

Maintenance & Instruction Manual
for

LUCAS

Quality

**ELECTRICAL
EQUIPMENT**



JOSEPH LUCAS LTD • BIRMINGHAM • ENGLAND

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WORLD-WIDE SERVICE

The Lucas Overseas Service Organisation is world-wide. In Australia, Canada, Eire, India, New Zealand Pakistan, South Africa and U.S.A., we have established our own subsidiary companies, while there are Lucas Service Agents with fully-equipped Service Stations in the principal cities and main centres throughout the world, so that adequate service and spare parts are available wherever British cars, motor-cycles and vehicles are sold. At home in Great Britain, in addition to our Lucas Service Depots given above, there are over four-hundred Official Service Agents throughout the country. A separate publication, No. 769, gives details of the Lucas Overseas Service Organisation.

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LUCAS ELECTRICAL SERVICES INC., NEW YORK & LOS ANGELES.

MAINTENANCE & INSTRUCTIONAL MANUAL



ELECTRICAL EQUIPMENT

LUCAS Electrical Equipment is designed and manufactured to give long periods of service with the minimum of attention. As with other parts of the car, however, occasional minor adjustments, lubrication of moving parts and cleaning should be carried out at regular intervals to ensure that the equipment functions with its utmost efficiency.

SECTION ONE of this Manual describes the small amount of attention which is required.

SECTION TWO gives general information on the operation of various items of equipment. It also includes instructions on lamp setting and on the carrying out of replacements, such as bulbs and high tension cables, which may become necessary from time to time.

The recommended procedure for a systematic examination to locate and remedy the causes of some of the more probable faults which may occur is set out in SECTION THREE.



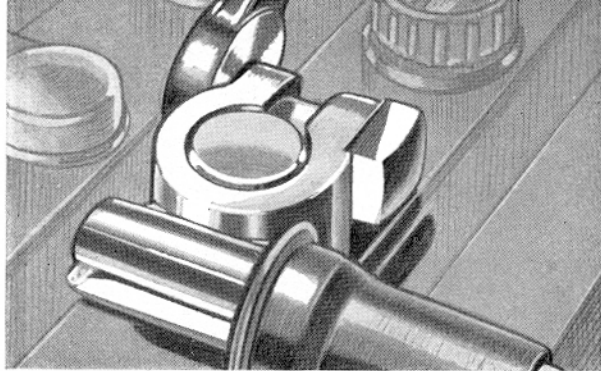


Fig. 3. Checking Battery Connector.

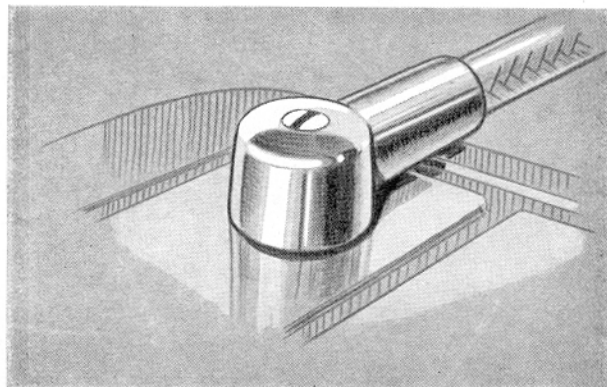


Fig. 4. Diecast Cable Connector.

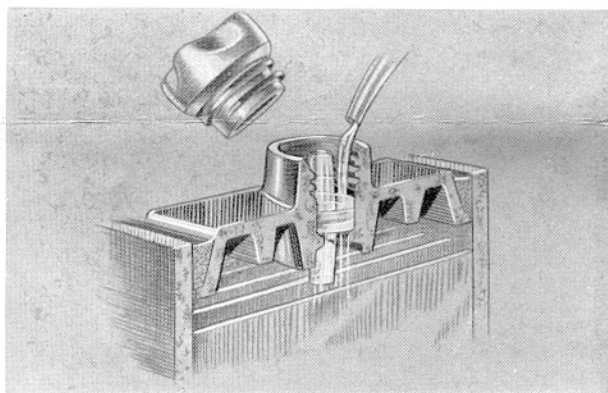
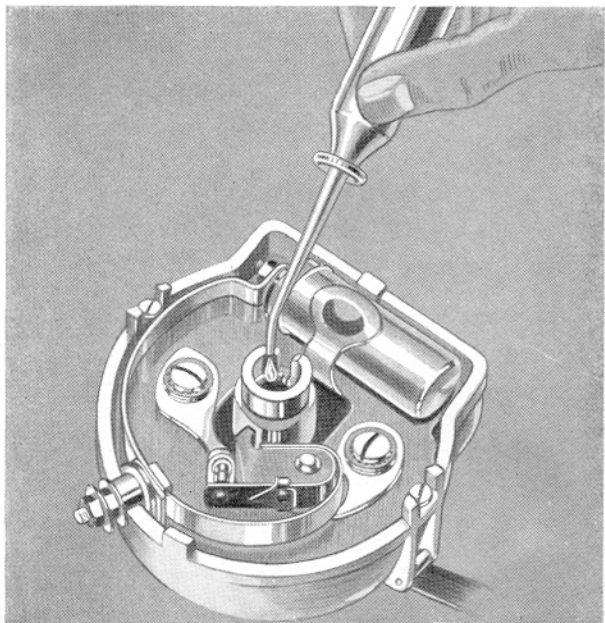


Fig. 5. Correct Acid Level Device.

Fig. 6. Lubricating Cam Bearing.



to bring the electrolyte level with the tops of the separators, thereby replacing water which has been lost by evaporation. With batteries not fitted with the "correct acid level device", a Lucas Battery Filler will be found useful for topping-up. This ensures that the correct level is automatically obtained and also prevents distilled water from being spilled on top of the battery. Its use is particularly recommended on cars where visual examination of the electrolyte level is difficult. Do not use tap water, as it contains impurities detrimental to the battery. Never use a naked light when examining the condition of the cells.

A "correct acid level device" is shown in Fig. 5, and one of these, when fitted, is located in each cell filler hole. The device consists of a central tube with a perforated flange which rests in the filling orifice. When topping up, pour distilled water round the flange until no more will drain through the perforation. This will happen when the electrolyte level reaches the bottom of the central tube, thereby preventing further escape of air displaced by the topping-up water. By lifting the tube slightly, the small amount of water in the flange will drain into the cell and the electrolyte level will be correct.

Wipe away all dirt and moisture from the top of the battery and make sure that the connections and fixing bolts are clean and tight.

Examine the terminals, and if they are corroded scrape them clean and coat them with petroleum jelly. Batteries which use the improved die-cast lead cable connector, secured to the terminal post by means of a single screw, will be found not to suffer from terminal corrosion.

DISTRIBUTOR

With DM4 and DM6 distributors, give the lubricator on the upper end of the shank one full turn clockwise to lubricate the shaft.

EVERY 3,000 MILES

Carry out the procedure for every 1,000 miles and the following:—

DISTRIBUTOR — LUBRICATION

Important : Do not allow oil or grease to get on or near the contacts.

(a) Distributor Shaft

Some distributors are provided with a lubricator on the distributor shank. With DM4 and DM6 distributors, refill the lubricator cap with Acheson's graphited grease grade GC, or an equivalent.

(b) Cam

Lightly smear the cam with a very small amount of Mobilgrease No. 2 or, if this is not available, clean engine oil may be used. Some distributors have felt cam lubricators to which the lubricant should be applied

(c) Cam Bearing

Pull the rotor off the top of the spindle and add a few drops of thin machine oil to lubricate the bearing. Do not remove the screw which is exposed to view as there is a clearance through which the oil passes between the screw and the inner face of the spindle. On some distributors the screw is drilled to allow passage of the oil.

Replace the rotor correctly and push it on to the shaft as far as it will go, otherwise there is a risk of the moulded cap becoming burned or tracked

(d) Automatic Timing Control

Carefully add a few drops of thin machine oil through the hole in the contact breaker base through which the cam passes. (Some types are provided with a hole in the contact breaker base plate, sometimes marked "OIL HERE," through which the oil should be added).

(e) Contact Breaker Pivot

Place a small amount of Mobilgrease No. 2 or clean engine oil on the pivot on which the contact breaker lever works.

EVERY 6,000 MILES

Carry out the procedure for every 1,000 miles and 3,000 miles and the following :—

DISTRIBUTOR — CLEANING

Wipe the inside and outside of the moulded distributor cap with a soft dry cloth, paying particular attention to the spaces between the terminals. See that the small carbon brush on the inside of the moulding works freely in its holder.

Next examine the contact breaker. The contacts must be free from grease or oil. If they are burned or blackened, clean them with a fine carborundum stone or very fine emery cloth, afterwards wiping away any trace of dirt or metal dust with a petrol-moistened cloth. Cleaning of the contacts is made easier if the contact breaker lever carrying the moving contact is

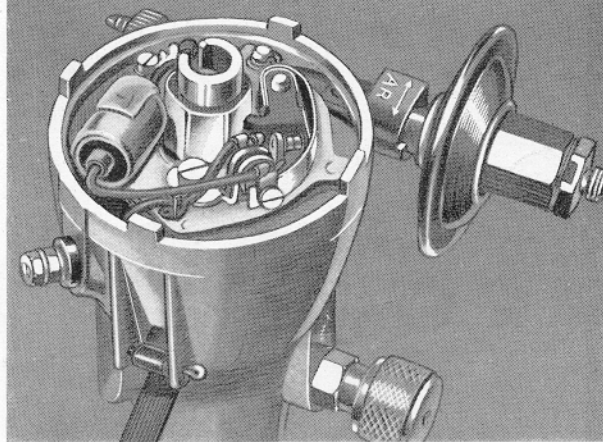


Fig. 7. Distributor, Model DM6.

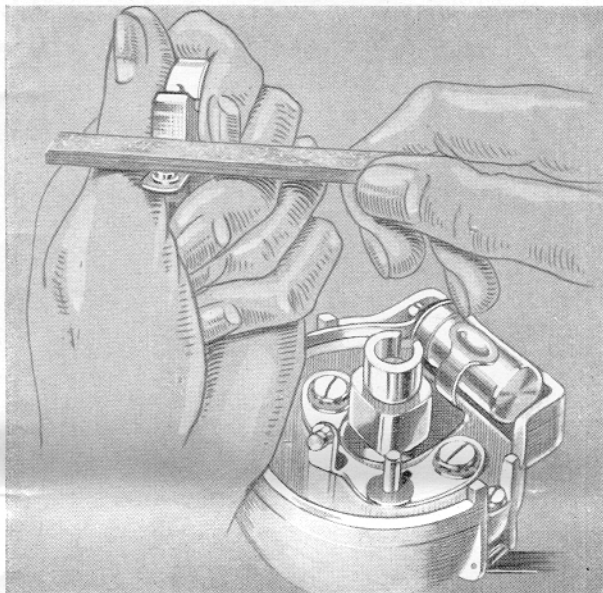
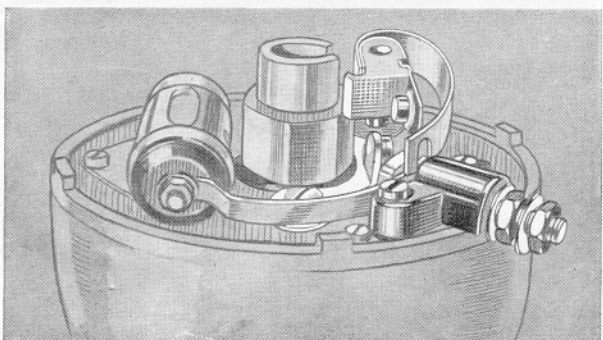
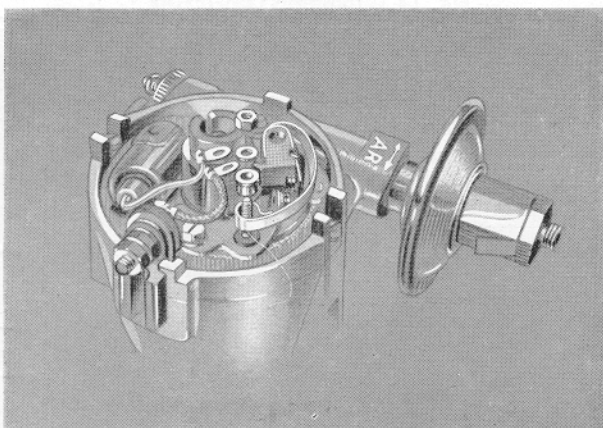


Fig. 8. Cleaning Distributor Contacts.

Figs. 9 and 10. Removal of Moving Contact.



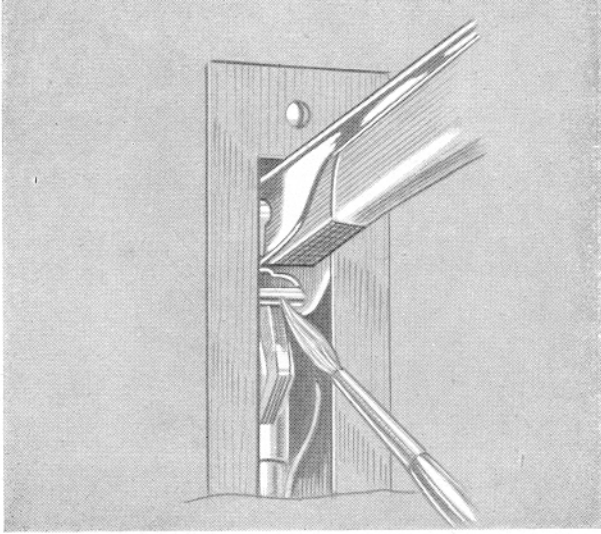


Fig. 11. Lubrication of Trafficator Catch Pin, Models SF34 and SF40.

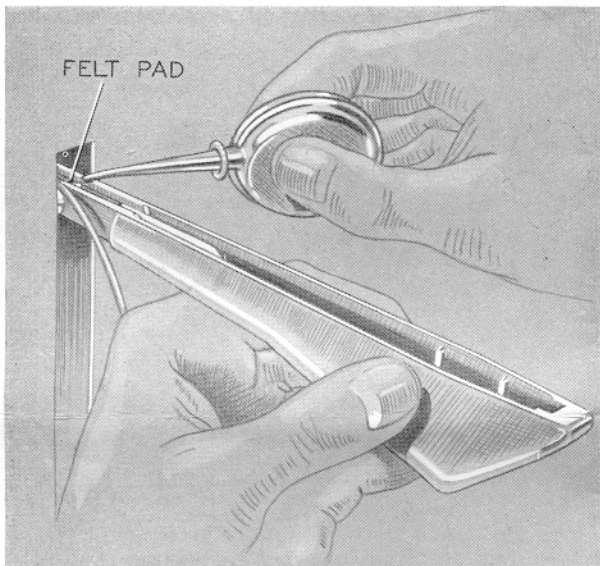
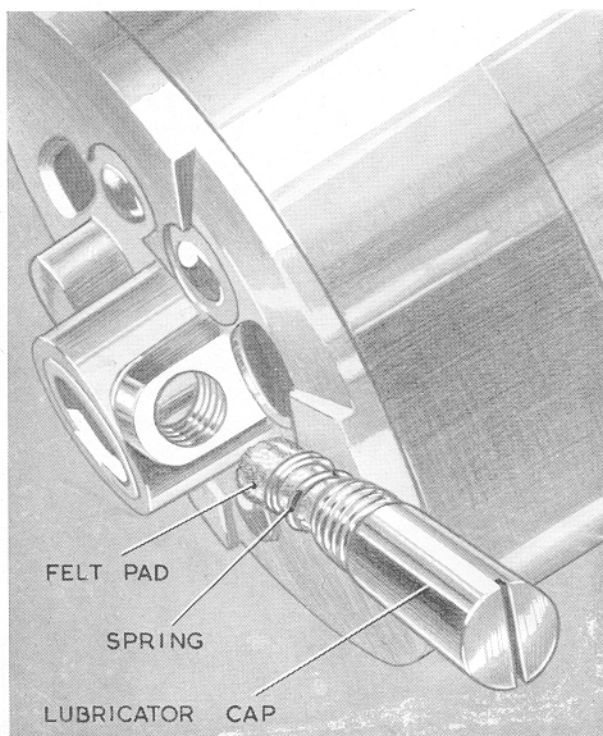


Fig. 12. Lubrication of Felt Pad, Models SF34 and SF40.

Fig. 13. Dynamo Lubricator.



removed. The method of doing this varies with different distributors. With some types, unscrew the nut securing the end of the spring, remove the spring washer and flat washer and lift off the lever complete with spring. With other designs, slacken the nut on the terminal post and lift off the slotted end of the spring. Then lift the contact breaker lever off its pivot pin.

After cleaning, check the contact breaker setting.

TRAFFICATOR — LUBRICATION MODELS SF34 and SF40

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 the operating mechanism. Use only the slightest trace, as any excess may affect the operating mechanism.

Also, in the case of Trafficator models SF34 and SF40, withdraw the screw on the underside of the arm and slide off the arm cover. Place the connecting wire to the bulb on one side and apply a drop of thin machine oil to the lubricating pad at the top of the arm. To replace the arm cover, slide it in an upwards direction so that the side plates engage with the slots on the underside of the spindle bearing, and secure the arm cover with the screw.

MODEL SF80

With Trafficator model SF80, it is only necessary to lift the Trafficator arm in order to apply one drop of thin oil to the bearing on which the arm pivots. No other lubrication is necessary.

EVERY 12,000 MILES

Carry out the procedure for every 1,000, 3,000 and 6,000 miles and the following —

DYNAMO — LUBRICATION

Most dynamos are provided with lubricators at the commutator end. Unscrew the lubricator cap, lift out the felt pad and spring and about half fill the cap with high melting point grease. Replace the spring and felt pad and screw the lubricator cap in position on the commutator end bracket.

DYNAMO — COMMUTATOR AND BRUSHGEAR

On dynamos having metal cover bands fitted over the brushgear, remove the cover band to inspect the brushes and commutator. Check that the brushes move freely in their holders by holding back the brush

springs and pulling gently on the flexible connectors. If a brush is inclined to stick, remove it from its holder and clean its sides with a petrol-moistened cloth. Be careful to replace brushes in their original positions in order to retain the "bedding". Brushes which have worn so that they will not bed properly against the commutator must be replaced and properly bedded by a Lucas Service Depot or Agent.

The commutator should be clean, free from oil or dirt and should have a polished appearance. If it is dirty, clean it by pressing a fine dry cloth against it while the engine is slowly turned over by hand. If the commutator is very dirty, moisten the cloth with petrol.

STARTING MOTOR — COMMUTATOR AND BRUSHGEAR

Examine the brushgear and commutator in the same manner as that described for the dynamo.

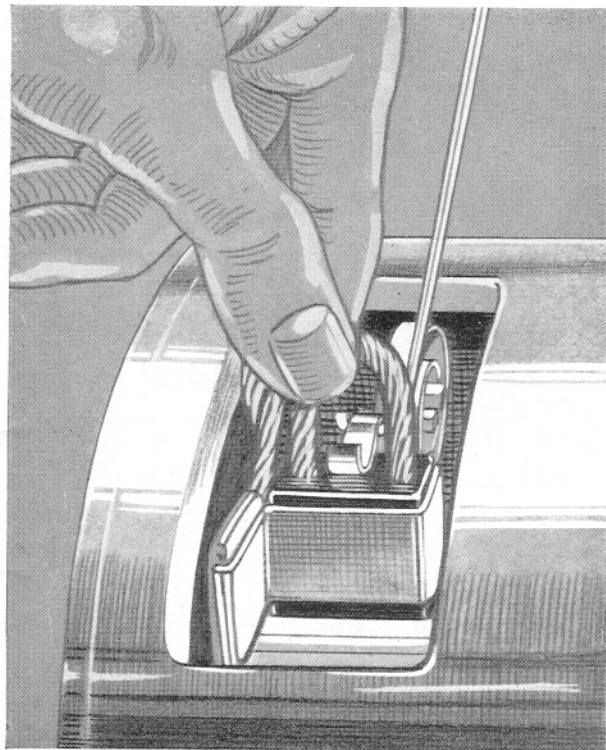


Fig. 14. Checking Brushgear.

SECTION TWO

GENERAL INFORMATION

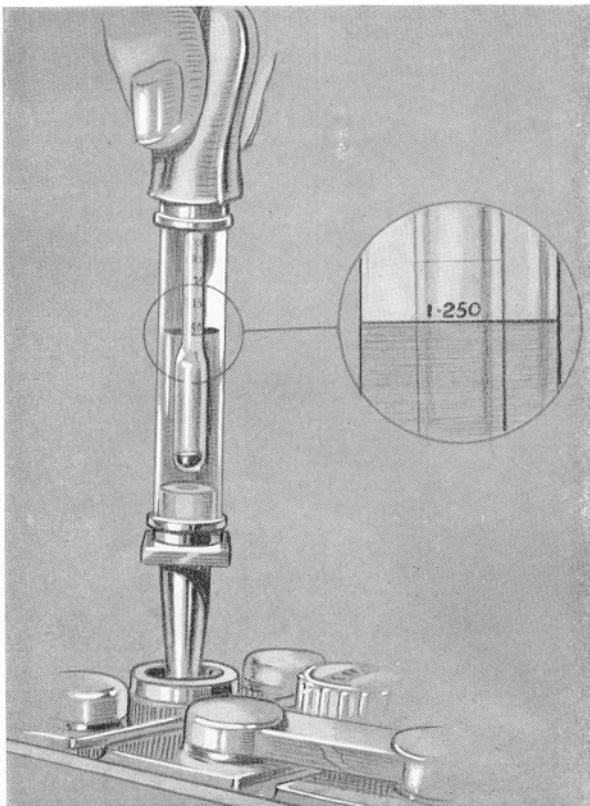
THE BATTERY

Occasionally check the condition of the battery by taking hydrometer measurements of the specific gravity of the electrolyte in each of the cells. Readings should not be taken immediately after "topping-up" the cells. Specific gravity readings and their indications are as follows :—

1.280—1.300	Battery fully charged.
About 1.210	Battery about half discharged.
Below 1.150	Battery fully discharged.

The reading for each of the cells should be approximately the same. If one cell gives a value very different from the rest, it may be that acid has been spilled or has leaked from this particular cell, or there may be a short circuit between the plates, and in this case the battery should be examined by a Lucas Service Depot or Agent.

Fig. 15. Taking Hydrometer Readings.



Never leave the battery in a discharged condition. If the car is to be out of use for any length of time have the battery fully charged and every fortnight give it a short freshening charge to prevent any tendency for the plates to become permanently sulphated.

DYNAMO

The dynamo fitted to modern cars is of the compensated voltage control type and operates in conjunction with the regulator unit housed, together with the cut-out, in the control box.

The regulator causes the dynamo to give an output which varies according to the load on the battery and its state of charge. When the battery is discharged the dynamo gives a high output so that the battery receives a quick recharge which brings it back to its normal state in the minimum possible time.

On the other hand, if the battery is fully charged, the dynamo is arranged to give only a trickle charge which is sufficient to keep it in good condition without the possibility of causing damage to the battery by overcharging.

The regulator also causes the dynamo to give a controlled boosting charge at the beginning of a run. This quickly restores to the battery the energy taken from it when starting. After about thirty minutes' running, the output of the dynamo will have fallen to a steady rate, best suited to the particular state of charge of the battery.

Occasionally inspect the dynamo driving belt and adjust, if necessary, to take up any undue slackness, by turning the dynamo on its mounting. Care should be taken to avoid overtightening the belt, which should have sufficient tension only to drive without slipping. See that the machine is properly aligned, otherwise

undue strain will be thrown on the dynamo bearings.

When the car is undergoing a general overhaul, say, after about 50,000 miles, it is advisable to have the dynamo checked by a Lucas Service Depot or Agent.

Ammeter Readings

When noting ammeter readings, it must be remembered that during daytime running, when the battery is in good condition, the dynamo gives only a trickle charge so that the charge reading will seldom be more than a few amperes.

A discharge reading may be given immediately after switching on the headlamps. This usually happens after a long run, when the voltage of the battery is high. After a short time, the battery voltage will fall, and the regulator will respond, causing the dynamo output to balance the load.

When starting from cold, the charging current will rise until it reaches a steady maximum at a speed of about 20 m.p.h., at which value it will remain for about ten minutes and then fall to a steady charge which is most suitable for the particular state of the battery.

It will be noticed from the ammeter readings that the dynamo does not charge at very low engine speeds. This is because it is not rotating fast enough to generate sufficient energy to charge the battery. The cut-out, which is an automatic switch connected between the dynamo and battery, allows the flow of current from the dynamo to the battery only. It closes when the dynamo is running fast enough to charge the battery and opens when the speed is low or the engine is stationary, thus preventing current flowing from the battery through the dynamo windings.

CONTROL BOX

This unit is usually mounted on the engine side of the dash and houses the cut-out, dynamo voltage regulator and, in some cases, two fuses which protect the circuits of the auxiliary accessories (i.e., the horn, windscreen wiper, etc.) In other instances, a separate fuse unit is provided.

The cut-out and regulator are protected by a moulded cover. On some control boxes this cover is sealed during manufacture. On models having the

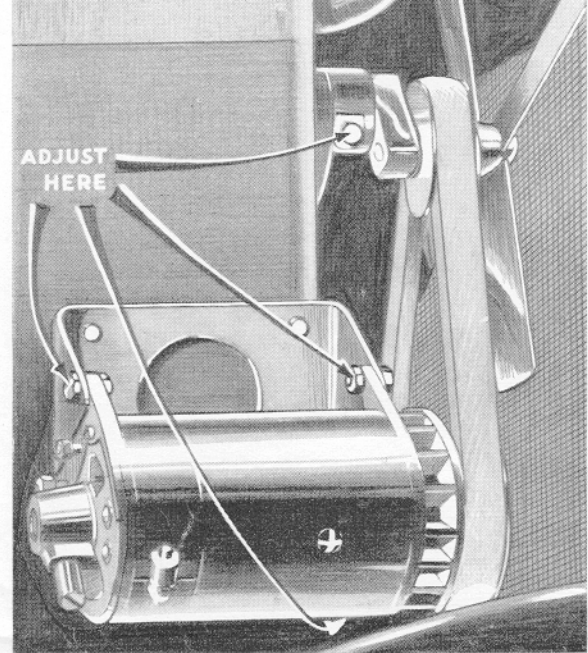


Fig. 16. Driving Belt Adjustment.

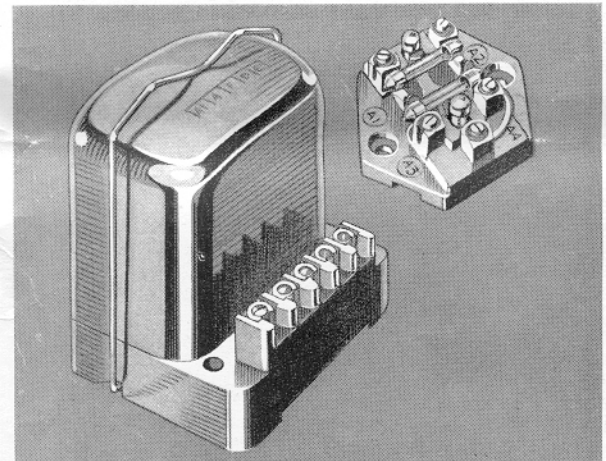
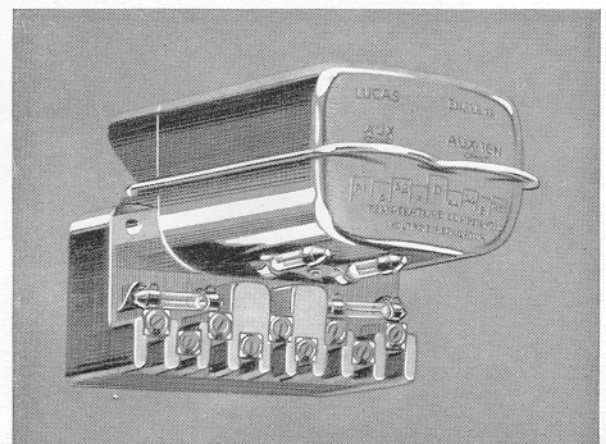


Fig. 17. Control Box with separate Fuse Unit.

Fig. 18. Control Box with External Fuses.



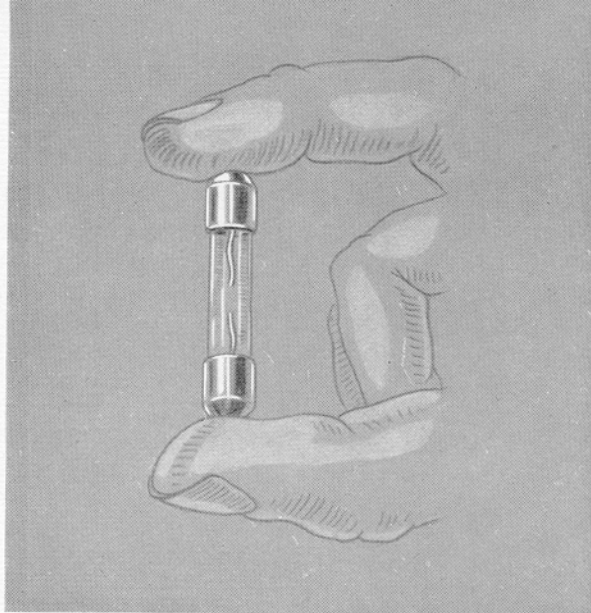


Fig. 19. A Blown Fuse.

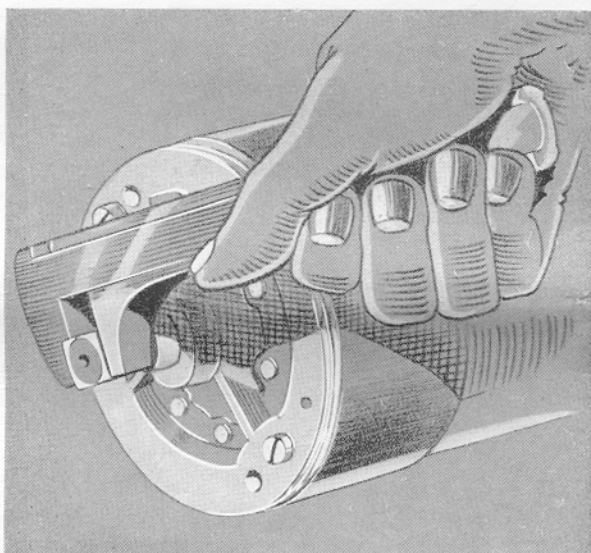
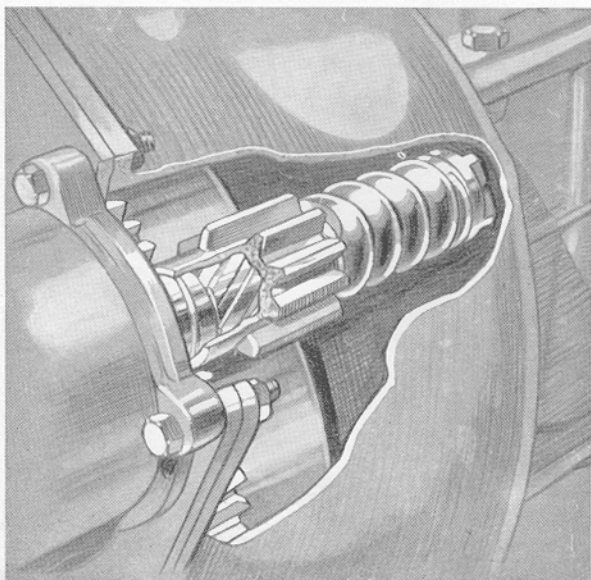


Fig. 20. Squared End of Starter Shaft.

Fig. 21. Starter, showing Screwed Sleeve.



fuses housed under the cover (which can be withdrawn when the spring clip is moved aside) take care to avoid closing the cut-out contacts when removing or replacing the cover, as this may cause damage to the equipment. Should they become accidentally closed when the engine is stationary, carefully pull them apart.

The cut-out and regulator are accurately set before leaving the works and they must not be tampered with.

Fuse marked "AUX "

This fuse protects the accessories which are connected so that they operate irrespective of whether the ignition is on or off.

Fuse marked "AUX IGN "

This fuse protects the accessories which are connected so that they operate only when the ignition is switched on.

The units which are protected by the fuses can readily be identified by reference to the wiring diagram.

THE STARTING MOTOR

When starting, observe the following points :—

1. See that the controls are properly set.
2. Operate the starter switch firmly and release it as soon as the engine fires.
3. Do not operate the starter switch when the engine is running. If the engine will not fire at once, allow it to come to rest before operating the switch again.
4. Do not run the battery down by keeping the starting motor on when the engine will not start.

In the event of the starting motor pinion becoming jammed in mesh with the flywheel, it can usually be freed by turning the armature by means of a spanner applied to the shaft extension at the commutator end. This is accessible after pulling off the small cap, sometimes secured by two screws.

If the starting motor drive is exposed, examine it to make sure that the pinion assembly moves easily on the screwed sleeve. If necessary, wash the sleeve with paraffin.

As in the case of the dynamo, the starter should be checked by a Lucas Service Depot or Agent when the car is undergoing a general overhaul.

HEADLAMPS & FOGLAMPS

There are a number of different models of headlamps and foglamps. Briefly, they can be grouped into two classes, namely those lamps which incorporate the Lucas Light Unit, which consists of a combined reflector and front lens assembly and uses a special "prefocus" bulb; and other models with the standard bayonet fixed bulb, this group including model "M" headlamps and the older range of foglamps. Lamps of the former pattern may be either flush fitting or stem mounted (external) types, while those of the latter type are invariably stem mounted.

Flush fitting headlamps and foglamps may be of either Mark I, Mark II, Mark III or Mark VI design, and differentiation between these designs will be possible by reference to the illustrations. For example, the Mark II, III and VI designs have horizontal adjustment screws on either side of the Light Unit.

Other differences occur in the rim design and rim

fixing arrangements, the rims of Marks II and III being split to facilitate their removal.

When sidelamps are not fitted to the car, the headlamps include pilot bulbs for use when parking. In the case of lamps using the Light Unit, the pilot bulb is mounted at the rear of the reflector, and provides illumination through a translucent window in the Light Unit.

One anti-dazzle arrangement in use in the United Kingdom is that in which operation of the dip switch extinguishes the offside headlamp and, at the same time, deflects the nearside headlamp beam downwards and to the left. This is achieved by the use of a double filament bulb in the nearside lamp, when of the Light Unit type, or an electrically operated dipping mechanism which moves the reflector on model "M" headlamps.

Since the introduction of the "block-pattern" lens depicted in Fig. 23, a double-dipping system by which both headlamp beams are deflected downwards and to the left has been adopted on new vehicles for use in the United Kingdom.

Anti-dazzle arrangements in other countries comply with the legislation existing.

Foglamps are fitted with a specially designed lens to give a flat topped beam, and a bulb shield to prevent the emission of any direct light rays from the bulb.

Fig. 22. Flush Fitting Headlamp, Mark I, with Front Rim Removed

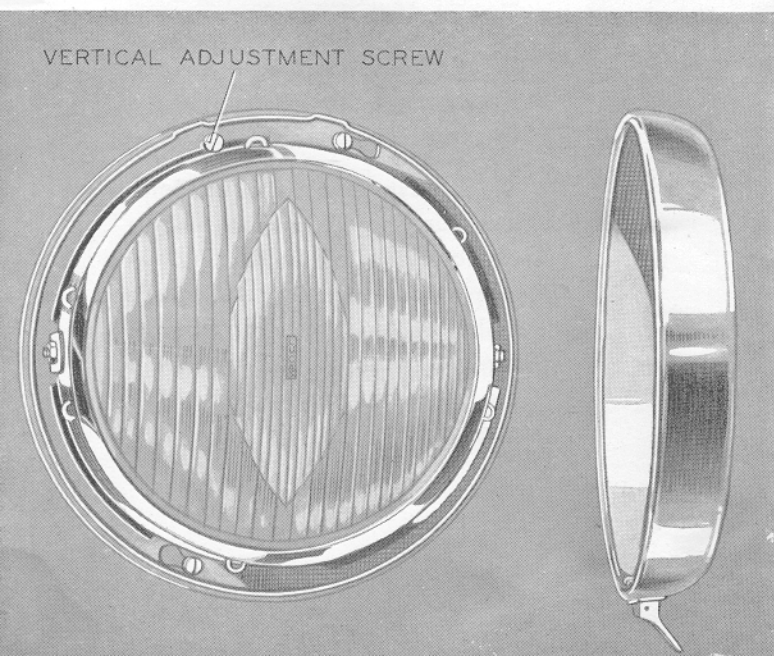
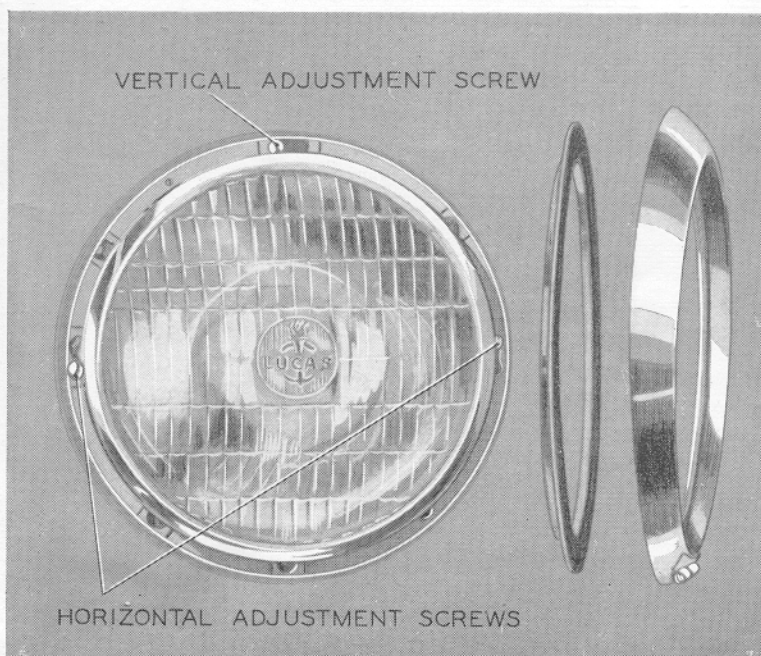


Fig. 23. "Block-pattern" lens of Flush Fitting Headlamps Mark III and Mark VI. (Mark II and early Mark III Headlamps have the front lens shown in Fig. 22).



SETTING & FOCUSING

Ministry of Transport Lighting Regulations (U.K.)

The Lighting Regulations state that a lighting system must be arranged so that it can give a light which is "incapable of dazzling any person standing on the same horizontal plane as the vehicle at a greater distance than twenty-five feet from the lamp, whose eye-level is not less than three feet six inches above that plane."

The foglamp must be set so that the beam does not rise above the horizontal when the car is standing on level ground. To ensure this, dip the lamp very slightly to compensate for road inequalities or an extra heavy load in the rear of the car, and also tilt the lamp to the right to allow for road camber. In addition the lamp can be swung slightly to the left in order to give additional illumination on the nearside of the road.

The headlamps must be set so that when the car is normally loaded, the main beams of light are parallel with the road and with each other.

Lucas Beam Setter

All Lucas Service Depots and many Service Agents now include among their special testing facilities an apparatus known as the Lucas Beam Setter.

This is a specially designed instrument by means of which headlamps and foglamps can be set and focused with extreme accuracy, thereby ensuring the maximum of efficiency from the lamps.

Owners are strongly advised to make use of this service wherever possible. Where, however, this is

not possible, the lamps must be set as shown. Check the setting by placing the car in front of a blank wall at the greatest possible distance, take care that the surface on which the car is standing is not sloping relative to the wall.

Method of Adjustment of Setting

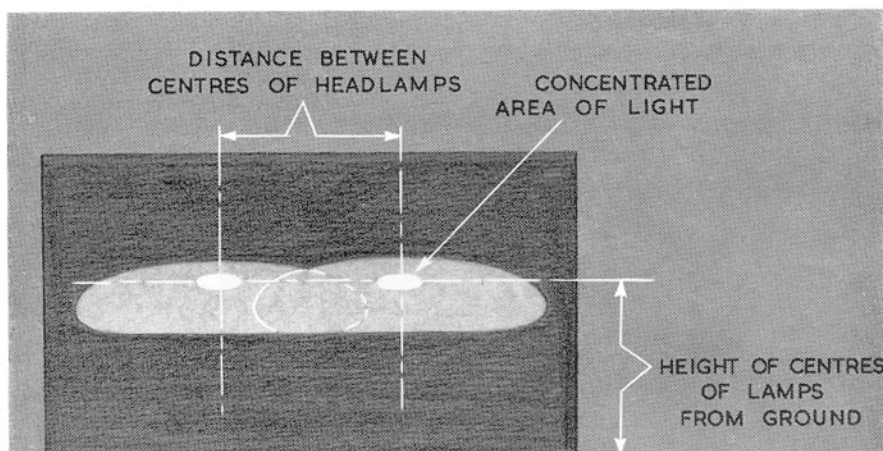
1. External or stem-mounted lamps (all models). Slacken the single fixing nut at the base of the lamp and move the lamp on its adjustable mounting to the required position. Finally tighten the lock nut.
2. Flush fitting lamps, Mark I. Remove the front rim by pressing down the catch at the bottom of the lamp and lifting it off. Adjust the vertical setting by turning the vertical trim adjustment screw in a clockwise direction to raise the beam, or an anticlockwise direction to lower it. Horizontal adjustment of setting is normally a factory operation, and further adjustment should be unnecessary. If, however, the setting has been disturbed, slacken the two nuts and move the Light Unit to the required position, afterwards tightening the nuts
3. Flush-fitting lamps, Marks II, III and VI. Remove the front rim by unscrewing the rim securing screw and lifting off the rim, which in the case of Marks II and III is split to facilitate removal. Next remove the rubber dust excluder when three spring-loaded adjustment screws will be visible, by means of which the setting can be adjusted as required.

Focusing

In order that a lamp shall give the best results, the bulb must be as near as possible to the focal point of the reflector. If the bulb is out of focus, the lamps will have a poor range and will cause dazzle to approaching traffic.

As previously mentioned, lamps incorporating the Lucas Light Unit employ a bulb of special construction which ensures that when the bulb is fitted, the filament is correctly positioned in relation to the reflector, and no focusing is necessary.

Fig. 24. Lamp Setting.



- A FRONT OF CAR TO BE SQUARE WITH SCREEN
- B CAR TO BE LOADED & STANDING ON LEVEL GROUND
- C RECOMMENDED DISTANCE FOR SETTING IS AT LEAST 25FT.
- D FOR EASE OF SETTING ONE HEADLAMP SHOULD BE COVERED

Before other types of lamps leave the Works, bulbs are focused to give the best results, and provided that genuine Lucas spare bulbs are fitted as replacements, it should not be necessary to alter the setting. If, however, an ordinary bulb has to be fitted it may be necessary to refocus.

When focusing headlamps, it will be found an advantage to cover one lamp while testing the other. If the lamp does not give a uniform long range beam without any dark centre, the bulb needs adjusting.

When focusing foglamps, the position of the bulb must be adjusted until any top light is removed and until the semi-circular beam of light is of the greatest concentration ; that is, the area of the beam must be as small as possible.

To make the adjustment, remove the lamp front and reflector as described below, slacken the clamping clip at the back of the reflector and slide the bulb holder backwards or forwards, noting the effect after each adjustment with the reflector and front fitted. When the best position for the bulb has been obtained, the clamping screw must be tightened.

With model "M" headlamps, pull forward the fixing clip at the bottom of the lamp front and swing it downwards. Remove the front from the bottom of the lamp first. When refitting, locate the top of the rim first then press on at the bottom and refit the fixing clip. The reflector is secured to the lamp body by means of a rubber bead. The reflector can be withdrawn when the rubber bead is removed. When refitting the reflector, the projection on the rim must fit into the left hand location at the top of the lamp body. The thinner lip of the rubber bead must be located between the reflector rim and the edge of the lamp body.

With foglamps, pull out the spring clip at the bottom of the lamp and swing it out of its location. The front and reflector can then be lifted off. When refitting, locate the top of the rim first, press the front on, and secure by means of the fixing clip.

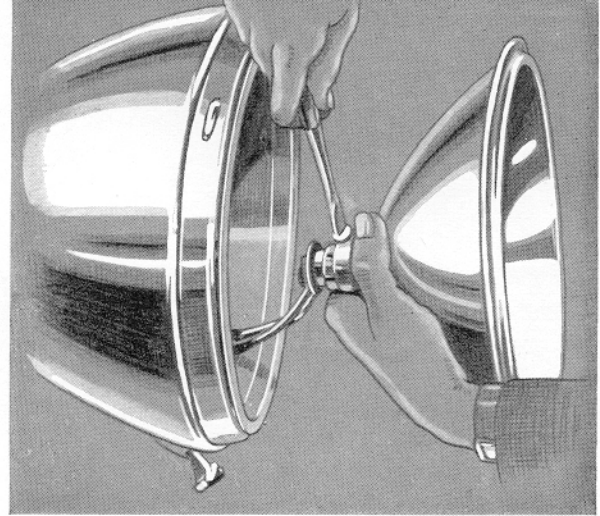


Fig. 25. Focusing "M" type Lamp.

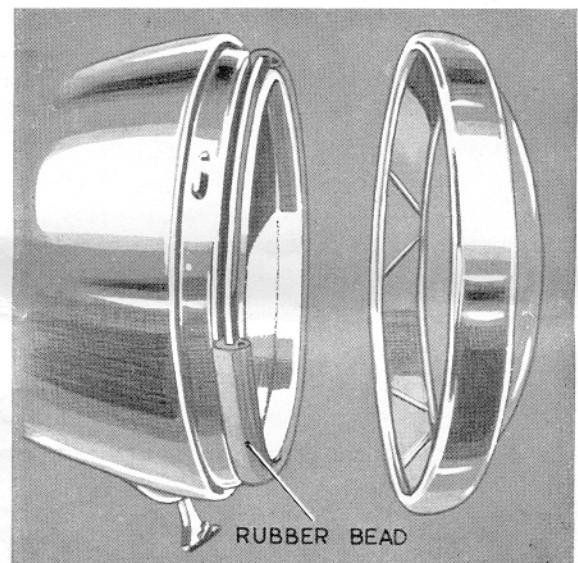
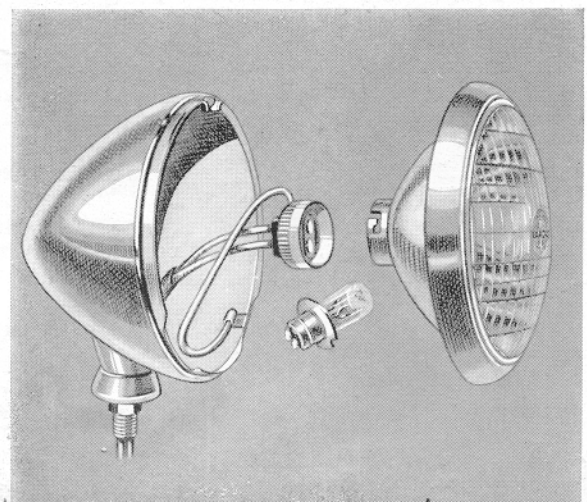


Fig. 26. "M" type Lamp with Front Rim Removed

Fig. 27. Stem Mounted Headlamp.



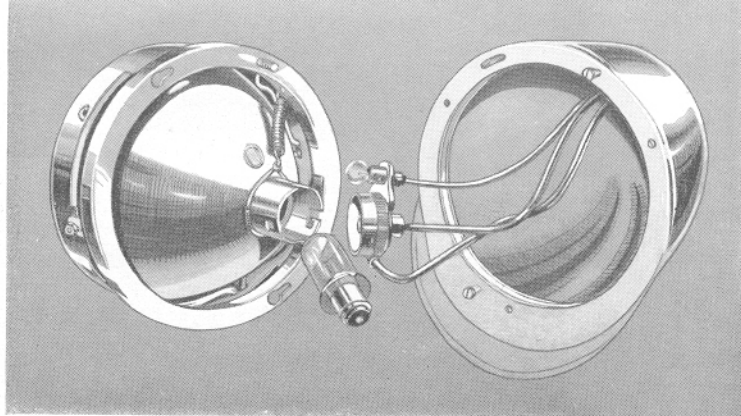


Fig. 28. Flush fitting Headlamp Mark I with Light Unit removed.

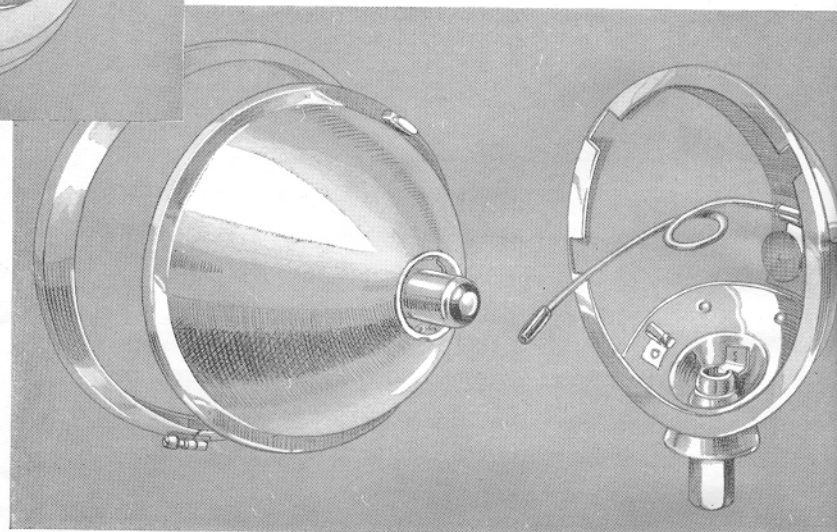


Fig. 29. Stem-Mounted Foglamp, with Light Unit, Model SFT700S.

BULB RENEWAL

When renewing a bulb it is important not only that the same size bulb is fitted, but also that the bulb has a high efficiency and will focus in the reflector. Cheap and inferior bulbs often have the filament of such a shape that it is impossible to focus properly. This will cause dazzle and will result in loss of range and light efficiency.

Lucas Genuine Spare Bulbs, sold by most garages, are specially tested to ensure that the filament is in the correct position to give the best results with Lucas lamps. Lucas bulbs have a number marked on the metal cap; when fitting a replacement, see that it is of the same number as the original bulb.

It is advisable to replace bulbs after long service before they actually burn out, as often the filaments sag thereby making it impossible for them to be focused properly.

To renew a bulb proceed as follows :—

Headlamps and Foglamps incorporating Lucas Light Unit

1. External lamps. Some lamps are fitted with a fixing catch or screw at the bottom of the rim, while others have a screw in the top of the lamp body. Press back the fixing catch, or slacken the securing screw. The rim and Light Unit assembly can then be removed.
2. Flush-fitting lamps, Mark I. Remove the front rim as described under "Setting". Slacken

the two screws which secure the flange of the Light Unit assembly and turn it in an anticlockwise direction to detach the flange from the securing screws. Lift the Light Unit assembly out of the lamp body.

3. Flush-fitting lamps, Marks II, III and VI. Remove the front rim and dust excluding rubber as described under "Setting." Press the Light Unit in against the tension of the adjustment screw springs and turn it in an anticlockwise direction until the heads of the screws can be disengaged through the slotted holes in the Light Unit rim. Do not disturb the adjustment screws when removing the Light Unit or the lamp setting will be altered.

In all cases except Foglamp Model SFT700S, the bulb is made accessible by removal of the back shell. To do this, twist the back shell in an anticlockwise direction and pull it off. The bulb can now be removed from the rear of the reflector. In the case of the foglamp mentioned above, the bulb can be removed from the rear of the reflector when the spring securing clip is released.

Place the correct replacement bulb in the holder. A special locating device with pre-focus bulbs and Light Units ensures that a bulb can only be fitted the correct way round.

Some double filament bulbs may be fitted in either of the two positions in the holder. If the bulb has the marking "TOP" on the metal cap, however, care must be taken to fit it accordingly, or the "dip"

and "main" beams will be interchanged and the "dip" beam thrown upward instead of downward. Later bulbs of this type have a specially designed cap, and can only be fitted in the correct position.

Engage the projections on the inside of the back shell with the slots in the bulb holder, press on and secure by twisting to the right. If a pilot bulb is incorporated, the back shell must be positioned so that when fitted, the pilot bulb is adjacent to the translucent window in the reflector.

Replace the Light Unit and front rim as follows :—

1. External Lamps. Engage the side of the rim opposite to the fixing device with the lamp body, press on and secure with the fixing device. On some lamps a metal tongue on the inside of the front rim must be engaged with a slot in the lamp body.
2. Flush-fitting Lamps, Mark I. 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 two fixing screws protrude through the slotted holes in the flange of the Light Unit. Twist the Light Unit in a clockwise direction and secure by tightening the two screws. Locate the top of the rim first, press on at the bottom and secure by means of the fixing catch.
3. Flush-fitting Lamps, Mark II, III and VI. Position the Light Unit so that the heads of the adjusting screws protrude through the slotted holes in the flange, press the unit in and turn in a clockwise direction. Replace the rubber ring so that the thicker inner edge rests in the recess around the Light Unit rim. Refit the front rim, locating the top of the rim first and securing by means of the fixing screw.

Headlamps, Model M

The bulb can be removed when the lamp front is taken off, as described under "Focusing."

Foglamps, Models FT

The bulb holder can be withdrawn from the rear of the reflector for bulb renewal, the lamp front and reflector being removed as described under "Focusing."

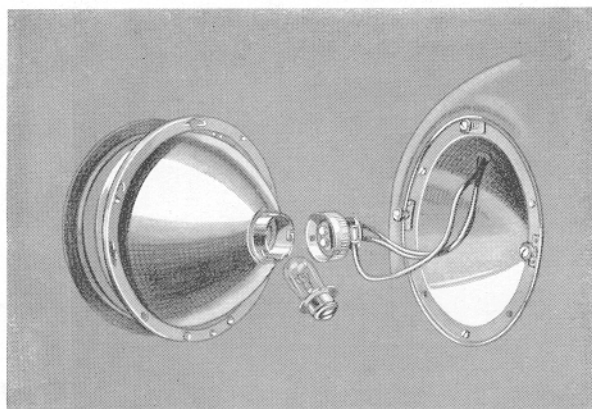


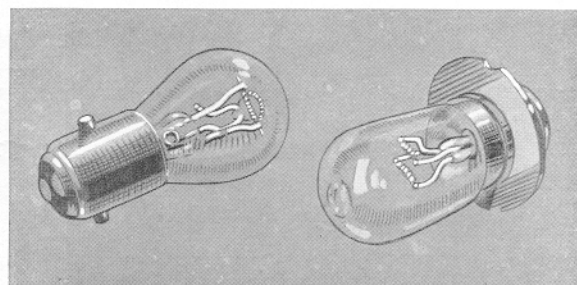
Fig. 30. Flush Fitting Headlamp, Mark III and Mark VI, with Light Unit Removed.

CLEANING LAMPS

The reflectors in lamps incorporating the Lucas Light Unit are, of course, permanently protected. With "M" type lamps, care must be taken when handling reflectors to prevent them from becoming finger-marked. If they do become marked, however, a transparent and colourless protective covering enables any finger marks to be removed by polishing with a chamois leather or a very soft cloth. **DO NOT USE METAL POLISH ON REFLECTORS.**

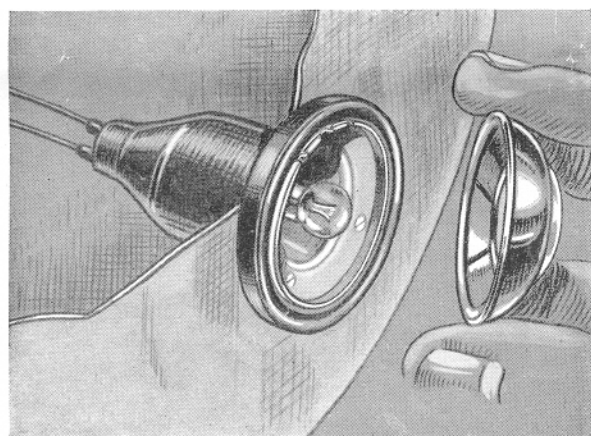
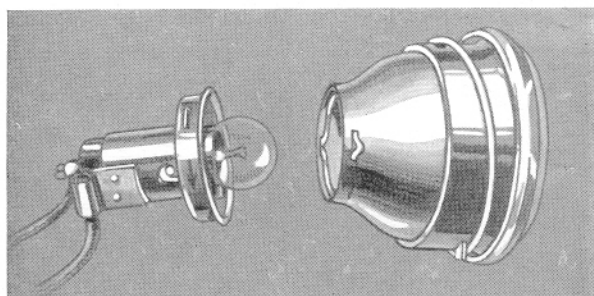
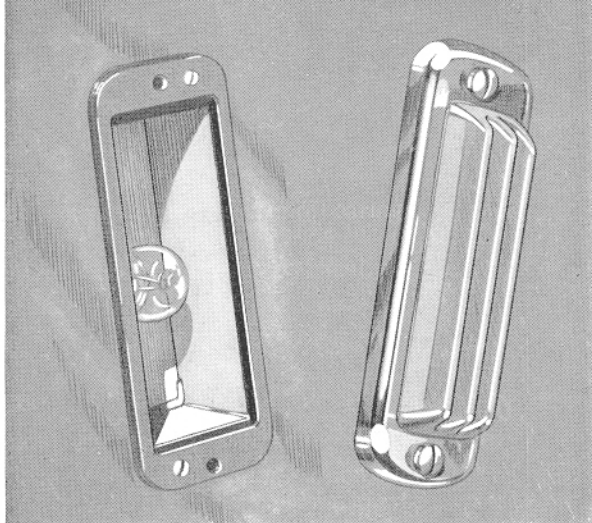
Metal polish must not be used for cleaning chromium plated surfaces. They must be washed with plenty of water and when the dirt is completely removed, must be polished with a chamois leather or a soft dry cloth. Black or coloured lamp bodies can be cleaned with a good car polish.

Fig. 31. Double Filament Bulbs.



"Indexed" bulb, as used in stop-tail and reverse-tail lamps.

"Prefocus" bulb, as used in headlamps incorporating Lucas Light Unit.



Figs. 32, 33 and 34. Flush Fitting Sidelamps.

SIDE LAMPS

The method of front removal for bulb replacement differs with various lamps. Some of the more usual are:

Flush-fitting Models

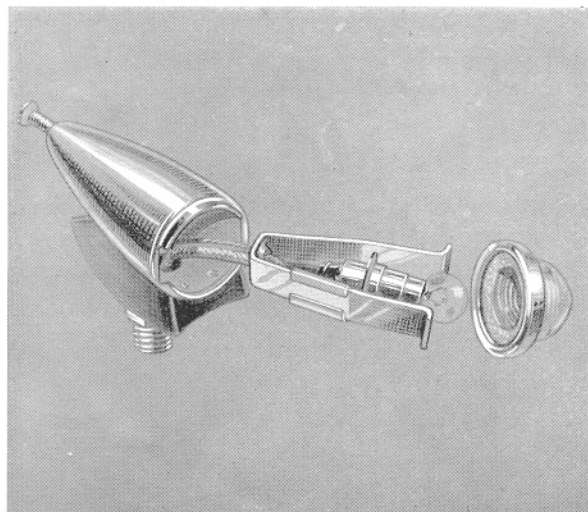
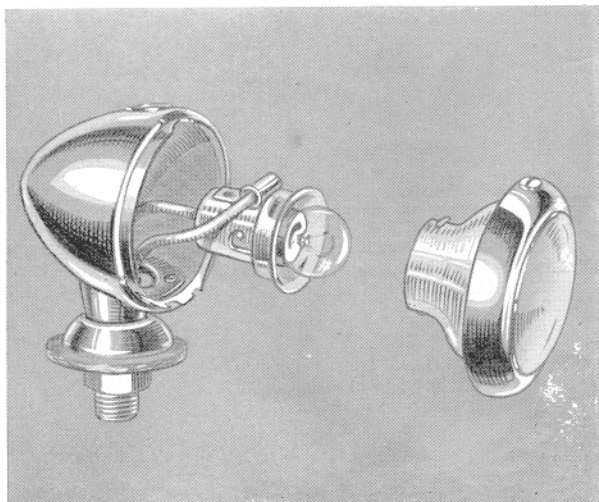
- Slacken the two rim fixing screws, when the front rim and glass can be taken off.
- Remove the small securing screw from the top of the lamp, which can then be pulled from the body by moving the top of the lamp forwards and downwards. Access to the bulb is obtained by twisting the lamp front in either direction to remove it from the body (Fig. 33). When replacing the lamp, locate the metal tag at the bottom of the lamp first.
- Move aside the rubber ring (Fig. 34) and lever off the rim and glass assembly from the bottom of the lamp. To refit, move aside the rubber ring, locate the rim at the top of the lamp, press the rim on and finally position the rubber so that it fits firmly around the rim.

External Models

The lamp front is secured by a single screw either at the top or bottom of the rim or at the rear of the lamp body. In some cases, the reflector and lamp front forms one assembly, and access to the bulb is gained by removing the bulb holder from the rear of the reflector.

After withdrawing the lamp front and bulb holder from the lamp shown in Fig. 36, the front rim and glass can be released for access to the bulb by squeezing together the two sprung sidepieces.

Figs. 35 and 36. External Sidelamps.



REAR LAMPS

There are a considerable number of designs of rear lamp, and the actual method of front removal for bulb replacement differs with the various designs. In most cases, however, it will be found that access to the bulb can be gained by pressing back a fixing clip or removing a front securing screw. Flush-fitting types are similar to the side lamps described previously.

Many rear lamps are also arranged to operate as stop or reverse lights. When a double-filament bulb (6/18 watt) is used for this purpose, the 6 watt filament is connected in the rear lamp circuit and the 18 watt filament in the stop or reverse lamp circuit. Bulbs having normal bayonet fitting (Lucas No. 189) are marked "Top" to indicate correct fitting, while in later lamps a special bulb is used (shown in Fig. 31) in which the locating pegs are offset or "indexed," thus ensuring that the bulb can only be fitted in its correct position.

TRAFFICATORS

Replacement of Bulb

Withdraw the screw on the underside of the arm and slide off the arm cover; the burnt out bulb may then be replaced. To refit the arm cover of models SF34 and SF40, slide it on in an upwards direction so that the side plates engage with the slots on the underside of the spindle bearing. To refit the arm cover of later model SF80 slide the arm cover inwards until the securing tongue locates at the top of the arm, then draw the cover outwards and downwards until the screw can be inserted in the end of the arm. Finally secure the cover by means of its fixing screw.

The replacement bulb is a 3 watt festoon type (Lucas No. 256 for 12 volt systems, No. 255 for 6 volt systems).

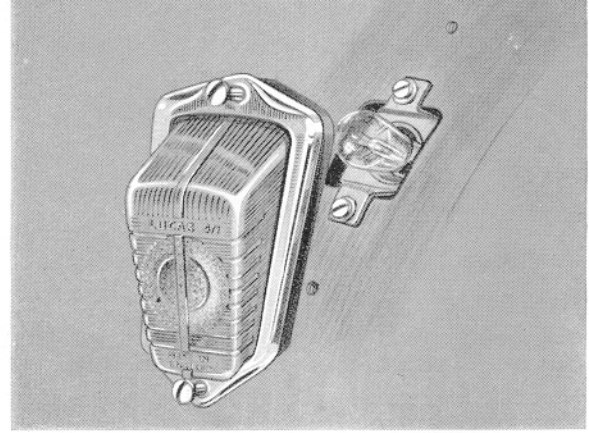
WINDSCREEN WIPER

The windscreen wiper requires no attention, as all moving parts are packed with grease during assembly, and no adjustment is required.

If the rubber wiping blades become worn or perished, they can easily be replaced at very small cost.

Model CW

This model is designed for mounting directly to the windscreen and is fitted with two interlocking controls—a handle and a switch knob. To start the motor, pull out the handle and disengage it from the switch knob; turn the switch knob to ON. To stop the motor, move the switch to OFF and pull out the handle, turning it so that it engages with the switch knob.



Figs. 37 and 38. Rear Lamps.

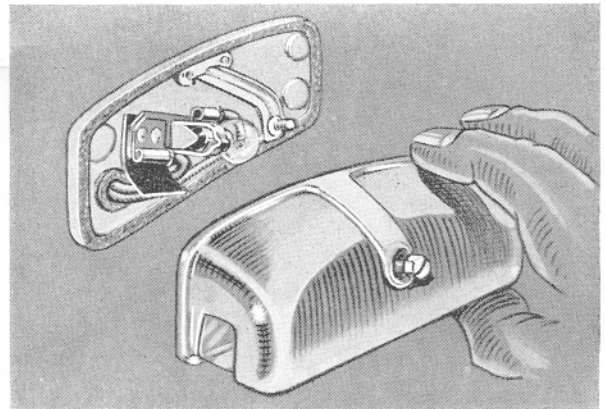
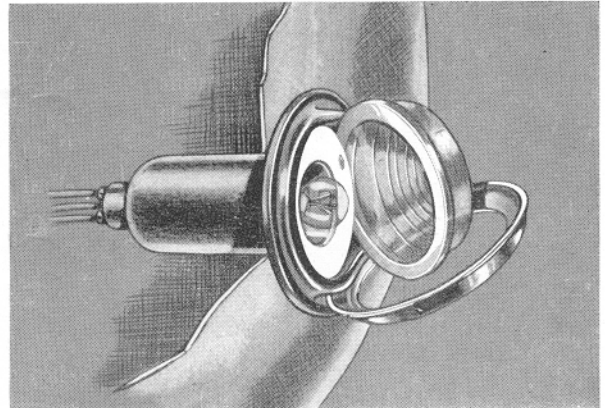
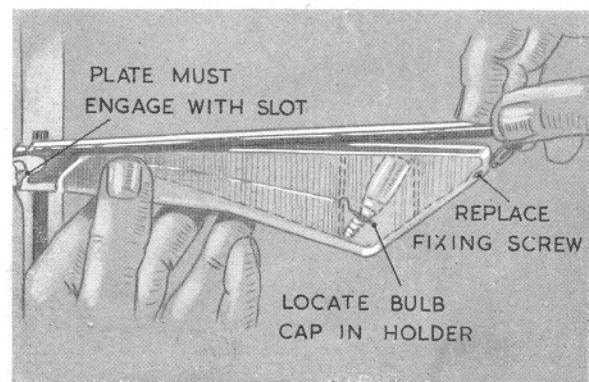


Fig. 39. Number Plate Illumination Lamp.

Fig. 40. Trafficator Bulb Replacement, Models SF34 and 40.



MODEL SW4.

The wiper arms of this model are actuated by a motor mounted on the engine side of the dash and controlled by two parking knobs. The motor has an inbuilt reduction gearbox which takes the drive to a continuously rotating final shaft. A crank at the end of the shaft imparts a push-pull motion to the clutch

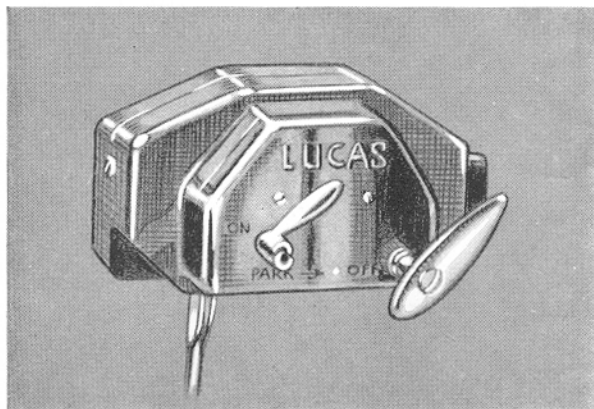


Fig. 41. Wiper, Model CW.

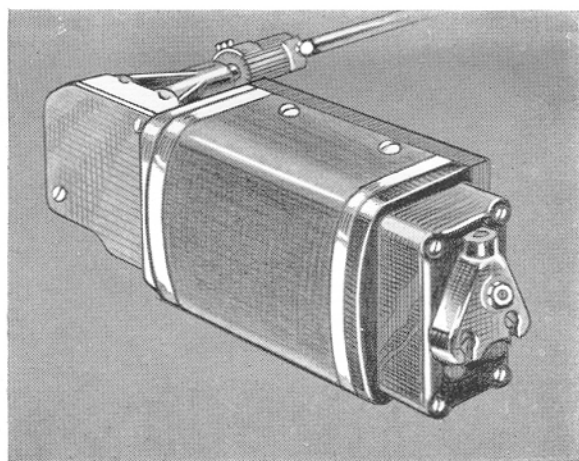
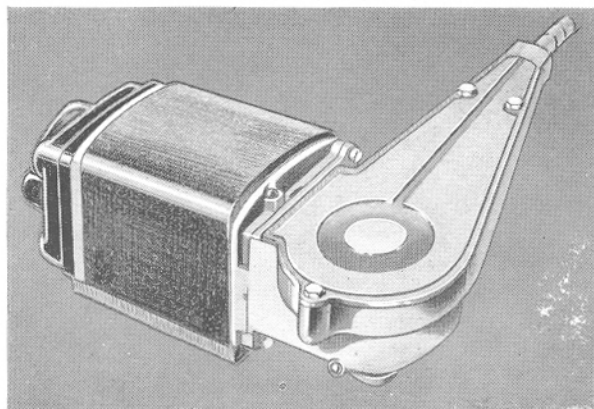


Fig. 42. Wiper, Model SW4.

Fig. 43. Wiper, Models CR and CRT.



box driving links. The clutch boxes, mounted on the screen rail, are fitted with parking knobs, the knob on the driver's side being also an On-Off switch.

To start the wiper, push in the knob on the driver's side and turn it to disengage it from the parking stop. Release the pressure on the knob and then rotate it until the driving dogs engage. Engage the drive to the arm on the passenger's side in a similar manner. To switch off, push in the knob and turn it until the arm lies on the scuttle.

MODELS CR and CRT

Wipers of the CR and CRT ranges, like the previous model, have a motor and gearbox mounted under the bonnet, but with these models the drive is transmitted to the wiper arms by means of a flexible cable rack mechanism. The flexible cable rack consists of an inner core of steel wire around which is wound a wire helix. The rack, which is contained in an armoured outer casing, is given a reciprocating motion by means of a crank in the gearbox, and engages with a gear in the wiper wheelboxes to drive the wiper arm spindles.

Models CR and CRT are identical in appearance, the difference being that the wiper motor of model CRT incorporates a protective device in the form of a thermostat which, under conditions of excessive heating, cuts off the current supply to the motor until normal conditions are restored.

If the blades are prevented from moving as, for example, by ice or packed snow on the windscreen, the thermostat will break the circuit when the motor becomes hot. Normal working will be resumed when the motor has cooled down and the obstruction has been removed; the cooling down period may be approximately ten minutes.

The normal method of starting and stopping these wipers varies with individual models. Early models have a single large control knob, often mounted centrally on the dash, whilst others have separate control knobs on each wiper arm spindle. Later models, without knobs, are controlled by a switch, parking of the arms being effected by switching off at the end of a stroke.

ELECTRIC HORNS

All horns are adjusted to give their best performance before being passed out of the Works and will give a long period of service without any attention.

If a 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 a discharge battery or a loose connection or short circuit in the wiring of the horn. A short circuit in the horn wiring will cause the fuse, if one is fitted, to blow.

When two horns are fitted, if both fail or become uncertain in action, the trouble is probably due to a blown fuse or a discharged battery. If the fuse has blown, examine the wiring for fault, and replace the fuse with the spare provided.

High Frequency Horns

No subsequent adjustment is required.

Wind Tone Horns

If after carrying out the above examination the trouble is not rectified, the horn may need adjustment but this should not be necessary until it has been in service for a long period.

Adjustment does not alter the pitch of the note, but 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 adjustments 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.

Remove the horn cover after withdrawing the fixing screw and detach the cover securing bracket by springing it from its fixing.

Slacken the lock nut on the fixed contact and rotate the adjusting nut until the contacts are just separated (indicated by the horn failing to sound). Turn the adjusting nut half a turn in the opposite direction and secure in this position by tightening the lock nut. Finally, if the note is still unsatisfactory, do not dismantle the horn but return it to a Lucas Service Depot or Service Agent for examination.

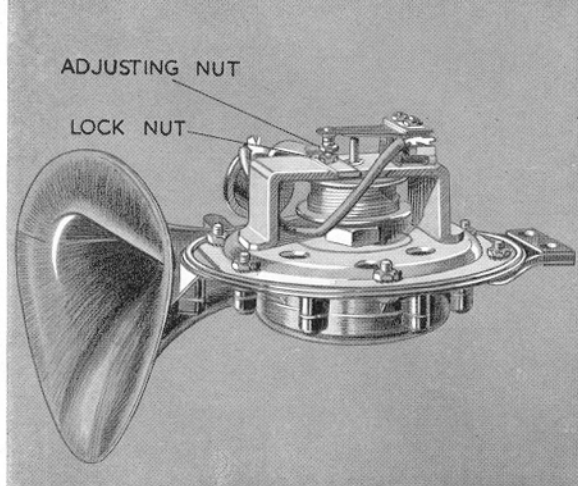


Fig. 44. Wind Tone Horn with Cover Removed

COIL IGNITION EQUIPMENT

Distributors with Micrometer Timing Adjustment

In order to obtain very fine timing of the ignition to the engine and to allow for altered engine conditions, e.g., state of carbonisation of engine, change of fuel, etc., a micrometer adjustment is provided on some distributors which allows fine adjustment to be made simply by the movement of a knurled knob.

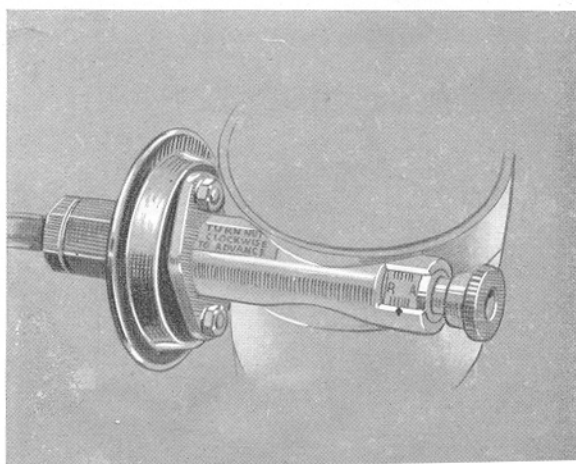
With a clean engine, and using first grade fuel, the micrometer index should be in the centre of the scale.

If the firing is found to be slightly too early or too late, adjust the knurled knob until the best engine performance is obtained. The adjustment should not be altered by more than half a division on the scale at a time.

The Coil

The coil requires no attention beyond keeping its exterior clean, particularly between the terminals, and occasionally checking that the terminal connections are quite tight.

Fig. 45. Micrometer Timing Adjustment.



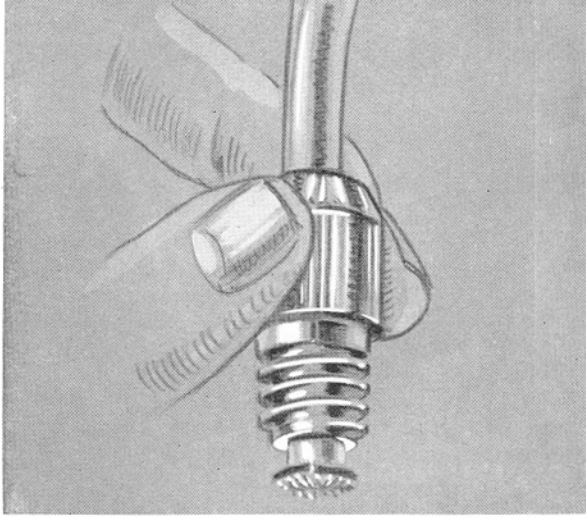
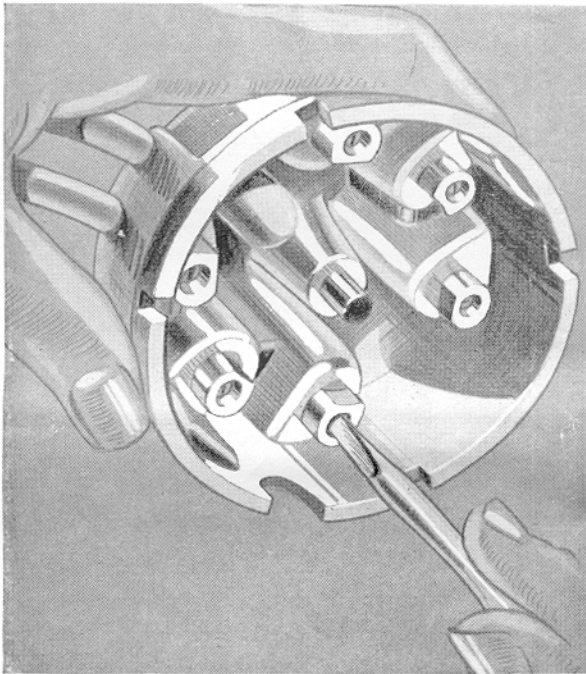
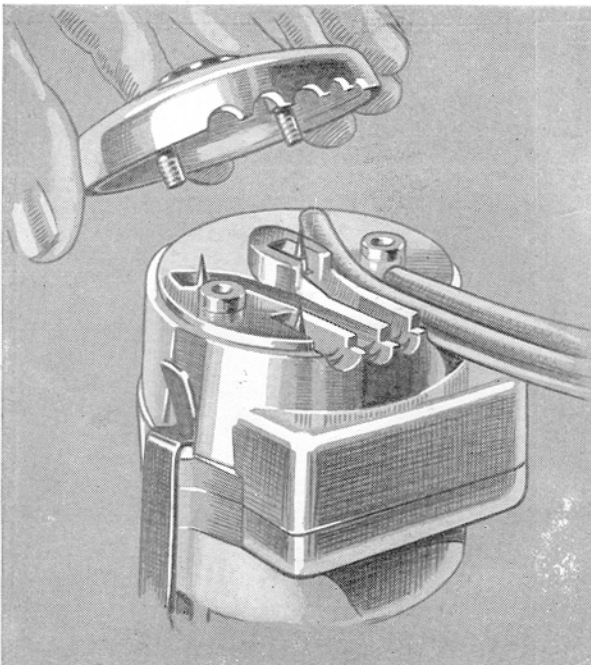


Fig. 46. Fitting H.T. Cable to Coils and some Distributors.



Figs. 47 and 48. Fitting H.T. Cable to Distributors with Horizontal Cable Outlets.



Renewing the High Tension Cable

The high tension cables are those connecting the coil to the distributor and the distributor to the sparking plugs. When these cables show signs of perishing or cracking they must be replaced by 7 mm. rubber covered ignition cable.

The methods of fitting high tension cable to the distributor and coil vary with different units. On coils and distributors in which the cables are taken vertically from the unit, the method of connecting them is to thread the knurled moulded nut over the cable, bare the end of the cable for about $\frac{1}{4}$ ", thread the wire through the brass washer provided, and bend back the strands. Finally screw the nut into its terminal.

With some distributors, the cables are secured by means of pointed fixing screws. To fit new cables, unscrew the pointed fixing screws on the inside of the moulding and push the cables, which should not be bared but cut off flush to the required length, well home into their respective terminals. The screw securing the centre cable is accessible when the carbon brush is removed. Now tighten up the screws which will pierce the insulation and make contact with the cable core.

With other types of distributors with horizontal cable outlets, the cables are held in position by a moulded cover which is secured by means of screws. The cables, which are cut off flush to the required length, are located in recesses in the distributor moulding and are pressed on to pointed terminal studs which pierce the insulation to make good contact with the cable core.

The Ignition Switch and Warning Light

The ignition switch, besides forming a means of stopping the engine, is provided for the purpose of preventing the battery being discharged by the current flowing through the coil windings when the engine is stopped. A warning lamp is usually provided in the instrument panel which gives a red light when the ignition is switched on and the car is running very slowly or is stationary, thus reminding the driver to switch off.

Should the warning lamp bulb burn out, this will not in any way affect the ignition system, but it should be replaced as soon as possible in order to safeguard the battery.

SECTION THREE

LOCATION AND REMEDY OF FAULTS

Although every precaution is taken in production to eliminate all possible causes of trouble, failure may occasionally develop through lack of attention to the equipment, or damage to the wiring. The following pages set out the recommended procedure for a systematic examination to locate and remedy the causes of some of the more probable faults. The sources of many troubles are by no means obvious and in some cases considerable deduction from the symptoms is needed before the cause of the trouble is disclosed.

For instance, the engine might not respond to the starter switch ; a hasty inference would be that the starter motor is at fault. But as the motor is dependant on the battery, it may be that the battery is exhausted. This in turn may be due to the dynamo failing to charge ; and the final cause of the trouble may be, perhaps, a loose terminal nut somewhere in the charging circuit.

If after carrying out the examination, the cause of the trouble is not found, the owner is advised to get in touch with the nearest Lucas Service Depot or Agent.

IGNITION CIRCUIT

1. Engine will not fire.

- (a) See that the controls are correctly set for starting, ignition switched on, petrol turned on, etc.
- (b) See that the battery terminals are secure and that the battery is in a charged condition, either by use of a hydrometer or by checking that the starter will turn the engine and the lamps give a good light

If the battery is discharged, it must be recharged from an independent electrical supply.

- (c) Remove the cable from the centre distributor terminal and hold the end of it about $\frac{1}{4}$ " away from some metal part of the chassis while the engine is slowly turned over. If sparks

jump the gap regularly, the coil and distributor are functioning correctly, and the sparking plugs must be examined. If these are clean, and the gaps correct, the trouble must be due to the carburetter, petrol supply, etc.

- (d) If no spark is produced in the above test, check for a fault in the low tension wiring. This will be indicated by (i) no ammeter reading when the engine is slowly turned and the ignition switch is on, or alternatively a steady reading that does not fluctuate with the opening and closing of the contacts, and (ii) no spark occurring between the distributor contacts when quickly flicked open by hand. Examine all cables in the ignition circuit and see that all connections are tight. If a voltmeter is available, a point-to-point voltage check of the wiring should be made.
- (e) If the wiring proves to be in order, examine the distributor contacts, if necessary cleaning them and adjusting the gap.

2. Engine Misfires.

- (a) Examine the distributor contacts, and if necessary clean them and adjust the gap.
- (b) Remove each sparking plug in turn, rest it on the cylinder head and observe whether a spark occurs at the points when the engine is turned. Irregular sparking may be due to dirty plugs, which must be cleaned and adjusted, or defective high tension cables. Any cable on which the insulation shows signs of deterioration or cracking should be renewed.
- (c) If sparking is regular at each plug when tested as described in (b), the trouble is probably due to engine defects, and the carburetter, petrol supply, etc. must be examined.

CHARGING CIRCUIT

1. Battery in low state of charge.

- (a) This state will be shown by lack of power when starting, poor light from the lamps, and hydrometer readings below 1.200, and may be due to the dynamo either not charging or giving low or intermittent output. On cars fitted with an ignition warning light, the light will not go out if the dynamo fails to charge, or will flicker on and off in the event of intermittent output.
- (b) Check the ammeter reading when the car is running steadily in top gear. With compensated voltage control equipment, the reading depends on the state of the battery and the equipment in use, being high when the battery is discharged and falling to 2 or 3 amps. when the battery is charged.

With the older "third-brush" system of regulation, the ammeter should register a charge of approximately 2 amps. during normal running with head, side and tail lamps on. If the dynamo output seems to be low, have the equipment examined by a Lucas Service Depot or Agent for the setting of the voltage regulator or the position of the third brush.

- (c) Inspect the dynamo driving belt, adjusting if necessary to take up undue slackness.
- (d) Examine the charging and field circuit wiring, tightening any loose connections, or replacing broken cables. Pay particular attention to the battery connections.
- (e) Examine the dynamo commutator and brushgear as described in Section One.

2. Battery Overcharged.

- (a) This will be indicated by burnt-out bulbs, very frequent need for topping-up the battery, and high hydrometer readings.

If adjustment of the regulator, or of the control brush in "third brush" systems, is necessary the equipment should be taken to a Lucas Service Depot or Agent.

STARTER MOTOR

1. Starter Motor lacks power or fails to turn engine.

- (a) See if the engine can be turned over by hand. If not, the cause of the stiffness of the engine must be located and remedied.
- (b) If the engine can be turned by hand, first check that the trouble is not due to a discharged battery.
- (c) Examine the connections to battery, starter and starter switch, making sure that they are tight and that the cables connecting these units are not damaged.
- (d) Examine the starter motor commutator and brushgear as described in Section One.
- (e) It is also possible that the starter pinion may have jammed in mesh with the flywheel, although this is by no means a common occurrence. To disengage the pinion, rotate the squared end of the starter shaft by means of a spanner.

2. Starter operates, but does not crank engine.

This fault will occur if the pinion of the starter drive is prevented from moving along the screwed sleeve into engagement with the flywheel, due to dirt having collected on the screwed sleeve. Clean the sleeve carefully with paraffin.

3. Starter pinion will not disengage from flywheel when engine is running.

Stop the engine, and see if the starter pinion is jammed in mesh with the flywheel, releasing it if necessary by rotation of the squared end of the starter shaft. If the pinion persists in sticking in mesh, have the equipment examined at a Service Depot. Serious damage may result to the starter if it is driven by the flywheel,

LIGHTING CIRCUITS

1. Lamps give insufficient illumination.

- (a) Test the state of charge of the battery, recharging it if necessary either by a long period of daytime running or from an independent electrical supply.
- (b) Check the setting of the lamps, and that the bulbs are in focus (when "prefocus" bulbs are not used).
- (c) If the bulbs are discoloured as a result of long service, they should be replaced. On lamps on which the reflector is accessible, see that it is clean.

2. Lamps light when switched on, but gradually fade out.

As para. 1 (a).

3. Brilliance varies with speed of car.

- (a) As para. 1 (a).
- (b) Examine the battery connections, making sure that they are tight, and replacing faulty cables.

4. Lights flicker.

Examine the circuits of the lamps for loose connections.

5. Failure of Lights.

- (a) Check the fuse (when fitted). If it has blown, examine the wiring for faulty cables or loose connections which may have caused the fuse to blow. Fit replacement fuse.
- (b) As para. 1 (a).
- (c) Examine the wiring for a loose or broken connection, and remedy.

6. Failure of dipping mechanism to operate.

In cars fitted with double-filament headlamp bulbs for dipping purposes, this fault will generally be caused by the failure of the "dip" filament. Alternatively, examine the dipping switch and its wiring for a loose connection or faulty cable, or a fault in the switch itself.

Failure of solenoid-operated mechanical dipping systems may be due to stiffness or sticking of the mechanism, a loose or broken connection in the dipper unit, or, more usually, a blown fuse in the dipper unit. Locate and remedy the short circuit or other fault before renewing the fuse.



FUSES

1. The fuses protecting the lighting and auxiliary circuits of the car are fitted on the control box or in a separate fuse box. In some cases each circuit may be protected by a separate fuse.

The particular system used, and the circuits protected by any one fuse, can easily be determined by reference to the wiring diagram.

2. A blown fuse is indicated by the failure of all the units protected by it, and examination of the fuse will at once confirm the diagnosis : if it has blown, the separated ends of the wire will be visible inside the glass tube.

Before replacing a blown fuse, inspect the wiring of the circuits that have failed for evidence of a short circuit, or other fault, which may have caused the fuse to blow.

It is important to use only the correct value for the replacement fuse. The fusing value is marked on a coloured paper slip inside the glass tube of the fuse.

3. If a fuse blows repeatedly, and the cause of the trouble cannot be traced, have the equipment examined by a Lucas Service Depot or Agent.

