

# SECTION C

## THE IGNITION SYSTEM

### OF THE MORRIS MINOR (Series MM)

Description and specification of equipment.

- Section No. C.1     Locating the cause of uneven firing.
- Section No. C.2     Testing the low-tension circuit.
- Section No. C.3     High tension cables.
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- Section No. C.7     Removal and replacement of the distributor.
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- Section No. C.9     Dismantling the distributor.
- Section No. C.10    Condenser.
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- Section No. C.12    Reassembling the distributor.
- Section No. C.13    Later distributor mounting.
- Section No. C.14    High-lift cam.

**GENERAL DESCRIPTION**

The ignition equipment is of the coil type and is provided with automatic advance mechanism which relieves the driver of the necessity of adjusting the timing. Its advantages are particularly evident when accelerating and during hill climbing, since the danger of knocking or pinking through excessive advance is very much reduced.

The automatic advance device is housed in the distributor unit, and it consists of a centrifugally operated mechanism by means of which the ignition is advanced in proportion to the engine speed.

Like the rest of the electrical equipment, it is wired on the positive earth system, which results in longer sparking plug life.

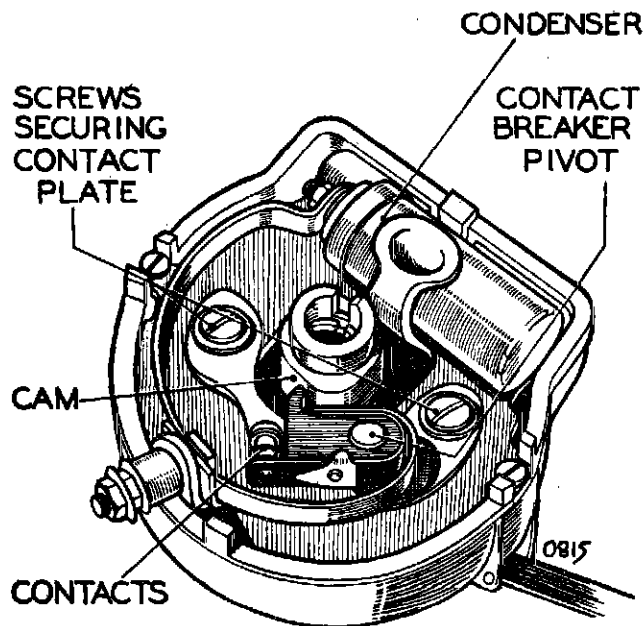


Fig. C.1

*The distributor with the cover and rotor arm removed, showing its components*

**Distributor type**

The distributor is a Lucas Model DKYH4A, Service No. 40056, on early models. These identification marks are stamped on the side of the distributor. When ordering replacements always quote these numbers.

Later models are fitted with a distributor with a high-lift cam bearing Type No. D2AH4/A176 and Service No. 40333 (see Section C.14).

**Ignition coil type**

The coil is a Lucas Model Q12, Service No. 45020. These identification marks are stamped on the base of the ignition coil. When ordering always quote these numbers.

C.2

**Sparking plugs**

The standard sparking plugs for the Morris Minor (Series MM) are Champion L10, 14 mm.,  $\frac{1}{2}$  in. reach.

**Section C.1****LOCATING THE CAUSE OF UNEVEN FIRING****To test with sparking plugs in position**

- (1) Start the engine and set it to run at a fairly fast idling speed.
- (2) Short-circuit each plug in turn by placing a hammer head or the blade of a screwdriver with a wooden or insulated handle between the terminal and the cylinder head. No difference in the engine performance will be noted when short-circuiting the plug in the defective cylinder. Shorting the other plugs will make uneven running more pronounced.
- (3) Having located the cylinder which is at fault, stop the engine and remove the cable from the terminal of the sparking plug. Restart the engine and hold the end of the cable about  $\frac{3}{8}$  in. (4.8 mm.) from the cylinder head.
- (4) If the sparking is strong and regular the fault probably lies in the sparking plug. Remove the plug, clean it, and adjust the gap to the correct setting, or alternatively fit a replacement plug. See Section C.4.
- (5) If there is no spark, or if it is weak and irregular, examine the cable from the sparking plug to the distributor. After a long period of service the rubber insulation may be cracked or perished, in which case the cable should be renewed. Finally, examine the distributor moulded cap, wipe the inside and outside with a clean dry cloth, see that the carbon brush moves freely in its holder, and examine the moulding closely for signs of breakdown. After long service it may have become tracked, that is, a conducting path may have formed between two or more of the electrodes or between one of the electrodes and some part of the distributor in contact with the cap. Evidence of a tracked cap is shown by the presence of a thin black line in the places indicated. A replacement distributor cap must be fitted in place of one that has become tracked.

**Section C.2****TESTING THE LOW-TENSION CIRCUIT****Testing in position**

- (1) Spring back the securing clips on the distributor and remove the moulded cap and rotor. If the

rotor is a tight fit it can be levered off carefully with a screwdriver.

- (2) Check that the contacts are clean and free from pits, burns, oil, or grease. Turn the engine and check that the contacts are opening and closing correctly and that the clearance when the contacts are fully opened is between .010 and .012 in. (.25 and .30 mm.) or .014 and .016 in. (.36 and .40 mm.), according to the distributor fitted. Correct the gap if necessary.

Disconnect the cable at the contact breaker terminal 'CB' of the coil and at the low-tension terminal of the distributor and connect a test lamp between these terminals. If the lamp lights when the contacts close and goes out when the contacts open, the low-tension circuit is in order.

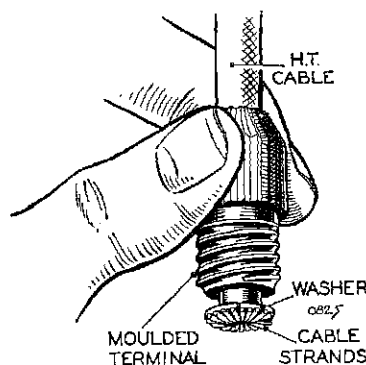
### To locate fault

- (1) Having determined, by testing as previously described, 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.
- (2) Refer to the wiring diagram and check the circuit with a voltmeter (0-20 volts) as follows.

**NOTE.—If the circuit is in order the reading on the voltmeter should be approximately 12 volts.**

- (3) *Battery to starter switch.* Connect a voltmeter between the starter terminal and a good earthing point. No reading indicates a damaged cable or loose connections.
- (4) *Starter switch to control box terminal 'A'* (brown lead). Connect a voltmeter to the control box terminal 'A' and to earth. No reading indicates a damaged cable or loose connections.
- (5) *Control box.* Connect a voltmeter to the control box terminal 'A1' and to earth. No reading indicates a broken or loose connection.
- (6) *Control box terminal 'A1' and feed terminal of the lighting switch* (brown with blue lead). Connect a voltmeter to the feed terminal of the lighting switch and to earth. No reading indicates a damaged cable or loose connections.
- (7) *Lighting switch feed terminal to terminal on ignition switch* (brown with blue). Connect a voltmeter to the ignition switch terminal and to earth. No reading indicates a damaged cable or loose connections.
- (8) *Ignition switch.* Connect a voltmeter to the other ignition switch terminal and to earth. No reading indicates a fault in the ignition switch.
- (9) *Ignition switch to control box terminal 'A3'* (white lead). Connect the voltmeter to the control box terminal 'A3' and to earth. No reading indicates a damaged cable or loose connections.

- (10) *Control box terminal 'A3' to ignition coil terminal 'SW'* (white lead). Connect a voltmeter to the ignition coil terminal 'SW' and to earth. No reading indicates a damaged cable or loose connections.
- (11) *Ignition coil.* Disconnect the cable from the 'CB' terminal of the ignition coil and connect a voltmeter to this terminal and to earth. No reading indicates a fault in the primary winding of the coil and a replacement coil must be fitted. If the correct reading is given remake the connections to the coil terminal.



**Fig. C.2**

*Demonstrates the correct method of fitting the high-tension cable to the moulded terminal of the ignition coil*

- (12) *Ignition coil to distributor* (white with black lead). Disconnect the cable from the low-tension terminal on the distributor and connect the voltmeter to the end of this cable and to earth. No reading indicates a damaged cable or loose connections.
- (13) *Contact breaker and condenser.* Connect the voltmeter across the contact breaker points. No reading indicates a fault in the condenser.

## Section C.3

### HIGH-TENSION CABLES

- (1) The high-tension cables must be examined carefully and any which have the insulation cracked, perished, or damaged in any way must be replaced.
- (2) To fit the cable to the terminal of the ignition coil thread the knurled moulded terminal over the lead, bare the end of the cable for about  $\frac{1}{4}$  in. (6 mm.), thread the wire through the brass washer removed from the original cable, and bend back the strands over the washer. Finally, screw into its terminal.

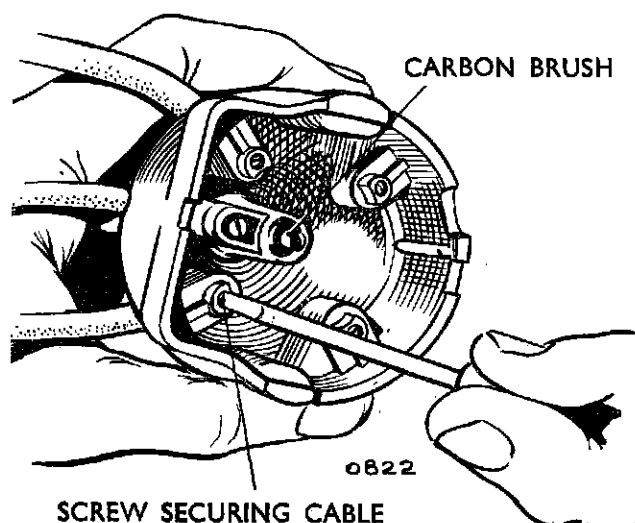


Fig. C.3

*Pointed fixing screws secure the high-tension cables to the distributor pick-up segments*

To make the connections to the terminals in the distributor moulded cap first remove the cap and slacken the screws on the inside of the moulding till they are clear of the cables. Cut the new cables off to the required length, fill the holes in the distributor cap with Silicone grease, and push the cables fully home. Tighten the fixing screws.

- (3) The cables from the distributor to the sparking plugs must be connected up in the correct firing order, which is 1, 3, 4, 2.

## Section C.4

### ATTENTION TO SPARKING PLUGS

To obtain the best engine performance and most economical running the sparking plugs must be kept clean and correctly adjusted.

Inspect, clean, adjust, and renew sparking plugs at the recommended mileage intervals.

When removing plugs note the condition of their gaskets. A large proportion of the heat from the insulator is dissipated to the cylinder head by means of the gasket between the plug and the cylinder head. Plugs not screwed down tight become overheated, causing pre-ignition, short plug life, and 'pinking'. The plug leads should be numbered before they are disconnected

from the plug terminals so that they can easily be replaced in the correct positions.

### Plug inspection

After removal of the plug the condition of the electrodes and deposits on the insulator and plug body should be examined.

- (1) If the insulator is brown in colour, the electrodes grey, and the plug body dry or covered with a thin layer of soot the engine condition and mixture strength are satisfactory.
- (2) A dry, greyish-yellow or brown insulator with a thin layer of light-fawn powder deposit indicates the use of a leaded fuel or a rich mixture.
- (3) When the insulator is dry and fawn or white in colour and the electrodes are corroded and burnt at the tips the plug temperature is too high. This is caused either through the use of an unsuitable plug, by a weak mixture, or by high combustion temperatures.
- (4) Soot deposits, forming a black velvety coating on the insulator and plug body, show that the plug does not reach a self-cleansing temperature. This may be due to a mixture which is too rich, but if the deposit is wet it indicates that oil is also reaching the combustion space in excessive quantities. Correct operation may be restored by adjusting the mixture, but an overhaul of the engine is necessary to reduce the amount of oil passing the piston.
- (5) After cleaning, examine the plugs for cracked insulators and the lower end for wear produced through previous cleaning.

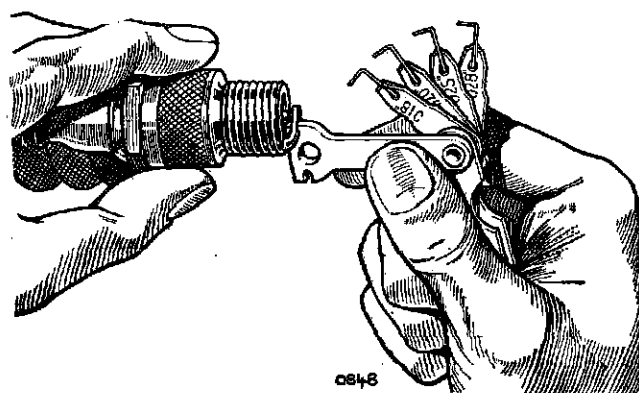


Fig. C.4

*Adjustments to the spark plug gap should be made only by bending the side wire, preferably with a Champion setting tool as shown here*

Whenever possible, sparking plugs should be cleaned in a special plug cleaner of the type supplied by the plug manufacturer. Oily plugs should be washed with petrol first. A compressed-air jet should then be used to remove any abrasive from the interior of the plug body and the insulator. If a plug cleaner is not available a wire brush is the best substitute. This should also be used to clean any accumulation of carbon from the threads.

Having ensured that the plug is thoroughly clean and still serviceable, the electrodes should be reset. A combination gauge and setting tool produced by the makers of Champion sparking plugs greatly facilitates the correct and easy setting of the sparking plug points, but care should be taken to avoid a false reading through distortion of the points.

When resetting the points the side electrode only should be adjusted to give the correct clearance. Never bend the centre electrode.

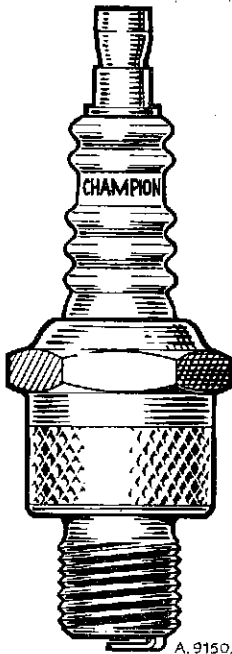


Fig. C.5

The Champion L10 14 mm. sparking plug, reach  $\frac{1}{2}$  in., which is the standard equipment for the Morris Minor (Series MM)

Champion L10 plugs are fitted as standard and their spark gap should be set correctly (see 'GENERAL DATA').

Since each engine design has its own particular working temperature and pressure inside the cylinder, it is essential that only sparking plugs recommended by Morris Motors Ltd. be used. A plug designed for a hot, dry engine will not function satisfactorily in relatively cool, oily engines as it will constantly oil up and cause trouble. On the other hand, a plug suitable for the oily engine will not function in the hot type of engine as the points will overheat and cause pre-ignition.

The threaded portion or 'reach' of the plug is also important since it determines the position of the points

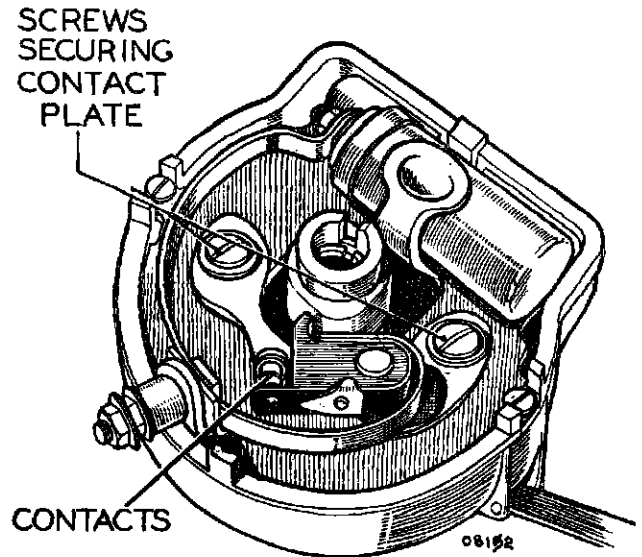


Fig. C.6

The contact breaker, showing the adjustment screws

in the combustion chamber and may produce pre-ignition if the threads on the plug body protrude beyond the cylinder head.

### Section C.5

#### CONTACT BREAKER MECHANISM

At the specified intervals check the contact breaker as follows:

- (1) Turn the engine until the contact breaker points are fully opened and check the gap with a gauge

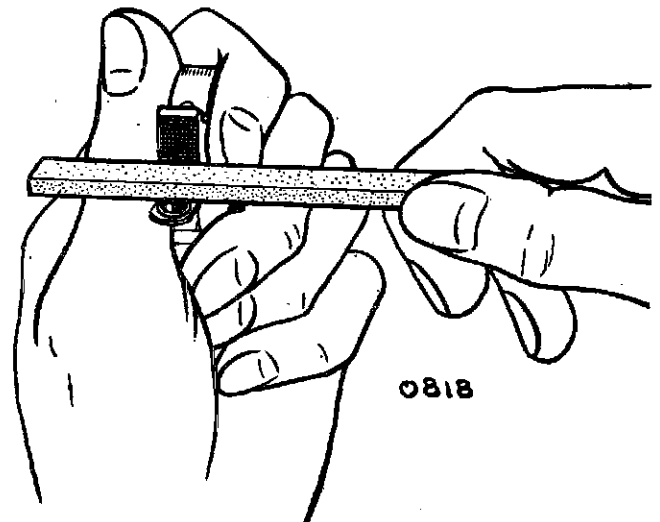


Fig. C.7

Cleaning the contact breaker points with a stick of carborundum

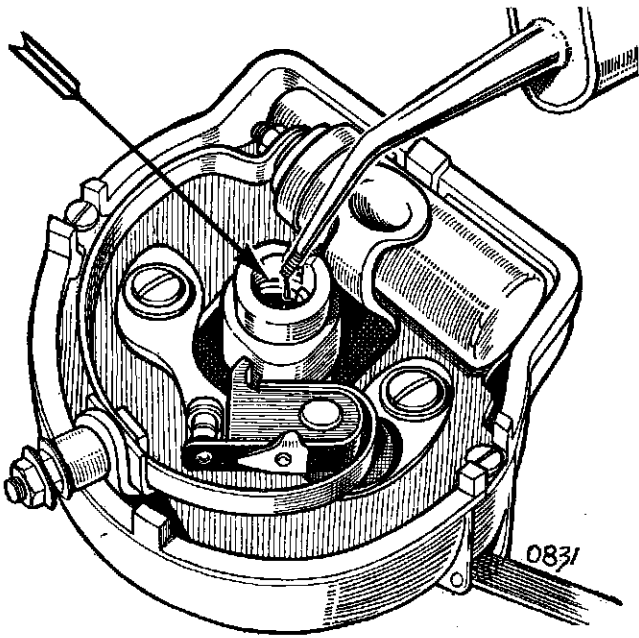


Fig. C.8

The cam bearing is lubricated through the opening revealed when the distributor rotating arm is withdrawn. Thin machine oil should be used

having a thickness of from .010 to .012 in. (.25 to .30 mm.) or .014 to .016 in. (.36 to .40 mm.), according to the distributor fitted. If the gap is correct the gauge should be a sliding fit. Do not alter the setting unless the gap varies considerably from the gauge thickness.

To adjust the setting keep the engine in the position which gives maximum opening of the contacts and then 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 then tighten the two locking screws.

Remember that the cam only keeps the contact points fully open over  $10^\circ$  and that care must be taken to ensure that the points are in the fully open position.

- (2) If the contacts are dirty or pitted they must be cleaned by polishing them with a fine carborundum stone and afterwards wiping them with a petrol-moistened cloth. The moving contact can be removed from its mounting in order to assist cleaning (see Fig. C.7). Check and adjust the contact breaker setting after cleaning the contacts.
- (3) Check that the moving arm moves freely on its pivot. If it is sluggish remove the moving arm and polish the pivot pin with a strip of fine emery-cloth. Afterwards clean off all trace of emery dust

and apply a spot of clean engine oil to the top of the pivot.

The contact breaker spring tension should be between 20 and 24 oz. (567 and 680 gm.) measured at the contacts.

## Section C.6

### DISTRIBUTOR LUBRICATION

To be carried out after servicing the distributor and at the specified intervals.

- (1) Give the cam a light smear of grease to Ref. D (page P.2) and apply a slight trace of oil to the top of the contact breaker lever pivot pin.
- (2) Lift the rotor arm off the top of the spindle and add a few drops of thin machine oil through the lubricating passage provided in the spindle to lubricate the cam bearing and distributor shaft. (Do not remove the screw in the top of the spindle as an oilway is provided.) Refit the rotor correctly, and push it on the shaft as far as it will go.
- (3) Add a few drops of engine oil to Ref. F (page P.2) through the hole in the contact breaker base through which the cam passes in order to lubricate the automatic timing control. Do not allow any oil to get on or near the contacts.

## Section C.7

### REMOVAL AND REPLACEMENT OF THE DISTRIBUTOR

The distributor on early models can be removed and replaced without interfering with the ignition timing,

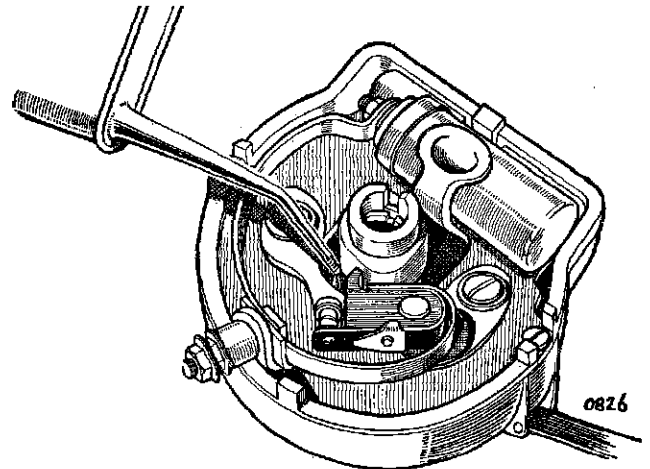


Fig. C.9

The advance control mechanism is lubricated through the aperture round the cam spindle. Take care that no oil finds its way onto the contact points

provided the clamp plate pinch-bolt is not disturbed. Later models with cotter bolt attachment must first be marked and then dealt with in the manner indicated in Section C.13.

To facilitate the replacement of the distributor turn the engine over until the rotor arm is pointing to the segment in the cover for No. 1 cylinder plug lead to provide a datum for replacement.

Remove the distributor cover and disconnect the low-tension lead from the 2 B.A. terminal on the distributor.

Extract the lock wire from the dowel bolt locating the distributor clamp plate to the cylinder head on early models and remove the bolt. In the case of later models slacken the cotter bolt nut and gently tap back the cotter to release the distributor.

To replace the distributor insert it into the cylinder head until the driving dog rests on the distributor drive shaft. The rotor arm should then be rotated slowly until the driving dog lugs engage with the drive shaft slots, both of which are offset to ensure correct replacement. The remainder of the assembly is now in the reverse order to that of removal.

**NOTE.**—Provided that the engine has not been turned, the rotor arm will be opposite the segment for No. 1 plug lead. The high-tension leads can then be replaced on their respective plug terminals in the order of firing, i.e. 1, 3, 4, 2, remembering that the distributor rotation is anti-clockwise.

The firing angles are 0°, 90°, 180°, and 270°.

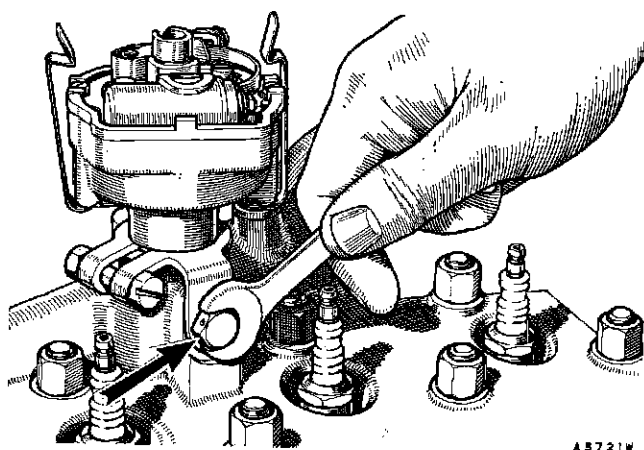
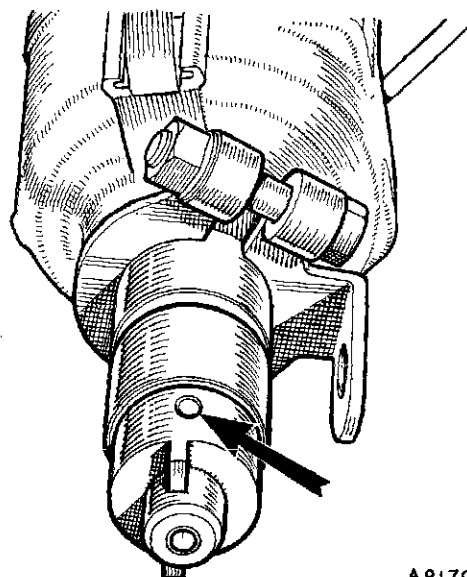


Fig. C.10

The distributor can be withdrawn on early models after removing the retaining bolt indicated. Later models are retained by a cotter bolt the nut of which must be loosened and the cotter tapped back to release the distributor (see Section C.13)



A9170W

Fig. C.11

The parallel driving pin locating the driving collar to the contact breaker spindle is here shown, together with the offset driving tongue

## Section C.8

### IGNITION TIMING

The ignition timing varies according to the condition of the engine and the fuel used and can only be determined by actual road test.

When setting the ignition timing commence by setting the ignition so that the spark occurs at T.D.C. or just before T.D.C. Then gradually increase the amount of advance until the engine just shows signs of 'pinking' when given full throttle in top gear on a normal steep incline. This is the correct setting.

To set the distributor in the correct position for firing if the timing has been lost the following procedure should be followed:

- (1) Turn the engine until No. 1 piston is at T.D.C. on its compression stroke. This can best be effected by turning the engine and observing the valves. When the valves are 'rocking' (i.e. exhaust just closing and inlet just opening) on No. 4 cylinder No. 1 piston is approximately at T.D.C. on its compression stroke. If the engine is now rotated until the groove in the crankshaft pulley is in line with the pointer on the timing cover the piston is exactly at T.D.C. (see Fig. A.23).
- (2) Set the contact breaker points to .010 to .012 in. (.25 to .30 mm.) or .014 to .016 in. (.36 to .40 mm.), whichever applies, when in their maximum open position.

- (3) Insert the distributor into its housing and engage the drive dog lugs with the drive shaft slots (both of which are offset) by slowly rotating the rotor arm.
- (4) Screw in the dowel bolt locating the distributor clamp plate to the cylinder head on early models and secure the bolt with locking wire.
- (5) Position the distributor so that the flat side of the body is facing, and parallel to, the sparking plugs.
- (6) Rotate the distributor body anti-clockwise until the points are fully closed. Then slowly rotate it in a clockwise direction until the points just commence to open. Secure the distributor body in this position by tightening up the clamp plate pinch-bolt and nut on early models or the cotter bolt on later models. Finally, check that the rotor arm is opposite the correct segment for the cylinder which is at the top of its compression stroke.

**IMPORTANT.**—To obtain an accurate setting an electrical method should be used to determine the actual position at which the points break, and the following method can be used.

With the low-tension lead connected to the distributor, turn on the ignition switch and connect a 12-volt lamp in parallel with the contact breaker points (i.e. one lead from the distributor low-tension terminal, and the other to earth) and turn the distributor as detailed in paragraph (6) until the lamp lights, which indicates that the points have just opened.

If a stroboscopic lamp is used, do not allow the engine r.p.m. to rise high enough to operate the centrifugal advance weights.

**NOTE.**—If the distributor drive gear assembly has been removed from the engine it should be refitted in accordance with instructions given in the last sub-section of Section A.19, and the above operation should then be carried out.

## Section C.9

### DISMANTLING THE DISTRIBUTOR

Before dismantling carefully note the positions in which the various components are fitted so that they can be replaced correctly.

- (1) Spring back the securing clips and remove the moulded cap.
- (2) Lift the rotor off the top of the spindle. If it is a tight fit it should be levered off carefully with a screwdriver.
- (3) Slacken the nut on the terminal post and lift off the end of the contact breaker spring, which is slotted to assist removal. Lift the contact breaker lever off its pivot pin. Take out the two screws,

complete with spring washers and flat steel washers, from the plate carrying the fixed contact and remove the plate.

- (4) Undo the two screws fitted at the edge of the contact breaker base and lift them out together with the spring washers. The contact breaker base can then be removed from the body of the distributor.
- (5) Unscrew the condenser terminal nut, lift off the spring washer, and remove the connector strip. Soften the solder securing the condenser in its clip with a hot iron, and remove the condenser by applying pressure at one end.

**NOTE.**—The condenser should not be removed unless absolutely necessary.

- (6) Drive out the parallel driving pin passing through the collar of the driving tongue member at the lower end of the spindle and withdraw the driving tongue from the spindle. Note that the driving tongue itself is offset and that the small offset is towards the front of the engine when the slot for the rotating arm faces the condenser in the distributor body.
- (7) Lift the cam, automatic timing control, and shaft assembly from the distributor. Take out the screw from inside the top of the cam spindle and lift the cam off. The automatic timing control is then accessible.

## Section C.10

### CONDENSER

The best method of testing the condenser is by substitution. Disconnect the original condenser and connect a new one between the low-tension terminal of the distributor and earth.

Should a new condenser be necessary, it is advisable to fit a complete condenser and contact breaker plate assembly, but should a condenser only be available, use a hot iron to soften the solder securing the defective condenser in the clip and remove the condenser by applying pressure at one end. Care must be taken not to overheat the new condenser when soldering it in position.

The capacity of the condenser is 0.2 microfarad.

## Section C.11

### FITTING NEW DISTRIBUTOR BUSHES

- (1) In order to ensure easy running of the distributor shaft when the shank has been rebushed the new bushes must be fitted so that they are in correct alignment. The bushes must be fitted by means of a vertical drilling machine or hand press, using a mandrel and a packing block of the type shown (Fig. C.12).



- (2) Fit the mandrel in the drilling machine or hand press and place the distributor body in an inverted position on the table below it.
- (3) To remove the bushes a sleeve must be fitted over the mandrel to build it up to the required size. With this sleeve fitted in position, force the old bushes out of the shank by applying a steady pressure. Before new bushes are fitted they should be allowed to soak for 24 hours in thin engine oil to Ref. F (page P.2).
- (4) Take the sleeve off the mandrel. Place one of the longer bushes on the mandrel, then the distributor body in an inverted position, and finally one of the smaller bushes.
- (5) Locate the end of the mandrel through the packing piece and press the mandrel downwards, taking care that both bushes enter the distributor shank squarely. Continue forcing the bushes into the shank until the mandrel reaches the end of its travel.

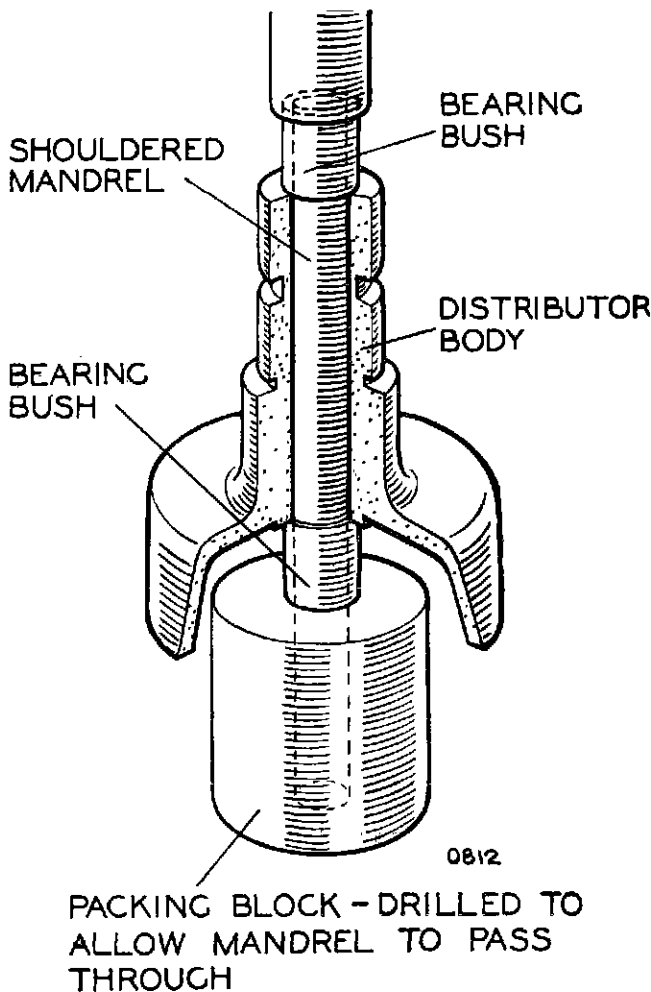


Fig. C.12

Replacement of bearing bushes

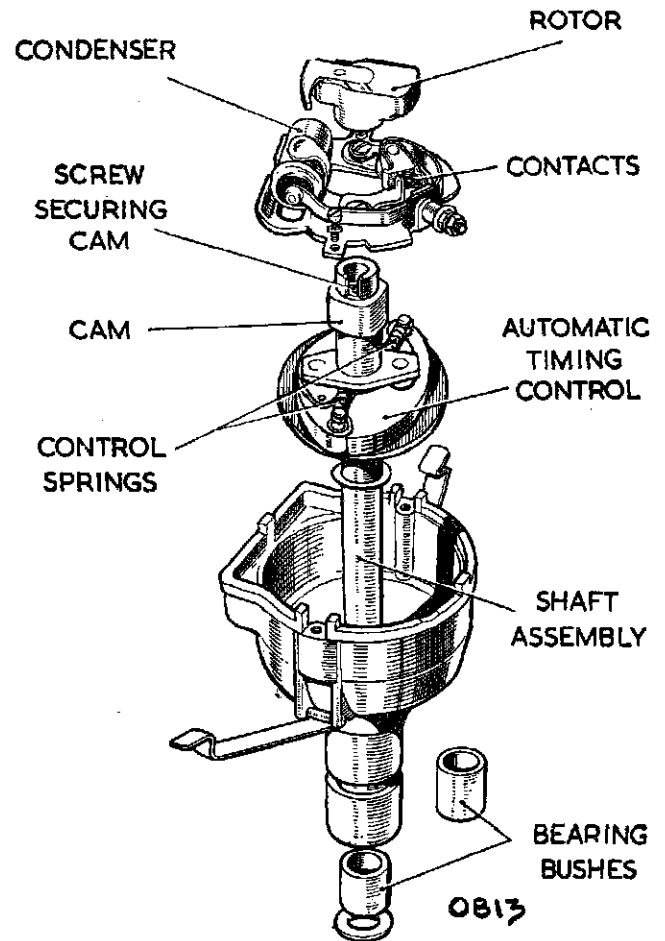


Fig. C.13

The component parts of the distributor on the Morris Minor (Series MM)

- (6) After fitting, the bushes must not be opened out by reaming or any other means, as this would tend to impair the porosity of the bushes and so prevent effective lubrication being obtained.

### Section C.12

#### REASSEMBLING THE DISTRIBUTOR

**NOTE.**—Before reassembly the automatic advance mechanism, distributor shaft, and the portion of the shaft on which the cam fits must be lubricated with thin, clean engine oil to Ref. F (page P.2).

- (1) Assemble the automatic timing control, taking care that the parts are fitted in their original positions and that the control springs are not stretched. Two holes are provided in each toggle; the springs must be fitted to the inner hole in each case. Place the cam on its spindle and secure by tightening the locking screw.

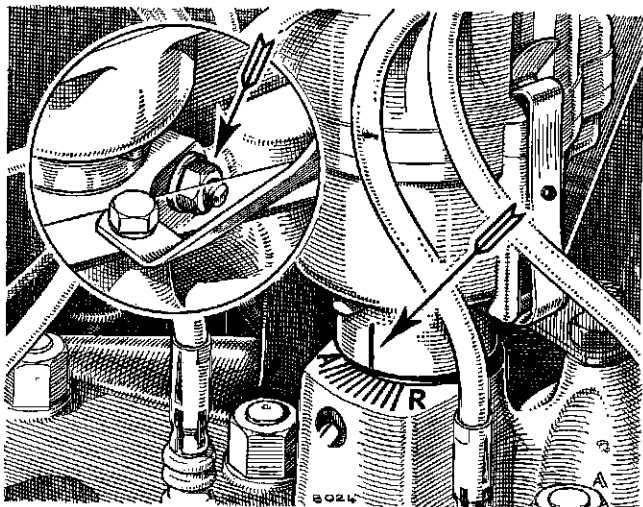


Fig. C.14

The later distributor mounting, showing the markings on the distributor body and the face of the mounting, and (inset) the nut of the cotter bolt which clamps the distributor in position

- (2) Fit the shaft in its bearings and replace the driving member. Remembering that the small offset of the driving tongue lies towards the front of the engine when the slot for the rotating arm in the cam faces towards the centre of the engine (or towards the condenser in the distributor body). Fit the driving pin and with a suitable punch burr over the collar each side to retain it in position.
- (3) Place the contact breaker base in position on the distributor body and secure it by replacing the two screws. A spring washer must be fitted under each of the screw heads, and the screws must be fully tightened.
- (4) Place the end of the connector strip over the condenser terminal post, refit the spring washer, and secure it by tightening the terminal nut.
- (5) Position the plate carrying the fixed contact on the contact breaker base and secure it by replacing and lightly tightening the two screws, placing a spring washer and flat steel washer under the heads of each of the screws. Place the insulating washer over the contact breaker pivot pin and position the contact breaker lever over the pivot pin. Locate the slotted end of the contact breaker spring under the head of the terminal screw and tighten the nut to lock the spring in position. Adjust the contact breaker setting to give a maximum opening of from  $\cdot 010$  to  $\cdot 012$  in. ( $\cdot 25$  to  $\cdot 30$  mm.).

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

- (6) Place the rotor on the top of the spindle, locating the register correctly, and push it fully home.
- (7) Fit the distributor moulding and secure it by means of the spring clips.

**NOTE.**—Later models are fitted with interference suppressors as standard. Contrary to popular belief, these suppressors have no adverse effect whatever on the ignition equipment.

## Section C.13

### LATER DISTRIBUTOR MOUNTING

On later models a new distributor mounting is employed which dispenses with the clamp plate for locating the distributor body. The later fixing consists of a cotter bolt which clamps the distributor body in its housing in the cylinder head, and datum marks are provided on the distributor body and the face of the cylinder head boss to facilitate timing.

To release this type of distributor it is first necessary to note the position of the vertical mark on the distributor body in relation to the radial scale on the face of the housing so that they can be replaced in the same position. The cotter nut should then be slackened a turn or two and the cotter gently tapped inwards to release the distributor, which can now be turned for adjustment of the ignition setting or completely removed if desired.

When replacing the distributor first make sure that the cut-away of the cotter bolt is in the position which will allow the distributor body to pass, and make sure that the same markings on the distributor body and housing coincide before tightening the cotter nut.

This will ensure correct timing, since the distributor drive tongue is offset and the two halves of the coupling can only be re-engaged in their correct relative positions.

It will, of course, be understood that the engine must on no account be turned while the cotter is loose without first making a note of the timing and retightening the cotter.



Fig. C.15

The three types of cam contour used on Lucas distributors, showing their appearance

**Section C.14****HIGH-LIFT CAM**

As a result of research it has been established that improved ignition characteristics are obtained by the combination of a high-lift cam and a wider gap for the contact breaker points.

All distributors bearing Lucas Service No. 40333 with the suffix 'A' and onwards are fitted with the high-lift cam contour and the contact breaker. Points on these should be set between .014 and .016 in. (.36 and .40 mm.).

All distributors bearing Lucas Service No. 40251 with the suffix 'E' and onwards are also fitted with high-lift cams.



**SECTION CC**  
**THE IGNITION SYSTEM**  
**OF THE MORRIS MINOR (Series II) AND MORRIS MINOR 1000**

Description and specification of equipment.

- |                   |  |
|-------------------|--|
| Section No. CC.1  | Locating the cause of uneven firing.       |
| Section No. CC.2  | Testing the low-tension circuit.           |
| Section No. CC.3  | High-tension cables.                       |
| Section No. CC.4  | Contact breaker mechanism.                 |
| Section No. CC.5  | Distributor lubrication.                   |
| Section No. CC.6  | Removal and replacement of the distributor |
| Section No. CC.7  | Static ignition timing.                    |
| Section No. CC.8  | Dismantling the distributor.               |
| Section No. CC.9  | Capacitor.                                 |
| Section No. CC.10 | Reassembling the distributor.              |
| Section No. CC.11 | Ignition vacuum pipe.                      |
| Section No. CC.12 | DM2P4 pre-tilt distributor.                |
| Section No. CC.13 | Engine/distributor fixing.                 |

## GENERAL DESCRIPTION

The automatic advance device is housed in the distributor unit, and it consists of a centrifugally and vacuum-operated mechanism by means of which the ignition is advanced in proportion to the engine speed and load.

Like the rest of the electrical equipment, it is wired on the positive earth system, which results in longer sparking plug life.

**Distributor type**

The distributor is a Lucas Model DM2A4, Service No. 40299. These identification marks are stamped on the side of the distributor. When ordering replacements always quote these numbers.

**Ignition coil type**

The coil is a Lucas Model Q12, Service No. 45020. These identification marks are stamped on the base of the ignition coil. When ordering always quote these numbers. On later models a fluid-filled coil, Lucas Model LA12 (Part No. 2A536), is fitted as standard.

**Sparking plugs**

The standard sparking plugs for the Morris Minor (Series II) are Champion NA8, 14 mm.,  $\frac{3}{4}$  in. reach.

The correct points gap should be between .020 and .022 in. (.50 and .56 mm.).

## Section CC.1

## LOCATING THE CAUSE OF UNEVEN FIRING

This is carried out in the same way as described in Section C.1.

## Section CC.2

## TESTING THE LOW-TENSION CIRCUIT

**Testing in position**

- (1) Spring back the securing clips on the distributor and remove the moulded cap and rotor. If the rotor is a tight fit it can be levered off carefully with a screwdriver.
- (2) Check that the contacts are clean and free from pits, burns, oil, or grease. Turn the engine and check that the contacts are opening and closing correctly and that the clearance when the contacts are fully opened is between .014 and .016 in. (.36 and .40 mm.). Correct the gap if necessary.
- (3) Disconnect the cable at the contact breaker terminal 'CB' of the coil and at the low-tension terminal of the distributor, and connect a test lamp between these terminals. If the lamp lights when the contacts close and goes out when the contacts open the low-tension circuit is in order.

**To locate fault**

- (1) Having determined, by testing as previously described, 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.
- (2) Refer to the wiring diagram and check the circuit with a voltmeter (0-20 volts) as follows.  
NOTE.—If the circuit is in order the reading on the voltmeter should be approximately 12 volts.
- (3) *Battery to starter switch.* Connect a voltmeter between the starter terminal and a good earthing point. No reading indicates a damaged cable or loose connections.
- (4) *Starter switch to control box terminal 'A'* (brown lead). Connect a voltmeter to the control box terminal 'A' and to earth. No reading indicates a damaged cable or loose connections.
- (5) *Control box.* Connect a voltmeter to the control box terminal 'A1' and to earth. No reading indicates a broken or loose connection.
- (6) *Control box terminal 'A1' and feed terminal of the lighting switch* (brown with blue lead). Connect a voltmeter to the feed terminal of the lighting switch and to earth. No reading indicates a damaged cable or loose connections.
- (7) *Lighting switch feed terminal to terminal on ignition switch* (brown with blue). Connect a voltmeter to the ignition switch terminal and to earth. No reading indicates a damaged cable or loose connections.
- (8) *Ignition switch.* Connect a voltmeter to the other ignition switch terminal and to earth. No reading indicates a fault in the ignition switch.
- (9) *Ignition switch to fusebox terminal 'A3'* (white lead). Connect the voltmeter to the fusebox terminal 'A3' and to earth. No reading indicates a damaged cable or loose connections.
- (10) *Fusebox terminal 'A3' to ignition coil terminal 'SW'* (white lead). Connect a voltmeter to the ignition coil terminal 'SW' and to earth. No reading indicates a damaged cable or loose connections.
- (11) *Ignition coil.* Disconnect the cable from the 'CB' terminal of the ignition coil and connect a voltmeter to this terminal and to earth. No reading indicates a fault in the primary winding of the coil and a replacement coil must be fitted. If the correct reading is given, remake the connections to the coil terminal.
- (12) *Ignition coil to distributor* (white with black lead). Disconnect the cable from the low-tension terminal on the distributor and connect the voltmeter to the end of this cable and to earth. No reading indicates a damaged cable or loose connections.

- (13) *Contact breaker and capacitor.* Connect the voltmeter across the contact breaker points. No reading indicates a fault in the capacitor.

**Section CC.3**

**HIGH-TENSION CABLES**

The high-tension cables must be examined carefully and any which have the insulation cracked, perished, or damaged in any way must be replaced.

●To fit the cables to the terminal of the ignition coil or the distributor cap on earlier cars carry out the instructions indicated in Section C.3. Later cars are fitted with plug-in type cables and sealing sleeves.●

**Section CC.4**

**CONTACT BREAKER MECHANISM**

At the specified intervals check the contact breaker as follows:

- (1) Turn the crankshaft until the contact breaker points are fully opened and check the gap with a gauge having a thickness of from .014 to .016 in. (.36 to .40 mm.). If the gap is correct the gauge should be a sliding fit. Do not alter the setting unless the gap varies considerably from the gauge thickness.

To adjust the setting keep the engine in the position which gives maximum opening of the contacts and then slacken the two screws securing the fixed contact plate. Adjust the position of the

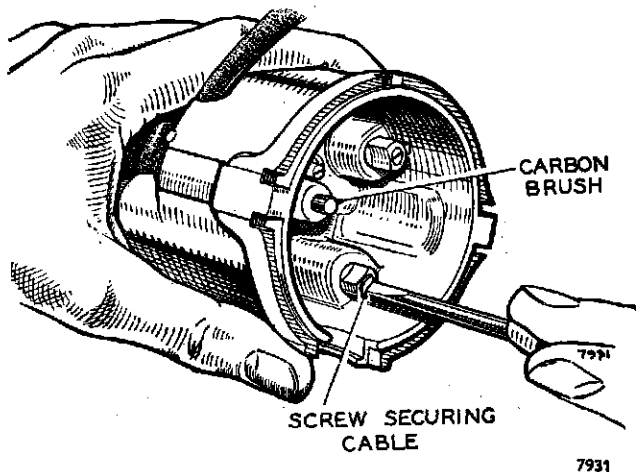


Fig. CC.1

●Shows how the high-tension cables are secured to the distributor pick-up segments by means of pointed fixing screws (earlier cars)●

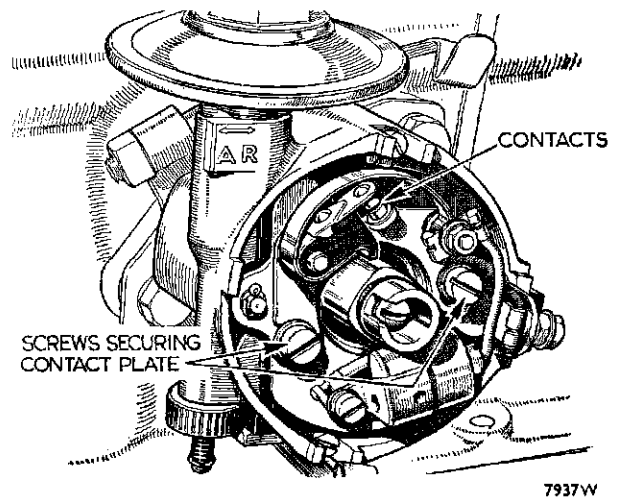


Fig. CC.2

The contact breaker, showing the adjustment screws

plate until the gap is set to the thickness of the gauge and then tighten the two locking screws.

Remember that the cam only keeps the contact points fully open over a very small angle and that care must be taken to ensure that the points are in the fully open position.

- (2) If the contacts are dirty or pitted they must be cleaned by polishing them with a fine carborundum stone and afterwards wiping them with a petrol-moistened cloth. The moving contact can be removed from its mounting in order to assist cleaning. Check and adjust the contact breaker setting after cleaning the contacts.
- (3) Check that the moving arm moves freely on its pivot. If it is sluggish remove the moving arm and polish the pivot pin with a strip of fine emery cloth. Afterwards clean off all trace of emery dust and apply a spot of clean engine oil to the top of the pivot.

The contact breaker spring tension should be between 20 and 24 oz. (567 and 680 gm.) measured at the contacts.

**Section CC.5**

**DISTRIBUTOR LUBRICATION**

To be carried out after servicing the distributor, and at the specified intervals.

- (1) Give the cam a light smear of grease to Ref. C (page PP.2) and apply a slight trace of oil to the top of the contact breaker lever pivot pin.

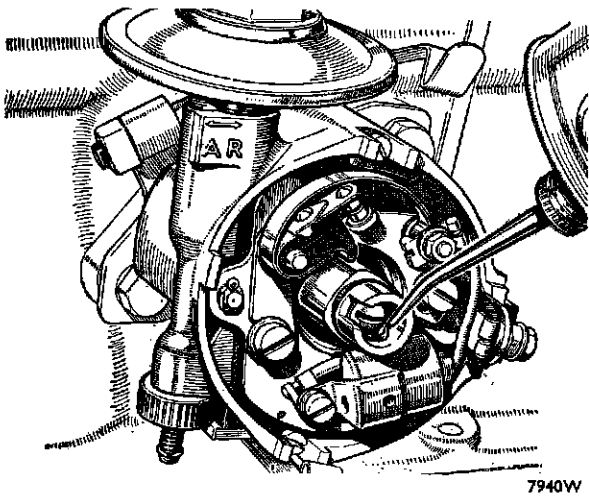


Fig. CC.3

*The cam bearing is lubricated through the opening revealed when the distributor rotating arm is withdrawn. Thin machine oil should be used*

- (2) Lift the rotor arm off the top of the spindle and add a few drops of thin machine oil through the lubricating passage provided in the spindle to lubricate the cam bearing and distributor shaft. (Do not remove the screw in the top of the spindle as an oilway is provided.) Refit the rotor correctly and push it on the shaft as far as it will go.
- (3) Add a few drops of engine oil to Ref. D (page PP.2) through the hole in the contact breaker base through which the cam passes in order to lubricate the automatic timing control. Do not allow any oil to get on or near the contacts.

## Section CC.6

### REMOVAL AND REPLACEMENT OF THE DISTRIBUTOR

The distributor can be removed and replaced without interfering with the ignition timing, provided the clamp plate pinch-bolt is not disturbed.

To facilitate the replacement of the distributor turn the engine over until the rotor arm is pointing to the segment in the cover for No. 1 cylinder plug lead.

Remove the distributor cap; disconnect the low-tension lead from the 2 B.A. terminal and the suction advance pipe at the union on the distributor.

Extract the two bolts securing the distributor clamp plate to the distributor housing and withdraw the distributor.

CC.4

To replace the distributor insert it into the distributor housing until the driving dog rests on the distributor drive shaft. The rotor arm should then be rotated slowly until the driving dog lugs engage with the drive shaft slots, both of which are offset to ensure correct replacement. Turn the distributor body to align the clamping plate holes with those in the housing. The remainder of the assembly is now in the reverse order to that of removal.

**NOTE.**—Provided that the engine has not been turned, the rotor arm will be opposite the segment for No. 1 plug lead. The high-tension leads can then be replaced on their respective plug terminals in the order of firing, i.e. 1, 3, 4, 2, remembering that the distributor rotation is anti-clockwise when viewed from above.

## Section CC.7

### STATIC IGNITION TIMING

Before timing the ignition refer to 'GENERAL DATA' for the correct setting.

To set the distributor in the correct position for firing if the timing has been lost the following procedure should be followed:

- (1) Turn the engine until No. 1 piston is at T.D.C. on its compression stroke. This can best be effected by turning the engine and observing the valves. When the valves are 'rocking' (i.e. exhaust just closing and inlet just opening) on No. 4 cylinder

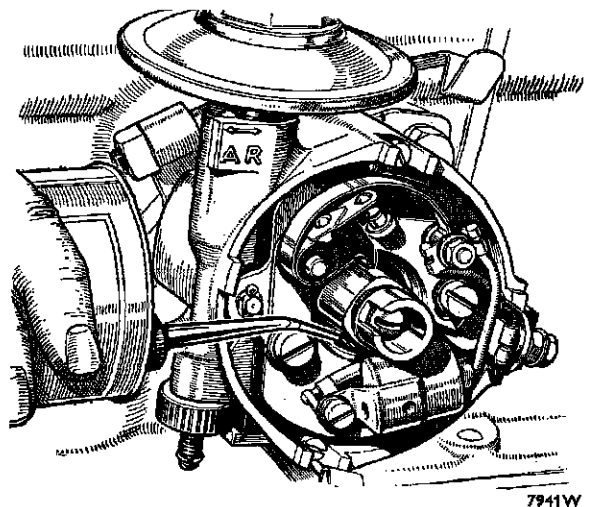


Fig. CC.4

*The advance control mechanism is lubricated through the aperture round the cam spindle. Take care that no oil finds its way onto the contact points*



No. 1 piston is approximately at T.D.C. on its compression stroke. If the engine is now rotated until the groove in the crankshaft pulley is in line with the pointer on the timing cover or the dimples on the crankshaft and camshaft gears are in line the piston is exactly at T.D.C. (see Figs. AA.15 and AA.16).

- (2) Set the contact breaker points to .014 to .016 in. (.36 to .40 mm.) when fully open.

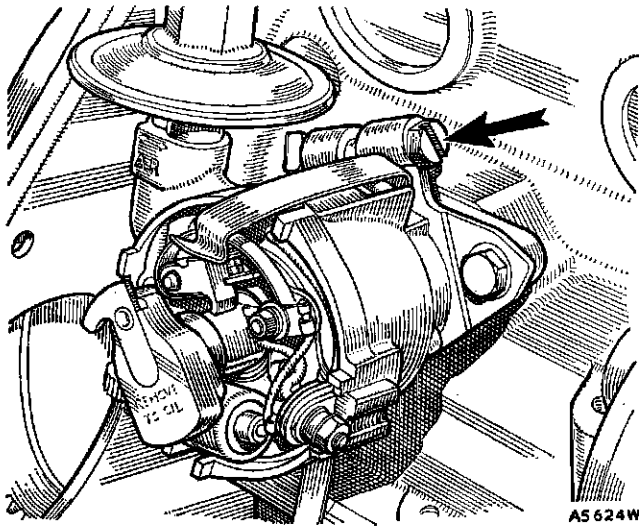


Fig. CC.5

*The distributor can be withdrawn after removing the two bolts. Do not slacken the clamp bolt indicated by the arrow*

- (3) Insert the distributor into its housing, and engage the drive dog with the drive shaft slots (both of which are offset) by slowly rotating the rotor arm.
- (4) Fit but do not tighten the two bolts securing the distributor clamp plate to the distributor housing.
- (5) Position the distributor so that the vacuum control unit is to the rear and the unit is vertical.
- (6) Rotate the distributor body anti-clockwise until the points are fully closed. Then slowly rotate it in a clockwise direction until the points just commence to open. Tighten up the clamp plate pinch-bolt and check that the rotor arm is opposite the correct segment for the cylinder which is at the top of its compression stroke.
- (7) Tighten the two bolts securing the distributor clamp plate to the distributor housing.

**IMPORTANT.**—To obtain an accurate setting an electrical method should be used to determine the actual position at which the points break.

With the low-tension lead connected to the distributor, turn on the ignition switch and connect a 12-volt lamp in parallel with the contact breaker points (i.e. one lead from the distributor low-tension terminal and the other to earth) and turn the distributor as detailed in paragraph (6) until the lamp lights, which indicates that the points have just opened.

If a stroboscopic lamp is used, do not allow the engine r.p.m. to rise high enough to operate the centrifugal advance weights.

**NOTE.**—If the distributor drive gear assembly has been removed from the engine it should be refitted in accordance with the instructions given in Section AA.28, and the above operations can then be carried out.

## Section CC.8

### DISMANTLING THE DISTRIBUTOR

The contact breaker plate may be removed as an assembly to give access to the centrifugal weights. To do this the rotor arm must first be removed and then the low-tension terminal nuts slackened to enable the slotted connector to be withdrawn from between the head of the terminal bolt and the insulating washer. Next take out the spring clip securing the suction advance unit arm to the plate and release the plate assembly by extracting the two screws which secure it to the distributor body.

The following procedure is necessary if the distributor is to be completely stripped. Before dismantling note the positions in which the various components are fitted so that they may be replaced correctly.

- (1) Spring back the clips and remove the moulded cap.
- (2) Lift the rotor off the top of the spindle. If it is a tight fit it must be carefully levered off.
- (3) Remove the nut and washer from the moving contact anchor pin. Withdraw the insulating sleeve from the capacitor lead and low-tension lead connectors, noting the order in which they are fitted. Lift the moving contact from the pivot pin and remove the large insulating washer from the pivot pin and the small one from the anchor pin.
- (4) Take out the two screws, each with a spring and flat washer, securing the fixed contact plate and remove the plate.
- (5) Take out the securing screw and remove the capacitor. Note that the earthing lead, which is attached to the same screw, passes under the capacitor to keep clear of the cams.

- (6) Remove the spring clip retaining the suction advance unit arm to the contact breaker base plate. Extract the two screws securing the base plate to the distributor body, noting that one also secures the earthing lead, and lift out the base plate.

**IMPORTANT.**—Note the relative position of the rotor arm drive slot in the cam spindle and the offset drive dog at the driving end of the spindle to ensure that the timing is not 180° out when the cam spindle is engaged with the centrifugal weights during reassembly.

- (7) Take out the cam retaining screw and remove the cam spindle.
- (8) Take out the centrifugal weights. These may be lifted out as two assemblies, each complete with a spring and toggle.
- (9) To release the suction advance unit remove the circlip, adjusting nut, and spring. Withdraw the unit. Take care not to lose the adjusting nut lock spring clip.
- (10) To release the spindle from the body drive out the parallel driving pin passing through the collar of the driving tongue member at the lower end of the spindle.

- (2) Turn the vacuum control adjusting nut until it is in the half-way position when replacing the control unit.
- (3) When engaging the cam driving pins with the centrifugal weights ensure that they are in the original position. When seen from above, the small offset of the driving dog must be on the right and the driving slot for the rotor arm must be downwards.

## Section CC.9

### CAPACITOR

The best method of testing the capacitor is by substitution. Disconnect the original capacitor and connect a new one between the low-tension terminal of the distributor and earth.

Should a new capacitor be necessary, it is advisable to fit a complete capacitor and bracket, but should a capacitor only be available, use a hot iron to soften the solder securing the defective capacitor to the bracket. Care must be taken not to overheat the new capacitor when soldering it in position. The capacity of the capacitor is 0.2 microfarad.

## Section CC.10

### REASSEMBLING THE DISTRIBUTOR

Reassembly is a direct reversal of the dismantling procedure given in Section CC.8, although careful attention must be given to the following points:

- (1) As they are assembled the components of the automatic advance mechanism, the distributor shaft, and the portion of the shaft on which the cam fits must be lubricated with thin, clean engine oil to Ref. D (page PP.2).

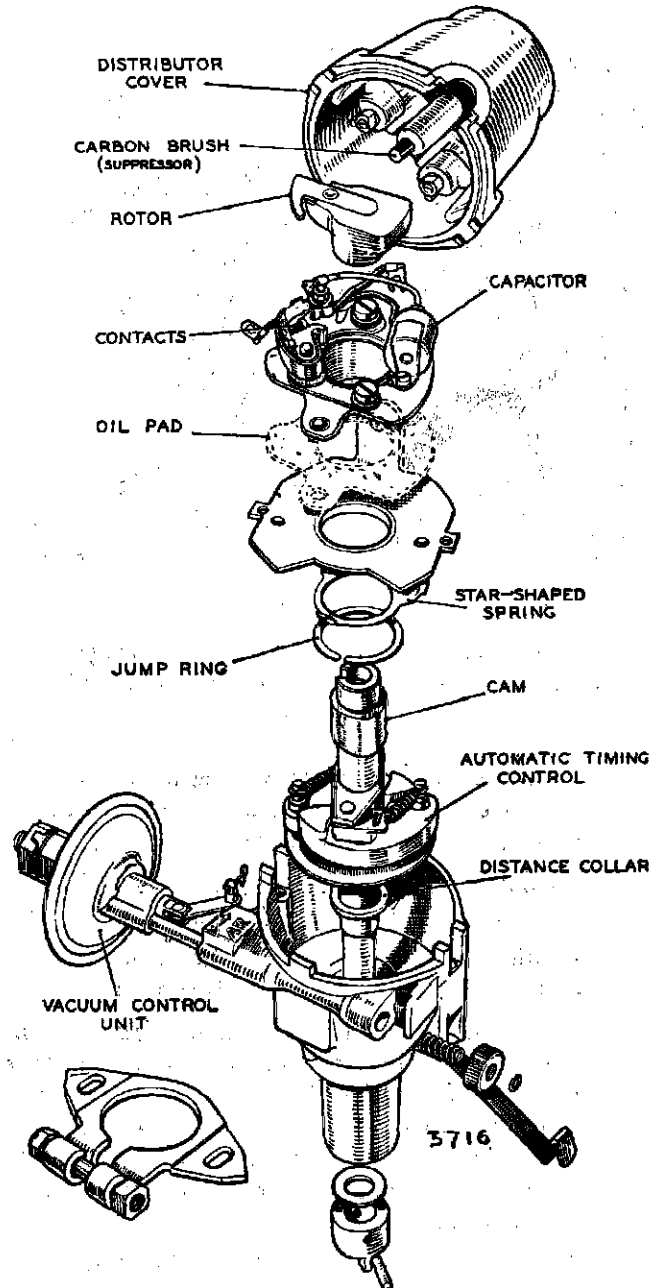


Fig. CC.6

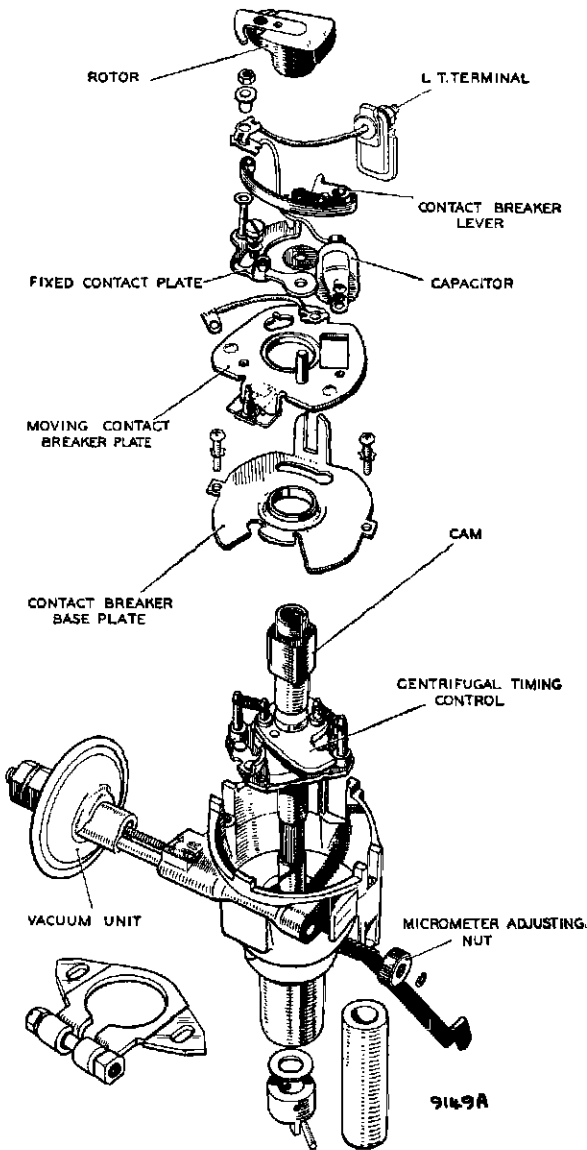
The component parts of the distributor fitted to the Morris Minor (Series II)

- (4) Adjust the contact breaker to give a maximum opening of .014 to .016 in. (.36 to .40 mm.).

**Section CC.11**

**IGNITION VACUUM PIPE**

On later engines a modified ignition vacuum pipe (Part No. 2A 546) is fitted. A small trap, which contains a fine-mesh gauze, is incorporated in the pipe to prevent fuel entering the vacuum control unit. This modified pipe may be fitted to earlier models.



**Fig. CC.7**

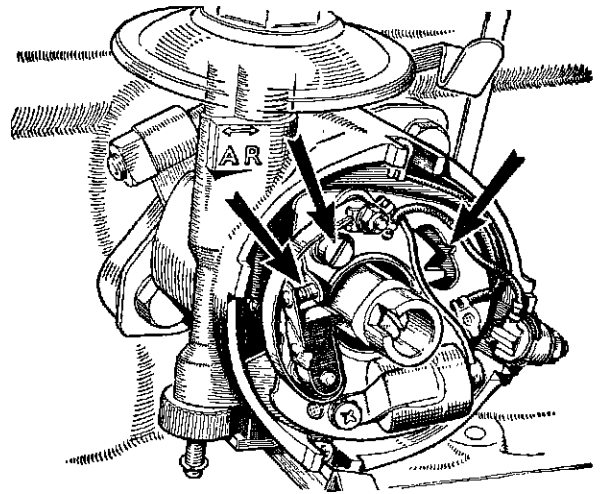
*The component parts of the DM2P4 pre-tilt distributor*

**Section CC.12**

**DM2P4 PRE-TILT DISTRIBUTOR**

The DM2P4 distributor fitted to later cars has a pre-tilted contact breaker unit. The moving contact breaker plate is balanced on two nylon studs and the angle through which the plate may be tilted is controlled by a stud riveted to the moving contact breaker plate locating in a slot in the base plate. The plate carrying the fixed contact is secured by one screw only (centre arrow, Fig. CC.8) on the new units.

To adjust the contact breaker gap (left-hand arrow, Fig. CC.8) turn the engine by hand until the contacts show the maximum opening. This should measure .014 to .016 in. (.36 to .40 mm.). If the setting is incorrect



**Fig. CC.8**

*The DM2P4 distributor with the cover and rotor arm removed, showing the contact breaker mechanism*

slacken the securing screw and adjust the contact gap by inserting a screwdriver in the notched hole (right-hand arrow, Fig. CC.8) and moving the plate carrying the fixed contact. Turn clockwise to reduce the gap and anti-clockwise to increase the gap. Tighten the securing screw.

The base plate components are assembled with a special lubricant and no further lubrication is necessary during the normal service life of the distributor.

An improved version of the metallized capacitor is fitted, and the eyelets on the cables connected to the contact breaker terminal post are squared and slotted to prevent them twisting round and short-circuiting against the distributor. A flexible actuating link connects the diaphragm in the vacuum unit with the moving contact breaker plate.

The new contact breaker base plates are not interchangeable with those of the previous type, and to avoid confusion distributors incorporating them are issued under a new part number (2A 610). A number of parts associated with the contact breaker plates have also changed, and it is important to state clearly the number stamped on the side of the DM2 distributor when ordering new components.

This change is introduced at Engine No. 241328 and on earlier models from Engine Nos. 240327 to 240601.

## Section CC.13

### ENGINE/DISTRIBUTOR FIXING

When fitting a distributor it is important that one or both of the two set screws, distributor clamp plate to distributor housing, are left slack until after the clamp plate pinch-bolt has been tightened.

A clamp plate pinch-bolt incorporating a fixed nut and rotating bolt should be tightened to 50 lb. in. (.576 kg. m.), but the torque loading of a pinch-bolt, which is tightened by means of the nut, is 30 lb. in. (.346 kg. m.).