RADIO & MODEL ENGINEERING

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Edited by M. B. SLEEPER

THE IMPROVED RASLA REFLEX

AN UNUSUAL ONE-TUBE REFLEX SET, BOTH AS TO RESULTS AND MECHANICAL DESIGN.

DESIGN OF A 100-METER RECEIVING SET, USING THE NON-OSCILLATING SODION TUBE.

CONSTRUCTION DETAILS AND CIRCUIT OF THE LATEST TYPE OF TELOMONIC RECEIVING SET.

FURTHER PLANS FOR THE CONSTRUCTION OF THE MODEL 310-FOOT U. S. DESTROYER.

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Vol. 4 No. 4

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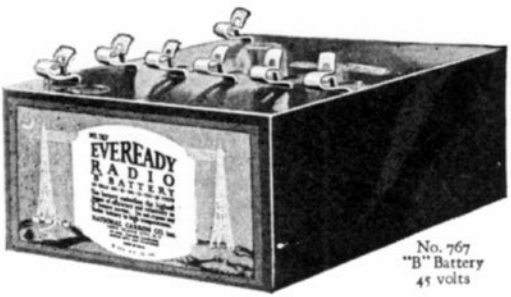

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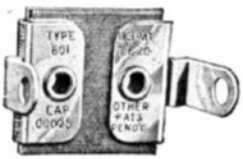

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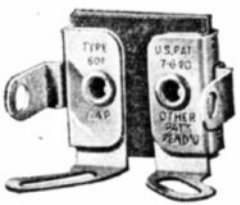

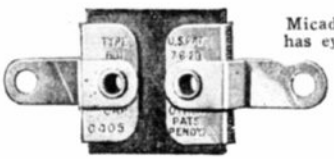

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The Improved Rasla Reflex Set

A redesign of the very popular Rasla Reflex which makes it easier to handle, and also readily adaptable to the various conditions which a portable set must meet

IT IS only natural, even tho it is misleading, that we hear about the exceptional rather than the average dependable results which are obtained on any particular type of radio set. The super-heterodyne, for example, is reputed to bring in at one coast stations located on the other. It must be admitted, however, that in our laboratory at Dardien, Connecticut, located right on the water, we have never heard a station west of the Rocky mountains.

Nor did we ever bring in a distant station on a loud speaker, using only one tube, until recently. The following description of the improved one-tube Rasla reflex set is not presented as describing a set which will bring in Atlanta, Chicago, and other stations over 1,000 miles away on a loud speaker always, anywhere, altho these results were accomplished at the laboratory where, apparently, we are working under approximately average conditions.

The Rasla Reflex Circuit

The circuit employed in the type 5900 receiver is not new altho there are special features of the circuit which are responsible for the unusually good results obtained. The real reason for the efficiency of the set lies in the use of the high ratio Modern transformer, the special design of the Rasla R. F. transformer, wound to match the crystal detector, and the use of the S. R. C. low-loss variometer.

This set is an excellent demonstration of the value of correct design, a principle which, applied to almost any circuit, will produce results superior to those obtained on more elaborate apparatus poorly designed. The 0.001 mfd. Micadon is in series with the variometer, across the antenna and ground. Under almost all circumstances the condenser is left in the circuit altho it is arranged so that it can be cut out by a jack switch where special conditions require it. Across the variometer the UV201-A is connected with the secondary of the audio frequency transformer cut in on the filament side. The plate of the tube runs to the primary of the R. F. transformer and telephones. No by-pass condenser is connected across the phones as the capacity of the cord is sufficient. The secondary of the R. F. transformer goes to the crystal detector and primary of the A. F. transformer.

Design of the Type 5900 Receiver

In appearance this is one of the most distinctive sets that we have built at the Darien laboratory. The arrangement of the front panel is most attractive. The jack and jack switch balance nicely and the new style 4-in. Kurz-Kasch knob and dial gives it a substantial

appearance. At the rear a clever arrangement has been worked out for connections between the rheostat and jack and the instruments under the tube panel. You will see that the four panel support pillars act as conductors for wires which are fastened to them behind the front panel and again behind the sub panel. Another novelty is the use of the screws which hold the sub panel to the supporting pillars to hold the angle brackets also.

Instead of mounting the Rasla detector between springs, one end is threaded into a hole in the tube panel. It can be removed quickly by taking off the top thumb nut and unscrewing it from the panel. A soldering lug between the panel and bottom end of the detector provides connection to the screw which goes into the coil mounting pillar on the grid binding post. By a slight change in the circuit, a Kantblo filament protector can be substituted for the B-binding post.

Standard Parts Required

A panel of Bakelite, either Formica, Dilecto, or Condensite, 7 by 14 ins., 3/16 in. thick, is used for the front, while the tube and sub panels, each 3½ by 7 in., 3/16 in. thick, are cut from a standard panel, 3½ by 22½ ins. The instruments required are a Rasla fixed crystal detector and R. F. transformer, a Modern 1 to 10 ratio A. F. transformer, Bestone standard base socket, Sleeper Radio variometer, Carter 1-spring telephone jack, and 2-spring jack switch, 0.001 mfd. Dubilier Micadon, a 20-ohm Pacent rheostat, 2-in. and 4-in. Kurz-Kasch knobs and dials, and six Eby binding posts of the Ensign type.

In addition, there are standard small fittings necessary — four panel support pillars, eight coil mounting pillars, and a left-hand and right-hand angle bracket.

You will see that the thumb nuts have been removed from the socket and from the Rasla transformer. In their place coil mounting pillars are put on the screws and fastened under the panel by screws which go in through the top.

Drilling The Panels

Figs. 3 and 4 show the front panel and rear panels at one-half scale. You will notice that all holes are to be made with a No. 18 drill unless otherwise specified. Center lines are drawn on the panels so that you can scale off the dimensions measuring to the right and to the left of the center line. You should draw a corresponding center line across each panel before you lay it out.

The problem of making the large hole for the socket tube has been simplified by the recent development of a very simple tool supplied by Stevens and Company. A 3/16 in. hole is first drilled at the center. Then the Stevens' cutter, a tool which looks like a crown gear, with a circle of teeth 1½ ins. in diameter, provided with a shank to fasten in the hand-brace and a 3/16 in. pin at the center which fits in the starting hole, is used to cut out the hole for the tube. With this new tool the hole can be cut easily and quickly.

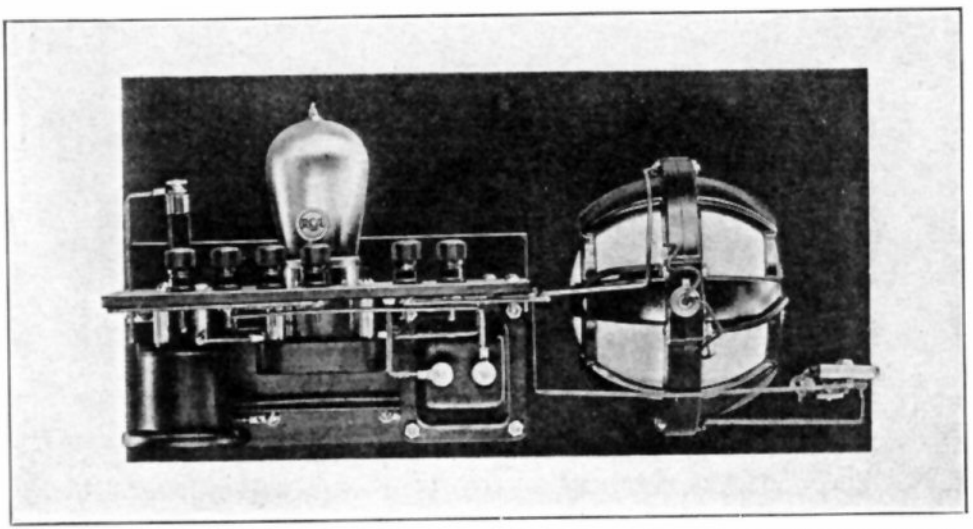


Fig. 1. The fixed crystal, mounted at the left of the tube, can be seen, as well as the supporting arrangement for the socket

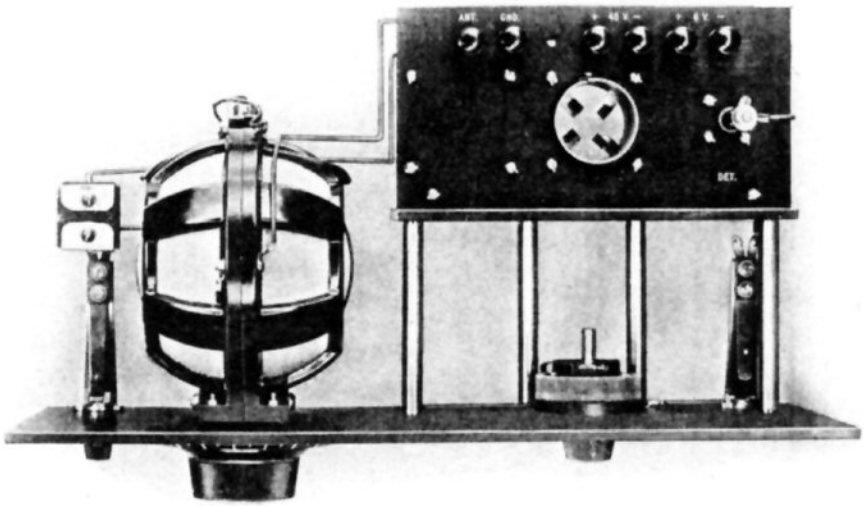


Fig. 2. Only two wires running to the tube panel are required. The rest of the connections are supplied by the panel supports

Concentric circles indicate that the hole must be countersunk for flat head screws.

The appearance of the set is greatly improved by having the front panel and the tube panel engraved. This is not expensive and adds a finishing touch to the outfit.

Assembly and Wiring

Fig. 4 shows the schematic wiring diagram, illustrating the system of connections used, and Fig. 5 the picture wiring diagram of the connections as they are actually made. There are always small discrepancies between these two kinds of drawings but the picture wiring diagram should be followed in making the connections.

Wirit is employed for the wiring. This is a tinned copper conductor, No. 18 gauge, drawn to a temper which makes the wire stiff without being brittle. Wirit is specially recommended for all kinds of portable equipment.

For insulation, No. 7 special varnished tubing from Mitchell-Rand is used. This is very small in diameter and is, consequently, better looking than the large size tubing. Moreover, it is less expensive.

Before you start to assemble the parts soldering lugs should be fitted to the various instruments. Each lug must be filled with solder before it is mounted. Then the joint can be made very quickly without heating the varnished tubing. A set of Spintite socket wrenches will help to speed up the assembly work, and insure tight connections.

1. Mount the jack, rheostat, variometer, and jack-switch on the front panel.

2. Solder one side of the 0.001 mfd. Micadon to the upper jack switch spring. The condenser is shown tipped up so as to illustrate the connections. These are terminals 1, and 2. Also connect 3, the lower jack switch spring to 4 and 5 to 6.

3. Mount the six Eby binding posts on the tube panel. Connect 7 to 8.

4. Mount the socket under the tube panel. Take off the thumb nuts and threaded washers and put coil mounting pillars in their places, with a soldering lug between each pillar and the tube base. Make sure that the screws are very tight so that the contact springs will not come loose. Fasten the pillars with ½-in. 6-32 R. H. screws.

5. Connect 9 to 10. Mount the R. F. transformer. Put a coil mounting pillar in place of each binding post thumb nut with a lug between the pillar and transformer. Fasten the pillars to the tube panel with ½-in. 6-32 R. H. screws.

6. Connect 11 to 12.

7. Mount the A. F. transformer under the tube panel. Note that the two binding post screws which come at the front must be cut off so that they are just long enough to take 6/32 nuts instead of the thumb nuts provided. If this is not done the screws will interfere with the sub panel.

8. Connect 13 to 14. 14 is a lug on the antenna binding post. Connect 15 to

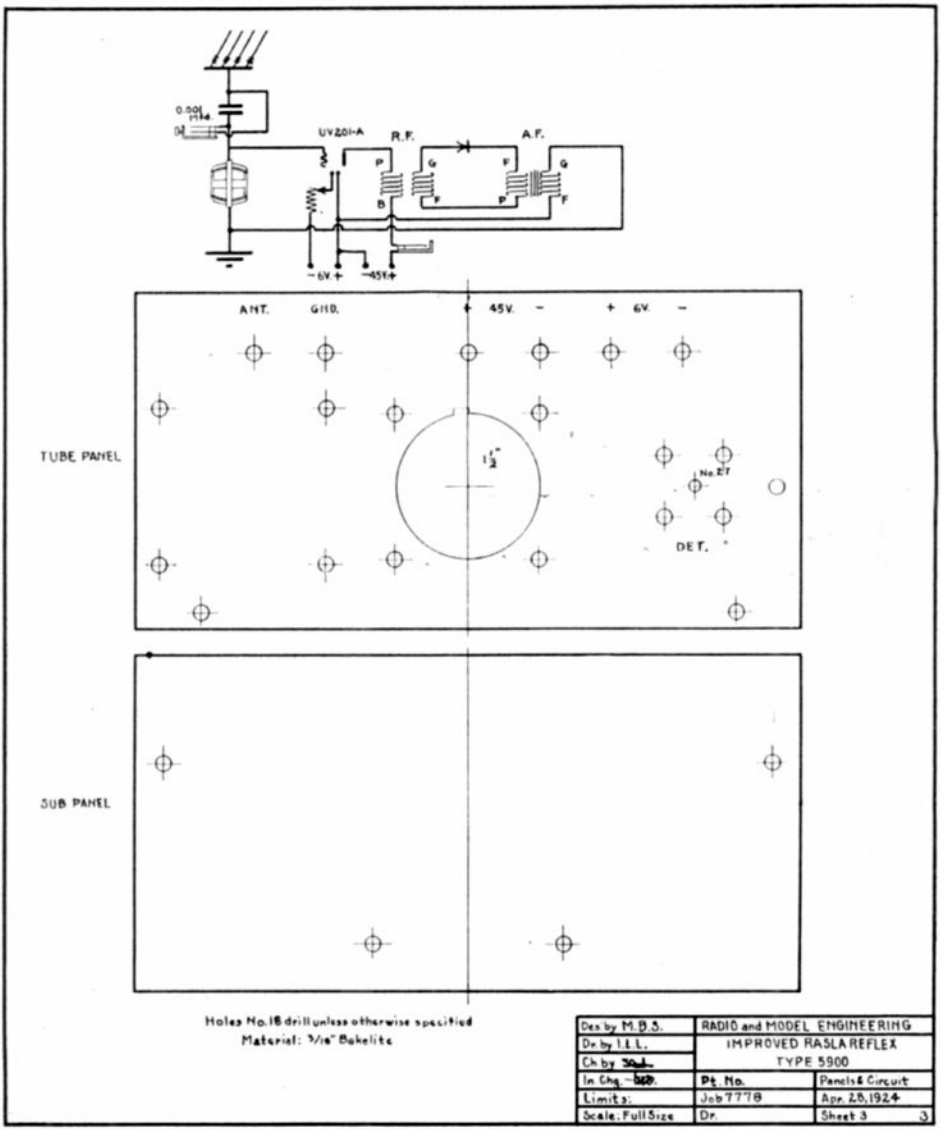


Fig. 4. Schematic wiring diagram and one-half scale drawings of the tube and sub-panels

16, 15 is the G binding post on the transformer. Connect 17 to 7 and 18 to 19. Keep this last wire well back so that it will not interfere with the sub panel when it is put on later.

9. Fasten the sub panel to the tube panel with the left and right hand angle brackets. Use ½-in. 6/32 R. H. screws and nuts to fasten the brackets to the tube panel and for fastening them to the sub panel put a ½-in. 6-32 R. H. screw through the bracket and sub panel and thread it into the coil mounting pillars. Put a lug on each screw going into the pillars.

10. Connect 20, the lug under the panel support screw to 21, connect 22, the lug under the other mounting pillar screw to 23, and 24 to 25. 25 is a lug under the head of a ½-in. 6-32 R. H. screw threaded into a panel support pillar. Connect 26, a terminal similar to 25, to 27.

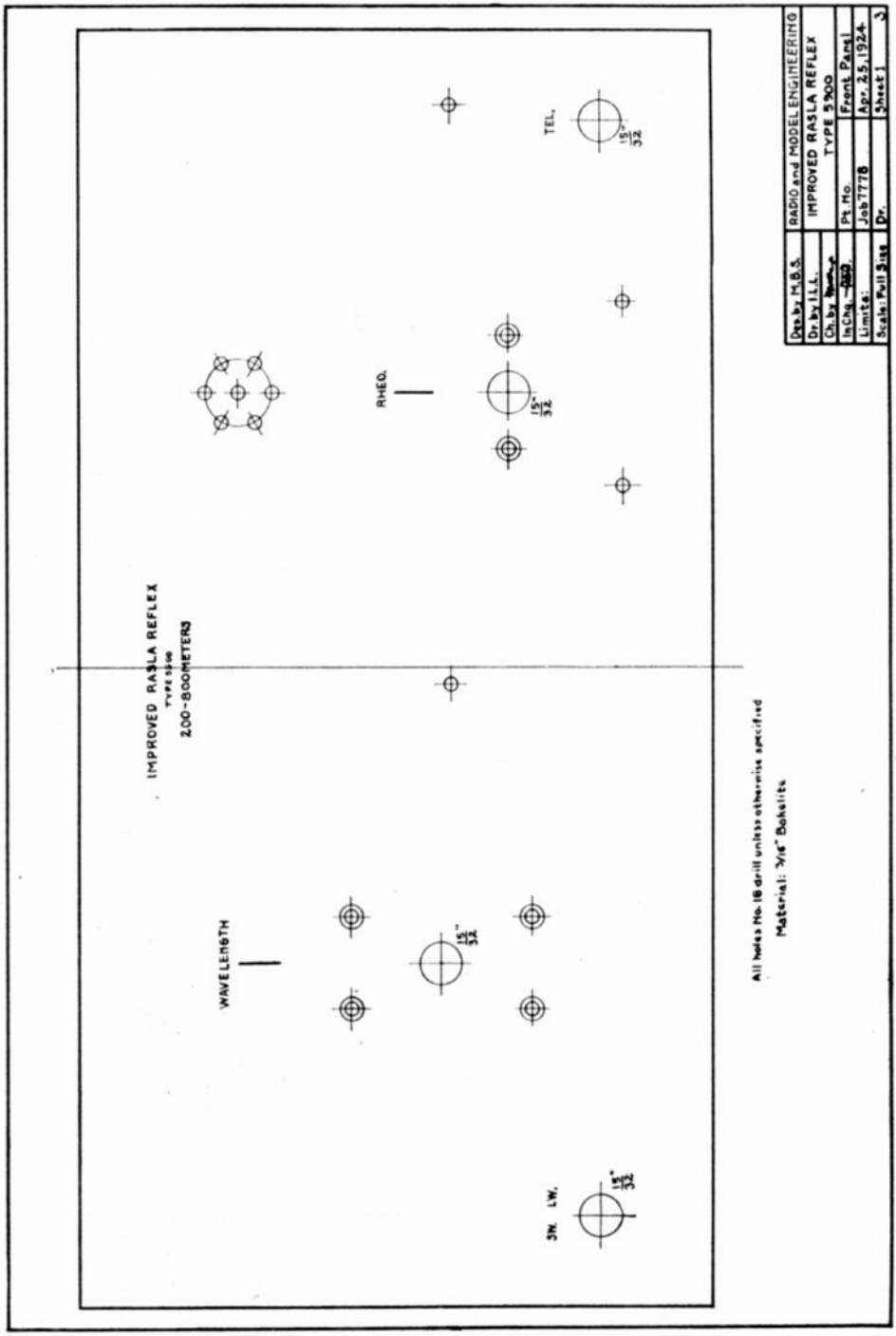


Fig. 3. One-half scale drawing of the front panel

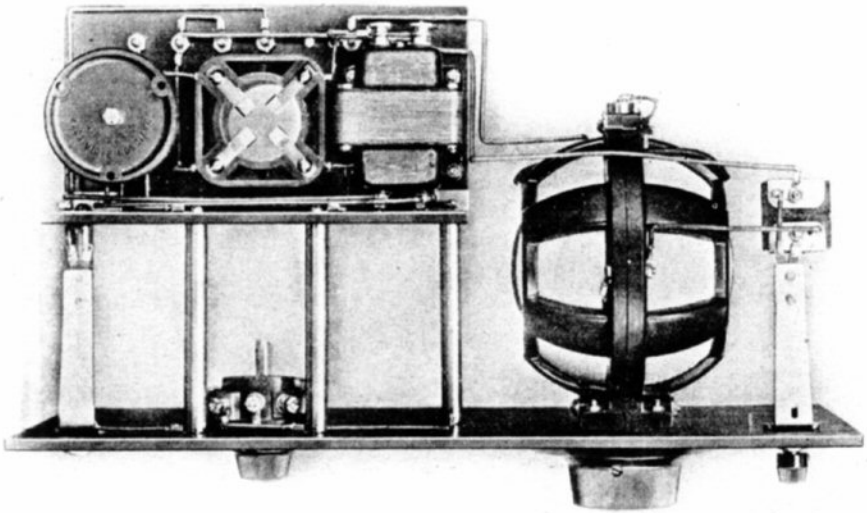


Fig. 6. Looking underneath at the works of the set. You can see the R. F. transformer, socket, and A. F. transformer

11. Remove one of the crystal detector thumb nuts and thread the screw into the hole in the panel. If you have used a No. 27 drill you will probably find that it is not necessary to thread the hole with a tap unless you want to. Put a soldering lug between the base of the detector and the tube panel and another at the top terminal of the detector.

12. Connect 28 to 29 and solder the lug at the base of the crystal detector, to 30, which is the head of the screw going into the pillar on the G binding post of the R. F. transformer.

13. Fasten the four panel support pillars to the front panel by means of ½-in. 6-32 R. H. screws. Put a soldering lug between each of the three right hand pillars and the rear of the front panel, and a lug between the left hand pillar and the front of the sub panel. Connect 31, the front panel lug on the pillar to 32, the center binding post on the Pacent rheostat, 33, the front panel lug on the pillar, to 34, 35, the front panel lug on the pillar, to 36, a connection made to the frame of the jack, and 37, the upper jack contact, to 38, a lug between the mounting pillar and the front of the sub panel.

14. Connect 39 to 40 and 41 to 42. 42 is another connection made to the lug on the antenna binding post.

Operation and Testing

Connect the antenna and ground to the binding posts on the tube panel and a 6-volt battery, either a storage battery or four 6-volt Eveready dry cells, to the filament binding posts. Try out the filament circuit to make sure it is working properly before you put on the B battery. If the filament circuit is O. K., connect 45 to 90 volts on the binding posts provided. Adjust the rheostat for moderate brillancy, put the switch in the short wave position and tune with the variometer. As soon as signals come in get a close setting on the wavelength dial and increase the filament rheostat until the signals are at maximum intensity without distortion. Do not turn the rheostat too far, however, for it not only makes the quality poor but it greatly shortens the life of the vacuum tube.

The life of the crystal detector is almost indefinite. If signals do not come in as well as you think they should, disconnect the upper terminal of the detector. That should very greatly reduce the strength or cut them out altogether. In case the signal strength is not affected substitute another crystal detector. If the signals do not come in stronger then the fault is probably due to some other part of the circuit rather than the detector but if the signal strength increases considerably that indicates that the fixed detector is not sensitive.

Installation of the Reflex Set

On the first page, the Rasla reflex set is shown as it was installed for testing purposes on the Elco Cruisette. This makes an exceptionally fine outfit for small boats and, if the boat is near a broadcasting station even tho the antenna is very small signals will come in with plenty of volume for loud speaker reception. A Perfectone speaker was used on the Elco boat and produced plenty of volume to fill the cabin. These tests were made with a Perfectone loud speaker.

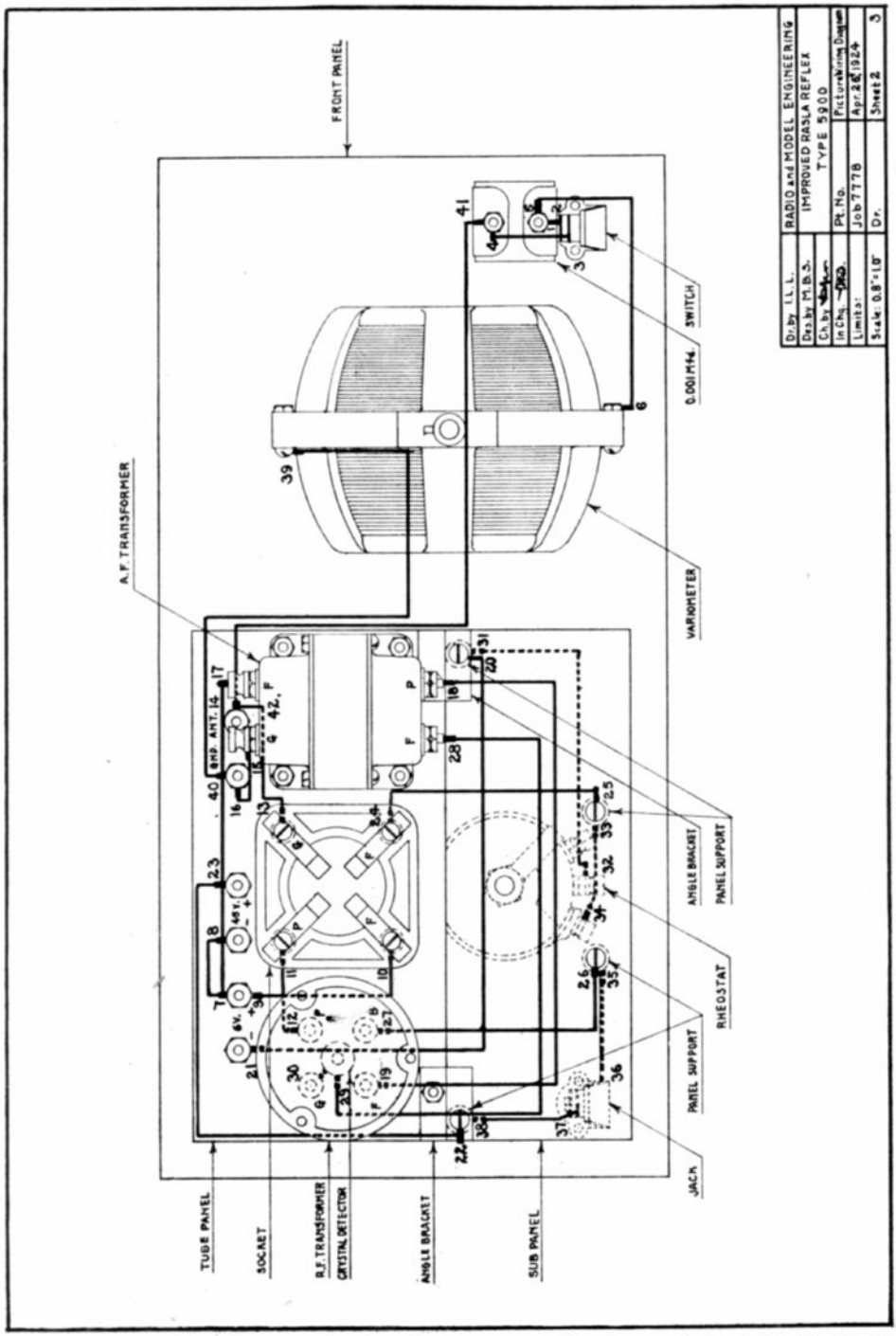
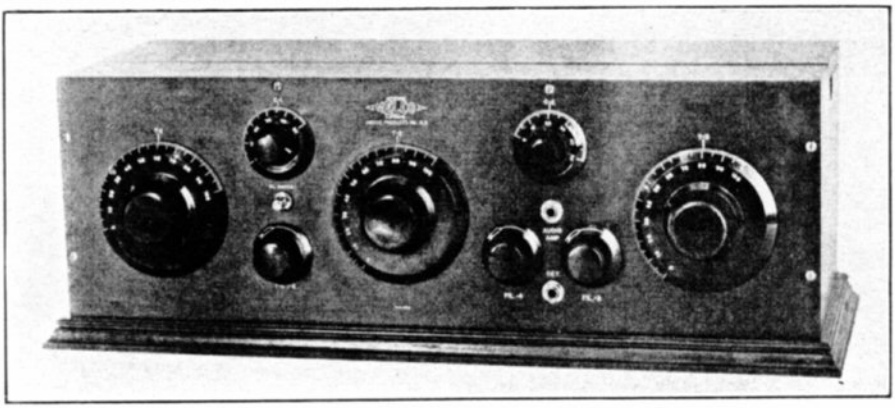


Fig. 5. Picture wiring diagram, showing the tube panel tipped upward so that you can see the connections



Telemonic Tuned R. F. Set

In this set tuned R. F. transformers are used, the adjustment of which is regulated by changing the inductance instead of the capacity

ONE of the most unusual types of radio sets is the Telemonic receiver, shown in the accompanying illustrations.

This outfit employs an entirely unique method of tuning, as you will see from the wiring diagram. Behind the panel are three units made up of fixed and rotating D coils. The first, which is on the right in the rear view, serves as a variometer, while the second and third are a combination of fixed primary inductance and variable secondary inductance. By this arrangement, when the inductance of the secondary is changed, the primary to secondary coupling is also varied. In this way coupling and inductance are reduced at short wavelengths so as to maintain a uniform amplification and selectivity over the entire range without introducing a capacity effect which will cause the set to oscillate. In the wiring diagram, unit A is the antenna tuning inductance, B is the adjustable radio frequency amplifying transformer, of the type just described, which works into the second R. F. amplifier tube, and C is a similar transformer working into the detector.

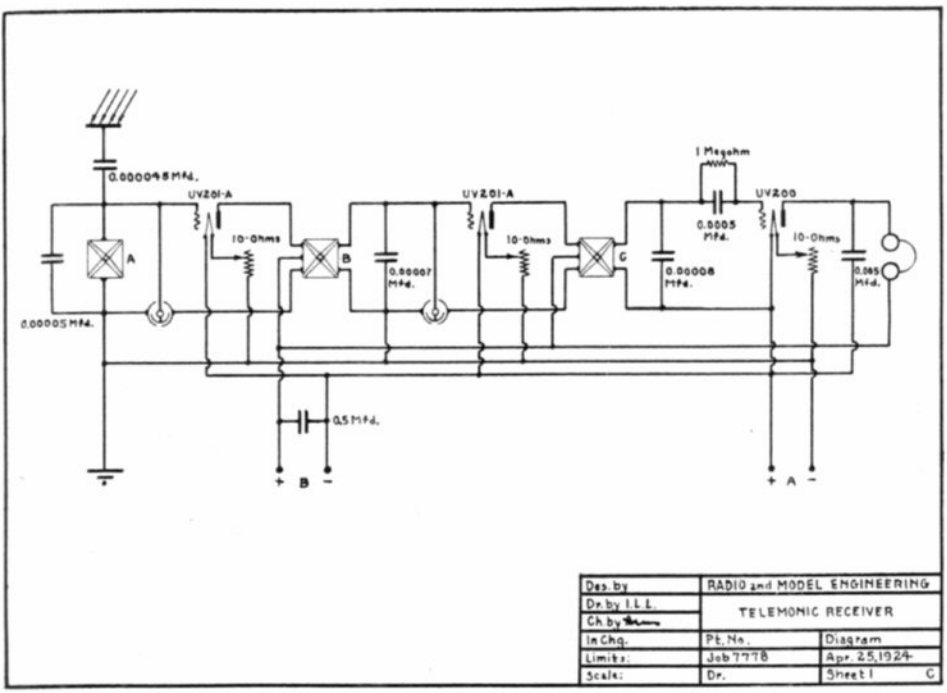
The capacity feedback is cut out by means of the two compensating condensers connected across the grid and filament of the first and second tubes. They do not, however, effect the wavelength adjustments of the R. F. transformers.

This system is, in a way, somewhat similar to the Neutrodyne in that it provides tuned R. F. amplification without permitting the tubes to oscillate since the compensating condensers neutralize the tube capacities. It is easier to handle, however, than the Neutrodyne because the neutralizing action can be readily controlled.

The parts required for this outfit include the three Telemonic tuning units, two Amsco compensating condensers and three rheostats, four Bestone sockets, two Carter jacks, Cutler-Hammer switch, Amertran audio transformer, 0.5, 0.005, and 0.0005 mfd. Freshman condensers and Daven or Pudlin gridleak. The one step of audio frequency amplification is not shown in the wiring diagram but it can be added in place of the telephones in the conventional way.

To tune this set, the compensating condensers are adjusted as soon as signals come in so as to prevent the circuit from oscillating. Once set, they need no further adjustment. Tuning is then done by means of the knobs and dials on the variometer and R. F. transformers. They are quite uniform so that the reading on each dial is practically the same when a station is tuned in. Sometimes, on distant stations, it helps to adjust the second compensating condenser, although that is not essential.

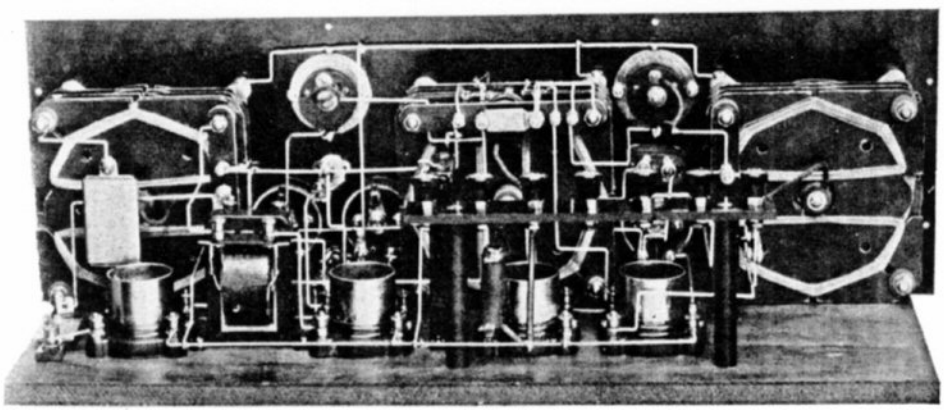
In the front view of the Telemonic set, the three large knobs provide the wavelength control, the two small knobs and



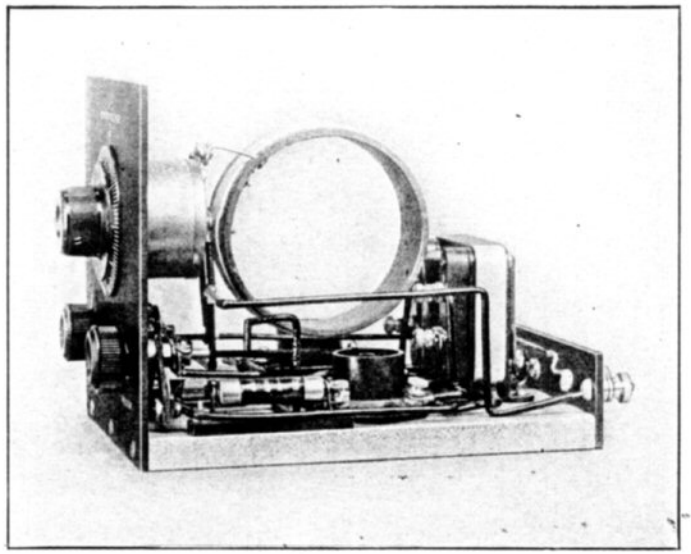
Complete circuit, with all constants, for the Telemonic receiver

dials are for setting the compensating condensers, and the three knobs below are for rheostats. The arrangement is slightly different on the 4-tube set from the 3-tube hookup given in the wiring diagram for, on the set as it is actually manufactured, the left hand rheostat controls the two R. F. amplifying tubes, the second rheostat the detector, and the third the A. F. amplifier tube. Jacks are provided so that the telephones can be plugged in at the detector or at the amplifier.

It is interesting to note that, in connection with the manufacture of this set, a special method has been devised for assembling and testing the low capacity fixed condensers which are in series with the antenna, around the A tuning unit, and across the secondaries of the B and C units.



Rear view of the outfit removed from the cabinet. Note the construction of the D coil variable transformers



The Sodion for 100 Meter Work

Unlike other detectors, the Sodion increases in sensitiveness at very low wavelengths. Hence, the unusual efficiency of this set

NOT so long ago, we thought that wavelengths below 200 meters were out of range of usefulness, partly because transmitters could not be made to work that low, and partly because we thought that the limited power which could be transmitted put too great a restriction on the sending range.

Then, suddenly, we discovered that KDKA was not only broadcasting on 100 meters but putting enough energy into antennas in England that music from Pittsburgh was re-broadcasted from 2LO, London. And now KDKA works regularly on what we had considered an impossibly short wavelength. Moreover, experiments are being made at 40 and 60 meters, for down there there seems to be practically no static interference.

Just what will develop from this work we cannot tell, for much data is yet to be collected. However, the progressive Experimenter and engineer must be familiar with this short wave reception.

There is just one thing that you must bear in mind when you are working in this newly explored section of the ether—Do not use a regenerative type of receiving set. This point cannot be emphasized too strongly. We must keep 100 meters clear of regeneration, with the consequent squeals and howls. That part of the wavelength band is still the exclusive property of Experimenters. Don't spoil it by regeneration!

The Sodion on Short Waves

One of the most interesting developments which has come about in working on short waves is the action of the Sodion detector. Unlike any other detector, it is more sensitive at some wavelengths than at others. Below 2,000 meters, down to 200, the sensitiveness is unchanged, but below 200 meters it increases considerably. The Sodion, the most sensitive of detectors at broadcast wavelengths, becomes ultra-sensitive on 100 meters or less. Consequently, it does better work than a regenerative receiver using the ordinary tubes.

The set shown in the accompanying illustrations is not designed as a finished outfit, but was assembled for testing purposes, to check the theory against actual practice. It is easy enough to change it, if you want to, into a permanent receiver with the details arranged to suit your own taste. You must remember, however, that in all

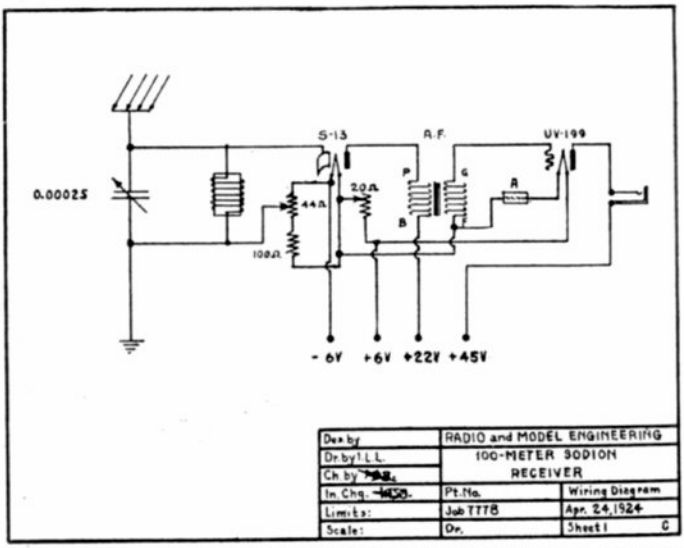


Fig. 2. Wiring diagram of the Sodion set for 100-meter reception

short wave outfits the leads to the tuning circuit and to the grid of the detector must be kept as short as is possible.

General Data on the Tube A little general information on the Sodion will be found useful. It is slightly smaller than the UV199 tube, and requires a special socket, or it can be fitted into an adapter for a 201-A socket. The elements and terminals are similar to those of other tubes, altho the grid is called a collector. These elements are very small in size. Unlike other tubes, they are sealed in a tiny evacuted glass tube which is inside the ground glass shell which you see in the illustrations. As a matter of fact, the outer glass can be broken without affecting the operation.

A current of 0.25 ampere at 4 volts is drawn by the filament. For the B battery 22 volts is sufficient. It is necessary to adjust the potential on the grid by means of a 150-ohm potentiometer or, as is shown in Fig. 2, a 44-ohm potentiometer in series with a fixed resistance of 100 ohms. Special rheostats and resistance units for this purpose have been developed by the Connecticut Telephone and Electric Company, manufacturers of the Sodion tube.

The 100-Meter Receiver In the side view of the set the general arrangement is illustrated. On the front panel, measuring 7 by 7 ins., a Triple Range condenser is mounted, with an inductance fastened to it by a single coil mounting pillar. The rheostat and potentiometer, as well as the phone jack, are also secured to the panel. No rheostat is used for the UV199 A. F. amplifier tube, as the current is regulated automatically by an Amperite. Therefore, 4 to 6 volts from dry cells or a storage battery can be applied to the filaments of both tubes. On one side of the coil is the special Sodion socket, and on the other, a UV199 socket. An audio frequency transformer and a terminal board complete the parts needed.

The coil is of 10 turns of No. 20 S. S. C. wire, B. & S. gauge (No. 22 S. W. G.) wound on a cardboard tube 3½ ins. in diameter and 1¼ ins. long. It is fastened by a 1-in. 6-32 R. H. screw to a coil mounting pillar, which protrudes far enough beyond the pillar to thread into the hole for condenser terminal screw B. The short strap across the A and B terminals on the Triple Range condenser should be left in place to give the maximum capacity range.

Operation and Testing Tuning on the 100-meter set is done entirely with the variable condenser. However, the potentiometer must be carefully set when the receiver is adjusted. When you move the potentiometer, you will hear a rushing sound similar to that which comes from a UV 200 detector. Similarly, the potentiometer should be turned back just to the point at which the sound ceases. That is the most sensitive adjustment. You can increase the life of the filament by burning it at the lowest possible brilliancy, just enough to make the outer glass bulb glow moderately.

The antenna used with this outfit should be quite small, not over 50 ft. from the set to the far end of the antenna.

Construction of a One-Eighth-Inch Scale Model 310-Foot U. S. Destroyer

Part 3. Showing constructional features of the midships section, including the smoke stacks, superstructure, and arrangement of the deck

IN the three illustrations of the 310 ft. destroyer, opposite, additional details of the mid-ships sections are given. The parts illustrated are quite simple so that detailed drawings are hardly necessary although they will be shown later in other scale drawings.

The super structure on which the 4-in. guns are mounted also carries two hatches and a water tank. Dimensions of the hatches have been given already. The water tank is merely a wooden dowel mounted on two blocks. The four smoke stacks are also made of wood, slightly hollowed at the upper end. The whistle and safety valves are short lengths of small brass rods fastened to the smoke stacks by soldering them to tiny pins driven into the wood. This soldering can be done most easily after the pins have been driven into the dowel. Consequently, it is necessary to apply the heat very quickly.

Another anti-aircraft gun is mounted at the side of the forward smoke stack. This is the same in size as the one for which a scale drawing has been given already. The torpedo tubes are cut from wooden dowels, shaved off on the under side. A short piece of dowel of large diameter is used to mount them. These details you can see in the photographs.

A spreader of small brass rod is mounted on two supports to the after smoke stack. This is for the auxilliary antenna.

One of the life boats is illustrated in these views. It is mounted on davits formed from brass rods.

Sheet brass, No. 18 gauge, is used to support the super structure, while the super structure deck itself is made from three-ply veneer.

Both the rubbing-strake and the bilge keel can be seen clearly in these illustrations. They are also shown in the scale drawing of the hull.

Staunchions add greatly to the appearance of the boat although they are very difficult to turn out. However, they can be obtained from H. E. Boucher, Inc., at a very small price. You will note that some are of the 2-ball type and some of the 3-ball type.

You can see from two of the illustrations how the model boat is mounted. Since there is no keel on the bottom, it can be fitted directly on the short wooden strips which, in turn, are carried on a wooden base board. Screws are put up through the base and the wooden strips into the hole of the boat. This makes a substantial mounting and permits the boat to be moved around after it has been completed. On the original model, as it was made by the Boucher company, paint was applied to the base board and dusted over with sand. A more expensive method which some model makers prefer is to cut out a piece from a sheet of green glass so that the hull fits down into the glass right to the water line. The boat can be arranged so that it will be vertical or rolling slightly to one side.

In addition to the photographs of the midship details, scale drawings of the fittings will be given. These photographs, however, are of vital importance to the model maker who is carrying out carefully each feature of construction for, at best, mechanical drawings do not show the finishing touches as well as pictures of the completed parts. If you feel that it will be too difficult to put on all the small fittings you should study over the illustrations so as to determine the best way for simplifying the work without destroying the accuracy of the scale.

A model of this sort can be built, as a matter of fact, to much less than a 1/8-in. scale and still convey accurately the destroyer design provided such fittings as are actually used are correctly proportioned.

The Navy Department uses an entire fleet of tiny model ships for training men in the use of the periscope. The model destroyer employed in this instruction work is hardly more than an inch and a half long but, because these boats are held closely to scale, sighted through the periscope, they look like real ships, in spite of the fact that, naturally, very little of the rigging is put on the models since, in this small size, only the most essential details and the general form of construction can be preserved.

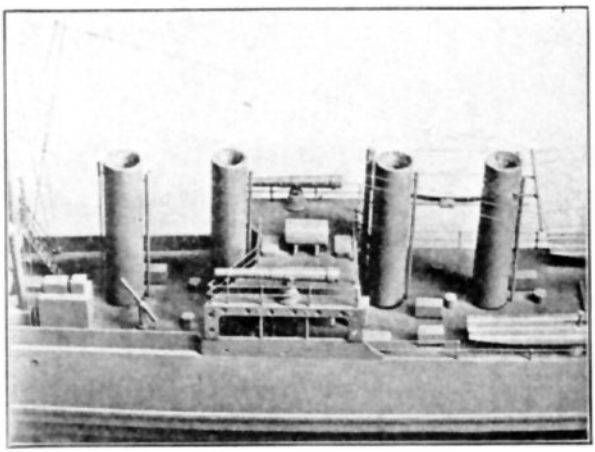


Fig. 7. Looking down amidships on the port side. The superstructure, with the 4-in. R. F. guns and fittings, is clearly shown, as well as the arrangement of the deck. At left is the ladder from the oridge, views of which have been given already. Such details as are hidden under the superstructure will be illustrated subsequently

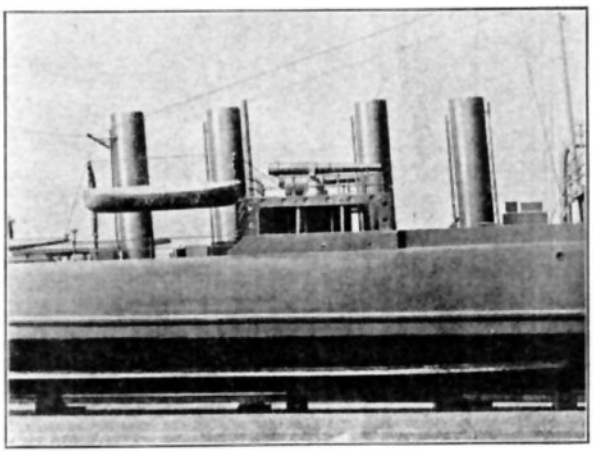


Fig. 8. This photograph of the original boat, loaned to us by H. E. Boucher, Inc., was taken from the starboard side, straight on. You can see the hull construction and the method of mounting the destroyer on the stand. Notice the fitting for the life boat. swung over the side

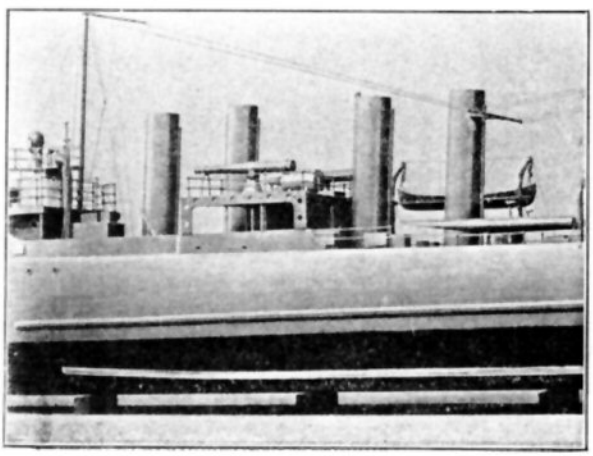


Fig. 9. Here the bridge shows more plainly. The tall ventilator is made by mounting an ordinary short ventilator on a wooden dowel. The life boat and the torpedo tubes are illustrated also. Port holes can be turned out of brass tubing. or they can be purchased either plain or fitted with glass

RADIO & MODEL ENGINEERING

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Twenty cents per copy in the United States and Canada; in foreign countries one shilling. Two dollars per year, twelve numbers in the United States and Canada; ten shillings in foreign countries.

Application for entry as second class at Albany, N. Y. pending.

Vol. IV MAY 1924 No. 4

EDITORIAL

THE work of preparing articles for R and M is so entirely a job of getting right down to facts and presenting them fully and clearly that it jars a little to see the statement in a contemporary publication that there is "Plenty from Tolls of King Telephone." The appended schedule of revenue from paid broadcasting for one week totals $3,600. This data is presented in such a way as to indicate that the A. T. & T. Company is making unduly large profits from the operation of station WEAF in a manner and in an amount which the public should resent. Oddly enough, this publication made capital, over a period of several months, of a type of circuit which of all others causes the most annoyance from its powerful radiating qualities.

When you are thinking about broadcasting and the concerns which are providing it, you ought to remember two things: Radio broadcasting must be kept entirely clear of politics, and as free as is practical from limiting legislation. Moreover, those concerns who are willing and able to provide good programs should be encouraged by the public and the press. Men who draw parallels between King George and King Telephone should spend enough time at the scene of the historic Tea Party to absorb some of the local color of conservatism. In the seclusion of the broadcast studio it is easy to forget that so many people hear everything that is said before the microphone.

Beneath an account of a "Tax on Souls" is a note to the effect that it is now possible to burn fifteen tubes on less current than was required, a year ago, for one tube. The original development work on the low-current tube, now marketed thru the Radio Corporation as the UV199, was done by the Western Electric Company.

One of the newspapers states that radio was unprofitable to monopoly until hundreds of thousands of radio enthusiasts had popularized it. Newspaper editors are not expected to concern themselves with facts, but it is worth mentioning that there was neither audience nor industry, as we know it today, until KDKA, WJZ, and WEAF were put in operation. The general public did not even realize that radio, as a means of communication, was an established fact during the years it was wearing only its dot-dash baby clothes. Only its voice of song and music brought to it the attention and support of the public, and made possible the development of an industry which supports hundreds of manufacturers and thousands of dealers.

The A. T. & T. Company controls the basic patents on wireless telephony because the equipment was developed by the Western Electric Company. The public is cheerfully paying the expense of development work at the General Electric and Westinghouse, as well as for broadcasting done by those concerns, as an allowance to cover it is made in the prices of tubes and sets sold thru the R. C. A. Magazines and newspapers carrying the advertising of these companies search out nice things to say about them as a matter of self-preservation.

If the A. T. & T. had an advertising appropriation of several million dollars a year these publications would be too busy helping to spend the money to think of supporting a broadcasting station so poorly designed that it is hard to tune it out, and so thoughtlessly managed that it imposes its own troubles upon uninterested listeners who have bought sets to bring in entertainment and not scandal.

While the press is publishing half-truths about WEAF, thousands of individuals who own A. T. & T. stock are wondering why, in the face of this kind of publicity, the Company continues to carry out the major part of the experimental and research work which is being done on broadcasting, why a staff of over seventy people are employed for the wide range of activities at WEAF, in addition to the regular engineering staff of the two associated companies.

The A. T. & T. is giving us the best broadcasting. The A. T. & T. knows more and is finding out more about radio telephony and broadcasting than any other concern. There's no reason why they should do it for nothing. If they can sell $3,600 worth of broadcasting in a week—splendid! Let's hope that there was enough left over, after paying the salaries of the staff, so that the stockholders won't get worried and insist that they close the station to save the expense.

M. B. SLEEPER, Editor.

Every fan who wants a better set— will send for this booklet!

THE first edition of this brochure pointed the way to amazing results for thousands of set builders.

It enabled Mr. J. Tuckerman, President of the Federal Engineering Co., to build a set of which he says, "We not only get the local stations with remarkable clearness and absolutely without distortion, but we are able at any time to tune out these stations and receive from far away stations with equal facility. The tuning is so extremely selective and sharp that we can truthfully say we have never before listened with more pleasure and enjoyment to radio broadcasting."

Another typical report comes from Mr. G. V. H. Cairns of the Oakland Motor Car Co., who says: "I have tried all R. F. transformers on the market, but none of them can compare with Telos for volume, clarity, ease of operation and best of all—they bring in the DX station!"

The second edition is now ready—packed with new ideas, proven hook-ups, and simplified instructions. It explains the Telos principle of tuned R. F. in complete detail. It gives you an entirely new viewpoint toward the possibilities of tuned radio frequency. Send for your copy. Write or use the coupon below.

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Send me a FREE copy of "Success with R. F. Amplification" and complete description of the Telos principle.

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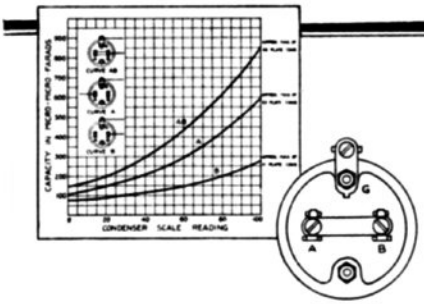

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The Connecticut D-10 Triple Range Condenser is all you need.

A few changes in the wiring connections does the trick. The chart tells the story.

The range indicated by Curve B—from .000075 to .000275 mfd.—approximately that of an eleven plate condenser, is secured by wiring into the circuit from posts G and B.

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The items listed above, some of which are hard to get locally, will be shipped by return mail from DURRANT, or they can be obtained at the New York office of DURRANT if that is more convenient. DURRANT supplies all parts called for in the Parts Lists in R and M.

NOTE: Complete set of parts for the Improved Rasla Reflex are now ready.

Price **$30.00**

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Standardized Parts List

The materials used to make up the set described in this issue were supplied by the following companies. The manufacturers whose names appear below will be glad to send you bulletins describing other products which they make. Please mention R & M when you write them.

PARTS FOR THE TYPE 5900 IMPROVED RASLA REFLEX

Type	Name	Price
	B. L. Sales Co. 35-X Warren St. New York City	
111	1—1 to 10 ratio Modern A. F. transformer	$5.50
	Carter Radio Co. G-209 So. State St., Chicago, Illinois	
101	1—1-spring jack	.70
2	1—2-spring jack switch	1.00
	Davidson Radio Co. L-718 Atlantic Ave., Brooklyn, N. Y.	
CR	1—Rasla R. F. transformer	4.00
FX	1—Rasla fixed crystal detector	1.25
	Dubilier Condenser & Radio Co. A-48 West 4th St., New York City, N. Y.	
601	1—0.001 mfd. Micadon	.40
	Henry Hyman & Co., Inc. 76-Y Broadway, New York City, N. Y.	
724	1—Standard base socket	.75
	H. H. Eby Mfg. Co. X-40 South 7th St., Philadelphia, Pa.	
Ensign	6—Ensign binding posts	1.20
	James Goldmark Co. B-83 Warren St., New York City, N. Y.	
W	1—½ lb. spool of wirit	.90
	Kurz-Kasch Co. South Broadway, Dayton, Ohio	
NW	1—4 in. tapered knob and dial	1.25
A-212	1—2 in. tapered knob and dial	.60
	Mitchell-Rand Mfg. Co. 18-F Vesey St., New York City, N. Y.	
7	4—Lengths special No. 7 varnished tubing	.60
	Pacent Electric Co. A-22 Park Place, New York City, N. Y.	
85C	1—20 ohm rheostat	$1.00
	Sleeper Radio Corp. 88 Park Place, New York City, N. Y.	
A-101	Molded variometer	6.50
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58	2—Pkgs. 25 soldering plugs	.40
22	1—Right hand nickeled angle bracket	.10
185	1—Left hand nickeled angle bracket	.10
63	2—Pkgs. 10 ½-in. 6-32 nickeled screws	.24
49	2—Pkgs. 10 6-32 nickeled nuts	.16
151	4—Terminal panel supports	1.20
14	8—Coil support pillars	.64
	COMPLETE SET OF PARTS	$32.81

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	National Carbon Comany, Long Island City, N. Y.	
763	Small 22½-volt B battery	$1.75
766	Large 22½-volt B battery	3.00
767	Large 45-volt B battery	5.50
771	4½-volt variable battery	.70
6810	50-amp. storage battery 6-volts	15.00
	Stanley Patterson West & Hubert Sts., New York City	
843	Deveau Gold Seal Phones, 2200 ohms	6.00
	Deveau Gold Seal Phones, 3200 ohms	8.00
	Perfectone Radio Corp. 1-490 Broome St., New York City	
DT	Perfectone loud speaker	15.00
	Clark and Tilson, Inc. 1-A East 42nd St., New York City	
W	Automatic drilling template.	1.00
	Pacent Electric Co. A-22 Park Pl., New York City	
40	Universal phone plug	.50
51	Twinadapter for two plugs	1.00
	Stevens & Company 395 Broadway, New York City	
	Set of 3 Spintite wrenches for nuts	1.00
T562	1½-in. panel hole cutter	1.00
	Connecticut Tel. & Elec. Co. Meriden, Connecticut	
S-13	Sodion detector tube	5.00
D-11	Triple Range condenser	4.50
J-128	Sodion socket	.75
	Radiall Company M-320 West 42nd St., New York City	
6V199	Amperite filament control	1.10

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Holds a wealth of interesting possibilities for engineers, experimenters and students of radio.

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The tops don't come off.
They're easily mounted on sets.
They give lasting satisfaction.
The price is surprisingly low.

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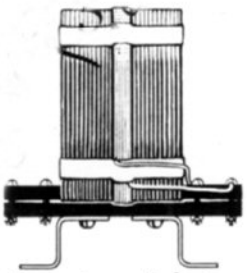
PICKLE BOTTLE COILS!



The only way to an inductance more efficient than the Single Layer Coil on a tube is to remove the tube—to remove the dielectric absorption. The Bureau of Standards winds coils on frames. PICKLE BOTTLE COILS are ENTIRELY SELF-SUPPORTING.

Built according to the specifications of M. B. Sleeper. For the portable Tuned R. F. 5800 Receiver. Price, $2.00 each. $4.00 complete pair. At your dealer or direct.

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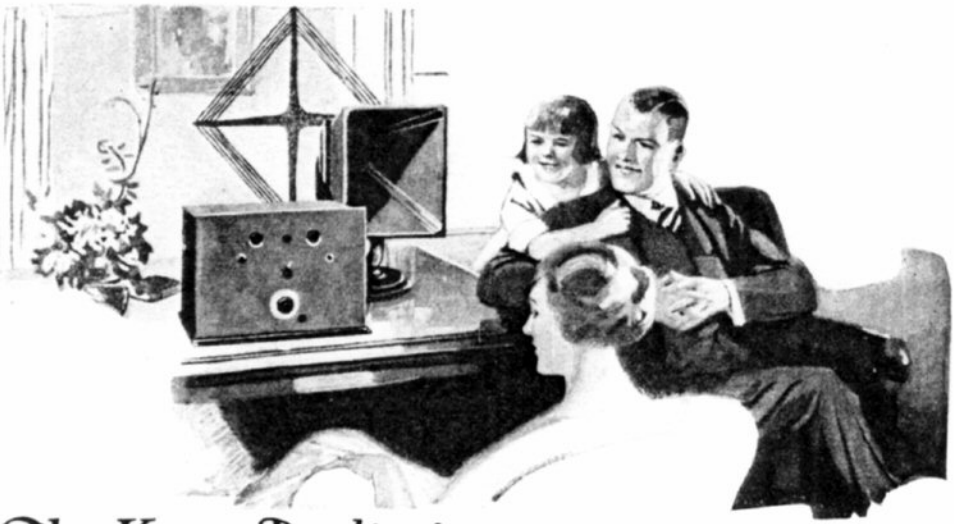


The Key to Radio is— Amplification without Distortion

THE key that unlocks the door to radio, with all its mysterious thrills and pleasures, is Amplification. Amplification builds up the tiny sound waves that come in to your receiving set, making them loud enough for you to hear and enjoy. Sounds that would otherwise be faint and unintelligible are transformed by amplification into—a concert in a far away city or a bed time story, or the latest news.

The danger of distortion

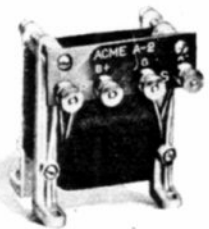
BUT in amplifying these sounds they must not be distorted. Distortion blurs the quality of the sound and makes squeals and howls out of broadcasting that should be clear and distinct. It is of utmost importance to use amplifying transformers that will amplify without distorting the sound.

How to get amplification without distortion

THE Acme Apparatus Co., specialists in the manufacture of transformers, have perfected two transformers which are famous among radio owners for giving the greatest amplification without distortion.

The Acme R-2 (also R-3 and R-4) Radio Frequency Amplifying Transformer builds up the incoming radio energy so that your detector will act. This gives added distance.

The Acme A-2 Audio Frequency Amplifying Transformer builds up the audio energy which comes from the detector. This gives greater volume of sound without distortion. To be sure of getting the greatest possible range and getting it "loud and clear" use these Acme Transformers.



THE Acme A-2 Transformer (shown above) and Acme R-2, R-3, and R-4 Radio Frequency Transformers sell for $5. each at radio and electrical stores.

Send for booklet

IN ORDER to get the best results, send for "Amplification Without Distortion"—an instructive and helpful book which not only explains exactly how to get the best results by proper amplification, but also contains a number of reliable wiring diagrams. It will help you build a set. Mail the coupon with 10 cents for your copy.

ACME APPARATUS COMPANY, Cambridge, Mass., U. S. A.

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Gentlemen: I am enclosing 10 cents (U. S. stamps or coin) for a copy of your book, "Amplification without Distortion."

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Necessary and Important Radio Parts--
The Advantages of Kellogg

Inductance Switches

The Kellogg ferruled bakelite knob and pointer, which is used on Kellogg rheostats, switch arms, etc., is unique and original in construction and having advantages, making it especially desirable for the advanced radio experimenter and engineer and yet is so simple that it is the favorite of the amateur. Is instantly removable. Having no threads or screw adjustments, it will not wear out and adapts itself to many important radio uses.

Inductance Switch

Kellogg switch arms are of just the right gauge and shape for most efficient contact and most positive operation.

No. 545 Inductance Switch..... $0.75

Switch Points

Kellogg contact points are also silver plated to lessen resistance. Have fluted shoulder to prevent slipping and are furnished with two hexagon nuts and tinned terminal. They are easy to mount, do not work loose and are especially desirable for the experimenter. Points used on the ends of sections are equipped with stops to prevent the arm slipping off the last points.

No. 501 Switch Contact.....each $0.05
No. 502 Switch Stops.....each .06

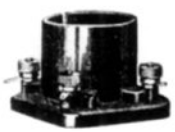
Dial

Dials

Kellogg dials are a superior article and show their quality on any sets. They have large fluted knobs making them easy to handle and control on delicate tuning. A special advantage of Kellogg dials used on apparatus having but one mounting shaft is the recessed center which allows for the flat mounting nut on the outside of the panel, keeping the dial close to its surface.

Kellogg dials are furnished in two sizes — three and four inches. Four inch dial has depth of 1 5/16 inches.

No. 501 3" Radio dial..... $1.00
No. 502 4" Radio dial..... 1.25



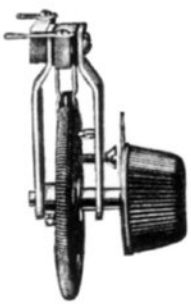
Tube Socket

Tube Sockets

Kellogg moulded bakelite tube sockets are accurately shaped, have brass bayonet reinforced slot. The contact springs are of sufficient gauge and strength to assure firm connection with the prongs of the tube. The four contact screws are equipped with extra hexagon and knurled nuts for securing the wires. A copper lock washer aids in making a firm contact with each terminal. In addition four Kellogg tinned terminals go with each socket.

These sockets are 2 3/16 inches square with round corners and with a total depth of 1¼ inches.

No. 2 Tube Socket..... $0.75



Rheostat

Rheostats

A big advantage of the Kellogg rheostat is that there are two wiping contact arms instead of the usual sliding one. Another big advantage is that in mounting this rheostat the setting of the knob has nothing to do with the pressure on the contact arm. Consequently the pressure is always the same. The knob always turns with the same smoothness and there is no slipping. There is but one moving part. The Kellogg rheostat is easy to mount, its simplicity itself. The connections are arranged for soldering to the usual tinned terminals or holding the wire under set screws.

No. 501 Rheostat, 6 ohms..... $1.50
No. 502 Rheostat, 25 ohms..... 1.50
No. 46045 Rheostat, Rotor, 25 ohms..... .90

Kellogg Switchboard & Supply Co.

1066 W. Adams St. Chicago, Ill.

"The Best That Money Can Buy"

"DEVEAU GOLD SEAL" HEAD SETS are electrically and mechanically,—as well as from a radio standpoint,— as perfect as the highest-priced Head Set on the market,—yet, with all their perfection, they retail at only $8.00 for 2200 Ohm and $10.50 for 3200 Ohm.

The trade mark "DEVEAU" has stood for the highest quality in telephone apparatus for thirty years,—a guarantee that every known advantage in design and manufacturing has been taken into careful consideration.

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The patented design of headgear is far ahead of any Head Set on the market,—affording as it does, instant fitting to ears and head without "re-harnessing" and without binding or pressure,—the latter an admitted nuisance with all other makes of Head Sets.

Caps are of genuine Bakelite,—of scientific design, and comfortable to the ear; the bakelite never loses its jet-black lustre or highly polished surface.

"DEVEAU GOLD SEAL" HEAD SETS are never found in the cut-rate market,—they are only sold to Jobbers who appreciate their value.

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