

# LUCAS

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## EQUIPMENT

### WORKSHOP INSTRUCTIONS

#### FLYWHEEL MAGNETOS

#### MODELS 13F2, 14F2 and 11AF



JOSEPH LUCAS LTD · BIRMINGHAM 19 · ENGLAND

**LUCAS WORKSHOP INSTRUCTIONS****FLYWHEEL MAGNETOS**

MODELS 13F2, 14F2 and 11AF

**1. GENERAL****(a) MODEL 13F2**

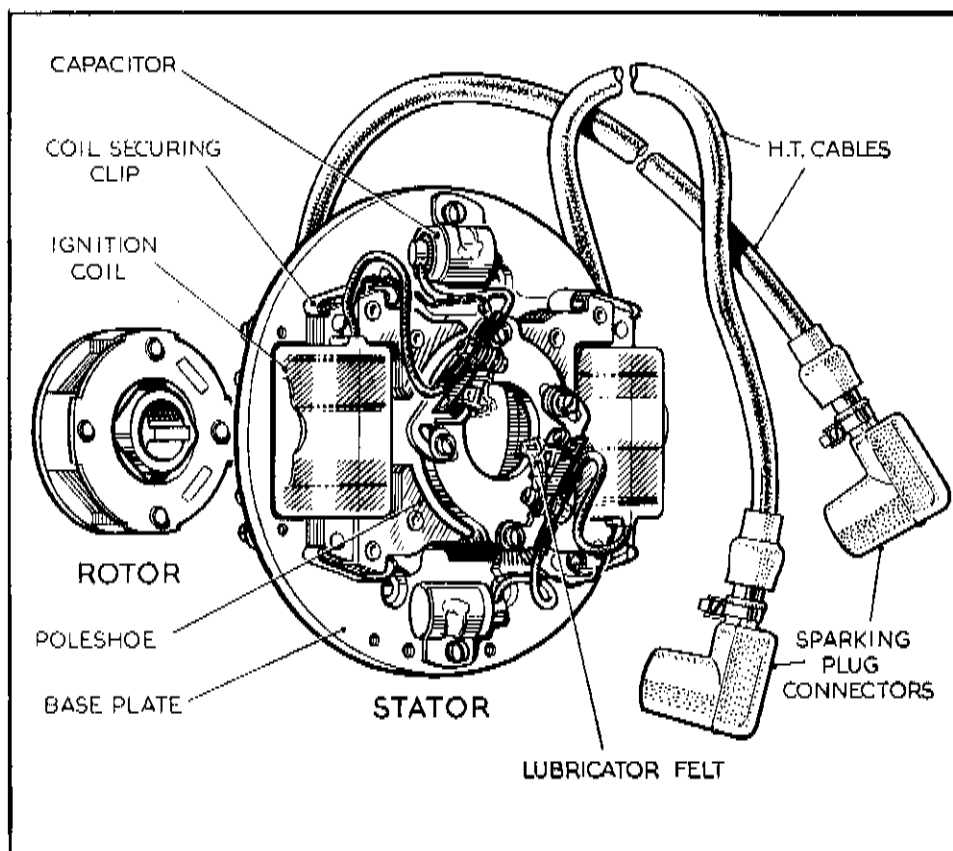
This flywheel magneto, shown in Fig. 1, consists of two main components, the stator and the rotor. The stator baseplate is an aluminium die-casting, and carries two pairs of pole shoe lamination stacks, each pair having an encapsulated coil with a laminated bar type core clipped across them. A capacitor and contact breaker assembly are associated with each coil. The rotor is formed by riveting an assembly of magnets and laminated pole pieces between two non-magnetic end faces, one of which is an aluminium die-casting incorporating

a keyed boss for location with the engine shaft. A sintered iron, oil-impregnated cam, to operate the contact breakers, is carried on the engine shaft. The actual flywheel is provided by the engine manufacturer and is fitted separately to the engine shaft.

**(b) MODEL 14F2**

This flywheel magneto, shown in Fig. 2, is similar to model 13F2, except for the method of fitting the rotor to the engine. In this unit, the rotor casting is designed for riveting to the engine flywheel.

In some applications, where an electric starter is fitted, the flywheel carries a ring gear.

**Fig. 1**

Flywheel magneto with stator withdrawn, model 13F2



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## (c) MODEL 11AF

Model 11AF flywheel magneto, shown in Fig. 3, operates on the energy transfer system in conjunction with two energy transfer ignition coils, model 3ET.

The stator comprises a steel baseplate carrying two contact breaker assemblies and two three-limbed lamination stacks, each having a feeder coil on its centre limb. The baseplate is arranged for spigot locating to the engine crankcase and the contact breakers are actuated by a single-lobe cam carried on the flywheel centre boss.

The flywheel is of unit construction—the magnets, laminated pole pieces and centre hub being incorporated in the aluminium die-casting. A circular cup is cast integral with the flywheel to accommodate a recoil starter device. An annular groove around the inner face of the flywheel rim forms a dust and flame trap, in conjunction with a complementary lip on the customer's mounting plate. An inspection window, with cover plate, provides access for contact breaker adjustment.

## (d) MODEL 3ET IGNITION COILS

The energy transfer ignition coils are encapsulated in polyester resin to give protection against excessive humidity. Each coil and its core is secured by two spring clips to a lamination pack which completes the iron circuit.

## (e) INSTALLATION NOTE (all models)

It is important, prior to installing the equipment on the engine, that the two screws in each contact breaker baseplate assembly are first slackened, and the contact breaker assemblies moved away from each other to the full extent of their adjustment traverse. This will prevent the possibility of their being distorted due to fouling with the cam during fitting. After securing the stator in position, rotate the engine until the cam is in a position to open each contact breaker fully in turn, then set the gap between the contacts to the correct measurement, as given in paragraph 3(a), and secure by means of the screws in the baseplate.

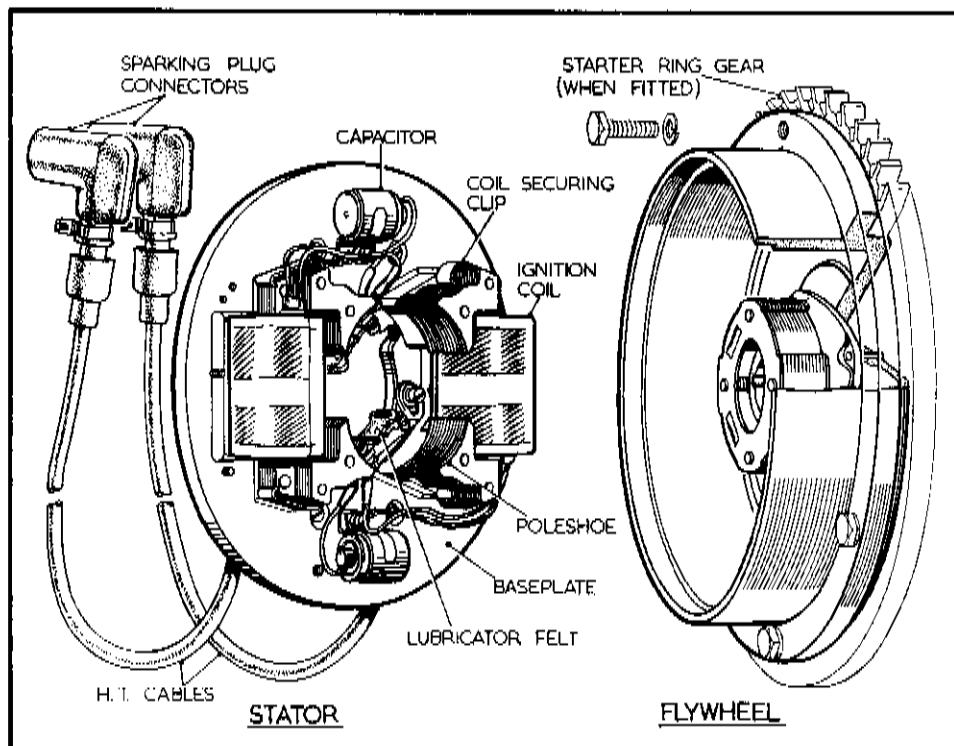


Fig. 2

Flywheel magneto with stator withdrawn, model 14F2



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## 2. ROUTINE MAINTENANCE

### Models 13F2 and 14F2

#### (a) AFTER FIRST 5 RUNNING HOURS

- (i) After the first 5 running hours of new flywheel magnetos and replacement contact breaker sets, most of the bedding-in of the contact breaker heel occurs. Contact breakers should, therefore, be checked at this time, as described in paragraph 2 (b) (ii), and reset as required.
- (b) EVERY 50 RUNNING HOURS OR, FOR MARINE APPLICATIONS, AT THE END OF EACH SEASON, WHICHEVER IS THE SHORTER
  - (i) Clean all accessible parts using clean, fluffless, petrol-moistened cloth.
  - (ii) Check the contact breaker and, if necessary, clean the contacts and reset the gap to 0.017"—0.019" (0.43—0.48 mm.). Removal of the flywheel is essential with both models. Trim rough or badly pitted contacts with a fine carborundum stone,

silicon carbide paper or emery cloth, as shown in Fig. 4. This may be achieved more easily if the contact breaker assembly is dismantled, as shown in Fig. 5. Remove all dust with a petrol-moistened cloth.

- (iii) Examine the high tension cables and replace as required. To remove the existing cable, slacken the screw through the cable support at the entry into the coil 'snout'. Grasp the cable firmly and pull straight out. Before fitting a replacement cable, a smear of a non-setting sealing compound such as 3M grade EC852 or Bendix type 47, should be inserted into the snout of the coil. Insert the cable and push home before retightening the screw. A continuity test between the free end of the high tension cable and earth should give a reading of approximately 5,000 ohms.

#### (c) FOR MARINE APPLICATIONS, AT THE COMMENCEMENT OF EACH SEASON

It is recommended that the contacts be cleaned in accordance with paragraph 2 (b) (ii).

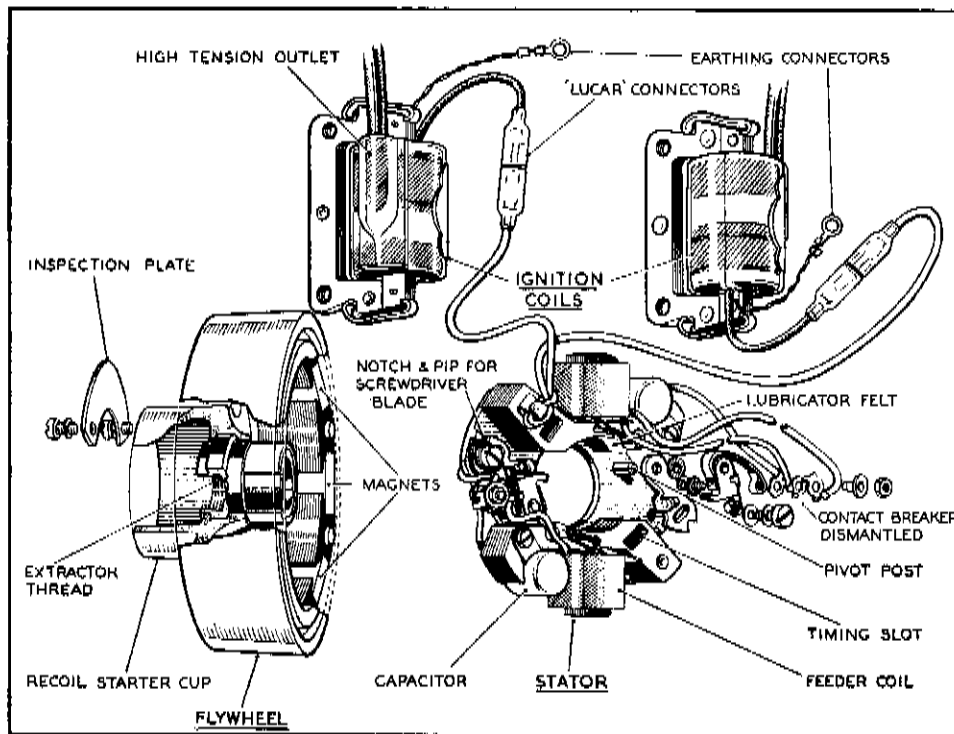


Fig. 3  
Flywheel magneto with stator withdrawn, model 11AF,  
and associated ignition coils, model 3ET



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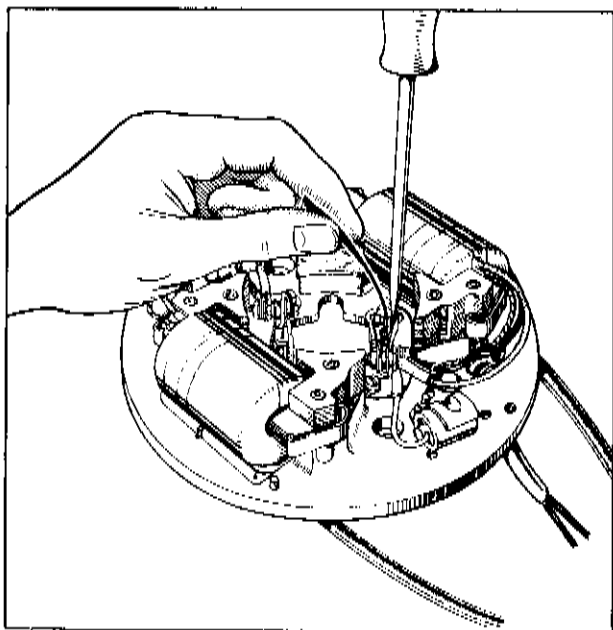


Fig. 4. Cleaning contacts, models 13F2 and 14F2

- (d) EVERY 200 RUNNING HOURS OR, FOR MARINE APPLICATIONS, AT THE END OF EVERY SECOND SEASON, WHICHEVER IS THE SHORTER

The sintered iron cam should be removed and re-impregnated. This involves removal of the flywheel and stator on both models.

The cam should be submerged in SAE 40 medium viscosity engine oil for 24 hours, after which all surplus oil should be removed and the cam refitted.

The stator should be replaced in accordance with the installation procedure of paragraph 1 (e).

### Model 11AF and Associated 3ET Energy Transfer Ignition Coils

- (e) AFTER FIRST 20 RUNNING HOURS

- (i) During the first 20 running hours of new flywheel magnetos and replacement contact breaker sets, most of the bedding-in of the contact breaker heel occurs. The two contact breakers should, therefore, be checked and, if necessary, reset to 0.014"–0.016" at the points of maximum opening. Access to the interior can be gained after removal of the inspection plate from the flywheel.

- (f) EVERY 200 RUNNING HOURS

- (i) Clean all accessible parts using a clean, fluffless, petrol-moistened cloth.
- (ii) Check contact breaker settings. If necessary, trim rough or badly pitted contacts with a fine car-

borundum stone, silicon carbide paper or emery cloth, afterwards removing all dust with a petrol-moistened cloth.

Cleaning of the contacts is more easily effected if the contact breakers are dismantled. In Fig. 3, the right-hand contact breaker is shown dismantled to facilitate correct reassembly.

If, for any reason, the stator portion is removed from the engine, first mark the position of the securing bolts in the timing slots to facilitate subsequent refitting.

Before reassembling a contact breaker, smear the pivot post with Ragosine molybdenised non-creep oil, or equivalent. If non-creep oil is not available, Mobilgrease No. 2 or clean engine oil may be used.

- (iii) Smear the cam with Ragosine Listate grease, Mobilgrease No. 2 or clean engine oil—taking care to avoid contaminating the contacts.

- (g) EVERY 500 RUNNING HOURS

- (i) Renew the cam lubricator felt which, in production, is impregnated with Ragosine Listate grease.
- (ii) Examine the high tension cables and renew as required.

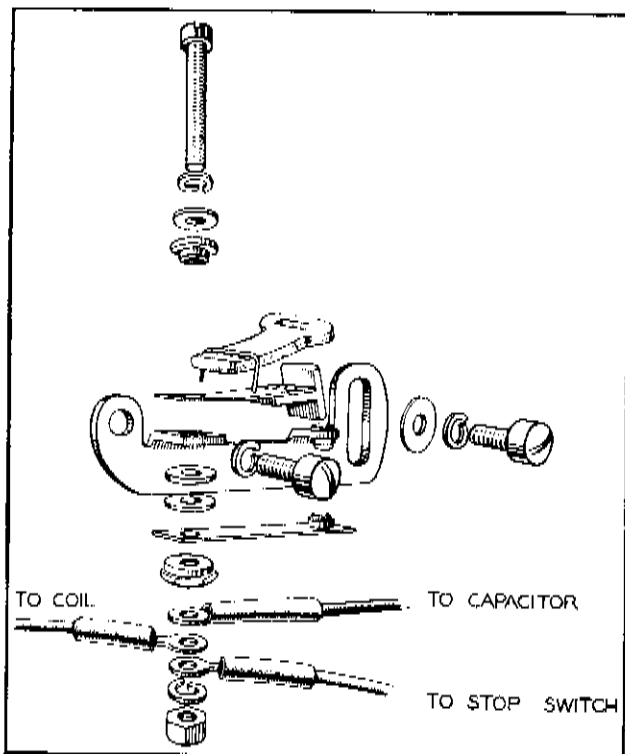


Fig. 5  
Dismantled view of contact breaker, models 13F2 and 14F2



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## 3. DESIGN DATA

Model	13F2 and 14F2	11AF
(a) Contact breaker gap ... ..	0.017"—0.019" (0.43—0.48 mm.)	0.014"—0.016" (0.35—0.40 mm.)
(b) Contact breaker spring tension measured at the end of the contact carrying blade ... ..	13—24 oz. (368—680 g.)	18—24 oz. (511—680 g.)
(c) Capacitance of capacitor ... ..	0.18—0.25 mfd.	0.18—0.23 mfd.
(d) Number of magnets in rotor ...	2	3
(e) Rotor extractor thread ... ..	—	1 $\frac{1}{8}$ " dia. x 16 t.p.i. (Whitworth form)
(f) Identification of model 3ET ignition coils ... ..	—	<p>Left-hand coil has letter 'L' moulded after name 'LUCAS' and has <b>black</b> sleeved primary winding feed wire.</p> <p>Right-hand coil has letter 'R' moulded after name 'LUCAS' and has <b>red</b> sleeved primary winding feed wire.</p>
(g) Ignition coil continuity check ...	When disconnected from fly-wheel magneto and associated sparking plug, electrical continuity must be obtained between end of sparking plug cable and each end of primary winding.	When disconnected from fly-wheel magneto and associated sparking plug, electrical continuity must be obtained between end of sparking plug cable and each end of primary winding.
(h) Coil resistance values :		
(i) Feeder coil (with associated contact breaker open) ...	—	0.85-ohm (approx.)
(ii) Primary winding of ignition coil ... ..	0.6-ohm (approx.)	0.5-ohm (approx.)
(iii) Secondary winding of ignition coil ... ..	5,000 ohms (approx.)	5,750 ohms (approx.)

## 4. SERVICING

### (a) TRACING CAUSE OF IRREGULAR SPARKING (13F2, 14F2, 11AF)

- (i) Examine the high tension cable(s) and check the sparking plug(s).
- (ii) Check that the rotor and cam (13F2 and 14F2 only) are firmly keyed to and not misaligned with the drive shaft—removing the rotor as necessary.

**Note:** When removing the flywheel of model 14F2, check that the rotor is rigidly secured to the flywheel inner face.

- (iii) Check the capacitor(s) by substitution.

### (b) COIL TESTING

- (i) The following equipment is required for the performance testing of flywheel magneto models 13F2, 14F2 and 11AF.  
Two 3-point spark gaps (see Fig. 6).  
Either, two rotary 3-point spark gaps, or one rotary 3-point and one annular 3-point spark gap.
- (ii) High Speed Test  
Set the rotary spark gaps to 8 kv. for models 13F2 and 14F2, or to 10 kv. for model 11AF.  
Connect the high tension cables from the ignition coils to the two rotary spark gaps, or, if two rotary spark gaps are not available, connect one h.t. cable to a rotary spark gap and the other cable to an annular spark gap.



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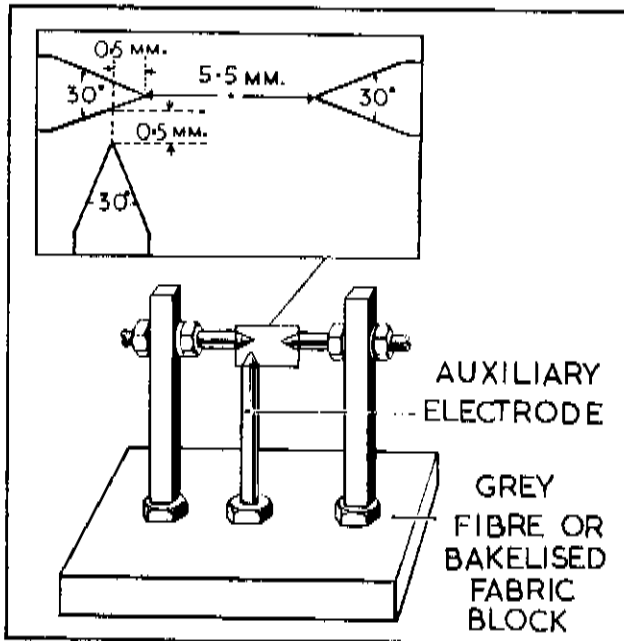


Fig. 6

Details of three-point spark gap for slow speed testing

Run the magneto at 5,000 r.p.m. and stabilise the magnetic system by short-circuiting the primary winding of one of the coils several times. Reduce the magneto speed to 500 r.p.m. (or to 1,000 r.p.m. for model 11AF). No missing must occur between 5,000 and 1,000 r.p.m. for models 13F2 and 14F2, or 5,000 and 500 r.p.m. for model 11AF.

If only one 3-point, rotary spark gap is available, stop the magneto and transpose the h.t. cables so that the second coil may be tested.

### (iii) Low Speed Test

Set the two 3-point spark gaps to 5.5 mm. and connect up the high tension cables, one to each gap. Run the magneto at 250 r.p.m. (or 300 r.p.m. for model 11AF). Not more than 1% missing must occur (5% for model 11AF).

### (c) COIL REPLACEMENT

The ignition coils on all three models are secured by means of spring clips (two per coil). To release a coil,

disconnect the h.t. and l.t. cables (and also the earth connections on model 11AF) and remove the spring clips.

When fitting a replacement coil on models 13F2 and 14F2, ensure that the stator lamination pack has not moved during the replacement operation. After securing the spring clips, check with a 0.002" (0.05 mm.) feeler gauge that all mating surfaces are correctly located. Before fitting a replacement ignition coil, model 3ET, check that its identification letter ('L' or 'R') and feed wire colour correspond with the original. See also paragraph 3 (f).

### (d) REMAGNETISATION

#### (i) Models 13F2 and 14F2

A 2-pole magnetiser is required as shown in Fig. 7. Note the position of the rotor keyway and the rotor face indentations relative to the polarity of the magnetising limbs.

#### (ii) Model 11AF

A special 8-pole magnetiser is required, and it is therefore recommended that these units be returned to the Works for remagnetisation.

### (e) TIMING

Magneto-to-engine timing must be carried out in accordance with the engine manufacturer's Instructions.

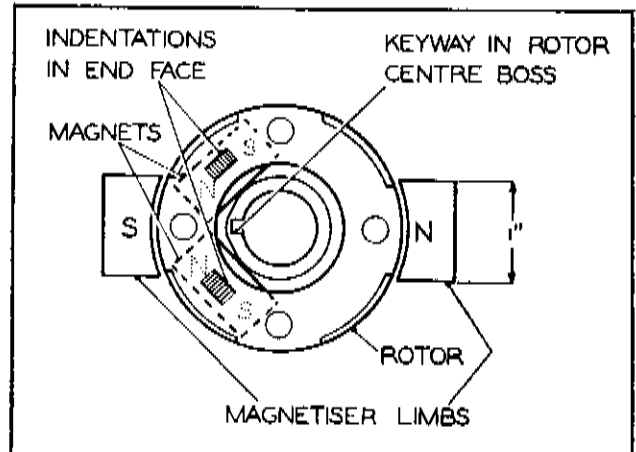


Fig. 7

Rotor remagnetisation, models 13F2 and 14F2  
(1" = 25.4 mm.)

