

LUCAS

Quality

EQUIPMENT

VOLUME 2

WORKSHOP INSTRUCTIONS

DISTRIBUTORS

MODELS

DM4, DMB4, DM6 and DMB6



JOSEPH LUCAS LTD · BIRMINGHAM 19 · ENGLAND

LUCAS WORKSHOP INSTRUCTIONS

DISTRIBUTORS

MODELS DM4, DMB4, DM6 AND DMB6

1. GENERAL

The coil ignition equipment comprises a high tension induction coil and a combined distributor, contact breaker and automatic timing control assembly driven at half engine speed via the camshaft. Current flowing through the primary or low tension winding of the coil sets up a strong magnetic field about it. This current is periodically interrupted by a cam-operated contact breaker, driven from the engine. The subsequent collapse of the magnetic field across the secondary winding of the coil induces a high voltage in it. At the same time, a rotor arm in the distributor connects the secondary winding of the coil with one of a number of metal electrodes, from which cables lead to the sparking plugs in the engine cylinders. Thus, a spark is arranged to occur in the cylinder under compression

at the exact moment required to produce combustion of the mixture.

Mounted on the distributor driving shaft, immediately beneath the contact breaker, is an automatic timing control mechanism. It consists of a pair of spring-loaded governor weights, linked by lever action to the contact breaker cam. At slow engine speeds, the spring force maintains the cam in a position in which the spark is slightly retarded. Under the centrifugal force imparted by high engine speeds, the governor weights swing out against the spring pressure to advance the contact breaker cam, and thereby the spark, to suit engine conditions at the greater speed.

A vacuum-operated timing control is also fitted, designed to give additional advance under part-throttle conditions. The inlet manifold of the engine is in direct

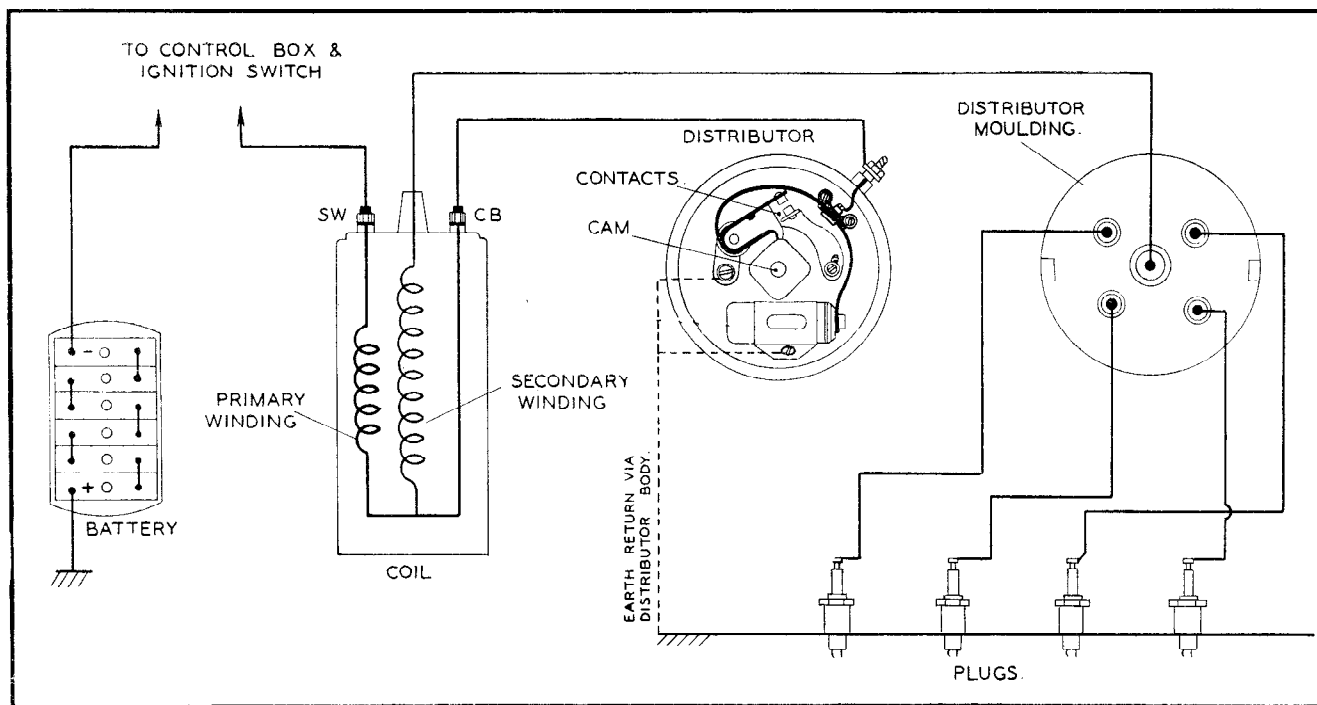


Fig. 1
A typical coil ignition circuit



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communication with one side of a spring-loaded diaphragm. This diaphragm acts through a lever mechanism to rotate the heel of the contact breaker about the cam, thus advancing the spark for part-throttle operating conditions. There is also a micro-meter adjustment by means of which fine alterations in timing can be made to allow for changes in running conditions, e.g., state of carbonisation, change of fuel, etc. The combined effects of the

centrifugal and vacuum-operated timing controls give added efficiency over the full operating range of the engine, with a corresponding economy in fuel consumption.

Models DM and DMB differ from each other in the arrangement of the distributor shaft bearings. On model DM distributors a hardened shaft runs in cast iron bearings, a greaser being provided for the upper bearing. Model DMB has a ball bearing at the upper end of the shaft and a porous bronze bush at the lower end. Both models are produced in four- and six-cylinder forms.

A measure of radio and television interference suppression is provided by the carbon brush that forms the connection to the rotating electrode of the distributor. This brush, longer than is usual and formed of resistive carbon, has the effect of a suppression resistor in the lead from the coil to the distributor.

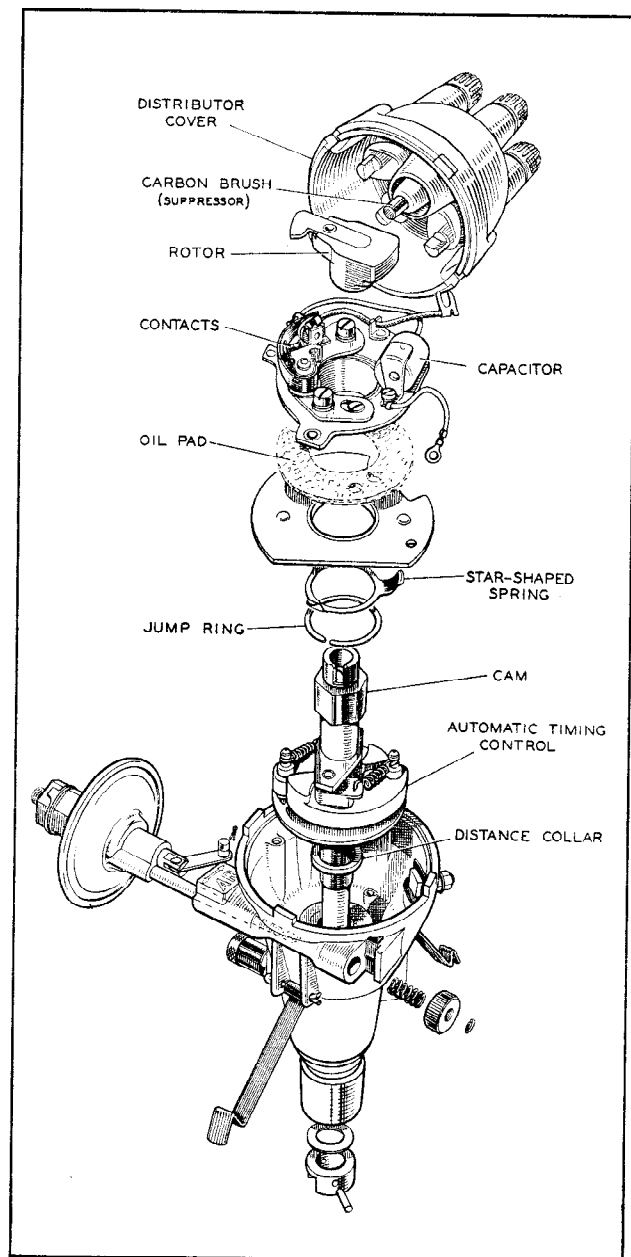


Fig. 2
Distributor, dismantled

2. ROUTINE MAINTENANCE

In general, lubrication and cleaning constitute normal maintenance procedure.

(a) LUBRICATION

Take great care to prevent oil or grease from getting on or near the contacts.

EVERY 1,000 MILES (MODELS DM ONLY)

Give the lubricator on the side of the distributor body **one full turn**, clockwise, to lubricate the distributor shaft.

EVERY 3,000 MILES

Add a few drops of thin machine oil through one of the apertures at the edge of the contact breaker to lubricate the automatic timing control.

Smear the cam and the pivot on which the contact breaker works with a little Mobilgrease No. 2. Lift off the rotor arm by pulling vertically and apply to the spindle a few drops of thin machine oil to lubricate the cam bearing. It is not necessary to remove the exposed screw, since it affords a clearance to permit passage of oil.

Replace the rotor arm, carefully locating its moulded projection in the spindle keyway and pushing it on as far as it will go, in order to avoid the risk of the distributor cover being burned or tracked.

Models DM only:

Unscrew the cap of the distributor shaft lubricator



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and refill the cap with Acheson's graphited grease, grade GC, or an equivalent grease.

(b) CLEANING — EVERY 6,000 MILES

Thoroughly clean the moulded distributor cover inside and out, with a soft dry cloth, paying particular attention to the spaces between the metal electrodes. Ensure that the carbon brush moves freely in its holder.

Examine the contact breaker. The contacts must be quite free from grease or oil. If they are burned or blackened, clean them with very fine carborundum stone or emery cloth, then wipe with a petrol-moistened cloth. Cleaning is facilitated by removing the contact breaker lever. To do this slacken the screw securing the slotted end of the contact breaker spring. The contact breaker lever may now be removed from its pivot. After cleaning, check the contact breaker setting. Turn the engine by hand until the contacts show the maximum opening. This should measure 0.014" to 0.016". If the measurement is incorrect, keep the engine in the position giving maximum opening, slacken the two screws securing the fixed contact plate and adjust its position by means of the eccentric adjusting screw to give the required gap. Tighten the screws. Recheck the setting for other positions of the engine giving maximum opening.

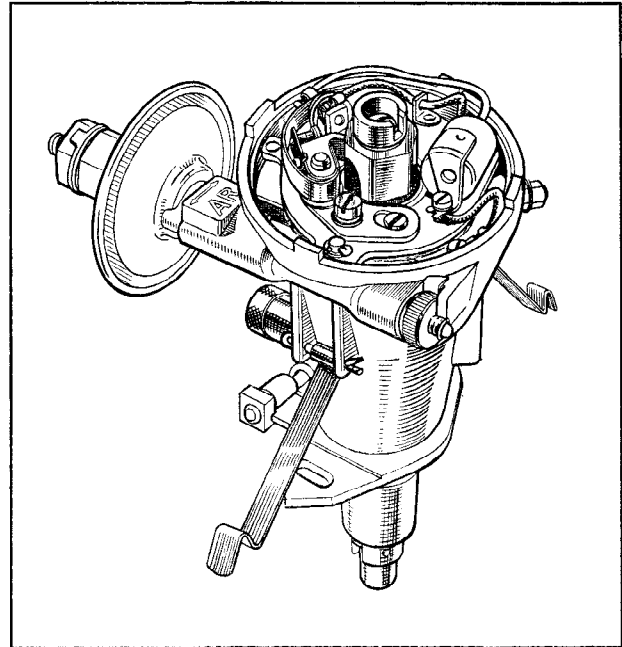


Fig. 3
Contact breaker assembly

DESIGN DATA

3.
(a)

	Open Period	Closed Period	Firing Angles
6 cyl. models	$25^{\circ} \pm 2^{\circ}$	$35^{\circ} \pm 2^{\circ}$	$0^{\circ}, 60^{\circ}, 120^{\circ}, \text{etc.}, \pm 1^{\circ}$
4 cyl. models	$30^{\circ} \pm 3^{\circ}$	$60^{\circ} \pm 3^{\circ}$	$0^{\circ}, 90^{\circ}, 180^{\circ}, 270^{\circ}, \pm 1^{\circ}$

(b) Contact breaker gap 0.014" — 0.016".

(c) Contact breaker spring tension, measured at contacts 20—24 oz.

(d) Capacitor: 0.2 microfarad.

(e) Automatic timing control: the operating range of the mechanism varies with each car model, and is given in the Test Data published by the Lucas Service Bulletin Department. The performance of the control may be checked against these figures if the requisite equipment is available.

(f) For current consumption, etc., of ignition coils, see SECTION C-8.

4. SERVICING

Before starting to test, make sure that the battery is not fully discharged, as this will often produce the same symptoms as a fault in the ignition circuit.

(a) TESTING IN POSITION TO LOCATE CAUSE OF UNEVEN FIRING

Run the engine at a fairly fast idling speed. Short circuit each plug in turn with, say, the blade of

an insulated screwdriver or a hammer head placed across the terminal to contact the cylinder head. Short circuiting the defective plug will cause no noticeable change in the running note. On the others, however, there will be a pronounced increase in roughness.

Having thus located the defective cylinder, stop the engine and remove the cable from the sparking plug terminal.

Re-start the engine and hold the cable end about $\frac{3}{16}$ " from the cylinder head. If sparking is strong and regular, the fault lies with the sparking plug, and it should be removed, cleaned and adjusted, or a replacement fitted.

If, however, there is no spark, or only weak irregular sparking, examine the cable from the plug to the distributor cover for deterioration of the insulation, renewing the cable if the rubber is cracked or perished.

Clean and examine the distributor cover for free movement of the carbon brush. If a replacement brush is necessary, see that the correct type is used;



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the standard non-resistive brush is too short for use with this distributor and will not make contact with the rotating electrode. If tracking has occurred, indicated by a thin black line, usually between two or more electrodes, a replacement distributor cover must be fitted.

(b) TESTING IN POSITION TO LOCATE CAUSE OF IGNITION FAILURE

Spring back the clips on the distributor head and remove the moulded cover. Lift off the rotor, carefully levering with a screwdriver if necessary.

Check the contacts for cleanliness and correct gap setting as described in Para. 2(b).

If an ammeter is fitted, switch on the Ignition and slowly crank the engine. Observe the reading, which should rise and fall with the closing and opening of the contacts if the low tension wiring is in order. When the reading does not fluctuate, a short circuit or contacts remaining closed is indicated. No reading indicates a broken or loose connection in the low tension wiring or badly adjusted or dirty contacts.

(c) LOW TENSION CIRCUIT—FAULT LOCATION

If it is determined by the eliminating check (b) above, that the fault lies in the low tension circuit, switch on the ignition and turn the engine until the contact breaker points are fully opened.

Refer to the wiring diagram and check the circuit with a volt meter (0—20 volts) between the following points (which refer to a normal ignition layout) and a good earth.

If the circuit is in order, the voltage reading should be approximately 6 or 12 volts, according to the system. No reading indicates a damaged cable or loose connections or a breakdown in the section under test.

(i) BATTERY TO AMMETER

Connect the voltmeter between the ammeter terminal "B" and a good earth on the chassis. In some systems this section of the circuit is made by way of the starter switch, in which case a voltage check should also be made at the battery connection to the switch. No reading indicates a faulty lead or loose connection.

(ii) AMMETER

Check the voltage to earth at the other ammeter terminal "A" and earth. No reading indicates a faulty ammeter.

(iii) AMMETER TO CONTROL BOX

Connect the voltmeter between the control box terminal "A" and earth. No reading indicates a faulty lead or loose connection.

(iv) CONTROL BOX

Check the voltage to earth at the control box terminal "A1." No reading indicates a broken connection in the series winding.

(v) CONTROL BOX TO IGNITION SWITCH

Connect the voltmeter between the ignition switch terminal, to which the lead from the control box is connected, and a good earth. No reading indicates a faulty lead or loose connection.

(vi) IGNITION SWITCH

Check the voltage between the other terminal of the ignition switch and earth. No reading indicates a fault in the switch.

(vii) IGNITION SWITCH TO IGNITION COIL

Remove the lead from the ignition coil "SW" terminal, and connect the voltmeter between the free end of the cable and earth.

On systems incorporating control box models RF91 and RF95 this portion of the circuit is made by way of the control box "A3" terminal, and a voltage check should be made at this point also.

Re-make the connection to the coil.

(viii) IGNITION COIL

Disconnect the lead from the "CB" terminal of the coil and connect the voltmeter between the "CB" terminal and a good earth. No reading indicates a fault in the primary winding of the coil, necessitating coil replacement. If, however, the correct reading is obtained, re-make the cable connection to the coil terminal.

(ix) IGNITION COIL TO DISTRIBUTOR

Disconnect the low tension cable to the distributor and connect the voltmeter between the end of the cable removed and earth. No reading indicates a faulty lead or loose connection. Re-connect the cable to the distributor.

(x) CONTACT BREAKER AND CAPACITOR

Connect the voltmeter across the contact points. If no reading is obtained, re-check with the capacitor disconnected. If a reading is now given, the capacitor is faulty and must be replaced.

(xi) Measure the contact breaker spring tension. This should be 20-24 oz., measured at the contacts.

(d) HIGH TENSION CIRCUIT

If, after carrying out these tests, the fault has not been located, remove the high tension lead from the centre terminal of the distributor cover. Switch on the ignition and turn the engine until the contacts close. Flick open the contact breaker lever whilst the high tension lead from the coil is held about $\frac{3}{16}$ " from the cylinder block. If the ignition equipment is in good order, a strong spark will be obtained. If no spark occurs, a fault in the circuit of the secondary winding of the coil is indicated and the coil must be replaced.

The high tension cables must be carefully examined, and replaced if the rubber insulation is cracked or



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perished, using 7 m.m. rubber covered ignition cable. To fit cables to ignition coils or distributor covers with vertical outlets, pass the cable through the knurled moulded terminal, bare about $\frac{1}{4}$ " of the end of the cable, thread the wire through the brass washer (removed from the original cable) and bend back the strands. Finally screw the moulded terminal into the coil moulding or distributor cover.

To make connections to the terminals in distributor covers having horizontal outlets, remove the cover and slacken the screws on the inside of the moulding. Cut the cables to the length required and push firmly home in the holes in the moulding. Tighten the screws, which will pierce the rubber insulation to make good contact with the cable core. The connection to the centre terminal is made accessible by removing the small carbon brush.

The cables from the distributor to the sparking plugs must, of course, be connected in the correct firing order.

(e) CONTACT BREAKER MECHANISM

Check and adjust as described in para. 2.

Ensure that the moving arm moves freely on the pivot. If sluggish, remove the arm and polish the pivot pin with a strip of fine emery cloth. Smear the pivot with a little Mobilgrease No. 2 before replacing the lever.

(f) DISMANTLING

When dismantling, carefully note the positions in which the various components are fitted, in order to ensure their correct replacement on reassembly. If the driving dog or gear is offset, or marked in some way for convenience in timing, note the relation between it and the rotor electrode and maintain this relation when reassembling the distributor.

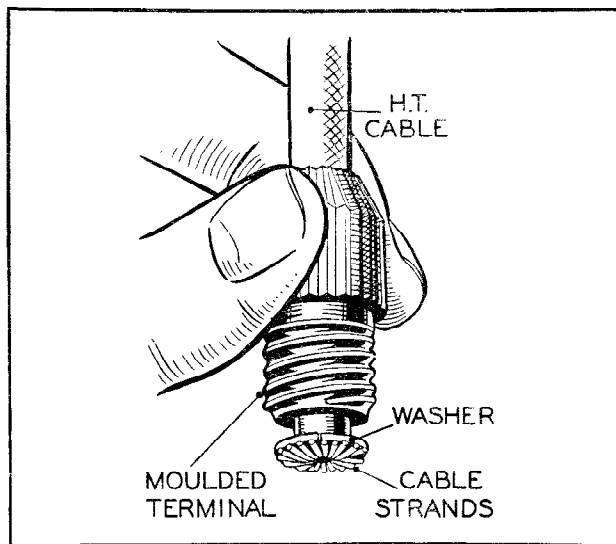


Fig. 4

Fitting moulded terminal to high tension cable (ignition coil, or distributor cover with vertical outlets)

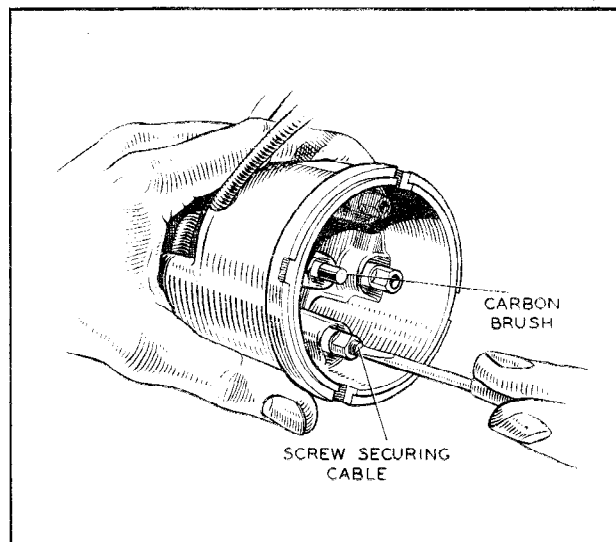


Fig. 5

Making connections to distributors with horizontal high tension cable outlets

(i) Spring back the securing clips and remove the moulded cover. Lift the rotor arm off the spindle, carefully levering with a screwdriver if it is tight.

Slacken and remove the screw securing the end of the contact breaker spring, taking care not to lose the two fibre insulating washers. Lift off the contact breaker lever and the fibre washer beneath it.

Remove the two screws securing the fixed contact plate, and remove the plate. (See notes on Page 6, Replacement Contacts). Withdraw the single capacitor securing screw and remove the capacitor.

(ii) Remove the two screws at the edge of the contact breaker base plate.

Remove the split pin securing the vacuum unit link to the rotating contact breaker plate, and pull the connection from the low tension terminal out of its fibre clip.

Lift the contact breaker base assembly out of the distributor body.

(iii) The contact breaker base assembly can be dismantled by removing the circlip and star washer under the lower plate.

(iv) Remove the circlip on the end of the micrometer timing screw, and turn the micrometer nut until the screw and the vacuum unit assembly is freed. Take care not to lose the ratchet and coil springs fitted under the micrometer nut.

(v) Take out the screw inside the cam and remove the cam and cam foot. The automatic timing control weights, springs and toggles can now be lifted off the action plate.



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(vi) BEARINGS

Model DM distributors have bearings forming an integral part of the cast iron shank, and no appreciable wear should occur during the normal service life of the distributor provided lubrication is carried out as specified.

NOTE: If it is necessary to remove the shaft and action plate assembly of model DM distributors, first unscrew the lubricator on the side of the body and remove the spring and felt pad. The bearing bush at the bottom of the shank of a model DMB distributor can be driven out with a suitable punch. The ball bearing at the top of the shaft can be removed by means of a shouldered mandrel locating on the inner journal of the bearing.

(g) REASSEMBLY

(i) If the bearings have been removed (model DMB only) the distributor must be assembled with new bearings fitted. Press the ball bearing into its housing at the top of the shank, using a shouldered mandrel that locates on both inner and outer bearing journals. The bearing bush at the lower end of the shank must also be fitted using a shouldered mandrel.

Before fitting the bearing bush it should be allowed to stand completely immersed in thin oil for at least 24 hours. In an emergency the period of immersion may be shortened to 2 hours by heating the oil to 100°C.

(ii) Place the distance collar over the shaft, fit the shaft into its bearings and (model DM only) replace the lubricator.

(iii) Refit the vacuum unit into its housing and replace the springs, milled adjusting nut and securing circlip.

(iv) Reassemble the automatic timing control. See that the springs are not stretched or damaged, and that there is a washer in position under each toggle. Place the cam and cam foot assembly over the shaft, engaging the projections on the cam foot with the toggles, and fit the securing screw.

(v) Moisten the felt pad underneath the rotating contact breaker plate with a little thin machine oil.

Fit the rotating plate to the contact breaker base plate and secure with the star washer and circlip. Refit the contact breaker base assembly into the distributor body. Engage the link from the vacuum unit with the bearing bush in the rotating plate, and secure with the split pin. Insert the two base plate securing screws, one of which also secures the earthing lead from the contact breaker plate.

(vi) Fit the capacitor into position. The eyelet on the contact breaker earthing lead is held under its fixing screw. Place the fixed contact plate in position and secure lightly with the two securing screws. One plain and one spring washer must be fitted under each of these screws.

Reassemble the terminal screw and eyelets on the fixed contact plate. Take care to position the two insulating washers correctly, so that the eyelets and the screw cannot touch the fixed contact plate. Fit the cable from the low tension terminal into the fibre clip, leaving the cable slack enough to permit free movement of the contact breaker.

Place the fibre washer over the contact breaker pivot and refit the contact breaker lever and spring. Set the gap to a maximum opening of 0.014"—0.016" and tighten the securing screws of the fixed contact plate.

REPLACEMENT CONTACTS

If the contacts are so badly worn that replacement is necessary, they must be renewed as a pair and not individually. The contact gap must be set to 0.014"—0.016"; after the first 500 miles running with the new contacts in position the setting should be checked and the gap reset to 0.014"—0.016". This procedure allows for the initial "bedding-in" of the heel of the new contact breaker lever.

(vii) Finally fit the rotor arm into position, locating the register and pushing it fully home, and refit the moulded distributor cover.

(viii) Before refitting model DM distributors to the vehicle fill the cap of the lubricator on the distributor body with Acheson's graphited grease grade GC, or its equivalent.

