SECTION F—5
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LUCAS

Quality

EQUIPMENT

WORKSHOP INSTRUCTIONS

CONTROL BOX

MODEL RB108

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CONTROL BOX

MODEL RB108

1. GENERAL

Control box model RB108 is fitted to tractors, motor cycles and stationary engines. In production, the unit is sealed against the ingress of moisture and dust and this condition must be maintained following any repair or adjustment which has necessitated the removal of the control box cover. It is therefore advisable to renew the cover gasket on such occasions.

Electrical settings can now be made without removing the cover. The two adjusting screws are spring-loaded and access to them is through rubber-blanked holes in the cover. Older units with unpierced covers were usually fitted with screw-and-locknut type adjusters and with these it is necessary to remove the cover when making adjustments.

2. ELECTRICAL SETTING DATA

(a) VOLTAGE REGULATOR

The following open-circuit voltage-regulator settings should obtain with a generator speed of 3,000 r.p.m.

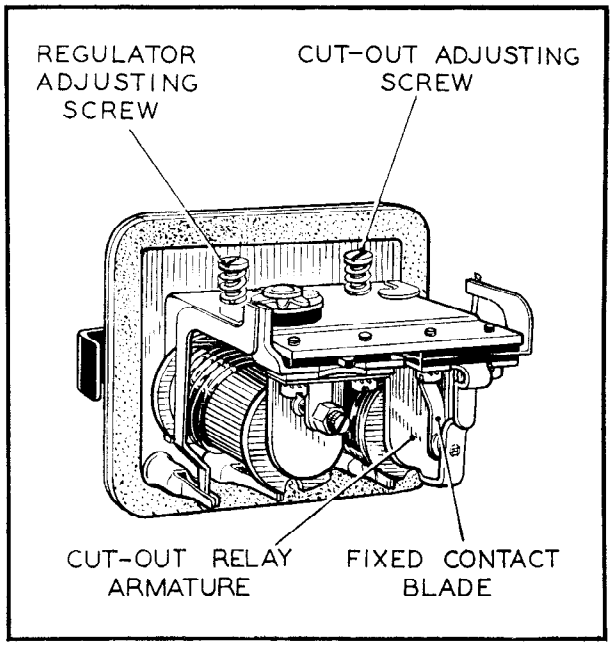

Fig. 1
Control box with cover removed

(i) All units excepting Part Nos. 37272 and 37274 :

Ambient Temperature	*12-volt units*	*6-volt units*
10°C. (50°F.)	16.1—16.7 volts	8.05—8.45 volts
20°C. (68°F.)	16.0—16.6 volts	8.0 —8.4 volts
30°C. (86°F.)	15.9—16.5 volts	7.95—8.35 volts
40°C. (104°F.)	15.8—16.4 volts	7.9 —8.3 volts

(ii) Part No. 37272 :

10°C. (50°F.)	17.3—17.9 volts
20°C. (68°F.)	17.2—17.8 volts
30°C. (86°F.)	17.1—17.7 volts
40°C. (104°F.)	17.0—17.6 volts

(iii) Part No. 37274 :

10°C. (50°F.)	17.1—17.5 volts
20°C. (68°F.)	17.0—17.4 volts
30°C. (86°F.)	16.9—17.3 volts
40°C. (104°F.)	16.8—17.2 volts

(b) CUT-OUT RELAY

	12-volt units	*6-volt units*
Cut-in voltage:	12.7—13.3 volts	6.3—6.7 volts
Drop-off voltage:	8.5—11.0 volts	4.8—5.5 volts
Reverse current:	3.5— 5.0 amp.	3.5—5.0 amp.

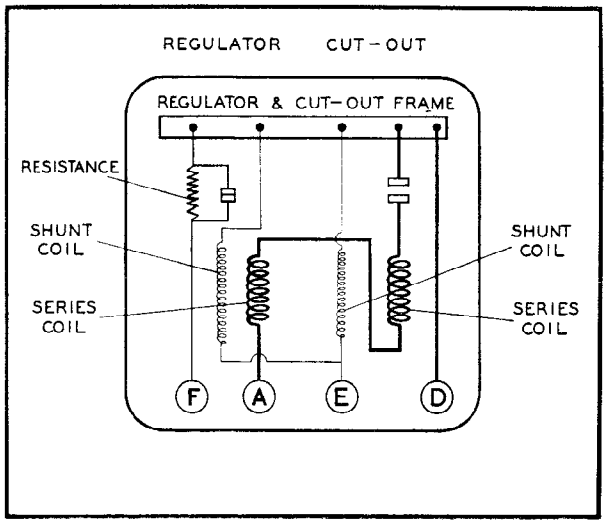

Fig. 2
Internal connections of control box

3. SERVICING

(a) PRELIMINARY CHECKING OF CHARGING CIRCUIT

Before disturbing any electrical adjustments examine as follows to ensure that the fault does not lie outside the control box.

Check the battery by substitution or with a hydrometer and heavy discharge tester of appropriate value.
Inspect the generator driving belt for wear or slackness. Rectify as required.

Detach the cables from the generator terminals and link the terminals with a short length of bare wire. Connect a good quality moving-coil voltmeter, calibrated 0–20 volts, between this link and a good earthing point and slowly run the generator up to about 1,000 r.p.m., when a rising voltage should be shown. If this is so, remove the wire link and restore the terminal connections. If a rising voltage is not shown, examine the generator. Inspect the charging circuit cables, and test for continuity, including the earthing cable of the control box.

Ascertain that reported undercharging is not due to low mileage or under-running.

(b) CHECKING REGULATOR ELECTRICAL SETTING

Checking and adjusting should be completed as rapidly as possible to avoid misleading readings due to heating of the shunt coil.

Detach the cable connected to control box terminal 'A'. When the unit has the terminal arrangement shown in Fig. 3, release the terminal clamp screw and withdraw the four cables from their terminal sockets. Push the 'F', 'D' and 'E' cables (only) further through the terminal clamp and re-insert these three cables into their appropriate terminal sockets, leaving cable 'A' disconnected.

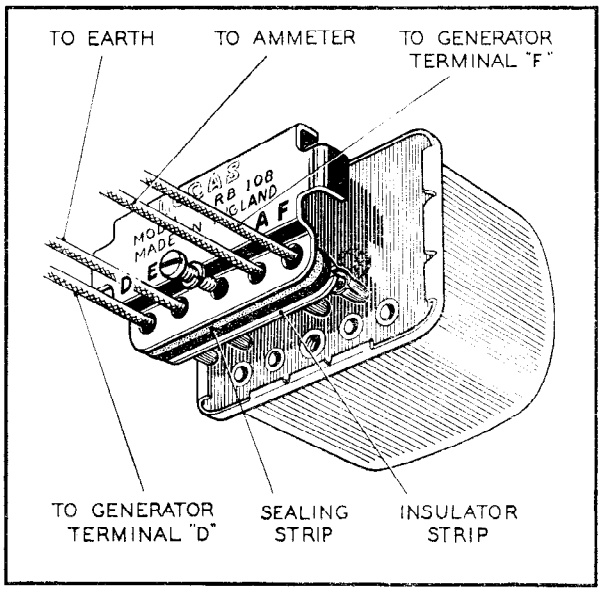

Fig. 3
Control box with ferrule-type terminals

Note: Cable 'A' is 'live' and must be prevented from contacting any metalwork.

Connect the voltmeter between the generator larger terminal ('D') and a good earthing point and run the generator at approximately 3,000 r.p.m. Alternatively, units having pierced covers can be checked as shown in Fig. 5. The voltmeter reading should be steady and lie between the appropriate limits given in para. 2 (a). If the reading is steady but occurs outside these limits proceed to para. 3 (c) below.

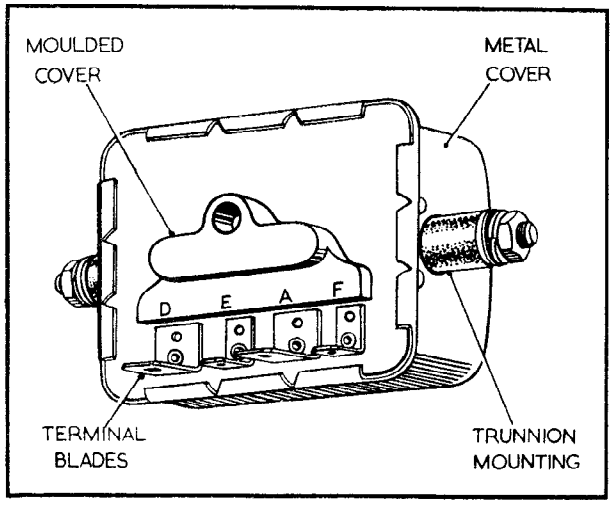

Fig. 4
Control box with 'Lucar' terminals

(c) REGULATOR ELECTRICAL ADJUSTMENT

(i) *Control boxes having cover piercings.*
Disengage the linked rubber blanks from the control box cover. The voltage regulator adjusting screw (no locknut is fitted) is visible through the left-hand hole when viewed from the domed end of the cover, holes uppermost.

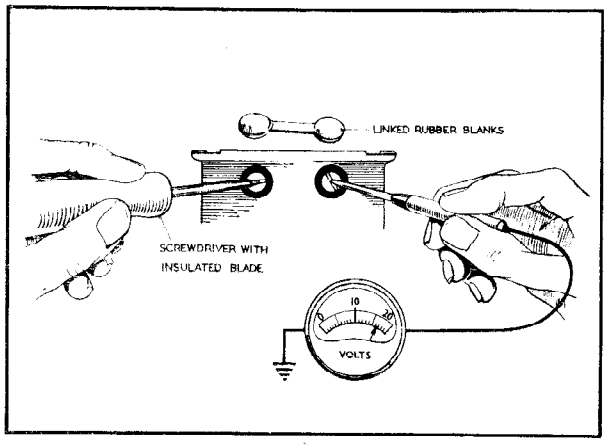

Fig. 5
Voltage check, units with pierced covers

(ii) *Control boxes having the unpierced cover.*
Remove the control box cover by prising away enough of the rolled-over edge to enable the cover to be freed. (Early-pattern control boxes have, additionally, four rivets fitted which must be removed.)

Repeat the voltage check given in para. 3 (b). Slacken the locknut (if fitted) of the regulator adjusting screw and turn the screw (clockwise to raise the setting or anti-clockwise to lower it) until the correct setting is obtained. Re-tighten the locknut. Check the setting by stopping the engine and then again raising the generator speed to 3,000 r.p.m.

Restore the original connections and refit the cover.

(d) CHECKING AND ADJUSTING CUT-OUT RELAY ELECTRICAL SETTINGS

Checking and adjusting of the cut-in and drop-off voltage settings should be completed as rapidly as possible to avoid misleading readings due to heating of the cut-out relay shunt coil.

(e) CUT-IN VOLTAGE

(i) Remake the connection between control box terminal 'A' and its associated cable.

(ii) Measure the voltage between the generator larger terminal ('D') and a good earth whilst the generator speed is slowly increased from zero.

(iii) Observe the voltmeter pointer, which should slowly rise and then drop back slightly at a reading between the limits 12.7—13.3 volts. The cut-in voltage is that reached immediately before the pointer drops back.

(iv) If the cut-in voltage occurs outside the limits 12.7—13.3 volts, remove the cover or rubber blanks as necessary and adjust the cut-out relay in a manner similar to that described for adjusting the voltage regulator, turning the cut-out relay adjusting screw clockwise to raise the cut-in voltage, or anti-clockwise to lower it. For control boxes with cover piercings the cut-out relay adjusting screw is visible through the right-hand hole viewed from the domed end of the cover, holes uppermost.

(v) Re-check the setting by alternately decelerating and accelerating the engine to give cut-out relay operation.

(vi) Stop the engine, disconnect the voltmeter and refit the cover or rubber blanks as necessary.

(f) DROP-OFF VOLTAGE

(i) Disconnect the cable from control box terminal 'A' as described in para. 3 (b), remembering to keep this cable well clear of any metalwork.

(ii) Connect the voltmeter between the control box terminal 'A' socket or 'Lucar' blade and a good earthing point.

(iii) Start the engine and drive the generator at about 3,000 r.p.m.

(iv) Observe the voltmeter pointer, while slowly decelerating the engine. Opening of the cut-out relay contacts, indicated by the voltmeter pointer dropping to zero, should occur between the limits 8.5—11.0 volts. If the drop-off voltage occurs outside these limits, it will be necessary to remove the control box cover and adjust the contact pressure ; otherwise stop the engine and restore the original connections.

(v) Stop the engine, remove and disconnect the control box. With 'Lucar' terminalled units, note each terminal and its associated cable.

(vi) Remove the control box cover.

(vii) Bend carefully the fixed contact blade towards the cut-out relay armature to reduce the drop-off voltage or away from the armature to raise the voltage.

(viii) Re-check the setting and, if necessary, re-adjust until the correct drop-off voltage is obtained.

(ix) Refit the control box cover, bending back the rolled-over edge into its former position round the base.

(x) Restore original connections as necessary.

(g) CLEANING CONTACTS

(i) *Regulator Contacts*
To clean the voltage regulator contacts use fine carborundum stone or silicon carbide paper.

(ii) *Cut-out Relay Contacts.*
To clean the cut-out relay contacts use a strip of fine glass-paper — never carborundum stone or emery cloth.

(h) ADJUSTMENT OF AIR GAP SETTINGS

Air gap settings are accurately adjusted during assembly and should require no further attention. If, however, an armature is removed for any reason, care must be taken to obtain the correct setting on reassembly.

(j) VOLTAGE REGULATOR

With the armature in the free position and correctly set, the distance between the core face and the underside of the armature is 0.030″ of which 0.015″ is through air when the copper separation consists of a disc or of two parallel wires, and 0.021″ when a square of copper is used. To obtain the air gap, proceed as follows :

Slacken the fixed contact locking nut and unscrew the contact screw until it is well clear of the armature moving contact. Slacken the voltage adjusting screw locking nut (when fitted) and unscrew the adjuster

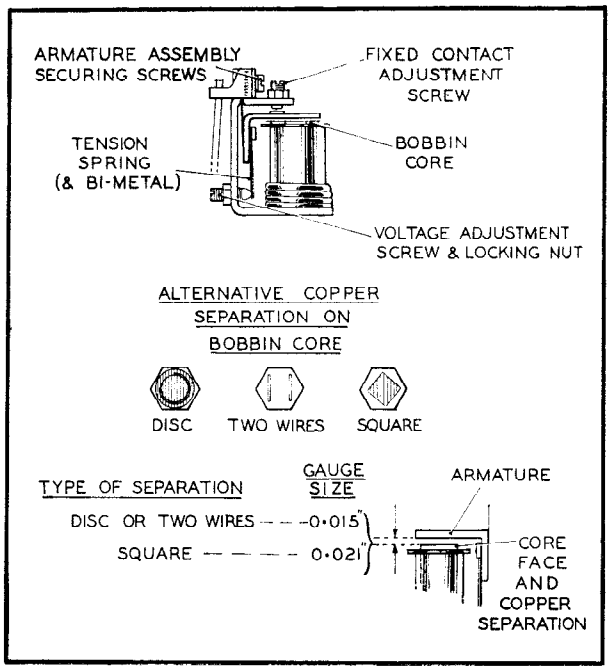

Fig. 6
Mechanical settings of voltage regulator

until it is well clear of the armature tension spring. Slacken the two armature assembly securing screws. Refer to Fig. 6 and insert a gauge of appropriate thickness (and wide enough to cover completely the core face) between the armature and the copper separation. Take care not to turn up or damage the copper disc, wires or square.

Press the armature **squarely** down against the gauge and retighten the two armature assembly securing screws.

With the gauge still in position, turn the fixed contact adjustment screw until it just touches the armature contact.

Retighten the locking nut.

Reset the voltage adjustment screw as in para. 3 (c).

(k) CUT-OUT RELAY

Slacken the adjusting screw locking nut (when fitted) and unscrew the adjuster until it is well clear of the armature tension spring.

Slacken the two armature securing screws.

Press the armature **squarely** down against the core face and retighten the armature securing screws. No gauge is necessary. Press the armature **squarely** down against the core face and, using suitable pliers, adjust the gap between the armature stop arm and the armature tongue to 0.025"—0.040" by carefully bending the stop arm.

Adjust the fixed contact blade to give a 'follow-through' or blade deflection, of 0.010"—0.020" when the armature is pressed **squarely** down against the core face.

Reset the cut-out adjusting screw as in para. 3 (e).

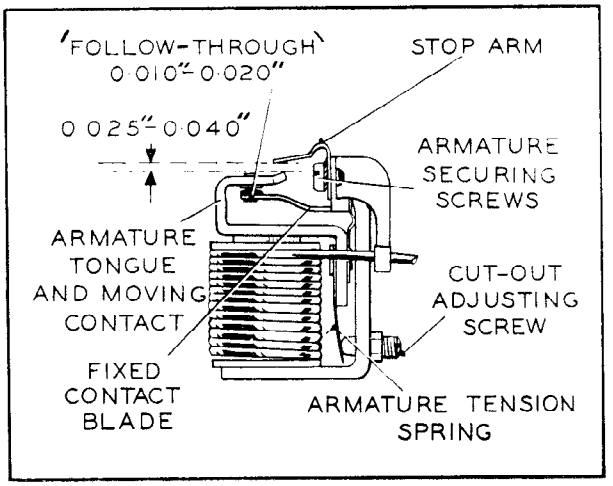

Fig. 7
Mechanical settings of cut-out relay