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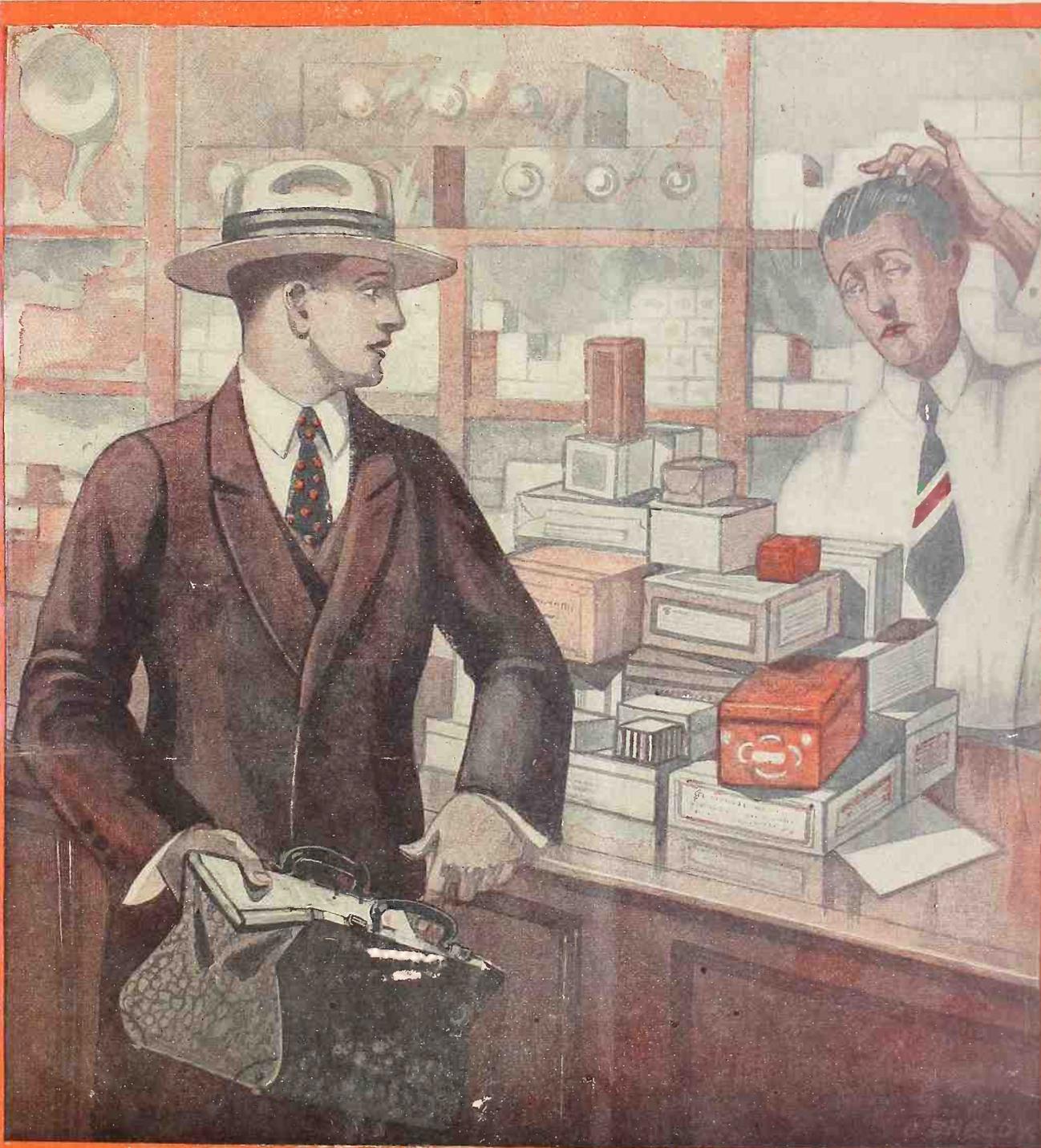
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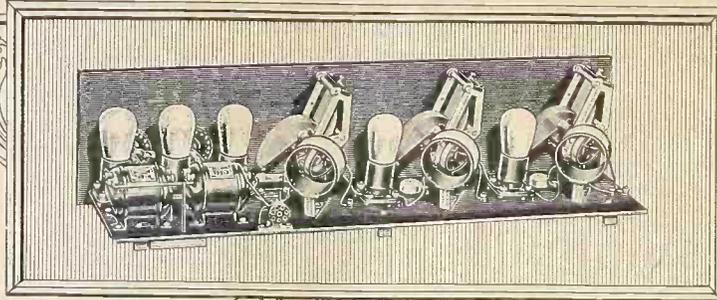
Vol. 10—No. 3

237

Illustrated



Build this Powerful Sweet-tone Receiver. The Karas Equamatic Five Tube Sensation



A Radical Development in Tuned Radio Frequency

THE Karas Equamatic Five Tube Sensation makes it possible for the first time to take full advantage of the amplification factor of your tubes. You can turn the dials from one end of the scale to the other and all stations within range come in with FULL VOLUME. No forcing of tubes at high wave lengths. No troublesome oscillations on low wave lengths. There is no need to touch your rheostats when tuning from one station to another. These results are possible because in the Karas Equamatic System there is always a CONSTANT EQUAL TRANSFER of energy between primary and secondary coils at ALL WAVE LENGTHS from 200 to 600 meters.

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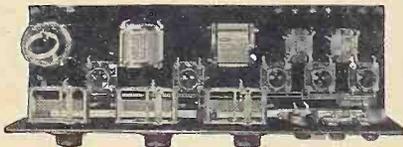


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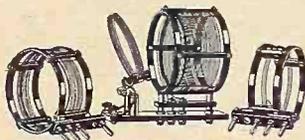
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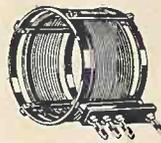
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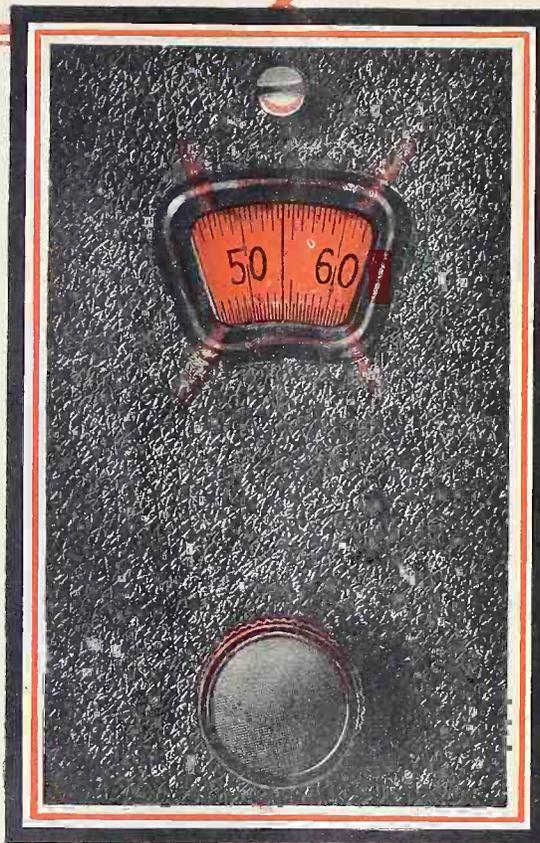
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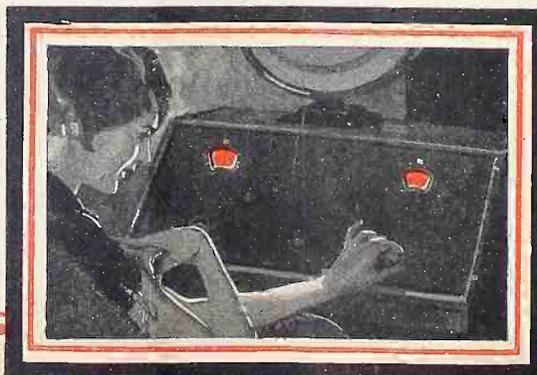
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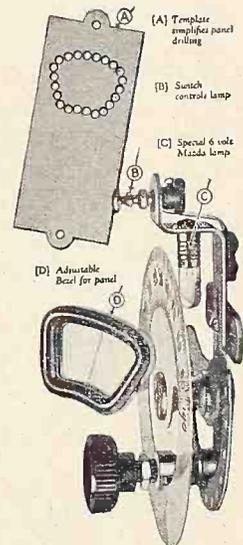
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[Entered as second-class matter, March, 1922, at the post office at New York, N. Y., under Act of March 3^d 1879]

Motor-boating Dissected

The Clucking or Popping Sound Lately Experienced With Some B Eliminators Is Audio Oscillation, Due to Common Impedance, J. E. Anderson Announces, and Suggests Some Remedies

Nuisance Traced to Phases

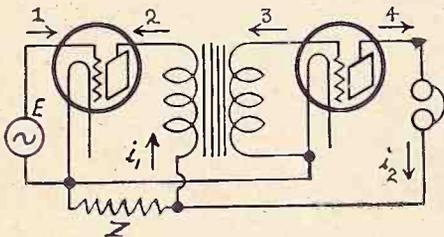


FIG. 1

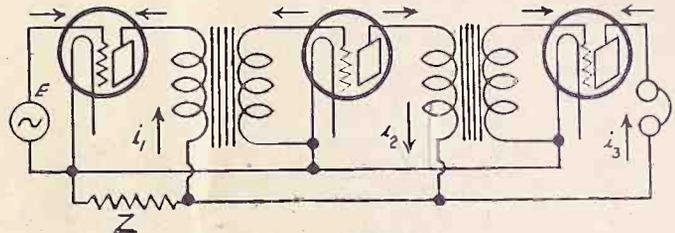


FIG. 2

A one stage audio circuit and a two stage circuit are shown. The first tube in either instance may be the detector. The horizontal arrows show the voltage phase and the vertical arrows the current phase. What effect these phases have upon audio oscillation or "motor-boating" is explained in the text.

By J. E. Anderson
Consulting Engineer

IT is well known that in most receivers served by B battery eliminators there is likelihood of a low frequency oscillation which is often referred to as "clucking" or "motor-boating." Sometimes it is very feeble in intensity and does not seriously interfere with reception, but more frequently it is strong enough completely to spoil the received program. It has proved a stumbling block to the successful application of B battery substitutes.

An analogous problem also is met when an attempt is made to operate certain receivers on exhausted B batteries. It is not at all uncommon that a receiver which has worked satisfactorily for a time suddenly will break into an intense oscillation, which may have any pitch from zero up to and above the upper limit of audibility. Long before the receiver starts to oscillate there will be a noticeable distortion of the signal, which will first manifest itself in rattling of the loud speaker, due to over-amplification of a certain note. When the set is served by a B battery, the signal immediately becomes normal upon replacement of the battery.

Whether this oscillation or distortion occurs in a set supplied with B voltage from a battery or a B battery substitute it is due to the same cause, namely, the impedance of the device which supplies the plate voltage.

Common to Plate Circuits

This impedance is common to all of the plate circuits in the receiver and for that reason energy from succeeding stages is fed back into the stages preceding. The common impedance is a mutual impedance, and it has the same effect as the mutual inductance in a tickler regenerative circuit, that is, oscillation. I have developed a theory whereby any receiver may be analyzed and the conditions under which the circuit might oscillate may be deter-

mined. Unfortunately, this theory is complex and is not suitable for presentation in this article. However, it is not necessary to include the mathematics to explain how regeneration occurs and how oscillation will occur at some frequency, though the particular frequency cannot be determined without mathematics.

Let us first consider the two tube amplifier depicted in Fig. 1, which is transformer coupled. The first tube may be the detector or it may be one of the amplifiers. The horizontal arrows represent AC voltages and the vertical arrows represent AC currents in the plate circuits. The impedance labelled Z is the impedance common to the two plate circuits. It may be the resistance of the B battery, the impedance of the B battery eliminator, the resistance of potentiometer arms in certain types of circuit, or any other common impedance, intentional or incidental. The important thing is that the plate currents of both the tubes must encounter it.

When the input voltage has the direction indicated by the first arrow (at extreme upper left, Fig. 1), the direction of the voltage in the plate circuit of the first tube is that shown by the second arrow (at plate of left-hand tube). The first plate current i_1 is then as indicated by the first vertical arrow. Now the leads to the transformer may be connected in two ways, either so that the voltage in the secondary is in the same phase as the primary voltage or so that it is in the opposite phase.

Both in Phase

In Fig. 1 the arrow shows the voltage in the secondary in phase, that is, the primary and the secondary voltages are in the same direction, as is shown by the second and the third arrows. The effective voltage in the plate circuit of the second tube is shown by the fourth horizontal arrow, and the direction of the plate current in the second tube is shown by i_2 , the

second vertical arrow. It will be noted that the first and second currents are in opposite directions, or in opposite phase. The second current is considerably greater than the first by virtue of the step-up in the transformer and the amplification in the second tube. Z is a part of the load in the plate circuit of the first tube and there is a certain voltage drop across it due to i_1 alone. Therefore i_2 is smaller than it would be if Z were not there. But i_2 also flows through Z, and it flows through it in a direction opposite to that of i_1 . This lowers the voltage drop in Z. If the two currents were exactly equal to each other at all times, then there would be no voltage drop in Z, and i_2 would be larger. But i_2 is larger than i_1 , and hence the voltage drop in Z, as far as i_2 is concerned, will be negative, that is, there will be a negative resistance in the plate circuit of the first tube, or there will be an additional emf in it which will aid that which is due to the input voltage to the first tube. The current in the first plate circuit will be greatly increased. This in turn will increase the input to the transformer and hence it will increase the second current. That will boost the first current some more, and so on.

Why Oscillation Begins

If this continued increase in the amplification is not stopped by the characteristics of the tubes and losses in the transformer, etc., it goes on until the circuit starts to oscillate. If it does not oscillate there will be a peak in the amplification at the frequency where the circuit would oscillate if it could, and this can only occur at one frequency for any given combination of circuit design and value of Z.

The manner in which the first current i_1 is increased by i_2 may also be looked at as follows: When i_2 encounters Z it has two roads to choose from. It can either go through Z or it can back up through the transformer primary and

J. E. Anderson Prescribes:

A Separate B Battery for the Detector at All Times, a 10 mfd. bypass Condenser Across the B Source, and Separation of DC and AC in Final Output to Get Rid of Motor-boating

through the internal resistance of the first tube. It chooses to divide according to Ohm's law, part flowing through Z and part through the transformer primary. The latter part is in phase with i_1 and consequently adds to it.

A circuit such as that shown in Fig. 1 is more likely to oscillate at low frequencies than at high, because the lower the frequency the more nearly is i_2 in opposite phase to i_1 and the greater will be the regenerative effect. As the frequency is increased the current is retarded by the inductance in the primary and in the speaker windings. The retardation in general will not be the same in both circuits. Hence the two currents will pull apart from direct opposition and the regenerative effect will be reduced.

When Regeneration is Prevented

When the two currents are at right angles there will be no regenerative effect whatsoever no matter how great is the current in the second plate circuit. If the tubes are alike, and if the impedances of the primary of the transformer and of the speaker are also alike, then the two currents will be opposite for all frequencies, and oscillation might occur at any frequency. But this is not likely to occur in a two tube circuit where one load is a transformer and one a loud speaker, and also where the tubes will have different characteristics.

Now suppose that the leads to the transformer in Fig. 1 be reversed so that there is a change of phase of the voltage. In that case all the arrows to the right of the transformer will be reversed. The second current i_2 will now flow through Z in the same direction as i_1 . The voltage drop in Z will therefore be much greater than it would be with i_1 alone flowing through it. That is, i_2 will increase the effective load in the plate circuit of the first tube, and the current in that tube will be decreased. Hence the amplification will be decreased by the second current, and this decrease will be greater the greater i_1 is.

Smaller Voltage

Not only will the amplification be decreased by a decrease in the current in

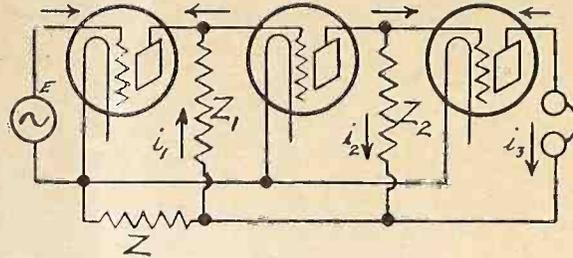


FIG. 4

A direct coupled circuit with phase arrows.

the first plate circuit but also by the fact that the voltage across the primary of the transformer is a smaller percentage of the total voltage drop in the first plate circuit. The greater the drop in Z , the smaller is the proportion of the primary or transmitted voltage.

Although the amplification is decreased by the presence of Z when the transformer is connected as in the preceding paragraph, the decrease will not be serious for any reasonable values of the common impedance, and the distortion will be negligible. There will be no pronounced amplification hollow to correspond with the amplification peak in the first case. Both the cumulative increase and the cumulative decrease in the amplification will be small in both cases, except at one frequency in the first case.

Now let us consider a three tube, transformer coupled circuit such as that shown in Fig. 2. A circuit having three tubes and two transformers may be connected in four ways: first, so that neither transformer reverses the voltage; second, so that both transformers do reverse the voltage; third, so that the first does not and the second does reverse the voltage; and fourth, so that the first does and the second does not reverse the voltage. Fig. 2 shows neither transformer reversing the voltage, Fig. 3, both transformers reversing the voltage. The diagrams for the other two cases may easily be sketched and are omitted.

Alternate Plate Currents

In Fig. 2 it will be noted that the plate currents alternate in direction when the transformers are connected so as not to change the phase of the voltage. Now remembering the discussion under Fig. 1 it will be apparent that i_2 in Fig. 2 will increase the amplification in the second tube by virtue of the presence of the common impedance Z . Also that i_3 will increase the amplification in the third tube for the same reason. But it will be noticed that i_2 and i_3 flow in the same direction through Z , and consequently that i_1 will decrease the amplification in the second tube, and therefore in the amplifier as a whole. One would expect that the regen-

erative effect would be more or less neutralized and that Z would have very little effect. This is true for lower frequencies, but may not be for the higher. In general there will be a region of frequencies in which the amplification will be increased by the common impedance, and where distortion will, and oscillation might, occur. This will most likely be at the higher audible frequencies, perhaps above audibility. If oscillation occurs above the audible limit it will become manifest by low amplification and by "hashing" of the signal.

Now let us take another step and consider Fig. 3, or the case of both transformers reversing the voltage phase. It will be seen that all the plate currents flow in the same direction. Amplification will therefore be reduced all the way around. There will be no tendency to oscillation but there will be a considerable decrease in the amplification if the common impedance has any appreciable value. This can easily be tested.

Few Ohms Mean Much

Suppose an amplifier of this kind be connected to a fresh B battery and tuned in to some signal. Then if a variable resistance be so arranged that it can quickly be switched in or out of the negative lead of the B battery there will be a noticeable decrease in the amplification when only a few ohms are switched in.

Long before the common impedance was suspected of being the cause of oscillation and distortion in radio receivers it was found experimentally that the connection of transformers shown in Fig. 3 (both reversing) gave the best results, and therefore transformers are almost universally marked so that when the terminals are connected as marked this condition will obtain.

The third and fourth possible connections of the transformers are practically identical as to results. They will be exactly the same if the three tubes are the same and also if the three load impedances are the same. Both are potentially good oscillators, and both are good distorting devices irrespective of the merits of the coupling transformers. It is easy to see why this might be so if the diagrams are sketched and the directions of the three currents put in. It will be seen that the regenerative effect through Z is greater than the damping effect.

Study of Direct Coupling

The much praised direct coupled amplifier is often the worst offender when it comes to oscillation and distortion as a result of a common impedance in the plate circuits. The reason for this state of affairs is in plain view in Fig. 4. In this representation of a direct coupled amplifier having three tubes the horizontal and vertical arrows have the same meaning as in the previous cases (voltage phase). Stopping condensers and grid

(Concluded on page 19)

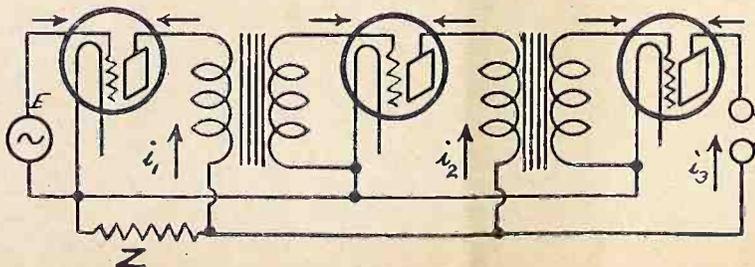


FIG. 3

Both transformers are connected here so that each one reverses the voltage phase, whereas in Fig. 2 both were connected so that the phase was unchanged.

A Practical 'A' Eliminator

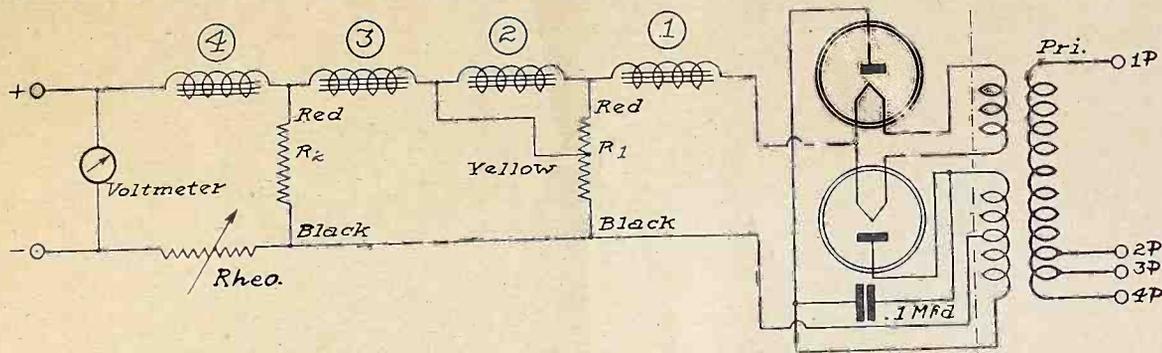


FIG. 1

Circuit diagram of the Lynch-Davy A assembly. The inductances 1, 2, 3 and 4, otherwise L1, L2, L3 and L4, are special choke coils. The power transformer is at right, with taps for 105 volts (4P), 110 volts (3P) and 115 volts (2P), with the minus post shown as (1P). This circuit applies only to AC.

The Lynch-Davy "A" Assembly Provides Up to 1¾ or 2 Amperes, So That Any Type of Tubes May be Used in the Receiver—Hum Is Eliminated by Special Filtering

[The A battery substitute described herewith consists of a power transformer, two Tungar bulbs, four chokes balanced by resistors, a rheostat and a voltmeter. The coil construction must be exact and cannot be duplicated by home-constructed coils. However, readers may experiment with different values, if they know the subject well. Any one having questions to ask may write to the author, care of RADIO WORLD, 145 West 45th Street, New York City. More about this assembly will be published in an early issue.]

By Arthur H. Lynch

ENGINEERS for many years have been working on the basis that some day or other the A battery, which is a common source of attention in many radio receivers, would be entirely eliminated. In those sections where lighting lines exist, to eliminate the A battery from a receiver where direct current is employed is not a particularly difficult problem. To use alternating current for supplying the filament of tubes in a radio receiver is, however, a different matter, particularly when the current is to be supplied to the tubes without making any changes whatever in the wiring of the receiver and without changing the type of tubes employed.

It is the purpose of this article to explain what has been done in this connection and how at present there is available for the home constructor an A battery supply working from alternating current which, though it is comparatively expensive, is perfectly satisfactory. In fact, this A supply has been examined by some of the best engineers in this part of the country and all agree that its performance is truly remarkable. Among those recognized engineers who studied the device in operation during the Radio World's Fair in New York were Charles Logwood, a man recognized for the work he did for the DeForest Radio Corporation, and whose ability as a technician is well recognized in the industry; Frank M. Squire,

chief engineer of the DeForest Co.; William Eisenhauer, president of the Corporation which is putting the LC-27 on the market; Glenn H. Browning, president of the Browning-Drake Corporation, and famous as the inventor of the Browning-Drake tuning unit; Volney D. Hurd, radio editor, "Christian Science Monitor"; Laurence M. Cockaday, technical editor, "Popular Radio"; and Herman Bernard, managing editor, RADIO WORLD.

A Little Bit of History

Many attempts have been made by various manufacturers to employ alternating current for lighting the filament of tubes in radio receivers and in their experiments along this line many have attempted to use a thermo-couple arrangement feeding the alternating current to a group of thermo-couples and utilizing the output of the thermo-couples to light the filament. Such a device was introduced for marketing some few months ago but because of its bulk and because of its price it never became very popular. It also suffered from the fact that it was necessary to use small tubes with it. In other words the output was not sufficient to supply the current for the standard type tubes where a quantity of them was used.

In the device to be described here most of these difficulties have been eliminated, the only remaining one being that the unit itself is quite heavy.

Although devices of this character have

been on the market for some time employing almost the same principle used in the system now being described, it has been found that even though their filter system is particularly good, they have been found wanting when used in connection with a three-stage resistance coupled amplifier. Such an amplifier is particularly sensitive to the lower audio frequencies, such as produced by the lower registers of the bull fiddle, which are ordinarily cut off by some transformers. Where three stages are employed if any hum whatever comes from the filament supply device it is transmitted through the resistance coupled amplifiers to the loud speaker. For this reason the filter system on the present model had to be materially different from the conventional, as is indicated by the diagram. This unit used in conjunction with a three stage resistance coupled amplifier produces music of marked fidelity with no hum.

The unit itself is capable of delivering between 1¾ and 2 amperes, which is sufficient for the supplying of filament current for up to seven or eight tubes. It has been particularly designed for use in conjunction with the 1927 model Victoreen Super-Heterodyne (September 18 issue) and the combination Amplifier and B Supply described in the September 25 issue of RADIO WORLD.

The drain on the unit when used to supply current for eight tubes in this

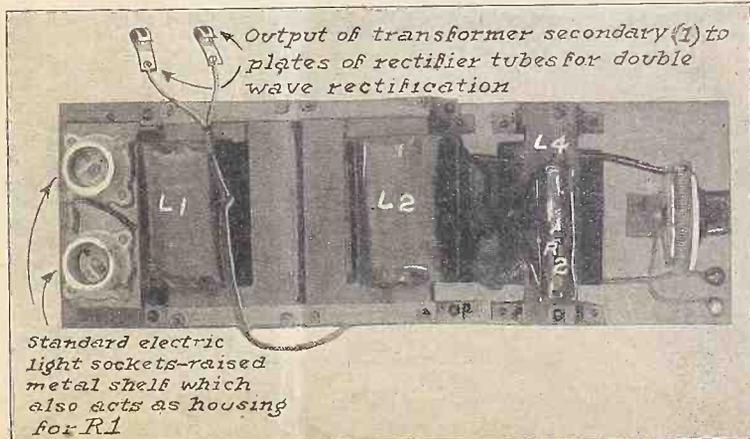


FIG. 2

Top view of the eliminator. Two Tungar tubes go in the sockets.

The A Battery Substitute

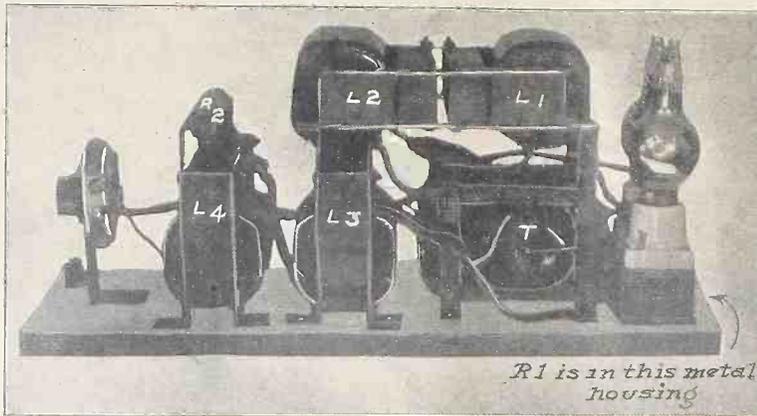


FIG. 3
Back view, with the output at the left.

manner is just about its limit and it is sometimes found when the line voltage fluctuates a little that adjustment of the rheostats on the various tubes becomes necessary. At times when long distance reception is desired, this line fluctuation is annoying. Although this device is a particularly satisfactory one it is not the purpose of the author to bring it to your attention without at the same time letting you know of some of its shortcomings. Where the Lynch-Davy A Assembly is used in conjunction with any of the five or six tube sets now on the market it is about as satisfactory a proposition as one can imagine.

Receivers and B Eliminators

In order to determine just how satisfactory this new A unit works when used in conjunction with regular broadcast receivers and the better class of B eliminators, I seized the opportunity of testing it in co-operation with a great many manufactured receivers and eliminators. It has been successfully employed in connection with the Browning-Drake receiver. It has been used in conjunction with many other receivers and many of the battery eliminators employing Raytheon rectifier tubes. As this article is being written, an Eagle Neurodyne used in conjunction with the A Supply and a Mayolian B Supply is performing in a very satisfactory manner in another part of the house.

The Lynch-Davy Assembly is a combination of transformer, rectifier tubes, impedances and resistances connected as illustrated in the diagram. A specially designed transformer having three taps on the primary for use in connection with various line voltages and having two secondaries used to feed the two tungar rectifier tubes is the basis or foundation of the completed unit. The reason for using two rectifier tubes is to take advantage of both halves of the alternating current cycles and provide a smoother direct current than if half way rectification were employed. The inductances or choke coils are all connected in series and are of special design. These choke coils in conjunction with the resistances marked R1, R2 and R3, form the smoothing out or filtering pad for the direct current supplied from the tungar rectifier tubes. The resistance R3 is a low resistance rheostat of heavy current carrying capacity used to control the output of the complete unit so as to reduce the current which will flow through the receiver. This rheostat when used in conjunction with the rheostat on the receiver provides very

satisfactory regulation of the voltage and therefore of the current allowed to pass through the tubes.

Use of a Voltmeter

In order to prevent burning the filament of the receiver at too high a temperature a voltmeter directly across the output of the unit should be employed and at no time should the voltage from the unit itself be allowed to rise to a point above 5.5. In fact in most instances a voltage considerably lower than this may be used satisfactorily. Of course the ideal arrangement is to have the receiver itself supplied with a voltmeter and in that way the filament voltage across each one of the tubes may be measured and kept within reason, while the large resistance R3 will merely determine the complete output of the A eliminator.

In all likelihood the home constructor will use an outfit of this kind in conjunction with the console cabinet and the A Supply itself will be found housed in the bottom of the console. For this reason it is unnecessary to take any special precaution regarding a layout in building a unit of this character. Using a baseboard such, as illustrated, and placing all of the necessary units on this baseboard work out in about as satisfactory a manner as any layout we have been able to develop. The tubes and other units are thus kept well out of the way and the rheostat comes to the front of the cabinet so that regulation of the filament voltage is a very simple matter. All of the units made for

use in conjunction with this eliminator are of special design and may be had from regular trade sources.

Some Tips on Best Results from Cone

WHAT GENERAL rules should be followed to obtain absolute satisfaction from a cone speaker?

See that the cord tips are properly connected to the plug. That is, the cord colored red, with crosses, etc., is positive. The other is negative. Reverse until louder signals are heard, if no markings are present. Do not keep the speaker near the set. If you cannot place it away from set, be sure that it is to the sides, not on top of the cabinet. A power tube, properly installed, will boost the undistorted volume. Don't overload your tubes, either with excess B voltage or signal voltage. Keep the A and B batteries full of life at all times. Don't play around with the driving rod. The rod is very thin and easily bent. This causes distortion, etc. Try placing the speaker in different portions of the room. Sound pockets, causing deadening and distortion of signals, are always present in rooms.

R. M. A. Gets Forty Membership Requests

During the New York show applications for membership in the Radio Manufacturers Association were handed in by over forty radio manufacturers. This fact alone indicates that this organization has passed the experimental stage and is firmly established. L. A. Nixon said:

"The radio industry has long needed a trade body with strong membership and capable officers. I believe we have this in the RMA today."

RESULTS EDITOR:

I am a boy only 11 years old, but have successfully built the Bernard 1-tube DX Set which was described in the Oct. 24, 1925, issue of RADIO WORLD. I have received over 22 DX stations with good volume. I can tune out WPG, operating on 299.8 meters, when WGN, operating on 302.8 meters is on the air.

CHARLES NEARPASS,
Eusters, Fla.

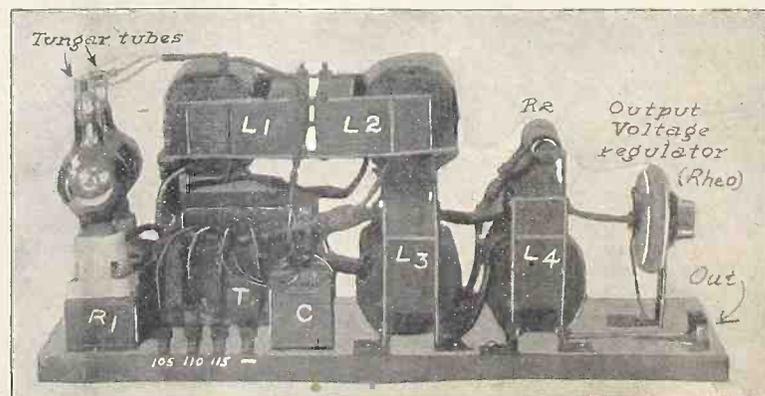


FIG. 4
Front view, showing where the binding posts, power transformer (T), choke coils, rheostat and tubes are placed.

Bug Stops WJZ Reception

Got Into One of the Huge Shielded Air Condensers and Caused a Short Circuit that Cost His Life and a Few Moments of Interruption of Program

New Jersey is full of radio bugs. In fact, one of these creatures fooling around WJZ's Transmission Station at Bound Brook recently, got himself into one of the huge air condensers, caused the station to cease broadcasting for several minutes and paid for the prank with his life. His charred body is kept by the Operating Staff at Bound Brook as a proof of the yarn.

While the transmitting station of WJZ is fully shielded electrically, there seems to be some defect in the shielding against flying pests. One night several of the engineers saw a large beetle or dragon-fly buzzing around the brilliantly lighted transmitting tubes. The presence of the insect did not cause them any concern about the operation of the station at that time, but they hurriedly inspected the screen doors to find where it had entered.

During the process of this inspection there was a blinding flash from one of the transmitting frames and the station "went off the air." The auxiliary transmitter was put into operation immediately and the screen inspectors turned their inquiry from the windows and doors to the apparatus. Everything seemed to be in proper order, but finally in one of the huge copper air condensers was found the tell-tale scar of a short circuit.

It was not until they looked upon the floor beneath the condenser and found the charred remains of the beetle or dragon-fly that the engineers learned of its sad demise and the cause of the trouble. Evidently the insect had flown into the condenser and its body had caused the blinding flash which automatically opened the circuit breakers and ceased the broadcasting. The official entry was made in the records, the body fled away and the incident closed.

Football Broadcast Schedule Completed

The complete football broadcast schedule of WJZ and WGY follows:

- Oct. 16—Princeton vs. Navy at Princeton.
- Oct. 23—Yale vs. Brown at New Haven.
- Oct. 30—Navy vs. Michigan at Baltimore.
- Nov. 6—Harvard vs. Princeton at Cambridge.
- Nov. 13—Yale vs. Princeton at Princeton.
- Nov. 20—Harvard vs. Yale at New Haven.
- Nov. 25—Pennsylvania vs. Cornell at Philadelphia.

WPAP TO CONTINUE ON AIR

WPAP built for Spring and Summer use at Palisades Amusement Park, N. J., will stay on the air, using a studio especially built at Loew's Lexington Theatre, New York City, as remote control, still maintaining the control unit at the park.

Proper Dial Action Aids Efficiency

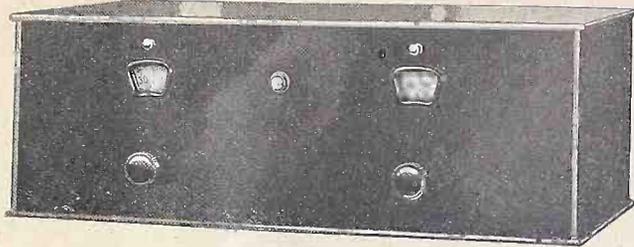


FIG. 1

THE PANEL view of the Beacon, showing the new Mar-co illuminated controls and the Bruno light switch as the only parts in sight.

Builders of the 3-Tube Beacon Find That Simplicity Is Heightened, Too, by Use of Mar-co Illuminated Control

Although the 3-tube Beacon has been before the public only for about three weeks, hundreds of letters have come to RADIO WORLD stating the tremendous volume and excellent quality of the local and distant stations obtainable with this set. The Beacon was described by James H. Carroll in the Sept. 11 and 18 issues.

Besides the circuit efficiency the layout, both on the baseboard and on the panel, is very attractive. The baseboard accounts for the good reception possible,

so that there is a minimum of interaction.

The panel layout, with the Mar-co illuminated controls, combines beauty and efficiency. The only other panel part is the Bruno light switch. With the Mar-co illuminated controls the tuning is simplified, aiding in catching more DX, and also in obtaining the stations with more pep. The graduations and the figures are large enough to be read with ease, the illuminated bulb aiding this factor.

Uncle Robert Praised By Governor Smith Telephoned Programs Satisfy One Company

In a letter which was addressed just "Uncle Robert," New York City, Governor Smith praised the work being done over WHN by this philanthropist and his juvenile radio pals each week on Wednesday and Friday afternoons. The Governor was ill at the time he wrote the letter, but that did not stop him from making known his view on the work of these radio entertainers. The Governor was specially pleased with the work of teaching the children of Greater New York proper regard for parents.

Anthony Elected Broadcasters' Head

At the annual meeting of the National Association of Broadcasters at the Hotel Astor in New York City, Earle C. Anthony was elected President; J. Groce, First Vice President; S. E. Baldwin, Second Vice President; A. H. Grebe, Treasurer; N. W. Kideney, Secretary, and Paul B. Klugh, Executive Chairman.

Seven directors elected to serve for a term of three years were Frank Elliott, W. H. Heinz, Powel Crosley, C. P. J. Mooney, W. A. Strong, George F. McClelland and E. F. McDonald, Jr.

After months of experimenting with wired wireless, the Rochester Gas and Electric Corporation finally has arrived at a successful method, which it intends to put into use very shortly, allowing the reception of studio programs direct from the electric light lines. This was announced by Robert M. Searle, president of the company.

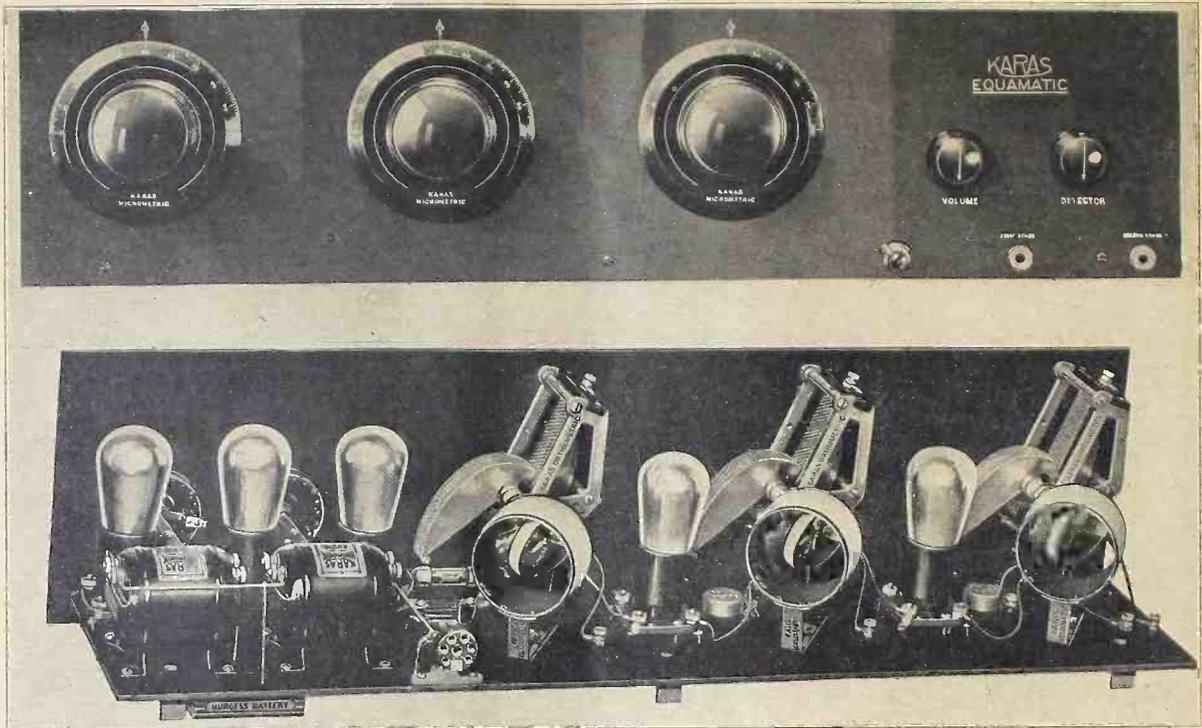
The plan is the nationwide project of the North American Company, public utility concern, and will be participated in eventually by thousands of utility companies all over the country, Searle predicted.

For the purpose a machine has been perfected to be installed in homes. By inserting the plug in the electric light socket the radio fan will be able to hear local and distant programs. Any number of programs may be received over the house wires, the number being limited only by the number of machines installed in the home.

"The greatest thing accomplished by utility companies since the introduction of electricity for illumination," Searle characterized the plan.

For the radio service the local gas and electric corporation will charge a small amount, adding it to the monthly electric bill, he said. The programs are telephoned, not radioed.

Building the Equamatic



FIGS. 2 AND 3

Front panel and rear views. The beautiful external and internal appearance of the receiver is well shown in these photographs.

[The theory of the King Equamatic System was described in the previous issue of RADIO WORLD, dated October 2. Briefly, it consists of having a totally separate and variable primary attached to the shaft of each tuning condenser, by means of a mechanism which allows the energy transfer from primary to secondary to be at maximum, just under the oscillation point, for any condenser dial settings. The system works out only when straight line frequency condensers are used, since the coupling is automatically graduated on a straight line frequency basis, too. Maximum efficiency on all waves, instead of amplification decline at the higher wavelengths or midway on the scale, is accomplished.]

By Capt. P. V. O'Rourke

UNUSUALLY high efficiency is obtained in the Karas Equamatic 5-tube set, tuning is simplified, tone quality is fetching and great beauty of appearance is achieved, certainly a combination of assets that must appeal to the home

constructor of radio sets. The success of the receiver depends on adherence to the choice of parts as set forth in the accompanying list, since the selection of a poor substitute may easily ruin the results.

The construction itself is relatively simple, especially as front panel and sub-panel, already drilled, are available to all who prefer to make their work as easy as possible and gain the most possible on the score of appearance.

The circuit of itself is the very popular 5-tube tuned radio frequency combination, consisting of two stages of tuned radio frequency amplification, a tuned detector input to a tube, and two stages of high-grade transformer coupled audio frequency amplification.

Getting Construction Started

The jump has been gained on the run of tuned radio frequency sets by using a system that gives an equal and maximum amplification at all radio frequency

wavelengths within the useful spectrum. The self-regeneration nuisance is wholly avoided, as the continuously variable primary, changing its coupling effect on a frequency basis, permits operation just under the point of oscillation, which is the point of highest efficiency. The stabilizing of the receiver is achieved by proper placement of the primary, the experimental shifting to correct position being very easy indeed. A setscrew fastens the primary shaft permanently in the desired position. The various coupling degree options were presented last week, and I will revert to this subject in a subsequent article dealing with the balancing of the complete receiver. Almost any one can effect this balance by reading what was published last week, but especially for the benefit of the novice some greater details on this subject will be published in the future.

After you have obtained the necessary parts for the construction of the Karas Equamatic set, check up the parts to make doubly sure that you have them all. This can be done most conveniently from the complete list of parts published herewith. If you are a novice it is well to chalk mark the parts with the diagram designations.

Mounting on Panel

First mount the necessary parts on the front panel. These consist of the three Karas 17-plate condensers, capacity .000375 mfd.; the switch; the RF rheostat, R1, which is mounted over the word "volume"; the detector rheostat, R3; the double circuit jack, DCJ, where the words "first stage" appear on the front panel, and the single circuit jack SCJ, under the lettering "second stage." If a drilled and engraved panel is obtained, the dial pointers or markers will be engraved there-

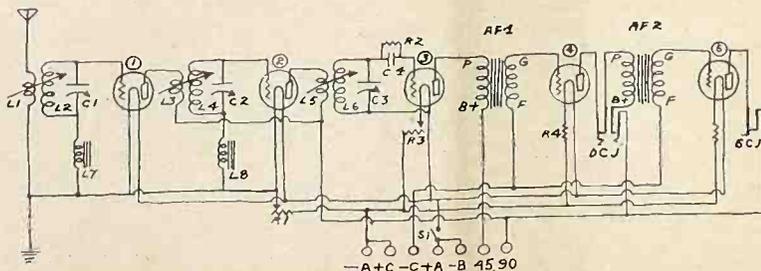
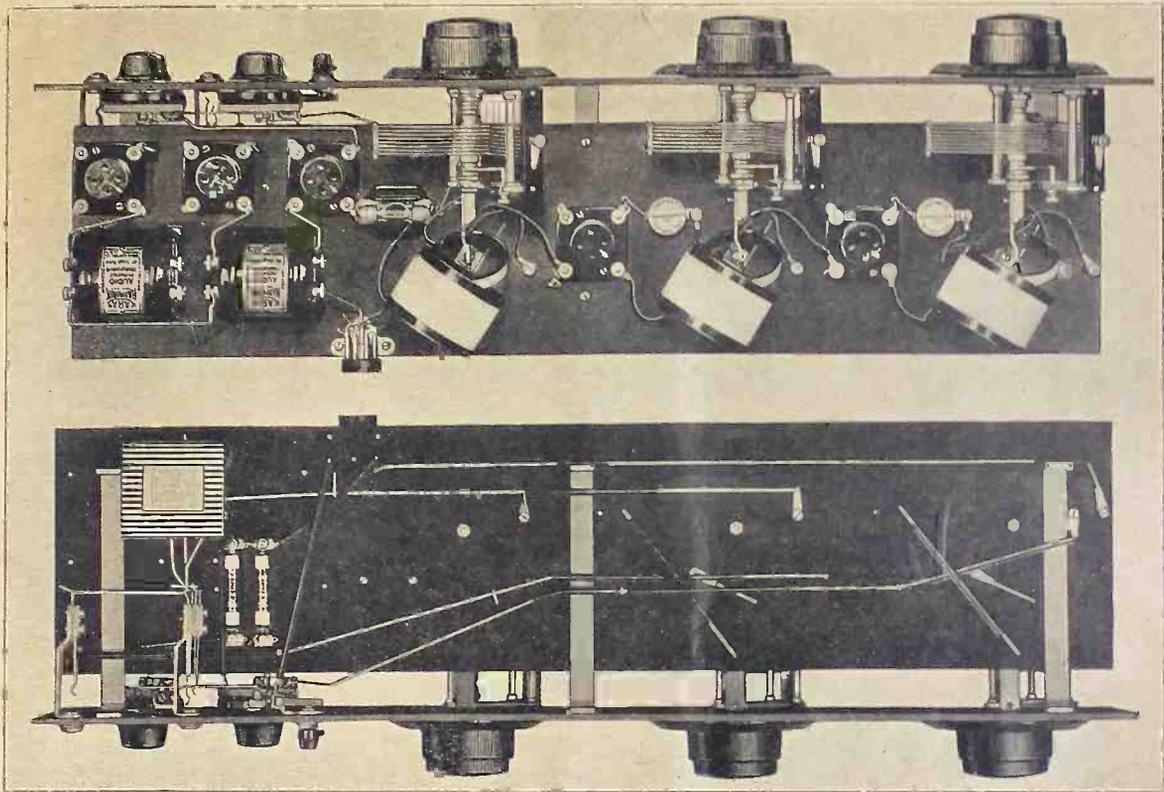


FIG. 1

The schematic diagram of the wiring of the Karas Equamatic 5-tube set. Note the retard coils used. R5 is the ballast resistor in tube 5.

Efficiency Marks Karas Set



FIGS. 4 AND 5

The top view, taken with the rear toward the eye, is shown in Fig. 4, the upper photograph, while the bottom view of the subpanel, Fig. 5, is so placed that the same corresponding direction prevails as in Fig. 4. The position as established in Figs. 4 and 5 is the one used for relative location in the exposition of the wiring in the accompanying text. All tubes are -01A.

on, but if you do not use such a panel get three dial pointers.

There are three small holes on the same plane as the jacks and switch which are for insertion of screws that will hold the brackets to the front panel, but these will be disregarded for the moment.

Now place the proper parts in position on the subpanel. This work is usually done most conveniently when the rear of the subpanel (as it will appear in the set during tuning) is nearer you, as in Figs. 4 and 5. Hence the aerial input is at right and the audio channel at left, under this system of working, and it is assumed in the ensuing directions that this relative position will be followed.

Audio Transformer Mounting

Place the five sockets in position. Their location is obvious from Fig. 4, showing the top view of the completed receiver as it was constructed in RADIO WORLD's laboratories. The sockets have the grid posts to the right front, which puts the plate posts at left front, the positive F at left rear and the negative F at right rear. Remember that these positions presuppose that you have the back of the subpanel toward you, as in Figs. 4 and 5.

Next put the two audio transformers, AF1 and AF2, in place. Both are of the same ratio, being the well-known Karas Hamonik transformers, so it makes no difference which one goes in the first or second audio position. Next fasten the Jones Multi-Plug jack in place. This is at front toward left, in Fig. 4, linearly right below the grid leak-condenser combination.

Put the Amperite mountings in place under the subpanel, as in Fig. 5 at left. Now you are ready to wire up the fila-

LIST OF PARTS

L1L2, L3L4, L5L6—Three Karas Equamatic RF transformers.

C1, C2, C3—Three special Karas Orthometric extended shaft .000375 mfd. condensers.

AF1, AF2—Two Karas Harmonik audio transformers.

L7, L8—Two Karas Equamatic retard coils.

R1—One Yaxley 10-ohm rheostat, with dial (gold).

R3—One Yaxley 20-ohm rheostat with dial (gold).

DCJ—One Yaxley interstage phone jack (gold) for first audio stage.

SCJ—One Yaxley No. 1 open circuit phone jack (gold) for second audio stage.

S1—One Yaxley filament switch (gold).

C4—One Sangamo .00025 mfd. fixed condenser with grid leak clips.

R2—One Amsco 2 megohm grid gate.

R4, R5—Two No. 1A Amperites, mounted.

Three Karas Equamatic subpanel brackets.

One drilled and engraved panel 7x28 x3/16".

Three new Karas Micrometric vernier dials.

One Jones Multi-Plug with mounting and 8-ft. cable.

Five Benjamin push type cushion sockets.

Binding posts, screws, bus wire, soldering lugs, spaghetti, C battery, etc.

ments, and it is handier to do this work when the coils are not in place.

Join the F plus posts of all the sockets

together with a bus lead. These posts are at left front on the mounted sockets. The wiring, except for actual connection to the sockets, is done beneath the subpanel. (Fig. 5)

Retard Coil Mounting

Connect the two F minus posts of the radio frequency sockets. Join together two of the posts at like ends of the Amperite mountings. Then connect the other ends of the mountings to the two audio tube socket F minus posts, one end to each such post. Now secure the two retard coils, L7 and L8, in place, to the right of the F minus posts of the radio frequency sockets, 1 and 2, so that you can read the lettering, that is, the word Equamatic is nearer what will be the front panel. Connect the post of each of these two retard coils to the nearer F minus post of the two RF sockets.

Connect the P post of AF1 to the P post of the detector socket and the G post of that same transformer to the socket G post nearest it, which is tube 4. Also join the G post of AF2 to the G post of the last socket (5, extreme left).

Duplicating the Model

The grid condenser may be mounted at this juncture with one terminal to the grid post of the third socket from left or right (for it's the same socket either way), and with the other terminal left unconnected for the while.

Now affix the three subpanel brackets to the subpanel and fasten the subpanel to the front panel by means of these same brackets, using the three holes previously cited. How the brackets appear under the subpanel is shown in Fig. 5. Note.

(Concluded on page 19)

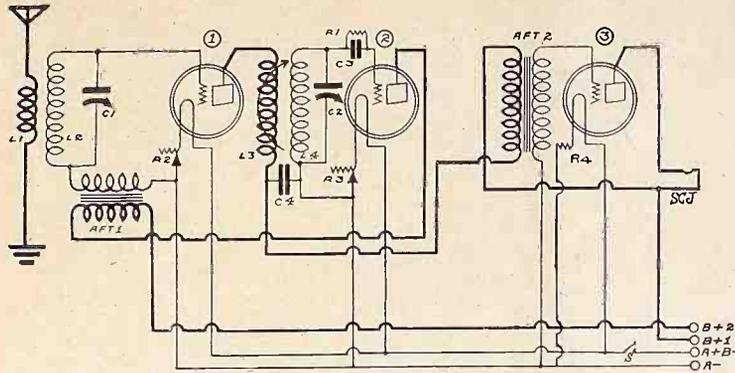


FIG. 442
The circuit diagram of the 3-tube reflex using the variable primary.

switch be installed? If so, how?—Everett Klein, Peeksville, N. Y.

(1)—Yes. (2)—The variable condensers, C1 and C2, that shunt the secondaries are of the .0005 mfd. type. (3)—Yes. (4)—Yes. Connect one terminal of the lamp to the A minus and the other terminal to the A plus. Connect one terminal of the switch to the A plus and the other terminal to the common F plus lead from the sockets.

WHILE LOOKING over the various radio parts I have laying around my room, I found a pair of tuned RFT. Both have 10 turn primaries and 82 turn secondaries. The primary of one of the RFT is variable, while the other primary is stationary and wound on the same tubing as the secondary. A 2 1/2" tubing is used for the primary-secondary winding. The variable primary is wound on a 2" tubing and placed inside of the larger tubing near the secondary. No. 22 dcc wire is used. I also have a pair of .00035 mfd. variable condensers and two audio frequency transformers, one of the 6 to 1 type and the other of the 3 to 1 type. Could I have the circuit diagram of a 3-tube set using these parts.—Fred Nurt, Palm Beach, Fla.

Fig. 442 shows the circuit diagram of such a receiver. The RFT tube is reflexed. AFT1 is the high ratio AFT. L1 is the stationary primary. L3 is the variable primary. L2 and L4 are the secondaries. C1 and C2 are the .00035 mfd. variable condensers. C4 is a .00025 mfd. fixed condenser. R2 and R3 are 20 ohm rheostats, while R4 is a 1/4 ampere ballast resistor. AFT2 is the low ratio AFT. C3 is a .00025 mfd. grid condenser, while R1 is a 2 megohm grid leak. S is the filament switch. B plus 1 equals about 67 1/2 volts. B plus 2 equals about 45 volts. SCJ is a single circuit jack. Tube 1 is the RF-AF tube, tube 2 the non-regenerative detector and tube 3 the audio frequency amplifier. L3 is used to control the oscillatory action of the RF tube, and the volume. The rheostat control is not critical. The tuning is very simple and loggable.

ABOUT HOW many henries should the choke coil, in the choke-condenser output system, used to prevent DC from entering the speaker windings have? What should the resistance of this coil be? Also state the capacity of the fixed condenser used in this system.—Larry Klart, Houston, Tex.

This should be of the 30 henry type, although a 10 henry type will do, as long as the resistance does not exceed 1,100 ohms, DC. The condenser may be of the 4 mfd. type.

PLEASE GIVE the number of turns to place on 3" tubings, to constitute the primary and secondary windings of RFT to use in the 3-tube resistance reflexed

receiver, shown on page 11 of the July 10 issue of RADIO WORLD. I am going to use .00035 mfd. variable single condensers.—Jud Hervett, Savannah, Ga.

The primaries consist of 10 turns. The secondaries consist of 59 turns.

IN THE 5-tube Neurodyne, shown on page 11 of the June 26 issue of RADIO WORLD, is it possible to use a 1/2 ampere ballast resistor in place of R1, which is the rheostat? (2)—Also, can R3 be replaced by a ballast resistor? (3)—I have two 4 to 1 ratio AFT. Can these be used? (4)—What is the resistance of the grid leak, R4?—Bert Ramt, Los Angeles, Cal.

(1)—Yes. (2)—Yes. (3)—Yes. (4)—About 2 megohms.

IN REGARD to the 3-tube reflexed receiver, shown on page 13 of the Sept. 18 issue of RADIO WORLD. (1)—What is the resistance of the potentiometer? (2)—What is the capacity of C6? (3)—Will the jacks, at the RF-AF outputs have a tendency to cause the tubes to oscillate, when the phones are inserted. If so, how may this be cured?—Mart Rumber, Baton Rouge, La.

(1)—400 ohms. (2)—.001 mfd. (3)—Yes. This can be cured by decreasing the plate voltage when the phones are taken out. The phones have a high resistance and when inserted, decrease the flow of voltage. Then when taken out, a sudden surge of voltage causes the tube to break out into oscillation.

I HAVE built the 4-tube receiver, shown on page 15 of the August 28 issue of RADIO WORLD and am obtaining great results, using the -01A tubes throughout. I have a UX112 and would like to know if this tube can be installed in the last stage of AF amplification. If so, please give

the necessary changes.—Hall Phontrest, Middletown, N. Y.

Yes and you may expect plenty of volume. However, you will have to change the filament, grid return and B plus wiring. Break the lead from the last socket going to the ballast R4, and run to a separate 1/2 ampere ballast. The other terminal of this ballast is brought to the A minus. Break the common C minus lead, so that you have two separate C leads. Also break the B plus Amp. lead, so that you have two B plus Amp. leads; one for the two AF and one for the last AF tubes. This tube works best at either of two voltages, e.g., 135, when a 9 volt C battery must be used and 157 1/2, when a 10 1/2 volt C battery must be used. Of course the greater the voltage, the greater the volume. If you use the higher voltage, you might be troubled by distortion. Be sure that the speaker you are using can stand much volume. If you are to use the cone type, the choke-condenser method of speaker coupling should be used.

I HAVE a receiver of the reflex type, such as shown on page 7 of the August 7 issue of RADIO WORLD. The results have been gratifying in so far as receiving local reception is concerned. For DX work, it is poor. I would like to add regeneration to the detector tube. I am using standard RFT, e.g., 10 turn primary and 45 turn secondary, on 3" diameters, No. 22 dcc wire. (1)—How may the regeneration be added? (2)—Will the reflexing cause the set to be tricky, when this new addition is made? If so, how may I cut it out?—James Geharty, Denver, Col.

(1)—The three circuit tuner system may be employed with best results. This may be added to the RFT in the detector stage. Procure a 1 3/4" diameter tubing and wind 36 turns of No. 26 single silk covered wire. This coil is inserted inside of the 3" diameter at the beginning of the secondary winding, or at that portion of the secondary winding, where the grid connection to the detector tube is made. One terminal of the new coil is brought to the plate and the other is brought to the P post on the AFT. (2)—The set will become tricky, but when properly handled will give great results. However, if you find that too much care is required for tuning, the transformer in the RF-AF stage may be taken out. The beginning of the secondary winding, L2, is connected to the arm of R2. The fixed condenser, C3, is disconnected also. The terminal of the tickler which formally went to the P post on the reflex transformer, now goes to the P post on the first transformer in the straight audio stages.

I AM making my own shielded coils. (Concluded on page 26)

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Showmanship on the Air

Major J. Andrew White Explains the Novel Demand on Resourcefulness That Is Imposed by a Great Chain Program—Even the Duration of Applause Must be Estimated, So That Entire Presentation Will Come Within Time Limit

By J. Andrew White

ANOTHER "opening night!" I have had a lot of opening nights in radio, but the responsibility of sending out the program from the Radio Industries Banquet transcended anything hitherto shouldered by any air impresario.

With the return of the vacationist to the grind of a work-a-day life came the opening of another radio season. For months leaders in the field of broadcasting planned for this occasion. It staggers the imagination when one contemplates a nation-wide aggregate of the unseen audience which would fill approximately 33,000 playhouses.

Consideration must be given to the varied tastes; the folk song must have its place; so, too, the mighty opera, merry comedy and serious drama, with music ranging from jazz to the dainty and exquisite fancies of the older masters.

Arranging a great program is a responsibility that must be taken seriously. It is somewhat an open secret that the magnates of the theatre have been more than a little skeptical of the entertain-

ment values of radio. They maintained that from the viewpoint of theatrical artistry radio appears to have run along in willy-nilly fashion, ignoring the basic things of showmanship.

Two Different Standards

Perhaps that is true, but I am not so sure that air entertainment can be sized up, even by the most astute producers, and judged for its values by the standards of stage and playhouse. For what is radio showmanship? A great deal has been said about what it is not, but no one has yet come forward out of the theatre with a magic formula for broadcast presentations.

Showmanship is nothing more or less than the ability to please and entertain an audience. Radio does that; maybe not perfectly, but it does entertain. It is considered quite a trick to do that successfully in a single theatre, and in a single city. A production that is a big hit in a metropolis often is a complete "flop" on the road. A falling off in box office receipts is not unknown even by the mere transfer of a successful production to another playhouse.

I recall that last season a notably successful play was moved from New York to Chicago because it was found impossible to fill up the gallery in the metropolitan theatre in which it opened. It was a different kind of a play to what the gallerite following had been accustomed, and they simply didn't come forward with the necessary upstairs patronage for the current attraction. If a comparatively small thing such as that can affect the theatre, what a gigantic task is faced by the impresario of the air!

Analysis of Task

On the night of the industries banquet the job was to entertain successfully an entire population—not in one city, or two cities, but almost throughout the entire nation. The most astute producer never

Noted Announcer Recalls The Arrangements For The Radio Industries Banquet, Where 43 Stations Were United in Nation-Wide Accomplishment, the Largest Tie-Up in History

experienced an assignment like that—to entertain, without any of the visible accoutrements of the theatre, without scenic effects, costumes or gesticulations—just the personal magnetism of the unseen voices, plus the earnest desire of the artists to put their heart and soul into the microphone. And, mind you, this must be done spontaneously, and without rehearsal, under most difficult circumstances.

The performers worked from a stage. There were fifty or sixty people on that stage at one time, and they were brought on and off quietly and quickly, completed their offering, and made way for the act which followed, without confusion or an instant's loss of time.

In an event like this one, of many record-making aspects, the lot of the Master of Ceremonies was not an easy one. A multiplicity of things required attention. It took countless hours of intensive thought and planning. First there were the many complications involved incident to the extra land wires, which hooked together the huge chain of stations, the largest hook-up in radio history. In the banquet hall itself there was a series of microphones for the air, tied up with special ones for the public address system, so that those present in person at the Astor and those listening at home had equal enjoyment of the new microphone technique, insuring perfect tone carriage throughout the country, although the actual voice was emitted into the "mike," only three inches away, in a tone almost a confidential whisper.

Knows Showmanship

The public expected something exceptional of this program. So, too, did the leaders of the radio industry. Two thousand of them were gathered there at the Hotel Astor, an audience which saw as well as heard the entire performance. Sixteen radio trade associations sponsored the affair, and their delegates were there not only to be entertained, but to be "shown!"

That brings me, then, to what was perhaps the most difficult, and certainly the most trying of the many obstacles to be surmounted—the "building" of the program. Arranging the time schedule, trying to gauge the applause accorded each act, and most important of all, the "placing" of each number—not according to merit, but built to the series of climaxes, to accentuate the heavy by skillful contrast with the light, to insure (in the language of the theatre) that the entertainment would "click"—which means the establishment of a tempo and holding it through a variety of offerings.

In short, to prove undoubtedly, that radio does understand "showmanship!"

Interference Range Is 93 Million Miles

Disturbances Within That Radius of the Earth May Affect Reception, Says Standards Bureau—Announces Sun Spot Theory Proved

WASHINGTON.

No matter how bad reception may be, the fan can always have the consolation that it might be much worse. According to the Bureau of Standards, disturbances within a radius of 93,000,000 miles of the earth may affect broadcast reception.

After a series of investigations, begun in 1922, the Standards Bureau definitely says that sun spots, which are known to be connected with magnetic disturbances on the earth, affect the intensity of radio signals. The measurements were undertaken with the hope of determining the laws of long wave transmission and with the thought of establishing a connection between changes in signal strength and weather, terrestrial magnetism, solar activity and the like. Ten stations were measured twice daily for a year, seven of which were in Europe, one in California, one in Porto Rico and one in Argentina.

"It has already been established," says the Bureau, "that there is considerable connection between radio signal intensity and temperature, especially for transmission over moderate distances when weather conditions are fairly uniform over the signal path. It is also certain that the more severe magnetic storms affect the signals, sometimes strengthening them, sometimes making them weaker."

"As radio signal strength is known to be difficult to measure with accuracy and as apparent discrepancies have been noted in previous measurements and observations, a comparison was made of the signal measuring apparatus of a leading radio corporation, an important radio laboratory and of the Bureau of Standards. That comparison showed that the three were in satisfactory agreement and is believed to be evidence of their absolute, as well as relative accuracy."

**ON ITS WAY—
BERNARD
A 6-TUBE RECEIVER**

Dill Wants Lower Waves

ROOM FOR ALL Selectivity Taxed IS AIR'S NEED, By Wave Congestion SAYS SENATOR

By C. C. Dill

(U. S. Senator from the State of Washington)

THERE is practically no control of radio today but the self-control of the broadcasting stations, stimulated by the nature of the radio business, compels stations to remain on the wavelengths assigned by the Department of Commerce.

If stations began a wholesale pirating of waves there would be so much interference that no one would care to listen to broadcasts, and the result would be no radio business.

I believe new legislation will be passed before Christmas. I am hopeful that both the Senate and the House conferees will come to an agreement, although both may have to yield some points.

I strongly advocate a radio commission because radio is so wide in scope now that it is too much for one man to handle. Secretary Hoover is a busy man and much of the work is likely to be left in the hands of subordinates and clerks. Radio is too important for that. Furthermore, a Cabinet member is likely to be partisan. I do not think that this is the case with Secretary Hoover, but we do not know who will occupy his position in years to come.

The greatest need in radio today is more wavelengths for broadcasting. We have more than 500 stations operating on 89 other channels. I believe the mastery of short wavelengths will solve the congestion problem, because many more stations can operate on short waves without interference. The problem rests with the scientists.

I do not believe that the Government should control advertising rates that pertain to such matter sent through the air. Nor do I want to see radio put in a straight-jacket by placing a tax on listeners as is the case in most other countries.

McNamee Travels; Joy Also Itinerant

Two of WEAf's well-known announcers, Leslie Joy and Graham McNamee, temporarily lately deserted their customary positions before the microphones at 195 Broadway, New York, to allow Western listeners to see what an Eastern radio announcer looks like. Leslie Joy appeared as one of the guests of honor at the Radio Exposition being held in Akron, Ohio, as did the well-known sports announcer, Mr. McNamee. "Mac" also made personal appearances before the Advertising Clubs of Rochester, New York; Cleveland, Ohio, and Columbus, Ohio, in addition to participating in the radio show. Mr. McNamee's appearances before the Advertising Clubs were featured by vocal solos, for he is a baritone of distinction.

Even Bands in Which There Are Fewer Stations the Situation Requires More Discriminating Sets Because Power Has Been Increased

By Thomas Stevenson

WASHINGTON.

Reports received by Chief Radio Supervisor W. D. Terrell from inspectors throughout the country indicate that early winter broadcasting will be under none too favorable conditions.

As the weather gets colder, the range of stations will increase and for the first time some idea can be obtained of the effect of the switch-about among broadcasters this summer.

Since July 1 there have been 55 new stations licensed, making a total of about 570 stations using 90 wavelengths. About 45 stations have changed their wavelengths and 34 stations have increased their power.

Mr. Terrell fears the results of abandonment of the allocation scheme worked out by the Department of Commerce. After several weeks of careful study and experiments, it was decided that a ten kilocycle separation was necessary between stations. With matters in their own hands, some of the broadcasters have selected channels separated by only a few kilocycles from their nearest neighbors.

Higher Power's Effect

Last Winter the band between 200 and 280 meters was congested to such an extent that only local stations could be heard with sufficient clarity to enable one to enjoy their programs. At the same time the band between 280 and 545 meters was in use by about as many stations as could operate there satisfactorily.

Last Winter there were 116 stations operating between 280 and 545 meters. This Winter there will be more than 164 stations, an increase of 48. Three months ago there were 416 stations operating between 200 and 285 meters. At the present time there are around 410 stations in this band, a decrease of six.

Reception in the band between 200 and 280 meters may not be improved by the decrease of six stations, in fact may be worse, because some of the remaining stations have increased their power.

In the band between 280 and 545 meters conditions are bound to be bad, although the extent of the damage cannot be determined yet. It depends largely on power and the selectivity of receiving sets. With a selective receiver it will be possible to pick up a wide range of stations from which clear programs may be received. A non-selective receiver, on the other hand, may be able to pick up only the stations nearby without interference.

Legislation Needed

Mr. Terrell believes that conditions will accentuate the necessity for legislation and for a limitation of stations.

"It will make people appreciate," says he, "that radio has its limitations. The

feeling has been that there is or should be room for everybody who wants to broadcast. This is not the case at all. There is only a limited number of wavelengths and the stations that use them must be limited, else there will be interference and confusion.

"However bad conditions may be, we may expect a quick remedy. If Congress does not take action, the broadcasters themselves will get together and work out a solution.

"With the exception of one or two congested areas, the switch-about of stations was not felt seriously during the Summer. I believe it will begin to be noticed in cold weather. Just how bad it will be nobody can tell yet."

Expect 24 New Stations

Mr. Terrell thinks that a number of new stations may be expected to go on the air this Fall and Winter. Indications are that at least two dozen new broadcasters will seek licenses.

Among the stations which have greatly increased their power are: WWAE, Plainfield, Ill., from 500 to 10,000 watts; KVE, St. Louis, from 500 to 5,000 watts; WPG, Atlantic City, from 500 to 5,000 watts, and WBZ, Springfield, Mass., from 2,000 to 5,000 watts. A number of other stations has increased its power from 50 and 100 to 500 watts, which is sufficient to make them a factor in the interference problem.

(Copyright 1926 by Stevenson Radio Syndicate)

\$501,742 July Export

WASHINGTON.

Radio apparatus valued at approximately \$501,742 was exported from the United States during July, according to figures just compiled by the Statistical Division of the Department of Commerce. This is around \$50,000 more business than during June and about \$100,000 more than July last year.

The principal purchasers of American equipment during July were: Canada, Great Britain, Argentina, Australia and Japan.

WHAT IS German silver?

German silver is an alloy consisting of copper, nickel and zinc. It is used in rheostats and measuring instruments.

* * *

WHAT MINERALS can be used as crystal detectors? Give a brief description of each.

Galena, molybdenite, bornite, zincite and iron pyrites. Galena is lead sulphide coming in crystalline bluish gray cubes. Bornite is a combination metal of copper and iron sulphide. Zincite is the pure red zinc oxide. Iron pyrites is iron sulphide and comes in bright yellow crystalline cubes.

RADIO MUSIC IS DISTORTED, SAYS EDISON

Noted Inventor Thinks Sets Are All Right for Speech, But That's All—Calls the Art a Fad and Believes Novelty Soon Will Wear Off and Phonograph Reclaim Its Own — Others Disagree

By Thomas A. Edison
(The World-Famous Inventor)

People interested in radio say that radio reproduction of music is good. Music on the radio is very poor because it is badly distorted. I quite approve of radios and think that there should be one in every home, but at the same time the set should not be used for musical purposes. It is good for news and for reports of ball games, boxing matches and speeches, where distortion is not noticeable.

There is no money for a dealer in it. We have made a survey of Edison dealers who have sold radios and find that they are rapidly giving them up. The mechanism is too complicated for the average man to fix, once it gets out of order, and the dealer is called in again and again, with the result that he loses both time and money.

The chief difference between the radio and the phonograph is in distortion. The average American family has an inborn love of good music and as the radio fad passes the people will once more turn to the phonograph.

The radio is a big and a new thing, but after the novelty has worn off the phonograph will reclaim its own.

The Other Side of it

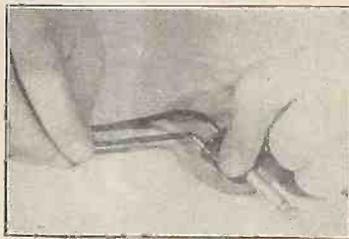
Radio engineers disagree with Mr. Edison.

Frank Reichmann, acoustical engineer with long experience in both phonograph and radio reproduction, said:

"I cannot believe that a man of Mr. Edison's intelligence and experience could be so badly misinformed as to condemn a tremendously growing and healthy American industry in this wholesale manner. Actually the best modern radio devices give distinctly better music than the finer phonographs. Radio dealers have made money and they are making money now, certainly more than phonograph dealers, and they are going to continue to make money on radio. Generally the public is entirely satisfied with the advancements in radio as evidenced by the increase in our business alone of over five hundred per cent over last year. We will be glad to send Mr. Edison a modern radio set for test."

Hugo Gernsback, editor of "Radio News," said that a phonograph record,

PROTECT CORDS



(Hayden)

OFTEN WHEN it is desired to disconnect speaker or phones from the jack, the speaker tips are pulled out. This may break some of the tender tinsel wires in the phone cord, resulting in scratchy reception. However, by tying the phone cord to the plug with a stout string the plug will come out, and not the speaker tips, and no tension will be exerted on the tinsel cord.

after being played a couple of hundred times, was incapable of rendering good music, even on the best phonograph ever made. He said the best radio sets distort less than the best phonographs.

Herman Bernard, managing editor of RADIO WORLD, said: "Mr. Edison is one of the greatest inventors the world ever produced and therefore any comparison he makes between radio and the phonograph is very interesting. It must be remembered Mr. Edison is a venerable man, hence we should listen to him with veneration, and respect him for his greatness, and not hold it against him if some of his remarks are contradicted by metered tests. The new phonographs distort less than the old radios, but the new radios distort less than the new phonographs. It is not clear which pair Mr. Edison compared."

Cites Trade Enthusiasm

"This is radio's greatest year, Thomas A. Edison to the contrary notwithstanding," said G. Clayton Irwin, Jr., general manager of the Chicago Radio Show. "In New York more than 10,000 dealers visited the Radio World's Fair. "They were all enthusiastic. Last year some of them were pessimistic. The only thing they are pessimistic about is the ability of the manufacturers to deliver orders. A number of the largest factories are now working night shifts in order to meet the demand."

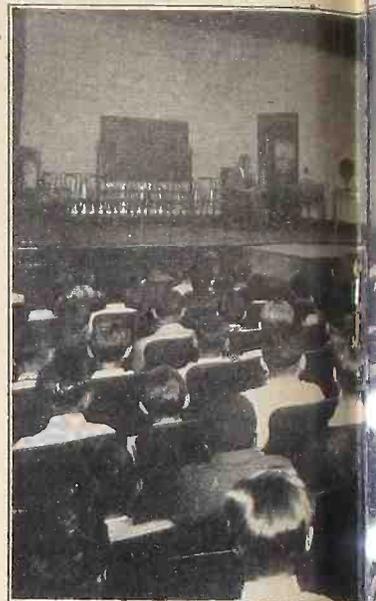
"If the public were not delighted with radio and the programs that are now being transmitted daily, with the fine receivers, cabinets, and accessories now on the market, this would not be true."

RADIO CHATS BY WIRE ANNOUNCED BY KDKA

PITTSBURGH.

"The Pittsburgh Post" Radio Chats will begin on October 9 at 2:15 p.m. These chats will be broadcast from KDKA, once each week by James W. H. Weir, Radio Editor of "The Post." It will be remembered that Mr. Weir carried out a radio lecture course last year on the elementary principles of radio over KDKA and the talks this year will act as a sort of supplement to this course the revised text of which are now appearing in the Wednesday morning "Post" Broadcasting News. These talks will be of ten minute duration and will deal with radio subjects of interest to the broadcast listener as well as the experimenter. Request subjects will be entertained and all listeners are invited to send in their comments.

BROADCAST LESSONS



(Underwood & Underwood)

PUPILS OF the Arsenal School of Hartford, Conn., heard twenty lessons broadcast by WTIC, Hartford, throughout Connecticut, Massachusetts, and New York.



(Hayden)

NEVER USE a cheap pocket type meter resistance and results in virtually short high resistance

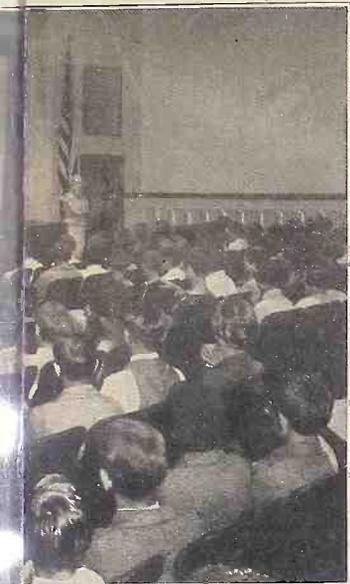
Whalers Adopt Radio

WASHINGTON.

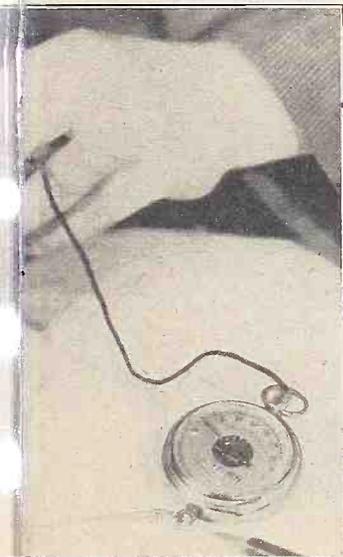
If a friend tells you this Winter that he got a whale on his radio, politely inform him that what he really got was a whaler.

A fleet of whalers recently made a thorough test of radio, including use of the compass, in the vicinity of the Southern ice barrier. They were so successful that it was decided to adopt radio permanently in future whaling expeditions. The fleet consisted of the mother ship,

SON IN SCHOOLS



...listening to the first of a series of ...rd, Conn. About 275,000 children ...ont, New Hampshire and Maine ...on.



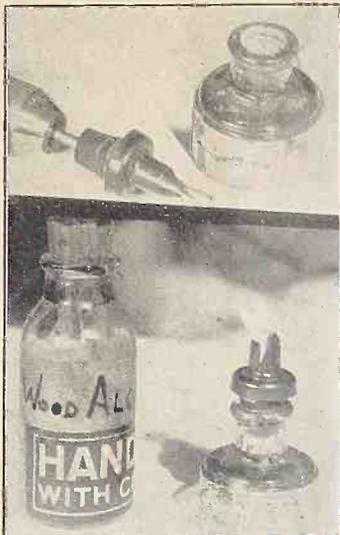
...ost a battery because it has a low ...ing the battery. A meter with a ...hd be used.

er Compass and Code

...epped with a direction finder and a ...nk transmitter, and five whale chasers, ... equipped with a direction finder and ... receiver. During heavy fogs the compa... proved invaluable, enabling the small ...t to make a safe return to their ...ther ship.

...fair weather the mother ship uses ...the radio to direct the smaller vessels in ...the chase of whales. The experiments ... were conducted with wireless telegraphy, ... although telephony will be tried out soon.

PINCH LAMP



(Hayden)

A GOOD soldering lamp can be made from an old writing ink bottle by drilling through the cork in the manner shown. Fit the drilled cork with a piece of ordinary wrapping cord, or a piece of cloth folded up and pushed through.

AF is Made RF

WASHINGTON.

In order to establish radio standards of frequency the Bureau of Standards has devised a method for "stepping up" from a known low frequency to a radio frequency by the use of harmonics, according to a recent announcement. The known low frequency used as a fundamental is a 1,025 cycle tuning fork driven by an electron tube. The low frequency output from the tuning fork is carried through an amplifier which distorts it and produces harmonics. Any desired harmonic may be selected by tuning the amplifier to its frequency. This harmonic is then amplified to sufficient power to operate the frequency meter (wave meter) under standardization. By selecting the different harmonics of the tuning fork, the entire range of a frequency meter from about 10 to 400 kilocycles (30,000 to 75 meters) may be obtained from one tuning fork of known frequency. Any fixed frequency generator, such as a piezo oscillator, may be standardized by the use of the harmonic amplifier with an auxiliary device for determining the frequency of the auxiliary beat note between a harmonic from the known tuning fork frequency and the unknown piezo oscillator frequency.

Blan Aids Foreigners

Michael Blan, well known radio dealer at 145 East 42nd St., N. Y. City, announces that he is now carrying a complete line of foreign radio publications. Mr. Blan is very well versed in seven foreign languages and therefore can aid many radio fans who can understand only their native tongue. At the time a RADIO WORLD representative visited him, he was explaining the function of the vacuum tube to a Spaniard in Spanish. In the collection are books and magazines from England, Canada, France, Germany, Spain, Italy, Japan and Russia.

FOREIGNERS WELL VERSED ON OUR SETS

American Manufacturers Hoping to Dump Obsolete Sets on Market Abroad Find Selves Up Against a Stone Wall

By C. J. Hopkins

Export Manager, The Crosley Radio Corp.

Americans believe that foreigners know nothing about the developments in the American radio market. When the introduction of new models leaves some manufacturers overstocked with obsolete sets, they turn with a sigh of relief to the foreign market, believing that the radio dealers of other countries will purchase the sets without questioning whether or not they are of the latest model. These manufacturers soon learn their mistake, however, and find that the foreign radio dealer is even better informed than his American compatriots.

News of the introduction of new sets is wired to countries all over the world and appears in radio journals in these countries almost as soon as it is published in America. The foreign dealer is kept informed by these news flashes as well as by the popular American magazines which are published in foreign editions.

The belief by some manufacturers that foreign dealers will not learn of developments in the American market is based largely upon the fact that few American dealers know of developments in the radio markets of other countries.

The American radio dealer is in a different situation, however. Tariff regulations and other factors make it impractical for him to buy sets from any but home manufacturers, so he is not interested in foreign sets. The foreign dealer, on the other hand, can often make greater profits by purchasing sets that have been made abroad than by handling those manufactured in his own country. Consequently the foreign dealer watches the American radio market closely, even though the American dealer is not interested in foreign radio products.

Manufacturers who realize the keenness of foreign merchants in buying, and who offer them the most modern equipment have export opportunities before them in the export field. An exporter has the whole world to choose from for his market, and when it is dull season in one country he can intensively work another.

NEW ORCHESTRA AT WGY

A new orchestral group, known as Roscoe Lee's Society Orchestra, has been included among the regular weekly afternoon features of WGY. The orchestra will be heard every Monday and Friday afternoon, taking the place of the Asia Club Orchestra.

A THOUGHT FOR THE WEEK

WHY expect to master radio in too short a space of time? Don't forget what that wise man of Harvard, the late Charles Eliot, said: "Nature's patient ways shame hasty little men."

RADIO WORLD

REG. U.S. PAT. OFF.

The First and Only National Radio Weekly

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

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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 acknowledgement of their subscription order. Changes of address should be received at this office two weeks before date of publication. Always give old address; also state whether subscription is new or a renewal.

ADVERTISING RATES

General Advertising

1 Page, 7 1/2" x 11"	462 lines	\$300.00
1/2 Page, 7 1/2" x 5 1/2"	231 lines	150.00
1/4 Page, 8 1/2" D. C.	231 lines	150.00
1/4 Page, 4 1/2" D. C.	115 lines	75.00
1 Column, 3 1/2" x 11"	154 lines	100.00
1 Inch		10.00
Per Agate Line		.75

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52 consecutive issues	20%
28 lines 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 23, 1922, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

WBBM Hires Critic to Judge Programs

CHICAGO.

Adviser extraordinary is a newly created and unique office in the broadcasting activities of station WBBM.

Phil Alt, attorney for the Sanitary District and original founder of the Anti-Blooming Association, holds the new office because of his interest in radio and broadcasting.

As station critic, Alt criticizes each program purely from the viewpoint of the public's interest in the station. His comments are used in the formation of station programs.

AUCKLAND GETS STATION

The International Telephone & Telegraph Corporation announces that a 500-watt Western Electric type broadcasting station, with call designation 1YA, has been placed in operation at Auckland, New Zealand. Since its inauguration, it has been heard regularly at Sydney, Australia, a distance of over 1,200 miles. A similar station is being installed at Christchurch, New Zealand.

Tim Turkey Dissects Broadcast of the Fight

By Tim Turkey

THE blow by blow narrative of the world championship heavyweight boxing contest between Jack Dempsey, champion, and Gene Tunney, contender, was broadcast by thirty-three stations. That made the broadcasts from the 500 others stations nothing more than rehearsals.

Thus within ten days two of the greatest tieups of stations were accomplished—the Radio Industries Banquet, with 43 stations in perfect program accord, the world's record, and the fight, with ten fewer. The craze is growing so steadily that soon we may expect the amateurs to ask to be tied in with some imposing chain.

There was a lot of selfishness attendant on listening to the fight over the radio. It is estimated that 25,000,000 persons listened in. They differed from the 135,000 at the ringside in Philadelphia, because many a dear grandmother was forced to snatch her rocking chair doze during the most exciting stages of the fight, if any.

This was the first heavyweight championship that changed hands without a knockout. It can't be that Dempsey stood up all through the fight just because of a desire to appease the radio audience that had counted on a full forty minutes of fight entertainment.

The farthest East point from which the broadcasting was done was from WCSH, in Maine, and the farthest West, from KGO, in California, both coastal points. Eight stations, all told, chimed in West of the Mississippi, the other 25 East of that handy geographical river.

Tex Rickard, promoter of the fight, gave several negotiators the surprise of their life when he demanded \$50,000 for permission to allow the fight to be broadcast. This figure was so staggering that the days rolled around without any one recovering sufficiently to show a sign of saying yes. So, three days before the fight, Tex began to wonder if any one would take him up. If not he would get the difference between what he could get and what he did not get. He prudently decided not to be out anything, and the rights were bought by George Ed Smith, for the Royal Typewriter Company, of which George Ed is president. The price is said to have been nearer \$25,000.

Tall hustling had to be done by the telephone company and the stations so that the fight could be put on the air, and not until the whole thing was over did those in charge of the technical work heave a sigh of satisfaction and relief.

Major J. Andrew White and Graham McNamee were the fight announcers for the radio, while a ballyhoo from the ringside did announcing intended for the arena audience only, but which got on the air very plainly at times, together with the ticking of the telegraph keys.

Major White was serving for WJZ and its augmented chain, while McNamee was battling for WEAF. During the preliminaries they took turns in telling about complete fights. Each told the story of

one whole fight. But when the big event arrived it was fortunate that Major White was in charge of this completely, with Mac doing interesting talking between rounds to give Major J. Andrew a one-minute breathing spell.

The Major proved again that, though he is ornate, he has the true dramatic instinct and a very fine command of terse and punchy language amid exciting circumstances.

Mac must spend a great many evenings in the studio or on remote control jobs, doing his announcing, and must miss many fights. The Major, on the other hand, is primed with the latest information from visual observance, and is in training, as it were, for fight broadcasting. Hence it was not surprising that he could outclass Graham at this ringside talkfest work.

At this business Graham is great but J. Andrew is greater.

Many noticed that Graham, whenever he discovered any fighter accomplishing anything easily, said the fighter did whatever he did, "without any trouble at all." In fact, he said that seven times, which is once too often for one evening.

Major White, during the first round, in a few words gave the listening audience a true picture of Dempsey by saying: "This is not the Dempsey that we know, but a very cautious and conservative fellow. This is a different Dempsey." The listeners, excepting grandmothers' quickly sensed that the fight was not going the champion's way.

The first round provided a real thrill, in that it surprised everybody. While some thought Tunney had a good chance to win, even before the first blow was struck, no one seemed to expect a walk-over, and the first round (with the usual reservations against accidents), foreshadowed that kind of a shoe.

One thing both Major White and McNamee did not bring out for the benefit of the radio audience. When Tunney entered the ring he was greatly cheered. That was announced. When Dempsey entered the ring there was a round of applause. That, too, was told. But when the ringside announcer or ballyhoo introduced Dempsey as the "champion who has defended his title for six years," there was a generous round of hisses and boos, if one can suggest any generosity attaches to the like. No mention of this was made and I think charity was carried too far. We like our hissing information when we're entitled to it.

When the fight was nearing the end the rain started in earnestly and both Major White and McNamee, and the 134,998 others, got drenched, while the radio fans snuggled closer to the speaker. Then came the judges' decision that the 10-round fight was won by Tunney, new world champion. Tunney spoke into the microphone, which was lifted into the ring for the purpose, and said he would defend his title like a Marine, mentioning that the Marines are always first to fight and last to leave. But it was noticed that Tunney quit the premises before the referee did.

MOTOR-BOATING

(Concluded from page 6)

leaks have been omitted as unnecessary to the analysis. In a direct coupled circuit there is no choice as to the direction of the currents in the plate circuits of consecutive tubes. They will alternate. The input voltage to the second tube is the voltage drop in the coupling impedance Z_c plus the voltage drop in the common impedance Z . And the voltage input to the third tube is the sum of the drops in the coupling impedance Z_c and in Z .

Since i_2 flows through Z in a direction opposite to that of i_1 , the drop in Z is decreased, as was the case under Fig. 1, and since i_2 is greater than i_1 the drop will be negative as compared with the drop in Z_c . The input voltage to the second tube therefore will be materially decreased because i_2 flows through Z , and the amplification in the second tube will be decreased. If the direct coupled circuit only had two tubes there would be no tendency to oscillate or to distort.

Last Tube Cuts Amplification

But the current in the plate circuit of the third tube also flows through the common impedance Z and in the same direction as i_1 . Hence this current increases the amplification. Since i_3 is much greater than i_1 , the regeneration is greater than the damping, and oscillation might occur if the common impedance and the gain in the circuit are great enough. However, the amplification in the circuit as a whole is decreased slightly by the fact that the current in the last tube tends to decrease the amplification in that tube, since it decreases its input voltage. But the overall increase in the amplification as a result of Z is greater than the damping. Hence a three tube direct coupled circuit is likely to oscillate, and it is likely to distort if the common impedance has any appreciable value. Few are the plate potential supply sources in common use in which the impedance is not great enough to cause distortion in a three tube, direct coupled circuit! When a fourth tube is added the situation is more favorable because the regenerative effect is more nearly neutralized by the extra current.

Noise in a resistance coupled amplifier which is usually attributed to grid blocking is in most cases due to regeneration by virtue of feedback through the common impedance in the plate circuits. The reason the noise stops when a lower value of grid leak resistance is used is that the amplification is reduced. The same effect can be produced by reducing the coupling resistance, by using tubes of lower μ or by using a new B battery. Is there any reason why the grids should block if they are kept negative for all values of the input voltage?

A resistance coupled amplifier of the type shown in Fig. 4 is most likely to oscillate at a very low frequency, because for the lower frequencies most of the current in the plate circuit of the last tube is in phase with the current in the plate circuit of the first tube.

What to Do About It

Now that all the favorite amplifiers have been "shown up" as potential oscillators and distortors, the question naturally arises as to what means may be taken to ameliorate the trouble. The answer is to remove the cause. If this cannot be done entirely, then its effect must be minimized. The particular method or methods to be employed depend on circumstances.

Suppose that a receiver served by an ordinary B battery suddenly begins to oscillate, or to develop symptoms of distortion. It is then time to replace the battery with a fresh one. If, however, the receiver is so designed that several different voltages are used for the detector and the amplifier tubes, then a rearrange-

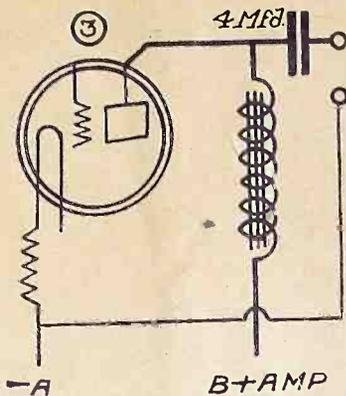


FIG. 5

This method of taking the output of the final audio tube (designated 3) is favored by J. E. Anderson as tending to reduce the danger of motor-boating, the new nuisance encountered in some B eliminators. The choke coil inductance should be large, preferably 60 henries or more, while 4 mfd. is a good value for the condenser.

ment of the battery may stop the trouble for a time. Suppose there are taps on the battery of 45, 90 and 135 volts in the usual order. In this case only the first block of 45 volts is common to all the tubes in the amplifier, and this is the first one to become exhausted. The 45 volt unit highest in the ladder is relatively the freshest because it serves fewer tubes. Hence the first and the third blocks may be interchanged, and the set will work well again for a little while.

A still better way of minimizing the effect of the common impedance is to use a separate B battery for the detector at all times. This is quite effective even in the most troublesome circuits, because it really reduces the common impedance to zero, at least as far as the most critical tube is concerned.

The use of a by-pass condenser across the battery or eliminator which is common, is of very little avail unless the condenser capacity is enormous, say 10 to 100 microfarads.

If the circuit is served by a B battery substitute which has an impedance high enough to cause oscillation, the use of condensers across its output is about the only thing that will help; and they will only be effective if they are very large, say 10 mfd. or more.

One thing that helps in any circuit is to bypass the AC component around the common impedance by means of a series condenser and a parallel choke coil. This is done in the last stage in cases where a power tube is used, in order to protect the speaker coils from burnout. In order that this method be effective the choke coil must have a very high inductance in comparison with the inductance of the speaker, and of greater importance, the return lead from the speaker must go directly to the minus side of the A battery and not to the plus side of the B supply.

THE EQUAMATIC

(Concluded from page 11)

too, how the leads run in that photograph, and see that they are duplicated, in point of position and direction, in the receiver that you are making.

With the front panel in position you are now able to go ahead with all the rest of the wiring, except to coils and variable condensers.

Now is the time to connect the green A minus shaft of the Jones multiple jack to three points—first to one side of the rheostat R1, extreme left in Figs. 4 and 5, second to one side of the other rheostat,

and third to the common joint of the two Amperite mountings. Now join the red shaft of the multiple jack to one side of the switch S1 and the other side of that switch to the lead connecting all the F plus socket posts.

Use All Cable Leads

Join the open side of the RIF rheostat R1 to the lead that went to the two F posts of sockets 1 and 2 and join the F post of socket 3 to one side of the rheostat R3, left-hand one in Figs. 4 and 5.

The B plus 45 lead is taken from the blue post of the multiple jack and this connection is made from B plus on AF1 to the blue shaft. The F post of AF1 goes to yellow shank of the jack, ordinarily used for B minus, but in this case we will later connect B minus to A plus by a wire from battery post to battery post, outside the set, so that all connections externally made will be taken from the plug.

The plate post of socket 4 goes to one of the outside terminals of the double circuit jack which is on the front panel, and the corresponding inside spring that contacts with that outside one is brought to the P post of AF2. The other inside spring goes to the B plus post of this transformer and the remaining jack spring is joined to a corresponding leaf of the other jack, SCJ, and carried to the pink shaft (B+ Amp.) of the multiple jack. Take care to distinguish between pink and yellow when making the connections, as under poor light, if one is careless, he can make a mistake.

The open side of SCJ goes to the plate of the last tube, 5.

Now put the coils in position. They have a mounting bracket that should be at an angle of 58 degrees. The screw securing this support to the subpanel should not be tightened down very much, as some shifting of position may have to be done, although this will not affect the position of the screw-hole.

Antenna Coil

Now put the antenna and ground binding posts in place, these being thumb nuts on threaded shafts, and carry the antenna post to the brown shank of the multiple jack. This lead in turn connects to the primary coil by means of a lug at the end of one of the coil terminals. Be sure that this lug is the one that connects to that terminal of the primary L1 that is farthest from the secondary. The other primary connection is made to ground by joining to the black shaft of the multiple jack. At the Jones instrument itself connect the black ground shank with the green A minus one. This grounds A minus.

Now, using the same system as employed in the antenna circuit, of input at the farther end of the primary, connect the plates of sockets 1 and 2 to the primary terminals of L3 and L4 farthest from secondaries and the other primary terminals to the B plus 90 lead, which is the pink post. (Do not confuse pink and yellow visually). The secondaries are connected with the terminals nearer you to grid and to the stators of the variable condensers. The other ends of the secondaries go, in the cases of L2 and L4, to the open sides of the retard coils L7 and L8, respectively, and to rotor plates of C1 and C2, and in the case of the detector input, to A plus and rotor plates of C3, instead of to F minus. Also make note that the grid connection in the detector tube is made through the grid condenser.

Put the grid leak (Amsco grid gate) in the condenser clips and put the Amperites in their mountings. Connect the free ends of the cables as explained. This is as they appear on the marker supplied by Jones, except that B minus is used here as C minus. Connect A plus and C minus at batteries.

[The adjustment and operation of the Karas Equamatic receiver will be described in the next issue, dated October 16.]

THE RADIO TRADE

Greatest Season Here; Sales Are Enormous

Clinical Study of Trade Situation Shows First Flying Start in Three Years—Credit Caution Adds To the Stability

By Samuel Lager

This season will be the greatest one in the history of the parts business. Commercial scouts who have made trips about the country return with glowing reports, not only concerning their own business, but in regard to the trade in general. Probably 10 per cent. of the manufacturers now have on hand orders which prove that their problem is one of production. This healthy condition brings the radio parts business to a plane that it has been three years.



SAMUEL LAGER

Although orders come piling in, it is advisable for manufacturers to keep pushing their products to the utmost, as the experience of many has been that when they let up on the drive to sell their goods, just because orders were plentiful, a slump set in that turned into failure a season that promised great success.

Quality Parts a Factor

The high grade of parts generally manufactured has done much to stimulate sales. The public has been waiting for a year that would develop high-grade apparatus, so that they could make their own sets in a fashion that made the receivers things of beauty. The drive for efficiency has been under way for a couple of years and the peak has been reached, unless some startling new invention appears, and there is no likelihood of that whatsoever. In fact, radioists who have been teased into a policy of watchful waiting have very properly given up phantom-chasing, and realize that circuits are standard by this time, parts are efficient, and that the greatest efforts have most recently been centered on mechanical and artistic phases, rather than on electrical objectives.

Many manufacturers simply were struggling along for the last three years, and great riches have not been made in the parts manufacturing end of the business, although the leading concerns have showed good profits. Set manufacturing has been very risky except for concerns like Freshman and Crosley.

Parts concerns have watched the products of the money-makers and have found in them a combination of high electrical efficiency and excellent appearance, so the industry as a whole has been greatly improved by following the leadership of the most successful.

Credit Situation Better

The credit situation, bad in radio since the very beginning, has improved considerably, and parts manufacturers know whom they can trust, and are very cautious about running any unnecessary risks.

Some manufacturers have emerged from a couple of seasons that showed credit losses running as high as 15 per cent. of the gross, and that lesson has taught them to be more conservative on credits. Also it has led to a strictly cash basis being forced upon those customers whose credit is not beyond question.

Much of the parts business is done on account of advertising and publicity in the radio publications, in fact without these periodicals the parts business would all but disappear. A void in previous seasons existed because of insufficient provision for supplying complete kits to the jobbers, the retail trade and hence the public. This season opens with the problem completely solved, except as to supplying the jobber. Now the jobber's kit supplies are made up of parts assembled from his stock, and augmented only by such few parts of designated manufacture that he does not carry. Hence only very large jobbers can tackle the kit business as such, which is unfortunate.

Possibly we will have to wait until next season for the solution of the direct supply of the complete kit to the jobber. Mail order houses and others are forced to supply the retail trade with kits, in some instances, because of the non-existence of the official kit assembler who can offer the complete boxed kit to the jobber on the same terms on which the jobber deals with a manufacturer. However, even this phase is being considered by leading parts manufacturers, and the present season, after all, may develop the solution.

Great Season Assured

At any rate a great season is assured, and one of longer duration than in the three previous years, for right after the Radio World's Fair in New York, which 250,000 persons attended, business started off with a great spurt for parts manufacturers, and the retail trade felt the reaction, too, although not quite so strongly.

Several small firms will become large and important this season, and great institutions will become still greater, which is always the way in a good year.

General Resistor Line

Due to a typographical error the address of the General Resistor Company, makers of the resistors used in the New and Improved Diamond of the Air was incorrect in a few copies of the Show Number, dated Sept. 11. The correct address is 190 Emmett Street, Newark, N. J. The new line of this concern is now ready and includes a new resistance coupled amplifier which is a revelation in tone quality and is the only automatic filament control amplifier on the market. This is sold separately or can be had with two General Resistor Hi Mu tubes and one General Resistor power tube for the best results. These tubes are made by the General Resistor Company to go with the amplifier unit.

Parts Will Sell Big, Ready's Study Shows

President of National Company Analyzes New Effect of Cheaply Made Sets on Kit Business

W. A. Ready, president of the National Company of Cambridge, Mass., makers of the famous Browning-Drake tuning units and National Velvet Vernier dials, has recently returned from an eight thousand mile trip throughout the United States and part of Canada. This trip was made by Mr. Ready with his general sales manager, George Q. Hill, and it might well be construed as a combination sales and observation trip.

On his return Mr. Ready reported that business throughout the country, particularly the parts business, is extremely good, and the prospects are that it will be considerably better before the season advances very far.

"The attitude of the entire trade," said Mr. Ready, "in connection with the parts business, has entirely changed since last year. Jobbers and dealers who last year believed that they would do better to specialize on complete sets figuring on the particularly long profit which each sale brought, have found in many instances that their high hopes for obtaining these profits were shattered. This shattering came about as a result of the

amount of service necessary on the part of the dealers and the jobbers in keeping the sets in satisfactory operation after the ultimate purchase had been made.

"Many dealers are now recognizing that the circuit exploited by some of the more responsible radio periodicals and designed by recognized radio authorities when used in conjunction with high grade parts really perform in a very satisfactory manner and in most instances require less service on the part of the dealer than some of the cheap ready-made sets.

"It must be remembered," added Mr. Ready, "that the greatest competition felt by the manufacturer of high grade parts came as a result of the production of cheap complete sets. The attitude on the part of the public was that it was useless to pay a lot of money for parts when for less money a completed receiver could be had. During the past two years the public has been almost completely disillusioned in this respect and is now not only ready but very anxious to procure high grade parts for use in recognized circuits.

"We found on traveling through the country that more interest is being displayed by dealers and jobbers as well as by the public itself in the Browning-Drake circuit than we have experienced at any time since that circuit was developed. Great interest is also being shown in some of the newer designed Super-Heterodynes and it is very likely that they will enjoy a very large sale this year."

Chicago Show Seeks to Exceed New York

Opens Monday for a Week's Run at Coliseum With 300 Exhibiting—DX Queen to Get Trophy—Cites Radio as Aid to Home Life

Plans are complete for the annual Chicago Radio Show, to be held at the Coliseum October 11-17. It is hoped the exposition will exceed in size and scope even the Radio World's Fair held in New Madison Square Garden, which was visited by 220,614 persons during the week of Sept. 13.

All the latest devices in radio apparatus, including much that was not ready for the New York exhibit will be shown at the Chicago Coliseum, and feature events of national and international importance are scheduled.

The champion among the women of America in reception of long distance stations will receive a silver trophy on the opening night. She is Mrs. Flossie E. Erickson of Bloomington, Ill., who has tuned in 326 stations, many at 2,000 to 4,000 mile range. She will also receive another silver cup for finishing second in the annual Radio Queen test. Her essay was on the service broadcasting is rendering to the women of America. Mrs. Lotta Harrauff, of Princeton, Ill., the Radio Queen, will be on hand to congratulate her.

Mrs. Erickson will broadcast how she meets with such success in radio. For one thing, she uses eight different aeriols, and has several kinds of receivers.

Mrs. Harrauff in accepting the Radio Queen trophy said:

"The radio is one of the greatest factors in restoring the family circle around the fireside. It gives our boys and girls the entertainment they seek and will seek elsewhere if it is not provided in the home. The boy who is encouraged to build his own set is not the boy who will be a gang leader. The girl who is permitted to ask her friends into the house and listen to good music or perhaps spend an evening dancing is not the girl who will be found in our rescue houses.

"The radio has a fascination all its own and its use in the home can only result in great good."

There will be 300 exhibits at the Chicago Radio Show. At least ten sets will be shown in each booth by the manufacturers. The receivers, in many cases, are housed in magnificent cabinets and consoles, and the price range runs from \$50 to \$2,000.

Biggest Season Ever, Is Steinle's Forecast

Harold H. Steinle, general sales manager of the C. E. Manufacturing Co., reports that his jobbers throughout the Middle West are very optimistic over the possibility of tube sales for the coming season. Mr. Steinle has just returned from a trip throughout the Middle West, and during his travels he came in contact with quite a number of radio dealers.

"Each and every one of them," he said, "has expressed the opinion that this is to be the biggest season the radio industry has ever had, and I heartily agree with this opinion. Although we did a very considerable business last year, we expect during this season to do even two or three times as much. We are now cranking up our production to 10,000 tubes a day and it is evident from the orders we are now receiving that this supply even will not be satisfactory.

"Quite a number of radio experts and authorities on tubes throughout the country are now recognizing the real value of our products and many of them are using our tubes in connection with articles they are writing for various radio periodicals and the newspapers.

"It is a real pleasure and a source of great pride to our company to have such men as Arthur H. Lynch, Glenn Browning, Laurence M. Cockaday, Herman Bernard, who prescribes them for the Bernard 6-tube model, soon to be described; Keith Henney, and many other recognized radio authorities not only write us telling of the high quality of our products, but also recommending our products to the public through their writings in the technical radio papers. We have always known and frequently endeavored to make known to others that we are turning out as high grade a product as the present

knowledge of the art permits, and, as I have said, this recognition of our efforts by those who are really in a position to know is a source of much satisfaction to us.

"The two new floors of our plant have just been completed and are now being put into shape for production. When we began the building of these two floors we were not positive that we would be able to procure enough business to warrant the expense. If we had the job to do over again, it is quite likely that two additional floors would be added to our plant, and we believe that this will be necessary before we start production for next year. Yes, sir, this is going to be a whale of a season, not only for CeCo tubes, but for everybody in the business."

Arthur Freed Reports Great Enthusiasm

Arthur Freed, secretary of the Freed-Eisemann Radio Corporation made a coast-to-coast tour, visiting the Los Angeles Radio Show and the Radio World's Fair in New York, and stopping to confer with dealers in Fort Wayne, Chicago, Denver, Kansas City, Salt Lake City, and many other cities.

"The public and the trade alike are greatly enthusiastic over the new radio year," declared Mr. Freed. "Personally, I never saw so much confidence, and I am certain that all records in radio sales will be broken.

"The public realizes that early evils in radio have been eliminated, that now they may be certain that the standard products of manufacturers who are in the business to stay are backed by the strongest kind of guarantee, and that with these efficient instruments they will receive the finest programs that have ever been put on the air.

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.

RADIO WORLD,
145 West 45th St., N. Y. City.
I desire to receive radio literature

Name
Address
City or town
State

- Delaware Radio Shop, 254 Delaware Ave., Albany, N. Y. (Dealers.)
- J. D. Auberteuil, 1523 Music St., New Orleans, La.
- C. E. Rice, 3701 Eastern Ave., Baltimore, Md.
- Toledo Academy of Music, 433 Superin St., Toledo, O.
- Adolph Brauner, Jr., 4136 Monticello Ave., Bx., N. Y. C.
- J. Galket, Jr., Box 72, Wilmerding, Pa.
- H. Diener, 2418 South 8th St., Philadelphia, Pa.
- W. V. Doss, 2405 Woodland Ave., Winston, Salem, N. C.
- Wm. A. Stead, 815 West 179th St., N. Y. C.
- J. R. Boice, Purchase, N. Y.
- Herold Whipple, Mystic, R. F. D., Conn. (Dealer.)
- Joe Johnson, 132 Peter St., Buffalo, N. Y.
- Robert Green, Henderson, N. C.
- P. S. Myers, 4305 Ferdinand St., Seattle, Wash. (Dealer.)
- James A. Lewis, East Gastonia, N. C.
- R. L. Dauberman, 1639 1/2 West Cucharas, Colorado Springs, Colo.
- Taylor's Drug Store, Spring City, Pa. (Dealers.)
- H. F. Russell, 2545 Howard St., San Francisco, Cal.
- Radio Service Co., 400 Mills St., El Paso, Tex. (Dealers.)
- Adolph Frye, Box 97, Leonardo, N. J.
- Aubrey Phelps, Box 436, Gleason, Tenn. (Dealer.)
- Oscar Tasse, 776 De L'Epee Ave., Outremont, Quebec, Canada.
- R. G. Ferguson, P. O. Box 535, Moran, Tex.
- Tiberio Toja, 11 Gunther Place, Brooklyn, N. Y.
- F. A. Maruna, 3141 W. 41st St., Cleveland, O.
- Henry Claeys, Anchorville, Mich.
- E. E. Brown, William Hotel, Daytona Beach, Fla.
- E. B. Jones, 3480 Davis St., Oakland, Cal.

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Wire specified for the 1927 VICTOREEN is made only by THE ACME WIRE CO. New Haven, Conn.



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A combination alkaline element battery and trickle charger all in one. Price, shipped dry with solution, \$16.00. Tube extra, \$1.00. 100-volt with chemical charger, \$12.00. 140-volt, \$17.00.

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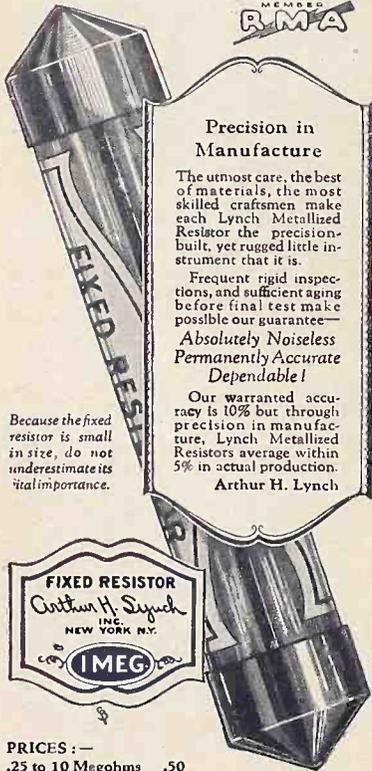
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Our warranted accuracy is 10% but through precision in manufacture, Lynch Metallized Resistors average within 5% in actual production.
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Because the fixed resistor is small in size, do not underestimate its vital importance.



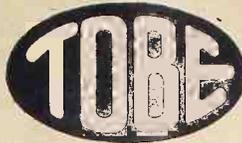
PRICES:—

.25 to 10 Megohms	.50	Single Mounting	.35
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Lynch Metallized Resistors cost no more than the ordinary kind. If your dealer cannot supply you it will be well worth your while to wait for the mail—we ship post-paid, at once.

LYNCH METALLIZED FIXED RESISTORS

THE TRADE-MARK



on the by-pass and filter condensers in your Victoreen Superheterodyne will insure your set against condenser trouble once and for all.

Used in the Lynch Power Amplifier for the filter and amplifier circuits.

Tobe Deutschmann Co.
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Complete stock of all parts for the Victoreen receiver, as specified by Arthur H. Lynch; also for the Lynch Amplifier and B Eliminator, and the A Eliminator.
CoCo Tubes, high mu Type G, or special detector type H, \$2.50; type A, \$2.
Also full line of Lynch Resistors, Tobe Condensers, National Illuminated Type C Dials, National Power Transformers, Chokes and Variable Condensers. Also all Bruno parts; switch, 75c; adjust. brackets, \$1.25.

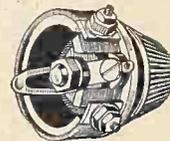
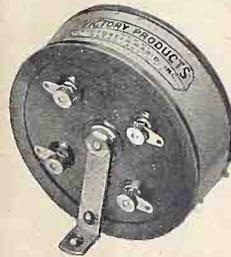
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The Heart of the Circuit

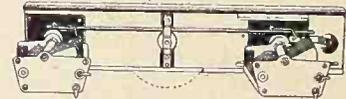
VICTOREEN Transformers and VICTOREEN Master Control Unit



Victoreen Manganin Rheostats

Zero temperature coefficient-resistance remains absolutely constant; double the number of turns of wire used on ordinary rheostats. Three terminals simplify wiring.
Five resistances—2, 6, 10, 20, 30 ohms, each..... **\$1.20**

Victoreen Potentiometers —200 and 400-Ohms resistances, each..... **1.50**



R. F. Transformers

Made with air core construction. They are not merely "matched" but are actually tuned to a guaranteed precision of within 1/3 of 1%.

Victoreen Super sets are free from oscillations, howls or squeals—no matching of tubes is necessary.

The "B" Battery consumption is exceptionally low—8 to 10 milliamps with potentiometer at negative side—less than some 3 tube sets.

Build a Victoreen Super and use these parts:
4 Victoreen No. 170 R. F. Transformers, each..... **\$7.00**

(No. 171 Transformers when dry cells are used.)
1 Victoreen No. 150 Coupling Unit, each..... **\$5.50**

Should the use of aerial be preferred to loop, Victoreen No. 160 antenna coupler is required, each..... **\$3.50**

Victoreen Master Control Unit

A complete assembled, convenient, single control unit for use on circuits employing two or more condensers of the same capacity. Easy to mount—no change of wiring necessary.
Victoreen Master Control Unit, Type VS..... **\$19.50**
Extra Condenser, each..... \$4.50

Get a complete list of parts from your dealer or write us direct.

Free Victoreen Folder and Hookup answers all questions about Victoreen circuit.

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Chosen for New Victoreen Circuit
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"TIP" JACK
 Fits any
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 Makes good
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THE RECTAVOX AND THE VICTOREEN



This charming Gothic mantel type reproducer is built especially to match resistance coupling. It will bring out all the true tones possible with the Victoreen Circuit.

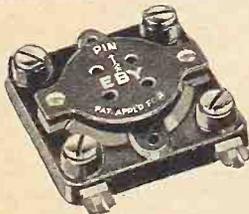
\$25.00 Complete

The principle of the Rectavox is that of the violin—the resonant cabinet vibrates with the music throwing off the tones, full, clear and mellow. The Rectavox is beautifully made—genuine mahogany woodwork, two-tone bronze-finished grill, and a 20-foot cord for placing it where the best acoustical properties of the room may be realized. Hear the Rectavox and compare.

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THE BROWNING-DRAKE CIRCUIT—Text and illustrations covering this famous circuit were covered in our issues of August 14, 21 and 28. The 3 numbers sent on receipt of 45c. RADIO WORLD, 145 W. 45th St., N. Y. C.

NATIONAL

VELVET VERNIER ILLUMINATED DIALS, TYPE C "EQUICYCLE" CONDENSERS

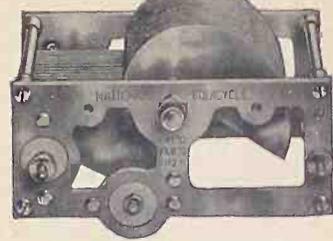
play their essential part in the perfection of the new Victoreen set, described in this issue of Radio World.



THE NATIONAL ILLUMINATED VELVET VERNIER DIAL, TYPE C has its scale brightly lighted by a tiny concealed 6-volt lamp. Tuning is easy with this dial, for you can see the figures, and if the dial light is put on the filament switch it acts as a telltale for the tube. Easily and quickly installed by anyone with drill and screw-driver only. And this new dial retains every feature which has made the NATIONAL VELVET VERNIER Type A and B Dials so universally used.

Price, \$3.00

NATIONAL COMPANY, INC. makes the NATIONAL Tuning Units comprising NATIONAL VELVET VERNIER DIALS, genuine NATIONAL Browning-Drake Space-wound coils and R. F. Transformers, and the NATIONAL Variable Condensers in a large number of different combinations suitable for the construction of practically any type of modern Radio receiving set. These are described in Bulletin 115-R.W., gladly sent you on request.



THE NATIONAL "EQUICYCLE" CONDENSERS (SLF)

turn through 20 degrees instead of the usual 130, thus spreading out crowded stations still more. Their precision of action, freedom from wear, lightness, rigidity and exceedingly low minimum capacity recommend them to radio users who want only the finest components in their sets. Furnished with or without NATIONAL VELVET VERNIER DIALS.

Prices: With Type C Illuminated Dials:—
 .0025 Mfd. \$7.50
 .0035 Mfd. \$7.75
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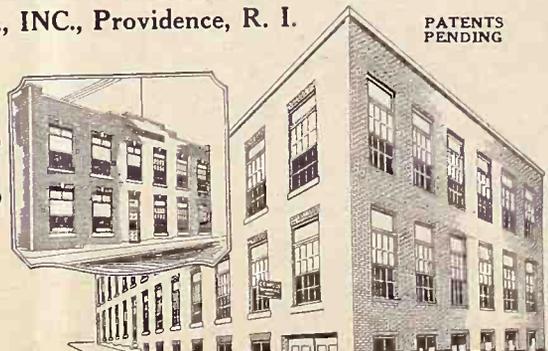
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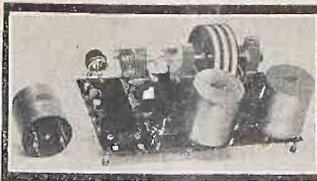
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Welty's R. F. Amplifier Unit

PARTS USED IN BERNARD SET

In next week's issue, October 16, will be published in full an article on how to build the Bernard 6-tube set, the latest development by Herman Bernard to come from RADIO WORLD's laboratories. This will constitute the longest and best single article ever published by RADIO WORLD and is a masterly exposition of how to build this tone quality receiver. How simply the set is constituted is shown by the economical and efficient list of parts that follows:

- C2, C4—One Bruno Unitune, Model 2C (with special condensers, .00035 mfd.)
- LS—One Bruno light switch.
- L1L2—One Aero fixed primary RF transformer.
- L3L4—One Aero adjustable primary RF transformer.
- GFPB—One Acme R3 fixed RF transformer.
- R3, R5, R7, R4, R6, R8—Six Lynch metallized fixed resistors (three .1, one 1 meg., one .5 meg., one .25 meg.)
- R2—One Bretwood Variable Grid Leak with grid condenser.
- 1, 2, 3, 4, 5, 6—Six Air Gap push type sockets.
- R1—One Electrad Royalty variable resistance, Type B (1,500 to 100,000 ohms).
- C7, C8, C9—Three Electrad 200-volt .25 mfd. bypass condensers.
- R9—One Electrad 2-ohm rheostat.
- J—One Electrad single closed circuit jack.
- C1, C3, C6—Three Micamold .00025 mfd. fixed condensers.
- One Birnbaum 5-lead battery cable.
- Nine cable tags (one A plus, one A minus, one C plus, one B minus, three C minus, one B plus amp., one B plus det. Two Eby binding posts (Ant., Gnd.)
- Three Lynch double mountings.
- One drilled hard rubber subpanel.
- One 7x21" Lignole drilled and engraved panel.
- One pair of Bruno adjustable brackets.

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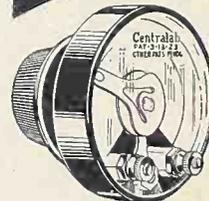
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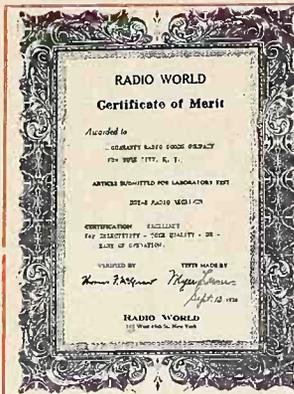
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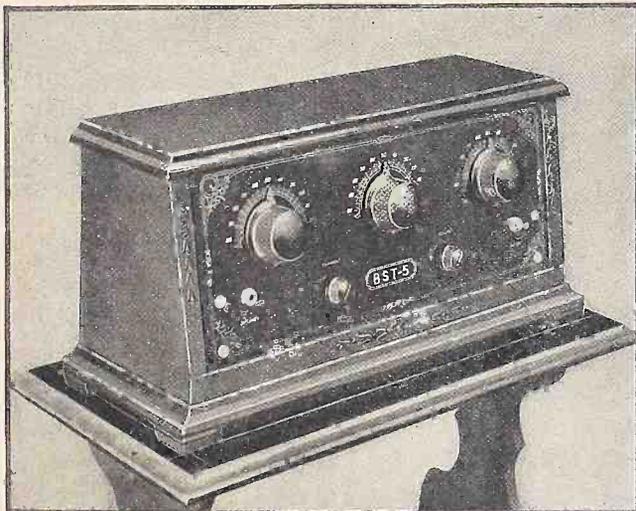
from
RADIO NEWS
and
RADIO WORLD

B—Beauty
S—Selectivity
T—Tone

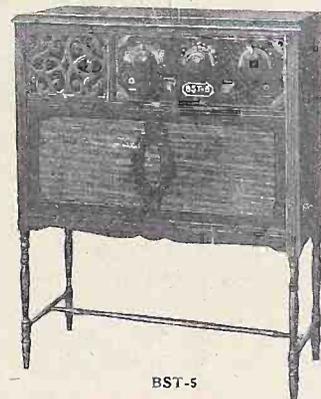


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MASTERPIECE
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UNIVERSITY
 (Concluded from page 13)
 Can I run the beginning of the second-
 ary winding, which I intend to connect
 to the rotary plates of the condenser and
 to the battery, direct to the metal shield?
 —Leroy Schuyler, Hoboken, N. J.
 Yes, this is a very good stunt. Be sure
 that the other leads are brought to posts
 which are well insulated from the metal,
 though. Also see that these posts are
 in no way connected to the grid posts.
 * * *
WILL YOU kindly advise me, if the
 Bruno Unitune, Model T-K, as shown in
 RADIO WORLD, Sept. 11 issue, with mounted

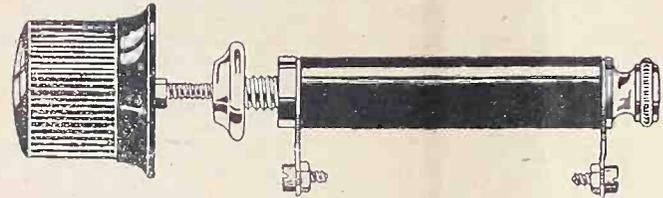
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 \$37.50

coils, will work satisfactory in the Dia-
 mond of the Air?—D. F. McKown, 467
 Frick Annex Bldg., Pittsburgh, Pa.
 Yes.
 * * *
 I **RECENTLY** moved into a new home
 and, of course, re-installed my radio set.
 The results are fine, but I am troubled
 by intermittent scratchy noises. I
 noticed that the telephone wire runs parallel
 to my antenna leadin, within a distance
 of one foot. Could the parallel wires be
 causing my trouble?—Harry Wright,
 Bronx, New York City.
 Yes. Either move the antenna wire
 further away from the wall or change its
 position.
 * * *

UPON WHAT does the internal resistance
 of a cell depend? Roughly how
 may the internal resistance of a primary
 battery be calculated?
 The internal resistance of a cell depends
 upon the type of cell and its condition.
 The resistance in the line must be con-
 sidered also. It may be obtained from
 this formula. Let us suppose that the
 voltage at the battery terminals is V1,
 when a current C1 is flowing and V2,
 when a current C2 is flowing. Then employ-
 ing Ohms law:
 Resistance equals V1 minus V2 over C2
 minus C1.
 In other words the first known voltage
 at a specific known amperage is sub-
 tracted from the voltage present when
 the battery is run down at that amperage.
 The results are then divided.

Take the Guesswork Out of the Grid Circuit

In any circuit where a grid leak has to be used its value in ohms
 is important. Conditions differ in individual circuits and with
 different equipment. Experts cannot specify definite values that
 are applicable to *all* cases. The variable leak takes the guesswork
 out of the grid circuit, and the **BRETWOOD** is the best for the
 purpose. "It Does the Trick!"



Bretwood Variable Grid Leak
 Guaranteed Precision Range, 1/4 to 10 megohms.

- BETTER TONE QUALITY
- GREATER DISTANCE RECEPTION
- INCREASED SENSITIVITY

Result from getting the correct resistance in the detector grid
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 (Prescribed by Herman Bernard for the New and Improved
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HOW TO USE AERIALS IN GROUND AND
 WATER, by Lewis Winner, appeared in **RADIO
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Bernard

A 5-Tube Receiver,
Balanced Against
Self-Oscillation
by a New Method

Will be described in full in the next issue of RADIO WORLD, October 16, by Herman Bernard, designer of the circuit.

FEATURES OF THE SET INCLUDE

- (1) Tone quality that excites hearers to frenzied enchantment; (2) drum type of tuning control, with nothing but the drums and a light switch on the 7x21" panel; (3) total absence of squeals, due to balancing by a new method; (4) selectivity adjustable to suit any location; (5) set suitable for any type of open antenna, including lamp socket antenna and indoor aerial; (6) resistance coupled audio.

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Fans Rave About Results on Diamond

RESULTS EDITOR:

I have constructed the New and Improved Diamond of the Air, with most gratifying results, following the blueprint and lucid detailed directions in the booklet. The dials happened to be set at a point where a 476 meter station would ordinarily be tuned in, and the minute the batteries, the antenna and ground were connected, to my astonishment, WFAA, Dallas, Texas, came in on the speaker with tremendous volume. As a matter of fact, the signals were so loud that they

could be heard in every room in our apartment, with extreme clarity. I then turned the dials and found the set just chockful of stations, with not a bit of interference between any of them, even with one meter difference. Each station comes in on exactly the same reading on both condenser dials. The control of the volume, via the tickler, is perfect. When the oscillation point is reached, no sharp click is heard, the action being very smooth. I have built many receivers, but have never heard one that can approach this Diamond for volume, clarity and distance. It is truly a dependable and efficient receiver.

ELSIE SCHONHOLTZ,
2675 Valentine Ave.,
Bronx, N. Y. C.

convince himself, as I did, by building it. Even that is easy.

SIDNEY GREENSTEIN,
828 Dawson St.,
N. Y. City.

RESULTS EDITOR:

Just a few words of appreciation of the wonderful Diamond of the Air. It is the best set I have ever built. The set is located at the engine house. During the Summer months many distant stations were tuned in. At times the stations come in too loud for comfort.

C. D. SHOOK,
Fire Co. 34, Ludlow and Clifton Ave.,
Cincinnati, O.

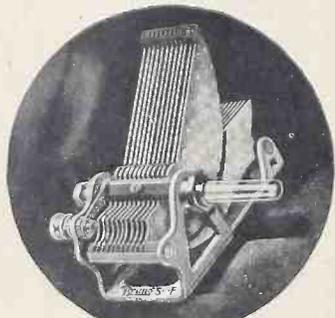
RESULTS EDITOR:

Results! That is what I have received with my Diamond. My hearing is very poor, yet I have no trouble in obtaining distant stations, with such volume as to enable me to hear them comfortably. These distant stations are located in Colorado, Canada and on the Atlantic Coast. It is really a marvelous set, easy to construct and tune in. Even with the high power KDKA on the air, I have no trouble in tuning in such DX stations as WSBC, WBBM, WBAL, etc.

H. W. LEWIS,
433 Arabella St.,
Pittsburgh, Pa.

RESULTS EDITOR:

It took a friend of mine months before he persuaded me to build the Diamond of the Air. I just couldn't be convinced that such a set as he described existed. He raved about the distance, volume and quality obtainable with the receiver. I finally gave in and built the New and Improved Diamond and I don't know how to express my appreciation to my friend for the introduction to the best receiver ever designed. His remarks regarding the results obtainable were all too meek. The set is great. That's all there is to it and anybody who doesn't believe it can



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BRUNO 101 Condenser, with clear Amber Bakelite Shaft, eliminates all body capacity. Very compact—Single Hole Mount.

.....00025MF (13 plates).....	\$3.50
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Variable Grid Leak
Certified for The Diamond



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Improves Any Set!
Price, \$1.50

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New York City

OFFICIAL LIST OF STATIONS, giving call letters, owner, location, wavelength in meters, even unto decimal fractions, and the frequency in kilocycles, was published in the October 2 issue of RADIO WORLD. Send 15c for copy. RADIO WORLD, 145 West 45th St., N. Y. City.



THE NEW IMPROVED DIAMOND OF THE AIR KIT

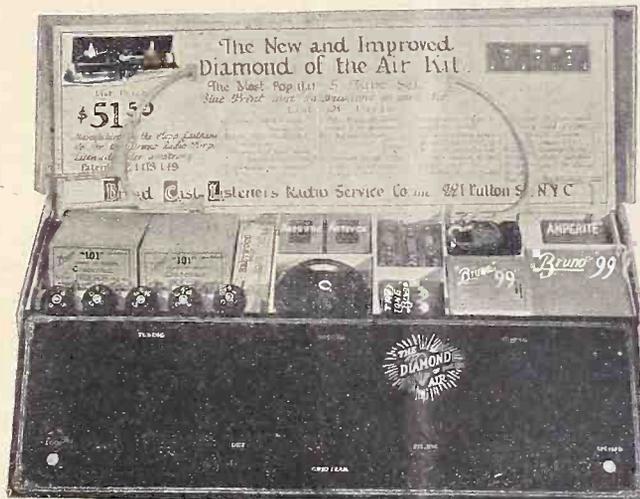
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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC. REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.
Of Radio World, published weekly at New York, N. Y., for Oct. 1, 1926.

State of New York, County of New York, ss: Before me, a Notary Public, in and for the State and County aforesaid, personally appeared Roland Burke Hennessy, who, having been duly sworn according to law, deposes and says that he is the Editor of the Radio World, and that the following is to the best of his knowledge and belief, a true statement of the ownership, management (and publication for the date shown in the above caption, refer to a daily paper, the circulation) etc. of the aforesaid required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Hennessy Radio Publications Corp., 145 W. 45th St., N. Y. C.; editor, Roland Burke Hennessy, 145 W. 45th St., N. Y. C.; managing editor, Herman Bernard, 145 W. 45th St., N. Y. C.; business manager, Fred S. Clark, 145 W. 45th St., N. Y. C.
2. That the owner is (if owned by a corporation its

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HOLLAND B. HENNESSY, Editor.

(Sworn to and subscribed before me this 28th day of September, 1926).

ESTHER M. GUERIN, Notary Public, Bronx County, Bronx Co. Clerk's No. 109; Register No. 2839. New York County Clerk's No. 218; Register No. 8213. Term expires March 30, 1928.

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