RADIO & MODEL ENGINEERING

A Magazine of Technical Accuracy for the Radio Engineer, Dealer, and Manufacturer

Edited by M. B. SLEEPER

THE NEWEST SODION SET

AN ORIGINAL DESIGN USING A SODION DETECTOR WITH A UV201-A IN A REFLEX RECEIVER.

DESIGN FEATURES OF THE BESTONE V-60 FOUR-TUBE SET WITH ONE STEP R. F.

CONSTRUCTION OF A SIMPLE FILTER WHICH CUTS OUT INTERFERING TRANSMITTERS.

FOURTH INSTALLMENT OF THE PLANS FOR BUILDING A MODEL 310-FOOT U. S. DESTROYER.

20c a Copy—In England, 1/-
JUNE, 1924
Vol. 4 No. 5

"THE AIR IS FULL OF THINGS YOU SHOULDN'T MISS"

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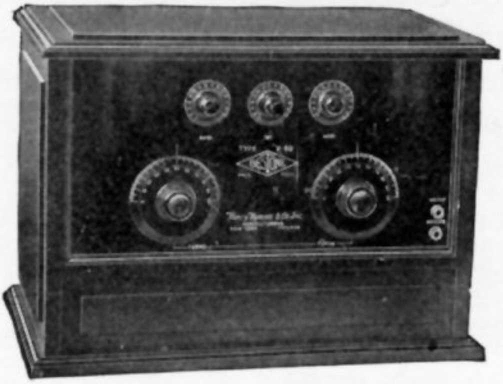

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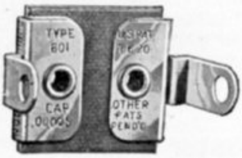

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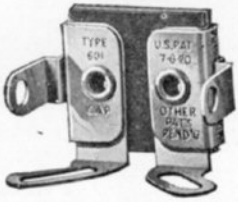

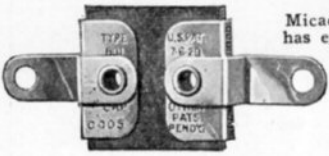

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Sodion Reflex Receiver

To the man who wants a set so equipped as to get the utmost from it, this outfit will appeal strongly. A Sodion is used for the detector, and a UV201A for the radio and audio amplifier.

MORE and more the small reflex sets are coming into vogue, a reaction, perhaps which accompanies the simultaneous popularity of multi-tube supers. B. C. L's in the cities find one or two-tube receivers adequate on local reception. Experimenters are working for more miles-per-tube efficiency. As a matter of facts, five-tube neutrodynes and eight-tube supers are only a step in the various stages thru which receiver design is passing. We used to discuss automobiles in relation to horsepower, but now the miles-per-gallon is the more interesting factor. To be sure, there are so many types of sets fundamentally different in method, but there must be a definite trend in present developments even tho it is not yet recognizable.

Type 6000 Sodion Reflex Set

Of all detectors, the Sodion tube is generally accepted as the most sensitive. Like any other sensitive instrument, however, the Sodion must be used correctly to realize the full efficiency. One of the first problems met in the design of the type 6000 set was the selection of an R. F. transformer. The Acme R2 was found to give the best results for working into the Sodion. You will find that maximum efficiency is obtained at about 360 meters and around 700 meters, altho Micadons of 0.0001 or 0.00025 mfd. can be put across the primary of the R2 to change the wavelength peaks.

The circuit depends upon a triple-range condenser and Paragon variometer for tuning. Across the variometer the UV201-A is connected, with the R2 transformer and filament control jack in the plate circuit. The secondary of the R. F. transformer goes to the collector of the Sodion on one side, and the potentiometer on the other. Instead of a potentiometer and fixed resistance, a special 190-ohm Pacent potentiometer is used, so as to simplify the arrangement. Coupling from the plate of the Sodion to the grid of the UV201-A is accomplished thru a 1 to 4½ ratio Kellog A. F. transformer. Fil-Ko-Stats provide a fine adjustment for the tube filaments.

Standard Parts Required

Three panels are needed, one 7 by 14 ins. for the front, and two 3½ by 9 ins. for the tube and sub panels, all 3/16-in. thick. Bakelite panels are the best, made of Formica, Dilecto, or Celeron. On the front panel are mounted a Paragon variometer, Connecticut triple-range condenser, two Fil-Ko-Stats, a 190-ohm Pacent potentiometer, and Carter open circuit fila-

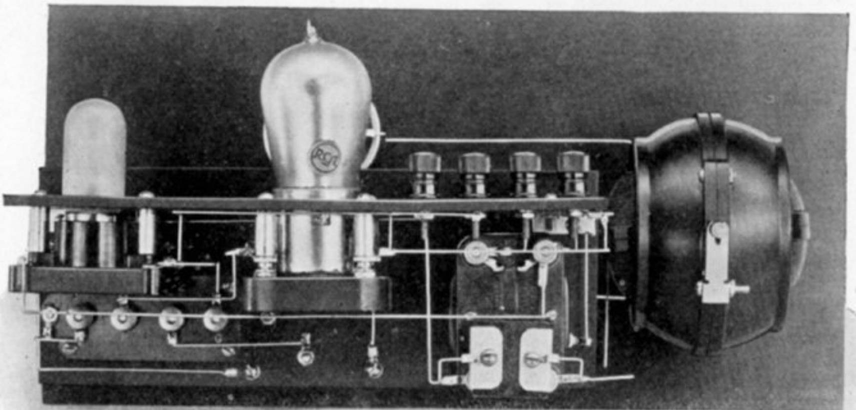

Fig. 2. Comparing this illustration with others previously published, it is obvious that the appearance of the set is greatly improved by using wirit instead of the heavy bus bar.

ment control jack. Kurz-Kasch knobs and dials are used except for the condenser. The big one is the new type, 4 ins. in diameter, and the other three are 2 ins. in diameter. The knobs originally supplied with the Fil-Ko-Stats were broken off and replaced with the Kurz-Kasch dials so as to make the appearance of the front panel uniform.

At the rear there are 6 Eby Ensign binding posts, an Acme R2 transformer, Connecticut Sodion socket, Bestone UV-201A socket, Kellog 1 to 4.5 audio transformer, and a 0.0005 mfd. Micadon.

The hardware is of standard design. Four terminal panel support pillars 3⅜ by ⅜-in. diameter are needed, left and right hand angle brackets, and six coil support pillars 11/16-ins. long by 5/16-in. diameter. Holes in the coil support pillars are threaded clear through for a 6-32 screw while the holes in the terminal panel pillars, also 6-32 thread, are ½-in. deep.

Drilling The Panels

Fig. 3 shows the front panel at one-half scale and Fig. 5 the two rear panels. You will notice that a center line is drawn through each panel. That is done so that you can measure, in laying out your panels, from the center to the left and to the right rather than working from one end or the other. The former way is much more accurate as the holes will be correctly located in respect to each other even tho the panel is not of exactly the correct length. Vertical measurements should be made upward from the bottom edge.

The 1-in. and 1½-in. holes for the tubes are made with Stevens panel cutters. A 3/16-in. hole should be drilled first at the center to take the point of the panel cutter. All holes on which dimensions do not appear should be made with a No. 18 drill.

Step-by-step Assembly Instructions

To make the assembly work as easy as possible, have all the parts and the necessary tools ready to work with before you start in. You ought to have an American Beauty soldering iron, a small and large Yankee screw driver, pliers and cutters, Spintite wrenches for ¼-in. and 5/16-in. nuts and a foot or two of rosin core solder. Remember to fill each lug with solder before you put it in place and put lugs on each instrument, pointing in the directions shown in Fig. 7 before you mount the separate parts.

1. Mount the variometer, variable condenser, Fil-Ko-Stats, potentiometer, jack and the four panel support pillars on the front panel. Screws and nuts are supplied with the Fil-Ko-Stats and potentiometer. The variable condenser is held by a clamping nut on the front panel. ½-in. 6-32 R. H. screws are required for the variometer and the panel support pillars.

2. Connect 1 to 2 and 3 to 4. 1 and 3 are lugs on the potentiometer binding posts. Terminals 3 and 4 are soldered directly to the coil mounting pillars. Connect 5 to 6. These are the terminals on the Fil-Ko-Stats. Connect 7 to 8. 7 is a lug on the Fil- Ko-Stat mounting screw and 8 the center spring on the jack. Connect 9 to 10. The strap on the variable condenser should be across A and B and connection 9 is on terminal A.

3. Put the interpanel connection screws and lugs on the sub panel. These provide connections numbered 22 and 60, 14, and 58, and 28 and 36. Looking at the sub panel from the rear, the left hand interpanel connection screw should have the lug

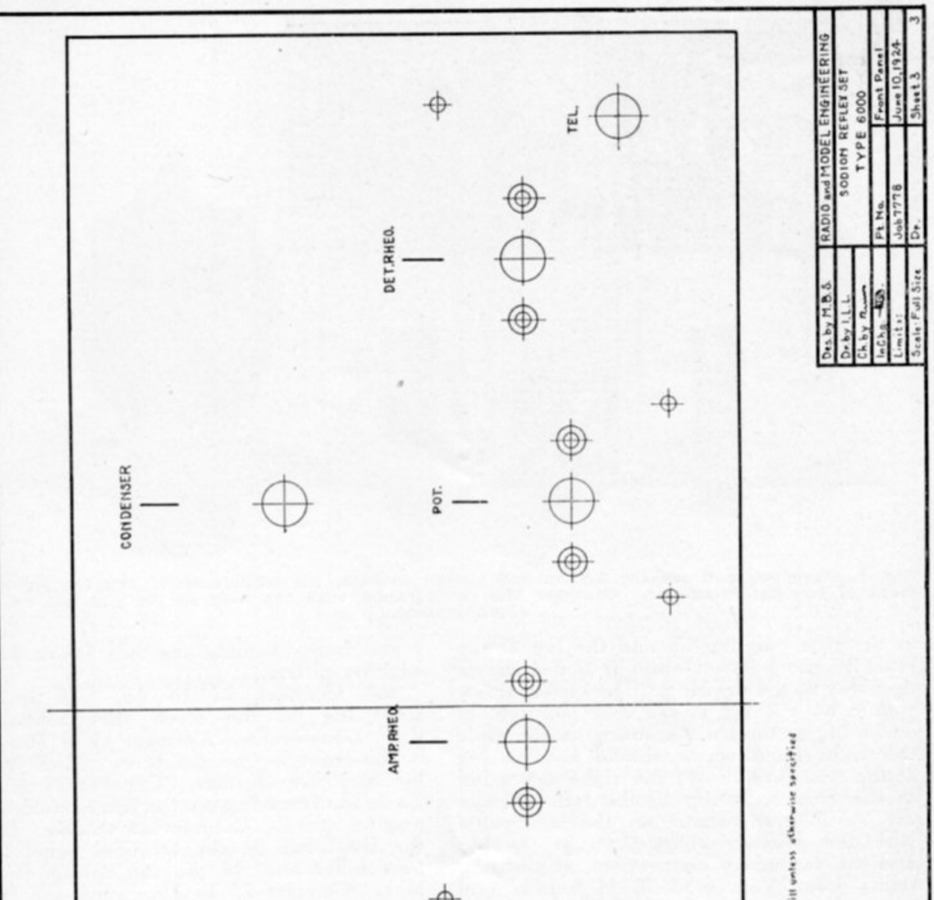

Fig. 3. One-half scale drawing of the front panel. Concentric circles indicate counter sinking for flat head screws.

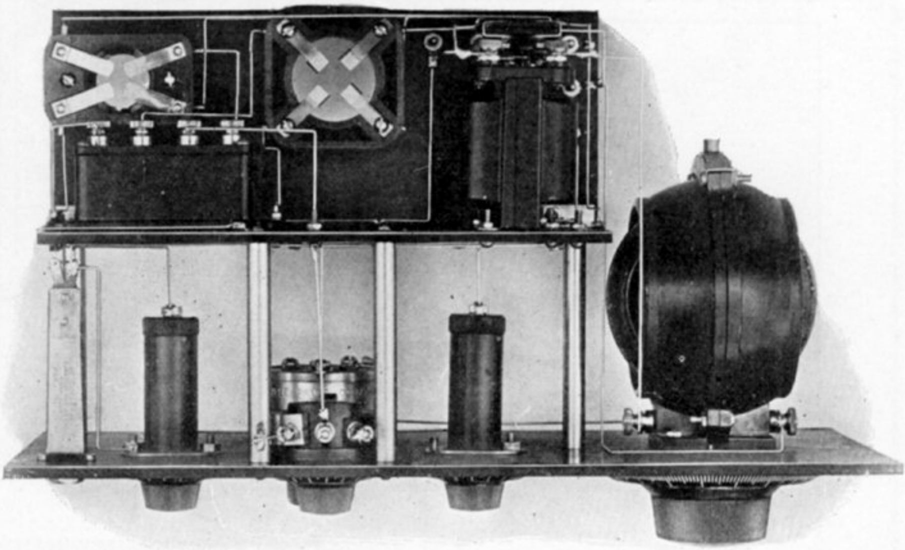

Fig. 4. Here you can see the Sodion and audion sockets, the transformers, and the arrangement of the potentiometer. Compare the photographs with the diagram as you put on the connections.

at the rear pointing up and the lug at the front pointing down, altho it is not shown that way in the drawing. The center screw should have a lug at the rear pointing up and a lug at the front pointing down, while the right hand screw should have a lug at the rear pointing to the right and a lug at the front pointing to the left. Mount the A. F. transformer on the sub panel with the primary connections at the top and the secondary connections at the bottom. Use ½-in. 6-32 R. H. screws and nuts. On the upper right hand mounting screw put a lug pointing to the right at the rear of the panel and on the left hand upper screw put a lug pointing to the left on the front of the panel. Mount the R. F. transformer on the sub panel using ½-in. 6-32 R. H. screws and nuts. The right hand screw should have a lug at the front of the panel pointing to the right and another lug on the transformer base pointing upward. The left hand mounting screw should have a lug at the front and another on the transformer base, both pointing downward.

4. Connect 11 to 12, and 13 to 14.

5. Mount the sub panel on the panel support pillars using ½-in. 6-32 R. H. screws. Beneath the screws which hold the two upper pillars put on the angle brackets, and on the screw holding the left hand angle bracket put a soldering lug, and another between the pillar and the front of the sub panel. These instructions are given looking at the rear of the set. Note that soldering lugs must be put under the screw heads holding the two lower panel support pillars.

6. Connect 17 to 18. 18 is the front lug on the screw that holds the R. F. transformer. Connect 19 to 20. 19 is the front lug on the screw which holds the A. F. transformer. Connect 21 to 22. 22 is the front lug on the inter panel connection screw. Connect 23 to 24. 23 is the front lug on the terminal panel support pillar and 24 the top spring of the jack. Connect 25 to 26. 25 is the front lug on the screw holding the R. F. transformer and 26 the longest spring on the jack. Connect 27 to 28. 27 is the frame terminal on the jack and 28 the front lug on the interpanel connection screw. Connect 29 to 30.

7. Mount the binding posts on the panel. Have the holes in the four rear binding posts pointing front and back and the two side binding posts left and right. Put lugs on each binding post. Turn the thumb nuts on the UV201-A socket down tight and on each binding post screw put a coil support pillar and tinned lug. Mount the socket with ½-in. 6-32 R. H. screws going into the pillars. Mount the tube panel on the angle brackets using ½-in. 6-32 R. H. screws and nuts. Connect 31 to 32. 31 is the filament lug on the socket and 32 the rear lug on the R. F. transformer mounting screw. Connect 33 to 34, 35 to 36, 37 to 38, 39 to 40, 41 to 40, and 42 to 29. 41 and 42 are lugs on ½-in. 6-32 R. H. screws passing through the terminals of the Micadon.

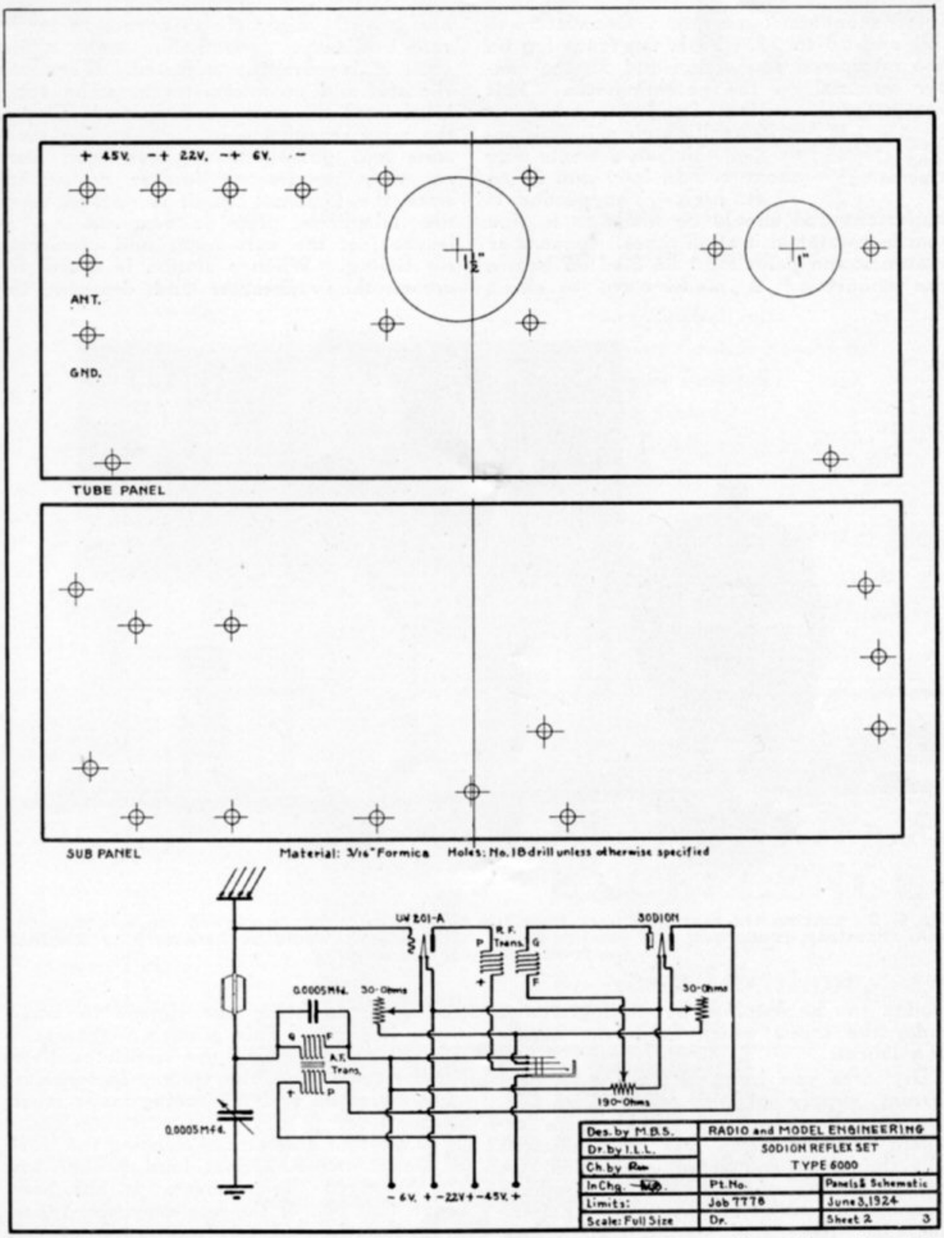

Fig. 5. One-half scale drawing of the sub panel and base panel and the schematic wiring diagram showing the general system of the circuit employed for reflexing.

Keep the Micadon close to the transformer terminals so that it will not interfere with the cabinet when the set is mounted. Connect 43 to 44. 44 is the plus terminal on the transformer. Connect 45 to 46. 45 is the grid terminal on the socket.

8. Put soldering lugs on the terminals of the sodion socket, and fasten the socket to the under side of the tube panel by means of ½-in. 6-32 R. H. screws threaded into coil support pillars.

9. Connect 15 to 16, 47 to 48, 49 to 50, 51 to 52, 53 to 54, and 55 to 60. 60 is a connection made to the rear lug on the

interpanel connection screw. Connect 56 to 57, and 58 to 59. 58 is the front lug on the interpanel connection and 59 the center terminal on the potentiometer. This completes the wiring of the set.

Testing And Operating

A small antenna is satisfactory on this set, a single wire about 100 ft. long and 20 or 30 ft. high. The ground is important and should be made to a pipe that has water in it at all times. Remember that rust and paint must be filed off before the connection is made. An excellent ground can be obtained by putting a wire under the screw which holds the handle of a faucet.

Dry cells can be used for the filament current supply of this set. The 6-in. Eveready batteries, type 7111, give excellent service. Two sets of four-series cells should be connected in parallel. A storage battery of 40 or 60 ampere-hour capacity is preferred by some Experimenters. The panel markings show how the B batteries should be wired, 45 volts across the two left hand rear binding posts, looking at the set from the front, and 22 volts across the two center posts. This puts 67 voles on the amplifier tube and 22½ on the detector.

Try out the filament circuit before you connect the B batteries so that any errors will be discovered before the tubes are blown out. Light the filaments to moderate brilliancy. The Sodion emits a hiss until it is correctly adjusted. Then the rheostat and potentiometer must be regulated until the noise just ceases. That is the most sensitive point. When the rheostats and potentiometer have been once set they require no further adjustment since the filament circuit is opened when the telephone plug is removed. That leaves just the variometer and condenser for tuning. When a station is heard, increase the variometer and decrease the condenser to bring the signals to maximum strength. This gives a regenerative effect without making the circuit oscillate. At the same time, the volume is considerably increased and the tuning made much sharper.

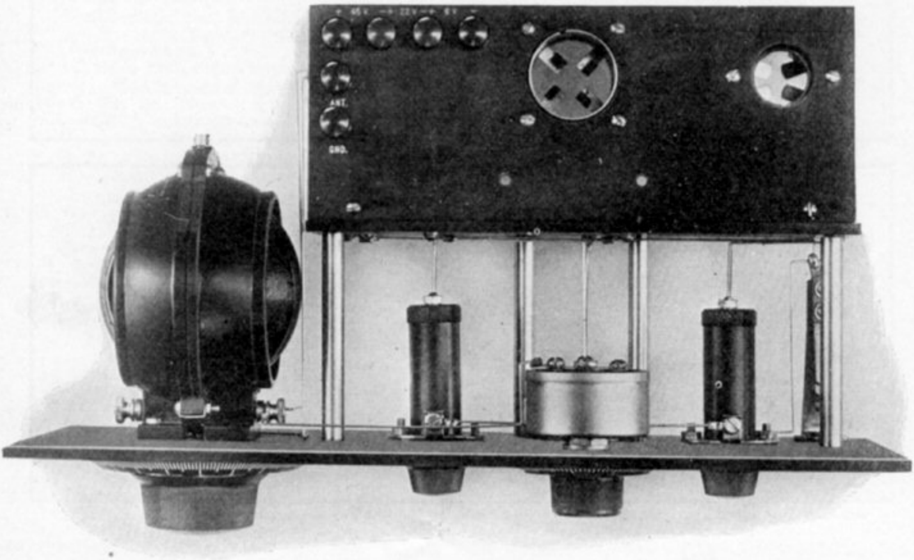

Fig. 6. By spacing the rear unit back from the front panel, room is allowed for mounting the jack, rheostats, condenser, and potentiometer. Otherwise it would be necessary to lengthen the front panel considerably.

In the first illustration, showing the front of the set, two Ackerman loud speakers are connected to the receiver. It has been found that two of the less expensive types, even tho the volume from each unit is less, give a greater total volume, oftentimes, than a single expensive loud speaker. It is essential, of course, to use loud speakers which do not overload or distort. Since only one jack is provided on the set, the plugs are inserted in a Pacent Twin Adapter, as you will see in the illustration. The individual plugs are of the Pacent No. 40 type.

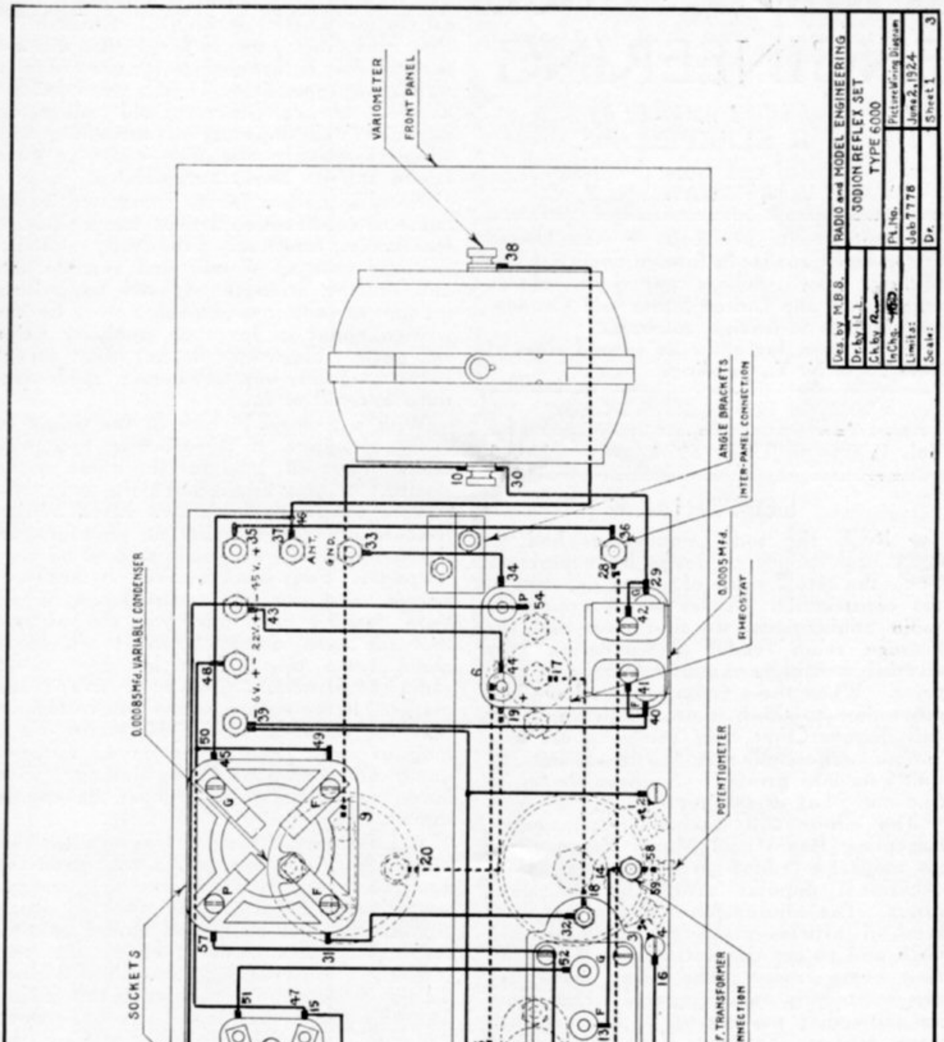

Fig. 7. The picture wiring diagram shows the connections as they are actually arranged. Much time and trouble can be saved by following the assembly and wiring instructions.

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EDITORIAL

SINCE the radio public has had an opportunity to judge by experience the actual value of ninety per cent of the construction articles which appear in radio publications, we find now that the average radio reader is wondering why all this worthless material ever gets into print. When these radio readers have had more time to think it over, however, they will discover that they really should ask, "Who writes all this worthless material that gets into print?" Suppose we try to find out. Let us ask questions.

The editor will disclaim responsibility. Excepting Radio and Model Engineering, no magazine editor writes more than an occasional popular article or the short fillers. The editor's job is to find out what kind of articles make the magazine sell well, and to get those articles. Where do they come from? The editor says they are written by radio experts. How does he know they are experts? Because they were among the first Experimenters to have radio sets back in 1910 or years ago, anyway.

Now—Think of someone who has owned a motor car for as long as that, so long that he has had all kinds of experience with all kinds of cars. Perhaps he can take the engine apart and put it together without one mistake. But is he an expert on automobile design and construction? He knows the faults of his motor, but can he design a new one that would be better? He can recognize a body squeak, but can he draw up one which will neither vibrate nor squeak?

Certainly not! He hasn't had the right kind of experience, nor the facilities for getting that kind of experience. Nor has the "free lance" writer of radio articles the fundamental grasp of theory or practice. Again, when you consider that the actual cost of producing a construction article for RADIO & MODEL ENGINEERING runs from $400 to $500 you will see that the cost is far too high for the ordinary writer who gets 1c or 1½c a word for the article. He can revamp old things on paper, or tell the story of something new which somebody else did—just as your friend can do about automobiles.

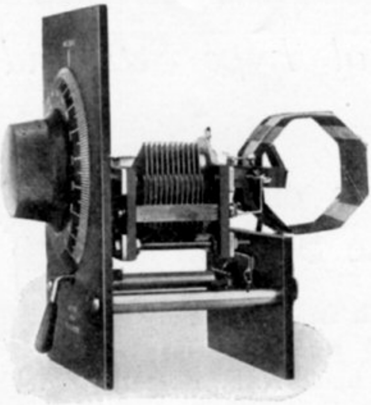
Not all of the offenses committed in the name of construction articles can be laid to free lances, however. Frequently a manufacturer gets up a new and terrible set, and on the strength of paid advertising induces the editor to publish a story he has written about it, for such publicity helps sell parts. Magazines do not often accept such materials but newspaper radio sections are full of it.

With a general picture of the origin of radio atrocities, it is easier to recognize them. First off, look for the name of the circuit. If you think that's the only new feature about it, that's two black marks. If there are drawings but no photographs, the set probably was built and tested only on paper. Four black marks. If there are photos, and the instrument looks like a Ford dealer's junk pile, you can assume that the man doesn't know much more about radio theory than he does about radio construction. Give it five black marks. If the author wants you to believe that the set is good for 500 miles on a loop or over 1,000 miles on an antenna under all conditions, he's bluffing. Five more marks. Any score over six counts the set out.

A little over three years ago, when this publication first appeared, it was given the name Radio and Model Engineering because we expected to divide the editorial space equally between radio and model articles. As it has developed, however, the two subjects are so distinct that they do not belong properly in the same magazine. Therefore, with the August issue, the word "Model" will be dropped, making the name in the future Radio Engineering. Later, a separate magazine will be published under the title of Model Engineering, but until that time model articles will be continued in Radio Engineering.

The size of R and M under its new name will not be changed, but the number of pages will be increased to allow room for the regular construction articles and, in addition, design data, technical information on new types of equipment, laboratory and factory tests and inspection, as well as special features planned for designers, engineers, and shop superintendents, and of equal interest to Experimenters and radio dealers who are keeping up with the advance of the art.

M. B. SLEEPER, Editor



A Selective Wave Trap

The ability of a wave trap to cut out unwanted signals depends upon low losses in both the inductance and condenser.

ON any type of receiving set a wave trap can be used to make the tuning sharper. Some experimenters who have tried to use this device, however, report that it does not help enough to make it worth while. Investigation has shown that, in every case, either the condenser or coil or both, were not of efficient design, the losses being so great that the tuning of the wave trap or filter was about as broad as that of the receiver itself.

The type illustrated here does give real selectivity because the losses are exceedingly low and the tuning, consequently, sufficiently sharp.

The front panel is of Formica 7 by 5 ins. and the rear terminal panel 2½ by 5 ins., both 3/16-in. thick. The front panel carries a 0.0005 mfd. Hammarlund vernier variable condenser, on the rear of which is mounted a Fikit of pickle bottle coil design, manufactured by the Eastern Coil Company. Although the Fikit with 12 turns on the primary is shown in the illustration, better results are obtained with the type having only 6 turns on the primary. Two holes are drilled in the upper part of the aluminum frame 2¼ ins. apart. These take 3/8-in. 6-32 R. H. screws and nuts to fit in the holes of the coil mounting legs. To make the unit handy for laboratory use the terminal panel is secured to the front panel by means of two coil support pillars.

Since this filter is of the inductively coupled type the primary terminals on the Fikit are run to the two binding posts and the secondary terminals to the connections on the variable condenser. One binding post should be run to the ground connection on the receiving set and the other to the ground lead. Sometimes better results are obtained with the filter in the antenna circuit although generally it makes very little difference.

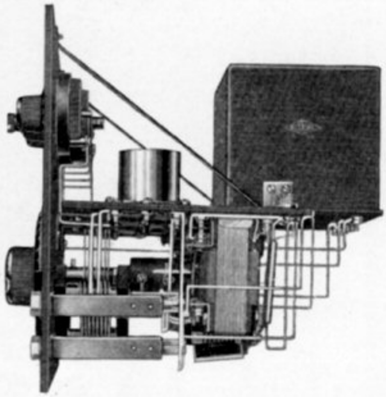
When the filter is not in use the variable condenser should be set at zero. As soon as interfering signals are heard, the dial should be rotated until the interference is reduced to minimum.

In some circuits better results are obtained with the filter directly in the antenna circuit. Then the primary winding on the Fikit should be left open, the antenna run to a connection on the fixed plates and a wire run from the variable plates to the antenna binding post on the set. That is the infinite impedance type of filter. Its operation is the same as for the coupled type.

The wave trap makes an excellent wavemeter, if you can have it calibrated from a standard, either for general laboratory use or to determine the wavelength of incoming signals. If it is calibrated, you can tell the wavelength of transmitting stations by adjusting the wavetrap until the station cannot be heard. At that point the wavelength setting is the same as that of the sending station. You can work the calibration backward, if you wish, by noting on a chart the setting of the wavetrap dial on various stations whose wavelengths are given in the programs or call lists.

Design Data on the Bestone Set

An unusual tuning circuit arrangement is employed in the V-60 receiver. This outfit employs a step of tuned R. F., detector, and two-step A. F. amplifier.



IN the V-60 receiver a very unusual tuning circuit arrangement is employed, as shown in the accompanying wiring diagram. The antenna circuit is coupled to the secondary by a single turn of wire altho it is conductively coupled to the first tube through a small condenser on one side and from the filament circuit on the other side. The 3-coil inductance unit, made up on a single tube, 3 ins. in diameter by 10 ins. long is wound with No. 18 D. C. C. wire, with 64 turns on the lower section, 32 turns on the center section, and 64 turns on the upper section. No space is left between the sections of the unit. The antenna coupling turn is wound on the center of the middle coil.

Coupling between the first tube, which is the R. F. amplifier, and the second, the detector, is accomplished by transformer L-5. This consists of a lattice winding of 48 turns of No. 24 D. S. C. wire, making a coil 5/8-in. wide. It is slipped inside a Bakelite tube around which 8 turns of the same wire are wound, to serve as a primary.

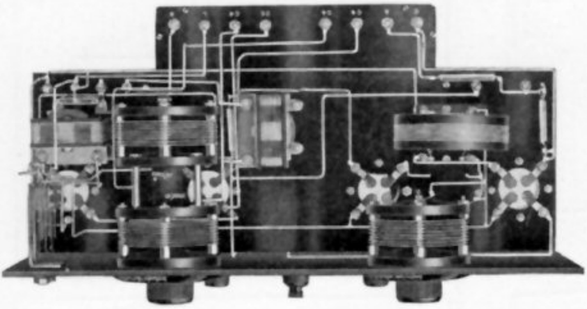
The side view shows a wooden case mounted at the rear of the tube panel. It contains the antenna and secondary coil unit with the fixed condensers. The R. F. transformer, however, is mounted beneath the tube panel.

Shunted around the upper and lower coils are 0.0005 mfd. condensers. They are controlled from a single knob, for the shaft of one is coupled to the shaft of the other, as can be seen in the illustration showing the under side.

The filament circuit is so arranged that, normally, only three tubes are lighted when the switch is turned on but, when the plug is inserted in the second jack, the filament control contacts close the circuit of the last tube, the second A. F. amplifier.

This is an excellent outfit for those who prefer non-regenerative tuned radio frequency rather than the usual regenerative outfits. The quality of reproduction is particularly good, the range compares favorably with the best types of receivers, and the tuning is extremely simple since, once the rheostats have been adjusted to give the proper brilliancy, there are only two controls to adjust.

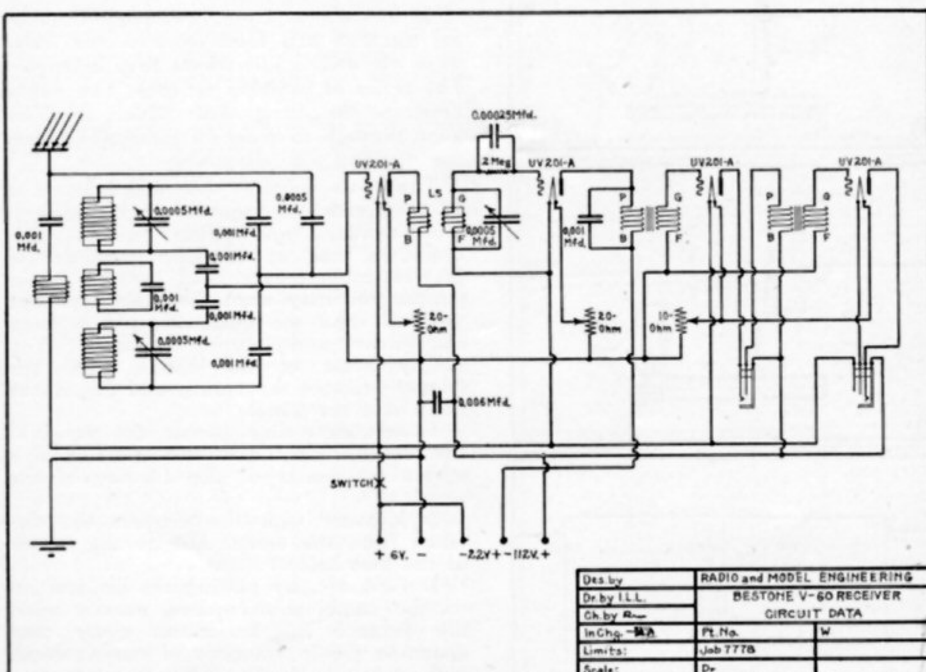
This outfit is manufactured to sell completely assembled altho, for the benefit of Experimenters who prefer to build their own equipment, the parts are available either as a complete kit or special items can be purchased individually. The price of the assembled receiver, without tubes or batteries, is $150.00, while the combination of coupled variable condensers, complete inductance unit, and R. F. transformer costs $20.50. The parts employed are of Bestone manufacture throughout except for the fixed condensers and gridleak, which are of Freshman manufacture. Two types of cabinets are supplied, either the mahogany cabinet with a compartment for B batteries or a smaller size without the B battery compartment, finished in black leatherette.



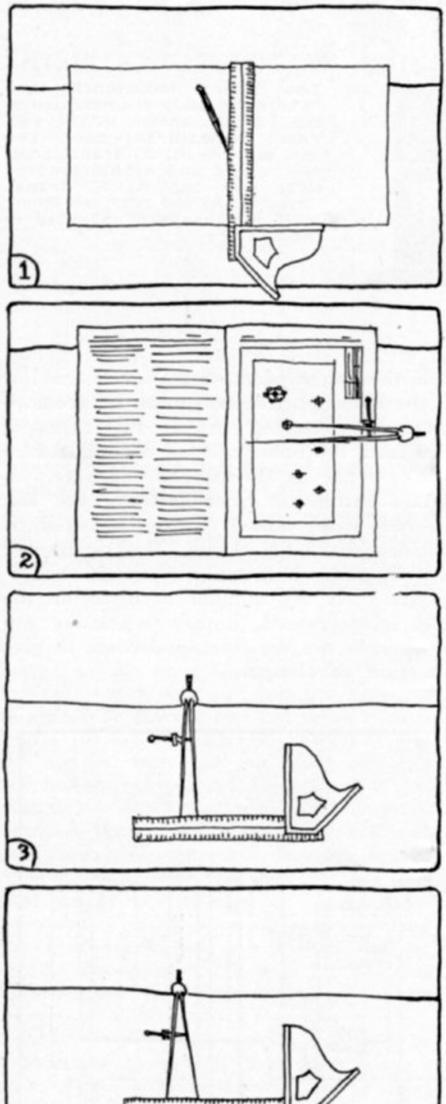
The tuning inductances and fixed condensers are mounted in the cabinet, shown in the side view. Beneath the panel you can see the R. F. transformer coil, single and double condensers, and the A. F. transformers. At the rear are terminals for the parts mounted in the box.

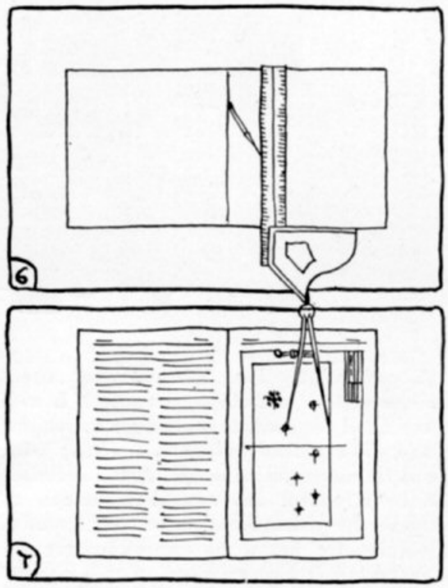
A particularly long ground may affect the circuit to a certain extent and it is well to try fixed condensers of various capacities in the ground lead before connecting with the A minus terminal. A .001 condenser has been found in several instances to increase the volume and selectivity greatly. A single-wire aerial of approximately 60 ft. in length is best adapted to this circuit. If a long aerial is used it is well to make the .0005 mfd. condenser of 0.00025 mfd., and where an indoor aerial is used, this condenser should be entirely eliminated.

If the range of the readings is too low on the dials, greater range can be accomplished by removing one or two turns of wire from the outer coils of the inductance unit. This is mentioned because, in certain instances, Experimenters use silk covered wire where cotton covered is specified and, of course, the distributed capacity and inductance vary in consequence. As the number of turns on the coils is decreased, higher capacities are required in the variable condensers to give the same wavelength.



The wiring of the set and the constants are given in this diagram.





IT is just as easy to lay out instrument panels accurately as it is to make mistakes and it is a lot more fun when you start the assembly work to have everything fit together properly instead of patching up here and there because the holes were not drilled just where they belonged. The series of sketches on these two pages illustrate the exact steps which must be gone through to scale off dimensions from the one-half size drawings.

The tools required for this job are a 12-in. combination square, pocket scriber, 6-in. dividers, and center punch. The tools we used at the laboratory are of Starrett manufacture. As for the center punch, you may want the plain type but you will find the automatic punch more convenient and more accurate. You simply press on the handle until the trigger releases the spring and forces the point into the panel.

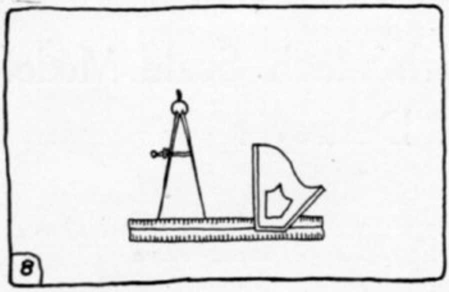
1. Scratch a line across the panel at the exact center and also draw a line across the center of the drawing of the panel.

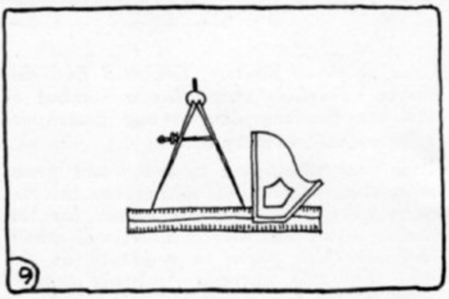
2. Measure with the dividers the distance from the center line to the center of the first hole.

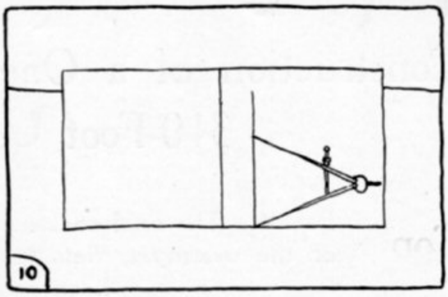
3. Find out, by putting the dividers on on the combination square, exactly what the distance is. In almost every case distances are in fractions of one-sixteenth inch.

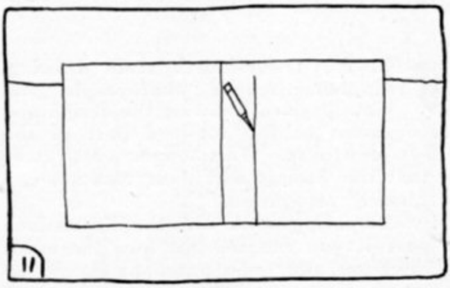
4. Reset the dividers at exactly twice the original setting, measuring on the square.

5. With the dividers, make a light mark









at that distance from the center line on the panel.

6. Scratch a line across the panel, parellel to the center line, through the mark just made with the dividers.

7. Measure on the drawing from the bottom of the panel to the center of the hole. Always work to the outside of the lines marking out the panel on the drawings.

8. Determine the distance just found on the drawing.

9. Double the distance as before and reset the dividers.

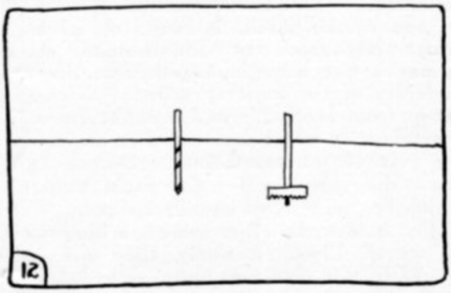
10. Lay off this new distance from the bottom of the panel up on the cross line previously scratched.

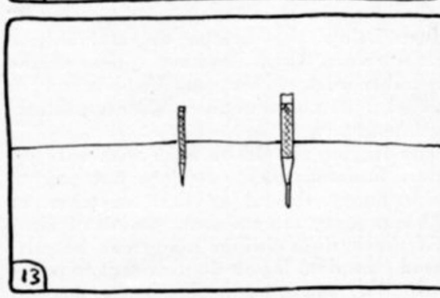
11. Where the new mark intersects the cross line make a center punch mark. This is the correct location for the hole.

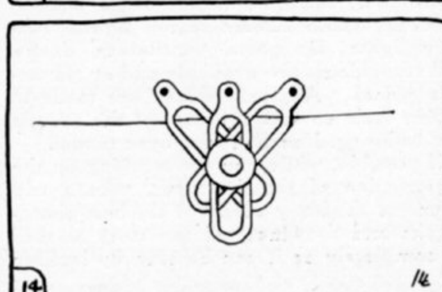
The other three illustrations show tools which are also used in this work, the twist drill, center punch, and panel cutter, the plain and automatic center punches, and the Church automatic drilling template.

The panel cutter is a new tool recently brought out by Stevens and Company. It can be fitted in a hand brace. This makes a smooth, clean hole for socket tubes and bezels. The automatic center punch has been described already.

The automatic template is particularly useful where you are employing an instrument that calls for drilling different from that shown in the scale drawings. It can be very quickly set to the holes on the instrument and the centers transferred to the panel by tapping on the hardened steel points.







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

Part 4. The final construction data on the forward half of the destroyer, detailed photographs of which have been given already.

FIG. 10, a one-fourth scale drawing, supplements the photograph previously given, showing the design and arrangement of the forward part of the 310-ft. destroyer. This is sufficiently clear so that the fittings and their location can be quickly recognized.

By comparing notes with the illustrations in part 1, you can see just how the mast, rigging, and the radio antennas should be designed. The auxillary antenna, running to the smoke stack, is made up of four wires, separated at the smoke stack spreader but brought together at the extremities of the mast spreader. A lead is taken from each side and brought down to a single wire which is secured to an insulater just aft of the bridge. Dotted lines show the spreader for the main antenna which has four wires equally spaced.

Just below, the cross arms are illustrated in dotted lines. Actually they are not turned in this direction but they are drawn in that way to show the size.

Just below the bridge an ammunition rack is shown which does not appear on the original model. This can be put on or omitted if its construction presents particular difficulties.

The rigging should be done with wire or, better, fine fish line. It does not pay to use ordinary thread as that stretches or even rots away after a short period of time.

Of the various fittings many can be purchased complete if you do not want to make them. For example, the life boats, anchor, binnacle, cabin doors, search lights, running lights, air ports, ventilators, davits, and stanchions, are available and at reasonable prices. All these things are made to 1/8-in scale so that they are of the correct size to be used on this destroyer model.

If possible, while you are working on the construction of the destroyer, take a trip to one of the Navy yards for the best photographs and drawings tell the story as well or completely as it can be seen by looking at one of these boats. You will find differences in details altho, for a number of years, the general plan of our destroyers has been changed very little.

It is very important to use water proof glue in the construction work even tho the boat is not to be put into water for the moisture in the air, after a time, will otherwise cause the parts to separate at the joints. For this purpose Ambroid cement is particularly recommended. It comes in a small can of 2 ounces or a larger size containing 5 ounces.

The flux used for soldering must also be watched for anything containing acid will corrode the metal pieces. If an acid flux is used all traces should be wiped away with a cloth or brush and alcohol. Experienced model makers use silver solder but that is a little harder to handle than the ordinary lead solder.

Many ship models which are so highly prized today were built years and years ago. The secret of maintaining a model in perfect condition for a long time lies in the proper choice and use of the materials. For that reason the painting, too, must be done with great care and with the best mediums possible.

For model makers who prefer to work from full-size drawings rather than those of one-fourth scale which are presented here, a set of photostats is now available, reproducing Fig. 4, Fig. 10, and the other half of the destroyer, not shown in Fig. 10, at the actual size for a one-eighth-inch scale model. The photostats can be obtained from the Blueprint Department. Several readers have asked why the scale of one-eighth-inch was chosen. This is, to be sure, an arbitrary scale, but it is the one most commonly used not only by model makers for their own work but for commercial and naval models as well. It is best to select a particular scale and keep to it, so that different models, when grouped together, do not seem disproportionately large or small.

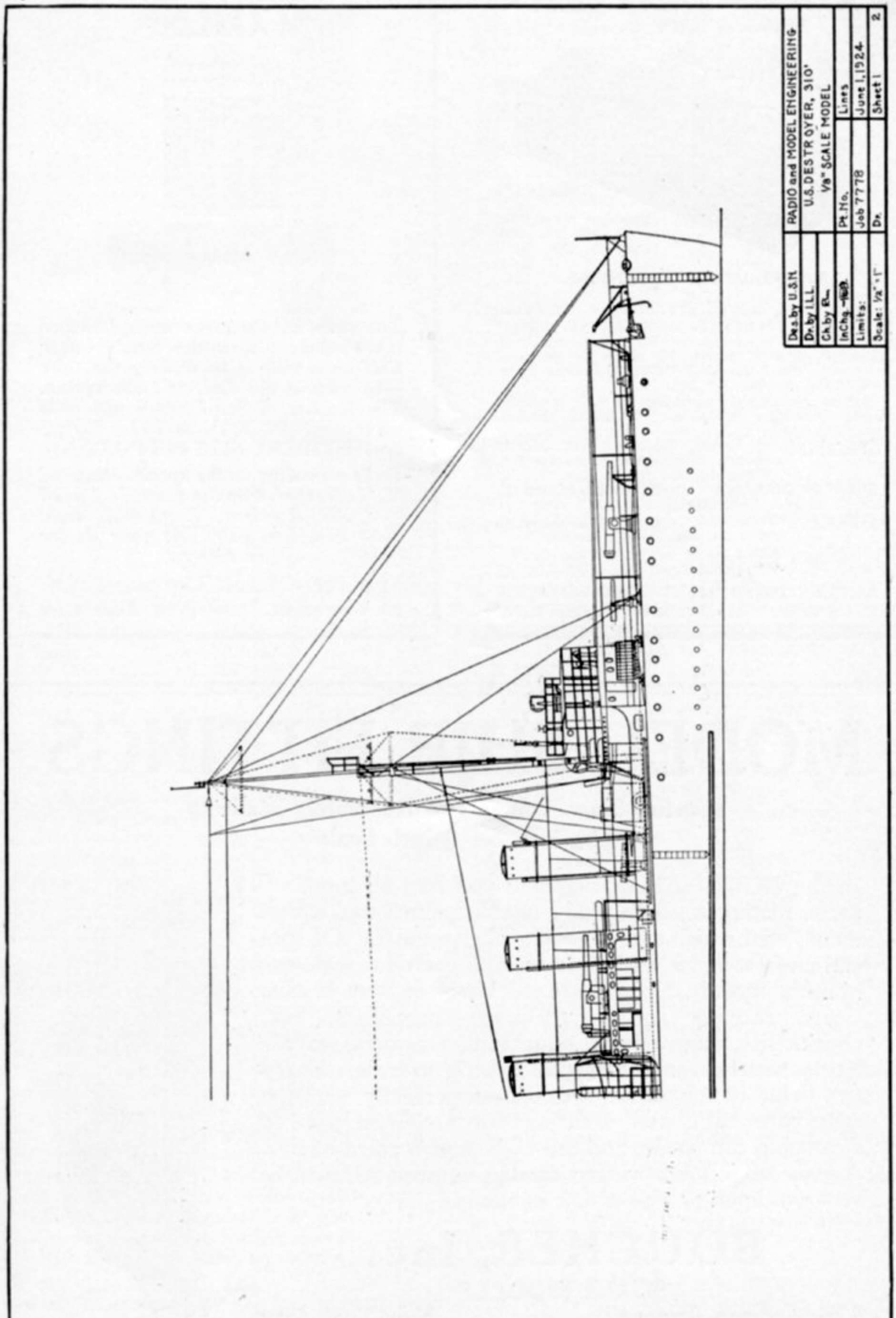


Fig. 10. One-fourth scale drawing of the forward half of the 310-ft. destroyer.

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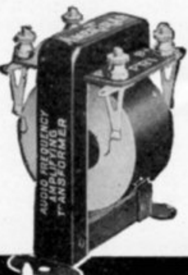

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American Transformer Co., 173 Emmet St., Newark, N. J.

Designers and builders of radio transformers for over 23 years

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.

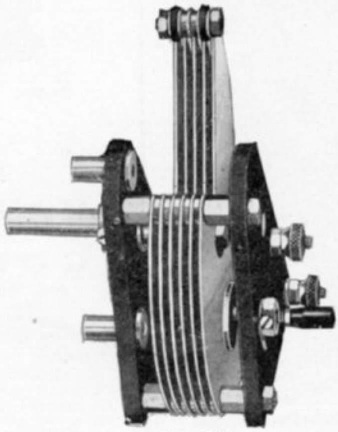
PARTS FOR THE TYPE 6000 SODION REFLEX RECEIVER

Type	Name	Price
	Acme Apparatus Company, Cambridge, Mass.	
R2	R. F. transformer	$5.00
	Adams-Morgan Company, Upper Montclair, N. J.	
	1-Paragon variometer	5.00
	Carter Radio Company, G-209 So. State St., Chicago, Ill.	
103	1-3-spring jack	.90
	Connecticut Tel. & Elec. Co., Meriden, Connecticut.	
S13	1-Sodion tube	5.00
D10	1-Triple range condenser	4.50
	Dubilier Condenser & Radio Corp., 48 West 4th St., New York City, N. Y.	
601	1—0.0005 mfd. Micadon	.35
	H. H. Eby Mfg. Co., X-40 So. 7th St., Philadelphia, Pa.	
Ensign	6—Ensign binding posts	1.20
	James Goldmark Company, B-83 Warren St., New York City, N. Y.	
W	1—½lb. spool of Wirit	.92
	Henry Hyman & Company 476-Y Broadway, New York City, N. Y.	
724	1—Audion socket	.75
	Kellogg Switchboard & Supply Co., 1066 W. Adams St., Chicago, Ill.	
501-A	1—1 to 4½ A. F. transformer	5.00
	Kurz-Kasch Company, South B'way, Dayton, Ohio.	
NW	1—4-in. tapered knob and dial,	$1.25
A212	3—2-in. tapered knobs and dials,	1.80
	Pacent Electric Co., A-22 Park Place, New York City. N. Y.	
	1—Special 190-ohm potentiometer,	1.25
	Poster & Company 26 Barclay St., New York City, N. Y.	
154	1—7 by 14 by 3/16-in. Formica panel,	2.49
98	1—3½ by 22½ by 3/16-in. Formica panel,	2.76
	Radio Stores, Inc., 218 West 34th St., New York City, N. Y.	
DX	2—30-ohm Fil-Ko-Stats,	4.00
	Miscellaneous Parts	
58	2Pkgs. 25 tinned soldering lugs.	.40
22	1—right hand nickeled angle bracket	.10
185	1—left hand nickeled angle bracket	.10
14	6—coil support pillars	.48
151	4—terminal panel supports	1.20
63	3—Pkgs. 10, ½-in. 6-32 R.H. nickeled screws	.36
49	2—Pkgs. 10, 6-32 nickeled nuts	.16
6000	Set of full size blue prints, 3 sheets, for Sodion reflex set	.75
	COMPLETE SET OF PARTS..	45.72

PARTS FOR TYPE 6100 WAVE TRAP

Type	Name	Price
	Eastern Coil Co., 22 Warren St., New York City, N. Y.	
6	1—Fikit, 6-turn primary	$2.00
	H. H. Eby Mfg. Co., X-40 So. 7th St., Philadelphia, Pa.	
Ensign	2—Ensign binding posts	.40
	Hammarlund Mfg. Co.. B-144 West 18th St., New York City, N. Y.	
	1—0,0005 mfd. Vernier condenser	6.00
	Kurz-Kasch Company, South B'way, Dayton, Ohio.	
NW	1—4-in. tapered knob and dial	1.25
	Poster & Company, 26 Barclay St, New York City, N. Y.	
158	1—7 by 5 by 3/16-in. Formica panel	1.00
98	1—7 by 2½ by 3/16-in. Formica panel	.53
	Miscellaneous Parts	
151	2—Terminal panel supports..	.60
63	1—Pkg. 10, ½-in. 6-32 R. H. nickeled screws	.12
	COMPLETE SET OF PARTS FOR THE WAVE TRAP..	11.90
	Auxiliary Parts	
	National Carbon Company 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

The Kellogg New Eleven Plate Condenser



No. 610

Radio fans, who have had trouble connecting and adjusting grid biasing condensers, will appreciate our new condenser, code 610, which the Kellogg Company have just placed on the market. This is a standard 11 plate variable condenser of minimum .000001 and maximum .000010 microfareds, and it has as part of the construction, a micrometer vernier condenser with a capacity minimum of one micro-microfared and a maximum of ten micro-microfareds.

The use of this No. 610 Kellogg condenser has many advantages.

1. It is designed to provide a vernier of minute capacity that can be used as a bias.

2. To eliminate unnecessary wiring and its attendant difficulties and complications.

3. To limit the number of parts necessary in the set.

4. Providing the greatest degree of efficiency in circuits requiring grid, micrometer, or biasing condenser.

The use of these condensers in any stage improves not only the appearance of the set, because of reducing the amount of wiring and apparatus, but actually aids in more efficient tuning.

The Kellogg Switchboard and Supply Company, in keeping abreast with radio developments, have found that the amateur and radio experimenter are interested in a reliable condenser with vernier capable of being tuned from one to ten micro-microfareds.

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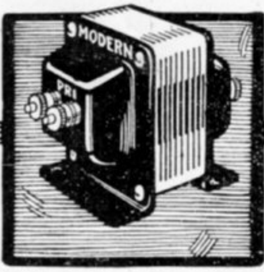

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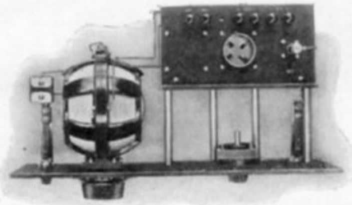
New York



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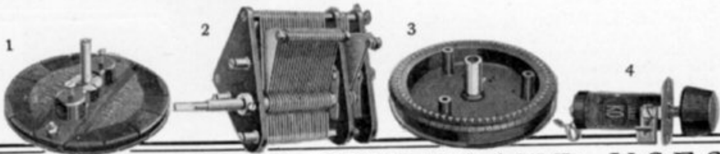

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