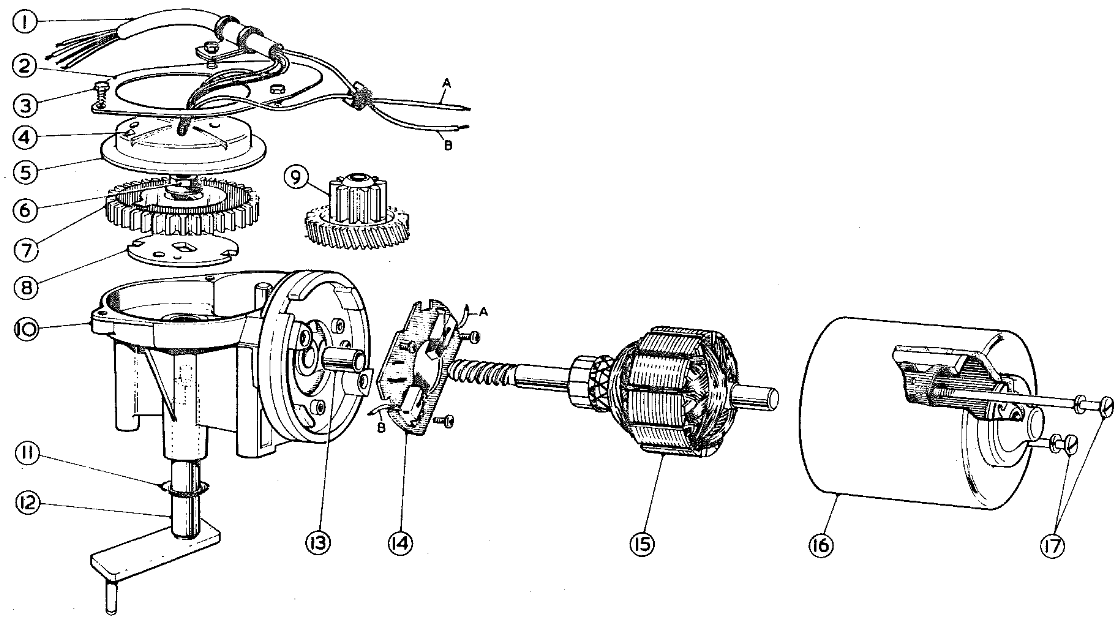
WINDSHIELD WIPER MOTOR MODEL 17W



1 Cable assembly (wiring to connector plug)
2 Gearbox cover
3 Gearbox cover fixing screw
4 Arrow-head marking (limit-switch setting)
5 Limit-switch cover
6 Locknut (final gear-wheel)
7 Final-gearwheel moulding assembly
8 Driving plate (final gearwheel)
9 Intermediate gear
10 Gearbox
11 Dished washer
12 Shaft & link assembly
13 Porous bronze bush
14 Brushgear assembly comprising: Insul plate & brush boxes, brushes, springs & fixing screws
15 Armature
16 Yoke assembly comprising: Two permanent magnet poles & retaining clips, & self-aligning bearing bush
17 Yoke fixing screws

Fig. 1 Windshield Wiper Motor Model 17W

1. DESCRIPTION

Windshield wiper motor model 17W is a single-speed unit designed to operate a link-type wiper installation. Power from the self-switching two-pole permanent-magnet field motor is transferred by a worm gear on the armature shaft to a two-stage reduction gear system. The final gearwheel drive is transmitted via a shaft and rotary link assembly to the links operating the wiper arm spindles. Self-switching of the motor takes place only after the manually-operated control switch has been moved to OFF (or park).

The gearbox incorporates an automatic limit-switch. This switches the motor off and then provides an electrical circuit which causes regenerative braking of the armature to ensure consistent parking of the wiper blades.

The wiper motor is shown dismantled in Fig. 1.

2. ROUTINE MAINTENANCE

All bearings are adequately lubricated during manufacture and require no maintenance.

Oil, tar spots or similar deposits should be removed from the windshield with methylated spirits (denatured alcohol). Silicone or wax polishes must not be used for this purpose.

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

3. TECHNICAL DATA

	12-volt	*24-volt*
(i) Typical light running current (i.e. with the rotary link disconnected from the transmission) after 60 seconds from cold:	1.2 amp.	0.8 amp.
(ii) Light running speed of the rotary link (or final gear-wheel) after 60 seconds from cold:	39–43 rev/min.	

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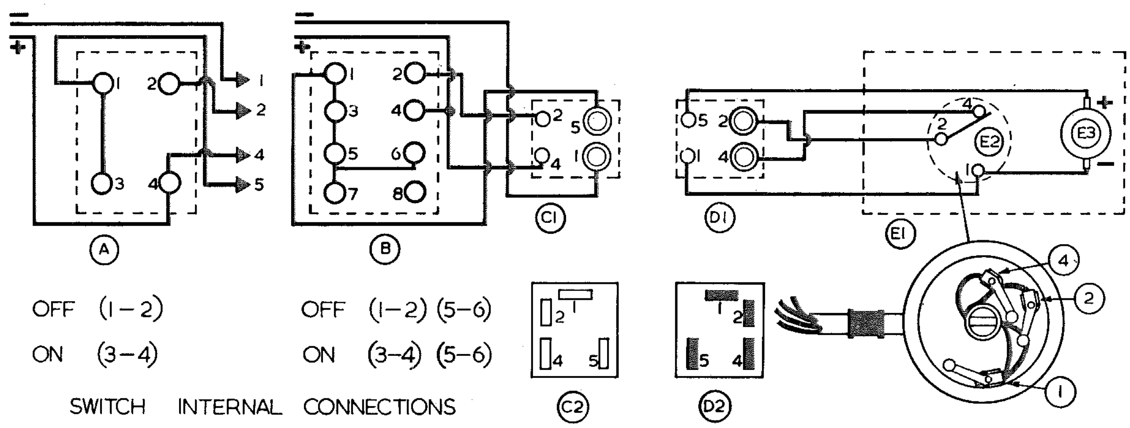


A Alternative type switch (Model 108 SA)
B Switch (Model 57 SA)
C1 Moulded Terminal Connector attached to cable harness
C2 Alternative type connector
D1 Moulded terminal connector attached to wiper motor
D2 Alternative type connector
E1 Wiper motor **E2** Limit switch
E3 Armature

Fig. 2 Wiring diagram using typical switches

4. SERVICING

Note : The correct rotation of a permanent-magnet field motor depends on the polarity of the connections. When the motor is connected to the vehicle wiring, the correct polarity is automatically assured by the design of the moulded terminal connectors. If the vehicle wiring connections are disconnected from the wiper motor (e.g. for test purposes) any alternative voltage source must be applied with due regard for the correct polarity requirements of the motor, otherwise damage to the limit-switch contacts may occur. In practice the switches are numbered as shown in Fig. 2 but the moulded terminal connectors are unmarked, being shown numbered for reference purposes only. The negative polarity must be applied to the moulded connector terminal shown as number 1 and the positive to connector terminal 5.

(a) Systematic Check of Faulty Wiping Equipment

Unsatisfactory operation (if the supply voltage to the motor is adequate) may be caused by a fault that is mechanical or electrical in origin. Before resorting to dismantling, consideration should be given to the nature of the fault.

The symptoms and remedial procedures associated with the more common causes of wiper failure (or poor performance) are described under the following headings (i) and (ii).

(i) Frictional Wiper Blades

Excessive friction between apparently satisfactory wiper blades and the windshield may result in a marked reduction in wiping speed 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 pair known to be in good condition. If this rectifies the fault, fit new blades.

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

To determine whether a low wiping speed is due to excessive mechanical loading or to poor motor performance, the rotary link must first be disconnected from the transmission linkage.

Measuring Light Running Current and Speed

Connect a first-grade moving-coil ammeter in series with the motor supply cable and measure the current consumption. Also check the operating speed by timing the speed of rotation of the rotary link. The current consumption and speed should be as given in para. 3.

If the motor does not run, or current consumption and speed are not as stated, an internal fault in the motor is indicated and a replacement unit should be fitted or the motor removed for detailed examination, see 4 (b).

If current consumption and speed are correct, check for proper functioning of the transmission linkage and wiper-arm spindles.

(b) Dismantling the Motor and Gearbox

Before commencing to dismantle the unit, make a mark on the gearbox cover adjacent to the arrow-head marking on the limit-switch cover. This precaution will enable the original setting of the limit-switch to be easily determined during the reassembly stage.

Proceed to dismantle as follows:

Remove the yoke fixing bolts complete with spring washers.

Part the yoke assembly from the gearbox. While removed, the yoke must be kept well clear of swarf, etc., which would otherwise be attracted to the permanent magnets. In some instances, the armature may unavoidably be withdrawn with the yoke. If not, carefully remove it.

Remove the fixing screws from the brushgear insulated plate and the gearbox cover, then detach from the gearbox the sub-assembly comprising: brushgear, limit switch, gearbox cover and the connecting cables. If the brushgear and cable assembly are threaded through the hole in the gearbox cover, the cover will be released from the sub-assembly.

All moving parts of the gearbox assembly are retained by a special hexagon-headed lock nut, which secures the final gearwheel to the shaft-and-link assembly.

Note: The gearwheel train must be prevented from moving while this nut is slackened (or, on reassembly, tightened). This is most easily achieved by securing the rotary link in a vice while the nut is being turned.

Dismantle the gearbox by first slackening the lock nut. A light tap on the top of the nut will overcome the initial reluctance of the gearwheel to part from the shaft. When the gearwheel is loose enough to enable it to be easily removed from the shaft, completely remove the lock nut and dismantle the parts from the gearbox. Remove, in order, the final gearwheel, its driving plate, the intermediate gearwheel and finally the shaft-and-link assembly. Take care not to lose the dished washer fitted on the shaft.

(c) Bench Inspection

After dismantling, examine individual items.

(i) Brush Replacement

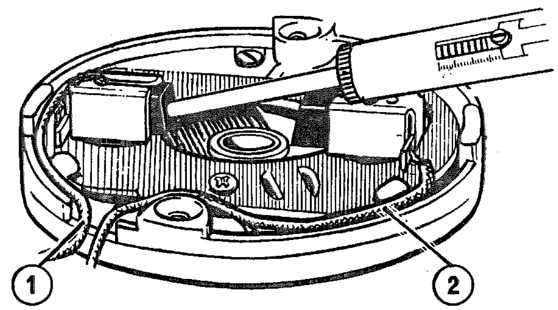
The original specified length of the brushes is sufficient to last the life of the motor. If, due to accidental damage to the brushes or to faulty commutator action, it becomes necessary to renew the brushes, the complete brushgear service-assembly must be fitted. The brushgear assembly will require renewing if the brushes are worn to $\frac{3}{16}$ in (4.8 mm). Check that the brushes move freely in the boxes.

(ii) Checking Brush Springs

The design of the brushgear does not allow for easy removal of the brush springs. Similar to the brushes, the springs are expected to last the life of the motor and should not normally require renewing. In the unlikely event of the spring pressure failing to meet the specified requirements, the complete brushgear service-assembly must be replaced, in a similar manner to that detailed for servicing the brushes.

To check the spring pressure, press on the end face of the brush with a push-type spring gauge (see Fig. 3) until the bottom of the brush is level with the bottom of the slot in the brush box, when the spring pressure reading should be 5–7 ozf (140–200 gf).

Note : In the event of the brushgear being renewed, it is important to reconnect the cables in accordance with Fig. 3.



1 Negative brush cable 2 Positive brush cable

Fig. 3 Checking brush spring pressure

(iii) Testing and Servicing the Armature

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

Test the soundness of the armature insulation by using a mains test-lamp (Fig. 4). Lighting of the lamp indicates faulty insulation.

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.

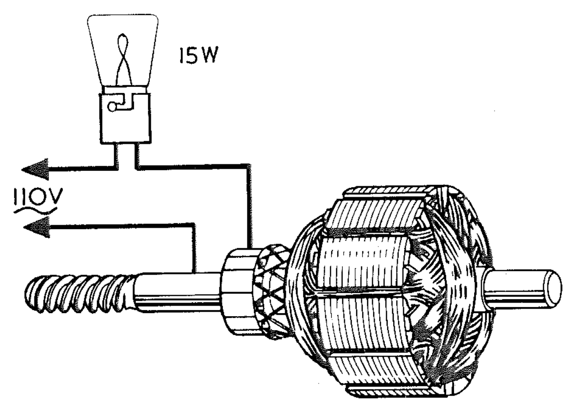


Fig. 4 Armature insulation test

(iv) Inspection of Moulded Gearwheels

Examine each of the gearwheels for signs of damage, particularly in regard to the teeth and the slip-ring on the final gearwheel.

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(v) Limit Switch

Inspect the inside of the switch cover and ensure that the cable connections are intact and that the contact arms are firmly riveted. To ensure that the contact arms exert the correct pressure upon the slip-ring, the measurement between the contact arm contact-faces and the base upon which they are riveted should be approximately $\frac{9}{32}$ in (7.1 mm).

(vi) Yoke Inspection

Check that the permanent-magnet retaining clips firmly secure the magnets to the inside face of the yoke.

(d) Reassembly

During reassembly, special consideration should be given to the following points:

Lubrication

Apply Ragosine Listate grease to the teeth of the gearwheels, the worm gear on the armature shaft and the slip-ring on top of the final gearwheel.

Apply Shell Turbo 41 oil to the final-gearwheel shaft, the bearing bushes and sparingly to the armature-shaft bearing surfaces.

Apply molybdenum di-sulphide oil to the intermediate gearwheel pivot-pin.

General

Before dismantling it was recommended that the position of the limit-switch cover should be marked to indicate the original setting of the switch, so that the correct parking position of the wiper blades would be maintained after reassembly. In conjunction with this, it is also essential to re-fit the final gearwheel with the slip-ring outer-facing segment pointing in the same direction as the rotary link (see Fig. 5).

The final gearwheel fixing nut should be tightened to a torque of 80–90 lbf in (0.91–1.03 kgf m). The rotary link must again be secured — see note in 4(b).

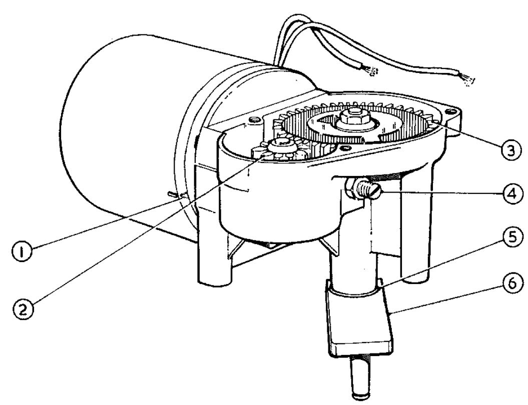
Before re-fitting the brushgear assembly, check the gearbox spacing-ring fixing screws for tightness. If necessary tighten them to a torque of 20 lbf in (0.23 kgf m).

Before fitting a service replacement armature, first slacken the thrust screw in the gearbox to ensure proper fitting of the yoke.

The marking on the yoke must be adjacent to the arrow-head marking on the gearbox rim (see Fig. 5) and the fixing bolts should be tightened to a torque of 12–16 lbf in (0.138–0.184 kgf m).

Armature end-float is 0.002–0.008 in (0.05–0.2 mm) measured with the final gearwheel removed from the gearbox. To obtain satisfactory end-float adjustment, with the motor and gearbox completely assembled, position the unit so that the adjuster screw is uppermost, tighten the adjuster screw until abutment takes place and then slacken it off one quarter turn and secure it in this position by tightening the locknut.

Following reassembly the motor may be noisy due to slight misalignment of the yoke bearing. This can be rectified by giving the rim of the gearbox a series of light taps with a plastic, fibre, or wooden mallet. Take care not to strike the yoke with the mallet, as this may cause damage to either the yoke or the permanent magnets, or both.



1 Yoke & gearbox assembly markings
2 Intermediate gear
3 Final gearwheel (showing assembly position of gearwheel in relation to shaft & link)
4 Armature end-float adjusting screw
5 Dished washer
6 Shaft & link assembly

Fig. 5 Gearbox assembly