RADIO ENGINEERING

The Technical Magazine of the Radio Trade ~ *Edited by* M. B. Sleeper

Fall News for the Technical Men

SEPTEMBER, 1926

Distributing Systems in Public Buildings

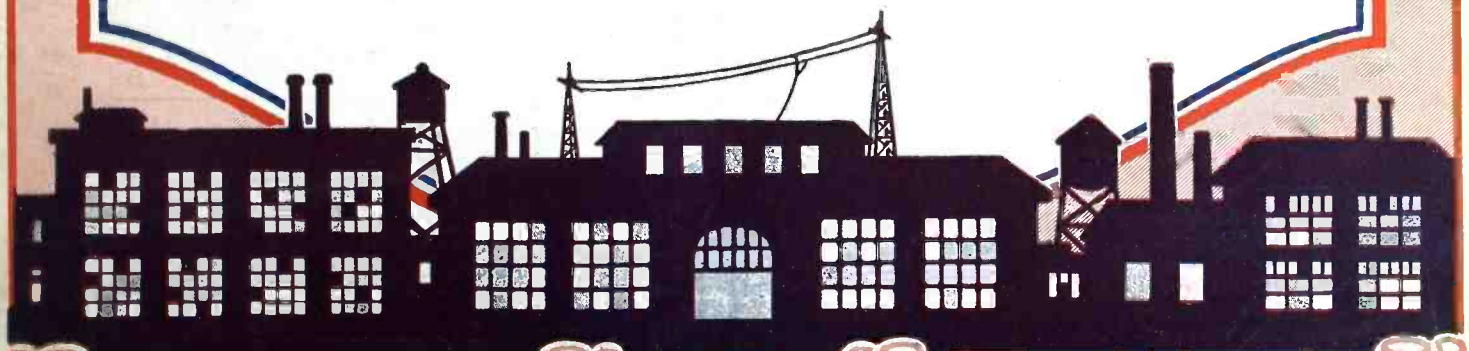
Important information concerning equipment and methods employed in installations for hospitals and apartment houses.

Making Money—by Following New Demands

Advance news on things being done to stimulate public interest, on which radio dealers can cash in.

Commercial Short Wave Equipment

Even this fall radio enthusiasts do not realize the marvelous achievements of short wave transmitting and receiving apparatus.



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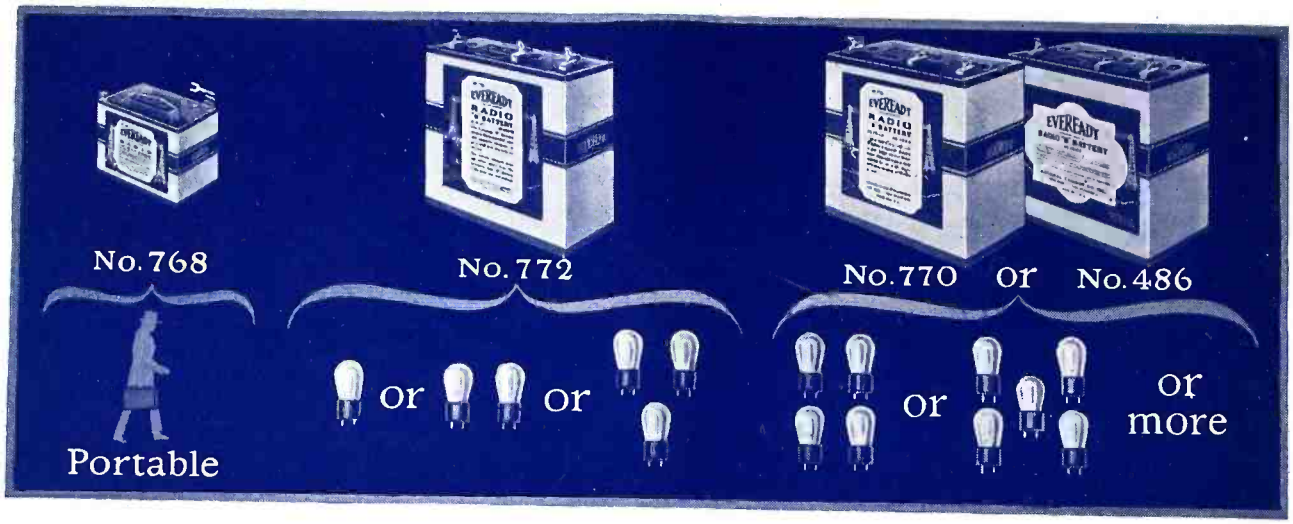
VOLUME VI NUMBER 9
Sixth Year of Publication

Perhaps you, too, can cut your "B" battery costs in half. Just follow the chart. It gives you the secret of "B" battery economy.



THOUSANDS of people have made the discovery that Eveready "B" Batteries, when used in the proper size, and on sets equipped with a "C" battery*, are a most economical, reliable and satisfactory source of radio current.

Here is the secret of "B" battery economy, reliability and satisfaction:

On all but single tube sets—Connect a "C" battery. The length of service given below is based on its use.*

On 1 to 3 tubes—Use Eveready No. 772. Listening in on the average of 2 hours daily, it will last a year or more.

On 4 or more tubes—Use the Heavy-Duty "B" Batteries, either No. 770 or the even longer-lived Eveready Layerbilt No. 486. Used on the average of 2 hours daily, these will last 8 months or longer.

These figures are based on the average use of receivers, which a country-wide survey has shown to be two hours daily throughout the year. If you listen longer, of course, your batteries will have a somewhat shorter life, and if you listen less, they will last longer.

Evereadys give you their remarkable service to the full only when they are correctly matched in capacity to the demands made upon them by your receiver. It is wasteful to buy batteries that are too small. Follow the chart.

In addition to the batteries illustrated, which fit practically all the receivers in use, we also make a number of other types for special purposes. There is an Eveready Radio Battery for every radio use. To learn more about the entire Eveready line, write for the booklet, "Choosing and Using the Right Radio Batteries," which we will be glad to send you on request. There is an Eveready dealer nearby.

Manufactured and guaranteed by

NATIONAL CARBON CO., INC.
New York San Francisco
Canadian National Carbon Co., Limited
Toronto, Ontario

*NOTE: A "C" battery greatly increases the life of your "B" batteries and gives a quality of reception unobtainable without it. Radio sets may easily be changed by any competent radio service man to permit the use of a "C" battery.

EVEREADY
Radio Batteries
-they last longer

Tuesday night means Eveready Hour —8 P. M., Eastern Standard Time, through the following stations:

WEAF–*New York*
WJAR–*Providence*
WEEI–*Boston*
WTAG–*Worcester*
WFI–*Philadelphia*
WGR–*Buffalo*
WCAE–*Pittsburgh*
WSAI–*Cincinnati*
WTAM–*Cleveland*
WWJ–*Detroit*
WGN–*Chicago*
WOC–*Davenport*
WCCO { *Minneapolis* / *St. Paul*
KSD–*St. Louis*

know these Radiotrons

and keep your set up to date

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

for dry battery sets

Radiotron UX-199 (or WD-11 or WX-12), for any or all sockets.
For big performance on small current.

Power Radiotron UX-120, for the last audio stage.
For added power—bigger volume—clearer tone.

for storage battery sets

Radiotron UX-201-A, for any or all sockets.
Efficient, long-lived under heavy usage.

Detector Radiotron UX-200, for the detector socket of specially built sets—for long range.

Super-detector Radiotron UX-200-A, for the detector socket, where a 201-A is now used. A special tube that gives added sensitivity—longer distance reach.

Power Radiotron UX-112 or UX-171, for the last audio stage.
For added power and finer tone.

for A.C. operated sets

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

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

RADIO CORPORATION OF AMERICA
New York Chicago San Francisco

RCA Radiotron

MADE BY THE MAKERS OF THE RADIOLA

EDITORIAL

THIS is the technical man's year!—The time, at last, when the fellows who have worked and worried, and some of 'em have gone hungry, too, while the companies they tried to build up failed, or while they worked for men who, with merchandizing experience in other lines, seemed to clean up in the radio business.

It seemed to start last spring, when the promoters took their trimming. They had an idea that success in radio was just a matter of high-pressure salesmanship, Saturday Evening Post advertising and—well, they could get a couple of those radio bugs to design sets and to attend to such details.

Fortunately for the industry, it didn't work out that way. The good engineers they got refused to be treated that way, and those that weren't good were no good at all.

The man who, by work and study and experience, was qualified as a radio engineer was ranked with the man who built a spark coil back in 1900. And no one with technical training could make any money.

But this year things are very different. Dealers and jobbers, too busy attending to business details to gather more than a cursory knowledge of radio, made too many costly mistakes by relying solely on their own judgment.

When sets work or don't work, when they require much or little servicing, if they are suited for special local conditions or not, the causes can be foreseen by men with real technical understanding.

The technical man knows whether the design and circuit of a construction kit are good or bad. He knows when the trend of interest will bring demands for certain parts. He sees the possibilities in accessory sales.

And this year the real technical man in the dealer, jobber, or manufacturing organization doesn't need to worry about a raise. There are plenty of companies which are glad to pay all he is worth.

With sudden swing, the entire purchases of the industry are being placed in the hands of the competent, skillful, technical men as fast as they can be found.

This is true from the dealer who consults with Tom before he takes on a new item, to the jobber who first asks his Mr. Smith about the merits of a new line, right up to the manufacturer who, this fall, has a properly equipped laboratory to tell him what's what before he spends his money.

Changing as the changing conditions of the industry demand it, Radio Engineering takes another step with the October issue. All construction articles, consuming much space by detailed directions, will be published in Radio Mechanics our new magazine which goes on sale at the newsstands September 10th.

There, by the way, is a radio magazine such as you have never seen before.

The space in Radio Engineering, thus released, will be used to present a wider range of technical information on complete sets, parts, accessories, and equipment. In short, Radio Engineering will be devoted entirely to the interests of the technical men in dealer, jobber, and manufacturing organizations.

It will interpret new sets, kits, circuits, materials, and methods in terms which will help the technical men meet the new and greater responsiblities which are being put upon them.

M. B. SLEEPER,
Editor.

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Vol. VI. **SEPTEMBER 1926** **No. 9**

Sixth Year of Publication

CONTENTS

In the October Issue

Radio Engineering can't try to tell its readers whether one set is better than another or not, but it can give the information from which each one can decide as to his own opinion. There will be some good dope of this sort in October, including the first release on the new Operadio set.

And, as you would expect, Radio Engineering has been picked to give the first details of the Jupiter set, the 1927 Hammarlund-Roberts, the Loftin-White, and Cardwell's new job.

In the November Issue

What did the factories learn last year? That question is at least partly answered in some exclusive stories in November. Materials, equipment, and methods come in for their share.

What is George Lewis doing? We hope to tell you all about it. If you know him, you'll want the dope. If you don't know him, you'd better get acquainted.

RADIO ENGINEERING

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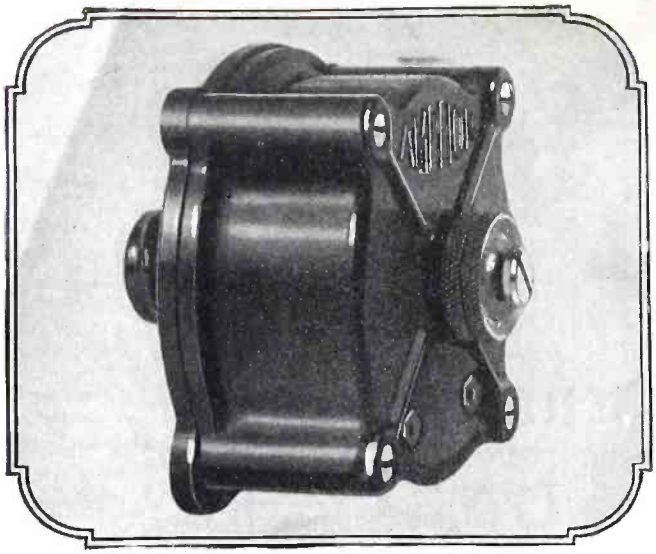

For your enclosed speaker—put the unit problem up to AMPLION

BACK of every Amplion unit is thirty-nine years of experience in designing and manufacturing loud speaking devices by "The House of Graham."

Time-tested engineering and acoustical design have proved conclusively the supremacy of the Amplion principle of reproduction.

Amplion welcomes the opportunity of offering this wealth of experience to set-manufacturers who are desirous of securing the utmost in quality reception from their sets.

To this end, Amplion is in a position to supply Amplion units *matched to the impedance of the set* in either high or low pitch as desired, to suit various types of air columns.

Many of the leading set manufacturers whose sets are in popular favor are Amplion equipped.

A letter indicating your interest will secure immediate cooperation on your problem

AMPLION

AMPLION CORPORATION OF AMERICA
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Greater Distance Finer Selectivity Greater Power

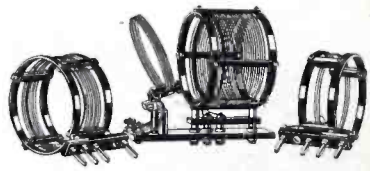
with

AERO COIL
SUPER-SENSITIVE
INDUCTANCE UNITS

Tuned Radio Frequency Kit
Price $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 to 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 Aerodyne receiver packed with each kit.



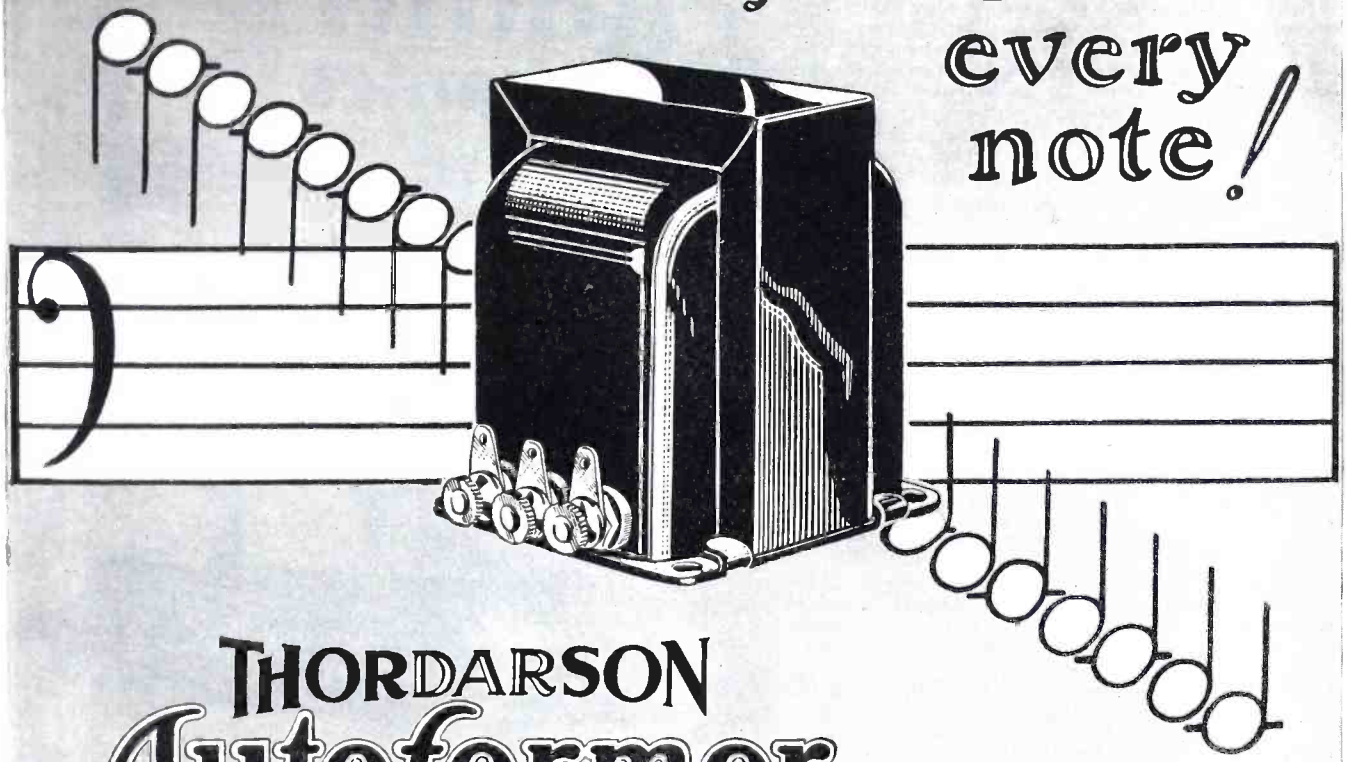
Low Wave Tuner Kit
Price $12.50

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 125 to 550 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.
1772 Wilson Ave Dept 17 Chicago, Ill.

Fully Amplifies every note!



THORDARSON Autoformer

Step-up Impedance Coupled Amplifier

Full Amplification of Bass Notes

Improved Reception of Weaker Stations

Greater Clarity on all Programs

Better Volume Control

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

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

Price each **$5.00**

Note: Only Thordarson makes the Autoformer

POWER
From the A. C. Line

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

Price.....$12.00

B-Eliminator Transformer R-195 is designed for use with the Raytheon tube, furnishing B voltages for the entire receiver. Capable of supplying 140 volts at 40 milliamperes. Conservatively rated. Will not heat up in continuous service.

Price $7.00

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

Price $5.00

THORDARSON ELECTRIC MANUFACTURING CO.

Transformer specialists since 1895

WORLD'S OLDEST AND LARGEST EXCLUSIVE TRANSFORMER MAKERS

Chicago, U.S.A.

"BRUSH my wings well," said St. Peter to his valet. "This reception is a matter of no mean importance, and I must look my best to-day." His halo finally adjusted to his liking, he strode out of the house, swinging his cane lightly, for, in spite of his years, he disdained to lean upon it.

"To the air port," he directed his chauffeur, and off they went in a cloud of gold dust, headed for the main flying field which lay about ten miles to the east of the Pearly Gates.

A small plane, capable of carrying perhaps forty people, was waiting, the motor already started. As St. Peter stepped briskly from his car, a group of men, obviously of importance, as indicated by the brilliant radiation which surrounded them, turned toward him.

St. Peter greeted them happily. "So good of you to come, Mayor Walker. No welcoming party could be complete without you. And Al Smith—what a pleasure. I feared you would be detained in the northern part of Heaven. Well, well, Tex Rickard himself. But who is that man?" he asked of General Harbor, who was standing nearby.

"His face is familiar, but I can't place him. Powell Crosley can tell you."

"Why, that is Clayton Erwin. You remember, St. Peter, that you let him in to make up for denying entrance to Sport Herman who beat up four policemen."

At that moment the pilot sounded his whistle and, as the party climbed aboard, the machine moved off with gathering speed across the aerodrome.

Thirty minutes more and the machine banked around to tie up along-side a tremendous airplane just arriving from the Earth. Other planes, big and little, accepted this incident as a signal for blasts, long and loud, from their whistles and sirens, while the fire planes shot up streams of water which glittered in the sun light. Amid rousing cheers from passengers on board, a man was helped over the side, into the arms of the welcoming party.

"Greetings to Josephus Smithington, the happiest man on Earth," cried St. Peter, as the others crowded around to shake the man's hand.

Quickly the plane headed back to the air port, where thousands upon thousands had assembled meanwhile. Lacking the protection of a police escort, for of course no policemen could be admitted to Heaven, the reception committee and their newly-arrived guest made slow progress to the City Hall. Having reached the steps, it was nearly fifteen minutes before Al Smith could quiet the people sufficiently to be heard.

"The happiest man on Earth," he said, and was drowned out by cries of "Speech, speech!"

"My friends," said Josephus Smithington in a voice almost overcome with emotion from this great popular demonstration, "My friends!" As he spoke, thirty-two reporters snapped their Neverbreak pencils into action, a special operator for the celestial branch of the Associated Press rattled his key, and fourteen movie men cranked their cameras.

"The truth is that I owe all to radio. In my home, I installed a radio set in the living-room to help my wife entertain her guests. In the nursery, I had a set to sing the baby to sleep. In the kitchen, another set kept the cook at peace with the world. But more, I taught my boy to make radio instruments, and with this bond of interest between us I held his confidence and respect. Thus I was able to bring him up in a way that was a credit to us both.

"Radio made my home the happiest home on Earth, and made me the happiest man."

"Tell us more," cried the people insistently. "Where did you learn how to do these things?"

"Why, from Radio Mechanics Magazine," said Smithington, when he could be heard again.

Amazed, St. Peter poked Frank Ryder on the arm. "Frank," he said, "make out an order for 100,000 copies of Radio Mechanics to be sent each month to Heaven, and arrange to distribute them in every home where discord threatens."

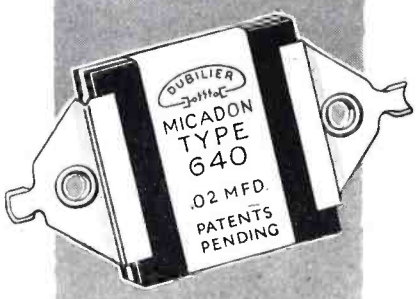
And now you know how it happened that the circulation of Radio Mechanics jumped so quickly, and you know the inside story of the first man who won international fame as the happiest man on Earth.

every one a micadon

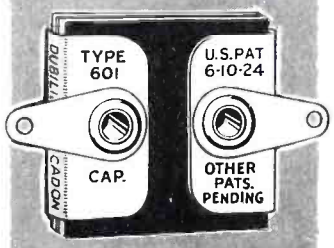
THERE are now three types of Micadons—each made to meet a new development in radio.

Micadon *601* is the standard of small fixed condensers. Designed on revolutionary principles, it was one of the first radio products to discard heavy molded insulation with its high dielectric losses. It provides and maintains a constant, fixed capacity wherever small condensers are required.

In Micadon *640*, the need for higher capacities in superheterodynes, reflex and resistance-coupled amplifiers has been met. The same accuracy, the same principles of insulation and protection against losses in its fixed and permanent capacity have given this condenser its unequalled popular demand.



MICADON 640



MICADON 601

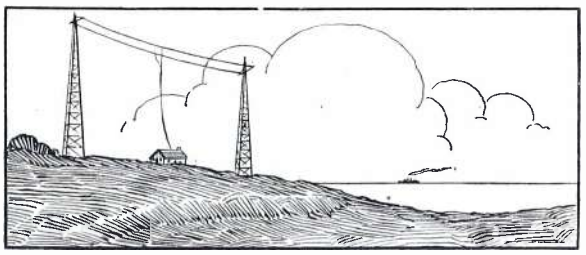
MICADON 700

Micadon *700* is the newest addition to this famous line. Completely shielded in its bright aluminum case, it is designed to withstand even the voltage found in low-power C. W. vacuum tube transmitters; thus providing the most compact, efficient and economical unit of fixed capacity that radio has yet known.

Three different types—but *every one a Micadon*. In the patented principles of their design; in the scrupulous care given to every stage of their manufacture; in their delicate precision, fully shielded and protected—worthy to bear the name of radio's greatest maker of condensers.

Dubilier

CONDENSER AND RADIO CORPORATION



RADIO DISTRIBUTION SYSTEMS

Part 1—Giving the details of the installation at the Sydenham Hospital, New York City—By R. C. Birkhahn

A REMUNERATIVE field is opening for dealers and service men which will become of greater importance in the near future. This is the field of radio distribution systems. The ultimate consumer is coming to realize that radio entertainment need not be confined to the room in which the set is installed, can be transferred to any desired location in the house.

The public and semi-public institutions of the country are beginning to realize the value of radio. An example of this is the use of radio equipment in hospitals. Of course, it is utterly impossible to install separate receivers in every floor or in every ward. The solution to this problem is a central receiver, under the expert supervision of an experienced radio man, which supplies a suitable distribution system. Among the first installations of this kind is the one in the Sydenham Hospital of New York City.

Churches and public halls also present fertile ground for distribution activities. A single receiver may supply entertainment, church services, dance music, etc., at a very low cost. Consider the furnishing of dance music over the air. The best orchestras and bands may be tuned in and will supply the best of music at a price not nearly approached by the cost of hiring a jazz band.

But the greatest application of distribution will be found in private dwellings. The wide-awake dealer and service man will find that he can sell many people on this idea. An impetus has been given to this field by the publication of the distribution system used in the house of one of the better known radio engineers. He calls it "Radio House." Other people will follow when they come to realize the many advantages and the much greater pleasure a distribution system provides. The entertainment may be enjoyed in what ever room desired. The maid and cook, too, can listen in and probably will be more content.

The installation in the Sydenham Hospital has been mentioned before. A short description of the system might prove to be a help in order to visualize the possibilities of distribution in the radio field. The main features are two W. E. 4-D radio receivers operating from loop aerials. These feed into separate amplifiers, which in turn are connected to duplicate distribution mains. By means of

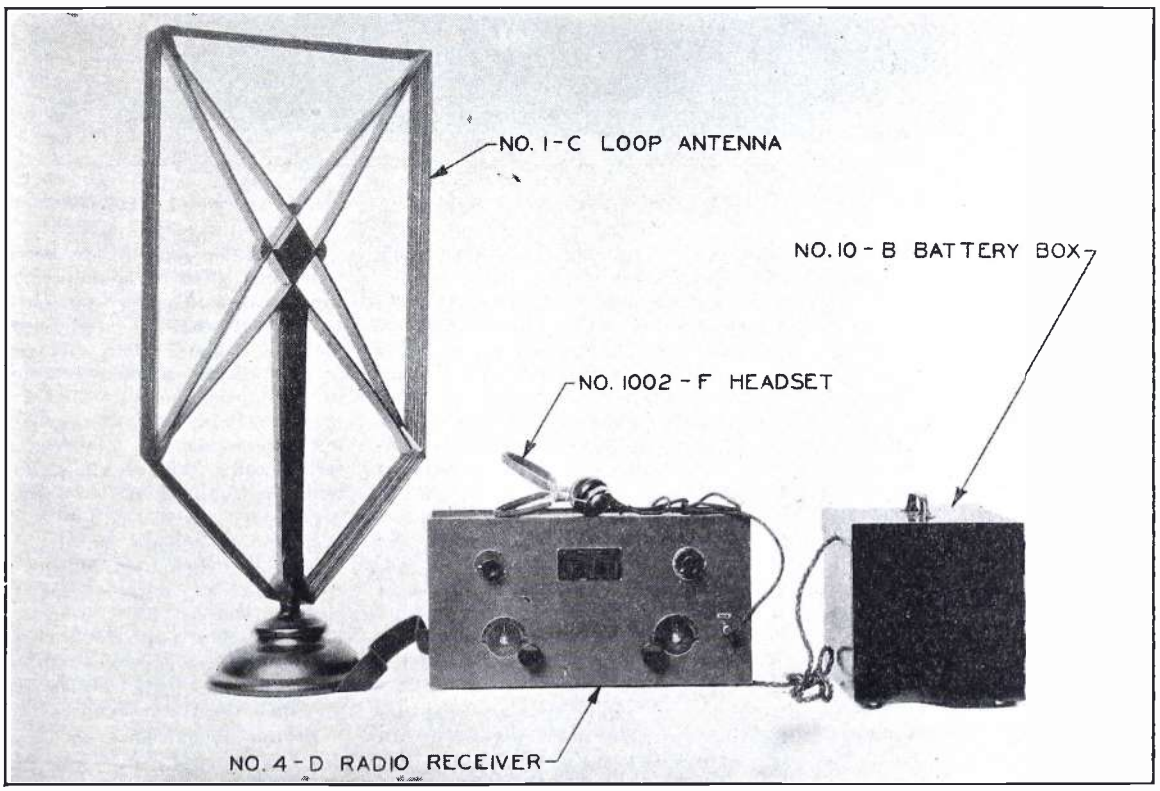


Fig. 1. The loop antenna, superheterodyne receiver, and battery box form the fundamental equipment for the installation.

D. P. D. T. switches the two amplifiers may be connected to a local microphone which permits the distribution of any local entertainment or address to any part of the hospital.

Western Electric equipment is practically standard for installations of this sort, and the experience of this company has enabled their engineers to develop apparatus specially adapted in design and detail to the needs of reception and distribution in public buildings.

The plan generally carried out is to have one, two, or three radio receiving sets of the 4-D type, the number of sets depending upon the choice of programs to be made available at a time. In the case of the Sydenham Hospital, two sets are used, operating simultaneously. These are installed in a room well separated from circuit breakers, motors, and X-ray equipment. Local interference of this sort is reduced considerably by the use of a loop antenna, but this additional precaution is important.

Each set is connected to a power amplifier, in order to overcome the drop in the long leads running to the various rooms where the phone and loud speaker jacks are located. Two output connections are provided at each amplifier, one for the head set line and one for the loud speaker line. This is done not only because head set volume would be too great on the loud speaker line, but because an uncomfortable shock can be got from the full amplifier output. That is not dangerous, however.

In the receiving room there is a charging and switching panel connected to a pair of rectifiers working from A. C. This is to take care of four 3-LXL-17 storage batteries, fifteen 12-LR-2, and two 4-LXL-5 storage batteries, all of Exide manufacture. This constitutes the complete supply for the two receiving sets and amplifiers.

As an adjunct to the radio installation, a public address circuit is also provided. The microphone can be plugged in at any end of several jacks which are connected to switches by means of which either amplifier can be operated. Throwing the switch for either amplifier, in the control room, disconnects the radio set and puts the microphone onto the input of the amplifier.

An installation of this sort is sufficiently expensive that the question of actual return on the investment must be considered carefully. Radio must produce such results for the patients of a hospital as to justify the cost.

Probably the first extensive installation was at the Walter Reed General Hospital, Washington, D. C. Since that time, this service has been widely incorporated in hospital design, for radio entertainment is generally admitted to be a most valuable aid in sustaining the patients' morale, as was recently observed by Major M. W. Ireland, Surgeon General of the U. S. Army. He said:

"I do not believe that the real significance of this radio diversion can be appreciated fully unless one has been confined to the bed for a long period, or has had experience in caring for the sick.

"In past years there has been little in the way of diversion or recreation for the chronic cases in our hospitals, and the so-called shut-ins in their homes except, perhaps, reading and simple games. At Walter Reed General Hospital there are several patients who have been there since 1918, and much of that time has been spent in bed. There are similar cases in other hospitals, no doubt. If radio is so popular with those of us who enjoy good health, and are therefore able to seek diversion at will, what does it mean to those confined to their beds for months or years?

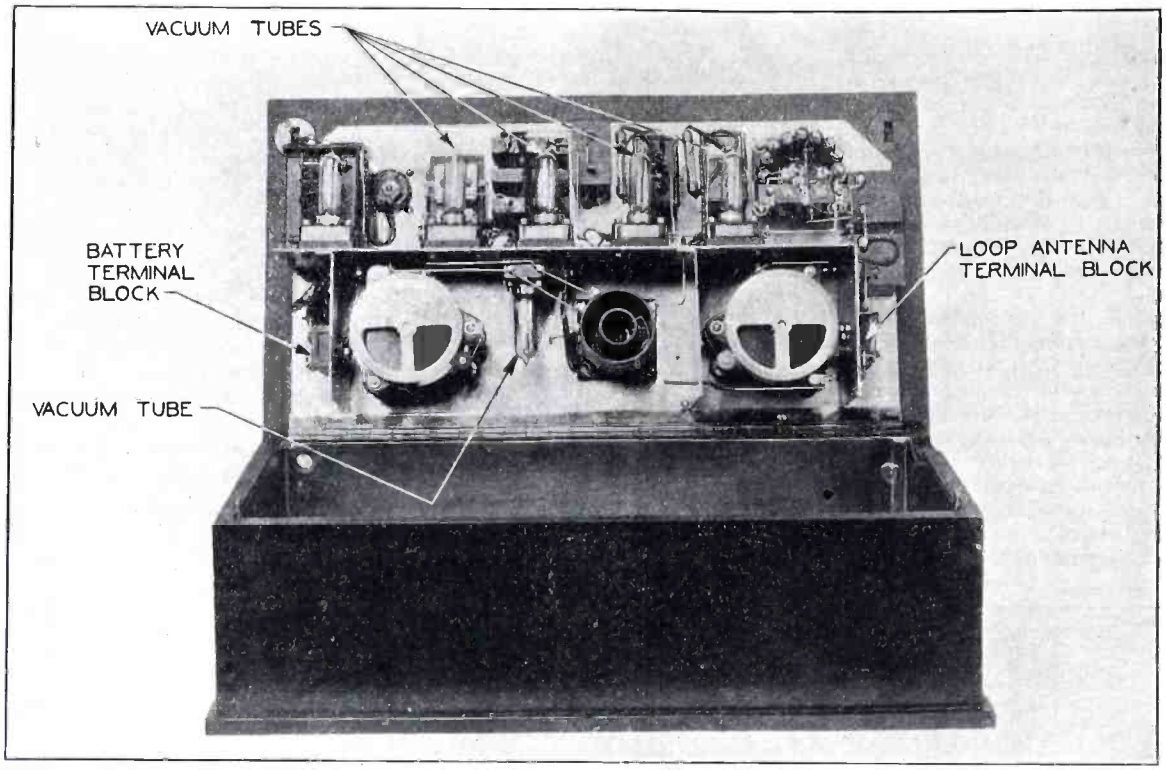
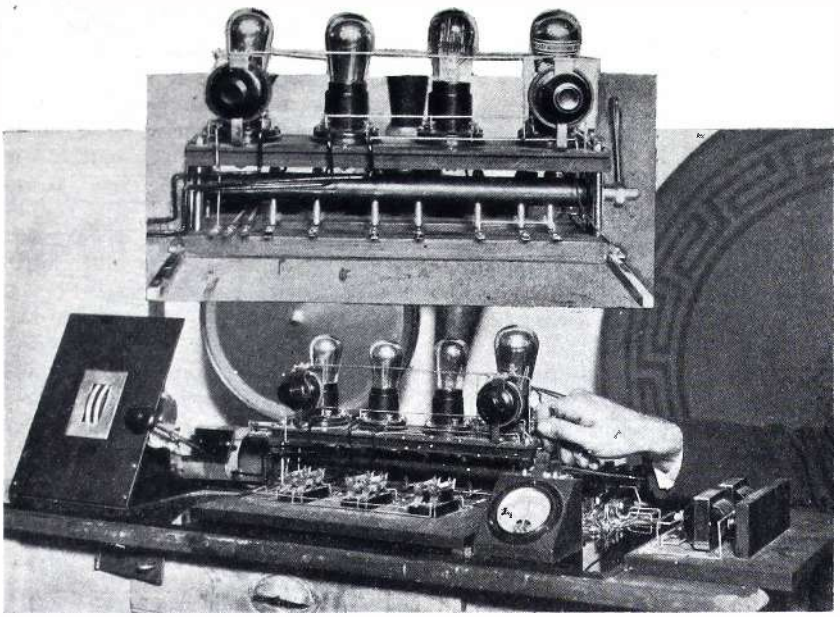


Fig. 2. Internal view of the Western Electric receiver used for the Sydenham Hospital Installation

"For each patient to be able to reach for a set of head phones hanging conveniently by and enjoy the variety of available radio entertainment is a great treat, and the value of this diversion as a morale factor in adding contentment cannot be estimated. This will, of course, contribute materially to recovery, as it is well known that a cheerful patient makes better progress than one who is depressed."

At the Sydenham Hospital, for the reasons outlined by Major Ireland, 164 head set outlets and 16 loud speaker outlets have been provided. Each one has two jacks, to allow a selection of programs. Moreover, a device is fitted to the outlets by means of which the volume can be regulated.

In the second part of this article details of the installation, specifying the conduit, outlet boxes, and similar data will be given together with a diagram of the equipment.



Above, the amplifier comparison apparatus, showing the details of the transfer switch.
Below, the device with a resistance coupling board inserted at the front.

Comparing Amplifiers

Quick-change set-up by which different or similar methods of amplification can be compared

WHAT is a fair method for comparing different amplifying devices and different methods of amplification? This question was answered in a most capable manner by Mr. H. P. Donle in designing a demonstration board for the Alden Manufacturing Company so that they could show the results from the new Alden amplifying units in comparison with resistance, transformer, or impedance coupling.

Two views of the apparatus are given above. The upper illustration shows the switching mechanism and the tube mounting shelf. Under the shelf is a long rod of hard rubber, rotated by a handle at the right. Forced into the rod are short lengths of brass rod, each connected to corresponding parts of the tube circuits.

When the handle is brought forward, the rods make contact with a set of contacts at the rear, or with a set at the front when the handle is pushed back.

For making comparisons, the devices to be tested are mounted on base boards, and the connecting wires brought to contacts along the edge. Then the boards, one at the front and the other at the rear, are put in place on the switching device.

The lower picture shows a resistance coupled unit in place, with a transformer board at the right. A radio receiving circuit is connected to the input of the apparatus, and the output to a loud speaker. Then, by throwing the handle, either amplifying system can be used with the same set, tubes, batteries, and loud speaker.

Another testing board of this sort is fitted with separate switches so that one step of amplification after another can be cut in. This gives a comparison between one step of transformer and two of resistance, for example.

While it might be argued that even this method of comparison is not the ultimate, it is fair in that the answer is given by the ear, which, after all, is the instrument that registers the quality and volume. Moreover, the same tubes are used. That eliminates any possibility that the tubes connected to one circuit are better than the tubes on the other.

The Bristophon is a device manufactured by the Bristol Company, Waterbury, Conn., which makes it possible to operate the old type of phonograph electrically. It is said that it gives it a tone richer and smoother, and of far greater volume, than it ever had before; and that this improved result is available with any phonograph which has an even-running motor and a correctly balanced turntable—regardless of the price paid for it.

When the Bristophon is to be used, it displaces the regular tone arm and horn, and utilizes a radio speaker, either horn or cone type. It can be operated through the medium of a radio power speaker, such as the R. C. A. 104; with any good radio amplifier and speaker; or with speaker only. In the first two instances a 1½ volt battery is required, but with speaker only, an ordinary 6 volt storage battery is used.

R. C. A. Announces the "Radiotron Man"

Plans are underway whereby a monthly circulation of over 23,800,000 is to be acquainted with the merits and distinguishing features of Radiotrons by full page advertisements in leading national magazines, and farm publications, backed by two advertisements a week in 120 leading newspapers. To capitalize this vast advertising effort to the fullest, the Radiotron Dealer will be provided with unique counter and window display material, as characterized by a little cut-out figure which will be known as the Radiotron Man, and who will do valuable and effective work in keeping the better part of the estimated 27,500,000 radio sockets filled with Radiotrons.

This quaint and interesting little fellow dramatizes the RCA Radiotron Campaign and never fails to deliver his message. Every month he has a new story to present on the posters which he holds, and together with his five lively little counterpart Radiotron Men will help liven up the dealer's windows and counters, serving as a constant and effective urge for Radiotrons.

Then there is the striking Radiotron sign, in the form of an art transparency which symbolizes a complete line of RCA Radiotrons and marks the store as the place to buy them. Being cut so as to permit a clear view through the show window while serving as a reminder, dealers who have seen it consider it a real triumph in transparency design.

Still another effective sales aid takes the form of Radiotron price tags, which will prove both useful and profitable. Tied to various articles of merchandise they will remind customers of their Radiotron requirements.

Lastly, there are the RCA Radiotron booklets complete in every way with all the necessary technical information set forth in an easily understood manner and supplemented with charts and diagrams. These booklets are designed to answer any questions you or your customer may ask.

Behind all this material so effectively geared to the nation-wide advertising campaign, the RCA organization has prepared a series of sales helps for dealers, offering periodical ideas and selling ammunition for Radiotrons. All this material is sent complete in a compact merchandising kit, containing one large Radiotron Man, five posters—seven additional posters are delivered later—five small Radiotron Men, one art transparency, 100 Radiotron Price Tags and a supply of Radiotron Booklets.

Spartan Electric Corp., New York City, is making a flexible rubber cap which, when slipped over a vacuum tube, effectively stops howling set up by vibration from the loud speaker. They are made in special sizes for all tubes.

The Henry-Lyford Kit

A five-tube receiver, in kit form, which embodies some new ideas in circuit and design

KITS may come and kits may go. Right now, the Henry-Lyford kit is a coming event of much importance to set builders.

The circuit, although not radically new, does employ some interesting and different ideas. In general, the outfit consists of two stages of R. F., a detector and two stages of audio frequency. Only two tuned circuits are used. The first tuned circuit is the input to the first R. F. tube. The coupling between the first and second tubes is obtained through a fixed R. F. transformer especially designed for this job.

Its amplification characteristic is practically a straight line from 250 to 600 meters. Below 200 meters, it acts as a by-pass, for little R. F. amplification can be obtained, or is needed, on short waves. The detector circuit is also tuned. This, therefore, reduces the tuning controls to two.

The outfit can be neutralized by the counter electromotive force method. The neutralizing or balancing condenser is mounted on the front panel. This permits a slight movement off the neutralizing point and introduces regeneration in the first tube. The signal is here built up to a large degree and transferred to the fixed transformer. After passing through the detector circuit, detection takes place without the usual grid leak and condenser. In other words a biased grid is used. It has been known for a long time that the former method of rectification introduces extraneous noises which are then amplified and thus become detrimental to good quality. Although not quite as efficient, the grid biasing method has no such disadvantages. As a result, one possible cause of distortion is eliminated.

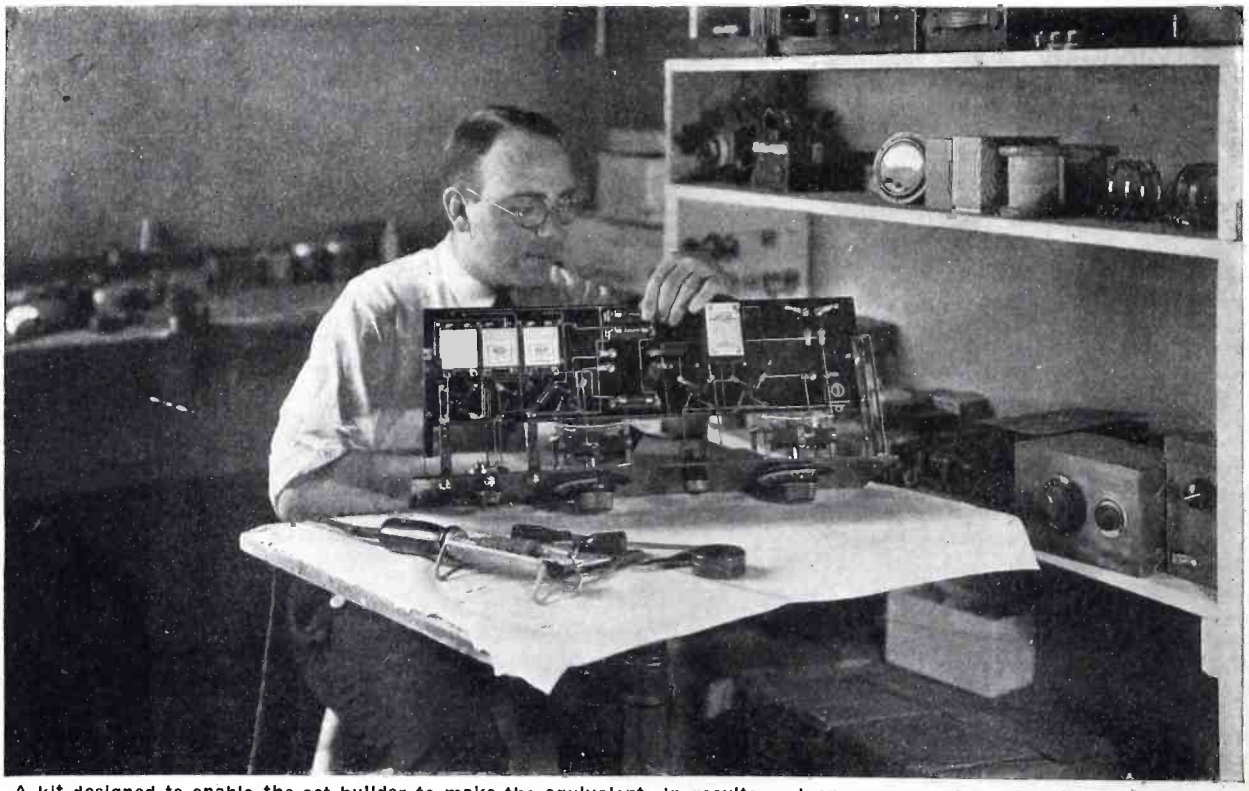
The audio end consists of two steps of transformer coupled amplification, using a UX 112 in the second stage. All of the tubes are provided with automatic filament control. To adjust volume, a variable non-inductive resistance is placed across the secondary of the first audio transformer.

The kit is very easy to assemble and wire. With a little extra effort and time, the result is a receiver which looks like a genuine commercial product. All the wiring is done underneath the sub-panel, except two small wires for the by-pass condensers. An eight-wire color-coded cable is included in the kit. This reduces the possibilities of wrong connections and consequent short circuits to a minimum. In addition the cable improves the appearance of the finished set since no wires are straggling haphazardly from all corners.

The Henry-Lyford receiver does not only cover the usual broadcast range of wavelengths, but reaches down to the amateur bands. The inductances used are of the plug-in type. If desired, additional sets of coils can be had to permit reception down to 37 meters. This is a feature which is becoming of greater importance today. The average listener is no longer satisfied with receiving broadcast entertainment. He is inquisitive and wants to hear what the amateurs are doing.

Good results can only be had with good material. The selected parts must then be so used that they will work at their highest point of efficiency. Take for instance the placing of coils and condensers. Should the inductance be placed in such a manner that it comes within the sphere of the electro-static field, the actual efficiency of both coil and condenser will be greatly reduced. The designers of the Henry-Lyford receiver have made very attempt to secure good design with good parts. Among the equipment used are the University air-spaced coils. The condensers are of good design and low losses, made by the Precise Mfg. Co. Two Thordarson audio transformers are used, which are responsible for the good quality of output. The by-pass condensers are Tobe Deutschmann products. Benjamin sockets are rivited to the sub-panel. Three 112 Amperites are used to control the filament current, and the color cable is manufactured by Belden.

* Complete construction article in Radio Mechanics, Oct. 1926.



A kit designed to enable the set builder to make the equivalent, in results and appearance, of commercial equipment

Making Money

An entirely new phase of activity has opened to dealers who are selling parts or sets

The End and the Means

"Making Money" is a new department, starting this month, in which there will be published a collection of practical, useful suggestions for widening that no-man's land of profit by which the enemy of expense is kept from encroaching upon the defense set up by income.

That is the end to be accomplished. As to the means to be offered in the succeeding paragraphs — they aren't about dressing up your windows or making your salesmen work, keeping books, or even about selling lightning arrestors in the winter.

No, sir! The correspondence schools teach more about those things than magazines can. But to get down to business. This department might have been called "How to Make Use of Rdaio Mechanics" for that is what it amounts to. Radio Mechanics is the means.

How It Works

By the time this issue of Radio Engineering is in the hands of its subscribers, the mail and express routes will be rushing one hundred thousand copies of the new magazine, Radio Mechanics, to get it distributed and on sale all over the United States and Canada by the tenth of September.

Radio Mechanics published by Radio Mechanics, Inc., at Radio Hill, Poughkeepsie, N. Y., and edited by M. B. Sleeper, is the first radio magazine to be written for the exclusive purpose of selling the public the fun of radio, whether it concerns sets or parts, as it can be enjoyed in the average American home. Now——

Selling Sets

The Mrs. part of our great public is well enough councelled concerning tubes and tuning and volume and quality. Her husband, sons, and friends see to that. The thing that she's worrying about right now is the way the radio will look along-side the Cogswell chair, or under the newly-acquired wood-block print.

Radio Mechanics to the rescue. —— Here, Madame, are some suggestions for arrangements in very attractive homes—and the photographs presented under the caption "Radio Belongs in the Home" will show Madame how people with unimpeachable taste are making their radio sets look as much a part of the decorative scheme as the rest of the furniture.

It may not be like her room at all, but, shown at the psychological moment, it will relieve that feeling which comes to most women, that a radio set is an impossible thing to fit into the living room.

Extras for Installation

And again, when the set is sold and the installation is under discussion. In Radio Mechanics, for October, the first issue, is a photograph that no women can resist. Have it ready, just as you suggest an extension for a loud speaker in the kitchen. While Madame looks at it, put that down on your order pad, for the picture does more talking than any high-pressure salesman.

Freshman Dealers

Bill and Bud, are worth more to set dealers than an armful of circulars. They are regular fellows, a pair of snappy young boys whom any dealer would be glad to hire. No Freshman dealer should fail to show his prospects the pictures in the October issue which accompany Bill's letter about the new model. Nothing technical in it, but some good stuff anyone can understand, written in a way that will hold every man's, or woman's attention.

If the prospect wants to, "think it over," let him take the article home. Then he'll be sure to come back — with his money. Incidentally, if you haven't seen a Freshman set correctly installed, you'll be surprised to see how handsome it looks in the proper surroundings.

Have You a Nut in Your Town?

Of course you have some new-hook-up bugs on your list of customers? Just let him have one look at the Henry Lyford set, and you've made a first class kit sale. It's got enough new kinks, including some special Hammarlund-Roberts plugs in coils, to please any of 'em. The big Thordarson transformers are provided together with plenty of Tobe Deutschman by-pass condensers, and the new Precise variables for tuning.

Pictures again—and with details that you never saw in any other magazine, made that way because its seeing that sells. Don't talk to your customers. Let the photographs save your voice.

Or One Who Would Like to but Can't?

You know the kind. He's done every thing there is to do with complete sets, and is looking for the next thing, but he doesn't tackle a construction job. Good, turn him loose on the Browning-Drake Five. This is a redesign of the set originally brought out in Radio Engineering. Now all the kinks have been taken out, and new parts built in, except for the National units, the Daven super-amplifier, and the Benjamin sockets, and these are of the 1927 types.

Even the front panel is changed to a Crowe metal panel. Incidentally, the design has been worked out so completely that the only insulated part on the panel is the phone jack.

There are X-L grid and neutralizing condensers, Carter rheostats and pilot switch, and a Samson R. F. choke in this set.

Also, for those ambitious enough to build their resistance amplifiers, there are photographs and dope on a home-made unit, using Lynch resistors and Aerovox condensers.

Accompanying the eleven photographs is the latest thing in hook-ups —the wire-less diagram.* Although Radio Engineering originated the picture wiring diagram method of showing connections, we are honest enough to admit its faults. Some magazines in attempt to improve upon it have made picture wiring diagrams with white lines printed on blue back grounds to similate blue prints. This has simply made confusion worse confounded, because they are hard enough to read when printed in black and white, but things printed in that way, as any occulist knows, are made impossible to look at intelligently.

Sales Resistance Overcome

In Radio Mechanics, the effort was made in the opposite direction. The average man who has never built a set looks at a picture wiring diagram, wonders in which section of Florida those lots are located, throws the magazine down, and feels more sure than ever that set building is impossible. He won't even try to understand such drawings. Therefore, to his dying days, he will never be seduced by a radio magazine into making a set.

But show him the wire-less diagrams, and he'll say promptly, "Is that all there is to it? Sure, I can do that." You'll make him a parts customer for life.

Capitalizing Short Waves

Are you bringing your DX hounds up to date? Or do they go down the street for their short wave apparatus? Short waves are the biggest stimulus there is this year for the parts business.

When they ask, "Can I really get 5,000 to 10,000 miles on a two tube set?" speak right up and say, "Why sure, here's how," and show them the pictures of the Hush-Hush 11 before they ask if it's hard to do. The pictures will show them that it's easy for they can see it done right before their eyes.

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* Patent applied for by M. B. Sleeper.

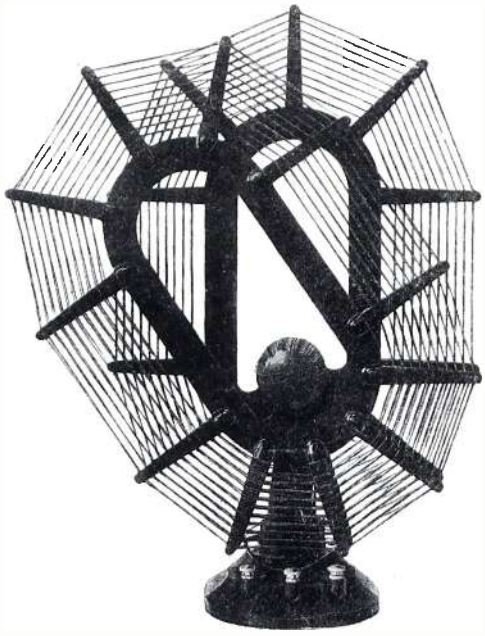
This little wonder-worker uses the Silver Marshall short wave kit, plus a Karas A. F. transformer, six Eby binding posts, a Muter grid condenser and leak, Electrad jack and switch, and Amperite filament controls.

A Little Education

Questions are the bane of the radio clerk's life, partly because they take up so much time, and partly because he usually doesn't know the answer anyway. Radio Mechanics to the rescue. It's carrying a series of articles which present the high school radio course, in written form, which A. H. Ghirardi is teaching in New York City.

It gives the elementary dope in as much detail as is useful, and stops at that point. There are understandable explanations, well illustrated, about those things which are so hard to get through a fellow's head.

It gives some stuff the clerks should read, or at least know enough about to refer long-winded customers to for answers to their questions. Time saved is money made.



The inductance of the English-Whitman loop is adjustable to the inductance value of the coil which it replaces

The Next Thing to Do

Tuned R. F. receivers can be brought right up to date by changing to loop antenna operation

NOT least important of the developments this fall is the renaissance of loop operation. Many brand new sets are designed for loop antennas, and all the Neutrodyne group have polished off the top of their lines with loop sets.

This revival of the loop has come about largely as a result of research in the shielding of individual radio circuits. Prof. Hazeltine discouraged the loop idea at the beginning because of the magnetic coupling between the loop and the inductances in the R. F. amplifying circuits.

Now, that objection has been eliminated by the use of shielding. One very important psychological factor in the business of selling parts has been overlooked by many dealers. The parts business can be maintained on the up-grade just as long as the parts which dealers offer enable set builders to reproduce in their home workshops the current designs offered by the set manufacturers. The interesting thing about making your own set is that, with slight skill, the results and general appearance of commercial products can be reproduced.

However, the minute that complete sets get beyond the ability of the set builder to copy, the parts business will drop fast.

This one factor undoubtedly accounts for the astonishing popularity of the English-Whitman loop in sections where radio dealers have salesmen of sufficient technical understanding to show their customers just what this type of loop accomplishes.

There isn't a set builder who has made a neutrodyne or tuned R. F. set who, realizing that it can be done, wouldn't be delighted to bring his set up to the peak of commercial development by making his outfit loop operated.

Some dealers who have seen this new loop have assumed, without attempting to get the facts, that it is a trick design that is intended to grab a little extra signal from the air. But it isn't at all.

The English-Whitman type acts just like any loop, except that it is so built that the inductance of the loop is adjustable. On some kinds of receivers, built for special loops, such adjustment is most useful without being essential, but the man who wants to make his neutrodyne or tuned R. F. set loop-operated has a special problem. He must disconnect the first variable condenser from the first inductance coil and, in its place, hook on the loop.

Now, unless the inductance of the loop can be made of the same value as the inductance of the coil just removed, the tuning of the first stage will be upset altogether. That is why the ordinary loop, having more or less inductance than the coil which it replaces, is not suitable for sets originally intended to work with an antenna and ground.

To install the English-Whitman type, the two leads in the set which run to the secondary coil from the first tuning condenser are disconnected from the coil and, by means of an extension cable, connected to the loop. Then the antenna lead is put on one of the loop binding posts. That broadens the tuning at the first stage.

Next, a station is tuned in. It is well to listen for one at about 300 meters. As soon as the station is tuned to full volume, the antenna lead is taken off. That will require a readjustment of the first condenser, and the loop will have to be turned around until the correct direction is determined.

To adjust the inductance of the loop, the first condenser is put at the same dial reading as the others. Then, with the loop pointed in the direction of the broadcasting station, the knob on the loop is rotated until the signals come in again.

The loop is really a variometer. That is why the inductance can be changed. Once the correct setting is obtained at one wavelength, it is correct at all waves, provided the variable condensers in the set run together. At least, when the loop has been set, the condensers will match as well as before.

In case there is howling or squealing from coupling between the loop and the coils in the receiver, it may be necessary to use a Crowe metal cabinet lining. That will shield the coils and overcome that trouble. Sometimes it helps to connect the shield to the ground binding post. Copper foil, fairly heavy in weight, can be used as a cabinet lining. The copper can be tacked right to the wood. Thin metal is not as efficient, however, for shielding.

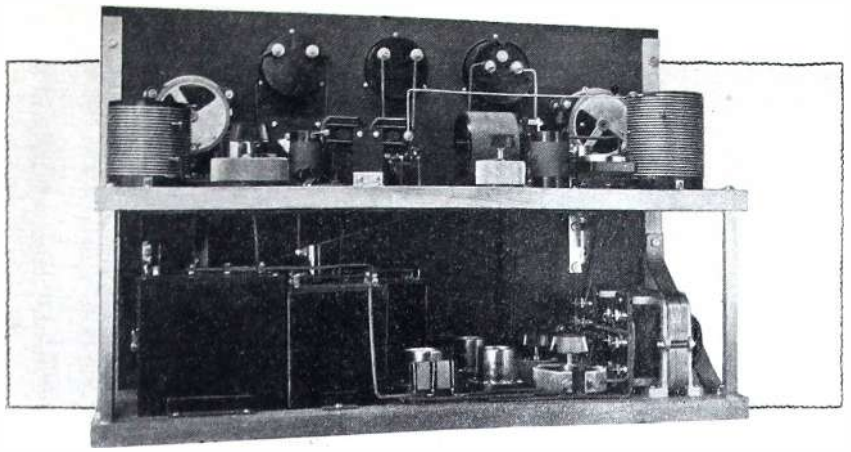


Fig. 4. The General Radio experimental crystal-controlled short wave transmitter

Commercial S. W. Outfits

There are many possibilities in short wave work, some of which are described here

RADIO, like any other art, passes through cyclic changes. The cycle that we are now approaching is that of short wave work. It has taken a considerable time for the industry to realize the potential possibilities of high frequencies. For quite a long time the engineer has been aware that efficiency increases with frequency. In fact the ordinary layman operating a set has found that his outfit will reach out much farther on the lower waves than on the higher ones. There was a time when DX and high wavelength were identical in the minds of the engineers. This is born out by the fact that all transatlantic communication was first attempted on several thousand meters.

It took the amateurs to delve into the higher frequencies when their sphere of activity in the lower ones was curtailed to a large extent. And wonderful things were discovered! With only a fraction of the power used previously, two or three thousand miles were easily covered. The larger companies in the radio field have taken up this work and the results exceeded expectations. A general idea of what can be done, can be gleaned from the log of station 2XAF. This is a broadcast transmitter of the G. E. Company, operating on 32.79 meters.

The antenna equipment consists only of fifty feet of wire of little more than pencil thickness hung vertically from the cross arm of a wooden pole seventy feet high. 2 XAF has been heard in nearly part of the habitable globe. Here are some of the station's achievements.

On April 3, a special program was broadcast by 2 XAF for the farmers of South Africa. This was rebroadcast by JB, the Johannesburg station. It is approximately 8,100 miles from Schenectady. Here is another startling achievement. 2 XAF was rebroadcast by the British Broadcasting Company which reported the quality of the rebroadcast signal as good as though originating in the London studio. The same program was heard direct from 2 XAF by radio listeners in Perth, Australia, 11,498 miles from Schenectady.

Apparently it does not require elaborate equipment to receive these short wave stations. For example—A listener in Elsternwich, Australia, claimed reception of strong signals from 2XAF, so that the words of the announcer were audible three feet from the headphones. He used a two-tube receiver of standard design. Frank G. Smith, explorer, enroute to Brazil, reported picking up 2 XAF aboard ship, 1,800 miles from Schenectady, using neither ground nor antenna for reception.

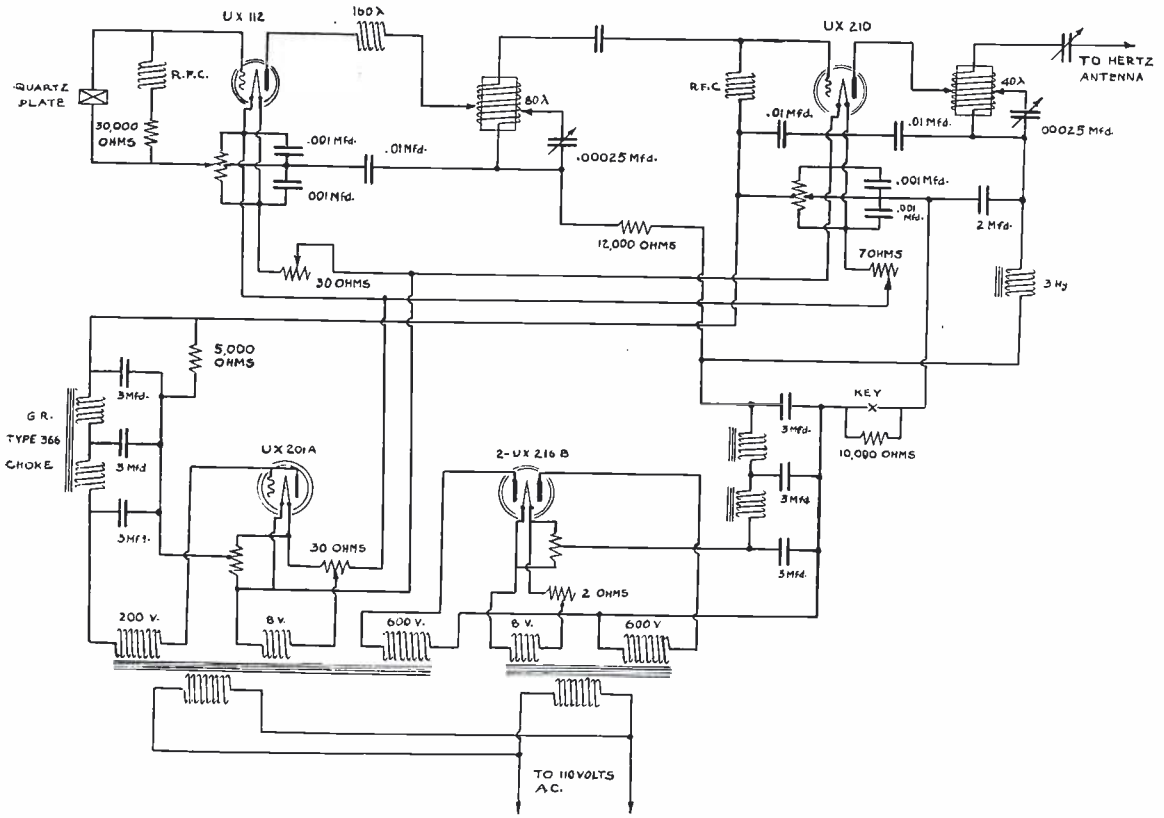


Fig. 5. A crystal-controlled transmitter gives a steady wave that can be easily received. Here is the complete circuit for the General Radio set

Figs. 1 and 2 show the construction of 2 XAF. Probably the most surprising thing about it is the small space it occupies. Long wave stations, to cover the same distances, would probably have the appearance of a power house.

An interesting short wave transmitter has been constructed recently by the General Radio Company. The outfit is shown in Figs. 3 and 4. Fig. 4, illustrates the arrangement of parts. The lower base board contains the power supply equipment. This consists of two rectifier and filter circuits. One of these supplies the operating power for the UX 112 and UX 210. It comprises a power transformer having an 8-volt and two 600-volt secondaries for two UX 216-B rectifier tubes. The filter circuit contains a G. R. type 366 choke and three 3 mfd. by-pass condensers.

The other rectifier circuit has a UX 210-A with grid and plate connected together. This provides a bias for the UX 210. The filter system is similar to the one described above. The upper base board holds the actual transmitting apparatus. The transmitter and rectifier circuits are shown in Fig. 5. It will be noticed that a quartz crystal controls the oscillations of a UX 112. This in turn feeds into a UX 210. The plate circuit of the 210 is keyed, with a 10,000 ohm resistance shunted across the contacts. The panel layout is given in Fig. 3. The two dials control the plate circuits of the oscillators. The meters indicate filament current, plate current, and voltage.

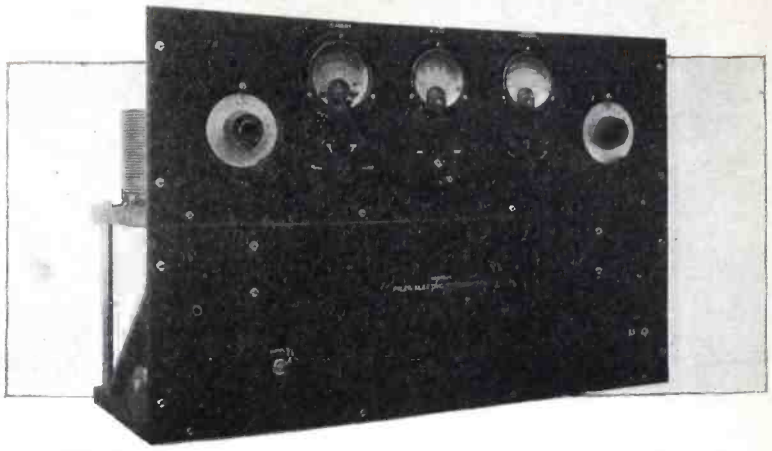


Fig. 3. The panel layout is symmetrical and leads to efficient operation

Here again we find a short wave transmitter which is a pigmy in size and a giant in ability. It can be placed conveniently anywhere since the only thing necessary is a supply of alternating current. The note emitted by the transmitter is clear and the wave steady. This latter characteristic is supplied by the piezo-electric quartz crystal.

The crystal is adjusted, by grinding and polishing, to oscillate at the frequency or a multiple of the frequency desired for transmission. It will be noted that the mechanical vibration of the quartz controls the drop across the R. F. choke and series resistance of 30,000 ohms. This drop, in turn, is impressed on the grid of the UX 112. The action of the larger oscillator, the UX 210, depends upon the output of the first tube. Therefore it is obvious that the quartz crystal actually controls the output of the transmitter. If it is desired to transmit on a wavelength of 40 meters, the plate circuit of the UX 112 has to be adjusted to respond to 80 meters or 3,750 kilocycles.

The set is very easy to construct. The power supply units are of standard design and are connected to the same light circuit outlet. The two UX 216-B tubes are operated in parallel, both plates circuits being at a potential of 600 volts, supplied from a separate secondary winding. The filaments are operated from the same 8-volt secondary. The actual transmitting apparatus, on the upper base board, is symmetrically placed, giving ease of operation. The circuit itself is carefully designed to eliminate, as far as possible, all parasitic harmonics.

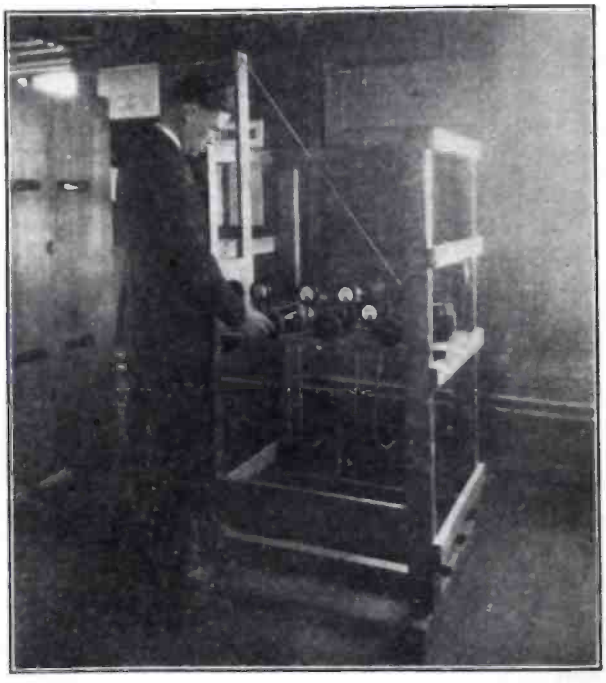


Fig. 1. Left, Fig. 2. Right. The short-wave station, 2 XAF, occupies only about one-tenth of the space usually taken up by long-wave stations of the same distance-covering ability

There we have an outfit that should bring to your attention forcibly the possibilities of short waves. A lot of interesting things are being done in that region. It is not generally known, but plans are now being completed to carry on transatlantic traffic on very short-waves. This can be taken as an indication of the trend of radio activities. It should be the business of every radio man to delve into short wave work since future developments will lie in that field.

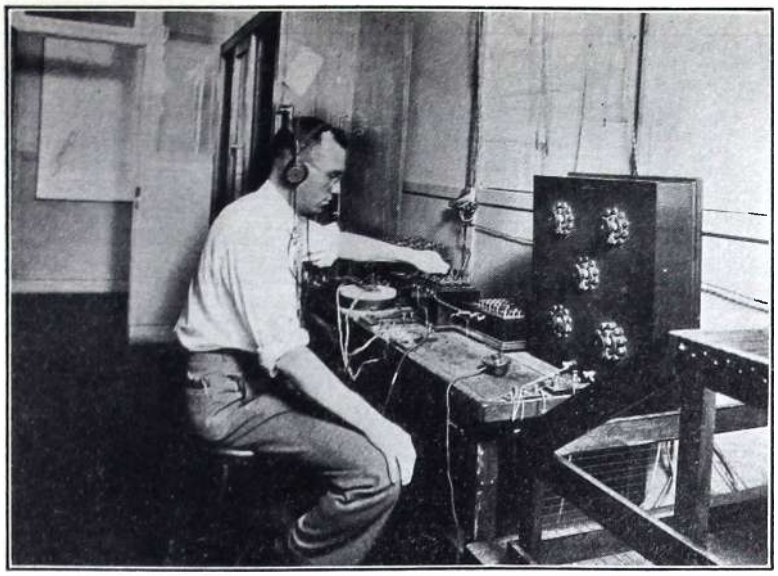


Fig. 1. The set-up used to measure the impedance of telephones or loud speakers

Laboratory Measurements

*Comparisons of performance cannot be useful until standard tests and measurements have been adopted—By Charles H. Roe**

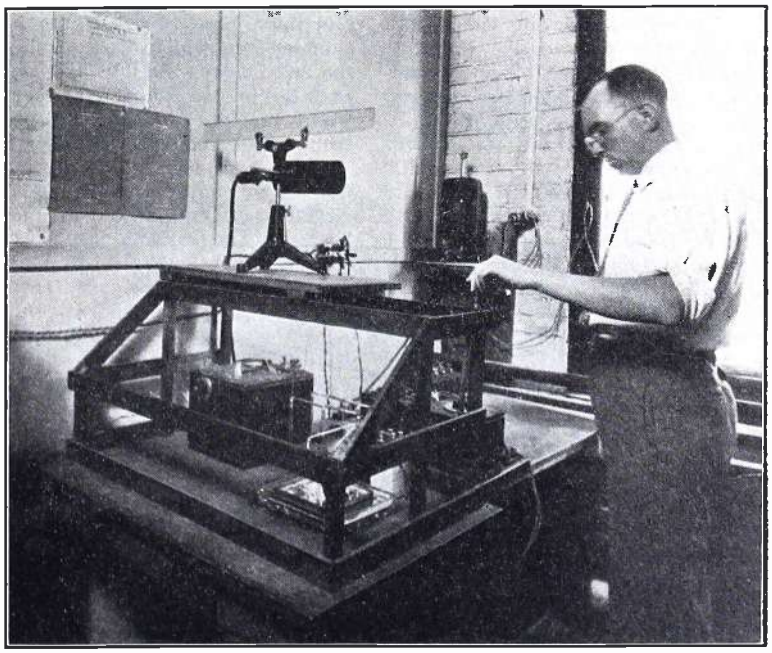
WE have heard a great deal in recent years about the use of extravagant claims and impossible promises in the radio field. Many a writer and many a speaker has offered his kingdom for a real honest-to-goodness method of "debunking" radio. In spite of all this, the solution and the remedy has always been there, and it is perfectly evident. The way to debunk radio is to stick to facts, and to ascertain the facts one must make measurements and tests.

The principal use of the testing laboratory today in connection with radio work is to assist the designer and manufacturer in the development of new models, types, and methods. Considerable testing was necessary, for instance, in developing all the present models of "straight-line-frequency" condensers for receiving sets. Some designers calculated the shape of the plates, but others used the cut and try method, and all had to ask the testing laboratory how their completed products worked. The matter of losses in variable condensers caused more testing. It takes something more than an elementary knowledge of electricity to measure the losses in a small radio condenser, and the manufacturer who wants to back up his "low-loss-condenser" advertising with facts goes to the testing laboratory to find them.

A radio receiving circuit is a very complicated thing, although it is essentially electrical in nature, and not superhuman or mysteriously unfathomable, as some literature on the subject would lead one to believe. Condensers are important parts of the circuit, but so are transformers, and there are several kinds of them. The impedance, ratios,and losses in transformers are all important and they can all be measured, so here is more work for the laboratory. A very important detail in making measurements of radio apparatus is the frequency used in the measurement. The impedance of a condenser might be negligible at 500 or 1000 cycles but considerable at 500,000 cycles such as is encountered in radio circuits. For this reason a good testing laboratory endeavors to use frequencies which correspond to those the apparatus under test is designed to use. How are these high frequencies obtained? By tube oscillators, just as they are in a transmitting station, and they are measured with a calibrated wave meter. There is room for some real progress in standardizing testing methods here. For testing audio frequency apparatus 1000 cycles is widely used, and for radio frequency 500,000 to 1,000,000 cycles, but there are no recognized standard frequencies.

Vacuum tubes, being vital to the operation of the set and inherently of limited life, come in for their place in the testing program. A tube is much more complicated than an ordinary incandescent lamp and is capable of being tested for many more characteristics. The most usual tests are for life of filament and for plate current. The life test consists merely of burning the filament at its rated voltage until it burns out, at the same time applying a stated "B" voltage to the plate. The voltage applied to filament and plate must be closely watched and accurately recorded. The plate current test usually results in the drawing of a curve showing the flow in milliamperes between filament and plate at different voltages. Other tests which are possible on tubes are for mechanical construction, degree of exhaustion of atmosphere, air leakage, and chemical composition of filament and atmosphere.

Although we have today sources of current supply which operates from the electric service mains, dry cells and storage batteries still remain a most important source of power supply for operating radio receivers and, hence, come in for their share of testing. It is not generally known that Uncle Sam, through the Bureau of Standards and the Federal Specifications Board,



Permanent set-ups are made for ordinary radio measurements

* Electrical Testing Laboratories, N. Y.

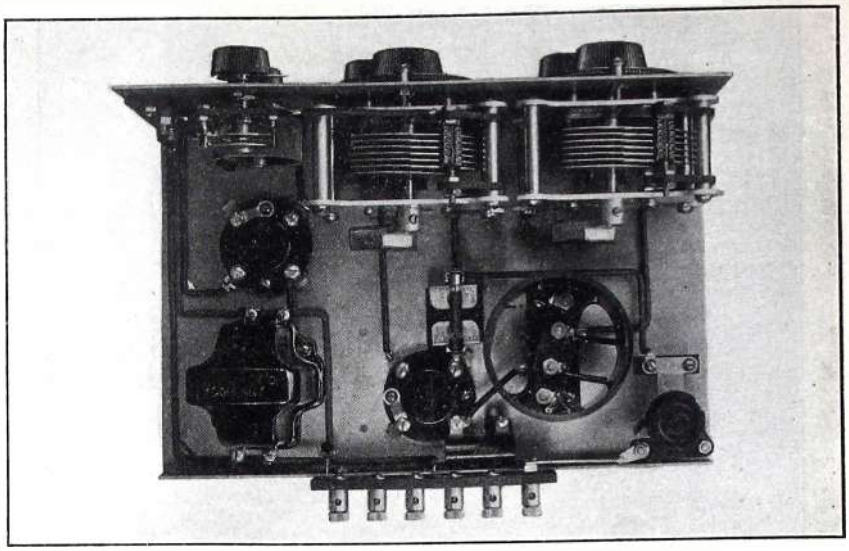
ras devised standard specifications covering dry cells, but there they are, procurable from the Superintendent of Documents in the Government Printing Office at Washington, at five cents per copy. The specifications even cover radio "B" batteries. The testing laboratory, of course, makes tests to see if dry cells conform to these specifications.

There have been many methods proposed for testing the performance of complete receiving sets and loud speakers, but none of them have proved satisfactory. It surely would be highly desirable if the testing laboratory could take all the various receiving sets and, after testing them, say "This one gives best results and this next best," and so on. The trouble is to determine the criterion. Mere ratio of amplification, mere amplitude of vibration of the loud speaker diaphragm, mere range of wave lengths translated into sound—these alone do not tell the story. The laboratory has yet found no method to substantiate the statement of the radio fan who says, "I like my set better than any other because it *sounds* better." That time may come, but in the meanwhile it can be said that the testing laboratory is able to answer practically any question relating to the performance of the set or any of its component parts, if only the questioner defines his standards.

A NEW radio frequency system has been developed recently by Messrs. Loftin and White, which will become of great importance this season. It is a circuit that has a great number of advantages, which will be presented in detail in an early issue. For example, with this system it becomes possible to neutralize a set independent of the tube capacity.

The outstanding feature of the circuit is a combination of the usual electromagnetic or inductive coupling with capacity coupling. The amount of energy transferred from the primary to the secondary of the ordinary R. F. transformer increases with frequency. Just the opposite is true for capacity or electrostatic coupling. If, therefor, they can be combined successfully, it should be possible to obtain equal energy transfer for all frequencies. This is exactly what Loftin and White have done

The circuit is very flexible and any number of interesting things can be done with it. It becomes possible to obtain regeneration at the high wavelengths and none at the low ones. Again, with the proper phasing of the two couplings, it is possible to obtain zero energy at any one desired frequency. Any number of similar startling results can be obtained. It is quite probable that a number of set manufacturers will adopt this circuit. It also should prove of great interest to home builders, since it is very easy to adjust and operate.



This experimental short wave set, made by General Radio, has a metal panel and base

Metal Panels for Short Waves

It has been stated frequently that metal panels cannot be used for short waves. How is it in practice?

RADIO dealers who are concerned with maintaining parts sales cannot stress too strongly the possibilities of radio's latest paradox—short waves. Time after time, short waves are found to do the strangest things, repeatedly appearing to contradict the theories built up around our experience with equipment for broadcast and commercial purposes.

There is the question of shielding. Not so long ago, designers were convinced that masses of metal, particularly in the form of shielding, were fatal to short wave set operation. Then came the portable S. W. transmitter and receiver built into an aluminum case. Fred Marco made a shielded set which was displayed at the 2nd District exhibit, and now General Radio has made a sample short wave receiver with a heavy brass front panel and base panel.

This set, illustrated above, is an interesting example of construction. The circuit is of conventional arrangement. That is, one variable condenser controls the wavelength, with another for regeneration. There are two little verniers, also, the one on the front panel being a fine adjustment on the tuning, while the other, at the back of the base panel, is to give an initial setting for antenna capacity.

The brass sheet, bent at right angles to form the front panel, is a part of the electrical circuit, being connected to the parts which are at ground potential. This is not, of course, a shield, but the mass of metal closely adjacent to the instruments demonstrates that short wave sets are not appreciably affected by this type of construction. Incidentally, this set indicates that, contrary to the views held by many, metal panels need not introduce any serious problems in insulation for the instrument mountings.

Like most S. W. sets now-a-days, this outfit has plug-in coils. The jack strip is secured to the brass base, as can be seen in the illustration. Another strip across the rear carries the binding posts.

Dealers when they are discussing short wave receiving sets with their customers, should not forget the transmitting end, also. Few people realize that they can operate their own telephone transmitters, minature broadcasting stations, in effect.

The National Carbon company, and Burgess as well, are doing much to popularize B battery operated transmitters, and have on hand information for the use of dealers who are going in for this phase of the parts business.

The cost of a transmitter working with a 201-A or 171 tube run from B batteries is far less than the price of a home-made tuned R. F. set. Such an outfit is capable of covering up to 50 miles on telephone, and an almost unlimited range on telegraph.

Records established by members of the American Radio Relay League in transmitting over long distances with low power are almost fantastic. Some of these have been reported by the Jewell Electrical Instrument Company, who hold DX contests each year, awarding valuable prizes to the winners. Because of the skip-distance effects, short wave transmission and reception have not been reduced to positively dependable operation, though that will be converted as experience indicates the cause and remedy.

Grebe is putting special emphasis, this season, on the refinement of the exterior

The Set Manufacturers

Notes on the trend of complete set designs, as indicated by the latest models

A. H. Grebe

A. H. Grebe, Richmond Hill, New York, is confining the most important changes in their line to the cabinets. Mechanically, it is practically the same as last year, except for refinements to speed up production and to take out little kinks that were experienced in the original Synchrophase model. The plainer models such as the Lancaster sells for $260.00, going down to $195.00 for the Puritan model, while the more elaborate ones run up to as high as $1,400.00.

Bremer-Tully

Bremer-Tully Mfg. Company, Chicago, Illinois, is featuring on the Counterphase Eight receiver a visual indicator for wavelength readings, individual calibration of each set, and a single selector for utning.

The Counterphase circuit has one rejector stage, three of tuned R. F., a detector, and three stages of audio, with a power tube output. Each stage is shielded.

The Counterphase Six is the same in general design except that it has one less stage of R. F. and of A. F.

The Bremer-Tully B tube unit is particularly designed to work with these receivers, altho it is equally adaptable to other types.

All-American

All-American Radio Corporation, Chicago, Illinois, has a very elaborate line of receiving sets, with loud speakers and a B eliminator to go with them.

Two types of chassis used in the two-price ranges are illustrated in the accompanying pictures.

The plainer types, to be mounted on a table, run from $80.00 to $90.00,

All-American has an entirely new arrangement for their low-price sets

while the 7-tube set ranges from $175.00 to $345.00. This is a brand new line of development which has been in progress since the first of the year, and represents highly capable engineering technique.

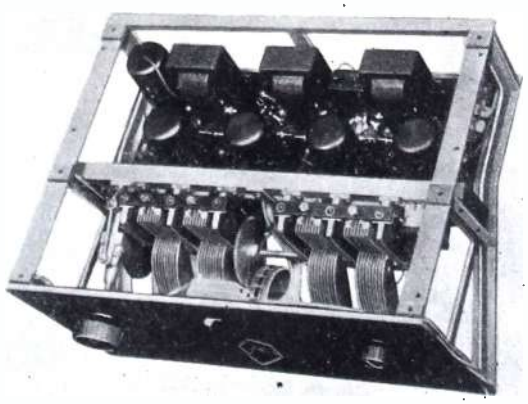
Howard Radio

Howard Radio Company, Chicago, Illinois, after greatly increasing their production facilities for the 1927 season, have sold their entire output.

This year they have gone into the Eastern territory, adding two new jobbers. This is a distinct departure for Howard because they have always avoided the New York territory.

Mohawk

The Mohawk Corporation of Illinois, Chicago, is using quite a distinctive arrangement for the control devices on the new Mohawk set. Everything is lo-



The die cast condenser and shielded coils are outstanding features in the more expensive All-American Models

cated on an attractively designed plate at the center of the front panel.

Federal

The Federal Radio Corporation, Buffalo, New York, is putting out a line of sets which represents a tremendous advance over the first type of receivers. The new models are single control, with a centralized arrangement for adjustments. The line includes both table and console models.

Kolster

Kolster receivers are being marketed this year by Kolster-Brandes, Inc., New York City. A power cone speaker cabinet has been added, as well as a B battery eliminator for operating their sets.

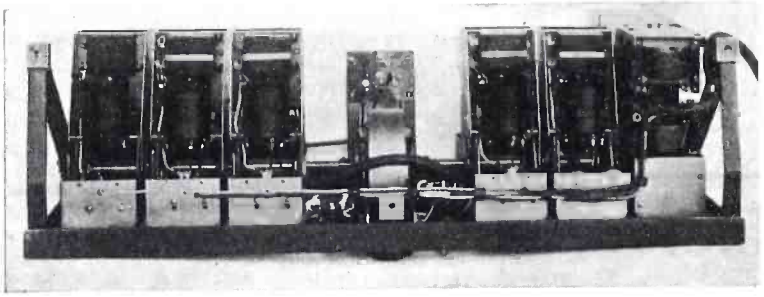
Priess

Priess Radio Corporation, New York City, has now gone to nine tubes. They call it the Straight Nine, a name which is accurately descriptive, because the nine tubes are in a line directly behind the front panel. The Priess set, again this year, is loop operated.

Freed-Eiseman

Freed-Eisemann Radio Corporation, Brooklyn, New York, has not allowed their departure into other fields of manufacture to interfere with the development of the Freed-Eisemann Neutrodyne.

This fall they have table and console models operating on antenna and ground, as well as a loop operated neutrodyne. Moreover, Freed-Eisemann is making a full floating cone speaker and a combination B and C eliminator.



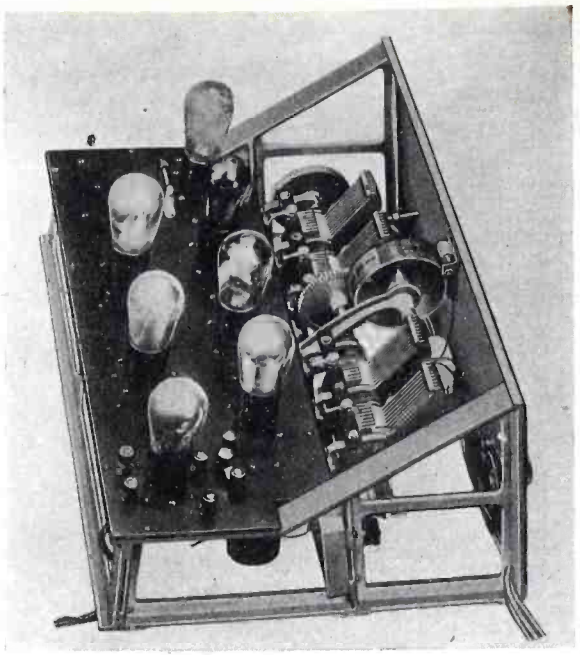
Underneath view of the Freed-Eisemann set with part of the shielding removed to show the coils

Bosworth

Bosworth Electric Mfg. Company, Cincinnati, Ohio, is offering a very handsome receiver in the 6-tube type B3 tuned R. F. set. They are also making a 5-tube, two-control model. Both of these are covered by an unconditional guarantee of satisfactory operation for one year.

Bosch

American Bosch Magneto Corporation, Springfield, Massachusetts, has two particularly interesting models for this fall. The Cruiser, a 5-tube set selling at $100.00, is as satisfactory in operation as it is attractive in appearance. Their big job, however, is the Amborada, a 7-tube set, which, in mechanical and electrical design, will teach many manufacturers much that is new.



Another view of the All-American chassis, showing the gang condenser control

Radio Master

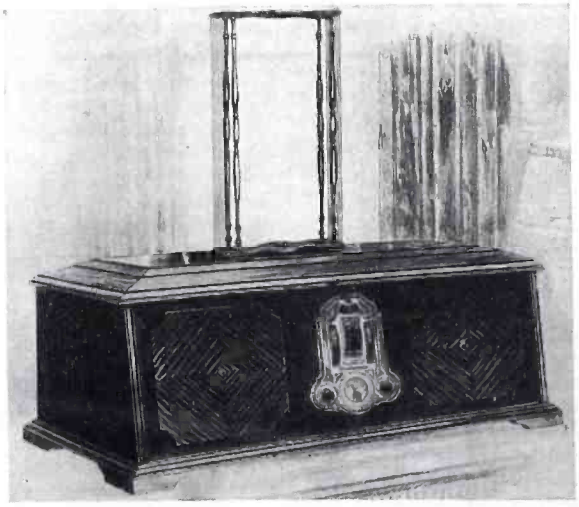
Radio Master Corp. of America, Bay City, Michigan, is out full force for cabinet business. They have special designs for Atwater-Kent receivers, as well as others suitable for various makes of outfits. These are being sold through the trade as well as to manufacturers who are building their own sets into them.

Crosley

Crosley Radio, Cincinnati, O., has designed the R. F. L. circuit into a single-control set which, in various models, lists as low as $65.00. Completely shielded, it is a remarkable example of the results of big production.

Grimes

Grimes Radio Engineering Co., Long Island City, N. Y., is starting deliveries on "Grimes' Own," a construction kit which includes every item needed for the complete set. Among the many novelties of design is the use of a cast aluminum shield, handsomely finished, which serves also as the cabinet.



Front of the Freed-Eisemann shielded, loop-operated neutrodyne

R. M. A. Show Exhibitors

Complete list of exhibitors at the New York Radio Show, with with booth numbers

DD	1	A-C Electrical Mfg. Co., Dayton, Ohio
BB	9	Acme Apparatus Co., Cambridge, Mass.
DD	5	Acme Wire Co., New Haven, Conn.
Z	8	Aero Products Co., Chicago, Ill.
HH	8	Aerovox Wireless Corp., New York City
W	5	Alden Mfg. Co., Springfield, Mass.
K	3	All American Radio Corp., Chicago, Ill.
M	2	Allen-Bradley Co., Milwaukee, Wis.
BB	5	Aluminum Company of America, Pittsburgh, Pa.
DD	7	American Bosch Magneto Corp., Springfield, Mass.
CC	14	American Electric Co., Chicago, Ill.
T	2	American Mechanical Laboratories, Brooklyn, N. Y.
S	7	Amplex Instrument Laboratories, New York City
CC	10	Amplion Corp. of America, New York City
F	3	Amsco Products Co., Inc., New York City
BB	17	Apco Mfg. Co., Providence, R. I.
BB	11	Apex Elec. Mfg. Co., Chicago, Ill.
FF	1	Argus Power Radio Co., New York City
G	1	Atwater Kent Mfg. Co., Philadelphia, Pa.
HH	3	Auburn Button Works, New York City
H	5	Bakelite Corp., New York City
DD	19	Nathaniel Baldwin, Inc., Salt Lake City, Utah
DD	11½	Batteryless Corp., New York City
BB	2	Beacon Radio Mfg. Co., Brooklyn, N. Y.
CC	9	Benjamin Elec. Mfg. Co., Chicago, Ill.
DD	5	Best Mfg. Co., Irvington, N. J.
HH	6	Blair Radio Laboratories, New York City
CC	5	Blandin Phonograph Co., Racine, Wis.
DD	4	Bodine Electric Co., Chicago, Ill.
CC	12	The Borkman Radio Corp., Salt Lake City, Utah
DD	11	Bosworth Electric Mfg. Company, Cincinnati, Ohio
Y	1	Boy Scouts of America, New York City
E	7	L. S. Brach Mfg. Co., Newark, N. J.
BB	12	Bremer-Tully Mfg. Co., Chicago, Ill.
V	1	Briggs & Stratton Corp., Milwaukee, Wis.
BB	16	Brooklyn Metal Stamping Corp., Brooklyn, N. Y.
CC		Browning-Drake Corp., Brighton, Mass.
S	5	Bruno Radio Corp., Long Island City, N. Y.
A	1	Burgess Battery, Chicago, Ill.
HH	3	Canotex Co., Auburn, N. Y.
GG	6	Allen D. Cardwell Mfg. Corp., B lyn, N. Y.
AA	7	Carter Radio Co., Chicago, Ill.
FF	2	C. E. Mfg. Co., Providence, R. I.
DD	4	Cell-o-kay Mfg. Co., New York City
DD	4	Central Radio Laboratories, Milwaukee, Wis.
S	6	Chicago Solder Co., Chicago, Ill.
K	1	Chicago Tel. Supply Co., Elkhart, Ind.
EE	3	Clarke-Splitdorf Corp., New York City
R	1	Cleartron Vacuum Tube Co., New York City
EE	1	Colonial Radio Corp., New York City
AA	12	Conneway Electric Laboratories, Hoboken, N. J.
O	2	Cornell Electric Mfg. Co., New York City
OC	17	Cornish Wire Co., New York City
L	1	Crosley Radio Corp., Cincinnati, Ohio
B	1–3	E. T. Cunningham, Inc., New York City
CC	2	Daven Radio Corp., Newark, N. J.
DD	12	Richard T. Davis, Inc., Chicago, Ill.
X	1	Day Fan Electric Co., Dayton, Ohio
L	5	De Forest Radio Co., Jersey City, N. J.
E	3	Dejur Products Co., Inc., New York
CC	20	Tobe Deutschmann Co., Boston, Mass.
T	5	Diamond Electrical Corp., Newark, N. J.
BB	1	Diamond State Fibre Co., Bridgeport, Pa.
U	1	Dictograph Products Corp., New York City
W	4	Dodd Mead & Co., New York City
BB	16	Dongan Elec. Mfg. Co., Detroit, Mich.
EE	7	Dry Storage Battery Co., Philadelphia, Pa.
W	1	Dubilier Condenser & Radio Corp., New York City
EE		Eagle Charger Co., Philadelphia, Pa.
Z	5	Eagle Radio Co., Newark, N. J.
C	1	Ekko Products Co., Chicago, Ill.
II	2	Electrad, Inc., New York City
FF	8	Electrical Record, New York City
K	7	Electrical Research Laboratories, Chicago, Ill.
C	7	Electric Storage Battery Co., Philadelphia, Pa.
T	7	Empire Electrical Products Co., New York City
BB	18	English-Whitman Products Co., New York City
EE	9 & 11	Executive Radio Council, New York City
T	3	Experimenter Publishing Co., New York City
C	1	Fansteel Products Co., North Chicago, Ill.
L	7	Farrand Mfg. Co., Long Island City, N. Y.
F	7 & 9	Federal Brandes, Inc., New York City
K	9	Federal Radio Corp., Buffalo, N. Y.
BB	14	J. B. Ferguson, Inc., New York City
CC	13	Forest Electric Co., Newark, N. J.
BB	10	Formica Insulation Co., Cincinnati, Ohio
G	5	Freed-Eisemann Radio Corp., Brooklyn, N. Y.
O	4	French Battery Co., New York City
H	1	Chas. Freshman Co., Inc., New York City
K	1	Herbert H. Frost, Inc., Chicago, I.
II	1	Furnell Mfg. Corp., Newark, N. J.
I	7	Garod Corporation, Belleville, N. Y.
CC	6	General Instrument Corp., New York City
V	2	General Radio Co., Cambridge, Mass.
CC	12	Globe Phone Mfg. Co., Reading, Mass.
DD	17	Golden-Leutz, Inc., Long Island City, N. Y.
S	3	Gold Seal Electrical Co., New York City
T	8	Gould Storage Battery Co., Inc., New York City
CC	12	The Graynie Corp., Chicago, Ill.
I	1	A. H. Grebe & Co., Inc., New York City
DD	10	Grigsby-Grunow-Hinds Co., Chicago, Ill.
Z	6	David Grimes, Inc., Jersey City, N. J.
DD	9	Hammarlund Mfg. Co., New York City
DD	14	Hartford Battery Mfg. Co., Hartford, Conn.
EE	5	Hartman Electric Mfg. Co., Mansfield Ohio
EE	16	Heath Radio & Electric Mfg. Co., Newark, N. J.
AA	14	THE HERALD-TRIBUNE, New York
M	1	Howard Radio Company, Chicago, Ill.
S	8	Hoyt Electrical Instrument Co., Cambridge, Mass.
FF	7	Indiana Mfg. & Electric Co., Marion, Ind.
BB	4	Jewell Electrical Instrument Co., Chicago, Ill.
E	5	Howard B. Jones, Chicago, Ill.
AA	5	Karas Electric Co., Chicago, Ill.
II	5	Kay Electric Co., Newark, N. J.
J	9	Kellogg Switchboard & Supply Co., Chicago, Ill.
H	6	King-Buffalo, Inc., Buffalo, N. Y.
E	9	Kodel Radio Corporation, Cincinnati, Ohio
DD	5	Lectrodia Corporation, Lynn, Mass
II	5	J. Libarkin & Son, Philadelphia, Pa.
BB	7	Liberty Electric Corp., New York City
DD	5	The Lignole Corp., Chicago, Ill.
DD	3	W. F. Loughman, Inc., Boston, Mass.
FF	4	Arthur Lynch, Inc., New York City
H	3	The Magnavox Co., Oakland, Calif.
Y	6	Marko Storage Battery Co., Brooklyn, N. Y.
Y	4	Martian Mfg. Co., Inc., West Orange, N. J.
BB	19	Martin-Copeland Co., Providence, R.I.
FF	6	Mayolian Radio Corp., New York City
S	4	Micamold Radio Corp., Brooklyn, N. Y.
FF	9	Miller Rubber Co., Akron, Ohio
EE	19	Montrose-Hast, Inc., New York City
T	6	Moulded Products Corp., New York City
R	1	Mowhawk Electrical Co. of Ill., Chicago, Ill.
F	1	Leslie F. Muter Co., Chicago, Ill.
EE	13	Nassau Radio Co., Brooklyn, N. Y.
FF	5	National Co., Boston, Mass.
B	5–7	National Carbon Co., New York City
GG	2	National Lead Battery Co., St. Paul, Minn.
Z	2	Northern Mfg. Co., Newark, N. J.
G	7	The Operadio Corp., Chicago, Ill.
EE	2	Pacent Electric Co., New York City
U	2	Pathe Phonograph & Radio Corp., New York City
CC	7	Pequot Mfg. Co., New York City
DD	3	Perlesz Radio Corp., Chicago, Ill.
II	5	Permatron Tube Co., Union City, N. J.
DD	13	Perryman Electric Co., New York City
Y	2	Perry Wire Works, Yonkers, N. Y.
BB	6	Pfanstiehl Radio Co., Chicago, Ill.
BB	16	Potter Mfg. Co., New York City
HH	4	Philmore Mfg. Co., New York City
CC	15	Plaza Music Co., New York City
EE	15	Polymet Mfg. Co., New York City
G	3	The Pooley Co., Philadelphia, Pa.
CC	4	Popular Radio, Inc., New York City
CC	12	Pressed Metal Co., Waukesha, Wis.
Z	4	The Presto - O - Lite Company, Inc., Indianapolis, Ind.
DD	2	Priess Radio Corp., New York City
CC	19	The Q. R. S. Company, Chicago, Ill.
EE	17	Radio Cabinet Co., Indianapolis, Ind.
J	5–7	The Radio Corporation of America, New York City
HH	1–2	Radio Digest Pub. Co., Chicago, Ill.
II	7	The Radio Guide, Newark, N. J.
BB	3	Radio Master Corp., Bay City, Mich.
BB	15	Raytheon Mfg. Co., Cambridge, Mass.
II	3	R. B. Radio Co., New York City
Z	1	The Radio Dealer Pub. Co., New York City
DD	20	Regent Radio Corp., New York City
K	5	Reichman Co., Chicago, Ill.
II	8	Resonata Corp. of America, New York City
BB	8	N. G. Saal Co., Chicago, Ill.
I	9	Samson Electric Co., Canton, Mass.
BB	13	Schickerling Products Corp., Newark, N. J.
II	5	Serenada Mfg. Co., New York City
GG	5	Shamrock Mfg. Co., Newark, N. J.
DD	16	Showers Brothers Co., Bloomington, Ind.
II	6	Simplex Radio Devices, Newark, N. J.
CC	3	Silver-Marshall, Inc., Chicago, Ill.
GG	1	M. B. Sleeper, Inc., New York City
H	7	Sonora Phonograph Co., New York City
W	2	Spaulding Fiber Co., Inc., New York City
A	3	Sparks-Withington, Jackson, Mich.
CC	11	Spartan Electric Corp., New York City
L	3	Splitdorf Electrical Co., Newark, N. J.
HH	5	Steinite Laboratories, Chicago, Ill.
C	5	The Sterling Mfg. Co., Cleveland, Ohio
FF	3	Stettner Phonograph Corp., New York City
DD	15	Stevens & Co., Inc., New York City
G	9	Stewart - Warner Speedometer Chicago, Ill.
N	1–2–3	Stromberg-Carlson Telephone Co., Rochester, N. Y.
CC	12	Sturdy Engineering Co., Chicago, Ill.
DD	18	Sturges Multiple Battery Co., Jamaica, L. I.
AA	20	THE SUN, New York City
I	7	Thordarson Elec. Mfg. Co., Chicago, Ill.
AA	16	THE TIMES, New York City
CC	18	Timmons Radio Products Co., Philadelphia, Pa.
CC	8	Tower Mfg. Corp., Boston, Mass.
BB	4	Trimm Radio Mfg. Co., Chicago, Ill.
AA	1	U. S. Army, Governor's Island, N. Y.
W	3	U. S. Light & Heat Corp., Buffalo, N. Y.
D	1–3	United Mfgrs. Cabinet Corp., Chicago, Ill.
GG	4	University Radio Co., New York City
D	1–3	Utah Radio Products Co., Chicago, Ill.
CC	16	Valley Electric Co., St. Louis, Mo.
S	1	Vesta Battery Corp., Chicago, Ill.
I	5	Walbert Mfg. Co., Chicago, Ill.
DD	5	Geo. W. Walker Co., Toledo, Ohio
Y	3	Watsontown Table & Furniture Co., Watsontown, Pa.
II	6	The Webster Co., Chicago, Ill.
Y	7	Weston Electrical Inst. Corp., Newark, N. J.
HH		J. Andrew White, New York City
C	3	Willard Storage Battery Co., Cleveland, Ohio
O	1	Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
CC	12	W. K. Electric Co., Kenosha, Wis.
AA	10	THE WORLD, New York City
II	4	Yaxley Mfg. Co., Chicago, Ill.
J	1–3	Zenith Radio Corp., Chicago, Ill.
Y	5	Zetka Laboratories, Montclair, N. J.

The S-M Power Pack

An efficient power amplifier combined with a B eliminator to operate an average receiver

THE combination of a B battery eliminator and one stage of power amplification is an ideal one. With the advent of power sets, the owners of battery-supplied receivers demand a device which will permit them to change from battery operation to light socket operation. Not only does this S-M pack provide B power, but it also includes a stage of good quality power amplification which will convert any type receiver into a 1927 model.

Engineers have come to realize that the ordinary type of audio amplification, using UX201-A tubes throughout, is not satisfactory. Distortion, which has been previously charged to transformers and loudspeakers, has been found to originate in the last audio tube. This was only too well demonstrated when transformers and other audio coupling devices appeared which, in conjunction with loudspeakers of good design, gave nearly distortionless amplification in the laboratory, but failed to work in actual sets. With fairly strong signals, the loudspeaker rattled and sputtered even when it was known that it could handle a far greater amount of volume. This vexing condition was eliminated by using a large tube of sufficient reserve capacity in the last stage.

However, the ordinary set is not designed for power tube operation. First, the filament current demanded is fairly large and requires special rheostat or filament control. Then again it is found that the plate voltage is unusually high and provisions must be made for applying it to the plate of the power tube. This in turn calls for C batteries of large capacity. Obviously, if the quality which can be obtained is desired from an older model receiver, it would have to be rebuilt or a new receiver installed.

The power pack makes all changes unnecessary. The largest and best type of power tube on the market may be used, without any further difficulty. This is therefore the justification for the existence of these devices.

The type 651 S-M power pack is very compact. A Raytheon type BH full wave rectifier is used. The amplifier circuit has a UX210. The diagrams in Fig. 1 show the combined circuits of the power amplifier and the eliminator. The lower diagram was inserted to indicate the position of the transformers and condenser blocks with the location of their various terminals.

There is nothing particularly unusual about this circuit, but the units of which it is made up have decidedly novel features. The power transformer is of special design, containing an electrostatic shield between primary and secondary windings. This is connected to ground and helps greatly in eliminating all noises which arise in the power line. A resistance is inserted in the negative lead to furnish grid potential to the UX210. The filament of the power tube is operated directly from a small secondary winding on the power transformer. A balancing resistance is placed across it, with a condenser in series with the center tap. The eliminator side of the power pack is provided with two taps furnishing 90 volts for the amplifier and 45 volts for the detector. These voltages are

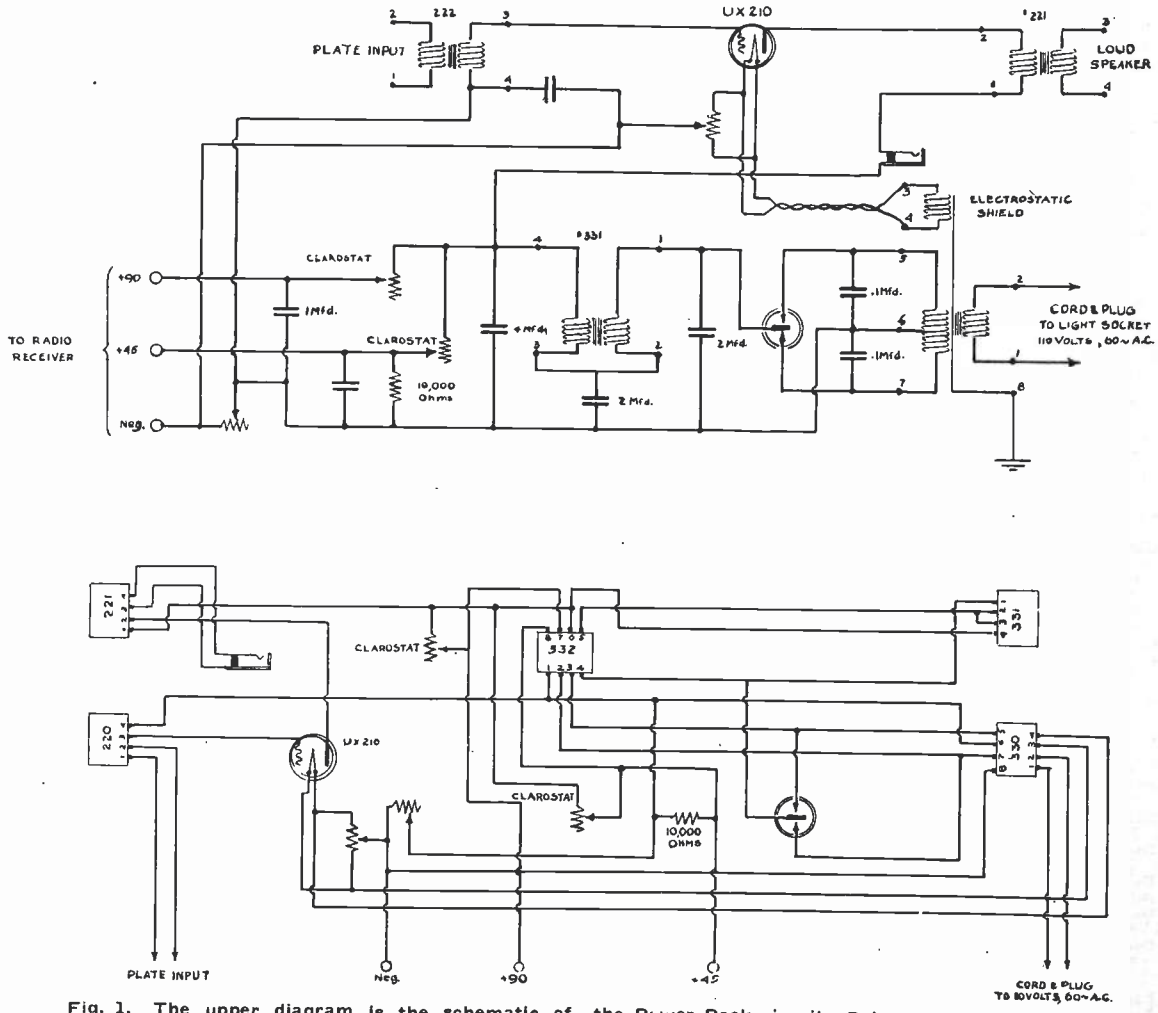


Fig. 1. The upper diagram is the schematic of the Power Pack circuit. Below is an explanatory diagram indicating position of transformers

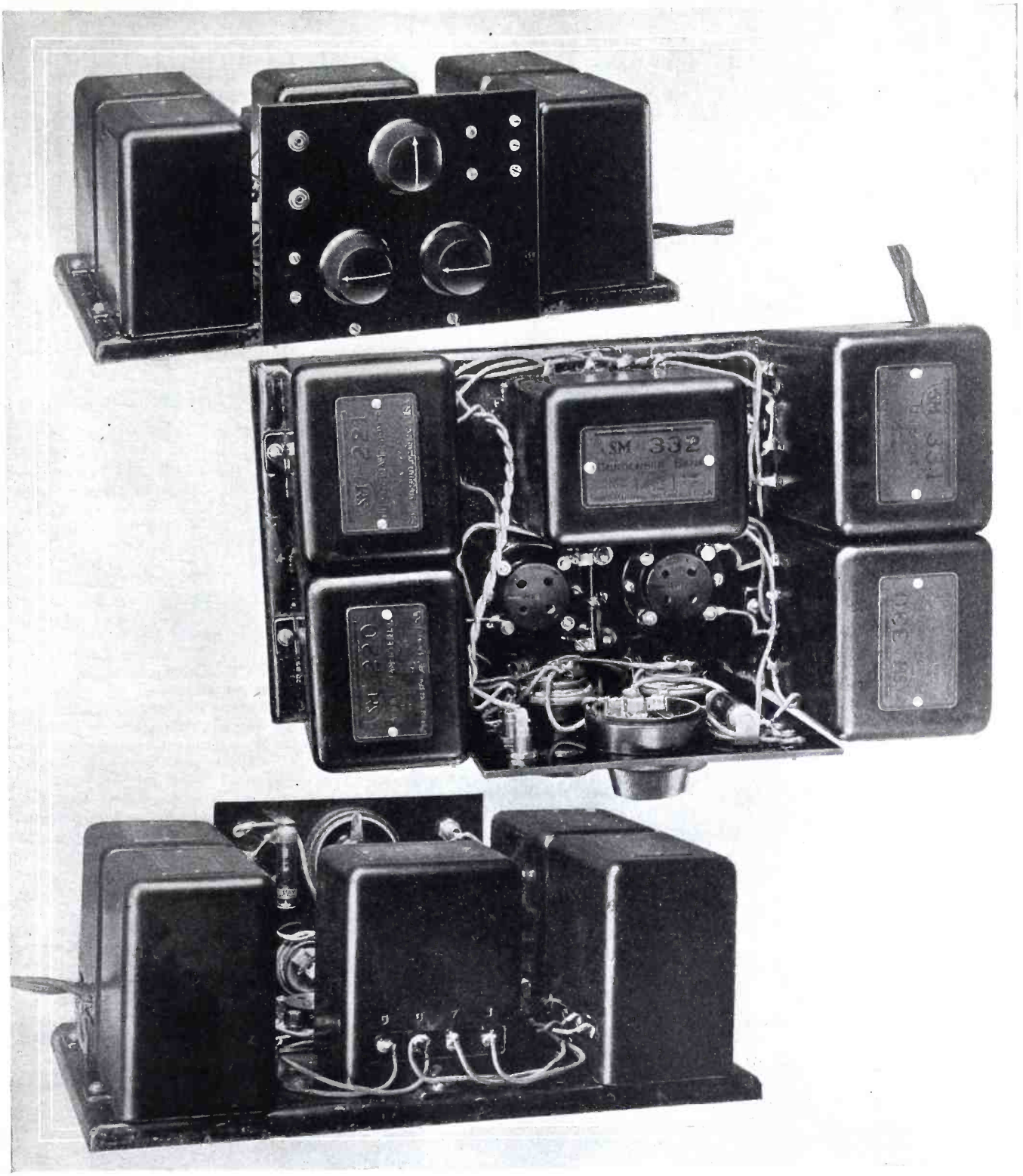


Fig. 2. The Power Pack is very compact, occupying a space little more than a B battery

not fixed but can be varied by means of Clarostats inserted in the leads. This should prove ample for the average receiver.

This is a thoroughly practical type of amplifier to build for use with the standard receivers already incorporating audio amplification. No attempt should be made to operate it in addition to the two stages of audio found in the average set. It should be connected by means of a cord and plug to the output of the first stage.

So used, the power pack will give maximum possible volume with a quality surpassing expectations. Thus it will do much to bring up to date older receivers which are quite satisfactory to their owners except in the matter of quality and volume.

Because all the units are completely shielded in metal cases, there is very little chance of stray fields to induce a hum in the radio receiving circuits from the 60-cycle current. As a matter of precaution, however, it is well to locate the eliminator and amplifier unit as far from the radio set as is convenient. Then there will be no opportunity for trouble of this sort from stray fields around the transformers.

As for the danger from high voltage in this unit—it is just as safe as any household appliance, and far safer than the 25,000-volt equipment for transmitting which, in the history of radio, has never harmed anyone.

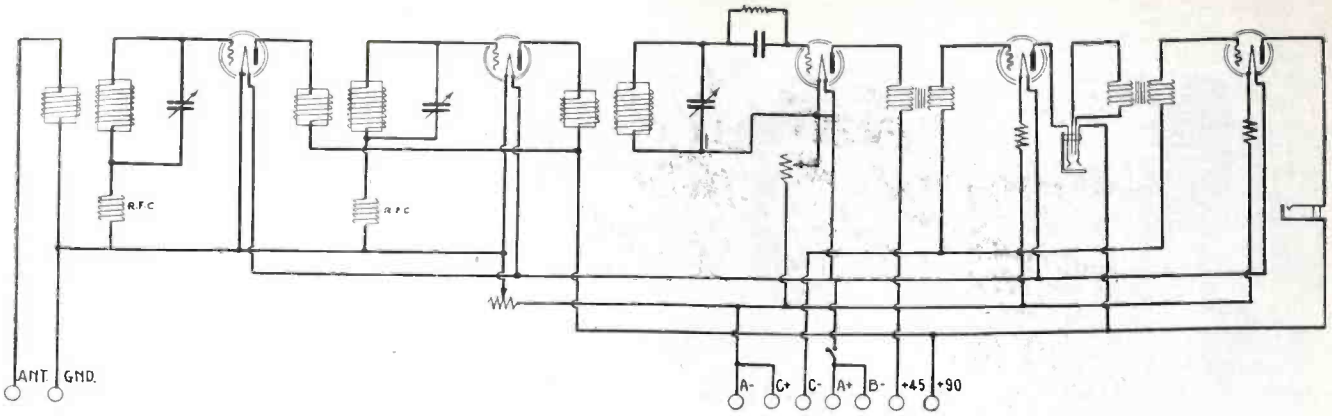


Fig. 1. The Equamatic can be applied to any circuit using electro-magnetic coupling. This shows its application in the well-known tuned R.F. circuit

Automatic R. F. Control

*Containing the first circuit data to be published on this new R. F. amplifying system**

THE one thing that is expected of the technical men in the radio business is an inexhaustible source of advanced information always on tap to serve the eternal—"What do you know about this?" because the average radio fan, however much he may read, always likes to have printed statements confirmed orally.

Right now it is important to be able to answer questions about the Equamatic circuit. What does it do, and how does it do it?

The text books tell us the efficiency of an R. F. transformer goes down as the wavelength goes up, providing the coupling between primary and secondary is fixed.

To maintain maximum efficiency at all wavelengths, then, the coupling must be variable.

This is demonstrated in any tuned R. F. receiver. The method ordinarily employed in designing R. F. transformers is to determine, by the cut-and-try system, the maximum coupling which can be used at the low waves, without setting up oscillations. Obviously, the efficiency and sharpness of tuning drops continuously from maximum, at the short waves, to a very low value at the high waves.

Some designers prefer to work to a point at the middle of the range. Then greater efficiency is obtained above the center of the range, but an adjustable losser must be used to stop oscillations at low waves.

Split primaries have been used, made so that a part of the primary is wound on the same tube as the secondary, and the tube mounted with its axis at right angles to the variable condenser shaft, on which the rest of the primary is fastened. As the condenser is turned, the coupling is varied. The joker about that system is that the coupling is varied from maximum to minimum, while the value for highest efficiency may run from something less than maximum to something more than minimum.

There you have the secret of the Equamatic System. Fig. 1, the circuit employed for the Karas construction kit, is not essentially different from regular tuned R. F. sets, except for the addition of two retard coils which are outside the tuning circuits.

Referring to the photographs, however, you can see the mechanics of the R. F. transformers. Once you understand their operation, the whole thing is simplicity itself.

Each primary coil is pivoted at the end of the condenser shaft. Each secondary is supported by a slotted bracket that is fastened to the base by a single screw. That makes it possible to turn the secondary coil to any angle with the shaft, and to move it toward or away from the primary.

Now here's the secret—At 100 divisions on the condenser scales, the coils are set so that, with the turns on the primaries and secondaries parallel, the coupling is determined by the distance that the secondaries are slid away from the secondaries.

At 0 on the scales, the coupling is determined by the angle to which the primaries and secondaries have been turned. As a result, the constructor can obtain the exact degree of coupling at high and low waves for full efficiency. That is the condition just under

* See Radio Mechanics, Nov., 1926, for complete construction article.

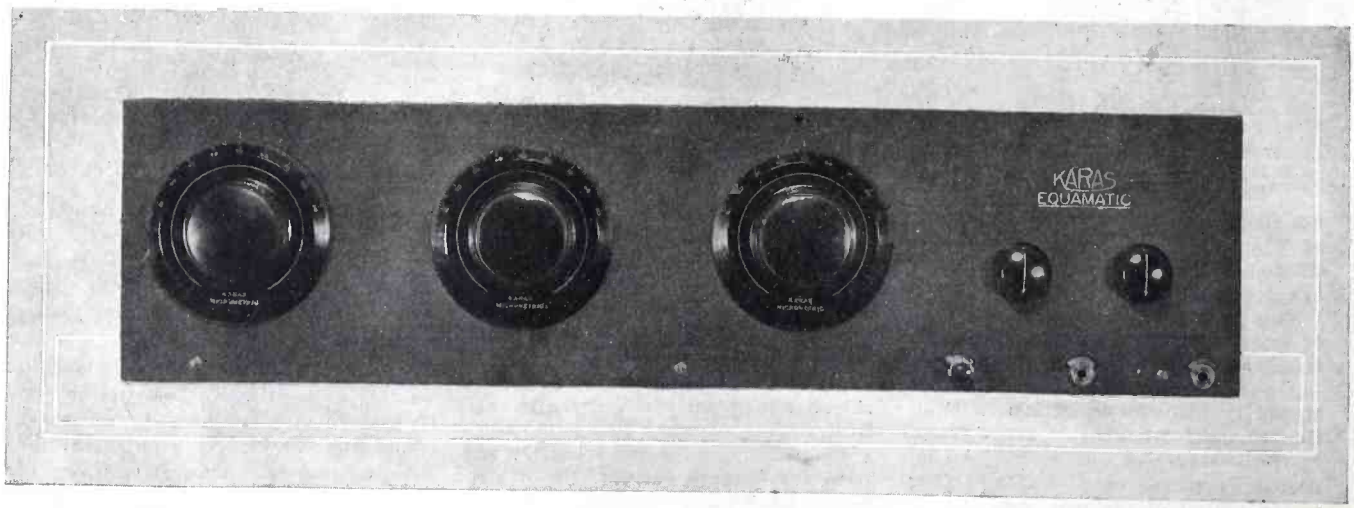


Fig. 2. The Equamatic system is entirely automatic, requiring no separate controls to prevent oscillating

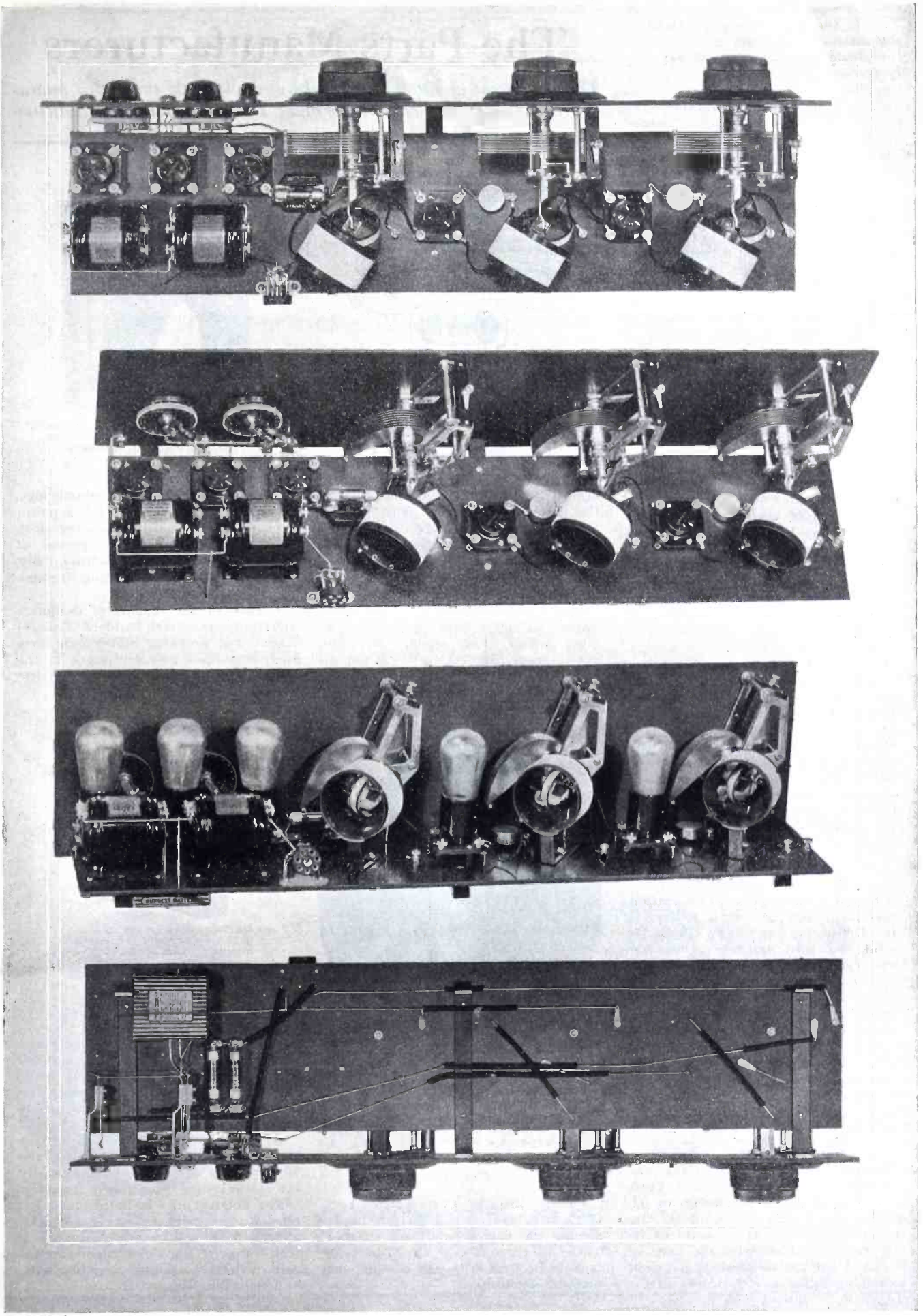


Fig. 3. Four views which tell the story of the Karas Equamatic construction kit

the critical point of oscillation.

As to the intermediate wavelengths, the same efficiency can be obtained if the condenser plates are designed to increase the wavelength at a rate corresponding to the increase of coupling as the condensers are rotated. All that has been worked out, of course, in the design of the Karas units. Therefore, it is only necessary for the set builder to make the adjustments at high and low waves, a job which may require ten minutes' work.

Incidentally, the effect of the R. F. system, plus the use of a C battery, reduces both the A and B battery drain to a minimum. With 201-A tubes, only 3½ volts are needed on the R. F. filaments. That not only cuts down the filament current and plate current as well, but greatly lengthens the life of the tubes.

Once adjusted, the rheostats need no further attention. All the tuning is done with the three condensers—and the selectivity, by the way, meets any ordinary situations as well as most situations that are extraordinary.

In addition to the Karas tuning units, transformers, retard coils, and hardware, there are five Benjamin sockets, Yaxley rheostats, jacks, and switch, Jones Multi-Plug battery connector, Sangamo grid condenser, Amperite controls for the A. F. tubes, Amsco grid leak, and Burgess C battery. Formica panels, specially decorated and drilled, are also available for this outfit.

To sum up the Equamatic system, if you want to give a man the whole story in one breath, tell him that it is a method for R. F. amplication, operating at a very low battery consumption, which is designed to give full efficiency over the entire wavelength range by increasing the primary-secondary coupling, as the wavelength is increased, by exactly the correct amount to counteract the natural loss, in a fixed transformer, as the wavelength goes up.

General Instrument

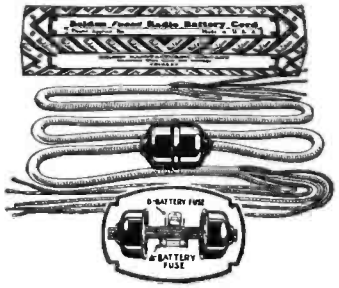
General Instrument Corporation, New York City, is already delivering the Metralign condensers, both in nickel and gold finishes. They also have the real thing for a low-priced rheostat in addition to which they are still making the regular General Instrument rheostat which has been a standard product with them for almost two years. The real excitement from General Instrument, however, is a new shielded construction outfit which will be announced at the New York Radio Show. It has mechanical features that are irresistible to the set builder.

Remler

The Remler division of Gray and Danielson Mfg., Company, San Francisco, California, is producing an unusually interesting device in the Infradyne amplifier. This should be investigated by those who are tired of the super-heterodyne receiver and want something brand new to work with.

The Parts Manufacturers

Current news about the activities and plans of the radio manufacturers and concerns which make things used by the industry



The Belden fused battery cable

Belden

Belden Manufacturing Company, Chicago, Ill., is ready with some new items. They have a fused battery cable which will be appreciated by the many people whose slips in connected up their sets have caused them to burn out tubes. The fuse can be renewed at slight expense. Both manufacturers and set builders will be glad to see the Belden Colorubber flexible rubber covered conductor. This is for connecting sets. It is supplied in red, blue, yellow, and green. For the dealer trade, this conductor is put up in 25 ft. coils.

Belden is also pushing enameled wire for antennas and loop wire.

Kurz-Kasch has a venier dial which is as handsome as it is unusual. It is made in a variety of colors

Pacent

Pacent Electric Corp., New York City, has done a splendid job in designing the new Pacent cone speaker. There are three models, the 17-in. table type, 36-in. floor type, and a 36-in. cone for wall mounting.

The Rahem Mfg. Co., New York, is building horns to be incorporated in cabinets

General Radio

General Radio Company, Cambridge, Mass., has ready for this fall a power pack kit which incorporates the skillful engineering that is expected of their organization. In addition, new individual items are coming through for fall delivery.

Backed by the support of designers and professional set builders, General Radio will probably make more firm than ever their position as one of the leading manufacturers of radio parts as well as scientific instruments.

Durham has a combination grid leak and condenser mounting that is very cleverly designed

Polymet

Polymet Mfg. Company, New York City, is doing splendid work to promote the interests of their jobbers and dealers, not only by backing them up with magazine advertising but by a thoroughly aggressive sales campaign to create public demand for the various parts of their line.

S. H. Groubard has been made special representative to handle the Metropolitan New York trade, usually the storm center of the parts industry.

The Polymet line includes plugs, extension connectors, rheostats, potentiometers, fixed and variable resistors, a wide range of mica and paper condensers, resistance coupled amplifier kits, and the Claroplug.

Another Karas Surprise!

First there was Harmonik
—the original high-quality transformer

Then Karas presented Orthometric
—the straight frequency line condenser

Its last triumph was Micrometric
—the vernier dial without back-lash

NOW Karas announces Equamatic
—the perfect system of broadcast reception and oscillation control

1. **The Equamatic System gives maximum and equal sensitivity and amplification on any wavelength — long, short or intermediate.**
2. It develops the greatest possible selectivity without distortion or loss of harmonics.
3. It assures perfect balance on all wavelengths without employing "losser" methods of any kind.
4. It conserves the life of "A" and "B" batteries.
5. It simplifies operation of all sets by perfect synchronization of the first dial with the others.
6. It eliminates fundamental wavelength antenna absorption.
7. It provides simple adjustment to meet varying conditions, permitting perfect balance of tubes, antenna, and associated apparatus.

The essential parts for the building of an Equamatic Receiver are made by Karas. Complete instructions for assembly and wiring, including drilling layouts, will shortly be ready. Mail the coupon for Equamatic booklet explaining this system for which the Radio world has so long waited.

THE KARAS MICROMETRIC DIAL

Tunes accurately to 1/1000th of an inch with a ratio of 63 to 1 and *can never develop back-lash.* Turns instantly in either direction at lightest touch on vernier knob; rough tuning is done with larger knob. Dial markings and numerals are gold inlay. Available in 180 or 360 degree rotation—clockwise or counter-clockwise. Diameter 4½".

Karas Micrometric Dials are stocked by good parts dealers in most cities. Orders will be filled direct or may be placed through dealer and his jobber. If you prefer to order direct, dials will be sent postpaid if cash accompanies order.

Price $3.50 Each

KARAS ELECTRIC CO.

Factory: **N. Rockwell St.** :: ***Offices:*** **1066 Association Bldg., Chicago**

Karas Electric Company
1066 Association Bldg., Chicago

Enclosed is 10c for which please send me booklet on the Equamatic System explaining what it accomplishes and how it does it.

Name .....

Address .....

.....

Swan-Haverstick antenna equipment, neatly packaged, is most convenient to sell with the other accessories for complete sets

Bosch, with increased production this year on the Nobattry, can now take care of orders which, in the past, have not been filled

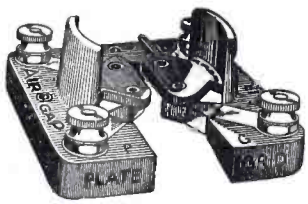
Belden non-stretching flexible wire for loop antennas is put up in packages for the retail trade

Swan-Haverstick lightning arrester does not cut down receiving efficiency, even in wet weather

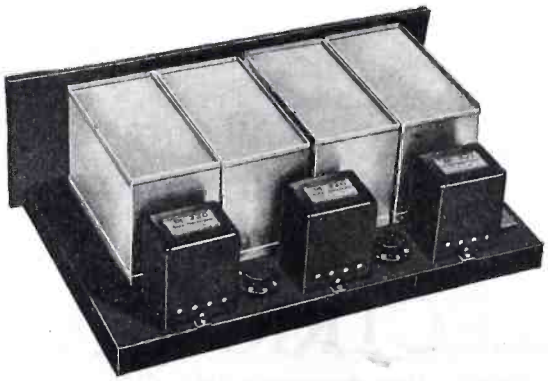
Centralab offers a heavy-duty type of variable resistor, ranging from almost 0 to 50,000 ohms

Freed-Eisemann full-floating cone speaker, a new item for fall delivery, is designed to do justice to the A.F. amplifier developments

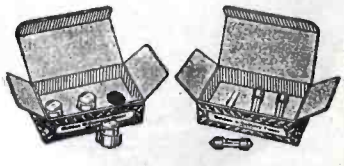
Westinghouse has a high power battery eliminator, supplying sufficient output and voltage regulation for practically any type of set



Airgap sockets, designed to isolate the grid and plate contacts, have been vastly improved by changing to molded Bakelite construction



Silver-Marshall is ready this fall with shielded R.F. tuning units



Belden fuses for the fused battery cable. A box on hand prevents delay when, thru a mistake in putting on connections, a fuse is blown

Leading Again!

Patented

WITH THE ONLY CONDENSER THAT SEPARATES ALL STATIONS ON ALL WAVE LENGTHS!

METRALIGN SLT is the only condenser embodying Straight Line Frequency on the low wave lengths, Straight Line Wave Length for the middle band and Straight Line Capacity for the high wave length stations, thereby making it possible to separate and bring in any station no matter on what wave length, low, intermediate or high.

METRALIGN SLT is the only condenser giving an even spread of stations over the dial and perfect and uniform selectivity over the entire wave length or frequency band. Due to its compactness the METRALIGN SLT condenser is especially adapted for replacing old type condensers in any set.

SLT-METRALIGN-SLT

Straight Line Tuning

Will be the Season's Biggest Seller

Because of its outstanding merits and superior performance, backed by a national advertising campaign in radio magazines and newspapers throughout the country, METRALIGN SLT condensers will be one of the season's biggest profit-making items for dealers. Prepare for the coming season's big replacement business. Get in touch with your jobber today. If he cannot supply you, write us direct.

Our booklet on the METRALIGN SLT is an education on Variable Condensers. You and your clerks should read it. Send for a copy today. It's free.

General Instrument Corporation

Meet Us At The New York Radio Show Booth CC5

477 Broadway, New York City

Makes any set a new set—In 15 Minutes

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Announcing—

The means of obtaining the MOST POWERFUL form of R. F. Amplification Possible with

The new WALBERT ISOFARAD

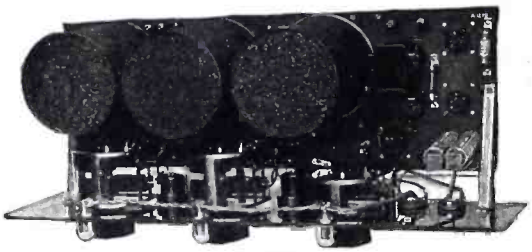
KIT

OF ESSENTIAL PARTS

or

CHASSIS COMPLETELY ASSEMBLED

READY FOR WIRING



Chassis

PERFORMANCE

The new Walbert Isofarad circuit about which so much has been written in the world's foremost engineering journals, and which has been so strikingly prominent in engineering discussions is now available to the set builder. Walbert takes pleasure in offering to you a kit of essential parts for building this circuit into a receiver using your favorite audio amplification or in a completely assembled chassis of a five tube receiver unwired.

With Isofarad Walbert gives you a chance to be first in your radio circle because it permits:

Maximum selectivity—actual separation of stations on adjacent wavelengths with no interference even though one station be a local.

Sensitivity—a voltage gain per stage that amplifies those weak signals in enormous proportions, much more so than any other R. F. system—the reason being Isofarad.

The result is pure unadulterated tones furnished the detector for amplification at audio frequencies. Isofarad is not affected by oscillation at any frequency because of its all capacity bridge circuit, the most important contribution to the art of radio amplification and reception known.

"ISOFARAD REVEALED" is a clear, instructive book needed by every experimenter who prides himself on knowing the latest radio advancement. 25c sent to the manufacturers of Isofarad brings your copy.

Kit of essential Isofarad parts, containing 3 Isofarad shielded coils, 3 special dust-proof variable condensers, 2 Isodon balancing condensers and two R. F. choke Isodon condensers with instructions— **$35.00** unwired.

Completely assembled unwired Isofarad 5 tube chassis, a replica of the factory made set, with necessary wire and instructions to wire the subpanel. **$85.00**

Prices slightly higher west of the Rockies.

Can be Obtained from Best Jobbers and Dealers. Write

WALBERT MFG. CO.

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1. *Gen-Win Condenser, General Winding Co., New York, N. Y.*
2. *Magnatron Tube Base, Connecwey Electric Laboratories, Hoboken, N. J.*
3. *Storm Guard, L. S. Brach Mfg. Co., Newark, N. J.*
4. *Centralab Modulator Plug, Central Radio Laboratories, Milwaukee, Wis.*
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In pace with radio's new developments

With every advance in Radio design, with each successive refinement in construction, the demand for faultless materials becomes more insistent. There is one that has met Radio's requirements—Bakelite.

This material, the standard insulation of the radio industry, used by 95 per cent of all set and parts manufacturers, steadily keeps pace with the progress of radio. In numerous cases it represents the progress, for many improved parts are possible solely because of Bakelite.

Its insulating value is permanent, unchanged after years of use. Bakelite resists extremes of heat and cold, and does not absorb moisture. Its handsome colors and finish are lasting—undimmed by time and use.

The Bakelite parts illustrated here are typical of the new developments in Radio. These and many more, embracing all phases of radio, will be displayed in Bakelite Booth #H5, Radio World Fair, New Madison Square Garden, September 13th-18th. You will find our exhibit educational and interesting.

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BAKELITE CORPORATION OF CANADA, LTD., 163 Dufferin St., Toronto, Ont.

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WHAT
is a
Radio Buyer
?

If you were a Manufacturer, Dealer, Jobber, Mail Order House Executive, in whose hands would *you* put the responsibility of selecting radio merchandise?

Wouldn't you select the man who in your organization had the best mechanical and engineering knowledge of radio?

Wouldn't you discuss with your sales force the general trends and developments, price requirements, and anticipated demand? Wouldn't you outline your general policies with the sales executives

AND THEN

Leave the actual decision as to lines to be handled as between competing merchandise—to the man fortified with a mechanical and technical knowledge of radio?

Radio Engineering—
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Send me further information as to how Radio Engineering can increase sales for me.

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City.....

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Manufacturers of

.....

.....

12,194 of these men in dealer and jobber establishments—

3,469 Engineers, designers, and buyers in manufacturing plants—

4,268 Educational Institutions, Professional Set Builders, Students, etc.

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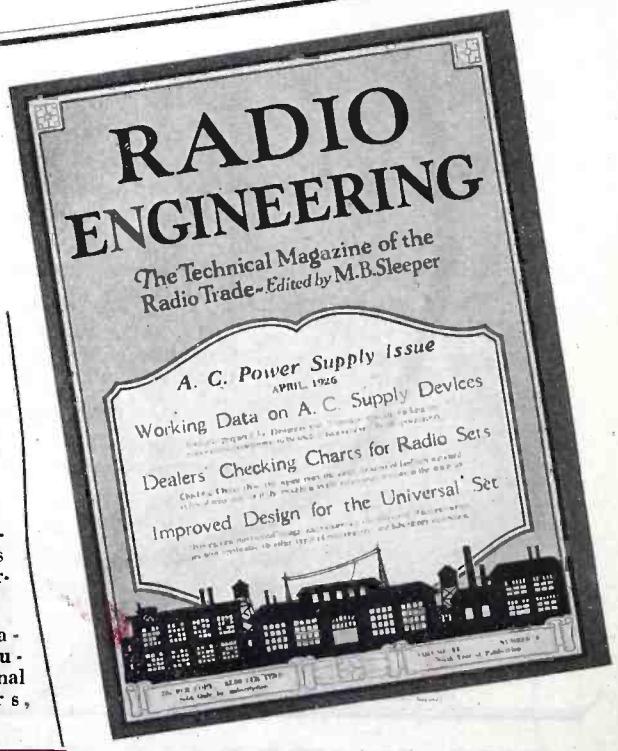
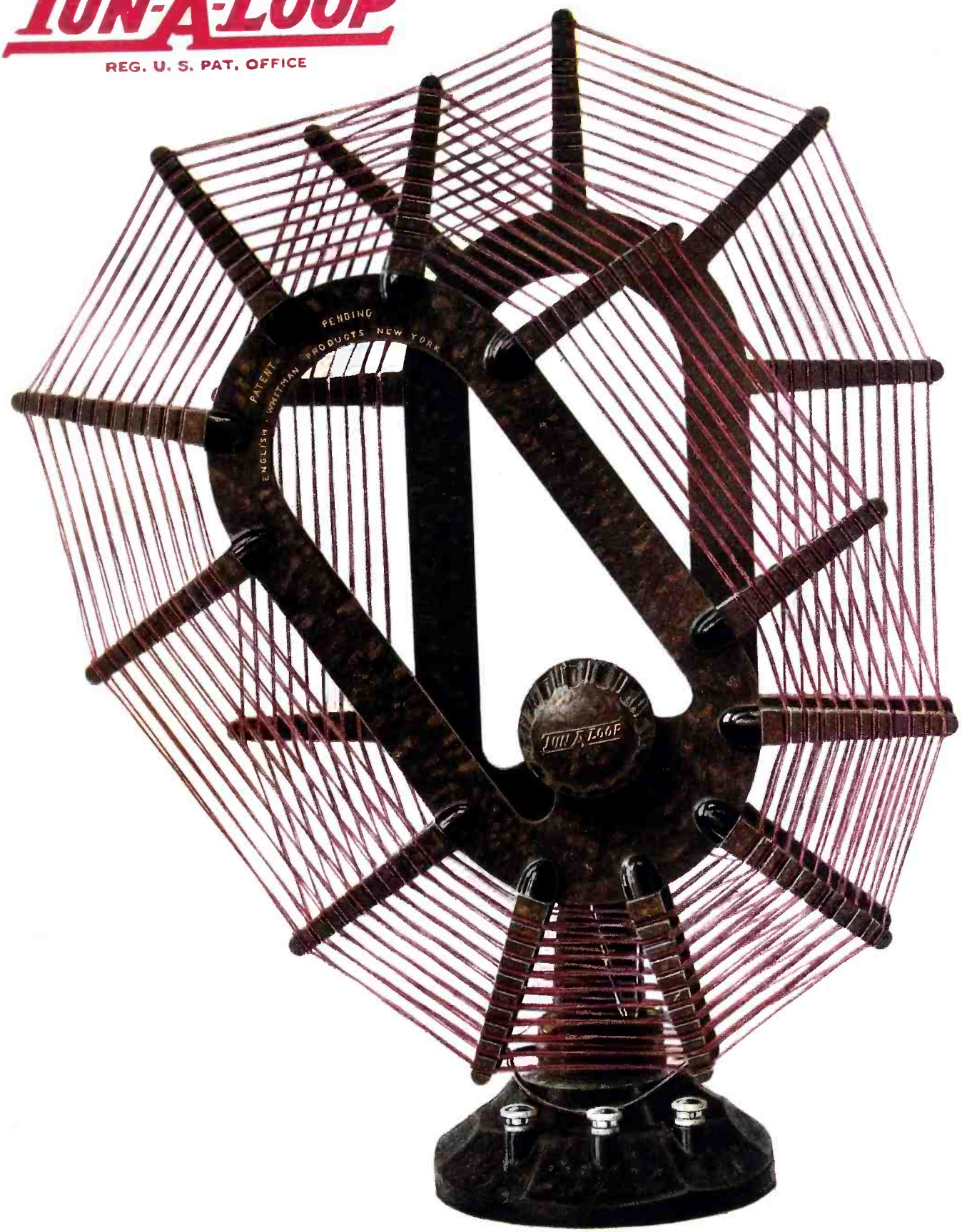


RADIO ENGINEERING

TUN-A-LOOP

REG. U. S. PAT. OFFICE



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SPEAKER -
NO HORN
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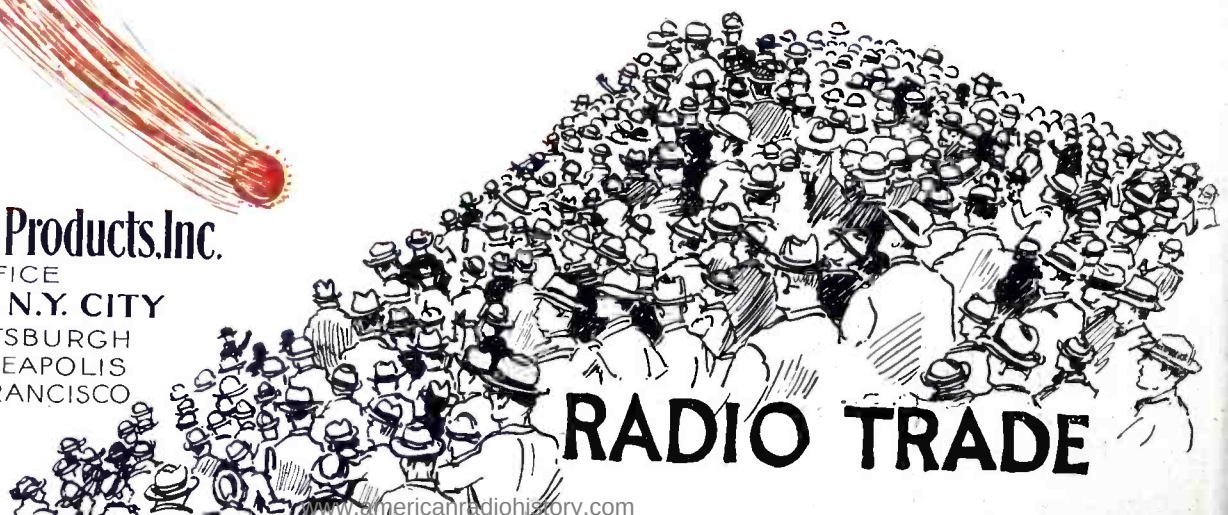

RADIO TRADE

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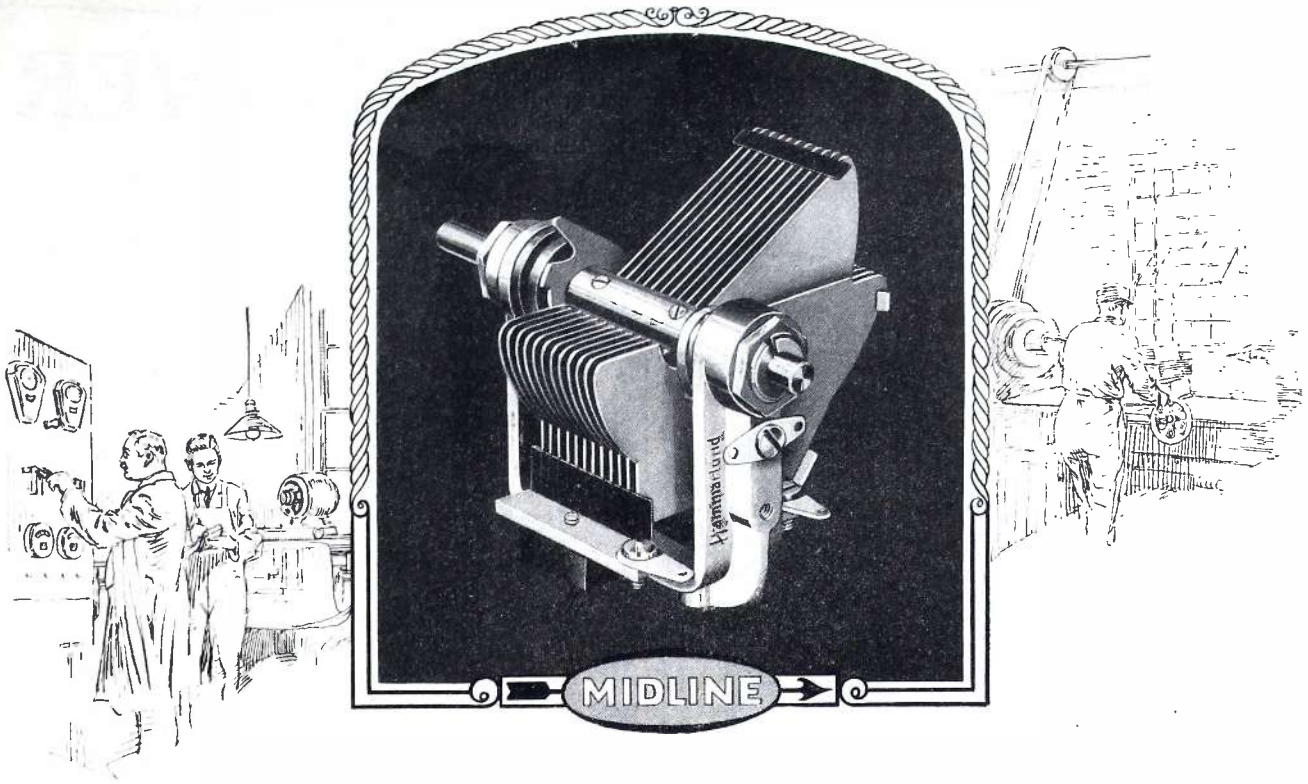


Hammarlund's New Creation
The "MIDLINE" Condenser

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

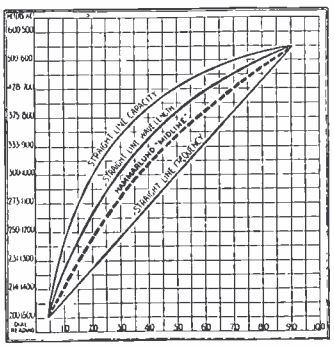
Experience is responsible for its many excellent features. Both you and we have learned that "Straight-line-capacity" crowded the low waves, "Straight-line-frequency" crowded the high waves and "Straight-line-wavelength" merely compromised between the two. *But the Hammarlund "Midline" retains the desirable qualities of these earlier types without any of their disadvantages.*

All of the tried and true Hammarlund features are included:—soldered, non-corrosive, brass plates with tie bars; rib-reinforced aluminum alloy frame; minimum dielectric; one-hole mounting, with anchoring screw; bronze clockspring pigtail; friction brake. In addition, there have been added ball and cone bearings, and a full-floating rotor shaft. This shaft only turns the rotor plates; it supports no weight. It may be entirely removed, or it may be adjusted for coupling to other condensers in tandem, or for mounting a variable primary coil.

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

The better dealers will have it soon.

Avoids Crowding at Any Part of the Scale



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

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

For Better Radio
Hammarlund
PRECISION
PRODUCTS

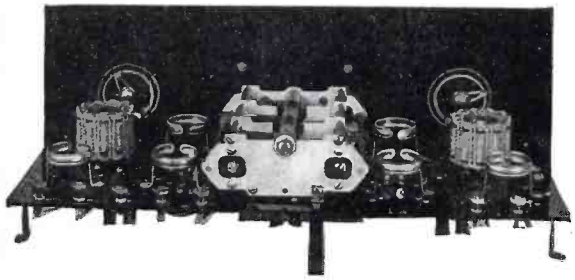
Hammarlund Space-Wound COILS are ideal for short-wave and broadcast reception.

Why Experiment?

Use the

PIERCE AIRO

Complete Assembly for a SIX TUBE RESISTANCE-COUPLED SINGLE DIAL RECEIVER



Interior and Front Panel Views

Pierce-Airo Complete Assembly with a 7 x 18 Processed Bakelite Panel, Ready for Wiring . . **$42.50**

Jobbers

You take no chance stocking the Pierce-Airo Complete Assembly. It is a proven seller. In New York and other large cities it has gone over big. It meets the season's demand for simplicity of operation and pure tone. There is a big field for the sale of the Pierce-Airo Complete Assembly as it fits all standard cabinets and consoles now on the market.

Install this assembly in your own models and save time and expense of manufacturing. The Pierce-Airo Complete Assembly is a mechanically and electrically perfect product, perfected by United Scientific engineers and assures that distortionless amplification combined with single-dial control which are the two big features in demand this season.

Write for Proposition.

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210 POWER AMPLIFIER

For perfect reproduction on any set

You can build the 210 amplifier in a single evening. All panels are drilled and engraved; everything ready for assembly.

You can connect the 210 amplifier in one minute. Just plug into your set and to the light socket. No connection to change, nothing to alter.

Full A. C. operation, tone results equal to the most expensive power amplifier. Design O.K'd. by J. L. Schermerhorn, Chief Engineer, American Transformer Company.

HERE IS A LIST OF THE PARTS

1—Celoron Panel—3/16" x 7" x 18".
1—Celoron Panel—3/16" x 3½" x 18".
2—Celoron Panels—3/16" x 3½" x 6⅜".
2—Celoron Panels—3/16" x 1" x 6⅜".
4—Garfield Radion Brackets.
1—Amertran Power Transformer, PF-52.
2—Amerchokes, No. 854.
2—Dubilier Condensers, 4 mfd. No. 902.
1—Dubilier Condenser, 2 mfd. No. 902.
1—Dubilier By-pass condenser, 1 mfd.
1—Amertran DeLuxe Second Stage.
1—Jewell Milliammeter, 0-50, No. 135.
1—Federal Potentiometer, No. 25, 1,800 ohms.
1—Electrad open circuit Jack.
2—General Radio UX Sockets.
2—Daven Single Resistor Mountings.
1—Aerovox Lavite Resistor, 200,000 ohms.
1—Aerovox Gridleak Resistor, 1 Meg.
4—Durrant Coil Mounting Pillars.
7—Lastite Terminals, 6-32.
10—1" F.H. 6-32 Black Lacquered Screws.
8—½" F.H. 6-32 Nickel-plated screws.
6—⅜" R.H. 6-32 Nickel-plated screws.
24—⅝" R.H. 6-32 Nickel-plated screws.
8—¾" R.H. 6-32 Nickel-plated screws.
50—6/32, .041 Nickel-plated nuts.
1—5 ft. Single phone cord.
1—Coil wirit.
3—Lengths No. 7 Varnished Tubing.

ALL AT THE MONEY SAVING PRICE OF $67.50

Complete set of blue prints, postpaid, $1.00

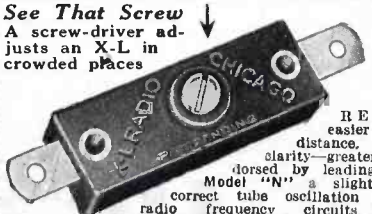
NOTE: Durrant can supply all Pacent accessories. As a recognized agent for Pacent Essentials, Durrant maintains a complete stock.

DURRANT RADIO, Ltd.

52 Vanderbilt Ave., New York City

See That Screw ↓
A screw-driver adjusts an X-L in crowded places

X-L VARIO DENSER



RESULTS in easier tuning, more distance, volume and clarity—greater stability Indorsed by leading authorities.
Model "N" a slight turn obtains correct tube oscillation on all tuned radio frequency circuits. Neutrodyne, Roberts two tube, Browning-Drake, McMurdo Silver's Knockout, etc., capacity range 1.8 to 20 micro-microfarads. **Price $1.00**
Model "G" with grid clips obtains the proper grid capacity on Cockaday circuits, filter and intermediate frequency tuning in heterodyne and positive grid bias in all sets. Capacity range Model G-1 .00002 to .0001 M F D. Model G-5 .0001 to .0005 M F D. Model G-10 .0003 to .001 M F D. Details on request. **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.**
Seven post panel, including lugs, bushings and screws.
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
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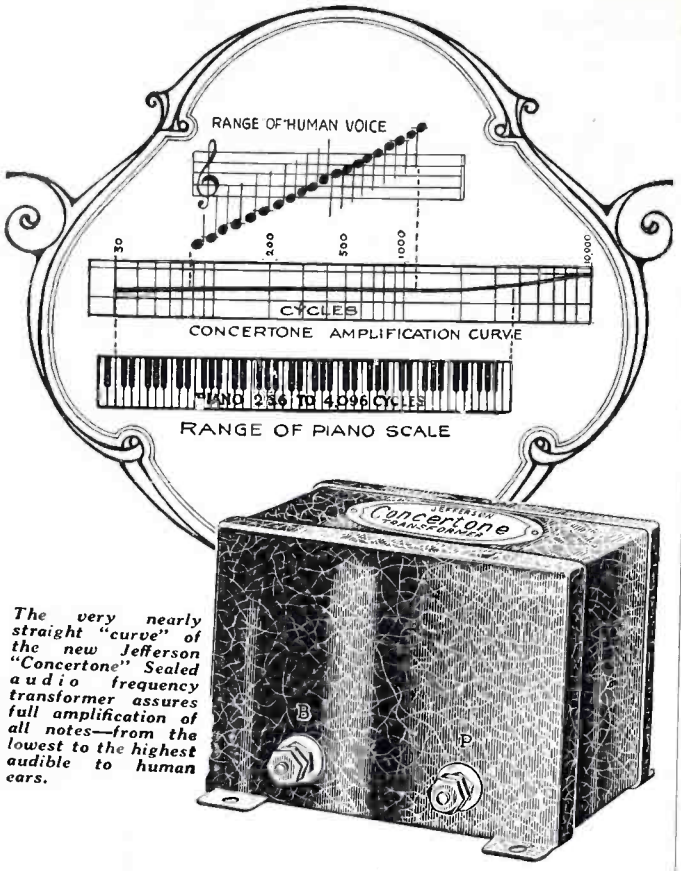


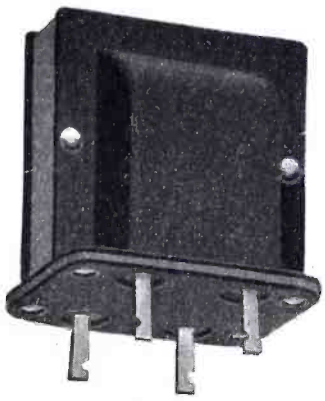
The very nearly straight "curve" of the new Jefferson "Concertone" Sealed audio frequency transformer assures full amplification of all notes—from the lowest to the highest audible to human ears.

They Come Through Right — and Right on Time!

WE appreciate the importance to you of having transformers come through *uniform* in tone quality, so that they "match up" properly and do not delay production.

Depend upon

JEFFERSON TRANSFORMERS



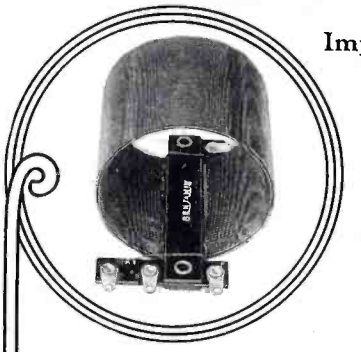
Prominent set builders, year after year standardize on Jeffersons because experience proves they can rely on Jeffersons for uniform quality and on time delivery. We will be pleased to have you investigate our record.

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

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

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

True-to-life reproduction depends upon quality radio parts. There must be no flaws—all parts must synchronize. Benjamin Radio Products increase sensitivity, selectivity and volume. Their use throughout the world—by authorities and amateurs—endorses Benjamin quality and preciseness.



Improved Tuned Radio Frequency Transformers

Complete tests prove this the most efficient coil for modern sets. Space wound, Basket weave. Cylindrical. Highest practical air dielectric. Gives sharper tuning, greater volume and purer tone.

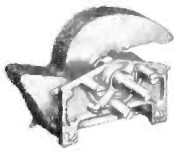
2¼-inch Diameter Transformer

Compact. Especially desirable for crowded assembly. Eliminates interfering "pick-up."

3-inch Diameter Transformer

Capacity coupling reduced to lowest degree. For use with .00035 Mfd. Condensers.

Straight Line Frequency Condensers



No crowding of stations—broadcast range spread evenly over complete dial. Eliminates interference; gives easier tuning. Adjustable turning tension. Low loss characteristics give definite and distinct reception. Beautiful in appearance—dull silver finish. Made in three sizes: .00025 Mfd.; .00035 Mfd.; .0005 Mfd.

Push Type Cle-Ra-Tone Sockets

Spring supported. Shock Absorbing. Stop Tube Noises. The greatest aid to non-noisy operation. Contacts always clean.

"Lekeless" Transformers

Uniform high inductance, low distributed capacity and low resistance. Slight external field permits placing coils close together without appreciable interaction.

Brackets

Simplifiy set construction. Support sub-panel, with room underneath for accessories and wiring. Plain and adjustable.

Battery Switch

Quick, positive, clean cut make and break. When it's "in" it's "off"—no wastful use of battery.

See Benjamin Products at the Radio Shows

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Benjamin Electric Mfg. Co.
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New York 247 W. 17th Street
Chicago
San Francisco 448 Bryant Street
Manufactured in Canada by the Benjamin Electric Mfg. Co. of Canada, Ltd., Toronto, Ontario

NATIONAL

in name

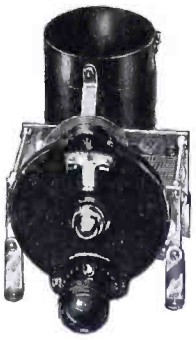
NATIONAL

in fact

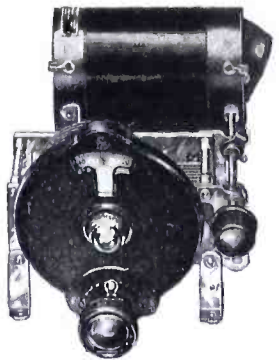
It would be hard to find a remote corner of these United States in which the NATIONAL Browning-Drake Radio Frequency Transformers, and the NATIONAL Velvet Vernier Dials are not known and appreciated.

There are only two good reasons for popularity. One is forced propaganda, which has only a temporary effect. The other is the good word spoken by one friend to another, on products of true merit, backed by fair and sound merchandising.

You can draw your own conclusions about NATIONAL Radio Set Essentials. Ask anyone who uses them.



BD-1B



BD-2B

The NATIONAL Tuning Units

are made up of the lowest loss, space-wound, Browning-Drake Radio Frequency Transformers, the NATIONAL "Equicycle" Condensers, with full three-quarter turn for wide spacing of stations—the NATIONAL Velvet Vernier Dials, known from coast to coast for their smoothness and fineness of action.

These units, with the NATIONAL Impedaformers, for audio-amplification, and the necessary sockets, etc., can be made into a set selective, sensitive, easy to operate and easy to listen to.

Send for Bulletin 115-RE

See our Exhibit at New Madison Square Garden, New York, Sept. 13-18; and the Coliseum, Chicago, Oct. 11-17.

NATIONAL CO. Inc., Engineers and Manufacturers

W. A. Ready, Pres., 110 Brookline St., Cambridge, Mass.

A

B-6 Detector in your set assures the maximum of quality, volume and distance.

PRICE $5

Announcing: A circuit especially adapted to the characteristics of the B-6 tube—on request.

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RAYTHEON CONDENSER BLOCKS

Try our Raytheon Condenser Block and Lavite Resistors for your "B" Eliminator. Write out for circuit sheet.

LAVITE RESISTANCES

Guaranteed to dissipate 4 Watts.

AEROVOX

"Built Better"

AEROVOX products are used by over 200 of America's Radio Manufacturers.

AEROVOX Fixed Condensers are approved by M.I.T. and Yale Universities

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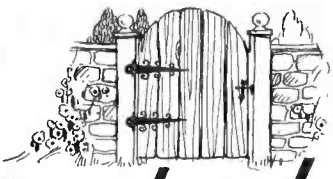
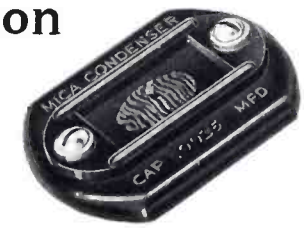


Important

little gateways of reception



CONDENSERS are the entrances that make or mar a good performance. A good condenser stores up tone impulses, to be released at the instant they reach full-rounded perfection. An inaccurate condenser lets only a distorted part of the tone trickle through, and cuts down the receiving range of your set by putting it out of electrical balance. You'll realize the importance of *accurate* condensers the day you equip your set with Sangamo Mica Condensers. They will improve tone, range and volume.

SANGAMO
Mica Condensers

Being solidly molded in bakelite, Sangamo Condensers are accurate forever. All edges are sealed tight against moisture, the worst enemy of condenser accuracy. Ribs of bakelite give mechanical strength and prevent a change in pressure on the delicate mica inside, which would also change the condenser capacity. All edges are rounded to prevent chipping. Rough treatment and exposure to heat, salt air or acid fumes will not hurt Sangamo Condensers—*they stay accurate*. Even a hot soldering iron will do no harm.

Put Sangamo Condensers in any new or old set and notice the difference. A range of 34 capacities makes it possible to get exactly the right capacity for your circuit.

SANGAMO *Accurate* Radio Parts

Sangamo By-pass Condensers are now available in 1/10, 1/4, 1/2 and 1 mfd. capacities.

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Springfield, Illinois

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Heavy-Duty RADIOHM *with* 5 *New advantages*

Designed to control the output current of "B" Battery Eliminators, Centralab Heavy-Duty Radiohms are *fully approved by the Raytheon Laboratories.*
Full resistance variation with a single turn of knob, allowing panel marking for proper setting to provide various voltages.
Resistance remains as adjusted. (No carbon particles or discs.) Bushing and shaft insulated to withstand 1500 volts. Will remain smooth and noiseless for the life of the eliminator. Write for full information, prices and discounts.

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25 Keefe Ave. **Milwaukee, Wis.**

Makers of a full line of variable resistances for 69 manufacturers of leading standard sets.

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Our Complete Line

STANDARD "B"
SUPER "B"
MASTER "B"

takes care of practically *any* Radio receiver on the market.

The demand for Majestic Radio B Power units has long existed. It fills the need for ***Constant, Dependable*** B power direct from the light socket — and fills it well. Their low purchase costs place Majestic units within the reach of all. Their sturdy construction insures long, faithful service.

No Acids or Liquids— Uses Raytheon Tube

Now you can get the cream of the B power unit business, for Majestics deliver ***constant, dependable,*** B power at a low average cost of about one-tenth cent an hour. Our complete line offers you one of the biggest money making opportunities you will ever have in radio! Write us today for full information.

Majestic Standard-B
For sets having not more than seven 201-A Tubes, or six 201-A plus one power tube.
Price $32.50
West of the Rocky Mts. 35.00

Majestic Super-B
Capacity 1 to 12 tubes, including the use of power tubes. Complete with switch to control current from light socket.
Price $35.00
West of the Rocky Mts. 37.50

Majestic Master-B
Rating 60 mils at 150 volts. Particularly adapted for Radiola 25-28 and 30 and super heterodynes. will operate all power tubes also the new super power tube UX-171 (180 volts).
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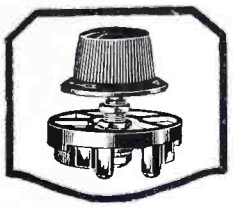
DeJur

RHEOSTATS

Standard the World Over



The Original One-Hole Mount

Genuine Bakelite base with resistance unit fastened in place by special bracket. No back panel fussing, no screws, nuts or bolts to work loose. Permanent, perfect contact assured. All metal parts are heavily nickeled plated. Can be supplied in any ohmage.

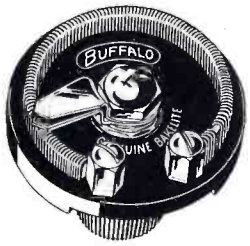
THE "BUFFALO"—FOR MANUFACTURERS

Requiring a Bakelite Base and Arrow Knob with the One Hole Feature

Guard over contact slider eliminates all strain and prevents breaking, bending or twisting, assuring permanent, perfect contact. Note break in resistance wire towards off end on resistance unit, giving contact slider a continuous smooth running service without dropping off the wire.

Standard Stock Sizes 6-10-15-20-30 Ohms

Below 6 Ohms and Above 30 Ohms Made to Specifications



All Metal — Air Cooled

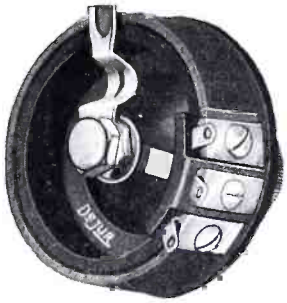
It is a one hole mount product and does not have to be taken apart in order to mount. Operates without any noticeable temperature rise at a constant co-efficient of conductivity. Filament voltage can be built up slowly and uniformly and held at the right point for most efficient operation. Sliding contact arm is adjustable and resistance is exposed on all sides. Any ohmage from 1 ohm to and including 600 ohms capacity can be incorporated.

Standard Stock Sizes 6-10-15-20-30 Ohms

Below 6 Ohms and Above 30 Ohms Built to Specifications

POWER

For Large Current Carrying Capacity



Large Bakelite base, 2¾" diameter and single-hole mounting. The resistance element ranges from 1 to 2,000 ohms, and is tightly fastened to the frame. The contact arm is designed to ride over the surface of the resistance smoothly. Soldering lugs are supplied for convenient connections. Furnished with a Bakelite knob.

See the DeJur Exhibit at the Radio World's Fair, New York. Booth 3, Section E.

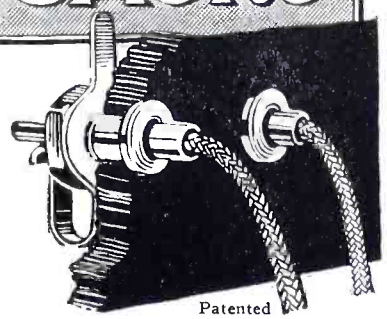
Write for Catalog of Complete Line of De Jur Guaranteed Radio Products

DeJur Products Co

"The world's largest manufacturer and exporter of radio products"

Lafayette and Broome Sts., New York City

UNION RADIO TIP JACKS



Patented

Steady Sellers and Repeaters

MOST set-builders know the convenience and dependability of Union Radio Tip Jacks. They make temporary or permanent connections quickly and easily and with positive electrical contact. No parts to loosen or lose. All parts heavily nickel-plated. Used as standard equipment in many fine sets.

Retail at 25c a Pair

Firmly grip all wires from No. 11 to No. 24 B & S gauge. Three sizes for all panels. TYPE A (Standard) for 3/16" to ¼" panels. TYPE B (Special) for panels, cabinet walls and partitions from 5/16" to ½" thick. TYPE C (Special) for panels up to ⅛" thick. Packed in self-selling counter cartons of 1/12, ½, and 1 gross pairs.

Identification Tags

Hard red fiber ovals, marked with proper identifications of battery connections, such as A—, B—, B67, B90, etc. Prevent shorting battery or blowing tubes. Two holes—will take any wire up to ⅛. Packed 100 in box of one designation only. Retail price $1.00. Also in set of 9, retail price 10c.

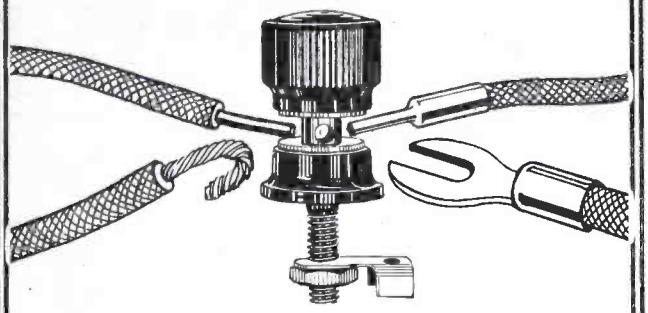
To All Branches of the Trade

Send for illustrated circulars and sample of these fast-selling radio products, and details of our attractive proposition.

UNION RADIO CORPORATION

124 SUSSEX AVENUE, NEWARK, N.J.

NEW YORK OFFICE 40 EAST 34th STREET



A GOOD Electrical Connection

No engineer can ask for more—or need expect less—from a binding post. But make sure they're

EBY BINDING POSTS

These famous posts, with the tops that don't come off, make positive contacts on a straight wire, looped wire, pin or spade terminal, and add much to the appearance of high-grade electrical instruments.

Furnished in metal composition or bakelite—9 styles, 30 markings

The H. H. EBY Manufacturing Co.
4710 Stenton Avenue Philadelphia

MEMBER RMA

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for good panels —brass

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

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

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The beginning of a comprehensive campaign in the Fan publications—to be amplified with local newspaper advertising.

Fan papers appearing on the newstands in September will carry the Polymet message to thousands of radio enthusiasts throughout the country.

Cash in on this live sales promotion. Write today for details of Polymet Products, samples, prices and name of your nearest distributor.

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"World's Largest Manufacturers of Radio Essentials."

Polymet Products

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STRAND—Antennae (plain or enameled)—Double Galvanized.
WIRE—Antennae (plain or enameled) Connecting and Ground (Rubber) covered, braided or plain.
BUS BAR—Litzendraht-Loop
MAGNET (Cotton or Silk).
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Trenton, N. J.

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A Universal Range Variable Resistor

USED AND ENDORSED BY

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Customer satisfaction and repeat orders are dependent upon your having the right merchandise at the right time.

Raytheon publicity, in which CLAROSTAT is specified, has created an overwhelming country-wide demand for this item. Your customers will demand it this fall.

CLAROSTAT has a universal resistance range of from practically 0 to 5,000,000 ohms—a current carrying capacity of 20 watts—is absolutely noiseless in operation—and mounts in one hole.

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Specialists in Precision Fixed and Variable Resistances

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"*THE GATEWAY TO BETTER RADIO,*" a 32-page book, which gives accurate instructions for the use of CLAROSTAT in every conceivable type of circuit, is now available. It covers all the popular types of receivers, B eliminators, and power amplifiers. Price 25c. May we send you a copy?

QUALITY DONGAN PRODUCTS

Why So Many Set Manufacturers Use Dongan Audio Transformers

First in Quality

In the first place Dongan has never failed to realize that highest quality is essential to keep your business—that's why we have led in high grade transformer design and manufacture for more than seventeen years. Our laboratory is always equipped with every known device to develop the new ideas worked out by our engineers—who always are among the first to introduce their thoughts in audio design. Nothing but the best grade materials go into the construction of Dongan products. Every fraction of an ounce of weight represents maximum operating efficiency.

Reliable in Delivery

An interesting fact was learned in connection with the buying habits of the set manufacturers who use Dongan Transformers. Few of them have any other source of supply on audio transformers—despite the fact that almost the entire radio industry has found it wise to have two sources on most parts.

Dongan is known throughout the trade for its ability to take care of customers. This is due to large facilities, always increased in anticipation of demand—not afterward. Also due to a managerial policy that insists upon the customer getting his transformers on time.

Real Economy

Experience over many years by the same group of men in the development of several articles naturally lowers the cost of production to an enormous degree. With guess work and costly failures eliminated, Dongan stands today in the fortunate position where proved products are turned out in large quantities,—and at a profit. Buyers of Dongan merchandise are given the benefit of Dongan experience, facilities and a seasoned organization. Dongan Audio Transformers are sold at the lowest price possible with consistent high quality.

Type H

A Super Transformer completely inclosed in Black Enamel Case.
Ratios 1-1 2-1, 3½-1 and 5-1.

List $4.50

Type K

A New Audio Transformer. Fully Mounted with Bakelite Top.
Ratios 2-1, 3½-1, and 5-1.

List $1.75

All Types—Mounted and Unmounted for all requirements.

IMPORTANT ANNOUNCEMENT

For the New Raytheon A B C Power Unit

for the 199 tube

use Dongan

Transformer . . . . . No. 2561

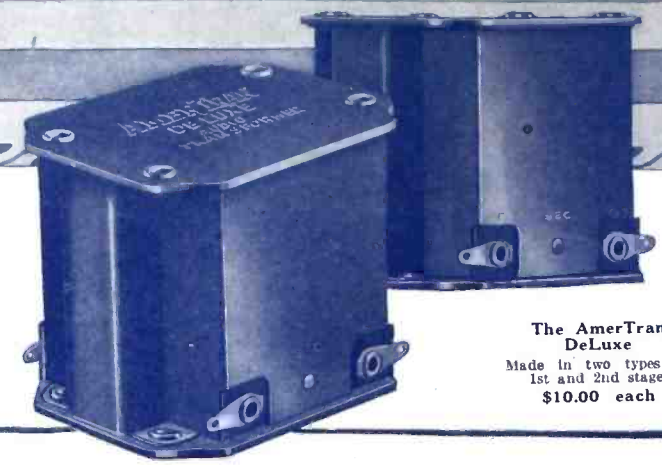
Choke . . . . . No. 1591

Complete information on request.

Be sure to get information on Dongan B-Power Parts for various types of filament and non-filament type tubes.

DONGAN ELECTRIC MANUFACTURING COMPANY
2995-3001 Franklin St.,
DETROIT, MICHIGAN

TRANSFORMERS of MERIT for FIFTEEN YEARS



The AmerTran DeLuxe
Made in two types for 1st and 2nd stages
$10.00 each

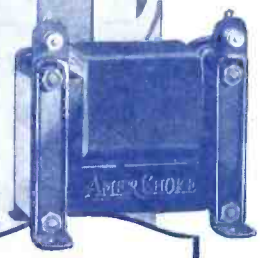
AMERTRAN RADIO PRODUCTS

Standing out prominently among recent developments toward better reproduction, the AmerTran DeLuxe sets an entirely new standard of audio amplification.

Here is an audio transformer which reproduces the deep boom of the bass drum, the roll of the pipe organ and the lowest tones of the bass viol with startling realism, at no sacrifice of the highest sounds within the audible range. Used in connection with the new cone speakers and new tubes these transformers amplify uniformly over the entire range. The approach to absolute perfection is so close that the human ear is unable to note further improvement.

The AmerTran DeLuxe is made in two types—first and second stages and should be used by the pair!

The AmerTran Power Transformer and the AmerChoke are the result of over twenty-five years experience in transformer building. They are among the finest units available for the construction of a power supply of the better type. The Power Transformer has filament supply windings for the rectifying tube and furnishes sufficient plate current, after rectification, for the operation of the set.



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.
$6.00 each

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 may now be purchased at a considerable saving in cost. Types AF-7 (ratio 3½:1); AF-6 (ratio 5:1)
$5.00 each

AMERICAN TRANSFORMER COMPANY

178 Emmet Street — Newark, N. J.

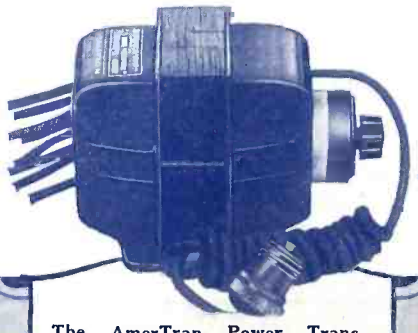
"Transformer builders for over twenty-five years."

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



Write today for interesting free booklet "Improving the Audio Amplifier" and other data on the subject of better radio.

The AmerTran Power Transformer Type PF-52
Type PF-52 is intended for use in the best power supply developments. It will convert the standard 110 volt, 60 cycle alternating house lighting current to a higher voltage for the plate and low voltages for filament supply.
$18.00 each