

15c

1,000 MILES ON SPEAKER

JULY 26

1924

RADIO WORLD

Title Reg. U. S. Pat. Off.

A New 4-Tube
Reflexed "Super-Het"
By CHARLES H. M. WHITE

A Hook-Up for
Tremendous Volume
By BYRT C. CALDWELL

1,500 Miles on Two Tubes
By HERMAN BERNARD

Fixed Coil Instead of
Variocoupler
By N. N. BERNSTEIN

Why the Metaform is a
Wonder
By WALT S. THOMPSON, Jr.

VOL. 5. NO. 18.

ILLUSTRATED

EVERY WEEK



(Underwood & Underwood)


LEARNING TO SWIM BY RADIO—Pre-breakfast swimming instruction, radiocast from station KYW, Chicago, by the Westinghouse Company, has won many devoted followers. The instruction is on the air at 7 A. M. Ruth Dace is shown going through the exercises. The loud speaker is contained in the portable set. In the afternoon she goes to the beach to see how she is progressing.

TROUBLE-SHOOTING IN THE 4-TUBE 'SUPER HET'

AMPERITE

The "SELF-ADJUSTING" Rheostat

PERFECT for every CIRCUIT
Simplifies wiring
Eliminates hand rheostats
RADIALL COMPANY
320 W. 42nd St., N.Y.

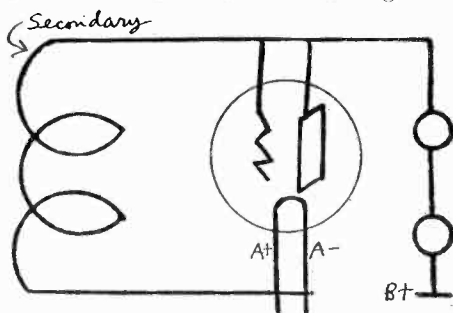


\$1 10
From Your Dealer

Write Dept. W-2
For Free Hook-ups

WHAT'S WRONG HERE?

THE wiring in the accompanying diagram is wrong. If you find what you think is "the error," write to Wrong Diagram Editor, RADIO WORLD, 1493 Broadway, New York City. Mention Wrong Diagram No. 9. The names and addresses of those sending in the right answer will be published. The following sent in the correct answers:



gram Editor, RADIO WORLD, 1493 Broadway, New York City. Mention Wrong Diagram No. 9. The names and addresses of those sending in the right answer will be published. The following sent in the correct answers:

WRONG DIAGRAM NO. 6

- Mrs. A. W. Wallace, 310 North 2nd St., Monroe, La.
- Ray Love, 328 East 12th St., New Albany, Ind.
- E. W. Simons, 141 Central Ave., San Francisco.
- Wm. G. Wheat, 2607 Benton Blvd., Kansas City, Mo.

WRONG DIAGRAM NO. 7

- Ray Love, 328 East 12th St., New Albany, Ind.
- Wm. G. Wheat, 2607 Benton Blvd., Kansas City, Mo.
- Mrs. A. W. Wallace, 310 North 2nd St., Monroe, La.
- H. V. Arney, 430 Elm St., Wabash, Ind.

WRONG DIAGRAM NO. 8

- John A. Rose, 32 West 40th St., New York City.
- H. W. Eisenhart, 392 Wheatfield St., York, Pa.
- Herman J. Brandt, 613 McKinley Ave., Lynchburg, Va.
- Walter A. Ott, 412 South Main St., Corbin, Ky.
- Jos. E. Bouck, 742 Jefferson Ave., Grantwood, N. J.
- Ray Love, 328 East 12th St., New Albany, Ind.
- Wm. G. Wheat, 2607 Benton Blvd., Kansas City, Mo.
- C. R. Dunbar, 718 Wellington St., Waterloo, Ia.
- Wm. H. Couch, 108 Shelton Ave., New Haven, Conn.
- Charles H. Shurtleff, care Radio Rite Shop, Parker, S. D.

DETROIT POLICE INSTALL SETS ON FOUR AUTOMOBILES

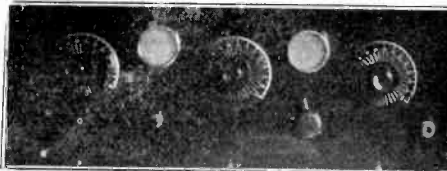
RADIO-equipped automobiles with loud speaker attachments have been put into active use by the police department in this city. Three big touring cars have been equipped with five tube Neutrodyne sets. These fit in a compartment in back of the driver's seat.

Outwardly, there is nothing to show that the cars have radio sets, as the antenna is concealed in the top and the frame of the car acts as a counterpoise. Each car has a windshield seven-eighths of an inch thick, made of bullet proof glass. Two gun racks, on the heelboards of the front and rear seats, each carry a sawed-off shot gun.

The cars will be in service twenty-four hours a day and will be in touch constantly with the Headquarters Station KOP which broadcasts on a wavelength of 286 meters.

HOW TO MAKE THE

??????
What shall we call it?



After a great deal of experimenting and testing, we have evolved what is undoubtedly the most sensitive, most selective, and most satisfactory two tube receiver which has ever been designed. In fact, it is more sensitive than any three tube receiver, more so than all but a few, a very few, four and five tube receivers.

The receiver uses but two tubes, and yet it is extremely sensitive, equal in this respect to the five tube tuned radio frequency receivers such as the neutrodyne. By that we mean that under ordinary good conditions, the receiver will bring in stations from all over the country on the loud speaker! And with but two tubes!

SELECTIVITY. No more selective receiver has ever been made. Local stations may be tuned out, and stations a thousand miles or more can be tuned in without the least interference, even if their wavelengths are but a few meters apart.

STONE. A crystal detector is used, and as a consequence, the tone is perfect. There is no howling, and no radiation.

PRICE. At the cost of an ordinary two tube receiver, you can make this super-sensitive, super-selective super receiver. In the directions, instructions are given, so that with a little work, and at no cost, you can use low priced apparatus, and so change this, that it is equal in efficiency to the highest priced equipment. This alone is worth the price of the direction many times over.

If you are going to build a receiver, if you build receivers for others, or if you are going to build any kind of a receiver, you should order today.

We sell the complete outfit of parts for this receiver, assembled, ready for wiring, or we sell the receiver, ready for operation, with a guarantee of perfect results.

When you order your directions, suggest a name for this wonderful receiver. As soon as a satisfactory name is received, we shall present to the person who suggested it, one of these receivers, made from the best parts which money will buy. Will you be the winner? Order now!

PRICE - Complete instructions, hook-up, diagrams, etc., etc.

\$1.50

Dealers! Write us for prices on this lightning seller.

The Biltmore Radio Co.

Dept. W-4 Boston 30, Mass.

SUPERTRAN

Key U. S. Patent Office

THE IDEAL AUDIO FOR NEUTRODYNES



Every Neutrodyne Receiver requires audio transformers which are especially built for this circuit. Build right by selecting SUPERTRANS first! Greatest volume. Least distortion.

Works equally well with all types of modern tubes.

Price \$6.00

At your dealers or by mail postpaid on receipt of purchase price. Write for our free literature.

Ford Mica Co., Inc.

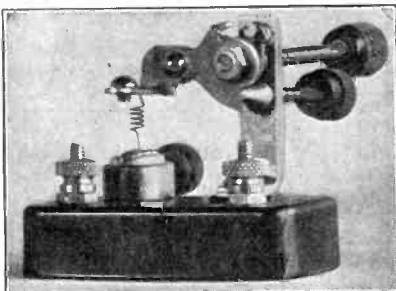
33 East Eighth Street, New York

New England Distributors:
Wetmore, Savage Co., Boston, Mass.
Western and South-Western Distributors:
Beckley-Ralston Co., Chicago, Ill.

Ambrose Marvelous Crystal Detector

Gives Best Results On Crystal or Reflex Sets

Every Detector Guaranteed 100% Perfect



Beats 'Em All At Your Dealers or Mailed Prepaid

\$2.00

DISTRIBUTORS WANTED

For Particulars Write

Ambrose Radio Company, 220 Vernon Ave., Brooklyn, N. Y.

Tested and Approved by Radio World—Mechanically and Electrically Perfect.

HENLEY'S WORKABLE RADIO RECEIVERS

An Authoritative 240-Page Book on Practical Receiving Sets of Modern Design with Complete and Explicit Directions for Building Them.

Written and Edited by a Staff of Radio Engineers of Practical Experience and Best Theoretical Training.

Price \$1.00 150 Diagrams and Illustrations Specially made for this book.

THIS new book contains complete and detailed descriptions of many types of receivers which, by long experience, have proved to be the most satisfactory from the viewpoints of selectivity, sensitivity, convenience and economy of operation, dependability, and signal quality. It gives in greatest detail, circuit and wiring diagrams, panel and baseboard layouts, and drilling templates, so that any amateur may build a successful receiver from the directions given.

It also includes a discussion on the principles underlying each circuit, and shows clearly how to test and calibrate the receivers.

In order to help the Workable Radio Set builder, who may not be familiar with the conventional symbols used, in hooking up a set, each of the receiving sets is illustrated by a complete full page diagrammatic drawing, showing just where to attach the wires, location of condensers, rheostats, transformers, vacuum tubes, plugs, jacks, etc.

THE COLUMBIA PRINT
1493 BROADWAY NEW YORK CITY

GET THOSE SUPERDYNE COPIES

THE Superdyne Circuit, brought up to date in diagrams and text, in RADIO WORLD for May 17, 24, 31. Per copy, 15c; the three copies, 45c, or start your subscription with the first number. RADIO WORLD, 1493 Broadway, New York City.

RADIO WORLD

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

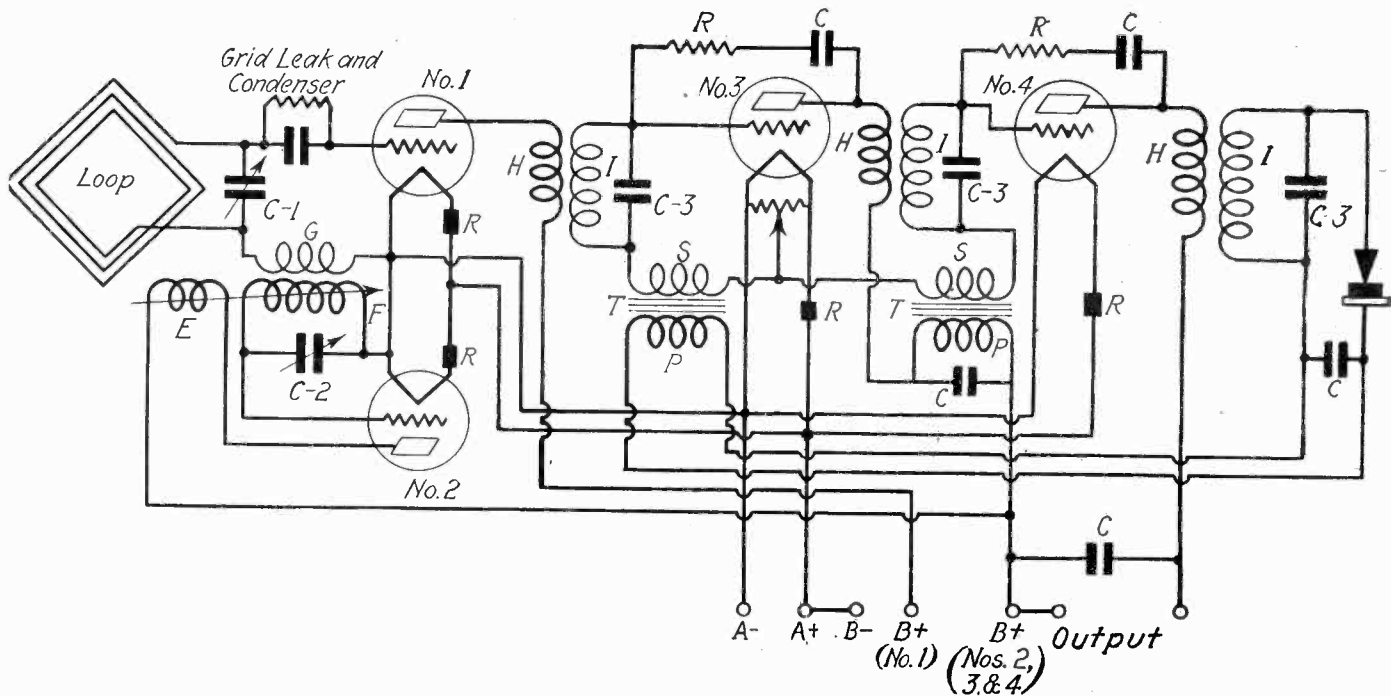
A Weekly Paper Published Every Wednesday and Dated Saturday, by Hennessy Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Phones: Lackawanna 6976 & 2063.

Vol. V. No. 18. Whole No. 122

July 26, 1924

15c. per copy, \$6.00 a year

A 4-Tube Reflexed Super-Heterodyne



THREE STAGES OF RF, oscillator, crystal detector and two stages of AF are accomplished in this 4-Tube Super-Heterodyne by reflexing (Fig. 1). The loop is a standard short-wave affair. E-F-G are the windings of a standard Super-Heterodyne coupler, of which there are several makes on the market. E is the rotor, but needs no dial, for once set right it need never be varied. C1 is an 11 or 13-plate variable condenser, which, with the loop, constitutes the main tuning control. H-I constitute three RF transformers, H being a honeycomb coil of 75 turns and I a honeycomb coil of 350 or 400 turns, both being tied tightly side by side for close coupling. The fixed condensers C3 should all be of the same value, .001 mfd. C are five .002 fixed condensers for bypassing and blocking. R are .05 megohm leaks, for stabilizing. T are good make AF transformers. The crystal may be a fixed one. The grid leak and grid condenser are of the usual values. The tubes are numbered to correspond with the accompanying text.

By Charles H. M. White

Consulting Engineer

THE Super-Heterodyne is without doubt the most discussed radio receiver at the present time. Its extreme selectivity coupled with the fact that it can be operated without aerial or ground for distant reception makes it an especially appealing outfit for all-around use. The advent of the UV199 type of tubes has made it possible to remove this type of receiver from the confines of a home or laboratory and make it completely portable. Whether the Super-Heterodyne will continue to be popular will depend upon two things, the reduction of the cost of operation and the maintenance of a high degree of efficiency per tube. The main cost of operation is the replacement of A and B batteries and the tubes that burn out, naturally or through accident. The maintenance of a high degree of efficiency per tube is dependent upon the ability so to design the receiver that the maximum use



CHARLES H. M. WHITE

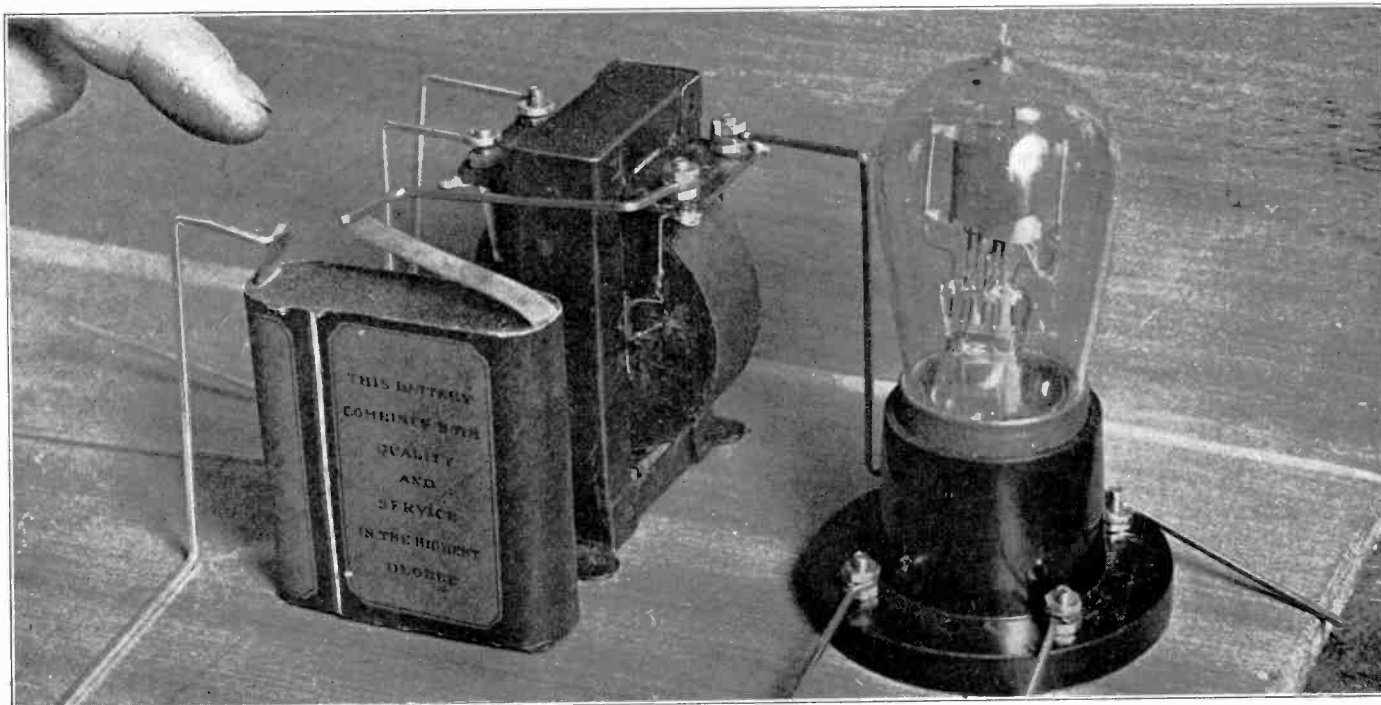
is obtained from each tube. The cost of operation can be reduced by the selection of the proper type of A and B batteries, while the risk of accidental burnout, the cause of over 91½ per cent. of all vacuum tube deaths,

can be completely removed by the use of a small safety fuse which slips on the filament prong of the tube base and does not interfere with the operation of the receiver even in the smallest degree.

The reflex idea is the real solution to obtaining the maximum efficiency from any type of receiver that permits its use. One of the leading sources of difficulty in applying this idea to the Super-Heterodyne has been the fact that the long wave radio-frequency transformers are generally designed with an iron core, since this style of construction has offered better possibilities for extreme amplification. If a receiver with such transformers for the radio-frequency amplification be used for reflex, it becomes necessary to bypass audio-frequencies through the coils, and as a coil with an iron core offers varying inductance to varying audio-frequencies, it is quite evident that the introduction of this new variable constant, external to the audio-frequency amplifying transformer, will introduce distortion. The use of air core transformers removes this trouble, since such transformers have a relatively constant inductance over a long band of frequencies. The unit E-F-G is a standard type of coupler for the Super-Heterodyne circuit. This style of coupler is now on the market under several trade names. The condenser C-2 should be the size of variable recommended by the manufacturer of the coupling unit. The coil E is the rotor of the unit. It is not necessary to mount a control dial for the rotor on the panel, since this control

(Concluded on next page)

How to Connect C Battery in Amplifier



(Kadel & Herbert)

THE C BATTERY is simply a small flashlight battery connected in the amplifying circuit. The C battery reduces the drain on the B battery by checking the flow of current so as to allow just enough to get by for proper amplification and prevents distortion which happens in amplifier circuits when the negative charge on the grid is too small. The C battery is connected in the circuit as follows: the long spring arm (negative tap) on the C battery is connected to the A minus post on the audio-frequency transformer. The short lead (positive) goes to the negative A battery lead. That's all. The wiring in the above photograph could be improved by shortening all the leads, making the wiring in as straight lines as possible. For example, the lead from the long spring arm of the C battery could be considerably shortened by having the connecting wire go straight over from the A minus post on the transformer to the base of the spring, thereby saving about two inches of wire. The same applies to the other wires on the transformer and battery. Instead of wasting wire in angles, a great saving in wire and efficiency could be accomplished by running the wires straight to their terminals, avoiding, of course, leads that pass too closely.

Fixed Crystal Used in 4-Tube "Super-Het"

(Concluded from preceding page)

will remain set after the best position has been once determined. The main tuning unit consists of a standard short wave loop and the condenser C-1 an 11 or 13-plate size. For rheostats Amperite automatic current regulators are used. These regulators will afford ample and correct control without the trouble of mounting on the panel. The type used will solely depend upon the tubes. The air core transformers H-I are made up of two honeycomb coils tied side by side to form a tight coupling. These coils can be purchased in the unmounted style at a saving. The coil H is a DL 75-turn coil, while I is a DL 400 or 350-turn coil. The condensers C-3 should be the same capacity throughout and to insure this only high-grade condensers should be used. The value of these condensers should be .001 mfd. The blocking and bypass condensers C have a capacity of .002 mfd. The resistors R are Daven Radio leaks of .05 megohm (50,000 ohms). These resistors tend to stabilize the radio-frequency amplifier and make tuning and control more certain. The transformers T are good audio-frequency transformers with the secondary and primary winding marked S and P, respectively, to insure proper connection.

With any circuit of this nature several types of trouble might arise and for that reason it is not advisable for a man to construct this receiver unless he has had previous experience building other radio sets and can readily hunt trouble. One of the first troubles experienced is too sharp tuning, so critical that it is almost impossible to control. The best remedy for this is to place a few turns of wire short circuited on themselves around each unit H-I. This will broaden

the wave band and the amount of this broadening will depend upon the number of turns placed around each unit. Another common trouble is the failure of tube No. 2 to function in the circuit. This can be generally cured by reversing the terminal connections to the coil E of the coupler. All Super-Heterodyne couplers of standard manufacture are of the correct ratio of turns and size of windings to insure oscillation of tube No. 2 under all conditions of normal operation. A crystal detector is used to save the expense of an extra tube. The efficiency of the crystal as a detector is very high with long waves, such as detected in this style of receiver. There are several good fixed crystals that will work fine in this set.

The arrangement of apparatus plays a large part in the circuit layout and operation. Great care should be taken to prevent interaction between the fields of the units marked H-I. It is a good plan to space these controls as far apart as possible and mount them so that their axis are at right angles. As far as actual operation is concerned this receiver is very simple. There are only two main tuning controls, the condensers C-1 and C-2. Very often, and with some types of audio-frequency amplifying transformers, a .002 condenser shunted across the secondaries (S) gives much better results. Try the circuit out with and without these condensers and note the effect.

WATCH THE POTENTIALS!

IF signals are mushy and stations hard to get, reverse the leads on the grid coil. You may have high and low potentials fighting each other.

A 6-Tube Demonstration Receiver

Great volume and purity of tone produced—Set is excellent for retailers who want to please the public's ear—Well suited for home use, too.

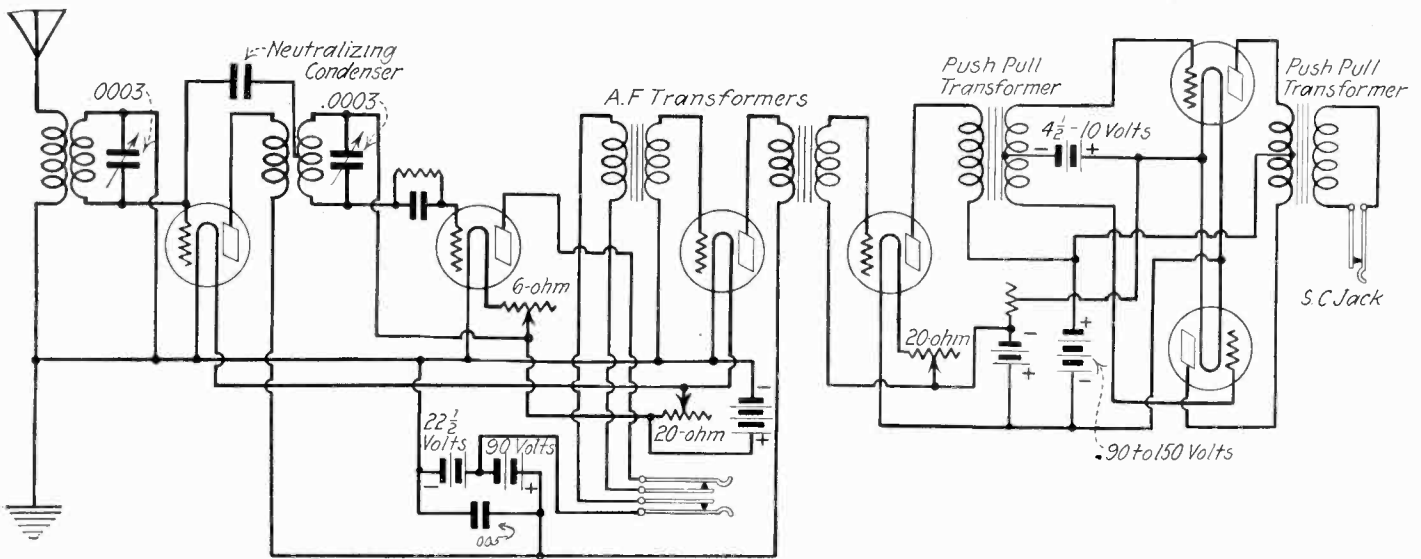


FIG. 2—Complete wiring diagram of the 6-tube Demonstration Receiver. The neutralizing condenser, shown connected from the grid of the first tube to the secondary of the second neutroformer, is unnecessary when only one stage of radio-frequency amplification is used, but will be necessary should another step be added. The .0003 variable condensers should be of the low-loss type for best results. A jack in the detector tube circuit is provided for the headphones for use while tuning in.

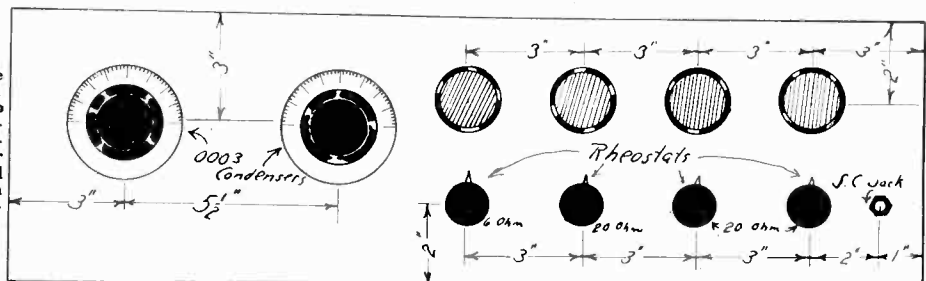


FIG. 1.—Front panel layout of Demonstration Receiver.

By Byrt C. Caldwell

WHEN the writer was working on the Super-Six Neutrodyne and the two-control Super-Neutrodyne he found that by using only one stage of tuned radio-frequency amplification, detector, two stages of audio frequency, and one stage of push-pull radio amplification, a receiver was had which would give tremendous volume on the local stations, great volume on those at a distance of several hundred miles, and good loud speaker reception on all except the stations at great distances. And all this reception was almost perfect. Tuning was very sharp, as there were only two controls, both of which had the same setting, operation was very simple. With all of these qualifications, it was thought that this receiver would make an ideal machine for the dealer who wishes to have a receiver in operation, for demonstrating and advertising purposes. When we pass some radio stores, unless we know what real reception is, we are likely to be disgusted with radio, because the dealer insists in punishing our ears with hideous sounds which he calls radio. The dealer who will do the greatest volume of business and who will do the most for the industry will be the one who demonstrates with a receiver which gives perfect tone. This machine is such an instrument. But it must not be thought that the dealer is the only person who might employ this receiver advantageously. It is, in fact, an ideal home receiver. Pure, perfect tone is its outstanding merit. It is sensitive, does not radiate, is selective, does not howl, and is easy to operate. These are the requisites of an ideal home receiver. In Fig. 1 the

diagram shows the panel as it will look when finished. It is size 7" x 24" and is marked out according to the dimensions given. A template made out of heavy paper will facilitate working on the panel. Fig. 2 shows the hook-up, which, it will be noticed, is rather simple for a 6-tube receiver. A neutralizing condenser is shown. This will not be required for this receiver, but is shown simply that the builder might know where to place it should he wish to add another stage of radio-frequency amplification.

The two variable condensers should be of the low-loss type, of .0003 mfd. capacity. These two condensers will have the same setting for any one station. The grid condenser has a capacity of .00025 mfd. and the grid leak should be variable. Special push-pull transformers are required for the last stage of A.F. amplification. These are sold only in pairs. The usual wiring precautions are, make short straight connections, and solder every one.

An extra jack is shown in the wiring diagram. This need not be used, and slightly better results will be had without its use. However, if it is desired that the receiver be used at times for head phone reception, or if tuning will be done with the phones, this may be used. It should be placed on the panel between the first two rheostats.

For the dealer, only tubes such as UV201A should be used, but for home use, UV199 tubes will give excellent results. WD11 tubes do not give such good results on this circuit, and although amplifier tubes may be used throughout, a detector tube, UV200, will give slightly better results in the second socket.

Why the Metaform Is a Wonder

THE Metaform System of reception, originated by Walt S. Thompson, Jr., and published in *RADIO WORLD*, issues of June 21 and 28, for the first time anywhere, has won an overwhelming indorsement from experimenters. It consists of a frequency changer, set at a given frequency, and used in conjunction with any set. The frequency changer requires only one tube.

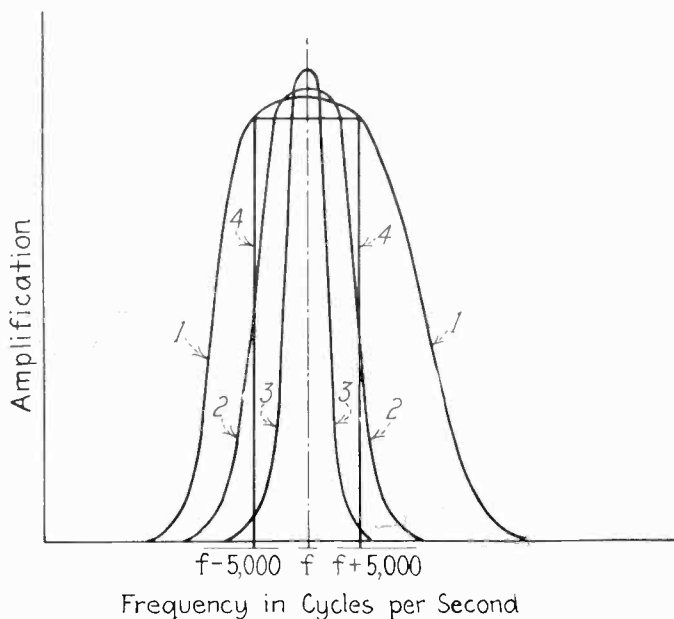


FIG. 1 shows three resonant curves, 1, 2 and 3, of various types of tuned circuits, and a theoretical resonant curve 4, which is the aim of all receivers. Curve 4 represents distortionless reception, as compared to the other curves.

By Walt S. Thompson, Jr.

IN radio telephony the radio-frequency wave, called the carrier wave, is modulated by the voice frequency waves, resulting in a radiated wave made up of several frequencies. For instance, if the frequency of the carrier is f cycles per second, and if the voice frequencies vary from 0 to 5,000 cycles per second, the wave radiated from the transmitting antenna will have frequencies from $(f - 5,000)$ to $(f + 5,000)$ cycles per second. From this it is seen that any receiving set must receive equally well a band of frequencies 10,000 cycles (or 10 kcy) wide, if distortion is to be avoided.



WALT S. THOMPSON, JR.

Fig. 1 shows three resonant curves, 1, 2 and 3, of various types of tuned circuits and a theoretical resonant curve, 4, which is to be aimed at by all radiocast receivers. Assuming that the carrier wave has a frequency f , curve 4 shows how all frequencies 5,000 cycles above and below the carrier frequency should be received equally well and how all others should be excluded. This curve, 4, represents distortionless reception, if all the tuned circuits have such resonant curves.

However, the actual resonant curves are usually similar to curves 1, 2 or 3. Of these curves No. 1 causes less distortion, for it is nearly flat for a fre-

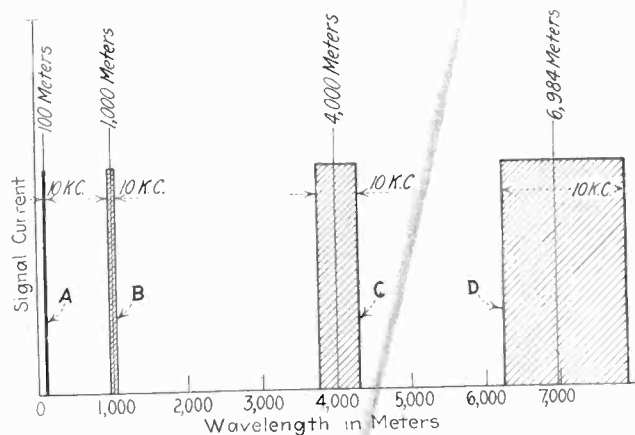


FIG. 2 represents theoretical resonant curves 10 kilocycles wide at various carrier wavelengths, at 100, 1,000, 4,000 and 7,000 meters. The higher the wavelength, the wider the resonant curve becomes, to prevent distortion. On the higher wavelengths therefore, highly selective circuits cannot be used if good reproduction is desired. If the carrier wave is lowered to 100 meters, the selectivity is great, while the reproduction remains unharmed, because on low waves, such as used in the Metaform, the theoretical curve is very narrow, indicating that highly selective circuits may be used.

quency band 10 kcy. wide. Curve No. 3 represents a resonant circuit which is too selective and one which will cause considerable distortion, as the voice frequencies are not equally amplified.

Fig. 2 represents theoretical resonant curves 10 kcy. wide at various carrier wavelengths, such as 100, 1,000, 4,000 and 7,000 meters. It should be noted that the higher the wavelength the wider must be the resonant curve to prevent distortion. This means that on high wavelengths highly selective circuits cannot be used if good reproduction is desired.

On the low wavelengths—see curve A—such as used in the Metaform receiver, the theoretical curve is very narrow, indicating that highly selective circuits may be used. By comparing curve D in Fig. 2, with curve A of the same figure, it is apparent that a more selective receiver can be used if the wavelength of the carrier wave is lowered to 100 meters than can be used if it were raised to 7,000 meters.

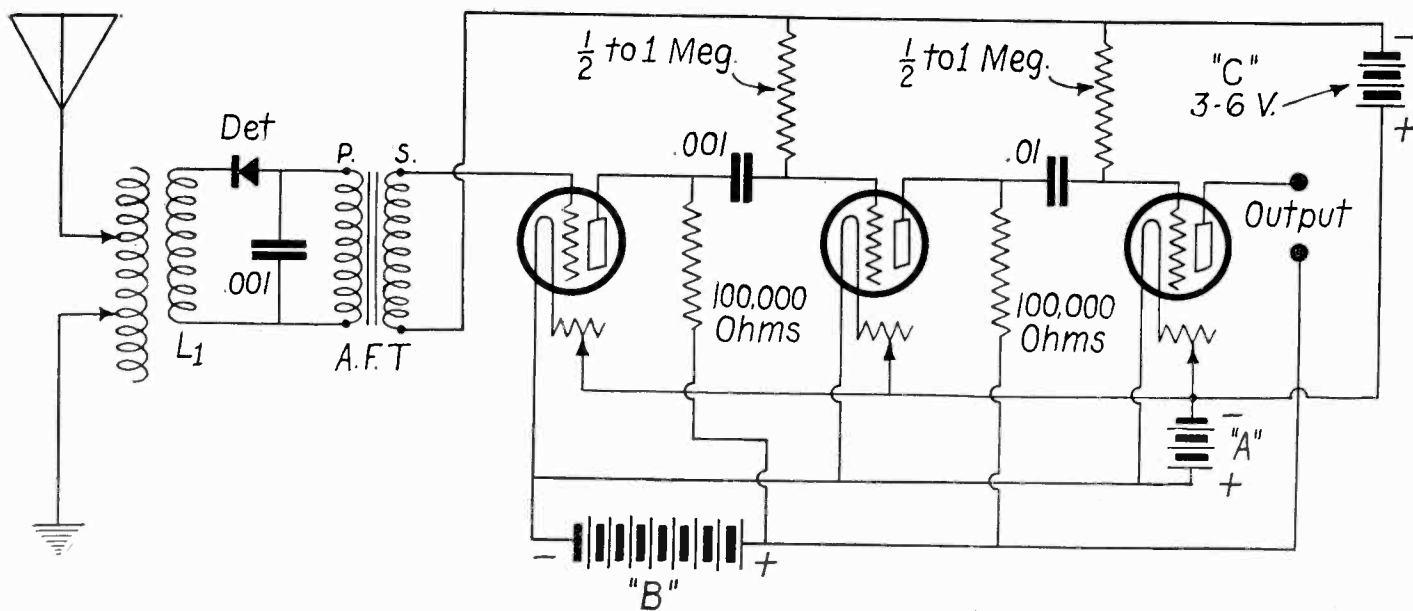
The Metaform System was described in *RADIO WORLD*, issues of June 21 and June 28. As I pointed out in the June 28 instalment, the Metaform receiver has some advantages over the Neutrodyne and the Super-Heterodyne. First, greater amplification can be obtained per stage of radio frequency because the RF amplifier, used with the frequency changer, amplifies signals of only one frequency and does not have to amplify all frequencies within the radiocasting range. For this reason the amplifier can be made much more efficient. This, of course, applies only when the frequency to which the incoming carriers are changed lies within a certain frequency range.

Another advantage in common with the Super-Heterodyne is the simplified control in tuning. With the Metaform System any number of stages of tuned radio-

(Concluded on page 8)

1,000 Miles On a Loud Speaker

Crystal Detector, one stage of transformer AF and two stages of resistance AF are used.



A SELECTIVE CRYSTAL SET, to which are added one stage of transformer-coupled audio-frequency amplification and two stages of resistance-coupled AF. "All the locals," says A. P. Peck, speaking of the results obtained from this circuit, "came in like a ton of bricks and the quality was all that could be desired. The DX results were likewise very satisfactory, practically all of the stations within a radius of 1,000 miles being heard on a loud speaker."

By A. P. Peck

Associate Member, Institute of Radio Engineers

IN the planning of a radio set several things have to be considered. First, is the set to be used with head phones only? If so, only one tube will be used. In a one-tube set the tube is not overloaded, unless you force the filament and make the tube distort or you carry regeneration past the most efficient point.

If you want volume and plenty of it you may run into trouble with the distortion. Distortion found in many receiving sets can be blamed on the set itself. Besides, sometimes it is due to a poorly constructed reproducer or to a bad horn on the reproducer. The transformers may be so mounted that they interact with each other and so cause trouble.

The vacuum tube is, even at its best, not a perfect rectifying medium when faithful reproduction is desired. It has several inherent faults that, while they have been reduced in the past few years, have never been entirely eliminated. In my opinion the only way to get really clear reception is to use a crystal rectifier.

With a detector of this type it is impossible to get distortion. But, some of you will say, the crystal detector does not yield loud signals nor is it capable of DX results. Right first, but wrong second. But if the signals are amplified they will be satisfactory.

As to DX reception with a crystal detector and no amplifier, I have obtained results that many in the same vicinity have been unable to obtain with a single-tube set. The rules for efficiency in a radio set were carefully followed by me and the set was studied thoroughly and operated in the best possible manner. There were of course other stations coming in that could not be heard well because they were too weak. This impediment was overcome when the amplifier illustrated herewith was added. The set is characterized by maximum volume with minimum distortion, ease of operation, reliability and selectivity.

The detector and element were selected after numerous tests conducted under actual conditions. During experiments many of the so-called permanent detectors were tried out. All of them were more or less good and

very stable. For those seeking stability and freedom from constant adjustment, these instruments are good.

However, I was not quite satisfied with the permanent type, so the search was continued. Undoubtedly many of the readers will want to follow this work, so it will be explained herewith. In the junk drawer of my work-table there is a little box containing rectifying minerals and crystals selected from masses of material. When buying minerals, buy in bulk, not single pieces. Break up the large masses and test each individual piece. In this way many very good sections will be found. The type mostly used in my set was radiocite, galena running it close second.

The stand used was an old type with a revolving and sliding cup. The cat-whisker was soldered to the end of a flat brass strip which was moved closer to or away from the cup by means of a machine screw. This type was easy to adjust and kept its position very well. With a good crystal, this detector was found to be superior to any of the permanent ones.

Next on the program was the amplifier. To step up the rectified voltage before it went to the first tube, an audio transformer was used. One stage of transformer coupled audio-frequency amplification will very seldom give trouble from distortion. So as to carry the work along and get good, clear volume, two stages of resistance-coupled amplification were added. And oh, what a kick that set did have!

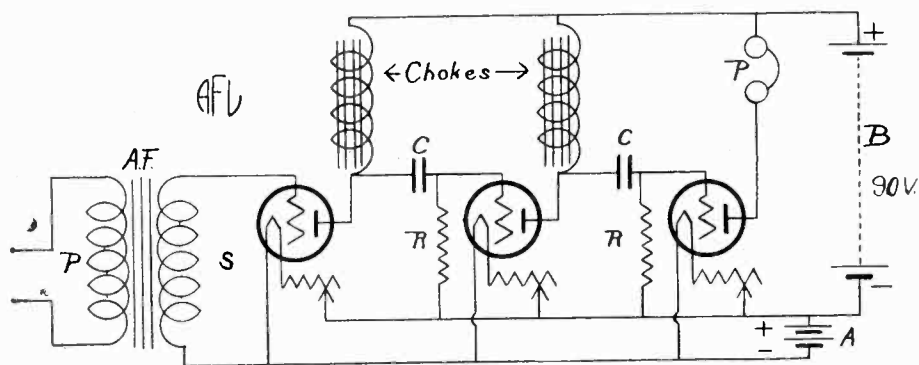
The values of the resistors used in the different positions are given on the drawing. The various units are of standard make but it is a good idea to have them measured and make sure that they are correct before incorporating them in a set. Much trouble may thus be avoided. It is possible to buy on the market standard resistance mountings with provision for two units. These are usually known as "resistance couplers" or a similar name. They are very handy and can easily be hooked up. Two units will be required, each one to hold a coupling resistance and a grid leak.

If you already have a radio set using three tubes it can very easily be changed to one of the type shown herewith. The sockets, rheostats and other material

(Concluded on next page)

AF That Gives Great Volume and Quality

One Stage of Transformer Coupling and Two Stages of Impedance Are Used



CIRCUIT DIAGRAM of 3-tube AF amplifier—one stage transformer-coupled and two stages impedance-coupled. The transformer is of good quality, iron core type, 5 or 6-to-1 ratio. The unit can be built into a 7 x 10 inch cabinet with binding posts at convenient points so that it may be connected to any 1-tube outfit. There is no necessity for jack in the intermediate stages, as the unit is designed to operate a loud speaker, but a single-circuit jack may be placed where the phones are shown. Two binding posts at the left for the primary of the AF transformer and three at the right of the panel for the A and B batteries are all that are necessary.

IT has been found desirable in some cases, where a set owner is located in the country at a distance from any radiocasting station, to obtain greater audio-frequency amplification with which to

work the loud speaker with good volume on any station, no matter how far away it may be. To meet this demand there is presented a 3-tube transformer and impedance-coupled audio-frequency amplifier,

using a transformer for the first stage, and impedance coupling in the last two stages. After considerable research it was found that an AF transformer of 6 to 1 ratio showed no appreciable distortion in the first stage. For the second and third stages impedance coupling proved to be absolutely free from distortion and howling. The choke coils are $\frac{1}{2}$ micro-henry each and may be procured from any of the larger electrical and radio supply houses,

The resistance R are 50,000 ohms each. The fixed condensers C have a capacity of .0005 mfd. The resistances should be wired from the post G on the tube sockets to the positive filament post of the same socket. The rheostats for these three tubes are placed in the positive A battery lead. This 3-tube amplifier can be used with any detector circuit and gives good volume and excellent modulation.

Thompson's Metaform

(Concluded from page 6)

frequency amplification can be used, but the controls always remain two in number.

Again the selectivity is greater with two controls than that of the Neutrodyne with three controls. The tuning is characterized by that knife-like sharpness obtained with the Super-Heterodyne. The selectivity obtained is due to the possibility of using more sharply tuned circuits as mentioned above. Distortion caused by the radio-frequency amplifier is also less.

By using the tuned radio-frequency amplifier for amplifying waves of only one frequency, another and more efficient method of neutralization will be used. This method consists of bridging a resonant circuit between the grid and the plate of each amplifier tube and tuning this circuit to the frequency being amplified. At this frequency, then, the grid-to-plate impedance will be nearly infinite, hence there will be little or no energy fed from the plate circuit to the grid circuit through this path.

When the frequency changer is added to a standard three-circuit regenerative receiver the advantages gained are simplified tuning, greater selectivity and less distortion. In addition, the regeneration control can be adjusted for one station and it will not be necessary to change its adjustment for other stations. Station after station can be picked up, each with maximum regeneration.

To summarize briefly, the Metaform system of reception consists of a frequency changer which is set at a given frequency, preferably above 1,000 kilocycles, and used in conjunction with an improved receiving set. The frequency of the incoming signal waves are changed by the frequency changer to that to which the improved receiver is tuned.

This system has many advantages, a few of which are:

- 1—Minimum signal distortion.
- 2—Great selectivity.
- 3—Great signal amplification.
- 4—Great simplicity in tuning.

Peck's Crystal Set

(Concluded from preceding page)

may be pressed into service. Probably the only additional apparatus that you will need is another amplifying tube, a crystal detector, and the resistances and mountings.

If you have only a crystal set and want to branch out, collect together all of the apparatus necessary and first hook it up without mounting the instruments. Give the set a thorough trial this way and after you are satisfied with its operation, then assemble it on a panel and enclose it in a cabinet.

Regarding the tubes used, the best bet is to employ the 6-volt type. UV201 gives excellent results. Use that tube throughout if you can spare the current. Otherwise use UV201A. Of course dry-cell tubes may be used but the volume will not be as great.

With this set the locals all came in like a ton of bricks and the quality was all that could be desired. The DX results were likewise very satisfactory, practically all of the stations within a radius of 1,000 miles being heard on a loud speaker.

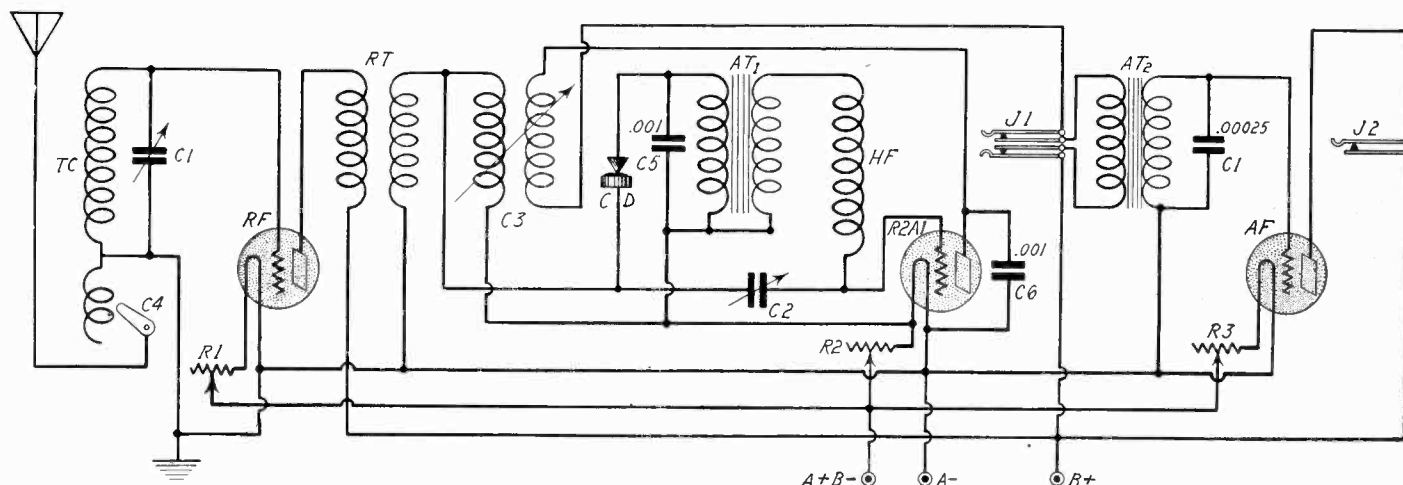
Using headphones, stations 1,500 miles away were consistently logged. I never heard another three-tube set that could hold a candle to it, either for volume or DX work.

The Grid Return

THERE is some question as to how the rheostats should be wired in a circuit. Follow the directions that are enclosed with the tube you buy.

The grid return in all amplifying circuits, radio and audio-frequency, is connected to the negative A battery lead. In detector circuits the opposite holds true, the grid return going to the positive lead. There is one exception to this, however, and that is when the UV200 is used. It is used only as a detector. This tube functions with the grid return going either to the positive or negative lead.

Trouble-Shooting in the Ultra Reflex



IF YOU MAKE THIS SET, paste the above circuit diagram of the Improved Ultra Reflex on the inside of your cabinet lid. It is the tuning coil, 57 turns of No. 244 DSC wire on a 4-inch diameter tube. Tap at following turns: 50th, 53rd, 55th and 56th. C4 is the tap switch. C1, variable condenser, 23 plates. R1, rheostat, RF, first radio-frequency tube; RT, any good RF commercial transformer; C3, standard variocoupler; CD, crystal detector; C5, fixed condenser, .001 mfd. AT1 and AT2, audio-frequency transformers; C2, 11-plate variable condenser; R2 and R3, rheostats; C1, fixed .00025 condenser, though .001 will work; R2A1, reflexed RF and AF tube; J1 and J2 jacks. This set works a loud speaker well.

By Neal Fitzalan

WHEN trouble-shooting in the Improved Ultra Reflex circuit, or any other circuit, it is well to have the circuit diagram right before you. Better paste the diagram on the inside of the lid of your cabinet.

If the parts are properly mounted and connected there should be little need for trouble-shooting, so the first consideration is to check up the mounting, etc. For this purpose refer to the following:

Fasten the panel to the baseboard. Mount the tuning coil TC on the left-hand corner of the baseboard so it will clear all parts and edges by an inch or more. The tap switch C4 is mounted on the front panel directly in front of the tuning coil. Next fasten condenser C1 to the front panel in line with the tap switch (Fig. 4). Then mount socket R1 on the baseboard, at least 1½ inches away from the panel, so that there will be room enough when placing the tubes in the sockets. Always allow sufficient space around sockets so that tubes can be inserted without difficulty. Next place the RF transformer RT on the baseboard at least 3" to the rear of the panel. Now mount the variocoupler C3 on the panel in line with condenser C1 and tap switch C4. The audio transformer AT1 is next mounted in about the same manner as the radio transformer, about 3" to the rear of the front panel and away from all the other parts. Condenser C2 is then mounted to the panel, and in the rear of this, as far back as possible on the baseboard, is mounted the choke coil HF, which, if a honeycomb coil is used, is placed horizontally. The tube of a home-made coil would be placed vertically. Be sure to allow sufficient clearness all around so as not to cause any capacity interference between parts.

The socket A2 is then placed on the baseboard and to the rear of this the audio transformer AT2. Rheostat R3 controlling, the second audio tube, is mounted on the panel directly in front of socket A2. Rheostat R2, also rheostat R1, are mounted on to the panel in line with each other (Fig. 4). The battery switch, the phone and loud speaker jacks are mounted to the front panel in the positions as shown.

It is well not to start wiring and soldering until all the parts needed have been placed on the baseboard and the best position found. You may have to do some slight shifting to space parts most advantageously and to keep the wiring as short as possible. Fans who have

constructed sets and have re-wired them three or four times, each time shortening the wiring, have been surprised with the improved results. Therefore, do it carefully and right the first time. The energy picked up by even the best aerial is an infinitely small quantity and should not be dissipated through uselessly long wiring. At first sight it may appear to the builder that he has made the wiring short and he may fully believe so. But after looking into the matter carefully he will invariably find that he can take off 1" wiring here, another ½" there and still another ½" elsewhere. Combining all these possible amputations, the builder will find that he can shorten the wiring of his set by a foot or two with increased efficiency. Manufacturers spend months not only in developing but in refining their receivers. Thus any fan who is not satisfied with his set after one evening's trial had better try to improve his set. Many a good hookup gets the "razz" not because it is N. G., or even partly so, but rather because some fan fails to do justice to the hookup. The fan who goes wild over a hookup is generally one who is very meticulous in building the set.

In trouble-shooting, watch out that the primary and secondary of the transformer AT1 are short-circuited at B and F (or P2 and S2). If this is not done you will get either poor results or no results. The coil HF, 200-turn honeycomb, goes from the grid to G of AT1—one end direct to G, the other end direct to the grid. You may use a self-wound coil of 150 turns of DCC wire on a 3-inch diameter tube. A fixed crystal may be used, but a variable one was employed by the author with success.

Use a Large Dial

IF you have trouble with tuning, because stations are easily passed, and do not want to go to the expense of a vernier, try a dial 4 or 5 inches, instead of the usual 3 inches. That makes it easier to get right in the center of the wave. Vernier or large dial is necessary on sharp-tuning sets.

Exercises Radiated

SETTING-UP exercises are now radiocast daily except Sunday from 7:30 to 8 A. M., Eastern Standard Time, by station KYW, Chicago.

Trouble-Shooting Advice for Builders of the 4-Tube Super-Heterodyne

Constants Used in Circuit That Has No Detector

Key to the Diagram

C1, 17-plate variable condenser.
 P, 400-ohm potentiometer.
 L1, L2, L3, oscillator coil, described in text and shown in diagram.
 C3, 43-plate variable condenser.
 C4, .001 fixed condenser.
 C5, .001 fixed condenser.

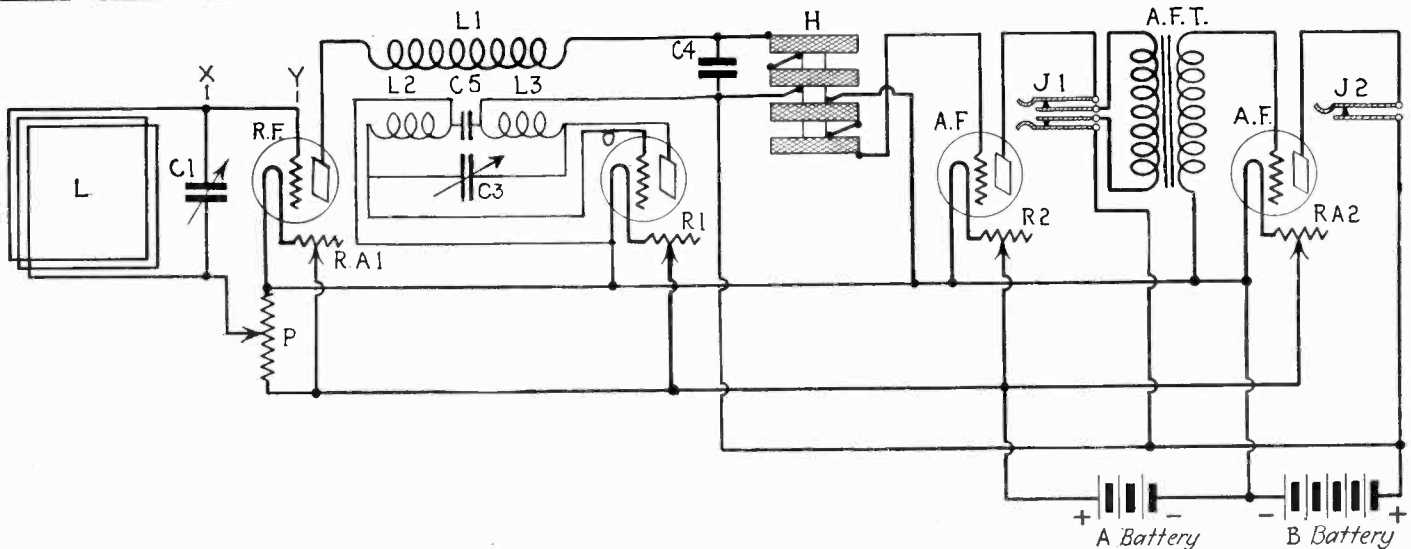
H, 4 honeycomb coils, 1,500 turns each. Two of the coils connected in series for the primary and two in series for the secondary.

J1 and J2, jacks.

B battery, 90 volts.

The sockets and rheostats should match the tubes used.

Any tubes may be used except in the oscillator O, which should have a UV201A or equal.



FOR TROUBLE-SHOOTING in the 4-Tube Super-Heterodyne pay particular attention to the connections of the oscillator and the value of the fixed condenser C-4. In the above diagram (Fig. 1) the oscillator coil is shown hooked up in a slightly different fashion than in the original diagram. The same oscillator coil is used. Another point for trouble shooting is the secondary of the transformer H. The beginning goes to the A-, and the end to the grid. This is correct, because F- and B+, the latter the end of the primary, are at low potential, and it is desirable to keep like potentials together. The wiring directions for the oscillator coil are given in the accompanying text. This coil consists of the three windings, L1, L2 and L3.

By Wainwright Astor

THE novelty of the 4-tube Super-Heterodyne brought out by RADIO WORLD has caused considerable experimenting by constructors desiring to get the most possible out of this receiver. Some trouble has arisen because the fixed condenser C4 was not of the proper value. The specifications called for a .001 mfd. capacity. As the function of this condenser is to increase the wavelength of the primary of honeycomb coil H, to bring it up to 50,000 meters and thus within the range of audibility, it is important that the condenser be of exactly the value specified. Otherwise too low a capacity would result in mushy signals or no signals at all, while too high a capacity would boost the wavelength out of proportion.

Another point of interest on the trouble-shooting expedition is the oscillator coil. Some constructors have reported excellent results when the oscillator coil is connected as described in RADIO WORLD for July 12, while others report poor or no results. Therefore the hook-up of the oscillator coil, which in that issue was connected in a novel fashion, may be switched around to a universal oscillator hook-up which will bring in the voluminous signals to be expected from this type of receiver.

Fig. 1 shows the complete circuit network with the oscillator coil connected in every day fashion. The construction of the coil is not changed in any particular. As shown in Fig. 1, L1 consists of 10 turns of No. 24 DCC wire, L2, 35 turns of the same wire, and L3 35 turns of the same wire. L1 is connected to the plate of the first tube and to the primary of H. One end of the

fixed condenser C4 is also connected to the beginning of H. The connections on L1 may be reversed as an experiment in seeking best results. The beginning of L2 is connected to one end of the variable condenser C3 and also to the grid of the second tube. The end of L2 is connected to one side of the fixed condenser C5, and to the A minus lead. That gives a direct grid return through L2 to the theoretical ground, minus A. The other side of C5 goes to the beginning of L3. The coil L3 is connected also at the beginning to plus B, to remaining side of the fixed condenser C4, and to the end of the primary of the coil H. The end of L3 is connected to the plate of the second tube and to the remaining side of the variable condenser C3. The pick-up coil in point of position may be at either end of the tube, depending on how the tube is placed. It makes no difference at which end of the tube the pick-up coil is, the most convenient way being used.

The coil H consists of four honeycomb coils of 1,500 turns each, two coils connected in series constituting the primary and two coils in series constituting the secondary. The transformer thus constructed is rather bulky, but there is no commercial transformer on the market which is suitable. If one were made in a factory it might be more advisable to increase the number of turns on the secondary. As it is, the honeycomb transformer has a 1-to-1 ratio, the lowest ratio which may be used. In the honeycomb arrangement 1-to-1 was settled upon to avoid adding to the already sizable bulk of H. Anybody, however, who desires to increase volume can do so by adding another 1,500-turn honeycomb coil to the end of the secondary of H.

The connections of the secondary of H are correctly

Fixed Coil Instead of Variocoupler

*One Control Thus Eliminated and Facility Afforded
for Experimenting with All Kinds of Antennae*

By N. N. Bernstein

Technical Editor

MANY owners of sensitive sets, such as the Super-Heterodyne and tuned radio frequency outfits, often wish to experiment with all types of antennae, indoor and outdoor. This does not apply to Superdyne sets, which use a tickler arrangement coupled to the secondary of the tuning coupler. Also, it has been the experience of radio users that a fixed coil for coupling the antenna and ground to the grid of the radio-frequency amplifier, or to the first tube in a Super-Heterodyne, is efficient. This coil consists of a primary and secondary.

Fig. 1 shows an excellent fixed coupler which may be used with any kind of a sensitive set that now has a variocoupler. Procure a hard rubber, bakelite or radion tube, 3 inches in diameter by $3\frac{3}{4}$ inches long. Starting from the bottom, drill two small holes $\frac{1}{4}$ inch from the edge and about $\frac{1}{4}$ inch apart. These small holes are for the ends of the windings, which are threaded through, and thus held fast without the use of adhesive substance. Leave 3 inches of wire slack. Drill two more holes $\frac{3}{4}$ inch and 1 inch from the bottom, and two more $\frac{1}{4}$ inch from the top. The primary is started by threading the end of the wire

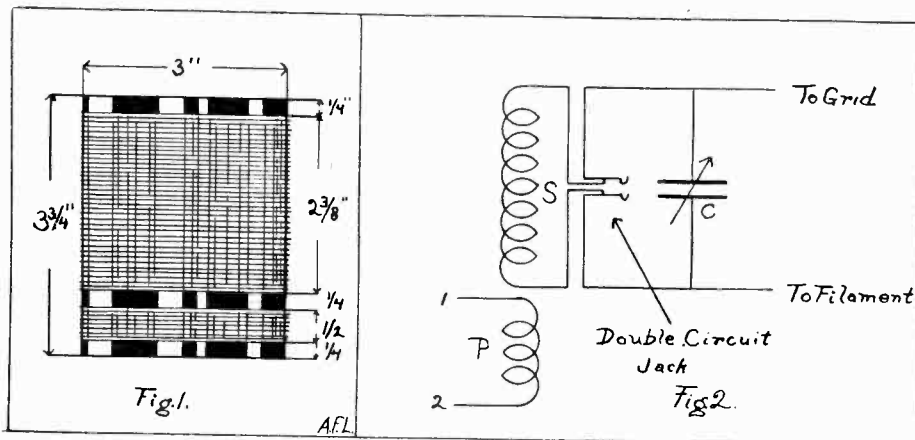


FIG. 1—Schematic diagram of the fixed coupler which can be used with any Super-Heterodyne or tuned radio-frequency circuit. The exact dimensions, together with full winding instructions, are given in the text, and should be followed to obtain best results. Fig. 2 (at right) shows how to hook up the fixed coupler to the set with the aid of a double-circuit jack, which may be mounted on the front panel. Points 1 and 2 go to the antenna and ground binding posts, respectively. The ends of the secondary winding are connected to the middle leaves of the double-circuit jack, while the outer leaves go to the variable condenser.

through the first two holes, and winding 15 turns No. 22 DCC wire. Terminate and thread the end through the two holes already drilled. Leave 4 or 5 inches at each end for convenient connections. The secondary is wound in the same manner and consists of 65 turns of No. 22 DCC wire, both windings being in the same direction. This coil can be placed in the cabinet, near the antenna and ground binding posts, and the leads 1 and 2 connected to the A and G posts on the inside of the set. A hole will have to be drilled in the panel to accommodate a double-circuit jack. This can be placed at the upper right-

hand corner of the panel. The secondary leads of the fixed coupler are connected to the middle leaves of the jack, and the variable condenser C is wired to the outer leaves. Normally the set is operating on the outdoor aerial, but when the jack, which is connected to a loop, is plugged in, it automatically cuts out everything before the jack, and connects the loop across the grid tuning condenser. Thus, one tuning control is done away with by the use of a fixed coupler and a double circuit jack, as there is no tap switch to be bothered with, and the same tuning condenser works either arrangement.

Focus on Oscillator in the "Super-Het"

(Concluded from preceding page)

given in the diagram. Although usually the beginning of the winding on the secondary goes to the grid, and the end of the filament minus, in this case the beginning of the secondary goes to the A minus and the end to the grid of the third tube, due to the desirability of having the low potential ends of the transformer together. As explained before, the F- is the theoretical ground potential, hence low, and the corresponding low potential on the primary is the B plus. Lest the connections be not strictly according to the diagram (Fig. 1) it may be advisable to reverse the connections of the secondary of H, and see whether you get better results. If you do, then check back on all your wiring, and see whether you have not slipped up somewhere in your connections.

The oscillator, hooked up in the fashion herewith suggested, is more selective than when connected in some other fashion. In fact, all except those living right close to a powerful broadcasting station should have no difficulty in tuning out interference. In the lead marked XY a variometer may be inserted to sharpen the tuning, but it should not be incorporated in the

circuit unless after considerable testing it is found that its presence is absolutely necessary.

The oscillator coil, the very same one used in the original circuit, may be connected differently on a trouble-shooting expedition to see whether better results are obtained. The top coil, L1, consists of ten turns of No. 24 DCC wire. The middle winding is L2 and the end winding, L3, both windings consisting of 35 turns of No. 22 DCC wire. The beginning of L1 goes to the plate of the first tube. The end of L1 goes to the beginning of the honeycomb coil primary. The beginning of L2 goes to the grid of the second tube and to one side of the variable condenser C3. The end of L2 goes to A-. The beginning of L3 goes to B+ and to the end of the primary coil H, and the end of L3 goes to the other side of the variable condenser C3, and to the plate of the second tube.

How to Mount Dials on the Neutrodyne

WHEN fastening the dials to the tuning condensers of Neutrodyne sets, place the movable plates entirely out of the stationary plates, thereby setting the condenser at zero capacity. Now set the dials so that the zero is on the pointer and fasten them there. Be sure to have all settings the same so that the stations may be logged on approximately the same dial numbers.

A 1,500-Mile 2-Tube Circuit

One stage of RF and a regenerative 3-circuit tuner, using honeycomb coils throughout in fixed coupling, with capacitive tuning, give wonderful quality and distance—No taps, no dead end losses, no distributive capacity that lowers efficiency—Hook-up excellent for dry cell tubes, but storage battery tubes work as well or better.

By Herman Bernard

THE regenerative circuit is undeniably great for distance. No other circuit using one tube or crystal can compare with it. By the introduction of a stage of radio-frequency amplification, you multiply the virtues of this set without contributing to its vices. The DX virtue is improved about 50 per cent. A well-made regenerative set, particularly the 3-circuit tuner or other adaptation thereof using an aperiodic primary, is good for 1,000 miles under good conditions. This result, however, is not to be rated as a Summer certainty. Even 1,000 to 1,500 miles will be bridged now and again by the regenerative set. Adding the RF, as herewith explained,



HERMAN BERNARD

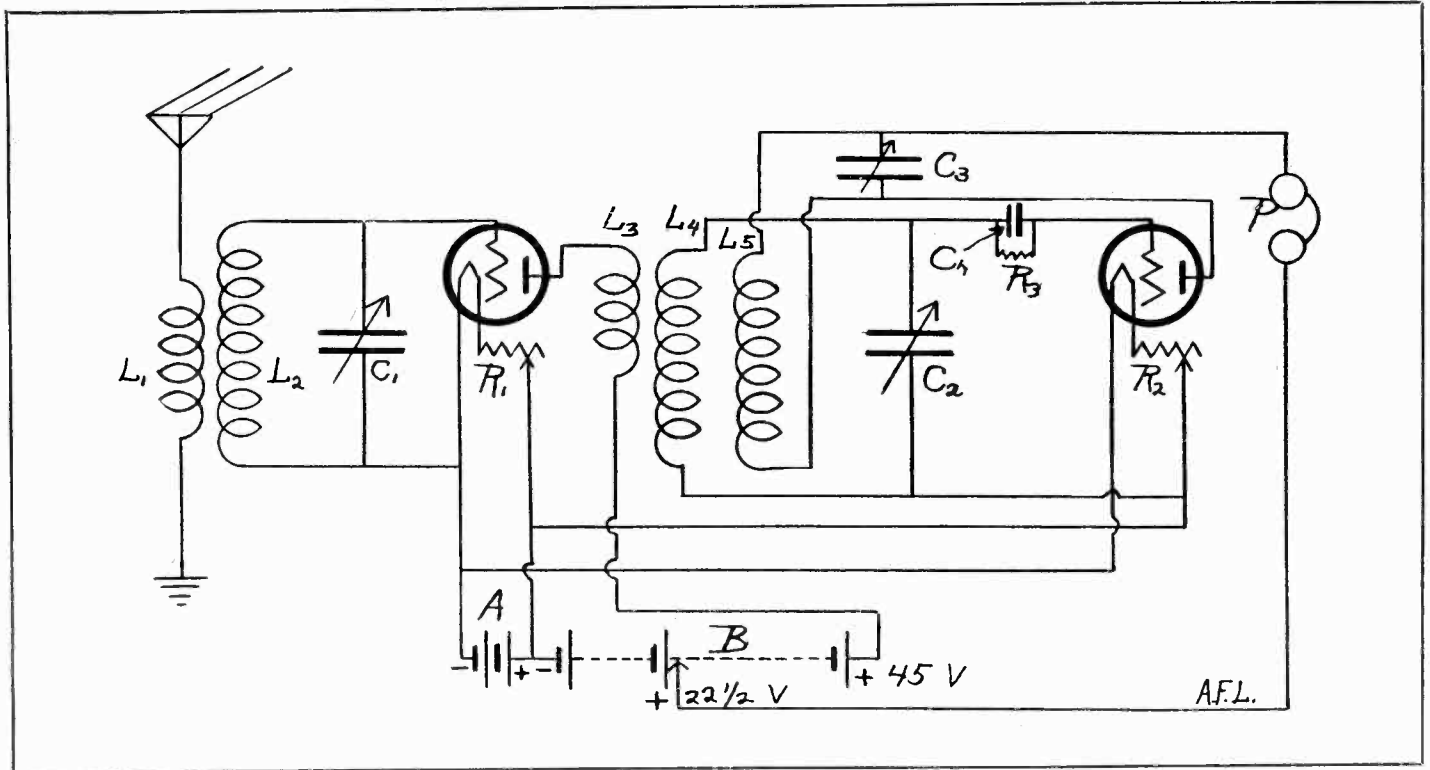
also will build up volume, too.

"RF for distance, AF for volume," is a time-honored phrase, and a true one. But the assertion is no denial of the interchangeability of the claim. Does RF add to volume? It does. And does AF add to distance? It

does. Add one stage of RF to a set using no RF and let your own ears tell you if the signal isn't stronger. As for AF and greater distance, the detector tube sometimes actually contains rectified signals too faint to be heard, yet they are there, nevertheless, and by adding AF you can hear them. These signals, you may be sure, do not come from the nearest radiocasting station. No! Some distant voice is calling you, and you need the AF to hear it. However, all that is to be desired in the way of audibility is not obtained on distance on a 1-tube regenerative set. Often the signals come in as if only for the express purpose of permitting your honest boast that you heard the station. Your DX log may look imposing, but you can not really claim good service. I do not consider such faint and foggy signals worth listening to and if a fan must have distance he should use RF.

In the circuit in Fig. 1 honeycomb coils are used throughout—five coils, with fixed coupling, tuned capacitatively, with variable condensers. That is the way the Neutrodyne is tuned. As in the Neutrodyne, each dial may be logged, any given station always coming in on the same combination of dial settings. This is certainly an advantage and one not commonly found in a regenerative circuit. A variocoupler is the usual source of uncertainty in the regenerative hook-up, the tuning by mutual inductance between stator and rotor being the obstacle to logging. Of course in the Neutrodyne there is no regeneration, or at least none except that which can not be avoided, due to feedback in inter-tube couplings and capacities.

The 2-tube DX circuit herewith is easy to make and



CIRCUIT DIAGRAM (Fig. 1) of 2-tube hook-up, consisting of one RF stage and detector, honeycomb coils being used throughout. L1 is a 25-turn honeycomb (DL) coil, from which 13 turns have been removed. It is connected to aerial and ground. L2, closely coupled to L1, consists of 75 turns and is bridged by C1, a 23-plate variable condenser. L3 is identical to L1. L4 has 75 turns; L5 has 50 turns. C2 has 23 plates, C3 being 13 plates. R1 and R2 are 30-ohm rheostats (as UV199 tubes were used). R3 is the grid leak, preferably variable up to 5 megohms or more. On the detector, try B battery voltages up to 40 and on the amplifier up to 60. In the author's set 22½ and 45 worked best. The hookup uses a 3-circuit regenerative timer. It is very selective. Try a .001 fixed condenser from the plate lead of the phones to B—.

A 3-Control DX Set You Can Log

Can be fitted in a 7" x 16" cabinet, but if 2 stages of AF are added use 7" x 21"—Signals heard with phones 12 feet from ear—Excellent selectivity obtained from this efficient circuit—No potentiometer is necessary in this hook-up, which, by proper tuning, can be kept under control.

may be attempted even by a novice without fear of final failure. The 1-tube regenerative set, if the exposition is well done by the author of the text and diagrams, may be made by a person who never before made a set, and yet may work successfully at once. The present circuit is a little more difficult than that, yet not so much more difficult than any one who never before built a set need fear to try it. The only difficulty he may expect, granting the wiring is done correctly, is in covering the radiocast wavelength band. That is due mostly to variations in the values of different condensers of the same number of plates. For instance in the set I built I tried out one 23-plate condenser, but it did not reach 526 meters, the wavelength of the new municipal station of New York City, WNYC. Indeed, it just brought in WEA, 492 meters. I tried another 23-plate (this one of the low-loss type) and WNYC came in at 68, amateur code being heard at 6,10, etc. I refer to the grid-filament condenser, C2. Of course, a coil with a greater number of turns could have been substituted for the coil used, instead of the condenser being changed.

If the UV199 type of tubes is used, get one 30-ohm rheostat for each tube. The grid return should be to the positive with these tubes (end of L4 to A+). The filament voltage should be 3, hence the dry cell C batteries may be used as A batteries. The 4½-volt posts

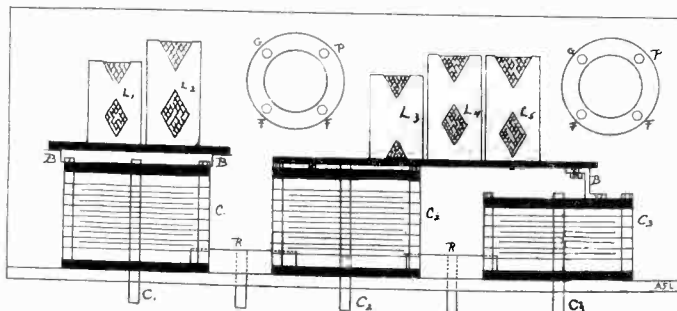


FIG. 2.—Layout assembly of the three-control set. The honeycomb coils are mounted on a bakelite strip bolted to the back of the variable condensers. It might be advisable to employ regular coil mounting so as to make possible different combinations of coils. They should be non-adjustable. If the coils are desired to remain in the set permanently, they should be tied together with a piece of twine, doughnut fashion, and then tied firmly to the bakelite strips.

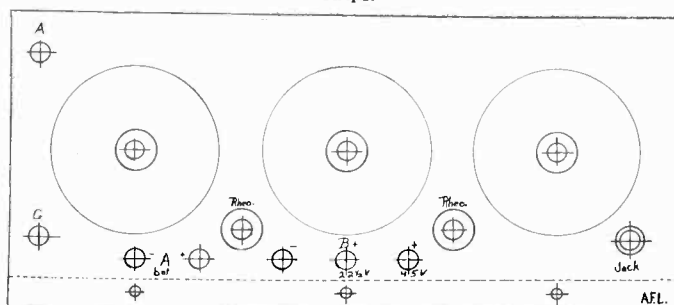


FIG. 3.—Front panel layout of the 2-tube three-control set. As all radio parts are not standard size, the builder should make his own dimensions, but following the general scheme as shown above. Only two binding posts appear on the panel, those for the battery connections being screwed onto the baseboard inside the cabinet out of sight. If desired, the A and G posts may also be placed in the rear.

Wiring Directions for 1,500-Mile Set

1. Connect the A—on the battery to the rheostat terminals connected to the center arm, the other terminals going to F— on the sockets. Connect A+ to the sockets.
2. Connect the beginning of L1 to the aerial and the end of L1 to the ground.
3. Connect the beginning of L2 as follows: (a), to the A— on the battery, not to the socket; (b), to one side of C1. This would connect to the rotor plates, unless a low-loss condenser is used, and in that case to the stator plates. Connect the end of L2 as follows: (a), to the remaining side of C1, and (b), to the grid binding post on the socket of the first tube.
4. Connect the plate of the RF tube (at extreme left, Fig. 1) to the beginning of L3, the end going to B+. From 40 to 60 volts are recommended, but you may try up to 90 as an experiment.
5. Connect the end of coil L4 as follows: (a), to one side of C2 (rotor plates, unless a low-loss condenser is used), and (b), to the A+ on the battery. This is a positive grid return, recommended for UV199 and C299, but a connection to A— will work. Connect the beginning of L4, (a), to the remaining plates of C2; (b), to one side of the fixed grid condenser, the other side of the grid condenser going to the grid, that is, the socket binding post G.
6. Connect the beginning of L5, (a), to the plate of the second or detector tube, and (b), to one side of C3. Connect the end of L5 to the other side of C3 and to one of the phone terminals. The other phone terminal goes to B+, between 22½ and 40 volts being recommended.
7. Connect B— and A+. This can be done from battery to battery.

on the batteries will usually give best results. The difference between 3 and 4½ is almost completely made up in the voltage drop in the rheostat. Connect A- in the rheostat for both detector and amplifier. The plate voltage in the detector should be between 20 and 40; in the amplifier, from 45 to 60. Try different voltages between these limits. The grid leak for these tubes should be pretty high—always more than 2 megohms, often as high as 9. Hence a variable grid leak is recommended.

C2 is the main tuning control. C1 is a condenser, tuning the secondary (L2) of the RF transformer. C3 tunes the plate circuit, which it is well to tune in a regenerative set, because in that way the grid circuit's sensitivity is increased to a surprising degree. True resonance, the ultimate goal in radio, is thus achieved with a satisfying certainty.

The set was made for UV199 or equivalent tubes. These tubes require special sockets. The tubes are inclined to be microphonic hence rubber-cushioned socket supports are often used. These gong-like sounds in the tube may be heard while tuning, but if the condensers and rheostats are correctly mounted, the dials not being permitted to scrape against the panel, little trouble from this source need be expected. Microphonic noises

(Concluded on next page)

RADIOCAST PROGRAMS

Thursday, July 24

Hotel Majestic's New Station

2XBG, New York, 273m (1100k), E. S. D. S. T.—New Hotel Majestic station, operating temporarily on the above call letters. Regular call letters will be assigned in the near future. 2:00 P. M., musical concert and artist performers until 8 P. M. daily. 11:30 P. M. to 2 A. M., three nights a week. All programs will consist chiefly of musical entertainment. Advance programs are being arranged, and will soon be published in RADIO WORLD.

WNYC, New York, 526m (570k), E. S. D. S. T.—7:30 P. M., police reports and alarms. 8:30 P. M., musical program composed of band selections and vocal and instrumental numbers by artists. 10:30 P. M., police alarms.

WMAQ, Chicago, 448m (670k), C. S. D. S. T.—4 P. M., sports results. 6 P. M., Chicago Theatre organ recital. 6:30 P. M., Hotel LaSalle orchestra. 8 P. M., weekly talk by Rockwell R. Stephens, auto editor of the Daily News. 8:15 P. M., weekly talk for Boy Scouts. 8:30 P. M., recreational talk. 8:45 P. M., weekly investment talk. 9 P. M., garden talks by James H. Burdett. 9:15 P. M., Filomeni Singing Society.

WFAA, Dallas, Tex., 476m (630k), C. S. T.—12:30 P. M., Epps G. Knight, business man and pioneer, on "Discharging the Duties of Citizenship." 8:30 P. M., string band from Krum, Texas. 11 P. M., Belcanto male quartet, in vocal recital.

CKAC, Montreal, 425m (710k), E. S. D. S. T.—4 P. M., weather; stocks; news. 7 P. M., kiddies' stories in French and English. 7:30 P. M., Rex Battle and his Mount Royal Hotel concert orchestra; solos by Nap. Dansereau, cellist. 8:30 P. M., La Presse studio entertainment. 10:30 P. M., Mount Royal Hotel roof garden dance program.

WDAF, Kansas City, 411m (730k), C. S. T.—Baseball scores at 3:30, 4, 4:30, 5 and 6 o'clock. 3:30 P. M., the Star's radio trio. 5:50 P. M., marketgram; weather forecast; time signal; road report. 6 P. M., address, Edgar Allan Linton, talks on world travels; reading, Miss Cecile Burton from popular poems and essays; children's story and information period; Carl Nordberg's Plantation Players. 11:45 P. M., (Nighthawk Frolic), the Plantation Players.

WHN, New York, 360m (830k), E. S. D. S. T.—6 to 7 P. M., Around the Alamac's Festive Board: Overture by Olcott aill's trio; jests by Toastmaster; talks and songs by renowned folk; dance music by Paul Specht's Alamac orchestra. 7 P. M., "Sport Period," by Thornton Fisher. 9:15 P. M., broadcasting in public from stage of Loew's Metropolitan theatre, Brooklyn. 9:45 P. M., Chas. Strickland's Palisades Park orchestra. 10:15 P. M., original poems by Wm. J. Stuart. 10:20 P. M., baseball statistics by Al. Munroe Elias. 10:30 P. M., Tom Bracken and Bob King, popular songs. 10:45 P. M., Roseland dance orchestra. 11:15 P. M., popular songs by Abner Silver & Co. 11:20 P. M., Henny Cagert and Sol. Hirsch, song writers. 11:30 P. M., Original James Boys from the El Fey Club.

WJZ, New York, 455m (660k), E. S. D. S. T.—5 P. M., Wallace M. Radcliffe, tenor. 5:15 P. M., Rita Hansun, soprano. 5:30 P. M., State and Federal agricultural reports; Farm and Home reports; closing quotations N. Y. Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., Gotham Hotel concert orchestra. 7:20 P. M., financial developments of the day. 7:30 P. M., Gotham Hotel concert orchestra. 8 P. M., weekly French lesson. 8:30 P. M., New York Philharmonic orchestra, direct from Lewisohn stadium. 9:45 P. M., radio program by the Sun, L. E. Bragdon, radio editor. 10:45 P. M., Hotel Majestic orchestra.

WJY, New York, 405m (740k), E. S. D. S. T.—7:45 P. M., United States Navy Night, Navy band of Virgin Islands. 8:15 P. M., "Deutsche Literatur," Prof. Zinnecker, New York University. 8:30 P. M., Navy band of Virgin Islands. 9 P. M., boxing bout, direct from Polo Gardens, semi-final, Berlenbach-Ratner; finals, Carpentier-Tunney; Major J. Andrew White, announcer.

WOC, Davenport, Ia., 848m (620k), C. S. T.—10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., market quotations. 12 noon, chimes concert. 12:15 P. M., weather forecast. 1 P. M., closing stocks and markets, including weekly report of wool market. 7 P. M., sport news and weather forecast. 9 P. M., orchestra program, the Palmer School radio orchestra.

WNAC, Boston, 278m (1080k), E. S. D. S. T.—10:30 A. M., WNAC Women's Club talks. 1 P. M., Shepard Colonial orchestra. 4 P. M., Shepard Colonial orchestra. 6:30 P. M., WNAC dinner dance, radiocast from Hotel Westminster Roof Garden. 8 P. M., program announced.

KDKA, Pittsburgh, 326m (920k), E. S. D. S. T.—5:30 P. M., dinner concert by the KDKA Little Symphony orchestra. 6 P. M., baseball scores. 6:30 P. M., Little Miss Merry Heart will sing for the kiddies. 6:45 P. M., news bulletins. 7 P. M., baseball scores. 7:15 P. M., farm program arranged by the National Stockman and Farmer. 7:40 P. M., market reports. 8 P. M., concert by the KDKA Little Symphony orchestra. This program is arranged especially for Spanish-speaking countries. Announcement made in Spanish and English. 9:55 P. M., time signals; weather forecast; baseball scores. 10 P. M., concert.

KYW, Chicago, 536m (560k), C. S. D. S. T.—6:02 P. M., news, financial and final markets. 7 P. M., dinner concert broadcast from Congress Hotel. 8 P. M., "Twenty Minutes of Good Reading," by Rev. C. J. Pernin. 8:20 P. M., musical program. 9:15 P. M., "Safety First" talk by Mr. Z. C. Elkin of Chicago Motor Club. 10 P. M., "At Home" program.

WBZ, Springfield, Mass., 337m (890k), E. S. T.—6:40 P. M., Leo Reisman and his Hotel Brunswick orchestra. 7 P. M., results of games, Eastern, American and National leagues. 7:05 P. M., letter from the New England Homestead; "At the Theatres," with A. L. S. Wood, dramatic editor. 7:30 P. M., bedtime story for the kiddies. 9 P. M., Mlle. Genevieve Gansouenat, soprano; Juliette Houle, accompanist. 9:30 P. M., Copley-Plaza orchestra. 10:55 P. M., time signals; weather reports.

WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—6:15 P. M., Albert E. Sonn, technical editor, weekly talk on "Radio for the Layman." 6:30 P. M., "Music While You Dine," Tom Cooper's Country Club orchestra. 7:20 P. M., resume of the day's sports with Jolly Bill Steinke.

KHJ, Los Angeles, 395m (760k), P. T.—6 P. M., Art Hickman's concert orchestra from the Biltmore Hotel. 6:45 P. M., children's program presenting Prof. Walter Sylvester Hertzog; weekly visit of Dickie Brandon, screen juvenile; bedtime story by Uncle John. 8 P. M., program, courtesy Platt Music Co. 9 P. M., Daniel Nelson Clark of the Radio Journal, speaker; Anton Chris, steel guitar; Thorlie Olsen, baritone. 10 P. M., Art Hickman's dance orchestra from Biltmore Hotel.

WLW, Cincinnati, 423m (709k), C. S. D. S. T.—11 A. M., weather forecast and business reports. 1:30 P. M., business reports. 3 P. M., market reports. 4 P. M., piano solos by Miss Adelaide Apfel. 10 P. M., three-minute message from the United States Civil Service; concert program by the Milnor Electric Instrumental trio. 10:45 P. M., musical reading, "The New Thought," by Miss Olive Vail. 10:55 P. M., popular program by the Deherty Melody Boys.

WGI, Medford, Mass., 360m (830k), E. S. D. S. T.—7 P. M., closing stock market reports; agriograms furnished by the U. S. Dept. of Agriculture; Boston police reports. 7:15 P. M., code practice; citizens' radio period. 7:30 P. M., evening program, talk by Geoffrey L. Whalen, the "Radio Movie Man." 7:45 P. M., Bernie and His Bunch. 8:15 P. M., musicale; weather report; time.

WLS, Chicago, 345m (870k), C. S. D. S. T.—6:30 P. M., Frank Westphal orchestra, College Inn, and at intervals during the evening. 7 P. M., ten minutes with the "Solemn Old Judge." 7:15 P. M., Mabel Harris Herstein, soprano. 7:45 to 8 P. M., Ford Rush and Glenn Rowell, lullaby time. 10:15 P. M., 8th Regimental Band.

KFI, Los Angeles, 469m (640k), P. T.—5 P. M., Evening Herald news bulletins. 5:30 P. M., Examiner news bulletins. 6:45 P. M., Y. M. C. A. concert and lecture. 8 P. M., Ambassador Hotel Coconut Grove orchestra. 9 P. M., Examiner-Placenta Chamber of Commerce program. 10 P. M., instrumental concert.

WEAF, New York, 492m (610k), E. S. D. S. T.—11 to 12 A. M., market and weather reports. 4 to 5 P. M., May Hughes, coloratura soprano; children's hour with stories. 6 to 11 P. M., dinner music from the Rose Room of the Hotel Waldorf-Astoria; interdenominational service, auspices Greater New York Federation of Churches; Bud Fisher's Happy Players; talk by the Bank of America; Helen White, dramatic soprano; Vincent Lopez and his orchestra from Roof Garden, Hotel Pennsylvania.

WDR, Philadelphia, 395m (760k), E. S. D. S. T.—2 P. M., Arcadia Cafe concert orchestra; artist recital from studio. 4:30 P. M., artist recital from studio. 5 P. M., question period, series of educational talks delivered under auspices Peirce School of Business Administration. 5:45 P. M., baseball scores.

Friday, July 25

WNYC, New York, 526m (570k), E. S. D. S. T.—7:30 P. M., police reports and alarms. 8:30 P. M., musical program composed of band selections and vocal and instrumental numbers by artists. 10:30 P. M., police alarms.

WHN, New York, 360m (830k), E. S. D. S. T.—6 P. M., Around the Alamac's Festive Board: Overture by Olcott Vail's trio; jests by Toastmaster; talks and songs by renowned folk; dance music by Paul Specht and his Alamac orchestra. 7 P. M., "Sport Period," by Thornton Fisher. 9:15 P. M., broadcasting in public from stage of Loew's Metropolitan theatre, Brooklyn. 9:45 P. M., Chas. Strickland's Palisades Park orchestra. 10:15 P. M., original poems by Wm. J. Stuart. 10:20 P. M., baseball statistics by Al. Munroe Elias. 10:30 P. M., Roseland dance orchestra. 11 P. M., George Jay, tenor; Clarence Gaskill, pianist. 11:15 P. M., Ross Fowler, baritone. 11:30 P. M., Club Alabam orchestra.

WJZ, New York, 455m (660k), E. S. D. S. T.—4:30 P. M., Hotel Astor organ recital, direct.

5:30 P. M., State and Federal agricultural reports; Farm and Home reports; closing quotations N. Y. Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., Ernie Golden's McAlpin roof orchestra. 7:20 P. M., financial developments of the day. 7:30 P. M., Ernie Golden's McAlpin roof orchestra. 8 P. M., looseleaf current topics, by Dr. William H. Allen. 8:30 P. M., "Election of President and Responsible Party Government," by Prof. Swenson, New York University. 8:50 P. M., Wanamaker concert, Willard I. Nevins, organist. 9:30 P. M., Frank Banister revue. 10:30 P. M., Harold Stern's Hotel Belleclair Towers orchestra.

WJY, New York, 405m (740k), E. S. D. S. T.—7:30 P. M., Leonard Nelson's Knickerbocker Grill orchestra, direct. 8:15 P. M., Plantation Night: Overture; prologue; episode 1, Old Darkey medley; episode 2, Plantation songs; episode 3, Negro piano compositions; episode 4, Songs of the Creole; episode 5, Largo New World symphony; episode 6, Jubilee songs; episode 7, Blues.

WOC, Davenport, Ia., 848m (620k), C. S. T.—10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., market quotations. 12 noon, chimes concert. 12:15 P. M., weather forecast. 1 P. M., closing stocks and markets. 7 P. M., sport news and weather forecast. 8 P. M., musical program, A. M. Rows, baritone; Milton Vaughn, tenor; E. L. Stread, humorous stories; Elanore Farley-Lorenzen, soprano. 9 P. M., weekly tourists' road bulletin.

WNAC, Boston, 278m (1080k), E. S. D. S. T.—10:30 A. M., Women's Club talks. 1 P. M., Shepard Colonial orchestra. 4 P. M., Shepard Colonial orchestra. 6 P. M., children's half hour. 6:30 P. M., WNAC dinner dance, Checker Inn orchestra. 8 P. M., broadcast from State theatre, concert program by State theatre orchestra and organ selections.

KDKA, Pittsburgh, 326m (920k), E. S. D. S. T.—5 P. M., baseball scores. 5:30 P. M., organ recital by Paul Fleege, from the Cameo motion picture theatre. 6 P. M., baseball scores; dinner concert. 6:30 P. M., Uncle Wiggley. 6:45 P. M., news bulletins. 7 P. M., baseball scores. 7:40 P. M., National Stockman and Farmer Market reports. 8 P. M., Pauline Rimm, soprano; and a trio for three flutes, Theodore Surdykowski, John Ingram and Alvin Houser, flutists. 9:55 P. M., time signals; weather forecast; baseball scores.

KYW, Chicago, 536m (560k), C. S. D. S. T.—6 P. M., news, financial and final markets. 6:45 P. M., children's bedtime story. 7 P. M., dinner concert, from Congress Hotel. 8:20 P. M., speeches by the American Farm Bureau Federation; "Boys and Girls Club Work in the Great South West," by Arthur W. Large; "Among Our Neighbors," a feature furnished weekly. 9 to 12:30 P. M., midnight revue.

WBZ, Springfield, Mass., 337m (890k), E. S. T.—6 P. M., dinner concert by the WBZ trio. 7 P. M., results of games, Eastern, American and National leagues. 7:05 P. M., "The Automobile Engine," by R. J. Beaver. 7:30 P. M., bedtime story for the kiddies. 10 P. M., concert by Neapolitan concert company. 10:55 P. M., time signals; weather reports. 11 P. M., concert by the WBZ trio; and Walter B. Marsh, baritone.

WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—6:15 P. M., Agnes Leonard in songs for the children. 6:30 P. M., "Man in the Moon" stories for the children by Josephine Lawrence and William F. B. McNeary. 7 P. M., Breaux and Tobias minstrels, Henry Tobias at the piano. 7:20 P. M., resume of the day's sports with Jolly Bill Steinke.

KHJ, Los Angeles, 395m (760k), P. T.—6 P. M., Art Hickman's concert orchestra. 6:45 P. M., children's program presenting Prof. Walter Sylvester Hertzog; weekly visit of Richard Headrick, screen juvenile; bedtime story by Uncle John. 8 P. M., program, courtesy of Margaret Cutche, composer. 10 P. M., Art Hickman's dance orchestra.

WLW, Cincinnati, 423m (709k), C. S. D. S. T.—11 A. M., weather forecast and business reports. 1:30 P. M., market reports. 3 P. M., stock quotations. 4 P. M., special program, T. C. O'Donnell, lecture on "Practical Lessons in Writing."

KSD, St. Louis, 546m (550k), C. S. T.—8 P. M., Silverman's orchestra concert broadcast direct from Lyric Skydome.

WGI, Medford, Mass., 360m (830k), E. S. D. S. T.—7:15 P. M., closing stock market reports; code practice; Boston police reports. 7:30 P. M., evening program; selected verses by Mr. Charles L. H. Wagner, radio poet. 7:45 P. M., musicale.

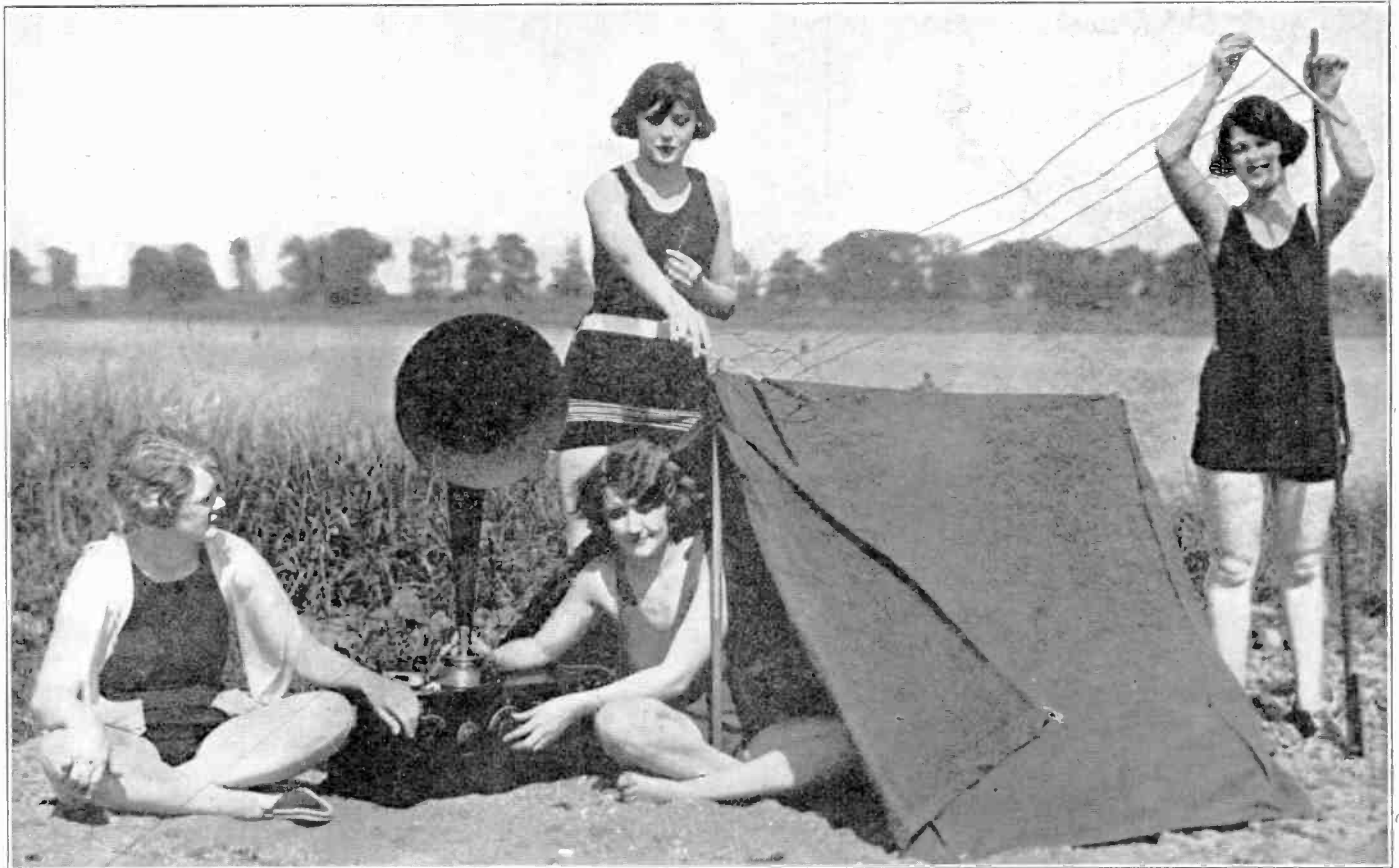
WLS, Chicago, 345m (870k), C. S. D. S. T.—6:30 P. M., Frank Westphal orchestra, College Inn, and playing at intervals during the evening. 7 P. M., ten minutes with the "Solemn Old Judge." 7:15 P. M., Harry L. Kohler, baritone. 7:45 P. M., Ford Rush and Glenn Rowell, Lullaby time. 8 P. M., University male quartet. 9 P. M., Mildred, Bernice, and Helen Elliott, string music. 9 P. M., farm program.

WIP, Philadelphia, 509m (590k), E. S. D. S. T.—3:30 P. M., concert by Comfort's Philharmonic orchestra; soloists, Miss Edna Cook Smith, contralto, and Mr. Charles Cinti, flutist. 6 P. M., weather forecast. 6:05 P. M., dinner music by Eddie Elkins' orchestra from the El Kadia Gardens. 6:45 P. M., Agriculture livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call for the children.

KFI, Los Angeles, 469m (640k), P. T.—5 P. M., Evening Herald news bulletins. 5:30 P. M., Examiner news bulletins. 6:45 P. M., Aeolian organ recital. 8 P. M., Evening Herald-Grigsby's orchestra. 9 P. M., Examiner-University of Southern California, School of Speech Night. 10 P. M., pupils of Myra Belle Vickers in vocal recital.

(Continued on page 18)

Girls Solve Beach Aerial Problem—



A SEASHORE AERIAL, erected by these four girls at Long Beach, N. Y., gave them good service on locals. The front pole of their pup tent was used as one support, a special pole dug in the sand being the other. The spreaders were attached to the poles, insulators being used. The girls are Beryl Clark, Sylvia Rose and Della and Ada Stone. (Foto Topics.)



(Foto Topics)

THE FALL STYLE for all those amateurs who were first to establish two-way communication with a European operator will be pepper-and-salt suit, four-in-hand with "solid" pearl stickpin, collar white all around, tortoise shell eyeglasses and—a brown derby (Kenneth B. Warner, distributor). Photo shows F. H. Schnell all dressed up in aforesaid fashionable style. He talked with French 8AB. Though traffic manager of the American Radio Relay League, he will wear the derby. His only objection is to being called a Derby winner.



(Underwood & Underwood)

A SHOE REPAIR CONCERN has customers listen in while their shoes are being mended.



(International Newsreel)

NO, this is not Station WOW radiocasting, neither are the infants being trained to be announcers. They don't need a radio to be heard, day or night, mostly night. The aerial comes through the window pane and in front of the set.

- WNYC, New Station, Big Success



(International Newsreel)

THE RADIOCASTING STATION WNYC, having opened, Grover A. Whalen receives congratulations by telephone. Mr. Whalen, as Commissioner of Plant and Structures, established this municipal station. He is now an executive of the John Wanamaker store, New York City. Shown with him are Raymond Asserson, radio engineer, and Frank Orth, operator at the station, which is in the Municipal Building. The station radiocasts mightily. Thousands of letters from delighted fans have been received at the station. One man visited there and said that while in California he heard WNYC on an 8-tube Super-Heterodyne.



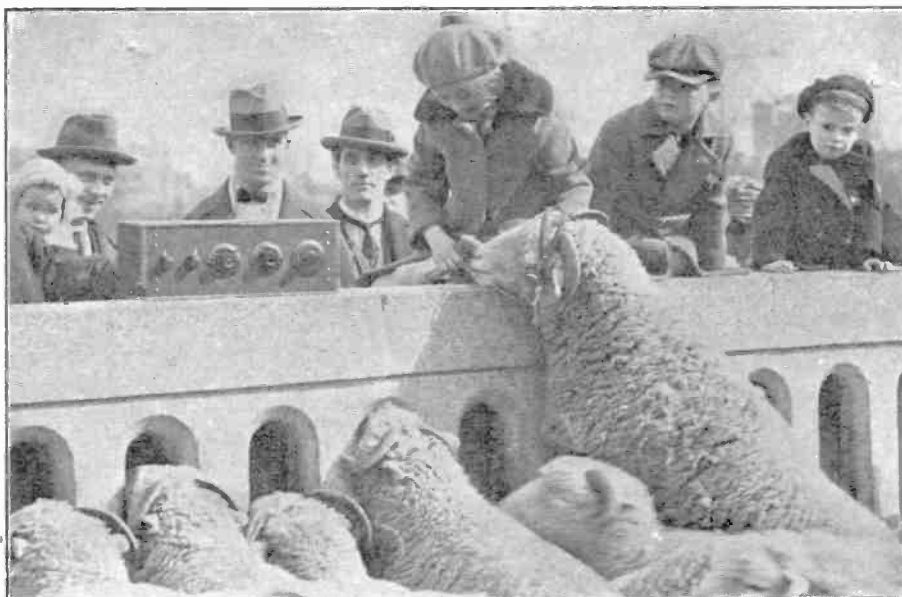
(Kadel & Herbert)

AT STATION WNYC, the great New York City radiocast station atop the Municipal Building, giant loud talkers are installed to provide entertainment for listeners 26 stories below. On quiet evenings the music can be heard in Jersey, across the river. The station is a big success.



(Kadel & Herbert)

ABOVE is a portable set with a vengeance. It was made by Joseph Camarato to improve revenue from his shoe-blackening enterprise. Note that the battery is a 1½-volt No. 6 type, contained in the ultra-utilitarian cabinet. The circuit is a one-knob regenerative. The aerial facilities are provided by tossing a long wire behind the wall of Central Park, New York City. Experts will see some shortcomings in this make-up. Instead of the usual nuisance of hand capacity in this type of one-knobber there is trouble from foot capacity. Joe would part with another tooth to get rid of this source of annoyance to customers. At left a method is shown of avoiding this, though at an expense Joe is not quite ready to bear. A Cincinnati shoe repair store installed a radio set with series-connected earphones, one in each booth. Persons owning only one pair of shoes, and who must wait while the cobbler cobbles, can listen in. Signals come in just as clear when one has his or her shoes off as otherwise.



(Foto Topics)

THIS MODERN BO-PEEP hasn't lost many sheep, because she tunes her radio for her woolly friends that they may listen to Mother Goose radiocasting through Station BAA.



(Kadel & Herbert)

JOHN W. DAVIS, Democratic candidate for President, is a radio fan. At his home on Long Island he spends many an interest-hour listening to the programs from local and DX stations. He is known as a DX hound and may be sad because his party's platform included no plank for more DX on 3 tubes.

Programs

Friday, July 25

(Continued from page 15)

11 P. M., Ambassador Hotel Coconut Grove orchestra.

WEAF, New York, 492m (610k), E. S. D. S. T.—11 to 12 A. M., talk by R. A. Atkinson, of the New York Health Speakers Service; market and weather reports. 4 to 5 P. M., Leta Newly Shelton, soprano; children's stories. 6 to 10 P. M., dinner music from the Rose Room of the Hotel Waldorf-Astoria; Blanche Kraft Fink, soprano, accompanied by Jenna M. Blauvett; Bomar Cramer, pianist; The Happiness Boys; "Eveready Man About Town"; B. Fischer and company's "Astor Coffee" orchestra.

WDAR, Philadelphia, 395m (760k), E. S. D. S. T.—7:30 P. M., Dream Daddy with the boys and girls; Stanley features. 8 P. M., book review by Arnold Abbott; artist recital. 8:15 P. M., fifteen minutes of dance music. 8:30 P. M., Emmett Welch Minstrels, direct from their summer home on the Million Dollar Pier. 9:15 P. M., the famous Benson Chicago orchestra, Don Bestor, director; Victor Record artists. 9:30 P. M., Charley Fry and his Million Dollar Pier orchestra. 10 P. M., Arcadia Cafe Concert orchestra; Benson Chicago orchestra; Charley Fry and his Million Dollar Pier orchestra; together, with recital of theatrical and Star entertainers.

Saturday, July 26

WNYC, New York, 526m (570k), E. S. D. S. T.—7:30 P. M., police reports and alarms. 8:30 P. M., musical program composed of band selections and vocal and instrumental numbers by artists. 10:30 P. M., police alarms.

WHN, New York, 360m (830k), E. S. D. S. T.—8 P. M., Jimmy Flynn, tenor. 8:15 P. M., boy's period, by Wm. J. Stuart, sponsored by Kiwanis Club. 8:30 P. M., Ellen Montague Cross, presents the Perfect Harmony Four. 9 P. M., broadcasting in public from stage of Loew's Metropolitan theatre, Brooklyn. 9:30 P. M., baseball statistics by Al Munroe Elias. 9:35 P. M., Fitzpatrick Brothers in old time medlies. 9:45 P. M., Jos. C. Wolfe, baritone. 10 to 11 P. M., musical program. 11:15 P. M., Jimmy Clarke and his entertainers.

WJZ, New York, 455m (660k), E. S. D. S. T.—4:30 P. M., Roger Wolf's Biltmore tea room orchestra. 5:30 P. M., State and Federal agricultural reports; Farm and Home reports; closing quotations, N. Y. Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., Waldorf-Astoria orchestra. 7:55 P. M., "The Radio Franks," Wright and Bessinger. 8:10 P. M., time pop question game. 8:45 P. M., Paragon Novelty trio. 9:30 P. M., sport talk by Fred Fletcher of the Evening World. 10:30 P. M., Specht's Club Lido Venice orchestra.

WOC, Davenport, Ia., 484m (620k), C. S. T.—9 A. M., opening market quotations. 10 A. M., household hints. 10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., government bulletins. 11:15 A. M., closing market quotations. 12 noon, chimes concert. 12:15 P. M., weather forecast. 7 P. M., sport news and weather forecast. 9 P. M., orchestra program, the Palmer School radio orchestra.

WNAC-Boston, 276m (1080k), E. S. D. S. T.—6:30 P. M., WNAC diner dance, broadcast from Hotel Westminster Roof Garden. 8:15 P. M., dance music, State Ballroom orchestra. 9:15 P. M., dance music, Hotel Westminster orchestra. 10:15 P. M., dance music, Copley-Plaza orchestra; popular songs, Irving Crocker, George Rogers at the piano; Ted and Dick Waterson, Don Ramsay at the piano.

KDKA, Pittsburgh, 326m (920k), E. S. D. S. T.—6 P. M., baseball scores. 6:30 P. M., Boots and his brothers. 6:45 P. M., last minute helps to teachers, by Carman Johnson. 7 P. M., baseball scores; sport review, by James J. Long. 8 P. M., Concert by Westinghouse band, assisted by soloists. 9:55 P. M., time signals; weather forecast; baseball scores.

KYW, Chicago, 536m (560k), C. S. D. S. T.—6:02 P. M., news, financial and final markets. 7 P. M., dinner concert broadcast from Congress Hotel. 8 P. M., musical program. 9 P. M., talk by Vivette Gorman, Home Economics Dept. 9:05 P. M., Youth's Companion, including short stories, articles and humorous sketches.

WBZ, Springfield, Mass., 337m (890k), E. S. T.—6 P. M., Schrafft's restaurant. 6:30 P. M., Leo Reisman and his Hotel Brunswick orchestra. 7 P. M., results of games Eastern, American and National leagues. 7:10 P. M., Leo Reisman Hotel Lenox ensemble. 7:30 P. M., bedtime story for kiddies. 7:40 P. M., concert by the Hotel Kimball trio; Jan Geerts, violinist and director; Angela Goddard Lonergan, cellist; Paul Lawrence, pianist.

9 P. M., Elisha Worthley, soprano; George E. Dwight, baritone; Mabel Bennett, pianist and accompanist, Boston studio. 10:55 P. M., time signals; weather reports.

WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—6:15 P. M., "Music While You Dine," Ernie Krickett's Cinderella orchestra. 7:20 P. M., resume of the day's sports. 8:30 P. M., recital by Hasrof Bagraduni, tenor. 8:45 P. M., address by Capt. Jerome Hart, world traveler, soldier, diplomat and musical critic, "On Duty in Many Lands." 9:15 P. M., continuation of recital by Hasrof Bagraduni, tenor. 9:30 P. M., recital by Sterling mixed quartette.

KHJ, Los Angeles, 395m (760k), P. T.—6 P. M., Art Hickman's concert orchestra. 6:45 P. M., children's program presenting Prof. Walter Sylvester Hertzog, Helene Pirie, screen juvenile; bedtime story by Uncle John. 8 P. M., program, courtesy of J. Howard Johnson, tenor. 10:11 P. M., Art Hickman's dance orchestra from the Biltmore Hotel.

WLW, Cincinnati, 423m (709k), C. S. D. S. T.—11 A. M., weather forecast and business reports. 1:30 P. M., market reports.

KSD, St. Louis, 546m (550k), C. S. T.—8 P. M., Missouri Theatre orchestra and specialties broadcast direct from Missouri Theatre.

WGI, Medford, Mass., 360m (830k), E. S. D. S. T.—7:15 P. M., code practice; New England weather forecast; New England crop notes. 7:30 P. M., talk on current events by David M. Cheney; musicale; weather report and time.

WLS, Chicago, 345m (870k), C. S. D. S. T.—8 P. M. to 1 A. M., national barn dance; Blue Hoosier Four, vocal and instrumental; Barngrover and Rose, violin and mouth harp; old-time fiddlers, Frank Hart, M. J. Delehanty, Wm. McCormick.

WIP, Philadelphia, 509m (590k), E. S. D. S. T.—6:05 P. M., dinner music by the Kentucky Sereaders orchestra. 6:45 P. M., agriculture, livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call for the children. 8 P. M., concert by Comfort's Philharmonic orchestra; soloist, Miss Ednah Cook Smith, contralto. 8:45 P. M., "What the Wild Waves Are Saying," picked up by a microphone placed amidst the breaking waves. 8:50 P. M., concert by Vessella's concert band. 10 P. M., dance music by Bob Leman's dance orchestra. 11:05 P. M., organ recital by Karl Bonawitz.

KFI, Los Angeles, 469m (640k), P. T.—5 P. M., Evening Herald news bulletins. 5:30 P. M., Examiner News bulletins. 6:45 P. M., Hennessy's Paramount players. 8 P. M., Norman Kolch, bass, arranging program. 9 P. M., Examiner-Fullerton program. 10 P. M., popular song program. 11 P. M., Ambassador Hotel Coconut Grove orchestra.

WEAF, New York, 492m (610k), E. S. D. S. T.—4:5 P. M., Elmer Grosso and his versatile orchestra. 6-11 P. M., dinner music from the Rose Room of the Hotel Waldorf-Astoria; Jeannette Johnson and orchestra; Rudolph John Stemler, bass-baritone; talk on health by Christine R. Kefauver; Daisy Krey, contralto, accompanied by Anne Newmann; Vincent Lopez and his orchestra, Roof Garden, Hotel Pennsylvania.

Sunday, July 27

WCAE, Pittsburgh, 462m (650k), E. S. D. S. T.—3:30 P. M., people's radio church services. 7 P. M., dinner concert from William Penn hotel.

WGY, Schenectady, 380m (740k), E. S. T.—9:30 A. M., service of the First Presbyterian Church. 7:30 P. M., concert by New York Philharmonic orchestra, broadcast from Lewisohn Stadium, New York.

KPO, San Francisco, 423m (710k), P. T.—11 A. M. to 12 noon, denominational and non-sectarian church services, speaker, Dr. W. S. Mathews, Methodist; soloist, Mme. Madge DeWitt, dramatic soprano; organ selections by Theodore J. Irwin. 8:30 to 10 P. M., concert by Rudy Seiger's Fairmont Hotel orchestra.

WLAG, Minneapolis, 417m (720k), C. S. T.—10:20 A. M., morning service, Plymouth Congregational Church. 4:15 P. M., service, House of Hope Presbyterian Church. 7:45 P. M., service, Central Lutheran Church.

WHAS, Louisville, Ky., 400m (750k), C. S. T.—9:57 A. M., organ music. 10 A. M., church service, auspices Crescent Hill Presbyterian Church, the Rev. Dr. J. V. Logan, pastor; Farris A. Wilson, organist and choir director. 4 P. M., concert by the Beechmont trio.

KGO, Oakland, Cal., 312m (960k), P. T.—3:30 P. M., concert by KGO Little Symphony orchestra and soloists, Carl Rhodehamel conducting.

WOS, Jefferson City, Mo., 441m (680k), C. S. T.—8 P. M., Union open air religious services broadcast from the Capitol lawn; music by the Missouri State Prison band.

WGI, Medford, Mass., 360m (830k), E. S. D. S. T.—5 P. M., twilight program, "Adventure Hour," conducted by Youth's Companion; musicale by Mr. Elmer F. Orno, Lynn, Mass.; talk, auspices Greater Boston Federation of Churches, by the Rev. Geo. A. Lawson.

WLS, Chicago, 345m (870k), C. S. D. S. T.—6:30-8 P. M., program by choir of Christ Church, Elmhurst, Ill.

WIP, Philadelphia, 509m (590k), E. S. D. S. T.—11 A. M., morning service broadcast direct from Holy Trinity Church, Rittenhouse Square. 3:30 P. M. special Sunday afternoon concert, with prominent soloists, broadcast direct from the WIP control station on the Steel Pier, Atlantic City, N. J.

Monday, July 28

WNYC, New York, 526m (570k), E. S. D. S. T.—7:30 P. M., police reports and alarms. 8:30 P. M., musical program composed of band selections and

(Continued on page 30)

Marching Onward

LOSSES are a source of annoyance at any time. They are inimical to good results in radio. How would you like to build a low-loss tuning coil, a very inexpensive but highly efficient coil that boosts volume and lengthens distance? In next week's **RADIO WORLD**, issue of August 2, out July 30, Byrt C. Caldwell will tell all about it. Other features include "How to Add 500 Miles for 10c," by Herman Bernard; "A 9-Tube Portable Super-Heterodyne," by A. P. Peck; "Trouble-Shooting in the Best Circuits," by Neal Fitzalan; "The Adventures of an Obliging Home Constructor," by C. J. Ridwell; "The Ford of Radio," a DX set, \$20 complete, by A. F. La Pierre, and "Building a Battery Charger in Your Set," by N. N. Bernstein, Technical Editor. The following issue, dated August 9, on sale August 6, will contain an important article, "A 3-Tube Super-Heterodyne." This set gets DX and works a loud speaker with fine volume. Just the set you've been waiting to build!

RADIO

WORLD

Vol. 5. No. 18.

15 CENTS Illustrated ISSUE OF JULY 26, 1924

A Weekly Paper Published Every Wednesday and Dated Saturday, by Hennessy Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Phones: Lackawanna 6976 and 2063.

TABLE OF CONTENTS

A 4-Tube Reflexed Super-Heterodyne, by Charles H. M. White. (Illustrated)	Page 3
A Demonstration Receiver, by Byrt C. Caldwell. (Illustrated)	Page 5
Why the Metaform Is a Wonder, by Walt S. Thompson, Jr. (Illustrated)	Page 6
1,000 Miles on a Loud Speaker, by A. P. Peck. (Illustrated)	Page 7
One Stage of Transformer Coupled and Two Stages of Impedance Coupled AF, Giving Undistorted Volume. (Illustrated)	Page 8
Trouble-Shooting in the Ultra Reflex, by Neal Fitzalan. (Illustrated)	Page 9
Trouble Shooting in the 4-Tube Super-Heterodyne, by Wainwright Astor. (Illustrated)	Page 10
Using a Fixed Coil Instead of a Variocoupler. (Illustrated)	Page 11
1,500 Miles on Two Tubes, a Honeycomb Coil Set, with a Stage of R F and Detector, by Herman Bernard. (Illustrated)	Page 12
Complete Advance Radiocast Programs	Page 14
News and Features Told in Pictures	Pages 16 and 17
Radio the Only Industry to Demand Regulation, by Herbert Hoover, Radio Chief of the Government	Page 19
Editorial—Radio Censorship Would Be a Disaster	Page 20
Radio University (Questions and Answers)	Page 21
Latest News	Page 23
Solving Aerial, Ground and Battery Problems for a Portable Set	Page 28

Radio the Only Industry to Pray for Government Control, Says Hoover

Users Themselves Fear Pandemonium Otherwise Secretary of Commerce Asserts By Herbert Hoover

Who, as United States Secretary of Commerce, Regulates Radio

UP to a few years ago, no one dreamed that the ether had any special importance in law or in government. It was surely inert from the point of view of public interest. Then it was discovered that radio messages are transmitted by an electrical wave through the ether. At once the ether developed some very important public questions like water rights and land rights. It threatens even to have property values. It has become the vehicle of public services, the possible scene of monopolies, it has boundaries, rights of way, rules of the road, raises questions as to free speech—functions that have hitherto been confined to the land and water.

Today there are literally 20,000 people trying to traverse the ether with all sorts of messages, and inasmuch as there would be utter pandemonium if there were no traffic rules, there has grown up a demand from the users of the ether themselves for government regulation. This is indeed the only industry I know of which has generally with one acclaim welcomed and prayed for government control.

Some day, with a greater development of the art, we may use several thousand different wave lengths—but today we must keep them a good ways apart, and we have the use of a very limited number. Therefore, the assignment of wave lengths and

preventing duplication and crowding in their use, is the first step in regulation of the traffic.

Up to ten years ago, practically all messages were dispatched by the dot and dash method. They had grown to have considerable importance for the transmission of messages from ships and to a small extent in international communication. The instruments have been much perfected since that time so that we have a very considerable increase in the number of wave lengths available for telegraphic purposes and we are not much troubled in that field.

The use of radio, for telephone purposes only became possible with the discovery of the vacuum tube for amplifying the electric currents which are controlled by the voice and which are made to produce sound. But the transmission of sounds in this way has so far been generally and practically used only in the lower wave lengths. Our broadcasting and ordinary receiving sets are today limited to the area from 200 meters to about 600 meters. In this range we can so far only safely venture fifteen or twenty wave bands in any one zone. Some of the bands in this range must be reserved for ships, and for amateurs, and the use of closely adjacent bands in nearby cities is not feasible so that we have at present a maximum of about seven that we can safely use for telephone broadcasting in a given vicinity without interference.

For telegraphic purposes, we can use a great many different wave bands above 600 meters, and there is no substantial congestion in that work. Furthermore we are trying gradually to eliminate the use of telegraph, except for amateurs, in any of the wave lengths which can readily be applied to telephone purposes, always maintaining, of course, provision for communication with ships.

If we wanted to apply the telephone to personal communications such as we have

in the normal telephone service, only seven people could call up at once in any one neighborhood, and, therefore, it has no practical application for service in personal communications.

This brings us to the second step in regulation. We do not allow any personal communications by telephone within this range of wave lengths, but reserve it entirely for broadcasting purposes where millions of persons can be served instead of only a few. If we allow private communication by radio telephone, we would have the air filled with invitations to a dinner or comments on Lilly's bobbed hair, with a possible exclusion of a speech by the President of the United States.

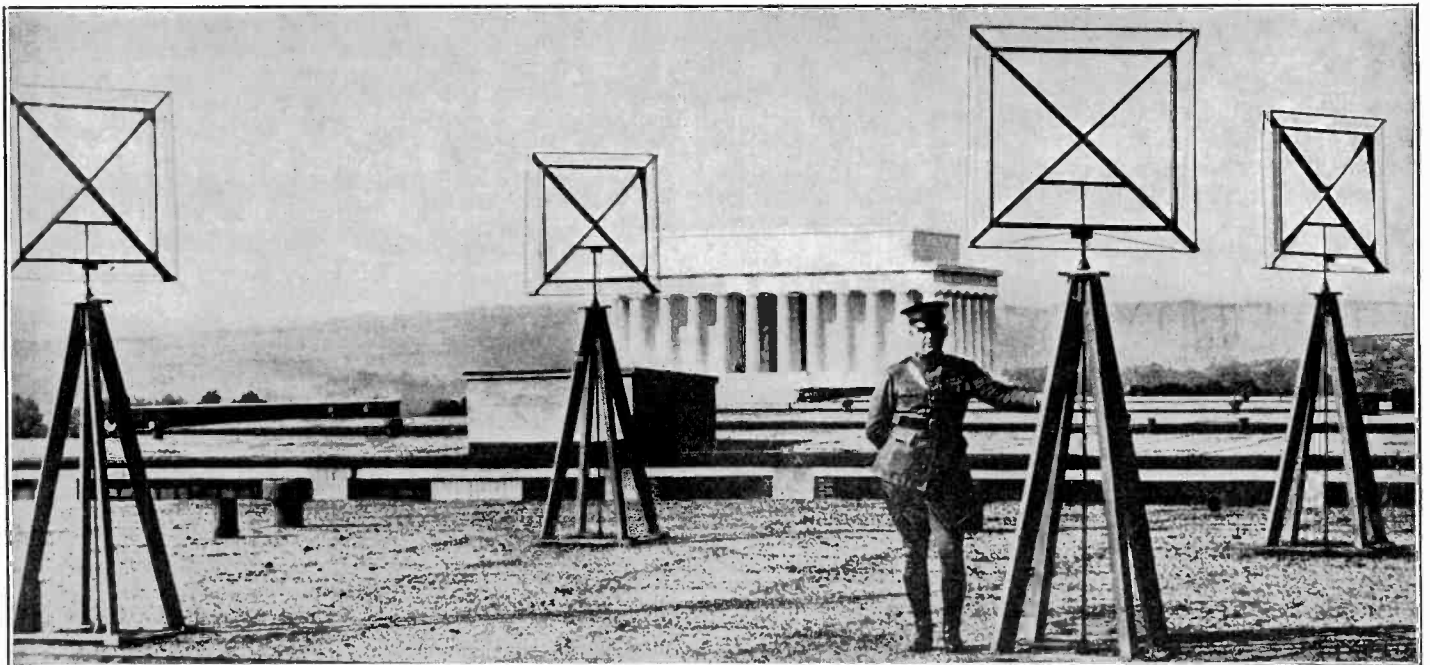
We have about 570 broadcasting stations, and in order that each one of them may have some right to start things in the ether, we have to regulate them.

Paris and London to Hear U. S. Regularly, Says David Sarnoff

ATLANTIC CITY, N. J.

WITHIN the next year the farmer in Kansas or Missouri, as well as the city dweller, may hear radio programs from Paris, London, South America and other parts of the world, according to David Sarnoff, vice-president and general manager of the Radio Corporation of America, in an address before the Associated Manufacturers of Electrical Supplies at the Ambassador Hotel.

International broadcasting which will link up the furthestmost corners of the earth is closer at hand than the public imagines, Mr. Sarnoff said. The outstanding developments in broadcasting during recent months, he continued, have been the increased power of sending stations under the system of superpower.



(Wide World)

THIS IS HOW the Army heads keep in constant communication with posts in this country and abroad. Each department has its own loop receiver which enables direct communication with different points at the same time without causing interference. All these loops are on top of the Munitions Building, Washington, D. C. The Lincoln Memorial is seen in the background.

A THOUGHT FOR THE WEEK—*He Who Has His Ear to the Radio
Has His Ear to the Heart of the World*

RADIO WORLD

Title Reg. U. S. Pat. Off.

TELEPHONE: LACKAWANNA 2062, 6976

PUBLISHED EVERY WEDNESDAY

(Dated Saturday of same week)

FROM PUBLICATION OFFICE,

HENNESSY RADIO PUBLICATIONS CORPORATION

ROLAND BURKE HENNESSY, President

M. B. HENNESSY, Vice-President

FRED S. CLARK, Secretary and Manager

1493 BROADWAY, NEW YORK, N. Y.

New York Representatives: James H. Carroll, W. H. Oke.

Circulation Manager: David Yokel.

Boston Representative: Chas. H. M. White, 18 Stuart

Street, Boston, Mass.

Chicago Representative: Mat H. Friedman, 519 East 60th

Street, Chicago, Ill.

Cincinnati Representative: Samuel H. Jaffee, 1117

Prorident Bank Bldg., Cincinnati, O.

European Representative: The International News Co.,

Breams Bldgs., Chancery Lane, London, Eng. Paris,

France. Brentano's 38 Avenue de l'Opera.

EDITOR, Roland Burke Hennessy
MANAGING EDITOR, Herman Bernard
TECHNICAL EDITOR, N. N. Bernstein

SUBSCRIPTION RATES

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

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

ADVERTISING RATES

FLAT RATE—Page, 7½x11", \$150; half page, 8½ D. C. or 5½x3 col., \$75; quarter page, 4½ D. C., \$37.50; one col., 2½x11", \$50—\$5 per inch. Back cover page, two colors, \$250. Preferred positions 20% extra.

CLASSIFIED ADVERTISEMENTS

Five cents per word. Minimum, 10 words. Cash with order.

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

JULY 26, 1924

Radiocasting of Franks' Murder Trial a Vicious Idea

ONE of the most lamentable things that could happen to radio would be the radiocasting of the trial of Nathan Leopold, Jr., and Richard A. Loeb for the murder of Robert Franks. The trial will be held in Chicago.

The great American public that listens to radio has no morbid desire to be horrified by the intimate details of a heinous crime. Rather, the sending out of such a trial over the air would offend thousands on thousands, who, being radio fans possessing good taste, would only be shocked at such a perfidy as descriptively sending the dregs of human degradation over the air.

The New York Daily News proposes that the trial be radiocast. It laments that only 200 persons could be crowded into the court room, and the world at large must needs be denied hearing the sordid details that the press has made familiar. The Chicago Tribune, under the same control as its New York adjunct, is co-operating in the movement. It is a mistake, an over-ambition on their part.

Radio Censorship Would Be a Disaster

WHAT radio does not need is a censor. Those in charge of radiocast stations may be depended on to keep within due bounds as to the nature of the entertainment and instructions on the program. If they do not, the good taste of the public at large is a safeguarding factor. Because some person may not like the kind of entertainment that characterizes a given station is no reason why an excited demand be made for a Congressional enactment setting up a preceptor of all programs. The respective States that set up moving picture censors are as good an argument against censorship as one could present. The duration of a filmed kiss is fixed in one State and it is a criminal offense to run a picture in which the kiss lasts longer than the legal maximum. In another State it is against the law to show a picture of any one smoking a cigarette. And so it goes, the greater the variety of the restrictions, the greater the absurdity of trying to make the products of the arts conform to the requirements of special groups. Under Federal regulation a censorship would work out even more ridiculously, for one man would have to make one ruling that would at once satisfy the demands of all the opposing elements in aesthetically diversified commonwealths.

The subject comes to the fore anew because of a shriek let out that Congress regulate radiocasting, due to WHN, New York City, being the medium through which Earl Carroll, producer of musical comedies, emitted a call for chorus girls for a new show. They were to appear in person on the stage of his theatre—almost in public, you might say—and thus avoid the necessity of paying a fee to an agent for getting a job. The shock attached to this arises from the heinous invasion of the sanctity of the home. It is felonious to suggest to any girl who is not already a stage girl that she apply for a position in the chorus. No demure darling of the drawing room must be contaminated with such ideas. No infant in his trundle-bed must hear such a phrase as chorus girl come through the loud speaker, lest when he grow up he become a philandering boulevardier, wear a boutonniere and twirl a malacca cane. It is better that some unknown possessor of a great voice and a charming stage presence should suffer the glorification of full obscurity, rather than have a suggestion of a theatrical career come from the outside. Witchcraft, return! Alchemism, welcome! Children's crusade, visit your emotionalized cruelty upon our innocents again! Ultra-Puritanism, come back! The world is moving backward; we are returning to the Middle Ages. James, get my suit of

armor! Knighthood is in flower! It is too sadly true that a listener has the option of tuning out any station he desires. Difficulty enters only when he or she ambitiously attempts to tune in according to desire. WHN may be tuned out with avenging regularity, but that station represents a type of entertainment that is a source of joy to many thousands. Its programs are of the happy-go-lucky, carefree, open-handed, impromptu sort, known as "popular." Not everybody likes it, but those who do like it simply dote on it. Who shall rise from the ranks of mere man to say that these teeming thousands shall not hear what they desire most to hear? The popularity of the station shows its appeal to a type. Opposition to it shows its offense to another type. But it is not publicly offensive; it is not unclean; it is just gay and free.

The management of WHN may regret the Carroll radiocasting, because of the reaction from one particular source and the desire not to stir up the censorial ranks of the smug. But even a lone protestor against the Carroll episode, were he to turn radiocaster, would soon have an abundance of regrets under censorship.

Why not let this stay a free country in all respects? Things haven't been going so badly under Old Glory so far.

HIS RADIO DAUGHTER

DADDY (just finishing a long talk and stern rebuke): Now you quite understand what I say?

SMALL DAUGHTER (very modern Miss): Will you broadcast it again, daddy? I haven't quite got your wavelength.—Minn. Hardware Trade.

The Radio University

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

Can I mount the 4 honeycomb coils on a round stick 6" long by 2" thick, and supported by brackets? I refer to B. J. Bongart's Super-Heterodyne.—Frank M. Livingston, Box 755, Springfield, Mass.

Yes, the coils may be mounted as you suggest, but be sure not to use iron or steel angles. Brass is satisfactory.

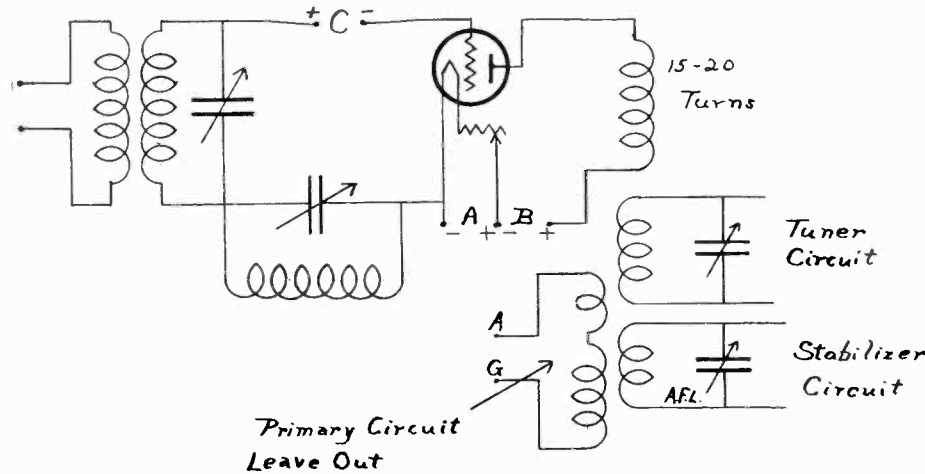
Can you publish a diagram of how the Metaform unit as described by Walt S. Thompson in RADIO WORLD for June 21 can be used with a Cockaday tuner? Can the same A and B batteries be used for the unit? Would this unit improve the Cockaday set the same as any other?—Henry Koenig, 63 Jefferson Avenue, Grant City, Staten Island, New York.

Fig. 25 shows you how to hook up the Metaform in conjunction with a Cockaday set. It is advisable to remove the single turn from around the tuner when using the unit. The primary

4615 Lexington, Hollywood, Cal., for which the above answer is also given.

I would like to build the double-range 3-circuit tuner published in RADIO WORLD for June 21. I have an 180-degree variocoupler with 7 taps. Can I use this coupler in this circuit? How is the grid leak connected?—A Parascondolo, 508 Adams Street, Hoboken, N. J.

You cannot use your coupler in its present form, but with the following changes, it will be suitable: Wind six or eight turns of No. 22 DCC wire around the primary of the coupler, spacing the turns equally, and connect the ends to the antenna and ground binding posts. The primary of the coupler now becomes the secondary, and the secondary becomes the tickler coil. The fourth tap on the coupler goes to the two points switch as shown in the diagram on page 7, RADIO WORLD, for June 21. The grid leak is connected from the grid post on the socket to the positive filament post.



CIRCUIT DIAGRAM of the Metaform unit used in conjunction with Cockaday tuner, asked for by Henry Koenig, 63 Jefferson avenue, Grant City, Staten Island.

circuit of the Cockaday is left open as indicated in the diagram. The same A and B batteries may be used and are connected in the usual way to the point indicated on the diagram. The coils of the frequency changer are wound on three-inch bakelite or radion tubes with No. 24 DSC wire. The antenna and ground leads are taken from the binding posts of the regular set and connected to A and G on the unit.

1—About what percentage of results will UV199 tube give in the Superdyne circuit compared to UV201A tubes? 2—Do you recommend the Double-Superdyne circuit published in RADIO WORLD for June 14 instead of the standard Superdyne hook-up? 3—Can I expect better distance with the Superdyne than with a 3-tube reflex?—J. F. Erlbacher, Elks Club, 100 Seventh St., Pittsburgh, Pa.

1—It is difficult to place even an average percentage of results on different types of tubes, it depending entirely on the construction of the set used, and the experience of the operator. Offhand, the novice or comparative beginner would get much better results using UV201A tubes. 2—The Double Superdyne circuit as published in RADIO WORLD has done great work. Anyone constructing his first Superdyne should follow data published in RADIO WORLD, issues of May 17, 24 and 31. 3—The distance-getting qualities of a set depend largely on the ability and experience of the operator. Reports have come in telling of great distances received on the loud speaker.

I am building B. C. Caldwell's Super-Power 4-Tube Reflex which appeared in RADIO WORLD for June 14, in which the author states to place a 50-turn honeycomb coil at the point marked X in the diagram. I am unable to locate this point. Will you please advise through the University Department where this coil should go? Can I use an untuned primary in this circuit instead of the coupler called for in the article?—Vincent J. Doyle, 1423 North Robinson St., Philadelphia, Pa.

A diagram showing the position of the coil is published in the University Department of RADIO WORLD, issue of July 5. Suggest you stick to the author's directions to insure the proper working of the circuit when finished.

The same question is asked by W. S. Milligan,

In RADIO WORLD for June 21 you published an article by Walt S. Thompson, Jr., on the Metaform. 1—What is the size of the tubing for winding the coils? 2—What is meant by the directions for coil L 3, 10 to 40 turns, and coil L 4, 5 to 20 turns? 3—Is it necessary to do any tuning on the ceiver which has been connected to the Metaform?—Wm. A. Houseweller 256 Delaware Avenue, Albany, N. Y.

1—The coils are wound on bakelite tubes 3" or 3 1/2" in diameter. Either size will do. 2—The ratios 10 to 40, and 5 to 20 mean that if you wish to make L 3 tune down low, therefore using but 10 turns, L 4 should have 5 turns. In other words, there are half as many turns on L 4 as there are on L 3. 3—No. Once the frequency changer and tuner are adjusted, the setting need not be changed necessarily, but it must be remembered that the tuner must be carefully tuned to the frequency changer in the first place.

1—I have a 5-tube Synchrondyne set, using UV201A as amplifiers and UV200 as detector. I am unable to get any great distance during the summer months. Are there any other kind of tubes I could buy which would give me greater distance? 2—Should I disconnect the B battery at night when the set is not used so as to save the power? 3—Should the Synchrondyne set be able to tune out WEBB, Chicago, and tune in other stations 20 to 30 meters apart? 4—What causes the whistling and howling I hear while tuning in for the distant stations, and what can I do to stop it?—Louis Clesen, 6150 North Robey Street, Chicago.

1—Great distances are not to be expected in Summer, and using other tubes will not help. With cooler weather, however, your Synchrondyne should reach out from coast to coast with ease. 2—The B batteries do not have to be disconnected when the set is not in use because no current flows when the tubes are not lit. 3—You should be able to tune out any station within 20 meters. 4—The whistling and howling you hear is caused by other receiving sets which the users do not know how to tune. These fans, in their ignorance, allow their sets to oscillate while tuning and listening, thereby radiating energy into their antenna, which energy is picked up by sensitive sets. There is no cure for this, other than educating the inexperienced operators who cause the disturbance.

MAGNAVOX Radio Products



New model

R3—\$35.00

Current consumption in the new Magnavox Reproducer R3 is so low that it is an unimportant factor.

This feature, combined with the new Volume Control, makes the new R3 indispensable for use with every radio receiving set.

Magnavox Reproducers

- R2 with 18-inch curvex horn \$50.00
- R3 with 14-inch curvex horn \$35.00
- M1 with 14-in. curvex horn. Requires no battery for the field . \$30.00
- M4 Latest Magnavox Reproducer. Requires no battery . \$25.00

Magnavox Combination Sets

- A1-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 1 stage of amplification \$59.00
- A2-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 2 stages of amplification \$85.00

Magnavox Power Amplifiers

- A1—new 1-stage Power Amplifier \$27.50
- AC-2-C—2-stage Power Amplifier \$50.00
- AC-3-C—3-stage Power Amplifier \$60.0

Magnavox products can be had at Registered Magnavox Dealers everywhere. Write for new 32-page catalogue.

The Magnavox Company
Oakland, California

New York Office: 350 West 31st Street

Canadian Distributors

Perkins Electric Limited
Toronto Montreal Winnipeg

R. C. A. Stockholders Defrauded; Finance Firm Accused; Injunction Is Issued

ATTORNEY-GENERAL CARL SHERMAN, of New York State, announced that he had obtained an injunction in the State Supreme Court restraining the sale of securities by the Radio Securities and Finance Corporation and Campbell Mason, its Assistant Treasurer and General Manager, of 42 Broadway. They were charged with trying to defraud stockholders in the Radio Corporation of America out of their holdings and were restrained from selling any securities whatsoever in the State of New York.

Deputy Attorney-General Maurice G. Lynn, who investigated complaints against the Radio Securities and Finance Corporation and its general manager, said that the corporation was incorporated in Delaware for \$50,000. He charged that "in furtherance of a scheme to defraud the public, it printed a circular letter to stock-

holders of the Radio Corporation of America, an old and well established corporation whose stock is listed on the Curb Exchange, requesting that the stockholders of the Radio Corporation send the defendants their certificates of stock to be issued by the Radio Corporation under a reorganization plan.

"These circulars were mailed to several thousand stockholders of the Radio Corporation," Mr. Lynn went on, "and the defendants received from several hundred their stock certificates. The defendants did not at any time intend to effect the exchange, but with intent to defraud the stockholders out of their stock they sold the stock and appropriated the proceeds to their own use."

Supreme Court Justice John M. Tierney granted the injunction after hearing the Attorney-General's argument.

The Radio Trade

Swindler of Electric Men Sent to Prison

SAMUEL A. DAWES, 35 years old, of 201 East 95th Street, New York City, who for five years has made a specialty of victimizing manufacturers and dealers in electrical supplies, was sent to Sing Sing prison, where he will serve a sentence of five years imposed on him by Judge Burt Jay Humphrey in the Queens County Court. Dawes three weeks ago pleaded guilty of grand larceny for the alleged passing of a bad check on the Kellogg Switchboard & Supply Company, 2 Stone Street, Manhattan, for a bill of radio supplies amounting to \$147. Dawes is married and the father of four children.

AMBROSE CRYSTAL DETECTOR FINDS READY MARKET

RADIO fans are taking to the Ambrose Vernier Crystal Detector. Dealers report it among the best selling crystal detectors. Many fans have written in telling of their success in adding it to Reflex and Triflex circuits. It is easily mounted on the panel and adds to the attractiveness of the finished set. Users pay tribute to the sensitiveness of the crystal used, which is an exceptionally live crystal, sensitive in every part, long-lived and stands an unusually high voltage. The Ambrose Radio Company, 220 Vernon avenue, Brooklyn, guarantees every detector 100 per cent perfect.

LIBERTY ELECTRIC CORPORATION IN FINE NEW FACTORY

THE Liberty Electric Corporation, Stamford, Conn., who market, among other things, a Super-Heterodyne kit, have purchased and occupied a new factory at Stamford. This factory, modern in all respects, affording 35,000 square feet, gives the Liberty Electric Corporation the room necessary to accommodate their fast-growing and already very large business.

DEROY CORPORATION LICENSED TO MAKE PLUSIFORMER SETS AND UNITS

A LICENSE to manufacture Plusiformer sets and units has been obtained by DeRoy Radio Corporation, 35 Belleville avenue, Newark, N. J. Production on a large scale is being planned.

RADIO AND MUSIC TRADES TWINS, SAYS FLEWELLING

THE leading radio manufacturers of the country have been visibly impressed with the tremendous field open for the merchandising of their goods in the music trade industry. More radio manufacturers are catering to the music field this season than ever before and several of the large firms are arranging for music store distribution on a much wider scale. The Music Trade Review has found that the large music dealers of the country are in favor of radio. Most of the larger music dealers have established radio departments.

E. T. Flewelling, radio engineer and inventor, says: "To my mind radio and the music industries are more suited to one another than any other two forms of competitive business."

New Corporations

DAVID GRIMES, inventor of the Grimes Inverse Duplex Circuit, is branching out, evidently going into business himself, to manufacture radio set. Mr. Grimes is actively associated with the Sleeper Radio Corporation, New York City. The new company, to be known as the David Grimes Corporation, is incorporated for 10,000 shares of common stock, no par value. The attorney is T. F. MacMahon, 1,400 Broadway, New York City.

OTHER NEW CORPORATIONS

Manor Electrical Co., Brooklyn, N. Y., \$5,000. H. Bardez, S. M. Shack, Attorney, M. Knapp, 291 Broadway, New York City.

Bisby Mfg. Co., Radio, New York City, \$10,000. E. S. Strauss, M. Bernstein, D. R. Bittan, Attorney, I. Tankus, 154 Nassau St.

Court Electric Co., Brooklyn, N. Y., \$5,000. H. L. Greenblatt, C. Weller, L. Fishman, Attorney, R. G. Pollard, 189 Joralemon St.

A. S. Foster, manufacturing radio supplies, \$20,000. Albert S. Foster, H. M. Barnes, R. E. Mehman, Philadelphia.

Coming Events

AUG. 16 TO 21, INCLUSIVE—Pacific Radio Exposition, Civic Auditorium, San Francisco, under auspices of Pacific Radio Trade Association, Herbert E. Metcalf, Magnavox Co., Oakland, Cal., president. A. S. Lindstrom is chairman of the exposition executive committee, assisted by C. C. Langevin, H. W. Dickow, F. J. Cramm and P. L. Jensen.

SEPT. 22-28—First Annual International Radio Show, Madison Square Garden, New York City.

OCT. 2-11—Exposition, Grand Central Palace, New York City, under auspices of American Radio Exposition Co.

NOV. 3-8—Third Annual National Radio Show, Grand Central Palace, S. L. Rothafel (Roxy) and "his gang" will broadcast from the convention.

NOVEMBER 24 TO 30, INCLUSIVE—International Radio Week.

DECEMBER 1 TO 6 INCLUSIVE—Boston Radio Exposition, Mechanics Building, Boston.

THEATRE MUSIC ON THE AIR

THE Mark Strand Theatre, New York City, began radiocasting its musical programs and special programs recently. The programs will begin at 7:15 each evening, daylight saving time, and will run until 11 o'clock. The overture, musical novelties and concert music will be relayed over telephone and cable wires to 195 Broadway, and thence several hundred miles to station WMAF, Dartmouth, Mass, 364 meters.

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.

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

I desire to receive radio literature.

Name

City or town

State

Any particular kind of literature preferred?

.....

.....

.....

D. S. Newcomer, Vinton, Ia.

Earl Geoffrey, Elliott, Ia.

C. Layson, Box 241, Millerburg, Ky.

Walter Radio Co., dealers, 5705 Troost Ave.,

Kansas City, Mo.

Star Radio and Electric Co., 231 Westminister

Ave., Venice, Cal.

Roy Hale, Greenville, S. C.

Charles Wilson, King City, Cal.

Chas. H. Wheeler, dealer, 647 Worthington St.,

Springfield, Mass.

Wm. G. Wheat, 2607 Benton Blvd., Kansas

City, Mo.

B. J. Killen, 34 Indiana St., Wheeling, W. Va.

The Electric Shop, dealers, 117 Rusk St.,

Ranger, Tex.

A. C. Sands, Hotel Columbus, Columbus, Ohio.

J. L. Lehnhierr, dealer, Towanda, Kan.

L. R. Martin, 1524 N. College St., Decatur, Ill.

R. B. Head, care S. W. Bell Tel. Co., Denni-

son, Tex.

Mrs. A. T. Partridge, Box 382, Augusta, Me.

David T. Weinberg, 592 Watkins St., Brook-

lyn, N. Y.

Radiocast University

Questions and Answers Radiocast from WLS, Chicago, by Mat Friedman, RADIO WORLD Representative, Every Wednesday Night.

I have listened to your radio advice from WLS, and would like to ask a question about my set. I have a 5-tube Freed-Eismann which I built myself from their parts and get good results, excepting that when I put the plug into the detector jack there is a scratchy noise, even when the rheostats are turned off. When the tubes are out of the sockets, there is noise, but as I put the first amplifier tube in the noise starts. What can my trouble be?—Jos. A. Sobczak, 479 Oklahoma, Avenue, Milwaukee, Wis.

Your troubles lies in a poor socket or jack in the detector or first audio-frequency stage. Replace the detector jack with a new one and replace the detector and first audio-frequency stage socket. The scratchy noise is due to a high potential leak in either the insulation of the jack or the sockets.

1—I am interested in the Super-Heterodyne as described by J. E. Anderson described in RADIO WORLD for May 31, June 7, 14 and 21. I am going to use UV199 tubes in this circuit with push-pull amplification. Will there have to be any changes made to use these tubes? 2—Mr. Anderson uses 60 volts on the plate of his detector tube. Is this not too much? I have always found that from 16 to 30 volts work best on the detector. 3—In the wiring diagram you do not show where the tap on coil L6 goes but you state it is to be connected to the plate battery bus bar. Which bus bar is it?—J. R. Nelson, Dell Rapids, S. D.

1—No changes are necessary at all except that 4½-volt batteries will be sufficient to work the tubes. 2—Mr. Anderson finds that 60 volts give him good results. However, you should experiment with the voltage and use the amount which gives you the best results. 3—The tap on coil L6 is connected to the bus bar carrying 60 volts.

Business Opportunities Radio and Electrical

Rates: 40c a line; Minimum 3 lines.

EXPERIENCED retail salesman, former manager of large New York City chain store, seeks opening as store manager or sales promotion expert. H. L., Box 600, Radio World.

WE DESIGN AND MAKE ANY SPECIAL machine you want; perfect inventions; make models, dies, manufacture. Box 333, Radio World.

ELECTRIC CONCERN wants party with \$10,000; absolutely secured; \$45,000 signed bonded city contracts on hand. Box 555, Radio World.

MANUFACTURER RADIO WANTED by sales agency selling jobbers and chain stores, metropolitan area and New York State; commission basis. Box 444, Radio World.

Expert Personnel Helps Make WNYC a Great Success

WNYC, radiocasting station in New York City, operated by the municipality, has proven a great success. It was instituted by the city after enormous obstacles were overcome. Much of the courage to face these came from Grover A. Whalen, who, as Commissioner of Plant and Structures, became the city's Radio Chief. Now that he has resigned to take an important executive position with the John Wanamaker store, New York City, he has been named Honorary Radio Chief by Mayor Hylan and will continue to apply the Whalesque touches to the administration of the station. Mr. Whalen's successor as Commissioner is William Wirt Mills, his former deputy whose department has jurisdiction over the station.

WNYC uses the maximum legal power, 1,000 watts, and operates on 526 meters. At 7:30 P. M., police alarms are radiocast. At 8:30 the musical program begins, lasting until 10:30, when there are more police alarms. The station generally closes at 11 P. M. As yet there are no Sunday programs. The programs are high class. Advance program service is being arranged by the director, Christie R. Bohnsack, well-known journalist, so soon the public will find the detailed programs in RADIO WORLD.

The chief engineer of the station is Raymond Asserson (U. S. Naval Academy, 1913). He had charge of installations on the U. S. S. Texas, Idaho and Illinois; noted radio instructor, with a brilliant record in the Navy.

Thomas H. Cowan (ACN), known to millions, is supervisor of broadcasting. He does most of the announcing. He is one of the radio pioneers, having been announcer at WJZ when that station—the first in the Metropolitan area—opened in 1922, in Newark. Harry E. Hiller (OHN), also a veteran in Mr. Cowan's class, is an announcer and technician, as is Mr. Cowan.

The charming and obliging hostess at the station is Miss Mildred Kelley, a southern contralto of exceptional talent. Her assistants are Elfrida Wilhelm, daughter of Carl Wilhelm, newspaper reporter, and Edna L. Broadhurst.

George A. Bryan is radio operator. Frank Orth, Bert L. Davis and Isaac Brimberg are public address operators. By the public address system of local amplification the studio performance is carried to the 26th floor of the Municipal Building (up one flight) and enables guests on the roof garden there to listen in. They don't hear radio, but sound carried at audible frequencies.

Roger Bruce Lum, entertainer and assistant program director, is a bedtime story teller who can imitate wild beasts' sounds. He comes from the Washington station, WRC, of the R. C. A.

George Oliver is technical assistant and Herman Neuman, pianist and assistant announcer.

Hundreds and hundreds of letters of commendation are received at the station daily. As requested, some offer suggestions. DX results are reported, too. Joseph Frito, now at 240 Spring street, New York City, reported in person that while in Santa Barbara, Cal., and in Los Angeles, he heard the station on an 8-tube set. His home is at 44 Via San Antonio, Santa Barbara.

Among those who sent in praise and suggestions were:

- J. Toman, Jr., 410 East 70th street, N. Y. C.
- B. R. White, 53 West Chester street, Long Beach, N. Y.
- Otto Bantal, 1271 East 88th street, Brooklyn, N. Y.
- J. K. Storer, 1759 Montgomery avenue, West Bronx, N. Y.
- Charles Koppesser, Jr., 1670 Linden street, Brooklyn, N. Y.
- Harry Hunt, 285 Grand avenue, Baldwin, L. I.
- Carl Newman, care Bronx Registrar's Office, Bronx, N. Y.
- Miss Dorothy Underhill, 7726 7th avenue, Brooklyn, N. Y.
- Max Thur, 407 East 153rd street, N. Y. C.
- I. Epstein, 613 Broadway, Bayonne, N. J.
- G. Panaviato, 200 East 77th street, N. Y. C.
- James G. Taylor, Hartsdale Road, Elmsford, N. Y.
- Phineas Spinard, 164 Cornelia street, Brooklyn, N. Y.
- Albert Wolte, 116 Booraem avenue, Jersey City, N. J.
- Wm. C. St. Clair, 7 Rhodes street, New Rochelle, N. Y.
- Walter McHale, 410 East 163rd street, N. Y. C.
- Wm. M. Bolmer, 3560 Willets avenue, Williamsbridge, Bronx, N. Y.
- Florent Hinnekens, 364 North 11th street, Paterson, N. J.
- Lester L. Michael, 29 Cornelia street, Brooklyn, N. Y.
- E. Jacobowitz, 873 Fresh Pond Road, Brooklyn, N. Y.
- Leslie E. Folks, 376 East 159th street, Bronx, N. Y.

The First Radiocast Horse Race to Have Epinard as the Star

FOR the first time race-track enthusiasts will be able to follow the progress of the horses, though miles from the track during the International Races at Belmont Park and Aqueduct on September 4 and 27. Through co-operation of Major August Belmont and the Westchester Racing Association, WJZ will radiocast running descriptions of both races direct from the Belmont and Aqueduct tracks.

Epinard, the famous four-year-old which Pierre Wertheimer has recently brought to this country, and who is now in training for the series of three races scheduled for the early fall, will be the star attraction of the first racing broadcasting in history, and the best horses of this country will be "seen" in competition with the foreign favorite by the radio listeners. J. Andrew White will be at WJZ's microphone in the judges' stand. Direct Western Union wires, specially installed for the event, will carry his voice to the studio on West 42nd street, New York City, where it will be "put on the air."

WBAH TO QUIT AIR JULY 31

WBAH, owned and operated exclusively by the Dayton Company, will be discontinued July 31. The station has been in operation since May 11, 1922, and has made a very successful record of being heard nationally and internationally with programs that have received commendation locally and elsewhere.

The Dayton Company station was the first high power station to be built in the northwest. The company says radiocasting has passed its pioneer and novelty stage, and has become an industry of itself, so the company does not feel that this is any longer a part of department store operation.

- R. A. Simonton, 1028 82nd street, Brooklyn, N. Y.
- Julius K. Brody, 81 Fulton street, N. Y. C.
- Neil Gallagher, 67 West 15th street, Bayonne, N. J.
- Benjamin Richmond, 2065 66th street, Brooklyn, N. Y.
- James J. Hearne, 1161 Ruscomb street, Philadelphia, Pa.
- Wm. Gerson, 133 North 3rd street, Paterson, N. J.
- Donald E. Treacy, 410 Seventh avenue, Pelham, N. Y.
- C. F. Young, 311 North 39th street, Philadelphia, Pa.
- G. F. Hoops, P. O. Box 93, Sea Cliff, L. I.
- Herman Goldstein, 41 Harrison street, Brooklyn, N. Y.
- Harry Hunt, Clinton, N. J.
- Edw. H. Cook, 115 Mill street, New Bedford, Mass.
- Louis Solomon, 80 First street, N. Y. C.
- G. W. Shook, 841 Bergen street, Brooklyn, N. Y.
- D. Rothman, 74 East 114th street, N. Y. C.
- Chas. Vogal, 1693 First avenue, N. Y. C.
- Mrs. Emma Lustig, 404 Onderdonk avenue, Brooklyn, N. Y.
- E. A. Hegel, 8735 143rd street, Jamaica, L. I.
- Fred Richter, 746 Flushing avenue, Brooklyn, N. Y.
- Chas. H. Francis, 93 North Mountain avenue, Montclair, N. J.
- W. Lee Granes, 77 South Munn avenue, East Orange, N. J.
- Lewis M. Loss, 308 Lakeview avenue, Clifton, N. J.
- E. W. Shore, 395 Lexington street, Auburndale, Mass.
- Theodore Leach, 37 Bushwick avenue, Brooklyn, N. Y.
- F. Seabridge, 787 Norman street, Bridgeport, Conn.
- Edwin Feddersen, 16 Tredwell street, Forest Hills, N. Y.
- Fred J. Senf, 1882 Hart street, Brooklyn, N. Y.
- P. A. Gold, 1824 Coney Island avenue, Brooklyn, N. Y.
- Chas. Ferguson, 206 East 23rd street, Wilmington, Del.
- Walter E. Strasser, 861 Union avenue, Bronx, N. Y.
- L. Goldsmith, 320 Tompkins avenue, Brooklyn, N. Y.

(Pictures on pages 16 and 17.)

The Weekly Rebus

CAN you decipher this Rebus? Send your answer to Rebus Editor, RADIO WORLD, 1493 Broadway, New York City, and mention Rebus No. 10. The names and addresses of those sending in the correct



THE answer is the name of a circuit. It is a synonym for reminisces.

answer will be published, so be sure to write your full name and address very plainly. A list of the correct answers of Rebus drawings will be published in RADIO WORLD soon after the twelfth Rebus has been printed. At that time a list will be compiled of all those who correctly answered all the Rebus correctly.

Radio Journalists Guests of Lewis J. Selznick

LEWIS J. SELZNICK, who has become associated with Warren H. Stone and other noted men in the operation of the General American Radio Corporation, recently sent out letters of invitation asking members of the radio trade press to be his guests at a theatre and supper party. Practically all of these invitations were accepted.

On Tuesday evening, July 15, there gathered at the Globe Theatre, New York City, representatives of all the radio publications, including the radio supplements of daily papers.

Following the performance of "Keep Kool," in which there had been interpolated a short comedy scene relating to the Selznick radio activities, the whole party taxied over to Mr. Selznick's beautiful apartment at 270 Park avenue. Here, with the charming Mrs. Selznick as chief hostess and with David and Howard Selznick to assist their father, a collation was served.

There was a promise in Mr. Selznick's invitation that nothing would be said or done by the host regarding business, and this promise was kept.

The chat among newspapermen present, however, was to the effect that if Lewis J. Selznick shows himself to be as resourceful and makes himself as valuable in radio as he was for years in motion pictures, then radio is the gainer thereby.

Among those present were: Lawrence Nixon, editor of Radio Dealer; Arthur H. Lynch, editor Radio Broadcast; Henry M. Shaw, Mr. MacAtammany, editor Radio Jobber and Dealer; Mr. Casey, editor American Radio Journal; Captain Steven Coles, radio editor New York Herald-Tribune; E. L. Bragdon, radio editor of The Sun; R. L. Dougherty, radio editor of Music Review, and representatives from various other trade and non-trade publications.

S-U-P-E-R-D-Y-N-E
SPECIALISTS
 Our Own Cells—guaranteed..... \$6.50
 KM (Flowing Condensers, Coils and Diagram)..... 19.50
 Complete Parts, Assembled with Diagram... 65.00
 Superdye Advice Free. Mail Orders Solicited.
WALLACE RADIO COMPANY, Inc.
 135 LIBERTY STREET NEW YORK CITY

Experience

READERS tell of their dramatic or humorous adventures in radio. Address Experience Editor, RADIO WORLD, 1493 Broadway, New York City.

I HAVE been a constant reader of your valuable magazine from its very start. Everything I know about radio I have learned through RADIO WORLD. I have constructed a great number of different sets, the hook-ups of which appeared in RADIO WORLD, and every one of them worked right

FAHNESTOCK CLIPS


"Popular Wherever Radio Is Used"

14 Sizes in Beautiful Display Case

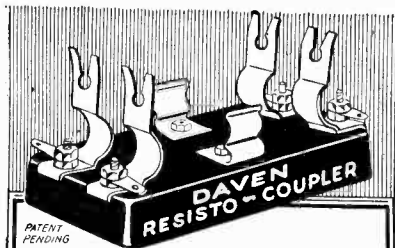
Dealers write for big money-making proposition.

FAHNESTOCK ELECTRIC CO.

Long Island City, L. I.



ULTRADYNE
the improved Super-Heterodyne. Send 50c for book giving complete details of drilling, assembling, wiring and tuning 6 and 8 tube ULTRADYNE Receivers.
50c
Phenix Radio Corp., 5-9 Beekman St., N. Y. C.



Resistance Coupled Amplification

The tone quality from a **DAVEN RESISTANCE COUPLED AMPLIFIER** is the most perfect known to the radio art.

The Daven Resisto-Coupler, illustrated, greatly simplifies the construction in building up one of these distortionless amplifiers. Sold everywhere\$1.50

Read our booklet, "RESISTORS - THEIR APPLICATION TO RADIO RECEPTION," by Zeh Bouck.

Price 15 cents
DAVEN RADIO CORP.

"RESISTOR SPECIALISTS"
9½ Campbell Street
Newark, N. J.

The Popular Neutrodyne!

This receiver is rapidly becoming the "Old Reliable." A five-tube tuned radio frequency set that any inexperienced fan can operate.

SEE RADIO WORLD for March 15, 22 and 29, and get all the details which will enable you to build this reliable and powerful five-tube neutrodyne outfit. The three copies for 45c, or sent free if you send \$6.00 for yearly subscription. NOW!

RADIO WORLD, 1493 Broadway, N. Y. C.

from the start. In my work I use only heavy plain copper wire for all connections, solder as little as possible and then file down every joint soldered until it becomes almost invisible, often dispensing with lugs and using the wire, flattened down and filed into shape, to serve the purpose, wherever possible.

Following the splendid advice RADIO WORLD so often gives in its columns, I made up my mind some time ago to discard the regenerative sets, especially the single-circuit, with which I had wonderful results. I built a Reflex and was more than satisfied with the result. The single circuit I had been using, and which had become like a pet, whose every mood and whim I had come to understand, was one published in your paper.

I can assure you that my neighbors have had little cause for complaint, as far as interference is concerned. Only after I had loaned my single-circuit regenerator to a neighbor who wanted to hear our President's speech, did I realize what a pest the single circuit can become in the hands of a novice. For a couple of weeks it was absolutely useless for me to try to work my reflex set. Then one evening I called my neighbor over, and while I let him listen in on my own receiver I worked the set I had loaned him. From that minute on he, too, was cured. Since then I have built for him a reflex. Interference between us is of course unknown.

The circuit by Brainard Foote, "A Two-Tube Set With a Kick," RADIO WORLD, February 23, 1924, a reflex, looked to me like the ideal set for a beginner, and it could easily be built into a portable outfit. I have built one for my brother. This set I have since built one for myself. It is a set that simply can't help work. With this set on an indoor aerial 100 feet Litzen draght around one room, using UV199 tubes, I have consistently logged Kansas City, St. Anthony, Chicago, Pittsburgh, Montreal, and the rest of the middle distance stations. For local work I use a loop, or a wire 15 to 20 feet long. It will work on wire so short that it seems ridiculous to mention. With a loop I have received KDKA, phones on second stage, while the New York stations were going at full blast. Again I must say that I am extremely careful in all the wiring, etc., taking nothing for granted, and will change a connection ten times if necessary, often making one length of wire serve for several connections, whenever possible. For clarity, quality, strength of volume, I have never heard the like, free from all noise or scratchy sounds. I have worked it sometimes for three hours without having to readjust it once. I work entirely with an indoor aerial. I am thoroughly satisfied. I thank RADIO WORLD for my success with every hook-up.

E. PETERS.

Wyckoff, N. J.

TELEDYNE

The most satisfactory radio circuit yet developed.

- M-V Teledyne Kit consisting of:
 - 1 tuning inductance mounted on .00025 variable inductance.
 - 1 variable unit comprising the R. F. Plate coil, detector grid coil and regeneration coil.

Price \$9.00

Satisfaction guaranteed. Send for free circular.

Jobbers-Dealers Write for discounts.
Mississippi Valley Radio Co.
203 Pine St., St. Louis, Mo.

INTERCEPTORS OF MESSAGES WARNED TO OBEY LAW

WASHINGTON.

THE Department of Commerce has received complaints that radio messages in code have been disclosed by unauthorized persons, and has issued a warning that this is contrary to the radio laws and regulations. Any one found guilty of violating regulation 19 of the 1912 Radio Act may be punished by both a fine of \$250 and imprisonment for three months, it is pointed out.

MAGNAVOX

R 3 or M 1

\$21.95

THE RADIO EXCHANGE
511 Seventh Street, Sioux City, Iowa

"GET HASTINGS, NEB."

We Will Mail Free the Hook-up of

"Killoch Kilo Koupler"

Most Wonderful Coil

A CIRCUIT WELL WORTH WHILE! Build a two-tube set, one stage of R. F., using neutrodyne principle and detector. Full details in Radio World, issue April 12. Send 15 cents.

David Killoch Company

Dodge Building, 45 West Broadway
Corner Park Place, New York City



Are you getting DX?

This book will show you how to get more!

It tells all about vacuum tubes and how to control them so as to get greatest D X, most volume and longest life from tubes and batteries. How to get maximum regeneration, clearest signals. Tells how vacuum tubes work.

IT'S FREE! WRITE FOR IT TO

D X INSTRUMENT CO.

Dept. RW-721

Harrisburg, Penna.

Some Good Service Articles in 1924 Back Numbers of Radio World

- Neutrodyne Article
- By B. L. Dougherty, March 15, 22, 29
- Construction of a Battery Charger
- By Walt S. Thompson, March 29, April 5
- Spider Web Neutrodyne
- By Byrt C. Caldwell, April 12
- Amplidyne
- By Thomas W. Benson, April 19
- Camp's Portable Set
- By J. E. Anderson, April 26
- Power-Amplification
- By Chas. H. M. White, April 26
- Neutrad Radio Frequency Unit
- By Walt S. Thompson, May 3
- Explanation of Super-Heterodyne
- By Walt S. Thompson, May 3
- Short Wave Adapters
- By J. E. Anderson, May 10
- Simplified Super-Heterodyne
- By Chas. H. M. White, May 17
- Superdyne
- By N. N. Bernstein, May 17, 24, 31
- Improved Super-Heterodyne
- By J. E. Anderson, May 31, June 7, 14 and 31
- New Double Superdyne
- By J. E. Anderson, June 14
- New Metaform Receiver
- By Walt S. Thompson, June 21 and 28
- King George's Set, with Diagram
- By Chas. H. M. White, June 14

Any copy, 15c. Any 7 copies, \$1.00, or start your subscription with any date. Radio World is \$3.00 per year (\$2 sec.), \$3.00 six months, \$1.50 three months.

RADIO WORLD, 1493 Broadway, N. Y. C.

82 Stations Lose License

Department of Commerce
Drops Inactive Permit
Holders from List

MANY FAILED TO RENEW

Total on Air Reduced to 534, or
55 Less Than on June 1 Last
— Power Stations, How-
ever, increase to 54, or 12
More Than on June 1

By Washington Radio News Service
A SURVEY and a house-cleaning of
radiocasting stations completed by the
Department of Commerce eliminated a
lot of dead wood stations, reducing the
total number of broadcasters to 534, thirty-
nine less than on July 1, last year, and 55
less than on June 1 this year. Many of
the stations eliminated simply failed to re-
new their licenses, and some will again
apply for permission to radiocast, it is be-
lieved. Of the stations which dropped out,
53 were in Class A and 29 in Class C. No
Class B stations quit the air, and there
are today 54 such, an increase of 12 over
the number on June 1. These are the high-
power stations. There are also 377 class

A stations; 101 C, and 2 in the experi-
mental Class D, still operating.

THOSE DISCONTINUED

Eighty-two stations were dropped, as
follows:

- KDYX—Star Bulletin Pub. Co., Honolulu, T. H.
- KDZQ—Nichols Academy of Dancing, Denver, Col.
- KFAF—Western Radio Corp., Denver, Col.
- KFAJ—University of Colorado, Boulder, Col.
- KFCY—Western Union College, LeMars, Iowa.
- KFDA—Adler's Music Store, Baker, Oregon.
- KFFQ—Marksheffel Motor Co., Colorado Springs, Col.
- KFFV—Graceland College, Lamond, Iowa.
- KFGV—Heidbreder Radio Supply Co., Utica, Neb.
- KFHX—Nelson, Robert W., Hutchinson, Kan.
- KFJV—Warren, Thomas H., Dexter, Iowa.
- KFLH—Erickson Radio Co., Inc., Salt Lake City, Utah.
- KFLP—Everette M. Foster, Cedar Rapids, Ia.
- KFMS—Freimuth Dept. Store, Duluth, Minn.
- KFMV—Boy Scouts of America, Long Beach, Cal.
- KFNH—State Teachers College, Springfield, Mo.
- KFOV—Davis Electrical Corp., Sioux City, Ia.
- WABL—Lake Forest University, Lake Forest, Ill.
- WABN—Ott Radio Inc., La Crosse, Wis.
- WBBF—Georgia School of Technology, Atlanta, Ga.
- WBBO—Mich. Limestone & Chemical Co., Rogers, Mich.
- WCAS—Dunwoody Industrial Institute, Minneapolis, Minn.
- WFAJ—Hi Grade Wireless Inst. Co., Asheville, N. C.
- WFAQ—Missouri Wesleyan College and Cameron Radio Co., Cameron, Mo.
- WFAT—Columbus College, Sioux Falls, S. D.
- WIAI—Heers Stores Co., Springfield, Mo.
- WIAJ—Fox River Valley Radio Supply Co., Neenah, Wis.
- WJAT—Kelley-Vawter Jewelry Co., Marshall, Mo.
- WKAY—Brenau College, Gainesville, Ga.
- WLAK—Vermont Farm Machine Corp., Bellows Falls, Vt.
- WMAJ—Drovers Telegram Co., Kansas City, Mo.
- WNAQ—Charleston Radio Elect. Co., Charleston, S. C.
- WOAR—Lundskow, Henry P., Kenosha, Wis.
- WQAW—Catholic University of America, Washington, D. C.
- WSAG—Davis, Loren V., St. Petersburg, Fla.
- WSAW—John L. Long, Jr., Canandaigua, N. Y.
- WVAF—Galvin Radio Supply Co., Camden, N. J.
- KFAN—Electric Shop, Moscow, Idaho.
- KFAU—Independent School Dist. of Boise City, Boise, Idaho.
- KFDO—Cutting, H. E., Bozeman, Mont.
- KFDV—Gilbrech and Stinson, Fayetteville, Ark.
- KFHB—A. S. Kolstad, The Rialto Theatre, Hood River, Ore.
- KFHF—Central Christian Church, Shreveport, La.
- KFFO—Smith, Dr. E. H., Hillsboro, Ore.
- KFFZ—Al. G. Barnes Amusement Co., Dallas, Texas.
- KFLR—University of New Mexico, Albuquerque, N. M.
- KFLW—Missoula Electric Supply Co., Missoula, Mont.
- KFMU—Stevens Brothers, San Marco, Texas.
- KFMZ—Roswell Broadcasting Club, Roswell, N. M.
- KFNC—Alonzo Monk, Jr., Corsicana, Tex.
- KFOF—Rohrer Electric Co., Marshfield, Oregon.
- KFOH—The Radio Bungalow, Portland, Oregon.
- KFOP—Willson Construction Co., Dallas, Texas.
- KGN—Northwestern Radio Mfg. Co., Portland, Oregon.
- KZV—Wenatchee Battery and Motor Co., Wenatchee, Wash.
- WABS—Essex Mfg. Co., Newark, N. J.
- WABV—Dewitt, John H., Jr., Nashville, Tenn.
- WBBO—Frank Crook, Pawtucket, R. I.
- WBBS—First Baptist Church, New Orleans, La.
- WCAM—Villanova College, Villanova, Pa.
- WCM—University of Texas, Austin, Texas.
- WDAO—Automotive Electric Co., Dallas, Texas.
- WFAF—Spratley, Henry C., Poughkeepsie, N. Y.
- WGV—Interstate Electric Co., New Orleans, La.
- WHAB—Thompson, Clark W., Galveston, Texas.
- WIAF—De Cortin, Gustav A., New Orleans, La.
- WJX—De Forest Radio Telephone & Telegraph Co., New York City.
- WLAT—Waco Electrical Supply Co., Waco, Tex.
- WMAB—Radio Supply Co., Oklahoma City, Okla.
- WNAN—Syracuse Radio Telephone Co., Syracuse, N. Y.
- WNAS—Texas Radio Corporation, Austin, Texas.
- WNAV—Peoples Tel. & Tel. Co., Knoxville, Tenn.
- WNJ—Shotton Radio Mfg. Co., Inc., The Albany, N. Y.
- WOAP—Kalamazoo College, Kalamazoo, Mich.
- WOK—Pine Bluff Company, The, Pine Bluff, Ark.
- WPAT—Saint Patrick's Cathedral, El Paso, Texas.
- WQAD—Whitall Electric Co., Waterbury, Conn.
- WRAA—Rice Institute, Houston, Texas.
- WRAH—Read, Stanley N., Providence, R. I.
- WRAY—Radio Sales Corp., Scranton, Pa.
- WSAT—Donohoo Ware Hrd. Co., Plainview, Texas.
- WWAC—Sanger Bros., Waco, Texas.

New Radiocasters

Call	Station	Keys	Meters	Watts
KFOR	Walter LaFayette Ellis, Okla. City, Okla.	1200	250	10
WBL	T and H Radio Co., Anthony, Kansas	1180	254	100
WEBC	Walter Cecil Bridges, Superior, Wis.	1240	242	10
WEBD	Electrical Equip. and Service Co., Anderson, Indiana	1220	246	10

MAHOGANITE and BLACK RADION PANELS

**DIALS, KNOBS, TUBING, SOCKETS
MAHOGANITE BINDING POSTS**

**"THAT SPECIAL SIZE" FOR YOUR
PHONOGRAPH, PORTABLE OR SUPER**

ALL STOCK SIZES

WHOLESALE RETAIL

Send for Complete Price List

New York Hard Rubber Turning Co.
212 Centre Street New York City

**For Maximum Amplification Without
Distortion and Tube Noises**

use the well known
Como Duplex Transformers

Push-Pull
Send for literature.

COMO APPARATUS COMPANY
446 Tremont St. Boston, Mass.

BRISTOL AUDIOPHONE
MORE THAN A LOUD SPEAKER

Bristol Audiophone, Sr., 15-in. Horn. **\$.30.00**
Bristol Audiophone, Jr., 11-in. Horn. **\$.22.50**
Bristol Single Stage Power Amplifier **\$.25.00**

Write for Bulletin 3006-W

The Bristol Company
Waterbury, Conn.

Perpetual Radio Fuse \$2.50

\$100.00 reward if you can blow your tubes with this protector in your circuit according to our instructions. SUPER ULTRADYNE Transformers, complete set including blue print. \$16.00
ULTRA SYNCHRODYNE Coils, set of three. \$7.00
Including blue print. With condensers. \$17.00

DEALERS and JOBBERS, we have an attractive territory proposition.

THE STANLEY RADIO COMPANY, Manufacturers
2947 Lorain Avenue Cleveland, Ohio

**THERE IS A BRAND-NEW
CRAM'S RADIO MAP**

(New Edition)

Just issued with all the very latest broadcasting stations and information.

**ALL THE STATIONS OF THE
UNITED STATES AND CANADA**

Scale 100 miles to the Inch
in two colors—Size 34x28"

PRINTED ON HIGH-GRADE MAP PAPER
UP-TO-THE-MINUTE INFORMATION
INDICATING ALL AMATEUR AND STAND-
ARD BROADCASTING STATIONS
WITH COMPLETE INDEX OF STATIONS
35c (POSTPAID)

THE COLUMBIA PRINT
1493 BROADWAY NEW YORK CITY

**Latest Developments in the
SUPERDYNE CIRCUIT
In Text and Diagrams**

RADIO WORLD dated May 17, 24 and 31 contains a series of three articles covering all the angles of the famous Superdyne Circuit. The original Superdyne Circuit articles appeared in Radio World last December, and the three issues in which they appeared are now completely out of print. That is the reason why we have published the Superdyne series in the May 17, 24 and 31 issues. 15c. per copy, three for 45c., or start your subscription with any number.

SPECIAL SUBSCRIPTION: Send \$6.00 for one year's subscription and we will send you our issues of May 17, 24 and 31 as a premium.

RADIO WORLD, 1493 Broadway, N. Y. City

The "Goode" Two-o-One



Le Ton d'argent



Guaranteed

BY
MAIL
ONLY

\$2.39

Postpaid

QUARTER AMPERE AMPLIFIER-DETECTOR RADIO TUBE

GUARANTEED SATISFACTORY

All "GOODE" Tubes Sold Direct to the
Consumer—No Dealer Profits

ONE—"Goode"
Detector-Amplifier **\$2.39**

THREE—"Goode"
Detector-Amplifiers **\$6.42**

(All postage prepaid)

The "Goode" Two-o-One A Tube amplifies
or detects. It is a quarter ampere, six volts,
standard base silvered tube.

Send express or postal money order or New
York draft to—

The Goode Tube Corporation

Incorporated
EVANSVILLE INDIANA

Music for the Night Owls from N. Y. Hotel On the Air for the First Time

THE Hotel Majestic radiocasting station on top of the hotel at Seventy-second street and Central Park West, New York City, opened Saturday at 2 P. M. A program of dinner music was radiocast at 7:30 o'clock and orchestra music and songs will be broadcast at 11:30

P. M. The wavelength of this station is 273 meters. The official call letters have not been assigned by the Department of Commerce. The experimental call is 2XBG and it will be used until the regular letters are assigned. The studio is on the ground floor of the hotel.

No definite schedule has been arranged for the hotel station, but at present it is planned to be "on the air" from 2 P. M. until 7 or 9 P. M. daily and from 11:30 P. M. until about 2 A. M., three nights a week. The programs will consist chiefly of music. In a few weeks the programs will be arranged well in advance and will be published in RADIO WORLD.

Electrically, the new Majestic radiocast apparatus is as powerful as that of WOR in Newark, N. J., so listeners both in and out of New York will have no trouble in obtaining satisfactory reception. It contains four big 250 watt tubes, suitably arranged in a very neat outfit in a small house atop the hotel. The aerial is supported by tall poles.

All the technical operations are in charge of Ray Ketcham, a well-known radio engineer and radiocast station constructor. He is assisted by Richard Sethmann, another expert.

Gimbel's, N. Y., to Be on Air By September

A NEW 500-watt radiocasting station has been ordered by Gimbel Brothers to be erected on the eighth floor of the New York City store. The equipment is being installed by the Western Electric Company. It is expected that the first program will be radiated before September 1. The Department of Commerce has allocated the 316-meter wavelength to the new station. Call letters have not been assigned yet.

The entire station, including the studio in which the artists perform, the transmitting room and power room, will be in a glass enclosure, so that the public can see how radiocasting is done and how the apparatus functions. Each instrument will be labeled and its purpose briefly explained. Visitors will be allowed in the studio when programs are being sent into the air and a special receiving room will be provided which will enable people to gather and hear important news events radiocast by various stations.

Louis Gimbel, who will have charge of the station, said that it was planned to have land wires link together the Gimbel Atlantic City radio studio on the Million Dollar Pier and station WIP, Philadel-

phio, in one circuit so that programs can be picked up and radiocast simultaneously from any of the three points.

Local programs will consist of debates and concerts by school children and music students recommended by teachers of music. A feature of the opening program will be Uncle Wip, the bedtime story teller of station WIP, Philadelphia, who has organized a club of 35,000 children by his radiocasts.

The station will be the third to be operated by Gimbel Brothers. The other stations are WAAK, Milwaukee, and WIP, Philadelphia. The towers of the New York station will be 135 feet, raising the aerials 335 feet above the street.

RADIO RECORD

Keep a permanently bound record of all stations you have received and how you received them. Radio Record 5 1/2" x 14"—600 lines. All broadcasting stations listed, and indexed with space for new stations—\$1.00 Postpaid.

THE BEADLE PRINTING CO.
MITCHELL SOUTH DAKOTA
Applause Cards 60 for \$1.00 Postpaid.

PRE-AMPLIFIER

A Radio Frequency Amplifier of **TREMENDOUS POWER**. Gets distance, volume, less static. Attachable to any receiving set. Price complete with tube, \$25.00.

Send for Circular
S. A. TWITCHELL
1930 Western Avenue Minneapolis, Minn.

"SUPER-HET"

THAT GOT SCOTLAND

Build Your Own "Rolls-Royce"

SPECIAL KIT OFFER

Kit comprising 3 Reson Intermediate Transformers, 1 Reson 10,000 meter Coupler, 1 Reson Oscillator Coupler... **\$39.50**

Dealers write for special offer. If your dealer cannot supply you, send his name and your remittance direct to

SUPER-SALES-SERVICE

Mail Order Department: 214 WEST 34th STREET
Factory: 112 CHAMBERS STREET
NEW YORK CITY

FREE! Descriptive Catalogue on request.



Super CRYSTAL
NEW NON-METALLIC HOUSING ELIMINATES SCRATCHES AND SQUEALING
Wonderful new crystal—has millions of sensitive spots—long life—cannot short-circuit. **FITS ANY STANDARD DETECTOR**
At your dealers—otherwise send purchase price and you will be supplied postpaid. Write for Reflex circuit 107.

50 Chas. Freshman Co. Inc.
Radio Condenser Products
106 Seventh Avenue, New York City

SAVE ONE HALF

MIDSUMMER CLEARANCE SALE OF RADIO PARTS AT HALF PRICE OR LESS

\$.50 3 1/2" Bell Bakelite Dials.....	\$.25	\$.88 7x10 Electrostatic Panels.....	\$.44
2.00 Bradleyleaks.....	1.00	1.05 7x12 Electrostatic Panels.....	.53
6.00 43 Pl. Var. Heath Condenser.....	3.00	1.23 7x14 Electrostatic Panels.....	.62
7.00 Giffison Variocoupler.....	3.50	1.58 7x18 Electrostatic Panels.....	.79
1.00 Phonograph Attachment, Delmont.....	.45	1.82 7x21 Electrostatic Panels.....	.91
1.00 Bell Standard Socket, Bakelite.....	.48	2.10 7x24 Electrostatic Panels.....	1.05
3.50 G. E. Filament Rheostat, 539.....	1.75	2.28 7x26 Electrostatic Panels.....	1.14
2.25 Gen. Radio 2 ohm Rheostats, Type 214-A.....	1.15	8.50 Pathe Plusformer.....	4.25
5.00 Loud-speaking Unit, Ackerman.....	2.50	13.00 Atwater-Kent Det. and 1 Stage Amp.....	7.50
5.00 Coto-coil Var. R. F. Transformer.....	2.25	.85 Radio Map, Pin Marked.....	.40
		Westinghouse Storage B Battery.....	4.75

MAIL ORDERS FILLED. ADD POSTAGE.

J. L. LEWIS, INC., 132 W. 32nd STREET, NEW YORK


THE FAMOUS
BEL-CANTO
ACOUSTICAL LOUD SPEAKER
Direct from Factory to You.
Delivered for \$10, free C. O. D. to your door.
Bel-Canto Mfg. Co.
General Office and Factory: Dept. R.W.
417-419-421 E. 34th St., N. Y. City
Telephone Vanderbilt 8959

COSMOPOLITAN PHUSIFORMER

"The Missing Link in Radio"
15-17 WEST 18th ST. NEW YORK

SOMETHING NEW

Green Radio Applause Cards
Bound in Book Form
with stubs on which records of Radio Artists are kept after card is detached and sent, a Log Book and Card combined, all for 1c. 25 CARDS 25c.
Sent by mail postpaid. No stamps. Address
PLATTSBURGH RADIO SUPPLY CO.
PLATTSBURGH, N. Y.
DEALERS: Write for sample and terms.



ARAGON
SILVER RHEOSTAT
The most attractive Rheostat on the market. Smooth gliding—and with perfect contact.
75c
ARAGON RADIO CO.
6 E. LAKE ST. CHICAGO

M. B. SLEEPER RADIO DESIGN & CONSTRUCTION FOR EXPERIMENTERS, REFLEX & RADIO FREQUENCY, \$1.00. The Columbia Print, 1493 Broadway, N. Y. C.

HOOK-UPS FOR EVERYBODY—Henry's
Radio Circuit Designs, \$1.00, postpaid. The Columbia Print, 1493 Broadway, N. Y. C.

PATENTS

To the Man with an Idea
I offer a comprehensive, experienced, efficient service for his prompt, legal protection, and the development of his proposition.
Send sketch or model and description, for advice as to cost, search through prior United States patents, etc. Preliminary advice gladly furnished without charge.
My experience and familiarity with various arts frequently enable me to accurately advise clients as to probable patentability before they go to any expense.
Booklet of valuable information, and form for properly disclosing your idea, free on request. Write today.
RICHARD B. OWEN
Patent Lawyer
32 Owen Building, Washington, D. C.
41 Park Row, New York City
Phone—Cortlandt 0721

Radio May Decide Who Will Next Be in White House

By Carl H. Butman

WASHINGTON.

THE presidential campaign will present a new and exceedingly interesting question: Who will get the vote of some 25,000,000 radio fans? Undoubtedly the host of listeners will be influenced in their voting by spellbinders now that the candidates for President and Vice-President have been named by both major parties. The candidates themselves soon will be on the air, voicing their platforms and aims.

It is the first time in history so many citizens have actually heard aspirants for high national honors. To be sure, not many fans have seen the men already selected to stand for election in the fall, but many have heard, or will hear, them speak before they vote.

IS YOUR NEUT RIGHT?

To revitalize unneutralizable Neutrodyne, we devised this Kladag Coast-to-Coast Circuit. Uses same panel, etc., as Neut, except three less parts. Merely rewire. Success certain. Necessary stabilizer. 22 feet gold sheathed wire, circuit and complete, simple instructions—\$5.00 prepaid. Many have already rebuilt their Neuts—and written wonderful testimonials. Thousands will do it. Be FIRST—have the finest five tube set in your neighborhood. Revitalize others' Neuts. Description, etc.—10c. Radio Lists—2c. Stamps accepted.

KLADAG LABORATORIES, Kent, Ohio

PETER J. CONSTANT, INC.

91 Seventh Ave. New York City
Direct Factory
DISTRIBUTORS FOR
38 Leading Manufacturers

POWER

From Your Lamp Socket

Send for particulars.

SIDBENEL RADIO CO.

29 Mount Eden Ave., New York, N. Y.

NEW TUBES MANUFACTURERS' SALE

Price, \$2.25 each

All Types—All Guaranteed

Send No Money—Pay Postman

WALTER SCOTT & CO.

636 HIGHLAND AVE., NEWARK, N. J.

All You Want to Know About Aerials

How An Apartment House Dweller Can Solve His Aerial Problem, if Unable to Erect an Outdoor Antenna. Issue of May 3. Unavailable to subscribers. Nineteen Different Types of Aerials. Mostly Outdoor. With a Diagram of Each. Issue of June 28. Pepping Up Your Aerial for Greater Distance and Volume. Issue of July 5. Loops. Which Type is Best and Why. How to Make Different Kinds of Loops and How to Connect Them in Your Set. Issue of July 19. Address Send 15c. for a copy of each issue. Address RADIO WORLD, 1493 Broadway, New York City. All the radio phases of the Republican National Convention and the Democratic National Convention, the first sessions in history in which the choosing of candidates for President and Vice-President were radiocast, published in RADIO WORLD, issues of June 21 and 28 and July 5. You should preserve these numbers as records and mementos of notable events. Send 15c. for a copy of each issue. Or start your subscription with any of these numbers. Address RADIO WORLD, 1493 Broadway, New York

Join the A. B. C.

THE American Broadcast Club, formed under the auspices of RADIO WORLD, has for its object the promotion of the welfare of the broadcast listeners of the United States, Canada and Mexico.

Membership is open to all interested in radio in any way, either as broadcast listener, dealer, manufacturer, wholesaler or jobber.

A novel feature of the A. B. C. is that membership entails no duties or obligations whatever. There are no dues. All you have to do is enroll. That will signify your interest in radio and make you one of the thousands unselfishly united in a common interest.

NEW MEMBERS

- C. J. Haines, 30 Torrey St., Dorchester, N. Y.
- Cliff McManus, RFD 6, Jackson, Mich.
- P. J. Dailing, Logan, Kan.
- H. R. Higgins, 148 East Main St., Somerville, N. J.
- Walter M. Mann, 714 Lexington Ave., Indianapolis, Ind.
- Cleo Carr, 2000 Tea St., Lincoln, Neb.
- A. L. Candy, 498 Lansdowne Ave., Toronto, Ont.
- A. C. Hollister, 2622 Peniston St., New Orleans, La.
- Joseph Neison, 278 East 78th St., New York City.
- Thomas E. Beeram, 111-02 Washington Ave., Rockaway Park, N. Y.
- A. Guglielmucci, 259 East 151st St., New York City.
- Jos. R. Coles, Manston, Wis.
- Max Rakofsky, 112 Goerck St., New York City.
- Roy L. Taylor, 313 Electra St., Electra, Tex.
- Norman L. Chase, 103 1/2 Alexander Ave., Syracuse, N. Y.
- Alfred B. Werhans, 872 Kenyon St., Akron, O.
- Cleve Hoffman, Route No. 4, Elkhart, Ind.
- W. D. Ruth, West Main St., Loudorville, Ohio.
- T. O. Westbrook, Houstonia, Mo.
- Leonard Locking, Houstonia, Mo.
- E. J. Williams, dealer, 289 Potomac Ave., Buffalo, N. Y.
- Henry Thompson, 97 South Main St., Keyser, W. Va.
- Wm. G. Wheat, 2607 Benton Blvd., Kansas City, Mo.
- J. M. Koyack, Box 113, Ranshaw, Pa.
- E. W. Haddon, 6638 Kimbark Ave., Chicago.
- Paul F. Turnure, 1735 Pine St., Boulder, Col.
- Jules Kespeleaux, Box 208, Petaluna, Cal.
- Clarence Feller, 505 Cypress St., Massillon, Ohio.
- Carl Hopkins, 406 East Second Ave., Roselle, N. J.
- Karl P. Goldner, 208 Driscoll Ave., Syracuse, N. Y.
- H. E. Burns, Box 705, Martinsburgh, W. Va.
- C. C. Plummer, 121 Exchange St., Portland, Me.
- DeWitt Lotz, dealer, Box 33, Nevada City, Cal.
- Anthony Lipsky, 930 East 5th St., Bethlehem, Pa.
- P. E. Maloney, West Main St., Andover, Ohio.
- D. S. Newcomer, Vinton, Iowa.
- G. Clark, 717 West 2nd St., Morristown, Tenn.
- J. C. Sturm, Box 362, Concord, N. H.
- H. M. Heron, 45 Ecker St., San Francisco, Cal.
- Robert Hurlburt, Galva, Ill.
- Louis Crawford, Galva, Ill.
- David N. Anderson, Box 19, R. F. D. No. 3, Scio, Oregon.
- Isaac Aboaf, 310 South Pryor St., Atlanta, Ga.
- E. H. Hufham, Roseburg, Oregon.
- F. S. Haynes, 15 Garden St., West Englewood, N. J.
- D. M. Williams, 4627 College Ave., Indianapolis, Ind.
- H. W. Mitchell, 159 Admiral Road, Toronto, Ont.
- C. Layson, Box 241, Millersburg, Ky.

132 Stations Operated by the Army

WASHINGTON.

FOURTEEN major radio stations and ninety-eight minor stations are operated by the army, according to a War Department announcement.

The larger stations have a radius of 1,000 miles at sea. They are located at Washington, Governors Island, Baltimore, Atlanta, Fort Hayes, Columbus, Ohio; Fort Harrison, Indianapolis, and Chicago, Fort Leavenworth, San Francisco, Jefferson Barracks, St. Louis, Omaha, Fort Douglas, Utah; Fort Sam Houston, San Antonio, Tex., and Fort D. A. Russell, Wyoming.

HENLEY'S 222 RADIO CIRCUIT DESIGNS—A fine book for the novice and the expert. Mailed on receipt of \$1.00. The Columbia Print, 1493 Broadway, New York City.

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

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

Name

Address

City or Town.....

State

WHAT IS AN INVENTION?

How to obtain a patent and other valuable information is supplied in our FREE Booklet.

Write for a copy today

MANUFACTURERS PATENT CO., Inc.

70 WALL STREET, NEW YORK

RADIO MAP FREE

Big Broadcasting Station List.

Also Radio Bargain List. Just Out.

The RADIO SHACK

America's Largest Radio Dealers

Dept. RW-7-26

55 Vesey St.

New York

\$15 Set Gets 2,000 Miles

The Essex Radio Special, the receiving set with a conscience, gets you more distant stations clearer and sweeter than sets costing ten times its price. \$15 Set complete with cabinet, without tube or batteries. \$20 Set complete with cabinet, tube and batteries.

ESSEX RADIO SERVICE

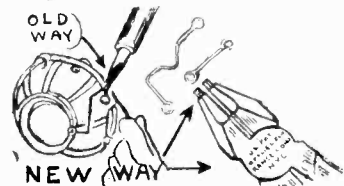
617 West 125th St. New York

Detailed information on request.

EVERY RADIO FAN NEEDS

Rance Combination Plier

Easier to use—better results.



Build your set in 1/2 the time. Does away with soldering joints by making eyes, loops, bends and offsets on Radio buswire; otherwise it is exactly the same as other pliers.

GENUINE KRAUTER PLYERS

\$3.50

RANCE RADIO CORPORATION

Liggett Building, 41 East 42d St.

New York

Dealers and Distributors Wanted

"ROLLS ROYCE" RADIO TUBES



Like their name, significant of quality. Durable and powerful. Bring in distance with a maximum of volume and clearness.

- Type 200—5 volts, 1 ampere Detector Tube
- Type 201A—5 volts, .25 amperes Amplifier and Detector
- Type 199—3-4 volts, .06 amperes Amplifier and Detector
- Type 199—3-4 volts, .06 amperes With Standard Base—Amplifier and Detector
- Type 12—1 1/2 volts, .25 amperes Platinum Filament—Amplifier and Detector

ALL TYPES of Radio Tubes \$2.50

Type 202 Five (5) Watt Transmitter \$3.00
EVERY TUBE GUARANTEED to work in Radio Frequency. Especially adapted for Neutrodyne, Reflex and Super Heterodyne Sets. Shipped Parcel Post C. O. D. When ordering mention type.

Rolls Royce Tube Co.

21 Norwood Street Dept. W Newark, N. J.

Solving Aerial, Ground and Battery Problems for a Portable Set

A LOOP is handy indeed for use with portable sets. However, a loop usually means multi-tube operation, so you may instead have about 100 feet of wire on a fishing, or other reel for use as an antenna. This holds good particularly

when you are carrying a set in a canoe or automobile. If you want to make a loop, read how in RADIO WORLD, issue of July 19, wherein the best type of loop was described, as well as many other types, presented as options.

The loop should be mounted in the car so that it can be turned or else the car will have to be turned about to receive from certain directions. Some build loops on the supports of the car's top or string them around the rear wall with supports at the upper corners of the top and at the ends of the rear seat. About ten turns of rubber-covered lamp cord serve well for this type of antenna.

Since the car is insulated from the ground by the tires, the question arises, "How should the ground connection be made?" If a regular antenna is employed, a metal rod can be driven one or two feet in moist earth to act as the ground when the car is in camp. If a loop is used, it has been found that louder signals will be obtained if one side of the loop is grounded. This allows the loop to act both as a regular open antenna and partly as a loop. The storage battery used for the lighting system is generally used to light the filaments of the vacuum tubes. This battery in most cars has its negative terminal grounded to the frame; thus the loop will be grounded to the frame.

Grounding the loop in this way will affect the directional properties of the loop. Such being the case, best reception will not be obtained when the loop points toward the broadcasting station. It may even act as a "unilateral" loop, that is, receive signals strong in one direction and weak from the opposite direction. For example, if the loop points toward a station to the north, it

may receive the signals with good intensity, but will only produce a weak signal from an equally powerful station at
(Concluded on next page)

CROSLEY
RADIO CATALOG FREE
Describes fully the complete line of radio frequency sets, regenerative sets (licensed under Armstrong U. S. Patent No. 1,113,149) and parts.
Write for Catalog Today
THE CROSLEY RADIO CORPORATION
POWEL CROSLEY Jr., President
6402 Alfred Street Cincinnati, Ohio

NEUTRODYNE PARTS

Full set of Neutroformers, Variable Condensers with dials, and Neutrodons **\$13.25**
Above parts are Genuine Workrite Neutroformers, made under Hazeltine patents.

Complete parts for three tube Neutrodyne tuner, (tubes, batteries, or phones not included), drilled panel, tube sockets, rheostats, fixed condensers, jack, binding posts, wire, spaghetti, and blue prints.

COMPLETE FOR \$19.95

Postage additional on all shipments.
Ask for our price list.

Send no money—Order by postcard—
Pay the Postman.

RADIO SURPLUS STORES
HELENA, MONTANA



WE REPAIR RADIO TUBES

WD-11 ..\$2.50	DV-2	\$2.50
WD-12 .. 2.50	DV-6A ..	2.50
UV-200 .. 2.50	UV-199 ..	2.50
UV-201 .. 2.50	C-299 ..	2.50
C-300 .. 2.50	UV-201A ..	2.50
C-301 .. 2.50	C-301A ..	2.50
DV-6 .. 2.50	Marconi ..	2.50
DV-1 .. 2.50	Moorhead ..	2.50
6 v. Plain Detector		2.50
6 v. Plain Amplifier		2.50

Mail orders solicited and promptly attended to.

Dealers and agents write for special discounts.

H. & H. RADIO CO.

P. O. Box 22-B

Clinton-Hill Station Newark, N. J.

Federal RADIO Products

Over 130 standard radio parts, each bearing the Federal iron-clad performance guarantee.

Write for Catalog.

FEDERAL TELEPHONE & TELEGRAPH CO.
Buffalo, N. Y.

The Ultimate Radio Receiver
THE FLEX-O-DYNE CO.
1674 Broadway (At 52nd St.)
New York, N. Y.
Circle 4569

USE
EVEREADY
Radio Batteries
-they last longer

COAST TO COAST
Every Turn **STAR** No
A Tap **COIL** Soldering
SEND FOR LITERATURE
STAR RADIO PRODUCTS CO.
711 S. DEARBORN ST. CHICAGO, ILL.

SUPER-HETERODYNE FOR YOU!

An improved Super-Heterodyne at a low price, complete, with map, complete wiring hook-up, schematic assembly of parts, wave length calibration chart, accurate panel specifications, detail of intermediate frequency transformer construction, how to wind all the coils, and complete constructional information so that anyone can build the outfit, in RADIO WORLD for May 31, June 7, 14, and 21. 15c a copy. The four copies for 60 cents, or start your subscription with May 31.

RADIO WORLD, 1493 Broadway, N. Y. C.

A mid-summer subscription offer

Subscribe NOW and Receive Another Radio Publication Without Extra Cost

Radio World has made arrangements

- to offer a year's subscription for
- any one of the following publications
- with one year's subscription for
- RADIO WORLD;
- RADIO NEWS or
- POPULAR RADIO or
- RADIO BROADCAST or
- WIRELESS AGE or
- RADIO DEALER or
- RADIO (San Francisco).

This is the way to get two publications

- for the price of one;
- Send \$6.00 today for RADIO WORLD
- for one year (regular price
- for 52 numbers)
- and select any one of the other
- six publications for twelve months—
- Add \$1.00 a year extra for
- Canadian or Foreign postage.
- Present RADIO WORLD subscribers
- can take advantage of this offer by
- extending subscriptions one year NOW.
- Or order thru your newsdealer.

RADIO WORLD'S SPECIAL TWO-FOR-PRICE-OF-ONE SUBSCRIPTION BLANK

RADIO WORLD, 1493 Broadway, New York City.

Enclosed find \$6.00, for which send me RADIO WORLD for twelve months (52 numbers, beginning and also without additional cost, Radio News, or Popular Radio, or Radio Broadcast, or Wireless Age, or Radio Dealer, or Radio for twelve months, beginning Put a circle around the other publication you want.

Indicate if renewal

This Offer Good

Until

August 10, 1924

Name

Street Address

City and State

TOWER'S

TOWER'S Scientific

WEIGHS ONLY 8OZ

Perfect Tone Makes



\$2.95

plus a few cents postage

Buy a Headset you'll be proud of



OUR \$200,000.00 COMPANY STANDS SQUARELY BACK OF EVERY HEADSET

WORLD'S GREATEST HEADSET VALUE

now \$2.95, with Notable Improvements

Longer Cord (full 5 feet), Stronger Magnets, Higher Resistance, Increase of Sensitivity, Perfect Tone Mates

EVERY SET TESTED BY LICENSED RADIO OPERATORS

Send no money - Order on a Post-Card

THE TOWER MFG. CO., Dept. D. 98 BROOKLINE AVENUE, BOSTON, MASS.

Scientific

PORTABLE'S PROBLEMS

(Concluded from preceding page)

the south, although the distance from the loop to the broadcasters is the same.

This effect is attributed to the mass of metal of the car being so near to the loop. The capacity effect of the metal of the car to the earth acts as a counterpoise or capacity ground.

Radio installation on a motor boat is more easily made than in an automobile. A regular sized loop can be used on a motor boat or a small standard antenna

can be erected between the mast and the deck or from mast to mast. Such an antenna should have at least four wires twenty feet long erected ten feet above the deck, otherwise the loop is more satisfactory.

If a storage battery is used on the motor boat for ignition purposes the same battery may be used for lighting the vacuum tubes. If dry batteries are used it is more satisfactory to use a separate "A" battery for the radio set. If an average sized loop antenna is used a ground connection is not required. If a regular antenna is used then the frame of the engine and a piece of bare wire thrown overboard into the water can both be used as the ground contact. A sheet of copper, about twelve inches square, fastened to the end of wire will afford more surface and improve reception.

The apparatus should be mounted to withstand vibration. Care should be taken not to place the set so that the dials are on the top and the vacuum tubes in a horizontal position. The tubes must be in a vertical position, otherwise the filaments will sag and come in contact with the grid or plate. If the set is to be made especially for automobile or motor boat service the controls should be mounted on the top of the cabinet instead of on the sides and the tubes mounted in a vertical position. This arrangement gives greater facility of controls.

A radio set in a motor car or boat is likely to pick up considerable interference from the ignition system. It is usually necessary to stop the engine, although near-by stations can be heard through the ignition disturbances. There is a method of muffling the ignition system, but its expense of installation does not warrant its use in most cases.

Automobile tourists will experience no

difficulty in entering Canada because of their radio equipment. Thousands of cars cross and recross the Niagara frontier daily to get a view of the Falls from different angles, and at times, especially on Sundays, cars extend over a mile back from the bridges, and it is a fact that last year cars equipped with radio presented a new problem to the customs officers. A ruling was made by the Canadian Commissioner of Customs and Excise, through the efforts of the American Automobile Association and the Ontario Motor League, which permits American tourists to enter Canada without a deposit, bond or payment of duty when their radio set is exported exclusively for touring.

10c Brings You Our New 48-Page Radio Catalog Includes Thousands of Unequalled Radio Bargains

Send a dime for your copy, today!



CHICAGO SALVAGE STOCK STORE
Dept. W6, 500 South State Street
CHICAGO

RADIO CRYSTALS

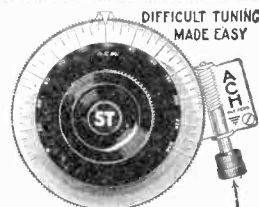
MOUNTED, UNMOUNTED, BULK

Packed under your own label if desired.

Dealers and Jobbers—Write us for lowest prices on Quality Crystals.

MELODIAN CO. OF AMERICA
INDEPENDENCE, MISSOURI

ACH SHARP TUNER



Mail Orders Prepaid

Why the A.C.H. is different
3 in. DIAL \$2.50 (150-10-1)
4 in. DIAL \$5.00 (215-10-1)
5/16 REG. 1/4-3/16 BUSHINGS 3¢ EACH

Send for Circular D

A. C. Hayden Radio & Research Co.
Brockton, Mass., U. S. A.

Programs

Monday, July 28 (continued from page 18)

vocal and instrumental numbers by artists. 10:30 P. M., police alarms.
WCAE, Pittsburgh, 462m (650k), E. S. D. S. T.— 3:30 P. M., baseball scores; Library news. 4:30 P. M., stock market reports; the Sunshine Girl; Pittsburgh livestock quotations. 6:30 P. M., dinner concert from William Penn Hotel. 7:30 P. M., Uncle Kaybee. 7:45 P. M., baseball scores. 9 P. M., Radio Ukulele lesson by C. Martin McGee. 9:30 P. M., musical program, the Sequilla Club of Pittsburgh. 11 P. M., late concert, Blue Ridge Syncopators.
WGY, Schenectady, 380m (790k), E. S. T.— 1 P. M., music and talk, "Hints for the Home Maker." 5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:15 P. M., review of week's sports, "Joe" Haubner. 7:15 P. M., address, "Why Be a Farmer?" Enos Lee, president N. Y. State Farm Bureau Federation. 7:30 P. M., "Town and County Fairs," R. H. Wheeler, Professor of Extension. 7:40 P. M., baseball results. 7:45 P. M., musical program.
KPO, San Francisco, 423m (710k), P. T.— 4:30 P. M., Rudy Seiger's Fairmont Hotel orchestra. 5:30 P. M., children's hour stories by Big Brother of KPO. 7 P. M., Rudy Seiger's Fairmont Hotel

orchestra. 8 P. M., organ recital by Theodore J. Irwin. 9 P. M., Western Union Night. 10 P. M., E. Max Bradford's Versatile band.
WFAA, Dallas, Tex., 476m (630k), C. S. T.— 12:30 P. M., address, Capt. S. C. Kile, United States Veterans' Bureau. 8:30 P. M., Charles Roessler, zither recital; W. W. Macbeth, harmonic expert, in specialties.
WLAG, Minneapolis, 417m (720k), C. S. T.— 2:40 P. M., matinee program. 4 P. M., magazine reading. 6 P. M., baseball scores and dinner hour concert, Geo. Osborn's Nicollet Hotel orchestra. 7:30 P. M., farm lectures, "Hollow Building Tile."
WHAS, Louisville, Ky., 400m (750k), C. S. T.— 4:5 P. M., selections by the Alamo Theatre orchestra; police bulletins; weather forecast; "Just Among Home Folks," daily humorous column; selections by Dick Quinlan's Golden Derby orchestra; late news bulletins. 4:50 P. M., local livestock, produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., Central Standard time.
KGO, Oakland, Cal., 312m (960k), P. T.— 3 P. M., studio musical program. 4 P. M., Henry Halstead's Hotel St. Francis dance orchestra. 6:45 P. M., stock exchange and weather reports, and news items. 8 P. M., educational program, with musical numbers; courses in agriculture, Spanish, music, economics and literature.
WWJ, Detroit, 517m (580k), E. S. T.— 9:45 A. M., public health service bulletins and talks of general interest. 10:25 A. M., weather forecast. 11:55 A. M., time relayed by the Western Union. 12 Noon, Detroit News orchestra. 3:50 P. M., weather forecast. 3:55 P. M., market reports and baseball scores. 8:30 P. M., concert by Schmeiman's concert band. 9:30 P. M., Detroit News orchestra.
WHAZ, Troy, N. Y., 380m (790k), E. S. T.— 9 P. M., Columbus Social Club Italian band, with assisting soloists and features.
WOS, Jefferson City, Mo., 441m (680k), C. S. T.— 8 P. M., address, "Survey Brings Out Soil Facts," and "The American Date Industry," by Colonel Arthur T. Nelson, State Marketing Commissioner. 8:20 P. M., musical program.
CKAC, Montreal, 425m (710k), E. S. T.— 1:45 P. M., Mount Royal Hotel luncheon concert. 4 P. M., weather, stock, news. 4:15 P. M., the dansant.
WMC, Memphis, Tenn., 500m (600k), C. S. T.— 8:30 P. M., program arranged and sponsored by George W. Hughes, Dixie's Harry Lauder.
WCO, Philadelphia, 509m (590k), E. S. D. S. T.— 8:15 P. M., grand organ recital, Harriette G. Ridley. 8:45 P. M., musical program, Mae Mackie, soprano; Florence O'Brien, contralto; Harriette G. Ridley, accompanist. 9:10 P. M., Fox Theatre grand orchestra. 10 P. M., dance program by Hotel Adelphi Roof Garden orchestra. 10:55 P. M., time signal. 11:02 P. M., weather forecast.
WMAQ, Chicago, 447m (670k), C. S. D. S. T.— 4 P. M., sport results. 6 P. M., Chicago Theatre organ recital. 6:30 P. M., Hotel LaSalle orchestra.

Max Bradford's Versatile band.
WFAA, Dallas, Tex., 476m (630k), C. S. T.— 12:30 P. M., address, DeWitt McMurray, in a medley of humor, pathos and wisdom. 8:30 P. M., song and orchestra recital by talent from Van Alstyne. 11 P. M., Mrs. Margaret Fifer and her orchestra.
WLAG, Minneapolis, 417m (720k), C. S. T.— 10:45 A. M., household hints. 2:10 P. M., women's hour, "World Co-operation in 1924," by Mrs. A. J. LeGuirs. 2:40 P. M., magazine reading. 6 P. M., baseball scores and dinner hour concert by Geo. Osborn's Nicollet Hotel orchestra. 7:30 P. M., farm lectures.
WHAS, Louisville, Ky., 400m (750k), C. S. T.— 4:50 P. M., local livestock, produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., central standard time. 7:30 to 9 P. M., concert by Roberta Garner's orchestra; late news bulletins; baseball scores; central standard time announced at 9 o'clock.
KGO, Oakland, Cal., 312m (960k), P. T.— 10 A. M., Henry Halstead's Hotel St. Francis dance orchestra. 4 P. M., concert orchestra of the Hotel St. Francis. 6:45 P. M., stock exchange and weather reports, and news items. 8 P. M., Arion Trio; KGO mixed quartette; Claire Harsha Upshur, soprano; Mary Groom Richards and Gwynfi Jones, contralto and tenor duet; steel and Spanish guitar duet; Richard Lundgren, basso; Boruck and Tarleton, vaudeville sketch; Joyce Holloway Barthelson, pianist; Claire Harsha Upshur and

(Concluded on next page)

Free Mailing Lists
 Will help you increase sales
 Send for FREE catalog giving counts
 and prices on thousands of classified
 names of your best prospective customers—
 National, State and Local—Individuals,
 Professions, Business Concerns.
99% Guaranteed
 by refund of 5¢ each

ROSS-Gould Co. 313 N. 10th St. St. Louis

WORLD BATTERY
Saves You 50%
 Famous Guaranteed Quality and Service—
 Backed by Years of Successful Manufacture and
 Thousands of Satisfied Users.

Prices That Save and Satisfy

Auto Batteries	Radio Batteries
6-Volt 11 Plate, \$12.25	6-Volt 60 Amps. \$ 8.50
6-Volt 13 Plate, 14.25	6-Volt 80 Amps. 10.00
12-Volt 7 Plate, 17.00	6-Volt 100 Amps. 12.50
	6-Volt 120 Amps. 14.50
	6-Volt 140 Amps. 16.00

Special 2-Volt Storage Battery for W. D. 11 and 12 tubes. Will run 200 hours on one charge. Rechargeable. \$5.00.
 Special 4-Volt Storage Battery for U.V. 199 tubes. Same features as 2 Volt. \$8.00.
 Shipment express C.O.D. subject to examination. 5% Discount for cash in full with order.

2-Yr. Guarantee Bond in Writing With Each World Storage Battery
 proves satisfactory World performance. Mail this ad with your name and address and we will ship battery day order is received; and give you a 45-Volt "B" Battery and Hydrometer Free with each battery purchased. Write today.

World Battery Company
 Dept. 17, 1219 S. Wabash Ave.
CHICAGO, ILL.

FREE
 45 V. B. BATTERY
 and
 HYDROMETER

KODEL PORTABLE

ONE TUBE RECEIVER.....\$16.00
 Complete, with Tube, Batteries, Phones. 27.00
 Latest Rechargeable "Super" B Battery. 4.95

BAKELITE PANELS, 3/16 in. thick, 2c. per sq. in.; 1/8 in., 1 1/2c. sq. in.; 1/4 in., 3c. sq. in.

MARVEL RADIO SPEC. CO. 132 Nassau St. New York City

RADIO and OTHER TECHNICAL BOOKS YOU NEED

Radio Teleg. and Telephone Receivers for Beginners\$0.75
 Design Data for Radio Transmitters and Receivers—M. B. Sleeper..... .75
 Wireless in the Home—DeForest..... .15
 Commercial Type Radio Apparatus—M. B. Sleeper75
 A B C of Vacuum Tubes—Lewis 1.00
 Operation of Wireless Telegraph Apparatus35
 Lessons in Wireless Telegraphy..... .35
 Radio Hookups—M. B. Sleeper..... .75
 Construction of New Type Trans-Atlantic Receiving Sets—M. B. Sleeper .75
 1922 Consolidated Call Book..... .50
 Radio Telephony 3.00
 Radio Tel. & Tel..... 1.00
 How to Pass Government Examinations30
 How to Make a Standard C W Set.... .35
 How to Conduct a Radio Club..... .50

Any book sent on receipt of price, post-paid. 20% discount on any two books of same title. The whole list of 15 books sent for

\$9.40

THE COLUMBIA PRINT
 1493 Broadway, New York City

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

5 CENTS A WORD. 10 WORDS MINIMUM. TELEPHONE YOUR CLASSIFIED IF IN A HURRY. RADIO WORLD'S PHONE NOS. ARE LACKAWANNA 2062-6976.

SELL RADIOLA V with 3,000-ohm Frost Phone—like new—less tubes and battery. \$55.00. Cost \$120.00. \$10.00 with order, balance C. O. D. Subject examination. Geo. Schulz, Calumet, Mich.

FOR SALE—One Westinghouse R. C. Set, with Ambassador Coil installed. One five-tube tuned impedance set, both in perfect condition. Returning to Canada cannot take sets. Appointment by letter only. GRANTZ, 251 East 13th Street, New York.

RADIO WORLD'S CLASSIFIED DEPARTMENT. If you want to buy, sell or exchange anything, use RADIO WORLD'S Quick-Action Classified Department, 5 cents per word, 10 words minimum. RADIO WORLD, 1493 Broadway, New York City.

MAGNAVOX M4—Latest nationally advertised battery-less reproducers. Magnetically balanced. sensitive. Improved rubber cushioned diaphragm. List \$25.00. Introductory \$21.00. Radio Central, Dept. W., Abilene, Kansas.

BOY WANTED to build sets, particularly Neutrodyne and Ambassadors. Call in person. Alonzo, 445 East 9th St., New York City.

A ONE-TUBE SET YOU CAN LOG, cost of construction \$25. Two honeycomb coils and two condensers used. Full data in RADIO WORLD, issue of July 12. Send 15c for a copy.

FULL LIST OF BROADCASTING STATIONS in Radio World dated May 17th, 1924, mailed on receipt of 15c or start your subscription with that number. RADIO WORLD, 1493 BROADWAY, NEW YORK CITY.

PATENTS—SEND DRAWING OR MODEL FOR EXAMINATION AND OPINION. Booklet free. WATSON E. COLEMAN, Patent Lawyer, 644 G Street, Washington, D. C.

HOW TO KILL RADIATION—See RADIO WORLD, February 23, March 1, 8, 22, April 14, 1924. 15c a copy. RADIO WORLD, 1493 Broadway, New York City.

GUARANTEED CRYSTAL SET—COMPLETE, FIVE DOLLARS, including phones—aerial—EVERYTHING. Radio Apparatus House, 140 Maiden Lane, New York City.

CRAM'S RADIO MAP IN TWO COLORS—Best map on the market, 35c. The Columbia Print, 1493 Broadway, N. Y. C.

**TECHNICAL BOOKS
FOR RADIOISTS,
ELECTRICIANS,
AND OTHERS**

- Construction of Radio Phone and Telegraph Receivers for Beginners—By M. B. Sleeper..... \$0.75
- Ideas for the Radio Experimenter's Laboratory—By M. B. Sleeper..... .75
- The Radio Experimenter's Hand Book—By M. B. Sleeper..... 1.00
- Radio Hook-Ups—By M. B. Sleeper..... .75
- Radio Design Data for Radio Transmitters and Receivers—By M. B. Sleeper..... .75
- Construction of New Type Transatlantic Receiving Sets—By M. B. Sleeper..... .75
- How to Make Commercial Type Radio Apparatus—By M. B. Sleeper..... .75
- A B-C of Vacuum Tubes Used in Radio Reception—By E. H. Lewis..... 1.00
- Wireless Telegraphy and Telephony Simply Explained—By Alfred P. Morgan..... 1.50
- Experimental Wireless Stations—By P. E. Edelman..... 3.00
- Six Successful Radio Sets—By M. B. Sleeper..... .50
- 101 Receiving Circuits—By M. B. Sleeper..... .50
- Articulate of Electricity—By Prof. T. O'Connor Sloane..... 1.50
- Commutator Construction—By William Baxter, Jr..... .35
- Dynamo and Electric Motors and All About Them—By Arthur J. Weed..... 1.00
- Electric Bells—By M. B. Sleeper..... .75
- Experimental High Frequency Apparatus, How to Make and Use It—By Thos. S. Curtis..... .50
- Electricity Simplified—By Prof. T. O'Connor Sloane..... 1.50
- Electrician's Handy Book—By Prof. T. O'Connor Sloane..... 4.00
- Electric Toy Making, Dynamo Building and Electric Motor Construction—By Prof. T. O'Connor Sloane..... 1.50
- House Wiring—By Thos. W. Poppe..... 1.00
- How to Become a Successful Electrician—By Prof. T. O'Connor Sloane..... 1.50
- Standard Electrical Dictionary—By Prof. T. O'Connor Sloane..... 5.00
- Storage Batteries Simplified—By Victor W. Page, M.S.A.E..... 2.00
- Telephone Construction, Installation, Wiring, Operation and Maintenance—By W. H. Radcliffe and H. C. Cushing..... 1.50
- Wiring a House—By Herbert Pratt..... .35
- The Modern Gasoline Automobile, Its Design, Construction, Operation—By Victor W. Page, M.S.A.E..... 4.00
- Hints and Tips for Automobilists—By Victor W. Page..... .75
- Questions and Answers Relating to Modern Automobile Construction, Driving and Repair—By Victor W. Page..... 2.50
- Automobile Starting, Lighting and Ignition System—By Victor W. Page..... 2.00
- Automobile Repairing Made Easy—By Victor W. Page..... 4.00
- The Model T Ford Car, Its Construction, Operation, etc.—By Victor W. Page..... 4.00
- Automobilist's Pocket Companion and Expense Recorder—By Victor W. Page..... 1.50
- Location of Gasoline Engine Troubles Made Easy—By Victor W. Page..... .35
- Location of Carburetion Troubles Made Easy—By Victor W. Page..... .35
- Location of Ignition System Troubles Made Easy—By Victor W. Page..... .35
- Lubrication of the Motor Car Chassis—By Victor W. Page..... .35
- Location of Starting and Lighting System Faults—By Victor W. Page..... .35
- Location of Ford Engine Troubles Made Easy—By Victor W. Page..... .35
- Location of Motorcycle Troubles Made Easy—By Victor W. Page..... .35
- A B C of Aviation—By Capt. Victor W. Page..... 2.50
- Aviation Chart—By Lieut. Victor W. Page..... .35
- Glossary of Aviation Terms—English-French-French-English—By Victor W. Page and Paul Montefiori..... 1.00
- Westinghouse E-T Air Brake Instruction Pocket Book—By Wm. W. Wood..... 2.50
- Machine Shop Arithmetic—By Colvin-Cheney..... .75
- Practical Instructor and Reference Book for Locomotive Firemen and Engineers—By Chas. F. Lockhart..... 2.50
- Gas, Gasoline and Oil Engines—By Gardner D. Hiscox..... 3.00
- The Gasoline Engine on the Farm, Its Operation, Repair and Uses—By Xenos W. Putnam..... 3.00
- Lathe Work for Beginners—By Raymond F. Yates..... 2.00
- The Lathe—Its Design, Construction and Operation With Practical Examples of Lathe Work—By Oscar E. Ferrizo..... 3.00
- Complete Practical Machinist—By Joshua Rose..... 3.00
- Shop Hints—By Robt. Grinstead..... 3.00
- Home Mechanic's Workshop Companion—By Andrew Jackson, Jr..... .75
- Machine Shop Tools and Shop Practice—By W. H. Vandervoort..... 4.50
- The Naval Architect's and Shipbuilder's Pocket Book—By Clement Mackrow & Lloyd Willard..... 6.00
- Prospector's Field-Book and Guide—By H. B. Osborn..... 3.00
- Model Making—By Raymond Francis Yates..... 3.00
- Motor Boats and Boat Motors—By V. W. Page and A. C. Letch..... 4.00
- Popular Handbook for Cement and Concrete Users—By Myron H. Lewis..... 3.00
- Fumes, Dies and Tools for Manufacturing in Presses—By J. V. Woodworth..... 4.50
- Standard Electrical Dictionary—By Prof. T. O'Connor Sloane..... 5.00
- A Course in Mechanical Drawing—By Louis Bouillon..... 1.50
- Self-Taught Mechanical Drawing and Elementary Machine Design—By F. L. Sylvester, M.B.E..... 2.50
- Practical Pattern Making—By F. W. Barrows..... 2.50
- American Stationary Engineering—By W. E. Crane..... 2.50
- Steam Engineer's Arithmetic—By Colvin-Cheney..... .75
- 500 Plain Answers to Direct Questions on Steam, Hot Water, Vapor and Vacuum Heating—By A. G. King..... 2.50
- Standard Practical Plumbing—By R. M. Starbuck..... 3.50
- Mechanical Drawing for Plumbers—By R. M. Starbuck..... 2.00

Any of these books sent prepaid to any part of the world on receipt of order in cash, check, stamps, express or postal order.

THE COLUMBIA PRINT
1493 BROADWAY NEW YORK CITY

Programs

Tuesday, July 29 (concluded from page 30)

Mary Groom Richards, soprano and contralto duet.

WWJ, Detroit, 517m (580k), E. S. T.—10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 12 M., Detroit News orchestra. 3 P. M., concert by Schmeman's concert band. 3:50 P. M., weather forecast. 3:55 P. M., market reports and baseball scores. 5 P. M., baseball scores. 8:30 P. M., concert by Schmeman's concert band. 9:30 P. M., Detroit News orchestra.

CKAC, Montreal, 425m (710k), E. S. T.—4 P. M., weather, news, stocks. 7 P. M., kiddies' stories in French and English. 7:30 P. M., concert from the Mount Royal Hotel main dining room. 8:30 P. M., varieties from La Presse studio. 10:30 P. M., concert from the Mount Royal Hotel roof garden.

WMC, Memphis, Tenn., 500m (600k), C. S. T.—8:30 P. M., program to be announced later. 11 P. M., midnight frolic.

WOAW, Omaha, Neb., 526m (570k), C. S. T.—5 P. M., address, "Teaching History Backward," H. V. Kaltenborn, associate editor of Brooklyn Eagle. 6 P. M., popular half hour. 6:30 P. M., dinner program by Russ Townsend's orchestra. 9 P. M., program by First Christian Church orchestra.

WOO, Philadelphia, 509m (590k), E. S. D. S. T.—11 A. M., grand organ. 11:30 A. M., weather forecast. 12 M., luncheon music by the Tea Room orchestra. 12:55 P. M., Naval Observatory time signal. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports and police reports.

WMAQ, Chicago, 447m (670k), C. S. D. S. T.—4 P. M., sport results. 6 P. M., Chicago theatre organ recital. 6:30 P. M., Hotel LaSalle orchestra. 8 P. M., Harry Hansen, literary editor, The Daily News. 8:20 P. M., Clara E. Laughlin, travel talks. 8:40 P. M., French lesson; Babson report. 9 P. M., One of the series of talks by the United States civil service commission. 9:15 P. M., Miss Coral Goris, mezzo-soprano.

Wednesday, July 30

WNYC, New York, 526m (570k), E. S. D. S. T.—7:30 P. M., police reports and alarms. 8:30 P. M., musical program composed of band selections and vocal and instrumental numbers by artists. 10:30 P. M., police alarms.

WCAE, Pittsburgh, 462m (650k), E. S. D. S. T.—3 P. M., piano recital by Fred Rosenfeld, exclusive WCAE artist. 3:30 P. M., baseball scores. 4:30 P. M., stock market reports; Uncle Kaybee; Pittsburgh livestock quotations. 6:30 P. M., dinner concert from the William Penn Hotel. 7:30 P. M., the Sunshine Girl. 7:45 P. M., baseball scores. 9:30 P. M., musical program.

WGY, Schenectady, 380m (790k), E. S. T.—11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:45 A. M., weather report. 11:55 A. M., time signals. 5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:30 P. M., Adventure Story.

KPO, San Francisco, 423m (710k), P. T.—2:30 P. M., Jack Fait's Entella Cafe orchestra. 4:30 P. M., Rudy Seiger's Fairmont Hotel orchestra. 5:30 P. M., children's hour stories by Big Brother of KPO. 7 P. M., Rudy Seiger's Fairmont Hotel orchestra. 8 P. M., E. Max Bradfield's Versatile band.

WFAA, Dallas, Tex., 476m (630k), C. S. T.—12:30 P. M., musical program by the Red Head Girl of the Dallas Journal Editorial Staff.

WLAG, Minneapolis, 417m (720k), C. S. T.—2:10 P. M., women's hour, beauty talk, by Maude Hart. 2:40 P. M., magazine reading. 6 P. M., baseball scores and sport hour. 7:30 P. M., farm lectures, "Vegetables as a Food for Children." 8:15 P. M., concert. 9:15 P. M., business message. 11 P. M., program, Geo. Osborn's Nicollet Hotel orchestra.

WHAS, Louisville, Ky., 400m (750k), C. S. T.—4:50 P. M., local livestock, produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., central standard time. 7:30 to 9 P. M., concert by Earl Elliott's Falls Cities' Serenaders; late news bulletin; baseball scores; central standard time announced at 9 o'clock.

KGO, Oakland, Cal., 312m (960k), P. T.—3 P. M., short musical program; speaker furnished through courtesy of the Cora L. Williams Institute. 4 P. M., concert orchestra of the Hotel St. Francis. 5:45 P. M., stock exchange and weather reports, and news items.

WWJ, Detroit, 517m (580k), E. S. T.—10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 12 noon, Detroit News orchestra. 3 P. M., concert by Schmeman's concert band. 3:50 P. M., weather forecast. 3:55 P. M., market reports and baseball scores. 5 P. M., baseball scores. 8:30 P. M., concert by Schmeman's concert band. 9:30 P. M., Detroit News orchestra.

WOS, Jefferson City, Mo., 441m (680k), C. S. T.—8 P. M., address, "Some New Facts in Call Feeding," by C. W. Turner, instructor in dairy husbandry, College of Agriculture, Columbia. 8:20 P. M., barn dance tunes played by the Old Tyne String Trio.

CKAC, Montreal, 425m (710k), E. S. T.—1:45 P. M., Mount Royal Hotel luncheon concert. 4 P. M., weather, stocks, news. 4:15 P. M., musical tea.

WOO, Philadelphia, 509m (590k), E. S. D. S. T.—4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results and police reports; dinner music by A. Candelori and his Hotel Adelpia Roof Garden orchestra. 8:30 P. M., concert from Houston Hall, Univ. of Penn.; Mae Ebrey Hotz,

soprano; Dorothy Johnston Baseler, harpist; W. S. Thunder, pianist. 9:30 P. M., grand organ recital, Harriette G. Ridley.

WMAQ, Chicago, 447m (670k), C. S. D. S. T.—4 P. M., sports results. 6 P. M., Chicago Theatre organ recital. 6:30 P. M., stories for children by Miss Katherine Waller. 8 P. M., weekly Northwestern University lecture. 9 P. M., talk from one of the Chicago charities. 9:15 P. M., program by Nell Gwynn, soprano.

Thursday, July 31

WNYC, New York, 526m (570k), E. S. D. S. T.—7:30 P. M., police reports and alarms. 8:30 P. M., musical program composed of band selections and vocal and instrumental numbers by artists. 10:30 P. M., police alarms.

WCAE, Pittsburgh, 462m (650k), E. S. D. S. T.—3:30 P. M., baseball scores. 4:30 P. M., stock market reports; the Sunshine Girl; Pittsburgh livestock quotations. 6:30 P. M., dinner concert from the William Penn hotel. 7:30 P. M., Uncle Kaybee. 7:45 P. M., baseball scores. 9:30 P. M., Mrs. Charlotte Beading McHugh, soprano soloist; Miss Florence Seibel, pianist and accompanist; Samuel Walters, violinist. 11 P. M., Moores' Cafeteria radio review.

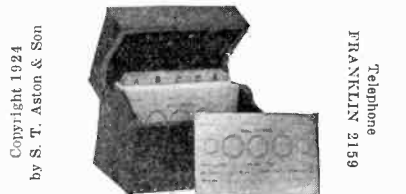
WGY, Schenectady, 380m (790k), E. S. T.—5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:15 P. M., report on New York state highways, State Highway Commissioner. 5:30 P. M., organ recital by Stephen E. Boisclair. 7:40 P. M., baseball scores. 7:45 P. M., "A Few Moments with New Books," L. L. Hopkins. 8 P. M., concert by Schenectady Salvation Army band.

KPO, San Francisco, 423m (710k), P. T.—2:30 P. M., musical program. 4:30 P. M., Rudy Seiger's Fairmont Hotel orchestra. 5:30 P. M., children's hour stories by Big Brother of KPO. 7 P. M., Rudy Seiger's Fairmont Hotel orchestra. 8 P. M., organ recital by Theodore J. Irwin. 9 P. M., program, management of Jack I. Thomas. 10 P. M., E. Max Bradfield's Versatile band.

WFAA, Dallas, Tex., 476m (630k), C. S. T.—12:30 P. M., address, Charles E. Osborne, physical director, on "Doing Your Best." 8:30 P. M., Robert Pool, tenor; Nell Lowrey, soprano; recital. 11 P. M., Mustang Serenaders orchestra.

ACME
for amplification

Record Your Radio Stations
On RADEX Log Cards to Match Your Set



100 Cards, Mahogany Finish or Oak Cabinet, and Index Dividers, Complete, \$3.00. A Useful Accessory to Any Set. Give Name of Your Set or Sketch of Dial Arrangement. Sent Postpaid on Receipt of Cash or Money Order.

S. T. ASTON & SON
114 WORTH STREET NEW YORK CITY

Burnt-Out Tubes Replaced for \$2.50



A Wonderful Tube for Your Superdync.

The Only Tube with a written Replacement Guarantee Against Breakage or Blowout.

Burnt-out, Defective or Broken Tubes of any brand or make whatsoever will be replaced by a brand new (not refilled) Royaltron Tube, at a cost of only \$2.50.

ROYALTRON TUBES

- 199 (.06 Amp.)
- WD12 (1/4 Amp.)
- 200 (1/4 Amp.)
- 201A (1/4 Amp.)

It is with the Object of Advertising the MERITS of ROYALTRON Tubes, that we make the above unusual offer.

Every ROYALTRON Tube is accompanied by a money-back guarantee.

Approved by the Radio News and World Laboratories

ROYAL MANUFACTURING CO.
Department W. O.

296 BROADWAY NEW YORK
Dealers, distributors and agents, write or wire immediately for unusual proposition.

EXCLUSIVE DEALER AGENTS

Will soon be appointed in every city or
locality to sell a

WONDERFUL NEW INVENTION

which

has a yearly market of over \$45,000,000.00
will be eagerly welcomed by every Radio user
will sell at retail for \$5.00
will be extensively advertised
will give a rapid turnover and liberal margin of profit

RADIO DEALERS

If you are interested in securing this valuable agency write to Box X,
Care of RADIO WORLD, 1493 Broadway, New York City, for full
particulars.

NOTE: Only established retail Radio Dealers
will be considered for appointment.

For Aggressive Dealers This Is a Real Opportunity