

# LUCAS

*Quality*

## EQUIPMENT

### WORKSHOP INSTRUCTIONS

#### MOTOR CYCLE GENERATOR

#### MODEL C35SD



JOSEPH LUCAS LTD · BIRMINGHAM 19 · ENGLAND

# LUCAS WORKSHOP INSTRUCTIONS

## MOTOR CYCLE GENERATOR

### MODEL C35SD

#### 1. GENERAL

Model C35SD generators are shunt-wound two-pole two-brush machines designed to operate in conjunction with a standard motor cycle control box. (See SECTION L-3 Part A).

later machines. On earlier machines a thrust spring was fitted between the commutator and the inner journal of the bearing. On later machines the bearing is secured to the armature shaft by a screw and the thrust spring, now loading the outer journal of the bearing, is fitted in the bearing housing in the

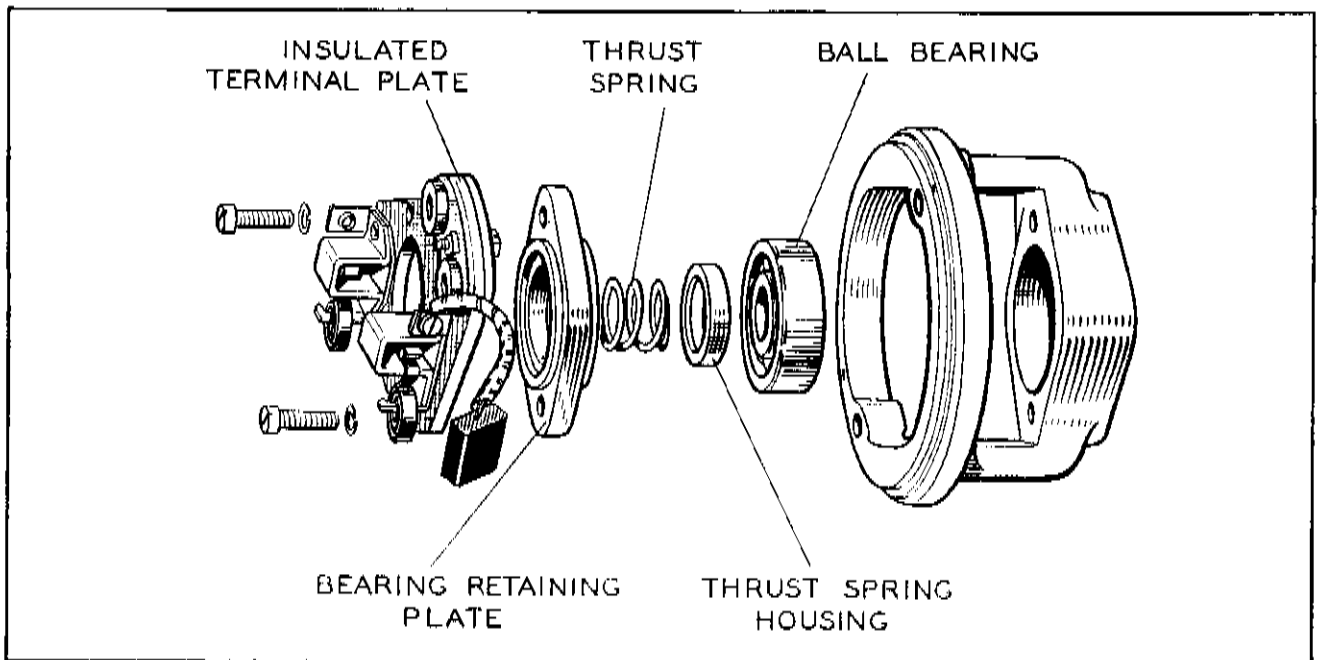


Fig. 1

Dismantled view of earlier type commutator end bracket

Both the drive and commutator ends of the armature are supported in ball bearings. The arrangement of the commutator end bearing has been modified on

commutator end bracket. The differences between the two methods of construction will be made clear by reference to Figs. 1 and 2.



# LUCAS WORKSHOP INSTRUCTIONS

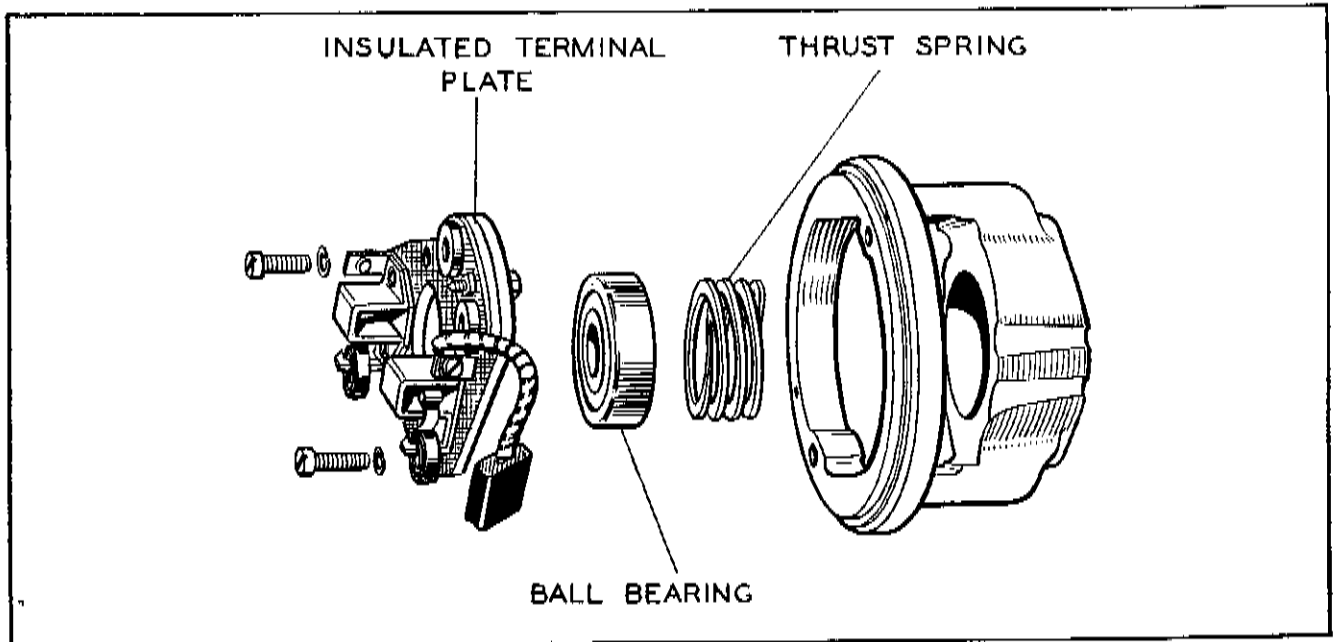


Fig. 2  
Dismantled view of later type commutator and bracket

Mounted on the drive end bracket of the generator is a distributor, driven via a worm gear and pinion from the armature shaft. Workshop instructions to cover the distributors are in SECTION L-5 Part C.

## 2. TEST DATA

Cutting In speed: 1000—1150 r.p.m. at 6.5 generator volts.

Output test: 10 amps at 1700—1850 r.p.m. at 7 volts.

Total field resistance: 2.6—2.8 ohms.

Brush spring tension: 16—20 oz.

## 3. ROUTINE MAINTENANCE

### LUBRICATION

No lubrication is necessary as the ball bearings are packed with H.M.P. grease, which will last until the machine is taken down for a general overhaul, when the bearings should be repacked. Thin lubricating oil, if allowed to reach the bearings, will soften the grease and eventually cause the bearings to run hot.

### INSPECTION OF COMMUTATOR AND BRUSH-GEAR

About once every six months remove the commutator end cover for inspection of commutator

and brushes. The brushes are held in contact with the commutator by means of springs. Move each brush to see that it is free to slide in its holder; if it sticks, remove it and clean with a cloth moistened with petrol. Care must be taken to replace the brushes in their original positions, otherwise they will not 'bed' properly on the commutator. If, after long service, the brushes have become worn to such an extent that the brush flexible is exposed on the running face, or if the brushes do not make good contact with the commutator, they must be replaced by genuine Lucas brushes. The commutator should be free from any trace of oil or dirt and should have a highly polished appearance. Clean a dirty or blackened commutator by pressing a fine dry cloth against it while the engine is slowly turned over by means of the kick starter crank. (It is an advantage to remove the sparking plug before doing this). If the commutator is very dirty, moisten the cloth with petrol.

## 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



# LUCAS WORKSHOP INSTRUCTIONS

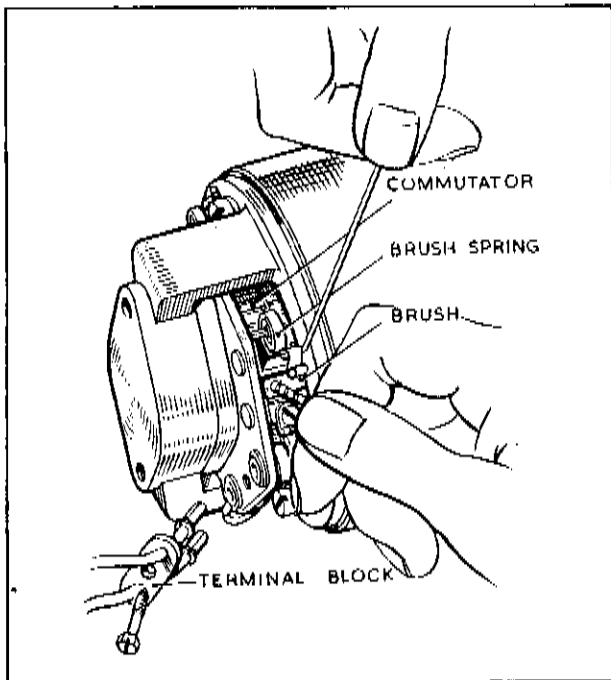


Fig. 3  
Checking brushgear

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'. Check the earthing cable connected to control box terminal 'E'.

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

- (vi) Remove the commutator end cover 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 16—20 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 while the engine is turned slowly by means of the kick start (with sparking plug removed).

Re-test the generator as in (v) above. If there is still no reading on the voltmeter, there is an internal fault and the complete unit if a spare is available, should be replaced. Otherwise the unit must be dismantled (see para. 4b) for internal examination.

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

## (b) TO DISMANTLE

Remove the generator and distributor from the motorcycle. To detach the distributor from the generator drive end bracket, loosen the distributor shank clamping bolt and withdraw the complete unit from the bracket. On earlier models an additional securing bolt is located in the drive end bracket and must be loosened a few turns to allow the distributor to be withdrawn from the bracket. Proceed to dismantle as follows:—

- (i) Remove the securing nut from the drive end of the armature shaft, and withdraw the gear with the aid of an extractor. Knock out the key from the armature shaft.
- (ii) Unscrew the two commutator end cover securing screws and remove the cover. Hold



# LUCAS WORKSHOP INSTRUCTIONS

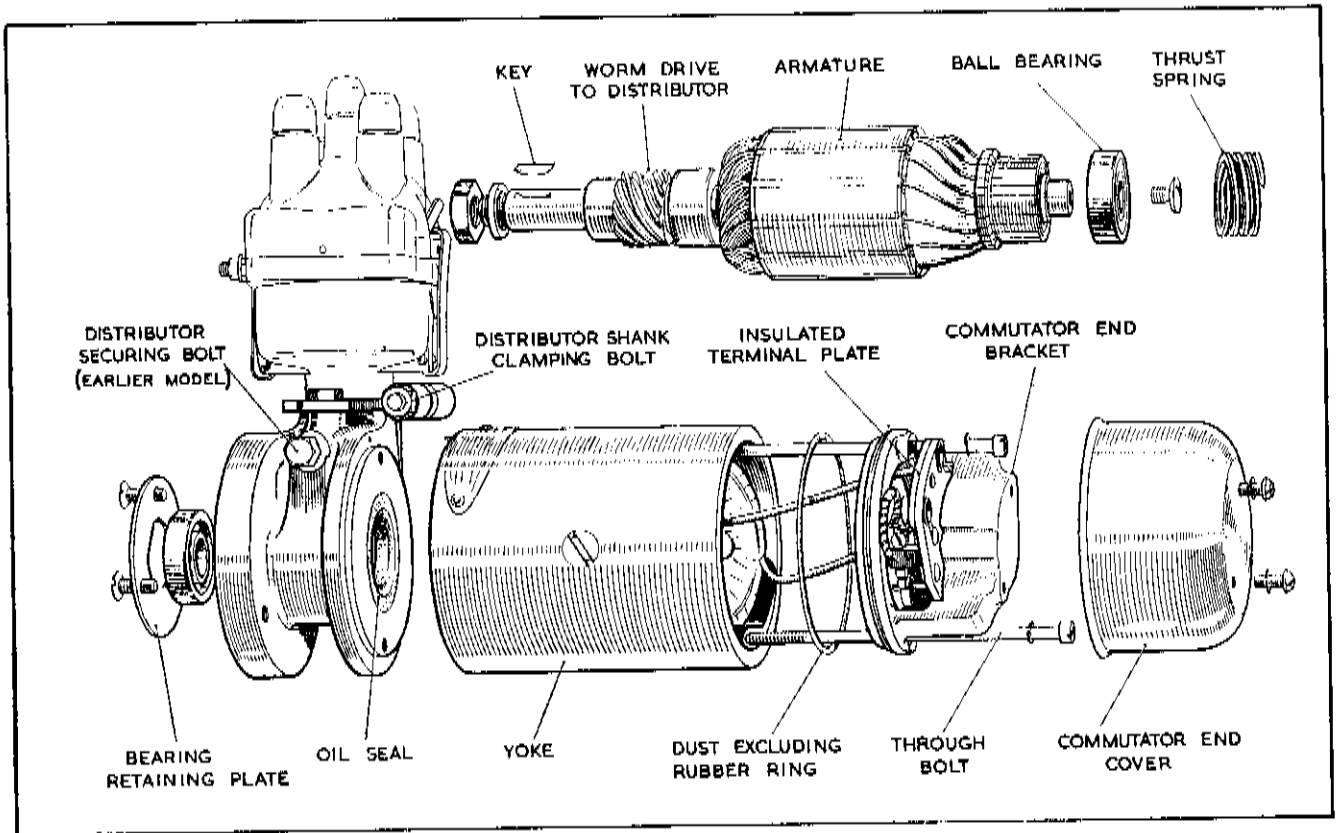


Fig. 4

Dismantled view of later type generator

- back the brush springs and lift the brushes from their holders.
- (iii) Disconnect the earthed field connection and unsolder the field connection to terminal 'F' on the terminal strip.
- (iv) Unscrew and remove from the commutator end bracket, the two through bolts securing the end bracket and yoke to the drive end bracket.
- (v) Draw the commutator end bracket away from the armature and separate the yoke from the drive end bracket. On earlier models a thrust spring will be found around the armature shaft (on later models it is located between the ball bearing and the housing); take care not to lose this.
- (vi) The armature can now be pressed out of the drive end bearing, taking great care not to damage the sealing lip of the rubber oil seal.
- (vii) Unscrew the two screws on the inner side of the commutator end bracket which secure the insulated terminal plate carrying the terminals and brushgear. On earlier models removal of the insulating plate will reveal the bearing retaining plate and thrust spring housing.
- (c) BEARINGS
- Ball bearings are fitted to both the commutator and drive end brackets. When the bearings become worn to such an extent that they allow side movement of the armature shaft, they must be replaced. The bearings should not be disturbed, except for the purpose of replacement. To replace the ball bearing at the drive end, proceed as follows:—
- (i) Remove the bearing retaining plate from the drive end bracket by unscrewing the three countersunk screws.
  - (ii) Press the defective bearing out of the end



# LUCAS WORKSHOP INSTRUCTIONS

bracket. Wipe out the bearing housing and pack the new bearing with H.M.P. grease.

- (ii) Position the bearing in its housing and press it squarely home, applying pressure on the outer journal of the bearing.

To replace the ball bearing at the commutator end, proceed as follows:—

## Earlier Type

- (i) Using an expanding calliper type extractor, draw the bearing from its housing in the commutator end bracket.
- (ii) Wipe out the bearing housing and pack the new bearing with H.M.P. grease.
- (iii) Position the new bearing in its housing and press it squarely home, applying pressure on the outer journal of the bearing.

## Later Types

- (i) To remove the bearing slacken and withdraw the thrust screw and pull the bearing off the armature shaft with an extractor.
- (ii) Wipe out the bearing housing and pack the new bearing with H.M.P. grease.
- (iii) Force the new bearing home against the shoulder on the armature shaft. Insert and tighten the thrust screw.

## (d) 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 glasspaper while rotating the armature. To remedy a badly worn commutator, mount the armature (with or without the drive end bracket) in a lathe, rotate at high speed and take a light cut

with a very sharp tool. Do not remove more metal than is necessary. Polish the commutator with very fine glasspaper.

Undercut the insulation between the segments to a depth of  $\frac{1}{32}$ " with a hacksaw blade ground down until it is only slightly thicker than the insulation.

## (e) FIELD COILS

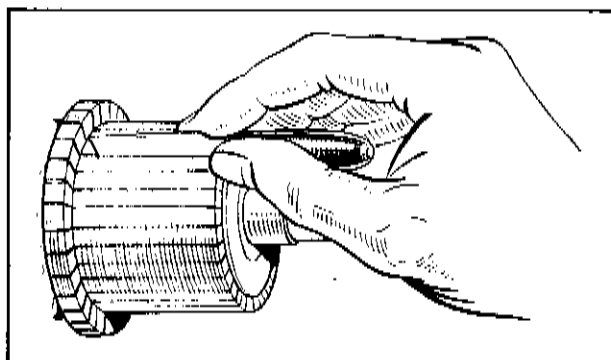
Measure the resistance of the field coils by means of an ohm meter (see para. 2). If an ohm meter is not available, connect a 6 volt D.C. supply with an ammeter in series across the coils. The ammeter reading should be approximately 2.2 amps. No reading on the ammeter indicates an open circuit in the field coils.

To check for an earthed coil, connect a 110 volt mains test lamp between one end of the field coils and the yoke. If the bulb lights, there is a short circuit between the coils and the yoke.

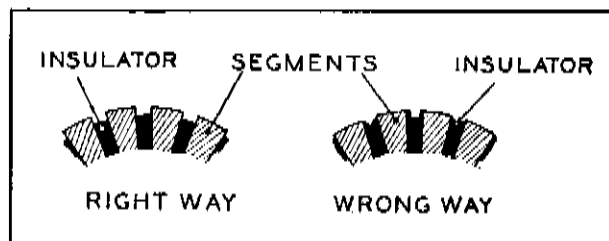
In either case, unless a replacement generator is available, the field coils must be replaced, but this should only be attempted if a wheel-operated screwdriver is available.

To replace the field coils, proceed as follows:—

- (i) Unscrew the pole shoe retaining screws by means of a wheel-operated screwdriver.
- (ii) Draw the pole shoes and field coils out of the yoke and lift off the coils.
- (iii) Fit the new field coils over the pole shoes and place in position inside the yoke. Take care to ensure that the taping of the field coils is not trapped between the pole shoes and the yoke.
- (iv) Locate the pole shoes and field coils by lightly tightening the fixing screws with a screwdriver. Give the screws a final tightening with the wheel-operated screwdriver. Lock the screws in position by caulking, that is, by tapping some of the metal of the yoke into the slot in the head of the screw.



(a)



(b)

Fig. 5

Method of under cutting commutator insulation



# LUCAS WORKSHOP INSTRUCTIONS

## (f) ARMATURE

Indication of an open-circuited armature will be given by burnt commutator segments. If armature testing facilities are not available, an armature can be checked by substitution. No attempt should be made to machine the armature core or to true a distorted armature shaft.

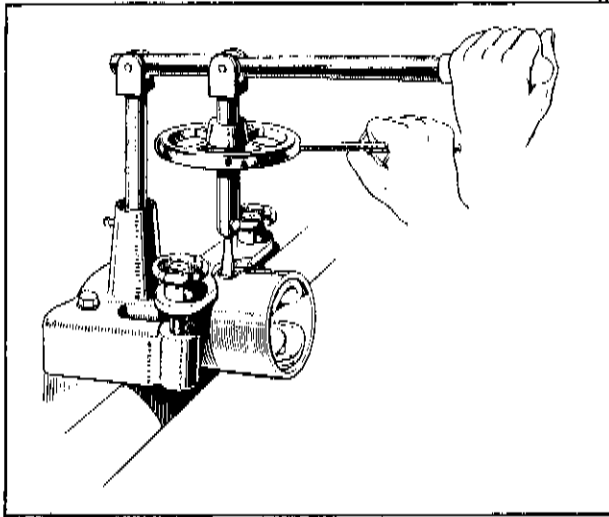


Fig. 6

Tightening pole shoe retaining screw

## (g) REASSEMBLY

In the main the reassembly of the generator is a reversal of the operations described in para. 4(b), bearing in mind the following points:—

- (i) The field coil lead fitted with a terminal eyelet must be connected, together with the eyelet of the earthed brush flexible, to the commutator end bracket by means of the screw provided.
- (ii) The second field coil lead must be resoldered to terminal 'F' on the insulated terminal strip.

- (iii) The unearthed brush flexible lead must be connected direct to terminal 'D' on the insulated terminal strip.
- (iv) When refitting the commutator end cover, do not forget to refit the dust excluding rubber ring.
- (v) If the oil seal in the drive end bracket has been damaged a replacement seal must be fitted during reassembly. To remove the oil seal from the end bracket, use a metal drift locating on the outer edge of the rubber seal. Insert a new seal using a mandrel to press it square home.

## 5. GENERATOR POLARITY

All replacement motor cycle generators are despatched from the Works suitable for immediate use on positive earth systems. If the negative terminal of the battery is earthed on the machine for which the replacement generator is intended, it will be necessary to re-polarize the generator before use to make it suitable for negative earth.

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.

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

### Para. (g) REASSEMBLY (continued)

- (vi) Before refitting the drive end bracket, pack the distributor drive housing with Duckham's H.B.B. Grease.

