Jan. 10 1925.

1925 MODEL SUPERDYNE

15 Cents

Having 4 Tubes, 2 Controls and Great DX Powers

GREAT OPERA SINGERS ON AIR

RADIO WORLD

Title Reg. U. S. Pat. Off.

VOL. 6. NO. 16. ILLUSTRATED EVERY WEEK

How to Make Low-Loss Coils for More DX

By

Herbert E. Hayden

—

Facts About Aerials, Symbols and Batteries for Beginners

By

Abner J. Gelula

Key to Cross-Word Puzzle

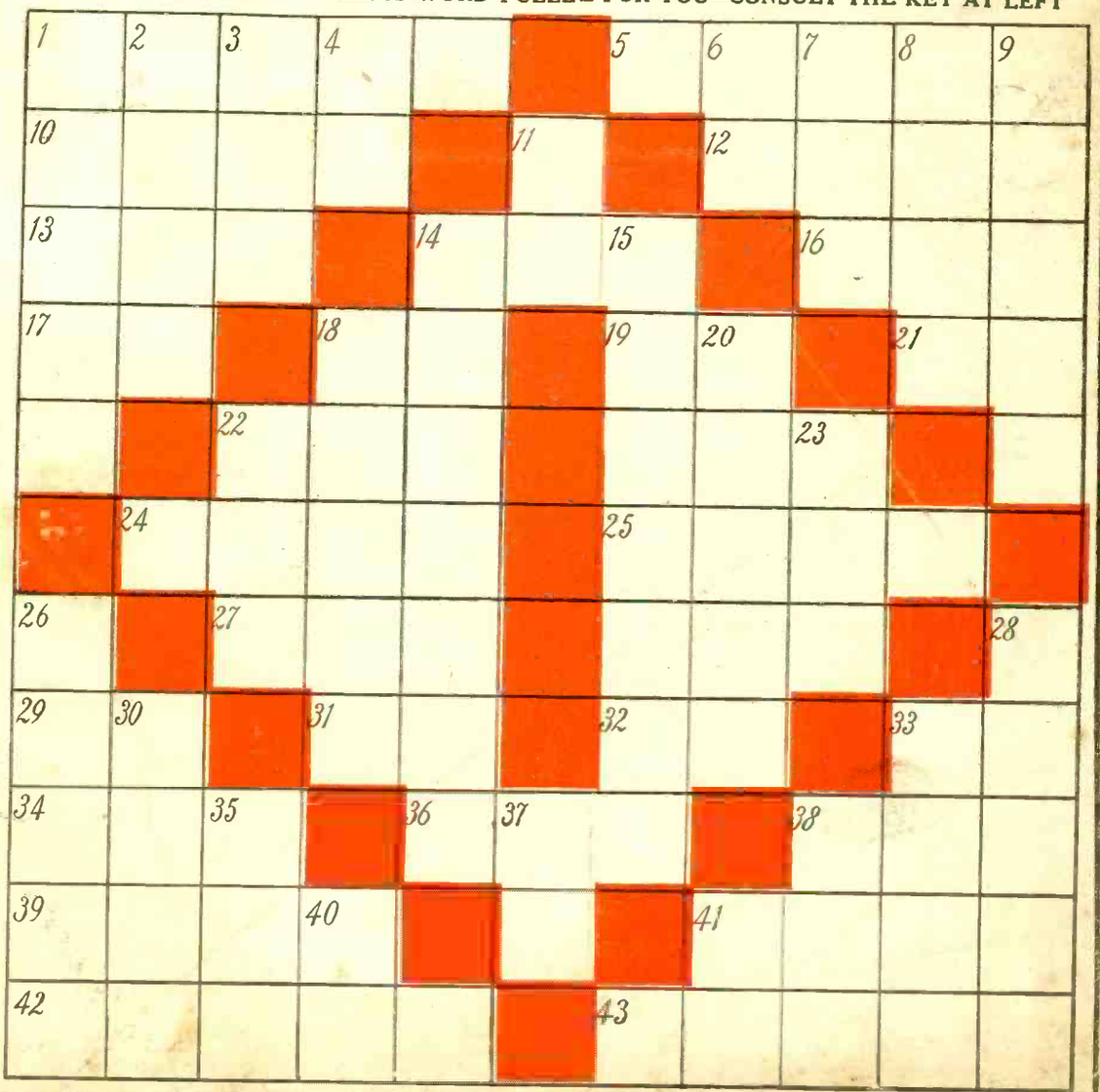
Horizontal

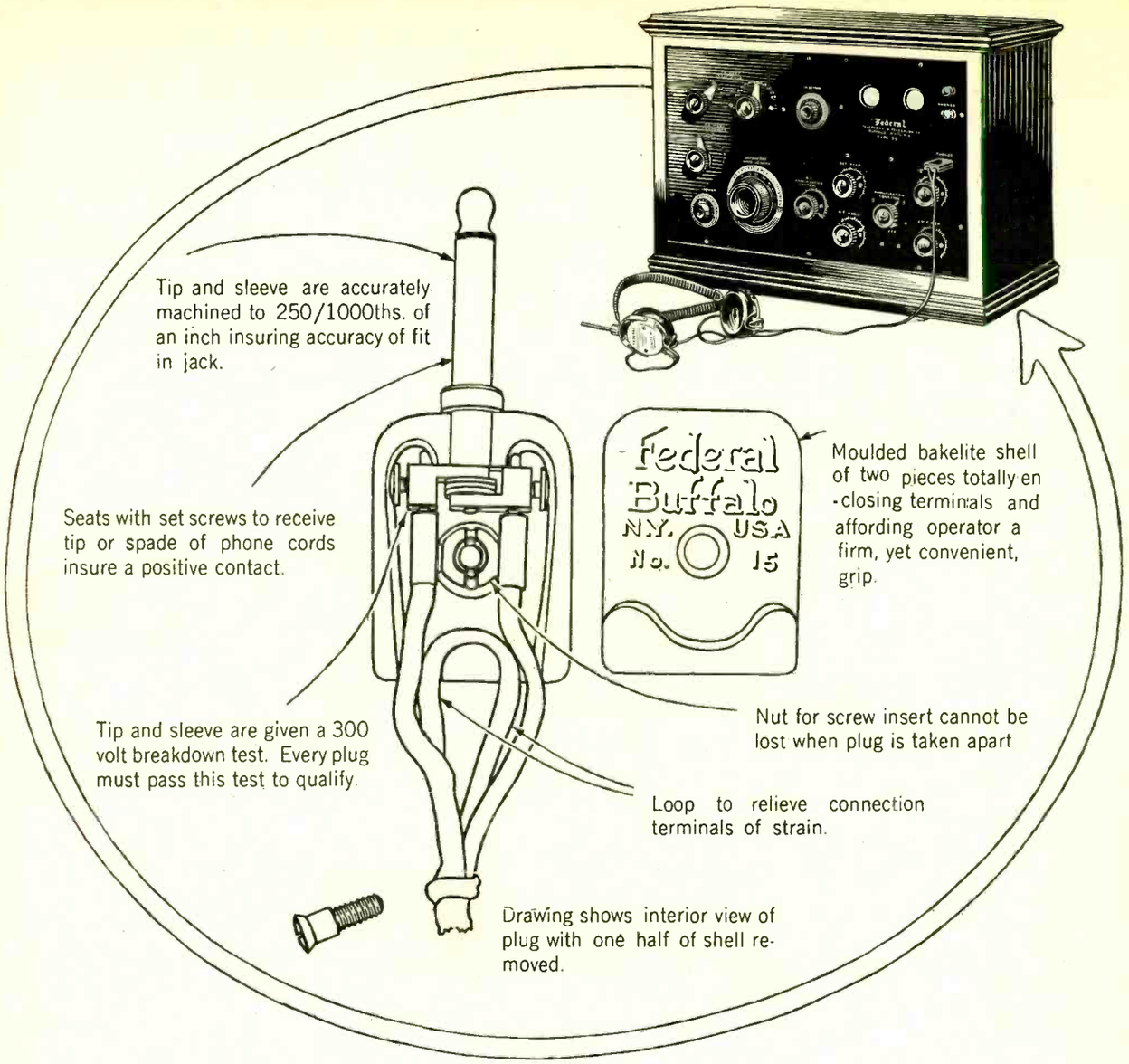
1—The art of sound transmission and reception.
5—Synonym for tubes.
10—Adjective describing desert country where dead spots abound.
12—Kind of air that carries signals best.
13—Jacket used on busbar.
14—A complete radio outfit.
16—Insect that makes a sound like that of an open circuit.
17—Intermediate amplification (abbrev.).
18—First syllable of potentiometer.
19—Intermediate transformer (abbrev.).
21—First and last of call letters of Gimbel Bros. station, Philadelphia.
22—Call letters of station, Davenport, Ia.
24—Old piece of furniture some home constructors use as a cabinet.
25—Unassembled parts for a specified set (plural).
27—The battery said ——— into the carpet.
31—Single-throw switch (abbrev.).
32—Resistance and inductance (abbrev.).
34—Intermediate radio-frequency (abbrev.).
36—Signal of distress.
38—Radio is referred to as "the ———."
39—Radioists heard the Christmas chimes ———.
41—Call letters of a station in Lansing, Mich.
42—A station ——— out a program.
43—The wavelength control.

Vertical

1—The audio transformer in the second stage should have a lower turns ——— than the one in the first stage.
2—Sopranes before the microphone often sing the "Vissi d'Arte" ——— from "Tosca."
3—If the audio stages are poorly wired the reception sounds more like ——— than like music.
4—Last two letters of synonym for the top of a radio cabinet.
6—The country that has the most and best radio stations (abbrev.).
7—Laboratory (abbrev.).
8—He connected the B battery to the filament and ——— out a tube.
9—For speaker operation two ——— of audio amplification are needed.
11—Radio engineer (abbrev.).
14—Parts in which tubes are placed.
15—A radio experimenter ——— with his set far into the night.
18—Leads are connected to binding ———.
20—No set should be condemned until it is given a fair ———.
22—First three of call letters of N. Y. City station on 492 meters.
23—Audio transformers (abbrev.)
26—Connecting wires may be joined to the A battery posts with ———.
28—The tickler coil is wound on a ———.
30—In the country an aerial insulator is often fastened to a ———.
33—There being no broadcasting monopoly, the air is ———.
35—One all wrapped up in radio.
37—He turned ——— his set.
38—Amateur Radio News (abbrev.).
40—Long-distance (abbrev.).
41—Western Union (abbrev.).

HERE IS AN ALL-RADIO CROSS-WORD PUZZLE FOR YOU—CONSULT THE KEY AT LEFT





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Specifications

LOW LOSS PRINCIPLE ADHERED TO THROUGHOUT.

TUBE SOCKETS: An original Low Loss design.

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CONDENSERS: Strictly Low Loss. Designed for straight line reading. No piling up of stations on the lower wave lengths.

AUDIO-TRANSFORMERS: This item and the variable condensers are manufactured by AIR SERVICE. We know they must be right.

DIALS: (Four inches in diameter.) The size of the dials permit a vernier control.

SUB-BASE: Mahoganite in color and of a high quality of insulating material.

FRONT PANEL: Of the new frieze design. Adds to the beauty and general appearance of the receiver.

CABINET: Size 7 x 18 solid mahogany, of a high piano finish. Made of selected stock, ⅞ of an inch in thickness. (Note the difference between the quality of mahogany used in this cabinet and that of the type of so-called mahogany used in many cabinets of other makes.)

CIRCUIT DESIGN: The most advanced type of radio frequency circuit. Unnecessary to fuss with neutralization. Oscillations are controlled by a special knob termed the CLARITROL. This gives complete manipulation for clarity and volume.

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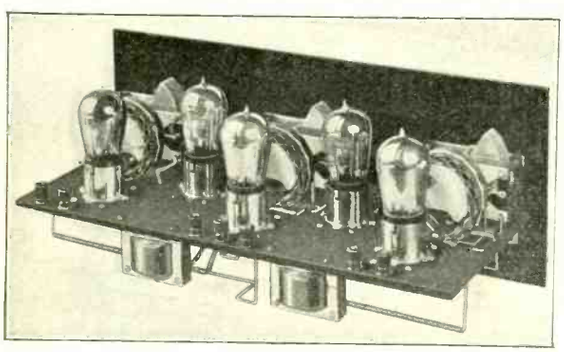
CLARITY—VOLUME



This receiver has brought in the broadcasting from coast to coast. The most efficient type of receiver ever designed. 7x18 GENUINE MAHOGANY CABINET INCLUDED. (Not an imitation.) (Without tubes.)

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Actors Plan to Restrict Selves

MEASURES of some kind, it was learned, will soon be taken by theatrical production interests, possibly through the Actors' Equity Association, against what is regarded as the serious and growing menace of radio entertainment. At a meeting of the Equity Council there was some discussion of the subject, prompted by letters from interested managers, but no decisive action was taken.

L. Lawrence Weber, secretary of the Managers' Protective Association, recently addressed a letter to Frank Gillmore, executive secretary of Equity, outlining the managerial reaction to the present situation, whereby potential audiences are enabled to hear over their radios entertainers and material that at the same time are being submitted for their box office patronage.

"I believe," said Mr. Weber, "that a notice should be sent to all members of Equity calling attention to the fact that when they make a contract with a manager calling for their exclusive services they must not accept radio employment without the manager's written consent."

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Phones: Lackawanna 6976 and 2069.]

VOLUME SIX OF

RADIO WORLD

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RADIO WORLD'S 4-TUBE SUPERDYNE

BY Herman Bernard

Only Two Controls Used in Wonder Circuit

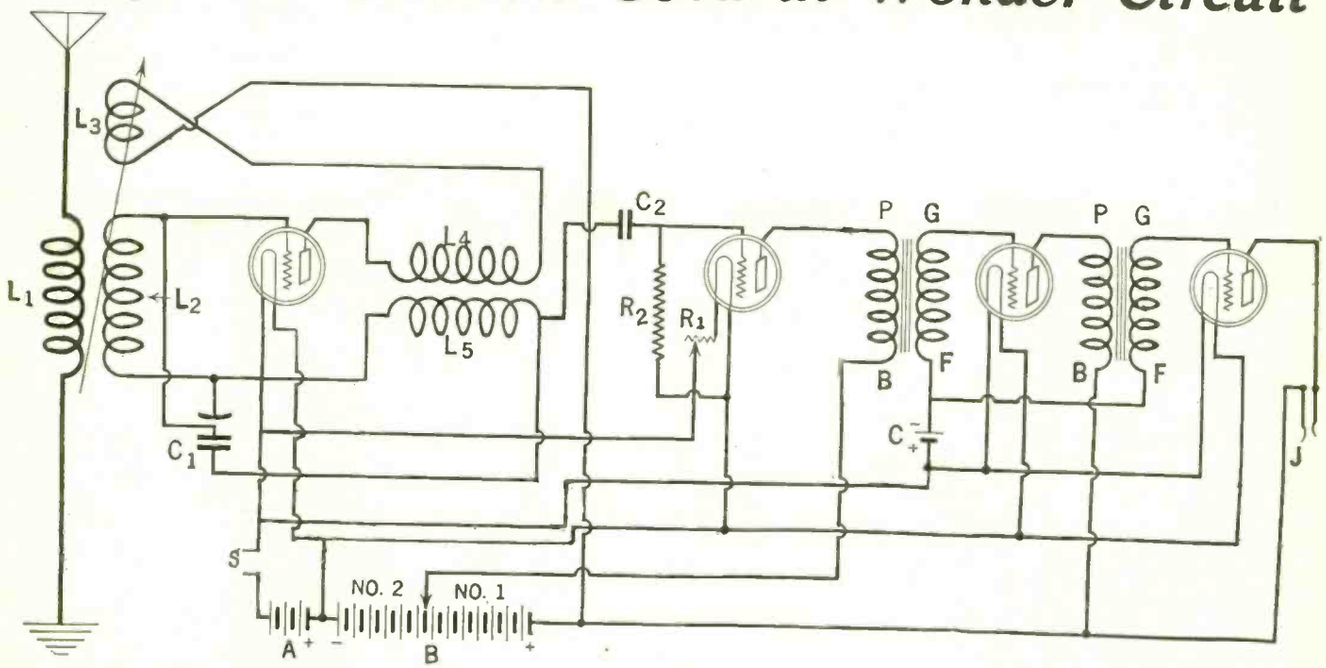


FIG. 1, the circuit network of RADIO WORLD'S 4-Tube DX Superdyne, which uses only two controls instead of three. The elimination of one control is accomplished without any sacrifice by employing variable condenser, C1, which has a common rotor connection, with separate stators. The RF tube grid return is to the minus, as is that of the detector tube, second from left, the common rotor of the variable condenser being connected to A—. Look at the grid of the first tube. Follow the lead through L2. The heavy dot shows where this grid return end of the coil is connected to the common rotor of the condenser, represented by the arc. Continuing, you will see that this lead makes connection with A—, just below the F— on the RF tube socket, then joins to the grid return side of the L5, the secondary of a radio-frequency transformer. The grid end of these two coils, L2 and L5, connect to the separate stators, represented by the parallel lines in C1. C2 is the grid condenser, .00025 mfd., and R4 the grid leak, preferably variable. The set works best with a UV200 or C300 detector tube, the other tubes UV201A or 301A. But dry-cell tubes may be used by a method described in the text. One rheostat, R1, is shown. It controls the detector tube and is vital. For the sake of simplicity, A— is connected to one side of a push-pull battery switch, the other side of the switch to the F— posts of the three amplifier sockets (one radio and two audio tubes). Only one jack is provided, as loud speaker operation is the sole intention. On some very distant stations, however, earphones will have to be used. Under test, this set produced signals of wonderful quality, almost matching the sweetness of crystal rectification, and night after night stations from 500 to 1,200 miles away were brought in on the speaker. This is one of the best 4-tube sets ever designed.

[Simplified tuning by the reduction of the number of controls to two, the preservation of the marvelous tone quality for which the Superdyne is famous and the achievement of at least as great distant reception, if not more, are some of the outstanding features of RADIO WORLD'S *4-Tube Superdyne. This set was carefully designed and subjected to a rigid test for three months in* RADIO WORLD'S *laboratories, where it established a proud record. How to build a set just like the one that accomplished the astonishing results of the laboratory model is explained in the ensuing article by Herman Bernard, America's most lucid radio writer. So that those just beginning to acquire some familiarity with radio set construction may undertake the building of this set that scales the peaks, Mr. Bernard has treated of the constructional features with an eye to the beginner. Also, he arranged with* RADIO WORLD'S *art director the prepara-*

Why the Superdyne Excels

tion of circuit diagram, asymmetrical diagram, panel layout and assembly plan, with the connections purposely duplicated pictorially so that readers who prefer the conventional wiring diagrams may follow those, while the others, not perhaps quite so well informed on radio technique, may read the simpler diagrams showing the parts in perspective, with the wiring clearly exposed. Also photographs of the original set, built in genuine fan fashion, add to the simpler understanding of the constructional features. One of the best 4-tube sets that any fan can build, this circuit is tempting indeed, especially to those who delight in the combination of great power for reaching into the far distances and entrancing tonal quality of the received signal, no matter how many thousand miles away the station may be. This set is one of the Worldbeater Series published by RADIO WORLD *and is presented with full indorsement.—EDITOR*].

A SET with a thrill in it is something that every radio fan is seeking. That thrill is amply provided by the Superdyne. It is impossible for the home constructor to achieve a more entrancing result than is obtainable from building RADIO WORLD'S 4-Tube Superdyne. It embodies a stage of radio-frequency amplification in which reversely fed-back regeneration is utilized and a strong amplification of weak signals afforded. A radio-frequency transformer, tuned by a variable condenser, couples the radio-frequency side of the circuit to the detector tube. The two stages of transformer-coupled audio-frequency amplification give voluminous signals on the loudspeaker. Distant stations are thus brought in with an astonishing clearness, 1,200-mile distances being not uncommon under good conditions on a winter's night. Often you might imagine you are listening to some powerful local station when in fact some broadcaster 1,000 miles away is being heard on the speaker. To hear this circuit in its astounding performance is to get a thrill like that which comes from hearing the song of the thrush at eve.

Superdyne vs Neutrodyne

Comparisons are frequently invited between the Superdyne and the Neutrodyne. While one must remember that different circuits have different eccentricities, it is nevertheless true that for tonal quality the Superdyne is better than the Neutrodyne; for volume, the Superdyne is at least as powerful as the Neutrodyne; for quietness of operation and ease of tuning the Neutrodyne is better than the Superdyne. But the Superdyne, with only four tubes, will about equal, often exceed the Neutrodyne in DX possibilities. Moreover, with the Superdyne stations may be tuned in with consistent selectivity over the entire broadcast wavelength band.

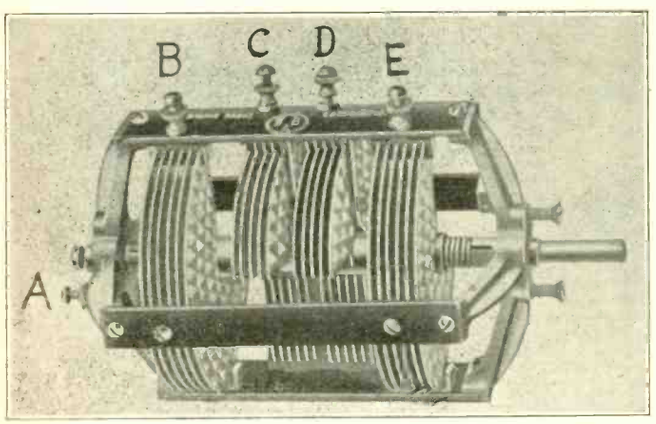


FIG. 2, the variable condenser used in the RADIO WORLD'S 4-Tube Superdyne. A designates the binding post connecting to the common rotor. B, C, D and E are binding posts connecting to separate stators, each having 11 plates (.00025 mfd.). As the capacity desired is .0005 mfd., the two binding posts marked B and C are joined with a wired connection, and D and E likewise are combined. Thus BC represents the stator of a .0005 mfd. variable condenser and DE the stator of another .0005 mfd. variable. No connection is made between C and D. The condenser is soundly designed both mechanically and electrically and functions with an efficiency that is quite remarkable.

Uses Only Two Controls

Like the Super-Heterodyne set, RADIO WORLD'S 4-Tube Superdyne has only two controls. The elimination of one control is not achieved at a sacrifice, but a variable condenser is used that has a common rotor joined to the A—. Hence the grid return of both the RF tube, the one at extreme left in Fig. 1, and of the detector tube, which is next to it, is made to A—, while the grid of the RF tube goes to one stator of this condenser and the grid of the detector tube to the other stator. Naturally, as one variable condenser is used to tune two coils, L2 and L5, these two windings must be matched, otherwise a given dial setting would represent different wavelengths. This synchronizing of the coils, however, is not difficult.

The Variable Condenser

The condenser, known as the Bruno Ultra-Vario, has four separate stators of .00025 mfd. maximum capacity each, but these stators are joined in pairs, so that each combined stator represents the desired maximum capacity of .0005 mfd., in this case 22 plates. Where these stators are united and the common rotor connection made is shown in Fig. 2.

The Coils

As for the coils, there are quite a few excellent Superdyne variocouplers on the market, all of which work splendidly in this circuit. Instead of an impedance plate coil an aperiodic primary of a radio-frequency transformer is used (L4). The beginning of this primary goes to the plate of the RF tube, while the end of the winding is connected to the end of L3, the tickler or rotary coil of the coupler. The beginning of L3 is joined to the B+ amplifier voltage, usually 90. In this way, by connecting the plate coil in standard fashion, but reversing the leads to the tickler, the Superdyne effect is gained. Oscillations are suppressed and this control of the heterodyning common to regenerative hookups enables the utilization of the strong radio-frequency amplification to its fullest extent and serves to block the emission of the heterodyned note through the antenna.

The set is not difficult to construct, especially as the important item of placing the parts is fully set forth in Fig. 3, showing the combined panel layout and assembly plan, with each instrument in perpendicular alignment in both sections of this illustration.

Under no circumstances must the coil L4L5 be in inductive relationship to the coupler. Almost always if the L4L5 coil is mounted as shown (Fig. 3) at right angles to the coupler and safely distant from the variable condenser, there will be no stray coupling to spoil the full enjoyment of the astonishing results which this circuit can produce. It is one of the best circuits it is possible to build at home, regardless of the number of tubes, and the reduction of the tuning controls to two adds considerably to the advantage.

Only One Rheostat

Only one rheostat, R1, is shown. This is connected in the negative lead of the detector tube socket so that advantage may be taken of the voltage drop in the

Panel and Assembly of the 1925 Model Superdyne

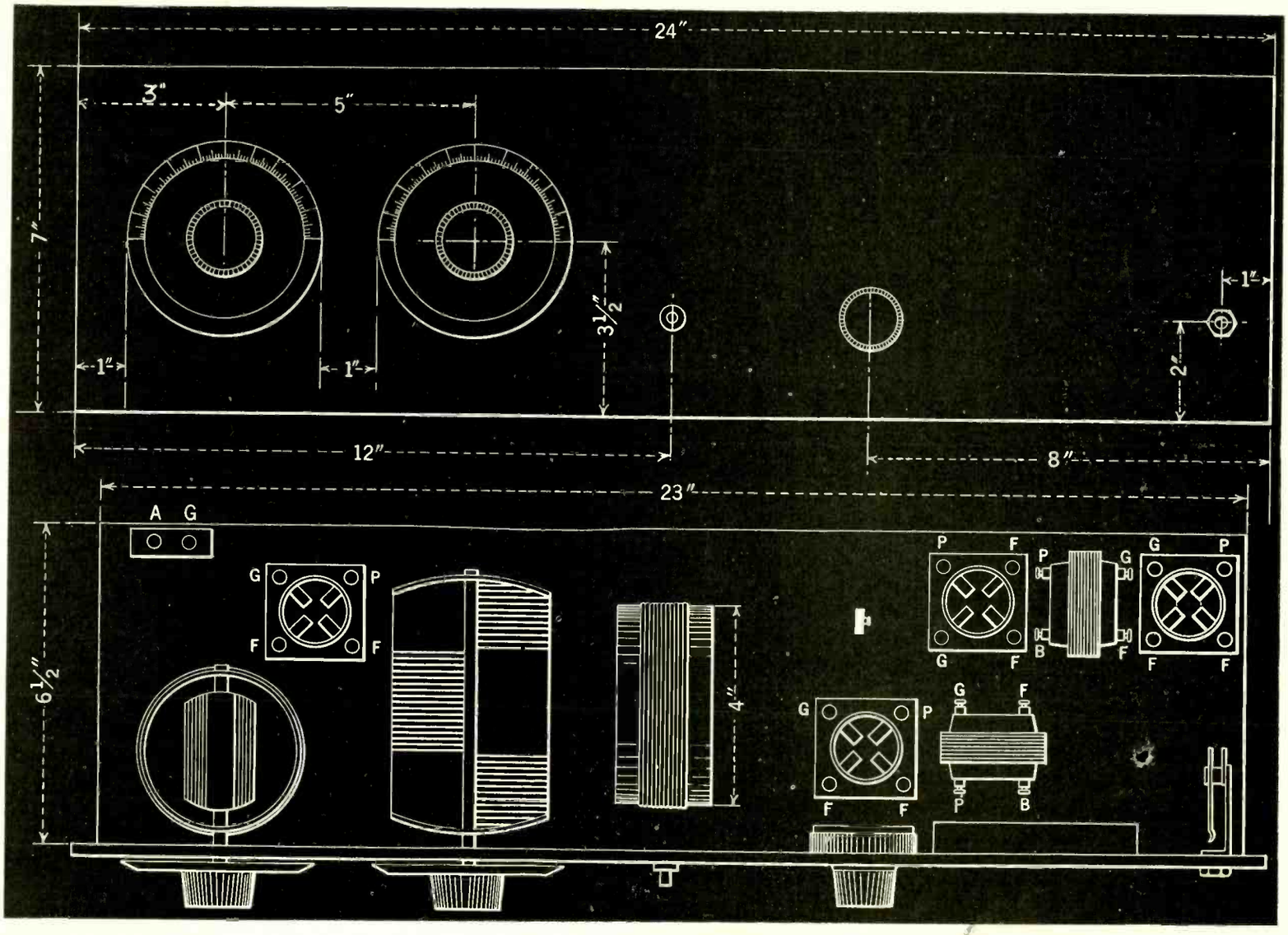


FIG. 3, blackprint of the combined panel layout and assembly plan for Radio World's 4-Tube Superdyne. The relative positions of the instruments are preserved in both diagrams. In the panel layout the dial at left is for the tickler, while the one next to it actuates the Ultra-Vario condenser, which tunes two coils with one motion. The dials are 4". The center of the left-hand dial is 3" from the left side of the panel, on a central horizontal line. The only other instruments on the panel are the switch, the rheostat and the jack. The assembly plan shows the Superdyne coupler at left, the RF socket behind it, then the variable condenser, which has a coil-like appearance in the diagram, then the plate coil. Note how the detector tube, audio tubes and audio transformers are placed. The white mark behind the detector socket shows where the terminal block is.

A Circuit with a Thrill in It

The Set As It Looks in the Home

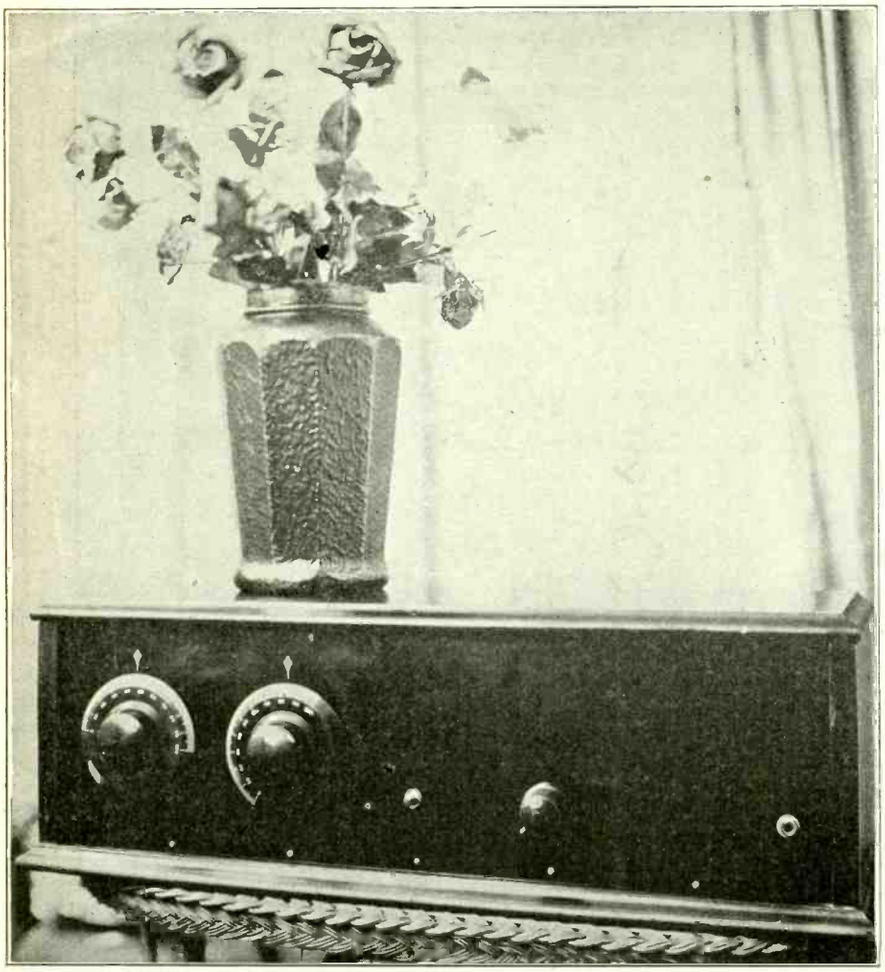


FIG. 4, the Superdyne in the home. The dial controlling the tickler of the coupler is at left. The other dial actuates the variable condenser. It is preferable to have vernier dials, tests showed. Next is the push-pull A battery switch, next to it the rheostat, and at right the jack. The vario-coupler may be any good make suitable for the Superdyne, such as Wallace, Globe, Bruno, Ferl, ARC Tri-Tuner, all of the 3-circuit type, with aperiodic primary. The radio-frequency transformer must be matched with the coupler secondary. The coil question will be fully discussed by Herman Bernard in next week's issue, dated January 17. Instructions also will be given for making your own coils. (RADIO WORLD staff photo.)

List of Parts for Superdyne

One certified Superdyne coupler (L1L2L3).
One certified matched radio-frequency transformer (L4L5).
One Bruno Ultra Vario Condenser, No. 19 (C1).
Two Federal (Nos. 65 and 65A) or two No. 3-A Stromberg-Carlson audio-frequency transformers.
Three UV201A tubes.
One UV200 tube.
Four Federal sockets.
One .00025 mfd. Dubilier grid condenser (C2).
One variable Bradleyleak (R2).
One Bradleystat (R1).
One Bradley push-pull battery switch (S).
One Tri-Jack or single-circuit jack (J).
One 120-ampere-hour Exide storage battery.
Two 45-volt Eveready B batteries (No. 1 and No. 2 in Fig. 1).
One 4½-volt Eveready C battery.
One 7x24" black Radion panel.
One mahogany cabinet, size to match.
Two silver Eureka dial pointers.
Two ½" diameter hard rubber bushings.
Ten feet of vari-colored battery cable.
Two lengths of spaghetti.
No. 20 double cotton covered wire or round bus bar for internal set wiring.
One pair of Tower's earphones.
One Western Electric loudspeaker.
One Eby terminal block.
100 feet 7-strand aerial wire, 50 feet No. 14 insulated lead-in wire, ground clamp, one double Fahnestock clip, screws, U-angle, two dozen solderless lugs, half-dozen Morse solderless union joints, hardware.

rheostat for negatively biasing the grid of the detector tube to the extent of that drop. For that reason, too, it is advisable to put the rheostat in the negative lead in any hookup for any stage, radio, detector or audio.

The Switch and the Tubes

The three amplifier tubes, the first, third and fourth from left in Fig. 1 are connected direct from the A battery minus, a push-pull filament switch S being used. Thus, to turn on the set, pull out the switch. If the rheostat is turned off, turn it on until the correct voltage is supplied to the detector tube, a condition easily determined simply by testing for best results. From that point on all the tubes may be turned on or off at will simply by use of the switch. Occasional variation of the rheostat may be advisable. As a UV200 or C300 tube works best in the detector socket and as the UV201A or C301A are best in the other stages, a 6-volt storage battery would have to be used to heat their filaments. Also, the type of detector tubes described works better on a negative grid return, hence the tubes recommended are admirable from every point of view. The volume obtainable therefrom is about 40 per cent. greater than from any other. Yet, despite the problem of a negative grid return (for the other detector tubes work better with a grid return to the A+) and despite the novelty of using any other tubes than those described for a 2-control 4-tube Superdyne, dry-cell tubes may be employed by use of a method to be described later in this article.

A 6-ohm rheostat should be used for controlling the 200 or 300 detector tube. Even with a negative grid return the 201A or equal works well in the detector stage, but only 83 per cent. as efficiently as the 200 or 300. If a 201A or 301A is used as detector be sure to use a 6-ohm rheostat, not a 20-ohm rheostat.

If any rheostat were used to control the three amplifier tubes it should be 2 or 3 ohms, but when the resistance to be employed is as low as that the rheostat may be safely omitted altogether, and such was done in the original circuit. A little finer control is afforded by the inclusion of the rheostat, and for those who desire to include it they should mount the amplifier rheostat just to the left of the jack in Fig. 3. But it is not a vital adjunct.

The grid leak, R1, should be variable for best results. It is shown in Fig. 1 connected from the grid post of the detector tube socket to the F+, but it may be mounted in conventional fashion across the grid condenser C2. Try both ways, and even place the grid leak from the grid of the detector tube to the F—.

A Loud Speaker Set

Only one jack is included, because the set is designed for loud speaker operation whenever possible. Nearly all distant stations that will be heard will come in

Bernard's World-Beater Set

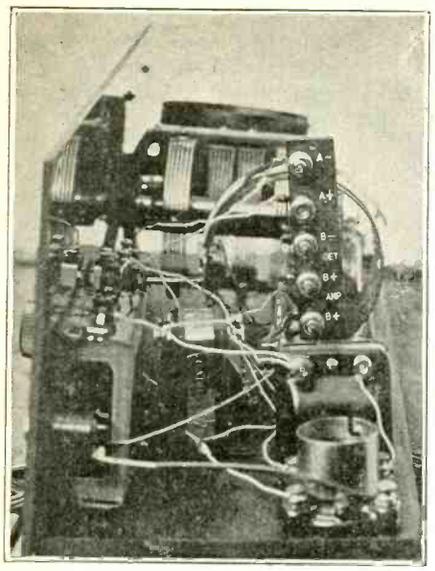


FIG. 5, side view of the interior of the Superdyne, looking from the audio end. This was one of the experimental models in RADIO WORLD'S laboratories. Note the perpendicular terminal block to which the five battery leads are connected. (RADIO WORLD staff photo.)

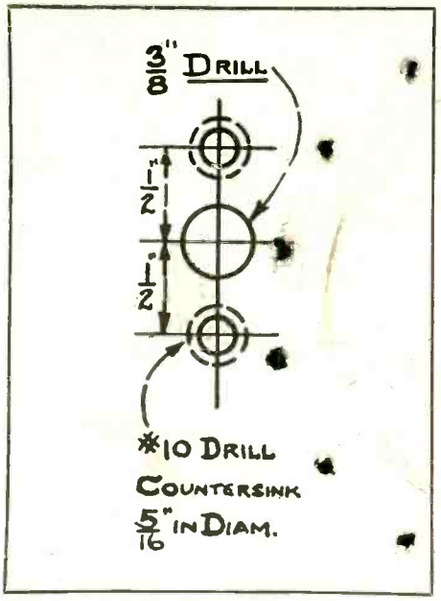


FIG. 6 template for drilling holes in the panel for mounting the special variable condenser used in the Superdyne. The center hole is for the condenser shaft and should afford free clearance. The two other holes are for the mounting screws.

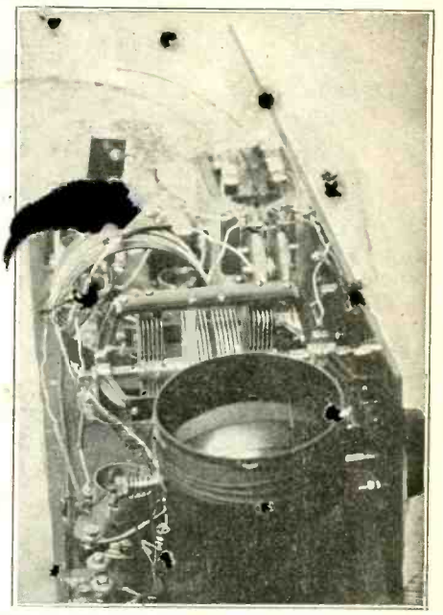


FIG. 8, side view of the Superdyne, looking from the coupler end. The terminal strip to which the aerial and the ground are connected is shown in the foreground. (RADIO WORLD staff photo.)

with enough volume to be audible on the loud speaker, but to cover the exceptional cases a pair of earphones come in handy. These would be plugged into the jack instead of the loudspeaker cord tips.

The C Battery

A C battery is included in the two audio stages to avoid possible distortion and to reduce the drain on the B batteries. There is room for the C battery right behind the panel, in front of the audio transformers. If the B battery voltage on the audio stages is 90 and the 201A or equal are used, the C battery voltage should be about 4½.

Set Anybody Can Build

The absence of three rheostats, one for each amplifier tube, greatly simplifies the construction of the set. Anybody with the slightest inkling of radio knowledge may confidently undertake the building of this circuit, for it is no more difficult than an ordinary regenerative set with two stages of audio, and yet it far surpasses in every way the advantages of the other and overwhelmingly justifies the inclusion of an extra tube. Indeed, as regeneration is used in the RF tube, the set is equivalent to a 5-tube non-regenerative set, such as the Neutrodyne or other tuned radio-frequency circuits, the regeneration surely equalling the amplification factor of the fifth tube in the other sets. Moreover, it will be possible to cover from 200 to 546 meters, which represents the entire broadcast band of wavelengths, present or suggested. This is due in no small part to the efficiency of the variable condenser, which has an extremely low minimum capacity and slightly exceeds .0005 mfd. at maximum capacity.

Selectivity

The selectivity of the circuit is good, but it is not as selective as the Super-Heterodyne. Care must be exercised in designing a circuit for fan construction lest the selectivity be so acute that distortion results. In this set there is no discernible distortion. In fact, the sweetness of its voice, if one may express the thought thus, is one of its chief allurements.

Stations five miles or less from the point of reception, and operating at 1,000 watts, will be heard within three degrees of the dial, provided the tickler is properly adjusted. Equi-distant stations operating at 500 watts will be heard over two degrees, or a little less, especially if they are on the higher wavelengths. If such stations, using 1,000 or 500 watts, are operating at the lower stretches of the band, say 400 meters or less, the tuning will be closer. Two stations, each using 1,000 watts, and each five miles from the reception point, of course are easily separable with this circuit. It would not be advisable for anybody living within three miles or less of a powerful broadcasting station to build this set, but that still renders the receiver highly serviceable to about 98 per cent, or more of the population of the world. The fact that the receiver brings in distant stations with such fidelity and regularity proves the sufficiency of its selectivity and also the preservation of just enough broadness to preserve the highly desirable advantage of superior tonal quality.

(*Continued next week, issue dated January 17*)

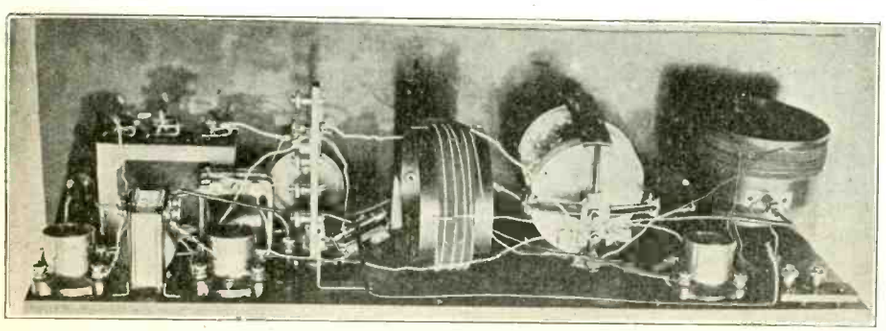


FIG. 7, rear view of the interior. The coupler is at right, the variable condenser next to it, then the radio-frequency transformer, which is tuned by the same variable condenser that tunes the coupler secondary. (RADIO WORLD staff photo.)

A Low-Loss DX Inductance

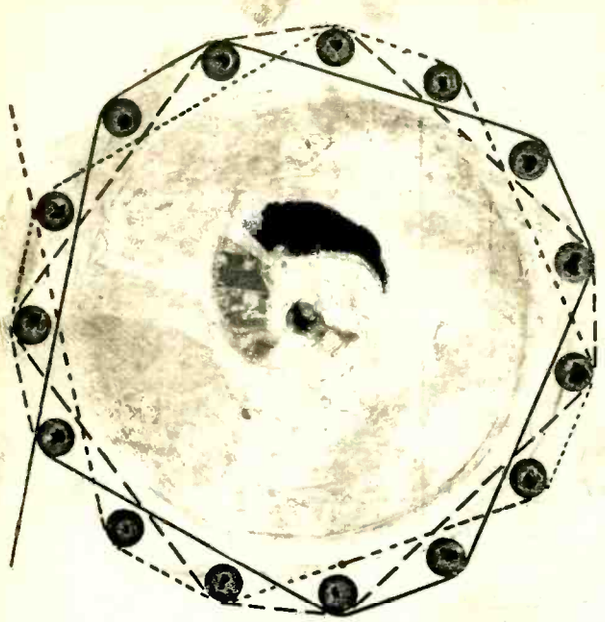


FIG. 2—Template for making the wooden block and inserting dowel rods to wind the low-loss coil. The rods are inserted in drilled holes and are at right angles to the base. The wire is wound in and out of alternate pairs of rods. The solid line represents one turn, the dotted line the next turn and the dash line the next. The coil is made self-supporting. The diameter between dowel centers is 3 inches.

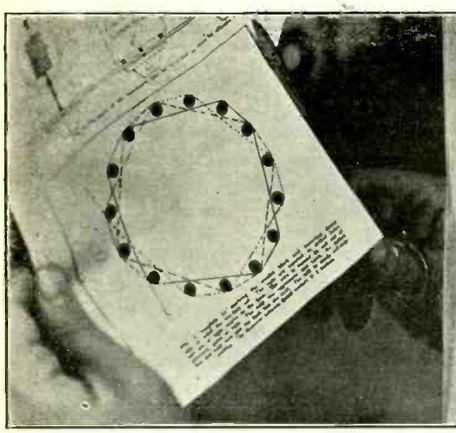


FIG. 1—The template shown in Fig. 2 being cut for pasting on a wooden block about 4" square.

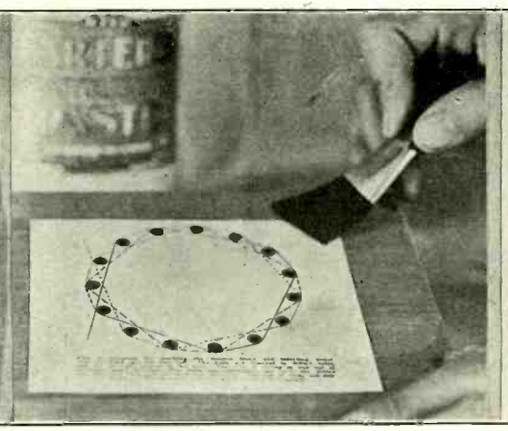


FIG. 3—The template being pasted on the wooden block, preparatory to drilling the holes for the dowels.

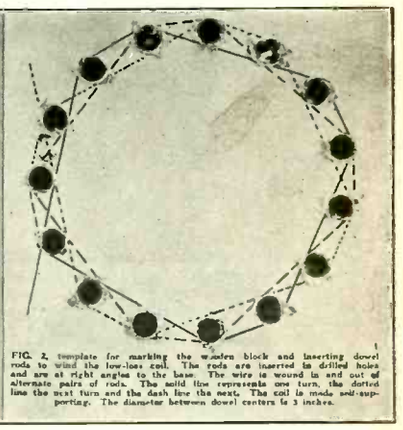


FIG. 4—How the board, with template on it, looks after the holes are drilled.

By Herbert E. Hayden

Illustrations by the author

THE basket-weave type of low-loss coil may be used for a tunable radio-frequency transformer, as a vario-coupler, either double or triple circuit, for a Superdyne plate coil or other impedance type of inductance, and often brings marked improvement when replaced for form-wound coils. In fact, the basket-weave is now, I think, the most popular of the low-loss varieties. It is not hard to make, although it takes more time and patience than simply wrapping a given number of turns around a cylindrical form.

I replaced some old Neutroformers with low-loss coils of the kind described here and results were remarkably better. Distant stations that I never heard before on that Neutrodyne came in, and also distant stations that sounded somewhat husky under the old conditions brightened up considerably when the new coils came to the rescue. On local stations, say within a radius of 100 miles, there was no noticeable difference. On distance, the comparison was gratifying. DX is something that interests everybody, whether they admit it or not. When a man talks about what his set did last night it is always in terms of DX. If he hasn't some remarkable DX to report he talks about strictly technical things like grid biasing and the prevention of stray coupling.

Therefore I shall, for the special benefit of the DX brethren, discuss the construction of the basket-weave coil on a little broader scope than published heretofore. This is the type of coil used by J. E. Anderson in his laboratory model of the wonderful 4-tube Superdyne published in RADIO WORLD, issues of November 22 and 29, and discussed from a trouble-shooting viewpoint in the issue of December 6. What results the constructors of this set obtained is a matter of radio history. I am frank to say, however, that these DX and quality achievements were not due exclusively to the coils. The Superdyne itself is a whale of a receiver no matter what coils are used.

Get a hard wood block about 4" square and paste on it the template, Fig. 2. Center-punch at each of the fifteen points, then drill holes at these places corresponding to the size of the dowel sticks to be used. Do not drill all the way through. Be sure to drill at right angles (Fig. 5). In almost any hardware store you can buy enough dowels for a quarter to last you a long time. The dowels should be sawed into 4" long pieces. They are then inserted in the holes (Fig. 7). If the space is just right the dowels will have to be pressed in slightly and may be made exactly perpendicular with the block. If they do not respond to this attempt, the dowel may be glued in the holes and rectified before the glue hardens. The disadvantage of lopsided insertion of dowels is an ugly-looking coil like a truncated cone.

Using No. 20 double cotton covered wire, wind sixteen turns (Fig. 8). The wire may be passed from inside to outside of every other dowel (Figs. 8 and 9), or every other pair of dowels. There is no difference in the result, electrically. It is somewhat handier to wind the coil "under two, over two." Now, using No. 20 double silk covered wire (only because it is green-covered and thus easily distinguishable from the white-covered cotton insulated wire) wind twelve turns. The same kind of cotton-covered wire as heretofore may be used, if preferable. The twelve turns completed, the secondary winding is now continued until a total of 52 turns are wound for the secondary. That includes the original 16. In other words, after the primary is wound, the additional number of turns to be put on the secondary is 36. An option in winding the primary, and which perhaps makes the coil a little more secure, is to wind the primary and secondary together, side by side, picking up the primary wire to begin this winding after the sixteenth turn of the secondary, putting on the twelve-turn primary, the secondary going with it, and then adding terminating the primary and adding 24 turns to the secondary. The number is 24 instead of 36 be-

A Coil That Makes DX Easier

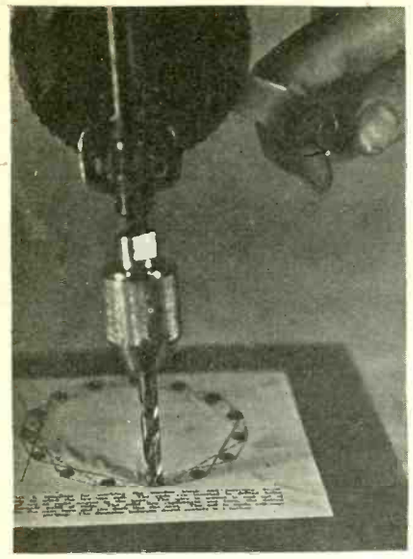


FIG. 5—Showing wrong way to drill.

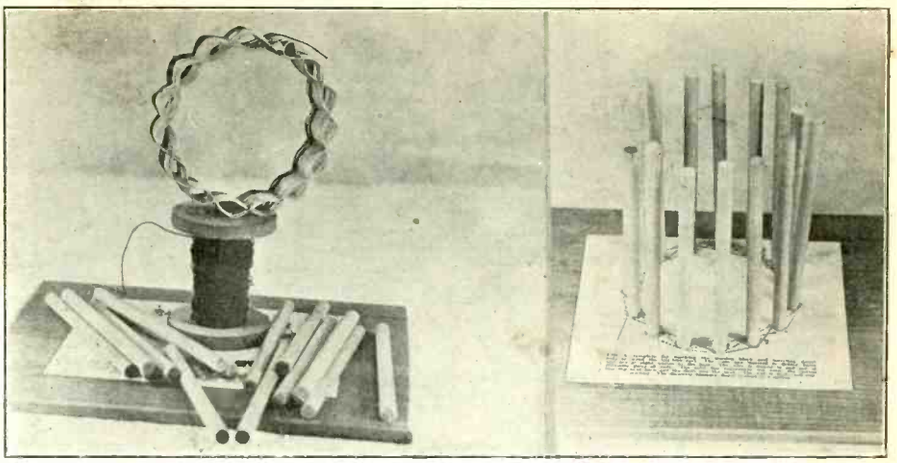


FIG. 6—An anticipatory glimpse, showing what the completed coil will look like, and revealing the spool of primary wire, dowels and block with template pasted on it. Note that on this particular coil an aperiodic primary has been wound of dark-covered wire, to distinguish it from the white-covered secondary.

FIG. 7—The temporary insertion of the dowels in the drilled holes. Before the coil is wound the dowels are straightened so that all are exactly at right angles to the block.

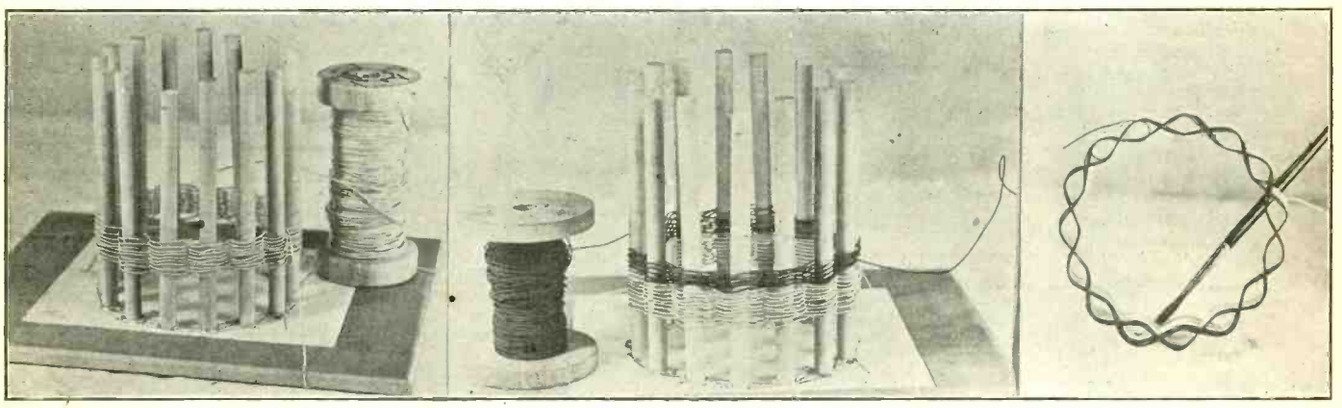


FIG. 8—The beginning of the winding process. No. 20 double cotton covered wire is used, being wound either in and out of every other turn, as shown, or in and out of every second turn. Both ways are equally good, the every-second-dowel shown, or in and out of every second turn.

FIG. 9—The beginning of the primary winding, after the sixteenth turn of the secondary. The primary, consisting of twelve turns, may be completed before the winding of the secondary is resumed. Both windings should be in the same direction. For temporarily securing the wire terminals they may be looped around a dowel.

FIG. 10—Showing how a sparing application of collodion is made to render the coil more secure. A little collodium is not harmful, but a lot of it is injurious, causing severe losses.

cause 12 turns of the secondary were put on simultaneously with the 12 turns of the primary.

After this much has been done a little collodion may be applied to the coil with a brush (Fig. 10). Use this sparingly. In small quantities it does no appreciable harm, tests showing no alteration in the high-frequency resistance of the coil with and without collodion. But when the coil is overdosed with collodion the resistance goes up frightfully. Another method or even auxiliary method of binding the coil is to use cotton twine or linen thread. A crocheting needle facilitates this work. The twine is passed through the air space between turns on one side of the angle and the other (Fig. 10), then brought up in reverse direction and knotted. Thus the knot is tied at the corners or angles. The tie-string, without being broken, is threaded similarly up and down at each of the 14 remaining points, then cut. If this work is carefully done no collodion is necessary.

If it is desired to make a rotor, as for a variocoupler, a 2" circle is described and 15 points registered thereon, using Fig. 2 as the guide, by simply carrying these points 1" nearer the center. Use No. 24 single covered wire and put on 40 turns. This is the tickler of a 3-circuit tuning coupler. It may be used in the RADIO WORLD 4-Tube DX Superdyne, 1925 model. The radio-frequency transformer used in that circuit would consist of the same kind of coil without the tickler, but the secondary would be tapped at every quarter turn, from the 49th to the 52nd, inclusive. This tapping is simply to afford readier means of making the two secondary inductances identical, for tuning both coils with one condenser.

For an impedance coil, that is, a simple solenoid such as the coil used for tuning a plate and gaining regeneration in this manner, wind 42 turns of No. 20 DCC wire on a 3" diameter (Fig. 2) and terminate.

All these coils may be used in any circuit calling for corresponding inductances. If the variable condensers to be used are less than .0005 mfd., normally 23 plates, then add more turns. For a .00035 mfd., normally 17-plate, variable condenser the secondary would consist of 62 turns, the primary 12 turns.

Send in Reports of Your Results

[*Those who construct any circuit or unit from data in* RADIO WORLD *are requested to write to Results Editor,* RADIO WORLD, 1493 *Broadway, New York City, and state how they fared. When possible give the trade names of the parts you use, or the manufacturers' names. Results letters will be published, including trouble-shooting letters. Readers may include questions in the same letter. The questions will be answered in the Radio University Department.*]

Phones, Aerials and Diagrams Discussed for the Novice

By Abner J. Gelula

Diagrams

IN all standard schematic hookups each symbol represents a certain instrument. There are comparatively few symbols in radio work and to memorize them is a very simple matter. After a bit of hookup work the placing of the various instruments becomes almost automatic, such as placing a fixed condenser in series with the grid lead, the plate of the tube to the phones, a coil in series with the aerial and ground, etc. For instance, the filament is represented by an inverted V or U (Fig. 1).

In all standard radio circuit work a coil is represented by a series of loops, as shown by L, L1 and L2 in Fig. 2. A condenser is always two closely spaced lines (C in Fig. 2). If the condenser is variable an arrow runs through it (C1). The aerial is a triangular effect (top of Fig. 2). The ground is a series of lines, one beneath the other and of graduating length (bottom of Fig. 2). The tube also has standard symbols. The plate is a parallelogram, the grid a zig-zag line. There are two filament leads, positive and negative.

To read the diagram, referring again to Fig. 2, note that the aerial goes directly to one side of coil L; the ground to the end of L1. Also, from the same point to which the aerial is connected to on the coil, another lead goes to one side of C1, a variable condenser, the other side to the ground coil.

Earphones

THE telephone as applied to radio telegraphy and telephony is one of the most sensitive detectors of electrical currents ever devised. Although the overall efficiency of the receiver is only 5 per cent, it was found by H. Abraham that less than 1/1000th of the energy in the receiver current is transformed and transmitted to the air in the form of sound waves!

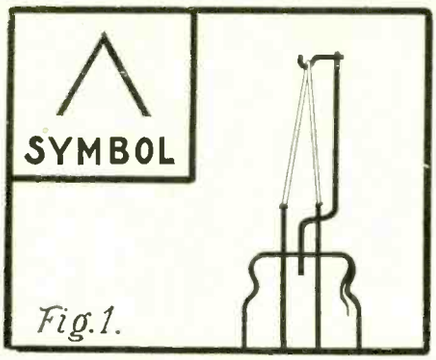
Considering all the losses in the telephone or radio receiver, it is interesting to note the infinitesimally small amount of energy required to give good clear signals; in fact it seems almost incredible. Preece found that a phone would respond to a current as small as .000,000,000,000,6 ampere!

Practically all receivers follow the same general design, being composed of two electro-magnets, soft steel pole-pieces, soft iron diaphragm, the steel or aluminum case and the removable cap. The Baldwin phone differs from the conventional type in that the diaphragm is connected physically with a pivoted soft iron armature. The pivot is set in the exact center between two electro-magnets. When the signal is impressed upon the magnets the armature varies accordingly, transmitting the variation to the mica diaphram.

There are many other types of phones that the radioman has not used much. The Fessenden Heterodyne Receiver, The Adler receiver, The Pierce Dynamometer Telephone, The Thermal receiver, The Mono-Telephone, the Condenser Telephone Receiver and the Brown Tuned Reed Receiver are among them.

The Aerial

THE aerial absorbs energy from the advancing electro magnetic wave in the form of radio-frequency oscillations. Therefore the aerial, as well as the ground,



THE FILAMENT is symbolized by an inverted V or U. At right is a graphic representation of the filament, a key to the origin of the symbol.

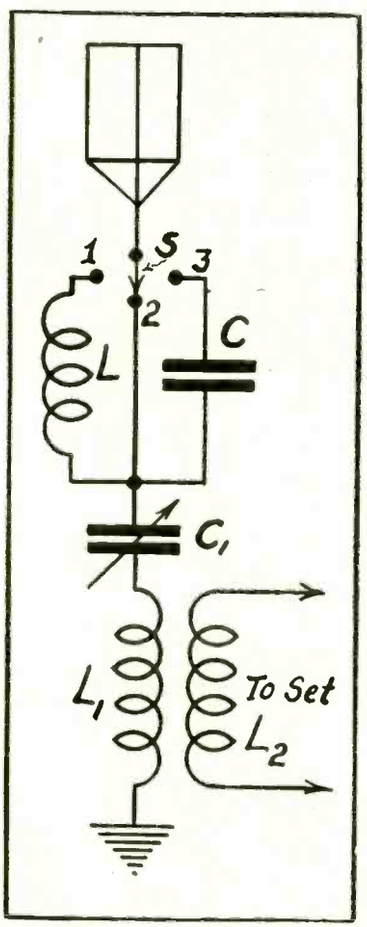


FIG. 2, showing the aerial and ground at top and bottom respectively. L, L1 and L2 are coils, represented by series of loops. A condenser is shown by two parallel lines (C), while, if variable, an arrow intersects the symbol. This diagram shows how to use a loading coil L and fixed series condenser C for varying the aerial's wavelength electrically.

is a very important item in the receiving equipment. After all, the actual receiving apparatus can rectify and amplify only those currents which the aerial feeds to the primary coil. If the aerial is of such construction that energy is lost before it reaches the set the results will be greatly impaired.

The ideal aerial for 200 to 600 meter reception would be of one wire, 75 feet long, well insulated at the ends and leadin, of about 25 feet or less, with a porcelain tube through the window sash for bringing the leadin to the set.

The multiwire aerial is beneficial for transmitting only; under actual test, there was absolutely no difference in results between the multiwire aerial and the single-strand aerial for reception.

The aerial and ground leads have a great tendency to raise the wave, unless they are of the proper length. A 43-plate variable condenser in the ground lead will decrease the natural wave, while the condenser, if placed across the aerial and ground, will increase it.

Glass insulators, I personally believe, are best. However, the insulators on the market today are effective. In wet weather, when leakage is at the highest point, the glass insulator will shed water more readily than the composition insulator.

Gold-plated wire is best for the aerial. But due to its prohibitive price, it is not often used. Enamelled copper wire is a close second, as to results. The enamel prevents corrosion of the copper, thus reducing skin resistance.

B Batteries

Under average conditions and average use (18 hours weekly) the B batteries should be renewed every four to five months. Your batteries may register perhaps half to three-quarter rated voltage, yet the possibility is that they are internally corroded and are the hidden cause to a variety of disorders. B batteries rated at 22½ volts are useless after going down to 17, while 45-volt post registering 37 also shows uselessness.

The ear is a good guide. When signals are noticeably weaker it is time to look to the B battery.

If proper care is taken of the B battery you will be rewarded with a battery having long life and presenting efficient, noiseless service.

Wire Weight-Length Table

THE following table shows the number of feet per pound of the respective kinds of wire. SCC means single cotton covered; DCC double, etc.; SSC single silk covered; DSC double, etc. The table:

Size B&S Gauge	SCC	DCC	SSC	DSC	Enamel
20	311	298	319	312	320
21	389	370	403	389	404
22	488	461	503	493	509
23	612	584	636	631	642
24	762	745	800	779	810
26	1192	1118	1265	1202	1286
28	1852	1759	1972	1917	2042
30	2860	2534	3145	2909	3240
32	4375	3737	4950	4654	5132
34	6500	6168	7740	7111	8093
36	9820	7877	12000	10039	12813
38	14300	10636	18660	14222	20274

From this table you can compute how to buy wire by weight to wind coils of given wire lengths.

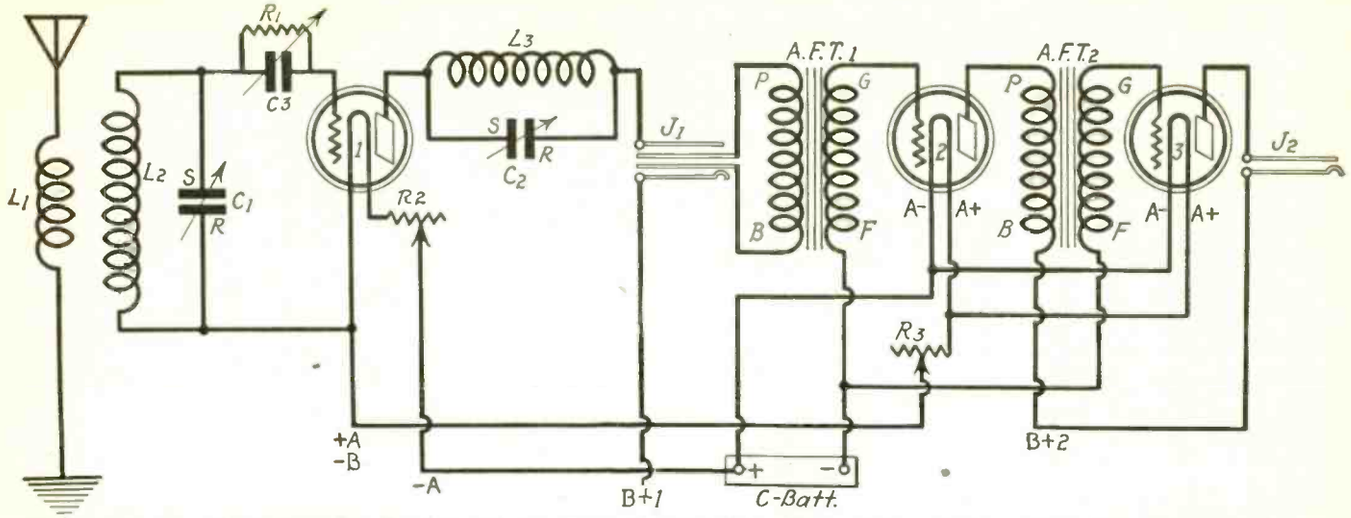
Report Stations Off Their Wavelength!

WASHINGTON

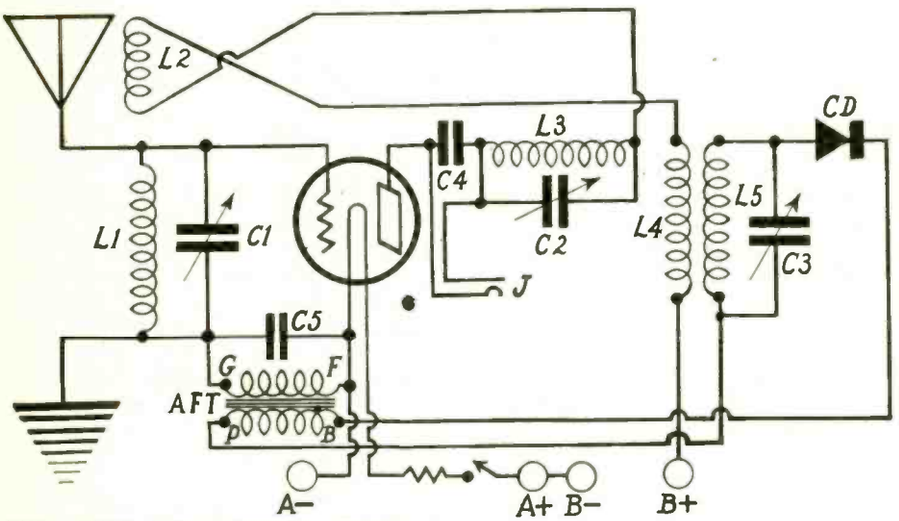
IF you catch a broadcasting station off its assigned wavelength write to the Radio Bureau of the Department of Commerce about it, or to the nearest radio inspector. In this way you will render material assistance in helping to enforce radio regulations and keeping down interference.

When a report is received that a station is off its assigned frequency, an immediate investigation will be made. If the report is found to be correct, steps will be taken to compel the station to stick to the wavelength assigned it.

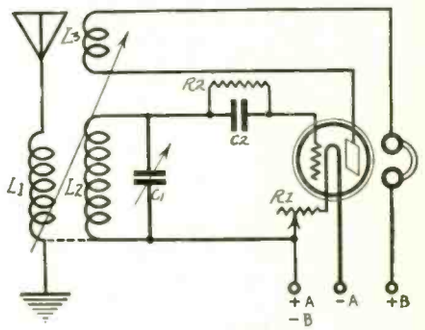
Hookups Worth Loss of Sleep



HERE IS the famous 3-Circuit Tuner You Can Log, with two stages of audio included. There are two controls, one the variable condenser C1, for tuning the grid coil, the other C2 for tuning the plate coil for regeneration. Easy to build, easy to operate, this DX circuit proved one of the most popular published by RADIO WORLD in 1924. The volume from this set is fine, the selectivity good and the tuning simple. A C battery is included in the audio stages for negatively biasing the grids of these two tubes. This set was fully described by Herman Bernard in the November 8 issue. Numerous constructors reported hearing Europe during the international tests.

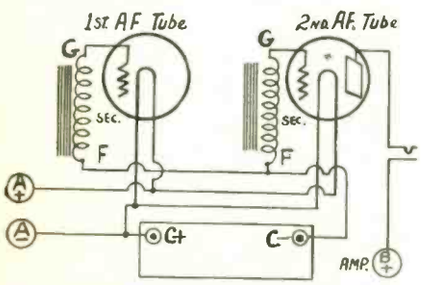


THE 1-TUBE Reflexed Superdyne diagrammed above, affords fine signal quality because of the crystal used as the rectifier. This circuit is not selective enough for those living in cities. L1L2 are both on one tubing and are fixed coupled. All the coils may be made at home. There are three controls, the variable condensers C1, C2 and C3. This is a good reflex for the beginner to build. It is not a DX set. The circuit was described in the December 6 issue.

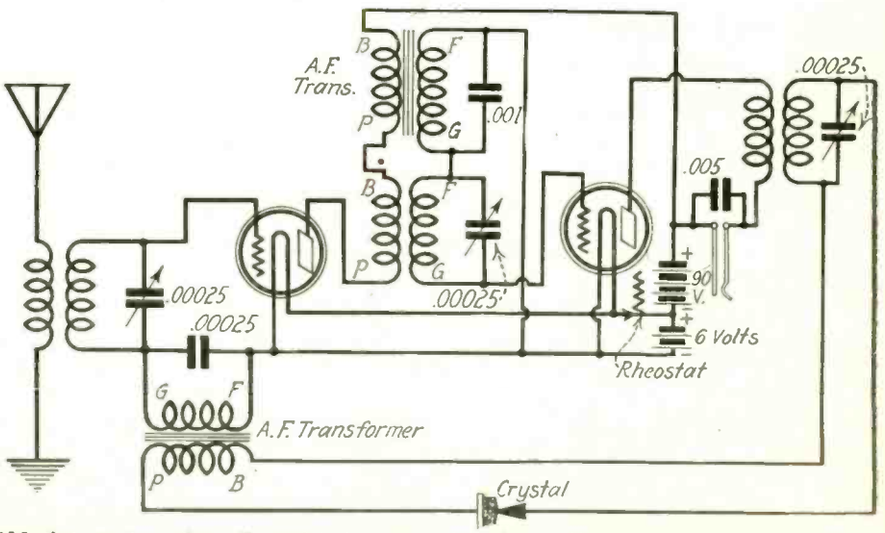


THE 3-CIRCUIT TUNER with tickler, instead of a condenser-tuned plate. L1L2L3 are respectively the primary, secondary and tertiary or tickler of a 3-circuit variocoupler. The variable condenser C1 tunes the grid, while L2 controls the feedback of the radio-frequency currents. This is the same circuit as the one that can be logged, except that tickler regeneration is so variable as to dial setting, from day to day, that the "logability" feature is absent. It is a little more selective than the logable set.

The Most Obtainable in 2-Tube Set



THE C BATTERY is an important addition to any circuit. If used in the audio stages, as shown above, it cuts the B battery drain and also the distortion. The grid is negatively biased for better control of the electronic flow within the tubes. The plus post of the C battery goes to A minus and the C minus post goes to the ends of the transformer secondaries, usually marked S2 or F. The A minus remains the same in the filament wiring, the C battery being inserted so as not to affect these leads. If the above diagram is followed, and from 3½ to 7 volts used, more plate current may be used for greater volume than otherwise, without accompanying distortion or tube paralysis. The C battery may be placed inside the cabinet, if the wiring is not crowded there, but otherwise should be placed outside the set, though close to it. Avoid placing the C battery near a coil.



ALL that any two tubes will stand is for each to be reflexed. Here is a 2-tube circuit comprising two stages of radio-frequency amplification, two of audio and crystal detector. The set is difficult to construct and to get operating properly, but experienced fans have had luck with it. Certainly it is economical. There are three controls. The range of such a set about equals that of the two regenerative types on this page. The hookup is tempting to the experimenter because there is so much yet to be discovered about successful reflexing. The set was described in the November 15 issue of RADIO WORLD.

Hopes and Prophesies for 1925

HERE is a compendium of the prophesies of noted experts of what advances radio will make in 1925:

1. Further development of high frequencies
2. Radio transmission of pictures with greater speed and accuracy.
3. Progress in reducing the effects of fading, atmosphereic disturbances and interference.
4. Directional transmission and reception.
5. Increase of the range of service of broadcasting stations through development of higher power.
6. Development of underground antennae which may increase distance and at same time eliminate static, fading and interference.
7. Advances in receiving sets, such as higher selectivity, simplicity of tuning, and the elimination of batteries through use of current supplied by electric lighting systems.
8. Better programs.

BY DR. J. H. DELLINGER
Chief of Radio Laboratory, Bureau of Standards

On the question of future developments, here are some of the things I expect in 1925:

Beam transmission: Development of practical means of directing waves in concentrated beams in desired directions. The use of this system at lower frequencies heretofore. Adaption of this system to the reduction of interference.

Directional reception: Improvements in direction finders. Development of very directional receiving systems. Introducing another element of interference reduction.

Further development and application of the high frequencies, 2,000 to 20,000 kilocycles: The utilization and control of radio waves at these frequencies on a regular engineering basis. Increase in knowledge of the possibilities of these waves and the mode of their propagation.

Radio relaying: Perfection of means for relaying and rebroadcasting and adaptation to various services, utilizing in particular the higher frequencies.

Fading: Improvements in broadcasting Broadcasting to take more definite form as a distinct service as against its initial phases of novelty or pastime. Higher quality in the receiving of broadcasting through improvements in receiving sets and through the use of higher power in the broadcasting stations. Greater availability of the past broadcast programs through interconnection of stations and through the use of higher power.

Sets: The wider use of sets of high selectivity can be expected. While batteries give such good service as the supply for electron tubes that are hard to displace, progress can be expected on devices for using alternating current as a tube supply.

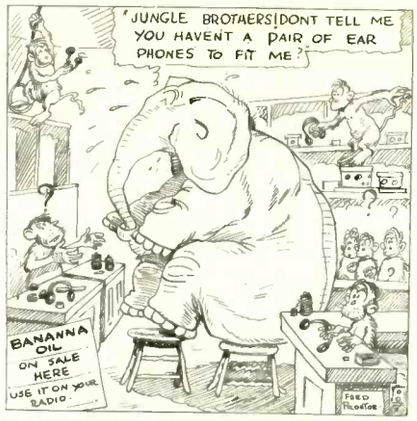
Standardization: Elimination of a multiplicity of parts by the radio industry. Standardization of receiving and transmitting electron tubes.

Radio Transmission of pictures: Improvement of quality and speed of transmitted pictures through efforts of numerous investigators and sompanies.

Radio beacons: Extension of radio beacon systems for navigation by sea and air.

General progress on many of the major problems of radio technique such as various phases of the interference problem, radio measurements, radio wave intensity measurement and control.

Jumbo's Aspiration



MR. ELEPHANT, whose ears have been a subject of comment since Noah's time, hopes that 1925 will produce a headset to fit them.

BY MAJ. LOUIS B. BENDER
Chief of Engineering and Research Division, U. S. Army Signal Corps

I think the major development of 1924 was the progress made in the exploration of high frequencies. I think the same subject will be the big development of 1925.

BY C. FRANCIS JENKINS
Inventor

The most outstanding event in radio the past year was the activity and marvelous accomplishments by the use of short wavelengths. The most outstanding feature of the coming year will be the introduction of pictures by radio in action as an entertainment in the home.

BY DR. HARRIS ROGERS
Inventor

I believe the greatest development of 1925 will be the transmission and reception by buried antennae. By the use of such, fading will be eliminated, signal strength will be the same during the 24 hours, the difficulties of static reduced and owing to the marked directivity of this form of antennae, less power will be required to cover great distances. I also believe that it will be conceded, sooner or later, that communication over great distances is had through the conductivity of the earth's crust and not through the space above. (Copyrighted 1924)

By HERBERT HOOVER

Secretary of Commerce and Radio Chief of the United States

"The Greatest Development in Broadcasting During the Past Year Has Been the Change in Public Attitude—Listeners Are Becoming More Appreciative and Critical—Radio Has Begun to Enrich American Life by a Real Contribution to the Home."

THE greatest development in broadcasting during the past year has not been in the application of new methods of transmission or reception, important as improvements in these lines have been. It is rather in the change in public attitude. Listeners are becoming more and more appreciative of the real service of radio and increasingly critical both as to the character of the matter furnished them and as to the efficiency with which it reaches them. The whole broadcasting structure is built up on service to the listeners. They are beginning to realize their importance, to assert their interest and to voice their wishes. Broadcasting must be conducted to meet their demands and this necessarily means higher character in what is transmitted and better quality in its reproduction to the ears of the listener.

There is a growing realization on their part of the public responsibilities they assume in conducting an agency so greatly affecting the cultural progress of our people. The innovations of which we hear so much—national programs, wire interconnection, short wave rebroadcasting, increased power, and wired radio, which are already playing so important a part and are destined to have still greater influence for good, are based entirely upon the necessity for meeting the growing popular requirement of better service The demand will continue to increase, and new method of efficiency will continue to be found to meet it. But beyond all, radio has begun to enrich American life by a real contribution to the home. It yet has far greater service to perform in this way and .I believe the next year will see great and more definite advance in this direction.

1925 to See National Broadcasting on Big Scale, Says Expert

By Judge S. B. Davis

Department of Commerce

I CONSIDER interconnection, in whichever mode effected, almost essential to the future of broadcasting, if we are to look at radio as a means of service to all our people all the time. It untimately means national programs, nation-wide utterances, more valuable subject matter and that great happenings in which our people have so vital an interest will be made available to everybody. To give them an immediate touch with national and world happenings must result in better citizenship. We have already seen examples of nation-wide communication in the simultaneous broadcasting on several occasions by stations from the Atlantic to the Pacific, and it is now a nightly practice within extensive areas. All this happened in the past year. It is transforming broadcasting from a local to a national service, and this not by way of detriment to the local stations, which are the backbone of the system, but as an advantage to them. Interconnection, with its corrallary of national service, is only just beginning. It will go much further. Its development, together with some general rise in the power level of stations for the overcoming of static and interference, giving us really useful reception, will, I believe, be the pricipal improvements in the immediate future.

The Radio University

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

KINDLY give me a working diagram for the construction of a cabinet for a portable set.—K. Korones, Roselle Park, N. J.

Fig. 59 is the diagram you desire.

* * *

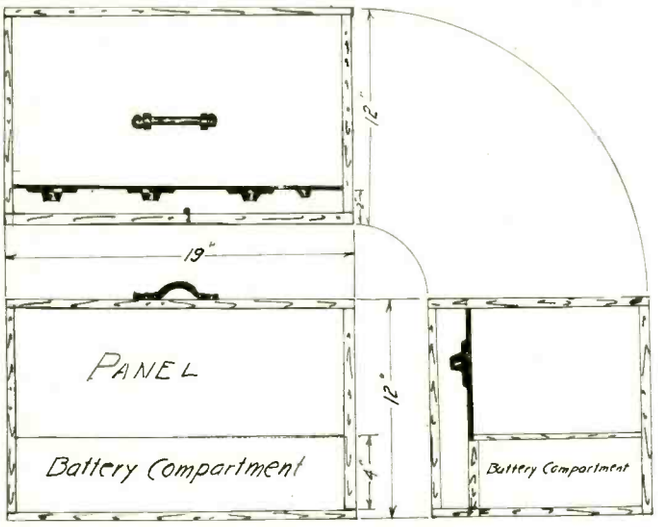


FIG. 59 (at right)—The cabinet diagram for a portable outfit. It is 19" long by 12" wide. It is well to have the box made of a light wood, such as maple. Make the set double-decked, so that the battery compartment will be at the bottom, the tuner and tubes at the top.

* * *

WHICH is the "high" side of a coil?—W. W. Aitken, Nashville, Tenn.

The side connected to the grid at the input or, if it is a coil used at the output, the side that goes direct to plate.

THIS city is about eighty miles from the nearest large broadcasting station. I think that the 3-tube Super-Heterodyne is what I want to build. I have never built a set, but have been studying the subject for some time. Do you think that this is too much for a novice to attempt? I would like to have DX, reasonable selectivity and spend about $30.—Dr. M. L. Baker, First National Bank Building, Christopher, Ill.

That set is entirely too difficult for any one to build successfully except a radio engineer or a person with equal experience. For $30 you can scarcely expect to build a set that will bring in DX on a speaker. If only earphone service is desired a stage of RF ahead of a tube detector would be very satisfactory. The 4-tube DX Superdyne, RADIO WORLD'S 1925 model, without the audio stages, is about as good as you can do. See the article in this issue. You might build the set on the specified size panel, omitting the audio stages until you feel ready to include them. The set with the audio stages would cost less than $100, including everything. For about $65, complete, the 3-tube DX Superflex could be built. This set was described in the December 27 issue by Abner J. Gelula.

* * *

IN building a 6-tube Super-Heterodyne which would be the best kind of audio amplification for loud speaker reception: 2 stages of transformer, 1 stage of transformer and 2 stages resistance, 3 stages of resistance, 1 stage of transformer and 1 stage of push-pull? I want to use either one or two stages of amplification and have signals come in clear without distortion. What ratio transformers are best to use?—E. V. H. Gillis, 3232 Mott Ave., Far Rockaway, N. Y.

Two stages of transformer-coupled audio-frequency amplification will satisfy you nicely. The Super-Heterodyne amplifies so powerfully at radio frequencies that there is an accompanying audio amplification at the second detector output, sometimes great enough to operate a powerful local on a speaker without any audio. Therefore, for locals one stage of audio is bound to be enough, so include a jack for the first audio stage. For DX plug in on the second audio stage. Both audio transformers may be 3½ or 4-to-1 ratio. For slightly greater volume, use 6-to-1 in the first stage, 3½-to-1 in the second. If good transformers are used there should be no distortion detectable by the ear. Precision instruments always show some distortion, but you do not listen with precision instruments. The human ear is not such.

* * *

I HAVE BEEN tinkering with a Grimes Inverse Duplex hookup. Am using three Neutro coils, with 16-turn primary, 64-turn secondary and 17-plate condensers, recommended by local dealer. Cannot get below 300 meters, while 546 meters comes in at about 50 on the dials. As I understand it, smaller condensers would lower the range, but according to one of your recent articles on this subject the small condensers may not cover the broadcast range. As I do not want to buy new condensers could turns be removed from these coils so that stations from 200 meters up would come in? No doubt this would cut out the 500-meter stations, but as there are more stations on the lower end of the range than there are on the upper end, I believe this would be better. Would you advise removing turns from primary, secondary or both? If so, about how many, and what ratio between the primary and secondary would be advisable? (2) In tuning this set I bring in stations with the first two dials and as the third dial is brought up to about the same setting the receiver gives a terrific squawk. After this point is past the station still continues to come in. Then by moving the first dial the squawk can be brought in again. I tried inserting a grid leak ahead of the detector, but it did not make much difference. Am using two stages of audio, but do not get much volume, except when the set is squawking.—R. K. Wheeler, Baur Carbonic Co., Standard Ave., Durson St., Indianapolis, Ind.

You have too much winding on your secondaries. Remove about 8 turns from each secondary. Leave each primary intact. You will still reach the high-wave stations. As you do not give the diameter it is impossible to give you the exact number of turns. If 8 turns off is not enough, remove more turns, one at a time. At 95 on the dial 546 meters should come in for best balance. (2) Symptoms indicate stray coupling, especially between audio transformers and the other coils. Try different capacities of fixed condensers across primary of first AFT and secondary of second AFT; also, mount the 2 AFT at right angles and mount the coils at 54.7 degree angle to the baseboard. Widen separation between AFT. Keep all coils 1½" or more from any other parts. This is a difficult circuit for home builders.

* * *

I AM interested in playing with the Monotrol or similar practical set of simple operation. Is the 1-knob set a fair example of the fundamental idea? (2) Is a 11-plate variable condenser enough to cover the 250-550 meter wave-band across a fixed coupler? (3) What commercial forms of such a fixed coupler and variable condenser would you advise me to adopt for simple experiments on this line?

(1) The 1-knob set is a fair example. (2) Usually not. (3) We do not specify commercially made products in this department.

* * *

I HAVE a 5-tube Neutrodyne receiver. When I get up above 360 meters it begins to squeal. Can you suggest a remedy?—G. F. Steele, 214 Houston St., Ripon, Wis.

Reneutralize the set. Be sure all tubes are good. Look for leak.

RADIO WORLD'S Broadcast University

Questions and Answers on the Air Every Wednesday at 6:45 P. M. at WGBS, the Gimbel Bros. Station, New York City.—Department Conducted by Abner J. Gelula, RADIO WORLD'S *Technical Editor.*

CAN YOU tell me how to mount a honeycomb coil on a baseboard without using the conventional plug system? I have a circuit that calls for the honeycomb coil unmounted, i. e., the coil without any base attached.—Herman Dein, 9707 110th St., Richmond Hill, L. I.

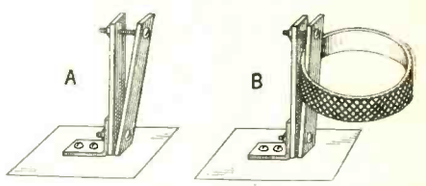


FIG. 73, how to mount a honeycomb coil on the baseboard. Two strips of bakelite or seasoned wood act as a vise, adjustable by two screws. Screw the strips to the wood baseboard. If no baseboard is used, the entire instrument may be mounted similarly on the back of the panel.

See Fig. 73.

* * *

I LISTENED with great interest to RADIO WORLD'S broadcast from WGBS of the diagram of the 3-tube Superflex. Will you please explain the underlying principles of this set and whether it uses regeneration and how?—Chas. L. Mulligan, 6802 Ridge Boulevard, Brooklyn, N. Y.

This set consists of a stage of tuned radio-frequency amplification, detector and two stages of audio, the first audio stage being reflexed in the radio tube. Thus 4-tube value is obtained from 3 tubes. Regeneration is in the detector stage both by inductive coupling of plate and grid, through the feedback by tickler action, and by capacitative coupling of the end of the tickler coil to the end of the detector grid coil. This connection is made by a fixed condenser, C3, as shown in Fig. 1, page 5, RADIO WORLD, issue of December 27, wherein the circuit was fully described. The reflexed tube tends to block oscillation from esctpe through the antenna. Much of the tuning, especially for DX work, must be done by the whistle. The set has three controls, consisting of two variable condensers and the tickler. It piled up an amazing DX record under severe rigid tests.

* * *

A FEW weeks ago I heard Herman Bernard broadcast from WGBS, the Gimbel Bros. Department Store studio in New York City, about the new wavelength band and the necessary changes to be made in sets to meet these conditions. Is it still imperative to make the changes, or were they given as merely contemplating an imminent exigency?—Jack Rielley, 405 Hawthorne Ave., Newark, N. J.

Due to changed conditions, particularly the big demand for licenses by prospective new broadcasters, it was found impossible to abide by the suggestions of the Third National Radio Conference as to a new wavelength band. Therefore the idea has been abandoned by the Department of Commerce. However, the range in meters may be greater than heretofore and some changes in receivers may be necessary. The wavelengths of some of the stations have been changed already, but rather under a reallocation scheme than as part of a plan to lengthen the meter range con-

(*Concluded on page* 19)

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.

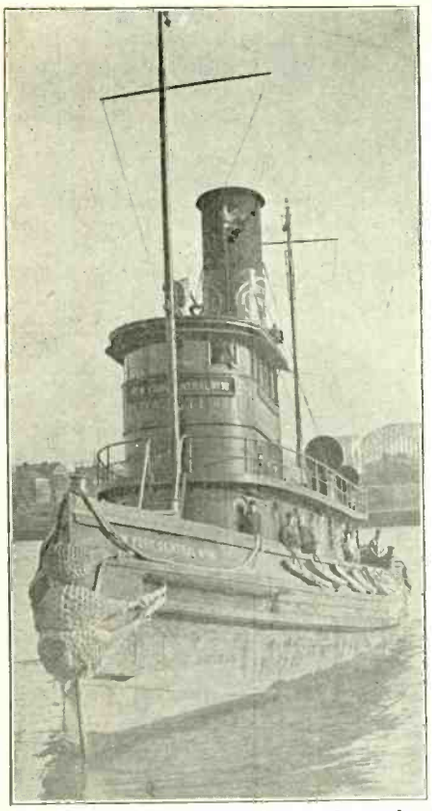
Name .....

Street .....

City and State .....

Telegraph queries will be answered collect the same day as received. Be sure to direct in your query that the answer be sent collect.

Tugs Get Orders by Radio



THE PROUD TUGBOAT, first to be equipped with radio for commercial purposes in New York Harbor, is known as New York Central No. 18. Orders directing the movement of the tug are received on a short-wave set, instead of being telephoned over land wires and the message "called for" at a pier. (Kadel & Herbert)

RADIO'S mark has been made. Even the humble tugboat, most despised of river craft despite its unselfish services in satisfying the material needs of mankind, has recognized radio at its true worth. Tugs of the New York Central Railroad, operating in New York Harbor, are being equipped with a radio receiving and sending apparatus and thus are guided in their courses and ordered about like mere ocean liners. One of the outstanding difficulties about fleet maneuvers for tugboats had been that of communication. The old plan was for the superintendent in charge to telephone his orders to some one in an office at a pier. In the fullness of time the tug would steam proudly up to the pier and an intelligent deckhand would receive the orders second-hand. Once in a while the superintendent would be amazed to learn that one of the company's most obedient and faithful tugs was moored at a pier at Canarsie, while the orders had been to pick up a crate of canaries at sea. These little troubles vexed the superintendent so much that he finally decided that radio would be the thing to make his life happy.

Therefore, the installation was made aboard New York Central Tug No. 18, mainly because its funnels looked enough like loudspeakers to give newspaper comedians a chance to originate quips thereon in the columns. The aerials were strung on fore and aft masts. The coils and condensers in the receiving set were made with an eye to safety so that only the low waves would be caught, thus eliminating the danger of the crew listening to Ben Bernie's orchestra from WNYC instead of the superintendent from NYC. As for the captain, it was conceded there never was any danger he would be distracted from his bounden duty by only such frivolity.

"UNCLE Robert," WNYC broadcaster

McCormack & 15 of World's Perform fro

Chaliapin, Galli-Curci, Elman, Gigli, Gorgoza Among Singers on Programs as Victor Talking Machine Company Makes Experiment to Increase Sale of Records—New Year Gift to Fans Most Important Program Improvement in History of Radio—McCormack and Bori Make Radio Debut First.

THE greatest improvement in the quality of programs in the history of radio was vouchsafed by the signing up of some of the world's most gifted singers and other musicians to broadcast from WEAF, New York City, and seven other powerful interconnected stations. This arrangement resulted from the decision of the Victor Talking Machine Company to avail itself of the opportunity presented by radio for widening the public appeal made by these singers and players. The stars under discussion are under contract with the Victor Company for exclusive "reproduction" rights and thereby were precluded from radio broadcasting. But the Victor Company, which in the beginning was hostile to radio because its business was almost cut in half when radio gained popularity, is making this test to determine whether the plan will increase the sale of records of these great artists. At the same time the commercial objects of the Victor Company meet the long-standing objection to radio programs in general that the best voices and most gifted strummers are to be heard only by one's personal presence at their performances or by hearing phonograph records. This criticism has been generally admitted in the radio field to be quite true. But the immeasurably important addition of the great lights of music to the list of regular broadcasting cast listeners with m thing to rave about multitude a fascina mulates an appetite passing any other si

Following is the g artistic wonders will of every home that

JOHN McCORMA whose concerts are of any in the ranks

AMELTIA GALL soprano of the Metr voice with its rare roused three Contine

MARIA JERITZA soprano, and prima politan, who has ris "Tosca" and other o perishable "Vissi d' via radio.

LUCREZIA BORI itan.

MISCHA ELMAN known violinist in th

BENIAMINI GIG ropolitan, who sings than Caruso did, an the world's greatest

ANTONIO SCOT Metropolitan, where twenty-six years.

REINALD WERR concert baritone.

RENEE CHEMET

JASCHA HEIFET olinist.

GIOVANNI MART ropolitan.

TITO SCHIPA, t Company.

TITTA RUFFO Opera Company.

EMILIO de GOR tone, the quality o

Monday Night Audiences Called the Largest

ACCORDING to the studio director of Station WSAI, Cincinnati, more persons listen on Monday night than other night of the week.

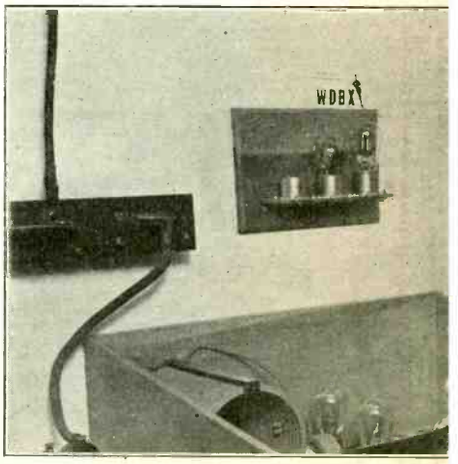
"We think more fans listen to broadcast programs on Monday night than any other," says the director, "although the large number of reports we receive from programs on that night might be due to the fact that more stations are silent on Monday night than any other weekday night. Thirty of the eighty leading stations in the United States, Canada, Mexico and Cuba are 'off the air' on Monday nights. Although thirty-four stations are silent on Sunday night, experience has proved that this is the weakest night of the week from the standpoint of 'radio attendance.' We attribute the increased listeners on Monday nights to the fact that it is, so to speak, an 'off night.' Most people, having spent the week-end in outside entertainment, remain at home on Monday."

HEARS NEW ZEALAND IN ONTARIO

PORT ARTHUR, ONT.

W. P. SUTTON established what is said to be a local long distance record for radio receiving at 4:30 a. m. when he picked up a code message dispatch by I. D. Bell of Waihemo, New Zealand. Mr. Sutton was able to hear the signals clearly and listened to them for forty minutes.

An Entire Broadcasti



HERE is the broadcasting outfit of WDBX, 233 m

Jeritza on Air; Best Artists n 8 Stations

artists gives broad-
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nd also opens to the
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or good music sur-
gle act in history.
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has a radio:

CK, the Irish tenor,
the most profitable
of music.

-CURCI, coloratura
politan, whose trick
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, Viennese dramatic
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he has served for

ENRATH, American

, French violinist.
Z, world-famous vi-

INELLI, tenor, Met-

nor, Chicago Opera

baritone, Chicago

OZA, concert bari-
whose voice is un-

Scotti, Werrenrath, Heifetz, Chemet, Martinelli, Schipa and Ruffo on Noted List—WEAF, WJAR, WNAC, WDBH, WGR, WFI and WCAE Interconnected for the Great Events—Whether the Concerts Will Be Permanent Depends on Their Commercial Advantage to the Victor Company.

surpassed by that of any other singer in his vocal class.

FEODOR CHALIAPIN, the Russian bass, of the Metropolitan Opera Company, and conceded by musical critics to be the best bass in the world.

The artists will appear before the microphone of WEAF, the American Telephone & Telegraph Company's studio at 195 Broadway, New York City, and a "choice few" may be permitted by special invitation to be present in the studio to watch as well as hear the momentous events.

The seven interconnected stations that will rebroadcast the programs of these celebrities are:

WCAP, Washington, D. C.
WJAR, Providence, R. I.
WNAC, Boston.
WDBH, Worcester, Mass.
WGR, Buffalo, N. Y.
WFI, Philadelphia.
WCAE, Pittsburgh.

It was announced that whether the concerts will become a permanent feature will depend on their popularity and on the advertising and financial benefits to the Victor Company. As the popularity is far beyond discussion or doubt, it becomes certain that the experiment, from the viewpoint of the Victor Company, is purely commercial.

Gold Hunt With Divining Rod

BERLIN.

THE divining rod, in which some persons placed great faith several years ago, but which impartial scientists pooh-poohed as a means of discovering the existence of underground streams, now has a competitor in the radio field. Hermann Jeastor has a device of his own improvising that he calls a "radio emanator," but instead of having mere water as its goal (water being cheap even in Berlin) it is supposed to locate gold. Thus any gold rush that may develop would be greatly simplified, provided the invention works as claimed. Instead of the old panning process at streams or the rather aimless digging of shafts, the existence of gold, even with some indications of the quantities thereof, may be predetermined by the emanator, says the inventor. When Mr. Jeastor first broached the subject to some business men they simply kept on signing the heaps of letters in front of them. So he went from one office to another. The divining rod had left unpleasant memoirs in the histories of mock science, so these estimable gentlemen acted very well the part of disinterested and even aloof parties. But with the determination characteristic of inventors, if their devices work or don't, Mr. Jeastor kept plodding on. After he had worn out two pairs of real leather shoes and worked up several expensive appetities because of the enforced pedestrianism and long hours of waiting outside cold doors, he began to show signs of elation. A Leipzig firm had begun to show signs of accumulating some interest in his project. Now the firm announces that it is satisfied there is something in Mr. Jeastor's invention besides a vacuum tube and will go into quantity production. Meanwhile, with the unconquerable confidence of an inventor, Mr. Jeastor is multplying large figures by still larger ones and even worrying about the tax he will have to pay from such a great income.

LOCATES GOLD? Yep, that's exactly what the "radio emanator" does, says Hermann Jeastor (above with the invention). The device doesn't care how deep the gold is buried, and, 'tis said, works just as well at prospecting as at buried treasure hunting. Now what will become of the gold-diggers of Broadway? (Gilliams)

ng Station in a Box!

ters, New York City, Dyckman Radio Shop. (Kadel & Herbert)

Broadcasting Snake Dies from Overwork

KELLY, the pet rattlesnake at Pennsylvania State College that was heard by radio fans all over this country last May in broadcasting demonstrations, is dead. In explanation of the cause, the college in announcing the death says that "Kelly" had to do his rattling stunt so often for visiters to his cage in the college nature-study zoo, that he virtually killed himself in obliging at private performances.

"Professor George R. Greene, head of the college nature-study department, on a feeding visit to 'Kelly' recently found the radio artist cold in death," says the announcement. "A fang protruded through the snake's jaw, leading Professor Greene to the belief that excessive coaxing had worn out the patience of the reptile.

"It was not a case of suicide, for Professor Greene declared that a rattler's venom will not kill it. 'Kelly' had experienced trouble in shedding his summer skin and had not been very active in recent weeks. The rattler, which had ten rattles on the tip of his tail, will be skinned and mounted and get a prominent place in the college natural history museum where posterity will be able to view what is said to be the first animal to be used successfully in radio broadcasting. 'Kelly's' radio stunt was commented upon by newspapers in all parts of the world, even in far-off Japan and India."

Kelly died without a murmur.

Navy Band at WEAF January 9

BROADCAST PROGRAMS

Thursday, January 8

KYW, Chicago, 536 (C. S. T.)—6:30 **A. M.,** morning exercises. 9:30, 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 by Walter Wilson. 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. Pernin. 8:20, Auburn orch. 9:15, "Safety First," by Mr. S. C. Elkin. 10, "Evening at Home" program.

KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—9:45 **A. M.,** Stockman reports. 11:55, time. 12, weather, Stockman reports. 12:15 **P. M.,** Scalzo's orch. 3:30, quotations on hay, grain and feed. 6:16, KDKA Little Symphony orch. 7:15, Stockman reports. 7:30, children's period. 8, National Stockman and Farmer program. 8:30, KDKA Little Symphony orch.; Mrs. F. H. Steele, soprano; Raymond Griffin, bass. 9:55, time, weather. 11, Edgar Thompson Steel

WEAF, New York City, 492 (E. S. T.)—11 **A. M.,** Minnie Weil, pianist; "Old Fashioned Molasses," by H. G. Kebel; talk by Marie Seelers, Home Bureau Editor of Pictorial Review; market and weather. 4 **P. M.,** Estelle Collins, dramatic soprano; lecture from Columbia. 6, dinner music; mid-week services; Lolita Gainsburg, pianist; Maria Paz Gainsborg, soprano; Luis Zamudio, baritone; Lecture, Columbia; choir; "Touring," George Elliott Cooley; "Hohner Harmony Hour"; Vincent Lopez and his orch.

WDAR, Philadelphia, 395 (E. S. T.)—11:45 **A. M.,** Daily Almanac. 12:02 **P. M.,** organ recital; Arcadia Orch. 2, Arcadia Concert Orch.; artist recital. 5, question period in educational talks. 7:30, boys and girls.

WJY, New York City, 405 (E. S. T.)—8:15 **P. M.,** "Aims and Objects of Museum of American Indian," A. B. Skinner. 8:30, Wanamaker organ recital. 9:30, Harold Stern's Belleclair Orch. 10, "American Negro-Poets and Poetry," James Weldon Johnson.

WJZ, New York City, 455 (E. S. T.)—10 **A. M.,** Menu, Mrs. Julian Heath. 10:20, "Review of Reviews." 10:30, "Household Equipment," Ethel R. Peyser. 10:40, "How to Monogram Linens," by Editor of "Needle Art." 10:50, Eleanor Gunn's fashion talk. 1 **P. M.,** Nathan Abas' Orch. 4:30, Bernhard Levitow's Hotel Commodore Tea Orch. 5:30, State and Federal agricultural reports; Exchange; foreign exchange; news. 7, Bernhard Levitow's Orch. 7:55, "The Virtue of Villainy," John B. Kennedy. 8, Wall Street review. 8:10, NYU air college; "Drama." 8:25, Hennessey's Dance Orch. 9, Society of Automotive Engineers banquet. 10:45, Waldorf Astoria Dance Orch.

KFDY, Brookings, S. D., 273 (C. S. T.)—8 **P. M.,** trombone solos, Clarence Solberg. 8:10, "Carrying Science to the Farm," W. F. Kumlien. 8:20, "Fuels for South Dakota," by H. H. Hoy. 8:30, banjo and vocal selections. 8:45, "Whims of Fashion," by Louise Leaton. 8:55, trombone solo.

WGBS, New York City, 316 (E. S. T.)—10 **A. M.,** timely talks by Terese. 10:10, Edward Morris and Erva Giles. 10:20, Pictorial Review period. 10:30, Morris and Giles. 10:40, Pictorial Review. 10:50, Morris and Giles. 1:30 **P. M.,** Armand Vecsey and orch. 3, Wynn Holcombe, artists, and Music Box Review stars; interview by Terese Rose Nagel. 3:20, Leslie H. Allen, "What's Your Problem?" 3:30, Wynn Holcombe and crowd. 6, Uncle Geebee. 6:20, Loretta Ellen Brady. 6:50, Bert Roborn's Bluebird Trio. 7, playlet, "Bound East for Cardiff." 8, "Social Unrest in India," Savel Zimand. 8:30, Oliver Sayler, "Footlight and Lamplight." 9, "Round the Campfire." 9:45, Muriel Muth and Al Goodhart. 10, Arnold Meksin concert pianist.

KSAC, Kensas State College, 341 (C. S. T.)—12:30 **P. M.,** reading, Osceola Hall Burr; weather; Ordering Trees for Spring Planting, W. R. Martin; radio question box; Value of Good Arsenicals, E. G. Kelly. 7:20, college bell and opening exercises. 7:30, Rugs and Rug Making, Harriet W. Allard. 7:40, Radio College Trio. 7:45, Do You Always Make Good Bread? Martha S. Pittman.

WKAQ, Porto Rico, 360 (A. S. T.)—8:30 **P. M.,** musical concert from "La Cafeteria" (the Coffee Pot).

WGR, Buffalo, N. Y., 319 (E. S. T.)—6 **P. M.,** Hallpryd String Quartet. 8:30, address by Dr. R. J. MacAlpine. 6:30, Vincent Lopez music. 6:20, Hutchinson High School orch. 8, Lucas Lux program. 10-11, the Wheat concert hour.

Friday, January 9

KYW, Chicago, 536 (C. S. T.)—6:30 **A. M.,** morning exercises. 9:30, late news and comment of the markets. 11:35, table talk by Mrs. Anna J. Peterson. 6:02 P. M., news, financial and final markets; Dun and Bradstreet's reviews. 6:35, childrens bedtime story by Walter Wilson. 7, Joska DeBabary's orhc. 7:10, Coon-Sanders Original Nighthawks 7:20, DeBabary's orch. 8, speeches under the auspices of the American Farm Bureau Federation. Speakers will be announced by radio. 11, midnight revue.

KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—7 **A. M.,** morning exercises. 8, morning exercises. 9:45, Stockman reports. 11:55, time. 12, weather, Stockman reports. 12:20 **P. M.,** Sunday school lesson. 3:30, quotations on hay, grain and feed. 6:15, Meyer Davis orch. 7:15, Stockman reports. 7:30, children's period. 8, "The Indians of the United States," by Flora Warren Seymour. 8:15, "The Coming Eclipse," by Heber D. Curtis. 8:30, "Toy Symphony," by Haydn. 9:55, time, weather.

WEAF, New York City, 492 (E. S. T.)—11 **A. M.,** musical program and talks; market and weather. 4 **P. M.,** Gertrude Otto, contralto; lessons in French. 6, dinner music; stories for children; The Happiness Candy Boys; United States Navy Band; Meyer Davis' orch.

WIP, Philadelphia, 509 (E. S. T.)—1 **P. M.,** Tea Room Orch. 1:30, weather. 3, "A Diet for the Anaemics," by Mrs. Anna B. Scott. 3:15, artist recital by Dorothy Deacon, pianist; Mrs. Opal Lorraine Smith Proctor, contralto; Milton J. Deacon, tenor; Flora Ripka, accompanist. 4:15, "Abnormal Children," by Dr. Frederick H. Leavitt. 6, weather. 6:05, popular music. 6:15, dinner music by Harvey Marburger. 6:45, livestock and produce market. 7, Uncle Wip's Bedtime Story.

WDAR, Philadelphia, 395 (E. S. T.)—11:45 **A. M.,** Daily Almanac. 12:02 **P. M.,** organ recital; features from the studio; Arcadia Concert Orch. 2, Arcadia Concert Orch; playlet. 4:30, Blue Ridge Serenaders. 7:30, 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. 1 **A. M.,** features from the studio.

WJY, New York City, 405 (E. S. T.)—7:30 **P. M.,** Billy Wynne's Greenwich Village Inn Orch. 8:15, "State Legislative Review," Julius S. Berg. 8:30, Gertrude Van Deinse, soprano. 9:45, "The Community Value of the Airport." 10, Ace Brigade and his fourteen Virginians.

WJZ, New York City, 455 (E. S. T.)—10 **A. M.,** Menu, Mrs. Julian Heath. 10:20, Book Review. Grace Isobel Colbron. 10:30, "Health and Beauty," by Ruth Champenois of "Good Housekeeping." 10:50, Eleanor Gunn's fashion talk. 1 **P. M.,** Hotel Ambassador Trio. 4, Walter M. Hamilton, tenor. 4:30, tea music. 5:30, State and Federal agricultural reports; farm and home market; Stock Exchange; foreign exchange; news. 7, Erdody's Park Lane Hotel Orch. 8, Wall Street Journal review. 8:10, NYU Air College; "Public Speaking." 8:45, Beatrice Bombaum, pianist. 9:15, U. S. Army night. 10:30, Beaux Arts Orch.

WGY, Schenectady, 380 (E. S. T.)—7:45 **P. M.,** health talk. 8, address, "What Every Voter Should Know About His City Government," by Professor Frank T. McKibben, head of the Civil Engineering Department of Union College, Schenectady. 8:15, WGY Orch. 10:30, program by Bluebird Dance Orch.

WOS, Jefferson City, Mo., 411 (C. S. T.)—8 **P. M.,** musical program.

WGBS, New York City, 316 (E. S. T.)—10 **A. M.,** timely talks by Terese. 10:10, Sybil Gidion Van Wezel, soprano. 10:20, fashionable dress period. 10:30, Sybil Van Wezel. 10:40, fashionable period. Inn instrumental. 3, interview; Gene Buck by 10:50, Sybil Van Wezel. 1:30 P. M., Blue Horse Terese Rose Nagel. 3:10, Hilma Millrodt, mezzo soprano. 3:20, Margot Andre, stage director. 3:30, Hilma Millrodt. 3:40, Alfred G. Robyn, harmony and composition lessons. 3:50, Hilma Millrodt. 6, Uncle Geebee. 6:30-7, "I'll Say She Is" Orch.

KSAC, Kansas State College, 341. (C. S. T.)—12:30 **P. M.,** reading, Osceola Hall Burr; weather; Farm and Home week, L. C. Williams; Radio Question Box; Why Tax Counties with Scalp Bounties, A. E. Oman. 7:20, college bell and opening exercises. 7:30, lecture on music, Ira Pratt. 7:40, musical numbers, department of music. 7:45, lecture on music, Ira Pratt.

Saturday, Januarv 10

WEAF, New York City, 492 (E. S. T.)—4 **P. M.,** Bruno Brothers orch. 6, dinner music; stories for boys, by Fred J. Turner; Alfred Orner, tenor; Rudolph Luks string ensemble; Sara Alter, pianist; Vincent Lopez.

KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—9:45 **A. M.,** Stockman reports. 11:55, time. 12, weather, Stockman reports. 1:30 P. M., Daugherty's orch. 6, children's period. 8:30, concert by the Westinghouse band. 9:55, time.

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, talble talk by Mrs. Anna J. Peterson. 6:02 P. M., news, financial and final markets. 6:35, children's bedtime story by Walter Wilson. 7, Joska DeBabary's orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, Jocka DeBabary's orch. 8, musical program. 9:05, Youth's Companion. 9:35, "Congress Classic." 12, "Congress Carnival."

WIP, Philadelphia, 509 (E. S. T.)—1 **P. M.,** organ recital by Karl Bonawitz, broadcast direct from the Germantown Theatre. 1:30, weather. 3, popular dance music by Howard Salmon's Society Orch. 6, weather. 6:05, Hotel St. James Orch. 6:45, livestock and produce market. 7, Uncle Wip's Bedtime Story. 8, "The Mineral and Vegetable Resources of the Sea," a talk by Ralph R. Foran, P. D. 8:15, Transportation Club dinner. 10:05, Art Coogan and orch. 11:05, organ recital by Karl Bonawitz.

WDAR, Philadelphia, 395 (E. S. T.)—11:45 **A. M.,** Daily Almanac. 12:02 **P. M.,** organ recital; features from Studio; Arcadia Concert Orch. 2, Arcadia Concert Orch; artist recital from the Studio. 4:30, dance program by the Cotton Pickers. 7:30, Arcadia Concert Orch.

WJZ, New York City, 455 (E. S. T.)—1 **P. M.,** Erdody's Park Lane Hotel Orch. 5:30, State and Federal agricultural reports; farm and home market; Stock Exchange; foreign exchange quotations; news. 7, Waldorf Astoria Dance Orch.; Joseph Knecht, director—"Learn a Word a Day." 8, "Bermuda," Wirt W. Barnitz. 8:30, "Art for Laymen," Walter M. Grant. 8:45, Empress of France Orch. 9:30, Ohio Society banquet. 10:30, Hotel Astor Dance Orch.

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

WGBS, New York City, 316 (E. S. T.)—10 **A. M.,** timely talks by Terese. 10:10, Kiddie Club. 10:40, William J. Stuart, serial story. 10:50, Betty Reich, candy recipes. 1:30 **P. M.,** Murray Scott, Canadian baritone. 1:45, Jersey Collegians. 3, interview with Charles K. Harris, by Terese Rose Nagel. 3:10, Covenant Players' musical revue. 3:30, Mrs. Josephine Ober, Society Editor of World. 3:40, Minnie Stern, pianist. 3:50, Edward Morris and Erva Giles. 6, Uncle Geebee. 6:30, Cameo Collegians. 7:30, Armand Vecsey and his Concert Orch. 9, Bayward Band. 9:30, Sam Comly, "Inside Movie Chats." 9:45, Bayward Band. 10, Gayne Dexter, Australian explorer. 10:15, Kenneth Burdick and Joe White, tenor. 11, Russian Eagle Orch.

Sunday, January 11

WCBD, Zion City, Ill., 345 (C. S. T.)—Mr. Glen R. Sparrow, tenor; Mrs. Glen Sparrow, contralto; Mr. and Mrs. Glen R. Sparrow, duets; Mrs. H. E. Mayfield, soprano; L. J. Hire, viola; Edwin Sach, piano; Wesley Carey, reader.

WIP, Philadelphia, 509 (E. S. T.)—10:45 **A. M.,** morning service; Rev. Floyd W. Tomins. 4, "Sunday Talk" meeting; "The Art of Living."

WOS, Jefferson City, Mo., 441 (C. S. T.)—7:30 **P. M.,** religious service.

WHAS, Louisville, Ky., 400 (C. S. T.)—4 **P. M.,** Alamo Theater organ; police bulletins; weather; "Just Among Home Folks"; readings; news. 4:55, livestock, produce and grain market reports. 5, Official Central Standard time announced. 7:30, concert. "Billy ad Jane" stories; news.

KGO, Oakland, Cal., 312 (P. S. T.)—10 **A. M.,** Baraca-Philathea Bible class; Professor E. G. Linsley. 10:45, service; Rev. George W. Phillips, pastor. 3:30 **P. M.,** KGO Little Symphony Orch. 7:45, services.

Monday, January 12

WCBD, Zion City, Ill., 345 (C. S. T.)—Dorothy Bull, soprano; Dorothy and Ralph Bull, duets; Ralph Reid, baritone; Mrs. Gertrude Mehaffey, reader.

WDAF, Kensas City, Mo., 411 (C. S. T.)—3:30 **P. M.,** program from Newman and Royal theaters. 5, weekly Boy Scout program. 5:50, marketgram; weather; time and road report. 6, address—C. H. Cheney; the Tell-Me-a-Story Lady; Trianon Ensemble. 8, Ivanhoe band. 11:45, Nighthawk Frolic.

WOS, Jefferson City, Mo., 411 (E. S. T.)—8 **P. M.,** piano solos, Harry M. Snodgrass.

WWJ, Detroit, 517 (C. S. T.)—8 **A. M.,** setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Public ealth Service. 10:25, weather. 11:55, time. 3:50 **P. M.,** weather. 3:55, market reports. 8:30, News Orch.

WHAS, Louisville, Ky., 400 (C. S. T.)—4 **P. M.,** selections played on the Alamo Theater organ; police bulletins; weather; "Just Among Home Folks"; readings; late important news bulletins. 4:55, local livestock, produce and grain market. 5, time.

KGO, Oakland, Cal., 312 (P. S. T.)—9 **A. M.,** music and lectures. 11:30, luncheon concert. 1:30 **P. M.,** N. Y. and S. F. stock; weather. 3, Studio musical program; speaker. 4, Henry Halstead's Dance Orch. 5:30, Aunt Betty stories. 6:45, stock; weather; S. F. produce and news.

KSAC, Kansas State College, 341 (C. S. T.)—12:30 **P. M.,** reading, Osceola Hall Purr; weather; Sweet Clover Seed, L. E. Willoughby; Radio Question Box; Some Yearly Record Rations, A. W. Knott. 7:20, college bell and opening exercises. 7:30, The Nature and Habits of Hogs, A. D. Weber. 7:40, Radio College Quartet. 7:45, The Management of airy Cattle, J. B. Fitch.

Tuesday, January 13

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 **P. M.,** the radio trio. 5, child talent program. 5:50, marketgram, weather, time and road report. 6, the Tell-Me-a-Story Lady; Trianon Ensemble. 11:45, Nighthawk Ensemble.

WWJ, Detroit, 517 (C. S. T.)—8 **A. M.,** setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Fred Shaw, pianist and popular songster. 10:25, weather. 11:55, time. 3 P. M., News Orch 3:50, weather. 3:55, market. 8:30, News Orch.

WHAS, Louisville, Ky., 400 (C. S. T.)—4 **P. M.,** Alamo Theater organ; police bulletins; weather; "Just Among Home Folks"; readings; news. 4:55, livestock, produce and grain market reports. 5, time. 7:30, concert by Rosson's Entertainers; "Billy and Jane" stories; news; time.

KGO, Oakland, Cal., 312 (P. S. T.)—11:30 **A. M.,** luncheon concert. 1:30 **P. M.,** N. Y. and S. F.

Gelula at WGBS Wednesday

stock reports; 6:45, stock, eather, S. F. pwroduce and news. 8, program through Young Men's Christian Association.

KSAC, Kansas State College, 341 (C. S. T.)—12:30 P. M., reading, Osceola Hall Burr; weather; Livestock Improvement Association, R. W. Kiser; radio question box; cornstalk poisoning in cattle and horses, Dr. R. R. Dykstra.

Wednesday, January 14

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., the radio trio. 5:50, marketgram, time and road report. 6, address, Health Conservation Association; address, Western Hardware Dealers; address, Meat Council of Kansas City; the Tell-Me-a-Story Lady; Trianon ensemble; classical music.

WOS, Jefferson City, Mo., 441 (C. S. T.)—8 P. M., address, "The Value of the Farm Inventory."; 8:15, address, "Vocational Education." 8:30, piano concert by Harry M. Snodgrass, "The King of the Ivories."

WWJ, Detroit, 517 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's dinner." 9:45, Public Health Service bulletins. 10:25, official weather forecast. 11:55, Arlington time relayed by the Western Union. 3 P. M., News orchestra. 3:50, weather. 3:55, market reports. 8:30, News Orch.; Templeton Moore, tenor.

KGO, Oakland, Cal., 312 (P. S. T.)—11:30 A. M., luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports; weather. 3, musical program and speaker. 4, Concert Orch. 6:45, stock reports, weather, S. F. produce asd news.

KSAC, Kansas State College, 341 (C. S. T.)—12:30 P. M., reading, Osceola Hall Burr; weather; What You Can Get for a Penny, Geo. Gemmell; radio question box;; The Care of the Diseased Udder, E. J. Frick. 7:20, opening exercise. 7:30, For Whom Should the Roads Be Built? L. E. Conrad. 7:40, vocal solos, Harold Flamm. 7:45, fundamentals of home planning, Paul Weigel.

WGBS, New York City, 316 (E. S. T.)—6:45 P. M., Abner J. Gelula, Technical Editor, RADIO WORLD, "Radio Hook-ups, Questions and Answers."

Thursday, January 15

WCBD, Zion City, Ill., 345 (C. S. T.)—Mrs. J. D. Thomas, soprano; Mrs. P. M. Larose, contralto; celestial bells; Bessie Wiedman, piano; Lois Wiedman, reader

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., the radio trio. 5:50, marketgram, weather, time, road report. 6 reading, Miss Cecile Burton; address, the Tell-Me-a-Story Lady; Trianon ensemble. 11:45, Nighthawk Frolic.

KFDY, Brookings, S. D., 273 (C. S. T.)—8 P. M., vocal duets by Miriam Hinman and Maude DeGroc. 8:15, the State College Junior short course. 8:25, "Higher Standards for Pharmacy," by E. R. Serles. 8:35, songs by the Shower Bath Quartet. 8:45, "Home Grown Feeds for Dairy Cows," talk by T. M. Olson. 8:55, special musical numbers.

WOS, Jefferson City, Mo., 441 (C. S. T.)—8 P. M., program of operatic numbers; address on "Missouri," George A. Pickens.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Public Health Service. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:50, weather. 3:55, market reports. 8:30, News Orch., Mme. Homer DuBard, soprano. 10, dance music. 11, News Orch.

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., Alamo Theatre organ, police bulletins, weather, "Just Among Home Folks," readings, news. 4:55, livestock, produce and grain market reports. 5, time. 7:30, concert by the Happy Hoosier Harmonists. International Sunday School, four-minute welfare talk, news, time.

KGO, Oakland, Cal., 312 (P. S. T.)—10:40 A. M., classroom instruction by Oakland Public Schools. 11:30, luncheon concert. 1:30 P. M., N. Y. and S. F. stock. weather. 4. Concert Orch. 6:45, stock reports, weather, S. F. produce and news. 8, "The Green Goddess," William Archer's four-act drama. 10. Henry Halstead's Orch.

KSAC, Kansas State College, 341 (C. S. T.)—12:30 P. M., reading, Osceola Hall Burr; weather; Are Baby Beef Clubs Profitable, M. H. Coe; radio question box; Fur Farming in Kansas, Roy Moore. 7:20, opening exercises. 7:30, Making Your Own Equipment, Harriet W. Allard. 7:40, Radio College Trio. 7:45, What Are Your Cake Making Problems? Mary S. Shaw.

Friday, January 16

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., the Radio Trio. 5:50, marketgram, weather, time and road report. 6, address, speaker from the Kansas City Children's Bureau; the Tell-Me-a-Story Lady; music, the Trianon ensemble. 11:35, Nighthawk Frolic.

WOS, Jefferson City, Mo., 441 (C. S. T.)—8 P. M., musical program.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Public Health Service. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:50, weather. 3:55, market reports. 8:30, News Orch., Anne Campbell, poet.

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., Alamo Theatre organ, police bulletins, weather forecast. "Just Among Home Folks" readings, news. 4:55, livestock, produce and grain market reports. 5, time. 7:30, concert, talk by George Colvin, news. 4, Selections played on the Alamo Theatre organ, police bulletins, weather, "Just Among Home Folks," readings, news. 4:55 livestock, produce and grain market reports. 5, time. 7:30, concert by "Dix" Bluegrass Serenaders; reading, Mrs. Frances Carre; news, time.

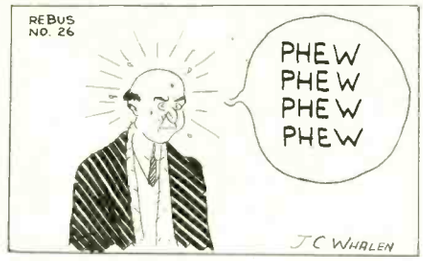
KGO, Oakland, Cal., 312 (P. S. T.)—11:30 A. M., luncheon concert. 1:30 P. M., N. Y. and S. F. stock reports and weather. 3, studio musical program and speaker. 4, Concert Orch. 5:30, the Girls' alf Hour. 6:45, stock reports, weather, S. F. produce and news.

KSAC, Kansas State College, 341 (C. S. T.)—12:30 P. M., tuning in piano selection; reading, Osceola Hall Burr; weather; Why Alfalfa Fails in Eastern Kansas, E. B. Wells; radio question box; Abortion Disease of Cattle, E. J. Frick. 7:20, opening exercises. 7:30, lecture on music, Ira A. Pratt. 7:40, musical numbers. Department of Music. 7:45. lecture on music, Ira A. Pratt.

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., the Star's Orch. 5:50, marketgram, weather, time, and road report. 6, address, Rogert W. Babson; the Tell-Me-a-Story Lady the Trianon ensemble.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner." 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:50, weather. 3:55, markets.

The Weekly Rebus



WHAT does this rebus represent? Send answer to Rebus Editor, RADIO WORLD, 1493 Broadway, New York City.

The names of those sending the solution will be published.

Anna Kestner, 415 E. Front St., Napoleon, O.
Stanley Szurek, 2412 Casmere St., Hamtramck, Mich.
Ray Herr, 1807 Webster St., Ft. Madison, Ia.

WGBS
Broadcast University

Under Auspices of RADIO WORLD

(*Concluded from page* 15)

siderably. At the moment there is no necessity of making any changes in receivers. As the problem becomes more concrete information will be published in RADIO WORLD as to the best ways of meeting it.

* * *

AS TO Abner J. Gelula's Superflex, the diagram broadcast from WGBS the other Wednesday evening, what ratio should the two audio transformers be?—Francis J. Tietsort, 520 West 124th St., New York City.

The author specified 6-to-1 ratio Erla for the first stage and 3½-to-1 Erla for the second stage. The first stage AFT is shown at lower left in the circuit diagram in the December 27 issue.

* * *

REFERRING to the set by Neal Fitzalan, issue of Nov. 1, what are some things in the set that may be changed for possibly better results?—R. G. Stewart, 926 Market St., Chattanooga, Tenn.

Switch the rotor and stator from the plate and grid, i. e., try rotor in the plate, with condensor across the stator in the grid and vice-versa. The set, with a 200 tube does not use a grid condenser. However, there is no harm in trying one.

* * *

IN Lieut. O'Rourke's 1-tube 1-dial set in the issue of Dec. 6, what is the diameter of the cardboard tubing, 3 or 3½ inches? (2) Does the basket-wound coil give any better results?—G. A. Culbertson, 621 Free Press Bldg., Detroit, Mich.

3½ inches. (2) In RF sets, yes: in regenerative sets, no.

* * *

REFERRING to the 4-tube Superdyne as described in the issue of Oct. 18: (1) Does the grid go to the beginning or end of the low-loss coil? (2) You show the A— and B— hooked together. I've always seen it hooked A+ and B—; which is correct?—William J. Steffens, 210 Valentine St., Glendale, L. I.

(1) Beginning. (2) Both are correct. The joining of A+ and B— adds the A battery voltage to the B battery voltage.

74 Whose Radio Queries to WGBS Were Answered

Queries from the following were answered by the Broadcast University:

Wm. J. Clarke, 76 Weldon St., Brooklyn, N. Y.
Herbert Smith, 500 W. 39th St., New York City.
J. C. Lehmann, 315 Willow Ave., Hoboken, N. J.
Ulric A. Marcony, 11 Carlton Ave., Bradford, Mass.
Arch. Hurlburg, 15 Bleecker St., Gloversville, N. Y.
Harry A. Weiss, 610 Clarkson Ave., Brooklyn, N. Y.
Eugene A. Murray, 259 W. 22nd St., New York City.
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Geo. B. Duncan, RD No. 1, Ganwurt, N. Y.
Earle R. Hall, Simsbury, Conn.
Gordon C. Hunt, Lancaster, N. H.
Wm. Schravesande, 300 E. 32nd St., New York City.
A. L. Sarwyn, 225 E. 79th St., New York City.
J. E. Buehler, 214 Crescent St., Long Island City, N. Y.
Richard F. Barker, care W. W. Orr, Scarsdale, N. Y.
Arthur Hand, 322 S. 4th St., Millville, N. J.
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Karl Ecke, 612 Washington St., Hoboken, N. J.
John E. Eahoo, 635 Herkimer St., Brooklyn, N. Y.
John J. Ferguson, 217a Wyckoff St., Brooklyn, N. Y.
John L. Beardmore, 1527 25th St., S. E., Washington, D. C.
Howard M. Irish, Bickfield, Me.
Ira C. Miller, 528 Boulevard, Westfield, N. J.
Duncan F. Geery, 659 E. 22nd St., Paterson, N. J.
A. M. Richards, 14 Duncan Ave., Jersey City, N. J.
Lawrence Kefer, 2261 Church Ave., Brooklyn, N. Y.
R. G. Reynolds, 400 Central Ave., Newark, N. J.
R. N. Angevine, 253 Milk St., Fitchburg, Mass.
Jos. Muir, 141st St. & S. Blvd., New York City.
W. J. Reed, 1640 Macombs Rd., New York City.
F. J. Fitzwald, Customs Bureau, General P. O., New York City.
S. E. Swenton, 73 Margaret St., Great Kills, S. I.
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Edw. G. Sprague, 21 Delivan St., Auburn, N. Y.
Wm. M. Mattingley, 1723 Penna. Ave., Wilmington, Del.
Michael Tonigho, 259 Ege Ave., Jersey City, N. J.
Clayton B. Shearman, 47 Center St., Hoosick Falls, N. Y.
Wm. Kaiser, 63 Mercer St., Newark, N. J.
F. A. Westwood, Box 251, South Windham, Me.
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R. W. Hersner, 525 Curtin St., Harrisburg, Pa.
S. Middleton, 146 Tenn. Ave., N. E., Washington, D. C.
Howard Carter, 34 Oak St., Bloomfield, N. J.
O. Dalrymple, 508 W. 160th St., New York City.
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Robt. E. Brooks, 2218 1st St., N. W., Washington, D. C.
Allan Grandy, 54 B'way, Jersey City, N. J.
August Schiappacasse, 702 Demott St., W. Hoboken, N. J.
N. W. Boller. 7515 113th St., Forest Hills East, N. Y.
R. F. Samber, 4008 Liberty Heights Ave., Bolto, Md.
G. F. Richards, 11103 91st St., Richmond Hill, N. Y.
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David Low, 250 7th St., Jersey City, N. J.
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John Gilday, 167 W. 102nd St., New York City.
Russell R. Ogden, 105 S. Main St., Groton, N. Y.
Robert Williams, Hamburg, Pa.
Donald Williams, Waterbury, Vt.
Dominac Bonfiglio, 506 Flatbush Ave:, Brooklyn, N. Y.
A. Hazel, care Consolidated Safety Pin Co., Bloomfield, N. J.

A THOUGHT FOR THE WEEK

EDISON says four hours sleep is enough for any man. Some of our enthusiastic young DXers agree thoroughly with the wizard.

RADIO WORLD
Title Reg. U. S. Pat. Off.

THE LINK CONNECTING RADIO FAN, DEALER, JOBBER, DISTRIBUTOR AND MANUFACTURER

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MANAGING EDITOR, Herman Bernard
TECHNICAL EDITOR, Abner J. Gelula

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JANUARY 10, 1925

Great Voices on the Air

THAT great stars of the opera should be rendered audibly accessible to radio fans is a vastly important step forward, even though the actuating motive of the Victor Talking Machine Company in making this possible is to stimulate the sale of phonographs and records. The growing popularity of radio has been a thorn in the side of the phonograph trade. Only a few weeks ago the Victor Company began advertising on a large scale a type of phonograph cabinet in which the purchaser may install a set of his own choice. The company refused to tie up with any particular set manufacturer. Then came the announcement that operatic stars, who by contract with the Victor Company may not broadcast without their permission, would appear before WEAF Microphone, interconnected with seven other powerful stations. Not only should music lovers hail this with delight, but the trade itself should see the great importance of this improvement of program quality. One undeniable shortcoming of radio has been the low average worth of programs. It is to be hoped that events will so shape themselves that such luminaries as McCormack, Jeritza, Bori, Gigli and the others on the selected list will be constant performers. Familiarity breeds enjoyment of good music, which, repeated before audiences, becomes part of their lives.

Radio Gives More per Dollar Than Any Other Product

Survey to Determine Why Such a Small Percentage Have Sets Is National in Scope

INVESTIGATORS, working for RADIO WORLD throughout the United States, are busily engaged compiling data on the condition of the radio industry and the reasons given by non-radio users for not having a set. This is part of the campaign by RADIO WORLD to determine why radio, the greatest invention that ever graced the earth, should rank only thirty-second as an industry, with the phonograph and automobile trades so far ahead of it, although radios are much cheaper than autos or phonographs.

The extreme youth of radio itself is accepted by some as the reason, but the overwhelming advantages of radio, **which gives more per dollar than any other obtainable product,** would seem to entitle radio to a much loftier position in the trade category. The attempt is not being focused on the industrial features, however, but thorough investigation is being made of the human side of the situation. "Why hasn't radio entered into your life?" is indeed not too dramatic a question to ask any "total abstainer" from radio. Is radio something to be shunned? If arguments such as one hears now and then are any criterion the answer would be yes, for some persons say that radio hasn't reached a stage yet where it is worth any man's money to buy a set, much less make one himself. Those familiar with radio know how ridiculous is such an assertion. But if a man whom you desire to have participate in some great blessing shuns that opportunity, what matter how ridiculous the argument he gives for dodging the advantage? The thing to do is to convince him he is wrong. There is certainly a sufficient number of manufacturers of excellent sets, certainly a sufficient number of manufacturers of high-grade parts, to afford any one a wide choice of sets or instruments, all calculated to produce the best that is obtainable from radio. And that best represents electrical excellence, beautiful appearance, fine volume, clear, undistorted signals and, with varying degrees of success, reception over great distances.

Maybe some persons hold that the programs are not sufficiently high-class to attract them. That is an unanswerable argument, if true. And, as they alone are the judges, it is true—or, rather, was true. Now with some of the world's greatest singers and other gifted musicians going on the air, due to the experiment of the Victor Talking Machine Company in the feasibility of thus stimulating the sales of records, one is assured of at least occasional programs of matchless excellence. Though not as lofty as this, programs elsewhere throughout the country are frequently of such excellence as to satisfy the discriminating.

However, when all the reasons are assembled and all the possible answers given, then will be the time for a special committee of experts to frame their solution. What will the manufacturers do? The burden is largely theirs. What will the fans do? And the radio press? The newspapers, magazines and periodicals in general? If they all see in radio an instrumentality for the advance of mankind, and so many of them freely assert that, then they, too, should unite in this attempt to solve a great problem. The attempt is made not only in the interests of the radio industry but as much, if not more, for the welfare of the people at large.

RADIO WORLD readers can do their share by writing to Survey Editor, RADIO WORLD, 1493 Broadway, New York City, answering any or all of the following queries: (1) Why is radio only in thirty-second place? (2) Does it deserve a higher place in the lives of the people? (3) If not, why not? (4) What are some of the reasons you hear given by non-radio users for not having a set in their homes? (5) What do you think of those reasons? (6) If any of the objections to radio seem to you valid, what do you suggest be done to meet them?

All letters published will be paid for at usual rates.

Another phase of the Survey is the mobilization of the A. B. C. to solicit interviews from persons to determine if those persons have sets and if not, why not? These interviews, if published, also will be paid for at usual rates. The A. B. C. is the designation for the American Broadcast Club, composed of thousands of radio fans throughout the world, united by RADIO WORLD for the promotion of the general welfare of radio and for rendering such aid as they care to give in the solution of radio problems of large scope. There are no dues, no initiation fee, no obligation of any kind whatsoever. Everything is voluntary. Any one may join by addressing A. B. C. Editor, care RADIO WORLD, at the above address.

MR. DX HOUND

A Character Created by RADIO WORLD *Artist*

By HAL SINCLAIR

The Radio Trade

U. S. Official Exploring Central American Markets

WASHINGTON

RUBEN A. LUNDQUIST, Chief of the Electrical Division of the Department of Commerce, sailed to Central America to investigate market possibilities in Central and South American countries for American radio and electrical equipment. He will be gone about four months, and his itinerary will include Venezuela, Colombia, Costa Rica, Nicaragua, Guatemala and Mexico.

Mr. Lundquist will make particular inquiry into the question of available sales agencies for radio and electrical manufacturers in the United States as well as into the special opportunities and general market conditions of the countries included in his tour.

The Market Prices of Radio Stocks

THE market price of radio stocks is exemplified by the following recent quotations on the Exchange:

De Forest	25¾	National Air Phone	5
Dubilier	60	Radio Corp. of Am.	43¾
Duplex	11	Rova	10¾
Equitable	4¼	Thermiodyne	16¼
Freed Eisemann	29⅞	R. E. Thompson	12
Garod	13½	Sleeper	15¼
Hazeltine	37	Tower Mfg.	24¼
Jones	7¼	Ware	30
Liberty Stores	6¼		

Fifty Appear Against Theft Suspects

MORE than fifty persons from the five boroughs of New York City and three from Fort Lee, N. J., appeared in West Side Court, New York City, when four men were arraigned in connection with the theft of radio sets. All of the witnesses asserted that they had been victimized by three of the prisoners to the extent of several thousand dollars.

Max Fischler, 28, proprietor of a radio store at 229 East Fourteenth Street, was charged with acting in concert with James de Luco, a radio operator, of 341 West Fifty-first Street, and Martin Chate, a plumber, of 80 West Eightieth Street. Magistrate Simpson fixed Fischler's bail at $1,000, de Luco's at $5,000 and Chate's at $7,500. John G. Schwartz, a clerk, of 886 Southern Boulevard, the Bronx, was held in $500 on the charge of tampering with witnesses. Examination was fixed for next Wednesday.

De Luco and Chate, according to the police, obtained radio sets from their owners by posing as inspectors for large stores. An advertisement offering high-priced sets at low prices at Fischler's store led to the arrests.

Exports Hit New High Level in October

WASHINGTON

RADIO exports during October reached the unprecedented high figure of $769,249. This was around $200,000 more than those for September. The biggest purchasers during October were Canada, Mexico, Brazil, Chile, Japan and Australia.

Atlantic City Show Set for April

ON Steel Pier, April 22 to 26, inclusive, the Third District Radio Convention will be held in connection with a radio show. There will be 141 booths.

Records on file at the office of the Steel Pier show that for several years past the attendance during the week of April 22 to 26 at the motion picture theater and band concerts averaged over 1,000 paid admissions daily. These motion pictures and concerts will continue during the show, as usual. The usual 25-cent ticket will admit bearer to all attractions on the pier including the Radio Exposition.

BOSCH ENTERS RADIO WITH A LINE CURRENT DEVICE.

THE American Bosch Magneto Company, according to announcement has entered the radio field. The company is expected to place on the market soon, a device which will do away with storage batteries. The new arrangement can be connected with the electric light socket under the trade name "Nobattry."

Coming Events

JAN. 19-24, INCLUSIVE—Pittsburgh Radio Show, Motor Square Garden.

MARCH 4—Broadcasting of President Coolidge's inaugural speech.

HOW to build a simple current supply unit, by Brainard Foote. You can light your amplifier tubes at a cost of only a few cents a year. Complete construction article and diagrams, with photo of completed unit, in Radio World, issue of Aug. 16. Send 15 cents for a copy or start your subscription with that number. RADIO WORLD, 1493 Broadway, New York City.

Sales Increase 300% Over Last Winter

THE radio industry grew rapidly in 1924. Sales this Winter are calculated to be 300 per cent. greater than last season. It is estimated that there are close to 5,000,000 receiving sets in the United States; 1,000,000 in England and 100,000 in Canada. The Department of Agriculture estimates there are 375,000 receivers on farms, which is an increase of 155 per cent. in a year.

The industry is more stabilized than it was a year ago. The great crowds that attended the radio shows in New York, Chicago, Boston and Buffalo this Fall indicated clearly that radio has gained thousands of new followers since January, 1924.

Business Develops

As broadcasting has widened its scope and gained more followers, so has the radio industry developed. The business has grown in four years to a sales volume of $115,000,000 in 1923, and the Copper and Brass Research Association, after a survey of the radio field, estimates that the business of the radio industry for 1924 will reach the $300,000,000 mark, and within two or three years sales will reach the $500,000,000 mark.

A vacuum tube manufacturer estimates that

(*Concluded on next page.*)

Unite Radio Fans As Police Force Is Plea Made by Sir Basil Thomson

LONDON

SIR BASIL THOMSON, former Assistant Commissioner of the metropolitan police and one of the world's greatest authorities on crime and criminals, believes the time is coming for the police authorities in both America and England to enlist the services of the thousands of wireless fans in the detection and prevention of crime.

Sir Basil makes his plea at a moment when Scotland Yard is carrying out wireless experiments which it hopes will greatly facilitate the work of crime detection. Sir Basil outlines what might be done by enlisting two million people in the United States and perhaps half a million in England.

Probably a majority of the people who listen in are young and the young are notoriously eager for adventure, particularly adventure in the amateur detection of criminals, he points out. A broadcast message would expand the police force by 100,000 pairs of eyes far more quickly than newspapers could do.

The obvious objection to using newspapers is that the suspected criminal reads his own description and the direction of the escape which it is believed he will take Wireless messages would outstrip him no matter how fast he might travel.

"Never since the Crippen case has a criminal attempted to embark on an oceangoing steamer," Sir Basil points out. "I feel sure that the time will come when every police force will at once dispatch a wireless message from their own wireless installations, which can be picked up by police and public alike."

Sir Basil asserts that nearly every person believes secretly he is another Sherlock Holmes and therefore that it would easy to enlist the radio fan in the detection of criminals.

Fingerprints Radioed Across Ocean

SCOTLAND YARD and the New York police are experimenting in the transmission of photographs and fingerprints by radio.

A picture of one of New York's policemen which recently crossed the Atlantic byair was said by Scotland Yard detectives to be so clear that they could easily recognize the man if they met him in the street.

Why the Proposed New Band of Waves Was Abandoned

WASHINGTON

REALLOCATION of wavelengths to radio broadcasting stations, as recommended by the recent National Radio Conference to the secretary of Commerce, has been abandoned by the Commerce Department.

The plan which was devised a short time ago has already been rendered obsolete by the increasing number of broadcasting stations and the demand for wavelength assignments, officials of the department said today

It is understood that until the radio broadcasting situation becomes more stable no attempt will be made to revise the present allocation of wavelengths, while the department will meet the increasing demands so far as possible.

The radio conference, which met here in October, drew up a comprehensive plan for the reallocation of all radio wavelengths, shifting in some cases, those for marine communication in order to extend the number available for commercial broadcasting stations.

The radio conference reallocation plan in general was devised to make available more wavelengths in the great centers of population, where, it was expected, the greater number of future broadcasting stations would be located. The applications that immediately began to come to the department, however, upset these calculations, since most of them were from the less thickly populated centers, for which it became evident that adequate provision had not been made.

The complete upset of the reallocation plan, according to unofficial but reliable information, has convinced Commerce Department officials that the radio art is changing so rapidly that it will be useless to attempt a general reallocation plan until such time as broadcasting conditions become more stable. Some officials are inclined to believe that as the art progresses, the number of radio stations will decrease, rather than increase, thereby automatically removing one of the greatest problems of radio regulation.

New Wavelengths Given to 15 Stations

KSD Now 549.1, Increase of 3.1 Meters Above Former Highest Wave on List—WNYC Up 2.8 to 528.8—Other Changes Include WOO, WIP, WVJ, WOAW, WHO and KYW.

WASHINGTON.

SEVERAL new channels for Class B stations will be created by a plan for the reallocation of wavelengths which is now being put into effect by the Radio Bureau of the Department of Commerce. The new plan calls for the reduction of the separation between the wavelengths of stations from 10 to 9, 8 and even 7 kilocycles. Experiments have convinced radio officials of the feasibility of this plan and a change is being made in the wavelength of many stations. Here are the stations whose wavelengths are changed immediately:

Station	*City*	*New*	*Old*
WHAA	Iowa City, Ia.	498	484
WOC	Davenport, Ia.	498	484
WMC	Memphis, Tenn.	503.9	500
WOO	Philadelphia, Pa.	509.9	509
WIP	Philadelphia, Pa.	509.9	509
KLX	Oakland, Calif.	509.9	509
WWJ	Detroit, Mich.	516	517
WCX	Detroit, Mich.	516	517
WOAW	Omaha, Neb.	522.3	526
WHO	Des Moines, Ia.	522.3	526
WNYC	New York, N. Y.	528.8	526
KYW	Chicago, Ill.	535.4	536
WCEE	Elgin, Ill.	535.4	536
KSD	St. Louis, Mo.	549.1	546
KFUO	St. Louis, Mo.	549.1	546

Practically two new channels are created. Under the new plan, WNYC, New York, has an exclusive wavelength whereas it was formerly on the same wavelength as WOAW, Omaha, and WHO, Des Moines. A new channel is also created at 542.2 which will be assigned to a new station at Auburn, Ala.

So far, the only changes that have been made are with stations above 484 meters, which under the new plan will be separated by only seven kilocycles (7,000 cycles).

When the experiments were first started, these stations were separated by only five kilocycles for test purposes. It was soon found, however, that such a small separation resulted in interference and the separation was increased to 7 kilocycles where it was found stations worked satisfactorily.

The idea of the new changes is to provide additional channels while at the same time keep interference down to a minimum.

Similar changes will be made in the wavelengths of class B stations below 484 meters within a short time.

Experiments will be started immediately to determine the exact distance necessary to prevent interference, which, it is believed, will average around eight, nine or ten kilocycles.

Just as soon as the experiments have been completed, changes will be made in the wavelengths of these stations so as to provide additional channels for the two dozen or more new stations which will require wavelengths within the next month.

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

10 CENTS A WORD. 10 WORDS MINIMUM

WANTED: RADIOS—Would like agent's proposition on A-1 Radio. D. R. Forbes, Hackett, Ark.

AGENTS—Write for free amples. 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 WORLD'S CLASSIFIED DEPARTMENT. If you want to buy, sell or exchange anything, use RADIO WORLD'S Quick-Action Classified Department, 10 cents per word, 10 words minimum. RADIO WORLD, 1493 Broadway, N. Y.

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

"A 6-TUBE SUPER-HETERODYNE," by J. E. Anderson. Variometer tunes aerial. How to make all coils, including intermediate frequency transformers. Send 15 cents for December 6 issue to RADIO WORLD, 1493 Broadway, New York City, or start your subscrpition with that number.

"A SELECTIVE 2-TUBE SUPERDYNE," by Herman Bernard, November 29 issue. Two RF and crystal detector, for fine quality and about 500 miles' reception. Send 15 cents for copy. RADIO WORLD, 1493 Broadway, New York City.

"THE 1-TUBE REFLEXED SUPERDYNE," by Herman Bernard. One stage of tuned regenerative RF, crystal detector and one audio stage. No tickler. This set is for those preferring quality to DX. Send 15 cents for December 6 issue. Those desiring a DX 1-tube Superdyne, send 15 cents for December 20 issue. RADIO WORLD, 1493 Broadway, New York City.

CATALOG OF RADIO & ELECTRICAL BOOKS sent free on receipt of post card. The Columbia Print, 1493 Broadway, N. Y.

FIRST CROSS-OCEAN BROADCAST MADE BY MARCONI 23 YEARS AGO

TWENTY-THREE years ago Marconi, listening in near St. John's, N. F., picked up the first transatlantic radio signal, broadcast from the fifty-kilowatt spark station at Poldhu, on the southwest tip of England.

Marconi landed at St. John's with two assistants on Dec. 6, 1901 They installed their wireless receiving instruments in the old barracks of Signal Hill, at the mouth of the harbor, a mile and a half from St. John's. On Dec. 10 a hexagonal kite made of bamboo and silk was sent aloft over the Grand Banks to hold the antenna wire high in the air. A strong wind snapped the wire and the kite passed out over the sea. A fourteen-foot hydrogen balloon was tried next, but the wire broke and tangled up on the ground as the balloon disappeared in the fog. Finally he was successful.

Most Stations in California

CALIFORNIA has the largest number of broadcasting stations of all types, records at the Radio Bureau disclose. Second to California in the total number of stations is Pennsylvania, with Texas third. According to the records, every state has one or more class A stations, while only 19 states and one territory have class B stations. The table follows:

Alabama	3	Nebraska	19
Alaska	3	Nevada	1
Arizona	3	New Hampshire	3
Arkansas	7	New Jersey	15
California	43	New Mexico	3
Colorado	11	New York	29
Connecticut	2	North Carolina	2
Delaware	1	North Dakota	5
Dist. Col.	5	Ohio	30
Florida	6	Oklahoma	10
Georgia	5	Oregon	9
Hawaii	2	Pennsylvania	37
Idaho	4	Porto Rico	1
Illinois	32	Rhode Island	6
Indiana	11	South Carolina	3
Iowa	22	South Dakota	4
Kansas	7	Tennessee	10
Kentucky	2	Texas	34
Louisiana	15	Utah	5
Maine	3	Vermont	2
Maryland	5	Virginia	5
Massachusetts	17	Washington	24
Michigan	17	West Virginia	2
Minnesota	13	Wisconsin	13
Mississippi	4	Wyoming	1
Misouri	20		
Montana	6	Total	542

Free Trip for Fans

A ROUND trip railroad ticket from his home to Hot Springs National Park, Arkansas, and entertainment as the guest of the New Arlington Hotel for three days awaits some lucky radio ran in the United States every month this winter, according to G. C. Arnoux, station KTHS, which went on the air December 20. Every person, man, woman or child, who writes a card, letter, or sends a telegram to the station from December 20 to January 20 will have an equal chance to win the trip. Details will be announced over the air from KTHS.

To Radio Subscribers:

Please note the expiration date on the label of you RADIO WORLD wrapper and renew your subscription before it expires.

This is an important matter, because if you renew befort your subscription expirts, you will be sure to receive RADIO WORLD without a break and your file will be complete.

Subscription Manager, RADIO WORLD,
1493 B'way New York City

"ADDING ONE STAGE OF AF" explained in Radio World, issue of Oct. 18. Send 15 cents. Radio World, 1493 Broadway, N. Y. C.

Sets Installed in Thirty Veterans' Hospitals

WASHINGTON

AWARD of contracts for installation of radio equipment in thirty of the forty-nine hospitals operated by the Veterans' Bureau was announced by Director Hines. Equipment for four others has been donated and partial equipment to be completed within three months has been installed in the remaining fifteen.

Provisions for placing radio sets in hospitals under construction has been made, the director said, by including the necessary equipment of conduits and wiring as part of the regular electrical system. The plan calls for a master receiving set in each hospital, with individual head sets in tubercular and general wards and loud speakers in assembly rooms.

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Dill Pushing His Bill

WASHINGTON.

SENATOR C. C. DILL (D.) of Washington, author of the now famous Dill bill, which grants the free use of copyrighted music to the broadcasters, is demanding action on the measure The Senator has announced he will ask the Committee on Patents, considering the bill, to take immediate action.

Inventor Tries to Transmit Iced Air

JAMES KERR, manager of the radio shows, said:

"One of America's leading set manufacturers is developing a feasible system for transmitting light, heat and power by radio, which he expects to have perfected in time to introduce at the Second Radio World's Fair in New York next fall.

"Another noted wireless engineer is working out a system for transmitting refrigeration by radio, which I believe will be perfected during the coming summer. Several inventors are bringing out instruments for transmitting and receiving motion pictures, and I believe that at least three of them will be complete successes.

"The radio developments of the coming year will be astounding."

Hoover Wants His Bill Passed Quickly

WASHINGTON

SECRETARY HOOVER thinks the emergency legislation recommended by himself for the regulation of radio should be passed as quickly as possible by Congress. He does not believe the proposed bill would give the Secretary of Commerce undue authority, as charged in several sources.

Standard Frequency Tests for January and February

THE Bureau of Standards transmits twice a month radio signals of definitely announced frequencies, for use by the public in standardizing wavemeters and transmitting and receiving apparatus. The signals are transmitted from the Bureau's station, WWV, at Washington, D. C., and from station 6XBM, Stamford University, California.

The schedule of standard frequency signals from both the Bureau of Standards and Stanford University is as follows:

(Frequencies in kiocycles; Approximate wavelengths in meters in parentheses)

Time*	Jan. 20	Feb. 5**	Feb. 20
10:00 to 10:08 p. m.	1500 (200)	3000 (100)	125 (2400)
10:12 to 10:20 p. m.	1650 (182)	3300 (91)	133 (2254)
10:24 to 10:32 p. m.	1800 (167)	3600 (83)	143 (2097)
10:36 to 10:44 p. m.	2000 (150)	4000 (75)	155 (1934)
10:48 to 10:56 p. m.	2200 (136)	4400 (68)	166.5 (1800)
11:00 to 11:08 p. m.	2450 (122)**	4900 (61)	205 (1463)
11:12 to 11:20 p. m.	2700 (111)**	5400 (55)	260 (1153)
11:24 to 11:32 p. m.	3000 (100)**	6000 (50)	315 (952)

*Eastern standard time for WWV, Washington, D. C. Pacific standard time for 6XBM, Stamford University, California.

**The schedules marked with this sign are tentative for station 6XBM, Stanford University.

The transmissions are by unmodulated continuous-wave telegraphy. A complete frequency transmission includes a "general call," a "standard frequency signal," and "announcements." The "general call" is given at the beginning of the 8 minute period and continues for about 2 minutes. This includes a statement of the frequency. The "standard frequency signal" is a series of very long dashes with the call letters (WWV or 6XBM) intervening. This signal continues for about 4 minutes The "announcements" are on the same frequency as the "standards frequency signal" just transmitted and contain a statement of the measured frequency. An announcement of the next frequency to be transmitted is then given. There is then a 4 minute interval while the transmitting set is adjusted for the next frequency.

The signals can be heard and utilized by stations equipped for continuous-wave reception at distances within 500 to 1,000 miles from the transmitting stations. Information on how to receive and utilize the signals is given in Bureau of Standards Letter Circular No. 92, which may be obtained on application from the Bureau of Standards, Washington, D. C.

CZECHS GET INTERESTED

WASHINGTON.

REPORTS to the Department of Commerce indicate that a new era of broadcasting has been inaugurated in Czecho-Slovakia and that the people of that country are just beginning to really awaken to the possibilities of it.

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Low Loss from the Ground Up, by Chas. H. M. White; Dec. 13.

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Adding 2 Stages of Audio, by Dennis J. O. Flaherty; Dec. 6.

Coils

My Favorite Low-Loss Coil, by Hallett B. Graeff; Nov. 8.

The Coil I Like Best, by Abner J. Gelula; Nov. 1.

A Sturdy Low-Loss Coil, by Lt. Peter V. O'Rourke.

Crystal Sets

My Crystal Set that Gets DX, by G. N. Barkett; Dec. 6.

Detectors

The Electrolytic Detector, by Brewster Lee; Nov. 22.

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The Neutrodyne on a Loop, by Chas. H. M. White; Nov. 8.

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A Fine 4-Tube RF Receiver, by Byrt C. Caldwell; Oct. 4.

White's D-Excellent 2-Tube Set, by Chas. H. M. White; Dec. 6.

A Quality Set for Locals (3 tubes and crystal), by Lt. Peter O'Rourke; Nov. 22.

RF with the 3-Circuit Tuner, by Herman Bernard; Oct. 18.

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Reflexing the 3-Circuit Tuner, by Thomas W. Benson; Dec. 13.

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Variations on the Theme of the 3-Circuit Tuner, by Herman Bernard; Nov. 1.

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Great DX on 1-Tube and 1-Dial, Lt. Peter V. O'Rourke; Dec. 6.

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The 4-Tube Superdyne by J. E. Anderson; Nov. 22 and 29; Trouble Shooting, Dec. 6.

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Adding 2 Stages of Audio, by Dennis J. O'Flaherty; Dec. 6.

RF or AF—which? Nov. 15.

How Oscillaters Function, by J. E. Anderson; Oct. 25.

Building Your First Tube Set, Nov. 8.

There Is Much Mystery in the Ether

By David Sarnoff

Vice-President and General Manager of The Radio Corporation of America

WE DO know how to build sending machines that will send messages and carry the human voice. We also know how to build receiving apparatus which will receive these waves on the other side. We know how to perform stunts in radio photography and the like, but we don't know much about what happens between the sending and receiving machines in the great outdoors that separates them

That is where we must look for additional information. The great development of radio, to my mind, will come from a better understanding and knowledge of the forces of nature which guide and control these electro-magnetic waves which we let loose in the air and which find in the air all sorts of neighbors, some desirable and others undesirable, like static, etc., and in which lurk the secrets of nature whihc ultimately will open out untold possibilities for the development of radio communication, and will make, I am sure, everything of today look insignificant in comparison with the developments of tomorrow.

Radio Recognized as Nerve Cure by British

LONDON.

RADIO is recognized by British hospital authorities as a treatment for nerve cases and insomnia, and a number of institutions are installing wireless equipment almost as a matter of routine. Doctors declare the radio programs are important to nerve patients not only in their direct effects, but as antidotes for the unpleasant everyday street noises.

Sir Henry Hadow is firmly convinced of the healing influence of radio music, and Sir Bruce Bruce-Porter attributes to it the high turnover of 100 patients a month at the third London General.

R. C. A. TO HAVE COMMERCIAL STATION IN PHILIPPINES.

MANILA

THE Radio Corporation of America expects to build a radio "super-station" in the Philippines, Rear Admiral W. H G. Bullard, retired, an official of the Federal Telegraph Company of Delaware, which is a subsidiary of the Radio Corporation of America, declared here.

REDUCE Operating Costs

THOUSANDS of people are already cutting their "B" Battery costs one-half, or even two-thirds, by using the new Eveready "B" Battery No. 770 on their heavy drain sets.

This new Eveready Heavy Duty Battery marks a marvelous advance in reducing "B" Battery costs.

If your "B" Batteries have lasted only two months on a five or six tube receiver, this Eveready Heavy Duty "B" Battery will increase the service two to three times.

Use this Eveready Heavy Duty "B" Battery on any receiving set on which the "B" Batteries last less than four months. When thus used to its full capacity, it is the cheapest as well as the best source of "B" energy ever offered.

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