**SECTION M-2**
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*also Section M-1, Part B, Page 1*

# LUCAS

*Quality*

# EQUIPMENT

VOLUME 2

# WORKSHOP INSTRUCTIONS

## SCREENJET

## MODEL 2SJ

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# SCREENJET

## MODEL 2SJ

## 1. GENERAL

A small permanent magnet motor is mounted on a moulded cover screwed to a glass container, as shown in Fig. 1. Inside the container is a small centrifugal pump combined with an auxiliary reservoir. The pump assembly and reservoir are located near the bottom of the container and are secured to the underside of the moulded cover by a metal tube. Inside this tube is a spindle which couples the pump to the motor.

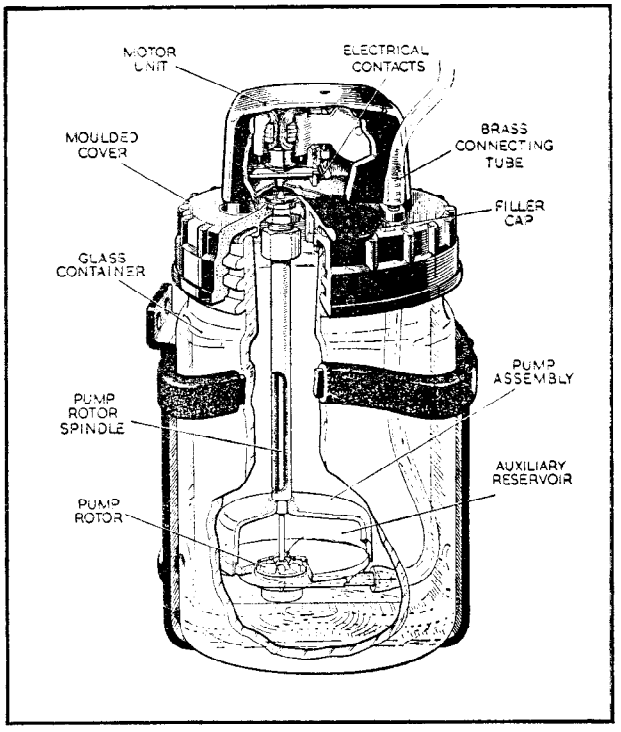


Fig. 1
Section of Screenjet

The pump rotor is so designed that when it is rotated at speed and is freely supplied with water from the auxiliary reservoir, a thrust is developed which causes the rotating parts to be moved upwards. This movement is employed:

(*i*) to close a pair of electrical contacts situated inside the motor housing.

(*ii*) to close the water inlet orifices in the recess at the base of the pump assembly.

The motor is set in motion by momentarily closing the pushbutton operating switch. The subsequent upward movement of the rotating parts then closes the internal contacts, thus maintaining the motor in motion, and cuts off the water supply to the auxiliary reservoir. When the latter is empty, the upward thrust is no longer present, so that the rotating parts move downwards to their original position, and the internal contacts are separated, so stopping the motor. The water inlet orifices are now opened, allowing the auxiliary reservoir to refill in readiness for the next operation.

Air, to replace the water discharged, is admitted to the glass container through a groove in the rubber filler cap, and to the auxiliary reservoir through its securing tube.

## 2. ROUTINE MAINTENANCE

(a) When the water level has fallen to the top of the auxiliary reservoir, refill the glass container with clean soft water until the level is at the bottom of the container neck.

(b) To avoid damage by frost, either empty the container or add denatured alcohol (methylated spirit). The underside of the rubber filler cap forms a measure. Two measures of denatured alcohol should be added per container **after filling with water.** Operate the ScreenJet once to ensure thorough mixing of the water and methylated spirit.
The addition of Lucas 'Crystal Clear' ScreenJet fluid (10 c.c. per container of water) will promote efficient cleaning of the windscreen.

(c) Keep the glass container free from sediment and the jet nozzles clear.

(d) Occasionally apply one drop of thin machine oil to the felt washer on the motor retaining plate, see Fig. 2.

## 3. TEST DATA

| | |
|---|---|
| (a) Current consumption: | 4·5 amp. (max.), 6-volt models<br>2·0 amp. (max.), 12-volt models<br>1·25 amp. (max.), 24-volt models |
| (b) Capacity of container: | 1,200 c.c. (2 pint approx.) |
| (c) Duration of jet: ... | 7 sec. (approx.) |
| (d) Quantity of water ejected during each operation: ... | 22 c.c. (approx.) |
| (e) Time for reservoir to refill when glass container is full: ... | 15 sec. (approx.) |

(f) Minimum water pressure
in external tubing: 3·5 lb. per sq. in. (0·245 kg./sq. cm.)
(g) Resistance between
commutator segments: 0·5—0·7 ohm, 6-volt models
2·8—3·1 ohms, 12-volt models
10·6—11·7 ohms, 24-volt models

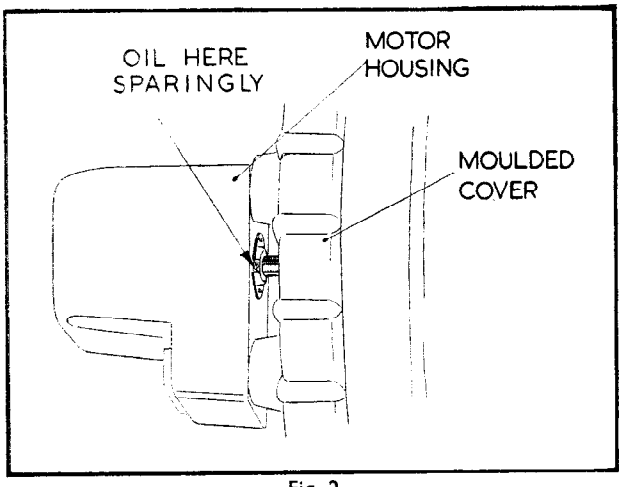


Fig. 2
Position of felt washer on motor retaining plate

## 4. SERVICING

### (a) TESTING IN POSITION

*(i) Testing with a voltmeter*

Connect the positive terminal of a 0-20 volts D.C. voltmeter to motor terminal 'A' and the voltmeter negative terminal to motor terminal 'C'. These terminals can be seen in Fig. 3.

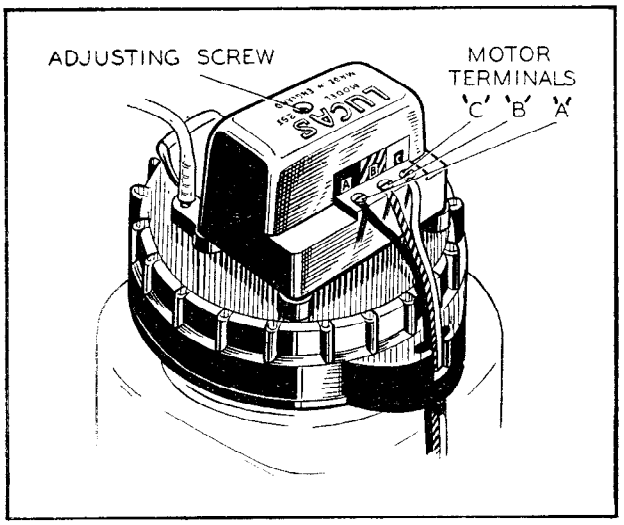


Fig. 3
View of motor unit showing electrical connections and adjusting screw

The normal battery supply should be indicated on the voltmeter.

Remove the voltmeter connection from terminal 'A' to terminal 'B' and operate the ScreenJet starting switch.
Battery voltage should again be indicated.
If in one of these tests, a low zero voltage is indicated, the 'A4' fuse, operating switch and external connections should be checked and corrected as necessary, see Figs. 4 and 5.
If the voltmeter gives a reverse reading, the motor connections must be corrected, see Figs. 4 and 5.
*(ii) Checking the external tubes and nozzles*
If the motor operates, but little or no water is delivered to the screen, or if the motor runs for a very much longer period than 7 seconds, the external tubes and nozzles may be blocked.
Remove the external plastic tube from the brass connecting tube and ensure that the connecting tube is clear.

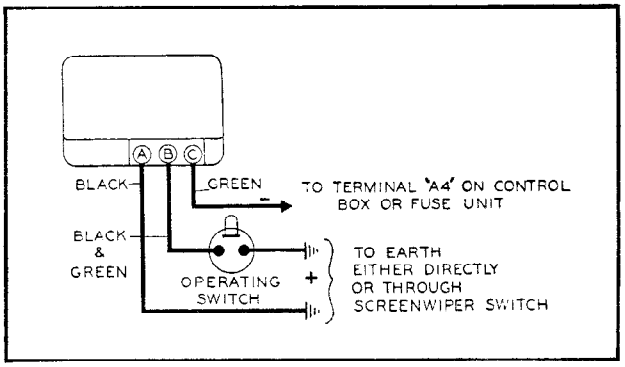


Fig. 4
Typical circuit diagram for ScreenJet when fitted to vehicles having the battery positive (+) terminal earthed

Operate the ScreenJet starting switch.
If a jet of water is ejected from the brass connecting tube, check the external tubes and nozzles for damage and blockages.
If no water is ejected, the ScreenJet must be dismantled as described in para. 4(b), and its component parts examined.
*(iii) Setting the adjusting screw—ScreenJet* in situ.
If the ScreenJet operates only as long as the operating switch is pressed, or operates continually, the switch adjusting screw may be incorrectly set. Two methods exist by which this setting can be checked. Para. 4 (e) gives details of the recommended setting procedure following general dismantling of the ScreenJet. When, however, it is required to check the setting of the screw with the ScreenJet *in situ*, the following method should be adopted:—
Remove the sealing compound to expose the adjusting screw (see Fig. 3.) With the external connections made, and without pressing the operating switch, turn the screw clockwise until the motor operates then immediately reverse the screw during the pumping operation until the motor switches off. Now turn the screw approximately two turns clockwise and check for satisfactory normal working of the unit.

(b) DISMANTLING

(*i*) Disconnect the external tube and electrical connections and unscrew the moulded cover from the glass container.

(*ii*) Withdraw the plastic tube from the brass connecting tube located in the moulded cover.

(*iii*) Unscrew the union nut using a $\frac{1}{4}$" Whit. spanner and pull away the pump assembly. Take care not to distort the pump tube, armature shaft or pump rotor spindle.

The armature shaft will pull out from the spindle connector, leaving the connector on the pump rotor spindle.

(*iv*) Remove the cover gasket, withdraw the four screws located inside the moulded cover and separate the motor and cover.

(v) Heat the free end of the spindle connector in a small flame and pull the connector off the pump rotor spindle. This connector must be discarded and a replacement fitted when reassembling.

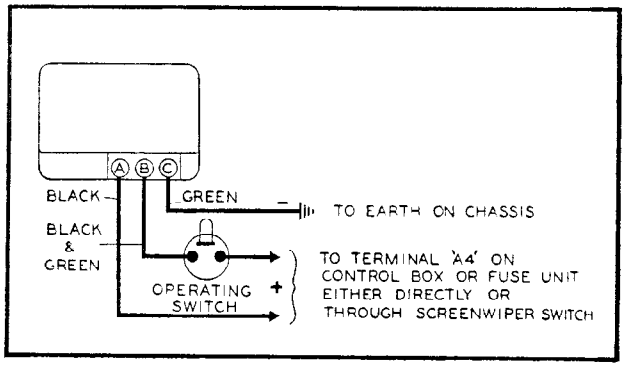


Fig. 5
Typical circuit diagram for ScreenJet when fitted to vehicles having the battery negative (—) terminal earthed

*The motor unit* (see *Fig.* 6)

(vi) Remove the sealing compound from the hole at the top of the motor unit. This exposes the adjusting screw.

(*vii*) Take out the three terminal screws.

(*viii*) Turn the motor unit so that the armature shaft is uppermost and, on earlier units, remove the small rubber washer.

(*ix*) Take out the two retaining plate securing screws and remove the retaining plate and rubber gasket.

(*x*) Lift out the three terminal nuts, contact arms and brushes.

(*xi*) Lift out the armature assembly and switch carrier assembly.

(*xii*) The pole assembly and ball bearing should not normally be disturbed. If, however, it is necessary to remove the pole assembly, it should be suitably marked to ensure that it can be correctly refitted. If the pole assembly is refitted with its underside uppermost the armature rotation will be reversed with consequent heating of the motor.

(c) BENCH TESTING

If the motor has been overheated, or if any part of the motor housing has been damaged, a replacement motor unit must be fitted.

(*i*) *Armature*

If the armature is damaged, or if the windings are loose or discoloured, a replacement armature must be fitted.

The commutator must be cleaned with a fluffless petrol-moistened cloth or, if necessary, by polishing it with a strip of very fine emery cloth.

The resistance of the armature winding should be checked with an ohm meter. The resistances between commutator segments should be as shown in para 3(g). A replacement armature must be fitted if the resistances differ greatly from this value.

(*ii*) *Brushes*

If the carbon is less than $\frac{1}{16}$" (1·59 mm.) deep, a new brush must be fitted.

Check that the brush spring tension is sufficient to ensure that the brush bears firmly on the commutator.

(*iii*) *Switch Assembly*

If the switch contacts are rough or pitted, a replacement switch carrier assembly must be fitted.

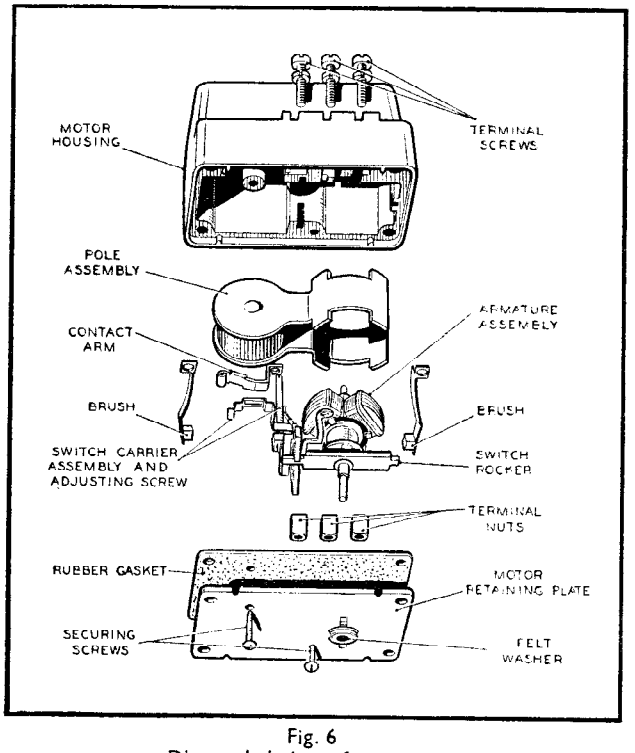


Fig. 6
Dismantled view of motor unit

(d) REASSEMBLING

(*i*) Ensure that the pole assembly is correctly positioned in the motor housing and check that a single ball bearing is located in the armature journal support.

(*ii*) Refit the switch carrier assembly so that the adjusting screw locates in the hole in the motor housing.

(*iii*) Insert the armature assembly in the pole assembly so that the armature journal locates in its support. Ensure that the small projection on the switch rocker on the armature shaft locates in the motor housing and that the larger projection rests on the contact spring on the switch carrier assembly.

(*iv*) Refit the brushes and contact arms. Refit the terminal nuts so that their polished surfaces make contact with the terminal tags on the brushes and contact arm.

(*v*) Refit the three terminal screws. Only the original screws, or approved spares, must be used as the use of longer screws may cause damage to the motor housing

(*vi*) Secure the rubber gasket and motor retaining plate to the motor unit with the two securing screws.

(*vii*) Check that the armature is free to rotate by turning the extension of the armature shaft.

(*viii*) Check the setting of the adjusting screw as described in para. 4 (e).

(*ix*) Replace the sealing compound.

(*x*) Push the smaller section of the replacement connector on the extension of the armature shaft until the crimp reaches the end of the shaft, see Fig. 8.

(*xi*) Position the filler cap in the moulded cover and the small rubber washer (when fitted) on the armature shaft. Secure the motor on the moulded cover with the four screws and refit the cover gasket.

(*xii*) Connect the plastic tube to the brass connecting tube.

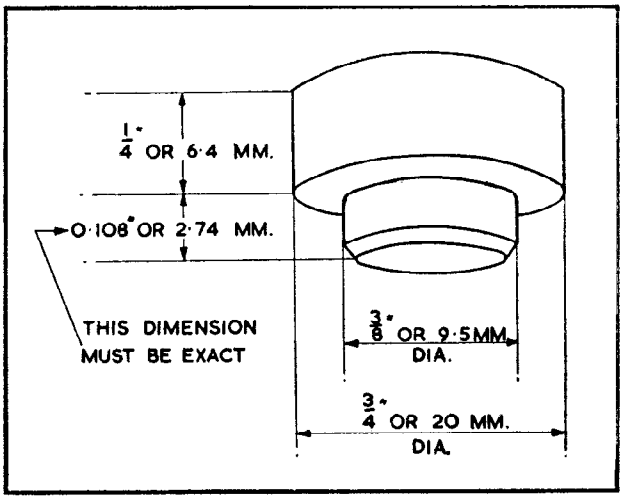


Fig. 7
Suitable gauge made from $\frac{3}{4}$" or 20 mm. rod

(*xiii*) Remove the filter gauze from the circular recess in the base of the pump assembly and insert in its place a gauge similar to the one illustrated in Fig. 7. It is essential that the gauging surface is perfectly flat.

(*xiv*) Line up the pump rotor spindle with the replacement connector located in the union on the underside of the moulded cover, see Fig. 8. Hold the gauge firmly in position and press the spindle into the connector, until the tube surrounding the spindle contacts the union.

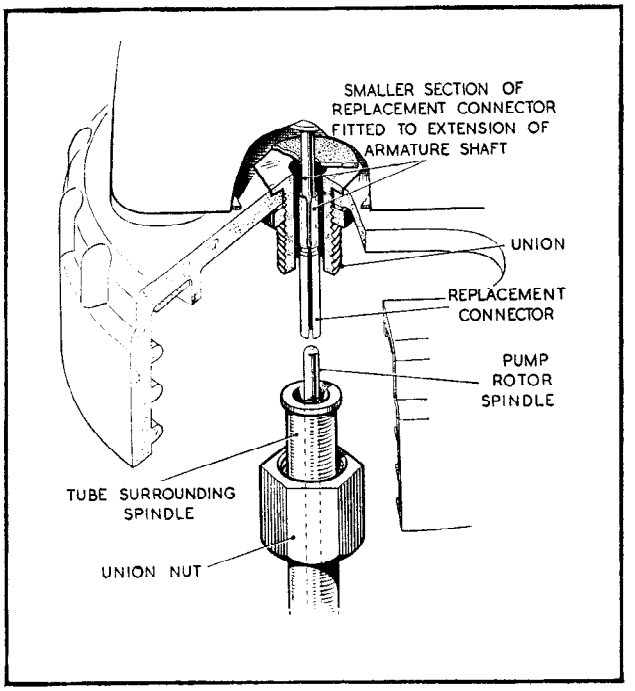


Fig. 8
Method of fitting pump assembly to motor unit

(*xv*) Remove the gauge and tighten up the union nut taking care not to apply pressure to the pump assembly.

(*xvi*) Again insert the gauge in the recess. Press the gauge inwards until its flange bears evenly on the circular rim.

(*xvii*) Remove the gauge. Dome the filter gauze outwards and refit it in the recess so that it does not obstruct movement of the pump rotor spindle.

(*xviii*) Refit the moulded cover and remake the external connections.

(e) SETTING THE ADJUSTING SCREW (motor withdrawn from moulded cover).

(*i*) Remove any remaining sealing compound from the hole in the top of the motor unit to expose the adjusting screw.

(*ii*) Connect an ohm meter, or a suitable D.C. supply

and a low-wattage bulb, between terminals 'A' and 'B', as shown in Fig. 9.

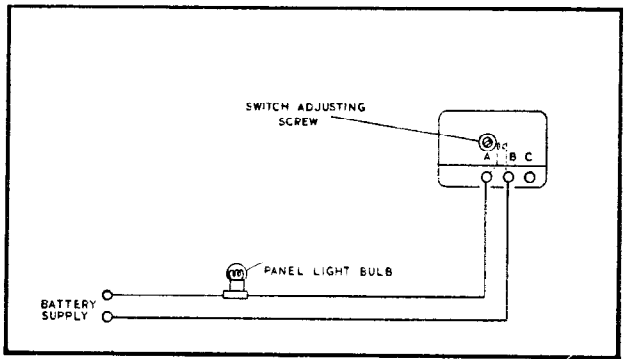


Fig. 9
Method of setting the adjusting screw

(*iii*) Press the extension of the armature shaft in to its limit.

(*iv*) Turn the adjusting screw clockwise until the ohm meter or bulb indicates that a circuit is made between terminals 'A' and 'B'.

(*v*) Turn the adjusting screw a further two turns clockwise.

(*vi*) Proceed as instructed in Para. 4 (d) (*ix*).

(*f*) TESTING PERFORMANCE

Equipment required:

D.C. supply equivalent to nominal battery voltage

D.C. voltmeter of appropriate range, first grade, moving coil

0—5 amp. D.C. ammeter

0—10 lb. per sq. in. (0—0.7 kg./sq. cm.) pressure gauge

Push switch

Two-jet nozzle (295005)

Turn-off water tap

Measuring cylinder 100 c.c. capacity

4' 6" (1.37 m.) length of plastic tubing

(*i*) Connect up the equipment as shown in Fig. 10. The water level in the container must be 4" (101.6 mm.) above the base of the pump assembly. The pressure gauge and nozzle must be 18" (457.2 mm.) above the water level.

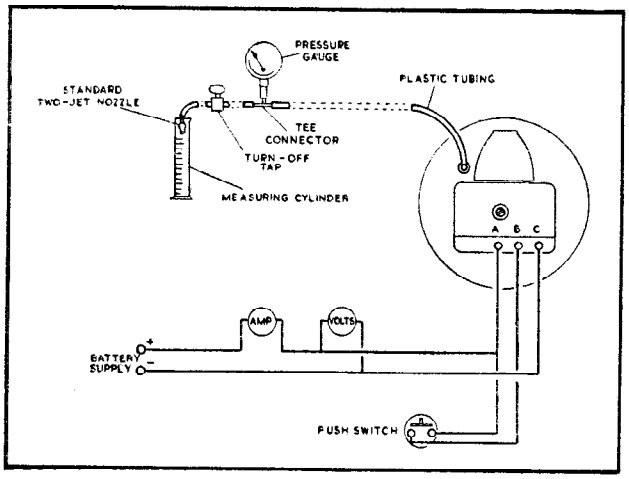


Fig. 10
Method of setting out equipment for performance test

(*ii*) Open the turn-off tap.

(*iii*) Operate the push switch.

This charges the connecting tubes with water.

Should the motor stop when the push switch is released, or fail to switch off when the auxiliary reservoir is empty, check the setting of the adjusting screw as described in Para, 4 (e).

(*iv*) Empty the measuring cylinder.

(*v*) Wait for the auxiliary reservoir to refill and then operate the push switch.

(*vi*) Take readings of current, pressure, measure of water delivered, time of duration of jet and time for auxiliary reservoir to refill.

All readings should agree with the appropriate values in Para. 3.

(*vii*) Operate the push switch and keep it depressed.

The auxiliary reservoir should empty as before but water delivery should continue as a reduced pressure of about 2·5 lb. per sq. in. (0.175 kg./sq. cm.).

(*viii*) Close the turn-off tap and operate the push switch in the normal manner.

The pressure gauge reading should be at least 5·5 lb. per sq. in. (0.385 kg./sq. cm.).

The water in the auxiliary reservoir should discharge, at a reduced rate, through the inlet orifices until the motor switches off. The time of this operation should be about 40 seconds.