

JULY
4 1925

**THE FREEDOM REFLEX,
THREE TUBES**

*By Capt. Peter
V. O'Rourke*

**15
CENTS**

RADIO WORLD

Title Reg. U.S. Pat. Off.

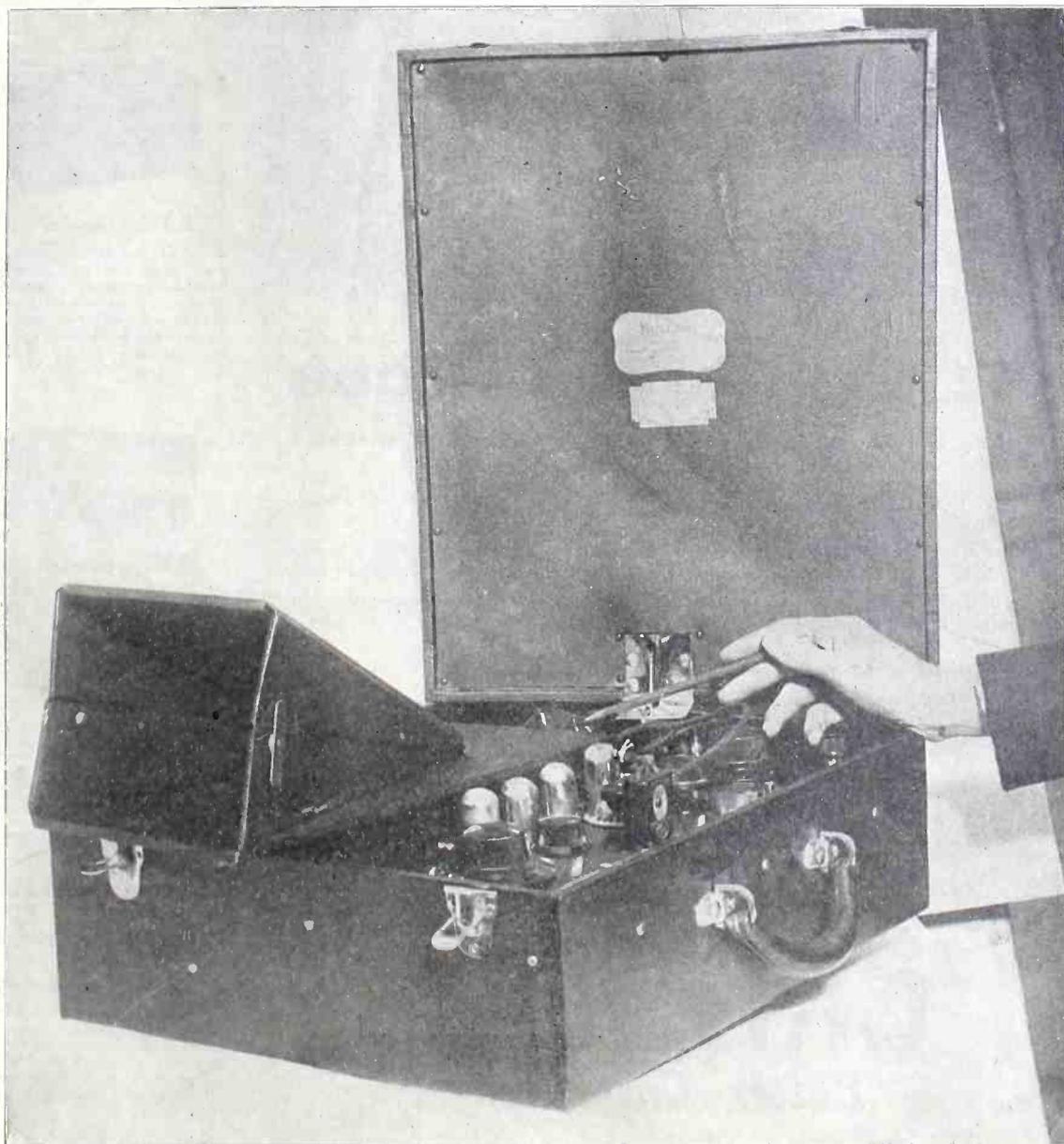
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**Meissner Transmitter,
Heising Modulation**

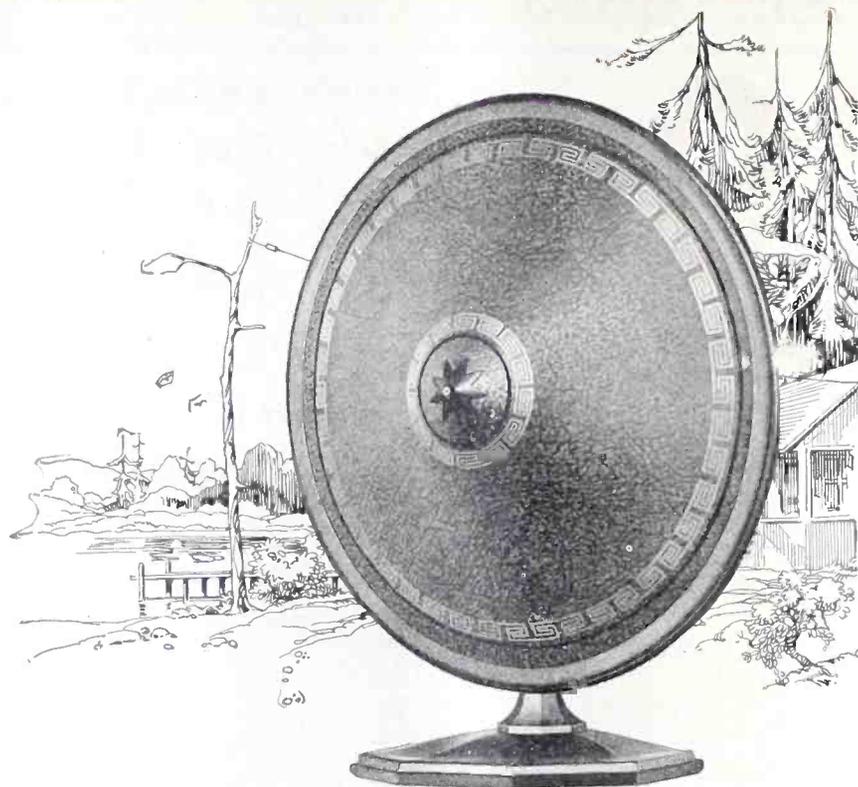
By Lewis Winner

**THE HANDSOME
4-TUBE PORTABLE**

By Herbert E. Hayden



THE HANDSOME PORTABLE, loop operated. Pencil points to the speaker unit. See page 3



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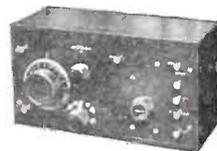
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Same as wonderful Crosley 50 with additional tube amplifier. Local and nearby stations on loud-speaker always and distance up to 1500 miles under average conditions. Much greater range with head phones. \$18.50, without accessories.



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A unique circuit combining tuned radio frequency, regeneration and reflexed amplification that equals in results the work of 5 and 6 tubes. Non-re-radiating. \$65 without accessories.

RADIO WORLD

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

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THE HANDSOME PORTABLE *A Speaker Set That Works Anywhere*

By

**Herbert E.
Hayden**

(Photographed by
the Author)

MANY a portable is conceived aesthetically but executed wretchedly. When the constructional engineering is tackled it is found to present numerous problems.

A portable should be serviceable under all operating conditions and should be good-looking. With these ideas in mind I set about to design a portable that would represent, at completion, those ideas of handsomeness and efficiency that I toyed with as I lost

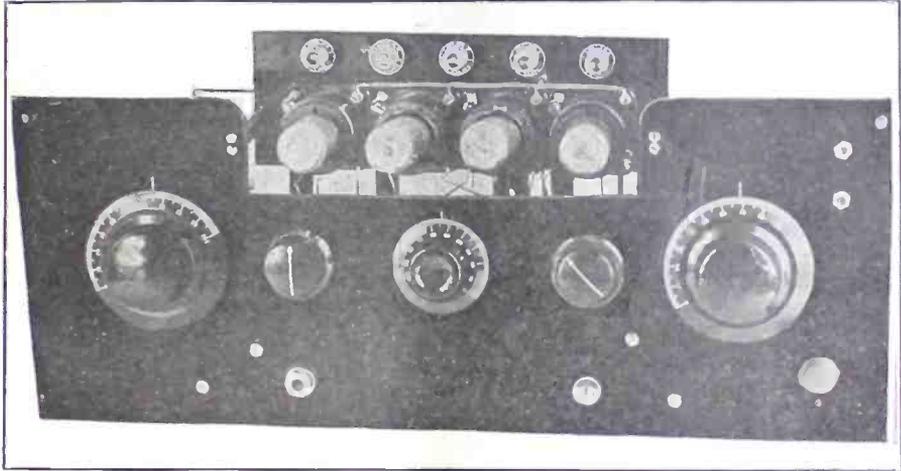


FIG. 2, the panel view of the portable. Note that the panel is horizontal, instead of in the conventional upright position. The tubes used are UV199. Directly behind them are the terminal posts. The two tuning condenser dials are at left and right. The middle dial is for regeneration control. One rheostat and one neutralizing condenser knob are the other objects appearing prominently on the dial. The knob at lower right is for the variable resistance across the primary of the first audio transformer, but this may be omitted.



THE CARRYING CASE (above) makes a neat "package." Below is the folding horn, which fits inside the case.

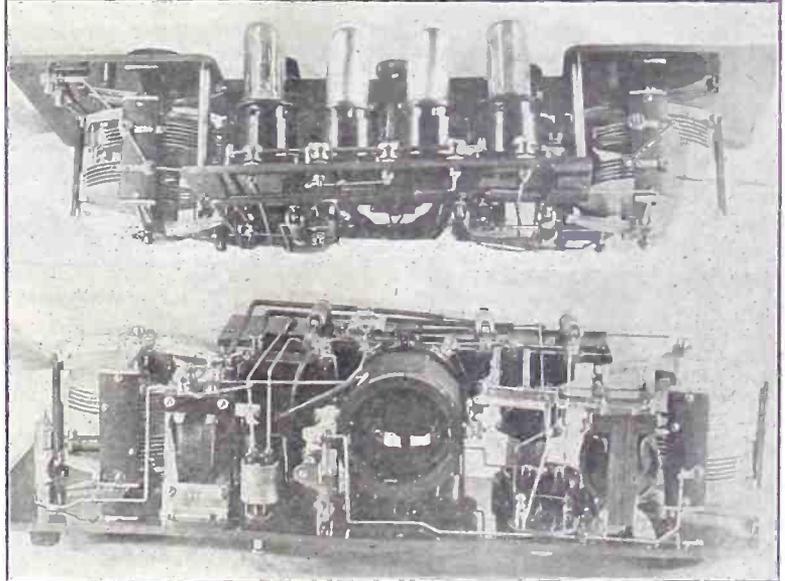


FIG. 3, rear view of Hayden's Handsome Portable and Fig. 4 (lower photo), the view as seen from one side

some sleep over theories evolved to meet practice.

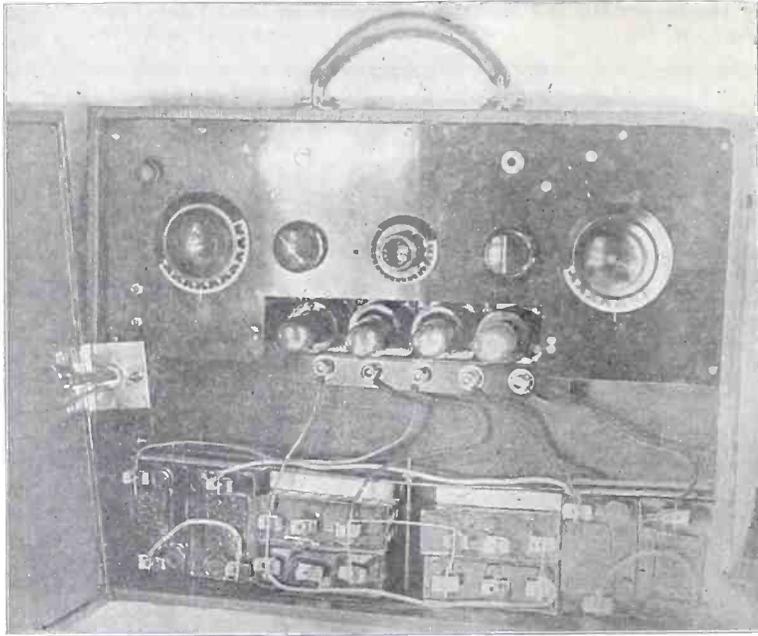
The result was a set so good-looking that I decided to name it Handsome. Then I began to worry a little about the operation of the set under those uncertain conditions encountered as one journeys across the country or penetrates the wood-

land to the very source of a great river.

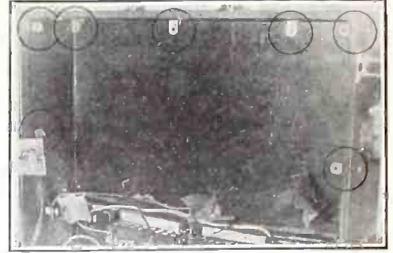
My fears proved groundless, I am pleased to report, for the set stood up under every test and ran neck and neck with the 8-tube Super-Heterodyne that was taken along as the companionable comparison.

The circuit is very powerful and has

A Cleverly-Designed Portable



A SIDE VIEW, showing how the batteries are placed. The loop is at left.



HOW the brackets which hold panel appear in case. When you buy the case or cabinet the holes for the brackets will not be present and they will have to be drilled. To emphasize the location of the brackets circles are shown.

the specially cut panel which fits in it so snugly, the socket subpanel and the other provisions all unite to make one splendid achievement.

How to Wind the Coils

L1L2L3, is a small-sized coil. L1L2 are wound on a piece of tubing or quartzite rods $2\frac{1}{2}$ " in diameter and $2\frac{1}{2}$ " high. There are 18 turns on the primary. No. 24 silk over cotton wire is used throughout. The secondary contains 60 turns. There is scant separation between the primary and the secondary. This is not detrimental to the set in any way. L3, the tickler, is wound on a piece of tubing or quartzite rods $1\frac{3}{8}$ " in diameter, 19 turns on each

(Concluded on page 25)

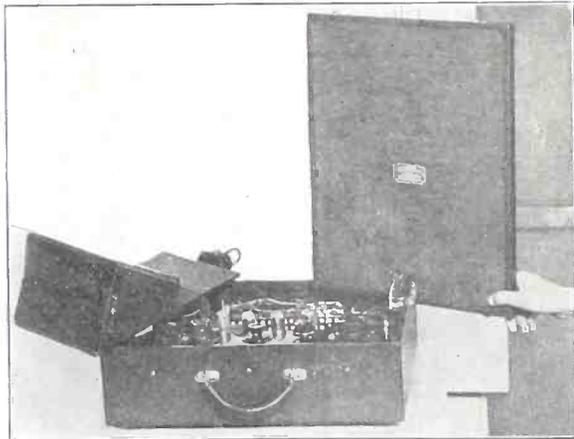
to be so, because of occasional poor reception conditions that one may expect to find in woodland and lakeside, and which must be overcome. There must be no uncertainty usually attendant on getting aerial connections and suitable ground, hence a loop must be used. This set operates with very excellent efficiency on a self-contained loop.

Severe Requirements Met

The radio-frequency side of the circuit amplifies very greatly the incoming signal, for there are the equivalent of three and a half stages of RF, the regenerative feature of the second RF stage representing one and a half stages by itself. One of the audio stages is reflexed and one of the RF steps is neutralized, to assure balance and stability. Everything that goes into this set is first-class, so that there will be no disappointment. The two tuning condensers are imperative.

The set is one of the most selective that I have ever operated and will tune out a very powerful broadcasting station that is only a few blocks away, bringing in a weaker station a few hundred miles off. Thus the set, while an excellent

portable, is splendidly adapted to home use after one returns from the great outdoors. The commercially made case,



THE loop is easily turned for directional effect.

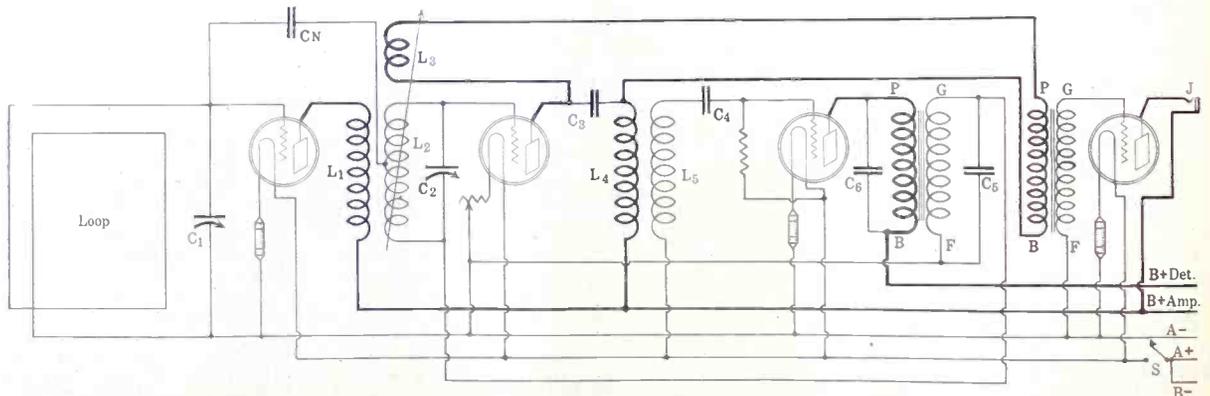


FIG. 1, the electrical wiring of Hayden's Handsome Portable, which embodies tuned radio-frequency amplification, reflex, neutralization and regeneration. Four tubes are employed and they do the work of five. The presence of regeneration accounts for the equivalent of one and a half stages of RF, hence there are theoretically three and a half stages of RF tube detector and two audio stages.

THE FREEDOM REFLEX

By Capt. P. V. O'Rourke

MANY persons constantly inquire for a non-radiating 3-tube set that still can give good selectivity and volume. They do not want regeneration, because the set is for general family use, including children, and they are afraid that lack of care in tuning will cause neighbors consider a big annoyance. And, besides, the controls are limited by the inquirers to only two, on the plea that no member of the family has more than two hands.



CAPT. PETER V. O'ROURKE

It is really surprising that so little attention has been paid generally to the hookup, Fig. 1, which is probably the most stable and satisfactory 3-tube reflex that you could build for aerial operation. Factory-made products, using only three tubes, may accomplish more, because reflexing, especially inverse reflexing, is a fine art. But the set shown in Fig. 1 will cause no trouble, either during building or afterward, and a reflex with the trouble element taken out must indeed be inviting.

Set Needs No Neutralizing

Why no neutralization you may ask. First, because none should be necessary with only one stage of radio-frequency amplification. It's the second RF stage that compels the inclusion of some stabilizing device, like a balancing condenser, potentiometer, plate resistance or the like. If by any chance oscillations do occur where not wanted—which would be only below 450 meters—the neutralizing condenser may be inserted. However, I have built several of these sets; neutralization never was necessary, hence I will not include directions for neutralization tap, etc.

There are only two coils to make, one for the aerial circuit (L1L2), the other for the interstage coupling (L3L4).

This circuit is characterized by freedom from squawking, freedom from difficulty in construction or operation, and freedom from excessive number of controls. Therefore it is called the Freedom Reflex, which has a timely touch to it, too.

No rheostats are employed, the resistance elements in the filament minus lead being Amperites suited to the tubes employed. It is all right to use the Amperite in the detector stage of this circuit. Thus one switch controls the entire filament lighting. As the set is designed for speaker operation, no phone jack is provided.

The Panel

The set may be constructed on a 7x18" panel. The panel may be divided horizontally, with a line 3" from top, and the center holes for the condenser shafts drilled 4½" from extreme left and extreme right, respectively. The only objects appearing on the panel are the switch S, the dials and the jack. The switch may be of the push-pull type, but if you can get the toggle kind with a small mounting hole required, that works more smoothly. The usual toggle switch (left and right or up and down motion) requires too big a panel hole, 1" or so, and few have the instrument necessary to drill this, or care for such a big "dent" in the panel.

The switch should be placed at a point

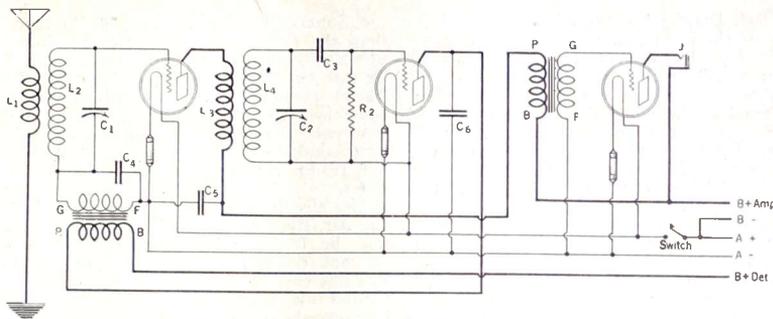


FIG. 1, the Freedom Reflex, so-called because of its freedom from trouble either during or after construction. There are only two controls. The panel has the two dials for these, one switch and one jack—that's all. It's simplicity itself, and a fine, dependable set that tunes quietly and may be logged.

near the A plus line to the terminal strip (binding posts).

The aerial coil is made of No. 22 double cotton covered wire on a 3½" diameter, either tubing or basketweave, L1 consisting of 17 turns and L2 of 43 turns, each winding separate and distinct, and the separation between ½". L3 is wound also on a 3½" diameter, consisting of 12 turns of the same kind of wire, L4 having 45 turns. If, after the set is in operation, it is found that C1 has higher dial readings than C2, then remove a turn or two from L4, until the two dials read together. The variable condensers should be of the same make and capacity, .0005 mfd.

The coils should be mounted at right angles to each other, the aerial coil (L1L2) usually being mostly conveniently placed at left rear of baseboard, with coil axis parallel with the baseboard (the coil lengthwise, running in the direction of the panel width of 18"). The other coil may be placed to the right of C2, with form bottom secured to the baseboard with angles.

The connections to the coils should be such that ground and F minus connections in the aerial circuit RFT are adjacent and B plus and positive A connections in the interstage coupler are adjacent.

C3 is the grid condenser, C4, C5 and C6 being by-pass condensers. These by-pass condensers in some cases, probably many cases, may be omitted entirely, but if

LIST OF PARTS

Two radio-frequency transformers, L1L2, L3L4.

Two .0005 mfd. variable condensers, C1, C2.

Three sockets.

Two 4" dials.

Two dial pointers.

Three 1A Amperites (for 201A tubes).

Fixed condensers, C3, .00025 mfd.

C4, .0001 mfd., C5 and C6, .001 mfd.

One 2-megohm grid leak, R2.

Two audio-frequency transformers.

One single-circuit jack.

One battery switch, S.

One 7x18" panel.

Accessories: One 7x17" baseboard aerial wire, ground clamp, lightning arrester, lead-in wire, cabinet, speaker, A and B batteries, jack plug, four UV 201A, C 301A or DV2 tubes, terminal strip, internal connect; wire, hardware.

volume isn't what you feel it should be, put them in, and your solution is found. Sometimes there is enough automatic bypassing. If there isn't, then you need the fixed condensers.

The condenser C4 is physically mounted across the secondary of the first audio transformer.

Tube, Socket and Battery Tips for Portable Fans

By Sidney E. Finkelstein

Associate, Institute of Radio Engineers

SOME day perhaps there will be just standard sockets, but to-day there are at least three kinds, (1) standard, for the run of tubes; (2) the 199 variety and (3) the WD11 and C11 type. To use the 199 tubes in standard sockets, special adapters are necessary. There are no adapters, so far as I know, so that 199 tubes can be used in WD11 sockets.



SIDNEY E. FINKELSTEIN

The socket question assumes the proportions of a problem sometimes. This is particularly true when one is

considering the construction of a portable set. The smaller tubes may be preferred, because of the smaller space required for them and the A battery. Thus, 199 tubes or equal will do nicely. For RF they equal the 201A and 301A tubes, while as detectors they run about even also. The audio volume from 199 tubes is about three-quarters that obtained from the 201A. But any station that can be heard on the speaker with 201A tubes can be heard on the speaker with 199 or 299 tubes.

The DV3 tubes have the same characteristics as the 199s. The DV3, however, are made by the DeForest Company, and fit in standard sockets (the same as the 201A). Thus, if one already has standard sockets and desires to construct a portable, he may have overlooked the fact that the DV3 tubes will do very well here, two parallel-connected 4½-volt A batteries (the usual C battery type) being enough to operate four tubes economically.

Diamond Hailed as the Best by Fans Who Know Their Radio

THE Diamond of the Air is proving one of the most popular circuits ever presented by RADIO WORLD. Indeed, it seems that it will be the most popular of all.

The reasons are not in any way beclouded. There is nothing tricky about the circuit. It is a regenerative detector, preceded by a stage of tuned radio-frequency amplification. These require two tubes. The two remaining tubes are for the transformer-coupled audio.

Great volume is produced from this circuit. Selectivity is very good. If exceptional selectivity is necessary, for instance because you live less than a mile from a powerful broadcasting station, use a loop. The circuit is not reflexed and it depends only on the one RF stage and regenerative detector for successful loop operation. When the circuit was first described by Herman Bernard as a loop set, letters began to trickle into RADIO WORLD's office doubting the efficacy of loop operation on this hookup, as seemingly no radio magazine had ever made a serious presentation of this actuality. Results have turned the doubters into boosters.

There is no circuit, excepting perhaps

the Super-Heterodyne, that will do more than the Diamond. When the amplification at RF is greater than that produced by this circuit, then some means of stabilization must be introduced (which means some loss-producing system, such as potentiometer, reverse connections, neutralizing condenser, absorption coil, etc.). The net result will be little gain for extra tubes.

The circuit diagram of the Diamond of the Air, showing a neutralizing condenser, may be followed by those who want to prevent radiation as much as they can. In some cases radiation can be totally prevented by inserting this condenser, Cn, but not always.

The actual construction of the set was fully described in a series of articles. Anybody desiring to build the set should read each issue containing an article on this circuit. The issues are April 4, 11, 18, 25, May 23 and 30, June 13 and 20. The issue of June 20 dealt with the 3-tube reflex, which may be used for portable use, although Mr. Bernard recommends the straight 4-tube set for best all-around efficiency. This issue will do for April 4.

BUILT TWO SETS, BOTH "GREAT," FAN REPORTS

RESULTS EDITOR:

I have built two Diamonds of the Air and they are great. I am now building a Diamond of the Air as a portable.

FLETCHER WILLIS,
725 N. Calvert St., Baltimore, Md.

550 MILES ON LOOP

HIS SUMMER RECORD

RESULTS EDITOR:

I constructed the Diamond of the Air and I find it to be my favorite set. When there is a large amount of static I plug in the loop and listen unmolested. The farthest station I have received on a loop is KDKA, 550 miles. I would like one of your nameplates, because the set is worth having a name.

EDWIN YOUNG,
Box 36, Edgerton, Wis.

BETTER THAN ANY OTHER; GETS DX AS IF BY MAGIC

RESULTS EDITOR:

I have just finished building my third Diamond of the Air. I like it better than any other set I have ever built. It gets distance as if by magic. It sure has the correct name, Diamond, Jem, Jewel, Joy.

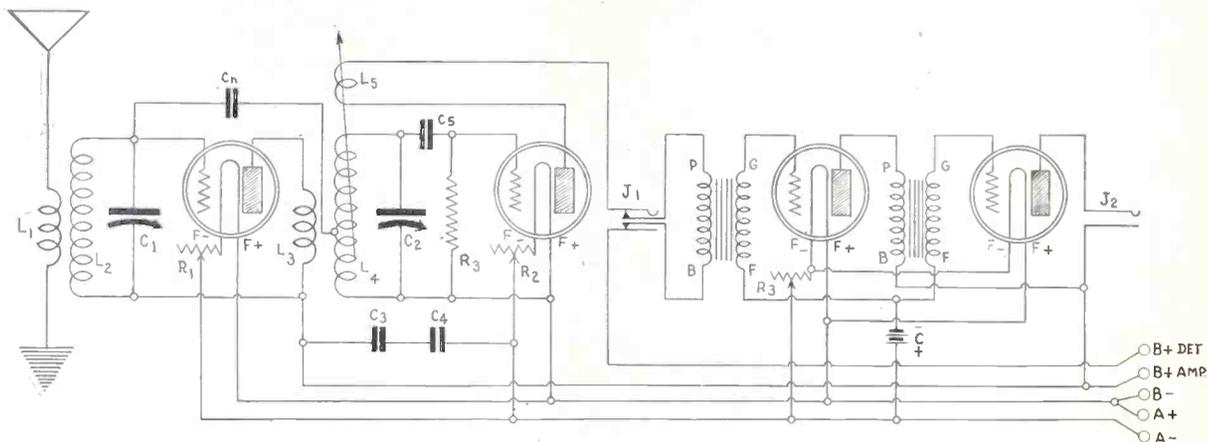


FIG. 1, the wiring diagram of The Diamond of the Air, showing the inclusion of a neutralizing condenser. The tap is taken from the 15th turn from the grid end of the detector secondary.

Loop May Be Used Successfully

The Diamond of the Air, operated as an outdoor aerial set, is shown in Fig. 1. This gives also the connections for a neutralizing condenser, should the constructor decide on neutralization.

The set may be successfully operated on a loop, with a Winter range of about 500 miles, and good for Summer portable use. The loop would be connected with its terminals where the terminals of L2 are now. To provide facilities for both loop and outdoor aerial options, insert a double-circuit jack, not shown in the diagram. The outside leaves of the jack (one spring and the right angle frame) connect as follows: frame to negative A and condenser rotor, the other spring to grid of the R. F. tube, at left, Fig. 1, and to stator of C. F. The inside springs of the jack are connected to the terminals of L2. Thus, when the loop plug is NOT inserted, the aerial is in use, but when the plug IS inserted the inside contacts are opened up and only the loop connects to the variable condenser.

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

LIST OF PARTS

- One 3-circuit coupler, L1L2L3 (Bruno No. 77).
- One radio-frequency transformer (Bruno No. 55).
- Two .0005 mfd. variable condensers, C1, C2.
- One sub-panel bracket.
- One 6-ohm wire-wound rheostat, R1.
- One Bradleystat, R2.
- One .00025 mfd. fixed grid condenser, C5.
- One .002 mfd. fixed condenser, C4 (C3, .001, is optional).
- One single-circuit jack (J2).
- One double-circuit jack (J1), the other for loop-aerial switching.
- Two audio-frequency transformers.
- Three 4" vernier dials.
- Three dial pointers.
- Four standard sockets.
- One terminal block.

THE BABY PORTABLE, by Herbert E. Hayden. A 1-tube DX set on a 7½x5½" panel. Send 30c for May 16 and 23 issues to RADIO WORLD, 1493 Broadway, New York City.

I would not trade it for any set made, barring none.

I would like to have three nameplates for these sets.

DEWEY L. SUIT,
Box 308, Clarendon, Va.

GIRL BUILDS THE DIAMOND; VERDICT NOW UNANIMOUS

RESULTS EDITOR:

I built The Diamond of the Air and it's great. Please send me a nameplate.

MISS FERN HOSKINS,
R. D. Box 6, Plainville, Ill.

NAMEPLATES

Stanley Green, 777 South 2nd St., Philadelphia, Pa.

L. Payette, Joliette, Quebec, Canada.

R. Hyde, 140 Nott Terrace, Schenectady, N. Y.
John Gross, 377 East 152nd St., Bronx, N. Y. City.

J. K. Kreuger, 710 Camp St., McKees Rocks, Pa.

Harry Noblitt, Edina, Mo.

Chas. T. Atkins, 65 Woodward Ave., San Francisco, Cal.

Louis Settich, 1001 Centennial Ave., Middletown, O.

O. C. Miller, Atchinson, Kansas.

Harvey Mitchell, 140 Yorkville Ave., Toronto, Ontario, Canada.

C. H. Gardner, 6921 Meade St., Pittsburg, Pa.
Miss Fern Hoskins, R. 1, Box 36, Plainville, Ill.

Rev. Numa Boulet, Ecole d'Agriculture, Sainte Anne de la Pocatiève, Kamouraska, Québec, Canada.

J. H. Sanderlin, Box 309, Oakland Station, Pittsburg, Pa.

An 8-Tube Super-Heterodyne

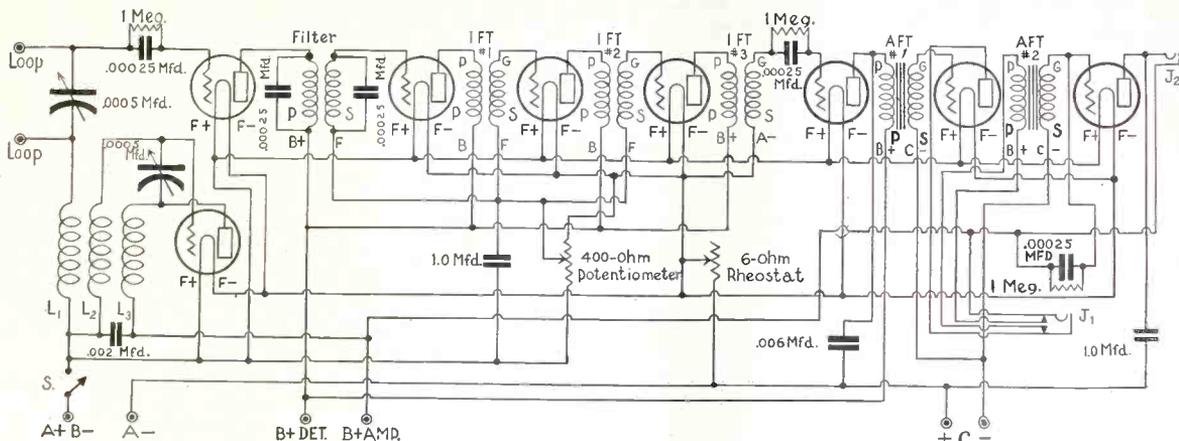


FIG. 1—The circuit of the 8-tube Super-Heterodyne. The actual wiring of the set is not half so complicated as it appears. If you should redraw this diagram leaving the filament leads out you would be surprised at the simplicity of the circuit. True, there are eight tubes, which draw two amperes, but the results far outweigh this item.

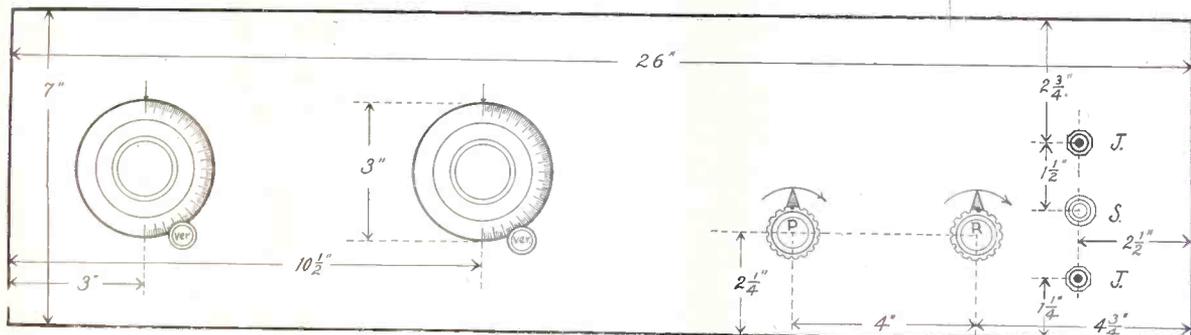


FIG. 2—The panel layout of the Super-Heterodyne. The panel is 7x26". Only 3" dials can be used on the Acme vernier condenser because of the extension of the vernier knob.

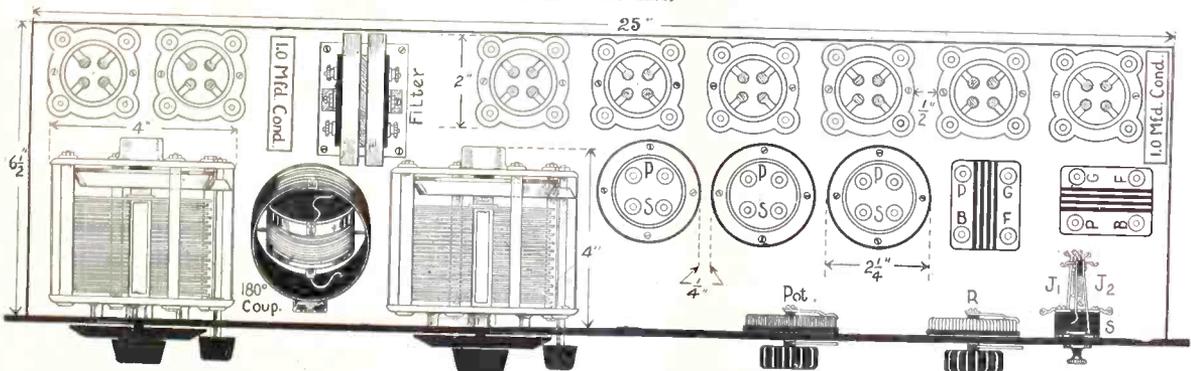


FIG. 3, the baseboard layout. Every inch counts in the layout of the instruments. Short leads must be considered, interaction of currents must be at a minimum, losses must be low. The Romler inter-frequency coupler and transformers were used in this set. The filter coil is identical with the other transformers, but for the sake of clarity in instructing you where to place the filter coil, it was specially drawn differently.

By Abner J. Gelula

PART I.

AT the mere mention of Super-Heterodyne the uninitiated immediately think of miles of complicated wiring, queer-sounding and acting transformers, a grand array of complicated tube-wiring, meters, loops, outdoor aerials, frequencies, heterodynes, etc. The building of the super-heterodyne is no more complicated than the little 1-tube regenerator, but that there is more to it. Practically every tube is wired similarly to the previous tube, and, although the circuit may appear to be a hook-up for the telephone company, I can assure you that it is far easier to

build than a reflex circuit and easier to get operating right than a neutrodyne.

This set was built in six hours in the laboratory of RADIO WORLD. On a little 2-foot loop, nearly every station of 500 watts power and east of Chicago was heard in the daytime on the loud speaker. Selectivity was wonderful. While WOR, Newark, N. J., was operating, WDAR in Philadelphia was tuned in without any semblance of interference. As for sensitivity, KFI, KGO, KOA and KHJ were heard on the loud speaker. KFI, KGO and KHJ are on the Pacific Coast, while KOA is located at Denver, Colorado. Volume is tremendous. It easily fills a large auditorium, if you have a loud speaker that will stand the entire output of the

second stage of audio-frequency. The control of the volume is so fine that, from filling an auditorium, the volume may be cut down so low that it is barely audible, without losing any degree of selectivity or tone. Speaking of tone, it compares favorably with any set of half the number of tubes. Of course, much of the tone value and undistorted output lies in the loud speaker. You can connect a poor speaker to a set, giving practically undistorted output, and be unable to understand the jabber emitted from the horn. But a well designed outfit used in conjunction with a good talker will be a pleasure.

This circuit is not "just another dyne." The super-heterodyne was the first set to
(Concluded on page 27)

The Meissner Circuit, Using Heising's Modulation Plan

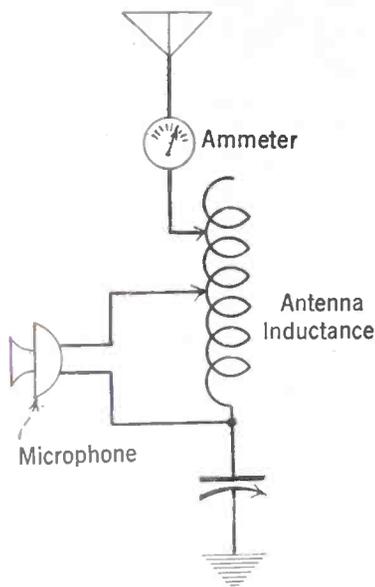


FIG. 1, showing how to connect a microphone in the antenna circuit to modulate the radio-frequency current being emitted.

How to make a 5, 50 or 250-watt transmitter is described by Lewis Winner in a 4-part article. Part 1, "How to Become an Amateur," was published last week (June 27) and gave instructions for learning the code and getting a license.

PART II.

By Lewis Winner

Radio Engineer

AFTER studying the diagram of the transmitter that was published last week, much of which was new to a large army of the fans, there are a batch of things that need explanation as to the why and wherefore of the successful operation of the set: (1) Why use the Heising system of modulation? (2) Why use a chemical rectifier and a filter also? (3) Why use the Meissner circuit? (4) Why use a counterpoise and a ground also? (5) Can not one use the absorption or grid method of modulation? (6) Are there any other systems of employing a key in the grid circuit?

We shall first discuss why we use the Meissner circuit instead of the Hartley, Colpitts, coupled Hartley, which is nearly the same as the Meissner circuit, Reversed Feed-Back circuit, or the Master Oscillator. A very excellent circuit for quality of reception is the Master Oscillator, but

this circuit is not very good for DX work, unless you use very high-powered tubes, and there the ordinary "ham" does not fare well at all.

Flexibility of Set

The Meissner circuit was invented by Dr. A. Meissner of the Telefunken Company, of Germany. This circuit is flexible, as the grid and the plate coils are not connected directly to the antenna, as is done in the Colpitts and the Hartley. Thus the set has more wavelength consistency. In the other two circuits as soon as the antenna swings or sags the capacity of the antenna is decreased or increased, the least little change affecting the wavelength of the set. There is also more resistance in those two circuits, as the resistance present in the antenna and ground systems is directly connected in the grid and the plate circuits of the actual transmitter, which makes them less selective. The common thought in this principle is that there will be more signal output with the two circuits just mentioned, which is very true, as you get all the energy right from the tube to the antenna, but selectivity is also necessary and it is nearly absent in those two transmitters. For low power, and high wavelengths those two circuits are nevertheless recommended as you certainly do get all you can out of a tube, but you have to keep your eye on the wavemeter readings while they vary (unless you have an antenna which is non-swinging or sagging, this being nearly impossible).

In the Meissner Circuit we have the very accurate way of obtaining feed back, and that is the old faithful tickler coil for tuning the plate, so often used in the receiver and referred to as the 3-circuit tuner. As a matter of fact the only difference between the first part of a Meissner Circuit (the oscillator of the transmitter) and a receiver is the key.

Ground and Counterpoise

As to why we use a ground and a counterpoise, it is for the purpose of reducing the resistance in the earth. This is an old system and was used by an old radio station in Spain in 1911. This is one of the most wonderful methods to obtain the maximum output of a transmitter where there are favorable space conditions. The counterpoise is installed right under the antenna, that is, if the antenna is an L type, 2-wire antenna, the counterpoise should consist of five or six wires. No doubt many fans do not know about a counterpoise. It is an antenna installed directly underneath the prime antenna, separation about 10 feet, provided the prime antenna is about 25 feet above the roof of the house. There are five wires in the counterpoise and they run in a fan fashion. They do not run in a straight line as does the antenna. The only objection to this is that you need a large amount of space for this type. In that case the counterpoise may be left out entirely. The difference in the normal output will be very small, (the system is usually used with high powered transmitters) but the probable range of the set will decrease. This is a theoretical condition, as it is dependent upon the location of the set. There are some places where a good ground is all that is needed and still there are places where without a counterpoise the output of the set is poor. However, the ratio of the poor ground to

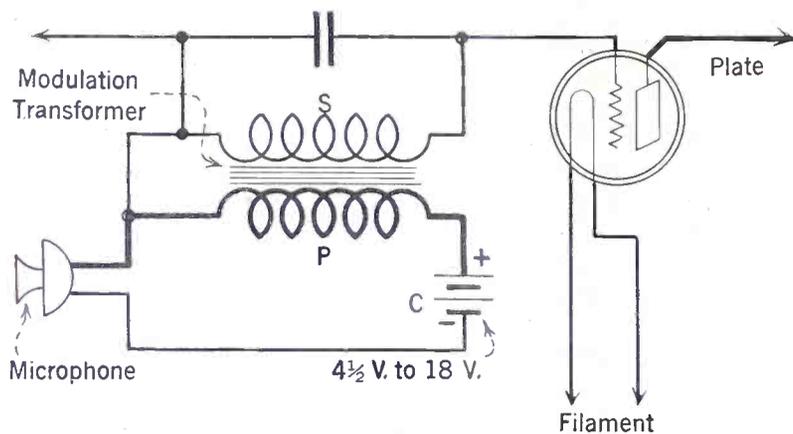


FIG. 2, showing how to connect a modulation transformer in the grid circuit of the oscillator tube. The secondary of MT takes the place of the grid resistance.

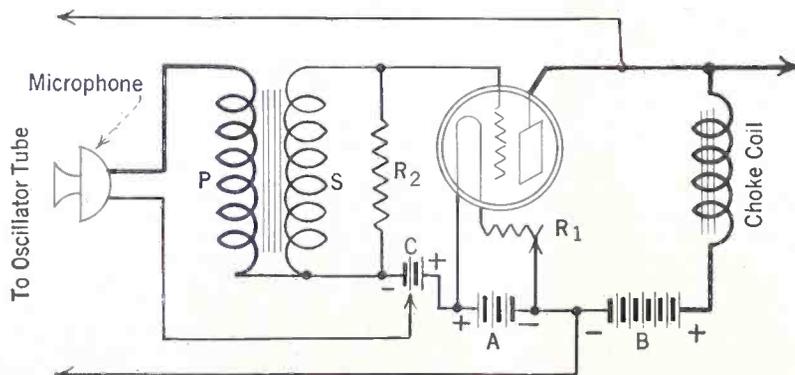


FIG. 3, how the Heising system of modulation looks in an electrical diagram. Note that the C battery supplies microphone circuit, also keeping at the same time the grid at a negative potential. Use about 20 volts C battery for a 5 watt tube and about 50 volts for the 50 watt tube. The variation of the grid voltage to a high or a lower voltage will give a better or worse modulation note. It may be found that a very high negative potential such as about 100 volts will work very well.

A Chemical Rectifier for 5 to 250-Watt Transmitters

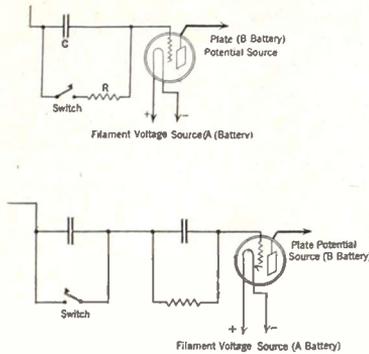


FIG. 4, the top diagram shows how the key is connected in the grid circuit, for use with low power only. The bottom diagram shows how a key is connected in the circuit, this being used with higher power. This latter method employs a key across a condenser of 2 mfd. to prevent any voltage surge. This system is used when tubes are used in parallel.

a good ground is very small and the main reason that this was placed in the diagram was to illustrate the fact what a counterpoise actually did in the transmitter. This may be left out when drawing the diagram at the Custom House.

Systems of Modulation

As for the systems of modulation used in the transmitting sets, the Heising System stands out alone for the wonderful quality that a set offers when it is employing that method of modulating speech coming from the phone transmitter.

The first and simplest method of modulation is using the microphone in the antenna coil for modulating the current output of the set. This is a very old method and can only be used for low-power tubes, say five watts. The best results can be obtained from this method if the actual resistance of the microphone is exactly equal to the resistance of the antenna. This method of modulation is very poor because the least change in the resistance in the antenna, which is very liable to happen in the rainy or in merely damp weather, will affect the modulating qualities of the set. See Fig. 1 for the diagram of hooking up the microphone in this indifferent manner.

The next method of modulation is by varying the grid voltage of the oscillator tube in a self excited transmitting system. See Fig. 2 for the diagram illustrating the method. The main trouble in this method is the fact that the oscillator has to do two things, (1) generate the current, (2) modulate it. These functions cannot be combined successfully. This voltage-variation method is only to be used with low power too.

The next and the best method of employing modulation is by the variation of the plate current. Let us suppose that the modulator tube is a sound-frequency generator which has for its excitation the microphone and the battery in the grid circuit. The sound frequency is a certain number of cycles or alternations of current per second of time. The output is the power generated by this tube and is given to the oscillator tube. The oscillator tube now acts as a resistance, during which time the energy from the generator or modulator tube will be transferable to the oscillator when an equilibrium exists. The first engineer practically to employ this method of modulation, was R. A.

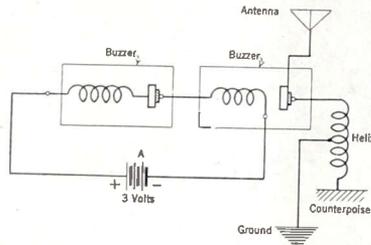


FIG. 5, the famous buzzer modulation scheme. The buzzer acts as a modulator of the radio frequency current. The armature of the buzzer vibrates, thereby sending out interrupted continuous wave signals.

Heising, of the Western Electric Company.

A peculiar thing to note about the choke coil used in this system is that as you increase the impedance of the coil the transfer of energy from the modulator or generator tube to the oscillator tube lessens. It would be great if we could have a choke coil whose impedance would go to infinity, throughout the whole range of sound frequencies (90 to 6,000 cycles). These frequencies refer only to the voice frequencies used more regularly. The maximum frequencies of 9,000 cycles are sometimes used, but the persons who have such a vocal maximum are very few and the same applies to the very low bass frequencies. The whole trouble lies in the fact that there is always present in the coil a lot of resistance. It is a well known fact that about 75 per cent of the power will be obtained when the impedance of the choke coil is equal approximately to two times the actual resistance of the oscillator and the modulator tubes. The tubes used for this purpose will have the same characteristics, that is the resistances of both tubes will have to be equal. You obtain transfer of energy only when the impedance is equal to the resistance of either tube. See Fig. 6 for the diagram showing how to build the choke coil.

There is still another method of modulation, the method concerning only the modulation of ICW (interrupted continuous wave). Most of us know that in pure CW work, the continuous radio-frequency note put out by the transmitter is broken up with a key into dots and dashes, each dot and dash having a certain time element. The key is placed in the circuit as per Fig. 4. While we are at this stage I might as well discuss the fact that these signals cannot be heard in an ordinary receiver. The heterodyne method of reception must be employed. Construct a separate oscillator. See June 20 issue on "Oscillating Wavemeters." Put the oscillator in inductive relation to a non-regenerative receiver. If the set is regenerative this method is not necessary.

Just set your tube oscillating and tune in the signal, which will be heard at the point where the difference of the signal is equal to an audio-frequency note. Set the oscillator going at a certain frequency, say 499,500 cycles, and let the incoming wave have a frequency of 500,000 cycles. Then what is known as a beat note will actuate the phones, this being of a frequency equal to the difference between 500,000 cycles and 499,000 cycles, or a 500-cycle audio-frequency note. This method probably necessitates a special re-

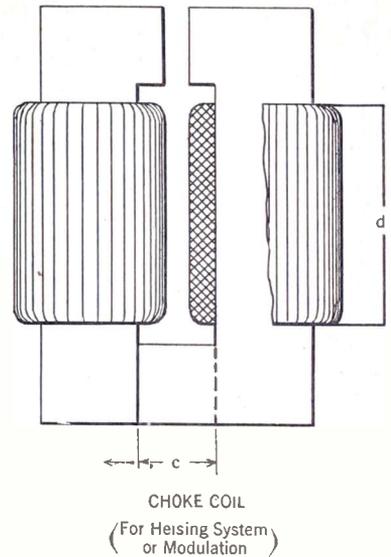


FIG. 6, showing the heavy choke coil for use with the Heising System of Modulation. There are 3,000 turns of No. 28 enameled wire used for the 5 watt tube, for the 50 watt, use No. 24 enameled wire and same number of turns as 5 watt. The width of the air-gap ranges from 1/32" to 3/32". The core dimensions for the 5 watt tube are 2x1", for the 50 watt, 3 1/2x1 1/2". The core is No. 26, silicon-steel lamination. (This is called "X" in last week's diagram.)

ceiver, but as for the transmitting end it is much better so far as distance is concerned, than the other method, which is on the same style as the old "spark" transmitters, except that the wave is a bit sharper.

The ICW method of transmission is clearly illustrated in Fig. 5. Here the radio-frequency output is broken up into little bars, at an audio-frequency rate, and in a musical tone. No doubt many fans have heard the "hams" on the air with this type of transmitter, as this is easily picked out from the other types, because each set has its particular musical note. In Fig. 5 we use a buzzer connected in series with the antenna and which modulates the current. Some hams prefer to use a chopper, which is nothing more than a motor which has on its shaft a commutator, having a certain number of copper slots, each insulated from each other. A piece of copper makes contact with these commutator slots. The motor is then set to go. The motor revolves at a rate so as to produce a musical note at the receiving end. This method is expensive and very undesirable in the home, as there is a lot of noise produced. The peculiar note resulting is often heard in the broadcast receivers, you will often hear the note start low and then go all the way up to a very high-pitched note due to the fact that the motor does not immediately start with great speed. It usually takes about 50 to 70 seconds for the motor to get at its regular speed. This method is used only where extremely high power is desired. The buzzer will work very well with a 5 or 50-watt tube, although the higher is likely to cause the buzzer to be irregular and produce an unmusical note. This is caused by the overloading of the little buzzer, which is only made to stand a certain load. This is all there is of im-

(Continued on page 28)

The Pressley as a Portable

ONE of the most popular of Super-Heterodynes, the Pressley, is well adapted to portable use. The photos show the set of Rossiter, Tyler & McDonell, Inc., consulting radio engineers, of 136 Liberty St., New York City.

The marvelous feats of this set, its compactness and the wonderful volume and selectivity, combine to afford the highest virtues. Fig. 2 shows how the front of the portable set looks when completed.

This set was put to very exhaustive tests by members of RADIO WORLD's staff. The receiver was turned on in the general executive offices of RADIO WORLD, which are

in a heavily shielded district. The volume from the set was loud enough to be heard through partitions. The cover of the case, in which the set is installed, was then closed, and the complete receiver was then carried into Broadway, still working. One of the members of the staff carried the set as he walked up and down Broadway amid Saturday afternoon crowds. The music could be clearly heard by people in the street 50 feet away from the set. A great crowd stopped to hear the concert and many marveled at the wonderful clarity and volume which was pouring forth from the Musicone speaker in the set.

The set was now taken into the New York "Times" building. As soon as it was placed here the volume decreased about 50%, due to the steel in the beams. When the set was put into the solid brass-enclosed elevator, there was not a murmur, due to complete shielding. The set

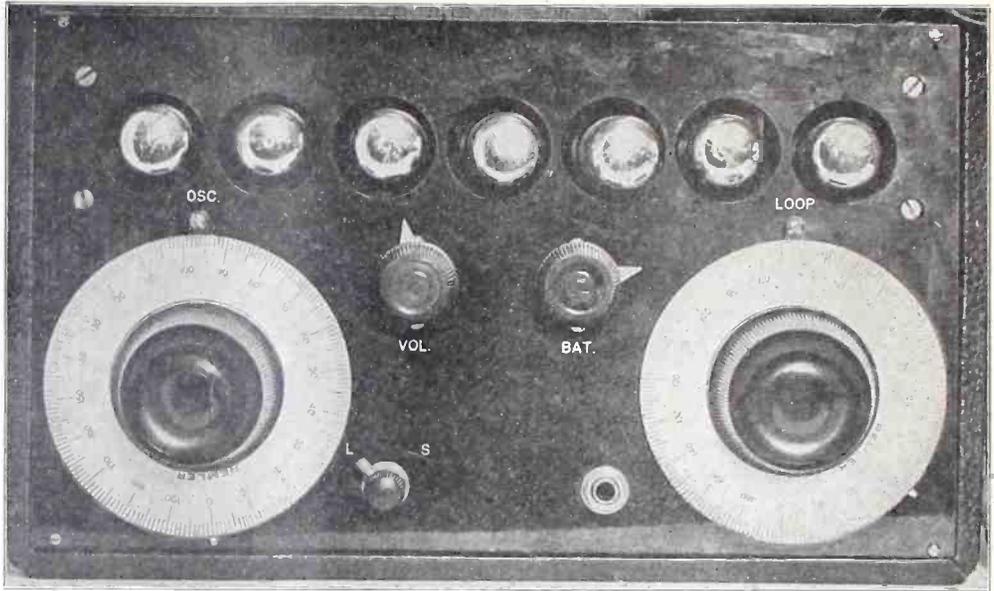


FIG. 1, showing a closeup of the front of the panel of the Portable Pressley Super-Heterodyne. Note how neatly and carefully the panel was laid out. The jack used here is of the filament control type. The panel is 12" in length and 7" in height, the photo being one-half scale. (Wide World.)

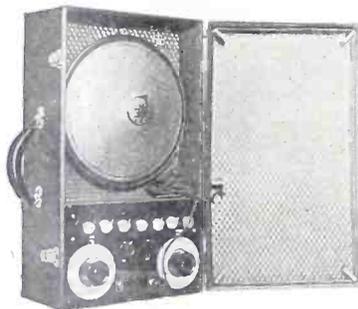


FIG. 2, how the whole set looks when the case is opened up. The coil antenna is in the cover at the right-hand side of the picture. The batteries are placed in the back of the receiver. Note the novel way in which the Crosley Musicone speaker was installed in the case. The set was in operation when this picture was taken.

was taken off at the ninth floor, where it offered some real scientific data to those conducting the tests. As the set was passed through the hall the volume decreased and increased by turns. The set was then put right next to where a steel beam was known to be present. Not a sound came forth from the speaker. It was then moved no more than one foot and the volume shot up to maximum. This certainly proved that steel absorbs radio signals, and answers a lot of queries as to why such and such a receiver will not work here and yet work in another place. Almost every beam in the building was picked out with this set, using the above method, and the results were verified mechanically.

The UV199 tubes are used throughout the set. To tune the set, two Ramler variable condensers are used. The coil antenna is in the cover of the case, which is turned for directional effect.

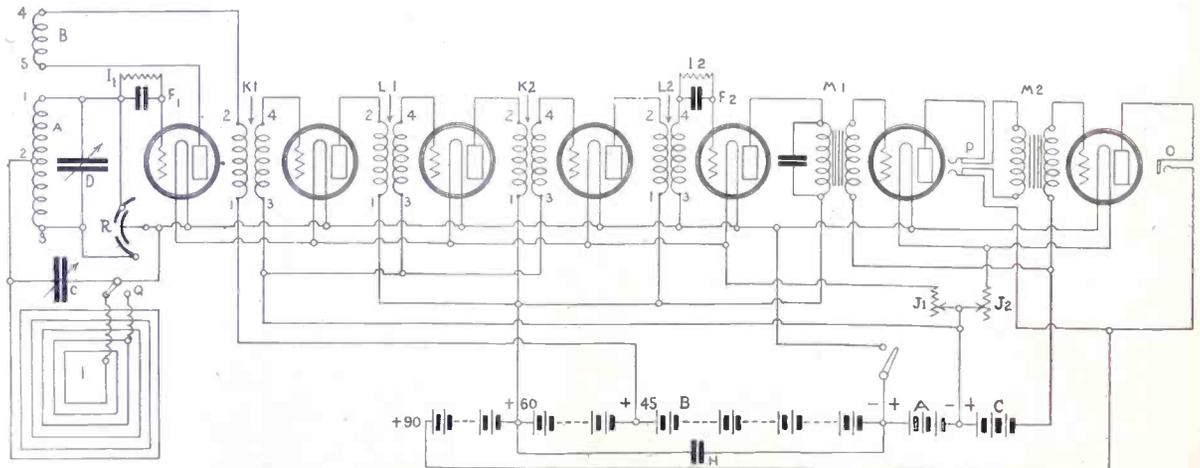


FIG. 3, the electrical diagram of the Pressley Super-Heterodyne. This is exactly the same fundamental circuit as used in the portable receiver. The filament wiring differs slightly. There is no filament control jack in the diagram, but instead there is a double circuit jack in the output of the first audio stage and a single circuit jack for the output of the second audio stage. For portable use the filament jack is to be preferred and is only in the last stage. There are three taps on the loop as you see on the diagram, these being designated on the front of the panel by the switch, which is labeled L and S. The Sangamo Pressley Super-Heterodyne kit is used.

WHY KDKA IS A PUZZLE ON HF BELT

WASHINGTON.

REBROADCASTING experiments now in progress on short waves (high-frequencies) may make possible in the near future an international exchange of programs. Recently there was announcement that radio programs will be exchanged between Berlin and New York. On several occasions British programs have been picked up and rebroadcast in the United States.

The greatest success with rebroadcasting has been on short waves, below 100 meters. At present several stations are using short wavelengths for the regular transmission of programs to distant points for rebroadcasting purposes. A number of other stations are experimenting with the short waves to determine their possibilities.

There are definite wave bands reserved exclusively for rebroadcasting purposes. These bands are in meters:

26.3	to 27.3
30	to 33.3
52.6	to 54.5
60	to 66.6
105	to 109

Any fan with apparatus capable of tuning in these low wavelengths may listen in on programs originally transmitted for rebroadcasting purposes.

However, there is no definite schedule showing when most of these wavelengths are used. The license which permits stations to use these wavelengths allows a great deal of latitude. The station can use almost any wavelength in the prescribed band at any time, so long as it does not interfere with others.

The reason for this latitude is that it permits experiments. For instance, a wavelength capable of satisfactory transmission and reception during the day may experience considerable static and fading

WGY First to Make Public Definite Programs of Work Done on the Short Waves

THE air of secrecy surrounding the short-wave work of the stations is being purified by a little publicity. WGY, Schenectady, N. Y., is the first to take pains to inform the public when they should listen in and on what wave. This is much to its credit, as there seemed to exist a conspiracy of silence on this subject, exposed in a recent editorial in RADIO WORLD. The WGY announcement:

"All programs of WGY, Schenectady, may now be found on four wavelengths. Experimenters in the field of radio are thus afforded an opportunity to compare the same program under similar conditions but with differences in power and frequency. "Evening programs of the General Electric Company's eastern station (WGY) are going out on four channels as follows:

WGY, 379.5 meters. 2XX, 109 meters.
2XAF, 38 meters. 2XAH, 1,660 meters.

"The last three groups of call letters are special experimental licenses of the General Electric Company.

"In broadcasting on higher and lower wavelengths than those provided in the band assigned by the government to broadcasting stations the General Electric radio engineers are pursuing an exhaustive research into the problem of transmission under all conditions of service, daylight and dark, summer and winter, under various degrees of power and with a variety of antenna arrangement.

"Radio fans who are equipped to receive the higher and lower wavelengths are asked to report to the engineers on their reception with particular reference to quality, fading and strength of signal on different wavelengths. For example, if the signal on the 38-meter wavelength rides through clearly while the 379.5 signal of WGY is blasted by static or smothered by fading, the engineers will be very much interested in knowing about it. Your report may become an important factor to them in solving some of the many perplexing problems of radio transmission.

"Stations 2XAF, 2XX and 2XAH are located at the transmission laboratory of the General Electric Company, three miles from the city of Schenectady. This 54-acre tract contains a total of thirteen buildings, five of which are used to house transmitting equipment, four for power machinery and the remaining four contain the tuning coils for the antenna systems."

It probably required some courage for WGY to break away from the old fogies' rule of silence and invite fan co-operation and reports, as suggested in the editorial. Now let all of the others follow suit, as well as they can. Some can not give out the information so sure-footedly because of varying use of waves.

Kodel to Use Short-Waves From Expurgated Rum Yacht

A RUM-RUNNER confiscated off the Atlantic coast has been purchased by Clarence E. Ogden, president of the Kodel Radio Corporation. It will be used on the Ohio River for broadcasting concerts, boat races and other features from towns between New Orleans and Pittsburgh.

The rum yacht, formerly the Betty Marie, was shipped to Cincinnati this week by train. It will be skidded into the river and moored behind the Kodel factory, East Pearl Street.

The boat is a 37-foot cabin cruiser, equipped with a galley, sleeping accommodations for 12 persons, and carries a powerful engine. When captured, the yacht was laden with liquor which according to Ogden, has been entirely removed.

Wishing to experiment with short-wave lengths Ogden will apply for a license to

operate a 20-to 30-watt transmitter on waves from 40 to 80 meters.

The boat will carry storage batteries sufficient to give 700 volts. Four 10-watt tubes will enable the broadcasting of voice or music over a range of 500 miles.

Collapsible antenna masts 25 feet high will be built especially for the river broadcasting station, the first of its kind in the middle west.

Rebroadcasting from WKRC will be one of the features. The concert sent from the boat or a river town will be picked up at the Alms Hotel and amplified into the transmitter of WKRC, which will rebroadcast with 1,000 watts power on a longer wavelength.

It is probable that operation of "radio boat" will not begin until late summer, as a special compact transmitter must be assembled.

during the night, while on some other wavelength conditions may be absolutely reversed.

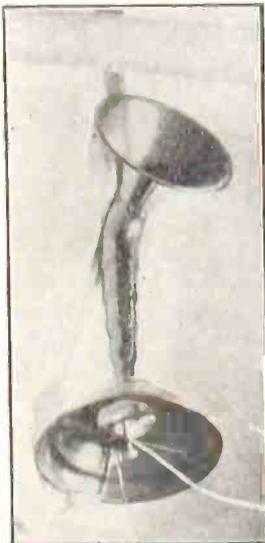
By experimenting, stations can determine which wavelength is best for night use, which is best for day use, and which is best for use both day and night.

Two stations, KDKA, Pittsburgh, and WAHG, Richmond Hill, N. Y., are doing regular short-wave rebroadcasting. KDKA, which transmits its programs to KFKX, Hastings, Neb., for rebroadcasting, does not use any regular short wave for this purpose. Fans who desire to pick up these short-wave broadcasts may have to go over the entire short wave band before locating the transmissions.

The Grebe station does not actually broadcast on short waves. Connected

with the station, however, are two short-wave portable transmitters. One of these, which picks up programs where they cannot be reached by land wires and forwards them to the main station, operates on 63 meters. The other portable operates on 236 meters and is used to pick up sporting events, such as baseball or football games at the field, and transmit them to the main station for rebroadcasting.

Predictions are that next year will witness the inauguration of regular short-wave exchange of programs between American and foreign stations. Fans who desire to experiment in attempting to pick up short-wave transmissions are advised to begin immediately to construct apparatus capable of tuning in the low wavelengths.



A MAKE-SHIFT often is the best one can have on vacation, so an ordinary telephone in the base of a tin horn serves as a speaker. If the horn gets busted you're out all of 75 cents.

THE KEY TO THE AIR

KEY

Abbreviations: EST, Eastern Standard Time; CST, Central Standard Time; MST, Mountain Standard Time; PST, Pacific Standard Time; DS, Daylight Saving Time.

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

If you are in	And want a station in	Subtract	Add
EST	EST	..	1 hr.
EST	MST	..	2 hrs.
EST	PST	..	3 hrs.
CST	EST	1 hr.	..
CST	MST	..	1 hr.
CST	PST	..	2 hrs.
MST	EST	2 hrs.	..
MST	MST	1 hr.	..
MST	PST	1 hr.	..
PST	EST	3 hrs.	..
PST	CST	2 hrs.	..
PST	DST	1 hr.	..

If you are under DST and the station you want is under that time, too, or if both are under ST, the above table will hold.

If you are under DST, and the station operates under ST, add one hour to the table result.

If the station uses DST, and you are under ST, subtract one hour from the table result.

FRIDAY, JULY 3

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12
 WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 to 1:05 PM; 8 to 12 PM.
 WAMD, Minneapolis, Minn., 243.8 (CST)—12 to 1 PM; 10 to 12.
 WBBM, Chicago, Ill., 226 (CST)—8 to 10 PM.
 WBBR, New York City, 272.6 (ESTDS)—8 PM to 10.
 WBOQ, Richmond Hill, N. Y., 236 (ESTDS)—7:30 PM to 11:30.
 WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM to 11.
 WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12 M; 1:30 to 4; 5:30 to 10.
 WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—12:30 to 1:30 PM; 4:30 to 5:30; 6:30 to 11.
 WDAF, Kansas City, Kansas, 365.6 (CST)—3:30 to 7 PM; 8 to 10; 11:45 to 1 AM.
 WFAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 11 to 12; 4 PM to 5; 6 to 12.
 WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 3:30 to 4:10; 8 to 11.
 WEAQ, Ohio State University, 293.9 (EST)—8 PM to 10.
 WEEI, Boston, Mass., 476 (ESTDS)—6:45 AM to 7:45; 2 PM to 3:15; 5:30 to 10.
 WEMC, Berrien Springs, Mich., 286 (CST)—9 PM to 11.
 WFAA, Dallas, Texas, 475.9 (CST)—10:30 AM to 11:30; 12:30 PM to 1; 2:30 to 6; 6:45 to 7; 8:30 to 9:30.
 WFBH, New York City, 272.6 (ESTDS)—2 PM to 6.
 WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 PM to 4; 6 to 11.
 WGPC, New York City, 252 (ESTDS)—8 PM to 11.
 WGES, Chicago, Ill., 250 (CSTDS)—5 PM to 7; 10:30 to 1 AM.
 WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 5:30 to 11:30.
 WGR, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:45 PM; 7:30 to 11.
 WGY, Schenectady, N. Y., 379.5 (EST)—1 PM to 2; 5:30 to 10:30.
 WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 11:30; 6 PM to 8.
 WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
 WBN, New York City, 360 (ESTDS)—12:30 PM to 1; 2:15 to 5; 7 to 11; 12 to 12:30 AM.
 WHO, Des Moines, Iowa, 526 (CST)—7 PM to 9; 11 to 12; 12:30 to 1:30; 4:30 to 5:30; 6:30 to 9:30.
 WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 8:45 to 10:05; 10:30 to 1 AM.
 WIP, Philadelphia, Pa., 508.2 (ESTDS)—7 AM to 8; 1 PM to 2; 3 to 4:50; 6 to 8.
 WJY, New York City, 405 (ESTDS)—7:30 PM to 11:30.
 WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 6; 7 to 10:30.
 WLIT, Philadelphia, Pa., 395 (EST)—12:02 PM to 12:30; 2 to 3; 4:30 to 6; 7:30 to 1 AM.
 WLW, Cincinnati, O., 422.3 (EST)—10:45 AM to 12:15; 1:30 PM to 2:30.
 WOR, New York City, 341 (ESTDS)—3 PM to 3:45; 4 to 5; 6:30 to 10:30; 11 to 12.
 WNYC, New York City, 526 (ESTDS)—3:45 PM to 4:45; 6:20 to 11.
 WOAW, Omaha, Neb., 526 (CST)—12:30 PM to 1; 5:45 to 7:10; 9 to 11.
 WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 3 to 3:30; 5:45 to 12.
 WOR, Newark, N. J., 415 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 4; 6:05 to 7.
 WPAK, Fargo, N. D., 283 (CST)—7:30 PM to 9.
 WPG, Atlantic City, N. J., 299.8 (ESTDS)—7 PM to 8:30; 10 to 12.

WQJ, Chicago, Ill., 448 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 2 AM.
 WRC, Washington, D. C., 469 (EST)—4:30 PM to 5; 6:45 to 12.
 WRNY, New York City, 258.5 (ESTDS)—11:59 to 2 PM; 7:59 to 9:45.
 WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30; 3 to 4; 6 to 7; 8 to 10.
 WKDA, Pittsburgh, Pa., 309 (EST)—6 AM to 7; 9:45 to 12:20 PM; 1:30 to 3:20; 3:30 to 11.
 KFAE, State College of Wash., 348.6 (PST)—7:30 PM to 9.
 KFDY, Brookings, S. D., 273 (MST)—8 PM to 9.
 KFI, Los Angeles, Cal., 467 (PST)—5 PM to 10.
 KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 9:30 to 12.
 KFNF, Shenandoah, Iowa, 268 (CST)—12:15 PM to 1:15; 3 to 4; 6:30 to 10.
 KFOA, Seattle, Wash., 455 (PST)—12:30 PM to 1:30; 4 to 5:15; 6 to 11.
 KGO, Oakland, Cal., 361.2 (PST)—11:10 AM to 1 PM; 1:30 to 3; 4 to 7.
 KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30 PM; 5 to 11.
 KHJ, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 3:30 PM; 5:30 to 11:30.
 KNX, Hollywood, Cal., 337 (PST)—11:30 AM to 12:30 PM; 1 to 2; 4 to 5; 6:30 to 12.
 KOB, State College of New Mexico, 348.6 (MST)—11:55 AM to 12:30 PM; 7:30 to 8:30; 9:55 to 10:10.
 KPO, San Francisco, Cal., 429 (PST)—7:30 AM to 8; 10:30 to 12 M; 1 PM to 2; 4:30 to 11.
 KSD, St. Louis, Mo., 545.1 (CST)—4 PM to 5.
 KTHS, Hot Springs, Ark., 374.8 (CST)—12:30 PM to 1; 8:20 to 10.
 KYW, Chicago, Ill., 536 (CSTDS)—6:30 AM to 7:30; 10:55 to 1 PM; 2:25 to 3:30; 6:02 to 7:20; 9 to 1:30 AM.
 CNRA, Moncton, Canada, 313 (EST)—8:30 PM to 10:30.
 CNEE, Edmonton, Canada, 516.9 (MST)—8:30 PM to 10:30.
 CNRS, Saskatoon, Canada, 400 (MST)—2:30 PM to 3.
 CNRT, Toronto, Canada, 357 (EST)—6:30 PM to 11.

SATURDAY, JULY 4

WAAM, Newark, N. J., 263 (EST)—7 PM to 11.
 WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 to 2 AM.
 WAMD, Minneapolis, Minn., 243.8 (CST)—12 M to 1 PM; 10 to 12.
 WBBM, Chicago, Ill., 226 (CST)—8 PM to 1 AM.
 WBBR, New York City, 272.6 (ESTDS)—8 PM to 9.
 WBZ, Springfield, Mass., 333.1 (ESTDS)—11 AM to 12:30 PM; 7 to 9.
 WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—10:45 AM to 12 M; 3 PM to 4; 6:30 to 7:30.
 WCBZ, Zion, Ill., 344.6 (CST)—8 PM to 10.
 WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12:30 PM; 2:30 to 5; 6 to 10.
 WFAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 4 PM to 5; 6 to 12.
 WEEI, Boston, Mass., 476 (ESTDS)—6:45 AM to 7 AM.
 WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 3:30 to 4:10; 7 to 8.
 WEMC, Berrien Springs, Mich., 286 (CST)—11 AM to 12:30 PM; 8:15 to 11.
 WFAA, Dallas, Texas, 475.9 (CST)—12:30 PM to 1; 6 to 7; 8:30 to 9:30; 11 to 12:30 AM.
 WFBH, New York City, 272.6 (ESTDS)—2 PM to 7:30; 11:30 to 12:30 AM.
 WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 PM to 3; 6 to 12.
 WGN, Chicago, Ill., 370 (CST)—9:31 AM to 2:30 PM; 3 to 5:57; 6 to 11:30.
 WGR, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:45 PM; 2:30 to 4:30; 7:30 to 8.
 WGY, Schenectady, N. Y., 379.5 (EST)—7:30 PM to 10.
 WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 11:30; 6 PM to 8.
 WHN, New York City, 360 (ESTDS)—2:15 PM to 5; 7:30 to 10.
 WHO, Des Moines, Iowa, 526 (CST)—11 AM to 12:30 PM; 4 to 5:30; 7:30 to 8:30.
 WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 AM.
 WIP, Philadelphia, Pa., 508.2 (ESTDS)—7 AM to 8; 10:20 to 11; 1 PM to 3 to 4; 6 to 11:30.
 WJY, New York City, 405 (ESTDS)—2:30 PM to 5; 8 to 10:30.
 WJZ, New York City, 455 (ESTDS)—9 AM to 12:30 PM; 2:30 to 4; 7 to 10.
 WKRC, Cincinnati, O., 326 (EST)—10 to 12 M.
 WLW, Cincinnati, O., 422.3 (EST)—9:30 AM to 12:30 PM; 7:30 to 10.
 WMAK, Lockport, N. Y., 265.5 (EST)—10:29 AM to 12:30 PM.
 WMAA, New York City, 341 (ESTDS)—3 PM to 3:15; 3:30 to 5; 8 to 8:15; 8:30 to 8:45; 11 to 1 AM.
 WNYC, New York City, 526 (ESTDS)—1 PM to 3; 7 to 11.
 WOAW, Omaha, Neb., 526 (CST)—9 AM to 11; 2:15 PM to 4; 9 to 11.
 WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 5:45 to 7:10; 9 to 12.
 WOO, Philadelphia, Pa., 308.3 (ESTDS)—11 AM to 1 PM; 4:30 to 5; 10:35 to 11:05.
 WOR, Newark, N. J., 485 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 5; 6:15 to 7:30; 8 to 11.
 WQJ, Chicago, Ill., 448 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 3 AM.
 WRC, Washington, D. C., 469 (EST)—4:30 to 5:30 PM; 6:45 to 12.
 WRNY, New York City, 258.5 (ESTDS)—11:59 to 2 PM; 7:59 to 9:30; 12 M to 1 AM.
 WKDA, Pittsburgh, Pa., 309 (EST)—10 AM to 12:30 PM; 1:30 to 6:30; 8:45 to 10.
 KFI, Los Angeles, Cal., 467 (PST)—5 PM to 11.
 KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 9:30 to 12:30.

KFNF, Shenandoah, Iowa, 268 (CST)—12:15 PM to 1:15; 3 to 4; 6:30 to 10:30.
 KFOA, Seattle, Wash., 455 (PST)—Silent.
 KGO, Oakland, Cal., 361.2 (PST)—11 AM to 12:30 PM; 3:30 to 5:45; 7:30 to 9.
 KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30 PM; 6 to 7; 10 to 11.
 KHJ, Los Angeles, Cal., 405.2 (ESTDS)—7 AM to 7:30; 10 to 1:30 PM; 2:30 to 3:30; 5:30 to 2 AM.
 KNX, Hollywood, Cal., 337 (PST)—1 PM to 2; 6:30 to 2 AM.
 KOA, Denver, Colo., 322.4 (MST)—11:30 AM to 1 PM; 7 to 10.
 KPO, San Francisco, Cal., 429 (PST)—8 AM to 12 M; 2 PM to 3; 6 to 10.
 KSD, St. Louis, Mo., 545.1 (CST)—7 PM to 8:30.
 KTHS, Hot Springs, Ark., 374.8 (PST)—12:30 PM to 1; 8:20 to 10:30.
 KYW, Chicago, Ill., 536 (CSTDS)—11 AM to 12:30 PM; 4 to 5; 7 to 8.
 CKAK, Montreal, Canada, 411 (EST)—4:30 PM to 5:30.
 CRO, Ottawa, Ontario, Canada, 435 (EST)—7:30 PM to 10.
 PWX, Havana, Cuba, 400 (EST)—6:30 PM to 11:30.

SUNDAY, JULY 5

WBBM, Chicago, Ill., 226 (CST)—4 PM to 6; 8 to 10.
 WBBR, New York City, 272.6 (ESTDS)—10 AM to 12 M; 9 PM to 11.
 WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—11 AM to 12:30 PM; 4:10 to 5:10; 7:20 to 10 PM.
 WDAF, Kansas City, Kansas, 365.6 (CST)—4 PM to 5:30.
 WFAF, New York City, 492 (ESTDS)—3 PM to 5; 7:20 to 10:15.
 WEAR, Cleveland, O., 390 (EST)—3:30 PM to 5; 7 to 8; 9 to 10.
 WFBH, New York City, 272.6 (ESTDS)—5 PM to 7.
 WGBS, New York City, 316 (ESTDS)—3:30 PM to 4:30; 9:30 to 10:30.
 WGN, Chicago, Ill., 370 (CST)—11 AM to 12:45 PM; 2:30 to 5; 9 to 10.
 WGR, Buffalo, N. Y., 379.5 (EST)—9:30 AM to 7:15 to 8.
 WGY, Schenectady, N. Y., 379.5 (EST)—9:30 AM to 12:30 PM; 2:35 to 3:45; 6:30 to 10:30.
 WHAD, Milwaukee, Wis., 275 (CST)—2 PM to 3.
 WHN, New York City, 360 (ESTDS)—1 PM to 1:30; 3 to 6; 10 to 12.
 WHT, Chicago, Ill., 338 (CSTDS)—9:30 AM to 10:30 PM; 5 to 9.
 WIP, Philadelphia, Pa., 508.2 (ESTDS)—10:45 AM to 12:30 PM; 3:30 to 4.
 WKRC, Cincinnati, O., 326 (EST)—6:45 PM to 11.
 WNYC, New York City, 526 (ESTDS)—9 PM to 11.
 WMCA, New York City, 341 (ESTDS)—11 AM to 12:15 PM; 4 to 5; 7 to 8.
 WOCL, Jamestown, N. Y., 275.1 (EST)—9 PM to 11.
 WPG, Atlantic City, N. J., 299.8 (CSTDS)—3:15 PM to 5; 9 to 11.
 WQJ, Chicago, Ill., 448 (CST)—10:30 AM to 12:30 PM; 3 PM to 4; 8 to 10.
 WRNY, New York City, 258.5 (ESTDS)—3 PM to 5; 7:59 to 10.
 WWJ, Detroit, Mich., 352.7 (EST)—11 AM to 12:30 PM; 2 to 4; 6:20 to 9.
 WKDA, Pittsburgh, Pa., 309 (EST)—9:45 AM to 10:30; 11:55 to 12 M; 2:30 PM to 5:30; 7 to 11.
 KFNF, Shenandoah, Iowa, 268 (CST)—10:45 AM to 12:15 PM; 2:30 to 4:30; 6:30 to 10:30.
 KOA, Denver, Colo., 322.4 (MST)—10:55 AM to 12 M; 4 PM to 5:30; 7:45 to 10.
 KGW, Portland, Oregon, 491.5 (PST)—10:30 AM to 12:30 PM; 6 to 9.
 KHJ, Los Angeles, Cal., 405.2 (ESTDS)—10 AM to 12:30 PM; 6 to 9.
 KTHS, Hot Springs, Ark., 374.8 (CST)—11 AM to 12:30 PM; 2:30 to 3:40; 8:40 to 11.

MONDAY, JULY 6

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12 M; 7 PM to 11.
 WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 M to 1:05 PM; 8 to 2 AM.
 WAMD, Minneapolis, Minn., 243.8 (CST)—10 PM to 12.
 WBBM, Chicago, Ill., 226 (CST)—6 PM to 7.
 WBBR, New York City, 272.6 (ESTDS)—8 PM to 9.
 WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM to 11:30.
 WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—12:30 PM to 1:30; 4:30 to 5:30; 6:30 to 12.
 WCBZ, Zion, Ill., 344.6 (CST)—8 PM to 10.
 WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12 M; 1:30 PM to 6:15; 8 to 10.
 WDAF, Kansas City, Kansas, 365.6 (CST)—3:30 PM to 7; 8 to 10; 11:45 to 1 AM.
 WFAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 4 PM to 5; 6 to 11:30.
 WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 3:30 to 4:10; 7 to 8.
 WEEI, Boston, Mass., 476 (ESTDS)—6:45 AM to 8; 3 PM to 4; 5:30 to 10.
 WEMC, Berrien Springs, Mich., 286 (CST)—8:15 PM to 11.
 WFAA, Dallas, Texas, 475.9 (EST)—10:30 AM to 11:30; 12:30 PM to 1; 2:30 to 6; 6:45 to 7; 8:30 to 9:30.
 WFBH, New York City, 272.6 (ESTDS)—2 PM to 6:30.
 WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 PM to 3:10; 6 to 7:30.
 WGN, Chicago, Ill., 370 (CST)—9:31 AM to 2:30 PM; 3 to 5:57; 6 to 11:30.
 WGR, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:45 PM; 2:30 to 4:30; 7:30 to 8.
 WGY, Schenectady, N. Y., 379.5 (EST)—7:30 PM to 10.
 WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 11:30; 6 PM to 8.
 WHN, New York City, 360 (ESTDS)—2:15 PM to 5; 7:30 to 10.
 WHO, Des Moines, Iowa, 526 (CST)—11 AM to 12:30 PM; 4 to 5:30; 7:30 to 8:30.
 WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 AM.
 WIP, Philadelphia, Pa., 508.2 (ESTDS)—7 AM to 8; 10:20 to 11; 1 PM to 3 to 4; 6 to 11:30.
 WJY, New York City, 405 (ESTDS)—2:30 PM to 5; 8 to 10:30.
 WJZ, New York City, 455 (ESTDS)—9 AM to 12:30 PM; 2:30 to 4; 7 to 10.
 WKRC, Cincinnati, O., 326 (EST)—10 to 12 M.
 WLW, Cincinnati, O., 422.3 (EST)—9:30 AM to 12:30 PM; 7:30 to 10.
 WMAK, Lockport, N. Y., 265.5 (EST)—10:29 AM to 12:30 PM.
 WMAA, New York City, 341 (ESTDS)—3 PM to 3:15; 3:30 to 5; 8 to 8:15; 8:30 to 8:45; 11 to 1 AM.
 WNYC, New York City, 526 (ESTDS)—1 PM to 3; 7 to 11.
 WOAW, Omaha, Neb., 526 (CST)—9 AM to 11; 2:15 PM to 4; 9 to 11.
 WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 5:45 to 7:10; 9 to 12.
 WOO, Philadelphia, Pa., 308.3 (ESTDS)—11 AM to 1 PM; 4:30 to 5; 10:35 to 11:05.
 WOR, Newark, N. J., 485 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 5; 6:15 to 7:30; 8 to 11.
 WQJ, Chicago, Ill., 448 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 3 AM.
 WRC, Washington, D. C., 469 (EST)—4:30 to 5:30 PM; 6:45 to 12.
 WRNY, New York City, 258.5 (ESTDS)—11:59 to 2 PM; 7:59 to 9:30; 12 M to 1 AM.
 WKDA, Pittsburgh, Pa., 309 (EST)—10 AM to 12:30 PM; 1:30 to 6:30; 8:45 to 10.
 KFI, Los Angeles, Cal., 467 (PST)—5 PM to 11.
 KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 9:30 to 12:30.

WGCP, New York City, 252 (ESTDS)—8 PM to 1 A.M.
 WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 3:30 to 5:57.
 WGR, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:30 PM; 2:30 to 4:30; 7:30 to 11.
 WGY, Schenectady, N. Y., 379.5 (EST)—1 PM to 2:5; 5:30 to 8:30.
 WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 12:30 PM; 2 to 10:30.
 WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
 WHN, New York City, 360 (ESTDS)—2:15 PM to 5; 6:30 to 12.
 WHO, Des Moines, Iowa, 526 (CST)—12:15 PM to 1:30; 7:30 to 9; 11:15 to 12.
 WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 A.M.
 WIP, Philadelphia, Pa., 508.2 (ESTDS)—7 AM to 8; 1 PM to 2; 3 to 4:50; 5 to 11.
 WJY, New York City, 405 (ESTDS)—7:30 PM to 1:30.
 WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 6; 7 to 11.
 WKRC, Cincinnati, O., 326 (EST)—8 PM to 12.
 WLIT, Philadelphia, Pa., 395 (EST)—11 AM to 12:30 PM; 2 to 3; 4:30 to 7.
 WLW, Cincinnati, O., 422.3 (EST)—10:45 AM to 12:15 PM; 1:30 to 2:30; 3 to 5; 6 to 10.
 WMAK, Lockport, N. Y., 265.5 (EST)—8 PM to 12.
 WMCA, New York City, 341 (ESTDS)—3 PM to 5; 6:30 to 7:45; 8 to 12.
 WNYC, New York City, 526 (ESTDS)—3:15 PM to 4:15; 6:25 to 10.
 WOAW, Omaha, Neb., 526 (CST)—12:30 PM to 1:30; 5:45 to 10:30.
 WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 3 to 3:30; 5:45 to 6.
 WOO, Philadelphia, Pa., 508.2 (ESTDS)—11 AM to 1 PM; 4:40 to 6; 7:30 to 11.
 WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 to 4; 6:15 to 11:55.
 WPAK, Fargo, N. D., 283 (CST)—7:30 PM to 9.
 WPG, Atlantic City, N. J., 299.8 (ESTDS)—7 PM to 11.
 WQJ, Chicago, Ill., 488 (CST)—11 AM to 12 M; 3 PM to 4.
 WRC, Washington, D. C., 469 (EST)—1 PM to 2; 2; 4 to 6.
 WRNY, New York City, 258.5 (ESTDS)—11:59 AM to 2 PM; 7:30 to 11.
 WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30 PM; 3 to 4; 6 to 10.
 KDKA, Pittsburgh, Pa., 309 (EST)—6 AM to 7; 9:45 to 12:15 PM; 2:30 to 3:30; 5:30 to 10.
 KFAE, State College of Wash., 348.6 (PST)—7:30 PM to 9.
 KFI, Los Angeles, Cal., 467 (PST)—5 PM to 11.
 KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 5:15 to 6:15; 9:30 to 12:30.
 KFNF, Shenandoah, Iowa, 266 (EST)—12:15 PM to 1:15; 3 to 4; 6:30 to 10.
 KFOA, Seattle, Wash., 455 (PST)—12:45 PM to 1:30; 4 to 5:15; 6 to 10.
 KGO, Oakland, Cal., 361.2 (PST)—9 AM to 10:30; 11:30 AM to 1 PM; 1:30 to 6; 6:45 to 7; 8 to 1 A.M.
 KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30; 5 to 8.
 KHL, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 1:30 PM; 5:30 to 11.
 KNX, Hollywood, Cal., 337 (PST)—12 M to 1 PM; 2 to 4; 5 to 6; 6:30 to 12.
 KPO, San Francisco, Cal., 429 (PST)—7 AM to 7:45; 10 to 12 M; 1 PM to 2; 3:30 to 11.
 KSD, St. Louis, Mo., 541.1 (CST)—6 PM to 7.
 KTHS, Hot Springs, Ark., 374.8 (CST)—12:30 PM to 1; 8:30 to 10:30.
 KYV, Chicago, Ill., 536 (CSTDS)—6:30 AM to 7:30; 10:55 to 11 PM; 2:15 to 3:30; 6:02 to 7.

TUESDAY, JULY 7

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12 M; 7 PM to 11.
 WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 PM to 1:05 AM.
 WAMB, Minneapolis, Minn., 243.8 (CST)—12 M to 1 PM; 10 to 12.
 WBBM, Chicago, Ill., 226 (CST)—8 PM to 12.
 WBOQ, Richmond Hill, N. Y., 316 (ESTDS)—3:30 PM to 6:30.
 WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM to 11.
 WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—12:30 PM to 1:30; 4:30 to 5:30; 6:30 to 11.
 WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12 M; 1:30 PM to 4; 5:30 to 10.
 WDAF, Kansas City, Kansas, 365.6 (CST)—3:30 PM to 7; 11:45 to 1 A.M.
 WEAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 11 to 12 M; 4 PM to 5; 6 to 12.
 WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 7 to 10; 10 to 11.
 WEEL, Boston, Mass., 476 (ESTDS)—6:45 AM to 8; 1 PM to 2; 6:30 to 10.
 WFAA, Dallas, Texas, 475.9 (CST)—10:30 AM to 11:30; 12:30 PM to 1; 2:30 to 6; 6:45 to 7; 8:30 to 9:30; 11 to 12.
 WFBH, New York City, 272.6 (ESTDS)—2 PM to 6:30; 11:30 to 12:30 AM.
 WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 PM to 3; 6 to 11:30.
 WGES, Chicago, Ill., 250 (CSTDS)—5 PM to 8; 10:30 to 1 A.M.
 WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 5:30 to 11:30.
 WGR, Buffalo, N. Y., 319 (ESTDS)—11 AM to 12:45 PM; 2:30 to 4:30; 6:30 to 11.
 WGY, Schenectady, N. Y., 379.5 (EST)—11 PM to 2:30; 5:20 to 7:30; 9 to 11:30.
 WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 11:30; 6 PM to 7; 11:30 to 12:30 AM.
 WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
 WHN, New York City, 360 (ESTDS)—12:30 PM to 1; 2:15 to 3:15; 4 to 5:30; 7:30 to 10:45; 11:30 to 12:30 AM.

WHO, Des Moines, Iowa, 526 (CST)—12:15 PM to 1:30; 7:30 to 9; 11 to 12.
 WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 A.M.
 WIP, Philadelphia, Pa., 508.2 (ESTDS)—7 AM to 8; 1 PM to 2; 3 to 4:50; 5 to 11.
 WJY, New York City, 405 (ESTDS)—7:30 PM to 1:30.
 WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 6; 7 to 11.
 WKRC, Cincinnati, O., 326 (EST)—8 PM to 12.
 WLIT, Philadelphia, Pa., 395 (EST)—11 AM to 12:30 PM; 2 to 3; 4:30 to 7.
 WLW, Cincinnati, O., 422.3 (EST)—10:45 AM to 12:15 PM; 1:30 to 2:30; 3 to 5; 6 to 11.
 WMCA, New York City, 341 (ESTDS)—3 PM to 4:15; 5 to 7:15; 7:30 to 10:30; 11 to 12.
 WNYC, New York City, 526 (ESTDS)—3:45 PM to 5; 6:50 to 11.
 WOAW, Omaha, Neb., 526 (CST)—12:30 PM to 1:30; 5:45 to 11.
 WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 3 to 3:30; 5:45 to 10.
 WOO, Philadelphia, Pa., 508.2 (ESTDS)—11 AM to 1 PM; 4:40 to 5; 10:55 to 11:02.
 WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 4; 6:15 to 7:30.
 WPG, Atlantic City, N. J., 299.8 (ESTDS)—7 PM to 11.
 WQJ, Chicago, Ill., 488 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 2 A.M.
 WRC, Washington, D. C., 469 (EST)—4:30 PM to 5:30; 6:45 to 11.
 WRNY, New York City, 258.5 (ESTDS)—11:59 AM to 2 PM; 4:30 to 5; 8 to 11.
 WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30 PM; 3 to 4; 6 to 10.
 KDKA, Pittsburgh, Pa., 309 (EST)—9:45 PM to 12 M; 1:30 PM to 5:30; 7:30 to 10:45.
 KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 5:15 to 6:15; 9:30 to 12:30.
 KFOA, Seattle, Wash., 455 (PST)—12:30 PM to 1:30; 4 to 5:15; 6 to 11.
 KGO, Oakland, Cal., 361.2 (PST)—11:30 AM to 1 PM; 1:30 to 3; 4 to 6:45; 8 to 1 A.M.
 KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30 PM; 5 to 10.
 KHL, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 1:30 PM; 5:30 to 11.
 KNX, Hollywood, Cal., 337 (PST)—9 AM to 10; 1 PM to 2; 4 to 5; 6:30 to 12.
 KPO, San Francisco, Cal., 429 (PST)—7 AM to 7:45; 10 to 12 M; 1 PM to 2; 3:30 to 11.
 KSD, St. Louis, Mo., 541.1 (CST)—6 PM to 7.
 KTHS, Hot Springs, Ark., 374.8 (CST)—12:30 PM to 1; 8:30 to 10:30.
 KYV, Chicago, Ill., 536 (CSTDS)—6:30 AM to 7:30; 10:30 to 11 PM; 2:15 to 4; 6:02 to 11:30.

WEDNESDAY, JULY 8

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12 M; 7 PM to 11.
 WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 M to 1:05 PM; 8 to 12.
 WAMB, Minneapolis, Minn., 243.8 (CST)—12 M to 1 PM; 10 to 12.
 WBBM, Chicago, Ill., 226 (CST)—8 PM to 10.
 WBOQ, Springfield, Mass., 333.1 (ESTDS)—6 PM to 11.
 WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—12:30 PM to 1:30; 4:30 to 5:30; 6:30 to 11.
 WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12 M; 1:30 to 4; 5:30 to 10.
 WDAF, Kansas City, Kansas, 365.6 (CST)—3:30 PM to 7; 11:45 to 1 A.M.
 WEAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 11 to 12 M; 4 PM to 5; 6 to 12.
 WEAO, Ohio State University, 293.9 (EST)—8 PM to 10.
 WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 3:30 to 4:10; 6:30 to 7:45.
 WEEL, Boston, Mass., 476 (ESTDS)—6:45 AM to 8; 3 PM to 4; 5:30 to 10.
 WEMC, Berrien Springs, Mich., 286 (CST)—8:15 PM to 11.
 WFAA, Dallas, Texas, 475.9 (CST)—10:30 AM to 11:30; 12:30 PM to 1.
 WFBH, New York City, 272.6 (ESTDS)—2 PM to 7:30; 12 M to 1 A.M.
 WGCP, New York City, 252 (ESTDS)—8 PM to 11.
 WGF5, Chicago, Ill., 250 (CSTDS)—5 PM to 7; 10:30 to 1 A.M.
 WGRS, New York City, 316 (ESTDS)—10 AM to 11 PM; 1:30 to 4; 6 to 7.
 WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 5:30 to 11:30.
 WGR, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:45 PM; 2:30 to 4:30; 6:30 to 11.
 WGY, Schenectady, N. Y., 379.5 (CST)—5:30 PM to 7:30.
 WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 11:30; 4 PM to 5; 6 to 10; 11:30 to 12:30 AM.
 WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
 WHN, New York City, 360 (ESTDS)—2:15 PM to 5; 7:30 to 11; 11:30 to 12:30 AM.
 WHO, Des Moines, Iowa, 526 (CST)—12:15 PM to 1:30; 6:30 to 12 M.
 WHT, Chicago, Ill., 238 and 400 (CSTDS)—11 AM to 1 PM (238 meters); 7 to 8:30 (400 meters); 8:45 to 10:05 (238 meters); 10:30 to 1 A.M. (400 meters).
 WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 A.M.
 WIP, Philadelphia, Pa., 508 (ESTDS)—7 AM to 8; 10:20 to 11; 1 PM to 2; 3 to 4; 6 to 8.
 WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 6; 7 to 11:30.
 WKRC, Cincinnati, Ohio, 326 (EST)—8 PM to 10.
 WLIT, Philadelphia, Pa., 395 (EST)—12:02 PM to 12:30; 2 to 3; 4:30 to 6; 7:30 to 9.

WLW, Cincinnati, O., 422.3 (EST)—10:45 AM to 12:15 PM; 1:30 to 2:30; 3 to 5; 6 to 11.
 WMCA, New York City, 341 (ESTDS)—3 PM to 3:45; 4 to 5; 6:30 to 12.
 WNYC, New York City, 526 (ESTDS)—6:30 PM to 11.
 WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 3 to 3:30; 4 to 7:05; 9 to 11.
 WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 4; 6:15 to 12 M.
 WPAK, Fargo, N. D., 283 (CST)—7:30 PM to 9.
 WPG, Atlantic City, N. J., 299.8 (EST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 2 A.M.
 WRC, Washington, D. C., 469 (EST)—1 PM to 2; 4 to 6:30.
 WRNY, New York City, 258.5 (ESTDS)—11:59 AM to 2 PM; 7:59 to 9:55.
 WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30 PM; 3 to 4; 6 to 7; 8 to 10.
 KDKA, Pittsburgh, Pa., 309 (EST)—6 AM to 7; 9:45 to 12:15 PM; 2:30 to 3:30; 5:30 to 11.
 KFAE, State College of Wash., 348.6 (PST)—7:30 PM to 9.
 KFI, Los Angeles, Cal., 467 (PST)—5 PM to 11.
 KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 5:15 to 6:15; 9:30 to 12:30.
 KFNF, Shenandoah, Iowa, 266 (EST)—12:15 PM to 1:15; 3 to 4; 6:30 to 10.
 KFOA, Seattle, Wash., 455 (PST)—12:30 PM to 1:30; 4 to 5:15; 6 to 10.
 KGO, Oakland, Cal., 361.2 (PST)—11:30 AM to 1 PM; 1:30 to 2:30; 3 to 6:45.
 KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30 PM; 5 to 10.
 KHL, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 1:30 PM; 5:30 to 12.
 KNX, Hollywood, Cal., 337 (PST)—1 PM to 2; 7 to 12.
 KOB, State College of New Mexico, 348.6 (MST)—11:55 AM to 12:30 PM; 7:30 to 8:30; 9:55 to 10:10.
 KPO, San Francisco, Cal., 429 (PST)—7 AM to 8; 10:30 to 12 M; 1 PM to 2; 4:30 to 11.
 KSD, St. Louis, Mo., 541.1 (CST)—7 PM to 10.
 KTHS, Hot Springs, Ark., 374.8 (CST)—8:30 PM to 11.
 KYV, Chicago, Ill., 536 (CSTDS)—6:30 AM to 7:30; 10:55 to 11 PM; 2:15 to 4; 6:02 to 11:30.
 PNX, Havana, Cuba, 400 (EST)—8:30 PM to 11:30 PM.
 CWRO, Ottawa, Ontario, Canada, 435 (EST)—7 PM to 11.

THURSDAY, JULY 9

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12 M; 7 PM to 11.
 WAHG, Richmond Hill, N. Y., 316 (EST)—12 PM to 1:05.
 WAMB, Minneapolis, Minn., 243.8 (CST)—12 M to 1 PM; 10 to 12.
 WBBM, Chicago, Ill., 226 (CST)—8 PM to 10.
 WBOQ, Richmond Hill, N. Y., 316 (ESTDS)—3:30 PM to 6:30.
 WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM to 11:45.
 WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—12:30 PM to 1:30; 4:30 to 5:30; 6:30 to 11.
 WBDZ, Zion, Ill., 344 (CST)—8 PM to 10.
 WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12 M; 1:30 PM to 4; 5:30 to 10.
 WEAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 11 to 12 M; 4 PM to 5; 6 to 12.
 WEAR, Cleveland, O., 390 (EST)—10:30 AM to 12:10 PM; 3:30 to 4:15; 7 to 11.
 WEEL, Boston, Mass., 476 (ESTDS)—6:45 AM to 7:45; 1 PM to 2; 2:30 to 10.
 WFAA, Dallas, Texas, 475.9 (CST)—10:30 AM to 11:30; 12:30 PM to 1; 2:30 to 6; 6:45 to 7; 8:30 to 9:30; 11 to 1 A.M.
 WFBH, New York City, 272.6 (ESTDS)—2 PM to 7:30; 12:30 to 1 A.M.
 WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 PM to 4; 6 to 7:30.
 WGES, Chicago, Ill., 250 (CSTDS)—5 PM to 8; 10:30 to 1 A.M.
 WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 5:30 to 11:30.
 WGR, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:45 PM; 2 to 4; 7:30 to 11.
 WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 11:30; 6 PM to 7; 11:30 to 12:30 AM.
 WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
 WHN, New York City, 360 (ESTDS)—2:15 PM to 5; 7:30 to 11; 11:30 to 12:30 AM.
 WHO, Des Moines, Iowa, 526 (CST)—7:30 PM to 9; 11 to 12.
 WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 A.M.
 WIP, New York City, 405 (ESTDS)—7:30 PM to 11:30.
 WJZ, New York City, 455 (ESTDS)—10 AM to 11 PM, 1 to 2; 4 to 6; 7 to 12 M.
 WLIT, Philadelphia, Pa., 395 (EST)—12:02 PM to 12:30; 2 to 3; 4:30 to 6; 8:30 to 9.
 WLW, Cincinnati, O., 422.3 (EST)—10:45 AM to 12:15 PM; 1:30 to 2; 5 to 6; 8 to 10; 11 PM.
 WMAK, Lockport, N. Y., 265.5 (EST)—11 PM to 12:45 AM.
 WMCA, New York City, 341 (ESTDS)—3 PM to 4:45; 8 to 12.
 WNYC, New York City, 526 (ESTDS)—3:15 PM to 4:15; 6:50 to 11.
 WOAW, Omaha, Neb., 526 (CST)—12:30 PM to 1:30; 5:45 to 11.
 WOC, Davenport, Iowa, 484 (CST)—12:57 AM to 2 PM; 3 to 3:30; 4 to 7:10; 9 to 11.
 WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 to 4; 6:15 to 7.
 WPAK, Fargo, N. D., 283 (CST)—7:30 PM to 9.
 WPG, Atlantic City, N. J., 299.8 (ESTDS)—7 PM to 11.
 WQJ, Chicago, Ill., 488 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 2 A.M.

(Concluded on page 24)

THE RADIO UNIVERSITY

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

I WOULD be very grateful to you if you will give me a diagram of a reflex set, using two or less dials, and having loggability property, also being able to do away with the regenerative squeal, tune-out locals and bring in DX.—S. H. Grobman, 64 Fulton St., N. Y. C.

See Capt. O'Rourke's article in this issue.

REFERRING TO Caldwell's 5-tube reflex (Dec. 6) how can I replace the antenna with a loop? (2) Will the 17-plate condensers called for reach the entire wavelength or shall I use 23-plate condensers? (3) Can three 3½-to-1 AF1 be used instead of one 6-to-1 and two 3½-to-1?—Chas. E. Oehley, Stirling, N. J.

(1) Take off the RFT and connect the loop in the following fashion: Connect the stator of the variable condenser to one end of the loop and the rotor end of the plates to the other end of the loop. That means that L1 and L2 is out of the circuit and C1 is used for tuning the loop. (2) The 17-plate condensers are O. K. (3) Yes.

I WANT to build the Diamond of the Air, 2-control, which was described in the May 23 and 30 issues of RADIO WORLD, but I am afraid I will get interference from the power house, which is directly across the street. Will I hear these noises if I use the loop? (2) Is the Acme 3-tube reflex better than the Diamond of the Air?—Henry Williams, 256 West 123rd St., N. Y. C.

(1) You no doubt will get the hum, but run an antenna at right angles to the power house lines, and also shield the antenna with a copper screen, 6" in diameter and which runs from the lead in all the way down to your house window. (2) It depends upon the manner in which the sets are built and the care exercised when tuning. It is very difficult to tell one just what set is better than another as there are too many physical as well as electrical quantities that are ratable factors.

MAY I ask a question about the Low-Loss Neutrodyne, described by Neal Fit alan, in the June 13 issue of RADIO WORLD? In placing the coils should not the coils all be mounted at right angles to each other instead of placing the coils at the extreme end parallel to each other?

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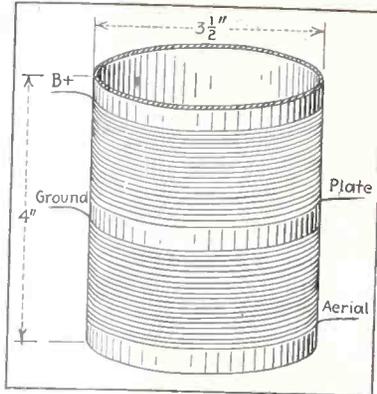


FIG. 160, showing the wrong method of connecting up a RFT. Note that the high and low potentials run together, which is wrong.

—Otto R. Vopel, 850 Rood Ave., Grand Junction, Colo.

This is a very good suggestion and will work out great, although the coils are well separated as they are.

WILL THE Pressley Super-Heterodyne, April 18 issue, work well with the UV 199 tubes? (2) Will it give sufficient volume to fill a room? (3) What size rheostat are necessary for these tubes with a 6-volt A battery?—William H. Morehouse, Thomaston, Conn.

(1) Yes. (2) Yes. (3) 50-ohm rheostats will fit the bill using a 6-volt storage battery to supply the A battery voltage.

WHAT is the wrong method of connecting up a radio-frequency transformer? —M. U. Plackman, N. Y. C., N. Y.

See Fig. 160, for the diagram. KINDLY FURNISH me with a hookup that will operate on ear phones, as well as loud speaker, and that can be attached to or enclosed in a phonograph, the panel to be of the size of the standard phonograph.—A. Bailey, 2114 Century St., Houston, Tex.

The first part of your query is answered in Mr. Grobman's question on this page. Send in the exact dimensions of the phonograph surface that you wish to put this

set in and we will be glad to give a complete panel and baseboard layout.

PLEASE GIVE me a diagram of the "Simple 1-Tube DX Set for the Novice to Build," including all data as how to wind

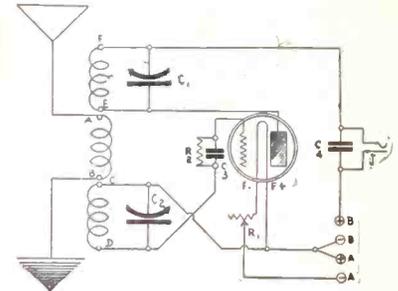


FIG. 161, showing the diagram of the 1-tube DX set. The coils F, E, A, B, C and D are wound on one tube 3" in diameter and 4" in length. There are 50 turns on the grid coil (C and D), 10 turns for the primary coil (A, B), the plate coil having 35 turns (E, F). Leave 1/2" between the windings. The variable condensers (C2 and C3) have a capacity of .0005 mfd. Use a WD 12 tube for the detector tube, and a 6-ohm rheostat for operating the same. The coil wire is No. 22 SCC.

the coils. This set was described in the May 23 issue of RADIO WORLD by Percy Warren.

See Fig. 161 for the schematic diagram.

PLEASE give data as to how to build an Ultraformer for the Ultradyne. Tony Vyliural, 345 West 4th St., Wahoo, Neb.

The primary is wound first and consists of 500 turns of No. 28 DSC wire in a center slot, which is 1/4" wide. The secondary is wound in two sections, using No. 30 DSC wire. Wind 550 turns on each side of the primary. The secondary has a total winding of 1,100 turns, the winding being continuous. In other words, the primary is wound in the center of a piece of bakelite about 6" in width and the secondary is wound on either side of the primary.

I WISH to ask you if the Bremer-Tully tuner and 13-plate condenser may be used in Diamond of the Air. (2) Is the set a reliable hookup and also is it easy to handle, so any of the family can operate it? (3) Will the WD12 tubes work in this set? (4) Do they give enough volume?—F. Willbrandt, 70 High St., Battle Creek, Mich.

(1) Yes. (2) Yes. (3) Yes. (4) Yes.

RECENTLY I built the "1-Tube, 1-Dial, DX" set as was described by Captain P. V. O'Rourke, in the April 11 issue, but I cannot make the set oscillate. Can you suggest a remedy?—F. H. Hollister, 214 Stephenson Bldg., Milwaukee, Wis.

Take out the .001 mfd. fixed condenser which is inserted in the ground circuit, and connect the A minus to the ground. Try another tube.

IN THE Short Wave Reinartz Receiver, May 16 issue, will you kindly tell me the condenser and the leak values in the grid circuit, when using the UV 201A as a detector? (2) Would this set work satisfactorily on a loop at 1,000 miles, or is an

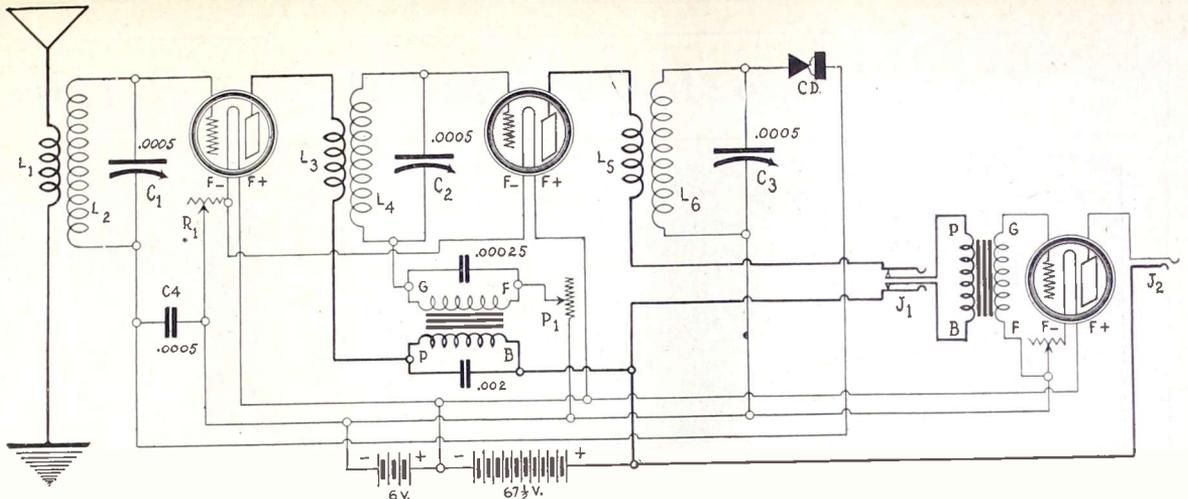


FIG. 163, showing the diagram of the Wright Powerful 3-tube Reflex. The variable condensers C1, C2, C3, have a capacity of .0005 mfd., or normally 23 plates. All the coils are wound on spider web forms, having an inside diameter of 2". L1L2, L3L4, L5L6, are the RFT of two coils each, placed side by side, with the windings running in the same direction. The secondaries L2, L4, L6, each have fifty turns of No. 24 DCC wire. The primaries are wound with No. 24 DSC, L1 having 12 turns, L3 18 turns, and L5 32 turns. The potentiometer P1 has a resistance of 400 ohms. The AFT are standard AFT, both being of low ratio. UV 201A type tubes are used here throughout.

outdoor aerial necessary in any case?—
F. H. Webster, Marvell, Ark.

- (1) The value of the condenser is .00025 mfd. and the grid condenser is 2 to 5 megs., a variable grid leak being advisable here.
- (2) It is an outdoor antenna set.

WILL YOU please give me the diagram of "A Powerful 3-Tube Reflex" as was described by H. E. Wright in the May 23d issue of RADIO WORLD, stating all the coil data, etc.?—L. P. I. Nomansky, Jersey City, N. J.

See Fig. 163 for the diagram which you request.

WILL YOU please give me some diagram, how to build a coil in the low-loss fashion using nothing more than air to hold the form?—T. K. Largey, New Orleans, La.

See Fig. 164 for the diagrams.

WHAT IS the correct way to install the Amperites and the rheostat in a 5-tube set, using the rheostat in the detector circuit?

See Fig. 165 for the diagram showing how to hook this up.

RECENTLY I saw an ad in the radio section of one of the New York papers which stated "Anode Resistance to Be Used for AF Amplification." What does "anode" mean?—K. M. Lonster, Bar Harbor, Me.

The Electrical Standard Dictionary defines "anode" as follows:

"The positive terminal in a broken metallic or true conducting circuit; the terminal connected to the carbon plate of a galvanic battery or to its equivalent in case of any other generator. In general practice it is restricted to the positive terminal in a decomposition or electrolytic cell, such as the nickel anode in a nickel plating bath or the anode of platinum in a gas voltmeter. It is the terminal out of or from which the current is supposed to flow through the decomposition cell. In electro-therapeutics, the term is used simply to indicate the positive terminal. In an electrolytic cell, the electro-negative substance or anion goes to the anode. Hence, it is the one dissolved, if either are attacked. The nickel, copper or silver anodes of the electroplater dissolve in use and keep up the strength of the bath. The platinum anode in gas voltmeter is unattacked because the anion cannot act upon it chemically."

In radio the anode is the tube plate; the filament the cathode.

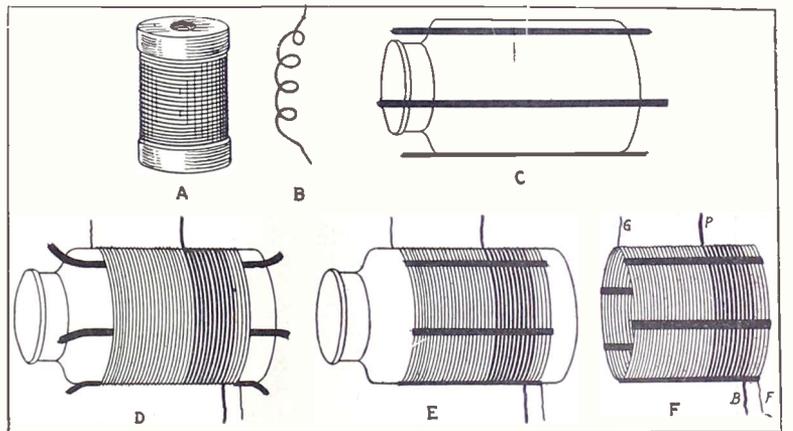


FIG. 164, showing how to wind a loss form. A is a spool of No. 20 enameled DSC wire. B is 13 feet of the wire, measured off and cut. C is an ordinary glass preserving jar with five strips of 1/4" adhesive tape gummed side up, laid upon the jar. D shows the completed coil wound over the tape, the dark wire, the aperiodic primary wound alternately with the secondary. E is the completed coil, the tape turned back to hold the winding in place. F is the coil removed from the jar winding form. P and B in Fig. F are the beginning and end of the primary, G and F, the beginning and end of the secondary. Do not place any holding substance in the coils as this makes the coil very inefficient, due to the small eddy currents that will flow through coil, also the distributed capacity of the coil will be materially increased.

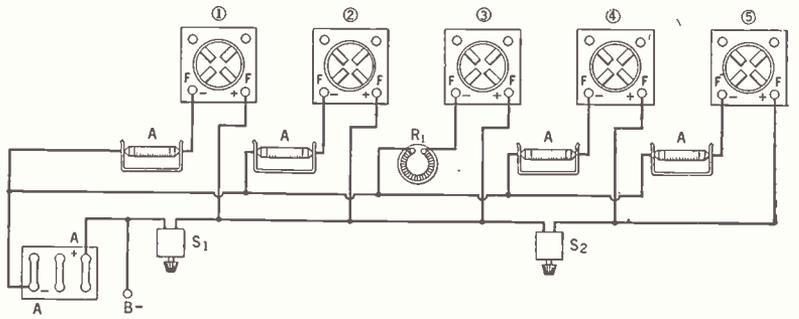


FIG. 165, showing how to make the filament connections. The resistances in the negative side of the A battery are Amperites, the proper one to be determined by the type of tube used. The rheostat is also placed in the negative side of the A battery. S1 and S2 are filament switches, being placed in the positive side of the A battery.

HOW long should tubes last?—P. H. Lonton, Tucson, Ariz.

Tubes govern results more than any other component of the receiving set. Unless the tubes have been abused by excessive filament voltage, four or five months of steady use should by no means wear them out. Radiotrons, properly used, have a life of 1,000 hours or more; but when

excessive filament voltage is applied, the process of boiling the electrons out of the filament and hurling them across the vacuum to the plate, is pushed beyond safe limits and the tube may become paralyzed, so to speak. To all intents and purposes, the tube does not appear to be damaged, since it lights in the usual manner. However, it fails to deliver the normal output expected of it.

"One Nation Indivisible"



ON the Fourth of July in many a camp, allegiance is pledged to the flag, "and the country for which it stands," while a broadcasting artist leads the audience. Members of the Kittredge Club for Young Business & Professional Girls are shown opening their summer camp at Upper Twin Lake, near Bear Mountain, N. Y., in rehearsal for the Independence Day exercises. For a moderate living expense, the girls are taught domestic arts. Founded 10 years ago, the camp is endorsed by leading social authorities. Photo shows Anna E. Heine (at flag) and Mrs. Ida S. Hutchinson (extreme right), camp directors. (Foto Topics.)



THE EAGLE Neutrodyne trio, heard at WEA, WOO, WEEL, etc., every Friday night.

RADIO IS FULL OF SYMPATHY

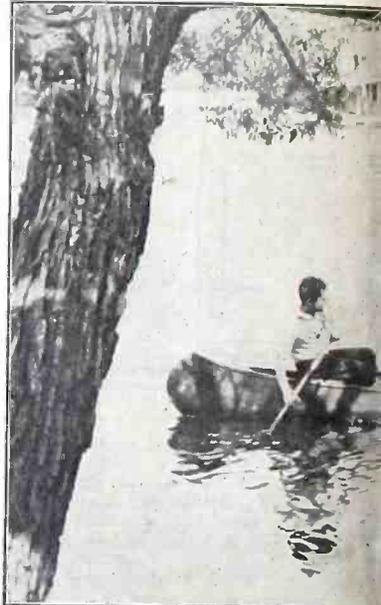
THE radio fits in well with summer life. What is the brush of the mountain breeze on one's cheek if

there is no music to delight the ear? And what better than broadcast music? Say not the "ukes" the campers tote along! Maybe the thrush in the rose bush or the nightingale amid the rhododendrons, but nary the "ukes."

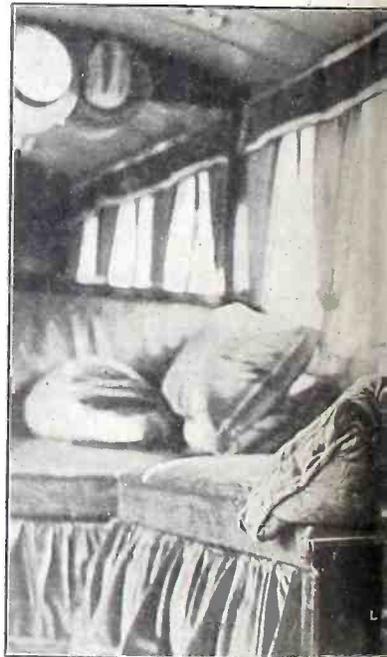
In solemn or serious moment, the radio is with you in spirit. Nothing is so sympathetic, except an undertaker about to present his bill. If one is embued with the holiday spirit and tunes in a Fourth of July program, he hears the stirring music, for once unaccompanied by a plea to vote anybody into public office. He repeats the oath of allegiance that every schoolboy knows by heart and every adult inquires about, to be sure to get all the words straight, and not make the pledge to the wrong country. Radio has a tendency to correct all wayward leanings, except those of multi-tube sets for large B battery consumption.

If one is canoeing or climbing moun-

—But Home W



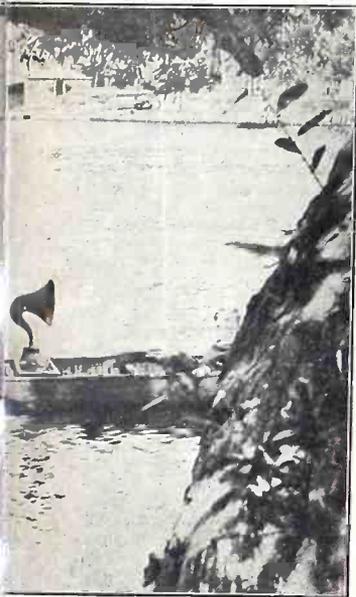
PADDLING their canoe on Verona Lake, at Verona, N. J., a young man, Mr. J. H. Parker, enjoying a radio concert supplied by a portable set. (Underwood & Underwood.)



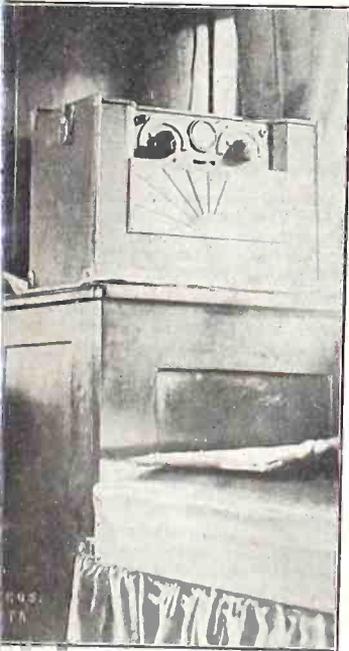
YOUNG STRIBLING, the speedy Georgia boxer, sitting in a portion of the interior of his auto, with the portable set. (Underwood & Underwood.)

tains, a portable's the thing, especially not in the mountain event. 'Mid blanketing branches 'tis soothing to paddle smoothly to the gliding strains of a Strauss waltz by son, father or cross-popper. And if there's a girl along, and it's night, with the magic of the

rk is More Fun



New Jersey, are George Ellis and Cortland set with a loud speaker attached. (Underwood & Underwood.)



coast to coast auto trip. The photo shows the radio which will furnish music enroute. (Underwood.)

pon working all its witchery on pliant portals, and the girl is beautiful, en what more natural than to pop e question? If accepted, it is polite see the thing through, and some day on, when you can spare the time, p before the altar with her. It's

Radio Talk Makes Two One



VIOLA CLARK of Philadelphia, was married to Seth Jacobs, also of Philadelphia, by radio at the Hotel Morton, Atlantic City, by the Rev. Walter Bruggeman. The ceremony was performed before a microphone connected by remote control to WPG. This was the first radio wedding held in Atlantic City. (Underwood & Underwood.)

quite the style to have the talking and music broadcast. These radio weddings include a lot of auditory guests who send no presents, not even an applause card.

On pleasure or on business bent, when one travels, a radio is a great benefit, even in an auto. Somebody must entertain at the microphone (that is, work for you), and maybe it's an aquiline trio or a soprano of rare delight, "rare" being the correct adjective. Anyway, the game's so popular the sheiks of Egypt are crying for stations so they can hear the women's voices before kidnaping the possessors thereof to the sultry sandheaps they call their kingdom. Nobody would offer even a case of "Charley horse" for such a kingdom. Why should he? DX reception is very poor in Sheikville. Nobody can get a good ground in the desert. Even signals have a sandy complexion.—H. B.



I. H. KORDI, of the Ministry of Communications of the Egyptian Government, in this country as the special emissary of King Fuad I, studying radio. Just at present he is located in the plant of the Independent Wireless Telegraph Co., N. Y., and is devoting his time to acquainting himself with the engineering side of the new science. He will return to Egypt and build radio broadcasting stations for his government. (Kadel & Herbert.)

An Overhauling Expedition

By S. W. Goulden

Commercial Engineer, Radio Corporation of America

IF you are an average radio fan, your receiving set has gone through some 600 hours of service since last it received any real attention. Since you overhauled the set last Fall the vacuum tubes have been burning over 600 hours. The batteries, especially the B batteries, have probably been delivering current over a long period. The antenna wire and its joints have been subjected to the wear and tear of the elements, as well as the corrosive effects of coal smoke. The soldered connections and blind post screws of the receiving set have had plenty of jars and rattles to shake them loose. The condenser plates and other parts have been accumulating dust and dirt and moisture, tending to introduce leakage paths and noises. The rheostat and switch members have become loosened. And so it goes.

Don't Blame It All on Static

Fault-finding in radio should begin at home. When the receiving set fails to function in accordance with fond expectations or past experience it must not be assumed that all broadcasting stations have suddenly cut their power in half or that Dame Nature has conspired to ruin our radio entertainment. There are four primary causes of poor reception, (1) tubes that have been abused either electrically or mechanically; (2) batteries; (3) faulty condition of set, and (4) weather conditions. As often as not the falling off in the strength of signals and the increasing parasitic noises which do so much to mar the programs are due to conditions within the long-used set itself. Of course there is such a thing as static; true, weather conditions have much to do with the radio transparency of space, so to speak; granted, some days are better than others for radio reception, but weather conditions are not always to blame for poor reception.

It must be borne in mind that Summertime radio is ushered in after the average receiving set has gone through a long session of steady use and is very much in need of replacements and general overhauling. Therefore, just as the average motorist would not think of starting his motoring season without going over his engine and body and tires to be sure of satisfactory operation during the hard Summertime use of his car, so the average radio fan should put his receiving set in tip top shape for the same Summer period when its efficient operation will bring joys and thrills.

Begin With The Antenna and Ground

Radio housecleaning starts with the wave-intercepting system, which is usually in the form of an antenna and a ground connection. The Super-Heterodyne and other types of receivers using a loop antenna are practically free from trouble in this direction, unless it be a loose connection, which is readily detected. But with the conventional antenna, summertime conditions are likely to introduce new factors which must be met. Thus the antenna that has been giving excellent service all Winter may require certain alterations with the approach of warm weather, when nearby trees and shrubbery take on foliage. The absorption factor increases with the appearance of foliage, so that the antenna, satisfactory as it may have proved during the Winter and early Spring, now requires more clearance above trees and shrubbery to provide the same

efficiency as heretofore. Again, the antenna masts may be bent over as the result of long exposure, and the antenna supporting ropes may be stretched, so that the antenna wires have a pronounced sag that lowers the height of the antenna. Lead-in wires, heretofore free and clear of trees and shrubs and walls, may now be touching objects which provide a direct path to the ground for the elusive radio currents. All these things should be watched for in going over the antenna.

Then there is the question of wear and tear. The antenna wire, exposed to the elements and the corrosive action of the sulphur fumes of coal smoke, becomes a poorer conductor as time goes on. Indeed, the high-resistance coating, which forms on antenna wires where there has been much corrosion, is likely to reduce the efficiency to some extent. Fastidious radio fans change their antenna wire at least once a year, although this is not essential to good results.

The main features are the joints, which, if they have not been soldered, are bound to become corroded in time and from high-resistance links in the wave-intercepting circuit, greatly reducing the efficiency of the set. The joints of the antenna, from the antenna wire to the lead-in and right down to the antenna binding post on the receiver, should be carefully examined. It may be best, even if there are no visible signs of corrosion, to undo each unsoldered joint, scrape the wires clean with emery cloth or sand paper, and make new connections. Of course, soldered joints are best; but if the unsoldered joints are tightly made and then wrapped with electrician's friction tape, they will remain satisfactory for a long while.

Antenna Insulators and Ground Connection

While going over the antenna system, the insulators should be examined since these are likely to accumulate a coating of dirt or soot with the result that a conducting path is formed for the leakage of the high-frequency radio currents. The insulators should be cleaned. If unglazed insulators have been in use, they should be replaced with the glazed kind.

The ground connection should next be examined. Often, due to the dissimilarity of the metals of the water pipe and the ground clamp or wire wrapped around the pipe, electrolytic action has set in with the result that the metals in contact are quite corroded, forming a high-resistance ground connection. Rather than overlook a serious handicap in this direction, it may be best to remove the ground clamp or wire, clean it with sandpaper or emery cloth, clean the water pipe thoroughly, and make a new ground connection with clean, bright surfaces. If another type of ground is used, it should be examined and good connections ensured by soldering the wire to the ground clamp.

Chasing Out Dust and Dirt

While the average radio receiving set is more or less fool-proof, constant use must necessarily bring about certain changes. First of all, there is the matter of dust and dirt—apparently insignificant, but really a factor that counts in achieving topnotch efficiency. Dust and dirt are apt to accumulate moisture, in which event serious leakage is introduced in the radio set with an accompaniment of troublesome noises. Especially is this true in the case of dust and dirt accumulating between the plates of the variable condensers. For dusting the radio receiver, a soft brush, preferably camel's hair, should be used, of such size as to permit of getting into the tight places

and corners. A pipe cleaner will do very nicely for cleaning in between the variable condenser plates.

Attention to Condensers

Then there is the matter of contacts and joints. If the variable condensers are not provided with flexible pig-tails or coiled spring connections, and if noise is noticed as they are turned, it is well to take them apart and clean the points of contact with fine emery cloth. If flexible connections are used, these should be examined to make sure they are unbroken.

Binding posts should be examined. Screws and nuts should be turned up right to make good connections with the wiring. Jacks should be gone over for loose connections. Switch members should be inspected to make certain that good contacts are made and that the various parts are properly tightened. Rheostat arms should be examined, to insure proper contact between the movable arm and the resistance wire winding. In fact, the radio receiver should be overhauled as much for mechanical details as for electrical.

Joints, soldered and otherwise, are a prolific source of trouble especially in the home-made variety of receiver. In the case of soldered joints, unless the work has been done with rosin-core solder or has been carefully wiped after soldering, they may become corroded. Again, flux which has not been wiped off after the soldering job tends to spread to the panel and out to adjoining parts, forming high-resistance leaks which become more evident with the advent of warm and damp weather. All traces of flux should be removed by cleaning the soldered parts with gasoline or alcohol.

Broken joints may be located while the receiver is in actual use, by tapping or moving each joint in turn and listening for noises in the head-phones. Movable parts can be tested in the same way, by manipulating them.

Attention to The Batteries

The wear and tear of radio reception falls heaviest on the batteries. The A battery, which operates the filaments of the vacuum tubes, may require recharging or replacement, depending upon whether it is of the storage or dry type. The B batteries, having gone through several months of service, may be pretty well exhausted, even though they still operate the radio receiver with fair volume but with increasing noisiness.

In the case of the storage battery, radio house-cleaning involves an examination of the battery. The lugs and straps of the battery may be partly corroded, and dirt may have accumulated between them, thus establishing a partial short-circuit which, while insignificant so far as the battery itself is concerned, is a fertile source of noise in the receiver. The vent caps should be removed and the battery electrolyte tested for specific gravity and also for water level. Distilled water should be added if necessary, and the battery should be recharged if the hydrometer reading is low. If the battery has been allowed to run down quite low, it is best to send it to a re-charging station for a good "boost" after which it can be re-charged when necessary with the usual home re-charger.

Dry batteries should be tested with a high grade high resistance voltmeter, and all voltage readings should be made with the tubes burning at normal filament temperature, i. e., under load conditions. If the voltage of the individual dry cell is below 1.1 it should be discarded and a fresh cell installed.

An Inductance Set for DX

By Percy Warren

NO matter how good other sets may be for distance, volume and quality, the 1-tube regenerative set still holds its own. This is not because a 1-tube set is better than the more elaborate types, but because it is simple to build and can always be rebuilt without any difficulty to suit the owner's fancy or whimsical preference.



PERCY WARREN

A peculiar thing about these 1-tube affairs is that when two steps of audio-frequency amplification are added more volume is obtained, than with the usual 5-tube receiver. In the December 6 issue of RADIO WORLD was published an article giving complete data on how to make a two-step amplifier, which can be added to any set.

The set (Fig. 1) is regenerative and tuned by the inductive method only, that is there are no variable condensers used when tuning the set. This is not new, but a very effective method, considering the selectivity and the volume obtained thereby.

In every set there is at least one objectional factor. There is no set at the present that one could rate as absolutely perfect. The factor here, is that the set, if not properly manipulated, will radiate and annoy neighbors.

There is very little to purchase for the building of this set. As a matter of fact, it can be built from parts lying around the house. The first essential is the panel, 7 x 10", with cabinet to fit. There are two controls in this set, two dials on the front of the panel, excluding the rheostat knob. For detection a UV201A tube is used, with a plate voltage of from 16½ to 45, depending on the individual characteristics of the tube. For controlling the filament temperature of the tube a 20-ohm rheostat is required. C1 is grid condenser, .00025 mfd. C2, by-pass condenser, is .001 mfd. fixed. This condenser may have to be omitted later on when testing the set, as it may be found that without it the tube oscillates more freely. The filament of the tube is lighted by four dry cells, which are connected in series.

L1, L2, L3, L4, are home-made coils. The phones should be a good pair as the quality of the reception as well as the volume of the set is somewhat dependent upon the phones. They do not have to be expensive to be a good pair, as there are many manufacturers putting out phones that are cheap and still are fine. A terminal strip, antenna wire, lead-in wire, ground wire and a ground clamp are needed.

Since the tuning coils are really the heart of the circuit, that is, they usually are the dividing line between success and failure, as far as selectiveness of the set is concerned, we shall discuss them first.

The first coil that we will wind is the antenna coil, L1. Procure a form 3" in diameter and about 4" in length. One-half inch from the end of the form start winding and put on 10 turns. Use No. 22 DCC in all cases. L2 is the stator and L3 is the rotor of the variometer, while L4 is the tickler. Take a form, 3" in diameter, and wind 28 turns, leave ½" and wind 28 turns more. This is for the stator. Where the space is left, drill a hole 3/16" in diameter, which is for the purpose of inserting the shaft. The rotor is wound on a 2" form. It is best here to

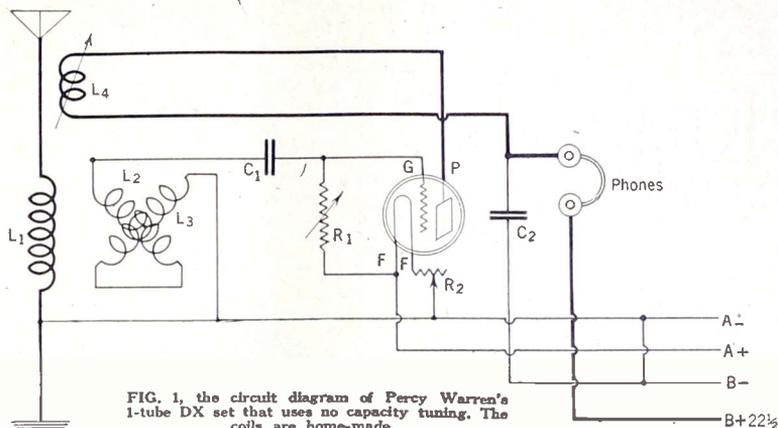


FIG. 1, the circuit diagram of Percy Warren's 1-tube DX set that uses no capacity tuning. The coils are home-made.

get hold of a regular rotor form, as you will find it difficult to wind 72 turns, which are the number of turns the rotor should have, on a straight piece of tubing. There are 36 turns on each half of the rotor, and a ½" space left between the turns. The stator coil should be considerably long, about 8". Connect the ending of L2 to the beginning of L3, when winding, so that when you have completed the coil, there will be only two leads protruding from the variometer part of the coil. The variometer will take up about 5" of the space of the tubing. Leave and make a dot 1" and 1" from this mark (1" from tubing end) drill a hole for the tickler shaft. Here you use the same kind of a form that you used on the rotor of the variometer. Wind 35 turns on this form, 17 on one half and 18 on the other half, leaving ½" between the turns. For holding the rotating forms in place a piece of solder is dropped on the shaft, which is brass tubing 3/16" diameter, after the shaft enters the stator, before it enters the rotor of the tubing and after it goes through the rotor close to the tubing. The same is done on the other end of the tubing and for the tickler also. This will hold the rotor tubings in place. The end of L1 is connected to the end of L3.

Bring the beginning of L1 to the antenna post of the terminal strip, and the end of this same coil to the ground, which is in turn connected to the end of L3 and to A minus post of the strip. The resistance wire R2 of the rheostat is connected to the A minus also, the pointer or the rheostat arm going to the F minus post of the socket. The end of L2 goes to one post of C1, the other post of C1 going to one terminal of the variable resistance, which in this case is the Bretwood, and also to the grid post of the socket. The end of R1 goes to A plus on the terminal strip and to F plus post of the socket. This means that there is a positive grid return. The end of the tickler coil L4 goes to the plate post of the socket and the beginning of this coil goes to the phone post and to one terminal of C2. The other post of C2 goes to the B minus, which is connected to the A minus. The other phone post goes to the B plus.

No matter how good a builder you may be there are always some things to be done to the set to get the most out of it. If you do not get regeneration reverse the tickler windings, omit the condenser C2, and increase the plate voltage. If your tuning is broad, decrease the length of your antenna, which by the way should be no more than 75 feet in total length, including the lead-in. Take off the con-

nection between the end of L1 and L3 for sharpening up the tuning. If you do not get the high wavelengths, put a .001 mfd. condenser across the antenna and the ground (parallel connection). If you do not get the low wavelengths put the same sized condenser in series with the antenna. To increase the selectivity of the set put a .001 variable condenser in series with the ground lead. R1, the variable grid leak, will be found some time to have no effect to the tube. It is the peculiar characteristic of some tubes that is there may be a leakage in the internal part of the tube or through the base of the tube. When using the UV201A, it will be found that about 5 or 6 megs. are required for most efficient detection by the tube. Scratchy noises often mistaken for static, are caused by a defective B battery or from leak. Be sure that all the connections to the set are solid, internally and externally, and you will have no trouble.

Tuning of the set.

This set at the beginning is very difficult to tune but as soon as the stations are logged you can rely upon the readings, except when it rains, when the dial readings will change because of the capacity of your antenna changing, due to leaking of the energy in your antenna and also the resistance caused by the water on your antenna.

First turn the tickler to the left and listen for a sharp click. This determines if your set is regenerating. The variometer is used for tuning in the wavelengths. To get louder signals, try reversing the leads of the A battery and your phone leads.

This is a good DX set, 1,000 miles being obtained steadily under best winter conditions.

LIST OF PARTS

- One auto transformer, (L¹).
- One variometer (L², L³).
- One tickler coil (L⁴).
- One UV 201A or C 301A tube.
- Four dry cells, 1½ volts each.
- Two 22½-volt B batteries.
- One pair of phones.
- One standard porcelain base socket.
- One .001 mfd. condenser (C¹).
- One .00025 mfd. condenser (C²).
- One variable grid leak (R¹).
- One 20-ohm rheostat (R²).
- One terminal strip.
- One pound of No. 22 DCC wire.
- Two 3" forms.
- Two special rotor forms.
- One cabinet 7x10".
- One panel 7x10".
- Two 3" dials.
- One baseboard 6" wide and 9" long.

A THOUGHT FOR THE WEEK

The summer heat may sizzle and make us thoroughly uncomfortable, but a radio set that gives us cooling music like the "Dance of the Esquimaux," or the "Bathing with Jennie at Coney Isle" will help some.

RADIO WORLD

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

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SUBSCRIPTION RATES

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

ADVERTISING RATES

General Advertising
1 Page, 7 1/4"x11" 262 lines..... \$300.00
1/2 Page, 7 1/4"x5 1/2" 221 lines..... 150.00
1/4 Page, 4 1/2" D. C. 115 lines..... 75.00
1 Column, 2 1/4"x11" 154 lines..... 100.00
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52 consecutive issues..... 20%
26 times consecutively or E. O. W. one year..... 15%
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Ten cents per word. Minimum, 10 words. Cash with order. Business Opportunities, 50 cents a line; midnight, \$1.00.

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

JULY 4, 1925

Wavelength Incubator Suggested as Solution

WASHINGTON.

IF a process could be formulated for manufacturing or hatching wavelengths it would probably net the inventor a fortune, and at the same time render a great service to the public.

With the ether already congested and with hardly room for another broadcasting station, the Radio Bureau of the Department of Commerce has learned of at least 160 new stations which are either under construction or are contemplated.

Warning has been given to each of these new projects that at the present time every wavelength is in use and that new stations have no certainty of receiving an air channel. This warning has discouraged some constructors while others are going ahead with the hope that some old station will drop out or else new inventions will open up additional wavelengths.

It is feared that considerable trouble may develop for the Department of Commerce when these disappointed stations are definitely refused the privilege of going on the air.

THE DIAMOND OF THE AIR AS A 2-CON-TROL SET, by Herman Bernard. This is the circuit that is sweeping the country. Four tubes; loop or aerial. Send 30c for May 23 and 30 issues of RADIO WORLD, 1493 Broadway, New York City.

Everything Cured Under Ether



The Waning of Early to Bed

ON the farm and in the city radio is retarding the hour of going to bed. Even in cities the hour used to be around 10 P. M. in many households, while on farms usually it was somewhat earlier. But now the entrancing orchestras, those of greatest fame and most fluent noisy mechanisms, strike up their opening chords at 10 P. M. or 11 P. M., leaving no option to the radioist who performs must listen to these vendors of musical popularity. The most powerful stations broadcast the work of the most famous orchestras, hence the ease of reception defeats any otherwise comfortable excuse for not tuning in.

There is, besides music or jazz, the delightful atmosphere of the hotel grill room, which reaches the stuffy city apartment no less invitingly than the porch of the farmhouse that is abuzz with the night life of the woodland. The chatter of table talkers, the hand-clapping, the use of the double microphones (snapping off the eclat when the station announcer is ready to talk up), all are familiar parts of night life at home. Radio has made them so.

But to be one of the great army one must stay up to listen. At first this is overwhelmingly enjoyable; next a rather exacting indulgence, when weighed by the ragged feeling at the hour of rising. Matutinal ablutions are just plain douses of cold water, very shocking, after six hours' sleep.

Then time wears on, the night life at home continues, the listening is no longer a novelty, yet still is a delight, and behold, the early-to-bed, early-rising genius is a mere six or seven-hour sleeper. The wholesome eight to ten hours have gone. And the suffering is—nothing! The human body is the most malleable machine ever devised, and the wonder is that some radio originalist has not taken out a patent on it!

Radio has changed not only the hour of retiring, but has cut into one's sleep without ill effect. The requirements for rising at a given hour still regrettably endure, for strictly commercial "bosses" continue to exact the same early promptness for beginning work. Maybe they will see the light themselves, and, finding that contented workers run the cows a good race, will lop an hour off the distaff side of the day's work, while being punctilious about not adding it to the other end, or cancelling the magnanimous effect by indentation of the pay envelope, or invasion of the constitutional rights to a fortnight's vacation to enable one to get tired enough to enjoy sitting down to work.

The Fourth of July is not a propitious time to suggest to the harassed employer that the hour be deleted without adverse consequence to employe. Business is not so brisk as it is in December, and besides there is no compromise in patriotic feeling. It is either the exposed risk of one's very life, or just a form of speech making, usually political. Let's wait for Christmas. While being optimists, let's not be too insistent on determining now which Christmas it will be.

When Reception Seems Hopeless

THERE are a few locations in which no set will work well. This is due to dead spots, or their somewhat less necrological brethren, screened areas; in any case, to some hostile absorption of the radiated waves. These spots will be encountered at summer resorts, in valleys, even on mountain-tops. Reception in most cases will not be prevented. It is well, therefore, not to condemn a portable set simply because it does not work in a given rural locality where radio conditions are undetermined. Ore in the ground is something receptionists frequently know nothing about, although varicose veins of the larcenous product abound, and all to the detriment of reception. It is no disgrace to radio that conditions exist whereby even a super-heterodyne cannot perform well. Persons wholly ignorant of things radio will be quick to laugh, but the real radioist will get busy himself trying to find a solution. He will drive a nail in a tree, as if to use one source of energy diversion for a gainful purpose, or run a wire under the lake for aerial or ground, to try a counterpoise, or a loop, or otherwise test for possibly good operating conditions. And in those few instances where he is completely stumped he will admit it and shrug his shoulders with as great an evidence of good nature as is possible for one whose expectations ran high before the mysteries of science prevailed over the yearnings of an enraptured soul.

ROXY NOSES OUT BERNIE IN POPULARITY

Snatches First Place, with 9,894 Votes, but Bernie is Only 8 Behind, and Test Has Three More Weeks to Run—Bonawitz Holding Third Position—Happiness Boys Fourth, Gaining in Strength—Personal Tributes Paid to Rothafel in Letters—Race Seems Confined to the Four Cited.

At the beginning of the last month of the contest to determine the most popular radio entertainer, on the basis of balloting by RADIO WORLD readers, Roxy snatched the lead that Ben Bernie had been holding for several weeks. A great batch of Roxy votes arrived by mail, giving him a stronger position day by day, until the day before this edition went to press, when Roxy actually took the lead.

Karl Bonawitz retains third position, which he has been occupying steadily. But the Happiness Boys showed increased strength, not because they crept up any in relative position, but because of the rain of ballots being received, indicating that they may finish better than fourth if the present rate keeps up.

Confined to Four

As the contest now stands it seems to be among Roxy, Bernie, Bonawitz and the Happiness Boys, since the others are very considerably behind these. Roxy, while first, has only eight more votes than Bernie. With the votes near the 10,000 mark for the leading two, this is nothing to make Roxy inordinately proud. As for Bernie being eased out of first place, it may be impertinent to say "I hope you'll like it." If he doesn't, there's a remedy. Get so many more votes that you'll be back in first place.

Laudation of Roxy

Roxy should be congratulated, however. The mail in which the votes for him arrived contained numerous letters expressing admiration of his work, both the musical programs from the Capitol Theatre, and his charitable endeavors, especially for wounded veterans. Roxy hasn't forgotten the veterans though some of us may have done so; and thousands have not forgotten Roxy, nor are likely to forget him.

The voting coupon is published on this page. Use it, also all coupons from previous issues, and give your support to your favorite radio entertainer. Remember that the contest winds up with the last issue in July—dated the 25th—so there is no time to lose.

Standing of the Contestants

Roxy (S. A. Rothafel), WEA, N. Y.	9,894
Ben Bernie & Orch., WEA, Philadelphia	9,886
Karl Bonawitz, WEP, Philadelphia	8,154
Happiness Boys, WEA, N. Y.	8,041
Ford and Glenn, WLS, Chicago	2,132
Alvin E. Hauser, WFBH, N. Y. City	1,110
Less than 1,000: Leo Reisman Orchestra, WBZ, Springfield, Mass.; Nils T. Gran-	

Contest Rules

1. The votes in RADIO WORLD'S 1925 contest to determine the radio entertainer entitled to the popularity gold medal may be cast by filling out the coupons as published weekly in RADIO WORLD. One coupon entitles the sender to one vote. The coupon should be properly filled out and mailed. Anybody subscribing to RADIO WORLD (a new subscriber or one renewing an existing subscription), may cast as many votes as are represented by the total number of weeks of the new or renewed subscription. In addition, as the coupons are published, the subscriber may use them for sending in one vote on each such coupon. When subscribing, cast your total subscription votes by specifying the candidate in the subscription order.

2. This contest closes July 31. The last coupon will be published in the July 25 issue.

3. In case of a tie, a gold medal will be awarded to each contestant so tied.

lund, WHN, New York City; Harmony Girls, WLS; Lambdin Kay, WSB, Atlanta, Ga.; J. Andrew White, WJZ, New York City; Gold Dust Twins, WEA; Walter Peterson, WLS; Hotel Commodore Orch., WJZ; Henry Field, KFNX, Shenandoah, Kan.; Jack Little, WOC, Davenport, Ia.; Herman Bernard, WGBS, New York City.

New Broadcasters

Washington.

Five new class A stations were licensed while two stations were transferred from class A to B and permitted to use higher power. The new stations follow:

CLASS A			
Call	Station	Motors	Watts
WKBG	C. L. Carrell, (Portable) Chicago, Ill.	215.7	100
WIBP	First Presbyterian Church, Meridian, Miss.	209.7	5
KFVZ	Glad Tidings Tabernacle, Inc., San Francisco	234	50
WGMU	A. H. Grebe & Co., Inc., Richmond Hill, N. Y.	236	100
WEHS	Robert E. Hughes, Evanston, Ill.	205.4	20
TRANSFERS, CLASS A TO CLASS B			
WBMM	Atlas Investment Co., Chicago, Ill.	226	1,500
KLDS	Reorganized Church of Jesus Christ of Latter Day Saints, Independence, Mo.	440.9	1,000

* * *

Washington.

CNRV, "The Voice of the Pacific" will soon be on the air to test the skill of American fans who like to get distance. CNRV, which is now under construction, will be located at Lulu Island, British Columbia, and will have a transmission radius of 2,000 miles under favorable weather conditions.

Two new stations will have two steel towers 150 feet high, quadrangular and tapering in shape and about 200 feet apart. The equipment will consist of No. 1 Northern Electric Type Transmission outfits with a 500 watt output.

Must Keep Radio Premium

THE report of the executive secretary of the Actors' Equity Association, presented at the twelfth annual meeting, pointed out the "injustice" of refunding money received for broadcasting. An excerpt follows:

"The decision of your Council that if a performance is broadcast from the stage the actors shall receive an additional one-eighth of a week's salary has been enforced upon several occasions and we only require your active cooperation to make it an established fact.

"When I say your active cooperation, I mean that you must not only report to us whenever a microphone is placed in the footlights and that you must also insist on being paid, but that you must see that some of your less experienced brothers and sisters in the company do not, by a

subterfuge, destroy the value of the ruling. For instance, we even had one case where we learned that a number of members of a company were prepared to turn back into the manager's pocket the money which he was to pay to them for the broadcasting. This works an injustice on those who desire to live up to the letter of the law in so far as their Association is concerned, and would, in the long run, nullify anything which we here at headquarters might do. Actors are generous beings. When they feel sorry for a manager, they want to help him even at a pecuniary loss to themselves, but they should bear in mind that their action might be the cause of preventing a perfectly legitimate claim for money being paid to hundreds and perhaps thousands of their fellow members."

RADIO WORLD'S POPULARITY CONTEST

To Determine the Gold Medal Radio Entertainer for 1925
Popularity Editor, RADIO WORLD, 1493 Broadway, N. Y. C.

I hereby cast one ballot for:

(Name of Entertainer).....

(Entertainer's Station).....

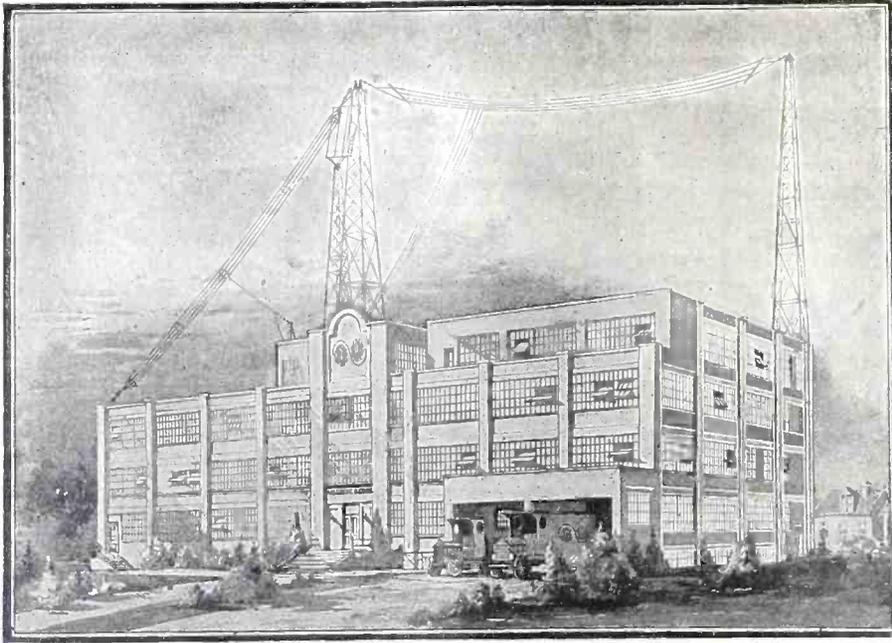
(Voter Sign Full Name Here).....

(Street and Number).....

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

FILL OUT THIS COUPON AND MAIL NOW!

Cut-price Sales Always Due to Bad Judgment says Grebe, Opposing Dumping



THE HOME of the Grebe broadcasting stations, a commodious, up-to-date building.

Wait Until September, 1926, for Short-Waves for Stations

THE only escape from the condition of overcrowding of the air seems to be in having the broadcasting stations on lower wavelengths, because there the channels are enormously more numerous. An alternative would be the limitation of the number of stations, but this does not suit the American policy of free-for-all competition in such matters. It would confer too great a benefit on mere seniority and, in the end, cause detrimental public reaction to radio in general. It would make radio smack too much of an art that was founded on favoritism.

Nobody need expect this change to lower waves to be made this year. Indeed it would be most unfair to the radio manufacturers to foist such a change on them with great suddenness, and render great stocks useless in their existing state.

The Fourth National Conference will be held in September and it is hoped that a solution will be reached then. But under no circumstances, out of regard to those who have helped so much to make radio what it is today, should any such change to lower waves be effective before the Fall of 1926. Also, about a full year's notice should be given, which would be possible if the Fourth National Conference would come to a courageous solution of the problem of relief from congestion. Of course the conference has no plenary power. All rests with Congress. But a strong recommendation by the Conference would be sufficient notice to the trade. Maybe this time Congress would co-operate. Other miracles have happened.

Business Opportunities—Radio and Electrical

Rates: 50c a line; Minimum, \$1.00

RADIO AND SPORTING GOODS STORE.

Gross business \$25,000 yearly; practically no competition; owner has other interests. Box 744, Martinsburg, W. Va.

ESTABLISHED RADIO MANUFACTURING

concern requires executives with \$10,000 to handle sales and half interest. Box X, Radio World.

CONSULTING RADIO ENGINEER WISHES

contact with individual having radio sales experience and capital to organize small radio manufacturing and sales company. Box Y, Radio World.

MACHINE SHOP LOOKING FOR MANUFACTURING

proposition; machine, tool, experimental work; design, develop new ideas; rent space. Community Machine Works, 122 Centre St., N. Y. C.

\$100,000 WAITING—Get into the radio business and make yourself independent. We can start you in this well-paying business if you are the right man. Write for particulars. Box 222, RADIO WORLD.

DEALERS! Write for our proposition for financing you over the Summer season, Box 223, RADIO WORLD.

A PRODUCTION, MECHANICAL OR ELECTRICAL engineer who has \$10,000 cash to put into a going business; two factories now in operation; 65,000 unfilled orders; American, Scandinavian or German who is familiar with semi-close manufacturing methods; must show successful record and be of high character; strictly confidential. Box Z, Radio World.

MAKE MONEY! RADIO BUSINESS. Write Konkle, 192 Market Street, Newark, N. J.

SIXTEEN years ago the science of radio communication was in its infancy. Its present popularity was not thought of, save in the heart of the dreamer. Complete transmitting and receiving sets were built by Grebe in his small factory at Richmond Hill at this early date.

Eleven years ago the first radio catalog from the Grebe factory made its bid for favor. At that time Grebe was supplying the greater part of the apparatus used by the amateur operators who composed the American Radio Relay League.

With the advent of broadcasting a host of manufacturers entered the field. Many were assemblers. A very few made every part of the receiver they sold. Grebe was the leader of the little band who believed that perfection could not be attained by assembling the parts of many makers.

He made every part of the Grebe receivers in his own shop. This pioneer plan of making every part in his own plant gave the Richmond Hill inventor an outstanding position in the radio world.

Many additions were made to the original Grebe factory. Two years ago the new concrete and glass plant was built. It was a large building devoted entirely to the manufacture of radio sets. This year the big building is being doubled in size. The addition will be completed by mid-July.

Recognizing that the growth of the radio business is largely dependent on the maintenance of radio programs, A. H. Grebe and Co., Inc., decided to install a broadcasting station. WAHG, the original Grebe station, went on the air last September.

A statement by the Grebe Company says:

"The Grebe organization numbers among its members executives who have grown up with the Company. These men have been in the thick of the fight for supremacy. They believe in the strength of the pack and work as one for united success. They know they are making and selling dependable apparatus. Practically every Grebe installation manufactured since the advent of broadcasting is still in service, doing the work it was designed to do and doing it well.

"A new radio season is about to unfold its portals. That it will be a good year for good radios goes without saying. Every year is a good year for the maker of good radios. The bargain counter never yawns with an overload of the best in radio for there is always a market for the best. Cut-price sales can always be traced back to bad judgment on the part of some assembler. And bad judgment usually runs true to form year after year. An issue of stock is an easy way to tide over a bad guess. Later on the stock buyers may use their "securities" for wall paper. To the adventurer radio is a game. To the conscientious manufacturer it is a good business,

Brightson Denounces Dumping

At a meeting of the Talking Machine & Radio Men's Association, held at the Cafe Boulevard, New York City, George E. Brightson, founder and former president of the Sonora Phonograph Co., and president of the Brightson True Blue Laboratories, discussed "Retail Merchandising of Radio."

"My observations," said Mr. Brightson, "based on my recent Western trip, show me that neither dealers nor the public may expect any radical changes to take place in the field. True, the manufacturers are paying considerably more attention to the appearance of their receivers—striving towards the fine furniture ideas. But that is about all, as far as changes go. I can not see any real radical technical changes for some time to come. Refinement is the word of the day, and quality the cornerstone."

"With regard to the cutting of prices, the manufacturers are realizing that they will have to give the dealers adequate protection. Figures show that over half of the radio receivers which we sold last year were purchased on the time payment plan. Therefore, the dealers have insisted on a stopping of the dumpings and sudden unloadings which have left them with many returned receivers, due to the fact that the customers could let their few payments go, purchase the receiver at the same price and still save thirty to fifty dollars. Also, manufacturers have realized that this is not contributing to the stabilizing of the field and have laid their plans to stop it themselves."

"My talks with various big manufacturers in the country have shown me that they are beginning to realize the need for the sale of the complete receiver ensemble—not leaving the choice of accessories to either price or fancy on the part of the purchaser."

"Furthermore, I see fewer dealers re-

tailing radio this fall than in the past. The race of elimination has started and only those with sufficient financial backing, upright merchandising principles and desire to elevate the retailing of radio to a higher plane, will continue to do business. The day of the locksmith shop who has his little nick in the sail and sells at three cents profit on the dollar is over, or nearly so. Price ranges may be lowered by the manufacturer due to lower production costs, but the man who will get the advantage is the stable dealer and his customers."

INDUSTRIES BANQUET TO BE IN MID-SEPTEMBER

The Second Annual Radio Industries Banquet will be held in New York the week of September 13, date not definitely announced. This banquet will be under the auspices of the National Radio Trade Association and a number of others in the industry.

The Industries Banquet has no connection with any radio show. Reservations for the banquet are being arranged by the secretaries of the various associations associated with the management of the dinner. A number of prominent speakers are expected and arrangements are being made for broadcasting and other features.

Coming Events

AUG. 23 to 29—3d Annual Pacific Radio Exposition, Civic Auditorium, San Francisco. Write P. R. E., 905 Mission St., San Francisco.

SEPT. 5 to 12—13th Annual National Radio Exposition, Ambassador Auditorium, Los Angeles. Cal. Address Waldo K. Tupper.

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

SEPT. 9 to 29—International Wireless Exposition, Geneva, Switzerland.

SEPT. 14 to 19—Second Radio World's Fair, 28th Field Artillery Armory, Kingsbridge Road and Jerome Ave., N. Y. C. Write Radio World's Fair, Times Bldg., N. Y. C.

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

SEPT. 14 to 19—Radio Show, Winnipeg, Can., Canadian Expos. Co.

SEPT. 21 to 29—International Radio Exposition, Steel Pier, Atlantic City, N. J.

SEPT. 23 to OCT. 3—National Radio Exposition, American Exp. Palace, Chicago. Write N. R. E., 440 S. Dearborn St., Chicago, Ill.

OCT. 3 to 10—Radio Exposition, Arena, 46th and Market Streets, Philadelphia, Pa., G. B. Bodenhop, manager, auspices Philadelphia Public Ledger.

OCT. 9 to 19—Second Annual Northwest Radio Exposition, Auditorium, St. Paul, Minn.

OCT. 5 to 11—Second Annual Radio Show, Convention Hall, Washington, D. C. Write Radio Merchant's Association, 83 Woodward Bldg.

OCT. 12 to 17—Boston Radio Show, Mechanics' Hall. Write to B. R. S., 209 Massachusetts Ave., Boston, Mass.

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

OCT. 12 to 17—Radio Show, Montreal, Can., Canadian Expos. Co.

OCT. 17 to 24—Brooklyn Radio Show, 31d Regt. Armory. Write Jos. O'Malley, 1157 Atlantic Ave., Brooklyn, N. Y.

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

NOV. 2 to 7—Radio Show, Toronto, Can., Canadian Expos. Co.

NOV. 3 to 8—Radio Trade Association Exposition, Arena Gardens, Detroit. Write Robt. J. Kirschner, chairman.

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

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

THE DIAMOND OF THE AIR AS A 2-CONTROL SET, by Herman Bernard. This is the circuit that is sweeping the country. Four tubes; loop or aerial. Send 30c for May 23 and 30 issues of RADIO WORLD, 1493 Broadway, New York City.

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 blanks below may be used, or a post card or letter will do instead.

Trade Service Editor,
RADIO WORLD,
1493 Broadway, New York City.

I desire to receive radio literature.

Name

City or town

State

Are you a dealer?

If not who is your dealer?

His Name

His Address

- P. R. Perry, 11 Orange St., Westfield, Mass.
- Walter Bain, Crewe, Va.
- F. W. Martin, 652 East 54th St., Indianapolis, Ind.
- Al. Kraus, 996 Aldus St., N. Y. C., N. Y.
- Harry G. Neher, 154 Chestnut Ave., Waterbury, Conn.
- Eugene V. Delk, 317½ North Franklin St., Michigan City, Ind.
- G. A. Starke, 123 East 4th St., Cincinnati, O.
- Merrall Hardware Co., Scranton, O. (dealer).
- Leland Stanford Orrick, P. O. Box 73, McCurtain, Okla.
- Paul Glowa, Holidays Cove, W. Va.
- Stefan Rosspeck, 139 3rd Ave., N. Y. C., N. Y.

TWO STATIONS FOR RIO WASHINGTON.

THE fire department of Rio de Janeiro is planning to install two radio stations, one on its main building at the Praca da Republica and the other at its maritime station on the Ilha da Santa Barbara.

SPECIAL! Timmon's B-Lim...\$16.00

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are now available. This is the set described recently in "Radio World." Designed by McMurdo Radio, Assoc. I.R.E. Complete working blueprints, baseboard layout, wiring plans, etc..... 50c

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1493 BROADWAY NEW YORK CITY

Court Denounces M a n Charged With Fraud Against Daven Corp.

Magistrate Simpson, in Commercial Frauds Court, New York City, held Moe Goldman in \$3,500 bail for trial in Special Sessions on a charge of selling spurious grid leaks, bearing labels with the Daven name forged on them. Neither the leaks nor the labels were Daven products, the court held, denying defendant's motion to dismiss.

It was brought out that Daven Radio Corporation sold \$175,000 worth of leaks (or resistors) during 1924.

The court was of opinion that Hoffman,

using Dorothy Milburn as dummy, caused the manufacturer of leaks at 5 cents each, got the alleged Daven labels printed, and sold a quantity to the Stuyvesant Electrical Co., 53 Walker Street, of which David Borgen is part owner. A check for \$552 was obtained (and immediately certified). It was made out to Irving Abrams. The court held that Hoffman presented himself as Abrams, supposedly acting for Miss Milburn. Borgen refused to pay for a subsequent shipment, whereupon Hoffman rushed to the police station to have him arrested for grand larceny. Bogen was "out" the \$552, having learned the leaks were not Daven, and therefore not being authorized to sell them or even give them away. Hoffman's arrest followed. The court denounced his conduct.

- KFAE, State College of Washington, 348.6 (PST) -7:30 PM to 9.
- KFT, Los Angeles, Cal., 467 (PST)-5 PM to 11.
- KFKX, Hastings, Neb., 288.3 (CST)-12:30 PM to 1:30; 5:15 to 6:15; 9:30 to 12:30.
- KFNH, Shenandoah, Iowa, 266 (CST)-12:15 to 1:15 PM; 3 to 4; 6:30 to 10.
- KFOA, Seattle, Wash., 455 (PST)-12:30 PM to 1:30; 4 to 5:15; 6 to 7.
- KGO, Oakland, Cal., 361.2 (PST)-11:30 AM to 1 PM; 1:30 to 3; 4 to 6:45; 7:15 to 10.
- KGW, Portland, Oregon, 491.5 (PST)-11:30 AM to 1:30 PM; 5 to 11.
- KHJ, Los Angeles, Cal., 405.2 (PST)-7 AM to 7:15; 12 M to 3:20; 5:30 to 11:30.
- KNX, Hollywood, Cal., 337 (PST)-11 AM to 12:05 PM; 4 to 5; 6 to 12.
- KPO, San Francisco, Cal., 429 (PST)-7 AM to 8; 10:30 to 12 M; 1 PM to 2; 3:30 to 11.
- KSD, St. Louis, Mo., 595.1 (CST)-7:30 PM to 9.
- KYW, Chicago, 536 (CSTDS)-6:30 AM to 7:30; 10:55 to 1 PM; 2:25 to 2:30; 6:02 to 11.

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ONE—"Goode" Two-0-one A Tube \$1.89

THREE—"Goode" Two-0-one A Tubes 5.00

The above is a five volt, quarter-ampere tube for use on storage batteries and can be used either as a Detector or an Amplifier.

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14 Sizes in Beautiful Display Case
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THE COLUMBIA PRINT
1493 Broadway New York City

SPEAK UP ON FALL MODELS IS TIP TO MANUFACTURERS

The attention of manufacturer members is called by the National Radio Trade Association, to the necessity for early announcement of Fall lines. While the association has gone on record as opposed to a general model time, believing this would make business of a more hesitant nature before the announcement of new models, the committee reporting on this question urges upon members the necessity of early introduction of models in order to give the trade an opportunity to clear their counters of all last season's goods. Henry M. Shaw is president and L. N. Nixon secretary of the association.

DE FOREST'S NEW TUBE STANDS 270 PLATE VOLTS

DE FOREST has a new tube, the DV5. It draws .25 ampere and is fed from a 6-volt filament source. It will stand plate voltage up to 270, with proper grid bias. Roy A. Weagant, De Forest Co.'s chief engineer, says it will give about double normal volume this way. The tube has an Insolantite base. As a regenerative detector the tube takes a very low plate potential.

CAN'T USE OWN NAME

In an action for an injunction brought by Paul Westphal, manufacturer since 1881 of Paul Westphal's Auxiliator, a hair tonic, against Westphal's Worlds Best Corporation, defendant, Justice Mitchell of the Supreme Court of New York, issued a decree against the defendant. Judge Mitchell held a man can not use his own name when it causes unnecessary confusion or where it usurps the established name or business of another.

THE KEY TO THE AIR

(Concluded from page 13)

WRC, Washington, D. C., 469 (ESTS)—1 PM to 2; 4 to 6:30.

WRNY, New York City, 258.5 (ESTDS)—11:59 AM to 2 PM; 7:59 to 10.

WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30; 3 to 4; 6 to 7; 8 to 9.

KDKA, Pittsburgh, Pa., 309 (EST)—9:45 AM to 12:15 PM; 2:30 to 3:20; 5:30 to 10:15.

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100 Cards, Mahogany Finish or Oak Cabinet, and Index Dividers. A Useful Accessory to Any Set. Give Name of Set and Sketch of Dial Arrangement. Postpaid on Receipt of Cash or Money Order. Dealers Write for Terms.

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"HOW TO MAKE"

- The following illustrated constructional articles have appeared in recent issues of RADIO WORLD:
- Sept. 6, 1924—A simplified Neutrodyne with Grid-Biased Detector, by J. E. Anderson.
 - A Low-Loss Wave Trap, by Brewster Lee.
 - Nov. 15—A Sturdy Low-Loss Coil, by Lieut. P. V. O'Rourke.
 - An Ultra 2-Tube Receiver, by Byrt C. Caldwell.
 - Dec. 6—A 6-Tube Super-Heterodyne Using a Variometer, by J. E. Anderson.
 - A 11 Coil Winder, by Herbert E. Hayden.
 - Dec. 13—The World's Simplest Tube Set, by Lieut. P. V. O'Rourke.
 - Dec. 26—A 1-Tube DX Wonder, Rich in Tone, by Herman Bernard.
 - Interchangeable Detector, by Chas. M. White.
 - Dec. 27—A 2-Tube Variometer Set, by Lieut. P. V. O'Rourke.
 - Jan. 3, 1925—8-Tube Portable That Needs No Outdoor Aerial, by Abner J. Gelula.
 - Jan. 10—A Low-Loss DX Inductance, by Herbert E. Hayden.
 - Jan. 17—A \$25 1-Tube DX Wonder, by Abner J. Gelula.
 - Jan. 24—A Selective \$15 Crystal Set, by Brewster Lee.
 - A Variometer-Tuned Reflex, by Abner J. Gelula.
 - An \$18 1-Tube DX Circuit for the Beginner, by Feodor Hofpatkin.
 - Jan. 31—A Transcontinental 1-Tube Set, by E. H. Wright.
 - An Experimental Reflex, by Lieut. P. V. O'Rourke.
 - Feb. 7—The Bluebird Reflex, by Lieut. P. V. O'Rourke.
 - A \$5 Home-Made Loudspeaker, by Herbert E. Hayden.
 - Feb. 14—A Super-Sensitive Receiver, by Chas. H. M. White.
 - A Honeycomb RST for DX, by Herbert E. Hayden.
 - Feb. 21—A 1-Tube Reflex for the Novice, by Feodor Hofpatkin.
 - A Set for Professional Folk, by Lieut. P. V. O'Rourke.
 - A Honeycomb Crystal Receiver, by Raymond B. Wadles.
 - Feb. 28—A Set That Does the Most Possible, With 3 Tubes, by Thomas W. Benson.
 - Three Resistance Stages of AF on the 1-Circuit Tuner, by Albert Edwin Sonn.
 - March 7—Storage B Battery, by Herbert E. Hayden.
 - Benson's Super-Heterodyne.
 - March 14—The Reflected 3-Circuit Tuner That You Can Log, by Herman Bernard.
 - March 21—A Variable Leak, by Herbert E. Hayden.
 - A 4-Tube, 3-Control Set That Gets the Most DX, by Jack Newcomb.
 - March 28—The Improved DX Dandy Set, by Herbert E. Hayden.
 - A 2-Tube Reflex for the Novice, by Feodor Hofpatkin.
 - April 4—The Diamond of the Air (Part 1), by Herman Bernard.
 - What the New Edison Tube Is, by Sidney E. Finkelshtein.
 - Set for the DX Devotee, by Lieut. P. V. O'Rourke.
 - April 11—Audio Hookups for Five Volume and Quality as Well, by Brewster Lee.
 - The Diamond of the Air (Part 2), by Herman Bernard.
 - 1-Tube Distance-Getting Sets, by Lieut. P. V. O'Rourke.
 - April 18—The Diamond of the Air (Part 3), by Herman Bernard.
 - The 7-Tube Pressley Super-Heterodyne (Part 1), by Thomas W. Benson.
 - An Easy D Co. by Jack Newcomb.
 - April 25—A 1-Tube, 2-Control DX Reflex, by Brewster Lee.
 - Trouble Shooting Article on Diamond of the Air, by Herman Bernard.
 - Wiring the Pressley Set (Part 2), by Thomas W. Benson.
 - May 2—The Twimplex, by J. E. Anderson.
 - May 9—A Set to Cut Static, by Feodor Hofpatkin.
 - Toroid Circuit Eliminates AF, by E. I. Sidney.
 - A Push-Pull AF Amplifier, by Lt. Peter V. O'Rourke.
 - May 16—A 1-Tube Reflected Neutrodyne, by Percy Warren.
 - The Baby Portable, by Herbert B. Hayden.
 - One Tube More for Quality, by Brewster Lee.
 - May 23—Powerful 3-Tube Reflex Receiver, by E. H. Wright.
 - The 2-Control Diamond (Part 1), by Herman Bernard.
 - May 30—Wiring the 2-Control Diamond (Part 2), by Herman Bernard.
 - 1-Control Neutrodyne, by Sidney E. Finkelshtein.
 - Making Your Set Tune the Entire Wavelength Band, by J. E. Anderson.
 - June 6—The Smokestack Portable, by Neal Fitzalan.
 - A and B Battery Eliminators, Using DO (Part 1), by P. E. Edelman.
 - A Variometer, by Lewis Winner.
 - June 13—Simple Short-Wave Circuits, by Herbert E. Hayden.
 - A Simple Push-Pull Rectifier, by A. C. G. Force.
 - A and B Battery Eliminators, Using AO (Part 2), by P. E. Edelman.
 - A Portable Super-Heterodyne, by Wainwright Astor.
 - June 20—The Diamond as a Reflex, by Herman Bernard.
 - A 2-Tube Portable Reflex, by Herbert E. Hayden.
 - A Reflex for 99 Type Tubes, by E. R. Barbely.
 - June 27—The Pocketbook Portable, by Burton Lindheim.
 - The Power House Set, by John L. Munson.
 - Lesson on Learning the Code.
- Any copy 15c. Any 7 copies, \$1.00. All these 32 copies for \$3.75 or start subscription with any issue. Radio World, 1493 Broadway, N. Y. City.

Loop Circuit Efficient, Using Four Tubes in Reflex Fashion

(Concluded from page 4)

half of the shaft, making 38 turns in all. The quartzite form is purchasable. This circuit, when completed should work as soon as the tubes are lighted up by the rheostats and the phone plug is inserted. In any set there is always room for improvement. The locality will have much to do with the success of the set, and also will the different type of tubes. The great-



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Send No Money — Just state battery wanted and we will ship day order in received, by Express C. O. D. subject to your examination on arrival. **FREE 'B'** Battery included. **Extra Offer:** 5 per cent discount for cash in full with order. Buy now and get a guaranteed battery at 50 per cent saving to you.

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2470 Radio Supply Jobbers	per List	20.00
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- One Karryradio, including self-contained loop and folding horn.
 - One Bruno No. 99 Junior coil.
 - Two Bruno No. 18 variable condensers.
 - One Continental midget condenser with panel knob.
 - One Dubilier Duratran.
 - Four Caldwell sockets.
 - Two Jefferson audio-frequency transformers.
 - One 7 x 18" drilled panel.
 - One socket subpanel, with binding posts and markers.
 - One .0025 mfd. grid condenser.
 - Two fixed condensers, .001 mfd.
 - One filament switch.
 - One 30-ohm rheostat.
 - Three Amperites.
 - Two 3" dials.
 - One speaker unit.
 - One 2" dial (for tickler).
 - One single-circuit jack.

est amount of trouble is caused by tubes. Always change the tubes around to get the utmost out of the set. Some tubes work better as detectors and some work better as amplifiers. The condenser C6 is optional. With some tubes it will make the set work better, but with most, it will not be needed. If you do not get selectivity, reverse the secondary of the fixed RFT (L4L5) and also the secondary of the baby coil. To get more regeneration reverse the leads of the tickler coil.

The New Type 54

SLEEPER MONOTROL

Reg. U. S. Pat. Off.

Has the extraordinary power of six stages of amplification, 3 of radio and 3 of audio. The utmost simplicity of tuning. Flawless tone quality. Exceptional selectivity.

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HOW TO BUILD A NEUTRALIZED LOOP, by Frank Freer. Send 15c for May 2 issue, RADIO WORLD.

On Your Vacation, Take a Portable Set—Build HAYDEN'S 4 TUBE PORTABLE

Complete Kit consisting of

- One Karryradio, including self-contained loop and folding horn.
- One Bruno No. 99 Junior coil.
- Two Bruno No. 18 variable condensers.
- One Continental midget condenser with panel knob.
- One Dubilier Duratran.
- Four Caldwell sockets.
- Two Jefferson (6 to 1 and 3 to 1) audio-frequency transformers.
- One 7x18" drilled panel.
- One socket subpanel, with binding posts and markers.
- One .0025 mfd. grid condenser.
- Two fixed condensers, .001 mfd.
- One filament switch.
- One 30-ohm Bruno rheostat.
- Three Amperites.
- Two 3" dials.
- One 2" dial (for tickler).
- One single-circuit jack.

\$39.95

Diamond of the Air
Complete Kit of parts.....**\$41.50**
(With loop \$46.50)

3 Tube Bruno No. 66 Kit
\$18.50

4 Tube Superdyne
Complete Kit of parts.....**\$39.50**

4 Tube Bruno No. 88 Kit
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Something New

"Bruno" Short wave tuner wound on quartzite glass with bare ribbon wire tuning from 25-110 meters **\$5.50**

BUILD THE "Bruno" "77" Wonder Set

Complete Kit consisting of

Write in for free catalogue and hookups.

- 1—7"x18" Panel
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- 1—Bruno No. 18 Ultra-Vario Condenser
- 1—Bruno Triple Socket Strip
- 1—Bruno 20 Ohm Rheostat
- 1—Bruno 10 or 6 Ohm Rheostat
- 1—Single Jack
- 1—Double Jack
- 2—A.F. Transformers
- 1—001 Fixed Condenser
- 1—.0025 Grid Condenser
- 1—2 Meg. Grid Leak
- 1—Filament Switch
- 2—4" Dials

\$22.50

B-C-L RADIO SERVICE CO.
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New York City

INDEX TO RADIO WORLD

APRIL 4

RADIO WORLD'S "Diamond of the Air," Part I, by Herman Bernard, giving picture and electrical diagrams.

Trouble Shooting Advice for Benson's Super-Heterodyne, by Thomas W. Benson.

The Coil Forms for the 1-A Portable, Part II, by Herbert E. Hayden, profusely illustrated by the author.

Official List of Stations of the U. S., alphabetically arranged.

Sets for the Devotee of DX, by Capt. Peter V. O'Rourke.

APRIL 11

An Analysis of 1-Tube Distance-Getting Sets, by Capt. Peter V. O'Rourke.

Nearly Ideal Coils for Use With a .001 Mfd. Condenser, by J. E. Anderson, with tables and diagrams.

The Coils for "The Diamond," by Herman Bernard, Part II.

The 1925 Model Portable, Part III, by Herbert E. Hayden.

APRIL 18

The 7-Tube Super-Heterodyne As Devised by Pressley, by Thomas W. Benson, Part I, with electrical diagrams.

How to Make a D Coil, by Jack Norwood.

How to Wire the Diamond of the Air, Part III, by Herman Bernard.

APRIL 25

The 1-Tube DX Divided Circuit, by Lewis Winner, with complete data and illustrations.

A 3-Tube 2-Control DX Reflex, by Brewster Lee, with diagrams.

How to Wire the Pressley Circuit, by Thomas W. Benson, Part II.

Diamond of the Air, Trouble Shooting, by Herman Bernard.

MAY 2

The New Twinplex, a 4-Tube DX Quality Set, Using Reflexed Push-Pull AF, Part I, by J. E. Anderson, with complete diagrams.

Testing, Balancing and Tuning the Pressley Set, by Thomas W. Benson.

List of Stations, in U. S., Canada, and Cuba, alphabetically arranged.

How to Build a Zero-Potential Loop Antenna, by Frank Freer.

MAY 9

A Set to Cut Out Static, by Feodor Rofpatkin. A Study of Resistance, by Lewis Winner.

How to Build the Toroid Circuit With Resistance AF, by E. I. Sidney.

The 2-Tube Earphone Tone-Marvel, by Brewster Lee.

How to Build a Push-Tone AF Amplifier, by Capt. Peter V. O'Rourke.

Pressley Trouble Shooting, by Neal Fitzalan.

MAY 16

How to Build the Baby Portable, by Herbert E. Hayden.

A 4-Tube Quality Receiver, by Brewster Lee.

The Short-Wave Receiver Reinartz, Will Use in the Arctic, by R. H. G. Mathews.

Easily-Made Crystal Sets.

A Study of Capacity, by Lewis Winner.

MAY 23

How to Build the Diamond of the Air As a 2-Control Set, Part I.

The Function of Inductance, by Lewis Winner. A DX Transmitter, a 5-watt phone set, by C. H. West.

A Powerful 3-Tube Reflex, by H. E. Wright.

A Simple 1-Tube DX Set for the Novice, by Percy Warren.

MAY 30

Lindheim's 1-Tube Reflex, by Burton Lindheim.

How to Make Your Set Tune the Entire Wave-length Band, by J. E. Anderson.

The 5-Tube Neurodyne Set, Ona Control, by Sidney E. Finkelstein.

Wiring the 2-Control Diamond, by Herman Bernard, Part II.

How to Make the Ballantine Reflex, with diagram, by Capt. Peter V. O'Rourke.

What You Should Know to Get Maximum Efficiency, by Lewis Winner.

Six Speaker Circuits that Captivated Discerning Fans, with the six diagrams and data how to build them.

JUNE 6

Third Annual Vacation Number.

The Smokestack Portable, a 5-Tube Set for Vacation Use, by Neal Fitzalan.

A and B Battery Eliminators using Direct Current, Part I, by P. E. Edelman.

How to Make a Wavemeter, Part I, by Lewis Winner.

Official List of Stations, alphabetically arranged, revised up to May 26.

Resistance AF in a RF Set That Gets DX on a 2 Controls, by Capt. Peter V. O'Rourke.

JUNE 13

How to Build Simple Short-Wave Sets, by Herbert E. Hayden.

A Simple Push-Pull Rheostat, by A. C. S. Force, with pictures.

A 5-Tube, Low-Loss Neurodyne, by Neal Fitzalan.

How to Use a Loop or an Aerial on the 2-Dial Diamond of the Air and How to Match the Coils, by Herman Bernard.

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A Portable Super-Heterodyne, by Wainwright Astor.

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More DX With a Tuned Aerial, a 1-Tube Set, by Capt. Peter V. O'Rourke.

JUNE 20

How to Build the Diamond of the Air As a 3-Tube Reflex and Also As a Portable, by Herman Bernard.

A Spare Parts Reflex, using 2-Tubes, That Works Great, profusely illustrated by Herbert E. Hayden.

How to Build Wavemeters That Have No Buzzers; Also How to Build an Oscillating Wavemeter, by Lewis Winner.

A Reflex for 3 UV197 Type Tubes, for Loud Speaker Use, by L. R. Barbly. (The Rasla Reflex.)

How to Use the AC Light Mains for A and B Battery Eliminators, Part III, by P. E. Edelman.

JUNE 27

The Pocketbook Portable, a 4-Tube Set, With Great Volume, by Burton Lindheim.

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Super-Heterodyne Theory

(Concluded from page 7)

use the suffix "dyne," and every syllable has a meaning; "super," greater or more than; "hetero," change; "dyne," power. The name of the circuit explains in outline the principle upon which the set operates.

It is a well known fact that all radio-frequency transformers have a set frequency on the amplification curve where signals are boosted to the greatest amplification value. Let us say, for instance, that this point happens to be 6,000 meters. All incoming signals, before they reach the amplifying transformers, have their wave lengths changed to the 6,000-meter wave, to be amplified at that wave. In this way the maximum amplification is attained. After the signal has passed through the inter-frequency transformers, it passes through the second detector, thence through the two stages of audio-amplification to loud speaker.

Referring to the circuit, note the six transformers, one filter, three inter-frequency, two audio-frequency. The filter boosts the wave to be amplified at the fixed frequency for which the IF transformers are designed. After passing through the second detector, the signal is

amplified for volume. Eight tubes are used. Oscillator, first detector, three inter-frequency tubes, second detector and the two audio-frequency amplifying tubes are the list. This is not a large number, considering the fact that it more than doubles the efficiency of a 4-tube outfit.

Two terminals are provided for the loop. No outdoor aerial or ground is recommended for this set. If you desire the utmost sensitivity, you may ground the filament side of the loop, but this will cut in slightly on the selectivity and the directional advantages of the loop. If you must try the aerial, although you may find the atmospheric noises amplified above the signal, place a 50-turn honeycomb coil across the "loop" terminals, connect the aerial to the grid side of this coil, the ground to the filament side, and omit the loop.

Every condenser in the circuit is vitally important. The super-heterodyne is not the type of circuit that will work "just as well" with or without a certain condenser. Everything shown in the circuit diagram should be used. You will notice that a condenser-leak is connected between the grid of the last tube and the positive amplifying B battery. This is supposed to better tone—to allow the excess voltage that otherwise would have overloaded the tube to leak off to ground potential. This is the only instrument in the set that may be eliminated, and then only by experiment will you be able to determine whether it is advisable, according to your own appreciation of tone.

The transformers used in this set were Remler. The variable condensers are a very important part of the circuit. In the laboratory model Acme was used.

The rheostat is the Federal, designed to stand two amperes, as this is the only rheostat in the set. The potentiometer is also Federal. The sockets are all Flewelling. The audio-frequency transformers are Kellogg. All fixed condensers are Dubilier. Jacks are Carter, filament switch Bradley. A Radion hard-rubber panel is used.

(Concluded next week)



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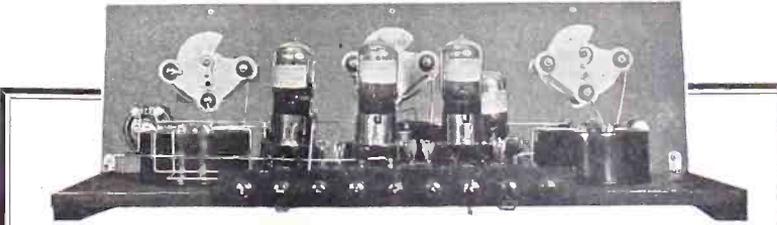
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How to Make the Rectifier and Filter for Transmitter

(Continued from page 9)

portance about the differences in types of modulation. More data can be obtained from the Superintendent of Documents, Government Printing Office, Washington,

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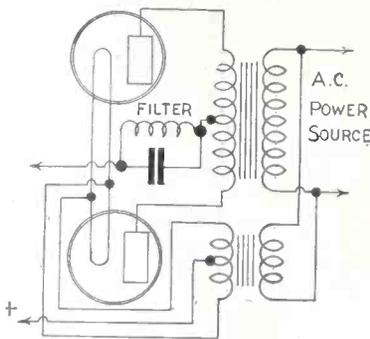


FIG. 7, how to connect up the rectifier tubes. This will be described in detail next week.

D. C., by enclosing 10 cents and asking for Scientific Paper of the Bureau of Standards, No. 423. This leaflet contains a batch of "dope" on modulatory systems.

Transformer-Rectifier-Filter Method

Now as to the reason why we use the transformer, rectifier and electrical filter method for supplying the plate voltage to the tubes. There is one every amateur desires, and that is a steady flow of DC for the plate voltage, which is no easy job for anyone to obtain. This type of rectifier operates on both halves of the cycle. The function of the filter is to flatten out the ripple. We use the chemical rectifier because it is cheaper, easy to make and very good when it operates. See Fig. 7 for tube rectifier, which is expensive, but also very good. There is, however, one objection to the chemical kind and that is the possibility of the solution in the jars spilling out. As for the filter, you will note that the modulation choke coil X is in series with the filter, which necessitates that no reactances be placed in this circuit, as this will combine with the inductance of the modulation choke coil and make the impedance of this flow fall below the value of the impedance

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of the average tube, which is about 4,500. We now have a very high impedance at 120 cycles (the number of cycles here employed) which falls off in step, and which never falls below 4,500 ohms, the impedance of the tube employed, throughout the whole audio-frequency range. We must use a condenser having a capacity of .02 mfd. as a balance. However, all this theory is no good if there is no thought given to the practical side. If we use the above theory we would have to use a choke coil with an inductance of 200 henries, which is quite large and impractical. So you see, there must be some good electrical factor given up, so we tune the circuit to a higher frequency, about 230 or 240 cycles, common ones to use. We reduce the inductance to approximately 25 henries, which is very easy. These data are only experimental and the operator actually will find out the inductance required for his particular filter by the "cut and try" method.

Here is some practical dope on how to make the choke coil, which has an inductance of 50 henries. This coil is made in similar fashion to that of the modulation transformer. Below is the data for building the 50 henry choke coil for the different tubes which one might want to be used:

For a 5-watt tube, use No. 30 enameled wire, and 50-watt tube No. 24 enameled
(Continued on next page)

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wire. There are 12,500 turns in each half of coil. There are 2½ lbs. of wire needed for the winding of the 5-watt coil and 16 lbs. for a 50-watt type. The dimensions of the core (5-watt tube, dxc in diagram) are 3x2"; for a 50-watt tube, 4x3". The width of the air gap ranges from ¼ to ¾".

For the condenser a .02 mfd. fixed type will fit the bill, which I would not advise anyone to build it. You may use the

Dubilier or the Stromberg-Carlson condensers.

How to Make the Rectifier

We are now going to construct a chemical rectifier, which is very simple to do, if all directions are carried out.

Each one of the jars which contain chemical rectifying properties should be able to stand 40 volts of the current, that you are presumably attempting to rectify. Let us take an example of just what this means. If a step-up transformer we are employing gives 1,200 volts (secondary voltage), 30 jars should be employed, 15 on each side of the line.

Now for the jars. These can be bought in any hardware store and may be pint preserving jars. Instead of the usual method of getting some hard rubber and sawing out a round piece to fit the top of jar, we are going to use the tin cover. Take the cover off and exactly in the center drill a ½" hole. This hole is used for putting solution in the jars so as to minimize evaporation.

This hole will be rough. File it down and get a piece of bakelite hard rubber fibre or even plain soft rubber tubing that will fit in the hole. Insert tubing and let it drop to ½" beneath the surface of the cover. Now drill two holes for holding of the electrodes, these being ¾" away from the center hole on each side. Drill holes large enough for the ordinary machine screw to pass through, 3/16" being the common size.

The plates may be bought of Eimer and Amend, Eighteenth Street and Third Avenue, New York City. Purchase about 14 feet of absolutely pure sheet aluminum and lead, ½" thick. If you are mathematically inclined you can find out how many inches of plate surface are required for so many milliamps that are being used in the plate circuit.

For every square inch of the elements surface, present in the solution, 41 milliamperes of current, which is on the plate of the tubes, is to be allowed, that is, if the plates are drawing 100 milliamperes, then there should be allowed 2.4 square inches on the surface of the electrodes, which are immersed in the solution. For the 5-watt tube the plates should be cut as follows: 4" long, 1" wide and ½" thick. Cut in 1" from either end and ½" from both sides. The plate will then look

like a handball racket. One-half inch from cut in section, make a right angle bend, and drill a 3/16" hole so that the machine screw from the top of cover will fit. For insulation purposes, put a ⅛" thick piece of bakelite between plate and cover, where the screw passes through.

This is done to all the plates for as many jars as is necessary in your particular case. There will be one aluminum plate and one lead plate in every jar. There will be 3 square inches of plate surface for the 5-watt tube, present in every jar.

For the 50-watt tube, the plate is cut as per: 5" long, 1¾" wide and ½" thick. cut plate same as for 5 watt, except that there is a cut in, 2" from either end and ½" from both sides. At ¾" from cut in section, make a right angle bend, and drill hole for the screw of the cover to fit. There are 5¼" of plate surface here. This is the amount present in every jar.

The solution is very simple to make. Ordinary borax is used here. Get about 1 lb. and dissolve in distilled water. Be sure that the solution is thoroughly cleaned as per: Borax cannot be dis-

(Concluded on next page)

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solved completely by water, so mix the solution for about 30 seconds, and then let the borax sediment settle on bottom. Either filter out or siphon out the clear solution. Each jar is filled with this solution, the plates being covered up until the cut in, on the plates are present. Put a little rubber cork in the center hole for prevention of evaporation. To prevent evaporation put a $\frac{1}{4}$ " coat of mineral oil on top of solution.

We cannot yet use the rectifier, as the

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plates are not formed. Get all the jars that you have made, connect them as per diagram, see last week's issue, and put them across the AC line, in series with a 200-watt lamp, for 10 hours. The aluminum plate will have light gray covering of oxide and the lead plate will have a dark brown covering when the plates are formed.

If after some weeks' operation, the jars heat up, better make new jars. The aluminum plate will look green, if operating perfectly, when in use with the transmitter.

Put the cells in trays which have been very carefully insulated from the earth by a couple of large size insulators. This is to prevent a possibility of an external short in the line, as the line is grounded

and if you ground the chemical cells, good-bye rectifier.

You may use DL 1,500 honeycomb coil for the choke coil, if you wish, that is, if you do not desire to wind all that wire, take 2 honeycomb coils (1,500 turns) put around a core, such as illustrated in the figure. They should fit snugly, around the core.

[Part III of this series on how to build a transmitter for amateur work will be published next week issue of July 11.]



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September 26

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1493 Broadway New York City

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For Seven Years the Best Practical Radio Magazine.

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ULTRA-VERNIER TUNING CONTROL

A VERNIER DIAL ON WHICH YOU CAN PENCIL
RECORD THE STATIONS GEARED TO TO 1. SILVER
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RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

10 CENTS A WORD. 10 WORDS MINIMUM

2,650 MILES DISTANCE WITH one tube. Wo power amplifier, circuit with instructions, \$1.00
W. G. Conger, Independence, Missouri.

RADIO HOSPITAL: Specialists in Neutrodynes and Super-Heterodynes. Dept. 4, Abilene, Kansas.

SUMMER STATIC CRUSHED. For \$3.00 I will mail specifications for powerful 40 to 600 meter four-tube DX broadcast receiver of extreme selectivity. Easy when you know how.
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GETTING BETTER QUALITY FROM AUDIO, by Brewster Lee. Last AF stage connected to two tubes in parallel. Send 15c for May 16 issue to RADIO WORLD, 1493 Broadway, New York City.

THE BABY PORTABLE, by Herbert E. Hayden. A 1-tube DX set on a $7\frac{1}{2} \times 3\frac{1}{4}$ " panel. Send 30c for May 16 and 28 issues to RADIO WORLD, 1493 Broadway, New York City.

A POWERFUL 1-TUBE REFLEX, by H. E. Wright. Send 15c for May 23 issue, RADIO WORLD.

THE PRESSLEY SUPER-HETERO-DYNE, described by Thomas W. Benson, beginning in this issue, will be continued in the April 25 and concluded in the May 2 issue. Send 30 cents for the April 25 and May 2 issues to Circulation Manager, Radio World, 1493 Broadway, New York City.

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

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

INEXPENSIVE AND EFFICIENT single tube power amplifier; circuit with instruction, \$1.00.
W. G. Conger, Independence, Missouri.

A PUSH-PULL AF AMPLIFIER with diagrams, in RADIO WORLD dated May 9. 15c per copy, or start your subscription with that number.
RADIO WORLD, 1493 Broadway, N. Y. C.

THE BLUEBIRD REFLEX 2-tube earphone marvel by Capt. Peter V. O'Rourke. Send 15c for February 7 issue. RADIO WORLD, 1493 Broadway, New York City.

MAKE MONEY! RADIO BUSINESS. Write Konkle, 192 Market Street, Newark, N. J.

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

A 3-TUBE REFLEXED NEUTRODYNE, by Percy Warren. Send 15c for May 16 issue, RADIO WORLD.

PATENTS—Write for free Guide Books and "Record of Invention Blank" before disclosing inventions. Send model or sketch of your invention for our inspection and instructions free. Terms reasonable. Radio, Chemical, Mechanical, Electrical and Trademark experts. Victor J. Evans & Co., 924 Ninth, Washington, D. C.

SALESMAN CALLING ON RADIO DEALERS WANTED to handle Radio Tubes as a side line. Thoria Tube Company, Dept. W, Middletown, Ohio.

EASILY-MADE CRYSTAL SETS. Send 15c for May 16 issue, RADIO WORLD.

A 3-TUBE REFLEXED NEUTRODYNE, by Percy Warren. Send 15c for May 16 issue, RADIO WORLD.

A SET FOR REDUCING STATIC with diagrams, in RADIO WORLD dated May 9. 15c per copy, or start your subscription with that number. RADIO WORLD, 1493 Broadway, New York City.

AMAZING SUMMER RECEPTION! "Radio for Everybody" means 100% efficiency from your set. Handbook—Working Guide—Authority. 360 Pages. 52¢. Profusely illustrated. Just published! Only \$1.65 postpaid. (C. O. D. if desired.) Satisfaction or refund. Mail only. Inventors Library, Dept. 5-A, 417 West 21st St., New York.

A DX TRANSMITTER, by C. H. West, May 23 issue, RADIO WORLD, 15c.

Fans Resent Attack On Hook-Ups

A LETTER of complaint, published in RADIO WORLD, June 20, denouncing the magazine's hookups, particularly one (from which others got excellent results) has stirred readers. L. H. Amidon for-

wards a carbon copy of a letter he wrote to E. S. Hancock, the complainant, who called RADIO WORLD hookups a fake. Mr. Amidon wrote:

E. S. Hancock, Esq.
1161 S. High St.,
Columbus, O.

Dear Sir:

Your letter to RADIO WORLD, published in their June 20 issue, has been noticed, and I beg to suggest that you look further for your trouble as I'm sure you will find it due to some fault of your own.

I haven't hooked up the particular circuit you mention, but have tried a lot of their hookups and find them quite as good as the average run of circuits offered the public by any magazine. There are a lot of good circuits, and most any of them will perform in some manner and usually there isn't a vast difference between any of them if properly connected and operated.

In my earlier experimental days, and I'm still only a rabid fan getting a lot of kick out of radio, I used to want to blame my troubles on someone else, but that didn't help the set any, and it won't do it in your case. If you use good parts, hook it up right and learn how to operate your receiver, I'll wager it will work and do all that is claimed for it. Maybe you won't get signals six to ten thousand miles away with it, but if you don't it will be because the set isn't designed for great DX.

I don't believe RADIO WORLD is much disturbed by your letter as they published it in full, and it is my suggestion that you rebuild this circuit, do it right, use good parts and you'll find it works, and if it does, then send an apology to the magazine, admit your error, as you should, and keep up the good work. You'll get a lot of kick yourself out of your set or some other. Here's good luck to you.

Yours, a brother fan,
L. H. AMIDON.

* * *

C. G. Schlegel, Kenesaw, Neb., wrote to RADIO WORLD:

"Just received my June 20 issue and note the 'exposure' by E. S. Hancock. I have tried your hookups and they sure do work."

THE SHORT WAVE RECEIVER REINARTZ WILL USE IN ARCTIC. Full wiring directions. Send 15c for May 16 issue, RADIO WORLD, 1493 Broadway, New York City.

Stop Secrecy, Executive's Advice to the Stations

EDITOR, RADIO WORLD:

I am interested in your editorial on the subject of short waves. Since there is so little known it might be of great advantage for stations to let people know what they are doing and then we could give them some ideas on the reception.

D. A. Johnston, Vice-President,
City Coal & Wood Co.,
New Britain, Conn.

Baseball Season is Here! Cash In

Now is the time to take advantage of our special bargain prices.

Lightning Arresters, Insulators, Freshman Kits, Head Sets, Tubes, Complete Sets.

MR. DEALER, WRITE NOW FOR OUR LIST. Baseball Season is pretty near, GET READY.

THE BOWER RADIO SHOP

Wholesale Radio Reading, Michigan

WANTED IN EVERY LOCALITY

An agent to sell Billmore Master Reformer Receivers to dealers, on our plan which allows the dealer to make summer profits equal winter profits.

The receiver with the "Guaranteed Best Tone"
BILTMORE RADIO COMPANY
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ACME POWR-BEE

Better Than "B" Battery

NO HUM NO NOISE

Reduces the cost of radio. At your dealer's or write.

THE ACME ENGINEERING CO.
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Dealers write for big sales proposition.

GLOBE Low-Loss Tuners

Always give best results

Globe Radio Equipment Co.

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New and Improved FRESHMAN MASTERPIECE

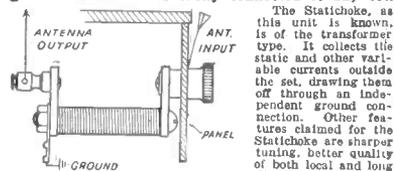
3-Tube Tuned Radio Frequency Receivers

Sold by Authorized Freshman
Dealers Only

OLD MAN STATIC "KILLED" AT LAST

Statchoke Has Startled the Radio World
—Sent Direct to Radio Fans on
10 Days' Free Trial

What is claimed to be one of the greatest modern improvements in Radio, through reduction of static and clearer, long distance, and better quality of reception is announced for a new imported unit which is easily connected to any set.



The Statchoke, as this unit is known, is of the transformer type. It collects the static and other variable currents outside the set, drawing them off through an independent ground connection. Other features claimed for the Statchoke are sharper tuning, better quality of both local and long distance reception, greater selectivity, especially on low wave lengths and a perfect safety lightning arrester. This unit was recently awarded a Certificate of Merit by the Radio News of Canada.

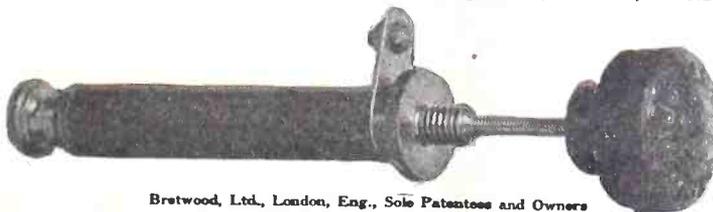
Owing to the limited number of Statchoke units available for American use this season, the distributors have set aside 25,000 units for distribution direct to radio fans for only \$2.50 each on 10 days' free trial.

Send no money—just your name and address to Radio Dept., Imperial Laboratories, 8529 Coxa Cola Bldg., Kansas City, Mo., and the Statchoke will be sent you by insured mail. Use it for 10 days with the distinct understanding that if it does not do everything claimed for it, return it in good condition and even this special price will be refunded. Write today and enjoy "Summer Radio," as this offer is fully guaranteed and you do not risk a cent.

The Leak That Kings and Fleets Employ

This leak is used in King George's Palace and by the U. S. Shipping Board; over 270,000 sold in last four months

Fit for
a King



1/4 to 10
Megohms

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The BRETWOOD Variable Grid Leak

More DX, Clearer Reception, Smoother Control in Regenerative Sets Assured

The Bretwood Variable Grid Leak may be installed in any set in five minutes by single hole panel mounting.

The North American Bretwood Co., 1505 Broadway, N. Y. City

Sole Distributors for United States and Canada

NOTE TO RADIO MANUFACTURERS

Upon request, we will send any known radio manufacturer a sample of the Bretwood Variable Grid Leak.

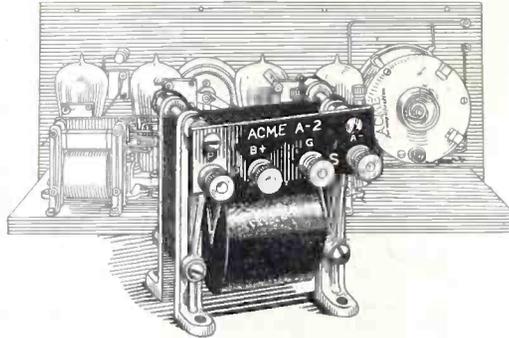
A set with a FIXED Grid Leak may work perfectly where tested, while it needs a VARIABLE Grid Leak so that set may be adjusted to the locality where used.

THE NORTH AMERICAN BRETWOOD CO.,
1505 Broadway, New York City.

Gentlemen: Enclosed find \$1.50 for which you will please send me one Bretwood Variable Grid Leak prepaid. Satisfaction guaranteed or my money back after trial within ten days of receipt by me.

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STREET CITY
STATE

Midsummernight's Entertainment



Loud and Clear with ACME Transformers

For Amplification Without
distortion use ACME
Transformers in the set
you build. Insist on them
in the set you buy and
enjoy all the year round
Radio

SOMEWHERE there's a comfortable chair on a comfortable porch. The heat of the day is over. Through the soft darkness a cool little breeze of evening is faintly rustling the leaves of the maple at the corner. In the depths of the chair, the end of a cigar fitfully glows. Out through the open window floats clear radio music; the romantic strains of La Paloma, or the Tales of Hoffman. There is deep content in the soul of the man in that chair, surrounded by the loveliness of the night and the soothing beauty of music brought to him by radio.

Can your radio do that for you in summer time? Do you enjoy what you hear—voices that sound clear, music pure in tone and quality?

Whether you have a neutrodyne, superheterodyne, regenerative or reflex, the addition of the Acme A-2 Audio Amplifying Transformer will make it better. They have given the pleasure of "amplification without distortion" to thousands of people. Try them and note the difference.

Each Acme—A-2 is tested and carries a guarantee tag. Use them in the set you build. Insist on them in the set you buy.

Send for our 40-page book which explains how to get the best results with your set. Also contains valuable wiring diagrams. It will help you build a set. Mail the coupon with 10 cents.

ACME APPARATUS COMPANY

Transformer and Radio Engineers and Manufacturers
Dept. L3, Cambridge, Mass.

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Dept. L3, Cambridge, Mass.

Gentlemen: I am inclosing 10 cents (U. S. stamps or coin) for a copy of your book, "Amplification Without Distortion."

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