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## Starter motors

**23B**

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**Starter motor**

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## General description

The Lucas M127 starter motor is operated by a solenoid and has a five roller clutch. The solenoid engages the starter drive in two operations to ensure that the motor gets its maximum torque only when the starter motor is engaged fully with the flywheel. The clutch prevents rotation of the armature at high speed if the starter is held in the engaged position.

The CAV CA45 or S115 starter motor has a smooth cylinder surface with no protrusions. This is because the solenoid and the main switch assemblies are inside the drive end cover around (co-axially with) the armature shaft. The main feature of the co-axial starter is that only the pinion assembly moves axially to engage the engine flywheel. There is no axial movement of the whole armature as with the axial type motor. To ensure smooth engagement of the pinion, full load is not applied until the pinion is completely engaged with the flywheel.

## Starter motor

To remove and to fit **23B-01**

### To remove

- 1 Disconnect the battery.
- 2 Disconnect the starter motor cables.
- 3 Release the fasteners and remove the starter motor and, if necessary, the distance piece.

### To fit

- 1 If necessary, put the distance piece in position with its location lip to the flywheel housing. Fit the starter motor and tighten the fasteners.
- 2 Connect the starter motor cables.
- 3 Connect the battery.

To maintain the brush gear and the commutator **23B-02**

### CA45G or S115 starter motors

Inspect the brushes at intervals to ensure that they are free in their guides and that the wire connections are free to move. To check this, lift the spring from the brush and pull carefully on the flexible connections. If the brush does not move freely, remove it from its holder and clean the sides with a material which is damp with gasolene.

Ensure that the brushes are fitted in their original positions to keep the original wear seat. The brushes must have good seats which conform to the shape of the commutator. If the brush seat is not correct, put a piece of very fine carborundum paper or similar material tight around the commutator with the rough face to the outside. With the brush in position, turn the armature by hand, in the normal direction of rotation, until the brush has the correct shape. If the brushes are so worn that the springs do not give enough pressure, they must be renewed. Check the spring pressure with the hook of a spring balance under the spring lip. The correct tension is 8,34/11,00 N (30/40 ozf) 0,85/1,13 kgf.

The new brushes must be the exact same grade as the original brushes. To ensure that correct brushes are fitted, use only parts from the approved manufacturer. To remove the brushes, remove the four setscrews that hold the brushes, one for each brush. When the new brushes are assembled, connect carefully the field coil and connector wires, held by two of the setscrews. Before the brushes are inserted in their holders, it is advised that the holders are cleaned with compressed air or with a material which is damp with gasolene.

The commutator must be completely clean of dirt and oil. Any sign of dirt or oil must be removed by a piece of clean dry material (with no loose fibres) pressed against it, while the armature is turned by hand.

If the commutator is dirty and has a colour other than its natural colour, lift the brushes and put a strip of fine carborundum paper or similar material around the commutator, with the rough surface to the inside. Turn the armature by hand until the surface has returned to its natural colour. Clean the commutator with a material which is damp with gasolene.

If a repair is necessary to the commutator or switch gear, etc. the starter must be removed for specialist repair.

### M127 Starter motor

Repair of this starter motor is more difficult. If necessary, remove the starter motor for specialist repair.

To test on the engine **23B-03**

Ensure that the battery is in a fully charged condition.

Turn on lights and operate the starter switch. If no lights are fitted to the machine, connect a voltmeter across the battery terminals and operate the starter switch.

If the starter does not operate but the lights keep their power or there is no voltage drop across the battery, check the switch and all the connections and wires. Slow action of the starter can be caused by faulty connections.

Difficulty to engage smoothly between the starter and the flywheel can be caused, on some types of starter motor, by dirt on the helical grooves of the starter motor drive, which can prevent free pinion movement. Clean the shaft thoroughly with gasolene, or a fluid made specially for the purpose, and apply a small quantity of Aero Shell 6B or its equal.