

## Chapter 5

### LEAD-ACID BATTERIES, TYPE J (VARLEY)

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#### **Introduction**

1. The Varley type batteries described in this chapter differ from the conventional lead-acid type in that they are of a non-spill design, having fully-absorbed electrolyte. The construction precludes internal short-circuits due to the formation of sludge, and gives low internal resistance with high efficiency. Though electrically interchangeable with conventional lead-acid batteries, they are physically smaller and have a lower weight/capacity ratio.

#### **DESCRIPTION**

2. A typical Varley aircraft battery is illustrated in fig. 1. In this method of construction the electrolyte is completely absorbed within a compressed block consisting of porous electrodes and separators. Since the plates are supported by the separator material, distortion of the plates and disintegration of the active material is prevented. It is therefore possible to use a much more porous paste on the plates, giving increased battery capacity.

3. As there is no disintegration or shedding of the active material, as in lead-acid batteries with free electrolyte, there is no need for sludge space at the bottom of the container, and all the available space can be occupied by the plate/separator block. This is another factor which contributes to increased capacity for a given size of battery; since the active material is supported, the battery is much less subject to damage from vibration than is a battery with free electrolyte.

4. A perforated plastic retaining sheet is fitted on the top of the plate/separator block. There is minimum danger of corrosion of the terminals, as the acid is completely absorbed.

#### **SERVICING**

5. The general servicing instructions and precautions for servicing lead-acid batteries, as given in Chap. 2, are also applicable to Varley type batteries, in addition to which the following general points should be noted. Since particular details vary for different types, full information on servicing procedure will be found in the chapter in A.P.4343A, Vol. 1, Sect. 11 on the battery concerned.

#### **Initial charging**

6. All batteries are now supplied by the manufacturer filled but uncharged. Such batteries are assembled with unformed negative plates and formed positive plates, and then filled with acid; consequently they are completely inert on receipt, and require a formation charge. ▶

7. On receipt of a new battery, care should be taken to follow exactly the manufacturers' instructions for that battery; it should be noted that an overcharge has no adverse effect on a Varley battery, but an inadequate first charge may impair the subsequent performance and life of the battery.

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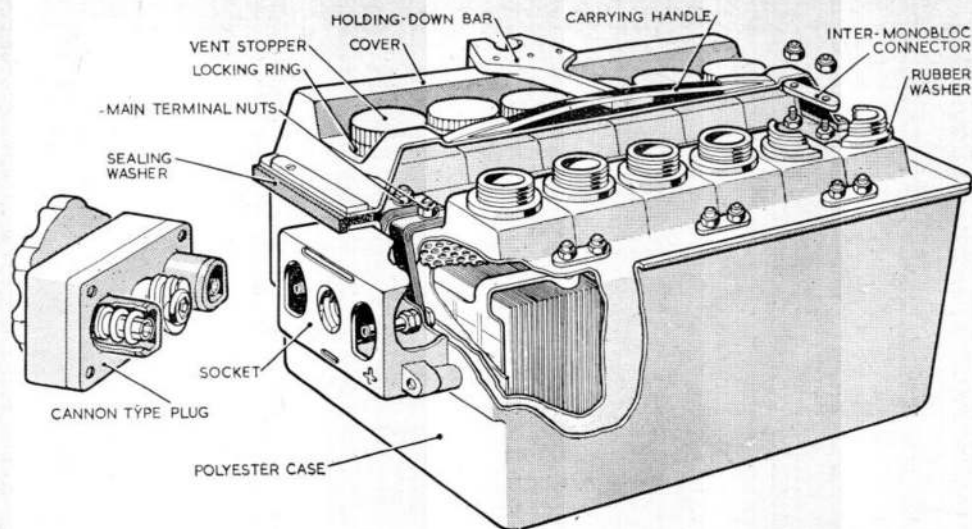


Fig. 1. Battery, Type J, 24-volt, 18 amp. hr.

### State of charge

8. The state of charge is determined by a voltage test, as no check of specific gravity is possible. It is therefore important that a reliable instrument should be used, and that readings should be taken accurately.

### Routine charging

9. After the battery has been out of use for some time it should be given a freshening charge at regular intervals.

### Storage

10. A filled but uncharged battery can be stored for a period of up to five years in temperate and two years in tropical climates, provided that the storage conditions are dry and cool and that the battery remains well sealed at all times until required.

11. A filled and charged battery should be periodically inspected and receive a freshening charge. It will be necessary to top it up with distilled water at intervals; if the battery has been out of use for a considerable time, it should be given a capacity test before being issued.

### Repair

12. A limited repair is possible with certain Type J batteries, when minor defects are confined to the area above the acid line. The batteries concerned are:—

<i>A.M. type</i>	<i>Varley type</i>	<i>Ref. No.</i>
Type J, 24-volt, 18 amp. hr.	24.19/25C	5J/3336
Type J, 24-volt, 18 amp. hr.	24.19/25S	5J/3388
Type J, 24-volt, 2.5 amp. hr.	24.11/4	5J/9101514

13. The recommended procedure is as follows:—

- (1) Scrape or file a V-shaped groove along the seam or other defective part in the area of the leak to provide a key for the cement.
- (2) Use as a filler either polystyrene cement (Ref. No. 33H/2202075), or a locally made solution of polystyrene shavings and trichlorethylene (Ref. No. 33C/547) to a consistency of treacle.
- (3) Clean the defective part with trichlorethylene, ensuring that none enters the battery. This also softens the surface to be treated.
- (4) Apply the cement to the area of the leak so that it is proud of the surface and overlapping the edges of the groove.
- (5) Leave the battery until the cement has hardened—two days should be sufficient.
- (6) Pressure test the battery in accordance with the instructions given in A.P.4343A, Vol. 1. ▶

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