THE RIDER WAVE TRAP THAT AIDS DX

DEC. 26 1925

RADIO WORLD

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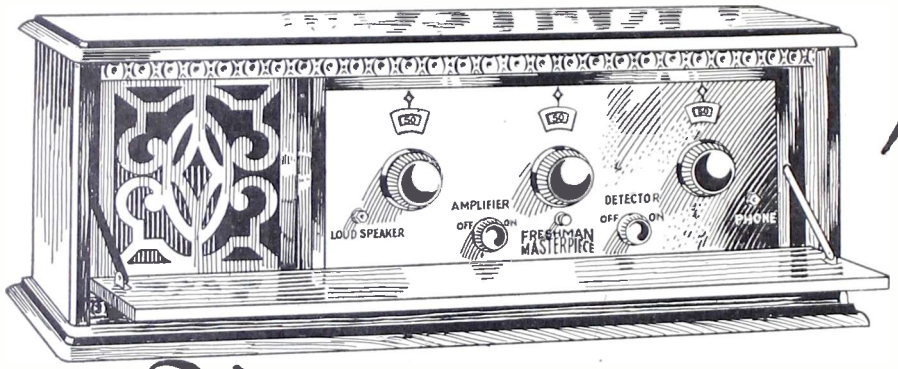

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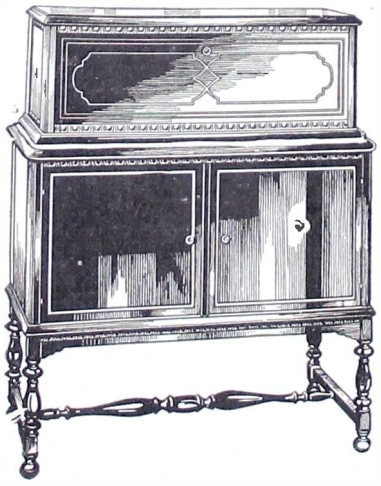

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RADIO WORLD

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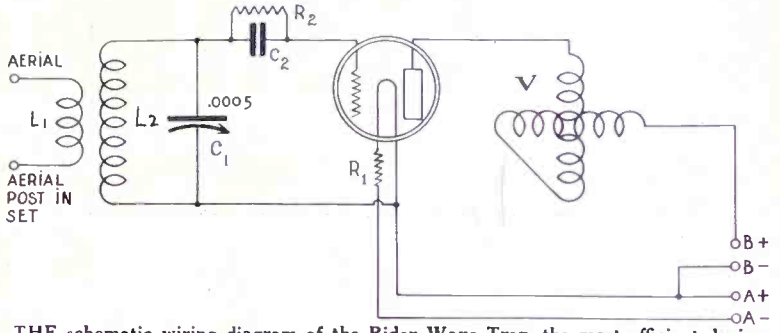
The Regenerative Wave Trap

Rider Contributes the Most Efficient Form of Wave Trap So Far Developed — External Detector Circuit Used with a Tuned Plate for Killing Off Interference —WNYC, 526 Meters, Cut Out, Three Miles from Station, and KYW, Chicago, 535 Meters, Tuned in on Speaker.



THE schematic wiring diagram of the Rider Wave Trap, the most efficient device of its kind so far developed. It is particularly welcome to fans living close to a station and who want to eliminate the drowning effect of that neighboring transmitter. If R1 is an Amperite, add a switch. (Fig. 1).

By John F. Rider
Member, Institute of Radio Engineers

THE wave trap or wave filter augments the selecting powers of a receiver and has proven generally unsatisfactory, irrespective of its method of connection into the receiving system, whether as an acceptor or as a rejector. The result was the same. The wave trap circuit tuned too broadly, and in this day of 10-kilocycle separations a wave trap to possess the proper value of utility must tune within this 10-kilocycle frequency spectrum.

Wave Trap Shortcomings

Let us for a moment analyze the most frequently used type of wave trap, that coupled inductively to the aerial and used to eliminate one interfering station. In fact, the analysis holds good for all types of traps, parallel or series, but we will discuss only the series type. This trap consists of two circuits, a primary of a few turns coupled inductively to the secondary, which coil is shunted by the tuning condenser. The primary is wired in series with the aerial lead of the receiver, being connected between the aerial post of the receiver and the aerial itself. When the tuning condenser of the wave trap is set at a certain value, and the tuning circuit made resonant to a certain frequency, any oscillations in the aerial circuit of that frequency are absorbed by the trap and caused to flow in the secondary condenser circuit, and excluded from the receiver. But, unfortunately, a band of wavelengths above and below that of the trap circuit is also excluded from the receiver, due to the damping effect of the trap circuit, the consequence being that while an interfering station is "trapped" the effect of the trap will not permit the tuning in of another station operating on a wavelength within 10 or 15 meters of that "trapped out" or filtered. In some instances this range has been found to be even larger, and in addition, the decrement of the trap was so high that the volume of the received signal was cut down appreciably when the trap was being used. This high decrement and high damping effect are applicable to all types of traps, but, of course, the design of the trap will have a bearing upon the value of the decrement and damping. That the decrement and damping are high is not surprising. The average wave trap is constructed along the usual lines, the necessity of very low-loss circuits being entirely neglected, resulting in a system with a high radio-frequency resistance, the reduction of which is absolutely the paramount item in any trap circuit that is to be used in conjunction with a radio receiver.

Effective Resistance Reduced

A reduction in the value of the effective resistance of the trap circuit results in several distinct advantages. First, the trap tunes more sharply, thus decreasing the side bands and permitting wider operation of the receiver. In other words the wavelength side bands removed from the effect of the trap are added to the receiver. Second, the lower the resistance of the trap circuit, the greater its trapping effect and the more efficient will be the action of the wave trap in filtering out the undesired station. But in the average trap it is impossible to reduce the effective resistance lower than its normal value on each frequency within the tuning band, since no means is provided for introducing into the trap circuit a negative resistance. Therefore a trap in which it is possible to reduce the effective resistance on each wavelength would be most efficient in operation.

Now, a wave trap is a receiver. To be exact, the coil-condenser combination on the average trap is identical to that found in the majority of receivers and if a crystal detector and phones are connected across the condenser in the trap, the signal flowing in the trap circuit will be rectified and made audible. The same is applicable if a tube replaces the crystal rectifier. Hence we can replace an ordinary wave trap with a one tube non-regenerative receiver and achieve the same effects. However, no advantage would be gained and the change would not be justified, since the system is too expensive for the results obtained. But if the receiver is made regenerative, so that by means of regeneration it is possible to reduce the effective resistance on all the wavelengths within the tuning band, any additional expense will be more than justified, because the function of the unit as a wave trap will be vastly increased.

The Solution

Thus the regenerative wave trap, Fig. 1, offers the solution. L1L2 and the variable condenser C1 are similar to inductances and capacities in the usual run of wave traps, but differ in their respective degrees of efficiency. As was mentioned previously, it is highly essential, in fact imperative, that the tuning circuit be of low-loss design. This is stressed, although regeneration is being utilized, and the effects of the losses due to the resistance are compensated for by the regeneration. We must not forget that regeneration is a function of the resistance in the LC (inductance-capacity) circuit and does not fully compensate for the resistance. Furthermore, when operating this unit, the regeneration control should not be set too close to the oscillation point. By having a highly efficient LC circuit it will not be necessary to crowd the regenerative system. Hence low-loss coils and the Hammarlund variable condenser were used.

Some fans, after a glance, may condemn the unit on the basis that if the regeneration is excessive the receiver will oscillate

LIST OF PARTS

One Hammarlund .0005 mfd. variable condenser.
One length 1¾" tubing 3" long.
One length 2" tubing 2" long.
One variometer, 150 to 550 meter range.
One Daven leakandenser.
One standard base vacuum tube socket.
One battery switch.
One 7x10" hard rubber panel.
Two binding posts.
Four Fahnestock clips.
One baseboard, 6x9".
One Amperite.

Locals Cut Out, DX Received

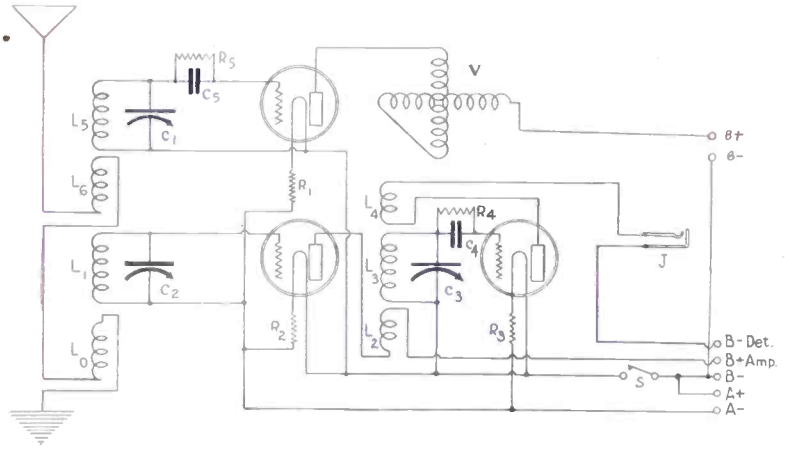
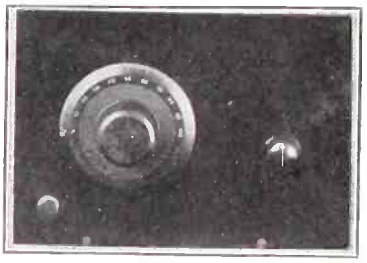


FIG. 2, the wave trap used in conjunction with a radio receiver.

(*Continued from preceding page*)

and radiate into the aerial, causing local disturbance. The arraignment is true. The regenerative wave trap will radiate an interfering wave if the unit is caused to oscillate. But why should the trap be set to the oscillation point? There is no necessity for that condition. The proper operating point, that is, the proper value of regeneration, is found much below the oscillating point. And since the unit is not utilized for locating carrier waves it is unnecessary that it be set oscillating. Also, with the A and B voltages at 6 for the filaments and from 22½ to 45 volts on the plate the current flowing in the aerial circuits approximates 250 microamperes.

The primary coil L1 is wound on the 2" tubing and consists of 12 turns of No. 24 DSC wire. The secondary is wound on the 1¾" tubing and consists of 85 turns of No. 22 DSC wire. The primary is slipped over the secondary winding form and the primary located at a point midway between the center of the secondary winding and the filament end. The variometer need not be in inductive relation with the secondary inductance.



THE PANEL VIEW of the wave trap. The knob at right actuates the variometer. The object at lower left is a switch, necessary if R1 in Fig. 1 is an Amperite. If R1 is a variable rheostat no switch is necessary.

The method of connecting the trap to a receiver is shown in Fig. 2. The filament of the trap tube is supplied from the storage battery used for the receiver tubes, but a separate "B" battery unit is used. This expense involved is only the initial expense, the drain upon this plate battery being so very small that it will safely last 6 months without renewal, perhaps even longer.

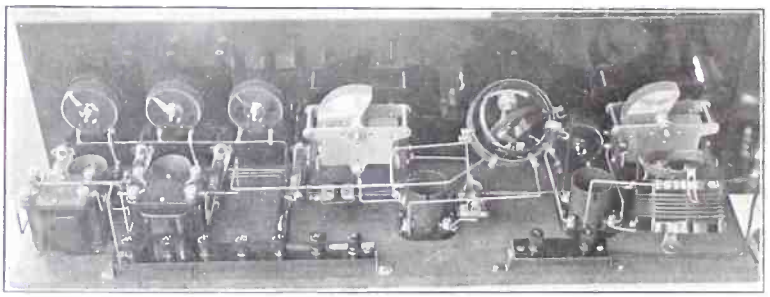
The wave trap unit in Fig. 2 is L5L6C1, with the variometer V in the plate circuit.

Results Obtained

As to results, this trap works where others fail. Properly manipulated, it gives efficient operation between stations 10 kilocycles apart, so that an interfering local station is "trapped out" and a distant station tuned in. Where the interference is via the aerial and not by direct induction into the coils of the receiver, this trap will eliminate it. This is an important consideration, since any absorption in the aerial circuit will not prevent induction into the unit supplying the detector grid. However, the interfering signal even under the above condition will be minimized in intensity, because shock excitation into the first stage of radio frequency, if such receiver is used, is also eliminated. In actual tests three miles from WNYC, New York City, this station was trapped out completely and KYW, Chicago, tuned in, with excellent intensity and no interference from the New York station. To test the regenerative action, the tube was removed, while the reception was in progress and the Chicago station was immediately lost; being drowned out by the local transmitter. When located within the shadow of another 500-watt station, whose aerial was not more than 500 feet distant, it was possible so to minimize the interference from this station, that all other locals were tuned in and the interfering signal was only audible during the moments when the other microphones were off the air. Without this trap in action the interfering station was heard at all times, regardless of the receiver dial settings.

Thus the regenerative wave trap vindicated itself. It is hoped that the constructors of this unit will realize as much therefrom as I did. I will be very glad to answer queries about this wave trap and also to receive reports of results. Address us in care of RADIO WORLD.

Fan Reports on the Set That Delights Him



THE 4-TUBE DIAMOND as constructed by Irving E. Johnson.

RESULTS EDITOR:

I am a subscriber to RADIO WORLD and have been a reader for over two years. I find it one of the best of radio publications. I have built a number of radio sets and have done considerable experimenting in radio and I have derived much benefit from your magazine.

Having become interested in your "Diamond of the Air" set, late in the summer on my vacation I built one of the 4-tube models from spare parts. The results obtained from this set are so good that I cannot help writing you about it. I had the works of the set photographed and I take pleasure in enclosing a print. You will no doubt recognize the apparatus used. A Bremer-Tully three-circuit tuner, a Bremer-Tully RF tuning transformer, and two .00025 Cardwell condensers are used for the tuning units. A Howard 25-ohm rheostat is used on each tube. The tubes are 201-A throughout. Kellogg 4½-to-1 and 3-to-1 AF transformers are used, with Carter jacks in the detector stage, first and second audio stages. A Carter jack switch is used for turning the set on and off. The wiring, except plate and grid leads, is bunched, and the plate and grid leads are run as straight and direct as possible. A Turn-It leak is used across the .00025 fixed grid condenser. I also used a .006 fixed by-pass condenser across the B plus and A minus, on account of the battery supply being located in the basement some distance from the set. The B battery voltage runs about 100 the current being supplied by a 48-cell storage battery. A .00025 fixed condenser is connected across the output of the tickler coil to the plus A side of the detector socket. The A plus and B minus battery leads are connected together. The set is hooked up and coil connections made according to Hoyle, as shown in issues of RADIO WORLD.

I wish to add a few words in regard to the Bremer-Tully tuning inductances. I found that the primaries had too much wire on them, and the set would not work at all on stations of short wavelength, from about 300 meters down. I had to take off all but ten turns on each primary, and after doing this the set worked O. K., and the set now covers the entire broadcast band, from 200 to 550. The tickler coil also had too many turns on it, and I had to remove all but 17 turns.

I originally intended placing the detector socket at the right of the two audio sockets, but I took into consideration that my grid and plate leads would be much shortened by placing this socket next to the three-circuit tuner.

IRVING E. JOHNSON,
717 Brown Street,
Lafayette, Ind.

[*The 4-tube model is the same as the new 5-tube one, except that the more recent hook-up has a better audio circuit—Ed.*]

American vs. British Sets

By William H. Fortington

Owner and Operator of British 6 AG

IT would perhaps be unfair to make qualitative comparisons between the various types of British and American receivers in use today. However a discussion on the outstanding points of receivers of both countries would not be out of place. Developments in the field of radio are making great strides in both countries, and conditions on both sides being even, there would be little to choose between the American or British receiver. Fundamentally all sets are alike, the main differences being the application of the various instruments, the external design, and the band of wavelengths the receiver is to cover.

5-Tube Sets Popular

Now in both countries the most popular type of set seems to be the 5-tube set, having two stages of radio frequency amplification, detector, and two stages of audio frequency amplification. Of course the number of sets in use in either country cannot be compared, as the United States has probably sixty per cent of the world's radio receivers. Tuned impedance, or tuned anode, as it is more generally known in Great Britain, is greatly favored as a method of amplifying at radio frequencies, the tuned transformer taking second place. Regeneration is accomplished by coupling the plate coil in the detector circuit to the grid coil of the same tube. or the closed circuit inductance of the first tube. Regeneration in the aerial circuit is absolutely "verboten." Apart from the regulations forbidding the use of such circuits it is surprising the number of squeals which can be heard in the more congested districts. As in America, transformer coupling of audio frequency tubes is the order of the day, with resistance and impedance couplings gaining ground in some quarters.

3-Tubes Much in Evidence

The 3-tube set with the three circuit tuned comprising an aperiodic primary, secondary and tickler, is also very popular. There is a tendency in England to use a tuned aerial circuit, in fact all amateurs as far back as 1919 used this as a standard part of their tuning arrangements. Aperiodic and semi-aperiodic RF transformers are greatly falling into disfavor in all parts of the globe. The low-loss rage has yet to start in Europe. Although several low-loss condensers and coils have made their appearance on the market the public in general has not taken much notice of this new phase of radio. The majority of condensers which are selling in England today are of the square law variety, having grounded stator and are called low-loss. Such is the diversion of opinion of the old and new worlds.

Plug-in Coils Utilized

The set utilizing plug-in coils of the honeycomb type is a great favorite among British amateurs. Since the wave-band to be covered is more than 2,000 meters it is obvious that some inductive means of covering this wide band must be adopted, since this can hardly be accomplished by the mere turn of a condenser. In other words, to get full enjoyment out of a set in Europe, one must have a set which is "universal."

Restrictions in England

The Super-Heterodyne and Neutrodyne are in great use by the amateur. The BCL, however, is generally content with other complicated apparatus. Unlike the American fan, he spends little money on the improvement of his set when once it is built. Sets of the 8-tube variety are used only by the ardent experimenter and the wealthy. It must be borne in mind that all apparatus in Great Britain must be licensed by the Marconi Company and the Postmaster General, royalties being paid on all sets that are factory built. Although the competition among manufacturers is not so keen as in America, prices are extremely low, as witness the price of tubes, which may be bought for about $1.50 each. During the boom period of radio prices of materials were at an astounding figure. Tubes in England sold for about $6.50. Today the British market is suffering the reaction of the boom days of radio in the same manner as the American market, only in a milder form. Manufacturers are not allowed a free hand in the manufacture of radio apparatus. They all must pay tribute to the powers that be.

Tubes Inside Now

For many years English manufacturers built their sets having the tubes on the front of the panel. There is a tendency today to follow the American practice of putting the tubes in the cabinet. In my opinion this is certainly advisable, as the average English set looks more like a power switch-board than a radio set. Apart from the unsightliness of such arrangements the question of breakage arises. Switching arrangements differ in many respects. While jacks are accepted in America as standard, the English manufacturers uses what is known as a Dewar switch, similar to the ring and listen key on a telephone switchboard, the loudspeaker being permanently connected to the output binding posts of the set. By this method, any number of tubes may be used by simply moving the switch to the desired position.

There is no doubt that it is in accessories that British and American radio apparatus differs mostly. The type of storage battery used by the American amateur is rarely seen in England except in automobiles. Practically all storage batteries are in celluloid containers, their total size and weight being much lower than the average American battery. The English batteries are not nearly so rugged in construction as the American.

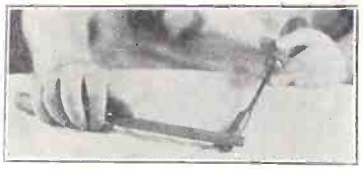
Tube Comparisons

Tubes differ in design only, their characteristics being very similar. American tubes are much better amplifiers at audio frequencies than any English I have ever tried. To counterbalance this, the English tubes are better radio frequency tubes than are the American. This is peculiar but undoubtedly the Western Electric 216A is the best power amplifier in the world, while the Marconi V24 is the best RF tube in the world. My own set utilizes a combination of tubes of both countries with a French tube as a detector.

There is little to choose between condensers, coils, rheostats, dials, etc., but the American condensers and coils are vastly superior to the British both as to efficiency and mechanical construction. The reverse was the case two years ago. I have yet to find a rheostat as good as the Marconi. America leads the world in dials and refinement in general accessories, such as battery eliminators, chargers, etc.; furthermore, sets are developed more quickly in the United States than in Great Britain.

It may be said that America is ahead of any other country in the development of radio apparatus, while the English and the French seem to get equally good results with sets a year or so behind in design. Since the American amateur is allowed greater privileges than any other amateur in the world, we must look to him to set the pace and be prepared to follow.

Use a Clean Iron



A lot of annoyance, due to difficulty in soldering and in making joints that will stay put, is caused by a soiled soldering iron. Pits may develop in the tip. Use a rasp to keep the tip surface bright and your soldering will be simplified and more efficient.

Programs on Short Waves Wired by Army to 162 Homes

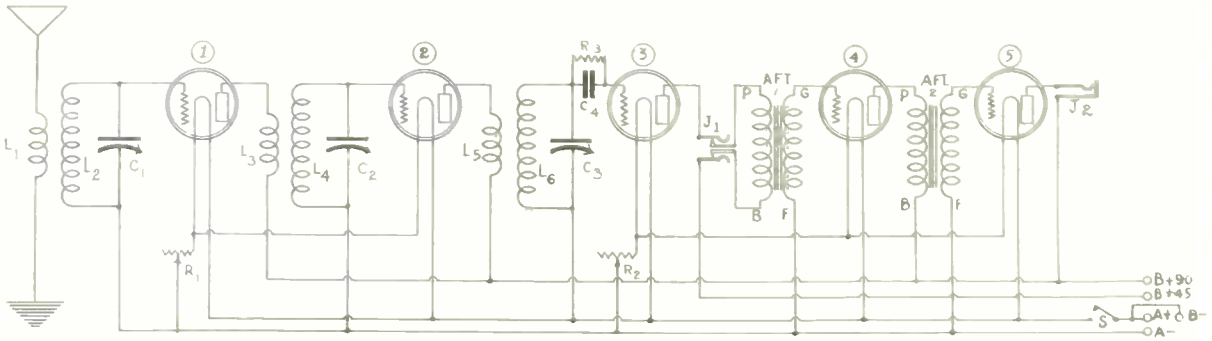
Experimental broadcasting by the General Electric Company on special wavelengths is finding increasing favor with many broadcast listeners. When the average listener tuned to the 379.5 meter wavelength of WGY hears the announcement that the program is also going out on 41.88, 109 and 1,560 meters wavelengths he pictures a few experimenters tuning in, but he is probably not aware that these wavelengths are furnishing a service for large numbers of people who might otherwise be unable to get the program.

WGY was recently informed by Captain Calvin H. Burkhead, post signal officer, at Fort Leavenworth, Kansas, that the 41.88 meter signals of WGY are received with good quality and heard in 162 homes. A master receiver, capable of receiving the short wave signals, picks up the programs and the signals after amplification are then sent over fifteen miles of wire to loud speakers in 162 homes. The speaker signal is stronger and of better quality at that distance, reports Captain Burkhead, than that received on the average receiving set.

Developmental work on the 1,560 meter wavelength has convinced the engineers that this is the ideal wavelength for reliable and consistent relay service over distances up to 300 miles. WCAD, the station of St. Lawrence University, at Canton, N. Y., is rebroadcasting the WGY program every Thursday evening, thus bringing the program, which includes features originating in New York and Washington, to the listeners of that station.

Further use for the 1,560 meter signal was brought to light a short time ago when Lieut. M. Van Voorst, signal corps, Military Department, Cornell University, Ithaca, N. Y., requested WGY to broadcast the Army-Navy football game on 1,560 meters. He explained that the receiver of the signal corps was not capable of picking up broadcast wavelengths being designed for telegraphy.

The 5-Tube Tuned RF Set



THE CIRCUIT DIAGRAM (Fig. 1) of the standard 5-tube tuned RF set.

By Capt. P. V. O'Rourke

THE standard 5 tube tuned RF set is shown in Fig. 1. The receiver uses basket weave coils that are mounted behind the tuning condensers. This introduces an action in the circuit which tends toward stability. Unless this were done the tubes on the radio side would be uncontrollable.

As a further check upon disastrous action by the radio amplifying tubes the rheostat controlling the two RF tubes may be varied. The greater the resistance of the rheostat in the circuit, the less brightly the tube burns and the less the oscillation

Fits on a 7x18" Panel

The set may be constructed on a 7x18" panel. A convenient method of assembly is to use a socket shelf. There is just enough room for the coils behind the condensers. Angle irons are used to secure the coils to the socket shelf. Although called irons they are most commonly brass. A tubing is inserted through one of the aperatures caused by the method of winding a basket-weave coil. This aperture formerly was occupied by a dowel stick or other rod of the winding form Inside this tubing a long machine screw is placed, with thread toward the condenser, so that a nut may be affixed at that end, to clamp the screw upon the brass angle. The other end of the angle is affixed to the socket shelf. Usually one angle, bent like an L, with a short horizontal plane as the base is sufficient for each coil

LIST OF PARTS

Three radio-frequency transformers, basket-weave (L1L2, L3L4, L5L6).
Three .00035 mfd. variable condensers. C1, C2, C3.
One 7x18" panel.
One 2½x17½" socket shelf, with five sockets.
Two 10-ohm rheostats.
One double circuit jack, J1.
One single circuit jack, J2.
One 2 meg. grid leak.
One .00025 mfd. grid condenser.
Two audio-frequency transformers.
Three 4" dials.
Three dial pointers.
One A battery switch.

The Coils

The inductances are alike in construction The primaries have 8 turns and the secondaries have 56 turns The wire is No. 24 enameled silk covered The form diameter is 3½ Usually there are fifteen rods on which the wire is wound these constituting the form

The secondary is wound for 24 turns then the primary wire is picked up and wound along with it side by side, for 8 turns The primary winding being terminated then the rest of the secondary (24 more turns) is put on The small primary is used as a further aid in obtaining a receiver that will not cause troublesome oscillations

The set made under these directions with 00035 mfd tuning condensers will tune approximately in step One factor that tends to operate against this is the added capacity in the first radio transformer L1L2 due to the aerial ground system Thus C1 might tune with readings a little lower than those of the other condensers To get away from this four turns may be removed from the secondary of the first radio transformer, or, in the actual winding, the number of turns might be made four fewer than that on the other secondaries (i.e., 52 instead of 56).

The circuit enables one to use earphones at the detector output but the jack provided for this purpose J1, is to facilitate the tuning in of distant stations, and not for general earphone reception On that account the rheostat that controls three tubes—the detector and two audio—has no auxiliary switching arrangement That is when the detector tube is lighted the audio tubes must be lighted —otherwise there would be something wrong with the wiring of Fig 1 were the guide J2 is for insertion of the plug to which the speaker cords are attached.

The circuit comprises two stages of tuned radio frequency amplification tube detector and two transformer coupled stages of audio frequency amplification

Tubes

The tubes should be 01A operated from a 6-volt storage battery with 45 volts or less of B battery on the detector plate and 90 on the RF and audio amplifier plates

The set will operate fairly well on dry-cell tubes such as the —99 type but the greater volume and amplification from the larger tubes make it well worth while to spend the extra amount of money Except with some types of Super Heterodynes, the small tubes, or any dry-cell tubes, are not for a permanent set, because in time the radio user goes over to the 5-volt tubes, because of their more satisfying service

Low Visibility No Test; Electrons Count in Tubes

Many radio fans are under the impression that the amount of light a radio tube gives off is an indication of its sensitiveness or general condition, and some are even inclined to regard with suspicion tubes that appear to glow only dimly The fallacy of this idea is explained by Clifford M. Norberg, a research engineer of the Sleeper Radio Corporation.

The fact that a radio bulb does emit light is entirely an incidental feature of its operation, says Mr Norberg. What is desired in a tube is a flow of little particles of electricity called "electrons," and the easiest way to obtain it is to burn certain kinds of wires in glass bulbs from which the air has been exhausted The temperature must be high to make the flow copious, and most wires must be heated white hot by the current from the A battery for proper operation Of course the incandescent wire, or filament, emits considerable light, but this phenomenon has absolutely no connection with the functioning of the tube from the radio standpoint.

It is quite possible to obtain a stream of the minute electrons in a tube by the use of certain substances known as "radioactive" materials, but their expense and rarity make their practical application extremely limited Radium and radium compounds are foremost in this radioactive group, so the cost of tubes equipped with filaments of this precious element can easily be imagined No A battery, incidentally, would be required for such tubes, as the flow of electrons from radioactive compounds is automatic and continuous

Certain less expensive chemical compounds of high electron emitting properties have been successfully employed in radio tubes The wire which ordinarily must be burned at white heat is coated with a layer of one of these compounds and the tube is then operated at a mere dull cherry red heat The new UX power tubes employ coated filaments of exactly this nature, as do the 216 A tubes that have been on the market a number of years

In many of the modern tubes of both the coated and uncoated variety little or no light is visible through the glass because of the inner coating of mercury which lines the bulbs The heaviness of this coating varies considerably as will therefore the amount of light that penetrates through it, so no significance at all can be atached to the brilliance of the illumination

A Cabinet B Eliminator

[Parts I and II of this article were published in the December 12 and 19 issues. Part III, the conclusion, follows.]

By Lewis Winner
Associate, Institute of Radio Engineers

PART III

SINCE the Rex B Battery Eliminator was described many folk have asked that the same eliminator be designed so that it can be placed in a cabinet. The result is shown in Fig. 2. The same material and the same hookup (Fig. 1) were used. The only extra articles that were employed were the panel, cabinet switch and single socket for the fuse, instead of the double socket.

A 7x14" cabinet with a panel to fit houses the parts. The same baseboard is also used. However, the baseboard must be cut down to fit the cabinet. Therefore, take all the parts off the board and lay them aside. Cut the board so that it is 11¾" in length and 7⅛" in width. Now take the panel. Three inches from the left and 3½" from the top and bottom drill a 5/16" hole. Three inches from the right and 3½" from the top and the bottom of the panel drill a hole ¼" in diameter. The hole on the left is for the shaft of the high resistance rheostat R2, while the hole on the right is for the rheostat R1, which controls the filament of the rectifier tube. Six inches from the right and the left and 2" from the bottom of the panel, drill a ¼" hole for the switch. The holes for the holding of the baseboard are four in number. They are ⅛" from the bottom of the panel.

Placing the Parts

The next thing that is attended to is the placing of the parts on the board. The step-up transformer is placed on the extreme left hand corner of the board. The choke coil L3 is placed right next to the transformer, but in an upright position. This is done by taking the angle irons off the laminations and placing them in such a position that the choke coil will stand on the short portions of the laminations. The terminals should be face up. The core is at right angles, although this does not matter. The last choke coil L4 is placed next to the choke coil L3, in the same manner. The core is at right angles to the core of the other choke L3 and parallel to the transformer core L1L2L3. See that the terminals lugs are face up, as it will be difficult to solder, if they are on the bottom. The socket is placed exactly in the front of the transformer. It is 1" from the right hand edge and 2" from the panel. The terminal strip is placed in the 1" portion, to the right of the socket. The first heavy fixed condenser C is placed opposite the socket or right in front of the choke coil L3, next to the transformer. The fuse socket is mounted next to the condenser. The last fixed condenser C2 is then placed.

Drill a ½" hole in the back of the cabinet. This is for the electric cord to pass through. On the left-hand side of the cabinet, or on the same side that the terminal strip is placed, drill 3 holes. These are each ¼" in diameter. They are 1" above the base of the cabinet. The first hole from the front is 17/16" from this point. They are each 1" apart. The condenser C3 was left out of the cabinet, as it was found not necessary to have it a permanent portion of the eliminator. If it is found that with your particular set, you need the condenser, there is plenty of space on the sides of baseboard to insert the same. Flexible leads should connect this to the B—B+ terminals. The electric cord is directly connected to the primary input, thereby eliminating the terminal posts.

Wiring the Eliminator

Connect the ending of the high tension secondary winding L3 to the beginning of the filament secondary winding L2. This same connection goes to one filament post on the socket. It does not matter whether it is a minus or plus post, as you are feeding AC to the filament of the tube. There is no definite plus or minus. Connect the other terminal of the filament secondary L2, or the end of this winding, to the resistance terminal on the rheostat R1. The arm of this rheostat R1 goes to the other F post on the socket. The beginning of the high tension secondary L3 goes to the beginning of the choke coil winding L5 and to one terminal of the fixed condenser C1. The other terminal of this choke coil, or the end of the winding, goes to one terminal of the fixed condenser C2. It also goes to the B+ amp. post on the strip and also to the resistance wire of the high resistance rheostat R2. The other terminal of the fixed condenser C1 goes to the plate post on the socket. This same connection goes to the beginning of the choke coil winding L4. The other terminal or the end of

(*Continued on page 26*)

LIST OF PARTS

One AC 220-volt step-up transformer L1L2L3 (Shore).
Two choke coils L4L5 (Shore).
Three 8 mfd. fixed condensers C1, C2, C3 (Conn. Tel. & Elec., Co., or Western Elec.).
One rectifier tube (Rex Magnatron).
One rheostat, 0 to 5 megohms, R2, (Clarostat).
One rheostat, 0 to 6 ohms, R1.
One 25 ampere, 110 volt AC fuse.
Ten feet of lamp cord.
One plug.
One switch.
One socket to hold the fuse.
One socket to hold the rectifier tube.
One 7x14" panel.
One 7x14" cabinet.
One 11¾x7⅛" baseboard.
Accessories: Bus bar or lead-in to wiring, solder, screws, nuts, etc.

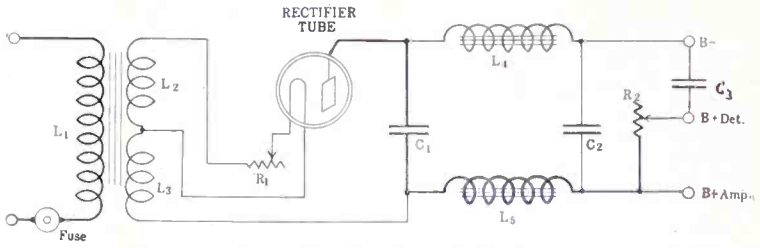


FIG. 1, showing the electrical diagram.

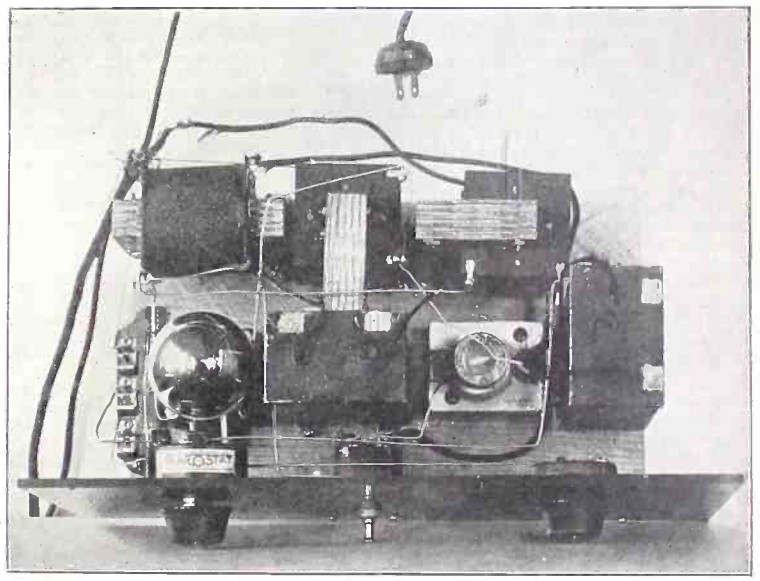


FIG. 2, showing the top view.

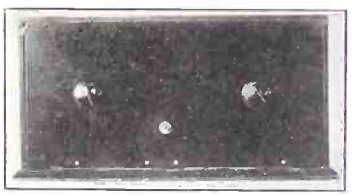


FIG. 3, the panel view.

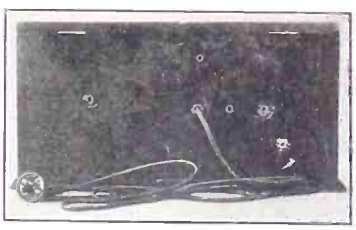


FIG. 4, showing the electric cord passing through the hole in the back of the cabinet.

The Spirit of Compromise

By J. E. Anderson

THE modern radio receiver is a set of compromises. It has descended from its grotesque prototype of early broadcasting days, which receiver was characterized by a multiplicity of knobs and a plurality of dials. That ancient complexity had so many knobs and dials that it was imposible to find room for all of them on the panel. It was necessary to mount them on all the six planes bounding the set, with a few extra varios strewn about the table. Everything in this set had to be adjusted for greatest efficiency so that a DX station located in an adjoining state could be picked up with a pair of earphones. Everything in it was variable, and the term "vario" was plastered on it as often as the terms "low-loss" and "straightline" are now attached to receivers. Of course this receiver was not easy to tune. The feat of finding and identifying a real DX station was an achievement to be heralded far and wide. Only the most persistent night owls could score. The great majority succumbed to dial twister's cramp long before they had solved a single combination. Variomania was epidemic when this monstrous receiver held sway.

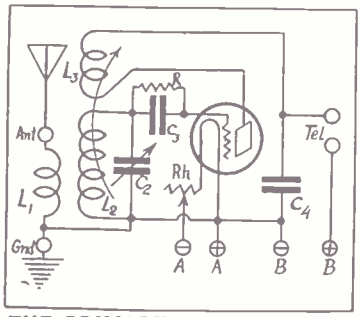
The Feminine Influence

The demand for a receiver which the "lady of the house could tune" became persistent. It was then noted that out of the infinite possible combinations of the many knobs and dials that fully ten to the twelfth power gave equally fair results. This led to the elimination of some of the varios, confining them to the panel and not exceeding in number the digits of hands and feet combined. But even this left much to be desired in the way of simplicity, and finally the present receiver emerged with a tolerably clean slate.

One of the first things to go was the inductance switch with its taps and switch points. First to go was the switch in the antenna circuit and the other primaries in the receiver. Then the switches in the secondaries followed. The only excuse for the inductance switch was that it extended the possible tuning range of the receiver. This sole advantage, however, was not sufficient to offset its many disadvantages, and its passing left no regrets, but a cleaner and less unwieldy set.

The Coupling Solution

The old-time variocoupler soon gave way to the fixed coupler. The variocoupler was a cumbersome affair and it complicated tuning to too great an extent to survive.



THE PRIMARY, L1, used to be invariably variable, in the old days, likewise the grid condenser C3 and the grid leak R. In the above diagram even the rheostat Rh might be replaced by a ballast. L3 has to be variable, however.

With a variable coupling between primary and secondary it was impossible to log stations accurately, since the condenser setting depended on the degree of coupling. The resultant fixed coupling is a compromise between various factors. For a given frequency there is a best degree of coupling to give the greatest output. If the coupling is looser the set is selective but there is very little power transferred in the coupler.

If the coupling is closer the power transfer is more favorable but the selectivity suffers. On either side of the most favorable degree of coupling the amplification decreases. Since the coupling cannot be just right over the entire frequency band for which the receiver is designed to respond it is necessary to compromise in such a way that the coupling is right at some chosen frequency in the band, say at the geometric mean of the upper and lower broadcast limits, or about 1,000,000 cycles.

But when the coupling is right for this frequency the set will usually oscillate at this and higher frequencies (lower wavelengths). This at first required that the coupling be made much less than that required for optimum results. The set had to be made inefficient to prevent uncontrollable oscillations. But since the development of various schemes for stabilizing a circuit, such as neutralization for instance, it is possible to increase the coupling to that required for maximum transfer of energy at some desired frequency in the middle of the band of broadcast frequencies.

More Variations Reduced

At one time both the grid leak and the grid blocking condenser were variable. Now only the former is variable but even that is for the most part left fixed. Now there are in endless number combinations of grid leak and grid condenser which will give identical results for a given input and given frequency. As the frequency and the voltage of the input varies, the required combination varies also, but this variation is not great; and there is no good reason why one combination should not be selected and left fixed. The condenser should be as small and the grid leak resistance as large as they can be made without having blocking of the grid for the loudest signal which the detector tube is called on to handle. For the ordinary tubes .0002 mfd. and 2 megohms may be considered as limiting values, upper and lower limits, respectively.

Hands-off Policy

The ancient prototype receiver had a filament rheostat for every tube. The modern receiver has no rheostat at all, or at most only one for the radio-frequency tube or one for the detector. The change is all in favor of simplicity and overall efficiency. Those receivers which have no rheostats employ Amperites or other filament ballast resistors. All of these devices effect a compromise. When the filament battery is fresh or fully charged, the filament current in each tube is slightly higher than the rated normal current; when the battery is nearly exhausted, the current is slightly less than normal. At no time during the life of the battery charge is the current excessive or greatly deficient. The adjustment is partly automatic due to a resistor element which has a very high temperature coefficient of resistivity. The resistance of the element changes with the current flowing through it, not with the voltage of the battery, as the sales argument has it, in such a manner as to keep the current nearly uniform. The great advantage of these automatic devices, in my opinion, is that they enforce a hands-off policy with respect to the filament circuit.

The Single Control

Perhaps the receiver of the future will be of the single control type, or perhaps of the push-the-button-and-get-what-you-want type. It can hardly be said that the receiver of today is of either of these types, although many attempts have been made to make single control receivers, exceed the multi-dial set in efficiency. Even in the best adjusted receivers in which one control governs the movement of more than one condenser the selectivity and the volume are compromises, except at one or two frequencies for which the adjustments have been made. Whenever vernier condensers or other devices are used to compensate for any variations between the selected points, the set ceases to be a single control receiver. Some of the sets that have appeared without these compensators work very satisfactorily, however. No doubt the single control receiver is in the ascendency. The push-the-button type will undoubtedly never emerge from the freak class, unless some radical change in the allotment of channels be brought about the world over.

Fixed Condensers

In the selection of by-pass or shunt condensers it is also necessary to com-

"Untuned," Not "Aperiodic," Called Right Primary Term

By Theodore R. Bunting

Research Engineer, Sleeper Radio Corp.

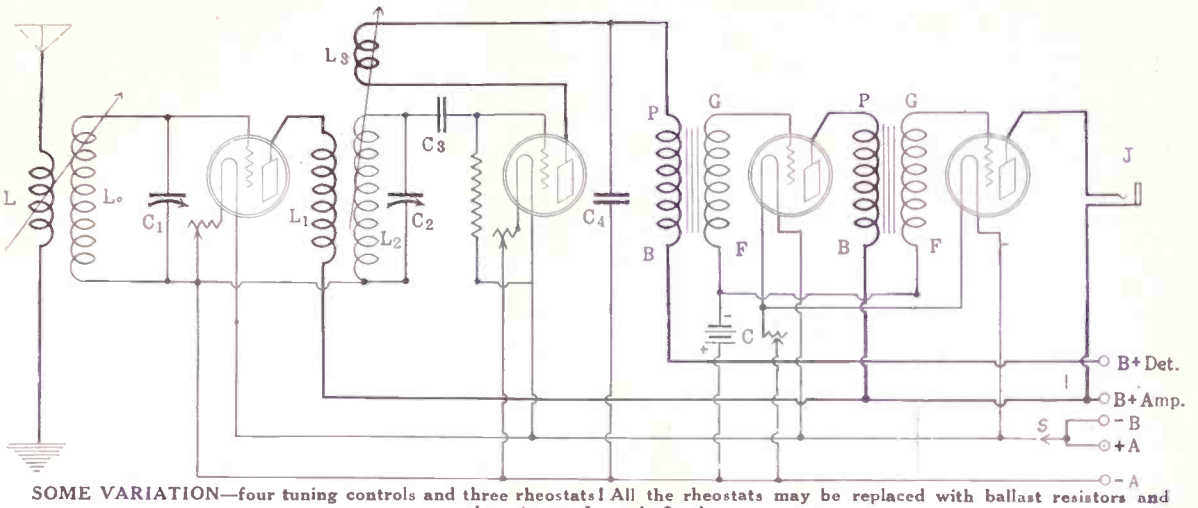
The use of the term "semi-aperiodic" to describe the nature of the small antenna primaries employed on many types of tuning coils is incorrect, there being no technical justification for it.

The primary circuit can be "periodic" or "aperiodic," but there is no half way condition. A "periodic" circuit is one capable of oscillating when properly excited, but an "aperiodic" circuit is one possessing such high resistance in its component parts that any current induced in its dissipates itself in heat losses just as quickly as it is supplied. The resistance of the small primaries of these tuning coils, which are found in many types of receivers, is not usually at all high enough to warrant the use of the designation "aperiodic" or "semi-aperiodic" for them.

Small fixed primaries on such coils are properly classified as "untuned" windings. They are said to be untuned because they are not adjusted to any particular wave in the broadcast band, but pick up all waves and feed them to the closely coupled secondary, where one wave is selected by a tuning process usually involving the adjustment of a variable condenser.

If these primary coils were truly aperiodic the resistance losses of the aerial circuit as a whole would be so great that only a very small percentage of the signal strength would be available for actuating the set, and as a net result the set operator would hear little if any broadcasting.

Radio's Rise to Simplicity



SOME VARIATION—four tuning controls and three rheostats! All the rheostats may be replaced with ballast resistors and the primary, L, made fixed.

promise. The by-pass condenser does its work best if it is infinite in size. In some cases, of course, the work would be too well done. For instance, if the condenser is connected across an audio frequency device it would by-pass the entire signal and not a rumble would be transmitted to the phones. No matter how small the by-pass condenser is in such a case some of the audio frequencies will be by-passed, and this will introduce distortion into the signal. But it is necessary to by-pass some in order that the radio frequencies be by-passed, and we have to tolerate the distortion that results. Usually the amount of distortion from this cause is not perceptible to the ear. This by-pass condenser should be the smallest possible that will satisfactorily by-pass the high frequencies. By-pass condensers across batteries or in certain filters should be as large as possible since they should by-pass everything except the direct current. Cost and dimensions are the factors which should determine the choice.

Series condensers in direct coupled circuits and in the output of a filtered power stage should be as large as space and cost permit. If these condensers are too small the low frequencies will be suppressed and distortion will result. The actual size of the condensers depends on the resistance or the inductance of the coupling impedances. For the usual values of these the condensers should not be less than one microfarad apiece. It is a compromise between price and space on the one hand and on quality on the other.

The coupling resistors in a resistance coupled amplifier should be extremely large for greatest step-up in voltage per stage. But when they are large it requires a plate battery voltage too high to be safe or economical in order to get any benefit of the possible step-up. If a low value coupling resistor is used the required battery voltage is also low, but then the tube does not operate effectively. A happy medium in resistance is required, the usual value selected being 100,000 ohms.

When choke coil coupling is employed the limit in the inductance, or the impedance, is the distributed capacity of the winding. It is comparatively easy to get an inductive impedance high enough to cause the tube to operate effectively without getting so high resistance in the winding as to cause a serious voltage drop in it; but it is difficult to keep the distributed capacity down. The capacity is of course in parallel with the inductance, and this partly nullifies the inductive impedance. It is a by-pass condenser and must be kept small for the same reasons.

The AF Transformer

When it comes to the selection of audio-frequency transformers there is very little for the fan to do except to decide on the price and the ratio of turns. A low ratio and a high price usually spell quality, not because the ratio is low and the price is high, but because it is easier to build a good transformer with a low ratio than one with a high ratio and because a good transformer of any ratio cannot be built to sell at a low price. The question of designing a good transformer is one to be answered by the transformer engineers. The final design of any transformer is a compromise of quality on the one hand and of cost, space and availability of materials on the other. A good transformer cannot be built along midget proportions. There must be ample core material of the highest available permeability; there must be enough turns on the primary to make its impedance high; and the turns must be spaced so as to keep the distributed capacity of the winding down to a minimum. All of these require space, and space filled with the best obtainable material costs money.

The Greatest Compromise

The greatest compromise in radio is that between selectivity and distortion. It is possible to get almost perfect selectivity, that is, so great as to exclude all frequencies but the one desired. It is also possible to build a receiver which is practically distortionless as far as unequal amplification is concerned. But it is not possible to attain these two extremes in a single receiver. The two are related to each other as a number and its reciprocal. If one is made great the other must of necessity decrease, and vice versa. Fortunately it is not at all difficult to compromise between selectivity and distortion in such a manner that the first is satisfactory for all practical purposes and the second not great enough to cause any unpleasant sound in the speaker. Most people would say that the quality is perfect when in reality the high notes in the signal are suppressed more than 75% as compared with the bass notes. The upper limit of the useful audio frequency band is usually taken as 5,000 cycles per second. A circuit which cuts down this frequency 50% as compared with a 50-cycle frequency is really a broad tuning circuit. Its selectivity does not compare at all favorably with the best low-loss circuit. Some of these, when regeneration is added, cut down the 5,000 cycle frequency 90% and more. This is serious distortion. The most selective Super-Heterodynes introduce even more distortion than that. That refers to the 5,000 cycle frequency. But in reality the audible frequencies which affect the timbre in music go much higher than that. They are audible up to about 15,000 cycles. These frequencies are, of course, suppressed much more, and the quality, or timbre, in music suffers accordingly. The reason that the distortion is not more noticeable is that the more important notes are comparatively low in pitch, and hence the useful harmonics of these are also camparatively low. By the time it comes to the high frequencies which are suppressed the harmonics contribute so little that their absence is not noticed. When it comes to a high pitched note like the upper ones of the piccolo there are very few harmonics audible anyway. Suppose the highest fundamental is near 5,000 cycles per second. The first harmonic of that is 10,000 and the second is 15,000 cycles per second. Most persons are unable to hear the second.

Heat's Effects are Used to Make Ammeters Work

The ammeters used to measure radio currents go from .003 to 3 amperes. These are hot-wire instruments and are made in the simplest form posible. Usually a single fine wire and some method of showing the heat produced by the wire are used.

It is usually in the antenna circuit.

Diamond Looms As 1926 Champion

AMONG receivers for home construction The 1926 Model Diamond of the Air bids fair to be the most popular set of the impending new year. This is RADIO WORLD'S most successful circuit and the fans that have built it have shared most gratifyingly in this success. Since the circuit appeared in its original form last April it has been built by more than 3,000 persons who purchased kits, and no one knows by how many thousand others. Results letters prove that it is easy even for the novice to construct this circuit with wonderful success, for the building data are very complete. The whole story of how to build this set was told by Herman Bernard in the September 12, 19, 26 and November 21, 28 and December 5 issues of RADIO WORLD. Also blueprints are available, so that the set may be made speedily without running any risk.

So wonderful is the set, and so successful have fans been who have built it, that thirteen leading radio parts manufacturers have combined their efforts to produce the official boxed and sealed kit. While parts of equal merit may be substituted for any specified, the kit offers a safe solution to those who do not feel confident enough to decide in what instances substitution would be safe.

A free nameplate will be sent to any one sending a request therefor. This nameplate is to be immersed in a tumbler of water for five minutes, then put on the panel with the reading matter toward you. The nameplate is of the transfer (decalcomanie) type, and the stiff piece of paper on which the nameplate had been fastened may be slipped right from under, leaving only the moist nameplate on the panel. In a few minutes this will dry and it will remain secure indefinitely.

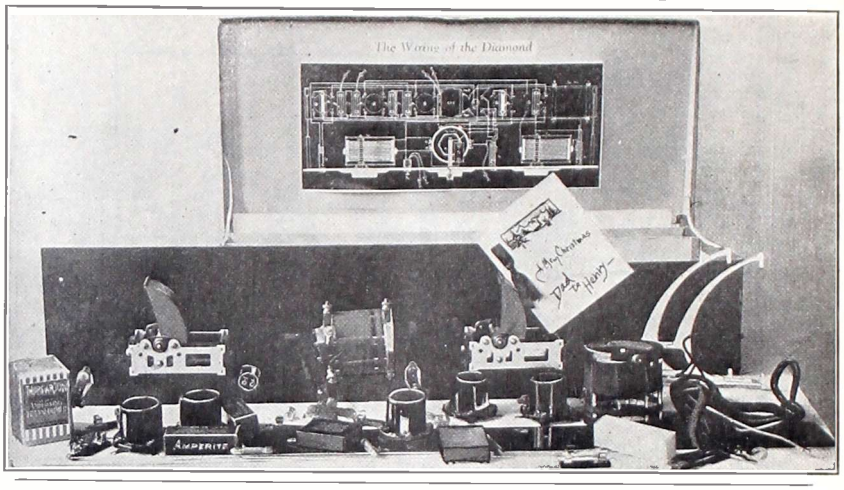
The requests for nameplates reach the Diamond Editor at the rate of 500 a week. A fraction of this week's mail is represented by the names and addresses published on this page.

Commercial plans are now going forward looking toward the boxing and sealing of 10,000 kits, to take care of the business between now and the end of May. If sales keep up with these production plans the 1926 Model Diamond of the Air will greatly outclass in sales any other boxed kit in the world. As the circuit was introduced about the middle of this year it was too late for it to achieve first place in the same year a position occupied by a circuit that had been pushed for more than ten months previously. The Diamond is now running second. But at the present writing it looks like a case of easy ascendancy for the Diamond in 1926.

Get a NAMEPLATE *Free!*

Your 1926 Diamond of the Air will not be complete without the nameplate, which will be furnished free to all who ask. This nameplate is of the transfer type. Immerse it in a tumbler of water for a minute, then place it on the panel, with the nameplate facing you. The paper may be easily pulled away and only the nameplate remain. When the nameplate dries it will be found securedly pasted to the panel.

Send in your request to Diamond Editor, RADIO WORLD, 145 West 45th Street, New York City, or come in and get one at the office, which is just a few steps east of Broadway.

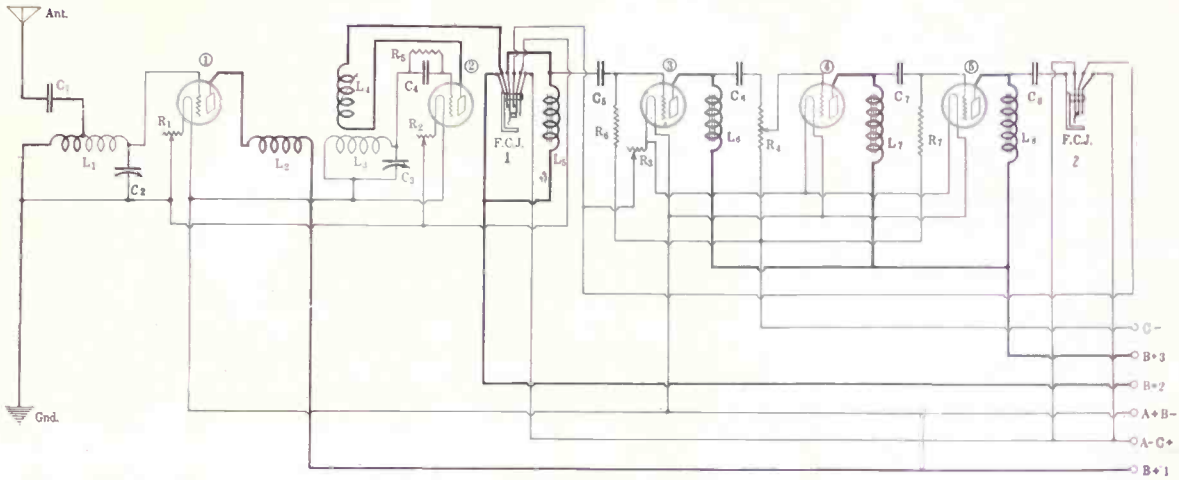


Great Rush for Nameplates for the Receiver

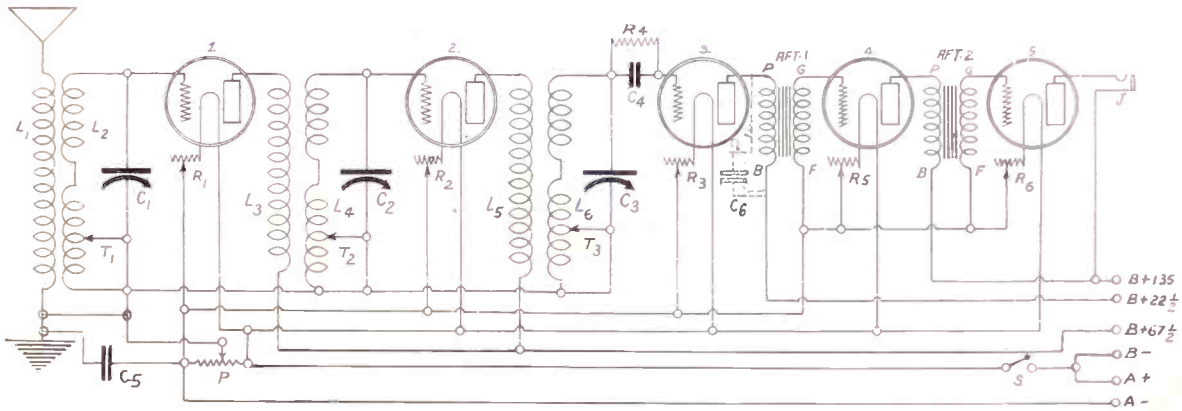
Following is a part list of the names and addresses of fans who sent in requests for a nameplate for the 1926 Model Diamond of the Air during the week in which this edition went to press:

A. Faltus, 1164 Plymouth, Fall River, Mass.
Frank Sutton, 9149 Cherwood Ave., Detroit, Mich.
John Cleavelin, Jr., 920 Chestnut St., Evansville, Ind.
Harvey Patenaude, 89 Peck Ave., West Haven, Conn.
Stephen Hidaglo, 365 W. 50th St., N. Y. City.
Jones Munker, 175 W. 188th St., N. Y. City.
William Dudley, Box 155, R. 1, Herrin, Ill.
J. C. McFarland, P. O. Box 101, Sandersville, Miss.
J. W. Flizfinger, Box 216, W. Elizabeth, Pa.
Chas. H. Carter, 2307 East Themingway, Seattle, Wash.
E. S. Danger, 28 Old Church Road, Whitchurch, Cardiff, Wales.
J. E. Rosengren, 619 Madison St., Topeka, Kan.
Arthur Parker, P. O. Box 627, Covington, Ia.
A. D. Daniel, Box 963, Sapulpa, Okla.
Arthur Waden, 35 Suffolk St., Lynn, Mass.
Joseph D. Baum, 1331 N. Broad St., Philadelphia, Pa.
David White, 514 W. 177th St., N. Y. City.
E. M. Watson, 414 Glenwood Ave., Rochester, N. Y.
Richard During, 12 Paterson St., Jersey City, N. J.
Ernest L. Brudos, Lake City, S. D.
W. K. Schuler, 3340 Pools, Kansas City, Mo.
Malcolm K. Sheppard, 11 Garden St., all River, Mass.
G. N. Boyton, 33 Bouden Ave., Toronto 6, Ontario, Canada.
R. L. Kierstead, 35 Princeton St., East Boston, Mass.
F. A. Brooke, 45 Edison Park, Quincy, Mass.
Arthur L. Lindley, R. 2, Pooli, Ind.
Allan Youngquist, 501 Brainerd Ave., St. Paul, Minn.
Courtenay Bateman, care Palmetto Ice Co., Columbia, S. C.
Albert Savage, 331 Weeden St., Pawtucket, R. I.
Ed. Dixon, 1513 South J. St., Tacoma, Wash.
E. F. Warner, 2207 Divisadero St., San Francisco, Cal.
Robert E. Page, 20 Brook St., Derry, N. H.
W. Cardinal, 1732a Chateaubriand, Montreal, Canada.
Carl Straubinger, 310 Stockholm St., Brooklyn, N. Y.
R. C. Bartlett, Vendome Hotel Building, Leadville, Col.
J. Henry Reisinger, Room 401, Southern Railway Building, 1300 Pennsylvania Ave., N. W., Washington, D. C.
Morris Kessler, Box 63, Brookside, N. J.
Dr. E. O. West, 608 Equitable Building, Des Moines, Ia.
A. J. Gunther, 535 St. Anns Ave., Bx., N. Y. City.
George W. Lippman, 2928 Ellsworth St., Philadelphia, Pa.
Frank Ward, Letterman, General Hospital, Ward No. 5, Presido, Cal.
W. E. Googler, 354 E. Georgia Ave., Atlanta, Ga.
H. A. Archer, 2055 Ellis Ave., Chicago, Ill.
C. Gooding, 234 Genners St., Rochester, N. Y.
George H. Wilhelm, 625 Willow Ave., Springdale, Pa.
H. O. Benfield, L. & N. Depot, Ticket Office, New Orleans, La.
Hyman Sobel, 2047-73rd St., Brooklyn, N. Y.
F. J. King, 56 Old Orchard Ave., N. D. G., Montreal, Quebec, Canada.
Arthur A. Phillipe, 1201 Clifton St., Winnipeg, Canada.
W. A. LeMieux, 117 Boyles St., N. W., Grand Rapids, Mich.
Harry G. Lupold, 708 W. Elm St., Morristown, Pa.
Freeman Martin, Perrvopolis, Pa.
C. J. Laughlin, 5726 Boles St., Kansas City, Mo.
Henry J. Loiselle, 197 Hope Ave., Worcester, Mass.
J. E. Staton, 420 W. Central Ave., Albuquerque, N. M.
H. E. Wikstrom, 3361 W. 98th St., Cleveland, O.
John R. Blum, Dansville, N. Y.
John Stark, 2547 South Harding Ave., Chicago, Ill.
J. F. Hooper, 204 Kindersley Rd., Montreal, Quebec, Canada.
P. Frick, 561 Hudson Ave., West N. Y., N. J.
Irving R. Fisher, 100 Springfield Ave., Buffalo, N. Y.
Paul E. Suits, 129 North Rutland St., Watertown, N. Y.
Herbert Parson, Box 612, Thomaston, Conn.
Michael Weber, 2247 French St., Erie, Pa.
E. N. Simpson, 714 Shaune Ave., Kansas City, Mo.
C. E. Blair, 513 Bergen St., Harrison, N. J.
S. A. Valter, 642 Shawmut St., N. W., Grand Rapids, Mich.
Alex. J. Juniewiez, Headquarters Co., 5th Infantry, Fort Williams, Me.
R. Erte, 20 Conklin St., Poughkeepsie, N. Y.
Joseph F. Huspek, 3925 W. 15th St., Cleveland, Ohio.
Paul Sweeny, 338 Woodland Ave., Syracuse, N. Y.
Alex Horvath, Jr., 2658 Grand Ave., Cleveland, Ohio.
A. J. Ibinger, Black River Falls, Wis.
George A. Godley, Berwyn, Md.
J. Donald Kinchiloe, Lathrop, Mo.
Alex W. Leek, 60 Burling St., Flushing, N. Y.
Thomas Carberry, 69 East 122nd St., N. Y. City.
E. F. Wilson, 1830 E. Velyn Ave., Memphis, Tenn.
Charles H. Sprean, 457 Bergen Ave., Jersey City, N. J.
Francis M. Field, Quarters 25, Governor's Island, N. Y.
Joseph A. Stackawitz, 2432 Salisbury St., S. S. Pittsburgh, Pa.
A. W. Sullivan, 44 Brow St., Fall River, Mass.
Clay M. Salladay, Box 81, Jerome, Idaho.
C. Arthur Wagner, 1131 North 7th St., Waco, Texas.
John Harasta, 16 Hudson St., Binghampton, N. Y.
Alejardo Csuevara, Acero 28, Mexico City, Mex.
J. D. Hartenbower, 7337 Coles Ave., Chicago, Ill.
James White, 1335 First Ave., N. Y. City.
Turner Coile, 100 Lemou St., Marietta, Ga.
George J. Lingl, Bird Island, Minn.
Charles J. Berry, Thorndike, Me.
Joseph W. Willis, 1944 W. Lafayette Boulevard, Detroit, Mich.
S. Thompson, Jr., 205 E. Main, Ardmore, Okla.
Russel Johnson, 10 Arthur St., W. Quincy, Mass.
Melvin Buouett, Box 283, Jonesville, Mich.
Alfred J. Terres, 1523 E. Franklin Ave., Minneapolis, Minn.
William J. Palmer, 3420 Alaska St., Seattle, Wash.
Clarence W. Lewis, R. 5, 1888 Greenway North, Columbus, O.
L. B. Williams, 830 Fremont, Manhattan, Kan.
Edward C. Mourhoff, R. D. 2, Cabot, Pa.
I. R. Sharp, Box 172, Stoneberry, Mo.
J. B. Reed, 1021 West 10th St., Los Angeles, Cal.
Charles W. Seagroat, 77 Market St., Morristown, N. J.
F. L. White, 3306 Morrison Ave., Houston, Tex.
George F. Worley, 571 North 1 St., Missouri Valley, Ia.
A. H. Stearns, 883 River St., Troy, N. Y.
I. H. Dieters, 807 E. Madison St., Tampa, Fla.
Keith Grover, R. F. D. 1, Pitsburgh, Pa.
William Forden, 237 Fulton St., Brooklyn, N. Y.
E. B. Halley, 41 Boonton St., Dover, N. J.

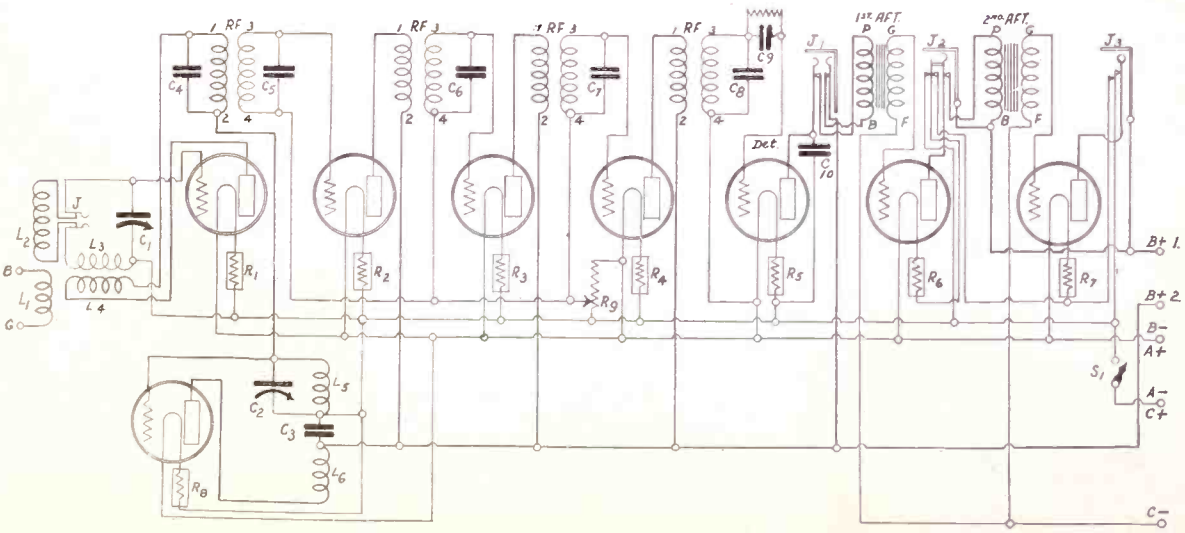
Three Sets in the Quality Class



THE 70 TO 1208 METER RECEIVER described by Robert Force in the December 5 issue of RADIO WORLD. The coils employed are of the plug in type. C2 and C3 are both .0005 mfd. variable condensers. L5, L6, L7 and L8 are 200 henry choke coils. R6 and R7 are 500,000 ohm resistances. R4 is a 500,000 ohm potentiometer.

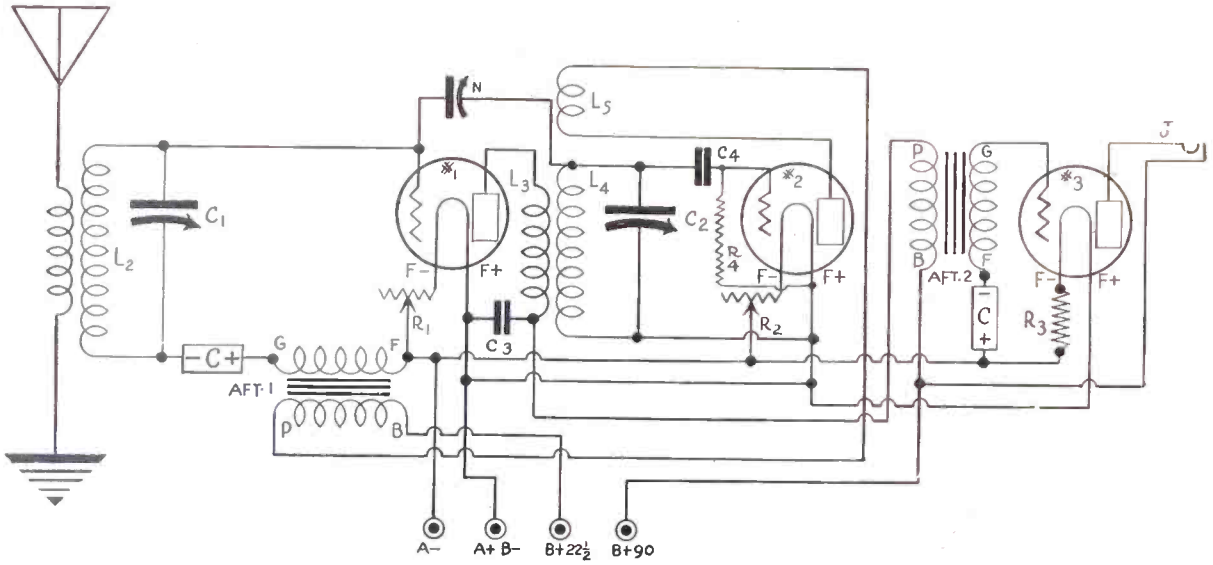


THE electrical diagram of the 5-Tube Geared Receiver, described by Lewis Winner in the September 5 and 12 issues of RADIO WORLD. T1, T2 and T3 are tap arms controlled by a ratchet and pinion. L2, L4 and L6 are variable and also controlled by a ratchet and a pinion.

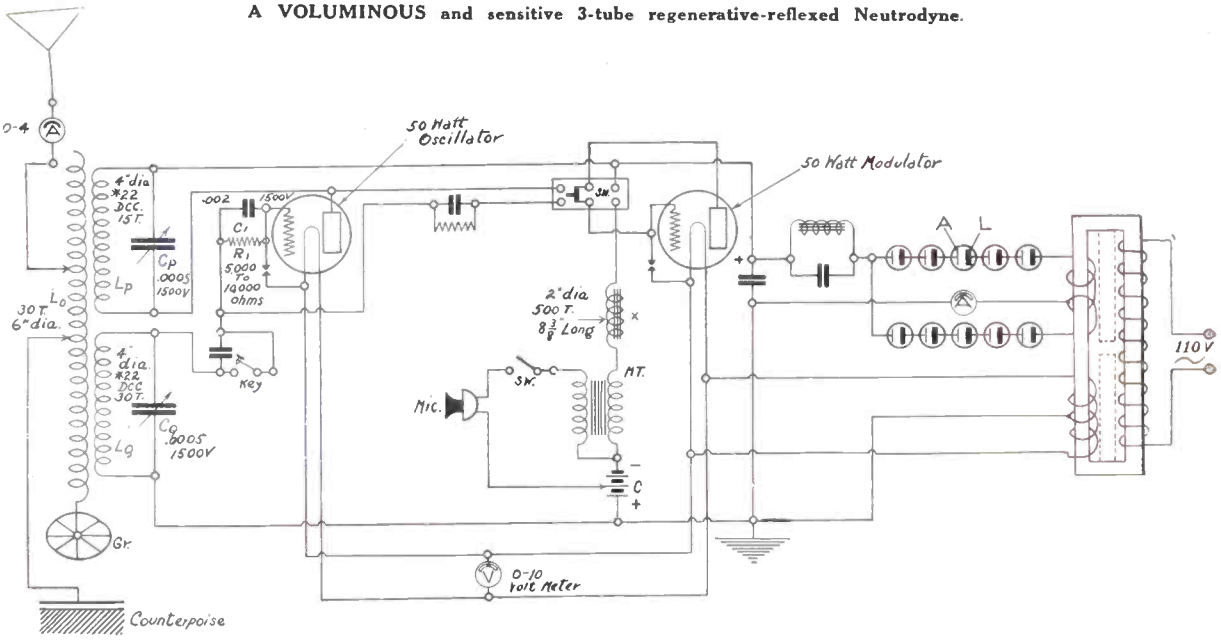


THE electrical diagram of the Ultradyne, described by Brunsten Brunn in the November 14 issue of RADIO WORLD. All the tubes employed are of the 201A type. A loop may be used with this receiver.

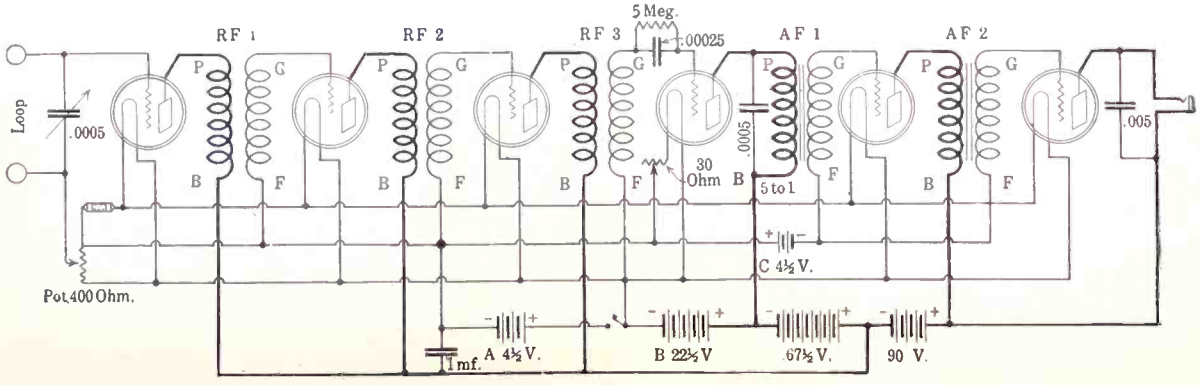
Hookups for Amateur and BCL



A VOLUMINOUS and sensitive 3-tube regenerative-reflexed Neutrodyne.



THE MEISSNER Transmitter with Heising System of Modulation.



THE 1-DIAL 6-Tube sensitive DX getter.

The 7-Tube Super-Heterodyne

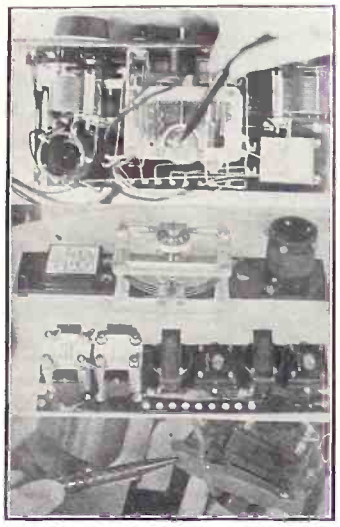


FIG. 20 (top), the balancing condenser, once set, is locked. Pencil points to the unit. Fig. 21 shows the arrangement of parts on subpanel. The placement of transformers, including AF, is shown in Fig. 22, while Fig. 23 gives an intimate view of how sponge rubber is used for shock-absorbing purposes.

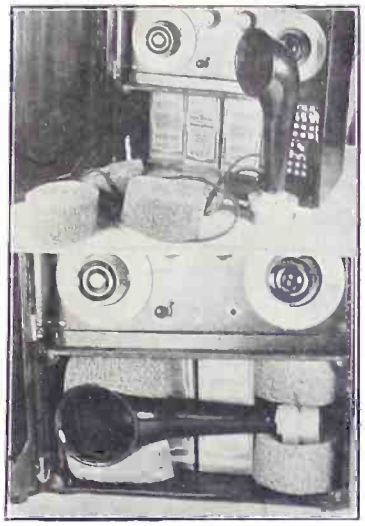


FIG. 24 shows the preparations for mounting the speaker and unit on the cabinet. Fig. 25 shows the feat actually accomplished.

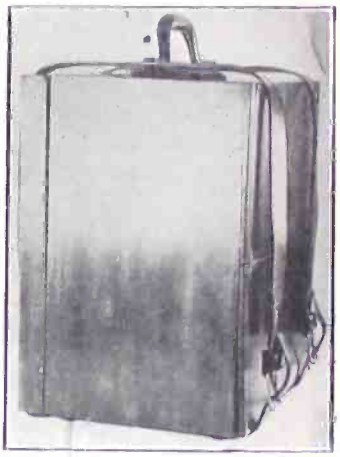


FIG. 26, the case, with shawl strap and handle, showing ready portability.

[Parts I and II of this article on the construction of a super-heterodyne in a portable cabinet appeared in the December 12 and 19 issues. Part III, the conclusion, follows.]

By Herbert E. Hayden

THE completion of the assembly of the Super-Heterodyne is shown in photographs herewith. The Pressley model was used, housed in a cabinet simulating that of the Radiola 26. As a kit is necessary for proper completion of the receiver, the coil winding data are omitted, also the list of parts.

The wiring diagram was published December 12.

First run all filament wiring to proper places. All connections are made under the socker panel. Run the jumper between the positive terminals of the sockets and connect this to the switch R. The other terminals of R go to the binding posts 8 and 6. The first five sockets have their negative filament terminals connected by a jumper which in turn goes to one terminal of the rheostat J1. In the same manner the last two sockets have the negative filament terminals connected together and to the rheostat J2. The two remaining terminals of the rheostat connect to binding posts 9 and 10. This completes the filament circuit wiring and it is well to test it by connecting a battery temporarily to the binding posts 8 and 9 and trying a tube in each socket to make sure the circuits are complete. In wiring to the sockets the bus is slipped up through the hole in the hollow rivet, bent over and soldered on top. Do the soldering carefully.

Second, wire the tuning and oscillator circuit. The letters S and R on the variable condensers refer to the stator and rotor respectively while the balancing condenser has two stators lettered S and S1.

Connect the rotor of D to one stator of balancing condenser E and to terminal 3 of the oscillator coil A. The stator of D is connected to terminal 1 of coil A to the other stator of E and to one side of grid condenser F1, the other terminal of F1 going to the grid of the first tube T1. The stator of the tuning condenser C connects to terminal 2 of the oscillator coil A and to binding post 1. The center contact of switch Q is connected to the rotor of C and to the rotor of the balancing condenser. The top and bottom contacts of switch Q are connected to binding posts 2 and 3 respectively. A lead runs also from the rotor of the balancing condenser to the negative filament lead. It remains to connect in the plate circuit of the oscillator. From binding post 4 a wire leads to terminal 1 of the first intermediate K1. From post 2 of K1 connection is made of 4 of the oscillator coil B, the other terminal of which (5) connects to the plate of the first tube.

Third, wire the intermediate frequency amplifiers. Post 4 of K1 connects to the grid of the second tube, T2, while post 3 of K1 connects to negative lead running to the rotor of the balancing condenser as shown in the diagram. The plate of T2 connects to post 2 of the second intermediate transformer L1 and terminal 1 of which connects to binding post 5. This same wire runs around and connects to post 1 of K2 and L2, to the positive B terminal of M1 and to one side of both fixed condensers H and G. Terminal 4 of L1 connects to the grid of the third tube T3 and the remaining terminal 3 of L1 goes to the negative A battery lead. This wire also connects to terminals 3 of K2 and to the unconnected terminal of the bypass condenser H. To complete the connections to the third intermediated transformer K2 we have only to connect terminals 2 and 4 to the plate of T3 and the grid of T4 respectively. The last intermediate transformer has post 2 connected to the plate of T4, post 1 being already connected to the B battery lead.

Since T5 is the second detector the grid of that tube goes to the condenser F2 which is supported by the buswire, the other side of F2 connecting to post 4 of L2. Post 3 being the grid return is connected to the positive lead to the sockets as shown.

Fourth, wire the audio-frequency amplifiers. The plate of the detector tube T5 connects to the remaining unconnected side of bypass condenser G and to the P terminal of audio-frequency transformer M1. Terminal G of M1 is next connected to the grid of T6 while the F terminal of both M1 and M2 are connected together and to binding post 11 on the rear of the socket panel. The plate of T6 is connected to post P of M2 and to the frame of jack P. The positive B terminal of M2 is connected to the short center spring of jack P. Terminal G of the same terminal connects to the grid of the last tube T7. The plate of T7 being then connected to the frame of jack O there only remains to connect binding post 6 to the top springs of both jacks to complete the wiring.

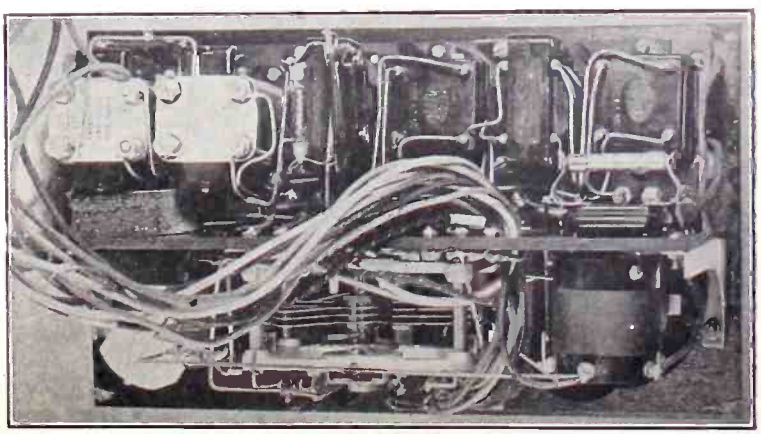


FIG. 27, rear view of the completed assembly.

Radio University

A Question and Answer Department conducted by RADIO WORLD for its Readers by its staff of Experts. Address Radio University, RADIO WORLD, 145 West 45th St., N. Y. C.

WILL YOU please give me a diagram of a 4-tube receiver, using a regenerative radio-frequency amplifier, a crystal detector with a battery to make the crystal more sensitive, one step of transformer coupled audio-frequency amplification, and two steps of auto-transformer coupled AF. Also state the constants of the coils, condensers, etc.—R. Campbell, Acres, Kan.

Fig. 245, shows the diagram. L1, the primary, is wound on a tubing 3¼" in diameter and 4" high. It consists of 10 turns. There is no space left between the windings. The secondary is therefore placed close to the primary. There are 45 turns placed here. The primary, L3, also consists of 10 turns placed on a form 3½" in diameter and 4" high. The secondary, L4, consists of 45 turns wound on the same tubing. No. 22 double cotton covered wire is used. C3 and C4 are both .001 mfd. fixed condensers. C1 and C2 are both .0005 mfd. variable condensers. CD is a fixed crystal detector. P is a 400-ohm potentiometer. S is a filament switch used to short circuit the fixed condenser, C4. R1 is a 10-ohm rheostat. AFT1 is a low ratio audio-frequency transformer. R2R3R4 are ¼-ampere ballast resistors. The stopping condensers in the autoformer stages have a capacity of 1 mfd. The potentiometer used in the grid circuit of the third tube has a resistance of 500,000 ohms. The resistance in the grid circuit of the fourth and last tube has a resistance of 500,000 ohms. J1 is a double circuit jack. J2 is a single circuit jack. S2 is a filament switch used to turn off and on the tubes. Use 201A tubes throughout the set.

* * *

WILL YOU please show diagrams depicting the various methods of connecting up audio-frequency amplifiers.—R. Edifroth, Elizabeth, Ind.

Fig. 246, shows the various types of audio-frequency amplifiers. The one to the upper left shows the transformer coupled type of AF amplification. The one opposite shows how to connect up a push-pull amplifier. The one diagram in the lower left shows the auto-transformer method of AF coupling. The last one, lower right, shows the impedance AF coupling method. The resistance method of coupling is the same as the impedance method, except that resistance is substituted for the choke coil L. The transformer method of coupling gives you the most volume per tube.

* * *

WILL YOU please explain the function of the potentiometer in a radio receiver when the resistance is connected across the A battery and the arm goes to the grid return?—H. L. Jackson, Wash-

When connected in the above mentioned manner negative or positive grid degrees of bias are obtained by varying the resistance. The potentiometer is usually a waste or rather a drain on the A battery, since the resistance is always across the battery. In other words, the battery, while not shorted is discharging through the resistance. Use a switch to remedy this.

* * *

AS A reader of RADIO WORLD I was especially interested in the Rex B battery Eliminator described in the December 12 issue. I would like to have the following queries answered: (1) What is meant by a drop of 30 volts for each individual plate lead? I am using a 5-Tube Acme Reflex, with 3 stages of audio-frequency amplification, with 90 volts on all the plate leads. Would this constitute 5 plate leads or one plate lead?—Eli B. Levy, 1440 Broadway, N. Y. City.

The drop will only be 30 volts, plus about 10 volts due to the resistance of the line in which the tubes are connected, or a complete 40-volt drop altogether. There will not be a 150-volt drop.

* * *

DO YOU think it advisable to change a 1925 Superdyne to the 1926 Diamond? (2) What fundamental changes are necessary? —Dr. Thomas W. Tuggle, 523 West 149th St., N. Y. City.

(1) Yes. (2) Instead of the radio-frequency tube being regenerative in action, the detector tube is made regenerative, while the radio-frequency tube is made non-regenerative. See November 21, 28 and December 5 issues of RADIO WORLD.

* * *

I HAVE built the Pathfinder, which was described in the October 31 issue of RADIO WORLD by Sydney Finkelstein and have some trouble with it. (1) I cannot get the low wave stations. From 55 up, the set works O. K., but from 55 down, the signals are nil. What can I do to remedy this? (2) What can I do to get more volume on all the stations?—Louis Koller, 473 Martin St., Roxborough, Pa.

(1) Connect the rotors of the condensers to a tap 15 turns away from the battery end of the secondaries. Take the resistance R4, out of the circuit. This means that the G post of the last audio-frequency transformer will go to the G post on the last socket. Reverse the A battery. Place more B battery voltage on the plates of both the detector and the amplifier tubes.

* * *

I HAVE built the Diamond of the Air, but cannot control the regeneration. As soon as I increase the regeneration to such a point where the maximum volume is obtainable the set starts to squeal. As soon as I place my hand within 3" of the grid leak, the set starts to squeal also. I am using an Ambassador radio-frequency transformer and an Uncle Sam 3-circuit tuner.—Jesse D. Warrington, 106 108 Water St., Catskill, N. Y.

Reduce the plate voltage on the detector tube. Decrease the number of turns on

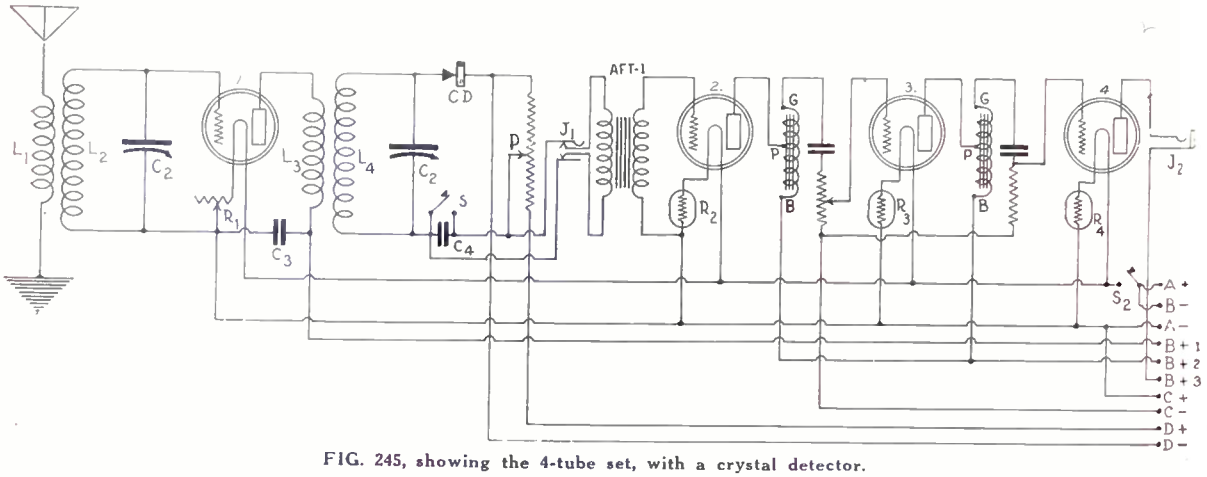


FIG. 245, showing the 4-tube set, with a crystal detector.

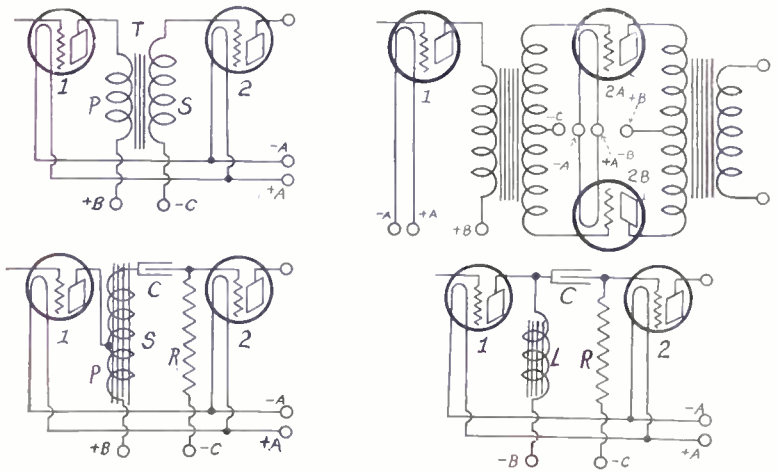


FIG. 246, shows the four types of AF coupling.

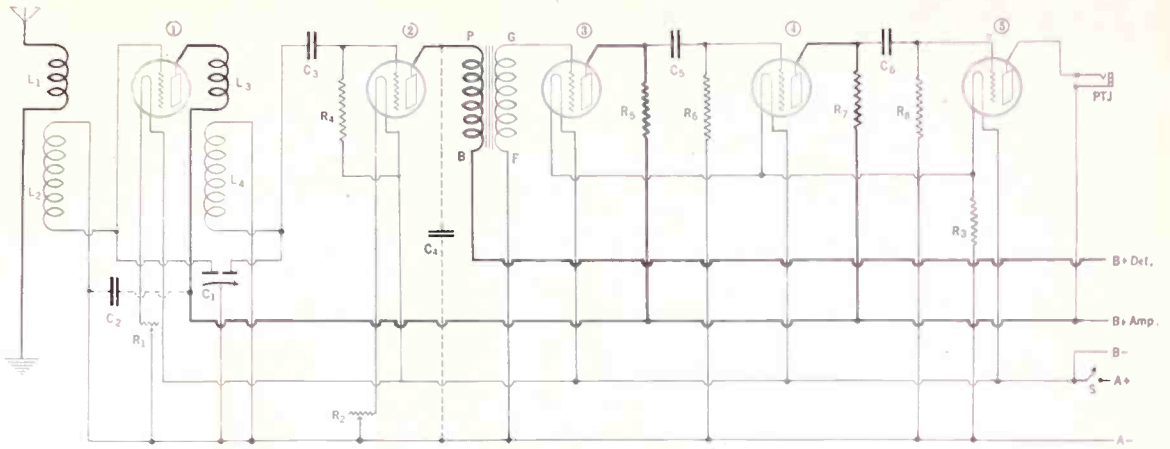


FIG. 247, the schematic diagram of the 1-control 5-tube Powertone, a selective and voluminous quality receiver.

the tickler coil. Reverse terminals to secondary L1. Reverse connections to grid leak.

* * *

IN THE May 23 issue of RADIO WORLD there appeared a description of a circuit wherein a single tube was used. This was described by Percy Warren. I should like to know a little more about this circuit as to its actual performance in distance, volume and selectivity.—E. H. Stephens, 820 East 87th Place, Chicago, Ill.

It is a good distance getter. The signals that are obtainable are very loud. The selectivity is good also.

* * *

PLEASE GIVE me the following information about the Freedom Reflex as published in the July 4 issue of RADIO WORLD. (1) I have a 3½" basket weave form. How many turns of No. 22 DCC wire should I wind for the primary and the secondary? (2) What spacing is there between the turns?—Asa Lemley, 703 Ohio Ave., Erwin, Tenn.

The primaries L1 and L3 consists of 10 turns. The secondaries, L2 and L4, consist of 45 turns. (2) There is a ½" separation between the windings.

* * *

I WOULD be pleased if the following questions were answered: (1) Would the efficiency of the Diamond be improved by neutralizing the radio-frequency tube? (2) Would the UV199 be better than the UV201A as a radio-frequency amplifier? (3) Where can I obtain suggestions as to the successful operation of the Diamond? —Irving Johnson, 717 Brown St., Lafayette, Ind.

(1) No. (2) No. (3) See the Nov. 21, 28 and Dec. 5 issues of RADIO WORLD.

* * *

PLEASE show a schematic diagram of the wiring of the 1-control 5-tube Powertone.—Bertram Reinitz, 127-A Clarkson Ave., Brooklyn, N. Y.

Fig. 247 is the diagram. The set may be assembled on a 7x18" panel, using a 5-gang socket shelf, 2½x17½". The tuning condenser, C1, is a 2-section instrument (double condenser), each section .0005 mfd. L1L2 and L3L4 are RF coils of the tuned type. On a 2½" diameter L1 and L3 would have 8 turns, L2 and L4 would have 53 turns. The wire is No. 24 silk over cotton. The separation between primaries and secondaries is ¼". R1 and R2 are 20-ohm rheostats. The ballast, R3, is ¾-ampere. R5 and R7 are 0.1 meg. resistors; R4, 2.0 meg.; R6, 1.0 meg.; R8, 0.5 meg. C5 and C6 are .006 mfd. C3 is .00025 mfd. The AF transformer is PBGF. Phone tip jacks, battery cable, five sockets and a vernier dial are necessary. Use 135 volts of B battery for the high voltage and 45 on the detector plate. If coil forms of 3" diameter are used, the 8-turn primary remains, but the secondaries have 45 turns. See the December 12 issue for construction and operating data.

* * *

I AM building the 1926 Diamond, using all materials that were specified in RADIO WORLD, with an exception. That is, I wish to use two Ambassador 3-circuit coils and dry cell tubes. (1) Will these coils serve the purpose? (2) I understand that one of ticklers will have to be left disconnected. If this is true will the results be hindered in any way? (3) What dry cell tubes will give best results? (4) What are the proper ballasts (Amperites) to use for the particular dry cell tubes that should be suggested? (5) Is there any part that the extra tickler can play in the circuit? (6) Will I lose much volume if I use the dry cells tubes, instead of the storage battery tubes?—O. T. Swan, 110 Union St., Oshkosh, Wis.

(1) Use the extra tickler as L0 for aerial tuning. Ignore the small primary on that coil. (2) No. (3) The UV199 tube will give the best results as to volume and distance for dry cell tube operation. (4) You will have to use individual ballasts. If you are using a 4½-volt battery, the No. 4V-199 Amperite should be used. (5) Yes, as explained. (6) Yes, the volume will be decreased severely, as compared to the results when using the 201A tubes.

* * *

WILL YOU kindly give me the coil data for the 5-Tube Browing Drake set that was described by Capt. Peter V. O'Rourke in the September 26 issue of RADIO WORLD, so that 17-plate condensers may be employed?—R. F. Wintermute, 9656 Myers Road, Detroit, Mich.

L1, the primary, is wound on a tubing 3½" in diameter and 4" high. It consists of 12 turns of No. 22 double cotton covered wire, tapped at the 6th turn. Leave ¼" sparing. The secondary L2, consists of 55 turns. L3 is also wound on a tubing 3½" in diameter and 4" high. L3 consists of 12 turns. L4 consists of 55 turns wound on the same tubing with a ¼" space left between the windings. The tap is taken at the 12th turn from the beginning (filament end) of the winding. The tickler L5 consists of 48 turns of No. 26 single silk covered wire wound on a tubing 2" in diameter.

* * *

COULD YOU please give me a formula for making the special electrolyte, so that I may charge my own A battery. (2) What other method could I use, to charge my own A battery. I have a 110 volt AC 60 cycle line.—Melville C. Gasaway, Deputy R. F. D. 1, Jefferson County, Ind.

(1 and 2) You cannot successfully employ a chemical solution for charging your A battery without injuring your battery. The only one and safe manner to charge your battery is to use a step-down transformer in conjunction with a rectifier bulb, such as the Tungar or a chemical rectifier in conjunction with current supply.

* * *

I CANNOT receive certain low wave, low power stations which are located in New York City, with any consistency. That is, I will get a station, which is operating on about 250 meters. Suddenly the station will sort of fade away, but by turning the dial a bit higher and sometimes lower the station can be obtained with full volume. What causes this?—P. Basletts, Great Neck, L. I., N. Y.

This is due to the poor oscillating circuit and also poor antenna system that the station is employing. It might be due to your swinging aerial also.

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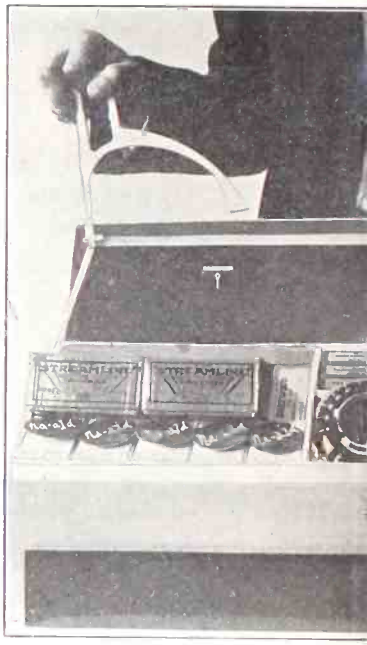

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Lightning Arrester	$0.50
Battery Cable	.45
Pacent Rheostat	.60
Dubilier By-Pass Condenser, 0.25 mfd.	.75
D.P.D.T. Switches	.50
S.P.D.T. Switches	.45
W.D.-11 Adapters	.50
Phone Plugs	.25
Triple Standard Sockets	1.00
Bezels 1" Nickel	.05
Bezels 1" Brass	.10
Glass Insulator	.20
Toggle Switch	.20
Bruno Inductance Switch (14 Point)	.35
Bruno "66"	2.25
Hydrometers	.65
Bell Wire (Half Pound)	.40
Na-ald U.X Adapters	.35
Aerial Kit (Complete)	2.50
Crystal Detector	.65
Double Jacks	.40
Single Jacks	.30
Westinghouse R. C. Set (2 only)	29.50
Neutralizing Condenser	.35

HARD RUBBER PANELS

7x10	$0.50	7x18	$0.95
7x12	.60	7x21	1.25
7x14	.75	7x24	1.35
7x26			1.50

Drilled and Engraved for Diamond of the Air 2.65
Powertone, 7x18, Drilled and Engraved Panel 2.15
3-Tube Bruno, 7x18, Drilled and Engraved Panel 1.45

Kit for Rider DX Wavetrap, $7.95

"Bruno 77" 3-circuit tuner wound on quartzite glass with special tickler for smooth regeneration control $5.50

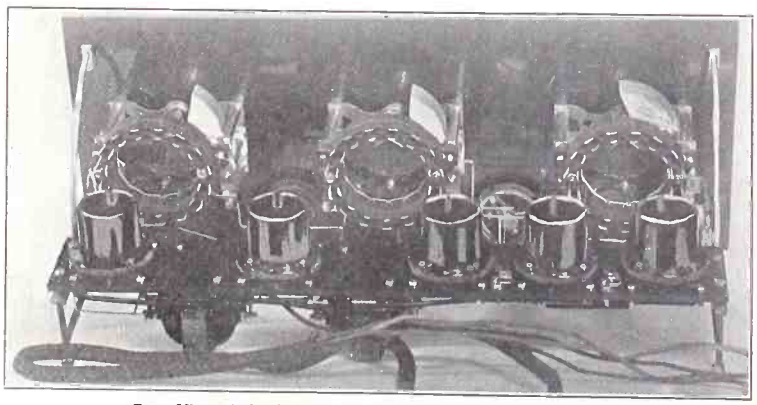
"Bruno" short wave coil. Tunes from 25-110 meters with .00025 condenser. Wound with flat ribbon wire.....$5.50

BRUNO BRACKETS

Give Your Set That Professional Appearance

Simplifies wiring and construction of any set. Price, per pair $1.00

THE NEW B-C-L TUNED RADIO FREQUENCY SET



Rear View of the Set, Showing Parts and Neat Assembly Work.

To Make New Friends for 1926

We offer this really dependable receiver, which contains all nationally-known makes of radio apparatus, for this remarkably low price of **$29.50**

WITH CABINET $34.00

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ERVICE CO.
EW YORK, N. Y.

Opera Singers Heard in Joint Recital

VICENTE BALLESTER, Spanish baritone of the Metropolitan Opera Company, heard in a joint recital.

HULDA LASHANSKA, American lyric soprano, heard in a joint recital during an "Atwater-Kent Radio Hour," broadcast by WEAF and fourteen other stations.

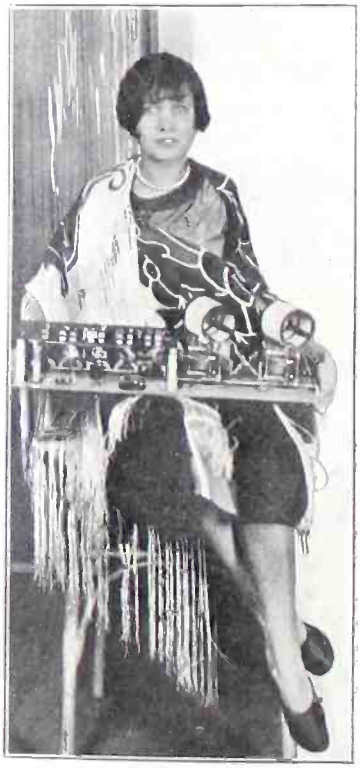
Japanese Like Radio, But Not Tax

OWNERS of radio sets in Japan pay a fee amounting to about 80 cents a month to the Tokio Municipal Radio Station. Then their sets are sealed on that station's radio length so that they are unable to tune in on any other wave. This is done to prevent the dissemination of radical ideas by secret broadcasting. Above is one of the equipment displays at the recent radio exhibition in Tokio. (Wide World.)

One Way of Shielding

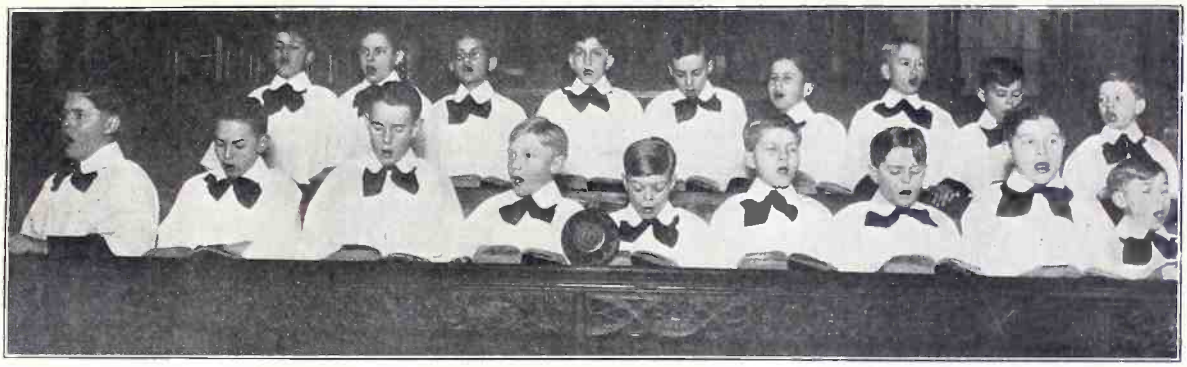
THOSE experimenters who desire to shield a coil, because of magnetic interaction between stages, may accomplish the result by slipping a metal can over the coil. Mother can help you out on the supply end. The coil would have to be baseboard mounted. The leads would be brought out by drilling holes in the baseboard.

Proud of Her Set



HER FAVORITE SET is exhibited by Margaret Czeto, of 763 Fifty-fourth Street, Brooklyn, N. Y. It has six tubes, of which four are used in resistance-coupled audio stages, with facility for turning off the last tube to reduce volume. The receiver will be described in RADIO WORLD.

St. Thomas' Boys' Choir Broadcasts Holiday Music from New York



THE famous boys' choir of St. Thomas's Church on Fifth Avenue, N. Y. C., before the microphone for the New Year's service. (Fotograms)

Sea Lion "Artists"

TWO sea lions in the Hagenbeck Zoo near Hamburg, Germany, broadcasting a concert over the radio. The two gentlemen to the right are holding the transmitter through which the concert of the sea lions was broadcast. (Henry Miller.)

Tin Pan Alley Has Lively Broadcast

BLUISH blasts from shining brass signify a great event. These lung exercisers are putting Jack Mills into office as the Mayor of Tin Pan Alley. Reading from left to right (first row): Geo. Friedman, Jimmy McHugh, Jack Mills and Irving Mills. The event was broadcast from Station WOR.

Doubles His DX

LEO. F. WOOLF and his Diamond of the Air.

DIAMOND EDITOR:

One of my greatest successes as a radio fan has been accomplished with my Diamond of the Air. I have doubled my speaker reception. I am now receiving stations 1,500 miles away on speaker. KOA, Denver, 1,400 miles distant, I receive regularly.—Leo. F. Woolf, 140 Fairview Ave., W. E. Pittsburgh, Pa.

Furnace Vent Used by Fan to Fill Home With Music

Always something new in radio!

Now comes a novel method of filling an entire house with music, using the furnace to carry the sound from cellar into every room.

Credit for this "discovery" justly belongs to Joe Best, an employe of The Crosley Radio Corporation and a dyed-in-the-wool radio fan who sits up until two and three o'clock 365 mornings in the year listening to everything in the air.

It so happened that one evening recently Joe was "tinkering" with his furnace. The cold air vent was out of order, and, in repairing it a remarkable idea stepped into his brain.

"This cold air will carry sound waves," quoth Joe. "The music will go through the furnace pit and up the heat pipes to the registers and thence into the rooms."

And so Joe "tried it out."

Mrs. Best, on the first floor, and friends who reside on the second floor, began hearing music but could not learn whence it came. In every room there was music—plenty of it. But the source of this wonderful entertainment remained a mystery until Joe came up from the cellar and started "snooping" about the registers to see how his plan was working.

Even Joe was surprised at the remarkable volume in every room. There was absolutely no directional feature. In other words, it was not necessary to stand over the register to hear the music. It seemed, so Joe told us, that the flames in the furnace had softened the music—burning out all unwelcome noises.

"Perfect radio reception everywhere," he said, as he started out to tell his friends of his "discovery."

STATION BANS JAZZ

Jazz is taboo in the programs of WHAP, newly located in Manhattan, having crossed the bridge from Brooklyn. It uses 500 watts and a 240 meter wave. The transmitter can output 2,500 watts. "The Station for Public Service" is its slogan.

A THOUGHT FOR THE NEW YEAR

The man whose allegiance is divided between his wife and his new set would like to know if anybody has written music to the lines:

"How happy could I be with either
Were 'tother dear charmer away."

RADIO WORLD

The Link Connecting Radio Fan, Dealer, Jobber, Distributor and Manufacturer

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

TELEPHONES, BRYANT 0558, 0559
PUBLISHED EVERY WEDNESDAY
(Dated Saturday of same week)
FROM PUBLICATION OFFICE
HENNESSY RADIO PUBLICATIONS CORPORATION
145 WEST 45th STREET, NEW YORK, N. Y.
(Just East of Broadway)
ROLAND BURKE HENNESSY, President
M. B. HENNESSY, Vice-President
FRED S. CLARK, Secretary and Manager
European Representatives: The International News Co., Breams Bldgs., Chancery Lane, London, Eng.
Paris, France: Brentano's 38 Avenue de l'Opera
Chicago: A. T. Sears & Son, Peoples Gas Bldg.
Cincinnati Office: Radio World, 304 Provident Bk. Bldg., 7th and Vine Sts. Telephone, Canal 753 and 379.
San Francisco: Lloyd B. Chappell, 656 O'Farrell St.

EDITOR, Roland Burke Hennessy
MANAGING EDITOR, Herman Bernard

SUBSCRIPTION RATES

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

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

ADVERTISING RATES

General Advertising

1 Page, 7¼"x11"	462 lines	$300.00
½ Page, 7¼"x5½"	231 lines	150.00
½ Page, 8¼" D. C.	231 lines	150.00
¼ Page, 4¼" D. C.	115 lines	75.00
1 Column, 2¼"x11"	154 lines	100.00
1 Inch		10.00
Per Agate Line		.75

Times Discount

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

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

CLASSIFIED ADVERTISEMENTS

Ten cents per word. Minimum, 10 words. Cash with order. Business Opportunities ten cents per word. $1.00 minimum.

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

DECEMBER 26, 1925

The Piker's Paradise

New Year Will Be Biggest One for Radio, Say Experts

Radio in 1926 will achieve a higher plane commercially and artistically than ever before, is the consensus of experts whose opinions were solicited by RADIO WORLD. *Dr. Alfred N. Goldsmith, broadcasting engineer for the Radio Corporation of America, and one of America's foremost radio experts, prophesied that international broadcasting will bind together the listeners of six continents. John V. L. Hogan, inventor and engineer, felt sure better broadcasting will be accomplished. Kendall Banning, editor of "Popular Radio," stressed the growth of radio use and popularity.*

Other notables who cast a prophetic eye upon 1926 were J. H. Morecroft, Department of Electrical Engineering, Columbia University; E. F. W. Alexanderson, chief engineer, General Electric Co., and Arthur H. Lynch, editor of "Radio Broadcast." Professor Morecroft is the author of a standard textbook on radio and ex-president of the Institute of Radio Engineers. Mr. Alexanderson is much in the public eye at the moment because of his important experiments with wave propagation.

Goldsmith Prophesies International Reception

EDITOR, RADIO WORLD:

In the broadcasting field, higher powered transmission will give clearer and more reliable service to the listeners, particularly in rural districts. International broadcasting will bind together the listeners of the six continents. Before the vast radio audiences there will appear the leading artists and educators of the world.

The long distance public service communications by radio will also expand. Radio telegraphy across oceans will continually improve in efficiency, as heretofore, supplemented wherever possible by the new short wave transmitters. The transmission of facsimiles and photographs by radio is at hand.

During 1926 it will be more conclusively demonstrated than ever that radio is a cultural force and an agency deeply woven into the fabric of human activities.

ALFRED N. GOLDSMITH.

* * *

Alexanderson Discusses Programs of Fine Music

EDITOR RADIO WORLD:

The broadcast listener has ceased to marvel at the mere reception of sounds from great distances. He wishes to enjoy high-grade music. Programs to satisfy his taste will be available for all through chains of superpower stations. The amateur's ambition is now to understand the mechanism of wave propagation and to be able to establish communication whenever he wishes.

E. F. W. ALEXANDERSON.

* * *

Better Broadcasting Predicted by Hogan

EDITOR, RADIO WORLD:

So far as enginering developments permit a forecast, I feel that 1926 will bring us better broadcasting service from a smaller number of stations, together with less wave-congestion and consequently less interference. Receivers will be simpler and more reliable in operation, and more desirable in appearance. Better musical reproduction will be common, and the radio public will, therefore, become less tolerant of the cheap and unsatisfactory apparatus so prominent even today.

JOHN V. L. HOGAN.

* * *

Radio Movies Nearer in 1926, Says Morecroft

EDITOR RADIO WORLD:

The field of radio is expanding so rapidly at the present time that it is difficult to foretell what it will embrace within the following year. However, the following may be reasonably expected in view of present investigations.

The application of short wave radiation to radio telephone, radio compass, and directional lighthouse service, will be extended and more completely developed; the transmission of photographs by radio will progress and be improved; it is conceivable that the problem of transmission of motion pictures by radio will be partially solved within another year.

Minor improvements in radio broadcasting, transmitters and receivers, will probably occur from time to time, with loudspeaker design and construction receiving major attention.

J. H. MORECROFT.

* * *

Lynch Expects Much from Short-Wave Works

EDITOR RADIO WORLD:

From what we know of the plans already under way by a great many radio manufacturers and from the tremendous interest being shown in radio by newspapers and general magazines, we are convinced that the radio business during 1926 will in all likelihood far excel any previous year.

From our own experience with short wave transmitters here in our laboratory it would seem that rapid strides can certainly be made in applying these short waves to some very constructive field, and it is very likely that this field will be discovered and partially applied during 1926.

ARTHUR H. LYNCH.

* * *

Increase in Sets, Banning's Theme

EDITOR, RADIO WORLD:

During the year 1926 the radio industry should reap the benefits of the inevitable and wholesome readjustment and stabilization through which it has gone during the past year. More people are using radio sets now than ever before; their number will undoubtedly increase during the coming year. This factor, combined with the advantages that are already accruing from the Fourth Radio Conference in Washington and the improvement in the technique, methods and programs of the broadcasting stations, would indicate that the year 1926 will be marked by a substantial growth and that radio will become more and more an influence in American life.

KENDALL BANNING.

Last Station Gives In; Chicago Has Silent Night

All Chicago broadcasting stations are now silent on Monday nights after 7 o'clock, Central Standard Time. This is the result of a campaign conducted by listeners' organizations. Station WOK agreed to stay off the air Monday nights.

FACTORY SETS

A weekly guide to prospective purchasers of manufactured receivers — questions answered by expert.

Phase Relationship Utilized to Balance Set Automatically

Details of the newly designed DeForest Balanced Circuit used in all the latest DeForest models and which DeForest engineers characterize as a "revolutionary advance in receiving," are described in a memorandum just published by the Engineering Staff of the DeForest Laboratories at Jersey City, N. J.

"The new principle utilized in the circuit, namely, that of an automatic balancing of frequencies when first picked up from the aerial," according to H. L. Lanphear, an executive of the DeForest Company, "may be considered revolutionary when compared with the present circuit methods used, the control of which is ordinarily beyond the reach of the listener in.

"It is, of course, generally understood that any receiver is performing at its best just before the point of oscillation. Immediately before oscillation takes place there is a so-called point of resonance at which point the set is in perfect balance. In ordinary 5-tube sets this balance is rarely ever attained through variation between the grid and plate circuits in radio frequency.

"In the new circuit, however, special attention has been paid to the phase relations existing in the grid circuits and the plate circuits of the two radio frequency tubes, and these two phases are brought into such relationship that if curves could be plotted characterizing these circuits and one of these curves superimposed upon the other, the angle at which the curves cross would be an angle of ninety degrees. By virtue of this relationship the balanced set is always sensitive to weak distant signals and unusually selective in tuning local stations. This is due, of course, to the set being automatically maintained at the highest point of resonance or perfect balance.

"Basically, the DeForest Balanced Circuit is a new means of preventing a tube from oscillating by controlling and regulating the internal capacities of the tube. In other words, the new circuit is a control of phase relationship and not of feedback potential. Five tubes in this circuit will do as much, or more, on a small inside antenna as can be done with the ordinary circuits on a large outdoor antenna, so that it at once makes unnecessary the construction of any antenna system of any considerable size."

Woman of the House Prefers Single Control, Says Lager

The idea of a single tuning control is decidedly attractive to the public, according to the Powertone Electric Co., manufacturers of the 5-tube 1-dial Powertone. Louis Lager, president of the company, said:

"We entered the 1-control set manufacturing field knowing that there were certain inherent difficulties attending the manufacture of a single-control receiver, but these are soluble if the right circuit is used and extra precaution taken that each set is properly balanced inductively and capacitatively.

"The Powertone circuit comprises a stage of tuned radio-frequency amplification, a non-regenerative tube detector, one stage of transformer coupled audio and two stages of resistance audio. Thus of the five tubes two are devoted to radio-amplification and three to audio. The reason for using three tubes instead of two for audio was to improve tone quality, for just as the public is demanding control simplicity, so is it insistent that the noise-boxes of a year ago be taboo.

"So long as a radio circuit is not robbed of its inherently precious energy by some artificial method of balancing out over-oscillation one stage of tuned radio-frequency amplification, ahead of a tube detector, is all-sufficient for selectivity purposes, and also the important side bands of the carrier wave are not cut off. Once they are not passed by the receiver the quality suffers badly.

"As a detector tube is a radio-frequency amplifier, it is obvious that a two-section condenser, tuning secondaries of equal reactance, enables single control. This method, invented by John V. L. Hogan, is an excellent one, especially where a multiple condenser with only two sections is used.

"The lady of the house exercises a dominant influence in the purchase of radio receivers, as well she should. Her choice is a set that will tune in stations by turning only one dial. The day of the 3-dial set is still here, but the popularity of that type of receiver is declining. The higher priced sets have one or two controls, such as the Super-Heterodyne, the 6-tube Neutrodyne and the like. Some receivers of lower price also have a means of control reduction. The Powertone Electric Co. caters to purchasers of very moderately priced receivers and has succeeded in keeping down the price without sacrifice of efficiency in any direction.

"There is no popular objection whatever to a 2-control receiver."

I HAVE a Freed-Eisemann 5-tube Neutrodyne receiver, which I have had for the past year and a half. Until recently it has given me very satisfactory service, but now I am having trouble. The volume is very poor. The B batteries are new and the A battery has been recently recharged. I have never touched any inner portion of the set. The antenna and the ground connections are all O. K. I really am puzzled as to why the volume has decreased so suddenly. Can you suggest anything so that I will be again able to receive signals loud?—Y. Rewois, New Hackensack, N. Y.

First change your tubes around. The trouble probably lies in the tubes. If necessary get five new tubes. Do not change any of the internal wiring of the set.

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,
145 West 45th St., N. Y. 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 .....

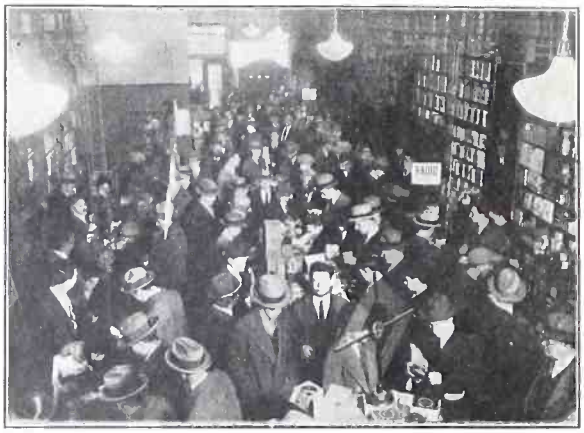
LITERATURE

R. W. Maxwell, 2933 Dudley St., Lincoln, Neb.
Ashley G. Stamp, Detroit, Mich.
J. C. Glazer, 9320 Kercheral Ave., Detroit, Mich.
Omer J. Meisser, 11 Burnside St., Lowell, Mass.
Eric Gronbeck, 3048 N. Ashland Ave., Chicago, Ill.
Roy Thompson, LeRoy, Ill. (Dealer).
H. C. Clark, Goshen, Ark. (Dealer).
A. F. Bryan, Norfolk, Va.
Elmer G. Richer, 729 Willow St., Walla Walla, Wash.
Francis J. Creighton, 10 Fairview Ave., Taunton, Mass.
James Roberts, Thomaston, Conn.
Robert Gibbs, Coal Crook, Tenn. (Dealer).
Robert C. Slagter, 1032 East 5th St., Erie, Pa.
Alton B. Wilder, Dexter, N. Y.
G. F. Langerin, 63 Mt. Vernon St., Lowell, Mass.
Marion Crowell, Crowell, Tex.
C. W. Sloan, 178 Lexington St., East Boston, Mass. (Dealer).
William Kerr, Utica, N. Y.
Wilfrid Cole, Calixa 1882, Sao Paulo, Brazil.
F. MacDonald, 17 Heweunay St., Boston, Mass.
G. F. Voight, 623 18th St., Oakland, Cal. (Dealer).
H. E. Atherton, Dunbar, W. Va.
Theodore Schmidt, St. Paul, Minn.
Cyril Hanlon, Dwight, Ill. (Dealer).
Glem H. Haldman, Elkins, W. Va. (Dealer).
C. M. Ozias, 426 Delmar St., Philadelphia, Pa.
Everett Roberts, 2534 Dupont Ave., South Minneapolis, Minn.
Paul J. Stuart, 8 Wventham Pk., Dorchester, Mass.
J. N. Wilson, 355 North Filmore Ave., Scranton, Pa. (Dealer).
C. H. Kvali, 1656 N. Mansfield Ave., Chicago, Ill.
Jack Howerton, Pauls Valley, Okla.
H. F. Lindemuth, 102 East Foster Ave., State College, Pa.
Star Garage, Chism, Okla. (Dealer).
W. J. Dunmire, 138 Johnson Ave., Blairsville, Pa. (Dealer).
A. J. Johnson, R. 1, Landa, N. D.
Guo B. Levine, Marquette, Mich.
Oscar M. Hersby, Nome, N. D.
F. W. Riepe, Metropolis, Ill. (Dealer).
Tubbs' Cash Store, Hobson, Mont. (Dealer).
Chas. Mitchell, Oklahoma, Ia. (Dealer).
J. F. Vandenburg, 1496 Greely St., Portland, Ore.
H. C. Parham, Jr., P. O. Box 992, Richmond, Va.
Joseph P. McNamara, 846 Lakeview Ave., Lowell, Mass.
H. P. Snyder, Lawrenseburg, Ind.
Herman G. Tyler, 2728 North 16th St., Philadelphia, Pa.
G. I. Rhodes, 838 Magnolia Ave., Long Beach, Cal. (Dealer).

Stinting on Clothes Laid to Radio Buying

The American people are denying themselves clothes to buy radio sets, motor cars and other things offered for sale on the instalment plan, according to speakers who undertook to diagnose the trouble with the woolen and clothing industry at the nineteenth annual meeting of the American Association of Woolen and Worsted Manufacturers at the Waldorf. More than 600 members were present. Plans to meet instalment-plan competition were outlined.

THE RADIO TRADE



SALES of radio parts are flourishing and it is expected that the parts business will show up extraordinarily well this season. The photograph shows how parts and accessories interested a Saturday afternoon crowd at the new store of City Radio Stores, Inc., at 110 West 42nd Street, New York City.

Ware Factory Shuts Down As Music Master Ends Deal

The Ware Radio Co. factory in New York City shut down the other day, at least temporarily.

Paul Ware, president of the company, said that the responsibility for the shutdown rested with the Music Master Company of Philadelphia. "Last June this company contracted to buy our output of 7-tube radio sets," he said. "We have turned over to them 20,000 of these outfits and have received no payment. We are unable to avoid this shutdown pending some sort of adjustment."

He intimated that the matter would be taken up in the courts. "I can't say when we will resume operations," he said. "But we will take care of all of our employes. We are just as disturbed as they are."

The Ware found its way into department store sales recently at dumping prices and it was generally believed that embarrassment had caused unloading.

The Ware Music Master was widely advertised in magazines of general circulation and on electric signs, one of which, on Broadway, represented a large outlay per week.

Walter I. Eckhardt, president of the Music Master Corporation, when informed in his home in Philadelphia of Mr. Ware's statement, said:

"Last June, through an arrangement made through financiers, we agreed to advance $450,000 to the Ware Radio Company under a stipulation that the Ware company was to make delivery of sets beginning in the following month. No deliveries were made in July, and in August less than 100 sets were delivered. In September, approximately 1,000 sets were delivered, and up to November 10, a total of 4,900 sets were received.

"We had kept up payments for each delivery up to November 10. We had paid the Ware company's weekly payroll. There have been deliveries since November 10, but all of these are to be returned and our contracts and other relations with the Ware company cancelled because of the unsatisfactory outcome of the arrangement made with Mr. Ware in June."

Freshman's Sales Increase Tremendously

The Chas. Freshman Company, Inc., New York and Chicago, manufacturers of the Freshman Masterpiece Radio Receiving Sets have just reported gross sales, for the month of November, 1925. These exceeded their previous estimate of one and one-half million sales for this month. November, 1925, sales were three and one-half times the gross sales for the same month in 1924, which totaled $494,321.95.

As previously reported, the sales for the entire year of 1924, were $2,112,315.92. Therefore, it is readily seen that, for one month, November, 1925, the sales of this company were over 80 per cent. of the entire year's sales for 1924.

It is reported that shipments for the first few days of December were well ahead of November, just passed, and it is believed that December sales will be fully as good as the sales for November—specified above.

NEW CORPORATIONS

Princeton Radio Co., Trenton, N. J., equipment, $10,000; Irving Alexander, Albert Harrison, Charles T. Lore, Trenton. (Atty., Philip M. Chamberlain, Trenton, N. J.)

Radio Exhibition Corp., N. Y. City, 200 common, no par; G. A. Wilson, C. H. Adams, W. K. Pettigrue. (Attys., Breed, Abbott & Morgan, 32 Liberty St., N. Y. City).

Beartone Radio Corp., N. Y. City, $5,000; L. Rosenstock, M. Rosen, I. Weinrich. (Atty., D. Hirschkopf, 38 Park Row, N. Y. City).

Golden Leutz, N. Y. City, formed by consolidation of Golden Leutz and Experimenters Information Service, and E. I. S., 32.625 common, no par; C. R. Leutz, C. and J. Golden. (Atty., R. E. Swezey, 50 Pine St., N. Y. City).

Art-Decorating Radio Panel Co., N. Y. City, $5,000; C. H. Hecht, A. and R. Grafstein. (Attys., Waldman & Lieberman, 302 Broadway, N. Y. City).

DeForest Tube Prices Reduced 50c To $2.50 Price

Retail price reductions on all lines of DeForest radio receiving tubes, as a result of specialized manufacturing processes, increased production, and greater sales, were announced. The lines affected are the newly standardized DV-2 detector, the specialized DV-5 for radio and audio frequency amplification, and DV-3 and DV-3A for dry cell battery circuits, all of which have heretofore held the record as the highest priced radio receiving tubes on the market. The price was $3 but is now $2.50.

H. L. Lanphear, an executive of the De Forest Company, in announcing the new schedule, said: "Our recently inaugurated policy of developing and producing a new and complete line of highly specialized receiving tubes has resulted in such increased sales throughout the country that we are now in the fortunate position of being able to announce forthwith a sweeping price reduction on all lines of our receiving tubes.

"With the addition of the DV-5 the company has at last realized the ambition long held by the DeForest tube engineering staff, namely, to supply specialist tubes for each step in radio reception. Exclusive design with new accuracy of adjustment, sensitivity and uniformity are now all accomplished, insuring the finest reception, greatest range and longest tube life. No research or engineering expense has been spared in the development. At the same time in the manufacturing process great credit is due the audion department for excellence in gauging and passing final inspection on tubes bearing the name of the man who by his invention of the audion gave to the world radio broadcasting and radio reception.

"This tube development by DeForest Engineers has resulted in several points of tube superiority, namely, (1) the use of an isolantite base by which the electrical losses have been reduced from one-eighth to one-fiftieth to those of porcelain, metal, rubber and bakelite; (2) uniformity in quality; (3) much higher vacuum through a new process of eliminating tube gases by chemical exhaust; (4) protection for the finished tube by a new shock-absorber package, cushioned so that the fine adjustments of the tube cannot be disturbed."

"POLISHING THE MOULD"

A man went into the radio parts manufacturing business last August. One of his products was to be a dial. He had had no experience with small moulders, so gave the job to an efficient but not very speedy little factory. He had planned a big splurge over the dial for this season, but the moulders are still "polishing the mould," and he will not see his first dial until after January 15. He had been promised deliveries of 800 a day by November 15. He expects now that his grandchildren, if not he, will live to see the day his first dial takes tangible form.

An AF Transformer Dissected

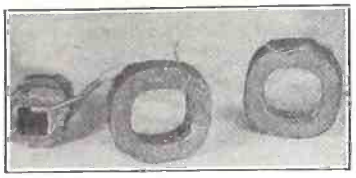


FIG. 1, primary and secondary windings.

By Wainwright Astor

THE manner in which an audio-frequency transformer is manufactured is clearly shown in Figs. 1 to 5.

Fig. 1 shows the secondary winding in two large rolls which consist of many turns of fine wire. There are often 3,500 feet of wire on the secondary, which in this case is in two parts. The winding at left in Fig. 1 is the primary. The split secondary enables a higher or lower ratio between the primary and the secondary windings. The secondary winding has a tap brought out for varying the ratio, although most transformers have a unit secondary.

Fig. 2 shows a closeup of the completed winding, on top. The center photo in Fig. 2 shows this same winding cut in two, disclosing the leads from both the primary and the secondary windings being brought out. The last photo (on the bottom) shows the windings with the laminations inserted.

Fig. 3 shows how to make the lamination. The bottom photo in Fig. 3 shows how the laminations are put together. They are put so in a special fashion (similar to that described by Lewis Winner in the December 19 issue of RADIO WORLD). These laminations have holes drilled at the ends so that screws for holding can be mounted securely. Angle irons are then attached to these screws. Binding posts are inserted and the leads from the primary and the secondary are brought forth. A metal cap (Fig. 5) is then put over the windings for shielding. A screw holding the laminations at the top is taken out and reinserted, so that this cap holds. Two angle irons are then inserted through the bottom holes. These irons are for the mounting of the transformer.

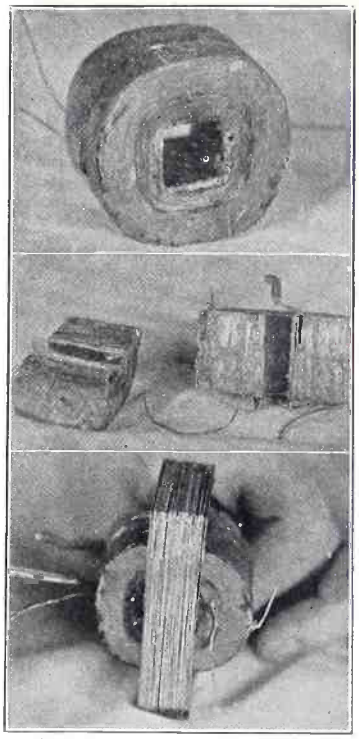


Fig. 2 (top), closeup of primary and secondary windings; (center) the winding cut in two to show the cross sections and the primary and secondary leads; (bottom) the complete transformer with laminations inserted. The laminations constitute the core.

Let us see what the transformer does when connected up. The signals are first detected and rectified by the detector tube. This action produces audio-frequency currents in the primary windings of the transformer. These are of the pulsating direct current type. By means of mutual induction, these currents are transferred to the secondary. The electromotive force, that is the result of the above action, is placed upon the grid of the amplifying tube. A variation proportional to the grid variation of current takes place on the plate of the same tube. The signal strength is therefore increased. This action is due to the peculiar characteristics of the electron tube. As soon as a small variation in voltage takes place in the grid of the tube, an amplification 8 times that voltage is obtainable. Therefore if the plate voltage is 40, the plate current is 430 microamperes. Increase the grid voltage from 1.4 (which the tube is operated at) to 1 volt and the plate current is increased to 530 microamperes.

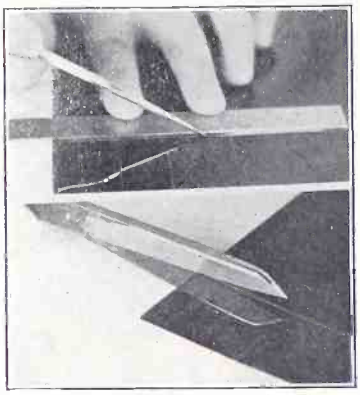


FIG. 3 (top), measuring off the silicon steel to obtain a lamination; (bottom) cutting the steel.

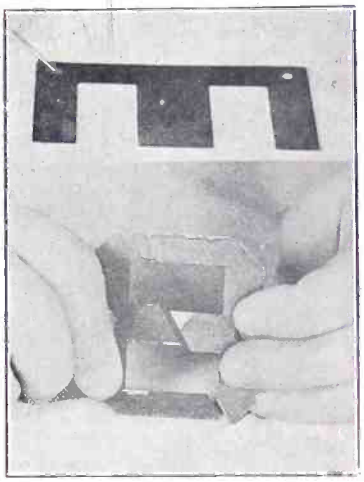


FIG. 4 (top), showing the cut lamination; (bottom) how the laminations are sliced together.

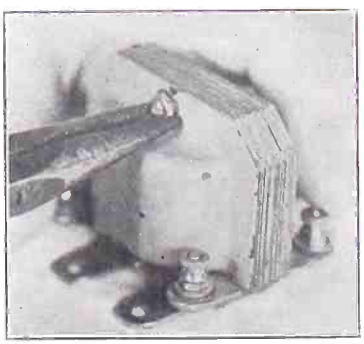


FIG. 5, putting the cap over the windings. Note the nut being set over the screw, which holds the cap.

The Radio PRIMER

THE VOLT is the unit of electromotive force or the standard practical unit of potential. Potential is the electrical pressure which determines the flow of current through a resistance. The volt is that electromotive force which is necessary to force one ampere (current) through one ohm (resistance). The volt is the trigger, the ampere the bullet.

* * *

THE OHM is the practical standard unit of resistance. Any circuit has a resistance of one ohm when a single volt is necessary to push a current of one ampere through it.

* * *

THE AMPERE is the standard practical unit of electric current. A circuit is said to have a current of one ampere flowing through it when the electro motive force is one volt and the resistance one ohm.

* * *

THE CURRENT in a circuit is proportional to the voltage and inversely proportional to the resistance. V=A multiplied by R. Also A=V divided by R. Also R=V divided by A.

HOW TO MAKE THE DX SUPER-HETERODYNE, by J. E. Anderson, appeared in RADIO WORLD dated Nov. 21. Sent on receipt of 15c. or start your subscription with that number. RADIO WORLD, 145 W. 45th St., N. Y. C.

Fond Remembrances of 1925

WJJD Studio a Suite of Eight Handsome Rooms

WJJD, the Moose Station at Mooseheart, Ill., claims to have the Ideal Radio Studio in its new quarters in the magnificent new Palmer House, Chicago.

In fact, it is called a "Radio Suite," because it consists of eight rooms.

It will be placed in operation when the new Palmer House is formally opened on December 21. When the second section of this $40,000,000 hotel is completed next year, the Palmer House will be the largest hotel in the world, having 3,000 guest rooms.

The WJJD Radio Suite is on the twenty-fourth floor and is the highest studio in Chicago. Instead of an opening night program, a week of gala programs will be put on the air from this studio from December 19 to December 26.

Jack Nelson, the director of WJJD and a pioneer broadcaster of Chicago, who, with the architects, is responsible for the "Ideal Radio Studio," says: "Fortunately for us the radio studio was planned right along with the rest of this great hotel and all the latest improvements and conveniences could be put into it. I have visited over fifty radio studios of large stations and feel that nowhere can there be found a studio which is as modern in all details as our new quarters in the Palmer House."

Some of its features are as follows:

1. It is the first radio studio to be incorporated in the original plans of a large modern building. All conveniences for guests and artists as well as the most modern equipment have been included.

2. Two studios will avoid delays and facilitate short rehearsals for those in the studio not on the air. This avoids confusion between numbers caused by the changing of artists, accompanists, music, etc., so that a big group can be on the air in one studio and a soloist ready with his accompanist and music in the other.

3. To keep everything under the control of the operator in his room between the two studios, a unique and elaborate, although thoroughly practical, electric light signal system has been installed for the guidance of artists. This consists of a buzzer and electrically lighted sign signals for "Get Ready," the red light sign "Broadcast," and others which tell the artists "Too Loud," "Too Soft," "Too Much Piano," etc.

4. A rest room for the ladies and smoking room for the men have been provided as part of the Suite.

5. This is the first radio studio in the world to have a motion picture booth as part of it. This is for the taking of pictures of celebrities at the microphone. Cameras and lights are stored there, and heavy cables direct from the main switchboard of the hotel furnish the high powered "juice" needed for the lights.

6. The troublesome microphone stands have been eliminated. The mikes in each studio are suspended at the end of eight-foot decorative wrought iron arms. which are adjustable to any height or position. This eliminates the ungainly appearance of the mike wire from a wall socket to the mike stand, the danger of having somebody kicking the cable which often pulls it from the wall socket and delays a program, and also the noise "on the air" caused by moving a microphone on a stand.

7. Loud speakers are placed in the Studio Parlor, each of the rest rooms and the Director's office, as well as the C ntrol Room, so that the program can be followed from any part of the suite.

8. The Studio Parlor is furnished on the style of a home living-room with chairs and lounges for the comfort of artists and guests. The windows between the Studio Parlor and the Studios are so draped that the guests can see into the studios, but the artists cannot see into the studio parlor and become disconcerted by the people watching them. This eliminates any chance of the artists feeling as though they were in an "aquarium," and yet it gives the guests an opportunity to watch the broadcasting.

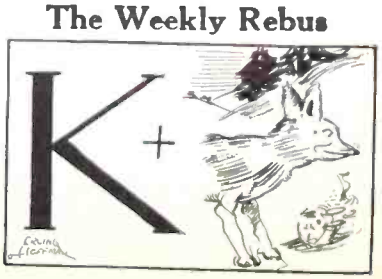
9. Twenty pairs of wires emanate from the control room of the "Ideal Radio Suite" to the "Public Address System" Control Room, where events in any part of the hotel can be relayed to the Radio Suite, or events being received by radio can be relayed throughout the hotel. These will be more than enough for ordinary use in broadcasting any of the five orchestras which will play regularly in the Palmer House, or any of the special e ents in any part of the dining-rooms or banquet halls.

10. Over $10,000 was spent for ventilation alone in this radio suite.

ORGAN MODULATION PERFECTED

Radio engineers of WGY have solved the difficulties of organ pick-up and the organ programs from the Schenectady station are now among its finest transmissions. Lovers of organ music will be interested to learn that Elmer A. Tidmarsh, organist and choirmaster of All Saints Cathedral, Albany, and director of the Albany Community Chorus of one thousand voices will give a series of six recitals beginning Tuesday night, December 1st.

The Weekly Rebus



Short-Wave Broadcasts Logged in Foreign Lands

The way of a radio wave is peculiar, for no one can predict accurately where it is going to stop. The international correspondence of WGY has been growing by leaps and bounds since the programs of that station have been broadcast on the 41.88 meter wave. East, west, north and south listeners who have sets built to pick up the short waves are reporting reception.

E. Warn (ZIFM) of Auckland, New Zealand, recently sent a log on WGY which checks with the station log for October 31. Mr. Warn stated that he picked up the 41.88 meter wave of WGY at 4:30 p. m., Sunday, November 1, while the sun was shining brightly. He held the station for a period of a half hour until it closed down and heard two vocal numbers, two orchestral selections and two xylophone solos.

From the letter of an English correspondent it is evident that the broadcast story of the Yale-Havard football game found its way across the Atlantic but the English listener was very much puzzled about the whole proceedings and thought he was getting a report of a baseball game. E. F. Killick, who lives at Skirbeck, Boston, Lincolnshire, England, reported reception of the 41.88 meter transmission of WGY, Saturday night, November 21, at 8:30 o'clock. He writes:

"I was surprised to hear WGY who then appeared to be relaying a game, probably baseball, with an announcer there explaining the game to the listeners and using such expressions as 'three yards to go,' 'now on the seven yards line,' etc., and the crowd could be heard in the background. At 9:30 p. m. the game stopped and the result was announced 0 to 0." Mr. Killick said speech was plain on the loud speaker and that he has had WGY before and logged it every time he tried, the first time being September 5.

"Wave Trap," Experts Reply to Complaints About Super Power

The use of super power by WJZ's new station at Bound Brook, N. J., has enabled many fans to receive this station well, although formerly they could scarcely bring it in. However local residents have made some protests.

Many radio enthusiasts of Bound Brook, Plainfield and other communities have complained to Congressman Ernest R. Ackerman that the new station has caused such abnormal interference that they have been unable to "catch" any other station. Congressman Ackerman announced that he had referred the complaints to Secretary of Commerce Hoover and that he would take further action to have the unusual interference eliminated.

While the protests have come from New Jersey alone, many owners of sets in New York City have noticed a decrease in the efficiency of reception since the new station went on the air. Some ascribe the cause to interference by the new station.

Officials of WJZ, however, said that it was doubtful whether the new station would affect adversely any receiving sets in the greater city, except perhaps a few in portions of Brooklyn, which would receive the high power waves as they came across the harbor. The officials, admitting that they had received protests from Bound Brook and Plainfield, declared that the reaction to the use of the new station had been overwhelmingly favorable.

James Dreher, WJZ engineer, said that by the use of a low priced device known as a "wave trap," owners of sets in towns near the new station could tune out the interference without any trouble. The device is not manufactured by the Radio Corporation of America.

Mr. Dreher went on to say that the Bound Brook station had been erected to obtain greater range and efficiency in response to requests from enthusiasts. The station, which receives its programs by ground wires from the studio in Aeolian Hall and other places, was placed at Bound Brook, he said, so that the high power would cause the least possible interference.

A Waterproof Set

A WATERPROOF set that has been designed especially for use in lifeboats in an emergency. This set was exhibiated recently at the Shipping and Engineering Exhibition at London
(Wide World)

THE B ELIMINATOR

(*Concluded from page 7*)

this winding post goes to the other terminal of the fixed condenser C2, and to the B— post on the terminal strip. The arm of the high resistance rheostat R2 goes to the B+ Det. post on the terminal strip. If you desire to use the other large condenser C3, place it across the B— and the B+ Det. post on the strip. The fixed condenser C3 is not a permanent unit of the eliminator.

Radio Will Doom Reading; Novels to Go, Says Hamilton

Cosmo Hamilton, the English novelist who predicted recently that radio and motion pictures would spell the doom of the spoken drama and put an end to the glory that is Broadway's, spoke at a meeting of the Press Club of Jackson Heights, Queens, N. Y. He startled his audience with a more daring prediction when he said: "In the future authors will have to adapt their stories for people to hear, not to read."

"People today, look and listen, but they do not stop," he declared. "The great surge of life sweeps them on. It is no longer a pleasant evening at home with a book. Evenings are spent listening to the radio.

The age of novel reading is fast passing. Writers will be compelled to understand that they must assist in directing what the people will hear.

In the future I expect to devote much time to writing novels and plays suited to a radio audience."

A few days thereafter Mr. Hamilton read into the microphone at WJZ his successful novel, "Paradise," which he condensed so that it conveyed the story in fifteen minutes of reading time. It is a novel originally written in 80,000 words.

"I am sure," said the author, "that this and other experiments will eventually lead to the elimination of long written novels. In due time the radio audience will be taxed. Broadcasting will not always be free."

In describing how the author of the radio novel and play would be paid for his efforts, Mr. Hamilton said:

"Let us assume that the tax on the listener would be not more than one cent per head. There are approximately 6,000,000 in the American radio audience. The author could expect $60,000 for the first reading of his novel, which is much as he would get for a first printed edition. A second reading could be considered a second edition and the pay could be made in proportion."

"How to Make—"

The following illustrated constructional articles appeared in 1925 issues of RADIO WORLD:

1-TUBE SETS

A $25 DX Wonder, Jan. 17.
An $18 DX Set for Novices, Jan. 24.
A 1-Tube Reflex for the Novice, Feb. 21.
A Set a Baby Can Build, Aug. 29.
A Powerful 1-Tube Set, Aug. 29.
The Thoroughbred, Oct. 17, 24 and Nov. 7.
The Bernard DX Set, Oct. 24.

2-TUBE SETS

The Transcontinental, Jan. 31.
Speaker Reflex, Aug. 15.

3-TUBE SETS

Portable, Jan. 3.
The Freedom Reflex, July 4.
The Marconi, July 18.
The Metropolitan, Aug. 1.
The Midget, Aug 8.
The 3-Tube 3-Circuit Tuner, Oct. 10.
The Dry Cell Set, Nov. 7.

CRYSTAL SETS

A Selective $15 Set, Jan. 24.
Honeycomb receiver, Feb. 21.
Sets You Can Log, Aug. 22.
One of Best Crystal Sets, Nov. 7.

4-TUBE SETS

Set for Professional Folk, Feb. 21.
Utmost DX, March 21.
The Twinplex, May 2.
The Divided Circuit, Aug. 1.
The RX-1, Oct. 17 and 24.
The Roberts, Nov. 7.
The A-A Receiver, Nov. 14 and 21.

5-TUBE SETS

RADIO WORLD's 1926 Diamond, Sept. 12, 19 and 26; Nov. 21, 28, and Dec. 5.
The Regenerative Neutrodyne, Jan. 31.
The 1-Dial Powertone, Aug. 29, Sept. 5, Dec. 12.
The Thordarson-Wade, Oct. 3, 10 and 17.
The Pathfinder, Oct. 31, Nov. 7.
Browning-Drake, Sept. 26.
The Phonograph Set, Oct, 24, 31 and Nov. 7.

SUPER-HETERODYNES

8-Tube Set, by A. J. Gelula, July 4.
Anderson's 6-Tube, July 18.
Welty 8-Tube, Sept. 26.
8-Tube DX, by J. E. Anderson, Nov. 21.

SHORT WAVES

Simple Circuits, June 13.
25-to-110-Meter Set, Sept. 12.
Hookups for Short Waves, Oct. 10.
O'Rourke's Favorite, Oct. 17.
A Flexible Set, Nov. 7.
Coil Data, Oct. 31.
Reinartz, Nov. 28.

PRACTICAL GUIDES

A Valuable Leak, March 21.
Battery Eliminators, June 6, 13 and 20; Sept. 19 and 26; Dec. 5, 12 and 19.
How to Use Fixed Condensers, Oct. 24.
Audio Circuits Compared, Oct. 3 and 10.
Ohm's Law, Rheostats and Juice Economy, Dec. 5.
A Home-Made Toroid, Aug. 22.

LOOPS

How to Make a Simple Loop, Nov. 7.
Zero Potential Loops, Nov. 28.

Any copy, 15c; any 7 copies, $1.00, or start your subscription with any issue RADIO WORLD, 145 W. 45th St., N. Y. C.

RECENT BACK NUMBERS of Radio World 15c each. RADIO WORLD, 145 West 45th St., New York City.

A SPECIAL 4-TUBE DX SET appeared in RADIO WORLD dated Nov. 14. 15c per copy, or RADIO WORLD, 145 W. 45th St., New York City.

HOW TO BECOME AN AMATEUR OPERATOR—A comprehensive, illustrated article appeared in issue of June 27, 1925. 15c per copy, or start your subscription with this number. RADIO WORLD, 145 West 45th St., N. Y. C.

England to Tune in for U. S. on 41.88 Meters During Tests

WGY of Schenectady will participate in an experiment in international rebroadcasting, Tuesday evening, December 15, at which time all the stations of the British Broadasting Company in the British Isles will attempt to pick up the 41.88 meter waves of the General Electric Company stations. The experiment will last for a half hour, running from 8:45 to 9:15 p. m. This program is arranged at the request of Captain P. P. Eckersly, chief engineer of the British Broadcasting Company.

The Waldorf-Astoria orchestra has volunteered to provide the music for this occasion and it is expected that the New York orchestra will become as well known to English listeners as the famous Savoy orchestra became to American listeners when WGY and WJZ rebroadcast the program of the London hotel group of musicians several months ago. WJZ of New York is cooperating in the experiment and will provide the pick-up. The program will be carried to the Schenectady station by wire lines.

The British Broadcasting Company now has twenty-one stations in its system which serves an estimated population of 23,000,000 most of whom are said to be within crystal set range of some one of the twenty-one stations. Nine of these stations are called main stations.

Five Broadcasters on Radio Week Board

Five members of the National Association of Broadcasters will be members of the executive committee for International Radio Week. Those appointed by the broadcasters to serve on the committee were Frank W. Elliott, of WOC, Davenport, and president of the Broadcasters Association; E. F. McDonald, of the Zenith Radio Corp., and past president of the Broadcasters Association; A. H. Grebe, head of the Grebe Radio Company and Atlantic Division chairman of the Broadcasters; Earle C. Anthony, of KFI, Los Angeles, Pacific divisional chairman, and Paul B. Klugh, executive chairman of the National Association.

The Radio Week committee, handling all details for the big event, January 24 to 30, 1926, now is comprised of representatives of more than sixteen associations in the radio industry. This is the fourth annual such event and will be participated in by radio groups in practically every civilized country in the world.

WHAM Joins Chain for R. C. A. Programs

ROCHESTER, N. Y.

Rapid extension of the "chain of stations" idea in radio broadcasting is seen in the announcement by WHAM, located at the Eastman School of Music in Rochester, and owned and operated by the Rochester Time-Union and the Democrat and Chronicle, of its link-up with the WJZ-WGY-WRC chain. WEBL at Syracuse will also be in the chain and plans are under way for its extension to cities west of here.

WHAM will broadcast programs originating in other cities in the chain and from time to time musical features at the Eastman School, including the Rochester Symphony Orchestra, now under direction of Eugene Goossens, will be broadcast by the stations in the chain.

If your dealer was sold out of
RADIO GIFTS NUMBER
before you asked for your copy, send 15c. or start subscription with that number. RADIO WORLD, 145 W. 45th St., N. Y.

Quicker Action Is Planned On Interference Complaints

WASHINGTON.

A big extension and improvement of the radio inspection service of the Department of Commerce will be undertaken if Congress approves the increased appropriation recommended for the Radio Bureau by the Bureau of the Budget.

If present plans are carried out, here are a few of the things that will be done with the extra money to improve broadcasting and reception.

Two or three new inspectors will be added to the staff of each radio district. This will permit of quicker and more thorough investigations of interference and steps for its removal.

New Cars to be Bought

Two or three new radio cars will be purchased for districts in which they are most needed. These radio cars, in effect, are movable inspection stations with which checks can be made on all kinds of interference and on the wavelengths and equipment of stations.

New and up-to-date equipment will be furnished radio inspectors to replace the obsolete apparatus with which they have been working for several years.

During the winter time when the best broadcast reception is possible, district supervisors and the Department of Commerce receive countless complaints of local interference from all sections of the country. In many cases, the interference spoils reception for an entire locality. Just as soon as possible, the radio inspector of the district in which the interference is reported makes an investigation and attempts to have it removed.

Service Slow Now

With the present limited field force of inspectors, it has been impossible to give prompt attention to the numerous complaints of interference. Sometimes there is an interval of weeks or months before the radio inspectors have time to check up on them. With a bigger field force, the public will not suffer as it has in the past from local interference of non-radio electrical character.

Newer and better equipment will also be of great service to the radio inspectors as it will enable them to make more precise tests, both of interference and of stations.

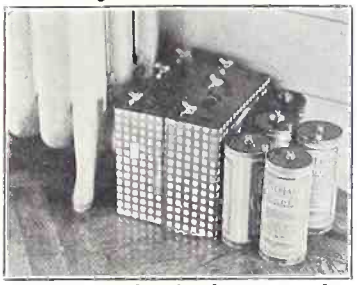
It is believed that $125,000 will be added to the appropriation of the Radio Bureau through the Budget Bureau recommendation.

Edison Play Contest Closes This Month

Cosmo Hamilton, famous English novelist and playwright, B. C. Forbes, editor of Forbes Magazine, and James H. McGraw, president of the McGraw-Hill Company, publishers of electrical and radio magazines and books, will act as judges in the radio play contest now being held in conjunction with The New York Edison Hour on the air, it was announced by Arthur Williams, vice-president, Commercial Relations, of The New York Edison Company, who is offering prizes for the best plays dramatizing the contribution of electricity to modern life.

The radio play contest, which closes at midnight, December 31, has aroused a great deal of interest among radio enthusiasts, writers and critics throughout the country. Manuscripts are already arriving at WJZ and requests for further information have been received by The New York Edison Company from Massachusetts, Illinois California, Connecticut, Minnesota and the District of Columbia.

Battery Life Shortened



THE LIFE of a dry battery or dry cell is shortened considerably when it is placed near any source of heat, such as a radiator. The heat dries up the blotter paper and may cause an internal short.

Radio-Controlled Planes Are Found Successful

LONDON.

Success is reported following experiments with radio-controlled airplanes.

Precautions for preserving the secrecy of the experiments were taken by the authorities. Residents of the South Coast town near the station where the tests were made never suspected that the airplanes which they saw flying over the sea carried no men.

Attention, Radio World Subscribers!

Subscribers will note that the end of their subscriptions is indicated on the labels on wrappers. If your wrapper shows a date earlier than the current issue, please send payment for renewal. Changes in expiration dates on wrappers appear two weeks after receipt of renewal.

RADIO WORLD, 145 West 45th St., New York City. (Phones: Bryant 0558-0559.)

How to Shoot Trouble in Sets; Tubes and Batteries Important

Some experimenters will often tell which is the plus terminal of a storage battery by noting its condition. The positive terminal is almost always discolored and covered with green copper sulphate from connecting wires. This pole should be wiped off and sandpapered to maintain a good contact. If the pole is coated with vaseline the acid does not work up to the binding post so readily and cause corrosion.

Loose contacts in the tube sockets can generally be fixed by sandpapering the pins on the tube bases and sandpapering the contacts in the socket. To do the latter use a simple tool made by gluing a disc of fine sandpaper to a squarely cut off piece of broomstick. Twist the stick in the socket to clean the prongs. It may be necessary to bend up the springs to improve contact. This is done with a screw-driver, first disconnecting B and A batteries to avoid a short.

Soldering flux on any of the instruments in the set—binding post panel, jacks, fixed condensers, etc., cause grinding noises—these being more common in home-made than in commercial receivers. Flux should be wiped off with a clean cloth.

Noises that are heard only when the aerial is connected are caused by loose joints in the aerial system. Leaving the aerial off and connecting the ground to the antenna post will show promptly whether there are loose connections on the ground side. The aerial, of course, should not touch anything on its way to the lead-in insulator.

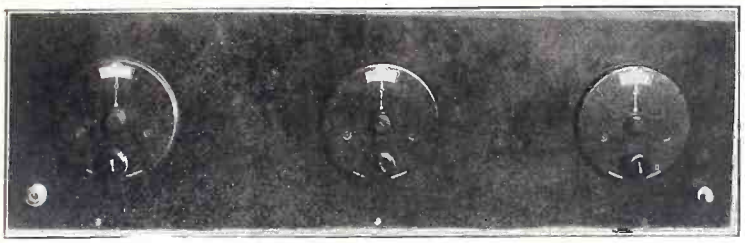
The common failing of 5-tube sets to function well on long wavelengths is due to the fact that the primary windings of the RF transformers have only sufficient turns of wire to provide amplification without oscillation on any wavelength. To provide better results on the long wave DX stations it is very helpful to provide an extra 45 volt B battery, together with the large condenser as in Fig. 3. This boosts the amplification, and because, it may cause oscillation on the shortest wavelengths, the usual voltage is retained for all reception except DX on waves over 500 meters.

Microphonic noises build up gradually, finally becoming a roar. These are caused by loose grids in the audio-amplifier tubes. These can usually be put in the RF amplifier, providing they are sensitive enough, or at least used only in the second step of the audio, where there is only one microphonic tube in the set. Such a disturbance stops when the offending tube is gripped and covered by the hand or a piece of felt to shut off the sound waves from the loud speaker. Merely closing the lid of the cabinet will often stop such howling, but as a strong signal tends to start it up again, it is best to change the tubes about till the faulty tube is placed where it doesn't cause that annoyance.

Summarizing: If the 5-tube set doesn't work well, look at the tubes first. Be sure they're good ones. Put new ones in the RF sockets for certainty. Next have good B batteries—not 45-volt units that are run down to 35. The by-pass condenser improves results with old batteries only within limits.

A $5 HOME-MADE LOUDSPEAKER, by Herbert E. Hayden, in Feb. 7 issue. Send 15c for copy. RADIO WORLD, 1493 Broadway.

Directions for Operating The Lemnis Receiving Set



THE PANEL VIEW of the 6-Tube Lemnis Entertainer.

By Edward Spiegler

After the batteries have been connected the tubes are inserted in their sockets, loud speaker cord connected to the telephone plug and the plug pushed into the jack on the panel. The battery switch is pulled out. The six tubes will spring into life and the set is ready to be tuned.

Synchronized Tuning

The dials read almost exactly alike for any particular station, so as a starter they should be turned to the setting 50. If nothing comes through the loud speaker, the first dial should be turned up to say 70, and the other two grasped in the hands and turned slowly to 70 also. When a station is heard, one dial may read a trifle higher or lower than the others, but at any event, the call letters of the station and its exact dial combination should be immediately noted on a ruled sheet of paper. This will serve as the log sheet and will contain the record of the receiver's accomplishments.

The trick in tuning the set, and especially in fishing for distant stations, is to set one dial, leave it alone, and then to use the hands in adjusting the other two. If the operator attempts to keep all three dials twirling at once he will never hear anything more than a few local broadcasters. The receiver is very selective, and a movement of as little as half a degree on the scales is enough to lose a station, so the dials should always be turned slowly. It is not at all difficult to handle, but like apparatus of any kind, must be studied.

On distance the set will prove itself a pleasant surprise by bringing in station after station. In the laboratory of Walter J. McCord, at 57 Dey Street, New York, where the set was made, it overcame what Mr. McCord claims is one of the city's worst radio holes and brought in WREO, Lansing, Mich., WTAM, Cleveland, Ohio, and six stations in Chicago, almost as loud as locals.

[The construction of this 6-tube set was described in the December 19 issue.]

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ALL ABOUT APARTMENT HOUSE AERIALS in Aug. 22 issue. 15c per copy. RADIO WORLD, 145 W. 45th St., N. Y. C.

ATWATER KENT 5-TUBE (new). Bargain. Write Simmis, Lake, New York.

A $5 HOME-MADE LOUDSPEAKER, by Herbert E. Hayden, in Feb. 7 issue. Send 15c for copy. RADIO WORLD, 145 W. 45th St., N.Y.C.

CONSTRUCTION OF THE 4-TUBE A-A RECEIVER, by Herbert E. Hayden, appeared in RADIO WORLD dated Nov. 21. 15c per copy, or start your subscription with that number.

FULL LIST OF BROADCASTING STATIONS appeared in RADIO WORLD dated Dec. 5. Send 15c, or start subscription with that number. RADIO WORLD, 145 W. 45th St., N. Y. C.

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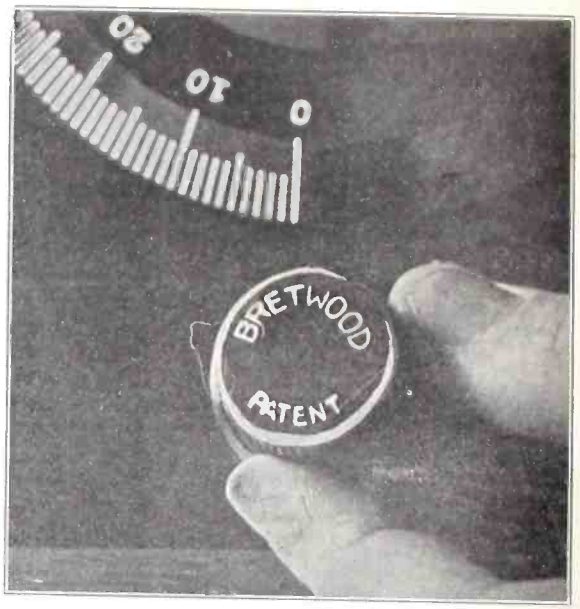

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JOS. L. MAIRE,
4026 Grezella St.,
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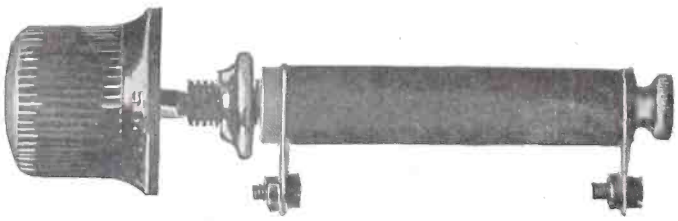

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