Mainly about Construction

BY "MEGOHM"

A 112-VOLT B ACCUMULATOR

SIMPLE AND EASY TO CONSTRUCT

Here is a description of how to construct a B accumulator on the same lines as one that has been working without a hitch for nearly two years. After success with a battery of the same voltage but with smaller plates, this was designed as an experiment in getting a fair capacity from lead plates without pasting, which is a process that many would prefer not to tackle. It has been so successful and is comparatively easy to make that it is certain to be of great use to many a radio enthusiast who enjoys making his own accessories. An ideal way of using this accumulator would be to arrange a trickle-charger that would operate during the night, so that a full supply of HT current would always be ready for the following day. It is not claimed that this battery has a very high capacity, but when forming of the plate is complete, it will run a four or five-valve set on loud speaker for at least five or six hours, even with power valves in use. Smaller sets will, of course, run proportionately longer, and for two and three-valve sets and short-wave work it will be found particularly suitable. It is convenient to use, giving three voltages which can be altered by plugging in as required, and each valve is protected by a reliable fuse attached to the positive leads as they leave the battery. For those who prefer to go to the trouble of putting paste in the plates in order to gain considerably in capacity, with less frequent charging, the same size and shape of lead plates can be utilised in a manner that will be described at the end of this article. Everything else is carried out as described, and the only difference is in the final treatment of the plates. The accumulator has an advantage over dry batteries, especially for intermittent use, as if charged up occasionally it will always keep in good condition, whereas a dry battery is deteriorating whether used or not, and is comparatively costly to replace, whilst quieter reception will be assured with the accumulator. Frequent charging is of course, necessary, but if convenient switching arrangements are provided, and a good chemical or other rectifier installed to charge from 230-volt alternating current mains, there need be no inconvenience on that account. Very few public electric installations utilise direct current, but where this is the case, no rectifier is required, as the current from the mains may pass direct to the battery, regulated by a suitable number of lamps as resistances. Those who are still on 105-volt supply must charge the battery in two halves simultaneously with a small additional switch attachment that will be described in due course The materials should not cost more than £2, and the cost of charging, even daily, will scarcely show in the electric light bill.

The diameter of the test-tubes used is nominally one inch, but there is usually some variation in size. even in the same batch, so the constructor would be wise to purchase the tubes before commencing the woodwork, so that the size to be provided for will be known. The length of the tubes is six inches, and owing to the way in which the lead plates are folded and interlocked, a much greater capacity is provided than is the case when simple flat strips are used. This shaping and placing of plates may seem difficult at first sight, but if the instructions are carried out correctly, it will be found that the plates will drop together with a minimum of trouble, and the assembling thus prove quite a quick and simple matter.

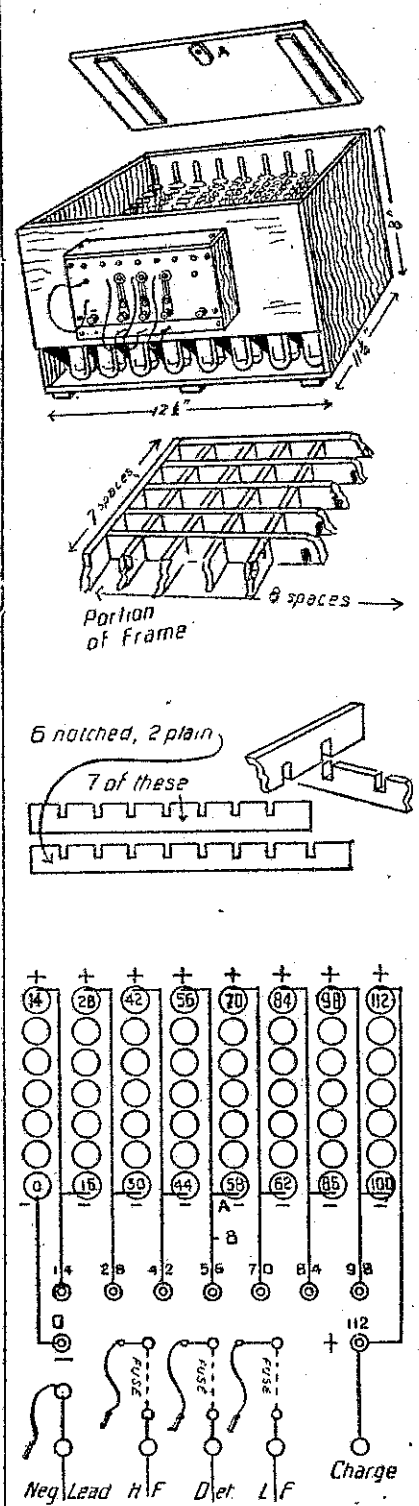
Materials Required.

56 Test tubes, 6 x 1in.
Ebonite, ⅛in., 6½ x 3¼in.
5 Terminals.
9 (or more) sockets.
4 pins for ditto.
6 Brass bolts ¼ x 1-8in. with nuts and washers.
Sheet lead 48 x 23in., about 32lb.
Celluloid, 20 mils., 8 x 8 1-8in.
Suitable timber and lathes.
Enamelled wire, brass screws, etc.

The case is made of heart rimu or other good timber, and a smart finish is imparted by polishing with a rag dipped in a solution of shellac in methylater spirits. This polishing may conveniently be done before the parts are screwed together. The outside dimensions of the case are given on the perspective view, and it will be seen that at the back and front an opening 2¼ inches high is left for inspection of the lower end of tubes and plates. A loose lid is provided, with a turnbutton at A which allows the lid to be kept slightly open whilst charging. Timber used for the case should be ½-inch, with 3-8 battens under the bottom and inside the lid. One-inch number 6 brass screws will be found suitable for putting the case together. At a distance of 1¾in. from the top edge a 5in. slot is cut in the front of case to allow the tap wires to reach the panel. The panel stands away from the front on two side pieces of 3-8in. thickness, 4¾in. by 1½in. screwed to the case from inside, the top ends level with the top of the slot, the space at top being covered with a slip of thin wood projecting over the top edge of the panel and flush with its front surface. Below the panel a strip of wood about an inch wide fills the remaining space and in this four holes are drilled to take the plugs when not in use

The tubes are supported by a frame with 56 apertures each one-inch square, constructed of laths one inch wide by barely three-eighths thick. These are notched half-way through and interlocked as shown in the diagram. The outside of this frame must be a loose fit inside the case, and a lath is screwed inside each end of the case to support the frame so that its top surface is five inches above the bottom of the case. If the constructor takes the sizes here given for the frame, he should make it first and make the case an easy fit for it, otherwise if the case is made first these sizes may not be quite correct, depending upon the exact thickness of the wood used in making the case. Eight laths are required, 10⅝ inches long, and six of these must be marked out and all notched by making the corresponding saw-cut in each at the same time, so that any slight inaccuracy will not cause trouble in fitting the cross-pieces. The notches must be of a width to take the laths snugly, and spaced out so that every division will be equal. Seven laths will be required of the short size, about 9 5-8in. and these will have six notches cut in each. Two laths will also be required for the ends of the frame, and the length of these will be determined when the rest of the frame is assembled.

The next operation will be the preparation of the lead plates. For these a piece of sheet lead 48 x 23 inches will be required, weighing about 32lb. in the ordinary gauge usually procurable, about 1-16th inch thick. Heavy gauge lead would be difficult to bend and cut. Before cutting up this sheet, lead must be well flattened out and cleaned on both sides with kerosene and pumice powder, or other wet process that will make it fairly bright looking. No dry cleaning method must be used, as the dust raised would be injurious to the health. Now scratch a line down the centre with a straight-edge as guide, giving two portions 11½ by 48 inches. Parallel to this central line two other lines two inches apart are to be marked down near the centre of each half, or in other words a line 4⅛in. from each edge and another line on each side of the centre line and 4⅛in. from it. Now



with a pair of snips or strong shears cut down the central line and then proceed to cut each of the two pieces thus produced into strips 11½ by 1 5-8in. as marked. Each of these pieces will then have two lines two inches apart marked across near the centre. Put eight of these aside for special treatment Forty-eight pieces are to have a piece cut out of the centre as shown by the two marks, but leaving a connecting strip on one side 3-8in. wide, as diagram. The eight other strips are for the ends of each row of cells, and are to be cut into two pieces so that each has a 3-8in. wide tag two inches long projecting at one side of the end, a small piece of waste coming out between the tags. Now the double plates can be bent to shape over a strip of wood about 3-8in thick, with a rounded edge. All the double plates are bent the same way and are put into the tubes alternately as shown in the diagram. See that the tubes are clean, smear vaseline half inch wide inside and outside tops, and drop into place in frame. Now the double plates with the connectors vaselined may all be put in place, and it will be seen which way the end one must be bent so that the tag will come at the outside end of the row. This tag on the end plates is to be bent as shown to prevent the plate from sinking in the tube, and the tap wire is to be soldered to the extreme top of the tag, as by this means the joint is kept clear of the acid. The top of these plates also must be coated with vaseline, likewise the soldered joints when they are completed. The tap wires are also utilised to connect one row of cells in series with the next, and these wires may be soldered to the negative end of each row, and then continue to the panel sockets. Each tap wire should run just below the edge of the tubes, and to keep them in place they may be passed through holes drilled in a couple of inch strips of celluloid about 11in. long, running from side to side between the cells.

The celluloid separators must now be made. They consist of strips 1 3-8in. by 1-8in. These are easily made, and a good supply is required, two for each cell, and some extra ones which may be needed. The celluloid should be 20 mils. thickness, and a piece 8 by 8 1-8in. will make a gross of separators. Divide the 8 inches into thirds of an inch, giving 24 and the 8 1-8in into six parts of 1 3-8in. each. Now take a straight-edge and sharp steel point and rule deep scratches where the celluloid is to be divided When this marking is all done, the celluloid can be bent and broken where the scratches are, and a clean edge results. Warm the strips a few at a time near a fire or over an electric radiator on a metal plate until they soften slightly, then bend to a V of the angle shown in diagram, which is about 70 degrees, but only needs to be approximate. These separators are pushed down between the plates as shown in the diagram, one at the bottom of one plate, and one at the top of the other plate. In odd places it may be necessary to put an extra one in.

(To be Concluded Next Issue.)

SOLDERING

SOME USEFUL HINTS

Probably many home constructors are satisfied at first to attempt to get through without soldering joints in their sets. But twisted wire joints may go a long way towards impairing the efficiency of the receiver, and soldering is really quite a simple and easy process to master, and once learnt, there will be no desire to risk noisy reception by letting joints go unsoldered.

The ideal soldering tool is the electric soldering-iron, as it keeps at an even heat, and is not made dirty by heating in a flame. The copper-bit is perhaps the most usual implement, and is capable of doing good work if properly handled. Some joints may be more readily made with the assistance of a jeweller's blowpipe (costing about 1s.) in conjunction with a flame of methylater spirits on cotton wool contained in a small receptacle such as the lid of a metal shaving soap container. In this method the joint is cleaned and fluxed and a suitable blob of solder laid on and heat is applied by directing the flame of the spirits upon the joint by means of the blowpipe, actuated by the operator's breath.

Whichever method of heating is employed, the parts to be joined must be made mechanically clean, the heat must be ample to melt the solder easily, and if a bit is used it must be kept in a properly tinned condition. Flux must not be used too lavishly, and surfaces to be soldered must not be handled once they have been cleaned.

By mechanical cleanliness is meant absence of all matter or conditions inimical to the success of the operation of soldering, for example, tarnish or oxidisation, grease, sooty deposits, etc. The presence of such matter in even minute quantities is sufficient to cause partial or complete failure in soldering, so that every surface to be worked should first of all be cleaned either with emery cloth, glass paper, or a smooth file.

It is unwise to assume that already tinned surfaces, such as those of tinned wire, tags, etc., do not require any cleaning. The cleaning in these cases may, however, be confined to rubbing with a cotton rag on which a little flux has been smeared, though if they are badly tarnished the emery cloth should be brought into use.

Certain means sometimes used for heating the bit are totally unsuitable for the purpose. A coal fire is one. Gas is not good, not only because it contains too many sooty impurities and oxidising agents, but also because its heating qualities are too great to be readily regulated for the purpose in hand.

The most suitable and convenient agent to use is undoubtedly a methylated-spirit flame, in which the bit can usually be left for quite a considerable period without raising its temperature sufficiently to cause oxidisation of the tinned surface. Small spirit lamps, especially designed for soldering work, may be purchased at small cost. It is advisable to choose a make which includes a hinged support for the bit.

The point relative to keeping the bit in a properly tinned condition is of such importance that the process of tinning will be briefly described and hints added as to the proper maintenance of that condition.

Tinning is the process by which any surface (not only that of the bit) is covered with a coating of bright solder. To do this with a new bit. it or rather the copper portion (the bolt), should be cleaned with emery cloth and the bit brought to the proper temperature in the spirit flame. This is the case when the flame becomes tinged with a green colour.

Here a word of warning. Never allow the tinned portion of the bit or that portion about to be tinned to come into direct contact with the heating flame, which should only be allowed to play upon that part of the bit where the bolt is rivetted to the shank. Remove the bit from the flame, dip the end of the stick of solder into flux, and with it lightly touch each of the bevelled surfaces.

The solder will probably not run evenly, but will collect in "blobs," so in order to spread it satisfactorily over the entire surface the bit should be wiped while still hot on a cotton rag on which a small quantity of flux has been smeared. The operation is then finished, and it will be seen that the business portion of the bit is completely covered with a bright coating of "tin."

Keep the bit well "tinned." This is the condition of the bit which it is necessary to maintain if quick, clean, and firm joints are to be effected. Should by any chance the tinned surface become dull (that is oxidised), or otherwise mechanically dirty, the bit should be heated and wiped thoroughly on the cotton rag already referred to.

In some cases where the bit has got into a particularly bad condition, it may be necessary to have recourse to a file to remove the entire existing surface. The bit must then be retinned in the manner described.

The rag already twice mentioned requires a short note to emphasise the necessity of its consisting of vegetable fibre, such as cotton, and not of animal fibre, such as wool, which, owing to the quantity of grease and other carbon it contains, soon ruins the surface of the bit for soldering purposes

The remaining points can be dealt with in a few words. Oxidisation, as can readily be inferred from what has already been written, is the main enemy of successful soldering. This undesirable condition is usually the result of over-heating, although it also follows from exposure to the atmosphere for any length of time and it is mainly to counter its effects that flux is used.

That is no excuse, however, for an improper use of this invaluable material. It should be remembered as an axiom that the slightest touch of flux properly applied in the right place is of far more value than wholesale and indiscriminate smears.

Square-tinned wire has many advantages over the round variety as far as ease of soldering is concerned. It is important to remember, however, that in order to effect really sound joints at least three adjacent surfaces of square wire should be cleaned preparatory to applying the solder so that the latter may flow readily all round the actual surface to be joined.

A large number of excellent crystals are either partially or completely spoiled in regard to their sensitivity by the method of mounting. The best of all methods is to fix the crystal into the cup with that compound known as "Wood's metal," but unless this is done very carefully you will overheat the crystal and destroy its sensitivity. The best way to mount crystals in Wood's metal is to take a few fragments (sufficient to half fill the cup) and then to hold a hot soldering iron, poker or, indeed, anything hot enough, against the outside of the cup until the Wood's metal inside just begins to melt. Immediately it melts, remove the soldering iron, wait a second or two, and then press the crystal into the Wood's metal with the aid of a pair of tweezers. The pressure of the crystal will make the melted metal rise up round it and when it sets the crystal will be properly secured.