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LUCAS DISTRIBUTORS

MODELS – 220-230-250

22D-23D-25D

3508 – 35D8

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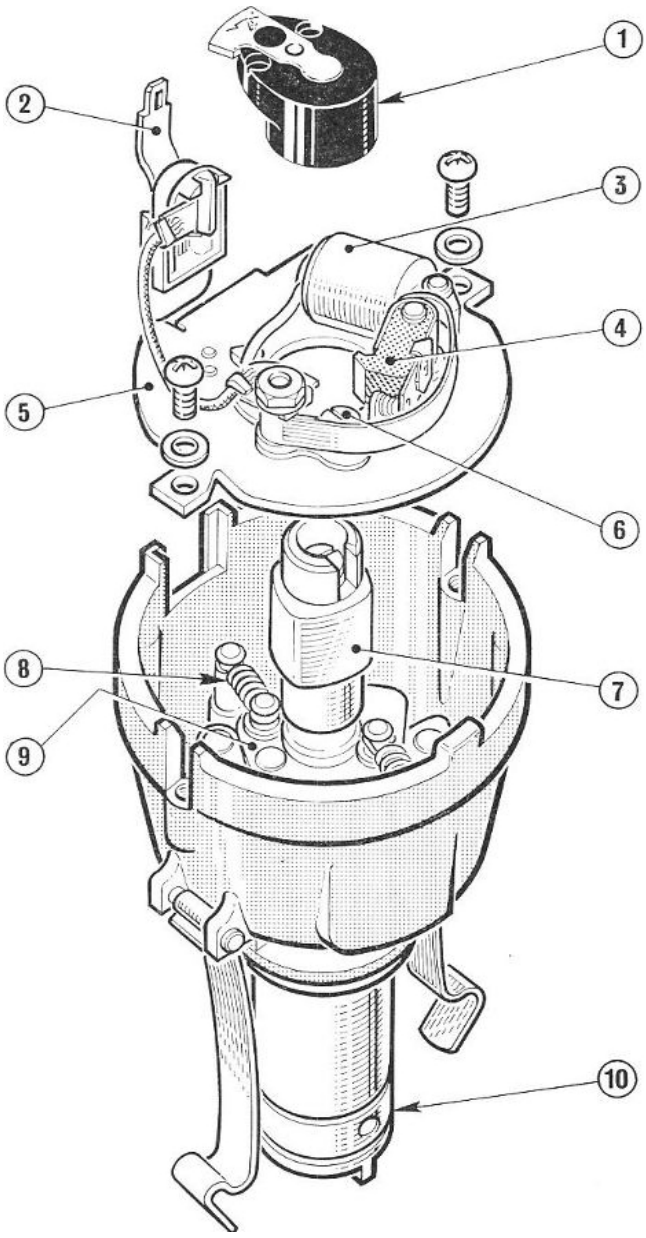
DISTRIBUTOR MODELS 220, 230 AND 250



1 Rotor arm
2 L.T. terminal
3 Capacitor
4 Contact set
5 Contact breaker base plate
6 Fixed contact securing screw
7 Cam
8 Automatic advance control springs
9 Automatic advance mechanism
10 Drive dog and thrust washer

Fig. 1 Model 230 distributor, complete with conventional contact set

1. DESCRIPTION

The basic models are as follows:-

Model 25D - Incorporates centrifugal advance and vacuum advance/retard mechanisms. Micrometer adjustment is also included in the majority of units.

Model 23D - Has only centrifugal advance mechanism.

Model 22D - Similar to Model 25D but has longer body to permit the use of two bearing bushes. A mechanical tachometer drive take-off point is sometimes built into the body for certain applications.

This range of distributors incorporates many components which are directly interchangeable between the three basic models. Both 4- and 6-cylinder versions of each model are available, the number of cylinders being denoted by a suffix number in the model description, i.e. 25D4 or 22D6.

All models have aluminium bodies with bearing bushes and incorporate a rolling weight automatic advance mechanism.

The bearing bushes are oil-impregnated before assembly in the distributor and in service are lubricated automatically by oil-mist from the engine.

Distributor Models 22D - 23D - 25D

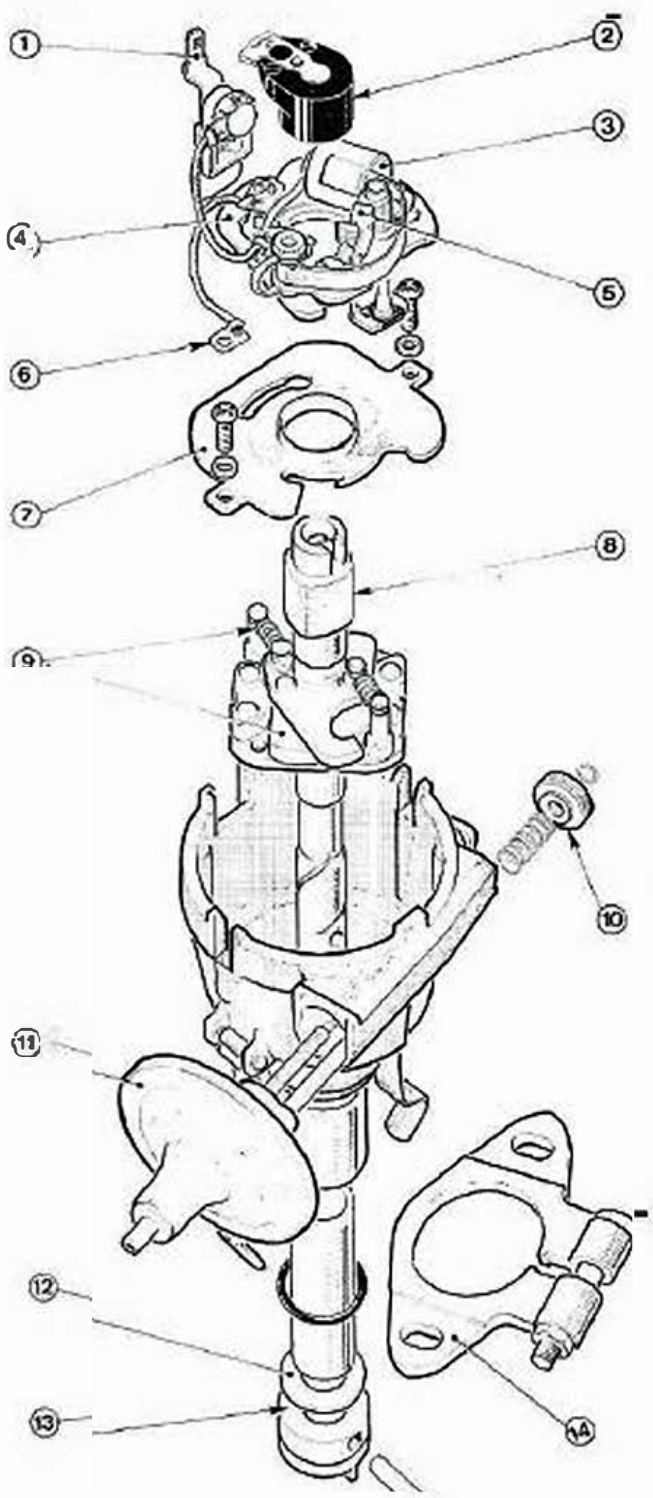
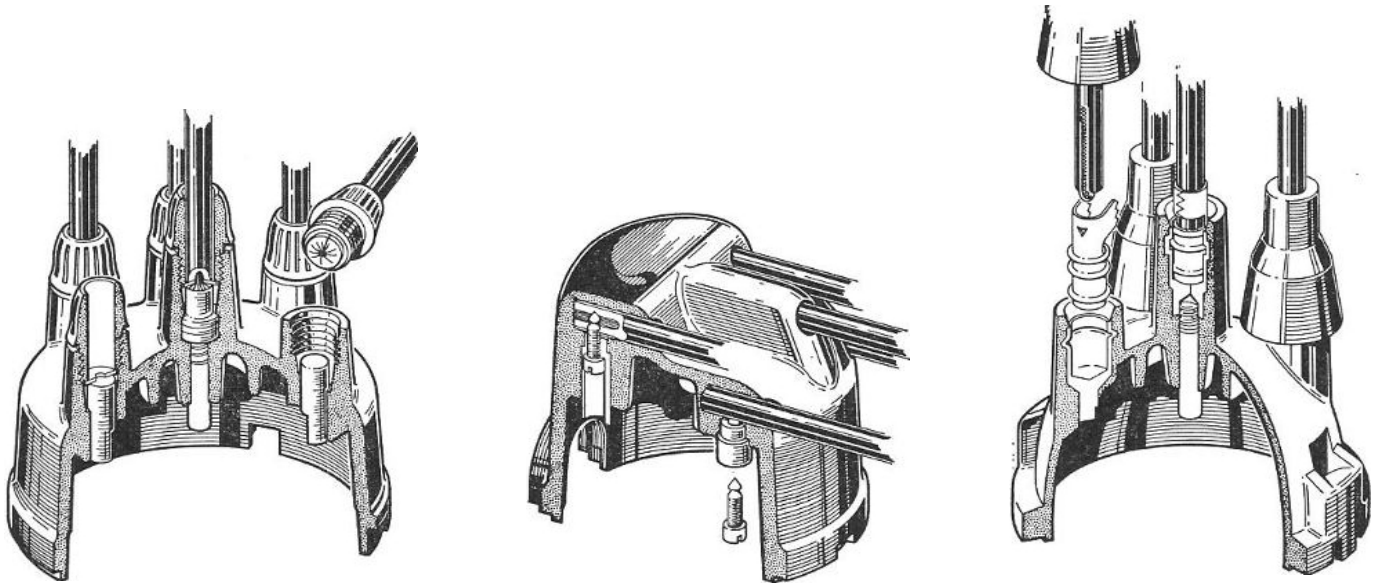


Fig. 2 Model 25D distributor, complete with one-piece contact set

1 L.T. terminal
2 Rotor arm
3 Capacitor
4 Contact breaker moving plate
5 Contact set
6 Contact breaker earth terminal
7 Contact breaker base plate
8 Cam
9 Automatic advance springs and weights
10 Micrometer adjustment nut
11 Vacuum unit
12 Thrust washer
13 Drive dog and pin
14 Securing plate

Distributor Models 220, 230 and 25D

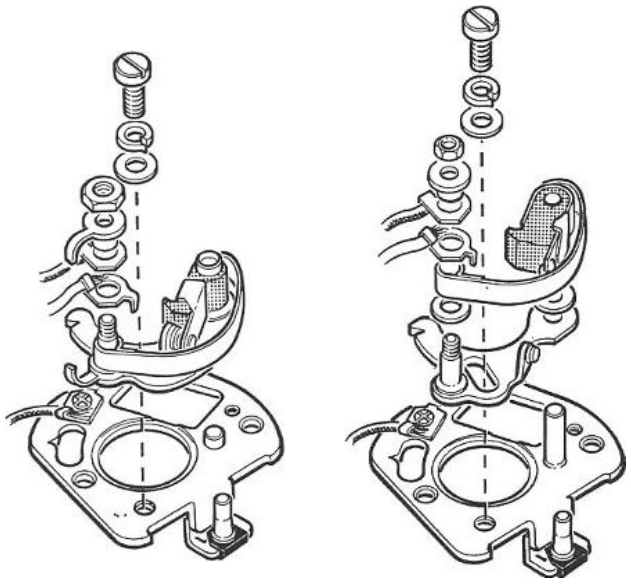


Vertical 'Screw-in' Horixontal Vertical 'Push-in'

Fig. 3 Typical distributor covers

Distributor Covers

Both horizontal and vertical outlet distributor covers are available. (Fig. 3). Earlier distributors with vertical outlet covers had conventional screw type terminals, which use knurled nuts to secure the H.T. cable in the chimney. Horizontal outlet versions had pointed screws, located inside the moulded cover as part of the electrode and these pierced the H.T. cable.



(a) Fig. 4 (b)

(a) One-piece contact set and contact breaker plate
(b) Conventional contact set and contact breaker plate

Later distributors have "push-in" type H.T. terminals and are confined to vertical outlet covers. These rely on a shaped connector which is crimped to the end of the H.T. lead to form a tight "push-in" fit in the chimney insert of the cover.

Contact Breaker Assemblies

The contact point gap setting is standard throughout the range and should be within the limits 0·014" - 0·016" (0·35 mm–0·40 mm).

Originally all these distributors had conventional contact sets, comprising fibre heel, insulating bushes and washers (Fig. 4b).

Later distributors have a modified contact breaker assembly incorporating a one-piece contact set. The contact breaker heel pivots on its own hollow pivot post which is positioned over a short locating stud on the contact breaker base plate.

Fig. 4a illustrates a modified base plate and contact breaker assembly. As the moving contact is smaller than the fixed contact, alignment is established when the moving contact has its diameter completely within that of the fixed contact. The two contacts need not be concentric. Insulation of the steel terminal post is provided by two nylon bushes joined together by a short link.

Vacuum Units

The characteristics of vacuum units are set during manufacture and cannot be adjusted in service. The complete vacuum unit must be replaced if a fault develops.

The performance details of a vacuum unit are marked on the casing using a code number. The figures in such a code, i.e. 3/24/12, stand for:-

(a) (b)(c)

(a) Vacuum in inches of mercury enHg) at which the unit commences to function.

(b) Vacuum ("Hg) at which maximum advance (retard) occurs.

(c) Maximum advance (retard) in degrees.

Full details of individual test figures for these codes are given in Publication No. SB222, Test Data Manual, Section 6, against the appropriate code number.

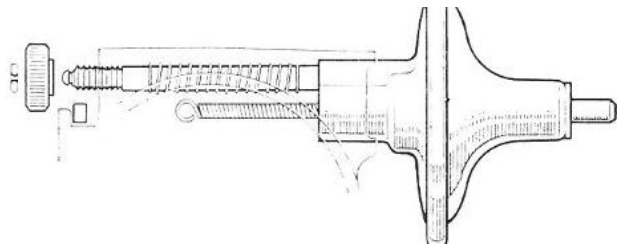


Fig. 5 Typical vacuum unit (advance type)

(i) Typical Advance Unit
The normal advance type units afford additional advance when the engine speed is high and lightly loaded.

(ii) Retard Type Unit
Certain engines incorporate an emission control system to limit obnoxious fumes from the exhaust. A retard vacuum unit is used to control the engine speed when the emission control system operates, during idling and over-run conditions.
Retard type units have an 'R' incorporated in the code marking, e.g. 4/8/5R.
Two versions of the retard only vacuum unit are used:-

(a) A typical advance unit mounted on the opposite side of the distributor to its normal position so that the C.B. moving plate is pulled in the direction of rotation.

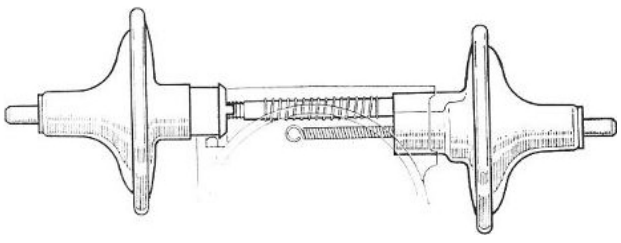


Fig. 6 Twin vacuum units (double-acting)

(b) The retard section of a single capsule double-acting unit (see sec. iv). In such cases the outlet from the advance side is sealed.

(iii) Twin Vacuum Units (Double-Acting)
Some emission controlled engines require two vacuum units. A retard unit is mounted on the opposite side of the distributor body to the advance unit, Fig. 6. The two vacuum units are linked by a rod mechanism and then connected to the contact breaker moving base plate.

(iv) Typical Single Capsule, Double-Acting Vacuum Unit
The double-acting vacuum unit incorporates both advance and retard characteristics, Fig. 7. Both codes are stamped on the casing.

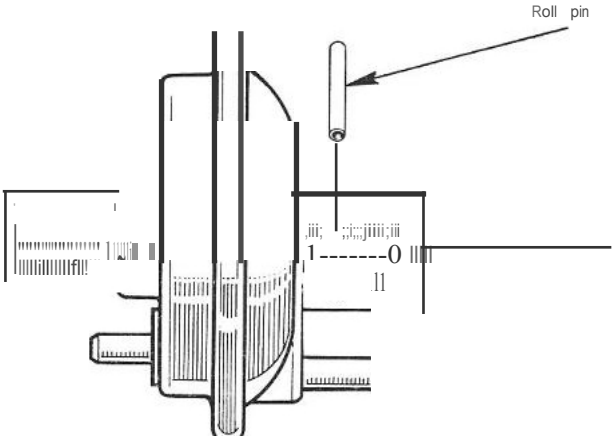


Fig. 7 Single capsule, double-acting vacuum unit

2. ROUTINE MAINTENANCE

Normal maintenance consists of general cleaning, contact breaker inspection, checking and adjusting contact gap setting and lubrication at regular intervals.

(a) Contact breaker adjustment -after first 500 miles (800 km)

When a new vehicle or replacement contact set has completed the first 500 miles (800 km), check that the contact gap is within the limits 0·014" - 0·016" (0·35 mm-0·40 nun).

(i) With the distributor cover and rotor arm removed, rotate the engine until the contacts are fully open, i.e. when the operating heel is on the highest part of the cam lobe.

(ii) A feeler gauge 0·015"(0·38mm) thick should bea sliding fit between the contact surfaces. (Any trace of piling must be removed, otherwise a false setting will be obtained, see para (b)). If the gap is incorrect, slacken the screw securing the fixed contact plate and adjust its position until the gauge can be inserted as a sliding fit. A screwdriver blade should be inserted between

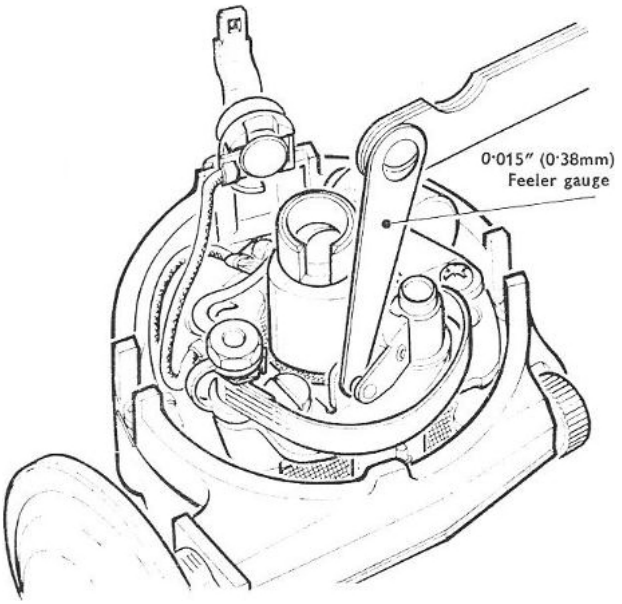


Fig. 8 Setting the contact point gap

the recess at the end of the fixed contact plate and the base plate and used as a lever to adjust the setting. When the gap is correct, tighten the securing screw and recheck the gap on each cam lobe.

(b) Cleaning and lubrication every 6,000 miles (5,650 km)

Thoroughly clean the distributor cover, inside and outside with a clean dry cloth, paying particular attention to the spaces between the metal electrodes. Check that the electrodes are not excessively eroded and that there are no signs of tracking. Ensure that the small carbon brush in the centre of the cover is unbroken and moves freely in its bolder.

Examine the contact breaker. The contact points must be free from grease and oil. If the points are burned, blackened or rough (badly pitted and piled) they should either be replaced or cleaned with a fine carborundum stone or emery cloth and then wiped with a petrol-moistened cloth to ensure they are absolutely clean and free from carborundum deposits etc.

Cleaning is made easier by removing the contact breaker assembly. Disconnect the connections from the LT. terminal post. Slacken and take out the screw securing the fixed contact plate. Remove the contact point assembly.

Before refitting the assembly (for sequence see Fig. 4) lubricate as follows:-

(i) Lightly smear the cam with Retinax 'A' or equivalent grease.

(ii) Inject one or two drops of clean engine oil (SAE.30) through an aperture in the contact breaker base plate to lubricate the auto-advance mechanism.

(iii) Lift off the rotor arm and apply a few drops of clean engine oil (SAE.30) to the top of the exposed screw to lubricate the cam bearing. It is not necessary to remove the screw since there is a clearance for the passage of oil.

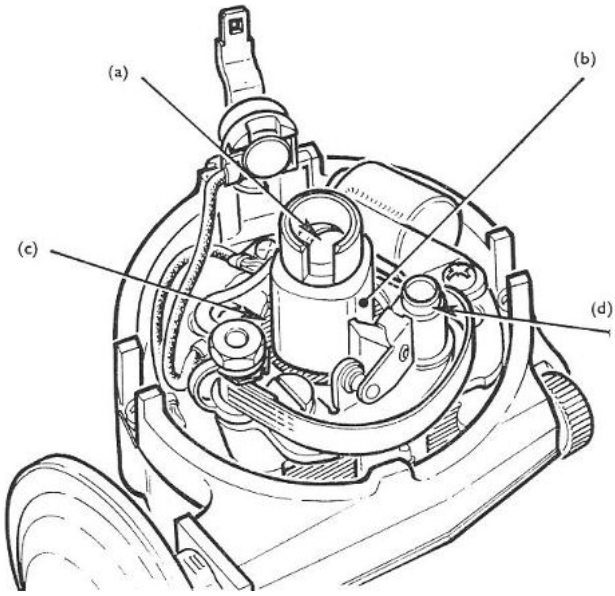


Fig. 9 Lubricating the distributor

(a) Apply 2 or 3 drops of clean engine oil
(b) Lightly smear cam with Retinax 'A' or equivalent grease
(c) Add several drops of clean engine oil
(d) One-piece contact set–lightly smear outside of hollow pivot post with Retinax 'A' or equivalent grease

(iv) Earlier contact set. Apply 1 drop of clean engine oil (SAE.30) to the top of the pivot post on the contact breaker base plate.

One-piece contact set. Lightly smear the outside of the hollow pivot post with Retinax 'A' or equivalent grease.

Note: *Take care to prevent oil or grease contaminating the contact points. All surplus must be wiped away immediately.*

After reassembly, set the contact gap within the limits 0·014" - 0·016" (0·35mm–0·40mm), except in the case of a new contact set. The limits are then extended to *0·019"* (0·48 mm) to allow for bedding in of the new contact breaker heel. For method of adjustment see para. 2(a).

3. DESIGN DAT A

(a) 4-cylinder units:-

Firing angles: 0°, 90°, 180°, 270° ± 1°
Dwell angle: 60° ± 3°
Open period: 30° ± 3°

6-cylinder units:-

Firing angles: 0°, 60°, 120°, 180°, 240°, 300° ± 1°
Dwell angle: 35° ± 3°
Open period: 25° ± 3°

(b) Contact breaker point gap: 0·014"–0·016" (0·35 mm- 0·40 mm).

(c) Contact breaker spring tension, measured at con- tacts: 18–24 ozf. (5–6·6 Newtons)

(d) Capacitor: 0·18–0·23 microfarad.

(e) Automatic timing controls: Refer to Section 5 of Publication No. SB222 against the appropriate distributor Service No. for test details of the automatic advance and vacuum timing control mechanisms.

(f) Securing plate:

Maximum tightening torque-
Trapped nut and rotating bolt-
30 Jbf/in. (5·25 k N/m).
Trapped bolt and rotating nut-
50]bf/in. (8·76 k N/m).

4. SERVICING - FAULT DIAGNOSIS

Before testing the ignition system, ensure the battery is in good condition and at least 70 % charged. Check the specific gravity of the electrolyte in each cell with a hydrometer. If the individual cell readings vary by more than 40 points (0.040), the battery is suspect and should be removed for testing by a Lucas battery agent.

State of charge	S.G. readings corrected to 15°C (60°F)	
	Climates normally below 25°C (77°F)	Climates normally above 25°C (77°F)
Fully charged	1.270- 1.290	1.210–1.230
70% charged	1.230- 1.250	1.170- 1.190
Discharged	1.100- 1.120	1.050 - 1.070

ElectrolyteTemperature Correction

For every 10°C (18°F) *below* 15°C (60°F) *subtract* 0.007. For every 10°C (18°F) *above* 15°C (60°F) *add* 0.007.

(a) Testing in position to locate cause of uneven firing

Run the engine at a fast idling speed. If possible, short circuit each plug in turn between the plug terminal and cylinder block or alternatively lift off each plug connector in turn. Short circuiting the plug or removing the connector of the defective cylinder will not cause an appreciable change in the running note.

When the suspect cylinder has been located, stop the engine and remove the H.T. cable from the sparking plug terminal. Restart the engine and hold the cable end about 0·25u (6 mm) from a clean unpainted part of the engine. If the sparking at the end of the lead is strong and regular, the sparking plug should be removed, cleaned and adjusted or a replacement fitted. If, however, there is no spark or the sparking is weak and irregular, examine the H.T. cable and connections to the plug and distributor cover. Renew the cable if the insulation is cracked, perished or the cable end connector is damaged.

Clean and examine the distributor cover. Check that the carbon brush moves freely. If a replacement brush is required, the correct type must be used. If there is any evidence of tracking (indicated by a thin burnt line between two or more electrodes or between one of the electrodes and earth), a replacement cover must be fitted.

If the fault still persists, proceed with further checks to the following:-

Contact points - see Section 2, paras a and b.
Capacitor - see Section 4, para b, (vii). Shaft side-play - see Section 5, para d.
All wiring connections.

(b) Testing in position to locate cause of ignition failure

Note: *COIL CONNECTIONS- Coils marked i+' and '—' have the '—' terminal connected to the dis- tributor contact breaker on a negative earth system, and to the ignition switch. on a positive earth system. (Meter connections shown are for negative earth systems).*

(i) Supply to the ignition coil

Connect voltmeter between a good earth and the feed or 'SW' terminal of the coil, Fig. 10. With the contact points closed, switch on the ignition. Battery voltage should be registered or in the case of a ballasted ignition system approximately 6V for a 12V system.

Zero reading indicates an open circuit between the battery and the coil.

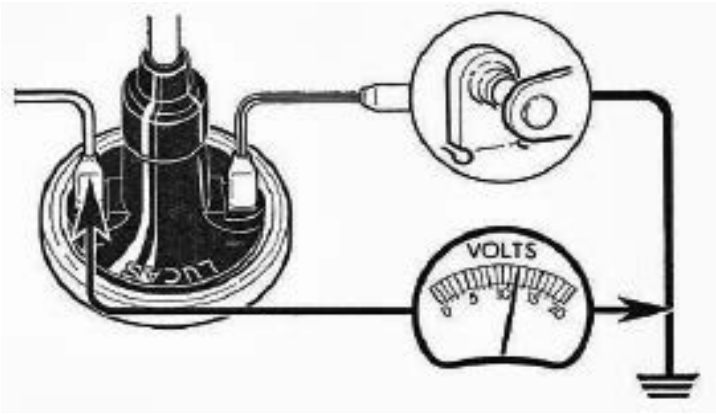


Fig. 10 Checking the supply voltage at the coil (contact points closed)

(ii) Coil primary winding

Connect voltmeter between a good earth and distributor side or 'CB' terminal of the coil, Fig. 11. Battery voltage should be registered when the ignition is switched on and the contact points are open.

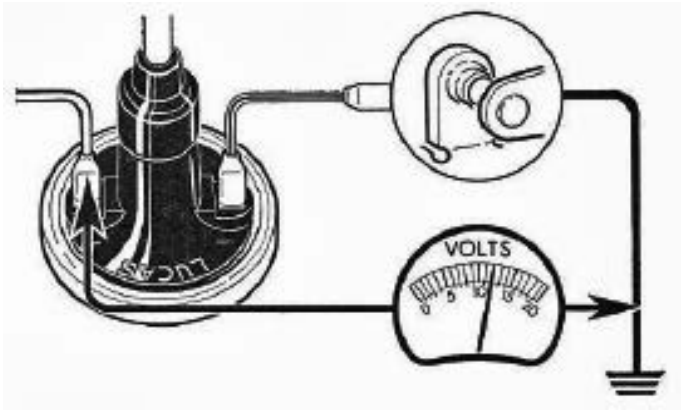


Fig. 11 Checking the primary winding (contact points open)

ff satisfactory proceed to para (iv).

If a zero reading is obtained it indicates either: -

(a) Open circuit of coil primary winding.

(b) Short circuit to earth in the coil to distributor L.T. lead or in the distributor.

To locate the cause of failure, disconnect the lead from the coil 'CB' terminal. Leave voltmeter still connected to the coil 'CB' terminal and the ignition on, check voltmeter reading:-

Zero - Faulty coil (open circuit primary winding.

Battery voltage - Coil satisfactory, but there is an earth fault in the coil to distributor lead or in the distributor. To check the lead, reconnect it to the coil and disconnect at the distributor. Connect the voltmeter between the free end of the lead and earth. If the lead is satisfactory, battery voltage will be registered and the fault must therefore lie within the distributor, proceed to para (iii). A zero reading indicates short to earth in the lead which must be rectified. Proceed to para (v), if further testing of the system is required.

(iii) Distributor earth

If testing indicates a short circuit to earth in the distributor, check:-

(1) the contact points are opening correctly. Conventional contact sets require an insulating washer under the moving contact;

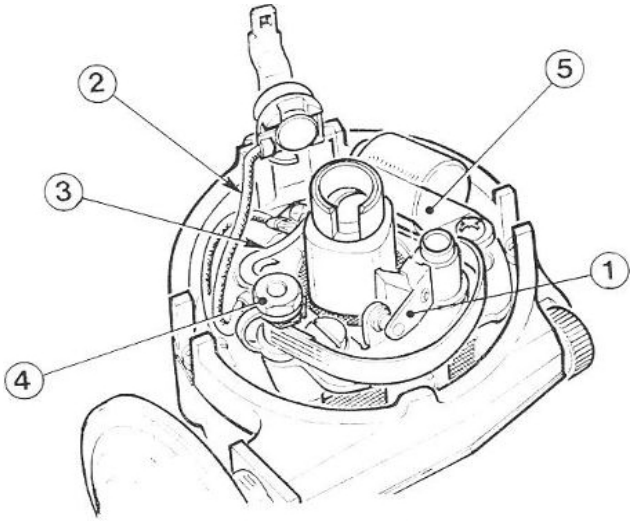


Fig. 12 Checking for distributor earths

(2) the flexible lead connecting the distributor L.T. terminal to the moving contact (terminal post);

(3) the capacitor lead connected to the terminal post;

(4) the terminal post connections are assembled correctly, see Fig. 4;

(5) the capacitor is not short circuited by removing the capacitor from its mounting position.

(iv) Coil to distributor L.T. lead

Connect voltmeter between a good earth and distributor L.T. terminal. With the ignition on and the contact points still open, check the voltmeter reading.

Battery voltage - L.T. lead is satisfactory.

Zero - Broken or open circuit lead (assuming the correct result was obtained in para (iii).

(v) Check contact points

Connect voltmeter between a good earth and distributor L.T. terminal. With the ignition and contact points closed, voltmeter reading should be zero, see Fig. 13.

If the voltmeter registers a voltage: -

(a) Contact points may not be closing.

(b) Contact points may be dirty or oily.

(c) A bad earth connection may be indicated, i.e. a broken flexible earth lead or a poor connection between the distributor body and the engine block.

(d) Ensure the flexible lead between the distributor L.T. terminal and the terminal post is not broken.

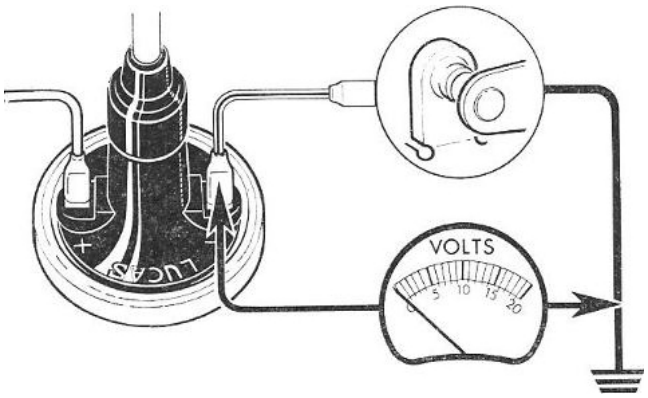


Fig. 13 Checking contact points (contact points closed)

(vi) Check **H.T.** spark to distributor

Remove H.T. lead from centre terminal of distributor cover and connect free end to 3-point gap, or hold end termination approximately 0·25" (6 mm) away from a clean unpainted part of the engine. The earth side of the 3-point gap must be connected to a good earth on the engine. Ensure contacts are closed, switch on the ignition and when the contacts are flicked open, a strong H.T. spark should be obtained across the gap.

If a strong spark is obtained each time the contacts are flicked open, the ignition coil and capacitor are serviceable. A spark will still be obtained even if the capacitor is open-circuit, but it will be weaker than normal. To check, proceed to para (vii).

However, if a spark is not obtained, the ignition coil secondary winding is probably defective and the ignition coil should be replaced.

(vii) Checking the capacitor

The capacitor is checked by substitution. The original capacitor must be disconnected and a test capacitor connected between the distributor L.T. terminal and a good earth. A strong H.T. spark should now be obtained when the contacts are flicked open with the ignition switched on.

If the spark obtained is stronger than in the previous test, the capacitor should be replaced.

(viii) Check distributor rotor arm

Connect an H.T. lead in the coil chimney and hold the free end 0·125" (3 nun) from the rotor arm electrode. With the ignition on, contacts are flicked open. If a strong spark is produced, the rotor arm is shorted to earth via the cam head and should be replaced.

(The H.T. spark referred to should not be confused with the faint sparking due to electrostatic charge and leakage.)

5. SERVICING- DISMANTLING

Spring back the clips and remove the distributor cover.

If a driving gear or dog is fitted to the shaft and has to be removed, note the relative positions between it and the rotor arm electrode. A gear should be marked to ensure correct re-assembly whereas a dog normally has offset tongues which should lie to the left of the centre-line when they are in line with the rotor arm electrode, see Fig. 14.

Lift the rotor arm off the cam.

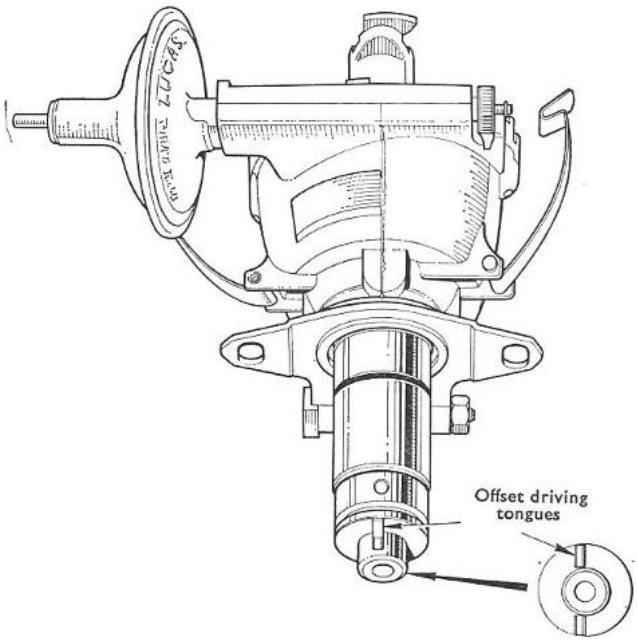


Fig. 14 Typical drive arrangement

When the distributor is fitted with a vacuum unit, the link connecting the vacuum unit to the contact breaker moving plate should be lifted off the tapered post. Remove the two screws at the edge of the contact breaker base plate to allow the contact breaker assembly and the L.T. terminal to be lifted clear.

Knock out the securing pin and remove the thrust washer, dog or gear. If the distributor is fitted with a mechanical tachometer take-off point, remove the two screws securing the tachometer gear cover and gasket and withdraw the gear from its housing. The complete shaft assembly, with the cam and automatic advance mechanism can then be separated from the body.

To remove a micrometer adjustment and vacuum unit, take off the circlip on the end of the micrometer screw thread and turn the adjustment nut until it is off its thread. Take care not to lose the ratchet and coil spring located under the micrometer nut. The vacuum unit can then be removed. In the case of twin vacuum units the small spring clip which retains the additional or retard vacuum unit must first be removed to allow the additional

unit to be screwed off the end of the inter-connecting rod while the other unit is held against its spring pressure to the body of the distributor (Fig. 6). If a single capsule double-acting vacuum unit is fitted, the roll pin (Fig. 7) should be knocked out and the vacuum unit then withdrawn from the distributor body.

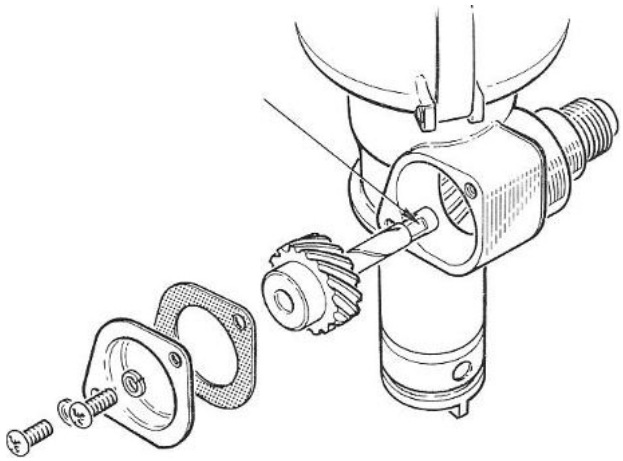


Fig. 15 Typical tachometer 'take-off' attachment

(a) Contact breaker assembly

To dismantle the contact breaker completely remove the nut, insulation piece(s) and connections from the pillar on which the contact breaker spring is anchored. Lift off the spring and insulating washers beneath it.

Remove the screw securing the fixed contact plate together with the plain and spring washers, and take off the plate.

Slacken and remove the self-tapping screw *to* free the capacitor.

The contact breaker plate assemblies of 22D and 25D distributors can be further dismantled by turning the moving plate clockwise and pulling to release it from the base plate.

(b) Replacement contacts

If the contacts are so badly worn that replacement is necessary, they must be renewed as a pair and not individually.

(c) Shaft and action plate

The dismantling and re-assembling of the automatic advance mechanism must be carried out carefully to avoid damaging the springs, which would alter the characteristics.

Carefully remove the springs. Slacken and withdraw the screw inside the cam and lift off the cam. Before removing the weights, note the position of the cam slots. Note also that a distance collar is fitted on the shaft underneath the action plate.

(d) Bearings

Tf the bearings are worn to such an extent that excessive side play of the shaft is evident, the complete distributor must be replaced.

6. SERVICING- RE-ASSEMBLY

The following instructions assume that complete dismantling has been undertaken.

(a) Before re-assembling the automatic advance mechanism to the shaft and action plate, the top section of the shaft (cam spindle), the top of the action plate, the cam foot weight pivots and all working surfaces of the weights and action cams should be smeared with Rocol MP (Molypad) lubricant. Assemble the mechanism and fit the cam securing screw.

Ensure the springs are not stretched or damaged during re-assembly.

(b) Ensure the distance collar is in position and then liberally smear the distributor shaft with Rocol MP (Molypad) before insertion into the bearing.

It is important to ascertain that the shaft is free to rotate without binding.

(c) If the distributor has a manual tachometer take-off point, insert a liberal quantity of Rocol 30863 Molybdenum grease into the gear housing. Refit the gear and secure the gasket and gear cover in position.

(d) If the distributor *is* fitted with a vacuum unit and micrometer adjustment (models 220 and 25D), ensure the ratchet for the milled adjustment nut is in position. Slide the vacuum unit into its housing and refit the spring, milled adjusting nut and securing circlip.

All other vacuum units should be fitted using a reversal of the dismantling procedure.

(e) Re-assemble the contact breaker assembly.

Where applicable, i.e. 22D and 25D distributors, lightly smear all the base plate bearing surfaces with Rocol MP (Molypad) lubricant. Assemble the base and moving plates together using a reversal of the dismantling procedure.

Before fitting the contact set ensure the moving contact pivot post has been lightly smeared with Retinax 'A' or equivalent grease. The fixed contact securing screw should only be loosely fastened at this stage.

Fit the capacitor and assemble the terminal post connections as shown in Fig. 4.

(f) Refit the complete contact breaker assembly into the distributor body and engage the link from the vacuum unit (if fitted) and slide the terminal block into its slot. Insert and tighten the two base plate securing screws. On models 22D and 25D one of these screws also secures the free end of the contact breaker earthing cable.

(g) Lightly smear the cam with Retinax 'A' or equivalent grease.

Note: *Take care to prevent oil or grease contaminating the contact points. All surplus must be wiped away immediately.*

(h) Set the contact point gap within the limits 0·014" - 0·016" (0·35 mm - 0·40 mm) or for a new contact set 0·019" (0·48 mm) maximum, and tighten the fixed contact securing screw. Check the gap for each cam lobe.

(i) Refit the rotor arm, locating the moulded projection in the rotor arm with the keyway in the shaft, and push fully home.

(j) Refit the thrust washer and drive dog or gear to the shaft. The tongues of the dog must lie to the left of tb.e centre-line of the shaft when they are in line with the rotor arm electrode, (Fig. 14).

Note: *A new shaft can be drilled using the hole in the dog or gear as a guide, (Fig. 16). Drill size* 5/32" *(0·1575") (4·76 mm).*

ff the distributor shaft has a fibre thrust washer, a 0·002" (0·05 nun) feeler gauge should be inserted as a temporary spacer between the dog and the thrust washer. (This is to ensure correct distributor shaft end float.) Maximum permissible end float is 0-005" (0·13 nun). Whilst drilling, the shaft and action plate must be pushed down from the cam end. The dog must also be held firmly compressing the thrust washer and feeler gauge against the shank. Fit the pin and caulk over the holes to retain the pin.

If a brass thrust washer is used, the 0·002" (0·05 mm) gauge is not required. The brass washer is fitted with the raised "pips" facing the dog. When the pin is fitted, the driving end of the shaft must be sharply tapped with a mallet to flatten the three pips on the washer and ensure the correct amount of end float.

(k) Refit the moulded cover.

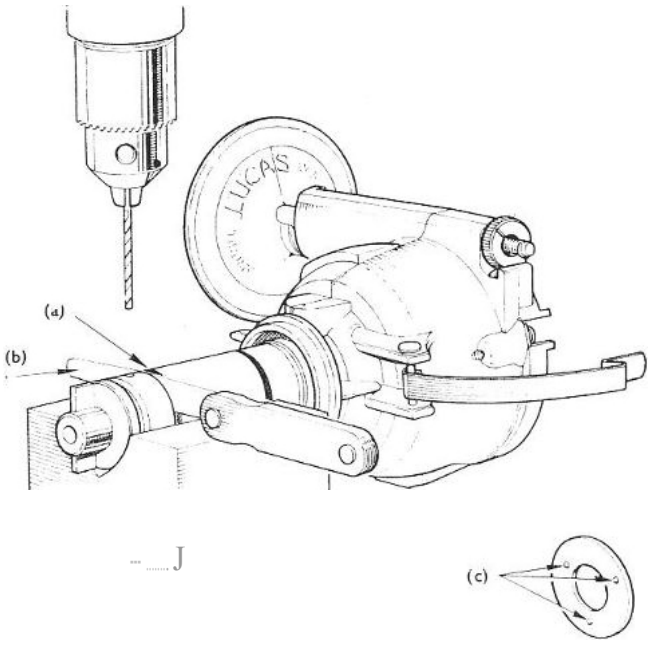
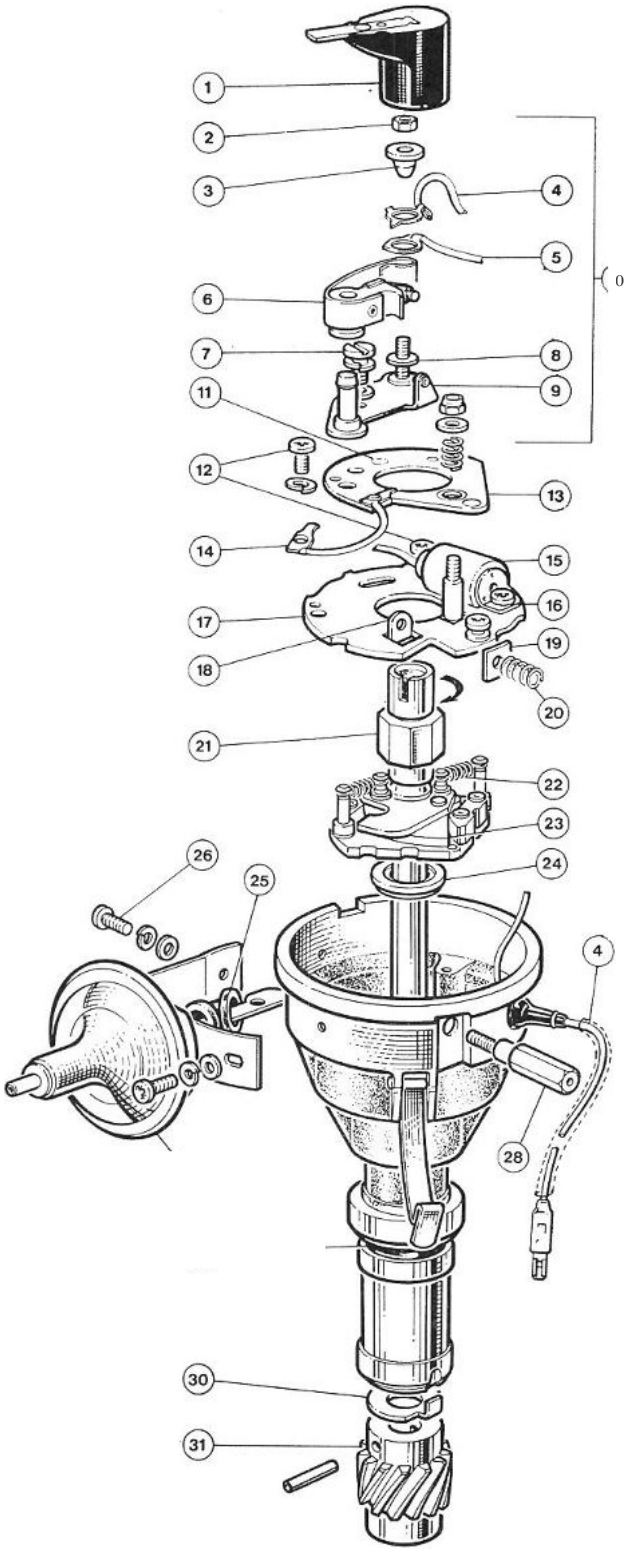
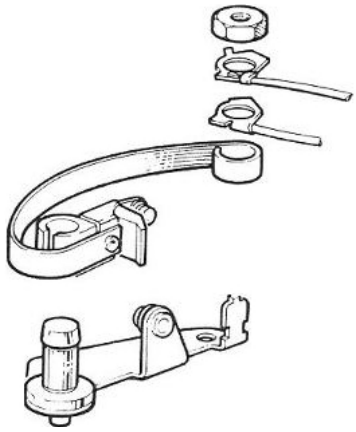


Fig. 16 Drilling the shaft

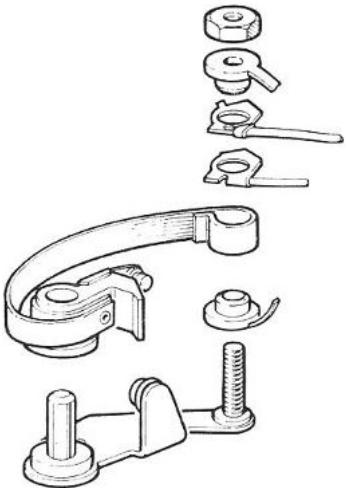
(a) Fibre washer (b) 0·002" (0·05mm) Gauge (c) Raised pips

MODEL 3508 DISTRIBUTOR





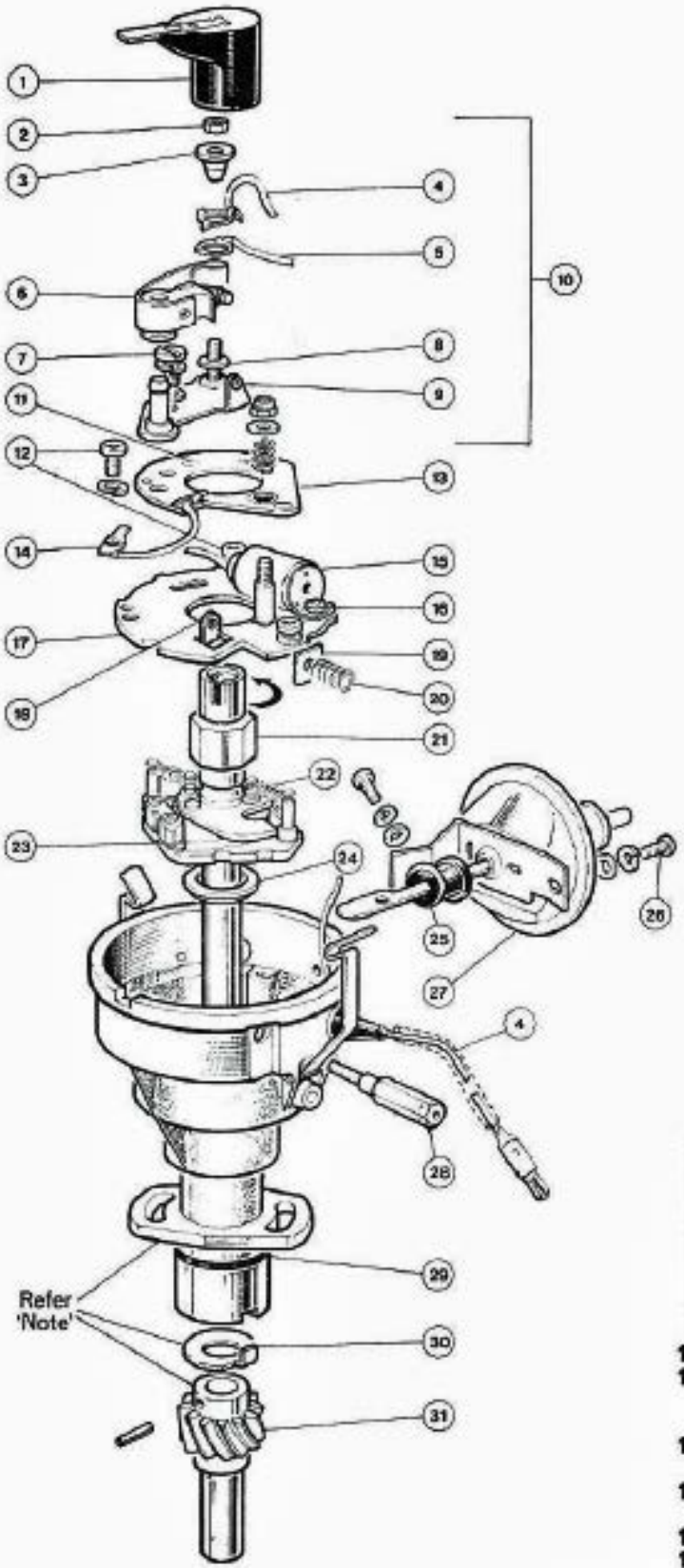
Alternative contact-breakers

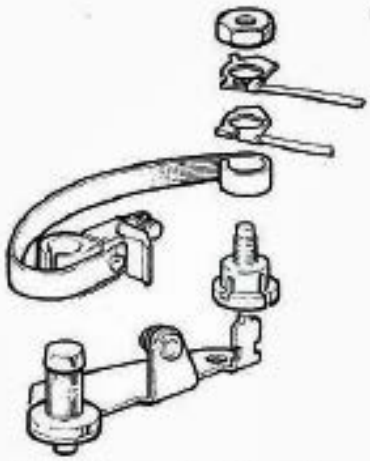


1 Rotor
2 Fixing nut
3 Insul bush
4 LT. cable (fly-lead)
5 Capacitor cable
6 Moving contact
7 Screw and washer
8 Insul washer
9 Fixed contact plate
10 Contact set (items 2-9)
11 Vacuum actuating peg, riveted to underside of plate
12 C/8 screw and washer (3 off)
13 Contact-breaker base plate
14 Earth lead
15 Capacitor
16 Screw and washer
17 Contact-breaker bearing plate
18 Threaded hole
19 Plastic friction strip
20 Tension spring
21 Eight-lobe cam
22 Centrifugal timing control springs
23 Centrifugal timing control weights
24 Distance collar
25 Grommet
26 Screw and washer (2 off)
27 Vacuum unit
28 C/8 dwell-angle adjuster
29 'O' ring oil seal
30 Thrust washer
31 Driving gear

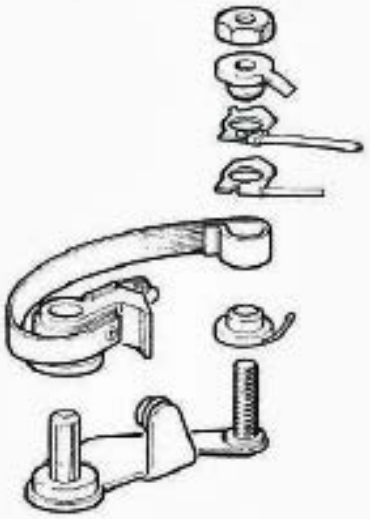
Fig. 1 Typical model 3508 distributor with offset pivot contact-breaker (anti-clock rotation, viewed from drive-end, and advance vacuum unit)

Model 35D8 Distributors





Alternative contact-breakers



1 Rotor
2 Fixing nut
3 Insul bush
4 L.T. cable (fly-lead)
5 Capacitor cable
6 Moving contact
7 Screw and washer
8 Insul washer
9 Fixed contact plate
10 Contact set (items 2–9)
11 Vacuum actuating peg, riveted to underside of plate
12 C/B screw and washer (3 off)
13 Contact-breaker base plate
14 Earth lead
15 Capacitor
16 Screw and washer
17 Contact-breaker bearing plate
18 Threaded hole } item 28
19 Plastic friction strip } item 28
20 Tension spring } item 28
21 Eight-lobe cam
22 Centrifugal timing control springs
23 Centrifugal timing control weights
24 Distance collar
25 Grommet
26 Screw and washer (2 off)
27 Vacuum unit
28 C/B dwell-angle adjuster
29 'O' ring oil seal
30 Thrust washer
31 Driving gear

Fig. 2 Typical model 35D8 distributor with offset pivot contact-breaker (clock rotation, viewed from drive-end, and advance vacuum unit)

Note: Method of fixing may vary, and items 30 and 31 may be driving dog arrangement shown in Fig. 5.

Model 3508 Distributor

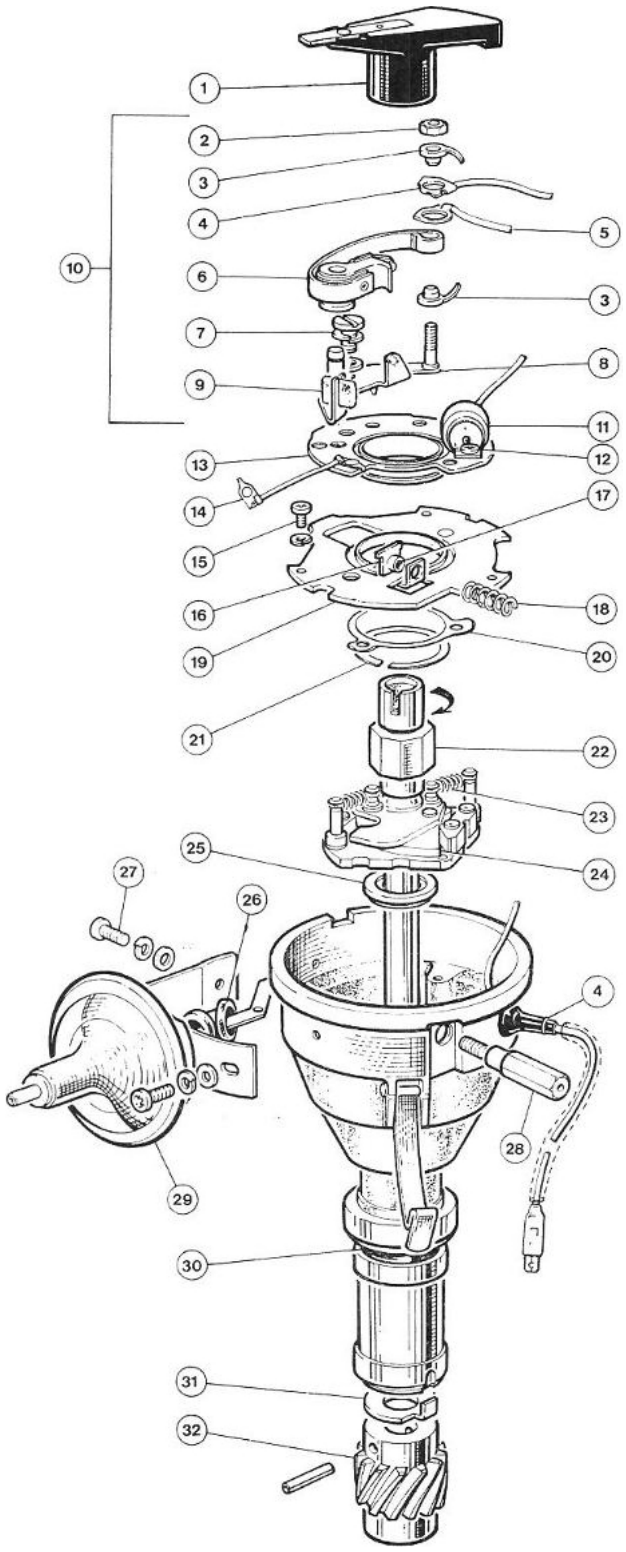
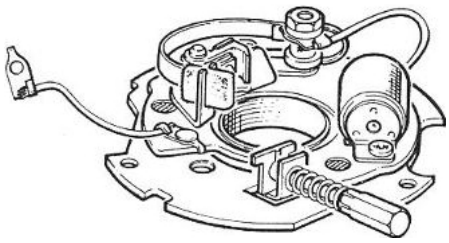
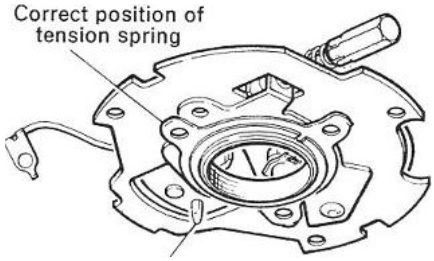


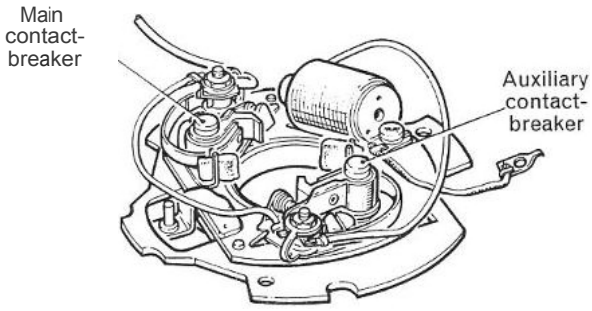
Fig. 3 Typical model 3508 distributor with single or twin concentric contact-breaker(s) (anti-clock rotation, viewed from drive-end, and advance vacuum unit)



Concentric single contact-breaker assembly



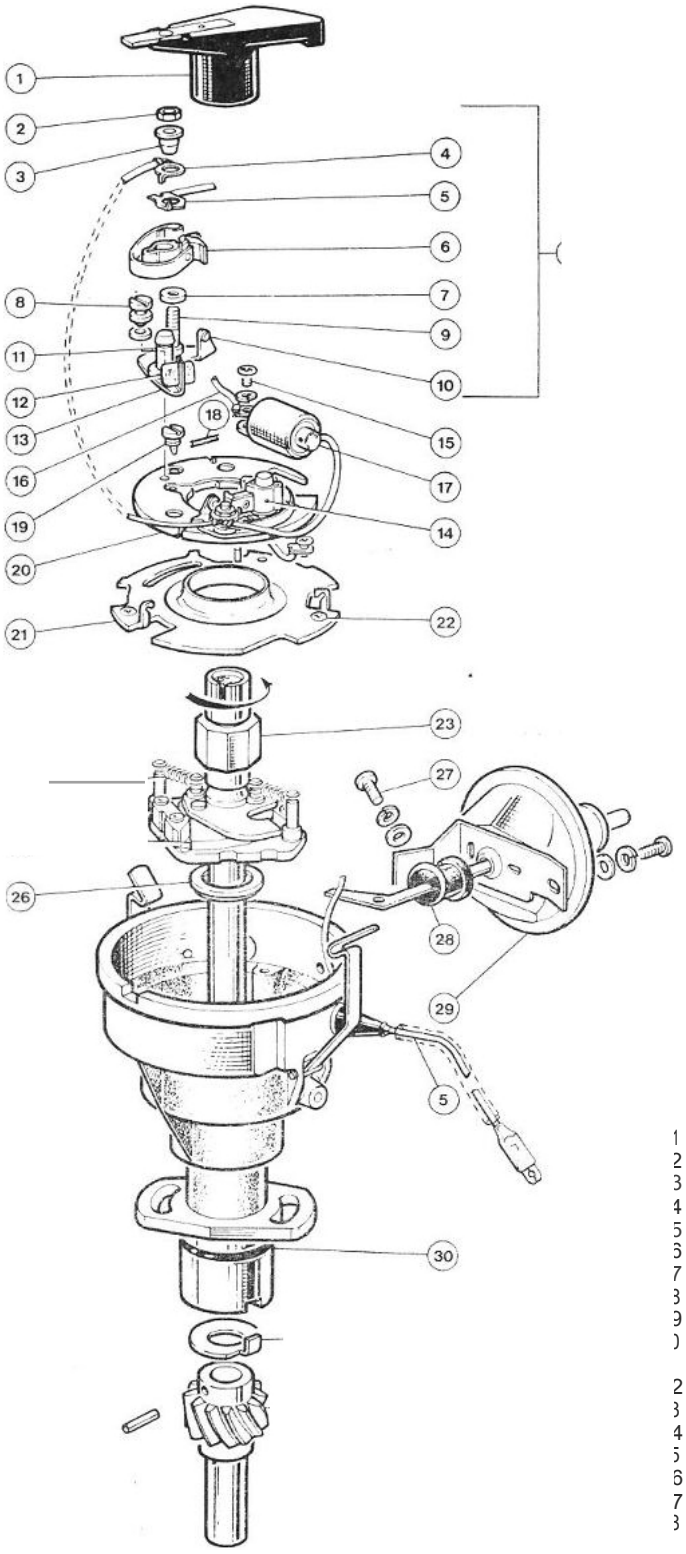
Underside view of concentric single contact-breaker assembly, showing correct positioning of 3-lobe tension spring

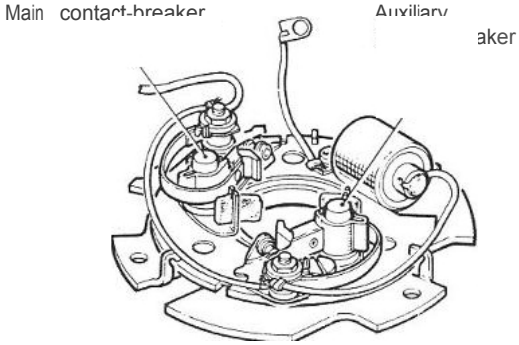


Concentric twin contact-breaker assembly (alternative fitment). Correct position of tension spring as shown above

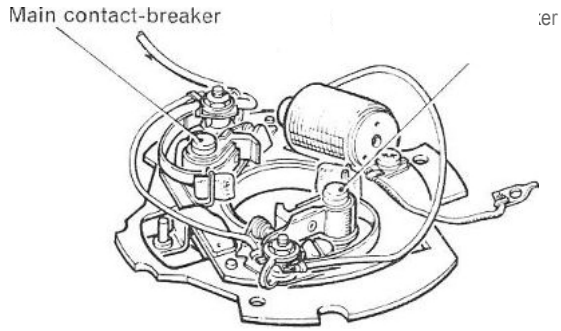
1 Rotor
2 Fixing nut
3 Twin insul bush
4 L.T. cable (fly-lead)
5 Capacitor cable
6 Moving contact
7 Screw and washer
8 Fixed contact plate
9 Felt pad
10 Contact set (items 2–9)
11 Capacitor
12 Screw and washer
13 C/B base plate
14 Earth lead
15 Screw and washer (3 off) for C/B bearing plate
16 Plastic friction strip
17 Threaded hole
18 Tension spring
19 Contact-breaker bearing plate
20 Three-lobe tension spring
21 Circlip
22 Eight-lobe cam
23 Centrifugal timing control springs
24 Centrifugal timing control weights
25 Distance collar
26 Grommet
27 Screw and washer (2 off)
28 C/B dwell-angle adjuster
29 Vacuum unit
30 "O" ring oil seal
31 Thrust washer
32 Driving gear

Model 3508 Distributor





Concentric twin contact-breaker assembly (early type)

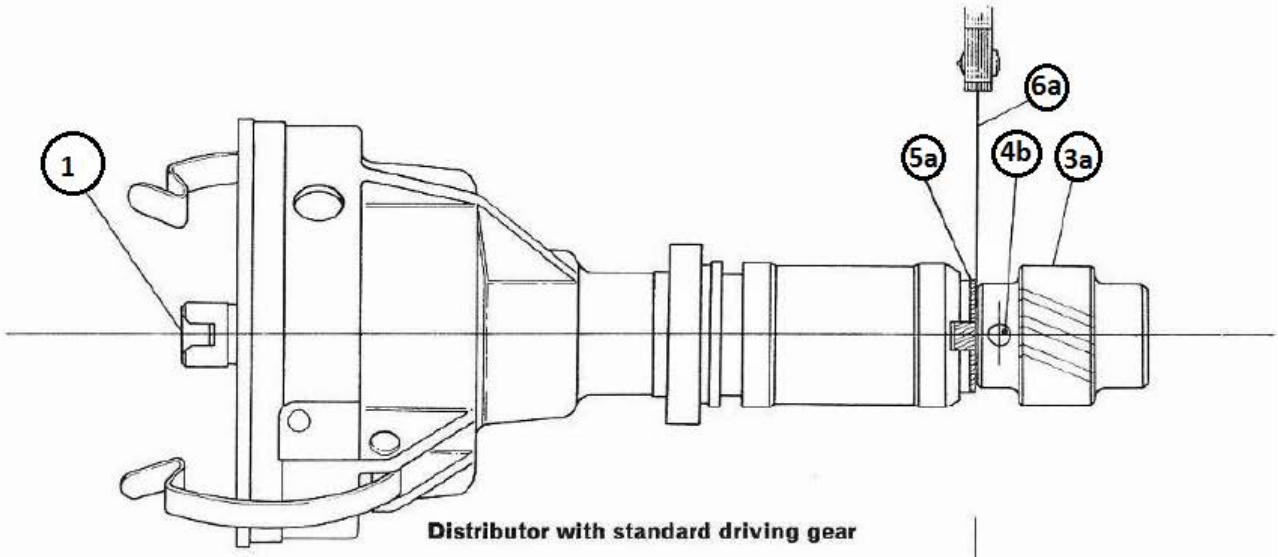


Concentric twin contact-breaker assembly (later type)

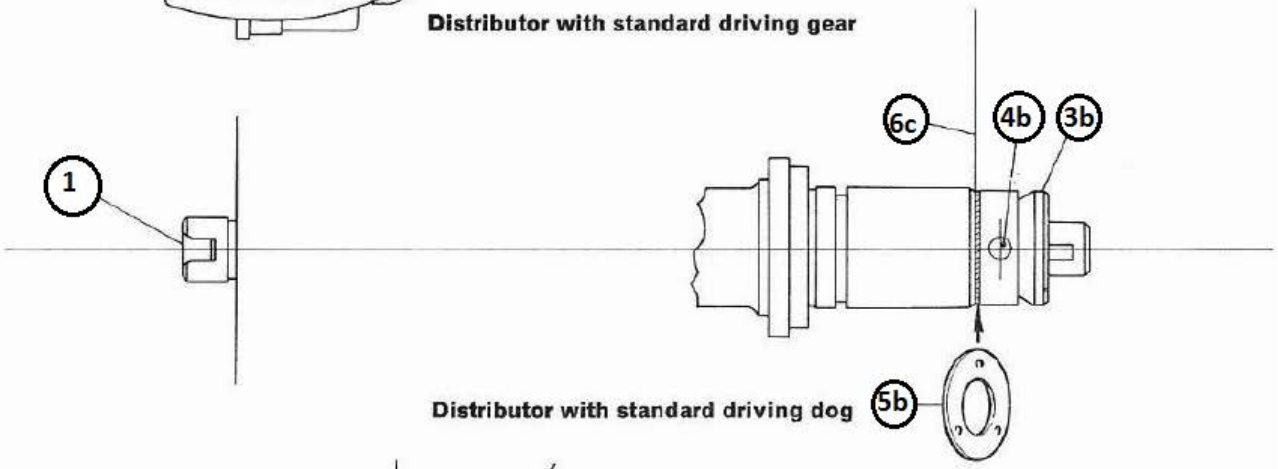
1 Rotor
2 Fixing nut
3 Insul bush
4 Contact-breaker LT.cable
5 Main L.T. cable (fly-lead)
6 Moving contact
7 Insul washer
8 Screw and washer
9 L.T. terminal post
) Contact Pivot post
2 Felt pad
3 Fixed contact plate
4 Contact set (items 2–13)
5 Capacitor fixing screw
6 Earth lead
7 Capacitor
8 Tension spring (base-plate)
19 Vacuum unit connecting peg
20 Contact-breaker base-plate
21 Contact-breaker bearing plate
22 Fixing screws
23 Eight-lobe cam
24 Centrifugal timing-control springs
25 Centrifugal timing-control weights
26 Distance collar
27 Screw and washer (2 off)
28 Grommet
29 Vacuum unit
30 'O' ring oil seal
31 Thrust washer
32 Driving gear

Fig. 4 Typical model 3508 distributor with twin concentric contact-breakers (clock rotation, viewed from drive-end, and advance vacuum unit)

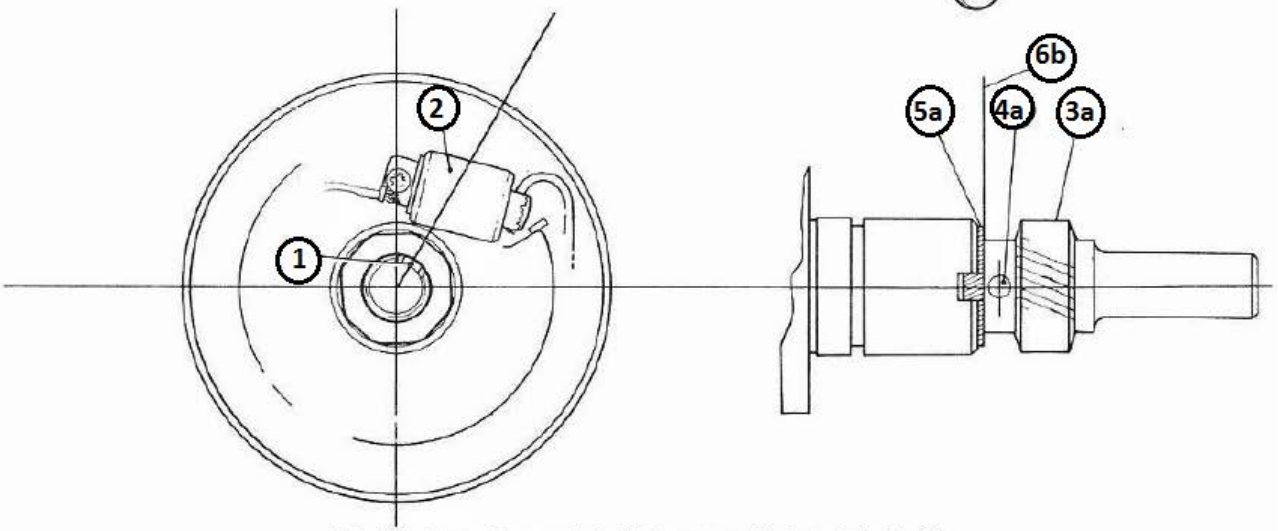
Model 35D8 Distributors



Distributor with standard driving gear



Distributor with standard driving dog



Distributor with special driving gear (extended shaft)

Fig. 5 Positioning driving dog or gear on distributor shaft

1 Rotor arm keyway in shaft
2 Capacitor
3 (a) Driving gear
(b) Driving dog (note offset driving tongue)
4 (a) Fitting pin and hole 3 mm ($\frac{1}{8}$") diameter
(b) " " " " 4 mm ($\frac{3}{16}$") "
5 (a) Steel thrust washer (with locking tab located in distributor shank)
(b) Brass thrust washer (fitted with raised 'pips' facing driving dog)
6 (a) End-float feeler gauge 0·18–0·30 mm (0·007–0·012")
(b) " " " 0·13–0·23 mm (0·005–0·009")
(c) " " " 0·13–0·25 mm (0·005–0·010")

Note: Reference 6(c) 0·13 mm (0·005") max. when fitting new thrust washer

Model 3508 Distributor

1. GENERAL

These high performance distributors incorporate contact-breakers, either single or twin, operated by an eight-lobe cam. Lightweight construction and consequent low inertia of the contact-breaker(s) prevent contact-breaker bounce at high engine speeds.

The distributors incorporate conventional auto-advance mechanism and a vacuum unit (advance-type, retard-type or double-acting type). An advance-type vacuum unit is fitted to improve fuel economy, when the throttle is partially open, while a retard-type vacuum unit is provided to operate in conjunction with an exhaust emission control system, incorporated in the engine design. The retard-type vacuum unit retards ignition timing during engine idling and over-run conditions. The associated emission control system is designed to reduce air pollution from the vehicle exhaust fumes.

Single contact-breaker distributors incorporate a dwell-angle adjuster screw (Figs. 1, 2 and 3, item 28), which enables the dwell-angle (closed-contact period) to be set accurately, while the engine is running, and so obtain the optimum performance from the distributor.

Twin contact-breaker distributors (Figs. 3 and 4) have no provision for dwell-angle adjustment, because the auxiliary contact-breaker provides increased dwell-angle period, affording sufficient time for the ignition coil primary windings to be energised at high speeds, and thus resulting in an improved ignition spark. The twin contact-breakers are connected in parallel, each moving contact having a common connection to the low tension (L.T.) terminal of the distributor. Static ignition timing is carried out in conjunction with the 'main' contact-breaker, the 'auxiliary' contact-breaker being ignored during this process. (The 'main' and 'auxiliary' contact-breakers are shown in Figs. 3 and 4, inset illustration.)

Operation of Twin Contact-Breaker

Before the main contact-breaker opens, the auxiliary contact-breaker is already open and ineffective. As the distributor cam rotates further, the main contact-breaker 'opens' breaking the ignition primary circuit, and producing a high tension ignition spark. The auxiliary contact-breaker then 'closes' having the additional function of switching 'ON' the ignition primary circuit, before the main contact-breaker closes. In this way the auxiliary contact-breaker increases the dwell-angle period, affording sufficient time for the ignition coil primary windings to be energised at high engine speeds.

The main contact-breaker now 'closes', but does not operate at this stage, because the auxiliary contact-breaker is also closed and the ignition primary circuit is switched 'ON'.

Finally, the auxiliary contact-breaker 'opens' again, but does not operate, because the main contact-breaker is still closed and holds the ignition primary circuit switched 'ON'.

Further rotation of the cam causes the main contact-breaker to open again, and the cycle of operations is repeated leading to the production of the next H.T. spark.

2. ROUTINE MAINTENANCE

Occasionally wipe clean the outside of the distributor moulded cover, the H.T. leads and insulated tops of the sparking plugs.

(a) Single Contact-Breaker Distributors

(i) After the first 1600 kilometers (1000 miles)

Check the contact-breaker gap, using a dwell-angle meter, or alternatively, a test-lamp or voltmeter, suitable for the vehicle electrical system.

Checking with dwell-angle meter

With the engine running at approximately normal working speed, check that the dwell-angle (closed-contact period) is within 26°-30°. If not, reset the contact-breaker gap by turning the dwell-angle adjuster screw. (Clockwise to decrease and anti-clockwise to increase the dwell-angle.)

Note: Reset contact-breaker gap with decreasing dwell-angle adjustment, conunencing above 32° and decreasing to a nominal 27°.

Checking with test-lamp or voltmeter
(alternative to using dwell-angle meter)

1. Remove distributor moulded cover.
2. Turn engine until contact-breaker heel rests on peak of cam. (Removing sparking plugs facilitates this operation.)
3. Operate ignition switch to 'ON'.
4. Connect test-lamp, or voltmeter, between earth and the distributor fly-lead connection on the ignition coil. (Do not disconnect the fly-lead.) The test-lamp should light or the voltmeter should register the system voltage.
   Leave test-lamp or voltmeter connected and proceed to 5.
5. Reset the hexagonal adjuster screw, as follows: With adjuster screw pressed towards distributor body, turn adjuster 'anti-clockwise' until the test-lamp goes off or the voltmeter needle returns to 'zero' (contact-breaker now just closed). Turn the adjuster a further half-turn (three flats of the adjuster).
   Finally, turn the adjuster screw carefully 'clockwise' until the test-lamp lights or the voltmeter registers the system voltage (contact-breaker now just open) and then turn the adjuster five more flats. The contact-breaker gap is now set to provide the correct dwell-angle.

(ii) Every 9600 kilometers (6000 miles)

Examine the contact-breaker. If cleaning is necessary, use a petrol-moistened cloth. If the contact surfaces show signs of burning or excessive wear, dismantle the contact-breaker and refinish the contact surfaces with a carborundum stone or fine emery cloth and then wipe clean with the petrol-moistened cloth. During reassembly of the contact-breaker, smear the moving-contact pivot post with Shell Retinax 'A' or equivalent grease (in the case of a new contact-set, the pivot post is pre-lubricated).

After servrcing the contact-breaker, reset the contact gap, as previously described in (i),

Finally, lubricate the distributor as subsequently detailed in (c).

(b) Twin Contact-Breaker Distributors

(i) After the first 1600 kilometers (1000miles)

Check each contact-breaker gap, with a feeler gauge, as follows:

Turn engine until the heel of each contact-breaker in turn rests on a peak of the cam (removing sparking plugs facilitates this operation). Insert feeler gauge between the contacts and check whether the gap is within the limits 0.35--0.40 mm (0.014-0.016"). If necessary, the gap can be adjusted after slackening the fixed-contact securing screw.

(ii) Every 9600 kilometers (6000miles)

Examine the contact-breakers. (Servicing is detailed in 2 (a) (ii), first para.). After servicing the contact-breaker, adjust the gap as detailed in previous para. (i),

Note: If new contact-sets are fitted, initial adjustment of the gaps should be 0.40-0.45 mm (0.0l—.018"), which allows for 'bedding-in' of the moving-contact heels.

(c) Lubrication

(i) Shell 'Retinax A' or equivalent grease

Lightly smear the grease on the working surface of the cam and on each contact-breaker pivot post. (The contact-breakers will need dismantling to enable the grease to be applied. If new contact-sets are fitted, the pivot post is pre-lubricated.)

Certain distributors have a felt pad fitted to the contact-breaker(s), to augment lubrication of the cam. This pad does not require periodic lubrication, as it was impregnated before fitting.

(ii) Shell 'Turbo 41' or clean engine oil

Apply the oil sparingly to the felt pad in the top of the cam beneath the rotor arm (to lubricate the cam spindle), and through the aperture at the base of the cam (to lubricate the auto-advance mechanism).

3. TECHNICAL DATA

Direction of rotation	According to arrow-marking on distributor body.
Firing angles	0.45°, 90° etc., ±1°
Dwell-angle (closed-contact period):	
(i) Single contact-breaker distributors ...	26-28°
(ii) Twin contact-breaker distributors ...	Determined by contact-breaker gap.
Contact-breaker gap:	
(i) Single contact-breaker distributors ...	Determined by dwell-angle setting.
(ii) Twin contact-breaker distributors ...	0.35--0.40 mm (0.0l4-0.016") 0.40--0.45 mm (0.Ol—.O18'1 Initial setting for new contact set.
Contact-breaker spring loading	5-7N or 512-680 gf (18-24 ozf).
Capacitor	0.l8--0.25 microfarad.

4. SERVICING, DISMANTLING AND REASSEMBLY

(a) Bench Servicing and Dismantling

Except in the case of removal and refitting of the driving gear or driving dog, servicing is facilitated by lightly clamping the distributor upright in the jaws of a vice.

(i) Servicing the contact-breaker(s) and general lubrication

(Refer 2. ROUTINE MAINTENANCE).

(ii) Renewing the vacuum unit and initial dismantling

Distributors with offset pivot contact-breaker (Figs. 1 and 2)

Remove the moulded cover and the rotor arm.

Remove the nut and the washer and spring, securing the contact-breaker base plate to the pivot post. Lift the contact-breaker base plate assembly (complete with contact-breaker) from the pivot post, to disengage the base plate actuating peg from the vacuum unit operating lever. Remove the two screws which secure the vacuum unit to the side of the distributor body. Remove the vacuum unit and renew, if necessary.

If further dismantling is required, refer subsequent para's (iii) and (iv).

Distributors with single 'concentric' contact-breaker (Fig. 3)

Remove the moulded cover and the rotor arm.

Disengage the vacuum unit actuating peg from the vacuum operating lever, by first removing the cheese-headed fixing screw and then lifting the one-piece contact-breaker assembly from the base plate (see underside view of the contact-breaker assembly, Fig. 3, showing vacuum unit actuating peg on the underside of the fixed contact plate). Remove the two screws securing the vacuum unit to the side of the distributor body, remove the vacuum unit and, if necessary, renew.

If further dismantling is required, refer subsequent para's (iii) and (iv).

Distributors with twin 'concentric' contact-breakers earlier type (Fig. 4)

Remove the moulded cover and rotor arm. Remove the two securing screws from the side of the distributor body.

Grasp the vacuum unit and pull on the vacuum unit until the contact-breaker base plate assembly has been rotated into a stop position. Slots in the base plate will now be in a position enabling the contact-breaker base plate assembly (complete with contact-breaker and capacitor) to be lifted and disengaged from the bearing plate. Still holding the vacuum unit, lift the contact-breaker base plate assembly and disengage the actuating peg from the vacuum operating lever, the vacuum unit can then be removed and if necessary renewed.

If further dismantling is required, refer subsequent para's (iii) and (iv).

Distributors with twin 'concentric' contact-breakers, later type (Figs. 3 and 4)

Remove the moulded cover and the rotor arm.

Remove the two screws securing the vacuum unit to the side of the distributor body.

Grasp the vacuum unit and pull on the vacuum unit until the contact-breaker base plate assembly has been rotated into a stop position. Still holding the vacuum unit, disengage the vacuum operating lever from the actuating peg and then remove the vacuum unit and, if necessary, renew.

If further dismantling is required, refer subsequent para's (iii) and (iv).

(iii) Renewing: Auto-advance springs, cam and centrifugal weights

Dismantle the distributor to the stage previously detailed in (ii), according to the type of contact-breaker (single offset-pivot, single concentric, and twin concentric earlier and later types).

Remove the three securing screws and lift the contact-breaker bearing plate (C.B. sub-assembly in the case of a twin concentric contact-breaker later type) from the distributor body. Access can now be obtained to the auto-advance springs, cam, and centrifugal weights, which if necessary can be renewed.

(iv) Renewing: Driving dog or gear, and the shaft-and-action plate assembly

Note: (1) The driving dog, or gear, is fitted in a particular position on the distributor shaft. To facilitate reassembly, before removing either the driving dog or the gear, note relative positions between the driving dog or gear and the rotor arm keyway in the shaft (see Fig. 5).

Note: (2) For service purposes: A new driving gear is supplied with the fitting pin hole predrilled, whereas a new driving dog is supplied with the fitting pin hole partially-drilled through one side of the dog only. A new shaft-and-action plate assembly is supplied with the shaft undrilled. Completion of the drilling of the fitting pin hole through the driving dog, or drilling of the fitting pin hole through the shaft, must be carried out after the driving dog or gear has been correctly positioned on the shaft (see Fig. 5).

(ii) Nylon bearing pads and the vacuum actuating-arm connecting peg on the underside of the contact-breaker base plate:- Smear with Rocol No. 30863 grease or equivalent lubricant.

(iii) The cam and contact-breaker pivot post:- Smear with Shell 'Turbo 41' oil, or clean engine oil.

Smear with Shell 'Retinax A' grease, or equivalent lubricant.

(iv) The felt pad located in the top of the shaft (beneath the rotor arm):- Apply a few drops of Shell 'Turbo 41' oil, or clean engine oil.

Removing the driving dog or gear

Lightly clamp or carefully support the shank of the distributor, then drive or press the fitting pin from the driving dog or gear. Use a pin punch 3 nun or 4 mm (!" or -rl;-") diameter, according to the fitting pin size.

After removing the driving dog or gear and the thrust washer, the shaft-and-action plate assembly can be withdrawn from the distributor body.

When the shaft-and-action plate assembly is refitted, ensure the distance collar is fitted to the shaft beneath the action plate (see Figs. 1 to 4) and smear the shaft with clean engine oil.

Fitting the driving dog or gear

To ensure the thrust washer and the driving dog or gear are correctly assembled, on the distributor shaft, refer Fig. 5. Note the following main points:

(1) Distributors with driving gear: The steel thrust washer has a locking tab which engages in a keyway in the distributor shank.
Distributors with driving dog: The brass thrust washer has three raised 'pips' which must face the driving dog.

(2) The driving dog or gear must be positioned relative to the rotor arm keyway in the shaft.

(3) The end-float controlling feeler gauge is positioned differently for the purpose of fitting a driving dog and a driving gear.

With the thrust washer and the driving dog or gear and the end-float controlling feeler gauge in position as shown in Fig. 5, use the hole provided in the driving dog or gear as a guide for the drill and pass the appropriate size drill through the shaft and through the other side of the driving dog or gear. (Apply pressure to the rotor arm end of the shaft, whilst carrying out the drilling operation, so ensuring the correct amount of end-float when the feeler gauge is removed.) After removing the feeler gauge, secure the driving dog or gear with the fitting pin and lightly rivet both ends of the pin.

(b) Reassembly

The general reassembly of the distributor is simply a reversal of the dismantling procedure. During reassembly, lubricate the following parts:

(i) Cam spindle and moving parts of the centrifugal auto-advance mechanism:- Smear with Shell 'Turbo 41' oil, or clean engine oil.