

Popular Radio

SEPTEMBER, 1926

25¢

\$110.00
IN PRIZES FOR IDEAS
— See page 413 —

— For the Experimenter —
**How to Build an Impedance-
-Coupled Amplifier**
— For the Broadcast Listener —
**How to Wire Your Home
for Radio**

know these Radiotrons and keep your set up to date

You can get fine, clear performance with one type of RCA Radiotron right through your set. Or you can change one tube in a set, and get more *power*. Change another—if you have a storage battery set—and get bigger *distance reach*. Know the Radiotron family, and keep pace with the Radiotron laboratories, and you can keep your old set up to date. Here are the most important Radiotrons to know!



for dry battery sets

Radiotron UX-199 (or WD-11 or WX-12), for any or all sockets.
For big performance on small current.
Power Radiotron UX-120, for the last audio stage.
For added power—bigger volume—clearer tone

for storage battery sets

Radiotron UX-201-A, for any or all sockets.
Efficient, long-lived under heavy usage.
Detector Radiotron UX-200, for the detector socket of specially built sets—for long range.
Super-detector Radiotron UX-200-A, for the detector socket, where a 201-A is now used. A special tube that gives added sensitivity—longer distance reach.
Power Radiotron UX-112 or UX-171, for the last audio stage.
For added power and finer tone.

for A. C. operated sets

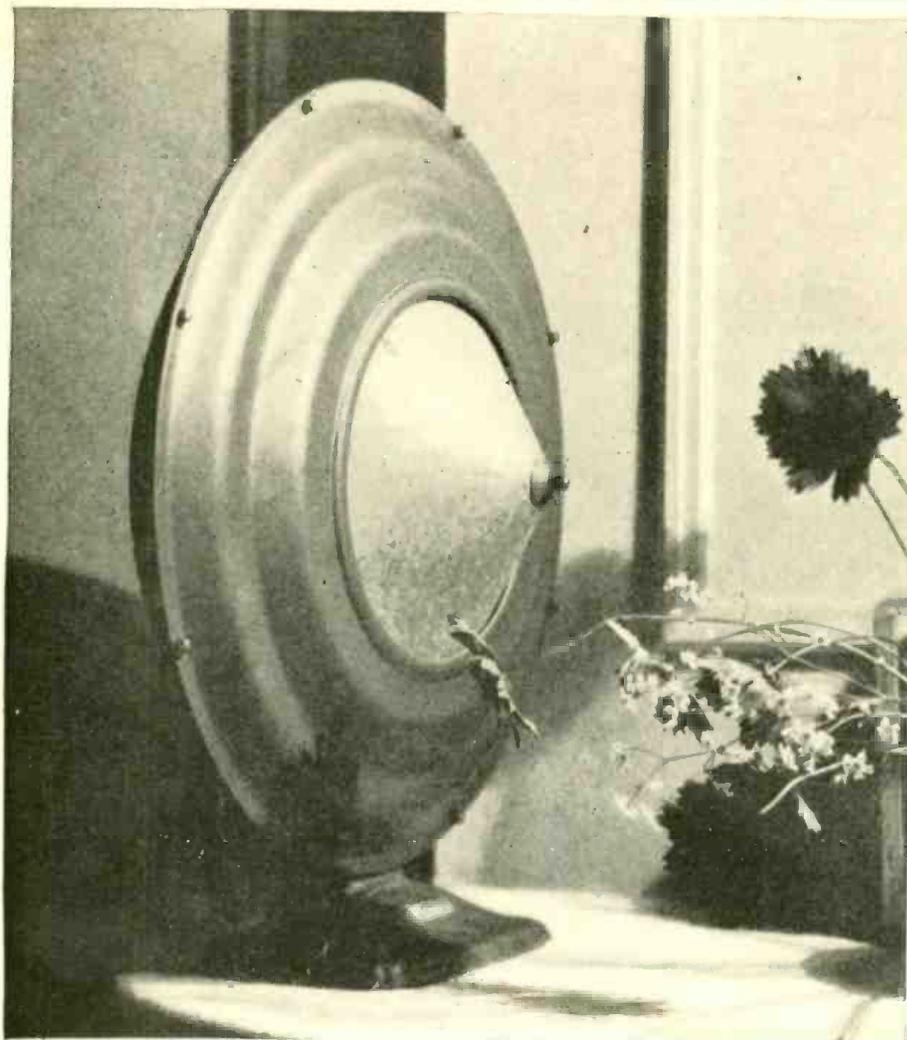
Super-power Radiotron UX-210, for utmost loudspeaker volume—the most powerful receiving tube in existence.

Many a set can be kept long at its best efficiency—or carried onward with the development of radio—by knowing all the Radiotrons, keeping step with the Radiotron laboratories—and watching always, when you buy, for the mark on the glass and the base, to prove a tube is a genuine RCA Radiotron.

RADIO CORPORATION OF AMERICA
New York Chicago San Francisco

RCA Radiotron

MADE BY THE MAKERS OF THE RADIOLA



Now This Super-fine Reproducer

A NEW and supreme contribution to radio enjoyment. The highest type cone at half the usual price. Develops low and high tones completely, broadening range, releasing hitherto muffled notes. Makes the set more enjoyable.

Sounds like it should cost \$25—but priced at only \$12.50.

Attractive. Antique bronze finish. Adjustable. Fifteen inches in diameter.

Only \$12.50

Acoustics by
Brandes
means the ultimate in reproduction

Popular Radio

EDITED by KENDALL BANNING



FOUNDED 1911

VOLUME X

September, 1926

NUMBER 5

Q HOW can radio broadcast programs be improved? Nine cash prizes will be paid to readers of POPULAR RADIO for the best answers to this question. For details turn to page 413.

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VOLUME X

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LAURENCE M. COCKADAY, Technical Editor

JOHN V. L. HOGAN, Contributing Editor

You hear *all* the tones

with an



ALL-AMERICAN TRADE MARK Reproducer

An All-American Quality Product

A good speaker is the only kind worth having. A poor one will ruin otherwise good reception.

We're making a good one for you—the *Lorel* Reproducer; a cone type correctly balanced with sounding-board and sounding-chamber, to give you that purity of *all* tones, which you desire.

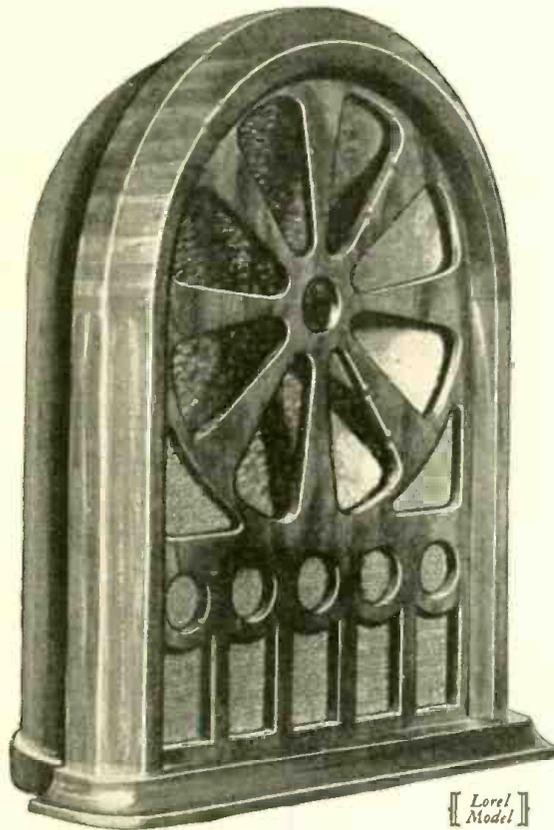
This remarkable unit combines the good features of both cone and sounding-chamber types of speaker; and eliminates their inherent weaknesses. You can hear *all* the high and low tones with the *Lorel*; clear and full.

Ask your dealer for a demonstration of the *Lorel*. You'll find it a real improvement in radio reception.

Price \$25 Slightly higher west of the Rockies

ALL-AMERICAN RADIO CORPORATION

4207 Belmont Avenue • Chicago



Lorel Model

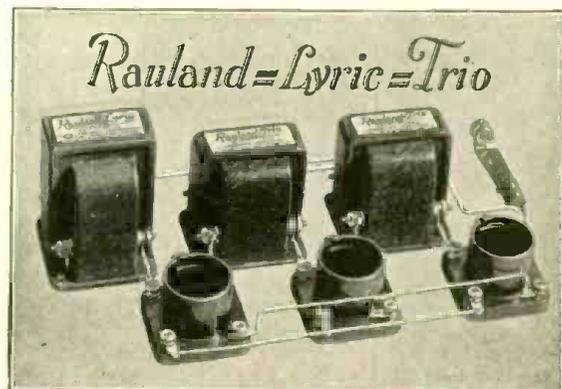
A Remarkable Improvement in Audio Amplification

A development by All-American laboratories—the Rauland-Lyric-Trio. You know the Rauland Lyric Transformer, famous among music critics for its exceptional tone perfection. It is now combined with two Rauland Trio impedance units; retaining the advantages and eliminating the weaknesses of the two leading systems of audio amplification. The result is the last word in audio amplification. Free book, "Modern Audio Amplification," tells more about this interesting development. Write for handbook "B-90."



Pure full tone is possible only with unvarying "B" power. With All-American "Constant B" you get a permanent, constant plate power. There's nothing to take care of; no annoying hum, and no acid. Permanently sealed. "Constant B" has a 10 to 60 volt tap, varied in output by a "detector" control; a 67½ volt and a 90 volt tap; a variable voltage "power-tube" tap uniformly controlled by a "High-Low" switch.

Price \$37.50 Complete with Raytheon tube Slightly higher west of the Rockies



A PAGE WITH THE EDITOR



From a photograph made for POPULAR RADIO

One of the Experimental Models of the New LC-27 Receiver

This newest product of the Popular Radio Laboratory—which is considered the best by the experts who have tested it—will be described in such complete detail in the next number of this magazine that the average experimenter should have no difficulty in building it himself—at a cost for parts not to exceed \$85.00.

THE coming issue of POPULAR RADIO—for October—will contain the complete constructional details of the new LC-27 receiver.

POPULAR RADIO believes that this new circuit, which is the special contribution of the POPULAR RADIO LABORATORY to the experimental set-builder for the 1926-27 season, is one of the most important contributions that have so far been made to the radio art.

THE outstanding features of the new LC-27 receiver may be briefly summarized thus:

1. From a standpoint of quality of reception, it is unsurpassed;
2. It is a beautiful piece of furniture;
3. It is highly selective and practically free from interference;
4. It has a good distance range;
5. It is simple to tune.

THIS new receiver may be used entirely without batteries or with any of the various types of power supply that are in use at the present time.

THE final development of the LC-27 is the result of the grouping of the individual features that are demanded by radio experimenters and set-builders; it also embodies the newer developments, from a scientific aspect, that have been made during the last year.

THE LC-27 is non-regenerative and contains no adjustments outside of the tuning control and the one knob that controls the volume.

IN a word, this new receiver design, with its easy control, its wealth of rich full volume and its artistic cabinet, should fulfill the desires of the most progressive radio set-builder and experimenter.

"AT this time I wish to tell you that I have been a constant reader of POPULAR RADIO, both here in Sausalito, California, and in New York, and have watched its progression from the start. I like your policies, the material which the magazine contains, and the way in which you are handling things. Many congratulations!"

—PETER TAYLOR

ON page 433 of this issue is told the story of how another radio amateur has won the POPULAR RADIO MEDAL FOR CONSPICUOUS SERVICE—Mr. C. B. Harrison of Belleville, Illinois, whose conspicuous service was rendered while he was under suspension.

WHILE the documents in the case were being scrutinized by the Committee of Awards the question was asked by Dr. John H. Finley "what did

Harrison do that the radio inspector had to suspend him for three months?"

MERELY as a matter of interest (because the reasons for the suspension had no bearing upon the award), the editor quotes below from Mr. Harrison's own report of his technical delinquency:

"YOU ask about my suspension. Well to begin with, I started in the game in the old spark days in 1911. My first license was 9XX. Then when the power tube came in 9DG was my call. During all this time I had never been called for examination, and as my speed was 28, I didn't bother about going to Chicago. The examinations in St. Louis were held as a rule during June. Just at the time I was due at Gloucester, Massachusetts, so I missed three or four examinations by being away at the time.

"I TRIED to take the examination in Boston one year but those in charge of the office asked why I didn't take it in my own district and asked it as if I was trying to put one over on some one.

"THE Chicago office evidently thought I was trying to evade being examined and suspended me for three months. This brought the desired results, and I lost no time in presenting myself for examination. That out of my system, the new call 9DOZ, which promises to stick, was issued to me."

LAST month's issue of POPULAR RADIO again demonstrated the place that the magazine holds in the regard of both the reader-public and the radio industry, by carrying more net advertising than any other radio magazine.

JUST because Prof. L. A. Hazeltine took the precaution of jotting down in his laboratory note book certain observations concerning his experiments, the priority of his claims to his mathematical exposition of the principle of neutralization was legally established. This simple precaution saved him patent rights that have been valued at \$1,500,000.

THE care that every radio experimenter should exercise in protecting his discoveries and inventions is the subject of a helpful, practical article that will appear in a coming issue of POPULAR RADIO, "How to Patent Your Radio Invention."

Kendall Banning
Editor, POPULAR RADIO

COMPACT CAPACITY

Putting capacity into a paper condenser is comparatively simple. Providing for unvarying capacity in a paper condenser of small size, and building it to withstand high voltages in continuous operation—this required years of work in Dubilier research laboratories.

In Dubilier paper condensers only the finest of linen paper and tin foil are used. But it is the Dubilier process used in making them; the exacting standards set by Dubilier tests—that give to Dubilier Condensers the kind of quality demanded by the greatest radio stations in the world.

Efficiency and a liberal margin of safety are never sacrificed for size or appearance—where a reputation such as that held by Dubilier must be maintained in every country in the world. You buy compact capacity and safety when you buy condensers made by Dubilier.

Dubilier

CONDENSER AND RADIO CORPORATION



Dubilier Condenser
Type 901
Cap. 500-1
D.C. Working Voltage 200
A.C. Working Voltage 150
The condenser may be used in any circuit provided the rated working voltage is not exceeded in continuous operation.
DUBILIER CONDENSER & RADIO CORPORATION
5377 LEBRON BLVD., NEW YORK
MADE IN U.S.A.

Types 901, 902 and 903. All purpose condensers with working voltages of 160, 400, and 600 volts respectively. Capacities 1, 2, 4 and 6 mfd.

Dubilier Condenser
Type 907
Cap. 1-20 mfd.
D.C. Working Voltage 160
A.C. Working Voltage 120
Dubilier Condenser & Radio Corp. New York
MADE IN U.S.A.

Type 907. An improved and compact condenser replacing the old "by-pass" type with a working voltage of 160 volts. Capacity: .1 to 20 mfd.

Dubilier Condenser
Type P.L. 90
Cap. 100-1000
D.C. Working Voltage 160
A.C. Working Voltage 120
Dubilier Condenser & Radio Corp. New York
MADE IN U.S.A.

Type P.L. 90. The Dubilier Raytheon Block Working voltage 160 volts. Taps at 2, 2.8, 1 and 3 mfd.

*Working voltage is the voltage at which a condenser may be safely used in continuous operation.

THE NEW NATIONAL VELVET VERNIER DIAL TYPE C HAS AN ILLUMINATED SCALE BRILLIANTLY LIGHTED BY A SMALL, CONCEALED LIGHT, AND EITHER TURNED ON SEPARATELY WHEN NEEDED, OR CONNECTED TO THE FILAMENT SWITCH, THUS ACTING AS TELL-

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FEATURE

MADE THE

TYPE B DIALS SO

USED — VARIABLE

WITH NEW AND BETTER

SCALE — EASILY MOUNTED

NARY DRILL AND SCREW DRIVER

CASE, WEARPROOF AND DISTINGUISHED IN APPEARANCE; — AND FINALLY —

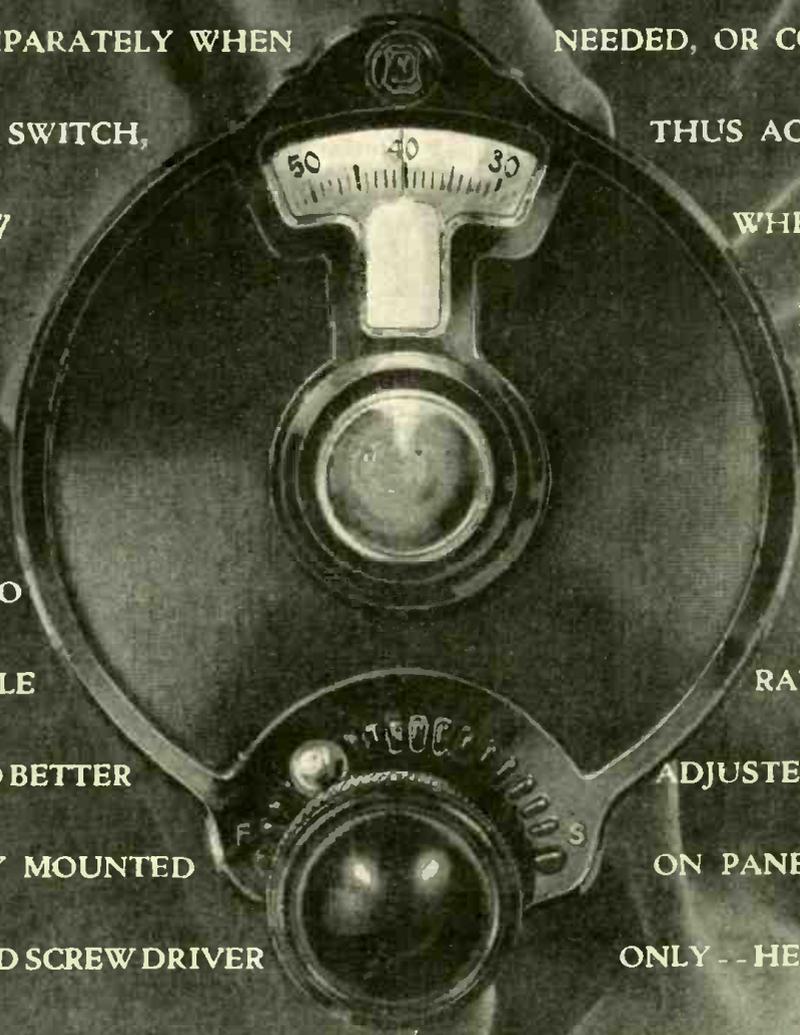
THE NATIONAL VELVET ACTION FOR HAIRLINE TUNING ACCURACY — RETAIN-

ING THESE QUALITIES UNCHANGED NO MATTER HOW LONG IT IS USED.

NATIONAL COMPANY, INC., ENGINEERS AND MANUFACTURERS

110 BROOKLINE STREET, CAMBRIDGE, MASS., — W. A. READY, PRESIDENT

BE SURE YOU GET GENUINE NATIONAL PRODUCTS



WHEN THE TUBES

IT HAS EVERY

WHICH HAS

TYPE A AND

UNIVERSALLY

RATIO 6-1 TO 20-1,

ADJUSTER, EASILY READ

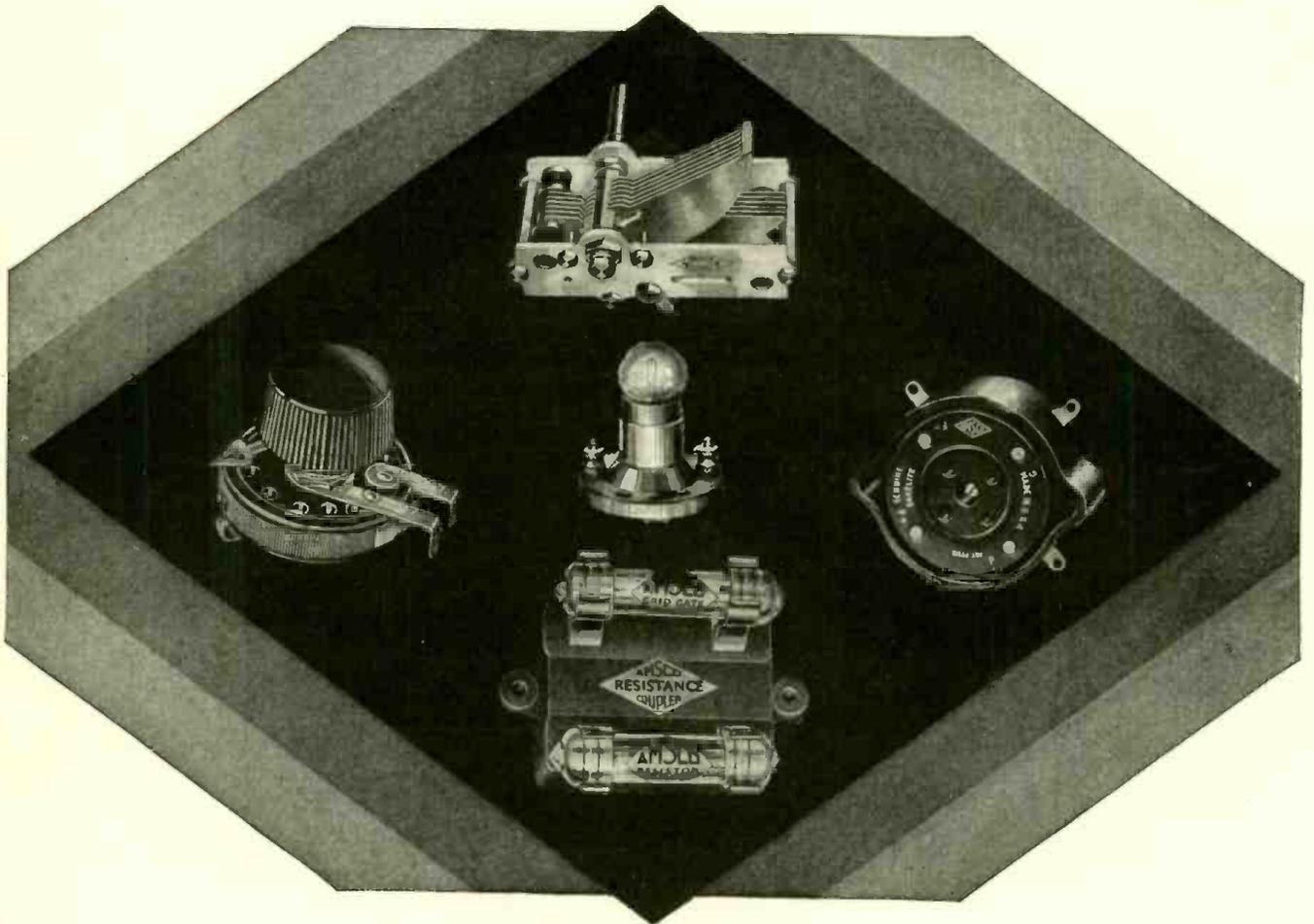
ON PANEL WITH ORDI-

ONLY -- HEAVY BAKELITE

PRICE TYPE C DIAL \$3.00
 Visit our exhibits at New Madison Square Garden, New York, Sept. 13th-18th, and at the Coliseum, Chicago, Oct. 11th-17th.

AMSCO

FOR EXCELLENCE



ENGINEERING ACHIEVEMENTS

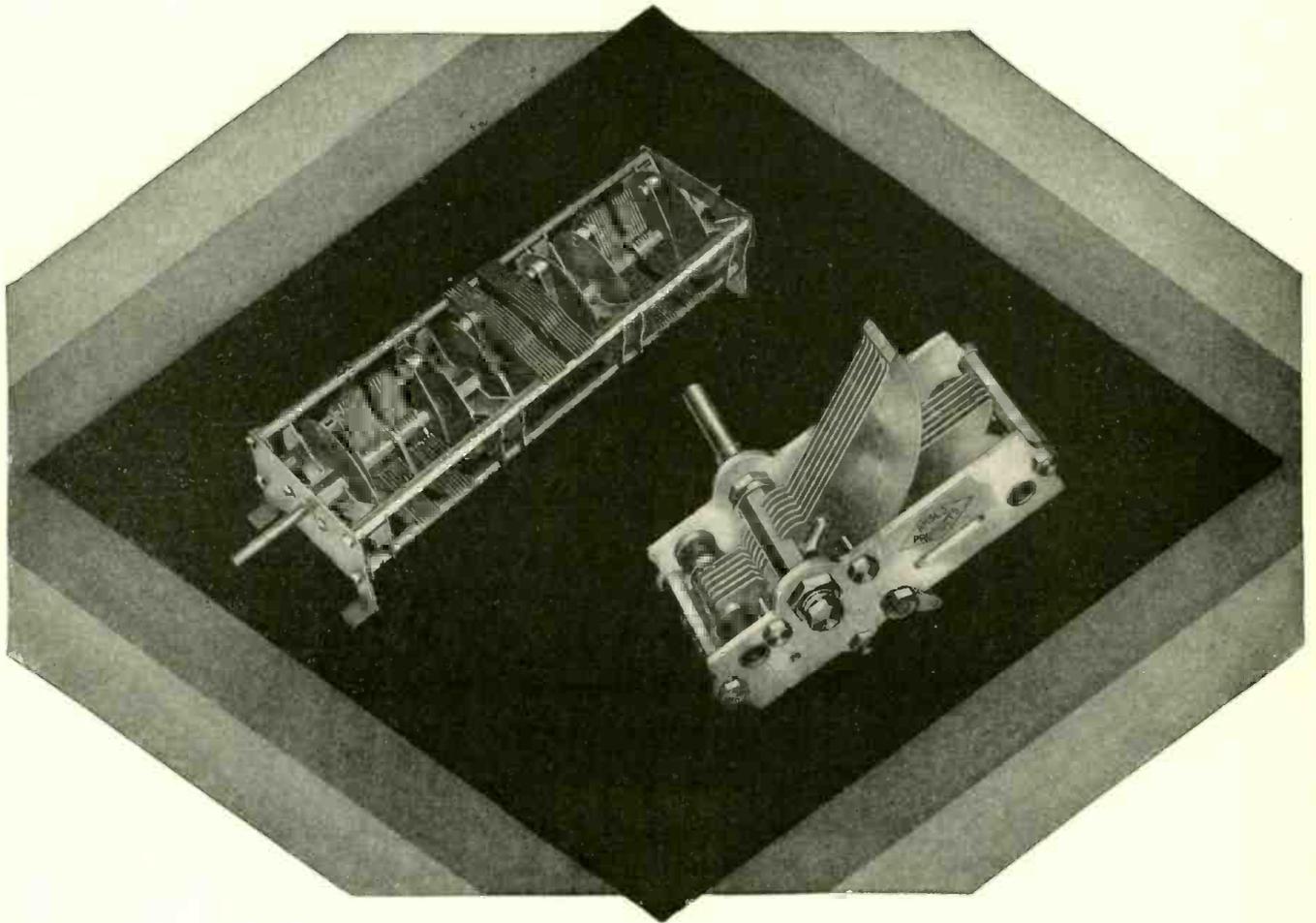
1926 - 1927

NEW AMSCO CONDENSERS *Allocating by Meters or Kilocycles*
METALOID GRID GATES AND RESISTORS *Stable and silent*
AMSCO FILATROLS *The Perfected Automatic Rheostats*
TOM THUMB RHEOSTATS *The midgets for giant performance*
AMSCO FLOATING SOCKETS *Positively non-microphonic at last*

For Details See Following Pages



AMSCO ALLOCATING CONDENSERS are made in all styles—straight frequency line, straight tuning line, and straight capacity line. They allocate or “spread” the stations with engineering precision, according to kilocycles, meters or capacity variations.



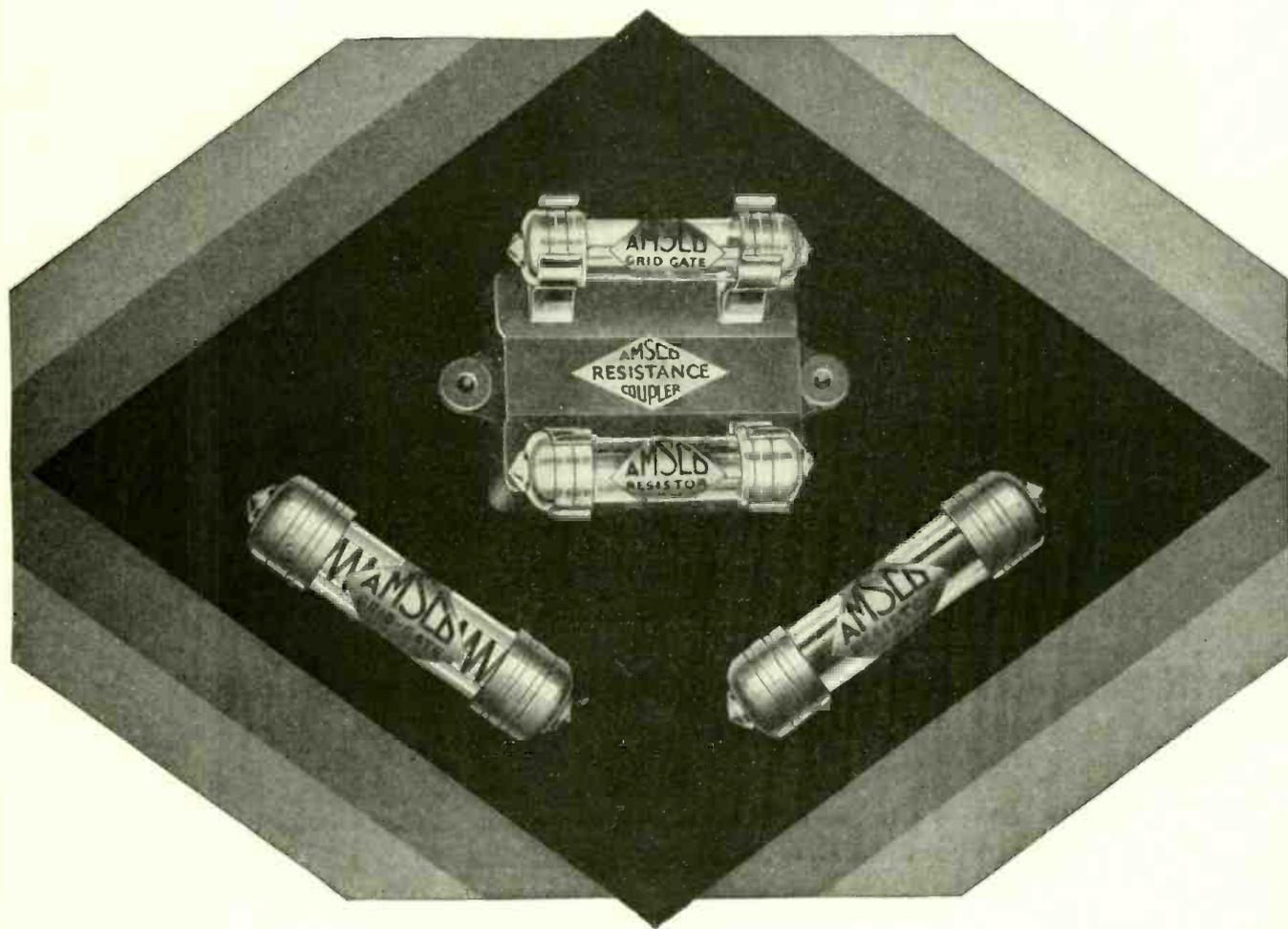
AMSCO ALLOCATING CONDENSERS of all types may be obtained single, siamese, or in gangs matched within less than 1%.

Their unflinching uniformity makes *practical* the hitherto theoretical ideal of single control in radio receivers.

Construction guaranteed mechanically and electrically perfect. *They're AMSCO!*

AMSCO METALOID
Grid Gates and Resistors are entirely unique, making possible unvarying electrical characteristics even under excessive overload.

A stable colloidal metal fused into glass at high temperature is the Amsco resistance element. Colloidal—*not crystalline*—means silent operation! Investigate!

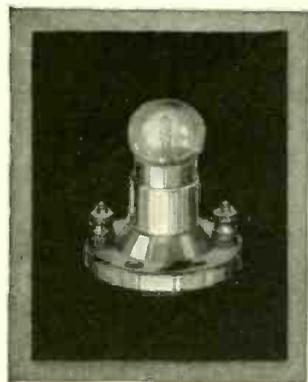


AMSCO Resistive Coupling Amplifier. With AMSCO Metaloid Resistors, this unit perfects the resistive coupled audio circuit. It improves upon all previous designs in the arrangement of the binding posts, in that the couplers may be lined up with the sockets, rather than between them.

Marvels of compactness—they eliminate the need for leads—and cut three full inches from the average panel. AMSCO in excellence!

AMSCO

FOR EXCELLENCE

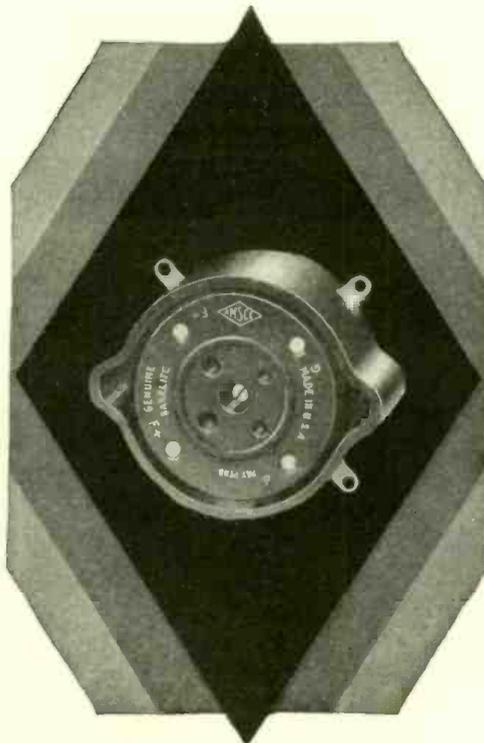


FILATROL

AMSCO again leads the way toward elimination of controls. The AMSCO Filatrol is an automatic filament control that *really* takes the place of manually adjusted rheostats in the average circuit. Its unique design, a departure from conventional form, gives unfailing efficiency, and unmatched compactness.

Guaranteed for the lifetime of any receiving set.

Exhibitors, Third Annual Radio World's Fair, New Madison Square Garden, New York, September 13th to 18th, inclusive.

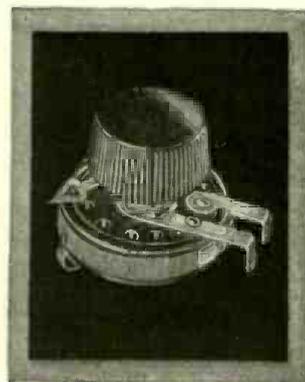


FLOATING SOCKET

Rugged and substantial, this socket is yet extraordinarily tiny—and "*it floats!*" All types of tubes fit with the click that accompanies positive wipe contact. The tubes almost literally float on air, practically isolated from the base or panel. Microphonic noises, mechanical feed back and audio vibration are effectively eliminated. An imperative choice for the sensitive set—or the set with built-in loud speaker.

AMSCO PRODUCTS, Inc.
Broome & Lafayette Sts., N. Y. C.

All AMSCO Parts are manufactured in accordance with Standards of the Radio Mfrs. Association, Inc.



TOM THUMB RHEOSTAT

A true midget for saving space front and back of the panel. No less effective because of its compactness—it has the normal amount of resistance, the normal electrical contacts. It is simply that needless bulk is eliminated by AMSCO design. Air cooled construction—Bakelite base and knob with indicator arrow. Sold under the usual AMSCO guarantee.

Exhibitors, Fifth Annual Chicago Radio Show, Coliseum, Chicago, October 11th to 17th inclusive.

\$110.00 for Ideas!

Nine cash prizes, ranging from \$50.00 to \$5.00 for the best 500-word letters that answer the question:

“How Can Radio Broadcast Programs Be Improved?”

What changes should be made in the programs, in the methods of presentation, in the arrangement of time schedules, in the quality or quantity of broadcast features, or in any other way that will add most to the pleasure and profit of listening in?

POPULAR RADIO invites its readers to express their constructive opinions.

For the letter that embodies the most interesting, the most helpful and the most practical suggestions—in the opinion of the

judges—POPULAR RADIO offers a prize of \$50.00 in cash.

For the letter that contains the next best suggestions a second prize of \$20.00 in cash will be awarded.

For the third best letter a prize of \$10.00 will be given.

And for the fourth, fifth, sixth, seventh, eighth and ninth best letters, prizes of \$5.00 each are offered.

The Rules of this prize contest are:

1. Address letters to the Editor of POPULAR RADIO, 627 West 43rd Street, New York.
2. The letters may be as short as the writers care to make them, but they must not exceed 500 words in length.
3. Any contestant may write as many letters as he or she desires.
4. Each letter may either confine itself to one specific idea or suggestion, or it may cover the several ideas suggested above.
5. All letters submitted in this contest must be in the mails not later than Friday, October 15, 1926.
6. All letters submitted in this contest shall become the property of POPULAR RADIO, which reserves the right to publish them in whole or in part.
7. Letters may be either typewritten or written in long hand, but they must be written on one side of the sheet only.

The prize winning letter will be published in POPULAR RADIO together with as many other letters or parts of letters as may con-

tain ideas of value to the radio fans and to the broadcasting interests.

The judges of this contest are:

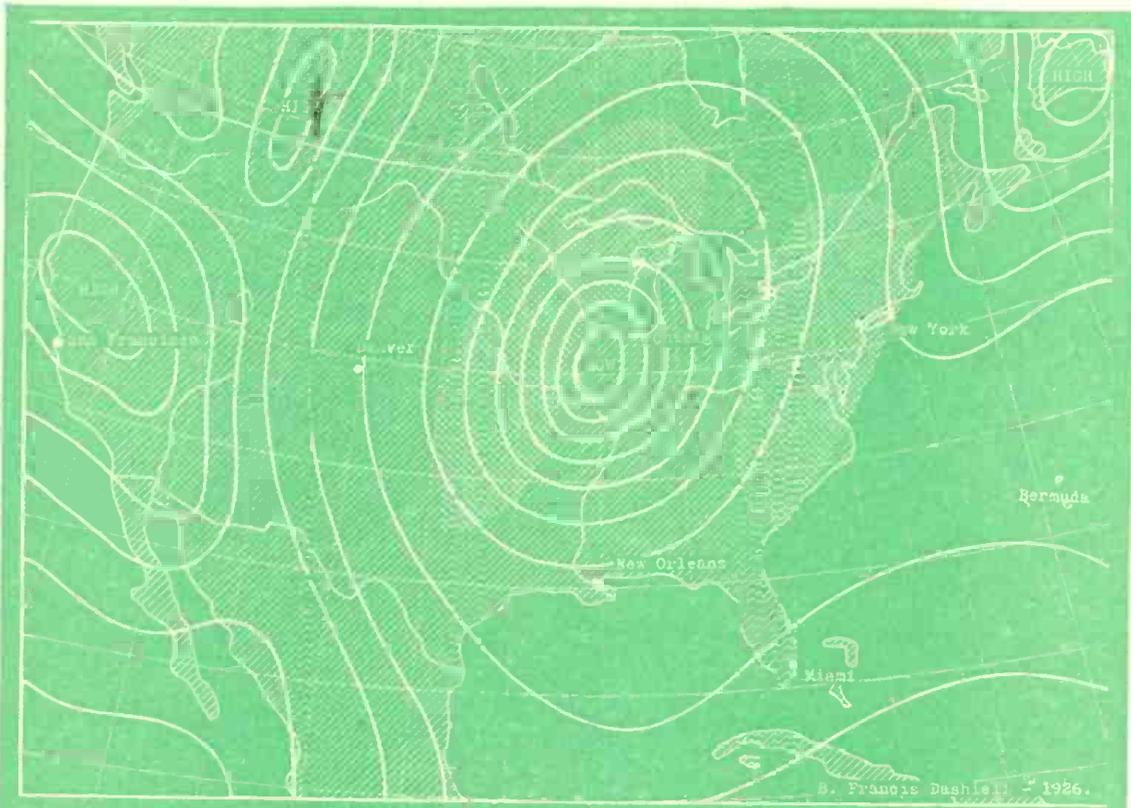
DR. ALFRED N. GOLDSMITH, Secretary Institute of Radio Engineers.

W. E. HARKNESS, Vice-President Broadcasting Company of America.

FRANK H. McDONALD, President Broadcast Listeners Association of America.

FRANK W. ELLIOTT, President National Association of Broadcasters.

THE EDITORS OF “POPULAR RADIO.”



What the Weather Map Tells

In the upper map the low pressure area below the Great Lakes indicates severe storms in that region and poor reception from New York to the western states. In the lower, a cold wave ("high") is pushing down from the northwest to cover the entire country so that within twenty-four hours there will be a fine chance for coast to coast reception.

Popular Radio



VOLUME X

September, 1926

NUMBER 5

Foretelling Radio Reception *from* the Weather Map

THERE is no doubt that radio reception over distances of more than a few miles is profoundly affected by the condition of the weather. Static is almost entirely a creature of weather disturbances, especially of thunderstorms. The United States Weather Bureau prepares and circulates a daily weather map, showing the conditions of air pressure, temperature and other weather elements for the entire United States; it has long been a hope of radio engineers to learn how to use these maps to predict radio reception or to control the operation of transmitting stations which are attempting to reach out for long distances. None of these attempts have been fully successful, doubtless because the problem is an extremely complicated one. In this article Mr. Dashiell explains what is now known about this important problem and outlines some predictions about radio reception which are possible from an inspection of the daily weather map.

—EDITOR

By B. FRANCIS DASHIELL

THE belief that some correlation exists between radio and the weather is now generally established in the minds of the radio public. The fact is, however, that this mutual relationship has never been fully determined. The laws that control radio communication and its correlation with weather conditions are obscure and little understood. Radio reception is limited in its general usefulness to small areas of the surface of the earth, while atmospheric disturbances, often of such magnitude as to affect an area equal to that covered by the average broadcast, frequently occur. The development of tentative theories concerning the effect of meteorological conditions on radio operations, will be an important scientific achievement.

There is no definite conclusion at this time that phenomena in connection with radio operations are directly associated with the changes in the weather, but it may be said that some radio disturbances have their origin in atmospheric electric discharges.

Static is the greatest natural phe-

nomenon with which radio has to contend. Fading seriously interferes with reception but is probably caused more frequently by mechanical difficulties than by the weather. Static is believed, however, to be directly associated with the weather conditions existing in the lower atmosphere. This part of the atmosphere is known as the troposphere and extends upwards to a height of seven or more miles, varying from a lesser height over the poles to a much greater height over the equator. Throughout this region the atmospheric gases are kept continuously mixed by winds and by convection. Here our storms occur, clouds exist, rain or snow falls and temperatures change.

The intensity of static varies at different portions of the earth's surface, increasing progressively from the polar toward the equatorial regions. The intensity, at any one point, also increases with the advent of summer and with weather changes; as for instance, from fair to stormy weather or from lower to higher temperatures. It must be remembered, also, that as we progress

southward the depth of the troposphere increases and more static-producing atmosphere is piled up overhead. The changes in the electricity of the atmosphere occurring in the troposphere as the weather changes are accompanied by natural electric disturbances which produce static outbursts.

Another atmospheric zone, the stratosphere, exists above the troposphere level and extends upward to a height of perhaps more than a hundred miles. Water vapor is not present in this zone; temperatures are believed to remain constant; convection ceases. No clouds or weather variations are known. The same condition exists throughout the ages. In this great zone there is much less likelihood that static disturbances will occur. With the exception of the great auroral electromagnetic storms at infrequent intervals, but little interference with radio communication would be noted. Atmospheric electricity, however, reaches well into the stratosphere. There may be powerful discharges taking place there that radiate static waves to the earth below, but

there is no sound theory upon which to base such conclusions or analyze them.

It is either above or within this stratosphere that the theoretical conducting layer known as the Heaviside Layer is supposed to exist. The height of this surface has not been determined exactly, but is approximately between seventy-five and a hundred miles. The atmosphere goes up and up, getting rarer and rarer. At only about fifteen miles above the earth's surface, 95 per cent. of it is left below. Yet there is sufficient gas to produce a white heat in meteors, as they rush into it, as high up as a hundred miles or more. At these very high levels the composition of the atmosphere may be entirely changed and is in dispute.

The earth, a spherical conductor and negatively charged, is surrounded by an atmosphere in which exist positive charges of electricity. If the earth were a perfectly smooth conductor and if winds and convection ceased, we would then have parallel equi-potential surfaces in the atmosphere and concentric with the earth itself. The possible irregularities of the upper conducting layer and the movements of storms through the atmosphere tend to distort the concentricity of the electrical surfaces and to increase or decrease the potential differences. The breaking

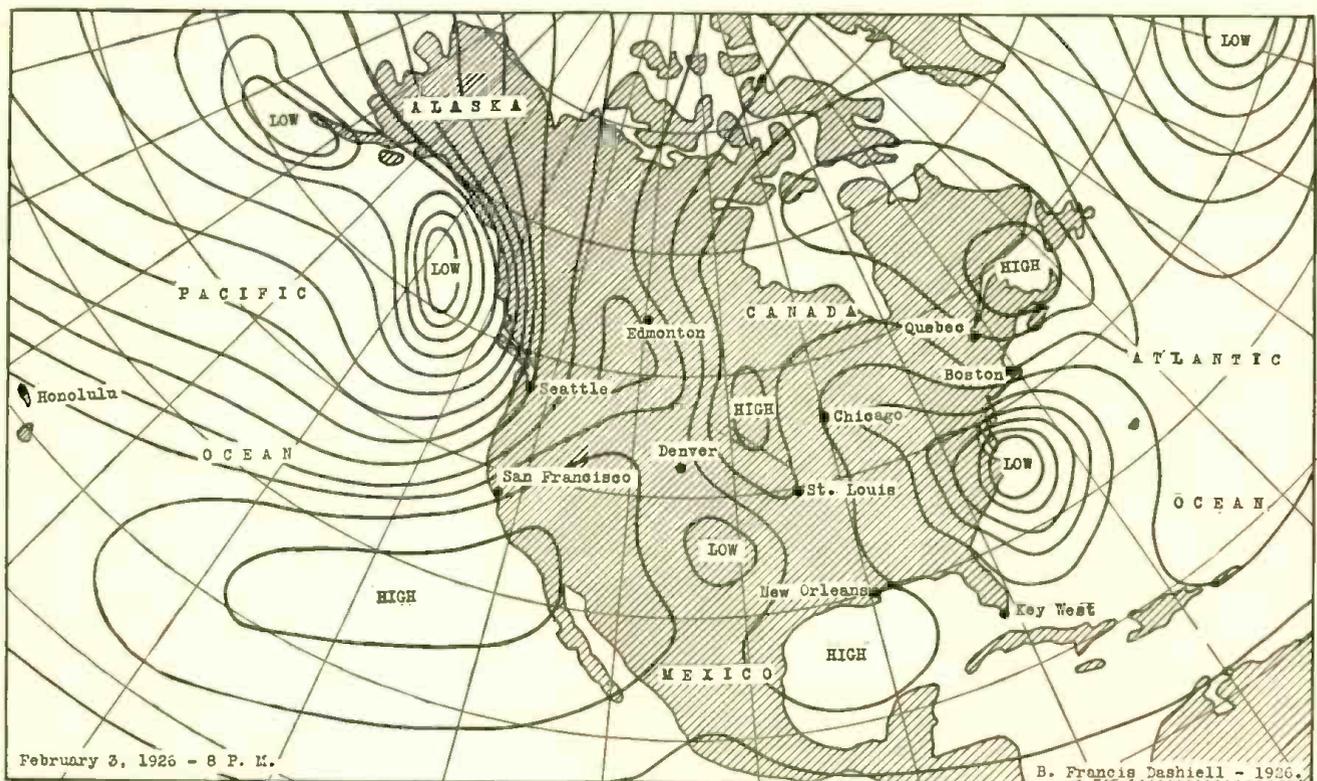
up of air molecules and of rain drops by impact and friction remove electrons from the atoms of atmospheric gases and leave positively charged ions. These ions are carried about by the air currents and produce changes in the potential relationship between the atmospheric electric gradients and the negative surface of the earth. These potential differences may become so great that, in the case of a thunderstorm, the air dielectric is broken down and a lightning stroke results. At such times static is at its greatest height. The degree of atmospheric interference with radio reception reaches its culmination in the lightning discharge.

Storm areas, and even small areas comprised of highly ionized air, are surrounded by electrostatic fields, the sizes of which depend upon the extent of the disturbance. If we know the intensity of the disturbance and whether it is increasing or decreasing, the temperatures to be expected, the degree of moisture present, whether rain or snow will be precipitated and, taking into consideration the season of the year, we might be able to determine the area of the storms' electrostatic fields and their rates of movement.

The expert meteorologist can determine the kind of weather to come with a high degree of accuracy. The weather

forecasts, supplemented with a study of atmospheric electric phenomena, should establish eventually a system whereby forecasts of the effect of weather on radio may be made. The predicting of static and fading, as well as the probable directions from which best reception may be obtained during the ensuing twelve to twenty-four hours, may yet be practicable. These radio phenomena seem to be controlled by atmospheric electricity and indirectly by changes in air pressure and associated weather. But much study and research will be necessary before any fully practical rules can be propounded.

The troposphere, in which the familiar meteorological disturbances take place, is continually in a state of agitation, due to the unending succession of areas of high and low air pressure that pass, usually from the west toward the east, over the North American continent. Generally speaking, a "low," or area of low air pressure, is associated with inclement weather and with rising temperature. A "high" (high air pressure area) is associated with falling temperatures and clearing or clear weather. Weather maps have all points of equal air pressure at the same hour joined together by lines which are called isobars. These are more or less concentric and never cross, as the air flows in



Radio Indications from a North American Weather Map

This map shows the weather as it was on February 3, 1926. The "lows" indicate storms over the Atlantic and Pacific states; these will produce static and reception will be poor up and down the coasts. The high pressure area over the middle west will cause good reception there, as well as both eastward and westward from Chicago.

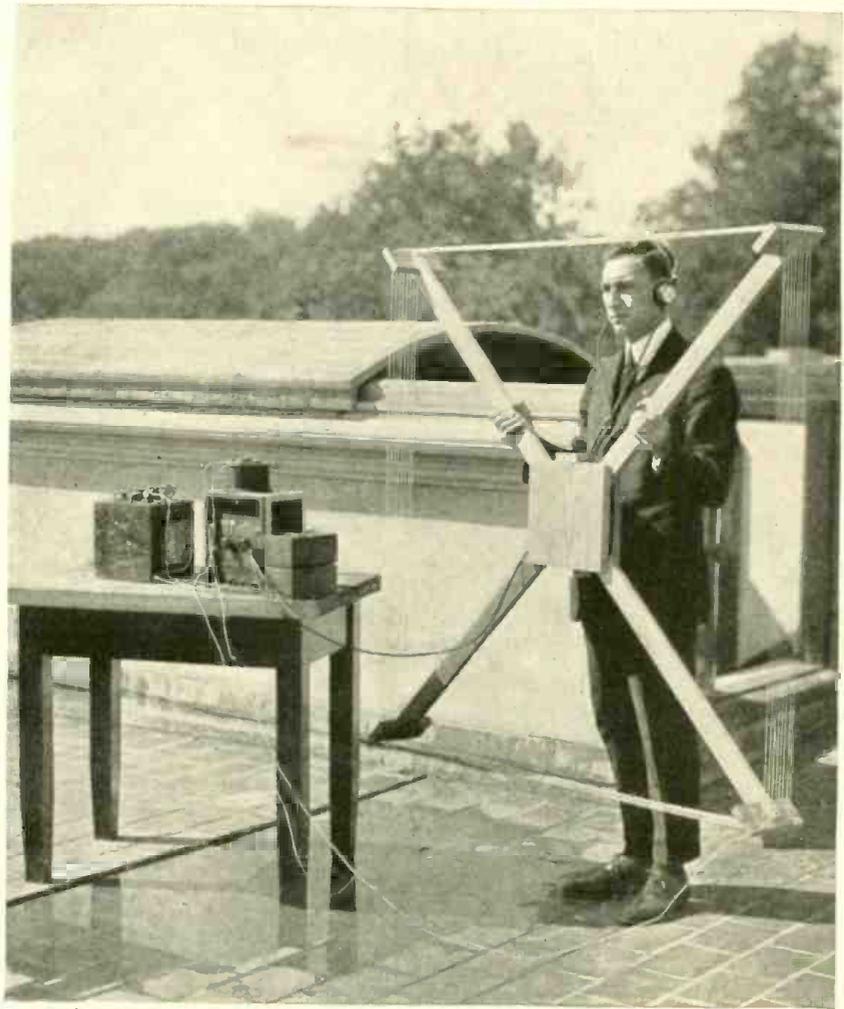
smooth semi-parallel paths. The greater the difference in air pressure between the centers of adjoining "highs" and "lows," the greater is the intensity of the disturbance, with stronger air movements and more decided temperature changes. The isobars will then be closer together and a gradient of relative steepness will exist.

The ions in the atmosphere, those produced through impact and friction rather than by the action of the rays of the sun, may be distributed fairly evenly through areas of equal air pressure. With such a distribution static is at a minimum, especially during cold weather and when the moisture content of the atmosphere is low. At such times distant reception is always probable.

On the other hand, the movement of a "low" is accompanied and preceded by much humid air and the production of ions within the disturbance. Due to the action of the air movement, these are drawn toward, and compressed within, the storm area. This comparatively heavy ionization, moving with the disturbance, tends to blanket the regular transmission of radio waves. It produces irregular periods of fading from stations within the area. It creates heavy electric charges, along with a tremendous increase in the potential differences of the atmosphere and a distortion or compression of the equipotential surfaces. In certain types of storms, the stresses and strains in the atmosphere become so great that the excess charges are discharged in the form of lightning. Static results. When we consider that millions of discharges of lightning occur within a relatively short interval throughout the world, it is not strange that static noises are almost always present in sensitive receiving sets.

Many of these electrical discharges are not to be seen or heard. They occur between clouds or within the cloud itself; silently, except to the radio receiver. It is not always necessary that thunder clouds be at hand for a discharge of internal lightning. Often the merest excuse for a cloud will be so charged that the portions of it which constantly detach themselves during its passage across the sky, may become charged by induction and many small discharges may take place. A single cloud, under proper conditions, may send out hundreds of electro-magnetic waves during its passage over a small sized town.

With the passage of a "low," cool dry air flows in its wake. The pressure rises, humidity falls; clouds evaporate. The conditions favorable for the mechanical production of atmospheric electric charges disappear. As a storm area



Bureau of Standards

A Detective for Static

This movable loop, designed by the United States Bureau of Standards, may be used to determine the direction from which static comes. Advancing storms, indicated on the weather map by low-pressure areas, are usually preceded by static. The locations and progress of storms can frequently be determined from static readings.

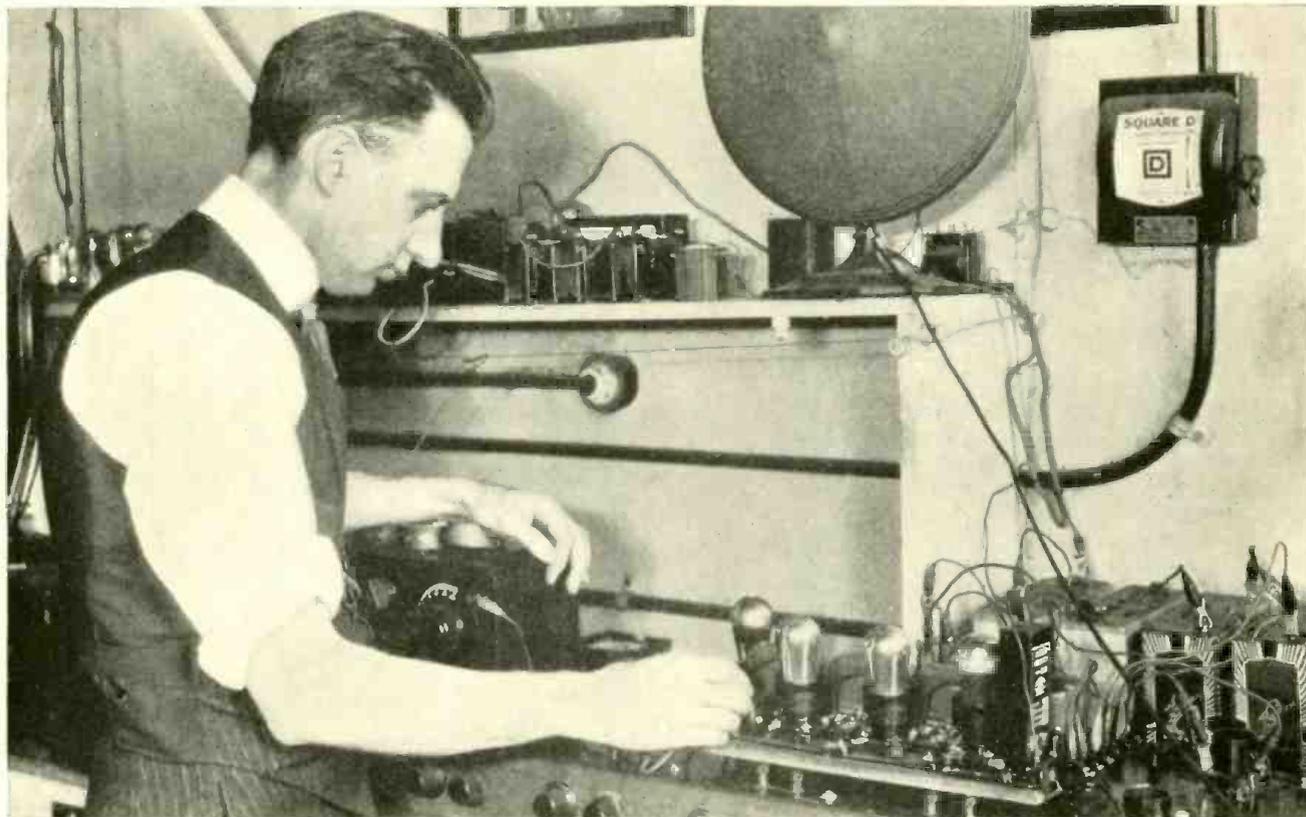
recedes from a receiving station the audibility of static becomes less. When one great area of high air pressure, or "high," covers the land, the static is scarcely noticeable. But the static noises do not always cease with the advent of the "high." This is because another "low" of some intensity is closely following or is coming from another direction. Its approach is heralded by the continuance of the static.

Rain, as well as snow, produces great amounts of positive electricity, heavily ionizes the atmosphere and is heralded several hours in advance by the increasing presence of static. Rain and snow bring down much more positive electricity than negative. This must be neutralized when the snow flake or rain drop comes in contact with negatively-charged or grounded objects. Tiny electromagnetic waves are then set up. Drops or flakes which touch an antenna may produce static impulses in this way that may interfere with reception.

It appears from many years of tests that certain types of weather, as indicated by the weather maps, imply that reception will be better from one direction than from another. No good reasons are known for this relationship, either meteorologically, electrically or magnetically. The best reception is encountered, usually, when signals are being received from a station located across (at right angles) the isobars, and when this line of direction is east and west. When the line of direction between the stations is north and south, reception is usually good even when the isobars are parallel to this direction. These rules, however, are far from perfect. Quite often the reverse is true.

In general, however, a receiving set located at a point which is directly across the isobars from a transmitting station, as shown by a weather map for the same period, should receive broadcasts best from that station.

(Continued on page 447)



From a photograph made for POPULAR RADIO

THE UNIT USED WITH A SIMPLE RECEIVER

FIGURE 1: *The new power unit in use with a non-regenerative detector and tuner on the testing board in the POPULAR RADIO LABORATORY. The volume obtained with this simple combination was equal to that obtained from much more complicated receivers. The quality of reproduction was superb.*

HOW TO BUILD AN

Impedance-coupled Amplifier

This new audio amplifier unit, which embodies all the newest features of impedance-coupled amplification, has been especially designed for the discriminating fan who wants to keep up with all the latest developments in audio-amplifier methods.

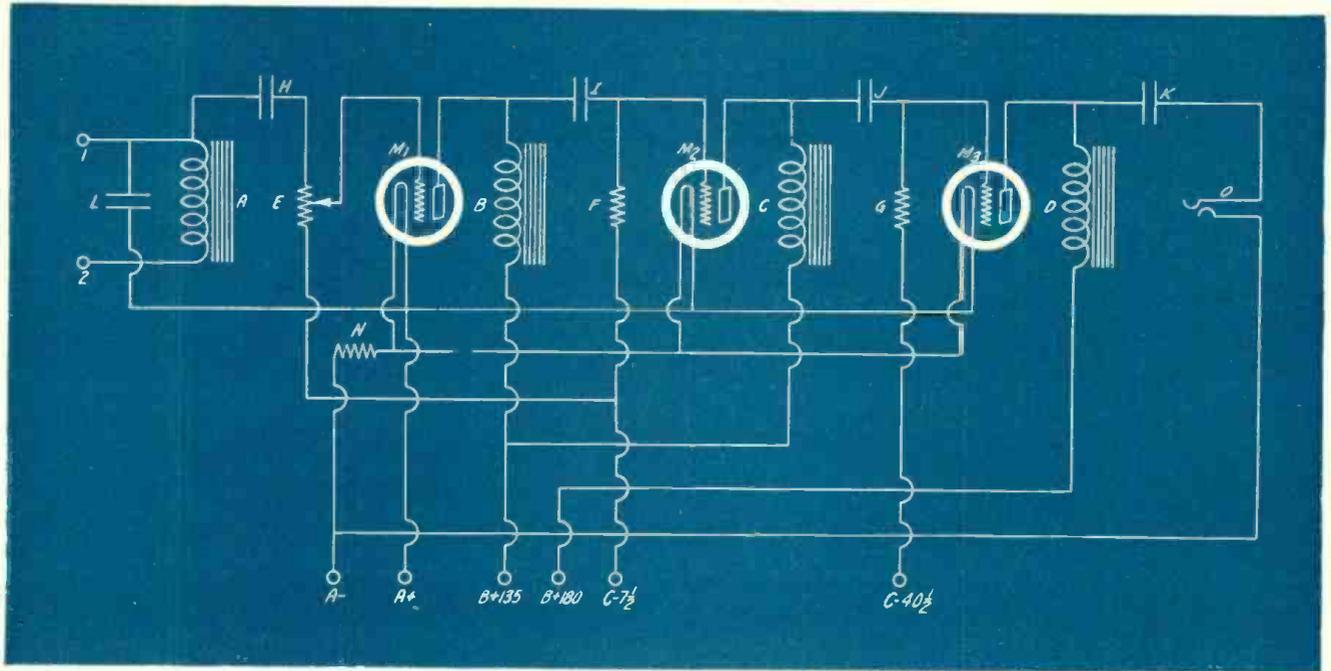
By LAURENCE M. COCKADAY

The list of parts given below includes the exact instruments used in the unit from which these specifications were made up. The experienced amateur, however, will be able to pick out other reliable makes of instruments which may be used with equally good results. But we recommend that the novice follow the list, as the diagrams in this article will tell him exactly where to bore the holes and exactly where to place the connections. If instruments other than the ones listed are used, the only change that will be necessary will be the use of different spacings for the holes that are drilled in the sub-base for mounting the instruments. To any reader who has difficulty in obtaining any of the parts which are necessary in making up these model receivers and power units, POPULAR RADIO SERVICE BUREAU, 627 West 43rd Street, New York City, will gladly assist in seeing that his requirements are promptly supplied.

COST OF PARTS: *Not more than \$33.50*

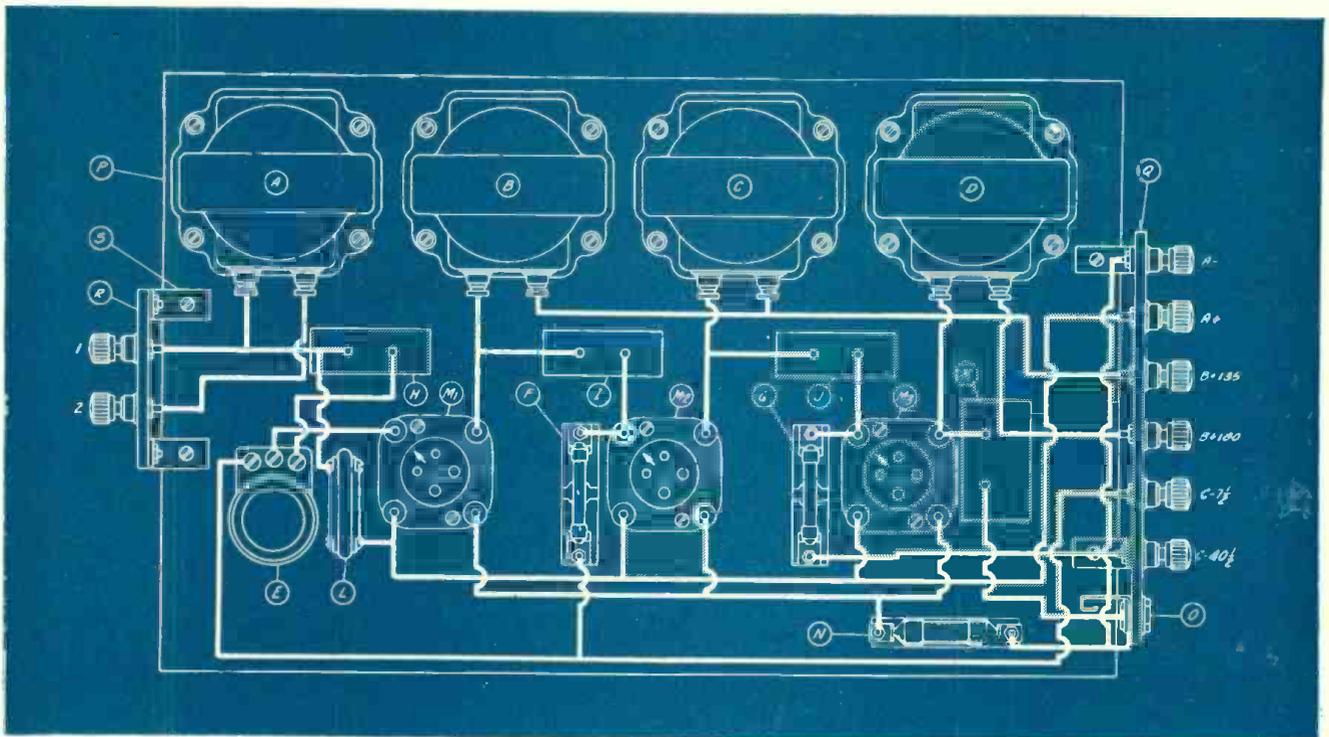
HERE ARE THE PARTS THAT WERE USED IN THE LABORATORY MODEL OF THIS UNIT—

- | | | |
|--|---|--|
| A, B and C—Acme audio amplifying impedances, type Z-2; | K—Dubilier condenser, 4.0 mfd., type 902; | jack or equal may be used instead); |
| D—Acme 30-henry filter choke, type B-2; | L—Sangamo mica condenser, .0005 mfd. as illustrated (Dubilier, Micamold, Aerovox or equal may be used); | P—hardwood baseboard, 7 inches by 15 inches by 1/2-inch; |
| E—Electrad Royalty variable high resistance, type 0 to 500,000; | M1, M2 and M3—Benjamin "Cle-ratone" sockets, No. 9040; | Q—binding-post strip, 7 inches by 1 inch by 3/16-inch; |
| F and G—Lynch fixed resistors with mountings, .5 meg. as illus. (Durham Daven, Tobe or equal may be used); | N—Amperite, No. 1, 1 ampere; | R—binding-post strip, 3 inches by 1 inch by 3/16-inch; |
| H, I and J—Dubilier condensers, type 712, .5 mfd. capacity; | O—Carter short jack, No. 1 (open circuit) as illustrated (Frost short | S—small brass angle brackets for supporting binding-post strips; |
| | | 8 Eby binding posts. |



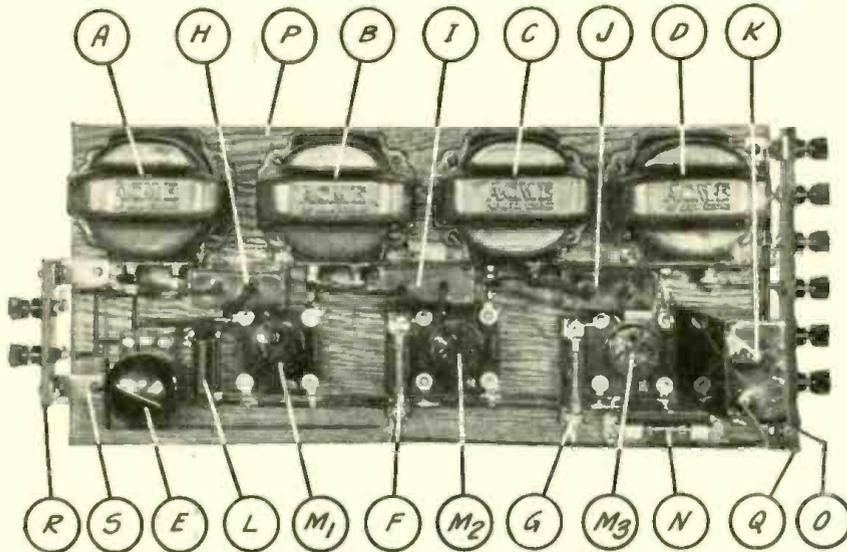
The Schematic Wiring Diagram

FIGURE 4: The electrical hook-up for all of the instruments that go to make up the amplifier circuit. All of the parts are designated by letters that correspond with the lettering in the list of parts at the head of the article and in the text.



The Picture Wiring Diagram of the Unit

FIGURE 5: Here is shown in detail the exact way in which to run the wires that hook up the various instruments. The wires are shown by heavy white lines that run between the terminals on the parts, which are shown in about their relative positions on the baseboard. If the experimenter follows this drawing, he should have no trouble in getting the unit to operate in a satisfactory manner.



THE UNIT AS SEEN FROM ABOVE

FIGURE 2: The general layout of the apparatus as it is mounted on the baseboard. The input binding posts are located at the left and the output jack is located at the right on the same strip as the "A," "B" and "C" battery terminals.

THE broadcast listener, as well as the radio set manufacturer, has realized this year more than ever before the prime importance of a good amplifier in obtaining clear and faithful reproduction from a receiver.

One of the modes of audio-frequency amplification that has been growing in favor, since the high impedances necessary for this means of coupling have been placed on the market, is the impedance-coupled amplifier.

With this in mind, the impedance-coupled amplifier described in this article has been designed by POPULAR RADIO for the broadcast listener.

This amplifier is easy to build, it may be mounted (as shown) on a board and used as an adjunct to the owner's present set or it may be built into the set itself with the general arrangement given here.

The amplifier contains three stages of impedance-coupled amplification with efficient apparatus arranged for quality reproduction. It is equipped with the new UX-171 power tube in the last stage, which operates into an output filter so that the high current required by the "B" batteries or the power-pack unit will not burn out the loudspeaker windings.

In the preceding stages either standard UX-201-a tubes or any standard make of 1/4-ampere high-Mu tube may be used.

The amplifier is furnished with vibrationless sockets and also with a volume control that is unique in that it does not change the quality of reproduction with an increase or decrease of sound volume.

The amplifier is equipped with two

binding posts for the input and with an output jack from the last stage. Binding posts are also furnished for connecting to the "A" and "B" circuits and also for the "C" batteries for the various stages of amplification.

How to Construct the Amplifier

After all of the instruments and materials for building the amplifier have been procured, the baseboard, P, should be prepared and cut into a rectangular shape, 7 by 15 inches. The binding-post strips, R and Q, should be made and attached to the baseboard as shown in Figures 2 and 5. The two binding posts at the left are for the input leads to the first impedance A.

Looking at the binding posts at the right of Figure 2, the top binding post is for the "A" battery minus (-) and the second for the "A" battery plus (+). The next post down is for the "B" plus (+) 135-volt for the two amplifier tubes,

the next for the "B" plus (+) 180-volt for the power tube. The next is for the "C" battery minus (-) 7 1/2-volt for the two first amplifier tubes and the last for the "C" battery minus (-) 40 1/2-volt for the power tube.

These connections are shown exactly in their correct positions in Figure 5.

Next, mount the three impedances, A, B and C, as shown in Figure 5 with the terminals pointing towards the builder. Then, mount the choke coil, D, and the three condensers, H, I and J, by means of wood screws, into the hardwood base P.

Then mount the potentiometer, E, and the three sockets, M1, M2 and M3, as shown in Figure 5. Then mount the condenser, K.

The final job is to mount the resistance mountings, F and G, and the filament control mounting, N, as shown in this same figure. Notice that the jack, O, is mounted right on the binding-post strip, Q, along with the binding post.

This completes the construction work on the unit and it may now be wired.

How to Wire the Amplifier

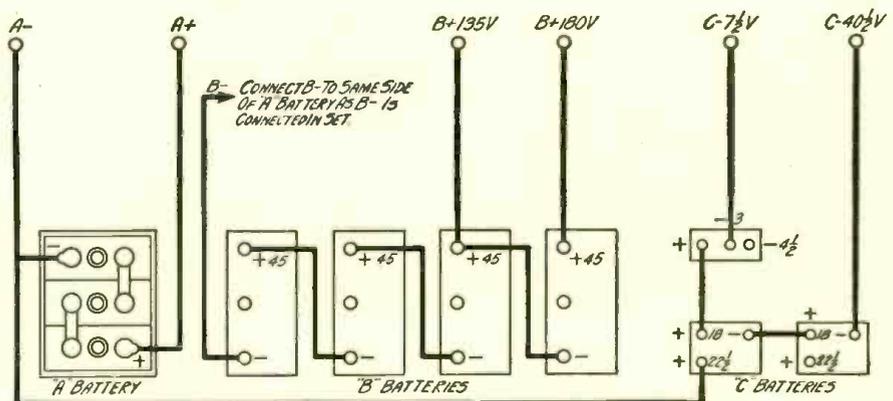
The design of this amplifier is such that the grid circuits of each of the three tubes is kept as short as possible and isolated from the other parts of the circuit.

The set should be wired with bus-bar. Either a tinned copper round bus-bar or an insulated bus-bar such as "Celatsite" may be used for all connections. All wire should first be shaped to fit and all connections should be made permanent by soldering.

It is best to refer constantly to the wiring diagram in Figure 4 and more specifically to the picture diagram in Figure 5 for the exact way in which to run the wires.

The fixed condenser, L, is supported by the wiring and should be included in the circuit when the wiring is being done.

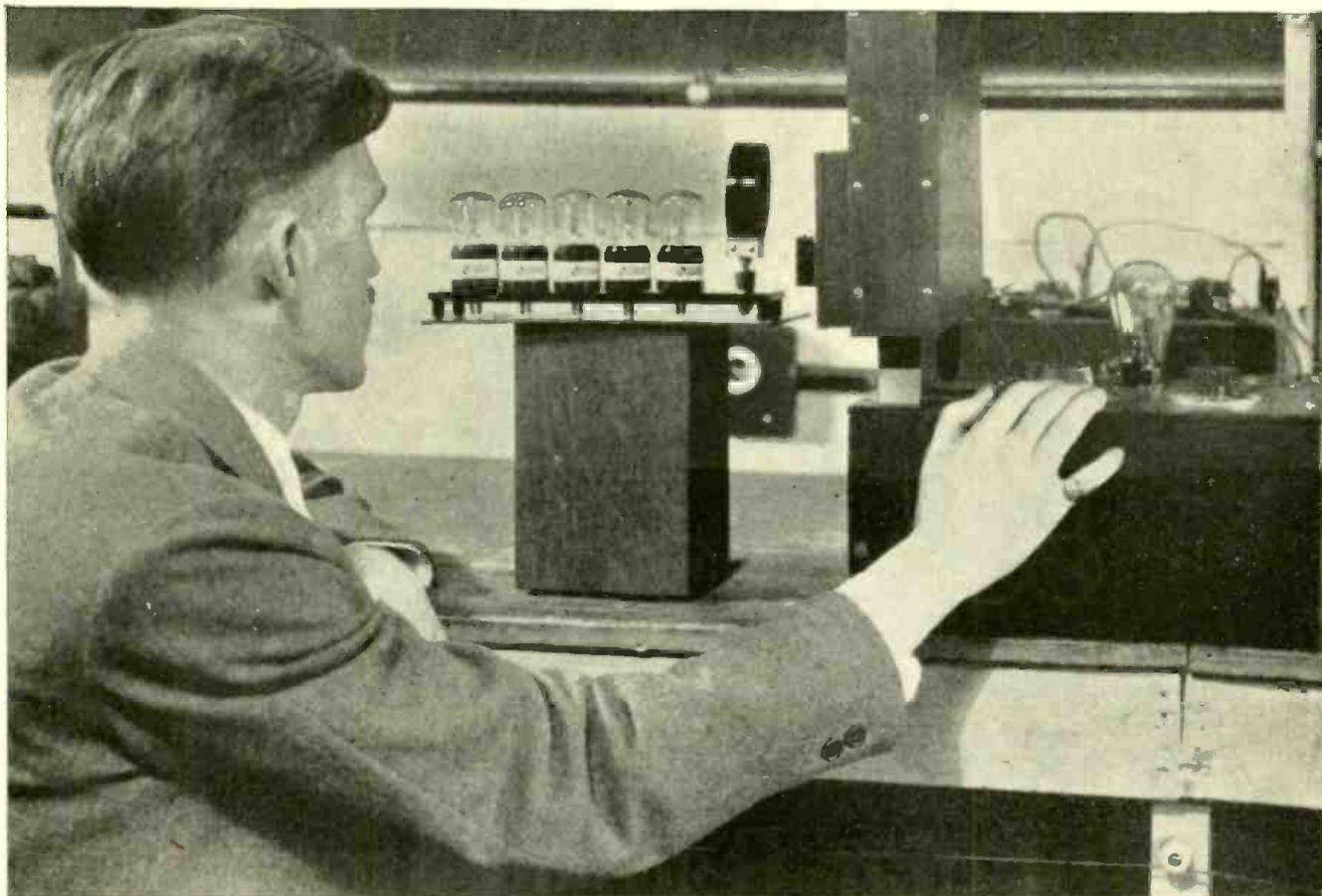
(Continued on page 448)



THE HOOK-UP FOR THE BATTERIES

FIGURE 3: This drawing gives the correct battery circuit and the voltages for all of the batteries that are used to operate the new unit.

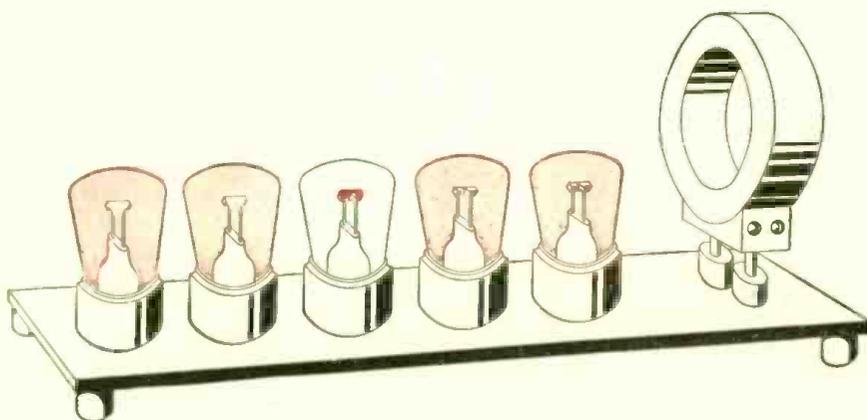
A RADIANT CRYSTAL PILOT



From a photograph made for POPULAR RADIO

How the New Glowing Crystal Tubes Are Used

Five of the radiant crystal tubes used in a set-up for calibrating a vacuum-tube oscillator. The crystals in the tubes are ground to different frequencies, and when the oscillator is tuned exactly to the frequency of any one of the tubes, the crystal glows with a brilliant, orange-red color and the gas in the tube gives out a soft orange tint. At the right is shown what happens when the oscillator is exactly in tune with the center crystal.



THE use of quartz crystals to control wavelength or frequency in transmitters and, as standard frequency oscillators, to calibrate sets and wave-meters, is rapidly growing.

The way in which they are used, however, is similar in all cases—except in the particular instance that is described here.

Dr. Signund Loewe, the German inventor, has recently discovered a new way to use crystals for accurate calibration. He has produced a tube in which is suspended, by a new means, a very small quartz crystal.

The crystal itself is ground so that its

natural frequency depends upon its length rather than its thickness as is ordinarily the case.

Instead of a vacuum in this tube, there is a vapor.

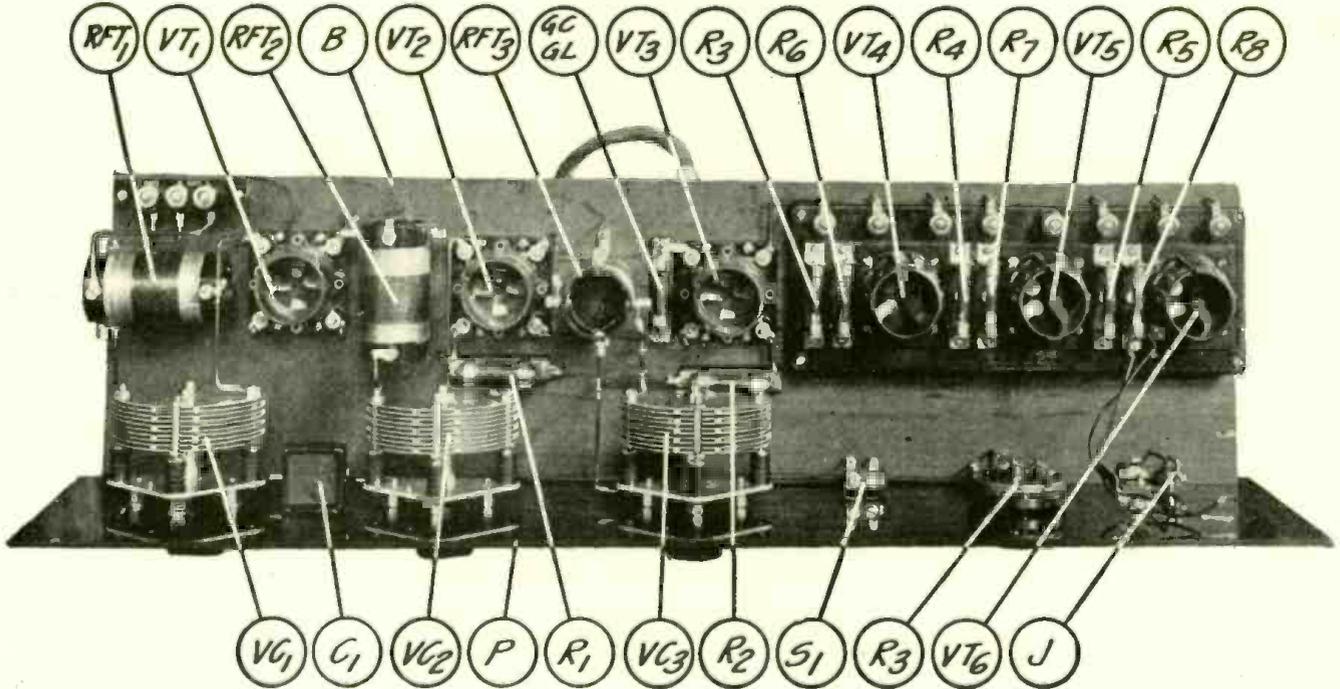
In ordinary operation five of these tubes are used in parallel, connected to a pick-up coil, as shown in Figure 1. They are all mounted on a suitable support. When one of these tubes is connected to a pick-up coil and a suitable radio-frequency energy is passed on to the tube from the coil, the gas in the tube will glow with an orange-pink color, if the frequency is not the same as the frequency to which the particular

crystal in the tube has been tuned by grinding.

If the frequency of the incoming oscillations is varied slowly so that its frequency will at one point coincide with the frequency of the crystal, the glow in the tube will disappear and the crystal itself will glow with a bright orange-red color.

This optical indication only takes place when the incoming frequency is exactly the same as the natural period of the crystal.

The crystals are generally used in a set of five, of which the middle one has
(Continued on page 448)



The Daven Bass Note Receiver

This receiver contains two stages of tuned radio-frequency amplification, detector and three stages of resistance-coupled audio-frequency amplification. Sensitivity and fidelity of reproduction together with tremendous amplification are some of its features. Note that switch S2 opens the filament circuit of VT1 thus making the set either a five or six-tube receiver at will. In sockets VT3, VT4 and VT5, type MU-20 tubes should be used; a MU-6 should be inserted in the last socket. The other tubes may be of the 201-a type.

Popular Radio Circuits

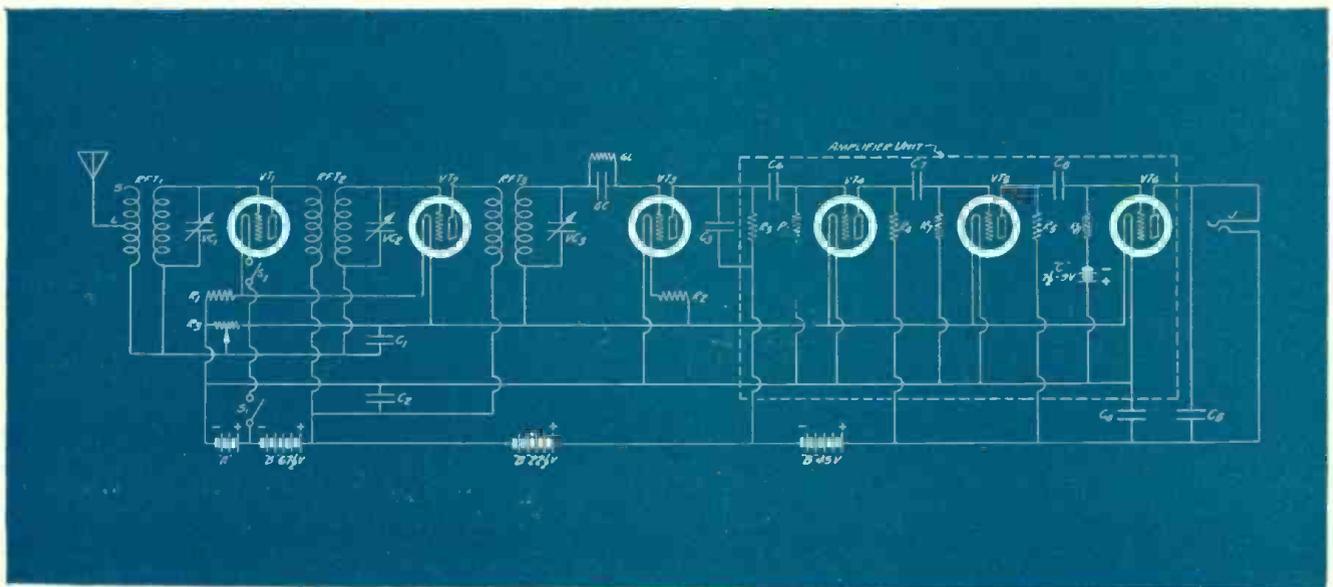
INSTALLMENT No. 2

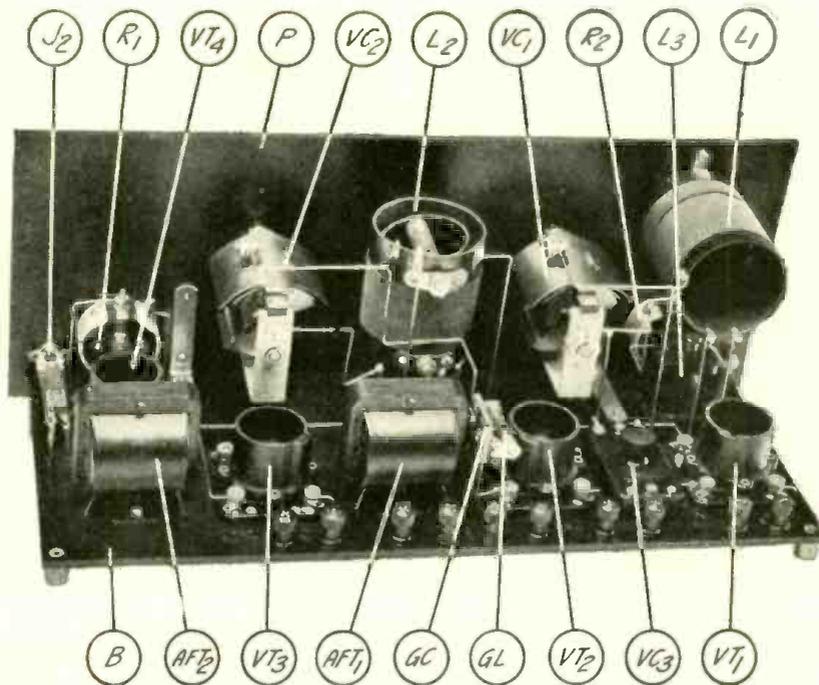
THE PARTS THAT ARE RECOMMENDED FOR USE IN THIS RECEIVER ARE—

RFT1, RFT2 and RFT3—Daven radio-frequency (DRF) coils;
 R1—Daven ballast resistor, 1/2-ampere;
 R2—Daven ballast resistor, 1/4-ampere;
 R3—Yaxley potentiometer, 400 ohms;
 C1—Daven special condenser, type A;
 C2, C4—Dubilier by-pass condensers, 1 mfd;
 GC, GL—Daven Leakandenser, No. 22;

C3 and C5—Sangamo mica by-pass condensers, .0005 mfd. and .006 mfd.;
 S1 and S2—Yaxley toggle switches;
 VT1, VT2 and VT3—Benjamin sockets;
 VC1, VC2 and VC3—U. S. Tool, SLW or SLF condenser, .00035 mfd.;
 P—Bakelite panel, 7 by 28 inches;
 B—Hardwood baseboard, 7 by 27 inches;

Daven Super Amplifier consisting of:
 R3, R4 and R5—Plate resistors;
 R6, R7 and R8—Grid resistors;
 C6, C7 and C8—Fixed blocking condensers;
 VT4, VT5 and VT6—Sockets;
 Antenna binding-post strip;
 Binding posts (3 required).



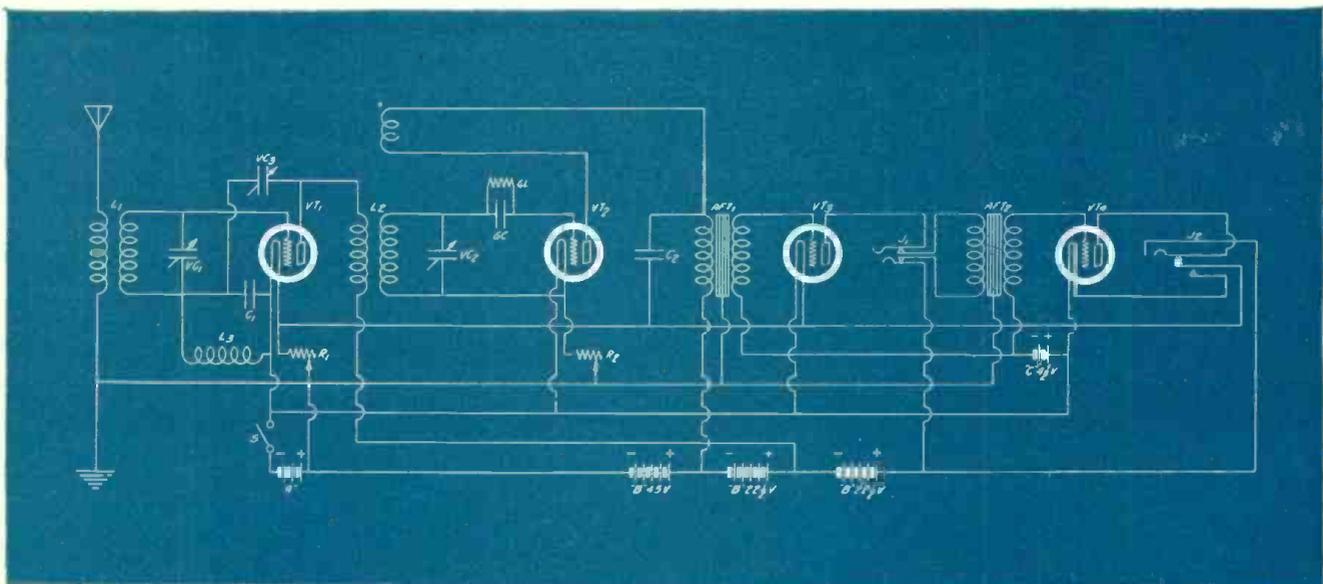


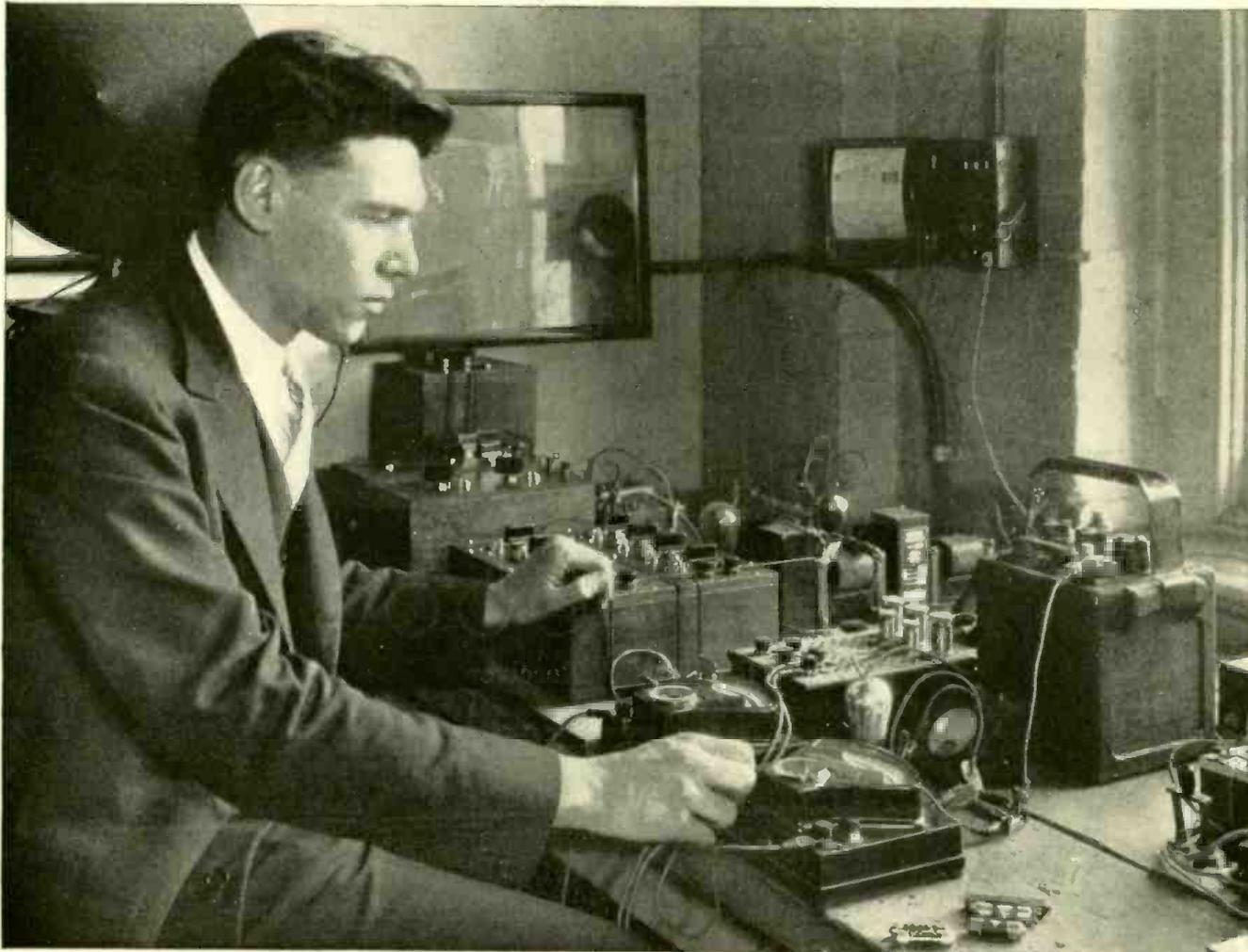
The "T. C." Receiver

This receiver is very selective and will give good reception with great volume; it is easy to build and simple to operate. The circuit employs one stage of radio-frequency amplification, a detector and two stages of audio-frequency amplification. This set is designed to be used with 201-a type tubes. If the operator desires to use 199 or WD-12 type tubes, the "A" battery voltage should be 4 volts for 199 type tubes and 1½ volts for tubes of the WD-12 type. Rheostats R1 and R2 should also be changed; they should have a resistance of 20 and 30 ohms respectively when 199 tubes are used and two and six ohms respectively for WD-12 tubes.

THE PARTS THAT ARE RECOMMENDED FOR USE IN THIS RECEIVER ARE—

- | | | |
|--|--|--|
| L1—Samson fixed coupler; | C1—Dubilier mica condenser, .00025 mfd.; | J1—Carter jack, type 104; |
| L2—Samson radio - frequency transformer; | C2—Dubilier mica condenser, .001 mfd.; | J2—Carter jack, type 103; |
| L3—Samson R. F. choke; | R1—General Radio rheostat, 10 ohms, type 301; | AFT1 and AFT2—Samson audio-frequency transformers, ratio 3 to 1; |
| VC1 and VC2—Samson variable air condenser, .0005 mfd.; | R2—General Radio rheostat, 30 ohms, type 301; | P—Composition panel, 7 by 18 inches; |
| VC3—Samson neutralizing condenser; | VT1, VT2, VT3 and VT4—Benjamin sockets for 201-a type tubes; | B—Composition panel, (used as sub-base), 7 by 17 inches; |
| GC—Dubilier mica condenser with grid-leak clips, .0005 mfd.; | S—Carter "Imp" switch; | Sub-base brackets, 2 required; |
| GL—grid-leak, 5 megohms; | | Eby binding posts, 10 required; |
| | | Condenser dials, 2 required. |





From a photograph made for POPULAR RADIO

HOW VOLTAGE-REGULATION CURVES ARE RUN ON AUTOMATIC FILAMENT ADJUSTERS

FIGURE 1: The set-up that was used to make the curves that are given in Figure 3. The circuit that was used in making this test is shown diagrammatically in Figure 2.

HOW TO SIMPLIFY YOUR SET WITH

Automatic Filament Controls

What they are, what they do, how they are made and how they are used

By K. B. HUMPHREY

WITH the present day type of tube there is no necessity for a fine graduation of filament voltage such as was essential for the efficient operation of the earlier types.

This is especially true for a tube which is operating in the audio-frequency amplifier of a receiver.

On the radio-frequency side of the set some manufacturers use a variable filament control to regulate the tendency to oscillate.

This article is concerned only with the automatic or semi-automatic filament controls as they are used in connection with the amplifier tubes in a receiver.

The rated voltage of the well-known UX-201-a type of tube used with the storage battery is 5 volts and the current taken at this voltage is .25 ampere. By Ohms' law the voltage divided by the current gives us an internal resistance of 20 ohms in the tube. Although the rated voltage of the tube is 5 volts it will operate with good efficiency in the receiver at as low a value as 4.6 volts. The values given run remarkably uniform for the standard makes of tubes in use to-day. The upper range of the tube is considerably higher than 5 volts and the tube will give good results as far as operation is

concerned up to 6 volts. However, the life of the filament is considerably shortened at these high voltages and it is not considered good practice to run the voltage much higher than five for any extended length of time. We may consider that the proper value then should range from 4.6 up to possibly 5.2 for efficient operation at all times.

Now, the storage battery of the 6-volt type has a voltage range of from 6.3 volts when fully charged down to about 5.3. This minimum voltage is not what the battery will give, to the last moment, but is the point at which it should be recharged. It must also

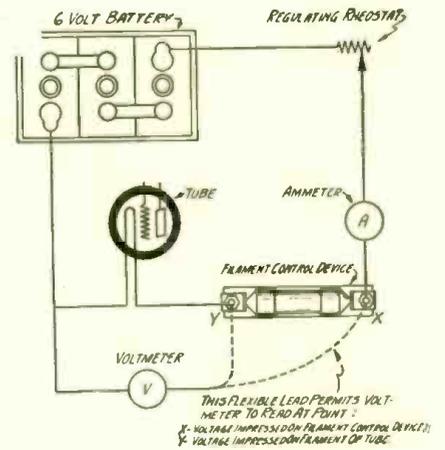
be remembered that the voltage of 6.3 volts only holds for a very short space of time when the battery is first charged and falls rapidly to 6 volts or a little under and remains at that point during most of the period of discharge. In other words the storage battery, while not a constant potential device, remains at practically a constant voltage over a considerable range of discharge.

To take care of the varying voltage of the battery and the need of a rather constant potential on the vacuum tube filament for operation at the most efficient point, several devices have been developed which automatically control this voltage. The principle upon which they operate is the fact that certain metals increase in resistance when they are heated. Some metals have this property to a remarkable degree. Iron wire shows this property but it has been found that others may be used with perhaps better results.

This is the action which takes place when an automatic control is used; when the battery voltage is high, as when the battery is fully charged, more

current is forced through the filament. This excess current heats up the wire in the control resistance and makes the resistance higher which in turn cuts down the current thus having a tendency to keep the voltage at more of a constant value than with the use of a constant value of resistance in the circuit. In a like manner, when the supply voltage is low, the current flow is less and the control resistance cools off and allows more current to flow.

This type of filament control may be obtained for use with one to five tubes, and the buyer should be sure to specify how many tubes and what amperage they take. They are usually mounted in convenient clips so that they may readily be changed when it is desirable to change the style of tube in the receiver, say from a .25 ampere tube to a power tube using from .5 ampere and up. An advantage which is of real account is the fact that the user of such a device cannot under any circumstances get a high enough voltage on the tube to cause filament burnout. Another indirect advantage is that the

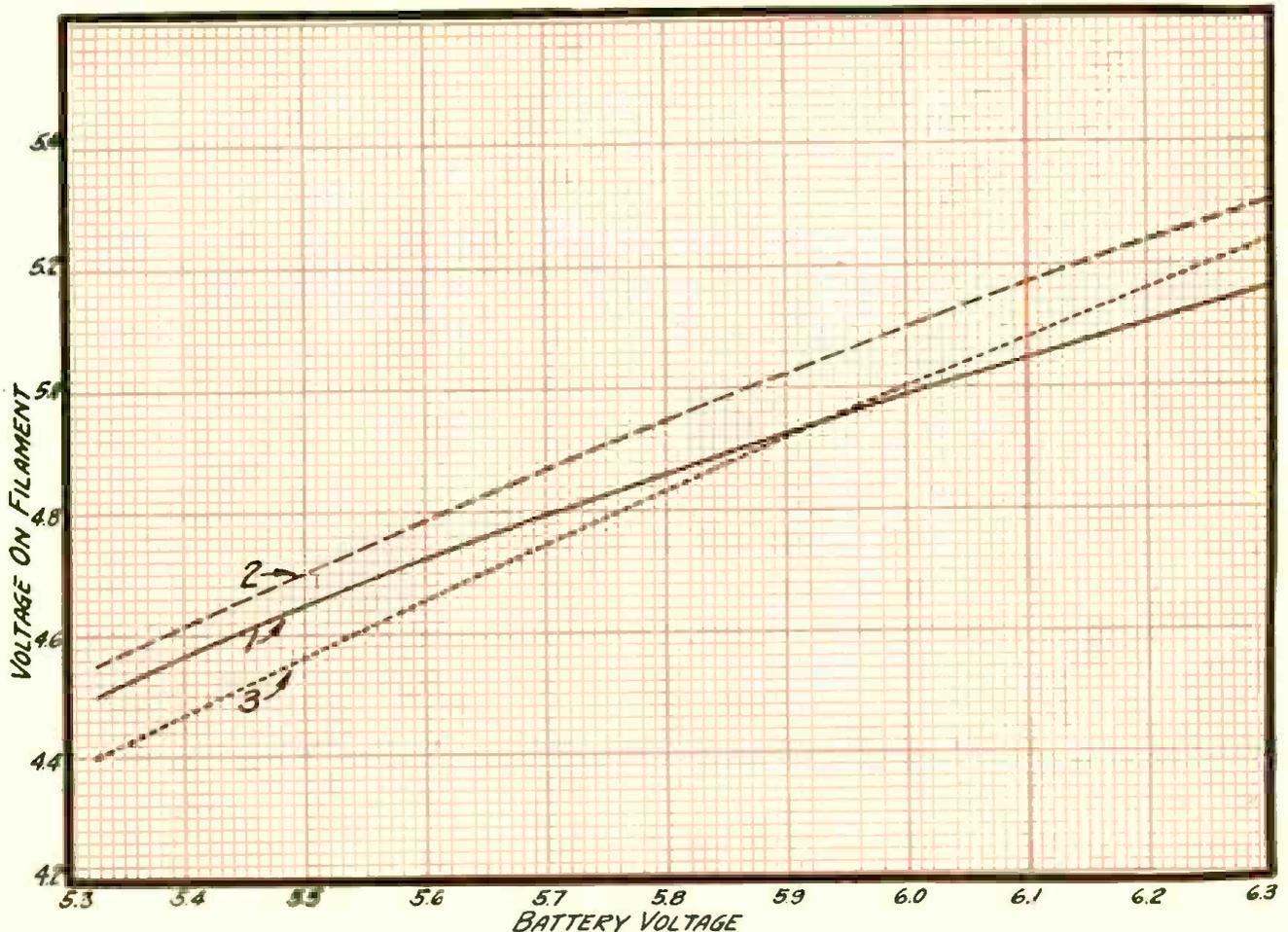


THE CIRCUIT DIAGRAM

FIGURE 2: This circuit was used in measuring the characteristics of automatic filament control devices.

storage battery cannot be run too low and cause the consequent damage due to sulfation of the plates. It is a protection to the tubes and to the battery at all times.

For the experimenter who wishes to
(Continued on page 453)



THE VOLTAGE RELATIONS OF THREE DIFFERENT FILAMENT CONTROLS PLOTTED ON A GRAPH

FIGURE 3: Curve 1 and Curve 2 show the kind of curve that is obtained with the control device and Curve 3 shows the straight-line operation of a pure resistance when it is used in series with the filaments of standard vacuum tubes.



From a photograph made for POPULAR RADIO

A SET THAT OPERATES WITHOUT BATTERIES, EXTERNAL
ANTENNA OR GROUND

FIGURE 1: This new model of the Radiola receiver (shown at the right) draws all of the operating electric current that it requires from the regular house-lighting lines, through the new model of combined loudspeaker and power unit shown at the left. Note the care with which these units have been designed to harmonize with the furnishings of the modern well-furnished home—a characteristic feature of the new season's models.

INSIDE INFORMATION ON

New Radio Receivers

By S. GORDON TAYLOR

First Installment

THE RADIOLA NO. 28; THE FADA "8;" THE STROMBERG-CARLSON "TREASURE CHEST".

The advance and exclusive data that is incorporated in this series of articles, concerning the outstanding features of the newest and best types of radio apparatus, has been obtained at first hand by the technical staff of this magazine, not only from the engineers or inventors who are responsible for the development of the receiver, but as the result of unbiased experiment and test in the POPULAR RADIO LABORATORY itself. The information is given here not only for the benefit of the prospective set owner but also of the experimenter.

—THE EDITORS

The New Model Radiola AC Operated Receiver

A RADIO receiver that operates entirely without batteries, ground connection or external antenna wires!

Ever since the popularization of broadcasting the great radio public has been looking forward to the time when this ideal receiver would become a practical reality. And now it has become a reality in the shape of the new Radiola No. 28 (AC operated) receiver, with its model No. 104 loudspeaker power supply unit (shown in Figure 1).

This combination outfit provides a highly efficient receiver which draws all of its electrical operating power from the alternating current, house lighting lines. There are no batteries to replace

or recharge nor does the receiver require upkeep attention of any kind. From the standpoint of convenience this set takes its place with the other electrical household devices that have made an essential place for themselves in everyday life.

The Radiola No. 28 (AC operated) with its stand, has real distinction as a piece of furniture. The cabinet and stand are of solid dark mahogany with insert panels of a lighter tone. The few necessary metal fittings are made of a dark bronze that matches the color of the woodwork and the wood framework of the loop antenna, which in operation is plugged directly into the top of the receiver.

The Model No. 104 loudspeaker unit is made to match the receiver. While the workmanship and general details of

the cabinet of the loudspeaker unit and its stand follow closely those of the receiver, too great a similarity in the design of the two units has been avoided.

One glance at the interior of either the loudspeaker or the receiver unit is sufficient to convince the layman that the same extreme care that is evident in the exterior design has been employed in the construction of the entire outfit. Practically all of the receiver parts, for instance, are assembled and wired in a small metal case that measures only 12 inches by 3 inches by 3 inches. This case also protects the electrical mechanism from dust and moisture and prevents tampering with the internal elements.

The confining of so many instruments in so small a space as is provided by

this metal case is an engineering feat of no small proportions. When successfully accomplished, however, as in the case of this receiver, it represents a decided advantage not only in space saving, but in electrical efficiency.

This receiver and the loudspeaker power supply unit, once they have been installed in the home, operate simply and without interruption. The combination is always ready to "go" at the pull of a switch.

There are two tuning controls in the center of the panel. Instead of the usual dials these tuning controls consist of two vertical discs that are mounted behind the panel in such a way that their milled edges project part way through slots in the decorative bronze plate on the panel.

To each of these discs is attached a drum which turns with them. The edges of these drums are calibrated in kilocycles and a space is also provided in which the call letters of stations may be written opposite the point on the scales at which the stations are tuned in. When the settings of the tuning controls have once been marked for a given broadcasting station, that station may always be tuned in again at the same setting of the controls.

The calibrated scales on the drums provide a simple method for tuning in stations which have not already been noted on the drums. If it is desired to tune in station WFAF, for instance, a consultation of the daily newspaper radio programs will show the frequency

of this station to be 610 kilocycles. The two controls are rotated until the figures 610 appear opposite the indicating arrow. This will provide approximately

the right setting of the controls for this station and a slight readjustment of one or the other of the controls will bring in the signals at the desired volume.

A novel feature of the receiver is that it may be used either as a single-control or a two-control set. The two-tuning controls are so designed that if either is turned the other will turn with it unless held with the other hand. Thus when they are once adjusted to the proper relationship with each other practically all tuning may be accomplished with one hand.

The superheterodyne circuit is made use of in this receiver to provide the great degree of sensitivity that is required to make the use of a small loop antenna practical. The details of the superheterodyne theory will not be gone into here except to explain that it involves the changing of the frequency of the incoming signals to a lower frequency. This is done to take advantage of the much greater radio-frequency amplification that is obtainable with a given number of stages of radio-frequency amplification at the lower frequencies.*

The Radiola No. 28 receiver makes use of three stages of radio-frequency amplification, a vacuum-tube, detector, a

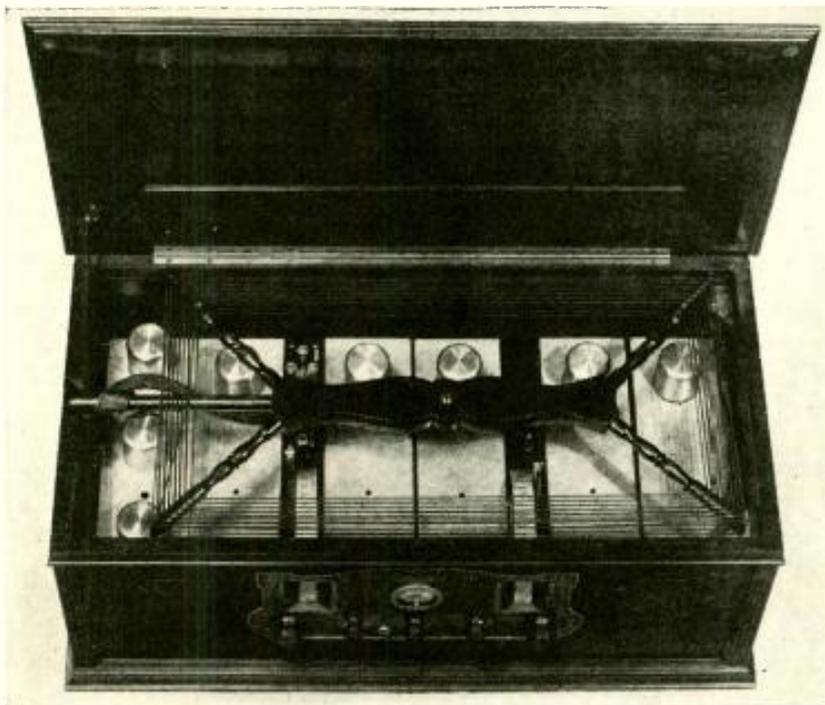
*The patents on the superheterodyne circuit are controlled by the Radio Corporation of America and this company has the exclusive right to manufacture receivers making use of this principle.



From a photograph made for POPULAR RADIO

A NEW MODEL RECEIVER THAT IS ENTIRELY SELF-CONTAINED

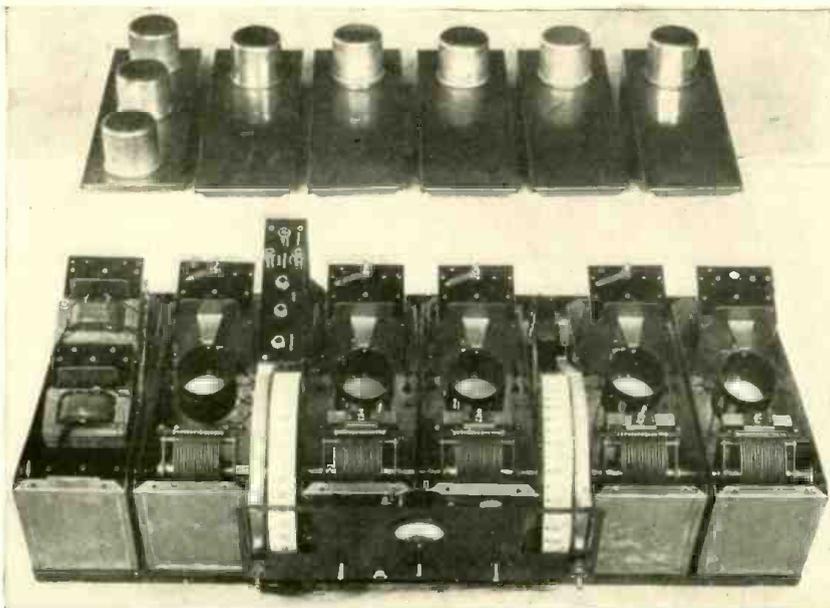
FIGURE 2: The cabinet contains a compartment large enough to hold either a power supply unit or all of the necessary batteries, as well as the loop which folds down into the top of this new model of a Fada eight-tube receiver. The loudspeaker shown is designed especially to operate with this set.



From a photograph made for POPULAR RADIO

HOW THE LOOP FITS INTO THE CABINET

FIGURE 3: This model differs from that shown in Figure 2 only in the smaller cabinet that is used. Note the shields that cover the apparatus.



From a photograph made for POPULAR RADIO

A COMPACT NEW MODEL, WITH THE SHIELDS AND CABINET REMOVED

FIGURE 4: Complete individual shields are provided for the radio-frequency amplifier stages and for the detector in the new Fada receiver; the two audio-frequency amplifier stages are included in a single shield. Note the compact and orderly arrangement of the apparatus.

vacuum-tube frequency changer (or first detector) and two stages of audio-frequency amplification. When it is used with the No. 104 loudspeaker power supply unit the last stage of audio-frequency amplification in the set is not used; this will be explained later.

The No. 104 loudspeaker power supply unit includes in a single cabinet the loudspeaker, one stage of high-power audio-frequency amplification and the apparatus necessary to convert the 110-volt alternating-current to direct current and supply this to the receiver and the power amplifier at the proper voltages.

Fortunately, every precaution has been taken to make this unit absolutely safe even in the hands of a child. The voltages used range up to several hundred volts (for the supply to the power amplifier stage) but it is impossible for anyone to come in contact with any part of the high-voltage apparatus. It is completely inclosed in the cabinet of the unit and if the door of the cabinet is opened the current is automatically cut off. Likewise, one cannot get at the terminal board of the unit until the plug which connects to the alternating current line has been pulled out of its socket. In this way great power is combined with absolute safety in the home.

The power audio-frequency amplifier stage, located in the No. 104 unit, makes possible the excellent quality and great volume that are obtainable with this receiver. Such volume would choke

an ordinary vacuum tube output with the result that signals would be distorted and of poor quality. But the UX-210 tube used in this stage is capable of handling even the most powerful signals with a quality close to perfection.

The loudspeaker must also be given its share of the credit for the quality of reproduction procured with this outfit. It is of a special design for maintaining quality with volume, and works admir-

ably with the combination of the two units.

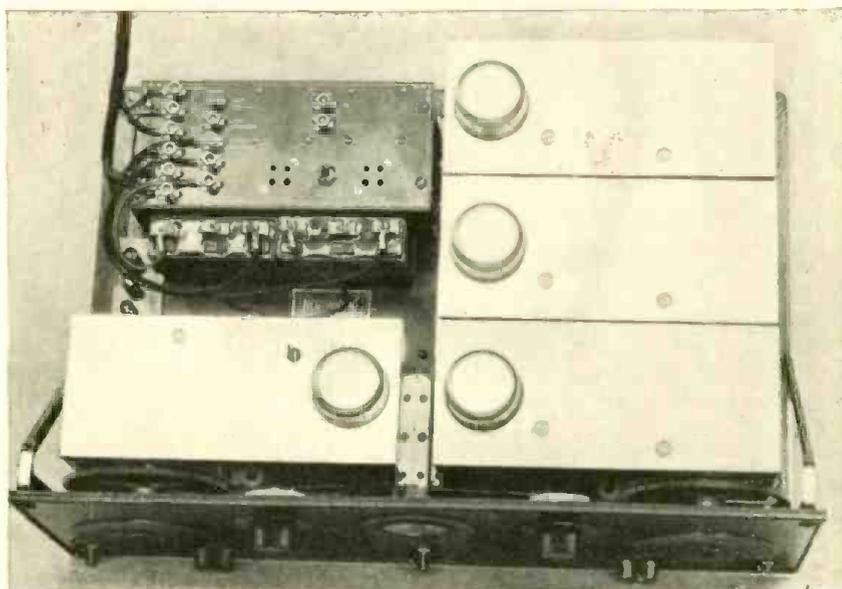
During the tests that were made with this receiver under normal reception conditions it accomplished everything that could be expected from the standpoints of selectivity, sensitivity, tone quality and volume.

Another test was made later under unfavorable conditions of location and atmosphere. The receiver was set up in the heart of the downtown section of New York City, a location that is in itself enough to greatly hamper reception. To add to the difficulties there were not less than seven or eight broadcasting stations in operation within a radius of two miles of the receiver.

These two conditions are ordinarily enough to make reception almost impossible, but, in addition, the time happened to be one of these sultry nights when radio waves seem unable to push their way through the atmosphere.

When the switch was pulled out, stations up to 50 miles and more away came rolling in, one after the other, as the tuning control was manipulated. The many local stations were easily separated, and in fact reception of all the local stations was just about the same as it had been previously under more favorable conditions. It was necessary to keep the volume control well over toward zero at all times.

It was only when more distant stations were tuned in that the volume control could be pushed up to the half-way mark. Stations in Philadelphia, Cleveland and Schenectady were brought in with more than ample volume without



From a photograph made for POPULAR RADIO

INDIVIDUAL METAL BOXES FOR SHIELDING PURPOSES

FIGURE 5: These four metal boxes shield the radio-frequency amplifier stages and the detector of the new Stromberg-Carlson model. All battery connections are made from the compact terminal board in the upper left-hand corner.



From a photograph made for POPULAR RADIO

A SENSITIVE SIX-TUBE SET WITH ITS BATTERY CABINET

FIGURE 6: Another completely self-contained receiver, when it is mounted on the battery cabinet made to match the set, is the new Stromberg-Carlson. The loudspeaker, made by the same concern, is provided with a 20-foot extension cord so that it may be moved to any part of the room.

pushing this control up all the way. The quality of reception from these stations was good, although reception from Cleveland was somewhat marred by the considerable amount of static that prevailed at the time. This test was conducted during the week of June twenty-first, 1926.

In view of the prevailing conditions this evening's work represented a most severe test for any receiver. Only a very sensitive and selective receiver could possibly provide adequate reception under these conditions.

*The New Model Fada
Eight-tube Receiver*

THE Fada "8," shown in Figures 2, 3 and 4, is another receiver that represents the latest word in modern set design. Great sensitivity, excellent reproduction of music and voice, simplicity of operation and the elimination of the necessity for external antenna and ground connections are among its attributes.

The newest developments in radio-frequency amplification embodied in this new model have made possible the use of four stages of this type of amplification whereas a year ago the practical limit was not more than two stages. The net result of this improved design is far

greater sensitivity, greater selectivity and more simple operation.

Audio-frequency amplification in this receiver has also come in for its share of improvement, with the result that the reproduction of music and speech now is more truthful than through any other mechanical or electrical means. This is partly accounted for by the development of new tubes, which are capable of handling greater volume without distortion, and by the provision of greater amplification per tube; it is also due in part to improvements in other instruments used in the audio-frequency amplifier portion of the receiver, and in the use of a really good loudspeaker.

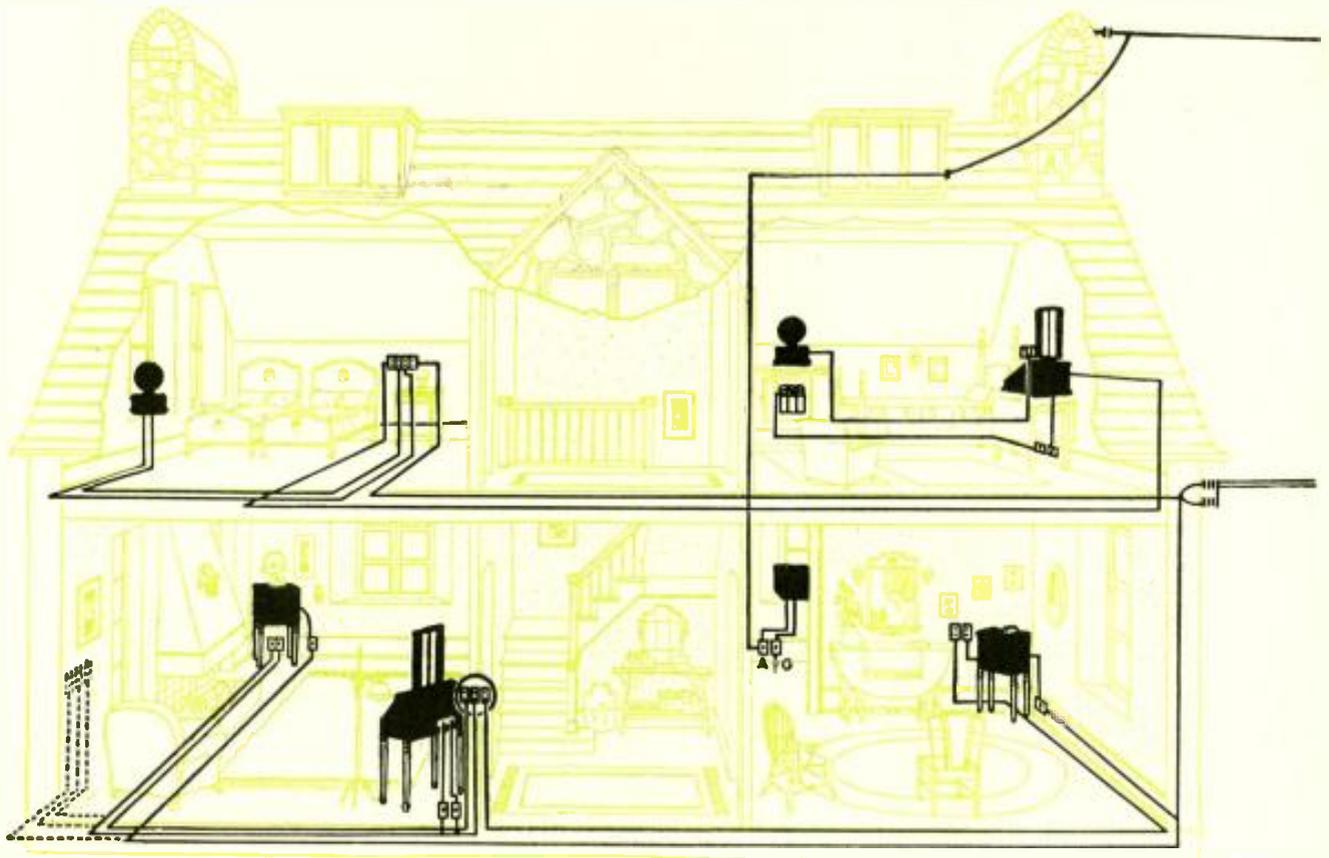
The Fada "8" employs eight vacuum tubes in all. Four of these tubes are used as radio-frequency amplifiers, one as a detector, and three as audio-frequency amplifiers. All of these tubes are of the UX-201-a type with the exception of the one used in the last stage of audio amplification and this is a UX-171 type power tube.

The four stages of radio-frequency amplification are perfectly neutralized so that it is impossible to make the amplifier oscillate anywhere within the broadcasting waveband. Moreover, the degree of amplification is practically equal for all wavelengths covered by the receiver. Another consideration—

and an extremely important one from the standpoint of the ultimate owner of a set—is that the amount of radio-frequency amplification per stage is the same as is found in other non-oscillating receivers using fewer stages. In other words, stage for stage, the radio-frequency amplification is equal or better than that of most good receivers of a year or so ago. The total radio-frequency amplification of this new receiver is therefore, greatly increased.

The amount of radio-frequency amplification, of course, determines the sensitivity of the receiver and this new model provides surprisingly good reception from stations at extreme distances. The high sensitivity permits the elimination of the outside antenna (or the indoor antenna) and the ground connection. The pick-up device used is a small loop antenna that is hinged directly onto the receiver cabinet and measures approximately two feet in height by one foot wide by three inches deep. For local reception, in the case of the table type receiver, the loop is dropped down flat inside of the receiver cabinet and is entirely concealed. For greater sensitivity it is swung to an upright position. In either position the cover of the receiver cabinet may be closed as the loop does not interfere.

(Continued on page 462)



AN ACTUAL HOME THAT IS WIRED FOR WIRELESS

Every room of this "radio house," (which is located on Staten Island, N. Y.) is served by radio, either in the shape of a complete receiver and loudspeaker installation or an extension loudspeaker unit with its own power amplifier. The wiring is as complete and as inconspicuous as the ordinary electric light wiring.

HOW TO

Wire Your House *for* Radio

Now comes the next step in the establishment of radio as an integral part of the home "the radio-wired house"—some practical types of which are described in this article by—

AUSTIN C. LESCARBOURA

AND now the radio wired home! Of course it was to be expected that radio, sooner or later, would join the central heating plant and the sanitary plumbing and the electric light as an integral feature of residential building construction.

Today, after five short but eventful years of development, radio broadcasting has become such an indispensable element in the home life of the typical American family that it has outgrown the narrow confines of the living room: radio now has something to say to the housewife while she is about her daily work in various parts of the house; radio has entertainment for the family and friends during the summer evenings

spent on the porch; radio has entertainment for the servants in their quarters; radio has dinner music to make the meals all the more enjoyable; radio has setting-up exercises for the more ambitious members of the family to follow in the privacy of their bedroom; radio has bedtime stories and lullabies for the kiddies; radio has plenty to do in helping to pass away the long hours of the sick member confined to his bed.

Radio is no longer a parlor variety of entertainment; its place in the household is everywhere, from morning till night, to be heard by anyone at will. All of which creates problems in radio wiring and in providing radio service in all parts of the household. It is mani-

fest that the radio facilities in the average home today are little more than crude improvisations, intended more as a means of becoming acquainted with the possibilities of radio. A parallel might be found in the early introduction of electric service in the home, when electric wiring did not go beyond plain moulding to bring the current to a single ceiling fixture in each room. Just as electric wiring has been extended to a complete system of convenient outlets and switches, together with all manner of electrical appliances, so must radio become a complete wiring system with ample equipment for a complete utilization of broadcasting service.

To begin with, the living-room radio

installation presents an inflexible system. The radio programs must be heard in that part of the house, although, so far as the apartment or small house is concerned, there may be sufficient loudspeaker volume to bring the music at least to other rooms. Still, it is annoying to strain one's ears to listen to a remote musical selection or speech; at best, this plan is a poor one. It means maximum loudspeaker volume, with everyone in the household—and in the neighborhood, for that matter—compelled to listen to that one particular program.

So the usual living-room installation lacks in two important particulars: *First*, the loudspeaker is located in one part of the house to which the household members must go for best results; *secondly*, all members of the household are compelled to accept a given radio program, as but one program can be received at a time.

There is no choice—but there may be many disputes—with this arrangement. Its one redeeming feature is, namely, low first cost and minimum operating cost.

That the evolution of radio in the home cannot stop at this stage is not only sound logic but a certainty as well. There must be ways and means devised whereby home radio becomes a more flexible means of serving the entire household.

Separating the Loudspeaker from the Receiver

Radio wiring, which answers the problem of making radio broadcasting service available in all parts of the house, may be as simple or as elaborate as the pocketbook and taste may dictate. It may be a temporary proposition, using exposed wiring of the home-made category, or it may be a permanent, concealed wiring job. Again, it may be applied in the home under construction, virtually side by side with the usual electric wiring, or it may be installed in the house already built. However, the radio wiring investment will return many times its cost and will immeasurably increase the pleasure derived from a given radio set.

Radio wiring had its start, no doubt, when some enterprising radio listener decided to bring the loudspeaker to another room without disturbing the receiver installation. Temporary wires were employed. Today there are special extension cords available for this very purpose. Simple as this method is, it affords a surprising extension of the broadcast service. Especially is this true in summer time, when the loudspeaker may be moved out on the porch or even on the lawn. Even as a regular thing it is desirable to have the

loudspeaker some distance away from the receiver, for the reason that the adjustments may be made more effectively if the operator is listening under the normal conditions of enjoying a radio program, instead of under the false conditions of having an ear virtually up against the loudspeaker.

The loudspeaker extension cord is a step in the right direction, even though allowing that it is an improvisation or makeshift.

So far as actual radio wiring is concerned, there are no fixed rules or specifications for radio wiring and radio installations. No universal prescription can be issued. Each case must be handled individually, with such factors as personal taste, expense and judgment influencing the final plans. The home owner should decide just to what extent radio service is desired throughout the home; then he should consult the radio dealer and the electrical contractor for a corresponding installation—or undertake the work himself.

The nature of the wiring is again a matter of choice. With low-powered

receiving equipment, using batteries throughout, the wiring may be of the ordinary bell-wiring variety; however, when it comes to high-power radio receivers that employ battery eliminators and appreciable voltages in the output connections, the wiring should follow the usual standard electric wiring for permanent and safe service.

Any home owner who can afford a good radio set should also secure a neatly wired installation, with protected wires and neat outlets. It should be a permanent job and not a sloppy one of temporary character, which is not only a menace to property but a constant source of radio trouble due to broken wires and faulty connections and leakage of current. Furthermore, the radio wiring should be in accordance with the rulings of the fire underwriters, especially now that considerable energy is being handled by high-power receiving sets, so as not to jeopardize the fire insurance protection.

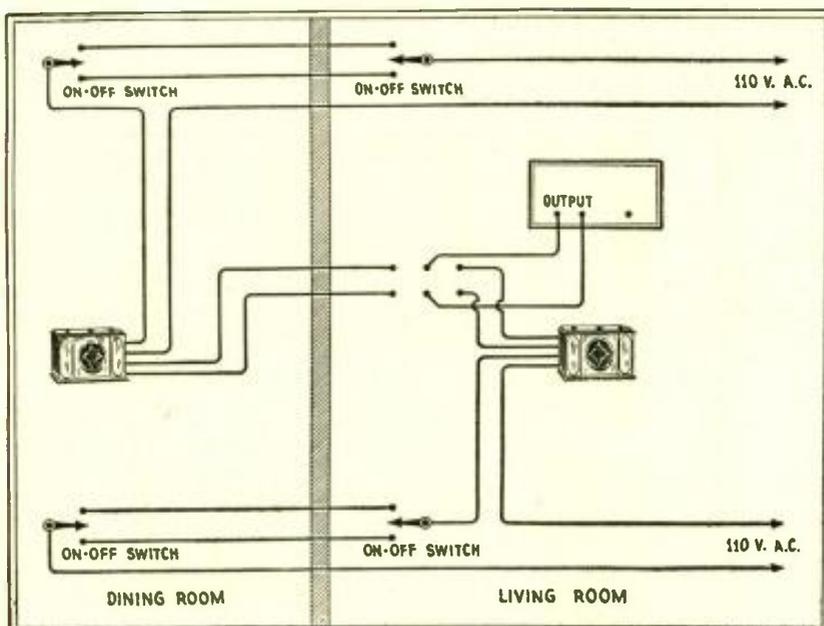
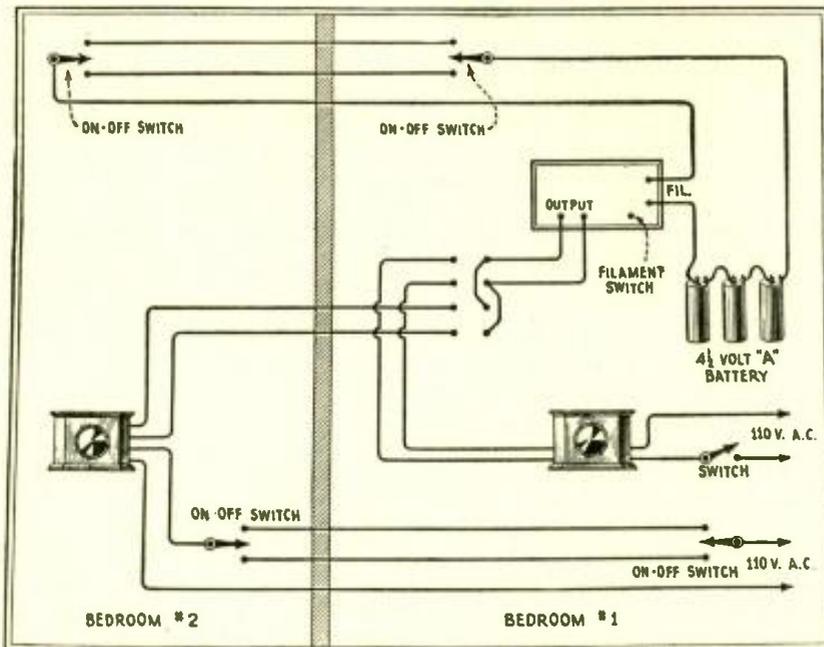
If the radio wiring is installed in a home under construction, it may be run in flexible armored cable or BX, side by



From a photograph made for POPULAR RADIO

THE WIRING IS BUILT INTO THE WALLS

The wiring for the outlet box for the switches may be done before the plaster has been put on the wall, as shown here, or it may be threaded through the wall partitions by a competent electrician.



HOW THE CONNECTIONS ARE MADE

These two drawings show the wiring arrangement for the dual operation of the set and loudspeaker installations on both the first and second floors of the "radio house."

provided the receiver is equipped with a power tube and ample energy to supply the necessary output.

Simplicity and low cost are the prime advantages of this form of radio installation. There are certain drawbacks, however, which should be considered in advance.

First of all, if several loudspeakers are in use at one time, the volume from each loudspeaker will be considerably reduced because of the multiple drain on the master receiver. Again, the delicate balance of receiver output to loudspeaker input must necessarily be upset when using two or more loudspeakers. Then there is the inconvenience of operation; each time there is need of re-tuning the receiver or turning it on or off, a trip must be made to the living room or wherever the receiver may be located.

A variation of the foregoing plan is to be found in the radio service supplied by hotels and large apartment houses, where one or more master radio receivers are wired to loudspeaker outlets in the rooms or apartments. A multiplicity of receivers and corresponding outlets permit of some choice of programs. This system, however, is hardly feasible for home use because of the elaborate installation, the constant services of a skilled operator attending to the several receivers, and the very considerable cost. It is intended primarily for larger institutions with listeners numbered by the dozens, than for the average household.

A Receiver for Each Member of the Household

The second form of radio installation for the home provides an individual receiver and loudspeaker in each room.

The obvious advantage of this plan is that individual radio tastes may be met at all times, with the receiver at hand for service as well as silence, for changing from one program to another, and for re-tuning and adjustment of loudspeaker volume.

This multiple receiver plan certainly provides ultra-flexible radio service; it is especially applicable in households where there are several strong-willed individuals. This plan requires practically no radio wiring; each receiver is complete in itself, including batteries or electric light current supply, and loudspeaker connection.

The obvious drawback to this scheme lies in the multiplicity of radio receivers, which represent a considerable investment and high upkeep; furthermore, a number of antennas are necessary, spreading out in various directions so as to minimize troublesome interplay. Unless loop receivers are employed,

(Continued on page 450)

side with the usual electric wiring. The contractor charged with the latter can also handle the former, and the cost is reasonable in comparison with the investment called for by the radio equipment.

If the wiring is installed in a house already built, the radio wiring may be of the concealed variety, using flexible armored cable or BX which electricians snake between walls and floors with surprising dexterity, or it may be in the form of neat metal molding which, although exposed to view, is unobjectionable, especially when it is painted to match the color of the walls and ceiling.

The Single Receiver with Multiple Loudspeakers

The simplest form of radio installation is the single receiver in the living room or other convenient part of the household, in conjunction with radio wiring to various rooms where plug-in outlets are provided to accommodate a loudspeaker.

With such an installation the "master receiver," as it is now termed, is tuned for the desired program, after which a loudspeaker may be placed in any part of the house reached by the "feeder" wiring. Better still, two or more loudspeakers may be employed,

Q *What the owner of station 9 DOZ did to win the*
POPULAR RADIO MEDAL FOR CONSPICUOUS SERVICE

“S. O. S.”

The True Narrative of the Dramatic Part Played by a
 Radio Amateur at the Time of the Tornado in Murphysboro

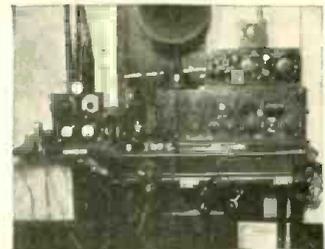
By J. ANDREW WHITE



Brown Bros.

**THE MAN WHO DISOBEYED UNCLE SAM—AND
 WAS REWARDED**

At the left is Mr. C. B. Harrison of Belleville, Illinois; at the right is his transmitting set with which, while under the ban of the Department of Commerce, he called for help to the stricken town that is pictured above. The set comprised six 5-watt oscillators, two 50-watt oscillators and a speech amplifier.



SUPPOSE that you were a licensed radio amateur who owned the only transmitting set in your town, and that because of some minor infraction of one of the regulations of the Department of Commerce you were not permitted to operate your set for three months.

And then suppose that a tornado should whirl down into a neighboring town during your period of suspension, carrying death, destruction and widespread suffering to your fellow men, and that the only medium of contact between the stricken area and the outside world should suddenly become your banned transmitter!

That is exactly the dramatic situation that faced C. B. Harrison, amateur operator of station 9 DOZ at Belleville, Illinois, when the historic tornado of March, 1925 laid waste the neighboring town of Murphysboro with dire results.

Harrison promptly decided that his duty lay with suffering humanity—and he acted on this decision without regard to the penalty thus invoked under the man-made law.

And in doing so he rendered the type of conspicuous service which has won for him the award of the Popular Radio Medal—fulfilling the condition that “prompt and efficient action was utilized to perform an essential part in the alleviation of human suffering or in the saving of human life.” (It might be explained here that the Radio Inspector not only whitewashed Harrison of blame but commended him for his useful service.)

The story rightfully begins with Harrison idling at home evenings on the first of March, restless and unhappy because of his suspension. For twelve years he had operated an amateur sta-

tion without hindrance; this was his first offense. Time hung heavy for the first eighteen evenings during which he could listen only to others and not reply to the friendly station voices that filled the air.

Methodical, as all good amateurs are, he jotted down various observations in his “log” as he listened to the doings of the other code handlers. An extract or two from these entries reflect somewhat the state of mind of the hard rider of a hobby suddenly unseated. During the first night of the suspension, for instance:

“Wish NAA could say something beside the weather and storm warnings. Key West just as uninteresting. Have not heard an SOS for over a year.”

Then later:
 “Have been reading a station for over one hour. He sure has a wonderful fist.

(Continued on page 459)



WITH THE EXPERIMENTERS

CONDUCTED BY LAURENCE M. COCKADAY

Adding Radio-frequency Amplification to the Four-circuit Tuner

WHILE the fine qualities of the Four-circuit Tuner are indisputable, the fact that a large antenna is needed to get best results is undoubtedly a drawback. For this reason, many requests have been received for instructions upon the addition of radio-frequency amplification, which would eliminate this requirement.

After considerable experimentation it has been found that the most practical plan is the conversion of the receiver to the LC-26 type. When this change has been made, only three stages of audio amplification are necessary; therefore, the converted receiver does not require an extra tube.

The circuit that is used in the converted receiver is the same as that of the LC-26 receiver, which was described in the December, 1925, issue of POPULAR RADIO except that phone jacks are used after the third, fourth and fifth tubes as in the Four-circuit Tuner and a "C"

battery has been added. The circuit diagrams of the Four-circuit, the LC-26, and the revised receiver are shown in Figures 2, 3 and 4.

Figure 1 shows a rear view of the Four-circuit Tuner after conversion.

The number of changes to be made in the receiver will depend largely upon the desires and pocketbook of the individual builder. At a cost, for new parts, of about seven dollars a change may be made which will result in a receiver that has the tone quality of the original Four-circuit Tuner with the added sensitivity of the LC-26 receiver.

In other words, for this amount a receiver may be obtained which is capable of providing excellent quality and plenty of volume, even when used with a short antenna. In tests made in New York City, loudspeaker volume was obtained from stations 30 and 40 miles away with a fifteen-foot wire lying on the floor as the antenna.

The New Apparatus Necessary for the Change

To make these essential changes it is necessary to obtain a variometer, a

primary coil for the old precision four-circuit tuner coil, a .00015 mfd. capacity fixed condenser for use as an antenna series condenser, and a battery switch to cut this condenser in or out as desired. The variometer should be one of the smaller type, such as the General Radio instrument.

The primary coil may be purchased from the manufacturer of the Precision coil, or it may be made at home. This coil consists of $10\frac{1}{2}$ turns of No. 18, DSC wire, wound on a tube $2\frac{1}{2}$ inches in diameter. The winding should run in the same direction as that of the large coil.

It goes without saying that the old four-circuit coil should not be used unless it is in first class condition. If there is any doubt on this score it would be better to play safe and purchase a whole new coil, such as the "Octaform" coil which is made especially for the LC-26 circuit.

If the old four-circuit coil is used the bank-wound portion, D, must be discarded. The inner ends of the two coils B and C are joined together and a tap is brought out from this connection to serve as the midtap, shown in the LC-26 diagram.

To assemble the coil, stand this large tube upright with the smaller winding, C, uppermost. Then, slip the new primary coil into the other in such a position that its top turn is on a level with the top turn of coil C and fasten it in that position by means of a small brass bolt running through one side of the ends of the two tubes. Later, when the primary coil is connected into the circuit, its top turn should connect to the plate of the first tube socket, and its bottom turn to the "B" battery.

Changes in the Layout of the Receiver

The physical changes in the receiver are not extensive. The four-circuit coil is of course removed from its original position, together with all of the wires which were connected to the coil. The switch lever, R, and the taps, S, are also removed from the panel.

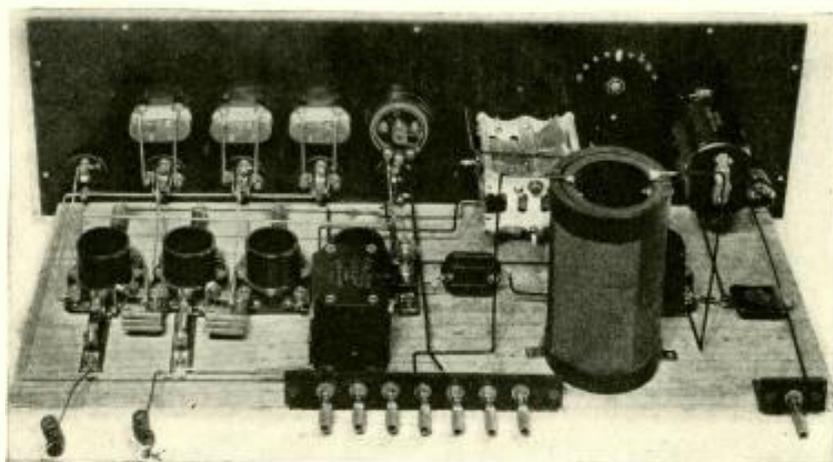
The variometer is then mounted with its shaft through the hole from which the switch lever was removed.

The coil is fastened to the baseboard in an upright position by means of two small, brass angle brackets. It should be placed with its center $6\frac{3}{8}$ inches from the left end of the baseboard and $1\frac{3}{4}$ inches from the rear of the base.

Socket J1 is moved toward the left to a position where its center is $4\frac{3}{8}$ inches from the left end of the baseboard. The amperite, L1, is placed directly in front of this socket, close to the panel.

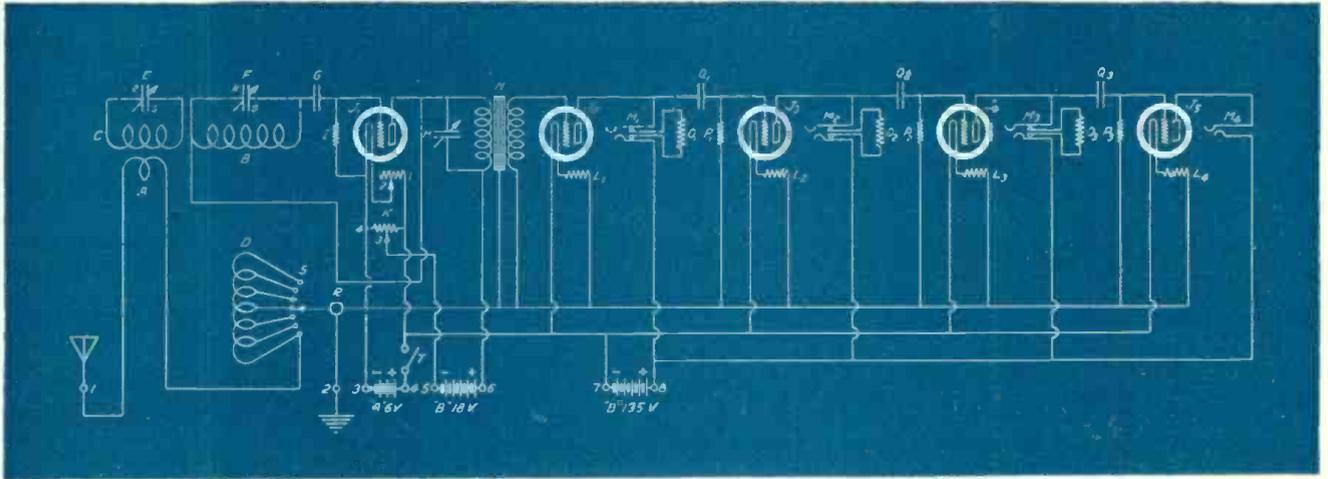
The condenser, Q1, and the resistance, P1, are removed and the transformer, N, is moved to the right to the position previously occupied by these instruments.

(Continued on page 469)



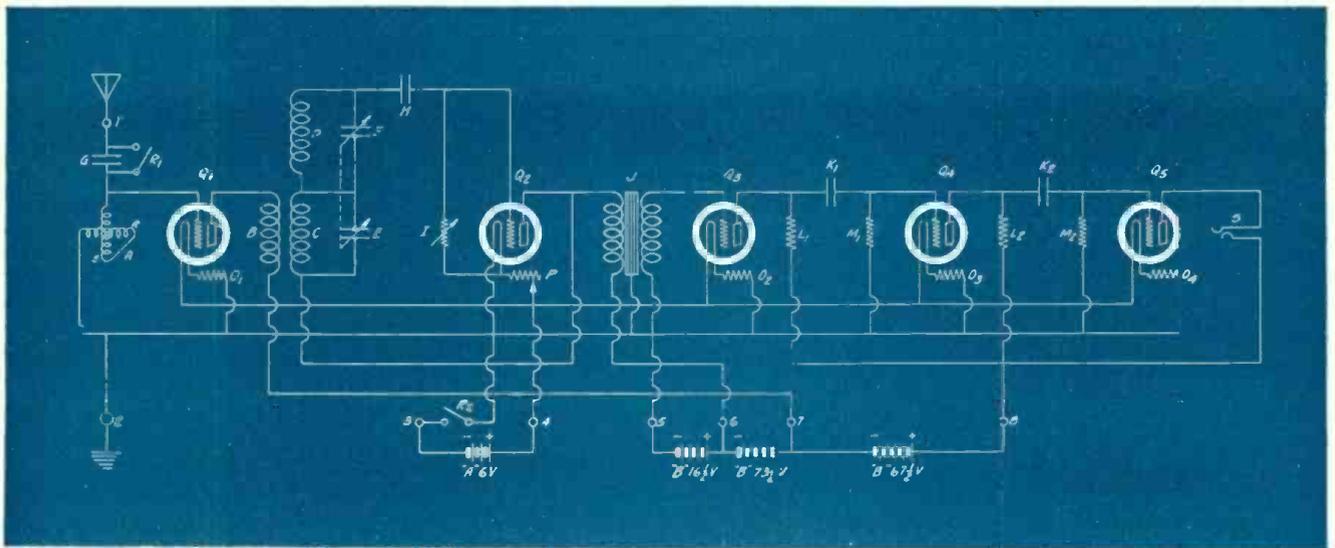
A REAR VIEW OF THE CONVERTED FOUR-CIRCUIT TUNER RECEIVER

FIGURE 1: How the Four-circuit Tuner should look when the changes that are outlined in the text have been made. The circuit of the completed set is essentially the same as that of the LC-26 receiver which was described in the December, 1925, issue of POPULAR RADIO. The Four-circuit shown here was constructed according to the directions given in the October, 1924, issue.



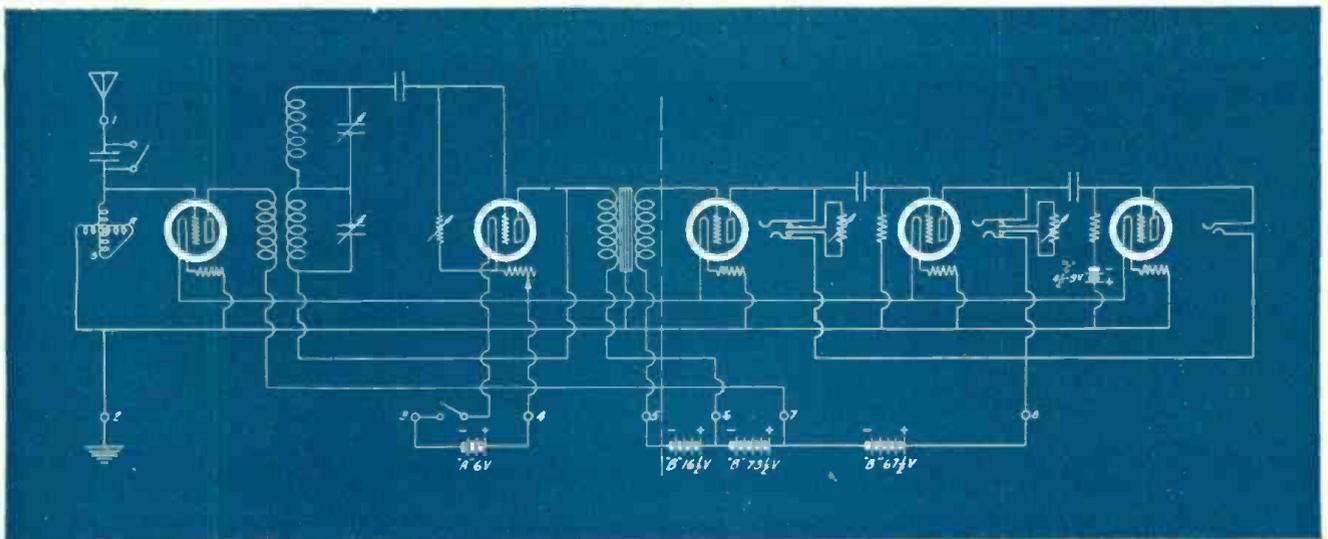
THE FOUR-CIRCUIT TUNER CIRCUIT DIAGRAM

FIGURE 2: *The diagram of the original set before any of the changes have been made.*



THE LC-26 CIRCUIT DIAGRAM

FIGURE 3: *Before undertaking the changes which are outlined in the text, the reader should compare this diagram with that in Figure 2.*



THE CIRCUIT DIAGRAM OF THE CONVERTED RECEIVER

FIGURE 4: *The circuit to the left of the broken line is identical with that of the LC-26; to the right of this line it is similar to that of the Four-circuit Tuner.*



IN THE WORLD'S LABORATORIES

CONDUCTED BY DR. E. E. FREE

Hope of Radio Enjoyment for the Deaf

THERE were mentioned in this Department, several months ago, the experiments of Mr. Jakosky and Dr. McConnell, of the United States Bureau of Mines, in teaching deaf persons to read radio or telegraph code by the feel of the vibrations on their skin, some form of vibrator sensitive to the incoming signals being pressed against the forehead or held in the fingers.* This interesting effort has now received a remarkable extension in the quite independent experiments of Professor Robert H. Gault, of Northwestern University, on the possibility of teaching deaf persons—or normal persons, for that matter—actually to “hear” sounds through the finger tips in the same way.†

The vibrator against which the finger of the “listener” is pressed consists of a telephone receiver the face plate of which has been cut out, so that a wide hole is left through which the tip of the thumb or finger can be pressed against the diaphragm. In teaching students to “hear” by this method Professor Gault speaks vowel sounds, syllables or short, simple sentences into a telephone transmitter. This transmitter is connected to an audio-frequency amplifier. The out-put of this amplifier goes, in turn, to the receiver carrying the vibrating diaphragm touched by the finger of the learner. Care is taken to have the entire apparatus substantially distortionless, special telephones and amplifiers having been loaned for this purpose by the Bell Telephone Laboratories.

*“Receiving Radio Code by Touch,” POPULAR RADIO for September, 1925, pages 285-286.

†“Touch as a Substitute for Hearing in the Interpretation and Control of Speech,” by Robert H. Gault. *Archives of Otolaryngology* (Chicago), vol. 3, pages 121-135 (February, 1926). Briefer and more popular accounts of Professor Gault's work have appeared in *The Scientific Monthly* (Garrison, N. Y.), volume 22, pages 126-131 (February, 1926), (by Professor Gault) and in the *New York Herald-Tribune* for July 4, 1926 (by the Editor of this Department). Details of some of Professor Gault's control methods will be found in “Control Experiments in Relation to Identification of Speech Sounds by Aid of Tactual Clues,” *The Journal of Abnormal and Social Psychology*, volume 21, pages 1-13 (April, 1926).

Professor Gault has been experimenting with this method for about three years, the last year under the auspices, and with the aid, of the National Research Council, at Washington, D. C. His success has been remarkable. With a comparatively short series of lessons, the average person, whether deaf or not, learns to recognize selected syllables with a high degree of accuracy. Some of Professor Gault's pupils have learned to recognize sentences quite well. Two of them are now able to catch the drift of a totally unfamiliar story by fingertip hearing alone.§ When one remembers that these results have been accomplished by a relatively small amount of training, far less than a child needs to learn to recognize speech for the first time, the outlook for help to deaf persons is extremely favorable.

These experiments have radio interest not only because it is the development

§For this last fact, as yet unpublished, POPULAR RADIO is indebted to a special communication from Professor Gault.

of radio amplifiers which has made them possible, but because they hold out promise of radio enjoyment to persons hitherto shut out from it by total, or nearly total, deafness. It is already well-known that deaf persons can sense the rhythm of music by its vibration. They are able to dance, for example, by aid of the vibration of the floor. Professor Gault's results promise them a chance to recognize tones as well. It is perhaps too much to hope that their appreciation would ever be as keen as that of persons with normal ears but even something far short of this would be a priceless boon to many of the afflicted.

Professor Gault is not primarily interested in this feature of his work, but in the help which it promises to supply in teaching deaf persons to recognize speech and to speak themselves. Many a deaf person is also mute solely because his deafness prevents his hearing the sounds which he must imitate in order to speak. Those who do learn to speak, by the help of the truly marvelous methods which the experts in such matters have developed, usually possess a peculiarly flat and unpleasing voice, again for the reason that they do not hear either their own voice or that of others and cannot make the proper corrections of mistakes. Professor Gault has found that the touch sensations which his subjects experience through their fingers are of great assistance in improving their speaking abilities. It is expected, too, that similar methods will help greatly in teaching deaf persons the art of lip reading.

From the viewpoint of pure science,

(Continued on page 438)



Harris & Ewing

USING THE THUMB TO HEAR SOUNDS

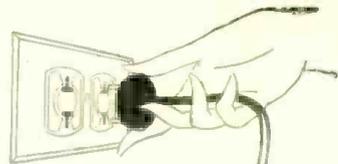
By the sensitive tip of the thumb, pressed against the vibrating diaphragm of this special telephone receiver, Professor Gault's pupils are able to recognize the sound of syllables or words by the touch sensation alone.

Two of them can even pick up the drift of an unfamiliar story.



Tungar is the original bulb charger. It is a G-E product developed in the Research Laboratories of General Electric.

East of the Rockies:
2 ampere Tungar \$18
5 ampere Tungar \$28
60 cycles—110 volts



So easy.....
plug in
..... battery charging

PLUG in the Tungar. Turn a switch to the right—and your "A" batteries are charged. To the left for your "B" batteries. Yes, it's as simple as that—with a Tungar.

An easy installation connects your Tungar permanently. Then you can conceal batteries in a cabinet, or down cellar—and just have a convenient switch to close when you sign off for the night.

In the morning your batteries are at their best, and you've only used about a dime's worth of current.

Tungar charges 2, 4 and 6 volt "A" batteries, 24 to 96 volt "B" batteries, in series; and auto batteries, too. No extra attachments needed.

It causes no radio interference.

It will not blow out Radiotrons.

Merchandise Department
General Electric Company
Bridgeport, Connecticut

Tungar
Reg. U.S. Pat. Off.
BATTERY CHARGER

Tungar—a registered trademark—is found only on the genuine. Look for it on the name plate.

GENERAL ELECTRIC

In the World's Laboratories

(Continued from page 436)

also, the experiments have great interest. They indicate that the touch nerves of the fingers may be highly educated for the perception of tones and sound vibrations, just as they can, we already know, in reading the raised letters of the print used for the blind or in such commercial matters as the feel of fabrics. The nerves of our ear, with which we now do our hearing, were originally touch nerves, as, indeed, were all the nerves of our body. The entire nervous system, the brain included, is a mere in-growth of the skin, developed in the course of ages of evolution out of the primitive touch sensation which was possessed by the skins of our ancient ancestors, the small worm-like creatures who lived along the sea shore when the world was very young. Having special ear nerves, which hear better than our touch nerves can, we have lost the power of perceiving sounds by the skin, which power our remote animal ancestors undoubtedly possessed. Professor Gault's experiments suggest, quite definitely, that we may be able, by training, to recover a large part of this lost ability of our nerves of touch.

reason why radio might not influence the weather and that he thought the matter ought to be looked into. The weather of 1926 all over the world has been unusual; in many places it has been marked by ruinous rains and floods. The peasants of several countries became excited by the discussion to the point of demanding that radio transmissions cease and that antennas be removed.

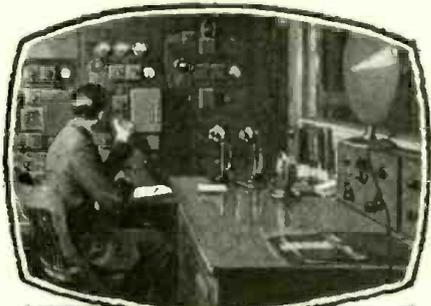
M. Painlevé seems to have spoken in this instance with the carelessness expected of a politician, rather than the caution demanded of a scientist. There is one simple consideration which makes obvious the virtual impossibility of radio having the slightest effect on the weather; this is the fact that the electromagnetic waves originating in natural electric disturbances, like thunderstorms, are thousands of times more energetic than the strongest radio waves. The earth's atmosphere has been in continual electric oscillation, owing to these natural discharges, for millions of years. It is exceedingly improbable that the tiny additions due to radio should have any perceptible effect on any atmospheric conditions.

The real reasons for the abnormal weather of this year probably lie in the deficiency of sunlight which existed for some three years and which has only recently been equalized. The waters of the North Atlantic and the North Pacific Oceans apparently have somewhat abnormal temperatures.

It is not possible to say that the weather is either colder or warmer, but that it is unusual and vastly disturbed. The fundamental causes, as of all such changes, are in the sun, not on earth.

Radio Does Not Cause Bad Weather

THE delusion, so prevalent three years ago, that "radio was spoiling the weather" and ruining the crops broke out again in Europe the past summer, largely as the result of a widely-quoted statement by Dr. Paul Painlevé, then French Minister of War and a mathematician of international distinction. M. Painlevé remarked that he saw no



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Stay home and hold your job—I'll bring your training to you. You learn quickly and easily in your spare time without leaving home. I guarantee to train you successfully or refund your money under the terms of a guarantee bond I give you upon enrollment. I supply you free of extra cost with all needed apparatus and receiving sets for practical work while learning, so you can master Radio quickly, easily, at home.

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Every day N. R. I.-trained men taking good places in the Radio field! Thousands of openings now awaiting the trained man in this new profession. FREE EMPLOYMENT SERVICE WHEN YOU GRADUATE. Many other big features. Don't go along at \$25 or \$35 or \$45 a week when as a Radio Expert you could be pulling down real money for the same six days. Get the Facts—CLIP COUPON NOW.

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Harris & Ewing

TESTING THE TRUTH OF TOUCH-HEARING

In order to be fully certain that his experiments were not explainable by traces of sound reaching the ears of his pupils and helping them to distinguish, unconsciously, the sounds causing vibrations under the finger tips, Professor Gault carried out some tests with the vibrating diaphragm inside this sound-proof bag.



There's a golden tinkle in the air—

Does it reach your ears? All you need is a Rectigon to make music sound like money. And to keep your batteries charged up to their ears with pep. Thus you attain best possible reception at lowest possible cost. Your Rectigon pays dividends quickly in money saved from the service station. And you always have a marvelous power reserve to bring in the best your set can get.

and it comes from charging at home with

The Westinghouse Rectigon Battery Charger

©, 1926, W. E. & M. Co.

No noise as it charges—not a bit of fuss. Not even a murmur that would disturb the mildest slumber.



No acids, chemicals—no moving parts—nothing to spill or burn. No muss, nor worry. You'll have no spoiled rugs, ruined clothing.



Snaps on in an instant—just plug into the light socket, snap on the terminals. Saves service station bother. Spares interruptions caused by absent batteries.



Charges both "A" and "B" batteries—Keeps both packed with power. Bulb is used for "B" battery charging and it is enclosed, like all other parts, in metal, safe from accident. (Rectigon charges automobile batteries, too.)



Safety for batteries and set—You'll not wake to find your battery discharged—that can't happen with a Rectigon attached. Should you tune in without detaching the Rectigon from battery, your set won't be harmed.

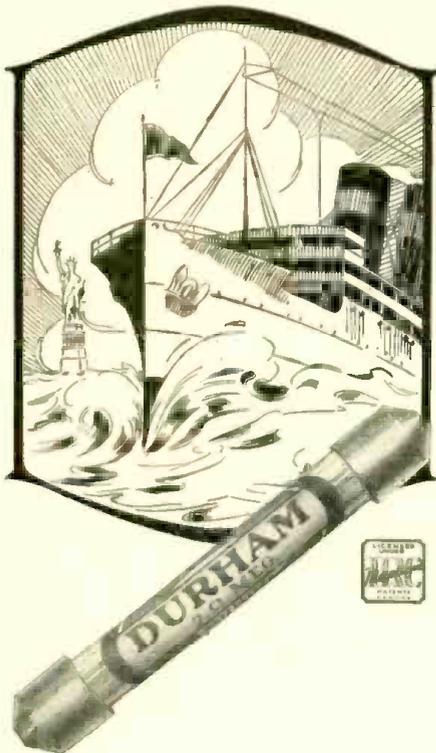


No Storage Battery Radio is Complete Without a Rectigon



THE RECTIGON is a superb Westinghouse product. Things you *can't* see, like extra heavy insulation, things you *can* see, like the durably enameled case—all are of highest quality. Westinghouse manufactures also a complete line of radio instruments, and Micarta panels and tubes.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
Tune in on KDKA · KYW · WBZ · KFKX

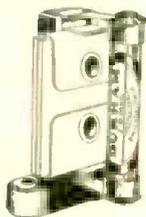


Supremacy!

LIBERTY, epitomizing the Land of the Free! The Leviathan, symbol of America's power on the sea! Both supreme expressions of a Nation's greatness.

The Durham Metallized Resistor is the supreme grid-resistor, because it embodies improvements that lift it above most competition. Noiseless, unaffected by atmospheric changes, and permanent in resistance value.

500 ohms to 10,000 ohms.....	\$1.00
Above 10,000 ohms to .24 meg.....	.75
.25 meg to 10 meg.....	.50



DURHAM RESISTOR MOUNTING

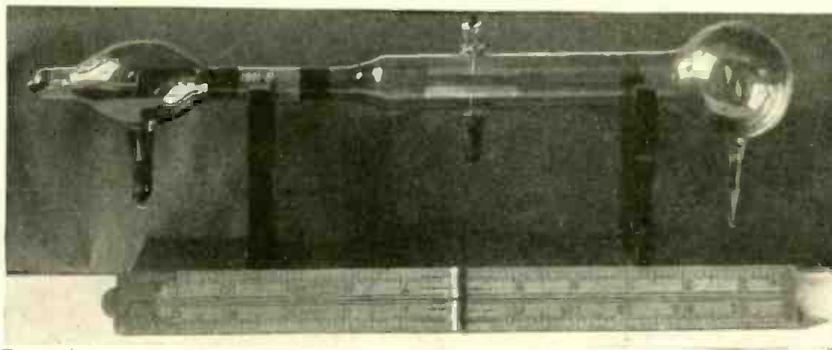
Made of moulded insulation of exceptionally high resistance. Has best quality, tension-spring, bronze contacts. The only upright mounting made. Occupies but little space in set.

Single mounting.....	50c
For condenser.....	65c

DURHAM METALLIZED RESISTORS

INTERNATIONAL RESISTANCE CO.

Dept. A., Perry Bldg., Philadelphia, Pa.



From a photograph made for POPULAR RADIO by Campbell-Gray, London.

IN THIS TUBE ELECTRONS WERE DISCOVERED

Shown at the Wembley Science Exhibit, and reproduced here by special permission of the Exhibition Committee of the Royal Society, this vacuum tube is the one used by Sir Joseph J. Thomson, in 1897, to explore the mysterious "cathode rays," now known to be streams of electrons.

All Electrons Are Alike

ONE of the basic conceptions of radio theory, as of many other branches of physics, is that all electrons carry the same electric charge, have the same mass and are otherwise identical. As Lord Kelvin said long ago about atoms, electrons are as uniform as though they were "manufactured articles," in which they differ sharply from most ordinary objects. No two leaves from a tree, for example, will ever be exactly identical. Not even any two crystals of rock salt or of galena are ever exactly the same.

This basic idea of the identity of any two electrons, no matter where found, was attacked some years ago by Professor Felix Ehrenhaft, of Vienna, who believed that he and his pupils had found evidence that under certain conditions there could exist what he called a "sub-electron," that is an electric charge less in amount than the supposedly uniform charge of .4774 billionth of an electro-static unit which all ordinary electrons are found to possess.*

Although this contention of Professor Ehrenhaft has had little acceptance from other physicists it has attracted much attention. It is important to record, therefore, that Mr. R. Sanzenbacher, a student of Professor Erich Regener, of the University of Stuttgart, in Germany, has repeated the experiments of Professor Ehrenhaft, has failed to confirm them and has apparently located the reason for Professor Ehrenhaft's mistaken conclusion.†

All of the experiments, Ehrenhaft's and Sanzenbacher's alike, are carried out according to the method originally devised by Millikan and used by him to obtain the modern measure of the electric charge of the electron. Tiny globules of mercury or of some other substance are floated in air. These

globules are allowed to pick up an electric charge of one or more electrons. The rate of movement of the charged globule is then measured, under the action of a known electrostatic attraction. The rate of fall of the globule, when uncharged, gives its mass. The rate of movement under the electrostatic attraction gives its electric charge.

In the original performance of this experiment, and in all his repetitions of it, Millikan found the same value for the electronic charge. Ehrenhaft did not. In some instances, especially with very small floating globules of mercury, he found indicated values a little smaller than Millikan's figures, although not small enough to be assigned to one whole electron less. Thus arose the idea that an electron might be divisible into "sub-electrons." In the new experiments, Mr. Sanzenbacher has studied tiny globules of mercury which altered in size, either by condensation (increase) or by evaporation (decrease) during the course of the experiment.

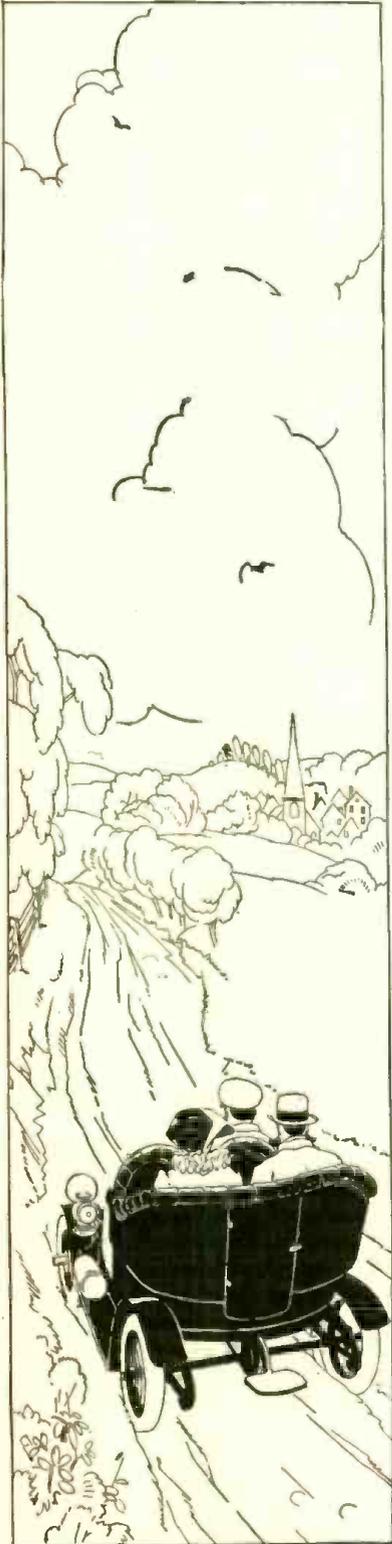
The results show no indication whatsoever of the existence of a fractional electron. Mr. Sanzenbacher did find, however, that when the globules of mercury were floating in hydrogen gas instead of in air there occurred, in some instances, a decrease in the rate of movement, thus furnishing an apparent indication of a decrease in the charge of one electron. The same decrease was observed occasionally in mercury globules which had stood long in air without changing in size, and provided that the globules were small.

Without pursuing the details, it may be said that all of Mr. Sanzenbacher's data indicate that Professor Ehrenhaft's mistake was due to some change in the surface of the small globules. Possibly these affix to themselves a thin layer of tightly-held air molecules; possibly their surface alters in some other way. However this may be, something happens to the surface of the globule which makes it move more slowly through the gas than it should. Thus arises an apparent, although false, indication that the charge on the globule is smaller than would correspond to one electron.

*For an account of Professor Ehrenhaft's ideas, with some contrary data from Dr. R. A. Millikan, see "Is the Electron Divisible?" POPULAR RADIO for October, 1925, page 378.

†The results are announced in a preliminary paper, "Contribution to the Explanation of the 'Sub-Electron'" (in German), by Erich Regener. *Die Naturwissenschaften* (Berlin), volume 14, pages 219-223 (March 12, 1926). The full details of the research will appear in a dissertation soon to be published by Mr. Sanzenbacher, at Stuttgart University.

Radio batteries with a name and a reputation



There is one safe guide to follow in buying radio storage "A" and "B" batteries—the name of the battery and the reputation of the manufacturer.

More than twenty years ago, Prest-O-Lite gave the motor-car its first really dependable light, and since that time Prest-O-Lite has more than kept pace with the ever-changing motor industry.

When the miracle of radio came, it was only natural that Prest-O-Lite should make batteries especially for this new industry; batteries which because of their unexcelled quality have added to the reputation and prestige of the name Prest-O-Lite.

These batteries were perfected in the world's largest electro-chemical research laboratories. They are made of the finest materials. Every user of a radio can depend upon Prest-O-Lite Radio Batteries to deliver their rated ampere-hour capacities and to insure good clear reception.

Prest-O-Lite Batteries are attractively priced from \$4.75 up. It is unwise to take a chance on batteries of unknown make. Ask for Prest-O-Lite.

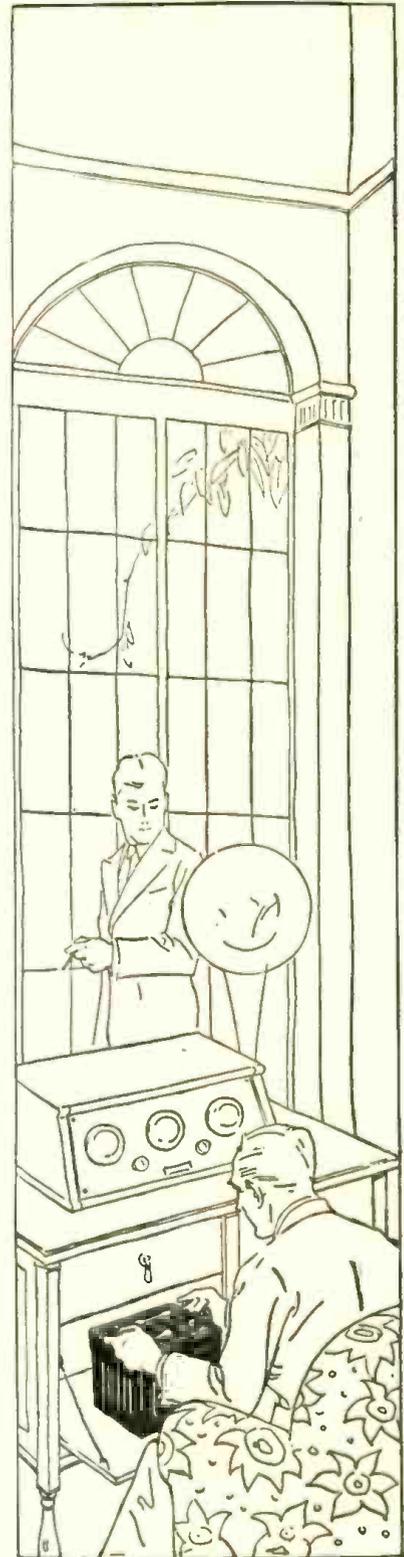
THE PREST-O-LITE CO., INC.
INDIANAPOLIS, IND.

New York San Francisco

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Send for free booklet

"What every owner of a radio should know about storage batteries" is a little booklet which every radio fan will find interesting and helpful. It is crammed full of hints that will bring surprising radio results—and save you money. It's yours for the asking—without obligation.

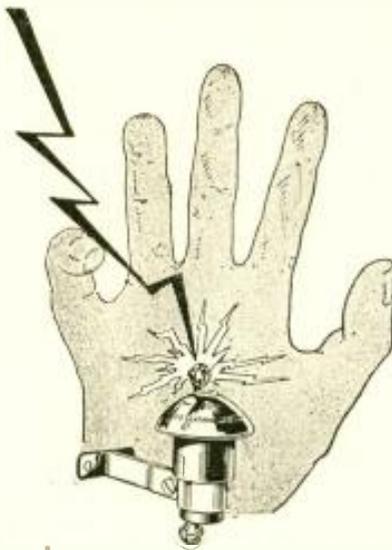


Designed especially for radio

Prest-O-Lite

STORAGE BATTERIES FOR
MOTOR-CARS AND RADIO





It says
“Stop”
 and lightning won't
 harm your set

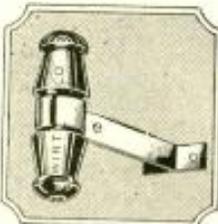
The National Board of Fire Underwriters specify that an approved Radio Lightning Arrester must be used with all out-door aerial installations.

Protection is easy. Insure your insurance and save your set with a WIRT LIGHTNING ARRESTER (listed as standard by Underwriters' Laboratories). The cost is a trifle.

THE WIRT LIGHTNING ARRESTER is an approved air gap type, made of bakelite giving ample insulation, with brass terminals moulded in bakelite, far enough apart so that there is no leakage. A "petticoat" of bakelite shields the arrester from water and dust. Handsome and rigid. Lasts a lifetime. Easy to install. Full directions on box.

Don't wait for a warning from the elements—it may be too late then. Install the WIRT LIGHTNING ARRESTER—now.

When you install your WIRT LIGHTNING ARRESTER, get a WIRT INSULATOR and prevent leakage along your lead-in wire. It keeps the wire at the proper distance, provides perfect insulation, and prevents wear and tear on the wire by preventing sagging and swaying.

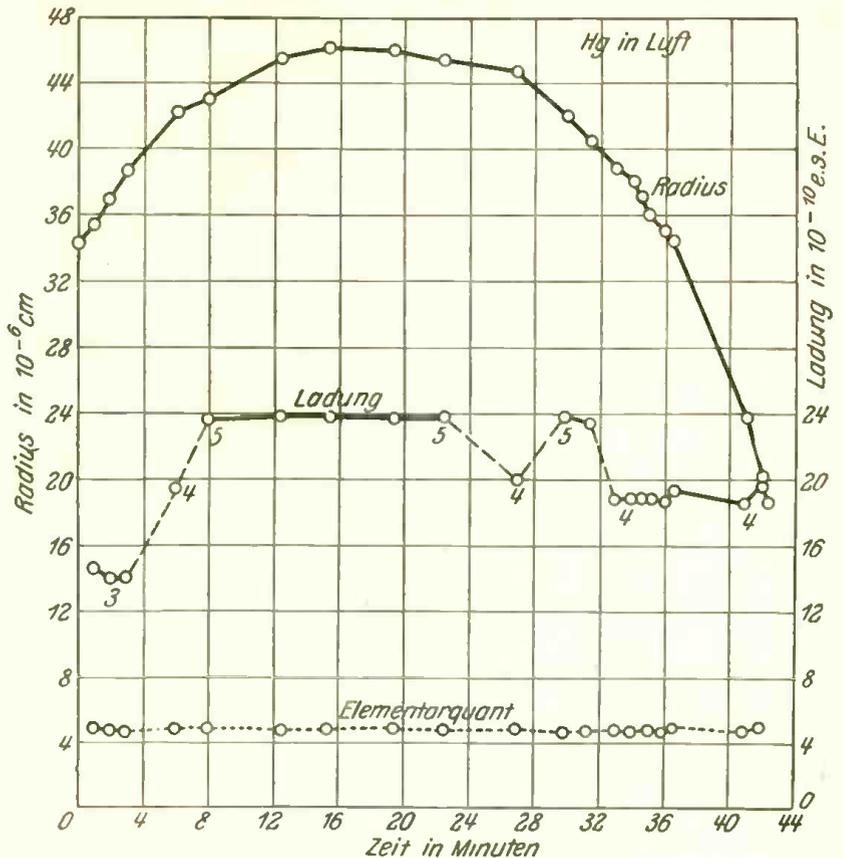


The Wirt Lightning Arrester is listed as standard by Underwriters' Laboratories.
 Wirt Lightning Arrester. \$1.00
 Wirt Insulator35

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Die Naturwissenschaften

THESE CURVES SHOW ALL ELECTRONS ALIKE

The upper curve shows the size of the floating mercury droplet; first increasing, then decreasing. The middle curve shows the electric charge on this droplet, the figures indicating the number of electrons on the droplet from time to time. The bottom curve shows these figures reduced to the basis of one electron. The straightness of this bottom curve proves that all the electronic charges were equal.

A Radio Method for Geologists

AMONG possible applications of radio to the study of rocks and ore deposits, a subject which POPULAR RADIO has already discussed on several occasions,* is a simple method described in a recent article by Professor Courant, of the University of Göttingen, Germany.† During the war Professor Courant was engaged in some studies of the ground-conduction telephone system—the so-called T. P. S. system—for the German Army.§ His present paper is a belated result.

The method which he suggests consists in determining the paths of flow of the alternating, ground-conducted field which goes out from a doubly-grounded transmitter. The transmitter may be merely a buzzer circuit, with both ends grounded. The detector is a combination of two coils, one oriented in a north-south plane, the other in an east-west plane. The coils are on

wooden frames about one yard square. Both ends of each coil are grounded. The north-south coil has one end grounded to the north, the other to the south. The east-west coil is similarly grounded; one end to the east, the other to the west. Mounded on the same axis as these two coils is a third coil, which can be rotated, like the coil of a radio-compass. In the circuit of this coil is a telephone. When thus arranged, the position of this inner coil which gives the minimum sound in the telephone indicates the direction of the audio-frequency field moving through the ground.

Professor Courant moves this receiver and the transmitter from place to place in the area to be examined, or, more conveniently, he uses a number of transmitters and a number of receivers. Thus he plots the paths of the lines of force through the surface soil of the area. These paths are not affected, he reports, by the superficial conductivity of the ground (as altered, for example, by rain). On the other hand, they are controlled largely by the geological nature of the country, the underlying rocks, the presence of faults and folds, and the like. He believes that methods along this line might be of service in geological surveys. Service in agricultural soil surveys is equally possible.

*See, for example, "Finding Mines by Radio," POPULAR RADIO, for September, 1924, pages 238-245.

†"On Variable Low-Frequency Currents in the Earth and Some Questions of Geophysics" (in German), by R. Courant. Die Naturwissenschaften (Berlin), volume 14, pages 61-64 (January 22, 1924).

§On the T. P. S. system, as used by the United States Army, see "Underground Radio Telegraph," by S. R. Winters. POPULAR RADIO for May, 1924, pages 490-492.

A New Way to Sell Radio Cabinets

Whoever Heard of Such a Thing Before?

We have placed on the market two NEW STYLES on which we give you choice of stock sizes at the same price. Our "Piedmont" is made of hardwood, fancy nicked hinges, three coats of the new lacquer varnish rubbed to a hard smooth glossy finish, mahogany finish only.

Sizes 7 in. by 18 in. by 10 in., 7 in. by 21 in. by 10 in., 7 in. by 24 in. by 10 in., 7 in. by 26 in. by 10 in.—YOUR CHOICE AT ONLY \$2.65 EACH. Cash with order, no C. O. D., f. o. b. Hickory.

We challenge anyone to show us a cabinet of this fine quality selling at such a low price. We have been making cabinets for four years—a few cents profit on each one, but a big production.

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ACME

ENAMELED ANTENNA



Best outdoor antenna you can buy. 7 strands of enameled copper wire; maximum surface for reception. Prevents corrosion and consequent weak signals.

The Original Celatsite

—a tinned, copper bus bar wire with non-inflammable "spaghetti" covering, for hook-ups. 5 colors; 30-inch lengths.

We also offer the highest grade of "spaghetti" tubing for Nos. 10 to 18 wires. 5 colors; 30-inch lengths.

Flexible Celatsite



Flexible, stranded wire for point-to-point and sub-panel wiring. Non-inflammable "spaghetti" covering. In black, yellow, green, red and brown; a color for each circuit. Put up in 25-foot coils.

Celatsite Battery Cable

—a silk-covered cable of vari-colored Flexible Celatsite wires, for connecting batteries to set. Prevents "blowing" of tubes; gives your set an orderly appearance.

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THE ACME WIRE CO., DEPT. P
NEW HAVEN, CONN.

ACME WIRE
MAKES BETTER RADIO

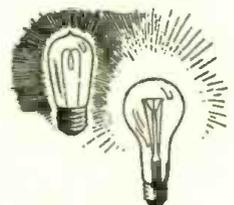
The LYNCH Metallized RESISTOR ASSORTMENT



Contains the following:—
Three .1 Meg.
One 1 "
One .5 "
One .25 "
One 2 "
Complete, \$4.25

METAL long has been recognized as the best of electrical conductors. The Lynch Metallized Resistor has received the unqualified endorsement of leading engineers, experimenters and test laboratories because it is absolutely silent in operation and remains permanently accurate.

Comprising a concentrated metallized deposit one-thousandth of an inch thick upon a glass core and sealed within a glass tube, each LYNCH METALLIZED FIXED RESISTOR wins in the exacting tests of time and service.



The old carbon lamp consumed more current to give less light. Tungsten, which is metal, proved more efficient, more dependable. The Lynch Metallized Resistor gives non-arcing, conductive resistance. It marks as great an advance as did the tungsten lamp.

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Absolutely Noiseless
Permanently Accurate
Dependable!

If your dealer cannot supply you, we will ship by return mail. You take no risk as Lynch products are sold on a money-back guarantee. Use the Convenience Coupon below.

PRICES { .25 to 10 Megohms .50
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Send me the Lynch Assortment described above (7 Lynch Metallized Resistors) with the understanding that I am to receive my money back if not satisfied. I will pay post-
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PERFECT FILAMENT CONTROL

FOR noiseless filament control and maximum range, ask your dealer for the Bradleystat. This graphite disc rheostat can be used **for all tubes** without change of connections. The bakelite knob is removable if desired. The one-hole mounting and small size make the Bradleystat easily adaptable to any radio set.



Bradleyohn

PERFECT VARIABLE RESISTOR

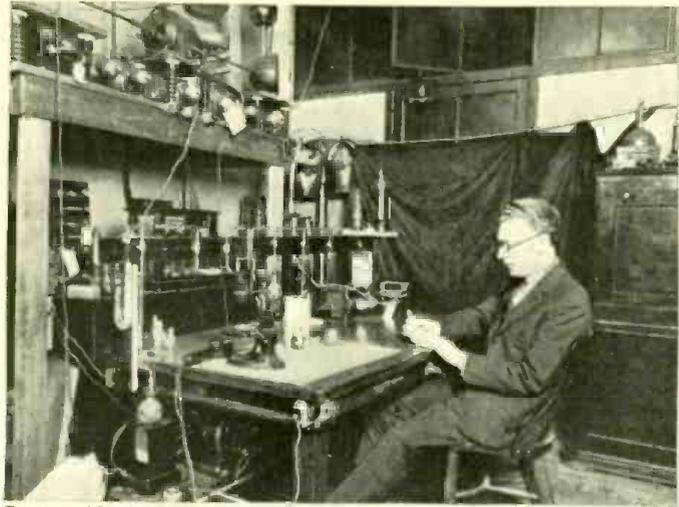
This ideal variable resistance unit is offered in several ranges as, for instance, from 10,000 to 100,000 ohms. These units are recommended by radio engineers for B-battery eliminators and solve the problem of obtaining variable voltage control from the B-eliminator. For fixed resistance units, always specify the Bradleyunit.

ALLEN-BRADLEY COMPANY
276 Greenfield Ave., Milwaukee, Wis.

Please send me your literature on the Allen-Bradley line of perfect radio devices.

Name.....

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Courtesy of Dr. J. D. Tear

DR. TEAR'S ETHER-WAVE MEASURER

Dr. Tear holds in his hand one of the radiometer bulbs. Others, with the accessory apparatus, are on the table in front of him.

Measuring the Energy in Ether Waves

A PHYSICAL instrument which is likely to be added, soon, to the armament of the well-equipped radio experimenter, is that known as the radiometer. It is one of the few instruments with which one can measure the energy in a ray of light, in a beam of infra-red or heat rays, or in a radio wave in the very short wavelength region now beginning to be explored.

The simplest variety of radiometer may be seen any day in the windows of the optical stores. It consists of a windmill-like arrangement of little metal vanes, black on one side and silvered on the other, the whole contained inside a glass bulb. When strong light falls on these vanes they move, the whole

arrangement spinning around merrily inside its sealed glass bulb. This display radiometer is a toy, not a scientific instrument. It is possible, however, to build a similar device which will have extreme sensitivity in the measurement of radiant energy, as well as the great advantage of being suitable for a wide range of wavelengths.*

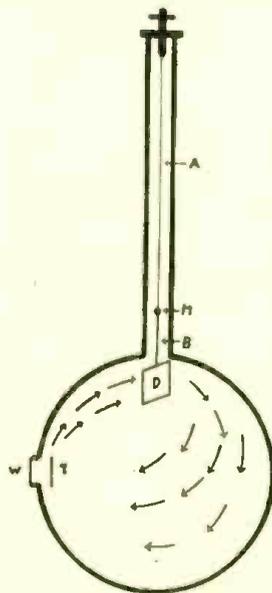
The movement of the vanes of the radiometer does not depend, as many persons think it does, upon the pressure of light. Such a pressure exists, but it is far too small to move bodies as large as the vanes in the radiometer.† What happens in this instrument is that the radiation, whether of light or heat rays or radio waves, is absorbed by the blackened side of each vane. This blackened side becomes a little hotter than the bright, reverse side. This heating, by interaction with a little gas which purposely is left inside the bulb with the vanes, produces the motion of the vane. The theory is complicated, but known;‡ and when the constants are known, the energy of the radiation may be determined.

In the delicate forms of the instrument the vane system does not rotate, but is merely allowed to twist around against the resistance of a fiber of glass or of quartz. The amount of this twist measures the energy of the radiation.

* The most sensitive form of radiometer, devised by the late Dr. E. F. Nichols and called by his name, is described in a recent paper by Dr. Nichols' former associate, Dr. J. D. Tear: "The Nichols Radiometer," *Journal of the Optical Society of America* (Menasha, Wisconsin), volume 11, pages 81-86 (July, 1925). Another form of radiometer, slightly less sensitive but easier to construct, is described in "A New Form of Radiometer," by R. L. Hanson, in the same *Journal*, volume 11, pages 283-288 (September, 1925).

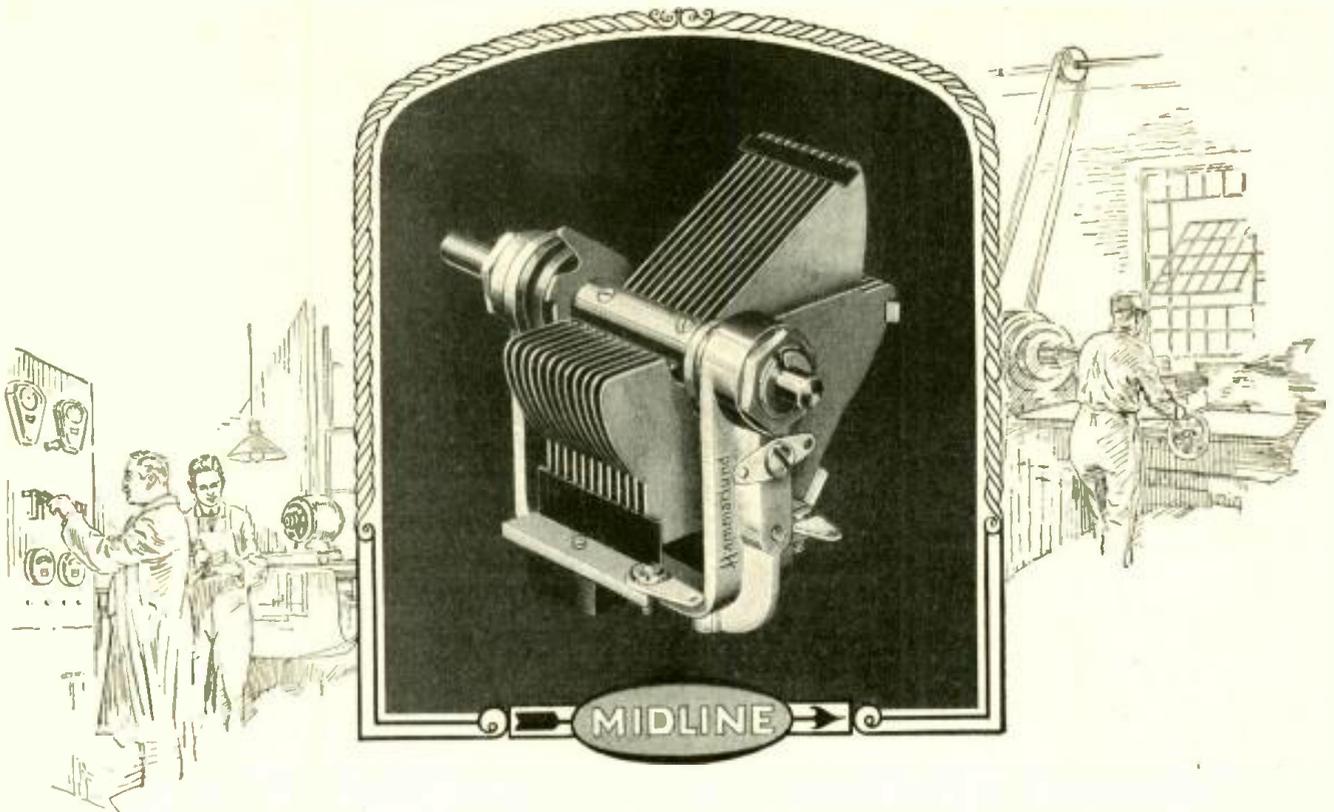
† Another instrument, capable of measuring the actual pressure of light, is described by Dr. Tear in "A Torsion Balance for Measuring Radiation Pressure," *Journal of the Optical Society of America* (Menasha, Wisconsin), volume 11, pages 135-145 (August, 1925).

‡ The accepted theory is due to the famous Dr. Albert Einstein. "The Radiometer" (in German), *Zeitschrift für Physik* (Berlin), volume 27, pages 1-6 (1924). See also, "Further Experiments on the Theory of the Vane Radiometer," by H. E. Marsh, *Journal of the Optical Society of America* (Menasha, Wisconsin), volume 12, pages 135-148 (February, 1926).



HANSON'S RADIOMETER

The waves enter at the window, W, and heat the plate, T. This creates air currents shown by the arrows. These twist the suspended plate, D, and thus the mirror, M, by means of which the amount of twist may be observed.



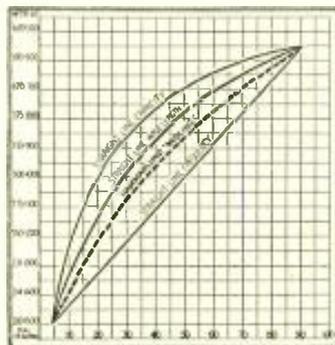
Hammarlund's New Creation The "MIDLINE" Condenser

The new Hammarlund "MID-LINE" condenser makes its bow with the claim of superiority over any other type ever produced.

Experience (yours and ours) is responsible for its many excellent features. "Straight-line-capacity" crowded the low waves; "Straight-line-frequency" crowded the high waves; "Straight-line-wave-length" merely compromised between the two. But the Hammarlund "Midline" retains the important advantages of these earlier types without any of their disadvantages.

All of the tried and true Hammarlund features are included: soldered, non-corrosive, brass plates with tie

*Avoids Crowding
at Any Part
of the Scale*



bars; rib-reinforced aluminum alloy frame; minimum dielectric; one-hole mounting, with anchoring screw; bronze clockspring pigtail; friction brake. In addition, there have been added ball and cone bearings, and a full-floating rotor shaft, the only function of which is to turn the rotor plates. It supports no weight; it may be entirely removed, or it may be adjusted for coupling to other condensers for tandem operation, or for mounting a variable primary coil.

The "MIDLINE" is much more compact and even stronger and more beautiful than previous Hammarlund models.

The better dealers will have it soon.

HAMMARLUND MANUFACTURING CO.
424-438 W. 33d Street, New York

*Hammarlund
"MIDLINE"
Condensers
will be available
in all standard
capacities;
single, dual,
and triple.*

For Better Radio
Hammarlund
PRECISION
PRODUCTS

*Watch for the
beautiful new
Hammarlund
"VERNI-TUNE"
DIAL
a revelation in
accurate, effortless
tuning.*



ELECTRAD

YOUR SET IS AS GOOD AS YOUR PARTS

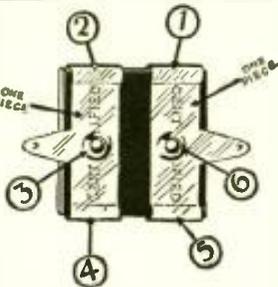
Use Electrad Metallic Leaks. No carbon, paper, varnish, fiber. Metallic resistance element fused to inside of glass tube.

Paraffined under high vacuum. Noiseless, constant, accurate, non-hydroscopic, non-inductive, unvarying under any weather or working condition. Sizes .1 to 10 megohms. Price 60c, in Canada 85c.



ELECTRAD Certified Condensers

Uniform pressure-insured by rigid binding at six points. Sheet copper, not tin-foil. Soldering iron can't hurt it. Guaranteed to remain within 10% of calibration. Standard capacities. All types. Prices 30c to 75c, in Canada 45c to \$1.50.



ELECTRAD CERTIFIED BY-PASS CONDENSERS

Prevent B-voltage fluctuation. Give undistorted amplification. Each condenser tested at 1000 volts. Maximum working voltage 250 A.C. Prices 60c to \$3.75, in Canada 85c to \$5.25.



ELECTRAD Certified Lead-in

Triple-ply insulation full 10 inches long, covered with waterproof webbing. Fahnestock clips, all connections riveted and soldered. Fits under locked windows and doors, bends to any shape. Price 40c, in Canada 60c.



For perfect control of tone and volume use the Electrad 500,000 ohm compensator. For free hook-up write 428 B'way, N.Y. City.



ELECTRAD, INC.

ELECTRAD

New York City Inc.



LISTENING IN

PRACTICAL pointers from experimenters and broadcast listeners. What helpful hints can YOU offer to your fellow fan? Readers are invited to address their letters to the Editor of this Department.

CONDUCTED BY LLOYD JACQUET

How I Picked Up Peru on My Four-circuit Tuner

IN the recent international tests, I tuned in Lima, Peru, using the old type Cockaday set, with an "Effarsee" Antenna and about 35 feet of lead-in wire. The antenna was installed in the attic.

While I believe I could have heard European stations, there was so much interference from "bloopers" that I could not clear any of the carrier waves sufficiently to hear them satisfactorily.

I have retained this old model Cockaday set, that was originally built from the design published in the October, 1924, issue of POPULAR RADIO, because of its sweet tone. When I want DX I still have no difficulty. The Cuban stations, for instance, have been coming in loud enough to dance to the music.

This is really good, persistent performance for this receiver, as it has been without a cabinet for over a year, and I have been rather negligent in keeping it clean. And I am also using the same soft detector tube that I purchased over a year ago for this set.

—ALBERT B. FISHWICH, Cincinnati, O.

How I Made a Terminal Board for My Power-pack

WHEN I constructed my Power-pack from the article in the May, 1926, issue of POPULAR RADIO, I wanted to have all of the controls easily accessible, as I wanted to place the unit in a cabinet together with the receiver. The necessity for a small panel board upon which all of the connections as well as the rheostats and other knobs are available can be appreciated.

I secured a piece of bakelite about eight inches long by four inches high, and located the necessary binding-posts and holes for the rheostats. I provided an extra connection for a "ground," although this is actually not needed.

The panel is secured to the baseboard by means of brass angles and wood screws hold it in place. Brass machine screws hold the panel to the brass angles.

All of the controls are now available together, and in the same plane. It may be placed along any edge of the baseboard and in the most convenient place for the purpose.

—HARRIS CUMBLETON, Port Washington, N. Y.

How to Get Rid of Home-made Static

MANY listeners-in may find that they can discover the source of many of their so-called "static" troubles right at home.

In my case, I was badly bothered with a noise that I finally traced to a small fan motor.

I found this small series motor sparking badly at the brushes. After trying to reduce the sparking to a minimum, I reversed the leads of the electric wire.

As one of the wires was grounded through the wiring of the system one of the brushes was connected to the ground side of the line through this change. The field coil was then on the "live" side of the line, and acted as a choke coil in the circuit.

I also found that if a two microfarad condenser is placed across the brushes, still better elimination of the sparking and interference will result. This condenser should be placed as near to the motor as possible.

If other listeners-in are bothered with similar difficulties, but find that the line is not grounded, the same methods may be used.

—A. M. FERGUSSON, Portland, Me.

The New "D" Battery

A WOMAN entered an electrical shop and asked for a "D" battery. When the clerk informed her that there was no such thing she exclaimed:

"Well, that's queer. Last evening my husband couldn't even get a whistle on the radio, and when I asked what the matter was, I distinctly heard him say it was that D— battery."

Foretelling Radio Reception from the Weather Map

(Continued from page 417)

When a receiving set is located at a point within the same pressure area as the transmitting station, and especially if this area is a "low" of great extent, reception will be poor, with much static and fading. This same condition will exist when the two stations are along the same trough of low air pressure, also when a line connecting the two stations is parallel to the isobars, unless this line be north and south. In the latter case reception will be nearly as good as when it is across the isobars in an east and west direction. When reception is across the isobars in a north and south direction, it is a little better than when the direction is parallel to them.

A transmitting station, when located within the same pressure area with the receiving station, should increase its power in order to get its signals through. When the transmitting station is within a "high" and the receiving station is in another "high," but with a "low" or a storm area between the two, reception will usually be very poor, often impossible. Static from an advancing "low" will be severe and it is generally useless to attempt reception from a broadcaster located to encounter this. Even super-power often fails to get through. It cannot be said that high power is a panacea for all radio evils.

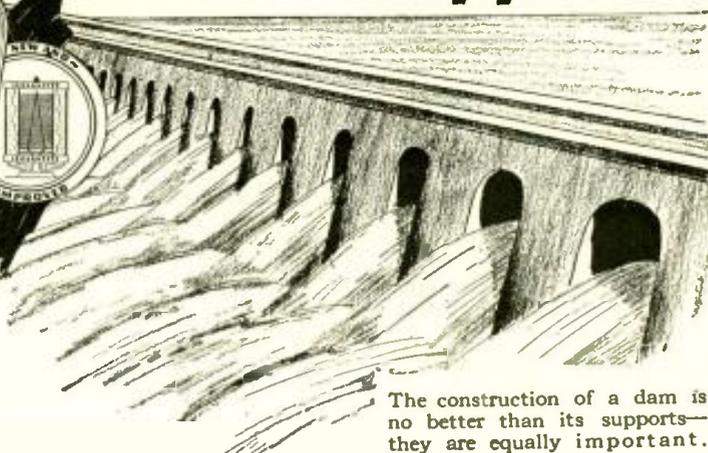
During the fall and winter months it is high pressure areas of great magnitude which so often cause phenomenally good reception. After a low pressure area has moved off toward the east of the observer and when practically no air pressure difference exists between the transmitting and receiving stations phenomenal reception may diminish. Due to the clear and cold atmosphere, however, static is virtually eliminated and irregular fading will seldom be observed.

Temperature alone does not appear to affect radio transmission or reception, except for such relationship as it has to the pressure of the atmosphere. Low temperatures nearly always indicate high air pressures and clear weather, and are usually accompanied, therefore, by a greater or lesser freedom from static. Falling temperatures usually indicate the arrival of a "high" and a sharp increase in good reception may be expected. Rising temperatures usually indicate a fall in air pressure, with high percentages of humidity. This frequently means a decrease in good reception, with trouble from static and fading. In winter, with relatively low temperatures existing, static interference may be high during a snowstorm, yet excellent directional reception will be obtained.

Thus the conditions of reception may be readily deduced from the weather forecast.

THE TUBE WITH THE SENSIBLE GUARANTEE 

The Dam Support!

Vibrationless
Uniform
and Good

The construction of a dam is no better than its supports—they are equally important.

THERE are three elements in a radio tube—The slightest movement in relation to each other causes a characteristic change, invariably disqualifying the tube.

THE NEW SUPERTRONS HAVE SUPPORTS THAT TIE THE THREE ELEMENTS INTO ONE UNIT

The BASE and SUPPORTS are ISOLANTITE

ALL TYPES—AT PUBLIC DEMAND PRICES

SX 201 A.....	\$2.00
SX 199.....	2.25
SV 199 small.....	2.25
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Supertheon Half.....	4.00
Supertheon Full.....	5.00

In Canada slightly higher.

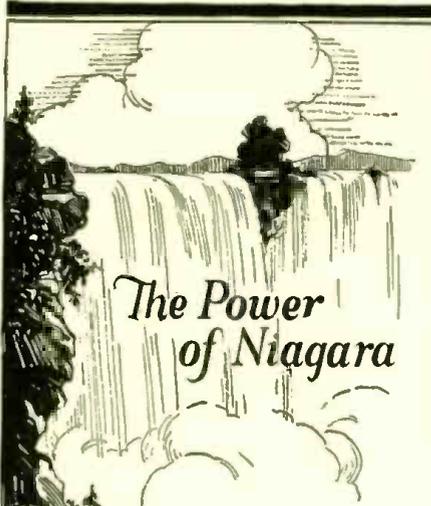
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SUPERTRON

A SERIAL NUMBER GUARANTEE

The Foremost Independent Tube In America



The Power of Niagara

Mayolian

"B" SUPPLY

The "B" Without a Buzz

THIS laboratory-built product of the pioneers in battery elimination means absolutely silent operation and constant, dependable voltage right from your light socket.

Highest "B" Voltage — 180!

And, all voltages are adjustable to the operating characteristics of any receiver or set of tubes. This means greater volume—better tone.

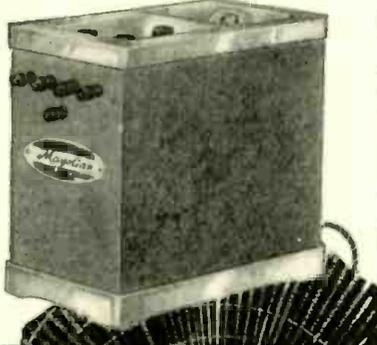
Mayolian, employing the dependable Raytheon tube, is endorsed by leading manufacturers and engineers.

Write us, stating whether your home is wired with A. C. or D. C.

MAYOLIAN RADIO CORP.
Pioneers in Battery Elimination
1991 Broadway New York, N. Y.



Operates at half the cost of a 25-Watt lamp



The Quiet of an Arctic Night

How to Build an Impedance-coupled Amplifier.

(Continued from page 420)

How to Install the Amplifier

After checking all connections, the unit may be placed in a convenient position near the tuner and the two wires running from the phone jack in the plate circuit of the detector tube on the tuner should be attached to the binding posts marked 1 and 2 in Figure 5. Next connect the "A," "B" and "C" batteries, as shown in Figure 3.

Then, insert two 201-a tubes or two high-Mu tubes in sockets M1 and M2. If high-Mu tubes are used, a "C" battery of less than 7½ volts should be used; this may be determined by experiment.

Place a UX-171 tube in the socket, M3. Then, place a 1-ampere Amperite in the holder, N. The tubes should immediately light to the correct brilliancy. The amplifier should now function properly, if the loudspeaker plug is inserted directly into the jack, O, and the set is tuned to a station. The volume control potentiometer, E, should be rotated in a clockwise direction for decreasing the volume and in an anti-clockwise direction for bringing the signals up to more volume.

The amplifier will work with any single-tube or crystal set or it may be used with a tuned-radio-frequency receiver or superheterodyne with really astonishing results in reproduction quality. It will reproduce signals truthfully with a range from a mere whisper to enough volume to fill a whole house with dance music.

The unit is so simple to build and so economical to operate that it should fit the needs of those radio enthusiasts who want to get quality reproduction with an economical outfit.

A Radiant Crystal Pilot

(Continued from page 421)

the frequency of the station that is transmitting. The two next crystals (one on either side of this tube), are ground to a frequency of only a few kilocycles higher and lower than the one in the middle tube; and the two end ones are ground to frequencies slightly higher and lower respectively than the two preceding crystals.

In operation, therefore, when the station is exactly on its correct wavelength, the crystal in the middle tube will glow brightly and the gas in the four remaining tubes will glow faintly. The four crystals in these tubes will be dark.

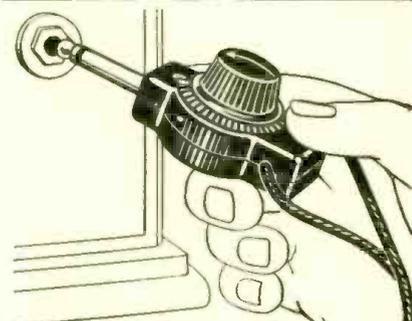
If the frequency of the station varies up or down, the crystal in the middle tube will become dark and its gas will glow faintly, whereas the crystal in one of the side tubes will take on the bright glow according to whether the frequency becomes higher or lower.

for good panels — brass

Sheet BRASS used as panels does not split or warp. Its easy fabrication assures economical production.

BRASS can be readily marked, engraved or etched and will take permanent finish in any color or style.

COPPER & BRASS
RESEARCH ASSOCIATION
25 Broadway New York



NOTHING ELSE LIKE IT!

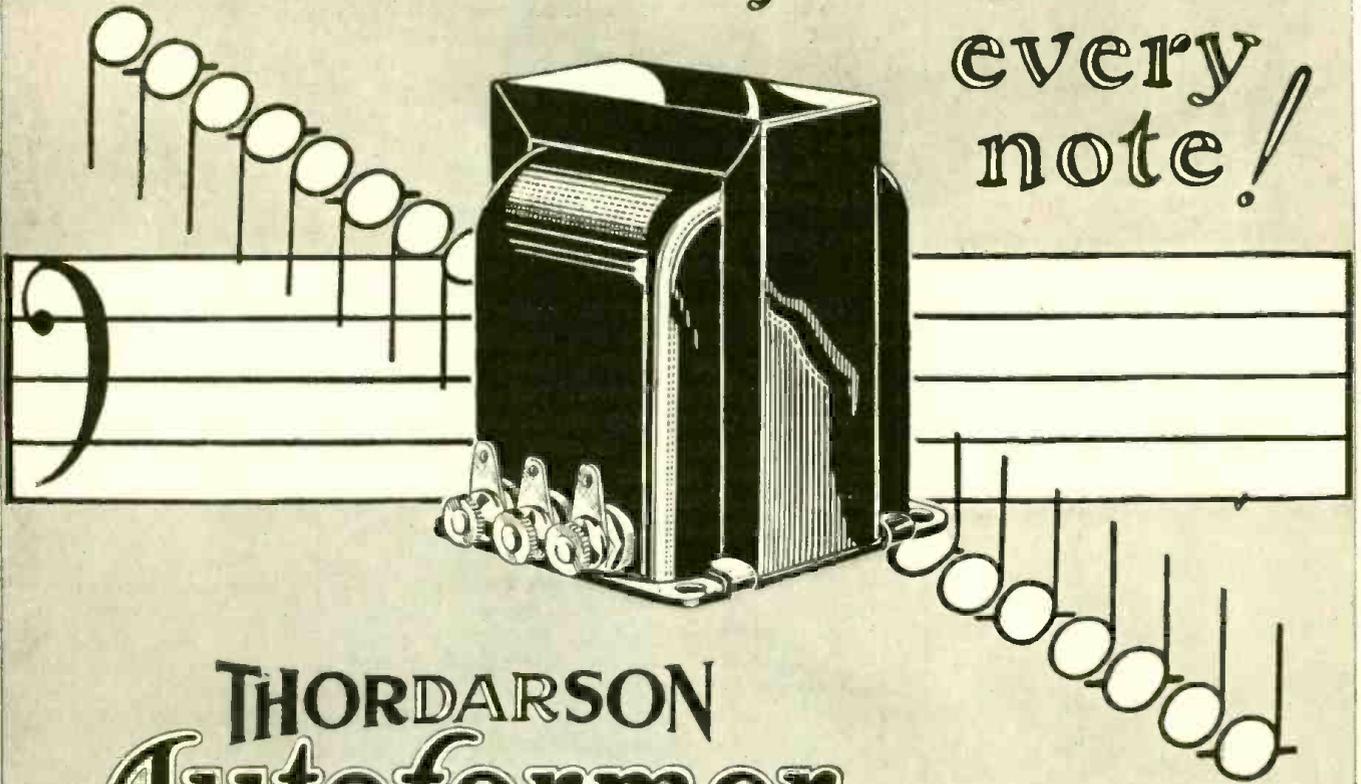
HERE is a simple radio control—the Centralab Modulator Plug—that is unique even in a field where phenomenal developments are common.

Provides smooth, noiseless control of tone and volume direct at the plug with the set operating at full efficiency. Without adjusting tuning dials or other controls, you can regulate volume from a whisper to maximum simply by turning the little knob on this plug. Reduces static interference—clarifies tone. Replaces the ordinary loud-speaker plug.

\$2.50 at your dealer's, or mailed direct on receipt of price.
CENTRAL RADIO LABORATORIES
17 Keefe Ave., Milwaukee, Wisconsin
Manufacturers of variable resistances for all radio circuits

Centralab

Fully Amplifies
every
note!



THORDARSON Autoformer

Step-up Impedance Coupled Amplifier

Full Amplification
of Bass Notes

Greater Clarity
on all Programs

Improved Reception
of Weaker Stations

Better Volume Control

Impedance coupling is universally accepted as the most perfect form of amplification from a reproductive standpoint—But the amplification increase of the straight impedance is low.

The Thordarson Autoformer is an impedance with a step-up ratio—It combines the faithful reproduction of the impedance with the amplification increase of the transformer, paving the way for the release of the deeper tones with increased volume and unrestrained quality.

Price each \$5.00

Note: Only Thordarson makes the Autoformer

POWER From the A. C. Line

Power Amplifier Supply Transformer R-198 furnishes current for both plate and filament of the power stage using the U. X. 210 power tube with 400 volts on the plate and 7½ volts on the filament. In addition furnishes complete B-supply for the set.

Price \$12.00

B-Eliminator Transformer R-195 is designed for use with the Raytheon tube, furnishing B voltages for the entire receiver.

Capable of supplying 140 volts at 40 milliamperes. Conservatively rated. Will not heat up in continuous service.

Price \$7.00

30 Henry Choke Coif R-196 is used in the filter circuits of power amplifiers and B-eliminators operating from the house lighting current. D. C. resistance 280 ohms. Capacity 70 milliamperes.

Price \$5.00

THORDARSON ELECTRIC MANUFACTURING CO.
Transformer specialists since 1895
WORLD'S OLDEST AND LARGEST EXCLUSIVE TRANSFORMER MAKERS
Chicago, U.S.A.

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- YAXLEY MFG. CO.
- AND OTHERS

DEALERS—SEND FOR LARGE ILLUSTRATED CATALOG

How to Wire Your House for Radio

(Continued from page 432)

Perhaps, after all, the ultra-flexibility of this system may likewise prove a serious drawback, for the reason that there is no master control. Thus an indiscreet guest might operate his individual radio receiver long into the night, whereas with the master control, politely flipped at the desired time, Mr. Indiscreet Guest is notified in simple terms that the time for radio entertainment is at an end for the night, at least.

With Master Receivers and Feeder Wiring for Real Service

The third form of radio wiring installation for the home is a combination of the two preceding plans; in other words, there are several radio receivers employed so as to provide some measure of program diversity with master control, together with a multiplicity of loudspeakers so as to bring the radio programs to all parts of the household.

The household is divided into natural divisions according to radio service, and a master receiver together with a system of feeder wiring and the necessary loudspeakers, is provided for each division. The various divisions are, to all intents and purposes, separate radio installations and operate quite independently of each other.

Typical of this plan is the unique "Model Radio House" recently completed at St. George, Staten Island, overlooking busy New York harbor. This home, with its radio wiring and radio equipment, has been sponsored by the Radio Corporation of America and marks the dawn of a new day in broadcast reception. It represents the first attempt to realize to the utmost the benefits of broadcasting service; hence it offers an excellent model in discussing the possibilities of radio wiring.

Permanent radio wiring, installed at

the same time as the usual electric wiring, provides the foundation for the radio installation of the Model Radio House. Outlets are provided for furnishing alternating current to the radio equipment and also to the loudspeakers, while gang switches provide the necessary means of local and remote control. An eight-tube super-heterodyne loop receiver is placed in the living room, and serves to operate a cabinet-type AC, drive cone on the opposite side of the room, or a similar cone in the dining room, through concealed wiring and gang control switches. Either loudspeaker may be turned on at will, either from the living room or dining room.

In the kitchen is a five-tube tuned-radio-frequency type receiver, operated by batteries and employing an aerial, with its own cone speaker; this set serves to supply radio entertainment and service for the housewife while about her kitchen duties.

Upstairs is located a master six-tube super-heterodyne loop receiver in the master bedroom, operating a power cone in that room and another power cone in the guest room, through a system of switches and concealed wiring. Radio service is available in either room at will, but the choice of programs obviously rests with the occupants of the master bedroom who may tune the receiver as desired.

As a further touch, the radio receivers are controlled by a time switch, set to turn on the service in the morning so that the cheery voice of the physical training director may serve to awake the sleepers and invite them to their daily dozen.

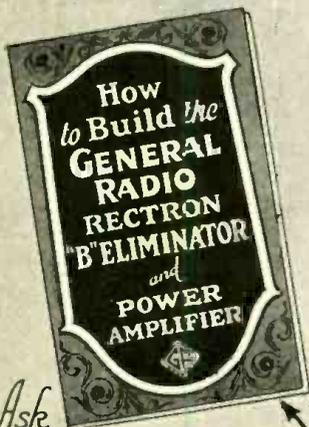
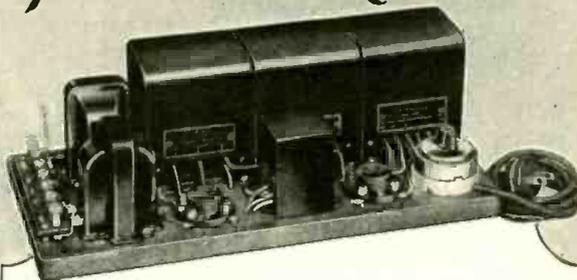
The plan here carried out seems to provide a happy combination of the advantages to be gained by both of the fundamental plans already outlined, with virtually none of the disadvan-

A TYPICAL RADIO INSTALLATION FOR A SIX-ROOM HOME*

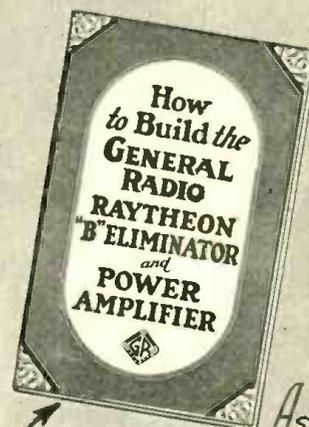
ROOM	SET	CURRENT SUPPLY	POWER CONSUMED IN WATTS	OUTLETS REQUIRED	COST OF ELECTRIC INSTALLATION	COST OF OPERATION
Living Room	8-tube super-heterodyne power cone	Full house current operation	200	7	\$35.00	1 cent per hour
Dining Room	Power cone	"	200	4	\$20.00	"
Porch	(Served by above)	"	200	4	\$20.00	"
Master Bedroom	6-tube super-heterodyne power cone "B" eliminator	"A" and "C" Battery "B" power from house current	100	8	\$40.00	1/2 cent per hour plus "A" battery cost
Guest Bedroom	Power cone "B" eliminator	"	100	4	\$20.00	"
Kiddies' Room	(Served by above)	"	100	none	none	1/2 cent per hour
Kitchen	5-tube r. f. receiver battery operated	Full battery operation	—	2	\$10.00	Battery costs

*Based on the "Model Radio House" installation, sponsored by Radio Corporation of America.

Not "How Far?" Not "How Many Stations?" But "HOW REALISTIC?" is now the pertinent question of radio



Ask your dealer or write for this folder



Ask your dealer or write for this folder

The spell of magic in radio is over. No longer are we mystified by programs from far off cities. No longer do we spend whole evenings in dial-fishing for all the stations we can get—just for the sake of boasting a long list of call letters.

Today we are in a new era of radio—one of quality reproduction. Broadcast listeners everywhere are demanding above all else reception that is natural.

If your radio set has not been modernized by the improved type of loudspeaker, better transformers, "B" voltage supply units and power amplifiers, you can not appreciate what clear, sweet-toned music athrob with human expression is in store for you.

Ask your dealer to show you the new General Radio Rectron and Raytheon "B" Eliminator and Power Amplifier kits which you can easily assemble in a single evening. Ask him about the new type 387 Speaker Filter and the type 285-D transformer for use with the new 200A detector tube. If he is not prepared to supply you with the equipment or information write us for whatever details you require.

GENERAL RADIO CO. Cambridge, Mass.



**The Type 285-D
Audio Transformer**
has a high impedance to match the output of the new 200-A detector tube. When used in the first stage of audio amplification following the 200-A the 285-D produces a very marked improvement in tone quality.
Price \$6.00



**The Type 387
Speaker Filter**
adapts the impedance of the amplifier to the Western Electric and other cone speakers of similar design and quality so that unusual purity of tone is produced. It has a very wide frequency range.
Price \$6.00

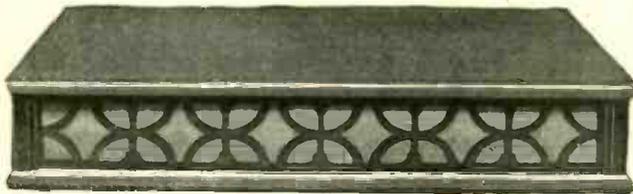
GENERAL RADIO

Behind the Panels of Better Built Sets

PARTS



Say **TIMBRETONE**
REG. U.S. PAT. OFF.
 and you say it all.

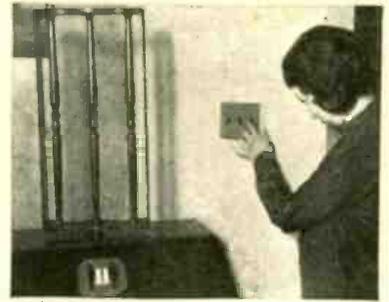


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Kadel & Herbert

IN THE HOME WIRED FOR RADIO
 Programs may be switched from one room to another as easily as you switch on and off the electric light.

tages. In actual practice it has proved by far the most desirable.

Balancing the "Wiring Costs" Against "Receiver Costs"

The question of radio installation resolves itself largely into a matter of balancing wiring costs against receiver costs.

Thus if the entire house is wired for radio service from a single receiver, the wiring cost is certain to be high in proportion to the receiver cost. If, on the other hand, individual radio receivers are employed throughout the house, the receiver cost will be very high while the wiring cost will be practically nil.

Somewhere between these two extremes, then, lies the economical and practical solution of any radio installation plan.

Conditions go far to decide the choice between radio wiring and individual radio receivers. For instance, with neighboring rooms not separated by sound-proof partitions, the logical choice should be a master receiver in one room, with loudspeakers in both rooms, together with the necessary extension wiring. Separate groups in the household, such as the family and the help, should be served by separate master receivers with individual loudspeaker wiring.

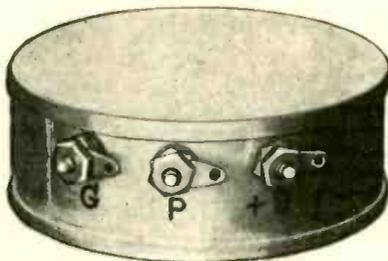
Again, two widely separated parts of the house, such as the living room and the den in the attic or the workshop in the basement, should not be placed on the same receiver due to the inconvenience of control, as well as the excessive wiring costs.

There are two fundamental principles to follow in planning the radio installation and wiring:

First, a single or master receiver for rooms quite close together, not separated by sound-proof partitions, and serving persons of more or less similar tastes.

Second, separate or individual receivers for widely separated parts of the house and for groups of widely divergent tastes.

These two fundamental principles, together with due consideration of the cost of wiring balanced against the cost of receivers, should prove a safe guide in planning a real radio home.



Shielded Tuned Radio Transformer, No. 30

SICKLES Diamond-Weave Coils

The new Sickles Shielded Tuned Radio Transformer prevents both outside and local interference. It is remarkably compact, sharp-tuning, sturdy.

Sickles Diamond-Weave Coils have established an enviable reputation for low distributed capacity, low dielectric losses, and large range of frequency with small variable capacity.

There are Sickles Diamond-Weave Coils for all leading circuits.

THE F. W. SICKLES CO.
 134 UNION STREET
 SPRINGFIELD :: MASS.

No.	Coil Prices	
30	Shielded Transformer	\$2.00 each
24	Browning Drake	7.50 set
18A	Roberts Circuit	8.00 set
25	Aristocrat Circuit	8.00 set

How to Simplify Your Set With Automatic Filament Controls

(Continued from page 425)

make his own set this is a decided advantage. First let us compare the results obtained by the use of different types of resistances. To do this a circuit was arranged as shown in Figure 2.

Only one tube was used to make the test and one was chosen which had standard characteristics, that is, when 5 volts was applied to the filament there was a flow of .25 ampere of current. A voltmeter with a range of 0-8 volts was used to measure the voltage of the battery and of the tube. Flexible leads were provided so that voltages across the resistance or across the filament could be read. A standard ammeter was used which provided an accurate reading of the current taken. An ordinary rheostat was used to vary the impressed voltage on the circuit and a high-resistance voltmeter was used so that there would be no misleading readings of current value due to the current consumed in the voltmeter. Several tests were run on various types of filament control devices which are on the market on the apparatus shown in Figure 1.

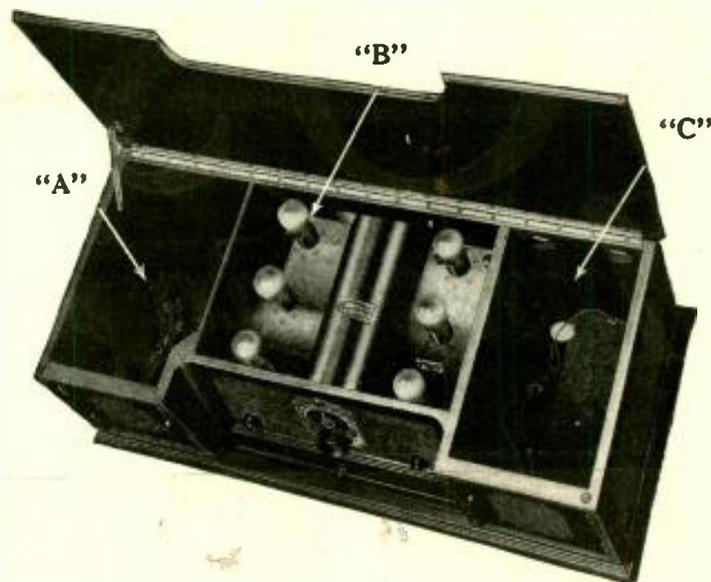
Only two characteristic curves are shown. They are numbered 1 and 2 in the accompanying curve sheet shown in Figure 3.

The voltage on the tube was plotted in a vertical direction and the battery voltage laid along the horizontal line. It will be noticed that they are practically straight lines. The ideal regulation of course would be a straight line running horizontally through the chart at 5 volts, thus indicating that no matter what the battery voltage happened to be the filament voltage would be 5 volts. This is practically impossible to obtain, however. But the closer the curve approaches the horizontal the better the regulation. Curve No. 3 shows the characteristics for an ordinary piece of resistance wire of an adequate size so that there could be no heating action, consequently the resistance remained constant at all voltages. This curve is not as close to the horizontal, or to the ideal conditions as the others. Using the simple resistance the storage battery must be recharged before it is down to as low a point as could be reached by the use of an automatic control.

A SET capable of receiving a thousand miles in the United States is not effective for more than 500 miles in India, due to peculiar atmospheric conditions there.

* *

WEATHER and meteorological data supplied by the Weather Bureau are broadcast today from 138 broadcasting stations in the United States.



(A) Space for 135 Volt "B" Battery or Mu-Rad B Eliminator.

(B) Power Tube.

(C) Space for "A" Battery and Trickle Charger.

PERFECTION

is never attained. Each year sees improvements in what was thought "the ideal" the year before. —Thousands of persons have bought MU-RAD receivers in the past five years—thousands of others will buy MU-RAD Super-Sixes this year. And the MU-RAD Company now provides an exchange plan on old for new model receivers, so that owners of last year's sets can secure a liberal allowance toward the purchase of a new

MU-RAD SUPER-SIX RECEIVER

- | | |
|-------------------------------|--|
| 1. Perfection of tone quality | 4. Thunderous volume controllable to a whisper |
| 2. Selectivity | 5. Fine appearance. |
| 3. Long range | 6. Single tuning control. |

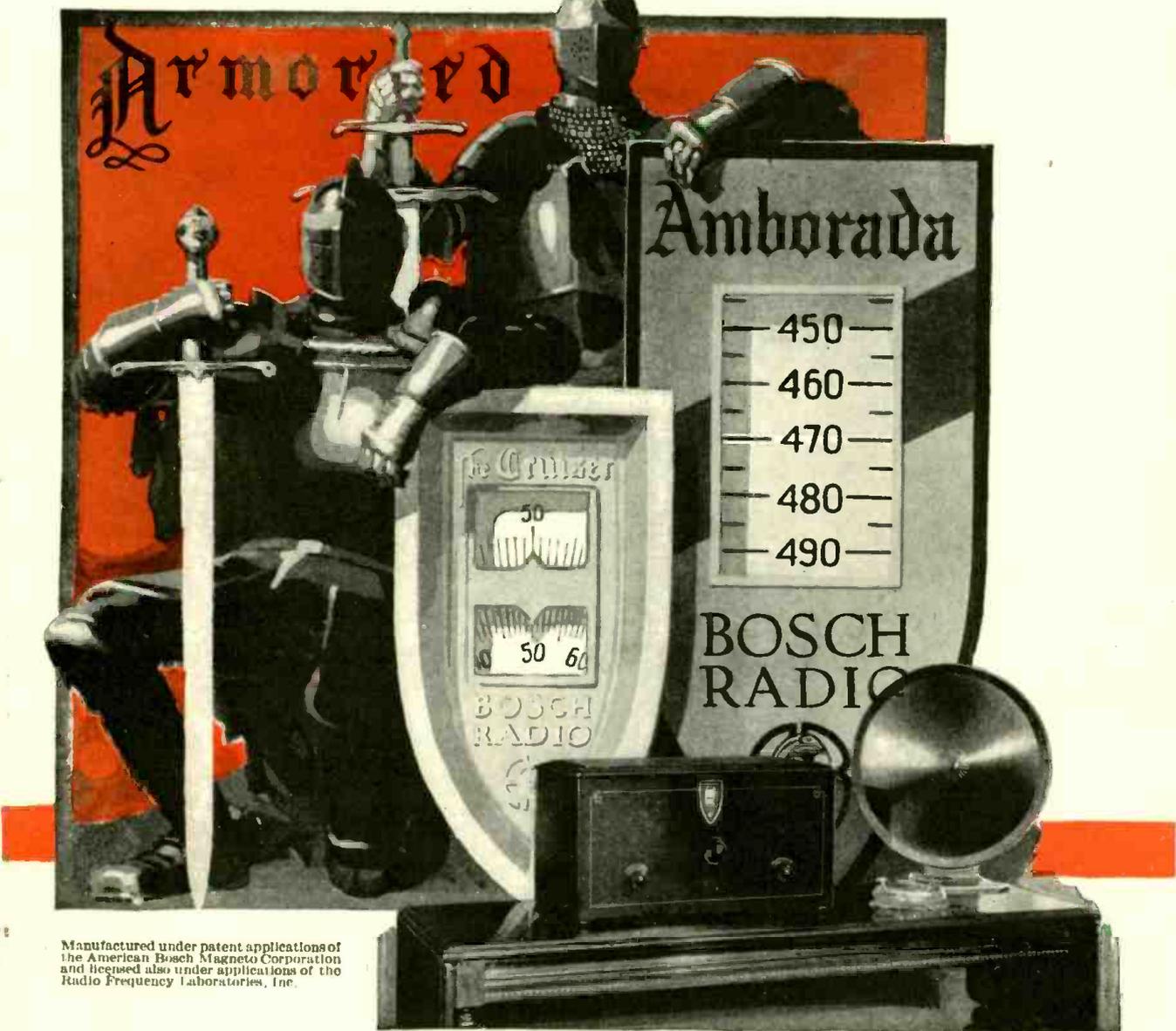
*There is a pride in possessing
fine things.*

MU-RAD RADIO CORP.

DEPT. P, ASBURY PARK, N. J.

BOSCH

Announcing the New



Manufactured under patent applications of the American Bosch Magneto Corporation and licensed also under applications of the Radio Frequency Laboratories, Inc.

The Cruiser 5 Tubes—\$100.

AMERICAN BOSCH

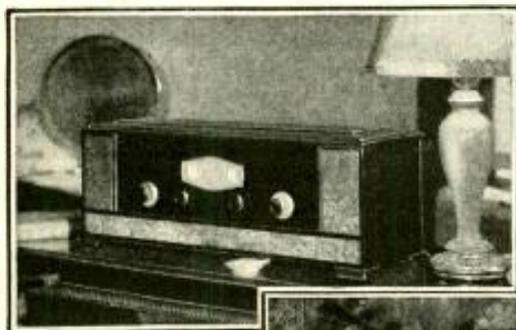
BRANCHES: NEW YORK CHICAGO DETROIT SAN FRANCISCO

RADIO

ARMORED LINE

Fully demonstrating its leadership Bosch presents two new Bosch Radio Models—the Amborada and the Cruiser—receiving sets which show a most remarkable advance in home entertainment. The Amborada is the embodiment of perfect radio and quality in furniture. It is a completely armored and shielded seven tube receiver with utmost simplicity of operation. There are but two controls—a Station Selector and a Volume Control. Never was radio made so simple or more enjoyable. The early American period cabinet presents a new and beautiful setting to radio in the home. Ample space is provided for all batteries, charges or power units with no evidence of its being a radio receiver. No antenna is necessary with this new model. The Amborada will be welcomed by those who have waited for just this development. The Cruiser is a compact

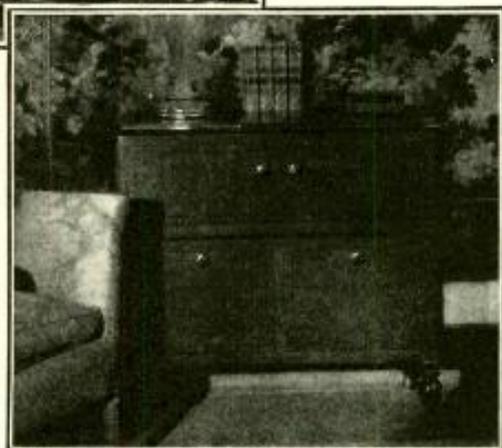
perfectly armored and shielded five tube receiver. Its simplicity is expressed in the Unified Control which gives the advantages of a single station selector for most tuning but when “Cruising the Air” two dial tuning advantages are always present. The Bosch Radio Dealer near you—usually the leader in his community—will explain the great advances Bosch has contributed to Radio. He also sells the Bosch Ambotone Reproducer and the Bosch NoBattery power unit, as well as the many other Bosch accessories. We invite your inquiry if you wish his address. Be sure to hear Bosch Radio before buying any radio equipment.



The Famous
Model 16 at \$150.



The Amborada
7 tubes—\$310

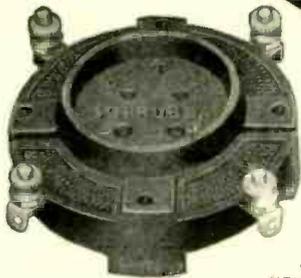


All prices slightly higher, Colorado and west and in Canada

MAGNETO CORPORATION

MAIN OFFICE AND WORKS: SPRINGFIELD, MASSACHUSETTS

SOFRUBBA



The
"Sofrubba"
Standard
Socket
2 1/2 inches
diameter



And Now! The Ultimate Achievement A Soft Rubber Socket

This new live rubber socket is the latest development in a perfected socket that really absorbs shock and eliminates all microphonic noises.

This is a revolutionary achievement that has solved V. T. socket problems and has caused great comment throughout the radio field.

Here are some of the remarkable features of the Sofrubba socket. Ask your dealer about them or write us direct.

It is a perfect shock-absorber.

It is made of special process soft—live—rubber.

It is guaranteed without qualification against rubber change or any other defect for 5 years.

It is unbreakable.

It is adaptable to top and sub-panel mounting without change.

It aligns itself to warped panels and imperfect panel drilling.

It gives a perfect hugging contact.

Each contact is one continuous piece and self-cleaning.

It is *Universal*. Takes UV and UX types of tubes.

It is good-looking—practical—efficient.

Its low price, alone, makes it distinctive.

It is surprising the difference this socket will make in your set

Dept. B

Moulded Products Corporation

549 & 551 West 52nd Street, New York City



The YES and NO MAN

POPULAR RADIO is receiving so many inquiries about broadcast artists—intimate questions concerning their private lives, the details of their professional training and their personal eccentricities—that it has finally been forced to broadcast the information for the benefit of all its readers. Address both your questions and your information about broadcast artists to THE YES AND NO MAN of POPULAR RADIO, 627 West 43rd Street, New York City.

APW.—Aage Sorenson of the WEAF "Vikings" is a real Norwegian, although he has been in this country for many years * * * He is thirty-seven years old and lives in New York City. * * * On this page, you will find a picture of him in costume—which we have dug up at enormous trouble, just for you.

A MERE WIFE.—Yes my dear, WRNY took the Edison hour away from WJZ—months ago. * * * Joseph Plunkett (WEAF) and his "Plunketeers" left the microphone nearly a year ago. * * * Glad to hear one woman voice her opinion concerning the morning "woman's hour." * * * Granlund is still clowning at WHN and Wendell Hall is still being funny and original somewhere in the United States. * * * What Wendell needs is another "Ain't Gona Rain No Mo" song; he's been living on the old one long enough.

LOUIS W.B.—Clyde Hager left WMBB and is now the director of KFQZ. * * * There is an appropriation to finish out the year for WNYC; what will happen to it in 1927 we do not know. * * * We think Lamdin Kay is still in business at Atlanta, Georgia. * * * Yes, he *does* personify the South just as Mr. Granlund personifies the Orpheum Circuit. * * * We can't keep track of Burr McIntosh; he's here and there; largely there. * * * His philosophy is too Dr. Crane-ish to suit *this* toughy.

JAKE.—Please don't write in here with a feminine hand and sign your letter Jake; you can't fool this sly old weasel! * * * If you're looking for the "Kansas City Jay Bird," his real name is Carson Robinson. * * * We don't know where he is appearing regularly; the last time we saw him it was 3 A.M. and he was bent on writing "an ode to mother." * * * There's only one thing that makes a man want to write an ode to mother at 3 A.M.

ELMER D.—You will find Harold Isbell broadcasting from KFI.

ZANDER THE GREAT.—Arthur Clifton is the organist from WBZ during the "Dreamland Recitals." * * * He *does* play nicely, but we would not yet accuse him of being a naster; he was discovered by one of the WBZ announcers while summering at Ocean Park, Maine. * * * Keith McLeod is still with WJZ. * * * Yes, he's Scotch and also the musical director of WSZ. * * * Now don't get nasty about Milton Cross! We eat people who don't agree with us about Cross.

T.D.F.—You are sure an industrious letter writer! * * * We don't know the true identity of WGN's "Phantom Violin," as a matter of fact, we have never been intrigued by mysteries of this sort and we care not a tinker's hellabalue whether Mr. Phantom is man, woman or announcer.



A.B.N.—Glad you like this new department—but never mind sending us that dozen of fresh eggs. Thanks just the same. * * * Thomas Cowan (ACN) was one of the pioneer announcers at old WJZ; he was born three blocks from the site of the old studio. * * * In a recent letter to us Tommy said that Ouida said that somebody else said that a "young married man is a young man married." * * * He is not married and says very emphatically that he "*never will be.*" * * * Mr. Cowan now lives in Greenwich Village; he is the first announcer that we know of who has displayed this marked aesthetic taste. * * * His habitat is in one of those cellars where you inhale the "new freedom" and other odors.

F.W.P., Jr.—ACN (Thomas Cowan) moved from WJZ to WNYC over a year ago. * * * That he is the incognito Duke of Coglein is news to us. * * * As a matter of fact, this sounds like gross exaggeration, but you never can tell. * * * We once met a young man at a summer boarding house who was resting *incognito*; he said he was a member of the House of Bourbona, but we later found him on the floor at Macy's Department Store.



ROBERT.—Rosaline Green is the young lady who takes leading parts in WGY's radio drama's. * * * She has also appeared in the Little Theater Productions of New York University at Washington Square, New York. * * * Write to her care of WGY, Schenectady, N. Y. * * * She does *not* pass on radio plays however.

MRS. A. H.—Yes, "Gambie" will probably be back on the air with "Roxy" after the new Roxy Theatre opens.

HARRIET.—The café you mention is one of those places where you pay no *covert* charge—but you have to drink your way out. * * * However, if you think the orchestra should be broadcast, write to one of the New York stations and suggest it.

NO-NAME.—That was Madame Feby Clement you heard at WTIC. The madame was formerly with the Boston Grand Opera Company. * * * Did we ever sing over the radio? * * * Oh, mister, what ever put such a thought in your mind?

A.A.M.—The WEA Opera Company is under the direction of Cesare Sodero and not Graham McNamee, as you seem to suspect.

DONALD LACY.—"Biggest Little City In The World" was the slogan of WDAY, Fargo, N. D. * * * This is another Babbitonian conception. * * * Daily Paskman is the director of WGBS and it was Allen McQuhae, one of 587,522 "famous and popular" Irish tenors that we have in America who sang from WEA for Mr. Atwater Kent on Sunday, June 27th. * * * Yes, WFBH (NYC) still has halitosis.

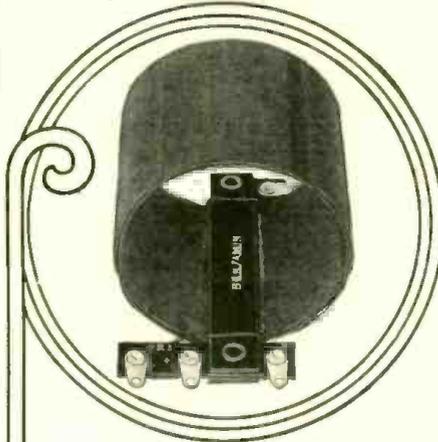
DWIGHT O.—So you're a tenor and you want a list of stations in your vicinity! Why not WGR? * * * That's really the only good microphone in Western New York. * * * Aw, please don't sing "Mother McCrea."

POLLARD, JR.—So you're going to study psychology and "knock 'em dead" on the air? * * * Well, good luck to you; if you can master a psychology of broadcasting you're a good man. * * * Try your stuff on WHN. * * * If you can "psycho-lize" this audience into appreciating something more aesthetic than entertainment that is the equivalent of a 125th Street burlesque show, you will deserve high honor.

Only the Best Radio Parts are good enough for a Good Set

All Benjamin Radio Products are of the same high standard as the far-famed Cle-Ra-Tone Sockets —

Quality in every part of a radio set is depended upon for true-to-life reproduction of radio. There dare not be a flaw anywhere. And all the parts must synchronize. Each Benjamin Radio Product fits in perfectly with the power and conditions of the set and contributes greatly to its sensitivity, selectivity, volume and quietness. The use of Benjamin Radio Products in every part of the world — by authorities and amateurs — endorses the quality and effort that the Benjamin Electric Mfg. Co., has put into each product.



Improved Tuned Radio Frequency Transformers

Proved through exhaustive and comparative tests to be the most efficient coil for modern radio sets. Better in all important features and characteristics. Space wound. Basket weave. Cylindrical. Highest practical air dielectric. Gives wonderful sharpness in tuning, better volume and purer tone quality.

2 1/4" Diameter Transformer
Compact. Especially desirable for crowded assembly. Eliminates interfering "pick-up." Set of three, \$5.75 — Single Transformer, \$2.10.

3" Diameter Transformer
Capacity coupling reduced to lowest degree. For use with .00035 Mfd. Condensers. Set of three, \$6.00 — Single Transformer, \$2.25.

"Lekeless" Transformers
Uniform high inductance, low distributed capacity and low resistance. The external field is so slight that it permits placing coils close together without appreciable interaction. Single Transformer, \$2.50.



Push Type Cle-Ra-Tone Sockets



Spring Supported, Shock Absorbing. Stop Tube noises. Greatest aid to non-noisy operation. Contacts always clean. 75 cts. each.



Battery Switch

Quick, positive, clean-cut make and break. When it's "in" it's "off," eliminating danger of wasteful use of battery. 30 cents each.

Straight Line Frequency Condensers

No crowding of Stations. The broadcast range is spread evenly over the complete dial. Stations come in without interference, and tuning is much easier. An instrument made with the precision and compactness of a watch. Adjustable turning tension.

.00025 Mfd., \$5.00 .00035 Mfd., \$5.25
.0005 Mfd., \$5.50

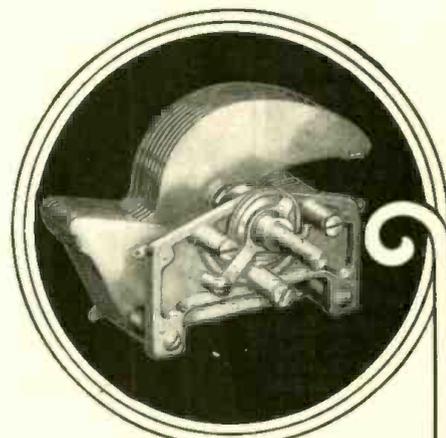
If your dealer cannot supply you send amount direct to our nearest sales office with his name

See Benjamin Products at the Radio Shows

San Francisco, Calif., Aug. 21-28. Booth 87.
New York, N.Y., Sept. 13-18. Booth 9, Sec. CC.
Chicago, Ill., October 11-17. Booth 9, Sec. P.

Brackets

An aid to simplification in set construction. Support sub-panel, with room underneath for accessories and wiring. Plain and adjustable. Plain 70 cents per pair; adjustable \$1.25 per pair.



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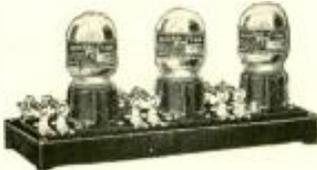
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Chicago

San Francisco
448 Byrant Street

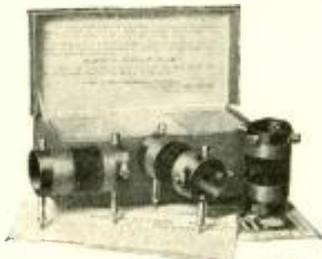
Manufactured in Canada by the Benjamin Electric Mfg. Co. of Canada, Ltd., Toronto, Ontario



A Chorus with no Bass Voices ?



Daven Super Amplifier, combines with any circuit, giving pure tone, free from distortion.



Daven Radio Frequency Coils combine extreme sensitivity with selectivity and ease of control.



WHAT would it sound like?—What does it sound like? Anyone with an ordinary radio set can tell you.

The Daven Bass Note Circuit, which is creating such a sensation among the fans, embodies everything that a good circuit should have—Quality—Volume—Sensitivity—Selectivity and Ease of Tuning. The Daven Super Amplifier assures perfect reproduction; the DRF Coils, designed as a companion of the Daven Super Amplifier, function as perfectly in the Radio end.

Six tubes, tuned radio frequency, volume controlled from the faintest whisper to enough to blast the speaker. Straight line construction, simple to build. Any Authorized Daven Service Dealer can supply you with all of the parts with full instructions. For full information and address of nearest Daven Dealer, write us direct. Catalog free.

DAVEN

BASS NOTE CIRCUIT

Embodying These Standard Daven Radio Parts

- 1 Set D. R. F. Coils
- 1 Daven Super-amplifier with the new Glasters
- 3 Daven MU-20 Tubes
- 1 Daven Leakandenser No. 22
- 1 Daven 1/2 Ampere Ballast
- 1 Daven 1/2 Ampere Ballast
- 1 Daven Type "A" Condenser
- 1 Daven MU-6 Power Tube

"The One of Merit"

DAVEN RADIO CORPORATION

TRADE MARK "Resistor Specialists" REGISTERED

159 SUMMIT ST., NEWARK, N. J.

MANUAL OF DAVEN AMPLIFICATION

This book, 25c at dealers, describes Daven Resistance Coupled Amplification in full detail. 30c by mail.

ALTON C.—Ben Bernie, the jazz "maestro," was born in New York's East Side and probably received his early inspiration from the rattle of the Third Avenue "L." * * * Yes, Brokenshire *does* think he is quite some pumpkin. At a certain party given by another announcer some-time ago, he said that WJZ had to bring him back to New York from Washington because the station was losing its audience. * * * There's lots and lots of announcers where Brokenshire came from; about 34,000,000 of them, in fact.

BEBE.—It is B. A. Rolfe, conductor and owner of the Palais D'Or (NYC—WEAF) orchestra who plays such beautiful cornet solos. * * * Incidentally, Mr. Rolfe holds the world's record for high registration on this instrument. * * * He goes away, away up; away up there by the balcony on the Woolworth Tower!

DANNY BOY.—It was Thomas Edison who said of Harry E. Humphrey's voice that it was the best he had ever heard. * * * Of course, we wouldn't be ironical for the world, but let me see, Mr. Edison is a bit deaf, isn't he?



K.K.K.—Stanley W. Barnett is a WBAL announcer and studio manager. * * * He is young and handsome, as you will see from his photograph. * * * No, he has never been in the movies.

LILLIAN C.—Lotta Madden is the soprano who sings for the Federation Mixed Quartette from WEAF; Bruce Muir is the tenor. * * * Thanks for the kind thoughts; you write a *very* chummy letter. * * * My, we wish we were young again!

HARRY H.D.—At the time this note is written, it is rumored that Lewis Reed is leaving the announcing staff of WJZ. * * * This is a blow to good announcing in New York; Reed is anything but a blah-blah boy.

D.B.C.—Marcel Dupré, my dear, is the man who plays the organ at Notre Dame, Paris; it was on his last visit to this country that he played the Wanamaker organ over WJZ. * * * Charles Popenoe is the director of WJZ; he is a captain in the Signal Corps Reserve. * * * Can't tell you what happened to Jolly Bill Stienke. * * *

CHARLES II.—Don't ask this department to tell you *why* Uncle Walt (WGN) talks like the father of 18 children. * * * Charlie Erbstein, the windy "gagster" of WLIB, is a really famous criminal lawyer. * * * He seems to be the type of announcer who thinks that Service's "Cremation of Dan McGee" is a whale of a dramatic piece. * * * That puts him definitely in the class of that master of poetic combustion, Mr. Granland of WHN.

ELKAY

TUBE EQUALIZER SYSTEM

Eliminates Rheostats

Elkay Equalizers replace variable rheostats, delivering correct voltage to any type of tube *automatically*. To use any combination of tubes in same set, merely insert correct value of Equalizer; there is one for every tube made. Before building your set, write for folder, to The

Langbein-Kaufman Radio Co. (Dept. P)
511 Chapel St.
New Haven, Conn.

50c Each
75c Mounted

Silent "B" Power with World Radio Storage "B" Battery

12 Cells 24 Volts

Lasts Indefinitely — Pays for Itself

Dependable. Quiet "B" power, clear without "hum." Economy you have never before thought possible. Convenience. Outstanding performance. Recharged for almost nothing. Solid rubber case insures against leakage or acid. Extra heavy glass jars. Heavy rugged plates. Approved and listed as standard by Pop. Radio Laboratories, Pop. Sci. Inst., Standards, Radio News Lab., Lefax, Inc., and other Radio authorities.

Extra Offer: 4 Batteries in series (96 Volts) \$10.50.

SEND NO MONEY! just state number of batteries wanted and we will ship same day order is received. Pay expressman after examining batteries. 5 per cent discount for cash with order. Send your order today—NOW!

WORLD BATTERY COMPANY
1219 So. Wabash Ave. Dept. 77 Chicago, Ill.

Makers of the Famous World Radio "A" Storage Battery

Prices: 6-volt, 100 Amp. \$10.50; 120 Amp. \$12.50; 140 Amp. \$15.25.
All equipped with Solid Rubber case.

World

STORAGE BATTERIES

Set your Radio Dial for the new 100-watt World Storage Battery Station, WJZ, Chicago. Always something interesting.

"S. O. S."

(Continued from page 433)

Wonder if I have forgotten how to pound brass?"

A week went by; ten days; two weeks. Entries such as these appeared:

"Have been copying press for two hours. I know every word of tomorrow's newspapers. . . . Got the time from Annapolis and Arlington; might as well stay up and get it from Paris and Pearl Harbor. . . . A ship wants a bearing from Hatteras; wonder if rum runners ever want a bearing."

And so they continue, lazy and dull in a drab world. Then on the night of March 14th, this significant entry:

"The reception conditions are very peculiar tonight. Unexplainable."

Similar entries covered the three succeeding days, with "terrific static" noted, and "fading beyond description; distance comes in like a local and is gone, later to be found on a change of wave."

Nature's warnings these, of the impending catastrophe, hidden from the faculties of humans but registered in the coils and condensers of the man-fashioned radio circuit.

The early evening of March 18th finds Harrison again at his receiver. He is unmindful of the possible upheaval of natural forces foretold in the freak conditions of the past few days; he realizes only that the period of queer and inexplicable air doings seem to be at an end. For in the log is this entry:

"Good chance for decent radio weather now. There has been a storm south of here and it is clear again."

Hardly had this entry been jotted down when the startling news broke—a cyclone at Murphysboro!

A tourist passing by gave the grim report; the railroad people verified it.

That Harrison realized instantly the direful import of the news and immediately sensed in it a call to duty for him; and that, too, he was painfully aware of his impotence to aid through the air channels, appears in the next log entry, written fifteen minutes after the optimistic notation quoted above:

"Cyclone at Murphysboro. 105 miles by auto. All wires down. Guess I'll drive down. Violent cyclone and damage to Murphysboro and nearby towns, Illinois Central Railroad reports. Wonder if any hams are on the air?"

A space, and below, the single despairing word:

"None—"

The dash is scrawled across the log sheet. An interruption; the telephone rang just then.

The log continues:

"Just called on phone by I. C. R. R. and St. Clair County Medical Association, asking me to broadcast for aid."

Then the pencil rapidly and automatically scribbling down the bewildered sequence of unspoken thought:

"How in hell can I? I'm suspended. . . . Two other stations here, 9 CHM—but he

U. J. Herrmann
Managing Director

G. Clayton Irwin Jr.
General Manager

Radio Manufacturers' Show Association
Presents

Third Annual RADIO WORLDS FAIR
Madison Square Garden
New York City
Sept. 13-18-1926

The World's Foremost Radio Exhibitions

Fifth Annual CHICAGO RADIO SHOW
Coliseum
Chicago
Oct. 11-17-1926

OFFICIAL SHOW

The World's Foremost

RADIO EXHIBITIONS

Held in the

World's Foremost Exhibition Halls

No industry in the history of the world has made such gigantic strides as radio.

Four years ago, outside of a limited circle of scientists, radio was unknown. Today a radio set is a necessity in every home, for to be without one is to be like Robinson Crusoe, stranded on a desert island.

With new distance records being made daily, radio is destined to link the world, bringing all nations into one big family.

Whether or not you are a radio fan, you should keep abreast of the latest developments in this marvelous new industry.

At the Third Annual

RADIO WORLD'S FAIR

Madison Square Garden

New York City

SEPT. 13-18th

AND

At the Fifth Annual

CHICAGO RADIO SHOW

Coliseum, Chicago

OCT. 11-17th

Every representative radio manufacturer will display his new products—a complete showing of everything new in radio.

If you own a radio, you will want to see what's new. If you do not own one, go to the show and see the latest developments.

There are all kinds of shows, but this is the show you can't afford to miss.

"Go to the Radio Show"

the final condenser!

The Country's Foremost Radio Engineers Have Acclaimed

METRALIGN

SLT STRAIGHT LINE TUNING

Here at last is the final condenser acclaimed by both amateurs and experts as the ONLY condenser embodying new and vitally important improvements over old type condensers—solving forever, the tuning evils of the past.

Makes Any Set a New Set in 15 Minutes.



Separates All Stations On All Wavelengths

METRALIGN SLT is the only condenser combining Straight Line Capacity, Straight Line Wavelength and Straight Line Frequency, eliminating the faults and retaining the advantages of each type—the result is a perfect tuning unit.

METRALIGN SLT spreads stations so evenly over the dial that all stations on all wavelengths can be quickly and easily tuned in or out and accurately logged.

FREE

We have prepared a most comprehensive booklet on tuning. It is written in simple language and tells all you want to know about condensers. Write for a copy today.

General Instrument Corporation

477 Broadway, New York City

can't work code. 9 AYX, but he is torn down. Nothing doing."

Another summons away from the radio set, and the return to jot down this entry:

"Phone again, saying a special train is being made up. Wants all surgeons and nurses along the line to make every effort to meet that train, which leaves at 10:30. Want bandages, antitoxin, caskets, clothing, food."

Only five hours to get together the relief expedition! Radio broadcasting was clearly the only way to get the message out in time to assemble the needed workers and supplies. The strain of the mental tussle going on within Harrison's consciousness is seen in the next entry:

"This is one hell of a predicament. Suppose I was in a fix like that? But there is a heavy penalty for breaking a suspension."

Ten minutes of harrowing indecision. Then this:

"I have adjusted my phone for 280 and 360 meters."

Picture the dramatic situation disclosed in that entry—the broadcasting band of wavelengths, forbidden channels to the amateur! But there the great audience would be found, listening to jazz and what-not in quiet serenity. Thousands could be reached instantly that way! That entry was made exactly at six o'clock. The next one is marked, 6:15—

"To hell with all rules, regulations and suspensions! Those poor devils need help now, or never."

With which final observation out went the call for aid.

Alternately on 280 and 360 meters, the summons was broadcast a dozen times, each twenty minutes up until the relief train pulled out from the station.

In the log is found, opposite the notation 10:40 P. M., the entry:

"Wonder how many got that Q.S.T.?"

By midnight the answer was known. The news had reached Chicago and St. Louis and collections for the sufferers were being taken up. A Red Cross portable radio set was en route to the scene of action. An army radio truck had left from Scott Field. The relief train, jammed to capacity, wended its way with workers who were miles away from the railroad having responded to the call through the air.

The rest of the story is in the log. Over the shoulder of operator Harrison let us read some of the things he jotted down:

"I A.M. to 3 A.M.—Starting list of those who want information of relatives in the cyclone district. Fifty-one so far. Calling the boys in that district, but no answer. Perhaps they were blown away."

Then, at two o'clock in the afternoon of the following day:

"My, how time does fly! Thought it was still yesterday. Nineteen messages gone out. Not bad. Wonder what the district inspector will say or do when he finds out I made my own laws? Hope I'll



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BROWNING DRAKE KIT \$65.00

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1 Table Filter Condenser 4 mfd.	3.75
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1 Sangamo mica condenser .006 mfd.	.85
1 X-L variocoupler, type N	1.00
3 Lynch double mountings	1.50
2 Tobe filter condensers, 1 mfd.	1.40
3 Lynch resistors, .1 meg.	2.25
1 Lynch resistor, .5 meg.	.50
5 Benjamin UX sockets	3.75
2 Lynch resistors .025 meg. & .09 meg.	1.50
1 Brach-Seal, Code 2-B, with mounting	1.00
1 Frost Gem-Jac, No. 934	.25
1 Carter battery switch	.65
2 Tall brackets	2.00
1 Sangamo grid condenser, .005 mfd. with clips	.50
Small brass brackets	.20
Antenna connection block	.15
Battery connection block	.25
Decorated bakelite panel	7.50
Complete	\$65.00

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never have any greater worry than that, but out of respect to the Government I'll write and say I'm guilty, and ask what they are going to do about it."

Hours passed, with the faithful amateur still on the job. At eight o'clock in the second evening of the vigil, this entry:

"Every broadcast station within hearing is asking funds for Murphysboro. Why don't some ham get on the air and take this bale of messages from me?"

"A fellow on the outskirts of Murphysboro informs me that if I will use my phone at 10 P.M. and give him the messages he will tune in and send my answers on the first freight train out in the morning. That will do fine."

The record suspends then until one o'clock in the morning. With the heavy responsibilities out of the way and full duty well done, the log is made confident of this information:

"1 A.M.—I have been asleep and didn't know it. Must have dozed off about midnight."

Thirty hours of continuous consecrated service, invaluable aid rendered for the saving of human lives, wearied and worn with the stress and strain of the emergency, loyalty to his country and its laws still weighed heavily on the tired brain of the amateur. For the final entry in the log records the decision:

"Now to continue the suspension. Unless another twister comes along."

With which sign-off passes into history another radio event to be immortalized by the presentation to C. B. Harrison, of Belleville, Illinois, of the Popular Radio Medal for Conspicuous Service.

Changes in the List of Broadcasting Stations in the U. S.

These corrections and additions to the list which was published in the March, 1920, issue of POPULAR RADIO (together with the changes which have been published in succeeding months) make the list correct as of July 20, 1921. Further changes will be published each month in this magazine.

STATIONS ADDED

KGAR	Tucson, Arizona	243.8
WCFL	Chicago, Illinois	491.5
WCFT	Tullahoma, Tennessee	252
WJBT	Chicago, Illinois	238
WMRJ	Jamaica, New York	227.1

STATIONS DELETED

KFMW	Houghton, Michigan	263
WEED	Anderson, Indiana	246
WVAO	Houghton, Michigan	263
WWI	Dearborn, Michigan	266

CHANGES IN LOCATIONS

WOKO	New York, N. Y. change to	Peekskill, N. Y.
------	---------------------------	------------------

CHANGES IN WAVELENGTHS

NOTE: So many stations have taken advantage of the recent ruling of the Attorney General of the United States removing all wavelength restrictions to change their wavelengths, that it is impossible to give accurate information on changes except from day to day. As soon as the radio situation becomes more stable, changes will be recorded in this list.

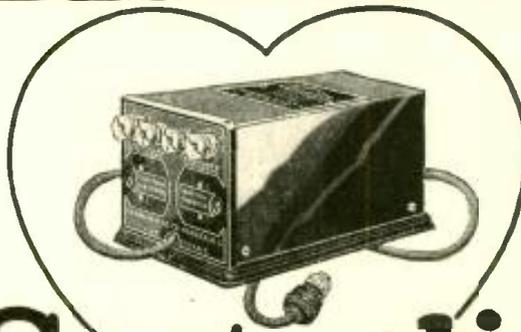
IN THE NEXT NUMBER—

"How to Build the LC-27 Receiver"

Ask your newsdealer to reserve a copy of the October issue for you.

Radio's Latest Necessity—

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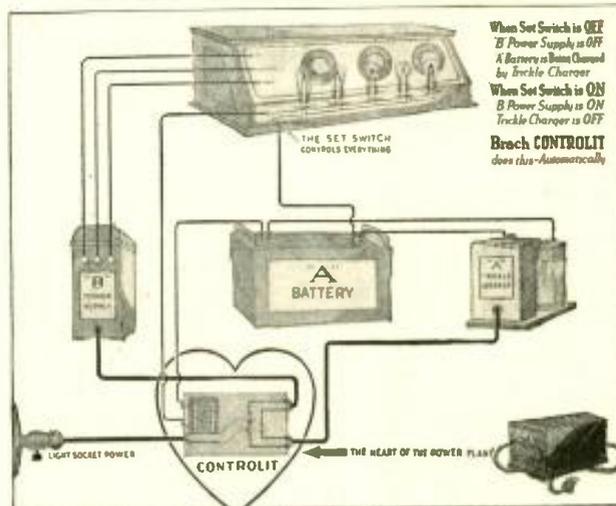
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Your set switch or rheostat ALONE can now control "B" Battery Substitute and "A" Trickle Charger automatically.

Merely adding a BRACH CONTROLIT makes any set a light power-operated set, eliminating all switches from "B" Battery Substitute and Trickle Charger. No added wiring. No alterations to set required.

Anyone can install CONTROLIT, and the power plant can be placed anywhere—in cellar, or closet, or shelf. No radio user will be without it. Ask Your Dealer. **Price Only \$6 U.S.A.**

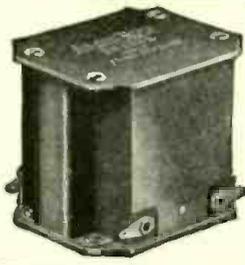
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When used in connection with the better loudspeakers of the cone type and the new tubes permitting the use of higher plate voltages in the last stage to prevent overloading, this new transformer provides faithful reproduction over the entire audible range. It so closely approaches perfection that further developments cannot be noticeable to the human ear.

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For economical, simple power operation of the set the American Transformer Company is now offering two units of the finest type—especially adapted to the use of the new 7½ volt power tubes in the last audio stage. These are the AmerTran Power Transformer and the AmerChoke, both ideally constructed for the type of audio amplifier required. The Power Transformer also has filament supply windings for the power tube, and supplies sufficient plate current, after rectification, for the operation of the set.

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- AmerTran AF-7 (3½-1)..... 5.00
- AmerTran AF-6 (5-1)..... 5.00
- AmerTran Power Trans. PF-52 18.00
- AmerChoke Type 854..... 6.00
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Inside Information on New Radio Receivers

(Continued from page 429)

With the loop in its upright position the receiver is capable of bringing in practically everything, so far as distance is concerned. On one of the first models of this receiver, operated in the suburbs of New York City, American broadcasting stations from all parts of the country were heard, including KOA in Denver and KGO in California; in addition the receiver brought in stations in Havana, Mexico City, Buenos Aires and Peru. This test took place during favorable weather conditions, of course (January 29th). But the remarkable consideration is the fact that all these stations were tuned in on the loudspeaker, and using only the loop antenna.

The fine tone quality of the receiver is obtained through the use of three stages of low-ratio transformer-coupled audio-frequency amplification rather than the more usual two stages of high-ratio coupling.

A UX-171 power tube is used in the last stage of audio-frequency amplification to prevent overloading and the distortion which would result if an ordinary tube were used. Another advantage of this arrangement is that a UX-171 tube is better matched to the loudspeaker than are tubes of the UX-201-a type; this enables the loudspeaker to function to better advantage.

To provide for greater flexibility of volume, a switch is provided on the front of the receiver which permits the operator to cut out one or two of the audio-frequency amplifier tubes at will. When it is desired to tone the reception down to extreme softness, this switch may be set at six. In that event the first and second audio-frequency amplifier tubes are cut out of the circuit, leaving only six in operation. An important innovation in the design of this switching circuit lies in the fact that the stage of amplification which includes the power tube is always in the circuit. Whether six, seven or eight tubes are in use, this power stage is always the one preceding the loudspeaker and the amplifier output is therefore always properly matched to the loudspeaker.

The Fada 415A cone-type loudspeaker was used during POPULAR RADIO'S test of this receiver. This instrument has a larger cone than the usual cone-type speaker; this may account in part for the natural reproduction, especially on the extremely low notes. It is a speaker well worthy of use with this fine receiver.

The 415A cone is supplied in three types; table, floor or wall mounting; the cone is identical in every case. Regardless of the type of mounting, the cone itself is supported on the mounting in such a way as to provide absolute flexibility. Inasmuch as sound production



MODEL "C" ITALIAN CHEST

Cabinets in stock—have piano hinge and are 10" deep—grooved front top rail being removable. Illustration shows gold line wood panel to match.

Size	Walnut Only	Panel to Match
7x18-10	\$15.00	\$1.26
7x21-10	17.00	1.47
7x24-10	19.00	1.68
7x26-10	21.00	1.82
7x30-10	23.00	2.10
*7x28-11	23.00	1.96

*For Madison Moore Receiver.

McLaughlin cabinet \$9.60 and \$12.00
*Hammarlund-Roberts 10.00 and 12.00

*With sloping panel and fancy gold line panel effect line grooves.

Improved Browning-Drake

also for L-C 26, and Orthophase

Mahogany or Walnut \$15.00
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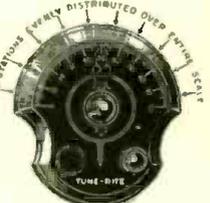
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Separates Low Wave Stations

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The "SELF-ADJUSTING" Rheostat

is contingent on the free vibration of the cone, this is obviously an important feature.

The tuning and operation of the receiver does not require technical knowledge of any kind. There are only two tuning controls, one for tuning the antenna circuit, and the other for tuning the four radio-frequency amplifier stages simultaneously. The method of mechanical coupling between this latter control knob and the shaft that operates the four tuning units is such that backlash is eliminated and the action is positive and smooth. The tuning knobs are of a novel shape which furnishes an excellent hand hold.

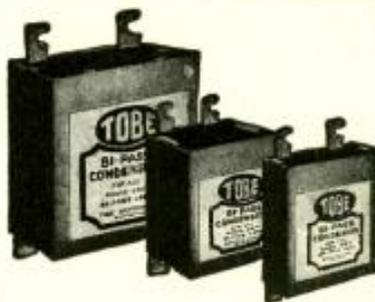
The calibration of the radio-frequency tuning control is carried on a drum which revolves behind a window set into the panel. This drum is calibrated directly in wavelengths. The antenna tuning indicator takes the same form, except that it is calibrated in degrees instead of wavelengths. This is made necessary by the fact that the setting of this control for a given station will vary with different antennas, therefore a wavelength calibration is not possible until after the receiver has been installed in the home of the owner. To enable the owner to calibrate the antenna tuning indicator, space has been provided on the drum to permit writing wavelengths or call letters in pencil. Thus the owner may readily calibrate this indicator himself. The indicator drums are mounted in such a way as to provide unusually wide visibility. Whether one is sitting or standing in front of the receiver the indicator settings are easily seen without any stooping or "squinching." The calibration scale figures are large and easily read.

In addition to these two tuning controls three other knobs are provided at the lower edge of the panel. One is used to control the volume and permits a gradual variation from zero to maximum. This control functions by increasing or reducing the current to the filaments of the radio-frequency-amplifier tubes, and thus varying the effectiveness of these tubes. Another volume control knob is provided in the form of the audio-frequency amplifier switch described above. This latter control is provided so that if a distant station is tuned in with more than ample volume it may be toned down by cutting out one of the audio amplifier tubes. Thus maximum sensitivity is maintained but the volume may be reduced as desired.

A third control is provided to permit the operator to determine the condition of all batteries at a glance. The voltmeter provided on the panel has a double scale. A low-voltage scale shows the voltage of the filament supply ("A" battery) all the time the receiver is in operation. A high-voltage scale is used to show the "B" battery voltages. This control is a small knob and operates a



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Are specified wherever quality sets are described for home construction. It is possible to get something resembling speech and music from a Radio set not equipped with good condensers,—but *truthful* reproduction is impossible without them.

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By ARTHUR H. LYNCH

	List Price
Coil and variable condenser, respectively, of the National Co. Antenna Tuning Unit	\$10.25
Coupling coils and variable condenser, respectively, of the National Co. detector tuning unit	13.75
Jefferson "Concertone" sealed audio-frequency transformer	6.00
Thordarson filter choke (same as that used for B eliminator work)	5.00
Tobe paper filter condenser, 4 mfd.	3.75
Sangamo mica fixed condenser, .002 mfd.	.50
Sangamo mica fixed condenser, .006 mfd.	.85
X-L variocoupler, type N	1.00
3—Lynch double-resistance mountings	1.50
2—Tobe paper filter condensers, .1 mfd.	1.40
3—Lynch metallized resistors, .1 meg.	2.25
1—Lynch metallized resistor, .5 megohms	.50
5—Benjamin vibrationless sockets for UX tubes	3.75
1—Lynch metallized resistor, 6 megohms	.50
2—Lynch, metallized resistors, .025 megohms; and .09 megohms, respectively	1.50
Brach-Stat Code 2-B, with mounting	1.00
Frost Gem-Jac, No. 954	.25
Carter battery switch	.65
2—Tait brackets	2.00
Sangamo mica fixed condenser, .005 mfd. equipped with grillelead clips	.50
Small brass brackets for mounting connection blocks	.20
Antenna connection block	.15
Battery connection block	.25
Decorated bakelite panel, 8 x 22 inches	7.50

Complete Parts \$65.00

Corbett Cabinet 8x22 for the above receiver made of genuine mahogany, including baseboard

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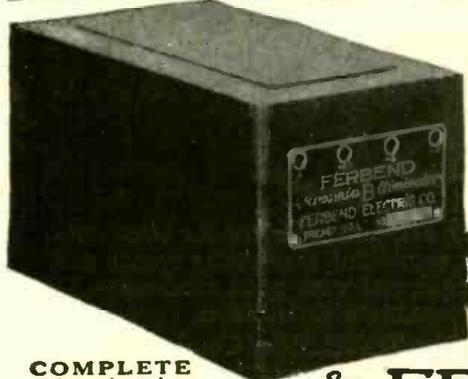
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nothing else to buy
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~ FERBEND ~ "B" ELIMINATOR ~

Many careful buyers choose to adopt a policy of "watchful waiting." This is often true in the purchase of an apparently better, but yet-to-be-proved, automobile. The same holds good for many other commodities. And Radio. With the original announcement of the good Ferbend "B" Eliminator and its amazing low price of \$12.50, many there were who chose to wait. They wanted to be convinced. True, thousands bought at the start and they are the ones who now tell you what to expect. Lack of space alone prevents us from publishing the hundreds of fine testimonials from satisfied users. They are all in our files open to public inspection at any time. One reproduced above. The Ferbend "B" Eliminator successfully passed the rigid Laboratory tests of Radio News, Popular Radio and Radio Broadcast. It is a Proved Radio necessity, and a great one.

Ask Your Dealer—or Send Direct

If you prefer, we will make shipment direct to you upon receipt of price, or C. O. D., if desired. Use for 10 days to convince yourself—if unsatisfactory, write us within that time and purchase price will be refunded. Send your order now.

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Ease, Economy and Accuracy in Construction
Simplified Blueprints were prepared under the personal supervision of Laurence M. Cockaday. They make it possible for anyone, without previous knowledge of radio, to construct a highly efficient radio receiver. Each set of Blueprints consist of 3 prints as follows.

Panel Pattern

This Blueprint is the EXACT size of the actual set. So accurate that you need merely lay it on your panel and drill as indicated. You can readily appreciate the convenience of this Blueprint. No scaling or measuring to do, no danger of ruining the panel through faulty calculation.

Instrument Layout

Here again you have an actual size print of each instrument and binding post and its exact location both on the panel and within the cabinet. Even the cabinet structure is clearly shown.

Wiring Diagram

The unusual feature of this Blueprint is that it is an actual size picture diagram of the finished set. Each instrument and other parts appear in exact size and the wires are so clearly traced from one contact to another that you can connect all terminals accurately without even knowing how to read a hook-up diagram.

Set No. 4—"Cockaday Four-Circuit Tuner with Resistance-Coupled Amplifier" (five tubes, distortionless, two dials, automatic vacuum tube control), as described in the October, 1924, issue of POPULAR RADIO.

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Set No. 15—"The Orthophase Receiver," as described in the February, 1926, issue of POPULAR RADIO.

Set No. 16—"The S-C All-Wave Receiver," as described in the March, 1926, issue of POPULAR RADIO.

Set No. 17—"The Power-pack Amplifier," as described in the April, 1926, issue of POPULAR RADIO.

Set No. 18—"The Improved Raytheon Power-Pack," as described in the May, 1926, issue of POPULAR RADIO.

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| <input type="checkbox"/> Set Number 14. | <input type="checkbox"/> Set Number 20 |
| <input type="checkbox"/> Set Number 15. | <input type="checkbox"/> Set Number 21 |

Name.....
Street.....
City..... State.....

five point switch. By turning the knob to the second point, for instance, the voltage of the detector "B" battery immediately appears on the voltmeter. The third point shows the voltage of the radio-frequency-amplifier "B" battery, the fourth point the audio-frequency-amplifier "B" battery and the last point the voltage of the power-amplifier battery. There is a spring arrangement on the switch so that when the hand is removed from the knob the switch immediately throws back to point one where the voltage of the "A" battery is continuously given.

The loudspeaker may be plugged into a jack provided on the panel, or into another jack on the terminal board inside of the receiver. If the listener wants to use headphones at any time, he may plug into either of these jacks, after first making sure that the audio amplifier control switch is set at 6. The usual plan is to connect the speaker to the jack inside of the receiver; then the headphones may be plugged into the jack on the front of the panel. Insertion of the phones in the front jack automatically cuts out the loudspeaker.

The terminal board inside of the receiver contains binding posts for connecting an external antenna and ground if they are desired. There are also two jacks into which the plugs attached to the terminals of the loop antenna may be inserted. When the loop is plugged in the antenna coil is automatically cut out of the circuit and is replaced by the loop. Thus the antenna and ground may be left connected to the receiver all the time, if preferred because they are disconnected inside of the receiver by the action of plugging in the loop. When antenna and ground are used the loop folds down inside of the receiver, out of sight.

The Fada "8" receiver is housed in two types of cabinet. The table mounting type is designed to be placed on a table, or mounted on a battery cabinet. It is of solid walnut, richly finished in two tones. An ornamental bronze plate is set in the front of the cabinet to carry the tuning controls, voltmeter and tuning indicator windows. The other model is a console type, as illustrated in Figure 2. This is of walnut and contains a compartment for batteries or power-supply units.

These two cabinets are fine examples of the cabinet-maker's art and either would grace any surroundings in which it might be placed.

The receiver itself is the same in both models. The instruments and panel are all mounted on a solid steel chassis for the sake of greater rigidity and to preserve the proper alignment of the instruments. All the parts for the receiver were designed by the manufacturer for this particular receiver and every one of them give evidence of careful thought and good engineering prac-

tice. The coils and variable condensers are so designed and constructed as to permanently maintain their original electrical characteristics so that once the assembled receiver has been tested, balanced and calibrated at the factory it will remain so throughout its life.

All the stages of radio-frequency amplification, as well as the detector stage are individually and completely shielded in metal boxes or "cans," to prevent electrical interaction. The stages of audio-frequency amplifier are included in a single "can."

The receiver may be operated from batteries, or direct from the alternating current house lighting lines in conjunction with a suitable rectifier and filter (power supply) unit. It is suggested that before any power supply unit is purchased for use with this receiver that it first be tried out with the receiver.

**The New Model
Stromberg-Carlson Receiver**

THE first impression that one gets of the latest models of the new season's receivers is that of marked improvement in the appearance of the cabinets that house the sets.

The new Stromberg-Carlson "Treasure Chest" receiver, shown in Figures 5, 6 and 7, is no exception. It is a thing of real beauty, harmonizing with the furniture of the finest drawing-room. Dull-brown, natural finish of the wood and the simple beauty of the design convey an impression of aristocracy that is fulfilled by the genuine quality of the workmanship.

The panel of this new receiver is of beautifully grained mahogany; the controls, indicators and other exterior items have been worked out in old bronze.

This model is designed to be placed on any table, or on the special stand, designed by the same maker, which matches the receiver and conceals the batteries. The same receiver may be obtained in an "Art Console" model. The solid walnut console cabinet rests on the floor and has concealed compartments for the batteries or other power supply units. The difference between the two models lies in the cabinets, as the receiver proper is exactly the same in both.

When the cover of the receiver cabinet is raised all that can be seen is a neat arrangement of shields that completely hide the working parts from view and protect them from dust and meddling fingers. When these shields are removed, as in the special laboratory tests, the exposed working parts of the receiver give a justified sense of splendid workmanship, precision and exactness. Even the connection work, ordinarily hidden from view, is perfectly finished.

The present-day purchaser of a receiver is not apt to be as much interested in the technical details of the set as with the quality of reception, with its sim-



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The 220 audio transformer has introduced a new standard in audio reproduction. It compensates for some of the short comings of modern broadcasting. It is the first transformer manufactured with a rising low note characteristic compensating for reverse conditions in our speakers. It delivers quality such as you've simply never heard. It's the largest, huskiest power type on the market. The 221 output transformer is for use between the last power tube and speaker. It will improve the low note reproduction, and increase speaker capacity for strong signals several hundred percent.

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| B-T Receivers | Hammarlund-Roberts |
| Hazelton Neutrodyne | McLaughlin 8 Tube Super |
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Model "N" A slight turn obtains correct tube oscillation on all tuned radio frequency circuits. Neutrodyne, Roberts two tube Browning-Drake, McMurdo Silver's Knockout, etc., capacity range 1/8 to 20-micro-micro farads. Price \$1.00.

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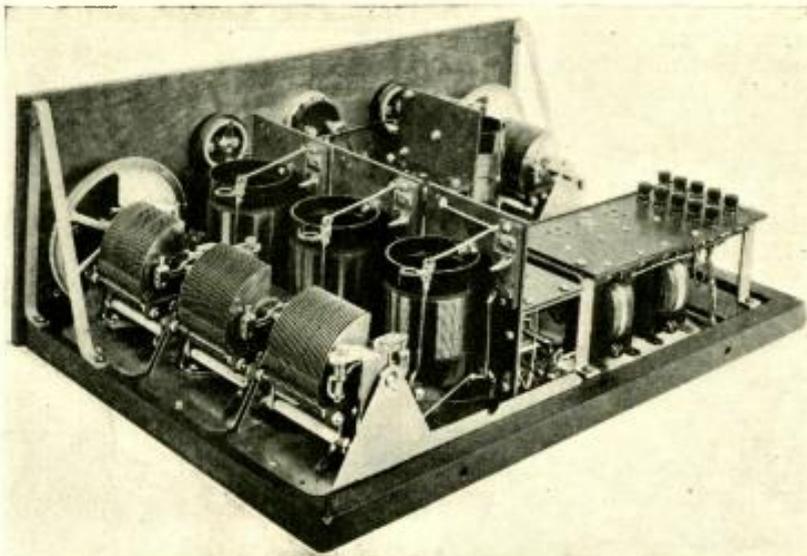
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ALL THE APPARATUS IS SUPPORTED ON A RIGID METAL BASE FRAME

FIGURE 7: The quality of workmanship is obvious both in the assembly and in the instruments of this new model of the Stromberg-Carlson "Treasure Chest" receiver.

plicity and accuracy of operation and with the distinctive appearance of the receiver. He wants a set that will give a sufficiently full quality of tone to allow him to close his eyes and feel that he is in the same room with the artists to whom he is listening. He also wants to be able to pick out one station without interference from another. In addition, it is essential that the receiver require no special skill in tuning.

These are all noteworthy features of the Stromberg-Carlson receiver.

Tuning is accomplished by means of two station-selector controls, one of which is calibrated so that it may be set to the desired wavelength merely by reference to the chart which accompanies each receiver. The other selector should then be turned up until the signals are brought in with the desired strength. This completes the entire tuning operation, except for the volume control knob.

Another important feature of this modern receiver is its sensitivity or ability to pick up distant stations. Even though the owner may not as a rule wish to tune in distant stations, this feature makes it possible for him to use a small indoor aerial when he listens to local signals and in this way to reduce static interference.

When this receiver was first tested in the writer's suburban laboratory, a few miles outside New York City, it was discovered that one of the tubes that were to have been used in the test was burned out and that only five vacuum tubes were available at the moment. In addition, the antenna had blown down in an unusual windstorm.

But, rather than lose the evening, the writer connected up the set to a small, insulated copper wire about 20 feet long, that had been left lying on the floor.

After the batteries were connected up and the loudspeaker plugged into the head phone jack, so that the last tube was eliminated, the signals from the local stations came in, even under these adverse conditions, with a wealth of volume. Moreover, more than a dozen other stations were tuned in, ranging up to a distance of 400 miles. This is a remarkable performance and it goes far to prove the extreme sensitivity of the new model under very severe test.

When the receiver was installed with outdoor antenna and full equipment of tubes, stations as far west as Chicago and St. Louis and ranging North to Boston and south to Miami Beach, Fla., were easily tuned in with very satisfying results. And it must be stated, too, that this was summer reception.

The circuit of the Stromberg-Carlson receiver consists of three stages of neutralized tuned-radio-frequency amplification, detector, and two stages of high-quality, transformer-coupled audio-frequency amplification.

Up to this last year the use of more than two stages of tuned-radio-frequency amplification in other than laboratory practice had not been found entirely practicable because of the difficulty of wholly preventing interstage coupling, or what is popularly known as "regeneration." However, with the good shielding and an improved neutralizing scheme, Stromberg-Carlson has succeeded in using three stages of radio-frequency amplification very successfully and in still keeping the set from becoming in the least unstable. The use of this extra stage makes the set particularly sensitive to weak signals.

The quality of the audio-frequency amplification in any set is the factor that governs, largely, the tone quality that is delivered to the loudspeaker.

Here again in this set, good design has produced the desired results. The audio-frequency transformers that are used have a "flat" curve which means that all musical notes are reproduced with almost equal facility. One fault in a great many of the old types of transformers, and also in the old type loudspeakers, was the tendency to favor certain tones more than others, with the result that the very low tones have been missed and some of the higher tones have been greatly exaggerated. This new Stromberg-Carlson receiver eliminates these troubles and is capable of producing a truly realistic signal from speech and music.

It was with this same idea in mind that the manufacturers of this set have also brought out a cone-type loudspeaker that has the same good reproducing characteristics as the receiver.

In the laboratory tests of the receiver this loudspeaker was used and the combination proved to be excellent.

The last tube in this set is a power tube of either the UX-112 or the UX-171 type. The use of either of these tubes rather than the standard 201-a type tube reduces the possibility of distortion, due to the overloading of the last tube. This power tube is placed in socket No. 2 on the terminal shelf at the rear of the receiver. Standard UX-201-a tubes are used in all the other five sockets.

In normal operation a 6-volt storage "A" battery is used to supply the current for lighting the filaments of all six tubes. The total drain on the "A" battery is 1 3/4 amperes.

The high voltage for the "B" circuit may be obtained from standard "B" batteries with a total voltage of 135 volts. The plate current in this case is at the rate of approximately 20 milliamperes. At this rate of current drain, the heavy-duty type of "B" batteries is recommended.

There are now on the market a number of "B" power-packs (inaccurately called "B" eliminators)* that may be used satisfactorily on this receiver, and the energy, then, may be taken directly from the alternating current lighting socket.

In purchasing such a device to go with this receiver, the wisest course is to have the "B" power-pack demonstrated in actual use with the receiver, preferably in the location where it is to be used.

There are also a few good "A" power-packs on the market that may be used with this receiver, and these should also be demonstrated to be sure that they

*Full constructional details of "B" power-packs may be found in "How to Build the Raytheon Plate Supply Unit" in POPULAR RADIO for November, 1925 (pages 405-414), and in "How to Build the Improved Raytheon Power-pack" in POPULAR RADIO for May, 1926 (pages 19-25). Eight additional models of the improved power-pack were described in the June, 1926 issue (pages 147 to 151) and the July, 1926 issue (pages 230-233).

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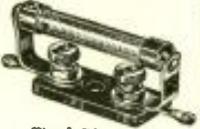
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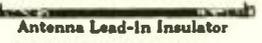
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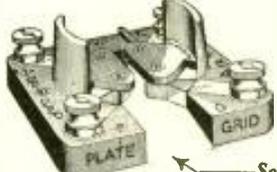
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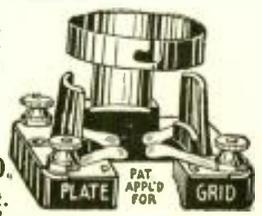
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They prevent closed circuit, absorption of current, intercoupling of circuits, feedback and undesirable capacity; making your set more stable, sharpening tuning, resulting in purer and clearer tones with more volume on local and distant stations.

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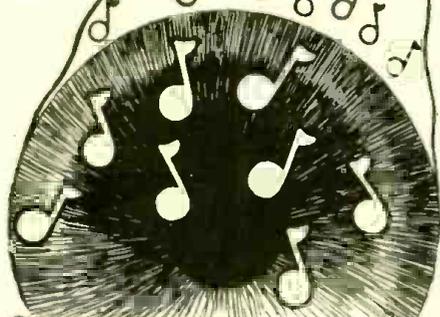


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(A1-2 SEALED) AUDIO FREQUENCY TRANSFORMERS

Because they do not lose, distort or "blast" any notes (from the lowest to the highest audible to human ears), the new large Jefferson "Concertone" Transformers are being used in latest circuits.

Not only do they make programs sound wonderfully natural and life-like by amplifying all tones equally; they also increase sensitivity and improve distance reception. Ideal for use with power tubes because of heavily insulated extra large cores and windings. Each "Concertone" is sealed against moisture in a 3 5/8" long x 2 3/4" high metal case—convenient for double-decking.

Make your set a 1927 model in quality of tone by installing a pair of "Concertones." \$6 each—at your dealer's.

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*Without removing your
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**KEEP TUBES LIKE NEW-CHARGE
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Tubes gradually weaken with use, as do batteries. Once a month attach Jefferson Tube Charger to light socket and connect with set for 10 minutes. Keep 201-A or UV-199 type tubes like new—at full efficiency. Rejuvenates run-down tubes. Improved reception with longer life of tubes and batteries will be worth many times the price to you. Guaranteed.

JEFFERSON TUBE CHARGER \$3.50

Makes it easy to regularly charge tubes, all at once, in your set, at home. Enjoy top-notch reception every night. Get one from dealer today.

Jefferson Electric Mfg. Co.
Largest manufacturers of small transformers
508 SO. GREEN ST. CHICAGO, ILL. U.S.A.

function satisfactorily with the receiver.

The manipulation of the main controls of the receiver have already been discussed, but a few additional details will not be out of place.

The small upper right-hand knob controls the current for lighting the filaments of the vacuum tubes. It will be noted that when this knob is turned to the right, the reading on the voltmeter increases. This control should never be turned high enough to cause the hand of the voltmeter to go beyond the red line that is marked at the 5-volt point on the dial. As a general rule, satisfactory operation is obtained when the voltmeter reads about 4 3/4 volts. Once this knob is adjusted there is no need for further change as long as the "A" battery is maintained properly charged.

The volume control is a rheostat that reduces the filament current to the first vacuum tube and acts as a gate that brings in the signals with greater or reduced volume.

The loudspeaker is ordinarily connected to the two binding posts provided for this purpose, on the terminal shelf inside of the receiver. It may be connected to the receiver by plugging into the jack provided at the lower right hand corner of the front panel, but this jack is provided mainly for experimental purposes such as for the comparison of two loudspeakers.

It may, however, be used for plugging in headphones. In that case the volume control should be turned well down, otherwise the volume of sound will be uncomfortably great.

The jack located on the terminal shelf inside is for use with an external power amplifier which includes one stage of high-power audio-frequency amplification. When a plug is inserted in this jack the second stage of audio-frequency amplification in the receiver is automatically disconnected. Thus the external power amplifier replaces this stage. An external amplifier of this kind is useful where tremendous volume is needed, as in a large hall to provide music for dancing.

A short antenna is recommended for use with this set. A total length of 40 feet seems to be ideal when the receiver is used in any metropolitan area close to the broadcast station. Used in a suburban or country district, the antenna may be increased to a longer length of possibly 80 to 90 feet. These dimensions include both the antenna length and the lead-in wire. The antenna may be erected outdoors or indoors, but for distance reception an outdoor antenna is preferable.

The small switch at the lower left-hand corner of the front panel is provided to adapt the receiver to the particular type of antenna in use. Tuning will be found to be sharper with one particular setting of this switch than with the other. This provides a means for tuning out undesired stations.

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**"HI-OHM" Universal Volume
Control for All Circuits**

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Half
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500,000
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A non-inductive, variable wire wound resistance 1 3/4" dia. Contact arm slides on protecting wires covering special moisture proof resistance element. The resistance curve is mathematically correct for all circuits. Cover resistances furnished for special circuits.

"HI-POT" same size and resistance with third terminal \$2.25. Write for illustrated folder.

New Tip Jack

A small, sturdy, nickel-plated jack. Fits snugly behind panel. Strong spring hugs the cord tip and makes positive connection. Carter well known quality.



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With the Experimenters

(Continued from page 434)

A hole is drilled in the lower left-hand corner of the panel for the new condenser cut-out switch and the switch is mounted therein.

In wiring the converted receiver, no changes need be made in the circuits of the last three tubes, except that the grid terminal of the third tube should be connected to the transformer, N. The potentiometer winding of K is not used and, therefore, the only terminals of this instrument to be connected into the circuit are the two left-hand binding-posts (looking at the instrument from the rear).

The variable resistance, O1, and the jack, M1, are not used.

It will be noted that the second tube from the left is now the detector tube, instead of the first tube, as formerly, and that the rheostat winding of K is connected into the circuit of this tube. The circuits of the first two tubes should be wired as shown in the diagram, Figure 4.

After the alterations in the receiver have been completed, the batteries may be connected up. The detector and amplifier "B" batteries need not be kept separate, as was the case with the Four-circuit Tuner. All the "B" batteries are now connected in series, with taps taken off at 18 (approximately), 90 and 157½. Otherwise the terminals at the rear of the receiver are connected the same as before.

Operation of the Receiver

The tuning of the converted receiver is much the same as that of the Four-circuit Tuner. The two condenser dials are tuned alike and the rheostat is used to control sensitivity as before. The main change is in the fact that the antenna is also tuned, by means of the variometer.

Other information regarding the operation of the converted receiver may be obtained from the article on the operation of the LC-26 receiver which appeared in the January, 1926 issue.

Further Modifications

The changes that were outlined above are those which are essential to the conversion of the Four-circuit Receiver. For enthusiasts who wish to carry the changes further some additional suggestions are given in Figure 4.

The additional changes shown in this figure are:

(1) An Amsco tandem condenser (No. 1814, .0003 mfd. capacity for each half) is substituted for the two separate condensers used in the Four-circuit Tuner. This simplifies the tuning of the receiver.

(2) Substitution of an Amsco fixed rid-leak for the former variable leak. The fixed leak, which should have a

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Cockaday Sets Now Made Easier to Build by Our New "Ready-to-Wire" Plan
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All you need do is to connect bus-bar according to diagram, solder and your set is finished. These Kits are sent to you completely mounted, and assembled on a Veneered Mahogany baseboard and genuine bakelite panel, drilled and engraved. Genuine parts used as listed below, exactly as used in Mr. Cockaday's Laboratory Model. COMPARE OUR OFFER!

RAYTHEON POWER-PACK

These are the exact parts used in building the Laboratory Model.

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1 Dongan transformer, No. 509.....	7.00
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1 Alnyap socket.....	.75
1 Bradleyohm No. 10—10,000 ohms.....	2.00
1 Bradleyohm No. 25—250,000 ohms.....	2.00
1 Bradleyunit resistance, 7,500 ohms.....	.75
1 Electrad resistance mounting.....	.35
1 Hardwood base.....	.25
1 Composition binding post strip.....	.25
1 Pr. small brass brackets.....	1.10

COMPLETE KIT \$42⁷⁰

The Improved BROWNING - DRAKE Receiver

National coil and variable condenser. Antenna Tuning Unit coupling coils and variable condenser and Detector Tuning Unit.

1 Jefferson "Concertone" sealed transformer.....	\$24.00
1 Thordarson filter choke.....	6.00
1 Tube filter condenser, 4 mfd.....	5.00
1 Sangamo fixed condenser, .002 mfd.....	3.75
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1 X-L variometer, type N.....	.50
3 Lynch double-resistance mountings.....	1.00
2 Tube filter condensers, .1 mfd.....	1.50
3 Lynch metallized resistors, .1 meg.....	1.40
1 Lynch metallized resistor, .5 megohms.....	2.25
5 Benjamin UX sockets.....	.50
1 Lynch metallized resistor, 6 megohms.....	3.75
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1 Brach-stat, 2-B, with mounting.....	1.50
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2 Tail brackets.....	.65
1 Sangamo fixed condenser, .005 mfd. with grid leak clips.....	2.00
4 Small brass brackets.....	.50
Antenna connection block.....	.20
Battery connection block.....	.15
Decorated bakelite panel, 8 x 22 inches.....	.25
	7.50

READY-TO-WIRE KIT, PRICE \$65⁰⁰

We Can Supply Any Form of "B" Battery Eliminator or Raytheon Power-Pack Kits

L-C 26 RECEIVER

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Model A B-2

Approved and used by POPULAR RADIO Laboratories.

A New and Improved Battery Substitute. Supplies A B and C

SPECIFICATIONS

SIZE: 9"x10½"x15" overall.
WEIGHT: 45 lbs. boxed for shipment.
FINISH: Entirely contained and shielded in an attractive green-brown steel case equipped with treasure chest handles.
PRICE: Complete with extension cord and plug, ready to operate, but without rectifying tube, \$85.00 f. o. b. Philadelphia, boxed for shipment. Rectifying tube recommended type UX-213 or equivalent, market price now \$6.00. One only required.

CHARACTERISTICS

The Model AB-2 Power Unit operates only on 50-60 cycle 110-120 volts A. C. current. Supplies "A," "B" and "C" current for any Radio Receiver delivering between 3 and 3¼ amperes A supply, and between 65 and 70 M. A. plate supply. Detector voltage variable from approximately 12 to 60 volts. Radio and audio amplifier voltages each independently variable from approximately 40 to 200 volts. "C" voltage adjusts automatically with corresponding increase of plate voltage in audio amplifier. Ammeter provided to show amount of "A" current rectified at all times. Consumes between 35 and 70 watts per hour depending upon size of receiver or number of tubes supplied. Once regulated the Model AB-2 Power Unit needs no further attention.

NOTE: Can be furnished to operate on 25 cycle current upon order at additional cost. Can also be furnished to operate 3 V. tubes or both 3 V. and 6 V. tubes on order at additional cost.

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Very low distributed capacity due to the slotted form of winding.

Can be used wherever this type of coil is necessary. Very compact. Only one inch in diameter. Can be mounted on sub-panel or baseboard. Bracket for mounting with each coil. List price \$1.



**DUO-OCTAFORM
COIL**

Especially designed for maximum amplification at radio frequencies within the broadcast range. Has a higher inductance than any other type of tuning unit for the range to be covered. List price \$3.50.

There is a Precision Coil for practically every Popular Radio designed receiver. The Precision Coil Co. also produces several condenser blocks at attractive prices. Write us.

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After carefully testing the Precision Line of Radio Power Units, one of the most complete scientific laboratories in the United States made the statement that, at the present time, there are no better radio power units for sale at any price.

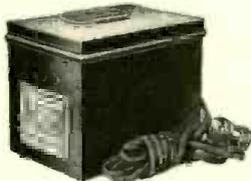
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209 Centre St. New York City

resistance of about six megohms, gives as good results in this remodeled receiver as did the variable instrument, and has the advantage that no adjustment is necessary.

(3) Substitution of an Amertran Deluxe 1st stage transformer for the transformer formerly used. This new transformer provides greater volume and more uniform amplification throughout the entire audio-frequency band. The extremely low and high tones are brought out much better with this new transformer.

(4) The position of the variometer is changed to balance the appearance of the panel. A square of black paper may be pasted over the holes where the switch and switch points used to be.

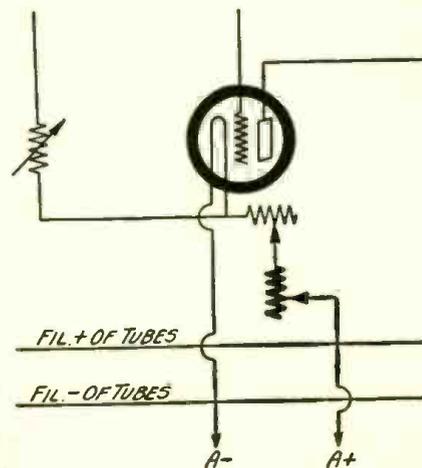
(5) A "C" battery is added in the grid return circuit of the last tube. This biasing battery improves the tone quality and cuts down the battery consumption. The proper voltage of the "C" battery can best be determined by trial. It should be somewhere between 4 1/2 and 9 volts.

(6) Substitution of a UX-112 tube for the 201-a tube in the last stage of audio amplification. This change prevents the overloading of the last tube on loud local signals, and results in generally better tone quality. If this change is made it is necessary to substitute a No. 112 amperite for the No. 1A amperite formerly used in the filament circuit of the last tube.

— S. GORDON TAYLOR

How to Add the New UX-200-a Detector to the LC-26 Receiver

MANY readers of POPULAR RADIO have asked whether the new UX-200-a detector tube may be used in the LC-26 receiver in place of the old 200 tube and whether the results obtained would warrant this change.



HOW TO ADD THE NEW UX-200-A DETECTOR TUBE

FIGURE 5: The resistance shown in heavy lines is the 10-ohm resistance that is added in series with the old rheostat to provide sufficient resistance to properly control the filament current for the new tube.



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From experiments conducted in the POPULAR RADIO LABORATORY, it was found that the use of the new tube results in a considerable increase in the sensitivity of the receiver.

A decided increase was noticeable in the volume of signals from distant stations; signals from several distant stations that were barely audible on the loudspeaker when the old 200 tube was used were increased to ample loudspeaker volume when the new UX-200-a was substituted in the set.

The tone quality of the received signals seems to remain the same with the new detector tube as with the old.

Aside from the advantage of increased sensitivity there is, of course, the important consideration that the filament of the new tube requires only one-quarter as much current as the old 200 tube. Furthermore, the adjustment of the filament rheostat and plate voltage are not nearly as critical as they were with the old tube.

Hence it would appear that the new 200-a tube is a decidedly worth-while tube, and its substitution for the 200 in the LC-26 receiver is well warranted.

The UX-200-a tube requires a higher resistance than the 6 or 10 ohms called for when the old 200 is used if proper control of the filament current is to be obtained. This increased resistance may be obtained by replacing the old detector rheostat with one of 20 ohms resistance, or by connecting a 10-ohm resistance in series with the old rheostat.

The author's pet plan is to install a separate 10-ohm rheostat in series with the old rheostat. Then, either the old 200 or the new UX-200-a tube may be used at will.

In the former case one of the rheostats is turned all the way to the right and the proper regulation of the filament current is obtained by varying the other rheostat. To use the new tube the first rheostat is turned so that it has maximum resistance and a variation of from 10 to 20 ohms is obtained with the other rheostat.

This plan is illustrated in Figure 5; the new rheostat is indicated by the heavy line. This extra rheostat may be mounted behind the panel as its accessibility is not important:

—S. GORDON TAYLOR

BULL fights in Spain are now broadcast by radio.

* *

LATVIA, the little republic in the Baltic, has one broadcasting station.

* *

THE Bureau of Standards plans to standardize all radio sets.

* *

ON the theory that the soapbox orator can no longer attract the attention of the public, the Socialists are said to be actively considering the acquisition of a radio station of their own.

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are also available in individual units of 1/10, 1/2, 1, 2, 3 and 4 mfd. in two voltage classes; Class A, Flash Test 800 V. D. C., for continuous operation on D. C. up to 300 V., or on A. C. up to 150 V.; Class B, Flash Test 1500 V. D. C., for continuous operation on D. C. up to 600 V., or on A. C. up to 300 V. Also a complete line of Condensers in units and gangs for all by-pass and blocking applications.

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POPULAR RADIO maintains for the benefit of its readers a Technical Service Bureau and Laboratory, under the personal supervision of Laurence M. Cocksaday which will, without charge, answer by personal letter any question, problem or request for information submitted by a subscriber. This service is, however, also available to readers, other than subscribers, at the very nominal rate of \$1.00 the inquiry.

In writing please confine your questions to one general subject, writing on one side of the paper only, and enclose a self-addressed and stamped envelope.

It is possible that your individual problem has been covered in an issue of POPULAR RADIO, and so as an aid to you we endeavor to keep a supply of back numbers in stock. The condensed index below gives a few of the subjects that have appeared recently, look this list over and if the information you want is covered, we will be pleased to supply back numbers at 35c. a copy.

December, 1925

- How to Build The New LC-26 Receiver.
- How to Improve Broadcast Reception.
- What Every Radio Experimenter Should Know About Condensers.
- "Truthful Reproduction." How to Get it from Your Set.
- Radio that Runs on a Beam.

January, 1926

- How to Get the Most Out of Your LC-26 Receiver.
- Some New and Useful Facts About Coils.
- When Your Set Won't Work.
- Straight-Line-Frequency Condensers.
- What's New in Radio Apparatus.

February, 1926

- How to Reduce Distortion in Amplification.
- Some Stunt Sets.
- Important Kinks in Wiring.
- How to Cut Down Your "B" Battery Bill.
- Hints for Amateurs.

March, 1926

- Why and How the Milliammeter Increases the Efficiency of Your Set.
- What "Inductance" Really Is.
- List of Broadcast Stations in the U. S.
- How to Build the S-C Receiver for Short and Long Waves.

April, 1926

- How to Get an Operator's "Ticket."
- What a Straight-line Frequency Condenser Really Is.
- How to Build a Power-pack Amplifier.
- The New "Crystal Pilot"
- How to Build and Operate a Low-Power Transmitter.
- The Popular Radio Medal for Conspicuous Service.

May, 1926

- How to Draw Up Your Own "Tuning Graphs."
- How to Build the Improved Raytheon Power-pack.
- How to Build an Antenna Mast for \$15.00.
- Fifteen Ways to Reduce Static.
- Do Your Coils Broadcast?

June, 1926

- How to Build the New Home Receiver.
- How to Put Up a Good Outdoor Antenna.
- How to Get the Most Out of Your Ready-made Receiver.
- Audio-frequency Amplification. How to Get it Without Distortion.
- Four New Combinations of Units for Assembling the Raytheon Power-pack.

July, 1926

- How to Get the Best Reception in Summer.
- The Best Crystal Set for \$13.00.
- How to Build the Newest Portable "Town and Country" Receiver.
- Four New Combinations of Units for Assembling the Raytheon Power-Pack.
- How to Get the Most Out of Your S-C Receiver.

August, 1926

- A New Method of Using Harmonics for Determining Frequencies.
- Popular Radio Circuits.
- How to Build the Improved Browning-Drake Receiver.
- How to Pick Out a Loudspeaker.
- How to Get the Most Out of Your "Town and Country" Receiver.
- Three Vacuum Tubes in One.

POPULAR RADIO

Department 98

627 W. 43d St., New York



WHAT READERS ASK

CONDUCTED BY HUGH S. KNOWLES

In justice to our regular subscribers a nominal fee of \$1.00 per question is charged to non-subscribers to cover the cost of this service, and this sum must be inclosed with the letter of inquiry. Subscribers' inquiries should be limited to one question or one subject.

The Use of a Fixed Grid-Leak

QUESTION: I understand that the use of high- μ tubes is advantageous in resistance-coupled amplifiers. Do you advise their use in the LC-26 receiver? I also want to experiment with a fixed grid-leak. My receiver is a little noisy and I believe that the variable leak contributes to this

—J. R. K.

ANSWER: Much has been said regarding the use of high- μ tubes in the intermediate stages of a resistance-coupled audio amplifier. Their use has been thoroughly tried out in the LC-26 receiver, in the first and second audio stages, which include the first two tubes to the right of the detector.

In the case of loud signal reception, as from a nearby broadcasting station, it is not necessary to use the high- μ tubes. In any case, the use of more than one of these tubes is not practical. In receiving weak signals, however, as from a distant broadcasting station, a high- μ tube in the first socket after the detector, that is, in the first stage of audio amplification, provides a noticeable increase in signal strength.

In general, when an absolute maximum of results is desired, the use of a high- μ tube in the first stage of audio is recommended, with 201-a type tubes in the first and fourth sockets, a UV-200 or UX-200-a type tube in the second and a UX-112 type tube in the last socket.

The variable grid-leak (Bradleyleak) that was specified in the December, 1925, issue of POPULAR RADIO has been successfully replaced in the LC-26 receiver with one of the fixed variety. It has been found that the inexperienced operator frequently has difficulty in adjusting the Bradleyleak to the best operating point. Usually the best point is where the knob is turned in just beyond that setting where a slight pressure becomes noticeable. The more experienced operator does not depend on the feeling of pressure but rather, judges the proper setting from the smoothness of oscillation control together with maximum sensitivity of the receiver.

With a fixed grid-leak, which has a proper resistance value, and which is well enough made to remain constant in its resistance the necessity for adjustment is eliminated and equally good results are obtained. For the dyed-in-the-wool experimenter, however, the variable grid-leak will always hold a certain amount of

fascination; and until manufacturers began to place reliable resistance units on the market, a variable resistance leak was quite essential for the proper control of the detector tube. Now, however, it is safe to depend on fixed leaks. For those who prefer to eliminate as many adjustable units as possible this change is recommended.

Usually a six megohm (6,000,000 ohms) leak has the best value for this receiver. In the experimental model of this receiver, and in a number of others, an Amsco "Grid Gate" resistance unit of this value was used with excellent results. It may be that in some individual cases a resistance value of five megohms or seven megohms will prove better. This will depend somewhat on the characteristics of the detector tube used. If one wished to experiment a little it may be worth while to try several different values. If not, six megohms will be close enough.

In that case try cutting down the detector plate voltage, $1\frac{1}{2}$ volts at a time, rotating the resonator knob after each change and advancing the rheostat knob, if necessary, in order to keep the detector oscillating. If the plate voltage is cut down too far the tube cannot be made to oscillate. Leave the voltage adjusted to the lowest point at which the tube can be made to oscillate.

If it is still difficult to stop the oscillation by means of the resonator knob, it is evident that the grid-leak resistance is too high. If a variable leak is used turn the knob, a little at a time, in a clockwise direction, trying the resonator knob after each change. An adjustment of the leak will be found where there is a small space on the resonator knob where oscillation will stop and the station causing the whistle will be clearly heard.

In actually tuning the receiver for distant stations the most pleasant method is to adjust the detector rheostat to a point just below that where whistles are heard. This is the most sensitive adjustment of this tube and stations will be brought in without the annoyance of whistles. Instead of a whistle there will be a rushing sound as the wavelength control passes over the wavelength of an operating station. In using this method keep the resonator knob just below the point of resonance with the wavelength control, until a station is heard, then bring it up to resonance with the latter. When brought into exact resonance, the rushing noise will stop and the station will be heard clearly and undistorted.

It may even be possible to turn the rheostat a trifle higher without loss of clarity in the reception of the signal.

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No. R-101 Bulb Type Trickle Charger



No. R-403 Tube Reactivator



No. R-225 Midget Tube Reactivator

effect) which depends on the direct current which flows through. If this current is made sufficiently high, the effective inductance may fall to a small fraction of that which it would have with a small current flowing through the windings. A "C" battery should be employed with the receiver, even when such a unit is used, both to minimize distortion and to decrease the load on the unit.

Another consideration which enters and which may produce either a howl or an accentuation of the disturbing noise is what may be termed the "dynamic" characteristic of the unit. Where the amplifier voltage is supplied through a variable resistance that is in series with the plate circuit of the tube a change in plate voltage produces a change in drop in the resistance. When this is used with most amplifiers this may cause trouble as regeneration at audio frequencies may occur.

How the Super "First Detector" Tube Works

QUESTION: Is the so-called "first detector" in a superheterodyne really a detector? It is frequently called a "frequency converter," merely a "radio-frequency amplifier" or what-not. Please explain its operation.

—M. DAUGE

ANSWER: The "first detector" is really a detector. Some confusion has arisen in regard to this due to the fact that it is almost impossible to prevent reception regardless of the adjustment of the first tube.

Actually, considerable precaution has to be taken in a superheterodyne circuit to prevent any rectification. When a tube is operated almost anywhere within its normal operating limits it will rectify slightly. When no rectification takes place, it means that the conditions under which distortionless amplification take place exist.

The average detector tube, or crystal detector for that matter, has what is called a parabolic characteristic. More specifically, this means that the current in the plate circuit is proportional to the square of the input voltage.

If an oscillating detector is used, the output current no longer follows this law. The output current then becomes directly proportional to the input voltage. In such a case the detector is much more sensitive to weak signals because of the fact that the efficiency does not decrease as rapidly with a decrease in the amplitude of the incoming signal.

The general case, which includes that given above, is one in which a current of one frequency is superimposed on another—both being impressed on the input circuit of the detector. In this case, the output current is proportional to the product of the amplitudes of the two. This means that it is directly proportional to the amplitude of either of them.

In the case of the superheterodyne, the oscillator amplitude remains constant; and the output current is then directly proportional to the amplitude of the incoming signal, which results both in greater sensitivity (greater than when receiving damped signals without using an oscillator) and distortionless amplification.

Rectification must take place in order to provide a resultant in the output circuit which is capable of going through the intermediate amplifier. The effect is comparable to that which has to take place in an ordinary detector where the frequency of the incoming signal is reduced to an audible frequency which is capable of actuating the receiver. This process is frequently called "de-modulation"

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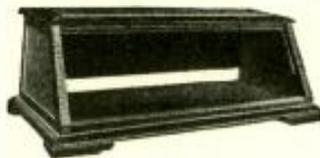
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To insure a fair and unbiased consideration of all claims, a Committee of Awards has been appointed that includes five distinguished citizens of international fame. To assist this Committee of Awards, an Advisory Committee has been appointed that numbers among its members some of the most eminent citizens of the United States, including representatives of many of our most distinguished institutions.

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1. The medal shall be known as the Popular Radio Medal for Conspicuous Service.
2. The medal shall be awarded, without discrimination as to sex, age, race, nationality, color or creed, to those radio amateurs, radio experimenters, broadcast listeners and other non-professionals through whose prompt and efficient action radio is utilized to perform an essential part in the alleviation of human suffering or in the saving of human life within the territorial confines of the United States and its possessions, or in the waters thereof.
3. The medal shall be awarded by a Committee of Awards that shall not exceed five in number. No member of this Committee shall be an employee, officer or stockholder of POPULAR RADIO, INC., nor shall any such employee, officer or stockholder have a vote in the deliberations of the Committee.
4. An advisory Committee, which shall cooperate with the Committee of Awards and which shall be particularly charged with the responsibility of making recommendations for awards of this medal, shall be made up of men and women who, because of their interest in the public welfare or because of their connection with institutions that are consecrated to public service, are in positions to bring to the attention of the Committee of Awards the exploits of candidates who are within their own special fields of activity.
5. The medal will be awarded for services rendered since Armistice Day, November 11, 1918.
6. Recommendations for awards may be submitted to the Committee of Awards at any time and by any person. Every recommendation must contain the full name and address of the candidate, together with a detailed account of the accomplishment on which the proposed award is based, and must be accompanied by corroboratory evidence from persons who have first-hand knowledge of the circumstances and whose statements may be verified to the satisfaction of the Committee of Awards.
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Set No. 16—"The S-C All-Wave Receiver" (as described in the March 1926 issue of POPULAR RADIO).

Set No. 17—"The Power-pack Amplifier" (as described in the April 1926 issue of POPULAR RADIO).

Set No. 18—"The Improved Raytheon Power-Pack" (as described in the May, 1926, issue of POPULAR RADIO).

Set No. 19—"The New Home Receiver" (three tubes, two stages of radio-frequency amplification with crystal detector, as described in June, 1926 issue of POPULAR RADIO).

Set No. 20—"The New Town and Country Receiver" (as described in the July, 1926, issue of POPULAR RADIO).

Set No. 21—"The Improved Browning-Draze Receiver" (as described in the August, 1926, issue of POPULAR RADIO).

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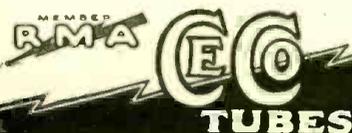
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The reverse; the name of each recipient will be engraved in the space provided.

8. All considerations not specified herein shall be left to the discretion of the Committee of Awards.

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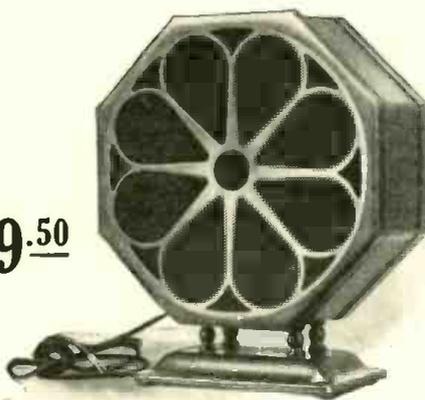
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National coil and variable condenser of the Antenna Tuning Unit, coupling coils and variable condenser of the Detector Tuning Unit..... \$24.00	1 General Radio variometer, with rheostat knob..... \$ 5.30
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Accurate as the Human Ear

\$19.50



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Octacone reproduces faithfully all musical sounds—from a soprano's trill to the rumble of a kettle drum. Its patented diaphragm—shaped exactly like a human ear drum—vibrates to every pitch and quality of tone in precisely the same way as a listener's ear. An exclusive feature that gives Octacone a naturalness of reproduction unequalled by even the highest priced speakers.

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Unlike most fine instruments, Octacone is built to withstand the hard treatment fine instruments too often receive. Even should it be accidentally knocked onto the floor, Octacone will come up smiling—and singing as beautifully as ever.

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"I have at last found myself," writes Lyle Follick, Lansing, Mich. "I have already made over \$500." Werner Eichler, Rochester, N. Y., writes: "—have made over \$50 a week in my spare time." Our members are starting radio stores, increasing their salaries, securing better positions, passing radio operator examinations, earning big money in spare time.

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New members receive one of the finest receiving sets made absolutely free. Coast-to-coast range. Most approved type. Unparalleled selectivity. To receive this wonderful set, you must act at once.

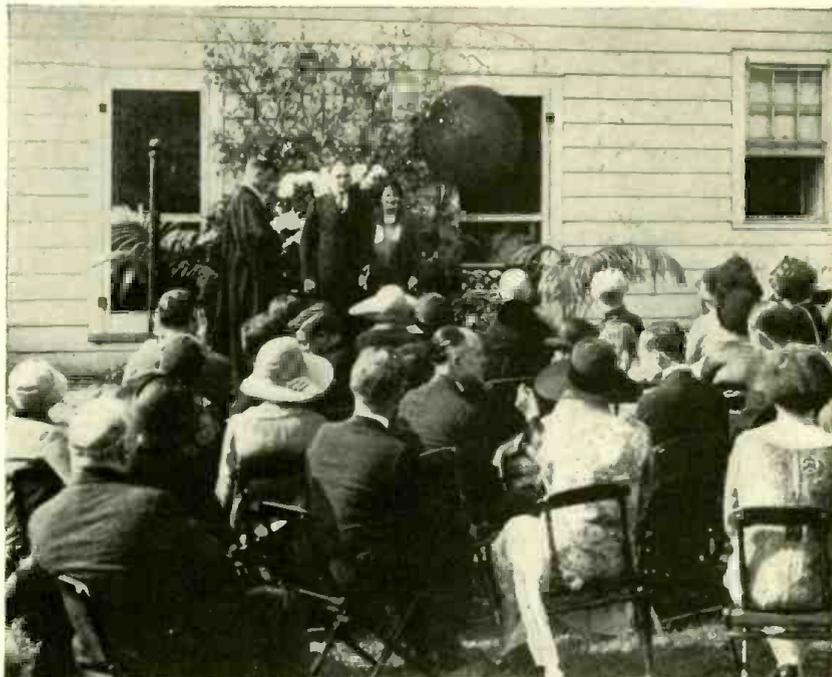
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International

A WEDDING SERVICE—PERSONALLY CONDUCTED BY THE AID OF RADIO

When Miss Mabelle A. Burbridge, widely known to newspaper readers as "Prudence Penny," decided that she wanted Mr. Maurice Barrabrant, the eminent organist of St. Thomas' Church in New York, to play the wedding march at her marriage to Mr. Leon G. Gray, did she abandon the idea merely because Mr. Garrabrant could not come to the ceremony at Douglaston, Long Island? She did not. She asked him to broadcast the wedding music to her from station WAHG. And he did, exactly on schedule time.

BROADCAST LISTENER

*Comments on radio programs, methods and technique
—from the point of view of the average fan*

By RAYMOND FRANCIS YATES

Posing Models Before the "Mike"

LANDS' sakes, we've got a lot of nice things to talk about this month!

It seems that broadcasting has passed through a little *renaissance* since our last columns went to press. One more novelty was exposed by WGBS when it broadcast a fashion show. While our own personal interests in female fashions begins and ends with the figures (No, not the figures of the models but on cancelled checks) we can understand the interest that might be aroused by such an event.

At any rate, it is a good idea and we are mighty particular as to what we label "good idea," we can tell you that.

Motor Races on the Ether

MY, we have so many little pleasures to run off this month! It makes us feel very, very happy.

WGN (which, in case you want our honest opinion, is one of the strongest stations in this country), was on its toes again when it broadcast the 500-mile automobile race at Indianapolis. Auto

aces between our established drivers should form a substantial bit of broadcasting, provided the announcing is in the hands of a capable and interesting observer. The auto race has plenty of action and there is the contagious element of bitter contest.

Broadcasting a Jewish Poker Game

THE antenna of this department is very sensitive to new ideas in broadcasting. They feel around and feel around, but it is only once in a blue moon that they contact with anything that we may put down as new. A few weeks ago WGBS (New York) broadcast "A Jewish Poker Game" with Milt Gross (father of "Nize Baby"), Harry Hershfield, Max Fleisher and Jimmy Hussey as the participants.

While all Jewish poker games are not funny, Jewish poker with a caste like the above could not fail to be funny.

Let's see now, that makes five studio managers we have caught thinking during the past year.



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“Interviewing” by Radio

WE do not need to ask you if you have ever heard a stage or movie star interviewed on the air. If you have escaped you are really a lucky person, for nothing bores so quickly as a dumb actress (of course, all actresses are not dumb) airing views about this and that.

New York is a bad place for this sort of business; that is, it's bad for the public but easy pickings for the publicity men. Being interviewed at station WGBS or WRNY is a trump card played by every publicity man just before he gets the air.

How Many Characters Can a Fan Identify in a Radio Drama?

OUR “Society for the Improvement of Radio Drama” has received a frightful setback. Just as we were beginning to think that the radio dramatists were falling for our propaganda along comes WGY with the “Reprisal,” calling for a cast of fourteen players with “German orderlies and Belgian citizens.” This sounds like a terrible lot.

Unless this old bear is badly mistaken “Reprisal” will be a flop. You cannot have fourteen characters in a radio play and expect your listeners to keep their identities straight.

The Arrival of the “First Radio Organ”

WGN, that big, wide-awake station way out there in Chicago, is making no mean effort to become America's major broadcaster. It is beginning to recognize important details—and when you begin to recognize details you usually improve your stuff.

In the past the organ has been more or less unsuited to broadcasting because of the difficulty of getting certain frequencies to register with anything like fidelity. Experts held, and correctly enough, that radio demanded an organ all of its own with special accommodations made for the benefit of the microphone. WGN, working with an organ specialist, has developed and installed the first radio organ.

We hope this may be taken as a sign that broadcasting is passing out of its Penny Arcade era.

The Oboe as a Solo Instrument

DEAR READER, be honest with us; have you ever in your days, long or short as they may have been, heard of a famous oboe player?

Whatever our own opinions may be, the publicity man of WGBS announced the performance of Michel Nazzi, “famous oboe player.”

An oboe solo may be a novelty—but we can think of many, many things we'd rather do than listen to one.

And finally~



“HERE is the latest embodiment of all that is good in the Inverse Duplex System. I have spared no pains in making its quality of material, workmanship and performance the best. It justifies my years of study, research and accomplishment.”

DAVID GRIMES

GRIMES OWN KIT

100% Shielded Inverse Duplex

TRUTH will out! The real rich values of the David Grimes Inverse Duplex System can be realized to their utmost only when quality parts, workmanship and design are present. Here is a master-made kit easily assembled into a master radio instrument that should last for a life-time.

The Grimes Own 5 Tube Storage Battery Kit (or the 4 Tube Dry Cell Kit) is built, sold and guaranteed by David Grimes. In addition each standard part is guaranteed by its own manufacturer, forming a double guarantee to the constructor. It is 100% shielded and when assembled, the finished aluminum cast-

ings form a sturdy artistic cabinet. The kit incorporates the latest improvements in the art, bringing the famous Inverse Duplex System to the utmost efficiency in selectivity, volume and tone. David Grimes has rightly called this kit his “own” because he is proud of it.

Send for Grimes Own Working Plans

You can now obtain charts and detailed descriptive matter covering the fascinating David Grimes Inverse Duplex System and its most recent developments. Pin a dollar bill to the convenient coupon below and get the valuable illustrated plans.

HIGH SPOTS

The Grimes Own is the only completely shielded kit set in existence. It is the first David Grimes Inverse Duplex Kit ever sold. It embodies three stages of radio, detector and three stages of audio frequency. Designed for power tube operation. Connections furnished for loop or antenna.

Study These Parts With Care!

- Two Samson Audio Transformers.
- One Grimes special resistance coupling.
- Five Benjamin non-microphonic UX sockets.
- Three semi-straight line Lind vernier tuning condensers and coils.
- One Grimes RF Choke Coil to equalize all wave-lengths.
- One Grimes RF Fixed Transformer for added amplification and equalization.
- One DeJur Rheostat.
- One Electrad Potentiometer.

- One drilled artistically etched black and gold metal panel, 7 x 18.
- Grimes complete aluminum shielding cabinet.
- One Grimes antenna switch.
- Six Sangamo fixed condensers.
- Three Arthur Lynch Grid Leaks.
- Three Grimes fixed filament resistances.
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- Battery Cable.
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I enclose a dollar bill. Send me those plans.

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**GETS ALL STATIONS
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The latest thing in radio. Gets everything on the air—amateurs, experimental, and all regular programs. Includes local and foreign. You can now get KKKA on 58 meters, WGY on 65.5 meters and a host of other low wave stations.

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The circuit is in one piece, firmly imbedded in the sub-panel. Eliminates soldered connections. No loose or broken contacts. Pronounced year's greatest improvement in construction.

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Mason made \$212 in a few days demonstrating this set. Clark got orders for 5 sets in one week making over \$100 profit. McNamara just ordered 5 more sets.

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Set has wonderful power and selectivity. Cuts through local stations like magic. Easy to tune in far distant stations. 3000 miles not unusual. Makes you king of the air.

FACTORY REPRESENTATIVES WANTED
We need representatives to demonstrate this amazing new 5 tube set. Big demand. Sells far below store prices. We start you in business. No investment. Easy to make \$60 to 100 a week in your spare time. Write for complete information and special offer.

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Our radio engineers have prepared a new course in radio. Simple and practical, but gives all the radio information needed to make you the radio expert of your community. Written so you can understand it.

FREE Every student is given a brand new 5 tube radio set like the one described above. 40 to 550 meters. Imbedded Circuit. But you must act at once. Send in the coupon.

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Please send particulars of your course in radio and one of FREE Radio Set.

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of America
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The Coming of the Radio Drama

For a time we thought that the perfection of the radio drama had been given up as a bad job; but it seems that there has been a larger effort toward improvement in the past few months.

That is encouraging; and every pioneer in this field can feel that the vast moral power of this department is squarely behind him. We feel and always have felt that in the radio drama we have only half discovered a source of entertainment that will some day be one of the chief features of the art. The "ear-play," as Waldemar Kaempffert has aptly called it, is still finding sustenance on crackers and milk; but no one will deny that it is capable of more substantial nourishment.

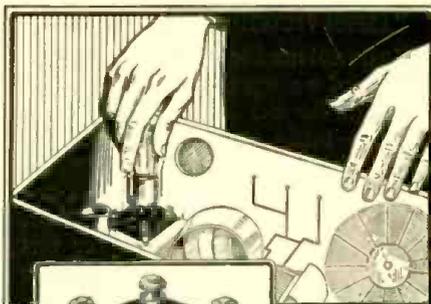
The dramatic art does not need to be reconstructed for air use; only adapted. The moving picture pioneers learned to present drama minus sound; radio must learn to present it minus sight—a more difficult task. Yet there is promise of a satisfying success; and it seems that the whole thing only awaits the patient application of a serious experimenter.

In presenting drama, some studios give a complete *resumé* of the plot and of the action before the performance begins. Is a plot that is so involved that it needs an introductory explanation suitable for radio? Is not suspense the greatest factor in drama? How can suspense be developed, let alone sustained, if the audience anticipates every bit of action?

To our small way of thinking the radio drama must be capable of unfolding itself, capable of telling its own story. If it cannot do this it is not drama.

Only superficial thinking is needed to show that the air-plot can afford to use only a few performers. Many of the ear-plays that we have listened to have had so many characters that one had to make a conscious effort to keep the characters tagged. After all, identification must be made on the basis of the difference in the sound frequencies of the voices involved and voices that come even within an octave of each other are most difficult to separate. The listener eventually finds himself making an effort to keep his identities straight; and this is fatal to sustained interest.

After some experience listening to ear-plays we feel ready to express the wholly private opinion that no radio drama should require more than five characters for its fullest interpretation. The voice frequencies of the performers should also be widely separated. Otherwise the listener will concentrate on identification, reducing the entertainment value of the thing to a point somewhere near zero. As the available five-character dramas are small in number, it is evident that we must build up



V. T. Socket
No. 242
Black Composition
Base, Push-type
Design

U X Tube Socket

This new push-type socket is designed for use with the new tubes with U X Bases.

Contacts of Phosphor Bronze insure a smooth self-cleaning and wiping contact. The lamps are held rigidly in place.

Circle F V. T. Sockets are of the most modern design and only the best materials and workmanship are employed.

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(See page 476 for description of Sets)

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Address.....

Foreign postage 50c extra No extra for Canada.

a school of radio dramatic art. Recently Mr. Lloyd Jacquet suggested a Radio Drama League; perhaps that would help to improve the art of air-plays.

To this observer, it has seemed that, in the past, the *locale* of each scene has failed to be sufficiently described. *Locale* is an important part of the plot; it is the matrix into which the plot is poured.

If the scene is a living room, it should be adequately described.

Is it a Colonial room, French, Tudor or Spanish? Is it small or large, light or dark? How is the furniture arranged?

It would seem, too that a complete description of each performer would help to create the perfect illusion at which radio must aim. Is the hero, dark or light, tall or short, fat or lean? Is the heroine blonde or brunette, slender or fleshy, brown eyes or blue? What is the color of her dress and how is her hair arranged?

If you leave the *locale* or the descriptions of the performers to the imagination of the listener, he will build them up to suit his own tastes—and his own tastes may not conform with the author's.

* * *

The Passing of the Old-Fashioned Announcer

ALTHOUGH we are not as yet ready to start the "Association for Preservation of the Memory of the Old-Fashioned Announcer," we cannot overcome the notion that this will soon be necessary if we are to leave authentic information for posterity.

Much as the thought moves us, we cannot help but feel that these dear boys are well on the way to total extinction.

The newer ideas of broadcasting leave the announcer with a fairly mean part if you should ask us. He will give the name of the selection, the name of the artist and the name of station *and that is all*.

The "personal reflection" announcement is losing favor with the grown-up folks although it is said that the high-school girls still like to hear Mr. Broken-shire's flapdoodle.

Did you hear Mr. Milton Cross handle the Victor program of March 25th? He gave the name of the station, the name of the artist and just a few words about the selections. His voice was pleasant, his annunciation good and the announcements were short but informative. That is the announcement of the future.

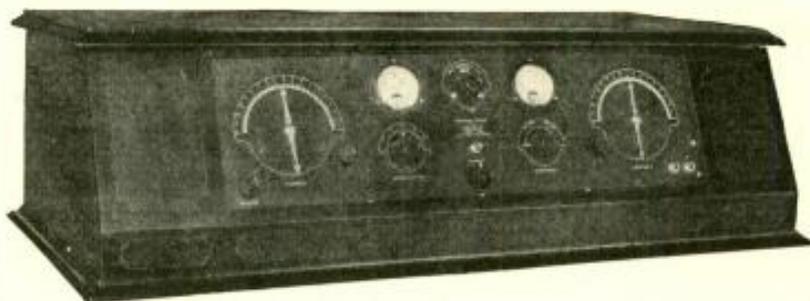
It looks pretty bad for the Mr. McNamees, the Bill Hays and the rest of the boys.

"Why do you call this a railroad radio?"

"Because it whistles at every station."

—Judge

A New Model—



UNIVERSAL SUPER-8

For the 1926-1927 season Golden-Leutz have 17 new models. See our Exhibits at the New York and Chicago Radio Shows.

A new 80 page catalog covering our entire line of radio equipment is now ready for mailing; we would be pleased to have you write for a free copy.

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Bakelite Construction

Simplifies your battery wiring and makes an instant and correct battery connection. Metal cable markers and colored template (RMA standard color code) permanently attached to the connector plate make it easy to wire any set. The phosphor bronze double contact springs are mounted in Bakelite and cannot work loose.

The Connector Plate mounts upon a bracket which is reversible or may be entirely removed for subpanel mounting. Extra fine quality seven strand cable (RMA standard colors) 7 feet, and six extra markers to match your wiring arrangement furnished.

No. 660 Cable Connector Plug, complete \$3.50

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1 DeLuxe first stage	10.00
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Quality amplification can only be obtained by using the best transformers with a high voltage output tube such as the UX 210 or CX 310.

The AMERTRAN "B" Supply and Amplifier furnishes this with the addition of "B" supply for your set.

The above units can be had completely assembled, wired and absolutely guaranteed. Write for literature and our special "Club Price Plan."

Authorized
AmerTran Service Station

IN STOCK—COMPLETE PARTS FOR IMPROVED BROWNING-DRAKE, S-C RECEIVER, RAYTHEON POWER PACK.



WHAT'S NEW IN RADIO

This department is conducted by POPULAR RADIO LABORATORY for the purpose of keeping the radio experimenter and the broadcast listener informed concerning the newest inventions and the approved developments in radio equipment. Only such apparatus as has been tested and endorsed by the Laboratory is noted in these columns.

A KIT OF RESISTANCES

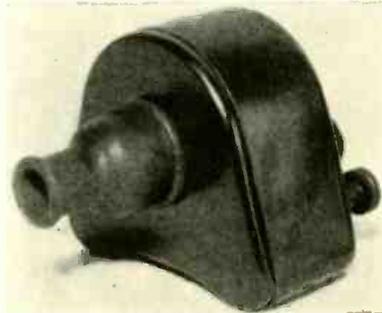
Name of instrument: Fixed resistances.

Description: These resistances are put up in a box that includes the various resistance values necessary for the "B" power-pack that has already been described in POPULAR RADIO. They are wire-wound on a special porcelain tube and covered with a vitreous enamel to prevent oxidation. They are equipped with soldering terminals for easy connections. These resistances are made especially for plate circuit use and have a current carrying capacity that is suitable for all such work.

Usage: In a "B" power-pack as a means for regulating voltages.

Outstanding features: Accuracy. High-current carrying capacity. Handy units. Moisture proof. Easy to install.

Maker: Ward Leonard Electric Co.



A NEW PHONOGRAPH ATTACHMENT

Name of instrument: Loudspeaker unit.

Description: This unit is furnished with a suitable cord for attachment to a radio receiver. It may be attached directly to any standard phonograph by means of a soft pliable rubber connection joint. It is mounted in a neatly finished black case and when used with a modern phonograph gives a delightful quality of reproduction.

Usage: In connection with a phonograph for reproducing radio signals.

Outstanding features: Easy to attach. Good volume. Excellent tone quality. Neat appearance.

Maker: Brandes Products Corporation.



Apparatus Approved by Popular Radio

This list of apparatus approved by the POPULAR RADIO LABORATORY will be continued as a part of the WHAT'S NEW IN RADIO department until all instruments, parts and complete sets have been included. The listing is alphabetical by manufacturer's name and the installment in this issue includes the letters T to Z.

AERIALS

Wound-wire aerial; Wound Wire Aerial Co.
DX-10-Point antenna wire; Xardell Corp.

AUDIO-FREQUENCY TRANSFORMERS

Thordarson audio-frequency transformers; Thordarson Electric Mfg. Co.
United audio-frequency transformer; United Mfg. & Distributing Co.
Audio-frequency transformer; Louis E. Werts
Serra audio transformer; Wholesale Radio Service Co.

BATTERIES

"Twin" dry batteries; Twin Dry Cell Battery Co.
RB 48-volt "B" battery; Universal Battery Co.
USL radio "A" and "B" batteries; U. S. Light & Heat Corp.
Westinghouse crystal case "A," "B" and "C" batteries; Westinghouse Union Battery Co.
Willard radio batteries; Willard Storage Battery Co.

Radio "B" batteries; Winchester Repeating Arms Co.
Wizard "A" and "B" batteries; Wizard Battery Co.
World storage "A" and "B" batteries; World Battery Co.

BATTERY CHARGERS AND RECTIFIERS

Valley battery charger; Valley Electric Co.
Waterbury "A" battery; Waterbury Battery Co.
Waterbury Super Cells; Waterbury Battery Co.
Westinghouse rectigon battery charger; Westinghouse Elec. & Mfg. Co.
Dynamik "A" and "B" battery charger; Wilson Electrical Labs.

"B" BATTERY ELIMINATOR

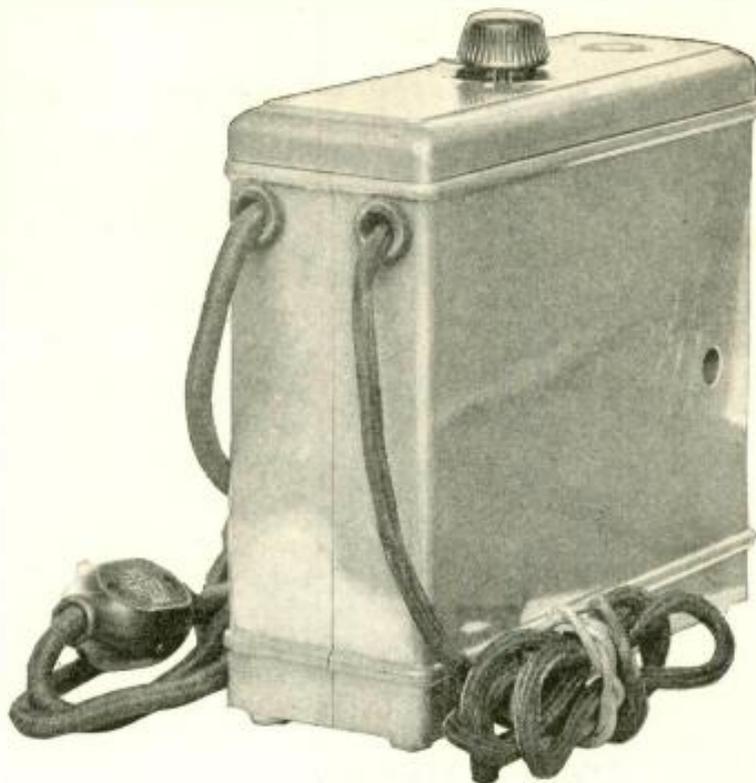
Valley "B" eliminator; Valley Electric Co.
Waage "B" eliminator; A. H. Waage.

BINDING-POSTS

Littered binding-posts; Walnut Electric Mfg. Co.
X-L push post; X-L Radio Laboratories.

Illustrated at right is Acme E-3 B-Eliminator with non-filament tube for use with one to six tube sets, 110 volts, 60 cycles, tan finish, rugged construction, price \$39.50

Write for leaflet describing this and also other Acme A, B and C Power Supply units.



Make your Radio Set a lamp socket receiver

TO TRANSFORMERS and loud speakers that give you amplification without distortion, Acme now offers its friends further radio comforts—the complete elimination from your present radio set of A, B and C battery nuisances, replacements and expenses.

You can now have lamp socket operation that lives up to the Acme reputation—amplification without distortion.

The change can be made over night. No trouble, no

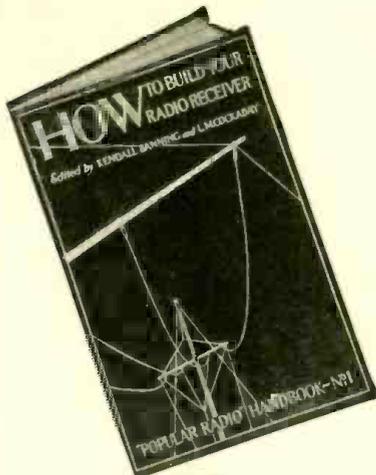
disrupting your set to do it. Merely hook up and tune in.

Other than household current, the first cost of these units is their last. There is nothing to wear out, nothing to get out of order.

See any Acme dealer or write us for special leaflet C15 giving complete information. Acme Apparatus Company, pioneer radio and transformer engineers and manufacturers, Cambridge, Mass.

ACME ~for amplification

RADIO MANUAL FREE



WITH POPULAR RADIO

Aside from the feature of economy, there is the thrill and satisfaction that comes from building your own receiving set. Thousands of sets have never been constructed because of the atmosphere of mystery that has enveloped the whole subject of radio. Kendall Banning, Editor, and Laurence M. Cockaday, Technical Editor of POPULAR RADIO through their close contact with the great radio public sensed this and compiled a book that will convince the veriest beginner that technical training is not essential. If you have a little time to devote to a most fascinating pastime, send for a copy of "How to Build Your Radio Receiver."

Free Advisory Service

POPULAR RADIO is full of helpful suggestions as well as instructive and entertaining articles on radio and allied scientific phenomena. This information is supplemented by an advisory service that is free to all subscribers. Any problem you encounter that is not answered in the book or magazine will be answered by personal letter if you will submit it to the Technical Service Bureau.

A Valuable Combination

For the next thirty days we will give you a copy of "How to Build Your Radio Receiver," FREE and enroll you for all privileges of the Technical Service Bureau at no further expense, on receipt of your remittance of \$3.00 in payment for a 12 months' subscription for POPULAR RADIO. (As an alternative offer, if you wish the combination with POPULAR RADIO for 7 months only—send but \$2.00). In any event, you run absolutely no risk as we will refund in full if you are not more than satisfied with your purchase.

CONTENTS

In "How to Build Your Radio Receiver" you will find complete constructional diagrams, specifications, photographs and instructions for building the following sets. Each has been selected as representative of its circuit because in laboratory tests it proved the best for distance, selectivity, tone volume, simplicity of construction, ease in tuning, reliability and all-around satisfaction.

A \$5 CRYSTAL SET

THE HAYNES SINGLE TUBE RECEIVER
A TWO-STAGE AUDIO-FREQUENCY AMPLIFIER

THE COCKADAY 4-CIRCUIT TUNER

A 5-TUBE TUNED RADIO-FREQUENCY RECEIVER

THE "IMPROVED" COCKADAY 4-CIRCUIT TUNER

THE REGENERATIVE SUPER-HETERODYNE RECEIVER

POPULAR RADIO

627 West 43d Street, N. Y. C.

Offer expires Sept. 30th, 1926

POPULAR RADIO, Dept. 95A,
627 West 43d St., New York City

Enclosed remittance of \$3.00 is payment in full for a 12 months' subscription for POPULAR RADIO and copy of "How to Build Your Radio Receiver" FREE.

Name.....

Address.....

City..... State.....

Check here and remit \$2.00 if you prefer POPULAR RADIO for 7 months only in combination with "How to Build Your Radio Receiver."

CRYSTAL DETECTORS

Radetec fixed detector; Towner Radio Mfg. Co. Cummings Union radio crystal; Union Radio Elec. Stores, Inc. "Yellowtip" crystal detector; Wholesale Radio Equipment Co.

DIALS

Radio dial; Trufix Radio Products Co. Micrometer dial; U. S. Tool Co., Inc. Knobs and dials; Walbert Mfg. Co. Dial; Walnart Electric Mfg. Co. E-Z-Tune dial; Workrite Mfg. Co. Knobs and dials; Yaxley Mfg. Co.

FIXED CONDENSERS

Fixed condenser; Walnart Electric Mfg. Co. Faradon fixed condenser; Wireless Specialty Apparatus Co. Faradon filter condenser; Wireless Specialty Apparatus Co. Yaxley fixed condenser; Yaxley Mfg. Co.

GRID-LEAKS AND RESISTANCES

Resistron; Temple Instrument Co. Variable grid resistances; Walnart Electric Mfg. Co. Resistance unit; Yaxley Mfg. Co.

HEADPHONES

Tower's Scientific headset; Tower Mfg. Co. Ambassador phone; Tower Mfg. Co. "Little Spitfire" headset; Tower Mfg. Co. Berwick Supreme headphone; Triangle Electro Trading Co. Trimm headsets; Trimm Radio Mfg. Co. "Ampl-tone phones; Union Fabric Co. Warren phone; Warren Radio Phone Mfg. Co. Work Rite concert headset; Workrite Mfg. Co.

JACKS

Union tip jack; Union Radio Corp. Yaxley jacks; Yaxley Mfg. Co.

KITS

U-ni-Dial kit; U-ni-Dial Radio Co. Superheterodyne kit; Victoreen Radio, Inc.

LOOPS

3-lead Thomas loops; W. I. Thomas Co. Variable radio loop antenna; Werner Radio Mfg. Co.

LOUDSPEAKERS

Thompson Magnaphone; R. E. Thompson Mfg. Co. Timbretone loudspeaker; Timbretone Mfg. Co. Timbretone loudspeaker (cabinet type); Timbretone Mfg. Co. Timmons Talker; J. S. Timmons. Tower's Scientific loudspeaker; Tower Mfg. Co. "Little Spitfire" loudspeaker; Tower Mfg. Co. Berwick Supreme loudspeaker; Triangle Electro Trading Co. Trimm loudspeakers; Trimm Radio Mfg. Co. Trinity loudspeaker; Trinity Radio Corp. Unger loudspeaker; Unger Radio Mfg. Co. "Black Beauty" reproducer; United Radio Corp. Utah phone-speaker; Utah Radio Products Co. Van-Le reproducer; Van-Le Corp. Leader Senior; Victor Radio Corp. Leader Baby Goose Neck; Victor Radio Corp. Professional radio reproducer; Voluma Products, Inc. Work Rite concertrola; Workrite Mfg. Co.

MISCELLANEOUS ACCESSORIES

Special alloy bracket; Robert W. Tait. Insurtube; Terle Electric & Mfg. Co. Dial adjusters; Union Radio Corp. Valley clip; Valley Electric Co. Var Flex tubing; Var Flex Corp. Var Flex wire core; Var Flex Corp. Vibroplex transmitter; Vibroplex Co. of America Panelites; Walbert Mfg. Co. Penetrola (auxiliary unit); Walbert Mfg. Co. Adjuster; Walnart Electric Mfg. Co. Universal soldering terminals; Lawrence S. Williams

PANELS

Celesto shadow-black panel; Triangle Rubber & Supply Co. Hard rubber panels; United States Rubber Co. "Universal" decorated panel; Universal Insulation Co. Micarta radio panel; Westinghouse Elec. & Mfg. Co.

PHONE PLUGS

G. W. 5-circuit plug; G. E. Walker Co., Inc. Yaxley plug; Yaxley Mfg. Co.

PHONOGRAPH ATTACHMENTS

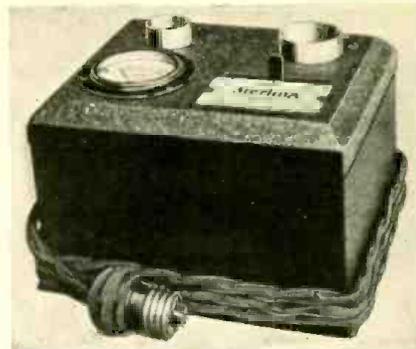
Dulce-Tone; Teagle Co. Trimm phonograph attachment; Trimm Radio Mfg. Co. Ampl-tone loudspeaker unit; Union Fabric Co. Leader loudspeaker unit; Victor Radio Corp.

POTENTIOMETERS

Potentiometer; United Scientific Laboratory, Inc. Yaxley potentiometer; Yaxley Mfg. Co.

RADIO CABINETS

Utility De Luze radio cabinet; Utility Cabinet Co.



A TUBE REJUVENATOR

Name of instrument: Tube rejuvenator.

Description: This piece of apparatus is contained in a metal cabinet with a black crystalline finish. The apparatus is equipped with a long extension cord for fastening to the 110-volt 60-cycle lighting lines. It will reactivate both the small and large thoriated filament tubes of the 199 or 201-a type. It is equipped with a lever which changes connections in the interior for producing the high current for flashing the filament, the medium current for maximum reactivation of the filament and the normal current for lighting the filament during test. When this lever is moved to the extreme left a reading on the meter is obtained that gives an indication of the filament emission, so that the operator may determine just when his tube is fully reactivated.

Usage: As an accessory for radio set owners in getting their tubes in good condition.

Outstanding features: Compactness. Efficiency. Equipped with a meter.

Maker: Sterling Mfg. Co.



A DIAL WITH A VARIABLE RATIO

Name of instrument: Vernier dial.

Description: A new vernier control that incorporates a means for changing the ratio to suit the particular receiver with which it may be used. There is a small metal button mounted on a rotor just above the control knob that may be adjusted into a number of positions that increase or decrease the ratio of the movement of the main shaft of the instrument to which it is attached in relation to the movement of the control knob itself.

Usage: In connection with any receiver as a tuning control.

Outstanding features: Variable ratio. Smooth operation. Neat appearance.

Maker: National Company, Inc.

Windsor loudspeaker console; Windsor Furniture Co.

RADIO-FREQUENCY TRANSFORMERS

United R. F. transformer; United Mfg. & Distributing Co.
Werner R. F. transformer; Werner Radio Mfg. Co.

RECEIVING SETS

Thermodyne receiver; Thermodyne Radio Corp.
Thompson 5-tube neodyne knockdown set; R. E. Thompson Mfg. Co.
Thompson "Minuet" receiver; R. E. Thompson Mfg. Co.
Trego tuned-radio-frequency set; Trego Radio Mfg. Co.
Tuska receivers; C. D. Tuska Co.
McLaughlin one-control superheterodyne; U-ni-Dial Radio Co.
"Unidyne" receiver; United Mfg. & Distributing Co.
USL Broadcast Receiver; U. S. Light & Heat Corp.
Valleytone set; Valley Electric Co.
Radiodyne receiver; Western Coil & Electrical Co.
Elf crystal receiver; Westwyre Co.
Work Rite receiver; Workrite Manufacturing Co.
Zenith receivers; Zenith Radio Corp.

RHEOSTATS

Rheostat; United Scientific Laboratory, Inc.
Vernier rheostat; Unity Mfg. Co.
Work Rite vernier rheostat; Workrite Manufacturing Co.
Air-cooled rheostat; Yaxley Mfg. Co.

SOCKETS AND ADAPTERS

V. T. socket; Union Radio Corp.
Walbert Safety Rim socket; Walbert Manufacturing Co.
Walnut sockets; Walnut Electric Manufacturing Co.

SWITCHES

Filament lock switch; Walbert Manufacturing Co.
Switch; Walnut Electric Mfg. Co.
Universal Bi-Polar switch; Weston Electrical Instrument Corp.
No. 210 Pilot light switch; Yaxley Manufacturing Co.
Jack switch; Yaxley Mfg. Co.
"A" and "B" voltmeter switch; Yaxley Manufacturing Co.

TESTING INSTRUMENTS

Victor battery hydrometer; Victor Manufacturing Co.
Weston radio panel voltmeter; Weston Electrical Instrument Corp.

TOOLS AND EQUIPMENT

Unity electric soldering iron; Unity Manufacturing Co.
Soldering iron; Westwyre Co.
Winchester small chair pliers, round nose pliers, diagonal cutting pliers; Winchester Repeating Arms Co.
See-Ess coil winder; Wireless Electric Co.
Wizard wire winder; Wizard Wire Winder Co.

TUBES

Universal vacuum tube; Universal Radio Laboratories.
Musselman Certified adapted Mogel 5VC power amplifier tube; Van Horne Co.

TUNING INDUCTANCE UNITS

Turney's spider-web plez coils; Tristan Sales Corp.
Uncle Sam Master tuning coil; Uncle Sam Electric Co.
Work Rite variometer; Workrite Mfg. Co.
Work Rite variocoupler; Workrite Mfg. Co.

VARIABLE CONDENSERS

Thordarson variable condenser; Thordarson Electric Mfg. Co.
Grounded rotor low-loss condenser; United Scientific Laboratory, Inc.
Multiple condenser for single-control receivers; U. S. Tool Co., Inc.
Straight-line-frequency condenser; U. S. Tool Co., Inc.
Triple multiple condenser; U. S. Tool Co., Inc.
Wade condenser; Viking Tool & Mfg. Co.
Univerner condenser; Walbert Manufacturing Co.
Variable condenser; Westwyre Co.
X-L variodensers; X-L Radio Laboratories

The use of radio by vessels in Spanish territorial waters is prohibited.

* *

MOUNTING a radio receiving set on a wheelbarrow and the loop antenna on a packing crate, a Long Island farmer has made weeding a pleasant task for his field workers.

Everything IN RADIO

for the Dealer.
Profit producing prices.
24 hour delivery service.
Complete stocks.

List of Parts for IMPROVED BROWNING-DRAKE RECEIVER

Part Description	Cost
Coil and variable condenser, respectively, of the National Co. Antenna Tuning Unit	\$10.25
Coupling coils and variable condenser, respectively, of the National Co. detector tuning unit	13.75
1-Jefferson "Concertone" sealed audio-frequency transformer	6.00
1-Thordarson filter choke (same as that used for B eliminator work)	5.00
1-Tobe paper filter condenser, 4 mfd.	3.75
1-Sangamo mica fixed condenser, .002 mfd.	.50
1-Sangamo mica fixed condenser, .006 mfd.	.85
1-X-L variodenser type N	1.00
3-Lynch double-resistance mountings	1.50
2-Tobe paper filter condensers, 1 mfd.	1.40
3-Lynch metallized resistors, 1 meg.	2.25
1-Lynch metallized resistor, 5 megohms	.50
5-Benjamin vibrationless sockets for UX tubes	3.75
1-Lynch metallized resistor, 6 megohms	.50
2-Lynch metallized resistors, .225 megohms, and .09 megohms, respectively	1.50
Brach-stat, Code 2-B, with mounting	1.00
Frost Gem-Jac, No. 954	.25
Carter battery switch	.65
2-Tail brackets	2.00
Sangamo mica fixed condenser, .005 mfd. equipped with gridleak clips	.50
Small brass brackets for mounting connection blocks	.20
Antenna connection block	.15
Battery connection block	.75
Decorated bakelite panel, 8 x 22 inches	7.50
Corbett sloping panel cabinet for 8 x 22 in. panel, walnut or mahogany finish	\$65.00
Genuine walnut or mahogany	\$13.00
Hardwood baseboard, 9 1/4 x 2 1/4 inches furnished with the cabinet	15.00

DEALERS—Thousands of dealers all over the country consider our monthly catalogue their "buy" book. If you are not on our mailing list you're losing money. Don't delay! Write today for our FREE CATALOGUE!

Come to Us for Kits and parts for all leading circuits. Our usual generous discounts and 24 hour service on

Amertran Power Pack LC-26 and all other Cockaday kits.

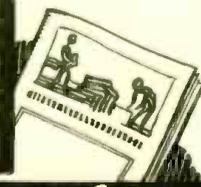
Raytheon Power Pack

Acme Power Amplifier

NEW!
S-M PLUG IN "B"
S-M Shielded Six
S-M Audio & Power
Trans.

Distributors of:

- Acme Apparatus
- Acme Wire
- All-American
- Allen Bradley
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- Frost
- Hoyt
- Jefferson
- National
- Magnatron
- Pyrex
- Radial
- Remler
- Silver-Marshall
- Thordarson
- Yaxley
- and others



WHOLESALE RADIO SERVICE Co.
6 Church St., N.Y. City
"The Radio Dealer's Best Friend"
write for free catalog

Cushioned to stop vibration—that's why the Cushion Base Tube makes such a wonderful improvement in reception

Equip your set with Cushion Base tubes and note the surprising softness and fullness of tone of reception that follows the elimination of vibration. Order your set from your dealer today.

THE VAN HORNE CO., Inc.
902 CENTER ST., FRANKLIN, OHIO

QUALITY DONGAN PRODUCTS

Newest Quality Types Audio Transformers

Semi-Cased

A growing majority of the leading manufacturers of receivers have long since found it an economy to standardize on Dongan Audio Transformers. For more than 15 years Dongan has specialized in the design and manufacture of the highest quality transformers—since the commercial success of radio has devoted almost its entire attention toward perfecting audio transformers.

There are many types—cased and semi-cased—all Dongan guaranteed. Send a sketch showing your method of mounting. Samples and quotations furnished immediately. Engineering data available if desired.

B-POWER PARTS
For Eliminator Manufacturers

NOTE—We do not make a complete eliminator outfit.

As Parts makers, Dongan has pioneered the design of B-Eliminator Transformers and Chokes. Dongan B-Power Unit No. 1582 is standard for Raytheon tubes. Other types, both cased and uncased, for all Full and Half-Wave Rectifying Tubes.

Dongan quality B-Power Units at quantity prices to Eliminator Manufacturers. Write at once.

Dealers
Send for Information on Dongan B-Power Unit No. 1582, List \$11.00.

Dongan Electric Mfg. Co.
2983-3001 Franklin Street Detroit, Mich.

TRANSFORMERS * MERIT FOR FIFTEEN YEARS

Watch For The AC VARION with

Cardwell Condensers



PERFECTION

IN the modern dreadnaught, every part is tested, retested, and tested again. It must be perfect.

No other condenser available has nearly the inspection which is part of the manufacture of every Cardwell Condenser. Like the Battleship, it must be right. There can never be a failure.

The Taper Plate Type "E"



Modified Straight Wave Length Type "C" for more long wave operation



PRICES:

#23-C	18 1/2"	.00025	\$4.00
#21-C	16 1/2"	.00035	\$4.75
#20-C	14 1/2"	.00045	\$4.25
#18-C	12 1/2"	.00055	\$4.00

The Allen D. Cardwell Manufacturing Corp.
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THE 'STANDARD OF COMPARISON'

Get all the fun your set can give

Fun?—say, did you ever try learning code and reading it on your radio? You're missing the best part of your set if you haven't.

The Buzzplex makes it easy. Use the buzzer for learning wireless or radio signals and the lamp for practice in flash or heliographic work. The switch puts either one in operation.

Students in military schools, boy scouts, everyone, wherever code is taught, is using the Buzzplex. Headquarters for Transmitting Apparatus.

J. H. BUNNELL & COMPANY, Inc.
Manufacturers and Distributors
32 Park Place, New York
Phone: Whitehall 5970

Complete with
full instructions

\$7.50



BROADCASTS

By RICHARD LORD

A Demonstration of the Need of a Law to Control Broadcasting

ALTHOUGH it has been contested since the inception of broadcasting that Mr. Hoover's power to regulate and assign wavelengths has been more or less arbitrary the recent court decision abrogating his authority has resulted in serious confusion.

This decision has at least shown that radio broadcasting, hampered as it is by a law that was never made for it, (the Alexander law passed in 1912) needed the moral support of a man like our present Secretary of Commerce. It was largely through his honest appeal to the common sense of license holders that confusion has heretofore been avoided on the air.

It was to be expected that some of our more wayward broadcasters should take advantage of such a situation and immediately move up into the territory of the more important stations regardless of the possibilities of interference and, in some cases, with disregard for the welfare of either listener or broadcaster.

WOR (New York), almost before the ink in the court decision had dried, moved into the old berth of WJY.

WHAP, a smaller Brooklyn broadcaster, came up just below WJZ.

WRNY immediately began to feel important and pompously and impudently moved into a 374 meter channel; the result of this hasty action has been that WRNY now seriously heterodynes with WGY and neither of these stations can be heard decently. It is merely a case where the work of a good broadcaster is being interfered with by the outpourings of an inferior studio.

WMSG also decided to move out of adolescence and it has arbitrarily taken on the wavelength of 302.8 meters.

What will come of this situation, no one can tell. It will be months before Congress again convenes and the broadcasters themselves do not seem any too willing to call an emergency conference of their own for regulation and distribution of wavelengths on an equitable basis. If the situation becomes much

worse Congress will at least be impressed with the importance of passing regulatory legislation when it does convene. Such action should be forced by concerted popular appeal to our Congressmen and Representatives.

Does Radio Fill Church Pews?

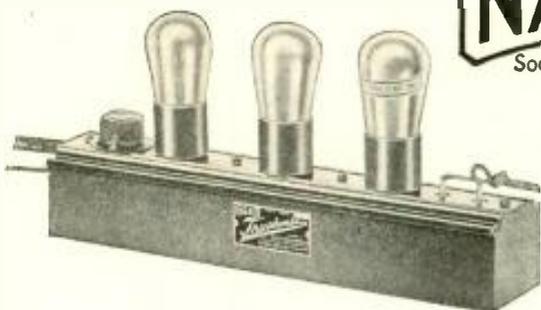
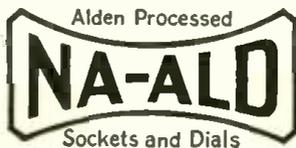
THE religious services broadcast by radio, instead of emptying the churches as was predicted, are filling them with more worshippers than they have known for many years—according to a survey that has recently been made by the Sears-Roebuck Agricultural Foundation. Twenty-seven clergymen stated that they had noticed an increase in the size of their congregations as a direct result of broadcasting, while one pastor wrote that forty persons had recently joined his church as a result of radio.

Radio Newspapers on Ocean Liners

STARTING as an experiment only three years ago, the radio newspaper has so grown in favor that now there are over 100 liners on the trans-Atlantic route alone that publish daily papers on their trips across the ocean. The American news is sent out already edited, through station WRQ, which uses 200 KW of power and transmits on a 13,500 meter wavelength. Even the headlines are radioed.

Trying Out New Plays by Radio

ONE of the ingenious uses to which radio has been put recently has been to try out new plays. Ordinarily a producer must go to the expense of buying scenery and costumes to give a play a short road run before he can know that his play is likely to meet success. One producer has conceived the idea of giving a play a preliminary "performance" before the radio audience, to find out to what extent it might meet with favor. The first play to be broadcast for this purpose was Frederick Arnold Kummer's "Beau Nash;" it was sent out over WGBS.



Na-Ald Truphonic Coupler

For those who are— awaiting perfect reproduction

A YEAR ago the phonograph was only a phonograph, and then came the Orthophonic. You will remember the amazement and admiration which this machine caused. Today, in radio circles, the Na-Ald Truphonic Coupler is causing the same amazement and admiration, and for the same reasons. The Na-Ald Truphonic Coupler gives the same thrilling distinctness and fidelity, the same quality and depth of tone, and at a volume far greater than hitherto thought possible. Listen to the announcer's voice. The diction is as crisp and clear as if he himself were in the room. A flute is playing—up, up it goes, and still the notes maintain their flawless purity. A piano plays and no longer do the keys sound out the stale and hollow flatness of a gong but the notes themselves with all their own true ringing clarity and even the delicate overtones are preserved in perfect harmony. An organ, too, is heard—beautiful with that full deep throated resonance which belongs to it alone. And now, the full symphony orchestra,—not the pale thinness of a single sound but a complete ensemble of instruments with the individuality of each so clear that you can follow the themes of everyone—the French horns as they burst forth to blend again with the whole; or, the bass viols as they pursue their lone and solitary air. And the applause? a jumbled roar? No! The staccato clapping of separate hands. The Na-Ald Truphonic Coupler does more than reproduce. It recreates and brings to you that vivid, breathing, fragile thing—the soul of the music itself.

The Na-Ald Truphonic Coupler is a new instrument; new in principle, new in design, and new in construction. It is neither an impedance, resistance or transformer coupling but a new invention of H. P. Donle which coordinates each compound in perfect proportion for precise, undistorted, and beautifully perfect amplification. Almost overnight it has revolutionized the science of amplification.

Attaching the Na-Ald Truphonic Coupler to your set takes but a jiffy. Connect the battery cables, slip in the tubes, plug in the loud speaker and there it is.

Words won't convince you of the performance of the remarkable little device. A demonstration will. Call at your dealers and he will gladly make you one; and, you, yourself, will hear the radio of which you've always dreamed.

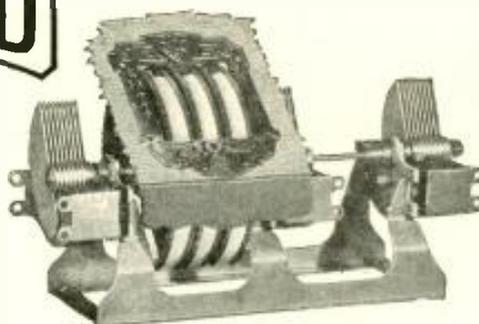
Price—Complete amplifier ready to attach \$20.00
(includes battery leads, sockets, output unit for protecting loud speaker with power tubes, connecting adapter.)

Individual Truphonic Couplers or Output Unit..... \$5.00 per stage

Complete amplifier parts for set builders.... 20.00 " "
(3 Couplers, output unit, sockets, catacomb, battery leads)

For full particulars write

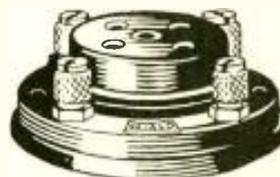
ALDEN MANUFACTURING CO.
Dept. C14 Springfield, Mass.



Na-Ald Localized Control Tuning Unit

ALL tuning condensers easily controlled by the touch of but three fingers of one hand! This amazingly simple tuning device reduces the complications of tuning to a single motion! All three condensers are operated at the same opening of the panel. All can be moved together or each can be moved separately. The result is exact tuning from station to station with the touch of one hand.

Price Quadruple \$16.00
Triple..... 10.00
Double..... 8.00



Na-Ald 481-XS Cushion Mount Socket

IMPROVED amplification demands a cushion socket if microphonic disturbances within the tube are to be removed. The Na-Ald 481-XS Cushion Mount Socket, by means of a perfected resilient mounting that practically floats the tube, gives complete protection by absorbing both vertical and lateral shocks. The only socket on the market with this feature. Fits all tubes.

Price..... 50c



Na-Ald No. 112 Connectorald.



Na-Ald 120 Connectorald.

The improved tone and quality of the new UX power tubes 171, 112 and 120 can now be had on any set without the need of rewiring for the additional B and C batteries required. Na-Ald Connectoralds function as adapters and, at the same time, provide cables for attaching the necessary B and C batteries without affecting the rest of the set.

Price of each..... \$1.25

"Batteries are Obsolete"



110 v.
60 cycles A.C.

The Davy "A" Power

is not a storage battery-trickle charger combination. It dispenses entirely with chemical components, condensers and moving parts, thus making its life practically indefinite. It is economical, inexpensive and absolutely noiseless.

Regulation of the radio receiver may be accomplished in the same way as when a storage battery is used.

Simply plug Davy "A" Power in your lamp socket and it is ready to operate your set for as long as you wish. It does not become exhausted as a storage battery does.

DAVY ELECTRICAL CORP'N
505 Court Street Brooklyn, N. Y.

POPULAR RADIO SETS

Are easier to build if you use Simplified Blueprints

Every Radio Shop Kit includes a set of blueprints. A full size instrument layout shows you just where to place each part. The picture wiring diagram shows you where to connect each wire. Each kit also contains a drilled and artistically engraved panel. A set constructed from a Radio Shop Kit is easier to build and its fine appearance makes it more valuable to you.

Check below for complete information and our prices.

Blueprints \$1.00 per set.

- The Improved Browning Drake.
- Cockadays L.C. 26 Receiver.
- S-C All Wave Single-Control.
- McLaughlin Single Control Super.
- Short-Wave Receiver.

THE RADIO SHOP
of STAMFORD

20 Worth St. Stamford, Conn.

"Mail Order Service for Set Builders"

Local Laws to Rule Radio

LOCAL radio legislation may take the place of long expected and delayed action by Congress to pass a radio bill for the national regulation of broadcasting. Already, several small communities have proposed and passed ordinances which attempt to regulate radio locally. Bay City, Ill., has been considering a measure which would place a \$2 tax on all radio receiving sets. The proceeds of this ordinance would serve to establish and run a radio bureau, the prime function of which would be the finding, and correcting of interference of all kinds.

A penalty is provided for radio sets which interfere with others, with the loss of the license for the third conviction. This is evidently an attempt to do away with the regenerative receiver.

There is no doubt but that the validity of such a law can be questioned, for radio regulation and licensing is now a matter of Federal concern. Secretary Hoover is known to be against the direct taxation of listeners-in.

The Ideal Receiver for the Farmer

THE Radio Section of the U. S. Bureau of Standards is trying to determine which is the ideal set construction for use by farmers. In attacking their problem, the engineers of the Bureau have laid down the following requirements as essential:

1. The receiver must be selective;
2. It must be sensitive;
3. It must be simple in operation;
4. It must have a wavelength range of 200 to 550 meters;
5. It must be ruggedly built.

The last consideration has been selected as the most important of the five, and the Department has begun tests to determine the best receiving sets that would withstand rough handling. Some

30 receivers were put through typical rough handling tests, and if any of the apparatus became detached or inoperative, the set was declared to be too frail for shipment to farms.

Tropical Explorers to Use Radio

UNDER the command of Captain Dyott, another expedition will soon start from New York City for the Amazon River, following closely on the Roosevelt trail, down the River of Doubt in Brazil. Radio will again be the medium through which the civilized world will know of the explorers' progress.

This is not the first time that radio has penetrated those regions; last year, the Hamilton Rice Expedition to the Upper Amazon passed on messages that were picked up by amateurs through its entire time in the tropics.

Five Years to Develop Aircraft Radio

A SUM of \$85,000,000 has been approved to carry out the provisions of the Naval Aviation Bill, which calls for the construction of 1,000 fighting planes and two dirigibles, both larger than the *Shenandoah*. All of these airships will be radio-equipped, and will further the incentive in the development of aircraft radio apparatus, which has been much neglected since the War.

Because of the huge size of the dirigibles, it is possible that they may carry radio equipment of battleship size, though, of course, not as heavy nor voluminous. Five years is all inventors, designers and scientists will have to work on the various problems of radio reception and transmission from aircrafts, as the program is to be completed within that time.



Radio Corporation of America

1926 MODELS—MALE, FEMALE AND NEUTER

One of the very nicest ways to enjoy radio—so we are told—is to be young and beautiful and to be hired by a publicity director of a receiving set manufacturing concern to go off on a yacht as a photographer's model, accompanied by other young and beautiful models, and just listen in. Who says that summertime reception hasn't its advantages?

Coming Events on the Ether

AUGUST 15 TO SEPTEMBER 15

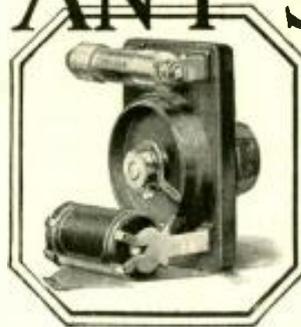
DURING the coming month, August 15th to September 15th, the following regular and special program features are scheduled. This list, which will be augmented monthly as advance information is received, will be published in each issue of this magazine; all broadcast stations are invited to report coming program features of outstanding interest or importance. Reports should reach the Editor of POPULAR RADIO on or before the 25th of the month preceding.

Daylight Saving Time

- *August 15; Goldman Band, WEAJ; 9:45 P. M. (Also broadcast from WEEL, WGR, WTAG, WSAI and WCSH).
- *August 16; Goldman Band, WEAJ; 8:30 P. M. (Also broadcast from WGR and WWJ).
- *August 16; Opera "Martha," WEAJ; 10:00 P. M. (Also broadcast from WCSH, WCCO, WOO, WCAE, WDAS, WJAR, WTIC, WCAP, KSD and WSAI).
- August 17; Gold Dust Twins, WEAJ; 8:30 P. M. (Also broadcast from WEEL, WFI, WCAE, WGR, WWJ, WOC, WCSH, WJAR, WCCO, WLIB, WTAM and KSD).
- August 17; Eveready Hour, WEAJ; 9:00 P. M. (Also broadcast from WEEL, WFI, WCAE, WGR, WWJ, WOC, KSD, WJAR, WCCO, WTAM, WGN, WSAI and WCAP).
- August 17; Keystoners, WJZ; 9:00 P. M. (Also broadcast from WRC and WGY).
- August 17; George Olsen's Orchestra, WJZ; 10:45 P. M.
- *August 18; New York Philharmonic Orchestra, WJZ; 8:30 P. M. (Also broadcast from WRC).
- August 19; Judge Jr., WJZ; 7:40 P. M.
- August 19; Royal Typewriter Hour, WJZ; 9:30 P. M. (Also broadcast from WGY, WRC and WCAD).
- August 20; Happiness Boys, WEAJ; 8:00 P. M.
- *August 21; New York Philharmonic Orchestra, WJZ; 8:30 P. M.
- *August 21; Goldman Band, WEAJ; 8:30 P. M. (Also broadcast from WGR and WWJ).
- *August 21; New York Philharmonic Orchestra, WJZ; 8:30 P. M. (Also broadcast from WRC).
- August 22; Capitol Theatre Orchestra, WEAJ; 7:20 P. M. (Also broadcast from WEEL, WJAR, WGR, WWL and KSD).
- August 22; Atwater-Kent Hour, WEAJ; 9:15 P. M. (Also broadcast from WEEL, WGR, WCAP, WWJ, WSAI, WGN, WCCO and KSD).
- August 23; Opera "The Masked Ball," WEAJ; 10:00 P. M. (Also broadcast from WCSH, WCCO, WOO, WCAE, WDAS, WJAR, WTIC,

CRYSTAL CLEAR TONES ON ANY SET

**Carborundum
Detector**



**Stabilizing
Unit**

THERE is no denying the pure, true quality of crystal reception.

And you can get such reception on any set without the fuss and worry of a nervous Cat's whisker jumping off the sensitive spot.

The Carborundum Stabilizing Detector Unit has revolutionized crystal detection.

It is built around the Fixed Permanent Carborundum Detector—no Cat's whisker—no adjustments—retains its sensitivity and simply can not burn out.

The Stabilizer gives you a resistance controlling feature through which the Detector can be made to match the impedance of any circuit. Simply turn the potentiometer knob.

The addition of an ordinary flash light dry cell gives the necessary booster voltage.

For greater sensitivity—greater distance—but above all for the reception of tones of natural quality equip your set with **The Carborundum Stabilizing Detector Unit**—it improves any set.

The
Carborundum Company

NIAGARA FALLS, N. Y.

Sales Offices and Warehouses in

New York, Chicago, Boston, Philadelphia, Cleveland,
Detroit, Cincinnati, Pittsburgh, Milwaukee, Grand Rapids

IN U. S. A.

\$3.50

Dealers
or
Direct

The
**Carborundum
Company**
Niagara Falls, N. Y.

Please send free
Hook-Up Book D-5.

Name _____

Street _____

City _____

State _____

Carborundum is the Registered Trade Name used by The Carborundum Company for Silicon Carbide. This Trade Mark is the exclusive property of The Carborundum Company.

Coming!

The VARION B & C ELIMINATOR

**NEW!
BETTER!
DIFFERENT!**

And the Marvelous
New Varion A. C.
Operated Receiver

Be sure your name is on our mailing list. A special issue of "Broadcasts" will tell the whole story of the new Varion A. C. Operated Set and Eliminator, leaders for this fall. Send in your name today. No obligation whatever.

WHOLESALE DISTRIBUTORS

MORISON
Electrical Supply Co., Inc.
15 EAST 40TH STREET
NEW YORK CITY

Build Your Improved Browning-Drake by the aid of Popular Radio SIMPLIFIED Blue Prints

Easy, Quick and Accurate

The Improved Browning-Drake Broadcast Receiver, designed by Arthur H. Lynch, former Editor of Radio Broadcast and built and approved in the POPULAR RADIO LABORATORY.

Here is a receiver which combines all the advantages of a circuit that has long been recognized as standard with new ideas and improvements which have been made in receiver construction since the circuit was first designed.

High efficiency that emphasizes fine tone quality is the outstanding characteristic of this new model.

By using POPULAR RADIO Blue Prints in building your Improved Browning-Drake Broadcast Receiver, you can save time, eliminate the possibility of error, and make your set exactly like the laboratory model (see page 476).

If your local dealer cannot supply you with Blue Prints of the Improved Browning-Drake they will be sent postpaid upon receipt of \$1.00 per set.

A full description of this set, with detailed directions for building, was published in the August, 1926, issue of POPULAR RADIO. Send 35c for copy.

POPULAR RADIO

Service Bureau 94-A

627 W. 43rd St., New York City

WCAP, KSD and WSAI).

August 24; Gold Dust Twins, WEAJ;

8:30 P.M. (Also broadcast from WEEL, WFI, WCAE, WGR, WWJ, WOC, WCSH, WJAR, WCCO, WLIB, WTAM and KSD).

August 24; Eveready Hour, WEAJ;

9:00 P.M. (Also broadcast from WEEL, WFI, WCAE, WGR, WWJ, WOC, KSD, WJAR, WCCO and WTAM).

August 24; Keystoners, WJZ; 9:00 P.M.

(Also broadcast from WRC and WGY).

*August 25; New York Philharmonic

Orchestra, WJZ; 8:30 P.M. (Also broadcast from WRC).

August 26; Judge, Jr., WJZ; 7:40 P.M.

August 26; Royal Typewriter, WJZ;

9:30 P.M. (Also broadcast from WGY, WRC and WCAD).

August 27; Happiness Boys, WEAJ;

8:00 P.M.

*August 28; Goldman Band, WEAJ;

8:30 P.M. (Also broadcast from WGR and WWJ).

August 29; Atwater-Kent Hour, WEAJ;

9:15 P.M. (Also broadcast from WEEL, WGR, WCAP, WWJ, WSAI, WGN, WCCO and KSD).

August 29; Capitol Theatre Orchestra,

WEAF; 7:20 P.M. (Also broadcast from WEEL, WJAR, WGR, WWJ and KSD).

*August 30; Opera "Mignon," WEAJ;

10:00 P.M. (Also broadcast from WCSH, WCCO, WOO, WCAE, WDAS, WJAR, WTIC, WCAP, KSD and WSAI).

September 1; Radio Nature League,

WBZ; 8:30 P.M.

September 2; Judge, Jr., WJZ; 7:40

P.M.

September 3; Happiness Boys, WEAJ;

8:00 P.M.

*September 4; Goldman Band, WEAJ;

8:30 P.M. (Also broadcast from WGR and WWJ).

September 5; Atwater-Kent Hour,

WEAF; 9:15 P.M. (Also broadcast from WEEL, WGR, WCAP, WWJ, WSAI, WGN, WCCO and KSD).

September 5; Capitol Theatre Orchestra

WEAF; 7:20 P.M. (Also broadcast from WEEL, WJAR, WGR, WWJ and KSD).

*September 6; Opera "Ernani," WEAJ;

10:00 P.M. (Also broadcast from WCSH, WCCO, WOO, WCAE, WDAS, WJAR, WTIC, WCAP, WSAI and KSD).

September 7; Gold Dust Twins, WEAJ;

8:30 P.M. (Also broadcast from WEEL, WFI, WCAE, WJR, WWJ, WOC, WCSH, WJAR, WCCO, WLIB, WTAM, KSD).

September 7; Eveready Hour, WEAJ;

9:00 P.M. (Also broadcast from WEEL, WFI, WCAE, WGR, WWJ, WOC, KSD, WJAR, WCCO and WTAM).

September 7; Keystoners, WJZ; 9:00

P.M. (Also broadcast from WRC and WGY).

September 7; George Olsen's Orchestra, WJZ; 10:45 P.M.

September 8; Radio Nature League, WBZ; 8:30 P.M.

September 9; Judge Jr., WJZ; 7:40 P.M.

September 9; Royal Typewriter, WJZ; 9:30 P.M. (Also broadcast from WGY, WRC and WCAD).

September 10; Happiness Boys, WEAJ; 8:00 P.M.

*September 11; Goldman Band, WEAJ; 8:30 P.M. (Also broadcast from WGR and WWJ).

September 12; Capitol Theater Orchestra, WEAJ; 7:20 P.M. (Also broadcast from WEEL, WJAR, WGR, WWJ and KSD).

*September 13; Opera "Manon," WEAJ; 10:00 P.M. (Also broadcast from WCSH, WCCO, WOO, WCAE, WDAS, WJAR, WTIC, WCAP, WSAI and KSD).

September 14; Gold Dust Twins, WEAJ; 8:30 P.M. (Also broadcast from WEEL, WFI, WCAE, WGR, WWJ, WOC, WCSH, WJAR, WCCO, WLIB, WTAM and KSD).

September 14; Eveready Hour, WEAJ; 9:00 P.M. (Also broadcast from WEEL, WFI, WCAE, WGR, WWJ, WOC, KSD, WJAR, WCCO and WTAM).

September 14; Keystoners, WJZ; 9:00 P.M. (Also broadcast from WRC and WGY).

September 14; George Olsen's Orchestra, WJZ; 10:45 P.M.

September 15; Radio Nature League, WBZ; 8:30 P.M.

September 16; Judge, Jr., WJZ; 7:40 P.M.

September 16; Royal Typewriter, WJZ; 9:30 P.M. (Also broadcast from WGY, WRC and WCAD).

September 17; Happiness Boys, WEAJ; 8:00 P.M.

*Special Summer Feature.

P.M. (Also broadcast from WRC and WGY).

September 7; George Olsen's Orchestra, WJZ; 10:45 P.M.

September 8; Radio Nature League, WBZ; 8:30 P.M.

September 9; Judge Jr., WJZ; 7:40 P.M.

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September 17; Happiness Boys, WEAJ; 8:00 P.M.

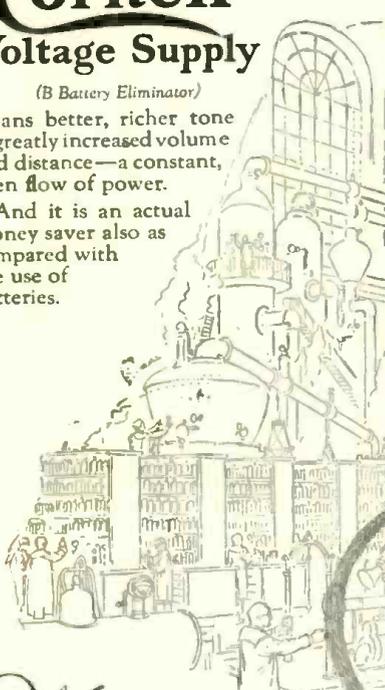
*Special Summer Feature.

Cornell Voltage Supply

(B Battery Eliminator)

means better, richer tone—greatly increased volume and distance—a constant, even flow of power.

And it is an actual money saver also as compared with the use of batteries.



Where Reliability is Born

To eliminate troublesome, expensive "B" Batteries has long been the aim of radio experts, but it remained for Cornell engineers to completely master the difficult problems presented in the best, most simple and truly scientific manner, as typified in the new Cornell Voltage Supply.

Price Type "B" complete in handsome case, with Raytheon Tube, cord and plug. For use with practically any 1 to 10 tube set, variable radio frequency 50 to 150 volts (audio amplifier 100 to 180 volts), and any speaker \$39.50.

Type CB is similar to type B with the addition of variable C Voltage Supply of 1 to 50 volts . \$49.00.
West of the Rockies add \$1.90

If your dealer cannot supply you, it will be sent express prepaid upon receipt of price. Write for full information with name of your nearest dealer.

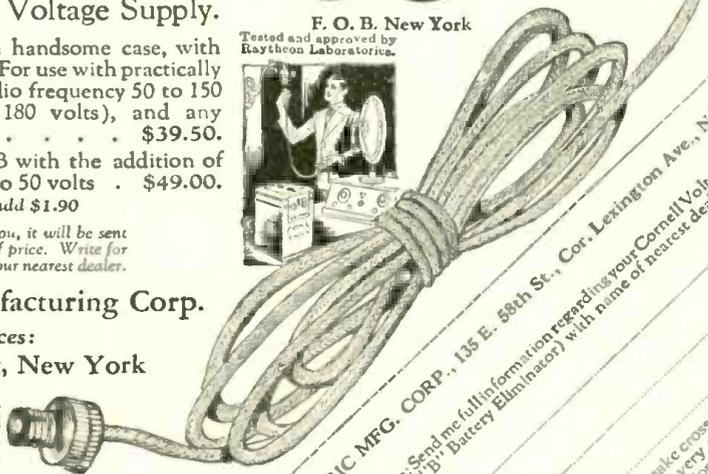
Cornell Electric Manufacturing Corp.

General Offices:
135 East 58th Street, New York

To Dealers—The Cornell Voltage Supply is sold direct from factory through authorized Cornell dealers. If you feel you can qualify, write today for full information.

\$39.50

F. O. B. New York
Tested and approved by
Raytheon Laboratories.



CORNELL ELECTRIC MFG. CORP., 135 E. 58th St., Cor. Lexington Ave., New York

Gentlemen: Send me full information regarding your Cornell Voltage Supply ("B" Battery Eliminator) with name of nearest dealer.

Name _____ Address _____

If a dealer make cross here and receive very special proposition.

FREE PARTS for the new "Improved Browning-Drake Receiver"

If you want to build your own set, here is your opportunity to secure FREE all the parts you need for this Improved Browning-Drake Receiver. Call on all your radio friends, and on anyone who has a set and tell them of the many special features of POPULAR RADIO.

These liberal offers will make it possible for you to secure an order from every one you call upon. For each subscription with remittance you send us you will receive credits as per the following scale:

POPULAR RADIO

4 Months for	\$1.00 counts	16 credits
6 " " "	1.50 " "	25 " "
8 " " "	2.00 " "	33 " "
12 " " "	3.00 " "	50 " "
24 " " "	5.00 " "	75 " "

Send us the full amount collected with names and addresses of subscribers and tell us the parts your credits entitle you to and we will send them to you. If the subscriptions you secure do not give you enough credits for the parts you want, we will allow you to purchase credits at the rate of 3 cents each. Example: With (7) seven 1-year subscriptions (350 credits) and 42 cents additional in cash you may have a Jefferson "Concertone" sealed audio-frequency transformer, three (3) Lynch metallized resistors, one (1) Mfd. and a Sangamo mica fixed condenser, 006 Mfd., for which you need 364 credits.

If the parts you want are not listed in the advertisement, we are prepared to supply them. Let us know what you want and we will tell you how many credits you will need.

On page 484 are described POPULAR RADIO'S Simplified Blueprints. You can have any set of prints you want for only 40 credits. You may also secure a copy of "How to Build Your Radio Receiver" described on page 490 for 60 credits.

CREDITS Needed for Parts Re- quired for the IMPROVED BROWNING-DRAKE RECEIVER

(Described and Illustrated in the August issue of POPULAR RADIO).

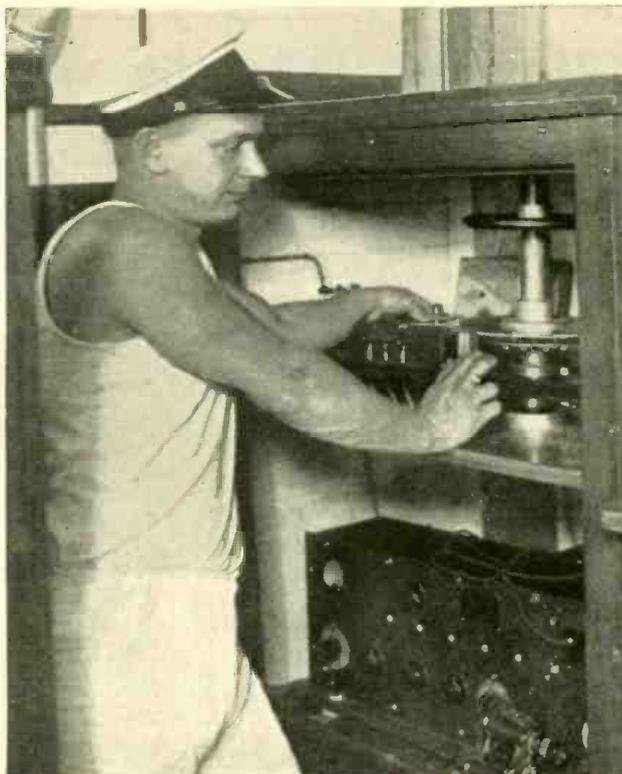
Quantity	Item	Credits
1	Coil and variable condenser, respectively, of the National Antenna Tuning Unit.	900
1	Coupling coils and variable condenser, respectively, of the National detector tuning unit.	
1	Jefferson "Concertone" sealed audio-frequency transformer.	240
1	Thordarson filter choke (same as that used for B eliminator work).	200
1	Tobe paper filter condenser, 4 mfd.	150
1	Sangamo mica fixed condenser, .002 mfd.	20
1	Sangamo mica fixed condenser, .006 mfd.	34
1	X-L variocdensor, type N.	40
3	Lynch double-resistance mountings at 20	60
2	Tobe paper filter condensers, .1 mfd. @ 28.	56
3	Lynch metallized resistors, .1 meg @ 30.	90
5	Benjamin vibrationless sockets for UX tubes @ 30.	150
1	Lynch metallized resistor, .5 megohms	20
1	Lynch metallized gridleak, 6 megohms	20
1	Lynch metallized resistors, .025 megohms; and .09 megohms, resp. @ 30	60
1	Brach-stat, Code 2-B, with mounting	40
1	Frost Gen-Jac, No. 954	40
1	Carter battery switch	28
2	Tilt brackets @ 40	80
1	Sangamo mica fixed condenser, .005 mfd, equipped with gridleak clips.	20
4	Small brass brackets for mounting connection blocks.	8
1	Antenna connection block.	6
1	Battery connection block.	10
1	Decorated bakelite panel, 8x22 inches	300
Total.		2540
1	Corbett sloping panel cabinet for 8 x 22 in. panel walnut or mahogany finish.	520
	Genuine walnut or mahogany	600
1	Hardwood baseboard, 9 1/4 x 21 1/4 in. furnished with the cabinet.	20

Write for List of Free Parts for Other Popular Radio Receivers

POPULAR RADIO

Department 91

627 West 43d St., New York City



Underwood & Underwood

A "RADIO DETECTIVE" FOR RUNNING DOWN RUM-RUNNERS

This rapid radio direction finder has been installed on some of the small patrol boats of Uncle Sam's dry navy to check up on the movements of the ships that approach our coasts. By means of this apparatus the operator can tell the position of any ship (when it is transmitting) accurately enough to steam over and give it an inspection in case it is suspected of carrying a contraband cargo.

Radio Locates a Long-lost Sister

TWENTY-SIX years ago Siegfried Jensen, a young engineer living at Windbaek, Southwest Africa, set out for the Congo on a mission for King Leopold II of Belgium. And that was the last that his widowed sister, Mrs. Lydia G. Nelson of San Francisco, heard of him—until a few weeks ago, when she was listening in on her radio set and was astounded to hear a broadcast appeal that her brother had sent out for her and that had been relayed from Africa. She verified its context by cable, and on July 18th she set sail to join him.

"During the last twenty years I often prayed that I would meet him, but little realized that I ever would," she said. "My prayers were answered by the modern miracle of radio, and I am very happy."

Radio Fills the Village Pulpit

A RADIO amateur with a receiving set recently took a hand in making the little church of St. Mark's, at Perryville, Maryland, one of the unique churches in the country. When its pastor, the Rev. J. J. Abell, died the church seemed likely to be abandoned, as there was a larger church a few miles away. But the radio amateur installed a receiver in the church and now the congregation is growing larger than ever through the

inspiration of programs broadcast by radio.

The choir receives the weekly program in advance and sings along with the radio.

* *

"Fading Secretary"—a New Profession

"FADING secretary" is the designation which Miss Mary E. Watkins of San Francisco applied to herself when she presided over the radio receiver during the after-dinner hours in the home of an army officer and his family in Honolulu. She reports that the position was remunerative as well as unique, and she recommends it to those who want to combine business with pleasure.

* *

Radio Entertainment for the Tired Jurymen

RADIO'S latest job, according to reports from Denver, is to soothe the ruffled nerves of jurymen who have spent hours of futile argument without reaching an agreement and must be locked up for the night. In two recent long drawn out murder trials the court ordered that radio sets be installed for the entertainment of the jury after working hours. A bailiff, however, kept within close enough range to shut off the set if any news comments on the trial were broadcast.



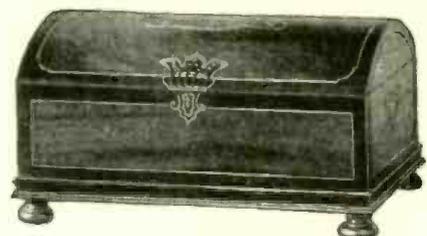
The "Jewel Case"---
not merely rare beauty
but new acoustic principles!

The "Jewel Case"---like a rich antique jewel cabinet in outward appearance, with all of the rare tone beauty of an old violin. Undreamed of fidelity, and small though it may be, volume is greater than any speaker yet marketed.

Velvet Speaker Number 21 is startling in its far flung progress toward the ideals of beauty and acoustic perfection. Be first to offer it and reap the sales. The price is reasonable---the quality the highest---and dealer, jobber co-operation unusual. Write today for the Velvet franchise!

Sales Dept.,
The Zinke Co.,
1323 S. Michigan Ave.,
Chicago, Ill.

Manufactured by
The Borkman Radio Corp.,
Salt Lake City, Utah
Kalamazoo, Mich.



VELVET RADIO SPEAKER NUMBER 21

Price \$45.00

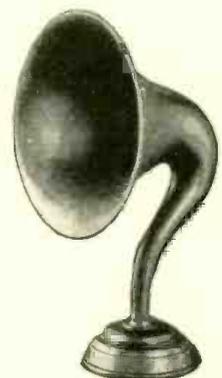
The work of master craftsmen---in beauty and acoustic perfection

NUMBER 12

12 1-2 inch bell
\$16.00

NUMBER 14

14 1-2 inch bell
\$23.50



Kerstenite horn---scientific air column. Concert volume. Graceful---handsome.

Velvet Radio Speakers

If you build sets
you sell sets
you service sets
you listen to a set

YOU cannot afford to be
without a copy of

“Audio Amplification”
By Samson

Radio, from “mike” to loud speaker, involves many steps, each step having its own particular “loss” or “distortion.” You cannot help those which occur at the transmitting end, but you are to blame for those in your own set. A poor amplification system not only causes losses due to its own inherent faults, but magnifies many times those which originate at the other end. Hence the great importance of an understanding of the requirements and operation of Audio Frequency Amplifiers.

The material contained in this book represents the results of many years’ research work in the laboratory on the subject of Audio Amplification, and is written in a manner which will enable anyone to better the quality of reproduction in their particular set. Quality comes with understanding, and understanding comes with this book.

Every man the least bit interested in the best reproduction obtainable in radio should have this book. Its practical and technical information is placed at the disposal of radio enthusiasts for the small sum of 25 cents, and is a valuable contribution not only to the individual, but to the industry as a whole, a necessity to the seeker after better reception.

If a copy of this book is unobtainable from your dealer or jobber, tear off and send to

SAMSON ELECTRIC CO.



CANTON, MASS.

Gentlemen:

Here’s my quarter or 25 cents in stamps. Send me “Audio Amplification.”

Name.....

Address.....

A Court Summons Served by Radio Is Declared Lawful

ACCORDING to a decision rendered by Supreme Court Justice Stephens in Rochester, N. Y., on July 25, 1926, a court summons served by means of radio broadcasting is lawful.

When Mrs. Lena F. Lapierre despaired of finding her husband (who left Elmira in March, 1920) through the usual legal channels, her attorney turned to the radio. A summons directing Lapierre to appear at the office of his wife’s attorneys subsequently was broadcast from station WHEC. This is reported to be the first use of radio for such a purpose. Justice Stephens held the radio process of serving was lawful and signed an order summoning Lapierre, preliminary to decision on the wife’s plea for divorce.

* * *

Q. S. T.

ALL radio amateurs will be interested to learn that POPULAR RADIO has just completed arrangements for forwarding to transmitting amateurs in England, Ireland and Italy all calls heard (QSL) cards that may be addressed to them by American amateurs. These cards will be delivered through local agents in those countries, who have or can obtain knowledge of the *present addresses* of the foreign amateurs.

Plans have also been completed by this magazine for forwarding to transmitting amateurs in this country in turn all QSL cards that may be addressed to them by amateurs from those countries and arrangements are being made now for furnishing a similar service with radio amateurs in all of

the principal countries of the world.

American amateurs are invited to send their cards to English, Irish and Italian amateurs through this office, which will not only assure safe delivery through the special agencies which are thus provided, but which will publish a monthly list in a trans-oceanic “Calls Heard” department.

Address your cards to the foreign amateurs by call numbers and enclose them in envelopes to—

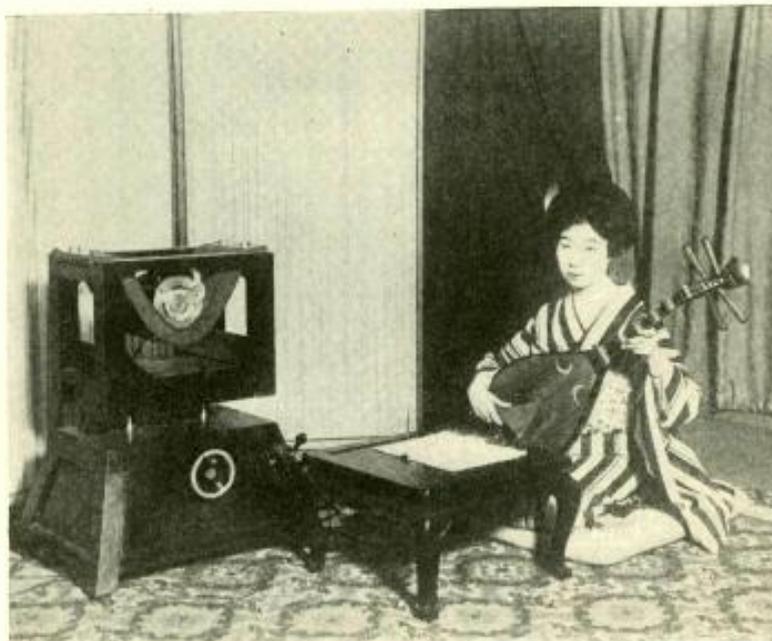
THE CALLS HEARD EDITOR
POPULAR RADIO
627 West 43d Street, New York.

The new department will publish these records of amateur performances as soon as sufficient time has elapsed to enable the amateurs to communicate with this office.

* * *

The Sesqui’s Radio Room

RADIO fans who attend the Sesqui-centennial Exposition at Philadelphia this summer will find there an interesting exhibit of radio apparatus which has been installed under the direction of the Department of Commerce. The exhibit will include all kinds of transmitting and receiving apparatus as well as the apparatus that was used until lately by Secretary Hoover’s radio police to see that stations kept on their assigned wavelengths. Among the exhibits is a new type of receiving set that is capable of picking up transmissions on any wavelength from the ultra-short waves up to about 50,000 meters. There is also included a number of “antique” receivers and transmitters, to illustrate the amazing progress that radio has made within the last few years.



Herbert

THE YELLOW PERIL via RADIO

The Japanese exclusion act is powerless to prevent ether waves from the 6 KW station JOCK in Nagoya, Japan, from entering U. S. territory; its programs are now being picked up regularly in California. Note the unique microphone which is adjusted to the artists who perform in the Japanese manner—on the floor.



IN planning what you are to handle this coming season, you hope, of course, for none of the grief which has accompanied many receivers in the past, and the Browning-Drake sound merchandising principles, in marketing a product of undisputed excellence, we believe, will be interesting to you.

The research at the Cruft Laboratory of Harvard University, begun in the summer of 1923 by Glenn H. Browning and Frederick H. Drake, has set the mathematical standard of design for radio frequency transformers, and is universally recognized as the scientific authority on this most important subject, justly called the "heart of any circuit."

One stage of scientifically designed radio frequency, incorporating the Browning-Drake transformer, together with the

flexibility of a two control receiver, has yet to be improved upon for all around satisfactory reception. Our research facilities are such that minor refinements are constantly being made without the necessity of yearly models to upset the industry.

Producing one model, fairly priced, with reasonable dealer discounts, and distributed only by the highest grade jobbers, the Browning-Drake Receiver has never been cut, and no dealer has ever lost money on Browning-Drake. Your percentage of returned sets will be an absolute minimum, for your customers have confidence in the Browning-Drake name and its standards, and know it represents a laboratory standard of development which will not be superseded or radically changed for many years.

For further information address the Browning-Drake Corporation, Brighton, Mass.



The BROWNING-DRAKE FIVE

BROWNING-DRAKE



The New McCullough AC Tube Comes Into Its Own!

Eliminates
Troublesome
A Batteries

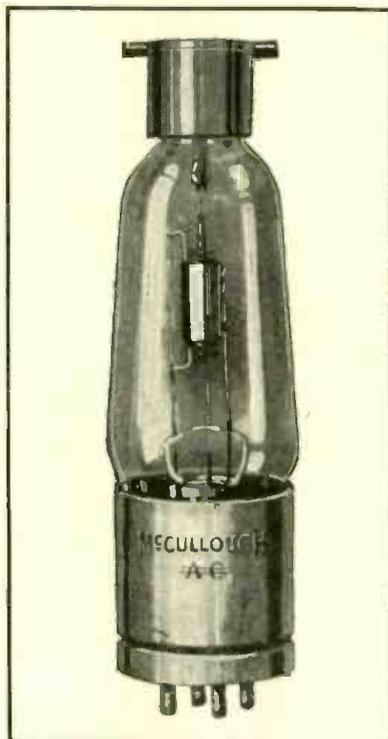
—
No Hum

—
Greater Amplifi-
cation

—
Less Microphonic

—
Better Tone

—
Receiver Always
at its Best



McCullough AC Tube

No Burn-Outs

—
Extremely
Rugged

—
Long Life

—
Not Subject to
Run Down Bat-
teries That Will
Condemn the
Best Set

Mr. Jobber:—

Unless you can give your dealers a Batteryless Set this year you will lose a lot of business. Ask your set manufacturer to equip one model with the McCullough A C Tube and make it batteryless. We will assist your manufacturers.

A selected group of manufacturers are turning out for your use complete broadcast receivers equipped throughout with The New McCullough A C Tubes.

Be sure to have your dealer demonstrate one of these sets to you as soon as he has one in stock.

All you have to do to make this kind of an A C Set work is to plug into your lighting circuit. And no batteries are needed!

Mr. Dealer:—

The only fundamentally new thing this Fall is the Batteryless Set. You should carry one in your line. If you will write us, we will tell you who is making them. Your competitor will sell one. How can you go wrong if you do?

McCullough Sales Company
(Laboratories)

20 Grand Avenue

:: :: :: ::

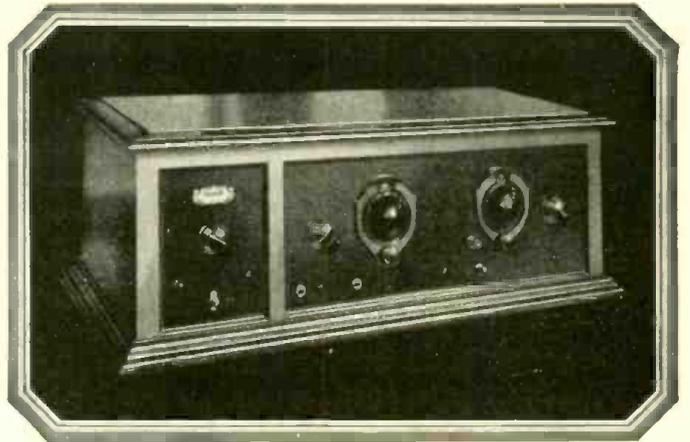
Brooklyn, New York

First in the field!

"A" and "B" Battery Elimination!
 Successful - at a price within reach
 of all...

The Best in Radio Today

\$200
 without Tubes
 or Loud Speaker



YOU radio fans who want a set that will eliminate both "A" and "B" Batteries can now have one at a reasonable price. The Cleartone Radio Electric Model 110, operating from the house current and using no fluids or acids, costs only \$200, without tubes or loud speaker.

This remarkable set uses McCullough AC Tubes, which abolish the battery problem and are undoubtedly the greatest achievement in radio today. It has been highly ap-

proved by such a great authority as Professor Wilcox of the Armour Institute of Technology of Chicago.

The Cleartone Radio Electric Model 110, is the result of five years of exclusive radio receiving set manufacturing. Tone quality and volume are exceptional. Two vernier dial controls with the proper degree of selectivity simplify operation. The high quality of workmanship insures a set which will give years of satisfactory service, fully guaranteed by a manufacturer of the highest standing in the radio industry.

DEALERS

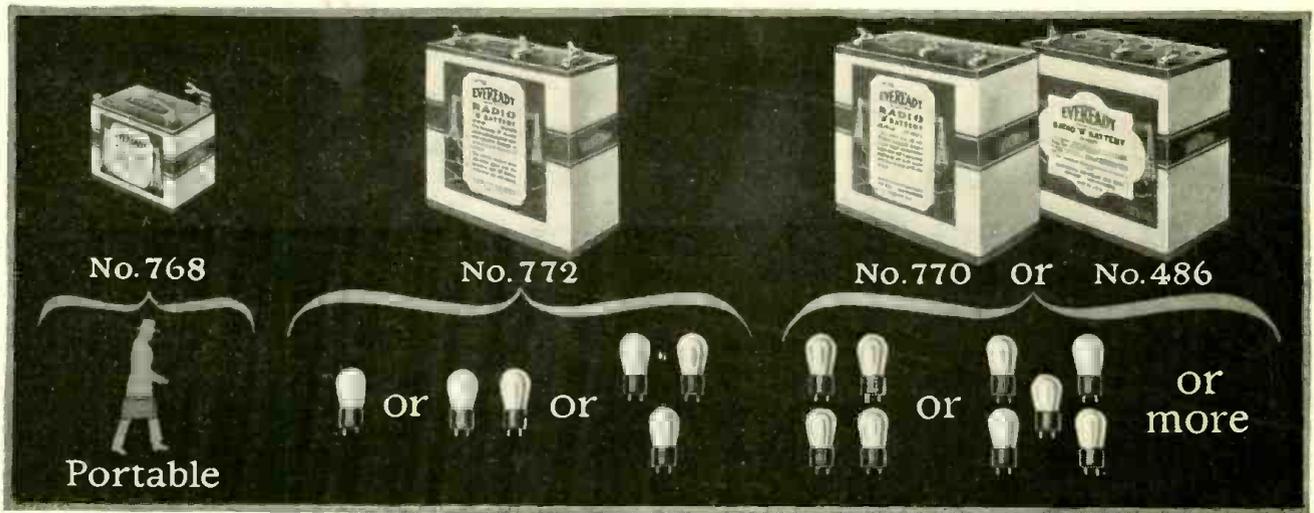
Let us tell you how you can make money with this new line. We have some interesting facts and figures for you.

Write for full details.

THE CLEARTONE RADIO COMPANY
 2427 Gilbert Avenue :: :: Cincinnati, Ohio

CLEARSTONE *Complete* RADIO SETS

Perhaps you, too, can cut your "B" battery costs in half. Just follow the chart. It gives you the secret of "B" battery economy.



THOUSANDS of people have made the discovery that Eveready "B" Batteries, when used in the proper size, and on sets equipped with a "C" battery*, are a most economical, reliable and satisfactory source of radio current.

Here is the secret of "B" battery economy, reliability and satisfaction:

On all but single tube sets—Connect a "C" battery. The length of service given below is based on its use.*

On 1 to 3 tubes—Use Eveready No. 772. Listening in on the average of 2 hours daily, it will last a year or more.

On 4 or more tubes—

*NOTE: A "C" battery greatly increases the life of your "B" batteries and gives a quality of reception unobtainable without it. Radio sets may easily be changed by any competent radio service man to permit the use of a "C" battery.

Use the Heavy-Duty "B" Batteries, either No. 770 or the even longer-lived Eveready Layerbilt No. 486. Used on the average of 2 hours daily, these will last 8 months or longer.

These figures are based on the average use of receivers, which a country-wide survey has shown to be two hours daily throughout the year. If you listen longer, of course, your batteries will have a somewhat shorter life, and if you listen less, they will last longer.

Evereadys give you their remarkable service to the full only when they are correctly matched in capacity to the demands made upon them by your receiver. It is wasteful

to buy batteries that are too small. Follow the chart.

In addition to the batteries illustrated, which fit practically all the receivers in use, we also make a number of other types for special purposes. There is an Eveready Radio Battery for every radio use. To learn more about the entire Eveready line, write for the booklet, "Choosing and Using the Right Radio Batteries," which we will be glad to send you on request. There is an Eveready dealer nearby.

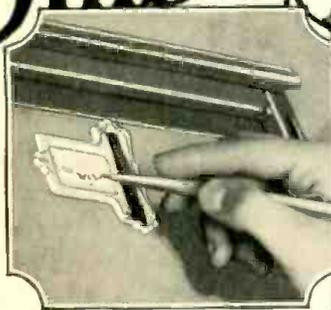
Manufactured and guaranteed by
NATIONAL CARBON CO., INC.
New York San Francisco
Canadian National Carbon Co., Limited
Toronto, Ontario

Tuesday night means Eveready Hour
—8 P. M., Eastern Standard Time,
through the following stations:

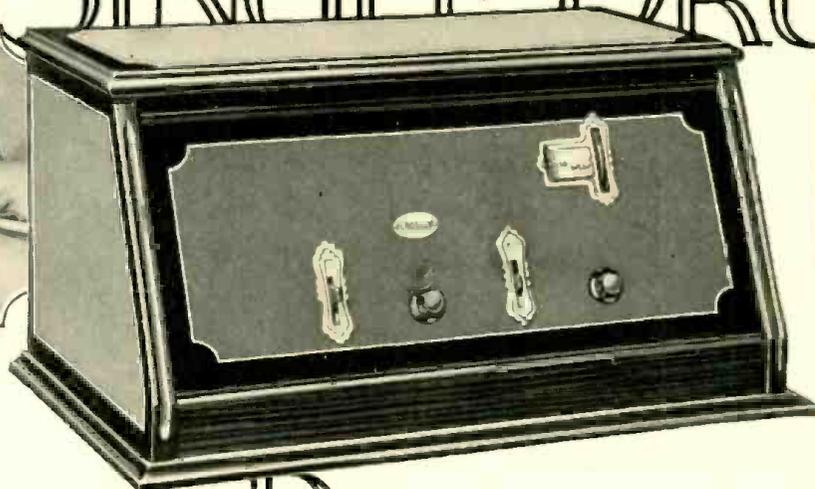
WEAF—New York	WSAI—Cincinnati
WJAR—Providence	WTAM—Cleveland
WEEI—Boston	WWJ—Detroit
WTAC—Worcester	WGN—Chicago
WFI—Philadelphia	WOC—Davenport
WGR—Buffalo	WCCO—Minneapolis
WCAE—Pittsburgh	WCCO—St. Paul
	KSD—St. Louis

EVEREADY
Radio Batteries
—they last longer

5 tube SINGLE DRUM



STATION
SELECTOR



RADIO RECEIVER

6 Other Crosley Radio Achievements

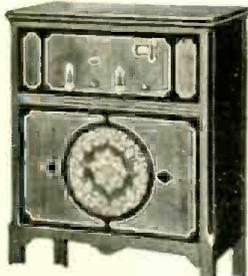
The Crosley 1-tube "Pup"—\$9.75—a double-circuit set, with which laymen have heard radio signals probably the greatest distances.

The 4-tube 4-29—\$29—a 4-tube receiver of amazing efficiency. Already proven its right to a permanent position in the Crosley line. CRESCENDON equipped!

The 5-tube 5-38—\$38. The 5-tube tuned radio frequency set incorporating the CRESCENDON—a spectacularly popular model.

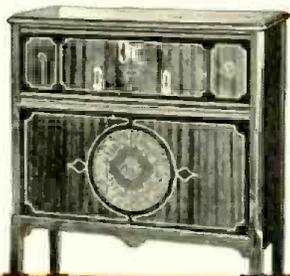
The 5-tube RFL 75—\$65—true cascade amplification; non-oscillating—non-radiating, regardless of how it may be mishandled.

The 5-tube 5-75—\$75—embodying the 5-tube single control, with drum station selector, as offered in a table model at \$50. SOLID MAHOGANY cabinet. Musicone built-in—41 inches high.



The 5-tube RFL 90—\$90—introducing the double drum station selector! Solid mahogany cabinet. Musicone built-in—ample room for batteries and accessories, 41 inches high, 30 1/2 inches wide.

Prices slightly higher West of the Rockies.



The CROSLLEY MUSICONES



Crosley Musicones are manufactured under basic patents issued and pending, controlled by Crosley.

The announcement of the new Super-Musicone is predicated on the success of the Regular (32 inch cone) Crosley Musicone in replacing hundreds of thousands of old type loud speakers. Musicone Regular 12 inch cone \$12.50. Super-Musicone 16 inch cone \$14.75. Musicone sole with built in Musicone \$32.00.



\$50.

Contrast the surpassing performance of this new type of Crosley Radio with what has hitherto been considered radio perfection.

The cabinet is solid mahogany, beautifully finished in two-tone and striped in gold. Metal fittings are rose gold finish.

The metal shielded chassis is divided into three compartments. The units shielded from each other, prevent interstage as well as external coupling. This improves stability of circuit and increases selectivity. This has never before been offered in sets of moderate price.

Crescendon Control affords unusual volume from distant stations.

Heretofore single dial control sacrificed selectivity. By means of the Acuminators, very sharp tuning is accomplished where the reception from local stations spreads broadly over the dial. Under average conditions, when once adjusted, these acuminators do not have to be touched again.

With the Graphic Station Selector, Stations from one end of the wave band to the other, are easily brought in at all times—**IN THE SAME PLACE.**

Crosley manufactures radio receiving sets which are licensed under Armstrong U. S. Patent No. 1,113,149 or, under patent applications of Radio Frequency Laboratories, Inc., and other patents issued and pending.

CROSLLEY RADIO

Write Dept. 16, CROSLLEY RADIO CORPORATION, CINCINNATI, O.

BETTER
...
COSTS
LESS

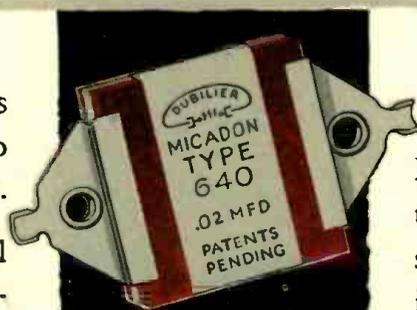
PRESS OF WILLIAM GREEN, NEW YORK

every one a micadon

THERE are now three types of Micadons—each made to meet a new development in radio.

Micadon 601 is the standard of small fixed condensers. Designed on revolutionary principles, it was one of the first radio products to discard heavy molded insulation with its high dielectric losses. It provides and maintains a constant, fixed capacity wherever small condensers are required.

In Micadon 640, the need for higher capacities in super-heterodynes, reflex and resistance-coupled amplifiers has been met. The same accuracy, the same principles of insulation and protection against losses in its fixed and permanent capacity have given this condenser



MICADON 640



MICADON 601



MICADON 700

its unequalled popular demand.

Micadon 700 is the newest addition to this famous line. Completely shielded in its bright aluminum case, it is designed to withstand even the voltage found in low-power C.W. vacuum tube transmitters; thus providing the most compact, efficient and economical unit of fixed capacity that radio has yet known.

Three different types—but *every one a Micadon*. In the patented principles of their design; in the scrupulous care given to every stage of their manufacture; in their delicate precision, fully shielded and protected—worthy to bear the name of radio's greatest maker of condensers.

Dubilier

CONDENSER AND RADIO CORPORATION