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LUCAS

Quality

EQUIPMENT

VOLUME 2

WORKSHOP INSTRUCTIONS

REMAGNETISATION OF MAGNETOS

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REMAGNETISATION OF LUCAS MAGNETOS

INTRODUCTION

Recent development in the manufacture of alloy steels for permanent magnets has been most marked. Magnetos now have about 26 times the energy possessed by an obsolete tungsten steel horseshoe magnet of the same size. Tungsten steel was the chief magnetic alloy used until about 1920. Since then other strongly magnetic steels have been made containing Chromium, Cobalt and Nickel and, more recently, magneto magnets have been made from compressed metal powders such as Alnico, Alcomax, Ticonal E, Ticonal G and Alcomax 2. These special high energy magnetic materials are more expensive than tungsten steel but their development has made possible the compact high efficiency magneto in use today.

Under normal conditions these small magnets will retain their power for very long periods but sometimes it is necessary to remagnetise them, particularly after an armature or rotor has been removed from a magneto for repair or examination.

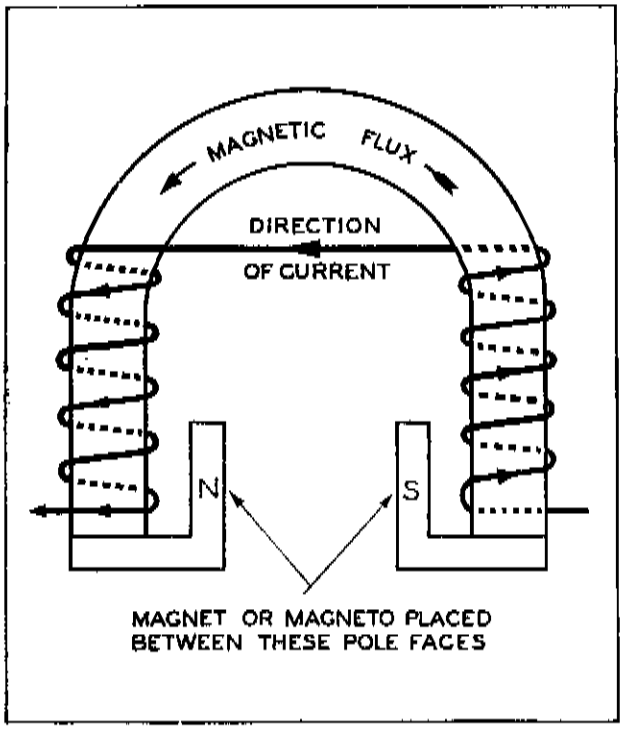

Fig. 1

Principle of an electro-magnetic magnetiser

Powerful electro-magnetic magnetising machines are used, classified as either vertical or pot type. The vertical type is the more common machine and is the type referred to in these notes, but the principle and method of use is similar in both cases. The magnet to be re-magnetised is placed on or in the magnetiser so that by bridging two pole faces or adjustable jaws it completes an iron circuit round which the magnetising flux can pass. The principle of all electro-magnetic magnetisers is shown symbolically in Fig. 1.

As the current is switched on, the coils on each limb produce a magnetic field. This field is concentrated within the limbs, since these form a common iron core. The intensity of such a field is a product of the current flowing (in amperes) and the number of turns of wire on the core. The recommended number of ampere-turns for a machine to remagnetise Lucas magnetos is stated on Page 2. The magnetising effect of one ampere flowing through one thousand turns of wire, is the same as one thousand amperes flowing round one turn, and either method may be used, whichever is the more convenient. In practice, since smaller currents are more easily switched, it is usual to employ many turns of fairly light-gauge wire and a small magnetising current.

Due to requirements of machine mounting and to the irregular shapes of some magnets, or of complete magnetos, the horse-shoe form of magnetiser shown in Fig. 1 is seldom used. A typical inverted horse-shoe or vertical magnetiser is shown in Fig. 2.

Should the magnet to be re-magnetised be of the horse-shoe form, as illustrated in Fig. 2, it will be a simple matter to obtain good magnetic contact with the ends of the magnet, and the flux path will then be through a closed iron circuit. However, with present day magnetos the magnet system is often cast integral with an aluminium or other non-magnetic alloy body. In such cases some sections of the flux path or circuit may, of necessity, be through air and aluminium; but by supplementing the iron circuit between the pole faces with adaptor pieces, and by building up with specially shaped soft iron blocks, these non-magnetic sections of the flux circuit can be kept to a minimum and the flux concentration within such a circuit can be greatly increased.

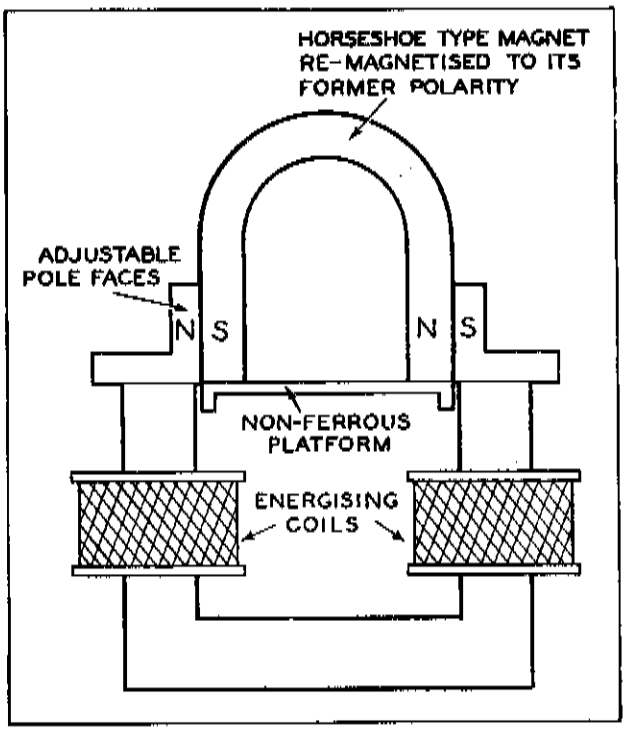

Fig. 2
Vertical type magnetiser

SPECIFICATION OF A TWO-POLE MAGNETISER

A two-pole magnetiser complying with the minimum specification detailed below would be capable of magnetising to saturation all commonly met with magnetos, including all Lucas models referred to in the following notes.

Core Material	Soft (preferably Swedish) Iron
Core Area	9 square inches
Recommended Core Winding	65,000-70,000 ampere-turns
Magneto Platform	Brass or other non-magnetic material
Minimum Distance Between Poles	Width of magneto body

NOTES ON THE REMAGNETISING OF VARIOUS LUCAS MAGNETOS AND INDUCTOR GENERATORS

MAGNETIC CIRCUIT

The recommended ampere-turns value given in the foregoing specification is intended only as a guide to cover the most difficult cases of re-magnetisation. In practice it may be found that saturation is possible at much lower values but this will depend on the efficiency of the external magnetic circuit. It is, therefore, most important when setting up magneto and blocks to keep all air gaps to a minimum, and to butt the various components so as to give maximum metal surface contact between them. The contacting faces of the blocks should be ground in order to increase this metal-to-metal contact. If these precautions are not observed the magnetiser may fail to saturate the magneto magnet.

VOLTAGE DROP

Cables connecting the magnetiser to the supply must be of sufficient section to carry the magnetising current without causing an excessive drop in volts. Likewise, any cable joints must be capable of passing the required current. To test for voltage-drop, a voltmeter reading must be obtained at the magnetiser terminals **with the magnetiser switched on.** The reading so obtained must not be less than the rated voltage of the magnetiser. If this is not the case, raise the supply voltage to compensate for line volt drop and for other losses which may occur.

IMPULSE STARTERS

Some magnetos are fitted with impulse starters. These must always be removed before such magnetos are remagnetised, otherwise the starter pawls will become polarised and may cease to function.

SPARK POLARITY

The voltage at which a spark will jump the plug gap is influenced by the temperature of the negative electrode — the hotter this electrode the lower will be the voltage required to cause a spark, and since it is desirable to keep the plug voltage as low as possible, in order to prevent undue electrical stressing of the windings, the central electrode, being hotter than the outer earthed electrodes, is normally made negative.

The sparks produced by a magneto designed for multi-cylinder engines are alternately positive and negative in polarity; that is to say, they jump alternately from the central electrode of the sparking plug to earth ('positive spark'). and from earth to the central electrode ('negative spark'). When remagnetising it is normally not necessary, therefore, to observe the original polarity of the magnet in a magneto for multi-cylinder engines. (An exception to this will be found in Model KVF. This magneto, designed for use with V-twin engines, produces two sparks, one of which is much retarded, and in order to obtain the most favourable slow speed performance, it is desirable to make the retarded spark of predetermined polarity.) On the other hand, the sparks produced by single-cylinder magnetos (and all ignition coils) are always of the same polarity - every spark can be a positive spark or a negative spark according to design — and the question arises regarding the most suitable polarity to adopt.

For the reason given a spark of negative polarity is chosen.

The production of a negative spark by a single-cylinder magneto is determined by the polarity of its magnet and rotation, together with the fitting of a contact breaker cam designed to interrupt a primary current of predetermined polarity.

CHECKING SPARK POLARITY BY INSPECTION

After a little practice, it is possible to check the spark polarity of a single-cylinder magneto by inspection. To make this check, connect the magneto high tension cable to a 3-point spark gap and run the machine at a fairly high speed. A glow will appear round the negative electrode. This glow, sometimes referred to as the 'feather' or 'ball' of the spark, should appear on the centre electrode of a sparking plug for correct polarity sparking.

REMAGNETISING

The influence of cam fitments on spark polarity with single-cylinder magnetos precludes remagnetising according to a rule-of-thumb based on polarity and rotation alone.

It is necessary therefore, before remagnetising, to check with a pocket compass the polarities of both magneto and magnetiser.

Note: When a compass needle is brought near to a magnet, that end of the needle which normally indicates North will be attracted to the South pole of the magnet.

When the polarities of magneto and magnetiser have been ascertained, place the magneto on the magnetiser so that unlike poles are adjacent, as shown in the accompanying sketches.

In the sketches, it will be noted that some models are shown with the driving end facing the viewer, whilst in others the contact breaker is shown. These are only sample illustrations and are not intended to show the only method of mounting any particular magneto model. A magneto must be mounted on the magnetiser so that unlike poles come together, according to the findings of the preceding compass check.

DISTRIBUTOR AND CONTACT BREAKER COVERS

It is important that distributor and contact breaker covers are in position during remagnetisation to prevent the possible entry of foreign particles.

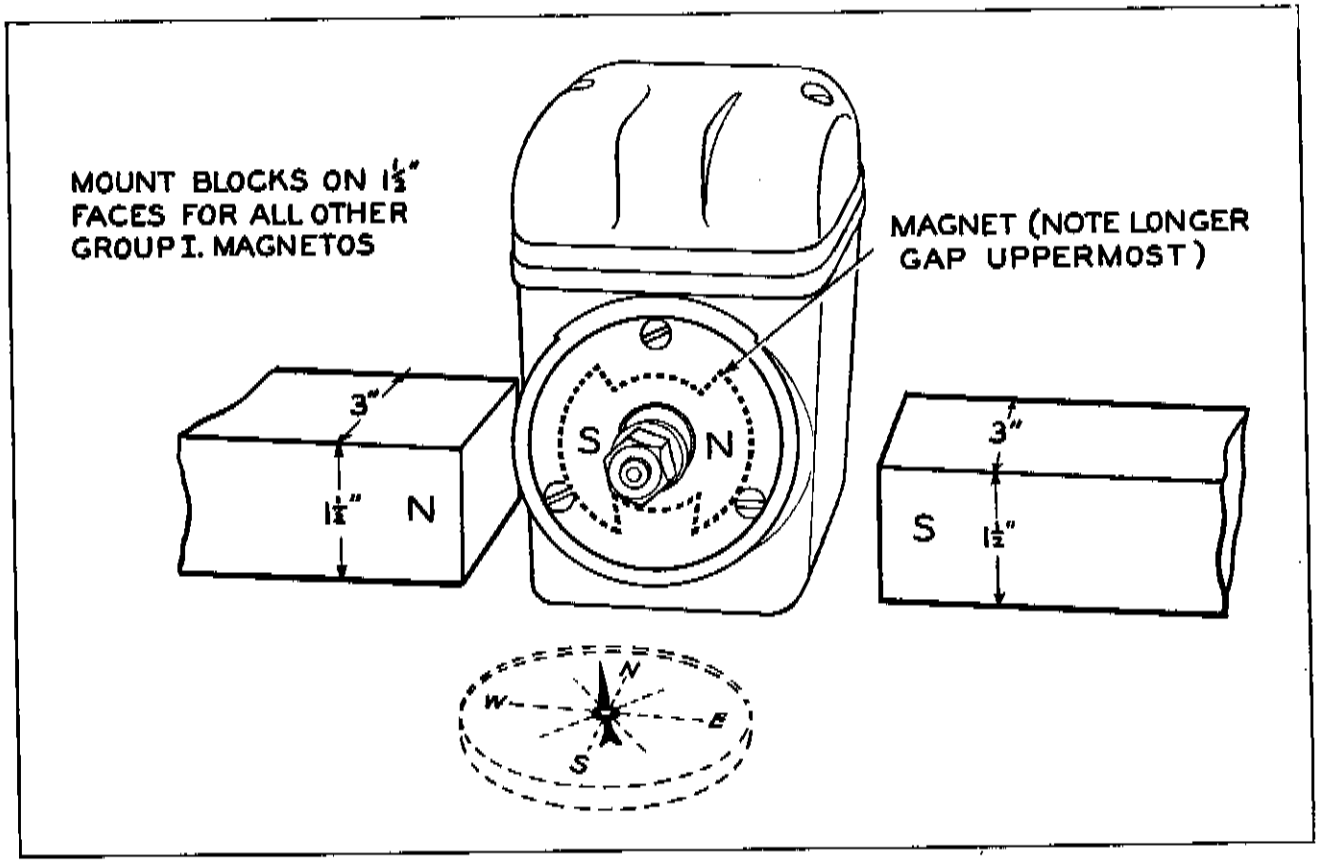

Fig. 3

Typical arrangement for remagnetising magnetos of Group 1 showing magneto model RS1 and blocks

APPLYING THE MAGNETISING CURRENT

After placing the magneto between the pole faces of the magnetiser and arranging blocks or jigs so that air gaps are kept to a minimum, the current should be intermittently applied. Five or six applications are recommended, each of one second's duration with two-second intervals. Further or longer applications will not increase magnetisation.

PROCEDURE FOR MAGNETISING

The following sections show which magneto models may be remagnetised using the same pair of blocks. The block dimensions are given, together with points to be watched with individual magneto models. The accompanying illustrations show one magneto from each group in position for remagnetising. They also show in broken line the approximate location, shape, and size of the magnet(s) within the magneto.

1. GROUP I

(a) Comprises:

(*i*) Rotating Armature Magnetos:—
Model GJ4 and others having horseshoe magnets;
Models N1, KN1, N2, KN2 etc.

(*ii*) Rotating Magnet Magnetos:—
Models RF2, RF2F, RF4, RF4F; Model RS1.

(b) Blocks:

The above ranges of magnetos require butting with two plain-ended, annealed mild steel blocks of 1½" x 3" section — their length will depend on the distance between the magnetiser poles. Note that, except for model RS1 magnetos, the blocks are mounted on the 1½" face.

(c) Procedure:

Remove the impluse starter, if fitted.

(*i*) Rotating Armature Magnetos:

Check polarity of the magneto and magnetiser, and place unlike poles adjacently.

Arrange blocks to give a good magnetic circuit. Operate the magnetiser.

(*ii*) Rotating Magnet Magneto: Single-Cylinder Model RS1.

Remove the moulded cover and turn the rotor shaft until the longer of the two gaps between the rotor poles is seen to be at the top.

DO NOT FORGET TO REMOVE IMPULSE STARTER (when fitted)

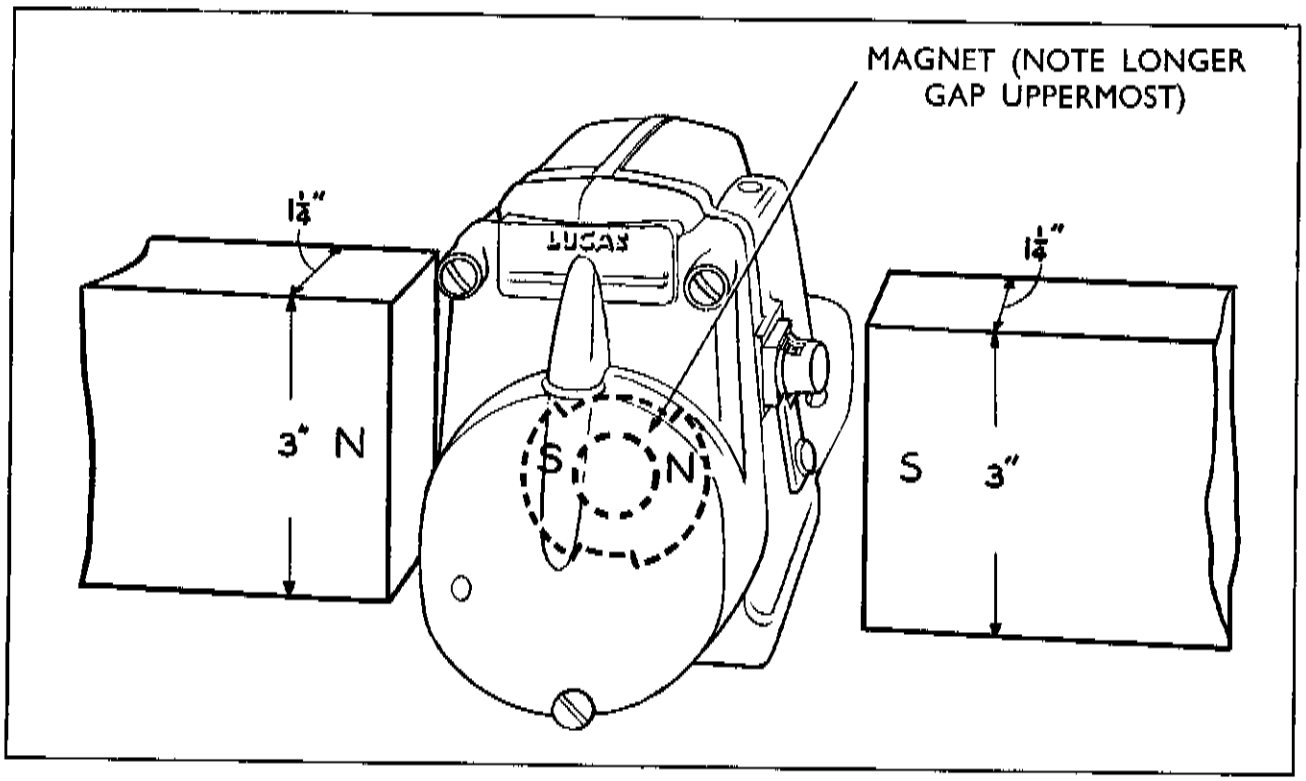

Fig. 4

Typical arrangement for remagnetising magnetos of Group II showing magneto model SR1 and blocks

Check polarity of the magneto and magnetiser. Place the magneto and blocks in position so that unlike poles of magneto and magnetiser are adjacent. Refit the moulded cover and operate the magnetiser.

(*iii*) Rotating Magnet Magnetos: Twin-and-Four-Cylinder Models RF2, RF2F, RF4, RF4F.

The rotor poles must be aligned with the stator pole pieces. To ensure this, turn the driving shaft so that its keyway is horizontal. Place the magneto and blocks in position so that unlike poles of magnet and magnetiser are adjacent. Operate the magnetiser, KEEPING THE ROTOR KEYWAY HORIZONTAL. N.B. Where large numbers of RF models are handled the use of a dummy impulse starter is recommended. This spare impulse starter should be marked so that by aligning the mark with the starter cover securing screw the correct rotor position for remagnetisation (i.e. rotor pole shoes aligned with stator pole pieces) is obtained automatically. The starter must be gripped to restrain the rotor from turning whilst re-magnetising.

2. GROUP II

(a) Comprises:

Rotating magnet magnetos:

Models SR1, SR2, SR4 (with or without prefix K or suffix F).

(b) Blocks:

1½" x 3" section, plain-ended.

(c) Procedure:

Remove the impulse starter, if fitted. If large numbers of model SR magnetos with impulse starters are handled, it is advisable to use a dummy impulse starter as described in the case of Group 1 opposite.

(*i*) Single-Cylinder Magnetos: Models KSR1, SR1, SR1F.

Remove the moulded cover and turn the rotor until the longer of the two gaps between its poles is seen to be at the top. Check polarity of the magneto and magnetiser. Place the magneto and blocks in position so that unlike poles of magneto and magnetiser are adjacent. Refit the moulded cover and operate the magnetiser.

(*ii*) Twin-and-Four Cylinder Magnetos: Models KSR2, SR2, SR2F, KSR4, SR4, SR4F.

Remove the moulded cover and turn the rotor until its poles are seen to be aligned with the stator pole pieces. Refit the moulded cover and place the magneto and blocks in position on the magnetiser platform. Operate the magnetiser.

3. GROUP III

(a) Comprises:

Rotating armature magnetos: models KIF, KVF, K2F.

(b) Blocks:

1½" x 3" section, with ends radiused as shown in Fig. 5.

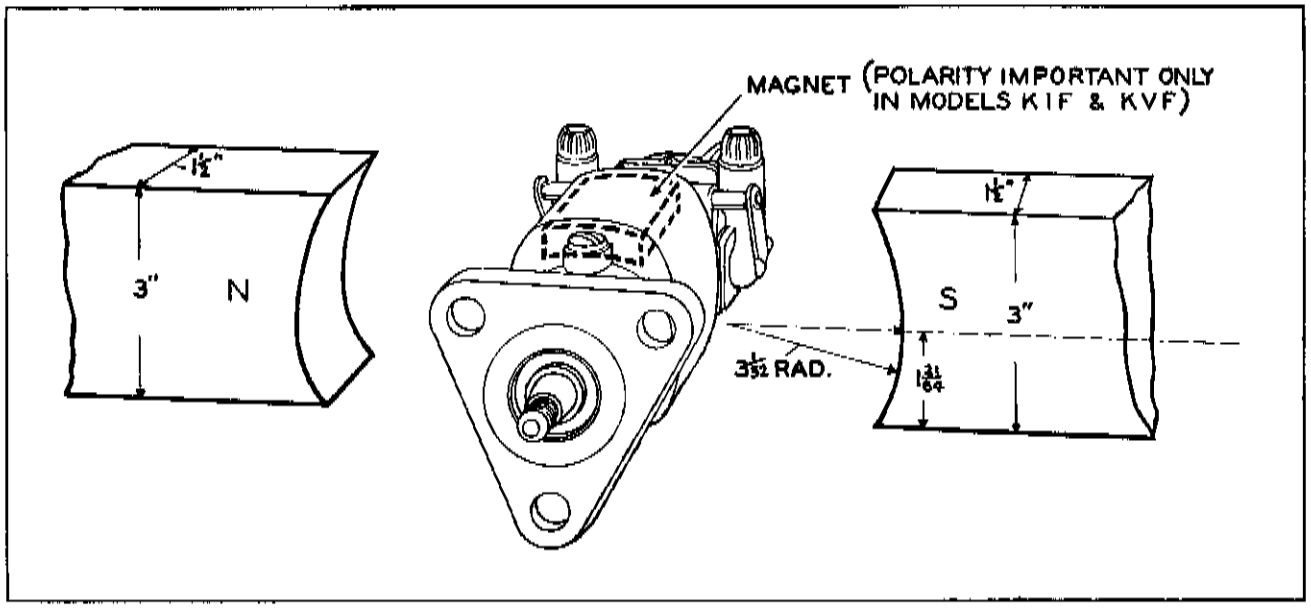

Fig. 5

Typical arrangement for remagnetising magnetos of Group III showing magneto model K2F with two special blocks

(c) Procedure:

(*i*) Single Cylinder Magneto, Model K1F.

Check polarity of the magneto and magnetiser and place the magneto in position so that unlike poles of magneto and magnetiser are adjacent. Arrange the blocks to give a good magnetic circuit and operate the magnetiser.

(*ii*) Twin Cylinder Magneto, Model KVF.

Check polarity of the magneto and magnetiser and place the magneto in position so that unlike poles of magneto and magnetiser are adjacent. Arrange the blocks to give a good magnetic circuit and operate the magnetiser.

(*iii*) Twin Cylinder Magneto, Model K2F.

No special rule need be observed since, with these machines, performance is unaffected by magnet polarity. Arrange the blocks to give a good magnetic circuit and operate the magnetiser.

4. GROUP IV

(a) Comprises:

Rotating armature magneto incorporated in Magdyno models MN2, MN1E, MO1, etc.

(b) Blocks:

Two blocks of $1\frac{1}{8}$" x 3" section. One must be convex-ended (to fill the space normally occupied by the dynamo yoke). The other must be plain-ended for contact with the magneto base.

For magnetos having dowel pins in the base a flat mild steel plate will be required, drilled to clear these dowel pins. This plate, or extra block, is shown in Fig. 6.

(c) Procedure:

Place the magneto on its side as shown in Fig. 6, then check polarity of the magneto and magnetiser. Place the magneto in position so that unlike poles of magneto and magnetiser are adjacent. Arrange the blocks to give a good magnetic circuit and operate the magnetiser.

5. GROUP V

(a) Comprises:

Rotating magnet 'vertical' magnetos:

Models 4VR, 6VR, (with or without suffix A or S); Model 8WRSF.

(b) Blocks:

These camshaft-speed 'vertical' magnetos require two blocks or plates about two inches square each having a circular recess to accommodate the bare shaft extension. The block or plate to be placed against the contact breaker assembly must have a central hole $\frac{7}{16}$" deep and $\frac{5}{8}$" dia. The block or plate to be placed against the drive end must have a central hole $\frac{3}{4}$" deep and $\frac{5}{16}$" dia.

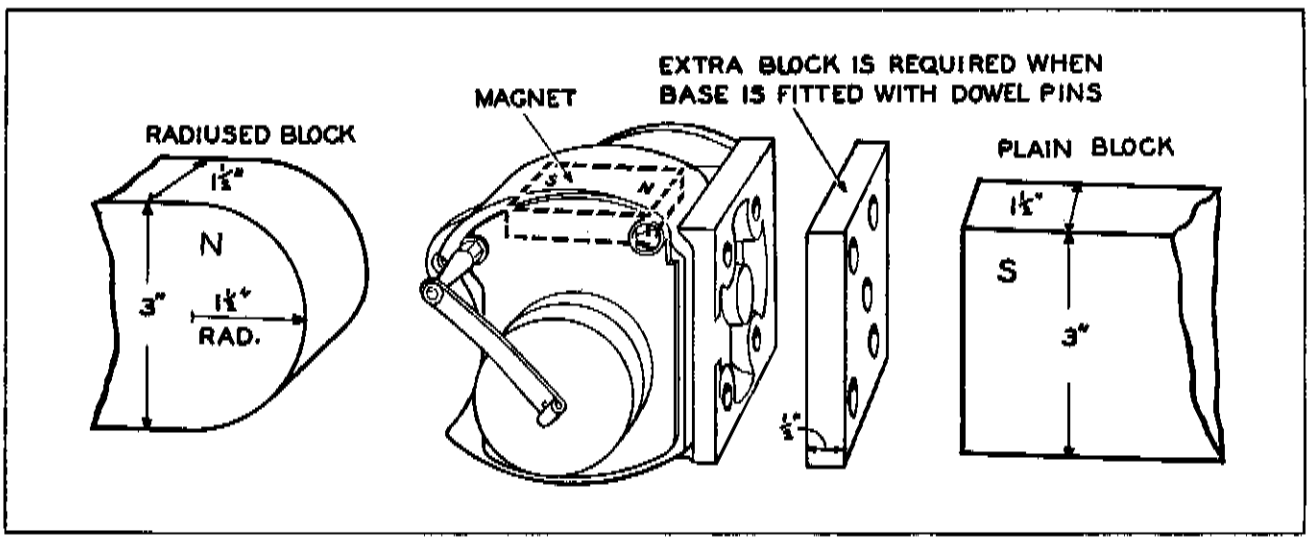

Fig. 6

Typical arrangement for remagnetising magnetos of Group IV showing magdyno model MO1 with dynamo removed

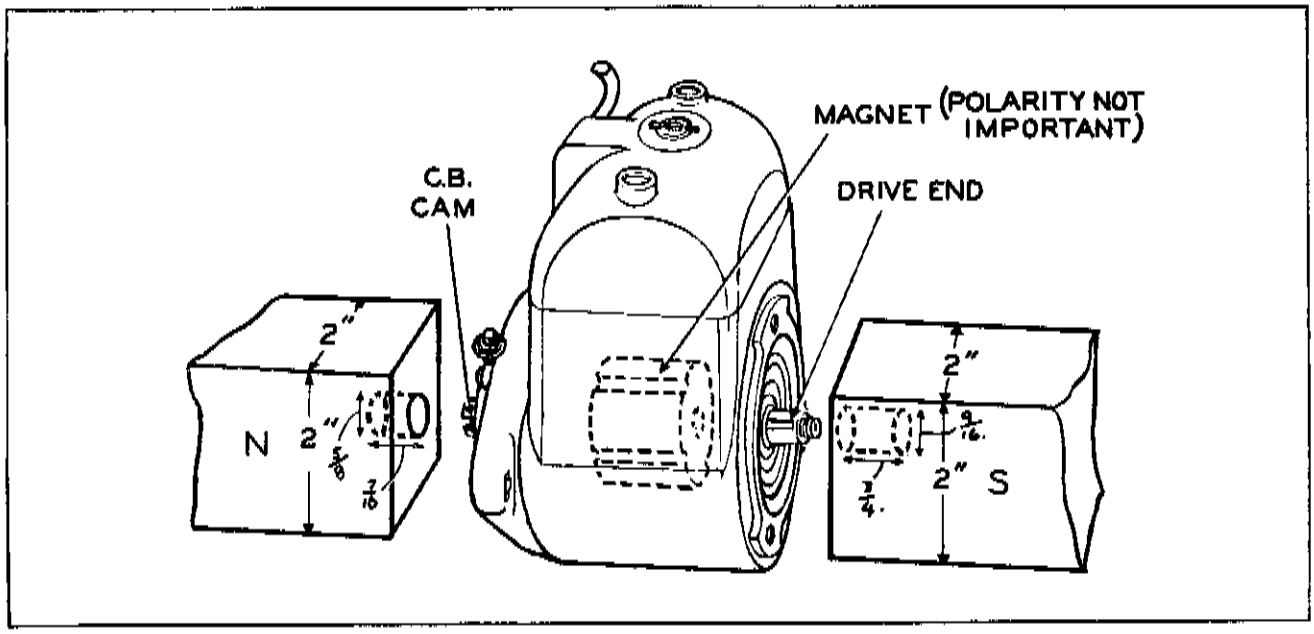

Fig. 7

Typical arrangement for remagnetising magnetos of Group V showing magneto model 4VR and blocks

(c) Procedure:

Before magnetising, the distributor cover and h.t. rotor arm must be removed from the upper end, and the lower part of magneto body containing impulse starter or auto advance mechanism from the other, (as Fig. 7). Place the magneto on the magnetiser platform and arrange the blocks as illustrated. Operate the magnetiser.

6. GROUP VI

Inductor Generator: Model IA45.

The rotor must not be removed from the stator, otherwise the magnets in the latter will become demagnetised.

The Inductor Generator calls for very special attention if remagnetisation should become necessary and, therefore, if the rotor is to be removed for any reason, it is strongly recommended that keepers be fitted across the magnets in the stator (see Fig. 8a.) thus preventing demagnetisation.

If it is necessary to carry out bench work, such as the replacement of stator coils, be sure to replace the rotor (or fit a dummy rotor) before taking the keepers off the stator. By this means, the need for remagnetisation will be avoided.

If these precautions are not observed, it will be necessary to return the complete unit to the Works, in order to restore its original performance.

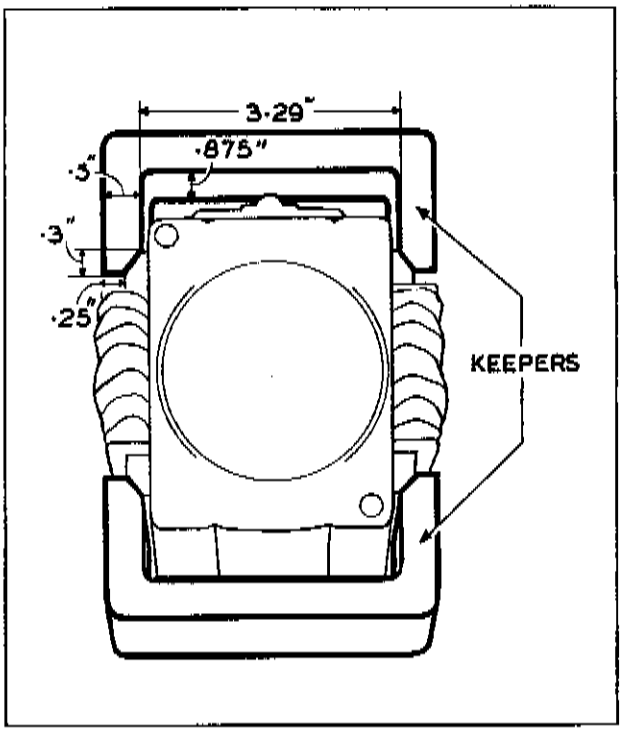

Fig. 8a

Showing keepers fitted to model IA45 inductor generator before removal of rotor

However, in an emergency, the magnets can be partially remagnetised with the magnetiser specified — but the output of the machine will not reach its original designed value.

Blocks:
The two blocks required for this 'first aid' treatment are of 3" x 1½" section, with the 1½" edges chamfered to locate with the laminated cores of the stator coils.

Procedure:
The stator contains two magnets which are to be separately remagnetised.

Leaving the rotor inside the stator, lay the generator flat on the magnetiser platform with the contact breaker assembly uppermost and the terminal board furthest away from the operator (see Fig. 8b). It will be seen that both magnets must be remagnetised in the same direction with respect to the stator. This calls for a two-stage operation. The arrangement for remagnetising the magnet furthest from the operator is shown is full line and labelled Position I; arrange the generator thus and operate the magnetiser. Then, to remagnetise the magnet nearest to the operator, arrange the generator as shown in broken line and labelled Position II. Operate the magnetiser.

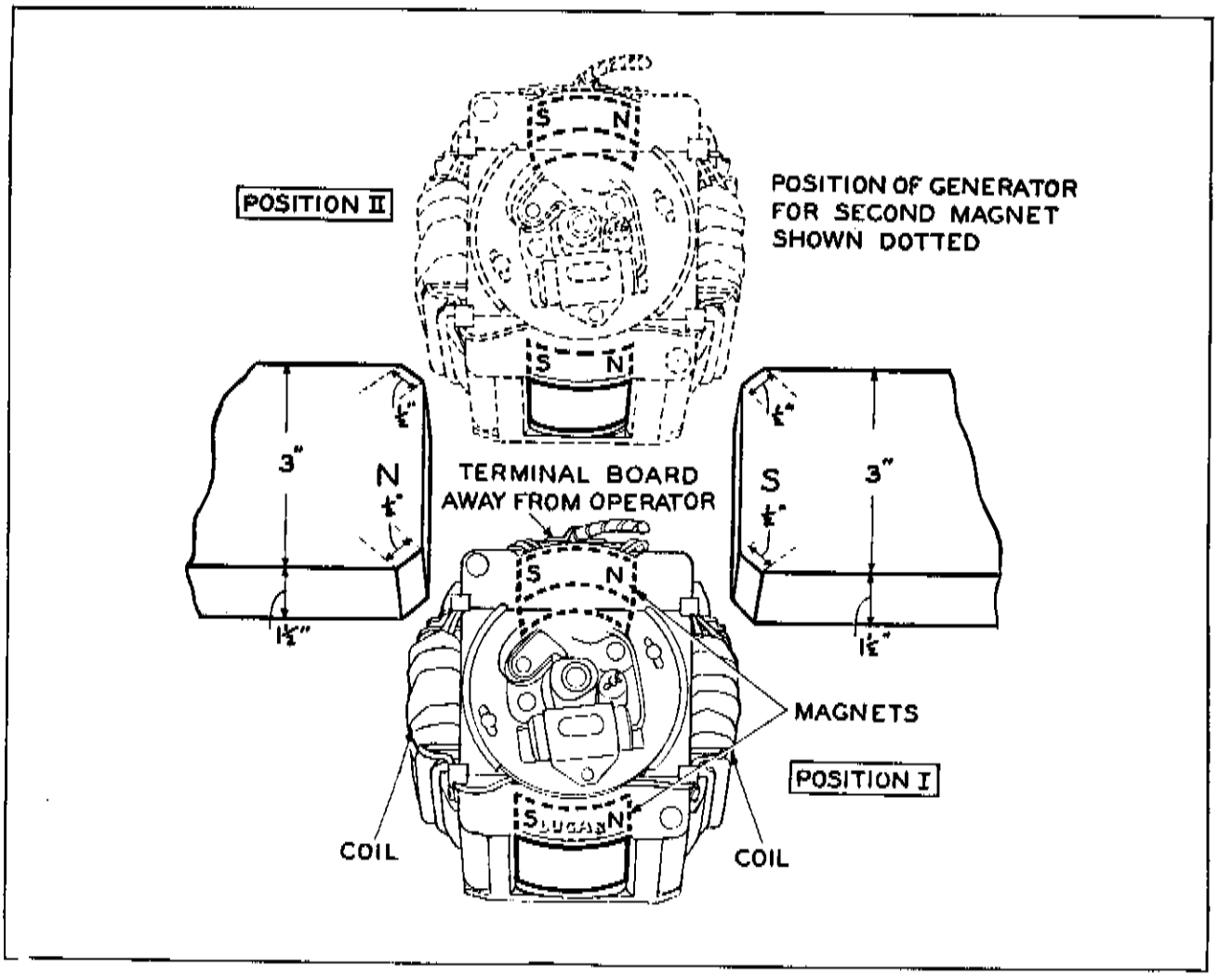

Fig. 8b

Typical arrangement for remagnetising model IA45 inductor generator

SECTION D-8
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LUCAS

Quality

EQUIPMENT

WORKSHOP INSTRUCTIONS

FLYWHEEL MAGNETOS

MODELS 13F2, 14F2 and 11AF

JOSEPH LUCAS LTD · BIRMINGHAM 19 · ENGLAND

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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 poleshoe 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.

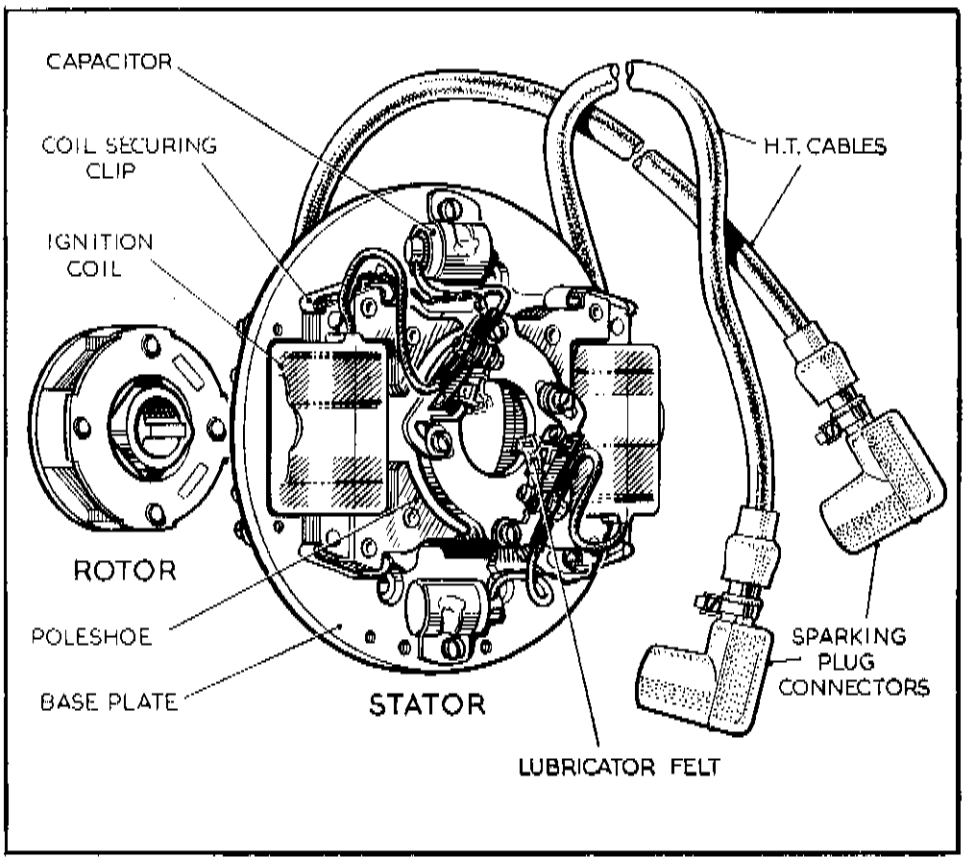

Fig. 1
Flywheel magneto with stator withdrawn, model 13F2

(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.

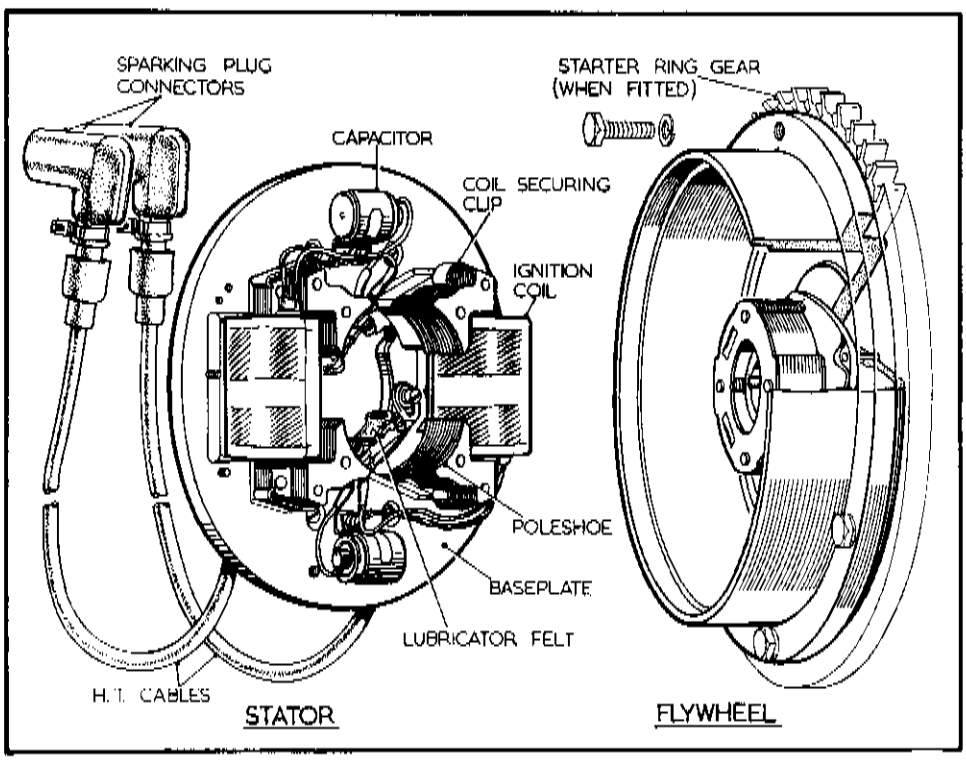

Fig. 2
Flywheel magneto with stator withdrawn, model 14F2

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).

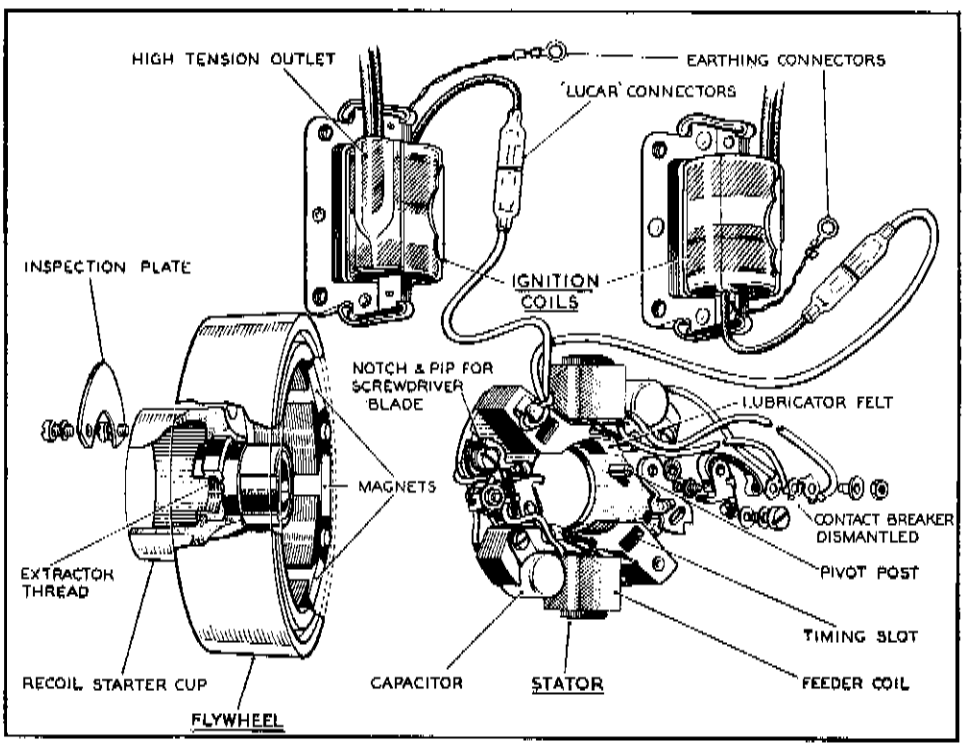

Fig. 3
Flywheel magneto with stator withdrawn, model 11AF, and associated ignition coils, model 3ET

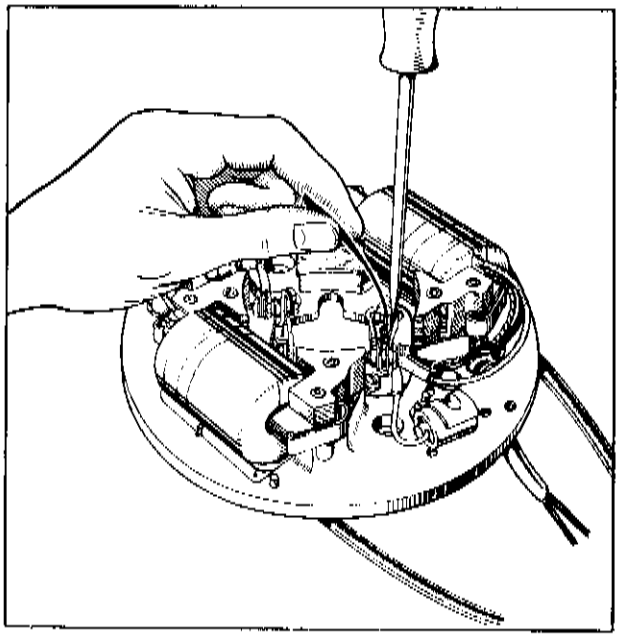

Fig. 4. Cleaning contacts, models 13F2 and 14F2

(*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 carborundum 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.

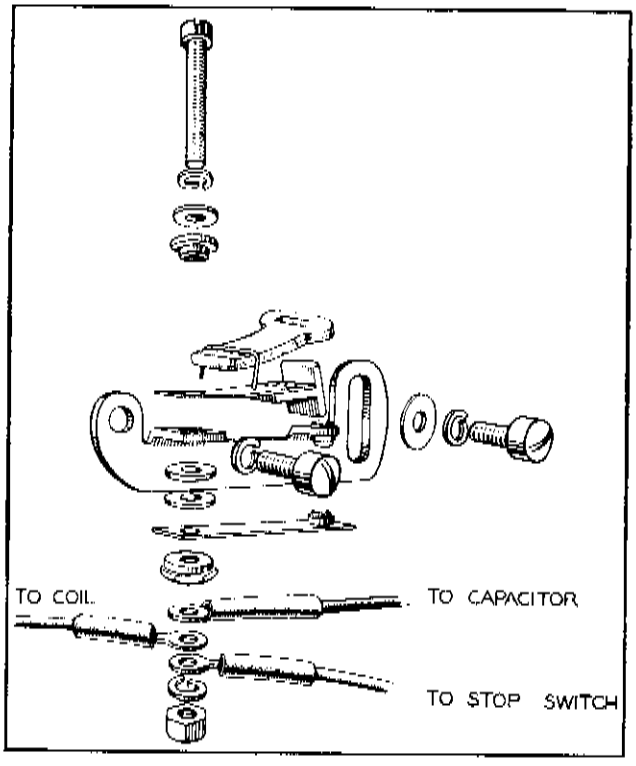

Fig. 5
Dismantled view of contact breaker, models 13F2 and 14F2

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	—	Left-hand coil has letter 'L' moulded after name 'LUCAS' and has **black** sleeved primary winding feed wire. Right-hand coil has letter 'R' moulded after name 'LUCAS' and has **red** sleeved primary winding feed wire.
(*g*)	Ignition coil continuity check ...	When disconnected from flywheel 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 flywheel 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.

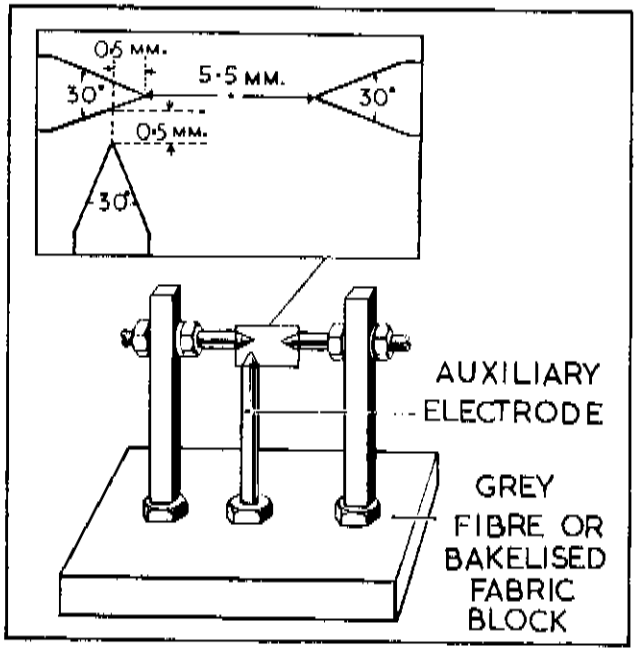

Fig. 6
Details of three-point spark gap for slow speed testing

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.

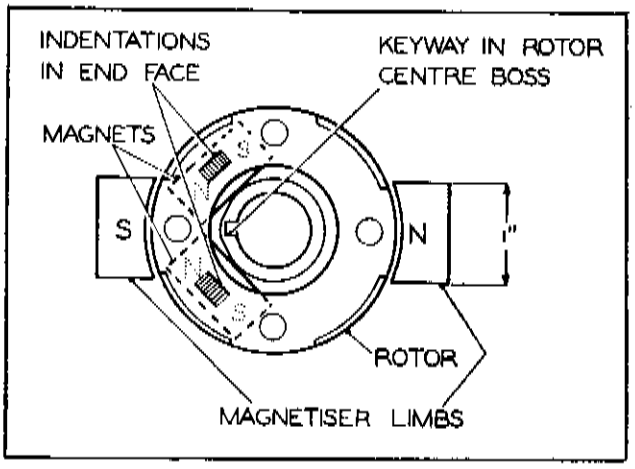

Fig. 7
Rotor remagnetisation, models 13F2 and 14F2
(1" = 25·4 mm.)