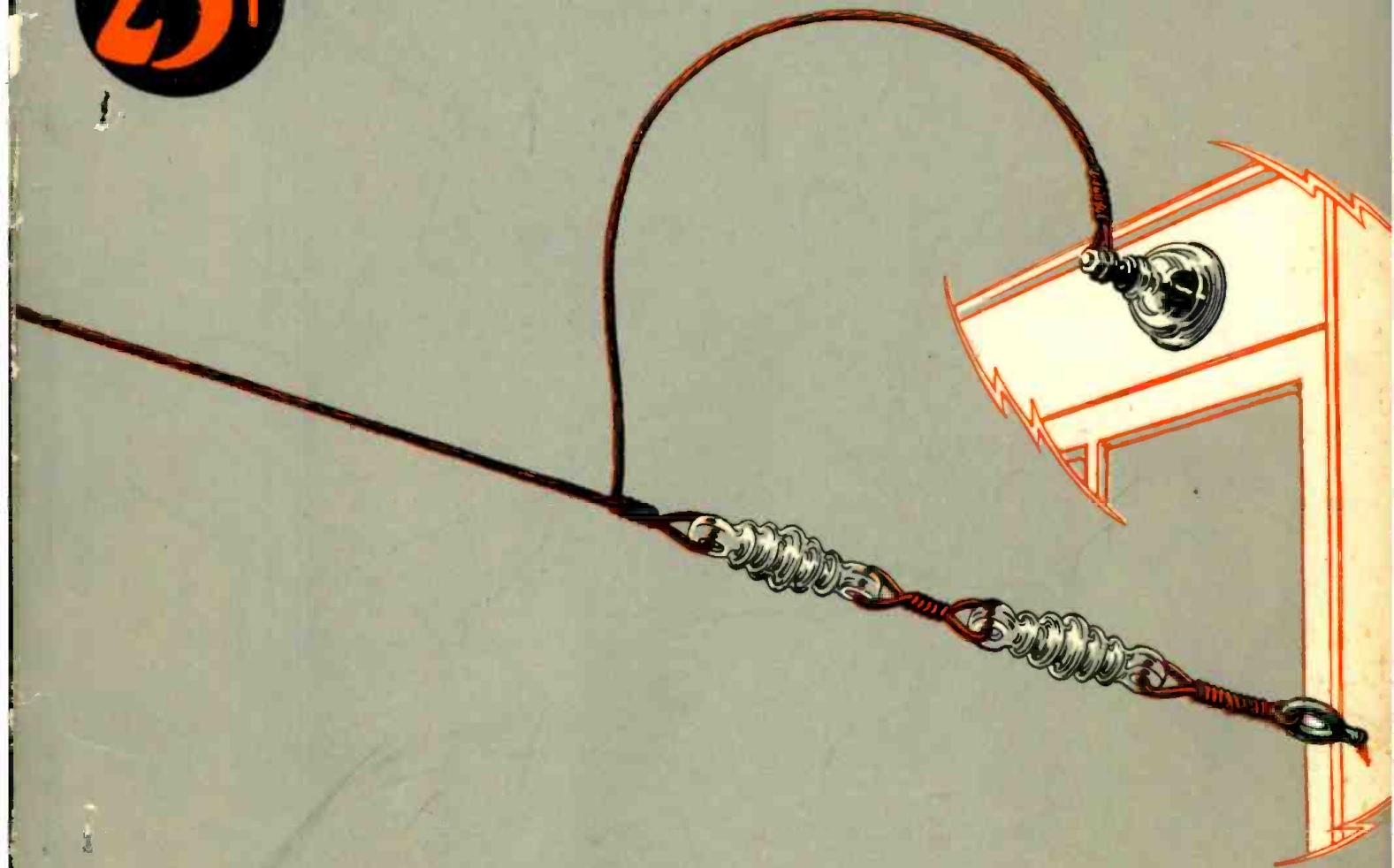


# Popular Radio

NOVEMBER  
1926

25¢



**For the Set Owner and Experimenter**

**How to Patent Your Radio Invention**  
**Practical Pointers for Buying Parts**  
**Inside Information on New Radio Receivers**  
**How to Build the LC-Senior Power Pack**



many times  
better than  
in 1921

WITH four times less drain on your "A" batteries than the storage battery tube of five years ago, the filament of a Radiotron UX-201-A throws across to the plate five times as many electrons—a steady stream of tiny electrical charges that carry the song and speech. This is a big increase in efficiency!

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### to get more power

—put an RCA power Radiotron UX-120, UX-171 or UX-210 in the last audio stage of your set.

### to get more distance

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—put the new special detector Radiotron UX-200-A in the detector socket.

RCA is not only making Radiotrons steadily better—but is further improving reception with these new special Radiotrons. Keep your set up to date.

These are but a few of the advances in vacuum tube making that have come from the laboratories of RCA and its associates—General Electric and Westinghouse. Unceasing research brings continual improvement in RCA Radiotrons, making possible ever better reception—at lowered cost.

RADIO CORPORATION  
OF AMERICA

New York Chicago  
San Francisco

# RCA Radiotron

MADE BY THE MAKERS OF THE RADIOLA



## Here's the most economical "B" battery ever built for radio

IN THE production of Heavy-Duty radio "B" batteries Eveready has established a new standard of "B" battery life and economy.

*Eveready Heavy-Duty 45-volt "B" Batteries will outlast any Light-Duty 45-volt "B" two to one regardless of the number and kind of tubes used! Moreover, though lasting twice as long, they cost only one-third more!*

To cap the climax of "B" battery economy, in Eveready Layerbilt No. 486, Eveready has perfected a Heavy-Duty "B" battery of unequalled endurance and dependability—positively the greatest "B"

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You will be buying the utmost in dependability of "B"

power—the greatest "B" power operating economy—D. C. (direct current) in its purest form, which insures pure tone quality.

With colder evenings at hand, radio reception is vastly improving. Equip your set now with Eveready Layerbilt No. 486, the greatest "B" battery ever built for radio.



LEFT—Eveready Layerbilt No. 486.

RIGHT—No. 7111 Eveready Dry Cell Radio "A" Battery, 1½ volts.



# EVEREADY

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*—they last longer*

*Manufactured and guaranteed by*  
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Tuesday night means Eveready Hour—9 P. M., Eastern Standard Time, through the following stations:

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| WTAG—Worcester   | WTAM—Cleveland  | WJW—St. Paul     |
| WFI—Philadelphia | WWJ—Detroit     | KBD—St. Louis    |
|                  | WRC—Washington  |                  |

# Popular Radio

EDITED by KENDALL BANNING



FOUNDED 1911

VOLUME X

November, 1926

NUMBER 7

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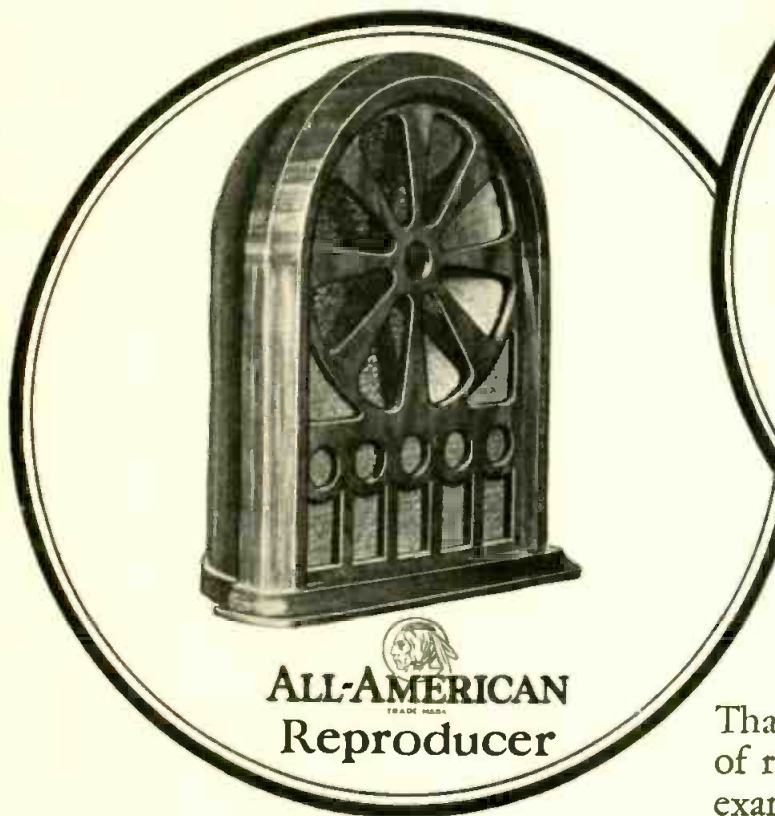
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E. E. FREE, Ph.D., *Contributing Editor*  
JOHN V. L. HOGAN, *Contributing Editor*

“—remarkably good!”



**ALL-AMERICAN**  
Reproducer



**ALL-AMERICAN**  
*Constant-B*  
Battery Eliminator

That is the judgment, without exception, of radio experts and enthusiasts who have examined and tested these two fine units.

They mean *better reception*. Both have a great deal to do with finer tone-quality. You owe it to your own enjoyment of radio, to know the facts about these fine-quality accessories.

**ALL-AMERICAN**  
*Reproducer*

For purity of tone this handsome product is outstanding among reproducers. It combines ingeniously all advantages of good cone-type reproducers—and the improved quality provided by a special sounding board and sounding chamber. A highly sensitive unit which reproduces voice and instruments naturally and clearly. Perfect uniformity is maintained over the entire musical range, whether amplifiers are turned to full volume, or down to a whisper. Absolute freedom from “inherent pitch” prevents low throaty tones or twangy nasal effects.

Price \$25.00

Prices are slightly higher  
West of the Rockies

**ALL-AMERICAN**  
*Constant-B*

An attractive compact unit of silent efficiency—insures a dependable supply of uniform plate current. Five output taps; negative, +45, +67, +90, and a power tube tap adapt “Constant-B” to all requirements. A “Detector” control provides voltage variation between 10 to 60 volts. An “Amplifier” control allows a variation of 10 to 120 volts on the intermediate tap, without affecting the 90 volts supplied to first audio stage. A High-low switch adapts “Constant-B” to receivers of various current requirements.

Price \$37.50 Complete with  
Raytheon Tube

*New 1927 Radio Key Book*

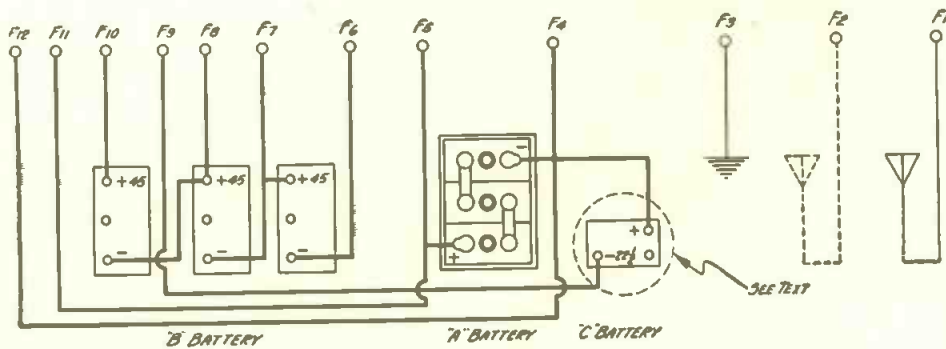
Learn more about the fundamentals of radio. This *new* 48-page book contains an interesting analysis of radio in language anyone can understand—also complete constructional details of the leading types of circuits. Sent for 10c (coin or stamps) to pay for postage and mailing.

**ALL-AMERICAN RADIO CORPORATION**

4207 Belmont Avenue, Chicago, Illinois

OWNING AND OPERATING STATION WENR 266 METERS

# A PAGE WITH THE EDITOR



## A Correction

In the diagram of battery hook-up for the LC-27 Receiver, shown in Figure 11 on page 556 of the October issue of POPULAR RADIO, the "C" battery terminals were, incorrectly, shown reversed. The proper connections are given above.

ONE of the compensating features of every catastrophe—such, for example, as the tornado that struck Florida September 18—is the evidence of self-sacrifice and heroism that is invariably displayed by individuals.

This quality was shown in a striking manner by radio amateurs in and near the path of the recent storm; to their unselfish spirit of service as well as to their technical skill much suffering and doubtless several lives were saved.

WHAT your radio amateurs did on that tragic occasion was reported briefly in a special dispatch by radio from Tampa, dated September 21, to the *New York Times* in the following words:

"The Tampa papers lost contact with the outside world in a large degree Saturday afternoon and asked W. P. Moore, operating 4IZ, to try to get news for them by radio. An emergency transmitter was placed in service and press received and transmitted to Atlanta. No stations south of Tampa could be raised.

"Early Sunday morning Amateur Radio Station 4KJ, operated by J. Y. Heisch of Miami, succeeded in getting an emergency station in operation. He raised Station 4HZ of Jacksonville and for hours they handled hundreds of relief messages.

"Yesterday at noon Heisch said his arm was numb from operating and he could send no longer. But after a break of half an hour he was back at it again. There is no doubt but that his efforts saved many lives.

"After learning of the destruction at Moore Haven, the Pierce Electric Company of Tampa equipped Fred Frick, a well-known Tampa amateur operating station 4BN, with a dry-battery-operated 40-meter transmitter. With American Legion men he left Tampa at 1 o'clock yesterday for Moore Haven to

establish communication between Tampa and the Lake Okeechobee section.

"For the last several miles the men must wade waist deep through water and carry the equipment on their backs. At 8 o'clock tonight they had not arrived at their destination, but contact is expected at any moment. The contact station of Frick is 4IZ of Tampa."

NEEDLESS to add, POPULAR RADIO immediately instituted a detailed inquiry into the activities of these radio amateurs; as soon as authoritative reports are received of their services "in the alleviation of human suffering or in the saving of human life," they will be presented for consideration to the committee of awards of the POPULAR RADIO MEDAL FOR CONSPICUOUS SERVICE.

ON page 700 of this number of POPULAR RADIO the new department "The Beginner In Radio" makes its first appearance.

THIS new department, which has grown out of the expressed needs of those of our readers who are just entering the magic realms of radio, is conducted by Mr. Armstrong Perry, who is well and affectionately known to many thousands of boys and young men throughout the country, as the expert in charge of the radio activities of the Boy Scouts of America for many years.

THERE are probably only a few of our readers who did not listen in on the broadcast reports of the Dempsey-Tunney fight on the evening of September 23; the able commentator who officiated before the microphone on that memorable occasion was America's most popular ringside reporter, J. Andrew White, whose contributions to POPULAR RADIO appear so frequently that he is regarded as a member of the POPULAR RADIO family.

As a broadcast program feature, a ringside report of a world's heavy-weight championship prize fight is, by all reports, the most popular and consequently the most stimulating and beneficial to the radio industry.

THOUSANDS of receiving sets and a vast number of parts are bought immediately before an event of this kind; even those who profess no interest in the standard radio programs justify their purchases of receivers by their desire to listen in on events of special moment to them—ranging from Presidential conventions to boxing bouts, from college fraternity dinners to stock market reports.

"STREET CROWDS WERE SMALL" states the headline on a New York daily on the morning after the Dempsey-Tunney fight. And the obvious explanation followed; everyone stayed at home to listen in on J. Andrew White's broadcast reports!

To what extent a professional prize fight is a "sporting event" may be a matter of opinion. But there is no question about its value to radio. It is hot stuff!

COMMANDER Stanford C. Hooper, who contributes the article, "Radio Transmits Weather Maps to Ships" on page 655 of this issue, is on duty with the Bureau of Engineering of the Navy, and is regarded as one of the foremost radio engineers in the country. He participated in the experiments with the Jenkins apparatus, and thus obtained his information at first hand.

THE September issue of POPULAR RADIO had been on the newsstands less than twenty-four hours when the first of the letters submitted in the prize contest for the best answer to the question "How can radio broadcast programs be improved?" arrived at the editorial office.

THE last line on page 660 should read "(Continued on page 676)," instead of 673. Unfortunately, a part of this issue was printed before the error was discovered.

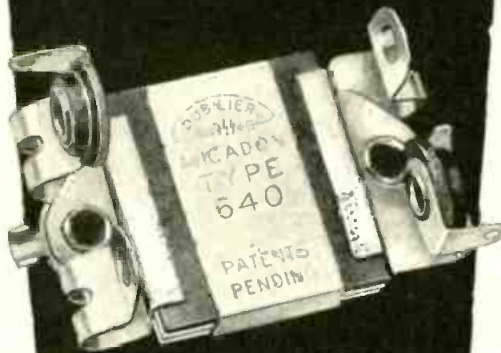
THE prize-winning letter will be published in this magazine as soon as the judges have come to a decision after the close of the contest.

*Kendall Banning*  
Editor, POPULAR RADIO

# tone reality need not be expensive

You don't need an expensive set to get faithful reproduction. Resistance coupling gives even amplification of all tones. And it has the added advantage of costing little, and consuming less "B" battery current.

Micadon 640 A is the Dubilier resistance coupling unit. It is a fixed condenser of the famous Micadon type, designed and patented by Dubilier to provide unvarying capacity



**MICADON 640A**

Capacities:  
0.06 to 0.2 mfd  
Price:  
\$1.00 to \$1.95



**METALEAK**

15,000 ohms to  
200,000 ohms  
75¢ each  
25 meg. to 3 meg.  
50¢ each

with the lowest dielectric loss—so essential for the true reproduction of sound.

Used with the silent Dubilier Metaleak, Micadon 640 A will give you the foundation for an amplifier unit with all the tone quality found in the best radio sets.

Send 10c. for our booklet showing fourteen ways to improve your set with simple applications of fixed condensers.

# Dubilier

CONDENSER AND RADIO CORPORATION

# The Masterpiece of Masterpieces!



## New and Improved **FRESHMAN MASTERPIECE**

—the thing that makes it wonderful is its tone quality. The large cone speaker has been designed to exactly match Freshman's new **QUALITY** radio receiver. This special cone speaker easily handles the full power that this new set delivers. Yet, in spite of its ability to handle great volume, when the power is reduced the softest and mellowest tones come forth in a manner never before achieved by any sound producing device.

### *Simplicity*

Its ease of operation, with its three distinct controls, allows any novice to tune in the station wanted day after day at the same points on the dials. This efficient means of operation eliminates the overlapping of wave lengths, which assures distinct separation of one broadcasting station from the others.

Write for our new booklet illustrating and describing the entire line of Freshman Masterpiece Receivers and other apparatus.

Model 6-F-11

**\$ 119.50**

Slightly Higher  
Denver and West

**THIS "Masterpiece of Masterpieces"**

startles and surpasses all expectations. It is the most perfect radio that has ever been designed. It is massive—it is beautiful. It is just what you want for your home. For no matter how exquisite your furnishings are, this artistic genuine mahogany upright console will lend additional beauty. And yet, it is priced so moderately that almost every family can easily afford to own one.

#### **Genuine R C A Radiotrons**

are recommended for use with Freshman Masterpiece Receivers. A special package containing—1 UX-112 power tube, 1 UX-200A detector tube and 3 UX-201A amplifying tubes—matched and tested for the set in which they are shipped; is sold by Authorized Freshman Dealers.

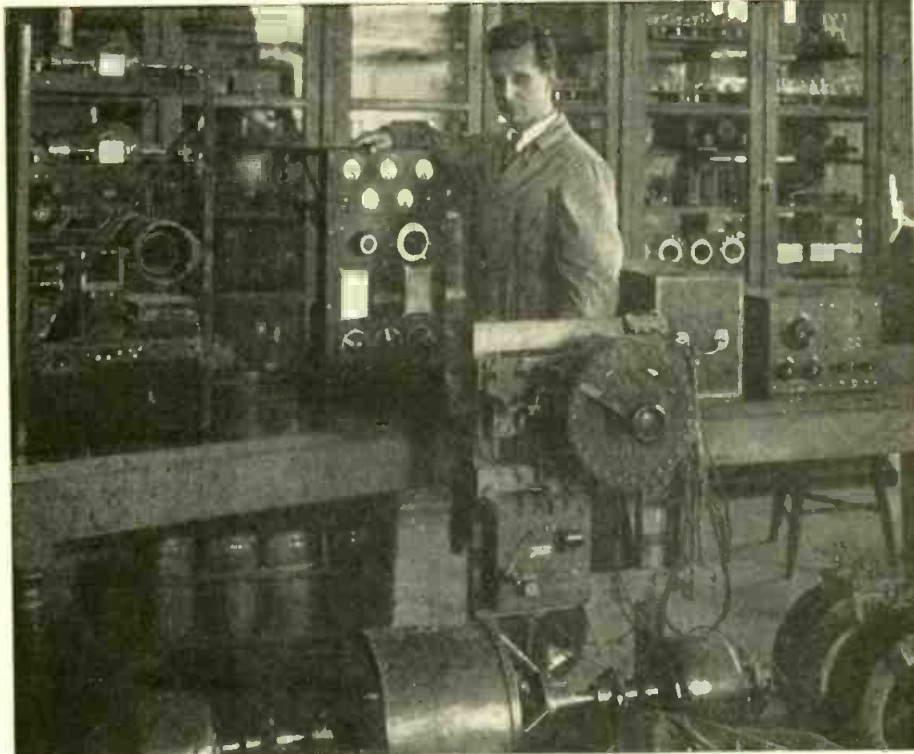
*Sold [on] Convenient Terms by Authorized Freshman Dealers*

**CHAS. FRESHMAN CO., Inc.**

Freshman Bldg., New York 2626 W. Washington Blvd., Chicago, Ill.

# The Most Perfectly Toned Radio Ever Produced



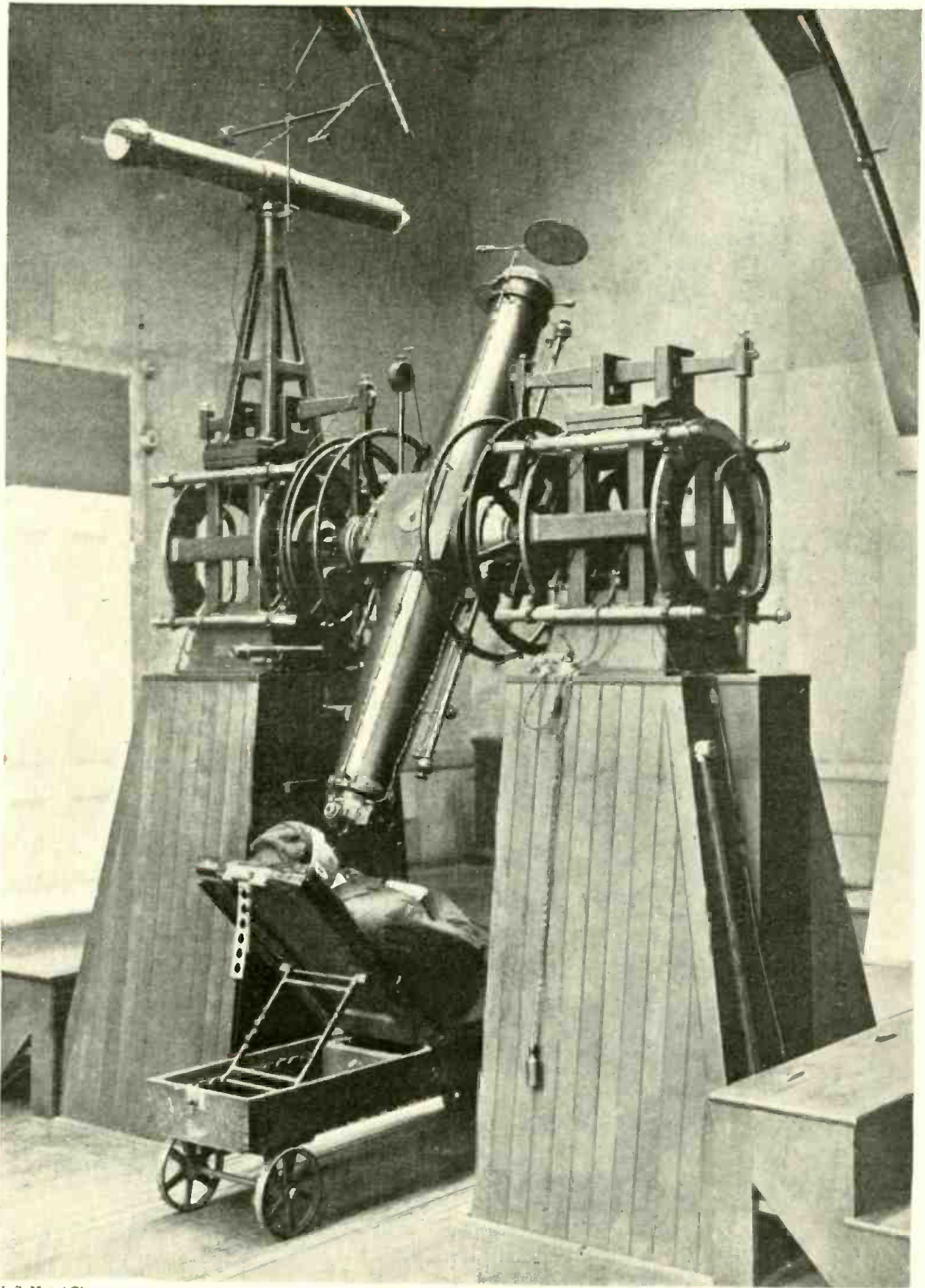


From a photograph made especially for POPULAR RADIO

### The Wonderful Work That Is Being Done by POPULAR RADIO

*"FOR several years I have strongly felt that the American public's enjoyment of radio could be greatly increased by an appreciation of the wonderful actions taking place in their receiving sets. It is not to be expected that this appreciation can be attained by reading the treatises of radio authorities, written for trained engineers; in supplying this appreciation the BONA FIDE radio magazine finds its task. I feel that POPULAR RADIO is doing a wonderful work in this field; dependable articles, written in attractive style, are nearly always found between the covers of the magazine. There are radio magazines which publish material much more lurid than dependable but such comment cannot be made of yours. May you continue to have success!"*

*J. J. Morecroft*



U. S. Naval Observatory

### The Ether Problem Is Bound Up With Time

*This telescope is used at the United States Naval Observatory, to determine the exact instants at which selected stars pass overhead. This corrects the clocks which send out the daily radio time signals; if there is a slip of the ether past the earth (as described in Dr. Free's article), this slip should affect the precision with which the time stars seem to pass across the telescope. Ether waves might be bent by the slip. No such effect has been detected, although often sought.*

# Popular Radio



VOLUME X

November, 1926

NUMBER 7

## Are There "Ether Waves" After All?

The idea that the ether is real is hard to kill. In July, 1922, when the late Dr. Charles P. Steinmetz published in POPULAR RADIO his famous article "There Are No Ether Waves," many distinguished scientists rushed to the defence of the threatened ether theory. Arguments raged for months; POPULAR RADIO published many of them. And at that very time—although the editors of this magazine did not then know it—there were going on quietly at the Case School of Applied Science in Cleveland, Ohio, the preliminaries of some experiments destined to produce four years later the nearest approach to a direct experimental proof of the existence of the ether that science has yet secured.

—EDITOR

By E. E. FREE, Ph.D.

**B**Y a research continuing, with intervals, for a quarter of a century and marked, especially in the last three years, by a care and labor seldom expended even on scientific work, Professor Dayton C. Miller believes that he has detected a measurable motion of the ether relative to the earth—usually designated as the "ether drift."

If the ether can move, or if it can stand still while we move through it, it is obvious that the ether must be real.

Ether waves must exist after all.

It is admitted nowadays that our theories of radio waves, of light, of X-rays and of other forms of ether waves are in very unsatisfactory condition. We really know nothing whatsoever of what radio waves are; the "wave" idea is merely a convenient theory. It may be true; it may be untrue. No one can say which. Professor Gilbert N. Lewis, of the University of California, has even suggested that light is not really "emitted" by one body, like a flame,

and "received" by another body, like our eye; both emission and reception may be, he thinks, parts of the same event. It is not that you see a light because a flame is lit. It is just as true to say that the flame burns because your eye has seen it.

The same ideas would apply to radio. Instead of a wave going out from a transmitting antenna because it was energized by moving electrons, Professor Lewis's theory would imagine that the wave went out because a receiver had received it. This sounds, it must be admitted, like utter nonsense, and I fear I am doing Professor Lewis's ideas some injustice by giving them merely this brief and inadequate description. They involve, for their proper comprehension, a complete revision of all our ordinary ideas of time and space. Past and future become interchangeable terms. A radio receiver does the transmitting just as much as the transmitter does. Which is cause and which effect

becomes very difficult to discover, perhaps impossible.

It is unnecessary to pursue these ideas farther into the rarefied air of philosophical discussion. The point is that all our theories of radiation are now in difficulties. No one knows quite what to believe. It would be satisfying if we could return to the old and simple ether theory, which still persists in our language when we talk about "ether waves," but which, since Einstein and Steinmetz, many scientific men have come to doubt.

Professor Miller's experiments do not quite permit us to return to the old carefree days when the ether was thought of as a simple, weightless substance filling all space as a great motionless ocean and through which the earth and the sun moved along as fish move in the sea.

This theory of a quiescent ether is gone, perhaps forever.

But Einstein's theory of relativity

resulted, as Dr. Steinmetz pointed out in 1922, not merely in disposing of the idea of a motionless ether; it disposed of the ether altogether. We had to call our familiar waves something else; just what Dr. Einstein did not tell us. Space was merely space; traversed, once in a while, by a radio impulse or by a wave of light. What carried this light or radio remained—and still remains—quite unexplained.

Under these circumstances it is natural that Professor Miller's apparent detection of a real and tangible ether has attracted enormous attention in the scientific world. Since his preliminary announcements some months ago, as noted in POPULAR RADIO at the time, he has been traveling among the scientific centers of Europe, describing his results to the experts there and submitting both his data and conclusions to the severest criticism.

Such criticism has not been lacking. It is admitted by no less an authority than Dr. Einstein himself that if Profes-

sor Miller's results are correct the Theory of Relativity will need severe correction; if, indeed, it will not have to be abandoned entirely. So many scientists have accepted this theory, it has been the basis of so many subsidiary theories and of so much detailed experimentation, that science cannot be expected to give it up willingly or even to modify it without a struggle. Nevertheless, no one has been able to adduce a convincing case against Professor Miller's facts. On the face of his data, he seems to have got a grip on the ether. Other experts have said that they believe he must be wrong, but no one has been able to point out just how he is wrong.

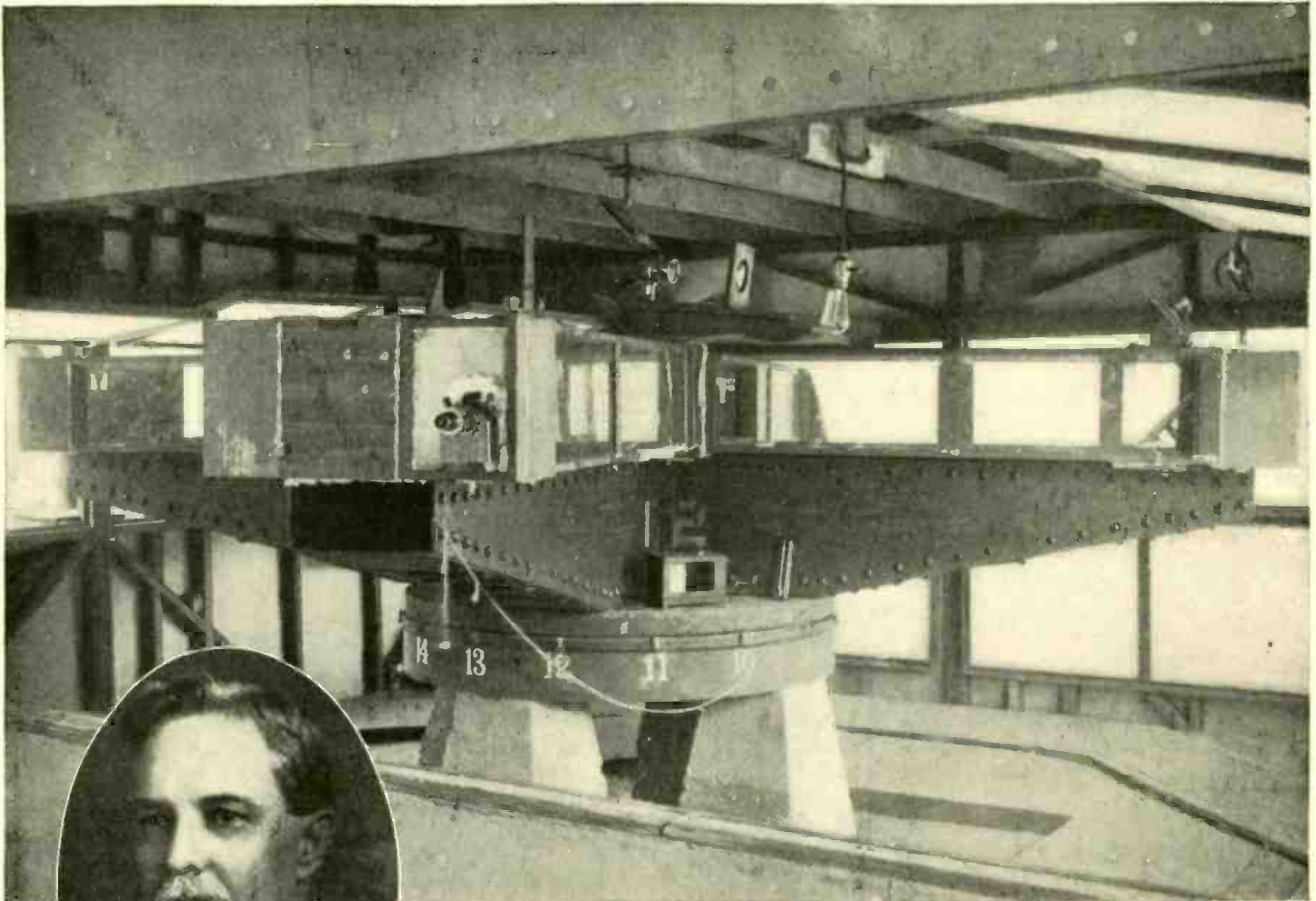
His experiments are really refinements and continuations of the famous Michelson-Morley experiment, carried out at Cleveland in 1887 and which was one of the chief facts used by Einstein in elaborating his theory of relativity. This experiment was designed to detect the ether by measuring the speed of light in the direction in which the earth was

moving as compared with the speed of light in the reverse direction.

It is obviously easier to swim with the current of a river than against this current. The down-stream swimmer will go faster.

A light ray may be thought of—if one believes in the ether—as swimming in the ether. The earth is in continual motion around the sun, as well as in continual rotation about its axis. Thus any particular place on the earth, such as the city of Cleveland, is moving through the ether in a spiral path composed of these two motions of the earth. Or, to put it conversely, the ether is streaming through Cleveland in a direction which varies from hour to hour, as the earth, with Cleveland on it, turns and flies. The ether is thought of, of course, as moving through the mass of the earth and the solid bodies of Cleveland and its inhabitants, just as though these were not there.

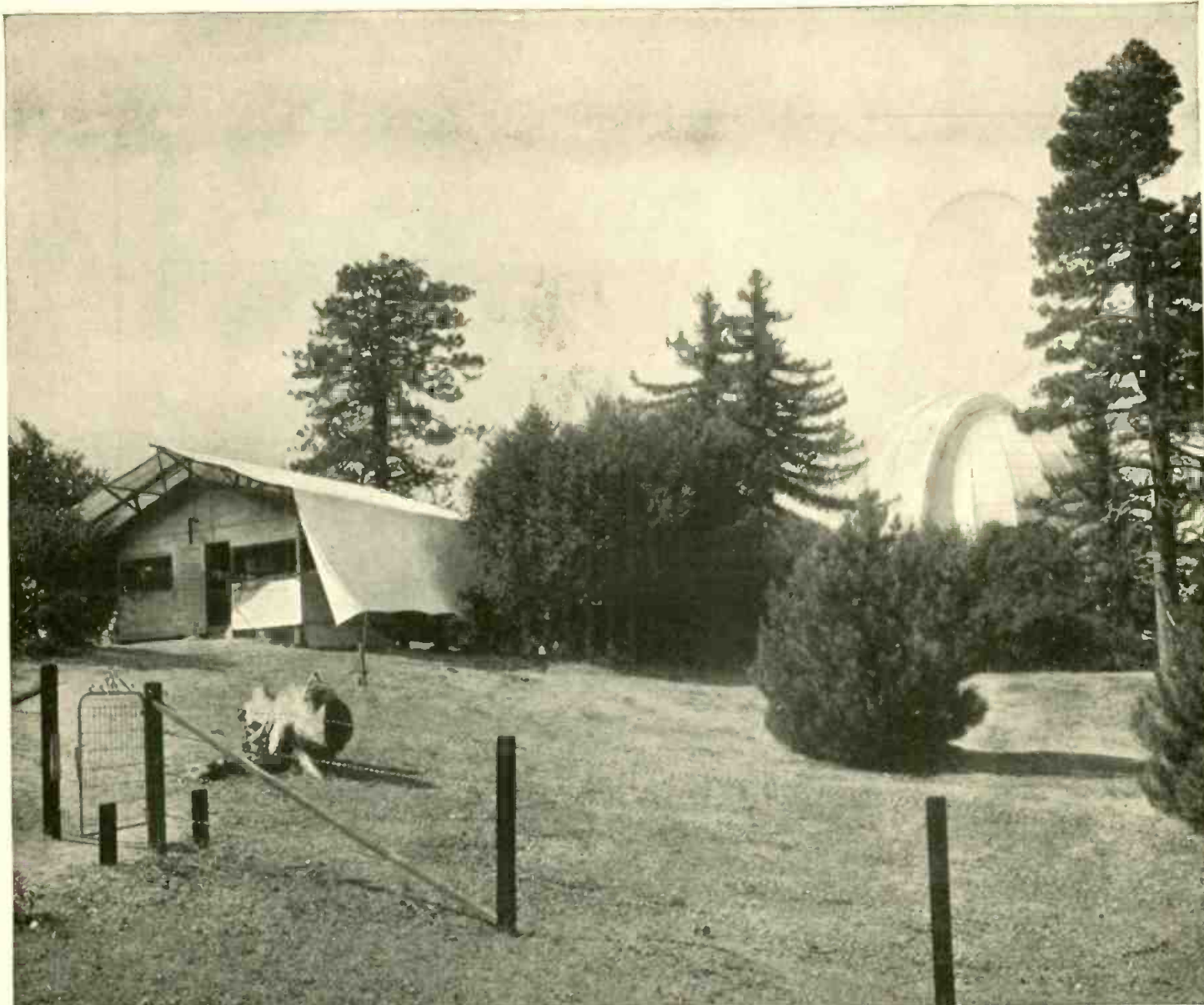
The Michelson-Morley experiment consisted in testing the speed of light in



Case School of Applied Science

### Here 100,000 Ether Tests Were Made

*This entire apparatus revolves slowly, being floated on liquid quicksilver. Dr. Miller, whose portrait is at the left, and his assistants, walked slowly around with the apparatus, like sailors around a capstan; meanwhile they observed, through the telescope, the changes of interference fringes visible therein. The final series of tests included more than 100,000 such measurements. The quicksilver is contained in the flat pan mounted on the concrete piers.*



Case School of Applied Science

### Where Dr. Miller's Ether-Test Apparatus Was Set Up

*On the grassy, pine-dotted plateau on top of Mt. Wilson, far above the city of Pasadena, in California, Dr. Miller erected his revolving apparatus inside this small tent house. Here have been made the recent measurements indicating that the solar system is falling rapidly through space and that ether waves perhaps do exist after all. One of the great domes housing the telescopes of Mt. Wilson Observatory is visible at the right of the photograph.*

a direction with the ether stream and in the opposite direction, against the stream. A difference should have been found; not a great difference, for the speed of light is vast as compared with the known speeds of the earth, but nevertheless a measurable difference. It was not found. Light proved to have the same speed in both directions, at least within the limit of error of the experiment and so far as the speed of the earth in its orbit was concerned. On this failure the Einstein theory was built.

Shortly after this experiment was completed Professor Michelson removed to the University of Chicago. Professor Morley, staying on at Cleveland, brought Dr. Miller into the matter. They repeated the famous experiment, with variations and on a hill-top instead

of in the basement laboratory formerly used. The result was the same. Nevertheless, the two scientists were not satisfied. They wished to repeat it again, with still greater refinements. Professor Morley died, but Dr. Miller kept up the work. In 1921 he carried apparatus to Mt. Wilson, in California, and made new tests there. These were still inconclusive. In 1922 and 1923 experiments were continued at Cleveland. Finally, in 1924, 1925 and 1926, other sets of tests were made at Mt. Wilson, the tests which now have set the scientific world so much agog.

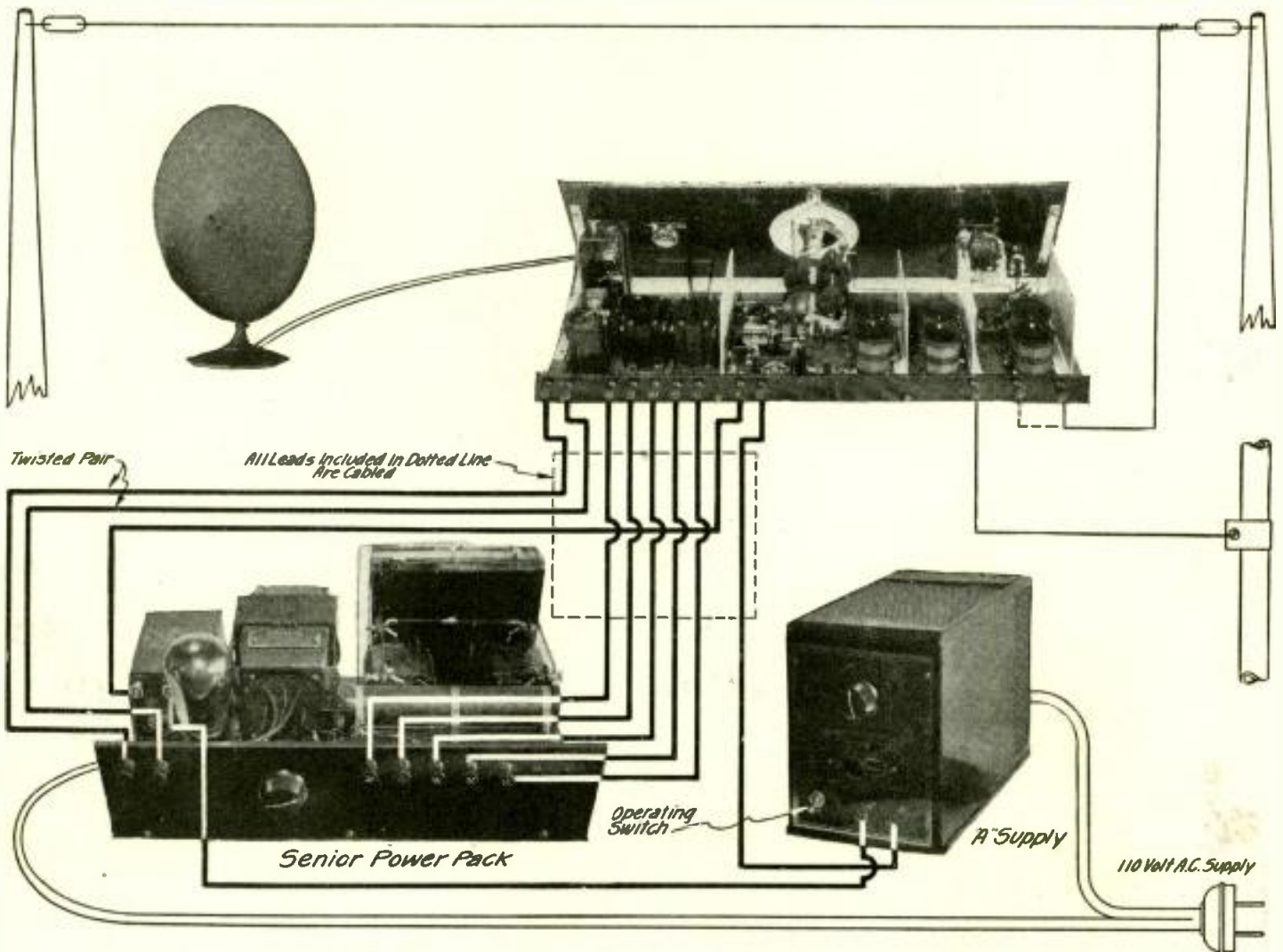
These tests are perhaps the most laborious and fatiguing of all scientific experimentation. The apparatus consists of a series of mirrors, lenses and other optical parts mounted on a heavy, disk-like base which floats in liquid

mercury. This entire apparatus is set to revolving in its mercury ocean, like a spinning top although much more slowly. An observing telescope protrudes from one side of the float. The observer must follow this telescope as it slowly moves away from him, with his eye continually glued to a quarter-inch eye-hole, but without touching the telescope or any part of the apparatus with so much as an eyelash.

One turn of the floating table requires about one minute. Within this minute the observer must make sixteen observations through his telescope, one each time that a nearby ticker gives the signal. The readings are called off vocally and are set down by an assistant. All that the observer has to do is to walk and look, like a horse on a tread-

*(Continued on page 706)*

**Q** This is the first of the series of four articles to follow "How to Build the New LC-27 Receiver" which appeared in POPULAR RADIO last month—



**HOW THE UNITS ARE INSTALLED**

**FIGURE 1:** This picture-diagram shows the LC-27 receiver connected up to the "A," "B" and "C" power and to the antenna, ground and loudspeaker. The input to the "A" supply and the Senior Power-pack are connected in shunt to the 110-volt alternating current supply lines so that no batteries are required.

**HOW TO BUILD THE**

# LC-SENIOR POWER-PACK

This new unit which supplies power for the whole set was especially designed for use with the LC-27 receiver; it may, however, be used with ANY TYPE OF RECEIVING SET, provided that a UX-210 tube is used in the last stage of amplification. Any set so equipped will be capable of delivering broadcast programs with the full volume of an orchestra and with a tone quality that is actually comparable with that of the orchestra itself.

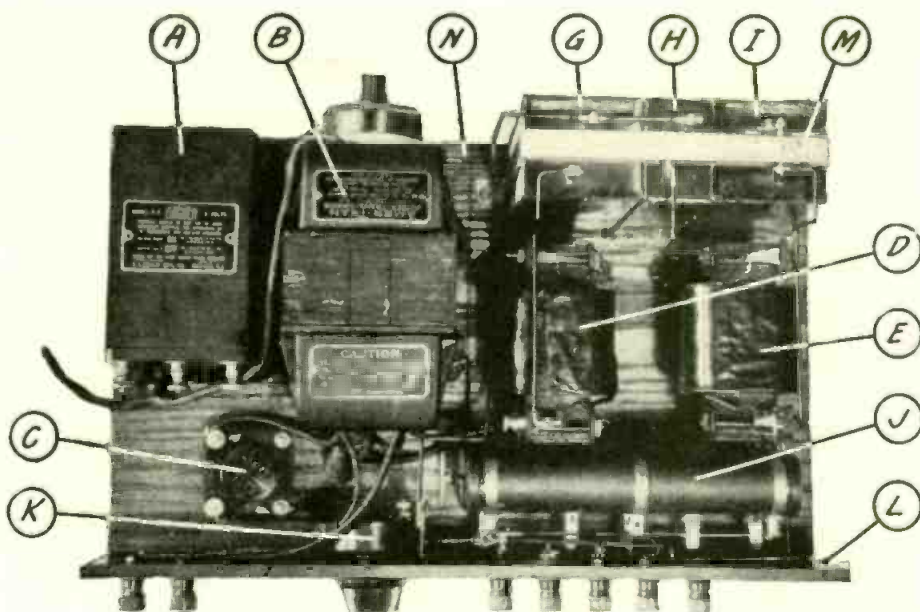
By LAURENCE M. COCKADAY

**Q** The list of parts given here 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 have been approved by POPULAR RADIO which may be used with 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 including cable connector): Not more than \$64.50

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

- A—Brach Controlit;
- B—AmerTran transformer, PF-52;
- C—Any approved type UX-socket (Benjamin socket illustrated);
- D and E—AmerChokes, No. 854;
- F6, F7, F8, F9, F10, F11 and F12—Any approved binding posts (Eby binding posts illustrated);
- G—Dubilier paper filter condenser, No. 903, 2 mfd., 600-volt AC operation, or Tobe condenser, Aeracon or Precision condensers with same characteristics;
- H—Dubilier paper filter condenser, No. 902, 2 mfd., 400-volt AC operation, or Tobe, Aeracon and Precision condensers with same characteristics;
- I—Dubilier paper filter condenser, No. 902, 4 mfd., 400-volt AC operation, or Tobe, Aeracon or Precision condensers with same characteristics;
- J—AmerTran resistor, No. 400;
- K—Any approved high-current variable resistance to dissipate 5 watts, 2000 ohms. (Centralab resistance illus.);
- L—Bakelite binding-post strip, 3½ inches by 1½ inches by ¼-inch;
- M—Brass mounting strip;
- N—Hardwood baseboard, 8¾ inches by 15 inches by 5⁄8-inch;
- Belden power cable connector assembly;
- One set of full-size blueprints for LC-Senior Power-pack.



A VIEW OF THE POWER-PACK FROM ABOVE

FIGURE 2: The relative position of all the parts that are mounted on the baseboard and the connection panel; the parts are designated with letters that correspond with the list of parts and with those given in the text.

**T**HIS power unit for the LC-27 Receiver has been designed, with the same care and foresight that were used in planning the receiver itself, to

fill certain definite requirements—to supply adequate power to the set without the use of batteries of any sort and to furnish, in combination with the receiver, the best obtainable quality of reproduction with a volume great enough to fill a hall or auditorium when used with a suitable loudspeaker.

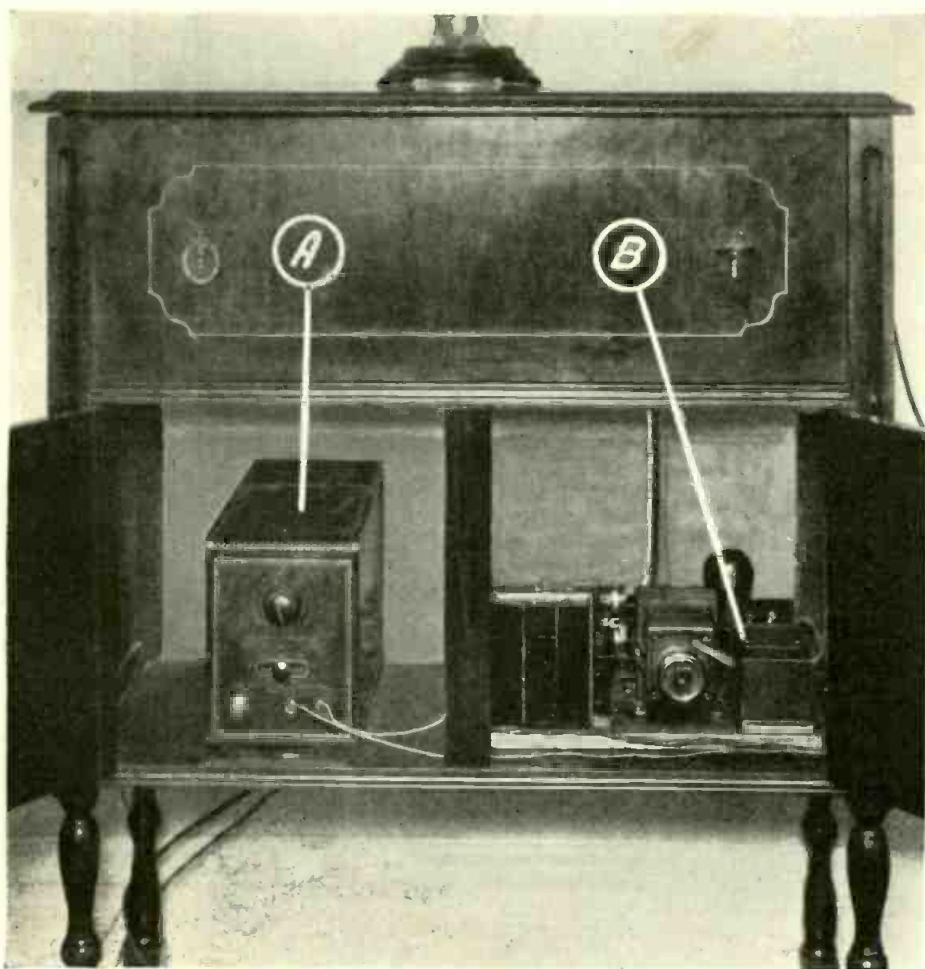
The volume, supplied by the unit, may be cut down to a mere whisper by means of the volume control in the set. But there is an abundance of reserve power ready to be delivered at any time in clear, undistorted tones. For this reason it should be especially useful to schools and other institutions as well as in homes where great amplification with fine tone quality is essential.

This power unit supplies the "A," "B" and "C" voltages for the 210 tube in the last stage of audio-frequency amplification. It furnishes, for the "B" supply, over 400 volts to this tube and 90 volts to the RF amplifier tubes and the first stage of audio as well as 45 volts to the detector plate circuit. The "C" supply is variable from 20 to 35 volts; besides this the unit supplies 7½ volts for the filament of the UX-210 power tube.

*How to Construct the Unit*

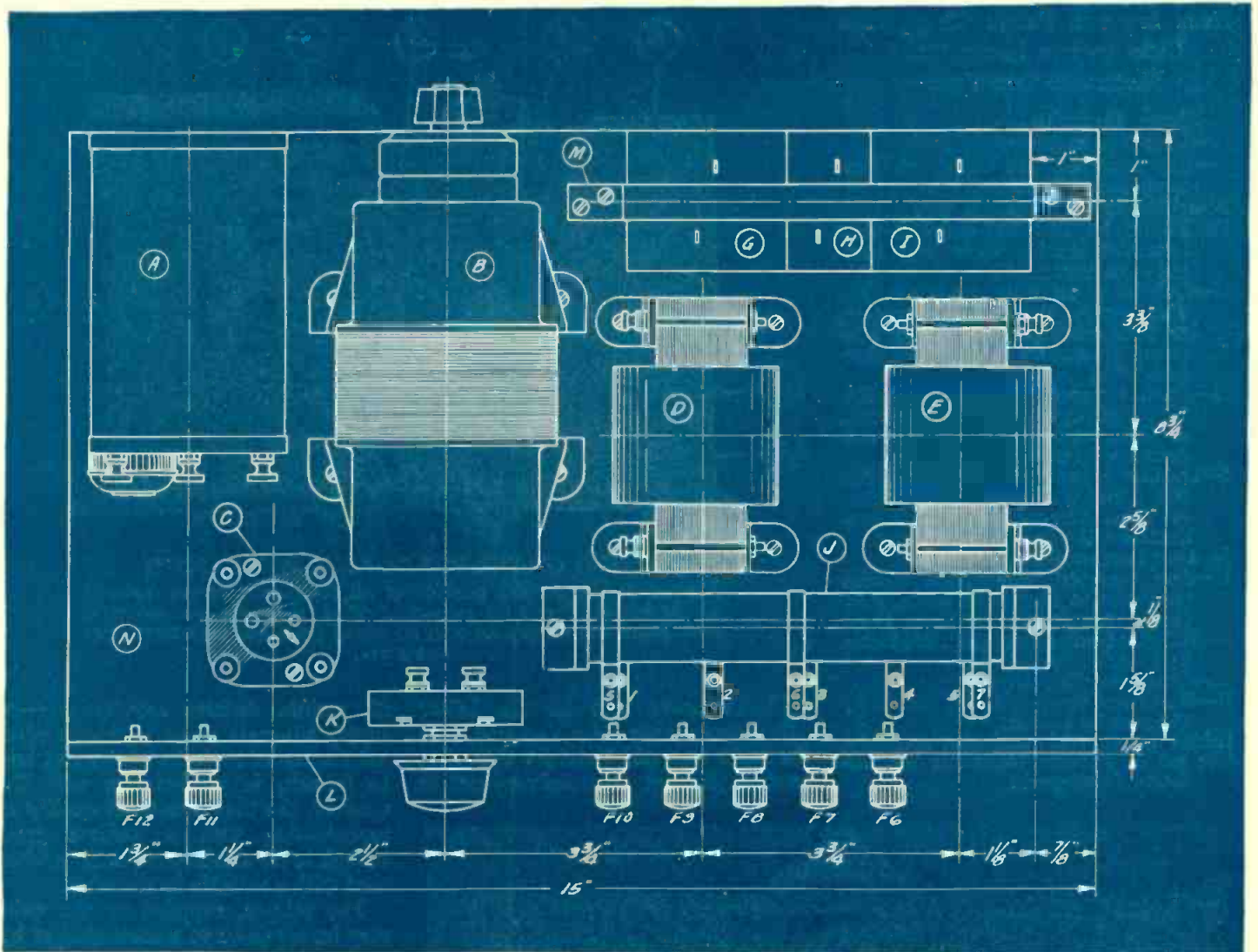
After all the instruments and materials for building the power-pack have been procured, the baseboard, N, should be cut to the correct size, as shown in Figure 4. It should be smoothed with sandpaper and given a coat of stain and shellac.

Next, the small panel, L, upon which are to be mounted the binding posts and the "C" battery control, K, should be



THE "A" AND "B" POWER-PACKS, INSTALLED IN THE CORBETT CONSOLE

FIGURE 3: At the left, at A, is shown the "A" power-pack; the LC-Senior Power-pack is shown at B. The receiver itself is located in the top of the cabinet and is accessible when the desk lid is let down.



**THE WORKING DRAWING FOR CONSTRUCTION**

FIGURE 4: In this drawing all of the parts are shown in their exact positions; these are given from center to center for all of the instruments. If these dimensions are followed the home-constructed unit should be exactly like the original model built in the laboratory.

prepared, as shown in Figure 7. When all the holes are drilled, the seven binding posts should be mounted and the variable resistance, K, should be fastened to the panel, as shown in Figures 2, 4 and 5. The panel, L, may then be fastened on one of the long sides of the baseboard, N, by means of three screws, as shown in Figure 1. These screws are inserted through the three holes in the panel into the edge of the baseboard, N. They should be strong wood screws.

Next, mount the control relay, A, by means of two screws. The metal cover of the relay will first have to be removed and then the screws put in place and screwed down on to the baseboard, N; after this the metal cover may be replaced. This should be mounted in the position indicated in Figure 4.

Mount the transformer, B, by means of four strong wood screws to the baseboard, N, and mount the two choke coils, D and E, in the same way. The positions for these instruments are also given in Figure 4.

Mount the tube socket, C, and the re-

sistor, J, as shown in the same diagram.

Next, prepare the brass mounting strip according to the dimensions given in Figure 6 and fasten down the three filter condensers, G, H and I, as shown in Figure 4. Be sure that they are mounted in the exact positions shown in this drawing with the terminals turned in exactly the same position. Also be sure that the brass connection strip does not touch any of the terminals. A small strip of cardboard laid underneath the brass strip on top of the condensers will serve to hold them snug when the four screws are tightened down to the baseboard.

This completes the construction work and the pack is now ready to be wired.

*How to Wire the Unit*

The mechanical and electrical design of this device have been worked out with extreme care through months of experiment and test. The whole unit is self-shielding; and it is due to this as well as to the electrical design of the circuit that no hum is produced in the

receiving set to which it is attached.

It is recommended that all wiring be done with an insulated, solid, round bus-wire.\*

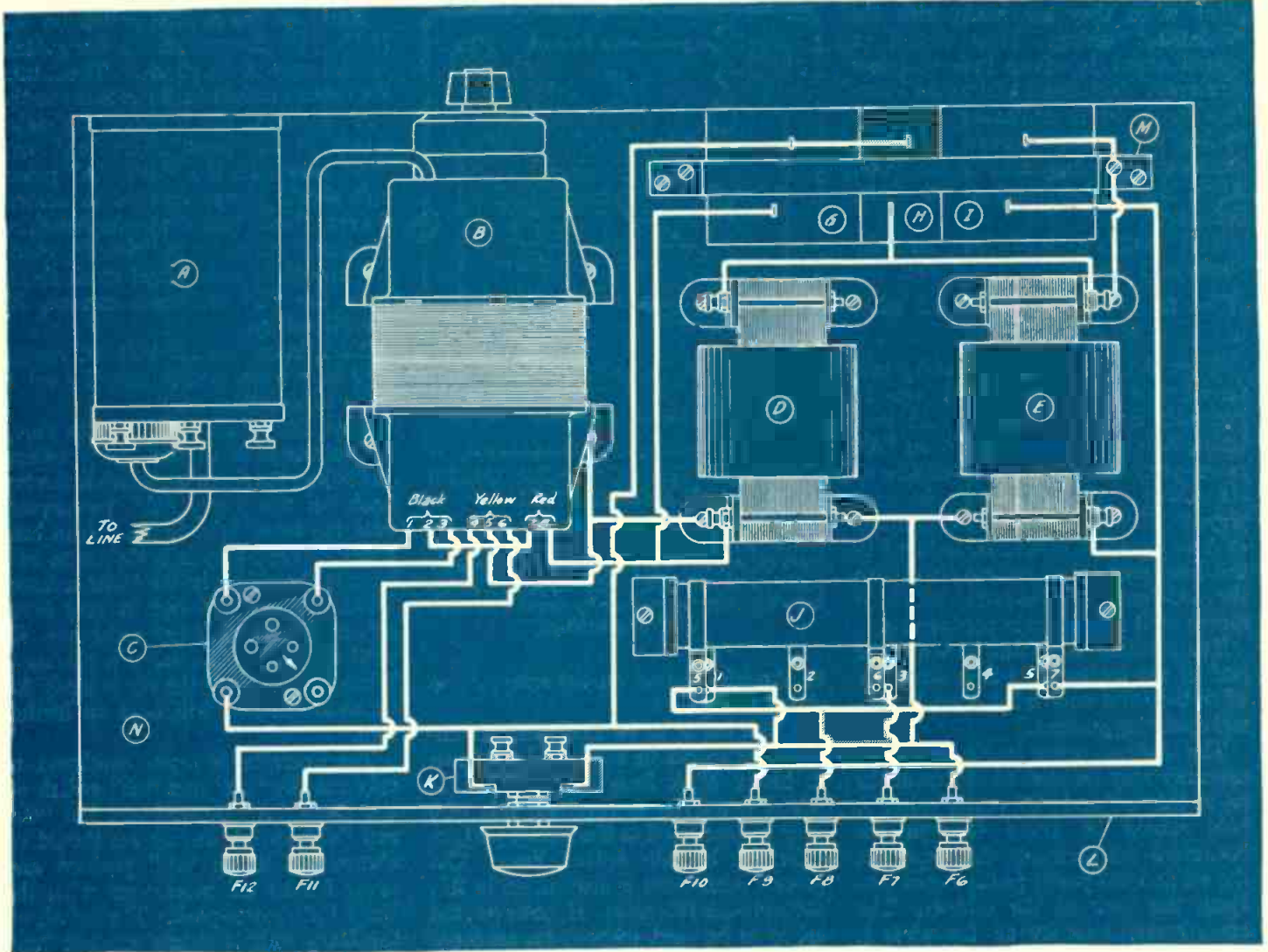
In wiring up refer constantly to the picture wiring diagram in Figure 5. Notice that the cases of the transformers and the chokes are connected together and grounded on the negative side of the direct-current voltage, which is obtained through the rectifier. This is an aid in shielding the output of the set from stray electrostatic fields.

Start the wiring by preparing the transformer leads in the correct lengths, as shown in Figure 5. The leads are of different colors, as indicated in this diagram. They may be readily recognized by referring to the small diagram given in Figure 7 which gives the proper numbers and the colors of the leads.

Then, wire up the leads to the socket and the resistance, the condenser bank, the chokes and the binding posts. Be sure that none of the leads touch each

\*The type of bus wire used in all the experimental models of this unit was "Celatsite."



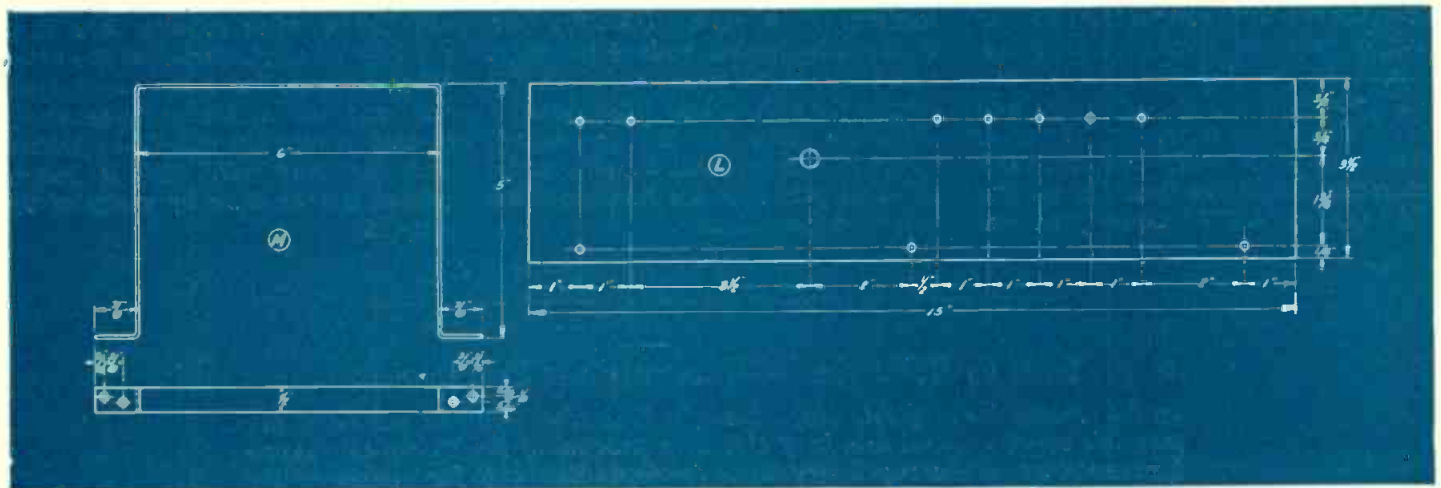


**THE PICTURE WIRING DIAGRAM**

FIGURE 5: The instruments are drawn in their relative positions; the wiring is shown in heavy white lines. Notice that the input plug from the transformer, B, is inserted into the proper socket on the relay, A, and the 110-volts 60 cycles should be connected to the input wire to the relay which is marked "To Line."

**Blue Prints for the LC-27 Senior Power-pack**

For the benefit of the experimental set builder who may prefer to assemble the LC-Senior Power-pack from larger diagrams than can be reproduced within the limited space of these magazine pages, a set of simplified blue prints in actual size have been prepared. This set includes (1) the working drawing for construction; (2) the picture wiring diagram, and the complete list of parts used in the laboratory model. If this set of blue prints cannot be obtained from your dealer, it will be furnished upon receipt of a remittance of \$1.00 sent to the POPULAR RADIO SERVICE BUREAU, 627 West 43rd Street, New York City.



**THE BRASS MOUNTING STRIP AND THE PANEL**

FIGURE 6: These drawings give the sizes for the strip with the drill holes located in proper position as well as the size and drilling specifications for the panel, upon which are mounted the binding posts and the grid bias resistance.

other when they are made with the "Celatsite" wiring. They should be spaced about  $\frac{1}{4}$  of an inch wherever necessary. The input lead to the transformer, B, which ordinarily would go to the alternating current should be shortened and plugged in on the relay, A, in the socket marked "B Batt. Substitute."

This completes the wiring and the power unit is ready to be installed.

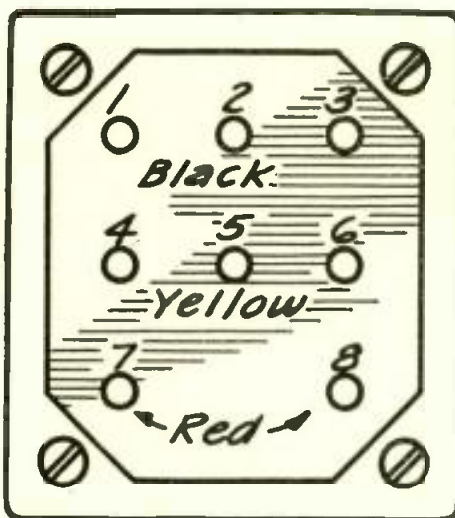
#### How to Install the Power-pack with the LC-27 Receiver

When the LC-27 Receiver, which was described in the October, 1926, issue of POPULAR RADIO is used without batteries, it is recommended that an "A" power-pack of similar characteristics to the Davy "A" power-pack be employed. This pack, which is designated as A in Figure 3, should be installed in the lower part of the console along with the LC-Senior Power-pack, which is shown at B in this same photograph.

The set itself is located in the upper part of the cabinet and it is accessible when the front door is let down in normal operating position.

The Belden power cable connector assembly may be used to run from the set to the "A" and "B" power units. A hole should be bored through the horizontal compartment that separates the set and the power packs somewhere along the back of the cabinet. The exact connections for all the wires is shown clearly in Figure 1. The cable itself contains wires of the correct lengths at one end to fasten directly to the binding posts on the back of the set and as they are all marked with tracers of different colors, it will be an easy matter to find the proper wire at the bottom end of the cable for connection to the "A" power-pack and the "B" power-pack.

The two wires marked "two line" in Figure 5 should be connected in parallel with the two wires coming from the "A" supply unit and they should be connected to the 24-foot length of wire equipped with a plug that comes with the Belden cable assembly. The other loose wire that comes with the cable assembly should run from the positive "A" post on the "A" power pack over



HOW THE TRANSFORMER LEADS ARE DESIGNATED

FIGURE 7: This small drawing gives the correct information for wiring up the leads from the transformer, B, to the various other parts of the circuit. The leads are designated by color as well as by number in both of these drawings.

to the middle post on the relay, A, as shown in Figure 1.

If the set is to be used with an antenna, it should be connected as shown in heavy black lines in Figure 1. If added selectivity is required, this wire may be connected to the second post, as indicated by the dotted lines. The ground connection is also shown in this same pictorial diagram. If, however, the set is to be used without an antenna, the ground should be connected to the end binding post that is ordinarily used for the antenna.

The loudspeaker should be inserted in the jack on the front of the panel of the set.

The set is now ready for operation.

#### How to Operate the Set With the Power Units

First of all, place two UX-201-a tubes in the first and second sockets in the receiver. Then, place a UX-200-a tube in the third socket with a UX-201-a tube in the fourth socket and a UX-210 tube in the fifth socket. Then, insert a UX-216-b tube in the power-pack socket, C. Be sure that the pins on the tubes are pointed in the direction of the arrows on the sockets.

Next, set the middle switch on the Davy "A" power-pack on the middle section marked "medium." Then, turn the battery switch on the receiver to the "on" position, which should be maintained at all times. The "on" and "off" switch on the Davy "A" power unit should always be used to control the set. Then, turn the power switch on the transformer, B, to "No. 1", which also should be maintained at all times. Place the "C" resistance control, K, in mid-position.

Then, insert the 110-volt AC supply plug in a lamp socket and the set is ready to be turned on.

Next, flip up the switch on the Davy "A" power-pack to the "on" position and adjust the rheostat, which is the top knob on the Davy "A" power-pack until the tubes light to the correct brilliancy. Then, tune in a station as outlined in the article in the October issue. When a signal is tuned in very loud, adjust the "C" battery resistance, K, until the best tone quality is obtained. When this is done, the set is ready for constant use and will need no further care.

The operator is again cautioned to only use the "on" and "off" switch on the Davy "A" power-pack; the "on" and "off" switch on the set should be always left in an "on" position and never turned off when used with the Davy "A" power-pack. The switch on the Davy unit is clearly marked "on" and "off" and it will control the whole set including the "A", "B" and "C" batteries.

The volume from the receiver may be controlled to just the right amount by the volume control resistance, S, as told in the article in the October, 1926, issue.

If an "A" battery is to be used with the set, it may be connected exactly as shown in Figure 1 in place of the "A" power-pack except, of course, that there will be no wires running from it to the 110-volt alternating-current supply. When a storage "A" battery is used, the "on" and "off" switch on the set should be used to turn the complete combination "on" and "off." This is accomplished in both cases by means of the relay, A.

## How to Build the LC-Intermediate Power-pack

In the coming issue of this magazine—for December—will be published the complete constructional details of this new product of the POPULAR RADIO LABORATORY, including instructions for installing and for operating the LC-27 Receiver (described in the October issue) with the LC-Intermediate Power-pack, without the use of batteries.



Brown Brothers

HOW A WAVE IS PROPAGATED

*Just as in radio, a water wave is propagated from a central point and proceeds outward in widening circles—here, through the water, in radio, through the ether. The small water waves in this pool were propagated by throwing a stone into the water; notice how the circles increase in diameter as they proceed away from the point of propagation. One "wavelength" is the distance from the peak of one wave to the peak of the next adjacent wave; this applies to radio waves also.*

# WAVES *and* WAVELENGTHS

ARTICLE No. 1

This is the first of a new and significant series of articles by this eminent British physicist. In this installment Sir Oliver begins with a simple description of waves and wavelengths; in the following articles he will treat of the conversion of radio waves into electrical impulses in tuning circuits, or electrical resonance and its analogy to mechanical or sound resonance, and finally he will describe the new method of tuning as embodied in the new "N" circuit, with which he has long been experimenting.

By SIR OLIVER LODGE, F.R.S., D.Sc., LL.D.

**W**AVES and the vibrations which give rise to them, and by which we are enabled to perceive them, contribute a great deal to our knowledge of the world and of the universe.

It is through waves of light that we gain a knowledge of the stars, even of their chemical composition and velocities, and of the existence of other worlds in space. Without the information thus acquired our universe would shrink to the small planet which we occupy.

It is through waves of sound also that

we are able to communicate with each other, and to hear events which are occurring at a distance.

Without these two sources of information we should be limited to what we could touch and smell and taste. But touch, with all that appertains to it, is a mechanical sense located in our muscles, as well as in the skin. It is through this muscular and tactile sense that we become aware of matter and of motion; whereas taste and smell appear to be chemical senses and to be brought into

activity by actual particles of matter given off by odoriferous bodies—the particles being received by the nose, or dissolved in juices of the mouth. The two main senses of man are dependent on waves or tremors, that is, on vibrations of some kind.

But now we have to consider in what sense the term "wave" can be applied to sound or to light.

The term "wave" was originally used, no doubt, to signify the traveling humps on the sea and the ripples on smaller

pieces of water. And it was by no means obvious—it had to be discovered—that there was any analogy between them and the apparently quite distinct phenomena of sound and light. As a matter of fact the waves are different; and it is chiefly because they can all be represented by the same mathematical equation that the same term is applicable to such very different phenomena.

Ask a mathematician what he understands by a wave, and he will probably reply

$$\frac{d^2y}{dt^2} = v^2 \frac{d^2y}{dx^2}$$

And if asked to put this into words he would say—something periodic both in space and time, traveling in the direction x with the velocity v.

Let us illustrate this.

By "periodic" is meant repetition at regular intervals. A row of railings is periodic in space, if the railings are all exactly alike. The swing of a pendulum is periodic in time. And if you had a row of pendulums swinging in regular succession, not all swinging together, but

started one after the other, the arrangement would be periodic in both space and time. And if you watched the pendulumbobs you would see a wave form running along them, coming in apparently at one end and going out at the other. There is no real progressive motion of anything material; but there is a form which progresses.

One might take another analogy:

The turns of a corkscrew are periodic in space. If you make it revolve it is periodic in time too; and accordingly you see the waves advancing.

So it is on the open sea. The wave advances, but the particles do not. The particles heave up and down. But because they do it in regular and periodic order, the result is an apparent progression, which anyone can see by throwing a pebble into a pond. Near the shore the waves get more complicated. The bottom part is held back by the beach, the top part travels forward, and the wave topples over and breaks upon the shore. These also are popularly called waves, but they are more complicated than true

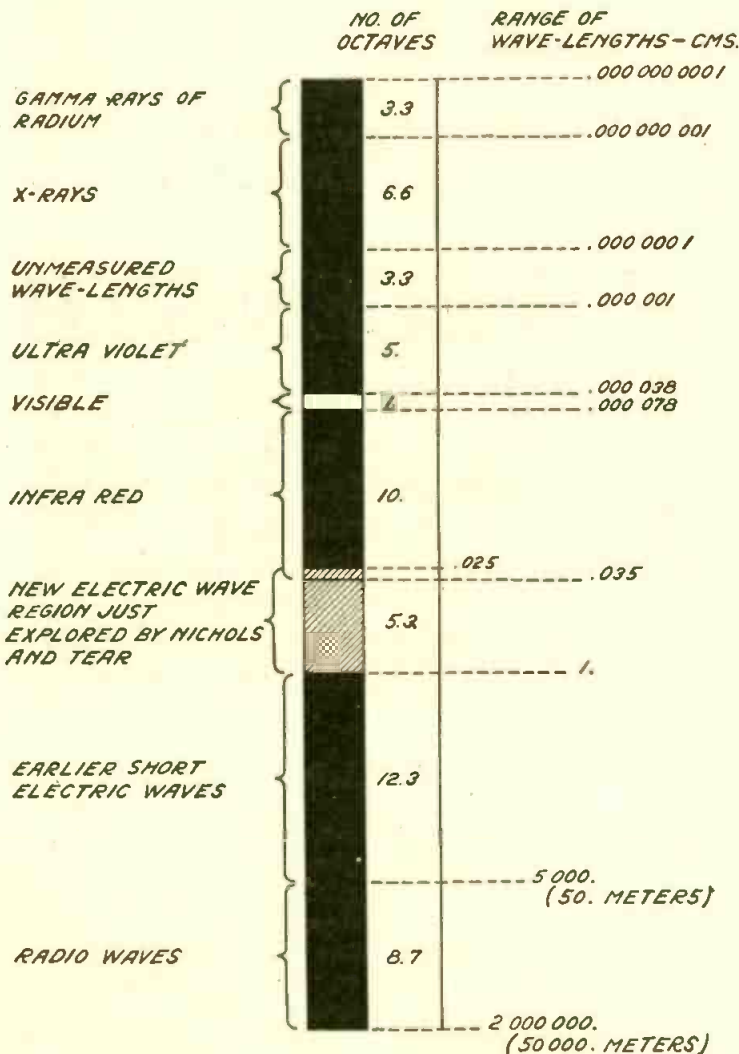
waves. They are breaking waves, and represent absorption or destruction of the wave motion, and its conversion into the irregular vibration which appeals to our senses as heat; though indeed the heat thus generated hardly raises the temperature of the water appreciably unless the waves are exceedingly violent. Nevertheless that is the way we get heat from the sun. The energy does not come to us as heat. It comes to us as a form of wave motion, and only when absorbed or quenched by matter does it turn into what we speak of as radiant heat. It is those waves which keep the earth warm, and make vegetation, and life generally, possible.

Waves are often generated by the molecular agitation we call heat; and they excite the same kind of agitation when they are received and quenched. Holding the hand or face in front of the fire is a sufficient example of that process. So it is if you stand in the blazing sunshine. The sun is at a terrifically high temperature and consequently emits very intense waves with prodigious rapidity.

Waves of sound also turn into heat when they are absorbed. But if either of these two classes of waves falls upon appropriate receiving organs, they excite the nerves with which those organs are supplied, and thereby give us the sense of sound or of light. How they do this is partly understood and partly still mysterious. The translation of a tremor into a sensation has to be interpreted, as far as it can be interpreted at present, by the science of psychology.

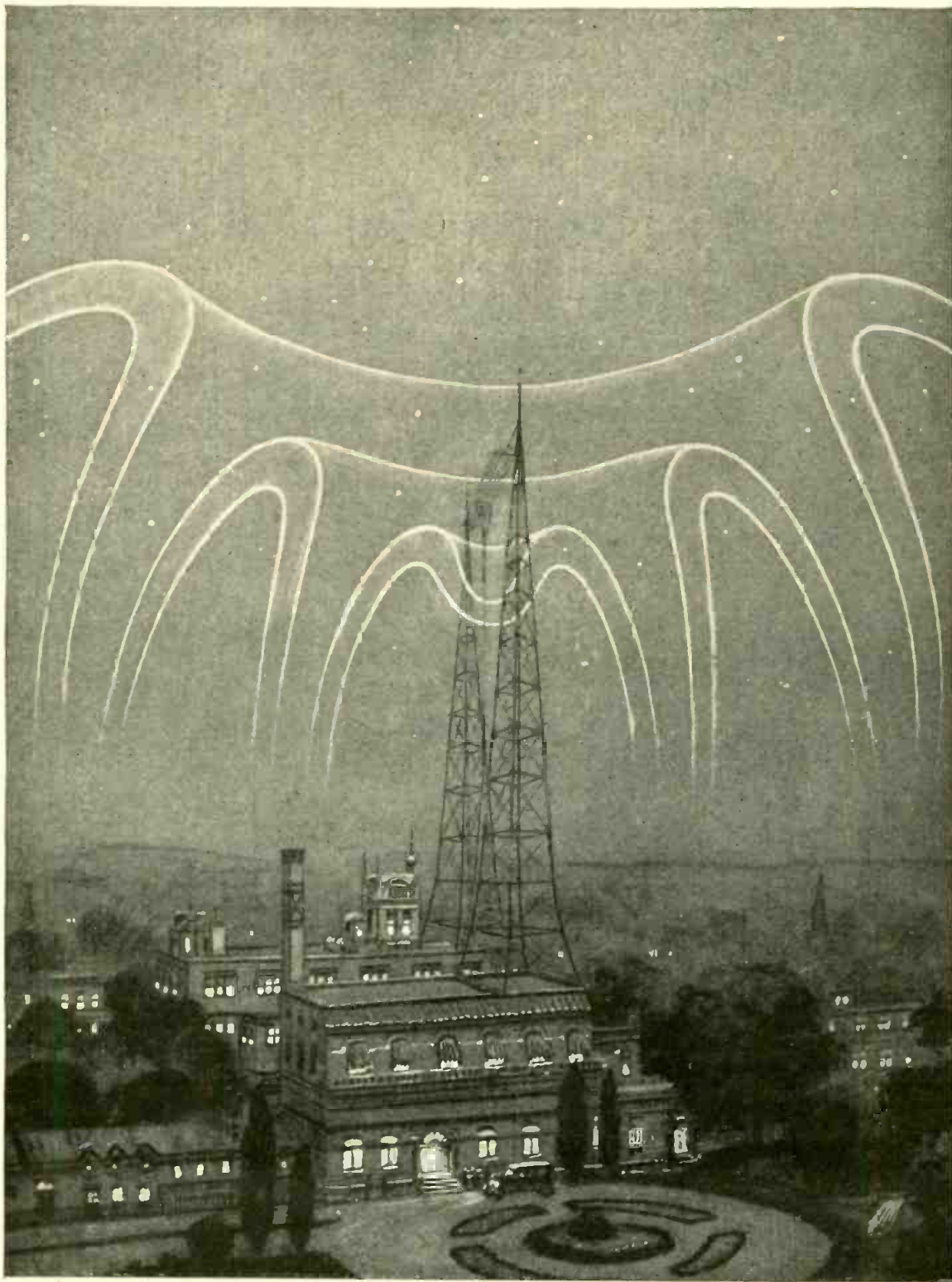
The eye and the ear only respond to a certain range of tremor. They will not respond to vibrations which are too slow, nor again to those which are too quick. The ear has the greater range of the two.

The range of the eye is extremely limited: the most rapid vibrations which the eye can perceive are only twice as quick as the slowest which it can perceive. The slowest excite the sensation that we call red, the most rapid excite the sensation that we call violet. But beyond the violet there is an immense range of ultra-violet, right away up to the X-rays and, even higher than those, the gamma-rays of radium, thousands of times more rapid than anything that can affect the eye. Fortunately, however, they are able to affect certain chemicals and therefore they may be photographed. Below the red again there is a great range, which is called infra-red; and much slower than that, the waves which are used in radio. These can neither be seen nor photographed; we require special instruments for their detection. They are big things and require a big collecting apparatus, well known as "the antenna;" and that



A FREQUENCY CHART THAT SHOWS MANY TYPES OF WAVES

This chart gives the frequencies of waves that lie between the extremely short gamma rays of radium and the relatively long waves that are used for radio communication.



From a drawing made by Arthur Merrick for POPULAR RADIO

### IF WE COULD SEE RADIO WAVES

*They would look something like the ghostly outlines shown in this picture. The waves start from the antenna and expand in ever enlarging circles. The white lines show a cross-section view of the wave motion of radio waves in the ether.*

has to be associated with either a coherer, or a crystal detector or a vacuum tube, which has the property of rectifying them and enabling them to produce low-frequency electric or magnetic effects, so that they can deflect a galvanometer or be heard in a telephone.

So far we have dealt with the analogy between the different forms of wave. We must now say a word about their differences.

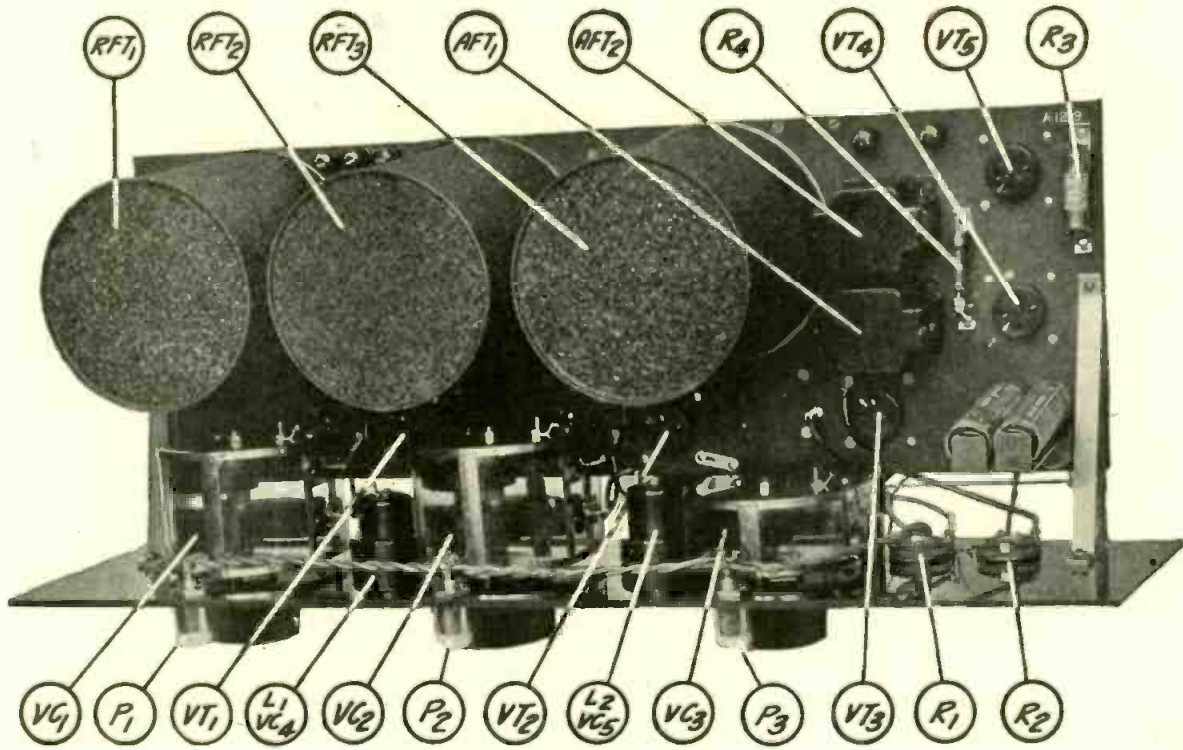
Waves of the sea and ripples occur

only on the surface of a liquid. They are a special though a peculiarly familiar type of wave.

Waves of sound are not really appreciable as waves at all. They consist of compressions and rarefactions of the air, periodic variations of pressure, such as might cause vibrations in a drum-skin or any other flexible instrument susceptible to rapid changes of pressure. Such a drum-skin is provided in the ear, and, by what we must call ingenious mechanism,

is transmuted into forcible though minute vibrations which can affect the endings of the auditory nerve immersed in nutritive fluid. Without air there would be no sound. The waves are conveyed by matter; and the ear is specially contrived to pick up these vibrations from a gaseous medium. Sound can be transmitted by solids and liquids also, but *always* by some form of matter. In that it differs entirely from light.

*(Continued on page 672)*



The Walbert "Isosfarad" Receiver

*This receiver is extremely selective and the reproduction is clear and loud. A novel scheme is employed for neutralizing the radio-frequency vacuum-tube circuits so that they cannot oscillate which gives greater radio-frequency amplification and which is exceptionally stable.*

# Popular Radio Circuits

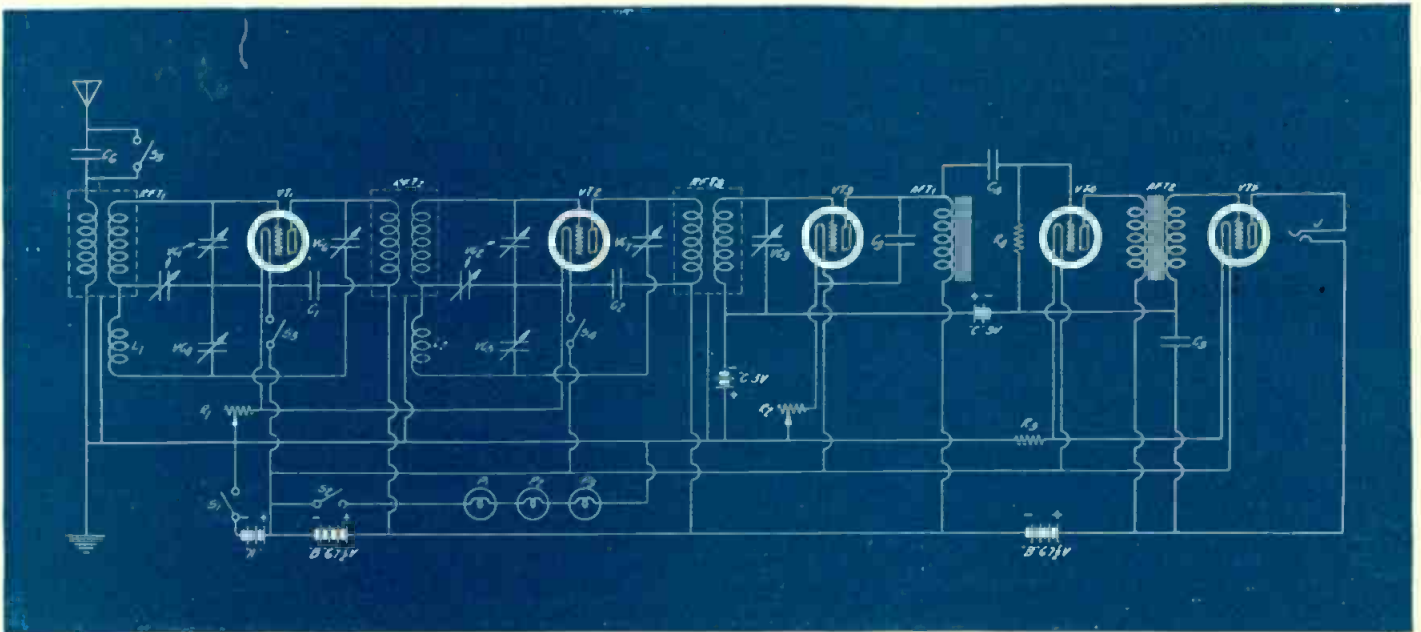
INSTALLMENT NO. 4

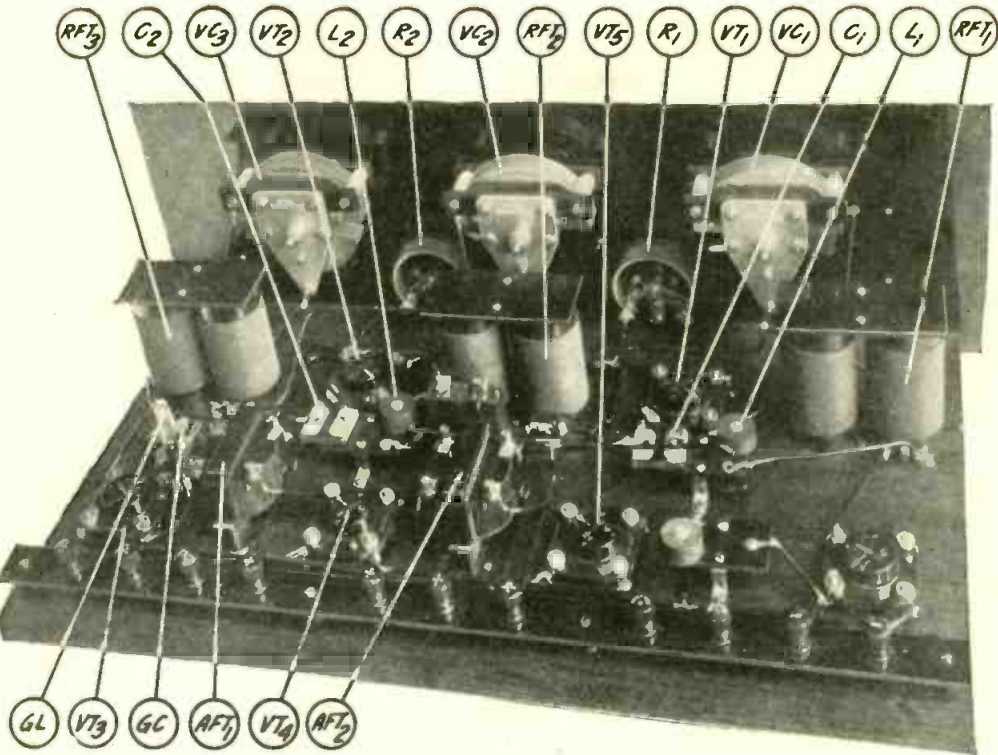
THE PARTS THAT ARE RECOMMENDED FOR USE IN THIS RECEIVER ARE—

RFT1, RFT2 and RFT3—Walbert shielded RF coils;  
 L1 with VC4, L2 with VC5—Walbert RF choke Isodons;  
 AFT1—Thordarson impedance transformer;  
 AFT2—Thordarson audio-frequency transformer;  
 VC1 and VC2—Walbert Isosfarad tuning condensers, type A;  
 VC3—Walbert Isosfarad tuning condenser, type B;  
 VC6 and VC7—Walbert Isodons;

VT1, VT2, VT3, VT4 and VT5—Benjamin sockets;  
 S1, S2, S3 and S4—Walbert lock switches;  
 C1, C2 and C5—Dubilier bypass condensers, .5 mfd.;  
 C3—Dubilier mica condenser, .001 mfd.  
 C4—Dubilier mica condenser, .01 mfd.  
 R1—Carter rheostat, 10 ohms;  
 R2—Carter rheostat, 25 ohms;  
 R3—Brach filament ballast, 1/2 ampere;  
 R4—Electrad grid-leak, .1 megohm;  
 P1, P2 and P3—Walbert Panelites;

Composition panel, 7 inches by 26 inches by 1/8-inch, drilled and engraved;  
 Composition sub-base, 8 inches by 25 inches by 1/8-inch, drilled;  
 Sub-base brackets (2 required);  
 J and S5—binding posts used here;  
 Binding posts, 5 required (includes J and S5);  
 Walbert connecting terminal and battery cable;  
 Walbert "Univernier" condenser dials (3 required).





### The "Dymac Somerlog" Receiver

This receiver features a method of balancing the plate and grid circuits by means of a simple bridge. This provides exceptionally clear reception with a minimum of extraneous noises. An additional stage of neutralized radio-frequency amplification may be added, as shown above, but the selectivity that is obtained with two stages, as shown in the circuit diagram, is sufficient for ordinary use. The audio amplifier is transformer-coupled. Another good addition to this outfit is recommended by the designer and shown above—a .1 mfd. bypass condenser across the "B" battery and a .002 mfd. condenser across the primary terminals of the first audio transformer.

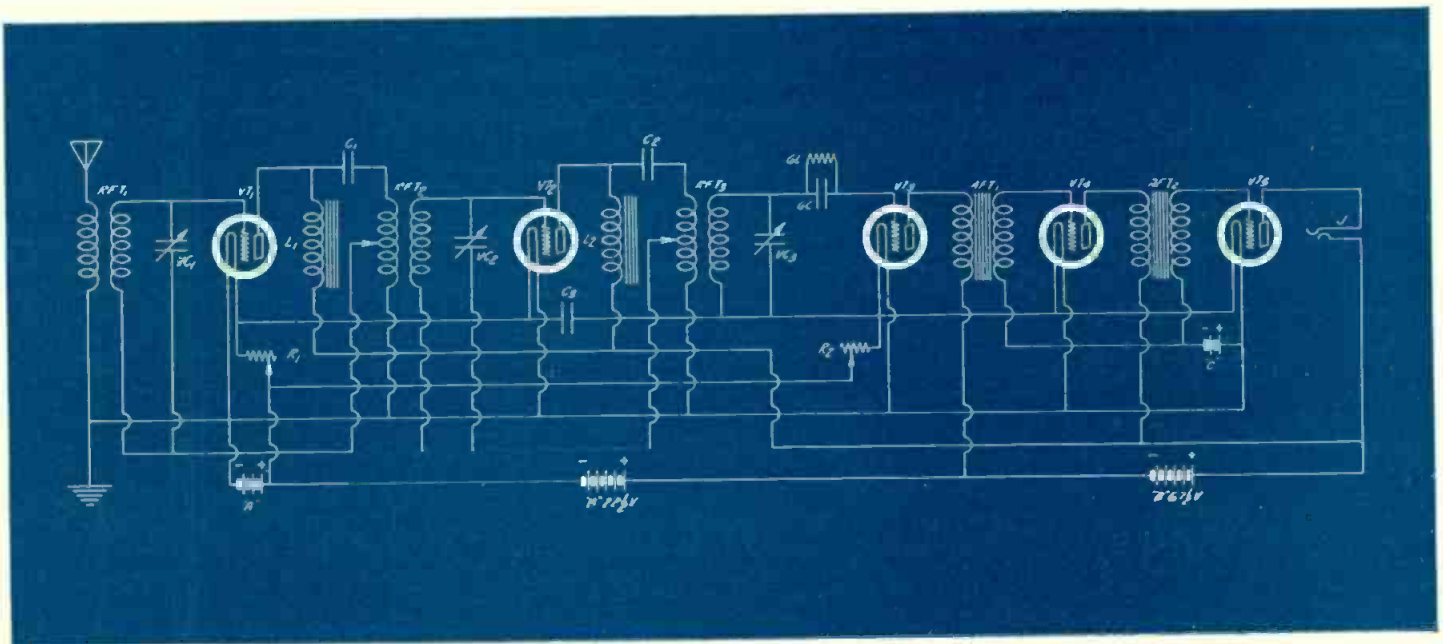
#### THE PARTS THAT ARE RECOMMENDED FOR USE IN THIS RECEIVER ARE—

L1 and L2—Dymac chokes,\*  
 RFT1, RFT2 and RFT3—Dymac radio-frequency coils;\*  
 C1 and C2—Dymac mica balancing condensers;\*  
 C3—Dubilier mica condenser, .006 mfd.;  
 VC1, VC2 and VC3—Dymac variable condensers, .00035 mfd.;  
 R1 and R2—Dymac rheostat, 10 ohms;

GC—Dubilier mica condenser with grid-leak clips, .00025 mfd.;  
 GL—Daven resistor, 2 meg.;  
 AFT1—Splitdorf audio-frequency transformer, ratio 5 to 1;  
 AFT2—Splitdorf audio-frequency transformer, ratio 3 to 1;  
 VT1, VT2, VT3, VT4 and VT5—Benjamin sockets;  
 J—consists of binding posts for speaker

mounted on binding-post strip;  
 11 binding posts;  
 Composition binding-post strip, 1 inch by 21 inches by 1/8-inch;  
 Composition panel, 7 inches by 22 inches by 3/16-inch;  
 Baseboard, 11 inches by 21 inches by 5/8-inch;  
 Kurz-Kasch dials, zero-100 (3 required.)

\*Contained in the Dymac Somerlog Kit.



## HOW TO SELECT YOUR RADIO PARTS

By  
K. B. HUMPHREY

**Q** Practical pointers for the buyer of radio apparatus; how to pick out the best from the assortment placed before you for your choosing

**T**HERE are times when a radio experimenter would like to build a radio receiver of a certain type, yet hesitates because the price of the parts is beyond his means.

While it is always better and safer to buy parts of standard make that are sold by reliable radio retailers, it is by no means possible always to stick to the letter of the diagram, as the question of price is often an important factor.

This article proposes to serve as a guide to the builder who wants to buy at the very minimum price, and who nevertheless wants to feel fairly certain that he will obtain satisfactory results from his purchases. Standard material which is specified in the hook-up may often be obtained at a price considerably below the list if the bargain sales are followed from week to week.

### How to Choose a Coil

In all of the circuits a particular coil is usually specified and a condenser of particular size is designated to go with it.

It happens that in the choice of a coil there are a great many factors which enter in, such as spacing, form, number of turns, and the size. When a receiver is designed one of the most important parts and one that demands probably more attention than any other one

detail is the coil. The spacing between coils of different shapes and sizes is particularly important when any radio-frequency amplification is used in the set. For this reason it is not desirable for the builder to deviate to a great extent in regard to the coil, unless he has had considerable experience in handling various types of coils. In other words, it is not possible to put any kind of a coil in just any sort of position without running into difficulties.

A solenoid has an entirely different shape of field than a spiderweb coil and different methods of spacing must be used. In many cases the turns, size, and other details, are specified in the drawings; in such cases the builder may wind his own coils. If he can do this, the price is considerably reduced.

### How to Select the Variable Condenser

The size of condenser is always specified to go with a given coil and is usually .00035 or .0005 microfarads.

A given coil and condenser always go together in order to produce a resonant circuit which may be varied over the wavelength band in use for broadcasting. Therefore, when a .00035 condenser is specified, the buyer must insist on getting that particular size and none other.

It happens that there are dozens of condensers, a great many good ones, which will fill the bill so far as size goes. In some cases the physical dimensions of the condenser are specified in a given receiver. In such a case the builder will have to find a condenser which is of the proper capacity and which will fit into the rest of the receiver. Practically any standard make of condenser will work as well as any other. Those of incorrect design are gradually getting fewer and fewer, and there is not a great deal of chance of getting one that is entirely inoperative.

Here are a few points which should be looked at when buying variable condenser:

*First:* See that the condenser is built strongly enough to resist any buckling or bending. It is not necessary to use a sledge hammer on it to test it, but it should be rugged enough so that it does not short with the slightest pressure.

*Second:* See that the condenser plates do not touch when the shaft is turned. The alignment of the plates is a very important factor and the spacing should be the same at all positions.

*Third:* See that the shaft turns freely but that there is no shake in it. The slightest movement of the shaft should cause it to be rejected because the

(Continued on page 692)





### HOW A MOVING PICTURE OF A MOVING OBJECT IS TRANSMITTED

*A large opaque disc that carries a series of small lenses mounted in a spiral revolves in front of the object, the image of which is to be sent through the ether. As this disc revolves, each one of the lenses cuts across a thin slice of the object and focuses the light variations on a sensitive cell that changes them into variations of electrical current. As each lens crosses the object a little lower than the previous one, the whole picture is finally strung out into a series of electrical vibrations, so that a whole picture may be transmitted with one revolution of the disc. The circle X shows the portion of the object taken in by each lens and the imaginary slot, Y, shows the path of the lens over the object. Of course, the illustration above greatly exaggerates the thickness of the slot, Y, that is taken in by one lens.*

## THE "TELEVISOR"

On August 9, 1926, the British Postmaster General issued the first transmitting and receiving licenses for radio television stations—thus officially recognizing the experiments of John L. Baird, who has been sending and receiving actual moving scenes between London and Harrow. The Baird apparatus used in these tests is described in this article.

By ORRIN E. DUNLAP, JR.

### *A message from the inventor to the readers of "POPULAR RADIO"*

"We are transmitting from Motograph House on 200 meters, and it is possible that our television transmissions are being received by the U. S. A. amateurs; they are audible as a rhythmic hum something like the sound of an aeroplane. This note changes with every change of scene which is being transmitted, but what will be heard will probably be the sound sent out by the face of Captain Hutchinson, our business director, who is at present the usual performer before the transmitting Televisor. We will be very pleased to hear from anyone who has picked us up on your side of the Atlantic; our call sign is 2TV."

*John L. Baird*

**A**FTER fourteen years of experimenting, John L. Baird, a Scottish inventor and thirty-six year old son of a Presbyterian minister at Helensburgh, near Glasgow, has developed a method

of transmitting pictures of moving objects by radio.

So confident is Baird in his "televisor" that he has recently secured from the British postoffice a license to build a

television broadcasting station, with which he plans to let the public "look-in" as well as listen-in. Reports from London indicate that the televisor will not be offered for public use for at least

another year, owing to the fact that the British Broadcasting Company's concession from the postoffice expires on December 31 after which date it is believed that the postoffice will operate the broadcasting service throughout the British Isles.

The receiving apparatus with which Mr. Baird has given several demonstrations is a box about 3 feet by 2 feet by 1 foot in size, with a hood projecting from one side. Inside this hood is a lens through which the transmitted picture appears. It seems likely that when the television service is inaugurated it will operate in conjunction with the regular broadcasting of entertainment and a loudspeaker will be included inside the receiving hood. Then if King George actuates the microphone it will be possible, by watching the lens inside the hood, to hear and see him simultaneously.

In his laboratory in the West End of London, Mr. Baird has his guests watch the lens covered by a hood in a small theatre he has fitted up on the floor be-

low. One observer who witnessed a demonstration said, "His voice and the picture of his face came through very clearly. The picture was in black and white, his lips could be seen enunciating each word, and the shadows changed with his changing expression."

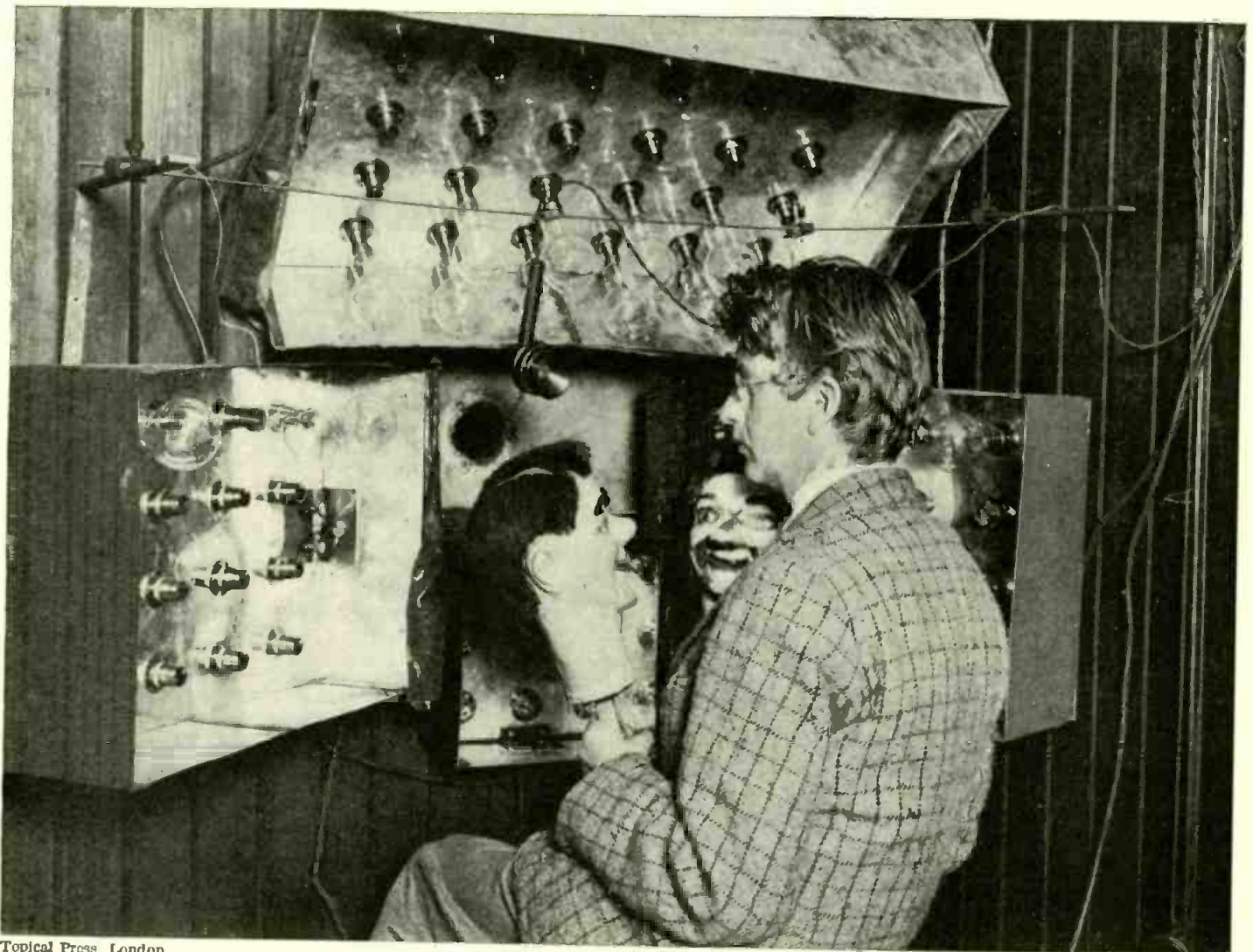
The televisior is designed to transmit to the human eye living and moving pictures at the instant of their occurrence. Baird explained to one group to whom he made a demonstration that his problem has not been only converting light into electric waves at the transmitting end and reconverting the Hertzian waves into light at the receiver, but he has had to find a way to synchronize the converting and reconverting processes and speeding them up so as to give the eye the impression that it is seeing an entire picture instead of a succession of parts.

"Once the synchronizing and speeding up problems have been solved," said Baird, "we can transmit motion pictures to any distance that wires or radio will carry. We can focus the lens of our

transmitter just as a kodak is focused, so that we can send a close-up of a face or a distant view. It is all a matter of speed and synchronization."

The general theory of television is to project a picture onto a cell sensitive to variations in light. The picture is projected in a piecemeal fashion and each tiny area into which the picture is divided causes the photo-electric cell to send out an electric current proportional to the amount of light in its area. Thus the dim parts of the picture are represented by a weak current and the bright parts by a stronger current. At the receiver these currents control a source of light which is projected onto a screen in exact synchronism with the projection of the picture at the broadcasting station, and the process is performed so rapidly that, due to the eye's retention of images, the complete picture appears simultaneously.

The Baird system uses only one photoelectric cell at the transmitting end and he breaks up the picture into  
(Continued on page 668)



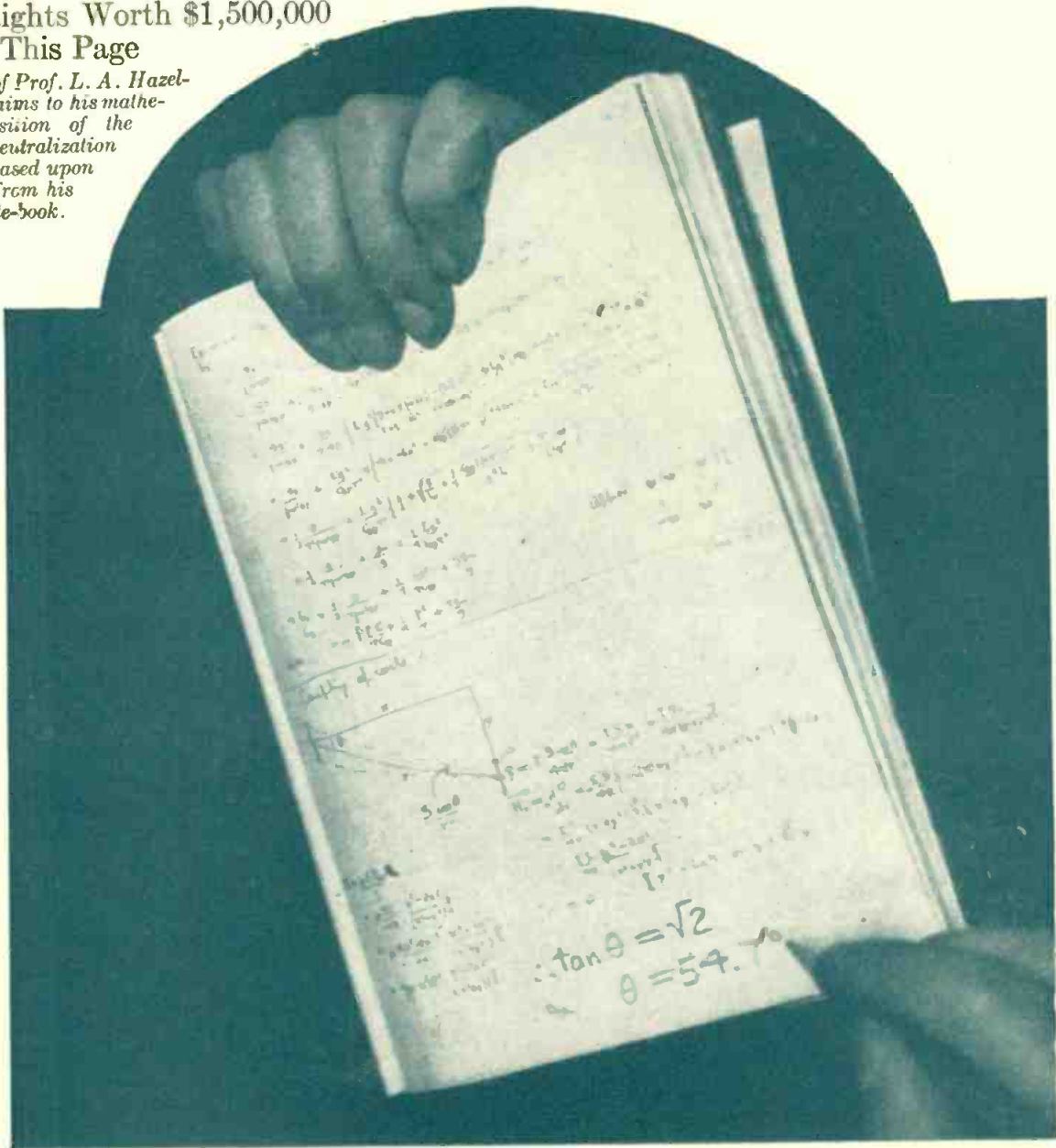
Topical Press, London

#### BEFORE THE FOOTLIGHTS OF THE TELEVISOR TRANSMITTER

The two ventriloquist's dolls, James and Bill—"the first television stars"—are held by Mr. Baird in front of the microphone and the mechanical eye that sees and hears everything that goes on in front of it.

## Patent Rights Worth \$1,500,000 Hung on This Page

The priority of Prof. L. A. Hazeltine's legal claims to his mathematical exposition of the principle of neutralization was largely based upon this notation from his laboratory note-book.



# HOW TO Patent Your Radio Invention

NOTE TO EXPERIMENTERS: *File this article for reference!*

The advice given on this and the following pages would have been worth millions of dollars to inventors—if they had received it before they made the mistakes that prevented them from profiting in full from their labors.

By EDGAR H. FELIX

**W**HEN you experience for the first time the thrill of discovery—the realization that you have invented something, or found a new way of doing something which you believe has never been accomplished before—you are less than normal if you do not speculate how you will spend the fortune which is to be yours.

Your next step is to seek the services of a patent lawyer.

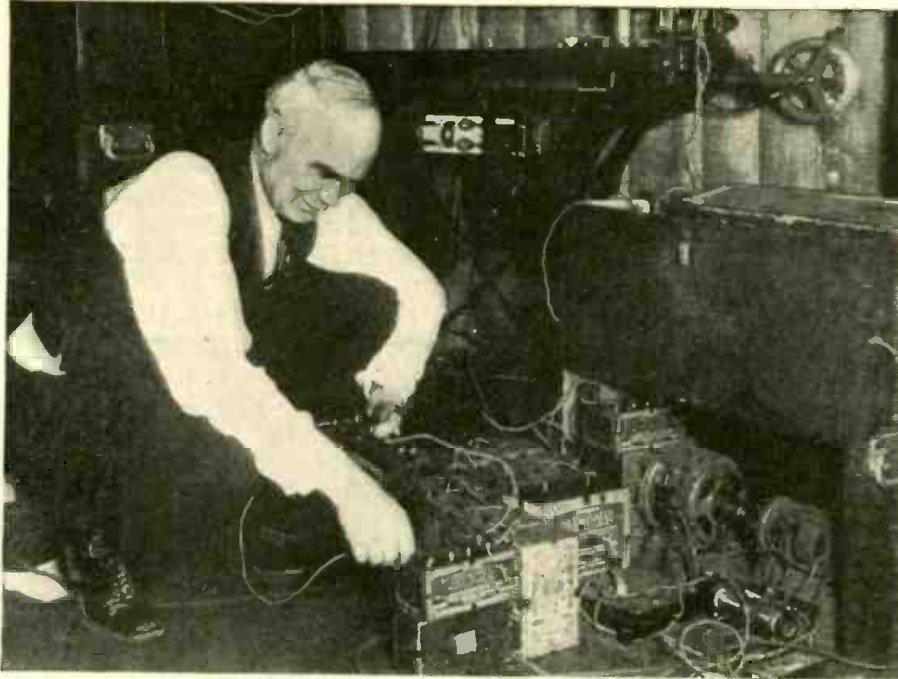
Probably the first lawyer you meet

knows little or nothing about radio. He will listen to your plausible story, assure you that your invention shows considerable promise, and he will encourage you to seek a patent. There may be a number of conferences, a search, the preparation of claims, their amendment and final acceptance. Then, after a lapse of six anxious months, you may receive a prettily printed document, a letters patent certificate, which ultimately takes its place in your safety

deposit vault with worthless oil stock, lapsed insurance policies and other misspent efforts.

At least, this is the experience of most inventors. Two out of three patent applications are rejected by the Patent Office because they fail to meet one or more of its requirements and, of the remaining third, only one out of a hundred, it is estimated, ultimately yields profit to its inventor.

Radio enthusiasts are particularly



### His Patents Have Earned \$500,000,000 for Others Than Himself

*"I have roughly figured up the money which has been paid me as a result of my radio inventions; it totals between \$800,000 and \$1,000,000. This is not a very good showing, I will admit, considering that my patents have easily earned \$500,000,000; however, it is much better than some inventors have secured from their work."*

*Lee de Forest*



### \$3,000,000 Returns in Twenty Years

*"It is rarely that the complicated patents are as remunerative as the simpler ones. Complicated patents, in order to be complete, involve a great deal of experimental work which is costly, and it is only occasionally that a chance experiment will result in a valuable improvement. . . . Regarding the approximation of the returns on my radio devices and patents during the last twenty years, I would say that about \$3,000,000 would be a fair estimate, but at that I have spent probably \$1,500,000 in development and patent expenses."*

*Edwin Howard Armstrong*

subject to the patent mania. There are so many ways of accomplishing a result in radio that an imaginative mind is more than likely to hit upon one now and then.

But a fortune is not yours unless your idea is entirely new, unless it is useful to a great number of people, unless it is patentable and unless it performs its service in a more convenient, economical and efficient manner than other existing devices for accomplishing the same object.

As the odds against the winning of the successful inventor's fortune are so much against you, it is worth while to consider carefully what your chances of making money are, before you seek a patent upon your idea. Answer honestly the following questions:

1. Does the device perform a service so useful that a sufficient number of people will pay enough for it to yield you a substantial profit?
2. Is the service performed by the device a new one, or is it accomplished by your device much more economically, efficiently and satisfactorily than by other existing devices?
3. Is it sufficiently simple of manufacture to permit it to be made in quantity at a profit?
4. Does it fill a need sufficiently obvious to its prospective users that it can be sold to them without excessive advertising and promotion cost?

An affirmative answer to each of these questions determines whether it is worth while to apply for a patent. A negative answer to one or more of these questions means that it is unlikely that you will ever be repaid for the expense to which you have to go to secure a patent. Each presents an essential link in the chain of success, which cannot be disregarded.

Let us suppose, for purposes of illustration, that you have discovered a device which automatically keeps all the stages of a radio-frequency amplifier in resonance, as you adjust a single controlling tuned circuit.

Applying the first question, the device is certainly useful because it would solve the difficult design problems in making a single-control receiver. It would be useful to a large number of people who desire and would pay for efficient, single-control receivers.

To the second question, you know that single-control receivers are already in existence. Even though your device may be a new one, if it does not do its job better than other present day, single-control receivers, it will never make you rich. It must, therefore, possess sufficient merit in these respects to replace existing means of accomplishing this particular purpose.

If the device is very complicated and difficult to make, the high cost of production will prevent it from being extensively applied. This point is brought up in the third question.

The desirability of single-control receivers is widely realized and you therefore may give an affirmative answer on the fourth question.

Assuming that you meet these four premises, you must next determine whether the device itself is patentable. Many conditions must be met to make a device patentable and, even if you are successful in meeting these conditions, you have still to go through the many steps of enlisting financial aid or selling your invention to those in a position to manufacture and market it.

The three principal conditions upon which the issuance of a patent depends are that the device under consideration is, first, an invention, a specific, tangible thing; second, it is a new device; and, third, it has utility.

These conditions are tersely stated in Section 24 of the Rules of Patent Office, which states:

"A patent may be obtained by any person who has invented or discovered any new or useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, not known or used by others in this country or described in any printed publication in this or any foreign country before his invention or discovery thereof, or more than two years prior to his application, and not patented in a country foreign to the United States on an application filed by him or his legal representatives or assigns more than twelve months before his application and not in public use or on sale in the United States for more than two years prior to his application, unless the same is proved to have been abandoned, upon payment of the fees required by law and other due proceedings had."

By "invention" is meant a new article, machine, manufacture or composition of matter, or any new and useful improvement of an existing device.

You cannot patent a superior skill or high grade artisanship in making a thing or a superior material applied to an existing thing or a method of enlarging or strengthening or merely changing or duplicating a part of an accepted article.

You cannot patent a general principle.

For instance, you might have been the first to conceive the idea that the heat of the sun's rays may be converted directly into steam, thus doing away with the use of coal. But you could not obtain a patent on this principle. If, you, on the other hand, were to invent a novel arrangement of mirrors and reflectors for the purpose, you might be able to secure a patent, even though there are scores of other experimental, sunheated boilers in existence.



### He Received \$300,000 from the Sale of His Sodion Patents Alone

*"Up until December of last year I was retained by the Connecticut Telephone & Electric Company and up to that time for a period of approximately ten years all patents secured were assigned to that company. I have no exact information upon the returns which were secured other than a few isolated instances, such as the sale of the sodion patents for \$300,000."*

*H. V. Danks*



Photo Topics, Inc.

### So Far He Has Collected \$1,500,000 on His Radio Inventions

*Mr. Marius Latour, the French radio expert, despite the large sums that he has already received from his radio inventions, has figured extensively in litigation; the famous "Latour patent," which is still pending in the courts, has long been discussed in radio circles, as it purports to grant Mr. Latour patent rights which are said to control most of the multi-tube receivers now in the market.*

You cannot patent a combination of old things in common use, so combined as to perform their old functions.

For instance, the man who attempted to patent the combination of an eraser and a pencil, failed to secure a patent, because this is a combination of old things producing an old result. If, on the other hand, this combination would produce an entirely novel result, such as serving as a barometer or as a new food for fishes or any useful service not performed by them separately, he might have obtained a patent.

The condition that an invention be new to be patentable is also a specification hedged in by many precedents. In a general way, your device must not be used or known prior to your invention of it.

If another has been making and selling the device upon which you desire a patent, without your knowledge, for two years prior to the date you apply for your patent, regardless of the date of invention, you are not entitled to a patent. Your patent may be upset, long after it is actually issued, if it can be shown that it has been manufactured or sold in quantity for more than two years prior to your application.

There is a limitation, however, to the rights of prior inventors. It often happens that somebody else has thought of an idea prior to the time another inventor conceives it. But, if he did not pursue its development with due diligence, by perfecting the idea and by

taking steps to secure a patent, he loses his right to it by abandonment. One who would upset your patent must show that he did more than merely think of your idea before you did. He must have pursued its development with due diligence so far as his circumstances permitted. Patent law allows him two years to take active steps to secure a patent. If he has done nothing about it in that time, somebody else, who did actively pursue it to the patentable stage, is free to obtain patent protection.

Suppose you discover a new type of vacuum tube, built on entirely new principles. As far as your limited funds permit, you continue its development in your home laboratory. You may work on it for five years and, so long as you keep adequate records of your experiments and pursue them with due diligence, your right to secure a patent is firmly established when the idea is sufficiently clarified to draw patent specifications. You are in no sense guilty of abandonment, even though more than two years passed from the time of conception to patent application, because you worked diligently and continuously on the idea. If another inventor, six months before you apply for a patent, gets the idea, develops it and patents it, you are able to upset his patent because you can prove prior conception and because it cannot be shown that you abandoned the idea.

If a description of the device is printed

in any publication in this or any foreign country before your discovery of it, you cannot secure a patent. The object of a patent search, which is made before the application is filed by your patent attorney, is to verify your precedence over other inventors. Patent searches are frequently made for a fee of ten dollars. Naturally, all existing periodicals in all countries of the world cannot be examined for this trifling fee. All you get for this sum is an examination of recent patents under that classification within which your device falls. This uncovers the most likely patents, but it does not protect you against applications already on file but not yet granted.

Another requirement is that the device shall not have been described in publication or book within two years prior to the time at which you make your application, even though this publication is made *after* you originally invented it. You may have conceived your idea in 1921; it may take you five years to perfect it before you can apply for patent, yet, if a description of it is published by another inventor in 1923, you cannot secure a patent in 1926, even though you antedated the other inventor.

The third requirement—that of utility—is a comparatively simple one and its purpose is obvious. For instance, a machine for making ruts in a highway might be very novel and efficient, but it hardly can be considered useful. A patent application for any device contrary and dangerous to the public interest would be thrown out on this ground.

There is much practical advice which can be given to inventors. More important than anything else is the establishment in an unmistakable manner of the date of conception. Many an inventor has been unjustly denied the fruits of his inventive genius because he has not been able to prove that he antedated another. You may work for fifteen years in your laboratory to bring something to perfection but, if you cannot prove that you did so, another who hit upon your idea and applied for a patent a short time before you filed your own application may be able to upset your claim. The first documentary and verifiable evidence of invention which can be produced is called, in legal parlance, "reduction to practice." This is the first time a description of the device and the underlying idea is written out in a notebook or an affidavit, in a manner such that the date of the description may be established.

Professor Louis A. Hazeltine, inventor of the neutrodyne system of reception, when interviewed on the subject

(Continued on page 690)



From a photograph made for POPULAR RADIO

### Just One of His Patents Brought \$1,000,000

*That is the amount that Dr. Reginald Fessenden is reported to have obtained from the sale of his patent covering the basic principle of heterodyning. But in the ten years previous to this, Dr. Fessenden, working with a staff of thirty-five men which were supplied by the company which had been formed to exploit his patents, spent nearly \$2,000,000 in developing new radio devices. He has probably patented more new radio inventions than any other man.*



Harris &amp; Ewing

#### THE INVENTOR SHOWS HOW A WEATHER MAP IS TRANSMITTED

*The original map is shown fastened upon a rotating cylinder which slowly passes every portion of the map before a photo-electric cell, which is contained in the metal case at the left of the cylinder; this sensitive cell changes the variations in light into electrical pulsations which are used to make and break the key circuit of the transmitter.*

## Radio Transmits Weather Maps to Ships

By COMMANDER STANFORD C. HOOPER, U. S. N.

**A**T the present time three-quarters of an hour is required to broadcast the general weather forecast from the Arlington radio station every evening. As the message is repeated, the total actual time required for transmitting the forecast is an hour and a half.

All ships copy the Arlington broadcast weather forecasts for the information and use of navigators, who are thus enabled to change their course as may be advisable. Small vessels, particularly, must avoid storm centers, for the sake of safety.

After the message is received on board a ship it must be deciphered and the result must be plotted, in order that the navigator may visualize possible developments. Unless the navigator has plenty of time and is thorough, he will not take full advantage of the information furnished, as it is a tedious job to

decipher and plot each day's weather map—not to mention the fact that portions of the message are often missed or garbled by the operators.

Now, however, the Navy Department, at the request of the weather Bureau, proposes to do the job in twenty minutes—and to put the results down in black and white—through the medium of actual weather maps transmitted by radio.

The recent tests made in Washington, D. C. employed the radio vision transmitter and receiver invented by Mr. C. F. Jenkins, of Washington, D. C., already described in *POPULAR RADIO*.\*

The method of procedure is this:

The weather map is supplied by the forecaster in the same way that the forecast message is supplied, only the *map* is transmitted instead of the message.

\*August, 1925.

The radio vision transmitter is shown in the illustration on this page; a typical weather map is shown elsewhere in this article.

The map with the temperature and barometer curves is wrapped around the glass cylinder of the apparatus, and in rotation passes before a light sensitive cell, to be changed into electrical pulsations which are used to make and break the key current of the 20 K. W. Arlington radio transmitter on 36 kilocycles.

At the receiving end the operation is equally simple. The Arlington signals are tuned in on the ordinary radio receiver by the receiving operator, and the signals from the receiver are automatically transferred to the radio vision receiving attachment. White paper is wrapped around the cylinder, which in

(Continued on page 698)



From a photograph made for POPULAR RADIO

#### A NEW MODEL WITH A SIMPLIFIED CONTROL

One of the advantages of this new Crosley "5-50" set lies not only in its small and compact size but also in the fact that it may be easily carried about.

## INSIDE INFORMATION ON New Radio Receivers

By S. GORDON TAYLOR

### *Third Installment*

THE CROSLEY "5-50"; THE MURAD "SUPER-SIX"; THE FRESHMAN CONSOLE "6-F-11"

This feature of the magazine is conducted for the information of radio fans who want to know about the newest models of good broadcast receivers—exclusive data was gathered at first hand by the technical staff of this magazine not only from the engineers and inventors who developed the sets but also from tests made in the POPULAR RADIO LABORATORY itself. The receivers that were described in the first two installments of the series are: The Radiola No. 28; the Fada "8"; the Stromberg-Carlson "Treasure Chest"; the Bosch "Amborada"; the Grebe "Synchrophase"; and the Freed-Eisemann "800."

### The New Model Crosley "5-50" Receiver

**I**F you are interested in a new five-tube receiver that combines great selectivity and good volume and tone quality with a reasonable price—consider the newest addition to the Crosley family—the "5-50" Receiver.

Small enough in size to fit nearly anywhere in the room (it is only twenty inches long by twelve inches deep with an overall height of ten inches) the receiver as a whole presents a pleasingly simple appearance.\* It is made up with

\*The same receiver unit that is described in this article may be obtained in the console type of cabinet (Model "5-75"); this will provide ample space for housing all the necessary batteries or power supply units.

a panelled effect in light mahogany with darker borders of the same material.

There is a major tuning control and four sub-controls on the panel; three of these are surrounded by gold-plated metal frames. The main tuning control is placed at the upper right in a convenient position for the right hand; the other four controls are located along the lower edge of the panel.

The receiving unit itself consists of two stages of tuned-radio-frequency amplification, a regenerative detector and two stages of transformer-coupled, audio-frequency amplification.

Tuning is accomplished by means of a single control that operates three variable condensers the shafts of which are

connected together through insulated couplings. With this arrangement the three tuned circuits are kept in resonance throughout the entire broadcasting waveband—enough to permit adequately close tuning of the circuits with the single control on all local and semi-distant stations.

To permit the exact tuning that is required to bring in distant stations, two additional controls, called "acuminators," are provided in the form of small levers on the front of the panel. By means of these two vernier controls, two of the circuits may be brought more exactly into resonance with the third. Once the correct setting of these two

*(Continued on page 678)*



## The Mu-Rad Super-Six Receiver

**T**HE Mu-Rad Super-Six receiver is a real single-control set; this has been amply shown in the POPULAR RADIO tests. There are no auxiliary wavelength tuning controls of any kind and there seems to be no necessity for them.

Aside from the usual requirements for tone quality, sensitivity, volume and selectivity, there has been a steadily growing demand during the past year for receivers of this type. But when a receiver employs two or more stages of radio-frequency amplification (as practically all receivers do these days), an effective single-control arrangement is a difficult objective for the manufacturer to attain. To accomplish this, the values of each of the three or more tuned circuits must be exactly alike to within a fraction of one percent. That is, as the single tuning control is turned it must vary the wavelength of the individual circuits in exactly the same degree. If one of the circuits is off, even slightly, the overall efficiency of the receiver is greatly decreased with a resultant decrease in volume, sensitivity and selectivity.

Many so-called "single control" receivers have auxiliary controls which are used to make up for slight variations in the values of the individual tuned circuits at different settings of the master control knob or dial; these sets, therefore, are not actually single control.

To check up on this point, the Mu-Rad receiver was set up next to a standard laboratory receiver in which all of the circuits are individually tuned. A distant station was then tuned in on the laboratory receiver and adjustment made for maximum volume. Then the same station was tuned in on the Mu-Rad receiver, which was also adjusted for maximum volume. The difference in the volume of the two receivers was then noted. Thereafter several distant stations were tuned in on the two receivers and it was found that the signal strength difference of the two receivers, as noted in the first test was maintained quite closely throughout the entire broadcasting waveband.

This true single-control tuning presents a decided advantage in the ease of operating the receiver. As the wavelength tuning knob is turned, station after station comes in with no fuss or juggling of a number of controls. The extreme selectivity of the Mu-Rad receiver adds to the pleasure of reception because it practically eliminates interference between stations. Powerful stations within fifteen miles may be cut out by a movement of one degree on the dial. With two high powered New York



From a photograph made for POPULAR RADIO

### A NEW SIX-TUBE RECEIVER WITH A SINGLE WAVELENGTH CONTROL

*This new model Mu-Rad Super-Six receiver is extremely selective. All tuning is done by means of the small knob in the center that connects to the tuning condensers; the small controls on each side need be used only to vary the sensitivity of the receiver and the volume of the signals that are received.*

City stations operating on 305 and 315 meters and located 8 miles and 20 miles away from the receiver, no difficulty was encountered in tuning in WPG, Atlantic City, and KDKA, Pittsburgh, without any trace of the local stations. These four stations all came in within a range of three degrees on the tuning scale of the receiver. It takes a receiver with an exceptionally high degree of selectivity to accomplish this feat in this particular location.

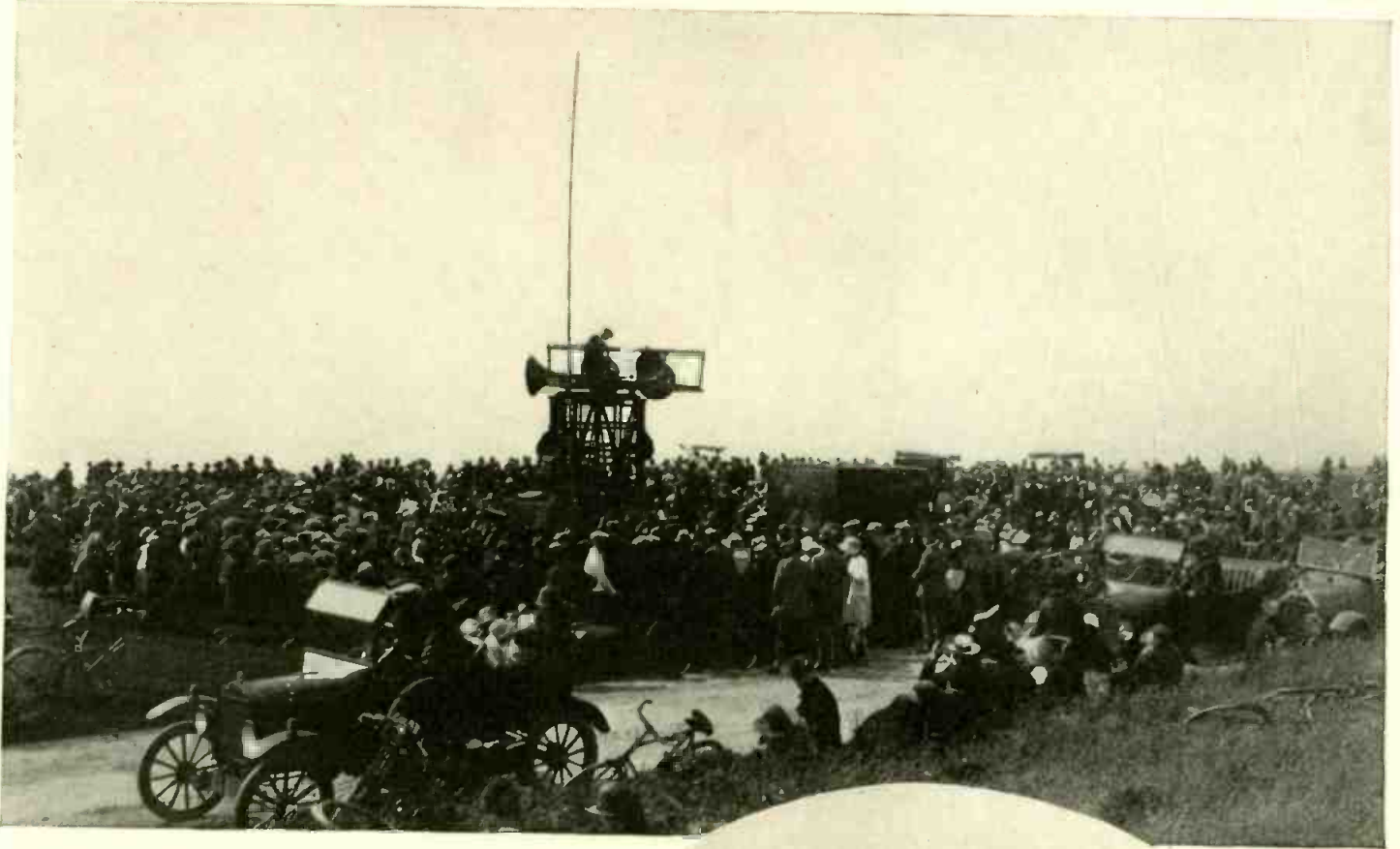
As its name implies, the Mu-Rad Super-Six receiver uses six vacuum tubes and consists of two stages of radio-frequency amplification, detector, and three stages of transformer-coupled, audio-frequency amplification. The input circuits of the first three tubes are tuned by means of variable condensers.

These three condensers are geared to a single shaft which is operated by the master tuning control knob. The gear ratio is approximately 5 to 1 and therefore permits fine adjustment without the inconvenience encountered where the gear ratio is too high.

In order to maintain constant the values of the tuned circuits, the toroidal type coils are sealed in individual composition cases. The variable condensers are also protected by a metal shield to keep dust from lodging between the plates.

The design of the radio-frequency amplifier is such that advantage may be taken of the maximum degree of amplification, obtainable when the circuit is just below the point of oscillation. There

*(Continued on page 681)*



*Eight loudspeakers were mounted on the platform of a motor truck.*

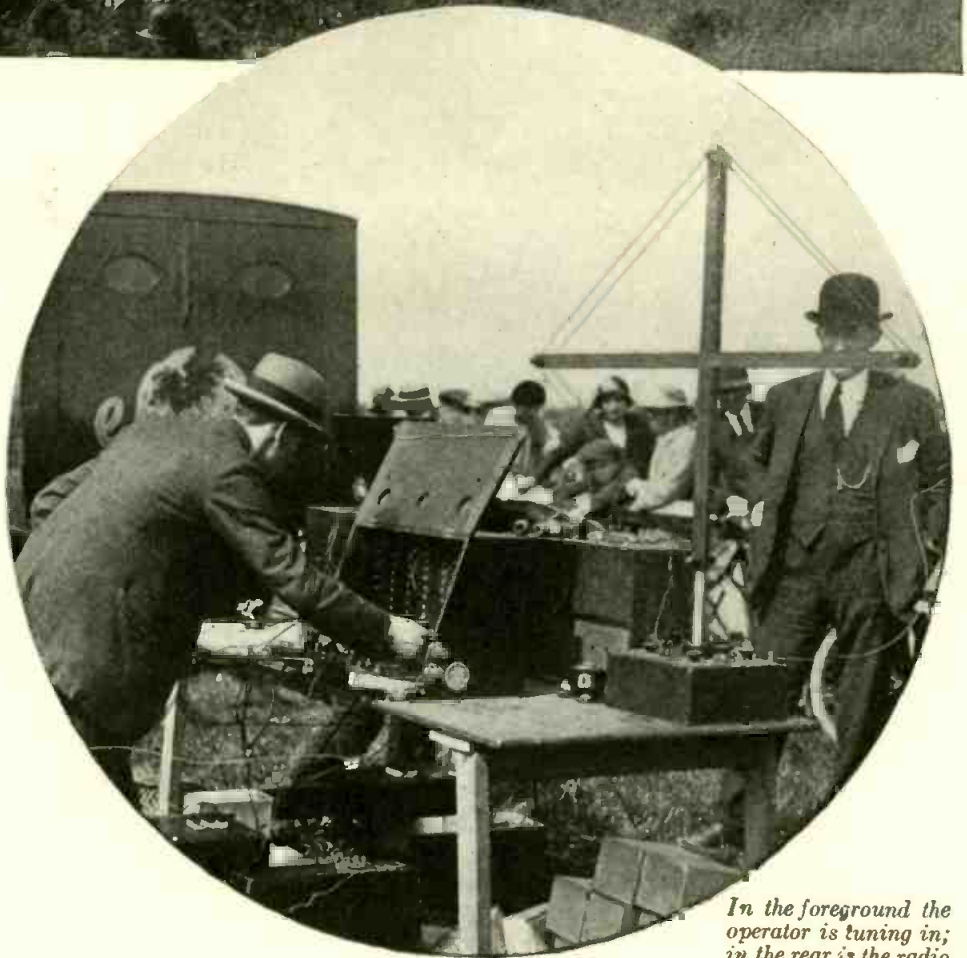
## Recruiting an Army of Fans

By C. A. OLDROYD

**T**O convince country dwellers and people in small towns of England that radio was worth while, the firm of Marconi, England's pioneer radio organization, recently equipped some trucks with radio receivers and loudspeakers and sent them all over the country. Local newspapers gave their arrival advance notices and told their readers when and where the demonstrations would take place; the radio engineers in charge did the rest. They converted the English country dwellers to radio.

Better than words, the pictures on this page will show how the listeners enjoyed their first taste of broadcasting. By thousands the English country folk came—and they applauded and clamored for more as each program feature came to an end. The particular demonstration pictured here took place in the North of England, on the West Coast; just behind the crowd lies the open sea. It would be hard to find a more ideal spot for a broadcast demonstration, especially in fine weather.

To get a sufficient volume of sound, eight loudspeakers were linked up. The horns are shown mounted on the platform of a tramway inspection truck; the



*In the foreground the operator is tuning in; in the rear is the radio truck.*

antenna mast is lashed to the side of the structure.

The circular picture shows the operator tuning in. The small loop in the foreground was used to determine the direction in which the antenna had to be erected to get maximum signal strength. Under the folding trestle

table are the batteries; they are charged by a small generator attached to the motor of the truck. Behind the receiver is the radio truck.

These demonstrations were a great success. People came, listened and—joined the world-wide fraternity of radio fans!

# HOW TO SOLDER

Details that Every  
Experimenter Should  
Know

*How to care for your iron;  
how to tin it and keep it  
clean, and how to use it  
to make good and permanent  
connections.*

By

ROBERT HERTZBERG

OF all the processes that are employed by radio fans in the construction of receiving sets, there is not one more important—and not one less skillfully applied—than the process of soldering.

There are capable experimenters who can assemble any kind of standard set from a single-tube regenerative to an eleven-tube superheterodyne without the aid of wiring diagrams, but who can no more handle a soldering iron than a kindergarten student can handle a machine gun. Their outfits are well-proportioned affairs that show every indication of thoughtful design and placement—and every sign of careless and slovenly soldering. Their connections are either smothered under mounds of solder that may be pried loose with a fingernail or else covered with superficial specks that discolor the wire and do nothing else.

The mere mention of soldering often frightens people out of building their own experimental radio sets, yet the process is ridiculously simple after it is once explained properly. The erroneous impression that soldering is extremely difficult and its mastery requires years of arduous application has gained circulation only because its unsuccessful practitioners have loudly proclaimed its difficulty to excuse their own incompetence.

Every radio fan should know how to solder; he has at least the antenna, ground and battery wires to connect properly.

The first step is to obtain the necessary tools, which are few, simple and inexpensive. They include an electric iron of medium weight and with a small, sharp point; a two-ounce can of non-corrosive soldering paste, or a suitable non-corrosive flux; a roll of soft solder in wire form; and two or three sheets



From a photograph made for POPULAR RADIO

## IT IS EASY—WHEN YOU KNOW HOW

*There is no excuse for the careless and slovenly soldering that mars the appearance of many home-made radio receivers. Far from being a difficult operation, soldering is both simple and enjoyable when the experimenter takes care and pride in his work.*

of medium emery cloth. A good iron made for radio work will cost from \$3.00 to \$5.00 in any radio or hardware store, while the rest of the material will not total more than fifty cents.

*Don't make your first attempt at soldering at the expense of your set.*

Delve into your junk box and select a piece of scrap brass or copper sheet, a few odd lengths of wire and a few soldering lugs such as most binding posts are supplied with. These will serve as the objects for your first experiment; if you ruin them you will lose nothing of value.

Connect the plug attached to the end of the iron wire to the nearest lamp socket. Support the middle of the iron on a small block of wood, and keep the tip clear so that it can not burn anything. Then turn the current on.

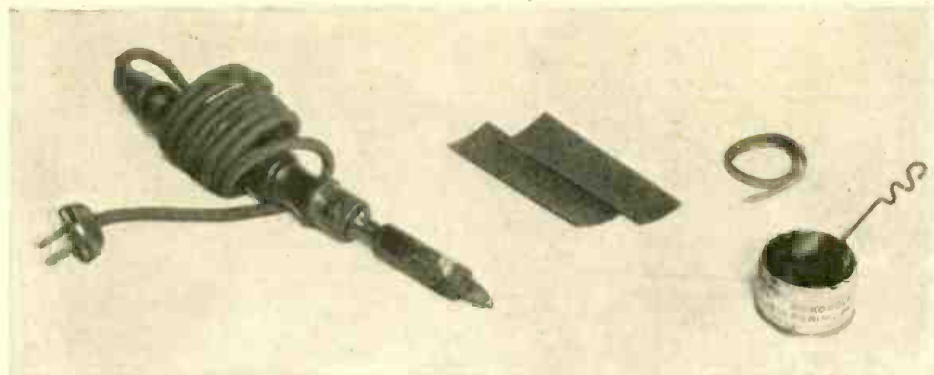
Now there is one watchword in soldering. *Cleanliness.* Everything you work with must be bright and shiny and, above all, free of grease. It is impos-

sible to solder anything that is dirty. Practically every case of poor soldering may be laid to the fact that one of the elements used in the process, either iron, solder, paste or the material itself, was not properly cleaned beforehand.

Take the piece of brass and scrub it with the emery cloth until its surface is bright and clean. It is not necessary to wear off a sixteenth of an inch of the material; merely remove the surface dirt so as to expose the bright metal itself. Then, with the aid of a tooth pick or a match, cover the cleansed section with a very thin film of soldering paste.

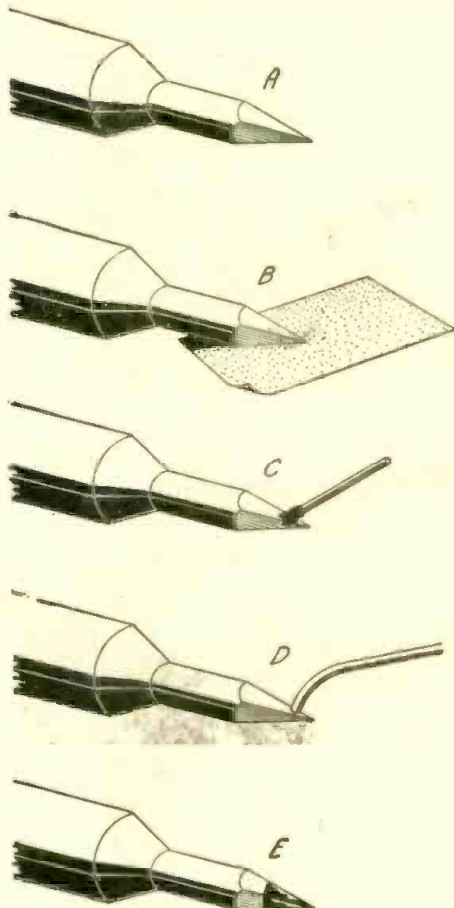
Another point to remember is: use just as little paste as is needed to cover the area to be soldered. This counsel is given in the interests of both economy and efficiency; the thinnest possible layer of paste works fully as well as the thickest slab and gives less consequent trouble from runovers.

Now, look to the iron. To test its



**THESE ARE THE MATERIALS THAT YOU NEED FOR SOLDERING**

FIGURE 1: A good electrical soldering iron, some emery paper, a roll of solder and some soldering paste or fluid constitute all the material equipment for doing a proper job.



**HOW TO PREPARE THE IRON**

FIGURE 2: Clean the tip of the iron, A, up brightly by rubbing it on a piece of emery paper, B, while the iron is hot. Soldering flux, C, should then be applied to the hot point and the iron rubbed with a strip of solder, D, until the whole tip is covered with molten solder as shown at E.

temperature simply touch the end of the roll of solder to the tip. If the solder must be held there for a few seconds before it starts to run, the tool is too cool; if it melts instantly, the iron is ready to be "tinned."

Tinning is a simple treatment which prepares the soldering iron for use. To apply it, determine that the iron is hot enough to melt the solder. Pick up the iron, and rub the faces of its tip on the emery cloth to clean them.

Then dab them quickly with some paste, and, before the latter has a chance to evaporate or burn completely, touch the solder to the tip and let a drop run onto each face. You will find

the tip is now covered with a bright coat of solder. The plating looks like tin. This step requires about ten seconds for its completion.

If the solder does not adhere to the iron, but rolls off instead, you either did not clean the copper sufficiently, or you hesitated too long in applying the solder to the tip after you dabbed on the paste or fluid. Repeat the process, handling the materials a little more deftly, and you will be rewarded with a nice, shiny iron.

As your first task, you are going to make a layer of solder stick to the surface of the piece of brass you have already cleaned. To do this, place one face of the tip of the iron on the paste-covered surface, and at the same time touch the solder to the point. The solder will turn liquid immediately and will flow onto the brass. Keep the iron on the latter for about three seconds, moving the iron to cover the space you want soldered, and then raise it. You will find the brass covered with a coat of

solder you cannot possibly pry loose.

As a second exercise, take a piece of bus bar, scrape it clean, and coat the end with paste. Touch the roll of solder to the iron so that a drop of solder hangs from the point. Press the bus bar to the piece of brass you have just tinned, and touch the iron to the juncture. The solder will flow onto the wire and the brass.

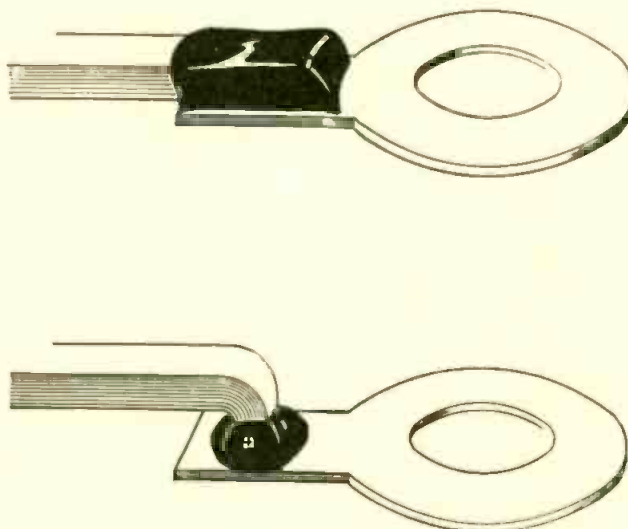
Then remove the iron, but do not release your hold on the wire until you see the bright molten solder shimmer a bit, whiten, and then finally harden. Remove the iron and you will find the wire held in place as firmly as if it were part of the brass sheet.

The ease with which you will do the whole thing the first time will astonish and delight you, and will make you wonder why you ever considered soldering such a toilsome undertaking. You will find yourself fascinated by the art, such as it is, and you will experience a rather unexpected thrill out of it. You may be so enthusiastic that you will carry around samples of your handiwork and exhibit them proudly to all your friends. "I made 'em; great, aren't they?" you will remark.

It all sounds foolish, but it has happened time and again. In the past you've undoubtedly associated soldering with rough looking plumbers and tinsmiths, but once you've tried it yourself, with your own hands, you will boost it as a highly diverting as well as useful pastime.

To develop dexterity with the soldering iron, pick up odd pieces of wire and metal and try soldering them together in various positions. If you remember to keep everything clean, bright and shiny, you will never have a loose joint.

Spare the paste and conserve the  
*(Continued on page 673)*



**TWO WAYS TO SOLDER BUS-BAR TO A TERMINAL LUG**

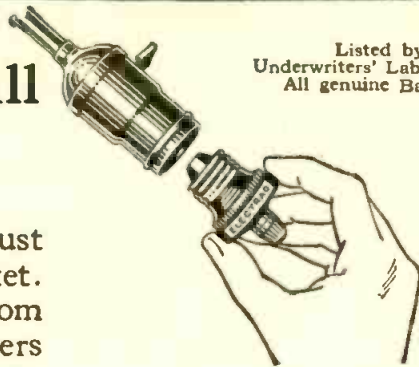
FIGURE 3: In the top drawing the bus bar is left flat on the flap of the soldering lug and soldered firmly in this position. At the bottom, the end of the bus-bar is bent at right angles and pushed through the small hole in the flap of the lug and then soldered fast.

# ELECTRAD

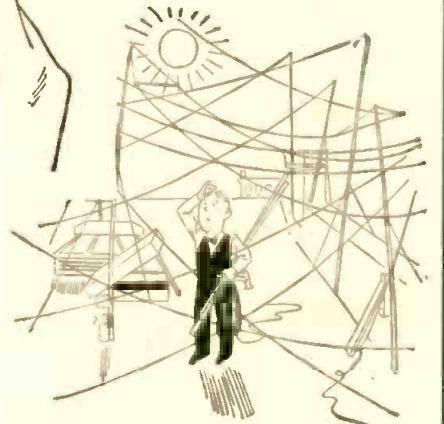
## Just Plug In—That's All No Trouble With This Antenna

**N**O trouble putting up an aerial. Just plug in on any electric light socket. No inconvenience or interference from neighbors' sets and aerials. Also smothers static and helps get distance. Uses no current. Perfectly safe to use. Tested and certified electrically. The simplest, neatest and most efficient on the market.

At all good radio stores, or they can easily get it for you.  
Price 75c., Canada \$1.10.



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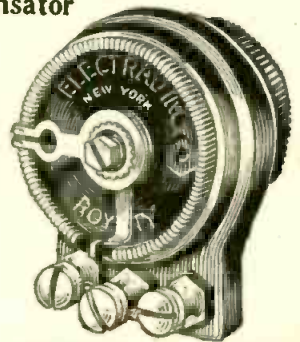


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The remarkable results secured by the use of this perfected device are due to the fact that it controls the output without any distortion or noise, so that pure music is received through the loud speaker. Note these six important features of design and construction:

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- 4—The resistance value is under control in the process of manufacture and does not change in use.
- 5—The entire range of resistance is covered with less than a single turn of the knob.
- 6—There is no mechanical binding and the shaft is turned over the entire range with a perfectly smooth operation.

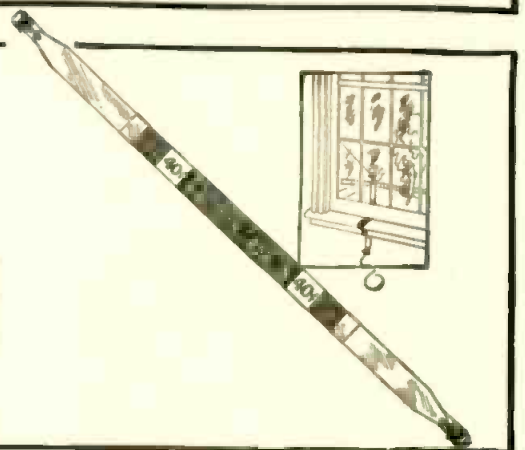
Made in various types for various purposes. Prices, \$1.50 to \$2.00; in Canada, \$2.10 to \$3.00. Write for circular.



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## If You Have An Outdoor Aerial Demand the Genuine ELECTRAD Lead-In

Copied and imitated, but the quality never approached. Triple insulation—full 10 inches long. Fahnestock clips, all connections *riveted* and *soldered*. Fits under locked windows and doors. Bend to any shape. Saves walls, windows and door trim.  
Price 40c, Canada 60c, at all good radio stores.



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.

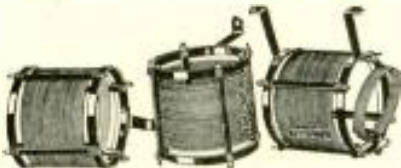


# ELECTRAD Inc.

## Greater Distance Finer Selectivity Greater Power

with

### AERO COIL SUPER-SENSITIVE INDUCTANCE UNITS

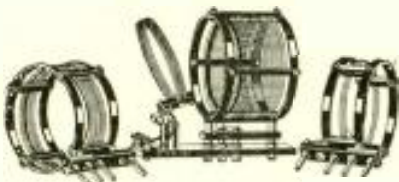


TUNED RADIO FREQUENCY KIT

**\$12.00**

The Aero Coil Tuned Radio Frequency Kit illustrated above will positively improve the performance of any receiver. Patented Aero Coil construction eliminates radio frequency losses and brings tremendous improvement in volume, tone and selectivity.

Kit consists of three matched units. The antenna coupler has variable primary. Uses .00035 condenser. 8 page color circuit, layout and instruction sheet for building the supersensitive 5 tube Aero-Dyne receiver packed FREE with each kit. Extra copies, 75c. each.



LOW WAVE TUNER KIT

**\$12.50**

Completely interchangeable. Adapted by experts and amateurs. Range 15 to 130 meters. Includes three coils and base mounting, covering U. S. bands, 20, 40 and 80 meters. You can increase the range of this short wave tuner by securing coils No. 4 and 5. Combined range of 25 to 150 meters. Both interchangeable coils fit same base supplied with short wave kit and use the same condensers. Coil No. 4 price \$4.00; Coil No. 5, price \$4.00.

These Aero Coils are available at your dealers. Get yours today!

**Aero Products, Inc.**

Dept. 104  
1772 Wilson Ave.  
Chicago, Ill.

## The YES and NO MAN

**HARRY L. H.**—Does *Mrs. Wendell Hall* ever tire of hearing her husband sing to the "little girl back in Chicago?" \* \* \* Well, it is reported that *Mrs. Hall* never listens to her husband.

**CURIOS.**—So you want to know what happened to *Mr. Right* and *Mr. Wrong* the "funny" men who appeared at WJZ. They were being chased through Bryant Park when last seen; according to late reports they are hiding in Hoboken. \* \* \* *Mr. Goldman*, director of the famous Goldman band, is an American and was born in Kentucky.

**LAURENCE D.**—From what university did *Mr. Brokenshire* graduate? Let's see, we think it was the Provident Life and Trust. \* \* \* *Phillips Carlin* is the father of a daughter, now about ten months old.

**GRACE.**—If you want to perform at WMAK write to *I. R. Lounsberry*, Lockport, N. Y., care the Norton Laboratories. \* \* \* Don't worry about "microphone fright," you'll survive it. \* \* \* It is the New York Edison Company that is conducting the "World Tour of Music" from WRNY.

**SOUL MATE.**—Why are you so curious about KDKA'S musical director? His name by the way, is *Victor Saldaneous*. \* \* \* Say, you're rather saucy, aren't you? Just remember we don't have to do this for a living; we could go back to paper hanging.



**GINGER.**—*Tommy Dowd* is not a musician; he assists *Major Bowes* at the Capitol. \* \* \* So you're falling in love with *Quinn Ryan's* voice? Well here's his picture; see if you can fall in love with that!

**F.M.F.**—*Edward Goessling* (KMOX) drives an ambulance for a St. Louis hospital when he is not singing baritone at the studio. \* \* \* Tenors, baritones and sopranos come from every walk of life, you know.

**BUSTER.**—We don't know why *Goldy* and *Dusty* were taken off the air. Perhaps the virus of doubt is beginning to bore into the minds of our national air advertisers.

**ANXIOUS.**—*Harold Sanford* has been directing the WEAF musical comedies. \* \* \* *Joy Sweet* is the contralto. \* \* \* *Mr. Sanford*, by the by, was an associate of the late *Victor Herbert*. \* \* \* To whom would we give the title of the most popular performer on the air? Well, that's a

problem; we would not care to risk an opinion although we know who *should* be the most popular performer on the air.

**M.V.B.**—*The Savoy Bearcats* (WEAF) are colored; perhaps that may help to explain their perfect harmony. \* \* \* *Harry Reser* directs the *Cliquot Eskimos*. \* \* \* *Phil Cook* (WOR) has been directing *Klein's Serenading Shoemakers*. \* \* \* How do we know so much about the performers? Oh, we do a lot of browsing around the studios; we know a lot we won't tell, too!



**B. W. MONTGOMERY.**—*Cynthia Grey* (KOA) is a columnist on the staff of the "Denver Express." \* \* \* You'd give \$5.00 to hear us broadcast? We don't know of a better way to waste your money.

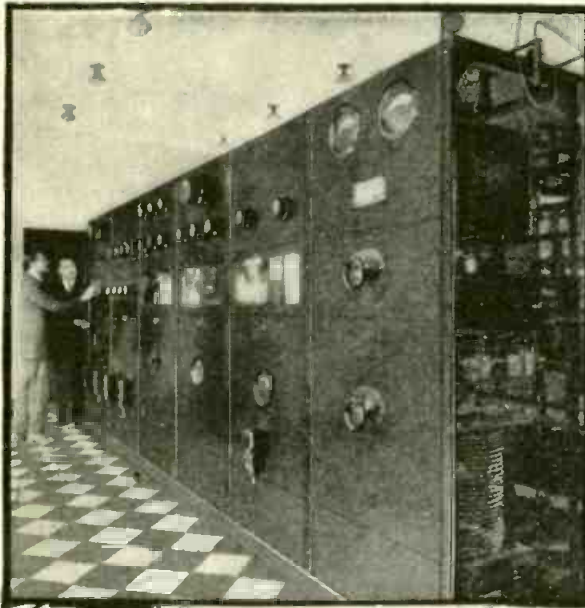
**MR. VAN S.**—If you were a millionaire you'd have your studio, eh? Well, if we were a millionaire we would try to get so far away from broadcasters that it would take \$15.00 in postage to send a post card to the nearest one.

**HARRY AND SAM.**—Why don't they broadcast the noise of the New York Subway for out-of-towners who have never heard it? \* \* \* Not a bad idea; we've heard worse things than that on the air.

**JERRY.**—We never went wild over the "Solemn Old Judge" as an announcer. \* \* \* WLS evidently means "World's Largest Store." \* \* \* We fear that your experience as a train caller would not be of great value to you in announcing; announcers must be articulate, polite, erudite, sanguine, resourceful, keen-witted, musical, virtuous, wise, calm, pleasant, chivalrous, dynamic, pragmatic and frightfully clever. \* \* \* Aside from all of these things, an announcer may be an ordinary human being.

**MERRYWEATHER.**—The \$500.00 radio contest was closed by WGY ages ago. \* \* \* Your play "Slow Horses and Fast Women" should be a wow. \* \* \* We don't know how you'd produce a noise like a man falling down stairs with eleven bottles of beer; if you'd make it a full case, we might be able to help you out.

**CICERO.**—You heard *Raymond Wright* playing from WOR at 2:50 P. M. on Saturday, August 21st; the gentleman was a pupil of *Jean de Reszke*. \* \* \* It was *Ragini Devi* that you heard from WRNY on August 17th; *Miss Devi* was born in Sringar, Cashmere, which is a long, long way from Times Square. \* \* \* *Joe Barnett* (WOR) is not, as you seem to think, an ex-policeman from Newark. \* \* \*



**\$50. to \$250 a week  
IN WORK THAT IS  
ALMOST ROMANCE**

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Get into the great new Big-Pay Industry—Radio. If you're earning a penny less than \$50 a week, clip coupon now. Send for AMAZING FREE BOOK. Be a Radio Expert, and draw down big money for the easiest and most fascinating work in the world. Positions everywhere. Thoroughly trained men are in big demand. Need for Radio Experts in every community. Short hours. BIG PAY. Free book gives all the facts. Astonishing opportunities—thousands of them! Every day N. R. L. trained men are taking good places in the Radio field. Free book tells all about their success. Send for it now!



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All instruments shown here and many others given to students for practice work while learning. Receiving sets, from simplest kind to thousand mile receiver. An UNEQUALLED OFFER. Many other big features for limited time only.

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Without obligating me in any way, send me your free book, "Rich Rewards in Radio," and all information about your practical, home-study Radio course.

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**Operates WMAQ**

"Accepted a position with Chicago Daily News—Station WMAQ. My income practically doubled, thanks to your fine course."  
Keith Kimball, Chicago.



**Gets Big Job**

"Just been made Sales Manager of this Radio concern—a big raise in pay. Regret I did not take course sooner."  
R. E. Jones, Bay City.



**LARGEST RADIO SCHOOL IN THE WORLD**

ORIGINATORS OF RADIO HOME-STUDY TRAINING

# Bradleyohm-E

## PERFECT VARIABLE RESISTOR

Endorsed by  
**PHILCO**



The leading manufacturers of B-eliminators are using Bradleyohm-E for voltage control. The number of Bradleyohms in each B-eliminator varies from one to three depending upon the type of eliminator. In all cases, the Bradleyohm-E is the choice of the experienced radio engineer.

**EVER** since radio broadcasting began, Allen-Bradley Radio Devices have met the demand for silent, stepless current control. Today, Bradleyohm-E, perfect variable resistor, is not only adopted as standard equipment by manufacturers of B-eliminators, but is recommended almost universally by radio engineers and writers as the ideal variable resistor for B-eliminator kits.



For a fixed resistance unit, Bradleyunit-A offers unusual advantages. It is a solid, molded resistor with silver-plated terminal caps that can be soldered without injuring the resistor. Since the Bradleyunit-A contains no glass in its construction and does not depend upon hermetic sealing for accuracy, it is unaffected by temperature, moisture or age.

The scientifically-treated graphite discs used in the Bradleyohm-E provide the only means of stepless, noiseless control which does not deteriorate with age. Carbon or metallic powders of various kinds have been used as substitutes by imitators of the Bradleyohm-E, but without permanent success. If you want a variable resistance unit for your B-eliminator which will give perfect service, be sure to ask your dealer for the Bradleyohm-E which is furnished in several ratings. Look for the Bradleyohm-E in the distinctive Allen-Bradley checkered carton.

Bradleyunit-A and Bradleyohm-E can be obtained from your radio dealer in several ratings. Insist on Allen-Bradley Radio Devices for lasting satisfaction.

ALLEN-BRADLEY CO.



276 Greenfield Avenue

MILWAUKEE

WISCONSIN

**OLIVE.**—You are thinking of *Olle Yettru* the pianist of the WGY orchestra. \* \* \* If you remember *Ditborn* and *Howard* you must be an old timer. \* \* \* Thanks for the kind wishes; we may need them.



**LARRY B.**—If you want to broadcast from WJZ, make arrangements with *Keith McLeod* for an audition; you will find him to be a charming young fellow and his opinion of your work will be honest and sincere.

**SPENSER PEN.**—Write to the publicity Department of WEAJ for that information. \* \* \* How many Irish tenors are on the air? Oh, roughly 171,283; that's just a guess. \* \* \* *Ben Bernie* is Jewish and not Spanish; you're thinking of *Lopez*.

**HAL.**—We don't know what station might want to have you talk about the "Psychology of High Pressure Salesmanship;" you'd never broadcast it from our station, we know that much, but you might try WGBS.

**FRANK B.**—Go ahead and write your play and submit it to either WLW or WGY.



**BENJAMIN.**—*Eunice Hoeffler* and *Eddie Hanson* play the organ at WBBM. \* \* \* We are publishing *Ben Bernie's* picture herewith; we're pretty good natured after all, aren't we?

**JOHN A. M.**—*Josef Bonime* directs the *Edison Ensemble* (WRNY). \* \* \* *Mac-Namee's* book is published and *Heywood Brown* has written a flattering preface for it.

**JOSEPH McCANN.**—*Art Gillham* is the whispering pianist, and records for Columbia; he was once on the staff of WDAP.

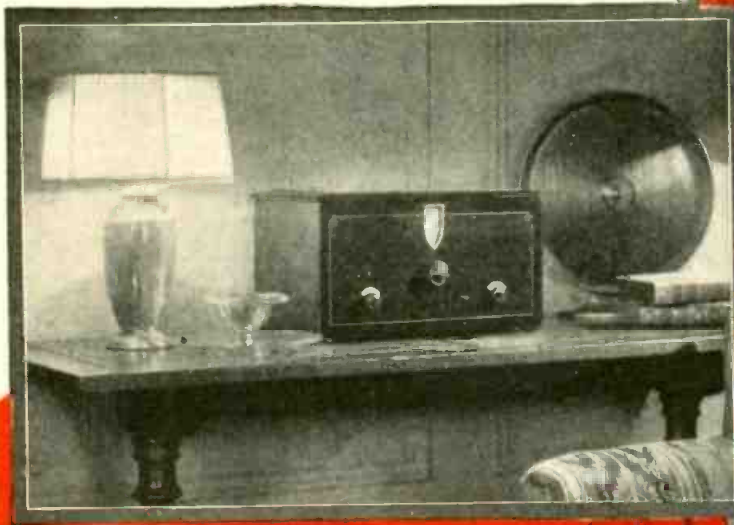
**ALMA.**—Yes, we believe that *Major Bowes* is sincere. He is idolized by the "family," and is an ingratiating employer. \* \* \* We don't know what happened to *Mickey*, the keen-witted whistler of the old gang.

**M.B.**—The publicity man at KMOX, way out there in St. Louis, tells us that *BAM* is a *nom de plume* made up of the names *Byrne A. Marconnier*. \* \* \* Mr. Marconnier is a member of the firm of *Davis Realty and Mortgage Co.* \* \* \* We don't know his age, and besides, you're too inquisitive.

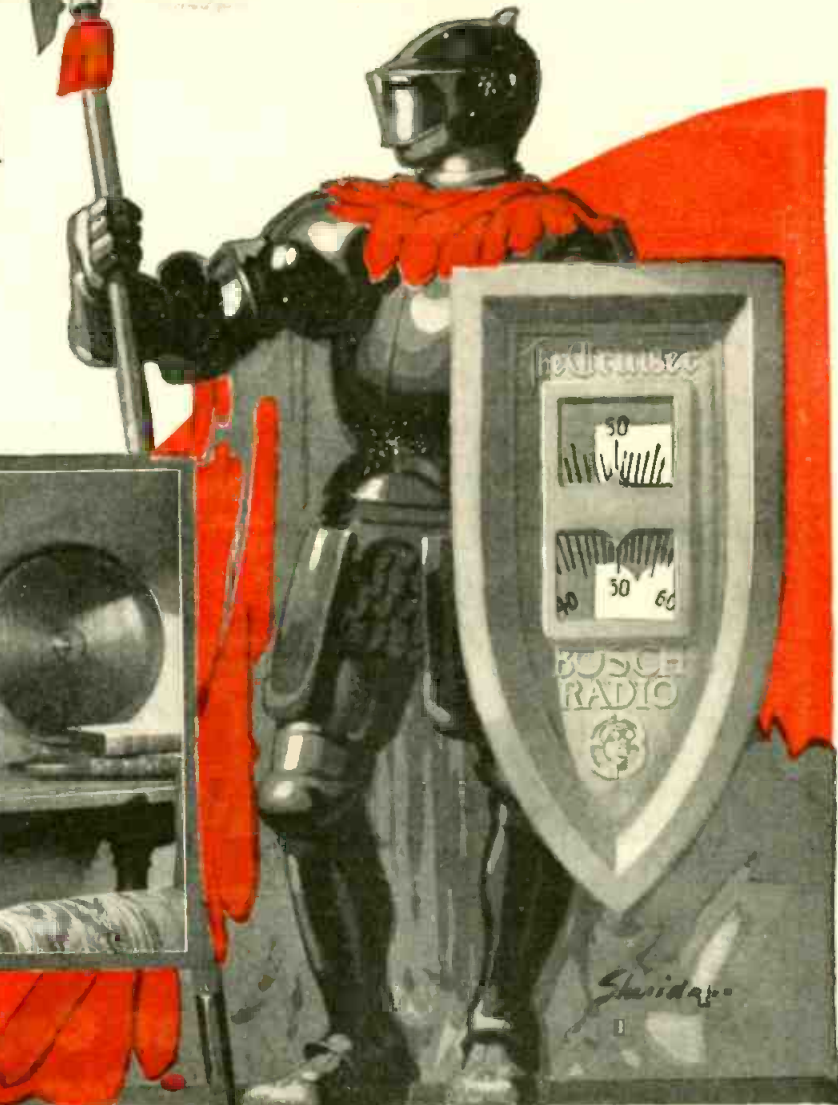


# BOSCH RADIO

## Armored



**THE CRUISER**  
5 tubes - - \$100



Perfect quality reception, tonal range, great power, penetration and simplicity of operation are the owner satisfaction features of the new Bosch Armored and Shielded Radio receivers. The embodiment of perfect radio and quality in furniture is particularly emphasized in the Amborada, a seven tube receiver, completely Armored and Shielded in a manner developed by Bosch engineers. It is controllable with a unified station selector. This receiver is incased in the early American period cabinet illustrated in this announcement.

The Cruiser, is also a perfectly Armored and Shielded receiver, of five tubes. Complete with a control system of remarkable simplicity, one dial station selector for powerful stations and two dial advantages when "Cruising the Air."

To hear Bosch Radio is to realize that another great step toward perfect home entertainment has been accomplished. Look for the Bosch Radio Dealer or write us—we will send you his name.

**AMERICAN BOSCH MAGNETO CORPORATION**  
SPRINGFIELD, MASS. Branches: New York Chicago Detroit San Francisco

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

There are five, six and seven tube receivers in the new Bosch Radio Line. Two cone type reproducers, the famous NoBattery "B" Power Unit and other improved radio necessities.



**THE AMBORADA**  
7 tubes - - - - \$310

All prices slightly higher, Colorado west and in Canada



## Dependable Products

**make your set operate better**

Endorsed and used by leading set builders

### Quality at Popular Prices

*May we send you our complete catalog?*

Write Dept. P. R.

## LESLIE F. MUTER COMPANY

76th & Greenwood Avenue  
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Variable High Resistance



Single Pole Double Throw



Double Pole Double Throw



Triple Pole Double Throw



Five Pole Double Throw



Resistance Amplifier Unit



Fixed Grid Leaks



Resistance Amplifiers



Interference Eliminator



Audio Frequency Transformers



Push-Pull Panel Switch



Automatic Shock-Proof Phone Plug



Fixed Condensers



Fixed Rheostats



Lightning Arrester



Antenna Lead-In Insulator



Adjustable Ground Clamp



Standard Complete Aerial Kit



Variable Condensers

Glad you miss *Hollywood McCosker's* funny stories; do you know his bed time story about the Elk who flirted with the little chicken on Broadway and about the dirty skunk telling his wife about it?

GERTIE.—Yes, *McNamee* was in the movies; these announcer boys certainly are popular. \* \* \* Should you take a correspondence course in singing in preparation for broadcasting? Yes, but don't take it too seriously.

GUNBOAT.—You put yourself down as an old member of the Fraternity when you mention *Vaughn de Leath* "The Original Radio Girl;" she stopped at WOR only a few weeks back. Most of her time is spent in vaudeville. \* \* \* The last we heard, the *Radio Franks* were singing at the Pelham Heath Inn at Pelham, N. Y.

DIMPLES.—No soft-soap, please! *Golly* and *Dusty* have left the air, but the *Happiness Boys* go on forever. \* \* \* Both *Winifred T. Barr* and *Kathleen Stewart* are married. \* \* \* Why don't we tell who we are? Well, why don't we? \* \* \* We don't know what happened to *Anne Pinto*; she certainly did not get rich from broadcasting. \* \* \* Go ahead and send us an apple pie even if we're almost dying with the gout now.



J.H.M.—We cannot say whether or not *John Corigliano* will play again for the Atwater-Kent Hour; we have not had advance information concerning the winter program. \* \* \* Here is Mr. Corigliano's picture for you.

STATIC.—The *Olympic Glee Club* usually broadcasts from KGO, San Francisco. \* \* \* Yes, the "Last Rose of Summer" was included in Flotow's opera "Martha." Thomas Moore, an Irish poet, wrote the words. \* \* \* Why don't we publish our picture? We'd rather be a subject for speculation than an article for condemnation.

TOMMY ROTT.—Please don't write such long letters—and thanks for wishing us a long, hard winter; if you get too fresh we'll have you pinched. \* \* \* *Si Spencer* (WLS) hails from the state of Washington. \* \* \* Imagine! Three pages to ask that question! If you wrote for money, you'd be a millionaire in no time.

SALLY B.—*Major Bowes* lives in an apartment on the sixth floor of the Capitol Theatre building. \* \* \* Now that that's settled what are you going to do?

POLLY BANNA.—*Victor Cockaday*, who sang tenor from WJZ, is the brother of *Laurence M. Cockaday*, the Technical Editor of POPULAR RADIO. \* \* \* So you want to meet us? Well, you can find us any night during the rush hour at the Times Square Station of the I. R. T.

## ACME 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.



### The Original Celatsite

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

### 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.

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

### Stranded Enameled Antenna

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

Send for folder

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

# ACME WIRE

MAKES BETTER RADIO

## Sheet Copper for Shielding

### Shielding

*Prevents* aerial radiation and feedback.

*Insulates* against interference from adjoining circuits.

*Improves* efficiency, selectivity and tone quality.

USE SHEET COPPER because it combines low resistance with easy working qualities.

COPPER & BRASS RESEARCH ASSOCIATION  
25 Broadway — New York

**A Supremely Fine Instrument**  
**No. 78—\$270**



*"The Mayfair"*

**Amazing Selectivity—Delightful Tone—Exceptional Volume!**

**T**WO new home delights! First the joy of a supremely fine bit of furniture craftsmanship—a rarely beautiful console to enhance the beauty of your home.

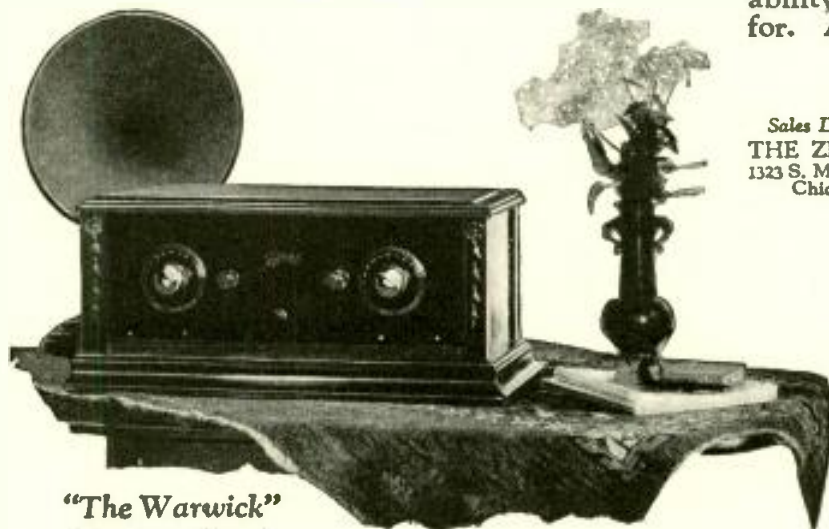
Second the all surpassing joy of true radio entertainment—all the programs of the air brought in with surprising fidelity and beauty of tone. Amazing selectivity that makes radio enjoyable.

The Trinum Circuit makes Oriole Receivers genuinely satisfying in performance. Built with the precision of a fine watch they bring at last to radio that genuine dependability which you have been hoping for. Ask your dealer to show you.



*"The Canterbury"*  
**No. 75—\$150**

This pleasing console model will grace any home. The six-tube, two dial Oriole Receiver will bring new joy to Radio for you.



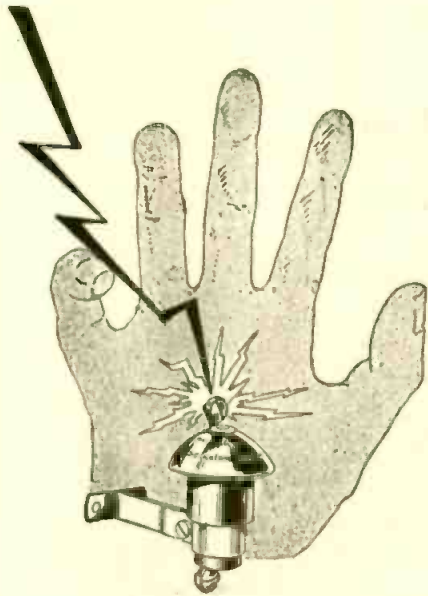
*"The Warwick"*  
**No. 71—\$125**

A table model of exceptional grace and truly unusual power. Everything that radio can give, at a price in reach of all.

Sales Department  
**THE ZINKE CO.**  
 1323 S. Michigan Ave.  
 Chicago, Ill.

Manufactured by  
**W-K ELECTRIC CO.,**  
 Kenosha, Wis.

**ORIOLE**  
**RADIO**  
**RECEIVERS**  
 with the Trinum  
 Circuit



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

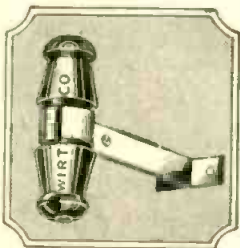
The National Board of Fire Underwriters specify that an approved Radio Lightning Arrester must be used with all out-door aerial installations.

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 Insulator . . . . . .35**

SOLD BY LEADING RADIO DEALERS

**WIRT COMPANY**  
 PHILADELPHIA, PENNSYLVANIA  
 Makers of Dim-A-Lite

The "Televisor"  
 (Continued from page 650)



Topical Press, London

**THE PICTURE THAT THE OBSERVER ACTUALLY SEES**  
 This scene inside of the receiving studio shows how the radioed living picture appears; the operator is holding the two dolls on his lap in much the same manner as in the illustration on page 650. A loud-speaker located within the cabinet reproduces the voices at the same time.

"areas" by means of lenses set in a whirling disk. It is the function of the lenses in the disk to focus the "areas" of the picture, one by one, onto the photoelectric cell, and when the disk has been whirled once around every "area," the picture has been focused consecutively onto the cell.

The photoelectric cell is connected through vacuum tubes and other electrical instruments to the transmitter and when the apparatus is actually broadcasting the ether wave is continually modulated to convey the strength of the light from successive areas of the picture. At the receiving end is a source of light the intensity of which is controlled by the transmitted wave. This light is moved as a spot across a screen by means of a slot and rotating spiral and is moved so as to follow the beam which comes through the whirling disk onto the photoelectric cell at the sending station. This produces the picture traced out in light and shaded portions at the receiver with sufficient speed so that the whole picture is seen. To the human eye it seems as if the entire picture was transmitted simultaneously, but, in reality it is projected bit by bit.

When a still picture is broadcast the transmitting disk whirls only once but when the picture of a moving object is to be radiated the disk is kept whirling and the successive pictures are traced out at the receiver. If the picture is to appear as a whole at the receiving end its last "area" must be flashed into space before its first "area" has had a chance to fade from the eye and this means that the complete picture must be broadcast in less than a tenth of a second.

Baird explains that it is simple enough to transmit the "areas" but the "area" of an entire face must be flashed within a tenth of a second if the eyes at the receiver are to retain an image of the picture. For example, if it requires as much as half a second to send a picture of a face by the time the photoelectric cell is transmitting the light values of the chin the eyes watching the screen at the receiver will have lost the light values of the hair, and the result will be that, although the radio apparatus itself may be perfect, the eyes at the receiving end will retain no image.

Radio having given the eye of the receiver one complete picture in a tenth of a second, can give it another com-

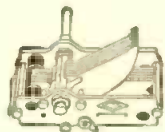
# AMSCO

## FOR EXCELLENCE

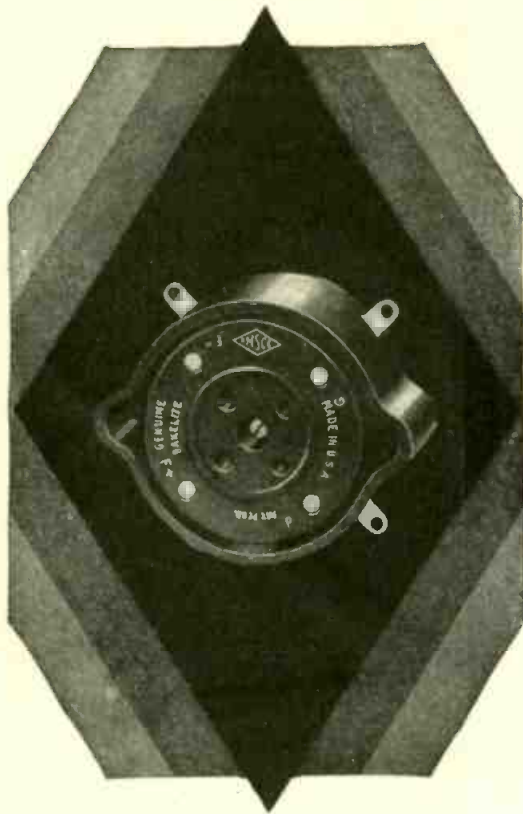


### FILATROL

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.



AMSCO ALLOCATING CONDENSERS "spread" the stations with engineering precision. Made single, siamese, three-gang and four-gang.



### 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.



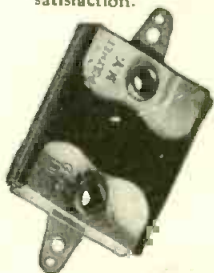
AMSCO METALOID GRID GATES AND RESISTORS are uniquely silent, due to a perfected colloidal Metaloid resistance element. Ask your dealer.



# RESULTS!

## Make Sure They Reflect Your Ability

The better the condensers you employ, the better your construction job. Polymet fixed mica and high voltage condensers are built to help YOU attain the perfect results which give complete satisfaction.



### Poly Fixed Mica Condensers

Genuine Bakelite housing. One-piece lugs mean perfect contact and make soldering easy and quick. Individually tested. Capacities stamped, guaranteed accurate.

.00015 to .01 Mfd.  
25c to \$1.00

### Poly High Voltage Condensers

Guaranteed 1000 V. Breakdown Test!

Incorporate finest insulating paper, best foil and specially prepared impregnating compounds. Non-inductive. High dielectric resistance for long life. Individual units or blocks—fixed terminals or flexible leads—in cans or unmounted.

.1 to 5. Mfd.  
60c to \$4.50



### Raytheon Circuit Condensers

Polymet's special Raytheon Block Condensers have passed the Raytheon Company's Laboratory tests with high rating. Use them for best results.

Type F 1000, 14 Mfd. \$9.50  
Type F 1001, .1-C-.1 \$2.00

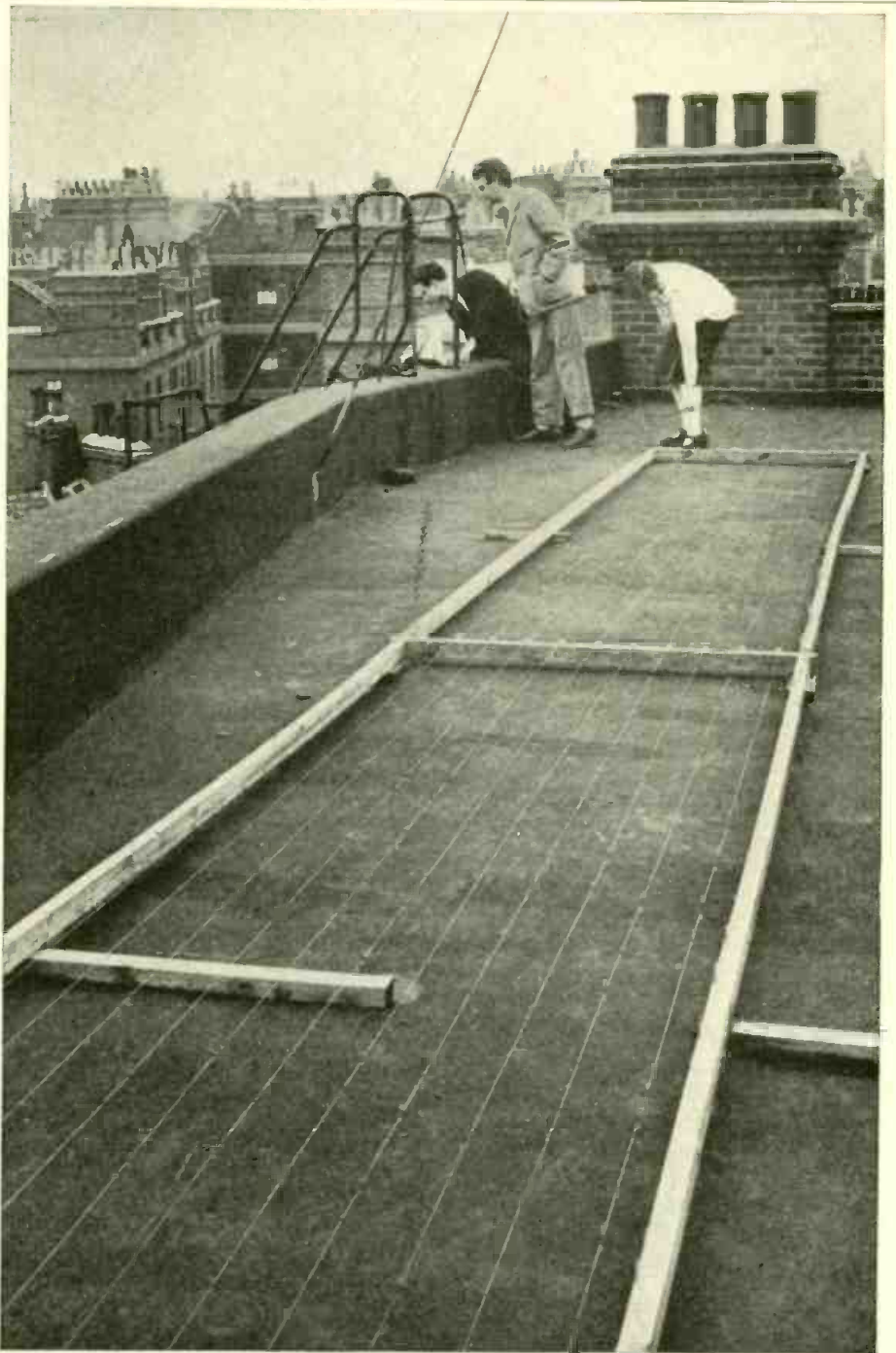


Over 125 receiver and power unit manufacturers specify Polymet Products as standard equipment. **THEY KNOW!** Follow the lead of the manufacturers—specify Polymet Condensers. At good dealers everywhere.

Write today for illustrated descriptions of all Polymet Products. Sent FREE on request.

**Polymet Manufacturing Corporation**  
599-C Broadway New York City  
"World's Largest Manufacturers of Radio Essentials"

# POLYMET PRODUCTS



Topical Press, London

## ERECTING THE ANTENNA ON THE WORLD'S FIRST TELEVISION BROADCASTING STATION

The large counterpoise that lies flat on the roof is a part of the antenna circuit for Baird's pioneer station in London for transmitting moving pictures by radio.

plete picture in the next tenth second by merely keeping the disk whirling at the transmitter. This is the ordinary moving picture principle and, as everybody is aware, motion pictures consist of an extremely rapid succession of still pictures. To transmit a motion pic-

ture of an object two inches square it is necessary to flash at least ten complete pictures of it every second, and by the most conservative estimate this requires approximately 25,000 light dots a second. This is what the Scottish inventor's machine is designed to do.

## WANTED—A Radio Humorist

Why does one kind of humor "get over" to the radio audience while another kind falls flat? What peculiar quality must a humorist have to prove successful before the microphone? For the answer, read Homer Croy's article in the next number of POPULAR RADIO—for December.



# No tears in these tunes!

Unless, perchance, they're tears of joy. For there's only unalloyed pleasure in a set kept at its lively best with a Rectigon. Your batteries are charged with ease and convenience. But more than solid comfort—there's no costly grief. You'll shed no agonizing tears because of spoiled furnishings, ruined clothes. You can do your charging wherever you wish. There's nothing in a Rectigon to spill or burn. No acids, no chemicals—and no moving parts.

when you do your own charging 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.



**Saves its cost in short order**—Count the dollars spent in a few trips to the service station and you'll hotfoot it for a Rectigon, for the good it does your pocketbook as well as your batteries.



**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.)



**Perfect safety for your set**—If you tune in while you're charging there'll be no harm either to set or batteries. Nor will batteries be discharged if anything happens to the current while your Rectigon's attached.



*No Storage Battery Radio  
is Complete  
Without a Rectigon*



THE RECTIGON'S 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 also manufactures a complete line of radio instruments, and Micarta panels and tubes.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.

Tune in on KDKA - KYW - WBZ - KFKX

# Radio Time is Here!



## Don't Wait!

### Put up your Beldenamel Aerial — this week!

DO you know that a clean, bright aerial wire gets louder volume and longer distance than a corroded, soot-covered aerial? The corroded, tarnished surface of a bare copper aerial wire interferes very seriously with the flow of radio frequency currents from the antenna to the set. That is why the shiny, smooth wires of a Beldenamel Aerial are protected with baked enamel.



If you install a Beldenamel Aerial, now, you will be through with aerial troubles for years to come. Smoke, fumes, and weather cannot affect the Beldenamel coating on a Beldenamel Aerial. That is why so many old, bare copper aerials are being replaced with Beldenamel Aerials.

Ask your nearest dealer to show you a Beldenamel Aerial. It is sold in a distinctive striped black-and-orange carton that protects you against substitutes.



The Belden Superadio Antenna Kit contains a Beldenamel Aerial and other high grade aerial and ground parts.

**BELDEN MANUFACTURING COMPANY**  
2316A South Western Avenue Chicago, Illinois

## Waves and Wavelengths

(Continued from page 645)

The air is no assistance to light: it can travel perfectly well in a vacuum. Air, and aqueous particles suspended in the air, are obstructive to light rather than helpful. We are screened from the full blaze of the sun by the atmosphere. We could not stand the undiluted glare. And if we ascend a high mountain, so that half the atmosphere is below us, we find the light very trying, not only to the eyes, but to the skin: we get first bronzed and then blistered. And even so, we are still screened by the upper half of the atmosphere.

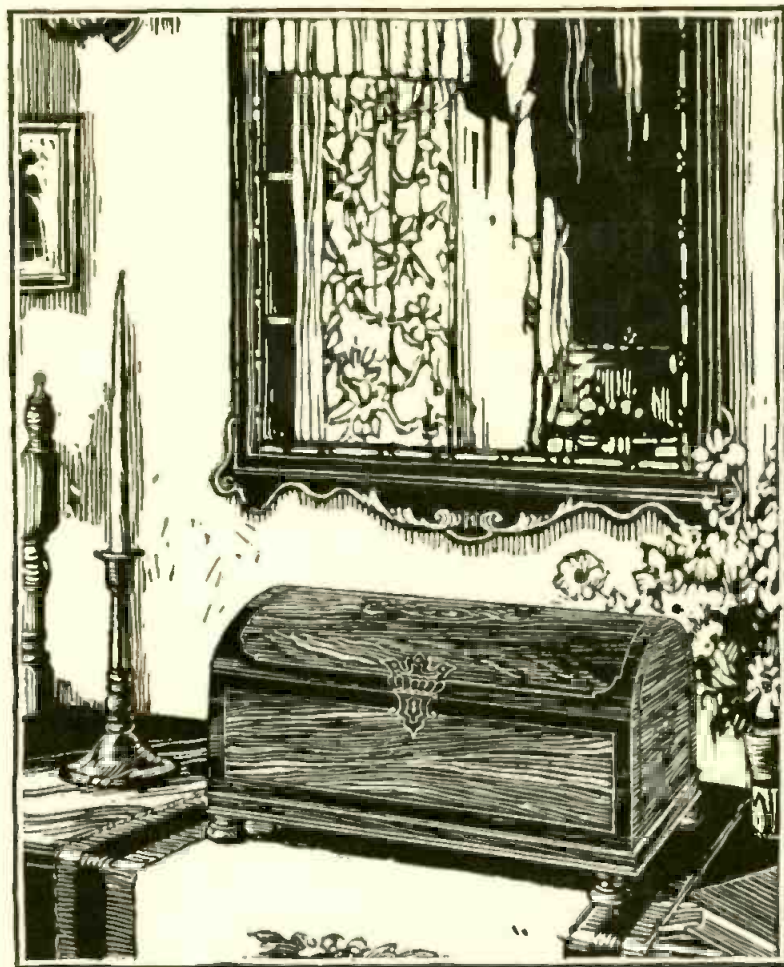
If light is not conveyed, then, but rather obstructed by matter—which is liable to absorb and quench it and turn it into heat—if it is able to travel quite freely and unobstructively through vacuum, what is there in that vacuum to convey it? There clearly must be something; we cannot imagine vibrations in empty space. We have every reason to know that space is not empty, but is filled with a subtle impalpable medium, which used to be called the luminiferous ether, that is to say, a substance which had the power of conveying light. This fact was known more than a century ago, but since then many other functions of the ether have been discovered, especially those associated with the terms electricity and magnetism.

But we have no sense organ for their appreciation; we can only investigate those things by instruments. And we have thus learned that what we call "light" is not a material but an electrical vibration, and that the ether is able to transmit every kind of vibration at the same rate, a rate which has been measured, and amounts to about 186,000 miles a second.

Sound waves travel at a comparatively slow pace, taking about five seconds to cover a mile; so that if we hear the thunder five seconds after the flash, we know that the flash is a mile away. If we hear the noise of the thunder ten seconds after, it is two miles away; and so on. But we see the flash practically instantaneously, though not quite. The light of the moon takes 1¼ seconds to reach the earth; the light of the sun takes eight minutes; the light of the nearest star about five years. How long the light has taken from the the furthest star, no one knows; nor whether there is a "furthest" star. But clusters of stars are known of which the light that we now see started on its long journey 30,000 years ago.

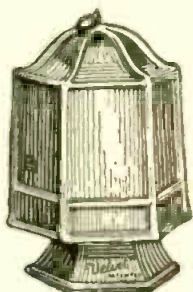
The rate at which light travels carries it a distance equal to seven times round the world in a second. A thread wrapped nine times round the world, and then stretched out straight, would reach to the moon, and 1¼ seconds is the time taken to cover that distance.





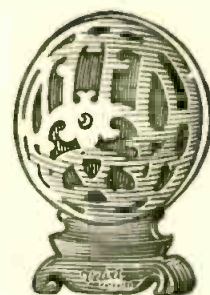
# Velvet Radio Speakers

No. 21  
"The  
Jewel  
Case"  
\$45



No. 9  
"The Lantern"  
\$12.50

Such quaint charm to please the eye — and rare power to please the ear! Full and faithful tone recreations of beauty. Priced low.



No. 18 ---\$27.50  
"The Chinese Cone-Flex"

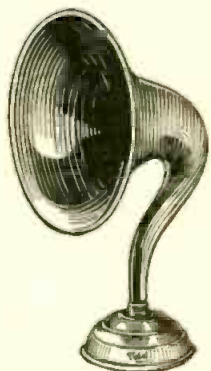
## "Just as if you were there!"

# The Ultimate in Radio Recreation

THE trappings of laboratory are gone. In its rich, quiet beauty, the Velvet "Jewel Case" Speaker is at peace in company with your richest furnishings—a rarely precious possession for any home.

For it is not merely beautiful. It is living Radio Recreation itself when it brings in the full round tones of the whole orchestration. Tonal beauty that matches its outward delightful dignity. You must hear it—see it—to fully appreciate the long step ahead which Velvet brings to Radio.

Dealer-Jobber Franchise sales plan unusual—write or wire for details. It will bring you new satisfaction in selling Radio.



No. 12--\$16.00  
No. 15--\$23.50

Borkmanite Horn—  
Velvet Double  
Stylus Unit

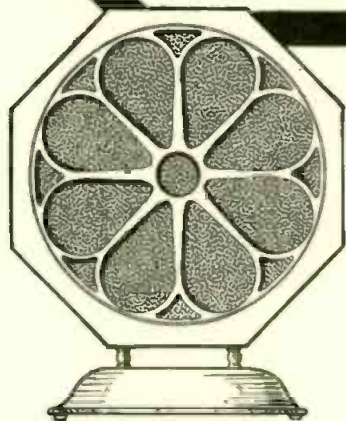
Sales Department  
**THE ZINKE CO.**  
1323 S. Michigan Ave.  
Chicago, Ill.

Manufactured by  
**THE BORKMAN RADIO CORP.**  
Salt Lake City, Utah  
Kalamazoo, Mich.

## With Rare Beauty, Volume, Power!

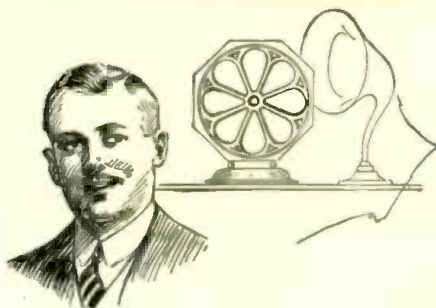


Try This! and you'll realize  
the Importance  
of your SPEAKER



\$19<sup>50</sup>

We ask you to make this test for your own benefit before you select any speaker—regardless of price. Walk into your dealer and ask him to connect one of his good receivers with any three speakers, including Octacone—and just for the sake of comparison be sure that the other two are *expensive* instruments.



Then turn your back on the apparatus as he plugs in each speaker. Notice the difference in their tones—especially on the very high and the very low notes. Watch for *naturalness* in reproduction. If you do you'll walk off with an Octacone at only \$19.50!

Octacone is built just like the human ear. Its diaphragm is shaped just like the human ear. Its apex is slightly off center just as it is in the Tympanic Membrane or ear drum. It vibrates to sound exactly as the human ear. And don't forget this—Octacone's handsome metal cone-case will resist the roughest treatment and even though you drop it on a cement floor it will not be injured in the least!

Octacone is licensed under Frank E. Miller patent numbers 1,190,787; 1,220,669; 1,294,137. Other patents pending.

{ Send for interesting booklet, "It's Almost Human". If your dealer doesn't carry the Pausin Octacone write to Department F. }

Pausin Engineering Company  
727 Frelinghuysen Ave., Newark, N. J.

OCTACONE  
PAUSIN

This is the rate at which radio waves travel; for they too travel through the ether, and consequently reach every part of the earth that they reach at all in a minute fraction of a second.

So that when it is said that a speaker whose utterance is being broadcast can be heard by the listeners-in before his voice and the other people at the back of the same hall as he himself is in, the statement is quite true, and would be true even if the listener-in were thousands of miles away.

In contrasting sound waves with water waves, we realize that the motions are different and that the rapidity of vibration is different too. The up-and-down motion on the sea may take several seconds to complete each period. The vibrations of an ordinary voice may be two or three hundred a second; or for a soprano might run up to almost a thousand or so. Indeed the highest squeak that is audible is estimated at between 20,000 to 40,000 a second. But radio oscillations are much more rapid than that, unless the sending-station is a gigantic one emitting waves several miles in length. The most usual waves employed in broadcasting are from 200 to 600 meters, let us say, about 400 meters, or about a quarter of a mile; and the antenna at such a station has to vibrate electrically 750,000 times a second. No form of matter is able to transmit waves at this rate. We are dependent wholly on the properties of the ether for *all optical and radio phenomena*. And were it not for the fact that the speed of transmission for every length of wave—whether they be twelve miles or the millionth of an inch in length—is accurately the same, there would be great confusion, and the transmission of radio telephonic speech would be impossible.

The question must now be asked, if waves on water and waves of sound, though both conveyed by matter, differ so entirely in their details—one being a heave up and down, while the other is a to-and-fro compression—what sort of motion is it which occurs in the ether, and what kind of waves are light waves?

The answer at present is that we do not precisely know. We know that they are not like water-waves, nor are they like sound-waves. They are purely electric or electromagnetic.

There is something in the structure of the ether which enables it to transmit these peculiar waves; but what the structure of the ether is has not yet been worked out. The remarkable thing is that these electric or ether waves, even if very intense—and they may easily be emitted with the strength of some horsepower—do not affect any of our senses, and do not appear to affect the human organism at all. We can live in the midst of them and know nothing about them. As a matter of fact we are living in the midst of them now, and we can only de-



**"How To Build It"  
Book**

Complete instructions for assembling, wiring and operating the Hammarlund-Roberts Hi-Q Receiver. Prepared under the direction of the Engineer-designers.

25c

**\$63.05**

**Complete Parts  
(less cabinet)**

*Automatic Variable Coupling*, same control operates tuning condenser and primary coil coupling simultaneously, gives maximum and equal amplification and selectivity over entire tuning range.

*Stage Shielding*—prevents coupling between stages, eliminating oscillation and increasing selectivity. Clarifies reception.

**Hi-Q Foundation Unit**



Includes drilled and engraved Micarta Panel, drilled Micarta sub-panel, two complete shields, extension shaft, two equalizers, fixed resistance, hardware, wire, nuts and screws.

**\$10.50**

**Associate Manufacturers**

Carter Radio Co.  
Martin-Copeland Co.  
Radiall Company  
Samson Electric Co.  
Sangamo Electric Co.  
Benjamin Electric Mfg. Co.  
Eby Manufacturing Co.  
Hammarlund Mfg. Co.  
Durham Resistors  
Westinghouse Micarta

## Hammarlund-Roberts Performance Means A New Measure For All Radio

**T**HE Hammarlund-Roberts Hi-Q is an outstanding example of scientific radio engineering. No ordinary standards of tone, selectivity or volume, can be applied to this new receiver.

In designing this Hi-Q Receiver, the Hammarlund-Roberts Board of Engineers representing twelve nationally known manufacturers, had at their disposal the finest experimental laboratories—and no handicap in building to establish specifications or to a set price.

This concentration of the leaders in the perfection of one radio Receiver has developed entirely new features that produce results unknown to the average radio man. Automatic variable coupling gives maximum and equal amplification and selectivity over the entire tuning range. Stage shielding eliminates coupling between stages, prevents oscillation and increases selectivity. Two dial control simplifies tuning.

ANYONE CAN BUILD THE HAMMARLUND-ROBERTS Hi-Q

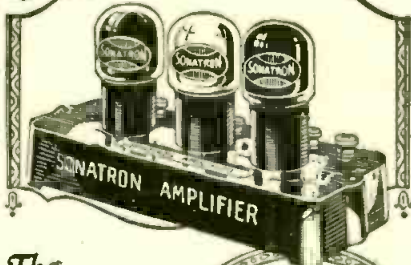
All the research, the selection of parts, the exact placing of units, has been worked out in advance for you. And you have a receiver that will equal an eight tube set—simplicity of design and operation hitherto unthought of—all at less than half the price you would pay for a factory made set of anywhere near equal efficiency.

**Hammarlund  
ROBERTS  
Hi-Q\***

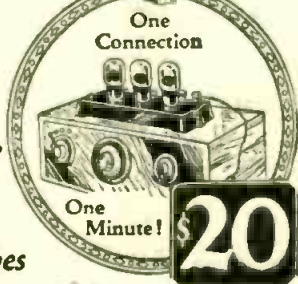
\* High ratio of reactance to resistance. High ratio—Great selectivity—Loud signals.

**Hammarlund-Roberts • 1182-B Broadway : New York**

# New!



The  
Sonatron  
Amplifier  
with 3  
Red, White  
and Blue  
Matched  
Power Tubes



**\$20**

## The Newest Product

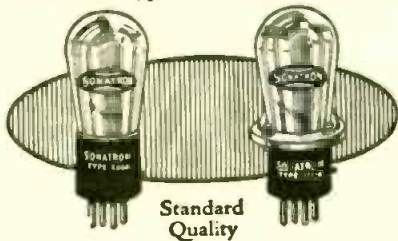
of the manufacturers  
of the largest line  
of RADIO TUBES in the world!

**T**O ADD 3 stages of amplification to any set, take one minute to make one single connection with the most amazing of all radio improvements—the Sonatron Amplifier! It will give you a new conception of tonal purity, and bring in distant stations with real volume and absolutely no distortion. Identify it by its Red, White and Blue tubes. See it at your dealer's—or write the nearest Sonatron branch.

*May even be used on crystal sets.  
Also furnished for dry cell sets.*

**Sonatron type 200-A**  
— Power Detector  
Replaces the old style 201-A and 200 and doubles volume and distance. One of Sonatron's 25 distinct tube types.

**Sonatron type 171-A**  
— Power Amplifier  
Replaces any 201-A without re-wiring. Used in last audio stage, its low impedance matches loud speaker, eliminating distortion.



Sonatron offers 25 distinct types of radio tubes—the largest line in the world! And each tube is carefully adapted to the particular work it is intended for—that means amazing results—a new standard of reception! Your dealer has the Sonatron line or get in touch with the nearest Sonatron branch.



fect their presence if we provide ourselves with a suitable "medium" for their detection, that is, a suitable receiving instrument.

Then we find that we are immersed in speech and music and Morse code, without the least knowledge on the part of ordinary humanity. Only the enlightened experimenter or listener has learned how to receive these ethereal pulsations, and interpret them in the way intended by the sender.

There may be many other things in the Universe of which we are equally unconscious, and until our eyes are opened, figuratively, or until we are provided with the necessary receiver, we may live and die in complete ignorance of many of the things that are going on round us all the time.

## How to Solder

(Continued from page 660)

solder, but don't skimp on the heat. A lukewarm iron is worse than useless. On the other hand, don't allow the copper to become red hot, for it is impossible to solder with a red hot iron. If you don't believe this, try it some time. You will see the solder roll right off the tip, and all the paste in the world won't make it stick.

Now, when you start work on your set, you will find the soldering the least troublesome of the mechanical details. In fact, you will distinctly enjoy handling the iron, for as it cements each wire in place it puts you just so much nearer the completion of the outfit.

Perhaps you are curious about the function of the paste or flux in the soldering operation. As most soldering directions are strangely silent on this detail, it is explained briefly here.

When a high heat is applied to an ordinary metal like copper or iron, the material reacts chemically with the oxygen that forms part of the air, and as a result its surface is covered with a thin film of a new substance, known as an "oxide" of that metal. Rusting of steel and iron constitutes a common form of this action. If it is desired to join two metals together through the agency of heat, this film must be destroyed, otherwise it would prevent the molten cohesive agent from attaching itself directly to the surfaces of the metals.

It is therefore necessary to introduce into the operation a substance which is capable of absorbing the film and rendering it harmless as quickly as it forms. In soldering, the paste, or more properly the "flux," is what accomplishes this devitalization.

The viscosity of the paste or fluid itself is no factor in the binding practice. The soldering flux serves only to remove the harmful film of oxide. As a matter of fact there are as many liquid fluxes as there are pastes.

# The 2 Biggest Bargains Famous HARKNESS Kits Better than Ever

**Harkness 3-tube Kit.** Most extraordinary outfit of its size made. Equals any ordinary 5-tube set. A wizard for distance. Unexcelled in tone quality. Complete parts  
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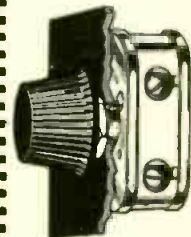
*Send for latest complete price sheet of radio bargains and free book showing all the famous Harkness circuits.*

## THE RADIO GUILD Inc.

243 Market St., Newark, N. J.

# Bradleystat

PERFECT FILAMENT CONTROL



Provides complete noiseless filament control for all radio tubes without change of connections. Metal parts are nickel plated. One hole mounting. Self contained switch opens battery circuit when desired.

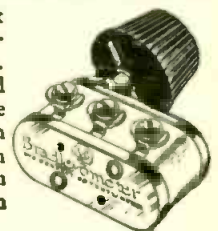
**Allen-Bradley Co.**

Electric Controlling Apparatus  
276 Greenfield Avenue Milwaukee, Wis.

# Bradleyometer

THE PERFECT POTENTIOMETER

Uses graphite disc resistors which are noiseless and not affected by atmospheric conditions. Metal parts are nickel plated. One hole mounting. Finish and knob match Bradleystat. Made in 200 and 400 ohm ratings.



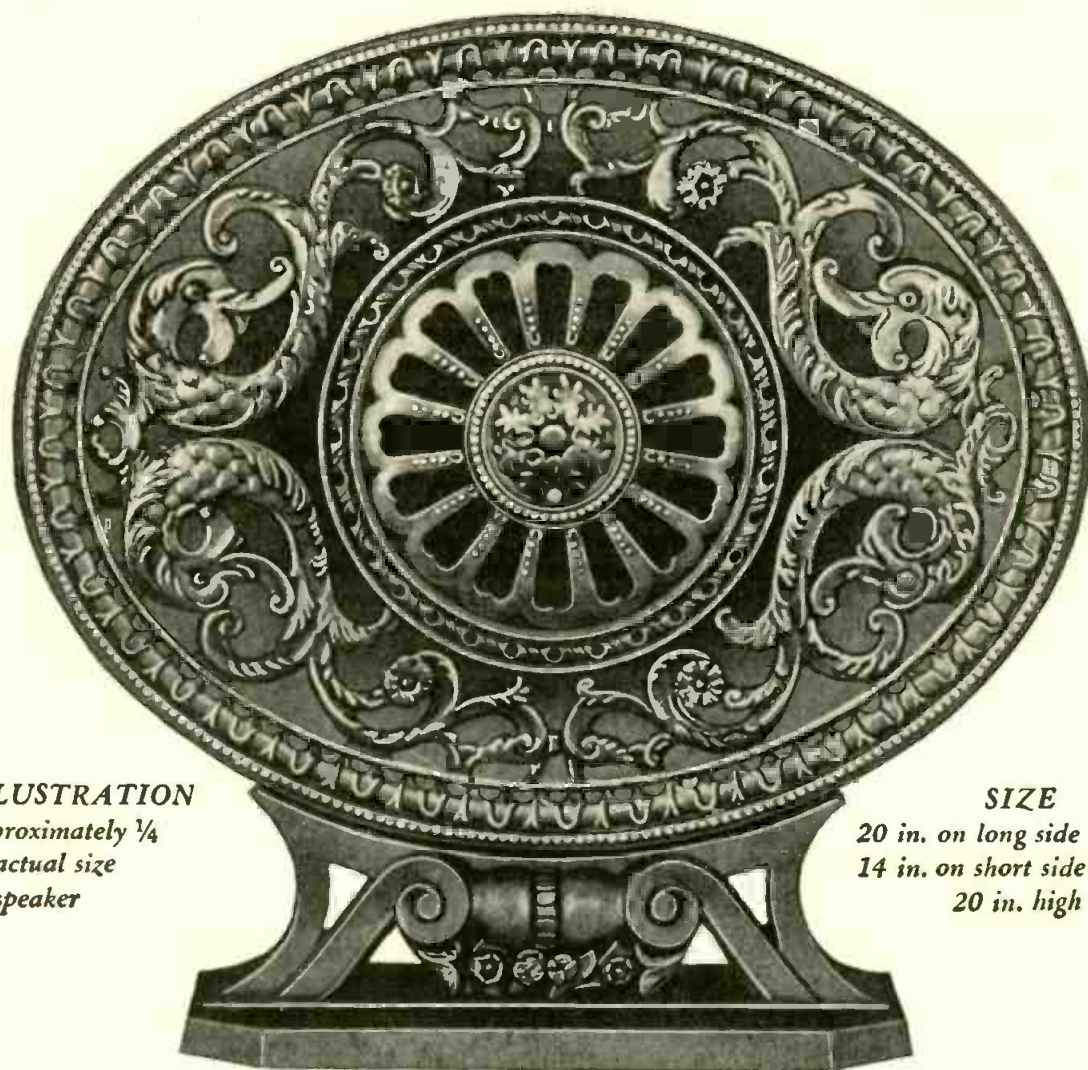
**Allen-Bradley Co.**

Electric Controlling Apparatus  
276 Greenfield Avenue Milwaukee, Wis.

Now a **BALANCED** Cone Speaker!

**R. F. I. BALANCED**

**OVAL CONE SPEAKER**



**ILLUSTRATION**  
approximately  $\frac{1}{4}$   
of actual size  
of speaker

**SIZE**  
20 in. on long side of oval  
14 in. on short side of oval  
20 in. high

AT LAST all the high notes and all the low notes! A small cone gives high notes only. In a large cone, low notes predominate. In the R. F. I. *Balanced Oval Cone Speaker* the long side of the oval stresses the low notes and the short side stresses the high notes, and the two give a *complete balance*. Wonderful volume, clear tone, and all mechanical parts hidden. The insistent demand for more beauty in radio loud speakers is met by the R. F. I. Oval. It is a pure Renaissance reproduction, designed by A. Kimball & Son, New York. Free of all patent infringements, licensed under all the Lektophone patents. Old Gold or Statuary Bronze.

*Price \$25.00 - West of the Rockies \$26.50.  
Supplied on Approval by your Dealer.*

**Mr. Jobber or Mr. Dealer: Write or Wire for Agency**

**RADIO FOUNDATION INCORPORATED**  
25 WEST BROADWAY . . . . . NEW YORK

SM

630



## SHIELDED SIX

The Shielded Six is one of the highest types of broadcast receivers. It embodies complete shielding of all radio frequency and detector circuits. The quality of reproduction is real—true to the ear.

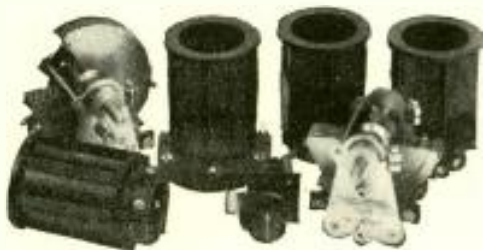
Behind the Shielded Six is competent engineering. It is sensitive. Day in and day out it will get distance—on the speaker. It is selective. Local stations in the most crowded areas separate completely—yet there are but two dials to tune.

These features—its all-metal chassis and panel, its ease of assembly, and many others—put it in the small class of ultra fine factory built sets, priced at several times the Six's cost.

The SM-630 Shielded Six Kit—including all specified matched and measured parts to build this remarkable receiver—price \$95.00.

The 633 Essential Kit—contains 4 condensers, 4 R.F. transformers, 4 coil sockets, 4 stage shields and the link motion—all laboratory matched—price \$45.00.

Clear and complete instructions, prepared by S-M engineers, go with each kit—or will be mailed separately for 50c.



## 635 Short Wave Kit

The type 635 Short Wave Receiver Kit contains the carefully designed and matched essentials for a real short wave set. Its range is 18 to 150 meters. The kit contains a set of four plug-in coils, one coil socket, one coupling condenser and two 140 mmf. condensers. These parts are all carefully designed for operation together.

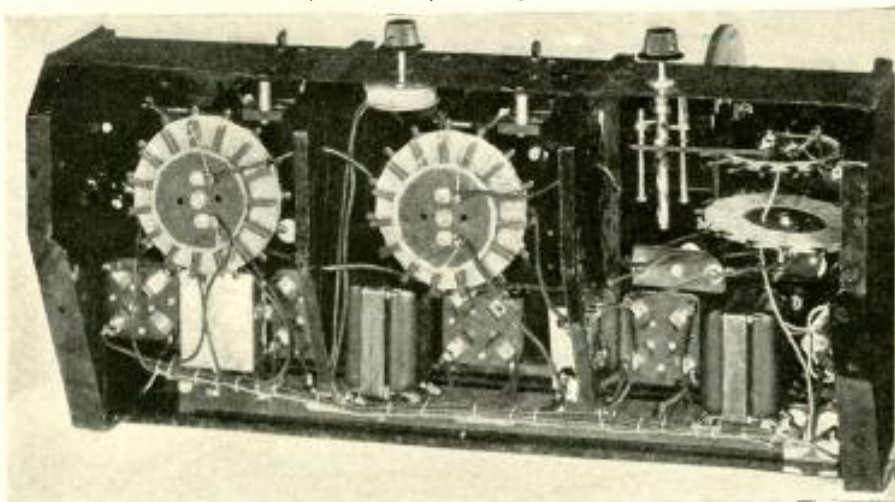
With the four coils supplied, the amateur bands fall well to the center of the tuning scale. "Dead spots" at which the receiver will not oscillate are totally eliminated. The antenna condenser allows coupling adjustment to suit individual conditions. Price \$23.00.

**SILVER-MARSHALL, Inc.**

844 W. Jackson Blvd.  
Chicago, U. S. A.

## The New Model Crosley "5-50" Receiver

(Continued from page 656)



**BENEATH THE SUB-PANEL OF THE NEW CROSLY**  
*Notice how the metal framework supports all of the apparatus that is used in the receiver and at the same time acts as a shield between the various stages.*

controls has been found, however, they may be left in that position and the three circuits will remain in resonance except, perhaps, when the receiver is tuned to the extremes of the broadcasting waveband.

There are two other controls on the front panel. At the left, near the bottom edge, is a small knob which operates the filament rheostat. This controls the amount of current fed to the filaments of the five tubes from the "A" battery. In operation this control may be set at the point which provides best volume and left there at all times (unless the "A" battery starts to run down, in which case this knob is advanced accordingly). Or this knob may be used as a volume control. (Another and better method of controlling the volume will be described later.)

The other operating control is the "crescendon," which is located toward the right, at the lower edge of the panel. This is a knob similar to the rheostat control knob. Its purpose is to regulate the sensitivity of the receiver by varying the amount of regenerative feed-back in the detector tube circuit. This use of regeneration adds greatly to the sensitivity of this receiver which is one of the few licensed under the Armstrong patents to use this method of amplification.

The tuning indicator is in the form of a calibrated drum which projects part way through the panel. The surface of this drum is covered with white paper on which is printed the calibration scale and ample space is provided to write the call letters of each station opposite the point on the scale at which the station is tuned in. On the side of this drum is a knurled disc which projects part way through the panel. This disc is the master tuning control which, as mentioned above, tunes the three circuits simultaneously. It is large enough to permit minute variations in its adjust-

ment; the knurled edge provides a good grip for the fingers when tuning.

The internal assembly of the receiver presents many innovations. All of the instruments are mounted on a chassis of comparatively light metal made rigid by the use of bulkheads of the same material, welded to the main chassis. These bulkheads not only add to the strength of the chassis, but serve as shields to isolate the fields of the various circuits from one another.

Except for the three variable condensers, all instruments are mounted on the under side of the chassis. Thus they are doubly protected from dust and damage. The tube sockets are placed just below suitable openings in the top surface of the chassis so that the tubes may be inserted or removed readily. None of the instruments are mounted on the front panel of the receiver, but instead, are mounted on the chassis in such a position that their control shafts extend through holes provided in the panel.

It is evident that simplicity and economy have been considered important factors in the design of the receiver. An examination of the internal assembly discloses numerous ingenious devices which accomplish difficult ends in a simple but efficient manner. One of these innovations, for instance, is the use of a small weight inside of the calibrated wavelength drum to counter-balance the weight of the rotor plates of the variable condensers. Thus when the master tuning control is turned to a position which brings the heavier portion of the eccentrically shaped rotor plates uppermost, the weight in the drum is down. This holds the rotor plates in position, without the necessity for friction bearings on the condenser shafts. The net result of this scheme is to provide easy action of the master tuning control without shifting of the condensers when the hand is removed from the control.

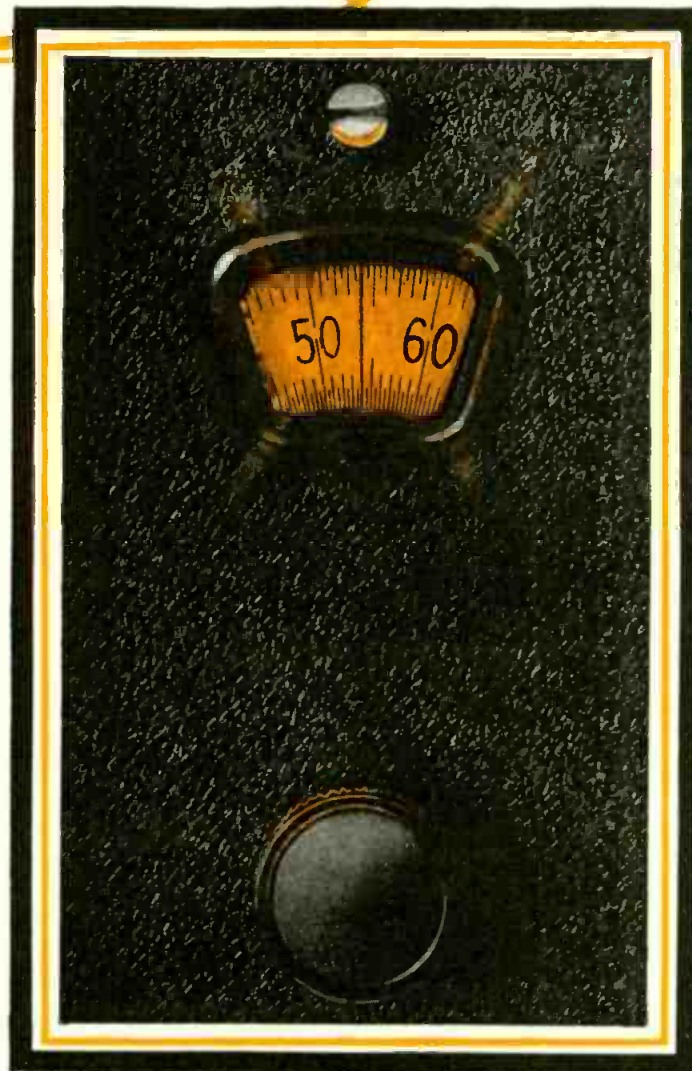
# Instantly - they have set a new standard of what a tuning control should be

**B**RAND NEW... yet it is already the distinguishing mark of a 1927 model receiver.

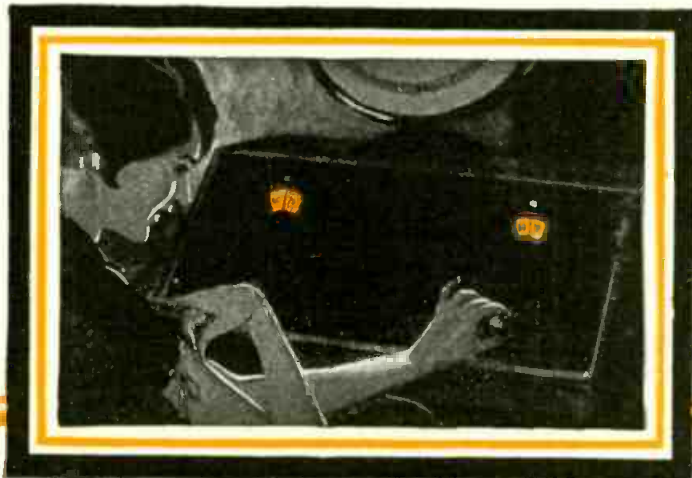
Such is the reception accorded the MAR-CO illuminated control by leading technical authorities and circuit designers everywhere

... a reception paralleled only by the widespread acclaim which, a year ago, swept 500,000 MAR-CO vernier dials into use.

Today MAR-CO tuning is standard or optional equipment in virtually every important set-design of the season:



## MAR-CO Illuminated CONTROLS



The Radio Home's "VARION" A. C. set  
MAR-CO controls standard equipment

The "Infradyne" sponsored by RADIO  
MAR-CO controls optional

The Fenway  
MAR-CO controls standard equipment

Ferguson Receivers  
MAR-CO controls built-in

Let this impressive list be your guide when you select the tuning controls for the new set you build, or the old one you remodel. ANY set can have MAR-CO tuning. Write for booklet.

Martin-Copeland Company  
Providence, R. I.

Radio Broadcast's "LAB" Receiver  
MAR-CO controls standard equipment

Cockaday's L. C. 27  
Entirely MAR-CO-tuned, using the illuminated control and 2 MAR-CO rheostat dials.

Radio News' "Auto-transformer"  
MAR-CO controls standard equipment

Popular Science's 5-tube receiver  
MAR-CO dials standard equipment; illuminated controls optional

Citizens Radio Call Book's TRF set with shielded transformers  
MAR-CO controls standard equipment and the St. James Super  
MAR-CO dials standard equipment

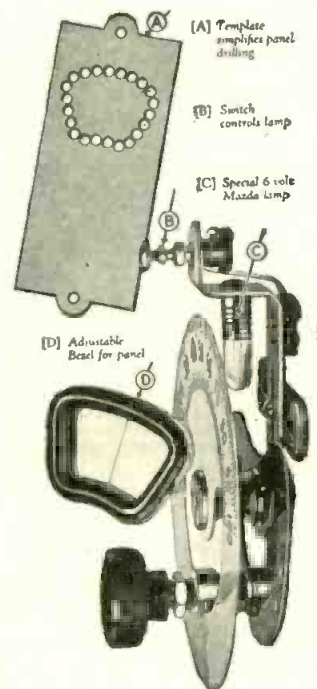
Radio World's "Hi-Power" and Beacon Sets  
MAR-CO controls standard equipment

Radio Age's "Super-9"  
MAR-CO 360-degree dials standard equipment

Radio Age "Four"  
MAR-CO controls standard equipment

Daven "Bass Note" circuit  
MAR-CO dials standard equipment

Hammarlund & Roberts, 1927  
MAR-CO dials standard equipment



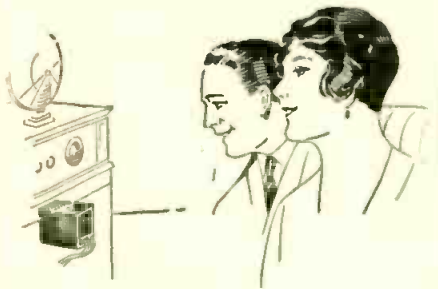
MAR-CO illuminated controls, (complete with template, bezel, and 6 Volt Mazda lamp) Scales 0 to 100, or 100 to 0, \$3.50

MAR-CO vernier dials, 4 inch and 3 inch. Scales 0 to 100, or 100 to 0, and 360° vernier dials, nickel plated..... \$2.50 gold plated..... 2.75

MAR-CO 2 inch rheostat dial (matches vernier dials in appearance) ..... .75

# MODERN "B" Compact

*What a  
difference  
it makes!*



**YOU** will be astonished to find what greatly improved reception you will get from your present set when you try a Modern "B" Compact.

It furnishes quiet, uniform current that eliminates many battery noises often mistaken for static, connects to your light socket and does away with "B" Batteries.

Ideal for sets up to six tubes including power tube. Has three B+ taps and two variable voltage controls. Complete with Raytheon tube.

**\$30.00**

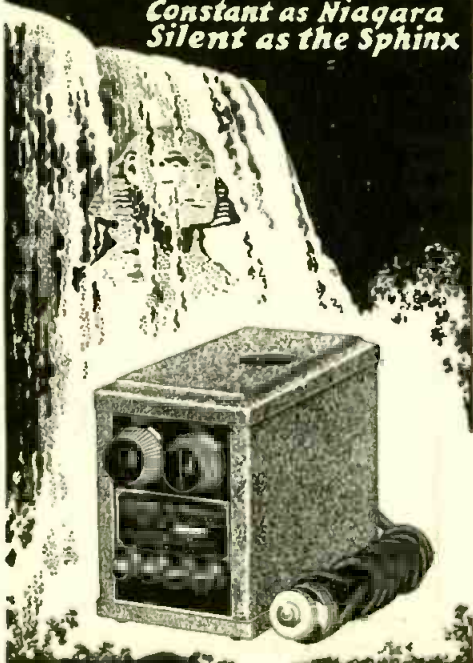
(EAST OF THE ROCKIES)

If your dealer can't supply you write us direct

The Modern Electric Mfg. Co.  
Toledo, Ohio

MODERN "B" POWER UNIT  
FOR SETS LARGER THAN SIX TUBES  
\$50.00 East of the Rockies

*Constant as Niagara  
Silent as the Sphinx*



The "5-50" receiver is exceptionally flexible in so far as its tube and battery requirements are concerned. The tube combination preferred by the author consists of UX-201-a tubes in the first, third and fourth sockets, a UX-200-a tube in the last socket for the detector, and a UX-112 power tube in the second socket, which is the second stage of audio-frequency amplification. If preferred, however, UX-201-a tubes may be used in all five sockets.

The above tube combinations apply only when a storage "A" battery is used. When the use of a storage battery is not desirable or practical, dry-cell tubes of either the 1½-volt or 3-volt type may be used throughout. Thus any standard type of tube may be used in this receiver without any change in the receiver itself.

The battery requirements depend largely upon the tubes used. If a power tube is used in the second stage of audio-frequency amplification, for instance, it is advisable to use a total of at least 135 volts of "B" battery, regardless of whether the power tube is a UX-112, a UX-171, or a UX-120. The "C" battery requirements will also vary with the type of tubes used. Complete information on the battery requirements of each type of tube are given in the instruction sheet which comes with the receiver.

In general, the tests of this receiver disclose the fact that its volume is so great that the use of a power tube in the last audio stage is necessary if distortion resulting from the overloading of the last tube is to be avoided. If a non-power tube is used it is necessary to keep the volume toned down in the case of reception from local stations, in order to avoid overloading. This regulation of volume is best obtained by turning the master tuning control slightly off the best setting for a given station. In other words, if a certain broadcasting station comes in best with the tuning indicator set at 50, the volume may be reduced by turning the tuning control slightly above or below this figure.

When a power tube is used the full volume of the receiver may be taken advantage of, without any loss of quality of reproduction. In such a case the volume is sufficient for all practical purposes, and too great for use in an ordinary room except on distant stations.

A good cone-type loudspeaker is recommended for use with this Crosley receiver—which is another way of saying that the tone quality of this receiver is of a high order that warrants the use of a high-class speaker if the good quality is to be maintained.

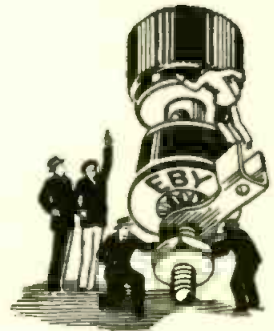
The set is considerably more sensitive than a five-tube receiver is ordinarily expected to be in these days of seven, eight and nine-tube receivers. A number of stations up to a thousand miles distant were tuned in during the eve-

# AUDIO FREE AMPLIFICATION

The four types thoroughly explained in a fully illustrated booklet 9 x 12". This book will be sent to you absolutely FREE if you will send me six cents in stamps to cover cost of handling and postage.

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Will get your O.K. on every point. The tops don't come off, it's impossible to make wrong connections and they make a perfect electrical connection with any type of terminal—straight wire, loop wire, pin or slotted.

Some of the greatest radio experts in the country looked them over and as a result EBY Binding Posts are used and recommended in the Infradyne, Hammarlund-Roberts, Cockaday, L.C. 27, Browning-Drake, Victoreen, Madison-Moore, Lynch and Varion Power Units and other popular circuits.

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The H. H. EBY MANUFACTURING CO.  
4710 Stenton Avenue Philadelphia, Pa.

—used  
in the  
LC-27

RMA



ning of the test and all were clearly audible on the loud speaker. Inasmuch as the test was made on a rainy summer evening, conditions were far from ideal and thousand mile reception under these circumstances is a pretty good indication of distance-getting capacity under more favorable conditions.

This reserve of sensitivity makes it possible to use this receiver with an indoor antenna or a short outdoor antenna, and to obtain entirely satisfactory results, at least from local stations up to a hundred miles or so distant.

For the maximum result, an antenna around 100 feet in length will probably be found best. In locations close by the broadcasting stations, however, it is advisable to use an antenna somewhat smaller than this.

### The Mu-Rad Super-Six Receiver

(Continued from page 657)

is a "sensitivity" control knob on the front panel which permits the operator to adjust the circuit to obtain this maximum amplification, but still to avoid distortion.

The audio-frequency amplifier uses three low-ratio transformers. The result is that the incoming signals are amplified to great volume and even in the case of reception from distant stations, there is ample volume to operate the loudspeaker. For local and semi-distant reception it is necessary to keep the volume control turned well down. The tone quality remains uniformly good, however, regardless of the amount of volume.

The external appearance of the receiver is altogether pleasing. The cabinet is of mahogany, finished in a warm two-tone brown; the large surfaces are broken by a panel effect, which lends considerably to the charm of the cabinet.

While the cabinet is a table mounting model, space is provided within it for all batteries. This space is provided in the form of compartments at either end, each of which has a front door which swings out to permit access to the batteries. Then, too, the entire top of the cabinet is hinged at the rear, so that it may be raised. This is an added convenience when replacing or moving the batteries or tubes, as the raised top not only exposes the receiver proper, but opens the top of the battery compartments.

The receiver is located between the two battery compartments and is equipped with a recessed, sloping panel which carries the operating controls. This panel is of a mahogany grained composition material, set in a frame of real mahogany. Both the panel and the frame match the coloring of the rest of the cabinet.

The single wavelength-tuning control



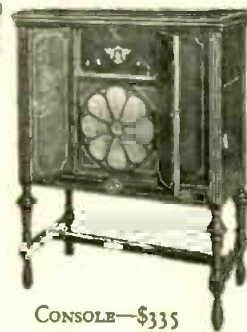
## 9-tube power smashes the barrier of distance

*Remote stations come in with remarkable clarity and volume even when local stations are on.*

**N**O other commercial set made has such power—or power so easily and simply controlled.

All the RADIO experience of 14 years is back of this new Priess, the best set that radio engineers have ever made and by far the greatest value your money can buy.

Do not buy any radio until you have heard the new Priess—IN YOUR HOME—a Priess dealer will demonstrate gladly. No obligation to buy. Write for names of nearest dealers. Illustrated leaflet on request.



CONSOLE—\$335

*The one set for cities and other congested areas*

#### LOOP OPERATED

Single dial control. Matchless selectivity. Nine Tubes. Tremendous distance. No interference. No background noises. No lightning hazards.

In the console there is ample room for all battery equipment.

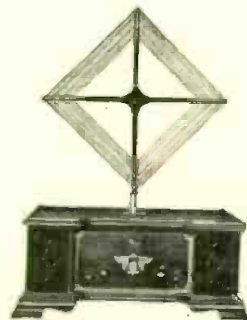


TABLE MODEL, \$195

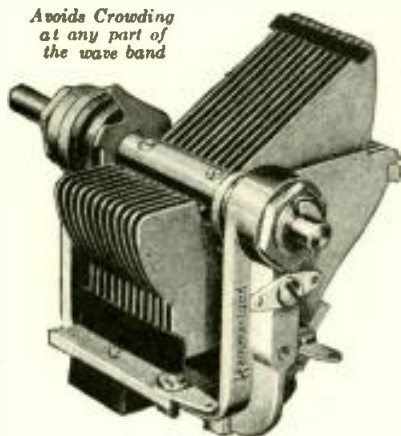
**Priess**  
TRADE MARK  
**STRAIGHT 9 NINE**

*"Outstanding radio performance and value on the market today—without exception"*

**PRIESS RADIO CORPORATION**  
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## The First Universal Condenser

*Avoids Crowding  
at any part of  
the wave band*



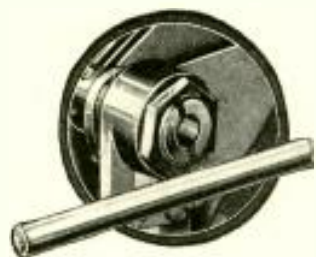
## The New Hammarlund "MIDLINE"

*With Full-Floating Rotor Shaft*

THE shaft may be adjusted to any desired length for accommodation of different dials, or it may be replaced by a longer shaft for direct coupling to other condensers. Gears, cams or pulleys may be attached for any arrangement of single-control multiple condenser operation.

The new "Midline" condenser has every refinement learned from Hammarlund's 16 years of experience in the manufacture of electrical precision instruments. Made in all standard capacities—single and multiple models.

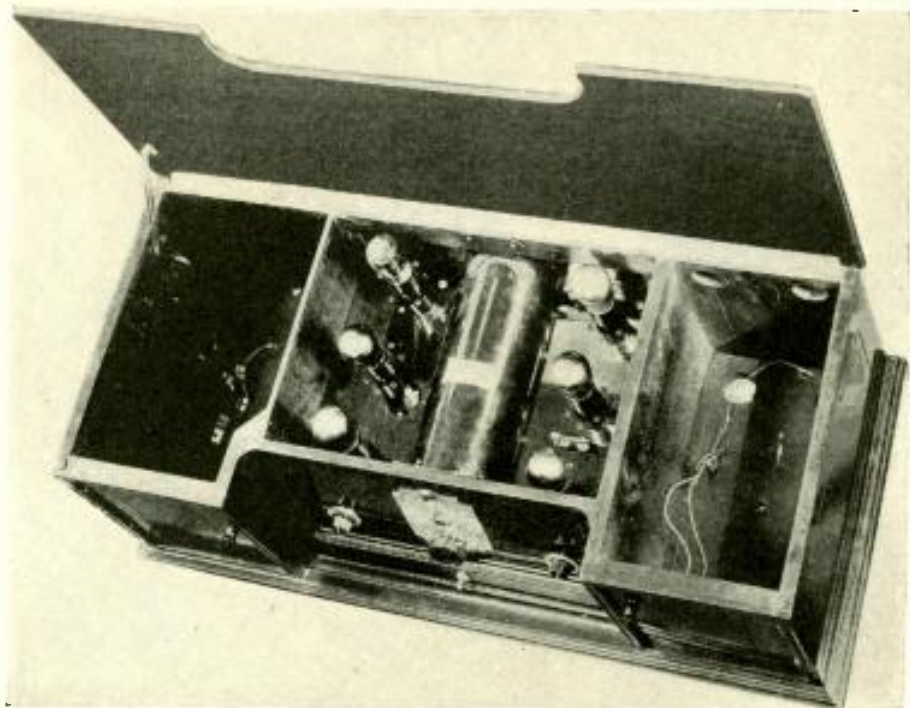
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*Write for descriptive folder*

**HAMMARLUND MFG. CO.**  
424-438 W. 33rd Street, New York City

**Hammarlund**  
PRECISION  
PRODUCTS



### A TOP VIEW OF THE MU-RAD RECEIVER

*The tuning condensers are enclosed in a metallic shield in the middle compartment that contains the receiver proper; the six tubes are mounted three on each side of the central tuning unit. The two rectangular compartments located on each side of the set compartment are for the "A" and "B" batteries.*

is placed in the center of the panel. This control is set in a bronze escutcheon plate on which a calibrated scale is embossed. The tuning indicator hand, also of bronze, moves over this scale. Immediately above the scale is a small, colored crystal window behind which is a small electric pilot light to indicate when the receiver is in operation.

At either side of the master tuning control there is a knob similar to the master knob but smaller. These are the "sensitivity" and "tone" (volume) controls. These three knobs are all of such size and shape as to provide a comfortable fingertip grip.

In the framework, just below the control panel, are two small rotary switches. One is the antenna switch, by means of which the antenna values are adapted to the requirements of this receiver. The other switch is to turn the receiver on and off.

Once a given broadcasting station has been tuned in on this new model, and a notation made of the setting of the indicator pointing for that station, it may be tuned in again at will by simply turning the control until the pointer is again at this same setting. Thus if a list is made up of the indicator settings of the operator's favorite stations, any of them may be tuned in whenever desired.

The antenna required for the operation of the "Super-Six" may be anything from a fifteen or twenty-foot indoor wire to a longer outdoor wire, up to 150 feet in length. When maximum results are required (considered from the standpoints of selectivity, volume, and distance reception), an outdoor antenna of from 80 to 100 feet in length

is recommended. When reception from nearby stations is all that is required, an indoor antenna strung around the picture moulding of the room in which the receiver is located will give good results.

The receiver makes use of UX-201-a tubes throughout, except in the last audio stage, where a power tube such as the UX-112 or UX-171 is recommended.

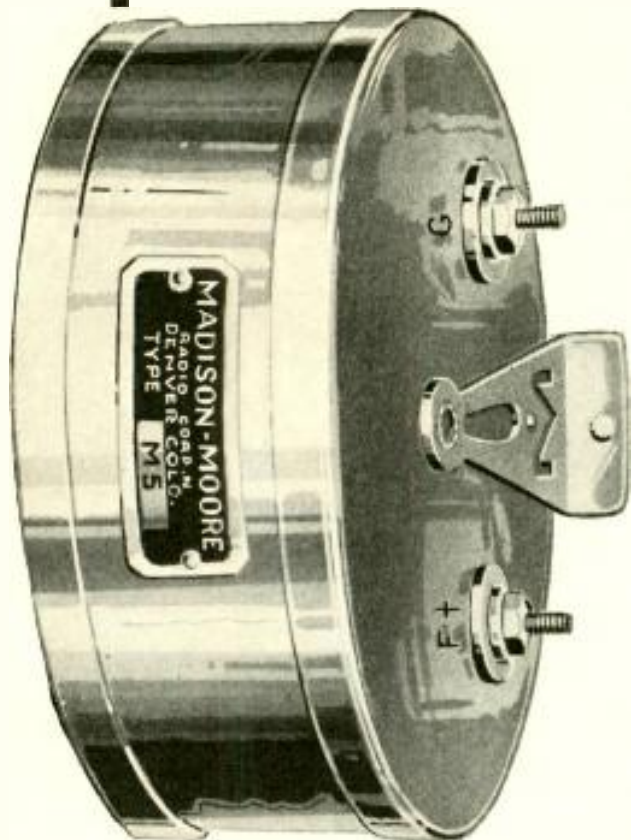
The batteries required are: a storage "A" battery and a suitable battery charger, preferably a trickle charger; three "B" battery blocks, with a total voltage of 135; and a "C" battery.

The type and voltage of the "C" battery will depend upon the type of power amplifier tube used in the last socket. With the UX-171 tube the "C" battery should be made up of one standard 4½-volt "C" battery unit and a midget size 22½-volt block. With the UX-112 tube in the last socket two of the 4½-volt "C" battery units are used.

In place of "B" batteries a power supply unit which takes the high voltage from the house lighting lines may be used. Such a unit should be capable of delivering between 135 and 180 volts, maximum, and should have additional terminals to provide 45 and 90 volts. The manufacturers of this receiver make such a supply unit, which is sufficiently compact to fit into the battery compartment in the receiver cabinet.

It will be seen from the illustration on page 657 that this receiver is adaptable to any sort of a table for mounting. As the batteries are all in the receiver cabinet there is no necessity for using a regular radio table. Instead a small serving table or any other form of table that happens to be at hand may be used.

# THE "finest TRANSFORMER IN THE WORLD!"



**R**ADIO Engineers and those who know, pronounce MADISON-MOORE TRANSFORMERS the most perfect. Their superiority has been unquestionably demonstrated under every possible test.

You are assured greatest satisfaction in the essentials of perfect Radio reception.

**SELECTIVITY:** Silent nights are no longer necessary. MADISON-MOORE Transformers can always be depended upon to make distant stations like locals on your dials.

**QUALITY:** From the tenor's falsetto notes, to the rumbling bass of a great pipe organ, they faithfully reproduce the beauty and shading of every tone.

**DISTANCE:** Repeated tests prove that stations out of reach of many of the finest receiving sets are easily brought in with MADISON-MOORE Transformers.

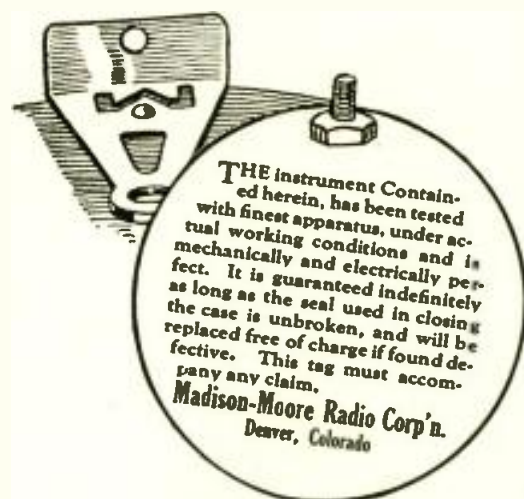
**VOLUME:** These Transformers, when used with only a two foot loop, produce loud speaker volume on stations that have never before been heard in that locality by the broadcast listener.

MADISON-MOORE Transformers are precision-made and subjected to most exacting laboratory tests until they are electrically and mechanically perfect.

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IT IS ATTACHED TO  
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# MADISON-MOORE

## Make your LC-27 Work and Sound like Cockaday's

- 1—Use only genuine specially tested parts, as used by Laurence M. Cockaday.
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ALLEN-ROGERS, AS THE ONLY DIRECT REPRESENTATIVE OF THE COMMITTEE OF 21 MANUFACTURERS is especially equipped to supply perfectly balanced complete sets of parts because:

- A—Every part is especially selected by the individual manufacturer for ALLEN-ROGERS.
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- That's why complete sets of LC-27 parts bearing the ALLEN-ROGERS label carry the following

## GUARANTEE

WE unreservedly GUARANTEE that anyone can construct the LC-27 Receiver to function properly when built by using a complete set of parts distributed by us. This means that if the set built by you does not work as we claim it should we will make it do so without cost to you, even though we should have to rebuild the entire set.

## COMPLETE SET of LC-27 Parts including cabinet

**\$103.<sup>20</sup>**

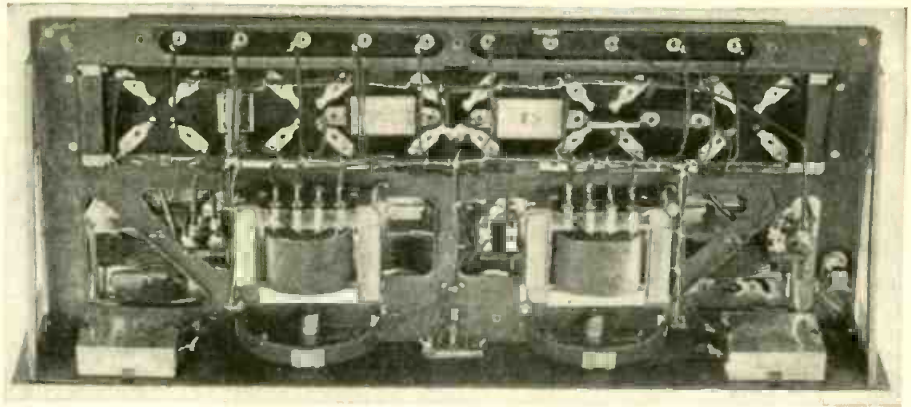
LC-27 Mechanical Kit  
**\$12.<sup>50</sup>**

Attractive discounts to Jobbers and Dealers. Send for free descriptive folder

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**Allen-Rogers**  
Incorporated

"Kit Headquarters"  
118 East 28th St., New York, NY



UNDER THE SUB-PANEL OF THE FRESHMAN RECEIVER  
*The transformers, condensers and tube sockets are mounted directly on the metal chassis and panel; notice that the wiring is all in the form of flexible cable leads.*

## The New Model Freshman Console Receiver

A HIGH-QUALITY radio receiver at the low price that mass production makes possible—that is the story behind the new Freshman receiver (Model 6-F-11).\*

In appearance this new set resembles the newest of phonographs. The mahogany finish of the cabinet has shading and highlights that lend variety and avoid the somberness that large surfaces that are finished in an even color have.

When the set is in operation the entire front of the cabinet opens up. The hinged door at the top front, which conceals the panel, drops down to a position at right angles to the front of the cabinet to serve as a shelf on which to rest the arms in tuning the receiver.

The rest of the cabinet front is made up of two large doors which open to disclose a cone-type loudspeaker and, just below it, an inner door to a compartment which holds the batteries.

When the top of the cabinet, which is hinged at the back, is raised the entire "works" of the receiver may be seen. The entire assembly job has been done

\*The data in this article also applies to Model 6-F-12 which is exactly the same as Model 6-F-11 except that the cabinet is of walnut instead of mahogany.

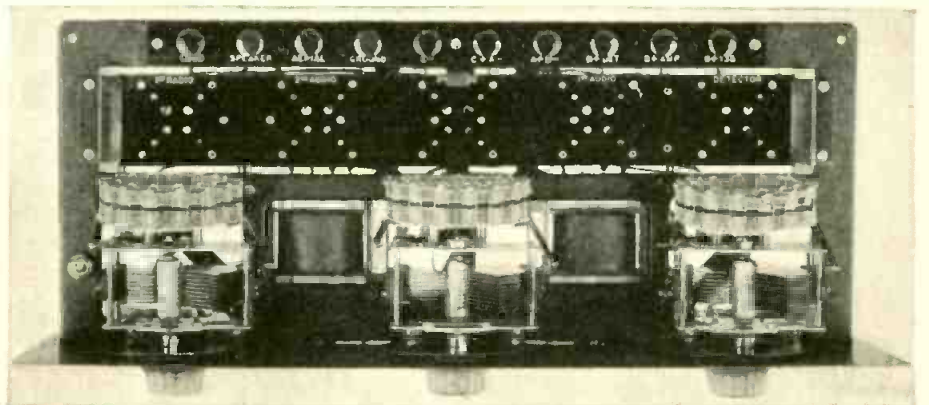
by a series of mechanical operations; hand labor was used only to wire the assembled receiver.

The receiver itself consists of two stages of tuned radio-frequency amplification, a detector and two stages of transformer-coupled, audio-frequency amplification.

The radio-frequency amplifier has been designed so that no neutralizing or stabilizing controls or adjustments are necessary. The receiver cannot oscillate, for the circuit design and physical construction of the radio-frequency amplifier are such that it keeps just below the point of oscillation no matter what wavelength the receiver may be tuned to. Thus good sensitivity is obtained, with stability, and with maximum simplicity.

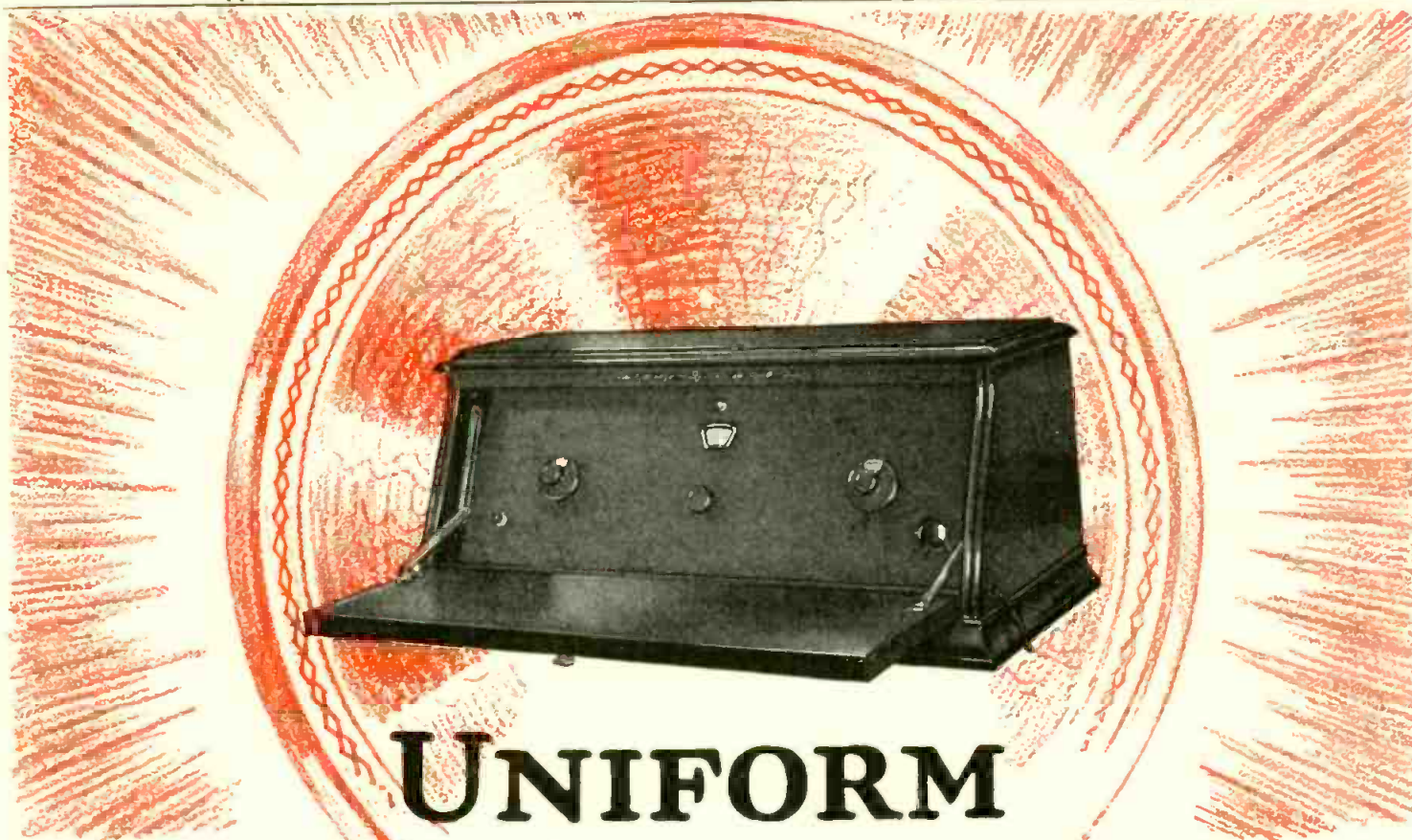
The audio-frequency amplifier is really excellent; this is one of the reasons for the fine tone quality and great volume that is obtained. A UX-112 power tube is used in the last stage of audio-frequency amplification and this creditably handles the immense volume put into it and reproduces extremely loud signals without blasting or distortion.

Tuning is accomplished by means of three knobs located on the front panel



THE RECEIVER UNIT AS VIEWED FROM ABOVE

*Note the neat appearance of this new model with the condensers and coils mounted as units and with the bakelite shelf for the tube sockets which is mounted on spring rubber to keep the set from howling by preventing tube vibration from loud signals.*



# UNIFORM POWER AMPLIFICATION

**N**OT just power amplification. *Uniform* power amplification—one of the three essentials embodied in the new LC-27 Receiver, designed by Laurence M. Cockaday, Technical Editor of POPULAR RADIO. It adds more pieces to the broadcast orchestras—the drums, the bass viol, the big horns, and it gives them the powerful, clear tone you were able to get only on the middle and higher tones before.

Now is the time to build the LC-27, the first receiver to have all three requirements for perfect tone in radio reception:

1. A clean, undistorted signal through the detector.
2. Uniform amplification of all voice and musical frequencies with full volume.
3. A filtered output by which nothing but pure voice current is permitted to actuate the loud speaker.

The LC-27 Receiver operates

with batteries or power-supply units; with or without aerial.

Let us tell you more about Mr. Cockaday's newest contribution to radio. Fill out and mail the coupon today. It's worth your while.

**COMPLETE LIST OF PARTS  
FOR THE LC-27 RECEIVER**

- 1—Hammarlund mid-line dual condenser, .000275 mfd.
- 1—Hammarlund mid-line single condenser, .000275 mfd.
- 1—Precision Transformer Co. transform coil set, one antenna coil, one detector and two interstage coils.
- 1—AmerTran No. 100 first stage transformer.
- 1—AmerTran No. 100 second stage transformer.
- 1—AmerChoke No. 854.
- 1—Dubiller No. 902 filter condenser, 4 mfd.
- 1—Dubiller No. 907 filter condenser, .1 mfd.
- 1—Mar-Co illuminated control, scale 0 to 100.
- 1—Mar-Co small controls, special for LC-27.
- 1—Carter Imp. battery switch.
- 1—Samson radio-frequency choke coil No. 85.
- 3—Aervox mica fixed condensers, .00025 mfd.
- 1—Durham resistor, 4 megohms.
- 1—Lynch grid leak mounting.
- 1—Carter short Jack, No. 1.
- 1—Carter resistance, 0-10,000 ohms.
- 12—Eby engraved binding posts.
- 5—Benjamin UX sockets.
- 1—Amperite, No. 1.

**Complete official parts, including mechanical kit, without cabinet, \$85.20**

### Mechanical Kits for the LC-27, \$12.50

The complete mechanical kit, containing the special parts necessary to duplicate the Popular Radio LC-27 Receiver, can be purchased from your dealer. The kit contains one decorated and engrave Micarta panel, one binding post strip, one pair of genuine cast aluminum Tait angle brackets, one set of four special Aluminum Co. of America shields, and all the nuts, bolts, screws and brass angles necessary to build the complete receiver. Dealers may obtain these Mechanical Kits from the Committee of 21 Manufacturers.

COMMITTEE OF 21 MANUFACTURERS :: 118 E. 28th STREET :: NEW YORK, N. Y.

The  
**LC-27**  
Receiver

Watch for this seal.  
It stands for parts of  
proven worth.



### MAIL THIS COUPON NOW!

Committee of 21 Manufacturers,  
118 East 28th Street,  
New York, N. Y.

Gentlemen:

I enclose 10c for which please send me full constructional data for building the LC-27 Receiver.

Name, .....

Address .....

# Build This New— HENRY LYFORD RECEIVER

It has been approved and endorsed by—

- RADIO NEWS
- RADIO
- RADIO AGE
- POPULAR RADIO
- CITIZENS CALL BOOK
- RADIO REVIEW

and numerous other publications.

Build this set and have the satisfaction of making the best and latest receiver. It's the outstanding circuit of the year.

Further information upon request

Complete parts  
carefully boxed **\$69.50**  
and fully  
guaranteed

without cabinet

Complete Parts for

## LC-27

- 1-Hammarlund Mid-Line Dual Condenser .000275 mfd. . . . . \$ 7.50
- 1-Hammarlund Mid-Line Single Condenser .000275 mfd. . . . . 4.65
- 1-Precision Duo-Octaform Coil Set. . . . . 10.50
- 1-Amertran DeLuxe 1st stage. . . . . 10.00
- 1-Amertran DeLuxe 2nd stage. . . . . 10.00
- 1-Amerchoke. . . . . 6.00
- 1-Dubilier #902 Filter Condenser, 4 mfd. . . . . 5.50
- 1-Dubilier #907 Filter Condenser 1 mfd. . . . . .60
- 1-Mar-Co Illuminated Dial 0-100. . . . . 3.50
- 2-Mar-Co Small Controls especially for LC-27, 0 to 50, 50 to 0. . . . . 1.50
- 1-Carter Battery Switch. . . . . .65
- 1-Sanson Radio Freq. Choke Coil #85 . . . . . 1.50
- 3-Dubilier .00025 Condensers. . . . . 1.05
- 1-Lynch 4 meg. resistor. . . . . .50
- 1-Lynch single mounting. . . . . .35
- 1-Carter Single Circuit small jack. . . . . .25
- 1-Carter resistance 0 to 10,000 ohms. . . . . 2.00
- 12-Eby Binding Posts. . . . . 1.80
- 5-Benjamin U. X. Sockets. . . . . 3.75
- 1-Amperite 1 ampere. . . . . 1.10
- Mechanical Kit consisting of aluminum shields, binding post strip, decorated panel and Tait brackets. . . . . 12.50

Complete Parts **\$85.20**

CORBETT CABINET  
for the **\$18.00**  
above set

DEALERS—Write for new Wholesale Catalog  
**HEINS & BOLET**  
Radio and Electric Supply Corp.  
Wholesale and Retail  
44 Park Place, New York

of the receiver proper. This panel is of brass, finished to resemble mahogany; thus it matches the color scheme of the cabinet. The three knobs control the variable condensers which tune the antenna and the two radio-frequency amplifier stages, respectively.

The manipulation of these tuning controls is simplified by the fact that the second and third tune exactly alike. That is, for a given station or wavelength, the settings of the second and third condensers, as indicated by the calibrated scales which revolve behind small windows just above the tuning controls, will always be the same. The setting of the first condenser may vary slightly from the setting of the other two, depending upon the size of the antenna used. At most, this variation does not appear to be more than a few degrees.

In addition to these three tuning controls there is a small lever, lower down towards the left of the panel, by means of which the volume may be regulated to any desired degree. A similar lever is placed to the right of the volume control for the purpose of regulating the filament current to the detector and audio-frequency amplifier tubes. This latter adjustment is made once and requires no further attention unless the storage "A" battery is allowed to run down below normal voltage, in which case compensation may be made by means of this filament control lever.

The physical make-up of the receiver is notably sturdy; it is evident that every precaution has been taken to keep anything from going wrong during shipment or after installation in the home of the owner.

An instance of this quality is seen in the assembly of the complete receiver unit on a rigid, pressed-steel chassis which is copper plated and then enameled. Mounting throughout is accomplished by means of riveted eyelets instead of the usual bolts and nuts. Thus there are no nuts to work loose.

This damage-proof construction has even been carried to the extent of equipping the receiver with brass tuning knobs and brass control levers, all with a pleasing antique finish in old silver. Then, too, instead of wiring the receiver with stiff bus wire, a flexible, insulated cable is used. This makes the possibility of broken connections remote.

A high-grade, cone loudspeaker is incorporated in the cabinet as part of the receiver. This speaker is especially designed and adjusted for this particular receiver; for this reason it does not have the peculiar muffled sound that is ordinarily obtained from a cone loudspeaker when it is partially inclosed in a compartment of a cabinet. Other difficulties were encountered in the attempt to operate the speaker inside of the cabinet; for instance, the tendency of the receiver to howl, due to the vibration of the vacuum tubes. When a sig-

# Ward Leonard Vitrohm



3/8 Actual Size

The resistor  
units you  
need for

## VARION Raytheon and AmerTran Battery Eliminators

Not affected by moisture, continuous service or overload. Wire wound, vitreous enamelled (glass-like); the permanently reliable resistor. Non-inductive; zero temperature co-efficient. Compact; easy to use; hard to break.



All sizes you need; separate units; or handy kits of units, totalling 21,750 ohms in various resistance. Recommended for all approved A. C. and D. C. eliminators. 34 years manufacturing of resistance as specialists.

7135-2

# STORAD

## RADIO POWER SUPPLY For Every Set Made

Storad Units are quickly and easily installed. Once you have a Storad on your circuit, you will have current—lots of it—when you want it.

Storad Units are 100% over capacity. They will work on any set regardless of size, without hum. Ample power for UX-171 Power Tubes.

Raytheon "B" Power Supply is used on all heavy duty Storad units supplying "B" Power. Tobe Deutchmann heavy duty condensers and Storad special transformers and filters are used throughout.

Here are some of the Storad Units:

**Type 201**—Combination "B" Power Supply and Trickle Charger complete with receiver control switch.

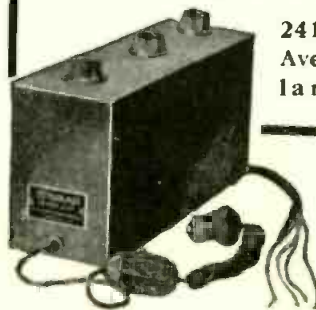
**Type 501**—Light Socket Power Amplifier supplying "B" Power for the set.

**Type 701**—Trickle Charger complete with receiver control switch.

Write for information.

## THE STORAD MFG. CO.

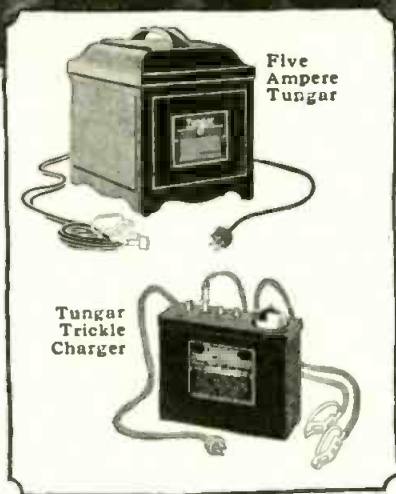
2417 Detroit  
Avenue, Cleve-  
land, Ohio



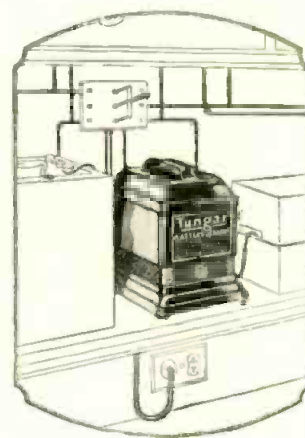
Type—101  
"B" Eliminator  
Surplus capacity,  
3 variable con-  
trols from 180  
volts down. Oper-  
ates on house  
lighting circuit.



Two ampere Tungar installed in a radio cabinet.



Merchandise Department  
General Electric Company  
Bridgeport, Connecticut



## Charging *now* simplified

When a Tungar charges your batteries just by the turn of a switch, how easy it is to keep batteries fully charged.

Nowadays, it is possible to have a Tungar *permanently* installed. Then you can place the batteries in a cabinet, a closet, or down in the cellar, and just have a convenient switch to throw when they need charging.

It's as simple as snapping on a light. And an overnight charge costs less than a dime

The 2 and 5 ampere sizes will charge 2, 4 and 6 volt "A" batteries, 24 and 96 volt "B" batteries, in series: and auto batteries, too. No extra attachments needed.

*East of the Rockies*  
2 ampere Tungar—\$18  
5 ampere Tungar—\$28  
Trickle Charger—\$12  
(60 cycles—110 volts)

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

# 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

*We have seen them come and go, but we have been making and selling Radio Cabinets for 4 years. To-day thousands of the boys know exactly where to buy good cabinets at a low price. Our FREE New Catalog tells all about our*

**"IVEYLINE"**—Sizes 7" x 18" to 7" x 30", 7½" or 10" deep. Mahogany rubbed finish or solid walnut. Full length piano hinge, lid support and rubber feet.

**"PIEDMONT"**—7" x 18" x 10", 7" x 21", 7" x 24", 7" x 26"—your choice, \$2.65 each, f. o. b., Hickory. Mahogany rubbed finish, fancy nicked hinges.

**"CAROLINA"**—Genuine mahogany or walnut. Battery compartments each end. Fancy base. Full length N. P. piano hinge. Highest grade rubbed lacquer finish. A beautiful cabinet.

**THE SOUTHERN TOY COMPANY**  
INCORPORATED  
Hickory, North Carolina . . . (the land of scenery, sunshine and prosperity)

nal was tuned in with great volume the loudspeaker, mounted inside of the cabinet, caused the entire cabinet to vibrate strongly enough so that the vibrations could be felt if the hand was placed anywhere on the outside of the cabinet. Naturally if the vacuum tubes were rigidly mounted they would vibrate with the cabinet. To overcome this the entire tube assembly was mounted on sponge rubber; this eliminates this trouble absolutely.

Some idea of the sensitivity of the receiver may be obtained from the fact that during the POPULAR RADIO tests of the receiver, the antenna was disconnected entirely and the ground connection made direct to the antenna terminal of the receiver. Under these conditions stations up to fifty miles distant came in so strongly that the volume had to be cut down for comfort. In a home where there is no interest in reception from great distances and where reception from stations up to say fifty miles is all that is desired, there is no real necessity for an antenna at all with this receiver.

If reception from distant stations is desired, an antenna is of course, necessary. Under ordinary conditions this should be an outdoor antenna about 75 feet long (measured from the receiver to the furthest end). If the receiver is located in close proximity to a number of broadcasting stations, as is the case in the larger cities, best all around results will be obtained with a shorter antenna of from 30 feet to 50 feet in length.

The tubes recommended by the manufacturer for use with this receiver are UX-201-a's for the two radio-frequency amplifier sockets and for the first audio-frequency amplifier socket. For the detector a UX-201-a or one of the new UX-200-a tubes may be used. The latter provides greater volume, especially on comparatively weak signals from distant stations. For the last audio-frequency amplifier tube the UX-112 tube is recommended although the UX-171 tube may be used.

The battery requirements call for a storage "A" battery for lighting the tube filaments; 135 volts of dry-cell or storage "B" batteries and two small dry-cell "C" batteries, providing a total of 9 volts. The voltages used by the receiver are: 22½ to 45 volts for the detector, 90 volts for the radio-frequency amplifier tubes and the first audio amplifier tube, and 135 volts for the power amplifier tube.

In place of batteries, it is entirely practical to operate this receiver from a power supply unit connected to the alternating current light lines.\* For this purpose the manufacturer recommends its complete "ABC" power-pack. When connected to the alternating

\*Any one of the various Raytheon Power-pack units described in POPULAR RADIO for November, 1925, May, 1926, June, 1926 and July, 1926, may be used to supply the "B" current for this receiver.

## FREE SIMPLIFIED BLUE PRINTS

You know how helpful, interesting and practical POPULAR RADIO is. You fully appreciate that at \$3.00 a year it is a real bargain. Consequently you should find it easy to convince one, two or more of your friends, who are not now subscribers, of the unusual value when any one of these thirteen sets of Simplified Blueprints (described on Page 699) is offered free with their twelve months' subscription for POPULAR RADIO at the regular price of \$3.00. In addition to the Blueprints given to your friends we will allow you one set free for each new subscription you send us with a \$3.00 remittance. Five new subscriptions and remittance of \$15.00 would entitle you to five sets free.

Only one set of Blueprints free with a renewal subscription whether your own or a friend's.

POPULAR RADIO, INC., Dept. 113  
627 West 43d Street, New York City

Enclosed is my remittance of \$..... covering .....annual subscriptions for POPULAR RADIO (names on sheet attached). Send me set(s) checked below.

- |                                     |                                     |
|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> Set No. 4  | <input type="checkbox"/> Set No. 16 |
| <input type="checkbox"/> Set No. 6  | <input type="checkbox"/> Set No. 17 |
| <input type="checkbox"/> Set No. 12 | <input type="checkbox"/> Set No. 18 |
| <input type="checkbox"/> Set No. 13 | <input type="checkbox"/> Set No. 19 |
| <input type="checkbox"/> Set No. 14 | <input type="checkbox"/> Set No. 21 |
| <input type="checkbox"/> Set No. 15 | <input type="checkbox"/> Set No. 22 |
|                                     | <input type="checkbox"/> Set No. 23 |

(See page 699 for description of Sets)

Name.....

Address.....

Foreign postage 50c extra. No extra for Canada.

## -RADIO FANS-

If you are interested in SAVING MONEY on all the new, improved KNOCK-DOWN KITS for the following receivers—

### LC-27

New and improved BROWNING-DRAKE 5 Tube

DAVEN BASS NOTE 5 Tube

S-M SHIELDED "6"

LC SENIOR POWER PACK

New Improved HAMMARLUND-ROBERTS Hi-Q

SAMSON T-C 5 Tube

REMLER INFRADYNE 10 Tube

RAYTHEON B SUPPLY; AMER-TRAN POWER PACK

and all the latest types of A and B eliminators and loud speakers—

**Write to us before you buy!**

Remember: All our knockdown kits are guaranteed to consist of all parts used by original designers.

**J and M Radio Co.**  
**88 Walker St.**  
**New York City**



current supply lines this unit rectifies and filters the alternating current, changing it to the required direct current and supplying this at the proper voltages as required of "B" and "C" batteries. The power-pack also contains a trickle charger which keeps the small storage "A" battery fully charged at all times. The storage "A" battery used with this power-pack may be a small one because there is never any considerable drain on it with this continuous charging process.

The use of the "ABC" power-pack relieves the owner of the receiver from all battery worries. Its use is extremely simple, as there are no adjustments to be made on it. It includes a relay switch so that when the push-button on the receiver is pulled out, to put the receiver into operation, the "B" and "C" power is also automatically turned on. When the receiver is turned off, the "B" and "C" voltages are cut off, and the trickle charger is automatically turned on to charge the storage "A" battery while the receiver is idle.

### Our Silly Contemporaries

The average man's life is now divided between worry over two tubes—radio and inner.

—Exchange

\* \*

"So your husband has taken your radio all apart?" said Mrs. Suburbs. "Is he an expert?"

"Not yet," replied Mrs. Saylor, "He hasn't got it back together."

—Life

\* \*

Excited voice on the phone; "John, come home at once, I've mixed the plugs, the radio is covered with ice and the ice box is singing, 'Way Down South in Dixie!'"

—Life

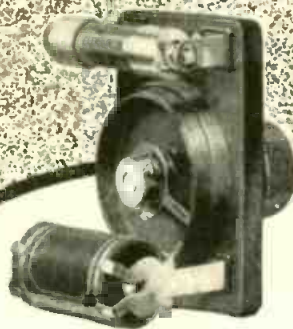
\* \*

R. M. sends us the story of a young bride who asked her husband to copy off a radio recipe she wanted. He did his best but got two stations at once, one of which was broadcasting the morning exercises and the other the recipe. This is what he took down:

"Hands on hips, place one cup of flour on the shoulders, raise knees and depress toes and mix thoroughly in one half cup of milk. Repeat six times. Inhale quickly one-half teaspoonful of baking powder, lower the legs and mash two hard-boiled eggs in a sieve. Exhale, breath naturally, and sift into a bowl.

"Attention! Lie flat on the floor and roll the white of an egg backward and forward until it comes to a boil. In ten minutes remove from the fire and rub smartly with a rough towel. Breathe naturally, dress in warm flannels, and serve with soup."

—Fargo (N. D.) Forum



## Radio Reception is only as good as its Tone Quality

VOLUME means nothing if it brings only distorted noise. Distance means nothing if you are not rewarded by tone quality.

Equip your set—no matter what type—with the Carborundum Stabilizing Detector Unit and you are assured of crystal clear tones—of a quality reproduction you have never before enjoyed.

The unit is built around the Carborundum Permanent Detector. No adjustments—no bothering with a jumpy cat's whisker. This detector is fixed under a five pound pressure—retains its super sensitivity—it won't burn out.

A booster voltage is supplied by a tiny dry cell and by a potentiometer control you adapt the unit to the circuit and receiving conditions.

Increases selectivity—gives greater distance and volume—but above all brings you true natural tones.

## THE CARBORUNDUM STABILIZING DETECTOR UNIT

Reg. U. S. Pat. Off.

### Improves Any Set

SEND FOR THE SPECIAL HOOK-UP BOOKLET

**\$3.50**  
IN U. S. A.  
DEALER OR DIRECT



Detector Alone  
**\$1.50**

THE CARBORUNDUM COMPANY  
NIAGARA FALLS, N. Y.

SALES OFFICES AND WAREHOUSES IN  
New York Pittsburgh Chicago Philadelphia Cleveland  
Detroit Cincinnati Boston Grand Rapids Milwaukee  
The Carborundum Co., Ltd., Manchester, Eng.

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.

The Carborundum Company  
Niagara Falls, N. Y.

Please send free Hook-Up Book D-5

Name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

# Corbett's Cabinets and Consoles for LC-27

## PRICES MODEL "C" 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.

Sizes	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.  
†For Victoreen.

\*Shipping charges prepaid—

"Write for folder showing complete LC-27 line and other Radio Furniture."



MODEL "C" CHEST

Model S-20-25  
COMBINATION CONSOLE.....\$60.00  
Model S-20  
CABINET only with baseboard.....\$27.50  
Model S-25  
TABLE only.....\$32.50  
Model S-20-25 is made of high quality five ply figured walnut only.

**CORBETT CABINET MFG. COMPANY**  
St. Mary's, Penna.

## How to Patent Your Radio Invention

(Continued from page 654)

of patents by the writer, gave some valuable advice to would-be inventors.

"The most practical way to establish beyond a doubt the date at which an inventor conceived an idea is to keep a notebook, summarizing all the work which he does from day to day. This should be a bound volume, not a loose leaf notebook. Whenever an idea is recorded which holds promise of being the basis for a future patent, it is important that the inventor discuss the idea with two or three friends who are capable of understanding it and in whom he has confidence. They should then sign the notes referring to that idea in the margin of the inventor's notebook, with some such statement as 'explained and understood by me,' together with a notation of the date they did so.

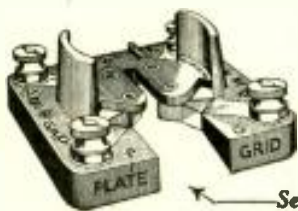
"Often an idea, which, at first, shows promise of but limited application, develops, and by means of a notebook, such as I have suggested, an inventor has an adequate legal record from the time he first conceived the basic idea. If an inventor waits until he fully appreciates the possibilities of an idea, especially in a subject upon which so many active minds are working, as radio, before he establishes by written record his date of conception, he may ultimately lose the patent as a result, even though he is, in truth, the first inventor."

It is interesting to note that Professor Hazeltine's mathematical exposition of the principle of neutralization was recorded in his laboratory notebook and that this original working out of the problem was very valuable in establishing the priority of his invention. This page from his notebook is reproduced with this article.

Another method of establishing your date of conception is to write yourself a letter, preserving a carbon copy, describing the device in full. Seal this in an envelope with sealing wax and mail it to yourself by registered mail. The record of its acceptance by the Post Office establishes the date without question. Upon its receipt, do not open the letter, but keep it sealed. File it in a safe place, attaching the carbon to the envelope. If it is ever required to establish your priority, see that the seal is broken in court under conditions prescribed by a lawyer. Of course, if the seal is broken without adequate legal witness, it can be contended that the description was not in the envelope at the time it was registered.

If you have conceived what seems to be a patentable idea, by all means establish in written legal form, through an affidavit or by the means herein described the date upon which you

### It Gets That Last Mile



The New  
U. X.  
Universal  
60c

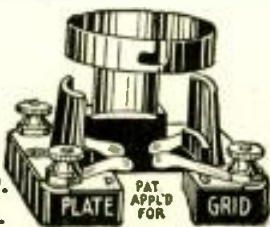
See that Gap?

**AIRGAP SOCKETS** will rid your set of those squawks, howls and frying noises due to socket capacity; they keep your grids negative, stabilizing your circuit, causing tube to go into oscillations more smoothly and not "spill over" until maximum results are obtained.

## The AIRGAP SOCKET

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.

Sent direct post-paid if your Dealer cannot supply you.



**AIRGAP PRODUCTS CO.**  
11 Campbell St.  
Newark, N. J.

U. V. 1-A Type 75c

## Build your LC-27 and all popular receivers!

### 100% Ready to Wire Knockdown Kits Save almost 100% Valuable Time

Pay No More!

**YES!** This is our own accomplishment. It makes radio building a pleasure. You can now build the most complicated receiver in less than one quarter the time. With our kit all that is left for you to do is to connect the accurately numbered wires to their terminals. All guaranteed parts are already perfectly mounted on veneered mahogany baseboard and genuine bakelite engraved panel.

You Pay No More!

Cooperative buying direct for the consumer enables us to sell factory built sets, speakers, eliminators and knock-down kits at lowest in the country prices.

Before You Buy—Write

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**Consumers Service Cooperative Ass'n**

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conceived the idea. Then apply the four questions which determine whether the idea holds a promise of profit, given in the beginning of this article. When the idea is sufficiently definite that you can show a working model or practical drawing so that it can be made by another, consult a patent lawyer. Select one who has had experience in drawing patents on similar devices. Patent lawyers of repute are usually specialists in some one field, such as radio, traction and automotive, for example. Use the same care in finding a reputable lawyer as you would in seeking a physician to perform a difficult operation. Inventors are usually careless about selecting legal, financial and sales assistance. A skillful and experienced lawyer can often extend the scope of a patent, greatly increasing its ultimate value.

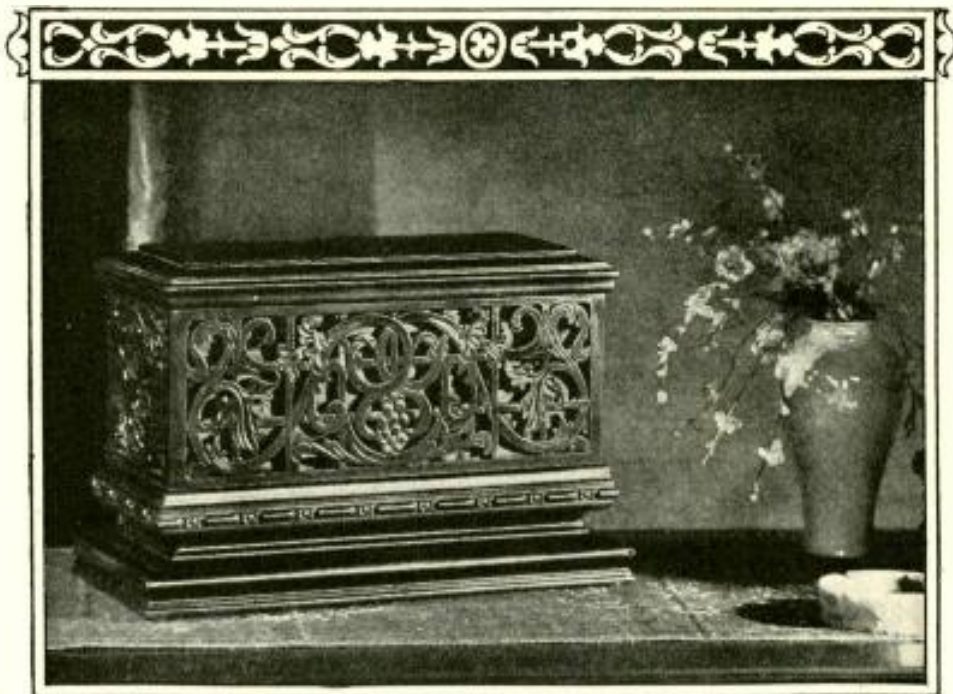
If the preliminary search, which costs from ten to twenty-five dollars, does not reveal any interfering patent, specifications are then drawn up which consist principally of a description of the device, drawings sufficiently clear to enable one skilled in the art to construct the device and a series of claims which set forth what the device proposes to accomplish. With the filing of this document at the Patent Office, a fee of fifteen dollars is required. It is now examined by the Patent Office examiners who bring to the attention of the patent lawyer any patents or applications which appear to conflict with it. These may require modifying amendments to your application or further affidavits to establish priority until all the objections of the Patent Office are met.

Notice of the allowance of the patent is then sent by the Patent Office and an additional fee of twenty dollars is due which must be met within six months or the application lapses. Astute inventors sometimes permit as much of this period to pass as possible because it, in effect, lengthens the useful life of the patent. Usually, within a month or two after the twenty dollar fee is paid, the patent is granted, effective for seventeen years after the date of issuance.

The granting of the patent is not, as is often supposed, a guarantee on the part of the government of the inventor's priority or possession of the patent monopoly. As a matter of fact, it gives you little more than the right to sue and to be sued in defense of the patent. The famous Selden patent, covering the use of an internal combustion with a wheeled vehicle, was contested almost to the day of its expiration.

Foreign patents must be filed before the U. S. patent is granted, but not more than one year before application is made in the United States. In many foreign countries, publication of a description of a device makes it impossible to secure a patent on it.

Patents may be assigned to another



The Amplion Patrician encloses a remarkable 48" air column, in a graceful, richly carved mahogany cabinet, 18"x12"x9". Acoustically it is non-directional, with a new, softly diffused mellowness of tone that makes this instrument the choice of the connoisseur, wherever heard, AA 18.....\$45.00

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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.

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person or a corporation and the inventor and assignee thereby become co-owners. Either of them may prosecute infringement. Licenses to manufacture your patents may be granted without assignment. Sometimes two inventors work out a patent and a patent may be granted to them jointly.

We have set forth in some detail many conditions which must be met before a patent can be obtained and before profit may be realized from it. Indeed they are a formidable array of conditions, sufficient to cool the ardor of the most enthusiastic would-be inventor. Recall that two out of three applications are rejected and that only one out of a hundred patents yield a profit. Obviously this high mortality of inventive effort makes it worth while to consider exhaustively all of the many conditions which must be faced. Appreciation of these problems may prevent the expenditure of hardearned money uselessly in an effort to secure patents on impractical devices.

Fortunately, to those who successfully clear all these hurdles, the opportunity for profit and distinction offers adequate compensation for the thought, effort and expense that are involved.

### How to Select Your Radio Parts

(Continued from page 648)

slightest play will certainly cause trouble in the future if not from the start.

**Fourth:** Be sure that the insulation between the rotor and stator is located away from the shaft. While this is not a factor which will cause a great deal of trouble, it is usually possible to get one which has this feature. Many good condensers have a bakelite end piece and are of very low loss design.

**Fifth:** See that the proper mounting screws are included with the condenser. This little factor will save a lot of trouble when the receiver is being assembled. The center hole mounting condensers are usually the best as there is no strain placed upon them if the hole should happen to be off a little, or the panel not quite true.

The question as to whether a straight-line-wavelength, or a straight-line-frequency, or a combination is to be used is up to the individual; there is no difference in the results obtained except that the straight-line-frequency, or combination, is usually slightly easier to tune. There will be no difference in the selectivity.

It is often possible to get the straight-line-wavelength, or the straight-line-capacity condenser at a very reasonable figure and if the design is correct, as indicated in the preceding lines, the builder need not have any hesitation in getting them.

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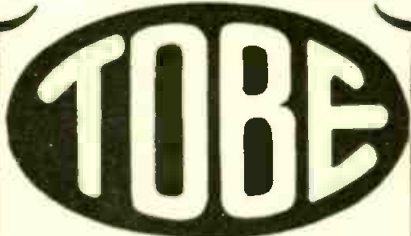
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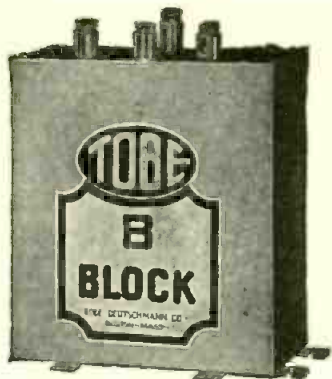
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When a loop of the finest available electrical and mechanical construction is required, the TOBE DTW Folding Loop, with its genuine Litz wiring, its four taps and beautifully finished frame, is still supreme. For Superheterodynes, Neutrodyne and other types of loop sets—the loop that is an ornament to any Radio installation.



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### How to Select By-Pass Condensers

The question of a by-pass condenser is merely a matter of procuring the correct sizes; almost any mica or bakelite-impregnated condenser will give good service. There is only one point to watch out for; get one that is mechanically rugged, so that the capacity will not change while in use. Cases have been found where the construction was so poor that the capacity was changed materially by merely pressing on the condenser.

### How to Choose Rheostats

Rheostats should be chosen from a standpoint of resistance, as this is the factor which controls the heating of the filaments by regulating the voltage.

Mechanical construction should again be the determining factor in the choice. See that the shaft does not fit too loosely and that there is good contact between the shaft and the binding post. A spring washer is usually preferable to a contact made only by the shaft in the bearing. Also see that the contact arm makes a sure connection and is not flimsy. The resistance wire should be wound on evenly and the contact should slide along without any perceptible hitches. The question of size sometimes enters into consideration, as rheostats are obtainable in sizes from slightly over an inch in diameter up to three inches.

### How to Select Transformers

The question of an audio transformer is an important one, as it probably has more to do with the quality of the music obtained than any other one factor. It is better to skimp on some other part of the receiver such as the cabinet, for instance, than on the audio-frequency transformer.

The larger and more expensive the transformer, the better are its operating characteristics, due to certain elements of the design. It is safe to advise the experimenter to get a transformer of ample size. The ratio is not so important as it has been found that the lower ratios usually give better results than the extremely high ratios which were in vogue a few years ago.

The mechanical layout should also be considered to some extent. A shield is a good thing, but is not essential from an electrical standpoint; it does, however, prevent the windings from being damaged readily. (A note might be made here that transformers should not be substituted in any reflex circuit, as their constants vary to some extent and would no doubt make the circuit give results entirely different from the original model.)

### How to Select Resistance Coupling

Here again the sizes of the resistors and the connecting condensers are im-

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portant. There are many inferior resistance units on the market and probably the only way to choose them is by buying standard makes which have proven their worth in actual use. These resistors must carry a certain amount of current and many of them become defective after a short time in use, or the resistance changes or they become noisy. A poor resistor will cause a noise in the receiver very much like static that is extremely annoying and usually hard to locate.

### How to Choose Sockets

In choosing a socket, care should be exercised to see that the springs make good contact with the prongs of the tube. This is very important.

The springs should be tested by bending for quite a distance more than they would normally be bent by the tube; if they come back to the original position, or at least very nearly so, they are all right.

The composition upon which the springs are mounted should be of bakelite or some other high insulating material. If the edge of the socket makes a mark on a piece of paper, the material is probably made of some lampblack compound and should be avoided.

A spring-mounted socket is sometimes desirable especially when the smaller dry-cell tubes are to be used. Only the best of this type should be used.

### How to Select Jacks and Switches

Both jacks and switches should be looked at principally from a mechanical standpoint. A plug should be tried in the jack and there should not be too much play between them. Springs should be tested in much the same manner as with the socket. A poor contact in the jack will cause a lot of trouble after the receiver has been in operation a few months.

There are many good jacks on the market and their cost is in most cases reasonable in price. If the short type of jack is obtained, be especially watchful of the springs.

Switches are sometimes made in the form of a jack operated by a cam. The springs should be fairly heavy in order to insure good contact. It is hard to judge in the enclosed types whether there is a good contact or not and it is better to depend upon the name of the manufacturer in a case like that.

### How to Choose Insulating Tubing

If the wiring of the receiver is such that insulating tubing is required, the only safe way is to buy the best. The expense of the tubing is not great in comparison with the rest of the apparatus used, and there is no excuse for getting a poor grade.

Leaky insulation causes a lot of



"Bird's-eye" view of the new two-dial hook-up of the Daven Bass Note Circuit.

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Parts exactly as used by Author **\$65.20**

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Aerial, Tubes and Batteries, of course, not included.

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trouble and the outcome may be anything from a burnt-out tube to a serious fire.

### How to Choose the Panel

The panel may be a conductor, such as brass or aluminum, and may act as a shield. If a metal panel is used, be sure and get at least No. 16 gauge, and heavier material is to be preferred. If metal is not used, a panel should be obtained of some good insulating material which will hold its shape and color through a long period of time. Here again it is better to go by standard trade marks as there are few indeed who can rightly judge panel materials without extensive tests.

Hard rubber of a good grade makes an excellent panel, while the cheaper grades gradually lose their luster and turn yellow or brown with use. There are many other panels of trade-marked names which will give excellent service.

It is well to remember that there is no halfway ground. The panel should be a good insulator or a good conductor.

### How to Select the Cabinet

The cabinet is more or less a matter of taste on the part of the builder. It does not matter what kind of wood or what kind of finish is used, nor does the size matter, so long as it is enough to take care of the desired apparatus. It cannot be too strongly urged, however, to have a cabinet of some kind, as it does not take long for dust to settle on an open receiver and cause trouble through leakage paths for the high frequency currents. The cabinet should be well made and the cover should fit snugly so that the chance of dirt getting in on the apparatus is minimized.

There are many unscrupulous dealers in radio materials who will, no doubt, try and sell the buyer something "just as good" as the article called for. But with these short instructions the buyer ought to have a better understanding of what may be substituted in the various hook-ups without endangering the practical, serviceable features of the finished receiver.

BULL fights in Spain are now broadcast by radio.

"My wife gave me a two-tube set for my birthday."

"Regenerative?"

"No. Shaving and tooth!"

—American Legion Weekly

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—Collier's

Statement of the ownership, management, circulation, etc., required by the act of Congress of August 24, 1912, of POPULAR RADIO, published monthly at New York, N. Y., for October 1, 1926, State of New York, County of New York.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Douglas H. Cooke, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the POPULAR RADIO and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit: 1. That the names and addresses of the publisher, editor, managing editor, and business managers are: PUBLISHER POPULAR RADIO, Inc., 627 West 43d Street, New York City, N. Y.; Editor, Kendall Banning, 627 West 43d Street, New York City, N. Y.; Managing Editor, None; Business Manager, Douglas H. Cooke, 627 West 43d Street, New York City, N. Y. 2. That the owner is: POPULAR RADIO, Inc., whose stockholders are: Laurence M. Cockaday, 627 West 43d Street, New York City; Kendall Banning, 627 West 43d Street, New York City; New Fiction Publishing Corporation, 627 West 43d Street, New York City, whose stockholders are: Douglas H. Cooke, 627 West 43d Street, New York City; Vernal H. Bates, 46 George Street, New Haven, Conn.; Wiley Blair, 4607 Ross Avenue, Dallas, Texas; Harold B. Emerson, 9 East 40th Street, New York City; Estate of William Green, 627 West 43d Street, New York City; \*Harris Corporation, 34 Pine Street, New York City; \*The Roy Sargent, St. Petersburg, Fla.; Abel I. Smith, 120 Broadway, New York City; Louis H. Strouse, Samuel Falk and Frank C. Fisher, Trustees in bankruptcy of Metropolitan Finance Corporation, 9 East 40th Street, New York City. \*Harris Corporation with the following as Trustees in dissolution of Harvey Flak & Son (1921) now dissolved: John Donovan, 30 Church Street, New York City; Harvey Flak, 34 Pine Street, New York City; Joseph M. Shellabarger, 30 Church Street, New York City. 3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: NONE. 4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. Douglas H. Cooke, Business Manager, Sworn to and subscribed before me this 17th day of Sept., 1926. Joseph T. Cooney, Notary Public, New York County. (My commission expires March 30, 1928.)

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Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_



## It doesn't take a battery expert to buy the best battery

ANYONE who walks into a radio store and asks for a Prest-O-Lite Storage Battery is making as wise a purchase as any battery expert could make.

The name "Prest-O-Lite" stands for storage batteries made by a company that for more than twenty years has rigidly maintained the highest standards of manufacturing skill and honest workmanship.

Prest-O-Lite Radio "A" and "B" Batteries have been perfected especially for radio use, in the world's largest electro-chemical research laboratories.

They are not only made to give you long years of service, but they can be depended upon to deliver their rated ampere-hour capacities. These two qualities constitute the real measure of battery value, and hours of radio pleasure result.

Prest-O-Lite Radio 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.

### Send for free booklet

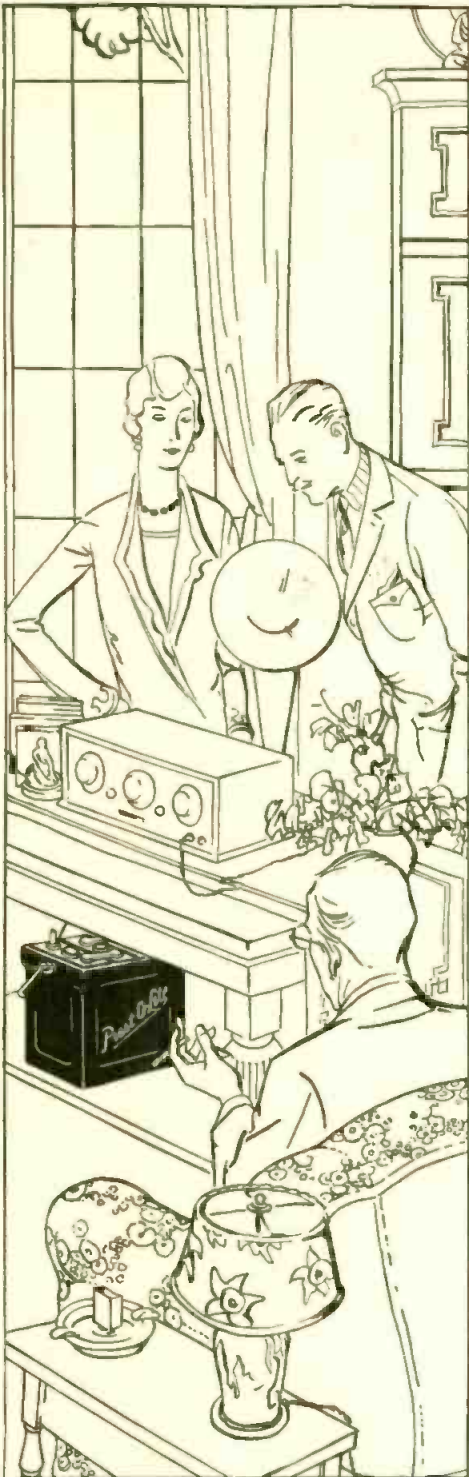
"What every owner of a radio should know about storage batteries" is a little booklet which every radio fan will find interesting and helpful. It is crammed full of hints that will bring surprising radio results—and save you money. It's yours for the asking, without obligation.

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

New York

San Francisco

In Canada: Prest-O-Lite Company of Canada, Ltd., Toronto, Ontario



Designed especially for radio



# Prest-O-Lite

STORAGE BATTERIES FOR  
MOTOR-CARS AND RADIO

# Permanent ACCURACY!

Metal long has been recognized as the best of electrical conductors. Because of metal, Lynch Metallized Resistors give *conductive, non-arcing* resistance that does not break down nor change in resistance value in the acid test of time.



Steel sky-scrapers withstand the ravages of time where crumbling cottages once stood. Lynch Resistors are impervious to moisture, do not change in resistance value and prove themselves in the exacting tests of time and service. The concentrated metallized deposit one-thousandth of an inch thick upon a core of glass is sealed forever within the tube.

Arthur H. Lynch



PRICES:—  
 .25 to 10 Megohms .50  
 above .01 to .24 " .75  
 .001 to .01 " \$1.00  
 Single Mounting .35  
 Double .50

**T**HIS better-built product—the result of years of research and experiment—has won the endorsement of leading engineers, experimenters and test laboratories because it is warranted absolutely noiseless, permanently accurate, dependable!

If your dealer cannot supply you, we will ship by mail, postpaid, same day order is received—and Lynch products are sold on a money-back guarantee.

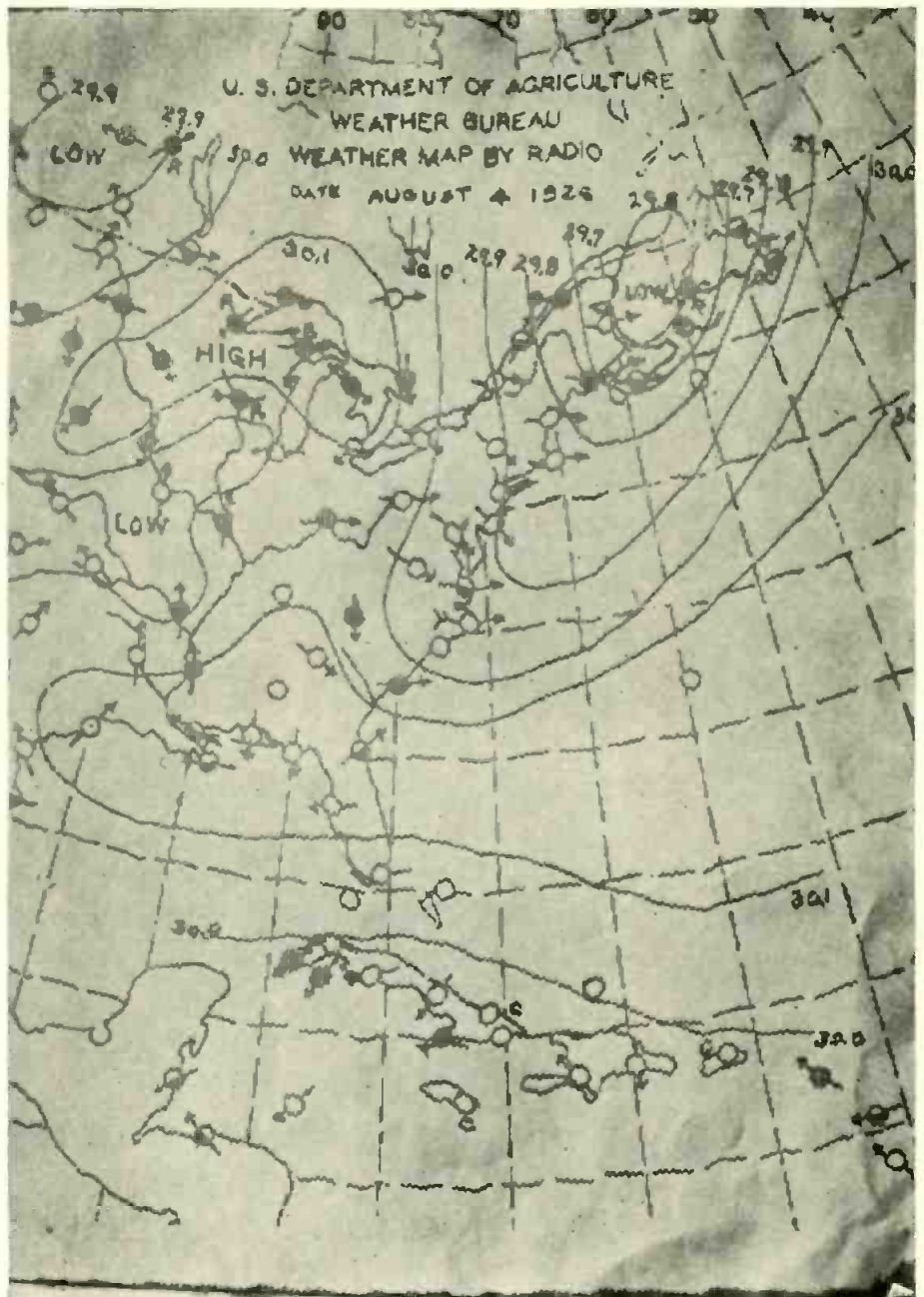
Dealers—Write us!

ARTHUR H. LYNCH, Inc.  
 Manufacturers of Radio Devices  
 Fisk Bldg., Broadway & 57th Street  
 New York, N.Y.

# LYNCH METALLIZED FIXED RESISTOR

## Radio Transmits Weather Maps to Ships

(Continued from page 655)



Jenkins Laboratories

### THE WEATHER MAP AS IT IS RECEIVED

*This is made up of the short strokes of a pen actuated by the electrical impulses received by radio; the blotches on the map are caused by bursts of static.*

rotation under the pen and ink device, has the incoming radio signals converted into ink dots to build up the picture which was sent out by Arlington. The only machinery additional to the ordinary continuous wave transmitter and receiver are two attachments shown in the illustration; these instruments are about the size of an ordinary typewriter, and have something of the appearance of the old time phonograph.

Experience will determine whether or not it will be necessary to repeat each map transmission. Static often causes incomplete reception of code weather forecasts; it does not, however, detract from the accuracy or completeness of the weather maps transmitted by radio vision, as the static merely appears on the received map as dots, or at the

most, blotches which are not sufficiently large to render the map unreadable to any important extent.

Mr. Jenkins has loaned the Navy Department two radio vision receivers for the purpose of the tests. These receivers have been installed on the cruiser *Trenton* cruising in New England waters, and to the naval transport *Kittery*, which makes regular trips between Norfolk and the West Indian ports. These ships will intercept the weather maps transmitted by Arlington daily, and will make reports of their success with the device.

In addition a radio vision receiver has been installed in the forecasting division of the Weather Bureau, in order that accurate check of maps that have been broadcast may be made.

# ACTUAL SIZE BLUE PRINTS

Priced at \$1.00 Per Set —

LAURENCE M. COCKADAY has personally supervised the preparation of *Simplified Blueprints* of thirteen of POPULAR RADIO's most popular circuits. Each set consists of one or more *Actual Size Blueprints*: first a Panel Pattern; second, an Instrument Layout; and third, a Picture Wiring Diagram all simplified in the fullest sense of the word because

The panel Pattern can be laid on the panel and all holes drilled as indicated. No scaling to do and so accurate there is no danger of ruining the panel through faulty calculation.

The Instrument Layout placed on the sub-base permits you to indicate by pin-pricks the exact location of every screw.

The Picture Wiring Diagram gives every instrument in exact size, and position with every wire clearly indicated from one contact to the other. With no knowledge of radio symbols you can assemble every part and complete your wiring with no chance of error.

Set No. 4—"Cockaday 4-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).

Set No. 6—"The Cockaday 8-Tube Super-heterodyne Reflex Receiver" (eight tubes, two tuning dials, loop, non-radiating, distortionless, as described in January 1925 issue of POPULAR RADIO).

Set No. 12—"8-Tube Super-heterodyne with Single Control" (as described in October 1925 issue of POPULAR RADIO).

Set No. 13—"Raytheon Plate Supply Unit" (a really dependable method for obtaining a "B" source of supply as described in November 1925 issue of POPULAR RADIO).

Set No. 14—"The LC-36 Broadcast Receiver" (as described in December 1925 issue of POPULAR RADIO).

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).

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. 21—"The Improved Brooming-Drake Receiver" (as described in the August, 1926, issue of POPULAR RADIO).

Set No. 22—"The LC-27 Broadcast Receiver" (as described in the October, 1926, issue of POPULAR RADIO).

Set No. 23—"The LC-Senior Power-Pack" (as described in the November, 1926 issue of POPULAR RADIO).

Full constructional and parts details for these Receiving Sets will be found in the issue of POPULAR RADIO indicated. Back issues of POPULAR RADIO will be furnished at the rate of 35c a copy.

## POPULAR RADIO

Department 114

627 West 43d Street, New York

POPULAR RADIO, Inc., Dept. 114,  
627 West 43d St., New York City

Date.....

Enclosed is my remittance of \$.....for which kindly send me Blueprint Set (S) consisting of Panel Pattern, Instrument Layout and Wiring Diagram as checked below:

- |  |  |
|--|--|
| <input type="checkbox"/> Set Number 4  | <input type="checkbox"/> Set Number 16 |
| <input type="checkbox"/> Set Number 6  | <input type="checkbox"/> Set Number 17 |
| <input type="checkbox"/> Set Number 12 | <input type="checkbox"/> Set Number 18 |
| <input type="checkbox"/> Set Number 13 | <input type="checkbox"/> Set Number 19 |
| <input type="checkbox"/> Set Number 14 | <input type="checkbox"/> Set Number 21 |
| <input type="checkbox"/> Set Number 15 | <input type="checkbox"/> Set Number 22 |
| <input type="checkbox"/> Set Number 23 |  |

Name.....

Address.....

City.....State.....

... this  
is the trend  
of Radio Progress

## SHIELDING



ALCOA



TRADE-MARK

Only the Genuine  
Bears this Mark

SHIELDING of radio receivers is the most notable feature of recent construction. Surprising improvements follow. ¶ Our exhibit of Aluminum Radio Shields at the Radio Shows created a sensation. ¶ Shields remove stray capacity and inductive coupling. ¶ They permit perfect stabilization. ¶ They eliminate interference by nearby circuits. ¶ Tuning controls can be reduced. ¶ Alcoa Aluminum Radio Shields are of virgin aluminum with the highest mass conductivity known.

## ALUMINUM RADIO SHIELDS

The Cockaday LC-27 uses Alcoa Aluminum Radio Shields. Now—another designer is using them—the Varion Receiver—marketed in kit form by the Morison Electric Supply Co., Inc., 15 East 40th St., New York City. Write them for hook-up and instructions, mentioning the ALCOA Shield.

## ALUMINUM COMPANY OF AMERICA

PITTSBURGH, PA.

Use the coupon. Get our new treatise "Aluminum Radio Shields" by Cockaday. Free, and our Research Engineers.

Aluminum Company  
of America  
Room 2321, Oliver Building  
Pittsburgh, Pa.

Gentlemen:

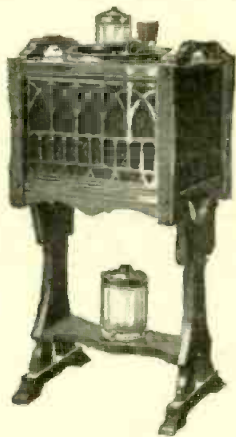
Please send me a complimentary copy of the booklet "Aluminum Radio Shields."

Name.....

Street.....City.....

What Circuit do you now use?.....

What one will you build next?.....



Announcing  
the first of a series of new models  
of

**TIMBRE TONE**  
REG. U.S. PAT. OFF.

Combined with the utility of a smoking stand is a loud speaker. Carry it about and have it where you want it—on the porch or along side of your easy chair.

Sales offices

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SAN FRANCISCO 311 Minna St.

Factory: **TIMBRE TONE MFG. CO.**  
Hoosick Falls, N. Y.

**Yale GROUND HOG**  
The Perfect Ground  
**INCREASES POWER AND DISTANCE**  
on your **RADIO**

Marvelous newly invented ground gives 100% improved reception. Increases power and distance, users say. Thousands getting results like D. S. Friedman, Radio Engineer of Burlington, Iowa, who writes, "Am very much pleased with way your Ground Hog operates. Am now able to tune in any good stations with little trouble from static." Everyone pleased and delighted. Users report, "Leaks stopped," "Static reduced," "end to jangling even in midsummer," "Results never dreamed of." Absolute satisfaction guaranteed or money back at once.

**Efficiency Always Insured**

Only ground on market that has power to draw and hold moisture thus assuring maximum efficiency at all times. Holds moisture indefinitely. Highly sensitive to radio energy. Proven valuable aid to clear, powerful distance reception.

**SEND NO MONEY**

Every radio owner needs a Yale Ground Hog. To introduce, we offer to those who act at once, regular \$5.00 size for only \$2.00. Send name today and pay postman \$2.00 plus 17c. postage on delivery, or send only \$2.00 with order and save postage.

**Highest Approval**



Tested and approved by Popular Radio Laboratory and other high scientific radio authorities. You can order direct today with absolute confidence of value and satisfaction.

**FREE**—Complete description of Ground Hog, proof of user satisfaction and full details of amazing special offer free on request—Send name today.

**Yale Specialty Supply Co.**

131 W. 5th St., Kansas City, Mo.



*The* **BEGINNER IN RADIO**

CONDUCTED BY ARMSTRONG PERRY

INTRODUCTORY NOTE

THIS department, which starts with this issue, purposes to give practical help and inspiration to the youngster—as well as to the oldster—who is just entering the fascinating and limitless field of radio experimentation. Readers are invited to send in reports of their experiments and bits of advice and information that are of interest to "the other fellow." The conductor of this new department, Mr. Perry, is known to boys throughout the country not only as a contributor to boys' magazines but as a radio expert as well; he was for some years in charge of radio activities in the Boy Scouts of America.

—EDITOR

**The Rewards Offered by Radio**

A FELLOW who shoots without aiming seldom hits anything—except possibly, an innocent bystander. When you use radio what do you aim at?

Here are some of the targets that radio users have aimed at and hit:

Kept up-to-date on dance music; took college courses; learned to enjoy and appreciate classical music; kept up with current events; caught market reports and made money by using the information; kept the home clocks and watches correct; learned about the new discoveries in science, art and industry; mastered the receiving set and made it deliver maximum distance, and quality; learned code and found out how government, commercial and amateur traffic were handled; learned to design and install radio apparatus; secured places in the Army and Navy radio nets; communicated direct by radio with amateurs in other lands; became a radio operator on a ship and saw the world without expense; became a broadcasting artist; became an operator at a broadcasting station; became a director of broadcasting; became a radio engineer.

Any of these objectives can be reached by a boy who will begin today to use the opportunity that radio gives him.

**Inspect Your Wire Connections**

WHEN a radio receiver loses its pep, in spite of good tubes and batteries, the trouble may be in the connections. Wherever wires are joined, or held by

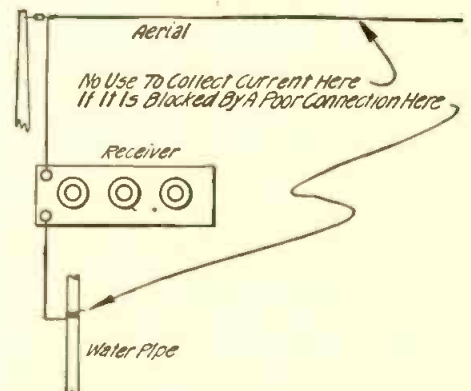
clips or binding posts, energy may be lost. Inspect every connection, from the antenna down to the ground. Clean joints with emery paper. Dampen a string with alcohol and run it through the holes in binding posts to clean the inside surfaces. Scrape the ends of connecting wires. Scrape the pipe or rod used for a ground connection until it is bright and fasten the wire or ground clamp securely to the bright metal.

Solder the joint. These precautions not only save losses but also help to eliminate noises.

**What Three Boys Did With Radio**

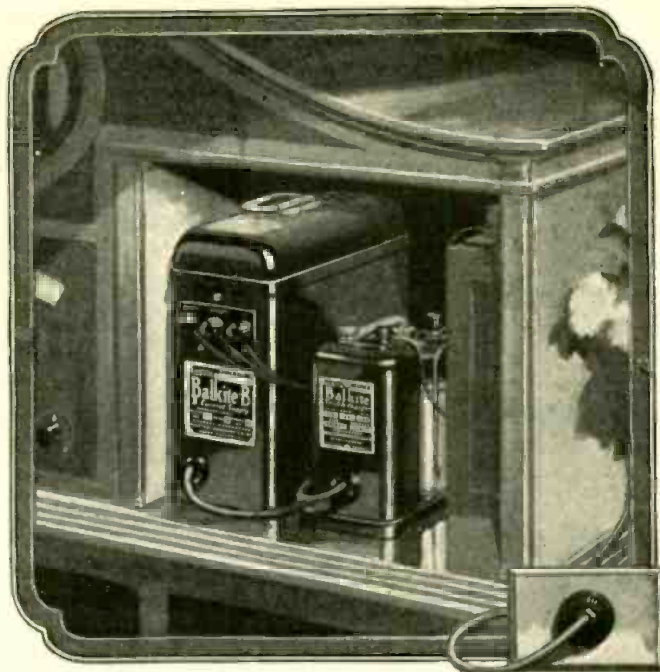
THERE is some encouragement in "ancient history." Here's some:

Harold Robinson, at sixteen, bought a radiophone guaranteed to transmit twenty-five miles; he worked at it until it was heard across the Atlantic ocean.

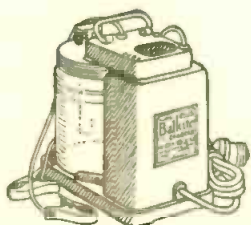


**INSPECT YOUR CONNECTIONS**

You can't expect to get good reception from the best antenna ever built if the connections to the ground or in your set are loosely and carelessly made.

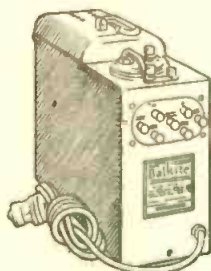


# The new Balkite "B" at \$27.50 and the Balkite Trickle Charger furnish all radio power from the light socket



## The New Balkite Charger

MODEL J. Has two charging rates. A low trickle charge rate and a high rate for rapid charging and heavy duty use. Can thus be used either as a trickle or as a high rate charger and combines their advantages. Noiseless. Large water capacity. Visible electrolyte level. Rates: with 6-volt battery, 2.5 and .5 amperes; with 4-volt battery, .8 and .2 amperes. Special model for 25-40 cycles. Price \$19.50. West of Rockies \$20. (In Canada \$27.50.)



## Balkite Combination

When connected to the "A" battery this new Balkite Combination Radio Unit supplies automatic power to both "A" and "B" circuits. Controlled by the filament switch on your set. Entirely automatic in operation. Can be put either near the set or in a remote location. Will serve any set now using either 4 or 6-volt "A" batteries and requiring not more than 30 milliamperes at 135 volts of "B" current—practically all sets of up to 8 tubes. Price \$59.50. (In Canada \$83.)

All Balkite Radio Power Units operate from 110-120 volts AC current with models for both 60 and 50 cycles. The new Balkite Charger is also made in a special model for 25-40 cycles.

The light socket is your most convenient source of radio power. Use it by adding the new Balkite "B" and the Balkite Trickle Charger to your radio set.

Balkite "B"—the unique "B" power supply—eliminates "B" batteries entirely and supplies "B" current from the light socket. The new Balkite "B"-W at \$27.50\* serves any set of 5 tubes or less requiring 67 to 90 volts. Balkite "B"-X at \$42\* serves sets of up to 135 volts and 8 tubes. Balkite "B"-Y at \$69 serves any standard set.

The Balkite Trickle Charger at \$10\* is probably the most popular of all chargers. Over 200,000 were purchased during one season and are now in service. Instead of operating intermittently at a high rate, it operates continuously at a low rate, thus automatically keeping the battery at full charge. In effect it converts your "A" battery into a

light socket "A" power supply. With 4-volt batteries it can be used as an intermittent charger, or as a trickle charger if a resistance is added.

Both Balkite "B" and the Balkite Trickle Charger are noiseless in operation. Both are permanent pieces of equipment, with nothing to renew or replace. Other than a slight consumption of household current, their first cost is the last. Both are built to conform with standards set by the Underwriters' Laboratories.

Over 650,000 radio sets are already Balkite equipped. Make yours a light

socket receiver too by adding these Balkite Units. Enjoy the pleasure of owning a radio set always ready to operate at its best.

\*Balkite Trickle Charger \$10.50 west of Rockies. In Canada, Trickle Charger \$15; "B"-W \$39; "B"-X \$59.50; "B"-Y \$96. Fansteel Products Co., Inc., North Chicago, Illinois.

### The Balkite Radio Symphony Concerts with WALTER DAMROSCH and the New York Symphony

These concerts will be broadcast every other Saturday Evening, beginning with October 23d. On intervening Saturdays Mr. Damrosch will give a piano lecture recital alone. At 9 P. M. Eastern Standard Time, over a group of 12 stations: WEAJ, WEEI, WGR, WFI, WCAE, WSAI, WTAM, WWJ, WGN, WCCO, KSD, WDAF.

FAN STEEL  
**Balkite**  
Radio Power Units



Tested and approved by Raytheon Laboratories

## Reliable—Noiseless Powerful

**R**IGIDLY tested, enthusiastically approved by radio experts and fully guaranteed. At last, reliable, constant, noiseless, uninterrupted power, right from your electric light socket, at a cost too small to be considered.

Double the pleasure to be derived from your receiving set with the

# Cornell Voltage Supply

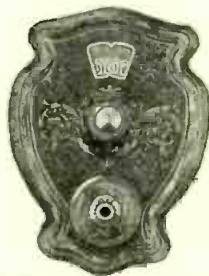
("B" Battery Eliminator)

Type B—137 to 220 volts at 30 milliamps., 150 volts at 60 milliamps., including Raytheon tube . . . . . \$39.50

Type CB—(illustrated above) 142 to 227 volts at 30 milliamps., 155 volts at 60 milliamps., including Raytheon tube \$49.00

West of Rockies add \$1.90 to above list prices.

Sold only through authorized Cornell dealers



**Beautify Your Set**  
With its deeply etched plate, this new attractive smooth friction, 9 to 1 vernier dial will beautify your set and make it a 1927 model.

List price - \$1.50  
Antique Gold Finish

CORNELL ELECTRIC MFG. CORP.,  
Annabelle & Rawson Sts., Long Island City, N. Y.  
Please send full information about your Cornell Voltage Supply; also name of nearest dealer.

Name \_\_\_\_\_

Address \_\_\_\_\_

If dealer, check here and receive special dealer proposition.

Everett Sutton, age fifteen, built a 5-watt outfit and hooked it to his mother's clothes line; one night he picked up signals from the MacMillan Arctic Expedition, established two-way communication, and for the first time in two months the explorers in the frozen north were able to send out messages to the waiting world.

Arthur Collins, age fifteen, kept the MacMillan Expedition of the following year in touch with the world for three weeks while experts failed.

Men could not have done better. The number of birthdays you have had matters little. The question is: What can you do?

\* \* \*

### Can You Read These Messages?

NAH NAH NAH DE KFYU KFYU KFYU QTF?  
KFYU KFYU KFYU DE NAH NAH NAH QTF 67 W 42 N.

This is not a puzzle, but just an ordinary message and answer such as you might pick up any night if you were listening in on 600 meters and understood code. Can you read it?

Some "ham" who has a call book and a list of the abbreviations used in radio communication can help you. Millions of dollars worth of property and hundreds of human lives sometimes depend upon the prompt handling of messages such as these.

\* \* \*

### What an Amateur's One-Tube Portable Set Did

IT WAS built and operated on the middle Atlantic seaboard. It used plug-in honey-comb coils and a .001 mfd. variable condenser with the rotor on the ground side.

The first night, the amateur heard two Chicago stations and one in Cin-

cinnati clearly. All New York broadcasting stations except one came in while a 50-turn coil was used. For 200-meter amateur traffic he used a 35-turn coil. Ship-to-shore traffic on 600 meters was received on coils of 75, 100 and 150 turns. Navy stations in Washington, Arlington, and New Orleans were QSA. A station in Norway, LCD, was logged. All these stations came in over an inverted "L" type aerial 76 feet long, 6 feet above the roof of a three-story building, badly shielded, connected in parallel with a triangle 60 feet on a side and open at one end. The set was grounded on a water pipe.

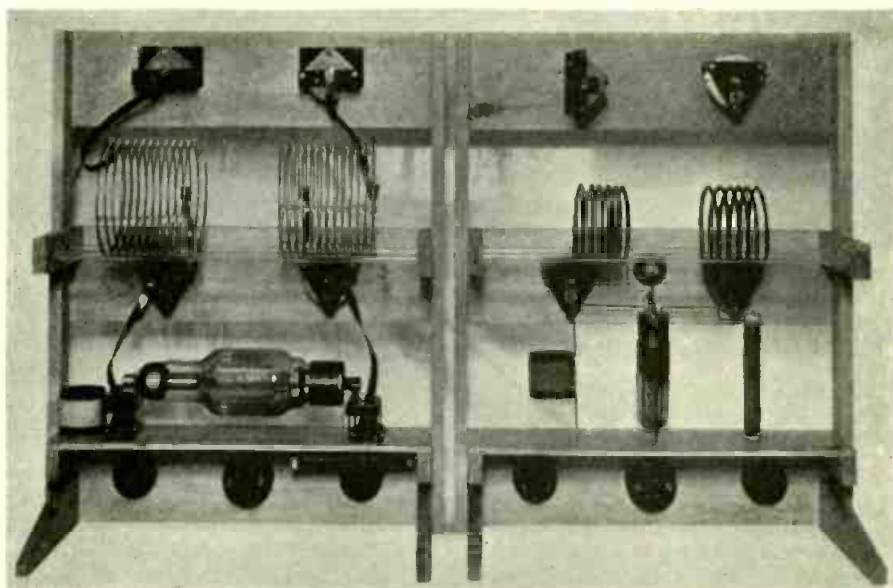
Experimenting with other antennas, this amateur brought in NAA, 200 miles away, with the bell wire circuit of the house. Local broadcasts came in without much volume on a 4-foot closed loop of four turns. Using an open loop and ground connection, NAA still came in well. With the bed spring as an antenna and the water pipe as a ground, local broadcasting stations could be heard clearly and NAA still could be copied.

\* \* \*

### The Use of Short Wavelengths by Amateurs

Amateur stations, many of them manned by very young operators, are covering greater distances than some of the high-powered, long-wave government and commercial stations. The amateurs are using short waves, below 100 meters, and tubes rated at from five to five hundred watts.

American amateurs are reaching brother hams on all the continents and most of the islands where amateur radio has a foothold. Nearly every night they may communicate with other boys thousands of miles away.



### AN HISTORIC TRANSMITTER MADE BY A BOY

These transmitters were built by Arthur A. Collins of Cedar Rapids, Iowa. With the larger one he handled all of the traffic of the MacMillan Arctic Expedition for 22 days while no other station was in touch with the explorers. His messages have been received in India, Australia and many nearer lands. He was fifteen years old when he made these remarkable radio records.

# Attention Dealers

Send for our  
200 page catalog



The finest and largest  
exclusive Radio Catalog  
in the United States

**Schneitter  
Radio Company**  
Dept. G  
St. Joseph :: Missouri

## Wonderful Volume with Clearness AMPL-TONE



**\$3.00**

Phonograph makers have spent years perfecting the acoustic properties of their phonographs. Use an AMPL-TONE Unit and make a real Loud Speaker in an instant or use it in your horn and get better results.

After all, speakers are as good as their unit. We make a real unit at a real price. Money gladly returned if you are not entirely satisfied.

We make units for other manufacturers.

The UNION FABRIC CO.  
DERBY, CONN.

Makers of the Excellent French AMPL-TONE Headset

Please send me an AMPL-TONE Unit for which I enclose \$3.00.

Name.....

Address.....

State.....

# Buy by the Name

*Success in Set Building  
Begins at the Dealer's Counter*



**Cle-Ra-Tone**  
Spring Supported—Shock  
Absorbing Sockets  
Stop tube noises. Greatest  
aid to non-noisy operation.  
Contacts always clean.  
75 cents each

ALL BENJAMIN RADIO PRODUCTS ARE  
OF THE SAME HIGH STANDARD AS  
THE FAR-FAMED CLE-RA-TONE SOCKETS

When you buy your radio parts, buy them right. Everything else being equal, when a name has stood for a quarter of a century's striving toward technical perfection it is practically as safe as a formula as a guide to right buying. When your dealer sells you Benjamin radio products for your set you have already leaped a big hurdle on the way to success.



### "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 Transformers, \$2.50



### Brackets

An aid to simplification in set construction. Supports sub-panel, with room underneath for accessories and wiring. Plain and adjustable.

Plain, 70 cents per pair  
Adjustable, \$1.25 per pair

### 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 "pickup."

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



### 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 dial. Stations come in without interference, and tuning is much easier. Adjustable turning tension. Low loss characteristics give a definite and distinct radio reception. Beautiful in appearance—a credit to the looks and efficiency of any set. Finished in dull silver. Made in three sizes:



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

*If your dealer cannot furnish you with Benjamin Radio Products send amount direct to our nearest sales office with his name and we will see that you are promptly supplied*

## REWARDS FOR RADIO REASONERS

Awards for novel and original hookups, modifications of existing circuits; trade names; slogans. Write our nearest office for full details.

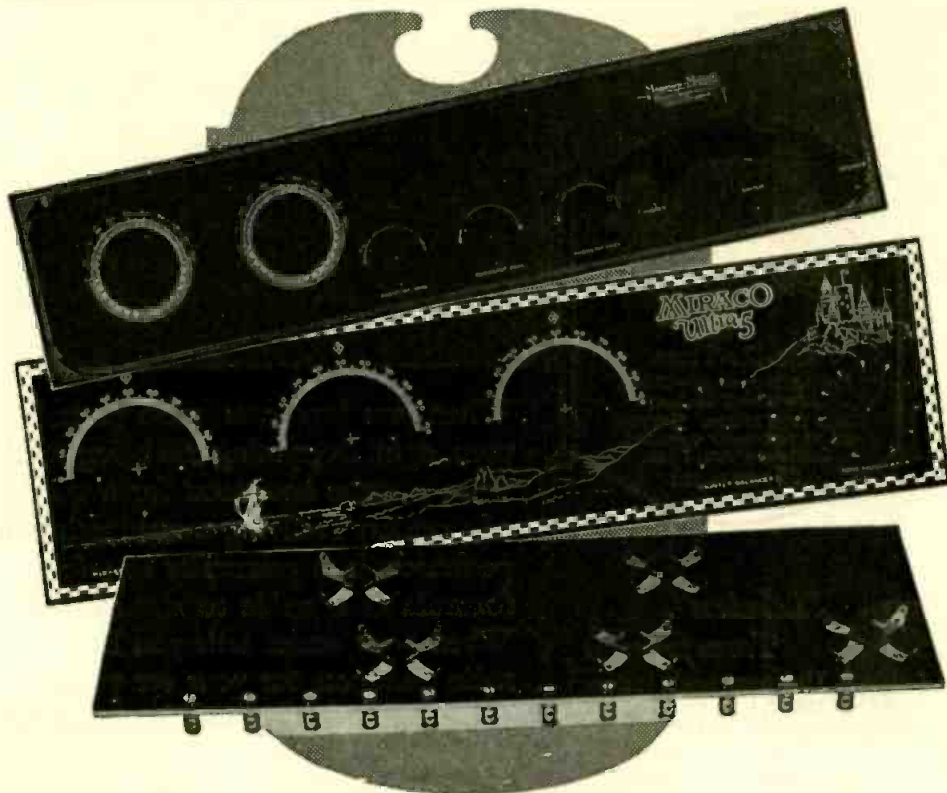
# Benjamin Electric Mfg. Co.

New York  
247 W. 17th Street

120-128 South Sangamon Street  
Chicago

San Francisco  
448 Bryant Street

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



**The Popular Kit Panels**

FORMICA panels in gloss black finish Veri Chromed in Gold are the popular panels or kits that are offered by leading manufacturers: Bremer Tully Counterphase; Browning-Drake National; General Radio Universal; Victoreen Superheterodyne; Madison Moore Superheterodyne; Camfield Duoformer; Aerodyne Five Tube; St. James 8 Tube; Karas, front and sub panel; and Infradyne.

**THE FORMICA INSULATION COMPANY**

4641 SPRING GROVE AVENUE

CINCINNATI, OHIO

Hear the FORMICA Orchestra Tuesday evenings from 9 to 10 over station WLW.



Formica has a Complete Service on Insulating Panels and Parts for Radio Manufacturers

**Winding a Low-Wave, Low-Loss Coil**

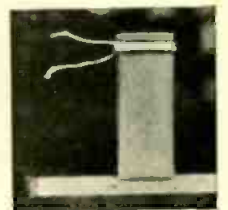
1. Start with a spool of No. 22 double silk-covered wire and a box about three inches square at the ends.

2. Wind the desired number of turns near the end of the box. If wound carefully, the turns will lie close together. Coils of from two to six turns are used in some low-wave receivers.

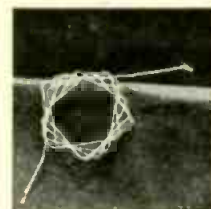
3. Remove the coil from the box. The wire will show a tendency to uncoil, instead of retaining its square shape.



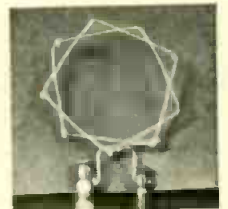
NO. 1



NO. 2



NO. 3



NO. 4

4. Bring together the corners on alternate turns and tie them with thread, making a coil of regular design. Bent wires may be straightened with a small pair of pliers. Attach the ends to binding posts placed wherever the design of your receiver requires. The coil needs no other mounting.

\* \*

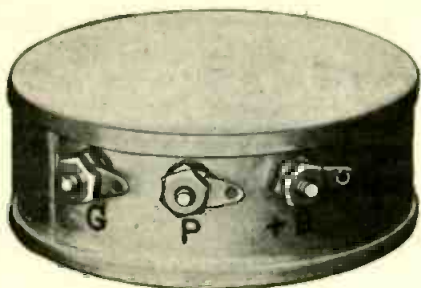
**Keep Notes on Your Experiments**

EVER think you would like to be an inventor and make a million dollars?

The article in this issue on "How to Patent Your Radio Invention" gives advice that you ought to read. School teachers are always insisting on notebooks which sometimes become a pest to pupils; this article shows that the habit of keeping notebooks saved Prof. Hazeltine, inventor of the neutrodyne receiver, patent rights worth \$1,500,000. (It might be worth while to leave out of our diaries some of the stuff about girls and jot down a real idea or two.)

The article at first seems discouraging; it shows how many things may stand in the way of securing a patent. Also that a patent gives only the right to sue and be sued, and that the invention even though patented, may be worthless. On the other hand, the illustrations show men like De Forest, Dubilier, Donle, Latour and Fessenden who started with less chance than we have today and made millions from patented inventions. If youth stopped at obstacles there would be no football games this fall.

So, keep notes on your work.



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



12 Cells  
24 Volts

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

**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 (95 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**  
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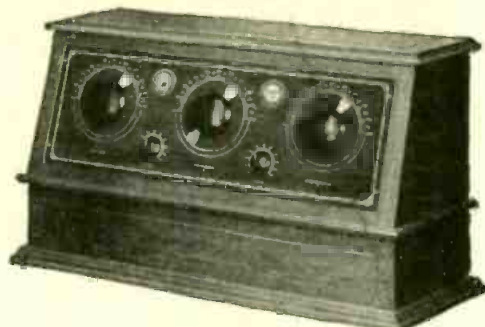
Makers of the Famous World Radio "A" Storage Battery  
Prices: 6-volt, 100 Amp. \$10.50; 120 Amp. \$12.50; 140 Amp. \$13.25.  
All equipped with Solid Rubber case.

**World STORAGE BATTERIES**

Set your Radio Dial for the new 1000-watt World Storage Battery Station. W.S.B.C. Chicago. Always something interesting.

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**\$132.50** F. O. B. Chicago. Ozarka Senior 5 Tube Model complete with Loud Speaker and all accessories. Also built in a 7 Tube Model



**\$100** F. O. B. Chicago. Ozarka Junior 5 Tube Model complete with built-in speaker and all accessories.



**\$215** F. O. B. Chicago. Ozarka Console 5 Tube Model, solid walnut cabinet, complete with all accessories. Also built in a 7 Tube Model

**We have a few Openings for the Right Men**

**W**HILE there are today 4364 Ozarka representatives, some territory is still open. We want men who believe in the future of radio—men who are tired of working for some one else—men who would like to add to their present income by devoting their evenings to Ozarka.

At the start you can keep your present position. Later on, after you have proven what you can do, then you will give us all your time because it will pay far more than your present position.

The man we want may not have much money but he is not broke. He has lived in his community for some time—he has a reputation that his word is good. He may not have made any startling success but he has never "put over something" just to make money. He may know nothing about radio or salesmanship but he will be successful if he is willing to study what we are willing to teach him, without cost.

The field in radio is wide open for the trained man. The success of the 4364 Ozarka representatives proves what men can do. If you are interested, ask for a copy of the Ozarka Plan, a 100 page book which tells a true story of how big money and a permanent business can be built in radio. It is a story of life; of why some men fail while others succeed. This book has shown many men how to start making extra money immediately and within a very short time establish a business of their own.

# Many will Start ~ But Few can Finish

**I**N the development of the radio industry, many have started but only those will finish who are building on a foundation of service which will stand.

**I**T is one thing to sell a radio instrument but quite a different matter to keep that instrument working perfectly in your home. Any new radio should deliver satisfaction but only trained service will keep it doing so—

In the rapid development of the radio industry the demand has been, in the past, generally more than the supply. It is only natural that little, if any, attention should have been paid to the one most vital requirement—trained service.

Four years ago Ozarka Inc. recognized the necessity of service—trained service, with the result, that now we have a trained service organization of 4364 men. One of these men is near you, ready and willing to deliver Ozarka service.

These men are not radio wonders who know all about all radio instruments. They make no claim to be able to service any radio

instrument but they do know the Ozarka perfectly.

Radio is no different to any other mechanical device—sometimes little things will go wrong, serious to the owner, but very easily and quickly repaired by a trained service man who knows that instrument as he should.

In the mad rush of selling radio very little, if any, attention has been paid to service. A trained service organization requires time to develop and train—it has taken us four years to train 4364 men, who today constitute the Ozarka service organization.

Ozarka instruments are only sold by these trained service men by demonstration in your home—the only place where you can decide what a radio should do.

The Ozarka representative will gladly set up an Ozarka in your home. He will not operate it but let you do all the tuning. Only in this manner can you decide if its tone, volume and ease of tuning is what you expect of a radio. Bring in station after station until you satisfy yourself of what it will do for distance, then discuss with him the most important matter of all—service—trained radio service.

# OZARKA

INCORPORATED

120 Austin Avenue D

CHICAGO, ILL.

# Elliott's

59 Corlandt St. Y. N. City

**RADIO DEPARTMENT**

**Sr. POWER PACK \$65.20**

Write to us for LC-27 Parts!

- 1—Hammarlund mid-line dual condenser, .000275 mfd. \$7.50
- 1—Hammarlund mid-line single condenser, .000275 mfd. 4.65
- 1—Precision Duo-Octaform coil set comprising one antenna coupler and two interstage couplers. 10.50
- 1—Amertran De Luxe first-stage audio-frequency transformer. 10.00
- 1—Amertran De Luxe second-stage audio-frequency transformer. 10.00
- 1—Amerchoke No. 854. 6.00
- 1—Dubilier No. 902 filter condenser, 4 mfd. or Tobe No. 604 filter condenser 4 mfd. 5.50
- 1—Dubilier No. 907 filter condenser, 1 mfd. .60
- 1—Mar-Co illuminated control, scale 0 to 100. 3.50
- 2—Mar-Co small controls especially for LC-27, scale 0 to 50 and 50 to 0. 1.50
- 1—Carter battery switch. 65
- 1—Samson radio-frequency choke coil No. 85. 1.50
- 3—Aerovox Condensers .00025 mfd. 1.05
- 1—Durham resistor, 4 megohms. .50
- 1—Lynch mounting. .35
- 1—Carter Gem Jack. .25
- 1—Carter resistance 0-10,000 ohms. 2.00
- 12—Eby binding posts. 1.80
- 5—Benjamin UX sockets. 3.75
- 1—Amperite for 1 amp. load. 1.10
- Mechanical Kit consisting of aluminum shields, binding post strip, decorated panel and Talt Brackets. 12.50
- Complete. \$85.20
- 1—Cabinet. 18.00

Working Model on Display

**AmerTran Service Station**  
**Power Pack & B Supply on Display**  
**Headquarters for Browning-Drake**  
**Raytheon Power Pack**  
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## Bradley-Amplifier

Resistance-Coupled  
**PERFECT AUDIO AMPLIFIER**



Provides audio amplification with minimum distortion. Bradley-Amplifier molded resistors used in the Bradley-Amplifier do not vary with age and are not affected by atmospheric conditions. Can be used to replace transformer amplifiers in standard radio sets with decided increase in tone quality.

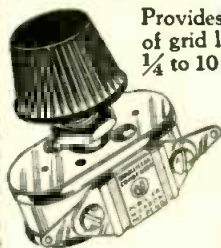
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Electric Controlling Apparatus

276 Greenfield Avenue Milwaukee, Wis.

## Bradleyleak

**THE PERFECT GRID LEAK**



Provides a noiseless range of grid leak resistance from 1/4 to 10 megohms. Assures most effective grid leak resistance value for all tubes. Small grid condenser (0.00025) is separate. Metal parts nickel plated. One hole mounting.

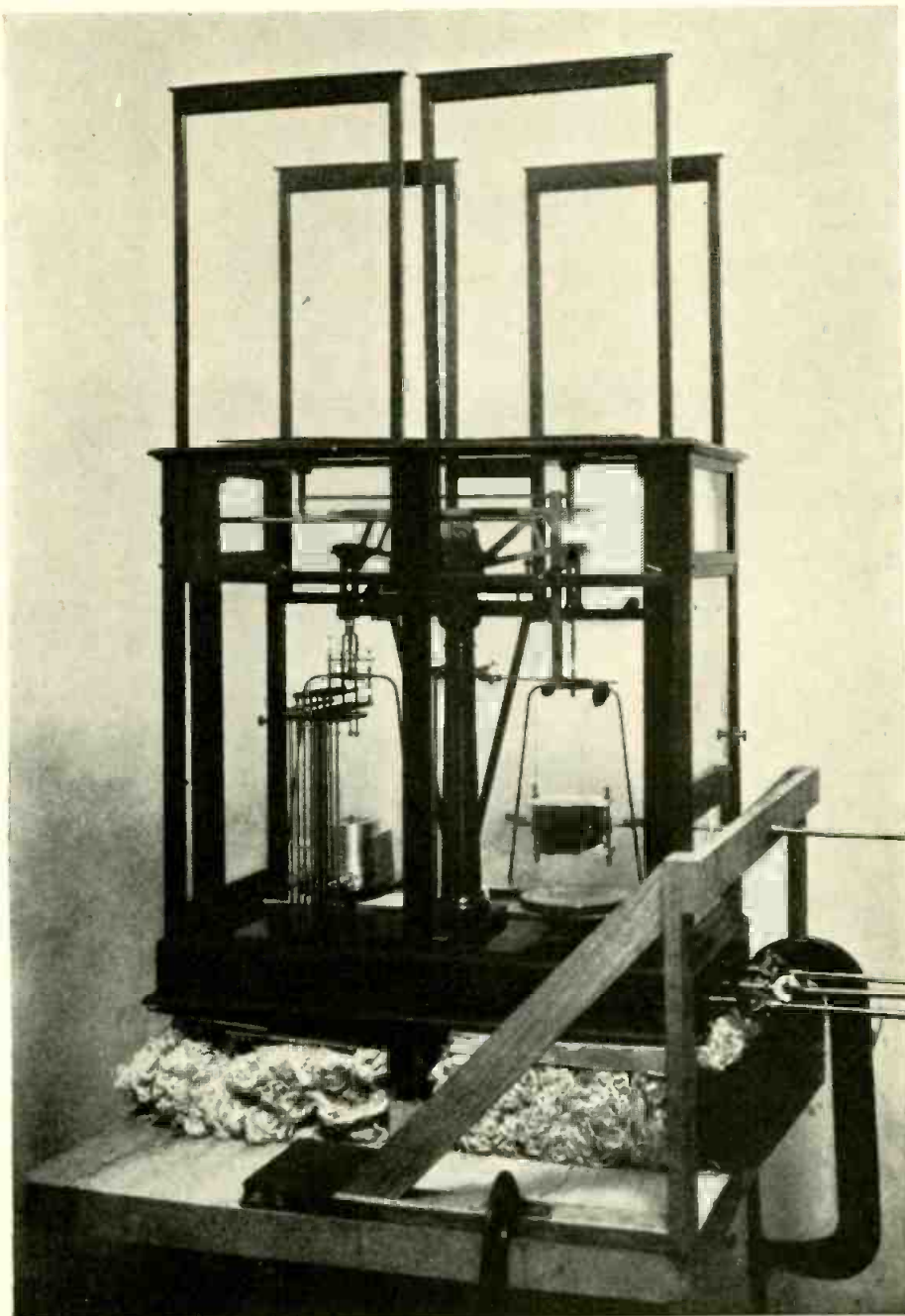
**Allen-Bradley Co.**

Electric Controlling Apparatus

276 Greenfield Avenue Milwaukee, Wis.

## Are There "Ether Waves" After All?

(Continued from page 637)



Harris & Ewing

### Another Way to Test Ether Theories

Dr. Paul R. Heyl, of the United States Bureau of Standards, has tried to obtain evidence of the ether drift with this apparatus. A large crystal of topaz was weighed, first in one direction, then in another, so that the internal structure of the crystal was differently placed with reference to the supposed ether drift. No drift was found, but it is conceivable that the experiment was not delicate enough.

mill with his eye glued to the deceitful bunch of hay in front of him. In 1925 Professor Miller and his assistants made over 100,000 separate readings and walked over a hundred miles round and round their scientific treadmill.

The purpose of all this is to measure, very accurately indeed, the velocity of light in different directions in space. What is actually measured is the difference in velocity between light moving in reverse directions inside the apparatus. If there is any motion of the ether relative to the earth this motion ought to affect these two speeds. As the table turns there will be some positions of the

lightpath inside it which will be relatively fast positions for the light movement; other positions which will be relatively slow ones. The measurements are made by means of interference fringes, produced by the alternate reinforcement and cancellation of light waves which are a trifle out of phase with each other. It is well known that such interference phenomena constitute one of the best ways of measuring very tiny differences in the lengths of light paths or in the speed of light.

Without discussing all the multitudinous details of Professor Miller's precautions against error and of the thousands

# NOW

## YOU CAN THROW AWAY COSTLY BATTERIES—GET CONTINUOUS RECEPTION —AND NO WEAK PERIODS

### Plug into Electric Light Socket

with

**\$88.35**  
with all tubes

# POWEROLA

In Combination  
With  
Power Tubes

## The greatest fundamental advance in Electric Radio

At last the receiving set problem is satisfactorily solved. If perfect reception is possible, Powerola will secure it if anything will. There are no expensive batteries to buy or recharge. You use your electric current. The price of operation is low and above all, the price of Powerola is lower than others because it is not an experiment but is made by experienced engineers who have been in this

business for fifteen years. There are none more perfect. There are none better. There are no good power sets that sell as low. Your dealer has a Powerola to show you. Or we will send one Powerola 6, Model 150, on a full and ironclad guarantee of \$88.35, dealer's price; \$20 with order, balance C. O. D.

**Powerola.** Electric set specially wired for power operation. The first successful electric set. Now on market several years, growing stronger in good will every year. Tested, approved and endorsed by highest authorities. Thousands are now in use. Has satisfied customers, dealers and agents everywhere. Sold thru the New York Edison Co., and numerous other Public Utility Companies.

**No Batteries.** Eliminates A and B batteries, chargers, meters, separate eliminators, chemicals, fuses, fragile tubes and crystals.

**Distance, Volume, Tone.** 2000 miles radius under normal conditions. Tone is always sharp, clear and full, and can be regulated at will by volume control to beautiful whisper.

**Selectivity, Tuning.** 3 dials but is practically a one dial set, because of remarkable synchronization. No hum noises, squeals or whistles. A one-year guarantee against electrical and mechanical defects goes with each receiver.

**Operating Cost, Tube Life.** Consumes less than  $\frac{1}{4}$ c per hour. Tubes are good for at least 1000 hours, are sturdy, have longer life, less breakage.



**Dealer's Price \$88.35**

*Including All Tubes—A. C. Set Complete in 1 Cabinet*

**Manufacturer.** Terminal Electric Co., N. Y., absolutely the pioneer manufacturer of electric receivers and socket power units; 15 years specialists in battery-eliminating power devices.

**Power Supply.** A. C.—100-200 Volts, 50-60 Cycle. Powerola-6, Model 150, above, enclosed in rich, attractive mahogany cabinet; T. R. F. designed for combination with six power tubes. Eliminates A and B batteries. 200-600 meters.

**Console Models:** Powerola Chassis, Model No. 175, is the same set without cabinet. Will fit into practically all consoles. Dimensions, 7" x 18" x 11". Power device in metal box, separate, for insertion in battery or other space. Easy to install. Other dimensions and D. C. chassis at special prices. Dealer's price including six power tubes. \$79.80.

**Direct Current Models:** Powerola C-3, Model T. R. F. employing five 201A or other UV.  $\frac{1}{4}$  Amp. tubes. Handsome two toned mahogany cabinet. Power supply, D. C. 100-120 volts. Dealer's price without tubes. \$65.55.

*All Shipments F.O.B. New York*

*Exclusively Distributed by*

# POWEROLA

## RADIO CORPORATION

*Executive Offices*

44 Whitehall St., New York

**CAN YOU BUILD ELECTRIC SETS?** "Powerola Power Circuits," our book, contains 29 new diagrams and instructions, showing power parts used and how to build or rewire radio circuits, sets and parts, to operate, hum-free and successfully, from A.C. to D.C. power mains, without A, B, or C batteries, chemicals and chargers. Invaluable for the service man and traders. Price \$1.00.

**A PROPOSITION FOR DEALERS** No doubt you have received a bulletin outlining our proposition. We are now adding to our exclusive agency list. Powerola is a fast selling proposition for three reasons—quality, efficiency, price. Your trade will become acquainted with Powerola thru advertising and will ask for it. Write us at once for detailed information.

A R O U N D T H E D I A L —

with the Mu-Rad Super-Six Receiver



Long winter evenings, a log on the hearth, a companion at your side—full contentment, quiet romance—into this picture fits Mu-Rad. Its beautiful tonal qualities, its faithful reproduction, the simplicity of operation and its perfect performance will thrill you to your fingertips. Operated by just one dial this remarkable receiver presents a simple solution to your radio problems. Ask your nearest dealer for a Mu-Rad demonstration. The Mu-Rad plan for exchanging old sets for new yearly models will make efficient radio a permanency in your home.

**MU-RAD**

RADIO CORPORATION  
Dept. P, Asbury Park, New Jersey

A C R O S S T H E C O N T I N E N T

of repetitions which he felt it necessary to give to every test, it may be said that the results did not detect the motion of the earth in its orbit, which was the effect originally looked for. We know that the earth does move around the sun but Professor Miller could not prove this by the ether. As his moving table turned it was alternately facing the earth's orbital path and against it. Regardless of this, the speed of light inside the apparatus remained the same.

This seemed at first a blow to the ether theory. The speed of the earth in its orbit is about nineteen miles a second, quite a sizable velocity. Nevertheless, the ether did not show any change. On careful computation, however, of the enormous number of individual observations which had been made, Professor Miller found that they did show one effect which was constant. There was a uniform alteration of the speed of light in a certain direction, not related to the earth at all but approximately parallel to the axis of the sun. The whole solar system seems to be falling through the ether, as though it were dropping like a flat cracker. The ether blows up through it, Professor Miller's results indicate, at a speed of about six miles a second.

It is not possible to assume that this is the actual speed of the solar system relative to the ether. If the Miller apparatus could detect an ether speed of six miles a second in the direction of the sun's axis, it would undoubtedly detect the known earth speed of nineteen miles a second in the direction of the earth's motion in its orbit. Professor Miller solves this difficulty by assuming the solar system to drag the ether along with it more or less, as a steamer moving in the ocean will drag some water in its wake. What the experiment measures, he thinks, is the amount of slip by which the ether drops behind the real speed of the solar system.

Computing, on reasonable assumptions, the amount of this slip as related to the real speed, Professor Miller calculates that the solar system is really dropping through ether-filled space at a rate of over 120 miles a second, instead of six miles a second. The direction in which we are pointed comes out as a spot in the constellation of the Dragon, not quite in line with the axis of the sun but nearly so.

Perhaps the chief support of these ideas from other sources is the fact that study of the motions of the stars with relation to the earth leads to an almost identical determination of the direction and speed with which our solar system is moving through space. Both Professor Miller's tests of the ether current on which we drift and the astronomers' observation of the stars that drift hither and thither with us, give us nearly the same reckoning for the course upon which we are set and the speed at which we travel.

**RADIO CATALOG**

**Dealers!**

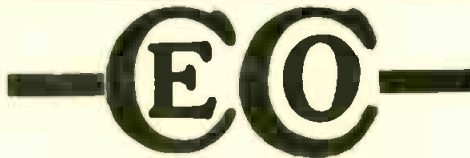
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New 1927  
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Containing hundreds  
of nationally advertised  
sets, cabinets,  
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Use your letterhead



**Western Radio Co.**  
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The BUY word for  
Tubes of Longer Life

There's a type for every Radio Need

Two New Members  
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Type  
"G"  
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for  
Resistance  
and  
Impedance  
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Type  
"H"  
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Critical

Price \$2<sup>50</sup> Each

At Your Radio Dealers

**C. E. Mfg. Co., Inc.**  
Providence, R. I.

Largest plant in the world devoted exclusively  
to tube manufacture.

That is the argument as it now stands. Professor Miller's critics have been able to point to no essential flaw in his conclusions; none, at least, that has proved convincing to independent students. There are, of course, some remaining difficulties. For example, there seems to be a continual tendency for the apparent wind of ether past the earth to deviate to the east of the direction from which it should be blowing. No one knows why this is so. Much has been made by the critics, also, of the necessity of assuming a slip between the ether and the earth, in order to account for the fact that the earth's own orbital velocity shows no effect. Whether these doubts will grow as time goes on or will disappear no one can say.

Are we to assume that an ether exists and that radio moves in it? Or are we to believe that there is no ether; which conclusion would require us to search further for an explanation of radio propagation.

Until the experts agree about Dr. Miller's conclusions, which they are now far from doing, we cannot answer these questions assuredly. But, at least, the reality of the ether is once more a tenable hypothesis. Those who cling to the ether idea when Dr. Einstein and Dr. Steinmetz attacked it are now provided, by Professor Miller, with some tangible ammunition of facts, facts which are proving very difficult to explain away.

And if an ether exists the old idea of absolute rest and absolute motion returns to a universe from which the mechanical theories of Einstein would have banished it. Indeed, it has recently been pointed out by Dr. Gustaf Strömberg, of Mount Wilson Observatory, that there are some astronomical facts which suggest the existence of a fundamental material, like the old-fashioned ether, which is at rest in space and with relation to which all motions of the stars and nebulas, the suns and planets, should be thought of as occurring.

These bodies may be "born," says Dr. Strömberg, "out of a fundamental medium, the metrical properties of which are the same everywhere. \* \* \* The uniformity in Nature is then due to the uniformity of this medium." Instead of there being no ether in the universe, the universe is all ether. Instead of there being no ether waves, these waves turn out to be perhaps the most fundamental of all realities—far more real than matter.

Radio waves have been defined as "strains in the ether." Atoms have been thought of similarly; also as ether "knots" or ether "vortices" or as tiny vacua in the ether. Electrons have been called ethereal condensations or rarifications. The ether seems to be coming back into scientific theory. There may be ether waves after all.



# Ec-centric!

the new SAAL CONE  
gives scientific reproduction  
of ALL tones



Side view of Saal Ec-centric Cone in comparison with the harp. Note the relation of short and long sides, giving proper vibrating area for both extremes of sound.

Saal Ec-centric Cone  
Height 22 inches

**\$25**

Junior Cone Model  
Height \$15  
16 in.  
Slightly more  
West of Rockies

Ec-centric construction—you have never seen it before in a radio speaker. It is the newest scientific development in cones. But it is based on the oldest musical principle—that of the melodious harp.

In the harp [as in the piano] long strings produce deep, low vibrations; short strings, the high notes.

For the first time in radio the Saal Ec-centric Cone speaker—with its center literally "off center"—provides these exact relative proportions of vibrating area for high and low notes—giving perfectly realistic, scientific, all-tone reproduction without unnecessary size. A cone built on musical as well as mechanical principles. Permitting a price never before possible in quality speakers.

Drum or barrel tone is completely eliminated by Ec-centric construction. The instrument is beautifully embellished with scrollwork medalion and border design in gold. Examine the adjoining diagram, then hear the Saal Ec-centric. A permanent investment—built for a lifetime. Write for descriptive literature. Saal cones are fully protected by patents.

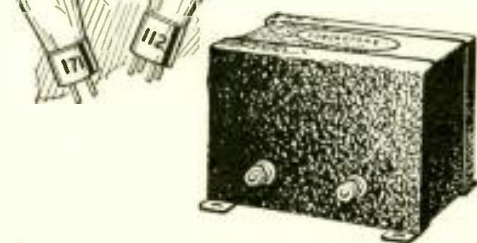
H. G. SAAL COMPANY  
1800 Montrose Avenue  
Chicago, Illinois

# SAAL

WORLD FAMOUS MAKERS OF HORNS • CONES • PEDESTALS

# With Power Amplifier Tubes

in latest circuits-



## be sure to use JEFFERSON Concertone

(AL-2 SEALED) AUDIO FREQUENCY TRANSFORMERS



## and No. 358 Jefferson Filter Chokes

THE Jefferson "Concertone" is one of the few transformers built with cord and windings that are sufficiently large as well as heavily insulated for safe and continuous use with the new power tubes. \$6 each at stores.

Similarly, Jefferson No. 358 Chokes are particularly adapted for use in the output circuit by reason of their extremely low DC resistance and their ample current carrying capacity, \$5.00 each at stores.

Prominent engineers, in specifying them for latest circuits, state that they find these new Jeffersons the most satisfactory.

### Easy to Put "1927 Tone Quality" into Any Set—Install "Concertones"

Merely replace present audio transformers with new large-size Jefferson "Concertones" and enjoy natural, life-like reproduction of all notes from the lowest to the highest. You will also notice increased sensitivity and better reception from distant stations. Make this simple change now and bring your old set up to date.

Write for Latest Literature

Other Jefferson Guaranteed Radio products include "Star" A. F. Transformers, \$2.75. \$3. Tube Rejuvenators, \$7.50; Tube Testers (for dealers, experimenters), \$8, \$9. No. 280 Jefferson Tube Charger with large socket only, \$3.50. No. 285 Jefferson Tube Charger with small socket, \$3.50. No. 290 Jefferson Tube Checker, \$6.00. Also Tube Chargers described below.



Without removing your tubes from the set ~

### KEEP TUBES LIKE NEW—CHARGE THEM MONTHLY and ALL AT ONCE

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 199 type tubes like new—at full efficiency. Rejuvenate 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. Made only by

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



## WHAT READERS ASK

CONDUCTED BY DAVID LAY

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.

### How to Get Your "C" Battery Voltage from a Raytheon Unit

**QUESTION:** I understand that it is possible to eliminate the dry-cell "C" battery where a Raytheon power-pack is used to supply the plate voltage for a receiver, by making some small change in the power-pack. Can you show a diagram of such an arrangement as I want to make the change in the Raytheon power-pack that I constructed from the description in the May, 1926, issue of POPULAR RADIO?

—CARL THOMAS

**ANSWER:** Your Raytheon power-pack can readily be changed to provide the "C" battery voltage required for your receiver. The power-pack circuit is shown in Figure 1. This is the same circuit that was given on page 22 of the May, 1926, issue except that the change has added in heavy lines.

The only extra parts that you will need are one more binding post for the "C" (—) minus terminal of the power unit and a variable resistance (R) with a maximum resistance of anywhere between 1000 and 2000 ohms. This resistance should be capable of carrying 50 milliamperes continuously without heating. The Federal No. 25 potentiometer or the Centralab "Radiohm" No. 2M are suitable for this purpose.

Terminal 1 of the power-pack is maintained at zero potential, so far as the receiver is concerned, inasmuch as it is connected to the filament circuit in the receiver itself. The new terminal will be at

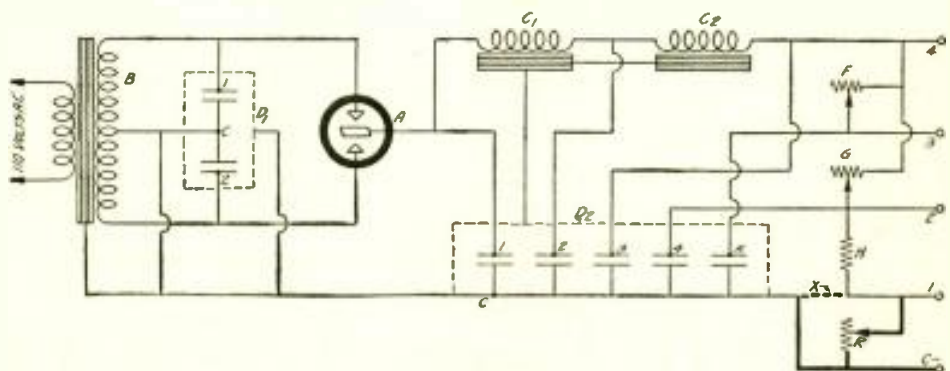
negative potential in relation to both the filament and terminal 1 by the amount of the voltage drop across the portion of the new resistance, R, which is in the circuit. This potential drop across R provides the negative biasing voltage that is ordinarily supplied to the receiver by the "C" battery. By varying the resistance, R, this negative voltage may be varied from zero to a voltage more than ample for the UX-171 tube which requires in the neighborhood of 40 volts when the plate voltage is 180.

### How to Substitute a Power Tube in the Last Audio-Frequency Stage

**QUESTION:** Can I use a 1/2-ampere power tube in my receiver in place of the UX-201-a tube which I have been using in the last audio-frequency stage, without the necessity of making a change in the rheostat? As the five tubes in the receiver are controlled by a single rheostat I don't see how a 1/2-ampere tube can be controlled by this same rheostat when all the other tubes are consuming 1/4-ampere each.

—NICHOLAS J. HAIGHT

**ANSWER:** It is feasible to substitute a UX-171 or a UX-112 tube for the UX-201-a in the last audio-frequency stage; at least the rheostat presents no difficulty in this connection. All of these types of tubes are designed to operate from a five-volt source of supply. Storage batteries have a voltage of approximately six-volts and a rheostat is therefore needed to cut this down to the required five-volts.



**HOW TO GET "C" VOLTAGES FROM THE RAYTHEON**  
FIGURE 1: This circuit diagram shows the change that has been made in the old Raytheon circuit to obtain a "C" voltage bias by adding a variable resistance.

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Tested and approved by all of Radio's Highest Authorities

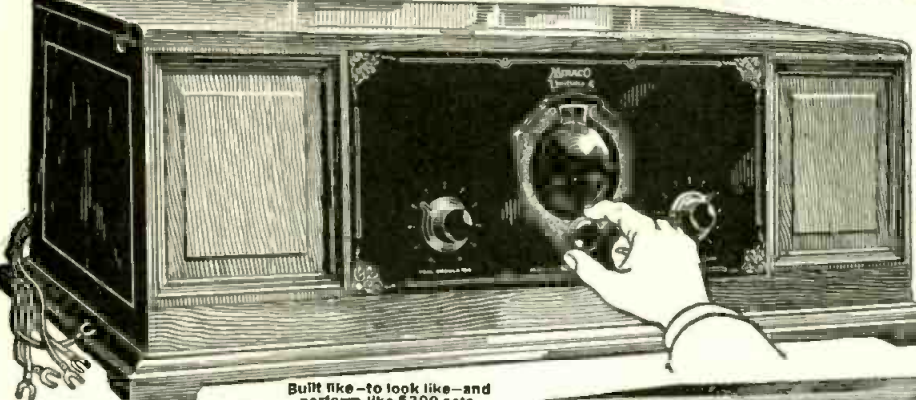


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NOTE: This offer is made to prospective buyers by famous big Radio Corporation, one of America's oldest reliable manufacturers of fine sets—seventh successful year. Many satisfied users in every state. Postal or coupon brings testimony of nearby users and proof Miraco's outperform sets costing up to 4 times as much. Very easy to install and operate.

BEAUTIFUL - BIG - POWERFUL Ultra Selective **MIRACO** Ultra 5

Retail LIST Price **now only \$49.75** GET SPECIAL OFFER One year GUARANTEE



Built like—to look like—and perform like \$200 sets

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Magnificent Big Powerful Miraco "Unitune-5" Retail List price only \$87.50—get special offer The celebrated Miraco Ultra-5—U.S. Navy type circuit, has also been adapted to Single Dial Tuning—without sacrifice of selectivity, volume, clearness, power, tone, or distance getting qualities! In the magnificent big Miraco Unitune-5, above shown, you turn one vernier knob for stations everywhere. Beautiful hand-rubbed, piano hinged, solid walnut cabinet, 23 in. long, 15 in. deep, 10 in. high. Sloping Bakelite panel in walnut finished to match. Also offered on 30 days free trial

## Coast to Coast and Foreign Reception Certified

**MIRACO RADIO GETS 'EM COAST TO COAST** Reception Certified by Miraco users Notice! Enormous sales of the celebrated Miraco 5-tube Receiver result from delighted users so highly endorsing them to friends! Again enable us to add hosts of costly new features, latest refinements and up-to-the-minute improvements such as you might expect to find only on much higher priced sets. Miraco's this year are still better—more beautiful—more selective—more powerful for less money than ever before.

**USER-AGENTS WANTED... WRITE!** Reports from users everywhere leave little for us to add. These are only a few of the many in our files and which we receive daily. Send coupon for plenty of additional proof and testimony of nearby users.

**CUTS OUT LOCAL, GETS PROGRAMS EVERYWHERE.** Meridian, Miss. Everyone says my Miraco 5 is the best set they have heard. It gets stations all over the states, also Mexico, Cuba. Have a broadcasting station next door! but it doesn't matter with the Miraco 6. I get them just the same. H. B. Hendrick

**COAST TO COAST—HEARS LOCALS** Omaha, Nebraska. Miracoisa wonder for distance, volume, tone, We have a local broadcasting station here and she goes right thru and brings them from coast to coast. No trouble at all. H. N. Elliot

**HEARS THE SELECTIONS.** Cleveland, O. Have been up against some pretty good radio men with other sets and this receiver has them guessing. In selectivity, volume and range it has outdone several. We were able to cut out WTAM (powerful local station) 10 1/2 points, WIOG (another station) 10 points, "UNITUNE" SEPARATES CHICAGO LOCALS. Chicago, Ill. With local stations broadcasting less than a mile away, one after another I can tune and keep separated as high as 15 Chicago stations on your "Unitune-5" during the summer months. I frequently get stations clear and loud on speaker as far away as Colorado, New Jersey, New Orleans and many others. We have the single dial switch from one to another station in an instant. The selectivity is amazing, the set is a beauty and the tone is perfect. W. H. Schaefer

**FLORIDA GETS CAL. FIRST NIGHT** Daytona Beach, Fla. Tuned in 45 stations the first night ranging through out Florida, Cuba and as far as California with Miraco 5. Monte Rankin

**OHIO HEARS THEM COAST TO COAST.** Westerville, O. We have to our credit about 85 stations from GPCF Montreal, Canada to British Columbia, Canada. WIOD Miami Beach Fla. two stations in California; a station at Seattle, Wash. We are more than pleased with the Miraco 5. Dan Groce

**HONOLULU TO LONDON FROM IOWA.** Anthon, Iowa. Here are some of the stations we picked up on the Miraco 5 Sunday, June 24 between 10 and 11 P. M. K2LO London, KY Honolulu, Hawaii; WKAC San Juan, P. R. and one station in Ireland; could not get a letter. John Kuhn

**NEW YORK LOCS 163 STATIONS** Buffalo, N. Y. I received 210 London, 11:45 on Monday night but there was so much interference it was not very plain. I also have logged 163 stations in U.S. and Canada. A satisfied user of Miraco 5 during the trial.

**NEBRASKA HEARS PORTO RICO ON SPEAKER.** Spencer, Neb. Using the Miraco 5 we have often heard Mexico City, Porto Rico, Miami, Florida, Ottawa, Canada and Vancouver, B. C., Canada and all along the Pacific Coast. All the above stations on the speaker. Have also heard Lima, Peru, South America, H. J. Schmidt

**TEXAS GETS 'EM N. Y. TO CAL.** Waco, Texas. In less than a week after I installed the Miraco-5 (tuned in on the loudspeaker) New York City; Oakland, Calif.; Minneapolis, Minn.; Mexico City, several stations in Florida and many others. E. E. Sitz.



Solid Walnut Cabinet

# Big Powerful New Unitune 5 MIRACO Ultra 5

28 in. long 27 in. long

ULTRA-SELECTIVE LONG DISTANCE 5 TUBE SETS EASY ON BATTERIES

SAVE or make a lot of money on sets and accessories by writing immediately for our Amazing Special Offer! It will astonish you. Unless 30 days' trial proves a Miraco the most selective, clearest toned and most powerful distance-getter among beautiful big 5-tube sets, don't buy it.

**Send for Testimony of Users Everywhere** First reports of delighted users will assure you that the beautiful, big Miraco's actually are unsurpassed (even at much higher prices) for razor-edge selectivity combined with extreme long distance reception, clear natural tone and powerful loud speaker volume, plus economy in use of battery current.

**Our Factory Prices Save You Up to 1/2! Facts About Makers of Miraco's:** To our many thousands of satisfied users throughout the world, we require no introduction. But those who have never enjoyed the pleasure and satisfaction of operating a Miraco Set, will undoubtedly wish to be assured that the makers of the Miraco are thoroughly reliable. We therefore present these facts about the Midwest Radio Corporation of Cincinnati, Ohio:

1. One of America's oldest, largest and most experienced builders of fine sets—seventh successful year.
2. Builds all sets complete in its own big factory and thoroughly tests them under actual broadcasting conditions before shipping.
3. Sells all sets on a Guarantee of Unconditional Satisfaction, allowing liberal trial privilege.
4. Deals direct by mail with its users, agents and dealers, thereby effecting great savings which are reflected in amazingly low prices.
5. Keeps all promises to the letter. Highest references from users, bank officials and all concerns with whom we have dealings. We have been customers of a big \$3,000,000 Cincinnati bank for many years. In our literature read what they say about our responsibility and reputation for square dealings.

**All the Proof you want is waiting for You!** Coupon or postal brings reports from hosts of users in your vicinity and elsewhere proving that Miraco sets at rock-bottom money-saving factory prices, outperform sets costing up to four times as much. You can also buy speakers, tubes, batteries, etc. at big savings from us!

Get our proposition before spending money elsewhere.

**MIDWEST RADIO CORPORATION** Pioneer Builders of Sets Cincinnati, O.

479-M Miraco Building Without obligation, send free literature, testimony of users. AMAZING SPECIAL OFFER and full particulars of your big money-saving factory-price proposition on Guaranteed Miraco sets and all radio supplies. ( ) User ( ) Dealer

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# Forget your battery charging problems!

Your storage "A" battery need never be low if you leave it to the Sterling Trickle Charger to keep it everlastingly charged. When you're using your set this charger takes a rest, but the moment you "turn off" the radio the charger starts to charge. It charges at the steady  $\frac{2}{3}$  ampere rate for 6 volt A or  $\frac{1}{2}$  ampere for 4 volt, a safe slow rate with automatic cut-off. It is the quiet and efficient bulb type. Sterling, meter equipped. Price \$14.00.

THE STERLING MFG. CO. CLEVELAND OHIO



No. R-102 Bulb Type Trickle Charger

Show this ad to your dealer. If he hasn't the Sterling Trickle Charger in stock he can get it for you.

Ask for our 32 page booklet on care and upkeep of radio—it's free!

## Sterling Trickle Charger

"It goes to work automatically the instant the set's off duty"



The filament resistance of each tube is correct to permit the tube to draw only the required amount of current providing the "A" energy supply is maintained at five volts. In the case of the UX-201-a tube, for example, the filament resistance is 20 ohms. Applying Ohm's Law (voltage ÷ resistance = current) we find that 5 volts divided by 20 ohms results in a current of  $\frac{1}{4}$ -ampere. The filament resistance of the UX-171 tube and UX-112 tube is 10 ohms. Following the above formula, this resistance allows a current flow of  $\frac{1}{2}$ -ampere.

Now, if several tube filaments are connected in parallel across the 5-volt line, as is the case in your receiver, each will draw current in proportion to its individual resistance. Each tube will therefore operate at the current rating for which it is designed, regardless of whether the five tubes are of the same type or not.

The only difference you will find in the operation of your receiver after installing a  $\frac{1}{2}$ -ampere power tube will be that the rheostat will have to be turned a little higher to maintain the line voltage of five, due to the heavier total current drain that results from the use of the half ampere tube.

If you plan to use a UX-112 tube it will be necessary to provide higher "B" battery voltage for this tube if any substantial benefit is to be obtained from its use. This voltage (135 to 157½ volts) should be applied to the power tube only. A separate "C" battery connection for this tube will be required also. These considerations also apply to the use of the UX-171 tube, although in that case the higher "B" battery voltage is advisable, but not essential. If your receiver was designed for the use of 90 volts on all amplifier tubes, and a single "C" battery terminal for the two audio-frequency amplifier tubes there are special devices on the market, such as the Na-ald Connector, which will enable you to use the new tubes without making any changes in the wiring of your receiver.

# Used in the LC-27

Makes a beautiful workman-like job of the sloping panel. Holds the front panel at exactly the right eye-level for reading the dials. Simplifies construction. Special aluminum alloy of unusual strength. Made especially for receivers designed by POPULAR RADIO LABORATORY. Sent postpaid anywhere upon receipt of price of \$2 per pair. Approved by POPULAR RADIO LABORATORY.

TAIT MFG. CO.  
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Also Used In  
The LC-26 Receiver, The Improved Browning-Drake, The Orthophase Receiver, The Home Receiver and others.



\$2 per set

## LC-27 KITS SEND YOUR ORDER IN TODAY!

Parts exactly as used by author in the LC-27 Broadcast Receiver

1—Hammarlund mid-line dual condenser, .000275 mfd.	\$7.50
1—Hammarlund mid-line single condenser, .000275 mfd.	4.65
1—Precision Duo-Octaform coil set, one antenna coupler and two interstage couplers.	10.50
1—Amertran De Luxe first-stage transformer.	10.00
1—Amertran De Luxe second-stage transformer.	10.00
1—Amechoko No. 854	6.00
1—Dubiller No. 902 filter condenser, .4 mfd	5.50
1—Dubiller No. 907 filter condenser, .1 mfd.	.60
1—Mar-Co illuminated control, scale 0 to 100.	3.50
2—Mar-Co small controls for LC-27	1.50
1—Carter battery switch	.65
1—Samson radio-frequency choke coil No. 85.	1.50
3—Aerovox mica fixed condensers, .00025 mfd.	1.05
1—Durham resistor, 4 megohms.	.50
1—Lynch grid leak mounting	.35
1—Carter Gem Jack.	.25
1—Carter resistance, 0-10,000 ohms.	2.00
12—Eby binding posts.	1.80
5—Benjamin UX sockets.	3.75
1—Amperlite.	1.10
Mechanical Kit consisting of aluminum shields, binding post strip, decorated panel and Tait brackets.	12.50
Complete.	\$85.20

COMPLETE PARTS FOR \$65.20  
LC SENIOR POWER PACK

Send Money order for immediate delivery

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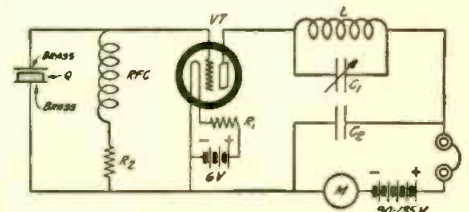
## How to Build a Piezoelectric Oscillator

QUESTION: I want to make a piezoelectric oscillator, using a quartz plate, that I can use to check the calibration of my short-wave wavemeter. Can you give me a good circuit for an oscillator of this sort? Would you advise me to purchase a ready-cut quartz crystal for this purpose, or can I cut and grind a suitable quartz plate myself?

—HARRY FREEMAN

ANSWER: A good circuit for an oscillator of this type is shown in Figure 2. The parts used in this unit are:

- L—45 turns of No. 24 DSC wire on a three-inch tube;
- C1—variable condenser, .00035 mfd.;
- C2—fixed condenser, .002 mfd.;
- Direct-current milliammeter with a range of zero to 100 milli-amperes;



THE CRYSTAL OSCILLATOR

FIGURE 2: The hookup for the quartz crystal in a vacuum tube circuit for obtaining a standard of frequency.



- Q—quartz oscillator plate ground to oscillate at about 400 meters;  
 RFC—radio-frequency choke coil consisting of 200 turns of No. 36 wire (DSC) wound on a two-inch tube;  
 R1—Amperite or other fixed filament-control resistance, suitable for tube used;  
 R2—receiving grid-leak, 5 megohms resistance;  
 VT—201-a or 112 tube.

The quartz plate should be mounted between two brass plates about an inch square and with the large surfaces absolutely flat. Lay the quartz on the lower brass plate, and then lay the upper brass plate on the quartz. The pressure should be light, so the upper brass plate should be not more than 1/32 of an inch thick and should be connected in the circuit by means of a flexible connecting wire. Thus the only pressure on the top surface of the quartz plate will be that of the weight of the upper brass plate.

With the quartz plate in position and the tube filament lighted, there will be a flow of current in the plate circuit of the tube. The amount of current that flows will be indicated by the milliammeter.

As the plate circuit is tuned to the fundamental frequency of the quartz plate, the entire circuit will start to oscillate. This condition will usually be indicated by a drop in the plate current. The lowest reading on the milliammeter will then be obtained when the plate circuit is tuned to exact resonance with the quartz plate. The plate circuit may be tuned several degrees off resonance but the circuit will still oscillate at the frequency of the quartz plate.

For calibrating and checking a short-wave wavemeter it is best to use a crystal with a fundamental frequency corresponding to a wavelength considerably higher than the highest wavelength for which the wave meter is to be calibrated. The harmonics of a quartz plate with a frequency corresponding to 400 meters, for instance, will provide 17 calibration points between 100 meters and 20 meters; enough points to provide an excellent curve on a wavemeter that has this wavelength range.

It is not advisable for the experimenter to try to cut and grind a quartz plate at home. In the first place the plate must be cut out of the raw crystal at just the proper angle; otherwise it is useless. Then an examination of the plate must be made by polarized light to detect flaws, twinning and other defects that are not visible even under a powerful glass. Unless the final plate is free from these defects it will not oscillate. Aside from these considerations, try to imagine cutting a wafer-like slice out of a chunk of glass, without chipping or cracking the slice; and then grinding this slice of glass down to certain specified dimensions, with opposite sides smooth and absolutely parallel to each other, and remember that cutting and grinding a quartz plate is even more difficult than a glass one because quartz is the harder substance. Even with the use of all possible precautions probably not more than 25 per cent to 50 per cent of the perfect plates cut by skilled cutters will oscillate when they are finished.

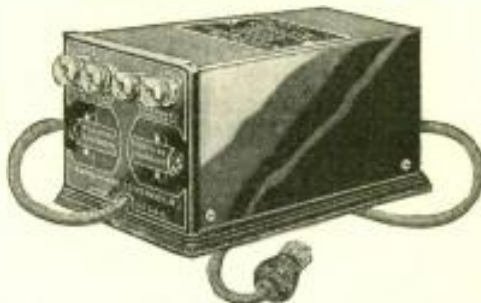
### An Antenna for the Lynch Receiver

QUESTION: What is the shortest length of antenna that you would recommend for use with the improved Browning-Drake set?

—JEROME A. McNALLY

ANSWER: Forty feet is the minimum length that should be used.

# Hook-up to Controlit for a Merry Christmas



## The Heart of the Power Plant

Any radio devotee will be glad to get a Brach Controlit on Christmas. It is new—it is different—it is something that will add enormously to the enjoyment of radio.

Adding a Controlit to any set eliminates all switches from "B" Battery Substitute and Trickle Charger and places complete, automatic control of set and power supply in one switch—the set switch itself. Price, in U. S. A., \$6.

and protect your Set  
with the Famous

## BRACH Lightning Arrester



No aerial should be without the protection to radio and home which a Brach Lightning Arrester affords. Good sense demands this protection. The authorities require it. Every Brach Arrester carries with it a \$100 insurance guarantee.



Prices as low as \$1

### The New Brach TOTEM-POLE ANTENNA

Here is an aerial antenna that gives most complete reception and unusual clarity to radio. It is the size of a small flag pole, can be readily attached to roof or side or window ledge of house and does away with all unsightly makeshifts.

Totem-Pole Antenna with 100 feet wound wire and fasteners, complete for

Only \$10



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To the Hydrometer with the famous Chaslyn Balls is combined the Drip-proof feature which insures full protection against battery acid falling on and injuring parquet floors, rugs or clothing.

After testing battery, the Hydrometer can be washed without danger from dripping acid.

Something nice to present to a radio fan or to buy for your own use.

Price \$1



# Brach Radio Products

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## NEW 1927 Radio Catalog



MORE than a score of the latest kits—the best of them with specified parts to build them—at prices that mean big savings for you. And all the latest parts and accessories as advertised in current radio magazines. The largest, most complete and up-to-date radio stock in the world. Yours to choose from in this new catalog. Write for your copy.

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### How to Make the Detector Voltage Adjustment on the Raytheon Power-pack

QUESTION: I constructed a Raytheon power-pack, some time ago, for use with my LC-26 receiver and have had splendid results from the combination. I find, however, that the adjustment of the variable resistance that controls the detector voltage for my UV-200 detector tube is quite critical. For this purpose I use a Bradleyohm No. 25; I have a 10,000-ohm fixed resistance across the detector voltage terminals. I find that the proper voltage is obtained when the knob of the Bradleyohm is turned to a point where the internal elements are barely making contact. Can you suggest any better method for making this adjustment?

—JAMES P. CONNOR

ANSWER: It is probable that you have a detector tube that operates best with an unusually low plate voltage, perhaps around 14 or 16 volts. If you replace the 10,000-ohm fixed resistance with one having a resistance of 7500 ohms you will find the adjustment of the variable resistance much less critical. For an additional improvement, you might substitute a Bradleyohm No. 50 for the No. 25 which you are now using.

### Resistance Coupling for Superheterodynes

QUESTION: Is it possible to use the resistance-coupled type of radio-frequency amplification for the intermediate stages of a superheterodyne receiver?

—C. A. BURKES

ANSWER: This is entirely feasible and, in fact, there is one such unit now on the market that is made by a well-known concern for just this use. You will need a tuned input circuit attached ahead of this unit to tune the intermediate-frequency amplifier to the desired wavelength that you choose for this purpose.

### What Tube Should be Used in High-voltage Power-packs

QUESTION: What type of tube could I use to get 400 volts of rectified energy for supplying "B" power to a 5-watt transmitter?

—LAURENCE REEDY

ANSWER: You can use a tube of the 216-B type for this purpose.

### The Best Ground Connection

QUESTION: Which makes the better ground for a radio receiver—a cold water pipe or a radiator pipe?

—R. C. M.

ANSWER: In some cases the cold water pipe is considerably better than the radiator pipe for a ground. The best way to determine which is best is to try each out separately. If there is not much apparent difference the radiator pipe will be satisfactory. However, the connection should be made to a stationary part of the radiator or water pipe by means of a regular ground clamp.

# A good GUARANTEE



Send for Booklet  
The Bosworth Electric Mfg. Co.  
3747 Main Ave., Cincinnati, O.

## BOSWORTH RADIO

## Potter Condensers

Build the best—

- Socket Power Devices
- A and B Supply Devices
- Power Amplifiers
- Impedance Amplifiers

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- For Filter Uses
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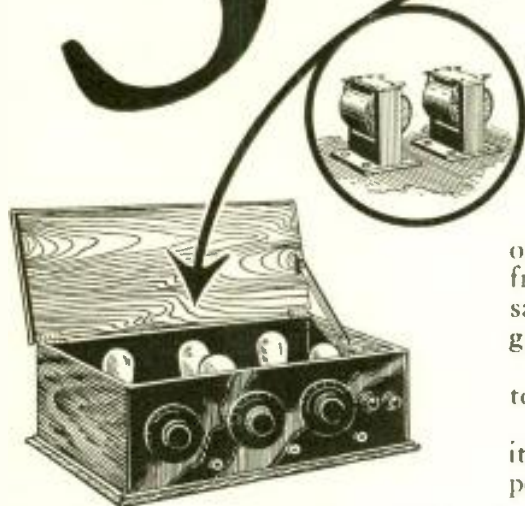
American made of best of materials to full capacity. All sizes and types.

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## Potter BY PASS AND FILTER Condensers

# Stop thief!

Ordinary amplification is the thief of Tone in radio music —



Your own radio set as it now stands is a perfect reproducing instrument—up to, and including, the detector tube. As everyone knows, if you listened with a pair of ear phones to the music from the detector tube you would have perfect reproduction. If that same quality could only be made to come out of your loudspeaker in great volume, then you would have perfect radio enjoyment.

But it cannot—with ordinary amplification. Too much is blurred, too much is weak, too much is lost altogether.

How can we get this pure detector tone with great volume? Can it be had simply by changing the method of amplification? That depends.

Resistance coupled amplification is better, but many of the high notes are frayed and shattered, and the tone breaks down badly on strong volume.

Large size transformers are also better, but too many weak signals are absorbed. The actuality of the base, and the distinction between one musical instrument and another are lacking.

Impedance Coupling is unstable. It shares most of the faults of resistance coupling, and, like transformers, it absorbs the weak signals.

Electric-light-socket power amplifiers are also better, to be sure. But they operate after one of the music-distorting transformers already in the set.

### The Truphonic Power Amplifier

An entirely new and different method of amplification has been developed by the eminent radio inventor, Mr. H. P. Donle, and is made by the Alden Manufacturing Company, well known for its Na-Ald quality products. It is called the "Truphonic." Already manufacturers of the higher quality sets are endorsing it, and adapting it as the finest type of reproduc-

tion. The Truphonic Power Amplifier is different from any other method of amplification. But what is most important, the results are different. No more need be said than that the Truphonic passes faithfully all notes of broadcasted music.

The Truphonic is a small compact instrument (shown below) which when attached in a few minutes to any radio brings through the loudspeaker with great volume the detector tube music in all of its perfect tonal quality.

What has just been said of the Truphonic can be said of no other method of amplification—regardless of the price you pay.

### What Does This Mean to You?

For the price of \$20 and an extra tube (using two of the tubes now in your set and one additional tube, either power tube or regular) you attach the Truphonic in a few minutes to your present radio and at one stroke convert it into the finest reproducing set that money can buy. A strong statement. But you want strong statements when the product backs them up.

Today! Tonight! Attach the Truphonic Power Amplifier and get all that radio can give.

### For the Set Builder

Truphonic amplification is provided in separate Truphonic couplers for the set builder. Three stages not only give the finest quality of reproduction obtainable but also give considerably more volume than two stages of ordinary transformer amplification. Price \$5.00 per stage.

The Truphonic Output Unit protects the speaker against burning out and demagnetization when power tubes are used. (This output is used of course in the complete Truphonic Power Amplifier described above). Price \$5.00.

The Truphonic Catacomb Assembly is also of great convenience to set builders. A lacquered steel catacomb houses three Truphonic couplers and a Truphonic output unit. A moulded Bakelite socket panel with 6 or 7 sockets of special construction which hold either UV-201A or all UX tubes, covers this catacomb. This unit may be arranged in a thousand different ways to meet all the requirements of every circuit and set design. Short direct leads to connected apparatus, with a minimum of soldered connections. No holes to drill, no apparatus to mount. A six-foot battery cable is included. Price 6 tube \$20, 7 tube \$22.



ALDEN MANUFACTURING CO.  
Dept. 316C. SPRINGFIELD, MASS.

# TRUPHONIC Power Amplifier

\$20



**For Perfect  
"SELF-ADJUSTING"  
Filament Control**

AMPERITE has been universally adopted by all leading engineers and set-builders; accepted as standard in every popular circuit.

Eliminates hand rheostats.  
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FREE—Send for "The Radiall Book", containing the latest popular hook-ups and construction data, to Dept. P.R.-11

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50 FRANKLIN ST., NEW YORK



Price \$1.10  
Complete

**AMPERITE**  
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The "SELF-ADJUSTING" Rheostat



C. W. Geiger

A UNIQUE RECEIVER IN A SHIP MODEL  
Not only has Miss Ruth Sabichi of San Francisco produced a highly decorative and interesting style of cabinet for her set, but has ingeniously employed the copper wire used for the rigging, as an antenna.

## BROADCAST LISTENER

Comments on radio programs, methods and technique  
—from the point of view of the average fan

By RAYMOND FRANCIS YATES

### Commercializing Boobery by Radio

It was not enough that that master crusader, Voliva, should use an instrument as beautifully scientific as radio to preach that the earth is flat and that Columbus was an unscrupulous Dr. Cook of his time.

Nor was it enough that Rev. Mr. Stratton, mad with the fundamentalist doctrines of orthodox theology, should use the radio in broadcasting a creed so thin as to be unpalatable to any open-minded schoolboy.

Now that prince of boob psychology, Mr. Edward Young Clark, formerly "Very Imperial Wizard of the Ku Klux Klan," has formed an anti-evolution society which he has endowed with the magnificent name of the "Supreme Kingdom."

The Supreme Kingdom is apparently a new and obvious attempt to commercialize the boobery of America.

That Mr. Clark should be adroit and clever enough to feed the starving minds of our prudery with the right kind of rot is really none of our business. But when this suave gentleman reaches to bring broadcasting into his scheme, as he is openly planning to do, it is high time to call a halt.

Mr. Clark assures his vapid followers that he is going to smear the country with anti-evolution propaganda from no less than six broadcasting stations and that he is going to wage a vicious attack on open-mindedness, tolerance

and all of the really civilizing virtues that have been accumulating in the race since *pythycanthropus erectus* strode the primeval plains.

Is it not about time that a thing so representative of the breadth and growth of human intelligence as radio should be employed by cultists, propagandists and fadists for the spreading of creeds manufactured by cliques of mountebanks that prey on truth-fearing numbskulls?

### Why Not Standardize Radio Announcements?


If you are a regular reader of this department (and really there is not a reason in the world why you should not be), you will know that we have never been what you call entirely satisfied with announcing.

The trouble has been with the announcers. Most of them have lacked personality and the background necessary to make of announcing an art.

The average announcer of the present is more interested in his own popularity than he is in the success or perfection of his work, and we listen, not to the announcements concerning that which is about to be broadcast but to that which the announcers believe will make of him, in the minds of the audience, a member of the *intelligentsia*. Either that or he is of the type who bases his campaign for popularity on wit and humor; he wants to Joe Cooke his way into the heart of his audience.

**CARTER**

**"IMP" Battery Switch**



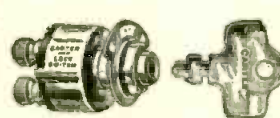
Quarter turn Snap. Compact, quiet. Indicates "on and off."

65c

(Half Size)

**"IMP" Lock Switch**


Battery switch with removable key. 3 keys furnished with each switch.



75c

(Half Size)

**Dial Light**




Lights up dials. Can be used as combined Battery Switch and Dial Light. Complete with lamp.

\$1.75

(Half Size)

**"IMP" Pilot Switch**



Shows red when tubes are in operation and switch is "on." Complete with lamp.

\$1.50

(Half Size)

Any dealer can supply

MEMBER  
NAB

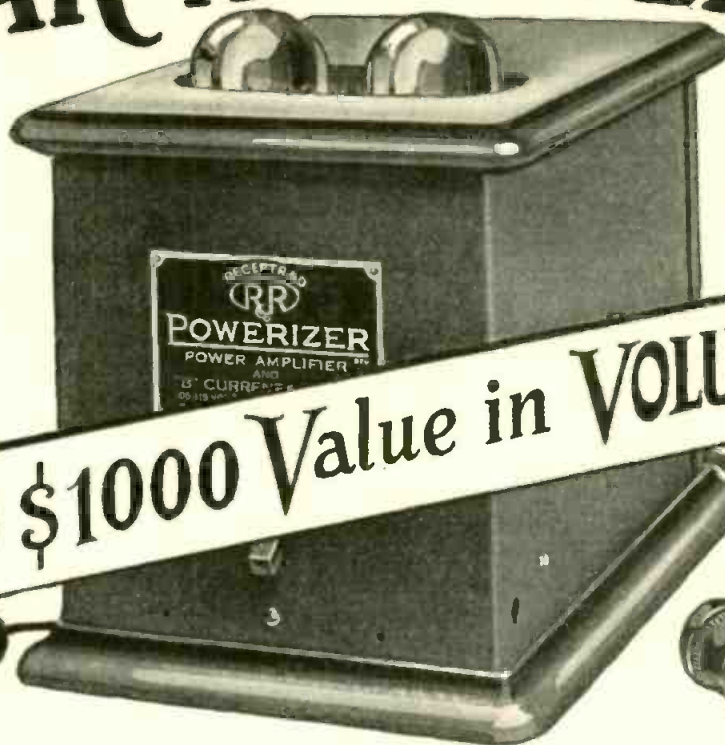
Also all types of Jack Switches

In Canada—Carter Radio Co., Limited, Toronto

**Carter Radio Co.**  
300 S. FINE AVENUE  
CHICAGO, ILL. U.S.A.

# HEAR IT - and BELIEVE!

*Ask Your Dealer to Demonstrate It*



**\$300 to \$1000 Value in VOLUME and TONE**

*for*  
**\$49.50**

# POWERIZER

REG.

## Combined "B" Eliminator and Power Amplifier

RADIO amplification and "B" Battery elimination are admitted to be the only two really big developments in Radio during the last five years. Powerizer now, in one revolutionary stroke, combines both in one unit, so that by merely attaching this unit, you can secure all the tone and volume advantages offered up to this time only in the newest power sets costing from \$300 to \$1,000.

With Powerizer attached to your set, former lifeless and colorless radio sounds are changed to vibrant brilliancies that literally transport you to the broadcast studio. Yet Powerizer costs you no more

than a good "B" Battery eliminator ALONE.

Supplies up to 170 volts "B" power for set, 350 volts for power tube, proper bias eliminating "C" batteries, and "A" voltage for last tube. Operates directly from any electric light socket and pays for itself quickly in "B" Batteries saved.

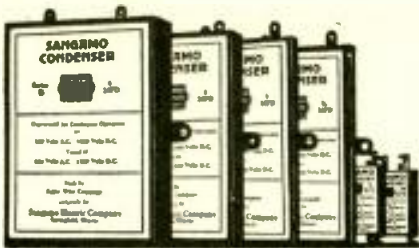
To know the Powerizer fully and to appreciate it, you must HEAR it. If you want Radio's most perfect reproduction in your own home, on your own present set—go to the nearest Powerizer dealer today and ask for a demonstration.

*Biggest Hit Ever Known in Radio*

DEALERS! Are you missing this unusual opportunity? Become a Powerizer dealer now. Be able to demonstrate this unit and reap the big sales that Powerizer dealers are enjoying. Write or wire today.

*Modernizes Your Set Instantly*

**RADIO RECEPTOR Co., 106 Seventh Ave., New York**



# SANGAMO

now offers  
a full range of sizes in  
**Wound Condensers**

**"They won't break down"**

**G**IVE us higher capacity condensers as good as Sangamo Mica Condensers," asked the radio set builders. We have done so. Sangamo Wound Condensers are now on the market. They have high insulation resistance and exceptionally good power-factor (or low energy loss). Recommended for use in radio-frequency circuits.

Internal air and ozone bubbles (the cause of breakdowns) are prevented by special winding processes that keep the aluminum foil and insulation under unvarying tension.

"The only eliminator that stands up in eliminator service." is the comment of testing laboratories. For sturdy Sangamo Wound Condensers will stand continuous duty at their service voltage.

### SERIES A

Guaranteed for continuous duty at  
250 volts A. C., 400 volts D. C.

1/10 mfd. .... 80c	1 mfd. .... \$1.25
1/4 mfd. .... 80c	2 mfd. .... 2.00
1/2 mfd. .... 90c	4 mfd. .... 3.00

### SERIES B

Guaranteed for continuous duty at  
500 volts A. C., 1000 volts D. C.

1/10 mfd. .... \$1.25	1 mfd. .... \$1.95
1/4 mfd. .... 1.40	2 mfd. .... 2.50
1/2 mfd. .... 1.60	4 mfd. .... 4.00

### CONDENSER BLOCKS—SERIES A

12 mfd. tapped 8-2-2 mfd. ....	\$9.50
12 mfd. tapped 8-2-2-1-1-1 mfd. ....	11.00

Also special sizes to order in quantity.

### VARION Eliminator Group

One 14 mfd. Block tapped 4B-4-2-1-1-1-1 } \$12.00  
Two 1/10 mfd. series B, tapped 1/10, 1/10 }



**Sangamo Electric Company**

6332-9 Springfield, Illinois

RADIO DIVISION, 50 Church St. New York

### SALES OFFICES—PRINCIPAL CITIES

For Canada—Sangamo Electric Co. of Canada, Ltd., Toronto.

For Europe—British Sangamo Co., Ponders End, Middlesex, Eng.

For Far East—Ashida Engineering Co., Osaka, Japan

After a terrible lot of night work we have decided to put our vote in for standardized announcing.

Rather than expose ourselves to the harangues of the average announcer, we would make of him an automaton, with a bit in his mouth.

He would never be permitted to compose his announcements. Instead he would simply say "Mr. Jones will now sing, 'Danny Boy' from WJZ, New York."

Of course, to make the scheme work out, Mr. Jones would have to start singing immediately, for periods of silence have done much to damage radio entertainment.

Incidentally, it has been the slowness of the performers in preparing for their next numbers that affords our announcers so many opportunities to gush over.

\* \*

## The Intrusion of "Paid Advertising" on Broadcast Programs

WMCA, atop the big McAlpin Hotel in New York, is an erstwhile broadcaster that has on at least one other occasion been none too politely reprimanded by this Department. It is the most naive broadcaster of advertising in the business and Sunday seems to be its big copy day.

If you want to hear broadcast advertising in its very worst form just tune in on this station any Sunday evening after 7:00 P. M.

Some weeks back a good old-fashioned book salesman in the guise of a reviewer laid down a barrage of sales talk that would have made any insurance peddler appear like a rank novice. It was a direct piece of selling in bad taste. The price of the book, too, was mentioned although Mr. Hoover has asked that broadcasters refrain from this practice believing, as he must, that it tends to make a public billboard out of the air.

We're very sore about the whole thing.

\* \*

## Why Do Broadcast Artists Assume Pseudonyms?

THERE are those in broadcasting who have the notion that if you conceal your identity and parade under some supposedly intriguing pseudonym like the "Silver-Masked Tenor" or WGN's "Phantom Violin" that you will in time rise to the dizziest heights of fame.

It is an old game and a highly successful one. It is at the same time a cheap press-agent trick unless the performer is sincere in his desire to withhold his identity.

If you travel long enough and far enough, you might find a modest genius fearful of the glare of the limelight. But who ever heard of a truly modest person seeking the stuff that American broadcasting stations have to offer?

# Radio Code!

Do you know you can get code on your radio and read it too? You can get more out of your radio with the Bunnell Buzzplex. It's easy to learn wireless and radio signals with the buzzer, or shift to the lamp for practice in flash or heliographic work.

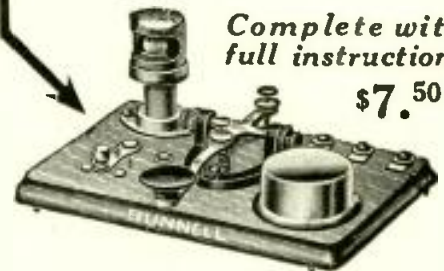
Used by military schools, boy scout camps and others, wherever code is taught. Instruction book and code chart furnished with each set. Headquarters for transmitting apparatus.

**J. H. BUNNELL & COMPANY, Inc.**

Manufacturers and Distributors

32 Park Place, New York

Phone: Whitehall 5970



Complete with full instructions  
**\$7.50**



# I. C. A. PANELS

For "Popular Radio" and All Other Well Known Circuits

DON'T spoil the appearance of a fine set with a makeshift front panel! An I. C. A. Panel of Insuline or Bakelite lifts your set right out of the homebuilt class and places it on a par with any factory-built set. Highest insulating efficiency, hence best results. Clean-cut decoration by our exclusive Etch-O-Gravure Method. Furnished accurately drilled, ready to set up.

### I. C. A. PANELS for "Popular Radio" Circuits

Home Run—3-Tube; Town & Country Receiver—7-Tube; Silver Cockaday—4-Tube; LC—27—5-Tube; Daven Bass Note—6-Tube; Orthophase—5-Tube; Samson T.C. Circuit—4-Tube; Reflex Receiver—5-Tube; McLaughlin Super Het—8-Tube; Amertran B Supply and Amplifier.

### For Other Popular Circuits

Rasla Reflex—2- and 3-Tubes; B. T. Counterphase—6-Tube; Hammarlund-Roberts—5-Tube; Browning-Drake—5-Tube; B. T. Nameless—5-Tube; Freshman Type T. R. F.—5-Tube; Madison-Moore Super Het—8-Tube; Fenway Super Het—9-Tube; etc., etc.

We also furnish sub-panels for all popular circuits

BEFORE YOU BUILD ANY CIRCUIT get the I. C. A. Free Booklet giving complete list of all insulating parts. Don't take a substitute for the genuine I. C. A. Products. If your dealer can't supply you write us direct. Dept. 11.

Insulating Company of America, Inc.  
Insuline Bldg., 59 Warren St.  
New York City

## Why the Saturday Night Debauch by Radio?

Our broadcasters, it would seem, are victims of American Saturday night psychology—a frame of mind that, despite the blatant rantings of Billy-Sunday theologians, has brought moral ruin to many a lass and lad.

In the old days booze hoisters funnelled Anheuser and went maudlin before sloppy bars; young bucks courted the village belles with hired buggies; burlesque shows bulged with the sporting gentry of the times, and wasp-waisted, pompadoured young ladies were waltzed ragged by brown-derbied sheiks.

The good old Saturday night mothered debauchery in all of its forms. And it still does.

Unless you are a ravenous consumer of jazz, a Saturday evening at the radio will break over you like a flood tide. The reckless abandon of the hebdomadal spree is the motivating force of nine out of every ten broadcasters who operate on this night. Go to the radio at 10:00 P.M. and you will find nothing but a seething sea of syncopation. All of the new tricks of jazzery will be practiced on you and fresh announcers will give themselves up to a strain of buffoonery that would drive a Mennonite to brass buttons and ankle bracelets.

Of course, if you like your music raw and bloody this will please you. On the other hand, if you belong to that little band of silly old goofs who can still tolerate the work of founders of the musical art you will feel that Saturday-night radio is, after all, only a shade removed from the penny arcade and that a source of entertainment still subject to the devastations of week-end psychology has a misty future.

\* \* \*

## The Renaissance of Jazz

It begins to look now as if something might come of jazz after all. For a while there, during the very heavy floods, we thought that nothing could ever be done that would make of it a music fit for polite consumption. It was pretty bad, pretty bad.

Just as we were getting ready to sound the final warning, the Big and Little Jazz masters decided that syncopation was being muted and hammered to the bow-wows.

Mind you, this is not going to be a general indorsement of jazz. We still have plenty of adherents to the old school, who, despite the missionary work of this very popular department in a very popular magazine, (*adv.*) are going right on with the old stuff. But then there is Ben Bernie, Joe Knecht, B. A. Rolfe, Whiteman and a few others who are leading the renaissance and who will eventually bring syncopation to the level of at least a sub-art.

## The Thrill of Successful Accomplishment

**I**N one way or another, this is the basis of every man's interest in life.

No one tires of the satisfaction of a good job well done. You might hesitate to tackle alone the construction of a grand piano, with any expectation of getting a thrill out of it.

But with National Radio set

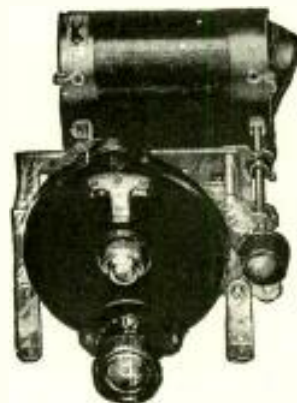
essentials and the necessary additional parts and accessories, you can produce a modern, sensitive, selective, attractive and beautifully toned Radio set.

It will have every desirable quality that can be bought. It will have one quality which cannot be bought—the thrill of successful self-accomplishment.

## NATIONAL TUNING - UNITS



BD-1B



BD-2B

The NATIONAL Tuning Units comprise the wonderful BROWN-ING-DRAKE inductance-coils or R. F. Transformers—now space-wound for sharper tuning; NATIONAL "EQUICYCLE" (SLF) or "EQUIMETER" (SLW) Condensers and the NATIONAL VEL-VET VERNIER DIALS (including the new Type C ILLUMINATED Dials). Made in a number of different combinations at prices from \$9.25 to \$14.25. Send for Bulletin 115-PR giving full particulars or inquire at any good dealer. Be sure you get genuine NATIONAL products.

*The NATIONAL IMPEDAFORMERS are complete units for the simple construction of quality impedance-coupled audio—extremely simple to wire up. And for B-Eliminators, the new NATIONAL POWER TRANSFORMERS, FILTER CHOKES, SOCKETS and TONE-FILTERS represent a real advance.*

**NATIONAL CO., INC.**

Engineers and Manufacturers—W. A. Ready, Pres.

110 BROOKLINE ST., CAMBRIDGE, MASS.

**THE TUBE WITH THE SENSIBLE GUARANTEE**





# Stop walking

*He* "Please stop walking—I just missed the announcer—because your walking vibrates these tubes and I can't hear anything but 'noises.'"

*She* "But dear, I must walk—We have no other means for conveying these dishes into the kitchen."

*He* "Pardon me, you're right Honey, I did'nt mean to speak so harshly—I guess I'll take Charlie's advice—your brother Charlie sure does know radio—You know, he had the same trouble—He tried all kinds of tubes without success—He even put sponge rubber under the sockets, but that did not prevent the tube elements from vibrating—So he went out and bought a set of those New Supertrons—They are internally re-enforced and rigid—Since then he and Maude dance and even Charleston without affecting reception"

*She* "Now ain't that grand—You better get some Supertrons now—Be sure they are isotantited—You'll see the difference."

*He* "Atright Honey—I won't take anything 'Just as Good' this time. I'll inslat on Supertron because they are guaranteed by serial number and if I'm not satisfied the dealer will replace or refund within 30 days—So long Honey, will be back soon with Supertrons."

**All Types at Public Demand Prices**

SX 201 A	\$2.00
SX 199	2.25
SV 199 small	2.25
SV 199 large	2.25
SX 112 power	5.00
SX 120 power	2.50
SX 171 power	5.00
SX 200 detector	5.00
SX HIM'u	3.00
SUPERTRON Half	4.00
SUPERTRON Full	5.00

In Canada slightly higher

**SUPERTRON MFG. CO., Inc., Hoboken, N. J.**

Chicago Office—30 N. Dearborn St.  
Export Dept.—880 Broadway, New York City



## SUPERTRON

**A SERIAL NUMBER GUARANTEE**

*The Foremost Independent Tube In America*

## What Vaudeville Programs Are Able to Teach the Broadcasters

This department has been doing some pretty deep thinking on the subject of the studio vs. the vaudeville theatre, and it only recently came to the astounding notion that our radio programs are, in the last analysis, very similar to the programs of the vaudeville theatres. Of course, the studio lacks the variety.

If we owned a broadcasting station we should present our programs with a single orchestra throughout the entire performance. This would not only give an effect of continuity, but it would give the performers a greater opportunity to win the approbation of their audiences.

There would be solos to be sure and they would be with and without orchestral accompaniment. In the case of piano and other instrumental solos the orchestra could pick up the melody on the last few bars and wind up each solo with a bang. The average soloist might be inspired to greater effort and the audience would be in a glowing frame of mind.

Our radio-vaudeville programs, by the way (and not very much by the way at that), would have *no announcements* except between the acts.

Announcing the names of numbers, has to us, always been a wholly unnecessary interruption. It is certainly never done in vaudeville and what vaudeville goer objects to that? The performer would be introduced and the nature of his act would be briefly described. Audiences want to be entertained, not educated, and entertainment must flow in an even stream. Verbal interruptions such as we now have in radio programs are, to our way of thinking, breaches in what might be an orderly movement of the features that go to make up the evening's entertainment.

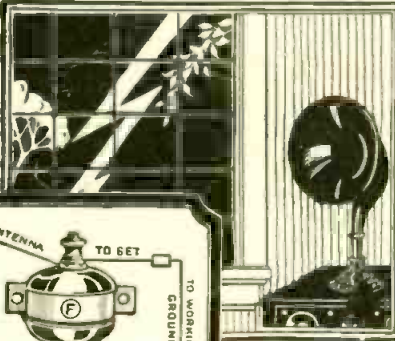
Now that this big thesis has been given to the world we shall wait for some alert broadcaster to make use of it. That shows what a little optimist we are!

### Short Waves

THE report of the War Department for the first six months of 1926 shows that the use of its radio net saved \$74,313.74. The cost of radio communications during the period was \$27,598.63; the same messages would have cost \$101,912.37 had commercial wires been used. The War Department also handled the radio business for 31 other government departments.

Some mathematical soul has figured out that the man-made sources of interference now number 54.

Radio programs are ninety percent music.



ANTENNA TO GET

TO WORKING GROUND

TO PROTECTIVE GROUND

No. 248  
E-5841  
Underwriter's  
APP.

## "Little Joe" Lightning Arrester

Especially designed for Radio Work. Made of porcelain, small, neat, rugged and serviceable. Can be suspended on antenna or fastened to wall.

Ask Your Dealer

M'fd by **CIRCLE F MFG. CO.**  
Trenton, New Jersey

## F. D. Pitts Company

INCORPORATED

219A Columbus Ave.

Boston, Mass., U. S. A.

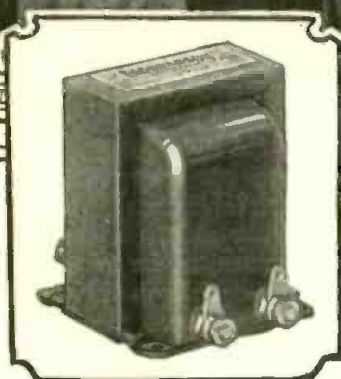
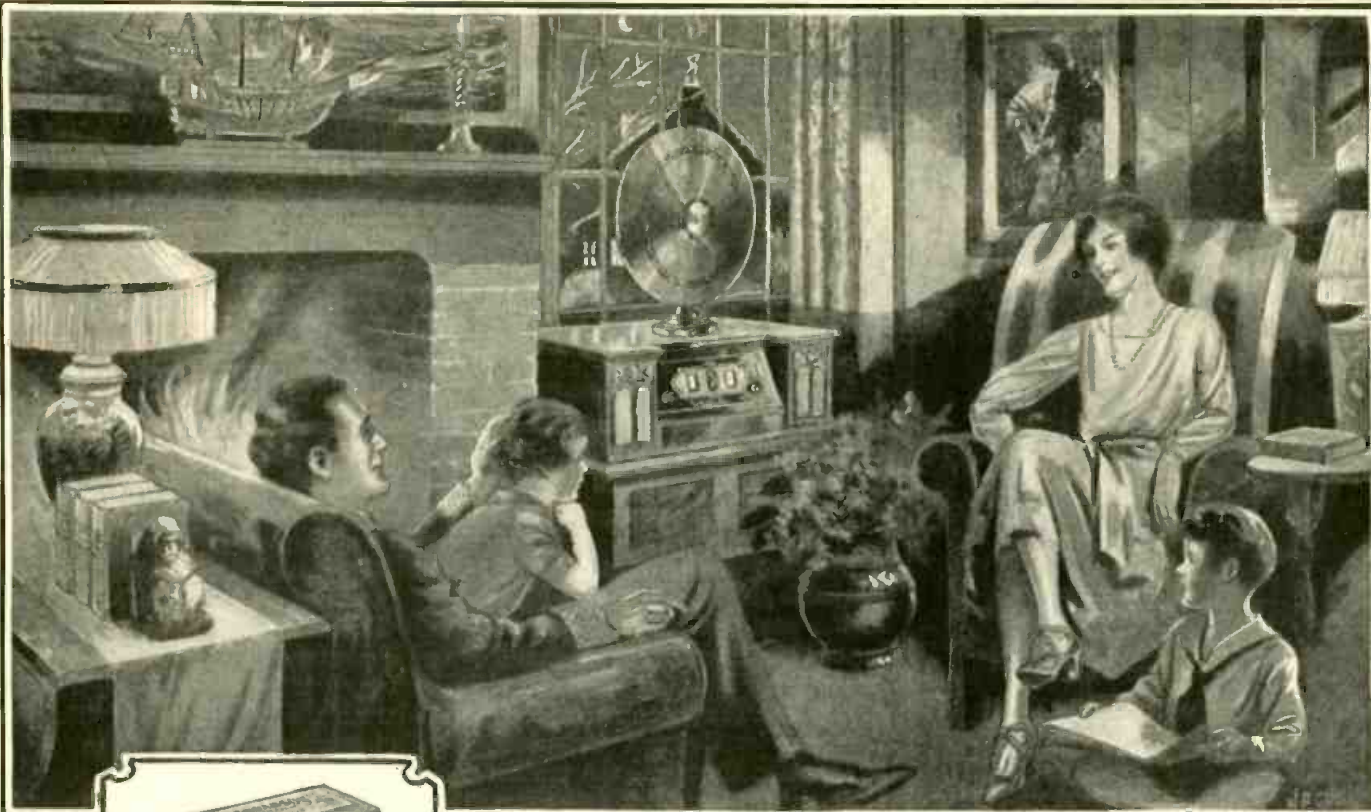
## Merchandising Radio Since 1919

DEALERS — send for large and profusely illustrated catalog on the products of scores of nationally advertised radio manufacturers.

Wholesale Exclusively

## "Pioneers in the Distribution of Radio"





# THORDARSON

R-200  
AMPLIFYING TRANSFORMER

*Supreme* in  
MUSICAL PERFORMANCE!

THE secret of good reception lies not in attempted correction of the deficiencies of poor broadcasting, but in faithfully reproducing the programs of the better stations.

Thordarson transformers employ neither a "rising" or a "falling" characteristic for corrective purposes. They are designed to give, as nearly as possible, equal attention to all notes.

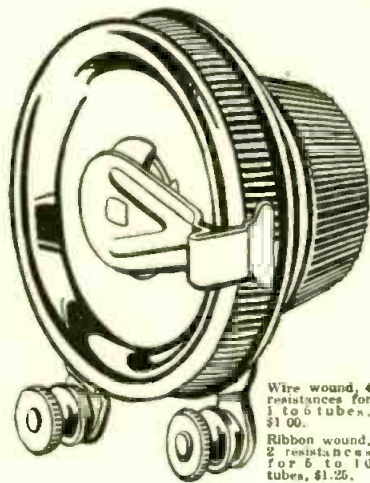
The majority of leading quality receivers are equipped with Thordarson transformers—a substantial evidence of the musical supremacy of Thordarson amplification.

**THORDARSON ELECTRIC MANUFACTURING CO.**  
*Transformer Specialists Since 1895*  
WORLD'S OLDEST AND LARGEST EXCLUSIVE TRANSFORMER MAKERS  
*Huron and Kingsbury Streets — Chicago, Ill. U.S.A. 3445*



# Centralab Rheostat S

Permanently Noiseless



Wire wound, 4 resistances for 1 to 5 tubes, \$1.00.  
Ribbon wound, 2 resistances for 5 to 10 tubes, \$1.25.

Where old design, ordinary rheostats overload, heat-up and quickly become noisy on circuits with several tubes, and on new tubes using increased current, Centralab Rheostats operate smoothly and permanently quiet.

Insulated metal discs clamp the resistance immovable and warp-proof—insuring even regulation and no dead spots. With large area of metal to aid in cooling, and carrying extra heavy current for their size, they improve the quality of any receiver.

### Switch-Type Radiohm

Tapered to control oscillation and volume in the plate circuit of radio frequency amplifiers, Centralab Switch Type Radiohms give the additional advantage of a positive quick acting "A" battery switch. Turning knob to right lights tubes and then increases the volume. To left decreases volume and then cuts off the batteries. One knob replaces two. Two essential controls practically at the price of one. Resistances, 0 to 500,000 ohms.

**\$2.30**

At Dealers  
Or Direct

Send for FREE CIRCUIT HOOK-UPS



**Central Radio Laboratories**  
17 Keefe Ave., Milwaukee, Wis.

Makers of a full line of variable resistances for 69 manufacturers of leading standard sets.

Australian Representatives: United Distributors, Ltd., Sydney.  
Canadian Representative: Irving W. Levine, Montreal.  
Great Britain Representative: R. A. Rothermel, Ltd., London.



## IN THE WORLD'S LABORATORIES

CONDUCTED BY DR. E. E. FREE

### Radio Features in the Vitaphone

NOTHING better illustrates the remarkable progress which has been made in the past few years with audio-frequency amplifiers than the new talking and singing motion picture perfected by the Bell Telephone Laboratories and presented for the first time in public by Warner Brothers, the motion picture producers, in New York City. The program offered to the public included a brief talk by Mr. Will Hays, so-called "Czar" of the motion picture industry; instrumental selections on piano, violin and banjo; an orchestral number; vocal selections and choral singing, and a complete musical score to accompany the motion picture "Don Juan."

The motion picture portion of the

apparatus offers nothing of especial interest to the radio engineer. There is no attempt to photograph the record of the sounds on the motion picture film itself, as is done in Dr. De Forest's phonofilm; instead the sound record is made on a wax disk and a phonograph record is prepared from this disk in much the usual manner. The problem of synchronizing the operation of this phonograph record with the motion picture film, so that the sounds will be emitted at exactly the right instant to suit the action on the screen, has been solved by driving both the motion picture projector and the phonograph turn-table from the same electric motor.

The radio portion of the apparatus appears, so far as reproduction is concerned, only in the amplifiers and loudspeakers used to send out the sound.



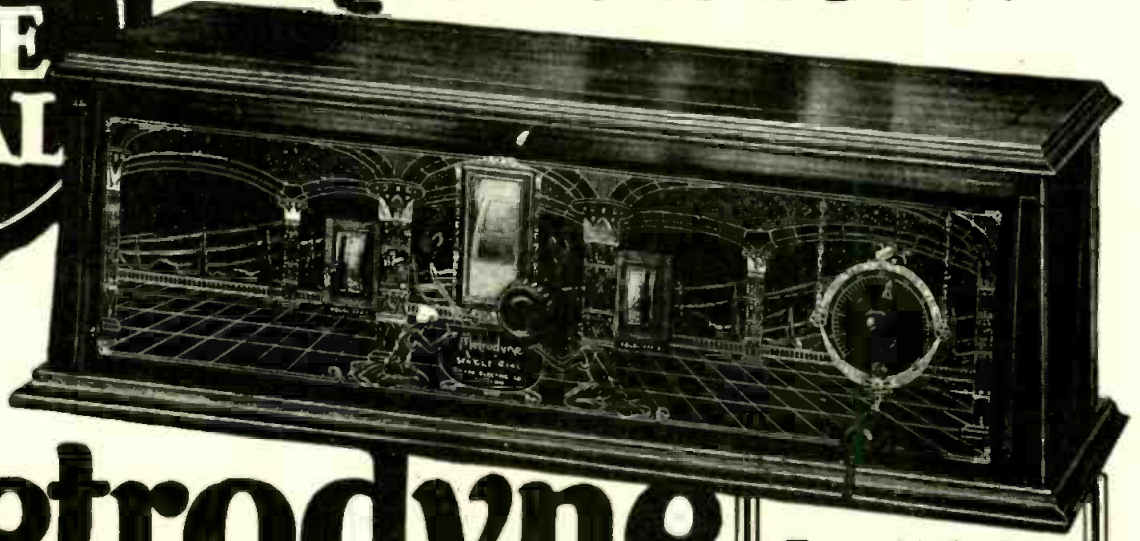
Bell Telephone Laboratories

### THE VITAPHONE'S "ELECTRIC EAR"

On this wax disk is made the record of sounds which record is later played to accompany the motion picture. The synchronous motor which drives the disk at the same speed as the camera, is seen below and to the right. The microscope permits continuous observation of the tiny indentations in the record made by the recording needle.

# 7 Tube Set Single Dial Radio

**30  
DAYS  
FREE  
TRIAL**



## The Metrodyne

**ONLY ONE DIAL TO TUNE**

**Retail Price**  
**\$75**  
**Completely Assembled**  
**Big Discounts to Agents and Dealers**

Wonderful offer direct from the factory!

A perfect working, single dial control, 7 tube receiver. And just to prove our claims, we will ship it to your home for **30 days' free trial**. Test it under all conditions. Test it for distance, volume and tonal quality — and if you are not convinced that it is the best single dial set you ever heard, return it to the factory. We don't want your money unless you are completely satisfied.

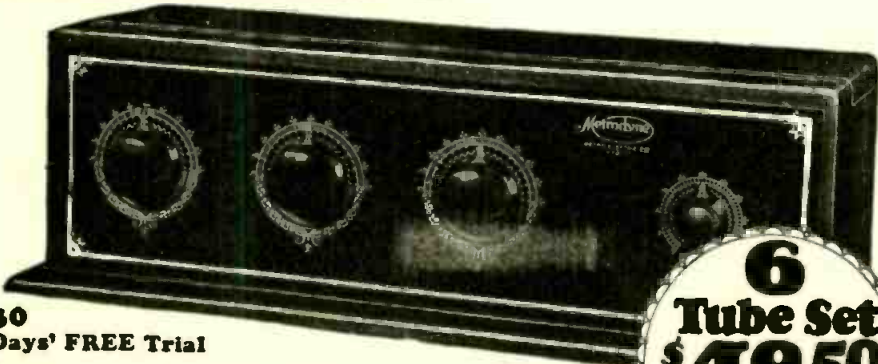
## Metrodyne Super-Seven Radio

A single dial control, 7 tube, tuned radio frequency set. Approved by America's leading radio engineers. Designed and built by radio experts. Only the highest quality low loss parts are used. Magnificent, two-tone walnut cabinet. Artistically gilded genuine Bakelite panel, nickeled piano hinge and cover support. All exposed metal parts are beautifully finished in 24-k gold.

Easiest set to operate. Only one small knob tunes in all stations. The dial is electrically lighted so that you can log stations in the dark. The volume control regulates the reception from a faint whisper to thunderous volume, 1,000 to 3,000 miles on loud speaker! The Metrodyne Super-Seven is a beautiful and efficient receiver, and we are so sure that you will be delighted with it, that we make this liberal **30 days' free trial offer**. You to be the judge.

### BIG PROFITS TO AGENTS AND DEALERS

Our Agents and Dealers make big money selling Metrodyne Sets. You can work all or part time. Demonstrate the superiority of Metrodynes right in your home. Metrodyne Radios have no competition. Lowest wholesale prices. Demonstrating set on 30 days' free trial. Greatest money-making opportunity. Send coupon below—or a letter—for our agent's proposition.



**30 Days' FREE Trial**

## Metrodyne Super-Six

Another triumph in radio. Here's the new 1927 model Metrodyne 6 tube long distance tuned radio frequency receiving set. Approved by leading radio engineers of America. Highest grade low loss parts, completely assembled in a beautiful walnut cabinet. Easy to operate. Dials easily logged. Tune in your favorite station instantly on same dial readings every time. No guessing.

Mr. Howard, of Chicago, said: "While five Chicago broadcasting stations were on the air I tuned in seventeen out-of-town stations, including New York and San Francisco, on my loud speaker horn, very loud and clear, as though they were all in Chicago."

We are one of the pioneers of radio. The success of Metrodyne sets is due to our liberal **30 days' free trial offer**, which gives you the opportunity of trying before buying.

**6 Tube Set**  
**\$48.50**  
**RETAIL PRICE**  
**Completely Assembled**

**MAIL THIS COUPON**  
or send a postal or letter. Get our proposition before buying a radio. Deal direct with manufacturer—**Save Money.**

### Mail COUPON Below!

Let us send you proof of Metrodyne quality

F. L. Warnock, Greentown, Ind., writes: "I received the Metrodyne in good shape and am more than pleased with it. Got stations 2,000 miles away."

C. J. Walker, Mariposa, Calif., writes: "Received my Metrodyne Single Dial set O. K. I believe that these one-dial sets are going to be excellent sellers. I had no trouble in tuning in stations enough to satisfy anyone, so you will please send me another set."

Roy Bloch, San Francisco, Calif., writes: "Very often we travel from New York to the Hawaiian Islands quickly—from station to station—by means of the little tuning-knob which operates the electrically-lighted dial. The Metrodyne Single Dial Set is much easier to operate than any radio set I've ever seen."

We will send you hundreds of similar letters from owners who acclaim the Metrodyne as the greatest radio set in the world. A postal, letter or the coupon brings complete information, testimonials, wholesale prices, and our liberal **30 days' free trial offer**.

**METRO ELECTRIC COMPANY**  
2161-71 N. California Ave., Dept. 138  
Chicago, Illinois

Gentlemen:

Send me full particulars about Metrodyne 6 tube and 7 tube sets and your **30 days' free trial offer**

Name \_\_\_\_\_

Address \_\_\_\_\_

If you are interested in AGENT'S proposition, place an "X" in the square

**METRO ELECTRIC COMPANY**  
2161-71 N. California Ave. • Dept. 138 • Chicago, Illinois

# Gem Tubes

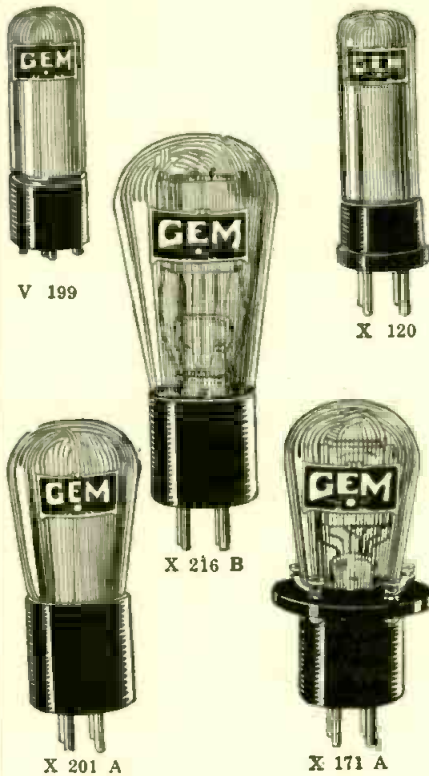
\$1<sup>00</sup>

## THE BIGGEST DOLLARS WORTH IN RADIO!

The Perfect tone and clear powerful volume of Gem Radio Tubes makes them indeed worthy of their name.

### EQUIP YOUR SET WITH GEM TUBES

Why pay more?—Gem Tubes are built to give greater distance, clearer volume and finer tone. Every tube guaranteed to give satisfaction.



### A COMPLETE LINE OF RADIO TUBES

There's a Gem for every Radio Receiver and every Radio Need.

#### GEM DOLLAR LINE:—

201A	199
199A	x199

#### GEM POWER TUBES AT POPULAR PRICES

200A	120	112 Adapter
112	171	171 Adapter
216B	210	213
RF201A	120A	202
M U—X 29-19-9	Dry Cell	
M U—X 30-30-6	Wet Cell	

Write for information about our special Kit that settles tube problems.

ASK YOUR DEALER TO SUPPLY YOU

### GEM TUBE COMPANY

16 Hudson St.

New York City

108 West Lake St., Chicago, Ill.  
Lafayette Bldg., Detroit, Mich.

The sound record consists, as usual, of a series of tiny indentations in the groove of the phonograph record. The needle runs over these indentations, also as usual. But instead of the vibrations thus induced in the needle being communicated mechanically to a diaphragm and discharged through a horn, as in the phonograph, the needle vibrations are transmuted electromagnetically into electric oscillations; that is, into an audio-frequency current. This is amplified by high-quality vacuum-tube circuits, much as is done with the speech currents in the telephone industry. When the amplification is sufficient the current is fed into loudspeakers placed behind the motion picture screen.

It is apparent that this system involves no basic departure from devices already well known. It merely puts together into one smoothly running unit a phonograph, an electric reproducer, an amplifier and a loudspeaker similar to those used in the well-known public address systems of the telephone company. However, to obtain the smoothness and perfection of operation which the Vitaphone shows was a most difficult task and one for which both Mr. Joseph P. Maxfield, who headed the Bell Laboratories' research on the problem, and his assistants deserve the heartiest congratulation.

While it is probable that delicate recording instruments might detect slight differences between the actual voice or music and the reproduction with which the Vitaphone fills the theatre, the human ear finds it impossible to make any distinction in those productions in which the equipment reaches its best attainments. A few of the short productions shown in New York City were not quite so perfect as this, but if perfection can be attained once it must

be possible to attain it again and some of the productions shown were perfect enough to suit anybody.

The taking of the picture and the production of a simultaneous sound record are accomplished by what amounts to a reversal of the method of reproduction. A distortionless microphone is suspended near the scene to be photographed, but where it cannot be seen by the eye of the camera. The output of this microphone is amplified and supplied to an electromagnetic device which cuts the necessary indentations in the wax record. By these the sound record is made. At the same time the motion picture is photographed, exact synchronism being attained by driving both the recording turntable and the motion picture camera with synchronous electric motors energized from the same source of alternating current.

While the first use of the Vitaphone will presumably be in the amusement field, probably to present musical scores for motion pictures without the expense of an orchestra, the device promises to have still more important uses in the preservation and distribution of material of educational value. Suppose, for example, that a great scientist like Niels Bohr or Albert Michelson gives an experimental lecture before the Vitaphone; both voice and experiment are permanently preserved. Any college or club that has the Vitaphone equipment can hear the lecture any time they wish.

A whole lecture course could be given in this way; experiments, demonstrations and everything. First-class teachers are rare men. The country never has enough of them. If the Vitaphone helps, as it seems quite possible that it can, to bring the faces and words and acts of such teachers to thousands of additional students, Mr. Maxfield and



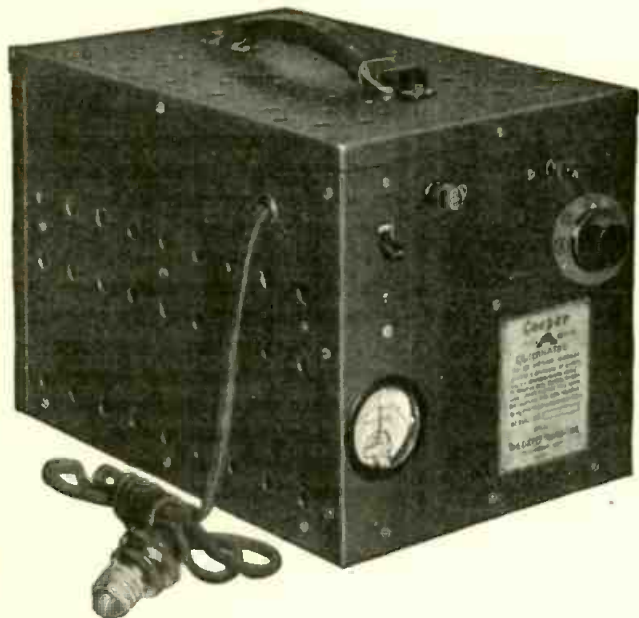
Bell Telephone Laboratories

### THE INVISIBLE SECRETARY

Mr. Sergius P. Grace, President of the New York Electric Society, is using one of the new dictation systems which employ radio amplifiers to permit ordinary dictation by an executive to be repeated from a loudspeaker in a room elsewhere. The whole outfit is energized from the ordinary lighting circuit, no batteries being required.

# HERE IT IS! THE NEW

## Cooper **A** Eliminator



Actually Eliminates the "A" Battery!

Operates Directly from the  
Light Socket!

No Battery to Bother with!

No Acids or Liquids to Replace!

Needs No Attention of Any Kind!

Good radio dealers in most cities have the Cooper "A" Battery Eliminator on display now. Price \$87.50 (tubes extra), slightly higher west of the Rockies.

**R**ADIO has been awaiting this day. The storage "A" battery with all its messy watering and charging has at last been totally eliminated as a radio necessity.

The Cooper "A" Battery Eliminator is entirely new in principle. It is unlike anything that has ever been offered the radio public. It actually eliminates the "A" battery with all its objectionable features—it operates directly from the light socket. The Cooper "A" Eliminator requires no attention of any kind—no battery to water or bother with—no acids or liquids to replace—none to spill and ruin costly rugs. It is not a power unit—it employs no trickle charger—it operates only while you operate the receiver. A simple throw of a switch and your current is on—tumble back the switch and the current is off.

The Cooper "A" Eliminator operates on any make or type of receiver using 6-volt tubes—it creates no noise of any kind—it gives you everything that batteries ever gave—and DIRECT from the light socket.

### DEALERS—JOBBER

The Cooper "A" Eliminator is entirely different from the many "A" power devices on the market. It offers tremendous sales possibilities. Limited distribution and full protection to trade outlets insure legitimate dealer and jobber profit. Write for full particulars of our exclusive proposition in your territory.

### SEND FOR THIS FREE BOOKLET

We have prepared a very complete illustrated folder describing the Cooper "A" Eliminator in detail. May we send it to you?

## THE COOPER CORPORATION

Radio Division—Dept. P

CINCINNATI, OHIO

First in the Field  
Specializing in  
Cockaday Kits

**S. HAMMER RADIO CO.,** 303 Atkins Ave.  
Brooklyn, New York

Cockaday Sets Now Made Easier to Build by Our New "Ready-to-Wire" Plan  
**50% of Your Time, Work and Worry SAVED!**

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!**

**LC-27 BROADCAST RECEIVER**

**SENIOR POWER PACK**

- 1 Hammarlund mid-line dual condenser. .000275 mfd \$ 7.50
- 1 Hammarlund mid-line single condenser. .000275 mfd 4.65
- 1 Precision Duo-Octoform coil set comprising one antenna coupler and two inter-stage couplers. 10.50
- 1 Amertran De Luxe first stage transformer. 10.00
- 1 Amertran De Luxe second-stage transformer. 10.00
- 1 Amerchoke # 854 6.00
- 1 Dubilier or Tobe 4 mfd. Filter condenser. 5.50
- 1 Dubilier filter condenser. .1 mfd. .60
- 1 Mar-Co illuminated control. scale 0 to 100 3.50
- 2 Mar-Co small controls scale 0 to 50 and 50 to 0 1.50
- 1 Carter Battery Switch .85

- 1 Samson radio-frequency choke coil # 85 \$1.50
- 3 Aerovox. mica fixed condensers. .00025 mfd. 1.05
- 1 Durham or Daven Resistor 4 meg. .50
- 1 Lynch Grid Leak Mounting. .35
- 1 Carter Gem Jack .25
- 1 Carter variable resistance. 0-10,000 ohms. 2.00
- 12 Eby binding posts 1.50
- 5 Benjamin UX Sockets 3.75
- 1 Amperite No. 1 1.10
- Mechanical Kit consisting of aluminum shields, binding post strip, decorated panel and Tait brackets 12.50

**READY-TO-WIRE KIT PRICE \$85.20**

**LC-27 SENIOR POWER PACK**

- 1 Braeh Controlt \$ 6.00
- 1 Amertran transformer. PF-52. 18.00
- 1 Benjamin UX socket 7.50
- 2 Amerchokes. No. 854 12.00
- 7 Eby binding posts 1.05
- 1 Dubilier. Precision or Tobe 2 mfd. 600 volt condenser. 5.50
- 1 Dubilier. Precision or Tobe 2 mfd. 400 volt condenser 3.00
- 1 Dubilier. Precision or Tobe 4 mfd. 400 volt condenser 5.50

- 1 Amertran resistor No. 400 \$7.50
- 1 Centralab Resistance. 2.00
- 1 Bakelite binding-post strip. 3 1/2" x 15" x 1/4" 1.50
- 1 Brass mounting strip. 17 1/2" x 1/2" x 1 1/8" .80
- 1 Hardwood baseboard. 8 3/4" x 15" x 1/2" .60
- 1 Set POPULAR RADIO blue prints 1.00

**COMPLETE KIT PRICE \$65.20**

**Completely Wired Sets  
In Stock Now !**

**Silver Shielded Six  
Kits In Stock Now !**

**WE GIVE SERVICE AND GUARANTEE THE OPERATION  
OF ANY LC-27 KIT OR SET PURCHASED FROM US**

**Write for our interesting special circular which we have prepared  
on the LC-27 Receiver and also catalogue. Do it now.**

*Authorized service station for the LC-27.*

*Inquiries from Dealers Invited*

the Bell Telephone Laboratories will have justified the enormous effort and money spent on the enterprise even if—which is most unlikely—it should prove to be a financial failure as an amusement device.

**Giving Dictation at Long  
Distance**

THE application of alternating current from the ordinary power-lines to the energizing of radio receivers has been followed by the development of a business telephone system which operates from this same source of electric energy. Developed and now under test in the New York City offices of the Bell Telephone Laboratories, the system will probably be released soon for general public use. It will be manufactured by the Western Electric Co.

At the desk of an executive is what looks like an ordinary telephone except that it has no receiver hanging at its side and that there is a small push button on the base of the instrument.

Suppose that the executive wishes to dictate to his secretary in another room. He presses the little push button. This turns on the electricity from the power mains and energizes the system. Anything spoken within a foot or two of the telephone is then repeated by a loud-speaker at the secretary's desk, no matter how far away that may be. Orders may be communicated to assistants, even talks made to assemblies of men, in this same way.

The essential novelty about the apparatus is the amplifier. This is provided with rectifying tubes, transformers, filters and other apparatus to derive from the alternating line current the various plate voltages, filament currents and so on that are necessary. Two or more stages of audio-frequency amplification are used, as may be necessary. Control of volume, so that the loudspeaker does not shout loud enough to disturb other persons nearby, may be attained by taps which alter the ratio of the first audio-frequency transformer in the amplifier.

It is suggested that the apparatus will probably find many uses in addition to that by office executives. For example, waiters in restaurants can give orders thus to the cooks in the kitchen; even guests might give their own orders without leaving their tables, something that might produce a much-needed speeding-up of service in more than one establishment.

**A Cheap Apparatus for  
Observing Atom Tracks**

It is now possible for anyone to see an atom. Or, to speak more exactly, it is now possible to see the track which a flying atomic particle makes when it passes through the air, this being the only way in which individual atoms have ever been made visible. The atom itself

**RADIO DEALERS**

Get the new  
**1926-27  
VAN-ASHE  
Catalogue**

Shows all the newest parts, circuits and kits—all the hard-to-get items that set-builders demand. 12-hour shipments—extra-good discounts. Mail the coupon.



**Van-Ashe Radio Co.**

204 North 10th St. ST. LOUIS, MO.

Send Catalogue.

Name.....

Address.....

**YOUR OWN  
BUSINESS  
Without Capital**

Right now, there is an opportunity in your locality to profitably devote your spare time or all your time to a pleasant, easy and profitable business—one that does not require any training or capital.

The publishers of POPULAR RADIO offer you an opportunity to become their local representative to take care of expiring subscriptions and new subscriptions for POPULAR RADIO and three other popular magazines that they publish.

**SALARY AND COMMISSION**

All material will be furnished you free of charge and you will be paid an attractive commission and salary.

Mail coupon for full particulars.

POPULAR RADIO, Dept. 116,  
627 W. 43rd St., New York City.

Send me full particulars regarding your salary and commission offer to local representatives.

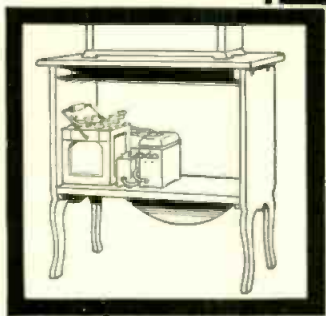
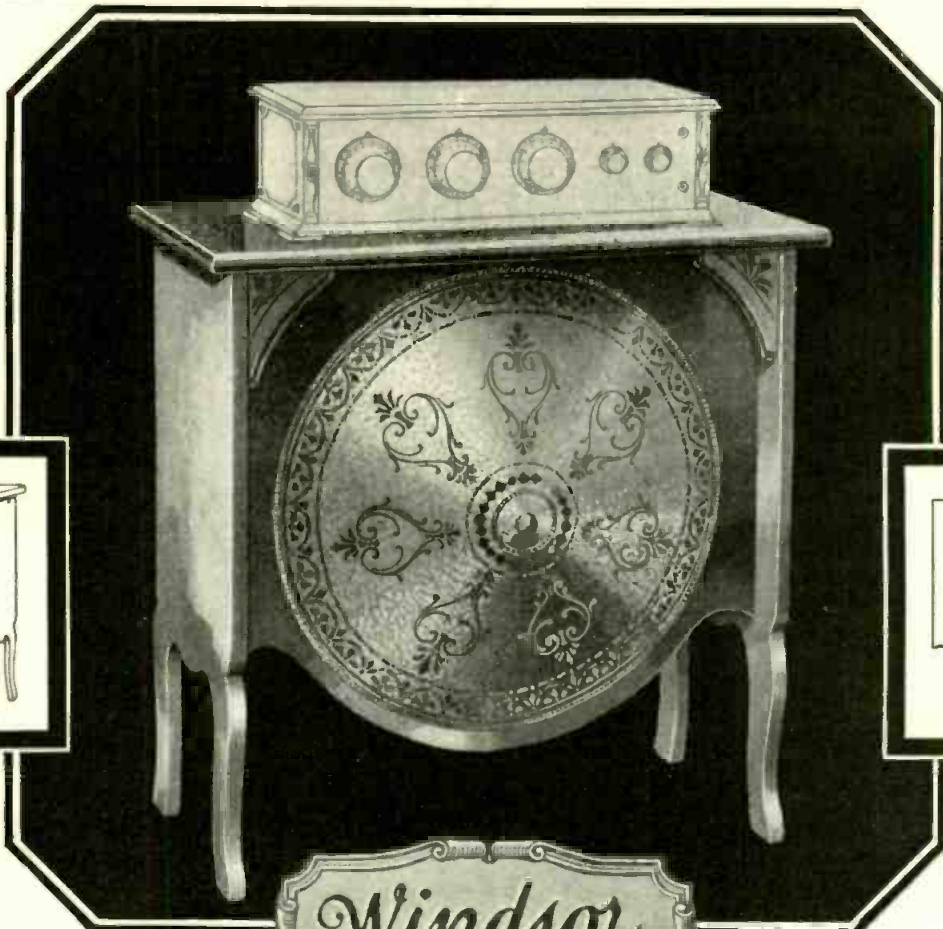
Name.....

Address.....

**\$29<sup>00</sup>**

Console with Cone Loudspeaker Ready for Your Set and Batteries

(West of the Rockies \$35)



Rear view showing large compartment providing ample space for all batteries, battery charger or battery eliminator. These are entirely concealed from view. The back is open for ventilation of batteries.



The Cone Loudspeaker, with its Spruce sounding board, is quickly and easily removable, allowing instant access to all batteries, battery eliminator or other equipment and wiring.

MODEL 200 with 22-inch Cone



MODEL 200 with 22-inch Cone

# A Revelation in Radio Reproduction

AT LAST—a cone loudspeaker that reproduces all the tones as they are broadcast. From the deep voiced tuba of an orchestra to the softest note of a vocal solo—every tone—every sound is reproduced in all its beauty, just as it entered the microphone.

\* \*

This 22-inch Windsor Cone Loudspeaker, with its spruce sounding board, will reproduce the softest crooning lullaby in a softly lighted room, or the full throated march music of a band in an auditorium—both with perfect fidelity of sound and tone.

\* \*

The Windsor Cone Loudspeaker Console is the greatest value in the

world of radio. When compared with the average cost of cone-type loudspeakers of even smaller size, the cost of the complete Windsor—cone loudspeaker, spruce sounding board, and console—is amazingly low.

\* \*

As a piece of furniture, the Windsor Cone Loudspeaker Console is of such manifest high quality and attractive design as to be a welcome addition to any home. Finished in Mahogany or Walnut.

\* \*

The Windsor Cone and Horn Loudspeakers, combined with attractive pieces of furniture in many models, are being demonstrated by recognized dealerseverywhere.

Go to your dealer today and examine this astonishing new Cone Loudspeaker Console. If he happens not to have one, write to us and we will tell you the name of the nearest store at which you can see and hear one.

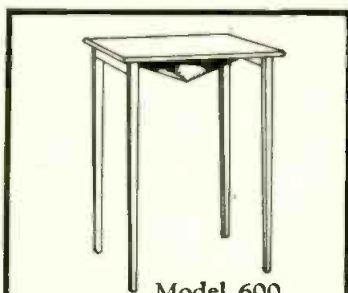
*Note to Dealers* Write or wire today for details of the highly profitable Windsor selling franchise

**WINDSOR FURNITURE COMPANY**  
World's Largest Manufacturers and Originators of Loudspeaker Consoles  
1414 Carroll Avenue Chicago, Illinois  
Los Angeles Branch—917 Maple Avenue

**WINDSOR FURNITURE COMPANY**  
Electrical Department  
1414 Carroll Avenue, Chicago, Illinois

Send me FREE and without obligation circulars of the Windsor line of Cone and Horn Loudspeakers combined with pieces of furniture, and name of nearest dealer:

Name.....  
Address.....  
City..... State.....  
Dealer's Name.....



Model 600  
With 16-inch Cone (Pat. applied for)  
This 20 by 17-inch Cone Loudspeaker Table has suspended from the underside of the top a 16-inch Windsor Cone Loudspeaker. Placed in any part of a room, it fills the room with music just as an inverted electric lamp floods the room with light. Finished in Mahogany \$19 or Walnut. Price.....  
(West of Rockies, \$23.00)



**22½ Volt un-acid everlasting rechargeable "B" Storage Battery**  
**\$2.65** includes chemical

45 Volts \$5.25, 90 volts \$10.00, 112½ volts \$12.50, 135 volts \$14.75, 157½ volts \$16.80. Truly the biggest buy today. Easily charged on any current including 32 volt systems. Any special detector plate voltage had. Tested and approved by leading authorities such as POPULAR RADIO laboratories. Over 3 years sold on a non-red tape 30 day trial offer with complete refund if not thoroughly satisfied. Further guaranteed 2 years. Knock-down kits at greater savings. Complete "Hawley" "B" Battery Charger \$2.75. Sample cell 35c. Order direct—send no money—simply pay the expressman cost on delivery. Or write for my free literature, testimonials and guarantee. Same day shipments.

**B. HAWLEY SMITH**  
 315 Washington Avenue  
 Danbury, Conn.



From a photograph made for POPULAR RADIO by courtesy of Professor Knipp

**A CHEAP DEVICE FOR WATCHING ATOMS**

Professor Charles T. Knipp, of the University of Illinois, has perfected a simple and inexpensive apparatus by means of which the tracks of flying atoms can be made visible and studied. This opens atomic science to everybody; not merely to wealthy laboratories. The device is just in front of Professor Knipp. The batteries at the left supply potential to attract the atomic particles.

is far too tiny, of course, ever to be seen in any manner now known or foreseen.

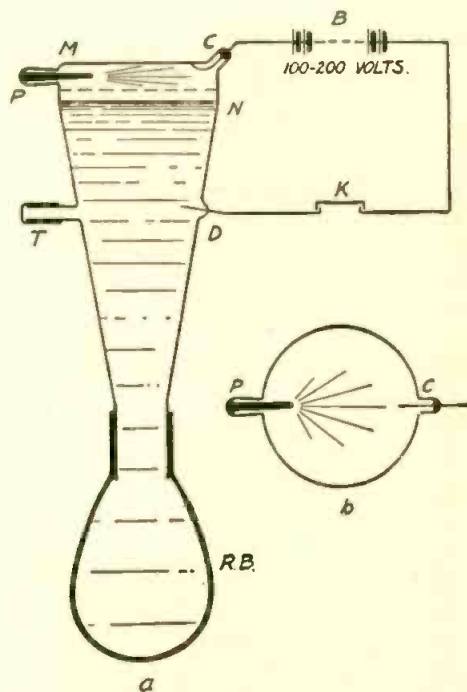
It has been possible for a number of years to produce these visible atom tracks by means of expensive apparatus. The important investigations of Professor W. D. Harkins, of Chicago University, were made with such apparatus. Collisions between atoms and air molecules were studied and the paths of atoms, and even of electrons, were observed under many different conditions. In this way much additional knowledge of atoms and electrons was obtained. But only the larger universities could afford the complicated and costly apparatus with which this was done. To the ordinary experimenter in physics, a radio fan, for example, who wanted to study atomic relations a little, the atom-track apparatus was inaccessible.

Professor Charles T. Knipp, of the University of Illinois, has now done the extremely useful thing of making an atom-track apparatus which can be bought for a few dollars or which an amateur can build for himself.\* Nothing could be better calculated to increase general interest in atomic experimentation in the smaller physical laboratories and among amateurs.

In the new apparatus, as in the earlier and more expensive ones, the principle is to make the track of the atom visible by producing dew along it. As the moving atom flies through the air it strikes against and ionizes many air atoms. These ionized atoms lose one or more electrons each. That gives them an electric charge. This charge attracts water, so that if a little dew is produced immediately in the surrounding air, the

track of the atom will be marked by a line of tiny visible particles of water.

In Professor Knipp's apparatus the supply of atoms is furnished by a little radioactive material placed near the flat bottom of an inverted glass flask. This radioactive material does not, strictly speaking, produce atoms. It produces what are called alpha particles, which are helium atoms which have lost their outer electrons. These alpha particles are shot out at enormous speeds from the radioactive material. Atoms



From Science

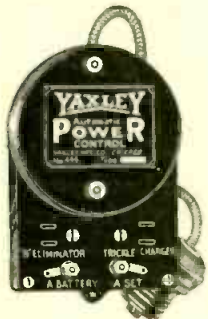
**THE ATOM-TRACK APPARATUS**

R.B. is the rubber bulb, attached to the glass flask. M is the radium, sealed into a small glass tube. The flask contains water. The small diagram, b, is a top view of the bottom of the inverted flask, showing what the atom tracks look like.

\*"Improvements in an Alpha-Ray Track Apparatus," by Charles T. Knipp. Science (Garrison, N. Y.), volume 64, pages 110-141 (August 6, 1925).



**Automatic Power Control**



No more inserting and removing plugs from your light socket—no more turning several switches every time you use your radio set when you have a Yaxley Automatic Power Control.

The Power Control automatically takes care of your B-eliminator, trickle charger and A battery when you turn your set on or off. It does this without fail. No danger of forgetting to turn one switch and find your A battery run down or your tubes needlessly burning.

The Power Control cuts in the B-eliminator and A battery, cutting out the trickle charger when the set is turned on. The B-eliminator and A battery are cut out and the trickle charger cut in when your set is turned off.

No. 444 Automatic Power Control, Series Type—for use with sets with tubes having a current draw equal to or greater than 6 U.V.-199 tubes. Each, \$5.00

No. 445 Automatic Power Control, Multiple Type—for use with sets having tubes with a current draw lower than that equal to 6 U.V.-199 tubes. Each, \$6.00

Order a Power Control from your dealer today. If he cannot supply you, send his name with your order to

**Yaxley Mfg. Co.**

Dept. P 9 So. Clinton St.  
 Chicago, Ill.



## Recommended for the LC SENIOR POWER PACK

THE NEW PRECISION  
HIGH VOLTAGE  
FILTER CONDENSERS



Made in the following capacities particularly for use where high voltage condensers are necessary:

- No. 46—4 mfd. DC working voltage 600. Price \$9.00.
- \*No. 26—2 mfd. DC working voltage 600. Price \$5.50.
- \*No. 44—4 mfd. DC working voltage 400. Price \$5.50.
- \*No. 24—2 mfd. DC working voltage 400. Price \$3.00.

\*Specified for the Senior Power Pack.

### THE PRECISION R. F. CHOKE COIL

Can be used wherever this type of coil is necessary. Very compact, being one inch in diameter and one and one-half inches long. Can be mounted on a sub-panel or a baseboard. Bracket for baseboard mounting provided with each coil. Has a very low distributed capacity, due to the slotted form of winding. List price \$1.00.



**180 VOLT B-SUPPLY**  
for use with 110 v. AC 50-60C.

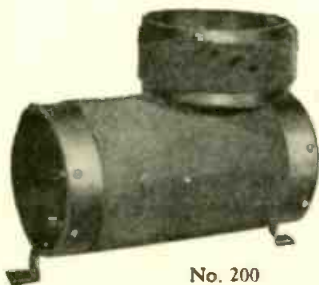
A very powerful, strongly constructed UX216B tube eliminator. Gives 180 volts at 60 mfd. Particularly designed to supply current for the new UX171 tube. List price \$47.50.



No. 20

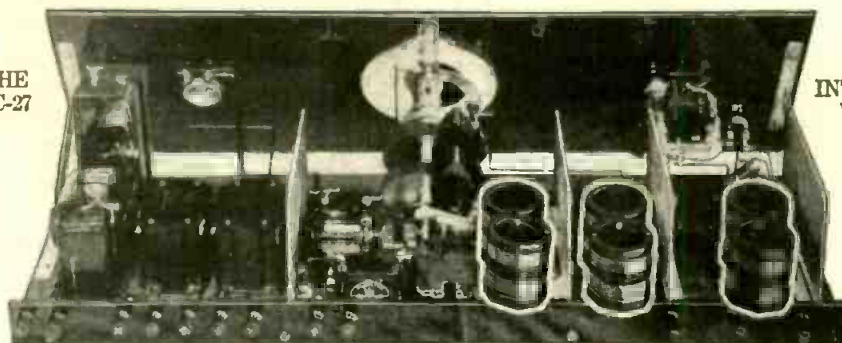
### THE ORIGINAL COCKADAY COIL

The only coil ever specified by Laurence M. Cockaday, inventor of the famous Cockaday Four Circuit Tuner for use in his set. The best hard rubber tubing and double silk covered copper wire insures a coil of unusual quality, resulting in increased volume and greater selectivity. Dielectric and leakage losses are extremely low. Price, \$5.50.



No. 200

THE  
LC-27



INTERIOR  
VIEW

## PRECISION DUO-OCTAFORM COILS

Used in the remarkable new LC-27 Receiver, designed by Laurence M. Cockaday, Technical Editor of POPULAR RADIO. Price each, \$3.50.

### THE COCKADAY LC-27 RECEIVER KIT

For the convenience of those consumers and dealers who wish to buy Cockaday's LC-27 in complete kit form, we offer the following parts exactly as used in Mr. Cockaday's laboratory model.

1—Hammarlund mid-line dual condenser, .000275 mfd. . . . . \$7.50	1—Mar-Co illuminated control, scale 0 to 100 . . . . . \$3.50
1—Hammarlund mid-line single condenser, .000275 mfd. . . . . 4.65	2—Mar-Co small controls for LC-27 . . . . . 1.50
1—Precision Duo-Octaform coil set, one antenna coupler and two interstage couplers . . . . . 10.50	1—Carter battery switch . . . . . .65
1—Amertran De Luxe first-stage transformer . . . . . 10.00	1—Samson radio-frequency choke coil No. 85 . . . . . 1.50
1—Amertran De Luxe second-stage transformer . . . . . 10.00	3—Aerovex mica fixed condensers, .00025 mfd. . . . . 1.05
1—Amerchoke No. 854 . . . . . 6.00	1—Durham resistor, 4 megohms . . . . . .50
1—Dubilier No. 902 filter condenser, 4 mfd. . . . . 5.50	1—Lynch grid leak mounting . . . . . .35
1—Dubilier No. 907 filter condenser, .1 mfd. . . . . .60	1—Carter Gem Jack . . . . . .25
	1—Carter resistance, 0-10,000 ohms . . . . . 2.00
	12—Eby binding posts . . . . . 1.80
	5—Benjamin UX sockets . . . . . 3.75
	1—Amperite . . . . . 1.10
	Mechanical Kit consisting of aluminum shields, binding post strip, decorated panel and Tait Brackets . . . . . 12.50
	Complete . . . . . \$85.20



Without Cabinet \$85.20

With Corbett Cabinet \$103.20

Built complete with cabinet \$10.00 extra

## THE LC SENIOR POWER PACK

Exactly as used in the laboratory model. Every part fully guaranteed.

### COMPLETE PARTS FOR THE LC SENIOR POWER PACK

1—Brach Controllt . . . . . \$ 6.00	1—AmerTran resistor, No. 400 . . . . . \$7.50
1—AmerTran transformer, PF-52 . . . . . 18.00	1—Centralab resistance, 5 watts, 2,000 ohms . . . . . 2.00
1—Benjamin UX-socket . . . . . .75	1—Bakelite binding post strip, 3 1/4" x 15" x 3/4" . . . . . 1.50
2—AmerChokes, No. 854 . . . . . 12.00	1—Brass mounting strip, 17 1/4" x 3 1/2" x 1/16" . . . . . .80
7—Eby binding posts . . . . . 1.05	1—Hardwood baseboard, 8 3/4" x 15" x 3/4" . . . . . .60
1—Precision paper filter condenser, No. 26, 2 mfd. . . . . 5.50	1—Set POPULAR RADIO blueprints . . . . . 1.00
1—Precision paper filter condenser, No. 24, 2 mfd. . . . . .3.00	
1—Precision paper filter condenser, No. 44, 4 mfd. . . . . 5.50	
	\$63.20

### INFORMATION EVERY DEALER SHOULD HAVE

Write for a set of Precision Coil catalog sheets. They describe in detail all of the Precision Coils used in POPULAR RADIO designed receivers for the past two years.

Be able to tell your customers all about the coils used in the New LC-27, the LC-26, the Cockaday Four-Circuit Tuner, and other famous circuits published in leading magazines and newspapers.

A complete list of the new Precision Line of Radio Power Units are also given in easily filed catalog form.

**PRECISION COIL CO., Inc.**  
209 Centre St. New York, N. Y.



**Burns**

**Double Enjoyment  
Volume with Perfect Tone**

Why sacrifice the excellent reproducing qualities of a set by the use of an inferior speaker. Proper design and construction has produced in the BURNS Speaker a most satisfying instrument. It is possible to reproduce with amazing exactness every note of music and inflection of the voice that the set is capable of picking up. A trial will convince.

At Your Dealers or Write Direct

**American Electric**  
COMPANY

STATE AND 64TH STREETS  
CHICAGO, U. S. A.

Ask about BURNS B-Eliminator

**Send for Latest  
RADIO CATALOG  
and GUIDE**

New 1927 Edition FREE!

The new 1927 Barawik Guide for fan and set builder, the big 164-page book that hundreds of thousands of radio enthusiasts turn to when they want the latest and best in radio, is now ready for you. It's the handiest and most reliable radio reference guide you could ask for, and a big money-saver besides. Keep up to date by utilizing Barawik service. It will help you to solve many a radio problem as well as saving you tremendous sums on the very things you need and use most. The latest 1927 Radio Catalog and Guide is brimful of the best approved standard radio sets, parts, and kits, at savings that will appeal to the thrifty. Profusely illustrated with reliable, guaranteed goods at a real saving. Be sure to get your copy before you spend another cent for parts and radio supplies.

164 Pages of Bargains

It gives 164 pages replete with reliable information about the newest and most advanced ideas in radio development, describes and illustrates the latest improvements. It will keep you posted on what's up to date. It will help you to build a better set or buy a complete new modern one. Every radio set owner, amateur, beginner and fan should have a copy.

Get Our Prices on Parts

It will pay you to get our prices for complete parts for the popular circuits featured in POPULAR RADIO and other magazines. Whenever a new circuit appears for which you want complete parts, write or wire us and they'll be on their way to you quickly. We know what parts to send you. Simply give name of circuit and we'll take care of the rest.

We guarantee you a big saving on every order.

Send the Coupon for Free Copy Today—NOW!

Get our new radio catalog today before you spend another cent on radio. Just mail the coupon and free copy will be sent you. Also please include name of a friend interested in radio to whom we can send free copy.



**BARAWIK CO.**

540-545 Monroe St.  
Chicago, U. S. A.

Mail This Coupon Now! For Free Copy

Name.....  
Address.....  
Fan.....  
Address.....



Underwood & Underwood

**A CRYSTAL INSPECTOR FOR BROADCASTING**

The possibility of maintaining an absolutely constant frequency for radio transmission by using one of the three fundamental frequencies of a quartz crystal has been put to use by several investigators. The apparatus shown in this photograph is used by the Westinghouse Company to maintain a constant 47-meter wave for radio telegraphy between Newark, New Jersey and East Pittsburgh, Pa.

shot out in any way would work in the same way but a radioactive source of alpha particles is the most convenient thing available to demonstrate what such atomic or electronic tracks in air are like.

The radioactive material is shooting out alpha particles all the time. To show some of the tracks moist air inside the glass flask is suddenly expanded by a rubber bulb attached to it. Water is kept in the flask to insure that the air is moist. The expansion of this wet air by the bulb cools it sufficiently that some fine drops of dew are instantly produced. These collect along the atom track. For tracks that are close to the flat bottom of the glass flask, these dew particles will persist for a moment on the inner glass surface, where they can be seen and their shapes observed. To assist the motion of the alpha particles across the space inside the flask an electric potential may be applied, just as it is to radio vacuum tubes but with a reversal of the positive and negative.

**Many Frequencies from  
Quartz Crystals**

THE use of quartz crystals, oscillating by what is called the piezo-electric effect, as controls for wavemeters and for radio transmitters has become well known. It is not so well known that many different frequencies, even well down into the audio range, may be obtained from the same quartz crystal. That this is possible was demonstrated by Dr. A. Hund, of the United States Bureau of Standards, before a meeting of the Institute of Radio Engineers on May 5, 1926.\* The secret is that any quartz crystal, if properly cut, has three fundamental vibration frequencies and a large number of harmonics for each.

If the cut piece of quartz crystal used for piezo-electric oscillation is cut so that its sides are properly placed with reference to the crystal axes of the

original crystal, the cut piece will have three fundamental frequencies, one corresponding to its thickness in each of the three directions parallel to a pair of sides. Its harmonics are like the harmonics of any oscillator, one set for each of the three fundamentals. Even low frequencies, within the audio range, may be obtained from a single small crystal, by selecting a crystal of such size that two of its fundamental radio-frequencies can be heterodyned to give an audio-frequency.

**A New Vacuum with  
Five-Electrode Tube**

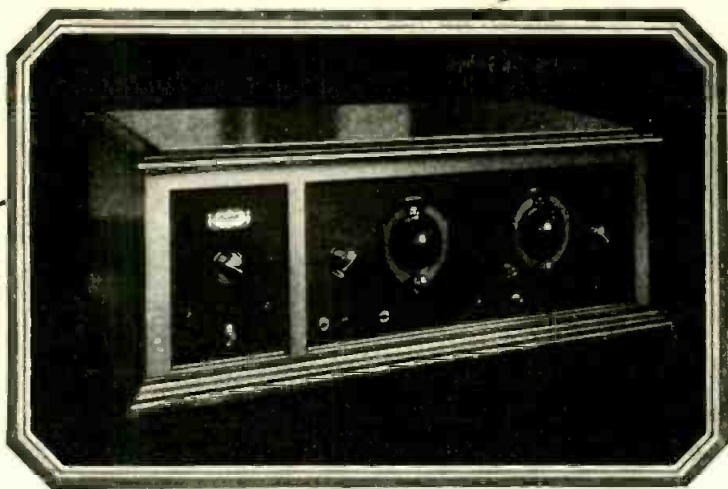
As one of many recent attempts to place the units of two or more vacuum tubes inside a single exhausted bulb, Dr. Leithauer, of Berlin, recently described a five-electrode tube in which a common filament supplies electrons for two grid-plate systems.\* The two grids and the two plates are connected to separate external terminals, so that each of the two systems can be used like a separate tube. The only common point is the filament.

The two parts of the tube can operate as detector and audio-frequency amplifier, as the parts of a push-pull amplifier system, or in many other ways. By connecting the two grids and the two plates together, the tube will operate at double emission, as though two separate tubes were connected in parallel. And, since the two sets of parallel elements are within the same vacuum and operating from the same filament circuit, the parallel operation is much easier to accomplish than with two separate, and somewhat different, tubes.

Under favorable conditions, collisions of an alpha particle with an air atom may be observed. This produces a branched track, one branch belonging to the air atom, the other to the alpha particle.

\*The paper will appear in the Proceedings of the Institute during 1926.

\*"The Pentatron," by H. Kroncke. The Wireless World (London), vol. 18, page 854 (June 23, 1926).



# \$ 231

with 5 McCullough AC  
Tubes and Rectron 213  
*without Loud Speaker*

## Clearartone LEADS THE WAY

Here is the first successful  
low-priced set to elim-  
inate "A" and "B" batteries

EVERYBODY was waiting for a set that would eliminate "A" and "B" Batteries without being high-priced. Here it is at last. The Clearartone Radio Electric Model 110, operating from the house current and using no fluids or acids. And the price including 5 McCullough AC Tubes and Rectron 213 (without loud speaker) is only \$231.00. What other set has such advantages at this figure?

The Clearartone Electric Model 110 abolishes the battery problem by using McCullough AC Tubes. They are undoubtedly the greatest achievement in radio today. The

set has won the approval of such eminent authorities as Professor Wilcox of the Armour Institute of Technology, of Chicago.

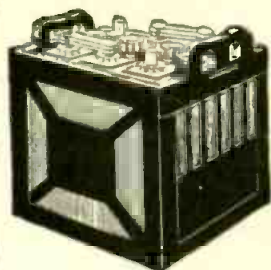
This set is the result of five years of exclusive radio receiving set manufacturing. You will marvel at its tone quality and volume. And the selectivity, which is attained by two vernier dial controls is exceptionally acute. The high quality of workmanship insures a set which will give years of satisfactory service fully guaranteed by a manufacturer of the highest standing in the radio industry.

**THE CLEARARTONE RADIO COMPANY**  
2427 Gilbert Avenue    ::    ::    ::    ::    Cincinnati, Ohio

### DEALERS

Let us tell you how this set will help you do away with losses due to heavy service costs. We have some interesting facts and figures for YOU.

# CLEARARTONE *Complete* RADIO SETS



## CHICAGO Radio Batteries

SOLID ONE PIECE  
RUBBER CONTAINERS

Guaranteed for 2 Years

**FAMOUS** for unexcelled quality, guaranteed long-lived service and unvarying dependability, Chicago Batteries offer the Radio fan an "A" Power that is backed by years of experience and master workmanship with the finest materials available. Endorsed and approved by leading Radio and Automotive authorities. Chicago Batteries in their new non-leak, solid rubber cases represent an amazing value at lowest cost.

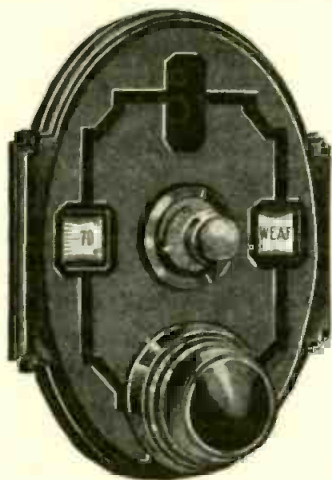
### PRICES RADIO BATTERIES Solid Rubber Cases

6 volts, 100 ampere hours. . . . . \$ 8.29  
6 volts, 120 ampere hours. . . . . 10.29  
6 volts, 140 ampere hours. . . . . 12.45

### SAVE MONEY—ORDER DIRECT

Buy Chicago Batteries direct from the manufacturer. Batteries shipped same day order is received. Express C. O. D. or 3% discount cash with order.

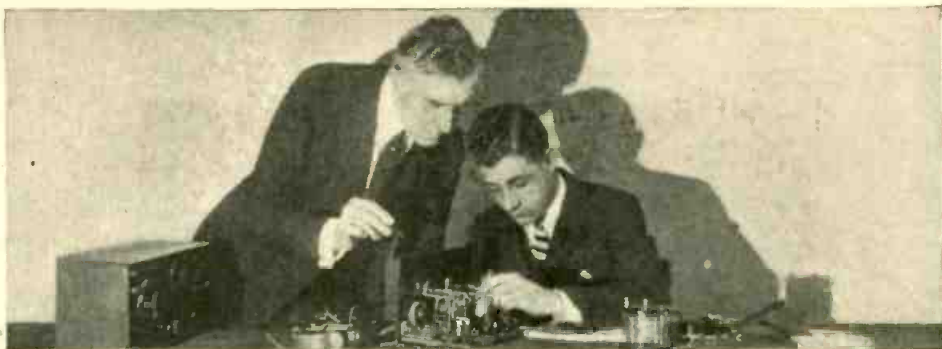
**MOGUL ELECTRIC LABS.**  
1216 So. Peoria St. Chicago, Ill.



## Accurate Recording Dial

Made of genuine Bakelite. It is easily mounted and of rugged construction. Its positive friction grip insures absolute smooth action. Graduated from 0 to 100 or reverse. Sold in three ways.  
Recording Dial . . . . . \$2.00  
(Ratio 10 to 1)  
With Micrometer Control . . . 2.75  
(Coarse ratio—and 200 to 1.)  
Illuminated extra . . . . . 50c.  
Sent direct if your Dealer cannot supply you

**Mydar Radio Company**  
9 Campbell St. Newark, N. J.  
"Pioneer Mfgs. of Micrometer Dials"



## WITH THE EXPERIMENTERS

CONDUCTED BY LAURENCE M. COCKADAY

### How to Eliminate Storage Batteries in Your S-C Receiver

MANY experimenters and radio fans do not care to use storage batteries with their sets; and, in the case of the S-C receiver that was described in the March, 1926, issue of POPULAR RADIO, it has been asked whether it is possible to get good loudspeaker operation on tubes that do not require a storage battery.

Dry-cell tubes may be used in this receiver with satisfactory results. However, if a dry-cell tube is used in the last stage, there is always the chance of overloading and consequent "blasting," if signals of great strength are tuned in.

In experimenting with this receiver, I have found a unique way to eliminate this trouble by operating this last tube from alternating current.

The diagram of the connections that are necessary in this novel scheme is shown in Figure 7. This diagram shows a circuit that uses, for the most part, the same fundamental principles that are embodied in the standard, storage battery operated, S-C receiver.

The filament and grid circuits, however, present a radical departure.

#### How the Filaments Are Connected

It will be noted that the filaments of the radio-frequency and first audio-frequency tubes are connected in series. The use of tubes of the 3-volt, UX-199 type, is recommended and for these an "A" battery of something over 9 volts

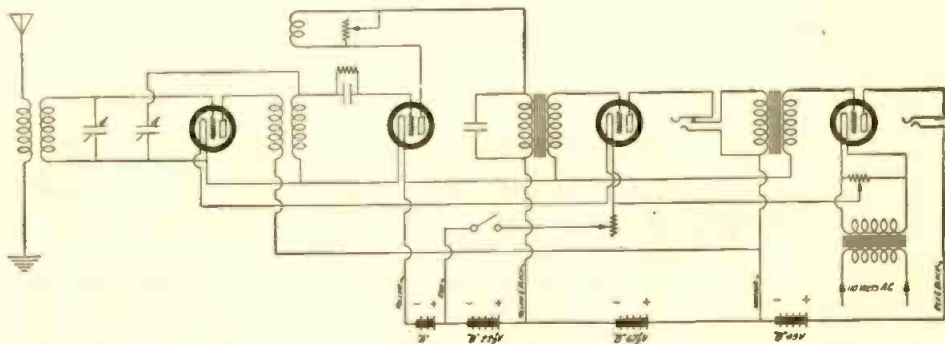
potential is necessary. This is obtained by connecting seven standard No. 6 dry cells in series, delivering 10½ volts to the rheostat, which in this case should have a value of 30 ohms.

Attention should perhaps be drawn to the peculiar sequence in which these filaments are connected. Starting from the "A—" terminal of the battery, the first filament is that of the detector, the second that of the radio-frequency tube and the last, that of the first audio-frequency tube. The detector tube requires a positive grid return for maximum efficiency but the grid return of the radio-frequency tube should be negative.

As the tuning condensers have a common shaft and as this shaft is of a conducting material, it is necessary that the connection to the condenser rotors and to the two filament ends of the secondaries of the antenna and radio-frequency coils, should all return to points of the same potential. The filament sequence that is used accomplishes this condition.

The absence of "C" batteries will be noticed. The series filament connection is used to obtain a negative grid-bias without "C" batteries.

Observe that the grid return of the first audio-frequency tube has to traverse the filaments of the detector and radio-frequency tubes in order to reach the negative end of its own filament. This particular tube has for its grid-bias the voltage drop across the filaments of the other two tubes, in this case about 6 volts, which readily permits a plate potential of 90 volts to be used.



THE NEW WIRING DIAGRAM

FIGURE 8: The wiring changes that are necessary in using dry-cell "A" batteries on the first three tubes, which are of the UX-199 type, and alternating current on the filament of the last tube are shown here.

# For All Popular Makes and Circuits of radio receiving sets

## Type 405 Plate Supply

**I**MPROVED quality of reception, free from anxiety caused by steadily deteriorating "B" batteries is now possible thru the use of General Radio-Raytheon plate supply.

This unit operates on 110 volt (60 cycle) A.C. and provides voltages of 45, 90, 130 and 200.

Voltages are readily adaptable to all popular makes and circuits of radio receivers by means of fixed resistances which are tightly sealed from dust and moisture, thus eliminating bothersome and noisy tendencies of variable resistance voltage controls. The unit is contained in a metal case with attractive black crystalline finish, and has a conveniently located A.C. switch.

Price, with BH Raytheon Tube . . . . . \$46.00



## Type 400 Power Amplifier and Plate Supply

**T**HE type 400 is similar to the above described unit except that it has the additional feature of a power amplifier and uses the UX-213 Rectron tube as a rectifier instead of the Raytheon.

A power amplifier in conjunction with the plate supply permits the convenient use of a high power tube in the last audio stage, regardless of whether the receiver may be operated by dry cell or storage battery tubes—the filament current of the power tube being supplied by A.C. from the secondary of the rectifier transformer. The power stage overcomes the tendency toward tube overloading and removes the most common cause of distortion in loudspeaker operation.

The plate supply provides voltages of 45, 90 and 130 for the receiver and 180 direct to the power tube.

Price, without tubes . . . . . \$68.00



Ask your dealer to show and demonstrate these units to you or write for our booklet containing complete information.

GENERAL RADIO COMPANY, Cambridge, Mass.

# GENERAL RADIO INSTRUMENTS

*Behind the Panels of Better Built Sets*

**Better than ever!**  
**The NEW**  
*Mayolian*  
 "B" SUPPLY

**Type 612**

The "B" Without a Buzz



**Delivers 180 Volts**

• •  
**ALL VOLTAGES  
 ARE ADJUSTABLE**

• •  
**Complete with  
 Raytheon Tube**

**\$42.50**

**A** MAYOLIAN gives you, direct from your light socket, silent, dependable "B" current—at half the cost of burning a 25-watt lamp. This means greater efficiency, more volume, better tone from your receiver—and the permanent solution of all "B" battery problems.

More than four years of pioneering and intensive research have led us to the development of five types to meet the voltage and current requirements of any receiver.

Mayolian Units have earned the endorsement of the leading engineers, magazines and receiver manufacturers, because each laboratory-built Mayolian is unconditionally guaranteed for one year—provided seals remain unbroken, and installation instructions are carefully followed. Mayolian pays for itself over again every year.

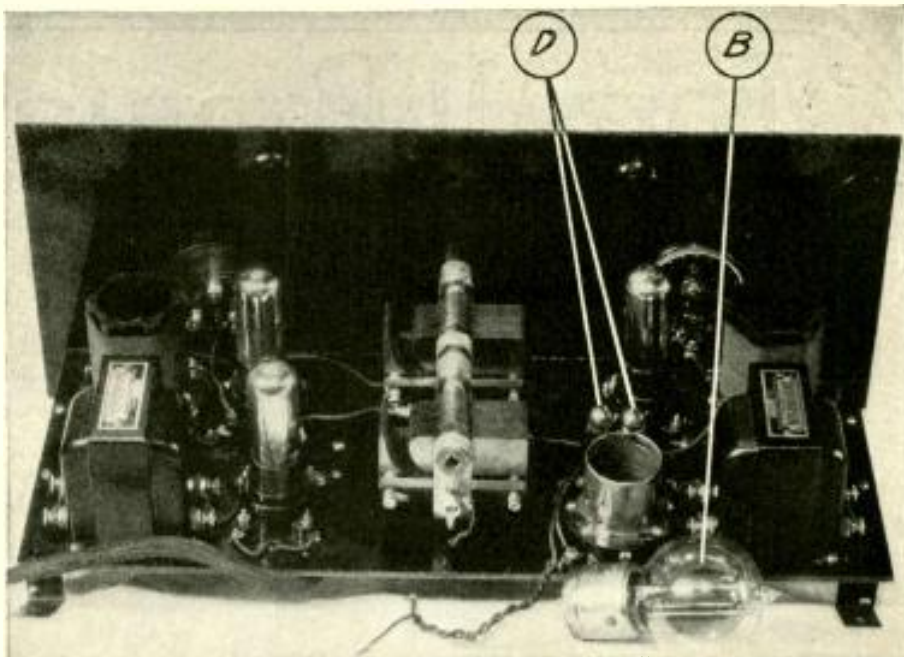
*The nearest Mayolian Dealer  
 will demonstrate. Write us!*

**MAYOLIAN**  
**RADIO CORPORATION**  
 1668 Webster Ave., New York, N.Y.

Pioneers in Battery Elimination



*The Power of Niagara—  
 The Quiet of an Arctic Night*



A REAR VIEW OF THE CONVERTED RECEIVER

FIGURE 7: The two resistances, *D*, are connected like a potentiometer across the filament of the last power tube with the center point connection to one side of the filament to each of the other tubes. The power tube, *B*, fits into the large socket.

*The Life of the "A" Batteries*

Just a word about "A" battery life. The three tubes consume a total filament current of 60 milliamperes, that is, the same amount of current that is required to light the filament of one '99 tube, though of course at a higher voltage. The use of an "A" battery of 10½ volts is necessary in order that the voltage of the dry cells as it drops slightly with use, may be compensated for by reducing the resistance of the rheostat.

The chance of tube damage, through the application of excessive filament voltage, is reduced about two-thirds by having the three filaments in series.

It is interesting to note that the plate current consumption of the three small tubes, with 90 volts on the plates of the amplifiers and 22½ volts on the detector plate, is only in the neighborhood of 4 milliamperes; that is, a small amount of plate current is used where a small amount will do the work.

The battery hook-up is shown in Figure 9.

*The Output Tube*

So far nothing has been said regarding the last, or output tube—by far the most important tube of the entire set, as its characteristics determine for the most part, the quality and volume of the music and speech you expect to hear.

This tube should fulfill two requirements: it should be capable of passing a relatively large "space-current" without overloading and its filament should be as quiet as possible in operation.

Tubes such as this are available only in types that draw a large amount of filament current and that, therefore, require a storage battery for operation.

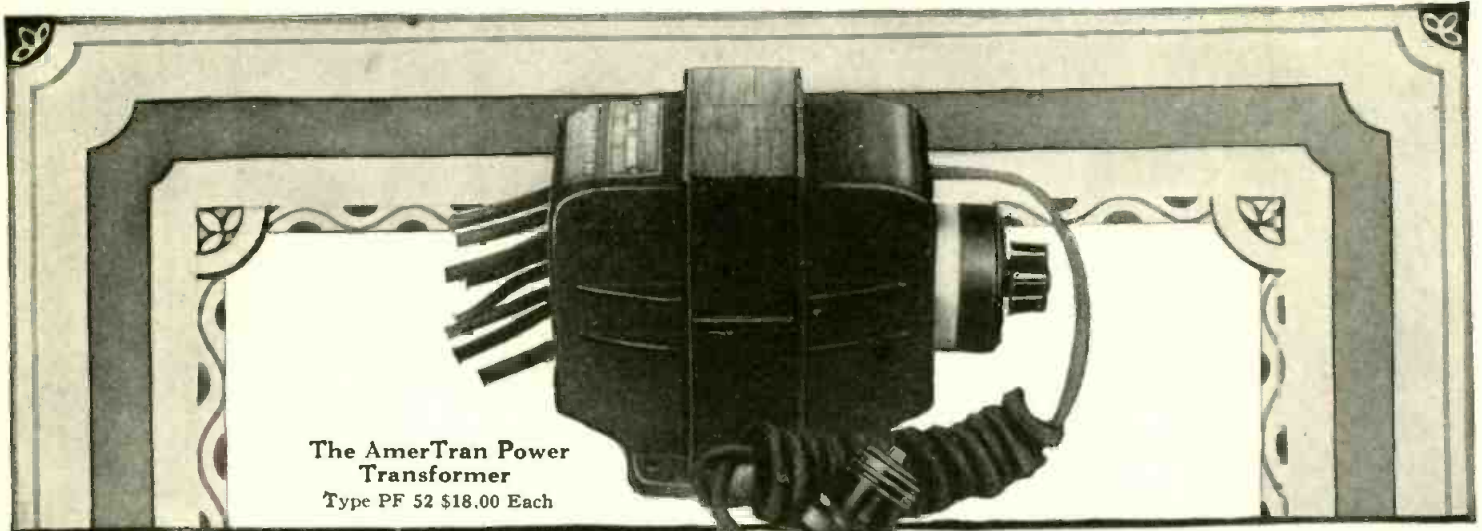
The tube that is recommended is of the Western electric No. 216-a type. The old VT-2 or the UX-171 will also answer the purpose well. Their filaments are of the oxide-coated type, are very quiet in operation and are of sufficient size so that they do not cool off materially between reversals of the alternating current; consequently the alternating current hum is minimized. Plate voltages of the higher order may be used with perfect safety.

*How the Last Tube Is Adapted to Use AC Current on the Filament*

To adapt these tubes to alternating current filament supply, two simple means are used. A step-down transformer of the bell-ringing type is inserted in the AC lighting line to reduce the voltage from 110 to 6 volts. An ordinary bell-ringing transformer is quite suitable and may be purchased for about a dollar. The grid return of the output tube is brought to the center of a center tapped resistance, the ends of which are connected to the filament lugs of the tube socket. A 400-ohm potentiometer may be used satisfactorily for this purpose.

It will be noticed that the grid return circuit again makes use of the "A" battery for negative bias. It passes through the three filaments of the three small tubes giving a negative bias of 9 volts and permitting a plate potential of 135 volts to be used on this tube.

This circuit therefore offers the fan who has 110 volts AC lighting-supply in his home, a receiver that gives an output of excellent quality and volume, and justifies the use of the most sensitive cone speaker. It permits the use of 3-volt tubes that have economical filament consumption and that operate on



The AmerTran Power Transformer  
Type PF 52 \$18.00 Each

# AMERTRAN RADIO PRODUCTS

## A REAL POWER TRANSFORMER

Perfected on the firm foundation of twenty-five years successful experience in transformer building, AmerTran Radio Products enjoy a reputation second to none in their respective fields. Their continued selection by leading engineers and experimenters gives ample proof of their high efficiency and dependable performance.

Of particular interest is the AmerTran Power Transformer Type P. F. 52—the transformer for real “honest-to-goodness” power supply. This transformer is intended for use on the standard 110 volt, 60 cycle house-lighting circuit and can be depended on to give and maintain satisfaction.

It has three separate windings—one for 525 volts and two 8-volt windings for the filament of the Rectifier and power tubes. The windings are enclosed in a strong metal case, provided with mounting feet. There are three primary taps for 110, 118 and 125 volts, connected to a three point snap switch, and a six-foot lamp cord and plug attached to the primary is standard equipment. The shipping weight is approximately 9 pounds and the price is \$18.00 each.



The AmerChoke type 854

This is a scientifically designed impedance or choke coil of general utility, designed primarily for use in filter circuits. As an output impedance for by-passing direct current from the loudspeaker it is both efficient and economical.  
Price—\$6.00 each



The AmerTran De Luxe Audio Transformer

This new transformer sets an entirely new standard of Audio Amplification. It makes possible a transformer coupled amplifier that excels all other forms of amplifiers. Made in two types for first and second stages.  
Price—\$10.00 each

## AMERICAN TRANSFORMER COMPANY

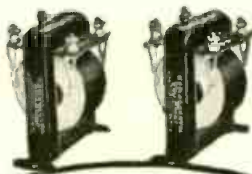
178 Emmet Street, Newark, N. J.

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AmerTran Products are Sold only at Authorized AmerTran Dealers

### Other AmerTran Products:

AmerTran Resistor Type 400 — \$7.50.  
AmerTran Heater Transformer Type H-28 (for A. C. Tubes)—\$10.00.



We shall be very glad to send you upon request a copy of our booklet “Improving the Audio Amplifier” together with other interesting and constructional data.

### AmerTran Types AF-7 and AF-6

AmerTran Audio Transformers, types AF-7 and AF-6, have been considered for years among the leaders in audio amplification. These popular and efficient models are made in two types—AF-7 (ratio 3 1/2:1)—AF-6 (ratio 5:1) \$5.00 each.



# SAMSON AUDIO UNITS

are capable of uniform and faithful amplification well in excess of the most exacting broadcast requirements.

Their range extends from the lower fundamentals through the higher harmonics enabling them to reproduce, with equal clarity, the dull rumble of the tom-tom or the thin shrill of the flute.

This ability to reproduce the harmonics or higher multiple frequencies is what gives tone-color or background to sound—is what permits the listener to distinguish notes of the same pitch but from different instruments—results not possible with audio units which cut off at comparatively low frequencies.

In a word—with a loud speaker of corresponding range—

## SAMSON Audio Units

insure the sort of radio you've hoped to hear—the quality of radio that will make you think you've been transformed from a broadcast listener to one of an audience which is listening, firsthand, to a speech or to music.

For 1926-27 the Samson Electric Company offers eleven different audio units:

Symphonic Transformers	\$9.00
Push-Pull Input Transformer Type X	5.50
Standard Transformers, Type HW-A3	
Ratio 2-1, 3-1, 6-1	5.00
Dual Impedance, Type D (Donle Design)	5.00
Output Impedance, Type O	5.00
Push-Pull Output Impedance, Type Z	5.00
Plate Impedance, Type P	4.50
Grid Impedance, Type G	4.50
Audio Frequency Choke, Type No. 3	3.00

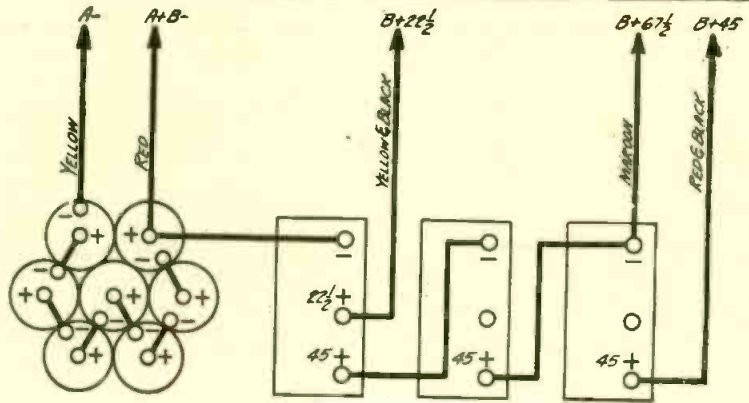
Our book—"Audio Amplification"—already accepted as a manual of audio design by many radio engineers—contains much original information of greatest practical value to those interested in bettering the quality of their reproduction. Sent upon receipt of 25c.

**SAMSON ELECTRIC CO.**

Main Office, Canton, Mass.



Manufacturers Since 1832



THE BATTERY HOOKUP

FIGURE 9: The connections for the dry-cell batteries that furnish power to the converted receiver.

dry cells. It offers sufficient grid-bias to prevent distortion without the use of a "C" battery. It permits the use of a high-grade, output tube with its filament operating from the lighting circuit. The inconvenience and first cost of a storage battery and charger are thus avoided.

### Changes in the Parts Used

The following parts must be substituted for the parts usually used with the S-C receiver:

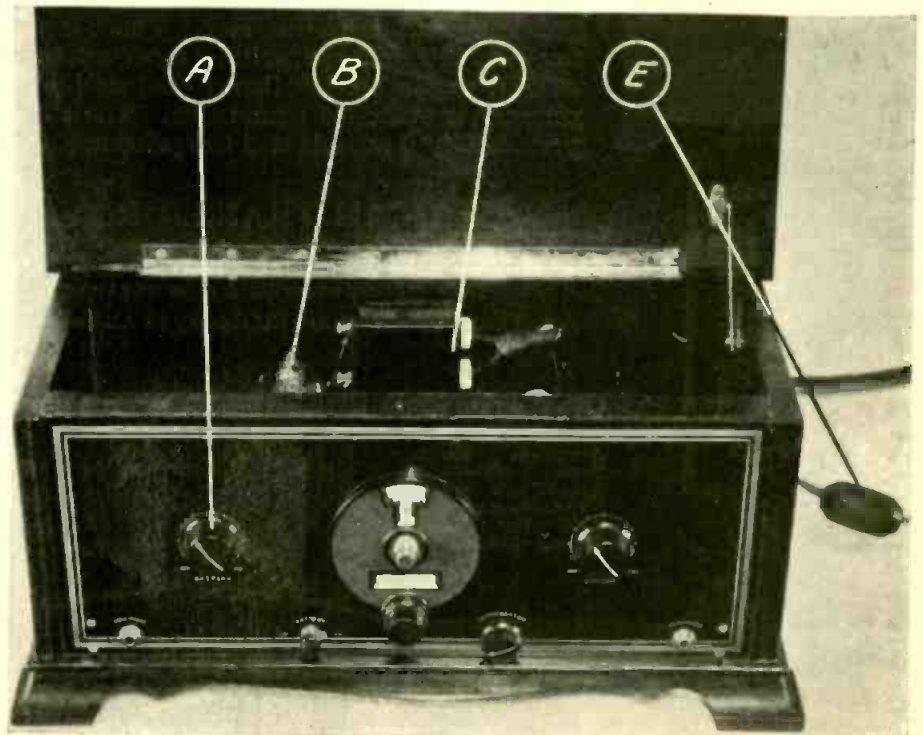
For the 6-ohm Yaxley rheostat, substitute a 30-ohm rheostat of the same make. For the last tube socket of the UX type, substitute a socket of the "bayonet" type, commonly used with UV tubes. For the storage battery, substitute seven No. 6 dry cells and a Thordarson "Winner" bell-ringing transformer, together with a Yaxley 400-ohm potentiometer. For the Belden wiring harness substitute 25 ft. of Belden rubber covered hook-up wire and a Belden battery cable. For the four

UX-201-a tubes substitute three UX-199 tubes and one WE 216-a tube or any other suitable power tube.

The mounting of the parts of the set is exactly the same as described in the March, 1926, issue of POPULAR RADIO, with the addition that the potentiometer and the bell-ringing transformer may be screwed to the rear wall of the cabinet with wood screws. The wiring of the set is of course not quite as simple as no wiring harness is available for these connections. The diagram may be readily followed and wiring with the flexible, rubber-covered wire is not difficult or arduous. After the wires have been run beneath the sub-panel they may be laced into a neat cable by binding them with white flax package string.

The operation of the set is exactly the same as the original model except that the last tube is lighted by plugging the flexible lamp cord, which is attached to the primary of the bell-ringing transformer, into a lighting socket.

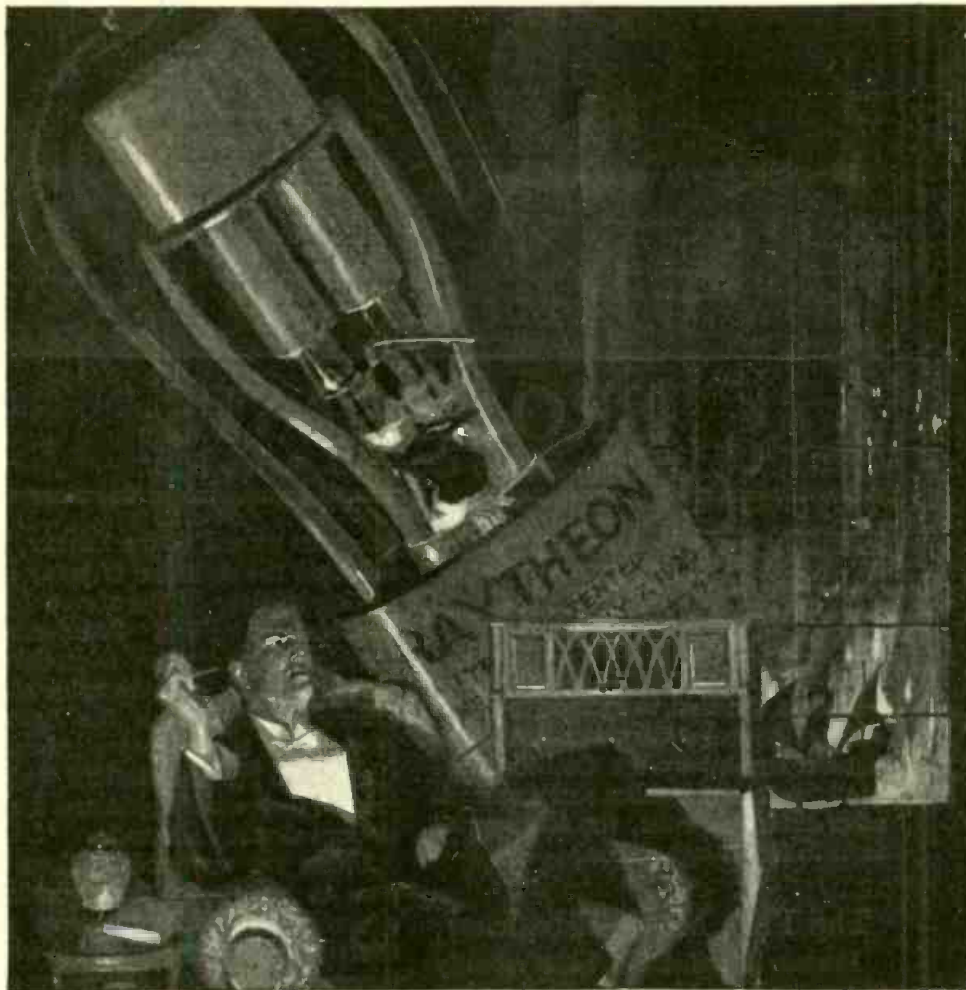
—HERBERT S. SNEAD



A VIEW OF THE SET FROM THE FRONT

FIGURE 10: The rheostat, A, should be replaced by a 30-ohm rheostat and the power tube, B, should be placed in the last socket. C is a bell-ringing transformer and E is the AC switch.





Approved by Raytheon

ACME APPARATUS CO.  
ALL-AMERICAN RADIO CORPORATION  
AMERICAN BOSCH MAGNETO CORPORATION  
AMERICAN ELECTRIC CO.  
APCO MANUFACTURING CO.  
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DONGAN ELECTRIC MANUFACTURING CO.  
GENERAL RADIO CO.  
JEFFERSON ELECTRIC MANUFACTURING CO.  
THORDARSON ELECTRIC MANUFACTURING CO.

## Then Forget It

**A** QUEER thing about the selection of a B-Power unit is that once you have it, you want to forget it. What you are after is complete freedom from worry over the source of your Radio B-Power.

Then why go half way? There are two major considerations in the selection of a B-Power unit:—the rectifier tube which is the heart of the unit, and the performance of the complete assembled product.

By selecting a B-Power unit using a Raytheon tube, you have taken care of both considerations. You may then forget it. The Raytheon Rectifier tube is the heart of reliable radio power. It has no fila-

ment nor chemicals requiring replacement and adjusting. Its gaseous principle assures even and permanent performance, and it gives full wave rectification with ample voltage for any set.

To assure more than satisfactory performance to the purchaser of any unit that is Raytheon equipped, Raytheon tubes are sold to a manufacturer only when his unit conforms by actual test to the standards set by the Raytheon Laboratory.

On this page is a list of makers of B-Power units whose product has been so approved. If you want unflinching, even power in your set, select one of these units, connect it, and forget it!

**RAYTHEON MANUFACTURING CO.**  
Cambridge, Mass.

# RAYTHEON

# Faradon

## CAPACITORS

FOR ALL PURPOSES

Immediate deliveries can be made on over 200 standard types of

# FARADON Capacitors

Devoting its resources since 1907 to specialized research and development in the Radio field and to the improvement, production and application of electrostatic capacitors, the Wireless Specialty Apparatus Company continues to supply equipment to efficiently take care of operating requirements.

Not until a product has successfully passed exacting final electrical and mechanical tests is it considered worthy of the "FARADON" trade mark and ready for commercial use. Dependable, efficient products are the result.

U. S. Army, U. S. Navy, Bureau of Standards, General Electric Co., Radio Corp. of America, Tropical Radio Telegraph Co., Westinghouse Electric & Mfg. Co., and Western Electric Co., are some of the large Faradon users.

Advise for what purpose capacitor equipment is wanted and literature describing such types will be forwarded promptly.

### TO SET MANUFACTURERS

We will promptly quote on your requirements upon receipt of detailed data. Complete specifications are requested.

**Wireless Specialty Apparatus Co.**

Est. 1907

JAMAICA PLAIN, BOSTON, MASS., U. S. A.



## BROADCASTS

CONDUCTED BY CHARLES L. REESE, JR.

### Ku Klux Klan to Run Their Own Station

ANOTHER propaganda station threatens to intrude upon the ether; the Ku Klux Klan now plan to erect a powerful station in the East to spread their doctrines. Between the propaganda stations controlled by the Catholics, the Methodists, the Zionites and numerous other sects and cults, the fan appears to be in for a tough season.

### The First Movie-Broadcast

BRITISH broadcasters have recently transmitted what is said to be the "first film play ever sent over the radio," from the station at Manchester, England. It was entirely a listeners program, however, for dialogue and sound effects took the place of scenes and the sub-titles were supplanted by descriptions given by the announcer. A background of orchestral music was used to supply the proper movie atmosphere and to give the desired emotional background.

### \$2,000 for Essays on Radio

Two prizes of \$1,000 each, await the successful lawyer-radio-fans who write the best essays on "The Law of Radio Communication" and on "Scientific Property"; that is, the granting of a quasi-patent right to the maker of a scientific discovery. The prizes have been offered by the Faculty of Law of Northwestern University and are known as the Linthicum Foundation Prizes. To be eligible for either prize the author must be a member of the bar or a registered law student.

### The Need of Radio Laws

THE chaos in radio that Secretary of Commerce Hoover predicted would follow the lifting of all restrictions on the broadcasters, is pretty well on its way as the fall season opens. More than 65 new stations have already been licensed, and listeners-in in the larger cities are finding it more and more difficult to pick up only one station at a time.

More serious, however, than the dis-

comfiture caused to the listener, is the fact that the existence of many broadcasting stations is threatened by this new state of affairs. Broadcasters in America depend upon advertising for their livelihood, and the value of radio advertising lessens as the "good-will program" is turned into a nuisance by the conflict between stations that have jumped their wavelengths and the other stations that are affected.

Unless the wayward stations agree soon to return to the "gentleman's agreement" or unless Congress passes restraining laws, the stations will find themselves without visible means of support and America will be deprived of a goodly proportion of its radio entertainment.

### League of Nations Meets While Europe Listens In

ALL Europe listened in this fall to the speeches of their delegates when the speeches made at the opening of the General Assembly of the League of Nations at Geneva were broadcast from the high-power stations at London and Daventry, England. Arrangements were made for relaying the speeches to stations in other countries where listeners were eager to hear the words of their political idols.

### A Radio Station that Threatens a Government

MEXICAN police have been baffled for some time past by a secret transmitting station that is broadcasting attacks upon the Government in general and upon President Calles in particular. The police have so far been unable to locate the transmitter of this station, although it is thought to be operated by enemies of the President somewhere near Mexico City.

### Farmer Programs

APPROXIMATELY 100 broadcasting stations, covering every section of the country, will broadcast daily, beginning October 4, programs prepared by the United States Department of Agriculture for the benefit of the farmer.

A Novel and Efficient Detector Receiver  
for  
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**THE TALKING BOOK**  
Brings a new story every night



Complete  
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Pair of standard Ear  
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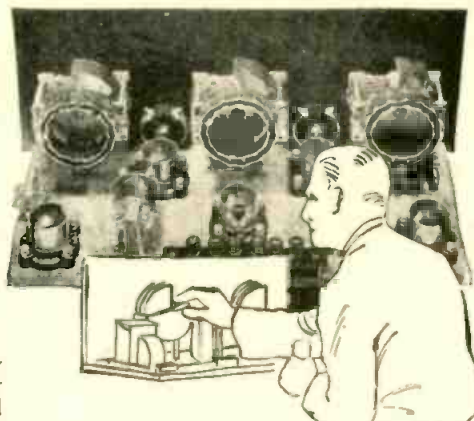
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**\$75 A WEEK**  
**BUILDING RADIO SETS**  
—in your spare time



**J**OIN the Radio Association of America. Learn how to build and repair radio sets. The Association will train you—start you out in business if you wish. Be the radio "doctor" of your community. \$3 an hour upwards easily made. Radio offers you a big money-making opportunity right now.

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"I have at last found myself," writes Lyle Follick, Lansing, Michigan, "I have already made over \$500 building radio sets after working hours." Werner Eichler, Rochester, N. Y., writes, "I 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 for the most enjoyable kind of spare-time work.

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A membership in the Radio Association of America gives you the most up-to-date and thorough training in the Science of Radio.

You're taught how to build and repair all kinds of sets. You're given the train-

ing you need in preparing for a Licensed Radio Operator's examination. You receive the privilege of buying parts at wholesale prices.

You're helped to make money.

**Join the Association Now**

If you're interested in Radio for either pleasure or profit, join the Association without delay, because we have a plan whereby your membership may not—need not—cost you a cent. Only a limited number of these memberships are acceptable. Write now for details. Write before it's too late.

This Association has prepared a beautiful book that gives figure-facts regarding the profit possibilities of the Radio Industry, the purpose of the Association, and the details of the Special Membership Plan.

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Dept. C-11—4513 Ravenswood Ave., Chicago

Send me your book and details of your Special Membership Plan.

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Address.....  
City..... State.....

**PROBLEMS SOLVED**

POPULAR RADIO maintains for the benefit of its readers a Technical Service Bureau and Laboratory, under the personal supervision of Laurence M. Cockaday 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.

**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.

**September, 1926**

- How to Build an Impedance-coupled Amplifier.
- A Radiant Crystal Pilot.
- Popular Radio Circuits.
- How to Simplify Your Set with Automatic Filament Controls.
- Inside Information on New Radio Receivers.
- How to Wire Your House for Radio.

**October, 1926**

- How to Build the New LC-27 Receiver
- The Radio Road Hog
- Popular Radio Circuits
- Sets That Earn Incomes
- Inside Information on New Radio Receivers.
- Why Signals Fade.

**POPULAR RADIO**  
Department 118  
627 W. 43d St., New York

—used in the LC-27

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"Built Better"

**FIXED CONDENSERS**  
are Specified in

LC-27	by L. M. Cockaday
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To be announced soon(?)	"John Rider
Raytheon "B" Eliminator	"Raytheon Mfg. Co.
Ultradyn	"R. E. Lacault
To be announced soon(?)	"R. E. Lacault

AEROVOX fixed condensers have been approved by M. I. T. and Yale Universities.

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New York

**The New 6-Tube**

**ELKAY**

*Ahead of its time!*

Takes any combination of tubes; new tubes can always be introduced without change of wiring. It embodies the Donle Truphonic Audio Amplification, and the Elkay Synauto R. F., giving it wonderful tone and uniform amplification from 200 to 580 meters. Completely shielded. New panel with Uni-Control—the flexibility of 3 dials at your finger tips. In brown antique, Duco-finished mahogany cabinet, \$125. (Exclusive franchise to the Trade). The Langbein-Kaufman Radio Co., Dept. P., 82 Franklin St., New Haven, Conn.



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Whether buying a cone type speaker at your dealer's or building one yourself at home, be sure that the cone is made of Alhambra FON-O-TEX. This remarkable product, adopted as standard by the leading cone speaker makers, gives tone-depth and roundness unobtainable with any other material.

For constructing large cones;—in sheets 38" x 38" at dealers. The Seymour Co., 329 West 16th Street, New York.

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**FONOTEX**  
PRODUCT AND PROCESS PATENTED  
FOR CONE TYPE LOUD SPEAKERS

### Building Your Own 3 ft. Cone Speaker?

Be sure to use genuine Alhambra Fon-O-Tex for the cone. Only with Alhambra Fon-O-Tex and a good unit will you get all the notes clear, distinct, round and full—the deep bass and the shrill treble.

Alhambra Fon-O-Tex sells at dealers at 75c. for a 38" x 38" sheet. If your dealer cannot or will not supply you we will do so direct. Add \$1 extra to the cost of the Alhambra Fon-O-Tex for packing and mailing.

THE SEYMOUR CO.  
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## Build Your Own Big 3 Foot Cone Speaker

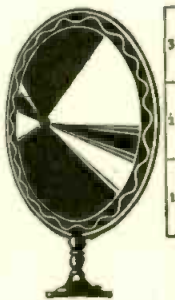
Unit developed and speaker designed by Clyde J. Fitch, noted radio engineer. Results guaranteed equal to the finest factory-built speaker or your money back if you wish it. Easily assembled; operates from any receiver that will work a speaker; wonderful tone quality at any volume even with power tubes.

Radio Show Sensation

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Famous Tun Bar Unit sent prepaid on receipt of \$7.50, or C. O. D. charges collect, if you prefer. Free blue print with each order for unit; blue print alone, \$1.

**Tunbar**  
Cone Speaker UNIT



\$7.50 Direct from maker

**TUNBAR RADIO CO.**  
26 Cortlandt St. Desk "R" New York City

## Trans-oceanic Calls Heard

POPULAR RADIO has just completed arrangements for forwarding to transmitting amateurs in England, France, Germany, Austria, Ireland and Italy all calls heard (QSL) cards that may be addressed to them by American amateurs care of this magazine. 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. American amateurs are invited to send their cards to foreign 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 following stations were received and logged at the experimental station of Thomas H. Coggins, 52 Castle St., Armagh, North Ireland, on a Reinartz-0-v-2 receiver. A single wire inverted L antenna 45-feet long with no ground was used.

U-1AAO—August 24, 1926; signal strength, R6; lot of static.

U-1CMX—August 27, 1926; signal strength, R6-7; good note.

U-1AXA—August 28, 1926; signal strength, R7; sounded like crystal controlled, very loud.

U-1CMF—August 28, 1926; signal strength, R5-6; some QRN.

U-1CJC—August 28, 1926; signal strength, R6; easy note to read.

U-1AYL—August 28, 1926; signal strength, R6, note very steady.

The following station was received and logged at the amateur station of J. N. G. Davidson, St. Fintans, Baily, County Dublin, Ireland on a Reinartz receiver with two stages of audio-frequency amplification.

C-8GS—August 18, 1926; signal strength, R6; slight hum with signals.

## Amateurs Vie for DX Prize

HAMS in the United States, Canada and Hawaii must be at their keys early and late to win the prize for short-wave DX work which has been offered by the Rand Daily Mail of Johannesburg, South Africa. The winner of the tests, which are being held under the auspices of the A.R.R.L. and the South African Radio Relay League, will be the amateur who makes the greatest number of two-way contacts on short waves with South African amateurs during the months of September and October. The making of schedules is prohibited. The prize will be a replica of an African springbok, a variety of small antelope.

## Build It Yourself



For less than 1/5 retail cost Equals Finest Cone Speaker made

## Giant 3 FT. CONE SPEAKER

In your spare time at home and for less than one-fifth the retail price you can build the radio sensation of the year—a Giant 3 ft. CONE SPEAKER equal in every way to the finest factory-built cone speaker. And you save four-fifths of the

price! Only with a 3 ft. cone speaker can you get real tone quality—every note of the brass horns in an orchestra, the beats of the bass drum, the low notes of a pipe organ and ALL the in-between tones to the highest note of the violin and the shrill treble of the piccolo.

But you must choose your unit with care. It is most important. Insist on a

## Penn Cone Speaker UNIT

Designed especially to operate a 3 ft. cone and to work perfectly even with power tube. Adjustable to the audio output of any set and will carry any load a set can give it. Recommended by leading radio engineers. Finest seasoned steel magnet; double pole vibration; shortest, most substantial driving rod on any cone speaker unit. A marvel of design and construction.

Your dealer has or can get the PENN Unit for you. Insist on examining it before you accept any other. Price, \$9.50. If he hasn't the PENN or will not get it for you, we will ship you direct, prepaid, on receipt of price.

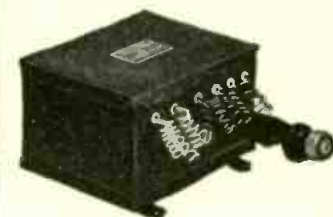
How to Build a 3 Ft. Cone Speaker for only \$14.10\* sent for 10c. Complete set Blue Prints, \$1.00.

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TRANSFORMERS OF THE... FIFTEEN YEARS

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

These corrections and additions to the list which was published in the March, 1926, issue of POPULAR RADIO (together with the changes which have been published in succeeding months) make the list correct as of October 1, 1926. Further changes will be published each month in this magazine.

### STATIONS ADDED

KGBY	Shelby, Nebraska	202.6
KGBZ	York, Nebraska	333.1
KGCA	Decorah, Iowa	280.2
KGCB	Oklahoma, Oklahoma	331.0
KGCG	Newark, Arkansas	234.2
KGCH	Wayne, Nebraska	450.0
KGCI	San Antonio, Texas	239.9
KGCL	Seattle, Washington	230.6
KGCM	San Antonio, Texas	263.0
KGCN	Concordia, Kansas	210.0
KGCR	Brookings, South Dakota	252.0
KPJM	Prescott, Arizona	215.0
KSBA	Kennonwood, Louisiana	312.6
KTUE	Houston, Texas	265.0
WBBC	Brooklyn, New York	249.9
WBRS	Brooklyn, New York	394.0
WCAH	Columbus, Ohio	265.3
WCAZ	Carthage, Illinois	245.8
WCBS	Providence, Rhode Island	242.0
WFCI	Pawtucket, Rhode Island	229.0
WGM	Jeanette, Pennsylvania	372.0
WHFC	Chicago, Illinois	258.5
WKBD	Jersey City, New Jersey	235.0
WKBF	Indianapolis, Indianapolis	244.0
WKBH	La Crosse, Wisconsin	249.9
WKBI	Chicago, Illinois	220.4
WKBJ	St. Petersburg, Florida	280.0
WKBM	Newburgh, New York	215.7
WKBN	Youngstown, Ohio	360.0
WKBL	Monroe, Michigan	252.0
WKBO	Jersey City, New Jersey	309.1
WKBP	Battle Creek, Michigan	265.0
WKDR	Kenosha, Wisconsin	428.3
WRAH	Providence, Rhode Island	235.0
WWRL	Woodside, New York	258.5

### STATIONS DELETED

KFWA	Ogden, Utah	261
WRW	Tarrytown, New York	273
WTAP	Cambridge, Illinois	242

### CHANGES IN CALL LETTERS

KFLZ	Anita, Iowa	change to	KICK
KTCL	Seattle, Wash.	change to	KOMO
WHBJ	Fort Wayne, Ind.	change to	WCWK
WKBD	Jersey City, N. J.	change to	WAAT

### CHANGES IN WAVELENGTHS

KFBC	San Diego, Cal., 215.7	change to	380.0
KFBK	Sacramento, Cal., 247.8	change to	535.0
KFBU	Laramie, Wyo., 270	change to	374.8
KFDY	Brookings, S. D., 273	change to	305.9
KFIO	Spokane, Wash., 265.3	change to	272.6
KFYF	Oxnard, Cal., 205.4	change to	214.2
KGBS	Seattle, Wash., 209.7	change to	227.0
KOIL	Council Bluffs, Ia., 277.6	change to	305.9
KOWW	WallaWalla, Wash., 266.3	change to	285.0
KOW	San Jose, Cal., 231	change to	333.1
WAAW	Omaha, Neb., 277.6	change to	384.4
WAPI	Auburn, Ala., 247.8	change to	461.3
WBZA	Boston, Mass., 241.8	change to	333.1
WCRW	Chicago, Ill., 239.9	change to	416.4
WEAN	Providence, R. I., 270.1	change to	367.0
WIBX	Utica, N. Y., 205.4	change to	234.2
WIL	St. Louis, Mo., 272.6	change to	258.0
WJAZ	Mt. Prospect, Ill., 322.4	change to	329.5
WKBA	Chicago, Ill., 288.3	change to	209.7
WKBB	Joliet, Ill., 214.2	change to	282.8
WKBE	Webster, Mass., 231	change to	270.1
WODA	Paterson, N. J., 223.7	change to	390.9
WQAM	Miami, Fla., 263	change to	285.5
WSBC	Chicago, Ill., 209.7	change to	288.3
WSBT	South Bend, Ind., 275.1	change to	315.0
WWAE	Electric Park, Ill., 241.8	change to	384.4

### CHANGES IN LOCATIONS

KFWH	Chico, Cal.	change to	Eureka, Cal.
KFXJ	Denver, Col.	change to	Edgewater, Col.
KOIN	Portland, Ore.	change to	Sylvan, Ore.
WPAP	Palisades, N. J.	change to	Cliffside, N. J.

## 1,000 Fans Listen In Through One Set

RADIO reception is very much of a community affair in an army fort out West, where one set is used to serve the needs of one thousand listeners. Each of the 254 homes at the fort is wired to a central receiver, where an operator is kept on service from 6 P.M. until 1 A.M. to tune in the best features that are on the air. In the homes it is necessary only to turn on the speaker.



# A New and Advanced Model— Norden-Hauck Super-10

## Highest Class Receiver in the World



Panel Size: 36"x9"x1-4"

Weight: 55 lbs.

**T**HE NORDEN-HAUCK SUPER-10 is an entirely new and advanced design of Receiver, representing what we believe to be the finest expression of Modern Radio Research Engineering. It is the product of years of experience devoted exclusively to the attainment of an ideal Broadcast Receiver—regardless of cost.

Results obtained in every respect will upset all your previous ideas of good radio reception.

Here are only a few of the host of features that place the NORDEN-HAUCK SUPER-10 far in advance of competition:

- 10 tubes employed to give perfect reproduction with unlimited range and volume power.
- Super selectivity on all wave lengths.
- Built to Navy Standards.
- Wide wave length range, 200 to 560 meters, without change of coils. (Adaptable 35 meters to 3600 meters if desired.)
- Use Loop or Antenna.
- Simple to operate, having only two major tuning controls.
- No Harmonics. Signals are received only at one point.
- Special Power Audio Amplifier, operating any loudspeaker and eliminates necessity of external amplifier.
- Can be operated directly from house current if used with NORDEN-HAUCK POWER UNIT AB-2 SPECIAL.

The NORDEN-HAUCK SUPER-10 is available completely constructed and laboratory tested, or we shall be glad to supply the complete engineering data, construction blue prints, etc., for those desiring to build their own receiver.

**Upon Request** A complete catalog, attractively illustrated, will be gladly mailed without charge, or full size constructional blue prints, showing all electrical and mechanical data, will be promptly mailed postpaid upon receipt of \$2.00

Write, Telegraph or Cable Direct to  
**NORDEN-HAUCK**  
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**ENGINEERS**  
 MARINE BUILDING  
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Gentlemen:—

Please send me without cost or obligation on my part, attractive illustrated literature describing the new Norden-Hauck Super-10.

I enclose \$2.00 for which please send me, postpaid, complete full size constructional drawings and all data for building the Super-10.

Name \_\_\_\_\_

Address \_\_\_\_\_

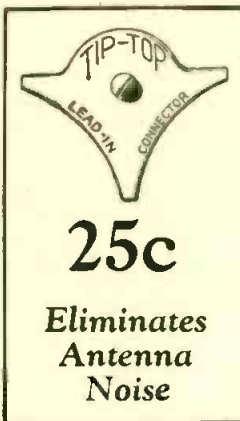


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Contact!

A FEW spare moments, a screw driver, and you have sure, perfect connection between your aerial and lead-in wire. No noise, no soldering, no loss of "distance" due to swinging aerial or corrosion. Tip-Top cannot work loose.

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MANUFACTURING CORPORATION  
36-42 West 47th St., New York



Outstanding Program  
Features of the Month

OCTOBER 17th to NOVEMBER 19th

DURING the coming month, October 17th to November 19th, 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 23rd of the month preceding.

OCTOBER

(Eastern Standard Time)

- 16th; Princeton vs. Navy Football Game, WJZ, WGY, WRC and WBZ.
- 17th; Atwater Kent Hour, WEAJ; 9:15 P.M. (Also broadcast from WEEI, WGR, WCAP, WWJ, WGN, WCCO and KSD).
- 18th; Opera "Il Traviatore," WEAJ; 10:00 P.M. (Also broadcast from WCSH, WCCO, WOO, WCAE, WDAS, WSAI, WTIC, WCAP, KSD and WSAI).
- 18th; Rolfe's Palais D'Or Orchestra, WEAJ; 11:00 P.M.
- 19th; George Olsen's Orchestra, WJZ; 10:45 P.M.
- 19th; Keystoners, WJZ; 9:00 P.M. (Also broadcast from WRC and WGY).
- 19th; Eveready Hour, WEAJ; 9:00 P.M. (Also broadcast from WEEI, WFI, WCAE, WGR, WWJ, WOC, KSD, WJAR, WCCO, WTAM, WGN, WSAI and WTAG).
- 19th; Auction Bridge Instruction, WEAJ; 10:00 P.M. to 10:30 P.M. (Also broadcast from WEEI, WCSH, WTAG, WSAI, WGR, WCAE, WTAM, WFI, WWS, WSAI, WGN, WOC, WCCO and KSD).
- 20th; Eastman Theatre Orchestra, WHAM; 6:30 P.M. (Also broadcast from WGY).
- 20th; Radio Nature League, WBZ; 8:30 P.M.
- 20th; Smith Brothers, WEAJ; 10:00 P.M. to 10:30 P.M.
- 20th; Eastman Theatre Orchestra, WHAM; 6:30 P.M. (Also broadcast from WGY).
- 21st; Judge, Jr., WJZ; 7:40 P.M.
- 21st; Eskimos, WEAJ; 9:00 P.M. (Also broadcast from WEEI, WJAR, WTAG, WFI, WCAE, WSAI, WTAM, WGR, WWJ, WOC, WCCO, KSD and WGN).
- 21st; Silvertown Orchestra, WEAJ; 10:00 P.M. (Also broadcast from WEEI, WFI, WCAE, WWJ, WGR, WOC, WCCO, WTAG, KSD, WSAI, WJAR, WGN, WADC and WCSH).
- 21st; Royal Typewriter Hour, WJZ; 9:30 P.M. (Also broadcast from WGY, WRC and WCAD).
- 22nd; Happiness Boys, WEAJ; 8:00 P.M.
- 23rd; Yale vs. Brown Football Game, WJZ, WGY, WRC and WBZ.
- 23rd; Walter Damrosch, WEAJ; 9:00 P.M. to 10:00 P.M. Piano lectures and New York Philharmonic Orchestra. (Also broadcast from WEEI, WGR, WFI, WCAE, WWJ, WSAI, WTAM, WGN, KFB, WCCO and WDAF).
- 24th; Atwater Kent Hour, WEAJ; 9:15 P.M. (Also broadcast from WEEI, WGR, WCAP, WWJ, WGN, WCCO and KSD).
- 25th; Rolfe's Palais D'Or Orchestra, WEAJ; 11:00 P.M.
- 26th; Auction Bridge Instruction, WEAJ; 10:00 P.M. to 10:30 P.M. (Also broadcast from WEEI, WCSH, WTAG, WSAI, WGR, WCAE, WTAM, WFI, WWS, WSAI, WGN, WOC, WCCO and WSK).
- 26th; Keystoners, KSD; 9:00 P.M. (Also broadcast from WRC and WGY).
- 26th; George Olsen's Orchestra, WJZ; 10:45 P.M.
- 26th; Eveready Hour, WEAJ; 9:00 P.M. (Also broadcast from WEEI, WFI, WCAE, WGR, WWJ, WOC, KSD, WJAR, WCCO, WTAM, WGN, WSAI, and WTAG).
- 27th; Smith Brothers, WEAJ; 10:00 to 10:30 P.M.
- 27th; Eastman Theatre Orchestra, WHAM; 6:30 P.M. (Also broadcast from WGY).
- 27th; Radio Nature League, WBZ; 8:30 P.M.
- 28th; Eskimos, WEAJ; 9:00 P.M. (Also broadcast from WEEI, WJAR, WTAG, WFI, WCAE, WSAI, WTAM, WGR, WWJ, WOC, WCCO, KSD and WGN).
- 28th; Silvertown Orchestra, WEAJ; 10:00 P.M. (Also broadcast from WWJ, WFI, WCAE, WWJ, WGR, WOC, WCCO, WTAG, KSD, WSAI, WJAR, WGN, WCAD and WCSH).
- 28th; Judge, Jr., WJZ; 7:40 P.M.
- 28th; Royal Typewriter Hour, WJZ; 9:30 P.M. (Also broadcast from WGY, WRC and WCAD).
- 30th; Walter Damrosch, WEAJ; 9:00 to 10:00 P.M. Piano lectures and Philharmonic Orchestra. (Also broadcast from WEEI, WGR, WFI, WCAE, WWJ, WSAI, WTAM, WGN, KFB, WCCO and WDAF).
- 30th; Navy vs. Michigan Football Game, WJZ, WGY, WRC and WBZ.

NOVEMBER

- 1st; Opera "Aida", WEAJ; 10:00 P.M. (Also broadcast from WCSH, WCCO, WOO, WCAE, WDAS, WSAI, WTIC, WCAP, KSD and WSAI).
- 2nd; Auction Bridge Instruction, WEAJ; 10:00 P.M. to 10:30 P.M. (Also broadcast from WEEI, WCSH, WTAG, WSAI, WGR, WCAE, WTAM, WFI, WWS, WSAI, WGN, WOC, WCCO and KSD).

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RADIO PANELS

The appearance of your set depends primarily on the panel used. The TESCO bakelite panel is cut, drilled and engraved as a standard unit for the LC-27 Cockaday Receiver. All you need to do is the mounting. You will be pleased with this beautiful, engraved panel and it is genuine bakelite.

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 ADJUSTS AN X-L  
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**X-L VARIO DENSER**

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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 1/4 to 20-micro-micro farads. Price \$1.00.

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  - Model G-5—.0001 to .0005 MFD
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- Price \$1.50

**X-L PUSH POST**

Push it down with your thumb, insert wire, remove pressure and wire is firmly held. Releases instantly. Price 15c.



Push Post Panel permanently marked in white on black insulating panel. In box including soldering lugs, raising bushings and screws for mounting, etc. Price, \$1.50



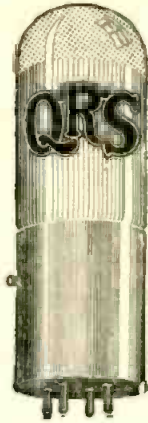
X-L Radio Laboratories 2422 Lincoln Ave. CHICAGO, ILL.

# Q'R'S REDTOP Radio Tubes

## are Better



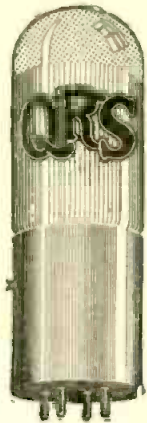
Super Detector \$5.00



Power Tube \$5.00



201A Type \$2.00

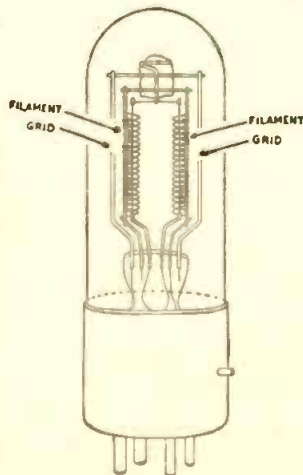
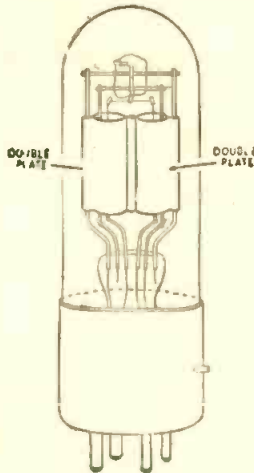


Full Wave Rectifying Tube \$6.00

EVERY TUBE ABSOLUTELY GUARANTEED

**Note the Difference**

Two tubes in one bulb—Consumes no more current



Clearer Reception—Better Tone Quality

You will never know how good your set is until you use better tubes

### You Will Never Really Hear Your Radio Set Until You Use a Q'R'S Redtop Super Detector

The Q'R'S Redtop Super Detector Tube is without a doubt the most wonderful detector tube made—with a 25% greater volume and a tone quality in a class by itself.

American Radio Relay League operator Knaack of Station 9 U Y says of it "I hear stations I never heard before—it gives as much signal strength as a regular detector tube and one stage of amplification."

We have many such testimonials.

The Q'R'S Redtop Power Tube will supply a large volume of undistorted output to your loud speaker; combining the double grid—filament and plate features with our new Power Tube design.

Illustrated literature mailed without charge.

**The Q'R'S Music Company**  
 306 South Wabash Ave.  
 Chicago, Illinois

Factories at: CHICAGO NEW YORK SAN FRANCISCO TORONTO, CANADA SYDNEY, AUSTRALIA

## HAND BOOK FREE WITH Popular Radio

Kendall Banning, Editor, and Laurence M. Cockaday, Technical Editor of POPULAR RADIO, have compiled a book that will prove to anyone that he can build a set which will give distance, selectivity and tone volume, and at the same time a very definite basic knowledge of radio.

**BUILD YOUR OWN SET AND SAVE MONEY**

In "How to Build Your Radio Receiver," you will find complete specifications, constructional diagrams, photographs and instructions for building all of the following sets:

- 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

**ADVISORY SERVICE ALSO FREE**

POPULAR RADIO maintains a big modern laboratory with a trained staff of investigators under the personal supervision of Mr. Cockaday. This Laboratory is always available through our Technical Service Bureau to answer, free to subscribers, by personal letter any problems you encounter which are not answered in either the "Handbook" or the magazine.

**SPECIAL BOOK OFFER**

You can secure a copy of "How to Build Your Radio Receiver" FREE, and have all the privileges of the Technical Service Bureau without additional expense. If you will send a remittance of \$3.00 in full payment of 12 months' subscription for POPULAR RADIO. (Or as an alternative, you may have the book and privileges of the Technical Service Bureau with POPULAR RADIO for 7 months only—for \$2.00. A two dollar bill will do.) Remember you take no chance—we will refund your money in full if you are not more than satisfied.

**POPULAR RADIO**

Department 115

627 West 43rd Street, New York

# it takes you less than one second



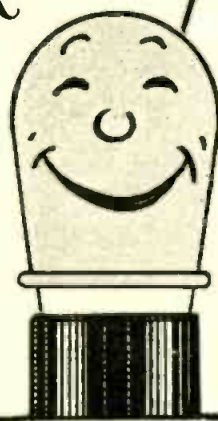
to end microphonic howling for once and all! That's when you slip one of these live rubber "howl absorbers" over the offending tube.

## McDONALD HOWL ARRESTER

remember this name! You can get it for every size tube. Just ask your dealer, or write

Sole Selling Agents for the U. S. A.  
**SPARTAN ELECTRIC CORP.**  
 350 West 34th Street, New York City  
 Manufactured in the U. S. A. by  
 Scientific Products Canada, Ltd.

Price 75 cents each  
 "It Stops that howl"



# Before You Buy the New LC-27

Write to us for a FREE copy of the official LC-27 constructional booklet containing diagrams and illustrations of this marvelous new receiver.  
 The Kit Service Co., Inc., specializes in parts for POPULAR RADIO Receivers. Every kit is absolutely guaranteed. Before shipment parts are checked to insure your getting everything exactly as used. Complete instructions are shipped with every kit, so that any one can build it in a few hours. Order your LC-27 Kit from a house of established reputation. Mail us your check or money order or we will ship C. O. D. We prepay all shipping costs.

### Complete Parts for the LC-27

1—Hammarlund mid-line dual condenser, .000275 mfd. . . . .	\$7.50	2—Mar-Co small controls for LC-27. . . . .	\$1.50
1—Hammarlund mid-line single condenser, .000275 mfd. . . . .	4.65	1—Carter battery switch. . . . .	.65
1—Precision Duo-Octaform coil set, one antenna coupler and two interstage couplers. . . . .	10.50	1—Samson radio-frequency choke coil No. 85. . . . .	1.50
1—Amertran De Luxe first-stage transformer. . . . .	10.00	3—Aerovox mica fixed condensers, .00025 mfd. . . . .	1.05
1—Amertran De Luxe second-stage transformer. . . . .	10.00	1—Durham resistor, 4 megohms. . . . .	.50
1—Amerchoke No. 854. . . . .	6.00	1—Lynch grid leak mounting. . . . .	.35
1—Dubilier No. 902 filter condenser, 4 mfd. . . . .	5.50	1—Carter Gem Jack. . . . .	.25
1—Dubilier No. 907 filter condenser, 1 mfd. . . . .	.60	1—Carter resistance, 0-10,000 ohms. . . . .	2.00
1—Mar-Co illuminated control, scale 0 to 100. . . . .	3.50	12—Eby binding posts. . . . .	1.80
		5—Benjamin UX sockets. . . . .	3.75
		1—Amperite. . . . .	1.10
		Mechanical Kit consisting of aluminum shields, decorated panel, binding post strip and Talt brackets. . . . .	12.50
Without cabinet. . . . .	\$85.20		
With Corbett cabinet. . . . .	\$103.20		
Built complete with cabinet. . . . .	\$10.00 extra		

### COMPLETE PARTS FOR THE LC SENIOR POWER PACK

Exactly as used. Every part guaranteed.

1—Brach Controll. . . . .	\$ 6.00	1—Amertran resistor, No. 400. . . . .	7.50
1—Amertran transformer, PF-52. . . . .	18.00	1—Centralab resistance, 5 watts, 2,000 ohms. . . . .	\$2.00
1—Benjamin UX Socket. . . . .	7.75	1—Bakelite binding post strip, 3 1/2" x 1 1/2" x 1/8". . . . .	1.50
2—AmerChokes, No. 854. . . . .	12.00	1—Brass mounting strip, 1 7/8" x 1/2" x 1/16". . . . .	.80
7—Eby binding posts. . . . .	1.05	1—Hardwood baseboard, 8 3/4" x 15" x 3/8". . . . .	.60
1—Precision paper filter condenser, No. 26, 2 mfd. . . . .	5.50	1—Set POPULAR RADIO blueprints. . . . .	1.00
1—Precision paper filter condenser, No. 24, 2 mfd. . . . .	3.00		
1—Precision paper filter condenser No. 44, 4 mfd. . . . .	5.50		

### OTHER KITS IN STOCK

Improved Raytheon B-Supply. . . . .	\$32.50	Improved Browning-Drake. . . . .	\$80.00
Silver Shielded Six. . . . .	88.05	The Cockaday LC-26 Receiver. . . . .	79.80

**KIT SERVICE CO., Inc. 209 Centre St. NEW YORK, N. Y.**

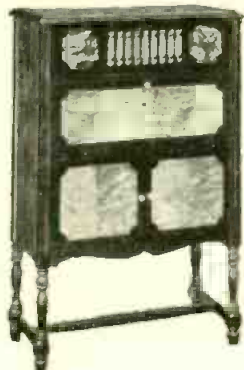
- 3rd; Smith Brothers, WEAf; 10:00 P.M. to 10:30 P.M.
- 5th; Happiness Boys, WEAf; 8:00 P.M.
- 6th; Walter Damrosch, WEAf; 9:00 P.M. to 10:00 P.M. Piano lectures and Philharmonic Orchestra. (Also broadcast from WEEI, WGR, WFI, WCAE, WWJ, WSAI, WTAM, WGN, KFB, WCCO and WDAF)
- 6th; Harvard vs. Princeton Football Game, WJZ, WGY, WRC and WBZ.
- 7th; Atwater Kent Hour, WEAf; 9:15 P.M. (Also broadcast from WEEI, WGR, WCAf, WWJ, WGN, WCCO and KSD).
- 8th; Rolfe's Palais D'Or Orchestra, WEAf; 11:00 P.M.
- 9th; Auction Bridge Instruction, WEAf; 10:00 P.M. to 10:30 P.M. (Also from WEEI, WCSH, WTAG, WSAR, WGR, WCAE, WTAM, WFI, WWS, WSAI, WGN, WCCO, WCCO and KSD).
- 9th; Keystone's, WJZ; 9:00 P.M. (Also broadcast from WRC and WGY)
- 9th; George Olsen's Orchestra, WJZ; 10:45 P.M.
- 9th; Eveready Hour, WEAf; 9:00 P.M. (Also broadcast from WEEI, WFI, WCAE, WGR, WWJ, WOC, KSD, WJAR, WCCO, WTAM, WGN, WSAI and WTAG).
- 10th; Smith Brothers, WEAf; 10:00 P.M. to 10:30 P.M.
- 10th; Eastman Theatre Orchestra, WHAM; 6:30 P.M. (Also broadcast from WGY)
- 10th; Radio Nature League, WBZ; 8:30 P.M.
- 11th; Eskimos, WEAf; 9:00 P.M. (Also broadcast from WEEI, WJAR, WTAG, WFI, WCAE, WSAI, WTAM, WGR, WWJ, WOC, WCCO, KSD, and WGN)
- 11th; Silvertown Orchestra, WEAf; 10:00 P.M. (Also broadcast from WEEI, WFI, WCAE, WWJ, WGR, WOC, WCCO, WTAG, KSD, WSAI, WJAR, WGN, WDAC and WCSH).
- 11th; Judge, Jr., WJZ; 7:40 P.M.
- 11th; Royal Typewriter Hour, WJZ; 9:30 P.M. (Also broadcast from WGY, WRC and WCAD).
- 12th; Happiness Boys, WEAf; 9:00 P.M.
- 13th; Yale vs. Princeton Football Game, WJZ, WGY, WRC and WBZ.
- 13th; Walter Damrosch, WEAf; 9:00 P.M. to 10:00 P.M. Piano Lectures and Philharmonic Orchestra. (Also broadcast from WEEI, WGR, WFI, WCAE, WWJ, WSAI, WTAM, WGN, KFB, WCCO and WDAF)
- 14th; Atwater Kent Hour, WEAf; 9:15 P.M. (Also broadcast from WEEI, WGR, WCAf, WWJ, WGN, WCCO and KSD).
- 15th; Rolfe's Palais D'Or Orchestra, WEAf; 11:00 P.M.
- 16th; Auction Bridge Instruction, WEAf; 10:00 P.M. to 10:30 P.M. (Also broadcast from WEEI, WCSH, WTAG, WSAR, WGR, WCAE, WTAM, WFI, WWS, WSAI, WGN, WCCO, WCCO and KSD).
- 16th; Keystone's, WJZ; 9:00 P.M. (Also broadcast from WRC and WGY)
- 16th; George Olsen's Orchestra, WJZ; 10:45 P.M.
- 16th; Eveready Hour, WEAf; 9:00 P.M. (Also broadcast from WEEI, WFI, WCAE, WGR, WWJ, WOC, KSD, WJAR, WCCO, WTAM, WGN, WSAI and WTAG).
- 17th; Eastman Theatre Orchestra, WHAM; 6:30 P.M. (Also broadcast from WGY)
- 17th; Radio Nature League, WBZ; 8:30 P.M.
- 18th; Judge, Jr., WJZ; 7:40 P.M.
- 18th; Royal Typewriter Hour, WJZ; 9:30 P.M. (Also broadcast from WGY, WRC and WCAD).
- 18th; Silvertown Orchestra, WEAf; 10:00 P.M. (Also broadcast from WEEI, WFI, WCAE, WWJ, WGR, WOC, WCCO, WTAG, KSD, WSAI, WJAR, WGN, WDAC and WCSH).
- 18th; Eskimos, WEAf; 9:00 P.M. (Also broadcast from WEEI, WJAR, WTAG, WFI, WTAE, WSAI, WTAM, WGR, WWJ, WOC, WCCO, KSD and WGN)
- 19th; Happiness Boys, WEAf; 8:00 P.M.
- 20th; Harvard vs. Yale Football Game, WJZ, WGY, WRC and WBZ.
- 25th; Pennsylvania vs. Cornell Football Game, WJZ, WGY, WRC and WBZ.

## Plans for Curbing Radio "Pirates"

JAIL sentences from eight days to six months for persons who pick up and publish private radio messages were recommended by a conference of news agencies that met recently at Geneva under the auspices of the League of Nations. One of the problems of radio has been to insure the privacy of radio messages. To remedy this situation the news agencies ask that receiving stations be given the right to receive messages only from public broadcasting stations and from experimental stations, and that they be forbidden to pick up messages intended only for the subscribers to the news service.



Factory  
to  
User  
Prices



Our No. 850 Console

Front panels burl walnut, top and sides 5 ply walnut, balance gum. Will take set with panel up to 8" high, 26" wide, depth 10 1/4". Battery compartment back of pair of doors 11" deep, 28 1/2" long. Outside size 45" high, 30 1/4" wide, 14 1/4" deep, with or without horn.

Send for catalog showing our 1926-27 line of consoles, radio tables and cabinets.

**Utility Radio Cabinet Co.**  
1710 St. Paul Avenue  
Milwaukee Wisconsin

## The Improved Browning-Drake

Parts for this Tried and Proven Circuit

AT BEST PRICES

Authorized Service Station and Source of Supply of Parts for the

**LC-27**  
and  
**SENIOR POWER PACK**

WRITE FOR OUR PRICES AND TIME SAVING PLAN OF CONSTRUCTION

on these or any other popular set, Power Amplifier or "B" Current supply.

DEALERS AND PROFESSIONAL SET-BUILDERS—SEND IN YOUR REQUIREMENTS

**The RADIO SHOP** of **STAMFORD**  
20 Worth St., Stamford, Conn.  
SERVICE FOR SET BUILDERS

# Here is the right eliminator for the LC-27 Receiver

Featured by adjustable "C" Voltages 0- to 60 volts. MEDIUM voltage terminal supplies 25 to 135 volts. HIGH terminal delivers voltage up to 180 volts at 50 milliamperes. DETECTOR voltage is adjusted over a range of from 10 to 80 volts.

Price R-97, complete with Raytheon Tube, including "C" voltage taps, \$55.00.

Price R-99, "B" power only, complete with Raytheon Tube, \$45.00.

Improved Raytheon Tube Type No. 97



# Sterling

"B" and "C" POWER

Proves Its Value By Comparative Performance Tests

By supplying up to 180 volts at 50 milliamperes, this eliminator is especially adapted to the LC-27 Receiver and other multi-tube sets using 171 or 210 power tubes.

The remarkable improvement in tone quality, absolutely undisturbed by hum or distortion is a dominating feature of this Sterling-Built device.

Because of its fine adjustment of detector and amplifier voltages, the Sterling "B" and "C" Power is equally dependable on receivers using low plate current or those operating at critical voltages.

It gives abundant, smooth flowing and silent "B" power for any set using 60 milliamperes or less, with or without the use of power tubes.



Combination "high," "low" and "off" Switch Adds Safety and Convenience.

Write for 32 page booklet on care and upkeep of radio.

**The Sterling Mfg. Co.**

Cleveland, Ohio

# BETTER RADIO CORPORATION

DESIGNERS AND MANUFACTURERS

OF HIGH GRADE RADIO RECEIVERS



MUNCIE, INDIANA

*Here's the Story!*

Un-err-r--Er-r-r--Pher-r-r-r--Uhr-r-r-r!

It's the same thing, morning - afternoon - and night - day after day - night after night - NOISE - HOWLS - WHISTLES and SQUEALS - No wonder Radio is hard to demonstrate - no wonder so many excuses are needed about atmospheric conditions -

BUT LISTEN! THE NEW MELODY SUPER SEVEN AND SUPER EIGHT ARE BUILT WITH THAT ART OF PRECISION - THAT PAINSTAKING CARE IN ENGINEERING - TO PERFECT AND REFINE THE RECEPTION OF THE MOST WONDERFUL RADIO PROGRAMS THAT THE INDUSTRY HAS EVER KNOWN.

MELODY SUPER SEVEN AND EIGHT REDUCE TO A MINIMUM THE HOWLS, SQUEALS AND GENERAL INTERFERENCE. MECHANICAL PERFECTION HAS BEEN ATTAINED IN ALL METAL CONSTRUCTION, WITH A DEGREE OF SELECTIVITY HITHERTO UNKNOWN.

THE SUPERB TONE OF THE MELODY IS EVIDENCED BY THE ABSOLUTE FIDELITY OF REPRODUCTION, AND THIS, OVER THE ENTIRE WAVE BAND.

You will be overwhelmed at this sets performance with a price of \$180.00 for the Seven and \$200.00 for the Eight. There is indeed a value you will appreciate. And in keeping with all this, a cabinet designed to your liking, which will grace any home.

Send today for our attractive Booklet "K" illustrating and telling more of the MELODY. Use the handy coupon.

DEALERS:- If you are not already lined up with us for the season, wire, write or telephone for appointment.

Sincerely

BETTER RADIO CORPORATION  
*J.W. Masmy*  
President

GWM/MMC

BETTER RADIO CORPORATION - MUNCIE, IND.  
Gentlemen,  
PLEASE SEND ALL INFORMATION & BOOKLET "K"  
TELLING ABOUT MELODY 7'S & 8'S.  
NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_  
DEPT. P

# For the Facts Use Coupon!

**CROSELY RADIO**  
All prices slightly higher west of Rocky Mts.



This little double-circuit 1-tube set has made long distance records.



4-Tubes. Amazing efficiency. Crescendon equipped!



The 4-29 in portable form.



5-tubes, tuned radio frequency. Two stages non-oscillating radio frequency amplification. Crescendon, two stages audio frequency amplification.



5-tube, 1 dial control acuminators. Crescendon, power tube adaptability.



5-tubes. True-cascade amplification: non-oscillating and non-radiating.



5-tube \$50 instrument. Crosley Musicone speaker, ample compartment for batteries—solid mahogany console.



Double drum station selector! Musicone and room for batteries and accessories.



12-inch size, \$12.50. Super Musicone, \$14.75. Musicone Deluxe, \$23.50.

Also beautiful console with room for batteries and accessories as below.



## CROSELY FEATURES

**THE "CRESCENDON"**  
When, on ordinary radios, ears must strain to catch a station miles away, a turn of the Crescendon on Crosley radios instantly swells reception to room-filling volume.

An exclusive Crosley feature.  
**ALL-METAL SHIELDED CHASSIS**

This truly great radio achievement, found in

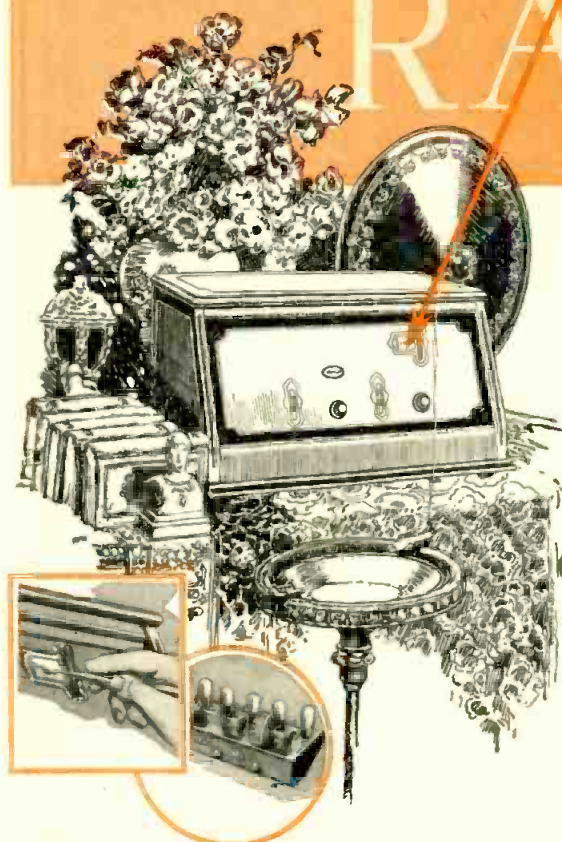
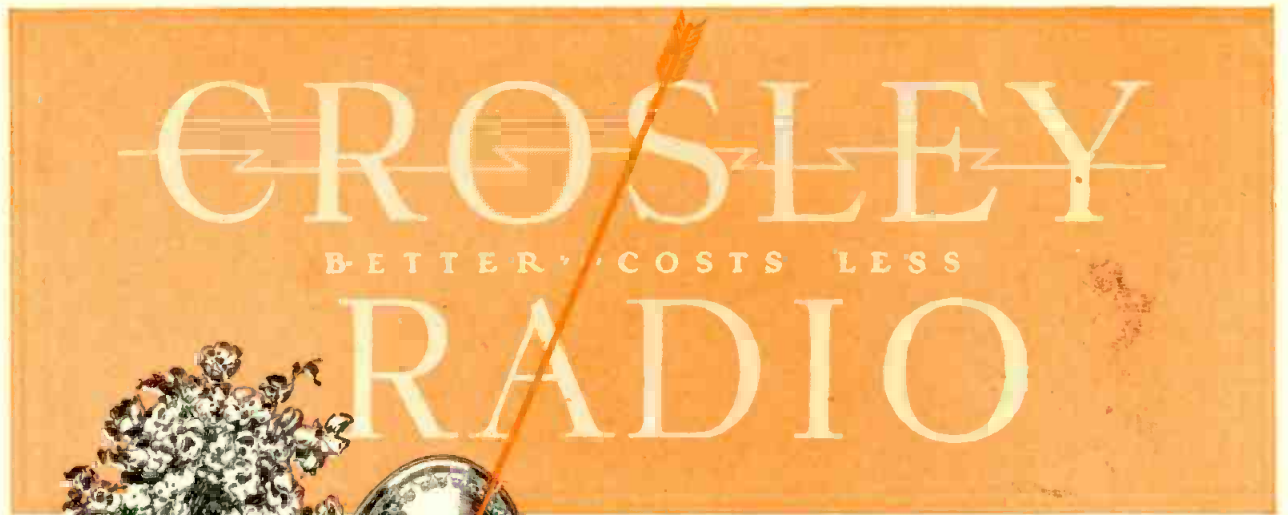
several Crosley sets, furnishes a substantial frame for mounting elements, produces excellent alignment of condensers, shields the units from each other, prevents interstage, improves the stability of the circuit, increases selectivity and saves costs by standardizing this

phase of manufacture.  
**THE SINGLE-DIAL STATION SELECTOR**  
Nothing in radio equals the joy or the convenience of single dial control. Crosley single drum control enables you to find the stations

sought without log book or "tuning."  
**THE "ACUMINATORS"**  
Crosley Acuminators provide sharp tuning where reception spreads broadly over dial, easily tune out local and bring in far stations. Ordinarily, once

adjusted and they need not be touched again.  
**USE OF POWER TUBE**  
Power tube adaptability marks the Crosley "5-50," "5-75" and "RFL" sets. This feature typifies Crosley provision for best radio reception at moderate cost.

QUALITY AND BEAUTY IN CABINETS AND CONSOLES



One-dial control. You find your station, then write its letters on the graphic dial, locating it once and for all, to turn to whenever your fancy dictates.

The new Crosley all-metal shielded chassis not only aids in producing astounding selectivity, but standardizes manufacture and helps make possible the price of \$50.

# \$50

Slightly higher west of the Rockies. Never before, at anywhere near this price, has a radio set possessed all these advantages: 1. Single-dial control with graphic station selector. 2. Metal-shielded chassis, contributing to amazing selectivity and reducing cost. 3. Crescendon control, producing exquisite volume from distant stations. 4. Crosley Acuminators, which sharpen tuning and increase selectivity. 5. Power tube adaptability. 6. Beautiful, solid mahogany cabinet of distinguished design and exquisite two-tone finish.

**THE CROSELY RADIO CORPORATION, CINCINNATI—POWEL CROSELY, Jr.,**

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. Owing and operating station WLW, first remote control super-power station in America. All prices without accessories.



**President**

For Catalogue write Dept. 16

# From "Consort" to Symphony —from Radio to Thorola Art



The first known representation of an Orchestra dates from about the year 1000 A. D.

The first crude orchestras were described as mere "consorts of flutes and viols". Compare this with the limitless tone effects of the modern symphony orchestra. A great advancement of course. Yet we truly believe you are bound to discover just such advancement in Thorola radio.

Thorola clearly marks the end of those days when the scientific wonder of radio could excuse artistic compromise. The flawless reception of pure, unblemished music and distinct, natural speech is the greater wonder of Thorola instruments.

Relentlessly all the old radio "disturbances" have been downed. As the pioneer American builders of long-distance acoustic apparatus we were ideally equipped for the task. We were able to originate Thorola Low-Loss Doughnut Coils making selectivity *positive*—concentrating full power on the wanted station only—and eliminating internal interference and circuit confusion, so that the remaining difficulties revealed themselves and

could be methodically conquered.

We also created Thorola Golden Tone transformers, balanced and sensitive to a degree never before considered commercially feasible. It was one more example of the attainments to be expected from an establishment which was one huge acoustics laboratory long before radio began!

And we already had the loud speakers whose brilliant clarity and fidelity, at any volume, admittedly improved all receiver performance.

Yet all of our highest technical achievements—so far ahead scientifically—should not mean as much as your ear in selecting radio! Unless you go and hear 1927 Thorola models you run the risk of owning radio that is already outdated. Whatever style you desire—console, cabinet, cone speaker, or horn speaker—the Thorola representative has it. He welcomes the most critical consideration. He will show you the first radio receivers with provable upkeep economy!



## MODEL 9. CONE SPEAKER \$20

With its Dual Range diaphragm, the Thorola Cone Speaker is the first of its type to cover the entire range of reproduction without compromise at either the high or the low end. Never has a speaker of this style had tone of this character. Luxuriously finished in Walnut and Old Gold, with Carved Ornamentation, this speaker delights the eye as well as the ear.

## MODEL 4. HORN SPEAKER \$25

The Controlled Mica Diaphragm of this speaker, with its exclusive Separix, brought out the artistic possibilities of radio, by reproducing even the musical overtones. Always known as perhaps the steadiest seller in radio history, Thorola 4 deservedly retains its rank—in appearance, too! The beautiful Bakelite Bell, smart Golden Throat Band, and Classic Base adorn any room.

## THOROLA, JR. SPEAKER \$15

Matchless Thorola tone quality, and graceful appearance are obtainable in a horn speaker of more moderate size, the Thorola Junior. It improves the operation of any receiver in a way which is out of all proportion to the price.

REICHMANN COMPANY, Chicago, Member R. M. A.

# Thorola

(Western and Canadian prices slightly higher)



## MODEL 57 CABINET \$60

Thorola radio at such a price seems unbelievable. Antique, Highlight Walnut finish and charming proportions distinguish this cabinet. It gives you the genuine Thorola 5-tube circuit, whose many special features insure performance which cannot be measured by any previous standards of power or hook-up.

## MODEL 59 DE LUXE CONSOLE (Illustrated) \$185 MODEL 58 \$125

A receiver with two speakers—the Thorola Cone and the Thorola Horn type! Perfect reproduction facilities for every radio impulse. Of course the 5-tube Thorola Circuit brings them all in clearly, with its exclusive Doughnut Coils, Golden Tone Transformers, Duo-Dial Control, Power Tube, and other great advancements. Their advantages make it literally impossible to judge Thorola receivers by the old formula of power-ratings. In fact, Thorola developments mean more power, and

more operating economy as well! The cabinet, in Antique, Highlighted Walnut, is a furniture masterpiece, comparing only with the rich artistry of Thorola reception.

Full Thorola performance and economy characteristics are offered at a moderate price in Model 58. The Console is of Antique Highlighted Walnut, as in the most luxurious Thorola models. All the Thorola circuit and speaker features assure unsurpassed radio.

