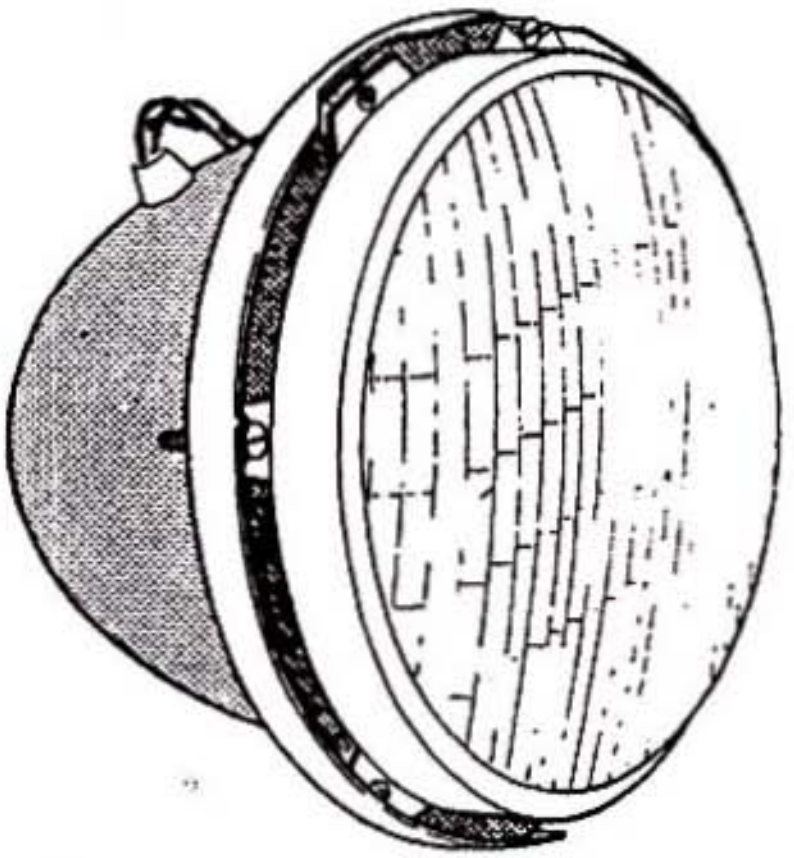


LIGHTING

INTRODUCTION

In order to comply with legal requirements, the motor vehicle must be fitted with certain forms of lighting which *must* be maintained in working condition.

Although the requirements may vary slightly with different types of vehicles, in general, the present requirements are as follows:

1. Headlamps (two minimum).
2. Side, rear and number plate lamps.
3. Direction indicator lamps.
4. Stop lamps.

Apart from the legal aspect, efficient lighting will enable the driver to "see and be seen", and a driver using defective or incorrectly aligned lamps is not only a danger to himself but also to other road users. It must be remembered that lights and lamp alignment are part of the M.O.T. test on vehicles requiring a certificate.

Additional lamps may be fitted to a vehicle, but they must comply with the regulations governing those particular lamps.

For example, any additional lamps fitted to the front of a vehicle where the mounting height exceeds 24" from the ground to the centre of the lamps automatically become headlamps unless they are used in conditions of fog or falling snow. As such, they must comply with requirements applicable to headlamps.

When testing lighting circuits the "volt drop" principle will be used. This will involve checking the "supply voltage available" under load (at the battery) then the voltage available at the actual lamp involved. Where the difference in voltage exceeds the permitted limits the voltmeter will be connected in parallel with both the supply and return sides of the circuit to determine where the fault exists. The exact procedure will be stated in this section.

In the case of direction indicator circuits, it will be necessary to use an ammeter in addition to the voltmeter, as the operation of the "flasher" unit is dependent on current consumption.

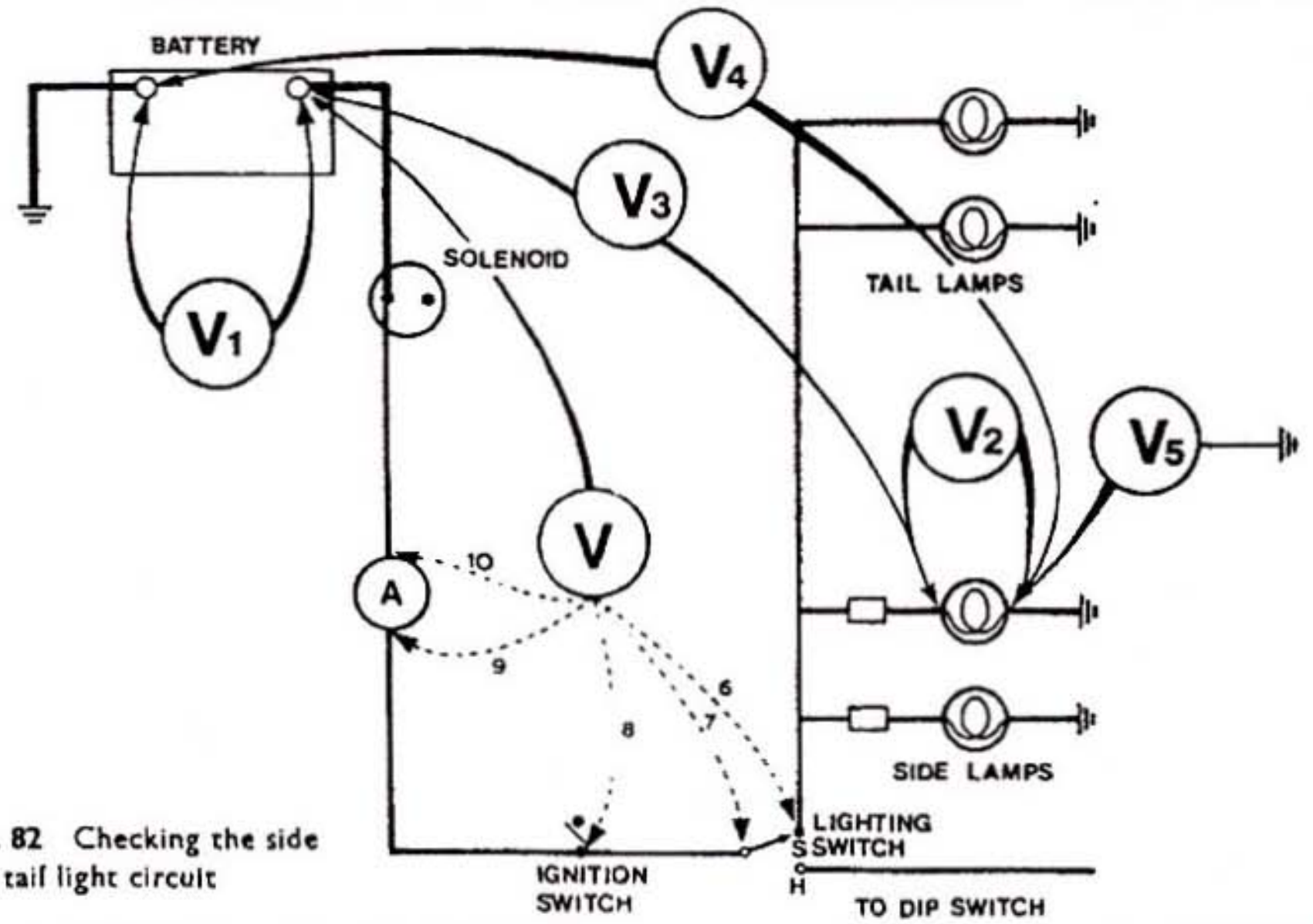


Fig. 82 Checking the side and tail light circuit

SIDE AND TAIL LIGHT CIRCUIT

ALL TESTS WITH SIDE AND TAIL LIGHTS SWITCHED ON.

Refer to Fig. 82 for voltmeter positions.

TEST 1. Voltage at the Battery under Load

Connect voltmeter (V1) across the battery terminals and note the reading.

TEST 2. Voltage at bulb connections

Connect the voltmeter across the bulb connections as (V2). Note the reading. The difference in reading (volt drop) should not exceed 10% of the system voltage. If the volt drop is excessive, proceed to Test 3 (insulated line).

TEST 3. Voltage drop on insulated line

Connect one side of voltmeter to the battery insulated terminal and the other side to the bulb insulated connection as (V3).

Note the reading.

TEST 4. Voltage drop on earth line

Connect one side of the voltmeter to the battery earth terminal and the other side to the bulb earth connection as (V4).

Note the reading.

If the total of the readings for Tests 3 and 4 exceeds 10% of the system voltage, a high resistance exists on either the insulated or earth lines or possibly both.

Bearing in mind that the total volt drop allowed is 10% (approx. 1·2V for a 12 volt system), it is permisible to have all this drop on one line or the other or as a combination of both lines.

TEST 5. Bulb earth connection

If the volt drop figure on the earth side is the higher, it is probably due to a bad connection between the lamp body and earth. To check, connect the voltmeter between the bulb earth connection and a good vehicle earth (V5). Any reading indicates volt drop.

TESTS 6, 7, 8, 9 and 10. Checking insulated line

To check volt drop on the insulated line connect one voltmeter lead to the battery insulated terminal and move the other voltmeter connection as in (V6), (V7), (V8), (V9) and (V10) until the faulty section is located.

HEADLIGHTS, STOP LIGHT AND DIRECTION INDICATOR CIRCUITS

To check these circuits, exactly the same procedure is used as described for the side and tail circuit. (Refer to Figs. 83, 84 and 85).

In the case of direction indicators one additional test is carried out together with the volt drop tests.

This involves removing the two leads from the 8FL flasher unit or the leads marked 'B' and 'L' from the FL5 and connecting an ammeter in series with these leads, as shown in Fig. 85.

With the indicator switch in either the right- or left-hand position, the indicator lamps on *one* side should light and the current registered on the ammeter should be that of the flasher unit rating.

E.g. 3·6 amps *or* 4·3 amps *or* 4·8 amps.

Should the current consumption not match up to that specified on the unit, then the rate of flash will be incorrect. This is caused by one of the following:

1. The wrong flasher unit has been fitted.
2. Bulbs of incorrect wattage have been fitted.
3. One bulb is faulty (this can be checked visually).
4. A high resistance exists in the circuit. This should be located using the volt drop test procedure.

Note: When testing indicator lamp circuits do *not* make a direct earth connection to any of the indicator lamp insulated connections (i.e. bulb contacts).

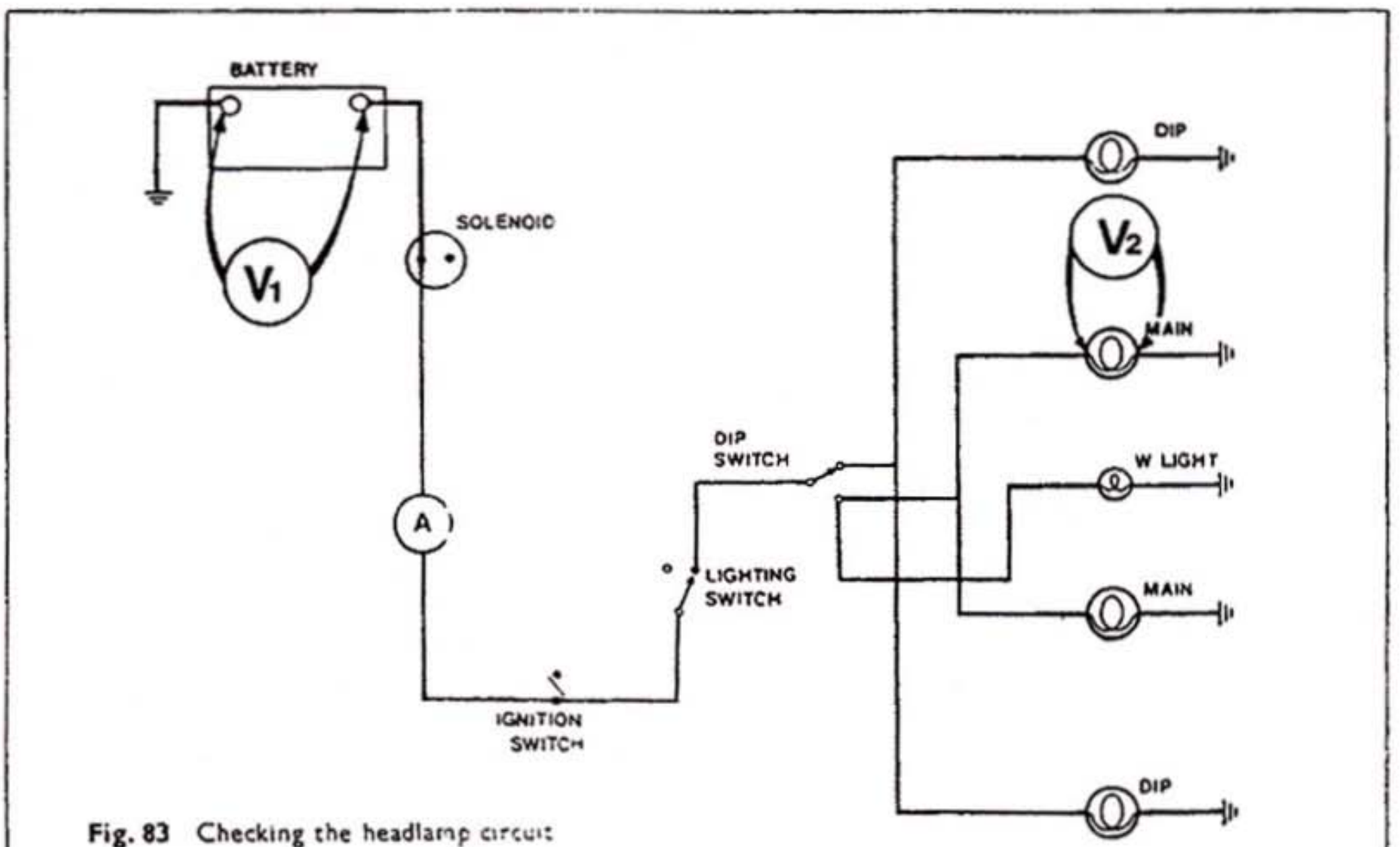


Fig. 83 Checking the headlamp circuit

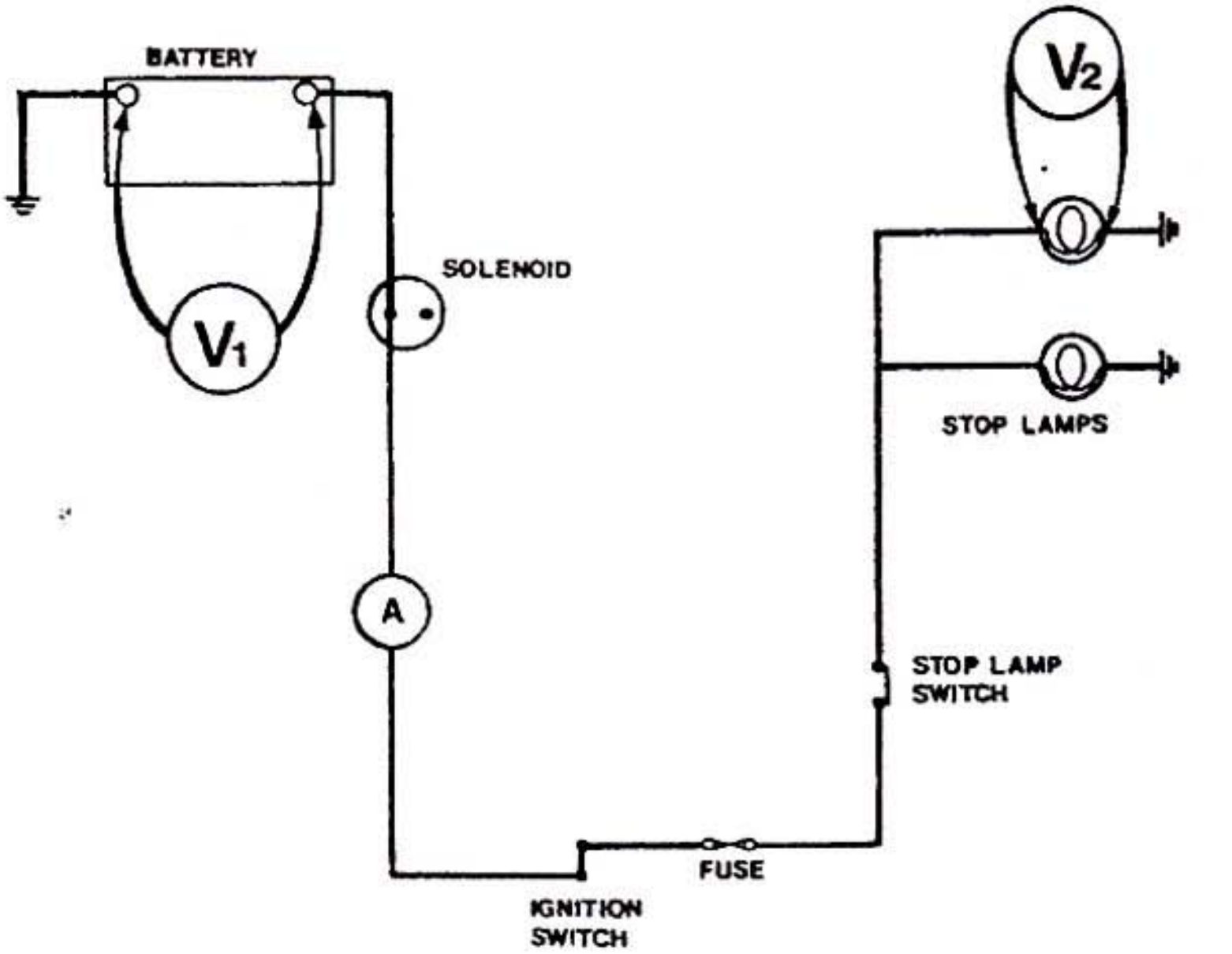


Fig. 84 Checking the stop lamp circuit

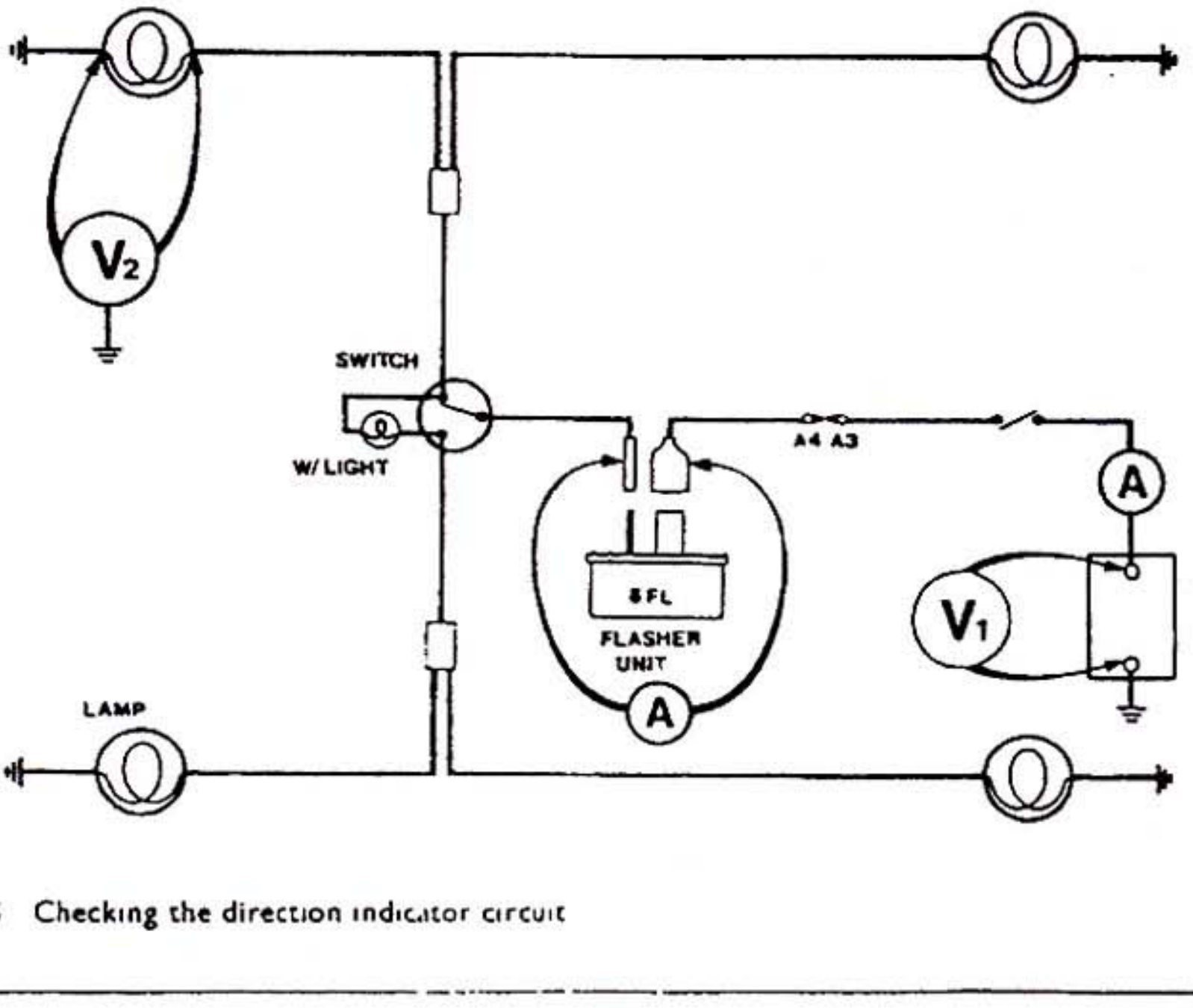


Fig. 85 Checking the direction indicator circuit

HEADLAMP ALIGNMENT

As previously stated, the headlamps can only be fully efficient when correctly aligned

The Lucas Beam Tester Mk. III, as shown in Fig 86 is an instrument designed specifically for the accurate checking and alignment of all types of vehicle headlamps.

In the absence of a beamtester, an alternative but less accurate method of checking the alignment is as follows; (see Fig. 87).

Position the vehicle on a piece of level ground 25 ft. from the wall (or door) to be used as a screen. (25 ft. is required in order to obtain a suitable beam pattern). The vehicle must, as far as possible, be at right-angles to the wall (or door).

Crosses are marked on the wall corresponding to the same centres as the headlamps (i.e. same distance apart and from the ground). These marks are then used as a guide line for the correct alignment.

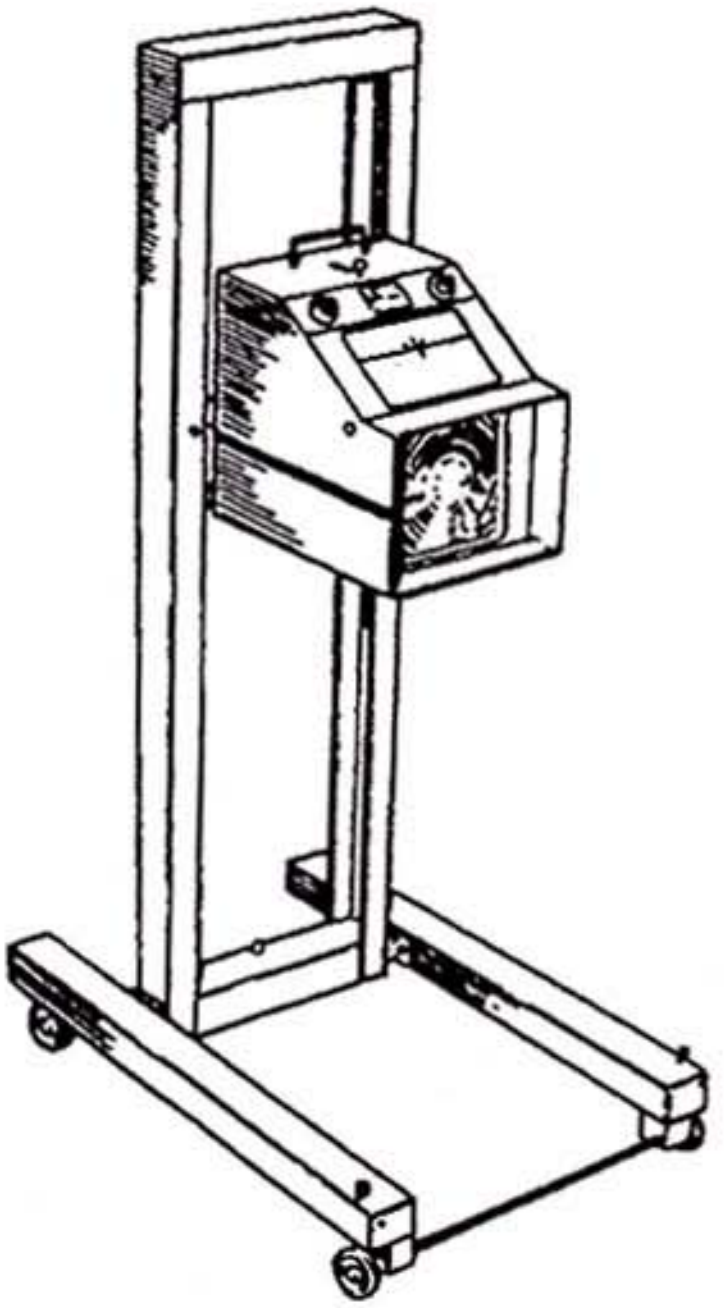
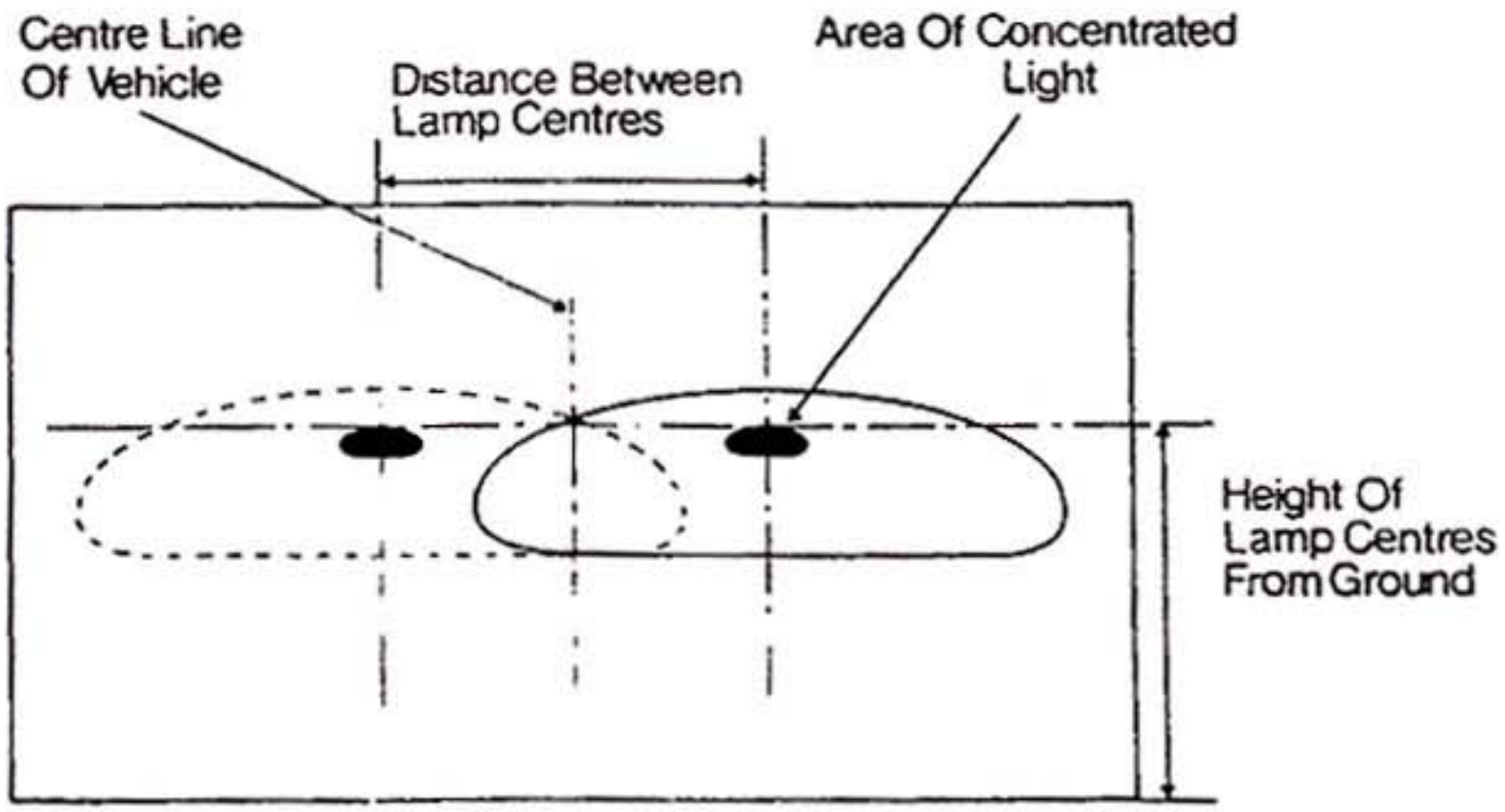


Fig. 86 Lucas Beam Tester Mk. III



A - Front Of Vehicle To Be Square With Screen.
B - Vehicle To Be Loaded And Standing On Level Ground.
C - Recommended Distance For Setting Is At Least 25ft.
D - For Ease Of Setting One Headlamp Should Be Covered.

Fig. 87 Headlamp alignment (without beam tester)