

# LUCAS

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## EQUIPMENT

VOLUME 2

### WORKSHOP INSTRUCTIONS

#### MOTOR CYCLE GENERATOR

#### MODEL MC45L



JOSEPH LUCAS LTD · BIRMINGHAM 19 · ENGLAND

# LUCAS WORKSHOP INSTRUCTIONS

## MOTOR CYCLE GENERATOR

### MODEL MC45L

#### 1. GENERAL

Model MC45L generator is designed for building directly into the engine crankcase. Of four-pole four-brush shunt wound design, this generator is arranged to operate in conjunction with the standard motorcycle control box. (See SECTION L-3, Part A.) As compared with other motorcycle generators, the yoke is of greater overall diameter ( $4\frac{1}{2}$  in.) but is very much shorter, the length being  $2\frac{3}{4}$  in.

Two different methods of mounting have been devised for supporting and driving the armature. On Sunbeam S7 and S8 models the armature is mounted on a sleeve which fits over the end of the crankshaft and is secured by a bolt passing axially through the armature and sleeve. On Scott 'Flying Squirrel' models the armature is supported by ball bearings at both ends. The ball bearing at the drive end is clamped in position by the driving flange, which is secured to the armature shaft by a bolt. The ball bearing at the commutator end is secured to the armature shaft by a countersunk screw.

Both methods of mounting incorporate a rubber oil seal at the drive end of the generator, to prevent the ingress of oil to the generator from the engine.

The yoke, pole shoe and field coil assembly which is of conventional design, is spigoted directly into the engine crankcase and secured by countersunk-headed bolts on Sunbeam motorcycles. On Scott motorcycles, two through bolts secure the commutator end bracket and yoke on the drive housing which in turn is clamped to the engine crankcase.

The brushgear is carried on a plate fitted to the commutator end of the yoke assembly. The polished commutator end cover (Sunbeam) or bracket (Scott), has a rubber sealing ring to prevent the entry of dirt and water into the generator.

#### 2. TEST DATA

- (a) Cutting-in speed: 750 — 850 r.p.m. at 6.5 volts.
- (b) Output test: 10 amps. at 1,250 — 1,400 r.p.m. at 7 generator volts taken without regulator, on a calibrated resistance load capable of carrying 12 amps. without overheating.
- (c) Total field resistance: 2.5 — 2.7 ohms.

#### 3. ROUTINE MAINTENANCE

##### Inspection of Commutator and Brushgear

Every 12,000 miles remove the commutator end cover (or bracket) and check that the brushes move freely in their holders, cleaning if necessary. The commutator must be clean and free from oil or dirt, and should have a polished appearance. If it is dirty, clean it with a dry fluff-free cloth. If the commutator is very dirty, moisten the cloth with petrol. Be careful to refit the brushes in their original positions in order to retain their bedding.

When reassembling, position the rubber seal between the cover and the yoke and carefully tighten the fixing screws.

#### 4. SERVICING

##### (a) Testing in position to locate fault in charging circuit.

In the event of a fault in the charging circuit, adopt the following procedure to locate the cause of trouble.

- (i) Check that the generator and regulator unit are connected correctly. The generator terminal 'D' should be connected to the control box terminal 'D' and generator terminal 'F' to control box terminal 'F'.
- (ii) Remove the cables from the generator terminals 'D' and 'F' and connect the two terminals with a short length of wire.
- (iii) Start the engine and set to run at normal idling speed.
- (iv) Connect the negative lead of a moving coil voltmeter, calibrated 0—10 volts, to one of the generator terminals and connect the positive lead to a good earthing point on the generator yoke or engine. Reverse voltmeter connections on negative earth machines.
- (v) Gradually increase the engine speed, when the voltmeter reading should rise rapidly and without fluctuation. Do not allow the voltmeter reading to rise above 10 volts and do not race the engine in an attempt to increase the voltage. It is sufficient to run the generator up to a speed of 1,000 r.p.m. If there is no reading, check the brush gear, as described in (vi)



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below. If there is a low reading of approximately  $\frac{1}{2}$  volt, the field winding may be at fault, see Para. 4 (d). If there is a reading of approximately  $1\frac{1}{2}$  to 2 volts, the armature winding may be at fault, see Para. 4 (e).

(vi) Remove the commutator end cover (or bracket) and examine the brushes and commutator. Hold back each of the brush springs and move the brush by pulling gently on its flexible connector. If the movement is sluggish, remove the brush from its holder and ease the sides by lightly polishing on a smooth file. Always replace brushes in their original positions. If the brushes are worn so that they do not bear on the commutator, or if the brush flexible is exposed on the running face, new brushes must be fitted.

Test the brush spring tension with a spring scale. The correct tension is 12—15 oz. and new springs must be fitted if the tension is low.

If the commutator is blackened or dirty, clean it by holding a petrol-moistened cloth against it whilst the armature is slowly rotated.

Re-test the generator as in (v) above. If there is still no reading on the voltmeter, an internal fault is indicated and the complete unit should be replaced. Alternately the unit can be dismantled, see Para. 4 (b) for internal examination.

(vii) If the generator is in good order, restore the original connections. Connect control box terminal 'D' to generator terminal 'D' and control box terminal 'F' to generator terminal 'F'. Proceed to test the control box as described in SECTION L-3 Part A.

## (b) To Dismantle

When fitted to Sunbeam motor cycles:

- (i) Disconnect the generator connections.
- (ii) Unscrew the two cover securing screws and remove the cover and sealing ring.
- (iii) Lift the brushes and wedge them in the raised position by means of the springs.
- (iv) Unscrew the two countersunk headed bolts. The complete yoke assembly can now be withdrawn, leaving the armature in position.
- (v) To remove the brushgear plate from the yoke, remove the two insulated brushes from their holders and unscrew the two earthing screws.
- (vi) Take out the armature fixing bolt (left hand thread), and withdraw the armature. Be careful not to damage the machined surface on which the oil seal rests.

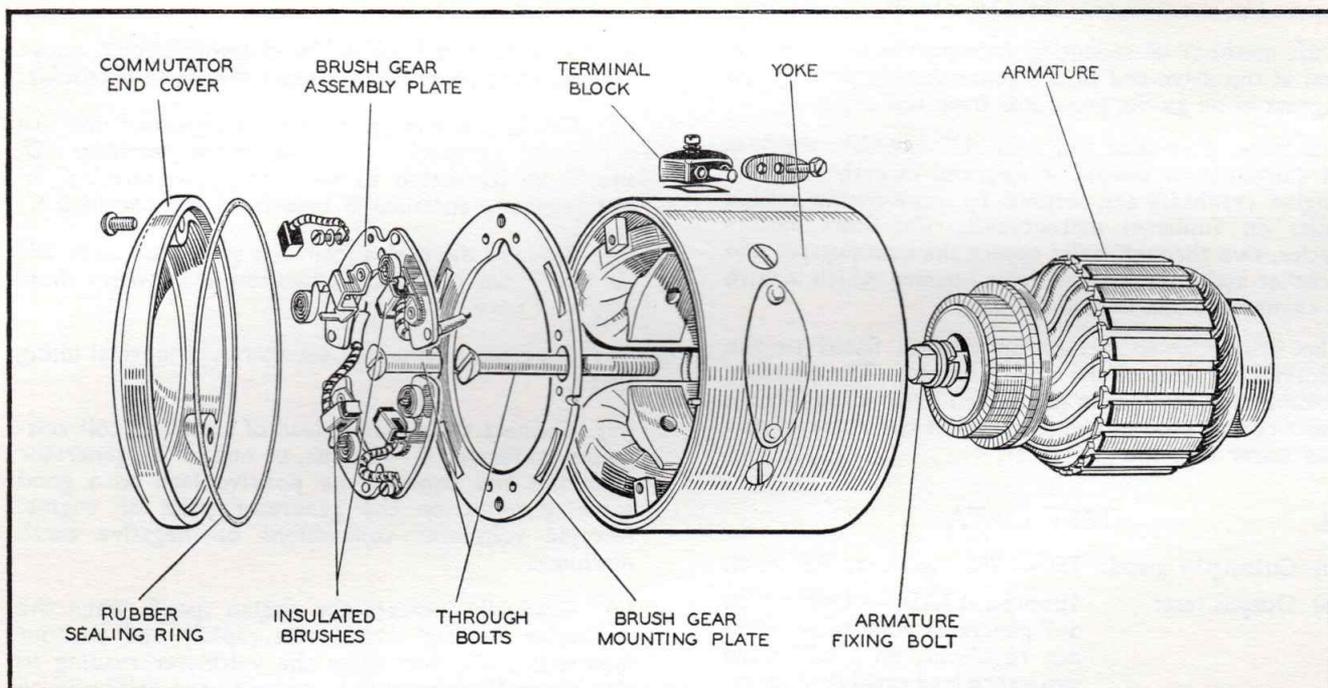


Fig. 1  
Dismantled view of generator (Sunbeam type)



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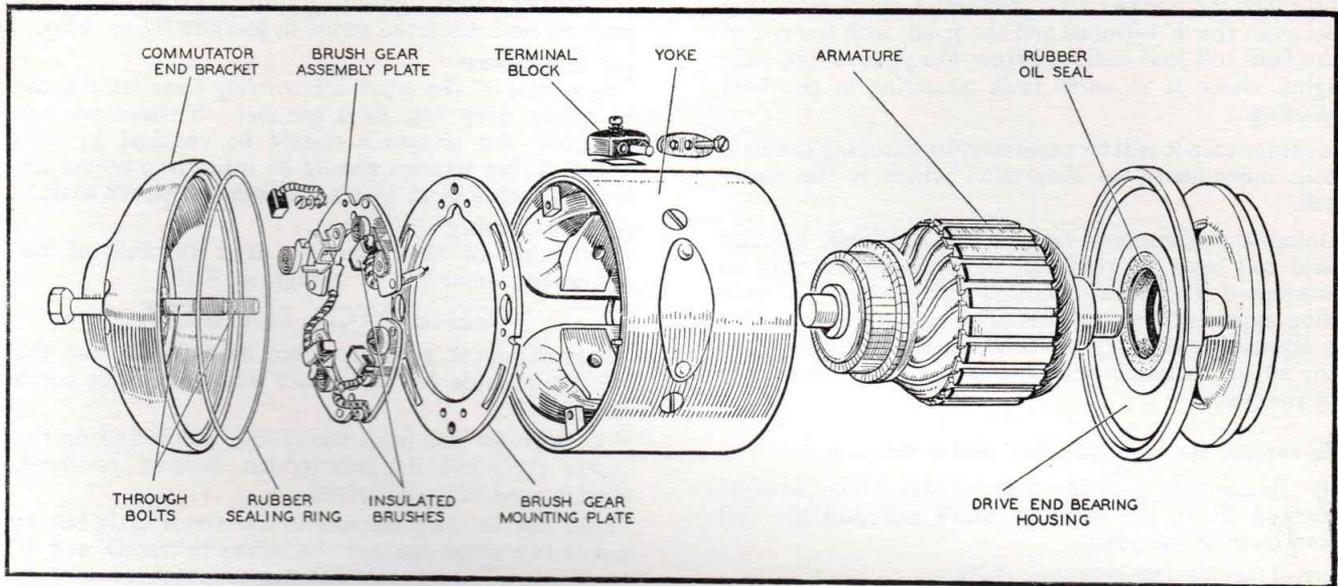


Fig. 2  
Dismantled view of generator (Scott type)

When fitted to Scott motor cycles:

- (i) Disconnect the generator connections.
- (ii) Unscrew the two through bolts and gently pull the commutator end bracket away from the yoke.
- (iii) Lift the brushes and wedge them in the raised position by means of the springs. The yoke assembly can now be removed from the drive housing.
- (iv) To remove the brushgear plate from the yoke, remove the two insulated brushes from their holders and unscrew the two earthing screws.
- (v) To remove the armature from the machine, the drive housing must be removed from the engine. When the drive housing has been removed, the driving flange will be exposed. Unscrew the armature fixing bolt from the centre of the driving flange and press the armature out of the ball bearing.
- (vi) The commutator and drive end brackets are not of Lucas manufacture and for information regarding oil seal and bearing replacement, refer to the manufacturer's instruction book.

### (c) Commutator

Examine the commutator. If it is in good condition, it will be smooth and free from pits or burned spots. Clean with a petrol-moistened cloth. If this is ineffective, carefully polish with a strip of very fine glass paper while rotating the armature. To remedy a badly worn commutator, mount the armature in a lathe, rotate at high speed and take a light cut with a very sharp tool. Do not remove any more metal than is necessary. For the purpose of skimming the commutator on Sunbeam armatures it will be necessary to use a

mandrel to ensure concentricity. On no account must the machined oil-sealing face be gripped in the chuck of the lathe.

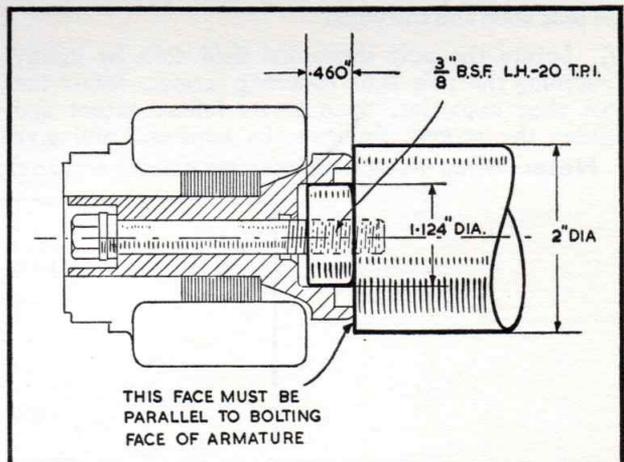


Fig. 3  
Mandrel for skimming commutator

### (d) Field Coils

Remove the nut securing the end of the field coil lead to the yoke, and measure the resistance of the field coils by means of an ohm-meter. If this is not available, connect a 6-volt battery and an ammeter in series with the field coils by connecting to the 'F' terminal and the end of the field coil lead. The ammeter reading should be approximately 2.3 amperes. No reading on the ammeter indicates an open circuit in the field winding.



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To check for earthed coils, connect a mains test lamp between the 'F' terminal and the yoke, with the end of the field coil lead removed from the yoke. If the bulb lights, there is an earth fault occurring in the field winding.

In either case it will be necessary, by checking the field coils individually, to determine which is the faulty coil.

Unless a replacement generator is available, a faulty field coil must be replaced, but this should only be attempted if a wheel-operated screwdriver and pole shoe expander are available. The pole shoe expander is especially necessary to ensure that there will not be any air gap between the pole shoe and the inner face of the yoke.

To replace the field coils, proceed as follows:—

- (i) Loosen the grub screw at the back of the terminal marked 'F' on the terminal block and pull the coil lead clear of the yoke.
- (ii) Unscrew the pole shoe retaining screws by means of the wheel-operated screwdriver.
- (iii) Draw the pole shoes and field coils out of the yoke and lift off the coils.
- (iv) Fit the new coils over the pole shoes and place them in position inside the yoke. Take care to ensure that the taping of the field coil is not trapped between the pole shoe and the yoke.
- (v) Locate the pole shoes and field coils by lightly tightening the pole shoe retaining screws. Insert the pole shoe expander, open to its fullest extent and tighten the screws. Remove the expander and give

**Note:** When fitting a replacement coil set ensure that the coils are arranged in the yoke as shown in Fig. 4 below.

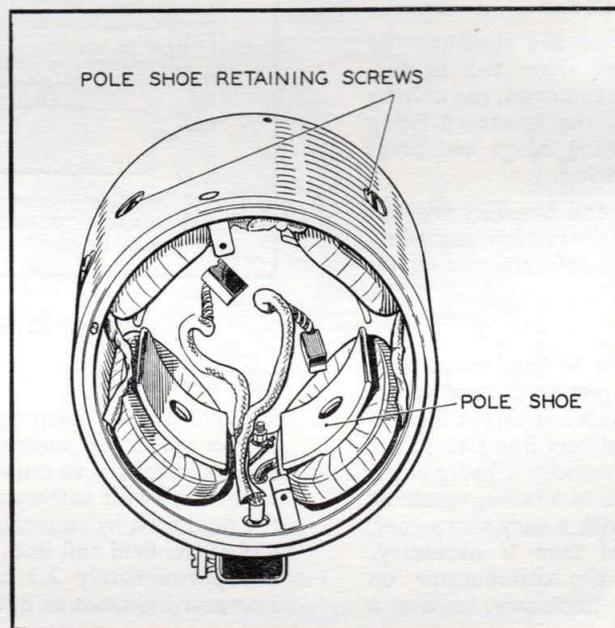


Fig 4

the screws a final tightening with the wheel-operated screwdriver. Lock the screw in position by caulking.

## (e) Armature

The testing of the armature winding requires the use of a volt drop test or a growler. If these are not available, the armature should be checked by substitution. No attempt should be made to machine the armature core or to true a distorted armature shaft.

## (f) Reassembly

Reassembly of the generator is a reversal of the operations described in paragraph 4 (b).

## 5. GENERATOR POLARITY

All replacement generators are despatched from the Works suitable for immediate use on positive earth systems.

If a generator has been incorrectly connected on the motor cycle and its polarity has become reversed, then it must be re-polarized.

To do this, fit the generator to the motor cycle but do not at this stage connect the cables to the 'D' and 'F' terminals. Temporarily connect a length of wire to the battery positive terminal and hold the other end of this wire in contact with generator terminal 'F' for a few seconds only. This serves to re-polarize the generator; the temporary connection can now be removed and the original cables connected to 'D' and 'F' terminals.

The practice of closing the cut-out points to reverse the generator polarity is not recommended as this method allows a high initial surge of current from the battery to pass through the armature, which can damage the windings, insulation, etc., and result in a decreased service life of the machine.

