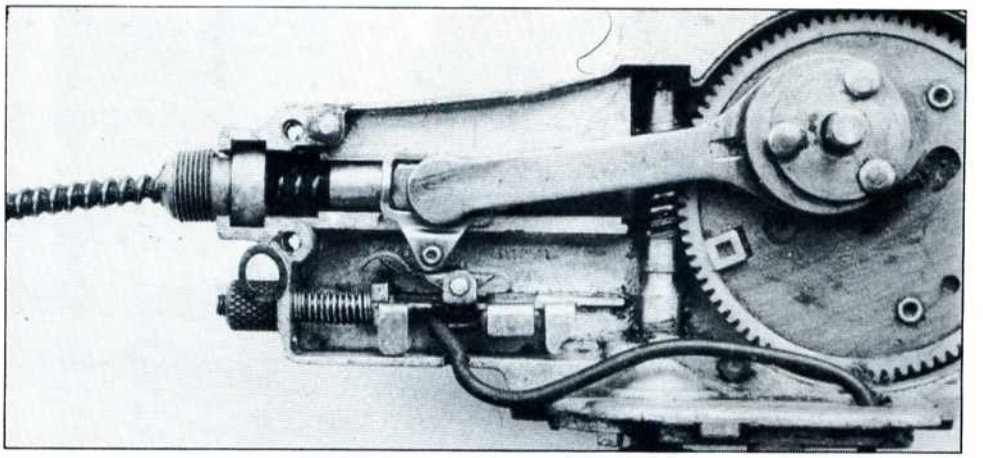
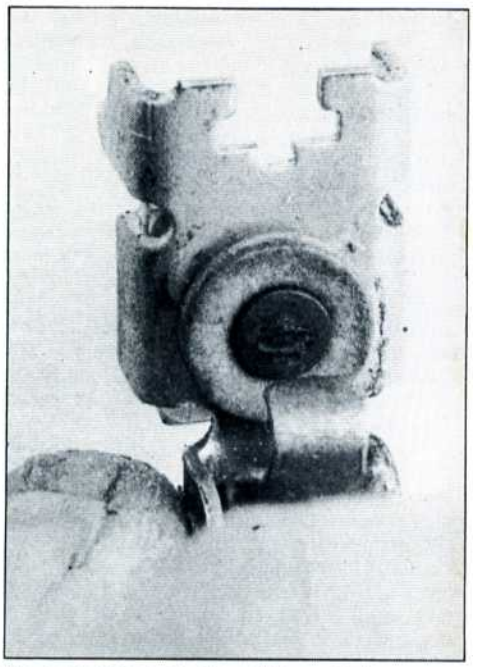
Car Care

# Under and Up



The inside of a DR3 gearbox with the crosshead about to operate the parking switch. Note the three bumps on the connecting rod to ensure parking the motor in the correct position. Check for chafing of the insulation where the cable to the parking switch comes out of the gearbox



The contact pad on the parking switch can wear because of arcing but can be cleaned with fine glasspaper

Practical editor Peter Wallage examines underbonnet wiper motors which drive the blades through a rack and wheelboxes.

UNDERBONNET wiper motors are slightly more complicated than the simple screen-mounted type but they are quite easy to overhaul and there is the advantage that most of the parts you need are still available. Once again I shall deal mainly with Lucas equipment as this is fitted to the majority of cars run by readers.

The screen-mounted wipers were superseded in the late Forties by the Lucas DR Series which in turn gave way to the 6W and 6WA motors in the Sixties. These used many of the same parts as the DR motors but to give increased torque for the more powerful wipers being used on larger screens, the worm drive gearing was replaced by a spur gear reduction. This meant mounting the motor on the underside of the gearbox instead of next to it and the end-float of the armature was catered for by a plate inside the gearbox instead of by a screw outside it. Apart from these differences, overhauling is carried out in exactly the same way as with the DR Series.

The DR1, DR2, DR3 and DR3A are all basically similar motors, the DR3 being the more powerful and the DR3A having a diffferent parking arrangements. The model number is engraved on top of the gearbox cover so they are easy to identify.

The earlier DRs could be either two-speed or single-speed and sometimes the single-speed ones were produced without the self-parking feature. The DR2 was similar except that it had a thermostatically-controlled circuit-breaker to protect the motor. The DR3 and DR3A were also similar but the 3A was fitted with a non-reversing motor for parking and was often single-speed so that it could be operated by a simple on-off switch. The DR3 used reversing of the motor for parking and was usually operated by a multi-position steering column switch.

As with any wiper motor, the first check to make if it is operating sluggishly or not at all is to see that there is current getting through. Secondly, check the current when it is running and also when you stall it by holding the wiper blades still.

The wheelboxes often go stiff because water has got into them but they are quite simple to take apart and clean. If you find that the gearwheel has worn so it is either jamming on the rack or not making proper contact, you can turn it round so that an unworn part of the wheel is engaging. On some models the rack can also be turned upside-down but this is more difficult if a parking switch is fitted and in any case the rack and its tubing are curved to fit the car so inverting them will only lead to early wear.

Turning to the motor, you can get into the gearbox by loosening and removing the four screws on top. The contents will be covered in grease but the first stage of dismantling is to take off the connecting rod between the large gearwheel and the end of the rack. On early models this was held by a split pin and washer but on later ones a circlip was used. Underneath the circlip on self-parking motors is a conical spring and a pair of plates, one which is wavy and one which is mounted eccentrically and which has a number of bumps. These plates stop the motor in the correct position to start again after parking. If the blades start to travel down the screen from the parked position instead of up when the wipers are switched on, it could be that the wavy plate is worn and the motor is not stopping at the correct part of the crosshead stroke, but these seldom slip or give trouble unless the conical spring is broken as well.

## Brush-gear troubles

If the motor is fitted with a parking switch, this sits in a cast compartment alongside the crosshead and is operated by a striker on the end of the crosshead. It is a simple on-off switch, quite robust but sometimes it gives trouble if the contact becomes dirty. It is quite easy to clean with a piece of fine glasspaper. The parking position is adjusted by sliding the switch backwards and forwards so that the striker operates it to open the contacts when the wiper blades are at the bottom of the screen. You can adjust it in this way by turning the knurled nut on the outside of the casing and if you take the nut right off, the switch lifts out.

A more usual source of trouble occurs in the wire that runs from the switch to the brush-gear. This comes out of the gearbox through a slot and then goes back into the motor and sometimes prodding and pulling by misguided owners rubs the insulation off and the switch shorts out to earth. If the insulation on yours is at all worn, renew the wire. When you put the switch back, remember that one end of the knurled nut is serrated and goes against the gearbox casing to act as a locking device.

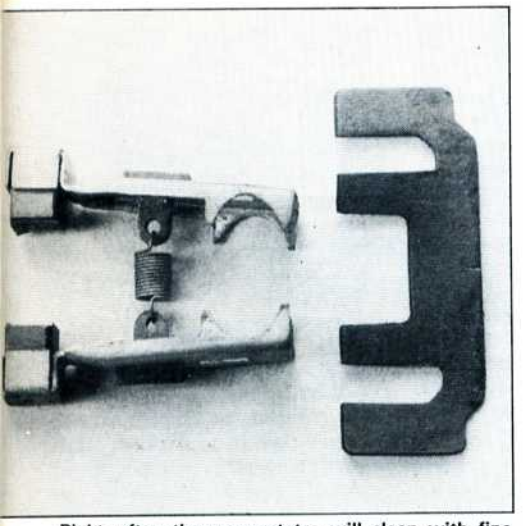
The large driving gear is unlikely to give trouble but if you want to take it out for cleaning and regreasing it is held from the underside of the gearbox either by a nut on earlier models or by a wire circlip with the later types. With the nut fixing there is a thin washer directly under the gear and another one under the nut. With the circlip, there is only one thicker washer directly under the circlip. Before you pull the gear out of the gearbox on circlip models, run a light file round the bottom end of the shaft to take off any burrs, otherwise you will score the inside of the bearings.

As explained earlier, the end-float for the armature with its worm-drive is adjusted by a screw and locknut on the DR models and by a small plate under the spur gear drive on the 6W models.

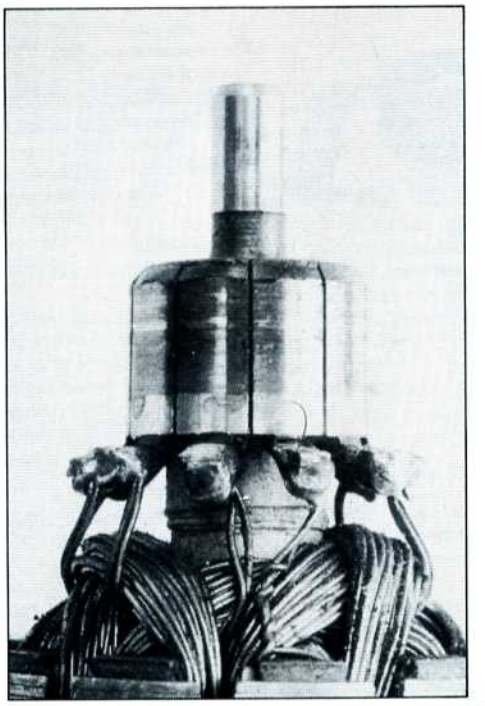
Moving now to the electrical part of the motor, you get into it by taking off the end cover which, on the DR3, is held by two long through-bolts. There may also be an earthing connection on the end cover. On some models an insulating sleeve was fitted over the through-bolts to watch out for these if you pull the bolts out before taking the end cover off.

On the earlier models the end cover is a simple plate with the through-bolts underneath. Also underneath is the bearing housing for the armature, held by three screws but on the DR3 this is mounted inside the end cover. This bearing is labelled as adjustable in the diagrams in most workshop manuals, as it has a spherical outside surface and is held by a large spring clip. It seldom wears and it is most unwise to take it out as it is lined up in its housing at the factory by a special tool. If you do move it and don't get it back in exactly the right position it will run hot and wear very quickly.

Once the through-bolts are out you can lift off the large body of the motor complete with the pole piece and brush gear, leaving the armature in place. The brushes on the end of the pole piece sit on a red Paxolin plate and come as a pair with a small tension spring between them. If they need renewing, you have to renew the complete brush assembly and not just the small carbon blocks. The red Paxolin plate also holds



Right, often the commutator will clean with fine glasspaper but if it is ridged a very fine skim in a lathe is permissible. Clean out the slots between the segments



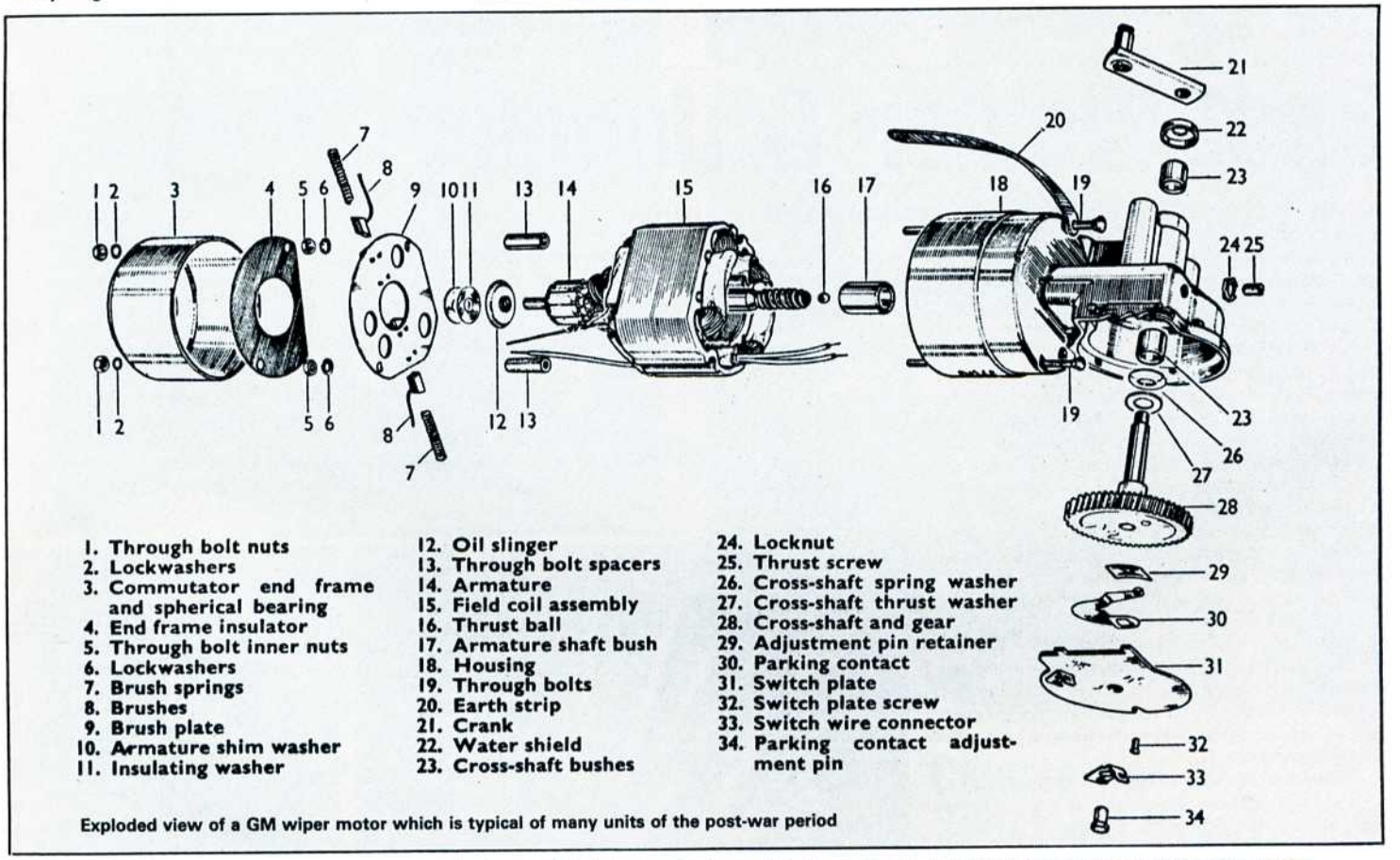
Above brushes for these motors come in pairs. The fibre retaining plate was not fitted to the earliest models but can be fitted on overhaul. Its main purpose is to stop the brushes jumping out of line with jolting

circuit breaker (not fitted to all models) you could easily replace it the wrong way round.

Unless you want to skim the commutator in a lathe, or take it right out to clean all the grease from the gearbox, you can clean the segments with fine glasspaper without bothering to take it off the gearbox. Use glasspaper rather than emery because the emery grit is a conductor and gets lodged between the segments so that the armature shorts out. After cleaning, run a fine knife blade down the segment slots to make sure they are clean.

If you want to take the armature out for any reason, once again do not disturb the bearing at the gearbox end. This is also usually labelled as 'adjustable' in diagrams but the same remarks apply to it as they do to the bearing in the end cap.

Putting everything together again should present no problems. The end-bearings for the armature are self lubricating but it does no harm to put just a smear of light bicycle or sewing machine oil on the armature spindle before you push it back in. In the gearbox you should use only a high melting-point grease as the motor runs quite hot and ordinary grease will melt and either run out or smother the parking switch so that it gives trouble. Before you put any grease in, adjust the armature end-float as it is none too easy to judge




Exploded view of a GM wiper motor which is typical of many units of the post-war period

these parts in place.

On some models you will find a thermostatic switch which saves the motor from burning out should the rack or the blades jam. This is fitted to the side of the motor body and is connected to the blue and green cables. Two types of thermostatic switch were used and though in the workshop manual it will tell you that they cannot be repaired and have to be replaced as a unit, Lucas confirms that it is possible to clean and reset them. They will, however, disclaim any responsibility if you break it or get the wrong thermostatic setting because these should be set on a jig.

The two types of circuit-breakers are very similar except for the method of fixing them so if you are getting a new one it is important that it is of the right sort. The early type is held by a single rivet and the later type by two pointed tags. If you want to have a go at resetting the thermostat, it should operate at sometime between half a minute and four minutes after the motor has stalled. There is a ribbed steel strip holding one of the contact blades and this has small projections at the neck where you can grip it to bend it with a fine-nosed pair of pliers. Be careful not to break this off.

There should not be any need to take the whole field coil winding out of the motor housing unless you want to renew the wires. If you do, however, it *is* easier to take it out and comes out quite easily when you remove two screws, but mark the end of the motor body before you take it out. The body has identical ends and with the exception of the holes which fit the thermostatic this when it is disguised by thick grease.

Put a smear of grease on the main gear spindle before you push it in place and also on the spindle for the connecting rod and crosshead. Pack some grease into the slot in which the crosshead slides and in the end-bearing which carries the rack. There is no need to pack the whole box with grease, indeed it is inadvisable where a parking switch is fitted. It is sufficient to pack a good layer round the teeth of the main gear and on the worm drive on DR models or the spur gears on the 6W models.

Any high melting-point grease is suitable, though the one recommended by Lucas is Ragosine Listate.

Next month, I will be dealing with various type of car horns.