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Vol. 7. No. 7. ILLUSTRATED. Every Week

A Set to Cut Static

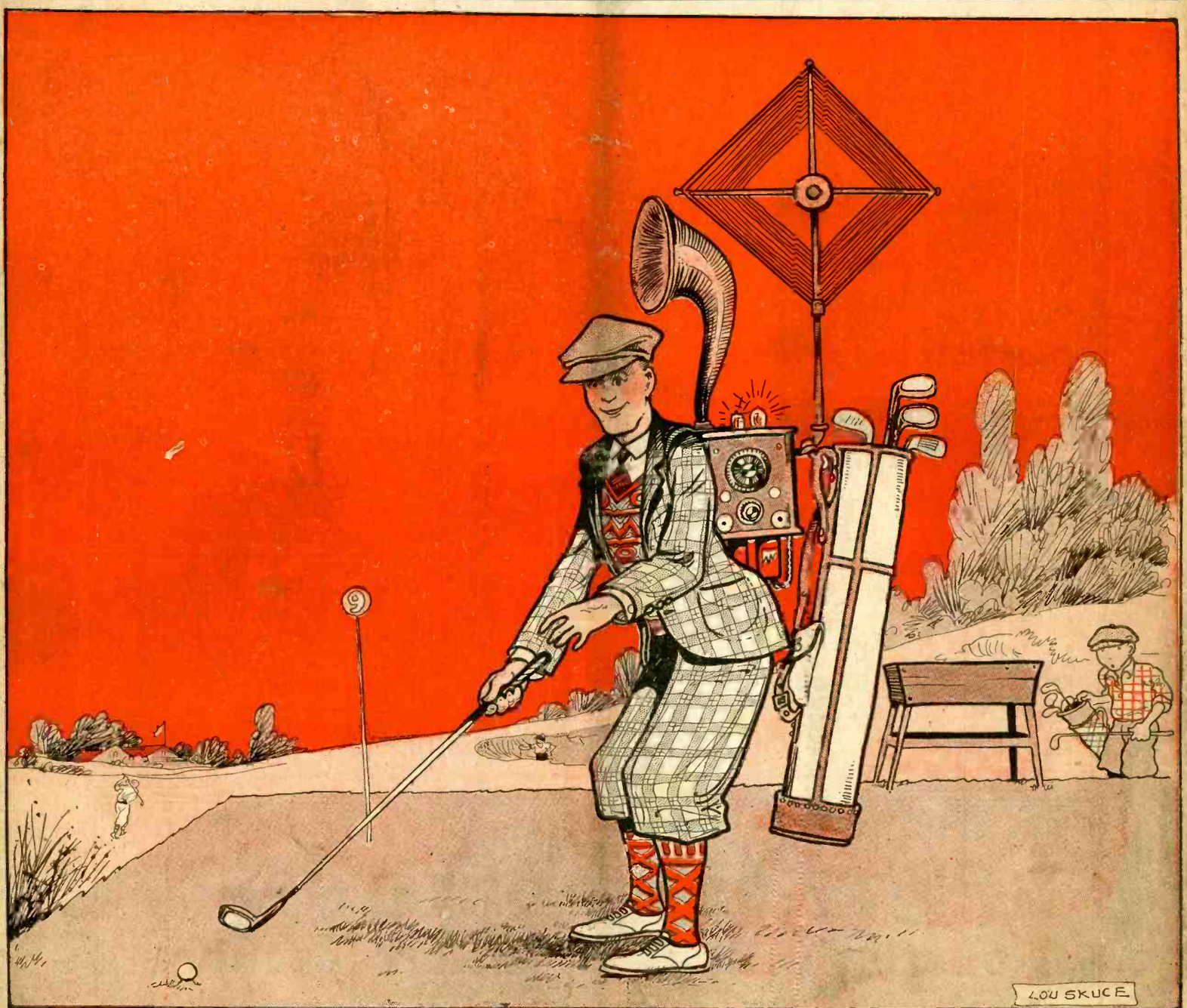
By Feodor Rofpatkin

Ohm, Sweet Ohm; A Study of Resistance

By Lewis Winner

Toroid Circuit with Resistance AF

By E. I. Sidney



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The 2-Tube Earphone Tone Marvel

By Brewster Lee

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VOLUME SEVEN OF

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A Set for Reducing Static

By Feodor Rofpatkin

SUMMER reception this year will be better than it ever has been, due in part to the increased power used by stations. However, some trouble from static is to be expected. Static is the stray electricity present in the air. It will get into any set, sometimes as stuttered interruptions of the program, other times cutting off reception temporarily. Some inventions have come to light recently, designed to eliminate static, but as yet there is no proof of their general applicability, or indeed their efficacy, although reports are promising. Meanwhile the radioist must use such means as are at his command to reduce static to the least possible stage of trouble.

Description of Circuit

The circuit diagram (Fig. 1), shows a 3-tube set, using a crystal as detector. There are two stages of tuned radio-frequency amplification, detector and two audio stages, one of which is reflexed in the first RF tube. The other audio stage is "free."

To minimize the effects of static, so far as circumstances readily permit, a crystal is inserted in series wtih the antenna lead, and also there is a spark gap across the aerial-ground system. As aerial and ground are only the plates of a large condenser (large in actual dimensions, but small in total capacity), the gap capacitatively attracts static to the ground side of this condenser, without electrically short-circuiting the aperiodic primary L1. The crystal in series with the antenna may be a fixed crystal, preferably of the carborundum type, but otherwise any good crystal. This offers a high resistance to the incoming static and has a choking effect thereon. Naturally, the volume of the set will be somewhat decreased on account of the presence of this crystal, which must not be confused with the crystal detector. But the sacrifice is made in a good cause and the total volume produced by the circuit is ample to operate a speaker, filling a couple of rooms with rich music and clear voice.

The use of a crystal as a detector has somewhat of a damping effect upon static, not only because of the internal resistance of the crystal, but because of the comparative diminuation in strength of all signals. The entire system of fighting static is based on a sort of downward revision schedule. Yet the net result is indeed attractive.

Grounding Effectively Used

So carefully is the grounding feature of the set taken care of that the static finds a path of low resistance in this direction, after it has seeped through the resistance introduced in the aerial. The zero potential point of the first audio-transformer's secondary is grounded, the by-pass condensers C3 and C4 being on either side of this ground lead. This is also true of the primary of this AFT,

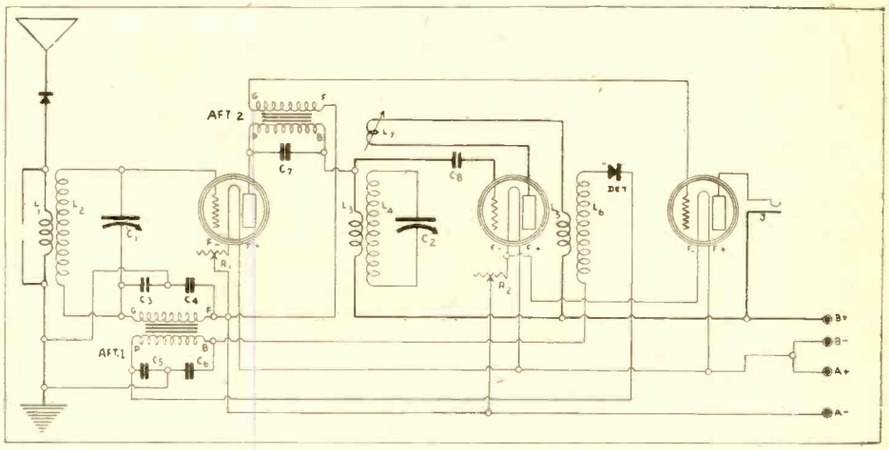


FIG. 1, Circuit wiring of the set designed to reduce static effects.

where the by-pass condensers C5 and C6 are at either side of the ground lead.

The absorption method is used at the interstage coupling, to enhance selectivity, affording a variable impedance helpful in congested localities, such as the large cities.

The set has three controls. Two of these are variable condensers. The third is the tickler coil, which provides regeneration. This adds greatly to the selectivity and sensitivty of the receiver.

L5L6 is a radio-frequency transformer coupling the RF side of the receiver to the detector stage. This may be a "peak" transformer, usually called untuned, and being in appearance a small, round or square insulated instrument, with windings hidden. It is more convenient to use this commercial type, which may be any of the Acme transformer series. For those desiring to make a fixed RFT of their own, they may wind a coil as will be described later, and make suitable provision for supplying the necessary broadness of tuning. It is not quite accurate to say that this transformer, either of the factory or of the home-made type, is untuned, for indeed it is tuned to the broadcast band, otherwise it would not function. The point is that the tuning is sufficiently broad to permit the passage of any wave within that band, there being no necessity for tuning this stage. The variable condenser that would be connected across L6 were that winding of the tunable type is omitted to avoid a fourth control. Selectivity will be ample without it.

A separate rheostat is used in the reflexed stage, for the first tube is the one most likely to be critical and should have provision for minute adjust of filament voltage.

Although this is a reflex, the stability will be found excellent and the tone quality fine indeed.

Function of the Dials

The dials are arranged as shown in Fig. 2, the one at left tuning the first RF stage, the middle one actuating the tickler and the dial at right tuning the other variable condenser, which is across the impedance-absorption coil L4. C2 will be found very handy when there is an interfering wave.

A novel feature of the circuit is the capacitative method of coupling the first RF stage to the second RF stage. C8, a fixed condenser, the same kind as is usually used as a grid condenser, is employed, but there is no grid leak.

Coil Directions

L1L2 is a radio-frequency transformer, wound spider-web fashion, on a form about 5½" outside diameter. The hub diameter will be about 1½". Using No. 22 single cotton covered wire, measure off 47 feet, also another and separate length of 11 feet. Usuing the longer stretch and winding over one spoke and under the next, put on 15 turns, then pick up the shorter length and wind both stretches of wire simultaneously, side by side. When inserting the shorter winding (which is to be the aperiodic primary L1) leave 4" slack for later connections inside the set. Also at the end of this winding, leave the same excess for the same purpose. After the primary is completed the rest of the secondary is wound "solitaire." The spokes may be cut away from the form after the windings have been laced with grocer's cord, to keep them in place, or a light coating of collodion applied for binding purpose, or both acts performed. Collodion is purchaseable in the drug store. A little of it does no harm.

The inductances L3L4L7 are a 3-circuit tuning coil. A commercial model is preferable. If one is to be made at home, use a 3½" diameter tubing, and wind thereon 43 turns of No. 20 single cotton covered wire for the absorption coil or secondary L4. The primary is wound over the secondary and in the center thereof. It consists of ten turns of the same kind of wire, wound in the same direction. The tickler is wound on a 2¾" diameter form, and consists of 30 turns of No. 26 single silk covered wire, 15 turns on one side of where the rotor

Rofpatkin's Summer Reflex

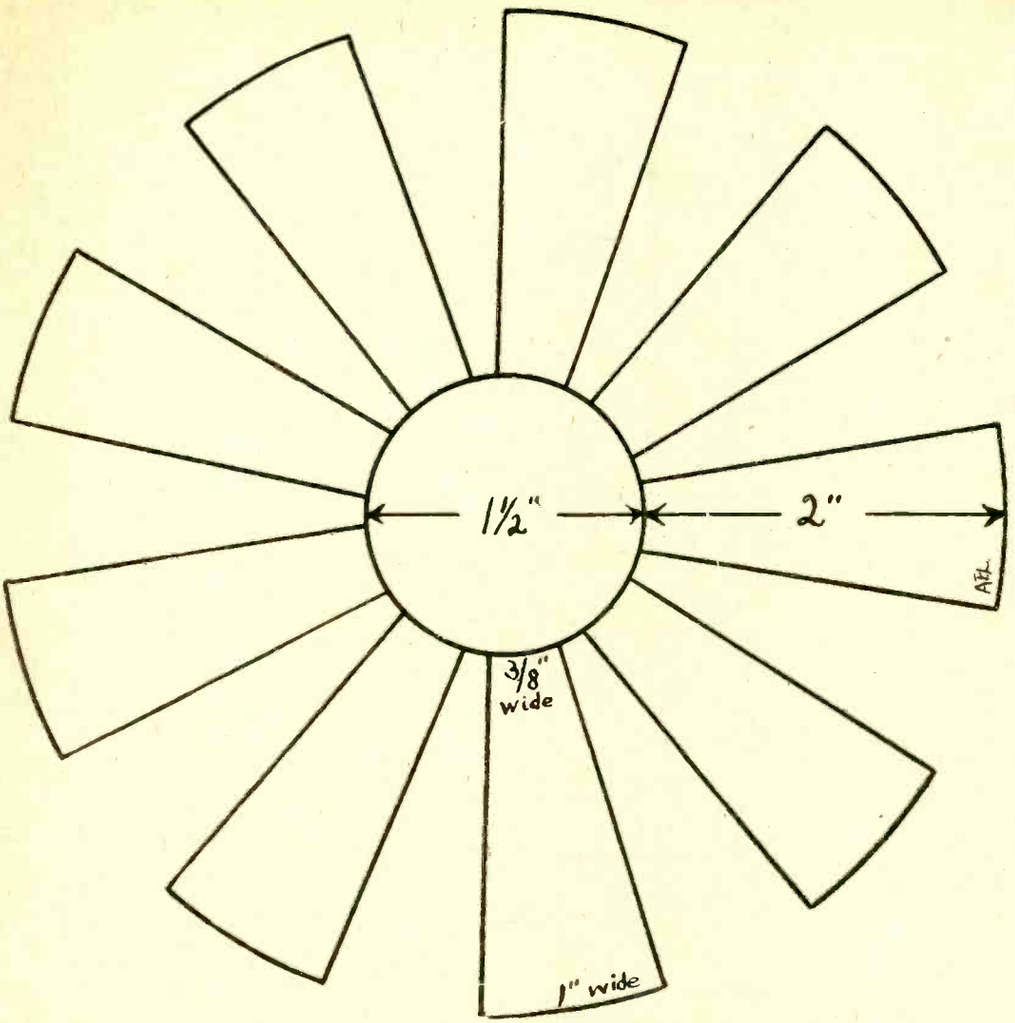


FIG. 4, template for making a form to wind spider-web coils. Put a piece of tracing paper on this, copy the form, paste copy on stiff cardboard, and cut the cardboard to form. Then wind on the cardboard. The hub is 1½", the outside diameter 5½".

The Problem of Static

ONE of the unsolved problems, indeed one of the mysteries of radio, is static. Although it is known to be loose or stray electrical currents in the air, of so-called spontaneous origin, just how and why it does originate or can be prevented has not been fully discovered. When static is mentioned the natural static is meant, and it is virtually in this division alone that the mystery has not been fully penetrated. Man-made static is well understood by scientists. It is the kind caused by X-ray machines, power plants, conduits, etc. By co-operation between unwitting offenders and not entirely exasperated victims, this part of the problem is fast being solved.

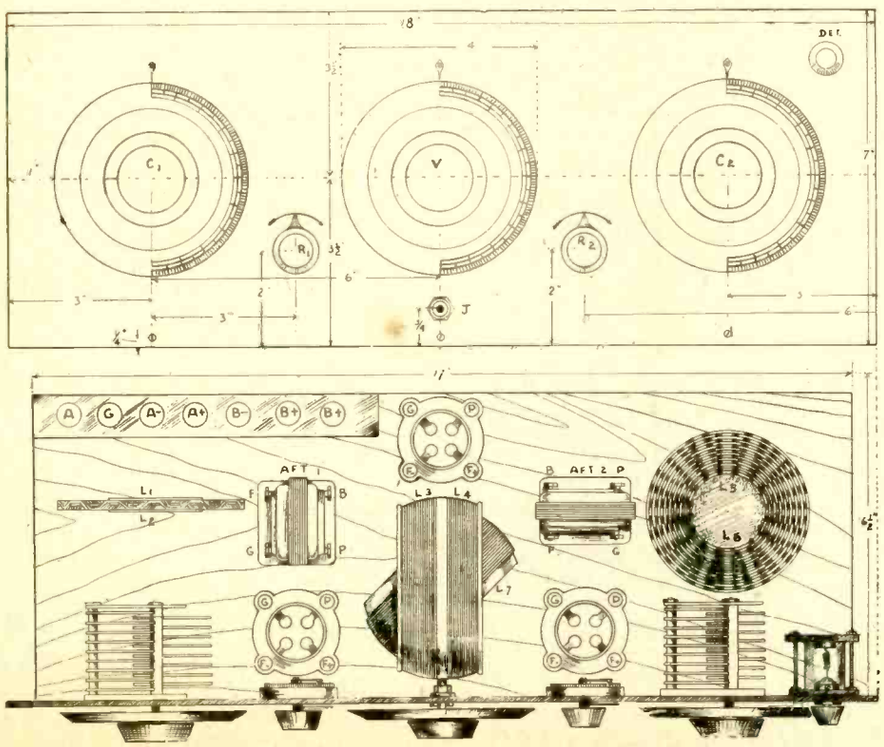


FIG. 2 (top), the panel layout, and Fig. 3, the assembly plan.

shaft is to be injected, and 15 turns on the other side. If a 3-circuit coupler is at hand it is better to use that than to try to make one at home. If an old coupler form is accessible, use that, reducing the number of turns if the diameters are greater than those prescribed. For a 4" form the secondary would consist of 32 turns, instead of 43, and the primary would be 8 turns. The tickler turns may be the same number as heretofore prescribed, even if the form is a little larger.

Making the "Untuned" Coupler

As for the coupling transformer, L5L6, as has been suggested, should be one of the commercial "untuned" products. But to make one at home that will serve the purpose, wind a spider-web coil as previously described. Leave the form intact. Get a handful of iron filings. Pour molten beeswax over the filings and shape the form to fit inside the hub of the coil support. The iron broadens the tuning. The idea is carried out by the dots shown in the center of this coil (Fig. 3, assembly plan).

How to Make the Gap

The gap arrangement across aerial and ground needs some explanation. A piece of busbar is connected across the aerial and ground posts. Then with a pair of wire cutters this lead is severed at the center, and filed down, so that there is no danger of the two pieces touching and thus short-circuiting the aperiodic primary. The distance between the two leads, or width of the gap, is ⅛". Static discharges may take place at the gap in these leads and thus avoid becoming a part of the "reception."

Details of Fixed Condensers

The variable condensers C1 and C2 are .0005 mfd., normally 23 plates. The fixed condensers have values as follows: C3, .002 mfd., C4, .00025 mfd. or less; C5, .002, C6, .002, C7, .001; C8, .00025. The detector is preferably an adjustable crystal, the Freshman having been used in the original

(*Concluded on page* 23)

The 2-Tube Tone Beauty

By Brewster Lee
Radio Engineer.

FOR earphone use the Tone Beauty is hard to excel. Not only do signals rich in quality actuate the phones, but distant reception is accompanied by undiminished quality. The set has three controls, two of which depend on wavelength (the variable condensers C1 and C2) and the tickler. While even the tickler has some relationship to wavelength, the setting depends on other considerations, too, including the degree of heating of the filaments of both tubes. The tickler can not be logged. It is the regeneration control.

The action of the combination L4C2 is to tune the plate to the same wavelength as the grid is tuned to, this being resonance. But the usual accompaniment of regeneration, due to such synchronized tuning, is not present, due to the tickler L3 usurping the regenerative function. Thus, if the tickler is set far below the saturation point, perhaps no signals will be heard at all, a phenomenon of tickler feedback. One might expect a tickler to afford the reception of signals no matter in what position below resonance it may occupy, since the plate is connected to the phones under any conditions. L4 may be called a resonator, a wavelength synchronizer, robbed of regenerative effect by the absorption factor in L3.

Use a 7x18" Panel

The set may be made on a 7x18" panel and afford all the room necessary. It is hardly advisable to use a smaller panel. A larger one, say 7x21" or preferably 7x24", will be necessary if audio stages are to be added for speaker operation.

The selectivity is good, the volume is great and the quality wonderful. A little hard to control at times, this circuit is not particularly suitable for general family use, as on distant stations the tickler setting may be rather critical.

Avoid Stray Coupling

Losses are sustained if the coils, intended to be out of each other's fields, are coupled by strays, therefore it is well indeed to put the coupler L1L2L3 at left and the plate coil L4 at right, the two inductance elements even being placed at right angles as an additional safeguard. This results in a long plate lead, but it is a happy compromise, since to shorten this lead (the plate coil's connection to the tickler) would necessitate closing up the valuable intervening space. Even with the long plate lead, no harmful results were noticed, whereas when stray couplings were tolerated the set became almost impossible to handle successfully. The solution, therefore, is an excellent one, for the circuit when made as shown in Figs. 2 and 3, gave very satisfactory results.

May Use Commercial Coupler

The coupler L1L2L3, a 3-circuit tuning coil, may be any commercial type suitable for the value condenser to be used across the secondary. Usually this condenser is .0005 mfd., normally 23 plates. If C2 also is a .0005 mfd. variable condenser the plate coil L4 may be so designed that the two condensers not only may be logged but will tune approximately in step (same dial readings on both for the same stations).

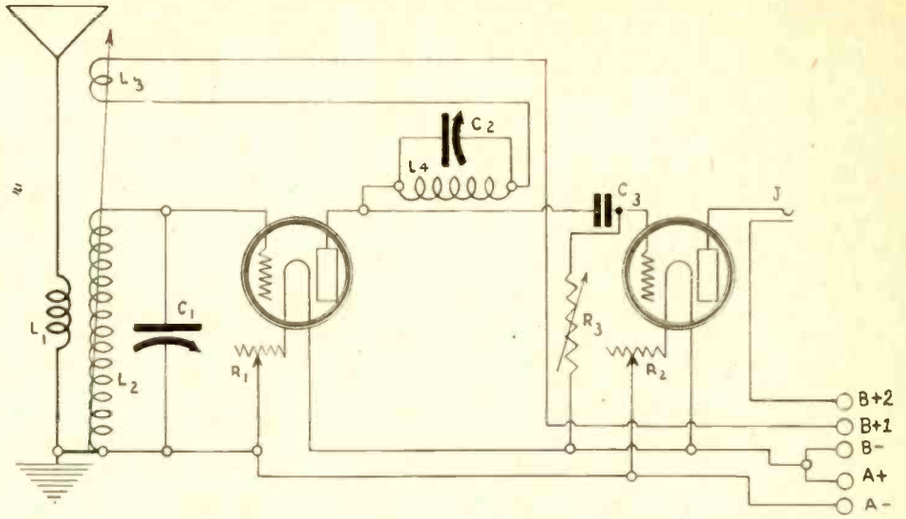


FIG. 1, circuit diagram of the Tone Beauty L1L2L3 is a 3-circuit coupler, L4 a single winding, the two inductances being kept out of each other's fields. C1 is a .0005 mfd. variable condenser, tuning the coupler secondary; C2 is of the same capacity and tunes the plate coil. The grid leak R3 is the Bretwood, newly introduced in the United States, after having won remarkable popularity in Great Britain R1 and R2 are rheostats of a resistance depending on the type of tubes used. The circuit comprises one stage of tuned regenerated RF and a non-regenerative detector. The set is extremely fine for reception of programs from distant stations.

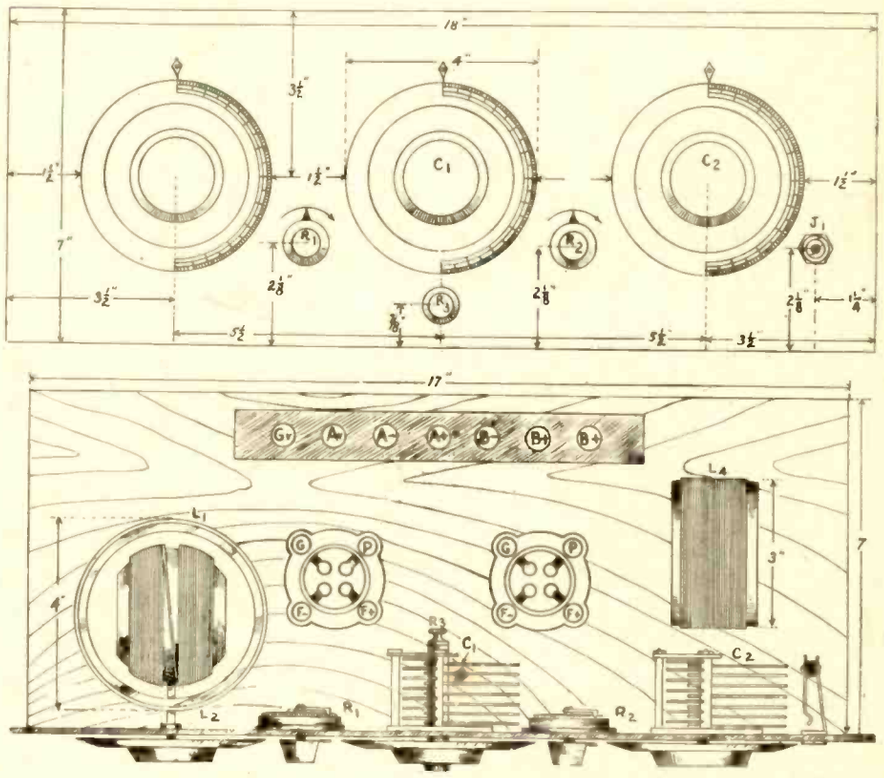


FIG. 2, the panel layout (above) and Fig. 3, the assembly plan.

The tickler may be regarded as a volume control, therefore even if it could be logged there would be small advantage, if any.

The coupler consists of a primary, secondary and a tertiary (tickler), the primary and secondary being a single winding. In commercial coils this type is not usually made, but if a factory product is employed, the same results are obtained by joining the end of the primary to the beginning of the secondary, using a short piece of wire. This lead is connected to A battery minus. The fact that in Fig. 1 the primary and the secondary look like two entirely different coils should not confuse the constructor, for a glance at the picture diagram of the wiring (Fig. 4) will elucidate this point. If the coil is home-made the tap system may be used with better facility, otherwise the wired connection between the posts on the coil as explained.

Works Well on Dry Cell Tubes

The dry cell tubes may be used very successfully, particularly the WD11 and WD12, which require 1½ volts to heat the filament. Two such cells should be connected in parallel. The UV199 and C299 tubes are good, too. The UV201A and C301A will give more volume. The detector may be the C300 or UV200, a 6-volt storage battery is to be used and

Wiring Great Earphone Set

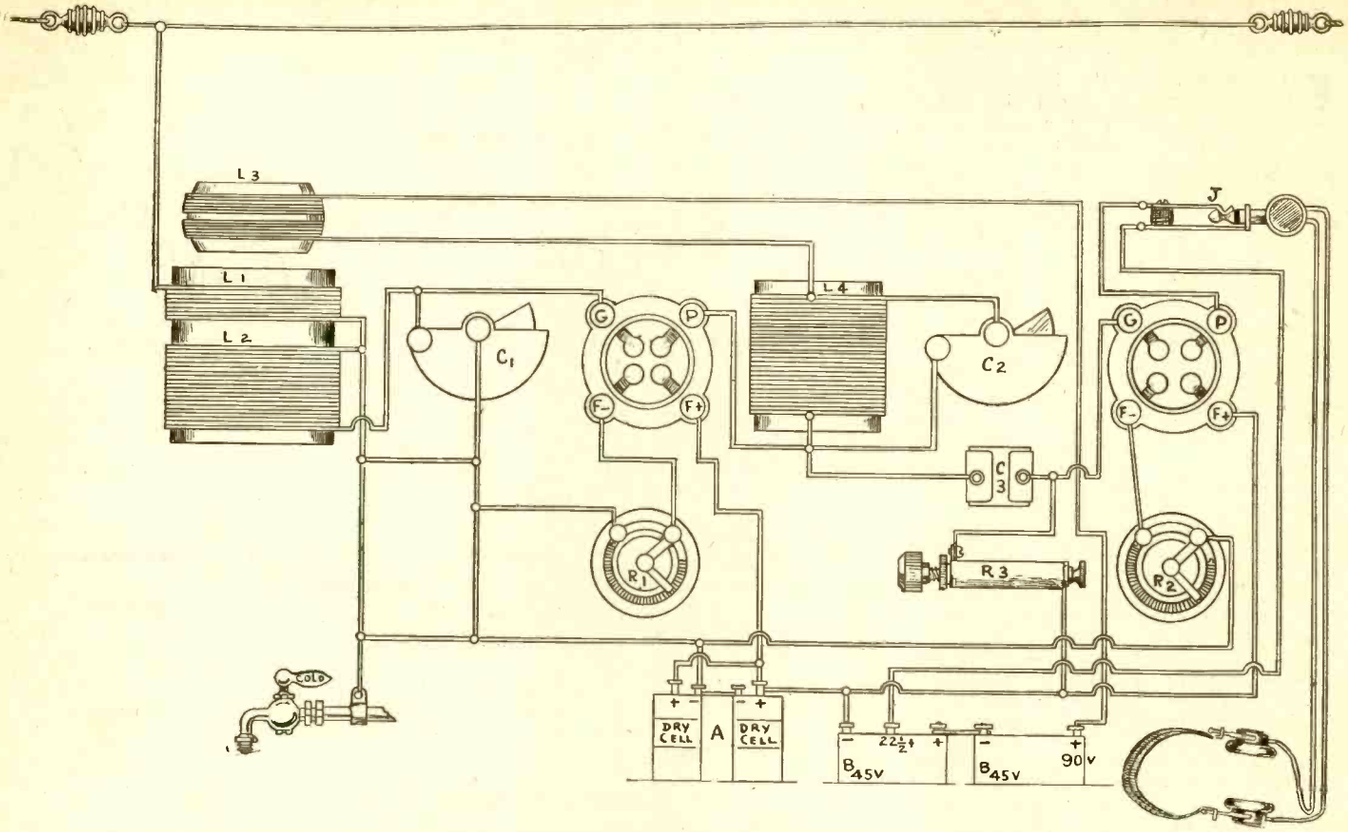


FIG. 4, picture diagram of the wiring of the Tone Beauty. This corresponds in every particular with the schematic diagram (Fig. 1).

List of Parts

¼ lb. No. 20 double silk covered wire.
¼ lb. No. 24 double cotton covered wire.
¼ lb. No. 26 single silk covered wire.
One tubing 3½" diameter, 4" high.
One tubing 3" diameter, 3" high.
One tubing 2¾" diameter, 2" high.
Two .0005 mfd. variable condensers.
Two standard sockets.
Two WD12 tubes.
Two 6-ohm rheostats.
One variable grid leak.
One .00025 mfd. grid condenser.
One single-circuit jack.
One 7x18" panel.
One 7-17" baseboard.
One cabinet to match.
Two 1½-volt No. 6 dry cells.
Two 45-volt B batteries.
One pair of earphones, aerial wire, internal connecting wire (bell wire or No. 18 DCC); 50 ft. No. 14 insulated leadin wire; ground clamp, lightning arrester.

there is no objection to the large current consumption. Two WD12s were used in the original model.

Discussion of Parts

The grid condenser C3 is .00025 mfd., preferably of the mica dielectric type. R3 is a variable grid leak. The Bretwood was used. This has a range from ¼ to 10 megohms and its smooth variation helps considerably in getting clear reception of distant stations, and in reducing tube noises.

J is a single-circuit jack, the frame (right-angle) of which is connected to B plus No. 2, normally 22½ volts, but try all voltages from 16½ to 45 for best results. The amplifier B battery voltage (B plus No. 1) should be tested from 22½ to 90.

Tips on Wiring

In wiring the set care should be exercised on the following points:

1. The rotor plates of the condenser C1 should connect to ground, to terminal of L1, to terminal of L2 and to negative A battery, while the stator plates go to grid of the radio-frequency tube (at left, Fig. 1).

2. The stator plates of C2, the condenser tuning the plate coil, should connect to that terminal of L4 that goes direct to plate of the detector tube, the connection that is also made to one side of the grid condenser.

3. The grid leak should be connected from the grid post of the detector tube socket to the positive A battery. It should NOT be connected to the plate side of the grid condenser.

4. The connections to the tickler should be made in either fashion, and if regeneration is not readily obtainable and controlled that way, the tickler connections should be reversed; that is, the lead that went to B battery would go to the end of L4 and the one that went to L4 would go instead to B battery.

Description of Circuit.

The set consists of a stage of tuned radio-frequency amplification, in which regeneration is present, and a non-regenerative detector tube. A capacity is used to couple the RF output (plate of the tube at left) to the detector input (grid of the tube at right). This capacity is the grid condenser, which thus serves a double purpose. The fine quality of the signals is due in part to a sane conservation of voltage step-up, many receivers distorting because of too great radio-frequency voltage impressed upon the tubes. This overloading impairs the general utility of a set to a marked degree. Overloading of tubes does not refer usually to the filament heating, but to the RF current. Of course, keep the tubes lighted as low as is possible yet consistent with the desired results. Use 6-ohm rheostats (R1 and R2) for the 11 and 12 type tubes, 20 ohms for the 201A and 301A class. For the 200 or 300 a vernier rheostat is necessary, such as the Fil-ko-stat.

Winding the Coils

L1L2L3 is made as follows: On a 3½" diameter tubing 4" high (cardboard, bakelite, fiber, etc.), wind ten turns, make a small twisted loop for a tap, and wind 41 more turns, a total of 51 turns. The wire is No. 20 double silk covered. Anchor terminals in pinholes in tubing. The first to tenth turns inclusive are the aperiodic primary, the remaining 41 turns the secondary, although both are one winding.

The tickler is wound on a 2¾" diameter tubing 2" high and consists of 30 turns of No. 26 single silk covered wire. L4 is wound on a 3" diameter tubing 3" high (not on a 3½" diameter tubing), and consists of 43 turns of No. 24 double cotton covered wire. It is a single winding and is not tapped.

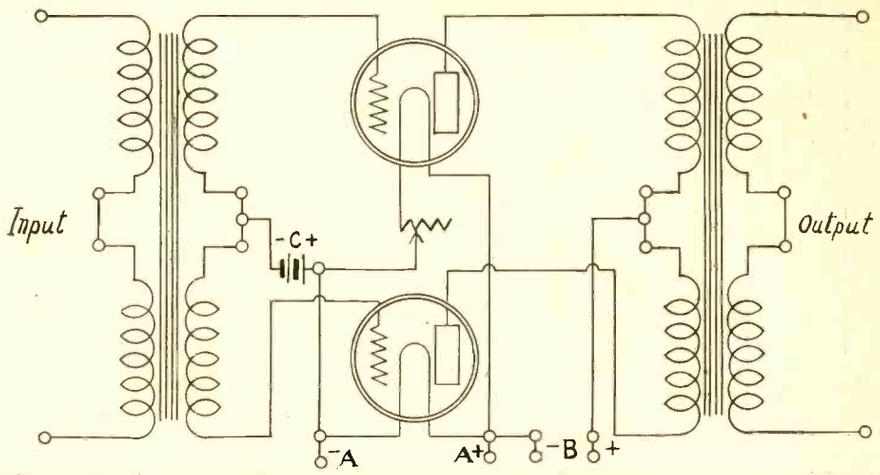
These coils require different tubing and wire sizes because the dielectric element was carefully considered in connection with the so-called "shape ratio" as determined by the Bureau of Standards for best results. This subject was treated very fully by J. E. Anderson in the March 7 and 14 and April 18 issues of RADIO WORLD.

A Push-Pull AF Amplifier

By Lt. Peter V. O'Rourke

A PUSH-PULL audio-amplifier is very handy to have around the house, especially when you are having some company and you want to show your friends what a tremendous amount of volume your set is capable of delivering without distortion.

The amplifier may be made in a separate cabinet so that you can hook it up to any receiver that you may desire to make, without ripping the whole set apart. A 7x10" mahogany cabinet and panel will house the instruments very nicely. Amperites or a 6-ohm rheostat are employed for controlling the filament of the tubes. VT1 or 216A tubes should be used. They can stand a large amount of voltage without distorting. As to the transformers employed, the Modern suits the bill very nicely. Two small Eveready C batteries, connected in series, are used to supply the grid bias.



THE DIAGRAM shows a push-pull amplifier, using a pair of the Modern Transformers, two 216A tubes to be connected to the output of the 2-stage audio-frequency amplifier, to obtaining a great volume, extra distortion. About 120 volts is used on the plates of the tubes. The grid bias is about 6 or 7 volts. The output is connected to a loud speaker, which can stand the large amount of volume. The same hookup may be used by delivering the output of one stage of regular audio to the input posts, and using two 201A tubes for the push-pull stage. This gives the same volume as the usual two simple stages, but much better quality.

How to Place the Instruments

Full satisfaction is desired and so the materials are placed in a certain manner, viz., place the transformers at right angles. The sockets are placed in between the two transformers, so that the grid and plate are short. The C battery is placed directly in back of the first transformer. At the bottom and back of the cabinet drill seven holes. These are for the leads from the terminal block, which consists of two for input, two for A+, A— and B—, one for B+ and two for the output. All that is seen on the panel is the knob of the rheostat or if an amperite is used, insert a switch in A+ lead and then all we will see is the silvery knob of the switch. Two holes about 1½ inch in diameter, for seeing if the tubes are lit, are then drilled.

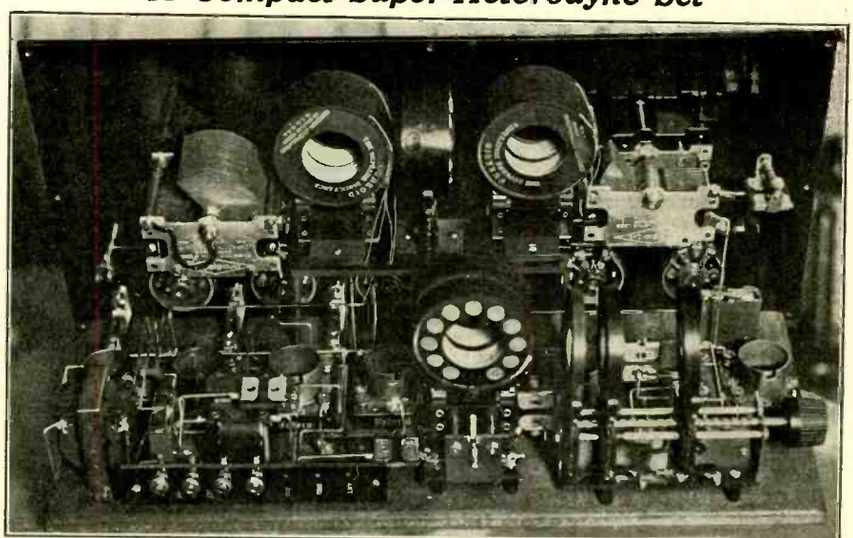
The Wiring

First, connect the plate and B plus to the two binding posts marked input.

Second, connect the grid post of the transformer to the grid post of the socket, the middle post to the minus of the C Battery, the other grid post to the grid post of the other socket. The plus of the C battery goes to the minus of the A battery, also to the pointer of the rheostat. The resistance wire goes to the minus filament post of the socket. The filament plus goes to the A plus. The middle post of the second transformer goes to the B plus. The two outer posts go to the plate posts of the two sockets. That completes the wiring. Bring the two tips of the speaker to the output terminal.

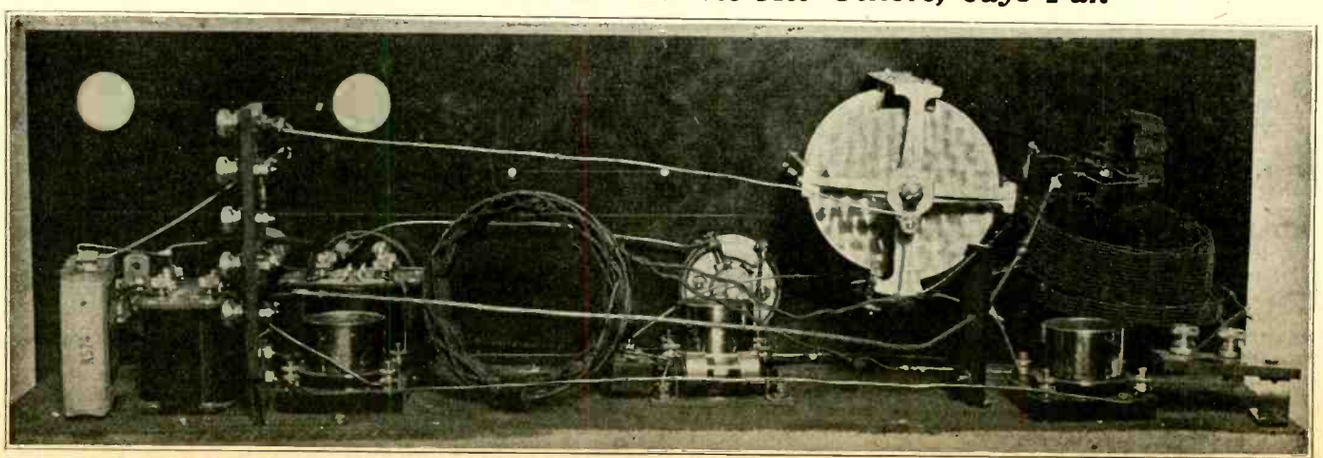
This amplifier will not give the volume of two additional tubes, but the volume is sacrificed for the clarity of the signals.

A Compact Super-Heterodyne Set



A 5-TUBE Super-Heterodyne, employing curkoid coils. The oscillator coils are at the right. The whole outfit is on a panel 15x3".

1925 Model DX Wonder Excels All Others, says Fan



THE 1925 MODEL two-control DX set, four tubes, was built by W. Schonefeld, of New York City, and has given him marvelous results on distant stations, he says. The quality, he states, is superb. Mr. Schonefeld adds that he would not trade his set for the best Super-Heterodyne on the market, as his receiver "excels all others." This construction was described in the January 10, 17 and 24 issues of RADIO WORLD.

DX, Quality and Volume, Too

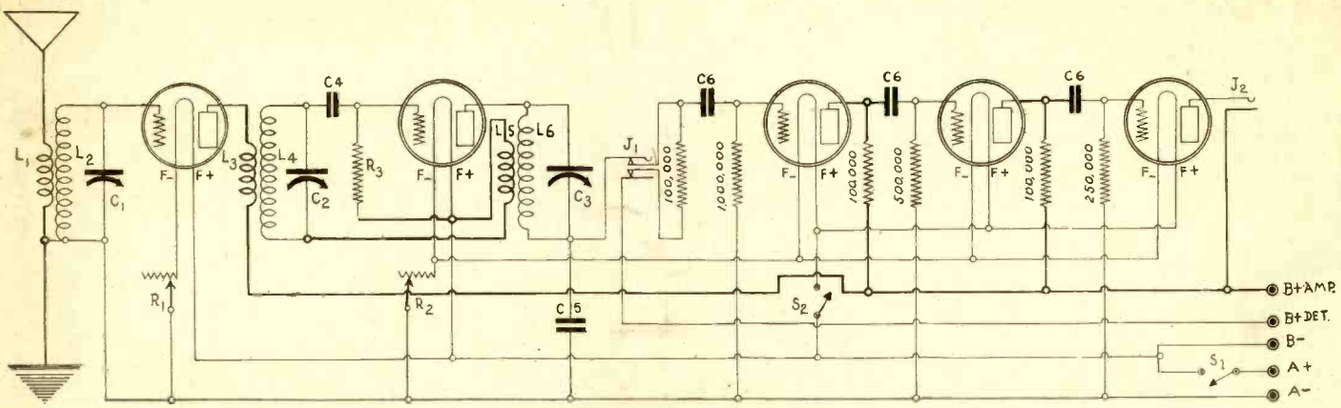


FIG. 1, wiring diagram of circuit by E. I. Sidney. The Summit Toroidal coils were used. The resistances were Daven products.

5-Tube Hookup Employs Toroidal Coils, Regeneration and Three Stages of Resistance-Coupled Audio-Frequency Amplification.

By E. I. Sidney

YOU can get all the voltage step-up that two tubes will stand, fine selectivity, excellent distance reception on the first two tubes at left in Fig. 1. This consists of a stage of tuned radio-frequency amplification, with a detector tube used regeneratively. By tuning the plate coil L6 the regeneration is produced. The actual performance of this circuit puts it in the Super-Heterodyne class. The toroidal type of coils is used.

Now, we want to operate a loudspeaker, of course. Also we want the best possible quality. Hence we select resistance-coupled AF, the three stages thereof affording as much volume as two transformer-coupled stages. But there's a marked difference in quality—an improvement that will delight you.

Resistance AF Beautiful

The audio amplifier may be home-constructed or a commercial 3-stage amplifier, already wired, may be used, which simplifies the making of the set and improves the internal appearance. The circuit shown in Fig. 1 is the RF and detector, as described, with a Daven Super Amplifier added for beautiful and rich loudspeaker operation. The double jack J1 is for earphones, the other Jack, J2, for speaker connections. While the switch, S1, turns the set on or off as a whole, the switch, S2, enables you to extinguish the audio tubes when you listen in on earphones.

The resistance values used in the audio amplifier are designated in the diagram. Notice that the coupling resistances, those connecting from plate to B battery, are all 100,000 ohms. Still regarding the audio amplifier, the grid resistances are, left to right, 1 megohm (1,000,000 ohms), .5 megohm (500,000 ohms) and .25 megohm (250,000 ohms). If the amplifier is to be home-constructed, these resistances (also called resistors) should be the Daven products, which are accurate and durable. The blocking condensers in the audio amplifier are all of the same value, .006 mfd., and are micadons (C6). Mountings should be purchased, if the amplifier is to be home-constructed, and these are placed at right angles to the length of the panel. All the plate resistances go from plate to B plus (one to B plus detector, the three others to B plus amplifier), while the grid resistances, which are leaks, always go to A minus. The detector plate voltage should be at least 45 when this form of audio amplification is used. The amplifier tube voltages (the RF tube and the three audio tubes) should be 90, if all are to be fed from one B plus amplifier lead; but preferably test the RF tube for best amplifier voltage, between 45 and 90, then use a B plus voltage of from 90 to 135 on the three audio tubes.

Excellent Results on 90

Excellent results are obtainable at uniform 90 volts on the amplifiers, radio and audio. The fact that more than 90 volts may work better on the audio stages does not mean that the B battery consumption is proportionately increased, for although the voltage is higher, the actual current consumption (plate drain in milliamperes) is not, so that on this moot question the resistance form of audio amplification holds its own with the transformer type. As to filament consumption, on account of the extra tube (three resistance audio stages as against two transformer audio stages), the increase is 50 per cent., but the results fully justify this.

A Novel Connection

The radio side of the circuit is standard, but an odd device is employed in the detector stage. Note that L3L4 is a radio-frequency transformer of the tunable type. L4 is tuned by C2, a .00035 mfd. variable condenser. Instead of the end of L4 connecting directly to positive A it goes through the aperiodic primary of another RF transformer to A battery plus. Thus not only is the plate of the detector tube tuned to resonance with the grid (by C3 tuning L6, the plate radio output being returned to the grid through the internal capacity of the detector tube), but also there is inductive coupling of grid and plate, due to L5 being in inductive relationship to L6. This insures a full amount of regeneration and does away with the difficulty sometimes encountered in making some tubes regenerate by the tuned plate method. Even tubes of low internal capacity, such as the UV199 and C299, if they will oscillate at all, will regenerate in this circuit.

The use of regeneration makes possible the nuisance of radiation. But to keep this down to a minimum, if not actually to prevent it entirely, as may indeed

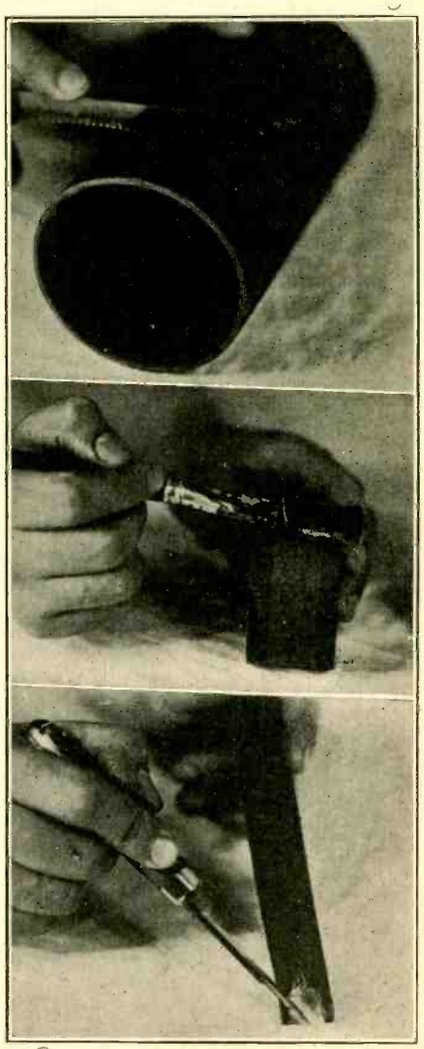
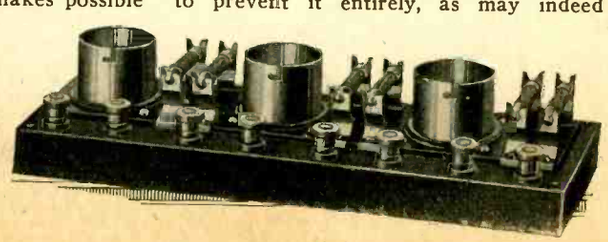


FIG. 2 (top), take a cardboard tubing, 3½" diameter. About 1¼" from the end saw off the resulting ring. Fig. 3, clean up the ring and give it a coat of shellac. Allow to dry. Fig. 4, take a wooden stick, 10" long x 1" wide and cut two notches, one at each end. The jackknife points to the U-shaped slot at one end.



THE resistance-coupled amplifier used in the circuit. This is a factory product, already wired, and need only be hooked up by connecting input to posts marked thereon (not legible here) connecting the A battery to the designated posts, and the output to J2.

How the Field of Toroidal Coils Is Concentrated

THE single-layer solendoid coil, as shown in Fig. 1, produces a field that sprays generously about the winding and is very easily picked up by other coils in the same set. This is true of all similar winding methods. The stray coupling is injurious to best results. Losses are

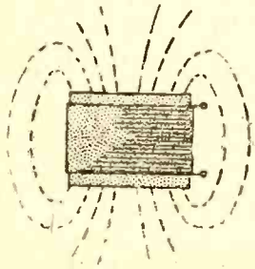


Fig. 1

sustained. No set can be properly neutralized when such stray magnetic coupling exists. In the Neutrodyne, therefore, the coils are mounted at an angle, approximately 53.7 degrees, but varying slightly for different conditions, to minimize the stray coupling or feedback. The object is to keep oscillations, an inherent vice in tubes, under control.

How two coils mounted horizontal to the baseboard set up fields that interplay is shown in Fig. 2. Even most skillful mounting can not completely disperse this harmful coupling in every case. Home constructors especially have difficulty

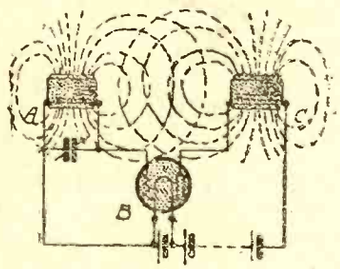


Fig. 2.

neutralizing a Neutrodyne, due to failure to obtain the correct mounting angle.

Fig. 3 shows the field of the toroidal type of winding. A set is electrically sound when it does not pick up signals without aerial, ground or loop, since if the waves can come in without such pickup,

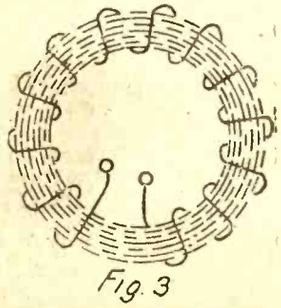


Fig. 3

squeals can get out despite neutralization attempts. The toroidal coils, daily becoming more popular, make for such electrical soundness.

How Toroidal Coil Is Wound

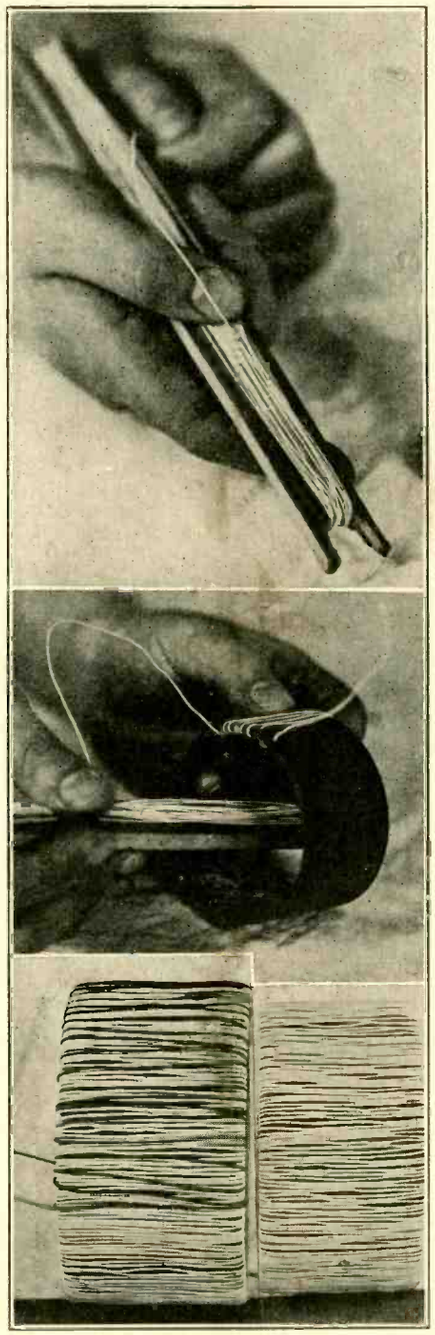


FIG. 5 (top), shows the object of the notching to be to provide security for a temporary winding. Thirty-five feet of No. 24 double silk covered wire are wound on the stick, round and round. Fig. 6, make two pinholes in the ring, the usual anchorage provided in home-made coil winding. Thread the free end of the wire through from the stick through one of the pinholes, for about 6", then through the remaining hole. The 6" slack is for connection purposes. The wire is sufficiently anchored by this method and the winding now is begun. The wire on the stick is easily wound around the ring, as shown, by passing the stick with the wire through the ring core and back over the top, and under again, until the total number of turns is put on. This should be about 250. Leave 6" slack at end and anchor. Fig. 7 (lower photo, in two sections) shows the toroidal coil as an RF transformer (left) and as an impedance coil. The only difference is that the RF coil has an aperiodic primary, denoted by the black-insulated wire. The primary is wound after the secondary is completed. The different coloring is used to facilitate distinction among terminals. The primary consists of 45 turns put on in the same manner as was the secondary.

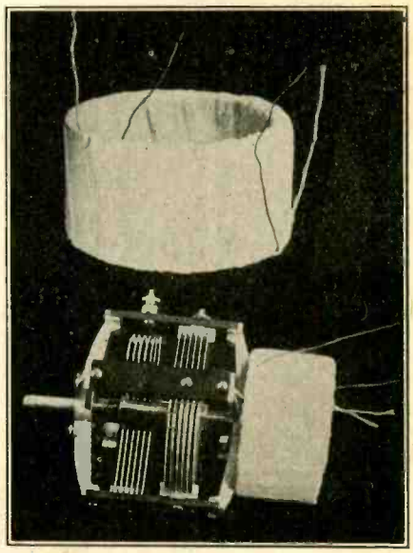


FIG. 8 (top) shows how the coil is covered with thin cotton tape ⅛" wide. This keeps the coil together and affords protection. Fig. 9 shows the completed coil mounted on the back of a low-loss variable condenser, .0005 mfd. capacity, a U-bracket being used, or two bakelite or wooden rods, so spaced as to press against the inside of the coil form. But .00035 is used in Fig. 1.

often result, the toroidal type of coils was used. This type has a closely concentrated field, more so than any other kind of coil, there being no interplay of radio-frequency currents to occasion losses, if the coils are properly spaced apart. The right-angle method of mounting may be used and there will be no coupling. The coils used in the set (Fig. 1) were those manufactured by the Summit Radio Co., of Newark, N. J. This coil is housed in a bakelite container, with the coil terminals properly marked. The coils comprise a set of three, one for the aerial circuit, one for the interstage coupling and one for the detector stage, and designated Nos. 1, 2 and 3.

The Home-Made Coil

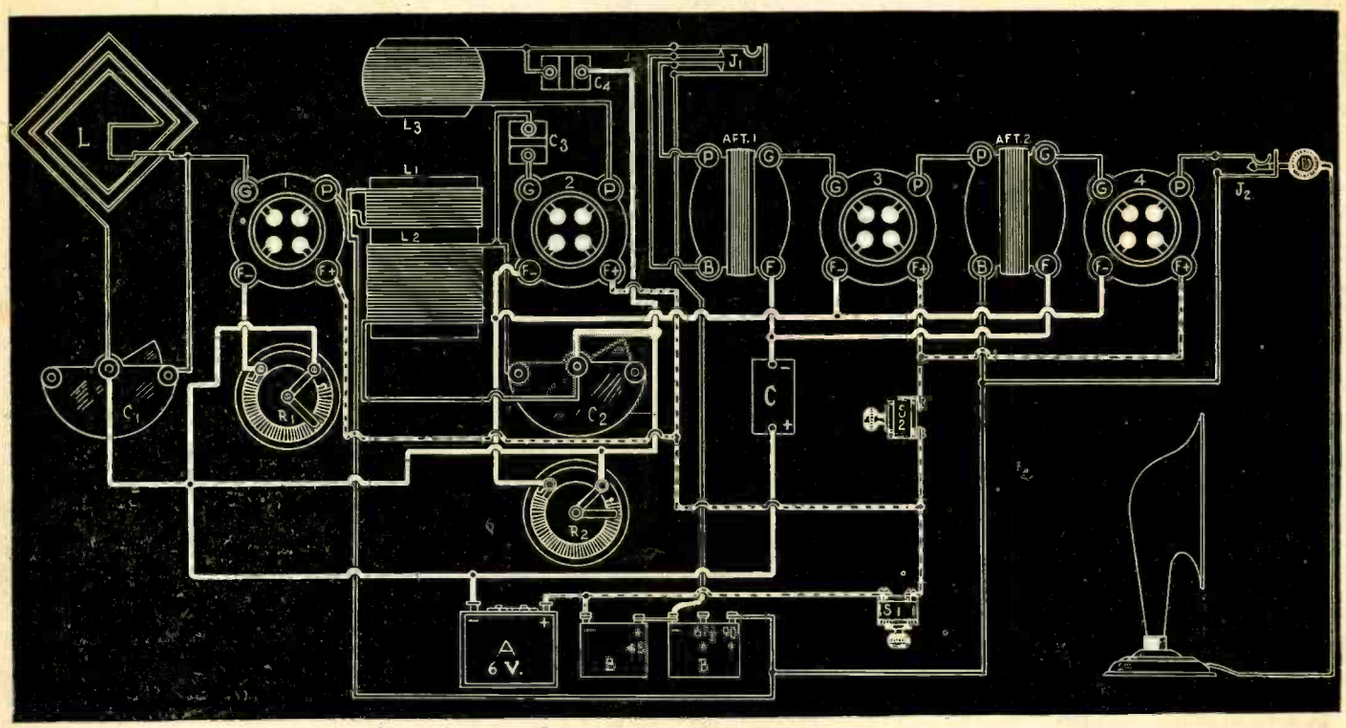
Making a toroidal coil at home is not so easy, if a handsome finished job is the goal, but for those desiring to try their hand at it illustrations and accompanying captions are published herewith. When the Summit coils are used it is convenient to mount the aerial and detector circuit coils flat on the baseboard or other subpanel, mounting the interstage coupling in the center, upright, its circumference on the baseboard.

Panel Directions

The panel should be 7x24" to allow plenty of room, the baseboard 7x23", the condenser shaft holes equi-distant (distances of 6" each from left to right of panel on a line 4" from bottom of panel). The rheostat R1 goes under dial No. 1 (left) and the other rheostat (R2, controlling detector and audio stages), under dial No. 2 (center). Jack J1 goes at bottom, between dial No. 2 and dial No. 3 (left to right) and the other jack about 1½" from the right side of the panel, at bottom. The switches S1 and S2 will be placed at the points on the panel most suitable, depending on where the binding post strip is located. That keeps the A

(*Concluded on page* 24)

Diamond Set Makes a Hit



PICTURE DIAGRAM of the wiring of The Diamond of the Air, a 4-tube DX loop receiver described in the April 4, 11 and 18 issues of RADIO WORLD, with a trouble-shooting article in the April 25 issue. Note that the ground side of the secondary connects to the rotor of the variable condenser C2 and the grid goes to the stator plates, as explained in the original article and shown in the schematic diagram (April 4) but not brought out clearly in the picture diagram in that same issue.

RESULTS EDITOR:

THE enclosed picture tells you more than I can write. The set is none other than the Herman Bernard's Diamond of the Air, the place stage door of Keith's National Theatre, Louisville, Ky., the personnel my wife and self (Keating & Ross) and the girl members of "The Five Spinettes," who have just arrived from England. Due to the tax one must pay over there to have a receiver, portable sets are seldom seen. The set in the picture I built in the dressing room of the theatre. The girls consider it a wonderful set, and so do I. Please extend my thanks to Mr. Bernard and put me on your list for a free nameplate. I have the set in my hotel. Last night I took my choice of all the Eastern and Middle Western stations and although it was no

night for radio I had wonderful success. Keep up the good work. I never miss your magazine. I think it is the best radio journal on the market.

HARRY ROSS.
Hotel Norval,
Lima, O.

* * *

RESULTS EDITOR:

I FIXED up a Diamond of the Air set for a friend and the results were so great that I am building one for myself.

JOSEPH HUGHES,
610 N. Paterson Park Ave,
Baltimore, Md.

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OF THE AIR
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Ohm, Sweet Ohm

A Study of Resistance

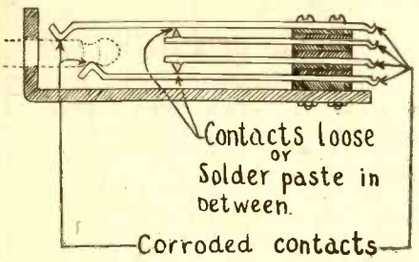


FIG. 2—Where resistance occurs in a jack.

By Lewis Winner
Radio Engineer.

THERE are three quantities present in every electrical circuit—resistance, inductance and capacity. When direct currents are employed we need only consider the resistance of the circuit. According to ohm's law the resistance of a circuit governs the number of amperes of current flowing through the circuit.

However, when dealing with alternating currents, we must consider not only the resistance, whose effect, generally speaking, is the same as it would be in a direct current circuit, but also must consider the action of inductance and capacity, whose effect is different in AC than in DC. Resistance plays a very important part in the radio receiving set.

What Resistance Is

Resistance is that property of a conductor which tends to oppose the flow of electric current in that conductor, the energy being spent in the form of heat. The resistance of a cubic centimeter of any conductor and a unit (cubic centimeter) cross section is called the specific resistance of the conductor. When pure metals, such as aluminum, are heated the resistance increases. Carbon is an exception. It decreases in resistance when heated. The proportional stepup in specific resistance as measured in temperature (centigrade) is called the temperature co-efficient of resistivity. For a great many metals the temperature coefficient is about .004, which means that for each 1-degree rise the resistance is increased by an amount equal to .004. A straight piece of copper wire has a greater resistance to alternating current than to direct current. For any given frequency the larger the diameter of the wire the less the resistance, up to a certain point. In each length of wire where high frequency is employed there is self-induction.

Study of Magnetic Lines

Self-induction is the phenomenon resulting from the rise and fall of the magnetic field of force around a coil through which a current is flowing. It is the property of an electric circuit which tends to retard the change of current that has been established. As the magnetic lines of force cut each element of the cross-section of the wire, an induced pressure is set up. The same action takes place in the windings of a transformer. This induced pressure is a back pressure, retarding the flow of current. The time arrives, as the lines of force continue to spread out from the center of the wire, when the current reaches its maximum value and starts to reverse. However many of the lines have not spread to the surface, as a point on the surface has not been cut by as many spreading lines of force as the point near the center of the wire. The induced back pressure will not be as great in the elements of the surface as

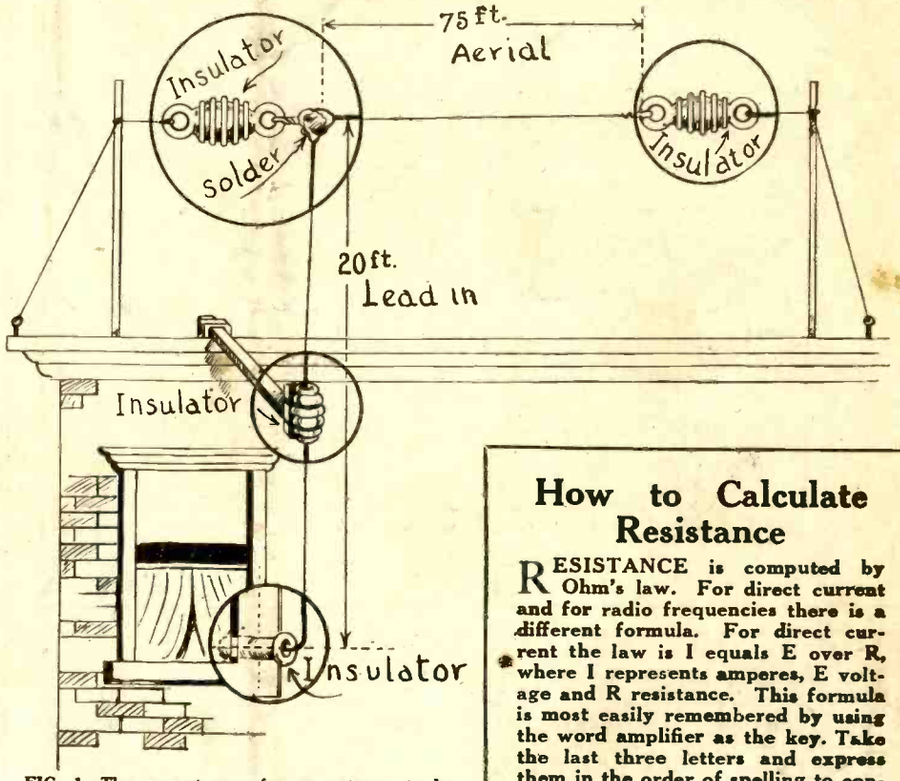


FIG. 1—The correct way for an antenna to be installed. Note where the insulators are placed, also the soldering connection.

in the elements of a cross-section at the center, the current is therefore free to flow on the surface of the wire more than at the center. This is known as the skin effect. The larger the cross-section of the conductor and the higher the frequency, the better the permeability and the less the specific resistance. Therefore radio-frequency currents travel on the surface of a conductor. It is interesting to note that a grid leak of two meghoms (2,000,000 ohms) has an ohmic resistance nearly as great as 2,000,000 feet of number 40 copper wire. The facts were taken from a grid leak using ground graphite as the resistor. Using an ordinary pencil mark about two or three inches long, the resistance is 1 to 2 megohms.

Ohmic resistance and radio-frequency resistance are found in every part of a radio set, viz., antenna, ground, coils, variable condensers, tubes, sockets, phones, audio-frequency transformers, radio-frequency transformers, insulators, crystal, A battery, B battery, leads and jacks. Ohmic resistance is sometimes helpful, as in the phones, where the number of ampere turns with a resistance of 2000 ohms is dependent upon the signal strength, that is, if the signal is weak then the number of turns has to be large, to make up for the loss of signal strength. But if there is radio-frequency resistance present in a circuit, the tuning is broadened to a great extent by resistance, thereby causing volume loss, since the resistance opposes the flow of the micro-amperes of current induced from the primary coil to the secondary coil.

Reducing RF Resistance

In the Antenna—Solder all connections; use mica or very good porcelain insulators. (Fig. 1).

In the Ground—Use a good copper ground clamp, which should be soldered to the water pipe, the leads to the set being as short as you can make them.

In the Tubes—Sandpaper the four ter-

(*Concluded on page* 28)

How to Calculate Resistance

RESISTANCE is computed by Ohm's law. For direct current and for radio frequencies there is a different formula. For direct current the law is I equals E over R, where I represents amperes, E voltage and R resistance. This formula is most easily remembered by using the word amplifier as the key. Take the last three letters and express them in the order of spelling to constitute the formula. To utilize the formula to calculate the resistance the equation is expressed as follows: R equals E over I.

This calculation will give you the ohmic resistance, which applies only to direct current.

To calculate the resistance at radio frequencies it is necessary to know the impedance. The formula for impedance is: Z equals the square root of R squared, plus two times (3 1/7 times the frequency in cycles times the inductance in henries). For AC resistance use the formula I equals E over Z, where I means amperes, E means voltage and Z means impedance in ohms.

To calculate RF resistance it is also necessary to know the reactance, which is the resistance of the wire to changes of current established in it.

The formula for reactance of a coil is X (reactance in ohms) equals 2 times 3 1/7 times inductance in henries times frequency in cycles. The formulas, therefore, for determining RF resistance include the AC formula, the impedance formula and the reactance formula. The answers are added up and the radio frequency resistance total is thereby derived.

Impedance is the total opposition of a circuit to a current of varying amplitude due to the ohmic or DC resistance and reactance of the circuit. Ohms law in words: The current which flows in a circuit in response to a steady impressed electromotive force is equal to this electromotive force divided by the resistance of the circuit.

Resistances in series are added while the resistances in parallel are calculated by the reciprocal law, viz.; R equals R times RR2 divided by R1 plus R2. The designations R1 and R2 represent simply the two resistances.

Completing the Twinplex

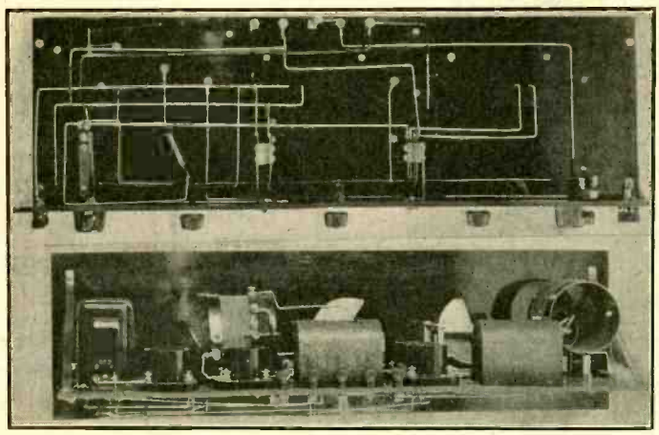


FIG. 5—Bottom view of the Twinplex circuit, showing how most of the wiring is under the subpanel. Fig. 6 (lower photo) is rear view.

J. E. Anderson's notable article on his Twinplex circuit, an original design, was begun in last week's issue, May 2, and is concluded herewith. It is a 4-tube reflex, using two push-pull AF stages in which the RF stages are in parallel. Fine quality and great volume are obtained.

By J. E. Anderson

Consulting Engineer

PART II.

THE five battery binding posts are placed on the baseboard back of the push-pull output transformer AFT3. These are conveniently placed so that if a hole is drilled in the middle of the back wall of the cabinet, the leads will be short. It will be observed that the plus A and the minus B posts have been connected together so that the plate return lead goes to the positive side of the A battery. This effectively adds about 6 volts to the plate voltage. If desired the usual way of returning the plate lead to the negative may be used by connecting the two minus posts instead.

Difficulties Overcome

When this receiver was first tuned in, it proclaimed in accents loud and mushy that it was a reflex circuit. There was a band or orchestra playing in the offing. But by way of local color the two parallel tubes oscillated, the detector growled, and the first audio tube contributed to the general racket by a constant squeal. A few adjustments had obviously to be made. The first was to ground the shield and core of the first transformer AFT1. This stopped the steady squeal from the first audio stage, and it also materially improved the action of the detector. But this was still noisy, and the main cause was overloading. A comparatively low value grid leak had to be used in order to prevent blocking and the resulting racket. Two megohms seemed to work best. The next step was to ground the shield and core of the push-pull output transformer AFT3. This cleared up the signal, and it became very clear and pleasing, too.

But there remained transformer AFT2, the shield of which had not been grounded. This was done. There was no improvement in the quality of the signal, but there was a decided diminution in the volume. Grounding the shield also upset the tuning qualities of the first tuned circuit. The reason for this was that a large capacity was connected in parallel with the tuning condenser and coil. Snipping the wire which grounded the shield restored the circuit to its sensitive and well-behaved condition.

The two tuning coils were placed far apart and at right angles, as will be seen from the photographs. This reduced stray coupling to a point where neutralization of the circuit was not necessary. However, if it is necessary to neutralize, this may be done by connecting the neutralizing condenser between the stator plates of the two tuning condensers. There is a very convenient position in this particular set where this may be done. Between the two condensers there are two vacant binding posts, one on each condenser, and they are connected to the proper plates. In order that neutralization may be possible, the leads to L3 must be connected in the right way. There are only two ways and one of them is the right way.

The ground binding post has been purposely left disconnected from the rest of the circuit in order that the antenna and ground leads may be interchanged if necessary. Certain stations will come in better with one connection and other stations with the other.

The switch S1 is a single-pole, single-throw jack switch, and S2 is a double-pole, doublethrow jack switch in which one of the springs is not used. J1 is a double circuit or four-spring jack, and J2 is a single-circuit or two-spring jack.

List of Parts

One RF transformer, L1L2.
One 3-circuit tuning coil, low loss, L3L4L5.
One audio-frequency transformer, General Radio, Type 285.
One pair of push-pull transformers, Como, Types I and O.
Two Bremer-Tully condensers, .0005 mfd.
Two Dubilier mica condensers, .0005 mfd.
Three Dubilier mica condensers, .001 mfd.
One Dubilier mica grid condenser, .002 mfd.
One large by-pass condenser, .005 mfd.
Three lengths of resistance wire, each 3.3 ohms (or three 1A Amperites).
One 30-ohm rheostat.
One 6-ohm rheostat.
One grid leak, 2 megohms.
Four standard tube sockets.
One single-circuit jack (Pacent).
One double-circuit jack (Pacent).
One SPST and one DPDT jack switch, Carter.
Nine insulated binding bosts, Eby.
One grid bias battery.
Three 4″ dials. (Right to left reading).
Two panels, hard rubber, 7x24″ (one cut to 7x23″).
Mounting angles for baseboard.
One cabinet.

Publishers Ban Free Ads in Programs They Print

THE American Newspaper Publishers' Association, ending its annual convention in the Waldorf-Astoria, New York City, adopted a resolution urging newspaper publishers to banish free publicity from the daily radio programs published in the papers and to keep direct advertising out of the programs of newspaper broadcasting stations.

Offered by Walter Strong of The Chicago Daily News, Chairman of the Radio Committee, the resolution was unanimously adopted. It read as follows:

"Whereas, it has been called to the attention of your Radio Committee that free publicity in the newspapers has been offered to advertisers as an inducement to sign a contract for broadcasting paid direct advertising; and

"Whereas, direct advertising by radio is likely to destroy the entertainment and educational value of broadcasting and result in the loss of the good-will of the public; therefore, be it

"Resolved, That members of the A. N. P. A. refuse to publish free publicity in their news columns concerning programs consisting of direct advertising; also, that they eliminate from program announcements the name of trade-marked merchandise or known products obviously used for advertising, and that newspaper broadcasters eliminate all talks which are broadcast for direct advertising purposes."

French Protest Use of American Radio

WASHINGTON.

FRENCH radio equipment manufacturers and the Chamber of Commerce of Paris have protested against the alleged discrimination by the Post and Telegraph Service in choosing American equipment for the radio sending station maintained at the Ecole Superieure des P. T. T. by the Government, according to advices to the Department of Commerce from Paris. This equipment is operated under American technical methods and with American material.

Pressley Trouble Shooting

By Neal Fitzalan

AFTER completing the wiring of the Pressley Super-Heterodyne, there are naturally some difficulties that you may encounter. Look over the filament connections. See tht all the tubes light before connecting up the B battery. If all the tubes light, then you are at least sure that you have connected the filaments of the vacuum tubes correctly. Now put the high voltage B batteries in the set. Insert the plug and if you get a loud click then you know that the plate and B battery are hooked up all right. When tuning the set you will probably notice that it seems sort of broad. That may easily be remedied by a few simple methods. First reserve the secondaries of the radio-frequency transformers, one at a time, that is, try reversing the first RFT leaving the rest of the transformers "as is." This same method applies to the second RFT, etc. If you have made the transformers yourself, loosen the coupling between the primary and the secondary of each transformer individually, so that the magnetic fields of the two coils will be at a minimum.

Wavelength Trouble

The next trouble that you may hit up against will be that of not being able to receive either the high or the low wavelengths. If you carefully follow the wiring diagram you will notice that there are three taps on the loop for the purpose of receiving all the wavelengths. However, in case the loop does not respond to the high frequencies (low waves) insert a .0005 mfd. fixed condenser in series with the loop at Q. If the low frequencies (high waves) are not heard, then insert the same condenser in parallel with the loop.

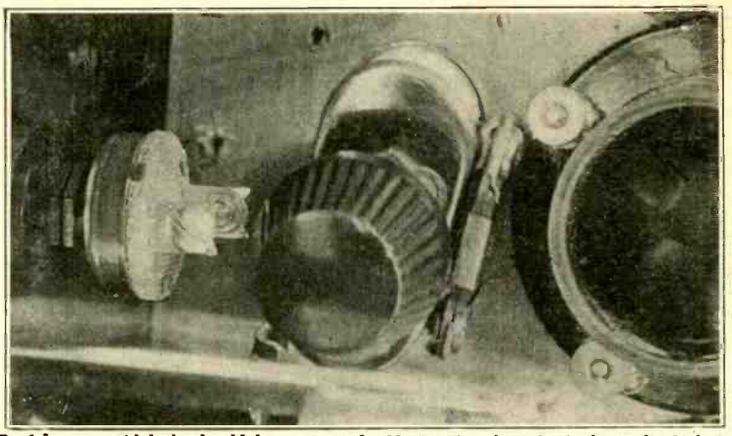
The next thing that we may step up against is poor oscillating action of a tube, which is very common in a Super-Heterodyne. This may be remedied by increasing the number of turns on B or shunting a .0005 mfd. fixed condenser across the same coil. Try different tubes in all the sockets so as to get the tubes which function best in their specific places. Perhaps one tube will act better as a radio-frequency amplifier than it will as a detector. This does not go to say that the tube which does not act as well as an oscillator is no good for any other socket. Oscillation is a natural action of the tube, and is dependent upon how the tube is adjusted at the laboratory. Sometimes there will be present in the set a sort of scratchy noise. This can easily be remedied by testing the B battery with a pair of phones. Connect the pair across the B battery. If a noise is heard then the battery is at fault, a common happening. This is caused by one of the cells being dead or one of the terminals in the battery itself being corroded and making a poor contact.

Remedy for Body Capacity

If body capacity is noticed, then ground the rotary of the variable condensers. You might be listening to signals suddenly a thud is heard and everything goes silent. This is due to the grid leak having too high a resistance, which chokes the tube up and thereby prevents the smooth flow of electrons from the filament to the plate.

A Good Variable Leak Aids

One of the best types of grid leaks to use is the variable Bretwood, a leak having a minimum of ¼ meghoms, and a maximum of 10 ohms. A smooth control



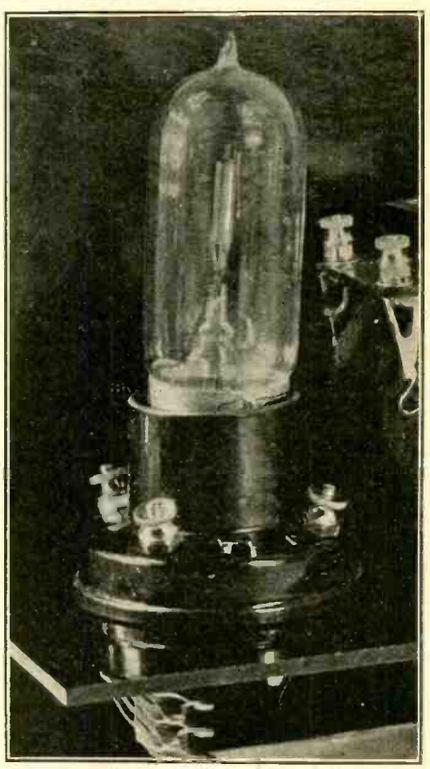
CLOSEUP of how a grid leak should be connected. Notice the short leads from the leak to the condenser and the socket. A variable grid leak is employed.

grid leak is wanted in every set and especially the Super-Heterodyne. If we use a grid leak that has a rough control the electrons will not flow in a uniform fashion from the filament to the plate, which is controlled by the grid mesh and a peculiar noise is heard in the phones. This is a terrible nuisance, especially when there is a great deal of amplification, such as in this Super-Hetrodyne. If, when you plug your jack in on the last stage of amplification, a loud howl is heard, a .001 mfd. fixed condenser placed across the secondary of the audio-frequency transformer will smooth it out. The transformers should be mounted at right angles, to prevent any distortion. Reversing the A battery will sometimes increase the volume. Ground the minus A of the storage battery for the purpose of receiving louder signals.

The Glass Cabinet Set

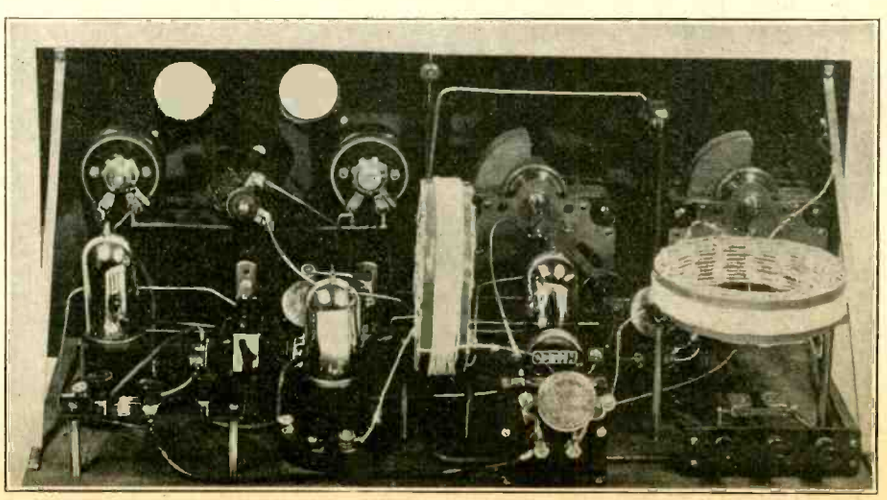
The Pressley shown on page 8 of RADIO WORLD, April 25 issue, was not a portable as stated. It was a standard Pressley, built in a glass cabinet by the Superadio Co., 136 Liberty Street. It was shown at the 2nd District Show recently held at the Hotel Pennsylvania, where it aroused great interest.

[*The Pressley Super-Heterodyne was fully described by Thomas W. Benson in the April* 18, 25 *and May* 2 *issues of* RADIO WORLD.]



HOW a sub-panel may be mounted on top of the jacks.

Set up for a 3-Tube Receiver



A 3-TUBE RECEIVER, employing a step of radio-frequency amplification, detector, and a step of audio-frequency amplification. The RF transformer and the detector coil are mounted to prevent stray coupling.

Great DX on Low Wave

20-Meter Wave Inaudible Nearby, Heard 2,000 Miles

WASHINGTON.

A DISTANCE of two thousand miles was successfully worked with a short wave radio set in a Navy plane in flight during a recent test held at the Naval Air Station, Anacostia, D. C. Signals from the plane, a Navy DH-4B type, were heard in St. Paul, Minn. and Tampa, Fla., but were not heard at stations much nearer. The plane was in communication with the Naval Radio Research Laboratory at Bellevue, D. C. on a 20 meter wavelength up to a distance of 60 miles, at which point signals from the plane were no longer heard, later reports telling of the reception with good audibility of the signals in St. Paul and Tampa.

Experiments with this type of radio equipment by the Navy during the past year have shown that signals on wavelengths below forty meters have what is known as a "jump-over" effect; that is, they only travel moderate distances, then disappear for a distance varying from 300 to 700 miles, reappearing at distant points.

The light-weight transmitter in the plane used only two receiving tubes, and the reception of signals from the set two thousand miles away is believed to be a record for heavier than aircraft radio equipment.

2-Way Talk with Australia Successful on 20 Meters

WASHINGTON.

A NEW record has been made by the Naval Radio Laboratory at Bellevue, D. C., in establishing two-way communication with Australia on 20 meters.

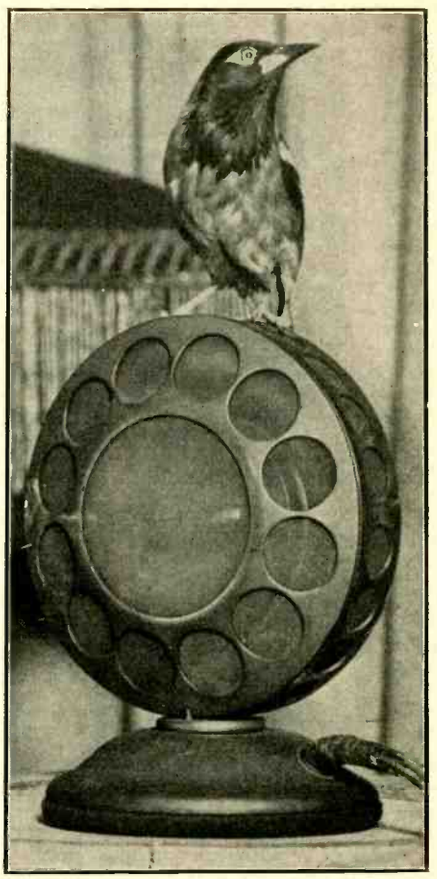
Around midnight the operator at Bellevue heard the Australian station calling England. He immediately broke in and called the Australian station. The two stations communicated with each other for more than thirty minutes. There was a particular absence of static or other forms of interference.

Bellevue Laboratory has been making some rather remarkable distance feats on short waves. Australia has been copied before at Bellevue, but it was the first time two-way communication was established.

The transmitter used at Bellevue employed less than 2 kilowatts while the antenna was of the vertical cage type with a four wire counterpoise. Details regarding the circuit used at Bellevue are being withheld until proper patent applications have been made.

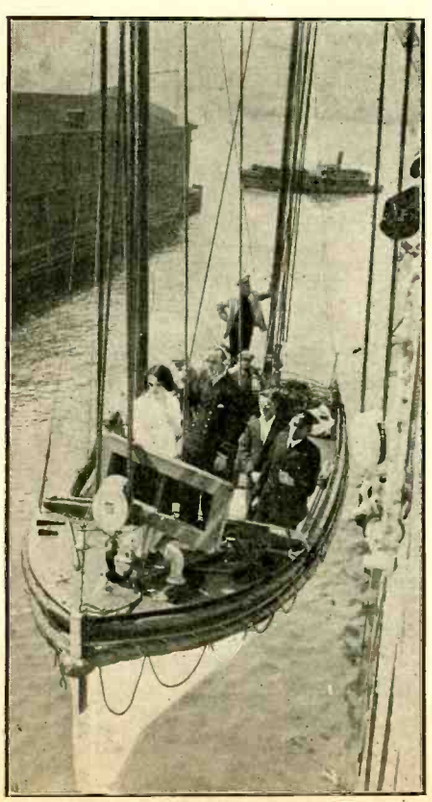
It is of incidental interest that during the two-way conversation, it was morning in Australia and midnight at Bellevue.

Novel "Artist"



A RARE BIRD, a Troupial, which inhabits the jungle along the Amazon River, gives for the first time, a successful radio concert over the microphone of WMCA, the new Hotel McAlpin Radio Station. Mrs. Calvin Coolidge has the only other specimen of this bird in the United States. (Kadel & Herbert).

Safety First



THE wireless-equipped lifeboat of the SS Orbita, the first of its kind being lowered over the side of the steamship. A directional loop is employed with this receiver to ascertain the direction from which rescue ship may be approaching. (International Newsreel).

New Broadcasters

WASHINGTON.

SIX new Class A stations were licensed by the Department of Commerce, while one station was transferred from Class C to A, two from Class A to B and one from Class C to B.

CLASS A (New)

Call	Station	Meters	Watts
WJBD	Ashland Broadcasting Committee, Ashland, Wis.	233	100
WFKB	Francis K. Bridgman, 4536 Woodlawn Ave., Chicago, Ill.	217.3	100
WJBC	Hummer Furniture Co., 2nd and Joilet Sts., La Salle, Ill.	234	100
WCBZ	Neutrowound Radio Mfg. Co., Chicago Heights, Ill.	217.3	50
KFWF	St. Louis Truth Center, 4030 Lindell St., St. Louis, Mo.	214.2	250
WNAB	The Shapard Stores, 30 Winter St., Boston, Mass.	250	100

TRANSFER FROM CLASS C TO CLASS A

WEAY	Iris Theatre, 612 Travis St., Houston, Texas	270	500

TRANSFERS FROM CLASS A TO CLASS B

WDWF	Dutee Wilcox Flint, Inc., 1332 Narragansett Blvd., Cranston, R.I.	440.9	500
WORD	Peoples Pulpit Association, Wagner Road, Batavia, Ill.	275	2000

TRANSFER FROM CLASS C TO CLASS B

WJAR	The Outlet Company, 174 Weybosset St., Providence, R. I.	305.9	500

KARACHI NOW 600 METERS

WASHINGTON.

NOTICE has been issued that beginning immediately the radio station at Karachi, British Indies will transmit on 600 meters instead of 2,000. American fans who have been picking up this station can make the necessary change in their logs.

Tennessee Transferred

WASHINGTON.

EFFECTIVE June 1, 1925, the State of Tennessee will be transferred from the Fifth Radio District, (New Orleans) to the Fourth Radio District, under the jurisdiction of the Supervisor of Radio, 208 Haas-Howell Bldg., Atlanta, Georgia. Applications for any class of license for Tennessee should hereafter be submitted to Atlanta instead of to New Orleans. Amateurs of Tennessee who have formerly been assigned call letters beginning with the figure "5," to represent the Fifth District, will hereafter be assigned call letters beginning with the figure "4."

Fourth Radio Parley to Try Solving Air Congestion

By Thomas Stevenson

WASHINGTON.

SECRETARY of Commerce Herbert Hoover has announced his intention to call another national radio conference at Washington next fall to consider problems which have arisen since the adjustment of the Third National Conference last October.

Two outstanding items of major importance are sure to occupy most of the time of the next conference, both of which have been looming as potential factors for controversy and trouble in the radio field. These two problems are:

1 The advisability of limiting the number of broadcasting stations in any given community and the total throughout the country.

2 A legislative program to take the place of the White Radio bill which was discarded during the last Congress.

Station Limit Difficult

The question of limiting the number of stations will probably be the most difficult to solve. For some time, due to the increase in class B stations, it has been apparent that some such regulation would be necessary because of the wavelength situation.

The primary purpose of the Third Natoinal Radio Conference was the reallocation of wavelengths. Two committees of the conference worked out a reallocation plan which would provide several new channels for class B stations. No sooner had the conference adjourned than it was discovered that the new plan was not practical.

Radio Supervisors from the various districts then put their heads together in an effort to devise a plan that would work. After one month's labor they gave it up as a bad job.

An attempt was then made by officials of the Department of Commerce to increase the number of channels by reducing the separation between class B stations. Experiments were made but it was found that too much interference resulted and this scheme was also discarded.

The reason for the failure of all these plans is obvious. It is that for every wavelength available, there are three or more individuals or concerns who desire to operate broadcasting stations.

For every new class B wavelength created by the Department of Commerce, there are demands from ten different sources for it.

Limitation of Authority

While the Department of Commerce cannot give something it does not possess, at the same time it has not the power under the law to refuse a wavelength to any applicant who complies with the provisions of the 1912 Act. For this reason every effort has been made to provide as many wavelengths as possible.

The result has been that the stations have been crowded too close together and have interfered with each other.

According to authorities who are in close touch with the situation, the only possible remedy is the limitation of stations.

While such a step would require legislative enactment, it is fraught with many dangers and difficulties. For instance, who is to say how many stations are necessary in any community and which stations they shall be? What is to prevent the cry of "monopoly" from arising from stations forced to keep silent while others are permitted to broadcast?

Radio Compass Enabled Homeric to Reach Doomed Freighter

CAPT. JOHN ROBERTS, of the Homeric (right) and Chief Radio Operator Tomlinson, who sent and received the messages. (Underwood & Underwood).

ALTHOUGH the Homeric of the White Star Line reached the Japanese freighter Raifuku Mari only to meet conditions preventing the saving of even one of the thirty-nine aboard, the liner would not have been able to reach the distressed ship at all were it not for a radio compass. The Homeric's captain, John Roberts, answering one of the SOS calls, radioed the following:

"To Raifuku Mari:

"We are 45 miles from you, proceeding 29 knots. We are fitted with directional wireless. Keep your wireless going.

"COMMANDER."

The sea was extremely violent, a strong spray permeated every point for a hundred miles or more, and visibility was low.

The radio compass consisted of a special directional loop outfit (Fig. 1). Although no lives were saved, due to the torment in the sea and the fact that all aboard the Japanese freighter were washed away before aid was within practical reach, the importance of the directional wireless as an element of safety at sea was once more emphasized.

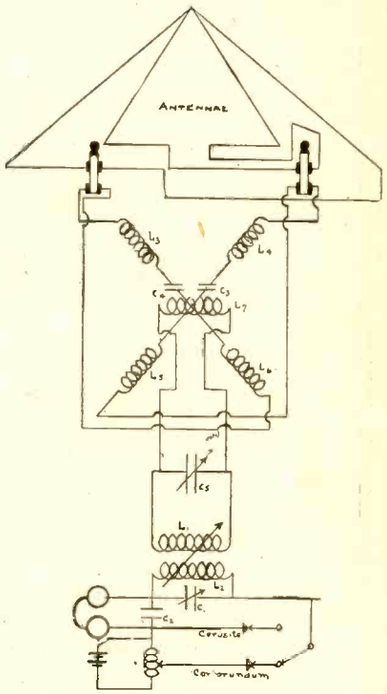
Relied on Wireless Compass

After the Homeric reached New York Captain Roberts said:

"We didn't know our position and she didn't know her position and we were able to get her direction only from the radio. We got radios from the Japanese freighter for quite a long time. When we got the last message we were forty-five miles from her. She was in pretty bad straits, and her last message read:

"'We are waiting for lifeboats.' She had given a list of 45 degrees before that—about three hours before we got to her. When she started on her final plunge she went over pretty well on her beam end and settled on an even keel. Water was pouring into her funnel when we arrived."

The freighter sank about 180 miles off the coast of Halifax.



WIRING DIAGRAM of the Marconi Direction Finder. Note the switches to shut in or out the 8 ft. and 6 ft. movable antennas. A large handle controls the moving of the aerials. This finder is a very accurate instrument.

There are two aerials in the Marconi Direction Finder, either one of which may be cut in or out by a special set of single throw switches. All the condensers employed in this loop are .0005 mfd. (calibrated). One antenna is 6 foot square and the other antenna is 8 foot square. The antennas are mounted on a special revolving base, so that the least variation will either bring in or out the incoming signal.

The loop is turned until a very weak signal is heard in the phones, not until a loud signal is heard, as a loud signal is spread over too many points on the dial and there is too much possibility of getting the wrong direction. A barely audible signal is more selective and the position on the dial is only one point.

The goniometer consists of a special set of coils and condensers, which are enclosed in a cabinet. These coils have been calibrated with the condensers. A 3-volt A battery is employed for the functioning of the crystal detectors. A .001 mfd. by pass is put across the phones.

SCHEDULE OF STATIONS' HOURS ON TH

KEY

Abbreviations: E. S. T., Eastern Standard Time; C. S. T., Central Standard Time; M. S. T., Mountain Standard Time; P. S. T., Pacific Standard Time; D. S., Daylight Saving Time.

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

If you are in	*And want a station in*	*Subtract*	*Add*
E. S. T.	C. S. T.		1 hr.
E. S. T.	M. S. T.		2 hrs.
E. S. T.	P. S. T.		3 hrs.
C. S. T.	E. S. T.	1 hr.	
C. S. T.	M. S. T.		1 hr.
C. S. T.	P. S. T.		2 hrs.
M. S. T.	E. S. T.	2 hrs.	
M. S. T.	C. S. T.	1 hr.	
M. S. T.	P. S. T.		1 hr.
P. S. T.	E. S. T.	3 hrs.	
P. S. T.	C. S. T.	2 hrs.	
P. S. T.	M. S. T.	1 hr.	

If you are under Daylight Saving Time, and the station you want is under that time, too, or if both are under Standard Time, the above table will hold.

If you are under Daylight Saving Time, and the station operates under Standard Time, add one hour to the table result.

If the station uses Daylight Saving Time, and you are under Standard Time, subtract one hour from the table result.

Friday, May 8

WEEI, Boston, Mass., 476 (E. S. T., D. S.)—6:45 A. M. to 8 A. M.; 2 P. M. to 3:15 P. M.; 5:30 P. M. to 10 P. M.

WAMD, Minneapolis, Minn., 243.8 (C. S. T.)—12 M. to 1 P. M.; 10 P. M. to 12 P. M.

KFKX, Hastings, Neb., 288.3 (C. S. T.)—12:30 P. M. to 1:30 P. M.; 9:30 P. M. to 12 P. M.

WBZ, Springfield, Mass., 333.1 (E. S. T., D. S.)—6 P. M. to 11 P. M.

KFOA, Seattle, Wash., 455 (P. S. T.)—12:30 P. M. to 1:30 P. M.; 4 P. M. to 5:15 P. M.; 6 P. M. to 11 P. M.

WLW, Cincinnati, O., 422.3 (E. S. T.)—10:45 A. M. to 12:15 P. M.; 1:30 P. M. to 2 P. M.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—12:30 P. M. to 1 P. M.; 4:30 to 5 P. M.; 6:30 to 7:30 P. M.; 8:30 P. M. to 9:30 P. M.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M. to 10 P. M.

KYW, Chicago, Ill., 536 (C. S. T., D. S.)—6:30 A. M. to 7:30 A. M.; 10:55 A. M. to 1 P. M.; 2:25 P. M. to 3:30 P. M.; 6:02 P. M. to 7:20 P. M.; 9 P. M. to 1:30 A. M.

WJY, New York City, 405 (E. S. T., D. S.)—7:30 P. M. to 11:30 P. M.

WGR, Buffalo, N. Y., 319 (E. S. T., D. S.)—12 M. to 12:45 P. M.; 2:30 P. M. to 4:30 P. M.; 7:30 P. M. to 11 P. M.

WCCO, St. Paul and Minneapolis, Minn., 416.4 (C. S. T.)—9:30 A. M. to 12 M.; 1:30 P. M. to 4 P. M.; 5:30 P. M. to 10 P. M.

WBBM, Chicago, Ill., 226 (C. S. T.)—8 P. M. to 10 P. M.

KFAE, State College of Washington, 348.6 (P. S. T.)—7:30 P. M. to 9 P. M.

KFNF, Shenandoah, Iowa, 266 (C. S. T.)—12:15 P. M. to 1:15 P. M.; 3 P. M. to 4 P. M.; 6:30 P. M. to 7:30 P. M.; 8:30 P. M. to 10:30 P. M.

WOC, Davenport, Iowa, 484 (C. S. T.)—12:57 P. M. to 2 P. M.; 3 P. M. to 5 P. M.; 5:45 P. M. to 7:10 P. M.; 8 P. M. to 9:30 P. M.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—1 P. M. to 2 P. M.; 5:30 P. M. to 11 P. M.

WRC, Washington, D. C., 469 (E. S. T.)—1 P. M. to 2 P. M.; 4 P. M. to 6 P. M.

WEAF, New York City, 492 (E. S. T., D. S.)—6:45 A. M. to 7:45 A. M.; 11 A. M. to 12 M.; 4 P. M. to 5 P. M. 6 P. M. to 12 P. M.

WPG, Atlantic City, N. J., 299.8 (E. S. T., D. S.)—2 P. M. to 4 P. M.; 9 P. M. to 10 P. M.

WDAF, Kansas City, Kansas, 365.6 (C. S. T.)—3:30 P. M. to 7 P. M.; 8 P. M. to 10 P. M.; 11:45 P. M. to 1 A. M.

KGW, Portland, Oregon, 491.5 (P. S. T.)—11:30 A. M. to 1:30 P. M.; 5 P. M. to 11 P. M.

WQJ, Chicago, Ill., 448 (C. S. T.)—11 A. M. to 12 M.; 3 P. M. to 4 P. M.; 7 P. M. to 8 P. M.; 10 P. M. to 2 A. M.

KHJ, Los Angeles, Cal., 405.2 (P. S. T.)—7 A. M. to 7:15 A. M.; 12 M. to 1:30 P. M.; 5:30 P. M. to 11 P. M.

WGBS, New York City, 316 (E. S. T., D. S.)—10 A. M. to 11 A. M.; 1:30 P. M. to 4 P. M.; 6 P. M. to 7:30 P. M.

KSD, St. Louis, Mo., 545.1 (C. S. T.)—7:30 P. M. to 9 P. M.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—8:30 P. M. to 10 P. M.

WOR, Newark, N. J., 405 (E. S. T., D. S.)—6:45 A. M. to 7:45 A. M.; 2:30 P. M. to 4 P. M.; 6:15 P. M. to 7 P. M.

WHN, New York City, 360 (E. S. T., D. S.)—2:15 P. M. to 5 P. M.; 7:30 P. M. to 11 P. M.; 11:30 P. M. to 12:30 A. M.

WHAD, Milwaukee, Wis., 275 (C. S. T.)—11 A. M. to 11:20 A. M.; 6 P. M. to 11 P. M.

WAAM, Newark, N. J., 263 (E. S. T.)—11 A. M. to 12 M.; 7 P. M. to 11 P. M.

WNYC, New York City, 526 (E. S. T., D. S.)—3:15 P. M. to 4:15 P. M.; 6:50 P. M. to 11 P. M.

WIP, Philadelphia, Pa., 508.2 (E. S. T., D. S.)—7 A. M. to 8 A. M.; 1 P. M. to 2 P. M.; 3 P. M. to 4 P. M.; 6 P. M. to 8 P. M.

ANNE MORGAN, J. P. Morgan's sister; A. H. Grebe, Miss Robinson Smith and Mrs. W. K. Vanderbilt, at WAHG, Richmond Hill, N. Y., in drive for professional women's clubhouse. (Wide World).

Saturday, May 9

WAHG, Richmond Hill, N. Y., 316 (E. S. T., D. S.)—12 M. to 2 A. M.

KSD, St. Louis, Mo., 545.1 (C. S. T.)—7 P. M. to 8:30 P. M.

WOO, Philadelphia, Pa., 508.2 (E. S. T., D. S.)—11 A. M. to 1 P. M.; 4:40 P. M. to 5 P. M.; 10:55 P. M. to 11:02 P. M.

KNX, Hollywood, Cal., 337 (P. S. T.)—1 P. M. to 2 P. M.; 6:30 P. M. to 2 A. M.

WEEI, Boston, Mass., 476 (E. S. T., D. S.)—6:45 A. M. to 7 P. M.

WMC, Memphis, Tenn., 499.7 (E. S. T.)—7:30 P. M. to 10 P. M.

KOA, Denver, Col., 322.4 (M. S. T.)—11:30 A. M. to 1 P. M.; 7 P. M. to 10 P. M.

WBBR, New York City, 272.6 (E. S. T., D. S.)—8 P. M. to 9 P. M.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—12:30 P. M. to 1:15 P. M.; 8:30 P. M. to 10:45 P. M. 12:30 P. M., markets, weather, music. 8:30, Fiddlers concert by the Frank Stokes fiddlers. 10, Meyer Davis orch.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—12:30 P. M. to 1 P. M.; 6 P. M. to 7 P. M.; 8:30 P. M. to 9:30 P. M.; 11 P. M. to 12 P. M.. 12:30 P. M.

WGY, Schenectady, N. Y., 380 (E. S. T.)—7:30 P. M. to 10 P. M.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M. to 5 P. M.; 7:30 P. M. to 9 P. M.

WWJ, Detroit, Mich., 352.7 (E. S. T.)—8 A. M. to 12:05 P. M.; 3 P. M. to 4 P. M.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—12:30 P. M. to 1 P. M.; 6 P. M. to 7 P. M.; 8:30 P. M. to 9:30 P. M.; 11 P. M. to 12 P. M.

WAMD, Minneapolis, Minn., 243.8 (C. S. T.)—12 M. to 1 P. M.; 10 P. M. to 12 P. M.

KFKX, Hastings, Neb., 288.3 (C. S. T.)—12:30 P. M. to 1:30 P. M.; 5:15 P. M. to 6:15 P. M.; 9:30 P. M. to 12:30 P. M.

KFOA, Seattle, Wash., 455 (P. S. T.)—4 P. M. to 5:15 P. M.; 6 P. M. to 11 P. M.

WLW, Cincinnati, O., 422.3 (E. S. T.)—8 A. M. to 9 A. M.; 10:45 A. M. to 12 P. M.; 1:30 P. M. to 3 P. M.; 3 P. M. to 5 P. M.; 6 P. M. to 7 P. M.

KYW, Chicago, Ill., 536 (C. S. T., D. S.)—6:30 A. M. to 7:30 A. M.; 10:30 A. M. to 3 P. M.; 6:02 P. M. to 1:30 A. M.

WOAW, Omaha, Neb., 526 (C. S. T.)—5:45 P. M. to 12 P. M.

KGO, Oakland, Cal., 361.2 (P. S. T.)—11 A. M. to 12:30 A. M.; 3:30 P. M. to 5:45 P. M.; 7:30 P. M. to 9 P. M.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—9:57 A. M. to 12:30 P. M.; 4 P. M. to 5 P. M.

CKAC, Montreal, Canada, 411 (E. S. T.)—4:30 P. M. to 5:30 P. M.

WOO, Philadelphia, Pa., 508.2 (E. S. T., D. S.)—10:30 A. M. to 12:30 P. M.; 2:30 P. M. to 6 P. M.

WEMC, Berrien Springs, Mich., 286 (C. S. T.)—11 A. M. to 12:30 P. M.; 8:15 P. M. to 11 P. M.

WHO, Des Moines, Iowa, 526 (C. S. T.)—11 A. M. to 12:30 P. M.; 4 P. M. to 5:30 P. M.; 7:30 to 8:30 P. M.

BEFORE an audience of 1,500 members of the invitation of Vice-President Charles G. Dawes. He also gave some of his experiences with Da Left to right: Gen. Pershing, Frank A. M

WCBD, Zion, Ill., 344.6 (C. S. T.)—8 P. M. to 10 P. M.

WEEI, Boston, Mass., 476 (E. S. T., D. S.)—3:45 P. M. to 5 P. M.; 7:20 P. M. to 10 P. M.

WIP, Philadelphia, Pa., 508.2 (E. S. T., D. S.)—7:15 P. M. to 10:30 P. M.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T., D. S.)—10:45 A. M. to 12 P. M.; 3 P. M. to 4 P. M.; 6:30 to 7:30 P. M.

WWJ, Detroit, Mich., 352.7 (E. S. T.)—11 A. M. to 12:30 P. M.; 2 P. M. to 3 P. M.; 7:20 P. M. to 10:30 P. M.

WOAW, Omaha, Neb., 526 (C. S. T.)—9 A. M. to 11 A. M.; 2:15 P. M. to 4 P. M.; 9 P. M. to 11 P. M.

KPO, San Francisco, Cal., 429 (P. S. T.)—8 A. M. to 12 M.; 2 P. M. to 3 P. M.; 6 P. M. to 10 P. M.

WAMD, Minneapolis, Minn., 243.8 (C. S. T.)—2 P. M. to 4 P. M.; 9 P. M. to 12 P. M.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—10:30 A. M. to 11:30 A. M.; 2:30 P. M. to 6 P. M.; 6:45 P. M. to 7 P. M.; 8 P. M. to 9 P. M.; 9:30 P. M. to 11 P. M.

WJY, New York City, 405 (E. S. T., D. S.)—2:30 P. M. to 5 P. M.; 8 P. M. to 10:30 P. M.

KFKX, Hastings, Neb., 288.3 (C. S. T.)—12:30 P. M. to 1:30 P. M.; 9:30 P. M. to 12:30 P. M.

KYW, Chicago, Ill., 536 (C. S. T., D. S.)—11 A. M. to 12:30 P. M.; 4 P. M. to 5 P. M.; 7 P. M. to 8 P. M.

WBZ, Springfield, Mass., 333.1 (E. S. T., D. S.)—11 A. M. to 12:30 P. M.; 7 P. M. to 9 P. M.

KFOA, Seattle, Wash., 455 (P. S. T.)—Silent.

WLW, Cincinnati, O., 422.3 (E. S. T.)—9:30 A. M. to 12:30 P. M.; 7:30 P. M. to 10 P. M.

KDKA, Pittsburgh, Pa., 309 (E. S. T.)—10 A. M. to 12:30 P. M.; 1:30 P. M. to 6:30 P. M.

WJZ, New York City, 455 (E. S. T., D. S.)—9 A. M. to 12:30 P. M.; 2:30 P. M. to 4 P. M.; 7 P. M. to 10 P. M.

WMAK, Lockport, N. Y., 265.5 (E. S. T.)—10:25 A. M. to 12:30 P. M.

WCCO, St. Paul and Minneapolis, Minn., 416.4 (C. S. T.)—9:30 A. M. to 12:30 P. M.; 2:30 P. M. to 5 P. M.; 6 P. M. to 10 P. M.

WGR, Buffalo, N. Y., 319 (E. S. T., D. S.)—12 M. to 12:45 P. M.; 2:30 P. M. to 4:30 P. M.; 7:30 P. M. to 8 P. M.

WBBM, Chicago, Ill., 226 (C. S. T.)—8 P. M. to 1 A. M.

KHJ, Los Angeles, Cal., 405.2 (E. S. T., D. S.)—7 A. M. to 7:30 A. M.; 10 A. M. to 1:30 P. M.; 2:30 P. M. to 3:30 P. M.; 5:30 P. M. to 2 A. M.

PWX, Havana, Cuba, 400 (E. S. T.)—8:30 P. M. to 11:30 P. M.

WRC, Washington, D. C., 469 (E. S. T.)—4:30 to 5:30 P. M.; 6:45 P. M. to 12 P. M.

WOC, Davenport, Iowa, 484 (C. S. T.)—12:57 P. M. to 2 P. M.; 5:45 P. M. to 7:10 P. M.; 9 P. M. to 12 P. M.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—8:30 P. M. to 11:30 P. M.

KFNF, Shenandoah, Iowa, 266 (C. S. T.)—12:15 P. M. to 1:15 P. M.; 3 P. M. to 4 P. M.; 6:30 P. M. to 10:30 P. M.

WEAF, New York City, 492 (E. S. T., D. S.)—6:45 A. M. to 7:45 A. M.; 4 P. M. to 5 P. M.; 6 P. M. to 12 P. M.

WGBS, New York City, 316 (E. S. T., D. S.)—10 A. M. to 11 A. M.; 1:30 P. M. to 3 P. M.; 6 P. M. to 12 P. M.

KSD, St. Louis, Mo., 545 (C. S. T.)—7 P. M. to 8:30 P. M.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—12:30 P. M. to 1 P. M.; 8:30 P. M. to 10:30 P. M.

WOR, Newark, N. J., 405 (E. S. T., D. S.)—6:45 A. M. to 7:45 A. M.; 2:30 P. M. to 4 P. M.; 6:15 P. M. to 7:30 P. M.; 8 P. M. to 11 P. M.

WHN, New York City, 360 (E. S. T., D. S.)—2:15 P. M. to 5 P. M.; 7:30 P. M. to 10 P. M.

WHAD, Milwaukee, Wis., 275 (C. S. T.)—11 A. M. to 11:30 A. M.; 6 P. M. to 8 P. M.

WAAM, Newark, N. J., 263 (E. S. T.)—7 P.

E AIR—THE DAILY KEY TO THE ETHER

Chicago Association of Commerce and thousands of radio listeners, General John J. Pershing, at the gave a brief outline of the conditions in South America as he found them on his recent visit there. ves as a member of his staff in France and during their boyhood days together in Lincoln, Neb. itchell, of the Association of Commerce, and Vice-President Dawes, at the Hotel LaSalle, Chicago. (Underwood & Underwood).

M. to 11 P. M.

WNYC, New York City, 526 (E. S. T., D. S.)—1 P. M. to 3 P. M.; 7 P. M. to 11 P. M.

WIP, Philadelphia, Pa., 508.2 (E. S. T., D. S.)—7 A. M. to 8 A. M.; 10:20 A. M. to 11 A. M.; 1 P. M. to 2 P. M., 3 P. M. to 4 P. M.; 6 P. M. to 11:30 P. M.

WPG, Atlantic City, N. J., 299.8 (C. S. T.) 7 P. M. to 12 P. M.

WDAF, Kansas City, Kansas, 365.6 (C. S. T.)—3:30 P. M. to 4:30 P. M.; 5:50 P. M. to 7 P. M.; 11:45 P. M. to 1 A. M.

KGW, Portland, Oregon, 491.5 (P. S. T.)—11:30 A. M. to 1:30 P. M.; 6 P. M. to 7 P. M.; 10 P. M. to 11 P. M.

WBBR, New York City, 272.6 (E. S. T.)—8 P. M. to 9 P. M.

WQJ, Chicago, Ill., 448 (C. S. T.)—11 A. M. to 12 M.; 3 P. M. to 4 P. M.; 7 P. M. to 8 P. M.; 10 P. M. to 3 A. M.

Sunday, May 10

WGR, Buffalo, N. Y., 319 (E. S. T., D. S.)—3 P. M. to 4 P. M.; 7:15 P. M. to 8 P. M.

WCCO, St. Paul and Minneapolis, Minn., 416.4 (C. S. T.)—11 A. M. to 12:30 A. M.; 4:10 P. M. to 5:10 P. M.; 7:20 P. M. to 10 P. M.

WBBM, Chicago, Ill., 226 (C. S. T.)—4 P. M. to 6 P. M.; 8 P. M. to 10 P. M.

KHJ, Los Angeles, Cal., 405.2 (E. S. T., D. S.)—10 A. M. to 12:30 P. M.; 6 P. M. to 10 P. M.

KFNF, Shenandoah, Iowa, 266 (C. S. T.)—10:45 A. M. to 12:30 P. M.; 2:30 P. M. to 4:30 P. M.; 6:30 P. M. to 10 P. M.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—9:30 A. M. to 12:30 A. M.; 2:35 P. M. to 3:45 P. M.; 6:30 P. M. to 10:30 P. M.

WEAF, New York City, 492 E. S. T., D. S.)—3 P. M. to 5 P. M.; 7:20 P. M. to 10:15 P. M.

WPG, Atlantic City, N. J., 299.8 (C. S. T., D. S.)—3:15 P. M. to 5 P. M.; 9 P. M. to 11 P. M.

WDAF, Kansas City, Kansas, 365.6 (C. S. T.)—4 P. M. to 5:30 P. M.

WQJ, Chicago, Ill., 448 (C. S. T.)—10:30 A. M. to 12:30 A. M.; 3 P. M. to 4 P. M.; 8 P. M. to 10 P. M.

KGW, Portland, Oregon, 491.5 (P. S. T.)—10:30 A. M. to 12:30 A. M.; 6 P. M. to 9 P. M.

WBBR, New York City, 272.6 (E. S. T., D. S.)—10 A. M. to 12 M., 9 P. M. to 11 P. M.

WGBS, New York City, 316 (E. S. T., D. S.)—3:30 P. M. to 4:30 P. M.; 9:30 P. M. to 10:30 P. M.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—11 A. M. to 12:30 P. M.; 2:30 P. M. to 3:40 P. M.; 8:40 P. M. to 11 P. M.

WHN, New York City, 360 (E. S. T., D. S.)—1 P. M. to 1:30 P. M.; 3 P. M. to 6 P. M.; 10 P. M. to 12 P. M.

WHAD, Milwaukee, Wis., 275 (C. S. T.)—2 P. M. to 3 P. M.

WNYC, New York City, 526 (E. S. T., D. S.)—9 P. M. to 11 P. M.

WIP, Philadelphia, Pa., 508.2 (E. S. T., D. S.)—10:45 A. M. to 12:30 P. M.; 3:30 P. M. to 4:30 P. M.

Monday, May 11

KGO, Oakland, Cal., 361.2 (P. S. T.)—9 A. M. to 10:30 A. M.; 11:30 A. M. to 1 P. M.; 1:30 P. M. to 6 P. M.; 6:45 P. M. to 7 P. M.; 8 P. M. to 1 A. M.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M. to 5 P. M.; 7:30 P. M. to 9 P. M.

WOO, Philadelphia, Pa., 508.2 (E. S. T., D. S.)—11 A. M. to 1 P. M.; 4:40 P. M. to 6 P. M.; 7:30 P. M. to 11 P. M.

KNX, Hollywood, Cal., 337 (P. S. T.)—12 M. to 1 P. M.; 4 P. M. to 5 P. M.; 6:30 P. M. to 12 P. M.

WEMC, Berrien Springs, Mich., 286 (C. S. T.)—8:15 P. M. to 11 P. M.

WHO, Des Moines, Iowa, 526 (C. S. T.)—12:15 P. M. to 1:30 P. M.; 7:30 P. M. to 9 P. M.; 11:15 P. M. to 12 P. M.

WCBD, Zion, Ill., 344.6 (C. S. T.)—8 P. M. to 10 P. M.

KFAE, State College of Wash., 348.6 (P. S. T.)—7:30 P. M. to 9 P. M.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T., D. S.)—12:30 P. M. to 1:30 P. M.; 4:30 P. M. to 5:30 P. M.; 6:30 P. M. to 12 P. M.

WOAW, Omaha, Neb., 526 (C. S. T.)—12:30 P. M. to 1:30 P. M.; 5:45 P. M. to 10:30 P. M.

KPO, San Francisco, Cal., 429 (P. S. T.)—10:30 A. M. to 12 M.; 1 P. M. to 2 P. M.; 2:30 P. M. to 3:30 P. M.; 4:30 P. M. to 10 P. M.

WEEI, Boston, Mass., 476 (E. S. T., D. S.)—6:45 A. M. to 8 A. M.; 3 P. M. to 4 P. M.; 5:30 P. M. to 10 P. M.

KOB, State College of New Mexico, 348.6 (M. S. T.)—11:55 A. M. to 12:30 P. M.; 7:30 P. M. to 8:30 P. M.; 9:55 P. M. to 10:10 P. M.

WAMD, Minneapolis, Minn., 243.8 (C. S. T.)—10 P. M. to 12 P. M.

KFKX, Hastings, Neb., 288.3 (C. S. T.)—12:30 P. M. to 1:30 P. M.; 5:15 P. M. to 6:15 P. M.; 9:30 P. M. to 12:30 P. M.

KYW, Chicago, Ill., 536 (C. S. T., D. S.)—6:30 A. M. to 7:30 A. M.; 10:55 A. M. to 1 P. M.; 2:15 P. M. to 3:30 P. M.; 6:02 P. M. to 7 P. M.

WBZ, Springfield, Mass., 333.1 (E. S. T., D. S.)—6 P. M. to 11:30 P. M.

KFOA, Seattle, Wash., 455 (P. S. T.)—12:45 P. M. to 1:30 P. M.; 4 P. M. to 5:15 P. M.; 6 P. M. to 10 P. M.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—10:30 A. M. to 11:30 A. M.; 12:30 P. M. to 1 P. M.; 2:30 P. M. to 6 P. M.; 6:45 P. M. to 7 P. M.; 8:30 P. M. to 9:30 P. M.

WLW, Cincinnati, O., 422.3 (E. S. T.)—10:45 A. M. to 12:15 P. M.; 1:30 P. M. to 2:30 P. M.; 3 P. M. to 5 P. M.; 6 P. M. to 10 P. M.

KDKA, Pittsburgh, Pa., 309 (E. S. T.)—6 A. M. to 7 A. M.; 9:45 A. M. to 12:15 P. M.; 2:30 P. M. to 3:20 P. M.; 5:30 P. M. to 10 P. M.

WJZ, New York City, 455 (E. S. T., D. S.)—10 A. M. to 11 A. M.; 1 P. M. to 2 P. M.; 4 P. M. to 5:30 P. M.; 6 P. M. to 6:30 P. M.; 7 P. M. to 11 P. M.

WMAK, Lockport, N. Y., 265.5 (E. S. T.)—8 P. M. to 12 P. M.

WGR, Buffalo, N. Y., 319 (E. S. T., D. S.)—12 M. to 12:30 P. M.; 2:30 P. M. to 4:30 P. M.; 7:30 P. M. to 11 P. M.

WCCO, St. Paul and Minneapolis, Minn., 416.4 (C. S. T.)—9:30 A. M. to 12 M.; 1:30 P. M. to 6:15 P. M.; 8 P. M. to 10 P. M.

WBBM, Chicago, Ill., 226 (C. S. T.)—6 P. M. to 7 P. M.

KFAE, State College of Wash., 348.6 (P. S. T.)—7:30 P. M. to 9 P. M.

KHJ, Los Angeles, Cal., 405.2 (P. S. T.)—7 A. M. to 7:15 A. M.; 12 M. to 1:30 P. M.; 5:30 P. M. to 10 P. M.

KFNF, Shenandoah, Iowa, 266 (C. S. T.)—12:15 P. M. to 1:15 P. M.; 3 P. M. to 4 P. M.; 6:30 P. M. to 10 P. M.

WBBR, New York City, 272.6 (E. S. T., D. S.)—8 P. M. to 9 P. M.

WPG, Atlantic City, N. J., 299.8 (E. S. T., D. S.)—7 P. M. to 11 P. M.

WDAF, Kansas City, Kansas, 365.6 (C. S. T.)—3:30 P. M. to 7 P. M.; 8 P. M. to 10 P. M.; 11:45 P. M. to 1 A. M.

WGST, Atlanta, Ga., 270 (C. S. T.)—9 P. M. to 10 P. M.

WQJ, Chicago, Ill., 448 (C. S. T.)—11 A. M. to 12 M.; 3 P. M. to 4 P. M.

KGW, Portland, Oregon, 491.5 (P. S. T.)—11:30 A. M. to 1:30 P. M.; 5 P. M. to 8 P. M.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—1 P. M. to 2 P. M.; 5:30 P. M. to 8:30 P. M.

WOC, Davenport, Iowa, 484 (C. S. T.)—12:57 P. M. to 2 P. M.; 3 P. M. to 3:30 P. M.; 5:45 P. M. to 6 P. M.

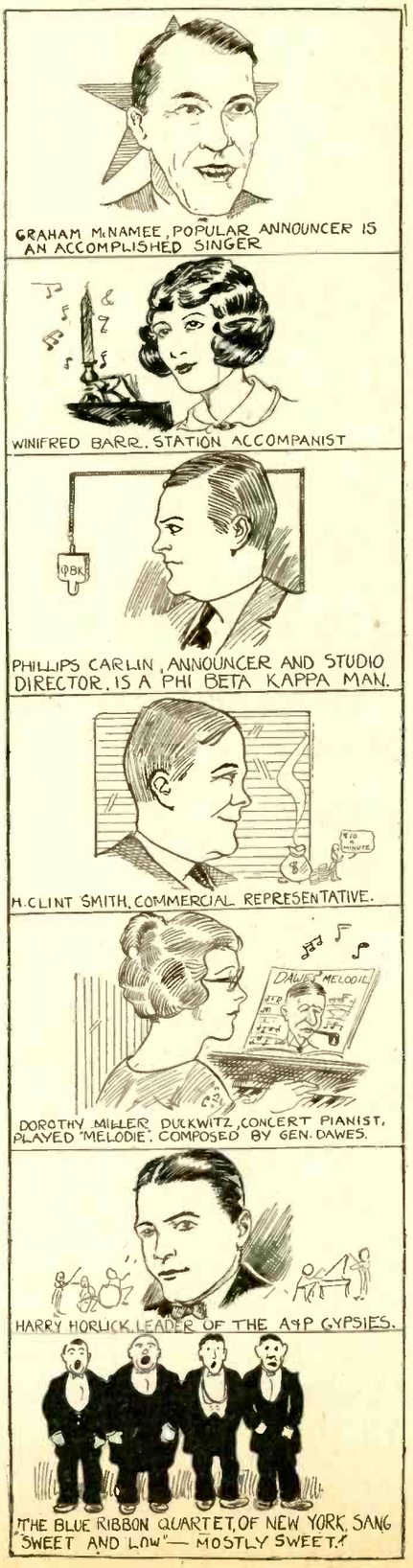
(*Continued on page 26*)

At Station

WEAF

(New York City)

with Irving Hoffman
RADIO WORLD *Cartoonist*



THE RADIO TRADE

Australia Leads in Eastern Market, Japan Second

WASHINGTON.

ALTHOUGH radio got a late start in the Orient compared to the United States, there was an increase of over 300 per cent in exports of radio sets and parts from the United States to Asia, Africa and Australia, during 1924, according to the Department of Commerce, which has just made public a world-wide survey of radio markets and conditions.

Australia is the leading market for American radio manufacturers in these areas, Japan being second in importance and New Zealand third. Exports to British South Africa during 1924 did not rank very high as compared with other world markets, but it is believed that this area presents a good potential market and marked development should take place during the present year.

There follows a survey of radio markets and conditions in the Orient:

Africa: Although the use of radio has not developed extensively it is of interest that broadcasting stations and the use of receiving sets are by no means unknown.

Algeria: There has been practically no market for radio equipment although there are possibilities among the 800,000 Europeans residing in that colony.

Union of South Africa: The Union of South Africa which has its own broadcasting stations presents an active radio market at the present time and it is believed it will progress considerably in the near future. A receiving license is necessary before installing a receiving set. Most of the sets in use are of British origin.

Egypt: The use of radio has not developed to any appreciable extent in Egypt.

Kenya Colony: Broadcasting has not started in this territory, the nearest station being Johannesburg, 3,000 miles distant. There is, therefore, no market for receiving sets.

Madagascar: There is no market at present.

His Number

Japan Offers Market as Ban on Sets Is Lifted

NOW that the Japanese Government has lifted the radio broadcasting ban, and receiving and broadcasting are permitted in Japan without government interference, it looks as if this is going to open up big possibilities for makers of crystal and other low-priced sets. Of course there undoubtedly will be a demand in Japan also for many of the higher-priced sets, but it must be remembered that 999 out of every 1,000 inhabitants of Japan earn wages, in terms of American money, from $3 to $10 per week. Nevertheless, the Japanese are a saving nation and seem always to have money to spend for anything that they really want.

In addition to the native population, there are, of course, many Americans, English and Germans in Japan representing various commercial concerns in their home countries. These non-natives should also be a fertile for the sale of radio sets.

There are several papers published in Japana in the English language, among these being The Japan Advertiser and the Trans-Pacific in Tokyo.

The Trans-Pacific Advertising & Service Bureau, with headquarters in Tokyo, and with American offices at 342 Madison Ave., New York City, are quite right in making this declaration to the trade:

"Those familiar with the Japanese temperament are convinced that they will rapidly develop into a race of radio enthusiasts, and that a new market of vast proportions is now open to American enterprises."

Coming Events

[*Readers are requested to send in dates and places of future events not scheduled in this department.*]

AUG. 22 to 28—3d Annual Pacific Radio Exposition, Civic Auditorium, San Francisco. Write P. R. E., 905 Mission St., San Francisco.

SEPT. 6 to 12—National Radio Exposition, Grand Central Palace, N. Y. C. Write American Radio Exp. Co., 522 Fifth Ave., N. Y. C.

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

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

SEPT. 23 to OCT. 4—International Wireless Exp., Geneva, Switzerland.

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

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

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

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

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

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

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

DEC. 1 to 6—Boston Radio Show, Mechanics' Hall. Write to B. R. S., 209 Massachusetts Ave., Boston, Mass.

Photos to Be Radio Over Ocean from Washington Fair

WASHINGTON.

RADIO manufacturers in all sections of the country are requesting space for exhibits at Washington's second annual radio show in Convention Hall, October 5 to 11. The Radio Corporation of America, the War and Navy Departments and Department of Commerce have promised special educational exhibits. The Radio Corporation will erect a miniature radio broadcasting sttaion. An attempt will be made during the show to transmit photos between the United States and England.

RADIO SERVICE LABORATORY

THE need of a high type of service for efficient adjustment and maintenance of radio receivers has long been in evidence, particularly as a result of the growing popularity of home-made receivers. Insufficient and inexplicit building specifications, faulty design or construction of parts, or the incorrect following of circuit specifications, often lead the builder into difficulties from which he cannot extricate himself.

In such cases, the services of the Radio Laboratory of Rossiter, Tyler & McDonell, Inc., at 136 Liberty Street, New York City, have proved to be of inestimable value in redeeming an otherwise useless investment. This laboratory is fully equipped to locate accurately any existing trouble in any type of receiver. The analytical methods employed have resulted in complete standardization of test and adjustment methods on an engineering basis, whereby not only errors in construction and wiring, but often those in the design of the essential parts, are corrected so as to insure a smoothly-working, sensitive, and efficient receiver.

Particular attention has been paid to the adjustment of superheterodyne receivers. The success of the laboratory in this field has resulted in so great a demand for this service that tests of receivers have often been scheduled more than six weeks in advance.

FEBRUARY EXPORTS $447,591

WASHINGTON.

EXPORTS of radio apparatus from the United States during February, 1925, amounted to $477,591 compared to $784,619 for January. The chief purchasers of American radio equipment during February were Spain, Sweden, United Kingdom, Canada, Mexico, Argentina, Brazil, Chile, Japan and Australia.

RADIO SEASON COMMENCES IN JUNE

RECENTLY completing a coast-to-coast trade survey, Mr. E. Alden, of the Shaw Insulator Company, reports that manufacturers in every section of the United States are advancing their time for production on their new equipment to the month of June. Final housecleaning in the radio industry which has been unusually thorough this year is now practically over.

Business Opportunities Radio and Electrical

Rates: 50c a line; Minimum, 2 lines.

FACTORY, about 20,000 square feet; located in best place in Bridgeport, Conn., for surroundings and labor. Address T. F. S., 11 East 42nd Street, New York City.

RADIO ENGINEER, thoroughly experienced in Radio Manufacture. Give full details, experience and references. Box 19, Radio World.

WELL EQUIPPED MACHINE SHOP, manufacturing special machinery patented, hardware specialties, radio parts; good opportunity for two or more mechanics to acquire well paying, established business. Box 01, Radio World.

HAVE NEW RADIO DEVICE just patented, working on two more; capital combined with business experience wanted and preferred. Box 02, Radio World.

RADIO PATENTS WANTED (not patent applications) by one of the largest radio manufacturers; mail copy of patent and if possible state purchase price. Box 03, Radio World.

FACTORIES FOR SALE—Factories, Long Island, three frame and one brick building, about 35,000 square feet; great bargain; immediate possession for all or will divide buildings and land in parts, electric power; good transportation facilities on concrete highway and railroad, four acres of land; investigate this opportunity. Theo. Voelker, Jr., Lindenhurst, L. I., N. Y. Telephone 9.

SOME FINE SPECIALS

THE 1-A PORTABLE, 1925 Spring Model, a 2-Tube Set of Great DX Powers. Two controls. Described by Herbert E. Hayden in RADIO WORLD, issues of March 28, April 4 and April 11, with trouble-shooting article in April 18 issue. Profusely illustrated, including templates. Send 60c, get all four copies. Address Circulation Manager, RADIO WORLD, 1493 Broadway, New York City.

A 3-TUBE REFLEX FOR THE NOVICE, by Feodor Roïpatkin. Schematic and picture diagrams, panel and assembly. Send 15c for March 28 issue of RADIO WORLD.

A COMPLETE INDEX TO MARCH ISSUES was published in the April 4 issue, the great Third Anniversary Number.

THE OFFICIAL LIST OF STATIONS in the United States, Canada, Cuba, etc., with list of station slogans, was published in May 2 issue. Send 15c for copy to RADIO WORLD, 1493 Broadway, New York City.

MR. DX HOUND

A Character Created By RADIO WORLD Artist

By HAL SINCLAIR

Victor Company Enters Radio With a Loudspeaker

Decision Made Following a $1,616,244 in Phonograph and Record Business, Ascribed to Inroads of Broadcasting — Nothing Said About Resumption of the Operatic Stars' Programs.

PHILADELPHIA.

THE Victor Talking Machine Company is about to enter the radio manufacturing industry. This was revealed officially for the first time when Eldridge R. Johnson, president, reviewed the company's activities in the twenty-third annual report to stockholders at the annual meeting held in Camden. He said:

"Plans, carefully and deliberately developed toward meeting the conditions confronting the industry, are rapidly nearing maturity and are anticipated to maintain your company in its position in the van of the entertainment field."

The conditions referred to as confronting the talking machine industry were the inroads by the radio on talking machine sales in the last Christmas holiday season.

Will Make a Speaker

Officials of the company declined to amplify Mr. Johnson's statement to shareholders. However, it was learned that the company has begun the manufacture of a loud speaker on which it holds exclusive patent rights. This is believed to be the first step in the company's plans, which contemplate the introduction of a combination victrola-radio instrument.

During the shareholders' meeting a new reproducing instrument was introduced and received an enthusiastic reception. Whether or not it is the plan of the company to adapt this to talking machines is not known.

The new loud speaker that the company will introduce is similar in design to a mantel clock of present popular type, measuring about eighteen inches at the base and standing about twelve inches high. The diaphragm is nine inches in diameter. The patent rights for it were purchased from a French inventor several years ago.

Reports in the radio industry say there possibly will be in the future a working arrangement on radio apparatus between the Victor concern and the Western Electric Company.

Business Fell Off

Last year was unusual in the experience of the company, according to Mr. Johnson. In prior years it had been impossible to satisfy the demands of the trade at the Christmas season. Consequently, with the additional facilities provided by the recent plant enlargements, an increased manufacturing schedule, considered adequate for the anticipated demands for the year, was put into effect.

The sales for the first ten months were about on a par with the previous year (one of the largest in the history of the company). However, an exhaustive canvass in October gave indications of a decrease in the holiday trade, owing to the great demand for radio receiving sets. Manufacturing schedules were reduced, but before the output was checked a considerable surplus of instruments had accumulated.

Concerning returns from or resumption of the broadcasts by operatic stars under contract with it, the company said nothing. The broadcasts took place this year only.

A reflection of the inroads made by radio on the talking machine business is revealed by the company's balance sheet as of Dec. 31, 1924, which shows a surplus for the year of $5,008,724, a decrease of $1,616,244, and inventories of $13,495,117, an increase of $1,883,584.

Ignition in Flivvers Blamed for Hum Interference

MADISON, Wis.

EXPERIMENTAL and research work on wavelengths of 20 meters and below has brought out that the ignition systems of many of the present-day automobiles generate radio waves of considerable intensity that can be detected for distances of several hundred feet, according to experts in a local radio laboratory. This fact has been brought out with considerable emphasis a number of times when the operator at 9XH has been in the midst of 20-meter reception from some distant point with excellent success until some representative of the flivver family insisted in parking one of the Auto Radio Broadcasters at the curb with motor running. The music has the same tonal qualities as is characteristic of the hum of the four-coil vibrators with an accompaniment of considerable clicking and scratching noises.

Literature Wanted

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

Trade Service Editor,
Radio World,
1493 Broadway, New York City.

I desire to receive radio literature.

Name .....

City or town.....

State .....

Are you a dealer?.....

If not who is your dealer?

His Name .....

His Address .....

F. H. Kadechka & Sons, Box 194 Wyndmere, N. D.
American Sales Co., 415 Bryson Building, Los Angeles, Cal.
A. M. Morgan, Nantahala, N. C.
Theodore Schmidt, 415 Sherburn Ave., St. Paul, Minn.
Frank Vebber, 694 Cramer St., Milwaukee, Wis.
C. A. Molt, 12 Falmouth St., Lawrence, Mass.
D. M. Kaine, 412 East 154th St., N. Y., N. Y.
M. Davis, Glisland, La.
C. B. Holland, 1190 Laurel Ave., Beaumont, Texas.
Adolph Schell, Box 175, Warden, Wash.
Harvey Oestrich, R. F. D. 1, Horicon, Wis.
Glen Peterson, R. 6, Aledo, Ill.
Howard O. Severeid, Huxley, Iowa.
Joseph Bruzek, 1909 S. 58th Ave., Cicero, Ill.
H. E. Arnold, 22 W. 17th St., Anderson, Ind.
Jerome C. Hill, 1712 S. Nagles Ave., West Tulsa, Okla.
J. M. O'Brien, 1415 Beacon St., Brookline, Mass.
Benjamin F. Hawley, 127 Chestnut, Medina, N. Y.
N. L. Eberhardt, 8106 St. Clair St., Cleveland, Ohio.
Walter Hoffman, 456 New St., Freemansburg, Pa.
John Orszulak, 183 Goodyear Ave., Buffalo, N. Y.
William A. Mundhenk, 545 Terrace Ave., Clifton, Cincinnati, O.

Radio-Controlled Auto Tour Planned Across Continent

ON July 1, America's first radio controlled automobile to make a transcontinental trip, without a driver, will leave New York City for a trip of over 4,000 miles to San Francisco, being controlled by a powerful transmitter in another car following. This car will be accompanied by three other cars. One car will carry receiving sets, and power amplifiers with a group of large loudspeakers, for use in receiving programs, for the public, when the cars are on demonstration in the various cities and towns thru which they will pass. The other cars will carry a display of samples of radio, and electrical equipment used in the construction of the apparatus. The cars will pass through Jersey City, Newark, Trenton, Philadelphia, Wilmington, Baltimore, Washington, Harrisburg, Pittsburgh, Chicago, Omaha, Salt Lake City, Denver, Reno, and Oakland, spending four days in each town. Stations will co-operate.

Great success is expected.

A THOUGHT FOR THE WEEK

YOU wouldn't go to a bakery for a motor boat would you? Then why go to a dry goods store for a radio set?

RADIO WORLD

Title Reg. U. S. Pat. Off.

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

TELEPHONES: LACKAWANNA 6976 and 2063
PUBLISHED EVERY WEDNESDAY
(Dated Saturday of same week)
FROM PUBLICATION OFFICE
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ROLAND BURKE HENNESSY, President
M. B. HENNESSY, Vice-President
FRED S. CLARK, Secretary and Manager
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EDITOR, Roland Burke Hennessy
MANAGING EDITOR, Herman Bernard

SUBSCRIPTION RATES

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

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

ADVERTISING RATES

General Advertising

1 Page, 7¼"x11"	462 lines	$300.00
½ Page, 7¼"x5½"	221 lines	150.00
¼ Page, 4½" D. C.	115 lines	75.00
1 Column, 2¼"x11"	154 lines	100.00
1 Inch		10.00
Per agate line		.75

Times Discounts

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

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

CLASSIFIED ADVERTISEMENTS

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

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

MAY 9, 1925

Roxy and Happiness Boys Among the New Contenders for Popularity Medal

N. T. G., of WHN, Also New on List, as Are Karl Bonawitz, of WIP, and Fred Morton, of KGO, Showing Nation-Wide Scope of RADIO WORLD'S Contest.

THE 1925 test, conducted by RADIO WORLD, to determine who, in the estimation of its readers, is the most popular person before the microphone, is surely nation-wide in its scope. The Pacific Coast is represented among the contestants as well as the Atlantic Coast "and points between." For instance, Ferd Morton, of KGO, the General Electric Company's station in Oakland, Cal., is one of the new contenders, a group of admirers having put him in the running. New England is represented by Leo Reisman, among others. WBZ is the station where Reisman's orchestra sends forth enjoyable music.

Roxy and N. T. G. on List

N. T. G. of WHN, New York City, is well up in the running. His friends know him as Nils T. Granlund. He is the announcer and most of "the works" at the station atop Loew's State Theatre Building, Forty-fifth Street and Broadway, New York City, just across the street from the building in which are housed RADIO WORLD'S editorial, art, advertising, accounting and executive departments. A near-neighbor of RADIO WORLD, Roxy, otherwise S. A. Rothafel, of the Capitol Theatre, Fiftieth Street and Broadway, is well in the running, and it is expected that his hosts of admirers will pour in votes in large quantities. He made an excellent showing in the 1924 test, and indeed nearly won it. Harry Snodgrass, then of WOS, was the victor.

The Happiness Boys, of WEAF, etc., also are new contestants this week. They are Ernest Hare and Billy Jones.

Philadelphia is entered on the lists, too. Karl Bonawitz, of WIP, the Gimbel Brothers' Department Store station in Philadelphia, is one of the contestants from that center of radio activity.. As told last week, other contenders are J. Andrew White, of WJZ, one of the Radio Corporation stations in New York City, and William C. Schlefield, director of the Amphion Quartet, heard often from WGBS, the Gimbel Brothers' Department Store station in New York City.

What About the Women?

This list shows a lively interest being manifested in the contest. But surely there must be some feminine announcers or entertainers who are favorites with fans. It is desirable that those who are strong for the mellifluous voice of rendition of some woman entertainer should begin sending in votes, as experience has shown that those who figure in the early voting are usually well up on the list when the final count is taken. That is due to the spurring effect the early publicity produces. When a fan sees his own favorite in the running he feels duty-bound to send in his own votes for that favorite, whereas otherwise he might have missed the opportunity of registering his choice. In fairness to entertainers who have given enjoyable hours on the air the fans should either rally to their support, if the entertainers are already on the list, or should put them in the running by sending in one vote or more. All those mentioned have received many votes.

Pretty soon RADIO WORLD will begin publication of the standing of the contestants, for there are many ballots on hand already. Watch for the important first list.

Attention Paid to Voters

The voters, too, are entitled to attention, for their early interest is putting the contest over in fine style. Therefore this week we are publishing the names of a few of the many who have cast ballots so far. There is not enough room to publish all the names, but just as an appreciative gesture we announce half a dozen who are among the honored electorate.

J. C. Prichard, Michigan Ave., Swarthmore, Pa.

Arthur Partridge, Box 382, Augusta, Me.

Charles Schlosser, 127 Monticito Ave., Oakland, Cal.

Louis Schilling, Jr., 14 Boyden Parkway, Hilton, N. J.

John Harkins, 325 East 36th Street, New York, N. Y.

Theodor Glissmann, 198 Wall St., Huntington, N. Y.

In some instances you may be able to guess the identity of the entertainer for whom the voter cast his ballot or ballots. Remember that every ballot is one vote, and that if you get a copy of RADIO WORLD every week you may cast a vote a week, and should do so. By subscribing you may cast the total number of votes represented by the entire subscription, in addition to the votes based on coupons to be published up to the July 25 issue.

RADIO WORLD'S POPULARITY TEST

To Determine the Gold Medal Radio Entertainer for 1925

Popularity Editor, RADIO WORLD,
1493 Broadway, New York City.

I hereby cast one ballot for:

(Name of Entertainer).....

(Entertainer's Station).....

(Voter Sign Full Name Here).....

(Street and Number).....

(City)..... **(State)**.....

FILL OUT THIS COUPON AND MAIL NOW!

No. 5,5-9.

THE RADIO UNIVERSITY

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

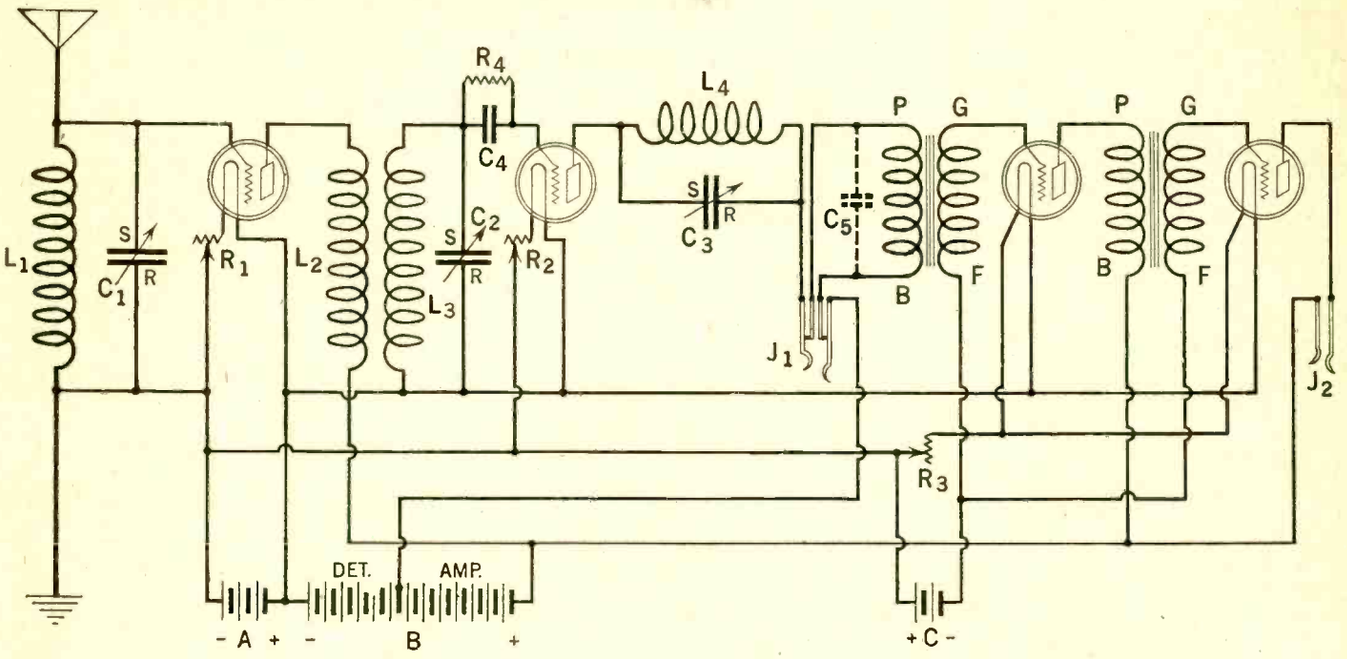


FIG. 138—Diagram of a very efficient tuned radio-frequency set, employing regeneration in the detector. L1 may be 37 turns wound on a 3" tubing, CIC2C3 are all .0005 mfd. variable condensers, L2 has 10 turns, L3 has 42 turns, L4 has 35 turns on a separate 3" tubing. Use No. 22 DCC wire throughout. C4 is a .00025 mfd. fixed condenser, C5 is a .001 mfd. fixed condenser. A 6-ohm rheostat is used for UV201A at R3, and the others 20 ohms. J1 is a double-circuit jack while J1 is a single-circuit jack. The C battery is of the Eveready type, having a maximum voltage of 4½ volts. R4 is a grid leak of about 2 or 3 meghoms. Note that the condenser rotors are grounded.

PLEASE publish a hookup of a 4-tube reliable receiver employing one step of radio-frequency amplification, detector with regeneration, and two steps of audio-frequency amplification. I want a set I can log.—L. P. Phillipson, Bronx, N. Y.

Fig. 138 shows the diagram.

* * *

PLEASE give specific directions as to the operating of a storage battery.—L. S. Clovers, Nowleton, Nevada.

The first thing that we want to do is to retard evaporation. This is done by keeping the electrolyte above the top of the plates by adding pure, fresh water (distilled) to a height of ½" (no more) above the top of the plates. The best time for adding water is just before a charge. Never add water while charging or immediately after. Do not use metallic receptacles for holding the water. A very important caution is to keep ignition of all kinds (match, candle, lantern, cigar, etc.) away from the battery at all times. Keep all filling plugs in place, except when necessary to remove them for adding water, reading specific gravity or observing gassing. When adding water do not forget after you are finished to replace the plugs and tighten them. Charge the battery twice a month. Charge the battery until all the cells have been gasing or bubbling freely for one hour. Before the semi-monthly charge and before adding water to the cells, read and record the specific gravity of each cell of the battery. Immediately after the semi-monthly charge, read and record the specific gravity of the cells. If the gravity of any cell shows a marked falling off to the rest of the cells, promptly investigate the cause and correct it. If a cell becomes dead from a leaky jar, cut it out of the circuit by opening up the connector and restore with a jumper. If a jar develops a leak, promptly replace it. The battery should be kept clean at all times. Keep all connections tight and free from corrosion. Do not allow impurities to get into a cell.

* * *

I PURCHASED a radio set about two years ago. I find that I have to buy new B batteries every two or three months. The batteries are of the small size. How long should a set of batteries last when they are only used about five hours daily?—L. Filman, Cataract, Cal.

There are many points which determine the life of batteries. The type and number of tubes, the voltage used on the amplifier and whether or not a C battery is employed, are all taken into consideration when determining this. Since you are using the small batteries you cannot expect them to last more than two months, as the amperage of such a battery is only about 3½ to 5.

* * *

I WOULD like some advice on the winding of a basketweave RFT.—P. B. Rand, St. Tileson, Miss.

A basketweave RFT is excellent. It is wound on a form having a core of 3" diameter, primary 10 turns, No. 22 DCC and a 50-turn secondary, same wires wound above in the same direction. Condenser across secondary .0005 variable.

* * *

WOULD you kindly tell me how to make my Freshman Masterpiece regenerative? (2) I would like to get down to 80 meters with the same set. —D. Kupperberg, Bronx, N. Y.

(1) To make the set regenerative insert a variometer in series with the plate circuit of the detector tube. (2) You cannot make this receiver a short wave type on account of the transformers used. The only type of a short-wave receiver in general use today is the simple 3-circuit regenerative tuner. You can make a coil for short waves with a primary containing 6 or 7 turns and a secondary containing 16 turns, which is wound on a 3" tube, the spacing between the turns being ¼". Number 22 DCC is used.

* * *

I HAVE a Garod Neutrodyne which I have had for the past four months. I find that the stations do not come in on the same numbers that they did when I first bought the outfit.—J. L. Robert, N. Y. C.

Your neutralizing condensers are at fault or you are using new tubes which have a different capacity from those to which you set was neutralized. The best thing to do would be to reneutralize your set.

* * *

WHAT three types of receivers are there?—L. C. Chapin, 1492 Franklin Ave., N. Y.

All radio receivers are classified according to the way in which their primary and secondary circuits are coupled. Inductive coupling and capacity coupling are generally used. In the conductively coupled receiver, the incoming radio-frequency currents are transferred from the antenna to the detector circuit by direct wired connection (physical contact). This receiver provides a very close coupling of the antenna and detector circuits. This receiver is limited as to selectivity. Of course by employing taps the coupling may be varied a little so as to get better selectivity. In an inductively-coupled receiver the radio-frequency currents are generated in the antenna circuit. The antenna, coil and condensers act inductively on the secondary, which is tuned to resonance with the antenna circuit by a variable condenser. The selectivity of this receiver is greater than that of the other type, because coupling of the antenna and detector circuits may be varied from zero to maximum. In the capacity-coupled receiver the incoming radio-frequency currents are transferred from antenna to the detector circuit by the medium of an electrostatic field. The tuning coils in the antenna and the coil in the detector are at right angles. The coupling between the inductances is varied by changing the capacity of the coupling condensers. The capacity of these condensers as varied simultaneously, as they are mounted on the same shaft. Straight inductive coupling, the most popular type is the third method, and consists of coils, usually fixed, with a variable condenser tuning the secondary, the aerial coil transferring the energy to the secondary by induction.

* * *

WHAT is the spark frequency of the closed oscillation circuit? (2) describe resonance in all its applications. (3) How would you determine the purity of the radiated wave? (4) What is the difference between an ampere and the coulomb?—Frank J. Jolly, Ogdensburg, N. Y.

The spark frequency of the set is the number of sparks that bridge the gap of the closed oscillation circuit per second. It is to a great extent the function of the alternator frequency. Oscillation frequency is the wave train frequency and is the number of wave trains that leaves the an-

(Concluded on next page)

The Radio University

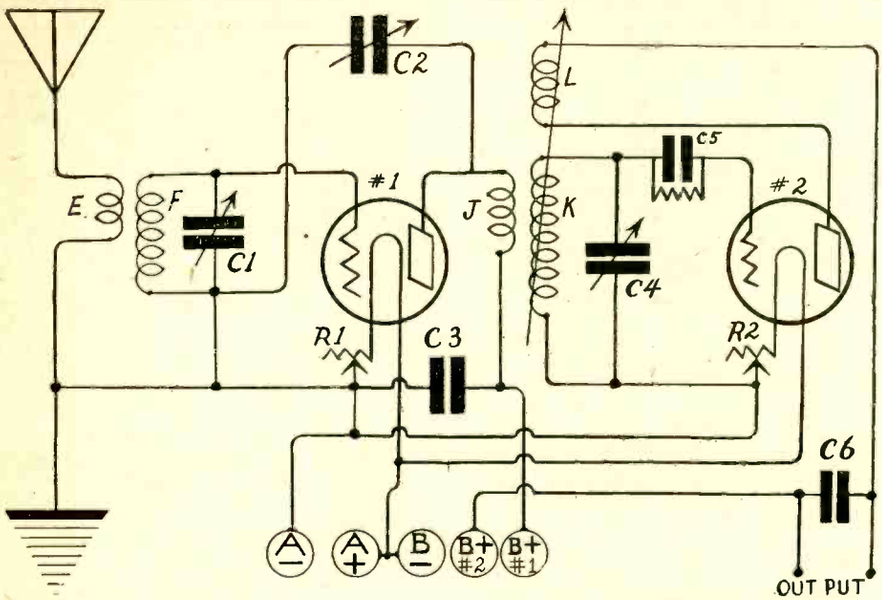


FIG. 139—A 2-tube receiver possessing great selectivity. E contains 12 turns, wound on a 3" tubing. C1C4 are .0005 mfd. variable condensers, C2 is a Chelten Midget, C3 is a .001 mfd. fixed condenser (great care should be made that this condenser is O. K. because your tube will go west if this shorted). F has 50 turns, J has 14 turns, K has 55 turns, L has 40 turns, all wound on a 3" tubing. The spacing between J and K is ½". The detector tube No. 2 has a grid leak of 3 meghoms and the condenser is .00025 mfd. Number 22 SCC wire is used.

tenna per second. (2) A pure wave is one which when there are two frequencies, the energy in the lesser wave is in amplitude less than 10% of that in the greater wave. We use a decremeter, which is nothing more than a wavemeter in series, with which is connected a "current square" meter by which the amplitude of current of the transmitted wave may be measured. A reading of the current corresponding to the resonance position on the wavemeter may be compared with a reading at such wavelength where the current value in the "current square" meter drops to ½ the value at resonance. (3) To determine the resonance of a circuit a galvanometer ("current square") is connected in series with the wavemeter circuit. The wavemeter is placed in inductive relation to the circuit which is under measurement. Set the wavemeter in resonance to either of the radiated waves. Corresponding current readings are taken on the meter while the station is on the air. Readings are now made at frequencies off resonance, corresponding current being observed and the resulting data being plotted on in curve form on the graph paper. The meter will deflect when the peak of each wave is registered. A resonance curve is really a graphic way of showing the relation between the wavelength and the current amplitude in the radiated wave. (4) The ampere is the value of current which is maintained in a circuit having a resistance of one ohm by an electromotive force of one volt. The coulomb is the unit of quantity flowing in a circuit when one ampere passes a given point during one second of time.

• • •

IF I reverse the polarity of plate and filament, would that have any effect on the vacuum tube?—D. Dorsman, Leonia, N. J.

If the polarity of the filament and the plate were reversed the tube might cease to function, because the current in the plate can flow in one direction only, viz., from the plate to filament. The terminal of the plate must always go to the positive side of the B battery. To reverse the polarity if the filament would only affect the volume, that is the signal strength would increase or decrease, depending upon the adjustment of the tube in the factory.

• • •

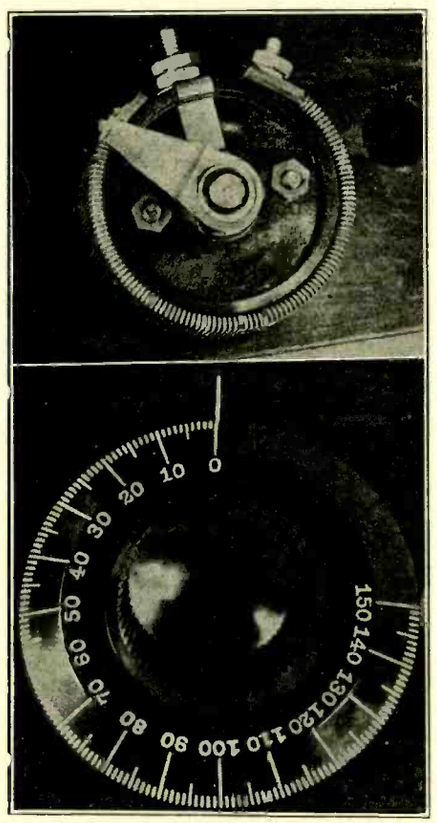
A DIAGRAM is requested of a 2-tube set employing regeneration in the detector and neutralization across the radio-frequency tube.—H. D. Plansers, Great Barrington, Vt.

Fig. 139 shows such a receiver.

• • •

WHY do you not use low resistance phones with crystal radiophone sets?—P. Philben, Clarkson, Pa.

Within certain limits, a given amount of flux lines (total number of static or magnetic lines of force in a given space) may be obtained from a coil which has been magnetized, carrying a strong current, or from a coil containing an immense number of windings carrying a comparatively weak current. The strength of the current flowing in the telephone circuit of a crystal receiver is very weak, amounting to about 1 or 2 microamperes. Land signals can only be obtained from a telephone having a large number of turns. The height of vibration of a telephone diaphragm with a current of a given strength depends upon the product of the current and the number of turns of wire in the magnet coils or in other words upon the ampere-turns of the electromagnet. Usually the receiver used for crystal reception has a resistance of about 1,500 to 4,000 ohms. Very fine wire is used in the electromagnet to produce this high resistance, usually number 38 enameled. Receivers having a resistance of 1000 ohms do not contain a sufficient number of turns to obtain the highest magnetic effect from weak currents.



THE CORRECT WAY to connect a rheostat is to join the post at left in top photo to the filament minus post of socket and the other rheostat post (not making contact with traveller arm) to A battery minus. Then when the rheostat is turned on the full resistance is in the circuit; the tube lights dimly and as the dial or knob is turned, becomes brighter. A clockwise dial (lower photo) or right-hand knob movement is used.

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

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

Name .....

Address .....

City or Town .....

State .....

JOIN THE A. B. C.

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

Fred Hughes, Ingramport, Halifax, Nova Scotia.
A. E. Hinman, 227 Valley Ave., Grand Rapids, Mich.
C. B. Holland, 1190 Laurel Ave., Beaumont, Texas.
S. C. Smith, 2613 Jeffries Ave., Los Angeles, Cal.
J. Trainor, Station B, Box 94, Brooklyn, N. Y.
Manuel Velazquez, Concha y Rodriguez, Havana.
John W. Singleton, Conway, N. H.
F. B. Peters, U. S. Naval Radio Station, Cape May, N. J.
H. R. Upson, Jr., 15 Clinton St., Batavia, N. Y.
Paul M. Hayes, 918 Bell, Pasadena, Cal.
John H. Jebens, Jr., 29 Argyle Ave., Bablyon, L. I., N. Y.
H. Borgne, 8643 E. Forest, Detroit, Mich.
C. G. Leasure, 1020 Oak Hill Ave., Youngstown, Ohio.
N. H. Reynolds, 966 55th St., Oakland, Cal.
Roy Ferris, Yuba City, Cal.
Fred Edwards, Lostine, Ore.
Harold A. Wakely, 784½ 12th St., Milwaukee, Wisc.
Alfonso Scolari, Los Alamos, Cal.
Ralph E. Berry, Conway, N. H.
J. Kane, 112a 1st Ave., Ladine, Montreal.
C. Noelle, 11133 Teler Ave., New York, N. Y.
Ernest Appert, Eddy Hotel, Hawley, Pa.

"HOW TO MAKE—"

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

Sept. 6, 1924—A simplified Neutrodyne with Grid-Biased Detector, by J. E. Anderson. A Low-Loss Wave Trap, by Brewster Lee.
Nov. 15—A Sturdy Low-Loss Coil, by Lieut. P. V. O'Rourke. An Ultra 2-Tube Receiver, by Byrt C. Caldwell.
Dec. 6—A 6-Tube Super-Heterodyne Using a Variometer, by J. E. Anderson. A $1 Coil Winder, by Herbert E. Hayden.
Dec. 13—The World's Simplest Tube Set, by Lieut. P. V. O'Rourke.
Dec. 20—A 1-Tube DX Wonder, Rich in Tone, by Herman Bernard. An Interchangeable Detector, by Chas. M. White.
Dec. 27—A 2-Tube Variometer Set, by Lieut. P. V. O'Rourke.
Jan. 3, 1925—A 2-Tube Portable That Needs No Outdoor Aerial, by Abner J. Gelula.
Jan. 10—A Low-Loss DX Inductance, by Herbert E. Hayden.
Jan. 17—A $25 1-Tube DX Wonder, by Abner J. Gelula.
Jan. 24—A Selective $15 Crystal Set, by Brewster Lee. A Variometer-Tuned Reflex, by Abner J. Gelula. An $18 1-Tube DX Circuit for the Beginner, by Feodor Rofpatkin.
Jan. 31—A Transcontinental 2-Tube Set, by H. H. Wright. An Experimental Reflex, by Lieut. P. V. O'Rourke.
Feb. 7—The Bluebird Reflex, by Lieut. P. V. O'Rourke. A $5 Home-Made Loudspeaker, by Herbert E. Hayden.
Feb. 14—A Super-Sensitive Receiver, by Chas. H. M. White. A Honeycomb RFT for DX, by Herbert E. Hayden.
Feb. 21—A 1-Tube Reflex for the Novice, by Feodor Rofpatkin. A Set for Professional Folk, by Lieut. P. V. O'Rourke. A Honeycomb Crystal Receiver, by Raymond R. Wailes.
Feb. 28—A Set That Does the Most Possible With 6-Tubes, by Thomas W. Benson. Three Resistance Stages of AF on the 3-Circuit Tuner, by Albert Edwin Sonn.
March 7—Storage B Battery, by Herbert E. Hayden. Benson's Super-Heterodyne.
March 14—The Reflexed 3-Circuit Tuner That You Can Log, by Herman Bernard.
March 21—A Variable Leak, by Herbert E. Hayden. A 4-Tube, 3-Control Set That Gets the Most DX, by Lieut. P. V. O'Rourke.
March 28—The Improved DX Dandy Set, by Herbert E. Hayden. A 2-Tube Reflex for the Novice, by Feodor Rofpatkin.
April 4—The Diamond of the Air, by Herman Bernard. What the New Sodion Tube Is, by Sidney E. Finkelstein. Sets for the DX Devotee, by Lieut. P. V. O'Rourke.
April 11—Audio Hookups for Fine Volume and Quality as Well, by Brewster Lee. The Coils for The Diamond, by Herman Bernard. 1-Tube Distance-Getting Sets, by Lieut. V. P. O'Rourke.

Any copy 15c., Any 7 copies, $1.00. The whole 21 copies for $2.00, or start subscription with any issue. Radio World, 1493 Broadway, N. Y. City.

New Device Reduces Static

STATIC is an electrical spark discharge which when emitted from the clouds may have an infinite number of wave lengths which will naturally be heard all over the dials, regardless of the receiver employed. When a spark transmitter emits a radio-frequency wave, which is at least tuned to a specific wavelength, the spark can be tuned out, but when static discharges are barely received, there is no specific wavelength on which it is transmitted. This is a natural cause and can not be entirely eliminated, although it can be reduced. The static discharge is usually sent out at a tremendous number of kilowatts. But the ratio of static to signal strength can be reduced, in other words, the signal can be given the better of the argument. One way of accomplishing this is to use a crystal as the detector.

Improvement Made

The tone quality is increased and the static effect decreased, as compared to tube detection. A crystal detector rectifies signals as they are sent out, and as it can not amplify, there is no distortion. Static is not amplified.

One old method of attempting to reduce static was to put a gap between antenna and ground, so that the static discharge would leap across the gap. and go to ground, avoiding the receiver. However, this experiment alone hasn't been very successful.

Radio listeners are interested in reducing static as much as possible, because it is almost exclusively a summer nuisance, and if not controlled in any way may not only spoil reception occasionally, but actually prevent it for stretches of varying duration.

New Device Introduced.

The Morrison Radio Company, Chicago, have a static reducing device which is serviceable in Neutrodyne and other tuned or untuned radio-frequency sets. It is inserted in the detector socket, instead of the present tube. A metal rod is placed across the grid condenser, instead of the leak. The B plus detector tap is disconnected from the set, and this binding post on the set is connected instead to minus A. In some cases the change to positive A is better than to negative A.

The device has a base and terminals, the same as a tube, and comes in airtight form. The logging of the set is not affected by the introduction of this device.

In a Regenerative Set

If a regenerative detector stage is used, the regeneration had better be transferred to a radio-frequency stage, and then the Morrison static reducer inserted instead of the detector tube. It is also handy to have the device at any time in case you blow out a tube and have none at hand to replace it.

ROFPATKIN'S SET

(*Concluded from page 4*)

List of Parts

Three inductance units as described.
Two .0005 mfd. variable condensers.
Three sockets.
Three UV20 1A of C30 1A tubes.
Two .00025 mfd. fixed condensers.
Three .002 mfd. fixed condensers.
One .001 mfd. fixed condenser.
Two audio-frequency transformers (if of different ratios, higher ratio in the reflexed stage).
One 7x18" panel.
One 7x17" baseboard.
One fixed crystal detector (for aerial).
One Freshman crystal for detector.
One 6-volt storage battery.
Two 45-volt B batteries.
One cabinet.
One loudspeaker.
One single-circuit jack and one plug.
Aerial wire, 50 ft. No. 24 insulated leadin wire, ground clamp, lightning arrestor.

model. It is shown at right in Fig. 3.

Only one jack is used, that for the speaker output. It is of the single-circuit type.

Wiring Directions

The wiring is mostly along standard lines. Note, however, that L4, aside from being bridged by the condenser C2, is not physically connected to anything. It acts in an absorption manner if need be, otherwise may be tuned to resonance for greatest signal strength. C1 and C2 may be logged. L7 will be adjusted to that point which affords most desirable volume, and this will vary with tube and atmospheric conditions, as well as according to the momentary choice of the listener.

The stator plates of the variablbe condenser C1 are connected direct to grid and the rotor plates go to ground, eventually. The other condenser, C2, is wired with the same regard to polarities, the stator plates going to the side nearer the grid connection, the rotor plates to that terminal of L4 nearer the B plus side of the primary L3.

Some confusion may result from the wiring of the reflexed stage. One connection or terminal of the primary L1 goes to aerial, the other to ground. That terminal of L2 nearer to the aerial terminal of L1 goes to grid and to the stator plates of C1, the other terminal of L2 to the rotor plates and eventually to ground, as will be described. C3 is connected with one side to the G post of the first AFT, the other side being joined to one side of C4. At this joint the lead is connected from ground. The other side of C4 goes to the F post of the first AFT (end of secondary of the AFT), and also is joined to negative A battery. In making the primary connections to this AFT, join one side of the crystal detector to the P post and the other side of the detector to the terminal of L6 nearest the connection made on L5 to plate. The other side of L6 goes to the B post of the first AFT. Now connect one side of C5 to the P post, the remaining side of C5 being joined to one side of C6 and also to ground, leaving the remaining side of C6 to be joined to the B post of the AFT. These condensers are mounted on the transformers, as is C7.

Tubes to Use

The tubes may be UV20 1A or C30 1A, in which case R1 is 20 ohms and R2 from 10 to 15 ohms. If the 199 or equal tubes are used the values are 35 ohms and 20 ohms. The 11 or 12 type tubes may be used with 6-ohm rheostat.

The set as described will cover the broadcast band of wavelengths. For ease of tuning in stations on the lower waves, use straight-line frequency or straight-line wavelength condensers for C1 and C2.

KDKA Heard in Australia

LONDON.

THE MORNING POST prints the following dispatch from Sydney, New South Wales:

"Last night's wireless telephonic test was the most successful so far recorded. Several musical items were broadcast on a 65-meter wave length from the local station. The experimenters heard a complete program from KDKA, Pittsburgh, 9,000 miles distant.

"Success was primarily due to the secrecy with which the plans were made."

Free Radio School Opened by "Cleveland Press"

THE "Cleveland Press" has opened a Radio School to the general public. More than 1,600 persons are attending the sessions every week. Motion pictures are used at this school to show radio sets in the process of being assembled.

David Dietz, radio writer for The Press, delivers a 60-minute lecture, after which he answers any radio questions the audience cares to ask.

Loew's State Theatre is used.

THE OFFICIAL LIST OF STATIONS in the United States, Canada, Cuba, etc., with list of station slogans, was published in May 2 issue. Send 15c for copy to RADIO WORLD, 1493 Broadway, New York City.

The Toroid 5-Tube Circuit

(*Concluded from page 9*)

wiring as short as possible for simplicity's sake.

Other Parts Used

C4 is the grid condenser, .00025 mfd., while R3 is a variable grid leak.

C5 is a .001 mfd. bypass condenser, R1 and R2 rheostats of a value depending on the type of tubes used. For UV201A or C301A, good tubes to use throughout in this circuit, R1 would be 20 ohms and R2 10 ohms.

Note that the ground is connected both to the end of the primary L1 and to the end of the secondary L2, this being accomplished by a jumper wire placed on the RFT.

Operation of the Set

The set was able to bring in distant stations without any difficulty, under good conditions. Speaker volume from stations 1,000 miles away was excellent.

Tuning does not prove difficult, either, since the control of regeneration is smooth. The set may be logged, as to the two condensers, C1 and C2, and indeed C3 is "loggable" to a considerable degree, also. C1 and C2 give dial readings that will be about the same for all sets, but C3 may give certain dial readings on one set and other readings on another, depending on internal tube conditions. But, generally speaking, once a station is brought in at certain settings it will come in at the same settings, if it is receivable at all.

The toroidal coils, moreover, do a great deal toward making the set one that can be recommended for general use even by non-experts at tuning, since over-regeneration, with its accompanying squeals, does not bother the neighbors much, if at all. The field is so greatly concentrated that little energy is radiated, scarcely ever enough to produce an audible beatnote in a neighbor's set.

WSB to Occupy New Site This Summer, Using 2,500 Watts

ATLANTA, GA.

THE Atlanta Journal, operators of WSB, announce the purchase of a new type of high-powered Western Electric transmitter for installation this summer on the topmost floor of the Atlanta Biltmore hotel here.

The new broadcasting unit for "The Voice of the South" will be one of the first two produced by the Western Electric factories and represents the most advanced engineering achievements in improved modulation, power and efficiency. The station has no prototype in the air today.

While rated at 1,000 watts, the actual power attained when voice or music are in the air will reach a peak of 2,500 watts. Use of a new type of 4,000-watt, water-cooled amplifying tube and a capacitively-coupled circuit will insure elimination of harmonics and will sharpen the station wave at its prescribed frequency.

The new location will be on the roof of the Biltmore hotel, ten stories high.

Mrs. W. K. Vanderbilt and Anne Morgan in Radio Plea

AN all-feminine appeal was made by radio in the interests of the Business Women's proposed $4,500,000 home, when 19 women, notable in society and on the stage, broadcast from WAHG in Richmond Hill, N. Y.

Among those who took part in the program were Mrs. W. K. Vanderbilt, Miss Anne Morgan, Mrs. Newcomb Carlton, Miss Robinson Smith, Marie Dressler, Muriel Pollock, Florence Nash, Daisy Jean, Guimar Novaes, Amelia Bingham, Elizabeth Hines, Janet Beecher, Olive Wyndham, Julia Kelety, Doris Kenyon, Rhea Silberta, Olga Samaroff, Marguerite Namara and Carroll McComas.

Kodel Station Gives Artists List of Applauders

STATION WKRC, Cincinnati, has created a new idea in broadcasting, in which the entertainers who appear on their programs are advised at regular intervals of the people who have called in appreciation of their programs mentioning their numbers. This includes letters and telegrams and the list is kept and mailed to each individual artist in a letter signed by Gene Mittendorff, studio director of station WKRC. A statement by F. J. Koons follows:

"We use a very neat folder on which there is an individual letter sent to the artist, expressing our appreciation of their programs. Following the letter is a list of names of people who get in touch with us regarding the program offered by the artist to whom the letter is sent. The final sheet tells of the service offered to the public by those who appear on radio programs.

"We find that by showing the individual entertainers this courtesy and keeping them informed of the interest which they are creating and the following they are building up, that we have their entire co-operation and it is therefore easy for us to arrange good programs. People do not realize how much it means for a broadcasting station to have comments sent in. We are sure other stations will follow suit and soon will be building a strong good will between the public, the radio entertainers and the broadcasting station.

"This idea was created by Clarence E. Ogden, president of the Kodel Radio Corporation, who are operating broadcasting station WKRC, a 1,000 watt station, in their studio at the Hotel Alms, Cincinnati. Plans are under way to increase the power of this station when we go on the air with our new equipment this fall."

Hearst-Schenck Stations Warned There's No Room for Some

WASHINGTON.

PROMOTERS of the William Randolph Hearst-Joseph Schenck scheme for erecting a chain of broadcasting stations throughout the country have been warned by the Department of Commerce that they will do so at the risk of being unable to obtain wavelengths for them.

At the present time every Class B wavelength has already been assigned and there is a long waiting list.

THE KEY TO THE AIR

(*Continued from page 17*)

WRC, Washington, D. C., 469 (E. S. T.)—1 P. M. to 2 P. M.; 4 P. M. to 6 P. M.

WGBS, New York City, 316 (E. S. T., D. S.)—10 A. M. to 11 A. M.; 1:30 P. M. to 3:10 P. M.; 6 P. M. to 7:30 P. M.

KSD, St. Louis, Mo., 545.1 (C. S. T.)—7:30 P. M. to 10 P. M.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—12:30 P. M. to 1 P. M.; 8:30 P. M. to 10 P. M.

WOR, Newark, N. J., 405 (E. S. T., D. S.)—6:45 A. M. to 7:45 A. M.; 2:30 P. M. to 4 P. M.; 6:15 P. M. to 11:30 P. M.

WHN, New York City, 360 (E. S. T., D. S.)—2:15 P. M. to 5 P. M.; 6:30 P. M. to 12 P. M.

WHAD, Milwaukee, Wis., 275 (C. S. T.)—11 A. M. to 11:30 A. M.; 6 P. M. to 10:30 P. M.

WAAM, Newark, N. J., 263 (E. S. T., D. S.)—11 A. M. to 12 M.; 7 P. M. to 11 P. M.

WNYC, New York City, 526 (E. S. T., D. S.)—3:15 P. M. to 4:15 P. M.; 6:20 P. M. to 11 P. M.

WIP, Philadelphia, Pa., 508.2 (E. S. T., D. S.)—7 A. M. to 8 A. M.; 1 P. M. to 2 P. M.; 3 P. M. to 8 P. M.

WEAF, New York City, 492 (E. S. T., D. S.)—6:45 A. M. to 7:45 A. M.; 4 P. M. to 5 P. M.; 6 P. M. to 11:30 P. M.

Tuesday, May 12

KGO, Oakland, Cal., 361.2 (P. S. T.)—11:30 A. M. to 1 P. M.; 1:30 P. M. to 3 P. M.; 4 P. M. to 6:45 P. M.; 8 P. M. to 1 A. M.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M. to 5 P. M.; 7:30 P. M. to 9 P. M.

KNX, Hollywood, Cal., 337 (P. S. T.)—9 A. M. to 10 A. M.; 1 P. M. to 2 P. M.; 4 P. M. to 5 P. M.; 6:30 P. M. to 12 A. M.

WHO, Des Moines, Iowa, 526 (C. S. T.)—12:15 P. M. to 1:30 P. M.; 7:30 P. M. to 9 P. M.; 11 P. M. to 12 P. M.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T., D. S.)—12:30 P. M. to 1:30 P. M.; 4:30 P. M. to 5:30 P. M.; 6:30 P. M. to 11 P. M.

WOO, Philadelphia, Pa., 508.2 (E. S. T., D. S.)—11 A. M. to 1 P. M.; 4:40 P. M. to 5 P. M.; 10:55 P. M. to 11:02 P. M.

KPO, San Francisco, Cal., 429 (P. S. T.)—7 A. M. to 7:45 A. M.; 10 A. M. to 12 M.; 1 P. M. to 2 P. M.; 3:30 P. M. to 11 P. M.

WEEI, Boston, Mass., 476 (E. S. T., D. S.)—6:45 A. M. to 8 A. M.; 1 P. M. to 2 P. M.; 6:30 P. M. to 10 P. M.

WAMD, Minneapolis, Minn., 243.8 (C. S. T.)—12 P. M. to 1 P. M.; 10 P. M. to 12 P. M.

KFOA, Seattle, Wash., 455 (P. S. T.)—12:30 P. M. to 1:30 P. M.; 4 P. M. to 5:15 P. M.; 6 P. M. to 11 P. M.

KFKX, Hastings, Neb., 288.3 (C. S. T.)—12:30 P. M. to 1:30 P. M.; 5:15 P. M. to 6:15 P. M.; 9:30 P. M. to 12:30 P. M.

KYW, Chicago, Ill., 536 (C. S. T., D. S.)—6:30 A. M. to 7:30 A. M.; 10:30 A. M. to 1 P. M.; 2:15 P. M. to 4 P. M.; 6:02 P. M. to 11:30 P. M.

WBZ, Springfield, Mass., 333.1 (E. S. T., D. S.) 6 P. M. to 11 P. M.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—10:30 A. M. to 11:30 A. M.; 12:30 P. M. to 1 P. M.; 2:30 P. M. to 6 P. M.; 6:45 P. M. to 7 P. M.; 8:30 P. M. to 9:30 P. M.; 11 P. M. to 12 P. M.

WLW, Cincinnati, O., 422.3 (E. S. T.)—10:45 A. M. to 1 P. M.; 1:30 P. M. to 2:30 P. M.; 3 P. M. to 5 P. M.; 6 P. M. to 11 P. M.

KDKA, Pittsburgh, Pa., 309 (E. S. T.)—9:45 A. M. to 12 M.; 1:30 P. M. to 3:20 P. M.; 5:30 P. M. to 10:45 P. M.

WJZ, New York City, 455 (E. S. T., D. S.)—10 A. M. to 11 A. M.; 1 P. M. to 2 P. M.; 4 P. M. to 6 P. M.; 7 P. M. to 11 P. M.

WJY, New York City, 405 (E. S. T., D. S.)—7:30 P. M. to 11:30 P. M.

WOAW, Omaha, Neb., 526 (C. S. T.)—12:30 P. M. to 1:30 P. M.; 5:45 P. M. to 11 P. M.

WGR, Buffalo, N. Y., 319 (E. S. T., D. S.)—11 A. M. to 12:45 P. M.; 7:30 P. M. to 11 P. M.

WCCO, St. Paul and Minneapolis, Minn., 416.4 (C. S. T.)—9:30 A. M. to 12 M.; 1:30 P. M. to 4 P. M.; 5:30 P. M. to 10 P. M.

WBBM, Chicago, Ill., 226 (C. S. T.)—8 P. M. to 12 P. M.

KHJ, Los Angeles, Cal., 405.2 (P. S. T.)—7 A. M. to 7:15 A. M.; 12 M. to 3:30 P. M.; 5:30 P. M. to 11 P. M.

WGY, Schenectady, N. Y., 266 (C. S. T.)—11 P. M. to 2:30 P. M.; 5:20 P. M. to 7:30 P. M.; 9 P. M. to 11:30 P. M.

WOC, Davenport, Iowa, 484 (C. S. T.)—12:57 P. M. to 2 P. M.; 3 P. M. to 3:30 P. M.; 5:45 P. M. to 10 P. M.

WRC, Washington, D. C., 469 (E. S. T.)—4:30 P. M. to 5:30 P. M.; 6:45 P. M. to 11 P. M.

WEAF, New York City, 492 (E. S. T., D. S.)—5:45 A. M. to 7:45 A. M.; 11 A. M. to 12 A. M.; 4 P. M. to 5 P. M.; 6 P. M. to 12 P. M.

WGBS, New York City, 316 (E. S. T., D. S.)—10 A. M. to 11 A. M.; 1:30 P. M. to 3 P. M.; 6 P. M. to 11:30 P. M.

KSD, St. Louis, Mo., 545.1 (C. S. T.)—6 P. M. to 7 P. M.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—12:30 P. M. to 1 P. M.; 8:30 P. M. to 10:30 P. M.

WPG, Atlantic City, N. J., 299.8 (E. S. T., D. S.) 7 P. M. to 11 P. M.

WDAF, Kansas City, Kansas, 365.6 (C. S. T.)—3:30 P. M. to 7 P. M.; 11:45 P. M. to 1 A. M.

WQJ, Chicago, Ill., 448 (C. S. T.)—11 A. M. to 12 M.; 3 P. M. to 4 P. M.; 7 P. M. to 8 P. M.; 10 A. M. to 2 A. M.

KGW, Portland, Oregon, 491.5 (P. S. T.)—11:30 A. M. to 1:30 P. M.; 5 P. M. to 11 P. M.

WOR, Newark, N. J., 405 (E. S. T., D. S.)—6:45 A. M. to 7:45 A. M.; 2:30 P. M. to 4 P. M.; 6:15 P. M. to 7:30 P. M.

WHN, New York City, 360 (E. S. T., D. S.)—12:30 P. M. to 1 P. M.; 2:15 P. M. to 3:15 P. M.; 4 P. M. to 5:30 P. M.; 7:30 P. M. to 10:45 P. M.; 11:30 P. M. to 12:30 A. M.

WHAD, Milwaukee, Wis., 275 (C. S. T.)—11 A. M. to 11:30 A. M.; 6 P. M. to 8 P. M.

WAAM, Newark, N. J., 263 (E. S. T.)—11 A. M. to 12 M.; 7 P. M. to 11 P. M.

WNYC, New York City, 526 (E. S. T., D. S.)—3:45 P. M. to 5 P. M.; 6:50 P. M. to 11 P. M.

WIP, Philadelphia, Pa., 508.2 (E. S. T., D. S.)—7 A. M. to 8 A. M.; 1 P. M. to 2 P. M.; 3 P. M. to 4:50 P. M.; 6 P. M. to 11 P. M.

Wednesday, May 13

KGO, Oakland, Cal., 361.2 (P. S. T.)—11:30 A. M. to 1 P. M.; 1:30 P. M. to 2:30 P. M.; 3 P. M. to 6:45 P. M.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M. to 5 P. M.; 7:30 P. M. to 9 P. M.

KNX, Hollywood, Cal., 337 (P. S. T.)—1 P. M. to 2 P. M.; 7 P. M. to 12 P. M.

WEMC, Berrien Springs, Mich., 286 (C. S. T.)—8:15 P. M. to 11 P. M.

WHO, Des Moines, Iowa, 526 (C. S. T.)—12:15 P. M. to 1:30 P. M.; 6:30 P. M. to 12 P. M.

KFAE, State College of Wash., 348.6 (P. S. T.)—7:30 P. M. to 9 P. M.

KPO, San Francisco, Cal., 429 (P. S. T.)—7 A. M. to 8 A. M.; 10:30 A. M. to 12 M.; 1 P. M. to 2 P. M.; 4:30 P. M. to 11 P. M.

WAMD, Minneapolis, Minn., 243.8 (C. S. T.)—12 M. to 1 P. M.; 10 P. M. to 12 P. M.

WEAO, Ohio State University, 293.9 (E. S. T.)—8 P. M. to 10 P. M.

WEEI, Boston, Mass., 476 (E. S. T., D. S.)—

THE OFFICIAL LIST OF STATIONS in the United States, Canada, Cuba, etc., with list of station slogans, was published in May 2 issue. Send 15c for copy to RADIO WORLD, 1493 Broadway, New York City.

THE KEY TO THE AIR

6:45 A. M. to 8 A. M.; 3 P. M. to 4 P. M.; 5:30 P. M. to 10 P. M.

KOB, State College of New Mexico, 348.6 (M. S. T.)—11:55 A. M. to 12:30 P. M.; 7:30 P. M. to 8:30 P. M.; 9:55 P. M. to 10:10 P. M.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—10:30 A. M. to 11:30 A. M.; 12:30 P. M. to 1 P. M.

KFOA, Seattle, Wash., 455 (P. S. T.)—12:30 P. M. to 1:30 P. M.; 4 P. M. to 5:15 P. M.; 6 P. M. to 10 P. M.

KFKX, Hastings, Neb., 288.3 (C. S. T.)—12:30 P. M. to 1:30 P. M.; 5:15 P. M. to 6:15 P. M.; 9:30 P. M. to 12:30 P. M.

KYW, Chicago, Ill., 536 (C. S. T., D. S.)—6:30 A. M. to 7:30 A. M.; 10:55 A. M. to 1 P. M.; 2:15 P. M. to 4 P. M.; 6:02 P. M. to 11:30 P. M.

WBZ, Springfield, Mass., 333.1 (E. S. T., D. S.)—6 P. M. to 11 P. M.

KDKA, Pittsburgh, Pa., 309 (E. S. T.)—6 A. M. to 7 A. M.; 9:45 A. M. to 12:15 P. M.; 2:30 P. M. to 3:20 P. M.; 5:30 P. M. to 11:00 P. M.

WLW, Cincinnati, O., 422.3 (E. S. T.)—10:45 A. M. to 12:15 P. M.; 1:30 P. M. to 2:30 P. M.; 3 P. M. to 5 P. M.; 6 P. M. to 11 P. M.

WJZ, New York City, 455 (E. S. T., D. S.)—10 A. M. to 11 A. M.; 1 P. M. to 2 P. M.; 4 P. M. to 6 P. M.; 7 P. M. to 11:30 P. M.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T., D. S.)—12:30 P. M. to 1:30 P. M.; 4:30 P. M. to 5:30 P. M.; 6:30 P. M. to 11 P. M.

WGR, Buffalo, N. Y., 319 (E. S. T., D. S.)—12 M. to 12:45 P. M.; 2:30 P. M. to 4:30 P. M.; 6:30 P. M. to 11 P. M.

WCCO, St. Paul and Minneapolis, Minn., 416.4 (C. S. T.)—9:30 A. M. to 12 M.; 1:30 P. M. to 4 P. M.; 5:30 P. M. to 11 P. M.

WBBM, Chicago, Ill., 226 (C. S. T.)—8 P. M. to 10 P. M.

KFAE, State College of Wash., 348.6 (P. S. T.)—7:30 P. M. to 9 P. M.

KHJ, Los Angeles, Cal., 405.2 (P. S. T.)—7 A. M. to 7:15 A. M.; 12 M. to 1:30 P. M.; 5:30 P. M. to 12 P. M.

KFNF, Shenandoah, Iowa, 266 (C. S. T.)—12:15 P. M. to 1:15 P. M.; 3 P. M. to 4 P. M.; 6:30 P. M. to 10 P. M.

WGY, Schenectady, N. Y., 379.5 (C. S. T.)—5:30 P. M. to 7:30 P. M.

WOC, Davenport, Iowa, 484 (C. S. T.)—12:57 P. M. to 2 P. M.; 3 P. M. to 3:30 P. M.; 4 P. M. to 7:05 P. M.; 9 P. M. to 11 P. M

WRC, Washington, D. C., 469 (E. S. T.)—1 P. M. to 2 P. M.; 4 P. M. to 6:30 P. M.

WEAF, New York City, 492 (E. S. T., D. S.)—6:45 P. M. to 7:45 P. M.; 11 A. M. to 12 M.; 4 P. M. to 5 P. M.; 6 P. M. to 12 P. M.

WDAF, Kansas City, Kansas, 365.6 (C. S. T.)—3:30 P. M. to 7 P. M.; 8 P. M. to 9:15 P. M.; 11:45 P. M. to 1 A. M.

WQJ, Chicago, Ill., 448 (C. S. T.)—11 A. M. to 12 M.; 3 P. M. to 4 P. M.; 7 P. M. to 8 P. M.; 10 P. M. to 2 A. M.

KGW, Portland, Oregon, 491.5 (P. S. T.)—11:30 A. M. to 1:30 P. M.; 5 P. M. to 10 P. M.

WNYC, New York City, 526 (E. S. T., D. S.)—6:30 P. M. to 11 P. M.

WIP, Philadelphia, Pa., 508.2 (E. S. T., D. S.)—7 A. M. to 8 A. M.; 10:20 A. M. to 11 A. M.; 1 P. M. to 2 P. M.; 3 P. M. to 4 P. M.; 6 P. M. to 8 P. M.

WGBS, New York City, 316 (E. S. T., D. S.)—10 A. M. to 11 P. M.; 1:30 P. M. to 4 P. M.; 6 P. M. to 7 P. M.

KSD, St. Louis, Mo., 545.1 (C. S. T.)—7 P. M. to 10 P. M.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—8:30 P. M. to 10 P. M.

WOR, Newark, N. J., 405 (E. S. T., D. S.)—6:45 A. M. to 7:45 A. M.; 2:30 P. M. to 4 P. M.; 6:15 P. M. to 12 P. M.

WHN, New York City, 360 (E. S. T., D. S.)—2:15 P. M. to 5:30 P. M.; 7:30 P. M. to 11 P. M.; 11:30 P. M. to 12:30 A. M.

WHAD, Milwaukee, Wis., 275 (C. S. T.)—11 A. M. to 11:30 A. M.; 4 P. M. to 5 P. M.; 6 P. M. to 10 P. M.; 11:30 P. M. to 12:30 A. M.

WAAM, Newark, N. J., 263 (E. S. T., D. S.)—11 A. M. to 12 M.; 7 P. M. to 11 P. M.

Thursday, May 14

KGO, Oakland, Cal., 361.2 (P. S. T.)—11:30 A. M. to 1 P. M.; 1:30 P. M. to 3 P. M.; 4 P. M. to 6:45 P. M.; 7:15 P. M. to 10 P. M.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M. to 5 P. M.; 7:30 P. M. to 9 P. M.

KNX, Hollywood, Cal., 337 (P. S. T.)—11 A. M. to 12:05 P. M.; 4 P. M. to 5 P. M.; 6 P. M. to 12 P. M.

WHO, Des Moines, Iowa, 526 (C. S. T.)—7:30 P. M. to 9 P. M.; 11 P. M. to 12 P. M.

WCBD, Zion, Ill., 344.6 (C. S. T.)—8 P. M. to 10 P. M.

WCAE, Pittsburgh, Pa., 461.3 (C. S. T., D. S.)—12:30 P. M. to 1:30 P. M.; 4:30 P. M. to 5:30 P. M.; 6:30 P. M. to 11 P. M.

WOAW, Omaha, Neb., 526 (C. S. T.)—12:30 P. M. to 1:30 P. M.; 545 P. M. to 11 P. M.

KPO, San Francisco, Cal., 429 (P. S. T.)—7 A. M. to 8 A. M.; 10:30 A. M. to 12 M.; 1 P. M. to 2 P. M.; 3:30 P. M. to 11 P. M.

WEEI, Boston, Mass., 476 (E. S. T., D. S.)—6:45 A. M. to 7:45 A. M.; 1 P. M. to 2 P. M.; 2:30 P. M. to 10 P. M.

WAMD, Minneapolis, Minn., 243.8 (C. S. T.)—12 M. to 1 P. M.; 10 P. M. to 12 P. M.

KFKX, Hastings, Neb., 288.3 (C. S. T.)—12:30 P. M. to 1:30 P. M.; 5:15 P. M. to 6:15 P. M.; 9:30 P. M. to 12:30 P. M.

WBZ, Springfield, Mass., 333.1 (E. S. T., D. S.)—6 P. M. to 11:45 P. M.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—10:30 A. M. to 11:30 A. M.; 12:30 P. M. to 1 P. M.; 2:30 P. M. to 6 P. M.; 6:45 P. M. to 7 P. M.; 8:30 P. M. to 9:30 P. M.; 11 P. M. to 1 A. M.

KFOA, Seattle, Wash., 455 (P. S. T.)—12:30 P. M. to 1:30 P. M.; 4 P. M. to 5:15 P. M.; 6 P. M. to 7 P. M.

KDKA, Pittsburgh, Pa., 309 (E. S. T.)—9:45 A. M. to 12:15 P. M.; 2:30 P. M. to 3:20 P. M.; 5:30 P. M. to 10:15 P. M.

WLW, Cincinnati, O., 422.3 (E. S. T.)—10:45 A. M. to 12:15 P. M.; 1:30 P. M. to 5 P. M.; 6 P. M. to 8 P. M.; 10 P. M. to 11 P. M.

WJZ, New York City, 455 (E. S. T., D. S.)—10 A. M. to 11 P. M.; 1 P. M. to 2 P. M.; 4 P. M. to 6 P. M.; 7 P. M. to 12 P. M.

WJY, New York City, 405 (E. S. T., D. S.)—7:30 P. M. to 11:30 P. M.

KYW, Chicago, Ill., 536 (C. S. T., D. S.)—6:30 A. M. to 7:30 A. M.; 10:55 A. M. to 1 P. M.; 2:25 P. M. to 3:30 P. M.; 6:02 P. M. to 11 P. M.

WMAK, Lockport, N. Y., 265.5 (E. S. T.)—11 P. M. to 1 A. M.

FRIDAY, MAY 15

KGO, Oakland, Cal., 361.2 (P. S. T.)—11:10 A. M. to 1 P. M.; 1:30 P. M. to 3 P. M.; 4 P. M. to 7 P. M.

WHAS, Louisville, Ky., 399.8 (C. S. T.)—4 P. M. to 5 P. M.; 7:30 P. M. to 9 P. M.

WEMC, Berrien Springs, Mich., 286 (C. S. T.)—9 P. M. to 11 P. M.

WHO, Des Moines, Iowa, 526 (C. S. T.)—7:30 P. M. to 9 P. M.; 11 P. M. to 12 P. M.

KFAE, State College of Wash., 348.6 (P. S. T.)—7:30 P. M. to 9 P. M.

WCAE, Pittsburgh, Pa., 461.3 (E. S. T., D. S.)—12:30 P. M. to 1:30 P. M.; 4:30 P. M. to 5:30 P. M.; 6:30 P. M. to 9:30 P. M.

KPO, San Francisco, Cal., 429 (P. S. T.)—7:30 to A. M. to 8 A. M.; 10:30 A. M. to 12 M.; 1 P. M. to 2 P. M.; 4:30 P. M. to 11 P. M.

WEAO, Ohio State University, 293.9 (E. S. T.)—8 P. M. to 10 P. M.

KOB, State College of New Mexico, 348.6 (M.

(Continued on page 30)

OLD MAN STATIC "KILLED" AT LAST

Statichoke Has Startled the Radio World—Insures Clear, Long Distance, Summer Reception

Kansas City, Mo., (Special)—The long promised invention which insures clear, long distance, "summer radio" without the agony of static, has just been announced here. Radio experts and fans who have tested this new imported invention, pronounce it marvelous. Awarded Certificate of Merit by Radio News of Canada.

In addition to reducing static to a minimum, the Statichoke increases the volume as well as clarity of distant reception, sharpens the selectivity of tuning in, eliminates that harshness of the tubes so noticeable on local loud speaker reception and acts as a safety lighting arrester.

The Statichoke somewhat resembles a small transformer, and by a system of coils it allows only the correct current value to enter the set, choking out other high current variation from the aerial, which is passed off through a secondary ground connection.

So confident are the American distributors that Statichoke will give you clear long distance summer reception that they have set aside 25,000 units for initial distribution direct to the radio fans, at a special price of only $2.50 each.

If interested write today to Radio Dept., Imperial Laboratories, 9625 Coca Cola Bldg., Kansas City, Mo., and the Statichoke will be sent you by insured mail. Write today as this is a special offer and may not appear again.

THE OFFICIAL LIST OF STATIONS in the United States, Canada, Cuba, etc., with list of station slogans, was published in May 2 issue. Send 15c for copy to RADIO WORLD, 1493 Broadway, New York City.

Relief from Interference on Great Lakes Discussed

WASHINGTON.

THE Department of Commerce called the radio conference held at Detroit to consider action to minimize radio interference caused by Canadian and United States coast stations and Canadian and United States ship stations on the Great Lakes.

The conference was attended by representatives of the Department of Commerce Radio Service, the Canadian Government radio service, commercial radio companies, steamship companies and others.

Consideration was given to the use of improved radio transmitters by ships and coast stations on the Lakes and to the use of a wavelength above 600 meters for traffic. This action was taken because of the numerous complaints of interference with broadcast reception caused by these stations which are under the purisdiction of the United States and Canada.

Official representatives of the American and Canadian governments who attended the conference follow:

D. B. Carson, Commissioner of Navigations which are under the jurisdiction of Radio; Arthur Batcheller, Supervisor of Radio, New York; E. A. Beane, Supervisor of Radio, Chicago; S. W. Edwards, Supervisor of Radio, Detroit; C. P. Edwards, Director of Radio Service, Dept. of Marine and Fisheries, Canada; H. M. Short, General Manager, Canadian Marconi Co.; Great Lakes Radio Inspector from Toronto; Representatives of the coast stations and steamship companies and several technical advisers.

ONE STAGE OF TRANSFORMER AF, two of resistance AF. Send 15c for April 11 issue of RADIO WORLD.

RESISTANCE

(*Concluded from page* 11)

minals of the base of the tube often, to prevent poor connection between the socket prongs and the terminals.

In the Jacks—See that the connections (Fig. 2) are always good.

When Wiring the Set—Always make solid connections. Never use spaghetti tubing, bus wire or any other paraphernalia for the purpose of making the set look pretty. Use No. 18 or No. 22 DCC or rubber covered wire. Use sockets that have phospher bronze or pure copper for the prongs, and a porcelain base. When making battery connections always see to it that they are tight. The aerial and ground leads should not be run parallel.

Questions

1—How do radio-frequency currents travel in a conductor?

2—What is the effect of radio-frequency resistance on a tuned circuit?

3—What are the causes of radio-frequency resistance in a coil?

4—What are the causes of radio-frequency resistance in a condenser?

5—Is the quantity termed radio-frequency resistance an actual resistance or is it a condition of leakage of energy which results in loss of the same amount of energy as would be lost were there an actual resistance in the circuit?

A $5 HOME-MADE LOUDSPEAKER, by Herbert E. Hayden, in Feb. 7 and March 4 issues. Send 30c for both copies. RADIO WORLD, 1493 Broadway.

THE 1-A PORTABLE, 1925 Spring Model, a 2-Tube Set of Great DX Powers. Two controls. Described by Herbert E. Hayden in RADIO WORLD, issues of March 28, April 4 and April 11, with trouble-shooting article in April 18 issue. Profusely illustrated, including templates. Send 60c, get all four copies. Address Circulation Manager, RADIO WORLD, 1493 Broadway, New York City.

WAHG Heard in Australia and France

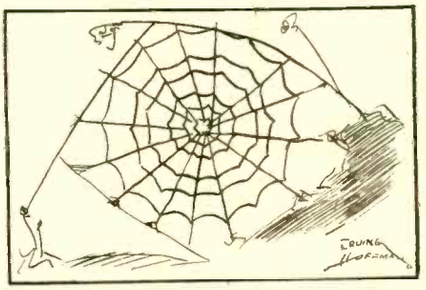
WAHG of Richmond Hill, N. Y., one of nine stations which broadcast special programs between 4 and 6 a. m. one day recently, in the hope of reaching Australia, reported that cablegrams had been received from Australia and France saying that their station had been heard in both places.

Australian listeners had occasionally reported hearing American stations, and great preparations were made for the test. On theoretical grounds it was believed that this was the right time of the year for the tests, because thunderstorms would interfere with sending during the summer months. As our winter is the Australian summer, thunderstorms over there would probably have drowned reception earlier in the year.

WAHG announced that a cablegram had been received from St. George Barlow in Australia saying that the locomotive bell, the Nassau Club Orchestra and the singing of Walter J. Neff had been heard in Melbourne and that WAHG would receive a silver trophy for its sending feat. At about the same time, it was announced, Lloyd Jacquet, American representative at the International Amateur Radio Convention, now in Paris, cabled that the Richmond Hill entertainment had been heard there. These messages from Australia and Paris showed that WAHG had covered a span of 15,000

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.

Charles J. Phaneuf, Jr., 344 Essex St., Lynn, Mass.
J. T. Rand, 3040 Hull Ave., Cheviot, Cincinnati, Ohio.
Myrtle Stephens, Hartman, Ark.
Merl Ansand, 42 Grape St., Kenton, Ohio.
G. Eastman, Birmingham Electric Co., Birmingham, Ala.
Sidney Eaton, North Reading, Mass.
W. H. Sharp, 242 Nagent St., St. Paul, Minn.
James Gaylard, 2600 South St., St. Pete, Fla.
Wm. E. Rosenlieb, Box 264, New Matamoras, Ohio.

RADIO PRESS AIDS SCIENCE, SAYS GOLDSMITH

EDITOR RADIO WORLD:

IT GIVES me great pleasure to assure RADIO WORLD of my appreciation of its successful efforts in helping to popularize radio and in spreading interesting information to a multitude of radio listeners and amateurs. The progressive growth of the better radio magazines is a noteworthy indication of the increasing importance of radio broadcasting. Science owes to literature a great debt in what the printing press, through the radio magazines and newspapers, has done in emphasizing the benefits of radio to the people of the United States.

ALFRED N. GOLDSMITH,
Associated Professor of Electrical Engineering, College of the City of New York.

A 3-TUBE REFLEX FOR THE NOVICE, by Feodor Rofpatkin. Schematic and picture diagrams, panel and assembly. Send 15c for March 28 issue of RADIO WORLD.

RECENT BACK NUMBERS
of RADIO WORLD, 15 cents each, or any seven for $1. Address Circulation Manager, RADIO WORLD, 1493 Broadway, New York City.

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Six Months 3.00
One Year, 52 Issues..... 6.00
Add $1.00 a Year for Foreign Postage; 50c for Canadian Postage.

THE KEY TO THE AIR

(Concluded)

S. T.)—11:55 A. M. to 12:30 P. M.; 7:30 P. M. to 8:30 P. M.; 9:55 P. M. to 10:10 P. M.

WEEI, Boston, Mass., 476 (E. S. T., D. S.)—6:45 A. M. to 7:45 A. M.; 2 P. M. to 3:15 P. M.; 5:30 P. M. to 10 P. M.

KFOA, Seattle, Wash., 455 (P. S. T.)—12:30 P. M. to 1:30 P. M.; 4 P. M. to 5:15 P. M.; 6 P. M. to 11 P. M.

WFAA, Dallas, Texas, 475.9 (C. S. T.)—10:30 A. M. to 11:30 A. M.; 12:30 P. M. to 1 P. M.; 2:30 P. M. to 6 P. M.; 6:45 P. M. to 7 P. M.; 8:30 P. M. to 9:30 P. M.

KYW, Chicago, Ill., 536 (C. S. T., D. S.)—6:30 A. M. to 7:30 A. M.; 10:55 A. M. to 1 P. M.; 2:25 P. M. to 3:30 P. M.; 6:02 P. M. to 7:20 P. M.; 9 P. M. to 1:30 A. M.

KDKA, Pittsburgh, Pa., 309 (E. S. T.)—6 A. M. to 7 A. M.; 9:45 A. M. to 12:20 P. M.; 1:30 P. M. to 3:20 P. M.; 5:30 P. M. to 11 P. M.

WLW, Cincinnati, O., 422.3 (E. S. T.)—10:45 A. M. to 12:15 P. M.; 1:30 P. M. to 2:30 P. M.

WJZ, New York City, 455 (E. S. T., D. S.)—10 A. M. to 11 A. M.; 1 P. M. to 2 P. M.; 4 P. M. to 6 P. M.; 7 P. M. to 10:30 P. M.

WOAW, Omaha, Neb., 526 (C. S. T.)—12:30 P. M. to 1 P. M.; 5:45 P. M. to 7:10 P. M.; 9 P. M. to 11 P. M.

KNX, Hollywood, Cal., 337 (P. S. T.)—11:30 A. M. to 12:30 P. M.; 1 P. M. to 2 P. M.; 4 P. M. to 5 P. M.; 6:30 P. M. to 12 P. M.

WGR, Buffalo, N. Y., 319 (E. S. T., D. S.)—12 M. to 12:45 P. M.; 7:30 P. M. to 11 P. M.

WCCO, St. Paul and Minneapolis, Minn., 416.4 (C. S. T.)—9:30 A. M. to 12 M.; 1:30 P. M. to 4 P. M.; 5:30 P. M. to 10 P. M.

KFDY, Brookings, S. D., 273 (M. S. T.)—8 P. M. to 9 P. M.

WBBM, Chicago, Ill., 226 (C. S. T.)—8 P. M. to 12 P. M.

KHJ, Los Angeles, Cal., 405.2 (P. S. T.)—7 A. M. to 7:15 A. M.; 12 M. to 3:30 P. M.; 5:30 P. M. to 11:30 P. M.

KFNF, Shenandoah, Iowa, 266 (C. S. T.)—12:15 P. M. to 1:15 P. M.; 3 P. M. to 4 P. M.; 6:30 P. M. to 10 P. M.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—1 P. M. to 2 P. M.; 5:30 P. M. to 10:30 P. M.

WOC, Davenport, Iowa, 484 (C. S. T.)—12:57 P. M. to 2 P. M.; 3 P. M. to 3:30 P. M.; 5:45 P. M. to 12 P. M.

WRC, Washington, D. C., 469 (E. S. T.)—4:30 P. M. to 5 P. M.; 6:45 P. M. to 12 P. M.

WEAF, New York City, 492 (E. S. T., D. C.)—6:45 A. M. to 7:45 A. M.; 11 A. M. to 12 A. M.; 4 P. M. to 5 P. M.; 6 P. M. to 12 P. M.

WPG, Atlantic City, N. J., 299.8 (E. S. T., D. S.)—7 P. M. to 8:30 P. M.; 10 P. M. to 12 P. M.

WDAF, Kansas City, Kansas, 365.6 (C. S. T.)—3:30 P. M. to 7 P. M.; 11:45 P. M. to 1 A. M.

WGST, Atlanta, Ga., 270 (C. S. T.)—7 P. M. to 8 P. M.

WQJ, Chicago, Ill., 448 (C. S. T.)—11 A. M. to 12 M.; 3 P. M. to 4 P. M.; 7 P. M. to 8 P. M.; 10 P. M. to 2 A. M.

WBBR, New York City, 272.6 (E. S. T., D. S.)—8 P. M. to 10 P. M.

KGW, Portland, Oregon, 491.5 (P. S. T.)—11:30 A. M. to 1:30 P. M.; 5 P. M. to 11 P. M.

WGBS, New York City, 316 (E. S. T., D. S.)—10 A. M. to 11 A. M.; 1:30 P. M. to 4 P. M.; 6 P. M. to 11 P. M.

KSD, St. Louis, Mo., 545.1 (C. S. T.)—4 P. M. to 5 P. M.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—12:30 P. M. to 1 P. M.; 8:20 P. M. to 10 P. M.

WOR, Newark, N. J., 405 (E. S. T., D. S.)—6:45 A. M. to 7:45 A. M.; 2:30 to 4 P. M.; 6:15 to 7 P. M.

WHN, New York City, 360 (E. S. T., D. S.)—12:30 P. M. to 1 P. M.; 2:15 P. M. to 5 P. M.; 7 P. M. to 11 P. M.; 12 P. M. to 12:30 A. M.

WHAD, Milwaukee, Wis., 275 (C. S. T.)—11 A. M. to 11:30 A. M.; 6 P. M. to 8 P. M.

WAAM, Newark, N. J., 263, (E. S. T., D. S.)—11 A. M. to 12 M.

WNYC, New York City, 526 (E. S. T., D. S.)—3:45 P. M. to 4:45 P. M.; 6:20 P. M. to 11 P. M.

WIP, Philadelphia, Pa., 508.2 (E. S. T., D. S.)—7 A. M. to 8 A. M.; 1 P. M. to 2 P. M.; 3 P. M. to 4:50 P. M.; 6 P. M. to 8 P. M.

Friday, May 15

WGR, Buffalo, N. Y., 319 (E. S. T., D. S.)—12 M. to 12:45 P. M.; 2 P. M. to 4 P. M.; 7:30 P. M. to 11 P. M.

WCCO, St. Paul and Minneapolis, Minn., 416.4 (C. S. T.)—9:30 A. M. to 12 M.; 1:30 P. M. to 4 P. M.; 5:30 P. M. to 10 P. M.

WBBM, Chicago, Ill., 226 (C. S. T.)—8 P. M. to 10 P. M.

KFAE, State College of Washington, 348.6 (P. S. T.)—7:30 P. M. to 9 P. M.

KHJ, Los Angeles, Cal., 405.2 (P. S. T.)—7 A. M. to 7:15 A. M.; 12 M. to 3:30 P. M.; 5:30 P. M. to 11:30 P. M.

WAMD, Minneapolis, Minn., 243.8 (C. S. T.—12 M. to 1 P. M. 10 P. M. to 12 P. M.

WOC, Davenport, Iowa, 484 (C. S. T.)—12:57 A. M. to 2 P. M.; 3 P. M. to 3:30 P. M.; 4 P. M. to 7:10 P. M.; 8 P. M. to 9 P. M.

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WPG, Atlantic City, N. J., 299.8 (E. S. T., D. S.)—7 P. M. to 11 P. M.

WPAF, Kansas City, Kansas, 365.6 (C. S. T.)—3:30 P. M. to 4:30 P. M.; 5:10 P. M. to 7 P. M.; 11:45 P. M. to 1 A. M.

WQJ, Chicago, Ill., 448 (C. S. T.)—11 A. M. to 12 M.; 3 P. M. to 4 P. M.; 7 P. M. to 8 P. M.; 10 P. M. to 2 A. M.

KGW, Portland, Oregon, 491.5 (P. S. T.)—11:30 A. M. to 1:30 P. M.; 5 P. M. to 11 P. M.

RESULTS

I BELIEVE that I have at last found the set that I have been seeking for about RESULTS EDITOR:

eight months. Yes, of course, I found it in RADIO WORLD. Thanks, old man. The set is the 4-tube, 3-control DX set, by Lt. Peter V. O'Rourke (March 4). It certainly is the cat's aces. Why even the first night's trial proved it to be a wonder. I used aerial and ground (connecting ground to A—). Listed are a few stations heard: WREO, WDAF, WJAR, WJY, WGY, WJZ, WGN, WOTS, WORD, WNAC, WEEI, WSAR, WHAS, WGR, WOC, WOO, WOR, KGO, KFI, KHJ, KFKX, WLW, WSAI, WFAA, WPAB, WBFH, WBAV.

CHAS. MARKARIAN
103 Summer St., Worcester, Mass.

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

10 CENTS A WORD. 10 WORDS MINIMUM

EARN $5-$10 WEEKLY, addressing, mailing circulars. Send stamped envelope for particulars. Palace Mail Co., Toledo, Ohio.

WANT TO MAKE MONEY? Of course you do! Fast selling new invention; write quick for territory. Have own business. Konkle, 192 Market St., Newark, N. J.

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

HOW TO MAKE IDEAL COILS, for tuning with .0005 and .001 mfd. condensers. Described by J. E. Anderson in March 7 and 14 and April 11 issues. Send 45c for all three. RADIO WORLD, 1493 Broadway, New York City.

THE DIAMOND OF THE AIR, by Herman Bernard, a 4-tube DX loop set of tremendous range and power. Three controls. Not reflexed. Send 45c, get April 4, 11 and 18 issues. RADIO WORLD, 1493 Broadway, New York City.

$160.00—5 tube Fada Neutrodyne. Practically new, $90.00. W. C. Bohn, 2419 Diehl Ave., Carrick, Pa.

AGENTS—Write for free samples. Sell Madison "Better-Made" Shirts for large Manufacturer direct to wearer. No capital or experience required. Many earn $100 weekly and bonus. Madison Mfrs., 501 Broadway, New York.

2650 MILES DISTANCE with one tube. We send complete understandable instructions with panel layout, picture diagrams, etc., for 25c. Or BIG BOOKLET FREE. VESCO RADIO CO., Box 117-RW Oakland, California.

A 3-TUBE REFLEX FOR THE NOVICE, by Feodor Rofpatkin. Schematic and picture diagrams, panel and assembly. Send 15c for March 28 issue of RADIO WORLD.

RADIO HOSPITAL. Specialists in Neutrodynes and Superhetrodynes. Radio Central, Abilene, Kansas.

NO MORE SQUEALS—Guaranteed static reducer. $2.65 C. O. D. Complete with instructions, or 85c for complete working plans. Highly recommended. Static Reducing Co., Iron Mountain, Mich.

HOW TO MAKE A VARIABLE GRID LEAK. Send 15c for March 21 issue of RADIO WORLD.

ONE STAGE OF TRANSFORMER AF, two of resistance AF. Send 15c for April 11 issue of RADIO WORLD.

A SURVEY OF 1-TUBE DX SETS, by Lieut. Peter V. O'Rourke. Seven circuit diagrams. Great material for DX fans. Send 15c for April 11 issue. RADIO WORLD, 1493 Broadway, New York City.

THE OFFICIAL LIST OF STATIONS in the United States, Canada, Cuba, etc., with list of station slogans, was published in May 2 issue. Send 15c for copy to RADIO WORLD, 1493 Broadway, New York City.

SURVEY OF RADIO

SURVEY EDITOR:

WE can look for the radio industry to spurt ahead. Within the past two years great and remarkable improvements have been made in all branches of radio art and industry. Vacuum tubes are greatly perfected and are likewise more efficient; loud speakers have been improved to an astounding degree; new circuits are advanced from time to time and some of them give excellent results, especially along lines of tone quality, simplicity of operation, distance and volume. Why not wake up the people and show them radio as it is and what it is for, and what its possibilities are?

Many people really do not take radio seriously enough. These people should be educated to the uses of radio so that they can understand its value and see its possibilities. It is up to those who recognize the advantages of radio to show non-users what they are missing. We must show them that radio is no mere toy or plaything, but a real means whereby one can educate and entertain himself each evening if he so desires. And I believe we should adopt some slogan which would tend to keep radio and its future possibilities before the American public. I suggest a few:

"If You Believe in Education You Must Believe in Radio."

"The radio DOES educate; it also entertains;
Some other things are obsolete,
but radio remains."

"Radio educates the people, 'tis true,
but the people must be educated to radio."

L. K. DOANE,
15½ Karges Place, Rochester, N. Y.

NEW RADIO PATENTS

WASHINGTON.

PATENTS on radio inventions granted by the U. S. Patent Office follow:

DETECTOR (No. 1,533,070), invented by Thos. E. Arundel, of Omaha, Neb. The detector, once set or adjusted, remains indefinitely in such position and may be subjected to shock or jar without changing the adjustment and without injuring the device.

RADIO Signaling System (No. 1,532,356), invented by R. A. Weagant, of Douglas Manor, N. Y. and assigned to Radio Corporaton of America. Eliminates static through an antenna system having relatively small aerials located at the receiving station thus doing away with the fractional wavelength spacing between antenna and attendant inconveniences.

RECENT BACK NUMBERS

for $1. Address Circulation Manager, RADIO WORLD, 1493 Broadway, New York City. of RADIO WORLD, 15 cents each, or any seven

Reception Good in Cavern Despite Static Above

SPRINGFIELD, O.

RAIN, electrical and wind storms may interfere with radio reception on top of the ground, but they do not have any effect below the surface.

This was recently demonstrated by a group of radio fans who took a superheterodyne set 60 feet below the surface. They set up the apparatus with an aerial loop in one of the large grottoes of the Ohio Caverns 20 miles north of Springfield.

Positively no connections were made with the exterior of the caverns. Radio waves were received through the 60 feet of limestone roofing.

In the course of about an hour "below," the party had WEBH, WEAF, KDKA, WLW, WSAI, WQJ, WGY, WGR, WJR.

The set was operated by M. R. Geyer and Frank Grimes, radio dealers of Urbana, O. The demonstration was witnessed by eleven persons.

This is believed to be the first demonstration of underground reception in a natural cavern.