

LUCAS COMPENSATED VOLTAGE CONTROL REGULATORS AND CUT-OUT UNITS

Basics

The regulator (CVC) unit has 2 coils. The first is the voltage regulator coil and has a voltage winding (lots of fine turns) and around that a few heavy turns - the current winding. This is where the CVC comes from – Compensated Voltage Control. On no load (open circuit) the voltage winding will control the dynamo output to a constant voltage by opening and closing the field circuit. The current winding is arranged to reduce the dynamo output voltage as the load current increases to restrict the current flow into a flat battery.

The second coil is the cut out which connects the dynamo to the battery. This also has two windings - one voltage and one current. The contact is normally open, but when the dynamo voltage reaches the set value, it closes and connects the dynamo to the battery. When the dynamo output drops, (engine idle or stop) the battery voltage is higher than the dynamo voltage. This is where the current winding comes in because the current now flows the other way (battery to dynamo) and the current winding now opposes the voltage winding and allows the contact to open, separating the battery and dynamo.

My TA is fitted with a Lucas RB106/1 control unit and a C39PV2 dynamo.

Control Box

The box has 5 terminals fitted with grub screws. The terminals are marked (L to R) A1, A, F, D, E. Viewed from the terminal side, the Voltage Control is on the left and the Cut-Out on the right. There are different versions of the Voltage controller. The number of turns on the compensating winding varies to match the output capability of the dynamo. For example, the Rolls Royce/Bentley regulator was matched with a high output RA5 dynamo and only had 1 main compensating turn and 1 load turn. The regulator used on the Fordson Tractor, with a small, enclosed dynamo, has 6 main and 3 load turns. Mine, which may or may not be original, has 3 main turns and 1 load turn.

NB! Before attempting to adjust or work on the control box, disconnect the battery.

NB! The contacts are of different materials and require different cleaning methods:

Regulator contacts are Tungsten and should be cleaned with a carborundum stone or silicone carbide paper. The cut-out contacts are silver and should be cleaned with fine glass paper.

Regulator Set-up

The RB106/1 uses a LRT9 regulator assembly. The manual states “...it is impossible to clean the contacts until the contact plate is swung outwards.”

To access the contacts, slacken the 2 screws holding the fixed contact plate and remove the upper screw. The contact can now be swung out. Remove both screws to remove the contact completely.

NB! Older units have shims between the frame and the fixed contact. These are “E” shaped and may fall out when the screws are loosened. Also note that the fixed contact is insulated from the frame.

Three dimensions are specified as critical:

- a) Vertical air gap between the armature and the frame should be parallel and between 0.018” and 0.020”. This can be adjusted by loosening the armature fixing screws in the top of the frame. (The holes in the armature mounting spring plate are slotted.)
- b) The air gap between the bobbin face and the brass pip or shim on the armature – 0.012” to 0.020”
- c) With the armature pressed against the frame, the contact point gap should be between 0.006” and 0.017”. Early units have shims between the fixed contact and the frame. Later ones are adjusted by bending the fixed contact.

Practical Note: It is not clear how all three adjustments are achieved as there is no apparent way to adjust the vertical position of the armature. Moving the fixed contact affects the rest position of the armature and therefore the gaps between armature/frame and armature/bobbin. I suspect that the geometry is such that, if you get 2 settings right, the third will be within tolerance.

Having got the mechanical settings correct, it is possible to adjust the electrical settings.

These settings must be made with the generator must be disconnected from the battery. This is achieved by placing a piece of dry card between the cut-out contacts.

With the generator running at 3000 rpm, the voltage should be within the limits of the table below (pre 1956 regulators):

<i>Ambient Temperature</i>	<i>Generator 3000 rpm</i>
	<i>Voltage</i>
10 °C (50°F)	16.3-16.9
20 °C (68°F)	16.0-16.6
30 °C (86°F)	15.7-16.3
40 °C (104°F)	15.4-16.0

Increasing the generator speed to 4000 rpm, the voltage should not increase by more than 1 volt.

Screw in the adjuster to raise the voltage and lock with the lock nut.

Cut-Out Set-up

The cut out operation is much less critical than the voltage regulator, as long as it does pull in and drop out at approximately the correct values.

The mechanical set-up instructions for this are not very clear but, if I interpret them correctly, are as follows (you will need 2 sets of feeler gauges):

- a) Vertical air gap between the armature and the frame should be 0.014”.
- b) With the armature pressed down towards the bobbin, the gap between armature and bobbin should be 0.011” to 0.015”.
- c) With a 0.025” feeler between the armature and the bobbin, the contact gap should be 0.002” to 0.006”.
- d) With feelers of 0.011 to 0.015 between the armature and the bobbin, the gap between the top of the armature and the curved stop should be 0.030” to 0.034”.

The cut-out should close at between 12.7 and 13.3 Volts and should open at between 8.5 and 10.0 Volts with a reverse current reading of between 3.5 and 5.0 Amps. Screw in the adjuster to raise the voltage and lock with the lock nut.

Resistor

There is a resistor connected across the regulator contacts.

It would normally be a cartridge type (looks like a fuse) – 63 Ohms, mounted underneath.

Tractor and motorcycle regulators use a Carbon pellet, mounted on the rear of the frame, again 63 Ohms.

Later units use a wire wound resistor, mounted underneath, 60 Ohms.

Roger Grix

11 September 2002

Information taken from Lucas Publication SB470 (4th edition) Revised