SECTION C-7
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# LUCAS

*Quality*

# EQUIPMENT

VOLUME 2

# WORKSHOP INSTRUCTIONS

## DISTRIBUTOR

## MODEL D4A8

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# DISTRIBUTOR

## MODEL D4A8

### 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 from the camshaft. Current flowing through the primary or low tension winding of the coil creates a strong magnetic field about it.

This current is periodically interrupted by cam-operated contact breakers, and the subsequent collapse of the magnetic field linked with 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 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.

This distributor is designed for use with eight cylinder engines, and is of the double lever type ; one contact breaker serving to make, and the other to break, the low tension circuit. The distributor is flange mounted, and may be found mounted either horizontally or vertically.

Mounted on the distributor driving shaft immediately beneath the contact breakers, is an automatic timing control mechanism. This consists of a pair of spring-loaded governor weights, linked by lever action to the contact breaker cam. At low engine speeds, the springs maintain 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, advancing the

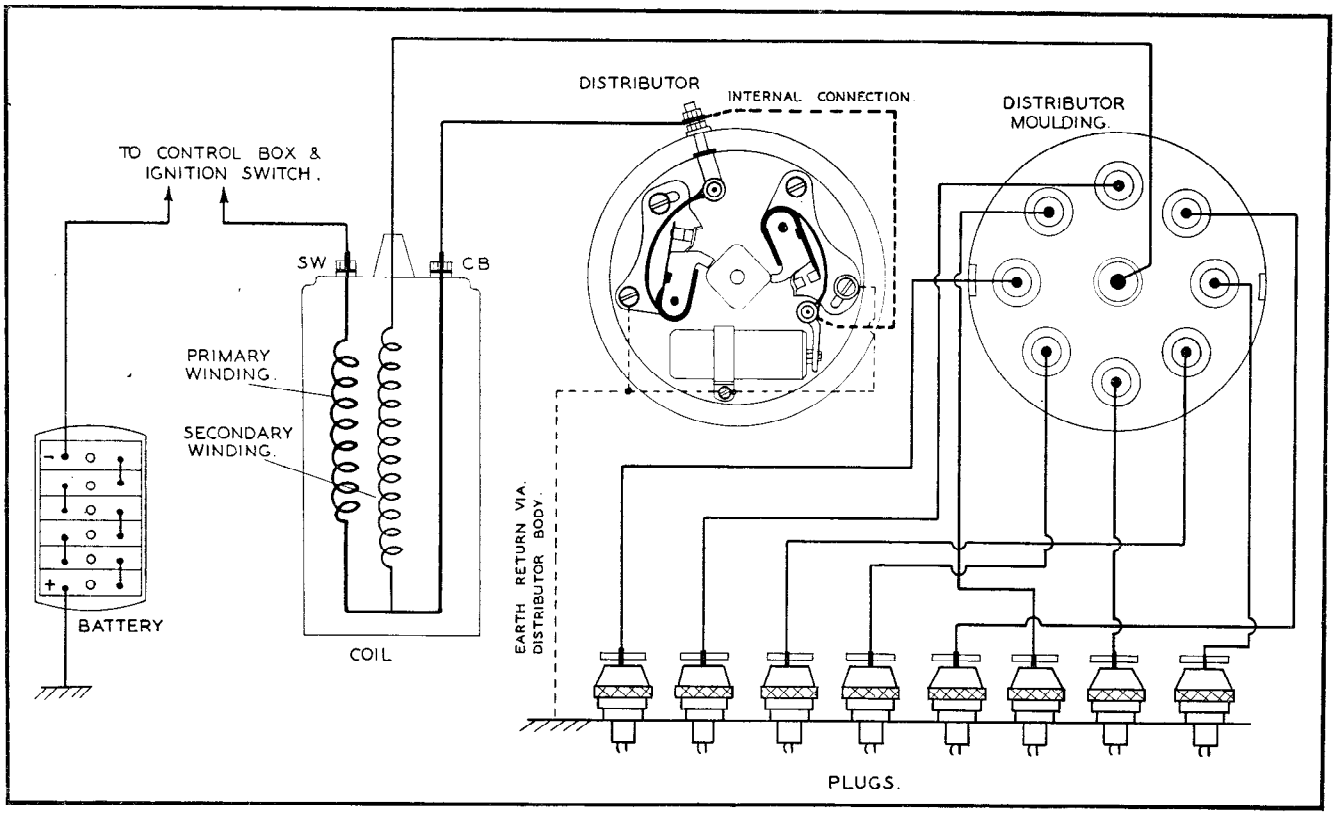


Fig. 1.
Typical coil ignition circuit

cam (and thereby the spark) to suit engine conditions at the higher speeds. A further timing control is provided by a vacuum brake connected to the inlet manifold, which bears on a member of the centrifugal control and varies the timing under part-throttle conditions to ensure maximum efficiency.

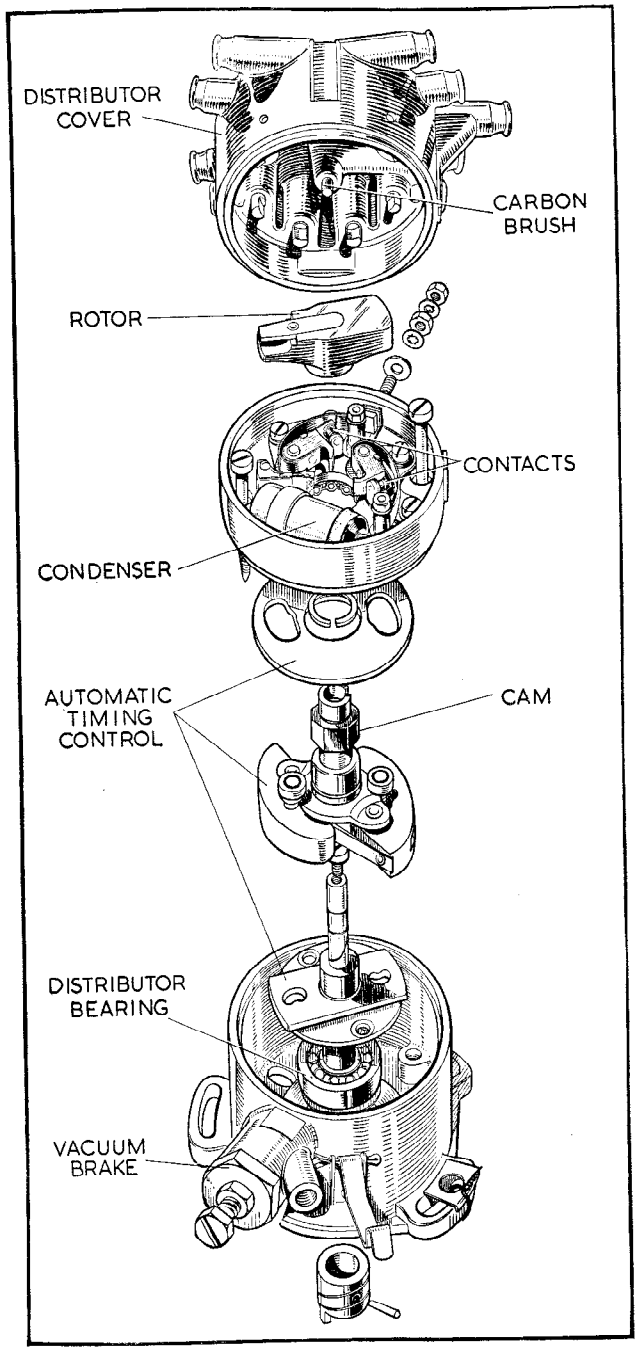


Fig. 2.
Distributor, dismantled

## 2. ROUTINE MAINTENANCE

### EVERY 3,000 MILES

### LUBRICATION.

Apply a small amount of clean engine oil to the felt cam lubricator, if fitted. Apply **one drop** of clean engine oil to the top of the pivots on which the contact breakers work. Lift the rotor arm from the top of the spindle by pulling it off vertically and add one drop of thin machine oil to lubricate the cam bearing.

Do not remove the screw exposed to view as it is drilled to enable the oil to pass through. Take care to refit the rotor arm correctly, pushing it on to the shaft as far as it will go.

Further lubrication is unnecessary, as the bearings are packed with grease before leaving the works.
It is very important to avoid over-lubricating the distributor.

### EVERY 6,000 MILES

### CLEANING

Wipe the inside and outside of the moulding with a soft dry cloth, paying particular attention to the spaces between the metal electrodes. See that the small

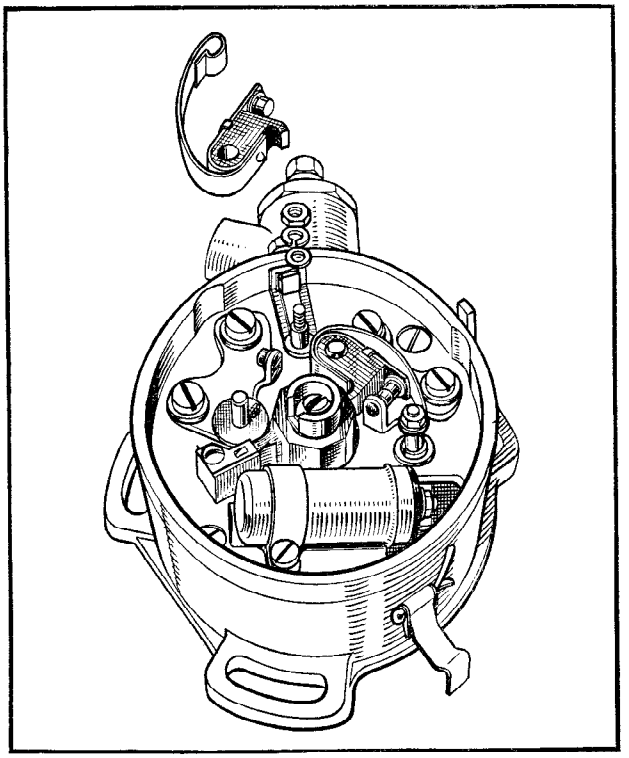

Fig. 3.
Removal of moving contact

carbon brush on the inside of the moulding 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 levers carrying the moving contacts are removed. To do this, remove the nuts, spring and plain washers securing the ends of the springs and lift off the levers. After cleaning, check the contact breaker setting.

### CONTACT BREAKER ADJUSTMENT

Turn the engine by hand until one pair of contacts are seen to be fully opened, and check the gap with a gauge having a thickness of ·014″ — ·016″. 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.

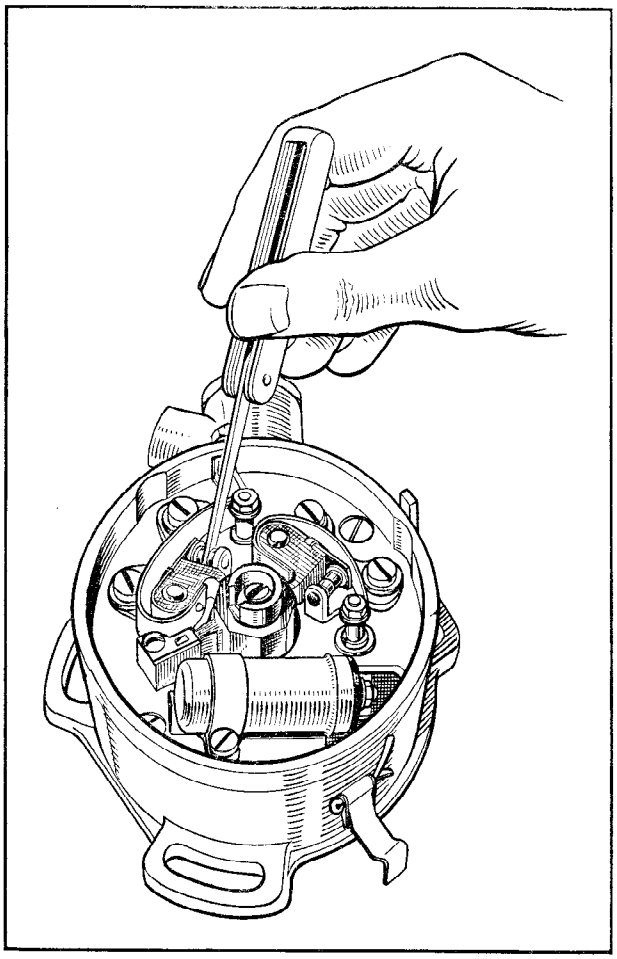

Fig. 4.
Checking the contact breaker setting

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. Recheck the gap for other positions of the engine giving maximum contact opening. Check the other pair of contacts in a similar manner.

## 3. DESIGN DATA

(a) Contact breaker gap : 0·014″ — 0·016″.

(b) Firing angles : 0°, 45°, 90°, etc., ± 1°.

(c) Open period : 13° ± 2° Closed period : 32° ± 2°.

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

(e) Condenser capacity : 0·2 microfarad.

(f) Automatic timing control : the operating range of the mechanism varies with each model of car, and is given in the Test Data section of the appropriate C.E. list. The performance of the control can be checked against these figures if the requisite equipment is available.

(g) For current consumption figures, 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 RUNNING

Run the engine at a fairly fast idling speed.
Short-circuit each plug in turn to the cylinder block with an insulated screwdriver or the head of a hammer. 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.

Restart the engine and hold the end of the cable about $\frac{3}{16}$″ from the cylinder head. If the spark 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 and irregular sparking, examine the cable from the plug to the distributor for deterioration of the insulation, renewing the cable if the rubber is cracked or perished.

Clean and examine the distributor moulded cap for free movement of the carbon brush. If tracking has occurred (indicated by a thin black line, usually between two or more electrodes) the distributor cap must be replaced.

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

Spring back the clips on the distributor head and remove the moulded cap. 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(a). If an ammeter is fitted, switch on the ignition and turn the engine. Observe the ammeter reading, which should rise and fall with the opening and closing of the contacts if the low tension wiring is in order. If 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 winding, or badly adjusted or dirty contacts.

### (c) LOW TENSION CIRCUIT — FAULT LOCATION

If it is determined that the fault lies in the low tension circuit, switch on the ignition and turn the engine until both sets of contact breaker points are separated.

Refer to the wiring diagram and check the circuit with a voltmeter (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 12 volts. No reading indicates a damaged cable or loose connections, or a breakdown in the component under test.

*(i)* BATTERY TO AMMETER
Connect the voltmeter between the ammeter "B" terminal 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 first be made at the battery connection to the switch.

*(ii)* Check the voltage between the other ammeter terminal "A" and earth.

*(iii)* AMMETER TO CONTROL BOX
Voltmeter connected between control box "A" terminal and earth.

*(iv)* CONTROL BOX
Voltmeter connected between control box "A1" terminal and earth. No reading indicates a break in the control box series winding.

*(v)* CONTROL BOX TO IGNITION SWITCH
Voltmeter connected between earth and terminal of ignition switch to which the cable from control box is connected.

*(vi)* IGNITION SWITCH
Voltmeter connected between earth and the other terminal of the ignition switch. 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 boxes 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.
Remake the connection to the coil.

*(viii)* IGNITION COIL
Disconnect the lead from the "CB" terminal of the coil, and connect the voltmeter between earth and the "CB" terminal. No reading indicates a fault in the primary winding of the coil, and the coil must be replaced. If, however, the correct reading is obtained, remake the cable connection to the terminal.

*(ix)* IGNITION COIL TO DISTRIBUTOR
Disconnect the low-tension cable to the distributor, and connect the voltmeter between the end of the cable and earth.
Remake the connection after testing.

*(x)* CONTACT BREAKER AND CONDENSER
Connect the voltmeter across the contact points. If no reading is obtained, re-check with the condenser removed. If a reading is now given, the condenser is faulty and must be replaced.
Measure the contact breaker spring tension. This should be 20 — 24 oz., measured at the contacts.

### (d) HIGH TENSION CIRCUIT

If, after carrying out the about tests, the fault has not been located, remove the high tension lead from the centre terminal of the distributor. Switch on the ignition and turn the engine until one pair of contacts close. Hold the high tension lead from the coil about $\frac{3}{16}$" from the cylinder block, and flick open the contact breaker points. If the ignition equipment is in good order, a strong spark should be obtained. If no spark occurs, a fault in 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 perished, using 7 m.m. rubber-covered ignition cable. The cables to the sparking plugs are provided with sleeves, which are a push fit in the distributor outlets.

The sleeves must be pushed well home into the cap, and the plugs must of course be connected in the correct firing order.

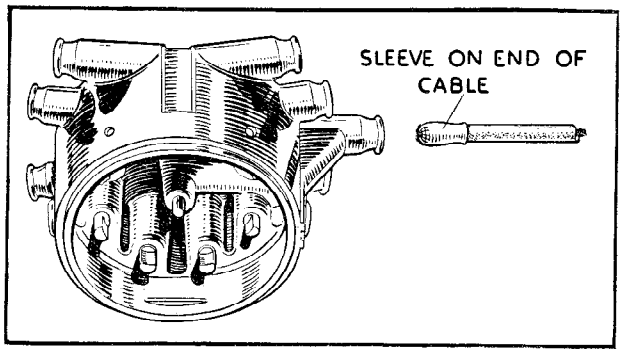


Fig. 5.
High tension cable connections

(e) CONTACT BREAKER MECHANISM

Check and adjust as described in Para. 2 above. Ensure that the moving arms move freely on the pivots. If sluggish, remove the arms and polish the pivot pins with a strip of fine emery cloth. Replace the arms and lubricate with a spot of clean engine oil.

(f) DISMANTLING

(*i*) Spring back the securing clips and remove the moulded distributor cap.

(*ii*) Lift the rotor off the top of the shaft. If tight, it may be levered off with a screwdriver.

(*iii*) To remove each pair of contacts, unscrew the nut securing the end of the spring, lift off the spring and plain steel washers and remove the contact-breaker lever. Lift the insulating washer from the post on the fixed contact plates, Remove the plate by taking out the two screws, with spring and plain steel washers, securing it.

(*iv*) Take out the screw from the condenser clip, unscrew the terminal nut, lift off the spring and plain washers and remove the condenser.

(*v*) Unscrew and remove the two screws fitted at the edge of the contact breaker base. The contact breaker base can then be removed from the distributor body. The ball race forms an integral part of the base, and cannot be removed.

(*vi*) Remove the screw from the top of the cam, and remove the cam and upper member of the automatic timing control.

N.B.—To do this, it will be necessary to push back the plunger of the vacuum brake. **It is essential that the brake pad is not damaged, that the control spring is not strained nor the adjusting screw disturbed,** as otherwise the characteristics of the automatic timing control will be affected.

(*vii*) Drive out the pin securing the driving dog and remove the dog by means of an extractor, or alternatively drive out the shaft from the dog and the bearing using a brass or copper drift. Support the body of the distributor while removing the shaft. Lift the distance collar off the shaft.

(*viii*) To remove the lower bearing, take out the three bolts from the bearing retaining plate, lift off the plate and press the bearing from its housing, using a shouldered mandrel which bears on the inner journal of the bearing.

(g) RE-ASSEMBLY

(*i*) Ensure that all components are clean. Pack the bearings with high melting point grease.

(*ii*) Press the lower bearing into its housing in the distributor base. A tool should be used that will bear on both inner and outer journals of the bearing. Replace and secure the bearing retaining plate.

(*iii*) Place the distance collar over the shaft. Press the shaft into the bearing until the distance collar bears against the inner journal.

(*iv*) Place the cam and timing control assembly on the shaft, making sure that the spigots on the weights engage correctly with the holes in the action plate.

(*v*) Replace the contact breaker base, and secure by means of the two retaining screws.
N.B.—If it is necessary to renew the contact breaker base, ensure that the bearing is of the correct size. Bearings of the same size are identified by means of a coloured mark on the underside of the base.

(*vi*) Place the end of the connecting strip over the condenser terminal post, refit the spring and plain washers and tighten the terminal nut. Secure the condenser to the contact breaker base with its screw and spring washer.

(*vii*) Replace the fixed contact plates, and lightly tighten the screws on to their plain and spring washers. Place the insulating washers over the pivot pins and fit the contact breaker arms on the pivots.

(*viii*) Fit the spring ends, washers and nuts over the fixing posts and tighten the nuts.

(*ix*) Adjust the contact breaker gaps, as described in Para. 2 above.
N.B.—If it is necessary to renew either pair of contacts, a replacement set comprising both fixed and moving contacts must be fitted.

(*x*) Fit the rotor on to the spindle and push fully home.

(*xi*) Fit the distributor cover moulding and secure by means of the spring clips.