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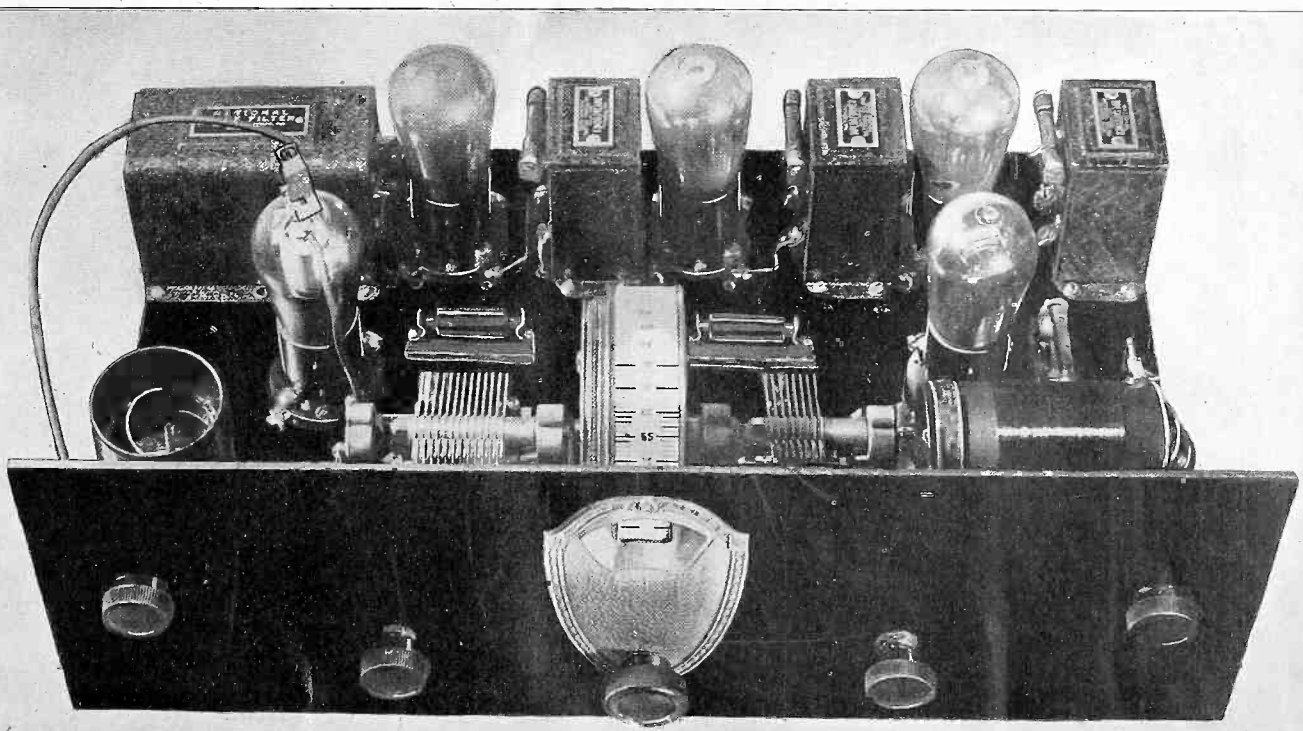
WORLD

The First and Only National Radio Weekly

316

Vol-13 No-4

THE NATIONAL SCREEN GRID FIVE



Destined to attain wide popularity, because it is one of the outstanding five-tube designs of the year, the National Screen Grid Five, pictured above, is described in this issue, for the first time anywhere. See the article by James Millen, beginning on page three.

RESULT OF SET BUILDERS' QUESTIONNAIRE

Sources of Audio Frequency Suppression

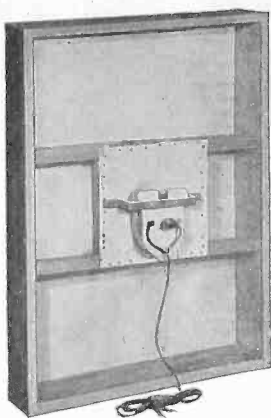
EFFICIENCY DATA ON KARAS SHORT WAVE SET

All Ready to Play with
Amazing Fidelity

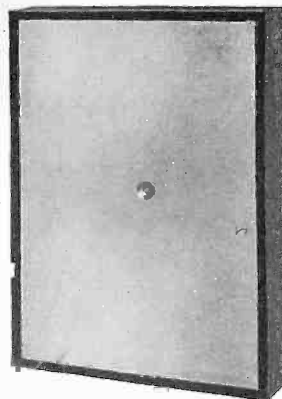
H.B.H.

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SPEAKER**

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Rear View of the HBH Airplane Cloth Speaker
Size 18x24 Inches



Front View of the HBH Airplane Cloth Speaker
Size 18x24 Inches

Size 18x24 inches, factory-constructed. **\$11.00**
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Genuine HBH Stiffening Fluid, secret compound, with superlative effect on fine quality. Large sized can, enough for three coats. Cat. No. 1097...\$1.50

The HBH Airplane Cloth Speaker may be purchased completely made up, in factory-sealed cartons, at the prices listed above, but if you prefer to build the speaker yourself you may do so at a saving of from \$1 to \$2, depending on the size of the speaker.

The complete kit consists in each case of airplane cloth, frame, moulding, unit, stiffening fluid, apex, crossarm, brackets, long cord, apex, hardware and instruction sheet.

We sell separately every component of the kit. See announcements below.



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

"DOPE"
HBH Stiffening Fluid may be used on any cloth type speaker to great advantage. It is of special manufacture, secret formula, and noted for superlative effects on tone quality. Two coats will suffice. Three are slightly better. Large size can, enough for three coats. When the first coat dries, in 15 minutes, a special speed feature, apply the second coat. When that dries put on the third and last coat. Cat. No. 1097...\$1.50

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Everybody wants a first-class speaker, because no set or power pack is any better than the speaker it feeds. Now the general public is enabled to obtain the famous HBH Airplane Cloth Speaker, both in factory-assembled form and in kit form, as well as each individual component of the kit separately, and thus can obtain a wonderfully clear-toned and faithful reproducer at the lowest cost at which such fine results are generally obtainable.

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Genuine airplane cloth same as used for best airplanes; great tensile strength, light weight. Govt. specifications. 18x24" (with 1x7 for baffle). Cat. No. 1099...\$1.50
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24x36" (enough extra to cut own baffle with shears). Cat. No. 1101...\$2.00
36x36" (enough extra to cut own baffle with shears). Cat. No. 1102...\$2.50

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Those who have special cabinets, consoles, phonographs, etc., into which they want to build a fine speaker, have every opportunity now to build a speaker that will create a sensation. It is very simple to make the famous HBH Airplane Cloth Speaker any size you want. Determine the size desired, and multiply the dimensions in inches, thus obtaining the number of square inches. Multiply this by three cents to obtain price. Then send cash, check or money order with your order, as odd size kits are not C.O.D. items. All else are. Or you may order the next larger standard size C.O.D. and cut it down yourself. In either case you get complete kit.

FRAME
The wooden frame, with coplar of decorative moulding, may be purchased in standard sizes and used as such, or may be cut down from a larger standard size to a smaller special size, and cloth cut by purchaser accordingly. The frames come complete with moulding and hardware, in factory sealed carton. 18x24" Cat. No. 1103...\$5.00
18x36" Cat. No. 1104...\$5.25
24x36" Cat. No. 1105...\$5.50
36x36" Cat. No. 1106...\$5.50

APEX
The apex is of the double type, so that one metal shield is placed outside the diaphragm and the other inside, but the same apex may be used on any type of cone speaker. Each apex is equipped with threaded sleeve and thumbnut for fastening unit drive. Highest quality and durability of metal used. Outside diameter of apex, 1 1/4". Guaranteed to be enduring and serviceable. 25c
Cat. No. 1107...25c

Complete Kit, 36x36", Cat. No. 1111...\$14

UNIT
The unit is the Power-tone model, which provides high degree of volume and yet is sensitive. Stands great strain. Used successfully in all radio receivers, including power pack installations up to 250 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. Cat. No. 1108...\$3.75

REPLACEMENT COILS

You may have a unit in which there is nothing wrong except that the small coil built into it, or one of the two coils, or both, are burnt out. Replace these coils and you have the same old fine unit. These coils are hard to get, but we have plenty of them in three different sizes. When ordering, state the dimensions of the bobbin, or, preferably, send your old coil and we will send the correct replacement coil. Cat. No. 1112, each, 75c.

UNIT MOUNTING BRACKET. Cat. 1113...35c

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New York City

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Name

Address

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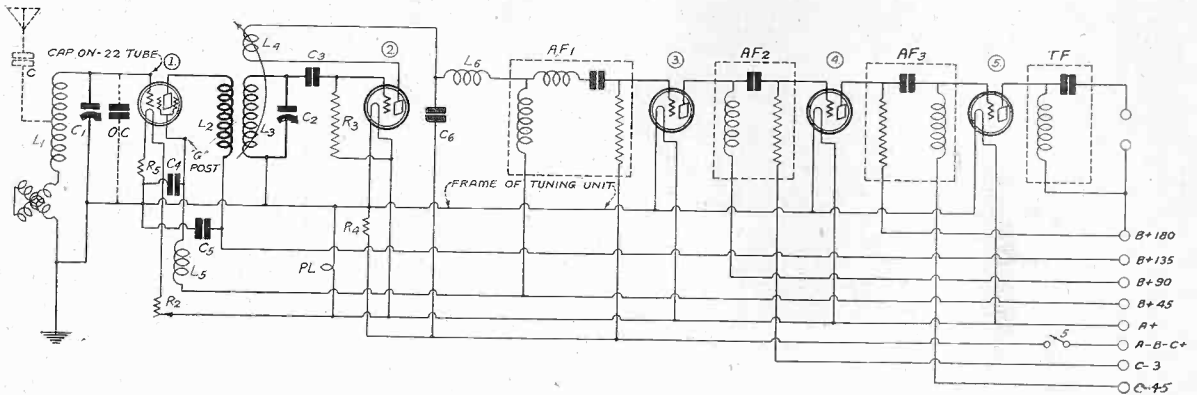
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Technical Accuracy Second to None

A Weekly Paper Published by Hennessy Radio Publications Corporation, from Publication Office, 145 West 45th Street, New York, N. Y.

Phones: BRyant 0558 and 0559.

The National Screen Grid Five



THE NATIONAL SCREEN GRID FIVE IS "ANTENNALESS" OR NOT, AS YOU PREFER. IF AN INDOOR OR OUTDOOR AERIAL IS USED, FOLLOW THE DOTTED LINE CONNECTION FOR AERIAL, AND INCLUDE THE CONDENSER C. IF THE PIANO HINGE OF THE CABINET, OR A WIRE STRETCHED INSIDE THE SET IS USED, CONNECT DIRECTLY TO THE CAP OF THE 222 TUBE, AND OMIT C AND AERIAL CONNECTION THERETO. REVERSE LEADS OF L2 EXPERIMENTALLY, TO DETERMINE WHICH WAY WORKS BETTER. C BIAS ON TUBE (4) MAY BE 3 VOLTS FOR TYPE -01A TUBES, BUT 1½ VOLTS TO 3 VOLTS MAY BE USED IF THIS IS A HIGH MU TUBE.

[A thoroughly worth-while receiver, one that has extreme sensitivity and produces enchanting tone quality, is the National Screen Grid Five, the construction of which is described here with for the first time anywhere. Parts of the best quality are used in a design that represents engineering of the soundest sort. The new screen grid tube is used as the radio amplifier, and in a way that well capitalizes this tube's remarkable properties. Every confident word written by the author is conservative, for the laboratory staff of Radio World is even more enthusiastic about this splendid receiver than the modest but brilliant engineer who designed it and who tells about it herewith.—EDITOR.]

By James Millen

Consulting Engineer

FOR a good many years now, the Browning-Drake receiver has been recognized as one in which simplicity of construction and excellence of performance have been combined in a most satisfactory manner. By the use of the 222 as the radio frequency amplifier tube even in this receiver, however, not only is its general performance improved to a most marked extent, but also its construction and operation are materially simplified.

Without resorting to the use of either shielding or neutralization, the operation of the receiver is made exceedingly stable.

Even the operation of the detector circuit is improved, because advantage can be taken of the regeneration control without throwing the RF tube into undesired oscillation. As a result of the RF tube not being right on the point of oscillating most of the time, the tone quality obtainable from the receiver as a whole is also improved.

Results of Actual Experience

To the radio listener who occasionally wishes to wander farther afield than the home stations but is not satisfied with any but the best kind of reception, such a receiver will furnish real joy.

The writer's experience with the original set hooked up just outside of Boston shows the pleasures that may be looked for.

Using approximately a three foot antenna wire, we tried for the nearest local station—WBET. At about the right setting of the dial we picked up a dance orchestra of nearly the right quality and volume for WBET.

Our surprise came at the end of the selection with the announcement—"WMBB, Chicago". With that to start us off, we called the roll of practically every station this side of the Pacific, getting fine quality and volume with little or no interference even between such stations as WJZ through WNAC on a 10 kc. separation.

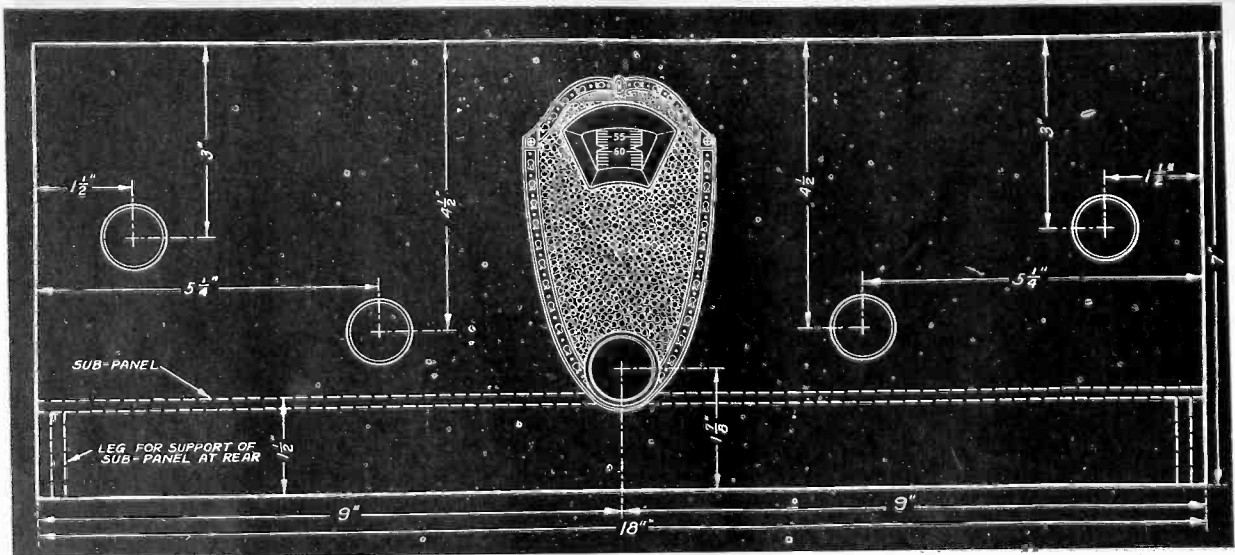
Such a set should be a great pleasure to radio listeners located in such congested districts as New York, Boston or Chicago, for its ability to break through the locals and bring in distant stations with a volume, quality, and lack of interference to make a radio program well worth hearing.

The secret of the good selectivity seems to be in the use of the very short antenna, the use of a regenerative detector

The Radio Frequency Amplifier

The secret of the good selectivity seems to be in the use of the very short antenna, the use of a regenerative detector

Self-Contained Antenna



THE ARRANGEMENT FOR THE FRONT PANEL. REVIEW NATIONAL DRUM DIAL, IS AT CENTER. AT EXTREME LEFT IS THE KNOB OF THE INDUCTIVE TRIMMER. NEXT COMES THE RHEOSTAT. TO RIGHT OF THE DIAL IS THE SWITCH KNOB, WHILE AT EXTREME RIGHT IS THE TICKLER KNOB. AS THE PANEL IS BLACK AND THE DIAL OF BEATEN SILVER EFFECT, THE ILLUSTRATION IS ALMOST PHOTOGRAPHIC.

222 Tube Used as RF Amplifier with Special Transformer—Stability and High Gain Achieved—No Shielding or Neutralization Needed—Regenerative Detector and Impedaformer Audio Complete Remarkable Circuit

and the use of a slot-wound high impedance primary transformer working out of a 222 tube, rather than the more generally advocated "tuned plate" system.

Certainly the transformer coupling, along with the proper location of coils and condensers, is responsible for the extremely stable operation. The grounded metal drum tuning control placed as it is between the two tuning units offers all the shielding necessary. This drum, which is of the vernier type, is also of considerable aid to easy tuning.

In general appearance, the National Tuning Unit employed is the same as the regular National Browning-Drake Unit, except for the greatly increased impedance of the slot-wound primary of the RF transformer, the omission of the neutralizing winding and the use of an inductive or variometer type of antenna compensator or trimmer in place of the mid-gest "trimmer" condenser formerly used.

Small Condenser Evens up Tuning

Because of the low internal electrostatic capacity of the 222 tube, a .0001 mfd. mica condenser, indicated by the dotted lines in the circuit diagram, must generally be connected across the antenna circuit tuning condenser, in order to keep the two tuned circuits in quite close step throughout the tuning range of the receiver.

Any slight variations are then easily compensated for by adjustments of the inductive trimmer.

The 15 ohm cartridge in the negative lead of the 222 filament circuit serves the double purpose of dropping the voltage down to the proper value and also for sup-

plying the grid biasing potential for this tube.

In the other lead is a 20 ohm rheostat that serves as a volume control.

Works Well on Eliminator, Too

It will be noticed that a radio frequency filter circuit, comprising an RF choke and a 1 mfd. condenser, are used in the screen grid lead.

As a result of such an arrangement, no trouble will be had in operating the receiver from a B eliminator. With some eliminators the condenser alone is sufficient, but in most instances the addition of the choke is well worth while.

The RF choke for the detector plate circuit is incorporated as part of the first stage National Impedaformer. An additional choke, however, as shown in the diagrams and photos, will in many instances still further improve the operation.

The Audio Frequency Amplifier

The combination impedance-resistance coupled amplification employed is one capable of excellent tone quality at a reasonable cost for the various parts needed.

The first stage impedaformer consists of an RF choke coil, plate impedance, coupling condenser and grid resistor. The second stage unit differs from the first only in that it does not include an RF choke, while the third stage unit comprises a plate resistor coupling condenser and grid impedance.

There are several advantages to the use of this "reversed" impedaformer as the last coupling unit. First, it improves the operation of the amplifier when used with B power units by overcoming any tendency toward motorboating, which is en-

countered at times with straight impedance coupled amplification, and second, it makes possible the use of a high mu tube in the second AF stage, where additional volume is required without any sacrifice of tone quality.

In the plate circuit of the power tube is incorporated a Tone Filter to protect the loudspeaker when using full voltage on the plate of a -71 tube.

Grid Bias Features

The grid bias for the first two tubes is obtained from the voltage drop across the filament equalizer, while that for the power tube is obtained from a dry C battery.

It will be noticed that a 4/5 ohm filament equalizer is employed to drop the 6 volt battery potential down to the 5 volts required for all the tubes save the 222. The 15 ohm equalizer then drops the 5 volts down 3.3 for the filament supply of the 222.

A 4/5 ohm Equalizer, however, provides a one volt drop when used with five 3/4 ampere tubes. In this receiver there are four such tubes and the 222, which only requires a trifle more than an eighth of an ampere for filament current.

The filament current required for the dial light, however, when added to that of the 222, makes a total of a quarter ampere, so that the standard No. 4/5 Equalizer is operated under proper conditions. The use of 5 volts instead of 6 across the dial light filament makes no appreciable difference in the brilliancy of the scale illumination, while it does materially increase the life of the small bulb.

Assembly and Wiring Notes

The actual assembly and wiring of the

of Few Feet Works Set

LIST OF PARTS

L1, L2L3L4, C1, C2, PL—One National Single Dial Tuning Unit BD No. 222 with No. 28 Illuminator (unit consists of drum dial, antenna and detector coils, two knobs, two tuning condensers, mounted on frame).

AF1—One National First Stage Impedanceformer.

AF2—One National Second Stage Impedanceformer.

AF3—One National Third Stage Impedanceformer.

TF—One National Tone Filter.

C, OC—Two Aerovox .0001 mfd. moulded mica condensers.

C3—One Aerovox .00025 mfd. moulded mica condenser.

C6—One Aerovox .001 mfd. moulded mica condenser.

C4, C5—Two Tone .5 mfd. bypass condensers.

1, 2, 3, 4, 5—Five General Radio sockets.

S—One Yaxley Switch.

R2—One Carter 20 ohm Rheostat.

L5, L6—Two National RF chokes, with two Lynch single mountings.

R3—One Lynch 2 meg. grid leak with single mounting.

R4—One Lynch No. 4/5 Filament Equalizer with single mounting.

R1—One Lynch 15 ohm Filament Equalizer with single mounting.

One—Bakelite front panel, 7 x 18 inches.

One—Bakelite subpanel, 10 x 17 inches.

Two extra knobs to match those on coil shafts, and to be affixed to rheostat and switch shafts.

One fuse clip or No. 45 Universal Pee-wee clip for cap of 222 tube.



THE RECEIVER THAT JAMES MILLEN DESCRIBES HEREWITH IS PICTURED ABOVE IN THE HOME OF WILLIAM A. READY, PRESIDENT OF THE NATIONAL COMPANY. NOTE HOW WELL THE RECEIVER BLENDS WITH THE HOSPITABLE WARMTH OF THE SETTING, THE RAYS FROM THE SILVER-FRINGED LAMP FALLING SOFTLY UPON THE EXQUISITE RADIO CREATION

receiver are quite simple and straightforward. The first step is to prepare the front and subpanels.

The tuning unit, sockets, audio components, and all other parts are then mounted in place on the subpanel, and the set completely wired, before mounting the front panel in place.

There is only one long lead carrying any RF current—the one from the plate of the 222 to the primary of the RF transformer. This lead should be run underneath the subpanel in as direct a line as possible.

Although best results are generally obtained when this plate lead is connected to the primary terminal nearest the front panel and the plus B 135 volt lead to the remaining primary terminal, it is well to try interchanging these two leads. With some sets, the reversed connections give considerably better performance.

Short Leads Assured

The location of the other parts is such as to eliminate the need for any long high frequency leads. The heavy line in the diagram indicates the frame of the tuning unit, and by making connection to this frame at several convenient points, as shown in the illustrations, the wiring is considerably simplified.

As an aid in making connections to this frame, soldering lugs should be placed under the heads of the several mounting screws that hold the tuning unit to the subpanel.

A short length of flexible rubber-covered hook-up wire with a fuse clip, No. 45 Universal Pee-wee or other suitable connector at one end, is fastened to the stator plates of the antenna condenser, as shown on the front cover. This is the contact to the cap or control grid of the 222 tube.

The cable is a home made one, consist-

ing of the required number of leads of flexible rubber-covered wire grouped together. A small cleat of bakelite or metal is used to fasten the cable to the subpanel and prevent strain on any of the soldered joints. Of course, a standard battery cable may be used if desired.

DX on 8-Foot Indoor Aerial

The circuit is so extremely sensitive that an indoor antenna consisting of not more than eight feet of wire, was used successfully, and distant stations tuned in. Even the piano hinge on the cabinet, or if there is no such hinge, a wire soldered to connect the two small hinges, makes an adequate aerial for this receiver. The value of a small antenna is to brighten selectivity very extensively. Particularly with such an aerial is the optional condenser OC desirable, since the antenna capacity is remarkably low.

Not only is the circuit wonderfully efficient but it presents a beautiful appearance when made up, as shown of the specified parts.

The layout is predetermined by the selection of these parts, since the factory-assembled tuning unit requires a front panel as diagrammed, and the location of the condensers and coils on this unit calls for placement of the other parts in the exact positions shown. In other words, the problem of placement of parts is solved for you, and every receiver constructed according to these directions will duplicate in appearance and efficiency

the laboratory receiver upon which this series of articles is based.

While the photographs and diagrams clearly show the way to build this outstanding receiver, many will desire to augment these data with an official template blueprint, with every part, connection, lead and wire clearly shown, and to that end I would be glad indeed to send such a blueprint with my compliments to all readers who ask for one. Address requests to James Millen, c/o RADIO WORLD, 145 West 45th Street, New York City. The blueprint shows front panel and subpanel full size and reveals the wiring with extraordinary clearness and precision.

Regarding the front panel, it will be noticed that there are no holes for bracket mounting, and no screws to mar the beauty of the front elevation. The secret of affixing the front panel to the subpanel is in the National drum dial, for the dial's frame is secured to the subpanel, while the escutcheon is fastened to the front panel and automatically attaches to the frame. The three tiny screws are matched to the silvery tone of the escutcheon and stamped radially to give the appearance of glittering diamonds.

[Wiring and tuning will be discussed in next week's issue, dated April 21. From week to week other interesting features of the National Screen Grid Five will be presented to readers of RADIO WORLD.]

Aesthetic Panel Design

By Herbert

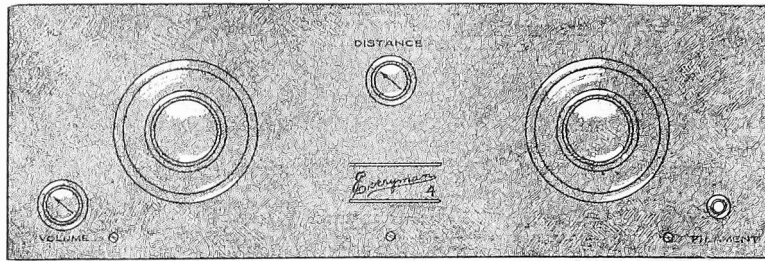


FIG. 1
AN ATTRACTIVE PANEL LAYOUT IN WHICH EMPTY SPACE IS EQUITABLY DISPOSED AND IN WHICH KNOBS AND DIALS GIVE THE APPEARANCE OF STABILITY AND BALANCE.

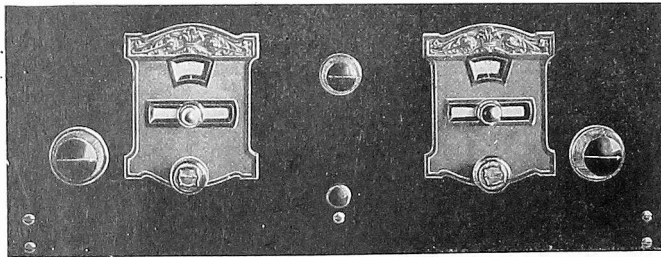


FIG. 2
ALTHOUGH THIS PANEL LAYOUT IS SYMMETRICAL IN ONE DIRECTION IT IS TOP HEAVY AND LACKS THE APPEARANCE OF STABILITY. THE EMPTY SPACE IS NOT WELL DISTRIBUTED. THIS LAYOUT WAS NECESSARY FOR ELECTRICAL AND MECHANICAL REASONS.

WHEN anything lacks symmetry it is usually stamped as ugly. If the nose of a man should point toward one side instead of forward, that man would not be good looking, no matter how regular his features were otherwise. If one cheek of a young girl should be more plump than the other she would not be pretty. Assymetry is not pretty where-

ver it may be, and our sense of balance rebels against it.

What is true of assymetry in general is true when applied to radio design, particularly with respect to panel layouts. If one dial be placed in the center with nothing else on the panel, the symmetry is maintained and we feel at ease looking at it. But if the dial is placed nearer

one end of the panel we experience an unpleasant feeling. And the permissible deviation from the center is very small.

If we have two equal dials to dispose of on the panel, geometric symmetry permits a wide choice of placement. The only requirement is that the centers of the two equal dials be at the same distance from the median line of the panel. But just any geometric symmetry will not suffice. There must also be an equitable distribution of empty space about the two dials. There must be more space between the two dials than at either end of the panel. Yet the dials must not be put too close to the ends, or the center will look empty.

Top-Heavy Panel

If nothing but the two dials is on the panel the dials should be centered along the horizontal median line, or placed slightly above it. If they are placed too far up, the panel looks top-heavy and gives rise to an uncomfortable feeling when one looks at it.

When minor knobs are put on the panel in addition to the main dials other factors of symmetry enter. Room must be left at the ends and in the middle for the extra parts. Since the minor knobs will fill some of the vacant spaces it becomes necessary to rearrange the dials so as to maintain the equitable distribution of parts. Just how this is done depends on the number of minor knobs to be disposed of. If there is an odd number one should be in the center and the others should be paired for symmetry.

Solidarity

One thing that should be kept in mind when laying out a panel is to obtain solidarity of appearance. The knob and dials should not be disposed so as to give the impression of instability. The two main dials may be raised above the median line but this change must be compensated for by placing knobs lower down to give the panel a visual foundation. If that is not done the panel will topple over in the mind.

The most stable geometrical figure is a triangle, provided the apex is pointing upward. Therefore to give stability of appearance to the panel the knobs should be disposed in triangular fashion with the apex up. The longer the base of the triangle relative to the height of it, the more stable does the panel appear to be.

Examples of Panel Design

This triangular layout has been followed by the designers of all three of the panels shown in Figs. 1, 2 and 3. In Fig. 1 the two main dials are symmetrically located both with respect to the vertical and the horizontal median lines. Much empty space has been left in the middle but this has been broken up by one knob which serves as the apex of the triangle and by the trade mark. One of the lower corners of the triangle is a volume control while the other is a filament switch. These are symmetrically located with respect to the vertical median line.

One of the knobs is much smaller than the other and this inspires a slight feeling of unbalance. It would be easy enough to make the two knobs equal and thus restore the balance and the solidity.

Triangular Lines

Fig. 2 illustrates a panel which is not so well laid out from the points of view discussed above. The deviation was necessitated by electrical considerations. Al-

New Resistors Suit Screen Grid Needs

Filament control on the screen grid tubes, although not critical, is a matter about which there are differences of opinion. Some manufacturers of the screen grid tubes have recommended one form of procedure and other manufacturers have recommended another. This has resulted in a certain amount of confusion on the part of the home-constructor. To satisfy the demands of each of these groups, Arthur H. Lynch, Inc., manufacturers of all types of fixed resistors and grid leaks, have brought out several new units for particular use in connection with the shield grid tube.

The first one of these units is known as the Lynch Equalizer type 15 and is designed for use in conjunction with a shield grid tube where a variable rheostat is also employed. The type 15 Equalizer and the variable rheostat are connected in series with the filament of the shield grid tube and the point of contact between the two is used as the grid return for the screen grid tube. By this

method the proper grid bias drop is secured.

Where more than one shield grid tube is employed, the rheostat and the 15 Equalizer are used on the first radio frequency tube only. For the remaining tubes, the Lynch Company has turned out other units in which there are no variables whatever. A standard Double Mount is used with two Equalizers, one of 5 and the other 15 ohms. By the proper connection, this unit is also used for supplying the proper filament current and the correct bias. For those who desire Equalizers of different values than are ordinarily supplied in these units, the Lynch Company have a whole group of Equalizers from which any desired choice may be made. The application of these units greatly simplifies the procedure necessary for procuring the best results from the new shield grid tubes. Full information will be furnished if you address Arthur H. Lynch, Inc., 1775 Broadway, New York City, and mention RADIO WORLD.

Invokes Geometric Plan

E. Hayden

though the triangular lines have been maintained the appearance is top-heavy. The main dials are too high or the end knobs are not low enough. There is too much empty space in the middle, especially near the bottom, and there is not enough at the ends. The spaces between the end knobs and the main dials are entirely too small. The fact that the end knobs are higher up than the lower edges of the tuning dials and the vernier knobs thereon gives the panel the appearance of instability.

These deviations from the artistic are permissible as the main function of the set is to please the ear and not the eye. When there is conflict between the electrical and the artistic the electrical takes precedence.

Fig. 3 illustrates a panel design in which symmetry, stability and simplicity have been combined. There is one exception, and that is the little knob to the right of the main dial. It clings to the dial like a satellite to a planet and it produces a similar, eccentric effect. The mechanical construction of the interior parts necessitated this design, but it could easily have been remedied by counterbalancing the knob on the left of the dial. This counterweight could have been a dummy or a trade mark.

Symmetry of layout of the panel adds to the beauty of a set and it should be taken advantage of wherever it is possible to do so without adversely affecting the operation of the circuit.

CeCo Adds 4 Tubes To Extensive Line

Four new types of radio tubes have recently been released by the C. E. Manufacturing Company of Providence, R. I., makers of the well-known line of CeCo tubes, types that are unusually popular right now with radio experimenters and set builders.

Of the four types, the new four-element, Shielded Grid Tube Type RF 22, probably is enjoying the widest popularity, because of its peculiar and outstanding characteristics which give promise of unusual and exceptional performance.

Used in special circuits designed for its use, and all shielding precautions utilized, an amplification of from 30 to 50 per stage is within the realms of possibility, as compared to from 5 to 15 with the ordinary tube.

The three other new types of CeCo tubes are of the power amplifying type, the latest of which is the type L50 a 7½ volt 1¼ ampere power tube that will handle greater volume than the 210 tube without a semblance of distortion.

The other two new tubes are the A types of the well known 112 and 171 power tubes, being F-12A and J-71A respectively, actually the equivalent of the 112 and 171 in all characteristics, excepting in A current consumption, which in the new types is ¼ ampere current drain as against ½ ampere in the older types. Shipments in all four types are rapidly going out of the trade.

MORE SALONS FOR EMPIRE

Empire City Radio Co., 173 Greenwich Street, New York City, are preparing for the opening of additional demonstrating salons. Harold Kaye is in charge of the receiver demonstrating rooms. This is one of the oldest retail outlets in the city.

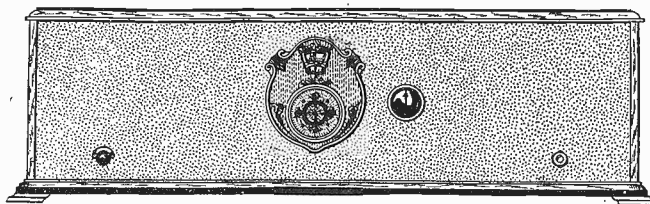


FIG. 3

ONLY ONE THING MARS THE SYMMETRY AND THE APPEARANCE OF STABILITY OF THIS LAYOUT. IT IS THE KNOB AT RIGHT OF THE MAIN DIAL. BUT EVEN AT THAT, THE PANEL IS ATTRACTIVE DUE TO ITS EXTREME SIMPLICITY.

Radio Checks Depths on Baltic Ferry Line

Washington — Radio will aid Baltic Sea ferries between Germany and Denmark to avoid shallows along their route, the American Consul at Copenhagen, Ellis A. Johnson, states in a report made public by the Department of Commerce.

Depths along the route will be checked in foggy weather by radio depth measurement apparatus which has been installed on each ferry. The apparatus is expected to prove valuable because of the prevalence of Baltic fogs which sometimes prevent checking the course by landmarks.

The danger has been rated as fairly high, but radio will reduce it.

Ben Aplin Promoted By Thordarson Company

Thordarson Electric Mfg. Company, Chicago, Ill., manufacturers of audio transformers and apparatus for radio power supply, announced the appointment of Ben. J. Aplin as Eastern Sales Representative, with headquarters at 30 Church Street, New York City. He was formerly Metropolitan representative. David F. Tobias, well-known radio engineer, is associated in the enlarged activities.

Mr. Aplin has acquired a large circle of friends in the metropolitan district as Thordarson representative during the past several years. The extension of territory will take in Philadelphia, Baltimore and Washington, D. C.

Accurate Center Tap Vital for AC Tubes

Many home-constructors and professional set-builders have discovered that the hum produced in the loudspeaker, where a B eliminator is used in conjunction with AC tubes is sometimes very much greater than when the same eliminator is used with a receiver employing battery operated tubes. Many constructors have imagined that flaws which existed in the engineering behind the B eliminator did not show up until the AC tubes were used. This is a mistake.

Although some B eliminators are not particularly satisfactory where a very sensitive audio frequency amplifier, such as a resistance coupled amplifier, is employed, it is safe to assume that most of the eliminators now available will perform in a most satisfactory manner when they are used with a properly designed circuit in which AC tubes are incorporated.

In fact they may be made to operate equally as well with AC tubes as they ordinarily did operate with battery operated tubes.

Much of the hum in the receiver employing AC tubes comes as a result of the filament balancing resistances being off-balance.

These resistances are made under a whole group of names but are easily recognized from the fact that they have a center tap. It is this tap which in most instances has caused the trouble. The

tap itself has been off-centered.

Laurence Cockaday, technical editor of "Popular Radio", has made the statement, that in some of the AC receivers designed in his laboratory, he has found that a single balancing resistance of this kind with its tap off-center has resulted in the production of more hum in the loud speaker than he has been able to find with even a very poor battery eliminator.

A new type of center tapped resistance has been developed by Arthur H. Lynch, Inc., for use in AC tube circuits. It is a precision instrument and the resistance on either side of the center tap is held to an accuracy of one half of one per cent.

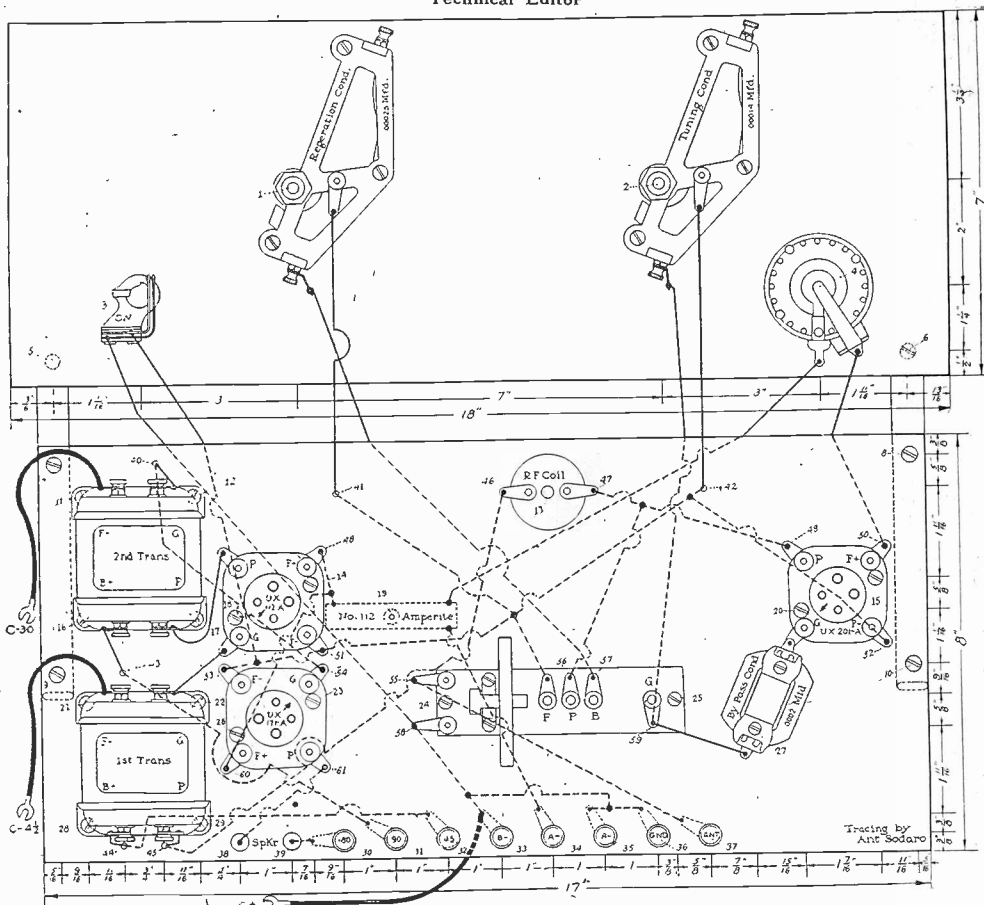
The use of precision resistances of this character, although a little more expensive, is really worthwhile because a few cents more spent for the proper building of the filament circuit really results in the production of a receiver in which the objectionable AC hum is at an almost unnoticeable minimum.

The new unit made by the Lynch Company is being marketed under the trade name of "AC Hum Killer". There are three types. One is for use in connection with 1.5 volts tubes, another is for use with 2.5 and 5 volts tubes and the third is for use with 7.5 volt filament tubes. These units are sold with one of the standard Lynch mounts.

Short Wave Efficiency

By J. E. Anderson

Technical Editor



WHEN operating the Karas short wave receiver it may be that the circuit will seem to oscillate even when the regeneration condenser is set at minimum. The noise heard may or may not be due to oscillation. It may be due to blocking of the grid of the detector tube. In either case the condition can be remedied by the use of rheostat Rhl. This rheostat was put into the circuit mainly for the purpose of stabilizing the receiver, and should be used.

Blocking may arise from oscillation in the first tube, from insufficient grid leakage, or from a very intense local signal. To determine whether the disturbance is a true oscillation or a blocking attention should be focused on the nature of the sound and how it varies as the tuning condenser is turned. If the noise is due to oscillation in the first tube the noise will be the regular heterodyne noise. That is, as the condenser is turned the noise will first be a high pitched whistle which will gradually decrease to a low pitch growl. Then after passing through a silent region the low pitch noise will reappear and gradually rise to a pitch above audibility. The sequence will be noted if the tuning condenser is turned slowly.

Grid May Block

If the noise is caused by blocking of the detector grid it will be a harsh whistle, usually of a very high pitch. It will not change much in pitch as the tuning condenser is turned, but it will respond in intensity with changes in the regen-

eration condenser. The regular sequence of tones is entirely missing.

Should any difficulty be experienced from body capacity when tuning it is well to go over the wiring of the condensers to make sure that both of the rotors are grounded. They must be grounded for greatest stability. If this is done there should be a complete absence of body capacity effects, except perhaps on the very shortest waves which may be tuned in on the circuit. If any body capacity should appear a little grounded shielding back of the panel will aid greatly in overcoming it.

An Important Connection

The wiring diagram of the Karas short wave receiver is published herewith again for the convenience of interested fans, as many are anxious to proceed with the building of the set before they get the official blueprint. Aero coils are used.

Attention is called to the F terminal on the coil receptacle. The solder lug for this terminal should be connected to the negative side of the filament line as shown in this drawing. In drawings of the circuit in which this terminal is left free the connection is supposed to have been made under the receptacle, that is, to the ground lead. But it is better to connect directly to F—or to the common lead from the rotors of the two condensers.

The set will not work unless this connection is properly made. The F terminal on the coil receptacle should not be connected to both the ground lead and

F—for that would short circuit the filament switch.

If blocking of the detector grid should occur it may be stopped by substituting a lower value of grid leak. If no leak can be found which stops the blocking it means that the grid circuit is defective somewhere. It may be a missing connection or a defective joint. A common error is to join the tuning coil and the variable condenser together and then forget to connect them to ground. Another is to connect the rotor of the condenser correctly but forget to connect the low side of the coil to the rotor. These errors invariably lead to blocking.

Coupling Through Operator

It very often happens that a circuit is stable and works satisfactorily as long as it is delivering its output to a loudspeaker but starts to oscillate when delivering the output to a head set worn by the operator. This may puzzle some fans but the explanation is simple.

Some radio frequency currents get into the audio frequency amplifier and are delivered to the speaker. The coupling is mostly capacitive. Then the operator himself acts as a coupler between the head set and the tuner. The energy fed back is enough to start the circuit to howl. This difficulty is particularly severe on short waves on which much energy can be fed back through the stray capacities. A remedy is to wrap the speaker cord with metal ribbon and then to ground this shield.

Hissing and Frying Strays

By James H. Carroll

Contributing Editor

"MY set sounds like Niagara Falls," said an irate radio fan when he reported on the performance of a new receiver from which he had expected very much. "The rushing sound is louder than the signals even from the local stations," he added.

Many radio fans are annoyed with a sound which is an imitation of Niagara Falls. It is the sound made familiar by the needle scratch of a phonograph. It is a prolonged *sh* sound. In some receivers it is louder than the signals from the local stations, in other sets it is comparable with the signals from stations 1,000 miles away. It is present in all receivers and in all transmitters. Whether it is heard or not depends on the degree in which it is present.

Sometimes this rushing sound is of an even texture. At other times it is interrupted by sputtering and by crackles.

What is the cause of this disturbance in a radio set?

Current Is Serrated

In telephone practice this kind of trouble has been called "frying," and considerable work has been done to determine its nature and cause. Oscillograph records have been taken of telephone currents infested with this disturbance and these records show that it is caused by irregular flow of current. The curves representing the current are serrated in a most complex manner. The changes in the current are abrupt and occur at a high frequency. There seems to be no order in the sudden rises and falls of the current.

These abrupt changes in the current which give rise to the rushing, frying sound can be due to one of two causes, or to both. The voltage which maintains the current may contain the irregularities or the resistance through which the current must flow may vary in an irregular manner.

The irregularities in the voltage can usually be traced to irregular variations in some resistance, so we shall confine our attention to defective resistances as the cause of the trouble.

Irregular Resistances

Frying noises have been attributed to irregular electron emission from the filaments of the tubes. That, no doubt, accounts for a certain amount of the noise in poorly made tubes, such as those with dirty or contaminated filaments and those not sufficiently evacuated. Whatever the irregular emission is due to it shows up in the tube as a variation in the plate circuit AC resistance.

But even in circuits containing nothing but first class tubes there are frying noises, which in some cases are very severe. So there must be other variable and irregular resistances. We shall mention some of them further on.

Hissing Transmitter

No doubt many fans have observed a hissing noise in the set when a carrier is on and the set is tuned in on a given station, and that most, if not all, of this noise disappears a few seconds after the announcer signs off. That is, the instant the carrier is off the frying noise ceases. It is obvious that the noise comes from the transmitter and not from the receiver.

Most of this hissing undoubtedly comes from the microphone. Frying noises in telephony were first noticed in the carbon microphone, the type which is used almost exclusively in broadcast transmit-

ters. These microphones are still hissing and frying. They work on the principle of varying resistance. The sound pressure on the diaphragm varies the pressure on the carbon granules in the microphone and this in turn causes the resistance of the carbon mass to vary. The current through the microphone varies inversely as the resistance.

But the variation due to changes in pressure on the carbon is not the only change in the resistance. Even when no sound falls on the microphone but when current flows through the carbon there is an irregular variation in the resistance, and it is this variation which gives rise to the frying. The hissing noise which arises in the carbon granules is carried over to the receiver by the radio wave and sets up the characteristic carries hiss in the loud speaker.

Hissing in Receiver

There is no microphone in the receiver but there are parts which may introduce the same kind of hiss. There are many non-metallic resistors used in every receiver, and the resistance of these may vary in an irregular manner as current flows through them. This is particu-

larly true when the resistance element is overheated or when the current flowing through it is excessive. Carbon grid leaks, plate coupling resistors and potentiometers are particularly amenable to the trouble.

At points in the circuit where contact between two conductors depends on pressure alone hissing may arise due to the formation of oxides on the surfaces. The current will not flow regularly through the oxide if it flows at all. These sources of hissing may be in the tube sockets where the prongs press against the socket springs, or in switches, jacks, binding posts and similar points.

Irregular Leakage

Leakage through insulation in many places will also give rise to hissing because the leakage current is nearly always irregular. Dust may be a prolific cause of hiss for this reason for the dust may be a microphone of the carbon granule type in principle.

It makes no difference where the leakage or the irregularly variable resistor is. The effect is the same. It may be in the grid circuit as in the grid battery or in the grid bias resistor. It may be in the plate circuit as in the coupler or in the B battery eliminator or the battery. It may also be in the filament circuit. Often the filament switch is to blame.

An Example

A certain Super-Heterodyne had been working satisfactorily for some time. Then it was put on a different voltage supply. A very serious hiss developed. It was traced to a resistor of the carbon strip type used to drop the voltage in several of the tubes. Adequate by-passing was used but it had little effect on the hissing. It was found that the resistance element of the resistor was disintegrating by the excessive current through it.

In another case the hissing developed without any apparent changes in the set. It was directly caused by a leaky stopping condenser. The condenser weakened first and this set up a heavy current both in the grid leak following it and in the plate circuit of the succeeding tube. Both of these resistors began disintegrating and increased the hissing. In numerous other cases of hissing has been traced to the filament switch.

No Immunity

No circuit or receiver is immune from this difficulty. But the more complex the circuit the more chances there are for a hiss to creep in, and the more the amplification in the circuit the greater will the hiss become.

When a hiss develops in a receiver it is necessary to overhaul the entire receiver. Loose contacts should be suspected first. If cleaning and tightening does not remedy the situation all carbon type resistors should be investigated and if found defective replaced. If the hissing still continues condensers and the insulation should be examined. Dust particularly should be removed.

But before making any tests on the receiver a determination as to whether the noise arises in the set or externally should be made. If the hiss is of external origin there is no object of proceeding with the receiver test. Disconnect the antenna. If the noise continues, it originates in the set. If the noise ceases when a station tunes off, the transmitter is at fault. If the circuit hisses on a B battery eliminator and is quiet on a B battery, the eliminator is at fault.

TYRMAN IN TESTS

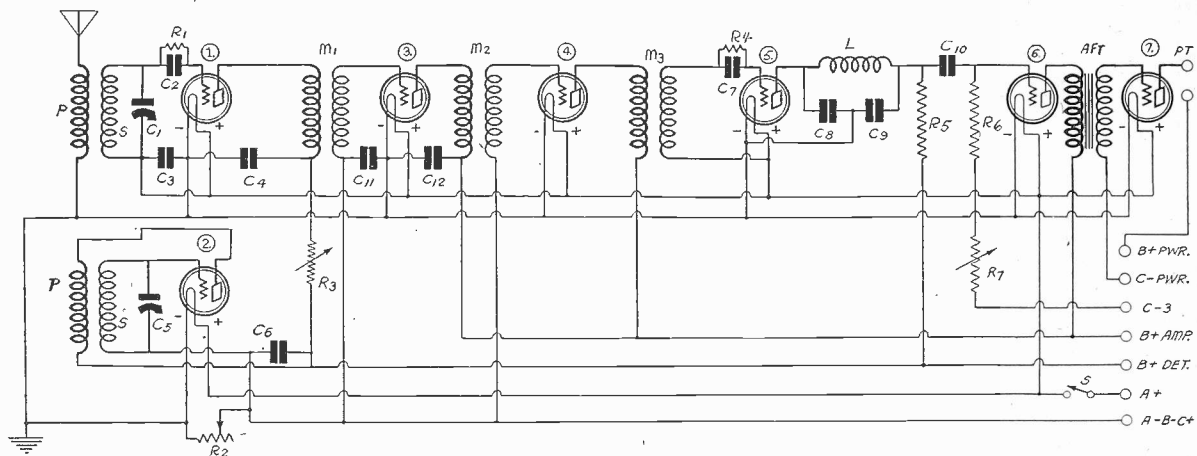


(Metropolitan)

ERNEST TYRMAN, WELL KNOWN DESIGNER OF THE TYRMAN 70 SCREEN GRID TUBE RECEIVER, WHO RECENTLY SAILED ON THE AMERICA TO CONDUCT MIDOCEAN TESTS WITH THE RECEIVER AND TO STUDY THE RADIO INDUSTRY IN GERMANY.

The Sources of Audio

By Ronald



A CIRCUIT WHICH ILLUSTRATES SEVERAL SUPPRESSORS. THE HIGH FREQUENCIES ARE SUPPRESSED BY THE GRID LEAK AND CONDENSER (R4C7) BY THE RF CHOKE COIL L, BY THE TWO BY-PASS CONDENSERS C8 AND C9, AND BY THE SELECTIVITY IN THE TUNER. THE LOW FREQUENCIES ARE SUPPRESSED BY STOPPING CONDENSER C10 (UPPER RIGHT) AND BY THE AUDIO FREQUENCY TRANSFORMER AFT. THE DESIGN OF THE CIRCUIT IS SUCH THAT THE SUPPRESSION IS NEGLIGIBLE IN THE ESSENTIAL AUDIO FREQUENCY RANGE.

MUCH has been written about high notes and low notes, high audio frequencies and low audio frequencies. Almost as much has been written about the middle notes.

Yet few have any idea what is meant by a low, middle or high note or audio frequency.

"Listen how she brings out those high notes," a proud radio fan boasted when a soprano struck high C. The booster referred to his radio set and loudspeaker and not to the singer. And the receiver did bring out that high C. Only a deaf person could have maintained the contrary.

That is not a single incident indicating that that particular fan thought that high

C is a high audio frequency. It is simply a typical case.

"She brings out the low notes all right," said another radio fan of his receiver which was woefully lacking in the lower tones. He said it just after a 'cello had sounded a note around the hundred mark. The note did not have much power behind but it was audible without any hearing aids.

Scale Better Known

"My set will go down at least 100 cycles lower than that," boasted still another fan just after a bass viol had run the scale down to the bottom. Going 100 cycles below the lowest note on the bull fiddle would put the note away below

zero. That is sure "going down" with a vengeance.

Few persons think in terms of cycles as referred to musical sounds. Most persons think in terms of the musical scale.

Anybody who has given some thought to music is able to whistle or hum middle C if asked to do so. The pitch may not be exact but it will in most cases be within 10% of standard pitch. At any rate it will never be 1,000% off.

But ask the same person what is the frequency of a given note whistled or hummed, and the answer is: "I don't know."

And there is no particular reason why everybody should know. Knowing musical frequencies in terms of cycles is like knowing temperature on the Centigrade scale, while knowing them in terms of tones and octaves is like knowing temperature on the Fahrenheit scale. One is the language of the physicist and the other is the language of the musician.

The musician is more popular and his language is more universally understood.

What is High and Low?

What notes are high and what are low? That depends on what position in the scale they occupy in relation to other notes. High and low are not absolute but relative. High C is high for a soprano but it is still higher for a basso. In fact it is so high that it is away out of reach for a basso. But for a piccolo high C is not high. It is rather low. Neither is it high for a violin. For a bass viol it is out of reach.

Middle C is high for the basso and low for the soprano. It is high for the bass viol and low for the piccolo.

But middle C is not in the middle of the scale from any point of view. If 16,000 and 16 cycles per second be taken as the upper and lower limits of audibility then the mean audible frequency from an octave point of view is 505.6 cycles. That is almost a whole octave above middle C. The arithmetic mean of the two extremes is 8,080 cycles, which is a whole octave higher than the highest note on a piano;

Novices Now Succeed With Nine Tube Sets

Ever since the advent of radio broadcasting there has been a cry for power and more power in receiving sets.

Originally the radio novice was content with earphone reception on a two or three tube receiver. However, the lay fan develops at an amazing rate; in a brief space of time he passes from his first state of wonder at the marvel of it all to the all-night session of the confirmed DX hound.

No longer does the two and three tube set answer his hunger for power and distance, he aspires to seven or eight tube receivers with sufficient amplification to give DX on the loudspeaker.

Just a few years ago the seven or eight tube radio set was an achievement reserved for the laboratories of the technician or the radio engineer. The problems of construction were so great as to be beyond the meager skill of the average radio fan.

A multi-tube set meant the drilling of a complicated panel, the balancing of a multiplicity of controls for panel harmony,

and much complicated wiring. This included several hand rheostat controls on the panel which had to be wired in turn to the respective tubes which they controlled with long winding and intricate leads to avoid intercapacity coupling. Added to this there were the tuning and volume control leads which made the interior of the set look like a bee-hive of wires.

With the development of the amperite self-adjusting rheostat control radio set construction has become entirely revolutionized. The panel is wiped clear of hand rheostat knobs, leaving only the tuning volume and filament switch controls. Thus the 8 or 10 tube Super-Heterodyne holds no terror for the fan who would like to build it.

Moreover, the radio set built by the present day novice, despite its seven or eight tubes, is very stable since the amperites keep the filaments of the tubes, at the correct operating temperatures at all times despite battery or power supply fluctuations.

Frequency Suppression

Pierce Dangerfield

as far as the frequency sensitivity of the ear is concerned we may consider frequencies from 250 to 5,000 as medium frequencies. Frequencies between 5,000 and 16,000 or 20,000 cycles can be considered as high, and frequencies between 250 and 16 cycles can be considered as low.

Meaning of Low

When a writer on loudspeaker or radio receiver performance speaks of low frequencies he means usually frequencies below 100 cycles per second—much below. And when he speaks of suppression of the lows he does not mean complete suppression. He means relative suppression. A frequency as low as 30 per second may be heard in a poor receiver, but it requires attentive listening to hear it above the rest of the sounds. By suppression is meant that the low frequencies are relatively less intense in the reproduction than in the original.

It is often stated that a speaker or amplifying system "cuts off" at a certain frequency, for example, at 50 cycles. That does not mean that nothing below the "cutoff" is audible and that everything above it comes through with full intensity. It simply means that the diminution in the volume becomes very rapid at the "cutoff", and that frequencies much below the point are very weak, if heard at all. There is no very sharp cutoff in ordinary amplifying systems and speakers. But in special circuits involving complex filter networks the cutoff may be very sharp.

Just as there is no sharp cutoff for the low notes there is none for the high. The diminution in volume is usually gradual, though it may be rapid in some circuits. An amplifier and reproducer may have a cutoff at 5,000 cycles. But that does not mean that no frequency higher than 5,000 can be heard. Even when the cutoff is as low as 5,000 cycles it is possible to hear frequencies up to 15,000 cycles, if the ear is sensitive to such high frequencies. But it requires close listening to hear them, for they are very weak above the cutoff.

The degree of absence of these frequencies can be judged by the difficulty of understanding speech. If the high frequencies are present in full force no effort of concentration is required to follow a speaker over the radio. If the high frequencies are present in full force all the consonants are clearly enunciated.

If the high frequencies are absent the consonants are indistinct and blurred. Particularly the hissing sounds are missing. If the high frequencies are too strong relative to the low and medium all the hissing sounds are too prominent.

What Downs the High?

There are many factors in a radio receiver which contribute to the lowering of the intensity of the high audio notes. The tuner is the first. It cuts the side frequencies remote from the carrier more than those closer. And the side frequencies remote from the carrier in either sideband represent the high audio frequencies.

The next place where the high notes suffer is in the grid circuit of the detector using grid condenser and leak for detection. This combination detects the low very much better than the high. This suppression of the high frequencies is not serious in ordinary circuits but still it may be as much as 10%.

The by-pass condenser in the detector plate circuit is the next suppressor of the

highs. The amount of suppression depends directly on the capacity of this condenser. This condenser is connected across the line and it is for that reason it suppresses the high notes. It makes no difference where the condenser is connected across the line. It has the same suppressing effect wherever placed. It may, for example, be put across loudspeaker terminals. The capacities of the windings of transformers and the input and output capacities of tubes come in the category. They are all across the line.

Any choke coil in series with the line suppresses the high notes. The most common example is the radio frequency choke put in the plate circuit of the detector to choke out radio frequencies. It does more than it is supposed to do. It depresses the higher audio frequencies considerably.

A choke coil in series with the line has the same effect no matter where it is put in the circuit, and the amount of choking it does is directly proportional to its inductance.

Often an audio frequency choke coil is put in series with the primary of a coupling transformer for the purpose of preventing motorboating. When so used it is ordinarily by-passed by a 1 mfd. condenser. Since this choke coil is in series

with the line it suppresses the high frequencies. But this suppression is prevented to some extent by the by-pass condenser. In most cases the condenser used is not large enough. It prevents the suppression of the high frequencies but not of the medium.

The low audio frequencies are not suppressed in so many places as the highs, but where they are suppressed they are usually suppressed much more. Low frequencies are suppressed by shunt coils and series condensers. A coil across the line by-passes the low frequencies just as a condenser by-passes the high. A condenser in series with the line chokes down the low frequencies just as a series coil chokes down the high.

In resistance coupled circuits series condensers are largely responsible for depressing the low frequencies. In transformer coupled circuits the lows are depressed largely because the primaries of the audio transformers do not have enough inductance. In impedance coupling the lows are depressed by both the series condensers and by the shunt coils. But that does not mean that this form of coupling is unsuitable for amplifying the lower notes. The circuit can be designed so that the suppression does not begin appreciably above the audible range.

Evolution of Vernier Measures Art's Pace

By Charles Golenpaul

American Mechanical Laboratories

Among the many advances scored in radio is that of micrometric control. From tuning coil sliders to variometers, and from variometers to variable condensers, we have now progressed to vernier or micrometric controls that make for marvelous precision.

Instead of covering the entire tuning condenser range in a half turn of the knob, as in the receivers of a few years back, we now cover the same range in several turns of the knob, thanks to gearing or other means of reduction.

The evolution from the sliding adjustments of the old-time tuning coil, loose-coupler and sliding plate condenser, to the rotary adjustment of variometers and variable condensers, has been a natural one.

Certainly a rotary movement is more convenient than a sliding movement. However, the covering of a wide range of inductance or capacity in a fraction of a turn of the knob makes it difficult to attain the split-hair adjustments necessary in separating closely packed broadcast signals.

For this reason the vernier dial, introduced several years ago as an accessory, has become a specific part of the receiver, with its merits fully appreciated.

Few radio enthusiasts, even if their radio experience dates back to pre-broadcasting days, realize how crude were our tuning coils and sliding contacts. In fact, with a tuning method of this sort it would be all but impossible to tune in the sharp continuous waves of present-day broadcasting stations, because the tuning could be carried out only to within the crude approximation of a full turn.

The variometer marked a great improve-

ment over the turn-by-turn tuning coil, yet failed to cover a sufficient range for the entire broadcast wavelength band. Therefore, the fixed inductance, with variable condenser arrangement, came into existence.

Aside from tuning, other micrometric controls have appeared for providing the necessary efficiency in present-day broadcast reception. The early vacuum tubes were so critical that the usual rheostat was often too crude, because of its step-by-step adjustment. However, vacuum tubes have been developed with less critical characteristics.

In the matter of plate voltage, volume, tone, regeneration and stabilization, and line-voltage control, the trend has been towards micrometric adjustment. The step-by-step devices have for the most part given way to stepless devices, as these have been developed free from loose contacts and noises in radio reception.

Instead of limiting the operation to a single turn or less, radio engineers have developed variable resistances with several turns of the knob to cover the full resistance range. As a consequence, there is now provided a separation fully five times as great as in the case of devices with a single turn or less.

It becomes possible to build variable pressure type resistances, as exemplified by the standard Clarostat, covering a resistance range of from 200 to 5,000,000 ohms, in five turns of the knob, so as to have sufficient spacing in the adjustment to provide even closer setting than in many single and part turn devices of a fraction of that range.

The tendency in present-day radio operation is decidedly toward what we might term door-knob manipulation. The radio devotee simply turns the knob round and round, clockwise or anti-clockwise, until the desired results are obtained.

TILTED MOUNTING CORRECTS ERROR



IN MAKING AN AIRPLANE CLOTH SPEAKER, IF BRACKET DOES NOT ALLOW THE UNIT'S PIN TO ENTER AT EXACT RIGHT ANGLE TO APEX THE BRACKET MAY BE TILTED BACK AND A LITTLE BRACE INSERTED UNTIL ADJUSTMENT IS PERFECT. JAMES FENTON, CHIEF ENGINEER OF THE FENCO LABORATORIES IS SHOWN. HE HAS ANNOUNCED A NEW A E F SPEAKER.

New Direction Finder Aids Plane's Safety

A new direction finder for aviators, which has been developed by the Bureau of Standards, was demonstrated with the sanction of the Department of Commerce. It is called a visual indicator and is science's latest contribution to the safety of aviation.

In the demonstrating plane was the Assistant Secretary of Commerce for Aeronautics, William P. MacCracken, Jr. The guiding device was exhibited at College Park, Md.

An announcement of the development of the visual indicator was issued by the Department of Commerce. The text follows:

Text of Announcement

The new airway direction finder greatly resembles in appearance an ordinary compass. Its needle-like reed, moved by electrical impulses received from a radio beacon, is on the dashboard

of the plane and warns the pilot if he leaves his designated course for an instant.

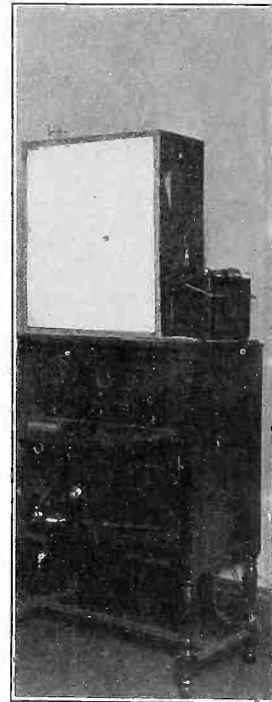
This visual indicator, as it is called, is the latest aid to airmen developed by the Bureau of Standards of the Department of Commerce. It does away with head phones and also eliminates the trailing wire antenna.

Radio Beacon Developed

The radio beacon system for guiding aircraft, which has been under intensive development by the Bureau of Standards, is now a demonstrated success. It permits the marking out of an invisible but infallible course along which aviators can fly regardless of fog or other weather conditions.

To make use of this system, an airplane need only be provided with a small receiving set carrying an indicator. An occasional glance at the indicator tells the pilot whether he is following the

POWER IN EL



THE TREMENDOUS POWER OF LOUDSPEAKER UNITS DESIGNED BY THE BUREAU OF STANDARDS DEMONSTRATED WHEN TWO OF THE UNITS WERE USED. THE POWER WAS DERIVED FROM

course, or how far off if he has deviated from it.

The result marks a distinct stage of progress in eight years of experimentation. The Bureau of Standards designed the directive radio beacon originally for the War Department and established the first of these beacon stations at McCook Field, Dayton, Ohio. There it was developed further by Army engineers.

The system required the pilot to listen to certain signals in order to judge whether he was on or off the course. The new system just announced uses a visual indicator eliminating all use of headphones, and is much less susceptible to interference.

Ready for Everyday Use

The experimental work is still in progress, but the system is now sufficiently perfected so that a beginning can be made in a practical everyday use of it in flying.

The only radio beacon station operating on the new system is the Bureau of Standards station at the College Park field near Washington, D. C. Airplanes of the New York-Atlanta line are being equipped with receiving sets for this system; and will operate by its aid, beginning May 1.

At the same time it is expected that airplanes of the New York-Cleveland line will begin use of the same service from the Bureau's beacon station at Belle

ELECTRO-MAGNET



THE NEW ELECTRO-MAGNETIC BY CLYDE J. FITCH WAS DEMONSTRATED SUPPORTED A 200-POUND MAN. A SIX VOLT DRY CELL BATTERY.

fonte, Pa. The latter station now operates on the older system requiring the use of headphones, but will be changed over to the new system during April. The establishment of stations at other airports throughout the country will be made later in accordance with the results of practical use of these two.

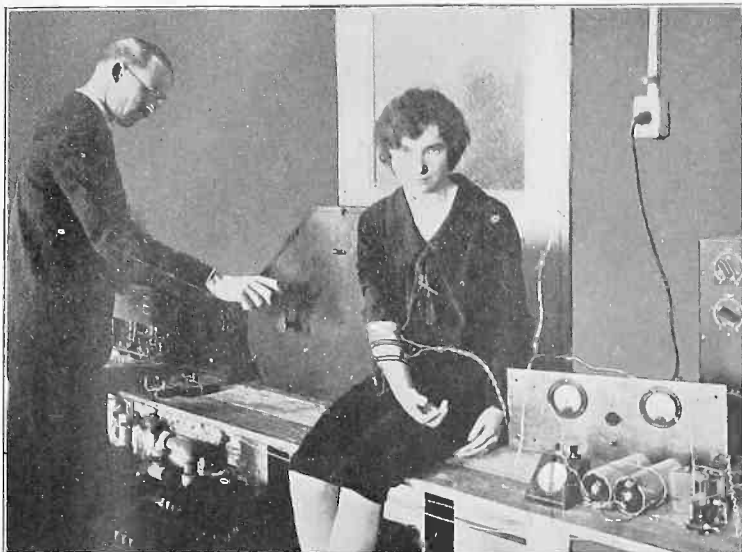
Flying Risk Reduced

With the radio beacon made practical and dependable, it is expected that air route operations can enter a new era of regularity and safety. Most of the trips which are now omitted or undertaken only at great risk can be confidently made.

It has been the rule to undertake flights only when weather conditions were favorable enough so that the pilot could see points upon the ground. In the early days of our air mail service flying schedules were frequently interrupted on account of weather conditions.

There is, of course, the method of aerial navigation called "instrument flying." When the pilot cannot see the earth below he forgets the outside world and, concentrating all of his attention on his instruments, navigates his craft from the information that they convey. One instrument tells him his elevation, another whether he is turning or flying straight away, and his compass indicates his general direction. Thus science combines to improve safety.

NOISY NERVES BROADCAST



(International Newsreel)

THIS YOUNG LADY IS SUBMITTING TO A NOVEL EXPERIMENT, THAT OF HAVING THE NOISE OF THE NERVE CURRENT IN HER BODY BROADCAST OVER WSIU, STATE UNIVERSITY OF IOWA. THE BROADCASTING IS THE RESULT OF THREE YEARS OF INTENSIVE WORK ON NERVE CURRENTS BY DR. LEE E. TRAVIS, ASSOCIATE PROFESSOR OF PSYCHOLOGY AND PSYCHIATRY, AND THEODORE HUNTER, TECHNICIAN IN SPEECH PATHOLOGY.

Center-Tap Balance Gives Easy Accuracy

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A series of engineering experiments conducted by this organization proved conclusively the determinations arrived at by receiver manufacturers.

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We have found in the manufacture of center tap resistances suitable for this work, that an accuracy of 1%, and even a fraction of 1%, is very easily obtained, whereas the same accuracy with a transformer winding is quite difficult to obtain.

"Not that the transformer can not be accurately tapped, but rather, that the economical considerations encountered in the design and construction of the transform-

er plus the electro static capacity factor encountered in the winding and the connecting leads, tends to increase the possibilities of an unbalanced filament circuit.

Permits Voltage Versatility

"The use of center tap filament resistances permits the use of rheostats, or any other simple means of reducing the filament voltage to the required value.

"If one were to utilize the transformer filament center tap, and endeavor to reduce the filament voltage to a predetermined value, it would be necessary to place voltage reducing resistances in each leg of the transformer winding to maintain the electrical balance.

"But if a center tap resistance is used in place of the transformer center tap, one voltage reducing resistance located at any point of the filament circuit between the center tap resistance and the transformer is satisfactory. This is a more economical method of operation.

"One precaution, however, is essential when center tap filament resistances are employed. They should at all times be located as close as possible to the tube filaments; as a matter of fact their location should be directly adjacent to the tube circuit."

YORKVILLE IN LARGER QUARTERS

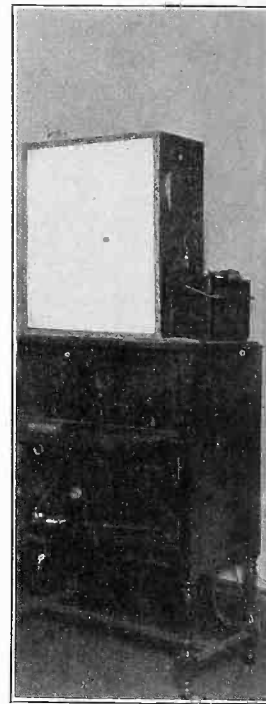
Yorkville Radio Co. of 147 E. 86th Street, New York City, have enlarged their display rooms and have taken additional space in the same building for use as offices. The Yorkville Radio Co. is one of the largest retail outlets in the city.

TILTED MOUNTING CORRECTS ERROR



IN MAKING AN AIRPLANE CLOTH SPEAKER, IF BRACKET DOES NOT ALLOW THE UNIT'S PIN TO ENTER AT EXACT RIGHT ANGLE TO APEX THE BRACKET MAY BE TILTED BACK AND A LITTLE BRACE INSERTED UNTIL ADJUSTMENT IS PERFECT. JAMES FENTON, CHIEF ENGINEER OF THE FENCO LABORATORIES IS SHOWN. HE HAS ANNOUNCED A NEW A E F SPEAKER.

POWER IN EL C



THE TREMENDOUS POWER OF LOUDSPEAKER UNITS DESIGNED BY THE BUREAU OF STANDARDS IS DEMONSTRATED WHEN TWO OF THE UNITS ARE USED TOGETHER. THE POWER WAS DERIVED FROM A 100-WATT SOURCE.

New Direction Finder Aids Plane's Safety

Washington. A new direction finder for aviators, which has been developed by the Bureau of Standards, was demonstrated with the sanction of the Department of Commerce. It is called a visual indicator and is science's latest contribution to the safety of aviation.

In the demonstrating plane was the Assistant Secretary of Commerce for Aeronautics, William P. MacCracken, Jr. The guiding device was exhibited at College Park, Md.

An announcement of the development of the visual indicator was issued by the Department of Commerce. The text follows:

Text of Announcement

The new airway direction finder greatly resembles in appearance an ordinary compass. Its needle-like reed, moved by electrical impulses received from a radio beacon, is on the dashboard

of the plane and warns the pilot when he leaves his designated course for an instant.

This visual indicator, as it is called, is the latest aid to airmen developed by the Bureau of Standards of the Department of Commerce. It does away with head phones and also eliminates the trailing wire antenna.

Radio Beacon Developed

The radio beacon system for guiding aircraft, which has been under intensive development by the Bureau of Standards, is now a demonstrated success. It permits the marking out of an invisible but infallible course along which aviators can fly regardless of fog or other weather conditions.

To make use of this system, an airplane need only be provided with a small receiving set carrying an indicator. An occasional glance at the indicator tells the pilot whether he is following the

course, or how far off if he has deviated from it.

The result marks a distinct stage of progress in eight years of experimentation. The Bureau of Standards designed the directive radio beacon originally for the War Department and established the first of these beacon stations at McCook Field, Dayton, Ohio. There it was developed further by Army engineers.

The system required the pilot to listen to certain signals in order to judge whether he was on or off the course. The new system just announced uses a visual indicator eliminating all use of headphones, and is much less susceptible to interference.

Ready for Everyday Use

The experimental work is still in progress, but the system is now sufficiently perfected so that a beginning can be made in a practical everyday use of it in flying.

The only radio beacon station operating on the new system is the Bureau of Standards station at the College Park field near Washington, D. C. Airplanes of the New York-Atlanta line are being equipped with receiving sets for this system; and will operate by its aid, beginning May 1.

At the same time it is expected that airplanes of the New York-Cleveland line will begin use of the same service from the Bureau's beacon station at Belle

ELECTRO-MAGNET



THE NEW ELECTRO-MAGNETIC BY CLYDE J. FITCH WAS DEMONSTRATED SUPPORTED A 200-POUND MAN. A SIX VOLT DRY CELL BATTERY.

fonte, Pa. The latter station now operates on the older system requiring the use of headphones, but will be changed over to the new system during April.

The establishment of stations at other airports throughout the country will be made later in accordance with the results of practical use of these two.

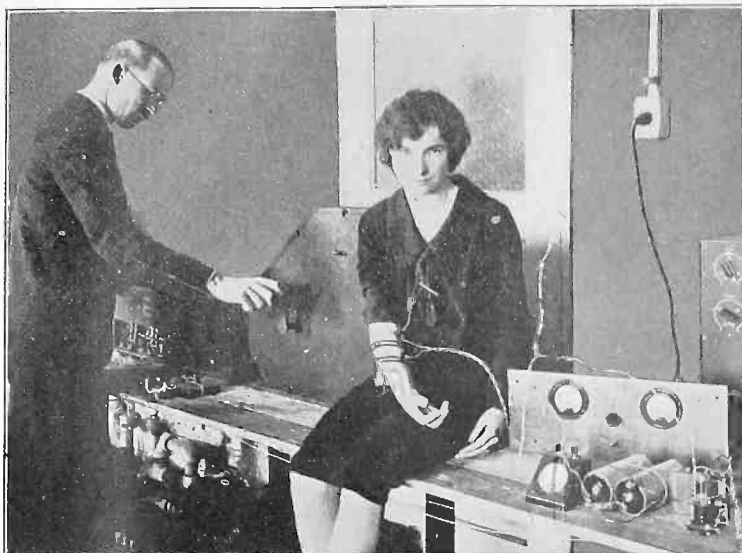
Flying Risk Reduced

With the radio beacon made practical and dependable, it is expected that air route operations can enter a new era of regularity and safety. Most of the trips which are now omitted or undertaken only at great risk can be confidently made.

It has been the rule to undertake flights only when weather conditions were favorable enough so that the pilot could see points upon the ground. In the early days of our air mail service flying schedules were frequently interrupted on account of weather conditions.

There is, of course, the method of aerial navigation called "instrument flying." When the pilot cannot see the earth below he forgets the outside world and, concentrating all of his attention on his instruments, navigates his craft from the information that they convey. One instrument tells him his elevation, another whether he is turning or flying straight away, and his compass indicates his general direction. Thus science combines to improve safety.

NOISY NERVES BROADCAST



(International Newsreel)

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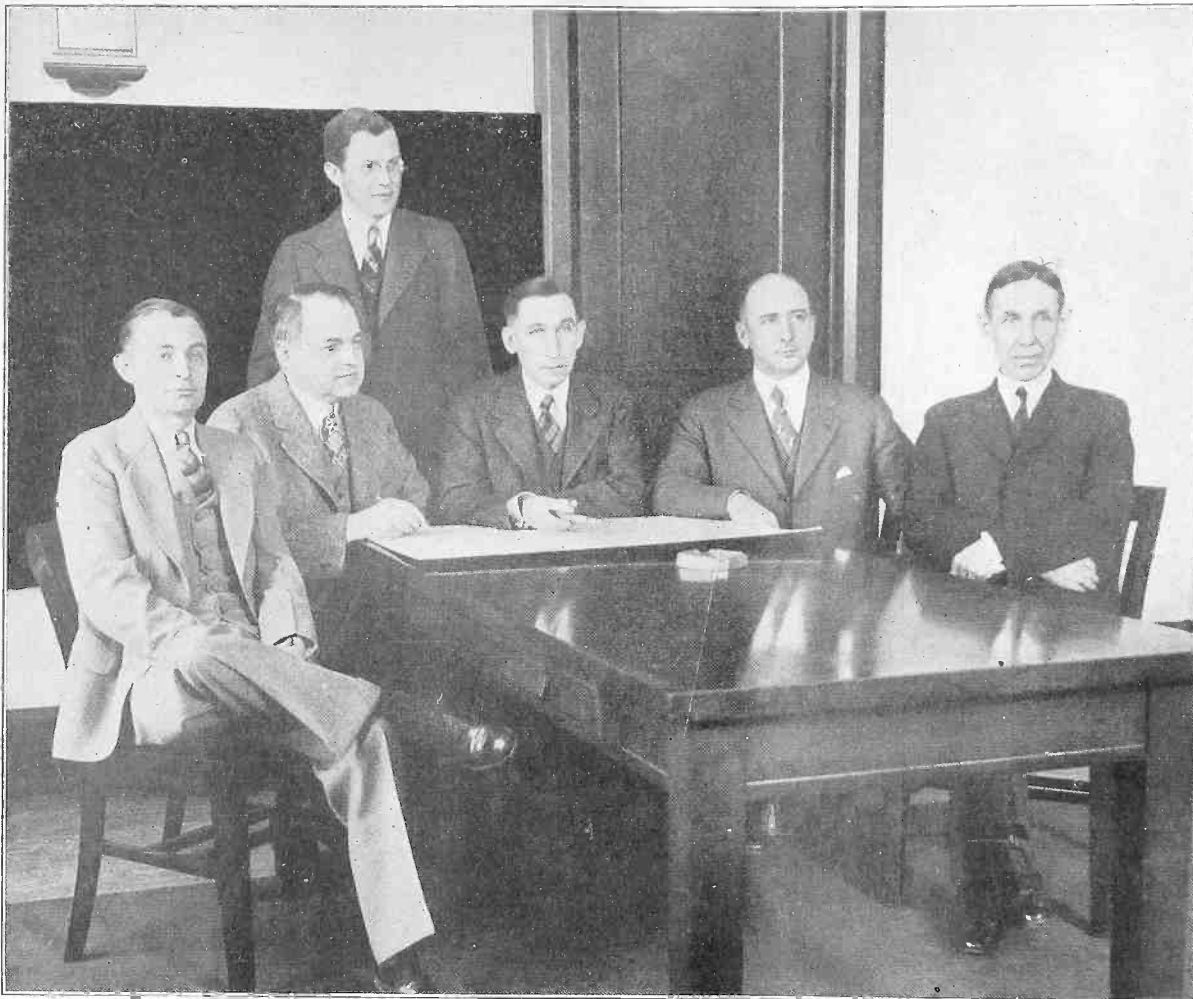
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ITS MEMBERSHIP COMPLETE, BOARD GETS BUSY



(Acme)

THE FULL MEMBERSHIP OF THE RADIO COMMISSION. LEFT TO RIGHT, (SEATED) SAM PICKARD, ORESTES H. CALDWELL, JUDGE EUGENE O. SYKES, ACTING CHAIRMAN; HAROLD A. LAFOUNT AND JUDGE IRA ROBINSON, WHO SUCCEEDS THE LATE GEN. BULLARD. CARL H. BUTMAN, SECRETARY OF THE COMMISSION, IS SHOWN STANDING

All Board Members Confirmed by Senate

Washington

The Senate confirmed the nominations of O. H. Caldwell, Sam Pickard, H. A. Lafount, and Judge Ira G. Robinson, as members of the Federal Radio Commission.

Senator Dill (Dem.), of Washington, asserted orally after the three-hour executive session in which the nominations were being considered that he had opposed the confirmation of Commissioner Caldwell, appointed to the Commission at its inception. A roll call resulted in "a close vote," he said. The official vote was announced as 36 to 35.

Follows Signing of Bill

Commissioner Caldwell, representing the first zone of New England and the Middle Atlantic States, was supported by Senator Copeland (Dem.), of New York, and Senator Wagner (Dem.), of New York, Mr. Dill said.

The confirmation came after President Coolidge's approval of the Radio bill extending the life of the Radio Commission for another year and culminating the offices of the present Commission at the end of that year.

The measure also directs the Commission to make an equitable allocation of stations, wave lengths, and power to each of the five radio zones of the country in so far as possible.

Judge E. O. Sykes, of Mississippi, acting chairman of the Commission, the only member confirmed before adjournment of the Sixty-Ninth Congress, represents the third zone of southern States, of the original members of the Commission.

Pickard's Home is in Kansas

Commissioner Pickard represents the fourth zone, of Middle Western States. His home is in Kansas. Commissioner

Lafount represents the fifth zone of Rocky Mountain and Pacific Coast States, and his home is in Utah.

Judge Robinson, appointed to fill the vacancy caused by the death of Admiral Bullard, was confirmed when both Senators Goff (Rep.), of West Virginia, and Neely (Dem.), of West Virginia, supported him, according to Mr. Dill. He was appointed to represent the second zone, of Northeast-Central States, and his nomination was favorably reported by unanimous vote of the Senate Committee on Interstate Commerce the morning before action was taken in the Senate itself. His home is in West Virginia.

As now constituted the Radio Commission has two lawyer members in Judge Sykes and Judge Robinson. Commissioner Caldwell formerly was a radio magazine editor.

Commissioner Pickard formerly was secretary of the Radio Commission and was director of station KFAC of Kansas State Agricultural College. Commissioner Lafount was a Salt Lake City business man engaged in irrigation projects.

Under the Radio Act the Commission is authorized to employ a technical staff to assist it on engineering problems.

Experts Help Board to Solve Wave Snarl

Washington
An informal conference on technical phases of the broadcasting problem was held by the Federal Radio Commission.

Commissioner Sam Pickard stated that the conference submitted to competent engineers tentative plans of the Commission for effecting a reallocation of broadcasting assignments in conformity with the newly enacted radio law.

The Commission met, but took no action of the chairmanship, it was stated. Judge E. O. Sykes has been acting chairman since the death last November of Admiral William H. G. Bullard.

Invited to the conference were repre-

sentatives of the Institute of Radio Engineers, the American Engineering Council and other radio organizations.

Radio engineers of the Bureau of Standards and representatives of the Radio Division of the Department of Commerce also attended, and the Commission extended an invitation to Senator Watson, (Rep.) Indiana, Senator Dill, (Dem.), Washington, and other members of the Senate Committee on Interstate Commerce, and to Representative White, (Rep.), of Lewiston, Maine, and Representative Davis, (Dem.), of Tullahoma, Tenn., and other members of the House Committee on Marine and Fisheries.

Head of R. C. A. Canada Asks Wants to Pin 12 Exclusive Rose on Board Wavelengths

Chicago.

Major General J. G. Harbord, president of the Radio Corporation of America, asserted in a speech before the Chicago Association of Commerce and later before the Chicago Bar Association that it was "high time someone pinned a rose on the Federal Radio Commission."

"The Commission itself," General Harbord explained, "working unpaid, with no staff, technical or otherwise, and with the certainty of its efficiency being cursed by those whose pernicious radio activities had so long gone unfettered, deserves the esteem and respect of all that understanding public who have, through its efforts, enjoyed nightly radio programs of high merit and constantly increasing quality."

"Republics," he went on to say, "are undemonstrative in their gratitude—some persons have even doubted that republics have it—but it is high time that someone pinned a rose on the Federal Radio Commission."

He also said:

"The Department of Commerce, with its far-reaching activities, headed by one of the ablest men of our generation, has

Washington

Since the signing of the radio bill a new element has injected itself into the situation which has still further complicated the wavelength and power distribution problem. It is the demand of Canada that its exclusive channels be increased from six to twelve. And in addition to these twelve exclusive channels Canada wants to share twenty channels instead of twelve, as at present.

Secretary of State Kellogg, who received the Canadian demand, turned it over to the Federal Radio Commission.

Canada claims that her present allocation is not sufficient on account of her large territory. It is expected that she will seek through diplomatic negotiations a new allocation based on her area.

Canada's prompt request for additional exclusive wavelengths and a reallocation based on her area as soon as the House of Representatives had passed the new radio law probably induced the Senate and House conferees from approving a similar basis for allocation in the United States.

NEW MEMBER



(Henry Miller)

IRA G. ROBINSON, FORMER SUPREME COURT JUSTICE OF WEST VIRGINIA, NOMINATED BY PRESIDENT COOLIDGE FOR THE VACANCY ON THE FEDERAL RADIO COMMISSION, AND CONFIRMED BY THE SENATE. THIS GAVE THE BOARD FULL MEMBERSHIP OF FIVE.

Such a restriction should not be placed in the law, and there are many other illustrations equally as indefensible.

"I favor equality of radio service for all sections of the country, and it will come; but in my judgment the Davis amendment both injures and delays that desirable result. It is unworkable from both laymen and engineering standpoints."

Interviewed at his laboratory, Dr. de Forest enlarged on some of the statements contained in this telegram. He said:

"There is no question, in my opinion, that there are too many broadcasting stations near the congested centers of population, and too few in the uncongested sections. But this proposed legislation is not calculated to remedy this situation.

Should Not Slight Cities

"If the South and West want more high-powered stations (and they certainly do need them) by all means give them every encouragement to obtain such and to permit them to broadcast the highest possible quality of programs.

"To do this at the expense of the metropolitan areas, however, is about as idiotic a proposal as Congress has ever yet propounded—and that, if electrically measured, represents many thousands of kilowatts.

"Unfortunately, Congress is made up for the most part of men who have little or no technical knowledge, of the intricacies of radio and radio litigation, and the salaries allocated to the members of the Radio Commission have not been such as to attract to that body the type of scientific experts who should be working on these problems.

"An appropriation from Congress sufficient to warrant men of this calibre devoting their time and brains to these highly technical subjects as a commission, appointed by the President and Secretary of Commerce, and with power to act, is in my belief the first step to be taken toward intelligent broadcast control in the interests of both the radio manufacturers and the millions of radio listeners."

De Forest Raps Law; Wants Expert Board

That the provisions of the new radio law are destructive and would work tremendous harm to the listening public, is the opinion of Dr. Lee de Forest. He telegraphed his sentiments to Bond P. Geddes, executive vice-president of the Radio Manufacturers Association, who directed the association's fight against the amendment in Washington.

Dr. de Forest charged that the Davis amendment "undertakes to repeal the law of nature," and "delays that desirable result" of bringing order out of the present chaos existing in the long wave length bands. In part he stated:

"An equal or fixed amount of power for each of the five zones is an incorrect and destructive policy.

Fault of Commission

"If the equality insured by the present law is not being carried out by the au-

thorities, it is the fault of those authorities and not of the law. The same amendment will do tremendously more harm to the listening public of every zone than the mistakes or misfeasance of the authorities charged with the responsibility.

"The entire radio problem must be considered from the viewpoint of the listening public. Each zone and sections of each zone have pronounced differences in both transmission and reception conditions. This is ignored in the proposed amendment which undertakes to repeal the law of nature.

"The proposed equality is entirely vocal when applied in actual practice and many proofs of this will appeal when enforcement of this law is attempted.

Amendment Unworkable

"To give but one illustration: the equality provided will limit both Nevada and Alaska to one 500-watt station each.

Set Builders Favored as

"Custom" as Fundamental Runs Close Second—Average Expenditure for Parts in 1927 Reported at \$811.09, Though Some Reached \$5,000 Class

THERE'S plenty of spice of life in the registration of choice of a name for the proposed custom set builders' organization, judging by the variety of replies. While tabulation is incomplete, and more replies are expected, the choice seems to run to some name that has the words "Set Builders" in it. Out of 300 replies analyzed, 32 favored Radio Set Builders Association, 31 favored Radiotricians, Inc., 24 were for American Radio Set Builders and 22 for American Radiotricians. Taking the fundamental words, this tabulation resulted in 72 for "Set Builders." Under the "Custom" group come the following, with the votes as shown:

Custom Set Builders Association.....	23
Custom Set Builders of America.....	22
Custom Radio Builders of America.....	14
Custom Radio Set Builders of America.....	11
	70

Therefore, regarding the names as grouped into fundamentals, the vote stood: Set Builders, 72; Custom, 70; Radiotricians, 53.

Cut out, fill out and mail questionnaire to Radio World, 145 West 45th Street, New York, N. Y., Attention Mr. McCord.

- (1) Your name
Address
CityState
- (2) How old are you?
- (3) Are you a citizen of the United States?....
- (4) If not, of what country?
- (5) Do you make custom radio sets as your exclusive means of livelihood?
- (6) If not, do you make custom radio sets for hire as a side line?
- (7) How long have you been making custom radio sets?
- (8) How many have you made?
- (9) If you do not make them for pay, do you make them for others without charge for labor?
- (10) Do you make radio sets exclusively for your own use and enjoyment?
- (11) From whom do you buy your parts?.....
- (12) Are you an annual mail subscriber for any radio magazines?
- (13) If so, state which.....
- (14) If not, do you regularly buy radio magazines at news-stands?
- (15) If so, state which.....
- (16) How did you obtain your radio knowledge?
- (17) How much did you spend last year (1927) on parts?
- (18) From what institutions of learning were you graduated? Include public school, high school, college, with addresses
- (19) Do you favor incorporation of the prospective custom set builders club?
- (20) Do you favor co-operative buying by the club for its members?
- (21) Do you favor local branches of such a club, in addition to the central organization? ..
- (22) What dues, if any, do you think should be charged?
- (23) Do you favor the club maintaining a central laboratory for the benefit of its members? ..
- (24) And sending out confidential circuits, tube and other data, including blueprints?
- (25) What circuits, if any, have you specialized in?
- (26) How many customers have you?
- (27) Do you sell factory-made sets?
- (28) If so, state which
- (29) Do you service sets other than those of your manufacture?
- (30) Do you accept time payments for sets you make?
- (31) If so, does anybody discount this paper for you?
- (32) What is your gross income per year from custom set building?
- (33) Net income from same?
- (34) Give two references as to your character. Name of reference.....
Address
- (35) Is your set building business in your home?
- (36) Or have you a separate place of business?
- (36) What name do you prefer for organization? ..

The tally follows:

Radio Set Builders Association.....	32
Radiotricians, Inc.....	31
Custom Set Builders Association.....	23
Custom Set Builders of America.....	22
American Radio Set Builders	24
Radio Technical Society of America....	17
Professional Radio Set Builders Club....	16
Custom Radio Builders of America.....	14
Professional Radio Set Builders of America	14
American Society of Professional Radio Set Builders	16
National Association of Radio Builders	13
National Radio Custom Set Builders....	12
Custom Radio Set Builders of America	11
Radio Craftsmen, Inc.....	11
Association of Radio Technicians.....	10
Scattering	34
Total	300

Average \$811.09 a Year

The average of the replies on other questions confirmed the fact that those interested in the formation of the club have a high intellectual rating and that they constitute an important parts-buying group.

For instance, the replies showed that the average experience in set building for pay exceeded four years, that the average expenditure for parts during 1927 was \$811.09 and that 15% spent more than \$1,000 during 1927 for radio parts, 12½% spent \$2,000 or more and 3½% spent \$5,000.

This week the final publication of the questionnaire in RADIO WORLD is being made, since the time is drawing near when the club will get started, and will take care of its own work when formed.

Fill Out Questionnaire

The names of 268 more who sent in coupons attesting their interest in the project are published herewith. The coupons called for were declaration of interest and are not to be confused with the questionnaire. Everybody who has not filed a questionnaire should do so now and mail it in. Address: RADIO WORLD, 145 West 45th Street, New York, N. Y., Attention Mr. McCord.

The names of those who sent in questionnaires have not been and will not be published. As the final coupon was printed in RADIO WORLD two weeks ago, soon the coupon list will exhaust itself

and publication thereof automatically cease.

Thanks Expressed

Thanks are hereby expressed to RADIO WORLD for splendid and generous assistance rendered. If in any way the club, when formed, can reciprocate the many kind favors extended by RADIO WORLD, and square the obligation for space unstintingly devoted to the club's best interests, I am sure that opportunity of proving gratitude will not be ignored.

—McCord.

* * *

Coupons expressing interest in becoming members of the set builders' club now forming were received from the following, the list comprising names never before published under this grouping, as no names are repeated:

- H. O. Benefield, 229 St. Charles St., New Orleans, La.
F. W. Dimmitt, 602 Finance Bldg., Kansas City, Mo.
Harry C. Sechrest, 3034 Cypress St., Kansas City, Mo.
Glas. Anderberg, 35 Regent St., San Francisco, Calif.
Y. Wilson, 25 James St., Bristol, Va.
George H. Buckley, 3801 1/2 38th Ave., Oakland, Calif.
Ernest S. Penay, 2106 Cleveland Ave., Kansas City, Mo.
Chas. W. Secord, 1699 - 69th Ave., Place, Oakland, Calif.
Cuyler R. Rees, 810 E. 19th St., Sioux Falls, So. Dak.
Edward J. Piper, 2608 W. 4th St., Chester, Pa.
Earl Stowell, 1141 N. Michigan Ave., Pasadena, Calif.
Albert A. Fry, 709 N. Fulton Ave., Baltimore, Md.
Russell D. Anders, 1706 Diamond St., Philadelphia, Pa.
John H. Kerr, 1703 N. Travis St., Sherman, Texas.
Albert D. Norton, 110 Cottage St., Easthampton, Mass.
J. M. Rutherford, 3933 Baltimore, Ave., Philadelphia, Pa.
A. P. Coffrin, 814 S. 55th St., Philadelphia, Pa.
E. E. Saxton, Box 155, Neosho, Mo.
J. A. Miller, 2833 Scott Ave., Ft. Worth, Texas.
Peter J. Lath, 10951 Centerville Ave., Ozone Park, N. Y.
E. A. Bell, 3208 1st St., Des Moines, Iowa.
L. R. Mason, 6056 Lemay Ave., Detroit, Mich.
Wm. B. King, 1435 Homestead St., Baltimore, Md.
Thomas P. Swist, 306 Lowell St., Manchester, N. H.
Louis V. Lenhardt, 798 Lexington Ave., Brooklyn, N. Y.
Henry Wooden, 1410 W. Church St., Urbana, Ill.
G. Martinez, 115 W. 27th St., New York City.
P. C. Hess, 215 S. 6th St., Vineland, N. J.
John J. Wilder, Jr., 1246 - 11th Ave., San Francisco, Calif.
J. F. Toberman, 122-124 W. Elmira St., San Antonio, Texas.
W. R. Spaulding, 245 Minnesota Ave., Buffalo, N. Y.
T. Y. Hammond, 1147 Main St., Buffalo, N. Y.
C. W. Pegues, Box 25, Odessa, Texas.
C. W. Siferd, 699 S. Elizabeth St., Lima, Ohio.
Otis K. Wolfe, Box 171, Harlan, Ky.
F. H. Dunster, 32 West 98th St., New York City.
James M. Cumstie, c/o Tabby, 77 Eastern Parkway, Brooklyn, N. Y.
S. F. Glass, 3133 Fulton St., Chicago, Ill.
E. D. Richardson, Cawker City, Kansas.
Leon Smith, 106 Washington St., Lodi, N. J.
Radio Shop, Batesville, Ark.
Harry A. Worden, 10 W. 3rd St., Tulsa, Okla.
Linfred L. Sterling, 925 Page St., San Francisco, Calif.
S. A. Twitchell, 186 Cedar Lake Road, Minneapolis, Minn.
O. H. Williams, 1678 - 69th St., Brooklyn, N. Y.
Fred E. Dodge, Redfield, S. Dak.
I. W. Polesky, 1747 S. 28th St., Omaha, Nebr.
Charles E. Vange, 3638 McLean Ave., Chicago, Ill.
Harold H. White, East Corinth, Vermont.
Anton P. Sloger, Station Hospital, Ft. Riley, Kans.
W. H. Johnson, Box 605, Hilo, Hawaii.
Frederick G. Schmidt, 933 E. 178 St., New York City.
Arthur E. Linfield, 989 Hanison Ave., Boston, Mass.
John F. Lorber, 27-15 Curtis St., Corona, L. I., N. Y.
G. B. Jenison, Blaine, Wash.
Jas. B. Gardner, c/o The Graves Co., Reidsville, N. C.
Ralph W. Adams, 1315 Otis St., N. E., Washington, D. C.
John E. Marx, Guerneville, Calif.

Basis of Club's Name

J. Albert Goyette, Alder St., Island Pond, Vt.
 E. A. Eilbrecht, 2209 Ann Ave., St. Louis, Mo.
 George H. Hicks, 1017 Benton Ave., N. S. Pitts-
 burgh, Pa.
 Barnett Lieberman, 167-17th St., Brooklyn, N. Y.
 W. E. Chorpennig, 111 North Arch St., Con-
 nesville, Pa.
 Glenn D. Howland, 606 W. Green St., Ithaca, N.
 Y.
 U. W. Iversen, Box 412, Lakeland, Fla.
 Thomas Beveridge, 736 North Scott St., South
 Bend, Ind.
 A. C. McLean, 108 East Ave., Greenville, Pa.
 Kenneth C. Schapp, 82 Liberty Ave., Rockville
 Center, N. Y.
 Henry F. Lee, 32 W. Jones St., Lock Haven,
 Pa.
 H. Hughes, 429 Lake Ave., Worcester, Mass.
 Dick Pignoni, 790 Courtland Ave., New York
 City.
 John W. Acker, 30 Mill St., Middletown, N. Y.
 R. Langfield, 2467 So. St. Paul, Denver, Colo.
 Carl Farber, 2129 W. Lexington St., Baltimore,
 Md.
 A. C. Schroeder, 8101 So. Main St., Los Angeles,
 Calif.
 Chas. A. Kelley, 17 E. Dedham St., Boston, Mass.
 Wm. Long, 1710 Menloway, Klamath Falls, Ore.
 G. M. DeRoss, Box 1116, Roseburg, Ore.
 H. M. Watts, 305 Summit Ave., Steubenville,
 Ohio
 Ralph B. Martin, 654 Chetwood St., Oakland, Calif.
 Walter Weigel, 134 E. College Ave., York, Pa.
 Henry A. Kettlegardes, 4129 Yisginia Ave., St.
 Louis, Mo.
 Irving Pincus, 64 Scholes St., Brooklyn, N. Y.
 Frank R. Baillie, 421 Beresford Ave., Toronto,
 Ont., Can.
 S. A. Larson, 1001 East 76th Place, Los Angeles,
 Calif.
 Marion L. James, 213 West 3rd St., Winslow,
 Ariz.
 F. Ritterbusch, 61 Davis Ave., Hackensack,
 N. J.
 J. A. Cargile, 444 Ewing Ave., Box 176, Gadsden,
 Ala.
 G. C. Cummings, 268 Manchester St., Battle
 Creek, Mich.
 A. C. Dinkel, 2905 1/2 Harrison St., San Francisco,
 Calif.
 Sam White, 2226 E. 81st St., Cleveland, Ohio
 G. R. Hutchison, Box 81, Stanstead, Que., Can.
 G. J. Alm, Augusta, Mich.
 Louis Adin, 1335 Boynton Ave., New York City
 Walter Stuedeman, Box 81, Highmount, N. Y.
 Harry Irwin Faith, Box 67, Manorville, Pa.
 R. W. Franklin, 4436 Highland Ave., San Diego,
 Calif.
 Charles Glatz, 850 Stebbins Ave., New York City
 Joseph Marshall, 525 Devitt Ave., Campbell, Ohio
 Tom A. Szymour, 301 C. St., Marysville, Calif.
 R. F. Caddell, 615 St. Charles Ave., Montgomery,
 Ala.
 W. H. Williams, 606 S. 17th Ave., Humboldt,
 Tenn.
 Ernest Border, 617 Niles Ave., Warren, Ohio
 Herbert Nestvogel, 2022 Palmetto St., Brooklyn,
 N. Y.
 A. Mahaffey, Box 214, Amoret, Mo.
 V. Scarborough, 460 69th St., Brooklyn, N. Y.
 Robert C. Fletcher, 81 Hudson St., Providence,
 R. I.
 Art Bousquet, Condon, Oregon
 Burt Cole, 1016 First St., North, Tampa, Fla.
 Fred P. Baker, 527 W. Second St., Mt. Vernon,
 Ind.
 Charles G. Funsch, Jr., 117-34 132nd St., South
 Ozone Park, L. I., N. Y.
 E. H. Ottem, 7356 Richmond Ave., Detroit, Mich.
 George W. Selbert, Jr., 131 Second Ave., North
 Pelham, N. Y.
 H. A. Lent, 222 Sherwood Ave., Plainwell, Mich.
 John Methven, 2430 Elm St., Bellingham, Wash.
 Kenneth Sweney, 63 South Terry St., Dayton,
 Ohio
 Charles Passarella, 982 50th St., Brooklyn, N. Y.
 C. Halchek, 415 E. 71st St., New York City
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 Lani Kanite, Box 95, Wendell, N. C.
 Van L. Martin, 1627 101st Ave., Sawtelle Sta.,
 Los Angeles, Calif.
 G. A. Schaefer, 4130 Reecle, Indianapolis, Ind.
 T. L. Clark, Box 204, Trenton, Ill.
 James I. Siltou, Box 162, Tempe, Ariz.
 Walter A. Wornio, 1124 42nd St., Rook Island, Ill.
 Henry H. Luther, Jr., 830 6th Ave., So., St.
 Petersburg, Fla.
 A. M. Kreps, 1590 Hanen St., Portland, Oregon.
 J. Hunter, 19 N. Virginia Ave., Atlantic City,
 N. J.
 Chaucey H. Cramer, Beson, New York.
 L. C. Hentpfil, 498 Drwicon, W., Ottawa, Can-
 ada.
 Robert A. Harris, 67 Bridge St., Lambertville,
 N. J.
 Herman Berman, 1538 Eichel Ave., Evansville,
 Ind.
 Max H. Hopf, Harper, Texas
 John N. Dell, 459 Turk St., San Francisco,
 Calif.
 Jack Ginsberg, 170 Boyd St., Newark, N. J.
 H. P. Kimball, 710 Willow Ave., Hoboken,
 N. J.
 Albert Torres, 221 East 10th St., New York City.
 A. W. Hargett, 1711 Woodmont Ave., Arnold,
 Pa.

James M. Shutt, Williams Ave., Barrington,
 N. J.
 Richard R. Raymond, 54 Littleton Ave., New-
 ark, N. J.
 McRae Walker, 13 1/2 Brenner St., Newark, N. J.
 George J. Meyer, 2108 South Phillip St., Phila-
 delphia, Pa.
 Leslie A. Duncan, Box 31, Capital Hill Sta.,
 Oklahoma City, Okla.
 D. Archambault, 811 Madison Ave., Albany,
 N. Y.
 Frank S. Dobbins, 24 Wakullah St., Roxbury,
 Mass.
 F. W. Blanchard, 253 Grenier Ave., N. D. G.,
 Montreal, P. Q., Can.
 Claude J. Flowers, 213 N. Goddard, Mart,
 Texas.
 Chas. Thacker, 912-24th St., Milwaukee, Wis.
 Thos. Teigen, 309-6th St., N. W., Minot, N.
 Dak.
 George R. Broadt, Box 53, Hellam, Pa.
 Jacob Silverman, 1214 Vyse Ave., New York
 City.
 John H. Greiner, 2439 S. Millick St., Philadel-
 phia, Pa.
 Jay P. Finley, 34 George St., Peru, Ind.
 G. L. Barch, 883-32nd St., Milwaukee, Wis.
 George W. Masters, 46 St. Louis Ave., Mid-
 dletown, N. Y.
 Earle H. Brown, R. F. D. No. 1, Middletown,
 N. Y.
 Mackall R. Bruin, 111 W. Maple St., Alexander,
 Va.
 Edward W. Little, 2333 N. Cleveland Ave.,
 Philadelphia, Pa.
 Fred R. Pope, 67 Maple St., White River Jct.,
 Vt.
 David R. Bitterman, 309 Fleet St., Pottsville,
 Pa.
 Roy R. Hescok, 753-E. 78th St., Nor., Port-
 land, Ore.
 Jos. E. Stinson, 1579 Elmwood Ave., Buffalo,
 N. Y.
 Roy Nicholas, 8030 First Ave., N. E., Seattle,
 Wash.
 Wm. L. Thurman, 6609 Elizabeth St., Tampa,
 Fla.
 Robert G. Eldridge, 58 West 8th St., New
 York City.
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 Ave., St. Paul, Minn.
 G. H. Bingham, Rogers, Ark.
 E. C. Leach, 1015 S. Waco St., Dallas, Texas.
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 City.
 B. M. Burchard, 5835 College Ave., Oakland,
 Calif.
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 Calif.
 Grover M. Plew, 1219 Eye St., N. W., Wash-
 ington, D. C.
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 City.
 Chas. Swearingin, 4415 Forest Ave., Kansas
 City, Mo.
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 Ill.
 Alexander Mego, 209-3rd St., Braddock, Pa.
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 wood, N. J.
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 delphia, Pa.
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 Ill.
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 City.
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 Holly, N. J.
 P. J. Kaiser, 96 Ontario St., Albany, N. Y.
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 Virgil McComas, Apt. 820, The Argonne, Wash-
 ington, D. C.
 F. E. Boettcher, 518 Wingra St., Madison,
 Wis.
 Clinton W. Kluge, 7305 Penn St., Kansas City,
 Mo.
 Arthur W. Chaplin, 167 Third St., Newport,
 R. I.
 Thomas Brown, 2794 Valentine Ave., New
 York City.

Harold C. Meyer, 624 Second Ave., Cedar Rap-
 ids, Iowa.
 H. Leonard Wilson, 239 Goodman St., Cincin-
 nati, Ohio.
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 delphia, Pa.
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 Car.
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 E. J. Hulse, Box 271, Denison, Texas.
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 W. D. Hemington, 60 Campbell Ave., Toronto,
 Ont., Can.
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 land, Calif.
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 Harold S. Hyde, 121 Bedford St., Cumberland, Md.
 J. G. Miller, 352 Park Ave., Mishawaka, Ind.
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 M. L. Kemp, 1475 Grand Concourse, New York
 City.
 D. B. Dickerson, 944 1/2 Phillips Ave., Toledo, Ohio.
 Robert S. Burgess, 1118 E. Douglas Ave., Nash-
 ville, Tenn.
 Gerald O. Cairns, 402 Greenwood Ave., Trenton,
 N. J.
 G. E. Stand, XL Radio, 329 Main St., Bowling
 Green, Ky.
 Chas. C. Cushman, 1337 1/2 Whitcomb Ave., Detroit,
 Mich.
 H. K. MacPherson, c-o Drewston Kennels, 536 S.
 3rd Ave., Mt. Vernon, N. Y.
 I. V. Everson, 1353A Stevenson St., San Francisco,
 Calif.
 Edward L. Becker, 206 Broadway St., Blue
 Island, Ill.
 Wm. George Cave, Jr., 2704 Pacific Ave., Wild-
 wood, N. J.
 C. T. Martz, 815 W. Michigan St., Sidney, Ohio.
 Perry Wood, 2504 East Ave., Erie, Pa.
 R. E. Schwartz, 417 Hayes Ave., Racine, Wis.
 Edward A. Wille, 910 55th St., Milwaukee, Wis.
 H. M. Emery, High Bridge, New Jersey.
 Leonard F. Washer, 590 E. 18th St. N., Portland,
 Ore.
 Joseph McMillan, 70 Goodfellow Ave., St. Louis,
 Mo.
 F. A. Bremor, Route 1, Box 152, Beaumont, Texas.
 N. H. Remley, 433 E. 3rd St., Berwick, Pa.
 Theodore Hammer, 500 Valley Road, Upper Mont-
 clair, N. J.
 Stanley Bizon, Valier Ave., Chicopee, Mass.
 Herbert E. Brown, 1945 15th St., San Francisco,
 Calif.
 Harry B. Farra, 414 Norvell St., El Cerrito, Calif.
 Clarence E. Read, 42 Benson Ave., Buffalo, N. Y.
 Norman R. Ring, Box 104, Highland Park, Ill.
 Julian Hankin, 189 Buffalo Ave., Brooklyn, N. Y.
 Wesley T. Williams, P. O. Box 3101 Ferry, San
 Francisco, Calif.
 J. Henry T. Glassner, Jr., 34 N. Potomac St., Bal-
 timore, Md.
 Hugo W. v. Koppenfels, General Delivery, West
 Philadelphia, Pa.
 H. Webb, 28 Greenville Ave., Jersey City, N. J.
 Stanley M. Ladage, 923 North 28th St., Camden,
 N. J.
 George E. Wendle, 855 Louisa St., Williamsport,
 Pa.
 Julian E. Feckey, Rio Linda, Calif.
 John H. Riessenbeck, 5310 Montgomery Road,
 Pleasant Ridge, Cincinnati, Ohio.
 A. F. Anderson, 6345 So. Oakley Ave., Chicago,
 Ill.
 Louis E. Courtois, 1650 11th Ave., Oakland, Calif.
 Jack Miller, 615 Parade St., Erie, Pa.
 Ivan F. Pierson, 1056 5th St., Brentnart, Wash.
 J. L. Robinson, 5506 Bryan Parkway, Dallas,
 Texas.
 G. B. German, 4631 Jay St., Duluth, Minn.
 Howard S. Williams, 206 West 8th St., Atlantic,
 Iowa.
 S. C. Rodenck, 2032 Calif. St., Graham, Los An-
 geles, Calif.
 R. A. Falconer, 1808 E. Glen Oaks Blvd., Glen-
 dale, Calif.
 L. J. Misuraca, 705 City Hall, Los Angeles, Calif.
 J. Edson Heath, 5409 Florence Blvd., Omaha,
 Nebr.
 C. M. Sager, 529 Lake View Pl., Rochester, N. Y.
 Emil Ritschel, 748 Burr Place, North Bergen,
 N. J.
 Carl W. Pettijohn, R. R. 3, Ridgeville, Ind.
 E. J. Van Ess, 1238 13th St., Milwaukee, Wis.
 Fred L. Cutler, 720 Tonawanda St., Buffalo, N. Y.
 W. Peddie, 901 Easter Road, Victoria, B. C.,
 Canada.
 Edward Fitzner, 85 Crook St., Hamilton, Ontario,
 Canada.
 Neil D. Baker, 216 Jefferson Ave., Hamsrouck Hts.,
 N. J.
 L. B. Ferguson, 400 Bland St., Bluefield, W. Va.
 G. R. Moore, 1128 Morehead St., Memphis, Tenn.
 Edgar S. Todd, 173 Smith-Ballard St., Richmond,
 Va.
 Geo. C. Burnham, 147 East Main St., Gloucester,
 Mass.
 Harry C. Deemer, 1217 W. Lehigh Ave., Phila-
 delphia, Pa.
 B. E. Hall, Box 202, Goffstown, N. H.
 Wm. D. McInnis, 1014 W. 76th St., Los Angeles,
 Calif.
 W. A. Edens, 102 Perry Road, Greenville, S. C.
 Harold F. Radbone, Box 41, Toledo, Ohio.

Set Builders Favored as

"Custom" as Fundamental Runs Close Second—Average Expenditure for Parts in 1927 Reported at \$811.09, Though Some Reached \$5,000 Class

THERE'S plenty of spice of life in the registration of choice of a name for the proposed custom set builders' organization, judging by the variety of replies. While tabulation is incomplete, and more replies are expected, the choice seems to run to some name that has the words "Set Builders" in it. Out of 300 replies analyzed, 32 favored Radio Set Builders Association, 31 favored Radiotricians, Inc., 24 were for American Radio Set Builders and 22 for American Radiotricians. Taking the fundamental words, this tabulation resulted in 72 for "Set Builders." Under the "Custom" group come the following, with the votes as shown:

Custom Set Builders Association.....	23
Custom Set Builders of America.....	22
Custom Radio Builders of America.....	14
Custom Radio Set Builders of America.....	11
70	

Therefore, regarding the names as grouped into fundamentals, the vote stood: Set Builders, 72; Custom, 70; Radiotricians, 53.

Cut out, fill out and mail questionnaire to Radio World, 145 West 45th Street, New York, N. Y., Attention Mr. McCord.

- (1) Your name
Address
City State
- (2) How old are you?
- (3) Are you a citizen of the United States?
- (4) If not, of what country?
- (5) Do you make custom radio sets as your exclusive means of livelihood?
- (6) If not, do you make custom radio sets for hire as a side line?
- (7) How long have you been making custom radio sets?
- (8) How many have you made?
- (9) If you do not make them for pay, do you make them for others without charge for labor?
- (10) Do you make radio sets exclusively for your own use and enjoyment?
- (11) From whom do you buy your parts?
- (12) Are you an annual mail subscriber for any radio magazines?
- (13) If so, state which
- (14) If not, do you regularly buy radio magazines at news-stands?
- (15) If so, state which
- (16) How did you obtain your radio knowledge?
- (17) How much did you spend last year (1927) on parts?
- (18) From what institutions of learning were you graduated? Include public school, high school, college, with addresses
- (19) Do you favor incorporation of the prospective custom set builders club?
- (20) Do you favor co-operative buying by the club for its members?
- (21) Do you favor local branches of such a club, in addition to the central organization?
- (22) What dues, if any, do you think should be charged?
- (23) Do you favor the club maintaining a central laboratory for the benefit of its members?
- (24) And sending out confidential circuits, tube and other data, including blueprints?
- (25) What circuits, if any, have you specialized in?
- (26) How many customers have you?
- (27) Do you sell factory-made sets?
- (28) If so, state which
- (29) Do you service sets other than those of your manufacture?
- (30) Do you accept time payments for sets you make?
- (31) If so, does anybody discount this paper for you?
- (32) What is your gross income per year from custom set building?
- (33) Net income from same?
- (34) Give two references as to your character. Name of reference.....
Address
- (35) Is your set building business in your home?
-or have you a separate place of business?
- (36) What name do you prefer for organization?

The tally follows:

Radio Set Builders Association.....	32
Radiotricians, Inc.....	31
Custom Set Builders Association.....	23
Custom Set Builders of America.....	22
American Radio Set Builders.....	24
Radio Technical Society of America.....	17
Professional Radio Set Builders Club.....	16
Custom Radio Builders of America.....	14
Professional Radio Set Builders of America.....	14
American Society of Professional Radio Set Builders.....	16
National Association of Radio Builders.....	13
National Radio Custom Set Builders.....	12
Custom Radio Set Builders of America.....	11
Radio Craftsmen, Inc.....	11
Association of Radio Technicians.....	10
Scattering.....	34
Total.....	300

Average \$811.09 a Year

The average of the replies on other questions confirmed the fact that those interested in the formation of the club have a high intellectual rating and that they constitute an important parts-buying group.

For instance, the replies showed that the average experience in set building for pay exceeded four years, that the average expenditure for parts during 1927 was \$811.09 and that 15% spent more than \$1,000 during 1927 for radio parts, 12½% spent \$2,000 or more and 3½% spent \$5,000.

This week the final publication of the questionnaire in RADIO WORLD is being made, since the time is drawing near when the club will get started, and will take care of its own work when formed.

Fill Out Questionnaire

The names of 268 more who sent in coupons attesting their interest in the project are published herewith. The coupons called for were declaration of interest and are not to be confused with the questionnaire. Everybody who has not filed a questionnaire should do so now and mail it in. Address: RADIO WORLD, 145 West 45th Street, New York, N. Y., Attention Mr. McCord.

The names of those who sent in questionnaires have not been and will not be published. As the final coupon was printed in RADIO WORLD two weeks ago, soon the coupon list will exhaust itself

and publication thereof automatically cease.

Thanks Expressed

Thanks are hereby expressed to RADIO WORLD for splendid and generous assistance rendered. If in any way the club, when formed, can reciprocate the many kind favors extended by RADIO WORLD, and square the obligation for space unselfishly devoted to the club's best interests, I am sure that opportunity of proving gratitude will not be ignored.

—McCord.

* * *

Coupons expressing interest in becoming members of the set builders' club now forming were received from the following, the list comprising names never before published under this grouping, as no names are repeated:

- H. O. Benefield, 229 St. Charles St., New Orleans, La.
- F. W. Dimmitt, 602 Finance Bldg., Kansas City, Mo.
- Harry C. Sechrest, 3034 Cypress St., Kansas City, Mo.
- Chas. Anderberg, 35 Regent St., San Francisco, Calif.
- Y. Wilson, 25 James St., Bristol, Va.
- George H. Buckley, 3801 38th Ave., Oakland, Calif.
- Ernest S. Penay, 2106 Cleveland Ave., Kansas City, Mo.
- Chas. W. Secord, 1699 - 69th Ave., Place, Oakland, Calif.
- Clyde R. Rees, 810 E. 19th St., Sioux Falls, So. Dak.
- Edward J. Piper, 2608 W. 4th St., Chester, Pa.
- Earl Stowell, 1141 N. Michigan Ave., Pasadena, Calif.
- Albert A. Fry, 709 N. Fulton Ave., Baltimore, Md.
- Russell D. Anders, 1706 Diamond St., Philadelphia, Pa.
- John H. Kerr, 1703 N. Travis St., Sherman, Texas.
- Albert D. Norton, 110 Cottage St., Easthampton, Mass.
- J. M. Rutherford, 3933 Baltimore Ave., Philadelphia, Pa.
- A. E. Coffrin, 814 S. 55th St., Philadelphia, Pa.
- P. E. Saxton, Box 155, Neosho, Mo.
- J. A. Miller, 2833 Scott Ave., Ft. Worth, Texas.
- Peter J. Lath, 10951 Centerville Ave., Ozark Park, N. Y.
- E. A. Bell, 3208 1st St., Des Moines, Iowa.
- L. R. Mason, 6056 Lemay Ave., Detroit, Mich.
- Wm. B. King, 1435 Homestead St., Baltimore, Md.
- Thomas P. Swist, 306 Lowell St., Manchester, N. H.
- Louis V. Lenhardt, 798 Lexington Ave., Brooklyn, N. Y.
- Henry Wooden, 1410 W. Church St., Urbana, Ill.
- G. Martinez, 115 W. 27th St., New York City.
- P. C. Hess, 215 S. 6th St., Vineland, N. J.
- John J. Wilder, Jr., 1246 - 11th Ave., San Francisco, Calif.
- J. F. Tobernan, 122-124 W. Elmira St., San Antonio, Texas.
- W. R. Spaulding, 245 Minnesota Ave., Buffalo, N. Y.
- E. N. Hammond, 1147 Main St., Buffalo, N. Y.
- C. W. Piques, Box 25, Odessa, Texas.
- T. W. Siferd, 669 S. Elizabeth St., Lima, Ohio.
- Otis K. Wolfe, Box 171, Harlan, Ky.
- F. H. Dunster, 32 West 93rd St., New York City.
- James M. Cumstie, c/o Tabby, 77 Eastern Parkway, Brooklyn, N. Y.
- S. F. Glass, 3133 Fulton St., Chicago, Ill.
- E. D. Richardson, Cawker City, Kansas.
- Leon Smith, 106 Washington St., Lodi, N. J.
- Radio Shop, Batesville, Ark.
- Harry A. Worden, 10 W. 3rd St., Tulsa, Okla.
- Linfred L. Sterling, 925 Page St., San Francisco, Calif.
- S. A. Twitchell, 186 Cedar Lake Road, Minneapolis, Minn.
- O. H. Williams, 1678 - 69th St., Brooklyn, N. Y.
- Fred E. Dodge, Redfield, Ark. Dak.
- I. W. Polesley, 1747 S. 23th St., Omaha, Nebr.
- Charles E. Vange, 3638 McLean Ave., Chicago, Ill.
- Harold H. White, East Corinth Vermont.
- Anton P. Sloger, Station Hospital, Ft. Riley, Kans.
- W. H. Johnson, Box 605, Hilo, Hawaii.
- Frederick G. Schmidt, 933 E. 178 St., New York City.
- Arthur E. Linfield, 989 Hanison Ave., Boston, Mass.
- John P. Lorber, 27-15 Curtis St., Corona, L. I., N. Y.
- G. B. Jenison, Blaine, Wash.
- Jas. B. Gardner, c/o The Graves Co., Reidsville, N. C.
- Ralph W. Adams, 1315 Otis St., N. E., Washington, D. C.
- John E. Marx, Guerneville, Calif.

Basis of Club's Name

J. Albert Goyette, Alder St., Island Pond, Vt.
 E. A. Ellebrecht, 2309 Anna Ave., St. Louis, Mo.
 George H. Hicks, 1017 Benton Ave., N. S. Pitts-
 burgh, Pa.
 Barnett Lieberman, 167 - 17th St., Brooklyn, N. Y.
 W. E. Chorpennig, 111 North Arch St., Con-
 nesville, Pa.
 Glenn D. Howland, 606 W. Green St., Ithica, N. Y.
 U. W. Iversen, Box 412, Lakeland, Fla.
 Thomas Beveridge, 736 North Scott St., South
 Bend, Ind.
 A. C. McLean, 108 East Ave., Greenville, Pa.
 Kenneth C. Schapp, 82 Liberty Ave., Rockville
 Center, N. Y.
 Henry F. Lee, 32 W. Jones St., Lock Haven,
 Pa.
 H. Hughes, 429 Lake Ave., Worcester, Mass.
 Dick Pignoni, 790 Courtland Ave., New York
 City.
 John W. Acker, 30 Mill St., Middletown, N. Y.
 R. Langfield, 2467 So. St. Paul, Denver, Colo.
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 Md.
 A. C. Schroeder, 8101 So. Main St., Los Angeles,
 Calif.
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 G. M. DeRoss, Box 1116, Roseburg, Ore.
 H. M. Watts, 305 Summit Ave., Steubenville,
 Ohio
 Ralph B. Martin, 654 Chetwood St., Oakland, Calif.
 Walter Weigel, 134 E. College Ave., York, Pa.
 Henry A. Kettlegardes, 4129 Yisginia Ave., St.
 Louis, Mo.
 Irving Pincus, 64 Scholes St., Brooklyn, N. Y.
 Frank R. Bailie, 421 Beresford Ave., Toronto,
 Ont., Can.
 S. A. Larson, 1001 East 76th Place, Los Angeles,
 Calif.
 Marion L. James, 213 West 3rd St., Winslow,
 Ariz.
 F. F. Ritterbusch, 61 Davis Ave., Hackensack,
 N. J.
 J. A. Cargile, 444 Ewing Ave., Box 176, Gadsden,
 Ala.
 G. C. Cummings, 268 Manchester St., Battle
 Creek, Mich.
 A. C. Dinkel, 2905 1/2 Harrison St., San Francisco,
 Calif.
 Sam White, 2226 E. 81st St., Cleveland, Ohio
 G. R. Hutchison, Box 81, Stanstead, Que., Can.
 G. J. Alm, Augusta, Mich.
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 Harry Irwin Faith, Box 67, Manorville, Pa.
 R. W. Franklin, 4436 Highland Ave., San Diego,
 Calif.
 Charles Glatz, 850 Stebbins Ave., New York City
 Joseph Marshall, 525 Devitt Ave., Campbell, Ohio
 Tom A. Seymore, 301 C St., Marysville, Calif.
 R. F. Caddell, 615 St. Charles Ave., Montgomery,
 Ala.
 W. H. Williams, 606 S. 17th Ave., Humboldt,
 Tenn.
 Ernest Border, 617 Niles Ave., Warren, Ohio
 Herbert Nestvogel, 2022 Palmetto St., Brooklyn,
 N. Y.
 A. E. Mahaffey, Box 214, Anoret, Mo.
 V. Scarborough, 460 69th St., Brooklyn, N. Y.
 Robert C. Fleicher, 81 Hudson St., Providence,
 R. I.
 Art Bouquet, Condon, Oregon
 Bud Cole, 1016 First St., North, Tampa, Fla.
 Fred P. Baker, 527 W. Second St., Mt. Vernon,
 Ind.
 Charles G. Funselt, Jr., 117-34 132nd St., South
 Ozone Park, L. I., N. Y.
 E. H. Otten, 725 E. 15th St., Detroit, Mich.
 George W. Selbert, Jr., 131 Second Ave., North
 Pelham, N. Y.
 H. A. Lent, 222 Sherwood Ave., Plainwell, Mich.
 John Methven, 2430 Elm St., Bellingham, Wash.
 Kenneth Sweeney, 63 South Terry St., Dayton,
 Ohio
 Charles Passarella, 982 50th St., Brooklyn, N. Y.
 C. Halchek, 415 E. 71st St., New York City
 Ira L. Morse, 3 Arlington Place, Arlington, N. J.
 Levi Kamiki, Box 95, Wendell, N. C.
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 Claude J. Flowers, 213 N. Goddard, Mart,
 Texas.
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 Vt.
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 Roy Nicholas, 8030 First Ave., N. E., Seattle,
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 Fred L. Cutler, 720 Tonawanda St., Buffalo, N. Y.
 W. Reddie, 901 Easter Road, Victoria, B. C.,
 Canada.
 Edward Fitzer, 85 Crook St., Hamilton, Ontario,
 Canada.
 Neil D. Baker, 216 Jefferson Ave., Hasbrouck Hts.,
 N. J.
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 G. R. Moore, 1128 Moreland St., Memphis, Tenn.
 E. S. Todd, 173 Smith-Ballard St., Richmond,
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 Harold F. Radbone, Box 41, Toledo, Ohio.

Set Builders Favored as

"Custom" as Fundamental Runs Close Second—Average Expenditure for Parts in 1927 Reported at \$811.09, Though Some Reached \$5,000 Class

THERE'S plenty of spice of life in the registration of choice of a name for the proposed custom set builders' organization, judging by the variety of replies. While tabulation is incomplete, and more replies are expected, the choice seems to run to some name that has the words "Set Builders" in it. Out of 300 replies analyzed, 32 favored Radio Set Builders Association, 31 favored Radiotricians, Inc., 24 were for American Radio Set Builders and 22 for American Radiotricians. Taking the fundamental words, this tabulation resulted in 72 for "Set Builders." Under the "Custom" group come the following, with the votes as shown:

Custom Set Builders Association.....	23
Custom Set Builders of America.....	22
Custom Radio Builders of America.....	14
Custom Radio Set Builders of America.....	11

70

Therefore, regarding the names as grouped into fundamentals, the vote stood: Set Builders, 72; Custom, 70; Radiotricians, 53:

Cut out, fill out and mail questionnaire to Radio World, 145 West 45th Street, New York, N. Y., Attention Mr. McCord.

- (1) Your name
- Address
- City
- State
- (2) How old are you?
- (3) Are you a citizen of the United States?.....
- (4) If not, of what country?
- (5) Do you make custom radio sets as your exclusive means of livelihood?
- (6) If not, do you make custom radio sets for hire as a side line?
- (7) How long have you been making custom radio sets?
- (8) How many have you made?
- (9) If you do not make them for pay, do you make them for others without charge for labor?
- (10) Do you make radio sets exclusively for your own use and enjoyment?
- (11) From whom do you buy your parts?.....
- (12) Are you an annual mail subscriber for any radio magazines?
- (13) If so, state which
- (14) If not, do you regularly buy radio magazines at news-stands?
- (15) If so, state which
- (16) How did you obtain your radio knowledge?
- (17) How much did you spend last year (1927) on parts?
- (18) From what institutions of learning were you graduated? Include public school, high school, college, with addresses
- (19) Do you favor incorporation of the prospective custom set builders club?
- (20) Do you favor co-operative buying by the club for its members?
- (21) Do you favor local branches of such a club, in addition to the central organization?
- (22) What dues, if any, do you think should be charged?
- (23) Do you favor the club maintaining a central laboratory for the benefit of its members?
- (24) And sending out confidential circuits, tube and other data, including blueprints?
- (25) What circuits, if any, have you specialized in?
- (26) How many customers have you?
- (27) Do you sell factory-made sets?
- (28) If so, state which
- (29) Do you service sets other than those of your manufacture?
- (30) Do you accept time payments for sets you make?
- (31) If so, does anybody discount this paper for you?
- (32) What is your gross income per year from custom set building?
- (33) Net income from same?
- (34) Give two references as to your character. Name of reference..... Address
- (35) Is your set building business in your home?
-or have you a separate place of business?.....
- (36) What name do you prefer for organization?

The tally follows:

Radio Set Builders Association.....	32
Radiotricians, Inc.....	31
Custom Set Builders Association.....	23
Custom Set Builders of America.....	22
American Radio Set Builders	24
Radio Technical Society of America.....	17
Professional Radio Set Builders Club.....	16
Custom Radio Builders of America.....	14
Professional Radio Set Builders of America	14
American Society of Professional Radio Set Builders	16
National Association of Radio Builders	13
National Radio Custom Set Builders.....	12
Custom Radio Set Builders of America	11
Radio Craftsmen, Inc.....	11
Association of Radio Technicians.....	10
Scattering	34
Total	300

Average \$811.09 a Year

The average of the replies on other questions confirmed the fact that those interested in the formation of the club have a high intellectual rating and that they constitute an important parts-buying group.

For instance, the replies showed that the average experience in set building for pay exceeded four years, that the average expenditure for parts during 1927 was \$811.09 and that 15% spent more than \$1,000 during 1927 for radio parts, 12½% spent \$2,000 or more and 3½% spent \$5,000.

This week the final publication of the questionnaire in RADIO WORLD is being made, since the time is drawing near when the club will get started, and will take care of its own work when formed.

Fill Out Questionnaire

The names of 268 more who sent in coupons attesting their interest in the project are published herewith. The coupons called for were declaration of interest and are not to be confused with the questionnaire. Everybody who has not filed a questionnaire should do so now and mail it in. Address: RADIO WORLD, 145 West 45th Street, New York, N. Y., Attention Mr. McCord.

The names of those who sent in questionnaires have not been and will not be published. As the final coupon was printed in RADIO WORLD two weeks ago, soon the coupon list will exhaust itself

and publication thereof automatically cease.

Thanks Expressed

Thanks are hereby expressed to RADIO WORLD for splendid and generous assistance rendered. If in any way the club, when formed, can reciprocate the many kind favors extended by RADIO WORLD, and square the obligation for space unselfishly devoted to the club's best interests, I am sure that opportunity of proving gratitude will not be ignored. —McCord.

* * *

Coupons expressing interest in becoming members of the set builders' club now forming were received from the following, the list comprising names never before published under this grouping, as no names are repeated:

- H. O. Benefield, 229 St. Charles St., New Orleans, La.
- F. W. Dimmitt, 602 Finance Bldg., Kansas City, Mo.
- Harry C. Sechrest, 3034 Cypress St., Kansas City, Mo.
- Chas. Anderberg, 35 Regent St., San Francisco, Calif.
- Y. Wilson, 25 James St., Bristol, Va.
- George H. Buckley, 3801 - 38th Ave., Oakland, Calif.
- Ernest S. Penay, 2106 Cleveland Ave., Kansas City, Mo.
- Chas. W. Secord, 1699 - 69th Ave., Oakland, Calif.
- Cuyler R. Rees, 810 E. 19th St., Sioux Falls, So. Dak.
- Edward J. Piper, 2608 W. 4th St., Chester, Pa.
- Earl Stowell, 1141 N. Michigan Ave., Pasadena, Calif.
- Albert A. Fry, 709 N. Fulton Ave., Baltimore, Md.
- Russell D. Anders, 1706 Diamond St., Philadelphia, Pa.
- John H. Kerr, 1703 N. Travis St., Sherman, Texas.
- Albert D. Norton, 110 Cottage St., Easthampton, Mass.
- J. M. Rutherford, 3933 Baltimore Ave., Philadelphia, Pa.
- A. P. Soffrin, 814 S. 55th St., Philadelphia, Pa.
- P. E. Saxton, Box 155, Neosho, Mo.
- J. A. Miller, 2833 Scott Ave., Ft. Worth, Texas.
- Peter J. Lath, 10951 Centerville Ave., Ozone Park, N. Y.
- E. A. Bell, 3208 1st St., Des Moines, Iowa.
- L. R. Mason, 6056 Lemay Ave., Detroit, Mich.
- Wm. B. King, 1435 Homestead St., Baltimore, Md.
- Thomas P. Swist, 306 Lowell St., Manchester, N. H.
- Louis V. Lenhardt, 798 Lexington Ave., Brooklyn, N. Y.
- Henry Wooden, 1410 W. Church St., Urbana, Ill.
- G. Martinez, 115 W. 27th St., New York City.
- P. C. Hess, 215 S. 6th St., Vineland, N. J.
- John J. Wilder, Jr., 1246 - 11th Ave., San Francisco, Calif.
- J. F. Toberman, 122-124 W. Elmira St., San Antonio, Texas.
- W. R. Spaulding, 245 Minnesota Ave., Buffalo, N. Y.
- E. N. Hammond, 1147 Main St., Buffalo, N. Y.
- C. W. Pegues, Box 25, Odessa, Texas.
- T. W. Sifer, 669 S. Elizabeth St., Lima, Ohio.
- Otis K. Wolfe, Box 171, Harlan, Ky.
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- James M. Cumstie, c/o Tabby, 77 Eastern Parkway, Brooklyn, N. Y.
- S. F. Glass, 3133 Fulton St., Chicago, Ill.
- E. D. Richardson, Cawker City, Kansas.
- Leon Smith, 106 Washington St., Lodi, N. J.
- W. H. Shon, Batesville, Ark.
- Harry A. Worden, 10 W. 3rd St., Tulsa, Okla.
- Linfred L. Sterling, 925 Page St., San Francisco, Calif.
- S. A. Twitchell, 186 Cedar Lake Road, Minneapolis, Minn.
- O. H. Williams, 1678 - 69th St., Brooklyn, N. Y.
- Fred E. Dodge, Redfield, S. Dak.
- L. W. Polesley, 1747 S. 28th St., Omaha, Nebr.
- Charles E. Vange, 3638 McLean Ave., Chicago, Ill.
- Harold H. White, East Corinth, Vermont.
- Anfon P. Sloger, Station Hospital, Ft. Riley, Kans.
- W. H. Johnson, Box 605, Hilo, Hawaii.
- Frederick G. Schmidt, 933 E. 178 St., New York City.
- Arthur E. Linfield, 989 Hanison Ave., Boston, Mass.
- John F. Lorber, 27-15 Curtis St., Corona, L. I., N. Y.
- G. B. Jenison, Blaine, Wash.
- Jas. B. Gardner, c/o The Graves Co., Reidsville, N. C.
- Ralph W. Adams, 1315 Otis St., N. E., Washington, D. C.
- John E. Marx, Guerneville, Calif.

Basis of Club's Name

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 E. A. Ellebracht, 2309 Ann Ave., St. Louis, Mo.
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 nersville, Pa.
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 Y.
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A THOUGHT FOR THE WEEK

JOHN BARRYMORE announced some months ago that he was through with the speaking stage. Then along came a firm of auto manufacturers—the disinclination to name an advertiser on our editorial page is why we cannot mention the name of Dodge—and induced the son of Maurice and Georgie Drew, the brother of Ethel and Lionel and the nephew of John Drew, to sign his name to a contract to give the players' scene from "Hamlet" over the radio. Naturally it was very fine indeed, although we somewhat shamefacedly report that the youthful heir to all our millions remarked that it didn't have the form or the quaintness that ooze from the mike dialogue of those classic comedians, the *Two Black Crows*. He admitted, however, that the diction was pretty good.

Movie Stars Fizzle, Excepting Barrymore

By Herman Bernard

John Barrymore and Paul Whiteman performed in their accustomed spheres in the recent Movie Star Hour put on by Dodge Brothers over WJZ and a chain, a total of 55 stations. Being in their element, they shone. Especially did the acting ability of America's greatest actor manifest itself when he delivered Hamlet's players' scene soliloquy, from Shakespeare.

Tensely, dramatically, masterfully was the soliloquy rendered, and it was something that even one of the Barrymore clan might well be proud of, but as for the others who performed out of their element, the result was most disappointing.

Reading the names, one rejoiced that such a famous aggregation could be brought together—Norma Talmadge, Dolores del Rio, Douglas Fairbanks, Charlie Chaplin and D. W. Griffith. And one would expect something even more than a treat. But Miss Talmadge did not gain fame as an expert on women's fashions, Miss del Rio never won international repute as a singer, Fairbanks is not an outstanding evangelist of moral philosophy, and Griffith is not an expert on the effect of love on tall buildings and rough men.

Yet these persons did things they were not well qualified to do. As one was led to expect much and got little, the disappointment bordered on despair. However, Barrymore's recitation and, to a fine extent, the playing of Whiteman's orchestra, saved the Hour from being a waste of time.

sonalities, and give themselves the advantage of distinctiveness, saying it can be done on little money, but as she hasn't had any experience in the small-money direction she may be forgiven for her generous and trite advice.

Miss del Rio sang "Ramona," but her rhythm was spotty and she must have kept the leader of the accompanying orchestra sweating blood trying to keep up with her. She raced through some phrases, lagged at others, and if the musicians couldn't keep time it wasn't their fault. A charming girl to look at, and an interesting actress, she unfortunately isn't quite so well endowed in the singing line.

Griffith's Trash

Griffith, famous moving picture director, delivered a shallow, theatrical and insincere speech on "Love." While his direction of epic scenes, and his grand imagination have appealed to us all, those of us who admire him would rather have him refrain from making a monkey out of himself by saying silly things about love. Some of the movie love scenes are bad enough, even in pictures he directs; others, in his pictures and out of them, are profound and convincing; but most of the sentimental trash that crowds upon the screen is of the same empty-headed hokum sort as he invoked for his tiresome talk.

Griffith was just acting and he didn't fool anybody unless himself.

He said that we admire great architectural achievements—huge, impressive buildings, imperial bridges and the like—and we think that man built them, "and in a sense of course he did," but really, take it from Griffith, not man, but LOVE built those things, for the great achievements of earth are due only to man's love for woman. Yes, sir, he wants to show some woman that he can do it!

This let out all the orphan bachelors who have done great things.

Griffith Does Some Imagining

Another obsession of Griffith's, if you can believe he believed what he was saying, is that love scenes as revealed by the motion pictures transform base instincts or imbue in callous hearts the true meaning of sweet love!

"A rough man can see a tender love scene and emerge with a different idea of love and of womanhood!" said Griffith.

He spoke like a contestant for a school prize in dramatic oratory.

Chaplin told some jokes awkwardly, obviously mike-frightened. If you'd told an uninformed admirer of Chaplin, the film scream, that this was the same Chaplin, with his poor jokes and poorer way of telling them, with a goodly spread of the English accent still in his words despite the twenty years in this country, your ready-to-laugh devotee simply would not believe it. It couldn't be THE Charlie Chaplin! And, come to think of it, there must have been some mistake.

Like Amateurs

It is not well to speak too much of so fine a performance as Barrymore's in the same article dealing with the big fish who chose to try to swim out of water. Barrymore, the artist in his native and hereditary art, was like the great guest professional deigning to dignify an amateur show.

Let's hope the public fares better with the new car than it did with the program!

Fairbanks Proves Dull

Phillips Carlin, in New York, did the announcing. That did not require much work on his part, since Fairbanks ultimately became the master of ceremonies, and took over the duties that naturally fall to an announcer. After Carlin had introduced E. G. Wilmer, president of the Dodge Company, and Mr. Wilmer had talked from his home in Detroit, about the company's newest car and the wonders of the program to come, Fairbanks, in Hollywood, spoke on "Keeping Fit." He surely has kept himself that way, and his athletic and gymnastic antics have delighted millions, but he wasn't so good at telling persons how it's done. He waxed trite and dull. Addressing himself largely to the younger element, he counselled the overcoming of handicaps by will power. Finally he said: "The worst things in life are the best things in life if we don't let them get the best of us."

All of this was ancient homily. He even asked the listeners to repeat the sentence after him, as if they were a lot of maimed and nervous children, but the response must have been meager, and it is well indeed that Doug wasn't within earshot of his real audience. Most of us probably said or thought just one word—"Blah!"

Norma Talks on Dress

Miss Talmadge pointed out that the clothes worn by movie actresses before the camera affect the styles in dress, since women who go to the movies often copy what they see screened. Expert stylists at Hollywood design costumes and other clothes for actresses, and these experts must be eight months ahead of the times, because of the lapse between filming and actual popular exhibitions of the play. In this Miss Talmadge interested her audience, but she also advised women to select their clothes to suit their own per-

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Bert Smith Joins Aero Products Staff

Bert E. Smith has joined the organization of Aero Products, Inc., Chicago. Mr. Smith has been a prominent figure in the radio industry since the inception of broadcasting. For four years he was sales manager of The Allen D. Cardwell Mfg. Corp., Brooklyn, N. Y., and was lately advertising manager of the Aero-vox Wireless Corp., Brooklyn.

Radio University

A QUESTION and Answer Department conducted by RADIO WORLD, by its staff of experts, for University members only.

keeps up night and day, rain or shine. It is so bad that it spoils all reception. I have checked the circuit over carefully and am sure that all connections, tubes and batteries are in good condition. What could be the matter?
IRVING PETERSON,
Chicago, Ill.

The trouble is undoubtedly caused by some electric device in your neighborhood. You have to do some detective work to locate it. Once located, the remedy is simple. First determine whether your neighbors have the same trouble. If they have, try to find out which of them is troubled most. This will tell you about where the trouble is. It may be a street light, a line insulator, a transformer on a pole, a trolley line, any electric motor, a thermostat, and any one of a thousand other electrical devices.

* * *

MY NEIGHBORS complain that I am interfering with their reception with my Super-Heterodyne. They contend that whenever I turn my dials they can hear howls in their receivers. I cannot hear any howls myself and some of my neighbors who have been present when I tune can not hear any whistles. But still they maintain that I cause interference. I cannot see how I am. Who is right?
ALBERT W. FOERST,
Detroit, Mich.

Your neighbors are right. Every time you turn your oscillator dial you cause a squeal in the sets of your neighbors. In some of the sets the squeal may be very weak, in others very strong. The squeal they hear you can not hear. You may produce many squeals in your set which your neighbors cannot hear but which you yourself can hear.

* * *

I WANT TO INSTALL a pilot light in my set to determine when the power is on or off. Where in the receiver shall I put it so that the light tells the whole story?
F. W. CARSON,
Kansas City, Mo.

You should put it in the primary of the supply transformer. If you have more than one transformer connected to the 110 volt line you should arrange the circuit so that the pilot light is across the line between the line switch and the socket into which you plug all the primaries. Thus when the light goes out the current stops in all the primaries and all the power is off. This is in line with the Underwriters' recommendations.

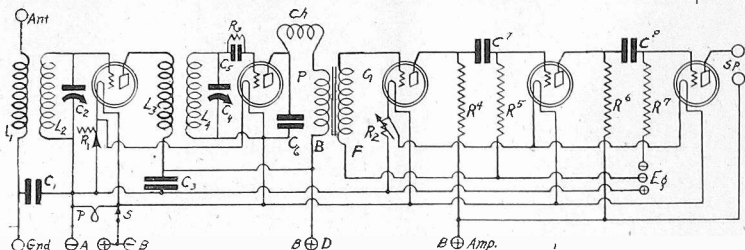


FIG. 612 THE CIRCUIT DIAGRAM OF A FIVE TUBE RECEIVER IN WHICH THE FILAMENTS ARE CONTROLLED WITH RHEOSTATS

CAN THE SCREEN grid tube be used in a resistance coupled audio frequency amplifier?

(2)—Is the screen grid tube an efficient detector?

(3)—I have an old three circuit tuner in which the secondary is wound on a 3 inch form and designed to work with a .0005 mfd. condenser. Can I use this to good advantage in the 4 tube Diamond of the Air?

(4)—If I cannot use it as it is will you kindly tell me what changes should be made in it? I am willing to rewind it.
FRED MORELEY,
Springfield, Ill.

(1)—Yes, provided you adjust the voltages right.

(2)—Yes.

(3)—Not without changing it.

(4)—Leave the secondary winding as it is. Add some more turns to the primary, about twice the number as on the primary now. If you do not have room for more turns, rewind with finer wire. You can use No. 40 wire if you have to. Also add many more turns to the tickler coil if the circuit will not oscillate otherwise.

* * *

WILL YOU please publish the circuit diagram of a 5-tube resistance audio set, in which the volume is controlled by a rheostat in the radio frequency tube and a common rheostat for the audio frequency tubes. I do not want the circuit regenerative as I would rather sacrifice distance for freedom from squeals.

(2)—Please give the values of the rheostats, coupling resistors and by-pass condensers.
NATHAN STUTZ,
Cleveland, Ohio.

(1)—Fig. 612 gives the circuit diagram you ask for.

(2)—R1 20 ohms, R2 6 ohms, R4 and R6 100,000 ohms, R5 one megohm, R7 one half megohm. C1 .001 mfd., C3 1 mfd., C6 .0005 mfd.

* * *

I AM USING grid bias detector on a receiver that has a first audio stage of resistance coupling and a second (final) stage of transformer coupling. The set motorboats slowly. What is the remedy?

ALANSON PIERCE,
Dubuque, Iowa.

Decrease the negative grid bias on the detector. That tube now amplifies probably as much as it detects. This creates motorboating.

* * *

EVER SINCE I bought a B battery eliminator and used it on my eight tube Super-Heterodyne I have had trouble. The eliminator was rated at 180 volts but when I measure the voltage with my high resistance meter it is not much over 100. The volume I get from the set is very weak and the quality is terrible. Come to my rescue.
EDWARD HILTON,
Miami, Florida

You have mistaken voltage for power.

You need voltage and current to drive your multi-tube receiver, and the eliminator you have does not deliver half the current your set needs. There is no hope of reconciling your receiver with that eliminator. Get a power pack that can maintain a voltage of 180 volts when the current drain is 60 or more milliamperes.

* * *

MY RECEIVER cackles like a hen, crackles like an egg frying in Cottolene, whoops at times like an Indian on the war path, and now and then takes long sighing wheezes. Can all these be symptoms of one ailment, or have complications set in? This is an urgent call for help. What is the treatment necessary to put the set back to normalcy?

EMIL BASTMAN,
Amarillo, Texas

It cackles because the grid blocks. It crackles because it contains a defective resistor somewhere and because the circuit oscillates. The whooping is a symptom of motorboating and so is the wheezing. Put in a new grid leak in the detector, say one of about 2 megohms. Stop the oscillation by suitable by-passing and by turning the filaments down. Stop motorboating by putting in another B battery eliminator. If that does not help, you can also put in a new receiver.

* * *

I HAVE a 1926 model Diamond of the Air which for two years has given good service. About a month ago it developed a lot of noise similar to static. This

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Pilot Defeats Suit on Window-Type Dial

The Pilot Electric Co., Brooklyn, N. Y., manufacturers of radio parts, and the S. S. Kresge Company, operating chain stores, sellers of large quantities of Pilot parts, won a decision in the suit filed against them by the Martin-Copeland Company (Mar-Co.) over the window dial. Martin-Copeland, plaintiff, alleged patent infringement. Judge Inch in Brooklyn Federal Court decided for the defendants in the following opinion:

"Plaintiff brings suit against the above-named defendants alleging infringement by them of a design patent owned by plaintiff. The suits were tried together.

"Plaintiff's patent (plaintiff's Exhibit 1), is one granted to P. L. Pendleton, November 17, 1925, No. 68828. By this patent Pendleton claims an 'ornamental design for a radio dial substantially as shown in the drawing.' The drawing in question shows substantially, aside from certain other matters, a single window at the top of the circle of a dial.

"Defendant's alleged offending design is indicated by plaintiff's Exhibit 4, being the 'cover plate' of a dial and plaintiff's Exhibit 5, representing the completed dial.

"Design patents cover appearances only and not usefulness (Royal Metal Co. v. Art Metal Co., 121 Fed. 128). A decision of an issue between a patented design and an alleged offending design rests on the 'sameness of aesthetic effect on the eye.' (Bolte Co. v. Knight Co., 180 Fed. 412).

"The important eye to observe a difference or the sameness is the eye of the judge trying the case regardless of such aid as may be received from testimony of experts and others. There is a distinct difference between a suit for unfair competition and a design patent suit.

"While there has been a great deal of testimony taken in regard to the validity of this design patent yet I feel that there has been no reason presented for de-

claring the Pendleton patent invalid. It seems to me to be in a very limited way, new, original and ornamental. I am, however, satisfied that defendant's design does not infringe. By placing them side by side they appear to me to be distinctly different.

"The defendant's structure has the well known Keystone opening. It is the appearance of a design that must be the basis for the decision rather than a close analytic inspection. (Walker on Patents 5th Ed. page 462.)

"Accordingly I have no doubt as to the no infringement by defendant and defendant is entitled to a decree."

Detroit to Have Show Four Days in July

The radio jobbers and manufacturers representatives of Detroit and Eastern Michigan have formed an organization known as the Radio Jobbers and Manufacturers Representatives Club. The immediate reason for the formation of such a group is the staging of a pre-season radio show to be held at the Book Cadillac, July 24, 25, 26 and 27.

H. A. Abrahamson, of Detroit Electric Co., 101 E. Jefferson Avenue, Detroit, Mich., is chairman.

NEW CORPORATIONS

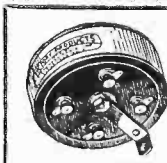
- Debs Memorial Radio Fund, Broadcasting—Atty, M. Hillquit, 19 West 44 St., N. Y. City.
- A. W. Franklin, Radio—Atty, D. Kassel, 51 Chambers St., N. Y. City.
- Circular Radio Co., Attorneys, Barshay & Gittelson, 26 Court St., Brooklyn, N. Y.
- F. Edwin Schmitt, Radios, Attorney, F. M. Veralli, 420 Lexington Ave., New York, N. Y.

SCOTT WORLD'S RECORD

Build the 9,400-mile receiver. **SUPER 10** Listen in on all the world. **SUPER 10** Easy and economical to construct. Results guaranteed. Write today for free circuit diagram, parts list and copies of long distance reception verifications.

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Condensers Specified for National Screen Grid Five

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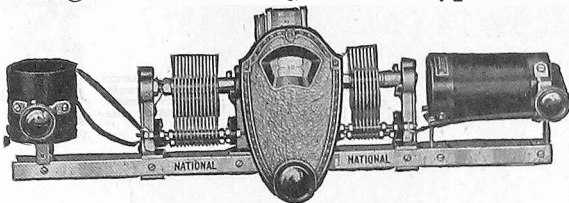
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Thousands of satisfied users. Send no money. Shipped C.O.D., plus express company charge. Indicate size and model desired.

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BE THE LICENSED RADIO DOCTOR in your community. \$7-\$10 spare time evenings. Our co-operative plan secures all the work you want. Secure franchised territory now. Write for booklet. Co-operative Radio Doctors, Dept. W, 131 Essex St., Salem, Mass.

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"RADIO THEORY AND OPERATING," by Mary Texanna Loomis, member Institute of Radio Engineers, Lecturer on radio, Loomis Radio College. Thorough text and reference book; 886 pages, 700 illustrations. Price \$3.50, postage paid. Used by Radio Schools, Technical Colleges, Universities, Dept. of Commerce, Gov't Schools and Engineers. At bookdealers, or sent on receipt check or money order. Loomis Publishing Company, Dept. RW, 405 9th St., Washington, D. C.

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FORTY TIMES as Much Amplification!

The New Shielded Grid
**4-TUBE
DIAMOND
OF THE AIR**

Designed by H. B. HERMAN and described by him in the February 4, 11 and 18 issues of RADIO WORLD.

The favorite four-tube design, simple as can be, takes a great step forward, so that home constructors of radio receivers, and custom set builders, 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 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.

All you have to do is to follow the official blueprint, and lol 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.

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!

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!

Front Panel, Subpanel and Wiring Clearly Shown

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.

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.

The circuit consists of a stage of tuned RF shielded grid tube amplification, a regenerative detector, and two transformer coupled audio stages.

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A genuine Clarostat in the form of an accessory rather than a part. Can be inserted in any radio circuit, without tools, alterations, time and trouble. Provided with connection cords and tip block connector for facilitating insertion in any circuit. Ideal for a remote volume and tone control. The handiest form of resistance for laboratory work. The resistor of a thousand-and-one uses in radio experimental work. Highly popular in a volume control with A-C tubes, particularly when using the harness arrangement. Resistance range of practically zero-500,000 ohms in several turns, providing micrometric resistance. Ample current-handling capacity. Noiseless. Stays put. Pool-proof. Long life. Yours at \$2.50.

Your dealer can show you the Table Type Clarostat and give you a copy of "Radio Etiquette." Or, if you prefer, write us for that interesting booklet and other data.

American Mechanical Laboratories, Inc.
 285 North Sixth St.
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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of Radio World, published weekly at New York, N. Y., for April 1, 1928.
 State of New York,
 County of New York, ss:

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

1. That the names and addresses of the publisher, editor, managing editor and business managers are: Publisher, Hennessy Radio Publications Corp., 145 W. 45th St., N. Y. C.; Editor, Roland Burke Hennessy, 145 W. 45th St., N. Y. C.; Managing Editor, Herman Bernard, 145 W. 45th St., N. Y. C.; Business managers, Herman Bernard, 145 W. 45th St., N. Y. C.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of the stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Hennessy Radio Publications Corp., 145 W. 45th St., N. Y. C.; Roland Burke Hennessy, 145 W. 45th St., N. Y. C.; Mrs. Mary J. McArthur, 1940 E. 82d St., Cleveland, Ohio.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent, or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers, during the six months preceding the date shown above is weekly. (This information is required from all publications only.)
 ROLAND BURKE HENNESSY,
 Editor.

(Sworn to and subscribed before me this 23rd day of March, 1928).

JOSEPH VIVIANI,
 Notary Public, Bronx Co. Clerk, No. 17; Bronx Co. Register's No. 285; New York County Clerk's No. 88; New York Co. Register's No. 8126; Kings Co. Clerk's No. 41; Kings Co. Register's No. 8062. Term expires March 30, 1928.

Note.—This statement must be in duplicate and both copies delivered by the publisher to the postmaster, who shall send one copy to the Third Assistant Postmaster General (Division of Classification), Washington, D. C., and retain the other in the files of the post office. The publisher must publish a copy of this statement in the second issue printed next after its filing.



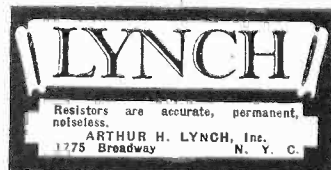
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RADIO WORLD
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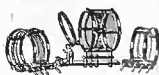
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The finest inductance coils for all short wave reception. Specified for all leading short wave jobs (See this issue of Radio World). Kit consists of 3 interchangeable coils and base mounting. Covers U. S. bands 20, 40 and 80 meters. You can increase range to cover broadcast bands by securing Aero Interchangeable Coils No. 4 and No. 5. Price, each, \$4.00. Aero equipment is available at all leading dealers. Or order direct from

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3 tube

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A short wave kit using famous Karas Parts—Karas Micrometric Dials are smooth, even tuning—free from backlash—made of Bakelite! Require no drilling; only one set screw; two knobs—rough tuning and vernier. Also Karas Orthometric Variable Condensers, built of the finest materials under precision standards. Greater separation—enlarged tuning range! Build this new set! Get the complete kit at your dealer's or write to

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Used in the majority of popular circuits. Experienced designers realize nothing can successfully be used in place of Carter parts.



Constant Filament Voltage
AMPERITE
 alone keeps tube filament voltage constant despite variations in "A" supply. Tube efficiency demands it. Indispensable with battery eliminators. Eliminates hand rheostats. Simplifies wiring. **FREE**—Amperite Book of latest construction data and circuits. Write Dept. R.W.7

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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, **Popular Radio**, or **Radio News**, or **Science and Invention**, or **Radio Dealer**, or **Radio (San Francisco)**, or **Radio Age**, or **Boys' Life** (or \$10.00 for a two-year subscription to one address). No other premium with this offer.

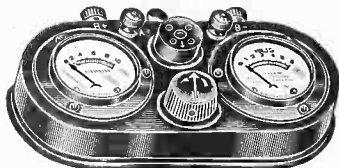
Indicate if renewal. Name
 Offer Good Until Street Address
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A Scientific Trouble-Shooting Test Set

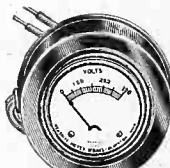
Consisting of Tube Checker That Reads Filament Voltage and Plate Current; Extra Meter Reads Plate Voltage, including B Eliminator Voltages. **Only \$10.00**

The best inexpensive combination for trouble-shooting is a Double R Tube Checker, comprising a 0-10 D.C. milliammeter, a 0-6 D.C. voltmeter, a switch, a rheostat and a socket. Add a high resistance voltmeter (0-300 v.). With these it is advisable to use a plug, so that all you need do is remove a tube from a receiver that you're testing, put the plug in the empty socket and the removed tube in the socket of the tester. You can immediately find open any short circuits, broken or flimsy connections, reversed connections, etc. The Double R Cord and Plug, the Double R Tube Checker, and 0-300 high resistance voltmeter constitute the Scientific Trouble-Shooting Test Set.

The Biggest Value That \$10 Can Buy



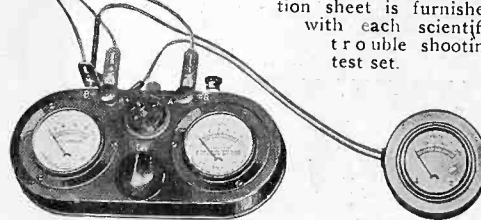
No. 210 Tube Checker consists of 0-6 volts D.C. Voltmeter, 0-10 D.C. Milliammeter, Grid Bias Switch, Rheostat, Socket, Binding Posts (with instruction sheet) in handsome naira case. . . \$6.50



No. 346—High resistance voltmeter for reading any and all DC voltages, including B eliminators, up to 300 volts. Portable type, full meter finish, long connecting cords and tips. \$4.50



No. 21—Cord and plug, with markers and lugs that fit tube checker binding posts. \$1.85



The complete combination is illustrated here-with, consisting of the tube checker, cord and plug and 0-300 v. high resistance voltmeter. All are genuine "Double R" products, guaranteed on a five-day money-back basis, and highly suitable for test work by radio repair men, professional trouble shooters, experimenters, amateurs, fans, students, service men, set builders, home constructors and others. Complete instruction sheet is furnished with each scientific trouble shooting test set.

The cord terminals of the plug leads correspond with the binding posts of the tube checker. Now connect the 6-300 volts high resistance voltmeter from A+ to B+ posts and you get all necessary readings. You can test plate voltage from B eliminators, or any other B supply, D.C. plate current and D.C. filament voltage, as well as the efficacy of the tube, by throwing the grid bias switch, for the plate current should change within given limits, depending on the type of tube.

Service Men! Custom Set Builders! Experimenters! Students!

Equip your testing outfit with the indispensable combination that constitutes the Trouble Shooting Test Set and Time-Saver. You quickly locate trouble while others flounder about.

WHAT YOU GET One No. 210 tube checker, with 0-6 voltmeter, 0-10 milliammeter, socket, rheostat, binding posts and bias switch, all built in; one No. 21 cord and plug, and one No. 346 high resistance 0-300 v. voltmeter. **FOR ONLY \$10**

If You Want Complete Test Set, as Above, But With 0-500 High Resistance Voltmeter, price is \$11.

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Our Five-Day Money-Back Guaranty Fully Protects You!

Many professional and other radio technicians require a 0-500 high resistance voltmeter, as part of their scientific trouble-shooting test set, so that they can test ALL power pack B voltages. They do a great deal of work with high voltage power packs, especially where a -10 or -50 tube is used in the output of a receiver. For them the 0-500 v. high resistance voltmeter, No. 347, is just the thing to include in the test set, instead of the No. 346 high resistance 0-300 v. voltmeter. The combination may be obtained with the 0-500 v. voltmeter, instead of the 0-300 v. voltmeter, at only one dollar extra. The 0-500 v. meter is exactly the same as the 0-300 v. meter, except for difference in maximum voltage reading.

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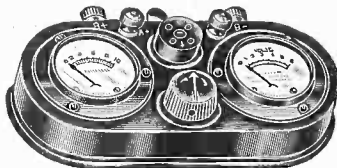
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A Scientific Trouble-Shooting Test Set

Consisting of Tube Checker That Reads Filament Voltage and Plate Current; Extra Meter Reads Plate Voltage, including B Eliminator Voltages. **Only \$10.00**

The best inexpensive combination for trouble-shooting is a Double R Tube Checker, comprising a 0-10 D.C. milliammeter, a 0-6 D.C. voltmeter, a switch, a rheostat and a socket. Add a high resistance voltmeter (0-300 v.). With these it is advisable to use a plug, so that all you need do is remove a tube from a receiver that you're testing, put the plug in the empty socket and the removed tube in the socket of the tester. You can immediately find open any short circuits, broken or flimsy connections, reversed connections, etc. The Double R Cord and Plug, the Double R Tube Checker, and 0-300 high resistance voltmeter constitute the Scientific Trouble-Shooting Test Set.

The Biggest Value That \$10 Can Buy



No. 210 Tube Checker consists of 0-6 volts D.C. Voltmeter, 0-10 D.C. Milliammeter, Grid Bias Switch, Rheostat, Socket, Binding Posts (with instruction sheet) in handsome noire case. . . . \$6.50

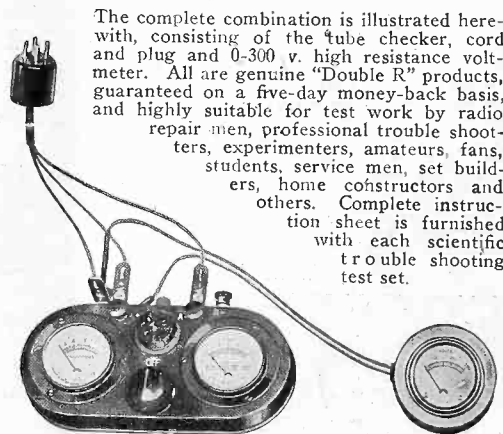
The cord terminals of the plug leads correspond with the binding posts of the tube checker. Now connect the 0-300 volts high resistance voltmeter from A+ to B+ posts and you get all necessary readings. You can test plate voltage from B eliminators, or any other B supply, D.C. plate current and D.C. filament voltage, as well as the efficacy of the tube, by throwing the grid bias switch, for the plate current should change within given limits, depending on the type of tube.



No. 346—High resistance voltmeter, for reading any and all DC voltages, including B eliminators, up to 300 volts. Portable type, full nickel finish, long connecting cords and tips \$4.50



No. 21—Cord and plug, with markers and lugs that fit tube checker binding posts. . . \$1.85



The complete combination is illustrated herewith, consisting of the tube checker, cord and plug and 0-300 v. high resistance voltmeter. All are genuine "Double R" products, guaranteed on a five-day money-back basis, and highly suitable for test work by radio repair men, professional trouble shooters, experimenters, amateurs, fans, students, service men, set builders, home constructors and others. Complete instruction sheet is furnished with each scientific trouble shooting test set.

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