BSA SERVICE SHEET No. 805

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All Models

BATTERY — LEAD-ACID TYPES

The range of Lucas batteries listed here covers those models fitted to B.S.A. motor cycles in recent years.

PU5E and LVW5E	Small capacity batteries for lightweight machines.
PU7E	Standard battery for cradle mounting.
GU11E	Larger capacity battery for sidecar machines.
SC7E	Large capacity lightweight battery for machines fitted with starting motors or two-way radio equipment, e.g. police machines.

All current Lucas motor cycle batteries are 'dry charged', and do not require initial charging. Except that these batteries have porous rubber separators, they are identical with earlier models supplied wet or uncharged and require the same routine maintenance when in service.

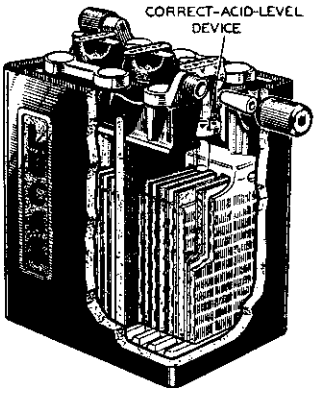

Fig. Y18. Sectioned battery, model PU7E/9

STORAGE

Used batteries must be fully charged before storing. In temperate climates they should be examined fortnightly, or weekly in the case of model LVW5E and all models when stored in the tropics. If necessary, give them a short refreshing charge.

After a long period of storage, the condition of the battery will often improve if it is put through a 'cycle', as described on page 4.

MAINTENANCE

Every fortnight, or more frequently in hot climates, examine the condition of the battery. Examine five-plate batteries every week.

Never use a naked light when examining the condition of the cells, as there is a danger of igniting the gas coming from the active materials.

Cleaning

Remove the battery cover and clean the cell tops. Examine the connections. If they are loose or dirty, remove them and scrape the contact surfaces clean. Coat them with petroleum jelly before replacing.

Remove the filler plugs and check that the vent holes are clear and that the rubber washer fitted under some plugs is in good condition.

Topping-up

During charging, water is lost by gassing and evaporation. Examine the electrolyte level in each cell and, if necessary, add distilled water to raise the electrolyte level with the top edges of the separators.

SC7E batteries have a woven glass pad fitted in each cell to reduce splashing when the battery is gassing during charging. When 'topping-up' this type of battery it is useful to note that the correct electrolyte level is reached when moisture appears through the porous glass pad.

The Lucas Battery Filler

The use of a Lucas motor cycle Battery Filler will be found helpful in this 'topping-up' process, as it ensures that the correct electrolyte level is automatically attained and also prevents distilled water from being spilled over the battery top.

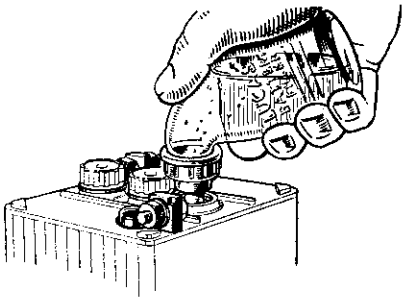

Fig Y19. The Lucas battery filler

Correct-Acid-Level-Devices

The correct-acid-level-device fitted to some Lucas batteries consists of a central tube with a perforated flange which rests on a ledge in the filling orifice.

When 'topping-up' a battery fitted with these devices, pour distilled water round the flange (not down the tube) until no more drains through into the cell. This will happen when the electrolyte level reaches the bottom of the central tube and prevents further escape of air displaced by the 'topping-up' water. Lift the tube slightly to allow the small amount of water in the flange to drain into the cell. The electrolyte level will then be correct.

If a battery requires 'topping-up' too frequently, the voltage regulator (on machines fitted with d.c. generators) may be out of adjustment, i.e. set too high, and should be checked. Conversely, a persistently low state of charge may be due to a regulator being set too low.

If one cell in particular needs 'topping-up' more than another, it is likely the container is cracked, in which event replace the battery and clean the carrier, using a solution of ammonia or bi-carbonate of soda in water. After cleaning and drying, paint the battery carrier and other surfaces affected by the electrolyte with anti-sulphuric paint.

TABLES OF SPECIFIC GRAVITIES AND CHARGING RATES

Battery	Plates per cell	Amp. Hr. Capacity		Electrolyte to fill one two-volt cell		Home Trade and Climates Ordinarily below 90°F. (32°C.) Specific Gravity of Acid (corrected to 60°F.)		Climates frequently over 90°F. (32°C.) Specific Gravity of Acid (corrected to 60°F.)		Initial Charge Current	Re-charge Current
1	2	3		4		5	6	7	8	9	10
		At 10 hour rate	At 20 hour rate	Pint	c.c.	Filling	Fully Charged	Filling	Fully Charged	Amp.	Amp.
LVW5E	5	5	5.7	1/8	71	1.270	1.270–1.290	1.210	1.210–1.230	0.3	0.5
PU5E	5	8	9	1/6	94	1.270	1.270–1.290	1.210	1.210–1.230	0.6	1.0
PU7E	7	12	13.5	1/5	113	1.270	1.270–1.290	1.210	1.210–1.230	0.8	1.5
GU11E	11	20	22.8	1/3	189	1.270	1.270–1.290	1.210	1.210–1.230	1.3	2.2
SC7E	7	22.5	26	—	250	1.270	1.270–1.290	1.210	1.210–1.230	1.5	2.5

The maximum permissible electrolyte temperature during charging is given below. Should the temperature of the electrolyte exceed this value interrupt the charge and allow the battery temperature to fall at least 10°F. (5.5°C.) before charging is resumed.

Climates normally below 80°F. (27°C.)	Climates between 80°–100°F. (27°–38°C.)	Climates frequently above 100°F. (38°C.)
100°F. (38°C.)	110°F. (43°C.)	120°F. (49°C.)

The specific gravity of the electrolyte varies with temperature. For convenience in comparing specific gravities, they are always corrected to 60°F., which is adopted as the reference temperature. The method of correction is as follows:

For every 5°F. *below* 60°F., *deduct* 0.002 from the observed reading to obtain the true specific gravity at 60°F. For every 5°F. *above* 60°F., *add* 0.002 to the observed reading to obtain the true specific gravity at 60°F.

The temperature must be that indicated by a thermometer having its bulb actually immersed in the electrolyte, and not the ambient temperature.

SERVICING

Battery Persists in Low State of Charge

First consider the conditions under which the battery is used. If the battery is subject to continuous discharge, e.g. long periods of night parking with lights on without suitable opportunities for recharging, a low state of charge is inevitable.

A fault in the dynamo or regulator, or neglect during a period out of commission, may also be responsible.

Vent Plugs

See that the ventilating holes in each vent plug are clear, and that the rubber washer fitted under the plug is in good condition.

Level of Electrolyte

The surface of the electrolyte should be level with the tops of the separators. If necessary, top-up with distilled water. Any loss of acid from spilling or spraying (as opposed to normal loss of *water* by evaporation) should be made good by dilute acid of the same specific gravity as that already in the cell.

Cleanliness

See that the top of the battery is free from dirt or moisture which might provide a discharge path. Check that the battery connections are clean and tight.

Hydrometer Tests

The space between each separator is not wide enough to permit the nozzle of an hydrometer to be inserted. Before taking a sample, tilt the battery to bring sufficient electrolyte above the separators. If the level of the electrolyte is so low that an hydrometer reading cannot be taken, no attempt should be made to take a reading after adding distilled water until the battery has been on charge for at least 30 minutes.

Measure the specific gravity of the acid in each cell in turn. The reading given by each cell should be approximately the same; if one cell differs appreciably from the others, an internal fault in that cell is indicated.

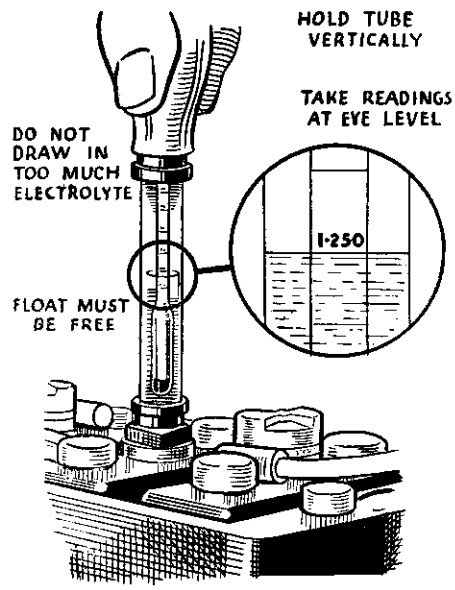

Fig Y20. Taking hydrometer readings

Specific gravity readings and their indications are as follows:

Climates under 90°F.			Climates over 90°F.
1.270—1.290	..	Cell fully charged	1.210—1.230
1.190—1.210	..	Cell about half discharged	1.130—1.150
1.110—1.130	..	Cell fully discharged	1.050—1.070

The appearance of the electrolyte drawn into the hydrometer when taking a reading gives a useful indication of the state of the plates: if it is very dirty, or contains small particles in suspension, it is possible that the plates are in a bad condition.

Discharge Test

Motor-cycle batteries must *not* be subjected to the heavy discharge test, as recommended for motor-car and commercial vehicle batteries.

RECHARGING FROM AN EXTERNAL SUPPLY

If the hydrometer test indicates that the battery is merely discharged, and is otherwise in a good condition, it should be recharged, either on the motor-cycle by a period of daytime running, or on the bench from an external supply.

If the latter, the battery should be charged at the rate given in the table until the specific gravity and voltage show no increase over three successive hourly readings. During the charge the electrolyte must be kept level with the tops of the separators by the addition of distilled water.

A battery that shows a general falling-off in efficiency, common to all cells, will often respond to the process known as 'cycling'. This process consists of fully charging the battery by passing through it from an external source the appropriate re-charge current given in the table. The battery is then discharged by connecting to a lamp board, or other load, taking a current equal to the normal re-charge current. The battery should be capable of providing this current for at least 7 hours before it is fully discharged, as indicated by the voltage of each cell falling to 1.8. If the battery discharges in a shorter time, repeat the 'cycle' of charge and discharge.

PREPARING BATTERIES FOR SERVICE

All new batteries are supplied without electrolyte but with the plates in a charged condition. When they are required for service it is only necessary to fill each cell with sulphuric acid of the correct specific gravity. No initial charging is required.

Preparation of Electrolyte

The electrolyte is prepared by mixing together distilled water and concentrated sulphuric acid. The mixing must be carried out either in a lead-lined tank or in suitable glass or earthenware vessels. Slowly add the acid to the water, stirring with a glass rod. *Never add water to acid*, as the resulting chemical reaction causes violent and dangerous spurting of the concentrated acid. The specific gravity of the filling electrolyte depends on the climate in which the battery is to be used.

The approximate proportions of acid and water are indicated in the following table:

To obtain Specific Gravity (corrected to 60°F.) of	Add 1 vol. of acid 1.835 S.G. (corrected to 60°F.) to
1.270	2.8 vols. of water
1.210	4.0 vols. of water

Heat is produced by the mixture of acid and water, and the electrolyte should be allowed to cool before pouring it into the battery.

The total volume of electrolyte required can be estimated from the figures quoted in the table on page 2.

Filling the Battery

Carefully break the seals in the cell filling holes and fill each cell with electrolyte to the top of the separators, *in one operation*. The temperature of the filling room, battery and electrolyte should be maintained between 60°F. and 100°F. If the battery has been stored in a cool place, it should be allowed to warm up to room temperature before filling.

Putting into Use

Batteries filled in this way are 90 per cent charged. If time permits, however, a freshening charge of four hours at the normal recharge rate given in the table would be beneficial.

During the charge the electrolyte must be kept level with the top edge of the separators by the addition of distilled water. Check the specific gravity of the acid at the end of the charge; if 1.270 acid was used to fill the battery, the specific gravity should now be between 1.270 and 1.290; if 1.210, between 1.210 and 1.230.

Maintenance in Service

After filling, the battery needs only the recommended attention.

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