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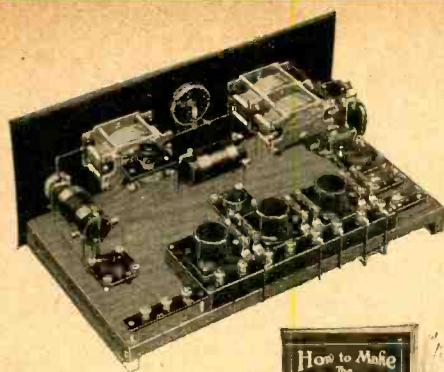
WORLD

America's First and Only National Radio Weekly

Vol. 10 No. 9

Illustrated





"Bird's-eye" view of the new two-dial hook-up of the Daven Bass Note Circuit. Easy to assemble.

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The Bass Note Circuit in a 2-Dial Hook-up

CLEARER than ever—even more selective—and always that crystal purity of tone—from highest soprano down to deepest, richest bass. The same astonishing Daven Bass-Note Circuit—with new refinements.

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See Story on P. 13

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RADIO WORLD'S

HOLIDAY GIFTS NUMBER

Most important issue of the year

December 4th

Editorial Features

The DX Getter. A 5-tube circuit. One of the most selective and penetrating hookups for home constructors. By Capt. Peter V. O'Rourke.

The Bernard Lamp Socket Set. How to construct the famous Bernard receiver and a B eliminator, so that it may be operated without need of battery replenishment. By Herman Bernard.

"The Christmas Spirit"—A front cover design in two colors. By J. Gerard Sheedy, art director of Radio World.

A D.C. Eliminator of A, B and C. Batteries. By Lewis Winner, technical editor, Radio World.

Common Fallacies in Radio. By J. E. Anderson, consulting engineer.

A Beat Note Audio Oscillator. By John F. Rider. Full Page of Fascinating Photographs of the latest happenings in radio.

Advertising Results

Radio World's Annual Holiday Gifts Number brings the maximum results to its advertisers. This issue will be advertised to some ten million people in other publications, and generally sells from forty to fifty thousand in addition to our 100,000 weekly circulation. It reaches the buyer just at the time when he is planning what he will give for Christmas.

Radio is the Most Appreciated Xmas Gift

This issue will tell what is best to buy and where to buy it.

Radio World's Holiday Gifts Number is dated December 4; is on newsstands December 1. Red form goes to press Monday morning, November 22. Last black form closes Tuesday noon, November 23. Full-page advertisers, on request, get an extra color—red—without additional charge. All advertisers get thousands of extra circulation without additional charge. Advertising rates:—\$10 an inch; \$100 a column, and \$300 a page.

RADIO WORLD

145 West 45th Street New York
FRED S. CLARK, Adv. Manager

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Let's Visit the Freaks

How It Is Possible to Hear Signals From a Set Without the Use of Phones or Speaker—Running Water May Prove More Troublesome Than Did the Indian of That Name

By Stanley Lyon

Radio World Staff Photos

MANY fans are bewildered at the mysterious actions of a radio receiver. Most such mysteries are explainable, although some are still stumping experts.

A great many peculiarities occur when antenna or ground or some portion of the energy collector is placed in proximity to an electric or telephone line. But the baffling mysteries arise from within the receiver itself, such as hearing signals from the set without the aid of phones or speaker or hearing signals without the need of antenna, ground, loop, or any such collector.

The external causes will be discussed first. Turning on the electric light (Fig.



FIG. 1
TURNING on a light, which causes a click in the set.

1), causes a click and a rushing sound. Whenever any light in the same line is turned on, the same thing happens. This is caused by the proximity of the collector to the line. If the line is noisy, due to motor or generator faults at the power house, the noise will increase when the light is turned on, at that instant only, because the same power is flowing through the line, whether it is being used or not, that is, it is always live. The only reason you hear a click when the light is turned on is due to the opening or closing of an external circuit. It resembles very much the action taking place when brushes make poor contact with either collector rings or a commutator, e.g., sparking, etc. Not only does the turning on of the electric light have this effect, but the switching in of any appliance, as electric iron, curling iron, sewing machine motor, violet ray machine, washing machine, battery charger, eliminator or relay produces this result. It must be remembered that none

of these noises will be heard if the receiver or collector is not close to the line, say a few feet away, since no mutual induction then exists. These mysterious effects are therefore due to the position of the lines.

Exactly the same condition exists with the telephone lines, bell wiring, etc. The induction or capacity coupling between the line and the set causes a form of interference.

The Mystery Telephone

Fig. 2 shows how the telephone may be used to listen in without the aid of a pair of phones or speaker plugged into the set. The phone is near the audio amplification end of the set. The set should be taken out of the cabinet unless you have a cabinet large enough to hold the phone. The action that takes place may be ascribed to two things, one of them being induction from the AF circuit, and the response, due to the telephone microphone being actuated. If the speaker is on, the telephone receiver vibrates too.

Signals Without Phones

Another interesting point is that if you place your ear close enough to the last audio tube signals may be heard, without aid of earphones or speaker. This is caused by the physical vibration of the elements in the tube. The plate, which is relatively large, acts as a diaphragm. These physical vibrations are communicable to surrounding air columns and to your ear. It also must be considered that this effect often is aided by induction.

These operations can only be carried out when some one has called you or you are calling someone, or the line is open for some other reason, otherwise the line is dead, the microphone having no effect.

A Typewriter Antenna

Another mystery was recently reported by a RADIO WORLD reader. For a year he had enjoyed perfect reception. Recently, however, for some reason unknown to him, the reception of clear signals during certain periods of the evening became an impossibility. All the batteries were checked up, tubes and circuit tested, but to no avail. A sudden glance at the antenna solved the problem. His son recently had obtained typewriting work, which he did during the evenings. The lead-in wire had snapped and the bare portion of the wire touched the leg of this typewriter. Whenever his son would type the tick-tick would emerge from the speaker. This was proved, for as soon as his son stopped writing, the signals came through with the same clear volume as formerly. When the broken antenna lead was repaired no more trouble was experienced.

The typewriter acted as an antenna, while every time the keys clicked, a feeble audio current would be generated, which would be modulated on the incoming waves, or the circuit would be broken by each tap. Fundamentally it resembled very much the action of a buzzer inserted in series with the antenna circuit in a miniature transmitter.

Here is another instance of odd reception with a set. When a station is tuned

Mother Acts as Antenna And Touches Aerial Post of Set to Bring in The Voice of Her Son, Broadcasting From a Local Station—A Battery Supplies Ground Potential and Body Capacity Does the Rest

in, the set being on some solid foundation, and then lifted up, the signals decrease or disappear (Fig. 4). Many times the station can be completely lost by lifting the set a few inches. This is due to the capacity between the oppositely polarized resting place and the coils. The signal loss or diminution is due to consequent detuning. This effect can be best noticed,



FIG. 2
LISTENING IN to broadcast signals with the telephone, no speaker or earphones being connected to the set.

if a station is tuned in weakly, as by dialing a couple of degrees away from the place the station would come in loudest, and then lifting up the set. The set in the air can be retuned for maximum volume. By placing different objects around the set, or collector agent, this same effect can be noticed.

Induction to Speaker

Many folk note that when they place the speaker away from the set the reception becomes clearer. This is due to reducing the air column between the set

Queer Stunts Explained



FIG. 3

LISTENING IN without use of any sort of earphones, telephone receivers or speaker.

Newspaper Vibrates in Woman's Hand When Set Is Turned On, Due to Response to Variations in Air Column—Same Phenomenon of Sympathetic Action Accounts for a Variety of Strange Effects—Inductive and Capacity Coupling Contribute Several Posers

and the speaker, hence averting coupling that causes howling. At times this howl is very high in frequency and even the note may be inaudible, but still the signals are scratchy or distorted, due to effect of the inaudible interference on the wave form.

The Word Vibrates

Some fans say that they can place their ear to the cabinet and hear signals. This is due to the type of wood used. It resembles the instance of the telephone and the tubes. The wood must vibrate readily. In some cases the panel is made of such material. It is really from the wood that the signals are heard, since in most cases, a fairly heavy wood is used for the cabinet. The physical vibration of the tubes causes the entire set to vibrate. The proximity of the panel to the set causes the panel to vibrate in sympathy and consequently the signals are heard.

The Water Trouble

Some persons say that every time the water is turned on, the signals increase and decrease. In this case the ground has been made to the water pipe. This is due to the decrease or increase of the resistance in the pipe, due to irregular flow of water, consequently the signal strength varies. Often the water has a high iron content. This, of course, is something that happens very seldom, but when it

does it is often very mysterious. This is one of the troubles that gets the service man's goat.

Promises Much

One night a radio experimenter was at the home of a woman whose son was to broadcast within a few minutes from WGBS. The visitor thought it would be a good idea to prove to the woman that she could bring in her own son's voice through her very body. He said so. She looked at him quizzically.

"Oh, yes, it can be done," he insisted, "and to prove it I am going to have you hold the antenna post of the set after I have disconnected aerial and ground."

So the visitor removed the aerial and ground leads. The negative A battery of the receiver was connected to the ground post of the set, as part of the original wiring, and this gave the end of the antenna primary coil a ground potential. The mother, when she touched the antenna post, supplied the high potential, the capacity effect of her body serving as an antenna.

The moment arrived for the son to broadcast. The visitor turned on the set and carefully tuned it. He picked up the station, although not quite loud enough to be readily audible from the speaker. He was wearing earphones, plugged in at the final output. Then by minute adjustment of the antenna tuning condenser he was

able to bring the volume to a higher level. This he further increased by applying greater plate potentials. Finally he felt that the volume was sufficient to be audible from the speaker, although it was none too much. He plugged in the speaker. His hostess was astounded to hear her son's voice, rather low in volume, nevertheless plainly audible. The visitor, as if to prove that he had nothing up his sleeve, walked out of the room, and the astonished hostess kept looking at the cone speaker and the sensitive receiver in amazement.

Her Newspaper Vibrates

One good woman always gets a big kick out of feeling her newspaper vibrating as she sits reading it while the radio is playing. The sound sent out by the speaker moves or vibrates the air columns in the room and the newspaper, usually held so that the top lightly tilts downward, responds sympathetically.

In fact, when she puts her hand on the dining room table, near which the speaker is placed, she can feel the faint vibrations even in the massive table top. The sensation is strongest at that part of the table top nearest the speaker, while at the diametrically opposite point it can not be felt at all.

JAPAN'S STATIONS UNITE

WASHINGTON

The broadcasting companies of Japan have decided to join their interests in the formation of one company which will control all broadcasting in the country, according to a report to the Department of Commerce. It is believed in some quarters that the move was directed and guided by the Government.

AMATEURS CONSIDERATE

Amateur interference with broadcast programs, a common occurrence three years ago, is practically non-existent today, a recent investigation shows. The use of short waves by the amateurs and the great improvement in broadcast receivers are given as the reasons for this condition.

NEW TIME CLOCKS

The Radio World Time Clock, marketed by George B. Gardner, is made in a variety of models including a new traveling model encased in leather, mounted for placement on top of one's set, for panel mounting and a desk model.



FIG. 4

LIFTING UP the set, which decreases the volume or even tunes out the program.

Vital Pointers About Tubes

By Capt. P. V. O'Rourke

IT is hard to select anything that is more important in radio reception, or transmission for that matter, than the vacuum tube. In its present high state of development it is a three element device, consisting of a grid, or automatic control shutter; a filament, or heating conductor; and a plate, or electron attractor.

Tubes are generally classified by the public along the broad lines of filament voltage and amperage. The plate voltage is optional. The most popular type tube is the A type (201A, 301A, etc.), the filament voltage of which is 5 and the filament current drain one-quarter of an ampere (.25 amp.). It is a good performer as radio or audio frequency amplifier and as a detector.

The power tubes require more filament current in all instances, although usually not with any increase in filament voltage, and are useful as audio and radio amplifiers, as well as for detection. However, as they draw more current, it is customary to reserve power tubes for the final audio stage.

Voltage vs. Amperage

The voltage may be regarded as something that is forced upon the filament of the tube and the amperage as something that the filament exacts from the source of supply. While this is not technically so, it is a good way to distinguish between the two effects. For instance, you desire to know what causes the filament to draw .25 ampere, and one may answer that the filament itself is the cause, because of its resistance or conductance at a certain temperature. That temperature is the determining factor in establishing the drain under the conditions of filament resistance, for the application of the voltage is not for lighting the tube at all, but for heating it.

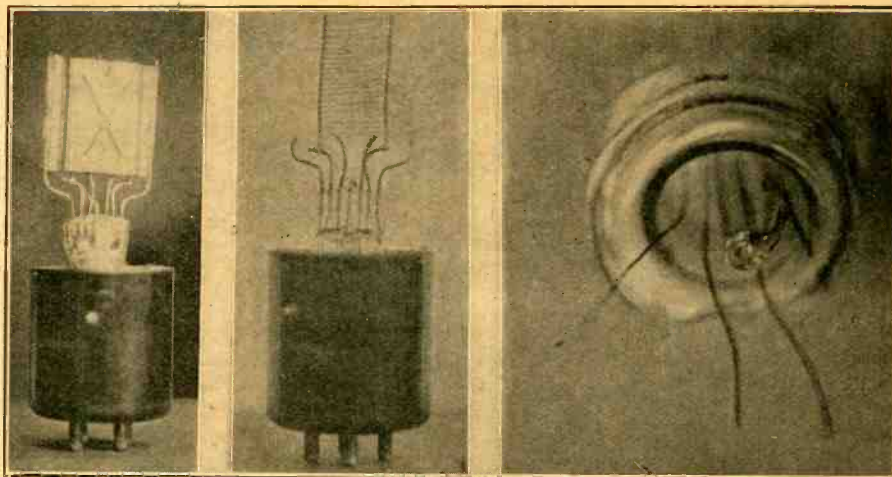
The usual method of connecting tubes is to join negative filament to negative filament and positive filament to positive filament, and apply the A battery terminals accordingly, excepting only that some resistor is connected in the negative lead to drop the battery voltage to the desired filament voltage. The filaments joined in this fashion are parallel connected, whereas the rheostat or ballast previously mentioned is in series. Note that the series connection reduces the voltage. Except to a slight extent it does not affect the amperage.

Thus with tubes connected in parallel, the voltage is the same at the filaments, but the amperage or current drain from the A battery is the sum of the drains. One tube draws .25 ampere at 5 volts, two tubes draw .5 ampere at 5 volts, etc.

Series Connected Tubes

Now, just as the rheostat was connected in series, so may we connect the tube filament in series, that is, negative of one tube filament to negative A, positive of the same tube filament to the negative filament of the next tube, the free end to A plus. This example serves where two tubes are series connected, but, of course, the system may be worked for any number of tubes.

As the filaments are series connected, the amperage remains the same (the amperage must be the same for each individual tube). The voltage required goes up in direct proportion, that is, you add the voltages. Hence two tubes, each requiring 5 volts if individually or parallel connected, would require 10 volts across the open terminals. Each tube



(Radio World Staff Photos)

HOW THE plate of a standard 5 volt tube appears is shown in the left hand photograph. In the center photo is the grid mesh, while at the extreme right the leads from the filament, plate and grid at the flared end of the tube are shown.

filament would drop half of the 10 volts, therefore there would be a five volt drop across each filament, and that is exactly right.

As eliminators are limited as to current more than as to voltage, the idea is to provide some system which will enable use of direct current to heat the tube filaments. The supply from the main, if alternating current, is stepped down and filtered, and tubes that have low filament current consumption are connected in series, e. g., four or five 99 type tubes, which draw individually, hence if series connected, totally one .06 ampere (60 milliamperes).

The Plate Supply

Besides the filament voltage and current there are the plate voltage and the plate current to consider. For detecting purposes the plate voltage, hence current, too, is lower than under other circumstances. For radio frequency amplification the plate voltage is somewhere between what it is for detection and what it is for audio amplification. Indeed, for detection the plate voltage may be so low that hardly any plate current is flowing.

The greater the plate voltage, at any given and unvaried grid voltage, the greater the plate current, up to a certain point which marks the saturation point of the tube. The grid voltage is usually negative. The more negative it is (in respect to the negative filament) the less plate current flowing, if the plate voltage is maintained at some unvaried value.

The most common method of obtaining a negative grid potential is to connect the rheostat in the negative A battery leg, and connect to A minus the grid return of the tube (that terminal of the grid circuit other than the one going to grid).

Value of Automatic Bias

The bias is equal to the difference between the minus post of the A battery and the negative leg of the tube filament, hence exactly equal to the voltage drop in the rheostat. This is usually 1 or 1½ volts, hence too small for many purposes. Hence a C battery, connected with its positive post to minus A, is usually incorporated to enable greater negative bias. Only detection calls for positive bias, although some special detector tubes take a negative bias.

In the audio channel the bias normally is more negative than in the radio channel, particularly in the case of the final stage audio tube. The voltage is greater at the plate for the last tube, though this plate is connected to the same point, through a resistor or coil, as is the plate circuit of the preceding audio tube. The reason is that direct current resistance of the speaker windings is less, hence the voltage drop across them is less than in the case of the resistor or coil in the preceding plate circuit.

Naturally, the biases should differ, too, which accounts for diagrams showing two different C battery connections for the audio channel, even if the tubes are of the same sort. Where a power tube is used in the last audio stage, a still greater negative bias is necessary, partly because a higher plate voltage is used, regardless of the effect of the speaker windings. For instance, the -71 type power tube takes as high as 180 volts on the plate, with 35 to 45 volts negative bias, which is far greater than the bias required for any other tube in the set.

Add the Automatic Bias

In computing the negative bias, therefore, it is necessary to determine the automatic bias resulting from the grid return and the manner of connecting the rheostat to A—, as explained, and adding thereto the C battery bias as used. For instance if the grid return is brought to the 4½ volt post of a C battery, and the rheostat voltage drop is 1, then the total bias is 5½. The bias is greater or less only where series connection of filaments is used and the grid return is brought to points in the series chain representing a wide option in biasing.

The vacuum tube often has been spoken of as the "heart" of the radio receiving set as used at present. Without the vacuum tube it is doubtful whether radio transmission would have made the rapid strides that it has made and is making every day and every hour. The vacuum tube is essentially an amplifier, that is, a small amount of electrical current controls a larger amount. It might be likened to a valve in a water pipe in that it controls the flow of electricity.

All three elements are enclosed in a glass tube and the air is thoroughly exhausted.

It has been an established fact for
(Concluded on page 6)

REFLEX CALLS FOR VERNIER IN RHEOSTAT

The RF-AF Tube Is Almost Certain to Be Critical on Filament Heating — Oscillation Control Also Important

Rheostats are essential in the filament control of the radio audio frequency and detector tubes in a reflex, as shown in Fig. 1. It will be noted that a variable primary in the plate circuit of the RF-AF tube has a tendency to cause this tube to oscillate, but with the proper filament adjustment fine results are obtained. The rheostat used should have a very fine control and contain wire that will not heat. These qualifications are found in the Electrad rheostats. Only

How a Tube Operates Explained by O'Rourke

(Concluded from page 5)

years than when a body of metal or some other material is heated that electrons are thrown off. Do not get confused by the terms used, as this body of electrons, which forms a sort of cloud in the immediate vicinity of the heated object, may be considered as an electrical conductor. Imagine if you can that whenever the filament is heated something is done to the surrounding space which makes it a conductor.

Object of Filament

The object of the heated filament is to provide this conductor. It is heated by means of an electric current, though it could be heated by gas or by any other means if it were practical and economical. Now, having a conducting medium, if we place a metallic plate near the filament but not heated, and apply an electric pressure to it, current will flow from the plate to the filament.

Now, if another plate is placed in the form of a wire mesh or grid and located between the plate and the filament we will have a slightly different action. By placing a voltage on the grid the conducting medium may be controlled in such a way that the plate current will be varied in proportion to the electrical potential or voltage on the grid. There is no need for a current to flow in the grid in most cases, as it is simply a control of the larger current from the B battery.

The Grid Controls

In other words, the grid is the handle on the valve which controls the flow of current in the plate circuit. Another way to look at it is that the grid actually makes the cloud of electrons thicker or thinner according to the voltage applied. If the grid is made very much negative, for instance, the cloud is reduced and the plate current becomes less. If the grid

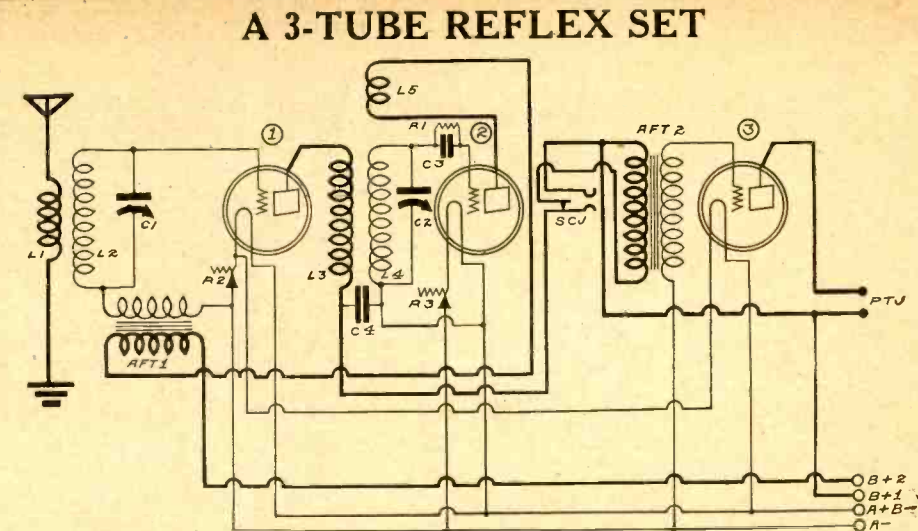


FIG. 1

THE CIRCUIT diagram of a 3-tube reflex, wherein the vernier control of the filaments of the RF-AF and detector tubes is very important.

one hole need be drilled for mounting. The rheostats for the set shown should be of the 20 ohm type, for -01A type tubes.

The radio-frequency coils, L1L2, L3L4, are of standard manufacture. AFT1 and AFT2 are of a low ratio (3 to 1) type. The bypass condenser is an Electrad .001 mfd. It is very important that this condenser contain the highest grade material.

Amateurs Talk To Jungle Party

HARTFORD, Conn.

Although the Roosevelt "River of Doubt" Expedition to the wilds of Brazil is penetrating further and further into the jungle region, the party is being kept in constant communication with the United States through the cooperation of American amateurs, according to a report issued by the American Radio Relay League, of the city.

Five years ago such an expedition would have been completely cut off from civilization for the greater part of the trip, but today, through the agency of a portable short-wave transmitter carried with the exploring party, nightly schedules with the New York offices are maintained. Dozens of amateurs throughout the eastern part of the United States have come to look for the familiar call GMD on the air, and reports or messages are quickly handled.

The station being used by the expedition was built and is operated by amateurs from New York.

Bengal and Bombay to Have Stations

WASHINGTON

A broadcasting company for India has been organized under the name of the Indian Broadcasting Company with an authorized capital of \$540,000, according to a report to the Department of Commerce. The new company intends to establish two broadcasting stations, one in Bengal and the other in the Bombay Presidency.

Each station will be 12 kilowatts and will cost approximately \$72,000 while the annual expenses are estimated at about the same figure. The company will receive 80 per cent of the value of broadcasting receiving licenses issued and 10 per cent of the import value of all wireless receiving apparatus and accessories.

RESULTS

Results Editor:

I built a Diamond of the Air set, which I had at the Sesqui Fire House. Wonderful results were obtained. The set makes a hit with every person who sees and hears it.

HARRY IRVINE,
Sesqui Fire Co. 2,
Philadelphia, Pa.

PERFECTION HAS A NEW MEANING

Apparatus That Was Hailed as Great Achievement a Few Years Ago Now Supplanted by Much Better Material

Although the Apostle Paul said there is no such thing as perfection one hears a heap about it in radio. In the very beginning of the popularity of radio broadcasting the expression "perfect reproduction" became popular. The word "perfection" was used as if it were an old friend.

The radio industry is growing up. Every year marks new heights. And radio reproduction has been improved to such an extent that phonograph makers have been compelled to improve their "perfect reproduction" to keep the whirling disks from becoming obsolete.

Nearly all the radio loud speakers that were said to give "perfect reproduction" three years ago have been abandoned because newer and better loud speakers have put in their appearance.

Nearly all the transformers that were supposed to give "perfect reproduction" three years ago have been thrown on the trash heap. New transformers and resistance couplings that reproduce in a more pleasing manner have taken their place in the sun.

New tubes have been placed on the market for use in the last stage of the radio broadcast receiver because they improve reproduction. To deny the possibility of improvement is to deny possibility of progress and development.

Stations Co-operated

Broadcast stations have been working incessantly with their microphones and circuits to provide better reproduction. Telephony experts have been changing wire lines used to carry orchestral music, or speakers of national import or the omnipresent soprano to the broadcast station so as to get better reproduction. Thus it will be seen that every maker in radioland is in pursuit of perfection.

The "perfect reproduction" of yesterday is a perfect mess today. But the radio fan cannot blame the maker, for was not radio his own child? Almost any parent will say that his or her child is perfect. The only difference is that the child is not for sale.

Everywhere myriad improvements may be noted. Better programs, better broadcast equipment, better broadcast receivers and vastly better reproduction.

There are many reasons why reproduction is difficult. A musical program is a complication of sound frequencies. These sound frequencies are notes that range from the highest to the lowest. These frequencies, or notes, occur first in the orchestral instruments; then in the air around the orchestra; then in the diaphragm of the microphone; then in electricity in the wires that go—sometimes many miles—from the microphone to the broadcasting transmitter. At the broadcast transmitter, they are mixed with a radio frequency. Then that mixture of the radio frequency with the multitude of sound frequencies goes into the ether and becomes ether frequencies. The ether frequencies start radio frequencies in the receiving antenna. Then they are all supposed to be repeated through the radio frequency amplifiers to the detector which cuts out the radio frequencies, leaving the

audio frequencies that go through the audio amplifiers and the loud speaker windings. They move the loud speaker diaphragm, or cone, and it moves the air that moves the mechanism in the broadcast listener's ear. That makes the radio fan think what ever radio fans do think about the program being broadcast.

There's Much Mechanism

Now even a blind man can plainly see that there is a lot of mechanism in radio. A lot of things can happen to the high and low frequencies around the orchestra from the time it happens in the air of the studio until it happens in the air in the home of the broadcast listener.

Some of those intermediate things may cut down some frequencies and boost others. That inequality is corrected somewhat in the wire lines and broadcasting stations by putting the frequencies through circuits that will favor the frequencies that have been weakened so those frequencies will increase in volume while the others fall off.—A. H. GREBE.

Ten Road Shows Planned for Radio

What is to be known as America's First Radio Road Show is now in the final stages of completion. The unit was organized by Don Meaney, announcer of KFI and KNX, Los Angeles, Cal.

The Road Show is to present programs at broadcasting stations throughout the country and make personal appearance in moving picture theatres.

The unit consists of an orchestra of eight men and five radio entertainers. The first unit is to be known as Don Meaney's Midnite Frolic.

It is the intention of the originator of the idea to put out ten companies over a circuit of forty-seven radio stations in thirty-two cities, each unit taking eleven weeks to cover the circuit of the country.

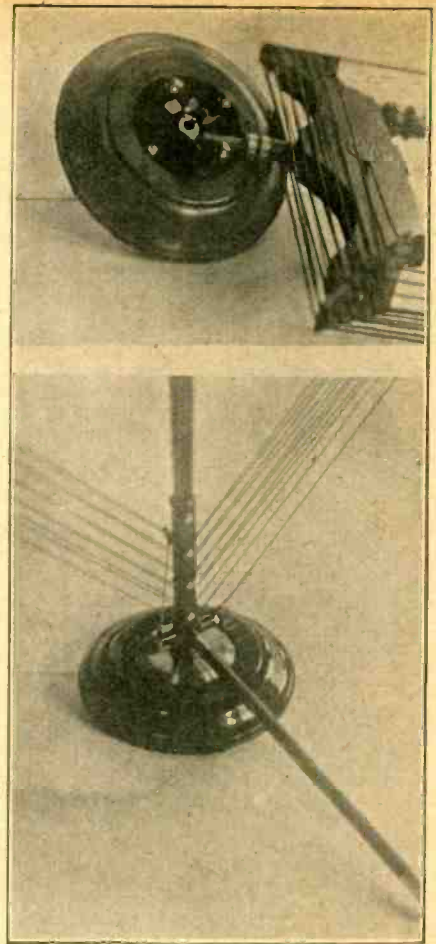
Spotlight Inspires Even Unseen Artists

So that artists may feel as if they were on the stage, the impresario of 2LO, London, has introduced a spotlight in the broadcasting studio.

This effect was requested by many of the entertainers and is proving to be very successful. The ray is directed toward the microphone, for this was the nature of the request.

The spotlight serves a purely psychological purpose, since often the singer is alone in the studio, except for the accompanist. Talkers are almost invariably left to themselves. When an orchestra is on, the spotlight is played upon indi-

LOOP CONTACTS



A PLUG and jack combination is used in the loop shown in top photo. Direct contacts on the frame are used on the loop shown below.

Direction Finder Trails Hurricane

WASHINGTON

Tracking a hurricane by radio is a new sport in the Navy Department and has been found to be very helpful to the Weather Bureau in sending out storm warnings.

En route to Haiti late in September, the cruiser Richmond ran into a tropical hurricane. During the storm the ship took numerous bearings on the center of the storm by obtaining bearings of the direction of the greatest static disturbance. These bearings, while not in all cases accurate, gave a very definite indication of its path.

viduals, one at a time, to their great delight. Another stunt, which is being tried by the director, is to have a skeleton audience laugh and applaud. This, it is stated, inspires the broadcaster to feel as if he were in personal touch with them.

Even the draperies are being done away with, specially treated walls and a microphone box being used instead. The draperies deadened the voice and unnerved the entertainer, it is said, while with the new system, high quality is maintained without deadening.

[Illustration on front cover]

The Four-Tube Diamond

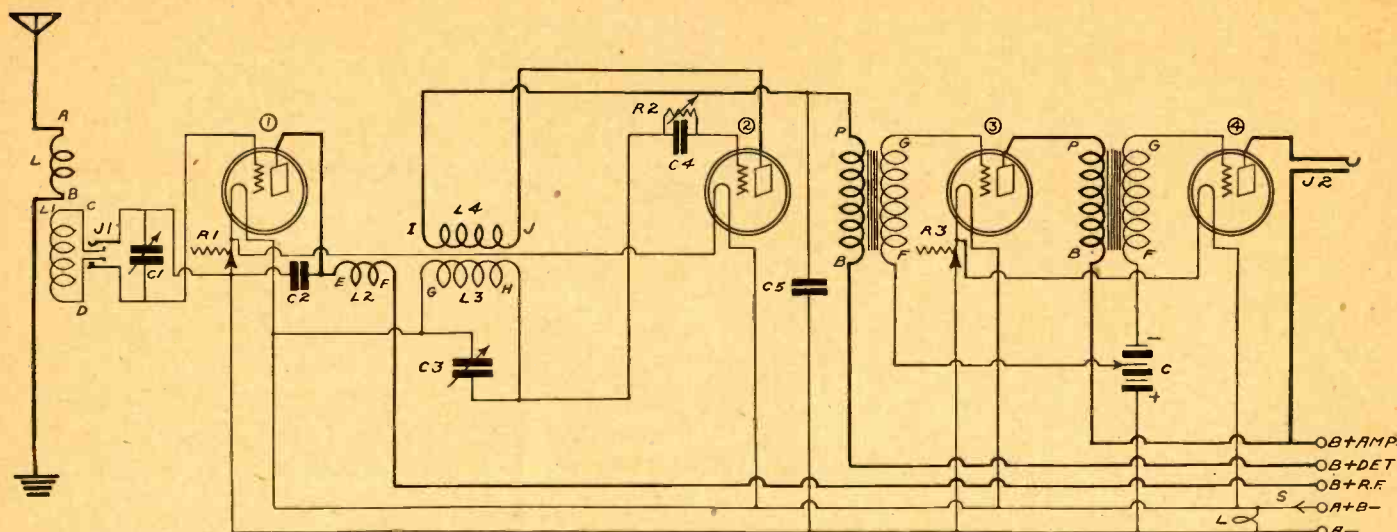


FIG. 1

The wiring diagram of the 4-tube Diamond of the Air. AF1 and AF2 are the audio transformers.

By Herman Bernard

Associate, Institute of Radio Engineers

THE Diamond of the Air is a radio frequency circuit design primarily, consisting of a hookup that has won great favor with experimenters and which has tended to advance the art. It comprises a stage of tuned radio frequency amplification and a regenerative detector, where a rotary tickler coil furnishes the feedback inductively. The tuned RF stage is necessary in these days of crowded condition of the air, and besides it enables the receiver to reach greater distances, produce more volume, and operate without serious offense to neighbors when the tickler is accidentally pressed too far.

As for the audio channel, that may be whatever the fan decides upon and he should suit his own ear and his own purse. Because a great many fans have a pair of audio transformers they would like to use in conjunction with a good radio circuit and because inquiries show an interest in the 4-tube model equivalent to that in the 5-tube design, it was deemed advisable to discuss the 4-tube set anew, including some remarks not hitherto broached in connection with either model.

The 4-Tube Model

For the benefit of those not familiar with the Diamond of the Air it is well to say that the circuit is nearly two years old. It first appeared in four-tube form. Subsequently instead of the pair of audio transformers the AF hookup was shown as a first transformer stage and two resistance coupled stages. That makes the 5-tube model, which is the same in its so-called new form as it was in its original form, the only changes being in the identity of the specified parts and not in the wiring at all.

In the 4-tube model the filament control is shown as it was in the first model of the Diamond, with a rheostat controlling the RF and the detector tube and another rheostat the two audio tubes. As rheostats go to-day this is a safe method still, because if the last audio tube is of the power variety, drawing .5 ampere, and the first audio tube is the type A, drawing .25 ampere, the total flow through this rheostat is .75 ampere (not counting the slight current drawn by the

rheostat itself). Now .75 ampere is a safe load for any rheostat.

The wiring of the 4-tube model is extremely simple, yet it is advisable that any one who builds the set should afford himself the benefit of the blueprint, which shows the exact location and identification of each part, life size, and which therefore may be followed much as if it were a template, which in some respects indeed it is.

Coils for the Set

The solenoid having been used in the original model, it is advisable to adhere to that form of coil, which consists of a single layer on a cylindrical form. The

cylinder happened to be one formed by quartzite rods, supported by Bakelite rings at either end. A small diameter is preferable, as it sets up a smaller field and there is less danger of magnetic interplay or stray coupling, which would result in difficulty in controlling oscillations. For the radio-frequency coil (LL1) this diameter may well be 2½" to duplicate the commercial coils employed, which were the Bruno 99 RF. In the case of the interstage coupler, or 3-circuit tuning coil, the same diameter is preferable again (L2L3L4).

For the 2½" diameter form the primary consists of 10 turns, ⅜" space being left, then the secondary being wound adjacent to the primary and consisting of 58 turns. The wire is No. 24, silk over cotton or No. 24 double cotton covered.

The 3-circuit turner is wound in the same fashion, as to the stator form, but inside this there revolves the rotary form, which is 1" diameter and 1" high, and on which are wound turns of No. 26 single silk covered wire until the wire almost completely covers the form, which will be about 38 turns.

If a 3" diameter form is used for the RF coil the primary would consist of 8 turns and the secondary of 47 turns, the same kind and insulation of wire being used. The tickler, 2" diameter, would have 30 turns of No. 26 SSC.

Terminals of Coils

The coil terminals in the diagram are designated by letters. These should be followed without alteration, except that I and J may be interchanged. The coil terminals are as follows:

A is the beginning of the aperiodic primary L, in the antenna circuit, and is connected to the aerial. In the Bruno coil trace this lead to its origin on outside of primary, though this post is at opposite end of the coil.

B is the end of that winding and goes to ground.

C and D should be watched carefully, as their source may be lost in the confusion of jack wiring. C is the beginning of the secondary L1, and is the terminal of the secondary which adjoins the end of the primary L (i. e., point B). In the laboratory receiver the Bruno coils were used, and these have binding posts on them, to which the coil terminals are secured. The wire terminals are not brought to the nearest binding posts, but the wire is turned back, so that the

LIST OF PARTS

LL1—One antenna coupled (Bruno 99 RF).

L2L3L4—One 3-circuit interstage coupler (Bruno 99).

C1, C3—Two Bruno SF .0005 mfd. variable condensers.

R1, R3—Two 20 ohm rheostats.

AF1, AF2—Two Bruno Trutone audio transformers, Model D.

R2—One Bretwood variable grid leak.

J1—One double circuit jack.

J2—One single circuit jack.

1, 2, 3, 4—Four push type sockets.

LS—One Bruno light switch.

C4—One Aerovox .00025 mfd. fixed condenser.

C2, C5—Two Aerovox .001 mfd. fixed condensers.

One socket shelf.

One pair of brackets (Bruno).

One 7x24" drilled and engraved panel.

One Birnbach 5-strand multi-colored battery cable.

Five battery cable markers, (B+ Det., B+ Amp., B+ Amp., A+, A-.)

Ten lengths of busbar.

Two flexible leads for C battery.

Screws, nuts, spaghetti.

ACCESSORIES

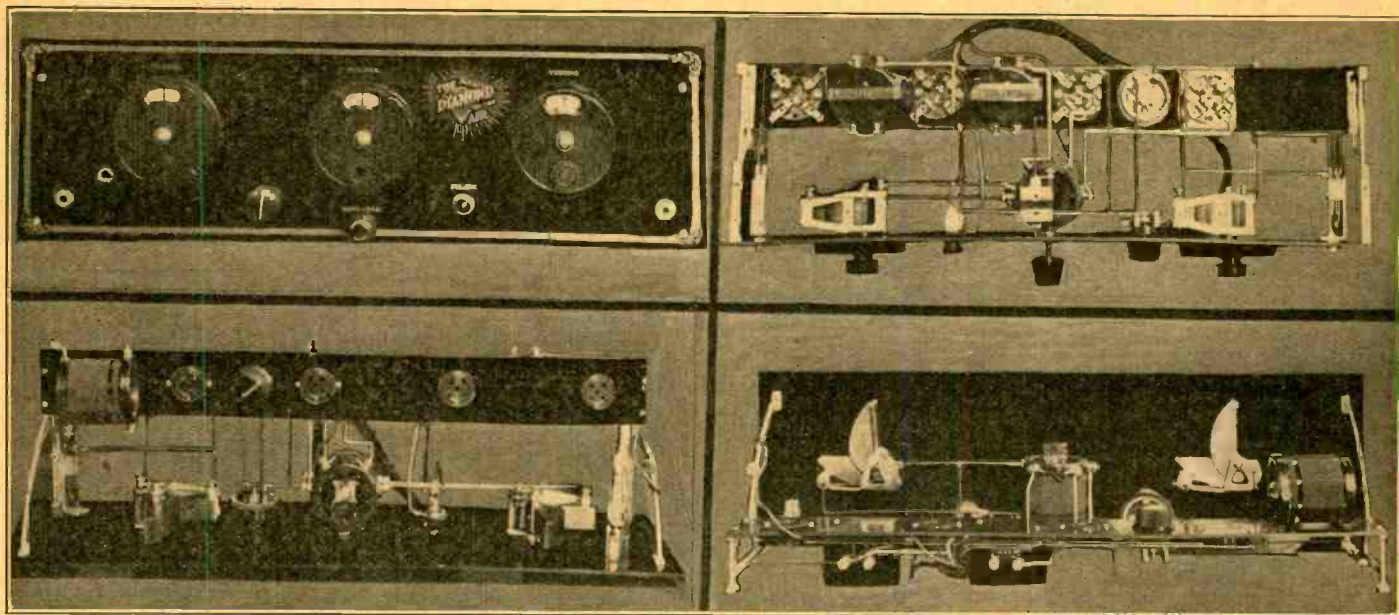
One Bodine loop, Model L500 de luxe, or Model B—12X standard for Diamond.

Two Polymet plugs (one for loop, other for speaker).

Four Ceco tubes (two type A, one type H, one type F).

One Octacone speaker.

Photos Elucidate Wiring



FIGS. 2, 3, 4 AND 5

The panel view shows the relative location of parts thereon, with the rheostat R1 mounted thereon. Loop jack is at left. Below the panel photo is the top view, showing rheostat R3 mounted on the socket strip. The bottom view (upper right) shows how the wiring is done so as to be out of sight. The other illustration is the rear view of the 4-tube Diamond.

winding is thus given added support, hence this is something to watch in determining the beginning and the end of a winding. It is easily done at a glance, but might be overlooked unless attention were called to it.

C is the beginning of the secondary winding and goes to that inside spring of the jack J1, which ultimately connects to minus A when the jack is closed.

D is the end of the winding and makes connection to the other inside spring of J1, which ultimately goes to grid. Trace this. Confirm the fact that the aerial

goes to outside of primary, grid to outside of secondary.

E is the beginning of the RF plate coil L2 and connects to the plate of tube 1.

F is the end of L2 and connects to B plus $67\frac{1}{2}$ or 90, i. e., B + RF.

G is the beginning of the detector input secondary L3 and connects to positive A.

With the Bruno 3-circuit coil mounted with tickler on top, G is the lower binding post for secondary. G does not connote "grid" here, but A plus.

Grid Leak Connection.

H is the end of the secondary winding and goes to one side of the grid leak-condenser combination. The other side of this combination goes to the grid post of the detector socket. H is the upper secondary post on the Bruno coil.

An excellent precaution is to connect the grid post of the socket to the lug of the Bretwood variable grid leak farthest from the panel, while the lug close to the panel goes to the other side of the grid condenser and to the rotor plates of C3. If other than Bruno condensers are used, connect grid leads to stator, not rotor, plates.

As for the tickler coil, since its angle of variation is very wide, there need be no special precaution about this wiring. As the flexible tickler leads on the coil are easily reversible, one may wire the tickler either way, reverse as a test, and retain that manner of connection which affords better results. Normally the same effect is gained either way.

rapid growths of any similar organization in the United States.

Judge W. E. Carroll was in the chair and the gathering took on the form of a round table discussion on radio reception in the different localities in Butte and various remedies to be made in the matter of interference.

In some locations, especially on the "flat," radio fans are troubled by motors of some of the street cars. As it always has been the policy of the Butte Electric Railway Company to eliminate such interference, these cars will be "spotted" and reported to the company.

The president announced that he would name the committee at the next meeting to investigate the possibilities of having a broadcasting station in Butte.

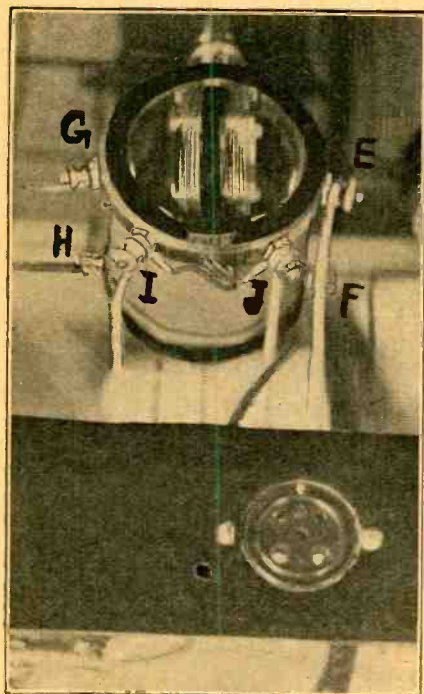


FIG. 6

The terminals of the three circuit coil as they appear when you look at the back of the front panel from the rear. Compare with Fig. 1 and the text.

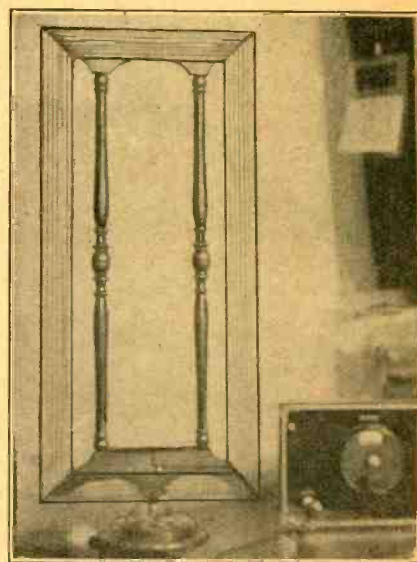


FIG. 7

The method of connecting the loop. The leads from the Bodine loop go to a phone plug and this plug is inserted in the loop jack. The visible Bruno dial tunes C1.

Butte Radio Club Has 281 Members

BUTTE, Mont.

At the regular semi-monthly meeting of the Butte Radio Club three new members joined, making the total roster 281 members. The club was organized 11 months ago and has had one of the most

DRY BATTERY'S TROUBLES SIFTED

Standards Bureau Expert Explains Why Polarities Reverse, Positive Plates Grow, Negative Ones Shrink and Why Undercharge Is Injurious

By George W. Vinal

(Chief of the Electro-Chemical Section, Bureau of Standards)

Overcharging a storage battery produces excessive gassing and this loosens active material in the plates, particularly the positive. This material, sifting down between the separators and the plates, is deposited in the bottom of the jar as a fine brown sediment.

Overcharging also increases the temperature of the battery and in some cases may carry it to excessive temperatures, which are destructive both to the negative plates and to the separators.

Some cases of buckling of the plates are to be attributed to overcharging, although this is by no means the only cause of buckling of the plates. Overcharging, which is accompanied by excessive gassing, results in a needless loss of water, requiring constant attention to keep the cells filled to the proper level with electrolyte. Occasional overcharging is beneficial, but habitual overcharge decreases the period of useful service which the battery can give.

Result of Undercharge

Consistent undercharging of the battery results in a gradual running down of the cells. This is indicated by progressively lower values of the specific gravity readings and a tendency of the plates to become somewhat lighter in color.

The sediment deposited in the bottom of the jar when undercharging has been prolonged is usually a fine white powder, consisting principally of lead sulphate. Some of this material is deposited each time the cell is recharged. Consistent undercharging generally results in one or more of the cells being exhausted before the others, and in some cases these may become reversed by the other cells of the battery. When this occurs the most obvious remedy is to charge the battery until all the cells are again in normal condition. Insufficient charging is one of the most common causes of buckling of the plates. The lead sulphate occupies more space than the original material and an excessive amount of it strains the plates.

Corrosion Hinders Current

Corroded terminals on storage batteries are a hindrance to the passage of the normal amount of current; cracked or broken jars invite the addition of water to electrolyte and this dilution weakens the cell capacity; short circuits may be caused by a breakdown of separators between the positive and negative plates or by the accumulation of sediment in the jars. Worn-out plates are commonly detected by the weakened capacity of a battery when being charged; if the electrolyte consistently remains below the top of the plates abnormal sulphurization occurs and the plates crumble, or freezing of the electrolyte is likely to occur during severe temperatures when the battery is in a discharged condition. Impurities in the cells may be eliminated by pouring out the electrolyte and flushing the cells with distilled water.

Corrosion of the grid, the reversal of the negative and positive plates, the growth of positive plates, the shrinkage of negatives,

and explosions are the remaining common sources of battery trouble.

Polarities Reverse

Reversal may be caused by the overdischarge of a cell deficient in capacity when in series with others that have a greater capacity or are more fully charged; generally, however, it is the result of charging a battery in the wrong direction, in which case all the cells are reversed. When corrosion of the grid occurs satisfactory battery service is not possible and the plates must be replaced.

The positive plates of a battery may grow in size, just as a plant or animal develops. Plates that have grown several inches in length and a less amount in width are occasionally found. The Bureau of Standards has a photograph showing a positive plate that has grown and a negative plate, the active material of which has shrunk. Originally these plates were the same size.

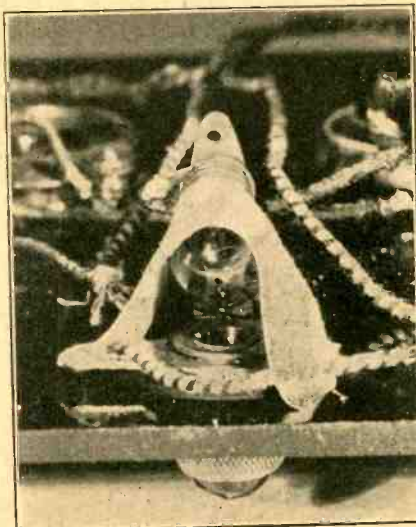
Keep Matches Away

The surface of the negative plate is in a state of flux during charge and discharge, and as a result the sponge lead tends to solidify, that is, to shrink. To counteract this tendency, expanders are added to the posts of the negative plates.

The Bureau of Standards has warned broadcast listeners not to light a match near storage batteries on charge because the gases liberated during charge are hydrogen and oxygen, which explode with violence if a flame or spark ignites them.

The Bureau has a photograph showing a double-compartment battery which exploded while on charge because of a bad contact. The force of the explosion blew out the side of the upper compartment.

MORE LIGHT



(Hayden)

TO GET greater brilliance from a pilot light you may stick adhesive tape behind the bulb and to the back of the front panel as shown.

WITH THE AMATEURS

PORTLAND, Ore.

Although separated from his business by some thousands of miles while on a trip to New Zealand recently, A. J. Baldwin, of this city, was kept in constant touch with his firm's affairs through the cooperation of amateur radio stations in New Zealand with the station of A. C. Dixon, Jr., radio 7IT, of this city. Dixon is the son of Mr. Baldwin's business partner.

When the New Zealand trip was originally planned it was not thought possible to maintain any regular communication with the United States, owing to the overcrowded condition of the cables. However, soon after establishing headquarters at Wellington, Mr. Baldwin received word from an amateur in Auckland that he had just received several messages from Dixon's station in the United States, relating to business affairs. This relay work was so encouraging that it was decided to find out if any amateur at Wellington could maintain a schedule with the United States amateur. A few nights later, Mr. E. A. Shrimpton, operating 2XA at Wellington, got in touch with Dixon at Portland, and thereafter the two maintained regular nightly schedules. On two occasions Mr. Baldwin went to the home of the Wellington amateur and carried on two-way conversation direct with his partner in the States. In addition to these exchanges, several 500 and 800 word messages were transmitted.

The service proved to be so entirely satisfactory and speedy that Mr. Baldwin contemplates using amateur radio for similar work on all his trips.

To demonstrate the speed with which amateurs can transmit messages across the United States on short waves, N. A. McIntyre, of Brooklyn, N. Y., operating station 2BO, recently sent off a message to Los Angeles. The message was copied direct by 6BSL, owned by K. B. Houston, at San Francisco, was relayed on to Los Angeles, and an answer secured and returned to Brooklyn in just twenty-one minutes.

Neighbor's Set Serves Old Lady

Neighborliness is exemplified in the action of Mrs. Preston M. Smith, of Rockaway Beach, L. I., in hooking up an additional loud speaker in the cottage of her next door neighbor so that both may enjoy Mrs. Smith's radio set.

"In the adjoining cottage," writes Mrs. Smith, "lives a very dear old lady, who is fond of good music but is not as fortunate as we in owning a radio receiving set. In order to give her the opportunity to enjoy splendid musical programs, we have placed a loud speaker in her cottage, which is connected with our loud speaker." And they say the days of good deeds have passed!

Fortunately, also, explains Mrs. Smith the "dear old lady's" musical tastes and Mrs. Smith's are similar. So the limiting of the neighbor's selections that come over is not working the slightest hardship in this thoughtful and ingenious method adopted by one who believes that it is blessed to divide one's radio programs.

Mrs. Smith knows a thing or two about radio. She has a Neutrolette. Her neighbor has been won over to radio and is considered a good prospect by trade folk in the vicinity.

POWER TUBES REQUIRE BIAS BE ACCURATE

REGENERATION BY FIXED COIL

Even the 171 or 371 May Be Operated From Battery for Plate Voltage, the C value Being 27 and the B Potential 135

Power tubes are power handlers, not power producers as many think.

Of itself, a power tube will not produce more volume than a non-power tube. Its design permits it to handle greater volume without distortion.

Most receiving sets are capable of delivering more volume to the last audio tube than can be handled without distortion by the usual types of amplifying tubes. This is where the power tube is needed—in the last audio stage only, where it can receive the volume developed in the earlier stages of the set and pass it on, amplified but undistorted, to the loud speaker.

The electrical characteristics of power tubes are quite different from those of the customary amplifying tubes. Power tubes consume more B battery current, and they require greater C battery voltage.

C Voltage Must Be Right

The wrong C battery voltage robs the power tube of its ability to handle greater volume without distortion, resulting in operation little, if any, better than ordinary tubes. In addition, if the C battery voltage is too low, the B current consumed by the tube is multiplied many fold, which rapidly exhausts the B battery. Merely substituting a power tube for some other tube in the last audio stage of a receiver will not bring about any noticeable improvement in reception. Provision must be made in the wiring of the set to allow placing the correct value of C battery voltage on the grid of the power tube.

The newest power tubes are the 371 and the 171 (same characteristics). These tubes can be operated on B battery voltages of 90, 135 or 180 volts. The amount of undistorted power which these tubes can handle when working at 135 volts of B battery, is in most cases, more than can comfortably be used in the average home. It is only when unusual volume is desired, such as to enable a crowd to dance in a large hall, that the extreme voltage of 180 volts is required. For home use, 135 volts of B battery is ample for the 371 and the 171 power tubes.

Power from B Battery

With these tubes, when the B battery voltage is 135 volts, the C battery voltage should be 27 volts. A new Eveready 22½ volt C battery has been introduced by the National Carbon Company, and when connected in series with a 4½ volt C battery the combination will deliver the 27 volts required by these power tubes operating at 135 volts of B battery.

The extra power handled by power tubes is furnished by the B battery, and because of this, they should never be operated from Light Duty B batteries. Use only the Heavy Duty size of good, reliable make, and be sure to use the correct C battery voltage.

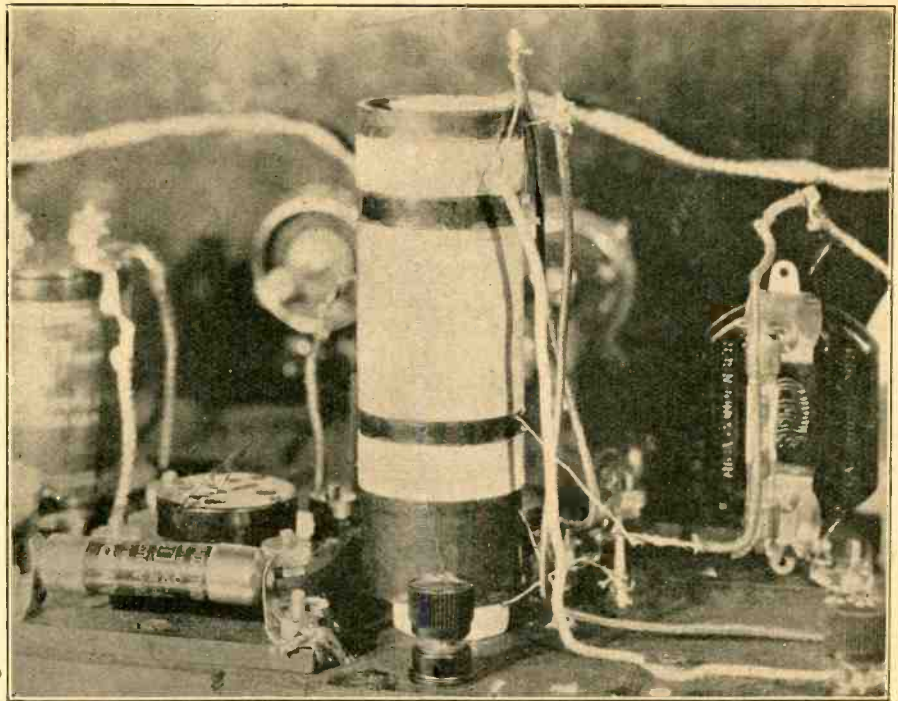


FIG. 1

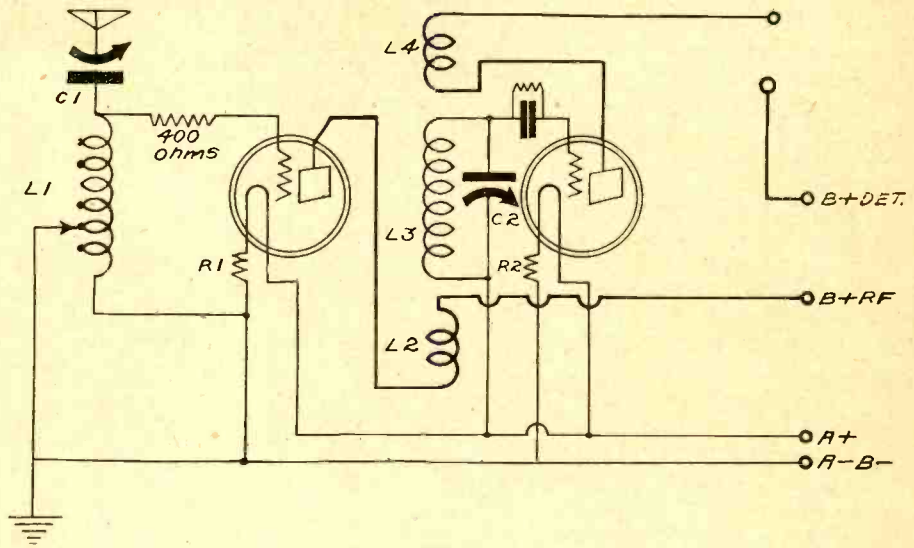


FIG. 2

Tendency Toward Self-Oscillation Is Overcome By a Resistor in the Grid Circuit of Preceding Tube

A circuit that affords good results by introducing fixed regeneration but not up to the point of oscillation is shown in Fig. 2. The antenna series condenser may be .0005 mfd., and the coil L1 may consist of 110 turns of No. 28 single silk covered wire on a 1½" diameter. This is tapped at every 10 turns, but the tap switch is subpanel mounted, because it is set so as to afford similar tuning of the series condenser as compared with the other tuning condenser. The setting is not changed thereafter. In other words, the connection to the tap is determined by antenna capacity conditions.

The three circuit coil consists of 25 turns of the same kind of wire on the same size diameter as heretofore, for L2, 87 turns for L3 (if the second tuning con-

denser is .0005 mfd.) and 25 turns for L4, the fixed tickler. As will be noted, the primary of the 3-circuit coil is connected in reverse fashion. All windings are in the same direction, but when the connection is made, B plus goes to the outside end of L2, plate to the inside end. The secondary terminal next to the L2 winding goes to A plus, the other secondary terminal to grid. The fixed tickler lead next to the secondary goes to plate of the detector tube and the other fixed tickler terminal to B plus detector.

The set would self-oscillate strongly at the lower wavelengths, were it not for the fixed desistor in the grid lead of the first tube. This should be about 400 ohms. A potentiometer, connected in rheostat fashion will serve the purpose nicely.

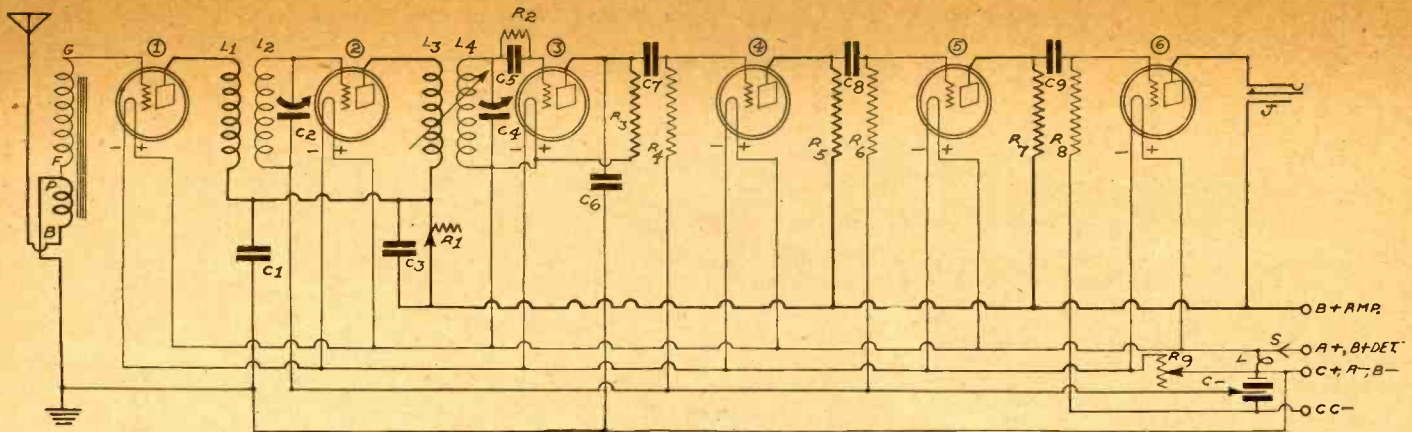


FIG. 1

The Bernard circuit, with three suggested changes, as contrasted with the diagrams published in the October 16 issue, in which the construction of this set was fully described. These changes in some instances will produce greater volume and more distance and facilitate getting rid of squeals. Note the changes, which are to be made experimentally as part of a servicing job: (1) aerial goes to the B post of the Acme R3 transformer, PBGF, ground, goes to the joined F and P posts, while G goes to grid as previously; (2), the B plus detector lead, is removed from B battery and placed instead at A battery positive, but be sure that A minus and B minus are interconnected; (3), ground may be brought to A minus instead of to C minus.

S E R V I C E D E P A R T M E N T

How to Increase Distance Reception and Volume on the Bernard and Also Insure Complete Absence of Squeals Caused by Set Itself

By Louis B. Blan, Ph. D.

ONE of the important phases of the radio business is the servicing of sets, not so much because sets fail to work well on their own account, but because radio is a popular attraction and is utilized by such a great number of persons who do not know even the rudiments of correct connection of batteries, leads and cables. Hence those persons versed in these simple matters find a fertile field of endeavor. Besides, of course, a set will go wrong now and then, a lead will become disconnected, or a tube will lose its amplifying power, and some one with a knowledge of radio must discover and remedy these faults. And the customer is delighted to have his set working well again. Hence the service field offers opportunities. Likewise it introduces one to a clientele that wants sets repaired, built and improved, and soon one finds himself busily engaged in this interesting work. An attractive sideline indeed; it soon begs one to devote all his time to it.

The servicing of receivers is interesting work, not only because of the help given in an individual case, but because one learns more and more about radio, the grand old teacher, experience, making one daily more proficient.

The set servicing of the Bernard receiver, construction of which was described in full in the October 16 issue, will be the subject of this week's service article. The three great considerations that confront one with any receiver will be taken up. These are "no DX," "not enough volume" and "set squeals." The solutions of these problems are interwoven, the remedy for one often being the remedy for all.

Getting More DX

The failure to get distant stations may be due to ignorance of how to tune in

DX. Persons used to tuning in only locals, whence the programs comes in with a bang, hence tuning can be done with eyes shut, sometimes expect distance to come in the same way, but this is not true. Tune the set carefully and slowly.

Aside from tuning ability, which is quickly gained, the condition of the tubes and batteries, the voltages applied to filaments and plates, and the degree of coupling between primary and secondary of radio transformers have much to do with DX. If the set squeals, then one can assume that the tubes on the radio side are in good condition, that is, amplify well, because they self-regenerate readily. Therefore address yourself to the filament voltage, which should be tested so that the reading of type A tubes or equivalent, is exactly 5. One rheostat, R9, which is an Electrad 2-ohm instrument, controls all six tubes, and its sole object is to drop the storage battery voltage of 6 to 5 volts at the filaments. Put a voltmeter across the filament posts of any socket when the tube is lighted and get the correct reading that way.

Where Do Squeals Arise?

Now, if the set still squeals, as it is likely to do on the lower wavelengths in particular, until the set is properly neutralized, discover which tube causes the trouble. If you will lift the adjusted primary L3 so that the coupling to L4 is made less, and you notice that the squeal disappears, then you are safe in assuming that the second radio frequency tube caused the trouble. This is because the L3 winding is in the plate circuit of the second RF tube, No. 2 in the diagram. Having located the trouble in this manner, you can tighten the coupling until you get to that point where no squealing results. Should volume be lower than de-

sired, when this test is being made, vary the negative bias of the lead marked C minus (as distinguished from the final audio grid return, marked CC minus). Also try various adjustments of the Royalty high resistance R1 (2,000 ohms maximum). After a few easy experiments you will find the right point of balance where volume is excellent and sensitivity is high.

But assume for the moment that the adjustment of L3 has not caused the squeals to disappear. That is a clear indication that the detector tube is self-oscillatory, since the first RF tube, due to the stage of untuned RF there, is less likely to be a squeal producer, and if the second RF tube is balanced, the first one is bound to be.

The A Battery to Plate

Now, if you are sure that B minus and A minus are the common connections of the batteries, or the A battery and the B eliminator, as shown in all diagrams of the Bernard circuit, then you may remove the B plus detector lead entirely from the B battery or B eliminator post, and connect it instead to A plus. This leaves the B plus detector post of the eliminator, e.g., the 22½ or 45 or other voltage posts previously used on B battery for detector, wholly unoccupied, and gives you instead two connections to the A battery positive—one the A plus lead, the other the B plus detector lead. Normally you will have a cable running from the set for each of these leads, and metal tags will be clipped to the cable to identify the leads. In that case put the A plus and the B plus detector leads at the A battery positive post. If you desire to use the same system of connection, of course you can omit the B plus detector cable, and simply connect the battery end of the detector plate resistor R3 to A plus as part of the set wiring. This particular method is shown in the diagram published herewith.

Gain in Efficiency

With the B plus detector going to the A battery you also get rid of the motor-boating nuisance common in many sets, particularly where a B eliminator is used. Also, you gain a degree of stability which is very attractive, and your amplification still remains high, indeed; the addition of stability makes the overall useful amplification even greater, since a squealing set (of the non-regen-

(Concluded on page 29)

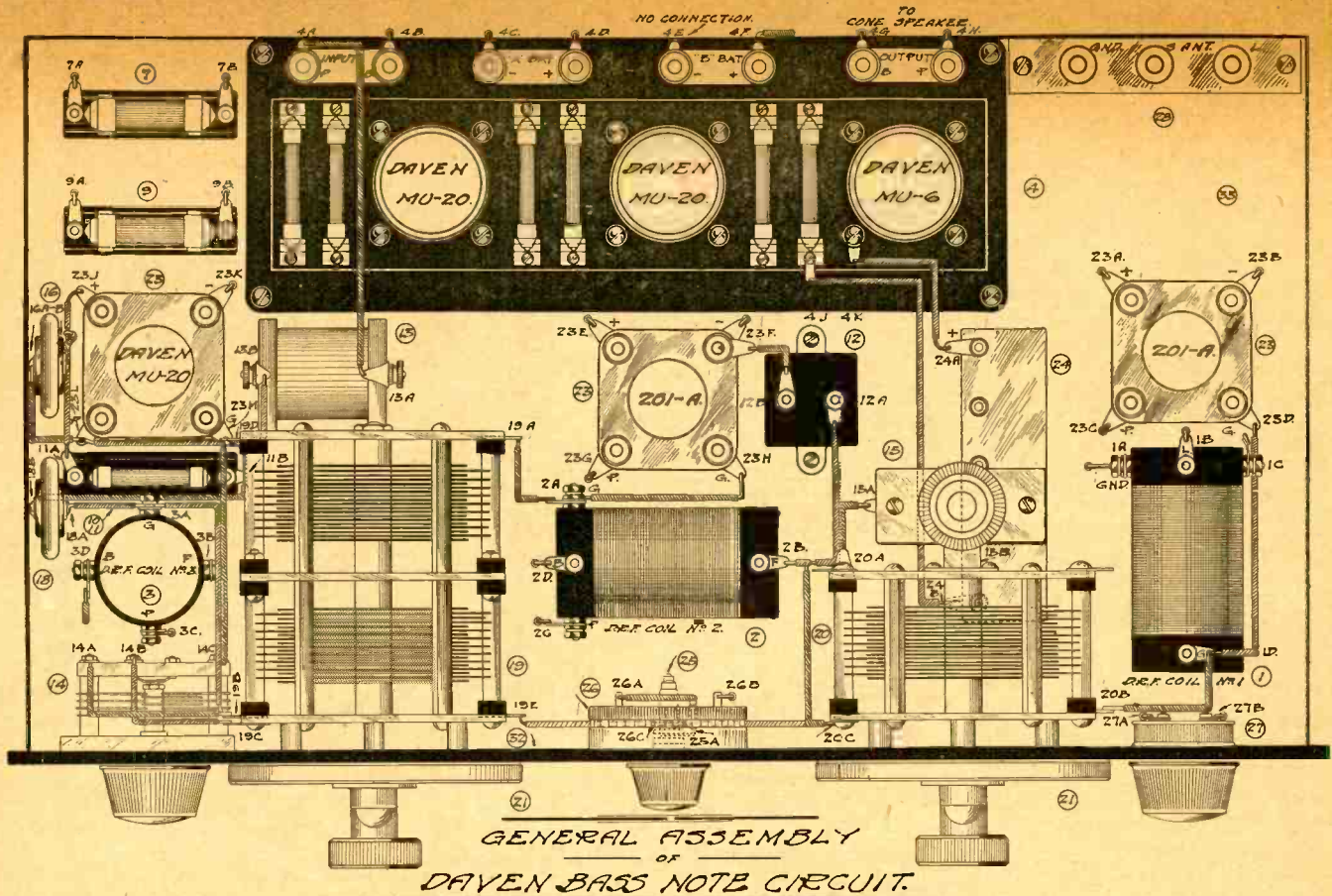


FIG. 6

HOW TO OPERATE BASS NOTE SET

Potentiometer and Rheostat May Be Used as Volume and Oscillation Controls—How to Tune in Distant Stations

(Part I of this article was published in the November 13 issue. Part II, the conclusion, follows. Trouble shooting next week.)

By T. T. Williams

NO method of audio amplification, except resistance coupling, could be used if the circuit name, the Bass Note, was correct. As has been proved many times, no other system of audio amplification has the same straight line curve of amplification. The particular unit as shown in the photograph has a range, without audible distortion, of from 25 to 15,000 cycles. The tone quality of the receiver therefore, is of the finest.

The unit shown, the Daven Super-Amplifier, is wired for a power tube in the last or output stage and is also wired for a C battery, to cut down the amount of B battery current when a power tube is used.

As resistance coupling has nothing to boost the signal except the tube itself, it is of vital importance to use high mu tubes in the first two stages of the amplifier to obtain the proper volume.

The following table shows the amplification per stage with 201A tubes and with high mu tubes on the amplifier used in this set:

First Stage		Second Stage		Third Stage	
Tube	Amplification	Tube	Amplification	Tube	Amplification
201A	4.9	201A	24	112	192
Mu20	13.4	Mu20	179.	Mu6	900

The picture diagram of the top of the sub-panel (Fig. 6) shows the connections. The numbers on the diagrams and in the material list correspond.

Constructors or builders should use exactly similar parts to those here otherwise efficiency in design of layout and operation would be considerably affected.

Any good variable condenser can be used if it has the proper capacity.

The audio amplifier shown was balanced with the set.

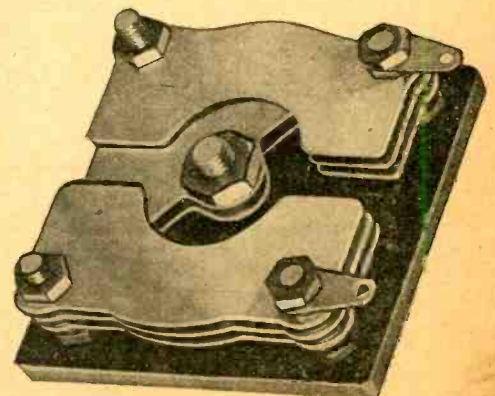
To tune the set, turn the potentiometer and rheostat knobs about half way around. Then set both tuning dials at approximately the same reading, finally moving them to the right or left until a station is heard. Then adjust the potentiometer until a slight squeal is heard, then turn the potentiometer to the left a trifle and retune each tuning dial until maximum signal strength is received. A slight further potentiometer adjustment will give maximum clarity and volume to the speech or music. Several refinements in tuning can now be made.

The rheostat at the extreme right can be used as a volume control and as a selectivity adjustment. The receiver will be most selective when the rheostat is turned to about one-quarter or one-half way around from the left. Turning this knob still further to the left will reduce the volume as much as is desired. The potentiometer acts not only as an

oscillation control, but also a vernier volume adjustment as well.

The purpose of the left-hand or tandem compensating condenser is to tune exactly the two main section variable condensers. For local reception this adjustment would be very seldom required. When tuning in distant stations, however, it will be necessary to set the rotor so that the capacity between the two sections of the stator is equally distributed. In other words, the rotor should be in neutral position. After the distant station has been located on the dial, the knob controlling this condenser should be turned either to the right or left, as will be quickly indicated when this adjustment is made. A careful adjustment of this condenser will bring in distant stations with maximum volume. The small balancing condenser adjustment should be made when a station is being received that tunes in at about 50 on the dials.

Turn the right hand condenser so that the dial readings agree with the dial readings on the left hand condenser and then adjust the small balancing condenser until the station comes in again with maximum volume. This setting of the condenser will be satisfactory for all points on the dial.



REAR view of part No. 14.

Radio University

A FREE Question and Answer Department conducted by RADIO WORLD for its yearly subscribers only, by its staff of Experts. Address Radio University, RADIO WORLD, 145 West 45th St., New York City.

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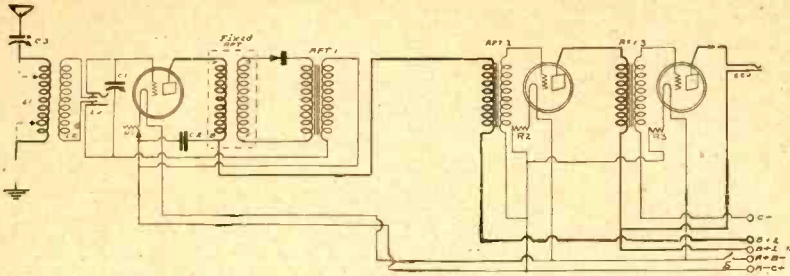


FIG. 461

The circuit diagram of the receiver requested by Reginald Herkimer.

I HAVE two .0005 mfd. variable condensers, a fixed radio frequency transformer with markings indicating that from 200 to 575 meters can be covered and an 18 turn loop, wound in two 9 turn sections on a 1½ foot frame, using No. 18 bell wire. Please give a circuit diagram of a 3-tube receiver, wherein the first tube is a radio and audio frequency amplifier, a crystal is used as a detector and the last two tubes are audio amplifiers, using the above mentioned parts. If possible I would also like to have a layout for the parts, I wish to house the parts in a 7x18" cabinet, use -99 type tubes and four standard sockets with adapters. In one of the sockets, I was thinking of placing the crystal which is fixed and mounted in a standard base. Is this possible?—Reginald Herkimer, Newark, N. J.

The circuit diagram of such a receiver is shown in Fig. 461. You will note it is a reflex. The fixed radio frequency transformer is used to couple the output of the RF-AF tube to the crystal detector. The RF-AF stage is tuned, a TRFT being used. The antenna is tuned by the .0005 mfd. variable condenser. The primary L1 consists of 30 turns. The secondary L2 consists of 44 turns. Both these windings are placed on a 3" diameter form, using No. 22 double cotton covered wire. The two windings are spaced ¼". Now the primary winding may be tapped. This system will give louder signals, but will require two additional controls. In this scheme, the coil is tapped at every 5th turn, giving you 6 taps, three of which are connected in the antenna system, while three are connected in the ground system. Across the secondary winding the other .0005 mfd. variable condenser is shunted. Here a double circuit jack, for alternately connecting the loop or the antenna and ground is also connected. The filament of the tube in this circuit is controlled by a 75 ohm rheostat. The bypass condenser C2 is of the .001 mfd. fixed type. AFT1 is of the 6 to 1 ratio type. The audio frequency transformers, AFT2 and AFT3 in the regular AF stages are both of the low ratio type (3 to 1). The filaments of the tubes in this circuit are controlled by ballast resistors of the Amperite No. 4 V-199 type. The last tube can be a power tube such as the -120, which will require a Amperite No. 120 for filament control. The plate of the RF-AF tube is connected to a single B post, B plus 2, about 67½ volts. The plates of the straight AF tubes are connected to, if the -99 tubes are used, a common B post, 90 volts. The C battery, in this case, is of the 4.5 volt type. Using the -99 and the -120, the plates of both tubes are connected to individual posts. The same plate voltage is still kept for the -99 tube, but for the 120 the B and C voltages stated on the carton should be used. How the parts may be

placed is shown in Fig. 462. Any type make of variable condenser may be used. These, you will note, are mounted on each side of the panel. The rheostat is in the center of the socket shelf, next to the socket, which holds the crystal, to which the file is pointing. Only two contacts on this socket are used. The RF tuned coil and the fixed RFT is placed beneath the socket shelf. The double circuit jack is mounted on the socket shelf, right next to the rheostat, on an angle iron. The audio frequency transformers are also placed beneath the subpanel. The single circuit jack is placed in the right hand corner, either near the bottom or top. Either a cable or individual binding posts may be used. If the binding posts are used, they should be placed behind the sockets on the shelf. The C lead may be a flexible one. If the tap system is used, the switch arms can be placed between the condenser dials, with the taps behind the panel. Fig. 463 shows the method of inserting the loop. That is, a hole large enough for the center pole of the loop to pass through, is drilled in the lid of the cabinet. A plug is attached onto the bottom of the center pole. The lid is then closed and the loop plug inserted through the hole and into the jack. The antenna and ground are connected through the back of the cabinet, where two separate holes should be drilled, about ¼" away.

I HAVE three .0005 mfd. variable condensers. I would like to build the 6-tube receiver shown in Fig. 435, Radio University columns of the Sept. 25 issue of RADIO WORLD. Please give the correct coil data for these condensers, using No. 22 double cotton covered wire wound on 3" diameter forms. (2)—Can the filaments of the two radio frequency amplifier tubes be controlled by a ballast resistor, such as the Amperite No. 112? (3)—What space should be left between the windings?—Morris Nexar, Liberty, N. Y.

The primaries consist of 10 turns. The secondaries consist of 44 turns. (2)—Yes. (3)—¼".

CAN THE untuned radio frequency transformer, L4L5, used in the 5-tube receiver shown on page 15 of the Aug. 21 issue of RADIO WORLD, be supplanted by a tuned radio frequency transformer? (2)—I have three tuned radio frequency transformers, with primaries consisting of 15 turns and secondaries consisting of 60 turns, wound on 2½" diameter tubing. These are, according to the directions given on the carton, to be tuned by .0005 mfd. variable condensers. (2)—Is that correct? (3)—Can they be used in this set? (4)—How will I use one of them in the antenna circuit, where a continuous winding coil is used?—Henry Specter, Mt. Vernon, N. Y.

(1)—Yes. (2)—Yes. (3)—Yes. (4)—

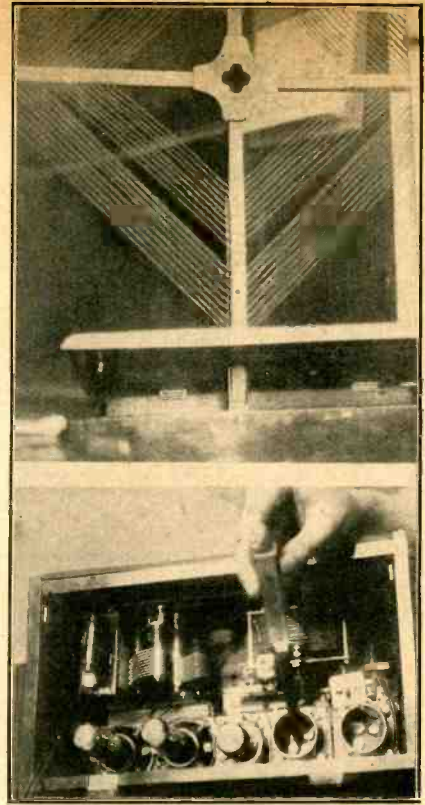


FIG. 462 (bottom) and 463 (top). How to place the parts and the method of inserting the loop is shown above.

The beginning of the primary winding is connected to the antenna post. The end is connected to the ground. The beginning of the secondary winding is connected to the A minus post and to the rotary plate post of the condenser. The end of this winding is connected to the grid post and to the stationary plate post of the first variable condenser.

I AM going to build the 2-tube reflex, shown in Fig. 375, Radio University columns of the July 17 issue of RADIO WORLD. (1)—Can another stage of transformer coupled audio frequency amplification be added? How? (2)—How should the filament be controlled? (3)—What ratio AFT should be used? (4)—I have a 3-circuit tuner, but the primary and secondary are wound so as to make one winding. It consists of 60 turns, tapped at the 8th turn. Can this be used? (5)—How should this be connected? (6)—I wish to use a -170 type power tube in this new added stage of AF amplification. Should I use a C battery and connect in the standard method? I suppose I can get the proper B and C voltages from the directions given with the tube.—Herman Vincent, Porto Rico, P. I.

(1)—Yes. The P post is connected to the top terminal or spring of the single circuit jack, J. The B post is connected to the bottom terminal of this jack. The G post is connected to the G post on the new socket. The F post is connected to the (answer to question 6) minus post of a C battery. The P post on the socket is connected to the top terminal of a new single circuit jack. The bottom terminal of this new jack is connected to a new B plus post. (2)—The filament of the RF tube can be controlled by a 20 ohm rheostat. The filaments of both AF tubes should be controlled by individual ballast resistors, the type of each suiting the tube used. (3)—It should be of the 3 to 1 ratio type. (4)—Yes. (5)—The tap is brought to the antenna. The portion of the winding containing the 8 turns, counting the tap as the first turn, goes to the ground. The 52 turn portion of the winding is connected to the grid post and to

the stationary plate post of the variable condenser. The rotary plate post of this condenser is brought to the ground post, or to the end of the 8 turn portion of the winding. (6)—C battery question answered in (1). Method of connecting the filament here is standard. See answer to question in (2).

* * *

CAN TWO stages of transformer coupled audio frequency amplification be added to the crystal receiver shown in Fig. 417, Radio University columns of the Aug. 28 issue of RADIO WORLD. (2)—Are the standard connections followed, the P and B posts being connected to the top and bottom of the jack, respectively?—Jeremiah Ling, Louisville, Ky.

(1)—Yes. (2)—Yes.

* * *

WHERE IS station WAGS? Who owns it and on what wavelength does it operate, (kc and m)? (2)—Has the wavelength of KFI been changed? If so what is the new one? (3)—What has happened to WGBR, located in Marshfield, Wis., and owned by George S. Ives?—Katheleen Pitrol, Hollywood, Cal.

(1)—WAGS is located in Somerville, Mass., and is owned by Willow Garages, Inc. They operate on a wavelength of 250 meters or a frequency of 1199 kc. (2)—Yes, from 468.5 meters (640 kc) to 467 meters (642 kc). (3)—They have discontinued broadcasting and dropped their license.

* * *

PLEASE SHOW by diagram the general construction of a balanced type speaker unit, used in many of the speakers today, where enormous volume is desired. Explain its operation. (2)—Please explain the operation and construction of a semi-balanced unit used in most cone speakers. (3)—Is it true that many of the cone speakers of the old type used nothing more than an ordinary unit with an armature substituted for the diaphragm and a driving rod connected to the center of this diaphragm and thence to the center of a cone shaped piece of parchment?—Leslie Butter, Butte, Mont.

Fig. 464 shows the general construction of a balanced type speaker unit. The armature is placed midway between the poles of the permanent magnet, the circuits being so arranged, that the permanent flux does not pass through the armature, this allowing the use of permanent magnets of great strength, which prevents the saturating of the armature. Only the variable magnetic flux, made by the amplified AF currents are carried by the armature (2). The semi-fixed balanced unit is built on identically the same fundamental principles, the armature being fixed in one position. The driving rod is usually connected then to a cone diaphragm. (3)—Yes.

* * *

I HAVE two 1 megohm; two .5 megohm; two .25 megohm and two .1 megohm fixed resistors. I would like to have a circuit diagram showing how to hook up these resistors in a straight transformer coupled audio frequency amplifier, to regulate the volume. The F posts of both AFT are connected to the minus post of a 4.5 volt C battery, the -01A type tubes being used with 90 volts on the plates of both.—Charles Mason, Portland, Ore.

Fig. 466 shows the circuit diagram of such a stunt. R1 are the 1 megohm resistors, R2 are the .5 megohm resistors; R3 are the .25 megohm resistors, while R4 are the .1 megohm resistors. A two contact single blade rotary switch is used. M1 indicates the minimum volume, while M2 indicates the maximum volume. The resistors are placed across the secondaries and reduced until there is no resistor across the secondaries at all, at point M2. These resistors may be mounted in a block and placed close to the secondary wind-

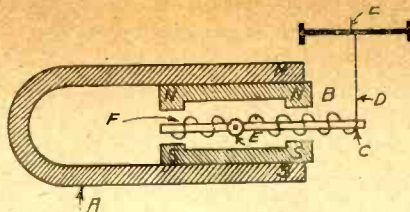


FIG. 464
The general construction of the balanced type of unit.

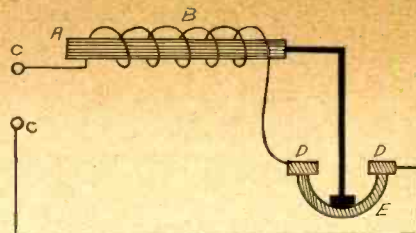


FIG. 465
The fundamental circuit diagram of a relay.

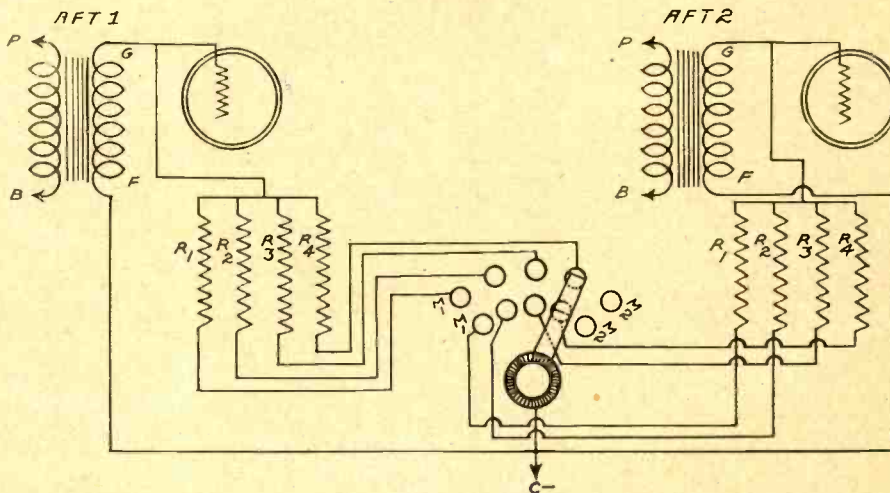


FIG. 466
The circuit diagram illustrating the method of hooking up fixed resistors across the secondary of audio frequency transformers for controlling volume.

ings of the AFT, or the four resistors may be mounted on one side of a 15x4" piece of bakelite or hard rubber, about 6" space left and the other batch of resistors mounted. The 6" space is for the taps. This arrangement takes up quite a bit of room. However, if you are willing to place this control outside the cabinet, a small control box, about 5" square may be built, the resistors mounted inside and the taps on the outside of the box, on a panel. The C battery may also be mounted in the box. Only the fundamental connections are shown, since there is no change or addition necessary to the standard AF hookup, other than shown.

* * *

PLEASE GIVE the fundamental circuit diagram of an automatic circuit breaker or relay, giving a brief description as to its exact operation.—Morris Schiller, Pittsfield, Mass.

The fundamental diagram is shown in Fig. 465. A is the movable core, having magnetic properties. B being the winding. D D are the contacts for the breaker action. E is the arm which makes and breaks the action. The output terminals are shown at C C. When current is turned on at the input terminals and increased

until such a point that the winding attracts the core, the arm E is lifted up and due to gravity, the contacts D D drop, breaking the action. As soon as the current is turned off the arm goes back. The same thing happens when the normal amount of current is flowing, but as soon as an overload flows, the breaker action occurs. The winding can also be so made that as soon as the current is turned on, the core is attracted, but instead of breaking the line contact, makes a contact, that is moves down. This scheme is used in making A and B eliminator relays, etc.

* * *

I HAVE just purchased a 140-volt-1250 milliamperes alkaline B battery, (Edison elements and potassium hydroxide solution). What general precautions should be taken with it?—Harold Klein, Atlantic City, N. J.

Using the set three hours per night, seven days a week, you should be able to keep the battery in tip top shape, by charging it every 4 weeks at a 30-mill charging rate. Addition of distilled water is only necessary every two months to each cell.

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OFFICER ON SHIP TREATED VIA AIR

San Francisco Marine Hospital Radioed Advice, as Vessel Had No Physician Aboard—Patient Restored to Health

WASHINGTON

The United States Public Health Service announced the receipt of a communication from the San Francisco Marine Hospital, relating to two instances in which the hospital gave advice to vessels at sea in the treatment of emergency cases. This communication, Surgeon General Hugh S. Cummings, of the Public Health Service, stated orally, is a striking illustration of the value of advice as to treatment given by radio by the Public Health Service to vessels at sea.

In one case, a request was made for treatment of the chief officer of the ship who was reported "very ill." During the same day three messages were exchanged between the marine hospital and the vessel, with the result that the patient's condition was reported improved.

The official report from the San Francisco Marine Hospital, which is under the jurisdiction of the Public Health Service, follows:

San Francisco, October 11.—Request received from vessel at 10:30 a. m., stating that the chief officer was very ill, vomiting and purging, and had severe cramps in his stomach. The Marine Hospital was informed that the patient had eaten a head cheese sandwich, but that other members of the crew eating the same material were not sick. The temperature of the chief officer was given as 100.2.

Advice was sent by the San Francisco Marine Hospital at 10:45 a. m., October

11, advising an enema, and to give nothing by mouth but water, and to apply an ice bag over the appendix.

At 11:03 a. m., on the same day, the master of the vessel, radioed that the patient had no pain over the appendix, and was resting better, and asked for further advice.

At 11:07 a. m., October 11, the hospital radioed to apply hot water bag over abdomen.

At 1:30 p. m., the same day, the master of the vessel radioed that the patient was feeling better, thanked the hospital for the advice, and asked for further advice.

At 1:35 p. m., October 11, the master was advised that the patient might have liquid diet the next day.

San Francisco.

Request received from vessel at 9:00 a. m., stating that patient was troubled with shortness of breath, especially two hours after meals. Patient had had practically no sleep during the preceding 72 hours.

At 10:00 a. m., same day, the San Francisco Marine Hospital radioed patient to take teaspoonful of baking soda in glass of hot water every four hours, and to limit the diet to toast, cereals and soft boiled and poached eggs until the attacks were relieved. Patient was also advised to take 15 grains of sodium bromide at once in half glass of water and to repeat three times a day, and to go to bed and put hot water bottle to pit of stomach.

After these treatments, he felt better.

PLANE PROGRAM THRILLS HEARERS

An educational course by the Army Air Corps in the science of aviation has recently been broadcast from midair, the airplane carrying instructors navigating in the vicinity of McCook Field, Dayton, Ohio.

These lectures, varying in subject matter from "bombing" to "radio beacons," have served the two-fold purpose of educating broadcast listeners in the rudiments of flying and affording the basis for radio experiments being projected by the radio laboratory at McCook Field, it was pointed out. The officers and civilians of the engineering division of the Air Service acted as instructors in aviation and the invisible audience of broadcast listeners served as judges in determining the success of the experiments. This educational course in aeronautics was not only broadcast directly from a flying machine, but the lectures were intercepted by WLW.

Letters of acknowledgment indicated that these lectures from flying craft were heard in at least seven States—Ohio,

Indiana, Illinois, Kentucky, Michigan, Tennessee and West Virginia. Many of the listeners made comparative tests in determining the relative clarity of the signals received directly from the airplane and those rebroadcast from the ground broadcasting station; some reporting one clearer and some the other. The idea of a speaker traveling in midair while addressing a vast invisible audience challenged the imagination of many, one woman, writing to the effect that she trusted the flyer was "right with God."

In the preliminary experiments a Martin bomber was employed, but the static and engine noises experienced on this type of flying craft made it necessary to use another kind of aircraft. This led to the rigging up of an enclosed transport for night flying, and the radio transmitting equipment was installed inside the cabin. The improvement noted in the transmission was marked. Thousands of cards and letters from broadcast listeners attested to the success of the novel feature.

EVEREADY ARTIST



IGNAZ FRIEDMAN, famous Polish pianist-composer, was guest artist during a recent Eveready Hour. Friedman is well known for his transcriptions and special arrangements of Chopin.

Microphone Calls Prisoners to Dock

WASHINGTON.

A system similar to the public address system is now being used in the judges room of the United States branch of the police court. The usual microphone is used. It is connected with the cell room, where prisoners awaiting trial are kept. When a prisoner is desired in court, the clerk has to merely speak into the microphone and the defendant is sent up.

If after several tests this system proves to be a success, a more elaborate system, connecting up every cell and room in the court house, will be installed. This will do away with the time honored custom of having bailiffs elbow their way through the crowded court rooms and hallways shouting for attorneys and witnesses.

Suggests New Stations Get Low Waves

Newcomers in broadcasting should be assigned the lower band of wavelengths, leaving the higher ones for owners of stations who have pioneered and developed the new art, Powel Crosley, Jr., owner of WLW, Cincinnati told members of the Indianapolis radio industry.

"Today," Mr. Crosley explained, "we are confronted with a situation in which we have nearly 600 broadcasting stations crowded into 88 channels in the radio broadcasting range, separated by 10 kilocycle. This overcrowding can be overcome through the creation of other wave bands in the lower range. This lower wave band should be made available for use immediately.

"Development of broadcasting on the lower wavelengths should be done by the newer stations whose owners had no part in the formative stages of the new

PIANIST RISES



EVA CAROL ROARK, well known studio pianist of WLW, Cincinnati, who broadcasts special piano solos every Tuesday at noon. Previously Miss Roark played accompaniments during the morning health exercises.

HER PREFERENCE



ONE FAN'S installation preference is for a loop-operated set on a table, with speaker below. She is Edna Kirby, actress, demonstrating for Hale Bros., San Francisco.

art. The older and pioneer broadcasting stations should not be asked to undertake the development of this new low wave band.

"Short waves, due to their peculiar properties, travel much greater distances than do the long waves, with a given power input. American amateurs have been able to establish and maintain consistently communication with such distant points as Europe and Australia, actually using less power than that consumed by the ordinary domestic 25-watt lamp. This phenomenon is particularly true in the case of transmission taking place during broad daylight."

MOUNT SET SOLIDLY

Mount your set on a solid base to prevent microphonic noises.

TERRELL RECALLS THE EARLY DAYS

**Started As Telegraph Operator, Soon Took Up Radio
and Became Pioneer Inspector—Calls DX
Important**

WASHINGTON.

William D. Terrell, chief radio supervisor of the United States, has grown up with radio. He is 45, stands 5 feet 8 inches and weighs 150 pounds. To that extent, and more, has he grown up with radio!

After finishing high school in his home town—Golansville, Va.—Terrell attended a business college, although it has always been his ambition to be a railroad engineer. It did not take him long to find out that a business career was not for him. Returning to Golansville to think it all over, he picked up a working knowledge of telegraphy and obtained a position in this new field at the age of eighteen.

After a year of service at Golansville as test operator, he went to Alexandria, Va., as manager of a commercial telegraph office. After two years at Alexandria he was transferred to Washington and worked at the Capitol. He served in Washington as operator, traffic chief and wire chief until 1901 when he accepted the position of manager of telegraph and telephone service for the American Can Company in New York.

Starts Radio Career

Here Terrell became interested in radio. A number of men in the office were amateurs and he joined their ranks. In 1903 he went to work with the Government as manager of the telegraph office at the Custom House in New York where he remained until July 1, 1911 when he entered the radio service.

Terrell was one of the two original inspectors of radio who were appointed when the service was first organized. R. V. Cadmus, now chief inspector at Baltimore, was his associate. Cadmus was assigned to the Pacific Coast and Terrell to the Atlantic. It was their job in those days to examine the radio equipment aboard ships and determine whether signals could be sent 100 miles.

"We had no instruments in those days," says Terrell. "My equipment consisted of a note book and pencil. The ships used any wavelength or call they wanted. After the law was passed in 1912 our work was enlarged and we assigned wavelengths and calls and the International Code was substituted for Morse.

Early History

"The United States was divided into nine districts and supervisors appointed for each. I remained in charge of the New York Office until March 1, 1915, when I was transferred to Washington and placed in charge of the radio division.

"The first I ever heard of broadcasting was in 1914 when the Marconi Company conducted a test from Wanamaker's store in New York, although at that time nobody realized broadcasting would develop.

"During the war all radio stations were turned over to the Navy or closed down,

and I was assigned to instructing operators.

"Broadcasting really started in 1921 when Frank Conrad made tests similar to those of 1914, using a phonograph for his music. He had no idea of broadcasting, but the amateurs were well pleased and asked that it be continued. He then realized there was a demand for it and the Westinghouse Company built stations for the purpose.

"Even then they did not realize the possibilities of broadcasting, because I remember when they talked it over with me they thought one wavelength would be all they would ever need. I gave them 360 meters.

Broadcasting Booms

"Pretty soon broadcasting started in real earnest, and in 1922 there were so many stations using 360 meters that it was necessary to call a conference which was known as the first Hoover National Radio Conference. Broadcasting has been going strong ever since until today we hardly know what to do with it."

Mr. Terrell has two children and lives at Livingstone Heights, Va. His avocation is farming and he owns a farm which he takes care of in his spare time. When he retires from the Government service he plans to take up farming in earnest.

With two radio receivers, one of six and the other seven tubes, Terrell has never been able to get the Pacific Coast although he has tried a number of times. He has two antennas, one 30 and the other 100 feet in length.

"I listened in during all of the International tests but all I could ever get was Cuba, Mexico and Canada," says he.

Terrell likes old-time music better than most other kinds of programs.

"I prefer all kinds of instrumental music. Mrs. Terrell also likes instrumental music, but she prefers singing. She likes the women's programs during the day time.

Kind Word for DX

"Although I like the local programs, I think at some time or other most fans have had the distance bug and few of them ever get rid of it entirely. I am not referring, of course, to the owners of crystal sets. I believe even they would get a thrill out of distance hunting if they ever experienced it.

"I hope Congress can do something to preserve distance reception for us. Unless a remedy is found, I fear very much for the future popularity of radio.

"Unless we have more wavelengths or fewer stations, we will have to content ourselves with local programs."
(Copyright, 1926, by Stevenson Radio Syndicate)

GETTING BETTER "A" READINGS

It is well to clean the barrel of your hydrometer quite often. Otherwise the lead shot tube will stick to the sides of the barrel and readings will be difficult to take.

A THOUGHT FOR THE WEEK

ONLY four years ago we were glad to receive any signals on a radio set and cared nothing about the appearance and complexity of the receiver. Today, the novelty gone, we look to radio as a beautiful and reliable source of constant entertainment and instruction. The honeymoon is over, but the old love still is there.

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Half of Programs In N. Y. and Chicago

More than half of the broadcasting programs of the world originate in New York and Chicago, Frank Reichmann, radio engineer, pointed out in a discussion of the broadcasting situation and broadcasting chains.
"It seems natural that this should be the case," Mr. Reichmann explained, "when you consider that the basis of every worthwhile radio program is music and that the music centers of America and the broadcasting world are in the two largest cities of the United States."
"Because of this more and more listeners throughout the country are enjoying programs broadcast by the great chain stations, headquarters being in N. Y. C."

The Location of a Set

A WEALTHY resident of New York City desired a radio set in his apartment on Park Avenue. He insisted that it be placed in the lounge room, as that was where he intended to do his heavy listening. Unfortunately, he was located in a shielded area or semi-dead spot, and it was very difficult to obtain reception. The general run of receivers would not give anything like satisfactory service. What was needed was a Super-Heterodyne, even one embodying regeneration, and when such a set was installed it was found to bring in signals weakly. A loop was used as the antenna, since an outdoor aerial was prohibited.

The receiver was removed to another room, near the lounge room, and it was much easier for the loop to intercept radio waves at this location. However, the head of the house would not countenance that, for it was a case of the lounge room or nothing. The expert who installed the set explained something about the difficulties, including the shielding effect of tall steel buildings that surrounded the apartment house in which the customer lived, and advised that the set be located in the most favorable room.

After much discussion the customer compromised, at the suggestion of the engineer, and the set remained in the lounge room, while the loop was placed in the other room. Hence when the user desires to avail himself of the directional effect of the loop he has to quit the lounge room to adjust the loop in the other room. This was a fair compromise, as he literally got what he wanted, the set actually being in the lounge room, but he has to suffer the inconvenience of making a trip into the next room whenever he wants to tune in another station. Hence it would have been better to locate the set and loop in the other room and the speaker in the lounge room.

Such a poor reception point is a rarity, but when the condition is met it is often found possible to get decent reception by finding the most sensitive spot in the house for loop location and placing the speaker in any desired location, no matter in what room.

Monday for Inspection

GIVING a little attention to a radio receiver once a week is not asking too much, particularly in view of the greater enjoyment to be derived. Those persons who use storage A batteries in particular suffer poor reception due to permitting the battery to become rundown. Also users of dry cell B batteries often fail to replenish these, although the set was used several hours each night for almost a year. The proud boast is that the set still works, and it is to the credit of radio that receivers will work even amid adverse conditions. But the goal should be splendid reception at all times. The mere statement that "it works" is not enough. Radio has passed out of that stage.

Therefore, why not let's inspect our installation every Monday? For the storage A battery, an hydrometer serves excellently as the tester, and should give a specific gravity reading as stated by the manufacturer indicating at least half charge, never less. For the dry cell B batteries use a high-resistance voltmeter of a scale deflection which reaches maximum somewhat beyond the highest voltage of your series-connected B batteries. This small amount of work will take only a few minutes, yet you will be repaid richly, in that supreme satisfaction will mark your reception, and you will not handicap your receiver with poorly conditioned accessories.
Let every Monday be radio inspection Monday.

Disappointing Guests

A GREAT deal of criticism of stations arises from the fact that announcers do not tell the call letters often enough. In cold weather, when it is easier to cover great distances with a receiver, this nuisance particularly enrages DX fans.
There is no excuse for regular announcers failing to disclose the identity of the station at repeated intervals. In fact, if they fail to do so they render their employer a disservice. However, the annoying condition exists today mostly when guest announcers are doing their willing work. These men are not professional announcers, as a rule, but head of some organization, like an orchestra, and they have a habit of letting half an hour or more slip by without giving any recognition to the station to which they are indebted. So, after all, it remains for the station to school these men in the necessity of behaving like well-trained announcers.

WORSE MIXUP OF STATIONS IS FORECAST

Cold Weather Will Bring More Evidence of Inter- ference, Says Terrell— Gets Many Protests

WASHINGTON

Protests of interference caused by the congestion of broadcasting stations provide adequate interpretation of the summary recently compiled by the radio inspectors of the Department of Commerce, according to Chief Radio Supervisor W. D. Terrell. The summary showed that there are 63 new stations in operation, 40 new stations under construction and 82 new stations contemplated.

With so many stations it is impossible to have reception without some interference, Mr. Terrell asserts. He believes that conditions will be much worse around the first of December when colder weather comes on.

Will Do Job Regularly

It is the intention of Mr. Terrell and his staff to compile a summary twice each month showing new stations, increases in power, changed wavelengths, stations under construction, stations preparing to increase their power and proposed new stations. An additional feature will be a report from each district showing the amount of interference suffered. By checking the summaries it is believed that some estimate of the trend of conditions may be obtained.

The protests began coming in only recently. During the Summer few if any complaints reached the Department of Commerce. Many of them indicate that the public still seems to believe that Secretary Hoover can do something about the interference.

Last Winter most of the complaints of interference referred to non-radio electrical devices. At present more than 90 per cent. of the complaints are of station interference.

Survey Conducted

To learn the full extent of the damage caused by the breakdown of radio regulation, the Department of Commerce men conducted a survey of all existing and contemplated broadcasting stations.

Radio Supervisors in all districts had been instructed to report to the Department of Commerce on the following:

(1) The total number of new stations under construction and the probable time they will require licenses.

(2) Stations which have increased their power and those which expect to increase their power in the near future.

(3) Stations which have changed their wavelengths and those that plan to change their wavelengths in the near future.

The survey was ordered as a result of reports reaching the Department of activities in the construction of new stations. According to the unverified reports, a large number of new stations are going up in all of the districts except the third

WHITE IS GLOOMY ON LEGISLATION

"Chances for Passage Less Bright," Says Representative, After Ascertaining Lawmakers' State of Mind

By Thomas Stevenson

WASHINGTON

"We have been fiddling while Rome was burning. We had a chance to control radio broadcasting and neglected to do so. Chances for the passage of radio legislation at the coming session of Congress seem less bright than at any previous time."

These are the views of Representative Wallace White, Jr., of Maine, author of the White bill and guiding genius of radio legislation in the House of Representatives. Since 1921 Mr. White has been interested in radio, and at every session of Congress in the last three years has introduced a bill which would permit of government regulation of broadcasting.

During the last session the White bill passed the House by an overwhelming vote, but a substitute bill introduced by Senator C. C. Dill, of Washington, was accepted by the Senate. During the last days of the session the two bills went to conference between the two Houses for adjustment, where they are at present.

Interference May Last

If Mr. White's fears are justified, it would mean that fans who suffer from interference may not obtain relief for some time to come.

Mr. White has definite evidence to bear out his assertion that legislation may not be enacted during the coming Congressional session. He thinks the greatest obstacle will be in the Senate.

During the last month a number of Senators have expressed dissatisfaction with the bill passed by the Senate. Some of them freely admit they didn't know what kind of bill they voted for and express a desire to have the bill reconsidered in the Senate.

Should the Dill bill be called from conference, it is likely it would receive much more serious and lengthy consideration in the Senate than ever before seemed possible. Dissatisfaction resulting from interference due to the breakdown of regulation has forcibly impressed on a number of Senators the fact that broadcasting has progressed beyond the plaything stage.

Senators Learning

Some Senators have attempted to increase their knowledge of the subject. Others own radio receivers and from first-hand experience know what conditions are. If the bill is recalled by the Senate, it is predicted that

(Baltimore). The report had it that in Chicago alone more than thirty new stations are under construction.

Value Expected

The survey it is believed, will be of great value to the Congressional conference on radio legislation which is expected to be held between members of the House and Senate in Washington late this month. It is the hope of Senator Dill and Representative White, authors of the Dill and White bills, that the conferees can work out some kind of agreement and report

a long and acrimonious debate over it may result.

There will also be trouble in the House, Mr. White fears. A number of Representatives are not convinced that the White bill contains sufficient anti-monopoly protection and they are going to try to safeguard the public in that respect.

Minor issues have been responsible for defeat of radio legislation in the past and Mr. White fears their effect on consideration of the subject this winter. He hopes they may be pushed into the background and the big principle of government regulation adopted.

Value of Legislation

His belief is that if a bill of some kind can be passed during the coming session it will provide the ground work for regulation and it can be patched up to meet changing conditions in the future. Immediate enactment of a bill would give the Government a chance to check the situation before conditions become unmanageable.

Mr. White is not entirely sure that the pending bills are adequate in view of changed conditions. There is nothing that can be done about that, however, since it is not within the power of the conferees to write new clauses into the bills.

During the last month Mr. White has received hundreds of suggestions for the improvement of conditions. Most of the suggestions, while sound in theory, are unworkable, he believes. One suggestion, for instance, is that stations which have jumped wavelengths or been licensed this summer be deprived of the broadcasting privilege. Such a proposal ignores the fact that the wave jumpers have violated no law.

Recourse to Courts

The solution of the whole problem, Mr. White believes, may come about through recognition by the courts of the priority right of stations to use wavelengths without being subjected to interference.

Mr. White was not at all surprised by the decision of the Chicago court which held that the Department of Commerce had not the authority to assign wavelengths. For more than two years he doubted the authority of the Department and hoped that legislation might be enacted before the Department's authority was questioned by the broadcasters and carried into the courts.

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a bill to their respective houses when Congress convenes in December. They believe if they are successful there is a chance that a radio bill may be enacted into law before the first of January.

If unconfirmed reports are true, the large number of new stations under construction may precipitate a crisis. With distance reception improving, fans are beginning to notice the difference between conditions this year as compared with last. It is said that interference is worse at present than ever before, and that matter will be much worse within the next two months.

THE RADIO TRADE SERVICING AIMS TO PAY ITS WAY

Ultimate Object Is to Make It Source of Profit—Fees Charged Now Vary Considerably—Yearly Contracts Popular

All radio service departments eventually will be placed upon a self-supporting basis, in the opinion of many leaders in the industry. In this respect it is believed by Frank A. D. Andrea, that radio will follow in the footsteps of the automotive industry where factory, jobber and dealer all maintain service departments that pay for themselves.

The establishment by manufacturers of a veritable school of instruction for dealers' service men is interpreted as leading in this direction.

While such instruction is available on a no-charge basis as a broad stroke on the part of the manufacturer in preparing a large section of the midwestern trade to undertake all types of radio service jobs, it should be clearly understood that this very training places the dealer in position to maintain his service station at a profit.

Profit a Prospect

The manufacturers and the wholesale element in radio are expected to be satisfied to break even on service in the beginning, provided the dealer is building a profitable service business. The remaining big element to be considered—the general public—likewise will be entirely pleased if every dealer gets "right" on the question of furnishing the proper service.

As an example of how special instruction in maintenance of service departments works for the good of the entire industry may be cited an instance where a midwestern dealer had become very much disgusted with the way radio was being handled and had about decided to get out of the business. He had heard of the visits of dealers and their service men to the special department in Chicago and made up his mind that he would look in on his next visit to the city.

Due to Forge Ahead

He did this and, after studying the possibilities in the service end, looked over the line of a certain manufacturer and got into the handling of radio with more vim than he had ever exercised before. As this dealer had built up a splendid following in the musical instrument end of his business, he may now turn out to be an outstanding figure in his community on radio also. It is a fact that in causing his interest to be born anew the service layout was an important factor.

In the recent survey conducted by the New York University Bureau of Business Research it was revealed that approximately half of the New York dealers maintain service departments in connection with radio. By far the greater majority of the dealers were credited as giving free service. Commenting on this at the time of the announcement of the results of the survey R. M. Klein said: "We believe the trade would be greatly benefited if the number of dealers able to render

service were increased to 100 per cent. and it will also be found that service in most cases justifies a reasonable charge."

Starting with the radio receiver from the time it leaves the factory and continuing for a reasonable period after it is in the hands of the ultimate purchaser, a good point to take up any service charge discussions is where factory defects leave off.

Charge for Work Varies

Everyone admits that such defects ought not to be made the subject of service charges. Yet there is a limit even here, for it is believed no one will be bold enough to sustain the argument that sets ought to be free-serviced after, say, a year's use, on complaint of alleged factory defect.

In New York those dealers who do charge for servicing, according to the survey referred to, do so at the following rates: \$2.50 per hour, by 25% of the dealers interviewed; \$2.50 per visit by 25%; \$1.50 per hour by 12½%; flat \$2.00 per visit by 12½%; \$10 per year service charge by 12½%; variable charges by 12½% of the dealers who charged for service.

Special investigation into actual operation of service charges in other sections of the country brought to light that many dealers are operating on a flat service fee of from \$10 to \$20 per year. Young's Radio Service, of Elmira, N. Y., for example, charges \$1.25 per month to call each month at the customer's home, give the installation a thorough inspection, take care that water is in the battery, test the tubes and, in general, see that everything about the installation is in perfect working condition. Of course, there is resultant business in batteries, tubes, etc., out of these service calls.

Obviously, the ideal service situation for a dealer would be for him to service every installation his store makes. A dealer should ask himself the question: "Do I hold all of my customers on servicing?"

How Freshman's A-B-C Performs

The A-B-C Power Supply unit, manufactured by the Chas. Freshman Co., Inc., is designed to eliminate the use of the individual B and C batteries, as well as to supply a replenishing current for the storage A battery.

The complete unit, encased in a crystallized metal container 10" long, 7" wide and 7" high, provides 22½ volts for detector, 90 volts for the amplifier tubes, and 135 volts for a power amplifier tube in the last stage of audio frequency amplification, which is arranged for in the new and improved Freshman Masterpiece receiver. A current of 9 volts negative

grid potential is also supplied for the operation of this last tube.

A 1-ampere Tungar rectifier converts the 110-volt 60 cycle current into a half-wave rectifying current which charges the storage A battery and keeps it fully charged. An automatic relay incorporated in the circuit operates so that when the radio receiver is turned on, the UX-213 full-wave rectifier tube is turned on and immediately furnishes B and C current.

When the set is shut off, this tube is also turned off and the Tungar tube is turned on, again replacing the A battery on charge. No attention is required in the operation of the device. The storage battery will need an occasional replenishing of distilled water.

The Freshman Company also manufactures a 30-ampere hour A battery to work in conjunction with their A-B-C Power Supply unit.

Paragon Buys Adams Morgan

The Adams Morgan Company, Inc., of Upper Montclair, N. J., one of the pioneers of the radio industry, makers of the Paragon radio receivers and devices, has been purchased outright by the Paragon Electric Corporation, an entirely new organization having as its officers C. Swayne Phillips, president, and Peter A. Petroff, secretary, treasurer and general manager.

Mr. Phillips is one of the most prominent residents in Upper Montclair, being a director of several of the local banks, in addition to his wide interests covering the textile, garment and publishing enterprises in New York City.

Mr. Petroff is identified with the radio industry and is well known in the field for his eminent sales and production organization records. He is a graduate Mechanical Engineer.

The assets of this corporation include a well equipped machine shop with automatic machines, merchandise in stock and in process, real estate and capital which constitutes a value of up to more than \$200,000.

The new Paragon Six includes modern construction and design, is completely shielded, and has double impedance audio amplification. This instrument operates through the electric light socket or A and B batteries for current supply.

Factory Sets Shown

Factory-built sets that aroused public interest recently, when exhibited in New York, were:

Blue Ribbon receivers of the Chicago Nipple Mfg. Co. exhibits ran from table model to console, all in the medium-priced class of sets. These sets performed well and gave good tone and volume.

The Reichmann Co., Chicago, displayed the full Thorola line of receivers and loud speakers. The console model, with a special equipment for horn speaker on one side with a matched cone on the other, attracted much attention and favorable comment on the quality of tone. The table model was shown together with the different models of horn and cone speakers. The American Wireless Co., is distributor for this concern.

VICTOREEN QUESTIONS ANSWERED

Any member of the trade who have questions on the 1927 Victoreen, or any equipment used in connection therewith, including audio amplifier, and B eliminator (known as the Lynch Light Socket Amplifier), and the A eliminator, should address Victoreen Editor, Radio World, 145 West 45th St., New York, N. Y.

EPIZOOTIC ZIP AT BROOKLYN SHOW

Automatic Palm Reading Machine, Silver Plating Solution and Shampoo Excel in Low-Loss Straight Line Frequency Design

By *Tim Turkey*

The annual comedy or farce, known as the Brooklyn Radio Show, was staged this year, as usual, only more so than ever, if you get what I mean.

The place of presentation was the same, too, it being none other than the Twenty-third Regiment Armory, Bedford and Atlantic Avenues, Brooklyn, N. Y., U. S. A. The address should be emphasized and particularized that way so that more persons will find the place conveniently.



Tim Turkey.

No doubt the teeming thousands in Brooklyn and beyond could not locate the stamping grounds of the radio herd. And the few thousands who did attend and who sought radio enlightenment, were treated to some of that, to be sure, but in addition found other sources of attraction.

The breadth or scope of activities at the radio show—with the accent on the word "radio"—included the Bucco Shampoo, 12 packages free at the show every hour, with a guarantee that the shampoo will remove corns or callouses after feet are soaked in hot water; Silverbright, which saves labor and money by making tarnished cutlery glisten with a new silver coat; Jenkisson's flowers, fit to grace any lapel or parlor vase; Ruth Parker, perfumes and specialties; Cler-site, which removes raindrops cleanly from windows or windshields, and likewise affects spectacle lenses, and a charitable institution seeking worthy assistance. Yes, these were leading exhibitors at the Brooklyn Radio Show.

Automatic Palming

More fascinating by far than any sight of a pair of variable condensers or a console receiver was the automatic palm reading machine known as Chrysomant Automat, and, as naively enough admitted, made by the Automat Exploiting Company, Vienna, Austria. This machine "exploits" your palm "on scientific principles;" in fact, if you get two readings, one after another, at a dime apiece, you get exactly the same readings. A mimeographed slip emerges from the machine. Some one else, with a palm strangely like yours, will get the same reading.

However, instead of uniformly large sheets of paper with identical or similar readings on it there are also, by way of variety, smaller sheets, with entirely different scientific analysis, and nearly as much misspelling as the others. For instance, the large sheet refers to "sympathe" and "judgement," neither form being sanctioned by Webster or the standards committee of the Radio Manufacturers' Association, while the smaller

one emblazons "missunderstood." Each sheet is headed, "Your Character."

Show Element Present

There were no wheels operated at the show, so it was a great week for radio, especially for those who put up real money for the fun of exhibiting their exhibits to other exhibitors, and exchanging circulars and pamphlets with competitors. However, the costly joke goes on year after year, accompanied by generous tendencies on the part of large radio stores, some jobbers and an occasional manufacturer, while the management contributed the element of suspense which makes a show so fascinating.

Sales were permitted at the booths, a fact capitalized by the man who had the refreshment concession.

After all the free sets and speakers were given out to the fortunate ones and exact tally was made, it was discovered that the radio exhibitors carried the election by a bare majority over the non-radio exhibitors, which, while not a signal victory, was consoling to the trade.

B. C. L. Branches Out

The Broadcast Listener's Radio Service, Inc., 221 Fulton Street, New York City, better known to the fans as B. C. L., has enlarged its quarters at this address, installing a service department, an experimental laboratory and up-to-date showrooms. The corporation occupies a whole floor in this building. This concern is making a specialty of the kit business and aims to give fans all over the country complete kits of parts for any known circuit, and will make up kits for every new circuit that is brought out. They now have ready for immediate shipment complete kits on the Bernard, the four and five tube models of the Diamond of the Air, the Bruno Unitone and all the recent Radio World successes, including the Singletrol and the Hayden Hi-Power.

Their special mail order department has been developed to a high degree of efficiency and kits will be sent out the same day the order is received, except in case of parts that are hard to get or of obscure circuits, but eventually the aim is to have anything in radio for quick shipment. Accessories are also to be had and another department will quote fans prices on anything that is wanted and hard to get. Inquiries are invited and courteous and efficient performance is promised. An interesting booklet will be sent by B. C. L. to all who ask for it. Mention RADIO WORLD.

LEADING JOBBERS

Weber-Rance Co., of 225 West 57th Street, New York City, are leading jobbers. Messrs. Kestenbaum and Compton cover the metropolitan territory. The lines carried by this concern include Crosley, DeForest, Bosch, Balkite, Rayovac batteries and the Wheelan Cone speaker.

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

- A. J. Oik, 1705 Boulevard of Allies, Pittsburgh, Pa.
- F. C. Gunderson, Box 570-R1, Seattle, Wash.
- Walter Schaffer, 1918 Harcum Way, S. S. Pittsburgh, Pa.
- L. O. Sawyer, 150 Minot, Auburn, Me.
- W. E. Foster, 1714 St. Louis Ave., Ft. Worth, Texas.
- Merrill Peoples, Manhattan Beach, Ore.
- E. C. Fenske, New City, Rockland County, N. Y.
- Le Roy L. Zimmer, 2236 West Main, Massillon, Ohio.
- F. P. Smith, Box 1483, El Paso, Tex.
- G. R. Throop, 718 Maplewood Ave., Ambriage, Pa.
- D. Glenn Davis, 415 E. Wayne St., Ft. Wayne, Ind.
- Anthony Aiello, 135 Carver St., Pittsburgh, Pa.
- Charles Turner, 118 High St., Elyria, O.
- N. R. Ring, Box 104, Highland Park, Ill.
- John E. Mapvell, 81 Woodlawn Ave., Pittsfield, Mass.
- H. C. Hoffert, 2414 Lawrence Ave., Toledo, O.
- Alton Warner, Irving, Mich.
- H. V. Eaton, 2424 Blanding Ave., Alameda, Calif.
- Peter F. Wallace, 1125 Kirkwood St., Wilmington, Del.
- B. L. Wright, 302 Main Drive, Charleston, W. Va.

NEW CORPORATIONS

- Brooklyn Broadcasting Corp., N. Y. City, \$10,000; P. J. and M. and P. Testan. (Atty., N. W. Curry, 220 West 42nd St., N. Y. C.)
- Ogden Wireless Laboratories, N. Y. City, radio equipment, \$5,000; C. A. Bass, A. G. and H. Lipincott. (Atty., W. R. White, Municipal Building, N. Y. C.)
- W. A. A. M., Inc., Newark, N. J., radio supplies, \$125,000; Isiah R. Nelson, East Orange; Edward F. Nelson, West Orange; Howard Phillips, Newark. (Atty., Levy, Fenster and McCloskey, Newark)
- Atlantic Broadcasting Corp., N. Y. City, \$20,000; A. Skillman, A. J. Johnston, E. J. Mellett. (Atty., H. Goldman, 120 Broadway, N. Y. City)
- Barlows Radio and Electrical Co., Forest Hills, Queens, N. Y., \$5,000; R. P. and L. R. Barlow. E. A. Ward. (Atty., Guernsey and Guernsey, Jamaica, N. Y.)
- Cres Radio Corp., Jamaica, Queens, N. Y., \$10,000; M. W. Sterns, E. M. Neuman, H. C. Wood. (Atty., Wood C. Marshall, Jamaica, Queens, N. Y.)
- 59TH St., Radio Shop, N. Y. City, \$5,000; L. Abati, H. and I. Sauer. (Atty., I. S. Kanner, 261 Broadway, N. Y. City)
- Radio Station WPDQ, Buffalo, N. Y., broadcasting, \$25,000; H. L. Turner, N. P. Baker, F. D. Miller. (Atty., Fleischman & Altman, Buffalo, N. Y.)
- Maxwell Radio Corp., N. Y. City, \$20,000; I. Halpert, H. Koch, B. Zerneske. (Atty., A. A. Lane, 5 Beekman St., N. Y. City)
- Astor Electric Co., N. Y. City, radio equipment, \$10,000; M. Cohn, A. W. Falk, H. D. Berlowitz. (Atty., A. A. Katz, 170 Broadway, N. Y. City)
- Allen-Rogers, wireless instruments, N. Y. C., 1,000 common, no par; W. A. Eisenhauer, S. J. Kessler, A. Stevens. (Atty., A. & H. Bloch, 285 Madison Ave., N. Y. C.)
- Radio Board of Trade, N. Y. City, mercantile agency, 200 common, no par; S. Schwartz, H. Lewis, G. Hoerner. (Atty., W. Kessler, 220 West 42nd St., N. Y. City)

CAPITAL INCREASES

- Sleeper Radio & Manufacturing Corp., N. Y., \$500,000 to \$20,200,000, 220,000 shares, of which 20,000 shares shall be preferred stock of \$100 each and 200,000 shares common stock, no par; G. C. Sleeper, Scarsdale, N. Y., H. C. Doyle, H. S. Ebeling, N. Y. City. (Delaware Corporation Co., Del.)
- United Scientific Laboratories, N. Y. City, \$10,000 to \$100,000.
- Radio Receptor Co., N. Y. City, \$50,000 to \$150,000.
- Nassau Radio Co., Brooklyn, N. Y., 300 shares, \$100 each, and 200 common, no par, to 650 shares, \$100 each, 3,000 common, no par.

U. S. FAR IN LEAD IN EXPORT TRADE

Radio Apparatus Worth \$9,903,857 Left This Country During 1925—United Kingdom a Poor Second—Standardization Grows World Over

WASHINGTON

Exactly \$9,903,857 worth of radio apparatus was exported in 1925, making the United States the world's leading supplier.

This is stated by E. F. Bemis, of the Electrical Division, Department of Commerce, in a regional review of American radio sales abroad. Mr. Bemis points out that the nearest competitor in this trade is the United Kingdom, which this country leads by far.

His review in full follows:

The United States is the world's lead-

ing exporter of radio apparatus, its total 1925 shipments of \$9,903,857 being \$3,407,325 greater in value than the radio exports during that year of the United Kingdom, which was the nearest competitor. American radio products are making satisfactory progress in the markets of the world with the single exception of Europe, a price market, where the British products have secured a stronger foothold.

Sales of radio apparatus to Europe are largely on a price basis, but the gradual progress of standardization throughout the world is tending to encourage the purchase of high grade radio material in which the United States specializes, rather than equipment at lower prices and quality.

Standardization Spreads

The Oceanic and African markets have nearly completed their efforts at radio standardization, and American products are increasing in popularity in the Western Hemisphere and in Asia, where Amer-

ican exporters have developed substantial markets for quality products and developed popular confidence in their goods.

The value of direct exports of radio apparatus from the United Kingdom was \$6,274,918 and that of reexports, \$220,614, making total exports of \$6,495,532. British exports to Europe, excluding those to Channel Islands, amounted to \$2,681,339 during the year and were slightly more than three times the value of American exports to that area.

British radio sales to Europe constituted more than 41 per cent of the total British radio exports and over 15 per cent of the total was sent to divisions of the British Empire, such as the Irish Free State, Malta and Gibraltar. The leading European markets for the British exports in 1925 were the Irish Free State, Netherlands, Spain, France and Sweden, which countries took more than \$1,305,909 of the exports from Great Britain during that period.

Exports to Canada

American shipments of radio to Canada during 1925 reached a total of \$3,703,133 as compared with those of the United Kingdom, which were valued at \$259,251. American sales to Latin America also greatly exceeded those of the United Kingdom, totaling \$1,485,023 as compared with the British figure of \$243,317.

Mexico purchased \$272,135 worth of American equipment as against \$1,713 worth of British apparatus. United States exports to Central America and the West Indies were more than seven times greater in value than those of the United Kingdom, and sales to South America were more than three times the value of British shipments to that area.

British sales in Central America and the West Indies exceeded those of this country only in the British West Indies and the Dutch West Indies, which two groups took about 88 per cent of the British equipment shipped to Central America and the West Indies.

IN "B" ELIMINATORS



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Rix Expands Again

The steady growth of Rix Radio Supply House, Inc., continues, forcing the opening of a new store and headquarters to supply their increasing army of customers. This store has been opened at 1230 Broadway, Brooklyn, N. Y., in addition to their quarters at 72 Cortlandt Street, New York City, and the main branch at 5505 Fourth Avenue, Brooklyn. This concern is well equipped to take care of fans' needs for the new radio season, carrying a full line of all standard parts for every known circuit which can be furnished singly or in kit form. A panel department furnishes panels of every material in all sizes for any circuit with a special order department for odd size panels. Every new speaker on the market is in stock including horns, cones and cabinet speakers units, cone paper and accessories. Cabinets in all woods and finishes to take any size panel are in stock at all times. Consoles to suit every taste can be had at a wide range of prices. A special answer department takes care of all inquiries for parts. This house specializes in mail orders and takes pains to see that every transaction is satisfactory. A catalogue will be sent to all who send for it. Mention RADIO WORLD.

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SHEET — ROD — TUBING
Special Hard Rubber Parts Made to Order
RADIO and HARD RUBBER
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Send for Price List
WHOLESALE RETAIL
NEW YORK HARD RUBBER TURNING CO.
212 Centre Street New York

LAW ASKED PROHIBITING WAVE JUMP

Northwest Radio Trade Association Resolves That Stations Be Held Strictly Accountable to Some Government Authority

The Northwestern Radio Trade Association, consisting of 500 dealers and jobbers in the Ninth Federal Reserve District, with offices at 301 Tribune Annex, Minneapolis, want a radio law to stop all of the jumping of wavelengths about the country and the opening of a lot of new stations. Three hundred would be enough, the association says, adding: "We have studied the situation from beginning to end and we know what we want in a radio law, and we are asking Congress to give it to us."

A resolution was adopted at a meeting of the Association, in conjunction with its affiliated Listeners' Leagues:

"Resolved, That the Northwest Radio Trade Association and its affiliated Listeners' Leagues urgently request the Congress, as soon as may be practicable after its assemblies in December, 1926, to enact a law embodying the following cardinal points:

- "1 The channels of radio communication shall be perpetually maintained and controlled by and for the people of the United States, and shall never be permitted to become private property.
- "2 The use of these channels for any form of radio communication shall be permitted only by Federal license, issued for a period of not less than three or more than five years and subject to revocation on proof of any violation of its major provisions.
- "3 Authority to issue and revoke licenses, to refuse to issue licenses whenever it appears that the public in-

terest is best served by such refusal, to assign wavelengths, call letters, to establish power limitations and to formulate and enforce regulations in connection with said licenses, shall be vested by law in some executive branch of the Federal Government, with adequate funds appropriated by the Congress to maintain the necessary special organization.

"4 Neither the holding of a broadcasting license prior to the passage of the new law, nor the ownership and operation of broadcasting equipment prior thereto, shall constitute any vested right to a license under said new law. Licenses issued under said new law shall not be transferable.

"5 Broadcasting stations shall not be deemed to be common carriers under the law, and shall retain the right to determine the character of all material broadcast.

"6 The law shall make specific provision for appeal to the courts on questions of law and constitutional right from decisions rendered by said executive branch of the Federal Government.

"7 There shall be no tax levied on radio receiving sets or parts, or upon broadcasting equipment or operation, for any special purpose related to radio broadcasting or government regulation thereof."

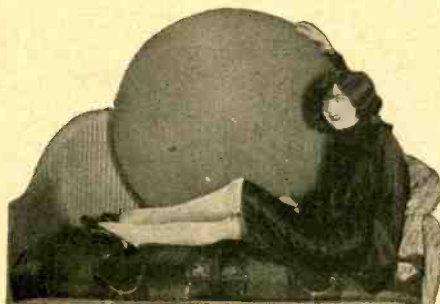
GERMANY REACHES BRAZIL WASHINGTON

Wireless communication between Germany and Brazil has been established, according to a report to the Department of Commerce.

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3 GIANT FOOT CONE SPEAKER Parts Complete **\$14.15** including Unit

In one evening, and for one-fifth the retail cost, you can build a 3' cone speaker, equal or superior in tone quality to the highest priced speaker that you can buy. But you must use the

Penn CONE SPEAKER UNIT

to get the low bass notes clear and musical and the high notes mellow and distinct. Penn C. S. Unit is adjustable to the output of the set with which it is used; designed especially for 3' cone speaker. Price, \$9.50. Complete parts for 3' cone, including unit, \$14.15. Pamphlet, "How to Build a Giant 3' Cone Speaker," sent for 10 cents, coin or stamps.

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THE BROWNING-DRAKE CIRCUIT—Text and illustrations covering this famous circuit starting with our issue of Aug. 14. The 3 numbers sent on receipt of 45c. RADIO WORLD, 145 W. 45th St., N. Y. C.

FOR ONLY 15 CENTS get full directions how to build the Bernard. Radio World, 145 W. 45 St., N. Y. C.

Wave Jumping Annoys the Navy

WASHINGTON

The Navy broadcasting station at Arlington, which daily sends out weather reports, time signals and other Government matter, has not escaped the effect of stations jumping of wavelengths. In two cases the jumping resulted in interference with reception of weather reports by coastwise vessels such as tugs, towing barges which do not carry licensed operators and rely upon the conventional broadcasting receiver and loud speaker for the reception of this vital weather information. Steps have been taken by the Navy to request the broadcasters to so arrange their programs as not to interfere.

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DAVEN BASS NOTE CIRCUIT KIT
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The latest improvement in amplification at a low cost. Connects like audio transformer.

SAMSON ELEC. CO.
CANTON, MASS.

Much Pains Taken In Radio Rehearsal

Each week the artists who are heard in the Royal Typewriter Hour from Stations WJZ, WRC, WGY and WBZ, spend more time in preparing and rehearsing the feature than is spent before the microphone in the actual broadcast. The art of radio presentation has reached such a degree of perfection that it is felt that this time is essential in order to give the listening audience a performance with the finish and polish that characterize these broadcasts.

Weeks in advance the programs are planned, and as soon as the selections

have been decided upon, the scores are obtained. These are gone over by Lucien Schmidt, the director of the orchestra, who makes an arrangement suitable for his organization. Early in the week that the program is broadcast, the entire orchestra spends several hours in rehearsing its part of the broadcast. At the same time, the two soloists, Miss Erva Giles, who sings the part of the Royal Heroine, and E. Boardman Sanchez, as the Royal Hero, are busy rehearsing their parts. Two days before the broadcast is to take place, the orchestra and soloists are brought together and the entire broadcast is run through to gain co-ordination. Then the announcer is brought in and the performance is again rehearsed, this time with the announcements read between each selection. While this rehearsal is not broadcast, the microphone is open and connected with a loudspeaker in an adjoining room where there are several critics who note any flaws in the performance and see to it that they are corrected. The final or dress rehearsal takes place at seven o'clock on the Thursday night of the broadcast. This rehearsal takes one hour, and then the artists are given an hour's rest before they go on the air at nine o'clock.

The Royal Hour is well liked by fans.

Five More Stations Jump Wavelength

WASHINGTON

Ten new stations have been licensed by the Department of Commerce while five stations have jumped wavelengths and one station has changed its call. This is the largest number of changes that the Radio Section of the Department of Commerce has experienced in one week for a long time.

NEW STATIONS

- WARS—Amateur Radio Specialty Co., Brooklyn, N. Y., 295 meters, 1016 kc.
- WKBZ—Karl L. Ashbacker, Ludington, Mich., 256.3 meters, 1170 kc.
- KRAC—Caddo Radio Club, Shreveport, La., 220 meters, 1363 kc.
- WKBW—Churchill Evan. Assn., Buffalo, N. Y., 362.5 meters, 827 kc.
- KRLD—Dallas Radio Labs., Dallas, Texas, 357.1 meters, 839.6 kc.
- WKBY—Fernwood Quick, Danville, Pa., 220 meters, 1363 kc.
- KGDA—Home Auto Co., Dell Rapids, S. D., 254.1 meters, 1180 kc.
- WHOG—Huntington Broadcasters Assn., Huntington, Ind., 241.8 meters, 1240 kc.
- KRSG—Radio Sales Corp., Seattle, Wash., 499.7 meters, 600 kc.
- WCGU—Chas. G. Ungar, Lakewood, N. J., 350.6 meters, 855.2 kc.

WAVE CHANGES

- WJBY—Gadsden, Alabama, from 270.1 to 260 meters.
- KNRC—Santa Monica, Calif., from 208.2 to 280 meters.
- KFEC—Portland, Oregon, from 247.8 to 252 meters.
- KGGG—Newark, Ark., from 234.2 meters to 239.9 meters.
- KFUT—Salt Lake City, Utah, from 260.7 to 263 meters.

CALL CHANGE

- WBBS—New Orleans, to WKBT.

Make any Good Receiver
BETTER
AX
CEC
TUBES
C.E.MFG.CO.
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NATIONAL in name NATIONAL in fact

There is not a small corner of this United States in which NATIONAL Browning-Drake Radio Frequency Transformers, NATIONAL Velvet Vernier Dials and NATIONAL Variable Condensers are not known and appreciated. This really applies to the whole world.

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PANEL, SUBPANEL
AND THE WIRING **\$1.00**
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An entirely new and original system of R. F. amplification and stabilization.

THE KIT CONSISTS OF

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- 3 Alden Somerbridge Fixed Balancers
- 1 By-pass Condenser
- 2 Sets of Working Drawings

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The AIRGAP SOCKET
"It gets that last mile"

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At Dealers, or direct postpaid 60c

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HOW TO BUILD THE BERNARD, the beautiful 6-tube thumb-tuning set, fully described and illustrated in the Oct. 16 issue. Send 15c for a copy. Namepieces for affixing to front panel free to all on special request. Radio World, 145 W. 45th St., N. Y. City.

THE GREAT AID OF BY-PASS CONDENSERS, by John F. Rider, appeared in RADIO WORLD dated May 8. Sent on receipt of 15c, or start sub. with that number, RADIO WORLD, 145 W. 45th St., N. Y. C.

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JUICE FROM THE AURORA USED BY WBZ

Telegraph System Works Mysteriously Without Battery Supply at Either End of Line and Phenomenon Is Ascribed to Northern Lights

The recent mystery at Westinghouse Station WBZ of Springfield and WBZA of Boston which enabled the engineers to talk by telegraph to each other without battery current being supplied to the line has been disclosed.

The two stations operated in synchronism maintain a direct line connection between Boston and Springfield where studios and transmitters are located respectively. This line carries three different circuits as three distinct uses are made of this connection; one for broadcasting, a second for controlling the stations' assigned frequency and the third for telegraph inter-communication.

Uses Simplexing Line

The telegraph system between WBZ and WBZA is operated by means of simplexing the line, and the battery current must be put on the line at either or both stations to use the telegraph. In the course of an evening's broadcast, the engineers at both stations are constantly in communication by means of telegraph.

The evening of the mystery was no exception, but during the early part of the broadcast the telegraph instruments kept making signals which the operators could not read. The telegraph line had been receiving the necessary current for maintaining communication from the Springfield station and in order to trace the cause of the strange signals, Engineer Wolfe took the Springfield battery off the line. The meters showed, however, that the line was still receiving current and he signaled Engineer Robinson at

Boston and asked if Boston was supplying current.

Still It Worked

Engineer Robinson replied in the negative but it was still found that the telegraph system could be operated without current being supplied at either end of the line. At that time, approximately nine o'clock, the Northern Lights were at their greatest intensity and for more than one hour and a half the operators discovered the Aurora Borealis was supplying sufficient current to operate the WBZ telegraph system. With the disappearance of the Aurora Borealis about 10:30 P. M. the operators were forced to put back the batteries on the line to operate the telegraph.

Another interesting feature caused by the Aurora Borealis during the time this phenomenon of nature operated the WBZ telegraph was the change in the direction of the current which occurred every few minutes. Each time the direction of the current changed the telegraph keys clicked and the operators were able to note the direction of the flow of current by reading their meters.

Special Coil Used By Coast Patrol

WASHINGTON

Seventy-five patrol boats of the U. S. Coast Guard have been equipped with radio direction finders designed by the Bureau of Standards.

The Bureau was requested to design a special direction finder which will operate on 2100 kilocycles. The result was a direction finder which consists of a 4-turn 20-inch coil located over the pilot house and rotated from below. This coil is connected with the ship's receiving set through a special coupling unit. All tuning adjustments are locked at the 2100 kilocycle position.

THE ONLY AUTHORIZED

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FREE RADIO CATALOG & GUIDE of 1927 ideas. 164 pages of special hook-ups with illustrations. Shows savings up to 50% on standard radio parts, sets, kits. Be sure to get this thrifty book before you buy. Also please send address of another radio fan. Write letter or postal NOW
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SIMPLIFIES THE CONNECTING OF
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SEPARATE COLORED WIRES
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AND 30-40-50-100-FOOT UNITS
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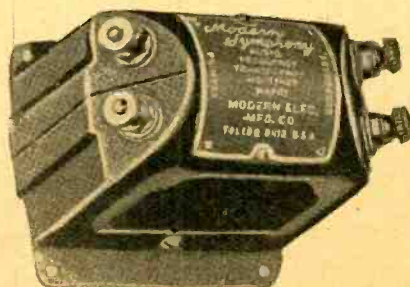
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If you are building the "Singletrol" circuit, described in Radio World, stick to "Symphony" transformers as specified. They were selected for performance and dependability.

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\$6.00
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Dealer's
or by Mail



Efficient
Uniform
Give Fine
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Quality

The Modern Electric Mfg. Co., Toledo, Ohio

Efficient Aerial Very Important

An efficient antenna system is an aid to any receiver. It cannot be efficient, however, unless each and every article included is of the highest quality. That is the reason for the inclusion of the Swan-Haverstick "Aero" aerial kit in the list of parts for the Singletrol receiver described in the Oct. 30, Nov. 6 and 13 issues of RADIO WORLD. The kit contains 100 feet of No. 7/22, better known as No. 14 hard drawn copper enameled wire; 50 feet No. 14 rubber covered braided covered lead-in wire; 25 feet No. 18 cotton covered flexible fixture wire; one Safe-Guard Bakelite lightning arrester, approved by the Board of Fire Underwriters; four porcelain nail knobs; two screw eyes; two screws; one S-H copperground clamp; one porcelain tube, 8" long; two porcelain insulators; twelve insulated staples; one S-H window lead-in strip; tacks and complete instruction sheet. Each part included is of the highest quality.

The necessity for good aerial parts can not be stressed too hard, for only after an actual installation can it be appreciated.

Of special interest is the lightning

arrester. It is made up of pure Bakelite, giving it durability for any type of weather. It may also be used with success indoors. It is very compact and can easily be mounted with the aid of a special bracket, given with the arrester. A protective petticoat, resembling a corona shield, protects the wire, held by screws and nuts underneath this shield. The bracket is of sufficient length to keep the arrester away from the wall to conform with the rules and regulations of the Underwriters. The arrester will stand up under the very highest possible voltage surges. It is hermetically sealed so as to keep out moisture, dust or lint.

RESULTS EDITOR:

I built the Bernard 1-tube receiver described in the Oct. 24, 1925 issue of RADIO WORLD and am most gratified with the results. The volume on the single tube, on locals, was great. In some cases I could operate a speaker. I added a single stage of transformer coupled audio frequency amplification and now every local and even distant stations come in with tremendous volume on the speaker. The set is simple to tune. No interference from stations is noted. The regeneration control action is very smooth and stable. It is a good, reliable set.

ARTHUR GREENBERG,
2675 Valentine Ave., N. Y. C.

LIST OF PARTS

For Singletrol

PBGF—One antenna coil (iron core transformer PBGF or a Singletrol radio independence coil).

L1L2, L3L4, L5L6—Three matched Singletrol radio frequency transformers.

C1, C2, C3—A single shaft .00035 mfd. Continental variable triple condenser.

C5, C6, C7—Three Aerovox .001 mfd. fixed mica condensers; one extra condenser, same capacity, to bypass R2.

C4—One Aerovox .00025 mfd. mica fixed grid condenser, without clips.

AFT1, AFT2—Two Modern Symphony all-stage audio frequency transformers.

1, 2, 3, 4, 5, 6—Six Eby push type sockets.

J—One Electrad single closed circuit jack.

LS—One Bruno light switch, less bulb.

R3—One Electrad 2-ohm power rheostat.

R2—One Centralab 400-ohm potentiometer, used as B rheostat.

R1—One Lynch 2-megohm metallized fixed resistor.

One National Velvet Vernier illuminated dial, type C, with bulb.

One 7x21-inch front panel.

One 9½x20-inch subpanel, hard rubber or bakelite.

Two American Radio Hardware Co. aluminum subpanel brackets.

One Lynch single mounting for grid leak R1.

One C battery.

One Birnbach 6-lead battery cable (A plus, A minus and B minus, C minus, CC minus, B plus det. and B, plus amp).

Ten lengths of stiff Acme Celatsite, vari-colored.

ACCESSORIES

One Swan-Haverstick aerial kit.

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Just state number wanted and we will ship same day order is received, by express C.O.D. Pay expressman after examining batteries. 5% discount for cash with order. Remember, you save 50% on World Batteries—so send your order today.

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Set your radio dial at 288.3 meters for the World Storage Battery Station WSBC. Variety—new talent—always interesting. Jerry Sullivan, Dir. and Announcer. "Ch-CAW-go"

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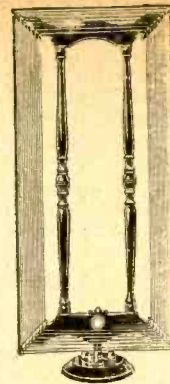
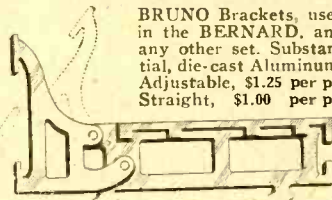
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Eliminates hand rheostats. Simplifies set-wiring.

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How to Build THE DIAMOND

5-Tube Model

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"Built Better"

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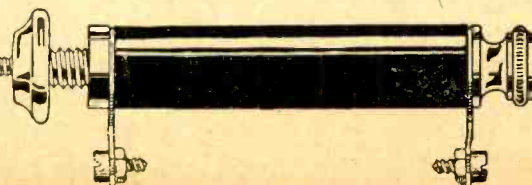
GETTING DX by Capt. P. V. O'Rourke, appeared in RADIO WORLD dated April 3, 1926. 15c per copy or start sub. with that issue. RADIO WORLD, 145 West 45th St., N. Y. C.

THE BRETWOOD

Variable Grid Leak Certified for The Diamond



The Diamond of the Air Owing Some of Its Efficiency to This Leak



THE BRETWOOD

Improves Any Set!

Price, \$1.50

NORTH AMERICAN BRETWOOD CO., 145 West 45th Street, New York City

Eight Microphones Installed in Hall

That the series of Saturday evening concerts being broadcast by the Boston Symphony Orchestra through arrangement with W. S. Quimby, of Boston, and G. H. Jaspert, director of WBZ, may be transmitted as perfectly as possible both from the musical as well as the mechanical standpoint, specially designed and constructed microphones and associated equipment have been installed in Symphony Hall, Boston, by the Westinghouse station engineers.

Eight microphones are used in sending out these concerts through WBZ and the chain network including WJZ, WGY and WRC. While two sets of three microphones each have been installed in the

hall for picking up the music, only one set is used during a single broadcast. The second or emergency set of three microphones is installed so that immediate switching may be accomplished in case of trouble with the first set. The two other microphones used in this broadcast are installed in the control room in the WBZ broadcasting booth at Symphony Hall where the operators and announcer monitor all the programs before they are put on the line.

For picking up the music of the orchestra, two mikes have been suspended from the ceiling on each side of the hall slightly in front of the stage, and another mike is set up on a stand on the floor of the hall directly in front of the conductor's platform. The emergency set of mikes has been installed in the same manner, thus requiring only the throwing of a switch to transfer from one set to the other.

WOOD Announces Air Mail Feature

A new feature inaugurated by WOOD, Grand Rapids, Mich., consists of a popular or jazz group of artists who fill requests received by air mail.

Besides hearing his request selection broadcast, each listener who sends a letter to the station via air mail also will receive a souvenir of the station by return air mail.

The new leg of the air mail services opening between Grand Rapids and Detroit still further facilitates the speed with which the request letters may literally "fly" to the station only to be quickly followed by the broadcasting of the composition and the flight of the souvenir in return. Government air mail stamps will be affixed to the red, white and blue striped envelopes. The pictorial souvenirs of WOOD's studios and rural transmitter, which also include numerous views of Grand Rapids the Furniture Capital, are being prepared by the Grand Rapids Association of Commerce.

Croxton Replaces Wilfred Glenn

Frank Croxton, concert and light opera bass of many years' experience, is filling Wilfred Glenn's place as a staff artist of the Eveready Hour during Glenn's engagement in London.

Glenn left in September with a group of American radio stars to sing at Prince's Supper Club in London. He is expected to return shortly before December 1 and will rejoin the Eveready Hour staff upon his return.

Croxton is a native of Kentucky and has been singing since he was a boy. His father was a music instructor and singer of note in the South for years and gave his son his earliest instruction in music.

Croxton went to New York as a very young man. For several years he sang in light opera with the Broadway Theatre Opera Company, in productions of the DeKoven and Gilbert and Sullivan type. He also appeared in a number of oratorios and frequently has been engaged in recording for several of the phonograph and talking machine manufacturers.

Station's Quality Laid to Batteries

The wonderful clarity of signals from station KRLD, owned by the daily Times-Herald, the Dallas Radio Laboratories and the Adolphus Hotel, located in Dallas, Tex., operating on a wavelength of 357.1 meters (840 kilocycles), which was recently opened, is ascribed to the use of storage batteries for plate supply. The station is rated at 500 watts.

Finer Reception

Follows the Installation of

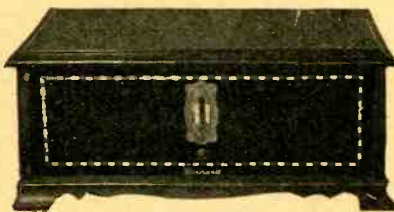
The Bretwood Variable Grid Leak



Precision Range, 1/4 to 10 Megohms

It Can Be Installed in Five Minutes in Any Set!

The Bretwood specified by Herman Bernard for the Diamond of the Air, both four and five tube models, and for the Bernard circuit.



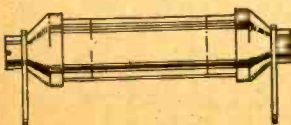
View of the Bernard Receiver

The Bretwood may be mounted on the subpanel, as at rear center in the Bernard,, turned to most efficient setting, and left thus.

BRETWOOD BULLET CONDENSER

Excellent for the grid condenser in any circuit.

Price, 60c.



Capacity .00025 mfd. (actual size)

The Bretwood Variable Grid Leak, \$1.50; with bullet condenser attached, \$2.00. Condenser alone, 60c. Send money order, check or stamps. Five-day money-back guarantee.

North American Bretwood Co.,

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New York City

SERVICING A RECEIVER

(Continued from page 12)

erative type) is most efficient when good riddance is said to the squeals.

To sum up, therefore, on the point of neutralizing or balancing the receiver, the first thing to do is to discover where the self-oscillation is taking place, and next apply the aforementioned remedies.

Now as to volume and DX, the Bernard produces more volume on local stations than most power tubes can safely handle without overloading, and the distant stations that have been tuned in at Radio World's laboratories are numerous enough to look like a condensed edition of broadcasting stations. Therefore every confidence should be placed in the receiver, since it was expertly designed and comprises parts of high efficiency.

Antenna Phase Change

Volume and DX are twin problems, because a set that does not give sufficient volume on locals will not render distant stations audible. Under some conditions the aerial and ground leads should be reversed. Suppose you are servicing an existing Bernard receiver. Simply remove the aerial and ground leads, putting the aerial at the post marked "Gnd" and the ground post marked "Ant." The effect of this change is shown schematically in the accompanying diagram of the set. In fact Herman Bernard uses this method in his personal receiver, which he operates in his home.

Those who did not get distance, or not enough of it, will find that changing antenna coil the polarity as explained, or changing from reversed to aiding phase, to put it differently, produces a pronounced effect on both volume and sensitivity.

Aside from any broken part or connection, or wrongly wired lead, no troubles need be normally expected except those discussed or suggested in this article. Shorting of plates of variable or fixed condensers, breakdown of resistors, etc., are faults so rare in this set as to be unseemly.

AT YOUR SERVICE

Rate: 10 cents a word. No advertisement less than ten words.

NEW YORK

Manhattan

DON'T endure poor radio reception. The right tubes, right battery voltages, correct wiring, etc., give you the utmost from your set. Let me improve your receiver if it is not up to snuff.—Max Lager, 221 Fulton St., N. Y. City.

DIAMOND OF THE AIR service. DX reception improved, if due to conditions in receiver. Also specialize on Bernard set.—T. Forshaw, 115 E. 82d Street.

Brooklyn

IF YOUR SET does not work properly we can put it in fine condition. Experts on Atwater-Kent, Ferguson, Freshman and Stromberg-Carlson. Familiar with all Radio World circuits.—Bert Reinitz, 127A Clarkson Ave., Brooklyn, N. Y.

EXPERT SERVICE on Bernard, LC27, Henry-Lyford, Infradyne, Diamond of the Air, Browning-Drake, Victoreen, Lynch Lamp Socket Amplifier. Special attention to electrification of receivers and getting rid of motor-boating. Write to 122 Stuyvesant Ave., Brooklyn, N. Y., or phone Bushwick 1676.—Sidney Buchalter.

PHILADELPHIA, PA.

SINGLETROL service. Also Bernard and Diamond hookups thoroughly understood. Familiar with circuits popularized by magazines.—A. Witz, Widener Bldg.

Industry Strong, Stock Rise Shows

By O. C. KYLE
Financial Expert

The present strength of the market finds the radio shares fulfilling predictions. During the previous slump, shares of Radio Corporation of America, Freshman, Grimes and many others, successfully withstood every attack of the professional short drive. The upward turn of the market began after the election and uncovered an extensive short interest in the radio stocks. Judging from the way in which the very limited offering of stock is quickly grabbed, and the eagerness of traders bidding for more, the shorts will pay dearly for their indiscretion. Little, if any, stock is offered.

The recent excellent report issued by

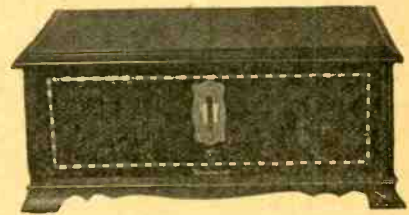
Radio Corporation of America, with the general information of big business enjoyed by Freshman and others of the established radio concerns, together with the plentiful supply of funds available for investment in new radio companies of merit only goes to show that the public has at last awakened to opportunities of the radio industry.

From present indications it is reasonable to assume that before very long the radio industry, now eighth in the United States, will take its place with steel, automotive and motion pictures, higher up on the scale. It is now recognized that radio is a household necessity and has come to stay.

Of interest to fans is the coming announcement of the organization of a corporation to manufacture and sell a popular 6-tube set along lines established by Ford in the automotive field. The set works without batteries.

Bernard

A 6-Tube Balanced Receiver, Rich in Volume and Tone Quality, and Surpassingly Beautiful to the Eye as Well as to the Ear.



THE woman of the house, with an eye toward the home beautiful, selects the Bernard for its handsome appearance and simplicity of operation.

The music lover chooses the Bernard because of the charming tone quality.

The home constructor selects the kit because he knows the circuit is expertly designed.

The best of parts were selected by Herman Bernard for this receiver. They include Bruno Unitune, Bruno adjustable brackets, Aero super-sensitive coils, Electrad by-pass condensers, rheostat and Royalty variable resistance, Lynch metalized fixed resistors, Aerovox fixed condensers and Lignole panel. The above parts are manufactured by

Bruno Radio Corp., 40 Paynter Ave., L. I. City, N. Y.
Aero Products, Inc., 1772 Wilson Ave., Chicago, Ill.
Electrad, Inc., 428 Broadway, N. Y. City
Arthur H. Lynch, Inc., Fisk Bldg., N. Y. City
Aerovox Wireless Corp., 489 Broome St., N. Y. City
Lignole Corporation of America, 508 South Dearborn St., Chicago, Ill.



The circuit consists of a first stage of untuned radio frequency amplification, a tuned second stage and tuned detector input, followed by three stages of resistance coupled audio.

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

Julia Marlowe Graces Microphone

Julia Marlowe, foremost American actress of Shakespearian roles, came out of retirement from the stage to present her art before the biggest audience of her career—the radio audience. Miss Marlowe was the star of the Eveready Hour program broadcast from Station WEA, of New York and its affiliated stations.

Miss Marlowe's voice, one of the most marvelous in the history of the stage, was heard for the first time "on the air." Thousands of listeners who had seen and heard her on the stage and millions of others who had neither seen nor heard her, heard Miss Marlowe's voice in con-

tributions that drew upon her memorable repertoire.

For this program, directors of the Eveready Hour bore the Armistice anniversary in mind. Last year, it will be remembered, the entire program was reminiscent of that memorable November 11th, 1918. The program this year made no attempt to recall to the audience the complete picture of that day in France which ended the greatest war of all times, but there was ample reminder of the observance of the anniversary. Miss Marlowe lent her great talent in honoring the heroes of the World War, and the Eveready "regulars"—the artists and orchestra of the Eveready Group—harked back for a few moments to that day of eight years ago.

Studio Damaged By Reprisal Blast

Three men tried to force an entrance into the main studio of WAAM, Newark, N. J. At the same time the companion studio of the East Orange Chamber of Commerce, hooked up with WAAM, was wrecked by a mysterious explosion.

Thomas F. Burley, Jr., secretary manager of the Chamber, left the studio two hours before the explosion. He said there was nothing in the studio when

he left that could have caused an explosion or a possible fire. About two weeks ago, Mr. Burley was threatened over the telephone that if he did not desist from broadcasting crime news and editorials his head would be "knocked off."

Since the Elizabeth (N. J.) mail robbery, some weeks ago, Mr. Burley has spoken over the air each time a serious crime has taken place. He advocated greater police efficiency and simplification of court procedure to convict criminals. He also added that a central broadcasting station with receivers should be installed in all police stations, so that all police alarms could be handled with utmost dispatch.

The radio studio where the explosion happened is a soundproof room on the second floor of a fireproof building at 451 Main Street, Newark, N. J. The force of the explosion blew out the plate glass windows on the first and second floors and the explosion and subsequent fire destroyed the contents of the radio room.

The headquarters of the East Orange Fire Department are directly across the street from the studio and Acting Assistant Chief Daniel Cohen examined thoroughly the building and the vicinity but could find no traces of a bomb, nor was there any evidence to show that any entrance to the Chamber of Commerce offices had been forced.



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Super Coils**
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Geo. W. Walker Co.
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10 CENTS A WORD
10 WORDS MINIMUM.
CASH WITH ORDER.

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"ACQUIRE" A MODERN KNOWLEDGE OF RADIO—30 cents. No stamps. Arthur Hanson, Box 582, Station C, Los Angeles, Cal.


OVER TWO POUNDS BUILDER'S DATA, catalog, circuits—25c, prepaid. Twenty weekly mailings, newest "dope," \$1.00. Kladag Laboratories, Kent, Ohio.

SEND FOR PAMPHLETS OF THE GOODMAN TUNER—In use for years and still good. Tested and approved by many technical laboratories. L. W. Goodman, Drexel Hill, Penna.

MAKE \$100 WEEKLY IN SPARE TIME—Sell what the public wants—long distance radio receiving sets. Two sales weekly pays \$100 profit. No big investment, no canvassing. Sharpe of Colorado, made \$955 in one month. Representatives wanted at once. This plan is sweeping the country. Write today before your county is gone. Ozarka, Inc., 431 N. La Salle Ave. R., Chicago, Ill.

FREE
NEW 1927 RADIO CATALOG
Write Today to
Chicago Salvage Stock Store
509 S. State St., Dept. R.W., CHICAGO, U.S.A.

MORE THAN a score of new kits—all the latest and best—with specified parts to build them—at prices that mean big savings for you. And all the latest parts and accessories as advertised in current radio magazines. The largest, most complete and up-to-date radio stock in the world. Yours to choose from in this new catalog. Write for your

Replaces "B" Batteries
\$12.50

**FERBEND
"B" ELIMINATOR**

Complete. Operates direct from socket on 110-120 volt A. C. lighting circuit. Delivers up to 100 volts. Second successful year. Amazingly low in price—high in value. Equal or superior to any "B" Eliminator, regardless of price. The FERBEND "B" Eliminator is approved and passed by the rigid laboratory tests of Radio News and Popular Radio.

Ask Your Dealer—or Send Direct
Shipment made direct on receipt of price, or C. O. D. if preferred. Use for 10 days to convince yourself—if unsatisfactory write us within that time and purchase price will be refunded. Write for Literature.

FERBEND ELECTRIC CO.
424 W. Superior St. Chicago, Ill.

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.

FOR ONLY 15 CENTS get full directions how to build the Bernard. Radio World, 145 W. 45 St., N. Y. C.

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Good Back Numbers of RADIO WORLD

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

1926:

- Mar. 6—The 1-Tube Set, by Capt. O'Rourke. The Chemistry of Batteries, by A. R. Reid.
- Mar. 13—The Non-Regenerative Browning-Drake Set (Part 1), by M. B. Sleeper. The Tectron Eliminator, by Lewis Winner.
- Mar. 20—The Super-Heterodyne, by J. E. Anderson. A 2-Tube Speaker Set, by Percy Warren. The Browning-Drake Set (Part 2), by M. B. Sleeper.
- Mar. 27—An Economical 4-Tube Set, by Edgar T. Collins. A Practical B Battery, by Capt. P. V. O'Rourke. Tectron Trouble Shooting, by Lewis Winner.
- April 3—How to Get DX, by Capt. P. V. O'Rourke. A Compact B Supply, by Lewis Winner.
- April 17—The New 1-Dial Powertone, by Capt. P. V. O'Rourke. The Action of Transformers, by Lewis Winner.
- May 1—New Multiple Tube, by Herman Bernard. The Aero All-Wave Set, by Capt. O'Rourke. Kilocycle-Meter Chart. An Analysis of Detection, by J. E. Anderson (Part 1).
- May 8—A Study of Detection, by J. E. Anderson (Part 2). To Wind a Loop on a Card-board Frame. How to Reflex Resistance AF, by Theo. Kerr.
- May 15—Super-Heterodyne Results Brought Up to Maximum, by Herman Bernard. The Truth About Coil Fields, by J. E. Anderson.
- May 22—A Built-in Speaker Set, by Herbert E. Hayden. The Powertone in Operation, by Capt. P. V. O'Rourke.
- May 29—Aerials in Ground and water, by Lewis Winner. Economized Filaments, by J. E. Anderson. How to Get DX, by John F. Rider.
- June 5—Five-Tube Compact Receiver, by J. E. Anderson. A Tester for Tube Circuits, by Spencer Hood. Problems of Portables, by Hugo Gernsback.
- June 19—Selectivity's Amazing Toll, by J. E. Anderson. The Light 5-Tube Portable Set, by Herman Bernard (Part 2). The 4-Tube Rogers-Schudt, by Wm. A. Schudt, Jr. (Part 2).
- July 3—Set with a 1-Turn Primary, by Herman Bernard. Part 2 of the Victoreen Portable, by H. Bernard. Trouble Shooting Article for The Light 5-Tube Portable.
- July 10—A Rub in Single Control, by Herman Bernard. A DX Double Regenerator, by Capt. P. V. O'Rourke. A 2-Tube Dry Cell Receiver, by Samuel Schmalz.
- July 17—A Double Duty Loop Aerial, by J. E. Anderson. How to Measure Coupling, by John Rider. A 1-Control Crystal Set, by Smedly Lyons.
- July 24—Why the Super-Heterodyne Is the Best Set, by Herman Bernard. A 1-Tube Reflex Receiver, by H. A. Reed.
- July 31—What's Best in an AF Amplifier, by Herman Bernard. A 6-Tube Reversed Feedback Set, by K. B. Humphrey.
- Aug. 7—The 5-Tube Tabloid, by A. Irving Witz. The Wiring of Double Jack, by Samuel Lager.
- Aug. 14—The Improved Browning-Drake, by Herman Bernard (Part 1). Storage Batteries, by John A. White.
- Aug. 21—A New Stabilized Circuit, by E. H. Loftin and S. Y. White (Part 1). The Browning-Drake, by Herman Bernard (Part 2).
- Aug. 28—The Constant Coupling, by E. H. Loftin and S. Y. White (Part 2). The Browning-Drake, by Herman Bernard (Part 3).
- Sept. 4—The Four Rectifier Types, by K. B. Humphrey. A Simple Battery Charger, by J. E. Anderson.
- Sept. 11—The Beacon (3-tubes), by James H. Carroll. The 1927 Model Victoreen, by Herman Bernard.
- Sept. 18—The 1927 Victoreen, by Arthur H. Lynch. Eliminator in a Cash Box, by Paul R. Fernald.
- Sept. 25—The Lynch Lamp Socket Amplifier, by Arthur H. Lynch. Wiring up the Victoreen, by Herman Bernard.
- Oct. 2—The Victoreen (Continued), by Herman Bernard. New Equamatic System, by Capt. P. V. O'Rourke.
- Oct. 9—A Practical "A" Eliminator, by Arthur H. Lynch. Building the Equamatic, by Capt. P. V. O'Rourke.
- Oct. 16—The Bernard, by Herman Bernard. How to Box an "A" Supply, by Herbert E. Hayden.
- Oct. 23—The 5-tube P. C. Samson, by Capt. P. V. O'Rourke. Getting DX on the Bernard, by Lewis Winner.
- Oct. 30—The Singletone Receiver, by Herbert E. Hayden. How to Get Rid of Squeals, by Herman Bernard.
- Nov. 6—Reduction of Interference, by A. N. Goldsmith. Variations of Impedances, by J. E. Anderson.
- Nov. 13—The 4-tube Hi-Power Set, by Herbert E. Hayden. A Study of Eliminators, by Herman Bernard.

Any copy, 15c. Any 7 copies, \$1.00. All these 33 copies for \$4.50, or start subscription with any issue. RADIO WORLD, 145 West 45th Street, New York City.

Municipal Talks Urged for WNYC

The Municipal Economy Committee suggested to New York City finance officers that WNYC, the city's radio station, receive no funds for next year unless it gives at least half its time to municipal affairs. George McAneny, the committee's Vice-Chairman, gave out a statement in which he said:

"Of 168 periods, other than police reports announced for the taxpayers' radio station per week, only four, or 2 per cent, taking only forty out of 1,790 minutes, are municipal affairs.

"Leaving out both police and weather reports, which require no expert and ardu-

ous planning by two program directors at \$4,000 and \$3,000, the station is on the air each week 1,670 minutes, of which only forty deal with municipal affairs.

"The Municipal Economy Committee does not suggest that taxpayers discontinue their own radio service but strongly urge that the service be required to do what only a publicly supported radio station may be counted upon to do, namely, help the public week in and week out to understand its own public business.

"The Municipal Economy Committee's proposal is that now is the time for the Board of Estimate and Apportionment, before voting money for WNYC next year, to declare that it must be made an important supplement to other educational agencies for the protection of rent-payers and taxpayers and for their progressive advantage."

RADIO NEWS RADIO WORLD GIVE BST-5 CERTIFICATE OF MERIT

A \$75 Set Direct from Factory at \$40

I received my B. S. T. radio set two weeks ago and I am very well pleased with it.

I had the set working in fifteen minutes and at the end of two hours and a half I had twenty-nine stations logged. The set brings in new stations almost every night.

The cabinet is very well constructed and the people that have seen it say that it is a very beautiful set.

G. C. PARRISH, Dallas, Oregon.

GUARANTEE

Satisfaction or Money Back

Each receiver is tested and retested, boxed and inspected before leaving factory, and guaranteed to reach you direct in perfect condition.

Workmanship throughout guaranteed the best. Assembled by experts.

Renaissance Model Console

With built-in Utah Nit Loud Speaker and commodious compartment in which there is ample room for batteries, charger, eliminators, etc.

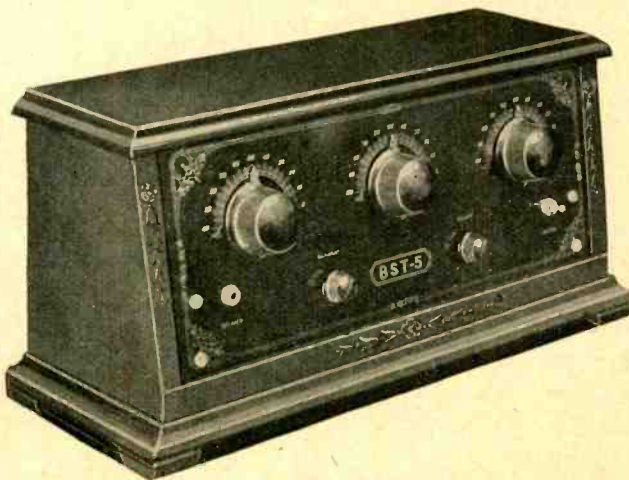
COMPLETE
BST-5
RECEIVER
Loud Speaker
and Console

\$57.00

IMMEDIATE
DELIVERY

\$40.00

Send Check or
P. O. Money Order



New model cabinet, Du Pont Duco finish; base 21" long by 8" wide, height 9½", top 21" by 6". Five-ply walnut veneer piano finish.

THIS highly sensitive, powerful and selective BST-5 radio receiver has all up-to-the-minute improvements. Heavy aluminum automobile type chassis, shielded against stray currents and distortion. Flexible grip, Universal type sockets, eliminating microphonic noises. Has provision for battery eliminator and any power tube. Fahnestock clips on sub-panel for adjusting C battery, has voltages for power tube. Efficient on either long or short aerial, including indoor aerial. This BST-5 sets a new standard for true tone values and selectivity. This BST-5 gives greater volume than many six-tube sets and consumes less current.

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145 West 45th Street New York, N. Y.
RADIO WORLD Guarantees the Responsibility of This Advertiser

The Masterpiece of Masterpieces!



New and Improved **FRESHMAN MASTERPIECE**

—the thing that makes it wonderful is its tone quality. The large cone speaker has been designed to exactly match Freshman's new **QUALITY** radio receiver. This special cone speaker easily handles the full power that this new set delivers. Yet, in spite of its ability to handle great volume, when the power is reduced the softest and mellowest tones come forth in a manner never before achieved by any sound producing device.

Simplicity

Its ease of operation, with it three distinct controls, allows any novice to tune in the station wanted day after day at the same points on the dials. This efficient means of operation eliminates the overlapping of wave lengths, which assures distinct separation of one broadcasting station from the others.

Write for our new booklet illustrating and describing the entire line of Freshman Masterpiece Receivers and other apparatus.

Model 6-F-11 **\$119.50**

Slightly Higher
Denver and West

THIS "Masterpiece of Masterpieces" startles and surpasses all expectations. It is the most perfect radio that has ever been designed. It is massive—it is beautiful. It is just what you want for your home. For no matter how exquisite your furnishings are, this artistic genuine mahogany upright console will lend additional beauty. And yet, it is priced so moderately that almost every family can easily afford to own one.

Genuine R C A Radiotrons

are recommended for use with Freshman Masterpiece Receivers. A special package containing—1 UX-112 power tube, 1 UX-200A detector tube and 3 UX-201A amplifying tubes—matched and tested for the set in which they are shipped; is sold by Authorized Freshman Dealers.

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