



### FIELD COILS.

The field coils can be tested for an open circuit by connecting a 12 volt battery having a 12 volt bulb in one of the leads, to the tapping points of the field coils to which the brushes are connected. If the lamp does not light, there is an open circuit in the wiring of the field coils.

Lighting of the lamp does not necessarily mean that the field coils are in order, as it is possible that one of them may be earthed to a pole shoe or to the yoke. This may be checked by removing one of the leads from the brush connector and holding it on a clean part of the starter yoke. Should the bulb now light it indicates that the field coils are earthed.

Should the above tests indicate that the fault lies in the field coils, the complete starter should be returned and a replacement fitted. If, however, a pole shoe expander and wheel operated screwdriver are available, it is possible to replace the field coils. A pole shoe expander is necessary to ensure that there will not be any airgap between the pole shoes and the inner face of the starter yoke.

Replace the field coils as follows:-

- (i) Unscrew and remove the terminal nuts and washers from the terminal (5).
- (ii) Remove the two insulation pieces which are fitted beneath the field coils to prevent the intercoil connectors from contacting with the yoke.
- (iii) Mark the pole shoes and yoke in order that the pole shoes can be fitted in their original positions.
- (iv) Unscrew the four pole shoe retaining screws (20) by means of the wheel operated screwdriver.
- (v) Draw the pole shoes and field coils out of the starter yoke and lift off the field coils.
- (vi) Fit the new field coils over the pole shoes and place them in their original positions inside the yoke. Take care to ensure that the taping of the field coils is not trapped between the pole shoes and the yoke.
- (vii) Locate the pole shoes and field coils by lightly tightening the fixing screws.
- (viii) Insert the pole shoe expander, open it to the fullest extent and tighten the screws.
- (ix) Finally, tighten the screws by means of the wheel operated screwdriver and lock the screws by peening into the slot.
- (x) Replace the insulation pieces between the field coil connections and the yoke.



- (xi) Position the terminal nut through its location in the starter yoke and fully tighten securing nuts.

#### ARMATURE.

Examination of the armature will in many cases reveal the cause of failure, e.g. conductors lifted from the commutator due to the starter sticking in the engaged position while the engine is running and causing the armature to be rotated at an excessive speed. A damaged armature must in all cases be replaced - no attempt should be made to machine the armature core or to true a distorted armature shaft.

#### MOTOR BEARINGS.

Bearings which are worn to such an extent that they will allow approximately .005" total side movement of the armature shaft must be replaced. Ball bearings are fitted at both commutator and driving ends, although some early starters had a roller bearing at the commutator end.

To replace the bearing at the commutator end, remove the commutator end bracket as previously described, and remove the bearing as shown in Fig. 16. Fit the new bearing, taking care to replace the distance piece, steel washer and felt washer as shown.

To replace the bearing at the driving end, dismantle the gearbox as previously described, and remove the bearing from the driving end by means of an extractor or by lightly tapping on the inner race.

The bearings should be packed with a High Melting Point grease.

#### THE DRIVE UNIT

The purpose of the clutch which is incorporated in the starter drive unit, is to allow a limited amount of slip to take place during engagement of the pinion with the flywheel, this has the effect of reducing the shock loading on the pinion and the flywheel teeth and thus increasing their life.

It is important that the clutch should slip within the fairly wide limits of torque loading prescribed, in order that it should perform its duty satisfactorily. For this reason, careful assembly of the drive is necessary and a slipping torque test (see later paragraph) strongly recommended.

On earlier type drives, five cork friction discs were used, while on later

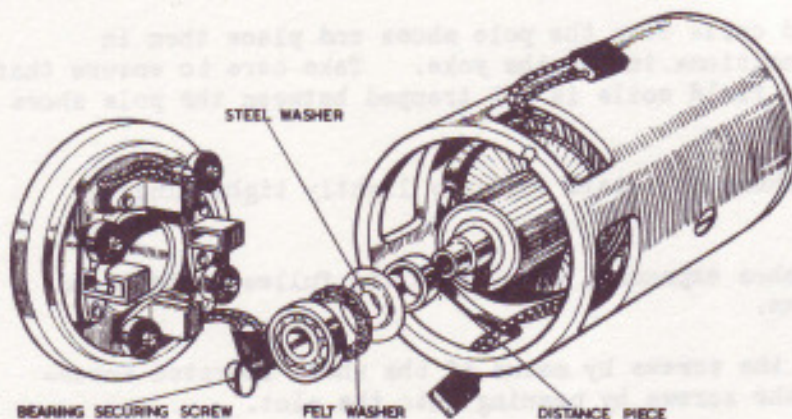


FIG. 16. COMMUTATOR END BEARING REMOVED.

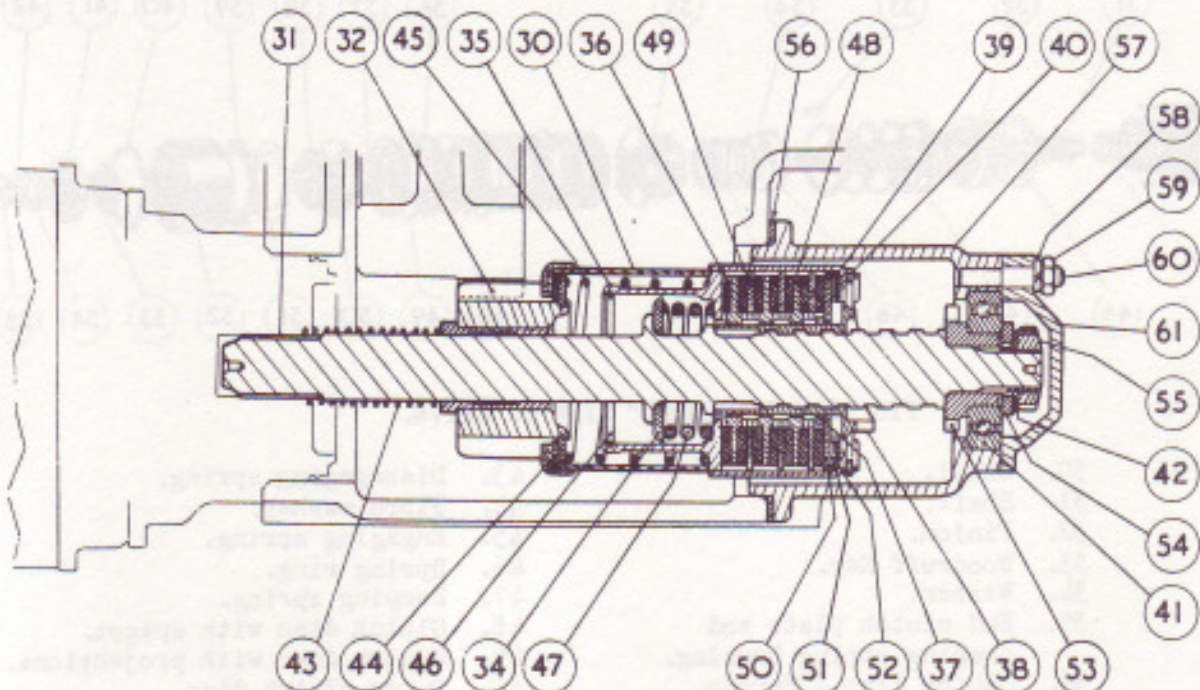


FIG. 17. SECTION THROUGH DRIVE IN ENGAGED POSITION. (A Vellumoid washer is fitted each side of the packing piece 56 on late chassis.)

- |                              |                |                    |
|------------------------------|----------------|--------------------|
| 56. Packing piece.           | 59. Nut.       | (For other numbers |
| 57. Aluminium drive housing. | 60. Stud.      | see Notation List  |
| 58. Spring washer.           | 61. End Cover. | for Fig.18.)       |

drives seven Ferodo discs are used. For a time the seven discs were made of an asbestos base material - Ferodo AM11, but this was superseded later by a cotton base material - Ferodo CR.

To dismantle the Drive.

Do not dismantle the drive unnecessarily. If it is functioning satisfactorily it is advisable to leave well alone. If there is any doubt about its performance, then the slipping torque can be measured as described in the appropriate paragraph, and as long as the slipping torque figures are between the limits of 15 to 35 lbs.ft., the drive can be considered to be performing satisfactorily. However, if dismantling is necessary, proceed as follows:-

- (i) Remove the small aluminium cover (61, Fig.17) secured by 3 nuts and spring washers.
- (ii) Mount the drive vertically in a vice, holding it by means of fibre vice clamps on the splined end of the shaft and after bending back the tab of the lock washer (42), unscrew and remove the slotted ring nut (55) and then remove the lock washer and plain washer (54). Remove from vice.

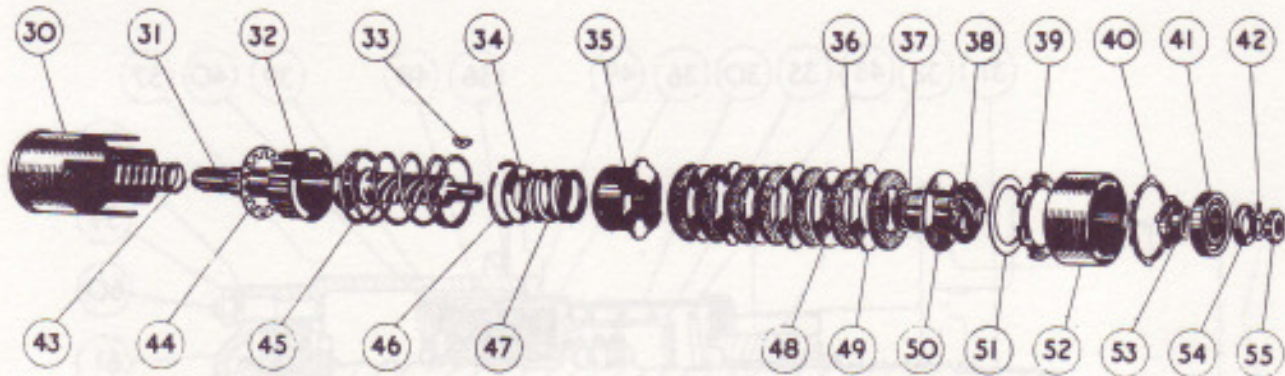


FIG. 18. "EXPLODED" VIEW OF DRIVE.

- |   |                                   |
|---|-----------------------------------|
| 30. Shell.  | 43. Disengaging spring.           |
| 31. Shaft.  | 44. Fibre washer.                 |
| 32. Pinion.   | 45. Engaging spring.              |
| 33. Woodruff Key.                                   | 46. Spring ring.                  |
| 34. Washer.   | 47. Damping spring.               |
| 35. End clutch plate and<br>damping spring housing. | 48. Clutch disc with spigot.      |
| 36. Clutch disc - Ferodo.                           | 49. Clutch disc with projections. |
| 37. Spring ring.                                    | 50. Outer clutch disc.            |
| 38. Operating nut.                                  | 51. Fibre distance washer.        |
| 39. Clutch ring.                                    | 52. Cover.                        |
| 40. Locking ring.                                   | 53. Stop operating bush.          |
| 41. Ball bearing.                                   | 54. Plain washer.                 |
| 42. Lock washer.                                    | 55. Nut.                          |

- (iii) Support the housing (57) and drive out the assembly from the housing, using an aluminium drift or fibre hammer on the end of the shaft.
- (iv) Remove the locking ring (40) by prising inwards with a screwdriver.

The drive will now come apart quite easily.

Inspection of dismantled Drive and preparation for re-assembling.

It is presumed that the clutch will only have been dismantled because of faulty operation, therefore visual examination of the parts will probably indicate the cause of the trouble.

In the case of the five cork disc clutch, the corks may have fractured; this will entail converting the drive to the seven disc type. For this, the following parts will be required: Three new steel discs (48, Fig.18) with a narrower spigot on the inner diameter to replace the two existing spigoted discs, also one additional inner clutch disc with projections (49) similar to the existing type and seven new Ferodo CR friction discs.

In the case of the seven disc clutch, inspection may reveal a charred surface on the Ferodo discs due to excessive slipping, this will entail replacement of the discs with new Ferodo CR type, irrespective of whether the discs



removed are of the asbestos base or cotton base type. A new lock washer (42) will also be required.

To Re-assemble the Drive.

Place the fibre washer (44) over the pinion (32) with the chamfer outermost.

Place the pinion into the shell (30) and then drop the shaft (31) into the shell and through the pinion.

Place the engaging spring (45) into the shell.

Place the assembly, which consists of the end clutch plate (35), the damping spring (47), the washer (34) and the spring ring (46), over the shaft and into the engaging spring and shell.

Now, holding the operating nut (38) vertically in the left-hand, assemble the various clutch discs to it in the following order (noting first that the outer steel clutch disc (50) is securely held in position by the spring ring (37)).

1st Ferodo disc, 1st steel disc with projections, 2nd Ferodo disc, 1st spigoted steel disc, 3rd Ferodo disc, 2nd steel disc with projections, 4th Ferodo disc, 2nd spigoted steel disc, 5th Ferodo disc, 3rd steel disc with projections, 6th Ferodo disc, 3rd spigoted steel disc and finally the 7th Ferodo disc.

Having thus assembled the discs, hold them closely together with the fingers, remove the operating nut (38) and with the aid of a 1 to 2 inch micrometer, measure the overall thickness of the discs, this should be 1.108" - .010" as shown in Fig.19. The .094" dimension shown in Fig.19 is the nominal thickness of each Ferodo disc.

If above the limit, then reduce the thickness of the Ferodo discs slightly by rubbing them on a piece of medium glass paper on a flat surface.

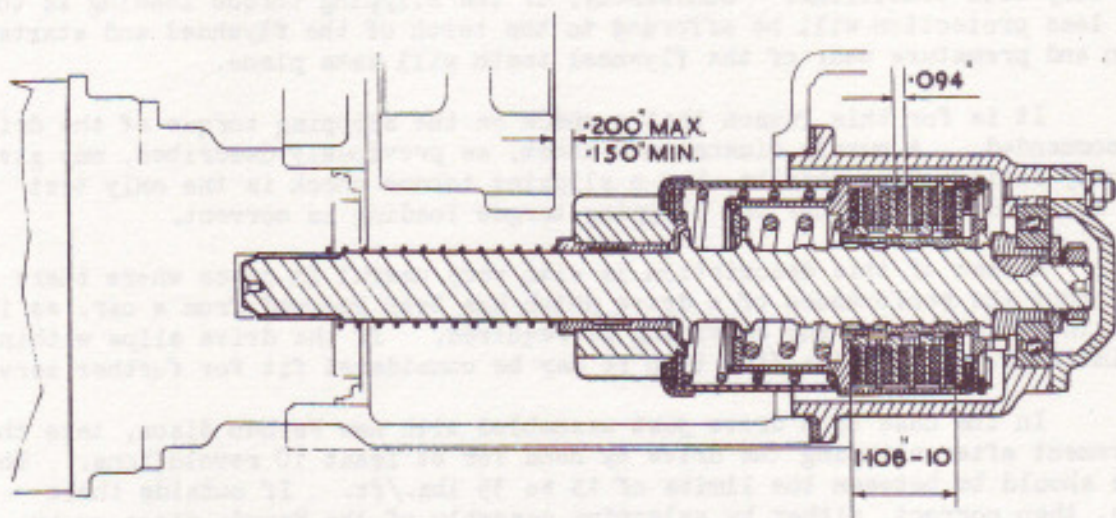


FIG. 19. SECTION THROUGH DRIVE IN DISENGAGED POSITION.



If below the limit, increase the thickness by selective assembly of the Ferodo discs.

Next, soak the Ferodo discs in engine oil for 30 minutes and then re-assemble the clutch discs on to the operating nut as already described.

The remainder of the re-assembling can be more easily carried out if the drive is mounted vertically in a vice, clamping on the pinion by means of fibre vice clamps.

Place the sub-assembly (just completed) consisting of the various discs and the operating nut, over the shaft and force it down against the spring by screwing the shaft through the operating nut. If the shaft is held in this position, the spring will remain compressed thus allowing the assembly to be completed.

Place the fibre distance washer (51) into the clutch ring (39), entering the chamfered outer diameter first, then place this ring and distance washer assembly on to the outer clutch disc (50) and hold down by turning the shaft, then fit the cover (52) and retain by means of the locking ring (40).

With the stop operating bush (53) in position in the bearing and the key (33) in its keyway, replace the aluminium housing (57) and bearing, and secure with the plain washer (54), a new locking washer (42) and the slotted ring nut (55). Do not bend up the tab of the lock washer until the slipping torque of the clutch has been tested. When this test has been satisfactorily concluded, lock the nut with the lock washer, lubricate the bearing with an H.M.P. grease and then replace the end cover (61) and secure with the three nuts and spring washers.

#### Measurement of the Slipping Torque of the Drive.

It is important that the clutch of the starter drive should slip at the correct torque loading within certain limits, for if the clutch slips too easily then damage may be done to the drive due to overheating of the friction discs during the excessive slipping which may occur when starting the engine under very cold conditions. Conversely, if the slipping torque loading is too high, less protection will be afforded to the teeth of the flywheel and starter pinion and premature wear of the flywheel teeth will take place.

It is for this reason that a check on the slipping torque of the drive is recommended. A purely dimensional check, as previously described, may give perfectly satisfactory results, but a slipping torque check is the only test which will indicate whether the slipping torque loading is correct.

A test of this description is also very useful in cases where there is doubt about the performance of a drive which has been removed from a car, as it should indicate whether any servicing is required. If the drive slips within the limits of 15 to 35 lbs./ft. then it may be considered fit for further service.

In the case of a drive just assembled with new Ferodo discs, take the measurement after slipping the drive by hand for at least 10 revolutions. The figure should be between the limits of 15 to 35 lbs./ft. If outside these limits, then correct, either by selective assembly of the Ferodo discs or by reducing their thickness slightly by rubbing them on medium glass paper



supported on a flat plate.

The following paragraphs describe alternative methods which may be adopted for measuring the slipping torque.

(i) By Torque Spanner.

If a torque spanner capable of reasonably accurate measurements and with a capacity of up to 35 lbs./ft. (420 lbs./ins.) is available, then the slipping torque of the drive can be measured very easily. To do this proceed as follows:-

Remove the slotted ring nut (55) from the end of the drive and substitute for this a standard half inch B.S.F. nut. This will allow the standard adaptor on the torque spanner to be used.

Mount the drive vertically in a vice and using fibre vice clamps, tighten up on the pinion and then apply the torque spanner to the nut on the top of the drive shaft as shown in Fig.20, turning the nut until slipping occurs and then continue turning very slowly and read off the torque loading from the dial.

If no suitable torque spanner is available, adopt method (ii).

(ii) By Torque Arm and Spring Scale.

A torque arm suitable for the purpose may be made from a piece of mild steel plate. The end which fits around the pinion may be suitably shaped by drilling and filing so that two or three projections in the shape of teeth are left on it to engage with the teeth of the pinion. The length of the arm should be 1 ft. between the two hole centres. A spring scale capable of reading up to 35 lbs. will be required. The torque in lbs./ft. required to make the drive slip, can be read directly off the scale. See Fig.21. If it is desired to use a smaller size of spring scale, then the torque arm could be made 2 ft. long and the reading off the spring scale is doubled.

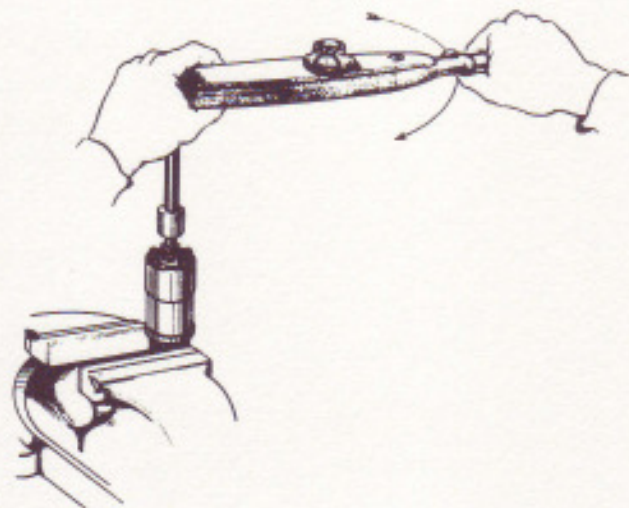


FIG. 20. MEASURING SLIPPING TORQUE OF CLUTCH WITH A TORQUE SPANNER.

When carrying out this test, keep the spring scale approximately at right angles to the torque arm.

In the event of a spring scale not being available, then the drive could be mounted horizontally in the vice and the load applied to the torque arm by hanging weights on the end.



PERIODIC ATTENTION AND LUBRICATION.

The reduction gear will require attention every 10,000 miles, when the filler plug should be removed and an S.A.E. 30 viscosity engine oil should be added until the level reaches the mouth of the plug orifice.

Periodically, approximately every 10,000 miles the brush gear and commutator should be examined and cleaned.

The various ball bearings, of which there are four, one supporting each end of the motor armature, one in the gearbox and one at the rear end of the drive unit, are lubricated with an H.M.P. grease during initial assembly and no further attention is necessary to these bearings until the starter motor and drive is dismantled for overhaul, when the bearings should again be lubricated with an H.M.P. grease.

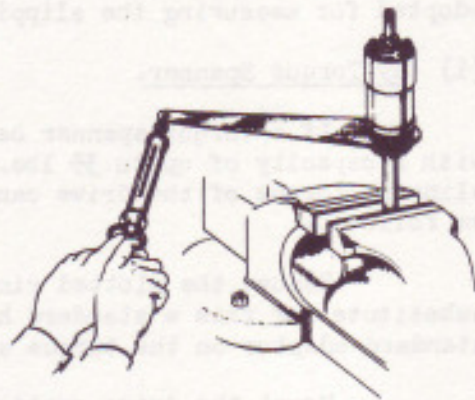


FIG. 21. MEASURING SLIPPING TORQUE OF CLUTCH WITH A SPRING SCALE.







STARTER MOTOR SWITCH.

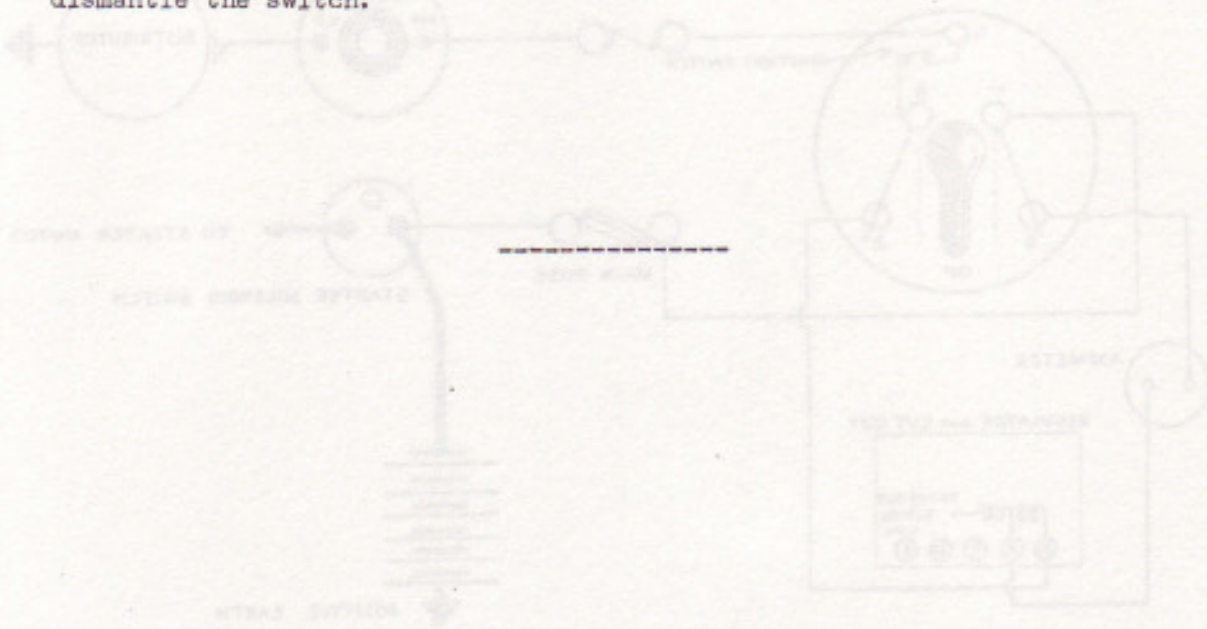
TYPE.

The starter switch is a Lucas Model ST810, Service No.076003. This identification mark is stamped on the case of the starter switch. The Bentley reference number is RD.3009. When ordering a replacement always quote these numbers.

To test the Switch in position.

Disconnect the existing cables from the switch terminals and connect a pair of test leads from a 12 volt battery to the switch. The negative lead must be connected to the small terminal fitted with a grub screw and the positive held against some clean metallic part of the switch body or fixing bracket. If the switch is in working order it will be heard to operate every time the circuit is completed.

If the switch is not heard to operate it is probably damaged internally and a replacement must be fitted. No attempt should be made to dismantle the switch.





THE IGNITION SYSTEM.

THE DISTRIBUTOR.

A diagram of the ignition circuit is shown in Fig.22. The distributor, which is accessibly mounted on the near side of the engine, is of the three lobe cam and twin contact breaker arm type. An automatic centrifugal advance mechanism is housed in the base of the distributor head. No hand control for varying the ignition timing being fitted.

To expose the contact breakers and cam, spring back the securing clips and remove the moulded distributor cover.

The only adjustments required in service are maintenance of the correct gaps, and in certain circumstances, the synchronisation of the contact breaker arms.

The firing order is 1,4,2,6,3,5, this is embossed on the distributor cover, No.1 being the front cylinder. The direction of rotation of the distributor is clockwise when viewed from the top.

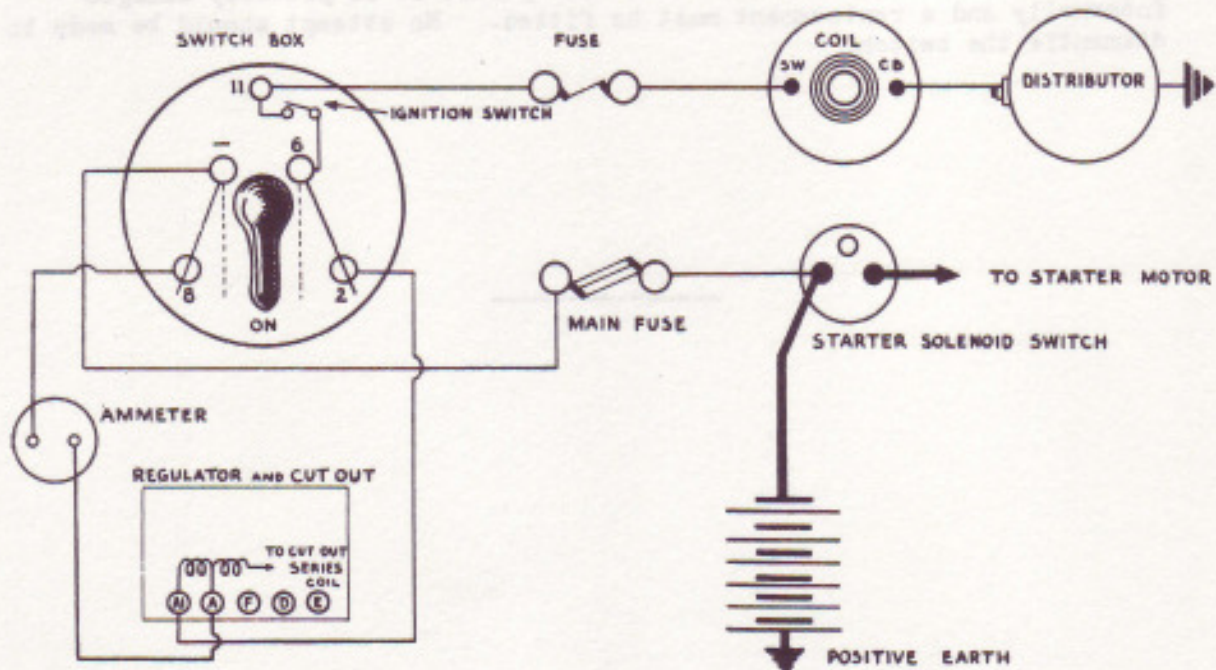


FIG. 22. IGNITION CIRCUIT.



### CLEANING THE CONTACTS.

Every 5000 miles the contact surfaces should be examined. If they have a clean greyish frosted appearance and are not badly pitted, then do not try to improve them by trimming.

If, however, they appear burnt and badly pitted, they should be removed from the distributor for trimming as follows:-

Lift the Rotor Arm off the top of the spindle. Remove the small screws which attach the springs to their anchorage. Remove the two Contact Plate Locking Screws B and E (see Fig.23), then remove the contact plates complete with breaker arms. Screws G, H and J MUST NOT be disturbed.

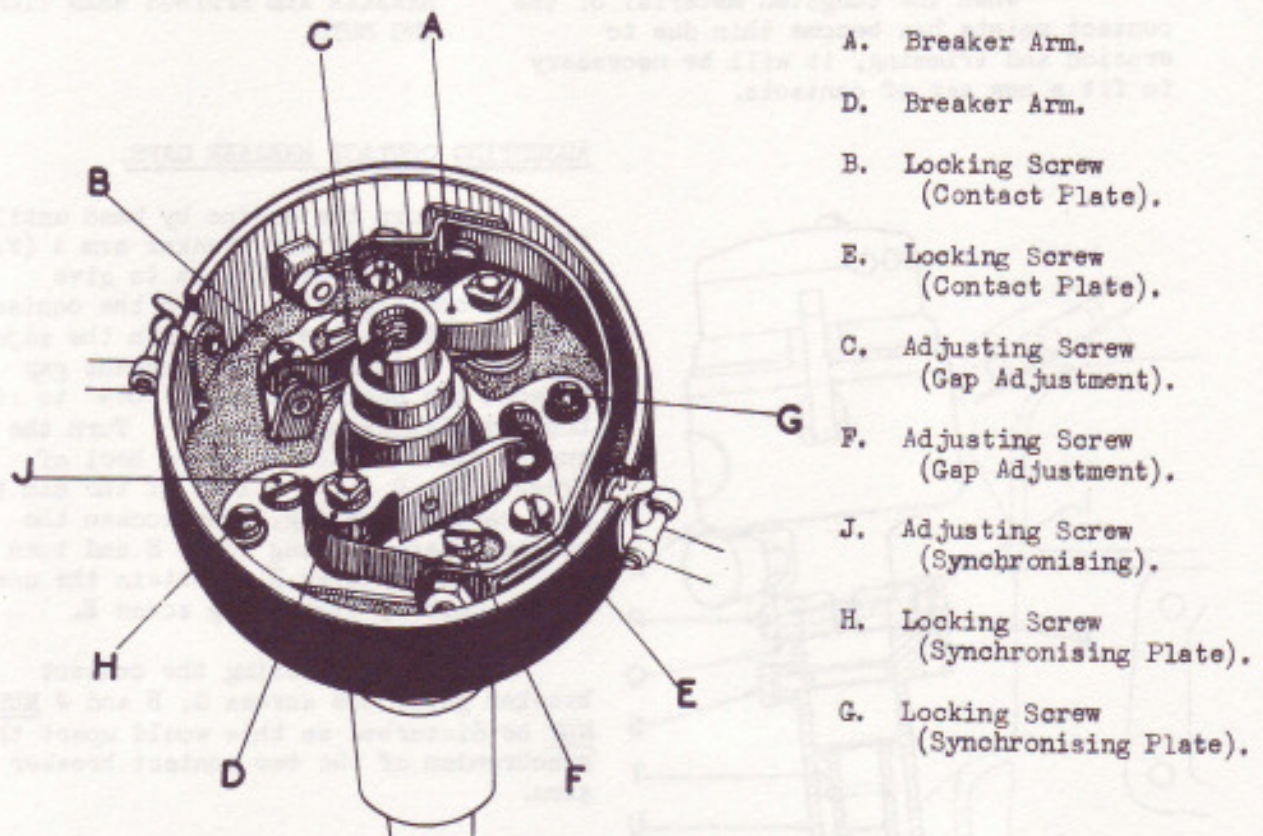


FIG. 23. LOW TENSION CONTACT BREAKERS.

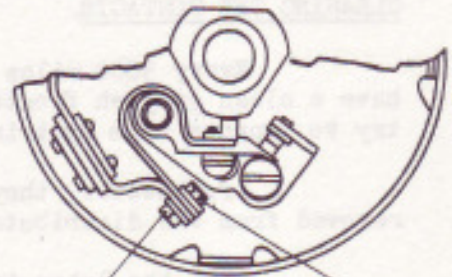
Trimming is best done with an India stone. It is advisable to leave the breaker arms in position on the pivots during this operation, to prevent loss of the small spring retaining clips and fibre washers, and to allow the contacts to be swung together to check for trueness of the surfaces, which should close flush with each other. All raised portions of the contact surfaces should be removed, but it is not necessary to remove the pit mark. Finish by wiping with a petrol moistened cloth to remove all traces of grease or dirt.



When replacing the contacts, they must be refitted in the correct position; i.e. the breaker arm D and its contact plate must be fitted over the synchronising plate, otherwise the springs will not line up with the anchorage nor will the fibre heels bear centrally on the cam. When attaching the springs to their anchorage, tighten the nuts as shown in Fig. 24, to avoid twisting the springs, and so cause the breaker arms to bind on their pivots.

Finally, lubricate where necessary and adjust the gaps.

When the tungsten material of the contact points has become thin due to erosion and trimming, it will be necessary to fit a new set of contacts.



TIGHTEN HERE HOLD HERE

FIG. 24. TO AVOID TWISTING BREAKER ARM SPRINGS WHEN TIGHTENING NUTS.

ADJUSTING CONTACT BREAKER GAPS.

Turn the engine by hand until the fibre heel of the breaker arm A (Fig. 23) is on a lobe of the cam to give maximum opening, then loosen the contact plate locking screw B and turn the adjusting screw C to obtain the correct gap between the contacts, i.e., .019" to .021". Lock by tightening screw B. Turn the engine again until the fibre heel of breaker arm D is on a lobe of the cam to give maximum opening, then loosen the contact plate locking screw E and turn the adjusting screw F to obtain the correct gap. Lock by tightening screw E.

When adjusting the contact breaker gaps, the screws G, H and J MUST NOT be disturbed as this would upset the synchronism of the two contact breaker arms.

- K. Distributor.
- L. Nut - Clamping Plate to Housing.
- P. Screw - Clamping Plate.
- Q. Clamping Plate.
- R. Packing Washer.
- S. Setscrew.
- T. Driven Sleeve.
- U. Distributor Housing.
- V. Driven Plates.
- W. Driving Shaft.
- X. Vellumoid Joint.

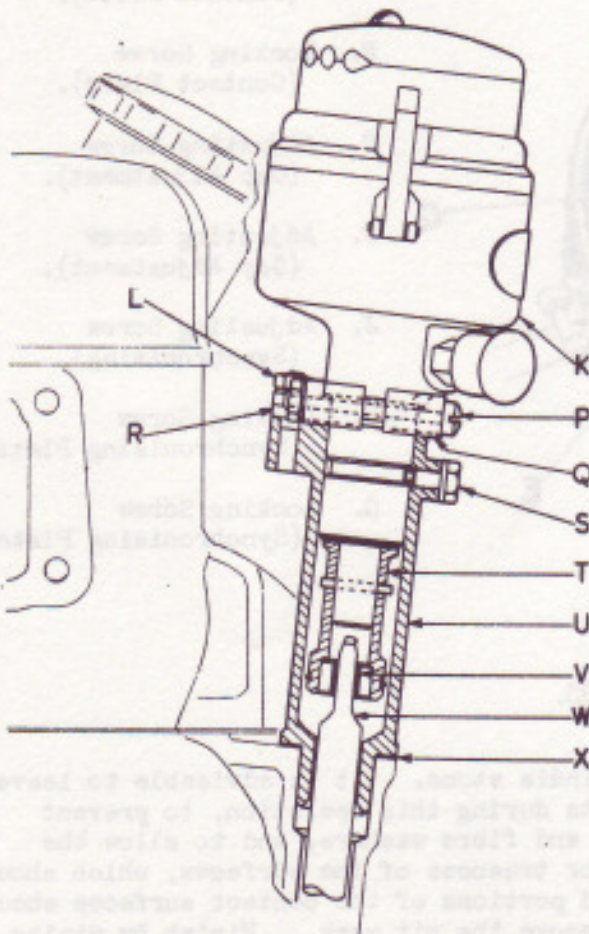


FIG. 25. DISTRIBUTOR AND HOUSING IN POSITION.



WHEN TO CHECK SYNCHRONISM OF BREAKER ARMS.

The contact breaker arms are accurately synchronised by the makers, and normally no further adjustment will be required; it will be necessary, however, to check them for synchronism and re-adjust in the following circumstances:-

- (a) If the screws G, H and J (Fig.23) have been accidentally disturbed.
- (b) If for any reason (such as a broken C.B. spring or fibre heel) only one new pair of contacts is fitted to the distributor and the other pair have been in use for some time.
- (c) If two new pairs of contacts are fitted to replace one new and one old pair as in (b) above.

Synchronising is carried out after removing the distributor from the cylinder block.

REMOVING THE DISTRIBUTOR.

Remove the distributor complete with the housing U (Fig.25) as follows:-

Remove the distributor cover. Turn the engine until the distributor rotor arm is in line with No.1 cylinder firing position as indicated on the moulded cover.

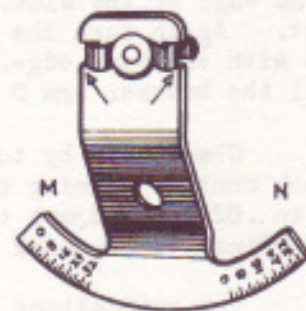


FIG. 26. SYNCHRONISING TOOL.

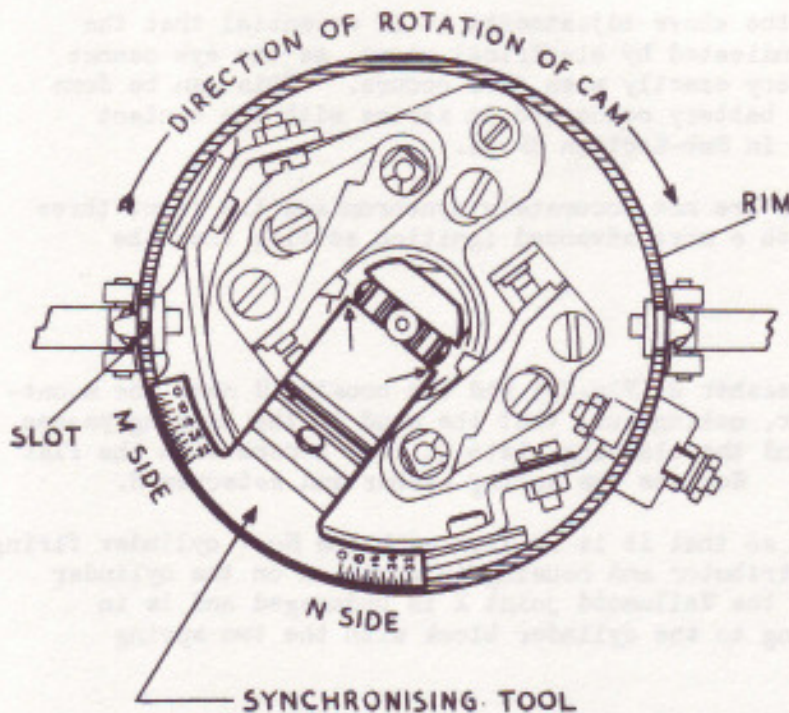


FIG. 27. SYNCHRONISING TOOL IN POSITION.

Remove the two nuts and flat spring washers which secure the distributor housing to the cylinder block and then remove the housing and distributor assembly from the block. Take care not to damage the Vellumoid joint X as fitted to the lower end of the housing.

NOTE: DO NOT slacken the clamping plate screw P, as the clamping plate should be left in position; i.e. clamped to the distributor so as not to disturb the timing.

Remove the nut L and flat spring washer which secures the clamping plate to the housing U. Remove the setscrew S which retains the distributor to the housing.



Withdraw the distributor from the housing thereby exposing the driven sleeve T.

#### SYNCHRONISING CONTACT BREAKER ARMS.

Using the special tool illustrated in Fig.26, proceed as follows:-

Adjust the gaps of both pairs of contacts as previously described.

Place the synchronising tool on the cam with the M side of the spring in the slot in the cam, then turn the cam in a clockwise direction until the graduations on the M side of the tool are near the slot in the rim of the distributor base (see Fig.27). Continue to turn the cam slowly until the breaker arm A just breaks contact. Note the graduation on the tool that aligns with the edge of the slot, in the exact position in which the points broke contact. Again turn the cam until the corresponding graduation on the N side aligns with the same edge. Loosen screws G and H and turn the adjusting screw J until the breaker arm D just breaks contact.

Check this by turning the cam again. Tighten screws G and H. Re-check contact opening of arm D and if it is not still within the limits of .019" to .021" re-adjust to obtain this figure, and re-synchronise the breaker arms. Finally, re-check the contact opening of arm D.

The graduations on the tool represent engine degrees and the markings on the M side are just 60 distributor degrees or 120 engine degrees from corresponding markings on the N side. The breaker arms must not be out of synchronism more than 2 engine degrees.

When carrying out the above adjustments it is essential that the opening of the contacts is indicated by electrical means, as the eye cannot detect with sufficient accuracy exactly when this occurs. This can be done by means of a small bulb and battery connected in series with the contact breaker points, as described in Sub-Section BP.6A.

If the breaker arms are not accurately synchronised the front three cylinders will be running with a more advanced ignition setting than the other three, or vice versa.

#### REFITTING DISTRIBUTOR.

Slide the packing washer R (Fig.25) and the housing U over the mounting spigot of the distributor, making sure that the stud in the housing passes through the packing washer and the clamping plate-Q, then secure with the flat spring washer and the nut L. Replace the spring washer and setscrew S.

Turn the rotor arm so that it is in line with the No.1 cylinder firing position, then place the distributor and housing in position on the cylinder block after making sure that the Vellumoid joint X is undamaged and is in position. Secure the housing to the cylinder block with the two spring washers and nuts.

**NOTE:** The distributor and housing can only be re-assembled to the block as described above if the tongue on the driving shaft W is in line with the driving plates V of the distributor assembly, therefore the engine should not have been turned since the distributor



was removed. However, if the engine has been turned, it will be necessary to re-set the engine position so that No.1 piston is at the top of its firing stroke. This can be done by removing the small inspection plate from the clutch housing just above the starter motor, and turning the engine until the IGN/TDC mark on the flywheel lines up with the pointer with both valves of No.1 cylinder closed.

#### DISTRIBUTOR COVER.

The moulded distributor cover which is of the side outlet type, requires no attention other than cleaning. This should be done by wiping the inside and outside with a clean dry cloth.

If cleaning of the distributor cover is neglected it is possible that "tracking" may occur, in which case a new cover must be fitted.

#### LUBRICATION.

The distributor grease cup should be given a turn or two about every 1000 miles, to lubricate the spindle bearing.

In replenishing the grease in the cup, Shell Mex V.W. or a similar type, should be used.

Every 5000 miles the rotor arm should be removed and a few drops of engine oil applied to the felt pad in the top of the spindle, this lubricates the automatic advance mechanism. At the same time, one drop of engine oil should be applied to each contact breaker arm pivot and the cam should be lightly greased with Mobilgrease No.2 to reduce wear of the breaker arm fibre heel.



### CHECKING AND ADJUSTING THE IGNITION TIMING.

In the fully retarded position the spark for No.1 cylinder should occur when the IGN/TDC marking on the flywheel is in line with the timing pointer and both valves of that cylinder are closed, i.e. No.1 piston at the top of its firing stroke.

The timing pointer and flywheel markings can be seen by removing the small inspection hole cover from the near-side front face of the clutch casing just above the starter motor.

Owing to the fact that a friction damped spring drive is used for driving the valve gear and distributor and as the starting handle operates to turn the crankshaft through the medium of the spring drive, the starting handle must not be used to turn the engine for timing purposes, nor must the starting handle have been used since the engine was last running. It is equally important that when the engine is turned from the rear as described later, it should be turned in the normal direction of rotation only.

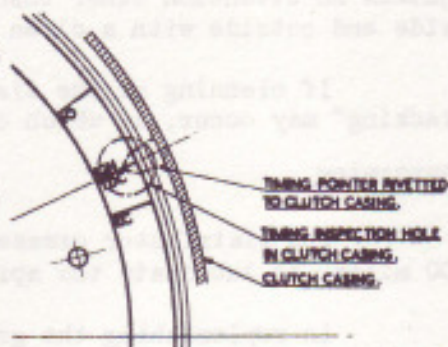


FIG. 28. TIMING MARKS ON FLYWHEEL.

If the engine has been turned in the opposite direction of rotation or if the starting handle has been used, the timing should be checked and re-adjusted if necessary after the engine has been running again.

To turn the engine for timing purposes, remove the sparking plugs, jack up one rear wheel, engage top gear, release the handbrake and turn the wheel in the normal direction of rotation.

To check the timing, turn the engine by the above method until the distributor rotor arm approaches the No.1 cylinder firing position, then continue to turn very slowly until the points just break contact. The moment the points "break" contact, prevent any further movement of the flywheel and observe the position of the flywheel marking through the inspection hole. The IGN/TDC marking should be in line with the timing pointer. If this is not so, turn the engine until the marking does line up with the pointer (not forgetting that the engine must be turned in its correct direction of rotation only) and then slacken the distributor head clamping screw (P, Fig.25) and rotate the distributor body in an anti-clockwise direction until the points of breaker arm (A, Fig.23) just break contact. Tighten the clamping screw (P) and check the timing again. If necessary re-adjust and then re-check.

On early chassis a hexagon nut was fitted to the clamping screw (P). On later chassis this has been changed to a knurled nut in order to eliminate the possibility of spanning the nut with consequent overtightening of the clamping plate (Q) causing the bearing of the distributor to be nipped. The clamping screw (P) should be tightened as follows:-



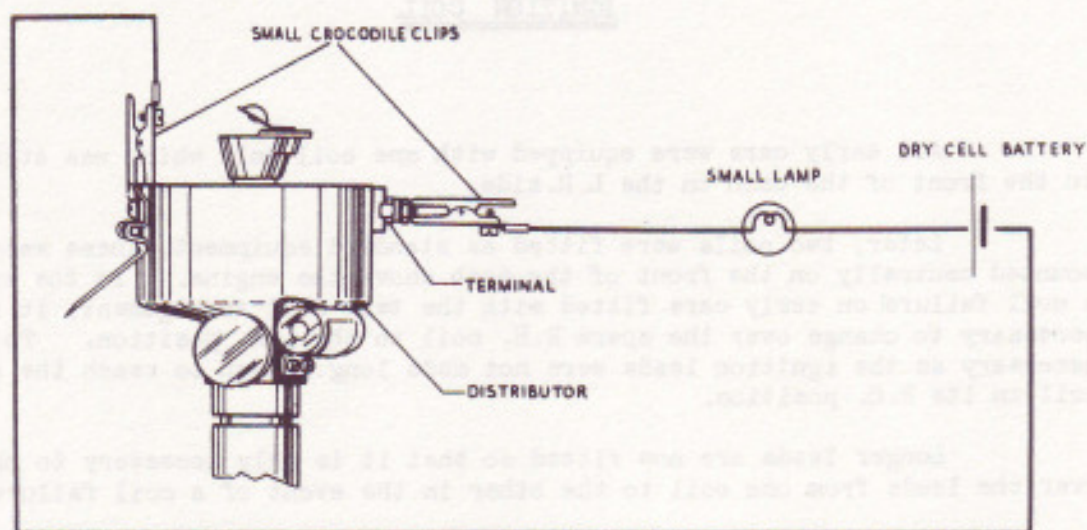


FIG. 29. BULB AND BATTERY CONNECTED IN SERIES WITH BREAKER POINTS.

- (a) If the screw (P) is fitted with a hexagon nut, the nut should be held by a spanner and the screw tightened by means of a screwdriver.
- (b) If the screw (P) is fitted with a knurled nut, the knurled nut should be held by hand and the screw also tightened by means of a screwdriver.

To advance the ignition timing, turn the distributor body in an anti-clockwise direction.

**NOTE:** When checking or adjusting the ignition timing, the distributor rotor arm must be kept fully retarded; i.e. in its fully anti-clockwise position.

#### TO DETERMINE WHEN THE POINTS BREAK CONTACT.

Either of the following methods of determining precisely when the contact points separate, may be used:

- (a) With the ignition switched off, and a small bulb and battery connected in series with the contact breaker points, as shown in Fig. 29. In this case the bulb will go out as the contact points "break" and will light as the points "make".
- (b) With the ignition switched on, and by observation of the ammeter. When the points are in contact a discharge of approximately 2 amperes will be shown on the ammeter, and when the contact points "break" the ammeter needle will return to zero.



IGNITION COIL

All early cars were equipped with one coil only which was attached to the front of the dash on the L.H. side.

Later, two coils were fitted as standard equipment, these were mounted centrally on the front of the dash above the engine. In the event of a coil failure on early cars fitted with the twin coil arrangement, it is necessary to change over the spare R.H. coil to the L.H. position. This is necessary as the ignition leads were not made long enough to reach the spare coil in its R.H. position.

Longer leads are now fitted so that it is only necessary to change over the leads from one coil to the other in the event of a coil failure.

The coil terminals are marked CB for the Contact Breaker lead and SW for the Switch lead.

The lead from the radio interference suppressor should be attached to the SW terminal of the coil in use. Make sure that the suppressor is well earthed to the dash by its mounting bracket.

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### SPARKING PLUGS.

The sparking plugs should be either Champion Type N8, or Lodge Type CLN, 14 m/m non-detachable.

The two important things to remember are that they should be kept clean and that the gap between the electrodes should be properly adjusted.

The gap should be checked with a feeler gauge and set at .025" (.635 m/m).

**NOTE.** Always remove sparking plugs with a well fitting box spanner.

Spark plugs have much to do with the performance and economy of the engine, and it is therefore recommended that they are cleaned in an abrasive, air blast type cleaning machine every 5000 miles.

The oxide deposit is a fine white powdery substance which collects on the insulator, usually well up in the shell as well as on the insulator tip. This coating being dry, is easily removed when it first forms, but under higher temperatures, the white oxide becomes fused and forms a smooth glassy coating over the insulator.

A plug in this condition will often perform satisfactorily when cool, but will miss badly as soon as it becomes warmed up.

Fused oxide coating is very deceiving, and after apparent thorough cleaning, there is apt to remain on the insulator a practically invisible layer of oxide. The safest way to handle such plugs is to give them a double cleaning to ensure satisfactory performance.

If the spark plugs are allowed to run without cleaning, the oxide will form into blisters, and the only remedy for this condition is replacement.



LAMPS.

HEAD AND PASS LAMPS.

HEADLAMPS.

The headlamps are Lucas Model RF.770, Service No.50311E, Bentley Motors (1931) reference No.RD.3936. Each headlamp incorporates a Lucas Light Unit which consists essentially of a combined reflector and front glass assembly provided with a mounting flange by means of which it is secured in the body housing. The bulb, which is of a Lucas pre-focus type, is located accurately in the reflector and is secured by a bayonet fixed backshell which also provides the contact to the bulb. The design of the bulb and its holder is such that the bulb is correctly positioned in relation to the reflector and no focussing is required when a replacement bulb is fitted.

Anti-Dazzle Scheme.

The headlamps are fitted with fixed reflectors. Operation of the foot switch extinguishes the headlamps, and at the same time switches on the pass-lamp.

To Replace a Bulb.

Slacken the screw at the bottom of the lamp and lift off the rim, removing it from the bottom first. Slacken the four screws (early lamps had two screws) which secure the flange of the Light Unit and turn it in an anti-clockwise direction to detach the flange from the securing screws when the Light Unit can be lifted out of the lamp body.

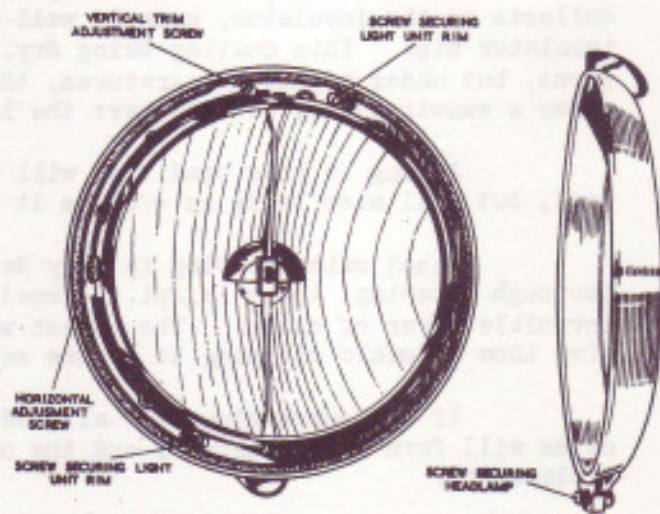


FIG. 30. HEADLAMP WITH RIM REMOVED.

Twist the back shell in an anti-clockwise direction and pull it off. The bulb can then be removed.

Fit the replacement bulb in the holder, taking care to locate it correctly. Engage the projections on the inside of the back shell with the slots in the holder, press on and secure by twisting it to the right.

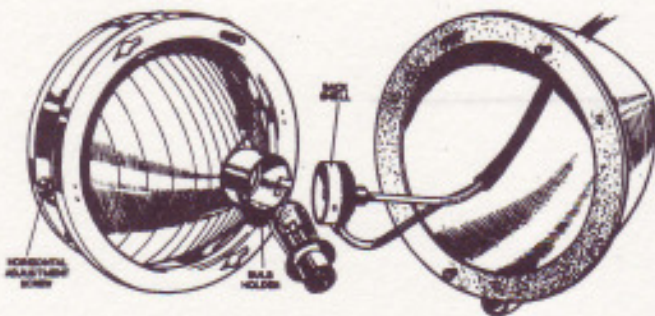


FIG. 31. HEADLAMP WITH LIGHT UNIT REMOVED.



Position the Light Unit in the lamp body so that the vertical trim adjusting screw locates in the slot in the body rim and the heads of the fixing screws protrude through the holes in the flange of the Light Unit. Twist the Light Unit in a clockwise direction and secure by tightening the screws.

Engage the tongue on the inside of the front rim in the slot at the top of the flange of the Light Unit, press it on fully at the bottom and secure by means of the screw.

Setting.

When setting the lamps, the measurements between ground level and lamp centres are to be made with the car loaded with five persons. The view inset (Fig. 32) shows the pass-lamp correctly tilted to compensate for road camber.

The headlamps must be set so that the beams of light are directed straight ahead and are parallel with the ground and with each other. If adjustment is necessary proceed as follows:-

Remove the front rim by slackening the securing screw. If vertical adjustment is required, set the Light Unit to the correct position by means of the vertical trim adjustment screw at the top of the reflector unit. Turn the screw in a clockwise direction to raise the beam and in an anti-clockwise direction to lower it. (See Fig. 30).

If horizontal adjustment is required, slacken off the two horizontal adjustment screws (one on each side of the Light Unit). After slackening off these two screws the reflector may be swung one way or the other as required, re-tighten the screws to lock.

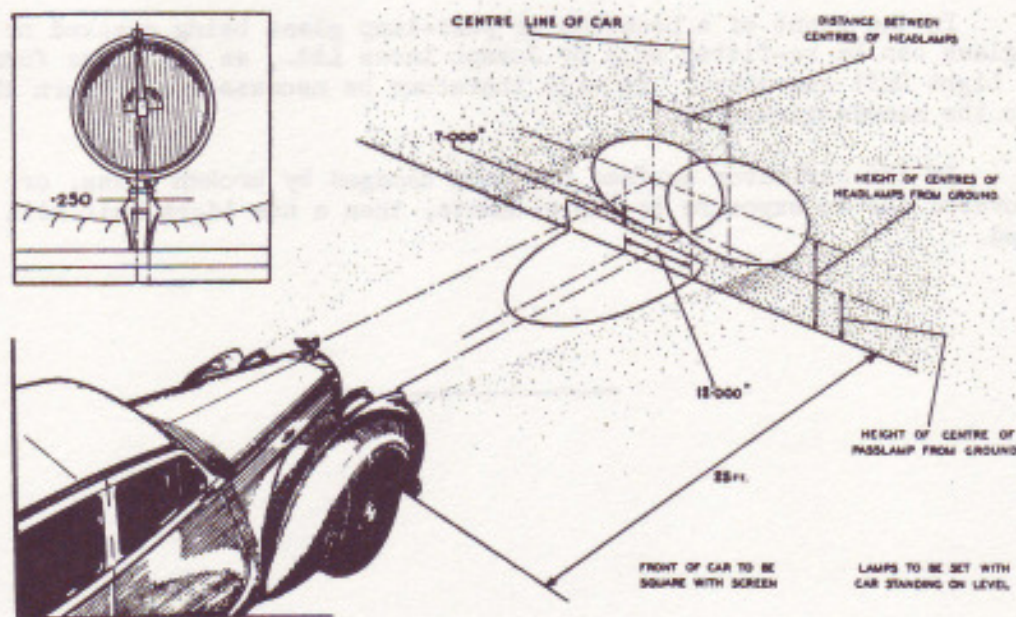


FIG. 32. THE RECOMMENDED SETTING FOR THE LAMPS.



### PASS-LAMP.

The pass-lamp is a Lucas Model RSFT700, Service No.55031A, Bentley Motors (1931) reference No.RD.3196. This lamp is also fitted with a Lucas Light Unit and pre-focus bulb similar to that fitted to the headlamps.

#### To Replace a Bulb.

Slacken the screw at the bottom of the lamp and pull off the rim complete with Light Unit assembly. Twist the back shell in an anti-clockwise direction and pull it off.

The bulb can then be removed.

Fit the replacement bulb in the holder, taking care to locate it correctly. Engage the projections on the inside of the back shell with the slots in the holder, press on and secure by twisting it to the right.

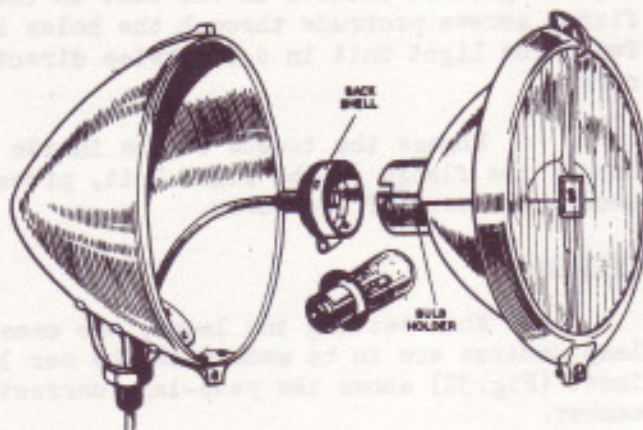


FIG. 33. PASS-LAMP WITH LIGHT UNIT REMOVED.

#### Setting.

The lamp should be set as shown in Fig.32. This will prevent dazzle to oncoming traffic even when travelling over normal road irregularities with the car fully loaded. If adjustment is necessary, slacken the single fixing nut and move the lamp on its adjustable mounting to the required position. Finally, tighten the locking nut.

#### REPLACEMENT OF BROKEN HEADLAMP OR PASS-LAMP GLASS.

In the event of a headlamp or pass-lamp glass being cracked or broken, a new glass can be re-fitted only by Joseph Lucas Ltd., as the glass forms part of the Light Unit assembly. It will therefore be necessary to return the Light Unit to the manufacturers.

If the reflector surface has been damaged by broken glass, or deteriorated due to exposure to the elements, then a new Light Unit will be required.



## SIDE, REAR AND STOP LAMPS.

### SIDELAMPS.

The sidelamps are Lucas Model R451, Service No.052348, Bentley Motors (1931) reference number is RD.3218.

#### Removal of Lamp Front.

Remove the small securing screw and pull out the lamp front and reflector, moving the top of the lamp in a downwards direction. When replacing, locate the metal tag at the bottom of the lamp first, refit and replace the securing screw.

To remove the lamp front from the reflector, twist it in either direction. This disengages a fixing clip, mounted on the reflector from slots in the lamp front which can then be pulled off. To replace the front, push it on to the reflector body and turn until the fixing clip re-engages the slots on the lamp front.

### STOP TAIL LAMP.

The stop tail lamp is a Lucas Model RST461, Service No.052349, Bentley reference number is RD.3570.

The lamp front can be removed as described above for Sidelamps.

### NUMBER PLATE BOX.

The Number Plate Box is a Lucas Model 288/3, Service No.052357, Bentley reference number is RD.3257.

To remove the lamp front, unscrew the single front securing screw then the lamp front can be swung open.

### CLEANING LAMPS.

Metal polishes must not be used for cleaning the chromium plated lamp bodies. They must be washed with plenty of water and when the dirt is completely removed, the lamp bodies should be polished with a chamois leather or a soft dry cloth.



TRAFFICATORS.

The Trafficators are Lucas Model RSP34L, Service No. 54003A. The Bentley Motors (1931) reference number is RD. 3211.

SERVICING.

If the movement of the arm is stiff, raise arm and apply by means of a brush, or other suitable article, a drop of thin oil, such as sewing machine oil, to the catch pin between the arm and operating mechanism (See Fig. 34). Use only the merest trace of oil as any excess may affect the working of the operating mechanism.

Also lubricate with one or two drops of thin machine oil, the felt pad fitted in the top of the arm, which lubricates the spindle bearing (See Fig. 35). To reach this, withdraw the screw on the underside of the arm, slide off the metal cover plate and move the wire to the bulb so that it does not cover the felt pad. Replace the cover plate by sliding it on in an upwards direction so that the plates engage with the slots on the underside of the spindle bearing (See Fig. 36). Finally, secure the plate by means of the fixing screw.

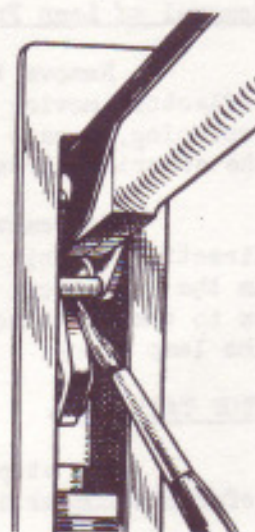


FIG. 34. LUBRICATING TRAFFICATOR CATCH PIN WITH THE AID OF A BRUSH.



FIG. 35. LUBRICATING FELT PAD.

If any difficulty is experienced in raising the arms by hand, switch the Trafficator on and then, supporting the arm in the raised position, switch to the off position.

Failure of the arm to light up, usually indicates a bulb failure and it should be replaced by a bulb of the same type as that originally fitted. The bulb is accessible when the cover plate is removed as described above. Bulbs fitted are Lucas No. 256 12 volt 3 watt festoon type.

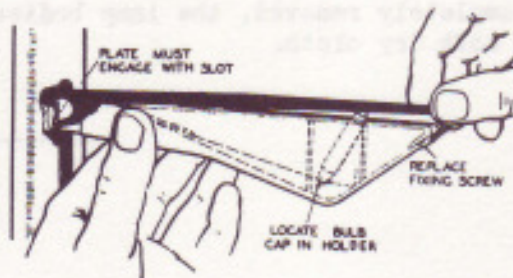


FIG. 36. REPLACING COVER PLATE.





### THE ELECTRIC HORNS.

The horns are Lucas Model WT29, Service Nos. 69004A and 69005A. The Bentley Motors (1931) reference number is RD.3206. The horns work in conjunction with a solenoid-operated relay, Model 585K, Service No. 33068A, Bentley Motors (1931) reference number RD.3084. The horns are adjusted to give their best performance and will give a long period of service without any attention.

#### Testing.

If one horn fails or becomes uncertain in its action, it does not follow that the horn has broken down. First ascertain that the trouble is not due to some outside source, e.g., a loose or broken connection in the wiring of the horn. If both horns fail or become uncertain in action, the trouble is probably due to a discharged battery, inoperative relay, or blown fuse. If the fuse has blown, examine the wiring for a fault which might have been the cause, correct, and renew the fuse. It is also possible that the performance of a horn may be upset by the fixing bolt working loose or by some component near to the horn being loose.

#### Relay.

To test the relay, remove the moulded cover by unscrewing its two fixing screws.

Next operate the horn push and note if the relay armature moves and the contacts close. If not, there is a fault either in the relay itself, or in the horn push wiring to the unit. To determine which, remove the horn push leads from the relay unit terminals and connect a 12 volt supply across the terminals, when, if the relay is in order, the contacts will close. The relay is actually set to operate at 7-8 volts.

If the contacts appear dirty or burnt, place a strip of fine glass paper between them, then close the contacts and draw the paper through. This should be done two or three times with the rough side towards each contact.

#### Adjustment.

If, after carrying out the above examination, the trouble is not rectified, the horn may need adjustment, but this should not be necessary until the horns have been in service for a long period. Adjustment does not alter the pitch of the note, it merely takes up wear of moving parts. When adjusting the horns, short circuit the fuse, otherwise it is liable to blow. Again, if the horns do not sound on adjustment, release the push instantly.

When making adjustment to a horn, always disconnect the supply lead of the other horn, taking care to ensure that it does not come into contact with any part of the chassis and so cause a short circuit.

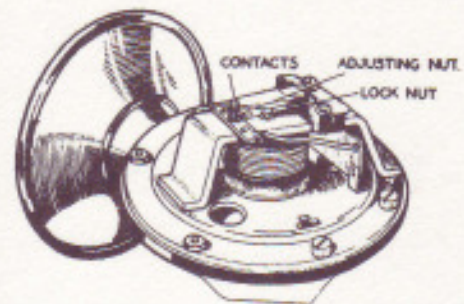


FIG. 37. HORN WITH COVER REMOVED.