

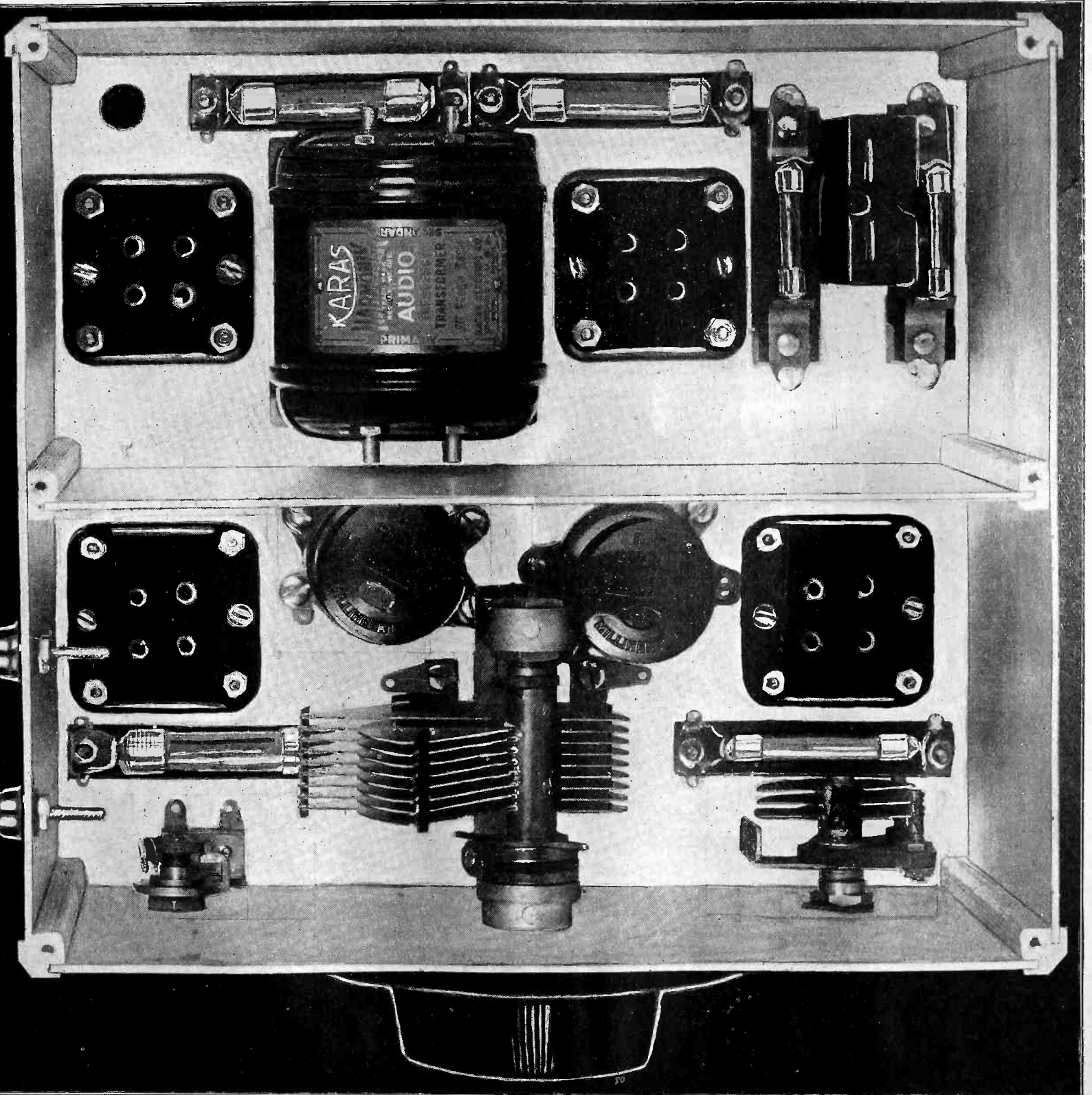
REG. U.S. PAT. OFF.

WORLD

The First and Only National Radio Weekly
326th Consecutive Issue—Seventh Year

Vol-13. No-14

MIDGET PORTABLE BUILT IN SHIELD



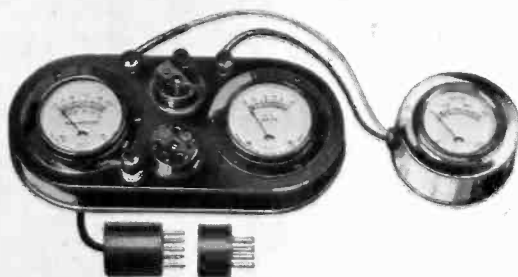
THE TOP VIEW of the layout of parts in the Double Shield Portable is pictured at about two-thirds the actual size of this physically diminutive but electrically important receiver. All the batteries are placed in a similar shield. See page 3.

A Two-in-One Universal AC and DC Scientific Trouble-Shooting Test Set!

A New Product Made in Response to a Demand for a Single Combination Meter Outfit That Measures Voltages and Currents of Both AC and DC Tubes

WHAT YOU GET:

- (1) One newly-designed Two-in-One 0 to 10 volt-meter for AC and DC. Same meter reads both. Scale especially legible at 1/2 to 7 1/2 volts. This meter reads the AC and DC filament voltages.
 - (2) One DOUBLE reading DC milliammeter, 0 to 20 and 0 to 100 milliamperes, with changeover switch. This reads plate current, which is always DC in all sets.
 - (3) One 0-300 volts high resistance voltmeter, with tipped 30" cord to measure B voltages.
 - (4) One 5-prong plug with 30-inch cord for AC detector tubes, etc., and one 4-prong adapter for other tubes.
 - (5) One grid switch to change bias.
 - (6) One 5-prong socket.
 - (7) One 4-prong socket.
 - (8) Two binding posts.
 - (9) One handsome noise metal case.
 - (10) One instruction sheet.
- [Outfit consists of two units, one being the 0-300 voltmeter (Cat. No. 346), the other the tester with enumerated parts built in. (Cat. No. 215.)]



Price Only

\$ 13.50

Trouble Shooting Amazingly Simplified!

Instead of bearing the expense of an assortment of meters, service men, custom set builders, home constructors, experimenters, teachers, students and laboratories can now fulfill their set-testing and tube-testing needs with the Two-in-One Test Set.

If you want to test a tube or associated circuit, remove the tube and insert it in the proper socket of the tester. You can't make a mistake, because the number of prongs on the tube base confines you to only one of the tester sockets:

Now insert the plug in the vacant socket of the receiver—using the four-prong adapter if the tube came out of a four-prong socket. Attach 0-300 voltmeter to two binding posts. Turn on the receiver. *Presto!* You read filament voltage (AC or DC), plate current and plate voltage!

Absolute 5-Day Money-Back Guaranty!

Get one of these Two-in-One Testers and try it out. If not completely satisfied return the outfit and your purchase price will be refunded. If you're not delighted we're not even satisfied.

[Some may prefer to read higher plate voltages than 300 volts. In that event a 0-500 high-resistance voltmeter (Cat. No. 347) may be obtained instead, at \$1 extra; total \$14.50.]

GUARANTY RADIO GOODS CO.,
145 West 45th Street, New York City.

Please send me at once, on a five-day money-back guaranty, one complete Two-in-One (AC and DC) scientific trouble-shooting test set, consisting of one No. 215 and one No. 346, for which I will pay the postman \$13.50, plus a few cents extra for postage.

- If 0-500 v. high resistance voltmeter No. 347 is preferred, put cross in square and pay \$14.50, plus postage, instead of \$13.50, plus postage.
- One No. 215 alone \$10.00.

NAME

ADDRESS

CITYSTATE

ALL METERS SOLD ON FIVE-DAY MONEY-BACK GUARANTY

SEND NO MONEY!

You can obtain the Two-in-One Tester, with 0-300 or 0-500 voltmeter, simply by filling in and returning coupon. We will ship C. O. D. at the specified prices, plus a few cents for postage. No C. O. D. to foreign countries, however.

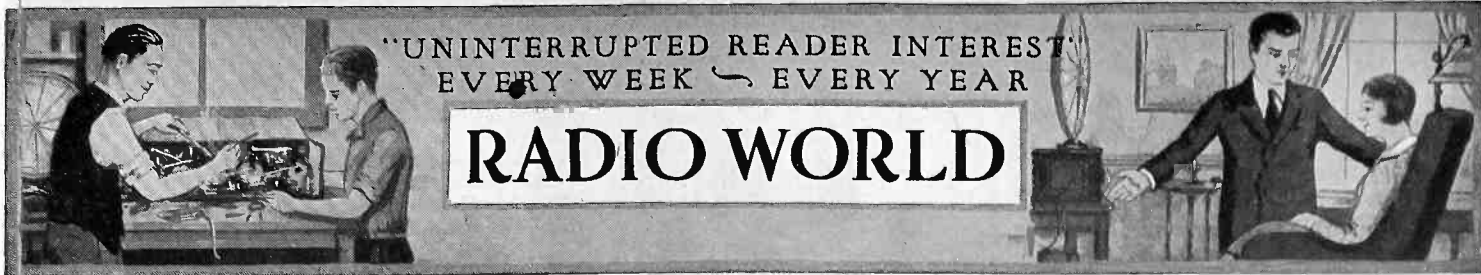
Remember that our five-day money-back guaranty is absolute and unqualified. You run no risk whatever.

Cat. No. 215 Two-in-One Universal Tester (Outfit complete except for high resistance voltmeter).....\$10.00
 Cat. No. 346 High resistance voltmeter, 0-300 volts..... 4.50
 Cat. No. 347 High resistance voltmeter, 0-500 volts..... 5.50

GUARANTY RADIO GOODS CO.

145 West 45th Street
 NEW YORK, N. Y.

(Few doors east of Broadway)



"UNINTERRUPTED READER INTEREST"
EVERY WEEK ~ EVERY YEAR

RADIO WORLD

A Weekly Paper published by Hennessy Radio Publications Corporation, from Publication Office, 145 West 45th Street, New York, N. Y. (Just East of Broadway) Phone: BRyant 0558 and 0559

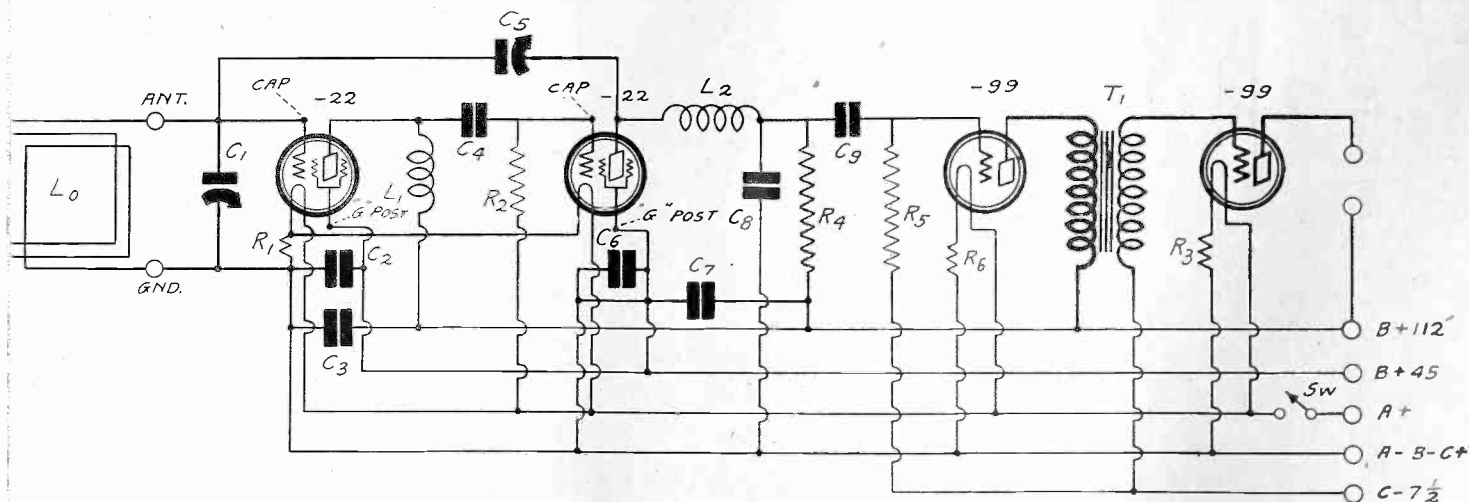
JUNE 23, 1928
Vol. XIII, No. 14. Whole No. 326
15c per Copy.
Entered as second-class matter, March, 1915, at the post office at New York, N. Y., under Act of March, 1879.]

Technical Accuracy Second to None

A Unique Portable — Only 20 Pounds Complete —

Complete 4-Tube Receiver in One Shield, All Batteries in Another —
Sensitivity High, Performance Good

By H. G. Cisin



ONE OF THE SLICKEST PORTABLES SO FAR TO COME TO PUBLIC ATTENTION.

PORTABLE receiver that fits into one Hammarlund shield, powered by batteries that fit into another shield of the same make and size, makes a fetching loop-operated outfit, useful in the home as well as on vacation. The loop and speaker are additional to the two component containers, since a collapsible loop and a speaker are easily carried separately, or everything put in a suitcase. The advantages of a portable are many. It is not true that the only object is to be able to place a single installation somewhere in the woods and listen in. Many persons like to listen to programs when they are in an automobile. Others simply want a receiver that may be taken to a camp, boarding house or hotel, and operated there, much as would be done in the home. Still others are keen for night rides in a canoe, with radio adding to the romance of moonlit waters. Train and steamboat rides are made all the more enjoyable to still others when they can listen in.

The receiver about to be described does all these purposes, for while it is

a portable it is also scientifically designed and handsomely executed.

The Twelve Points

The outstanding features of this Double Shield Portable are:

- (1) extreme compactness
- (2) light weight (total only 20 pounds)
- (3) sensitivity, reaching high levels due to the aid of the screen grid tubes
- (4) loop operation
- (5) handsome appearance
- (6) versatility of use (at home or abroad)
- (7) single tuning control
- (8) optional regeneration
- (9) optional use of antenna or ground or both, without any change in the circuit
- (10) moderate cost
- (11) foolproofness
- (12) low drain on B batteries.

Taking up these points in the order named:

It is scarcely possible to make the receiver of smaller plane area, since the parts take up what room they arbitrarily

require, and there is very little air space between, yet this is accomplished without electrical overcrowding.

The set is stable in operation, whereas it would have been easy, by missing opportunities of design, to suffer self-regeneration by close placement.

Watch the Height

There is no more height than the circumstances require, because when the height of the Frost socket and height of the tube are added, there is just enough clearance for the caps of the two screen grid tubes to meet physical and electrical requirements. Frost sockets, or other small-height ones, should be used, because other sockets are too high to prevent the top of the shield from striking the cap of the screen grid tubes.

As for the separate battery compartment, all the room available is used.

The completed, encased receiver weighs 5½ pounds and the batteries (including shield) twelve pounds. Less weight is scarcely possible. The sensitivity is high,

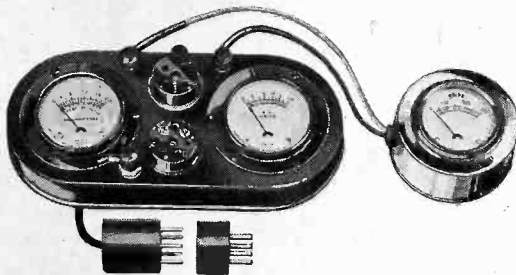
(Continued on next page)

A Two-in-One Universal AC and DC Scientific Trouble-Shooting Test Set!

A New Product Made in Response to a Demand for a Single Combination Meter Outfit That Measures Voltages and Currents of Both AC and DC Tubes

WHAT YOU GET:

- (1) One newly-designed Two-in-One 0 to 10 volt-meter for AC and DC. Same meter reads both. Scale especially legible at 1/2 to 7/8 volts. This meter reads the AC and DC filament voltages.
 - (2) One DOUBLE reading DC milliammeter, 0 to 20 and 0 to 100 milliamperes, with changeover switch. This reads plate current, which is always DC in all sets.
 - (3) One 0-300 volts high resistance voltmeter, with tipped 30" cord to measure B voltages.
 - (4) One 5-prong plug with 30-inch cord for AC detector tubes, etc., and one 4-prong adapter for other tubes.
 - (5) One grid switch to change bias.
 - (6) One 5-prong socket.
 - (7) One 4-prong socket.
 - (8) Two binding posts.
 - (9) One handsome noire metal case.
 - (10) One instruction sheet.
- [Outfit consists of two units, one being the 0-300 voltmeter (Cat. No. 346), the other the tester with enumerated parts built in. (Cat. No. 215.)]



Price Only

\$ 13.50

Trouble Shooting Amazingly Simplified!

Instead of bearing the expense of an assortment of meters, service men, custom set builders, home constructors, experimenters, teachers, students and laboratories can now fulfill their set-testing and tube-testing needs with the Two-in-One Test Set.

If you want to test a tube or associated circuit, remove the tube and insert it in the proper socket of the tester. You can't make a mistake, because the number of prongs on the tube base confines you to only one of the tester sockets:

Now insert the plug in the vacant socket of the receiver—using the four-prong adapter if the tube came out of a four-prong socket. Attach 0-300 voltmeter to two binding posts. Turn on the receiver. *Presto!* You read filament voltage (AC or DC), plate current and plate voltage!

Absolute 5-Day Money-Back Guaranty!

Get one of these Two-in-One Testers and try it out. If not completely satisfied return the outfit and your purchase price will be refunded. If you're not delighted we're not even satisfied.

[Some may prefer to read higher plate voltages than 300 volts. In that event a 0-500 high-resistance voltmeter (Cat. No. 347) may be obtained instead, at \$1 extra; total \$14.50.]

GUARANTY RADIO GOODS CO.
145 West 45th Street, New York City.

Please send me at once, on a five-day money-back guaranty, one complete Two-in-One (AC and DC) scientific trouble-shooting test set, consisting of one No. 215 and one No. 346, for which I will pay the postman \$13.50, plus a few cents extra for postage.

- If 0-500 v. high resistance voltmeter No. 347 is preferred, put cross in square and pay \$14.50, plus postage, instead of \$13.50, plus postage.
- One No. 215 alone \$10.00.

NAME

ADDRESS

CITY STATE

ALL METERS SOLD ON FIVE-DAY MONEY-BACK GUARANTY

SEND NO MONEY!

You can obtain the Two-in-One Tester, with 0-300 or 0-500 voltmeter, simply by filling in and returning coupon. We will ship C. O. D. at the specified prices, plus a few cents for postage. No C. O. D. to foreign countries, however.

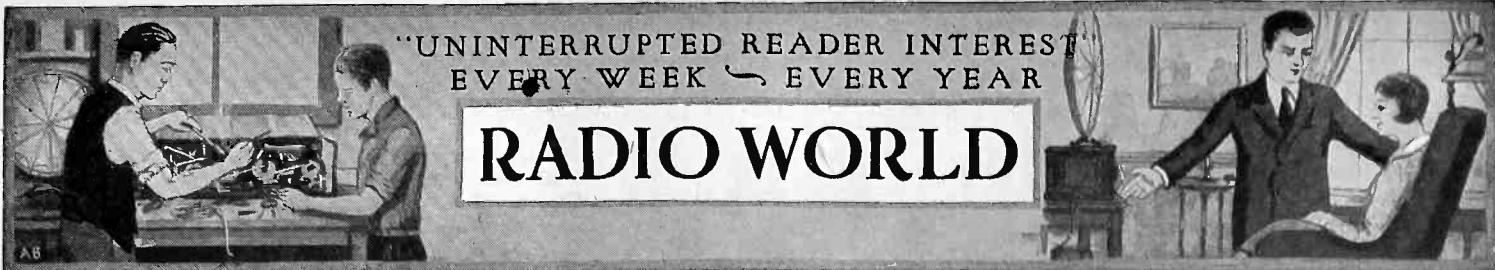
Remember that our five-day money-back guaranty is absolute and unqualified. You run no risk whatever.

Cat. No. 215 Two-in-One Universal Tester (Outfit complete except for high resistance voltmeter).....\$10.00
 Cat. No. 346 High resistance voltmeter, 0-300 volts..... 4.50
 Cat. No. 347 High resistance voltmeter, 0-500 volts..... 5.50

GUARANTY RADIO GOODS CO.

145 West 45th Street
NEW YORK, N. Y.

(Few doors east of Broadway)



JUNE 23, 1928
Vol. XIII, No. 14. Whole No. 326
15c per Copy.

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

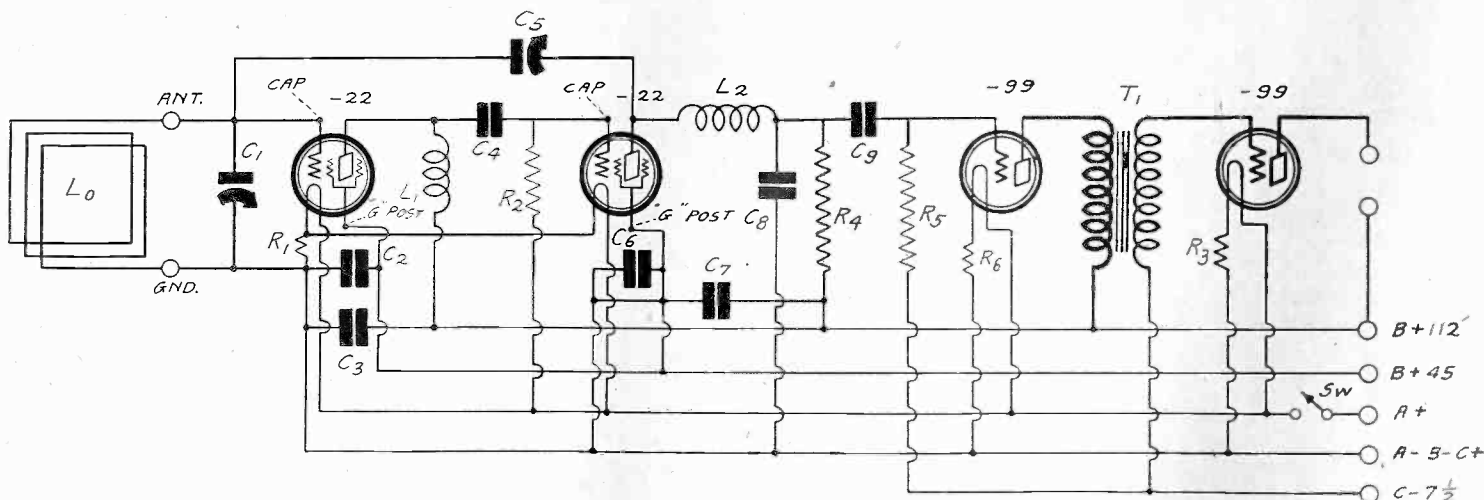
Technical Accuracy Second to None

A Weekly Paper published by Hennessy Radio Publications Corporation, from Publication Office, 145 West 45th Street, New York, N. Y. (Just East of Broadway)
Phone: BRyant 0558 and 0559

A Unique Portable —Only 20 Pounds Complete—

Complete 4-Tube Receiver in One Shield, All Batteries in Another—
Sensitivity High, Performance Good

By H. G. Cisin



ONE OF THE SLICKEST PORTABLES SO FAR TO COME TO PUBLIC ATTENTION.

A PORTABLE receiver that fits into one Hammarlund shield, powered by batteries that fit into another shield of the same make and size, makes a fetching loop-operated outfit, useful in the home no less than on vacation. The loop and speaker are additional to the two component containers, since a collapsible loop and a speaker are easily carried separately, or everything put in a suitcase.

The advantages of a portable are many. It is not true that the only object is to be able to place a single installation somewhere in the woods and listen in. Many persons like to listen to programs when they are in an automobile. Others simply want a receiver that may be taken to a camp, boarding house or hotel, and operated there, much as would be done in the home. Still others are keen for night rides in a canoe, with radio adding to the romance of moonlit waters. Train and steamboat rides are made all the more enjoyable to still others when they can listen in.

The receiver about to be described serves all these purposes, for while it is

a portable it is also scientifically designed and handsomely executed.

The Twelve Points

The outstanding features of this Double Shield Portable are:

- (1) extreme compactness
- (2) light weight (total only 20 pounds)
- (3) sensitivity, reaching high levels due to the aid of the screen grid tubes
- (4) loop operation
- (5) handsome appearance
- (6) versatility of use (at home or abroad)
- (7) single tuning control
- (8) optional regeneration
- (9) optional use of antenna or ground or both, without any change in the circuit
- (10) moderate cost
- (11) foolproofness
- (12) low drain on B batteries.

Taking up these points in the order named:

It is scarcely possible to make the receiver of smaller plane area, since the parts take up what room they arbitrarily

require, and there is very little air space between, yet this is accomplished without electrical overcrowding.

The set is stable in operation, whereas it would have been easy, by missing opportunities of design, to suffer self-regeneration by close placement.

Watch the Height

There is no more height than the circumstances require, because when the height of the Frost socket and height of the tube are added, there is just enough clearance for the caps of the two screen grid tubes to meet physical and electrical requirements. Frost sockets, or other small-height ones, should be used, because other sockets are too high to prevent the top of the shield from striking the cap of the screen grid tubes.

As for the separate battery compartment, all the room available is used.

The completed, encased receiver weighs 5½ pounds and the batteries (including shield) twelve pounds. Less weight is scarcely possible. The sensitivity is high,

(Continued on next page)

(Continued from preceding page)

because the circuit was designed with sensitivity, rather than selectivity, as a prime consideration. There is no need for much selectivity in a portable. The problem seldom, if ever, is to segregate one station from some interfering station, but rather to get any station at all.

Don't Expect the Impossible

Reception on portables never should be expected to come up to reception from home receivers, because the portable is used at points often far removed from any station, and under circumstances where intervening woodland, mountain-side, metallic soil and the like, interpose severe barriers.

As an example, on a given receiver WEAf comes in strong and clear at Coney Island. The same receiver, taken to a Summer cottage on Lake Popolopen, N. Y., a few miles back of West Point, using the same aerial, brings in WEAf only well enough to make it audible on the loudspeaker. In both instances—01A tubes, storage battery and a maximum B supply of 135 volts, from batteries, were used. If small tubes, like the—99 type, were substituted the volume would be still less. Hence, to overcome in part the rustic handicap, screen grid tubes should be employed in any portable.

All Hail the Screen Grid

Loop operation is made really practical by the use of the screen grid RF tube and some regeneration, for otherwise more tubes for radio frequency amplifying would be required. Thus the filament current drain would be at least as much, probably more, than in the present circumstances, and a bulky receiver would have to be constructed.

The handsome appearance and excellent shielding are due to the shield construction. The shields are made of Alco aluminum, manufactured by the Aluminum Company of America, and glisten softly because dipped to give a satin finish. The parts contained in the receiver have fine eye appeal.

The receiver may be used in the home just as it is, for it is an attractive and a scientifically-appearing piece of work. The receiver should be provided with rubber feet, because of the protrusion of the hexagonal nuts at the bottom.

The receiver may be kept on a table or the like, and the power supply put in the console compartment, or, if you have no table or console, the combination may be placed side by side on an ordinary flat-top table. Assuming you might use two screen grid, one—01A and one 112 tube in the home, a diagram for such use is published on page 8.

Single tuning control—one dial to determine wavelength—is a virtual necessity with a portable, for often you may have to tune with your eyes shut.

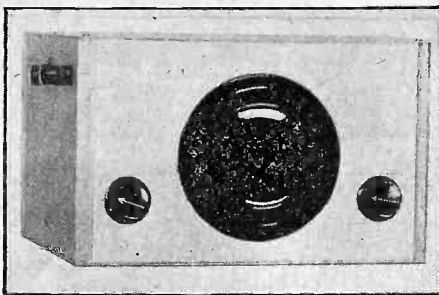
Regeneration is in reach by turning the knob of the midget condenser, but the midget condenser may be set once, to regenerate a little on 400 meters or more, and left thus for all waves.

Antenna, Ground, If You Like

If you use a ground you may pick up more energy with a loop-operated receiver than if you don't, so if you want to carry a short spare wire to be stuck into the ground with the aid of a plumb or other device to which it is soldered, you may get stronger signals.

Also, if you want to throw a wire over the branches of trees or in the water, to obtain greater signal strength, you may try that, or you may combine the assistance of sky aerial with ground connection, as you would most likely do in a shack or tent in the woods, for still better reception. Simply connect to the loop binding posts on the shield receiver. The loop then serves as a tuned impedance with antenna-ground input.

While the set works well without this



THE LOOP POSTS ARE AT THE TOP LEFT, WHILE ON FRONT, AT LEFT, IS THE SWITCH, AND AT RIGHT THE MIDGET CONDENSER.

assistance, it may work better with it. The tuning will change somewhat—perhaps as much as 10 degrees—due to the antenna-ground capacity. Lower dial settings will prevail when antenna or ground or both are used. The change is always in the tuning condenser, when antenna and ground or one or ground is employed.

The midget condenser, if used for variable regeneration, slightly changes dial settings.

Self-Insuring

The moderate cost is made possible by the choice of only such parts as are necessary to obtain the desired results, and to the choice of parts that perform very well yet sell at a reasonable figure.

The portable is foolproof, a good thing, especially when you are among inquiring strangers with the technical itch. When the shields are put together you can't touch anything inside them.

The low drain on batteries makes it likely that the batteries will last for your entire vacation, provided you don't take more than three months! The filament current is .384 ampere, which overtaxes the No. 6 dry cells about 30 per cent, reducing the life of these cells about 50 per cent. This is of no importance, as you are not seeking long life of the A supply, but content to have these batteries last through the Summer. The B battery drain, which is very important, is kept low (at 16 milliamperes), so that you won't have to replace these batteries either, for this Summer's vacation.

Construction Outlined

In constructing the receiver the first step is to assemble the shield. This is very easy, as it is necessary only to screw the flat pieces and the uprights together, and screws for this purpose are furnished with the shields.

It is necessary to watch the center uprights, for they may be inserted so as to bring the screw hole to one side or the other, and if mounted out of conformity, it would seem that one of the uprights and the cover were a misfit. Reverse one of the uprights to solve this. Then insert the center flat centerpiece. Next screw down the lid and the shield is finished.

The reason for asking you first to put the shield together is to make sure you become familiar with its construction. No particular order of assembly need be followed, except that the cover must be put on last.

Note This Difference

It is all right to put the front and back on in pairs, so that the space may be widened by easy pressure to insert the side pieces. If the flat sidepieces do not slip easily into the grooves, slide one piece through the workable groove, and distend the uprights, clamping the flat pieces into place in the stubborn pillar by bringing back the distended uprights in easy fashion. Do not try to force anything. All parts work into a harmonious ensemble, without forcing.

The piece to be used for the front is

LIST OF PARTS

For the Receiver

- Lo—One loop.
 - L1, L2—Two Hammarlund 85 millihenry RF choke coils.
 - C1—One Hammarlund .00035 mfd. Midline tuning condenser.
 - C2, C3, C6, C7, C8—Optional fixed condensers of .001 mfd. each.
 - C4—One .00025 mfd. fixed condenser.
 - C5—One Hammarlund junior condenser (9 plates).
 - R1—One 1A Amperite.
 - R6, R3—Two 4v-199 Amperites.
 - R2—One Lynch 2 meg. metallized grid leak.
 - R4—One Lynch 100,000 ohm metallized resistor.
 - R5—One Lynch 5 to 10 meg. metallized grid leak.
 - T1—One Karas Harmonik audio frequency transformer.
 - C9—One .5 mfd. Aerovox bypass condenser.
 - SW—One Yaxley No. 10 switch.
 - One Hammarlund QS Aluminum shield.
 - Four Frost sockets.
 - Four binding posts (Ant. and gnd. for receiver shield; speaker output posts to go on battery shield.)
 - One Karas micrometric dial.
- For Power Source
- Three Burgess No. 6 "A" 1½ volt A batteries.
 - Five Burgess No. 4156, 22½ volt B batteries.
 - One Burgess No. 5540, 7½ volt C battery.
 - One Hammarlund QS Shield.
 - Two Output (speaker) posts.

the one that allows wider depth. There is a slight difference in depth between the two compartments, so be sure to select the larger. Put the dial in exact center, by locating the tuning condenser shaft at that point, and center the shaft holes for the switch and the midget condenser at lower left and right, respectively, as shown in the front elevation illustration.

The piece to be used as the front is removed from the shield so that the mounting of switch, midget condenser and tuning condenser may be handily done. The aluminum will be found easy indeed to drill, and each hole made should be finished off with a countersink effect, as with a reamer, to remove any burr. It is absolutely imperative to insulate the switch and midget from the panel, front and back.

Now with a sharp pointed pencil draw a light line demarcating the division of the bottom area. Write the letters "RF" near where the first socket will be (lower left in front cover illustration). This will key you in your layout work afterward, giving you instant notice of which is front and where the radio frequency channel should be.

Condenser Must Clear

Now disassemble the shield, except for the two front uprights, so that you may work on the bottom piece, the one you've ruled and which you've initialed.

Locate the parts as follows: first put the RF socket so that the far edge comes just inside the pencilled partition line. Next to the socket put the RF tube's choke, next that of the other choke, then the detector socket. Simply lay them in place. Also lay the one Amperite mounting in front of the RF socket and the Lynch single mounting in front of the detector socket, both in the direction of and parallel with the front panel.

Slip the front panel into place. The front uprights have been left in position for this purpose. You can determine the fact that the tuning condenser clears everything in all directions, also that you will have room between the first socket and the first choke coil for the RF coupl-

ing condenser, C4, .00025 mfd., which is mounted upright.

There are no other vital parts for the radio frequency section of the receiver, since the fixed condensers C2, C3, C6 and C7, are optional. If used, they should be small ones, like Tiny-Tobes. Others won't fit. All are .001 mfd.

Insulate "Ant." Post

Hold the center piece in position, using the pencilled lines as guide, and make doubly sure that everything clears this partition.

Next take one of the side pieces, and near the top and toward one corner, drill two holes. These are for the loop binding posts. Since some may want to make antenna connections, it is well indeed to use "Ant." and "Gnd." posts, as these distinguish high and low RF potentials. The "Ant." post must have insulating washers front and back. These may be punched bakelite or hard rubber. You can make your own by cutting or getting small squares, say 1/2 inch diameter, and drilling quarter-inch holes in each. The "Gnd." lead should not be insulated.

Drill a half-inch hole in the rear right-hand corner, through which the cable is to pass.

Now locate the mounting holes for the two sockets already positioned, as well as for the Amperite mounting, the Lynch mounting and the Hammarlund choke coils, and secure these to the bottom. The parts themselves are a template. Use a scriber and press strongly to locate the centers of the holes. Then drill quickly, to avoid "catching" the aluminum.

A Little Speed, Please

Put a slab of wood underneath, so that you can make a clean drillhole in each instance by finishing with speedy turns.

Wire up the simple radio part of the receiver. Always have the radio division performing correctly before constructing the audio part of any receiver, for if any trouble arises the work of locating it is simplified fourfold. It seems simplicity varies directly as the square of the numbers of tubes in circuit.

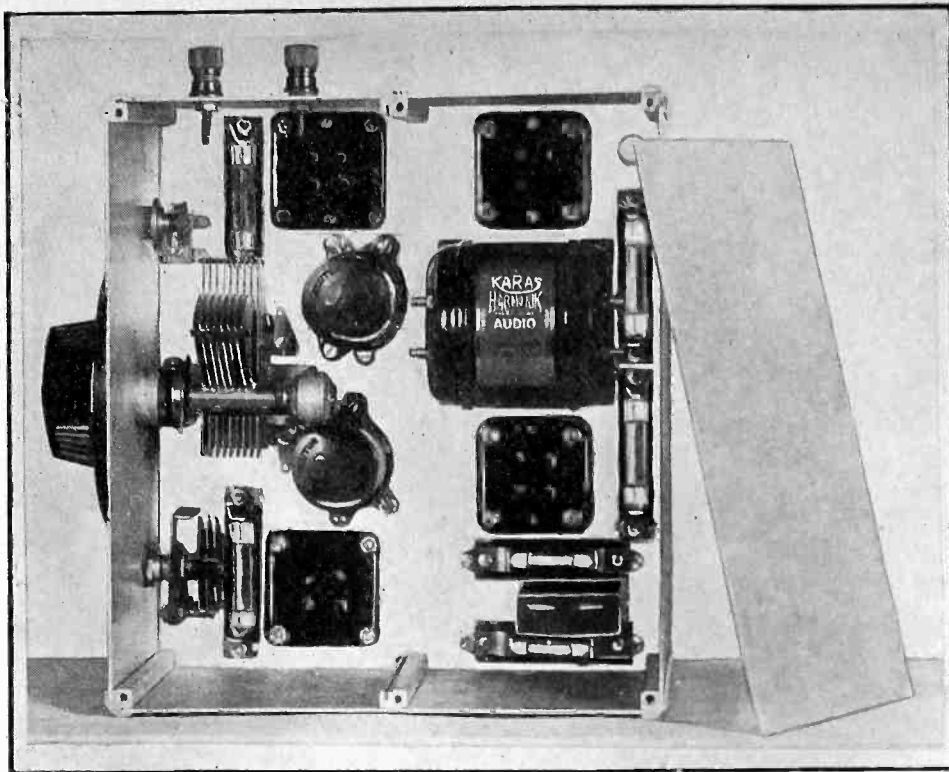
The shield itself is to be A minus and ground, so join one end of the Amperite (the end farther from F minus on the socket) to the holding screw of the Amperite mounting. Solder carefully. The screwhead more than likely is nickel plated. Careful workmen lightly rub a file or emery paper over the top of such screw before putting the screw to use, if they desire to solder to it. Nickel plating sometimes resists solder by letting it roll off, even when at proper heat, and also sometimes causes an actually soldered joint to be weak.

Nearest Iron Many Miles Away

The extra precaution is doubly worth while when building a receiver that may be worked many miles from the nearest soldering iron.

The two F minus posts of the two sockets are united by a wire lead and brought to the free end of the Amperite mounting. A screen grid tube is placed in the socket at left. (Always assume the front panel at front in determining left and right, front and back). A clip, such as a No. 45 Peewee clip, is soldered to one end of a flexible insulated lead, and the clip is attached to the cap of the tube. The front panel is to be held in place for a while now. Thus the distance to the nearer stator lug of the tuning condenser is measured, half an inch extra is allowed, the wire is snipped, the insulation peeled off a bit, and the bare end soldered to the lug of the tuning condenser.

A flexible lead is metallically connected but not soldered to the other lug of the stator frame, the other end of this wire being soldered to the stator of the Junior or midget condenser. The object is to have the front panel removable without unsoldering, in the event of trouble shooting. A few leads must be removable there-



THE CENTERPIECE OF THE SHIELD IS USED TO SEPARATE PHYSICALLY THE RADIO FROM THE AUDIO PART OF THE CIRCUIT. YOU CAN SEE WHERE THE CENTERPIECE, TILTED AT RIGHT, WOULD SLIDE INTO THE TWO UPRIGHTS. THE COMPARTMENTS ARE OF SLIGHTLY DIS-SIMILAR SIZE. BE SURE TO USE THE LARGER ONE FOR THE RADIO CHANNEL.

fore. One is to the right-hand stator lug of the tuning condenser. Scrape off enough wire insulation to permit looping the end. Solder this to create a firm, small circle. Remove the lug screw. Place the bare circle over the screw hole. Do not hold the circle but insert the screw through it and into the threaded hole, bearing down on the screw with a driver. The wire circle is bumpy from solder and the screw would be tilted, and not enter, if the wire were used as guide. The rotor of the midget goes to detector plate.

Remove the front panel.

Two More Stunts

There are only two tricks left.

The detector plate RF choke had to be mounted on the grid side of the detector socket. Bring the detector plate lead around to the more distant connection point of this choke, so that the lug nearer the audio circuit is available for shorter connection later on, to the plate resistor mounting.

The other point is to be sure to mount the coupling condenser C4 (.00025 mfd.) in an upright position. A wire around the first RF choke connects to the plate of the first socket and to this fixed condenser. The open side of the condenser is connected to grid side of the Lynch mounting.

The rotor of the tuning condenser need not be considered constructionally, because of automatic connection to the shield proper. This grounds the rotor and makes it A minus, too.

Try On the Front Again

Two wires should join A plus at sockets. The open side of the Lynch mounting should be connected to A plus likewise. Also the G posts of the two sockets are interconnected. These do not represent the grid as we commonly know it, but the shield grid of the new tubes, that gets a B positive voltage.

At any time during these operations one may try on the front panel, to be sure of clearance in all respects even as to clearing the wiring. Of course the front panel had to be held in place awhile to do the soldering to the stator lugs previously discussed.

Now reconstruct the shield, but leave off the top.

Temporarily connect wires as follows: one to A plus on either socket, one to A minus on "Gnd" post, one to B plus 22 1/2 volts and G post of either socket, one to B plus 112 and the first RF choke (L1). Only one open lug is on each choke. Connect a loop or the secondary of an RF transformer with antenna and ground, to the two posts. Connect earphones from the open lug of the detector choke coil and B plus 112. Insert the two screen grid tubes. Tune in.

Operation of the Receiver

If you work the receiver from your home in any large center you may notice that the selectivity is not sufficient, by mere tuning, to get rid of crosstalk of powerful local stations, but that to accomplish such elimination you must carefully turn the loop, fully utilizing its directional properties. Readjust the midget for greatest volume at 400 meters or higher—even 500 meters or more—but so there's no squealing at any higher setting. Only the combination of tuning condenser and directional properties of the loop makes good reception possible in centers so overcrowded with stations as New York and Chicago, unless the midget is properly set.

You may find that the regeneration condenser is very critical. At minimum setting you get no regeneration, but a little extra capacity suddenly gives you too much. Carefully get in between. There is a correct point. Find it.

This is one point that bears close attention—the condenser required is likely to be of about as tiny a total capacity as you can possibly buy for front panel mounting.

Again—Watch Clearance

Familiarize yourself with the tuning. Then remove the temporary leads to the battery-supplied terminals, disassemble the shield, and construct the audio part, using the photographs and wiring diagram as your guide. The two Amperites are soldered together where their lugs meet, or almost meet, and this joint is connected to the mounting screw of one of the

(Continued on page 8)

The Effects of Wave and Television

By J. E.

Technical

THE factors in a radio receiver which contribute to distortion of the signal are well understood and it is now possible to build receivers in which the fidelity is almost perfect.

There are two kinds of distortion in sound transmission and reception. One is amplitude distortion and the other is wave form distortion.

In amplitude distortion currents of some frequencies are not amplified to the same degree as currents of other frequencies. In wave form distortion harmonic frequencies are introduced which change the timbre of the sound.

A certain amount of either of these types of distortion will be present in every receiver no matter how faithful it is. But "perfect" reproduction may be defined as such that the ear cannot tell the reproduction apart from the original. This is a very flexible definition, but it is diplomatic in that it leaves each proud set owner to be his own judge of the quality of his set.

How Distortion Arises

Amplitude distortion arises in numerous ways. A selective tuner will cut down the amplitude on the higher audio frequencies more than on the lower. The grid condenser and leak method of detection has the same effect. A by-pass condenser connected across the line anywhere also permits the high frequencies to escape the loud and thus suppress the high. A choke coil in series with the line produces the same effect.

A condenser in series with the line will cut the low frequencies more than the high. A choke coil across the line will let the low frequencies escape from the load and thus suppress them.

A series resonant circuit across the line will cut out one frequency almost completely and will reduce the amplitude of currents of adjacent frequencies. A parallel tuned circuit across the line will have the opposite effect, that is it will amplify one frequency more than others and cause an amplification peak, and depress both higher and lower frequencies. Feedback through impedances common to two or more plate or grid circuits may cause an enormously high amplification peak at one frequency and a suppression at other frequencies.

Wave form distortion occurs wherever

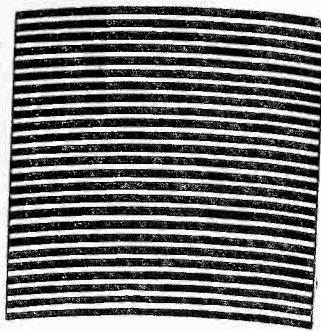


FIG. 1
THIS FULL-SIZED DRAWING SHOWS THE APPEARANCE OF THE FIELD OF VIEW IN THE TELEVISION RECEIVER AS DESIGNED BY ALEXANDERSON.

there is overloading of tubes and transformers.

Television Distortion

Just as there is distortion in sound transmission and reception so there is in television, and this distortion may be due to optical, electrical or mechanical causes. The optical system can be made, at little cost, so that it will contribute an inappreciable amount of distortion. To convince ourselves of the truth of this we only have to look on the ground glass in a photographic camera and note the fidelity of the image to the object. Even an inexpensive camera will give a clear image. A little curvature in a line that is supposed to be straight is not noticeable, and if the proper lens system is used there need be no curvature.

Distortion due to electrical causes are of the same type as in broadcasting and they are produced by the same factors. But in television they are much more severe because the sidebands are much wider. The sound reproducing system is designed to be faithful over a range of somewhat less than 10,000 cycles. In television it may have to be made faithful over a band as high as 100,000 cycles. The difficulties of design will be more than ten-fold.

It is clear that if it is difficult to bring in a broadcast station through interference without seriously cutting sidebands,

it will be much more difficult to bring in television, the sidebands of which may be ten times as wide as broadcast sidebands.

It is equally clear that if it is difficult to detect the higher audio frequencies properly it will be much more difficult to detect ten times higher frequencies. And when the television signal has been detected the difficulty of faithful amplification has just begun. Equal amplitude amplification must be maintained from zero to about 100,000 cycles or there will be distortion in the picture.

How Signal Is Modulated

In the most popular method of television there are 24 scanning holes, each passing the object 18 times per second. That does not mean that the signal will necessarily contain a frequency of 18, or 24, or of 18×24 (432 cycles). These frequencies will be present but only incidentally.

The essential side frequencies arise from the variations or the changes in the intensity of illumination of the picture transmitted. And these side frequencies may have any value. If the illumination is everywhere the same, the essential side frequency will be zero. This is true whether the picture is white, gray or black. Where the illumination changes suddenly from light to dark, as at the line of demarcation between highlights and shadows, the essential side frequencies will be very high. In fact, if the line is sharp there will be frequencies of infinite value.

What will happen to these lines of contrast if the electrical transmitter and receiver are not able to reproduce the high frequencies? The change from dark to white in the image will be gradual instead of abrupt. The picture will pass from dark to white through a gradation of grays. The image will appear to be out of focus. And the more rapidly the scanning is done the greater will this blurring effect be.

Anything in the electrical system which suppresses the high notes or frequencies will contribute to this blurring effect. As mentioned above, some of them are the selectivity in the tuned circuits, by-pass condensers across the audio amplifier, choke coils in series with the line, and self-capacity in the amplifier tubes. Hence it is of utmost importance to design the electrical system so that all frequencies up to about 100,000 are transmitted and received.

Effect of Mechanism

Mechanical distortion will arise from improper scanning and lack of synchronism between the transmitter and the receiver. If the two scanning devices are not perfectly synchronized "picture points" will be displaced. The image received may become a caricature of the transmitted image, or the image may not appear at all.

If the scanning holes are accurately placed in both the transmitter or the receiver, but if they are too small, the image will contain light and dark bands. If the holes are of the proper size and

Ives Cites Biggest Television Obstacle

Chicago.

Manufacturers making more than eighty per cent of all the radio sets sold annually in the United States were represented at the annual meeting of the Radio Division, National Electrical Manufacturers Association, in the second day of its annual meeting. Member companies also owning broadcasting stations totalled more than two hundred kilowatts of power out of a total in the United States of six hundred thirty-four kilowatts.

Addresses were made by Dr. Herbert E. Ives, television research engineer of the Bell Telephone Laboratories, who described the almost insuperable technical and economic obstacles to practical television.

Dr. Ives said that the economic limits

were the greatest ones to practical television.

"As an engineer I have no hesitancy in saying that slowly the huge obstacles in the way of practical television by wire or radio will gradually be overcome.

"But the cost of the apparatus, both at the transmitting and receiving end, will be enormous. The apparatus now required will provide a recognizable image of about one and a half inches square with apparatus that is tremendously cumbersome and expensive.

"The expense of better television apparatus will be immeasurably greater. What will the public be willing to pay for, when they find out what is the quality of pictures obtainable even with our present comparatively crude apparatus?"

Frequency Distortion on Reception

Anderson

may be a bright streak and next to it a dark streak when the unmodulated field should appear homogeneous, that is the intensity of illumination should be everywhere the same. When the distance between the adjacent scanning lines is $1/16$ of an inch and the size of each scanning hole is .035 inch, which is the case in the Alexanderson system as now used, there is a separation of .0275 inch between the luminous bands on the image, and the field will be banded or striated.

coated paper, a screen of 200 or more lines to the inch can be used. And the finer the screen the better will the print be, if the paper permits it, and the more detail and the finer gradations will the picture contain.

Exactly the same holds true of television. In the Alexanderson system a "screen" of 16 lines to the inch is used, or 24 lines for a picture of $1\frac{1}{2}$ inches square.

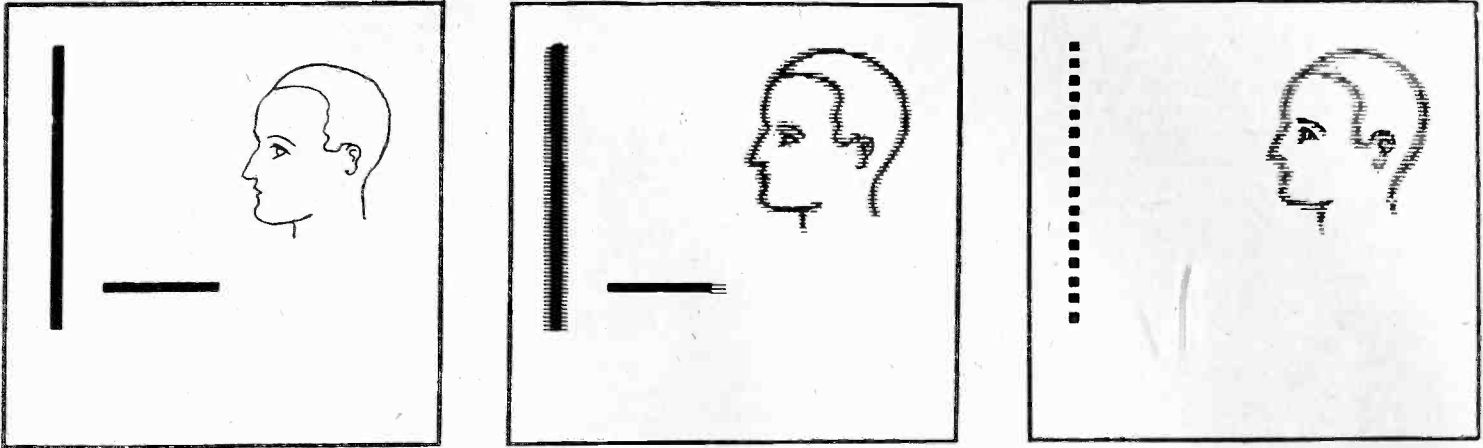


FIG 2

THESE THREE DRAWINGS ILLUSTRATE TELEVISION DISTORTION. AT THE LEFT IS THE ORIGINAL PICTURE CONSISTING OF A HUMAN PROFILE, A VERTICAL LINE AND A HORIZONTAL LINE. THE MIDDLE PICTURE SHOWS HOW SUPPRESSION OF THE HIGH FREQUENCIES IN THE SIDEBANDS DISTORTS THE PICTURE. ALL SHARP VERTICAL LINES BECOME FUZZ-EDGED AND INDISTINCT. THE HORIZONTAL LINE REMAINS SHARP EXCEPT AT THE ENDS. THE LINES IN THE PROFILE BECOME FUZZY EXCEPT WHERE HORIZONTAL. AT RIGHT IS SHOWN HOW A VERTICAL LINE IS BROKEN UP BY THE SCANNING ELEMENTS. THE PROFILE SHOWS NOT ONLY HOW THE LINES ARE BROKEN UP BUT ALSO HOW THEY ARE BLURRED BY THE SUPPRESSION OF HIGH FREQUENCIES.

overlap the proper amount the striations will not be noticeable.

If the scanning holes are improperly placed the image will also be striated, but the bands may not have the same width. In one part of the field of view there

But as the picture is transmitted that way, the image would be distorted if it did not appear the same way.

[In an early issue the author will discuss the construction of amplifiers suitable for television.]

In the Ives system a much finer "screen" is employed, and consequently the Ives system is much more complex than Alexanderson's. But the finer "screen" used in the Ives system produces a much finer picture, with more detail and greater definition. If the "screen" used were still finer the reproduced picture would contain still greater definition and finer gradations, but the cost of operation would mount to enormously higher figures.

The technical problems involved in using a finer "screen" have been solved, but the financial problems are the stumbling block. That holds true whether the system used be that of Dr. Ives or that of Dr. Alexanderson. But is it doubtful whether the "screen" used in the Alexanderson system can be made much finer than it is now.

Much of the cost of fine "screen" television lies in providing a suitable channel of transmission. The finer the "screen" and the finer the definition required, the greater are the requirements of the line or the channel of transmission.

A course "screen" may not require a line which will transmit faithfully over a range of frequencies greater than 5,000 cycles per second. A finer "screen" may require a channel which will be faithful over a range of 50,000 cycles. And a still finer "screen" may require a high grade channel that will handle frequencies up to 500,000, or even 5,000,000 cycles per second.

Imperfect television can be had at little cost. High quality television at present can be had only at a cost which is out of all proportion to the value of the new service. An Alexanderson receiver could be built for \$100, whereas an Ives receiver easily could cost more than \$5,000.

How Price Questions Affects Television

Dr. Herbert E. Ives, under whose guidance the Bell Laboratories have developed the most successful system of television, has stated that the only obstacle to the general application of television is economic. The technical features of the problem have been solved but the financial problems seem insuperable.

Dr. E. F. W. Alexanderson, of the General Electric Co., has developed a simple system of television which is now used for broadcasting vision on regular broadcast waves. His system is well-known and the receiving apparatus required for this system costs no more than an inexpensive radio receiver. The transmitter seems to be no more complex nor costly. The financial problems connected with the Alexanderson system are not beyond solution.

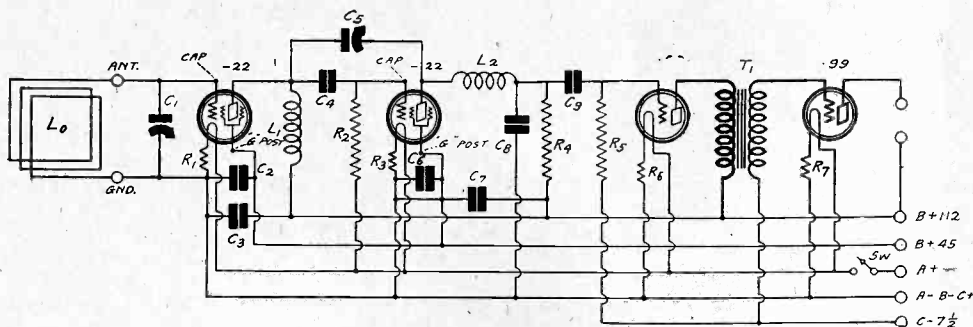
Wherein lies the difference? Here are two of the foremost authorities on television in the United States apparently taking opposite views. One says that television is not practical for economic reasons and the other is the technical sponsor for the actual broadcasting of

moving pictures. Each represents organizations with practically unlimited financial resources. Each man understands perfectly the technical problems involved in television. Yet one states that it is economically unpractical and the other lets the transmitted pictures speak for him.

Where Is the Difference?

The difference lies in the systems used by the two men and in the opinions as to what constitutes practical perfection. There are many degrees of definition in the transmitted and received pictures, just as there are many degrees of definition in a half-tone print. One half-tone picture may be built up on the basis of 50 lines to the inch, another of 100 lines and still another of 200 lines, the number of lines used depending on the fineness of the paper on which the picture is to be printed. For newspaper work, on newsprint paper, a screen about 65 lines per inch is used, for a finer screen would only result in black splotches. For better grade paper a screen of 135 is used, as in RADIO WORLD. For book purposes one fine,

Midget Portable Set Does Giant's Work



IF THE RECEIVER IS DESIRED FOR HOME USE, THIS CIRCUIT MAY BE FOLLOWED. THEN TWO SCREEN GRID TUBES, ONE —01A AND ONE 112 (OUTPUT) TUBE WOULD BE USED. THE CHANGES ARE: SEPARATE 622 AMPERITE FOR EACH SCREEN GRID TUBE AND CONNECTION OF MIDGET CONDENSER STATOR TO PLATE OF THE RF TUBE, INSTEAD OF TO ITS GRID, TO MAKE C-5 A VOLUME CONTROL.

(Continued from page 5)

Amperites. The other ends go to the respective F minus posts of the two audio sockets.

Take care to mount the Karas audio transformer so that the screws thereon will not touch the aluminum partition. There is just enough room to do this. If you miss up, clip off enough of the screw to give good clearance.

The wiring of the audio channel requires that the open end of the RF choke coil in the detector plate be connected to the near lug of the Lynch mounting at far-right corner, the other lug on this mounting going to B plus 112.

The rest of the wiring is conventional, except that the output of the last tube is flexible lead passed through the large hole in the bottom level, later to connect to a binding post on the shield containing the batteries, but now left with loose end. The other speaker terminal goes to B plus 112.

This is Permanent

Permanently connect the cable lead to A plus (equal post on nearest socket, that being the last AF); C minus (attached to F post of audio transformer and open end of first audio grid resistor), and, after drilling a hole in the partition, carry through the leads for A minus (to one side of the switch), B plus 22½ to G post of one of the two screen grid tubes; B plus 112 (to end of first choke coil and, by scraping insulation, to B+ of audio transformer. The loop post may be used for C plus temporarily.

After connecting the open side of the switch to the Gnd. posts, by first looping and soldering the still unconnected end of the wire, and connecting by fastening with a nut to post, you can now operate a loud-speaker from this compact receiver.

Testing the Receiver

When the receiver is completed it should be tested by putting the shield together, except the top, and connecting the batteries from a table top. Assuming that the test is made at home, use only a loop, or ground A minus and use loop, too, but do not use a flat wire antenna, as the selectivity will not be good enough. Otherwise it is good.

The voltage of +45 for the screen grid tubes, shown in the diagram, is to be used if the plate resistor is 50,000 ohms or less. Better use 100,000 ohms and 22½ screen grid (not plate) volts.

The lowered screen grid voltage necessitates increased capacity of C-5, the junior condenser to attain regeneration. Tune in a station and fiddle with the C-5 setting until all blurred effects disappear

from the signal. Readjust C-1 every time you reset C-5.

If you can't get low wave stations your loop has too many turns. If high waves escape you the loop has too few turns. The tuning condenser is supposed to be .00035 mfd. But if your loop has too few turns for that you may use .0005 mfd. The only object is to match loop and condenser. The other differences are immaterial.

You will find signals very clear, but not extremely loud. When you get into the country you can retain about the same volume by using antenna and ground.

When you're satisfied that the set is working properly, lay the lid on the can. The screen grid tube caps clear the lid easily. But a portable may get some hard knocks and rough treatment. Chalk the caps and press down on the lid to register the point of contact. Even if both caps are touched by the lid no batteries are shorted, but no signals come in. So pencil mark the cap registry points and cut two pieces of adhesive tape about 1 inch square. Heat the adhesive side high over a match flame and stick one piece of tape over each pencil mark. Thus you prevent shorted signals, for the tape, so long as dry, acts as an insulator.

The dry batteries fit into the second

shield. The batteries are made by Burgess. The three No. 6 dry cells (1½ volts each) are laid flat and fit in only one way. The shield partition cannot be used.

On top, in a row, are put three 22½ volt batteries, side by side, the long sides adjacent. This makes a tight fit. The pillars can't be cleared but the sides of the shields are back a bit and can be cleared—just. The fourth and fifth 22½ volt batteries are placed in front of the others and allows room for the 7½ volt dry battery (C battery). Plug up the air space to prevent jouncing. Card-board or wood cut to insulate battery terminals from the shield is necessary, but remember the shield is A minus, hence connect accordingly.

A connection to the shield at any point can be made by drilling a hole, inserting a machine screw, tightening down a nut, and soldering to screw or nut. You can't well solder to aluminum.

[This completes the article on the construction of the receiver and gives a working basis for building the batteries into a shield. Actual battery dimensions and layout will be discussed next week in a final instalment.]

Roxy Would Climb on Television Wagon

Addressing the Convention of the National Association of Music Merchants at the Hotel Commodore, New York City, S. L. Rothafel ("Roxy") said that he for one would be ready to welcome television whenever and as soon as it becomes a practical reality. He added:

"People have often asked me: 'What are you going to do when television comes?' When it comes we will hitch it to our wagon as we did radio, and if they want it we are going to give to them. We are not worrying about it."

Radio Girl Wants No Disillusionment

Vaughn De Leath, "the Original Radio Girl," was asked by an interviewer:

"Are you looking forward to working in television?"

She replied:

"No. Judging from letters, the different people who haven't seen me have individual, and usually very pleasant mental pictures of me. I despise people who go in for disillusionment."

Television Found Still Experimental

With the development and introduction of the Raytheon Kino-Lamp or neon tube for television reception, and the Raytheon Foto-Cell for television transmission, the Raytheon organization has launched into an extensive campaign of research and special production in co-operation with television experimenters.

"We do not assume for a single moment that television has arrived at the commercial stage or anything even approaching such refinement," states D. E. Replogle, of the engineering staff of the Raytheon Manufacturing Company.

"However, we do believe that the time is ripe for television experiments both at the transmitting and the receiving end, on an extensive scale. Therefore, as headquarters for gaseous tubes of all kinds, we are prepared to co-operate with experimenters and others in the development

and production of special tubes for television requirements.

"Our research staff, headed by C. G. Smith, inventor of the Raytheon tube and its predecessor, the S-tube, has had long experience in gaseous conduction. Experiments have been conducted with every conceivable gas, electrode, spacing, arrangement, insulator and so on. We have studied the effects of gas pressure until today we can produce tubes of a given starting voltage, luminosity, responsiveness, and so on.

"We therefore wish to co-operate with television experimenters in the development of the necessary neon tubes and photo-electric cells of regular or special design, to the end that this young art may receive the maximum co-operative effort of amateurs in repeating the spectacular development of radio broadcasting."

Boy Scouts and Radio

By B. L. Sicnarf

'WAY back before the war, when there were no broadcast stations, a young man was tinkering around with crystal sets and putting up curious looking wires on the roof.

Aerials were so rare then that people on the street would stop and look at the poles and wires and point it out to their friends as a curiosity. "Who is this chap?" they said. "Oh, that's Barry and some wireless affair," some one would say.

As early as 1916 he started in experimenting and has since spent many hours dabbling in radio.

As a typical example of the modern radio fan, his career is doubtless an example of the place that radio has come to occupy in the minds and hearts of many of our young men, and even many of the older ones, who should realize that once they are bitten by the radio bug, they have succumbed to a disease for which there is no cure.

They are doomed to listen in for distant stations, to be satisfied never, to experiment always and to be forever seeking the new and better set, and always buying parts.

Large Buying Power

Their number is legion and their buying power has made the radio industry one of the leading industries of the country.

And yet, there is a recompense to the sufferers from "radiotis" and this comes in the ability to tell the other fellow in an authoritative tone just what is wrong with his set and tell in tones of glee of the tremendous power with which Los Angeles boomed into one's own house.

For the interest of our readers, therefore, we present Lyman F. Barry, chronic sufferer from "radiotis." Bitten with the bug 'way back before the war, he was almost cured when the police raided his house on the outbreak of the war with Germany and decreed that no private radio stations must remain in operation for the duration of the war.

Mr. Barry attended the College of the City of New York, where he took the science course and was one of the Charter Members of the C. C. N. Y. Radio Club. Back in the days of 1919, the club had a one kilowatt spark set with rotary gap, whose roar could be heard a block away when the station was transmitting.

He Gets a License

In 1919, Mr. Barry obtained a license from the Department of Commerce to own and operate a transmitting station of his own—call letters 2-OH. At City College, he was elected Vice-President of the Radio Club, which office he held until his graduation.

The club put in newer and more modern apparatus and was greatly assisted by Dr. Alfred N. Goldsmith, then one of the members of the Faculty, and liberal in his donations of radio equipment to the club. A phone transmitter was installed and the members of the club were able to phone other amateur stations over the radio for 25 miles, 50 miles, and even greater distances.

Under the auspices of the City College Radio Club, the organ recitals of Professor Baldwin in the Great Hall were broadcast, which constituted one of the earliest known broadcasts of organ music in the United States.

Has Military Experience

A high power CW set was used as the club's main transmitter and succeeded in handling messages with practically every part of the United States. The College had a license from the U. S. Radio Inspector, which would be worth its weight in gold today. This was to use "any wavelength—any power."

As a member of the Reserve Officers



Training Corps unit, Barry attended the Officer's Training Camp at Camp Devens, Mass., in 1920 and discovered a 1915 model pack radio set lying around the camp.

With the assistance of Cadet Captain D. T. O'Connell, he hauled the set over to one of the barracks and with the permission of the commanding officer, erected it as the official U. S. Army station at this post.

Copied Each Night

Every night radio reports were copied from Arlington, Va., which were sent out in code, and daily news items noted. Although the rated power was $\frac{1}{2}$ kilowatt, the station never succeeded in reaching the Charlestown Navy Yard, only about forty miles away. For power, it was necessary to turn a generator by a hand crank, and the hands often grew tired.

Barry was graduated from the College of the City of New York in 1923 with the degree of B. Sc. and went into the publishing business. But always, he had a radio set and was ever tinkering around and building sets. He was Scoutmaster of Troop 503, Manhattan Boy Scouts of America, and under his able direction, this troop took portable radio sets to its Summer camps and supplied the neighboring town with the only up-to-date weather reports direct from the Weather Bureau at Washington, received every night in code, back in 1921.

Experiments with Portables

He has made extensive experiments with portable radio sets and says that for volume and simplicity the single tube regenerative set is hard to beat. In 1925, in an article published in "Motor Camper and Tourist," he described the use of trees as aerials (first discovered by General Squiers) and told of his experiments in this line. One of the interesting things he noted was that every tree had a definite wavelength. That is, a tree could be used as a radio antenna for a receiving station by merely driving a nail into the tree several feet from the ground and connecting to the set with a wire. And a pine tree 75 or 80 feet high would have about the same fundamental wavelength as an ordinary wire aerial of say a hundred feet.

Using a tree as an aerial, in this way, music was received from neighboring broadcast stations for considerable distances and code came in as well as ever.

In 1924 Mr. Barry went with the biggest radio publishing organization of the day in an advertising capacity, and also had charge

of answering all the difficult questions of the readers about where to buy the many different gadgets that were on sale in those early days of broadcasting. He also advised readers as to just what sets and apparatus were good and what was "junk." This was all handled in his spare time with the aid of three or four stenographers and his main job

Lauds Short Waves

"The most remarkable thing in recent years," said Lieut. Barry, "is short waves. Only a comparatively few years ago all wavelengths below 200 meters were thrown to the amateurs as worthless and now they are more valuable than the long waves. Years ago, transatlantic radio work was carried on at the wavelengths of 5,000 to 10,000 meters and required huge coils of wire to load up the receiving set so as to reach these wavelengths, as well as requiring expensive transmitting equipment. Nowadays, wavelengths of 20, 40 and 60 meters not only work as well but better, and many of the long wave stations have been completely remodeled.

With only \$50 or \$100 worth of equipment, 13,000 young men have established radio amateur stations from which they can transmit messages half way to Mars—at least there is no known place on the globe which they have not reached, so we may speculate that they go outside and reach other planets.

"Waves as short as 5 meters have been used for transmission over considerable distances and produce uncanny effects. Only the other day, a New York newspaper said that waves of 6 meters produced a rise in the temperature of the body of persons who were nearby and that it was proposed to use this as a means of treating certain diseases where high body temperature killed certain dangerous germs without harming the patient."

The time may come when radio will be used for curing the sick as well as for letting them listen to the messages of music and cheer from local broadcast stations that keep their nerves calm and their mind off their pain.

Need of Clear Air

"The great need now is to stop interference and perhaps some way will be found to reduce that. The U. S. Army, for example, would be exceedingly interested in any transmitting radio set that could be placed inside a steel tank and efficiently transmit messages for five or ten miles.

"Just now, the metal acts as an almost perfect shield. Exposed aerials may be shot away or catch on obstacles, hence cannot be of any size. So the man who can make a radio transmitter work really efficiently inside a steel box will find many people interested. A receiving set like this would be just what is needed to work really efficiently inside some of the steel buildings in New York."

Just at present, Barry is trying to interest more of the Boy Scouts to get transmitting radio stations and so be able to talk with other scout troops all over the country. With the help of the national headquarters of the Boy Scouts of America he is collecting a list of all the scout radio stations throughout the country. Many of them report keen interest.

Experts at the Helm

Some of these stations, manned by expert scout operators, are achieving remarkable results. For example, Charles P. Smith, Jr. Asst. Scoutmaster Troop 28, Philadelphia, has a troop call of 3-GV. Every evening, he works WNP, the Bowdin Expedition to
(Continued on page 23)

Walls of Audio Before Engin

By Capt. Peter

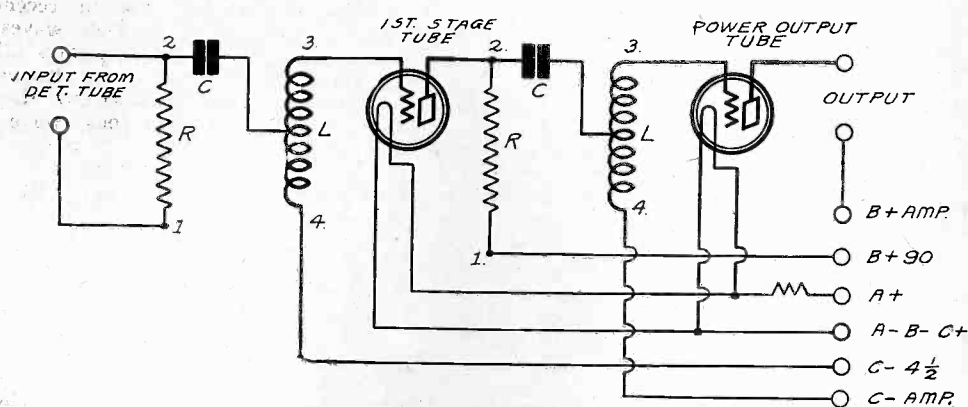


FIG. 1
THE CONNECTIONS OF THE TRANSFORMERS EMBODYING THE CLOUGH SYSTEM. THE PLATE VOLTAGE IS APPLIED THROUGH R, THE DIRECT CURRENT IS PREVENTED BY CONDENSER C FROM ENTERING THE AUTO-TRANSFORMER L.

NO phase of radio has been subjected to more thorough research than has audio amplification.

The search for perfect reproduction has gone on ever since the first days of broadcasting.

The cause of every form of distortion has been wrested from the unknown. The remedy for every type of distortion has been found.

As a result of all this research the technique is so well known that any distortion left in a well-designed amplifier and reproducing system is there for practical reasons, not for lack of understanding of the principles of audio amplification.

During the last few years the endeavors of the research worker have been directed toward a closer reconciliation between the conflicting elements in theory and practice. Just a few years ago it was not practical to build amplifier systems which would do justice to the bass notes because of excessive bulk and prohibitive cost. Hence the amplifiers built were deficient in this respect, and the deficiency was covered up by the statement that no human ear could tell the difference. Some of the amplifiers were also deficient on the very high audio notes. Various ingenious excuses were given.

Situation Now Changed

But not all the ingenuity was devoted to making excuses for lack of close agreement between the theoretically desirable and the practically attainable. By far the greater part of it was devoted to research work that would lead to a reconciliation. And it seems that the research workers have worked themselves out of their jobs, for now the actual reproduction is very close to the goal of perfection. Now the audio frequency amplifiers of the best design have the "straight line characteristic" from the lowest audible note to the highest note desirable to bring out.

On the whole this general improvement has been brought about by increasing the size of the audio transformers and other

coupling units, by raising the power level throughout the amplifier and by making use of adequate power supplies. With this all-around uplift the cost of parts and of the complete equipment also was lifted.

But there are notable exceptions to this trend toward larger parts and higher prices. In one case at least a change in the circuit made it possible to decrease the size of the transformers, lower the price, and still improve the quality of reproduction to a new point of advance.

Conditions for Quality

It has long been known that if a high voltage amplification is to be obtained from a tube of given characteristics in conjunction with a coupling device, the impedance of the useful load on that tube should be large in comparison with the plate impedance of the tube itself.

For resistance coupling a high value plate coupling resistor and a high value grid leak resistor should be used, and for impedance and transformer coupling the impedance of the winding connected in the plate circuit of the tube should be high to get high amplification.

Since a resistance does not appreciably change in impedance with change in frequency, the amplification remains constant over the frequency scale, except as it is affected by the stopping condenser and shunt capacities.

But the impedance of a transformer or of a choke coil changes with frequency. Roughly it is proportional to the frequency. Thus the amplification will be high for high frequencies and low for bass frequencies. But the change in amplification does not follow the linear law. It increases toward a certain value and either remains there as the frequency increases or it drops again. The drop is due to capacity in the windings of the inductance unit and in the tubes. The drop at the low frequency end is due to the rapid decrease in the impedance of the winding as the frequency is lowered.

Different Now

To make the impedance at low fre-

quencies high and thus to bring up the amplification on the bass notes it is necessary to use a high inductance choke or transformer primary. This means much wire, a large iron core and a high cost. Then if the coupler is made large the distributed capacity increases and the amplification drops on the high notes. In the past the best practical compromise has not been as good as it could be.

Lately special core materials have come into use. These materials are characterized by a high permeability, which means that for a given inductance and size of core much fewer turns may be used. Thus when such material is used the inductance may be made high enough to bring out the low frequencies almost as well as the middle, and still keep the amplification of the high frequencies since fewer turns mean lower distributed capacity.

There is one thing that militates against this high permeability material. It saturates magnetically very quickly. Saturation of the core reduces the inductance, and hence the impedance and the amplification. It also introduces harmonic distortion.

Saturation Prevented

It is not the signal current which causes the saturation but the direct component of the plate current. Hence if this part of the current is excluded from the winding, saturation is prevented and full advantage may be taken of the high permeability of the material.

Various circuit connections may be used for separating the DC from the AC components of plate current. The plate voltage may be supplied through a choke and the coupling transformer may be fed in the same manner that a loudspeaker is fed by the so-called output filter. While this method prevents the saturation of the coupling transformer it does not prevent saturation of the choke. This method, then, does not have any marked advantages over the direct connection of the coupling transformer, and it has some disadvantages.

The plate voltage may be supplied also through a non-inductive resistance. This is not subject to any saturation and it passes high and low frequencies equally. Across this resistor the primary of the transformer may be connected in series with a stopping condenser. Thus only the AC component will flow through the transformer winding, and the core is prevented from saturating. The core does not have to be as large as if the direct current also flowed through it.

Wise Choice of Values

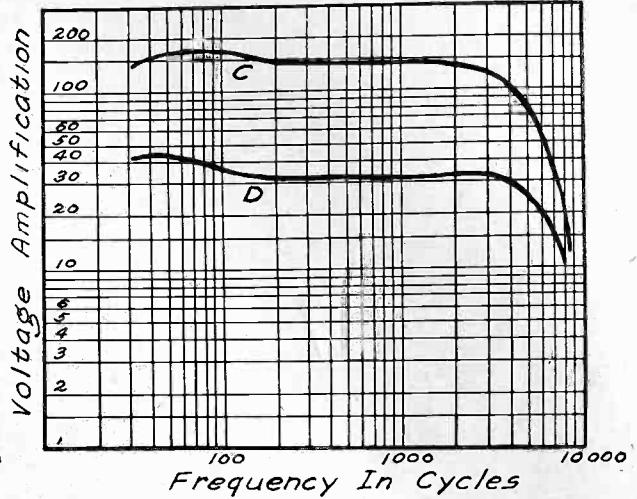
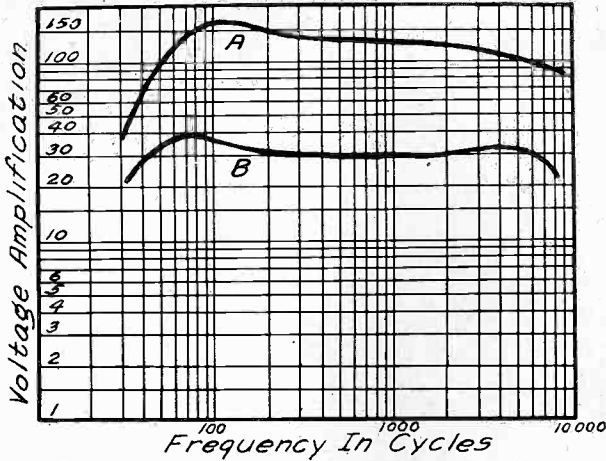
The condenser in series with the primary will stop the low frequencies to some extent, but the suppression will be negligible if the capacity is large and the inductive impedance in series with it large.

It is possible to choose the values so that the suppression of the low frequencies will be negligible for all audible frequencies. In fact, the values may be chosen so that the coil and condenser form a resonant circuit at some frequency near the low

Distortion Crumble Engineers' Long Siege

O'Rourke

A shows the amplification of one S-M 255, one -26 type tube and one S-M 256, measured from plate of a -27 type detector. Curve B shows amplification of one S-M 256 and one -26 type tube. Curve C shows amplification of one S-M 225, one -26 type tube and one S-M 226, measured from the plate of a -27 type detector. Curve D shows amplification of one S-M 226 and one -26 tube.



FIGS. 2 AND 3

audio limit. In that case it is even possible to cause an amplification peak to compensate for low frequency deficiencies in some other part of the circuit. For example, if the inductance in series with the condenser is 100 henrys and if the capacity is 0.5 mfd., the resonant frequency is 22 cycles, at which the peak would occur. If the condenser is raised to 1 mfd. the resonant frequency is lowered to 16 cycles per second. Hence by choosing the proper value of condenser the peak may be put wherever required.

The Clough System

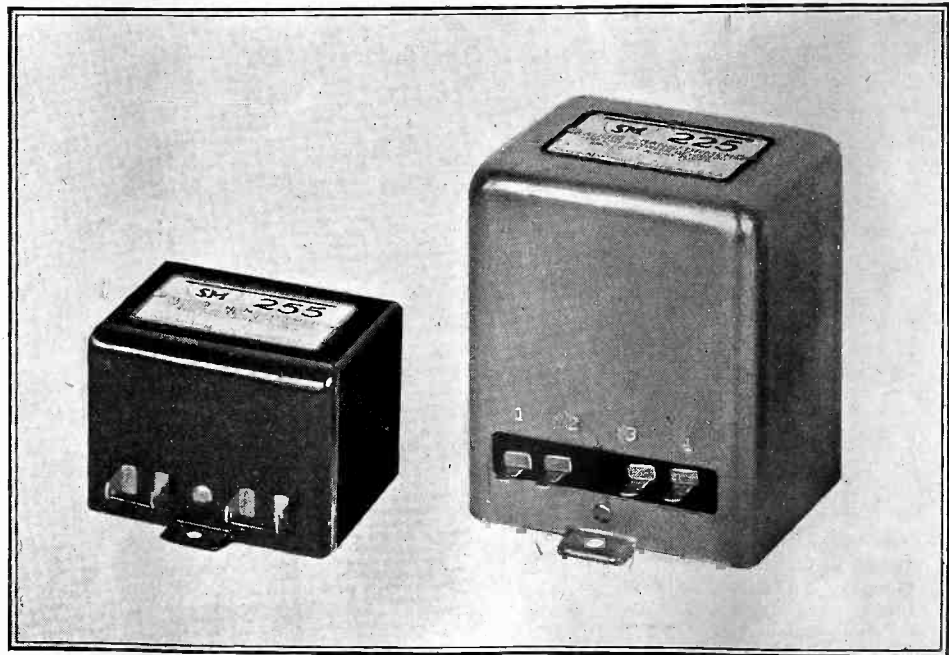
The principles discussed above are embodied in a coupling device developed by Kendall Clough of the Research Laboratories of Chicago, and is the subject of a patent application. Silver-Marshall, Inc., of Chicago, the first licensee under this application, has marketed five types of transformers based on the new idea, all of which are said to have unusual characteristics.

Types S-M 225 and S-M 226 are built to the same physical dimensions as the S-M 220. The S-M 255 and S-M 256 are only half as large. The 225 and 255 are to be used after a detector tube and the others after an amplifier tube.

The fifth transformer, S-M 223, is of the large size and is intended to be used after a screen grid tube operated as a space charge tube. This transformer and the screen grid tube give an amplification of about forty over nearly the whole audible range.

Amplification curves obtained by the manufacturer on these transformers are shown in Figs. 2 and 3. Those in Fig 2 show the performances of the smaller transformers, those in Fig 3 show the performances of the larger.

The most notable fact about these curves is that the amplification increases as the frequency decreases. This is the reverse of the usual characteristic.



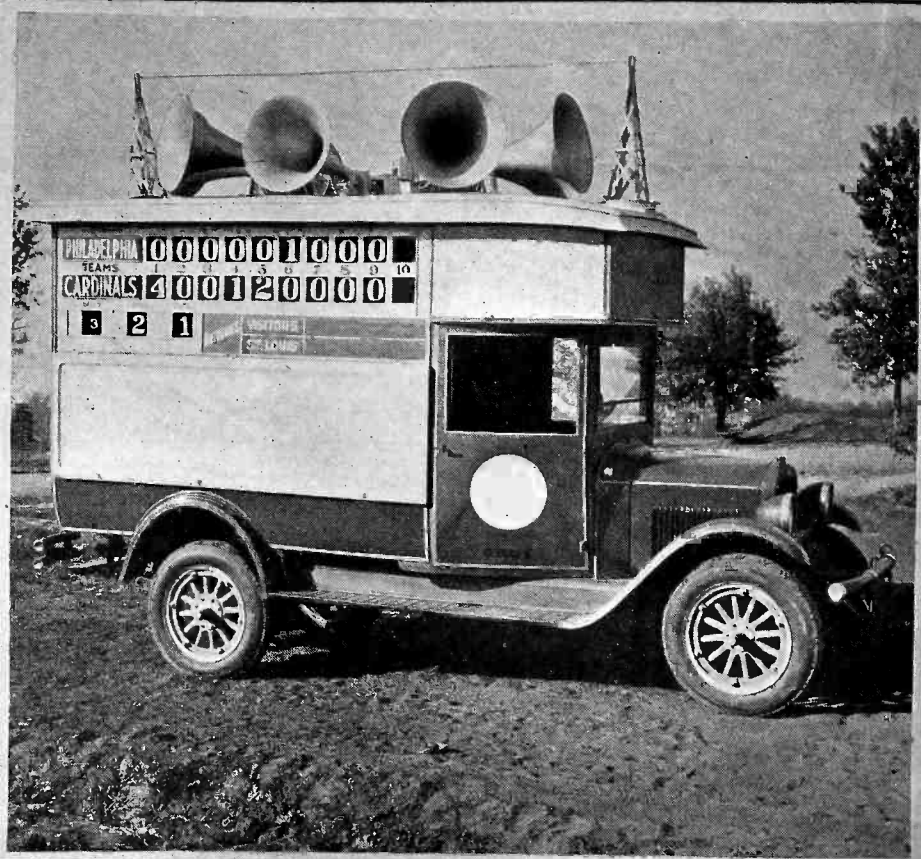
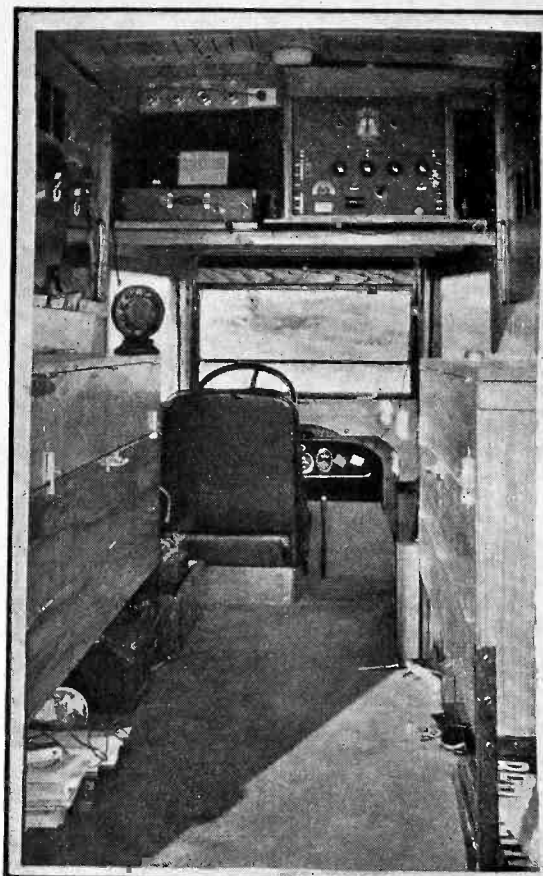
COMPARATIVE VIEW OF THE NEW 255 AND 225 S-M AUDIO TRANSFORMERS. THESE ARE FOR USE IN THE FIRST STAGE. THEIR COMPANION TRANSFORMERS FOR THE SECOND STAGE ARE THE 256 AND 226, IN CASINGS OF THE SAME RESPECTIVE SIZES.

Expansion Expected In Foreign Market

American Radio Manufacturers, like American automobile builders before them, are aggressively developing a world-wide market for their product, and exports of radio sets and accessories have now almost reached the \$10,000,000 a year mark, Charles H. Winship, Jr., an executive of the Lektophone Corporation, stated today on his return from London. "Since 1922 the radio export business has increased four-fold, and there is

hardly a single country in the world today where American radio sets and accessories are not being sold," Mr. Winship said. "The United Kingdom, including Canada, Australia and New Zealand, purchased nearly \$6,000,000 worth of radio equipment during the past year, accounting for nearly two-thirds of our total export business. Italy, Spain and Japan imported about one-fourth of this amount, and China's total was \$100,000 during 1927."

TRUCK FEEDS BASEBALL NEWS TO EYES AND EARS



A VERSATILE RADIO STATION ON WHEELS, CONTAINING A RECEIVER, A TRANSMITTER AND A PUBLIC ADDRESS SYSTEM. THE STATION MAY BE USED TO PICK UP BROADCASTS OF A BASEBALL GAME AND ANNOUNCE ITS PROGRESS AND KEEP A RECORD OF THE SCORE. THE STATION CAN BE USED ALSO AS A PORTABLE PICK-UP FOR KMOX OF ST. LOUIS, MO.

Commissioners Travel To Get Air Evidence

Washington.

Chairman Ira E. Robinson and Commissioner Orestes H. Caldwell went to New York to study reception conditions and hear station comment on the elimination plan, while Commissioners Eugene O. Sykes and Sam Pickard went to the Chicago district. In announcing this the Commission gave out a statement in part as follows:

"Because of the congestion of radio stations in the New York area the Commission finds it necessary to eliminate from 25 to 30 stations in order to conform to recent legislation by Congress calling for an equal distribution of radio facilities throughout the country.

Promising "Square Deal"

"In view of the magnitude of the task before it, the Commission is leaning heavily on Judge Robinson for counsel and advice, because of his long judicial experience and training in dealing with intricate and complex problems. Under his guidance both the broadcasters and the listening public are certain to get a 'square deal.'

"For nearly forty years Chairman Robinson has been a member of the Bar, and for a long period was presiding justice of the Supreme Court of West Virginia, during which time he rendered many vital opinions dealing with profound questions.

"His judicial training and sound judgment are proving valuable assets to the Federal Radio Commission at this period. Already, after critical study, Judge Robinson has expressed the firm opinion that the Radio Act is not subject to successful attack and he holds that all the regulatory powers granted the Commission may be constitutionally exercised.

To Act With "Firm Hand"

"He has also said that Congress by the so-called Davis Amendment has directed the Commission to deal with the matter of a surplus of stations with a firm hand, and he gives assurance that the Commission proposes to so act.

"Recently the Commission issued an order which in effect denies the license of 162 radio stations effective July 31."

Illinois Cut Put at 50%

In a statement sent to the broadcasters in the Chicago area Commissioner Pickard pointed out that to meet the terms of the recent amendment to the Radio Act, and to improve reception in that district, it may be necessary to reduce the present broadcasting facilities now available to Illinois by approximately one-half. He called upon the broadcasters for their cooperation on the theory that they can adjust many local problems and thus aid materially in bringing about a more stable broadcasting situation.

Australia Plans High Duty on All Radio

Higher tariff rates on radio sets and parts are under consideration of the Australian Tariff Board, the Trade Commissioner at Sydney, Earl C. Squire, has cabled the Department of Commerce.

The present general duty on radio sets and parts imported into Australia is 5 per cent ad valorem and the British preferential duty 35 per cent ad valorem, the Foreign Tariffs Divisions states.

Stability of Called

Chicago.

H. B. Richmond, of the General Radio Company, chairman of the engineering division of the Radio Manufacturers' Association, arriving at the recent Chicago radio trade show, said:

"The most important radio engineering advance in the past twelve months has been essentially the high degree of stability attained in the up-to-date receiving set.

"In the production of models exhibited in the Chicago trade show great care has been taken to overcome the things that made sets give trouble. Squealing and whistling particularly have been eliminated in the year's models through 'shielding'—that is, enclosing the various component parts in copper casings.

"The next important step forward has been appreciation of the fact that we must have full range of sound in order to

General Electric Asks Trust Suit Dismissal

Washington.

Announcement was made by the Federal Trade Commission of a hearing, at which the General Electric Company, et al., entered a motion to dismiss the complaint charging monopoly in manufacture and distribution of radio apparatus.

This case has been pending for some time and testimony has been taken on both sides. It is unrelated to a complaint recently filed by the commission against a large radio concern in which unfair methods of competition in the manufacture and sale of vacuum tubes was charged.

Respondents in the present case, other than the General Electric Company, are as follows: Radio Corporation of America, Western Electric Company, Inc., Westinghouse Electric & Manufacturing Company, Wireless Specialty Apparatus Company, United Fruit Company, American Telephone and Telegraph Company, and International Radio Telegraph Company.

Service Men's Data Is Being Compiled

For the first time since radio broadcasting began, the radio industry, through the Radio Division, National Electrical Manufacturers Association, will help train radio service men. No radio service man, called upon to give service to set owners possessing radio receivers of widely differing design and arrangement possibly can have readily available all the information he needs.

Louis B. F. Raycroft, vice-president, said:

"We are now gathering the information on radio sets which have been on the market since 1924 and in one of the two books in the radio service course will provide wiring diagrams of radio receivers and power units and will supplement this by regular additions to keep the diagram handbook up to date. Our handbook of practical technical information for the service man will complete the course."

Operation Year's Gift

get good quality of tone. In the earlier sets attempts to avoid interference resulted in very sharp tones. This not only cut other stations, but also part of the program we sought to tune in on.

"That has been corrected through the reallocation of broadcasting stations by the Federal Radio Commission, which makes it not as necessary as formerly to obtain what we call 'knife-edge' cut-off, and through the improved type of construction of the radio circuits."

ACME HAS AC WIRE

For AC filament hook-up Flexible Acme Celatsite is put up in convenient form. One strand of red and one strand of black 16/30 flexible Celatsite are twisted together. The two colors are used so that, if desired, the same sides of all filaments can be maintained at the same relative potential.

Socket Power Choice Outlined by Expert

By D. E. Replogle

Raytheon Engineering Staff

If your set is one of the eight million or more sets originally intended for battery operation, and if that set is functioning properly, it is just plain horse sense to hold on to it. However, in keeping with the times, you may wish for the convenience and economy of socket power operation, in which case the following suggestions are in order.

The first step in socket power operation is the B eliminator, for it replaces the B batteries. Furthermore, the advent of power tubes, with their heavy current drain, virtually demands a B power unit as the source of power.

There are many types of B eliminators or B power units now available. Mass production has served to bring the price of these devices down to new low levels, so that in a year or two of use, depending on the number of hours a radio set is used each day, the B eliminator can pay for itself in actual savings.

Has Long Life

As likely as not, you already have a B eliminator, in which event you have solved at least half the battle of the electrified receiver. Fortunately, aside from the rectifier tube which should be replaced at the end of a thousand hours of use, or a year of typical radio application, there is little to wear out in the properly designed and constructed B eliminator.

With the B power requirements taken care of, the next consideration is the C potential or grid biasing source. It is possible to obtain grid biasing effects by means of voltage drop through resistances in the different B circuits, or again by means of small C battery. Often the latter method is preferable, especially when the battery type receiver is being converted over to socket power operation.

Three Filament Choices

Next and last we come to the operation of the tube filaments. Here we have three courses available, each with its own peculiar advantages:

First, there is the A eliminator, which converts the usual alternating current of the house lighting circuit into low-voltage direct current for lighting the usual tube filaments. There are several A power units on the market. In conjunction with the B eliminator, the use of the A eliminator, in place of the storage battery, provides the simplest electrification job.

Secondly, there is the series filament method, in which all the tube filaments, with the exception of the power tube, are connected in series. This means rewiring the filament circuits of the receiver, and a skilled radio man should be capable of rewiring the usual receiver in two hours or less.

World Parley Adopts Copyright for Radio

Delegates from thirty nations having a total population of 1,000,000,000 have signed the new copyright law elaborated at the Rome conference. The agreement is now ready to be submitted to the national parliaments for ratification.

The convention accepted unanimously by the delegates provides what is known as "automatic copyright without need of formal registration and the copyright is effective from the moment the work is put on paper. Each country is left free to support a copyright office where works

can be registered for the purpose of establishing priority.

Considerable discussion centered around copyright as applied to broadcasting. It was finally decided that broadcasting should be subjected to the ordinary copyright law. The article on this point reads: "Authors of literary and artistic works have the sole right to authorize communication of their work to the public by means of the radio."

The American delegation was largely responsible for getting this article accepted by the convention.

Jugoslav King Loses Sleep to Tune in U.S.

Belgrade.

King Alexander of Yugoslavia is keenly interested in radio and is known as the "radio King." He has a powerful radio installation in each of his six palaces and takes as much interest in operating them as any American schoolboy.

Often he sits up until 4 o'clock in the morning trying to pick up signals from New York, Schenectady, Pittsburgh and other American radio stations. He often

sacrifices sleep for the thrill of picking up distant stations.

One of his favorite radio pastimes is to listen to the propaganda broadcast by the Moscow Communist Internationale. He understands Russian perfectly, having been educated in Petrograd. For his wife, Queen Marie, he translates into French or Serbian the propaganda about how the Communists intend to establish workmen's and peasants' utopias throughout the world.

Station Quits, Board Asks Others Follow

[Following closely on the voluntary withdrawal of WOO, the Wanamaker station in Philadelphia, because the station was not considered advantageous enough to warrant the expense, comes the voluntary withdrawal of WEBJ, New York City. S. W. Huff, in writing to the Commission of this move by WEBJ, explained that he believed the big stations were attracting the big audiences, leaving too small a percentage to warrant a station like his own continuing. His letter is interesting therefore, because of its general application to existing conditions, and is made all the more important because the Commission, in reply, through Mr. Caldwell, hopes "that this fine and unselfish example *** will be voluntarily followed by other broadcasters in the metropolitan area."—Editor.]

Washington.

An offer voluntarily to discontinue the operation of WEBJ, of New York City, to assist the Federal Radio Commission in its task of improving radio reception conditions, has been received by the Commission from S. W. Huff, president of the Third Avenue Railway System of New York, operators of the station. The letter was made public together with a letter from the Commission expressing its appreciation.

The full text of Mr. Huff's letter, follows:

"When radio broadcasting was in its infancy and there were but a few stations in New York City, we conceived the idea of establishing a station for broadcasting along certain special lines; i. e., safety; relations between the public and the transportation company; relations between employe and employer, and kindred subjects in which we were especially interested, broadcasting along with this matter sufficient entertainment to carry the more serious subjects.

"We were not interested to enter the advertising field, and the particular line of broadcasting outlined above required only a few hours per week. For these reasons Station WEBJ has never operated more than six hours per week.

Served Its Purpose

"The station was purchased and installed by our electrical department and we believe that it has always maintained a high degree of mechanical and electrical efficiency, while the programs have been the best which could be noncommercially provided.

"It is believed that the station has served a very useful purpose. We are satisfied that it has resulted in a better understanding between the management of this company and the communities from which it derives more than one million passengers per day, and between the management and the employe.

"When this station first came into existence in July 1924, the public were tuning in on all stations and we had ample evidence that WEBJ was getting its share of the attention of the listeners.

Fearful Encumbrance

"With the present situation, when the principal stations have been highly commercialized and the best and most expensive talent secured for their advertising programs, and when extensive hook-ups of such stations are being made, we are satisfied that the great mass of listeners confine their attention to these elaborately programmed stations and that the other stations to a large extent simply encumber the air and interfere with the reception from the more prominent sta-

tions, without serving any good public purpose.

"WEBJ was not included among the 162 stations throughout the country (25 of them in the vicinity of New York) named by your Commission to be considered for discontinuance, and so far as we have had any intimation from your Commission, we might be allowed to continue our operation indefinitely. We realize the purpose for which your Commission was created, and the difficulty of your work, and in the hope that the discontinuance, voluntarily, of one station may be of service to that end, we are prepared to voluntarily discontinue the operation of Station WEBJ.

No Place For It Now

"We are satisfied that the station no longer serves any good public purpose and at the present time we can conceive of no conditions under which it might be advisable for it to resume operation, but we should like your Commission or its successor to have on record the fact that WEBJ has been a highly efficient station mechanically and electrically and we believe that its programs have been of such a character as to justify the amount of time the station has been on the air, in the event that we should ever wish to reenter the broadcasting field.

"I may add that we have taken an active part in the scientific work of radio development. Our electrical engineer is chairman of the Committee of the American Electrical Railway Association for the Study of Radio Interferences and we have been making a number of investigations to determine the causes and possible remedies of interference derived from street railway currents and we shall continue this research work although we are no longer in the broadcasting field."

Caldwell's Reply

The reply of O. H. Caldwell, Commissioner, follows in full text:

"Dear Mr. Huff: My fellow Commissioners have asked me to express to you their appreciation of your public-spirited action in voluntarily relinquishing your broadcasting licenses for Radio Station WEBJ, in view of the present emergency in the radio situation (where, as every one knows, far too many stations are on the air to permit all to be heard satisfactorily).

"Your willingness to adopt the course indicated, which will help clear the air around New York for improved radio reception of the remaining stations, certainly deserves the commendation of the local millions of listeners who will benefit.

"And it is to be hoped that this fine and unselfish example of your company will be voluntarily followed by other broadcasters in the metropolitan area, to the end of helping the Commission solve its difficult problem of clearing the ether channels for good radio this Fall and Winter."

Stations Told to Quit Will Fight to Stay

Washington.

Six radio stations, which have been ordered to sign off permanently on Aug. 1, have notified the Radio Commission that they intend to be present at the hearing here called for July 9.

The stations are WCGU, New York; WCOT, Providence, R. I.; WDJ, Tuscola, Ill.; WEBW, Beloit, Wisc.; KGBX, St. Joseph, Mo.; and WMBD, Peoria, Ill.

CALDWELL WANTS BUT 350 ON AIR

Washington.

After the proposed elimination of 162 stations and twelve portables a scientific plan of allocation must be devised, Commissioner Orestes H. Caldwell told the Electrical Supply Jobbers Association at Hot Springs, Va. That will be the second step in enforcing the equalization clause recently enacted, he explained, and will be designed to remove heterodyne and crosstalk.

He pointed out that there are 90 channels, and that even with the proposed station elimination carried out there would be 518 stations, necessitating still further reductions. Only 350 broadcasters should occupy the 90 channels or waves, he said. He suggested 40 exclusive channels for stations of 5,000 watts or more; 45 channels to be shared by doubling up or trebling up stations of 500 to 5,000 watts, the remaining five channels to be packed with the left-overs.

Commissioner Caldwell continued:

"In other words, the accommodations for broadcasters in the hotel ether number only ninety rooms, with 350 beds. If any more guests present themselves they must alternate in the occupancy of the beds. They must sleep in alternate shifts.

"Such sharing of channels, or division of time by stations having indifferent program facilities, will work to the benefit of the listening public.

"Each station thus sharing a wave will then put on only its best features and the public will be served with the cream of the two or more programs instead of phonograph records and indifferent tinning."

Program Corporation Builds Own Studios

One of the largest and most scientifically planned radio studio outlays in the country has been constructed for the use of the Judson Radio Program Corporation on four floors of the Steinway Building, New York City. Several of the studios have been prepared temporarily and are being used for audition, rehearsal and broadcasting purposes by the radio program makers pending the completion of the entire project, but complete occupancy will not take place until late this Summer.

As numerous musical organizations will be rehearsing or broadcasting from the studios at the same time, the engineers deemed it wise to scatter the outlay over several floors to reduce the confusion, hall and lobby congestion and to segregate the various units.

The electrical installation will include the latest developments in this field. An interlocking and intercommunication microphone and loudspeaker system will make it possible to bring programs originating in any of the studios to any other studio, conference room or office. Outgoing wire lines also make it possible to transmit a program in any studio to broadcasting stations in practically all parts of the United States for audition or broadcasting use. By this system, it is possible to send a program to an indefinite number of cities, and in each city the same program can be sponsored by a different local advertiser.

Convenience is served and better results are attained.

Station Cut Wins In Chicago Survey

Chicago. WBBM has completed a listener survey on the recent action of the Federal Radio Commission planning the elimination of a number of stations in the Chicago district.

Night letters were sent to a selected list of 250 names of persons living in the Chicago radio district. The list was classified with the idea of obtaining the viewpoint of the average radio listener. Individuals who listen in only occasionally and fans who never leave their sets were both eliminated from the survey. The names included executives, laboring men, farmers, professional men and women, and in ten cases children. The answers totalled 212.

The questions asked were as follows:

Questions Asked

- "1. Do you approve the action of the Radio Commission in eliminating stations in the Chicago district?"
- "2. If you were given the power of the Federal Radio Commission, how many stations would you permit on the air in Chicago?"
- "3. What do you consider good "public service" on the part of a radio station?"

In the case of the children, only one question was asked, as follows:

"What station do you like best in Chicago?"

Three Women Dissent

On Question No. 1, all except three persons approved the action of the Commission.

The three dissenting votes were women, but in every case they based their objection to the elimination of some particular station on the fact that they enjoyed some one feature that they heard from this station. One woman frankly admitted that she did not listen to the station when this feature was on.

Singular Unity

On the question of "public service," that they would eliminate all but 8 or 9 stations in the Chicago district. There was a singular unanimity of opinion regarding the stations favored. According to the tabulations these are the wave channels best liked in the Chicago district and where the programs furnish enough of variety to satisfy a great majority of listeners: KYW, WCFL, WGN-WLIB, WMAQ-WOJ, WBBM-WJBT, WEBH-WJJD, WLS, and WENR.

No attempt was made to ascertain which of these stations is the most popular, and the order in which they are listed above does not indicate the order of popularity.

On the question of "public service," the listeners also indicated that their opinions were alike. A typical letter, one that indicates the majority opinion of the 212, is as follows:

"On the question of 'public service,'" wrote this man, "I believe there has been some misunderstanding on the part of radio stations as to what the phrase actually means.

"Many stations have thought that if they merely fill up a certain part of their air time with dry and uninteresting lectures and talks they have completed their duty to the public.

"It is quite obvious that no good is being accomplished along educational or public service lines if the educational or public service features put on by stations merely have the effect of driving the listeners to other programs."

Approves Indirection

"It seems to me that the best method for giving real public service is to give it by indirection, rather than directly.

"By that I mean: People will listen to an interesting travelogue which has musical features interspersed in the program where they will not pay any attention to a dry lecture which covers the same ground.

"It must be understood that the radio is primarily an instrument for entertainment. There have been too many stations who have failed to realize that in endeavoring to furnish real entertainment they are in competition with the stage, the night club, and other forms of entertainment and amusement.

"In many instances programs have been presented by persons who could not possibly get a position either on the stage, in a cabaret, or anywhere else for that matter.

Defines "Public Service"

"Public service, as I see it, means, first of all, real entertainment, second, real features such as news flashes, accounts of baseball and football games, etc., and third, educational features that are so presented as to be of real interest in themselves and of such a character that the station does not have to beg listeners to stay tuned in while they are being presented."

35,000 Watt Station Opened in Finland

Washington.

Opening of a 35,000 watt radio broadcasting station in Finland and plans for a 50,000 watt station in Czechoslovakia are announced in two reports received by the Department of Commerce from consular representatives in those countries. Following are the full texts of the reports:

"The Lahtis broadcasting station, declared one of the most powerful transmitting stations in Europe, was opened recently in Finland, states Vice Consul George L. Tolman, Helsingfors, in a report made public by the Department of Commerce. Equipment of this station was furnished at a cost of \$200,000 and is of the same type as that in use at the Zeesen station in Germany. It operates on a wave length of 1,525 meters with a power of 35 kilowatts which is shortly to be increased to 40 kilowatts.

"A state broadcasting station of enough power to be heard throughout Europe is now under consideration by Czechoslovak Government authorities, states a report from Consul General A. C. Frost, Prague, made public by the Department of Commerce. Construction plans now under review contemplate a power of 50 kilowatts. The site has not yet been definitely chosen but it is expected to be in the vicinity of Prague."

Kent Gets a License from Lektophone Corp.

The Atwater Kent Manufacturing Company, Philadelphia, has been licensed to manufacture controlled-edge cone speakers under the basic Lektophone and Hopkins patents by the Lektophone Corporation. Colonel Robert Davis, president of the licensing company, so announced.

With the recent development of power driven speakers and the broader application of controlled-edge cone speakers largely necessitated by the change, Lektophone Corporation has materially modified its original licensing policy to conform to the needs of the radio industry and to afford a greater measure of protection for Lektophone license. With the addition of Atwater Kent, practically every principal radio manufacturer in the United States in now licensed to build radio cone speakers under Lektophone patents and improvements.

Grigsby-Grunow Company, of Chicago, makers of the Majestic line, were licensed by Lektophone recently. They are using the speakers in some of their new AC receivers.

KYW Towers Sight for Chicago Visitors

Chicago.

Visitors to Chicago, as they drive down Michigan Boulevard, may see the towers of KYW, the pioneer of the west, located on the roof of the Congress Hotel, at the corner of Congress street and Michigan Boulevard.

Autoists or pedestrians in Grant Park, which is the lake front of downtown Chicago, as they gaze toward the city's skyline, at once see KYW's steel towers and antenna sort of standing guard over the city in the background.

KYW, the first broadcaster of Chicago, went on the air on Armistice Day, November 11, 1921, and as a fair tribute to the spirit of pioneering and to the great city it represents, the station has its home on Chicago's main thoroughfare, Michigan Boulevard, where millions of people pass daily.

Trade Asks Ban On "Narrow" Stations

Chicago.

The Federal Radio Commission is now confronted with the problem of reducing the number of broadcasting stations in simultaneous operation, retaining only those which in the language of the Radio Act "serve public interest, convenience and necessity."

The trade has taken a hand.

Asserting that only those stations should be allowed to remain on the air which make every effort to appeal and serve a wide variety of interests, the broadcast Transmitter Section of the National Electrical Manufacturers Association in session here recommended that licenses should not be renewed where the station

"acts purely as a house organ for selling merchandise for one firm."

That greater consideration should be given to those stations which serve a wide variety of interests was the definite recommendation of the radio manufacturers. This action is interpreted as a direct criticism of the continued operation of religious, political and similar stations as well as those engaged in "direct selling."

The association also went on record as favoring the early adoption of the Institute of Radio Engineers' plan of broadcasting allocation by Federal Radio Commission to provide best radio conditions for listeners in the most practical fashion.

Goldsmith Gives Tips on Summer Listening

By *Dr. Alfred N. Goldsmith*

Chief Broadcasting Engineer, Radio Corporation of America

Radio, unlike canned goods, has no Winter or Summer season. There are fresh vegetables the year round in the radio garden, so that it is hardly necessary to harvest and can our radio enjoyment during a few months for use in what might be a less fortunate season.

If we mentioned Wintertime or Summertime phonographic music, we might be laughed at, because the phonographic presentation has come to be accepted as a permanent, unchanging, immune form of entertainment, ready to serve in mid-Winter or mid-Summer alike. And by the same token, when radio programs and radio services are maintained from one end of the year to the other at the same high levels of excellence, with little difference to indicate the passing seasons, it becomes decidedly out of order to speak of seasonable radio.

Whatever errors of judgment may have been committed in the early days of radio broadcasting, particularly with regard to the power required by a transmitter for a given service range the year round, they have long since stood corrected.

Signal Strength Splendid

Today the signal strength of any first-class broadcasting station within its service range is more than ample to ride high above the normal Summertime static level.

Indeed, it is only when the radio enthusiast insists on going in search of DX (long-distance signals) that the static level becomes troublesome, since he has plunged below it.

Yet is it any more reasonable to expect ideal DX radio results in Summer than it is to expect to enjoy outdoor picnics in mid-Winter? Seasons are seasons. The very variety of conditions imposed on us by changing seasons makes life all the more interesting, if we maintain the proper philosophical outlook.

Of course the elements of good reception should perhaps be more closely observed in Summer than in Winter.

Some Advice

Among the more important considerations are:

(1)—Selecting the signals from a station of adequate power, located not too far distant. It is well that the station have a reputation for careful maintenance, and be quite free from the criticisms of poor transmitter operation, haphazard monitoring, varying power, serious fading, wave-length wobble, and other signs of poor broadcasting, or at least poor broadcasting so far as the listener is concerned.

Fading, it goes without saying, is usually a condition beyond the control of the broadcaster, and may just as well be charged up to the location of the listener, for that matter.

Pick Good Programs

(2)—Selecting high quality programs, and especially features with sufficient "body" to cover up such static background as may exist even with high signal level. It is well to note that signal level is one thing, and sound level is another. Thus a dance orchestra or concert band is a better feature in combatting static interference than a soft, mellow string trio or a soothing violin solo. Some judgment should be exercised in selecting the proper program features, just as the artist working over an old canvas must

employ heavier opaque paints in preventing the undesired motif from showing through.

Don't Go Volume Mad

(3)—It is well to be content with reasonable volume. While it is true that the volume control of the radio set proportionately increases or decreases everything issuing from the loudspeaker—static as well as signal—it is a matter of how much background noise may be present before the listener becomes fully conscious and even irritated by its presence.

Just as we are told by automobile repair men, over and over again, that the performance of our car is largely a question of our liver rather than of the car itself, so may we say that static, and for that matter the radio rendition at large, is mainly an indication of our digestion. By being satisfied with reasonable volume during the days of high static, we may reduce the background noise to a minimum.

Of course broadcasting stations remain in the same location during the Summer months. Foolish as this statement may seem, it is no more so than the attitude of some who almost seem to assume that stations move to remote points with the approach of warm weather.

Toleration Admonished

Again, the power of transmitters is not reduced during the Summer months.

Hence in most localities there is ample signal strength from leading stations to ride well above the usual Summer static, with the exception of the occasional thunderstorm in the immediate neighborhood. Yet who expects ideal radio conditions every night? Try driving your automobile through a thunderstorm at night, with the dazzling flashes of lightning, the torrential downpour, with the ignition system in difficulties due to moisture, and other troubles! Still, we do not speak of Summertime automobile handicaps. Or again in Winter, with the roads covered with a sheet of ice, or again a foot of snow through which your car must break its own slippery trail. Even so, we do not speak disparagingly of Winter motoring. We are willing to forego motoring during the occasional storm of Summer or Winter.

Why not, therefore, assume the same tolerant attitude towards your radio entertainment during the occasional severe static spell, when it is not feasible?

Not a General Vacation

Contrary to expectations in some quarters, the staff of the usual broadcasting station do not all go on vacation at the same time. While broadcasters, quite as well as others, are entitled to well-earned vacations, they use some judgment and consideration to the end that there are always enough men on hand to maintain good broadcasting.

Programs, likewise, are maintained at the highest standards, although in keeping with seasonal moods and activities of outdoor weather, they may be pleasantly different from those of indoor weather. The skilled program director, in fact, pays close attention to the demands of his Summertime audience, and treats with the lighter side of life during the next few months.

No Panic Now

There was a time not so long past

when the program director was panicky with the approach of warm weather. It meant the loss of much of his usual talent, obtained for the mere asking during Winter and Spring. To offset such loss of raw material pouring into the studio, the program director had to arrange for picking up more outside features.

Different Now

Today, however, with the sponsored program the rule rather than the exception, the program director is assured of at least an ample foundation for his Summertime programs, while he has the additional advantage of going afield in search of novel outside features.

Aside from the sponsored programs, the sustaining programs furnished by the broadcasting station itself are maintained at highest standards since it is imperative to hold the interest of the audience throughout the year. The continuity of broadcast effort, whether it be by the sponsor of a feature or by the broadcasting station, is the prime essential to broadcast success.

Listen In a Lot This Summer

As to the radio listener-in, there is just as much reason to listen in during the Summer as during the Winter. Music, enlightenment, contact with the world, the thrill of sporting events, participation in history in the making, and other program features form a rich mental background for our Summer life. Whether it be at home, on the farm, in the Summer boarding house, on the water—anywhere, there is a place for radio entertainment which is not filled by any other form of diversion.

If anything, radio may truly be enjoyed to better advantage amid the outdoor settings made possible in warm weather. The acoustics are frequently better when windows can be thrown open. Radio is at its best outdoors, on the porch or even on the lawn.

A Dip Into Poesy

It is enchanting to listen to a radio concert on a Summer's night, on quiet, silvery waters, by the light of the moon.

Radio programs seem to blend with the very infinity of the universe, creating a magnificent stage setting for the audience of all mankind. Indeed, too little attention has been paid to the stage setting for the radio presentation, and Summertime offers us many an opportunity in this direction.

Cooler Swings Around the Big Kuprox Circle

James R. Coole, Kodol representative in the metropolitan territory, with offices at 150 Nassau Street, New York City, has started on a trip to the Kodol Radio Corporation factories whence he will return with full information as to the new Kuprox radio light socket and other devices for the coming season. Mr. Coole is well known among the trade and has done great work for Kuprox in this territory. He is a good electrical as well as radio man, his experience going back to an early training with the Automatic Transportation Company, building and merchandising electric trucks.

He later joined the staff of the Automatic Electric Devices Company, now the Kodol Radio Corporation, in charge of general service and assistant in sales development, from there being transferred into New York State, establishing his present offices in New York City two years ago. During that time he has sold many carloads of Kuprox apparatus and has placed this well known line in the forefront of favorites.

—J. H. C.

Stiff Technical Tasks Make Listening Easy

Mr. Average Listener seats himself in front of the old reliable set, twists the dials and settles back comfortably to listen to a program of dance music, played in the Manger Hotel by Hal Kemp's Orchestra.

It's an easy job for Mr. Average Listener to bring music into his home via the radio set. It isn't so difficult for the Manger Orchestra to play the dance melodies. But on the technical staff of the National Broadcasting Company—the unseen and seldom-mentioned people behind the radio scenes—falls the real responsibility for the success or failure of the broadcast.

Long before the broadcast is made, the technical workers must be on the job. Microphones must be placed to pick up the music, and any old place at all won't do for the microphone.

The room or hall in which the orchestra is to play is tested for acoustics. Then the placement of the orchestra is worked out. Every instrument is placed in a certain position with regard to the microphone. Brass and percussion are farthest away, with reeds in the middle ground and the strings close up. This is done in order to obtain proper balance. With an orchestra in proper balance, the brasses play their important part without muffling the sweet notes of the strings.

Room Sometimes "Muted"

The problems of microphone and orchestral placement worked out, wires between the place of the broadcast, in this case the Manger Hotel, and the National Broadcasting Company's main control room, must be tested.

Sometimes it is necessary to "mute" the room with heavy hangings to eliminate objectionable echoes. Two microphones often are used, one directly in front of the orchestra and the other hung from the ceiling to give an "auditorium effect."

A microphone mixing panel and an amplifier are then set up in the broadcasting place in such a way that the operator of the mixing panel may have a clear view of the orchestra.

Everything now is ready for the broadcast.

To trace the music from the orchestra to the home of Mr. Average Listener we will take one bit of sound. Assume that the clarinet player, happy because of a solo passage in the orchestration, has just caused a bleated "waa-waa." The vigilant "mike" instantly picks up the "waa-waa" and sends it over a short wave length or wire to the mixing panel. Here the technical qualities of the "waa-waa" are revealed by a visible needle set in a small black box on top of the operator's control board.

The Jumping Needle

If the needle jumps too far across the dial, the operator knows that there is too much volume and his hands, never off control knobs throttle down the sounds that are going on the air. If the "waa-waa" is faint and weak, the operator builds up volume.

After the "waa-waa" has been properly regulated it goes to the amplifier where it is built up or "boosted" in order to go over the several miles of telephone wire to the main control room at headquarters.

To eliminate ordinary "wire noises," always present on telephone circuits, the "waa-waa" goes through another amplifying system and through a special device known as a "pad." The "pad" acts as a filter, trapping out the "wire noises" from the broadcast music.

At the central control room another needle on a volume-indicating meter provides an additional means of checking the music before it goes on the air.

All In Less Than a Second

After being amplified, the "waa-waa" goes to the big switchboard in the central control room and from there out over telephone wires to the WEAf transmitter at Bellmore, Long Island. At Bellmore, the "waa-waa" enters the radio trans-

mitting apparatus and then goes on the invisible ether channels to be picked up by the receiving set of Mr. Average Listener. At the transmitter, the "waa-waa" again is "boosted."

If the program is being broadcast over a network, the music leaves the main switchboard over a dozen or more telephone wires for radio transmitters scattered from coast to coast.

Fast as Light

Yet while Bellmore is just a few miles from New York, and Kansas City is many hundreds of miles, the music goes on the air from the two stations at the same second. And during this same second the music is made in the place where the broadcast originates.

Radio transmission is as fast as light speed.

"Roxy" Says Radio Helps Theatre Thrive

S. L. Rothafel ("Roxy"), addressing the National Association of Music Merchants, at the Hotel Commodore, New York City, said:

"We have been broadcasting since 1922, six years. I believe we are the pioneers today on the air, and in that time I have received 3,500,000 letters. Of course I haven't read them all, but I read a great, great many of them, and I believe that I possess the greatest signpost and indicator of public taste possessed by any man in this country. I have received these letters from people in all walks of life, and this great correspondence has been the means of determining what I shall give to my public.

"We find that the taste for good music has increased so rapidly that in the past five years it is almost unbelievable. We can today play modernists, if you please. We can play Ravel and Debussy and Stravinsky in motion picture theatres and get rounds and rounds of applause, and yet if we attempt to play the old chestnuts that used to evoke a tremendous influence like 'Tell' and 'Raymond,' even the Overtures of 'Tannhauser,' they sit there and say: 'Yes, we know that, we have heard it; it isn't anything new.'

They Drink In Symphony

"But play an excerpt from a symphony for them and immediately you can see the tension that come over them. They lean forward and drink it in.

"Our audience today is a great deal more receptive and understands a hundred times more than the audience of ten years ago as to what music is all about. I think it has been brought about by this tremendous wave of music that has been all over the country. They take it every day, all day long, and they cannot get away from it, and it is a mighty good thing for you people.

"When we first started broadcasting there was in the back of our heads a commercial aspect to this effect: What will it do for the theatre and what will it do for ourselves?

"At that time, you remember, I had the honor of directing the Capitol Theatre of New York. When this response came back and we found that we had by our method of procedure and by our voices and by our sincerity created something, commercialism flew out of the window and something very beautiful flew in.

No Commercialism Now

"There is no commercial aspect to our work today on the air. We have found a marvelous road and the most beautiful thing that has come into our lives, and it has been done simply because of a sincerity and a desire to give out to that great audience the best that we have.

"And we haven't failed to put this great force to some good practical use. Without any effort to commercialize it, and giving the best that we have, we have created something that we couldn't have paid for if we owned all the money in the world. That is good will. You cast your bread on the water and see what comes back to you.

"We appreciate the great responsibility that has come to us, and I want to tell you it is a great one. There is an example for every man and woman in this room, and that is his and her sincerity of purpose, to believe firmly in yourself and to give all that you've got. Throw off the brakes and go. And don't be afraid to be a little generous, because I think it will pay you great returns. I think if you understand one another you will find that there is room here for everyone. There isn't any mistake about it. You cannot stop progress."

Nobile Rescue Party Locates Him by Radio

Radio played an important role in locating the crew of the Italia and in keeping the public informed about progress of rescue work.

At first news came that amateurs in various sections of the world had picked up signals emanating from the transmitter of the shipwrecked crew. Whenever such reports appeared credible they were broadcast immediately. Later authentic reports came from Spitzbergen that the base ship Citta di Milano had been in communication with General Umberto

Nobile aboard the Italia, and that the exact location of the men had been obtained. Now, thanks to radio, rescue work proceeded with a definite goal in view. Even if transmitter of Nobile failed to work, the rescue parties knew at all times within a few miles where the men in distress were.

As an aid in the rescue work the Federal Radio Commission, through Chairman Ira E. Robinson, requested absolute silence within a range of 500 kc. of the Italia's 9,090 kc.

A THOUGHT FOR THE WEEK

WHILE the Bell Laboratories and General Electric Company have their troubles with television, Cortlandt Street offers night lamps, scanning discs with Swiss cheese holes in them, and a kit to build something or other for Lord knows what.

RADIO WORLD

The First and Only National Radio Weekly

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

TELEPHONES: BRYANT 0558, 0559

PUBLISHED EVERY WEDNESDAY

(Dated Saturday of same week)

FROM PUBLICATION OFFICE

HENNESSY RADIO PUBLICATIONS CORPORATION

145 WEST 45TH STREET, NEW YORK, N. Y.

(Just East of Broadway)

ROLAND BURKE HENNESSY, President

M. B. HENNESSY, Vice-President

HERMAN BERNARD, Secretary

Kansas City, Mo.: E. A. Samuelson, 300 Coca Cola Bldg.

Los Angeles: Lloyd Chappel, 611 S. Coronado St.

European Representatives: The International News Co.,

Breams Bldgs., Chancery Lane, London, Eng.

Paris, France: Brentano's, 8 Avenue de l'Opera.

EDITOR, Roland Burke Hennessy

MANAGING EDITOR, Herman Bernard

TECHNICAL EDITOR, J. E. Anderson

ART EDITOR, Anthony Sodaro

CONTRIBUTING EDITORS:

James H. Carroll and Capt. Peter V. O'Rourke

SUBSCRIPTION RATES

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

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

ADVERTISING RATES

General Advertising

1 Page, 7 1/4" x 11"	462 lines	\$300.00
1/2 Page, 7 1/4" x 5 1/2"	231 lines	150.00
1/2 Page, 8 1/4" D. C.	231 lines	150.00
1/4 Page, 4 1/8" D. C.	115 lines	75.00
1/4 Page, 4 1/8" S. C.	57 lines	37.50
1 Column, 2 1/4" x 11"	145 lines	100.00
1 Inch		10.00
Per Agate Line		.75

Time Discount

52 consecutive issues	20%
26 times consecutively or E. O. W. one year	15%
13 times consecutively or E. O. W.	12 1/2%
4 consecutive issues	10%

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

CLASSIFIED ADVERTISEMENTS

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

Entered as second-class matter March 23, 1922, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

Stations Beware!

AMERICANS hate censorship. The censor is not for our people. The very idea breathes the spirit of intolerance, often injustice—always the overhanging sword. Let us have none of this Old World menace to independence of thought, manliness, liberty, but let us be sure not to permit the offenses against public policy or good taste that make the shadow of the censor to hover darkly over us.

This caution is directed at some broadcasters—thank God, they are few in number—who give the impression that they are willing to go as far as they dare in song, humor and sometimes in matters which have no place in radio.

Be careful—or beware!

Vitality and Profundity

THE Federal Radio Commission has its hands full. All the stations on the air, except WOO and WEBJ, want to stay there. The Commission is for getting rid of a goodly number of them, and starts off with a proposal to eliminate 162.

The listening public is divided on the subject of good-riddance. A great many listeners in the mid-West complain only that there are too many chain stations on one coast on the same wave as preferred stations on the other coast. They are for crimping the stations that the Commission does not see fit to molest.

Even experts disagree with the Commission's plan and say that a 10 per cent. station reduction would be ample, reporting general satisfaction with the existing situation.

Stations served with notice to quit are protesting. They charge discrimination. They point, some of them, to their years of continued and faithful service. Dissent from the dissenters takes the form of criticism of the noisy, boisterous, cheap programs some of these endured stations have been transmitting.

The Commission plans to straighten things out, is expected by each proponent and kicker to satisfy him, and evidently has some hope of accomplishing the impossible feat of pleasing everybody. Whence it derives such innocence is hard to imagine. A storm will swirl around the cool heads of the Commissioners no matter what they do. The army of disgruntled will be self-recruiting and self-perpetuating. Invective will be the ammunition.

The Commission decided to have itself do some field investigating, hence Commissioners journeyed to the East and the mid-West. Chairman Ira E. Robinson and Commissioner Orestes H. Caldwell went to New York, in which area more than two dozen stations were on the list of the doomed, while Commissioners Eugene Sykes and Sam Pickard went to Chicago and points thereabout. In making the announcement the Commission sent a notice to the press which was a laudation of Chairman Robinson's ability. The notice included the following.

"In view of the magnitude of the task before it, the Commission is leaning heavily on Judge Robinson for counsel and advice, because of his long judicial experience and training in dealing with intricate and complex problems. Under his guidance both the broadcasters and the listening public are certain to get a 'square deal.'"

"For nearly forty years Chairman Robinson has been a member of the Bar, and for a long period was Presiding Justice of the Supreme Court of West Virginia, during which time he rendered many vital opinions dealing with profound questions."

But, with all his experience, talent, training and the vitality of his opinions on subjects of deep profundity, the Chairman will find it rather difficult to convince a station ordered off the air that the action represents a "square deal." When the elimination plan is finally put into effect "with a firm hand," as promised, and August 1 dawns with a purged ether, the Chairman may begin to think that he was unpopularly nominated for President of the United States at one of the conventions, and may come to know that vital opinions on profound questions have something of the vitality of dynamite in the administrative branch of public affairs.

The Chairman is an able man, but it takes unusual physical strength and refrigerated mentality to endure the onslaughts of the kickers.

To lose one's head is to lose one's case and the Judge seems to be growing petulant under the strain.

The Broadcast Anthem

WHEN the band plays "The Star Spangled Banner" should you stand up?

Certainly.

But suppose the band is playing at some patriotic services that are being broadcast, and the music of the accepted, though not enacted, National anthem arrives in your home by the ethereal route?

Should you stand up then?

Why, cert—er—well, let's see.

If there are youngsters present, whom it is desired to impress with the necessity of respect for the flag and for the country for which it stands, it would be quite proper to rise, and have them do likewise. But it isn't obligatory under any conditions. Not even a member of the armed forces of the United States, present in uniform, need stand when the de facto anthem is received by radio.

The subject is an interesting one. A letter addressed to the Adjutant General's Office of the War Department brought the following kind reply from Major General Lutz Wahl, the Adjutant General: "I have just received your letter in which you ask for advice as to the general custom and the procedure in the Army with reference to standing and facing the radio during the reception of the National Anthem.

"As far as is known, your query marks the first time that this question has been brought to the attention of the War Department and there would seem to be no such general usage in this connection as to warrant the designation of custom.

"The action you suggest, while perfectly appropriate in large gatherings, schools, or upon other similar occasions, would hardly seem necessary in the privacy of the home, except during programs of a particularly solemn or patriotic nature and when it is desired to impress those of tender years present with the necessity for showing proper respect for the flag and institutions of our country.

"The regulations which are issued for the guidance of the Army contain no instructions with reference to the procedure to be followed when the National Anthem is received by radio.

"In this connection, I am sure that you will appreciate that this department can fix no rules for the guidance of our citizens who are not members of the military establishment."

Blessings on R.C.A.

STOCK market quotations are not always a true reflection of the condition of a business, but there is no denying that the general public has been mightily impressed by the recent upward tendencies of the Radio Corporation of America stock, one man in particular. He lived in Westchester County, N. Y. He had been holding 140 shares of R. C. A. stock some years. His buying price was 42. Early this year he was offered 47 for his shares.

At first he thought the would-be purchaser was crazy. Then it occurred to him that he could afford to be as crazy as the other man by refusing to sell. He refused. He waited and saw R. C. A. shares go up to 188. He sold at that figure and wasn't at all upset when he saw the stock advance several points, even when it later dropped 26 points in one day.

Taking his profit of \$20,440, he invested it in Westchester property and now he isn't paying rent any more. Some Wall Street friend tell him he lost a pile of money by selling too soon. He only smiles and remarks: "When I'm through, I'm through." He surely is—and there's the house and garage and no rent bills. Oh, he's through all right and he says: "God bless the R. C. A.!"

The Radio Trade

Bureau Starts Drive Against Tube 'Gyps'

According to complaints made to the National Bureau, 383 Madison Avenue, New York City, by manufacturers, "bait" advertising practices are being followed by radio retailers in various sections of the country. The Philadelphia Bureau has taken aggressive steps to combat a local situation with good results.

The National Bureau has cooperated with the Better Business Bureau of New York City in shopping local retail establishments. One prominent retailer in this city uses two outstanding lines of tubes as bait, in the following manner, says the bureau:

Discourage Better Brands

"The well-known tubes are advertised at a cut price.

"When the purchaser wants a quantity of these tubes, he is told that the tubes are not guaranteed and that they cannot be tested. If he wants a guarantee, he is urged to buy the special tube which the retailer offers for sale, at a higher price. Every effort is made to dissuade the purchaser from buying the outstanding tubes. Clerks will go so far as to roughly handle them with the apparent intent to injure their usefulness.

"We are informed that the clerks are penalized if they sell too many of these

outstanding tubes, and that if they prove unsuccessful in the art of switching, they are discharged.

"We have found the same situation existing in regard to the sale of two makes of radio sets, and other merchandise of national character.

Seeks to Quash Practice

"With a view toward aiding the radio industry as a whole to combat this deceptive practice, we requested that each local Bureau shop representative radio establishments in its city for the purpose of determining whether they are following 'bait' practices.

"We wish you would give particular attention to the advertising and selling of the outstanding tubes, as these items seem to be the favorites for 'bait' purposes. However, we would appreciate learning of 'bait' practices that are followed in regard to any radio merchandise."

SICKLES BUYS OUT OTHERS

The F. W. Sickles Co., 130 Union street, Springfield, Mass., is now owned by Frank W. Sickles alone. He bought out H. C. Hyde, G. E. Boynton and A. L. Bausman, who also are no longer officers or directors

Literature Wanted

THE names and addresses of readers of RADIO WORLD who desire literature on parts and sets from radio manufacturers, jobbers, dealers and mail order houses are published in RADIO WORLD on request of the reader. The blank below may be used, or a post card or letter will do instead.

RADIO WORLD,
145 West 45th St., N. Y. City.

I desire to receive radio literature.

Name

Address

City or town

State

- B. M. Swkey, 435 West 24th Street, New York City.
- Charles E. Russell, 1006 East 5th Street, Coffeyville, Kansas.
- K. G. Silverwood, 502 Jefferson Street, Port Clinton, Ohio.
- James J. Cochran, 827 Sheldon Bldg., San Francisco, California.
- Frank S. Boyd, Broken Bow, Nebraska.
- B. R. Balsis, 1617 Peoples Gas Bldg., Chicago, Illinois.
- Daniel E. Schiller, 183 Pleasant Street, Milwaukee, Wisconsin.
- J. J. Ferst, Jr., 74 Elm Street, River Rouge, Michigan.
- Harold Styles, P. O. Box 393, Poughkeepsie, New York.
- Karl K. Kahley, 603 South Grand Street, Lewistown, New York.
- H. Pedersen, Convent Station, Convent, New York.
- A. T. Strenstrom, 25 Mackay Place, Brooklyn, New York.
- Tracy D. Edmonds, Box 446, Coeur d'Alene, Idaho.
- W. W. Parker, 838 East Chestnut Street, Lancaster, Pennsylvania.
- J. Stewart, 802 F Street, N.W., Washington, D. C.
- Nat Lewis, 9231 State Road, Philadelphia, Pennsylvania.
- J. H. Sams, 2 Eigner Terrace, Elyria, Ohio.
- R. N. Chambers, 619 5th Street, Albion, Nebraska.
- Max A. Jeffords, 147 S. Emerson, Wenatchee, Washington.
- E. N. Hammond, 1447 Main Street, Buffalo, New York.
- Nick Ihley, Radio Shop, Coeur d'Alene, Idaho.
- James L. Hudson, 6380 Hazlett Street, Detroit, Michigan.
- Merle Yoder, R. D. No. 1, Hollspple, Pennsylvania.
- D. S. Nash, Geneva, Alabama.
- Alvin Gruske, 126 3rd Avenue, S.E., LeMars, Iowa.
- Broward Electric Co., Box 1013, Fort Lauderdale, Florida.
- A. S. Mason, c/o T. M. Revell, R. R. 5, Guelph, Ontario, Canada.
- Walter H. Hays, 210 W. 136th St., New York City.
- Walter Marker, 391 Riverdale Ave., Yonkers, N.Y.
- Murray H. Abrams, 471 Audubon Ave., N. Y.
- A. H. Schroder, Box 562, Freeport, Texas.
- Geo. W. Freeman, 119 Elmora Ave., Elizabeth, N. J.
- W. E. Lincoln, 263 Broadway, Taunton, Mass.
- Shenandoah Radio Shoppe, 202 E. Centre St., Shenandoah, Pa.
- L. Sakellar, 10 Orange St., Brooklyn, N. Y.

Sonora Stops Sonatron in Fight Over Name

Washington.

The Patent Office, through Assistant Commissioner Moore, sustained the complaint of the Sonora Phonograph Company that the name "Sonatron," used by a tube company, interferes with the registered name "Sonora." Mr. Moore upheld the Examiner of Interferences, whose decision came before Moore on appeal. The action was against Harry Chirelstein, head of the Chicago company manufacturing Sonatron tubes. The complainant makes a set, the Sonora, and also has registered "Sonoradio."

In his opinion Moore wrote:

"The first question presented for decision . . . is whether the applicant's (Sonatron's) mark so nearly resembles the opposer's marks as to be likely to cause confusion or mistake in the mind of the public or to deceive purchasers when the marks are concurrently appropriated to merchandise of the same descriptive properties . . .

May Confuse

"It is believed that the word 'Sonatron' so nearly resembles the words 'Sonora' and 'Sonoradio' as to be likely to cause confusion. The first two syllables of the words are substantially alike in appearance, sound and suggestion, and while the concluding syllables of the words are different, yet it is believed that differences are such as would not be carried in the mind of the purchasing public. In fact the testimony of witnesses in the record of the Sonora Phonograph Company shows that actual confusion in trade

has occurred in several instances. It is believed that the rule adopted and applied by the Court of Appeals in many cases to the effect that where the newcomers adopts a trade-mark which is an approximate simulation of a well-known trade-mark all doubts should be resolved in favor of the prior user, should be applied in the instant case . . .

Goods Similar

"The next question presented for decision is whether the merchandise of the parties is of the same descriptive properties.

"The applicant's mark is appropriated to radio electron tubes; whereas, the opposer's marks are appropriated to radio receiving sets, amplifiers and loudspeakers for radio receiving sets, etc. The Examiner of Interferences correctly held that electron tubes form an essential part of radio receiving sets, and that the goods of the parties possess the same descriptive properties.

"It seems evident . . . that the word 'Sonatron' was regarded as so nearly resembling the word 'Sonora' as might be calculated to deceive the trade and the purchasing public when the two words are concurrently used 'in connection with the manufacture and-or sale of phonographs, radio products and combinations and parts thereof.'

"The decision of the examiner of interferences sustaining the opposition and adjudging that the applicant is not entitled to the registration for which he has made application, is affirmed."

Show Crowds Flock to Giant Ohmmeter

It is one thing to be told that a variable resistor has a range of thus and so, and quite another to see the actual resistance before one's eyes. And since observation is by far the more effective practice, the manufacturers of the Clarostat provided the "seeing-is-believing" feature at their Trade Show Booth No. 24 in Chicago.

A huge direct-reading ohmmeter, with an 18-inch dial—probably the largest meter of its kind ever constructed—was mounted on a wall, so that the resistance readings could be followed by a large crowd at a considerable distance. Crowds flocked to the booth.



Some Book!

A handy manual of 36 pages and cover—with 88 illustrations and over 20,000 words of practical, concise, understandable text—prepared by Austin C. Lescarboua and our engineering staff. Just the thing to show you how to get better radio results. It's yours for 25 cents—either from your dealer, or by remitting stamps or coin to

Get It!

American Mechanical Laboratories, Incorporated
Specialists in Variable Resistors
285 N. Sixth St. :: Brooklyn, N. Y.

CLAROSTAT
REG. U. S. PAT. OFF.

LYNCH
Guaranteed equalizers supplied in any desired value.
ARTHUR H. LYNCH, Inc.
1775 Broadway N. Y. C.

Send for Book

Make any Good Receiver BETTER

CC TUBES
C. E. MFG. CO.
Providence R. I.

THE NATIONAL SCREEN GRID 5, described by James Millen in April 14th, 21st and 28th issues. Fully illustrated, including picture diagrams of wiring. Uses screen grid tube for the single RF stage, four other tubes standard. Send 45c for these three copies and get blueprints free. RADIO WORLD, 145 West 45th St., New York City.

\$50,000 Free Samples Upset Manufacturer

"The N. A. B. News," issued by The National Association of Broadcasters, Inc., 1265 Broadway, New York City, publishes an interesting account of a manufacturer who bought time on the air, broadcast an offer of free samples, and was swamped with requests. To fill all requests he had to spend nearly \$50,000. "The story," says an editor's note, "while perhaps seemingly fanciful, is taken from an actual case on record."

The moral drawn from the narrative is that every station's sales force should acquaint prospective clients with the possibility of an enormous response where samples are offered free over the air.

The copyrighted article republished by permission, follows:

Five thousand letters came pouring in on the first mail. Apparently radio advertising was a big success. But when almost that same amount of letters came in on the second, and then the third mail, the manufacturer decided that perhaps he wasn't quite prepared for this avalanche of requests.

The manufacturer was glad to see the great interest shown in his offer of a free sample to all those who would write in for it, and was also glad to see the success of his first radio advertising, but he had prepared only a limited amount of free samples and they were fast running out.

He decided that under no conditions could he fall back on his offer to the public, so he drafted every available man in his factory to help in preparing and sending out his product.

When Mr. Manufacturer finally drew his breath and began to check up, he found out that three carloads of material had gone out, and the amount spent totaled nearly \$50,000.

The above mentioned gentleman became slightly hot under the collar. He had discussed his program with the man in charge at Station - - -, and he had not been told to expect such an overwhelming answer to his offer. Why—why hadn't he been advised as to what to prepare? He could have saved a great deal of time, trouble and money if he had received a word of advice from the radio man in charge of his advertising.

Perhaps this is a fairly new angle on the subject of radio advertising, but it is one which needs careful thought. The advertiser offering a free sample of his goods is likely to receive thousands of letters, and in nine cases of ten, if it is his first appearance "over the air," he is totally unprepared.

A definite response to radio advertising is, of course, a necessity to the manufacturer, but in cases such as the one we mention, an intelligent statement should be given to all manufacturers advertising in this manner, that the public's response may be very great.

There is something about the lure of "free sample" that will make thousands of listeners take their pen in hand and write immediately.

The case mentioned here is not the only one we have on record—such cases are not uncommon, and all radio men in charge of station advertising should be on the "qui vive" to assist advertisers, using their stations, in coping with such a situation.

WAVE TRAP, \$1.50



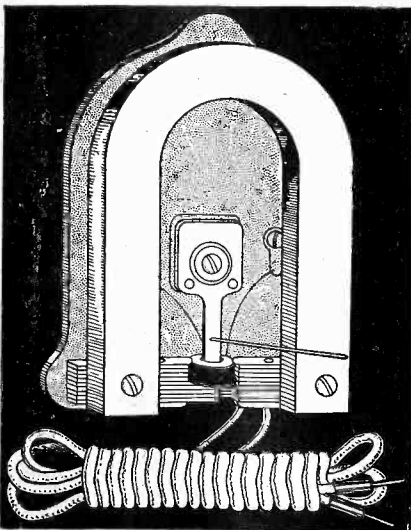
Genuine Moulded Bakelite Casing, panel or sub-panel mounting option, or placement atop of cabinet, mark this new model wave trap that cuts out interference. Send check, P. O. money order, or postage stamps.

Five-day money-back guaranty
Guaranty Radio Goods Co.

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

A Strong, Rugged Loud Unit

That Drives Any Cone Speaker and Reproduces Fine Tone at Great Volume!



This unit has a full floating armature, which means that armature is mounted so that it acts like a plunger between two sets of magnets or pole pieces. As the magnetization of the armature changes under the influence of the signal it plunges first toward one pair of pole pieces and then toward the other.

The large field magnet used insures a strong and permanent polarizing flux, which protects against loss of sensitivity from self-demagnetization to which some loudspeaker units are subject.

The cone driving pin is directly coupled to the full floating armature at that point on the armature where the force is greatest. This insures against loss of power through complicated levers.

The sturdy construction and heavy weight of the assembled unit prevent motion of the unit itself and insure that all the power is transformed into sound.

The armature is adjustable from an exposed knob in the back.

Apex, chuck and thumbscrew supplied with each unit!

This unit stands 150 volts unfiltered. With filtered output the unit has stood up to 550 plate volts continuously without damage.

Each unit is supplied with an apex, consisting of two metal plates, so that any type of airplane cloth or cone speaker may be built; also with each apex are supplied a threaded chuck and thumbnut for engaging the pin. The screw firmly grips the pin. Besides, a 60-inch cord with tips, is also supplied with each unit.

The Powertone Giant Unit, complete with apex, chuck, screw and 60" cord; total weight, 3 lbs. (Cat. No. 1098).....\$3.75

SEND NO MONEY!

GUARANTY RADIO GOODS CO.,
145 West 45th St., New York City.

Please send me one cone speaker unit (Cat. 1098), as advertised, with apex. I will pay postman \$3.75, plus few cents extra for postage. Your 5-day money-back guaranty is accepted.

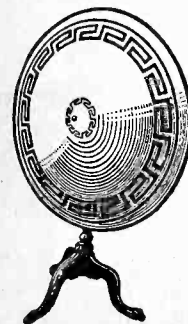
Name

Address

City State

5-DAY MONEY-BACK GUARANTEE!

36" GIANT CONE \$6.00 KIT



(Pedestal FREE with all orders received before June 15.)

Kit consists of one Powertone Unit, one designed front sheet of Fonotex, one plain Phonotex back sheet, two metal rings, one metal bracket, one apex, thumbscrew and chuck; one tube of cement; hardware; instruction sheet. Tri-foot pedestal. FREE if you order NOW!

SEND NO MONEY!
We Ship C. O. D.

GUARANTY RADIO GOODS CO.
145 West 45th Street New York, N. Y.
FIVE-DAY MONEY-BACK GUARANTY!

\$40,000 Is Offered for Original Music

"To encourage the art of musical composition in the United States," the Victor Talking Machine Company of Camden, N. J., has announced three prizes aggregating \$40,000 for the best original works of music by American composers not hitherto published or performed in public. The plan and the rules governing the competition were announced by John Erskine, author of "Galahad" and "The Private Life of Helen of Troy," and were broadcast by station WJZ of the National Broadcasting Company and by affiliated stations in the Blue network. The competition is limited to persons of American citizenship.

A prize of \$25,000 will be awarded for the best work of symphonic type in any form which the composer may employ or develop within the playing scope of the full symphonic orchestra.

In addition, \$10,000 will be awarded for the best and \$5,000 for the next best concert composition within the playing scope of the American dance, jazz or popular concert orchestra. The closing date of the symphonic competition is May 27, 1929, and the awards will be announced on Oct. 3, 1929. The closing date for the popular competition is Oct. 29, 1929, and the awards will be announced Dec. 28, 1929. Competitors are not restricted as to the number of compositions they may submit.

One of the features will be broadcasting of the prize-winning compositions.

DOUBLE SHIELD PORTABLE BLUEPRINT

Actual size, clear wiring in picture form, after H. G. Cisin's pattern, exactly as described in this issue. Indorsed by him.

PRICE \$1.00

Send Check or M. O. for Immediate Delivery or Come in Person

Guaranty Radio Goods Co.

146 WEST 45TH STREET
NEW YORK, N. Y.
(Few Doors East of Broadway)

Subscribers: Look at the Expiration Date on Your Wrapper


We do not like to take your name from our subscription list without specific instruction to do so because many of our readers wish to keep a complete file of the paper.

Please, therefore, look at the subscription date stamped on your last wrapper, and if that date is earlier than the issue contained in the wrapper, please send check to cover your renewal.

In this way you will get your copies without interruption.

Subscription Dept., RADIO WORLD,
145 West 45th Street, New York City.

For Best Results
With the
DOUBLE-SHIELD PORTABLE
Featured by
RADIO WORLD
Use Only the
HAMMARLUND
Condensers, Chokes and Shields
Specified by the Designer
For Better Radio
Hammarlund
PRECISION PRODUCTS




VICTOREEN Super Coils
Send for Folder
Geo. W. Walker Co.
2825 Chester Avenue
Dept. B Cleveland, O.

THE SCREEN GRID EQUAMATIC...
and be sure to use genuine
KARAS PARTS
Write for Literature to
Karas Electric Co.
4039-FD N. Rockwell St.
CHICAGO

BUILD ONE of these FAMOUS CIRCUITS
5 TUBE SHORT WAVE KIT

The Aerovox Research Worker is a free monthly folder that will keep you abreast of the latest developments in Radio.
A postcard will put your name on the mailing list. Write today. Aerovox Wireless Corp., 72 Washington Street, Brooklyn, N. Y.



AEROVOX

THE DIAMOND OF THE AIR

Using General Purpose Tubes

4 Tubes Set uses three type A tubes and one 112 type; has TRF stage, regenerative detector and two stages of transformer coupled audio. (This is not Shielded Grid Diamond.)

5 Tubes Same RF and detector as the other, but has one transformer and two resistance coupled audio. Especially suitable for B battery operation. (Not Shielded Grid Diamond.)

Guaranty Radio Goods Co.,
145 West 45th Street, New York City.
Please send me one newly printed official blueprint of the—
 5-tube Diamond of the Air
 4-tube Diamond of the Air
(Check off one you want.)
and the textual data giving full directions for construction.
Enclosed please find 25 cents to defray all expense.
NAME.....
ADDRESS.....
CITY..... STATE.....
(These are not Shielded Grid Diamonds.)

Take Your Choice of 5 Other Publications

For NEW RADIO WORLD Subscribers Ordering NOW

Radio World has made arrangements
—To offer a year's subscription for any one of the following publications with one year's subscription for **RADIO WORLD**—
RADIO NEWS or **SCIENCE** and **INVENTION** or **BOYS' LIFE** or **RADIO DEALER** or **RADIO** (San Francisco).

This is the way to get two publications

- for the price of one:
- Send \$6.00 today for **RADIO WORLD**
- for one year (regular price
- for 52 numbers)
- and select any one of the other
- six publications for twelve months.
- Add \$1.00 a year extra for
- Canadian or Foreign Postage
- Present **RADIO WORLD** subscribers
- can take advantage of this offer by
- extending subscriptions one year
- if they send renewals NOW?

Radio World's Special Two-for-Price-of-One Subscription Blank
RADIO WORLD, 145 West 45th Street, New York City.
Enclosed find \$6.00 for which send me **RADIO WORLD** for twelve months (52 numbers), beginning and also without additional cost, **Radio News**, or **Science** and **Invention**, or **Radio Dealer**, or **Radio** (San Francisco), or **Boys' Life** (or \$10.00 for a two-year subscription to one address), thereby getting **RADIO WORLD** and the other selected magazine, **BOTH** for two years. No other premium with this offer.

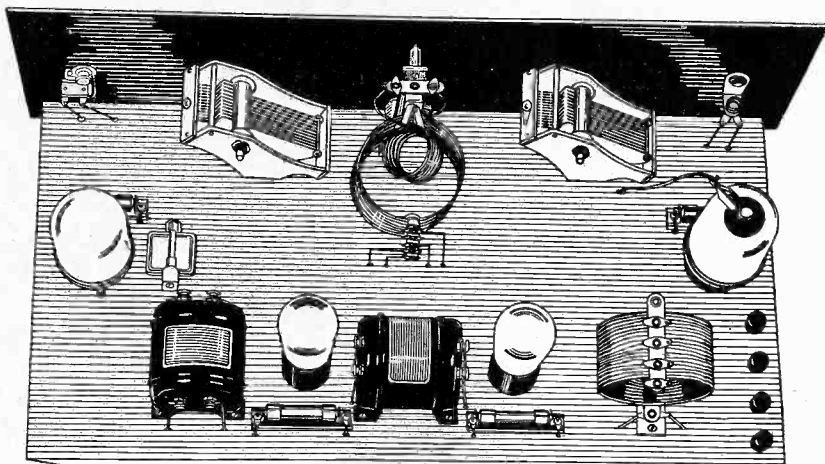
Indicate if renewal. Name

Offer Good Until Street Address

July 25, 1928. City and State

NO OTHER PREMIUM OF ANY KIND WITH THIS OFFER

Bakelite Front and Aluminum Subpanel
for the
4-Tube Screen Grid
DIAMOND OF THE AIR - - \$5.00
Five-Day Money-Back Guaranty



View of the Completed Receiver, using Drilled Front Panel and Aluminum Subpanel

Finest eye appeal results from construction of the 4-tube Screen Grid Diamond of the Air when you use the official panels. The front panel is bakelite, already drilled. The subpanel is aluminum, with sockets built-in, and is self-bracketing. Likewise it has holes drilled in it to introduce the wiring, so nearly all of it is concealed underneath set. Make your set look like a factory job.

- Front panel alone, bakelite, drilled.....\$2.35
 - Aluminum subpanel alone, drilled, with sockets built-in..... 3.00
- Screws, nuts and insulating washers supplied with each subpanel.

GUARANTY RADIO GOODS CO.

145 WEST 45TH STREET

NEW YORK, N. Y.

[A few doors east of Broadway]

Technical Service
Is Added by Blan

Blan, the Radio Man, known to radio fans all over the country, had added an elaborate technical department to his store at 89 Cortlandt Street, New York City. This is for the benefit of fans and custom set builders and its facilities are free to all. A. L. Caminetsky has been placed in charge. Mr. Caminetsky is well qualified to handle this department and give advice on all kinds of radio problems in all branches, as he has held a first class commercial radio license for ten years. Eight years of this time he spent at sea as Radio Operator and met and solved many ticklish problems during this service.

He recently was staff engineer at station WRNY and helped greatly in the success of this well known station. Prior to this, he filled the position of chief engineer at station WBRS, also at WGL. He will be glad to welcome inquiring fans or set builders with troubles.—J. H. C.

30 PER CENT. DUTY ENOUGH

In a ruling, sustaining protests of H. Scott Martin, of San Francisco, the Customs Court in New York found that certain imported radio tubes, taxed upon entry at the rate of 40 per cent ad valorem, under paragraph 399, Act of 1922, as manufactured of metal not specially provided for, should have been assessed at 30 per cent ad valorem under the provision in paragraph 372 for "machines and parts thereof," * * * not specially provided for." Chief Justice Fischer wrote the court's findings.

RADIO WORLD FOR SEVEN WEEKS, \$1.00

4-TUBE SHIELD GRID DIAMOND OF THE AIR BLUEPRINT FREE WITH EACH SUCH SUBSCRIPTION!

At 15c per copy, each week for seven weeks, Radio World costs you \$1.05, but if you subscribe for seven weeks at \$1.00 you will also get the official blueprint of this circuit FREE! The blueprint was designed by H. B. Herman from the original laboratory receiver. Size of blueprint, 27 x 27 inches. All connections, leads, parts, etc., shown actual size. Very simple to follow.

Home constructors of radio receivers, and custom set builders, by

DISTANCE JUST ROLLS IN THOUGH SET IS EASY TO TUNE!

All you have to do is to follow the official blueprint, and lo! a new world of radio achievement is before you! Distant stations that four-tube sets otherwise miss come in, and come in strong. No tuning difficulty is occasioned by the introduction of this new, extra powerful, startling tube, but, in fact, the tuning is simplified, because the signal strength is so much greater.

The circuit consists of one shield grid stage, detector and two transformer audio stages, with 112A in the last stage.

When you work from the official wiring diagram you find everything so delightfully simple that you marvel at the speed at which you get the entire receiver masterfully finished. And then when you tune in—more marvels! 'Way, 'way up, somewhere around the clouds, instead of only roof high, will you find the amplification!

following the blue print, can build a distance-getting and voluminous set, the parts for which list remarkably low.

The new shielded grid tube is used as the radio frequency amplifier. That is why the amplification finally is boosted forty times over and above what it would be if an -01A tube were used instead.

Such simplicity of construction marks the receiver that it can be completely wired, skillfully and painstakingly, in two and a half hours.

Great stability! No neutralization required! No shielding necessary!

You'll be overjoyed. But you should place every part in exactly the right position. Stick to the constants given, and, above all, wire according to the blueprint!

When you work from this blueprint you find that every part is shown in correct position and every wire is shown going to its correct destination by the ACTUAL ROUTE taken in the practical wiring itself. Mr. Herman's personal set was used as the model. This is a matter-of-fact blueprint, with solid black lines showing wiring that is above the subpanel, and dotted lines that show how some of the wiring is done underneath.

Everything is actual size.

EVEN A NOVICE CAN BUILD THIS CIRCUIT SUCCESSFULLY!

Not only is the actual size of the panel holes and instruments given, but the dimensions are given numerically. Besides, it is one of those delightful blueprints that novice and professional admire so much—one of those oh-so-clear and can't-go-wrong blueprints.

Be one of the first to send for this new blueprint, by all means, and build yourself this outstanding four-tube receiver, with its easy control, fine volume, tone quality, selectivity and utter economy. It gives more than you ever expected you could get on four tubes—and the parts are well within the range of anybody's purse.

Complete official list of parts given on each blueprint; also the schematic wiring diagram (besides the picture diagram of the wiring.)

SEND YOUR ORDER TODAY!

RADIO WORLD, 145 West 45th St., N. Y. City.

Enclosed please find:

\$1.00, for which enter my name on your list of mail subscribers for seven weeks and send me FREE at once one official blueprint of the Four-Tube Shielded Grid Diamond of the Air, as designed by H. B. Herman, and described by him in the February 4th, 11th and 18th issues of Radio World. No other premium this offer. 45c extra for Feb. 4th, 11th and 18th issues.

Renewal Present subscribers may renew for seven weeks under this offer. Put a cross next to word "Renewal."

NAME

ADDRESS

CITY STATE

Quick Action Classified Ads

Radio World's Speedy Medium for Enterprise and Sales

10 cents a word — 10 words minimum — Cash with Order

NEW SHIELDED GRID TUBES for Diamond, S-M Six or Laboratory Super, Tyrman 70. Price \$5 each. Philip Cohen, 236 Varet St., Brooklyn, N. Y.

"CALIFORNIA STATIONS" Three in one night, 3 tube Foreign Circuit Blueprints 50c. A. R. S., Box 18, White Plains, N. Y. 6-30-28

THE NATIONAL SCREEN GRID 5, described by James Millen in April 14th, 21st and 28th issues. Fully illustrated, including picture diagrams of wiring. Uses screen grid tube for the single RF stage, four other tubes standard. Send 45c for these three copies and get blueprints free. RADIO WORLD, 145 West 45th St., New York City.

GUARANTEED Safety Razor, with strop, in neat, strong carrying case, 25 cents. First-class, new. Send coin, M. O. or stamps.—P. Cohen, 236 Varet Street, Brooklyn, N. Y.

KARAS SHORT WAVE SET, three tubes, 13 to 750 meters, described in the March 31, April 7, 14, 21 and 28 issues. Send 60 cents for these five issues and get blueprint free. RADIO WORLD, 145 W. 45th St., N. Y. City.

EVERY FRIDAY at 5.40 P. M. (Eastern Standard Time) Herman Bernard, managing editor of Radio World, broadcasts from WGBS, the Gimbel Bros. station in New York, discussing radio topics.

Boy Scout Chief Sounds Rally Call

(Continued from page 9)

the North Polar Regions. His own call is 3-AKW and his portable call 3-AMT on the 10 meter bend.

"A few hundred stations of this sort operated by scouts and scattered over the country would be an invaluable help in time of emergency," Lt. Barry stated. "At the present time, members of the American Radio Relay League have a splendid system of this sort, but their lack of uniform and failure to have definite connection with local city governments renders their excellent emergency service in time of disaster somewhat difficult.

In business, Mr. Barry is president of the Lyman F. Barry Co. Inc., an advertising agency which makes a specialty of radio accounts.

Due to his intense interest in Scout work and his radio affiliations, Mr. Barry would like to build up a radio Scout page, if there is a demand. Enough scouts must show real interest. Therefore, Mr. Barry wishes the scouts to rally and send in letters of opinion. Address, Lyman F. Barry, care of RADIO WORLD, 145 West 45th Street, New York City.

SM

NEW!

AUDIO TRANSFORMERS



SILVER-MARSHALL, INC., introduces two totally new types of audio transformers, so far superior to present standards as to justify the term "revolutionary."

Yet they are offered at prices approximately *half* what might be expected, give *double* the amplification of the best existing types, provide far better frequency characteristics, and practically eliminate hysteretic distortion.

The *smaller* S-M 255 (first stage) and 256 (second stage) transformers list at only \$6.00 each! The larger *standard size* S-M 225 (first stage) and 226 (second stage) list at \$9.00 each!

Buy a pair, try them, and you'll see why they are called "revolutionary."

SILVER-MARSHALL, Inc.
878 W. Jackson Blvd.
CHICAGO, U. S. A.

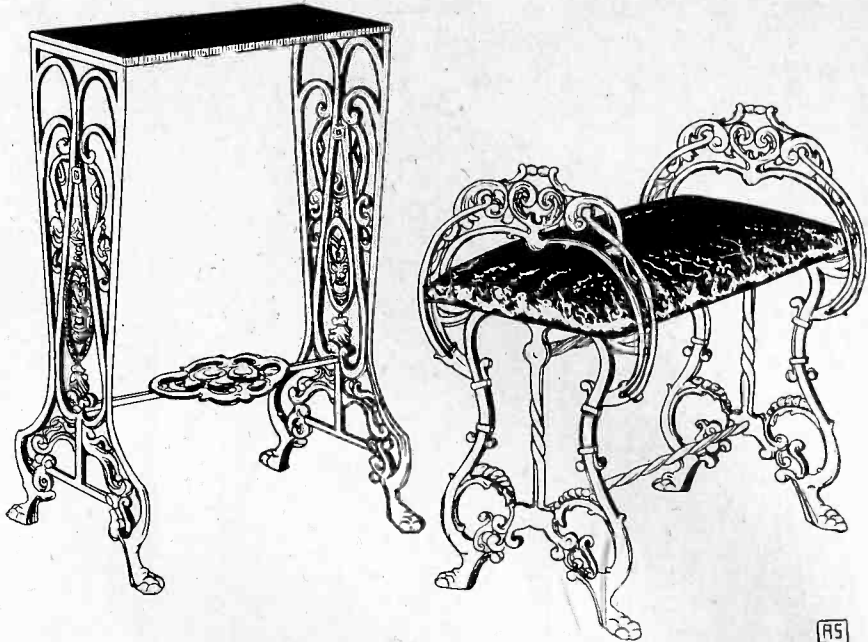
**BLUEPRINT
and Instruction Sheet**
for the Silver-Marshall
Shielded Grid Six

The New Receiver
Utilizing the New
Shielded Grid
Tubes with Their
Powerful Kick.

25 Cents

Guaranty Radio Goods Co.
145 WEST 45TH STREET
NEW YORK CITY

A Creation in— Radio Table and Bench At Exceedingly Low Cost to You!



The superb culture of Spanish design has been embodied in the Craftsmen's Wrought Iron Radio Table and Bench, in antique gold and polychrome finish. Table, as illustrated, \$11.50. Bench, in Italian red or jade green figured upholstery, \$10.

Beauty and Durability In Craftsmen's Wrought Iron

Modern appointments for the home all tend toward the fetching, the beautiful. The entrancing lure of the Craftsmen's Radio Table and Bench is achieved without stinting, yet at a price you will agree is a bargain.

These pieces of furniture blend with the most exquisite parlor or living room settings, yet fit in beautifully with modest surroundings as well, embellishing them, and creating a spot of color that tones up the appearance of the whole room.

THE TABLE—One model for two types of benches. The antique gold and polychrome finish is exactly like that on either bench. As there is no upholstery on the table, the same table harmonizes with both jade green and Italian red upholstered benches. The table is 28 inches high. The wrought iron antique gold polychrome flat top is 18 inches wide by 10 3/4 inches deep. Platform below will hold a speaker, as when an AC or other complete electric set is used, or may be used in other instances to hold a power pak and A supply, which you may curtain off. Table may be used for any size set in cabinet by allowing excess to protrude. Fits exactly Atwater Kent Models 37 and 38. Table is model 1150T. Price \$11.50.

THE BENCH: The seat is 15 inches high; the arm rests 23 inches high; the width of seat, 24 inches.

Model 1000J (jade green upholstery) . . . \$10.00
Model 1000R (Italian red upholstery) . . . \$10.00

Note: The table and the bench come knocked-down. Each takes only five minutes to assemble. There are only eight screws to tighten to each to complete assembly. Screws furnished with each order.

Guaranty Radio Goods Co.,
145 W. 45th St., New York, N. Y.

Please ship at once by express (put cross in square):

- One wrought iron table, antique gold and polychrome finish, model 1150T, at \$11.50.
 - One knocked-down wrought iron bench, antique gold and polychrome finish, with Italian red figured jacquard, model 1000R, at \$10.00.
 - One knocked-down wrought iron bench, antique gold and polychrome finish, with jade green figured jacquard, model 1000J, at \$10.00.
- All shipments C.O.D.

NAME

STREET ADDRESS

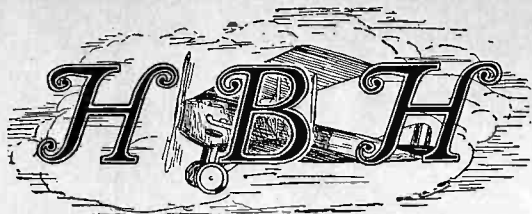
CITY STATE

Let Radio World Follow You on Your Vacation

If you are a subscriber and are going away this summer, send us your name and change of address and we will see that the paper reaches you every week.

If you are not already a subscriber, send us one dollar and your name will be placed on our subscription list from now until Labor Day and your address will be changed as often as you desire. Such change should reach subscription office two weeks in advance of date of publication.

Subscription Dept., RADIO WORLD, 145 West 45th Street, New York City

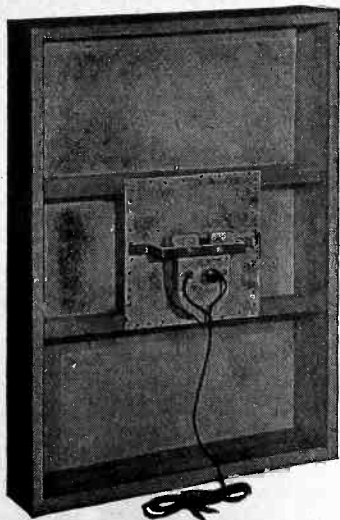


\$7.00

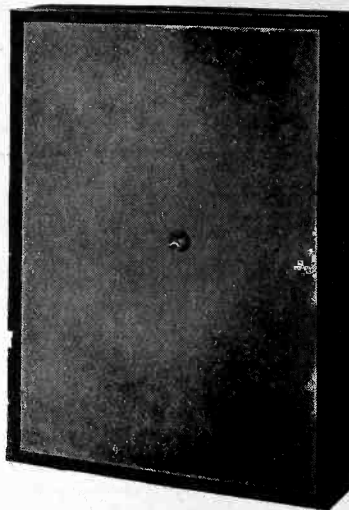
Airplane Cloth Speaker Kit

Special size 16½" x 22½", (Cat. 1086) Price, Including Unit

Kit Consists of airplane cloth, frame, moulding, unit, stiffening fluid, apex, crossarm, bracket, long cord, apex, hardware and instruction sheet.



Rear View of the HBH Airplane Cloth Speaker
Size, 16½x22½ Inches



Front View of the HBH Airplane Cloth Speaker
Size, 16½x22½ Inches

An Opportunity is presented to you to obtain a kit of this special but attractive size, 16½x22½", because a manufacturer accumulated an extraordinarily large stock of them.

For \$1 Extra We Build It for You!

If you do not want to build the speaker yourself, at \$1 extra cost you can quickly receive the factory-built speaker in your home, all ready to play. Size 16½x22½" (Cat. 1086B)....

\$8.00

Buy a Kit and Build Speaker Yourself at These Prices

- Complete Kit, 18x24", Cat. No. 1109.....\$10
- Complete Kit, 24x36", Cat. No. 1110.....\$12
- Complete Kit, 36x36", Cat. No. 1111.....\$14

Buy a Factory - Made Speaker, Ready to Play, at These Prices

- 18x24", Cat. No. 1088.....\$11
- 24x36", Cat. No. 1090.....\$14
- 36x36", Cat. No. 1091.....\$16

CHOOSE WHAT YOU WANT, BUT SEND NO MONEY!

GUARANTY RADIO GOODS CO.,
145 West 45th Street, New York City

Ship me the following items as advertised in Radio World:

Cat. No.....Cat. No.....Cat. No.....

Cat. No.....Cat. No.....Cat. No.....

for which I will pay postman advertised price plus few cents extra for postage.

Name

Address

CityState

Five-Day Money-Back Guaranty

LOUD UNIT



Powerful unit, excellent for any cone or similar type speaker, standard for HBH speaker; very loud. Cat. No. 1093, with apex, \$3.75.

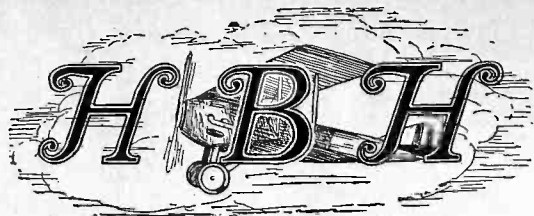
The unit is the Power-tone model, which provides high degree of volume and is very sensitive. Stands great strain. Used successfully in all radio receivers, including power pack installations up to 550 volts on the plate. Up to 135 volts DC may be passed through coils of unit without damage. For higher voltages filtered output is recommended, but unit has long stood up to 180 v. unfiltered.

Unit mounting bracket, Cat. No. 1113..... 35c.
Apex. Cat. No. 1107, 25c.

GENUINE "DOPE"



Genuine HBH Stiffening Fluid, secret compound, with superlative effect on tone quality. Large sized can, enough for three coats. Cat. No. 1097, \$1.50.

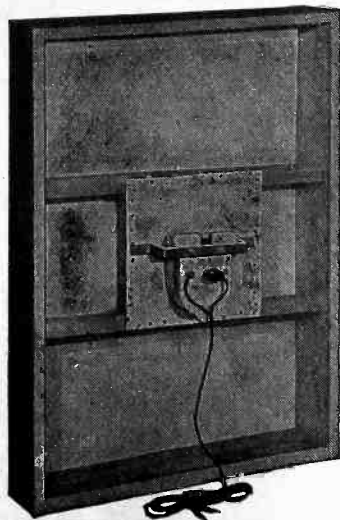


\$7.00

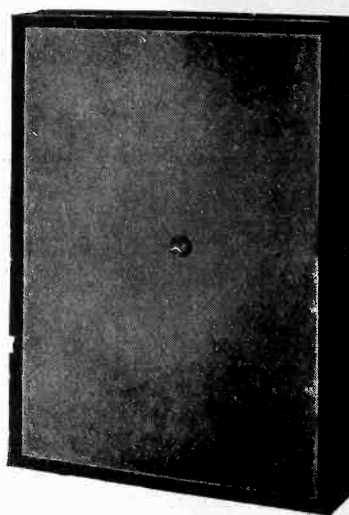
Airplane Cloth Speaker Kit

Special size 16½" x 22½", (Cat. 1086) Price, Including Unit

Kit Consists of airplane cloth, frame, moulding, unit, stiffening fluid, apex, crossarm, bracket, long cord, apex, hardware and instruction sheet.



Rear View of the HBH Airplane Cloth Speaker
Size, 16½x22½ Inches



Front View of the HBH Airplane Cloth Speaker
Size, 16½x22½ Inches

An Opportunity is presented to you to obtain a kit of this special but attractive size, 16½x22½", because a manufacturer accumulated an extraordinarily large stock of them.

For \$1 Extra We Build It for You!

If you do not want to build the speaker yourself, at \$1 extra cost you can quickly receive the factory-built speaker in your home, all ready to play. Size 16½x22½" (Cat. 1086B)....

\$8.00

Buy a Kit and Build Speaker Yourself at These Prices

- Complete Kit, 18x24", Cat. No. 1109.....\$10
- Complete Kit, 24x36", Cat. No. 1110.....\$12
- Complete Kit, 36x36", Cat. No. 1111.....\$14

Buy a Factory - Made Speaker, Ready to Play, at These Prices

- 18x24", Cat. No. 1088.....\$11
- 24x36", Cat. No. 1090.....\$14
- 36x36", Cat. No. 1091.....\$16

CHOOSE WHAT YOU WANT, BUT SEND NO MONEY!

GUARANTY RADIO GOODS CO.,
145 West 45th Street, New York City

Ship me the following items as advertised in Radio World:

Cat. No.....Cat. No.....Cat. No.....

Cat. No.....Cat. No.....Cat. No.....

for which I will pay postman advertised price plus few cents extra for postage.

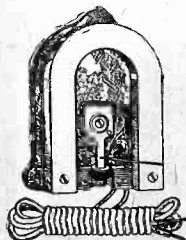
Name

Address

CityState

Five-Day Money-Back Guaranty

LOUD UNIT



Powerful unit, excellent for any cone or similar type speaker, standard for HBH speaker; very loud. Cat. No. 1098, with apex, \$3.75.

The unit is the Power-tone model, which provides high degree of volume and is very sensitive. Stands great strain. Used successfully in all radio receivers, including power pack installations up to 550 volts on the plate. Up to 135 volts DC may be passed through coils of unit without damage. For higher voltages filtered output is recommended, but unit has long stood up to 180 v. unfiltered.

Unit mounting bracket, Cat. No. 1113..... 35c.
Apex. Cat. No. 1107, 25c.

GENUINE "DOPE"



Genuine HBH Stiffening Fluid, secret compound, with superlative effect on tone quality. Large sized can, enough for three coats. Cat. No. 1097, \$1.50.