

Mainly about Construction

BY "MEGOHM"

A FULL-WAVE B BATTERY ELIMINATOR FOR HOME CONSTRUCTION

A CONSTANT AND PLENTIFUL SUPPLY OF HIGH TENSION AT LOW RUNNING COST

(Third Instalment.)

This is the third instalment of the B eliminator construction article. At the commencement it was stated that the eliminator would run a five or six-valve set, but this statement was too conservative, for it will run an eight-valve super-het., and probably a ten-valve set, as the double-wave gives a good supply of current. In case of running a large set it might be necessary to add an extra 2md condenser each side of the choke. It is always good to have plenty of reserve of smoothing power, then all chance of hum is cut out. The condenser holder was originally designed to hold seven fixed condensers of 2mfd. each, and it will work well with these on a four or five-valve set, but the extra condenser was added between the transformer L/T centre tap and HT negative lead in order to ensure an overplus of smoothing capacity. That this capacity is provided is shown by the fact that the set will continue working for a second or so after the 230-volt switch is cut off.

The cost of parts and materials required will total £7 odd, according to how the parts are purchased. This cost is not great for a double-wave eliminator, as nearly twice the price is asked for the factory-made article.

The valves used are two single Clear-ton rectrons, costing 12s. 6d. each, and with the two working together on

THE SMOOTHING CONDENSERS.

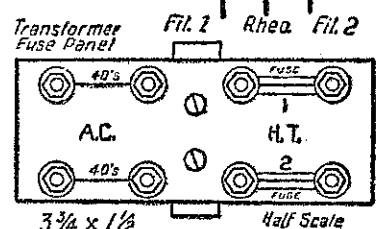
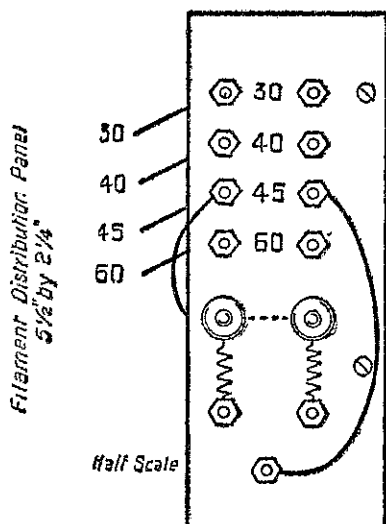
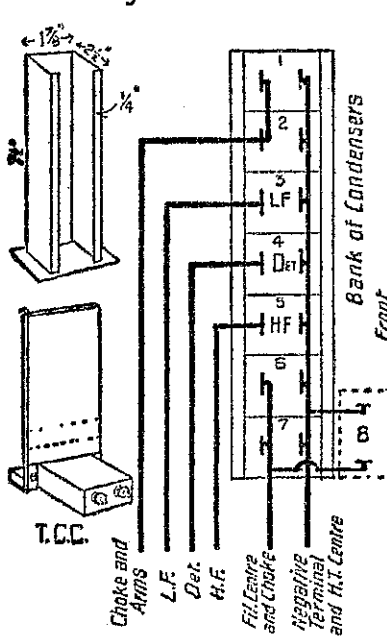
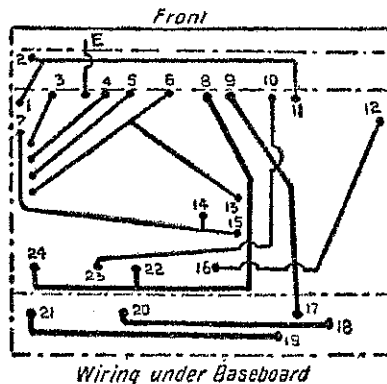
The seven fixed condensers of 2 mfd. capacity each are held in an upright receptacle made of tin, as shown, the outside finished with black cycle enamel, as used for the outside case. It is as well to include the extra condenser and place it at the outside of the case, where it will be held by the connecting wires. Of course, the 4 and 6 mfd. may each be bought in one unit of that value if preferred. Connections of the condensers are shown in the diagram. One side of every condenser is connected to the high tension negative, and other sides as shown.

The holder shown above is to take the Dubilier make of condenser, but if the T.C.C. type is to be used, a different method of holding will be necessary. A strip of thin board 7in. long by 2½in. wide can be fastened in an upright position and the T.C.C. condensers can then be screwed to it, one above the other. These condensers are exactly the same thickness as the Dubilier, so they will occupy the same space as regards height.

Connections to the bank of condensers are clearly shown in the diagram. The one marked "Choke and arms" goes to one end of the main choke, and also to the arms of resistances, all three of which are connected together.

THE FILAMENT PANEL.

The small panel to which the filament taps of the transformer are attached is shown. The taps run



straight from the end of the transformer to the respective bolts in the panel. To make connection easier, it is as well to solder a connecting tag to each tap, and through the hole in this the panel bolt will pass. Near the centre of this panel there are two terminals, below which are two bolts. These are provided so that a short piece of resistance wire may be included in each filament circuit to suit the current as exactly as possible to each valve so that the one rheostat will give an equal control of each valve. The two terminals are connected together behind the panel, and the 18's wire is continued round to the front, where it is attached to the left-hand bolt giving the required voltage. The corresponding bolt on the right-hand is connected by a piece of 18's to the single bolt at bottom of panel, and from the back of this a wire runs to the rheostat. The two bolts to which the lower ends of the resistance wires are attached are connected to a fila-

THE 112-VOLT B ACCUMULATOR

ALTERNATIVE TIPS FROM A CONSTRUCTOR

The following letter was addressed to "Megohm" by a Wanganui constructor, who appears to have tackled the B accumulator with a determination to make a thoroughly lasting and serviceable battery. The letter speaks for itself, and as it contains an alternative method of construction, it is printed in full. Letters such as this and others that have been received from constructors are appreciated, as they show that the page is appreciated and helpful. The letter reads as follows:—

You have expressed a wish in the "Record" to hear the results obtained by your readers in carrying out the ideas and suggestions which you publish, so I am writing to let you know that the B battery which I have constructed more than fulfils the claims which you made in your descriptive article. In the first place I wish to thank you for your previous reply to my queries re the battery. I made a few variations, which were as follows:

(1) Instead of making a grid work of battens to support the tubes I bored the necessary number of holes in a piece of three-ply which just fits inside the case; to steady the bottom of the tubes I burnt seats with a red hot piece of iron, one inch diameter, and rounded, to correspond with the shape of the end of a test-tube. This makes a neat job, and a good deal less trouble than the battens. I have made the case, etc., suitable for 140 volts, but so far as my set only requires 90 volts I have made the battery up to 98 volts. The punching of the plates was a tedious job, but was facilitated somewhat by a punch which made five holes at a time; 60 holes were made in each positive and negative plate, holes varying from 1-16in. to ¼in. in diameter.

(2) Instead of using wires for connecting up each 14v. section of the battery I burned on lead bridges. (3) I inserted 1½in. wide strips of celluloid between each 14-volt section; then made a sort of inner lid of celluloid which sits right down on these strips. Where necessary I burned on lead strips to stand vertically and cut the lid to allow about ¼ inch to come through. I don't think I will bother about the front panel and plugs, the inner celluloid gives a fair amount of protection to the battery, and the usual spring clip can tap the battery at 24, 25, 28, 30, 42, 52, 56, 70, 84, 90, and 98 volts.

(4) To grease the top of the tubes and the lead connection I melted motor gear grease in a tobacco tin and then dipped the ends of the tubes etc., to a depth of ¼in.

(5) Peroxide of lead was not available, so ordinary red lead was used for the positive plates and litharge for the negatives. This pasting was tedious, but seems well worth while.

For mixing I used a of the strength recommended by you, 1170 sp. gr.

For charging I used an A and B charger, and gave a continuous charge of about 100 milliamps for about 70 hours, by which time the positives had assumed the characteristic deep chocolate colour, the specific gravity had risen to 1.220, the tubes were gassing freely, and the voltage was right up. On connecting up to my set I was pleased to find that it worked with a tick and a zip which had been absent for some time owing to the gradual decline of mv drv batteries, which were down to about 67 volts. Since using the new battery I have pulled in sev-

eral stations, including 2UE and KPN, which I had not had previously. I gave the battery about 15 hours' use on the set, and then put it on charge again, as I thought it better not to try and get too much out of it for a start. It apparently still had plenty of kick at the end of the first 15 hours' use, voltage right up, and positive plates still deep chocolate, but for a while I intend to use it and charge it on the principle of a little in and a little out.

The battery has cost: Test tubes, 18s. 1d.; lead, 13s. 9d.; litharge and red lead, 1s. 6d.; sulphuric acid, 2s.; brass screws, 6d.; three-ply, 1s., a total of £1 16s. 10d.

The case was made from benzine-box wood, which was dressed, stained and polished. These materials, as well as solder and grease, I had, so the trifling cost of the battery under £2. It, of course, remains to be seen whether the paste will hold inside the folded plates, but with a low charging rate and not over-discharging I do not anticipate much trouble, and I must say that at present I feel very pleased with the result.—Yours in Radio, "Positive"

(Provided that the plates have been closed at the bottom as directed, and not too great a charging rate is adopted, no trouble is to be anticipated.—"Megohm.")

A half-scale drawing of the transformer fuse panel is also shown. The wiring under the baseboard is given, but will be described later. When taking this wiring from the eliminator it was necessary to refer to the published circuit diagram, and it was found not to agree with the actual article. The discovery was then made that the original diagram made twelve months ago before the construction of the eliminator had been used from which to make the drawing. The actual circuit was taken from a well-known English radio paper, and before commencing the construction it was found that there was an error in the English diagram, and this was altered on another working drawing that had been prepared. The incorrect diagram appeared superficially to be correct and was used, and in the hurry for publication got by unnoticed. Next week we shall publish the corrected circuit, and meanwhile ask readers to take no notice of the one already published.

SEEKING PURE REPRODUCTION

A FEW NOTES ON THE LOUD-SPEAKER

In selecting a loudspeaker of either type, there is no method equal to that of hearing several demonstrated at the dealer's, and taking home the two you fancy best to try on your own set under actual conditions under which the speaker is to be used. There are a number of makes of good cone speakers, but for a set giving liberal volume, a speaker that will carry plenty of volume, without overloading, is essential, and in such a case a small speaker will do scant justice to your set. Very often the set gets the blame for trouble that is solely due to the loudspeaker.

AN INTERESTING EXPERIMENT.

Readers having a horn speaker already on hand can try an interesting experiment if they care to go to a little trouble. From thin cardboard, stiff brown paper, or the large manila sheets used to make office folders, an experimental horn can be made, the thin end just a fit for the aperture when the ordinary horn is removed, and the wide end eighteen inches in diameter, the total length of the horn being four feet six inches. The speaker unit can be placed on the floor with the horn standing upright and pinned to the wall. The use of this should prove to be a pleasant surprise, as the lower or bass frequencies will be heard as they never were before from the same unit. The only thing that could prevent these low notes from being heard would be faulty audio transformers, incapable of reproducing and passing on such frequencies. A convenient and quick method of securing the lower half of the horn when rolled up is to wind round twine in a spiral direction, securing it as soon as possible with glue. The top portion is easily secured by paper fasteners passed through at suitable points. The sheets of paper must first be glued together on the flat, to form a large triangle of suitable dimensions, the wide part sixty-four inches across.

This experiment shows that length is the essential to good reproduction from a horn speaker, and the increased length also gives extra volume. As most horn speakers have not more than a two-foot horn at the most, and many are much shorter than that, it is a wonder that they are as good as they are, but careful design is made to compensate to some extent for the lack of length.

CONE SPEAKERS.

Cone speakers are improving rapidly, great attention being centred upon the driving mechanism, in the direction of securing volume approximating that from a horn type under the same conditions. Many cone speakers are efficient on low notes, but discriminate badly against high tones. For the lower

frequencies, at any rate, they are mostly less directional than the horn-type, and for ordinary rooms and moderate volume a cone is excellent. It is quite likely that before very long a cone type will be produced that will actually respond to as low as 50 cycles, and equally to all intermediate audio frequencies up to 7000. Such a speaker would cover the whole range of musical sounds.

There are in use in America at the present time orthophonic horns 40 feet in length, yet mathematically designed with a correctness that allows equal response to the lowest bass notes and also to the high C of the soprano.

Experimental cones up to ten feet in diameter have been built in a factory laboratory, and though only driven by an ordinary small unit, the voices of singers are reproduced with great faithfulness, and most wonderful musical reproductions.

When rewinding old transformers for choke-coupling for the loudspeaker, if it is possible, the laminated core should be reassembled so that all the joints come together at the one place, and in the space where the two outside lots meet, a square of thick paper should be inserted, the whole pushed together tight, and clamps screwed on. This gives a core with gaps, which is the correct thing for a low-frequency choke.

ANSWERS TO CORRESPONDENTS

From Matakoko a Browning-Drake constructor sends the following letter:—"I wish to thank you for your kind reply to my inquiry. I have the set going, and am getting power and to spare on all the New Zealand three main stations, but have not yet tried it out on any of the lesser stations. I am very pleased with the clear way you have of explaining things, and although very much a beginner have managed to build quite an efficient set. There is no sign of Farmer's or 2B1 when I am listening to Wellington or Auckland, or vice versa."—Pleased to hear of your success—you will soon be raking-in the "lesser ones."

An interesting letter and photograph from a lighthouse-keeper will be dealt with next week.

"Rongotai" (Wellington) asks if there is any method of charging a B accumulator with an ordinary A accumulator charger. Such a method was fully described in Nos. 11 and 12 of the "Record." The only proviso is that the B battery must be divided into sections each of several volts below the voltage given by the charger. This system works best with a charger giving a voltage between 16 to 24 volts.

Converting Set to Browning-Drake.

"Inquirer" (Otago) wishes to know if he can convert a Roberts reflex three-valve set into a four-valve Browning-Drake as described in recent issues. Certainly this could be done, especially as panel and baseboard are the correct size. Follow the published instructions, using any existing gear that you can. The .0005 variable condensers will necessitate fewer turns on the secondary coil. If your aerial and R.F. transformer coils are both space-wound, use them as they are. Ticker of 20 turns will be right, but connections may have to be reversed. Connections to variable condensers, etc., should be made as in article, otherwise you will be troubled with hand-capacity. Probably your Kellor 44 to 1 audio transformer will do well for first stage and the Ferranti A13 for second stage, as you suggest, will give excellent results.

Fixed condensers across primary first audio transformer, and a small valve across plate and grid terminals of same, but not across secondary. Another of good capacity across speaker and 'phone output, although this is not shown in diagram.

Considerable interest is being taken in the article recently published on the oscillating crystal, and readers are inquiring as to where a suitable crystal can be obtained. If any dealer has good specimens of zincite in stock, "Megohm" would be glad to be advised accordingly, so that inquirers can be put in touch.

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