

# How to Construct a Cheap, Efficient, High Grade Regenerative Set

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FOR the amateur who wants to build a real receiving set and does not feel that he can afford to spend the money, I submit the following specifications of the Reinartz tuner, which, according to my many correspondents, is giving far greater satisfaction than the well-known vario-coupler and vario-meter set. This set is claimed by many users, to bring in signals which cannot be heard with the other well-known types, and the small investment required to build it is one of the features which recommend it to the experimenter. All of the inductances are wound upon the same form, which are of the well-known "spider web" type.

## Construction.

The mounting is made by cutting out a disc of fiber one-sixteenth of an inch thick and six and one-half inches in diameter. If fiber cannot be obtained, good heavy cardboard can be used, but it must be very carefully varnished with shellac before the winding is put on. Cut out the disc as described and divide the outside edge into eleven parts. Draw a circle two and one-half inches in diameter upon the disc to locate the bottom of the slots, then at each of the divisions cut a slot one-eighth of an inch wide from the outside edge to the inner circle so marked.

After all the slots have been cut, a coat of shellac varnish, or celluloid cement, is put on and, when dry, the form is ready for winding. It is a good idea to study the circuit as shown in Figure 3 before starting to wind. Note where the taps are taken off, as a great deal depends upon just the right number of turns being used. Leave all taps at least twelve inches long, so that no splicing will have to be done when the inductance is connected to the switches. The best wire to use for the winding is No. 26 cottename or silk enamel insulation, although plain cotton insulation will do if the maker is careful in his work. Begin winding at the bottom of any one of the slots, leaving an end at least twelve inches in length for connections. Wind in and out of the slots as shown in Figure 2 until fifteen turns have been put on. In counting

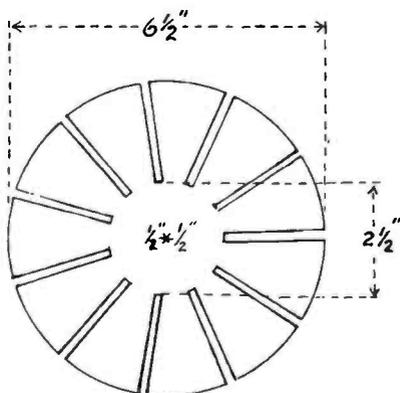


FIGURE 1.

these turns after they have been put on remember that only one-half of the turns will be visible on one side of the disc, so that when seven turns show on one side and eight on the other, it means fifteen complete turns.

When fifteen turns are in place, make a twelve-inch loop, twisting it together, so that this twist will come up tight to the slot, then the tap will not lose its identification among the numerous other taps to come. Continue the winding in this way, taking off a tap at every fifteen turns until sixty turns are in place. At the last turn cut the wire off, leaving the twelve inches for connection. If these instructions have been followed faithfully there will now be three taps and two ends projecting from the disc. It is a good plan to bring out these taps in different slots; that is, the first tap comes out in the next slot to the one in which the coil was started and the next tap in the next slot, etc., as this makes the identification of the wires much easier. This

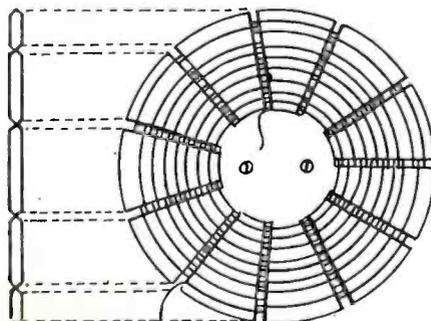


FIGURE 2.

coil is shown at the bottom of the diagram in Figure 3, and is marked "inside coil."

Now start the next coil in the next vacant slot, leaving the customary twelve-inch end; wind one turn only and bring out a loop. Continue in this way, taking a tap off at every turn until you have ten turns. Instead of cutting the wire at the end of the tenth turn, bring out another tap and wind fifteen more turns before you bring out the next tap. After the tap on this fifteenth turn, wind twenty-eight more turns, tapping them at every seventh turn, except the last one which will be a single end, as it is the finish of the winding. Now check up the number of turns with the diagram Figure 3 and see that the correct number of turns have been put on. There should be sixty turns on the inside coil and fifty-three on the outside coil. Now after the winding is completed, paint the coil all over with some insulating varnish, such as shellac or celluloid cement. Both of these windings together will just about fill the form. The best way to mount the coil is to cut off a piece of curtain-pole (wood) about one inch long, place it against the center part of the disc and fasten it to the panel with two brass screws. (Do not use iron screws, as they will tend to dampen the oscillations.)

If the set is to be mounted in a cabinet, it will be better to mount the coil with the piece of curtain-rod on a separate piece of wood, in an upright position, as this will give better access to the wires when it comes time to make the connections. The switches and contact points can be purchased at any radio supply store. Two variable condensers are necessary, one shown at "C" in Figure 3 should have a capacity of .001 M. F. and the one shown at "D" in the same figure should have a capacity of .0005 M. F. The rest of the apparatus required is the same as that used in any other regenerative set, viz.: One grid leak and condenser, one detector tube and socket, one storage "A" battery (6 volts), one plate, or "B" battery (twenty-two two and one-half volts), and one pair

of two or three thousand ohm receivers.

Figure 3 shows how all the connections are to be made, and the builder can mount the outfit as he pleases, either in a box with a panel front, or on a table or base-board. The method of winding the coil is shown at "B" in Figure 2. If this set is carefully constructed, the results obtained will surprise the most skeptical reader and with one step of amplification it will produce results equal to two steps of amplification on the vario-coupler and variometer set. The amplifier, however, should be of a specially designed circuit, which will be explained for those wishing to add it to their sets.

### Amplification for Reinartz Tuner.

Figure 4 shows the method of adding one step of amplification to the Reinartz tuner. In this circuit a variable condenser is shown in place of the grid-leak and condenser. The use of either of these is optional with the builder. The variable condenser will give better tuning effects, but the set will work very well if the grid-leak and fixed condenser is used; in fact, the set from which these specifications were taken used the fixed condenser and grid-leak. The method of connecting the amplifier to the circuit is similar to that of the ordinary circuit. The head phones are removed from the circuit shown in Figure 3 and replaced with the primary winding of a ten to one ratio audio amplifying transformer. In the set from which these specifications were taken, this primary winding of the transformer furnished enough reactance to make the tube oscillate properly, but this is not always the case. If it is found that the filament has to be burned at a dangerous degree of brilliancy to produce the oscillations, then an extra inductance should be inserted in the circuit at the point marked "X" in Figure 4. If however, the tube is found to oscillate without crowding the filament, then this extra inductance "X" should not be inserted.

If it is found that the inductance is necessary it can be made by making a small form similar to the one on which the two coils are wound, but much smaller, and winding six turns of wire of the same size as that used on the large coil. This has been found by experiment to be the correct number of turns and should not be changed. The secondary of the transformer is

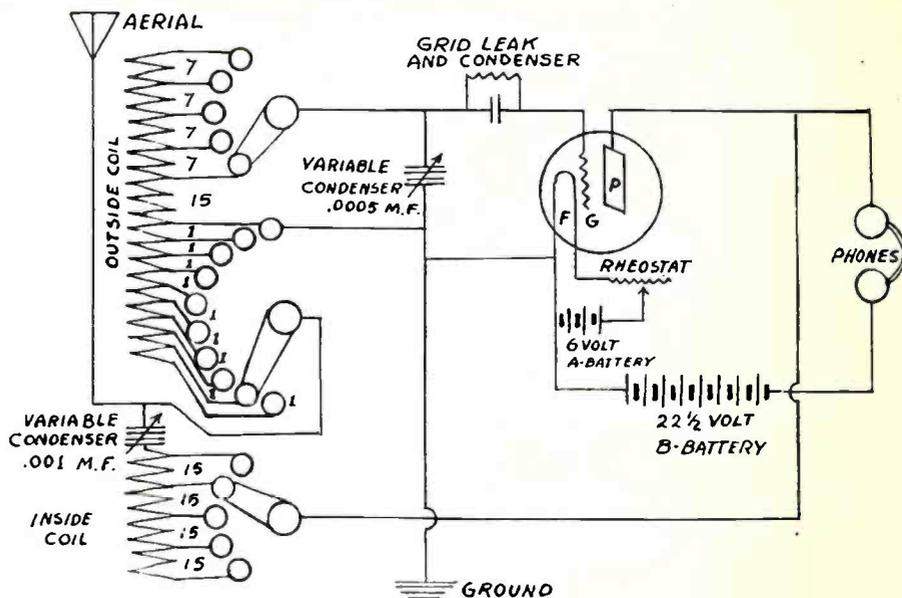


FIGURE 3

connected to the grid and filament circuit as shown in Figure 4.

The circuit shows only one set of "B" batteries used for both the detector and amplifier tube plates, but stronger signals may be obtained by adding another twenty-two and one-half volt "B" battery between the head phones and the battery shown on the drawing. This is shown in Figure 6. It is absolutely necessary to see that the positive side of the "B" battery is connected to the part of the circuit, which eventually gets to the plate,

and the negative side must always be connected to the filament. Another important thing is to see that the rotating part of the condenser "C" is connected to the aerial, and that the rotating part of condenser "D" is connected to the earth. The set will not give good results unless this is done.

The connections to the aerial, ground, and batteries are taken out through the back of the case, to avoid using binding posts on the front of the panel, as this always makes an unsightly wiring job. If desired,

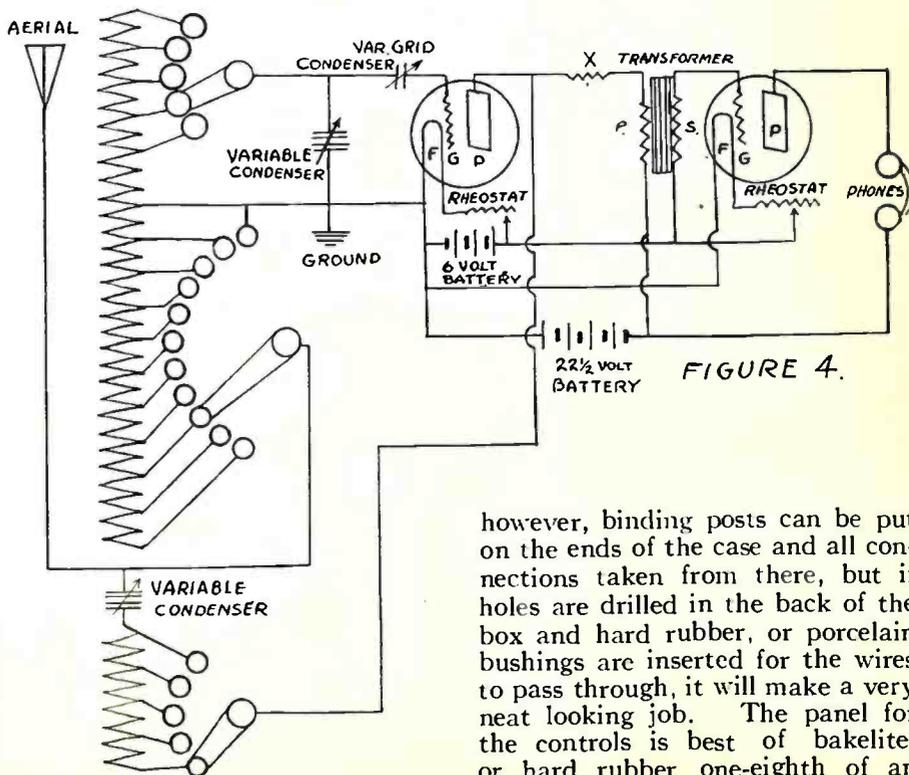


FIGURE 4.

however, binding posts can be put on the ends of the case and all connections taken from there, but if holes are drilled in the back of the box and hard rubber, or porcelain bushings are inserted for the wires to pass through, it will make a very neat looking job. The panel for the controls is best of bakelite, or hard rubber one-eighth of an

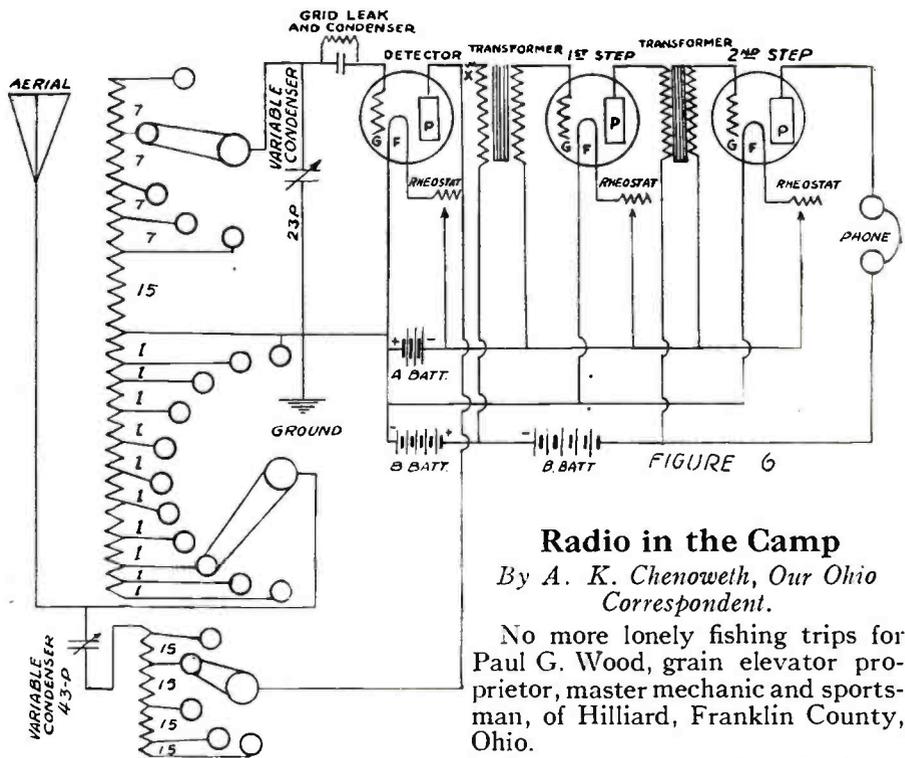
inch thick, eighteen inches long and eight inches high. The sockets and tubes are mounted directly behind the controlling rheostats and the holes in the panel shown above the rheostats are for the purpose of watching the brilliancy of the tube filaments.

The two dials shown are used for the purpose of adjusting the variable condensers and if a variable condenser is used in place of the fixed condenser and grid-leak, then another dial must be used for this purpose and the arrangement of the panel will have to be altered to suit the case. The spider-webb coil is mounted as far back in the box as possible and is placed directly behind the switches to facilitate the connections. The addition of this amplifier will make a wonderful addition to the set, but if it is desired to carry the amplification farther, another step of audio frequency amplification may be added.

**Addition of the Second Step of Amplification.**

Figure 6 shows the method of adding two steps of audio frequency amplification to the Reinartz tuner. While this addition is very seldom necessary, still there are some fans who can not get signals too loud to suit them and this circuit is shown for the benefit of those who want to go the limit. When I say limit, I think I have found a good word, for this is about as far as the amplification can go with this set without injury to the receivers, or loud speakers.

The diagram shown in this figure will be clearly understood without going into details, if the reader has carefully followed through the preceding circuits. The only changes shown are in the addition of the second step, and the addition of two more "B" batteries of twenty-two and one-half volts each. These batteries must be connected in such a way that the positive of one of them connects to the negative of the next, etc. This is clearly shown in the diagram. If a loud speaker is to be used in any of the circuits, it is placed where the receiver is shown in the different diagrams. The transformers used may be of the ordinary audio frequency type, the one used in the first step to be a ten to one ratio, while that used in the second step is a three or three and one-half to one ratio. Any one of these circuits will give great satisfaction to the user and with a little patience and care in adjusting he should have no trouble in receiving signals from 1,500 miles in the winter time.



**Radio in the Camp**

By A. K. Chenoweth, Our Ohio Correspondent.

No more lonely fishing trips for Paul G. Wood, grain elevator proprietor, master mechanic and sportsman, of Hilliard, Franklin County, Ohio.

For many years, Mr. Wood has spent his week ends and vacation times in a shack some twenty miles from his home, on the banks of a stream running through several Central Ohio counties.

When the radio first reached this section, Mr. Wood installed one of the largest and most elaborate sets at his grain plant. He secures the market reports each day and in addition tunes in on all of the available stations for concerts, programs, etc. His plant is by far the most popular place in the village and his business in side-lines, including seeds, feeds, coal, etc., has been doubled.

Each week end, when he goes to his camp, he loads the radio receiving outfit into his auto and in place of a talking machine, or bothersome companions, he goes it alone, with his radio.

Reaching camp and setting his lines for the night, he connects the machine with the aerials already in place and while waiting for the fish to bite, he enjoys concerts, speeches, solos, etc. When he is ready for sleep, he tunes in on one of the bed-time stories—and passes on to slumberland.

Sunday morning, after running his lines and eating breakfast, Mr. Wood tunes in on one of the wonderful sermons, and while courting Mother Nature, keeps his spiritual being in tune with the day.

In the afternoon, the instrument is tuned to receive a sacred concert and in the evening he again listens in on one of the main broadcasting stations.

**Making Switchboards**

There are few trades that demand as many painstaking operations as telephone switchboard installing, the intricacies of which are well illustrated in an analysis of the work just completed on the Lexington Exchange, the newest of New York's central offices. Before the switchboard was declared ready for service, the Western Electric installers on the job were forced to make 619,082 soldered connections. In the task of making the wiring connections in the installation, they used 236,616 feet of telephone cable, which contained 8,858,450 feet of copper wire.

**Toledo Is Optimistic**

Interest in radio, which had fallen off during the summer months is reviving, local dealers report. A. J. Gogel, president of the Toledo Radio Club and manager of the radio department of the Athletic Supply Co., says the change in weather conditions as fall approaches and the fact that different stations are increasing their power of sending are two causes for the reviving interest.

"In the last two weeks," he says, "unusual distances have been reached. One Toledo doctor who sits up nearly every evening until 12 and 1 o'clock listening in on the different stations reports that in one night he heard Memphis, Atlanta, Kansas City, St. Louis, Chicago, Toledo, Detroit and Dubuque, Ia.

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