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LUCAS

Quality

EQUIPMENT

VOLUME 2

WORKSHOP INSTRUCTIONS

DISTRIBUTORS

MODELS
DVX, DVY and DVZ

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DISTRIBUTORS

MODELS DVX, DVY AND DVZ

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, and 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.

The design of the automatic timing control constitutes the only point of difference between models DVX, DVY and DVZ. The controls fitted to models DVX and DVY are similar in appearance, but the latter incorporates diecast lead control weights and the former steel weights. Model DVZ employs a slightly different design of control (see Fig. 8).

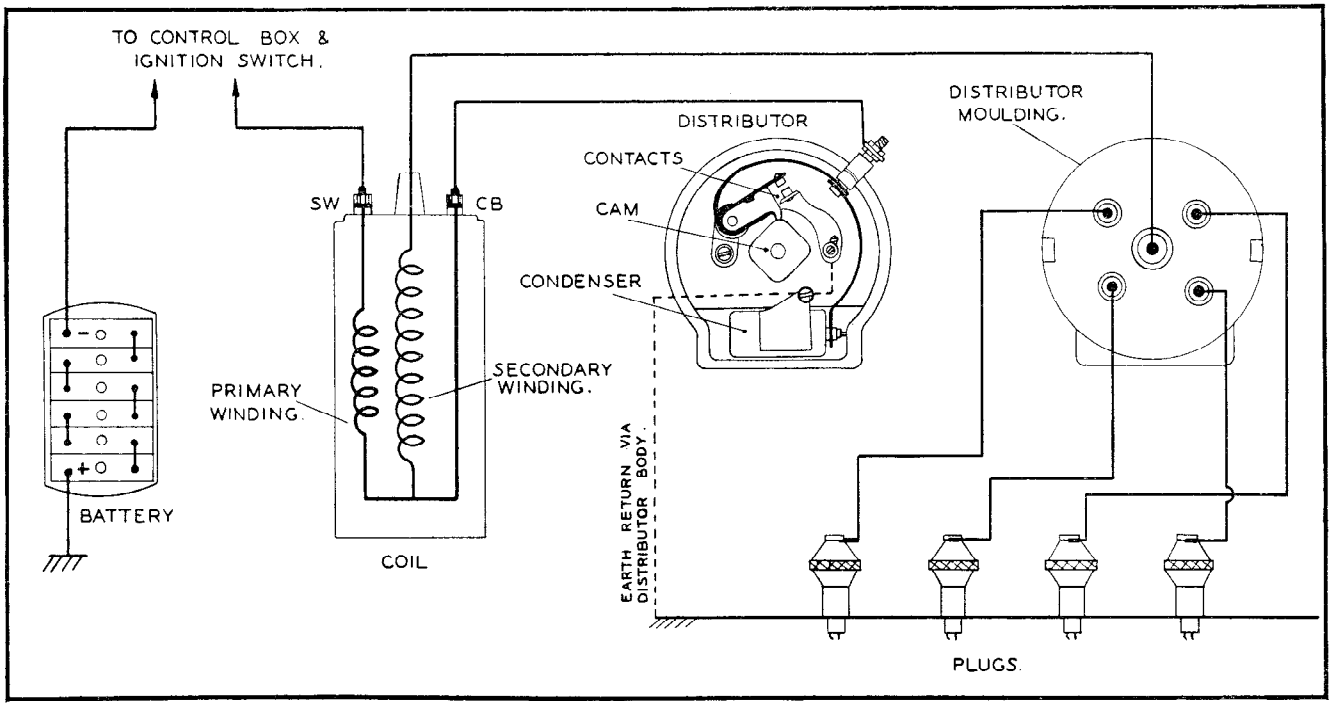

Fig. 1.
A typical coil ignition circuit

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 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 usually also a micrometer 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.

2. ROUTINE MAINTENANCE

In general, lubrication and cleaning constitute normal maintenance procedure.

(a) LUBRICATION — EVERY 3,000 MILES

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

Replenish the oil well with one or two teaspoonsful of good grade engine oil : this lubricates the automatic advance mechanism and also the distributor shaft.

Smear the cam and the pivot on which the contact breaker works with 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 is either drilled or affords a clearance to permit passage of oil.

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

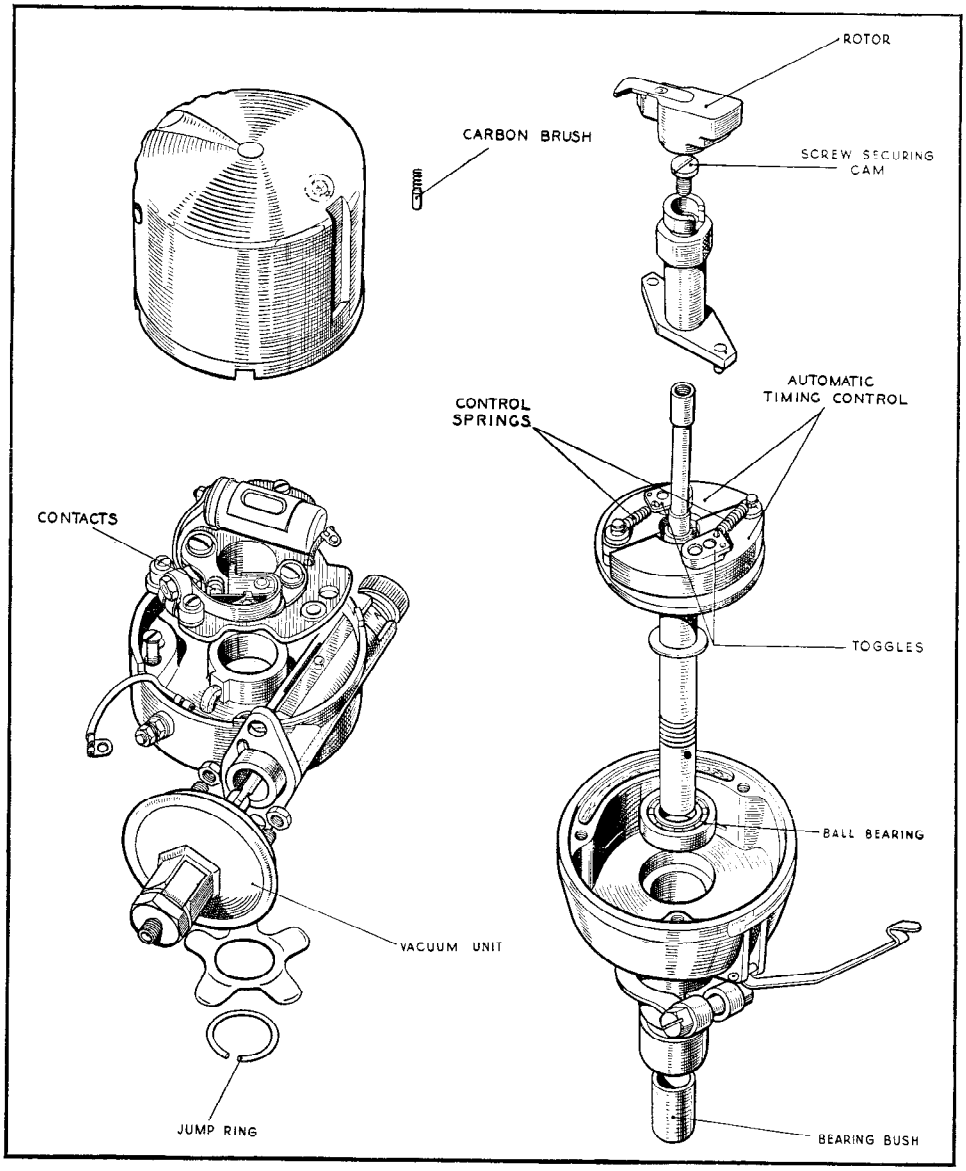

Fig. 2.
Distributor, dismantled

(b) CLEANING — EVERY 6,000 MILES

Thoroughly clean the moulded distributor cap, inside and out, with a soft dry cloth, paying particular attention to the spaces between the metal electrodes. Ensure that the small 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 nut on the moulded terminal block and lift out the 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 0·010″ to

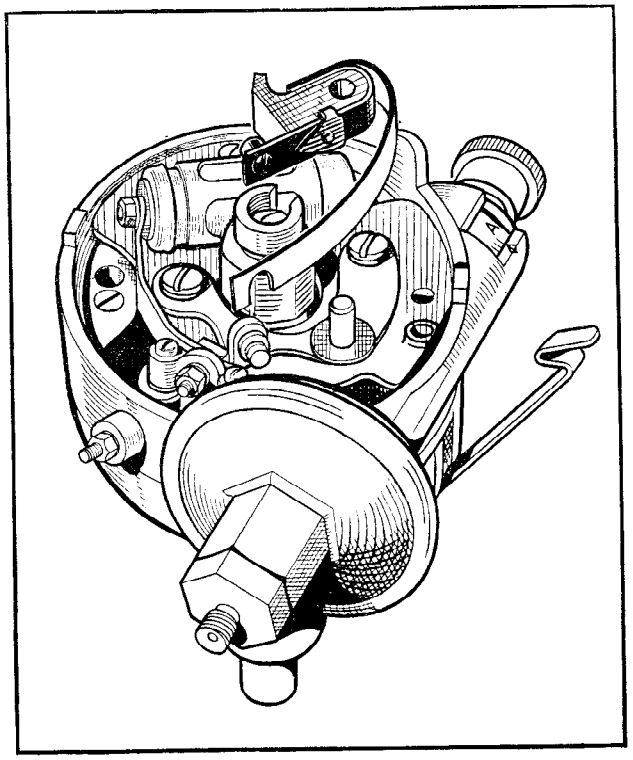

Fig. 3.
Removal of moving contact

0·012″. 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 to give the required gap. Tighten the screws. Recheck the setting for other positions of the engine giving maximum opening.
On the latest four cylinder models a new type asymmetrical cam is fitted, the purpose of which is to minimise "clicking" when the contacts close. As the number of degrees for which the contacts are fully opened is smaller with this type of cam, it is important when checking or adjusting the gap on these distributors to ensure that the rocker heel of the contact breaker is actually at the highest point of the lobe on the cam.

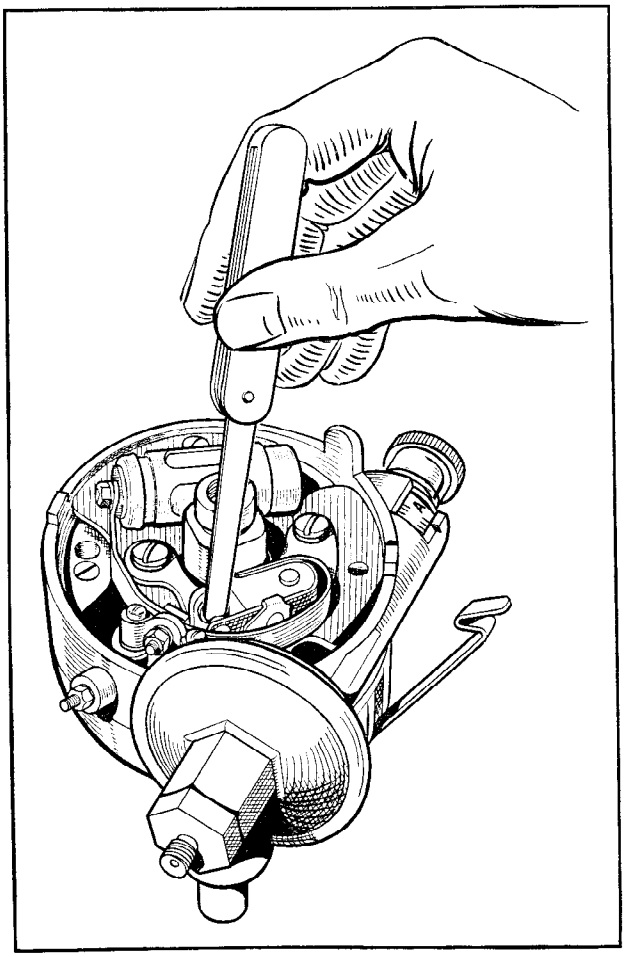

Fig. 4.
Checking the contacts

3. DESIGN DATA

(a)

	Open Period	Closed Period	Firing Angles
6 cyl. models	22° ± 4°	38° ± 4°	0°, 60°, 120°, etc., ± 1°
4 cyl. models (symmetrical cam)	45° ± 4°	45° ± 4°	0°, 90°, 180°, 270°, ± 1°
4 cyl. models (asymmetrical cam)	41° ± 4°	49° ± 4°	0°, 90°, 180°, 270°, ± 1°

(b) Contact breaker gap, 0.010″ to 0.012″.

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

(d) Condenser capacity : 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 section of the appropriate C.E. list. 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.

Restart 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 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, a replacement distributor cap 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 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(b).

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

Refer to the wiring diagram (published in the appropriate C.E. list) 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 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 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 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, remake 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. Reconnect the cable to the distributor.

(*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.

(*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. Switch on the ignition and turn the engine until the contacts close. Flick open the contact breaker lever while 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.

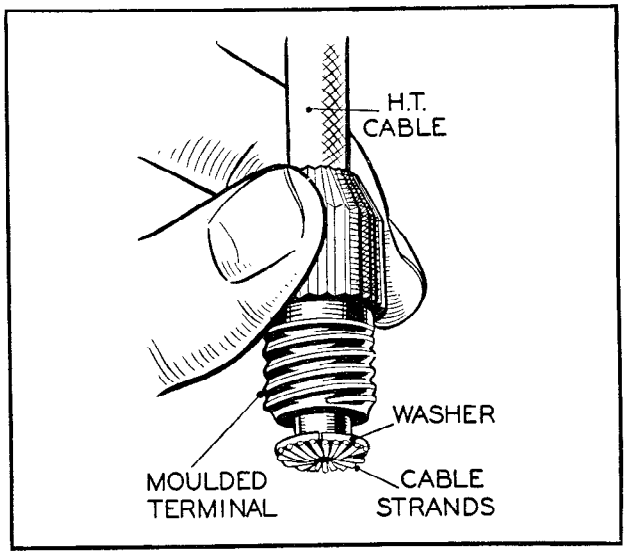

Fig. 5.
Fitting terminal nut to high tension cable (ignition coil, and distributor with vertical outlets)

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. To fit cables to ignition coils and distributors with vertical outlets, pass the cable through the knurled, moulded nut, 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 nut into its terminal.

To make connections to the terminals in distributor caps having horizontal outlets, remove the cap 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.

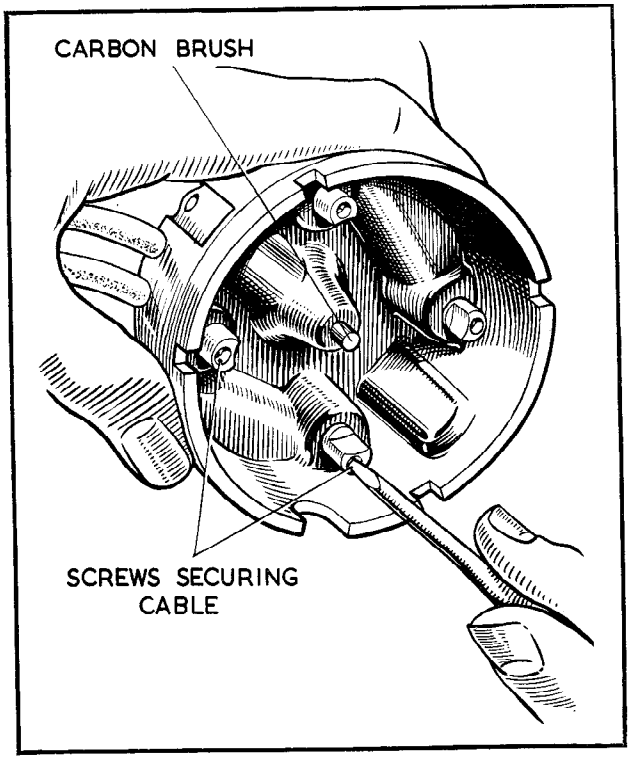

Fig. 6.
Making connections to distributors with horizontal high tension cable outlets

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 above. 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. Replace the arm and lubricate with a spot of clean engine oil.

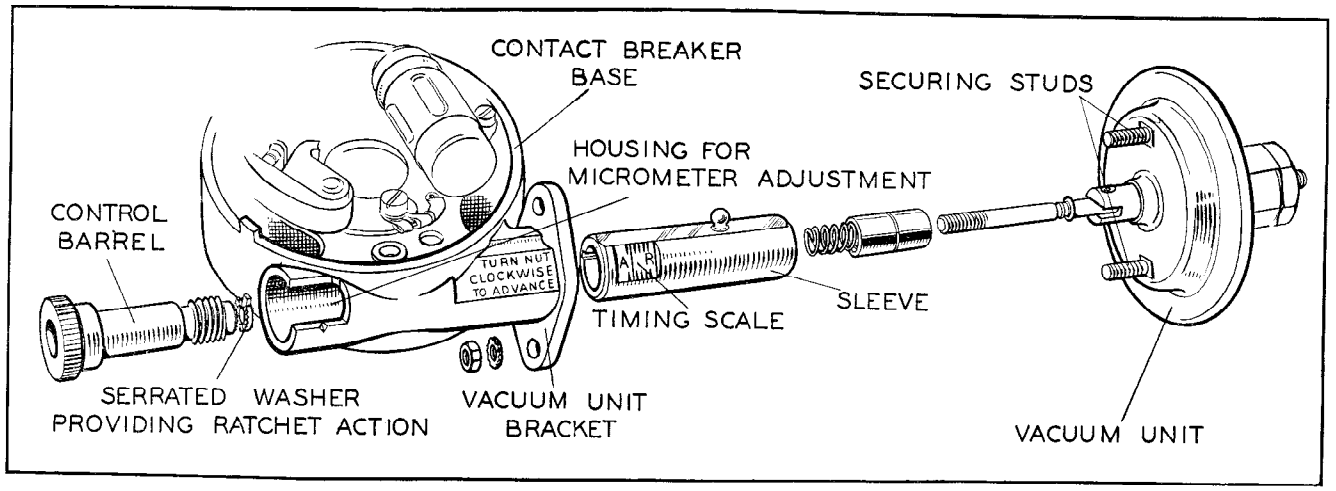

Fig. 7
Vacuum control

(f) DISMANTLING

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

(*i*) Spring back the securing clips and remove the moulded cap. Lift the rotor arm off the top of the spindle. If tight, carefully lever off with a screwdriver. Remove the nut on the moulded terminal block and lift off the end of the contact breaker spring. The contact breaker lever can now be lifted from its pivot. Lift the insulating washer from the pivot. Remove the two screws, together with the spring and plain steel washers, securing the fixed contact plate, and remove the plate.

Unscrew the screw from the condenser band clip. Unscrew the terminal nut, lift off the spring washer and remove the condenser and connecting strip.

(*ii*) Undo the three screws fitted at the edge of the contact breaker base casting and lift them out. The screws are accessible through the apertures cut in the contact breaker plate. The contact breaker base can then be removed from the body of the distributor. Remove the jump ring from the underside of the contact breaker base, lift off the star-shaped spring and slide the contact breaker plate out of the base, first withdrawing the screw securing the earth connection to the base.

(*iii*) Undo the two nuts from the studs securing the vacuum unit to its bracket, pull the unit off its seating so that the studs are clear of the fixing bracket and rotate the vacuum unit to unscrew the connecting rod from the control barrel. Take care not to mislay the spring and serrated washer inside the barrel.

Unscrew the control barrel from its sleeve and remove it. The sleeve can now be slid out of its housing.

(*iv*) Remove the driving gear or dog from the shaft.

(*v*) Take out the screw from inside the top of the cam spindle and lift off the cam and cam foot. The automatic timing control is then accessible. Before dismantling, carefully note the positions in which the various components are fitted in order that they may be replaced correctly. To remove the automatic timing control and shaft assembly from the distributor,

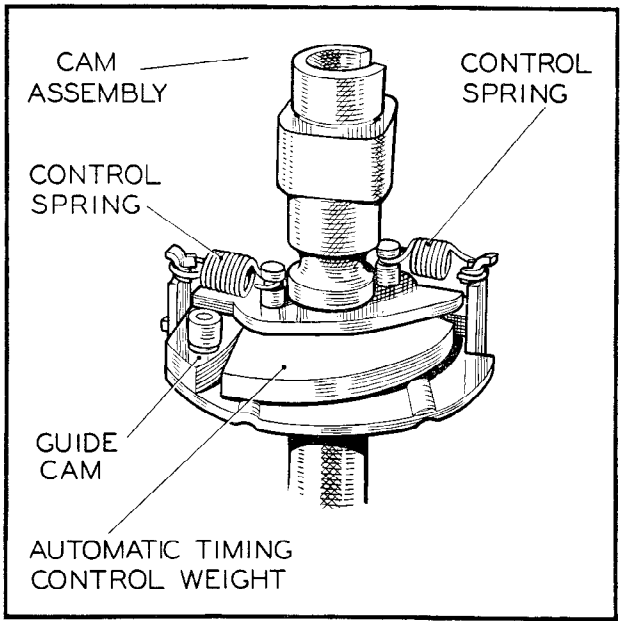

Fig. 8
Automatic timing control as fitted to Distributor Model DVZ

it must be pressed out of its bearing. The bearings must not be disturbed unless they are worn and need replacing. The bearing bush fitted at the lower end of the shank can be removed by driving it out with a suitable punch ; while the ball bearing at the top can be removed by means of a shouldered mandrel locating on the inner journal of the bearing.

(g) REASSEMBLY

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

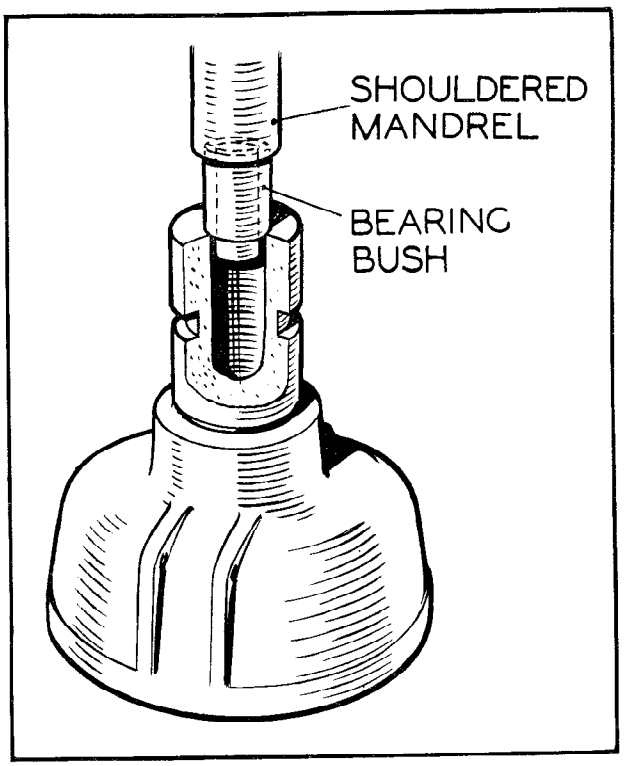

Fig. 9
Replacement of bearing bush

Before fitting the bearing bush it should be allowed to stand completely immersed in thin oil for at least 24 hours.

Place the distance collar over the shaft, fit the shaft in its bearings and replace the driving member.

Assemble the automatic timing control, taking care that the parts are fitted in their original positions and that the control springs are not stretched. Place the cam on its spindle and tighten the locking screw.

(*i*) Fit the sleeve of the micrometer adjustment into its housing in the contact-breaker base, so that the timing scale appears in the window on the right of the body. Screw the control barrel fully home in the sleeve. With the barrel and sleeve pushed as far into the housing as they will go, screw the vacuum unit connecting rod into the barrel, taking care that the serrated washer is correctly fitted.

Position the vacuum unit on its fixing plate so that the two studs fit through the holes provided. Place a spring washer over each stud and secure by tightening the locking nuts.

(*ii*) See that the two cables are connected to the terminal and to the earthing screw in the base casting. Position the contact breaker plate in the base casting so that the peg fitted in the control barrel locates in the hole provided in the contact breaker plate. Place the star-shaped spring over the bearing sleeve on the under side of the base casting and secure by springing the jump ring into its location.

Place the contact breaker base on the distributor body and secure by means of the three screws.

(*iii*) Insert the terminal post on the condenser through the hole in the connector strip. Replace the spring washer and tighten the terminal nut. Secure the band clip by replacing and tightening the fixing screw.

Position the plate carrying the fixed contact on the contact breaker base and secure it by replacing and lightly tightening the two screws, first placing a spring washer and flat steel washer under the heads of each of the screws. The eyelet on the end of the cable connected to the earthing screw must be fitted under the head of one of the screws. Place the insulating washer over the contact breaker pivot pin and position the contact breaker lever on its pivot pin. Insert the square headed bolt through the condenser connecting strip and the hole in the end of the contact breaker spring. Fit the bolt in the moulded junction block, place the eyelet on the end of the connector from the low tension terminal over the bolt, followed by a spring washer and secure by tightening the nut. Adjust the contact breaker setting to give a maximum opening of .010″— .012″.

NOTE : If it becomes necessary to renew the contacts a replacement set comprising fixed and moving contacts must be fitted.

Place the rotor arm on the top of the spindle, locating the register correctly and push it fully home.

Fit the distributor moulding and secure by means of the spring clips.