

HOW TO BUILD 4 **DOERLE** SHORT WAVE SETS

10
CENTS



EVERYTHING
about ALL
the famous
DOERLE
RECEIVERS

RADIO PUBLICATIONS, 25 WEST B'WAY, NEW YORK 7, N. Y.

a third, because of careful and thoughtful construction and consideration, you could very well guess it's our old timer—the *Schnell* method of regeneration control for the detector, and a stage of audio frequency. (See hookup diagram.)

We know that some people write backward and think forward; but let's start the discussion just as you perhaps draw a radio hookup diagram—starting with the antenna symbol and completing the diagram with a few curves or loops to represent the output load—in our set we intend to use head "phones."

Antenna and Ground

Now as to the antenna, a wire strung twice across the living room and anchored to the picture molding with small finishing nail, together with a good "water-pipe" ground connection, has enabled the author to pick up signals with such a receiver from stations 6,000 miles away, even on a hot summer day on the Pacific Coast (Oakland, California). Say, fellows, if a well-insulated outside antenna had been possible of erection why the other 6,500 miles of "no-man's land" would have been easily heard and conquered.

Time is moving along, and there is much ground yet to be gained. Let us consider for a moment the antenna "series condenser." For the operator's convenience, a seven-plate midget is quite suitable for the purpose; but in a small receiver of this price, a condenser made of two pieces of old condenser plates, cut to

4 Doerle Short Wave Sets

about $1\frac{1}{2}$ square inches in area and spaced on the binding-post strip $\frac{1}{8}$ inch apart, will serve very well for coupling the R.F. energy from the antenna to the oscillating circuit of the receiver.

(An adjustable padding condenser or a 35 mmf. midget variable will provide an easy way of overcoming dead spots caused by the antenna.—Editor.)

Keeping Down Those "Losses"!

Be sure that the post strip is of bakelite; as this is the cheapest, though not the best, insulation for the purpose. In some experiments made by the author, a home-made series condenser was mounted on $\frac{1}{4}$ -inch plywood baseboard, but a surprise awaited—the signal intensity as heard in the phones was about three-quarters its value when the series condenser plates were mounted on the bakelite strip. If there is nothing else to gain from this article, be sure that, when you make a two-tube set, you keep all losses as low as possible. It's hard to compensate for them.

Since this type of receiver would undoubtedly call for home-made plug-in coils, because of their convenience, we follow up our diagram with a discussion of this type of coil for the oscillating circuit. To hold the wire in place on the tube-base, the author has found orange shellac to have small loss, and it gives a shiny finish to the form. As to the condensers for use in this receiver, select those that have the smallest amount of dielectric in supporting the stator plates.

4 Doerle Short Wave Sets

Use a 5-megohm leak and .0001-mf. grid-condenser. These values will make the receiver very sensitive.

Now, in our discussion we are near the audio-frequency transformer and our eyes immediately behold an R.F. choke. Gee, what a mean thing for

the temper; but, at any rate, 300 turns of No. 36 D.S.C., magnet wire, close-wound on a $\frac{1}{2}$ -inch wooden dowel, will choke the R.F. current out of the transformer primary, even at 20 meters or, use a standard SW choke (about 2.5 mh.).

As to the audio transformer, we

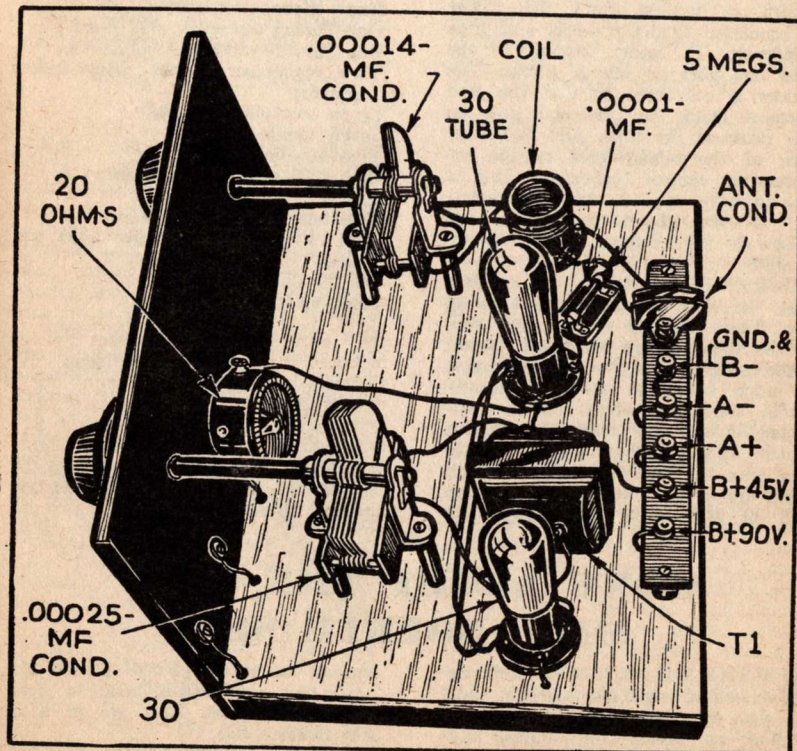


Illustration showing placement of parts.

can't boast for any type; but a good 5 to 1 ratio and a hefty type, will be good.

If for any reason the set should fail to work, the first place to look for the trouble is in the coil connections. In connecting the coil make sure that the end of the grid coil which is farthest from the tickler is connected to the grid-leak and grid-condenser. The other terminal of the grid coil goes to the A minus. The tickler is connected so that the lead farthest from the grid coil goes to the plate of the tube. And the other side of the tickler goes to the regeneration control (condenser) and to the primary of the audio transformer. If the above instructions are followed the detector tube should oscillate.

Failure of the tube to oscillate may be due to the antenna being too closely coupled to the grid coil. While the diagram shows a home-made antenna coupling condenser, it is much better to use a small variable condenser which can be adjusted to suit the particular antenna which is used. Before you assemble and wire the set, make sure that all parts are in good condition and there will be no reason for failure. The

MORE ABOUT THE 12,500 MILE DOERLE SET

IN THE first article, Mr. Doerle described at length his interesting short wave receiver, which is capable of picking up signals from almost anywhere, depending on the parts used. It goes without saying that if cheap parts

4 Doerle Short Wave Sets

above hints apply to the construction and wiring of all short wave sets using two winding coils.

The following is a list of parts for the set proper:

List of Parts

One Bakelite panel 7 x 10 in.;
One Baseboard 9 x 11 in.;
Three 4-prong cocklets;
One Tuning condenser .00014-mf.;
One Throttle condenser .00025-mf.;
Two condenser plates 1½ inches square;
Seven terminal poststrip;
Seven binding posts;
Five megohm grid-leak;
One .0001-mf. grid condenser;
One 5:1 transformer;
Two telephone binding posts;
Two 3 in. dials, (vernier type are best);
One 20-ohm rheostat;
Hook-up wire, screws, etc.

Coil Data

Range (meters)	Turns	
	S	T
15-45	5	6
35-75	9	5
60-125	16	6

All coils are close-wound with No. 24 enamelled copper wire, and with no spacing between S and T.

and an insensitive pair of phones are used, that one cannot hope to hear far-distant signals. Let's go on with Mr. Doerle's tale:

Let it be understood here that all tube-base coils are not going to act

4 Doerle Short Wave Sets

alike in the detector stage. Some bases are made of genuine bakelite, while others are made of an extra hard "tar" or "composition." You will probably appreciate that fact better if you get some experience in drilling small holes in these bases with the use of a power-driven drill press. In some instances, the drill must be forced for cutting action; while in others, the drill eats in as though it were going through cardboard.

"What" Tube Base Is Important

But you will probably say — "What difference do tube bases make? Here is the explanation. Since we want a maximum signal voltage existing between the grid and filament of the detector tube, that means the oscillating circuit should have a maximum impedance (for it is a tuned circuit); and, if a high resistance is in parallel with the oscillating circuit (the losses constituting part of this resistance, because the condenser tuning across the coil also has losses), this resistance determines the voltage drop from grid to filament. Not only for this reason do we want "low losses" in the oscillating circuit, but for another which regards the amount of feed-back energy from the plate circuit, via the tickler coil and the throttle condenser. The lower these losses, the smaller can be the tickler coil and feed-back condenser capacity. To hold the wire in place on the coil forms use a few drops of shellac or rubber cement.

Now that the oscillating circuit has withstood the fire, and emphasis has been laid on the impor-

tance of cutting down its losses to a low value, shall we now throw away our labor and have a poor, insensitive receiver, by taking no precautions in the selection of other parts? By no means, and we intend to fight until the globe is encircled and we can hear the "peeps" from a "5-watter" at the 12,500-mile meridian. We started out after signals, records, "logs," and the whole field of short waves to show the "rich" man that a "super" midget radio still exists in poor Lazarus' field.

That R.F. — Choke — Its Pedigree!

300 turns of No. 36 D.S.C., magnet wire, close-wound on a ½-in. wooden dowel, will choke the R.F. current out of the audio transformer primary, even at 20 meters. This can be verified by pressing the phone cord in the hand while the set is operating. If no change occurs in the received audio notes, the choke is performing its duty.

Try Different Grid Leaks and Condensers!

Try different leak-condenser values; by the time you have done this and have soldered some of these grid-condensers in place and used leaks thereon, you will probably give up in disgust and say, "Aw shoot! Let's take the other fellow's values to save time and trouble." After going through part of such an experiment, even to getting knuckle burns from the hot iron, take a tip and use the values given herein — 5 megohm leak and .0001-mf. grid-condenser.

These values will make the receiver very sensitive and, if you listen in the phones, to notice how the back ground-noise level comes into prominence, when using the throttle condenser on increasing its capacity for feed-back, you will greatly commend the receiver for its sensitivity. Also notice the "softness" of feed-back (no spilling over) with "power plus" and "free wheeling." Aren't you getting anxious to "work" one of these receivers?

As to the audio transformers, a good 5 to 1 ratio and a hefty type will certainly make the signals more prominent in the phones. Oh! that the day would come when radio parts would be sold by weight, and prices could be vetoed! Phones! phones! and we must have a pair, but let's not be guilty of innocent blood. Just buy a pair large enough to cover nearly the whole ear and, together with that, with enough weight. The "skinny make" of phones always give the signals a mouse-squeak background, at least that's been my experience.

Before proceeding further, the circuit is checked against the wiring diagram, preferably with a continuity meter (volt meter with series battery or ohmmeter).

4 Doerle Short Wave Sets

Efficiency of Battery Tubes

Didn't we say in the beginning that power should not be wasted? Well, let's back up our words with action and use the '30 (2-volt filament) type of tubes — the tubes with the '99 economy, but '01A amplification and output. Can you imagine this economy — two dry cells and 90 volts of "B" battery for at least six months of pleasure at a cost of \$2.50 — only about \$0.50 a month!

Short-wave stations are growing more numerous; and the time to build this "super midget" and get a long "log" of stations is now.

Suggestions and Parts

The simplicity of the hook-up and photo has warranted us not to give a mass of details for constructing this receiver; for we believe that by so doing, the ingenuity of the builder has free course with the parts he may have available. The tubes burn at a dull red color when two volts are impressed on the filaments.

4 Doerle Short Wave Sets

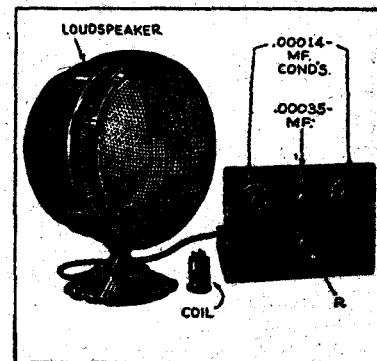
THE "DOERLE" 3-TUBE SIGNAL GRIPPER

By W. G. DOERLE

FOR a long time no single article has occurred in print which gave the "babe" the outstanding principles of operation and description of a short-wave set. Not only do the following paragraphs remedy the ill, but supply the "food" for the two classes of will-be short-wave enthusiasts.

30 Minutes of Short-Wave Education

For the facts that are of outstanding importance, and that will soon be elaborated, assume that the neophyte has listened to a friend's short-wave receiver bring in distant signals and that from such an "audition" he has received his inspiration to construct a receiver that will afford him pleasure in his home. No doubt he also has searched through short-wave magazines to find out which materials and radio parts are necessary for the construction of a set — one that fits the leanness or fatness of his purse — but is at a great loss to get a panoramic view of the whole situation. If the "beginner" goes too blindly at the construction of a short-wave set, he will be addressing many letters to radio editors, set manufacturers, and companies selling radio parts, asking for help with his difficulties; whereas if he knew the facts about short-wave receiver operation and construction, he



"Signal Gripper" Works Loudspeaker

would be amazed at his technique and "trouble-shooting" for the "needle in the haystack."

Since the story is getting somewhat lengthy already, it is necessary at this point to give a hook-up of a short-wave set that involves all the principles which will be explained in the text. This diagram for a set would be called a three-tube hook-up, embodying a stage of R.F. (radio frequency) amplification, a regenerative detector (DET.) and a stage of A.F. (audio frequency) amplification. As a battery set has such a versatility of use (portable, can be operated in an automobile, affords much pleasure while rolling along with the breeze, can be operated in

