

Windshield Wipers (Models DR1 & DR2)

THE DR1 AND DR2 WIPER MOTOR ASSEMBLIES

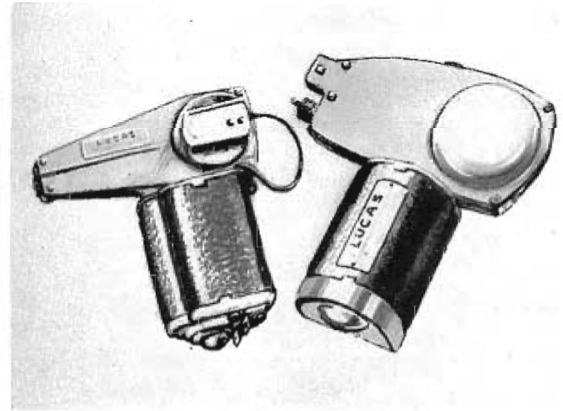
The DR series of complete Dual wiper assemblies are the latest additions to the Lucas range and are now being widely applied to current production vehicles of all makes.

There are two basic types, the DR1 which may be for either single or two speed working, and the DR2 single speed. Both models, which are made for 6, 12 or 24 volts are substantially more powerful than the earlier CR types.

The two-speed arrangement has been developed specially for high speed vehicles which may be subjected to any conditions up to the proverbial tropical downpour.

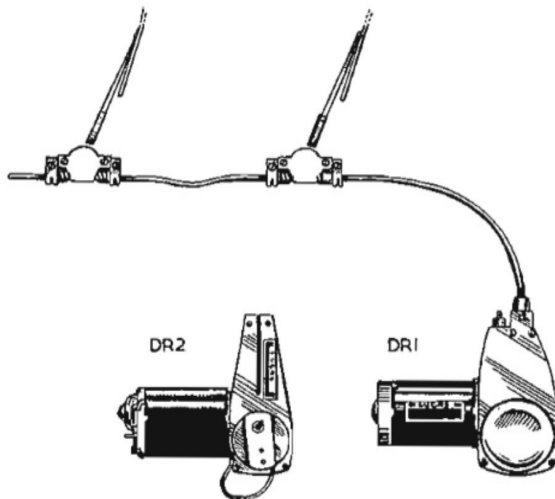
Both of these wipers are so far arranged for automatic self-parking and are controlled by means of switches mounted on the fascia panel.

The DR1 uses a rotary 3-position switch, and the DR2 a simple push and pull, 'on and off' switch.



DR2

DR1



THE DR1 AND DR2 GENERAL ASSEMBLY

The layout of cable rack, casing, wheelboxes, arms and blades follow the general pattern of the CR with certain differences.

In order to provide for the increased power it has been necessary to substitute the flexible metallic outer casings by rigid steel 'Bundy' Tubes. This is a ductile steel tube with a coppered lining and is attached to the motor and wheelboxes by 'flaring' the ends, and connecting to the motor by means of a 'union' type connection, and to the wheelboxes by means of clamp plates.

The wheelboxes themselves are cast assemblies on the DR1 model, and steel pressings on the DR2.

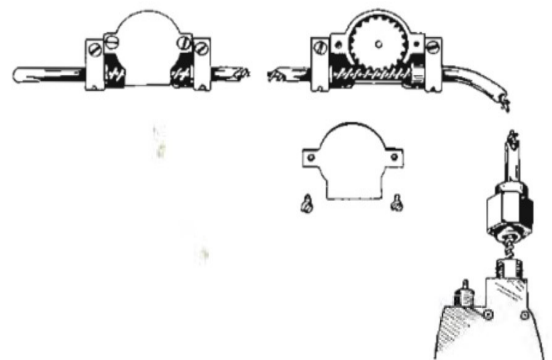
THE RACK DRIVE ASSEMBLY

A more detailed consideration of the wheelbox, motor and outer casing assembly is desirable.

Trouble free service is contingent upon the free running of the rack within the wheelboxes and the tube.

This illustration of the Bundy Tube layout will show clearly how necessary it is to have correct alignment throughout. Flattened sections or kinks in the rigid tube will cause binding and consequent overloading of the motor and care must be exercised when fixing the assembly.

Misalignment of any of the components is also liable to cause binding, the junction of the motor assembly to the Bundy tube being one of the most vulnerable points.

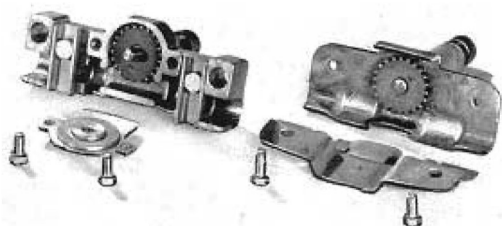
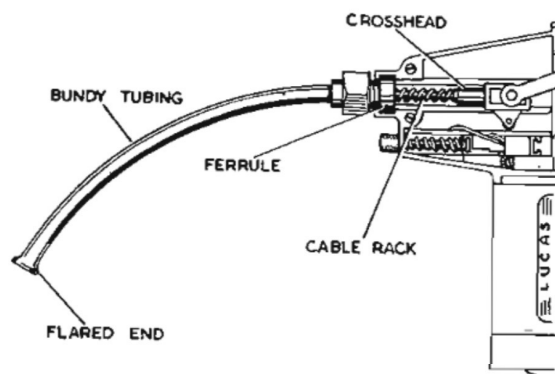


THE RACK DRIVE AND ATTACHMENT OF THE BUNDY TUBE

As seen on the left of the picture, the Bundy tube is 'flared' for attachment by the clamp plates to the wheelboxes. The drive-end fixing centre is a 'union' type attachment.

The flexible rack connects to the motor crank by means of the cross-head shown.

Parking adjustment is made by means of the limit switch with which we shall deal in detail at a later stage.



WHEELBOXES

Whilst following the general pattern of the CR type wheelboxes, the clamping arrangement varies in order to fix the Bundy tube properly.

The DR1 wheelbox shown on the left is of die-cast construction, and, as you can see, the flared end of the Bundy tube is located in the special recesses positioned between the rack wheel and the clamping plates.

The DR2 pressed steel wheelbox, on the other hand, uses the cover for clamping the Bundy tube in position.

The DR1 wheelboxes may be single hole fixing similar to the CR type, or may be located by means of two separate fixing screws as shown on the left.

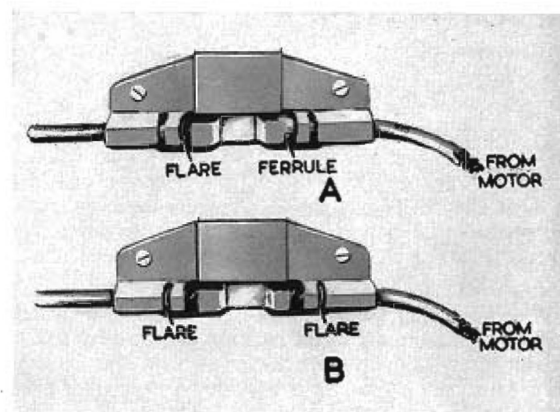
The DR2 wheelbox in the picture on the right is a one-hole fixing type only.

DR2 WHEELBOX BUNDY TUBE LOCATION

On the early production DR2's a ferrule brazed to the Bundy tube on the primary length from motor to wheelbox was arranged to locate in the space next to the rack wheel as shown at 'A' in the illustration.

On later production the use of the ferrule was discontinued and the end of the tube 'flared out.' The correct position of the flare is then in the narrow space as shown at 'B.'

In the lower picture it can be observed that the flare on the inter-connecting section of tube may also be located in the narrow space, but this is immaterial.



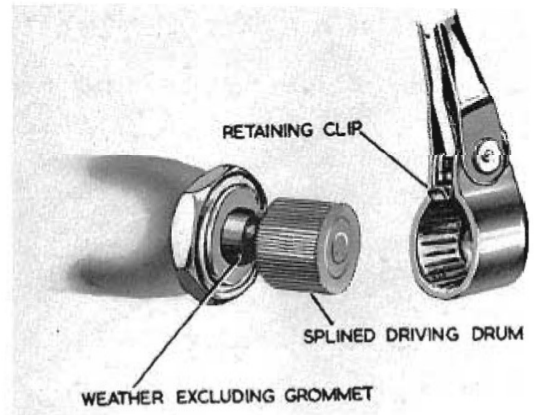
WIPER ARM FIXING

Another departure from the earlier CR arrangement is the method of locating and locking the wiper arm on to the wheelbox spindle.

In both the DR1 and DR2 a splined drum is pressed on to the wheelbox spindle, and mates with the splined hub of the wiper arm. The arm is locked by means of the retaining spring clip as shown. In order to remove the wiper arm it is only necessary to lift the spring clip by means of any small lever and withdraw the complete arm.

It should be noted that the splines are arranged at 5° intervals to enable the arm to be placed in any desired parking position.

It may also be noted that the wheelbox spindle is grease packed on assembly, and embodies a weather excluding grommet as shown.



THE DR1 MOTOR ASSEMBLY

We may now examine the DR1 motor and gearbox assembly.

To summarise the characteristics of this TWO speed arrangement.

1. It is produced for 6, 12 and 24 volt working.
2. Has "NORMAL" wiping speed of 90—130 wipes per minute and in the "HIGH" speed 130—150 wipes per minute.
3. The high speed is obtained by weakening the motor field by means of a resistance inside the motor, and a combination switch mounted on the fascia.
4. The angles of wipe will vary between 90° and 130° as specified by the vehicle manufacturer.
5. Parking is available at either end of the stroke as may be desired.
6. A thermostatic cut-out switch built into the motor is provided to prevent damage if persistently overloaded for any reason such as heavily packed snow or ice.

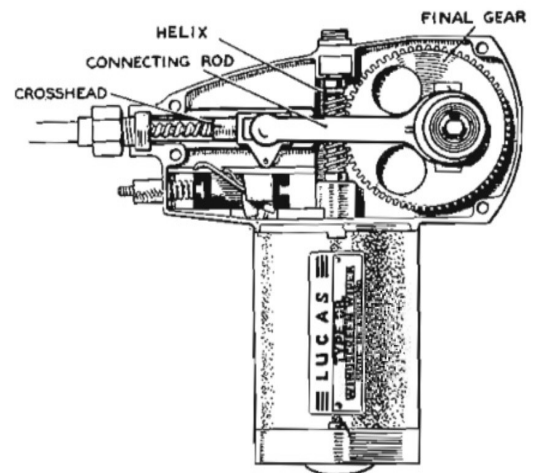


DR GEAR MECHANISM

This view of the inside of the DR1 gear box shows the gearing. In some ways it is simpler than either the CW or the CR wipers.

A worm cut on the end of the armature spindle engages with the worm wheel as shown, providing a reduction ratio of 42½ to 1. This worm wheel in turn mounts the crank pin which connects directly to the crosshead of the driving rack. A screw type adjustable Thrust Pad for the worm spindle will be seen at the top.

A self-parking switch is located at the bottom left and is adjustable for exact parking position by means of the screw and knurled nut shown on the extreme left. This parking switch is actuated by a striker fixed to the crosshead.



THE SELF-PARKING MECHANISM

Let us now make a closer examination of this self-parking device.

The requirements are that the wiper blades park automatically on whichever side of the screen may be determined by the vehicle manufacturers, and also they can be adjusted to stop at any desired position in relation to the bottom of the screen.

To do this, a simple blade type switch "A" is located in a slide as shown.

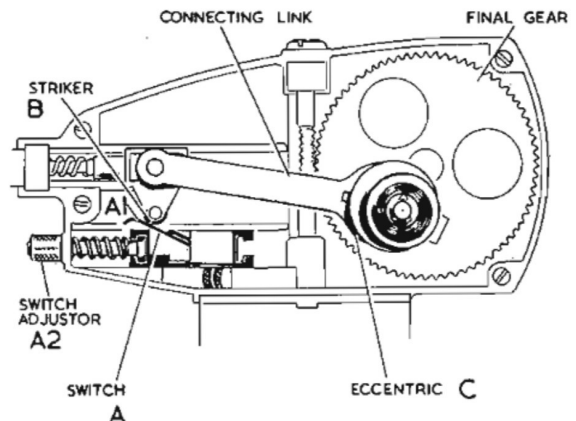
With the motor running normally the striker roller 'B' on the crosshead will NOT come into contact with the switch blade 'A1'.

To stop and park the wiper blades the first operation is to reverse the direction of the motor by means of the main switch on the facia panel inside the car.

When reversal of the motor rotation commences an eccentric cam 'C' on the crank pin causes the driving rack to move further outwards than when running normally.

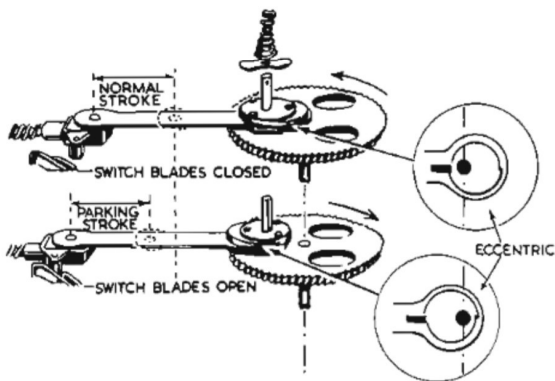
The striker roller 'B' on the crosshead then contacts the switch blade 'A1' and stops the motor. This stoppage will always take place at the end of the stroke.

The exact stopping position is determined by means



of the adjusting screw shown at 'A2' and this adjustment can be varied at any time in service.

If the wiper blades are to be parked on the opposite side of the windscreen two things are necessary. Firstly, the motor armature connections must be changed over and secondly the switch assembly 'A' must also be changed over. That is, with the blade 'A1' facing inwards towards the final gear.



ARRANGEMENT OF OPPOSITE PARKING POSITIONS

The top illustration clearly shows the layout of the 'PARKING' or 'LIMIT' switches for stopping the wiper either on the left or right hand side of the screen, also the knurled nut for setting the final at-rest position in relation to the bottom of the screen.

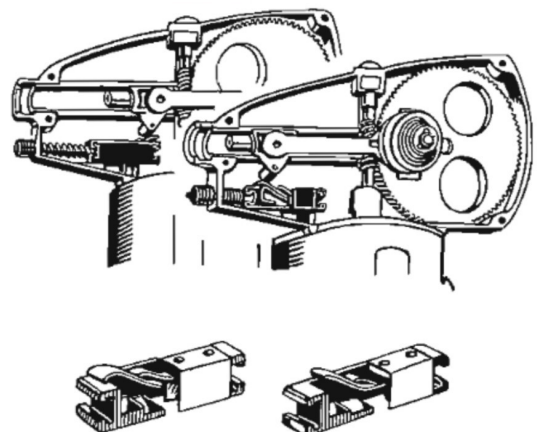
The smaller illustration gives a fair idea of the switch assembly itself, the latest model on the left having the end of the blade extended by comparison with the early type.

THE ECCENTRIC CAM

This illustration shows in some detail the eccentric cam between the crank pin and the connecting rod.

The top picture illustrates the normal stroke path of the connecting rod which is coupled to the driving rack.

When the panel switch is moved to the 'Park' position, the direction of rotation of the motor is reversed. The eccentric cam as shown in the lower picture moves through half a revolution, and the stroke path of the connecting rod will then be moved along sufficiently for the striker on the crosshead to open the contacts of the Limit Switch and thus stop the motor.

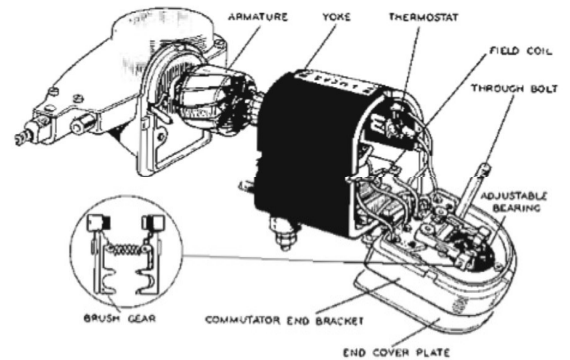


THE DR1 MOTOR

The main features of this motor, both magnetically and electrically are similar to that of the CRT model which has already been reviewed. It is an eccentric machine, the armature being offset from the centre. The field is provided with one coil only, located below the armature. The 'U' shaped yoke of mild steel, which forms part of the body of the unit completes the magnetic circuit, bringing the opposite polarity, the south pole, to the other side of the armature.

The armature itself is supported at the commutator end by a self-aligning bearing of the type used in the CR model. There is also a bearing bush between the motor and gear-box, and at the outer end of the shaft an adjustable stop is provided to control end movement.

A thermostat wired in series with the armature is mounted on the inside of the yoke near to the second pole-piece. It consists of a bi-metal strip and contacts, which open when the temperature rise becomes excessive. In this way the motor is protected against overload.



An additional component is the resistance which is connected into the field to produce the speed increase for the High Speed wiper. This is over-wound on the motor field coil, and is brought out to the terminal board on the C.E. bracket as we shall see.

THE DR WIPER MOTOR CIRCUITS

As a simple commencement to a study of the circuits of the DR1 wiper arrangement we may trace through the motor circuits only.

The motor itself may be considered to have four circuits: (1) The Armature Circuit; (2) The Field Circuit; (3) The Field with resistance in circuit, and (4) The Limit Switch circuit.

Commencing at the armature circuit the current path is from Terminal 5 through the thermostat switch to the brush terminal 'A', through the armature to brush terminal 'B', finishing at terminal 4.

The field circuit — from terminal 2 to one end of the Field Coil, through the field returning to terminal 1.

The field with resistance in circuit — from terminal 2 through the field coil to the junction point with the resistance, and from the other end of the resistance to terminal 3.

The gearbox limit switch is placed in the earth side of the motor circuit, and is as shown from terminal 4 through the switch contacts.

