). The safest way, however, is to use a wavemeter. (3) From the Radio Inspector, in your case, the 9th district, Chicago. (4) No charge. You must be able to read, at least 12 words per minute in code (Continental). You must be acquainted with the ins and outs of the transmitting laws. You must know theory. (5) It makes no difference whether the reception can be heard only around the block or for 1,000 miles. An operator's and station license are required.

I AM going to use resistance-coupled amplification with my Magnavox loudspeaker. Do you think that I will experience any difficulty using this type of amplification with the loudspeaker?—A. F. Steiner, RFD 3-sec. A-Box 5, Ft. Smith, Ark.

IS THERE any such thing as a long-distance crystal set?—Joe H. Morgan, Winona, Miss.  
Distance in any set, especially a crystal, is dependent upon many factors. Location, aerial, ground, sensitivity of detector, instruments used, skill of operator, etc., all have to do with distance. However, to receive with comfortable volume on the phones, a consistent distance of 50-miles on a crystal may be considered good.

THE PLATE condenser in my Reinhart set doesn't seem to have any effect upon tuning. Should this be the case in this circuit?—John Carrig, 70 Willow St., Oil City, Pa.

It should have an effect on regeneration, which must be varied as the wavelength is changed. But it is not a direct wavelength control, only a control of feedback.

I STARTED to build the 5-tube reflex as published in the issue of Dec. 15, but, as you say, the range of the set is only approximately 500 miles. Is there any set, at any price, that will cover around 2,000 miles on a loop?—Marshall Keith, Crandon, Wis.

Build a Super-Heterodyne or Ultradyn, and use it with a 4-foot loop.

USING an 11-plate variable condenser, how many feet of wire should I use for the primary and secondary of my transformer on a Neutrodyne? (2) Will I need neutralizing condensers? (3) If I use regeneration on the Neutrodyne, will it improve DX?—Earl Haupt, Evergreen, Colo.

(1) 55 feet for the secondary wound on a 3 1/2" form. Primary wound right over the secondary wind 7 1/2 feet of wire. Use No. 20 DCC wire. (2) Yes. (3) Yes. See the issue of Jan. 31.

IN Herman Bernard's 1-tube Superdye as described in the issue of Dec. 20, can I use a 23-plate in place of the 43-plate variable condenser? (2) Would a hookup using one variocoupler and two variometers be good for DX? (3) How can I make a variometer?—J. C. Overstreet, Jr., Plumerville, Ark.

(1) Yes; add ten turns to the coil. (2) Yes, but tuning will be found a little more difficult than in the average set. However, with a variometer in the plate, a variometer in the grid and a tapped variocoupler or a coupler using the aperiodic primary, the circuit, in skilled hands, is hard to surpass for either volume or sensitivity. Selectivity is also high. (3) Get a 4" diameter and a 3"

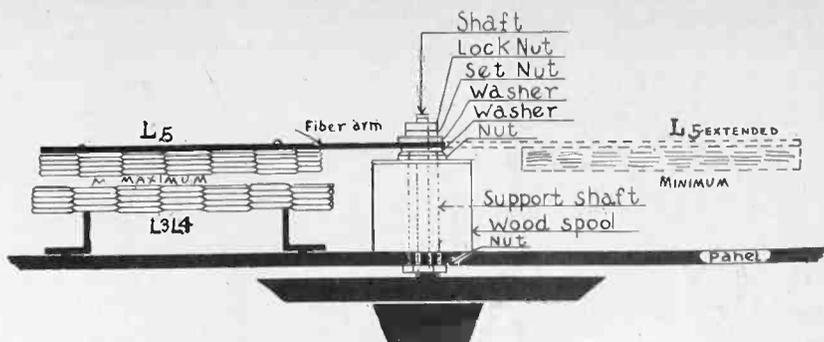


FIG. 78, showing exactly how minimum and maximum inductive effects are obtained in the 3-tube Superflex. L5 is the variable coil, L3 L4 is fixed. The distance between the two coils at maximum should not be greater than 1/4". The wood spool may be a cut-down cotton spool, the shaft a bolt with the head removed. Set-nuts keep the coil rigid throughout its rotation. If you have trouble in getting the coil to remain where set, a balance weight may be placed at the opposite end of the fiber arm.

diameter form, one small enough to rotate within the other. On each form wind 35 turns of No. 22 DCC wire. Connect the two coils in series, you will then have two leads left: one from the stator and one from the rotor. These are your two leads from the variometer. A small brass or bakelite rod may be fastened to the rotor form for varying. The wavelength range of this instrument will be approximately 200 to 550, covering the whole waveband.

PLEASE give me the names of the companies manufacturing the Neutrodyne. I mean the licensees.—Paul C. Roby, Box 121, Shreve, Ohio.  
The 17 licensees are: Adler-Royal, Amrad, Medford Hillsdale, Mass.; Eagle, 20 Boyden St., Newark, N. J.; Fada, 1581 Jerome Ave., New York City; Freed-Eisemann, Sperry Bldg., Manhattan Bldg. Plaza, New York City; Garot, 120 Pacific St., Newark, N. J.; Gillilan, 1815 W. 16th St., Los Angeles, Cal.; Howard, 4248 Northwestern Ave., Chicago, Ill.; Lafayette, Malone-Lemmon,

342 Madison Ave., New York City; Murdock, 366 Washington Ave., Chelsea, Mass.; Kink-Hinners, Silverton, 1819 Broadway, New York City; Stromberg-Carlson, 1060 University Ave., Rochester, N. Y.; Thompson, 30 Church St., New York City; Ware, 160 Duane St., New York City; Work-Rite, 1806 E. 30th St., Cleveland, O. These manufacturers have a combined floor space in their plants, exclusive of contributory plants making most of the cabinets and certain of the parts, amounting to approximately 500,000 square feet. Their employees number about 5,000.

MY Superdye (3-tube set by Herman Bernard, December 27 issue) works fine, but there is a little body capacity in the plate coil.—Chester B. Knox, Santa Paula, Cal.

Connect the detector plate to the stator plates of the variable condenser. Move the plate coil farther back from the condenser tuning it. Move the detector tube a little farther back.

## New Broadcasters

WASHINGTON.

SIX new class A broadcasting stations have been licensed by the Radio Bureau, one station transferred from class C to A, two stations, from class A to B and two from class C to B.

### NEW STATIONS

Call Station	Meters	Watts
WBRE—Baltimore Radio Exchange, Wilkes-Barre, Pa.	231	10
KFUV—G. Pearson Ward, Springfield, Mo.	252	10
KFUW—Earl Wm Lewis, Boberly, Mo.	233	10
WGBK—Lawrence W. Campbell, Johnstown, Pa.	248	5
WGBL—Albert H. Ernst, Elyria, Ohio	227	10
WSRF—Harden Sales & Service, Broadlands, Ill.	233	10

### TRANSFER CLASS C TO CLASS A

WKY—WKY Radio Shop, Okla. City, Okla.	275	100
---------------------------------------	-----	-----

### TRANSFER CLASS A TO CLASS B

WEMC—Emanuel Missionary Col., Berrien Springs, Mich.	285.5	500
WJJD—Supreme Lodge, Loyal Order of Moose, Mooseheart, Ill.	302.8	500

### TRANSFER CLASS TO CLASS B

WCAL—St. Olaf College, Northfield, Minn.	336.9	500
WSAC—Clemson Agri. College of S. C., Clemson College, S. C.	336.9	500

**BIG OPPORTUNITIES IN RADIO MANUFACTURING.** We have for sale small parts manufacturing shop which can be quickly converted into a radio manufacturing establishment, located in Mount Vernon, N. Y. Labor plentiful, efficient; reasonable rent. Will sell machinery at bargain prices. Box 5, Radio World.

## Business Opportunities Radio and Electrical

Rates: 50c a line; Minimum, \$1.00

**RADIO MANUFACTURING MAN OF VISION** with \$25,000 to join exploitation, the newest development, most practical radio receiving apparatus (patent pending), fully equipped for production; highest references given and required. Box 1, Radio World.

**RADIO MANUFACTURING CORPORATION;** founder's half interest for sale at \$15,000; New York corporation, distributes nationally; owns valuable trade-marks, licenses and automatic machinery; growing consulting practice and other interests compel retirement from active participation. Box 2, Radio World.

### RADIO DEPARTMENT

Thoroughly experienced radio man wanted to establish department in best store in Elizabeth, N. J.; rental or commission basis; wonderful opportunity. Levy Bros., 76-84 Broad St., Elizabeth, N. J.

**MANUFACTURER'S AGENT CALLING ON** radio-electrical jobbers; Chicago and vicinity, has opening for three additional lines carrying volume business; as we cater to large jobbers. Edelstein, 1804 McCormick Building, Chicago.

**ELECTRICAL ENGINEER, EXPERIENCED** contractor, would invest \$5,000 with services in going electrical concern; can obtain and manage contracts. Box 3, Radio World.

**DO YOU WANT TO INVEST IN A BUSINESS,** or do you wish to sell one? Do you need capital for any legitimate purpose? If so consult us in strict confidence. Personal Finance & Service Exchange, Inc., 141 Broadway, Rector 4195.

## Join RADIO WORLD'S University Club

and Get your own number. Put the number on your queries and they will be answered personally the same day as received. And Get Full Question and Answer Service for the Coming 52 Weeks.

RADIO WORLD, 1493 Broadway, New York City:

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

Name .....

Street .....

City and State .....

# BROADCAST PROGRAMS

## Thursday, February 5

**WMAQ, Chicago, 447.5 (C. S. T.)**—4 P. M., household hour, Mrs. Elizabeth O. Hiller. 4:30, Illinois Federation of Women's clubs. 6, Chicago theatre organ recital. 6:30, Hotel LaSalle orch. 8, talk under the auspices of the Western Railways committee. 8:15, Boy Scout talk. 8:30, to be announced. 9, lecture from University of Chicago. 9:15, weather League program.

**KGO, Oakland, Cal., 512 (P. S. T.)**—10:40 A. M., classroom instruction. 11:30, luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports and weather. 4, concert orch. of the Hotel St. Francis, San Francisco, Vinton La Ferrera conducting. 6:45, final reading, stock reports, weather, S. F. produce news, and news items. 8, "Mrs. Temple's Telegram," a farce in three acts. 10, dance music program.

**WHAS, Louisville, Ky., 400 (C. S. T.)**—4 P. M., Alamo organ, police bulletins, weather, "Just Among Home Folks," readings, 4:55, livestock, produce and grain market. 5, time. 7:30, concert under Mrs. Robert K. Van Pelt, four-minute digest of International Sunday school lesson, four-minute welfare talk, late news, time.

**KOA, Denver, Col., 323 (M. S. T.)**—1 P. M., N. Y. stock reports, livestock, fruit and vegetable report, weather. 3, half hour matinee for housewives. 6, final reading, stock reports, livestock, vegetables and late news.

**WNYC, New York City, 526 (E. S. T.)**—7:30 P. M., police alarms. 7:35, orch. and glee club of Washington Irving High. 8:30, John Carroll, baritone; Benar Barzelay, Polish violinist; Erno Balogh, distinguished Hungarian pianist; Jack Berger and his Ritz Carleton orch; addresses by A. M. Loeb. 10, Francis P. Bent, "Timely Topics." 10:10, piano recital. 10:30, police alarms and weather. 10:35, 12th Street band.

**WGBS, New York City, 316 (E. S. T.)**—10 A. M., timely talks with Terese. 10:10, Arthur J. Hand, baritone. 10:20, Lillian Regan. 10:30, Arthur J. Hand, baritone. 10:40, Lillian Eichler, etiquette talk. 10:50, Arthur J. Hand. 1:30 P. M., Scripture reading. 1:35, Roberto Cantillano, flutist. 2, Leon Kourcik, songs. 3, interview with Charlie Walton. 3:10, Dora Frazier, soprano. 3:20, Louise Rice, graphologist. 3:30, Dora Frazier. 3:40, Don Short, radio talk. 3:50, Dora Frazier. 6, Uncle Geebee. 6:30, Dave Harmon's Cinderella orch. 7, "What the World Is Ooing," Independent Magazine. 7:10, Dave Harmon's Cinderella orch. 7:30, Armand Vescey Concert orch. 8:30, Oliver Saylor, "Footlight and Lamplight." 9:30, program direct from studio. 11, musical program. 11:30, Russian Eagle orch.

**WJZ, New York City, 445 (E. S. T.)**—1 P. M., Nathan Abas' orch. 4, Edward Meyers and his Ragador Five. 4:30, Bernhard Levitov's orch. 5:30, State and Federal reports. 7, Bernhard Levitov's orch. 7:55, "Curse of Courtesy," John B. Kennedy. 8, "Learn a Word a Day." 8:01, Wall Street Review. 8:10, NYU Air College; "Business Economics," Professor Reid L. McClung. 8:30, "Night with Thomas Moore." 10:30, Joseph Knecht's Waldorf Astoria dance.

**WJY, New York City, 405 (E. S. T.)**—7:30 P. M., Ralph De Stefani and his Penatit Point Inn orch. 8:15, Wanamaker Organ recital. 9:30, "What Federal Meat Inspection Means to the American Public." B. Florens McCarthy. 9:45, Cantor A. J. Levinsky, celebrated European tenor. 10, Curtis Burnley Railing, impersonator.

**WDAR, Phila., 395 (E. S. T.)**—11:45 A. M., daily almanac. 12:02 P. M., organ recital; features from the studio; Arcadia concert orch.; Feri Sarkozi, director. 2, Arcadia concert orch.; artist recital. 4:30, artist recital; Mrs. Anna D. Scott in her weely talk on the "Market Basket." 7, question period. 7:30, Dream Daddy.

**KHJ, Los Angeles, 404 (E. S. T.)**—12:30 P. M., music and news. 2:30, matinee musicale. 6, Art Hickman's concert orch. 6:30, children's program. 7:30, Harold Swartz of the Otis Institute, "Art." 7:45, Dr. Philip M. Lovell, "Care of the Body." 8, program through the courtesy of West Coast Theatres. 10, Art Hickman's dance orch.

**KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)**—9:45 A. M., stockman reports. 11:55, time. 12, weather. 12:20 P. M., Institute from Trinity Church. 3:30, closing quotations on hay, grain and feed. 6:15, KDKA Little Symphony orch. 7:15, stockman reports. 7:30, children's period. 8, program by National Stockman and Farmer. 8:30, KDKA Little Symphony orch.; George Kirk, baritone. 9:55, time; weather. 11, concert from the studio.

**WEAF, New York City, 492 (E. S. T.)**—11 A. M., musical program and talk; market and weather reports. 4 P. M., Sally Hamlin, entertainer; Gramatan Four; "Current Events," Dr. William Carter. 6, dinner music; mid-week services; Mabel Corlew, soprano; Doris Bernstein, pianist; Columbia University Lecture Course on Contemporary English Fiction; "Touring"; George Elliott Cooley, tour director; Grosskopf Trio; Wm. Bowen, banjoist; Ben Bernie and his Hotel Roosevelt orch.

**WCCO, Minneapolis, Minn., 417 (C. S. T.)**—10:45 A. M., Betty Crocker, "More About Meat." 2 P. M., "The Popular Concert," Mrs. Agnes Fryberger. 4, "Marriage Insurance," by John Randolph Hornady. 5:30, children's hour. 6:30,

dinner concert. 7:30, farm planning for 1925. Andrew Boss. 7:45, health talk. 8, municipal organ concert, St. Paul Auditorium, Hugo Phuller Goodwin, organist. 10, dance program.

**WGY, Schenectady, N. Y., 380 (E. S. T.)**—2 P. M., music and address, "Shall Our Young People Go to College?" Prof. George M. Yorke. 6:30, Ten Eyck trio. 7:45, book talk, W. F. Jacob. 8, grand opera, "Il Trovatore," by WGY Opera Company. 11:30, organ recital by Stephen E. Boisclair.

**WRC, Washington, D. C., 469 (E. S. T.)**—6:45 P. M., children's hour. 7, dinner music by the Lee House trio. 8, American Automobile Association talk. 8:30, "The Ocean's Resources," by Dr. Lewis Radcliffe. 9:55, time, 10, popular songs, "Dixie Stars." 10:30, Waldorf-Astoria orch.

**KFOA, Seattle, Wash., 455 (P. S. T.)**—4 P. M., The Times, Wm. F. Hoffman's concert orch.

**WIP, Phila., 509 (E. S. T.)**—1 P. M., Gimbel Tea Room orch. 1:30, weather. 3, recital by artists from the Phillip-Jenkins studio. 6, weather. 6:05, dinner music by Benjamin Franklin concert orch. 7, Uncle Wip's roll call and birthday list. 8, "Keeping the Child in Good Physical Condition," by Mr. William A. Stecher. 8:15, 114th Infantry Band of Camden, N. J. 9, the Lyric Trio; Ernestine Bacon, soprano; Florence Haelen, violinist; Dorothy Power, harpist. 11, dance music by Harvey Marburger and his vaudeville orch.

**WOAI, San Antonio, Tex., 394 (C. S. T.)**—9:30, P. M., Jimmie Joy's orch.

**KYW, Chicago, 536 (C. S. T.)**—6:30 A. M., morning exercises. 9:30 late news and comment of the markets. 10:30, farm and home service. 11:35 table talk by Mrs. Anna J. Peterson. 2:35 P. M., "Afternoon Frolic." 6:02, news, financial and final markets. 6:35, children's bedtime story. 7, Joska DeBabary's orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, DeBabary's orch. 8, "Twenty Minutes of Good Reading," by Rev. C. J. Fernin. 8:20, musical program. 9:15, "Safety First" talk, Bert Vanderwari. 10, "Evening at Home."

## Friday, February 6

**WMAQ, Chicago, 447.5 (C. S. T.)**—12:25 P. M., Y. M. C. A. forum. 4, one of a series of talks on English diction by Mrs. J. Elliott Jenkins. 4:30, pupils of Bush conservatory. 5, "The Lullaby Lady," Mrs. Gene Davenport. 6, organ recital from Chicago theatre. 6:30, Hotel LaSalle orch. 8, Weekly Wide-Awake Club program. 8:30, musical geography, Mr. and Mrs. Marx E. Oberndorfer. 9:15, musical program from Gary, Ind.

**KGO, Oakland, Cal., 512 (P. S. T.)**—11:30 A. M., luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports, weather. 3, studio musical program and speaker. 5:30, the Girls' half hour. 6:45, final reading, stock reports, weather, S. F. produce news, and news.

**WHAS, Louisville, Ky., 400 (C. S. T.)**—4 P. M., Alamo Theatre organ, police bulletins, weather, "Just Among Home Folks," readings, late news. 4:55, local markets. 5, time. 7:30, one-hour concert.

**KOA, Denver, Col., 323 (M. S. T.)**—1 P. M., N. Y. stock reports, livestock, fruit and vegetable report, weather. 3, half-hour matinee for housewives. 6, final reading, stock reports, livestock, vegetables and late news. 6:40, Book of Knowledge program. 8, studio program. Complete program of vocal and instrumental solos, duets and quartets; "Road Troubles With the Automobile," by H. L. Johnson.

**WNYC, New York City, 526 (E. S. T.)**—7:30 P. M., police alarms. 7:35, Irving Selzer and his orch. 8:30, Board of Estimate meeting. 8:45, Joseph A. Wiesner, baritone; Lulu Strohm Peters, soprano and University Trio. 9:45, Joseph M. White, tenor. 10:10, dance program. 10:30, police alarms; weather. 10:35, dance program.

**WGBS, New York City, 316 (E. S. T.)**—10 A. M., timely talk with Terese. 10:10, Ella Bayner, soprano. 10:20, Mrs. Maybelle A. Burbridge, beauty talk. 10:30, Ella Bayner. 10:40, Rosario Duprez, history of perfume. 10:50, Ella Bayner. 1:30 P. M., scripture reading. 1:35, Blue Horse Instrumental quartet. 3, interview with Congressman Royal H. Weller. 3:10, Mildred Brewer, soprano. 3:20, Madeline Thayer, "Famous People Broadway Never Meets." 3:30, Mildred Brewer. 3:40, Dr. Alfred G. Robyn. 3:50, Mildred Brewer. 6, Uncle Geebee. 6:30, Abner Gelula, "Your Radio Problems." 6:45, Nat Martin's "Til Say She Is" orch.

**WJZ, New York City, 445 (E. S. T.)**—1 P. M., Hotel Ambassador trio. 2, meeting of the City Federation of Women's Clubs. 4:30, Hotel Belmont tea music. 5:30, State and Federal agricultural reports. 7, Bernhard Levitov's orch. 8, "Learn a Word a Day." 8:01, Wall Street Journal Review. 8:10, NYU Air College; "Public Speaking." 8:40, Chief Steward Ballyn of "Berengaria"; sea songs. 9:10, piano recital direct from Aeolian Hall. 10, Old Guard Ball of City of New York.

**WJY, New York City, 405 (E. S. T.)**—7:30 P. M., Billy Wynne's orch. 8:15, travelogue, "From Burma to Java," by Dr. Sigel Roush. 10, "How Motion Pictures Are Made," Dr. A. B. Hitchens. 10:15, Ace Brigade and his Fourteen Virginians.

**WDAR, Phila., 395 (E. S. T.)**—11:45 A. M., daily almanac. 12:02 P. M., organ recital from the Stanley Theatre; features from the studio; Arcadia concert orch., Prof. Feri Sarkozi, director. 2, Arcadia concert orch.; Playlet by members of the National School of Elocution and Oratory. 4:30, dance program by the Blue Ridge Serenaders. 7:30, Dream Daddy with the boys

and girls. 8, "Turning the Pages," a book review. 8:10, "Fifteen Minutes with Sam Wingfield, humor editor. 10, meeting of the Morning Glory Club; dance orch., Salvatore Pizsa, director. 11, features from the studio.

**KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)**—7 A. M., morning exercises. 8, morning exercises. 9:45, stockman reports. 11:15, time. 12, weather forecast. 12:20 P. M., Sunday school lesson. 3:30, closing quotations on hay, grain and feed. 6:15, concert by Charlie Gaylord's orch. 7:30, children's period. 8:15, "Preparation of Personal Income Tax Returns Under \$10,000," by Mr. Robert D. Ayars. 8:30, concert by the Girls Glee Club. 9:55, time; weather.

**KHJ, Los Angeles, 404 (E. S. T.)**—12:30 P. M., program presenting Perry's orch. 2:30, matinee musicale. 6, Art Hickman's concert orch. 6:30, children's program. 7:30, Gladys DeWitt, "Romance of the Santa Fe Trail." 8, Marian Ralston, composer-pianist. 9, the Piggy Wiggly girls. 10, Art Hickman's dance orch.

**WEAF, New York City, 492 (E. S. T.)**—11 A. M., musical program and talks; market and weather. 4 P. M., Edith Marion, soprano; French lesson by Prof. Wm. Doub-Kerr of Columbia University; children's stories. 6, dinner music; Sir Hobgoblin story by Blanche Elizabeth Wade; Happiness Candy Boys; Hohner Harmony Hour; U. S. Navy Band Moeller Quartet; Meyer Davis orch.

**WCCO, Minneapolis, Minn., 417 (C. S. T.)**—10:45 A. M., home service, "Meal Planning." 2, P. M., woman's hour, "Happy Times at Sheltering Arms," Mrs. W. S. Dunnell. 2:30, matinee musical. 4, "The Lame Duck," by Josephine Dodge Doskam. 5:30, children's hour. 6, sport talk. 6:30, dinner concert. 7:30, lecture, Taxpayers' Association. 7:45, lecture, R. Beethoven Ladies' String quartet. 9, "F. and R. Family."

**WGY, Schenectady, N. Y., 380 (E. S. T.)**—2 P. M., music and talk, "A Guide to Better Homes." 7:45, health talk, "Dog Psychology," by Dr. John March, Professor of Psychology, Union College. 8:20, travelogue, "From Burma to Java," by Dr. Sigel Roush. 10:30, program by WGY orch.

**WRC, Washington, D. C., 469 (E. S. T.)**—4 P. M., Fashion Developments of the Moment, by Eleanor Gunn. 4:10, piano recital by Eleanor Glynn. 4:20, "Beauty and Personality," by Elsie Pierce. 4:30, tea music by Meyer Davis' orch. 6, Children's Hour, by Peggy Albion.

**KFOA, Seattle, Wash., 455 (P. S. T.)**—12:30 P. M., Seattle Chamber of Commerce program. 4, The Times, Wm. F. Hoffman's Concert Orch. 6, Sherman, Clay & Co. program. 8:15, weather. 8:30, The Times program. 10, Eddie Harkness and hi orch.

**WIP, Philadelphia, 509 (E. S. T.)**—1 P. M., Gimbel Tea Room Orch. 1:30, weather. 3, recital. 4, "The Amending Provisions of the American Constitution in Practice," talk by Dr. Herman Amer. 6, weather. 6:05, popular numbers by Mark Fisher and Joe Burke. 6:15, dinner music by Harvey Marburger and his vaudeville orch. 6:45, U. S. Department of Agriculture, livestock and produce market. 7, Uncle Wip's bedtime story, roll call and birthday list.

**KYW, Chicago, 536 (C. S. T.)**—6:30 A. M., morning exercises. 9:30, late news and comment of the financial and commercial markets. 11:35, table talk by Mrs. Anna J. Peterson. 6:30 P. M., news, financial and final markets; Dun's Bradstreet's Weekly Review. 6:35, children's bedtime story. 7, Joska DeBabary's orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, DeBabary's orch. 8, speeches auspices American Farm Bureau Federation. 9, midnight revue.

## Saturday, February 7

**WMAQ, Chicago, 447.5 (C. S. T.)**—2 P. M., Union League Club forum. 6, Young Folks' Catholic association. 8, LaSalle Hotel orch. 8:30, radio photologue, "World Reporting." 9, Weekly theatre revue.

**KGO, Oakland, Cal., 512 (P. S. T.)**—11:30 A. M., luncheon concert. 12:30, final reading, stock reports, weather. 4 P. M., concert orch. 8, "Pirates of Penzance," a comic opera by Gilbert & Sullivan, given through the courtesy of the Pacific States Electric Company; Fred Kickbush, baritone; Marion Veoli, baritone; Gwymvi Jones, tenor; Grace Le Page, soprano; Ruth Waterman, contralto; Beatrice L. Sherwood, soprano; Mary Groom Richards, contralto; Carl Anderson, director; Wilhelmina Wolthus, accompanist. 10, dance music program by Henry Halstead's orch.

**WHAS, Louisville, Ky., 400 (C. S. T.)**—4 P. M., Alamo Theatre organ, police bulletins, weather, "Just Among Home Folks," readings, late news. 4:55, local livestock, produce and grain market. 5, time. 7:30 to 9, concert auspices of Arthur Findling, late news, time.

**KOA, Denver, Col., 323 (M. S. T.)**—1 P. M., N. Y. stock reports, weather. 9, Joe Mann and his Rainbow Lane orch.

**WNYC, New York City, 526 (E. S. T.)**—7:30 P. M., police alarms. 7:35, The Chateau Five. 8:30, Colonel James Churchward, "Electricity, Lightning." 8:45, Bertha Donnelly, soprano. 9, "Newspaper Humor," by Professor James M. Lee. 9:15, Police quartet. 9:45, piano recital. 10:10, travel talk. 10:30, police alarms and weather. 10:35, Kathleen T. Fitzpatrick, soprano, assisted by Nicholas S. Murphy; Roy N. Hair at the piano.

**WGBS, New York City, 316 (E. S. T.)**—10:00 A. M., timely talks with Terese. 10:10, Eleanor Schorer's Kiddie Klub. 10:40, Dorothy Cocks, Reading. 1:35, Jack Wheaton and his orch. 2, Alfred Seeger, ballad singer. 2:10, Jack Wheaton and his orch. 3, Fulton Oursler interviewed by

Terese Rose Nagel 3:10, Cecile Werler, contralto. 3:40, National Woman's Party program. 3:50, Cecile Werler, contralto. 6, Uncle Geesbe. 6:30, Cameo Collegians, 9, modern marriage musical program. 9:30, Sam Comly, inside movie chats. 9:45, Fiesta Mexicana. 9:45, Mexican String Trio. 9:50, Louis Zamudio, Mexican baritone. 10, Gonzalez Trio. 10:10, Madame Gonzalez, Mexican prima donna. 10:20, address in Spanish. 10:25, Madame Gonzalez, Mexican prima donna. 10:30, Roberto Castellano, flutist. 10:35, Louis Zamudio, baritone and trio. 10:40, Mexican national anthem with Madame Gonzalez and Mexican Trios. 10:45, Bob Emmerich, popular pianist. 11, Vincent Rose Orch.

WJZ, New York City, 455 (E. S. T.)—11 A. M., American orchestral concert. 1 P. M., Erudoy's Park Lane Orch. 2:15, discussion of the National Republican Club. 4, Ken Burdick, composer baritone. 4:30, Sherry's Tea Orch. 5:30, State and Federal agricultural reports; farm and home market reports; New York Stock Exchange; foreign exchange news. 7, Freddie Rich and Hotel Astor Dance Orch. 8, "Learn a Word a Day." 8:01, "Art for Laymen." Walter M. Grant. 8:15, "Empress of Scotland" Orch. 8:30, "Forty Years a British Journalist," Geo. Laval Chesteron. 8:45, "Empress of Scotland" Orch. 9:15, Harriet Young, soprano. 9:30, the Dickens Fellowship Dinner of New York. 11, Joseph Knecht's Orch.

WDAR, Philadelphia, 395 (E. S. T.)—11:45 A. M., daily almanac. 12:02 P. M., organ recital from the Stanley Theatre; features from the studio; Arcadia Concert Orch., Prof. Feri Sarkozi. 2, artist recital by Margaret L. Steirnuck, contralto; Norman Greig, baritone; Elizabeth Gear, pianist and accompanist; Arcadia Concert Orch. 4:30, dance program by the Cotton Pickers, auspices of Wilbur De Paris. 7:30, Arcadia Concert Orch.

KHJ, Los Angeles, 404 (E. S. T.)—12:30 P. M., program presenting H. Moulton's Orch. 2:30, matinee musicale; Charlie Wellman and his Afternoon Frolic. 6, Art Hickman's Concert Orch. 6:30, children's program presenting Prof. Walter Sylvester Hertzog. 8, program through the courtesy of "Silverwoods." 10, Art Hickman's Dance Orch.

WEAF, New York City, 492 (E. S. T.)—1 P. M., dance program. 6, Hazel Fleener, Loye, mezzo soprano; Rafael Saumell, pianist; Walter Scott, violinist; Ben Bernie and his orch.

KYW, Chicago, 536 (C. S. T.)—6:30 A. M., morning exercises. 9:30, late news and comment. 10:30, farm and home service. 11:35, table talk by Mrs. Anna J. Peterson. 6:02 P. M., news financial and final markets furnished by the Union Trust Co. 6:35, children's bedtime story. 7, Joska DeBabury's Orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, Joska DeBabury's Orch. 8, musical program, Hazel Wood, soprano; Elston King, baritone; Thomas B. Stephenson, tenor. 9:05, Youth's Companion, including short stories, articles and humorous sketches. 9:35, "Congress Classics" broadcast from KYW's studio in the Congress Hotel. 12, "Congress Carnival" broadcast from KYW's studio.

WCCO, Minneapolis, Minn., 417 (C. S. T.)—10:45 A. M., Betty Crocker. 8 P. M., "Fireside Philosophies," Rev. Roy L. Smith. 8:15, "In Santiago, Chili, Sept. 8, 1925" MacMartin. 8:30, program from Overland Building, Northwest Auto Show and Trade Week. 10:30, dance program.

WGY, Schenectady, N. Y., 380 (E. S. T.)—9:30 P. M., dance music by Phil Romano's Orch.

WRC, Washington, D. C., 469 (E. S. T.)—6:45 P. M., children's hour, by Madge Tucker. 7, dinner music by the Boernstein Orch. 8, Bible talk. 8:30, "The Development of Washington," by Fred J. Essary. 8:45, to be announced. 9:55, time. 10:30, dance program. 11:15, organ recital by Otto Beck.

KFOA, Seattle, Wash., 455 (P. S. T.)—4 P. M., The Times, Wm. F. Hoffman's Olympic Hotel Concert Orch. 6:45, Rhodes Department Store program; Dr. E. A. Schilling, "Eyes and Your Diet," concert under direction of Olga Rahlke. 8:30, The Times program. 10, Eddie Harkness and his orch.

WIP, Philadelphia, 509 (E. S. T.)—1 P. M., organ recital by Karl Bonawitz. 1:30, weather. 3, Gerald O'Dell and his Entertainers. 3:45, song recital by Harry Hoffmeister, baritone. 6, weather. 6:05, U. S. Department of Agriculture, livestock and produce market reports. 7, Uncle Wip's bedtime story and roll call. 8, "The Water Supply and Its Relation to Health and Diseases," by Dr. Wilbur Horn. 8:15, the Senior Choir. 10:05, dance music by Benjamin Franklin Dance Orch. 11:05, organ recital by Karl Bonawitz.

Sunday, February 8

KGW, Portland, Ore., 492 (P. S. T.)—10:30 A. M., service from First Presbyterian Church. 3 P. M., municipal concert. 6, church services. 7, dinner concert by Colburn Concert Orch.

WJZ, New York City, 455 (E. S. T.)—11 A. M., service of the First Baptist Church. 3:30 P. M., KGO Little Symphony Orch. 7:30, service of the First Baptist Church.

WIP, Philadelphia, 509 (E. S. T.)—10:45 A. M., morning service, broadcast direct from Holy Trinity Church. 4 P. M., services under the auspices of the Germantown Y. M. C. A.; "What Western Democracy Means to Me," lecture by Arthur Walwyn Evans.

WOAI, San Antonio, Tex., 394 (C. S. T.)—11 A. M., services of First Presbyterian Church. 7:30 P. M., services of Central Christian Church. 9:30, the WOAI Entertainers.

WLW, Cincinnati, O.—423 (C. S. T.)—9:30 A. M., school by Sunday School Publications. 11, services, Dr. Frank Stevenson; organist, J. Warren Ritchey and mixed quartet; soprano, Charlotte Sandman Angert; alto, Louise Koetter; tenor, Erwin Meyer; bass, Edwin Weidinger. 11:55, time. 7:30 P. M., services, P. L. Dannenfeldt. 8:30, con-

cert by the Western and Southern orch.; William Kopp, director; Carl Wunderle, zither.

Monday, February 9

WLW, Cincinnati, O., 423 (C. S. T.)—8 A. M., setting-up exercises. 10:45, weather and business reports. 11:55, time. 12:15 P. M., Williamson review and entertainment. 1:30, business reports. 3, market reports. 4, Babson reports. 5, Selsinsky instrumental quintet. 8, Times-Star orch.; Esther Deschler, soprano; Howard Hafford, tenor; Majorie Garrigus Smith, pianist; Louise Law trio.

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 5 P. M., children's program. 7:15, markets, weather, news bulletins and police reports. 8, Oregonian Concert Orch. 10, Colburn's Melody Men.

WWJ, Detroit, 352 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "To-night's Dinner" and a special talk. 9:45, Public Health Service bulletins. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Orch. 3:50, weather. 3:55, market reports. 6, dinner concert. 8:30, News Orch.; P. Eugene Wilson, baritone; Miss Margaret F. soprano.

WEEI, Boston, 303 (E. S. T.)—2 P. M., Frank Toomey's Roseland Orch. 3, Fenway Radiowis. 6:30, Big Brother Club. 7:15, Dok Eisenborg and his Sinfonians. 7:55, Pathe News Flashes. 8, musicale. 9, A. & P. Gypsies. 10, Sid Reinherz and his orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

Tuesday, February 10

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 1:30 P. M., concert. 5, children's program. 7:15, markets, weather, news bulletins and police reports. 8, Oregon Agricultural College lecture. 8:30, Mrs. Miles Delwin Warren, soprano, and Reatha Fowler Miller, contralto. 10, Multnomah Hotel Strollers; Phil Frank Houser, soloist.

WWJ, Detroit, 352 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "To-night's Dinner" and a special talk. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Hotel Statler Orch. 3, news Orch. 3:50, weather. 3:55, market reports. 6, dinner concert. 8:30, News Orch.; Joseph Tesano, accordion; William D. Leitch, tenor.

WEEI, Boston, 303 (E. S. T.)—2 P. M., Napoli Four. 6:30, Big Brother Club. 7:15, Dok Eisenborg and his Sinfonians. 8, program from New York Studio. 9, Eveready Hour. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—2 P. M., Napoli Four. 6:30, Big Brother Club. 7:15, Dok Eisenborg and his Sinfonians. 8, program from New York Studio. 9, Eveready Hour. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—2 P. M., Napoli Four. 6:30, Big Brother Club. 7:15, Dok Eisenborg and his Sinfonians. 8, program from New York Studio. 9, Eveready Hour. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—2 P. M., Napoli Four. 6:30, Big Brother Club. 7:15, Dok Eisenborg and his Sinfonians. 8, program from New York Studio. 9, Eveready Hour. 10, Goodrich Silvertown Chord Orch.

Erwin Meyer, tenor; Edwin Weidinger, bass; J. Warren Ritchey, accompanist; concert by the Milnor trio, William Stoos, violinist; Arthur L. Knecht, cellist; Rosemary Ellerbrock, piano and celeste; Clifford Lang, pianist. 9, Formica orch. 9:30, talk. "Where the Birds Spend the Winter." Dr. W. C. Herman. 9:35, Formica orch.; songs by Laryl M. Ferguson, baritone; Instrumental trio, Edith MacDonald Taube, violin; Winifred Hazelwood, cello; Olive Terry, piano.

WEEI, Boston, 303 (E. S. T.)—11:30 A. M., luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports and weather. 3, musical program and speaker. 4, Concert Orch. of the Hotel St. Francis. 6:45, final reading; music reports, weather, S. F. produce news and news.

WKAQ, Porto Rico, 360 (E. S. T.)—8 P. M., concert by the Municipal Band.

Thursday, February 12

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., concert by Civio Music Club, children's program. 7:15, market, weather and news.

WWJ, Detroit, 352 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "To-night's Dinner." 9:45, Public Health Service bulletins. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Orch. 3:50, weather. 3:55, market. 6, dinner concert. 8:30, Louis C. Rabaut, tenor. 10, Jean Goldkette's Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

WEEI, Boston, 303 (E. S. T.)—1 P. M., assembly luncheon. 6:30, Big Brother Club; address by "Comrade" and "Brother" W. M. T. Landers. 7:15, address, Mrs. Geo. R. Blinn. 7:50, Dok Eisenborg and Sinfonians. 7:55, Pathe News Flashes. 8, programme from New York Studio. 9, Victor concert artists. 10, Goodrich Silvertown Chord Orch.

Friday, February 13

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., concert. 5, children's program. 7:15, market, weather, and news bulletins. 8, lecture by University of Oregon. 10:30, Hoot Owls.

WWJ, Detroit, 352 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "To-night's Dinner" and a special talk. 9:45, Public Health Service bulletin and talks. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Hotel Statler Orch. 3, News Orch. 3:55, market reports. 6, dinner concert. 8:30, News Orch.; Anne Campbell, poet; Harry E. Parker, tenor.

WEEI, Boston, 303 (E. S. T.)—2 P. M., Happy Hawkins and orch. 6:30, Big Brother Club. 7:15, James A. Watts, tenor. 7:30, A. E. Richardson interviewed by Otto Grow. 8, program courtesy Neapolitan Co. 8:30, U. S. Army Band.

WEEI, Boston, 303 (E. S. T.)—2 P. M., Happy Hawkins and orch. 6:30, Big Brother Club. 7:15, James A. Watts, tenor. 7:30, A. E. Richardson interviewed by Otto Grow. 8, program courtesy Neapolitan Co. 8:30, U. S. Army Band.

WEEI, Boston, 303 (E. S. T.)—2 P. M., Happy Hawkins and orch. 6:30, Big Brother Club. 7:15, James A. Watts, tenor. 7:30, A. E. Richardson interviewed by Otto Grow. 8, program courtesy Neapolitan Co. 8:30, U. S. Army Band.

Saturday, February 14

WWJ, Detroit, 352 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "To-night's Dinner." 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Hotel Statler Orch. 3, News Orch. 3:50, weather. 3:55, markets. 6, dinner concert.

WWJ, Detroit, 352 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "To-night's Dinner." 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Hotel Statler Orch. 3, News Orch. 3:50, weather. 3:55, markets. 6, dinner concert.

WWJ, Detroit, 352 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "To-night's Dinner." 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Hotel Statler Orch. 3, News Orch. 3:50, weather. 3:55, markets. 6, dinner concert.

WWJ, Detroit, 352 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "To-night's Dinner." 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Hotel Statler Orch. 3, News Orch. 3:50, weather. 3:55, markets. 6, dinner concert.

WWJ, Detroit, 352 (E. S. T.)—8 A. M., setting-up exercises. 9:30, "To-night's Dinner." 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Hotel Statler Orch. 3, News Orch. 3:50, weather. 3:55, markets. 6, dinner concert.

# SHORT WAVES BECOME MARVELOUS



WHEN Lady Luna stepped upon the heels of Old Sol many things in radio that interested scientists were corroborated. The Sun's rays had a marked effect upon radio transmission and reception. With the oncoming of the eclipse, radio waves of short length were affected to so great an extent that during the period of totality (shown above) signals came in loud and clear, but as soon as the shadow passed, the audibility became rapidly weaker until the signal could no longer be heard. Long waves didn't seem to be so greatly affected. (Underwood & Underwood).

THE total eclipse of the sun corroborated previously existing evidence that static diminished, even virtually disappeared, during darkness. The eclipse was the first instance since Columbus discovered America of such a quick change from "night" to day, hence comparisons were valuable from a radio viewpoint.

Observations were made in various parts of the United States by radio experts. RADIO WORLD'S laboratories found that static diminished on waves in the broadcast band. Especially at 75 meters (WGY's test wave) static dropped as darkness neared.

Dr. Alfred N. Goldsmith, chief broadcast engineer of the Radio Corporation of America, made experiments at the company's laboratory at Van Cortlandt Park, New York City.

WGY, the General Electric Company's station at Schenectady, began to broadcast on its regular 380-meter wave at 6 a. m., Eastern Standard Time, and simultaneously 2XI, a low wave experimental station of the General Electric Company located on the outskirts of Schenectady, began sending 500 watts of power on a continuous modulated wave seventy-five meters in length.

Super-heterodyne receivers connected to recording machines, which produced a graph of the signals' intensity and fading, were tuned to the wavelength of the Schenectady stations when they went on the air at 6 o'clock. The recorders were operated by A. F. Van Dyck, Division Engineer; Dr. W. V. B. Roberts, Research Engineer, and C. F. Engel, Assistant Engineer.

The 380-meter signals of WGY were picked up at Van Cortlandt Park when the sending station opened at 6 o'clock. The signals waxed and waned, but the reception was normal, according to a chart made at the same hour the previous day. The normal fading occurred until 8:30 o'clock, when a noticeable change appeared on the paper tape, which moved away from the recording pen at the rate of five-eighths of an inch per minute. The wave became steady and continued in that manner until 9:15, when the sun-

light came back over Van Cortlandt Park.

Under normal conditions the 380-meter waves fade in the early light of day, and then become steady about 10 o'clock. During the total eclipse a steady condition was noted and fading ceased. After the period of totality the signals began to swing again, as they did prior to 8:30.

Some time after the eclipse had ended the 380-meter waves became steady, just as they do daily under normal conditions. Dr. Goldsmith explained that fading was most noticeable from the first signs of dawn until about 10 o'clock, when the signals become steady. The shadow of the eclipse from 8:30 to 9:15 produced the steady effect that generally comes after 10 a. m.

Although the short-wave transmitter at Schenectady began to radiate at 6 a. m., no signals were picked up at Van Cortlandt Park until 7:03 o'clock. This was regarded as a normal effect, because previous tests revealed that the 75-meter waves traveling between Schenectady and New York are inaudible in darkness. The first short waves detected at 7:03 were very weak and remained so until 7:50. The sun was over the horizon of the park by that time, and the increasing signal strength indicated that sunlight stimulates the short waves.

The signals swung in and out rapidly but with good volume until 8:15 o'clock. Then they gradually weakened and dropped to one-third the volume by 8:30, reaching about the same intensity as when first intercepted at 7:03 a. m. at 8:45 o'clock the short wave signals vanished and were inaudible until 9:51, when the eclipse was almost over. As the sunlight came back the short waves gained in strength and at 10:05 they reached the same volume as at 7:45.

Dr. Goldsmith then picked up the paper tape on which the performance was recorded and reviewed the findings. He said:

"This chart of the short-wave reception looks like the fever chart of a very sick patient, and there is no question that the sun's light and energy, poured in upon the atmosphere of the earth, greatly affects radio waves. No theories have been upset, but many new complications have arisen which we will have to think about for quite some time. We will lock ourselves up in a room after all the data are collected, and then some of the puzzles may be solved.

"Long waves are normally steadied by sunlight," said Dr. Goldsmith, "but I cannot understand at this time why the shadow of the eclipse had the same effect and steadied the 380-meter signals. This is one new problem we will have to study thoroughly. It is certain, however, that the 75-meter waves flashed over a distance of 160 miles are absolutely dependent upon sunlight."

Dr. Goldsmith was asked to explain how WGY and KDKA could send short waves to England at night, when there is no sunlight, across the Atlantic, so successfully that English stations could intercept the low waves, amplify them and re-broadcast over England and Europe. He answered:

"It is evident that the distance and the frequency of the waves play an important part in the transmission. Apparently the short waves traveling from Schenectady to New York, a comparatively short distance, are dependent upon sunlight, yet the same waves can span the sea at night. That is another problem we must study."



THIS is the apparatus that the Radio Corporation used for reception below 100 meters, though that the effect was not so detrimental on the chief broadcasting engineer; Walter Roberts, re-

Radio listeners have often wondered why the regular programs from WGY, Schenectady; WBZ, Springfield, and KDKA, Pittsburgh, fade so much in New York. Dr. Goldsmith was asked if he could find an answer to this from his eclipse data. He said: "There are two ways the signals may travel, either along the ground or along a 'Heaviside' layer (reflecting medium), thought to exist about sixty miles above the earth. When a sky wave is reflected from the mirror-like layer above, so that it meets the ground wave at a certain point, there is an interaction that causes fading. It is apparent from the eclipse observations that the 380-meter waves from WGY travel to New York about ten miles above the ground, and also by way of the 'Heaviside' layer. Normally these two waves must meet in the metropolitan district and produce fading. This not only applies to WGY but undoubtedly explains the fading of KDKA and WBZ. During the eclipse the fading of WGY on 380 meters stopped and the waves were steady. This would indicate that the shadow of the moon affected one or other of the waves, probably the sky wave, so that it did not meet the other wave at New York to create an interaction, therefore no fading occurred.

"The seventy-five meter waves apparently travel along the ground between here and Schenectady and therefore are not exposed to the full force of the sun. If they traveled by way of the 'Heaviside' layer they might not have faded completely from 8:45 to 9:51 o'clock, because sunlight aids the short waves. However, the eclipse effect is not equivalent to darkness across the entire continent or sea, as far as 380-meter waves are concerned, but it was very effective on the seventy-five-meter signals.

"It looks as if the sun has something to do with static," said Dr. Goldsmith. "As the sunlight disappeared the static clicks diminished in intensity. From 9 o'clock until 9:25 only a little static was noticeable, and it sounded like the sharp click of a telegraph key. At 9:25 the static was back at normal intensity, as recorded before the eclipse began. This indicates that static is not particularly local, but comes from some distance."

The apparatus used in the tests consisted of a super-heterodyne of the second harmonic principle connected to a

# LY EFFECTIVE DURING THE ECLIPSE



of America used in observing the action of the sun on radio waves, during the total eclipse of the sun. er for longer wavelengths. It was found that the sun greatly interfered with reception on short waves, ng waves. The photo shows A. Van Dyck, division engineer of the R. C. A.; Dr. A. N. Goldsmith, b engineer. They are making tests on the "fading recorder." (Wide World).

sensitive galvanometer, which registered changes in a potential drop across a crystal detector, through which the output of the super-heterodyne passed. As the needle of the galvanometer swung back and forth across its scale the recording operator moved a duplicate needle over the face of the instrument. The movement of the second needle registered the signal intensity on a moving tape.

WGY announced shortly after 9:30 o'clock that it would intercept the Arlington time signals from 9:35 to 9:40, amplify and reradiate them as part of the eclipse test. The time ticks from Washington were clearly heard on a loud-speaker at the Van Cortlandt Park laboratory.

During the observations several amateur transmitting stations registered on the tape and interfered with the low wave tests. Station 9DAU, Waterloo, Iowa, was picked up at 9:20 o'clock. Station PAT, Irvington, N. J., was heard calling a station in Massachusetts at 9:35. Much of the amateur interference was stopped by Arthur Batcheller, radio supervisor of the New York district, who was at the laboratory taking photographs of the eclipse. He called the interfering stations on the telephone or had other amateur stations tell them to stop transmission.

## SIMILAR EFFECTS NOTED AT CORNELL

ITHACA, N. Y.

**F**AILURE to receive the short wave lengths sent out from the General Electric Company's station at Schenectady during the solar eclipse had nothing to do with the eclipse, in the opinion of Dr. Greenleaf W. Pickard and his assistant, William E. Bostwick, of this city, who made extensive radio tests.

Although complete arrangements had been made to receive and measure station 2X1, a short wave length station at Schenectady, its signals were not heard until one hour later, and then too faintly to be read here at all, nor anywhere near loud enough to measure. This, the experts here said, was not due to the eclipse, but was caused in large part by interference by transmission from the Pacific Coast. An amateur operator working from Schenectady on the same wave length was received clearly and distinctly.

The failure of 2X1 to come through is assigned by the experts here to mechani-

cal defects and interference in transmission. Another radio test was more successful. The experts were anxious to receive the records from WGR in Buffalo, in the centre of totality. Prior to today's experiments this station could not be recorded, but Mr. Bostwick's records today showed an increase in intensity during the period of totality. Excellent signals and a fine set of points were received, and tonight the experts are busily engaged in charting them.

\* \* \*

## VIRGINIA RECEPTION EXCELLENT DANVILLE, Va.

**T**HE Piedmont section of Virginia viewed the eclipse under ideal conditions, the obscuration being approximately 90 per cent. Colored people, in bygone years timid of its portent, viewed the occurrence with interest and equanimity. Scores of radio listeners heard New York and other stations with clarity and volume equal to best previous results, under normal daylight conditions their sets were inarticulate.

W. T. Gravely, district observer for the American Radio Relay League, observed results on short waves, and reported increasing intensity as the eclipse developed. An absence of fading was generally noted by radio listeners.

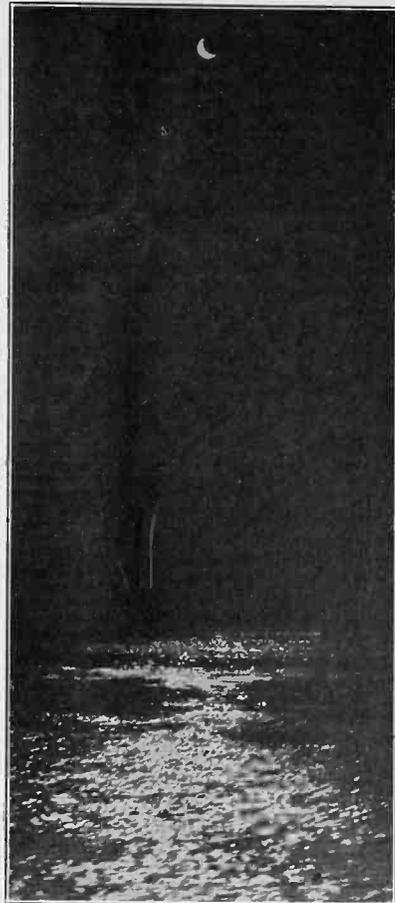
\* \* \*

## RANGE INCREASED IN MIDWEST ESCANABA, Mich.

**A** REMARKABLE radio range observed here before, during and after the eclipse in experiments conducted by E. F. McDonald of Chicago, President of the National Association of Broadcasters, probably was caused by an unnatural continuation of the usual dawn effect, in the opinion of R. H. G. Matthews of the American Radio Relay League.

The unusual distance and signal strength of radio at the breaking of dawn have for a long time been noted. According to the theory of Mr. Matthews, the moon's shadow served as a medium of continuing this dawn effect, even though the moon and sun were not yet in eclipse. The tests, made by Station WJAZ portable transmitter, were excellent, Mr. McDonald said.

Eighteen telegrams from Gladstone, Mich., only eight miles distant, reported almost a total loss of signal strength, yet stations outside the totality band, includ-



WHEN the sun was in half-eclipse, as shown above, radio reception was approximately the same as at twilight. Signals that could not be heard in the full light of the sun came in with medium power. During partial eclipse, distance was barely audible, and with increasing totality, the signal strength increased in proportion. (Kadel and Herbert.)

ing reports from Oklahoma, Nebraska, Kansas, North Carolina and Virginia, reported exceptionally loud signals both before, during and after the eclipse. This was better than the usual night reception.

In a band between 80 and 100 miles distant listeners reported inability to hear, even at night, yet loud signals were received before and after the eclipse, but nearly a total failure was reported during totality.

The distances covered are not only uncanny for a 100-watt daytime broadcast transmission, but are greater than covered from this locality heretofore at night.

CHICAGO.

**A** TEST program broadcast on 536 meters by Station KYW during the eclipse caused engineers of the station to conclude that the sun's rays do absorb the long waves in radio transmission, thus accounting for poorer reception by day than at night. No short-wave test was made.

PHILADELPHIA.

**R**ADIO Station WDAR here announced that a marked departure from the direction of their tone wave had been observed by radio scientists stationed at Waterbury, Conn., immediately before and during the first stages of the eclipse. The statement given out by the station and dated Waterbury confirmed this.

## 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.

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 .....

Emil Culumber, Tower Hill, Rt. 2, Ill.  
Carl C. Peterson, Brainard, Minn.  
W. C. Mayer, 1305 E. 124th St., Cleveland, Ohio.  
Louis A. Sunde, Valley City, N. D., Box 31.  
E. W. Brown, San Francisco, Cal.  
Lawrence Gollow, Fairmont, Okla.  
Geo. A. Gookin, 507 Cumberland St., Bristol, Va.  
Louis A. Sunde, Valley City, N. D.  
Edward Goldthwai, 204 Helen St., Syracuse, N. Y.  
George D. Chambers, Greenwich, Conn., Box 55.  
L. C. Struckmeyer, Madison, Wis.  
H. Parsons, Epworth, Mo.  
Geo. A. Gookin, Globe Radio Co., Bristol, Va. (Dealers).  
Wm. C. Meyer, 1305 E. 124th St., Cleveland, O.  
The Radio Inn, 214 N. Alamo Ave., Bell, Calif.  
C. H. Regan, 936 S. Taylor Ave., Oak Park, Ill.  
Frank O'Gara, Sauk Center, Minn.  
H. P. Hanson, 1110 Moro St., Manhattan, Kan.  
H. V. Plant, 505 Winne Bldg., Wichita, Kan.  
N. B. Winter, 614 Oakwood Ave., Columbus, O.  
Geo. Bullwinkle, 305 6th Ave., Brooklyn, N. Y.  
K. Evans, 38 21st Ave., Paterson, N. J.  
Geo. J. Murray, Wyandotte, Mich.  
Walter J. Marcoux, Box 40, Farmington, N. H. (Dealer).  
W. I. Bartlett, Atlanta, Mo.  
E. A. Violette, Ione, Cal.  
Henry J. Kunz, 134 Lafayette St., Glendale, L. I., N. Y.  
Radio, 613 36th St., Milwaukee, Wis.  
W. A. Fine, Box 1384, Muskogee, Okla.  
Robert Neill, Elmira, N. Y.  
Charles Jacobson, Jr., 299 Neville St., Perth Amboy, N. J.  
V. R. Glasson, Taft, Tex.  
B. L. Kearney, 1503 First Ave., Peoria, Ill.  
Chester Daggett, Hamburg, N. Y. (Dealer).  
Eric R. Hawkins, 401 E. 23rd St., Long Beach, Cal.  
H. A. Wilson, Clarksburg, W. Va.  
Frank Brown, Stuarts Draft, RFD, Va.  
Francis E. Baker, 36 Elm St., Warsaw, N. Y. (Dealer).  
Fred Helmke, Deanneville, Tex.  
E. E. Mankall, Jamestown, Mo.  
C. B. Searle, 532 Chester Ave., Oakland, Kan.  
Palmer & Gibson, Farmington, N. M., Box 336B.  
James Dahm, 2603 Cason St., Lafayette, Ind.  
J. J. Price, Columbus, O. (Dealer).  
W. W. Evans, Dyer, Tenn.  
Classy Specialty Co., Cincinnati, O. (Dealer).  
Frank Bowers, 2255 N. 13th St., Phila., Pa.  
E. H. Berg, 1127 California St., El Paso, Tex.  
W. C. Freeman, RFD 32, Box 202a, Ferguson, Mo.  
J. A. Young, Yarmouth, Me.  
Jos. Puchrik, 1210 1/2 Barrett Ave., Richmond, Cal.  
J. A. May, 5700 Terry Ave., St. Louis, Mo.  
Kennard Fisher, Garrison, Md.  
L. V. Davis, Park Ave., Bayside, L. I., N. Y.  
M. K. Moon, Mt. Desert Ferry, Me.  
Edwin R. Webber, Bellevue, Ia.  
Lester Albert, Horicon, Wis., Box 124.  
W. Ballard, Pine Bluff, Ark.

### ZENITH PAYS 6% DIVIDEND

THE Zenith Radio Corporation decided that because of the opening of a second new factory it would be unwise to declare more than a 6% dividend. A 6% cash dividend was authorized.

## Radio EUREKA Radio DIAL POINTER

Beautiful your set by installing the Eureka Dial Pointers. You save eyestrain and eliminate guesswork in logging your stations.

10c each  
Screws  
fast to  
Panel



Gilt or  
Nickel  
finish

Obtain at your dealer's or send 10c in stamps for each sample desired.

Manufactured by C. W. BUTTS, Inc.  
42 Hadden Place East Orange, N. J.

Responsible jobber wanted in each city.

# The Radio Trade

## Jobbers Sell at Retail, Injure Own Customers, Dealer Complains

DEALERS, jobbers and manufacturers are sending in their views on "What's the Matter With Radio?" (32d on the list of industries, yet the world's greatest invention). Every reader of RADIO WORLD, whether in the trade or not, should send in his views. Letters published will be paid for at usual rates.

The object of RADIO WORLD's survey is to determine (a) the state of the radio industry, a task being undertaken by RADIO WORLD's Industrial Statistics Bureau; (b) to obtain the views of the general public on why there is such a small percentage of radio sets in use, compared with the number of homes; (c) to lay these facts and opinions before a committee of experts, to be announced later, for the purpose of having them submit a report, with recommendations to the public and the trade.

The following is a letter from a dealer:  
SURVEY EDITOR:

JUST read your article on "What's the Matter With Radio?"

I have been interested in radio for five years and have been a dealer for three years. My main trouble in my sales experience has been with the jobbers. It seems that anybody who wants a radio just has to sit down, write to a jobber stating that he is interested in radio and is thinking of opening a radio store, or (if now a merchant) he is going to stock radio receivers and accessories, and along in the next mail will come a catalog with special discount sheets to dealers. Last week I heard of a prospect for a receiver who wanted a 5-tube Neutrodyne. I drove out to see him. He lived fourteen miles from town. The road was so bad it took two hours to get there. When I did get there what did I see but a nice antenna all ready for a receiver to be hooked on. He had not bought but was figuring on a Fried-Eismann NR-5. This receiver was listed at \$150, less tubes and batteries. I

made him a straight price on the receiver and accessories, less 5% for cash. He became very much insulted and showed me a price 25% less than list on accessories and 35% less than list on receivers. I asked him who made him a price of that kind and he showed me a letter from a jobber I have bought from—one of the largest in Virginia. Then he showed me prices and discount sheets from other large houses in Norfolk, Va., and Richmond, Va., and one manufacturer in Cincinnati. Of course, I did not sell him. Last year I had in an order with a jobber for about \$50 worth of B batteries (a small order). A customer came in to see a receiver I had on hand. The price was \$275 less batteries. I offered it to him complete, installed in his home for the list price, \$275. He almost closed the deal and said he wanted it the following week. That week end he went to Richmond, saw the same man who had my order for batteries, and bought another 5-tube set less the usual dealer's discount. I cancelled my order for batteries. In installing his receiver he burned out his first five tubes. He came to me and wanted five more, less 25%. I asked him where he bought his receiver and he told me. Under those conditions the small dealer has a fighting chance of keeping out of the alms house.

We are still trying and hope to see the day when things will be better. We are trying all we know how and will continue to try to put "a radio in every home."

Yours very truly,  
WATLINGTON & HEADSPETH.  
(J. E. Watlington)  
South Boston, Va.

### MAKES NEW TUBES OF OLD

THE Singer Radio Corp., Times Bldg., N. Y. City, by a process of their own, have been successful in reviving worn out tubes. Tubes that light but that are weak are restored to good efficiency and an added life of 500 hours given to them. The Singer Corporation guarantees a life of 500 hours to every tube they revive. Only 201A, 301A, 199, 299 and DeForest tubes can be processed and the tube must light to be renewed successfully.

### JOFFE-GOLBERT MOVES INTO BIGGER QUARTERS

JOFFE-GOLBERT CO., New York distributors of well-known radio merchandise and exclusive distributors for several radio articles, are now doing business in their new enlarged quarters at 33 West Sixtieth St., New York City. Prior to Feb. 1 their establishment was located at 47 West Sixty-third street.

## New Corporations

Meyers Radio Corp., Wilmington, Del., \$15,000.  
Al Finger, New York City, \$10,000; S. Finger, S. Salzman, J. Morgan. (Atty. A. H. Goodman, 1482 Broadway, New York City).  
Xact Radio Corp., New York City, \$10,000; M. & N. Singer, G. Schifter. (Atty. Menken Bros., 206 Broadway, New York City).  
Kenman Elec. Co., migr. radios, 100 shares, 'no par, no common; S. S. Brin, L. Grossman, E. Goldstein. (Atty. M. Shlivek, 120 Broadway, New York City).  
Woodlief Battery & Mfg. Co., Dover, Del., \$150,000; J. S. McFeathers, J. G. Leonard, Tom Wilson, Braddock, Pa. (Capital Trust Co. of Del.)  
Armley Radio Corp., Dover, \$15,000,000.

## MAHOGANITE and BLACK RADION PANELS

DIALS, KNOBS, TUBING, SOCKETS  
RADION LOUD SPEAKER HORNS, ETC.

"THAT SPECIAL SIZE" FOR YOUR  
PHONOGRAPH, PORTABLE OR SUPER

ALL STOCK SIZES  
WHOLESALE RETAIL  
Send for Complete Price List

New York Hard Rubber Turning Co.  
212 Centre Street New York City



## LITTLE WONDER! SOLDERLESS LUG

Holds Bus Wire Like Clip!  
Connect or Disconnect Wires  
Without Disturbing Terminals!  
Price, 10 for 5c. Ask your dealer.  
Distributors Wanted.

Mfd. by PAUL GLAMZO  
203 Lafayette St. New York

**MR. DX HOUND**

*A Character Created  
by RADIO WORLD Artist*

By **HAL SINCLAIR**



**Make Sets That Reach Down to 200 Meters, U. S. Advises**

WASHINGTON. THE manufacturers of radio sets must produce receivers that will tune in the low wavelengths. This is practically the only avenue to escape from the present wavelength problem facing the radio bureau of the Department of Commerce.

Confronted with a situation of attempting to provide 47 wave lengths among 105 Class B stations without requiring a division of time in three ways, the bureau has been experimenting with the possibility of reducing the separation between stations in order to create new channels. After a month of these experiments it has been generally concluded that the separation cannot at present be reduced since increased interference would result. In all cases where interference has resulted from the shift of wavelengths, stations will be changed back to their old wavelengths with a 10 kilocycles separation.

**Faced With a Problem**

The bureau is faced with the problem of finding wavelengths for the new stations which are demanding licenses. The Secretary of Commerce is not the authority to refuse a license to applicants who meet the rather slim requirements. Only one of two things can be done, it is believed. Either stations will be required to divide the same three ways or else new class B applicants will be given wavelengths in the class A band below 280 meters.

It is considered highly undesirable to compel stations to divide time three ways.

**Low Wave Sets Needed**

If most of the receivers in use were capable of tuning in low wavelength the solution of the problem would be comparatively easy. The class B stations could be placed in the band below 250 meters and the band from 250 to 280 meters assigned to class B stations, thus providing 12 new class B channels.

The question before the radio bureau is whether to wait until apparatus is on general sale which will tune in low wave lengths or to create the demand for such apparatus by placing stations on the low wavelengths.

Everything considered, it is believed the only solution is for radio manufacturers to produce sets which will tune as low as 200 meters.

**CANADIAN RADIO WEEK SET FOR FEBRUARY 2**

WASHINGTON. THE Canadian Radio Trades Association, whose membership is made up of the leaders in the Canadian radio industry, has designated the week of February 2 as Canada's second annual radio week, Assistant Trade Commissioner, J. Donnelly, Ottawa, informs the Department of Commerce. Manufacturers of radio apparatus, distributors and dealers throughout the Dominion are co-operating to make this year's radio week an unequalled success. Every evening during the week special addresses and entertainments will be broadcast from Dominion stations.

**FIRST GRANT OF NAVY PATENT GOES TO STEWART WARNER**

THE first license under the Navy radio patents seized from the Germans has been approved by the Secretary of Navy for issuance to the Stewart Warner Speedometer Co. It is believed that all other applications will be granted.

**Great Growth in Sale of Parts Surprises Big Manufacturer**

By **Gustave Frankel**  
President, Mohawk Electric Company

AS I look over the figures for the radio business during the year 1924, as far as they are available, I am surprised, as I believe are the majority of the other large radio manufacturers, over the continuing interest in home-made sets. The sale of parts during the past year increased very substantially, not as fast as set sales, of course, but still the increase was great. It might have been expected that as the factory-made sets became available in volume and reached a price where it was practically as cheap to buy a set as to build one, the incentive to build sets at home would be lacking. But it seems not to have turned out that way.

In looking around for the cause of a phenomenon that struck me as more or less mysterious, as it seemed to run counter to the usual American custom of buying ready-made everything that can be bought that way, I was impressed by the large number of "non-professionals" who

make a more or less regular business of building and selling sets as a sideline. In other words, a great many of the sets which would count in the list of home-made sets were really purchased by the final consumer as complete sets—manufactured sets.

To those who feel that they can build their own set, I say, DO IT. You will have a lot of fun and acquire useful information. But if you have not the inclination to handle a soldering iron and drill panels, and all of the rest of it, buy a factory made set. There has been more dissatisfaction caused by "buying a set from a friend" than by anything outside of static.

I am absolutely certain that a man could not go into the market, buy the parts, and build a receiver like any first-class standard set on the market. He may have the knowledge and the technical ability. He might even be a more expert radio man than anybody on a factory staff. But without the organization, without the tools, without the testing facilities, without the backing of a long line of laboratory experiments on every phase of every problem, he would be helpless.

**Coming Events**

- FEBRUARY 4**—Consolidated freight classification No. 4 effective; rates on radio apparatus increased 50% to 100%.
- FEBRUARY 2**—Beginning of Canadian Radio Week.
- MARCH 2 TO 7, INCLUSIVE**—Fifth Annual Radio Show and Convention, Hotel Pennsylvania, New York City. Executive Radio Council, Second District.
- MARCH 4**—Broadcasting of President Coolidge's inaugural speech.
- APRIL 22 TO 28**—Third District Radio Convention, Steel Pier, Atlantic City, N. J.
- SEPTEMBER** (early in month; date not settled). Fourth Annual National Radio Exposition, by American Radio Exposition Co., 522 Fifth Ave., N. Y. C. Exposition will be held in Grand Central Palace.
- SEPTEMBER 14 TO 19**—Second Radio World's Fair, 258th Field Artillery Armory, Kingsbridge Rd. and Jerome Ave., New York City.

**FIGHT ON INCREASED FREIGHT RATES IS BEGUN**

FACED with a heavy increase in freight rates the radio industry has begun to take the necessary steps to fight the carriers in their efforts to charge radio shippers higher rates, the first step in this direction being the series of conferences held by various organizations of manufacturers and others in the radio industry.

The freight rate increases announced by the railroads cover less than carload shipments in the eastern section with an increase of fifty per cent, while on the southern territory the increase is one hundred per cent. In western territory the increase claimed is fifty per cent. The new rates are effective February 4.

**SLEEPER CLOSES BIG CONTRACT**

Sleeper Radio has just closed a big contract with one of the leading Victor talking machine distributors in the country.

**Federal Investigation of General Electric to Be Widened**

WASHINGTON.

BESIDES the court action brought against the General Electric Company in Ohio in connection with the manufacture of electric light bulbs, the Department of Justice is proceeding with investigation into other lines of activity of the company.

This was disclosed by Assistant Attorney General Seymour before the Senate Interstate Commerce Committee during a discussion on the Norris resolution proposing a "power trust" investigation. Senators said, however, that Mr. Seymour did not indicate that a general inquiry such as that proposed by Senator Norris was under way.

The examination of Mr. Seymour in secret meeting of the committee is to be resumed. Meantime, Chairman Smith obtained unanimous consent that a report on the resolution be deferred for a week.

Mr. Seymour was not pressed, committeemen said, as to the character of the other investigation, but he gave some details regarding the pending suit. He was quoted as saying that inquiry had disclosed that while the manufacture of electric bulbs constituted only 20 per cent. of the whole business of the company the revenue derived from it was 60 per cent. of the total profits.

Some committeemen predicted that the Norris resolution would be modified to make the scope less general. As interpreted by some, it would require the Federal Trade Commission to inquire into the circumstances regarding the holdings of General Electric securities by all banks, corporations or business houses.

**WARE NET PROFITS \$320,000**

WARE Radio reports net profits before taxes, but after royalties and other charges for the quarter ended Dec. 31, of \$320,000, equal to more than \$4 a share on 75,000 shares of common stock outstanding.

## A THOUGHT FOR THE WEEK

WHAT comes over a wire, instead of through the air, takes the romance out of radio.

# RADIO WORLD



TELEPHONES: LACKAWANNA 6976 AND 2063

PUBLISHED EVERY WEDNESDAY

(Date 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 45rd Street)

European Representative: The International News Co.,  
Brems Bldgs., Chancery Lane, London, Eng., Paris,  
France, Brentano's 38 Avenue de l'Opera.

EDITOR, Roland Burke Hennessy  
MANAGING EDITOR, Herman Bernard  
TECHNICAL EDITOR, Abner J. Gelula

## 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, 7 1/4" x 11"	462 lines	\$300.00
1/2 Page, 7 1/4" x 5 1/2"	231 lines	150.00
1/4 Page, 4 1/2" D. C.	115 lines	75.00
1 Column, 2 1/4" x 11"	154 lines	100.00
1 inch		10.00
Per agate line		.75

## Times Discounts

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

## CLASSIFIED ADVERTISEMENTS

Ten cents per word. Minimum, 10 words. Cash with order.

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

FEBRUARY 7, 1925



MIGUEL FLETA, noted Spanish tenor, entertained the Radio Audience during the Victor Hour from WEAF, WEEI, WCAE and other broadcasting stations that were linked together by remote control.

## HOUSE APPROVES \$220,525

WASHINGTON.

THE House of Representatives has approved of the Budget Bureau estimates for the 1926 fiscal appropriation for the Radio Bureau of \$220,525. It is believed a deficiency appropriation bill will be submitted to Congress within a short time and that it will also receive approval.

## Wired Radio Problems Solved, Says Company President

THE major technical difficulties surrounding wired radio (sent over power lines) have been solved, said C. W. Hough, president of Wired Radio, Inc., of 60 Broadway, New York City. Experiments had been conducted in laboratories in Washington, Cleveland, Staten Island and New Jersey under the direction of R. D. Duncan, Jr., chief engineer.

The major difficulties that presented themselves when the plan was first undertaken three years ago have been cleared away, Mr. Hough said. Wired radio has been found practicable and feasible and programs will be offered the public at around \$2 a month through apparatus owned by the public utilities companies.

Tests of the new wired apparatus have been concluded both in New York and in New Jersey. It is understood that a number of Staten Island homes have been equipped for some months during the test.

## Restricted Choice of Programs

Wired radio differs from space radio. Instead of traveling through the air the wave goes along the same wires that convey the light and power. The subscriber has a small box with three push buttons and a silk cord. The cord is plugged into any lamp socket, a button is pushed and out comes a radio program. Each button represents a different program, as it has been found that three programs can be transmitted simultaneously.

"The high frequency radio current carrying music, speech and other sounds simply rides the wires from the central station over low-frequency lighting current," said Mr. Hough. "Neither interferes with the other. Receiving equipment will be rented rather than owned by subscribers, and maintained by whatever service organization may later be formed.

## Problems That Were Solved

"Two major defects manifested themselves a year ago in an experimental try-out of wired radio under actual consumer conditions on Staten Island. Both of these have been overcome by inventions that would have been deemed impossible a few years ago. Ten months ago we were able to give only a single program. Now, with the multiplexing apparatus, we can superimpose three separate channels of radio over the lighting current.

"The other vanquished problem had to do with distribution of radio waves over the modern type of electric power and light wires. Practically every lighting company today uses what is known as a three phase system. Radio current, however, has always been single phase. Hence it was up to Mr. Duncan and his staff to invent methods of generating three phase

## Invention Picks Up Broadcasts, Repeats Them Over Wire

WASHINGTON.

A BROADCAST distribution system, which if put into effect would practically put some radio reception on the same basis as the telephone, has been invented by Edward F. Clement, of Washington, D. C. Mr. Clement has assigned his patents covering the invention to Edward F. Colladay, of Washington, D. C.

Mr. Clement's scheme contemplates a central station in each city which would pick up broadcast programs and distribute them to subscribers by wired wireless. The system, it is claimed, could either be used for broadcast reception, or for wired wireless.

The service supplied by the central station would be on a subscription basis, the cost of which would depend on the use. A meter system is provided to determine the length of time each subscriber uses the receiver.

radio energy to travel over the three phase lighting lines. They have succeeded. The result is an entirely uniform distribution of radio waves over the lighting lines, yielding a clear, loud, undistorted tonal quality that comes close to the ideal in radio reception. Wired radio is free from static, interference, and other objectionable noises."

Mr. Hough said wired radio will not interfere with the growth of "space" radio. He said they will supplement each other. No announcement was made revealing what power company, if any, would permit such use of their wires.

## Radiograms

KDKA, East Pittsburgh, was heard distinctly in Sydney, Australia, after winging its way through the 9,000 miles of ether. This is believed to be a record in distance reception and is declared to be an achievement in radio history. This result was the outcome of a series of tests by the Westinghouse Electric Co. The night before and especially the night after the eclipse of the sun created, it is believed, extraordinary receiving conditions also in South America. An Argentine amateur reports hearing several North American broadcasting stations on these evenings—42 in all, notably WGY and KDKA.

THE FIRST step toward forming a committee to "protect" theatrical interests against "the radio menace" was taken in New York City. Producers, actors and managers discussed the ultimate effect that radio possibly might have upon the stage. A resolution was adopted declaring radio detrimental to the advancement and preservation of the theatre!!!

COMMERCIAL TYPE RADIO APPARATUS, by M. B. Sleeper. Mailed on receipt of 75c. The Columbia Print, 1493 Broadway, N. Y. C.



**"A THING OF  
BEAUTY AND A  
JOY FOREVER."**

5 TUBE  
TYPE 5A **\$50**

183 Greenwich St., N. Y. C.

WRITE FOR  
**NEW CATALOGUE**  
Home of Semi-Assembled Kits  
**THE RADIO SHACK**  
55 Vesey Street Dept. B-151 New York

# Join the A. B. C.

## NEW A. B. C. MEMBERS

- Joe Beaver, Purcell, Okla.
- J. H. Jorgensen, 3026 Belmont Ave., Baltimore, Md.
- Phillip Marschel, 3433 Penn. Ave., St. Louis, Mo.
- Ray R. Raymond, 907 Brokaw Bldg., New York City.
- Albert E. L. Jones, 60 Peace St., Providence, R. I.
- Albert C. Barr, 1623 Kenneth Ave., Arnold, Pa.
- Howard C. Hosmer, 65 Lake Ave., Auburn, N. Y.
- H. A. Bellia, Delphos, O.
- S. A. Seale, 1800 Omehundo Ave., Norfolk, Va.
- H. A. Mendell, 4529 N. Market St., St. Louis, Mo.
- Peter Kalkman, 165 W. 8th St., Holband, Mich.
- Elden Story, 820 2nd Ave., Berlin, N. H.
- Fred Miller, 403 Jackson St., Pittsburgh, Pa.
- G. A. MacDonough, 112 Pleasant, Royal Oak, Mich.
- Richmard Hermann, 22 E. 95th St., New York City.
- H. W. Smith, Hq. Troop 1st Cavalry, Marfa, Tex.
- Curtis O'Neal, 2022 Marshal St., Little Rock, Ark.
- Bert Schartz, 130 W. 16th St., New York City.
- T. D. Walker, Room 1544, 466 Lexington Ave., New York City.
- H. L. Howland, Box 222, Edinboro, Pa.
- H. K. Fusler, 13501 Chapelside Ave., Cleveland, Ohio.
- Chas. Robbins, 13501 Chapelside Ave., Cleveland, Ohio.
- Roy O. Shuford, Y. M. C. A., LaGrange, Ga.
- Frank West, Jr., Warehouse Point, Conn.
- Dr. B. W. Brush, 126 23rd St., Jackson Heights, N. Y.
- Albert Dack, 2612 Kingshighway, St. Laris, Mo.
- J. M. Dunn, 217 Fayette St., Morgantown, W. Va.
- G. W. Burton, 306 32nd St., Ashford, Ky.
- Kennard W. Fish, Garrison, Md.
- M. H. Cannell, Giadding D. G. Co., Providence, R. I.
- Harley Koch, 3709 Brookdale Ave., Oakland, Cal.
- E. L. McMillan, Box 1411, Rt. 2, Halfway, Mich.
- Thos. Lane, 3209 Virginia Pk., Detroit, Mich.
- J. L. Clemmo, 7 Tamarack St., Massena, N. Y.
- T. L. Pullen, 1124 North 3rd Ave., Columbus, Miss.
- B. Gebert, 4x 314 City Hall, St. Louis, Mo.
- F. G. Ludwig, 4544 Polk Ave., Houston, Tex.
- Walter Ezell, 1818 W. Lake Ave., Chicago, Ill.
- Wm. Rohrback, 131 S. Ruby St., N. Phila., Pa.
- Robt. Neel, 942 S. 2nd St., Louisville, Ky.
- Mrs. K. A. Meremness, Schoharie Co., New York.
- C. Warner Lasky, 246 Tremont St., Syracuse, N. Y.
- Fred J. Kaiser, 187 N. Lake Ave., Albany, N. Y.
- W. E. Wolverton, M. D., Linton, N. D.
- Donald McCully, 653 W. Onondga, Syracuse, N. Y.
- Robert Neill, 723 W. Water St., Elmira, N. Y.

A B. C. stands for the American Broadcast Club. Join it today. It involves no dues or payment of any kind, and no obligations. It was founded by RADIO WORLD simply to unite the broadcast listeners and radio fans in general in a common bond to promote their welfare as occasion requires. Send your name and address to A. B. C. Editor, RADIO WORLD, 1493 Broadway, New York City.

A. B. C. Editor, RADIO WORLD, 1493 Broadway, New York City.

Please enroll me as a member of the American Broadcast Club.

Name .....

Address .....

City or Town .....

State .....

## RADIO BARGAIN SALE!

- Radio Guild Harkness Reflex Coils. 1 set for \$3.00; 2 sets for \$3.01
  - Columbia Molded Varlo-Couplers. 1 for \$6.00; 2 for \$6.01
  - Freshman Variable Leak and Condenser. 1 for \$1.00; 2 for \$1.01
  - Amplex .0005 Grid-densers. 1 for \$1.25; 2 for \$1.26
  - Stiers or UnXold Lift-wire wound 3-circuit tuners. 1 for \$6.00; 2 for \$6.01
  - Footo Coast-Coll. 1 for \$7.00; 2 for \$7.01
  - Triple honey-comb mounts. \$2.98 each
  - Framingham Vernier Rheostats. 2 for \$1.39
  - Peerless Double-Rotor Coils. \$4.98 each
  - Varlo-Couplers. 89c. each
  - Roberts Knockout Coils. \$6.78 set
  - Silicon Mineral. \$2.95 per lb.
  - Pyrite Mineral. \$3.95 per lb.
  - Galena Mineral. \$3.95 per lb.
  - Star Rheostats with dials and knob. 2 for \$1.10
  - Brass Silders for crystal sets. 7c. each
  - Brass Square Rods. 10c. each
  - Paper Condensers. 3 for 12c.
  - Chapin Gold Band Audio Transformers. \$2.95 each
  - Diamond Low-Loss Condensers. 11, 17, 23 plate types. \$1.88 each
  - Rheinarz Low-Loss Coils. 2 for \$2.50
  - Journal Filter Tuners. \$1.25 set
  - Journal Filter Tuners—Low-Loss type. \$2.45 set
  - Samson or Precise Audio Transformers. \$3.85 each
  - Roberts Knockout 2-tube Kitset. \$35.95 kit
  - Recegrad Super-Het. Kitset. \$35.95 kit
  - Saldwin-Pacific Super-Het. Kitset. \$12.25 kit
  - Ultra-dyne kit. \$21.45 kit
  - N. Y. Coll Super-Het. kit. \$12.58 kit
  - Electrad Journal Filter Tuner Resistances. 90c. each
- Orders under \$1.00 will not be accepted. We ship anywhere C. O. D.—you pay postage. All parts are fully guaranteed.

FEDERAL RADIO PRODUCTS CO.  
712 BROADWAY SCHENECTADY, N. Y.

## "Better Than an Aerial"

Say Many Fans and Dealers of THE

# PARAMOUNT LOOP

LIST PRICE \$12

A Marvelous New Antenna, the Popularity of Which is Fairly Sweeping the Country.

Spider-web wound with silk over phosphor-bronze wire on genuine Bakelite frame, the PARAMOUNT LOOP gathers and sends direct to the receiver every electron of current, producing

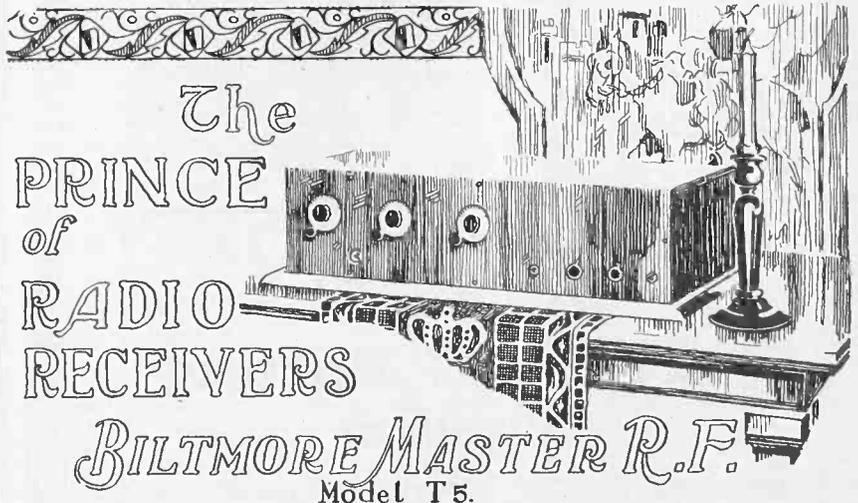
- GREATER VOLUME!
- GREATER CLARITY!
- GREATER DIRECTIONAL EFFECT!
- GREATER RECEIVABILITY!

For results that will add still greater delight to your "Radio Afternoon or Evening."

Order a PARAMOUNT LOOP from Your Dealer—or Direct from the Manufacturer—To-day!

## PARAMOUNT RADIO CORP.

23 Central Avenue, Dept. R.W., Newark, N. J.  
Big Opportunity for Dealers.



The  
PRINCE  
of  
RADIO  
RECEIVERS

BILTMORE MASTER R.F.  
Model T 5.

A \$150.00 Receiver Selling for Only \$68.00

Here is as fine a five-tube receiver as was ever made. Fine in appearance, workmanship, materials and results.

The circuit is the Biltmore improved Radio frequency type. All materials are the finest which it is possible to obtain. The variable condensers and R. F. Transformers are low loss especially designed.

The cabinet is heavy mahogany hand rubbed. The panel is mahogany and all metal parts are highly nickel plated.

The results match the appearance of the Receiver. Its extreme sensitiveness, matchless selectivity and perfect tone have made for the Biltmore a host of highly enthusiastic owners. "Absolutely the best Receiver which can be had at any price" is an example of the hundreds of testimonial letters in our files.

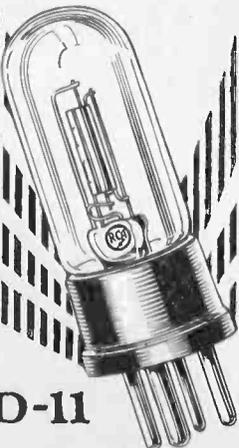
Model T 5, Price.....\$68.00

For Sale by all the better Radio Dealers.

Write for descriptive literature Dept. D.

The Biltmore Radio Company.  
BOSTON 30 MASS.

## Buy Tubes by Name



WD-11

# Radiotron

REG. U.S. PAT. OFF.

# THAT LOUDSPEAKER

(Continued from page 9)

of the operation (triflingly reversed from my textual directions) are shown in Fig. 3. The inside cardboard circle may be cut away first and the lateral slice made later, if you prefer, as shown in Fig. 3.

The two ends of the strip now are glued together. The object of cutting the strip was to enable you to pull it together now in such manner that the one of the baps overlaps the other about  $\frac{1}{2}$ " , thus affording the bevelled effect of the microphone, instead of the straight-front lines that would otherwise obtain. You must be careful about keeping the flaps together while the glue or cement hardens. Some shellac, varnish, collodion of valspar is used as the binder. The work I have been describing is shown in Figs. 4 and 5.

### The Speaker Diaphragm

Next tackle the diaphragm of the speaker. We will do a lot of talking about diaphragms, hence remember that the speaker has a diaphragm (in two parts) and the telephone unit has one. The unit diaphragm is black and tiny, while the speaker diaphragm is the silk, parchment, etc.

Fig. 6 shows how the diaphragm material is caught between the hoops and thus made taut. The excess of the material used is then cut away (Fig. 7). This operation is repeated. The result is two diaphragms, front and back.

You will have to take the unit apart to some extent (Fig. 8). The screwcap is removed and two holes are bored through the metal housing of the unit. Be sure not to let your drill strike the magnets. Use a drill that will pass the 6/32 screws. These two holes are shown clearly in Fig. 9. Just what their distance apart will be depends on the type of unit used. Center them as best you can, however, using a tri-square with centering attachment, if you have one.

A common or garden variety of pin is soldered to the diaphragm of the unit (Fig. 11). Use rosin-core self fluxing solder or uncured solder, with jeweler's soldering paste. The head of the pin is soldered. The result is shown in Fig. 12. The pin in that case was a little larger than the common or garden variety. It

might be termed a specimen of the parliamentary or conservatory variety. To make sure you get to the center of the diaphragm, resort to the tri-square with centering attachment. If you have one you know how it works. If you haven't one, do the best you can about getting the center of the diaphragm, but do not rely solely on your eye. The eye, like the ear, is not a precision instrument, luckily.

The brass or copper rod's purpose is shown in Fig. 13. It is a brace. Using the two holes already drilled in the metal housing of the unit as your guide, mark two points on the brass or copper rod, and drill corresponding holes. Thus you will be able to insert a 6/32 machine screw in each hole and its mate aperture in the rod. Secure the rod with a nut on the screw at each point (Fig. 13).

The rod will prove a little longer than would seem necessary. This is a misapprehension. Its extra length is utilized by turning the excess back, at each end, to form a right angle, and drilling a hole in each right angle. Thus, when a hole is drilled in the frame support of the speaker to accommodate each of these apertures in the rod, the rod is supported by the frame and the unit now occupies an impressive position. Care should be exercised that the unit and its trappings are so mounted that the rod is exactly level with the horizontal. This has no mechanical advantage, but only an aesthetic one. You can see from Fig. 14 just how the frame is mounted on the base. This accounts for the two remaining screws and nuts. Depending on what type base you use, the necessity may arise for employing 1" long screws here. Wood screws might be pressed into service with fine results. The detail of mounting the frame to the base is self-explanatory in the photos. (Figs. 14, 15, 16, 17 and 19). Fig. 15 shows the reverse view of that depicted in Fig. 14.

### What the Corks Do

Now for the corks. They are the shock-absorbers of this speaker. Or you might call them snubbers. Four of them, evenly distributed about the circumference, occupy the free space between the exterior circumference of the larger hoops and the inside circumference of the cardboard frame tubing that supports the speaker;

the pin or needle or whatever is used here is permitted to protrude through the diaphragm of the speaker. There is bound to be intrusive vibration caused by the oscillation of the needle, hence some neutralizing method must be used. As  
(Concluded on page 28)

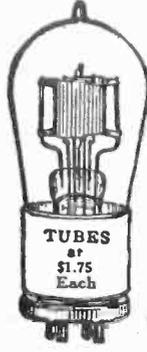
## PANELS

FOR ANY KNOWN  
CIRCUIT DRILLED AND ENGRAVED  
PRICES ON REQUEST

**Cortlandt Panel Engraving Co.**  
81 Cortlandt St. New York City

**SAVE \$2.25**

ON COST OF NEW  
TUBES BY HAV-  
ING YOUR OLD  
TUBES REBUILT  
AT \$1.75 EACH.



Guaranteed equal to new. Send us your tubes by parcel post. We return them parcel post, C.O.D., and try to maintain 24-hour service.

**HARVARD RADIO LABORATORIES**  
200 Old Colony Ave.  
Boston, Mass.

## VOLT-X

### VARIABLE GRID LEAK



NEW! A Ball-Bearing Grid Leak That Stays Put  
Screw adjustment, expansion contact and resistance unit that cannot wear or tear.

**VOLT-X GRID LEAKS** are positive and smooth in action with an accurate range of from one-half to fifteen megohms. Balancing Resistances for Super-Heterodyne and other circuits, 30,000 - 150,000 ohms. They fit any standard leak mounting, and get the absolute maximum from your tubes. They do not wear out.

Grid Leak ..... \$1.00  
Grid Leak Mounting . . . . .30

**BURTON & ROGERS MFG. CO.**  
755 BOYLSTON ST., BOSTON, MASS.

**RADIO** MONEY SAVING CATALOG SENT FREE

**TIMES SQUARE AUTO SUPPLY CO. INC.**  
BROADWAY at 86th St. New York

For Daylight Reception Use  
**Hetro-Magnetic Receivers**

Send for Catalogue  
**SIDBENEL RADIO CO.**  
29 W. Mt. Eden Ave. Bronx, N. Y.

**S. HAMMER RADIO CO.**  
303 Atkins Avenue, Brooklyn, N. Y.

Please send me FREE, Your NEW  
**RADIO CATALOG**

Name .....  
Address .....  
City ..... State .....  
FILL OUT AND MAIL

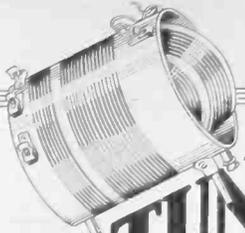
**SOLVED!**

**—The "B" Battery Problem**

Throw away your "B" Batteries and install a Kellogg Trans-B-former. It gives you "B" Battery current direct from your electric light socket at the trifling cost of one-fifth of a cent per hour. Gives better reception—no interferences. Write for details.

**KELLOGG SWITCHBOARD & SUPPLY CO.**  
**Trans-B-Former**

1066 WEST ADAMS STREET CHICAGO, ILLINOIS



# TRI-TUNER

Pre-paid \$3.00

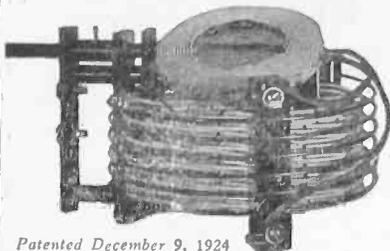
This very efficient tuner has been tested and approved by the Radio World. It is very selective, therefore an excellent coil for those who seek distant stations.

The TRI-TUNER has many improvements over other coils of distinct advantage to the Home Set Builder. These include the Fanstock solderless clips, pig-tail connections, genuine Litz wire wound on natural Bakelite. Satisfaction with this tuner is guaranteed.

### ARC RAD PRODUCTS

48 South 7th Street Newark, N. J.  
Guaranteed Radio Products

## LOW-LOSS TUNERS



Patented December 9, 1924

The Globe Low-Loss Tuner is designed to give maximum efficiency. All metal parts entirely eliminated. Less than 1 1/2 oz. of insulating material. Anti-capacity windings. Suitable for use in all standard hook-ups. Special unit for the SUPERDYNE circuit.

#### PRICES:

Standard Tuner (Broadcast Range).....\$7.00  
Short Wave (70-250 Meters).....\$7.00  
For Superdyne Circuit.....\$8.50

Circular on request.  
Dealers and jobbers write.

**Globe Radio Equipment Co.**  
217 WEST 125th STREET  
NEW YORK CITY



### Mailing Lists

Will help you increase sales  
Send for FREE catalog giving  
counts and prices on classified names  
of your best prospective customers—  
National, State, Local—Individuals,  
Professionals, Business Firms.

99% Guaranteed  
by refund of 5¢ each

**ROSS-Gould Co.** 10th St. St. Louis

## COAST TO COAST

Every Turn **STAR** No  
A Tap **COIL** Soldering

SEND FOR LITERATURE

**STAR RADIO PRODUCTS CO.**  
719 S. DEARBORN ST. CHICAGO, ILL.

"THE INSIDE STORY OF THE TUBE," by  
Abner J. Gelula. What happens on a tube. What  
tubes to use for different circuits. Send 13 cents  
for copy of November 29 issue to RADIO WORLD

## RESULTS

**WHAT Results Did You Obtain from Constructing Sets or Parts Following Data Published in Radio World? Write to Results Editor, Radio World, 1493 Broadway, New York City**

#### RESULTS EDITOR:

I HAVE built the 4-Tube Superdyne, 1925 Model, and would like very much to have one of your name-plates, as advertised in the Radio World.

I think this is a great set. I can tune in distant stations on the loudspeaker and the volume and tone are exceptional. The remarkable thing about this set is I get the distant stations with almost the same volume as the near ones.

A. E. BRYANT,  
61 Federal St., Lynchburg, Va.

#### RESULTS EDITOR:

IT IS my pleasure to report that I have built Radio World's 1925 model 4-tube Superdyne and am obtaining wonderful results. This is the circuit described by Herman Bernard in the issues of January 10, 17 and 24.

It has the volume of a Super-Heterodyne and as to tuning it is all that any one could ask. I have not tried much for DX, since I am new with the circuit, but WOC and WBZ come roaring in and I see the possibilities are there.

I hope that you will send a nameplate for this wonderful circuit, which I would be more than pleased to receive.

RUSSELL R. LEE  
1449 Huron St., Toledo, O.

### STATION IN VARBERG COMPLETED WASHINGTON.

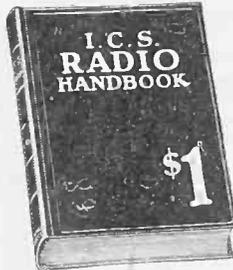
THE new radio broadcasting station at Varberg, Sweden, is completed, reports to the Department of Commerce state. This makes direct radio communication between Sweden and the United States possible for the first time.

COMPLETE 1924 INDEX OF RADIO WORLD, appeared in RADIO WORLD dated Oct. 18, 1924, and Jan. 10, 1925. 15c per copy. RADIO WORLD, 1493 Broadway, N. Y.

### DOWNEY SUCCEEDS WHITTEMORE WASHINGTON.

WILLIAM E. Downey, technical radio expert and assistant Chief Radio Supervisor, has been selected to fill the vacancy caused by the resignation of L. E. Whittemore as secretary of the Inter-Departmental Radio Advisory Committee. In addition to filling the new position, Mr. Downey will continue to serve as assistant Chief Radio Supervisor.

## Every Question ANSWERED for only \$1



JUST OUT  
514 PAGES

Compiled by  
HARRY F. DART,  
E.E.

Formerly with the  
Western Electric Co.,  
and U. S. Army In-  
structor of Radio.

Technically edited by  
F. H. Doane

NO MORE need you turn from book to book, hoping to find what you want. It is all here, in 514 pages crammed full of every possible radio detail. Written in plain language, by engineers for laymen. More than 100,000 sold.

IT EXPLAINS: Electrical terms and circuits, antennas, batteries, generators and motors, electron (vacuum) tubes, every receiving hook-up, radio and audio frequency amplification, broadcast and commercial transmitters and receivers, super-regeneration, codes, etc.

Send \$1 to-day and get this 514-page I. C. S. Radio Handbook—the biggest value in radio to-day.

International Correspondence Schools  
Box 8793-C Scranton, Penna.

I enclose One Dollar. Please send me—post-paid—the 514-page I. C. S. Radio Handbook. It is understood that if I am not entirely satisfied I may return this book within five days and you will refund my money.

Name .....

Address .....

Check here  and enclose \$1.50 if you wish the de luxe edition, bound in Lanthroid.

BUY, SELL, EXCHANGE? Use  
RADIO WORLD'S Classified Department,  
RADIO WORLD, 1493 Broadway, N. Y.

## WHY NOT SAVE 20%

FROM LIST PRICE ON EVERYTHING?

**NO EXCEPTION—ALL STANDARD RADIO MERCHANDISE OF EVERY TYPE AND MANUFACTURE**  
from complete sets to parts, tubes, and loud speakers, such as:

Atwater-Kent	Eiseman Magneto	Kennedy	Radio Corp.
A. C. Dayton	Federal	Malone-Lemmon	Western Electric
Balkite	Freshman	Magnavox	Workrite
Cunningham	Grebe	Paragon	Zenith, etc.

MAIL ORDERS FILLED; 10% DEPOSIT WITH ORDER. 25% ON ORDERS OVER \$25  
YOU PAY US ONLY AFTER DEDUCTING 20% OFF LIST PRICE.

**ECONOMY RADIO SALES CO.,** P. O. Box 99, Station O, Dept. 10, New York, N. Y.

## Genuine MASTERTONE TUBES Reduced

SIMPLY TO INTRODUCE THEM

Type M12, 199A

Type M199

Type M200, Type M201A

LIST, \$4.00  
NET, 2.00



All Tubes Guaranteed.  
Agents and Dealers Wanted.

**RADIOTUBE COMPANY**

903 BROAD STREET NEWARK, N. J.





# British Paper Lauds Article By Brewster Lee

(Concluded from preceding page)

nected to the positive side of the cell or battery.

### Different Electrodes

It has been discovered that a large electrode may be of zinc and a smaller electrode of platinum wire. If the zinc is used as an electrode, no battery will be required in the set, as it generates its own current. Carbon also may be used for the large electrode.

Do not connect the large electrode to a copper wire so that the copper wire is also immersed in the solution. The acid eats into the copper, thus spoiling the solution and the action of the detector.

One of the first terms that the beginner learns is "detector." When mention is made of the detector, the usual impression is of a valve, or a piece of galena or silicon. But a piece of coal would do as well.

Carbon is also a detector of radio-frequency currents. And nearly every mineral is, more or less. However, whether it be a valve or a piece of coal, the action for the "detection" of the signal is the same.

# KSAC Will Broadcast Its Lessons to 9,000 Kansas Schools

OPENING exercises by radio for the 9,000 rural country schools in Kansas and a rural radio Sunday service for the hundreds of communities without pastors are two innovations in radio activity which will be introduced by the extension service of the Kansas State Agriculture College Feb. 1. An unrivalled popularity for service is the mark of distinction accorded

For Maximum Amplification Without Distortion and Tube Noises use the well known **Como Duplex Transformers** Push-Pull Send for Literature **COMO APPARATUS COMPANY** 448 Tremont Street Boston, Mass.

radio station KSAC, judging the barometer of public opinion as expressed by a deluge of congratulatory communications received since its dedication Dec. 1.

**FRESHMAN MASTERPIECE**  
RECEIVERS and TUNING KITS  
Send 4c for catalog. State if you are dealer.  
**THE BOWER RADIO SHOP**  
Wholesale Radio MICHIGAN  
READING

**Best R. F. 5 Tube Hookup**  
Uses same panel, same layout, same (but fewer) parts than Neutrodyne. Gives selectivity and pleasing volume from Coast to Coast. Hundreds have changed their Neutros to this. Only extra part, 22 feet real gold shrouded bus wire, lithographed circuit and complete data, prepaid, for \$5.00. Nothing else to buy. Satisfaction guaranteed. Data about circuit—10c. 48 page parts catalog for stamp. We accept stamps same as cash.  
**KLADAG RADIO LABORATORIES, Kent, Ohio**

# Earn \$50 to \$200 a Week in RADIO

You can! Hundreds of ambitious men are already earning thousands of dollars in this wonderful new industry—you, too, can get your share. Mail coupon below for Free Book which describes fully the amazing money-making opportunities in Radio and tells how YOU can earn from \$5,000 to over \$10,000 a year.

The astounding growth of Radio has created thousands of big money opportunities. Millions of dollars were spent during the past year on Radio, and thousands of young men are needed right now to meet the ever-increasing demand of work.

Men are needed to build, sell and install Radio sets—design, test, repair—as radio engineers and executives—as operators at land stations and on ships traveling the world over—as operators at the hundreds of broadcasting stations. And these are just a few of the wonderful opportunities.

### Easy to Learn Radio at Home in Spare Time

No matter if you know nothing about Radio now, you can quickly become a radio expert by our marvelous new method of practical instruction—instruction which includes all the material for building the latest up-to-date radio apparatus.

Scores of young men who have taken our course are already earning from \$75 to \$200 a week. Merle Wetzel of Chicago Heights, Ill., advanced from lineman to Radio Engineer, increasing his salary 100% even while taking our course! Emmett Welch, right after finishing his training, started earning \$300 a month and expenses. Another graduate is now an operator of a broadcasting station—PWX of Havana Cuba, and earns \$250 a month. Still another graduate, only 16 years old, is averaging \$70 a week in a radio store.

### Wonderful Opportunities

Hardly a week goes by without our receiving urgent calls for our graduates. "We need the services of a competent Radio Engineer." "We want men with executive ability in addition to

### Pay Increases Over \$100 a Month



I am averaging anywhere from \$75 to \$150 a month more than I was making before enrolling with you. I would not consider \$10,000 too much for the course.  
(Signed) A. N. Long, Greensburg, Pa.

### Doubles Salary

I can very easily make double the amount of money now than before I enrolled with you. Your course has benefited me approximately \$3,000 over and above what I would have earned had I not taken it.  
(Signed) T. Winder, Grand Junction, Colo.



qualifies for a government first-class commercial license. It gets you the bigger paying jobs in Radio.

### Send for FREE RADIO BOOK

Learn more about this tremendous new field and its remarkable opportunities. Learn how you can quickly become a radio expert and make big money in Radio. We have just prepared a new 32-page booklet which gives a thorough outline of the field of Radio—and describes our amazing practical training in detail.

This Free Book, "Rich Rewards in Radio," will be sent to you without the slightest obligation. Mail coupon for it now! For a short time we are offering a reduced rate to those who enroll at once. Act promptly and save money.

### National Radio Institute

Dept. 78DB  
Washington, D. C.



NATIONAL RADIO INSTITUTE,  
Dept. 78DB, Washington, D. C.

Please send me without the slightest obligation your Free Book, "Rich Rewards in Radio," and full details of your special Free Employment Service. Please write plainly.

Name ..... Age .....  
Address ..... Occupation .....  
City ..... State .....

# The "Goode" Two-o-One



Le Ton d'argent

Guaranteed



BY  
MAIL  
ONLY

\$2.39

Postpaid

# QUARTER AMPERE AMPLIFIER-DETECTOR RADIO TUBE

### GUARANTEED SATISFACTORY

All "GOODE" Tubes Sold Direct to the Consumer—No Dealer Profits

- ONE—"Goode" Detector-Amplifier ..... \$2.39
- THREE—"Goode" Detector-Amplifiers ..... \$6.42 (All Postage Prepaid)

The "Goode" Two-o-One A Tube amplifies or detects. It is a quarter ampere, five volts, standard base, silvered tube.

Send express or postal money order or New York draft to—

**The Goode Tube Corporation**  
Incorporated Dept. B  
**OWENSBORO KENTUCKY**

# The Coils for the Bluebird Reflex

(Continued from page 6)  
three separate windings. It will be found that the number of turns on the primary

L1 will, in commercial models, vary considerably, but a few turns more or less usually makes no difference here. The secondary should have a sufficient number of turns to tune over the entire broadcast band when the secondary is shunted by a .0005 mfd. variable condenser, normally 23 plates. The tickler coil should have from 36 to 44 turns, depending on the diameter of the tubing or other form used. The basketweave type of variocoupler is excellent, so are the coils wound on cutout forms or on Pyrex or insulantite. Dry cardboard, many may be surprised to learn, is excellent, too, but commercial coils are not made of cardboard, possibly because cardboard is not impervious to moisture effects. It is not advisable for the home constructor to attempt to make the coupler, unless he uses the forms of an existing coupler.

Making a basket-weave coupler, with tickler, is a difficult job. However, for those desiring to make their own coupler the following is presented:

A basketweave coil would consist of 42 turns of No. 18 double cotton covered wire on a 3 1/2" diameter in which fifteen equidistant dowel rods are placed upright for winding purposes. The primary would be wound over the secondary and consist of six turns of the same kind of wire, wound in the same direction. The tickler would consist of 24 turns of No. 22 single cotton covered wire on a spider-web form, hub diameter 1 1/2", outside diameter of the finished tickler coil 2 3/4". There is no difficulty in making the windings but great difficulty in obtaining mechanical security and smooth rotation without factory facilities. These particular specifications closely resemble those for the Globe broadcast coupler.

The new Wallace basketweave coupler may be used by those preferring this type of winding. Here the tickler, too, is basketweave. The pickle-bottle coil made by the Eastern Coil Co. also works well in this set.

As for coils of the Uncle Sam or Ambassador type, these may consist of 16 turns or less on a tubing of 3/4" outside diameter, 3 1/2" high, for the primary; 40 turns for the secondary (begun 1/4" away from the end of the primary); and a 44-turn tickler on a tubing 2 1/4" outside diameter, 1 3/4" high. The wire is Litz. All windings are in the same direction. Cutout forms are good. Pyrex (a special glass) is fine, too. The new Bruno coil is wound on Pyrex. The standard Trituner of ARC may be used to advantage in this circuit.

If a 4" diameter form is handier, the number of turns should be 4 to 10 for the primary, 32 for the secondary. The form should be 2" high. The tickler would consist of 38 turns, 19 on each side of where the shaft penetrates a 3" diameter

form 1 3/4" high. The wire may be No. 20 DCC or DSC.  
The RFT (L5, L6) must be a commer-

## Panel Shielding After Your Set is Finished

A liquid metal: cuts out body capacity, brings in music clear and sweet. Done in 5 minutes. One can will shield 5 or more sets; 50c per can. Also a liquid spaghetti can be put on after set is finished, fine for insulating the base board, 50c per can. Post paid.

WALKER MANUFACTURING CO.  
247 Scott Street San Francisco, Cal.

## NEUTRODYNE KIT \$19.75

Complete kit of licensed Neutrodyne parts including panel, tube sockets, rheostats, jack, fixed condensers and grid leak. Neutroformers complete with variable condensers and neutrodons. Every part included even to screws and wire. Easy read plans.

Send No Money Order by Postcard  
Pay the Postman  
RADIO SURPLUS STORES  
HELENA MONTANA

TEN TIMES TESTED TOWERS Scientific Phones \$2.95

## CONNOR "B" BATTERY

The thriftiest outfit yet

100 volt unit, 2200 M. A. hours, lead plates, beautiful mahogany cabinet, 14x7x7", shipped dry anywhere in U. S. prepaid, \$21.00; high polished cabinet, \$23.00; direct or alternating current chargers for B batteries, \$3.75 without attachments, and \$5.25 with attachments. Full set of instruments with battery and charger. Half cash with order, balance C. O. D. 5% discount for cash with order. Get this outfit and stop annoyance of having to buy dry cells every few months and the lugging of battery to service station with its cost.

### Connor Battery Company

Van Wyck Boulevard, Richmond Hill, N. Y.

## "Morsing Bus-Bar Union"

Assemble Round or Square Bus Bar and Solder Three Wires at a Time.



Quick Assembling. Repairs Can Be Made Without Taking Set Apart.

Enough for one set, 25c

No. 1 for 14; No. 2 for 12 wire.

Ten dozen for \$1.00.

Newark Watch Case Material Co.

15 Ward Street Newark, N. J.

DISTRIBUTORS WANTED

## RADIO MAILING LISTS

15870 Radio Dealers	Per M	\$7.50
970 Radio Dealers in Mexico	Per List	10.00
1808 Radio Mfrs.	Per List	15.00
2324 Radio Jobbers	Per List	20.00
1125 Radio Jobbers, rated \$5,000 and up	Per List	15.00
714 Radio Jobbers, rated \$50,000 and up	Per List	10.00
597 Radio Mfrs. making complete sets.		5.00
128 Radio Battery Mfrs.		2.50
125 Radio Cabinet Mfrs.		2.50
60 Crystal Mounters for Wireless apparatus		2.50
25000 Radio Amateurs	Per M	7.50
325 Phonograph and Music Radio Dealers		5.00
7400 Radio owners	Per M	7.50

Guaranteed 98% correct. Ask for Price List and all other lists.

A. F. Williams, Mgr., List Dept.

Established 1880

166 W. Adams St.

Chicago, Ill.

## INDEPENDENT

NEW TUBES ALL TYPES \$2.15 EACH

3 FOR SIX DOLLARS  
5 FOR NINE DOLLARS

REPAIRED OR EXCHANGED \$1.75  
5 FOR \$7.50

QUICK DELIVERIES EVERY TUBE CARRIES A MONEY BACK GUARANTEE

RADIO TUBE OUTLET

207 Market St. Newark, N. J.



## Compendyne Radio Receiver

5 TUBE RADIO FREQUENCY

MANUFACTURED BY

E. SINGER CO.

40 HUDSON STREET NEW YORK CITY  
Write for Details



Standard RADIO Products

Over 130 Standard radio parts, each bearing the Federal Iron-clad performance guarantee.

Write for Catalog.

Federal Telephone & Telegraph Co.  
Buffalo, N. Y.

## This Set Will Set the Nut



The New Britain Machine Co.  
197 Chestnut Street New Britain, Conn.

## NEW REFLEX TUBES

\$2.50

CANADA 35c EXTRA

All Tubes Guaranteed.

Mail Orders Solicited.

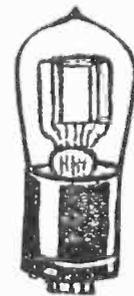
Dealers and Jobbers

Write for Discounts.

Denning Radio Mfg.

455 SPRINGFIELD AVE.

NEWARK, N. J.



## ONLY THREE TUBES

and it is the equal of any five-tube set ever built. It has selectivity and volume equal to any Super-heterodyne or Neutrodyne.

It has the purity and quality of tone of the crystal set.

It has the simplicity of control of the single-circuit set.

It has brought in Honolulu, Paris, London and other foreign stations on a loud speaker.

It gets distant stations while a 500-watt station only three blocks away is broadcasting.

It has only two controls and can be logged. It is not a reflex; it is the result of years of careful scientific research and experiment.

Any novice can build one successfully from our diagrams with complete instructions and special coil.

PRICES  
Diagram, instructions and coil..... \$5.00  
Three-tube instrument ready to use... 50.00  
One-tube instrument ready to use:  
gets everything on head-phones... 18.50

Build or buy one of these wonderfully sensitive instruments and you will want no other.  
All goods shipped prepaid.

S. A. TWITCHELL CO.  
1930 WESTERN AVE. MINNEAPOLIS, MINN.

COMPLETE 1924 INDEX OF RADIO WORLD, appeared in RADIO WORLD dated Oct. 18, 1924, and Jan. 16, 1925, 15c per copy. RADIO WORLD, 1493 Broadway, N. Y.

# Duolateral Plate Coil Used

cial model. Tri-coil, Acme and several other types are good.

The plate coil may be spider-web wound, basketweave or, preferably, duolateral or honeycomb. A Branston lateral-wound coil is excellent for this purpose. Get a 75-turn coil. This has entirely too much inductance but turns should be removed until the correct value

is found. Usually the removal of 12 to 15 turns will enable one to tune the plate in step with the grid. The way to determine this is to insert the 75-turn duolateral coil in the set temporarily and tune in a station that has a high wavelength, say above 500 meters. It will be found, for instance, that a station operating on 492 meters will come in at near 75 on C1, the condenser tuning the grid circuit. But the setting for C2 will be far below that, perhaps around 30. Now remove turns from the plate coil until the correct setting of C2 for that wavelength coincides with the dial setting on C1. The tickler setting has to be varied for different wavelengths for best results. Its correct setting even for a given wavelength may vary as time goes on, but experience will teach you best the manner of adjusting the tickler.

The variable condensers should be low-loss, of which there is a variety of choice on the market.

### Tubes

This circuit works best with UV201A or C301A tubes, fed by a 6-volt storage battery. As only two tubes are used a 90-ampere-hour storage battery is ample.

If dry cell operation is desired, the most economical method of producing good results is in the use of two WD11 or WD12 tubes, (or C11 or C12, as the C tubes

(Continued on page 30)

**BUY RADIO BY MAIL**  
**SEND 10c TO-DAY FOR**  
**OUR NEW CATALOG**  
 SIMPLEX RADIO SALES CO.  
 1806 Lafayette Ave. St. Louis, Mo.

**PRE-AMPLIFIER**  
 Registered



**Makes Distant Stations Sound Like Local Ones**

THE TWITCHELL PRE-AMPLIFIER is a Powerful Radio Frequency Amplifier attachable to any make of receiving set. It brings in many distant stations which you cannot hear without it. Brings in with tremendous volume those you now hear only faintly. Makes your set selective. Prevents re-radiation. Price, complete with tube, prepaid

**\$25.00**

Diagram of circuit, \$1.00

**S. A. TWITCHELL CO.**  
 1930 Western Ave. Minneapolis, Minn.

**The Superdyne Cycle**

"RADIO WORLD'S 1925 MODEL DX SUPERDYNE," by Herman Bernard. Only two controls; 4 tubes. One RF detector, 2AF. Wonderful tone quality, great simplicity, fine DX powers and excellent volume. Issues of January 10, 17 and 24, Trouble-shooting described in January 31 issue. Get all four copies. Play safe.

"A 1-TUBE REFLEXED SUPERDYNE," by Herman Bernard. One stage of tuned regenerative RF, crystal detector and one AF stage, great quality of signals. Good for about 150 miles on earphones. Issue of December 6.

"THE 1-TUBE DX SUPERDYNE," by Herman Bernard. One of the best 1-tube DX sets ever published. Fine signal quality. Issue of December 20.

"THE 3-TUBE DX SUPERDYNE," by Herman Bernard, explaining how to add two audio stages, transformer-coupled, to the 1-Tube DX Superdyne. Issue of December 27. Get December 20 issue, too, for full particulars on the detector circuit.

"THE ANDERSON 4-TUBE DX SUPERDYNE," by J. E. Anderson, consulting engineer. One of the most popular and best DX and quality sets using three controls. Issues of November 22 and 29. "Trouble Shooting" in December 6 issue.

Any of the above copies at 15 cents each, or start your subscription with any number. RADIO WORLD, 1493 Broadway, New York City.

**For Crystal Set Owners**

Illustrated articles on the making and use of crystal sets appeared in Radio World dated Dec. 6, 20 and 27, 1924, and Jan. 24, 1925. 15c per copy, or the 4 copies for 60c.

RADIO WORLD, 1493 Broadway, New York

**NOLTE LOW LOSS COILS**  
 for the  
**ROBERTS CIRCUIT \$5.50**



T. R. F. COILS  
 SELF BALANCED  
 F24 (3), \$4.50

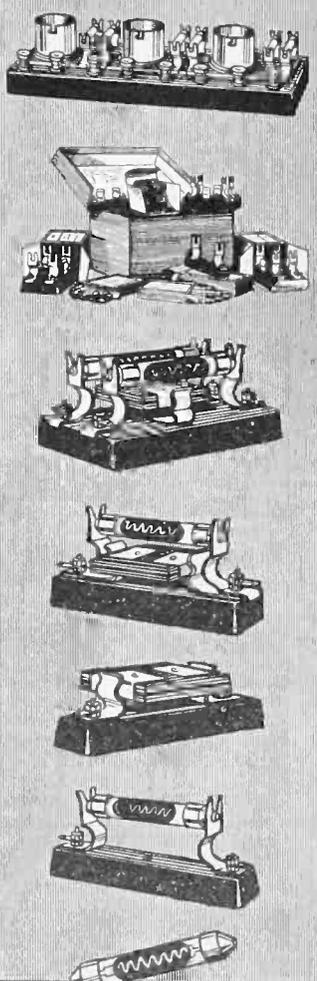
JOURNAL ONE  
 KNOB COIL  
 F25, \$1.25

JOURNAL  
 FILTER TUNER  
 COILS  
 F23 (2), \$2.50

WAVE TRAP  
 FILTER COIL  
 F22, \$1.25

**NOLTE MFG. CO.**  
 Dept. C  
 61 GAUTIER AVE. JERSEY CITY, N. J.

**DAVEN RADIO PRODUCTS**



**THE** history of the Daven Radio Corporation dates back before the days of Radio Broadcasting. Its engineers have concentrated their efforts in the perfection of amplifying devices, which have been copied and duplicated by others, but their quality never equalled.

In perfecting the Daven Resistance Coupled Amplifiers, many careful laboratory experiments were made at great expense. The SUPER AMPLIFIERS and the knock-down kits are the results, and have convinced the most skeptical that Resistance Coupling is the ultimate method of amplification.

The SUPER-AMPLIFIER comes to you in complete form, ready to install. All the connections are underneath the molded Bakelite base. It gives wonderful volume, and is absolutely distortionless.

THE KITS are for those who prefer to build their own. They are easy to assemble and may be used in any standard tuning circuit. Sockets and mica-fixed condensers are not included, but instructions are furnished giving complete information and diagrams. Supplied for either three or four stages.

Buy of your Dealer the "RESISTOR MANUAL," our complete handbook on Resistance Coupled Amplification. Price - 25c. If your Dealer cannot supply you, we will send one direct, post paid for 35c.

TRADE MARK  
**DAVEN RADIO CORPORATION**  
 "The Sine of Merit"  
 Resistor Specialists

Newark New Jersey

*The Aristocrat of Amplifiers*

# HAYDEN'S SPEAKER

(Concluded from page 22)

potentiometers are not popular with our low-loss friends, neutralizing condensers difficult to adjust and the Superdyne method fully treated elsewhere in this

## THE ASTON CARD INDEX RECORD YOUR RADIO STATIONS

Copyright  
1924 by  
S. T. Aston  
& Son

Telephone  
Franklin  
2159



**\$3.00**  
Complete  
Postpaid

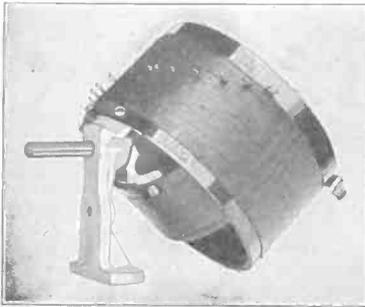
100 Cards, Mahogany Finish or Oak Cabinet, and Index Dividers. A Useful Accessory to Any Set. Give Name of Set and Sketch of Dial Arrangement. Postpaid on Receipt of Cash or Money Order. Dealers Write for Terms.

**S. T. ASTON & SON**

114 WORTH STREET NEW YORK CITY

# TRIPOD

180° UNDERCUT STATOR



THE TUNER THAT MADE THE  
**DX SPECIAL SET**  
FAMOUS ALMOST OVERNIGHT

THIS SPECIAL TUNER ENABLED THE manufacturers of the DX Special Set to guarantee two thousand miles on their sets.

SENT POSTPAID ON RECEIPT OF \$2.00

# TRIPOD

ELECTRIC CO., INC.

16 HUDSON ST., NEW YORK CITY

issue, reliance will be placed instead on the beeswax method of neutralization. Please be sure to use beeswax. I said that before, but I'm so afraid that some one will try candle drips on this pet product of mine, and then trouble letters will pour in. Beeswax's the word! A dab of it is shown on the diaphragm in Fig. 16, while a method of obtaining this rather even distribution of the stuff is shown in the excellent action photo (taken by the author, modest cuss) and known to fame as Fig. 18. The wax is placed, in all its solidity, then the flame is permitted just to graze the surface of the wax, which, yielding to its heat, distributes itself in impartial directions upon the focal point, whereupon the match is jerked back out of the theatre of action. Then the excess beeswax is cut away with a dull knife. About 1/8" of it may be suffered to exist about the protruding pin. The whole daub is not tolerated in the best of circles.

That brings us to Fig. 17, which shows the rear view of the speaker, after the speaker diaphragm has been put in front position and the phone cord (purchaseable in radio store) attached. Some units include phone cords. The connections at one end of the cords are of the tip variety, for insertion in phone plugs, while the other terminals are crowned with an unjeweled diamdem apiece, a sort of lug, in common parlance, and the nuts on the unit terminals are fastened over these lugs.

And now we come—with a sigh of relief to a weary hand—to the final touches.



Bracket mounting type.  
Complete, \$4.50

**One Pull** on the Jones MULTI-PLUG instantly disconnects antenna, ground, A and B batteries from your set. One push reconnects. And it can't be plugged in wrong! Eight foot cable permits placing batteries out of way—in basement, closet or elsewhere. Makes your set portable. All leads plainly coded.

## Jones MULTI-PLUG

THE STANDARD SET CONNECTOR

Used by

Howard-Workrite-Zenith-Mu-Rad

Write for illustrated folder of  
Panel Mounting and Binding  
Post types.

**HOWARD B. JONES**

618 S. Canal St.

Chicago

The hole is drilled now, if it has not been done already, in the bottom of the support, to permit the phone cords to be passed outside the speaker (Fig. 17). The No. 14 sprung wire, also purchaseable in a hardware store, is inserted at the inside diameter of the microphone face, and holds the front pair of hoops in place. If difficulty is encountered here, use two pieces of spring wire, one on each side of one pair of hoops, and as close to them as possible.

The other side of the speaker is covered up by the other component of the diaphragm, i.e., the arrangement consisting of the other set of hoops, the other 8" square silk, etc., and the other piece of spring wire.

LACH signing off.

**FREE BOOKLET FOR INVENTORS**

IF YOUR INVENTION is new and useful it is patentable. Send me your sketch. Z. H. POLACHEK, 70 Wall St., New York. Reg. Patent Attorney-Engineer

## Make BIG MONEY! —IN RADIO

We Need Men—Can You Qualify?

Ozarka representatives make real money because they give real values and deliver a real service. For instance, there is a 4-tube Ozarka Instrument for loud speaker operation, giving wide range of reception at \$39.50. Our men demonstrate Ozarka Instruments and Install.

The Instrument makes the sale easy by its performance. We train you to know radio and our methods, make you worthy to wear the Ozarka button as our accredited representative. Previous experience is not necessary. In fact we prefer to do our own educating. If you have a clean record, are industrious, and have saved up a little cash, here's a real opportunity, if you can qualify for an exclusive territory. We already have 2247 representatives. Territory going fast.

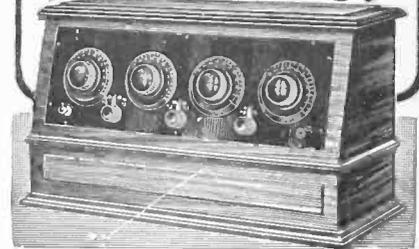


### FREE, LARGE Illustrated BOOK

WRITE Today for illustrated book No. 101 that gives the entire Ozarka Plan. Don't fail to give the name of your county.

**OZARKA, Inc.**  
842 Washington Blvd.  
CHICAGO

**4 Tube Sets As Low as \$39.50**



# Do You Want a Radio Publication Gratis? For NEW RADIO WORLD Subscribers Ordering NOW

Radio World has made arrangements

—To offer a year's subscription for any one of the following publications —with one year's subscription for RADIO WORLD

- RADIO NEWS or
- POPULAR RADIO or
- RADIO BROADCAST or
- WIRELESS AGE or
- RADIO DEALER or
- RADIO JOURNAL or
- RADIO (San Francisco) or
- BOYS' LIFE

This is the way to get two publications

- for the price of one:
- Send \$6.00 today for RADIO WORLD
- for one year (regular price
- for 52 numbers)
- and select any one of the other
- eight publications for twelve months.
- Add \$1.00 a year extra for Canadian or Foreign postage.
- Present RADIO WORLD subscribers
- can take advantage of this offer by
- extending subscriptions one year
- if they send renewals NOW.

### RADIO WORLD'S SPECIAL TWO-FOR-PRICE-OF-ONE SUBSCRIPTION BLANK

RADIO WORLD, 1483 Broadway, New York City  
Enclosed find \$6.00, for which send me RADIO WORLD for twelve months (52 numbers), beginning.....  
and also without additional cost, Radio News, or Popular Radio, or Radio Broadcast, or Wireless Age, or Radio Dealer, or Radio Journal, or two yearly subscriptions.

Indicate if renewal.  
Offer Good Until  
February 20, 1925

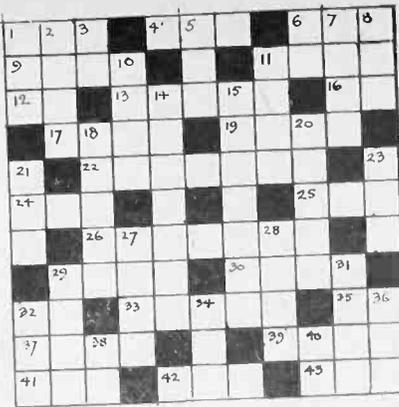
Name .....

Street Address.....

City and State.....

# Radio Cross-Word Puzzle

HEREWITH is published a radio cross-word puzzle. If you can solve it send your solution to Cross-Word Puzzle Editor, RADIO WORLD, 1493 Broadway, New York City. The names of those sending in the solution will be published. The solution of last week's puzzle follows:



### HORIZONTAL

- Broadcasting station at St. Louis.
- Caused by static.
- Unit of electrical resistance.
- Against.
- A form of antenna.
- A field of cold lava.
- To complete, as a circuit.
- An afterthought added to a letter (abbr.)
- Form of canoe used in South Sea Islands.
- First requirement for listening to radio (plural).
- An aerial.
- A type of aerial.
- Infantry (abbr.)
- Ground for growing flowers (plural).
- Girl's name.
- Spool, as of wire, etc.
- Towards.
- Girl's name (German version).
- Each (abbr.)
- Place of Napoleon's exile.
- Once radio was a dream, now it is

### VERTICAL

- Large snake in Kipling's "Jungle Stories."
- Sound made by electric spark.
- Abbreviation for the effect of heavy drinking.
- Last name of a Japanese marquis.
- A size of wire.
- How a spark crosses a gap.
- British legislators (abbr.)
- Idol.
- Description of weak mixture of gasoline and air.
- At the side.
- Transmitters.
- Distance between sending and receiving stations.
- What amplifiers do to sound.
- Toward the stern.
- Audio-frequency transformer (abbreviation).
- Scope, as of a receiving unit.
- Stations heard most clearly.
- Unit of electro-motive force.
- Gradual discharge of a condenser.

- Light afternoon meal.
- Product of electrical decomposition.
- First name, hero of "The Forty Thieves."
- An early type of direction-finder, from the initials of its two inventors.
- Initials of a British firm of electric equipment manufacturers.

## NOW -its the "SELF ADJUSTING" RHEOSTAT

No more guessing and uncertainty as to your tube filament voltage. AMPERITE inside your set, one for each tube, automatically gives just the right current to bring the most out of every tube. Simplifies wiring and operation. Increases set compactness. Lengthens tube life. Tested, proved and adopted by more than 50 set manufacturers. The set you buy or build will not be up-to-the-minute in effectiveness without it.

\$1.10 Everywhere

RADIALL COMPANY  
Dept. R. W. 50 Franklin Street, New York



Write for  
**FREE**  
Hook-ups

## AMPERITE

REG. U.S. PAT. OFF.  
"means right amperes"

The LARGEST RADIO STORES in AMERICA



## Hook-ups!

All the latest and best kits in our new

## RADIO CATALOG



No other Radio Catalog includes such a complete assortment of the best and latest Knock-Down Kits, Parts and Accessories. You need this book—Write for your FREE copy today!

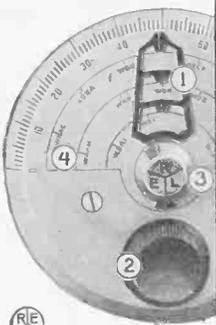
### We Save You Money!

Our business is to buy up manufacturers' and government surplus stocks, jobber and dealer bankrupt stocks—but only brand-new, fully guaranteed, nationally advertised apparatus. Our catalogue crammed with bargains.



509 So. State St., CHICAGO, ILL., Dept. R.W.8

## Direct Tuning!



Pencil record a station on the dial—thereafter simply turn the finder to your pencil-mark to get that station instantly. Eliminates fumbling, guessing.

This alignment is the gauge for penciled station records.

- Operates vernier for half-splitting adjustment.
- Takes standard condenser shaft lengths—easy to mount.
- Penciled station records easily erased from silvered dial.
- Designed by R. E. Lacault, inventor of the famous Ultradyne circuit. This monogram seal (R.E.L.) is your assurance of Lacault's design. Retail at \$2.50

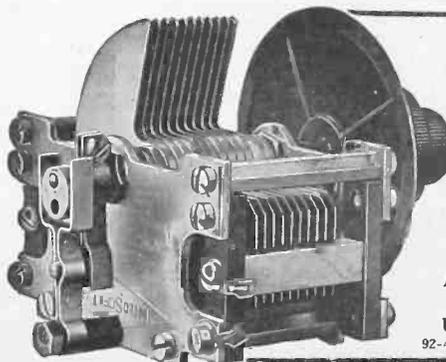
**ULTRA-VERNIER  
TUNING CONTROL**  
PHENIX RADIO CORPORATION  
5-9 Boekman Street New York City

# IN THE WEST it's "RADIO"

For Seven Years the Best  
Practical Radio Magazine.

A Free Sample Copy  
for the asking

PACIFIC RADIO PUB. CO.  
Pacific Bldg. San Francisco



## LOW LOSS CONDENSER

DUAL  
RATIO

GROUNDED  
ROTOR



PLAIN

VERNIER

Improved Type RHEOSTATS AND POTENTIOMETERS

United Scientific Laboratories, Inc.  
92-4 East 10th Street New York City

# Wiring the Bluebird Reflex

(Continued from page 27)

have the same characteristics as their UV brethren). The volume will be about 20 per cent. less. Two 1½-volt dry cells should be used, connected in parallel, that is, minus to minus, plus to plus, so that, while the voltage will not go up, the amperage will be greater, necessitated by the drain by two tubes. With a storage battery, on 5-volt tubes, the amperage question does not directly enter. (The other volt is dropped in the rheostat).

If UV199 tubes are available they may be used to advantage, with a volume decline of about 12 per cent. as compared with the type recommended. If the economy question is important, however,

as it may be where speaker volume is desired from a set using only two tubes, the tubes of the dry-cell type may be used without fear of poor results.

If the 199 type of tubes is used the rheostat should be 15 to 20 ohms. In the other instances the rheostat should be 6 ohms. The rheostat is not a bit critical in adjustment in this circuit. Operate the set with the tubes at a minimum of current consumption consistent with desired results.

## Wiring Directions

1. Connect the A battery minus to one side of the rheostat R1, the other side of the rheostat to the F— posts of BOTH sockets. Connect the A battery plus to the F+ posts of both sockets. That completes the filament wiring.

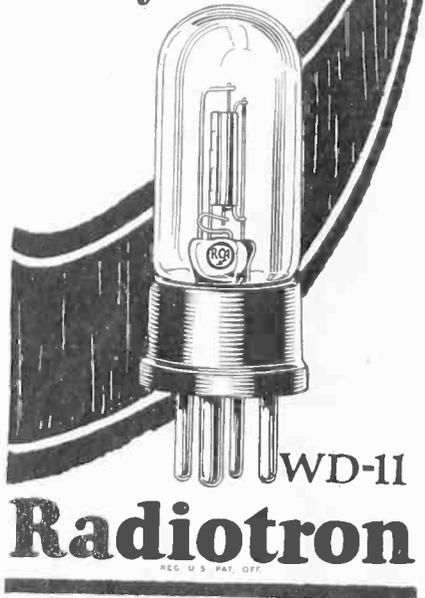
2. Connect the aerial to the beginning (top) of the primary L1, which is the small winding on the stator form of the variocoupler. The end of this coil is connected to ground.

3. The top or beginning of L2, the secondary or large winding on the stator of the variocoupler, is connected (a) to the stator plates of the variable condenser C1 and (b) to the G post or grid of the first tube (No. 1). The rotary plates of C1 are connected (a) to the G or S1 of the first stage audio-frequency transformer (AFT1) and (b) to one side of the fixed condenser C4. The other side of the fixed condenser connects (a) to the F or S2 post of AFT1 and (b) to C—. The corresponding post (S2 or F)

of the second audio transformer is likewise connected to C—. The C+ is connected to A BATTERY minus, NOT to the F— on the socket and NOT to the side of the rheostat that makes contact with the socket.

4. The plate of the first tube (No. 1) is connected (a) to the beginning of L4, and (b) to the stator plates of the variable condenser C2, which is, like the other variable, .0005 mfd. capacity. If a dual-lateral coil is used, as suggested, the beginning may be identified as that lead which comes from the INSIDE of the

Buy Cautiously  
— by name



COMPLETE 1924 INDEX OF  
RADIO WORLD

Appeared in RADIO WORLD dated Oct. 14, 1924, and Jan. 10, 1925. 15c per copy. RADIO WORLD, 1493 Broadway, New York.



ROYALTRONS  
NOW \$3.00

Approved by Radio News  
Laboratories

### TYPES

- 400—6 V. ½ Amp.—Det.
- 401A—6 V. ¼ Amp.—Det. and Amp.
- 412—1½ V. ¼ Amp.—Det. and Amp.
- 499—3 V. .06 Amp.—Det. and Amp.
- 402—Transmitter.

At all good dealers.

Every ROYALTRON  
must give satisfaction.

ROYAL MFG. CO.  
Dept. RW, 208 Broadway, New York City

**RADIO Buyers' GUIDE**

For Consumers Get it now—before you buy any set or parts to build one. It will tell you all the latest information on complete sets, parts and accessories. (Will you be so kind as to fill the name of one or more friends you believe will soon want such goods? Thank you!)  
**FREE** 100 Pages Just send your name.  
Liberty M. O. House, Dept. F-681 106 Liberty St., N.Y.



### FOR A LIMITED TIME ONLY

You can purchase for \$3.50 a 22 cell 24 volt RABAT SENIOR battery. Saving \$6.10 through direct buying. The Jobber and Dealers profit now 15 cents. 24 cell 40 volt size \$7.00.

### Rabat Senior Batteries

are neat, powerful, noiseless and well harmonize with any Radio Set. Separate cells and patented rubber cork prevent current leakage and clear glass tubes give vision of the condition of battery. Heavy duty plates 3" 10" x 1 7/8" with staggered ribbed grid form the backbone of this sturdy battery. Shipped completely charged ready for instant use. And you can save \$6.10 by ordering now.

**RABAT JUNIOR BATTERY \$2.15 c. o. d.**  
(14 CELLS 24 VOLTS 1200 M.A. CAPACITY)

Incomparable in price and performance. Designed to satisfactorily operate sets equipped with 3 tubes or less. Constructed of the same high grade materials as used in our Senior battery. Shipped dry, uncharged. Order today and save \$1.00.

**Rabat Super-Charger \$3.00 c. o. d.**

Is specially designed to satisfactorily recharge any make of storage "B" battery. Shipped complete ready to use, including lamp socket, attachment plug and cord. You save \$1.00 by ordering direct.

### SEND NO MONEY

But write us today, advising quantity and type wanted. After examining and approving these wonderful batteries then pay the Expressman the small C.O.D. charges. The Rabat guarantees in back of all our products. DON'T WAIT. ORDER TODAY and save the middleman's profit.

THE RADIO RABAT COMPANY  
1768 82 Clair Avenue Cleveland, Ohio

## RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

10 CENTS A WORD. 10 WORDS MINIMUM

**FOR SALE AT SACRIFICE**—Radiolas, Superheterodynes, Reflex Sets, Parts. Write for list. M. D. Robertson, Washta, Iowa.

**OLD CANCELLED STAMPS BOUGHT**—Any quantity—Also stamp collections. A. Herbst, Room 326, 1493 Broadway, N. Y. C.

**MANUFACTURER'S AGENT** calling on Radio-Electrical Jobbers, Chicago and vicinity, has opening for 3 additional lines carrying volume business, as we cater to large jobbers. Edelstein, 1804 McCormick Bldg., Chicago, Ill.

**A RADIOGRAM FROM MARS.** Will make you jump a foot. Great for Radio parties. Barrels of fun. Send 10c. and get one of these funmakers. Busse, 725 N. Hoyne Ave., Chicago, Ill.

**FOR SALE**—Radio and Electrical business, well established. Address V. G. Bidwell, Healdton, Okla.

**BUILD YOUR OWN**—Best low loss parts, units, full size diagrams. Reflex and three circuit at 15% saving. Write, Reflex Radio, Dunellen, N. J.

**AGENTS**—Write for free samples. Sell Madison "Better-Made" Shirts for large Manufacturer direct to wearer. No capital or experience required. Many earn \$100 weekly and bonus. MADISON MILLS, 564 Broadway, New York.

**DINING & SLEEPING CAR CONDUCTORS** (white), Exp. unnecessary. We train you. Send for book of Rules and application. Supt. Railway Exchange, Sta. C, Los Angeles.

**LOW-LOSS INDUCTANCE FORMS**—Linen Impregnated Bakelite. 50c each. The Kehler Radio Laboratories, Abilene, Kansas.

**RADIO CABINETS**—For your Radio Set, beautiful and sturdily built, 32" Wide, 52" High, 16" Deep. Built in loud speaker compartments for "A" and "B" Batteries, \$28.00. Circular showing all details on request. Ferguson Novelty Co., Box 116, Parkersburg, Iowa.

**"A 3-CIRCUIT TUNER YOU CAN LOG"** by Herman Bernard. A 3-tube set that gets speaker DX, described in RADIO WORLD issue of November 8. One stage of radio-frequency ahead of this circuit, making 4 tubes, described by Mr. Bernard in the December 13 issue. 15 cents a copy. Send 30 cents for both to RADIO WORLD.

**"A VARIOMETER-TUNED REFLEX,"** by Abner J. Gelula. Three variometers. Three tubes; 1 RF stage, detector, one reflexed audio and one straight audio. Send 15 cents for January 24 issue to RADIO WORLD, 1493 Broadway, New York City.

**"A SELECTIVE \$15 CRYSTAL SET,"** by Brewster Lee. Send 15 cents to RADIO WORLD for January 24 issue.

**"A MECHANICALLY STRONG LOW-LOSS COIL,"** by Herbert E. Hayden. Illustrated by photographs. Easy coil to make. Send 15 cents for January 17 issue, RADIO WORLD.

**CRAM'S INTERNATIONAL RADIO ATLAS,** 4 big maps, each 2 pages by 14x20. Map of Canada, Mexico, Cuba, Porto Rico, United States, Alaska. All Radio Stations for the United States and Canada, Alphabetical by Signals, States and Cities. Latest wave lengths, Kilocycles, Locations and names of operators. Liberal space for private log and new stations. The most comprehensive and illustrated list ever published. Price 50c., postpaid. The Columbia Print, 1493 Broadway, New York.

# EVEREADY Radio Batteries

- they last longer



This 5-tube tuned radio frequency set has been termed the "Champion of Them All" Wonderful proposition to dealers.  
**AMEREX ELECTRIC CORP.**  
232-E GREENWICH STREET NEW YORK



## BELLTONE RADIO TUBES

TYPE 201-A \$1.75 TYPE 11-12 199 200

199 With Standard Base Life, Tone and Volume

With Money-Back Guarantee Mail Orders Promptly Filled

**Manhattan Lamp Works**  
Room 411, 324 West 42nd Street, New York City



## Stations You Never Heard Before!

Know the joy of faultless reception. Control your grid action with FIL-KO-LEAK. Clear up distortion; increase volume; get stations you never heard before. Resistance element constant, accurate. Unconditionally guaranteed.

## FIL-KO-LEAK

SCIENTIFICALLY CORRECT  
VARIABLE GRID LEAK  
INDIVIDUALLY CALIBRATED

Resistance read in megohms through panel peep-hole or baseboard mounting. Get it at dealers—or Dept. R.W.-27.

**DX Instrument Co., Harrisburg, Pa.**

## ACME POWR-BEE

Better Than "B" Battery  
NO HUM NO NOISE  
Reduces the cost of radio at your dealers or write  
**THE ACME ENGINEERING CO.**  
Dept. 8 LOUISVILLE, KY.  
Dealers write for big sales proposition

## ESSEX RADIO SHOP

42 Headdon Pl. East Orange, N. J.  
Please send me your free list of guaranteed standard radio parts.  
Name .....  
Address .....  
City .....  
Fill out and mail

"A \$30 1-TUBE DX SET THAT GETS DX," described by Lieut. Peter V. O'Rourke in January 24 issue. Two controls. Set can be logged. Send 15 cents to RADIO WORLD, 1493 Broadway, New York City, or start your subscription with that number.

# O'Rourke's 2-Tube Reflex

(Concluded)

winding. The end of L4 is connected (a) to the rotor plates of C2 and (b) to the END of the tickler coil L3. If the tickler is so placed that its windings are parallel with those of the secondary on the coupler, that is, the respective wire terminals point in the same direction, the connection is made to the tickler from the plate coil at the lead connecting to the lower terminal of the tickler winding. The other terminal of the tickler goes to the P post of the fixed radio-frequency transformer. The B post of this RFT primary (L5) connects to the P or P1 post of the second AFT and the B or P2 post of this AFT is joined to the B+, normally 90 volts. The F or S2 of this AFT already has been connected to C—. The G or S1 post of AFT2 goes to the G post of the second socket (grid) and the plate post of this socket is joined to the spring or right-angular arm of the single-circuit jack J. Preferably make this connection to the spring. The other side of the jack goes to the battery+.

5. The G post of the fixed RFT is connected to one side of the crystal, the other side of the crystal (a) to the P post of the FIRST AFT (at left, Fig. 1) and (b) to one side of the fixed condenser C3. The other side of this fixed condenser goes (a) to the B or P2 post of AFT1 and to the F post of the fixed RFT.

Now turn on the rheostat. If the tubes light, join A+ and B—. The remaining 45-volt plus post of this battery is joined to the minus post of the other 45-volt battery, and the remaining unconnected 45-volt post (on the second battery) is used as the B+ connection throughout.

### LIST OF PARTS

- One 3-circuit variocoupler (L1, L2, L3).
- One 75-turn duolateral coil (L4).
- One fixed radio-frequency transformer (L5, L6).
- Two .0005 mfd. variable condensers, normally 23 plates (C1, C2).
- Two .002 mfd. fixed condensers (C3, C4).
- One 6-ohm rheostat (R1).
- Two UV201A tubes.
- Two sockets.
- One storage battery, 6 volts, 90 ampere-hours.
- Two 45-volt B batteries.
- One 4½-volt C battery.
- One Freshman crystal detector (CD).
- Three 4" dials.
- One Courtlandt Panel terminal block.
- One single-circuit jack.
- One 7x18" panel.
- One 17x8" baseboard.
- Two audio-frequency transformers, both the same ratio, 5-to-1 or less.
- 100 feet of 7-strand aerial wire, 50 feet No. 14 insulated lead-in wire, six lengths of round tinned busbar, lugs, solder,

lightning arrester, loudspeaker, battery charger.

## FREE!

Everyone Interested  
in RADIO  
Should Write for  
this FREE Radio Book

We want you to have a copy of our new 80 PAGE CATALOG. No other catalog includes such a complete assortment of the best and latest KNOCK-DOWN SETS and CIRCUITS — COCKADAY, REFLEX SUPER-HETERODYNE, BERNARD'S RADIO WORLD SUPERDYNE, ROBERTS, NEURODYNE, ERLA, ULTRADYNE and many others.

No matter what you need for your radio—whether it's a complete set or the smallest part it can be had from "WRS" at prices that save you money.

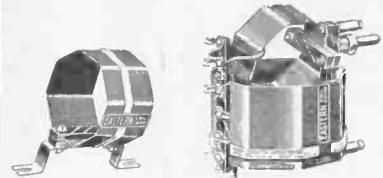
Ask This Magazine About Us

### Wholesale Radio Service

Dept. B  
9 Church St. New York City

## LOW-LOSS COILS

in the Famous Pickle bottle form  
designed by M. B. Sleeper



Certified by HERMAN BERNARD

for use in the

## Radio World's 1925 Model DX SUPERDYNE

Guaranteed for best results in this wonder circuit

Price \$8.00 per set

At your Dealers or direct postpaid.

**EASTERN COIL CORP.**

22 Warren St. New York, N. Y.  
Dept. R.W.

## Tubes Made New Again

By Absolutely

New Process \$1.00

Brings back original strength to Tubes that are Weak or Worn Down.

Each

**Guaranteed 500 Hours**

Mark your tubes for identification and wrap securely. Your own tubes returned same as new. Only UV201A, C801A, UV199, C299 and Do Forest Tubes can be processed.

TUBES MUST LIGHT TO BE PROCESSED

Orders shipped parcel post C. O. D.

Dealers Write for Proposition

**SINGER RADIO CORP.**

Times Bldg. Dept. W New York City

"THE WORLD'S SIMPLEST TUBE SET," by Lieut. Peter V. O'Rourke. One tube, one dial, great volume. Good DX. Low-loss coil and condenser. Costs \$14.25 to make. Send 15 cents for December 13 issue to Radio World, 1493 Broadway, New York City.

### INDEPENDENT

NEW TUBES ALL TYPES **\$2.15**

EACH

3 FOR SIX DOLLARS

5 FOR NINE DOLLARS

REPAIRED OR EXCHANGED **\$1.75**

EACH

5 FOR \$7.50

QUICK DELIVERIES EVERY TUBE CARRIES A MONEY BACK GUARANTEE.

**RADIO TUBE OUTLET**  
207 Market St. Newark, N. J.

# Are you BURNING MONEY?



## THE ANSWER IS "YES"

**If You Are Not Using RADECO SAFETY FUSES**  
There is neither wealth nor wisdom in burning money,  
and yet that is exactly what happens when you burn  
out vacuum tubes.

91½% of all Radio tubes are destroyed before serving  
their full rated life.

RADECO SAFETY FUSES absolutely stop this  
waste.

They are the only fuses which fit on the filament  
terminal of the tube and therefore the only devices  
which protect it against ALL causes of blow-outs.

When you purchase RADECO SAFETY FUSES you are actually  
purchasing a guarantee that your tubes cannot be blown out.

RADECO SAFETY FUSES are made for all standard types of tubes  
and fit in all standard sockets. One fuse to a tube is sufficient.

Price 50 cts. each at all Radio dealers or sent postpaid.

**RADECO FOR SECURITY**

RADIO EQUIPMENT  
COMPANY.

*New England's Oldest Exclusive Radio House.*

20 STUART ST., BOSTON, MASS.

