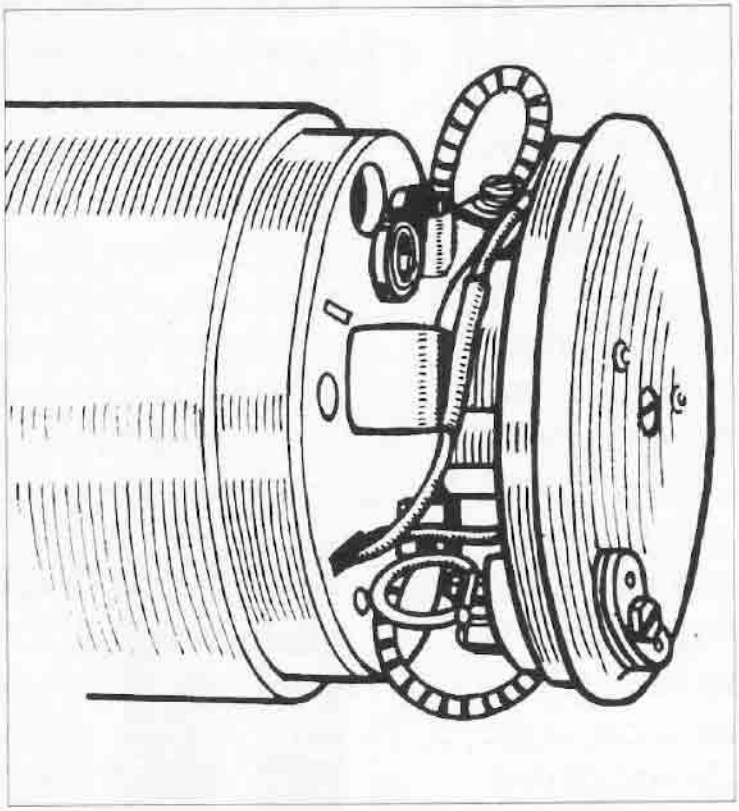
All about

DYNAMOS



THE CLASSIC MotorCycle

DYNAMO MAINTENANCE

Two points to remember about dynamos are (a) they have a rooted aversion to petrol and oil, and (b) the live battery lead should be removed before the dynamo is touched.

Before removing brushes check which way round they fit in their slots, maybe even marking them if necessary. Many brushes may look the same, but be of a different hardness of material. Make sure that the brushes are put back in their original position.

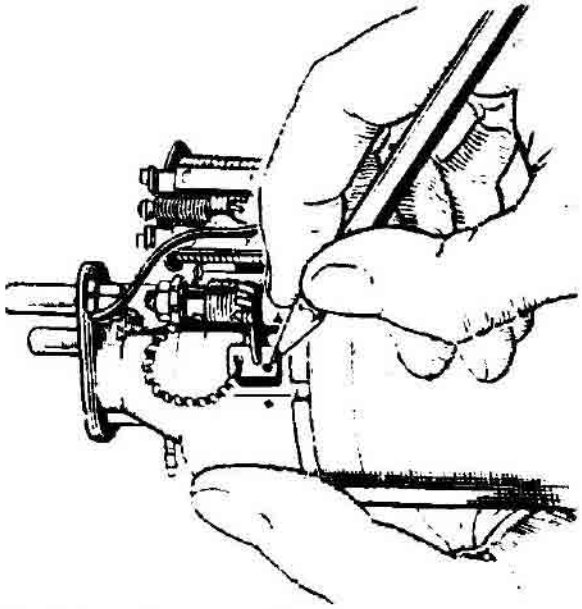
The brushes should slide freely in their holders, and should be held squarely against the commutator by the spring clip. Unevenness can be removed by using fine glasspaper wrapped round a pencil. According to Lucas, brushes should be replaced when the top end of the brush is halfway down the slot in the side of the brush box, for then the spring pressure has started to weaken.

THE THIRD BRUSH

Badly fitting brushes or a dirty commutator have the effect of making the dynamo charge irregularly. If your dynamo relies on a third brush for the control of its output and this sticks or doesn't bed down properly, the output maybe so high as to cause the windings to overheat and burn out. On some larger machines this brush is adjustable; it can be raised and lowered depending on the level of output required, thus protecting the battery, for example, from overcharging on a sunny day when no lights are in use.

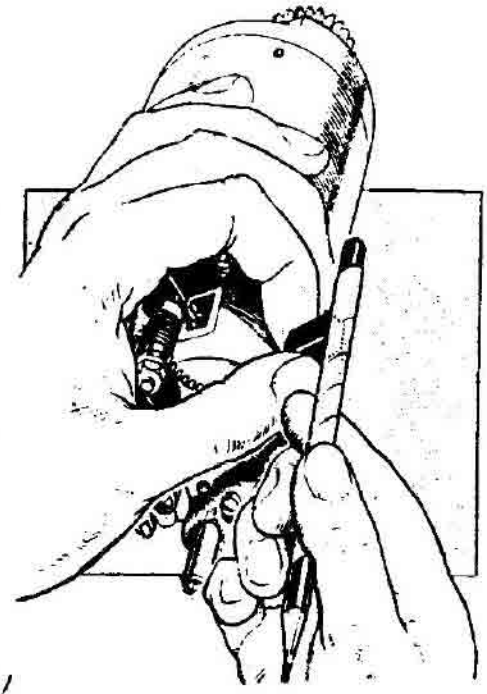
THE COMMUTATOR

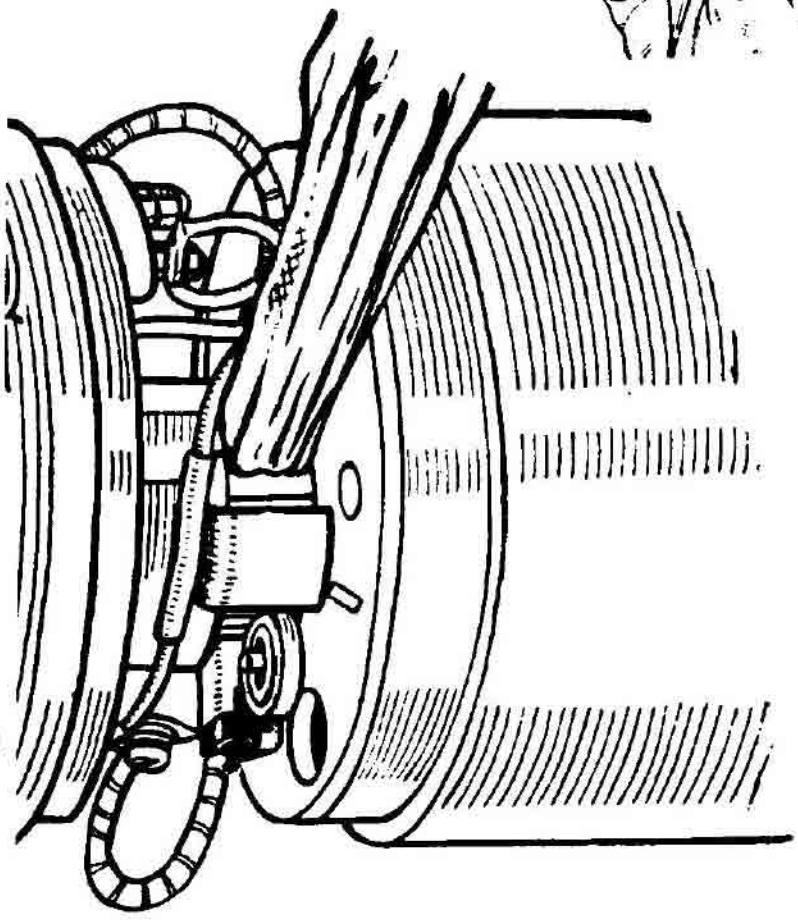
The commutator should be kept clean and free from oil. Initially this is done by removing a brush from its holder, inserting a rag soaked in methylated spirits (petrol if



Mark brushes so they are replaced right way round.

Below: ease high spots on new brush with glasspaper around pencil.





A dirty commutator can be cleaned by pressing a petrol moistened rag against the work with a piece of wood.

you must, but meths is better), and spinning the commutator until it gleams. If this is not sufficient, the commutator can be cleaned with fine glasspaper once the armature has been removed. If carbon deposits clog the commutator grooves they must be scraped clean with a sharp point, taking great care not to damage the soft copper of the commutator itself, and to cut to the correct profile.

ARMATURE REMOVAL

Two or three long screws hold the driving side end plate in place. After tightening, these will have been burred over, either at the screw head or through a small hole ⅛th inch from the end plate. A good twist with a snug fitting screwdriver will usually remove the screws, but if not the burrings may need to be be drilled out before the screws are undone. Take care not to damage the screws in the process.

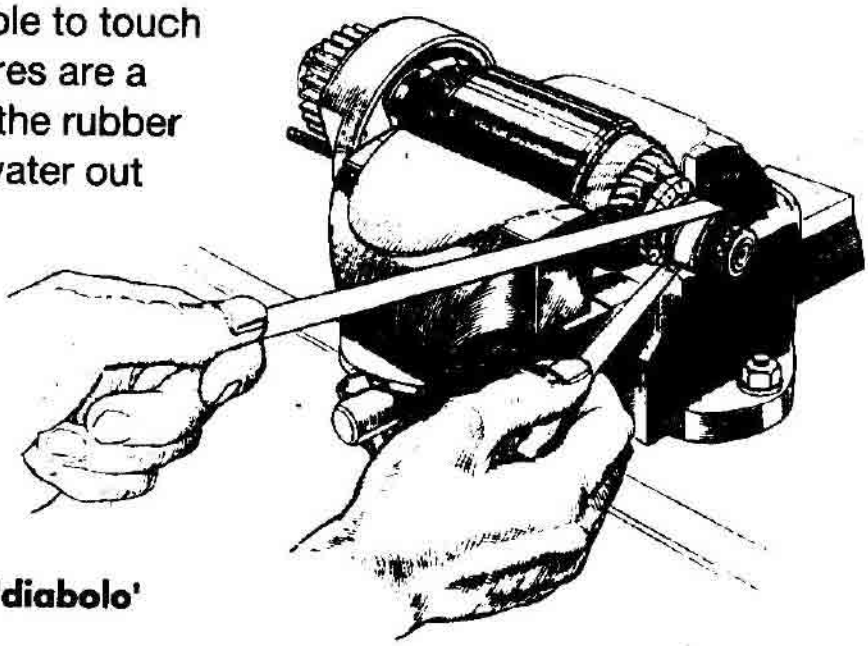
REVERSED POLARITY

If a dynamo should reverse its polarity (usually denoted by a discharge ammeter reading when the dynamo is charging), the trouble is either due to the battery connections being crossed over or a bad earth return circuit between the body of the lamp and the dynamo. To cure the former, swap the battery leads over. For the latter improve the earth connection by scraping off paint, or run an extra earth lead between the headlight shell and the dynamo body. Then turn the switch to the charge position. Start up the engine, running at a tickover to open the cut-out points, and hold the points together for a second.

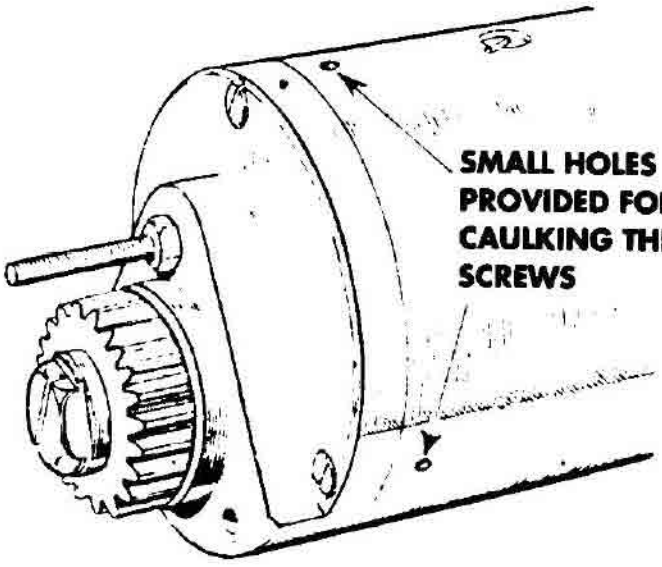
REASSEMBLY

When reassembling the dynamo after routine maintenance, make sure that the armature

bearing has enough, but not too much, grease. Tighten up the long screws and burr them over again. At the business end of the dynamo there are a lot of leads in a compact space; ensure that all connections are correct and tight, and that when the tin cover is slid into place, one will not be able to touch another. If the wires are a loose fit through the rubber grommet, keep water out with a light smear of grease or silicon sealant. If the dynamo is belt driven, as on many Velocette machines, the belt should be tensioned so that if the dynamo pulley is rotated by hand the belt will turn the engine pulley against compression.

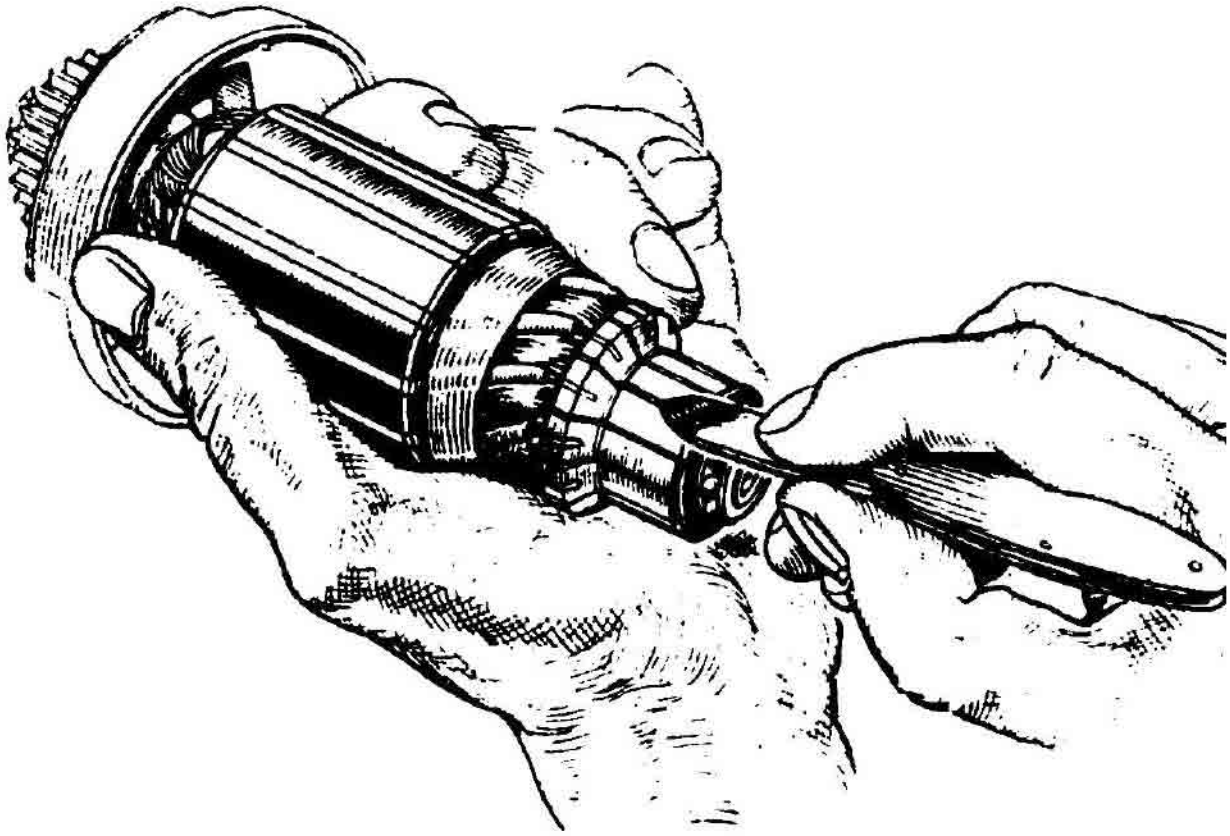


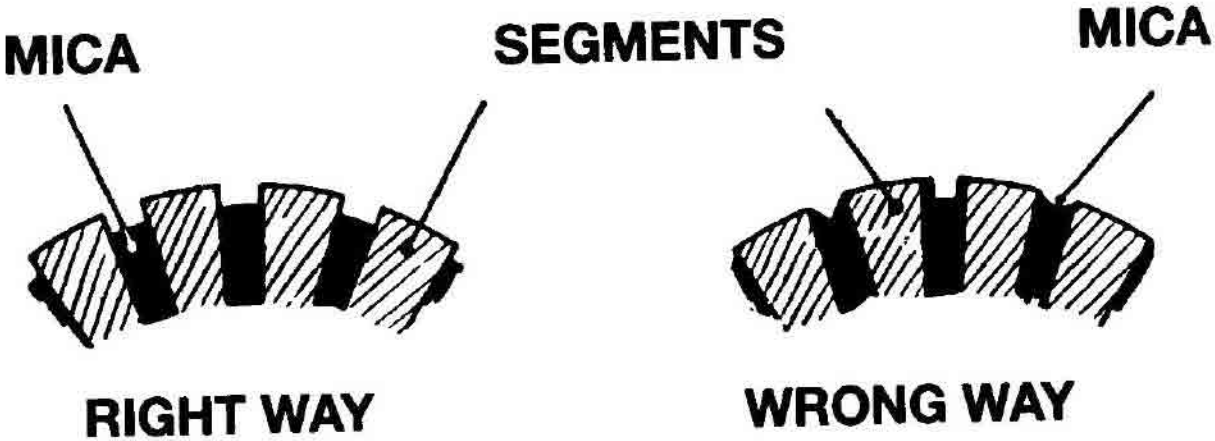
Cleaning up the commutator with glasspaper using 'diabolo' method



The screws that hold the end plate are burred over through these small holes. If a good twist with a screwdriver fails to shift screw, drill burring away.

A penknife blade held at roughly 45 degrees to the commutator can be used to clean out the grooves. Draw the knife carefully along the grooves away from the armature.





When undercutting the insulation of the commutator, great care should be taken to ensure a flat cut over the full width of each mica segment.

DYNAMO FAULT-FINDING

	Symptoms	Causes
Battery in low state of charge	Dynamo giving low or intermittent output	Commutator dirty Commutator worn Brushes sticking Brushes worn Brush springs weak Regulator out of adjustment
	Dynamo not charging	Commutator dirty Brushes worn Regulator out of adjustment Cut-out damaged Cut-out contacts dirty or damaged Battery needs attention
	Battery overcharged Burnt out bulbs; Battery frequent 'topping-up'	Regulator out of adjustment Faulty battery

DYNAMO FAULT FINDING

The field windings can be tested by earthing the dynamo, and connecting a voltmeter in series between the live terminal of a six-volt battery and the F terminal on the dynamo. Once the battery is earthed, the voltmeter should give a six-volt reading. If no voltmeter is available, tough the +ve and -ve leads of a well charged battery simultaneously on adjacent commutator bars. Sound windings will produce a spark.

The armature can be checked by motoring the dynamo with the battery. Connect the F and D leads on the dynamo with a length of wire and, with the battery and dynamo body earthed, touch the battery live lead across the shorted terminals. The armature should show an inclination to spin.

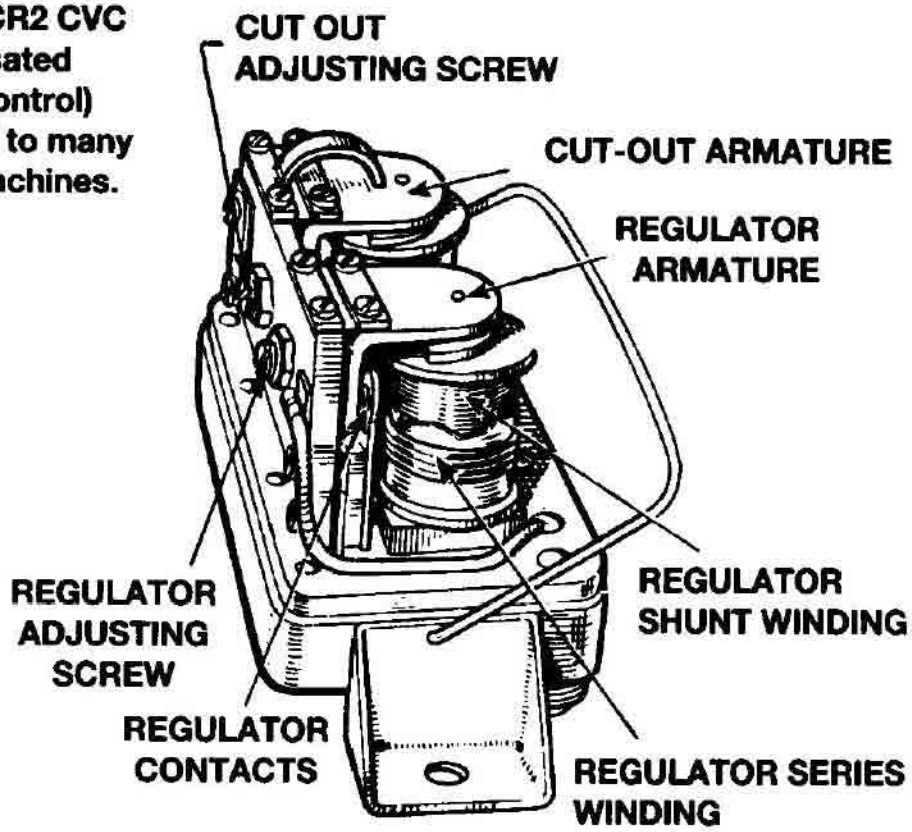
To test if there is contact between one or more of the windings and the armature, bridge the commutator segments one by one with the armature spindle. There should be no passage of current, and therefore no spark, if the insulation of the armature windings is intact.

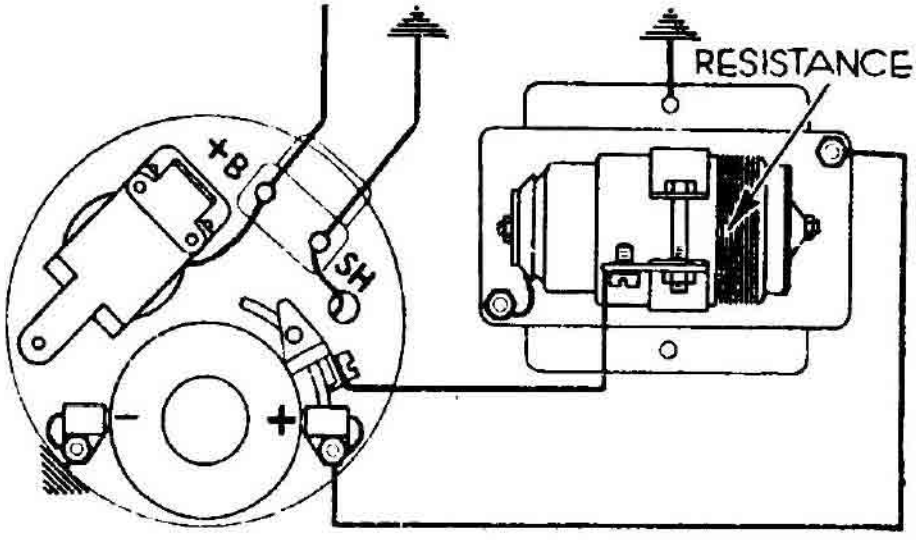
VOLTAGE REGULATOR AND CUT-OUT

Lucas compensated voltage control units contain two windings; one is the dynamo cut-out and the other the voltage regulator. First check that it is wired correctly. F-A-D-E is not an advanced warning from the Prince of Darkness, but stands for Field-Ammeter-Dynamo-Earth.

All responsible manuals advise meddlers to leave CVC boxes well alone. However, they can be adjusted by the grub screws on the back of the windings. In the case of the cut-out, anti-clockwise rotation of the grub screw lessens the spring loading on the cut-out blade, causing the points to close earlier and open later.

Lucas MCR2 CVC (compensated voltage control) unit fitted to many British machines.





Miller dynamo, introduced in 1936, with separate voltage control. This design superseded the earlier three-brush dynamo.

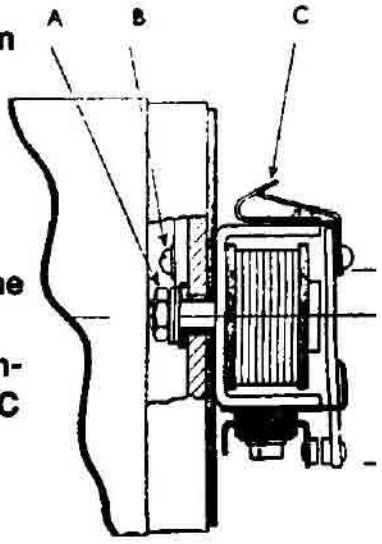
Rotating the screw clockwise has the opposite effect. For regulator adjustment turning the grub screw clockwise increases output and vice versa. Loosen and retighten the locknut before and after adjustment. When checking a dynamo's output against an ammeter, before fiddling with the control unit remember that a dynamo charges at a higher rate when cold than it does after it has been in operation for a minute or two.

In the case of Miller units the cut-out is bolted to the commutator end bracket, although it works on the same principle as the Lucas unit. To test the Miller cut-out, disconnect the three outside dynamo leads and clip the positive side of a voltmeter to the B+ dynamo terminal and earth the negative side. If there is no reading on the voltmeter with the engine running, clip the positive side of the voltmeter to the D+ connection. This by-passes the cut-out, so if there is now a reading it indicates that the dynamo is charging but the cut-out is faulty.

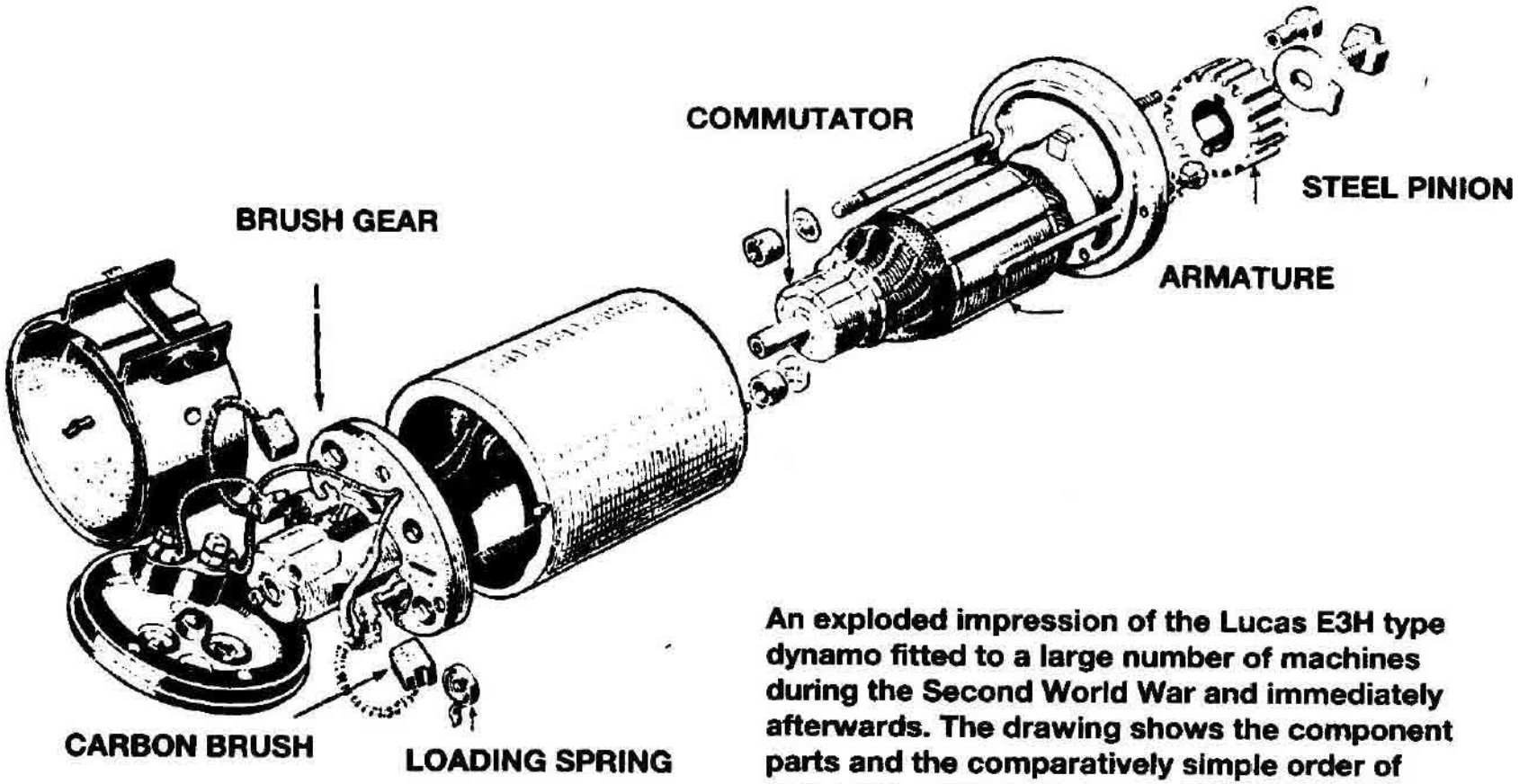
The Miller regulator is a separate unit fixed to the top of the dynamo. It can be tested by disconnecting the battery live lead, and putting a voltmeter across the +ve and -ve base terminals of the regulator unit. With the engine running at 1000 rpm the voltmeter should record 7.5-7.9v.

Below 7.5v suggests over-regulation, and adjustment can be made by screwing out the negative contact screw (visible at the conical end of the unit) two complete turns.

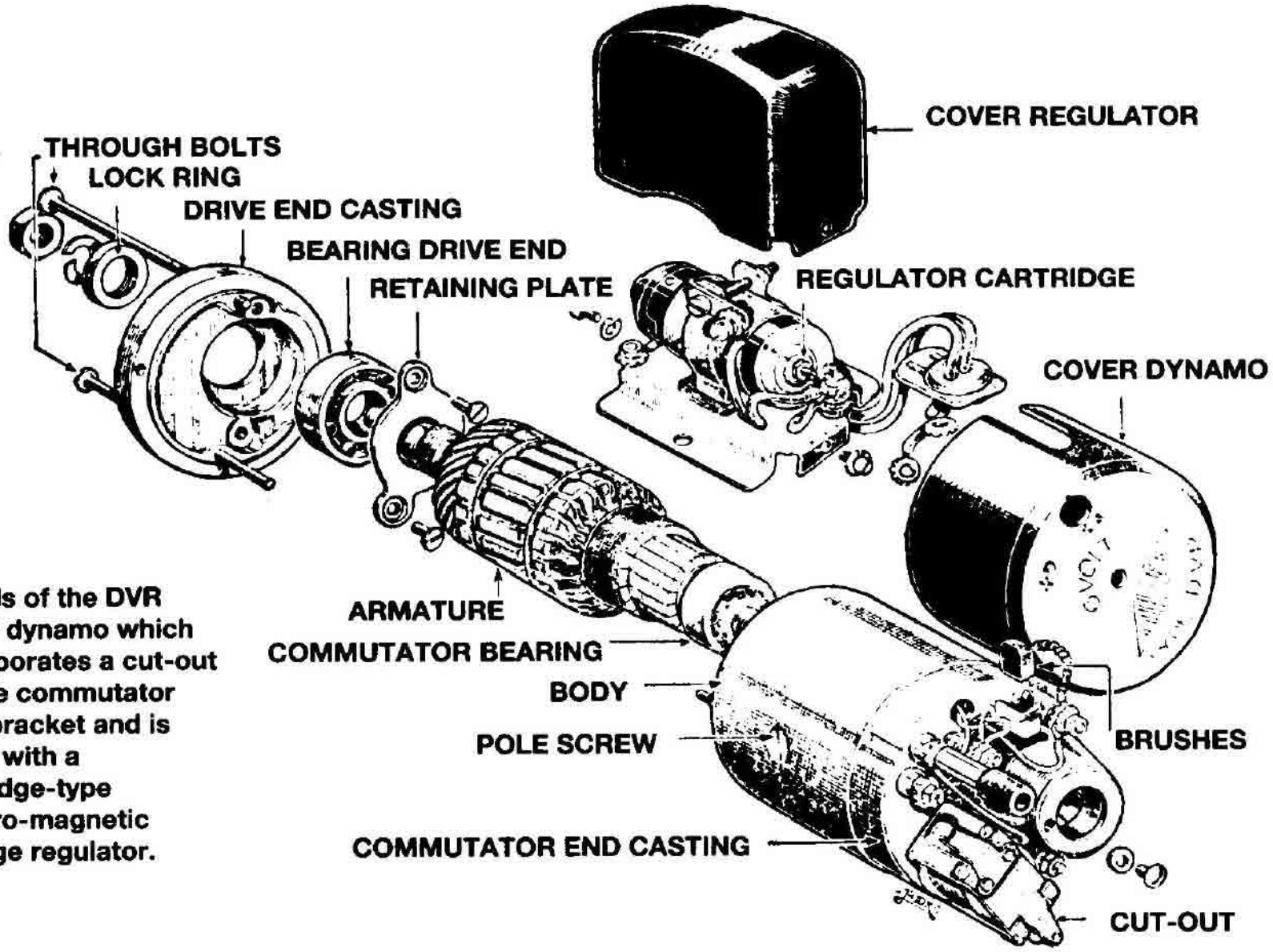
Under-regulation is adjusted by slackening the screw at the other end of the unit a quarter of a turn.



Right: a cross-section of the Miller voltage control regulator cut-out showing A the fixing nut, B the earth connection and C the tension spring.



An exploded impression of the Lucas E3H type dynamo fitted to a large number of machines during the Second World War and immediately afterwards. The drawing shows the component parts and the comparatively simple order of dismantling this instrument. Other Lucas dynamos are structurally similar.



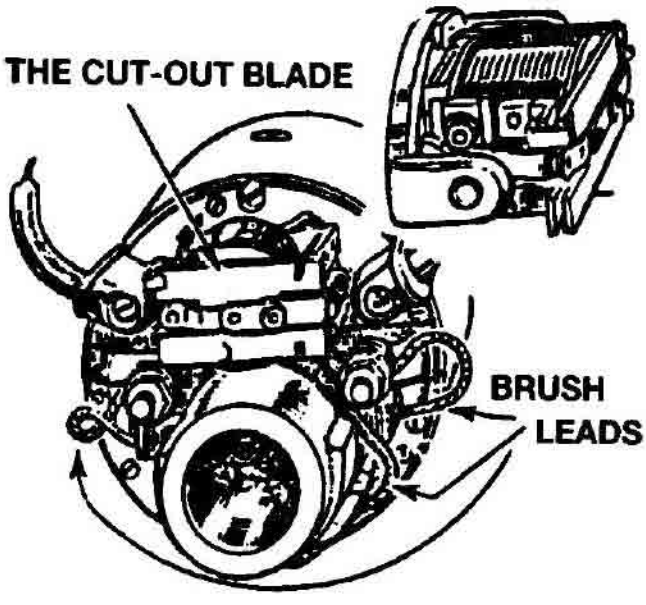
Details of the DVR Miller dynamo which incorporates a cut-out on the commutator end-bracket and is fitted with a cartridge-type electro-magnetic voltage regulator.

VOLTAGE CUT-OUT

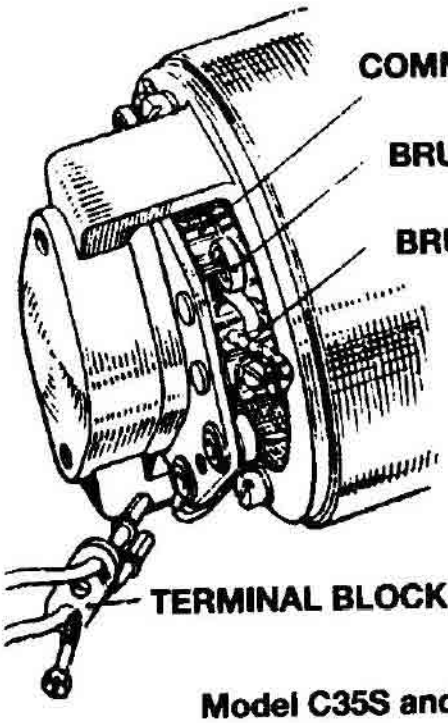
Early Lucas dynamos mounted the cut-out with the commutator. In the cut-out there are two windings — shunt and series. The shunt winding is straight across the main brushes of the dynamo. Therefore, lift the brushes and apply the leads from the battery to the brush holders. There should be a small spark, which, since the current is only about 0.2 amp is difficult to select unless one looks closely. A surer way of testing is to leave the battery connected to the brush holders, depress the arm of the cut-out, and feel whether there is any magnetic pull. It is necessary to press the points together and feel for the magnetic force, because, of course, the battery is only of six volts, whereas the cut-out is set to operate at 7.5 volts.

The series winding is connected between the positive brush holder and the insulated point. In this case a flash test can be made — quickly and not too often, because otherwise you may burn out the winding and damage the battery. Flash between the +brush holder and the fixed point, ie the insulated one.

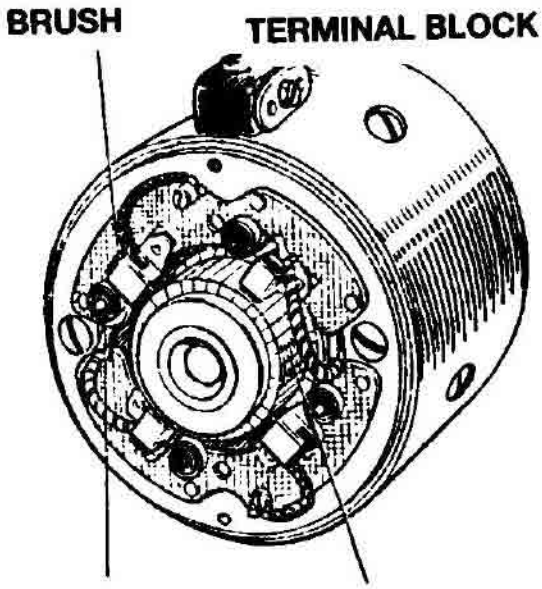
When the end cover of a dynamo is replaced care must be taken that none of the cables fouls the cut-out blade. This may cause late cutting in; so too, may loose or dirty connections in the field circuit, though generally the latter will cause *no* cutting in.



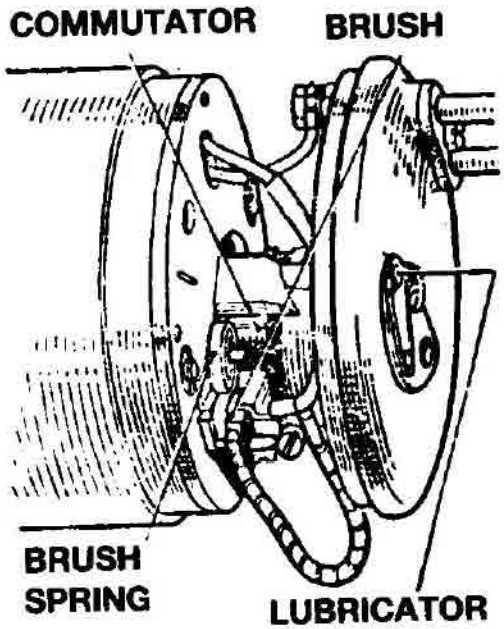
TYPES OF LUCAS END-BRACKET



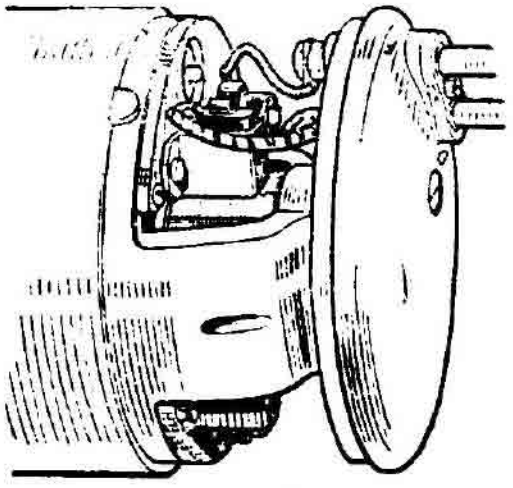
Model C35S andC35SD



Model MC45



Model E3H and E3HM



Model E3LM

DYNAMO OVERHEATING

While there is nothing abnormal in the dynamo getting warm after a long run, excessive overheating may be due to one of the following:

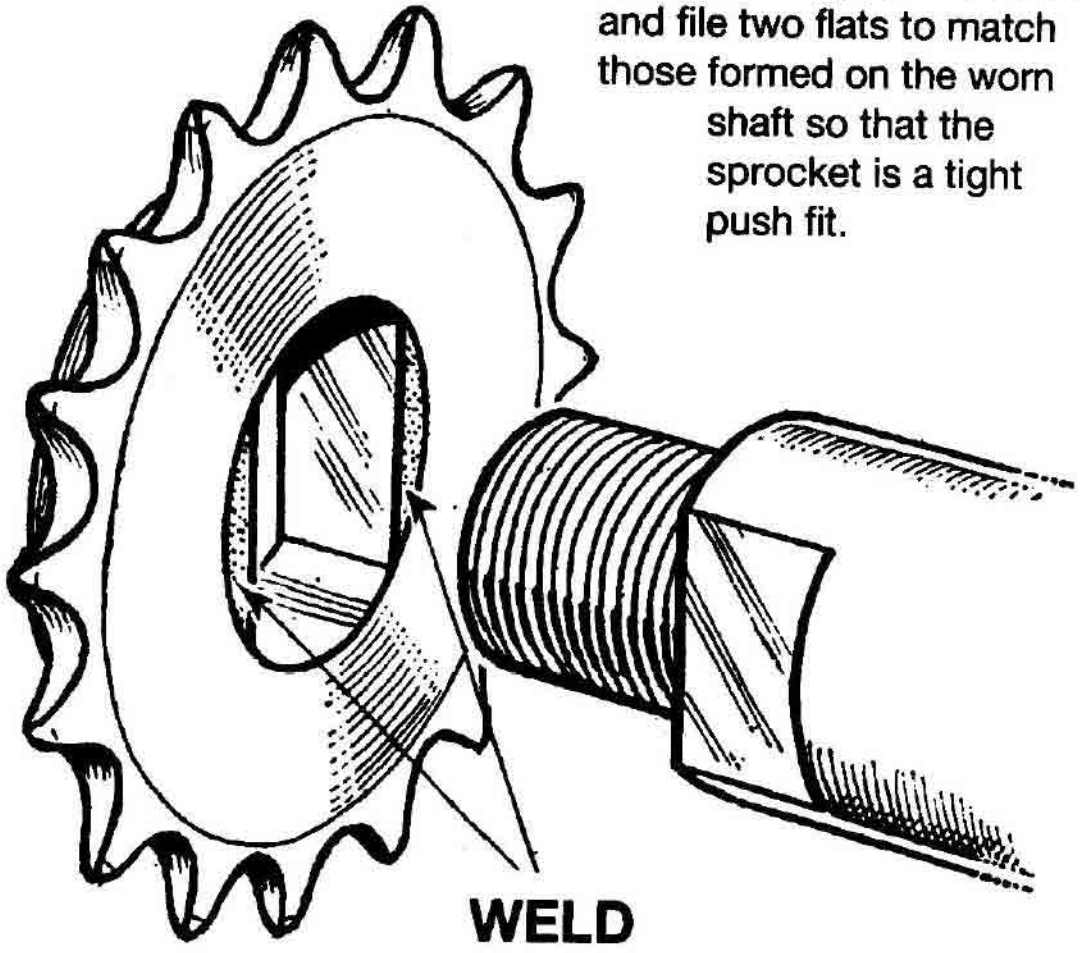
1) Dirty or oily commutator.

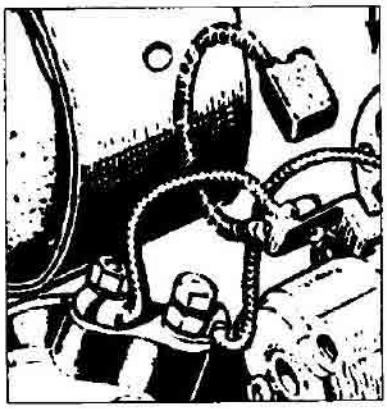
2) Worn armature bearings, which may cause fouling of the pole shoes.

3) A short-circuited armature, which would cause the dynamo to give a reduced and intermittent output.

A STRIPPED KEYWAY

A stripped keyway on a dynamo shaft can be cured by filing two flats on the worn shaft. Then fill two sides of the hole in the centre of the sprocket with weld; electric welding should not distort the sprocket. Tidy up the welds, and file two flats to match those formed on the worn shaft so that the sprocket is a tight push fit.





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