ALTERNATOR WARNING LIGHT CONTROL MODEL 3AW

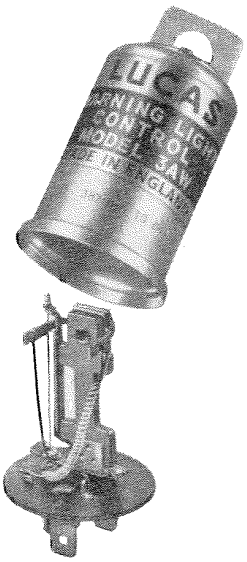
1. DESCRIPTION

(a) Application

Alternator Warning Light Control Model 3AW, is a thermally operated relay for controlling the switching on and off of a facia panel warning light. It is connected through alternator terminal 'AL' to the centre point of one pair of the six alternator diodes, and to earth (or return wiring). The indication given by the warning light is similar to that provided by the ignition (or 'No Charge') warning light used with dynamo charging systems. The warning light is illuminated when the alternator is stationary or is being driven very slowly. The light is switched off as soon as the alternator voltage begins to rise. If the voltage does not rise for any reason — a broken alternator driving belt for example — the warning light remains illuminated.

The unit is suitable for use with earth return installations of either polarity and with insulated return wiring. It can be used with either 12-volt or 24-volt alternators. When used in 24-volt installations, an external ballast resistor is connected between terminal 'AL' on the unit and 'AL' on the alternator.

The full circuit is shown in Fig. 2.



Another application is to control the diesel engine starting aid inhibitor relay used on 12-volt circuits, in addition to the charge indicator warning lamp bulb.

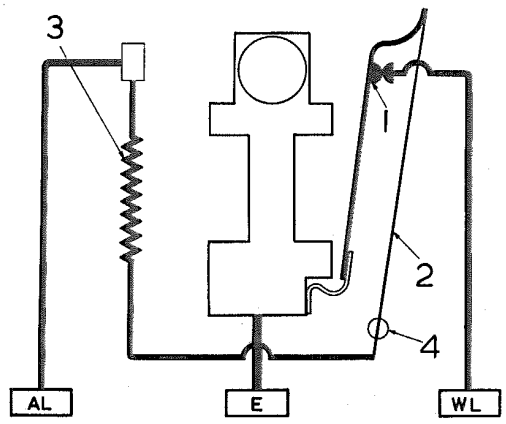


Fig. 1

Internal circuit, showing

1 Contacts
2 Actuating wire
3 Ballast resistor
4 Glass bead

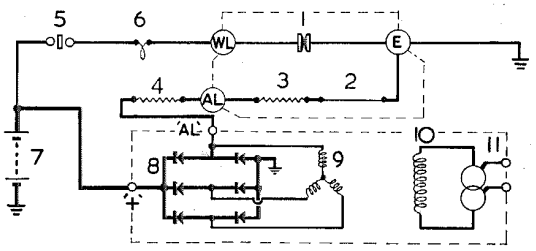


Fig. 2

Circuit of warning light control, battery and alternator, showing

1 Contacts
2 Actuating wire
3 Internal ballast resistor
4 External ballast resistor (24-volt units only)
5 Ignition switch
6 Warning light
7 Battery
8 Alternator diodes
9 Stator windings
10 Rotor winding
11 Slip rings

Caution: Because of the external similarity of the Alternator Warning Light Control Model 3AW to Flasher Unit Model FL5, a distinctive green label is applied to the aluminium case of model 3AW. Care must be taken to avoid connecting either of these units into a circuit designed for the other.

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(b) Operation

The unit consists essentially of a pair of contacts held closed against spring tension by a length of nickel-chrome resistance wire. When cold, the wire is in tension: when current flows through the wire, it heats up and lengthens, allowing the contacts to open.

When the ignition switch (or equivalent device on diesel engine vehicles) is closed, current flows from the battery, through the ignition switch (or equivalent) and panel warning light to terminal 'WL' on the unit; thence, across the closed contacts, down the moving contact arm and hinge spring to terminal 'E', and back to the battery. The warning light is then illuminated.

When the engine is started (and providing the charging system is operating and in working order), a small low-voltage current from the alternator enters the unit by terminal 'AL', passes through the internal ballast resistor and actuating wire, down the moving contact arm and out through terminal 'E'. This current heats the actuating wire and causes it to lengthen. The actuating wire is resistance-brazed to the upper end of the moving contact arm which, being spring loaded at its lower end by the hinge spring, moves away from the fixed contact. The warning light circuit is thus interrupted and the light goes out.

2. ROUTINE MAINTENANCE

The unit is sealed and no routine maintenance is necessary.

3. TECHNICAL DATA

(a) Resistance values

Resistance of actuator wire and internal ballast resistor (measured with an ohmmeter connected between terminals 'AL' and 'E'):	14–16 ohms
Resistance of external ballast resistor (used in 24-volt circuits only):	14–16 ohms

(b) Ratings of Associated Warning Light Bulbs

12-volt installations:	2.2 watts (Lucas Bulb No. 987, M.E.S. cap, 11 mm dia. envelope).
24-volt installations:	2.8 watts (Lucas Bulb No. 650, M.E.S. cap, 11 mm dia. envelope; or Lucas Bulb No. 993, M.E.S. cap, 15 mm dia. envelope).

(c) Terminals

The unit has three blade-type terminals conforming to British Standard AU17. The unit can also be plugged into the standard S.A.E. socket adaptor.

4. SERVICING

(a) Replacement procedure

Caution: A faulty diode in the alternator or an intermittent or open circuit in the alternator-to-battery circuit can cause excessive voltages to be applied to the warning light control. Therefore, to prevent possible damage to the replacement unit, it is important first to measure the voltage between the alternator terminal 'AL' and earth (or return wiring), using a first-grade 0–20-volt moving coil voltmeter.

To check the voltage at alternator terminal 'AL', run the machine at 3,000 rev/min. The voltage should be of the order 7 to 7.5 volts (12-volt alternator) or 14–15 (24-volt). If a higher voltage is indicated, first check all charging circuit connections and then, if necessary, the alternator diodes (as described in PART A) before fitting a replacement unit. In the case of a low voltage, check the alternator (as described in PART A).

If the voltage at terminal 'AL' is satisfactory, proceed as described below.

(b) Testing in Position

Symptom	*Action*
Warning light fails to illuminate when the ignition switch (or equivalent) is turned on	Check the warning light bulb. Check the warning light control, if possible by substitution. If a substitute unit is not readily available, check the original unit in situ, as follows. Move the ignition switch (or equivalent) 'ON' and use a test link or the blade of a small screwdriver to connect together terminals 'WL' and 'E' of the warning light control. If the test results in the warning light being illuminated, this proves that the warning light control is faulty and the unit should be renewed.

If the test does not result in the warning light being illuminated, a fault is indicated in the external circuit of the warning light control. Check all wiring and connections between the warning light control terminal 'WL' and battery feed to the switch, and check wiring and connections between the warning light control terminal 'E' and frame (or between 'E' terminal and return wiring side of the battery in the case of insulated-return vehicles). If the circuit wiring and connections are satisfactory, check the continuity of the warning light bulbholder and switch. **Note:** The warning light bulb should previously have been checked.

Warning light fails to go out when the alternator is being driven.	Check warning light control by substitution. Check the continuity of the circuit between terminals 'AL' on the alternator and warning light control.
Warning light shows intermittent flickering light.	Check for loose wiring connections. Check warning light control by substitution.

(c) Bench Testing

The performance of the warning light control can be checked with a 12-volt battery (having exposed intercell connectors) and a 12-volt test lamp.

(i) Connect the battery and test lamp in series with the 'WL' and 'E' terminals of the warning light control (see Fig. 3). **The bulb should light.**

Leave the battery and test lamp connected and proceed to further testing (para ii).

(ii) Connect terminal 'AL' of the warning light control to a 6-volt tapping on the battery (Connection 1, Fig. 3). **The bulb should go out within five seconds.**

Transfer the 'AL' connection to a 12-volt tapping on the battery (Connection 2, Fig. 3) and maintain this connection for ten seconds, then immediately transfer the connection to a 2-volt tapping on the battery (Connection 3, Fig. 3). **The bulb should light within five seconds.**

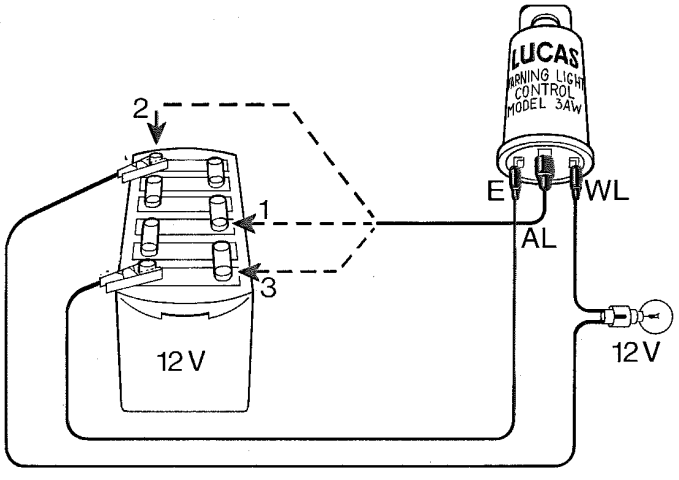

Fig. 3 Bench testing the Warning Light Control
(Broken lines indicate sequence of alternate connections)