SECTION L-5 Part A
ISSUE 1, JANUARY 1953

LUCAS

Quality

EQUIPMENT

VOLUME 2

WORKSHOP INSTRUCTIONS

MOTOR CYCLE MAGNETOS

MODELS N1, KN1, K1F, K2F and KVF

JOSEPH LUCAS LTD · BIRMINGHAM 19 · ENGLAND

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MOTOR CYCLE MAGNETOS

MODELS N1, KN1, K1F, K2F and KVF

1. GENERAL

The motor cycle range of general service magnetos consists of two basic designs, namely, base-fixed models and flange-fixed models. All models have wound rotating armatures and high-energy magnets cast integral with the bodies. Brief descriptions of current models are tabulated below:—

N1	Base fixed magneto for use with single-cylinder engines. B.S.I. tapered driving spindle of centre-height 35 mm. Contact breaker actuated by a tappet and face type cam.
KN1	Similar to Model N1, but centre-height of driving spindle 45 mm.
K1F	Flange fixed magneto for use with single-cylinder engines. B.S.1 tapered driving spindle. Contact breaker actuated by ring type cam.
K2F	Similar to Model K1F, but designed for use with twin-cylinder engines, excepting V-twins.
KVF	Similar to Model K2V, but for use only with V-twin engines.

Small breathing holes are provided in the bodies of the above magnetos. These holes should not be allowed to become blocked.

Ignition timing is either fixed or variable. When provision for variable timing is made, one of two methods is adopted. These methods are Manual Control and Automatic (Centrifugal) Control. With the former method, the cam is moved relative to the armature, whereas in the latter method the armature is moved relative to the drive and for test purposes these magnetos are regarded as having fixed ignition timing.

With Manual Control, the position of the contact breaker cam can be varied by the rider by means of a Bowden cable connection to a control lever on the handle bars.

With Automatic Timing Control, the point of firing is fully retarded at start, and is advanced as the engine speed increases. This variation is effected by using a special driving gear carrying an inner plate fitted with two pins; a weight is pivoted on each pin, and each weight carries a pivoted toggle lever connected by a control spring to a pin at the pivoted end of the weight. An outer driving plate, secured by a central bolt to the magneto spindle, is provided with two pegs on its underside. These pegs locate with holes in the toggle levers.

When the magneto is stationary, the weights are in the closed position and the timing is retarded for starting. When the engine fires and the speed of the drive increases, centrifugal force acting on the weights overcomes the restraining influence of the spring. The weights, moving outwards, cause relative movement to take place between the driving gear and the magneto spindle, and in this way cause the timing to be advanced. The range of movement is limited by stops provided on the driving plate.

The springs selected are matched to suit individual engine models in order that this form of control will conform closely to the changing requirements of the engine.

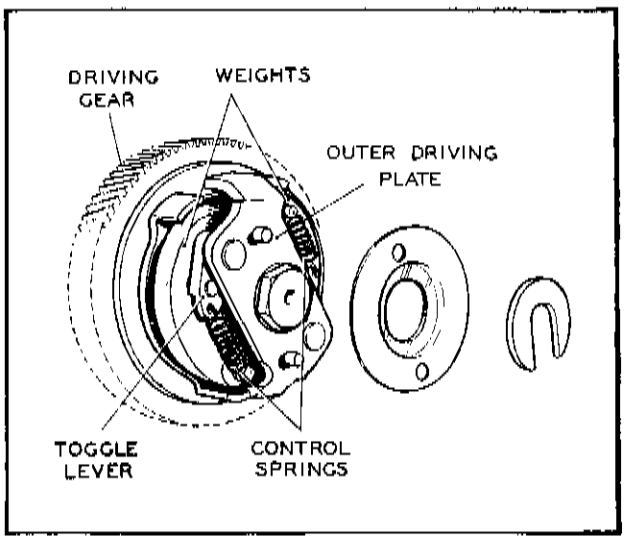

Fig. 1.
An automatic timing control mechanism

2. ROUTINE MAINTENANCE

(a) LUBRICATION. To be carried out every 3,000 miles.

(i) Magnetos with Ring Type Cam

Wipe the outside of the magneto to remove dirt or grease, and then take off the contact breaker cover. Unscrew the hexagon headed screw in the centre of the contact breaker and withdraw the contact breaker from its housing. Push aside the contact breaker arm retaining spring and prise the arm off its pivot. Wipe away any dirt or grease from the contacts with a petrol-moistened cloth.

If necessary, use a very fine carborundum stone to polish the contacts, re-cleaning afterwards with a

petrol-moistened cloth. Smear the pivot pin with a little Mobilgrease No. 2 before refitting the contact breaker arm.

Remove the cam ring, which is a sliding fit in its housing, and lightly smear inside and outside surfaces with Mobilgrease No. 2. Both removal and refitting of the cam can be made easier if the handlebar control lever is half retarded, thus taking the cam away from its stop pin. Apply one or two drops of thin machine oil to the felt cam lubricator in the housing. Refit the cam, taking care that the stop peg in the housing and the plunger of manual timing controls, engage with their respective slots.

Refit the contact breaker. This can be made easier if the contact breaker heel is away from the cam lobe; turn the engine until this is so. The key on the projecting part of the contact breaker base must engage with the keyway in the armature shaft. Refit the hexagon headed screw and tighten with care. It must not be slack, neither must undue force be used.

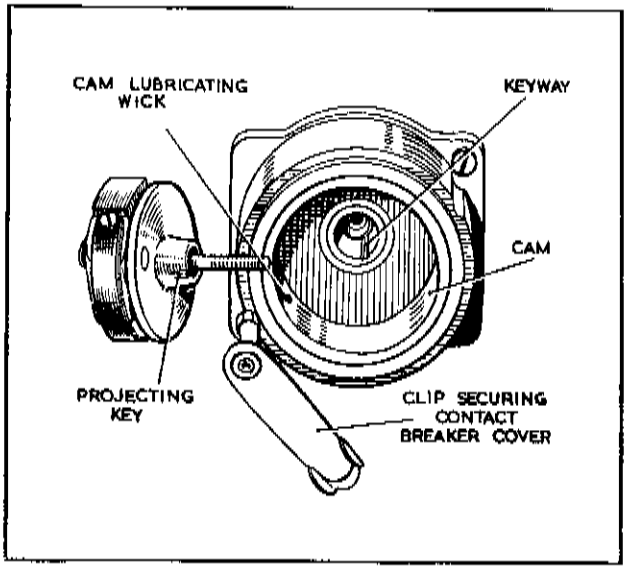

Fig. 2.
Contact breaker with ring type cam

(ii) Magnetos with Face Type Cam

The cam is lubricated by a wick located in the contact breaker casting. To reach the wick, remove the backing spring and spring arm by withdrawing the single securing screw. The wick is carried in a hollow hexagon-headed screw which can now be withdrawn. Take care not to lose the insulating washer or tube. Moisten the wick with a few drops of thin machine oil and refit the hollow screw.

At this stage, bend back the brass locking tag from the hexagon head of the contact breaker securing screw and withdraw the screw. The contact breaker can now be removed. Take out the tappet which actuates the spring arm and lightly smear it with thin machine oil. Extract the wire ring and remove the face cam. Lightly smear both sides of the cam with Mobilgrease No. 2.

Refit the cam, taking care that the stop peg in the housing and the plunger of the timing control engage with their respective slots. Note that a recess is provided for the 'eye' of the wire ring.
Check that the tappet moves freely in the contact breaker casting.

Thread the special tag washer on the contact breaker securing screw, and place the flat edge of the washer against the location provided for it in the contact breaker casting. Tighten the screw and lock it by bending the tag washer against one of the hexagon flats.

Wipe away any dirt or grease from the contacts with a petrol moistened cloth. If necessary, use a very fine carborundum stone to polish the contacts, re-cleaning afterwards with a petrol moistened cloth.

Refit the spring arm and backing spring. The bent portion of the spring arm must curve outwards. Place a lock washer over the fixing screw and tighten.

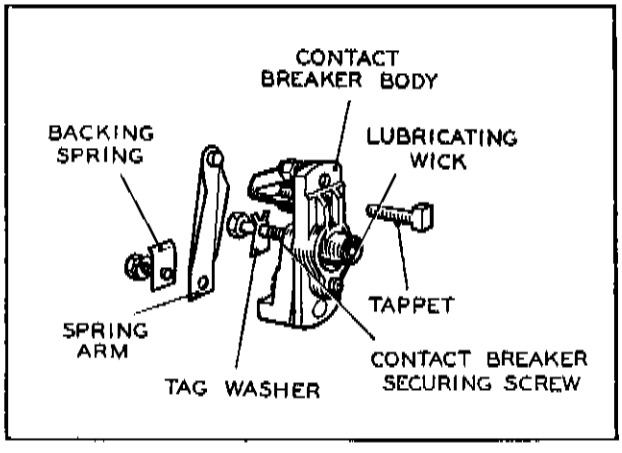

Fig. 3.
Contact breaker for use with face type cam

(iii) Bearings

The main bearings of the magnetos are packed with grease during manufacture and need no attention until a general overhaul is undertaken.

(b) ADJUSTMENTS. Check every 3,000 miles.

(i) Setting contact breaker gap

The contact breaker gap must be set to 0.012"-0.015" when the contacts are fully separated.
To adjust the gap, turn the engine until the contacts are fully opened. Slacken the locking nut of the

adjustable contact, and turn the contact by its hexagon head until a feeler gauge of appropriate thickness is a sliding fit in the gap. Tighten the lock nut and recheck the gap.

(ii) **Adjusting the Timing Control Cable**

When manual control of timing is fitted, any slackness in the cable can be taken up by sliding the waterproofing rubber shroud up the cable and turning the hexagon headed cable adjuster. After adjusting, return the rubber shroud to its original position over the adjuster and central barrel.

(c) CLEANING. To be carried out every 6,000 miles.

Check the contact breaker contacts and, if necessary, clean them as described in Para. 2 (a). Wipe the outside of the magneto to remove dirt or grease. Check the cable adjuster and control barrel (when fitted) for signs of water ingress.

Remove the high tension pick-up or pick-ups and polish with a soft dry cloth. The carbon brush must move freely in its holder and, if necessary, clean it with a petrol moistened cloth. Should the brush be worn to within $\frac{1}{8}$" of the shoulder it must be renewed.

Whilst the pick-up moulding is removed, clean the slip ring track and flanges by holding a soft dry cloth against them with a suitably shaped piece of wood while the engine is slowly turned.

The high tension cable or cables must be kept clean and dry.

(d) RENEWING HIGH TENSION CABLES

If, on inspection, the high tension cable shows signs of deterioration, it must be replaced, using 7 mm. rubber covered ignition cable.

To fit a new high tension cable, bare the end for about $\frac{3}{8}$", thread the knurled moulded nut over the cable, and thread the bared cable through the washer removed from the old cable.

Bend back the strands radially, and screw the nut into the pick-up moulding.

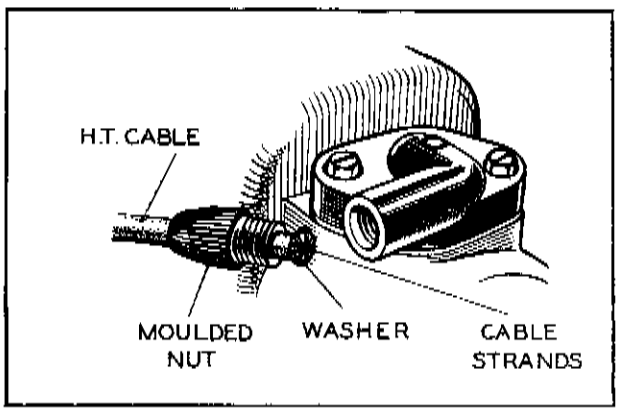

Fig. 4.
Renewing H.T. or ignition cut out switch cable

(e) RENEWING TIMING CONTROL CABLE

The Bowden timing control cable (when fitted) should be renewed if it becomes frayed, otherwise moisture may enter the contact breaker housing.

To do this, slip back the rubber shroud and, by means of the hexagon at the base, unscrew the control barrel. If the cable and the plunger to which it is attached are now pulled upwards, the cable nipple can be disengaged from the plunger slot.

Soften the solder and remove the nipple.

Thread the new length of cable through the rubber shroud, cable adjuster, control barrel, sealing washer and restoring spring. Solder the nipple to the end of the cable. Engage the nipple with the slot in the plunger and screw the control barrel into the body, ensuring that the sealing washer is correctly fitted between the barrel and the body.

Take up any slackness in the cable by means of the adjuster before refitting the rubber shroud in position.

(f) CONTACT BREAKER SPRINGS

Correct contact breaker spring pressures, measured at the contacts, are 18-24 oz. with ring type cams and 28-36 oz. with face type cams.

3. SERVICING

(a) TESTING MAGNETO IN POSITION ON ENGINE

To locate cause of misfiring or failure of ignition, check as follows:

(*i*) Remove the sparking plug or plugs from the engine. Hold the end of the H.T. cable about $\frac{1}{8}$" from the cylinder block and crank the engine. If strong and regular sparking is produced the fault lies with the sparking plug or plugs which must be cleaned and adjusted or renewed.

(*ii*) If no sparking is produced, examine the H.T. cable and, if necessary, renew it as described above in Para. 2 (d).

(*iii*) Very occasionally, the fault may be due to a cracked or punctured pick-up moulding. This type of fault is not easily detected by inspection, and a check should therefore be made by substitution.

(*iv*) If an ignition cut out switch is fitted, disconnect the cable at the magneto and retest. If the magneto now functions normally the fault is in either the cable or the cut out switch. Correct by replacement.

(*v*) If the magneto has recently been replaced or removed, it may be incorrectly timed. Refer to the engine makers' instructions, and check.

(*vi*) Check the contact breaker for cleanliness and correct contact setting as described under Maintenance.

If the cause of faulty operation cannot be traced from the foregoing checks, the cause may be an internal defect in the magneto. The magneto should therefore be removed from the engine for dismantling.

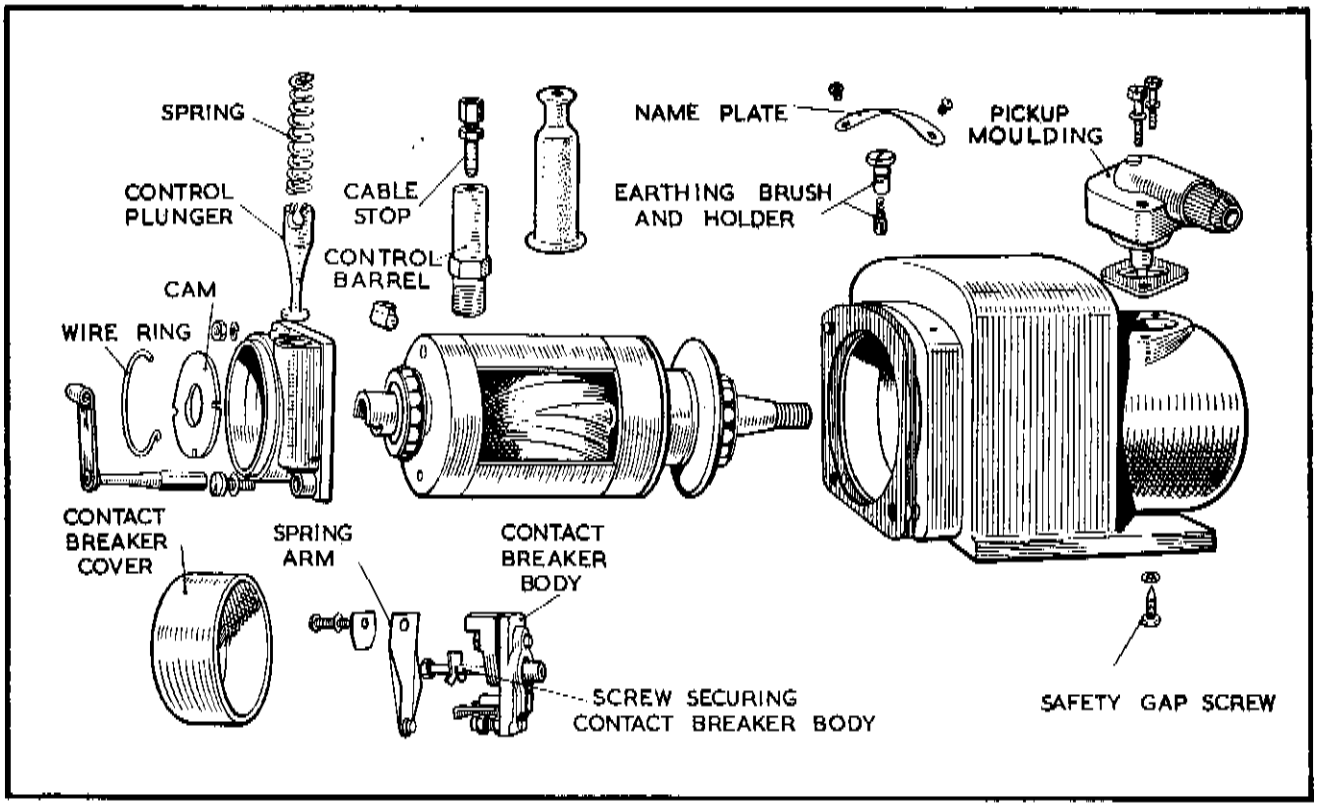

Fig. 5.
Typical base fixed magneto, dismantled

(*b*) DISMANTLING

Important:

The following dismantling, testing and reassembly procedures must be carried out while **working at a clean bench.**

(*i*) Remove the earthing brush and (when fitted) the safety gap screw or screws. Failure to remove these parts will cause damage to the armature, when the latter is withdrawn from the magneto body. The earthing brush is under the nameplate at the contact breaker end of base-fixed magnetos, and near the flange at the driving end of flange-fixed magnetos.

A safety gap screw (when fitted) is recessed in the base at the driving end of single-cylinder base-fixed magnetos — a second earthing screw being fitted opposite to the first, in the case of twin-cylinder models. The safety gap screw in single-cylinder flange-fixed magnetos is fitted in the underside at the contact breaker end — a second screw being fitted in the upper side, in the case of twin-cylinder models.

(*ii*) Remove the H.T. pick-up moulding or mouldings, taking care to retain the gasket for use when reassembling.

(*iii*) Remove the contact breaker and cam as described in Para. 2 (a).

(*iv*) If manual ignition timing control is fitted, remove the rubber shroud, cable, cable adjuster, control barrel, sealing washer, plunger and restoring spring as described in Para. 2 (e).

(*v*) Take out the screws securing the contact breaker housing to the magneto body and unscrew the pillar carrying the cover retaining spring. The contact breaker housing is now free to be withdrawn from the magneto body, but care must be taken to retain the sealing gasket and shims for use when reassembling.

(*vi*) Withdraw the armature from the magneto body. The high-energy magnet in the latter does not need a keeper across it; although a very small amount of energy is lost at the first removal of the armature, subsequent removals do not affect it.

Do not place the magneto body or armature near to iron filings, always work on a clean bench.

(*vii*) Examine the armature for signs of damage. A faulty winding or condenser can only be detected by the tests given later.

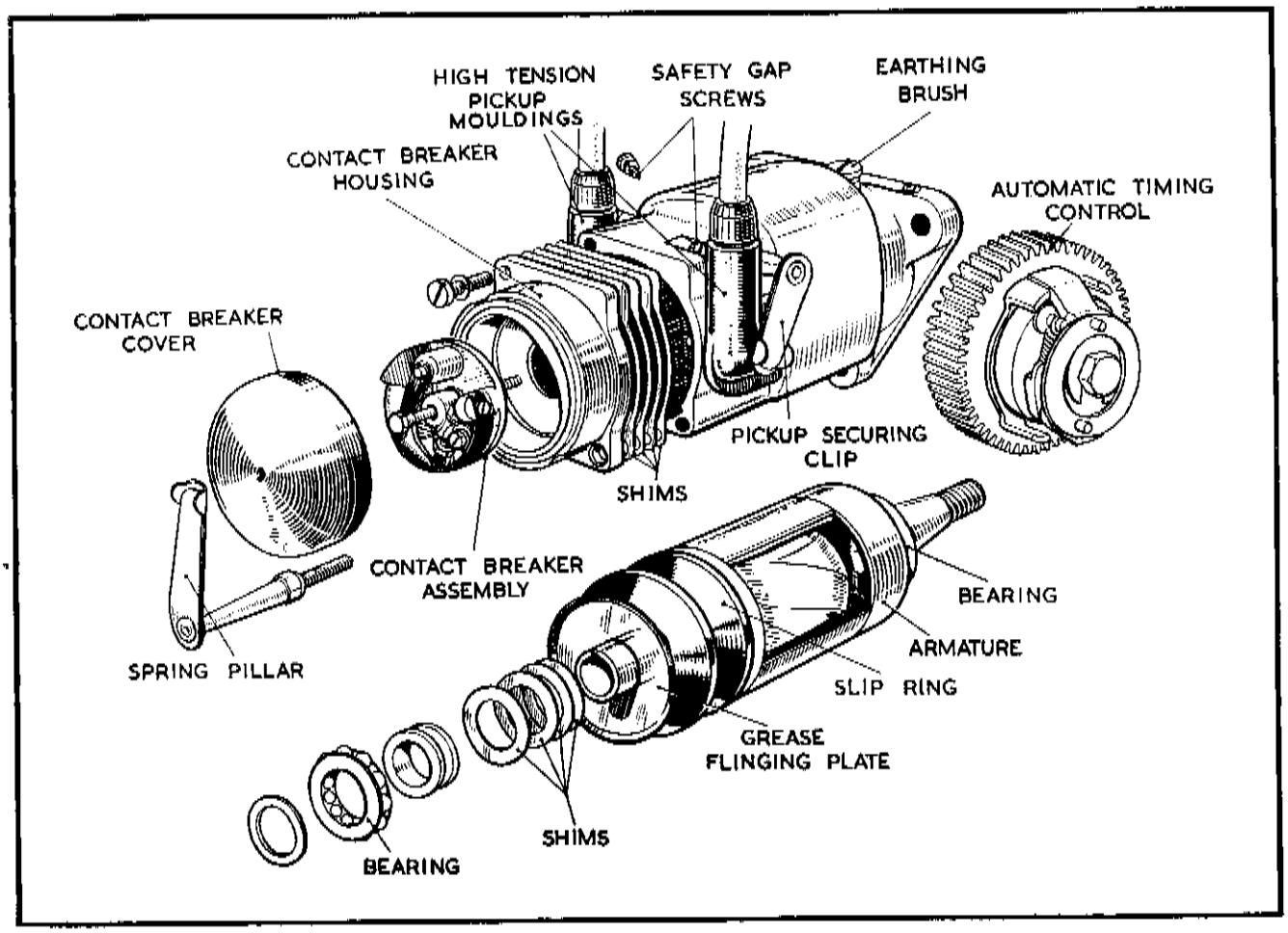

Fig. 6.
Typical flange fixed magneto, dismantled

(*viii*) It is important that the two ball bearings supporting the armature are in good condition. These are packed with grease during manufacture and will stand an almost unlimited period of normal running. If, however, the shaft is bent, the bearings may begin to fail and need replacing.

The balls and cages can be pulled off the inner races without difficulty, and the inner races removed from the armature shaft using an extractor. The outer races can be removed with an expanding collet type extractor or by the use of a tool as shown in Fig. 7.

(*ix*) Examine the slip ring and moulding. If these show signs of burning, tracking or other damage, a new slip ring unit must be fitted. To do this, remove the bearing adjacent to the slip ring, shims, grease flinging plate and defective slip ring unit.

Note: When removing the inner race, the extractor must bear on the brass shaft extension and not on the electric contact or on the insulator inside the shaft. A disc of appropriate diameter can be placed across the face of the shaft extension.

Carefully straighten the wire coming from the armature and check that it is clean. Fit the new slip ring moulding on the shaft, taking care that the wire enters the hole in the slip ring boss, and that it goes fully home without bending. Seal the wire into the boss with varnish; a special air drying varnish is used during manufacture, though shellac may be used if the former is not available.

Refit the grease flinging plate, the correct number of shims, and the inner race of the bearing.

(c) TESTING THE ARMATURE

(i) Checking Continuity of Primary Winding and Insulation

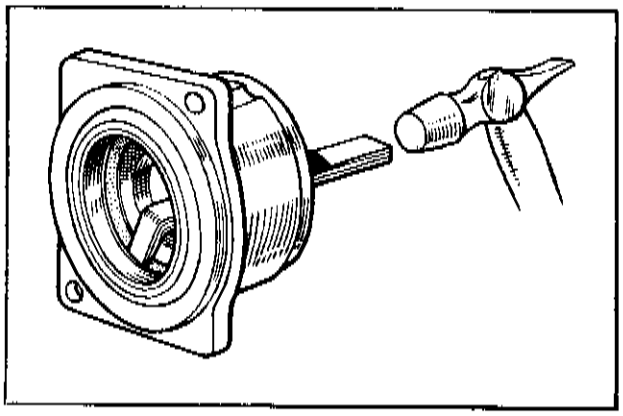

Fig. 7.
Removing bearing outer race

A continuity check of the armature primary winding can be made using 0—10 amp. ammeter and a two-volt supply, e.g. a tapping across one cell of a lead-acid battery.

Screw the contact breaker retaining screw for a small distance into the end of the armature shaft.

Note: If the screw is screwed right home in the case of base-fixed magnetos there will be a danger of contacting and damaging the condenser.

Connect one terminal of the battery to one terminal of the ammeter.

Connect the second battery terminal to the metal body of the armature.

Contact the second terminal of the ammeter with the screw in the armature shaft.

The ammeter should indicate approximately 4 amperes. If a current differing appreciably from 4 amperes is indicated, a replacement armature must be fitted.

An insulation test, using a 500 volt insulation tester, should give a reading of not less than 10 megohms.

(ii) Simple Check of Secondary Winding

If test apparatus is not available, leave the connections as described for the primary winding continuity check and proceed as follows:

Take a 15" length of H.T. cable and bare one end for about ½" and the other end for about 4".

Wrap the longer bared end about the slip ring brass insert, taking care not to damage or scratch the brush track. Holding the other end about ⅛" from the armature shaft, flick the end of the wire from the battery against the armature shaft.

Failure to spark indicates a fault either in the armature windings or in the condenser. In either case a replacement armature must be fitted.

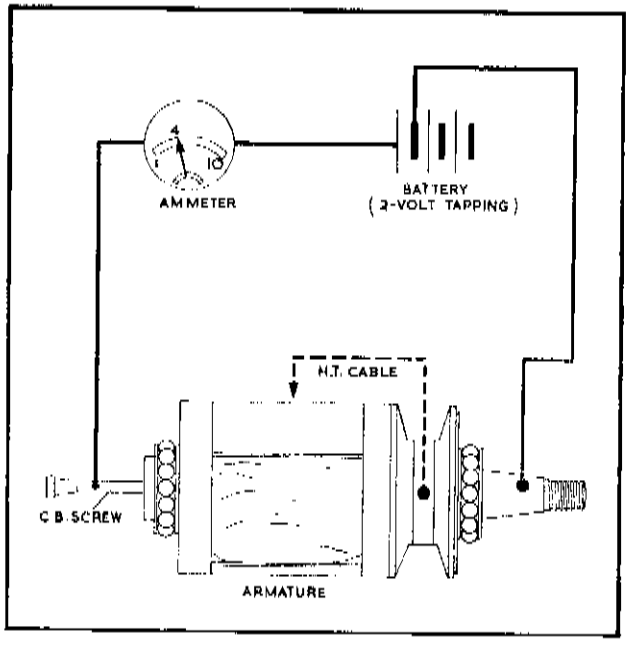

Fig. 8.
Connections for primary winding continuity test (additional connection for secondary winding sparking test shown in broken line)

(iii) Checking Performance and Insulation

Connect in series an 8 volt accumulator, e.g. a tapping across four cells of a 12-volt lead-acid battery, a contact breaker actuated by a four lobed cam having a 45° closed period, and the armature primary winding — the contact breaker-to-primary connection to be at earth potential. Connect a 0.2 mfd. condenser across the contact breaker contacts.

Connect a high tension cable between the brass slip ring insert, taking care not to damage or scratch the brush track, and either a 3-point spark gap or a rotary gap set to 14 k.v.

Run the contact breaker cam at 750 r.p.m. to give 3,000 operations of the contacts per minute.

Regular sparking should occur. Explore the taped surface of the armature windings with an earthed pointer. No flash-over must take place.

If the windings are in order, sparking can occur even if the condenser inbuilt with the armature is defective. Disconnect, therefore, the external condenser. If sparking now ceases or is irregular, the internal condenser is defective and a replacement armature must be fitted.

(iv) Checking Maximum Primary Running Current

If a satisfactory performance is not obtained in the foregoing test, measurement should be made of the

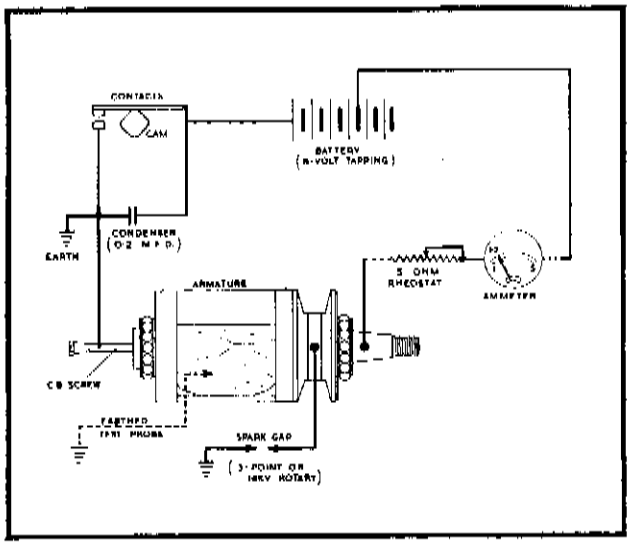

Fig. 9.

* Connections for performance check of armature, using a separately driven contact breaker (earthed probe, and connections for checking primary winding running current, shown in broken line)

maximum primary running current. To do this, include in the primary circuit a moving coil ammeter having a full scale deflection of not more than 5 amperes, together with a variable series resistance of approximately 5 ohms and of suitable current rating.

Run the contact breaker as before and adjust the variable resistance until occasional missing occurs, i.e. when the armature is just failing to produce a regular spark. The ammeter should then indicate a current of not more than 1.2 amperes. If a current reading differing appreciably from this figure is given, the armature must be replaced.

Note: Under no circumstances must the condenser or its connections be disturbed.
It is important, when carrying out either of the foregoing tests, to maintain a constant 8 volt supply and a constant cam speed; also, that the armature is free from external magnetic fields, e.g., it must not be tested on an iron bed plate or bench.

(d) REASSEMBLY

(i) **Cleaning and refitting bearings and oil seals**
The inner and outer bearings are matched and carefully run-in during manufacture and it is essential that neither the cages nor the races become interchanged end for end during reassembly. As a precaution, remove, clean and replace the bearings one at a time. It should be possible to withdraw the bearings without effort.

The cages should be washed in **clean** petrol and afterwards dried. The inner races should not be removed from the armature shaft unnecessarily. When an inner race has to be removed, it can be refitted using a hand press and a length of tubing fitted over the shaft and locating on the race. Lightly pack the cages with high melting point grease, before refitting them to the inner races. If the outer races have been removed, place a new oil seal in the bearing housing at the driving end of the magneto body. Press the outer races into their housings with a mandrel of the type shown in Fig. 10, taking care that a serrated insulated washer is positioned between each race and its housing. More than one insulated washer

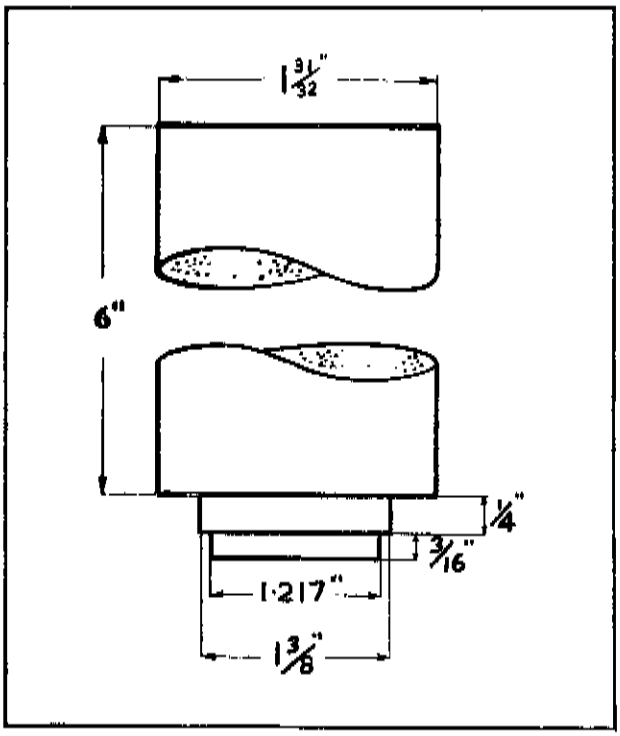

Fig. 10.
Mandrel for fitting bearing outer race

may be used to ensure a tight fit of the race in its housing.

Note: Oil seals may be cleaned only in light lubricating oil, **not** in petrol or paraffin.

(ii) Check that the slip ring moulding and insert are clean, and that the interior of the magneto body is free from swarf, etc. Insert the armature into the body, shaft end first.

(iii) Refit the contact breaker housing, taking care that the end plate shims are in position, and tighten the securing screws.

(iv) Check the armature for end float. It should rotate freely when turned by hand but no end play

should be present. If necessary, add or remove shims behind the contact breaker end plate until correct armature rotation is obtained.

Shims are available of 0.003" and 0.005" thickness. The actual amount of end float allowed depends on the type of cam fitted. With ring type contact breakers an end float of 0.001" to 0.005" is allowed. With face type contact breakers, an armature end float of 0.001" to 0.003" is permitted.

(v) Refit the cam and contact breaker as described in Para. 2 (a) and set the contact gap to 0.012" to 0.015" with the contacts fully open. Refit the contact breaker cover.

(vi) Check that the H.T. pick-up or pick-ups are clean and that the H.T. brush moves freely in its holder. Lightly smear the seating surface of the magneto body with grease before fitting the cork washer and screws.

(vii) Check that the earthing brush or brushes move freely in their holders, and refit.

(viii) Refit the safety gap screw or screws. The distance from the tip of a screw to the slip ring should be 6½—7½ mm. Refit the name plate if removed.
(ix) Refit auto-advance unit (when carried).

Note: When refitting or replacing an auto-advance unit, do not press the unit right home on the armature driving taper, but allow the retaining bolt to do this as it is tightened. In this way, the danger of locking the retaining bolt before the auto-advance unit is fully engaged on the taper, or of accidentally engaging the extractor left hand thread with the retaining bolt, will be avoided.

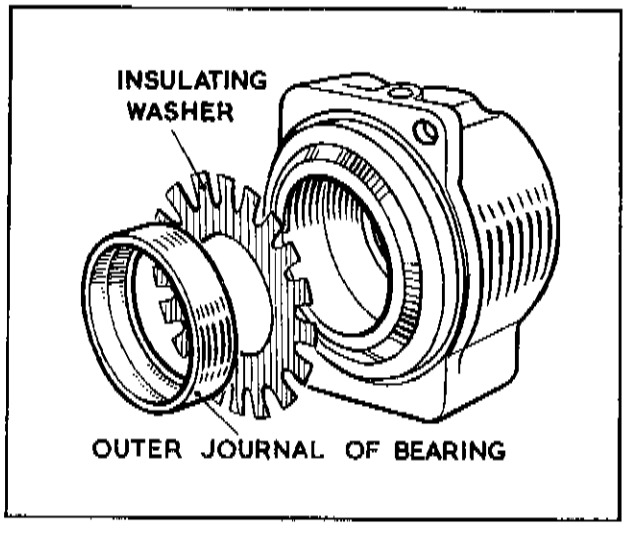

Fig. 11.
Position of serrated insulating washer

(x) **Remagnetisation.** Normally, remagnetisation will not be necessary but, should it be considered so, full instructions will be found in Section D-6 of the Lucas Workshop Manual.

(xi) Carry out the tests and inspections specified below. In the event of a magneto failing to perform satisfactorily any of these tests, it must be returned to the Works for examination.

Endurance Test

With the contact breaker cover in place, run the magneto for one hour at 3,000 r.p.m. with the H.T. cable or cables connected to an 8 k.v. annular spark gap.

Inspection

After the above run, disconnect the magneto and examine it as follows:—

Remove the pick-up or pick-ups and check for signs of sticking brushes, and for flashover or of fouling against the slip ring moulding.

Examine the slip ring for signs of flashover, burnt or rough track, presence of swarf or of eccentricity.
Remove the contact breaker cover and check as follows:—

Ring type cams: The contacts should be in line and the maximum gap to be 0.012" to 0.015". The earth brush, when fitted, should be free to move in its holder. The contact breaker arm must be free to rock on its pivot. All screws must be tight, and the contacts must not begin to open before 3° after the magnetic pull.

Face type cams: The contacts should be in line and the maximum gap to be 0.012" to 0.015". The tappet must move freely in its holder. All screws must be tight.

Remove the earthing brush and check that it is free to move in its holder.

Check for excessive end float or any binding of the armature.

Safety Gap Test

If the magneto is fitted with a spark gap or gaps, remove the H.T. cable and run for 30 seconds at 1,000 r.p.m. in the case of magneto models N1 and KN1, or at 1,800 r.p.m. in the case of magneto models K1F, K2F and KVF.

Inspection

After the above run, remove the H.T. pick-up or pick-ups and examine for signs of tracking or flashover at the slip ring.

High Speed Test

Connect the H.T. cable or cables to a rotary gap.

set as shown in SB 222 Section 4 to 8 k.v. using a 2½ micro-mho load. Remove the contact breaker cover. No missing must occur over a speed range of 1,000—3,000 r.p.m. Watch the contact breaker gap for excessive sparking.

While running at 3,000 r.p.m. the primary winding should be short-circuited at least six times, by touching the rotating contact breaker with an earthed cable.

Low Speed Test

Connect the H.T. cable to a 3-point spark gap set to 5.5 mm. Use independent spark gaps in the case of twin-cylinder magnetos. Not more than 5% missing must occur at the following speeds:—

Models N1 and KN1	...	130 r.p.m. (advanced) 170 r.p.m. (retarded)
Models K1F and K2F Fixed Ignition or Auto-Advance		130 r.p.m.
Manual Control	... ...	110 r.p.m. (advanced) 150 r.p.m. (retarded)
Model KVF	... ...	130 r.p.m.

Automatic Advance Characteristics

These figures, when applicable, will be provided by the Service Department on receipt of the model and service number of the magneto.

SECTION L-5 Part B
ISSUE 1, FEBRUARY 1953

LUCAS

Quality

EQUIPMENT

VOLUME 2

WORKSHOP INSTRUCTIONS

MOTOR CYCLE MAGDYNOS

MODELS
MOIL and MN2L

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Printed in England

MOTOR CYCLE MAGDYNOS

MODELS MOIL and MN2L

1. GENERAL

The magdyno is a base-fixed magneto-and-generator unit, the body of the magneto portion being arranged to carry a standard strap-fixed generator of the patterns described in Section L-2 Part A. A shock absorbing drive is arranged between the magneto and generator portions. Two magdyno models are produced, the magneto portion of each having a wound rotating armature and a high-energy magnet case integral with the body. These models are:

MOIL Magneto portion designed for use with single-cylinder engines. Contact breaker actuated by a tappet and face type cam. Magdyno includes generator model E3L.

MN2L Magneto portion designed for use with twin-cylinder engines. Contact breaker actuated by ring type cam. Generator as fitted to MOIL.

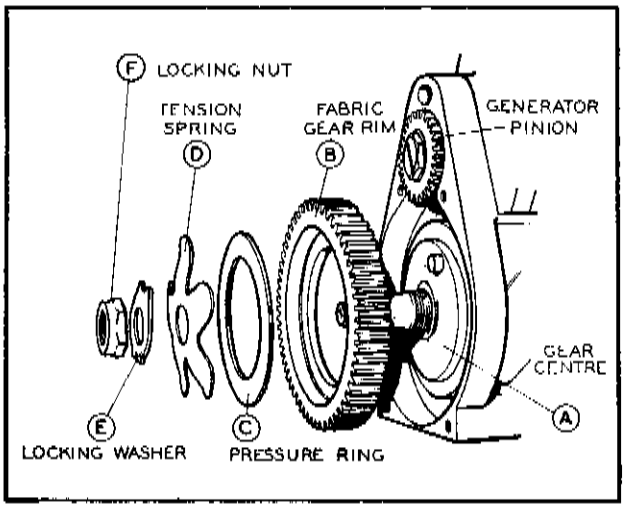

Fig. 1
Exploded view of generator drive

The shock absorbing drive is incorporated in the larger of the two gears which transmit the drive from the magneto shaft to the generator, and is shown exploded in Fig. 1. This drive, whilst permitting maximum generator output to be obtained, reduces peak shock loadings on the teeth of a bakelised fabric type gear to a minimum value. The drive is taken from metal gear centre A, keyed to the magneto shaft, to fabric gear rim B by means of pressure ring C and tension spring D. A peg projecting from gear centre A prevents relative movement of the gear centre and tension spring D. In the event of a back-fire or an electrical short-circuit, slip will occur between the contacting surfaces of fabric gear B and gear centre A.

2. ROUTINE MAINTENANCE

(a) LUBRICATION
To be carried out every 3,000 miles, see Section L-5, Part A, Para. 2(a).

(b) ADJUSTMENTS
Check every 3,000 miles, as described in Section L-5, Part A, Para. 2(b).

(c) CLEANING
To be carried out every 6,000 miles, see Section L-5, Part A, Para. 2(c).

(d) RENEWING HIGH TENSION CABLES
See Section L-5, Part A, Para. 2(d).

(e) RENEWING TIMING CONTROL CABLE
See Section L-5, Part A, Para. 2(e).

(f) CONTACT BREAKER SPRINGS
See Section L-5, Part A, Para. 2(f).

3. SERVICING

(a) TESTING MAGDYNO IN POSITION ON ENGINE
To locate cause of misfiring or failure of ignition, check as described in Section L-5, Part A, Para. 3(a).

(b) DISMANTLING

Important:

The following dismantling, testing and reassembly procedures must be carried out while **working at a clean bench.**

(i) The generator and magneto portions, can be separated by withdrawing the generator securing nut G and slackening band clip securing screws H, see Fig. 2.

Remove the driving end cover I, by unscrewing the four countersunk securing screws, and bend back the tags of locking washer E.

Whilst slackening securing nut F, the spindle can be prevented from turning by using a special tool as shown in Fig. 3. The tool consists of a U-shaped length of $\frac{1}{4}$in. dia. mild steel rod, the limbs being $\frac{3}{4}$in. long and $3\frac{3}{16}$in. between centres. Remove nut F, locking washer E, tension spring D, pressure ring C, and fabric driving gear B.

(ii) On single-cylinder models, take off contact breaker cover J, spring arm K, and unscrew the contact breaker securing screw L. Withdraw contact breaker body M from the armature shaft. Spring out the wire ring N and lift out cam O and plunger P.

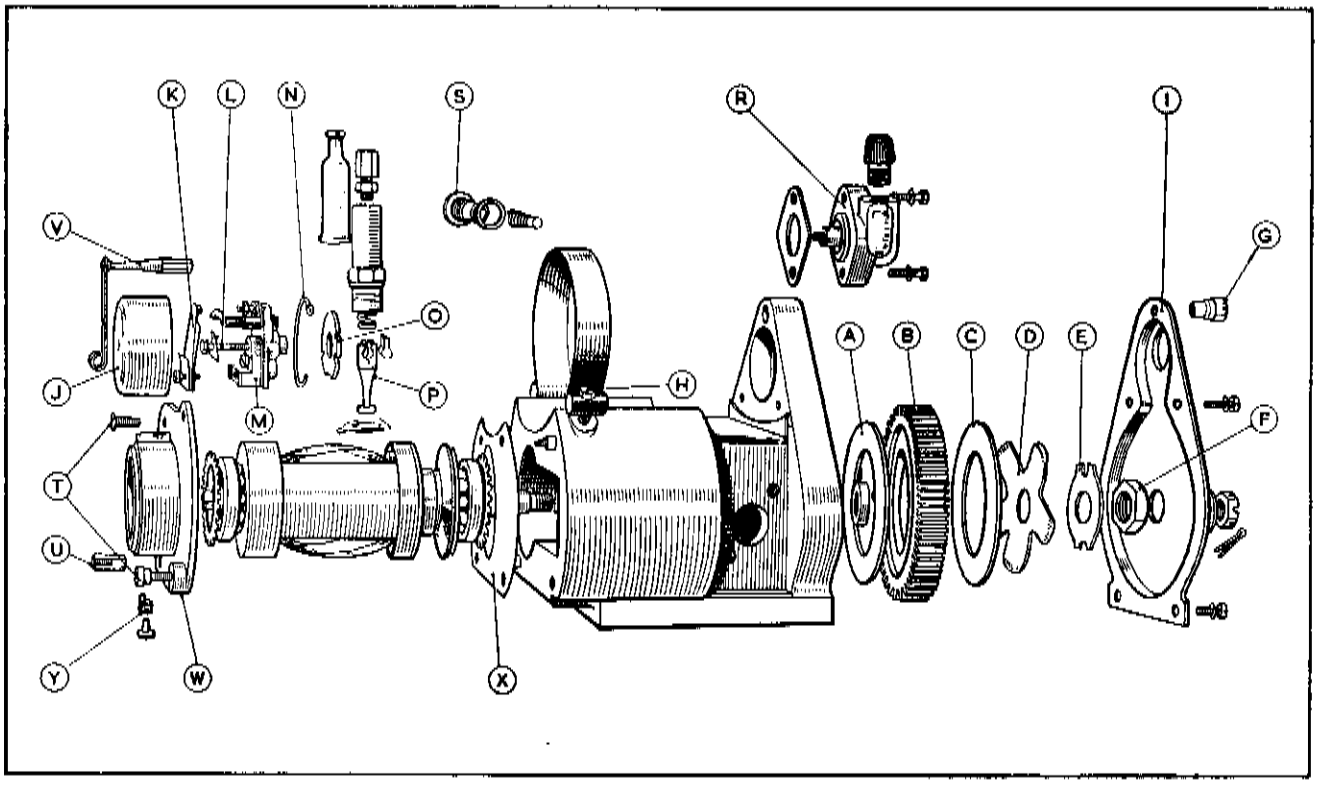

Fig. 2

Exploded view of typical single-cylinder magdyno

On twin-cylinder models, unscrew the hexagon headed screw in the centre of the contact breaker and carefully prise the contact breaker off the tapered shaft on which it fits. Remove the cam ring which is a sliding fit in its housing.

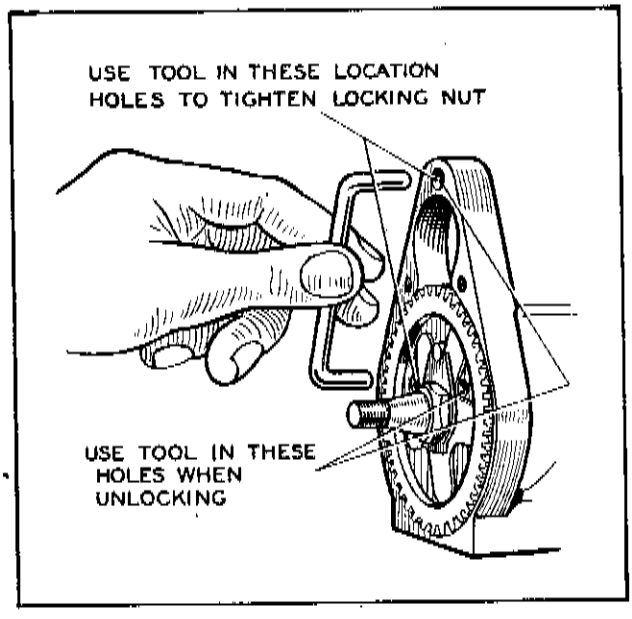

Fig. 3
Generator drive locking tool

(iii) Remove the H.T. pick-up moulding or mouldings R, taking care to retain the gasket for use when reassembling. Unscrew and withdraw the earthing brush holder S, also shown in Fig. 4.

Release the contact breaker end plate W by withdrawing screws T, earthing terminal U and pillar V. The contact breaker end plate, together with shims X can now be removed.

(iv) In order to detach the armature from gear centre A, tap the driving end of the shaft with a rawhide mallet. The armature can then be withdrawn from the magneto body. The high energy magnet in the latter does not need a keeper across it; although a very small amount of energy is lost at the first removal of the armature, subsequent removals do not affect it.

Do not place the magneto body or armature near to iron filings, always work on a clean bench.

(v) Examine the armature, bearings and slip ring as described in Section L-5, Part A, Para. 3b. (vii-ix).

(c) TESTING THE ARMATURE

See Section L-5, Part A, Para. 3c (i-iv).

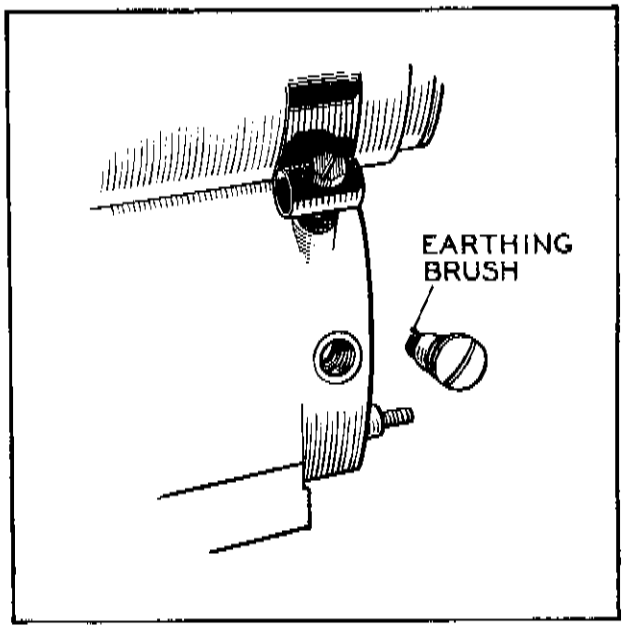

Fig. 4
Earthing brush withdrawn

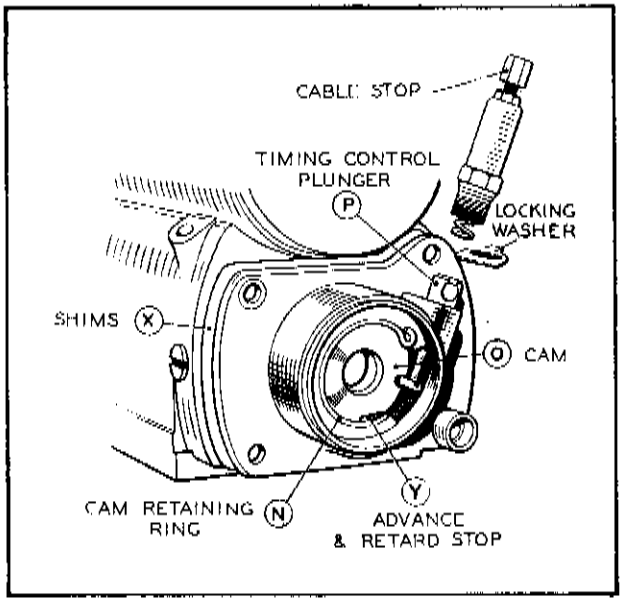

Fig. 5
Contact breaker end plate and timing control mechanism

(d) REASSEMBLY

(i) See Section L-5, Part A, Para. 3(d), noting that safety gap screws and oil seals are normally not fitted to magdynos.

An exception to the above rule will be found in the case of magdynos MN2 Part Nos. 46021 and 46027. These two models were fitted with a special drive end plate incorporating an oil seal. See para. 3 (e) for details of the special reassembly procedure to be followed when refitting these end plates.

(ii) Assemble the drive, keying gear centre A on to the spindle and refitting fabric gear rim B, pressure ring C, tension spring D, locking washer E and locking nut F.

(iii) Check the drive slip-setting, as shown in Fig 6. With the gear locked, the drive should slip when a torque of 4-10 lb.-ft. is applied through a 12in.

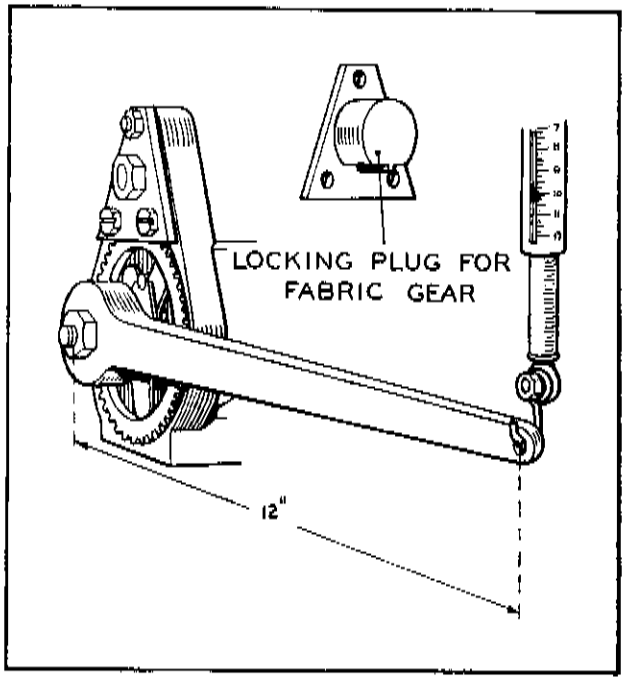

Fig. 6
Method of checking generator drive

horizontal lever secured to the magneto spindle. If slipping occurs below 4 lbs. or above 10 lbs., a new tension spring must be fitted.

(iv) **Remagnetisation.** Normally, remagnetisation will not be necessary but, should it be considered so, full instructions will be found in Section D-6 of the Lucas Workshop Manual.

(v) Carry out the tests and inspections specified below. In the event of a magdyno failing to perform satisfactorily any of these tests, it must be returned to the Works for examination.

Endurance Test

With the contact breaker cover in place, run the magdyno for one hour at 1,600 — 1,800 r.p.m. with the H.T. cable or cables connected to an 8 k.v. annular spark gap.

Inspection

As Section L-5, Part A, Para. 3d (xi).

High Speed Test

See Section L-5, Part A, Para. 3d (xi).
No missing should occur (when the control is advanced or retarded) at 3,000 r.p.m.

Low Speed Test

Connect the H.T. cable or cables to a 3-point spark gap set to 5.5 mm.

Use independent spark gaps in the case of twin-cylinder magdynos. Not more than 5 per cent missing must occur at the following speeds:—

Advanced	Retarded
110 r.p.m.	160 r.p.m.

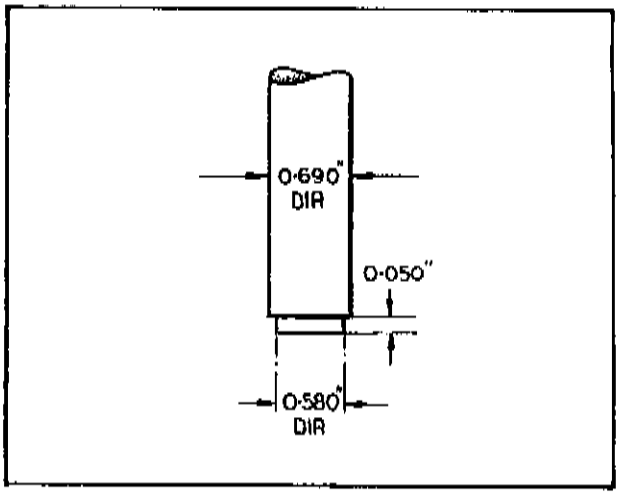

Fig. 7
Mandrel to expand oil seal

(e) REFITTING DRIVE END PLATES INCORPORATING AN OIL SEAL

The internal diameter of the oil seal is less than the diameter of the driving sprocket boss. The oil seal must therefore be expanded, by the use of the mandrel shown in Fig. 7, before refitting the sprocket.

To refit the sprocket, proceed as follows:

Remove the drive end plate from the magdyno, and insert the mandrel from the armature side, as shown in Fig. 8. The main shank of the mandrel is of the same diameter as the external diameter of the sprocket boss. The end of the mandrel, however, has a reduced diameter, and locates with the inside of the boss. The mandrel will therefore open the oil seal and allow the sprocket to be pressed into position in the end plate without damage to the seal.

Remove the mandrel, and refit the drive end plate to the magdyno.

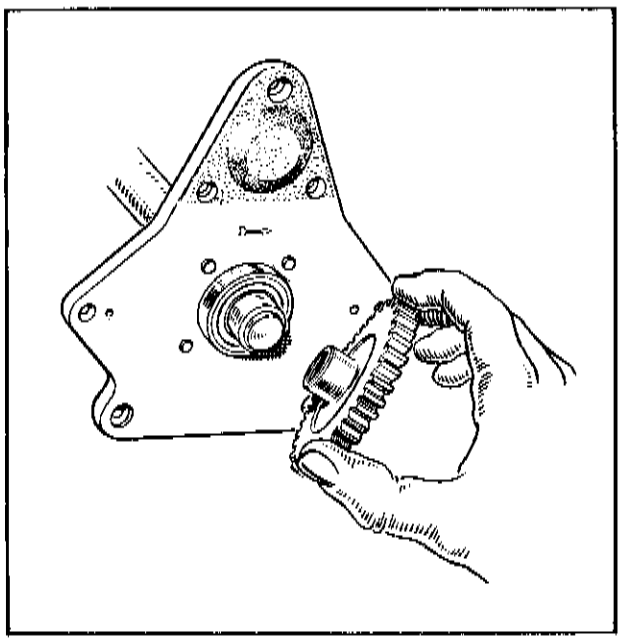

Fig. 8

Replacing driving sprocket with mandrel in position

SECTION L-5 Part C
ISSUE 1 FEBRUARY 1953

LUCAS

Quality

EQUIPMENT

WORKSHOP INSTRUCTIONS

MOTOR CYCLE COIL IGNITION EQUIPMENT

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MOTOR CYCLE
COIL IGNITION EQUIPMENT

1. GENERAL

Coil ignition equipment fitted to motor cycles comprises an ignition coil and a contact breaker, and in the case of twin and four cylinder machines, a high tension distributor.

Figs. 1 and 2 illustrate the distributor types in most common use. Model D1A2 is arranged for flange fixing, and has the main shaft carried on two bearings, a bronze bush at the driving end supplied with lubricant from the engine, and a ball bearing above the cam, carried in a bridge piece forming part of the contact breaker plate. An adapter fitted to the end of the shaft above the ball bearing carries a standard type moulded rotor arm.

Model DKX is manufactured for single, twin and four-cylinder machines. It has a moulded contact breaker base, and the shaft is carried in two porous bronze bushes. Twin and four-cylinder units have high tension distributor rotors fitted on an extension of the cam spindle, the moulded distributor cover carrying electrodes in the usual manner.

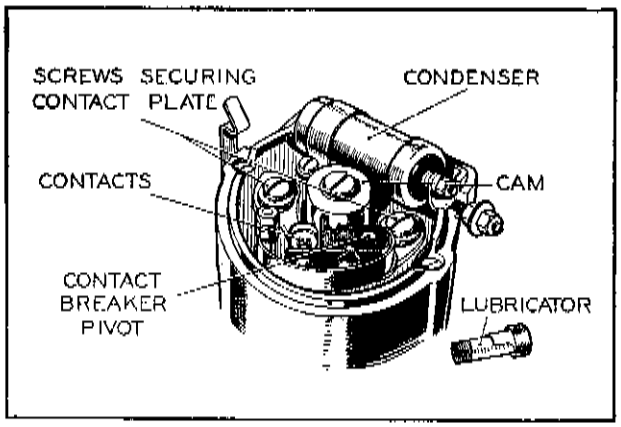

Fig 1. Contact breaker, Model DKX.

Mounted immediately beneath the contact breaker base is an automatic timing control mechanism, consisting of a pair of spring-loaded governor weights linked by lever action to the contact breaker cam.

At low engine speeds, the spring force maintains the cam in a position in which the spark is slightly retarded. Under the centrifugal force imparted by increased engine speeds, the governor weights swing out against the spring tension, to advance the cam and thereby the timing of the spark to suit engine conditions at the greater speed. It should be noted that in the case of Model D1A2 the moulded rotor arm is connected directly to the shaft and not to the cam as on Model DKX and it is not possible, therefore, to cause movement of the cam by turning the rotor arm by hand.

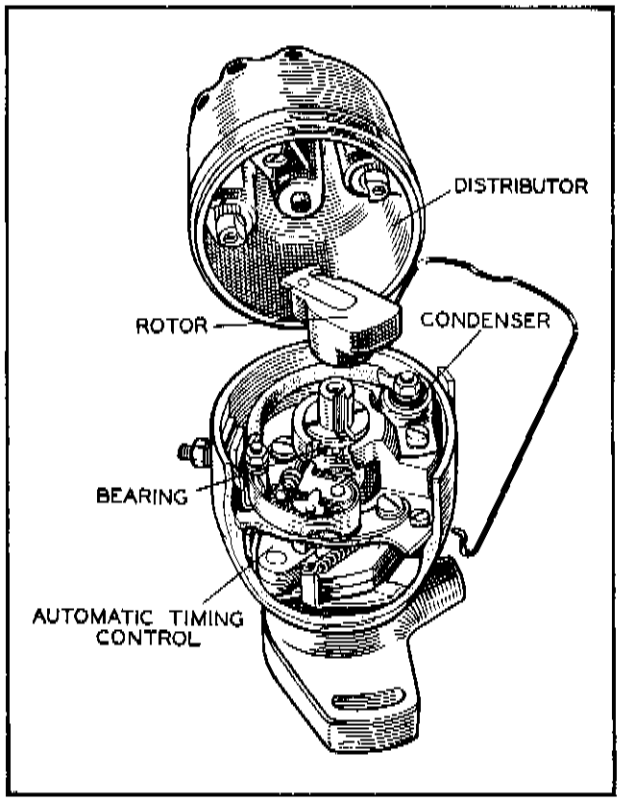

Fig. 2. Distributor Model DIA2.

The ignition coil consists of a laminated core around which are wound the secondary and primary windings. One end of each winding is connected to the CB terminal, the other end of the secondary winding is connected to the high tension outlet and that of the primary winding to the SW terminal. The coil assembly is wax-impregnated, and the sealed metal case is filled with an insulating compound.

2. ROUTINE MAINTENANCE

(a) Ignition Coil.

The only maintenance necessary is to keep the coil casing clean and free from oil and water, paying special attention to the moulding at the terminal end, and to check the terminal connections for tightness from time to time.

(b) Distributor.

(i) Lubrication. To be carried out every 3,000 miles.

Cam. Smear the surface of the cam very lightly with Mobilgrease No. 2 or, if this is not available, clean engine oil may be used.

Cam bearing. Remove the screw from inside the rotor bore and apply a few drops of thin machine oil to the tapped hole thus exposed.

Contact breaker pivot. Place a small amount of Mobilgrease No. 2 or clean engine oil on the pivot on which the contact breaker lever works.

Shaft. When a lubricator is fitted in the shank of the unit, add a few drops of thin machine oil.

Automatic Timing Control.

Model DKX: Unscrew the two screws securing the contact breaker base plate to the distributor body and lubricate the timing control mechanism with thin machine oil, paying particular attention to the pivots. Refit the base plate.

Model D1A2: Take the distributor off the machine and remove cover and rotor. Inject a small quantity of thin machine oil through the aperture between cam and contact breaker base plate.

NO GREASE OR OIL MUST BE ALLOWED TO GET ON OR NEAR THE CONTACTS WHEN CARRYING OUT THE FOREGOING PROCEDURE.

(ii) Cleaning. To be carried out every 6,000 miles.

Wipe the inside and the outside of the cover moulding with a soft dry cloth. On twin and four cylinder units, pay particular attention to the spaces between the metal electrodes, and check that the small carbon brush moves freely in its holder.

Examine the contact breaker. The contacts must be free from grease or oil. If they are burned or blackened, clean them with a fine carborundum stone or very fine emery cloth, afterwards wiping away any trace of dirt or metal dust with a petrol-moistened cloth. Cleaning of the contacts is made easier if the contact breaker lever carrying the moving contact is removed. To do this, unscrew the nut securing the end of the contact breaker spring, and remove the nut, spring washer and bush. Lift the contact breaker lever off its bearing. After cleaning, check the contact breaker gap setting.

(iii) Contact breaker setting.

Contact breaker gaps should be checked every 3,000 miles. If the gap is allowed to decrease below the specified setting, rapid and excessive pitting and piling may occur.

Turn the engine until the contacts are seen to be fully opened and check the gap with a gauge having a thickness of .010-.012 in. (except for four-cylinder units manufactured 1952 onwards which must be .014-.016 in.). If the gap is correct, the gauge should be a sliding fit, but if the gap varies from the gauge, the setting must be adjusted.

To do this, keep the engine in the position giving maximum contact opening and slacken the two screws securing the fixed contact plate. Adjust the position of the plate until the gap is set to the thickness of the gauge and tighten the two locking screws.

With D1A2 units, while checking the gap, the driving dog must be fitted or the shaft must be properly supported at the base of the body.

(c) High Tension Cables.

Examine the high tension cables. Any which have the insulation cracked or perished, or show signs of damage in any other way, must be renewed.

3. SERVICING

(a) Testing in position to locate ignition fault.

If a failure of ignition or misfiring occurs, first make sure that the trouble is not due to defects in the engine, carburettor, petrol supply, sparking plug, etc. If necessary adjust the sparking plug gap to the setting recommended by the motor cycle manufacturer. Ensure also that the battery is not discharged.

(i) Examine the high tension cable(s). If the rubber shows signs of deterioration or cracking, the cable should be renewed.

(ii) Test each plug and high tension cable by removing the plug and allowing it to rest on the cylinder head and observing whether a spark occurs at the points when the engine is turned. It should, however, be noted that this is only a rough test, since it is possible that a spark may not take place when the plug is under compression.

(iii) Examine the contact breaker, checking the gap setting and measuring the contact breaker spring tension. This should be 20-24oz. measured at the contacts.

(iv) Switch on the ignition, turn the engine and observe the ammeter reading. If an ammeter reading is given which rises and falls with the closing and opening of the contacts, then the low tension wiring is in order. If the reading does not fluctuate in this way a short circuit in the low tension wiring is indicated.

When no reading is given, a broken or loose connection in the low tension wiring is indicated.

(v) To trace a fault in the low tension wiring, switch on the ignition and then turn the engine until the distributor contacts are opened. With the aid of a voltmeter (0-10 volts), proceed to make a point-to-point check around the low tension circuit in the following manner (note that some machines may have a wiring layout different from the example quoted, and the appropriate wiring diagram should be referred to).

Lead from the unearthed battery terminal to terminal B on ammeter.

Connect voltmeter between ammeter terminal B and earth; no reading indicates faulty lead or loose connections.

Ammeter.

Connect voltmeter to the second ammeter terminal and earth. No reading indicates faulty ammeter.

Lead (purple) between ammeter and ignition switch.

Connect voltmeter to terminal A on ignition switch and earth. No reading indicates faulty lead or loose connections.

Ignition switch.

Connect voltmeter to terminal IG on ignition switch and earth. No reading indicates fault in switch.

Lead (white) between ignition switch and ignition coil.

Connect voltmeter to ignition coil terminal 'SW' and earth. No reading indicates faulty lead or loose connections.

Ignition coil.

Connect voltmeter to ignition coil terminal 'CB' and earth. No reading indicates that fault lies in the coil primary winding.

Lead between ignition coil and contact breaker.

Remove the lead from the terminal on the contact breaker, and connect voltmeter between the end of this lead and earth. No reading indicates faulty lead or loose connections. Reconnect lead.

Condenser.

Connect the voltmeter across the contacts. If no reading is obtained, disconnect the condenser and test again. If a reading is now given, a new condenser (0.2 microfarad) is required.

(vi) If the primary circuit is in order, the secondary or high tension circuit can be checked as follows:—

Remove the high tension cable from the plug (in single cylinder engines) or the centre distributor terminal (twin and four cylinder engines). Switch on the ignition and turn the engine until the contacts close. Flick the contact breaker lever open while the high tension lead from the coil is held about $\frac{3}{16}$ in. away

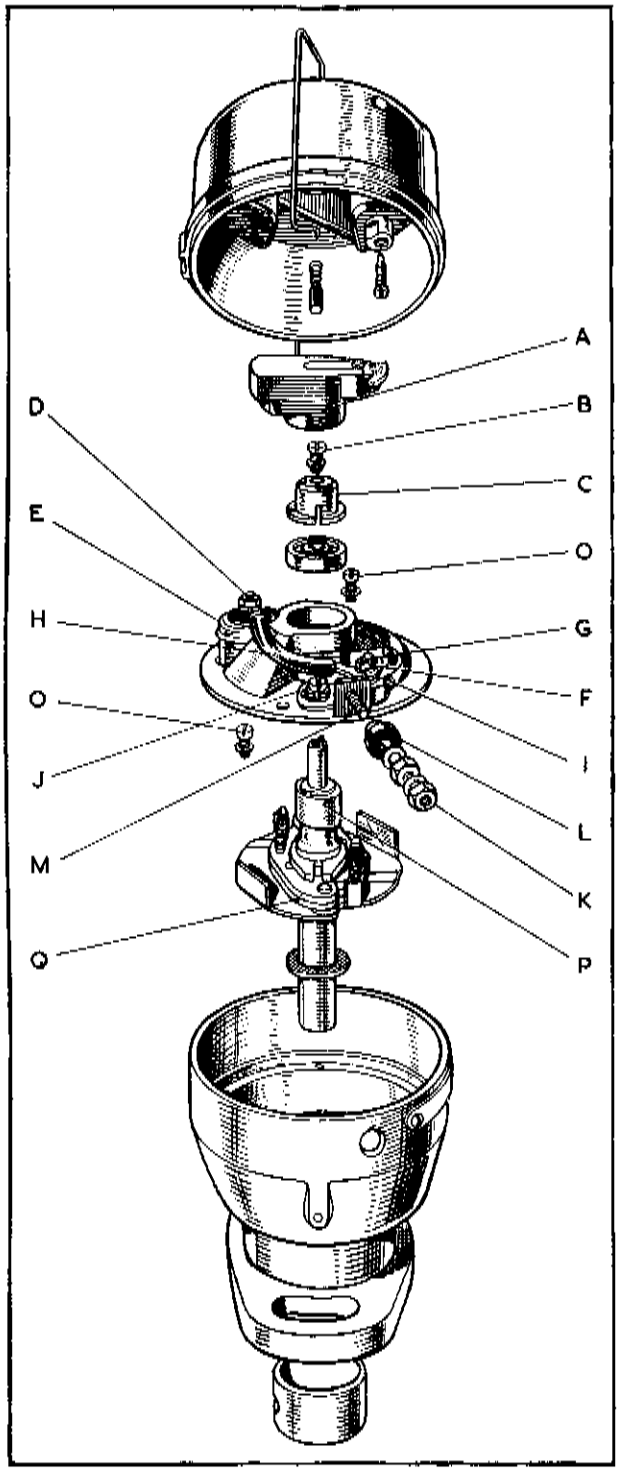

Fig. 3. Model DIA2-dismantled.

from the cylinder block. If the ignition equipment is in order a strong spark should be obtained. If no spark is given, it indicates a fault in the circuit of the secondary winding of the coil and the coil should be replaced.

(b) Dismantling the Distributor.

(i) Model D1A2. (Fig. 3).

Spring back the securing clip and remove the moulded cover.

Lift the moulded rotor arm 'A' off the top of the spindle.

Take out the screw 'B' and spring washer from the top of the spindle. The adapter 'C' can now be withdrawn. Remove the nut 'D' and spring washer from the terminal of the condenser 'E'. Take the nut 'F', spring washer, flat steel washer and insulating bush from the pillar 'G'. The metal strip connector 'H' to the condenser can now be removed. Lift the end of the contact breaker spring 'I' from the pillar.

Take out the screw 'J', spring washer and flat steel washer from the plate carrying the fixed contact.

Unscrew the two terminal nuts 'K' and remove, together with spring washer, flat steel washer and insulating bush 'L'. The terminal bolt 'M', connecting link and insulation strip can now be removed. Take out the two screws 'O' together with spring washers which secure the contact breaker base plate to the distributor body. The contact breaker base, together with cam 'P', spindle and automatic timing control 'Q' can now be removed. Press the shaft and timing control from the bearing in which it is held.

The automatic timing control should not be dismantled unnecessarily. If it is desired to dismantle the mechanism, carefully note the position of the various components in order that they may be refitted correctly.

(ii) Model DKX. (Fig. 4).

Spring back the securing clips and remove the moulded cover. Lift the moulded rotor arm off the top of the spindle (twin and four-cylinder units). Withdraw the two screws 'A' together with the spring washers, when the contact breaker base can be lifted off.

To remove the moving contact, unscrew the nut 'B' on the pillar 'C' and remove the nut, spring washer and bush. The contact breaker spring 'D' can then be lifted off and the contact arm lifted from its pivot 'E'.

The fixed contact is carried on a plate 'F' secured by two screws. The condenser can be removed when its terminal nuts and single securing screw are removed. The shaft 'G' carrying the cam 'H' and automatic timing control 'J' can be removed when the driving dog is taken off.

The automatic timing control should not be dismantled unnecessarily. If it is desired to dismantle the mechanism, carefully note the position of the various components in order that they may be refitted correctly.

(c) Bearings.

Badly worn bearings are usually indicated by the maximum opening of the contacts varying considerably as the shaft is slowly rotated by hand, while side pressure is applied to the cam.

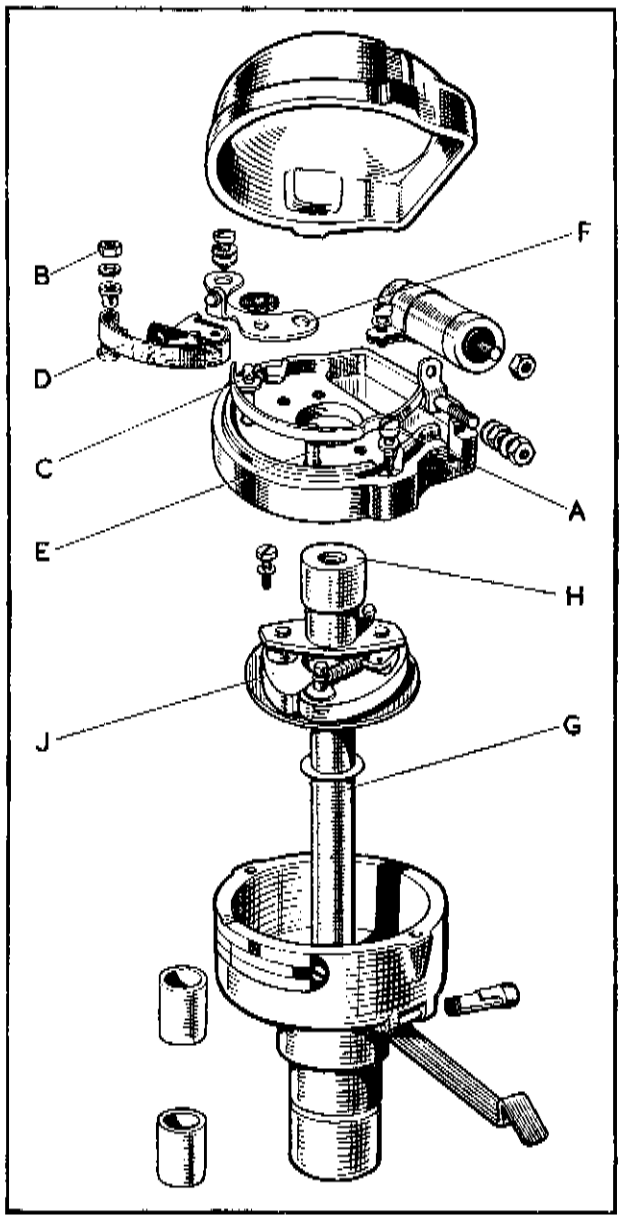

Fig. 4. Model DKX-dismantled.

Porous bronze bearing bushes should be inserted in the body on a highly polished shouldered mandrel, which on withdrawal will give the finished bore diameter without machining. Before use, these bushes should be stored in a covered container, and fully covered with oil of a grade equivalent to Mobiloil Arctic or other good thin mineral oil. The minimum time of soaking should normally be 24 hours; in cases of extreme urgency, this period may be shortened by heating the oil to 100° C., when the time of immersion may be reduced to 2 hours.

The ball bearing in the D1A2 may be removed by means of a normal type of extractor.

(d) Contact breaker.

When trimming a pair of contacts, it is not essential to grind down a slightly pitted contact, but only to remove excess metal from the piled contact. Should the pitting and piling be found excessive, a replacement contact set, comprising both fixed and moving contacts should be fitted. Before despatch, replacement contacts are given a protective coating of oil which should be removed with a petrol-moistened cloth before fitting.

(e) Reassembly.

Reassembly is a reversal of the dismantling procedure described in para. 3 (b). Note that an insulating washer must be placed over the contact breaker pivot before the moving contact is fitted.