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WORKSHOP INSTRUCTIONS

FLASHING-LAMP DIRECTION-INDICATORS

INCORPORATING FLASHER UNIT MODEL FL3

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FLASHING-LAMP DIRECTION-INDICATORS

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1. GENERAL

In general, flashing-lamp direction-indicators can be classified as four-lamp or two-lamp systems. With four-lamp systems two white (or amber) forward-showing lamps are located adjacent to or in combination with the sidelamps, and two red (or amber) rearward-showing lamps are located adjacent to or in combination with the tail or stop-tail lamps. The lamps of the nearside or offside pair are arranged to flash in unison, according to the intended direction of turn. With a two-lamp system, one amber lamp is mounted in a conspicuous position on each side of the vehicle. In addition, both systems utilise a small interior warning lamp mounted in a prominent position before the driver and which flashes in unison with the external signals.

Separate, non-interchangeable, flasher units are supplied for two-lamp and four-lamp systems.

In the United Kingdom, the positioning on the vehicle of flashing signal lamps must conform with the requirements of the Motor Vehicles (Construction and Use) (Amendment) Regulations, 1953.

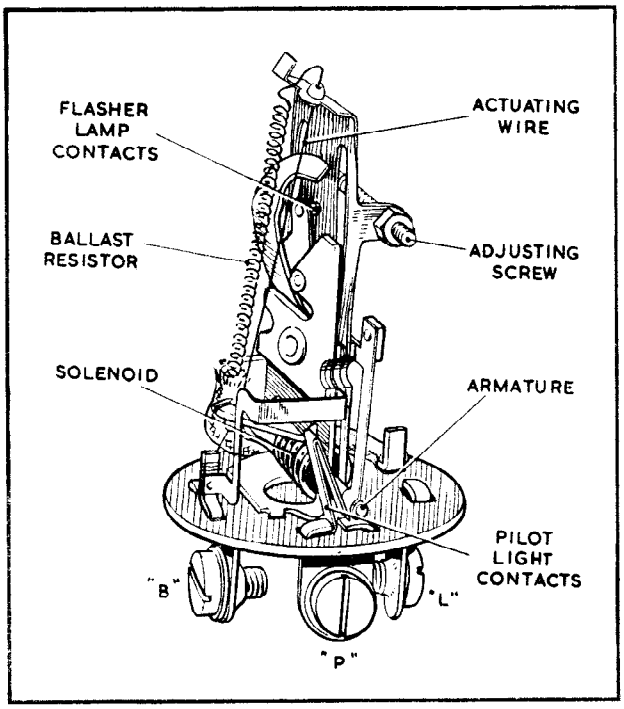

Fig. 1
Flasher unit, model FL3

THE FLASHER UNIT

Model FL3 Flasher Unit is contained in a small cylindrical metal container, one end of which is rolled over on to an insulated plate carrying the mechanism and three terminals. The unit depends for its operation on the linear expansion of a length of wire which becomes heated by an electric current flowing in it. This actuating wire controls the movement of an over-centre spring blade carrying a moving contact—the sequence of operation being as follows:

When the direction indicator switch is turned either to left or to right, current flows through the actuating wire and associated current-limiting or ballast resistor to earth via the flasher lamp filaments. This current is limited by the ballast resistor to a value which will ensure that the flasher lamp filaments do not light at this stage. The actuating wire grows in length under the heating influence of the current until the spring blade is allowed to snap into its alternative position, thereby closing a pair of contacts in the supply circuit to the flasher lamp or lamps and, at the same time, short-circuiting the actuating wire.

The current passing to the flasher lamp flows through a small solenoid on the unit base. The resulting electromagnetic effect attracts an iron core which closes the contacts of the pilot warning lamp so that now both flasher lamps and warning lamp are illuminated.

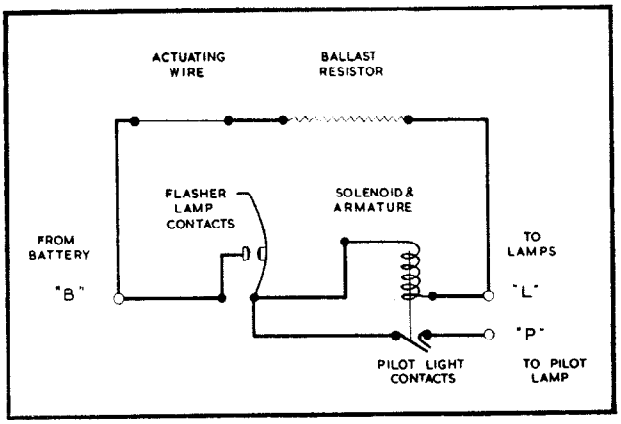

Fig. 2
Flasher unit, model FL3, internal connections

Since, however, heating current no longer flows through the short-circuited actuating wire, the latter

cools down and consequently contracts in length. The spring blade is thus again deflected, the contacts open, the light signals and pilot warning lamp are extinguished, and current again flows through the actuating wire. In this way the Flasher Unit is set into operation and the direction indicating lamps are caused to flash on and off.

The warning lamp serves not only as an indication that the Flasher Unit is functioning correctly but also gives warning of bulb failure in any of the direction-indicator lamps—since a reduction in the bulb current flowing through the solenoid reduces the electromagnetic effect acting on the iron core and prevents closure of the pilot light contacts.

The pilot lamp is located either in a prominent position on the facia or is incorporated in the indicator switch.

THE BRAKE SWITCH OVER-RIDING RELAY

When stop-light filaments are used also as direction lights, it is essential that responses to the flasher unit should over-ride simultaneous applications of the brake switch. In the event of simultaneous applications being made, the relay shown in Fig. 3 allows the appropriate stop-light filament to flash and the other to remain steadily illuminated as long as the brake pedal is depressed.

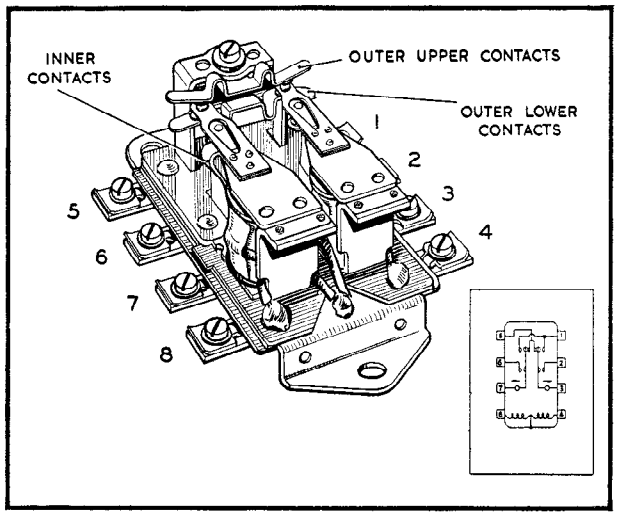

Fig. 3
Brake switch over-riding relay, model DB10, with cover removed and showing internal connections

Operation of the direction-indicator switch to right or left first energises the appropriate relay operating coil which effects movement of its associated armature in the direction shown by the arrow (Fig. 3, inset). By this means, flasher unit terminal L is connected to relay terminals 2 and 3 (or 6 and 7) and, thus, to the indicating lamps. As long as the relay coil remains energised, connection to the brake switch on the corresponding side is interrupted.

SWITCHES WITH STOP-LIGHT CONTACTS.

The function of the brake switch over-riding relay can also be effected within the direction-indicator switch, thus obviating the need for a relay. Switches designed for this purpose incorporate additional contacts connected in the stop-light circuits. The connections of such a switch are shown diagrammatically in Fig. 4. In addition to the connections shown, some switches include connections in the warning light, horn push or horn ring circuits.

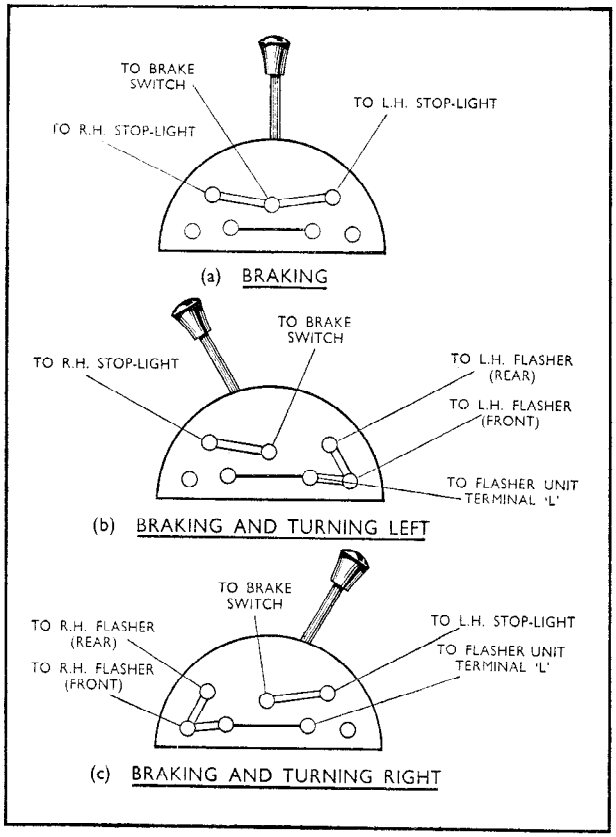

Fig. 4
Direction-indicator switch with brake switch over-riding contacts

2. MAINTENANCE

(a) BULB REPLACEMENT

The following bulbs should be used as required:

	Earth Return Vehicles
(i) Single-filament front or rear flasher lamps:	Lucas No. 382 12-volt 21-watt S.C.C. cap.

Insulated Return Vehicles

	Lucas No. 335 12-volt 21-watt S.B.C.
(ii) Double-filament front or rear flasher lamps:	Lucas No. 380 12-volt 21/6-watt S.B.C. (non-reversible).
(iii) Pilot warning lamp in facia or switch body:	Lucas No. 987 12-volt 2.2-watt M.E.S. cap.
(iv) Pilot warning lamp in switch lever:	Lucas No. 280 12-volt 0.75-watt Lilliput cap.

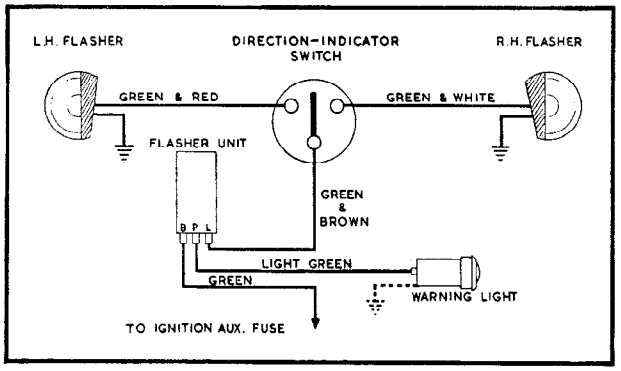

Fig. 5
Wiring of two-lamp indicator set

(b) CHECKING FAULTY OPERATION

In the event of trouble occurring with a flashing light direction-indication system, the following procedure should be followed:

(i) Check the bulbs for broken filaments.

(ii) Refer to the vehicle wiring diagram and check all flasher circuit connections.

(iii) Switch on the ignition.

(iv) Check with a voltmeter that flasher unit terminal 'B' is at 12 volts with respect to earth.

(v) Connect together flasher unit terminals 'B' and 'L' and operate the direction-indicator switch. If the flasher lamps now light, the flasher unit is defective and must be replaced.

(vi) If, in a system incorporating model DB10 brake switch over-riding relay, the lamps do not light in test (v), check the relay as follows:

Temporarily link relay terminal '1' to terminals '2' and '3'.

The left-hand lamps should now light.
Temporarily link relay terminal '5' to terminals '6' and '7'.

The right-hand lamps should now light.

If the lamps do light in test (vi), the relay is defective and must be replaced.

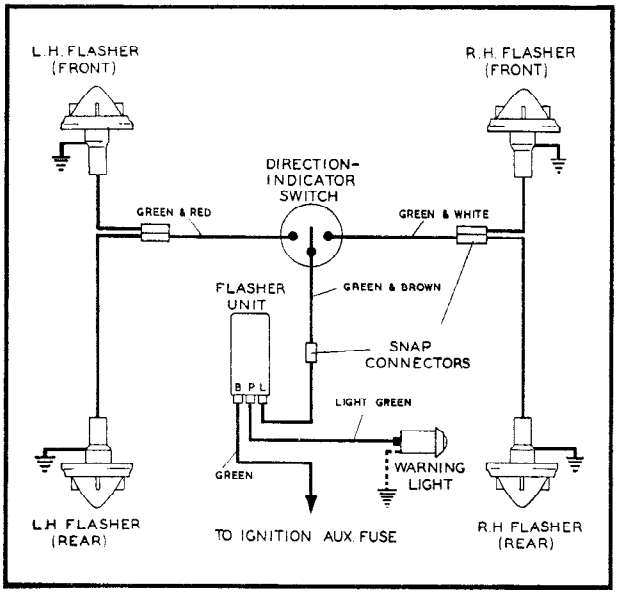

Fig. 6
Wiring of four-lamp indicator set

3. DESIGN DATA

(a) TWO-LAMP AND FOUR-LAMP FL3 FLASHER UNITS:

(i) Main bulbs:	12-volt 21-watt or 6/21 watt.
(ii) Pilot bulb:	12-volt 2.2-watt (M.E.S.) or 0.75-watt (Lilliput).
(iii) Rate of flashing:	70-105 flashes per min.
(iv) Light period/dark period ratio:	50/50±10%.
(v) Resistance (measured by ohmeter) between terminals 'B' and 'L':	11.5—12.5 ohms.

(b) DB10 RELAY

	6-volt units.	*12-volt units.*	*24-volt units.*
(i) Cut-in voltage	3.25–4.5	6.0–9.0	12.0–18.0

(ii) Drop-out voltage	1.0–2.0	3.0–6.0	6.0–12.0
(iii) Resistance of coils, measured between terminal '4' and base, or terminal '8' and base:	2.75–3.25 ohms	17.75–20.25 ohms	70.0–80.0 ohms

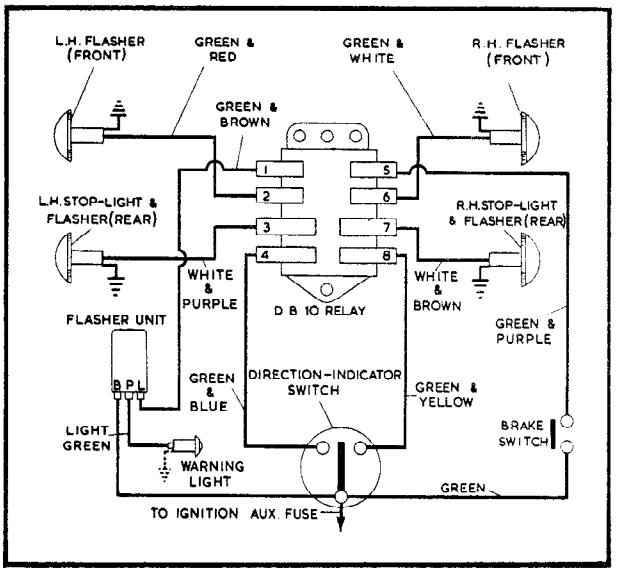

Fig. 7
Wiring of four-lamp indicator set with relay

4. SERVICING

Flasher units cannot be dismantled for subsequent reassembly. A defective unit must therefore be replaced, care being taken to reconnect as the original.

The cover of model DB10 brake switch over-riding relays can be withdrawn for checking air-gap settings. No further dismantling is possible. In the event of defective coils or contacts occurring, relays must be replaced as complete units, care being taken to reconnect as the original.

Similarly, defective direction-indicator switches must be replaced as complete units.

(a) REPLACEMENT OR INSTALLATION OF FLASHER UNIT—PRECAUTIONARY NOTE

When replacing a flasher unit or installing a flashing light system, it is advisable to test the circuits before connections to flasher terminals L, B and P are made. When testing, join the cables normally connected to these terminals together and operate the direction-indicator switch. In the event of a wrong connection having been made, the ignition auxiliaries fuse will blow but no damage will be done to the flasher unit.

Flasher units must be handled with care. Factory-made settings, though good for conditions of normal automobile duty, can be thrown off balance by rough handling.

(b) CHECKING AND RE-SETTING RELAY AIR-GAPS

Prise off the relay cover, noting the non-reversible locating slot between terminals '6' and '7'.

Each armature controls three pairs of contacts, two pairs being normally open and one pair normally closed. For setting purposes these contacts can be identified as follows:

Inner pairs, adjacent to bobbins, normally open.

Outer lower pairs, normally open.

Outer upper pairs, normally closed.

When an inner pair of contacts is just touching, a relay in correct adjustment will have an armature-to-bobbin core gap of 0.010"–0.015". In addition, when these contacts are separated by a 0.007"–0.013" gap, the outer lower contacts must be separated by 0.012"–0.018" gap. If the gaps are not within these limits, the relay must be re-set.

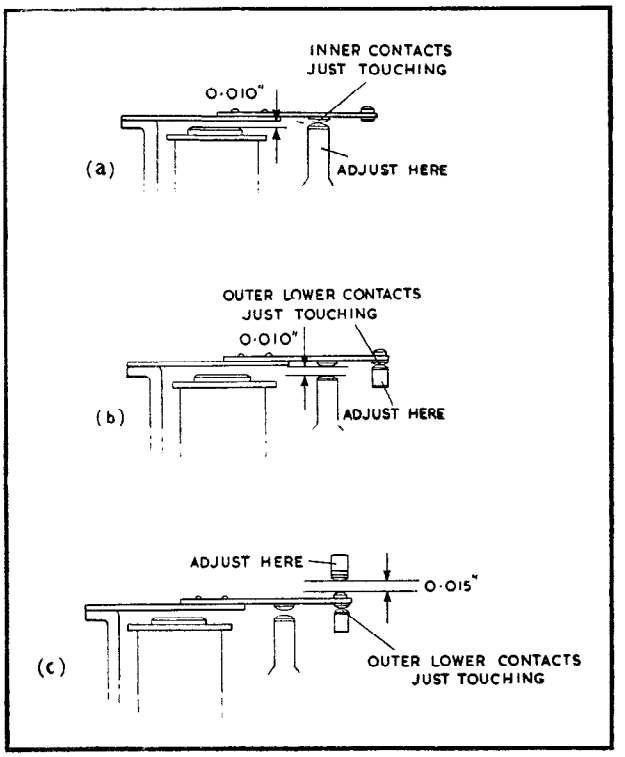

Fig. 8
Air-gap settings of model DB10 relay, showing order of adjustment

Adjustments are made by bending the fixed contact carriers with a suitably slotted bending tool. Setting is effected in three stages, as follows:

(i) Insert a 0.010″ gauge between one of the armatures and its bobbin core.

Press down the armature.

Adjust the height of the inner contact carrier until the inner pair of contacts is just touching.

Remove the gauge.

(ii) Insert the 0.010″ gauge between the inner pair of contacts and lightly press down the armature.

Adjust the outer lower contact carrier until the outer lower contacts are just touching.

Remove the gauge.

(iii) With the outer lower contacts just touching, adjust the upper contact carrier until a 0.015″ gauge is a sliding fit between the outer upper contacts.

Remove the gauge and refit the cover.