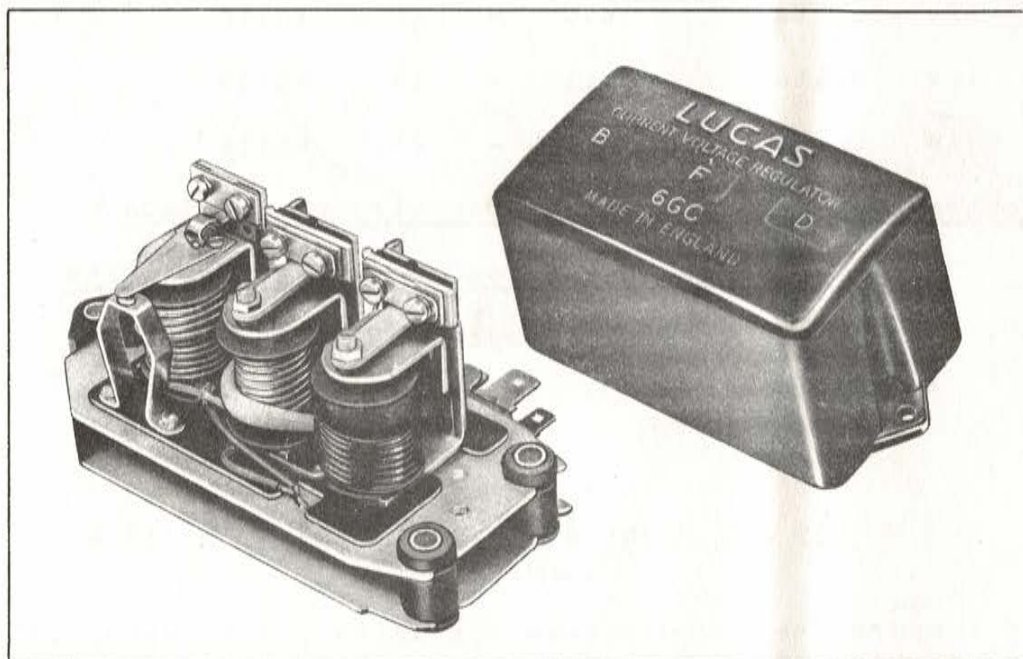


SB/RG/32 HOME  
B/5 EXPORT  
OCTOBER 1965

## Lucas Control Box Model 6GC

### Introduction, Servicing & Equivalents List



#### General

The Lucas 6GC control box has been developed to supersede the RB310 as initial equipment for C.A.V. and is also to be used as a replacement for existing Lucas and C.A.V. RB310 units in service.

The internal arrangement of three bobbins and contact assembly of the RB310 are retained while the base and terminal assembly are similar to the RB340, although units with screw terminals are also available for replacing the earlier RB310 with this type of connexion.

An extended foot (just visible to left of illustration) converts the fixing centres of the RB340 base, when replacing the RB310 to make it suitable for fitting into the existing fixing holes without modification being necessary.

Terminal arrangement is marked on the moulded cover 'B' 'F' 'D' and 'R'. The screw type unit has four terminals, the offset one marked 'R' being the earth terminal (Return terminal on Insulated Return Systems.) Units fitted with Lucar terminals incorporate a double 'B' terminal and an additional small Lucar for connecting the warning light.

Servicing - Electrical Settings

(i) Voltage Regulator- checking and adjustment of the open-circuit voltage.

O.C.V. Setting limits at 20°C (68°F) are as follows:-

Lucas	12v	units	14.6	-	15.8	volts
C.A.V.	12v	units	14.1	-	14.5	volts
C.A.V.	24v	units	28.0	-	28.5	volts

Control Boxes with Special Open Circuit Settings

<u>Pt.No.</u>	<u>Associated Generator</u>	<u>Setting Limits</u>
37469 ) 37470 )	C47, C48 (Rolls Royce)	14.8 - 15.1
37473 ) 37485 )	C48,	14.2 - 14.8
37476 ) 37481 )	C45 PV5 Uprated	14.4 - 15.0

Ambient temperature compensation for units fitted with 0.012" thick bi-metal springs is as follows.

For every 10°C (18°F) above 20°C subtract 0.2 volt, for every 10°C below 20°C add 0.2 volt.

The open circuit voltage checking or adjustment must be carried out as quickly as possible in order to avoid any errors due to the heating effect of the operating coil.

Voltage regulators fitted with 0.010" thick bi-metal springs (i.e. units fitted in conjunction with C45 PV uprated, C47, C48 and all 24v generators), do not require correction as they have a level voltage temperature characteristic.

The procedure for checking or adjustment of the O.C. voltage should be carried out as follows:-

- (a) Disconnect the cable(s) from control box "B" terminal.
- (b) Connect a first grade 0-20 v moving coil voltmeter (12v units

or 0-40v for 24v units) between "D" terminal and earth.

- (c) Start the engine and run generator at 1500 rev/min for C45 uprated, C47, C48 and D5L24, 2000 rev/min for G512 and at 3000 rev/min all others.
- (d) Observe the voltmeter pointer, this should read steady between the stated limits.
- (e) If the reading is steady but occurs outside the stated limits an adjustment can be made by turning the spring loaded adjustment screw clockwise to raise the voltage or anti-clockwise to lower it.
- (f) Check the setting by reducing the generator speed, and then slowly increase it again to the setting speed.
- (g) After the open circuit voltage has been checked or adjusted, the generator speed should be reduced to zero, and again raised slowly until it is running at 3500 rev/min for G5-12, 5000 rev/min for GL 45 and at 4500 rev/min all others. At this speed the voltage setting should not exceed 16.2 volts for 12volt machines and 31.0 volts for 24volt machines.
- (ii) Current Regulator - checking and adjustment of the current setting.
  - (a) Using a suitable bulldog clip, short out the voltage regulator contacts by connecting it across the fixed contact plate and regulator frame.
  - (b) Disconnect the cable(s) from control box terminal blade 'B' and using a suitable jumper lead; connect the cables to the load side of a first grade 0-40A moving coil Ammeter.
  - (c) Connect the other side of the ammeter to the control box terminal blade 'B'. It is important to ensure that terminal 'B' carries only this one connexion. All other load connexions (including the ignition coil feed) must be made to the battery side of the ammeter.
  - (d) If the battery is in good state of charge, switch on a load (i.e. side & headlamps). This is necessary to enable the generator to develop its full rated output.
  - (e) Start the engine and run generator at 2000 rev/min for D5L24B-11, and G512, 3000 rev/min GL45, GH45, D5F24B and G5A24, and at 4000 rev/min all Lucas generators. The ammeter pointer should be steady and indicate a current equal to the maximum rated output of its associated

generator (see table) pages 8-10.

NOTE If an unsteady reading is obtained i.e. one fluctuating more than  $\pm 1$  amp, this may be due to unclean contacts or foreign matter in regulator air gaps. If the reading is constant but too high or too low, adjust as follows.

- (f) With a small screwdriver, turn the adjustment screw on the back of the regulator frame, clockwise to increase the setting or anti-clockwise to decrease the setting.
- (g) Switch off the engine and replace the original connexions.
- (iii) Cut-Out-Relay - checking and adjustment of the cut-in and drop-off voltages.

Electrical settings are as follows:-

Cut-in voltage	Lucas 12v 12.7 - 13.3	C.A.V. 12v 13.0 - 13.5	C.A.V. 24v 26.5 - 27.0
Drop-off voltage	9.5 - 11.0	9.5 - 11.0	19.0 - 23.0

#### Method of Cut-in adjustment

- (a) Connect the test voltmeter between control box terminal 'D' and a good earth point.
- (b) Switch on the side and headlamps
- (c) Start the engine and slowly increase its speed.
- (d) Observe voltmeter pointer, it should rise steadily as engine speed increases and then drop slightly at the instant of closure. The cut-in voltage is that which is indicated immediately before the pointer drops back. It should occur between the stated limits.
- (e) If an adjustment is required, turn the adjustment screw clockwise to increase the voltage setting, or anti-clockwise to decrease the setting.

#### Method of Drop-off adjustment

- (a) Disconnect cables from control box terminal 'B', and connect the voltmeter between this terminal and earth.
- (b) Start the engine and run up to approximately 2000 rev/min then slowly decelerate, noting the instant when voltmeter reading falls to zero. This should occur between the stated limits. If the contacts open outside the stated limits, an adjustment can be made as follows.

- (c) Carefully straighten the legs of the fixed contact post to raise the 'drop-off' voltage or 'bow' them to reduce it.
- (d) Repeat the test, and if necessary, re-adjust until the armature releases at the specified voltage.

Air Gap Settings

Air gap settings are accurately adjusted during assembly and should require no further attention. If however, an armature has been removed for any reason or the airgaps are to be checked, care must be taken to obtain the correct setting on re-assembly as follows.

- (i) Current and Voltage Regulators
  - (a) Slacken the two armature assembly securing screws if checking or leave loose if re-assembling so that the armature is loosely attached to the regulator frame.
  - (b) Slacken the fixed contact locking nut and unscrew the fixed contact adjustment screw until it is well clear of the armature moving contact.
  - (c) Unscrew the voltage or current adjustment screw until it is well clear of the armature tension spring.
  - (d) Using a flat steel gauge of appropriate thickness (see data table) and wide enough to cover the bobbin core, insert the gauge between the underside of the armature and the copper square.
  - (e) Press the armature down squarely against the gauge and re-tighten the two armature assembly securing screws. With the gauge still in position, screw in the fixed contact adjustment screw until it just touches the armature moving contact. Re-tighten the locking nut and remove the gauge.

AIR GAP SETTINGS

LUCAS

Associated Generator	VR Setting Gauge	CR Setting Gauge	VR Bi-Metal Thickness
C39PV-2, C45-PV-6, C40, C45PV-5, C40L	0.018" (0.45mm)	0.018" (0.45mm)	0.012" (0.3mm)
C45PV-5, C40, C39P, C40A This applies to units No. 37472 & 37504.	0.018" (0.45mm)	0.021" (0.53mm)	0.12" (0.3mm)
C47, C48, C45PV-5, uprated	0.021" (0.53mm)	0.021" (0.53mm)	0.010" (0.25mm)

C.A.V. UNITS

Associated Generator	VR Setting Gauge	CR Setting Gauge	VR Bi. Metal Thickness
GL#45 (12v)	0.018" (0.45mm)	0.021" (0.53mm)	0.012" (0.3mm)
GL#45 (24v) GH#45#1 D5LFA 24B-21, D5L24B-11	0.026" (0.66mm)	0.026" (0.66mm)	0.010" (0.25mm)

(ii) Cut-Out Relay

- (a) Again slacken the armature assembly securing screws so that the armature is loosely attached to the Cut-Out frame.
- (b) Unscrew the adjustment screw until it is well clear of the armature tension spring.
- (c) Press the armature down squarely against the core face and re-tighten the two armature assembly securing screws. No gauge is necessary.
- (d) Press the armature down against the core face and adjust the armature back-stop so that a 0.018" (0.45mm) gap is obtained between the tips of the back stop and the contact blade.
- (e) Insert an 0.015" (0.38mm) thick flat steel gauge between the underside of the armature and the copper separation. The gauge should be inserted from the side of the core nearest the fixed contact post. The leading edge of the gauge should not be inserted beyond the centre line of the core face. Press the armature down against the gauge and check the cut-out contacts. These should be just touching. If necessary, adjust the height of the fixed contact by carefully straightening or bowing the legs of the fixed contact post.

NOTE This is a nominal setting that, in order to obtain the correct drop-off voltage may later require modifying within the limits 0.010" - 0.020" (0.25mm - 0.51mm)

Cleaning Contacts

The voltage and current regulator contacts may be cleaned with carborundum stone or silicon carbide paper, but it is important to thoroughly clean afterwards with methylated spirits.

Cut out contacts may be cleaned with very fine glass paper but never emery cloth or carborundum stone.

Resistor Values

<u>Contacts Resistor</u>	<u>Value in ohms</u>	<u>Colour Code</u>
Lucas 12v units	60 ± 5	Red
C.A.V. 12v units	100 ± 5	Orange
C.A.V. 24v units	240 ± 12	Blue

Field Parallel Resistor

12v units	40 ± 4	Yellow
24v units	40 ± 4	Yellow

(On 24v units this resistor is series connected with a Lucas diode between field terminal 'F' and base)

Swamp Resistor

24v units only	30 ± 1.5	(This resistor provides a swamp path to earth for both voltage reg. and Cut-Out shunt windings.)
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Shunt Winding Resistance at 20°C (60°F)

	<u>Voltage Regulator</u>	<u>Cut-Out Relay</u>
12v units )	103 - 115 ohms	56 - 65 ohms
24v units )		
(with Swamp) )		

Polarization

All 24 volt units have a diode in the field discharge circuit and carry a distinctive label denoting their polarity.

Each diode carries the rectifier symbol indicating conventional current flow.

Warning

Ohmmeters of the type incorporating a hand driven generator must never be used for checking diodes.

LIST OF CONTROL BOXES, CURRENT RATINGS, EQUIVALENTS AND REMARKS

LUCAS

<u>Part No.</u>	<u>Associated Generator</u>	<u>Volts</u>	<u>Current Rating</u>	<u>RB 310 Equivalent</u>	<u>Remarks</u>
37469	C47	12	30 + 1	37195, 37308	Screw Term
37470	C48	12	36 + 0 - 1	37277	Screw Term
37471	C45FW-6	12	25 + 1	37297	Screw Term
37472	C45FW-5 C40	12	22 + 1	37299, 37346	Lucar Term
37473	C48	12	34 + 1	37301, 37357	Screw Term
37474	C39FW-2 C40	12	19 + 1	37302	Lucar Term C40 - 4 1/2" Fan
37475	C45FW-5 C40	12	22 + 1	37303, 37315	Screw Term
37476	C45FW-5 Up-rated	12	30 + 1 1/2	37305, 37320	Screw Term
37477	C45FW-6	12	25 + 1	37304, 37334, 37336	Lucar Term 37336 - Suppressed
37478	C39FW-2	12	19 + 1	37307, 37401, 37332,	Screw Term C40 - 4 1/2" Fan
37483	C45FW-5 C40	12	22 + 1	37335, 37337	Lucar Term Suppressed
37481	C45FW-5 Up-rated	12	30 + 1 1/2	37323	Lucar Term
37485	C48	12	34 + 1	37341, 37389	Lucar Term
37490	C39P C40A	12	11 + 5	37400	Lucar Term
37504	C40-1	12	20 + 1	37332	Screw Term

All the above units are fitted with the extended foot



## C.A.V.

Con. Box Part Nos.	Polarity & Earth Connexion	Voltage	Associated Generator	Type*	Current Rating	RB 310 Equivalent	Remarks
37433	+ ve	24	GL45-24	NV	15 + 0 - 1		Lucar Terms. Down
37434	- ve	24	GL45	NE	15 + 0 - 1	37372	Lucar Terms. Down Extended Foot
37435	+ ve	24	GL45	NV	18 + 0 - 1		Lucar Terms. Down
37436	- ve						Extended Foot
37437	+ ve	24	GL45	HE	22 + 0 - 1		Lucar Terms. Down Extended Foot
37441	- ve	12	GL45	NE	20 + 0 - 1		Lucar Terms. Down Extended Foot.
37442	Insul	12	GL45	NV	25 + 0 - 1		Lucar Terms. Down Moulded Base Cover
37453	+ ve	24	GL45	NE	15 + 0 - 1	37361	Screw Terms. Down
37454	- ve						Extended Foot
37455	- ve Insul	24	GL45	NE	15 + 0 - 1		Screw Term. Down Moulded Base Cover
37456	+ ve	24	GL45	NV	18 + 0 - 1	37390	Screw Term. Down
37457	- ve						Extended Foot.
37458	+ ve	24	GL45	HE	22 + 0 - 1	37411	Screw Term. Down
37459	- ve						Extended Foot.
37462	- ve	12	FL45	NE	20 + 0 - 1		Screw Terms. Down Extended Foot
37463	Insul	12	GL45	IV	25 + 0 - 1		Screw Term. Moulded Base Cover
37465	- ve Insul	24	GL45	NE	15 + 0 - 1		Lucar Term. Moulded Base Cover
37466	- ve	12	GL45	NV	25 + 0 - 1		Lucar Terms. Down Extended Foot
37492	Insul	12	GL45	NE	20 + 0 - 1		Screw Term Moulded Base Cover
37505	- ve	12	C48	NV	34 + 0 - 1	37341	Lucar Terms Down

C.A.V.

Con. Box Part Nos.	Polarity & Earth Connexion	Voltage	Associated Generator	Type*	Current Rating	RB 310 Equivalent	Remarks
37506	+ ve	24	GH45-24	NV	15 + 0 - 1	37314	Screw Terms Up
37507	- ve	24	D5LFA24B-21	NV	18 + 0 - 1	37327	Screw Terms Down
37508	- ve	24	D5L24B-11	NE	12 + 0 - 1	37328	Screw Terms Up
37510	+ ve	24	D5L-24B-11	NE	12 + 0 - 1	37300	Screw Terms Up
37511	+ ve	24	GH45-24	NV	15 + 0 - 1	37333	Lucar Terms Up
37513	+ ve	24	GI45	NE	15 + 0 - 1	37371	Lucar Terms Down
37515	- ve	24	GI45	NE	15 + 0 - 1	37425	Lucar Terms Up Suppressed

\* Key to abbreviations given in column 5

- NV Normal Speed Ventilated
- NE Normal Speed Enclosed
- HE High Speed Enclosed