WINDSHIELD WIPER MODEL 5W

1. DESCRIPTION

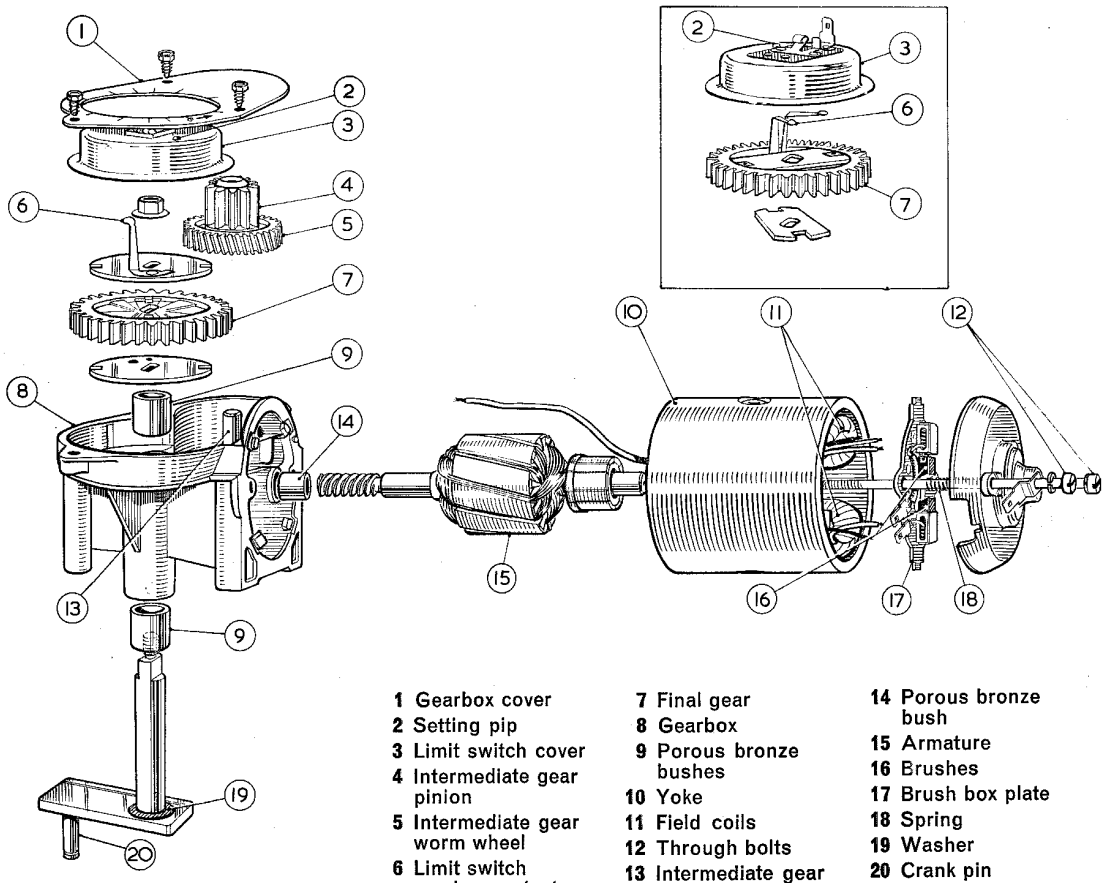
The high-output 5W motor unit is designed to work with the longer arms and blades used on the larger windshields fitted to modern commercial vehicles. The output from the motor is transmitted via a rotating crank and links to reciprocating drop arms on the spindles upon which the wiper arms and blades are mounted. These components may be arranged either as a single assembly on a rigid mounting bracket, or fitted separately to the vehicle, when adjustable-length links are provided to suit individual installations.

The motor is a shunt-connected two-pole unit with a cylindrical yoke. The armature is carried on porous pre-lubricated bearings, that at the commutator end being of the spherical self-aligning type. The armature shaft is extended in the form of three-start worm gearing which drives a worm wheel — the first stage of a two-stage reduction gear system. The second stage consists of a spur-toothed pinion which drives the final gear. An adjustable rotary limit switch is incorporated in the gearbox cover to effect self switching of the wiper motor and thus ensure that the arms and blades "park" at the end of the wiping cycle during which the motor is switched off.

The 5W motor unit is shown dismantled in Fig. 1.

2. ROUTINE MAINTENANCE

The motor gearbox, armature bearings and spindle bearings, are lubricated during manufacture and do not require periodic lubrication.



1 Gearbox cover
2 Setting pip
3 Limit switch cover
4 Intermediate gear pinion
5 Intermediate gear worm wheel
6 Limit switch moving contact
7 Final gear
8 Gearbox
9 Porous bronze bushes
10 Yoke
11 Field coils
12 Through bolts
13 Intermediate gear shaft
14 Porous bronze bush
15 Armature
16 Brushes
17 Brush box plate
18 Spring
19 Washer
20 Crank pin

Fig. 1 Windscreen Wiper Motor Model 5W, showing (inset) alternative components for insulated return motors

Oil, tar spots or similar contaminating substances should be removed from the windshield with methylated spirits (denatured alcohol). Silicone or wax polishes must never be used for this purpose.

Efficient wiping is dependent upon keeping the wiper blades in good condition. Worn or perished blades are readily removed for replacement.

3. TECHNICAL DATA

	12-volt	24-volt
(i) Light running current after 60 seconds from cold (with blades and arms removed or arms locked back off windshield):	3.3 amp max.	2.0 amp max.
(ii) Light running speed of final gear after 60 seconds from cold:	37–41 rev/min	37–41 rev/min
(iii) Resistance of armature winding at 60°F (15.5°C) measured between adjacent commutator segments:	0.13–0.18 ohm	0.60–0.80 ohm
(iv) Resistance of field winding at 60°F (15.5°C):	7.8–8.8 ohms	31.0–35.0 ohms

4. SERVICING

(a) Systematic Check of Faulty Wiping Equipment

If unsatisfactory operation of the wiping equipment is experienced (despite the supply voltage to the motor being adequate) this may be caused by a fault that is electrical or mechanical in origin. Before dismantling is resorted to, consideration should be given to the nature of the fault.

The symptoms and remedial procedure associated with the more common causes of wiper failure (or poor performance) are described in (i) and (ii) below.

(i) Frictional Wiper Blades

Excessive friction between apparently satisfactory wiper blades and the windshield may result in a marked slowing of the wiping rate when the blades are operating on a windshield that is only partially wet.

A further symptom is that the blades become noisy at each end of the wiping arc. When possible the blades should be temporarily replaced with a set known to be in good condition. If, by this action, the fault is confirmed, the original blades should be renewed.

It is important when doing this to use only the Lucas recommended replacement blades.

(ii) Low Wiping Speed or Irregular Movement of the Blades

To determine whether a low wiping speed is due to excessive mechanical loading of the linkage system or wheelbox spindles, or to poor motor performance, the linkage must first be disconnected at the rotary crank (see Fig. 1).

Measuring the Light Running Current and Speed

Connect a first-grade moving-coil ammeter in the motor supply cable and measure the light running current. Also observe the operating speed by timing the speed of rotation of the rotating crank. With the motor and linkage system disconnected the light running current should not exceed 3.1 amperes (12-volt) or 1.9 amperes (24-volt). The final gear speed should be 37–41 rev/min.

If the motor does not run, or the light running current and speed are not as stated, an internal fault in the motor is indicated; a replacement motor should be fitted, or the motor removed for detailed examination.

Checking the Linkage System and Wheelboxes

If the light running current and speed are correct, check the linkage system and wiping spindles. The linkage rods should be checked for correct length and the wiping spindles for free rotation.

(b) Dismantling the Motor

CAUTION: **Before dismantling the motor note the position of the limit switch cover setting pip in relation to the gearbox cover. On reassembling the motor it is essential to maintain this relationship to ensure correct parking of the wiper blades.**

Withdraw the three gearbox cover retaining screws and lift off the cover and limit switch carrier. Unscrew the nut securing the final gear to the output shaft and rotary link. Before dismantling further, note the angular relationship between the rotary crank pin and the limit switch moving contact so that these components can be re-assembled in like manner. Tap the shaft clear and remove the final gear, taking care not to lose the dished washer that is fitted beneath it.

Withdraw the intermediate gear.

Unscrew the two through bolts from the commutator end cover. Withdraw in turn the cover, brushgear plate, yoke and armature.

Note that anti-rattle springs are sleeved over the through bolts, between the cover and brushplate.

(c) Bench Inspection

After dismantling, examine individual items.

(i) Replacement of Brushes

The flexible brush connectors are soldered to terminal tags. Brushes worn to, or approaching $\frac{1}{8}$" (3 mm) in length must be renewed. The brushes are square in section. When inserting a brush into a brush-box take care to keep the side of the brush from which the flexible emerges turned towards the soldered connection.

(ii) Checking of Brush Springs

The brush springs can be withdrawn from the brush boxes once the brushes are held clear.

A good spring will exert a force of 5–7 oz.f (140–200 gr.f) when compressed to 0.158" (4 mm) in length. Springs which fail to do this should be renewed.

(iii) Testing and Servicing the Armature

Use armature-testing equipment to check the armature windings for open circuits and short circuits.

Test the soundness of the armature insulation using a mains test lamp (Fig. 2). Lighting of the lamp indicates faulty insulation.

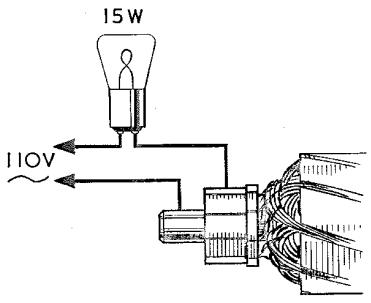
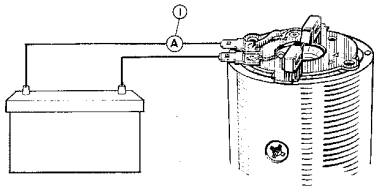


Fig. 2 Armature Winding Insulation Test

If the commutator is worn, it can be lightly skimmed while the armature is mounted in a lathe. Afterwards, clear the inter-segment spaces of copper swarf.

(iv) Testing and Servicing the Field Coils

Check the resistance of the field windings using an ohmmeter connected between the two 'Lucar' terminals on the brushgear plate (keep the brushes well clear of each other during this test). If an ohmmeter is not available, connect an ammeter in series with a 12 or 24-volt supply, as appropriate, across the same terminals (see Fig. 3).



1 Ammeter

Fig. 3 Field Coil Resistance Test

No reading indicates open-circuit field coil(s).

Normal readings are either as given in 3 (iv) if an ohmmeter is used, or 1.5 amperes for 12-volt coils and 0.7 ampere for 24-volt coils, if the alternative test is made.

Ohmic readings much below, or current readings much above, these values indicate short-circuited field coils.

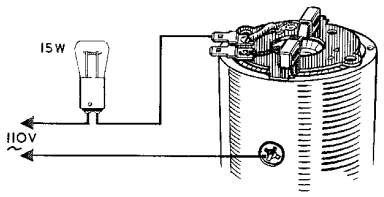


Fig. 4 Field Coil Insulation Test

Connect a 110-volt A.C. supply in series with a 15-watt test bulb between one of the 'Lucar' blades and one of the pole shoe screws (see Fig. 4). The test lamp will light if the insulation of the coils is faulty.

Field coils can be withdrawn after the pole shoe screws are removed. Refit pole shoes in their former position and ensure that the tape around the coils does not get trapped between the mating surfaces of the pole shoes and the yoke. Ensure that each pole shoe is sitting squarely in the yoke before tightening its securing screw.

(v) Inspection of Gear System

Examine the gear system, especially the gearwheel teeth, replacing any part which shows signs of wear or damage.

(d) Re-assembly

This is a reversal of the dismantling procedure described in 4(b). Ensure that the limit switch cover setting pip is in the original position. (See below for adjustment procedure should this be necessary.) Take care not to damage the brushes when fitting the brushgear plate over the commutator.

When re-assembling lubricate the following parts:

Lubricate sparingly the output shaft and armature shaft bearings using Shell Turbo 41 oil. Also the wheelbox spindles if these have been removed from the wheelboxes.

If any gearbox lubricant has been lost in the dismantling of the motor, further Ragosine Listate or Shell Retinax 'A' grease lubricant should be added.

Each of the following parts should be tightened to the torque indicated:

Through bolts:	20 lbf in	(0.23 kgf m)
Pole shoe screws:	40 lbf in	(0.46 kgf m)
Rotary link:	80 lbf in	(0.92 kgf m)

Check the armature end-float following the re-assembly of the motor. Slacken the end-float adjuster nut and carefully screw in the adjuster until resistance is felt. (Make this adjustment while holding the yoke vertical, with the commutator end cover lowermost.)

Screw the adjuster back for quarter turn and lock it in this position. This corresponds to an end-float of 0.004″–0.008″ (0.1–0.21 mm).

(e) Adjustment of Limit Switch

To adjust the parking position of the wiper blades, slacken the three gearbox cover screws and rotate the limit switch cover slightly in the appropriate direction. Retighten the gearbox cover screws when the desired parking position is reached.

IMPORTANT: If the wiper motor is fitted to the vehicle, this adjustment should be made while the motor is operating under normal service conditions, i.e. with a well-charged battery (or with the generator running above cut-in speed) and with the windshield wet.

Limit switch adjustment made with a partially discharged battery or dry windshield may prove unsatisfactory when normal service conditions are encountered.