

Main Group EL

Electric System and Instruments

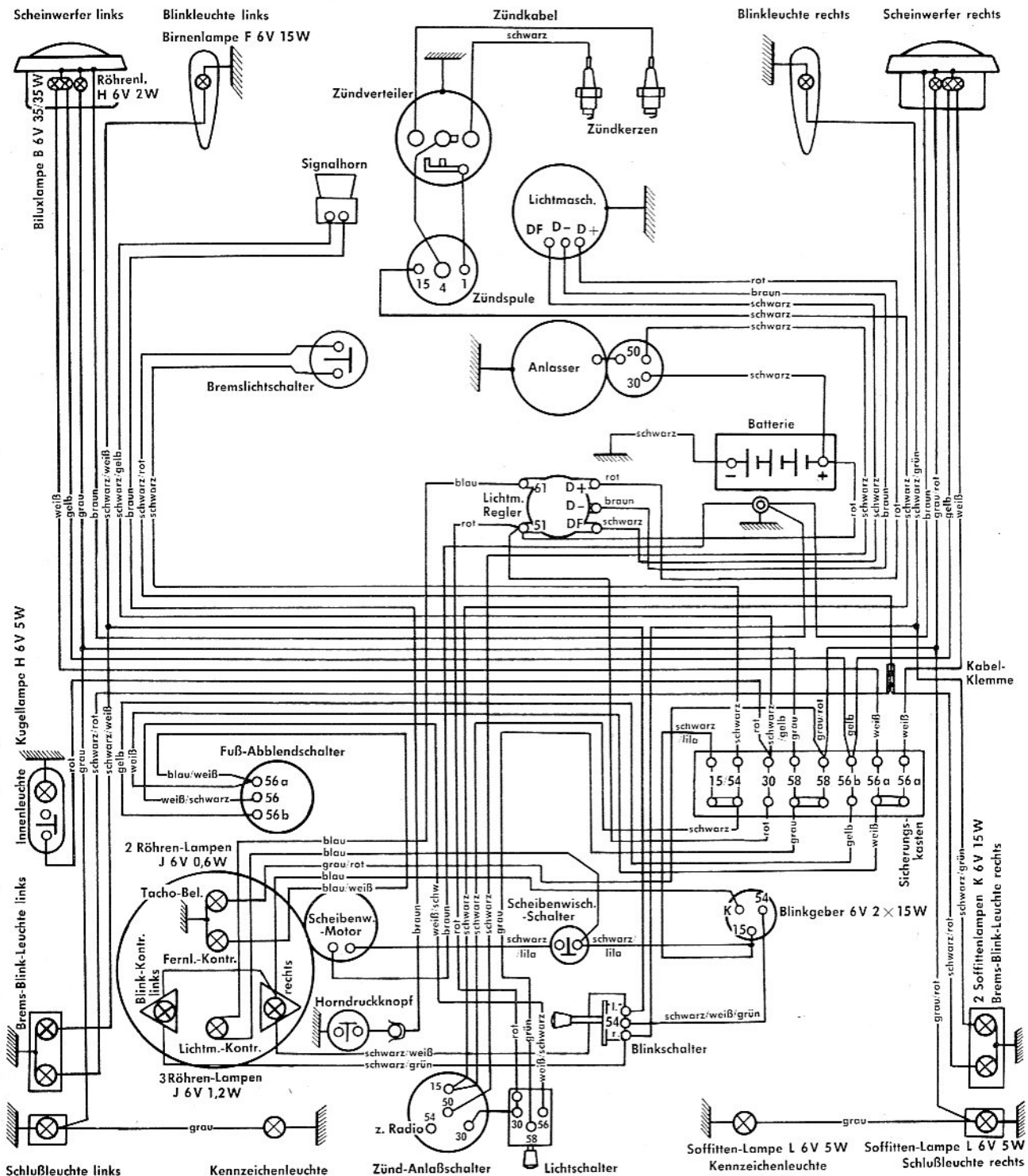
- 1** – Sub-Group Wiring Diagrams and Fuses
- 2** – Sub-Group Dynamo and Regulator
- 3** – Sub-Group Battery
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- 5** – Sub-Group Ignition
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Declaration for pages 1-1, 1-2, 1-3, 1-4, 1-5 and 1-6.

Wiring Diagram
for LT/LS 600 up to Chassis-No. 6/313 826

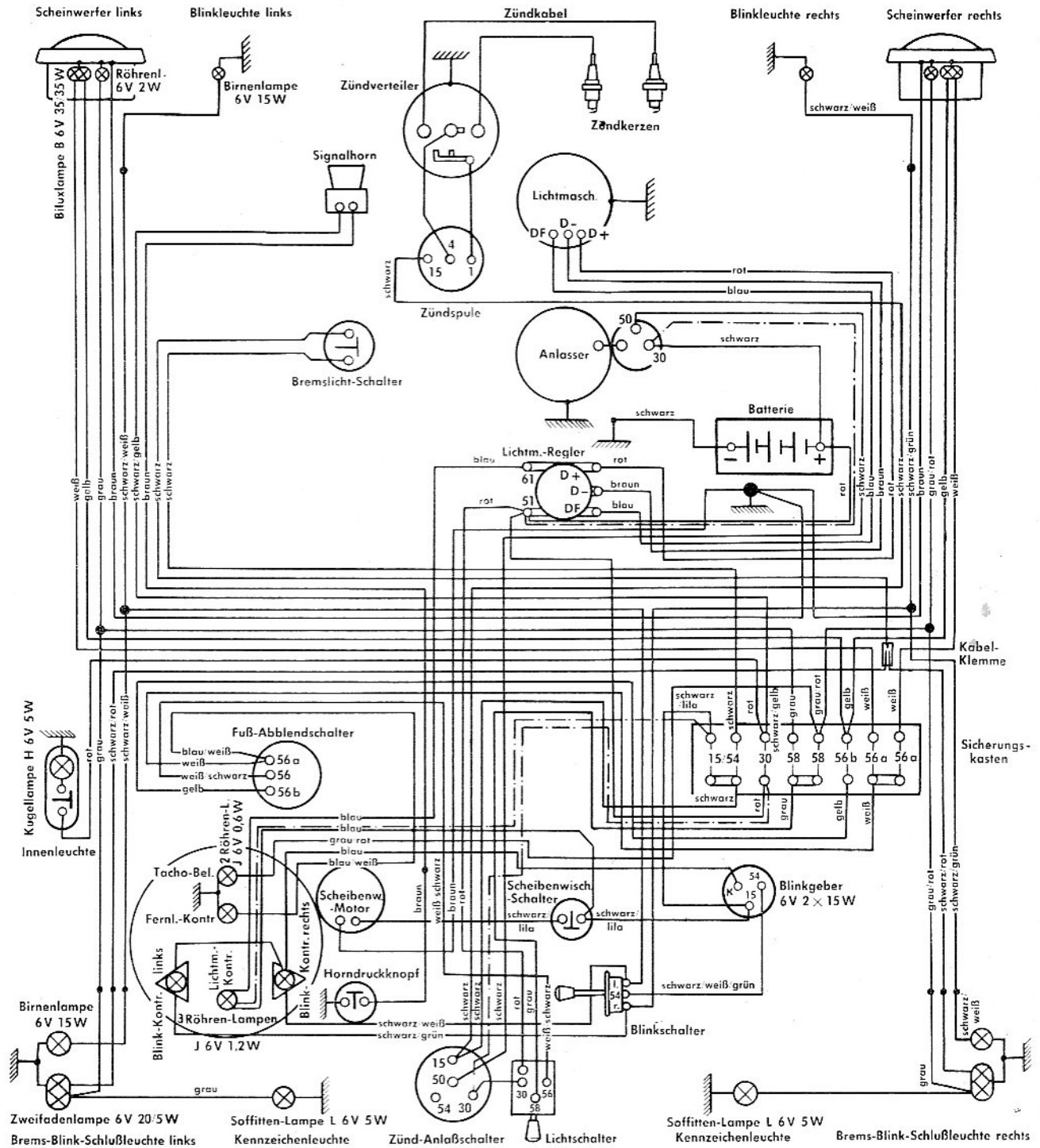
Scheinwerfer, links	=	Head lamp, left
Blinkleuchte, links	·	Flashing light, left
Zündkabel, schwarz	=	Ignition cable, black
Blinkleuchte, rechts	=	Flashing light, right
Scheinwerfer, rechts	=	Head lamp, right
Röhrenlampe H 6 V 2 W	=	Tubular lamp H 6 V 2 W
Birnenlampe H 6 V 15 W	·	Bulb lamp F 6 V 15 W
Zündverteiler	=	Ignition distributor
Zündkerzen	=	Sparking plugs
Signalhorn	·	Horn
Lichtmaschine	=	Dynamo
Zündspule	=	Ignition coil
Bremslichtschalter	=	Stop light switch
Anlasser	=	Starter - motor
Rot		red
Braun	=	brown
Schwarz	=	black
Weiß		white
Gelb	=	yellow
Grau	=	grey
Schwarz-weiß	·	black-white
Schwarz-gelb	=	black-yellow
Batterie		Battery
Lichtregler	=	Light regulator
Fußabblendschalter	=	Foot dimmer switch
Kabelklemme		Cable terminal
Kugellampe	=	Spherical bulb
Innenleuchte	=	Interior light
Brems-Blink-Leuchte, links		Stop-Flasher light, left
2-Röhren-Lampe	=	Twin-tubular lamp
Scheibenwischermotor	=	Windscreen wiper motor
Scheibenwischerschalter	=	Windscreen wiper switch
Blinkgeber	=	Flasher-unit
Sicherungskasten		Fuse box
Tachobeleuchtung	=	Speedometer illumination
Fernlichtkontrolle	=	High beam indicator
Blink-Kontr.	·	Flasher light pilot lamp
Lichtm. Kontr.	=	Dynamo pilot lamp
3-Röhren-Lampen		Triple-tubular lamp
Blink-K., rechts	=	Flashing light pilot lamp, right
Hornruckknopf	=	Horn push-button
Blinkschalter		Flasher switch
2 Sofittenlampen	=	Tubular-bulb
Bremsblinkleuchte, rechts	=	Stop-Flasher light, right
z. Radio		to Radio
Schlußleuchte, links	=	Tail light, left
Kennzeichenleuchte, links	=	Licence plate light, left
Zündanlaßschalter		Starter-Ignition-switch
Lichtschalter	=	Light switch
Sofittenlampe	=	Tubular-bulb
Kennzeichenleuchte, rechts	·	Licence plate light, right
Sofittenlampe	=	Tubular-bulb
Schlußleuchte, rechts	=	Tail light, right

Wiring Diagram
for LP/LS 600 and Alexander from Chassis-No. 6/313 827



1 - 1/2

Wiring Diagram
for LP 600 Standard with Dynamos LJ/GEH/130/6/2600 L 8 and LJ/GEH/160/6 2500 L 8



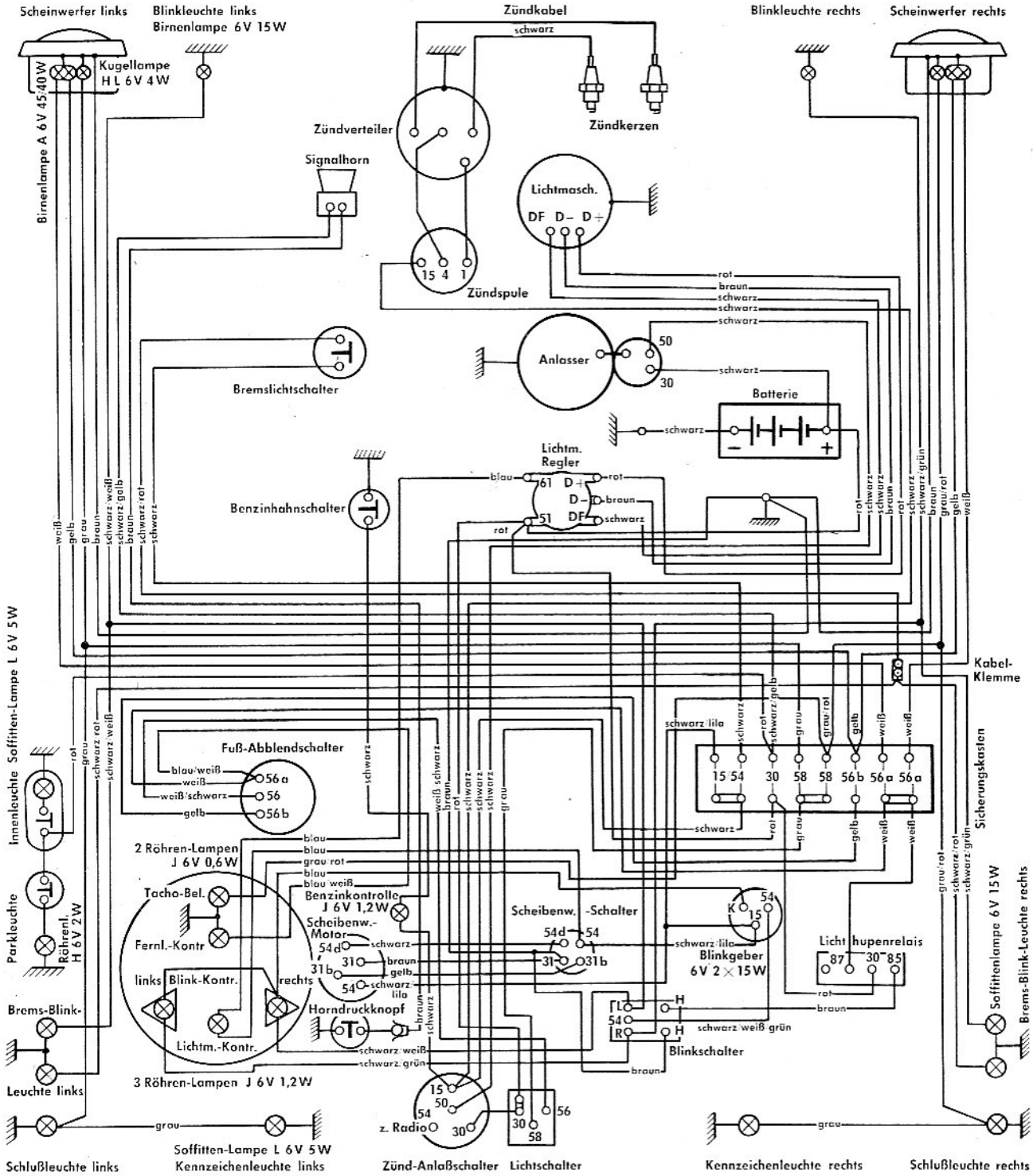
1 - 1/3

The dash-dotted lines refer to vehicles equipped with dynamos 130/6. In this case, the following lines are omitted:

1. From terminal 51 of the regulator to + pole of the battery.
2. From terminal 51 of the regulator (red line) to fuse box terminal 30.
3. From dynamo pilot lamp (blue) to windscreen wiper switch.

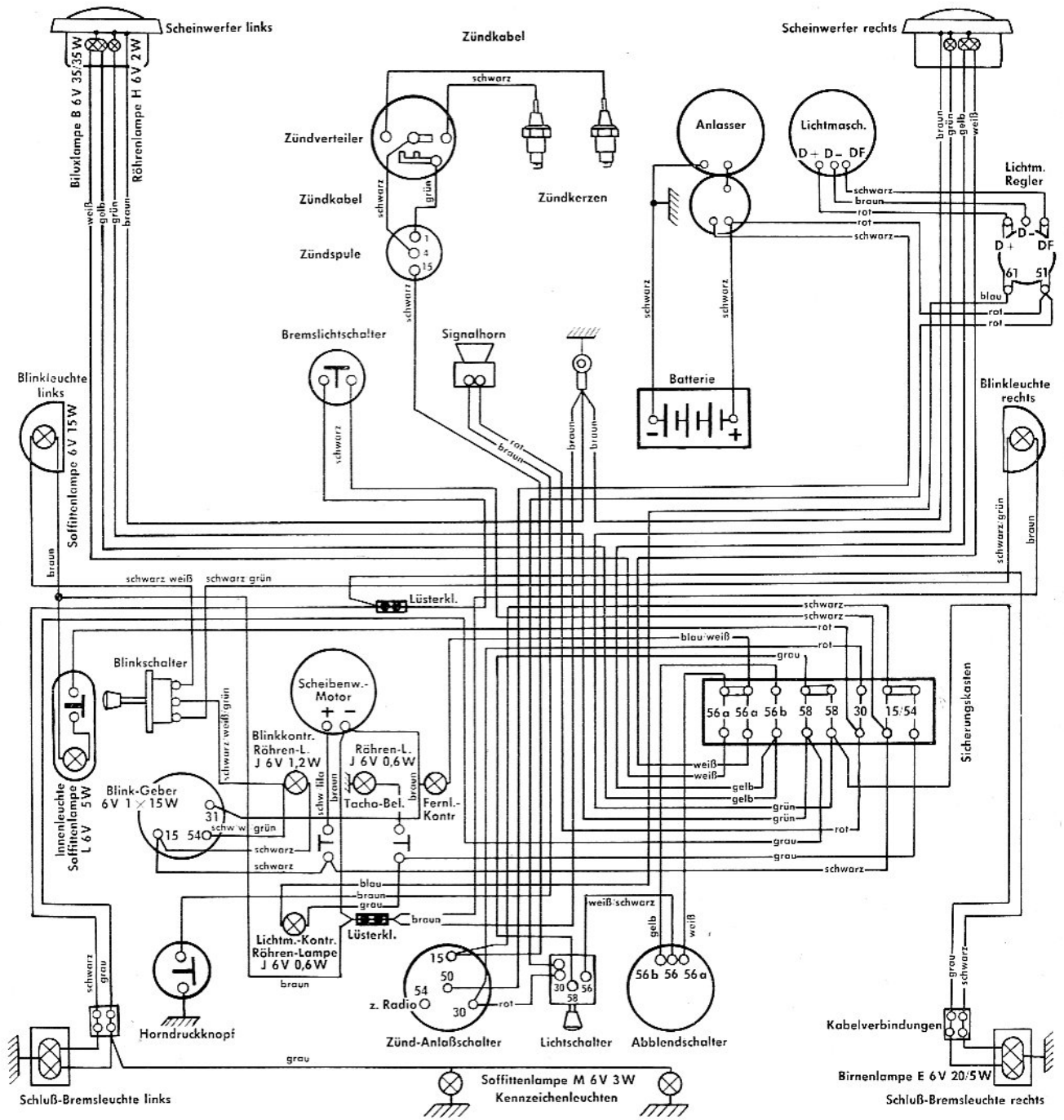
On the vehicles equipped with dynamos 160/6 the dash-dotted lines are omitted.

Wiring Diagram
for LLOYD Alexander TS



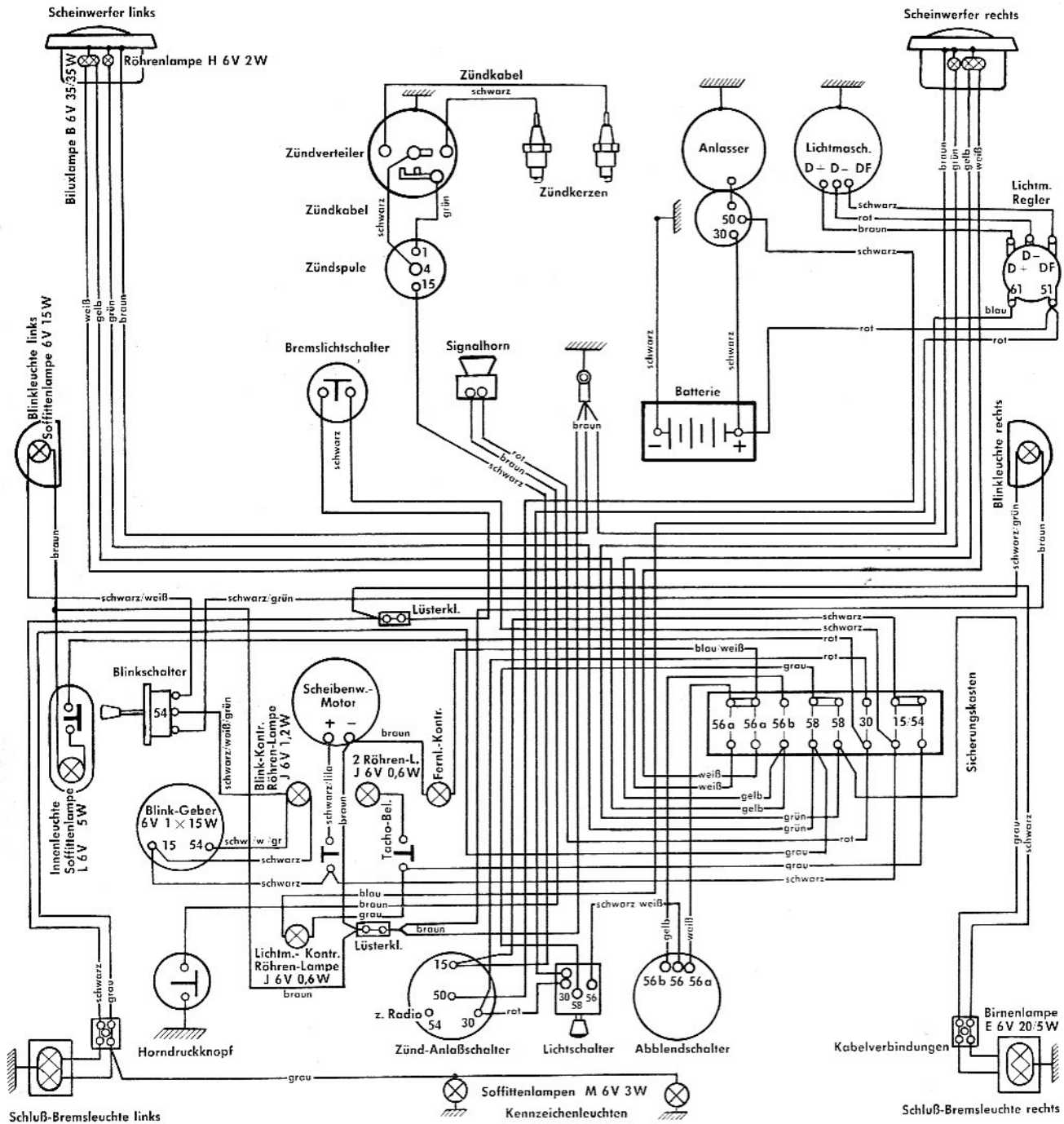
1-1/4

Wiring Diagram
for LT/LTK 600 up to Chassis-No. 6/117 639



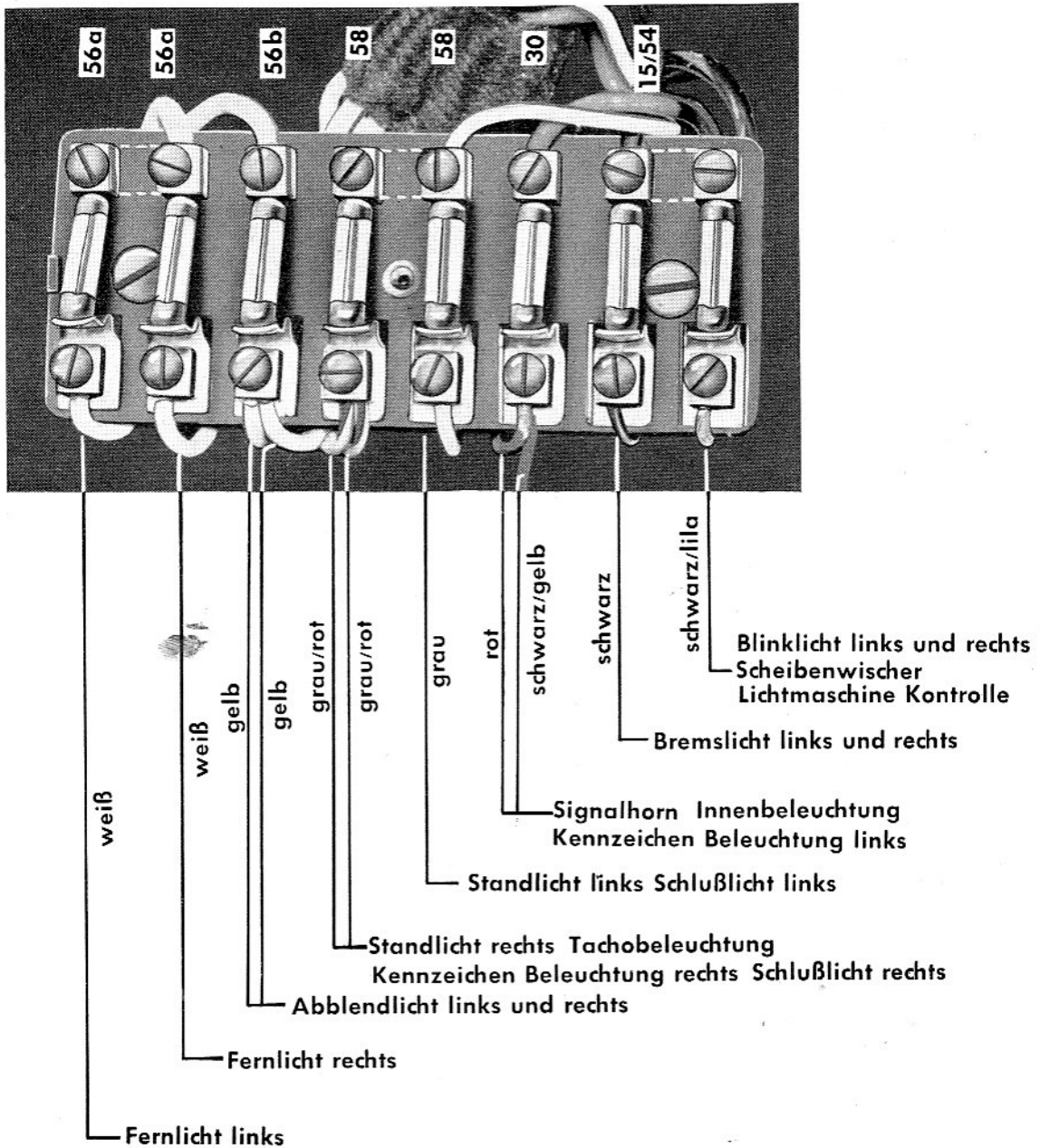
1 - 1/5

Wiring Diagram
for LT/LTK 600 from Chassis-No. 6/117 640



Fuse-Box

for LP/LS 600 and Alexander with cable colour code and denomination of connections

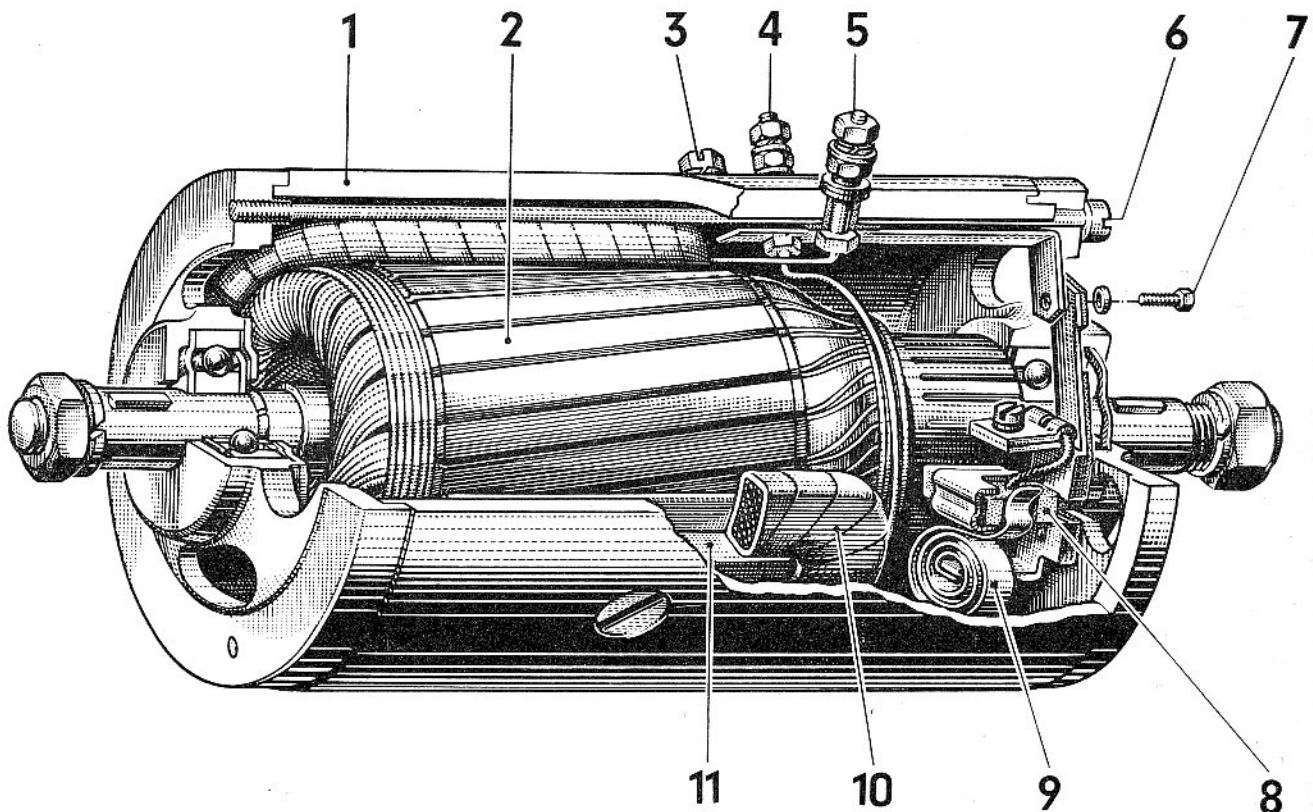


1 - 1/7

- | | |
|---|---|
| Weiß | = White |
| Weiß-gelb | = White-Yellow |
| Grau/Rot | = Grey/Red |
| Grau | = Grey |
| Rot | = Red |
| Schwarz-Gelb | = Black-Yellow |
| Schwarz | = Black |
| Schwarz/Lila | = Black/Pale violet |
| Blinklicht links u. rechts | = Flashing light, left and right |
| Scheibenwischer | = Windscreen wiper |
| Lichtmaschine Kontrolle | = Dynamo pilot lamp |
| Bremslicht, links u. rechts | = Brake light, left and right |
| Signalhorn, Innenbeleuchtung | = Horn, Interior lighting |
| Kennzeichenbeleuchtung, links | = License plate light, left |
| Standlicht, links, Schlußlicht, links | = Parking light, left; Tail light, left |
| Standlicht, rechts, Tachobeleuchtung | = Parking light, right; speedometer lighting |
| Kennzeichenbeleuchtung, Schlußlicht, rechts | = License plate light, right; Tail light, right |
| Abblendlicht links u. rechts | = Dimmed light, left and right |
| Fernlicht, rechts | = High beam, right |
| Fernlicht, links | = High beam, left |

Function of the Dynamo

The armature moving through a magnetic field carries in each of its slots in an iron core a number of copper windings which while rotating cut the lines of force of the magnetic field built up between the poles of the dynamo, thus inducing in the windings an electromotive force. In the closed circuit flows electric current which is drawn from the carbon brushes resting on the commutator and passed through the connected lines to the consumers and to the battery. The dynamo designed to operate as D.C. shunt-wound machine produces its own exciting current, that is, the exciting current is being derived from the armature current. While starting the dynamo, first only a weak magnetic field, produced by residual magnetism, becomes effective between the pole shoes so that during the first revolutions only a small electromotive force will be produced which, however, will suffice to increase the exciting current and thus also the already existing magnetic field. Thus, the electromotive force is being strengthened in the armature windings. As the speed increases, the electromotive force will also grow, thus strengthening the magnetic field until the machine is fully excited and a further growth in speed and in the electromotive force will result in a saturation of the magnetic circuit so that no strengthening of the magnetic field will take place any more. It goes without saying that the exciter windings are connected to the armature in such a manner that this will result in an appreciable strengthening of the residual magnetism still existing. For this reason the dynamo must be driven only in the direction of motion as indicated on the pole casing.



- 1 – Pole casing
- 2 – Armature
- 3 – Connecting terminal D–
- 4 – Connecting terminal D+
- 5 – Connecting terminal DF
- 6 – Cylindrical head screw for fastening bearing cap

- 7 – Connecting part with screws for terminal D+
- 8 – Carbon brush
- 9 – Brush spring
- 10 – Exciter winding
- 11 – Pole shoe

General

Dynamo

The function of the dynamo driven by the car engine by means of a Vee-belt is to supply several current consumers of the car with electric energy and to charge the battery in an unobjectionable manner. Depending on the driving habit and driving speed the engine speed is subjected to great variations. Accordingly, not only the speed of the dynamo but also voltage and amperage will therefore vary. Moreover, the dynamo will be loaded in a different way as result of the power required and the number of connected current consumers. Many high-power consumers require a greater dynamo output than only a few small power consumers.

Regulator

To satisfy these comprehensive requirements a regulator cut-out is provided. The function of this regulator is to connect the dynamo, when sufficient speed (voltage) is available, to the battery and to the consumers, and to break the circuit when there is a drop in the dynamo voltage below that of the battery owing to a decrease in speed. Furthermore, the regulator diminishes or short the current flowing through the field coils so that a control of the charging current outgoing from the dynamo is ensured. A full-discharged battery is being supplied with a considerably larger amount of current than a charged one. The total dynamo output depending on the output in continuous service (rated output + 50%) will not be exceeded under these conditions provided the car is equipped with the conventional standard type current consumers.

For this reason, only a regulator that is destined for controlling the rated dynamo output should be used. Any other regulator designed for larger capacities will cause overload of the dynamo whereas a small-capacity regulator is unable to fully utilize the dynamo output. In the latter case current consumers and battery will possibly not get sufficient current.

The LLOYD 600 cars are equipped with the following types of dynamos and regulators:

Type of Vehicle	Dynamo	Regulator
LP/LS 600 to Chassis-No. 6/313 826	Bosch LJ/GEH/130/6/2600 L 8	Bosch RS/TB 130/6/1
LP/LS 600 from Chassis-No. 6/313 827	Bosch LJ/GEH/160/6/2500 L 8	Bosch TBA 160/6/1
LT/LTK 600 to Chassis-No. 6/117 639	Bosch LJ/GEH/130/6/2600 L 8	Bosch RS/TB 130/6/1
LT/LTK 600 from Chassis-No. 6/117 640	Bosch LJ/GEH/160/6/2500 L 8	Bosch TBA 160/6/1

Check Dynamo and Regulator (not detached from the car)

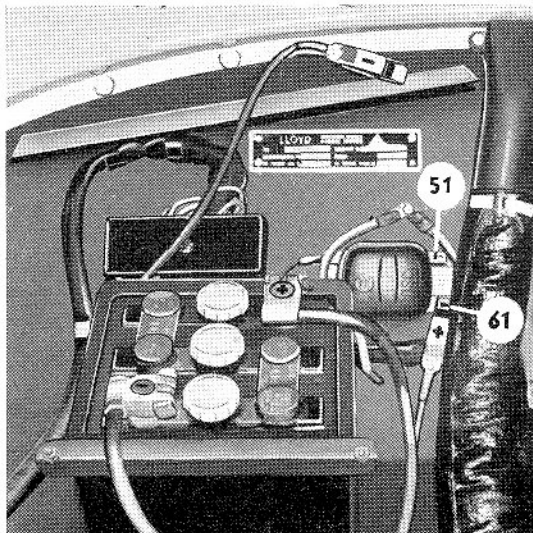
General

When the car engine has been started and speeded up, the charging pilot light will extinguish at the instant the automatic reverse current circuit breaker contained in the regulator is closed, thus indicating that the battery is under tension but it gives no security for the proper setting of the regulator switch and thus no information about the proper current supply to the battery and to the consumers. For an accurate test of the electric system – here, for instance, for testing the dynamo and regulator – a good electrical test equipment is necessary. Dynamo and regulator may also be checked in the built-in condition by means of ammeter, voltmeter and a load resistance. It would be best to test the entire electric system with a test equipment specially developed for this purpose and which incorporates the necessary instruments to be connected in such a manner that all tests can be done most appropriately. Test equipment of such a kind can be obtained from various Manufacturers. The tests described hereunder on electrical units in Lloyd-vehicles are made with a Bosch-Electro-Tester.

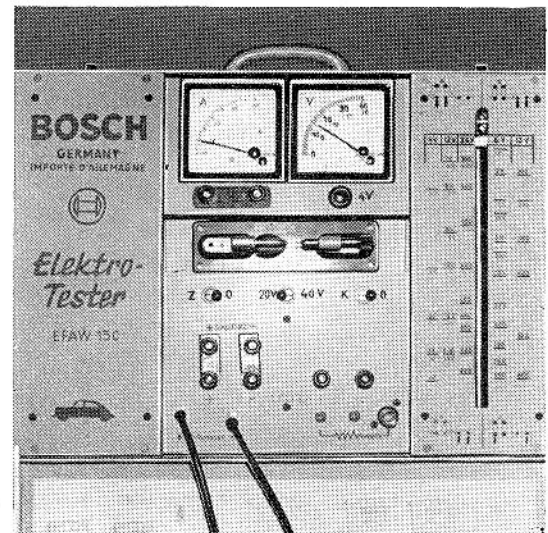
Check Regulator Tension under no-load condition

("No-load" means that the dynamo is not loaded by consumers in "ON" position)

1. Disconnect connecting cable from terminal 51 on the regulator and connect with each other (see also Fig. 2-3/1). A dynamo of the 130/6 type has been installed on the LP/LS 600 and Alexander up to Chassis-No. 6/313 826 resp. on the LT/LTK 600 up to Chassis-No. 6/117 639. On these cars the + cable (red) from + pole on the battery to terminal 51 on the regulator were omitted and, instead, the current flow was led through starter (terminal 30) to terminal 51 on the regulator. In the latter case the a/m connection need not be effected.
2. Connect voltmeter as follows:
 - a) + cable (red) to terminal 61 on the regulator
 - b) – cable (black) to be grounded to the vehicle frame (Fig. 2 - 3/1 and Fig. 2 - 3/2)



2 - 3/1



2 - 3/2

3. Turn change-over switch for voltmeter to the dynamo voltage (0–20 volts) and set red pointer of the voltmeter to the reference value of the regulator tension under no-load condition to 7.4 volts.

Dynamo and regulator

4. Start engine. Watch voltmeter and increase speed until the black needle of the voltmeter makes a full deflection and does not swing any more. Thus, the regulating voltage kept constant by the regulator is obtained. At this speed and also with higher speeds, the voltage indicated by the instrument should remain constant, that is, the black needle of the voltmeter shall as far as possible coincide with the red needle set to the reference value. Any deviation from this reference value shown by the red needle should lie within the permissible range.

Tolerances for Regulating Voltage under no-load:

Dynamo LJ/GEH/130/6/2600 L 8 with regulator RS/TB/130/6/1 :	7.0 – 7.7 volts
Dynamo LJ/GEH/160/6/2500 L 8 with regulator TBA 160/6/1 :	7.1 – 7.8 volts

5. If the value indicated by the test set lies within the range of tolerances, the dynamo is all right as far as the electrical side is concerned, that is, there are neither shorts in the armature windings nor accidental grounds. The exciting winding from start (+brush on commutator) to the end (DF regulator side) has no ground; likewise the connection cable from the dynamo to the regulator (from DF to regulator). The same also refers to the connection of D+ on the dynamo to D+ on the regulator. Furthermore, the measurement indicates that the voltage to which is set the regulator is neither too high nor too low.

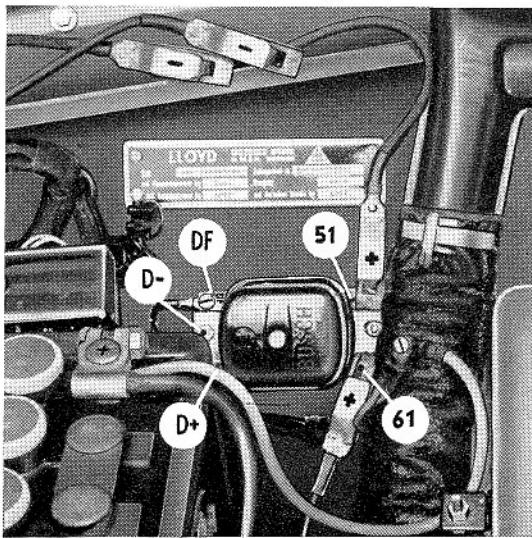
If the voltmeter shows too high a tension, this may be due to a defective regulator cut out. In any such case you must install a new regulator. Should the voltmeter, though the terminals are properly fastened, register no reading, the dynamo is not excited.

In order to determine whether the dynamo is defective it is recommendable to have the dynamo run as a motor for a short time. To this effect, first remove vee-belt and then cable from terminal 51 on the regulator. If the cable is connected to regulator terminal 61 which is connected to D+, the dynamo is compelled to run in the rated sense of rotation. During the short-time functioning of the dynamo as a motor the exciting windings get polarized, that is, the residuary magnetism is being rebuilt again. (See also page 2-1 "Functioning of the Dynamo"). Afterwards, connect cables properly to regulator cut out terminals 51 and 61 again and repeat voltage check – as described under 1-3. If during this test it will be found that the voltage is too low, a defective regulator will be the cause provided that no fault of the dynamo owing to a short in the armature windings or to worn carbon brushes, etc. will be the cause. For this reason, replace regulator and repeat test in order to determine whether the dynamo is defective. If the voltmeter does not register any reading or too low a voltage, the dynamo must be repaired.

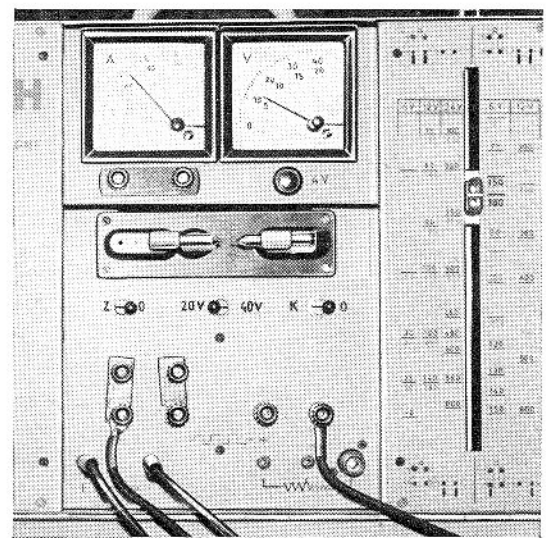
Check Regulator Voltage under Load

(Corresponding to the rated capacity, 130 or 160 Watts, the dynamo is to be loaded with a resistance built in the test set.)

1. Remove connecting cable from terminal 51 on the regulator.
2. Connect to each other the cables removed from terminal 51. (See also Fig. 2 - 5/1). When a 130/6 dynamo is installed in our cars, the + cable (red) from + pole of the battery to terminal 51 on the regulator is omitted. In that case no connection need be made.
3. Connect voltmeter of test equipment as follows:
 - a) + cable (red) to terminal 61 on regulator
 - b) - cable (black) to frame of vehicle.
 (Fig. 2 - 5/1 and Fig. 2 - 5/2)



2 - 5/1

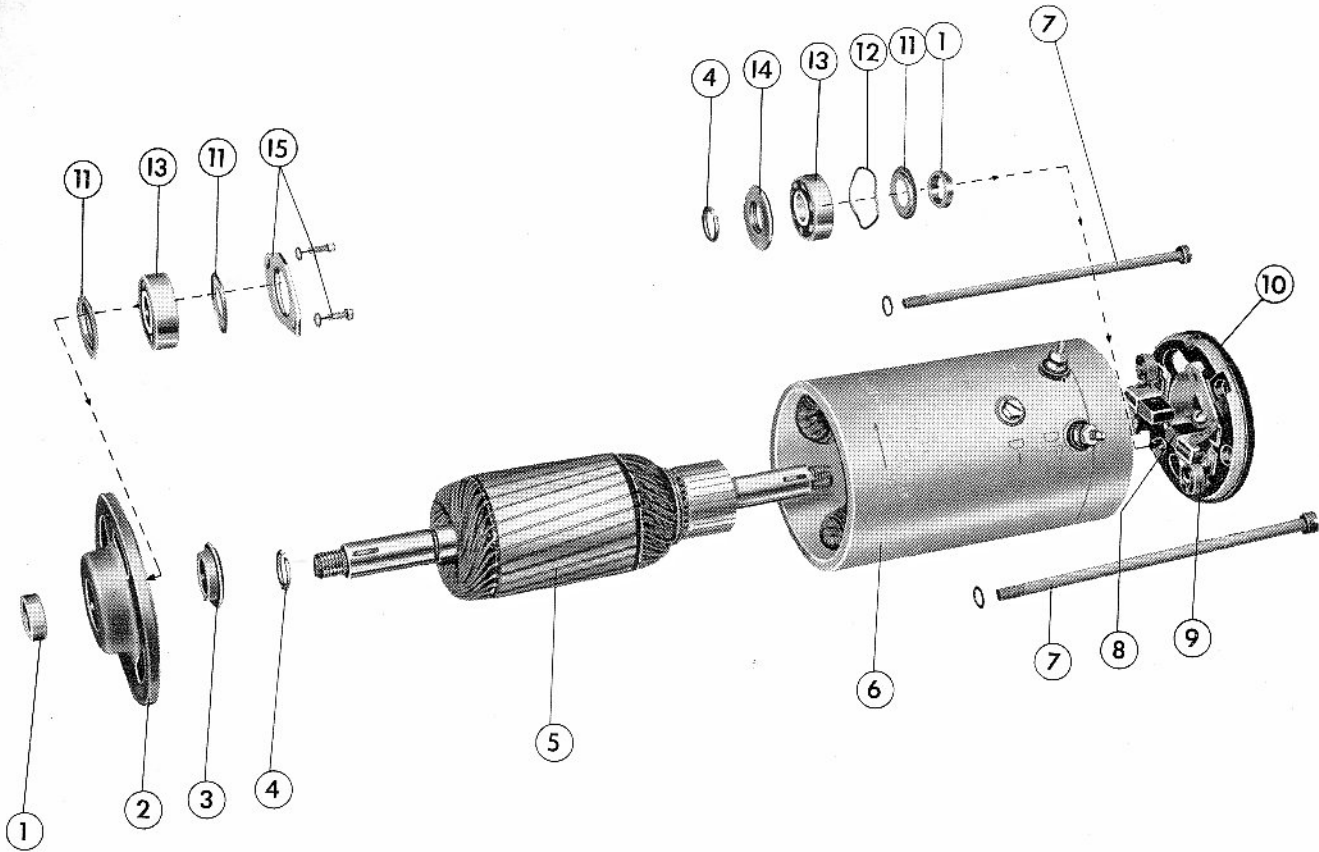


2 - 5/2

4. Adjust load resistance to the rated output of the dynamo. The rated output may be read from the inscription engraved in the dynamo casing. (The denomination 130/6 means 130 Watts - 6 Volts; 160/6 means: 160 Watts - 6 Volts). As shown in Figure 2 - 5/2, the load resistance for testing a dynamo LJ/GEH/160/6 2500 L 8 has been set to 160 Watts.
5. Corresponding to the wiring symbols above or below the slide resistance (watch the red and black rated outputs) connect current cable to the test set and connect to the car:
 - a) + cable to terminal 51 (regulator)
 - b) - cable to the car frame
 (Fig. 2 - 5/1 and Fig. 2 - 5/2)
6. Turn changeover switch below voltmeter to the indicating range of from 0 to 20 Volts and set red needle to 6.5 Volts as reference value of the regulator voltage under load.
7. Start motor; watch voltmeter; increase speed until the black needle of the voltmeter makes a full deflection and stops swinging. At this speed and even at higher speeds, the black-needle of the voltmeter should approximately coincide (within the permissible range of tolerances) with the red needle. The tolerances are the same for the 130/6 and 160/6 dynamos with their respective regulators. Tolerances for the regulating voltage under load: 6.1 - 7.00 Volts.

The value indicated within the permissible tolerances means that the carbon brushes and commutator segment of the generator are in proper condition. However, the dynamo should be overhauled if no correct readings can be obtained after replacing carbon brushes and cleaning collector segments and connections.

Disassembling Dynamo. Replacing and Reassembling Carbon Brushes
(with dynamo detached from car)

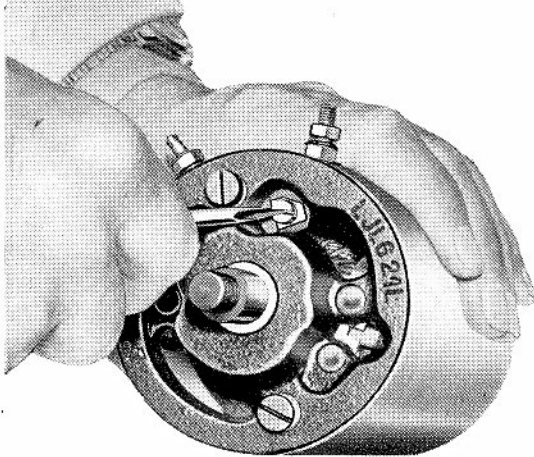


- | | |
|--|------------------------------------|
| 1 – Intermediate ring | 9 – Brush spring |
| 2 – Bearing cover | 10 – Bearing cap with brush holder |
| 3 – Oil thrower washer | 11 – Cover ring |
| 4 – Retaining ring | 12 – Spring retainer, undulated |
| 5 – Armature | 13 – Annular ball bearing |
| 6 – Pole casing | 14 – Spacer |
| 7 – Cylindric head screw for fastening bearing cap | 15 – Retaining plate with screws |
| 8 – Carbon brush | |

For dismantling the dynamo refer to the instructions given on pages 8-1 and 8-2 under "Engine".

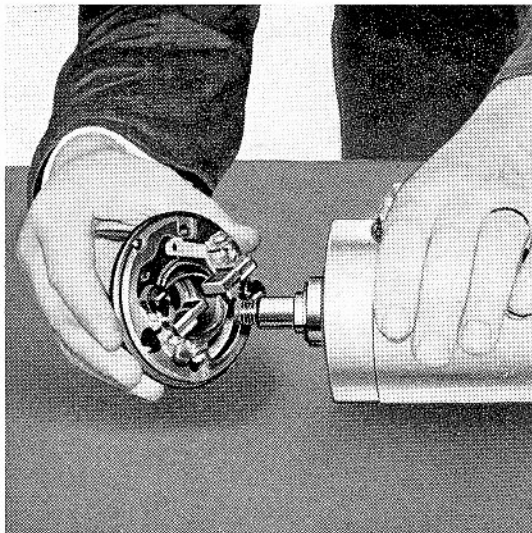
Disassembling

1. Loosen cylindric head screw M 4 from connection bridge of bearing cap of commutator and remove. (Fig. 2-7/1)



2-7/1

2. Loosen the two long cylindric head screws SW 9 on the bearing cap side of the commutator and remove them from the pole casing.
3. Remove commutator bearing cap with brush holder and carbon brushes from pole casing. (Fig. 2-7/2)



2-7/2

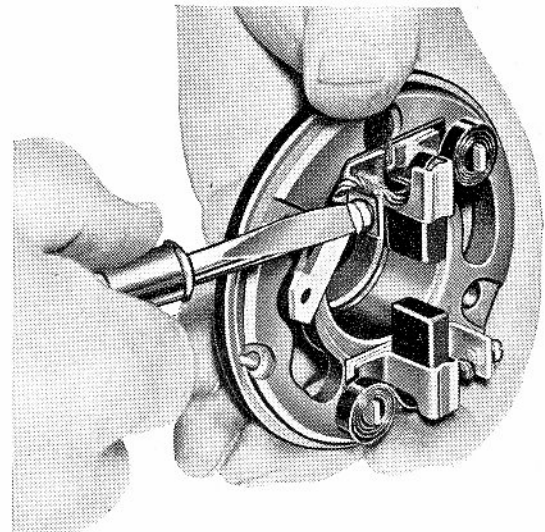
4. Remove bearing cap on the drive side with armature from pole casing of dynamo. (Fig. 2-7/3)



2-7/3

Should any resistance be felt in loosening the bearing caps, use a copper or rubber hammer and strike gently in axial direction against the dynamo shaft.

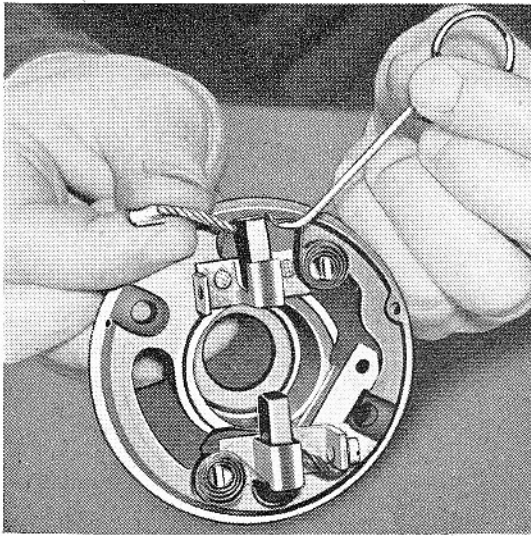
5. Loosen both screws on the strand fastening. (Fig. 2-7/4)



2-7/4

Dynamo and regulator

6. Lift brush holder with a hook and take carbon brushes out of brush holder. (Fig. 2-8/1)



2-8/1

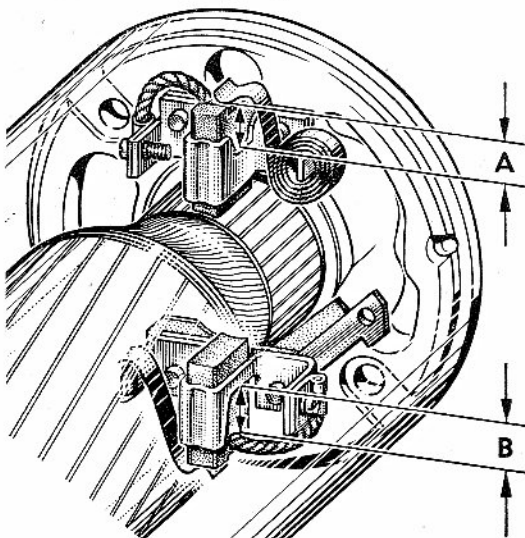
7. Clean brush holder and carbon brushes. Check for free movability of the carbon brushes in their respective guides. Any sticking of carbon brushes is in the majority of cases due to dirt. For cleaning use only a rag moistened with gasoline (never use cotton waste as lint may be left.)

Do not dress bright tracks of carbon brushes with emery paper or with a file or a knife. After cleaning, blow out brush holder thoroughly with pressure air.

8. Insert carbon brush; connect strands and check for proper gaps:

A = between brush holder and brush spring.

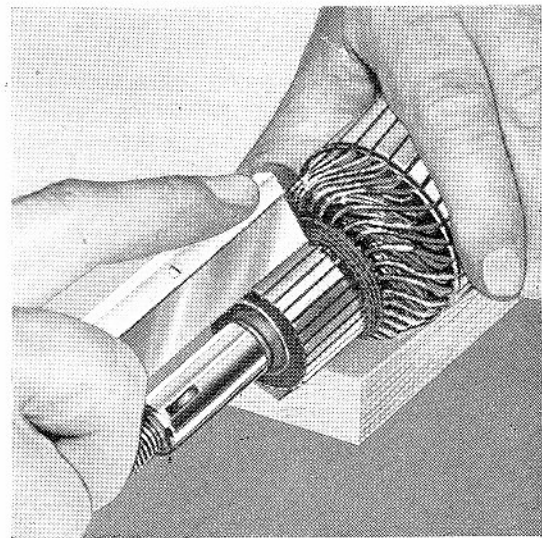
B = between brush holder and strand. (Fig. 2-8/2)



2-8/2

If a carbon brush is broken or worn, so that either the brush spring or the strand, soldered into the carbon, nearly rest on the brush holder, it is necessary to install a new carbon brush.

9. Check ball bearings for wear and damage. If necessary, replace. Should ball bearings require to be washed out, use for this work only a clean gasoline and fill then bearings with hot Bosch bearing grease.
10. Check commutator. Its surface should have a smooth grey/black appearance and should be free of dust, grease and oil; it shall show neither scores nor burnt spots.
11. If the commutator is scored, turn it down in a lathe with a fine cut at sensitive feed rate until the surface has a smooth unobjectionable appearance. Be sure that the commutator diameter for the two dynamo types (LJ/GEH/130/6 and LJ/GEH/160/6) does not drop below the minimum size of 31.5 mm = 1.24".
Never use a file or emery paper!
12. After machining saw out 0.5 (0.0197")–0.8 mm (0.0315") deep grooves in the commutator with an undercutting saw. (Fig. 2-8/3)



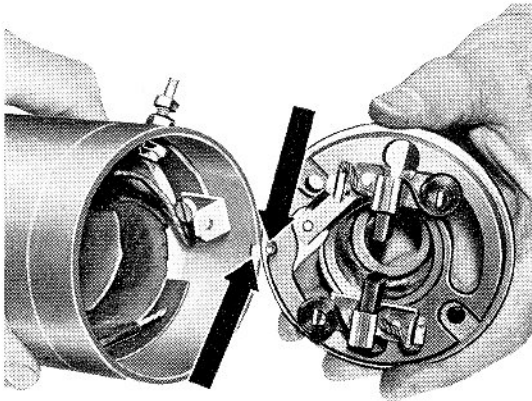
2-8/3

13. Check armature and commutator for untrue running. The maximum permissible out-of-round value is 0.02 mm (0.0008") for the commutator and 0.05 mm (0.0020") for the armature.
14. Check with a test lamp armature and exciter winding for any short-circuits in the windings.

Reassembling

Reassembling of the dynamo takes place in the reverse order. In doing this, the following hints should be borne in mind:

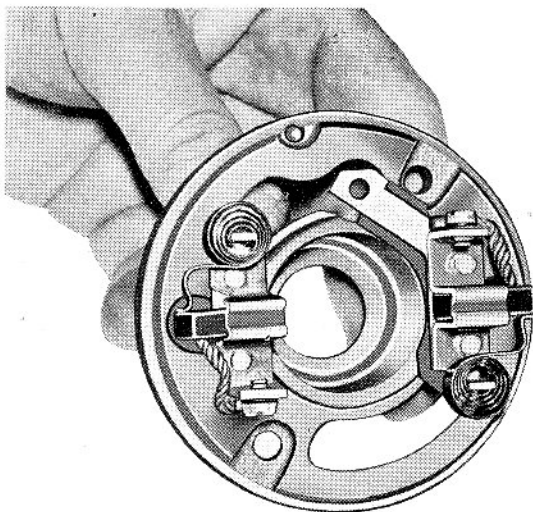
1. Both bearing covers are provided with bore holes to take the noses on the pole casing. (Fig. 2 - 9/1)



2 - 9/1

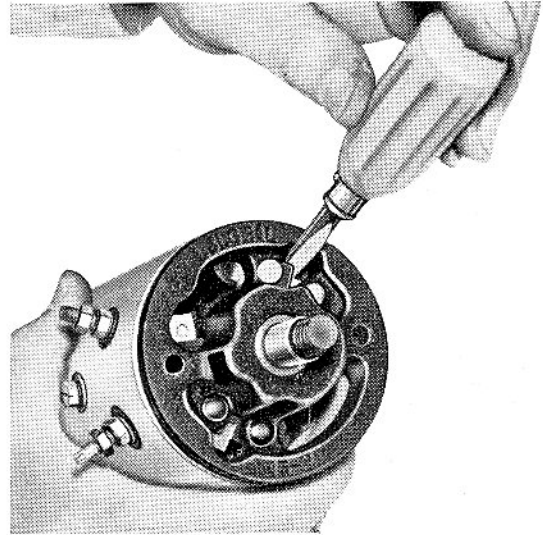
2. On the inscription label side introduce armature with bearing cover fitted in place into the pole casing. (Be sure the armature is properly centered!)

3. For inserting the bearing caps on the armature side the carbon brushes are to be kept in raised position with the aid of the brush springs. (Take care of proper centering!) (Fig. 2 - 9/2)



2 - 9/2

5. Use a screwdriver or any other tool in order to press the carbon brushes down on the commutator. This will cause the brush springs to move back into their proper functioning position. (Fig. 2 - 9/3)



2 - 9/3

Dismantling and Reinstalling Regulator

Dismantling

1. Disconnect positive cable from battery. Thereafter, loosen cable connections.
2. Loosen hex nuts SW 9 and remove regulator from the dashboard.

Reinstalling

Reinstalling is to be effected in the reverse order. In doing this, the following hints should be borne in mind:

1. The regulator RS/TB 130/6 (installed in the LP/LS 600 and Alexander up to Chassis-No. 6/313 826, and in the LT/LTK 600 up to Chassis-No. 6/117 639) belongs to dynamos LJ/GEH/130/6.

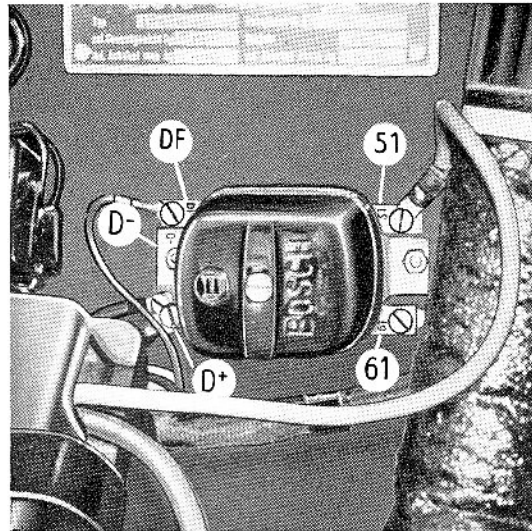
The regulator TBA/6 (installed in the LP/LS 600 and Alexander from Chassis-No. 6/313 827 and in the LT/LTK 600 from Chassis-No. 6/117 640) belongs to the dynamos LJ/GEH/160/6.

When connecting the cables give care to the proper colours:

- black cable (single) to DF
- brown cable (single) to D-
- red cable (single) to D+
- 2 red cables (combined) and 1 red cable from battery to 51

1 blue cable to 61

(Fig. 2 - 10/1)



2 - 10/1

The single + cable (red) coming from the battery and going to the regulator (terminal 51) was omitted when dynamos 130/6 were installed.

General

The function of the battery is to store electrical energy, which is generated by the dynamo, at times when the car engine is running, to supply current to the consumers at times when the engine is not running and to supply the necessary electrical energy to the starter and ignition system for starting the car engine.

To enable the battery to meet always these requirements, be sure to carry out all maintenance and servicing work very carefully.

The LLOYD cars LP/LS, Alexander and LT/LTK 600 are equipped with storage batteries, the rated capacity of which (referred to a twenty-hour discharge rate) is 56 ampere-hours and which is capable of withstanding all normal operating loads involved by the current consumers.

Since the beginning of the production of the LLOYD Alexander TS our cars are equipped with 66-ampere-hour batteries.

The capacity (storage ability) represents the amount of current a battery can deliver from fully charged to discharged condition. Aside from size and number of the plates per cell, from density and temperature of the electrolyte (filling acid) the capacity depends to a large extent upon the discharge rate. At a lower discharging rate the electro-chemical activities which precede the current supply, take place not only on the surfaces but also deeply in the lead plates, while at a high rate of discharge the transformation of energy takes place principally on the plate surface so that a smaller amount of ampere-hours will be produced by the battery.

Cranking operations of longer duration resulting in discharge rates up to 250 amperes, lead to a quick discharge of the battery. In the case of preponderant short-distance operation of the car with resulting frequent use of the starter – and also in winter, it is therefore necessary to recharge the battery at frequent intervals from a foreign current source.

Care of the Battery

General

1. The connecting terminals and pole connections should always be kept in proper condition so that any contact resistance will be kept to a minimum.
2. For cleaning use only a clean rag, if necessary, use a pole cleaner. Thereafter, a coat of special non-acid grease should be applied to the pole shoes and connecting terminals.
3. Give care to ensure that all vents in the screw plugs are kept open so that gases which may develop during charge (even in engine operation) may escape.

Check Acid Level

In the course of time the acid level in the battery drops, particularly in summer, due to evaporation and dissociation of the water. As soon as the liquid level would be lower than 0.3937" to 0.59055" above upper edge of plates, it is indispensable to refill with distilled water to ensure that the proper distance of 0.3937" between separators and liquid level, and of 0.59055" between upper edge of plates and liquid level will be restored. For refilling principally use only distilled water unless evidence is given that filling acid has been lost. In such a case measure density of acid and refill only with an acid of same density. Any acid spilled over can be neutralized with a soda solution.

Preparation of Filling Acid

Either filling acid ready for use or chemically pure concentrated sulphuric acid ($H_2SO_4 - 96\%$) and distilled water may be used. In mixing filling acid the following precautions should be taken:

Always pour concentrated sulphuric acid into water or into battery acid; never pour water into concentrated sulphuric acid to avoid spraying of solution out of the mixing container. As it is known, the concentrated sulphuric acid goes immediately down into the battery where it is mixed with water or battery acid, whereas in pouring water into the acid water might be sprayed out with acid particles owing to the heat developed.

In preparing filling acid proceed as follows:

1. Pour distilled water into an acid – resisting mixing receptacle (e. g. glass container).
2. Add slowly concentrated chemically pure sulphuric acid in a thin jet. Add only a small quantity and simultaneously stir with a glass or an ebonite rod (under no circumstances use a metal rod) measure temperature of the mixture; it shall not exceed $176^\circ F$. Should this be the case stop adding concentrated sulphuric acid until temperature of acid has dropped.
3. Allow acid to cool down and then measure its density. If the acid has a density of 1.285, it may be used for refilling the storage battery.

The following table indicates the mixing ratios for preparing filling acids of different density ($86^\circ F$).

Mixture of Fresh Filling Acid

Spec. Weight (Acid Density) in kg/l.	1.2	1.22	1.24	1.26	1.285	1.31	1.33	1.36	1.38
Conc. Sulphuric Acid (96%) in cm ³	180	200	220	240	260	280	300	320	340
Distilled Water in cm ³	820	800	780	760	740	720	700	680	660

Filling Acid for the Tropics

High temperatures result in an increased capacity due to accelerated chemical activities in the battery, simultaneously, however, in an increased load on the plates. In addition, the so-called self-discharge will be detrimentally influenced due to high temperatures.

For these reasons a filling acid of

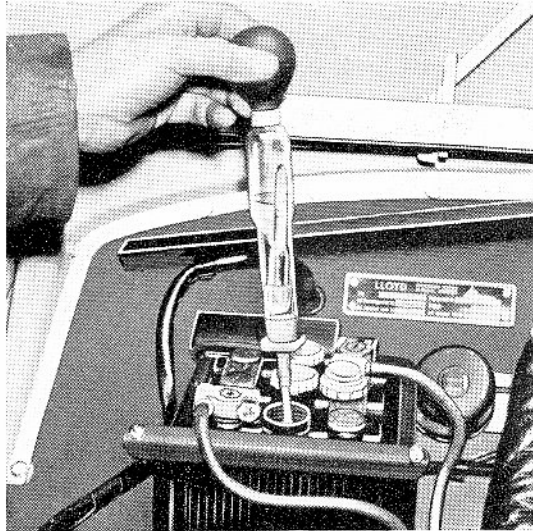
a specific weight of 1.23 kg/l

should be used.

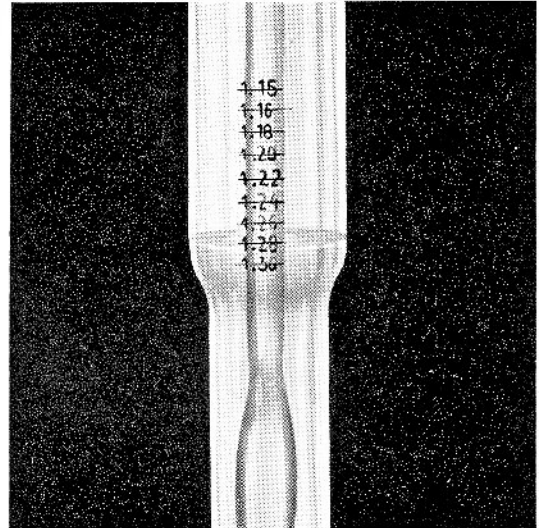
Acid Density

The acid density is a criterium for the state of charge of the battery. Therefore, it is possible to determine the state of charge by measuring the density of the acid.

For measuring the density of acid use an acid tester (hydrometer) by sucking in battery acid until the acid spindle floats in the acid (Fig. 3 - 3/1 and Fig. 3 - 3/2).



3 - 3/1



3 - 3/2

The lower the battery gravity the deeper sinks the float stem of the hydrometer. The ratio of concentration of the filling acid is indicated on the scales in gr/cm³ (resp. kg/L) or in degrees Baumé.

The acid density of a full-charged battery at a temperature of + 68° F is 1.285 gr/cm³ = 32° Bé (in the tropics: 1.23 = 27° Bé).

From the following tables read the state of charge that corresponds to the density of the battery fluid. (The indicated densities refer to a temperature of + 68° F).

1. Normal-filled Batteries

Acid Density in degr. Baumé	Spec. Weight of Acid	State of Charge
32° Bé	1.285 gr/cm ³	well-charged battery (full)
24° Bé	1.20 gr/cm ³	one-half charged battery
18 – 14° Bé	1.14 – 1.11 gr/cm ³	discharged battery

2. Batteries filled for Use in the Tropics

Acid Density in degr. Baumé	Spec. Weight of Acid	State of Charge
27° Bé	1.23 gr/cm ³	well-charged battery (full)
17 – 18° Bé	1.14 gr/cm ³	one-half charged battery
12 – 13° Bé	1.08 gr/cm ³	discharged battery

Check Battery Voltage under Load

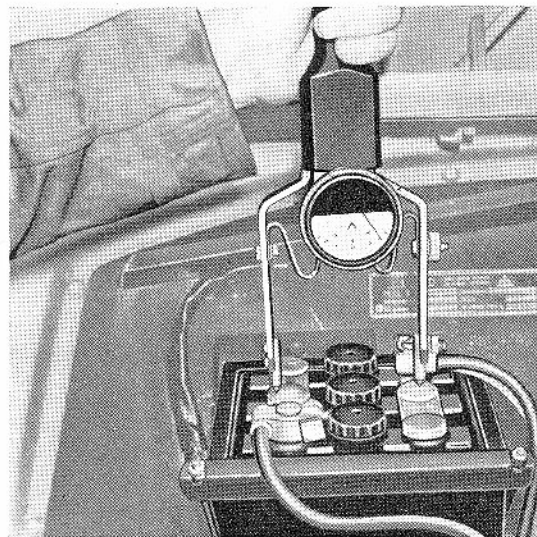
A voltage test for a battery should be made principally under load to enable the state of charge to be checked.

Such tests can be made in a simple manner with a battery cell tester with built-in load resistance connected in parallel with the contacts.

Although testers with adjustable load resistance are to be had for this purpose, for the shop and station practice it suffices to have a simple battery cell tester with a fixed load resistance ranging from 80 to 100 amperes.

When testing proceed as follows:

1. Press contact tips of cell tester down on terminal posts of a cell (Fig. 3-4/1).
2. Read voltage of battery cell after a load duration of 10-15 sec.
3. Carry through the test described under (2) for the two other cells, too.



3 - 4/1

The cell voltage of a charged battery should not drop below 1.8 volts. The normal tension is 2 volts. Furthermore, it must be born in mind that the difference of the voltage between the various cells should not exceed 0.2 volt, otherwise the battery is defected and should be replaced by a new one.

Voltage Test under Load with the Starter

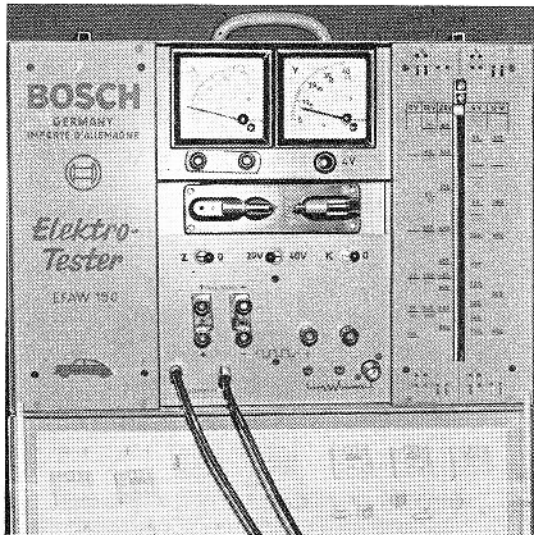
As far as a suitable tester, for example, a voltmeter or any other test equipment is available, a voltage test can be made with the starter turned on. In the following, full particulars about the measurement of voltage drop with a Bosch-Elektro-Tester are given:

Test Procedure

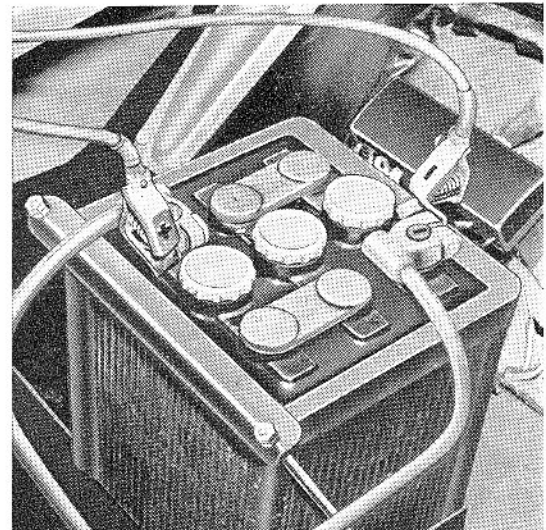
1. Connect voltmeter in parallel with the battery:

- + connection of voltmeter to + pole of battery
- connection of voltmeter to - pole of battery

(Fig. 3 - 5/1 and Fig. 3 - 5/2).



3 - 5/1



3 - 5/2

2. Use red needle on the voltmeter for adjusting the reference value of 3.5 volt for the voltage drop (Fig. 3 - 5/2).
3. In order to get a high loading current, shift into "direct gear" (3rd or 4th speed) and apply hand brake.
4. Turn on starter switch for four seconds and read voltage drop during that interval. If voltage drops to 3-5 volts the battery is in good order and in a well-charged condition. If voltage drops below 3.5 volts it is recommendable to repeat the test for the various cells as outlined under 1 - 3. If the measurements show the same values (e. g. 0.8 volt, 0.8 volt and 0.8 volt), the battery is in good order and needs only to be charged. Irregular values as, for example, 0.8 volt, 0.3 volt and 0.8 volt give evidence that the battery is defective.

Normal Charging of the Battery

In order not to affect the life and the capacity of a battery it is recommendable to recharge it at short intervals (about every 3-4 months depending on the load demands on the battery, at more frequent intervals in winter months). To this effect dismantle the battery and discharge it to a cell voltage of 1.8 volts and thereafter recharge with a D.C. battery charger. Under normal conditions recharging of the battery is necessary as soon as the density of the acid has dropped to $1.15 - 1.10 = 18 - 14^{\circ}\text{Bé}$, or the voltage of the individual cells has dropped to 1.8 volts.

Charging Procedure

1. Check battery acid and clean battery terminals. Remove screw plugs from the cells.
2. Check acid level and, if necessary, refill with distilled water. Be sure that acid level is 10 mm above separators and 15 mm above upper edge of plates.
3. Connect battery to the D.C. charger; connect + cable of charging equipment to + pole of the battery and ground lead to the - pole of the battery.
4. Turn on battery charger and adjust it to an amperage of about 1/10 of the rated battery capacity. With batteries of a capacity of 56 ampere/hours the charging current will be about 5 amperes.

During the charging process check temperatures of the acid; this shall not exceed 40°C (in the tropics 50°C). Diminish charging rate if the temperature is too high and, instead, charge battery for a correspondingly longer time. The normal charging time will be about 10 hours. If the battery plates should already have become sulphated (perceivable by the white deposits on the plates), the charging rate should be increased and the charging time be prolonged accordingly. To this effect, charge battery first at a rate as high as $1/4$ of the specified rate in amperes for a period of 40 hours, that is, with batteries of a rated capacity of 56 ampere/hours at about 1.5 amperes and next at a normal charging rate until termination of the charging process.

5. Charge battery until all cells have "gassed" (boiled) uniformly for 3 hours.
6. Measure cell voltage with battery charger turned on. Charging is terminated if after three subsequent measurements at 1-hour intervals both the specific gravity of the acid and the voltage of each cell show no increase any more. In this case there must be a density of 1.285 (in the tropics 1.23) and a cell voltage of 2.75 volts. After the battery charger has been turned off, the battery voltage drops to a cell voltage of 2.2 to 2.0 volts.
7. Now, after termination of the charging process, move battery to and fro for 2 hours so as to make the gas eventually existing in the battery escape from it. Check density and level of acid again and, if necessary, correct. Then, replace screw plugs. Neutralize drained or sprayed out acid with a soda solution, wipe dry carefully cell cover; grease well all metallic parts with acid-proof grease.

Quick Charging of Batteries

In urgent cases which, however, should be only exceptional ones, a battery may quickly be charged at a considerably higher rate than usual by the normal charging method. In batteries with a rated capacity of 56 ampere/hours quick charging is made at a 40-ampere rate. At this rate the battery may be charged to a state not exceeding 80% of its rated capacity up to a cell voltage of 2.4 volts, at which the battery begins to boil ("gassing"). In doing so, much time may be gained as the quick charging method will last about half an hour whereas for a normal charging process 10 hours will be generally required. If, however, the battery shall be brought up to full charge, it requires to be finally charged by the slow-charging method. Quick charging should be done best with a modern quick charger as available on the market. Chargers of such type operate fully automatically, charging rate and charging time being so adjusted that no overcharging and thus no excessive heating will take place. The operating instructions supplied by Manufacturers with their equipment should be carefully followed so as to ensure proper charging by the high-rate method without detrimental effect to the battery life.

Quick charging, however, should be made only with sound, already used, batteries. In no case quick charging should be done with new batteries. Before commencing quick charging, check the battery as it is of no use to charge defective batteries by this method as this would result in an increase of the bad state of the batteries.

Putting new Batteries into Operation

Batteries are, as a rule, delivered unfilled and in charged condition, so that after filling-in acid of a density of 1.285 = 32° Bé (in the tropics 1.23 = 27° Bé) batteries are ready for use without any additional charging. The batteries will first deliver only 80% of their rated capacity and reach their full capacity only after three dischargings and rechargings.

In putting a new battery into operation, proceed according to the operating instructions supplied by the Manufacturer.

General Hints

1. Remove plugs from cells, and cardboard washers if any.
2. Fill cell with pure battery acid, specific gravity 1.285 = 32° Bé, at a temperature of -20° C (-68° F) (in the tropics - 1.23-27° Bé) until acid level is 15 mm = 0.59" above upper edge of plates and 10 mm = 0.39" above upper edge of separators.

Attention! Never use as filling acid so-called reconditioning liquids, otherwise the Manufacturer will undertake no guarantee.

3. Allow batteries to stand for 5-6 hours so as to enable the plates to get soaked. If during this time the acid level drops, refill up to the previous level.
4. Connect battery to a D.C. battery charger and charge at a rate of about 3.5 amperes. In no case quick charging is permitted.

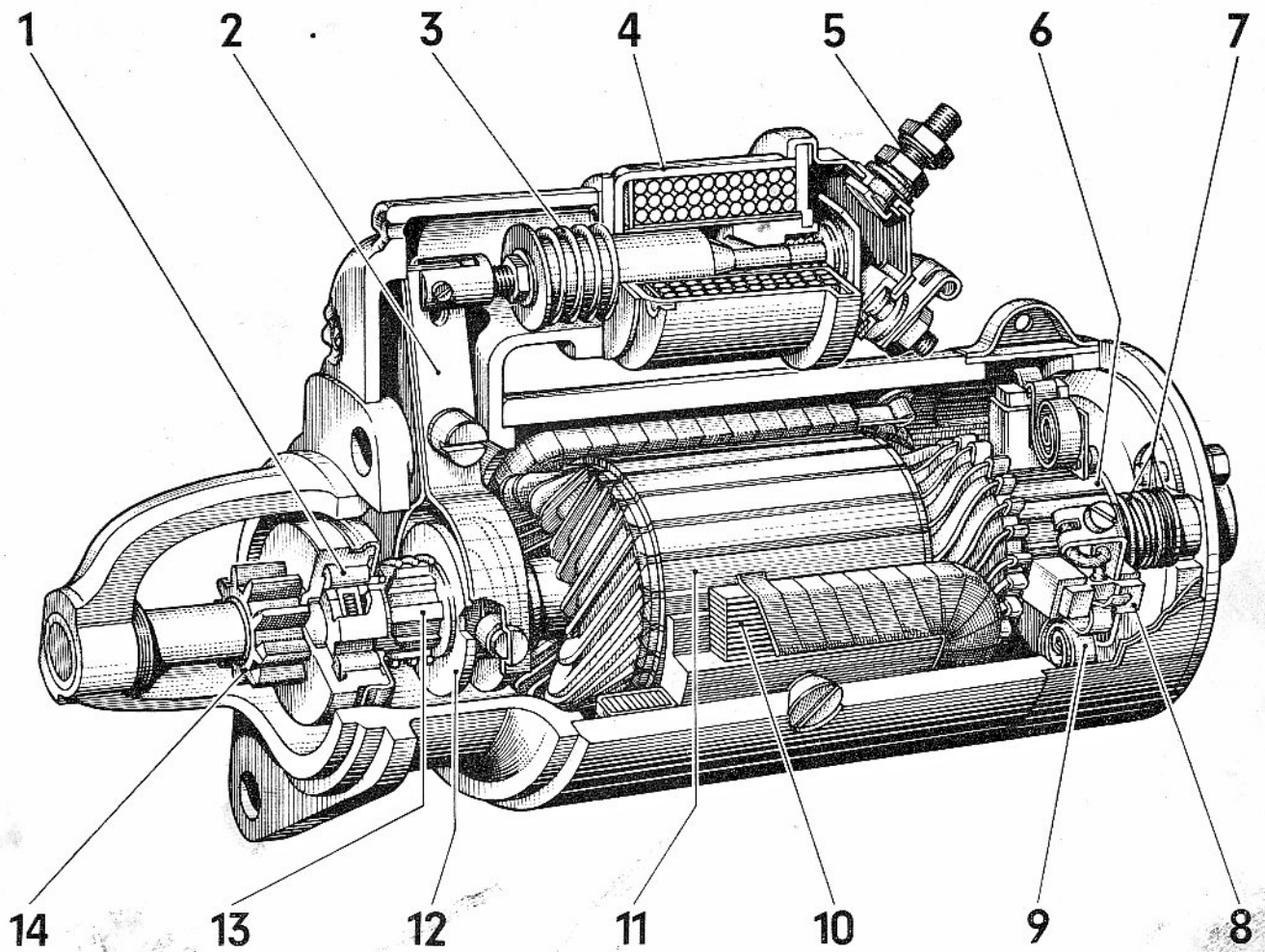
Putting Battery out of Use

If a battery shall be put out of use for about 2 to 3 months, never store it, when filled with acid, in a discharged condition as owing to oxidation the plates will become unserviceable within a short time. Furthermore, it must be borne in mind that owing to the so-called self-discharge the battery will loose on an average 0.5 – 1% of its rated capacity every day and recharging at 4-week intervals will be necessary.

If the battery should be put out of operation for longer time, proceed as follows:

1. Charge battery according to the instructions given on page 3-6.
2. Pour out slowly filling acid and adjust with distilled water.
3. Recharge battery again for 6 hours at a rate of 4-5 amperes and pour out distilled water.

After the battery has been refilled with fresh distilled water, it should be stored in a cool and, if possible, dry room. In this case, recharging at 4-week intervals is not necessary any more. For putting the battery working again, it should be treated like a new one.



1 – Roller type overrunning clutch
 2 – Shift lever (engaging lever)
 3 – Compression spring
 4 – Magnetic switch
 5 – Connecting terminal
 6 – Commutator
 7 – Armature brake

8 – Carbon brush
 9 – Brush spring
 10 – Fieldcoil
 11 – Armature
 12 – Guide ring
 13 – Splined section of armature shaft
 14 – Pinion

General

The LLOYD Vehicles LP/LC, LT/LTK 600, Standard, Alexander and Alexander TS are equipped with a Bosch Sliding Pinion Starter CDD 0.4/6 R 5. This starter, driven by a series – wound 0.4 HP motor, transmits the power required for starting the car engine, by means of a pinion to the teeth cut in the flywheel rim.

Actuating the ignition start switch on the instrument panel causes the catch with pinion to be moved along the splined section of the armatur shaft by the magnetic switch and into mesh with the teeth cut in the flywheel rim. The axial displacement of the pinion and of the catch due to the action of the magnetic switch is transmitted by a forked shift lever. Immediately after the drive, pinion is in full mesh with the teeth cut in the flywheel rim the main circuit is closed, the armature will develop the full torque, thus bringing the motor to starting speed.

Starter

Because of the large gear ratio between starter pinion and flywheel rim, the pinion is not allowed to remain always in mesh, otherwise the armature would be spun at too high a speed and centrifugal force would cause the starter motor, particularly the armature and field coil, to be damaged. For this reason, after the engine has started, it is necessary to disconnect the non-positive connection between starter armature and engine flywheel. This will be enabled by a sliding pinion that is not rigidly connected to the armature shaft but by a roller type overrunning clutch; this clutch provides for an automatic de-meshing device designed to produce de-meshing as soon as the flywheel will revolve at a higher speed than that of the starter pinion.

A compression spring attached to the magnetic switch causes the starter pinion with the forked shift lever to move back into its initial position. In order to ensure that after de-meshing the pinion will come at rest as quick as possible and, if necessary, shortly after new cranking can take place, an armature brake is fitted to the commutator bracket. Brake pressure is exerted by a coiled spring and is so dimensioned that the starter in "On" position will not be impeded while cranking the engine.

Practical Hints

It goes without saying that the ignition starter switch must be turned back into ignition position shortly after the engine has started in order to allow the pinion to be moved back into its initial position, otherwise the Compo-bushing (starter pinion bearing) would get overheated because of the high pinion speed on the stationary armature shaft. This overheating results in jamming ("seizing") of the Compo-bushing and in overbridging the overrunning clutch so that the starter armature likewise comes up to an excessive speed, at which the armature coils will be thrown out by centrifugal force and thus get ruined.

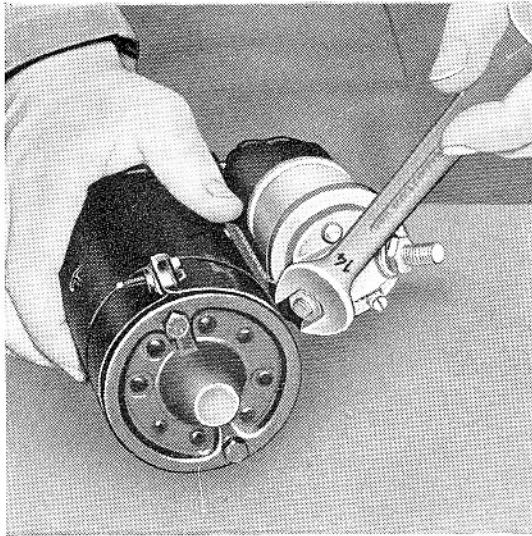
Dismantling and Reinstalling Magnetic Switch

(Starter detached)

For dismantling starter refer to Main Group M, Page 8-2.

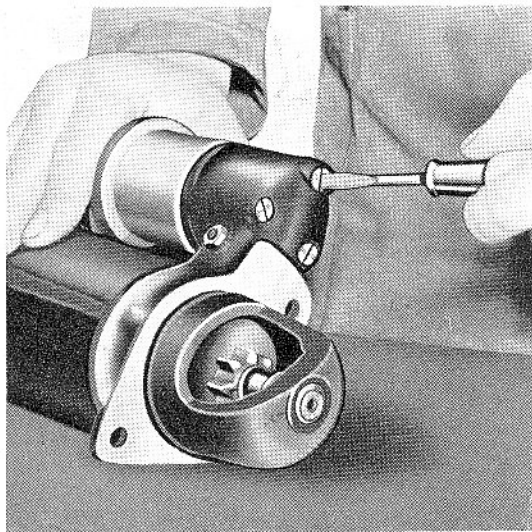
Dismantling

1. Loosen hex nut SW 14 and take out connecting bridge of magnetic switch. (Fig. 4 - 3/1)



4 - 3/1

2. Loosen countersunk flat head screw M 5 on magnetic switch and take out magnetic switch (Fig. 4 - 3/2).



4 - 3/2

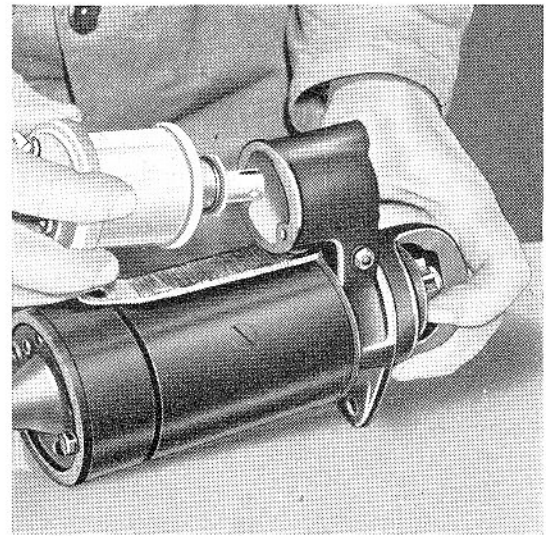
3. Check functioning of magnetic switch. Connect negative cable to magnet casing and approach positive cable for a short time to connecting terminal 30. If magnetic switch does not function properly, it should be replaced.

Take care of proper insulation of contacts. Perhaps contacts may get damaged owing to excessive tightening of nuts.

Reinstalling

Reinstalling the magnetic switch should be made in the reverse order.

Reinstalling the magnetic switch will be facilitated by withdrawing the pinion. (Fig. 4 - 3/3)

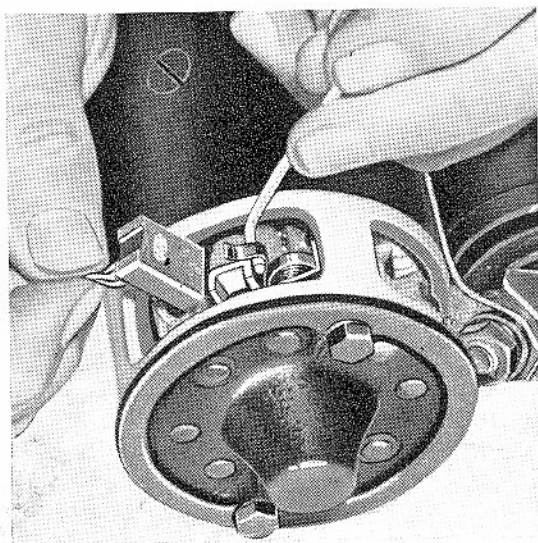


4 - 3/3

Dismantling and Reinstalling Carbon Brushes (Starter detached from car)

Dismantling

1. Loosen and remove cover band.
2. Loosen connecting screws of the strands. Lift brush springs with a hook and take out carbon brushes. (Fig. 4 - 4/1)



4 - 4/1

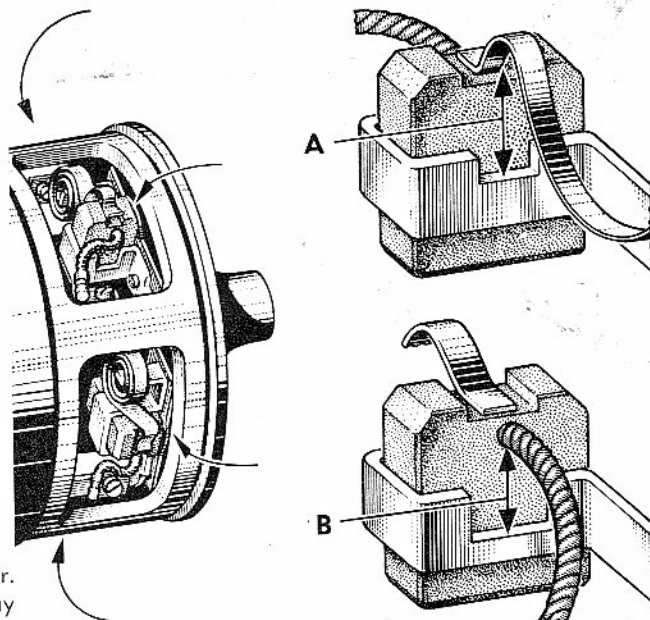
3. Clean brush holder, carbon brushes and commutator. For cleaning do never use cotton waste as lint may be left on the parts cleaned, but use only a cleaning rag moistened with gasoline and wound round a wooden stick. Care should be used to ensure that no gasoline or dirt may enter the ball bearing.
4. Should the commutator become out of round in way of carbon brush trace or if there are burnt spots, the starter must be overhauled.

Reinstalling

1. Insert carbon brushes and connect strands.
2. Check voltage of brush springs. Should there be slack or burned springs, replace by new ones
3. Check for proper gaps:

A = between brush holder and brush spring.

B = between brush holder and strand (Fig. 4 - 4/2).



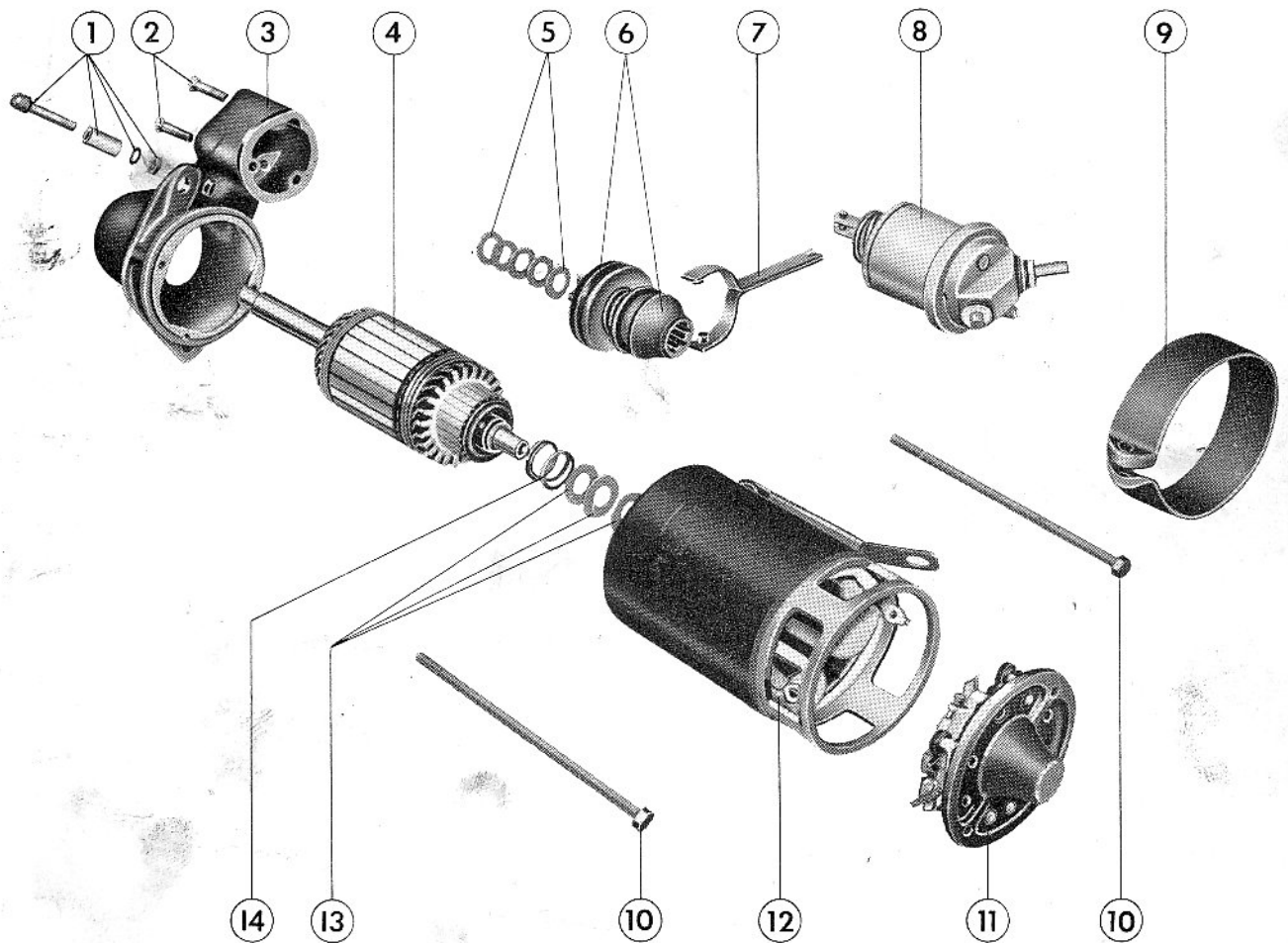
4 - 4/2

If the brush springs and strands should nearly or entirely fail to make good contact, new carbon brushes must be installed.

4. Push into place cover band and fasten.

Disassembling and Reassembling Starter

(Starter detached from car)



- 1 – Switch lever support
- 2 – Countersunk flat-headed screws for fastening magnetic switch
- 3 – Casing part, pinion side
- 4 – Armature
- 5 – Spacers
- 6 – Pinion with roller type overrunning clutch

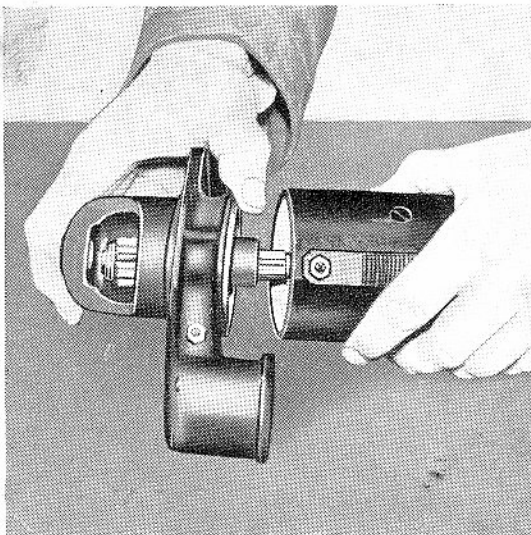
- 7 – Switch lever
- 8 – Magnetic switch
- 9 – Cover band
- 10 – Cylindric head screw
- 11 – Commutator bearing cover
- 12 – Pole casing
- 13 – Washers for armature brake
- 14 – Compression spring for armature brake

Disassembling and Reassembling Starter

(Starter detached from car)

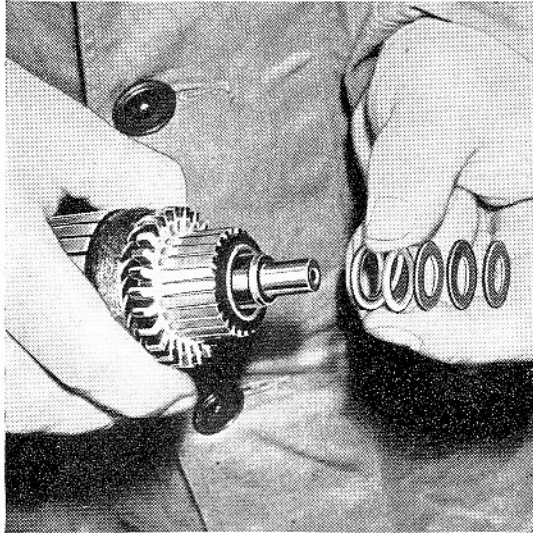
Disassembling

1. Loosen connecting bridge of magnetic switch (nut SW 14). (See also Fig. 4 - 3/1).
2. Loosen countersunk flat-head screw M 5 and take off magnetic switch. (See also Fig. 4 - 3/2).
3. Remove clamping strap. Loosen screws of strand fastening on brush holder and take out carbon brushes.
4. Loosen the two long hex screws SW 9 on the commutator bearing cap side and remove from casing. (See also Fig. 4 - 5/1).
5. Remove casing together with drive pinion. In doing this, give care that no washers between pinion and casing will be lost. (Fig. 4 - 6/1).



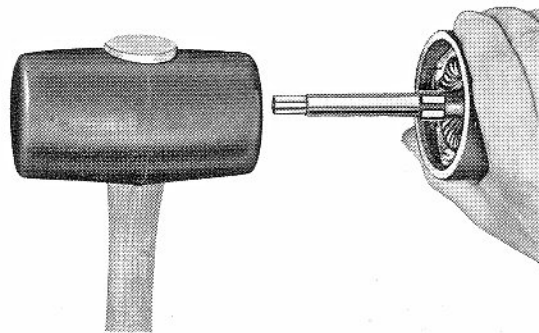
4 - 6/1

6. Take armature out of pole casing. Remove brake spring and washers from armature shaft. (Fig. 4-6/2).



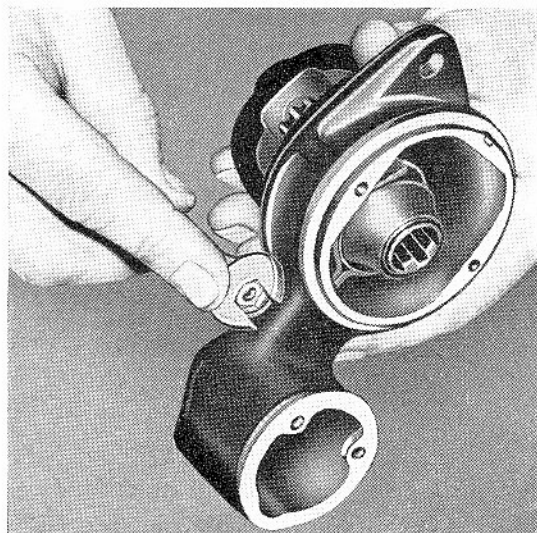
4 - 6/2

7. Use armature to press commutator bearing cap and brush holder out of pole casing. If the bearing cap cannot easily be loosened, tap armature shaft with a rubber or copper hammer. (Fig. 4 - 6/3).

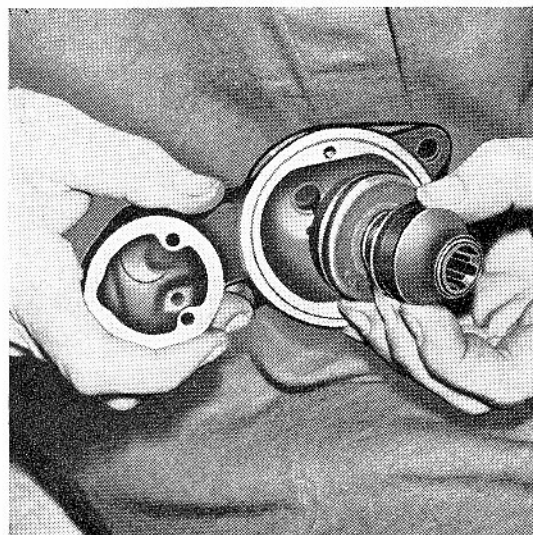


4 - 6/3

8. Loosen hex nut SW 9 and take out bearing of forked engaging lever. (Fig. 4 - 7/1)
10. Remove starter pinion from casing. (Fig. 4 - 7/3)

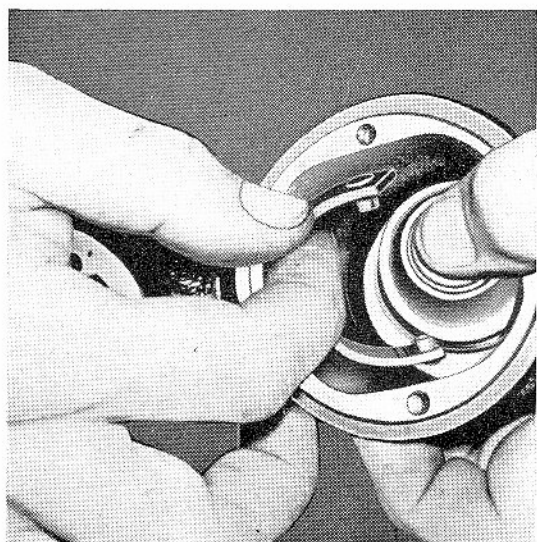


4 - 7/1



4 - 7/3

9. Take engaging lever out of pinion groove by twisting and remove from casing. (Fig. 4 - 7/2)
11. Check pinion for burr on the front edge and, if necessary, eliminate burr carefully with a smooth file.



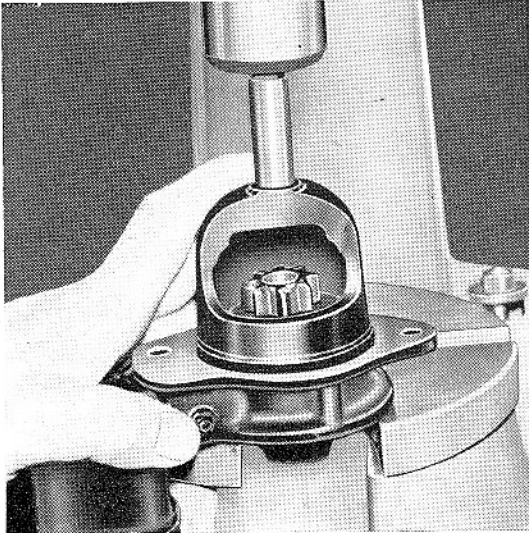
4 - 7/2

12. Clamp pinion in suitable wooden shoes and check roller overrunning clutch. If the roller overrunning clutch reveals to be defective or the pinion to be heavily damaged so that the removal of burr does not suffice to restore proper functioning, the complete pinion (with roller overrunning clutch) should be renewed.

Starter

13. Check bearing bush for armature shaft. If necessary, replace. The bearing bush on the commutator side can be pressed out of the bearing cap with a screw tap M 12.

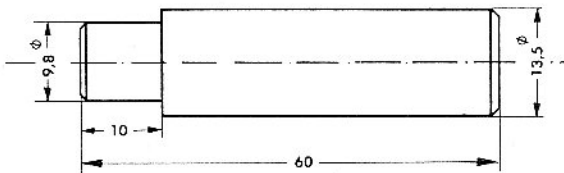
The bearing bush on the pinion side, which is subjected to an increased wear, should be pressed out of the casing with a suitable drift. (Fig. 4 - 8/1)



4 - 8/1

When pressing a new bushing into place, take care to ensure that it does not protrude from the pinion side.

Tool for pressing bearing bushings out and in. (Fig. 4 - 8/2)



4 - 8/2

14. Clean carbon brushes with a clean rag and check their free movability in the brush holders.
15. Check proper distance of carbon brushes between brush spring, strand and brush holder. (See also Fig. 4 - 4/2)

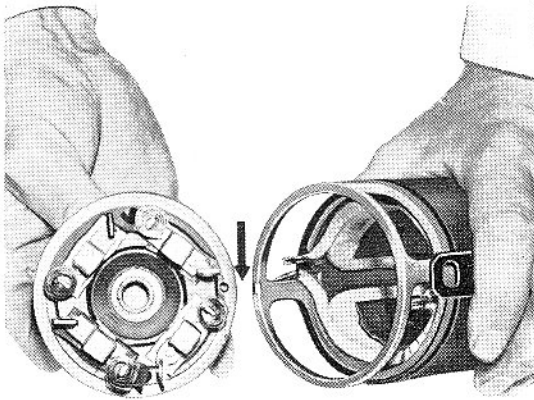
If the carbon brushes be worn until brush spring and strands almost make contact with the brush holder, new carbon brushes should be inserted.

16. Check commutator: The surface should have a smooth grey-black appearance, free of dust, grease and oil and shall show neither scores nor burned spots.
17. If the commutator is scored, turn commutator down in a lathe at a sensitive feed rate until the surface is smoothed. The minimum measure for the commutator diameter on starter CDD 0.4/6 R 5 is 31.5 mm (1.243") and should not be exceeded. For refinishing never use emery paper or a file.
18. The copper segment of the commutator are isolated from each other and require to be cut out by an undercutting saw to a depth of about 0.5 - 0.8 mm (0.0197" - 0.0315") after turning over in a lathe.
19. Check armature and commutator for true running; the maximum permissible out-of-roundness value is 0.02 mm (0.0008") for the commutator and 0.05 mm (0.0020") for the armature.

Reassembling

Reassembling the starter must be done in the reverse order by paying attention to the following points:

1. The commutator bearing cap and casing with pinion are provided with bores for fastening into which engage the noses fitted to the casing. (Fig. 4 - 9/1).



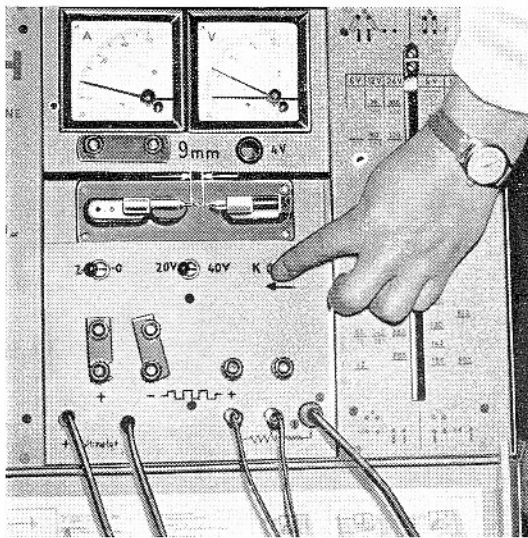
4 - 9/1

2. Install carbon brushes only when the bearing cap on the commutator side is mounted. When the carbon brushes are in raised position (held in position by the brush spring), bearing cap cannot be mounted.

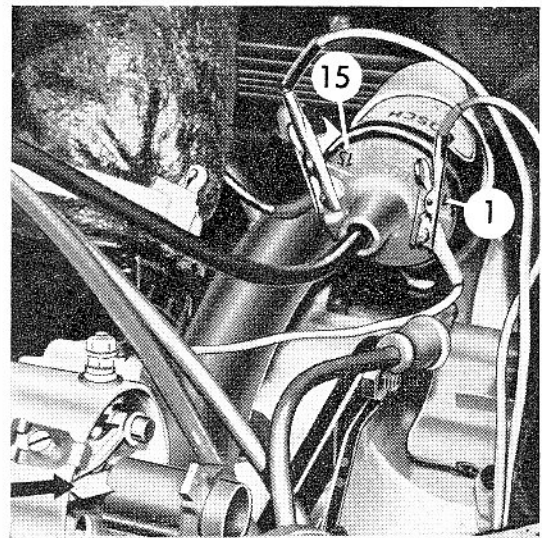
Construction, functioning and care of the ignition coil as well as a simple testing procedure used in common practice have already been described under Main Group "Engine" Sub Group III. The following supplementary instructions on the testing procedure with an Electro-Tester should be followed.

Check ignition coil

1. Switch off ignition switch and disconnect H.T. cable from ignition coil.
2. Connect car battery properly to the connection of the voltmeter in order to energize the tester (+pole of battery to +connection; -pole to -connection on the voltmeter). (Fig. 5 - 1/1)
3. Connect the H.T. cable of ignition coil and the two L.T. cable (terminal 1 + 15) to the tester. (Fig. 5 - 1/1 and Fig. 5 - 1/2)



5 - 1/1



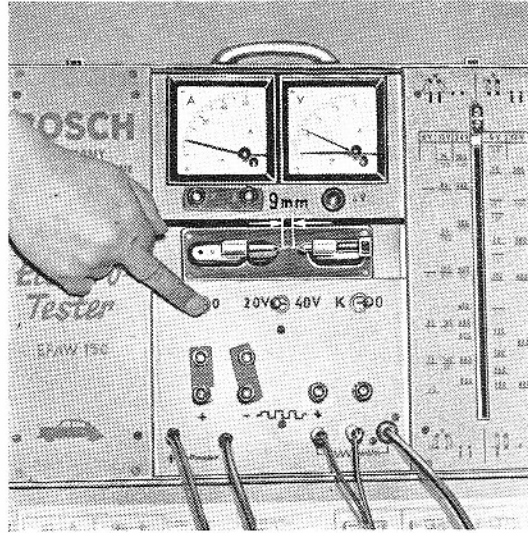
5 - 1/2

4. Remove distributor cap and interpose thick insulating paper between the contact-breaker points. (See arrow).
5. Adjust spark gap to proper opening of 9 mm (0.354") with the help of the gauge sheet attached to the adjustable measuring electrodes.
6. Turn the left tumbler switch of the tester to "Z", thus the primary circuit being closed through the built-in buzzer breaker.
7. Turn the right tumbler switch to "K" so that the condenser in the test set is cut in.

If after switching over a uniform spark flashes over between the electrodes adjusted to an opening of 9 mm (0.354"), the ignition coil is in proper order. Should no uniform spark be flashed over, repeat testing procedure after interchanging the L.T. cable (item 3, terminal 1 + 15) on the tester. Does the spark not function properly while testing, the ignition coil is defective and should be replaced by a new one. In this case the fault will not be a defective condenser, because the test has been made with the condenser built in the tester.

Testing Condenser

If the ignition coil is in order, testing the condenser may be effected in the same manner as outlined on page 5-1 "Testing Ignition Coil". For this testing procedure the already existing connections will be used with the exception of the tumbler switch that is to be turned from position "K" to position "O". (Fig. 5 - 2/1)



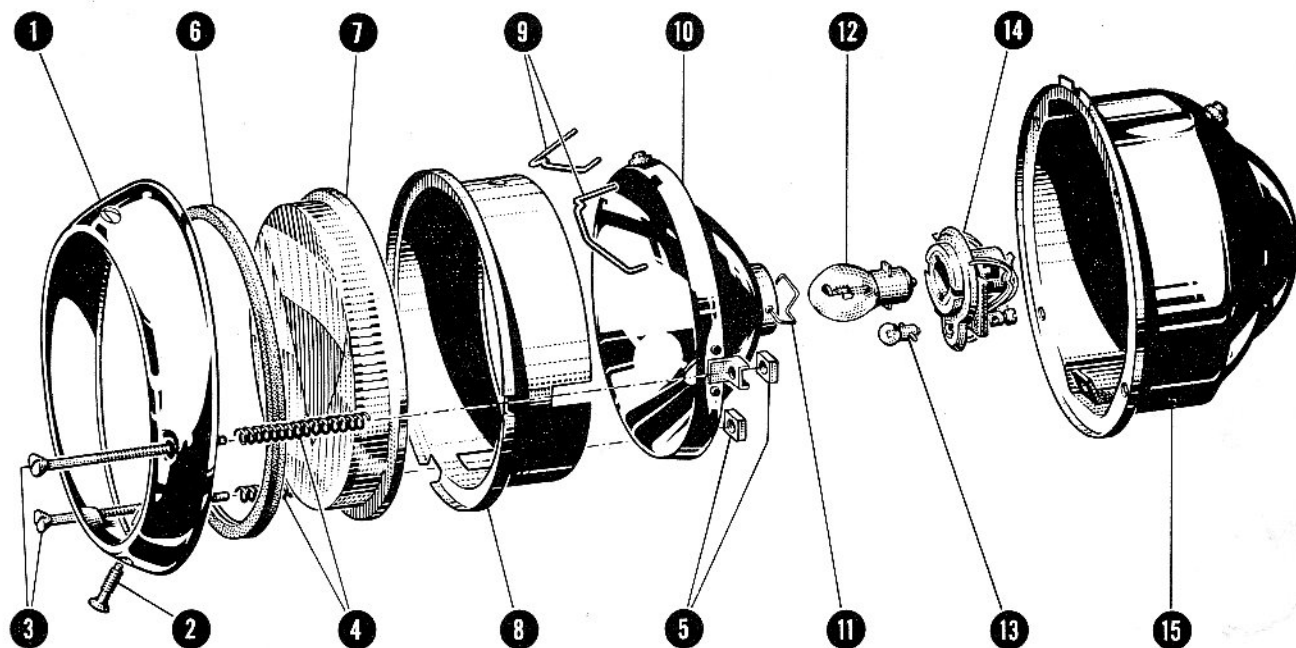
5 - 2/1

After having switched tumbler switch over, a uniform spark should likewise flash over between the electrodes, otherwise the condenser is defective and should be replaced by a new one.

Head Lamps (with symmetrical dimmed light)

General

The model LT/LS Alexander and LT/LTK 600 are normally equipped with head lamps, the diameter of the reflector being 130 mm (5.118"); they are mounted flush in the front side parts. A spherical bulb 6 volt/2 watts for the parking light and a two-filament bulb 6 volt/35 watts for the far beam and dimmed light are mounted in a common lamp holder and are held in the reflector by means of a clip. For lateral and vertical displacement of the reflector adjusting screws accessible from the exterior are fitted.



- 1 – Glass retainer ring
- 2 – Fastening screw
- 3 – Adjusting screw
- 4 – Compression spring
- 5 – Square nut
- 6 – Rubber seal
- 7 – Glass
- 8 – Carrier for reflector

- 9 – Circlip
- 10 – Reflector
- 11 – Clip
- 12 – Bulb for far beam and dimmed light
- 13 – Bulb for parking light
- 14 – Lamp holder
- 15 – Head lamp casing

Dismantling Head Lamp – Replacing Lamp and Reinstalling

Dismantling

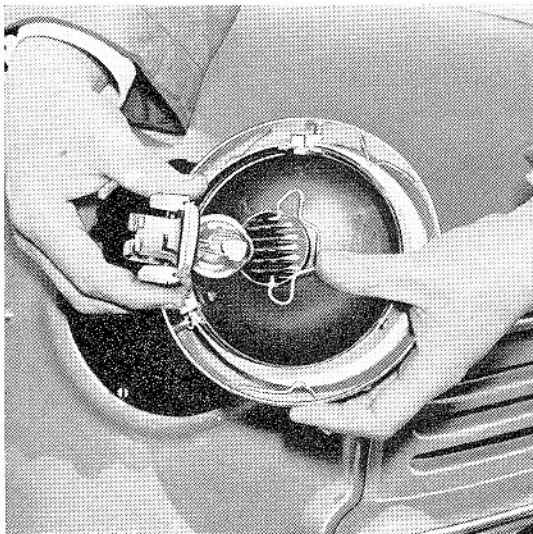
1. Loosen retaining screw and remove chrome ring with head lamp insert. (Fig. 6 - 2/1)



6 - 2/1

In the above Figure the dismantling of the Hella Head Lamp No. 130 EO - 37 with concave-shaped glass is shown. On the head lamps Hella 130 EO - 28 loosen the left of the two bottom screws, whereas in the head lamp Bosch LE - YES and CIBIC 51. 25. 04 the chrome rings are fastened with a retaining spring.

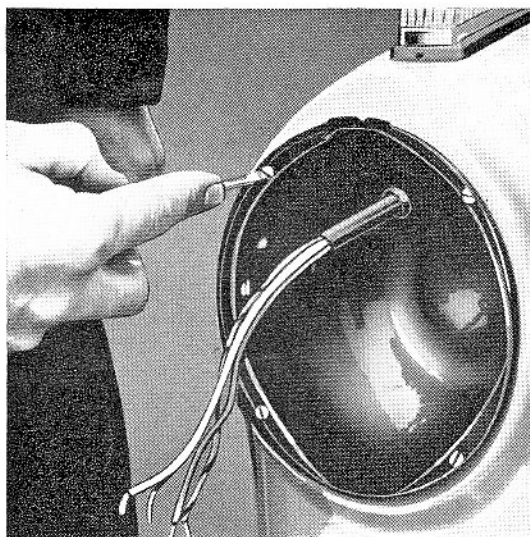
2. Swing back clip and remove lamp holder from the reflector. (Fig. 6 - 2/2)



6 - 2/2

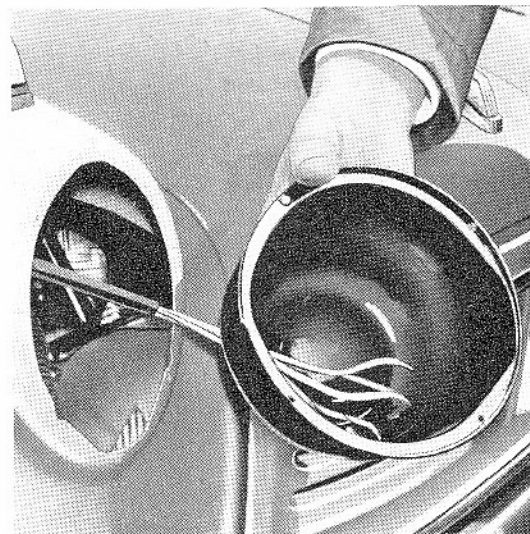
3. Press-in bulb a little, turn to the left and remove from lamp holder.

4. Disconnect cable connections. Remove lamp holder and loosen half-round metal sheet screws on the housing. (Fig. 6 - 2/3)



6 - 2/3

5. Remove head lamp housing from the forward side part. (Fig. 6 - 2/4)



6 - 2/4

Reinstalling

Reinstalling must be made in the reverse order by paying attention to the following hints:

1. In connecting the cables the following colour identifications should be taken into consideration:

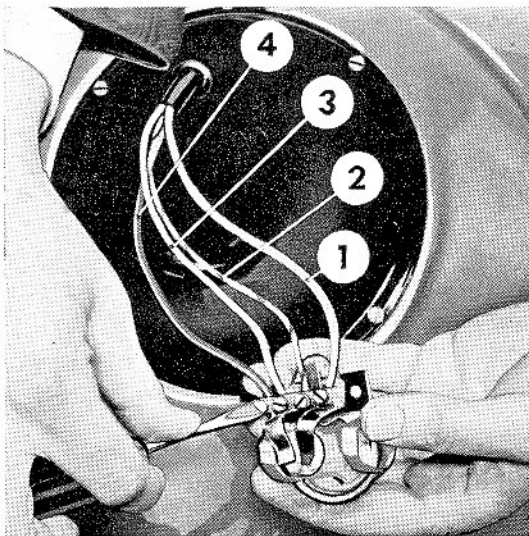
Head Lamp right

- 1 white = far beam
- 2 grey/red = parking light
- 3 yellow = dimmed light
- 4 brown = mass

Head Lamp left

- 1 white = far beam
- 2 grey = parking light
- 3 yellow = dimmed light
- 4 brown = mass

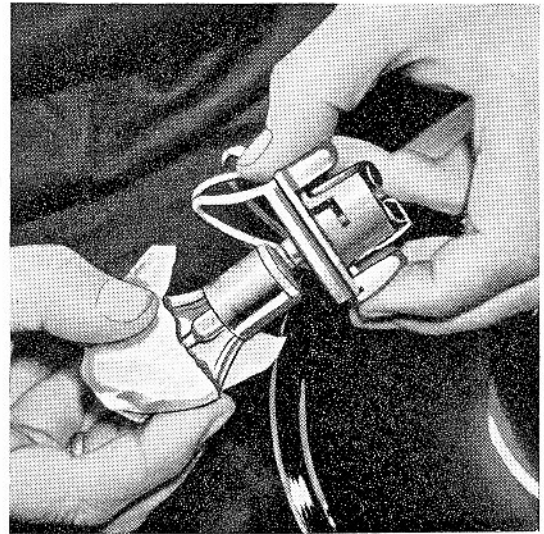
(Fig. 6 - 3/1)



6 - 3/1

The above picture shows the lamp-holder in the right head lamp.

2. Grasp lamp with lamp packing or with a piece of paper and reinstall. (Fig. 6 - 3/2)

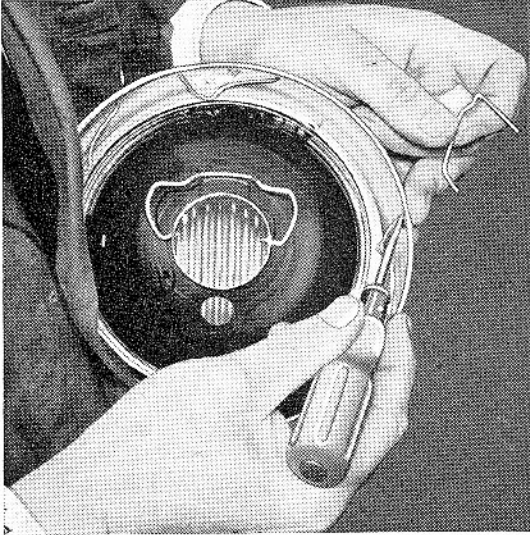


6 - 3/2

Never touch new lamps with the fingers or palm of your hand as sweat may get on the glass bulb and vaporize there, which might result in corrosion of the reflector.

Dismantling and Reinstalling Head Lamp Glass

1. Dismantle head lamp – see page 6-2, items 1 and 2.
2. Press retaining springs of reflector with a screw driver out of the notch in the chrome ring. (Fig. 6-4/1)
3. Unscrew both adjusting screws. Remove reflector and glass with rubber ring.
4. Remove rubber ring from head lamp glass.



6 - 4/1

Reinstalling

For reinstalling the head lamp glass proceed in the reverse order. In doing so, the following hints should be taken to account:

1. Renew defective rubber rings.
2. When inserting the glass, give care to ensure that the rubber ring makes close contact and the longitudinal grooves are in upright position.

Adjustment of Head Lamps with symmetrical dimmed Light

An easy and safe adjustment of the head lamp can be made in a simple manner with the help of an optical or photo-electrical adjuster. In using such an adjuster follow closely Manufacturer's instructions. If no adjuster is available, adjustment should be made with the help of an aiming screen.

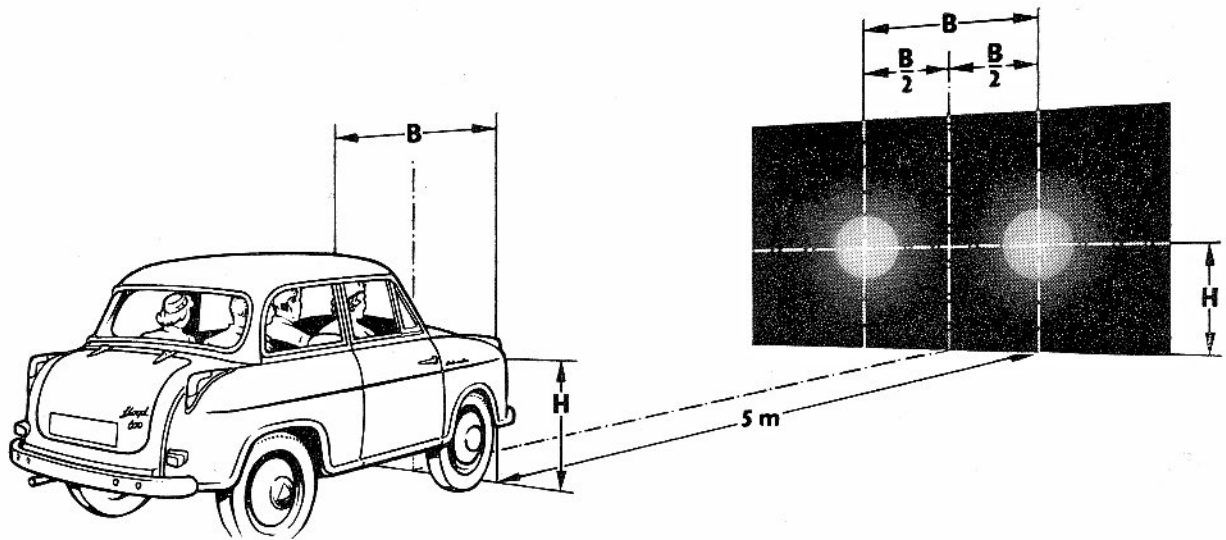
Prepare aiming screen

1. Place car on level floor 5 m (16.4') in front of a wall at right angle to this screen.
2. Mark point of contact of the car centre line at the wall and draw a vertical line through this point.
3. Load the car with 4 x 75 kg (165.3 lb.) at seat height.
This load corresponds to the average weight of 4 persons.
In the vehicle LT/LTK 600 loading should be made according to the indications given under "Payload" in the Service Instructions.
4. Determine height (H) of head lamp and draw at this height a horizontal line on the aiming screen.
5. Draw a second horizontal line, 5 cm (1.969") below line H.

6. Draw on the aiming screen at a distance $B/2$ from the center line on both sides a vertical line. The distance B corresponds to the distance B of both head lamps. In the cars LP/LS 600 Standard, Alexander and Alexander TS 1000 mm it is ($= 39.37''$) = 1000 mm, and $= 600$ mm ($= 23.4''$) in the LT/LTK 600 cars.

Adjusting Head Lamps

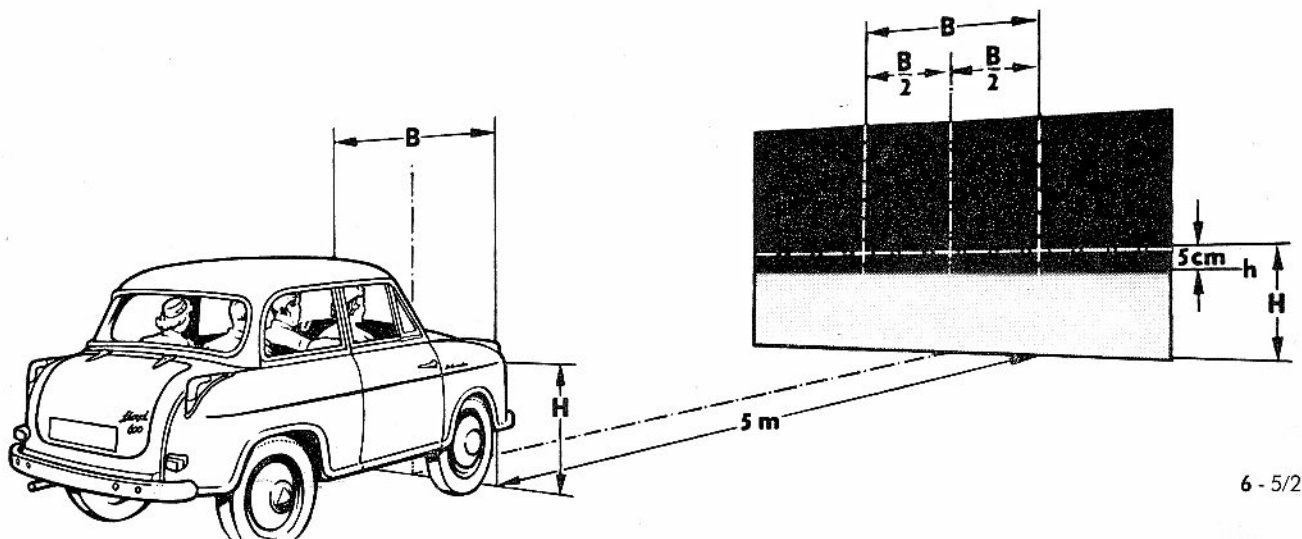
1. Turn on far beam light. With the lateral and bottom screws adjust the sealed beam of one of the head lamps so that the brightest spot of the illuminating pattern coincides with the centre of the aiming cross. (Fig. 6-5/1)



6-5/1

If it is possible to effect the shifting of the head lamp to the right or left, independently of shifting the head lamp up and down with an adjusting screw, first adjust the sealed beam to the right or left and then accomplish adjusting of the beam in vertical direction. While adjusting the sealed beam of the head lamp, the other head lamp must be covered.

2. Turn on dimmed light and check for proper position of the bright/dark boundary line. This boundary shall not exceed the horizontal line "h" on the aiming screen. The bright/dark boundary line means the transition from the black upper part to the bright lower part of the dimmed beam of the head lamp. Any bright spots of minor importance extending upwards will not be taken into consideration. (Fig. 6-5/2)

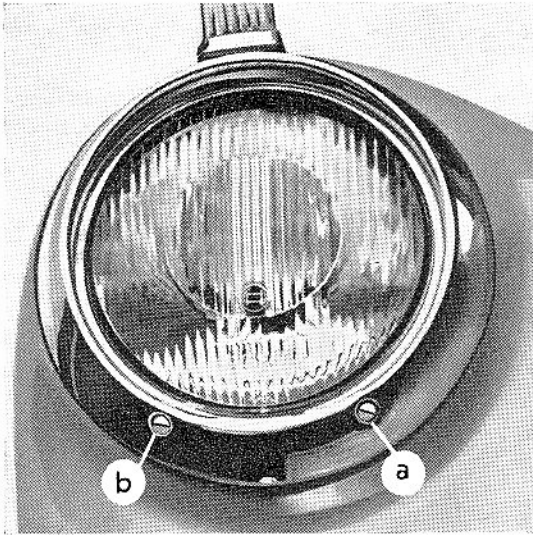


6-5/2

Lighting

The adjustment is to be effected with far beam turned on by twisting the adjusting screws arranged laterally and at bottom. (Fig. 6 - 6/1, Fig. 6 - 6/2 and Fig. 6 - 6/3)

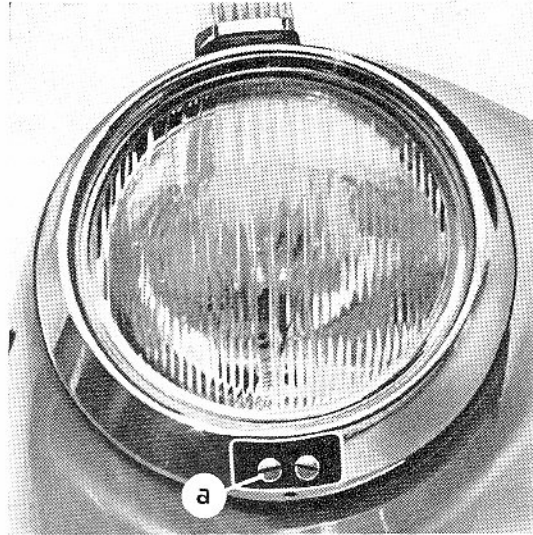
Bosch



6 - 6/1

- a) Vertical adjusting of beam
- b) Horizontal adjusting of beam

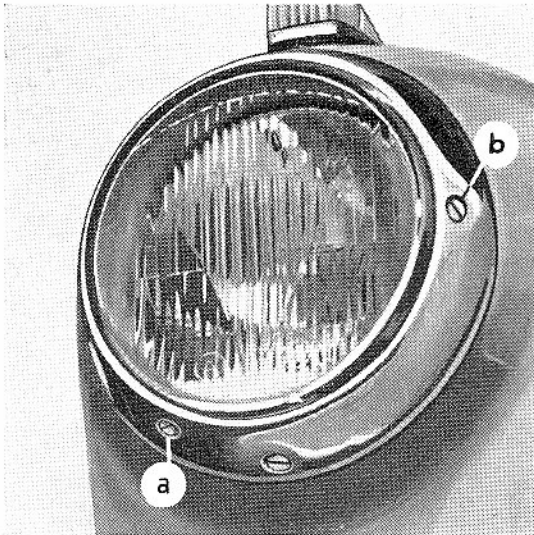
Hella (with convex glass)



6 - 6/3

- a) Vertical and horizontal adjusting of beam

Hella (with concave glass)



6 - 6/2

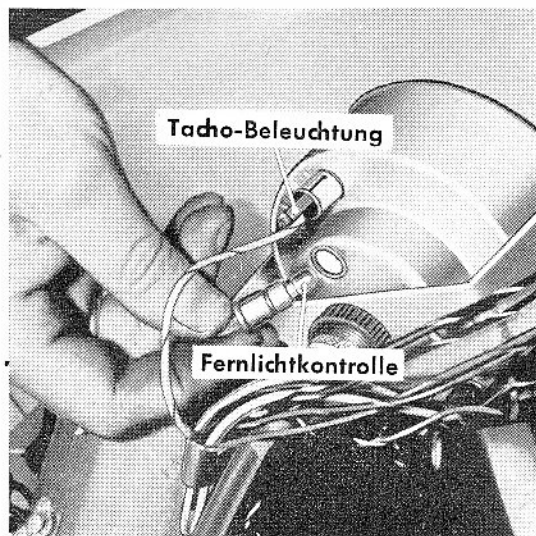
- a) Vertical adjusting of beam
- b) Horizontal adjusting of beam

Testing of Far Beam Pilot Lamp

With the far beam turned on the far beam pilot lamp (blue) lights up, which is connected with the terminal 56a of the foot dimmer switch and becomes energized at the instant the far beam lights are turned on.

Replacing Pilot Lamp

Pull lamp with its socket out of speedometer casing by pressing it gently into the socket and rotating it a little; then pull out. (Fig. 6 - 6/4)



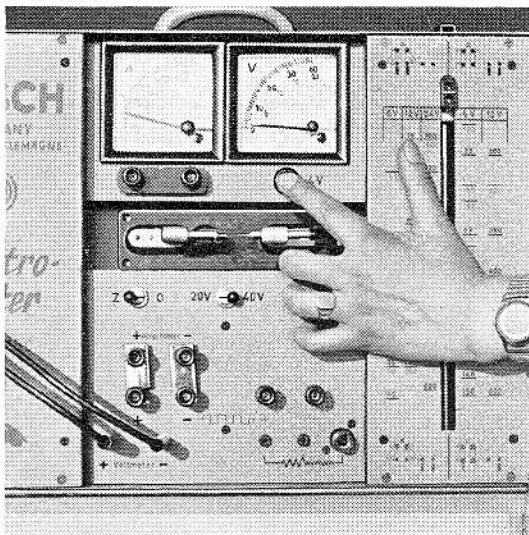
6 - 6/4

Voltage Drop in the Electric Current Supply (+) and Return Current Path

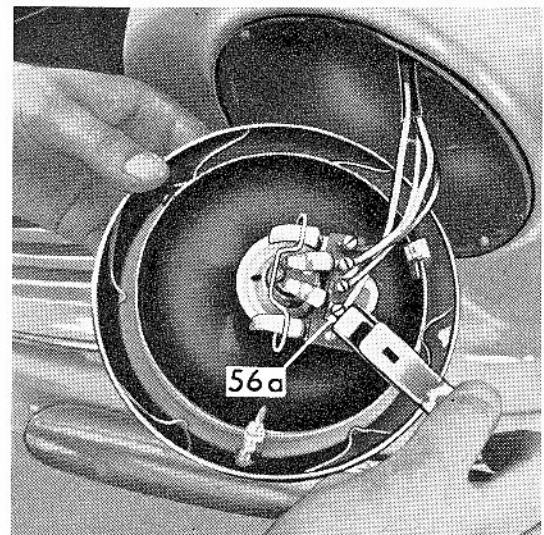
Reduced lighting efficiency of a lamp in the electric circuits may be due to different failures. Possibly a connecting terminal has become slack or there is a poor connection of the strand of the current carrying cable. Furthermore, a poor ground connection may exist or there may be defective (cracked) leads which may cause a drop in voltage, under circumstances also a short-circuit. Failure of this kind can be detected-as far as available-with a highly sensitive voltmeter suitable for this test. In the following a test procedure for testing the head lamp circuits with the Bosch-Elektro-Tester will be outlined in detail.

Measuring voltage drop in the electric current supply of the head lamp circuit

1. Take head lamp with reflector out of mudguard.
2. Connect cables of voltmeter as follows:
 - a) plus (+) cable of voltmeter to plus (+) pole on battery.
 - b) minus (-) cable of voltmeter to connection 56 a on the head lamp mounting ring (Fig. 6-7/1 and Fig. 6-7/2).



6-7/1



6-7/2

3. The maximum permissible voltage drop is 0.15 volt, this voltage is to be set on the tester board with the red voltmeter needle as reference value. (Fig. 6-7/2)
4. Turn on far beam light and read voltage drop at the voltmeter. The Bosch-Elektro-Tester allows the indicating range from 0 to 40 volts to be reduced to 0-4 volts by depressing the pushbutton arranged below the meter so that more accurate readings can be taken.

If the voltage drop exceeds the maximum permissible value of 0.15 volt, the electric current supply lead might be defective. In any such case the electric current supply line should be checked. This should be done step by step. In doing so, proceed as follows:

- a) Disconnect minus cable of voltmeter from terminal 56 a on head lamp and connect to connection 56 a, at first on the incoming side, finally on the outgoing end of the fuse box.
- b) If there is no remedy of the voltage drop and it is still greater than permissible repeat the same test procedure on the outgoing side 56a and ingoing side 56 of the foot dimmer switch.
- c) If the voltage drop cannot be remedied, repeat testing at the terminal 56 of the lighting switch (outgoing side) and at the terminal 30 of the lighting switch (incoming side).

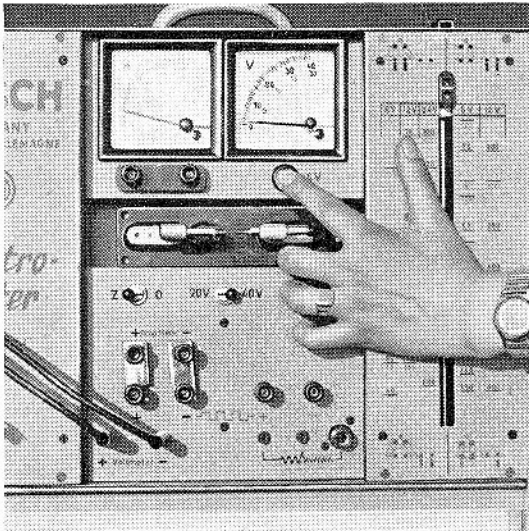
Return Current Path (metal of head lamp)

The head Lamps draw the greatest amount of current among all regularly built-in electrical consumers except the starter. In order to obtain a good ground connection and to keep down any contact drop to a lowest possible level, a ground cable is fitted, which connects the metal connection of bulbs to the fuse box support.

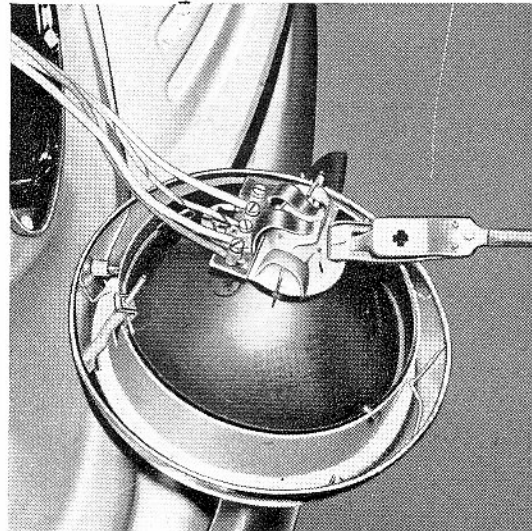
Measuring voltage drop in the electric return line of the head lamps.

1. Connect cable of voltmeter as follows:

- a) negative (-) cable of voltmeter to minus (-) pole of the battery,
- b) positive + cable of voltmeter to the ground connection of lamp socket (Fig. 6 - 8/1 and Fig. 6 - 8/2).



6 - 8/1



6 - 8/2

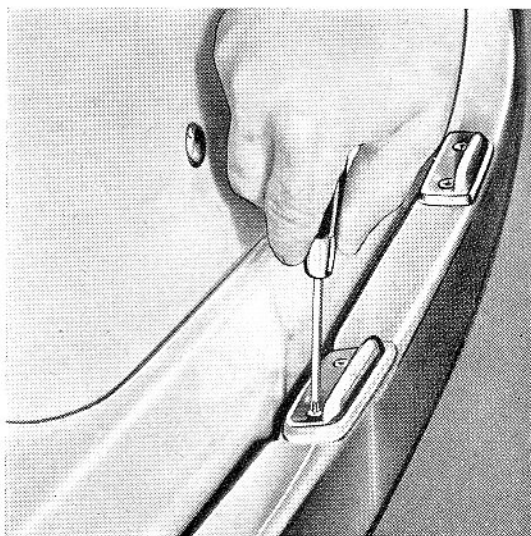
2. Adjust maximum permissible voltage drop of 0.15 volt on the tester board with the red needle below the voltmeter as reference value.
3. Turn on far beam light and press push-button below voltmeter so that the indicating range is reduced to 0-4 volts. Read voltage drop. If the value of 0.15 volt is exceeded, the cause might be a defective ground connection. In any such case check step by step ground connection in the following manner:
 - a) Connect positive (+) cable of voltmeter to ground connection of the fuse box support and repeat testing procedure.
 - b) If the drop in voltage remains the same at the end of the final testing, connect positive (+) cable to the engine casing and repeat testing. If no excessive drop in voltage is found, the defect is due to a bad connection between engine casing and battery or to a defective ground cable or a defective connecting terminal.

Number Plate Light

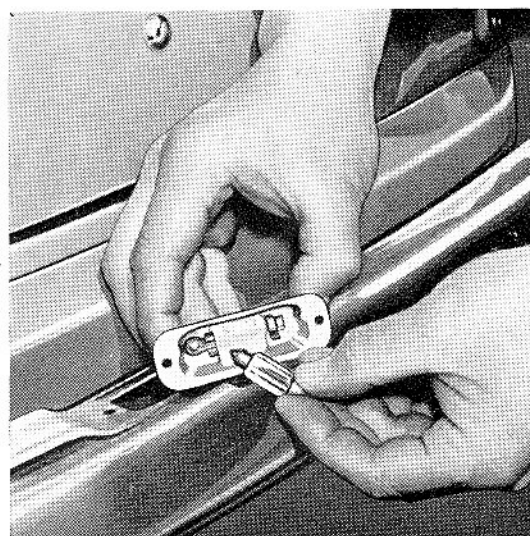
In the following you will find some notes on the installation and dismantling of number plate lights in the vehicles LP/LS 600 and Alexander where the number plates are lighted from below by two lamps located in the rear bumpers. Up to Chassis-No. 6/251 021 the number plate lights are fitted laterally at the rear at height of bumper corners. The vehicles of the LT/LTK 600 type are equipped with two lights arranged at the rear wall door above the number plate.

Dismantle number plate lights, replacing and reinstalling bulbs

1. Loosen cross-slotted head screws; remove cover with rubber base. (Fig. 6 - 9/1)
2. Remove lamp casing from the rear bumper and replace bulb. (Fig. 6 - 9/2)



6 - 9/1



6 - 9/2

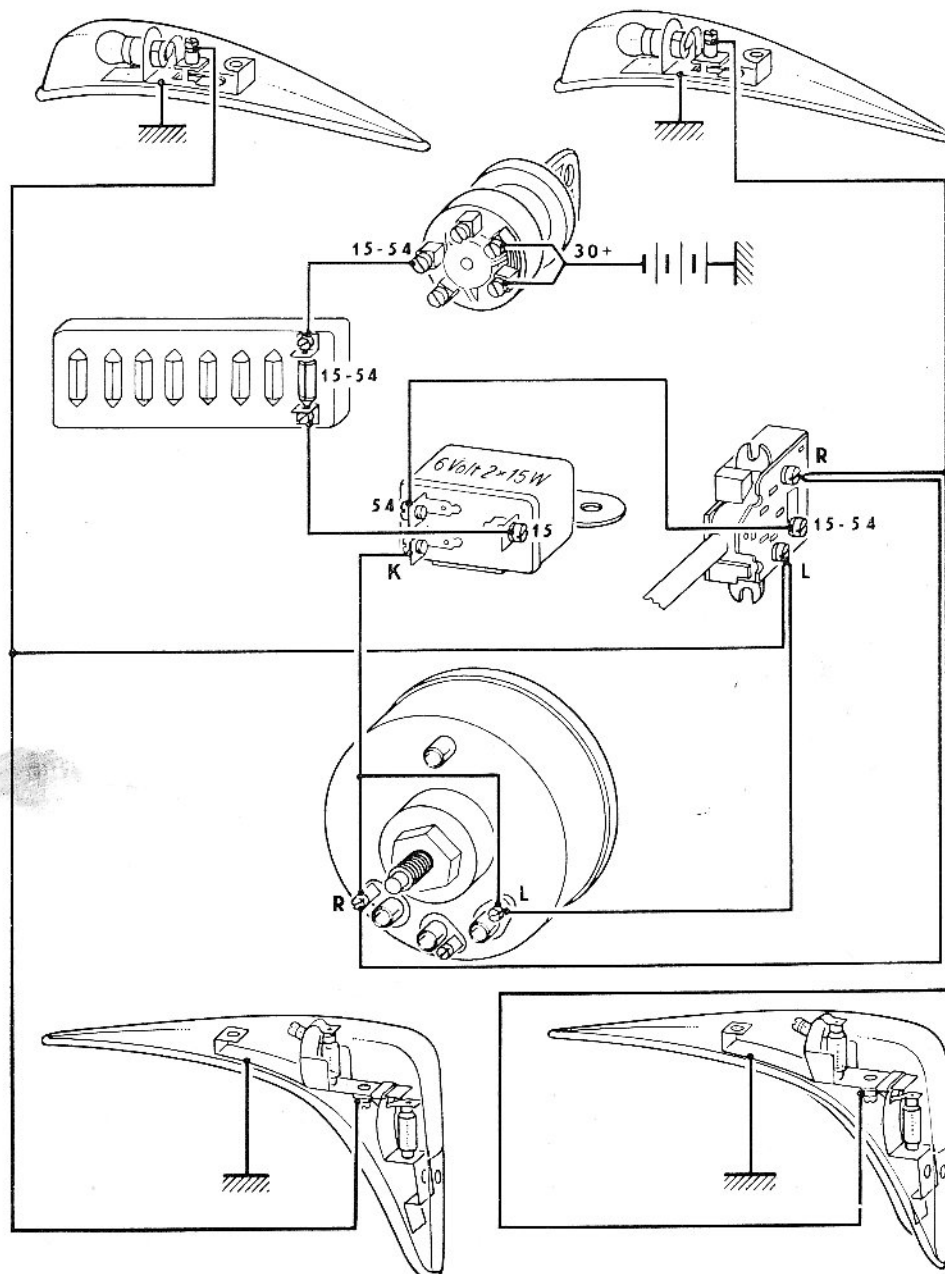
General

To indicate a change of direction the LLOYD vehicles are regularly equipped with flasher lights. Colour of the flasher lights, installation of the flasher bulb and flashing frequency (number of flashes per minute) are in conformity with traffic regulations. In the vehicles LP/LS and Alexander the flasher lights are mounted to the side parts at front and at rear, whereas in the standard types the front flashers are fitted below the head lamps and the rear flashers at bottom on the rear side part as combined tail/brake flasher lights. The vehicles LT/LTK 600 are equipped with a flasher lights at each side.

Functioning

By switching on the ignition switch (terminal 15) the flasher transmitter becomes energized through the fuse just in the same manner as, for example, horn and windscreen wiper. The instant the flasher switch is shifted downwards or upwards for indicating a change of direction either to the right or to the left, the electric circuit is closed. The current flowing now in the circuit is controlled by the action of the transmitter at a flashing frequency of 80 flashes/minute and is led to the flasher lights through the interconnected leads. According to the traffic regulations the flash frequency should be in the order of 60 to 120 flashes/minute.

Wiring Scheme of the Flasher System



Flasher system

Testing Flasher System

If the pilot lamps fail to burn or if the flash frequency is too slow or too fast, there must be a fault, the source of which, however, must not always lie in the transmitter itself. In a simple testing procedure without the use of a testing equipment, the following pointers should be noted.

1. If **both** pilot lamps light up at intervals, the cause is probably a defective flasher or an incorrect cable connection. In such a case the second flasher on the defective flasher side will light up in a quicker frequency.
2. If **both** pilot lamps light up **constantly**, both lamps on the same side are for the most part defective, this means, the cause will be either an improper cable connection or both lamps are defective. If the switch is shifted to the opposite direction towards the properly functioning lights, they will function properly, but in this case the pilot lamp will give no indication.
3. If the functioning of the right flashers is indicated by the left pilot lamp or that of the left flashers by the right pilot lamp, only a faulty connection will be the cause.

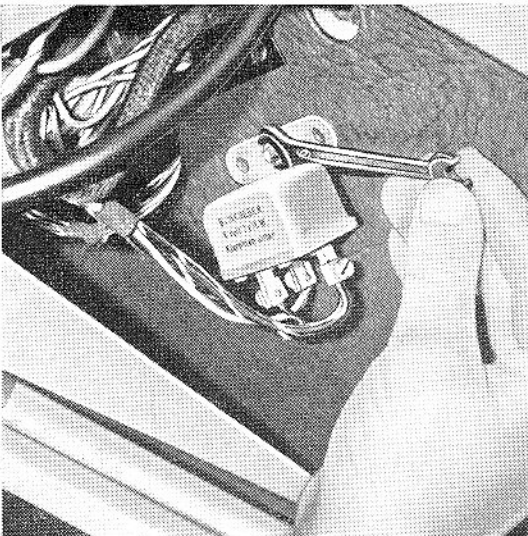
If all four flashers light up, the cause will nearly always be a defective flasher switch. It is possible that all four flashers become energized at the same time through bent bridging-over terminals.

Testing Flasher System Circuits

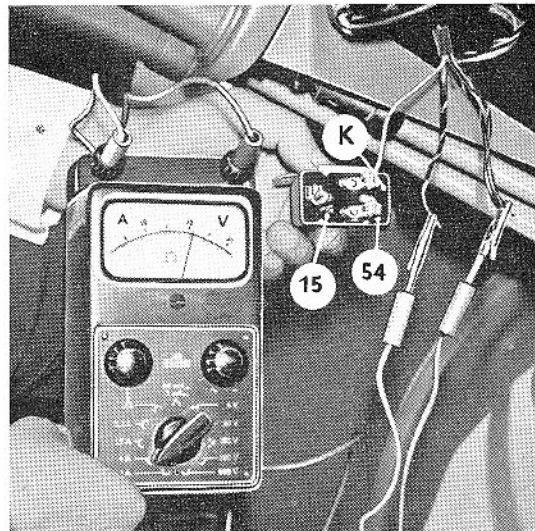
If after replacing the incriminated defective lamps the flasher system is still defective, it is advisable to have the circuits checked. For this purpose an ammeter with fine and, if possible, adjustable indicating range will be necessary. In testing the flasher transmitter is to be put out of operation by disconnecting the cable (terminals 15 and 54) and, instead, the ammeter to be installed in series connection. If it is found that all circuits are in order, here is likelihood of the flasher transmitter being defective. In any such a case repeat testing after the installation of a new flasher transmitter.

Testing

1. Loosen hex screw SW 9 from the dashboard and remove flasher transmitter. (Fig. 7 - 2/1)
2. Disconnect cable connections from the terminals 15 and 54 of the flasher transmitter and connect amperemeter by series connection. (Fig. 7 - 2/2)



7 - 2/1



7 - 2/2

3. Turn on ignition. Shift flasher switch upwards (change of direction to the right) and read amperes on the ammeter.

After shifting the flasher switch, both flasher lights are lighting up without interruption on the side turned on (left or right) provided that no "short" or no interruption in the current circuit will exist.

4. Shift flasher switch downwards (change of direction to the left) and read again amperes on the ammeter.

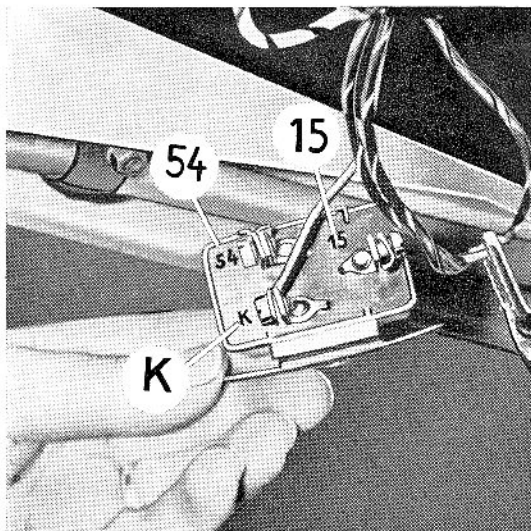
If the flasher transmitter is provided for lamps of 2×6 volts and 15 watts like in the LP/LS 600 and Alexander, the ammeter must indicate 3.9 – 4.2 amps. The LT/LTK 600 vehicle are equipped on each side with a flasher bulb of 6 volts and 15 watts. The amperage should be 2.2 – 2.2 amps in this case. If a lower amperage is indicated, the cause may be bad contacts, improper earth connection etc. If a higher amperage is indicated, this will mean that either an uncomplete or a complete short-circuit is existing in the switch or flasher leads. A complete short-circuit draws a very high current, thus causing the fuse to blow. Furthermore, take care that short-time shorts will be avoided, otherwise the contacts in the flasher control may glow out or the coil may burn.

A defective flasher transmitter should be replaced by a new one. Prior to the installation of the new transmitter it is recommended to eliminate the cause of the damage, e. g. short circuit as otherwise the new flasher transmitter would be damaged in the same way.

5. Connect cable (see also Fig. 7 - 6/1) and fasten flasher transmitter to the dashboard.

When testing the circuits it reveals that there are probably faulty leads and connections in the flasher system a measurement of the voltage drop in the different leads can be made by means of a voltmeter, the indicating range of which should be as fine as possible. By testing the leads, eventually by checking the individual sections, the source of irregularities may be detected. In the following a description of the testing procedure with a Bosch Electro-Tester is given.

Check Voltage Drop in the Flasher Supply Line



7 - 3/1

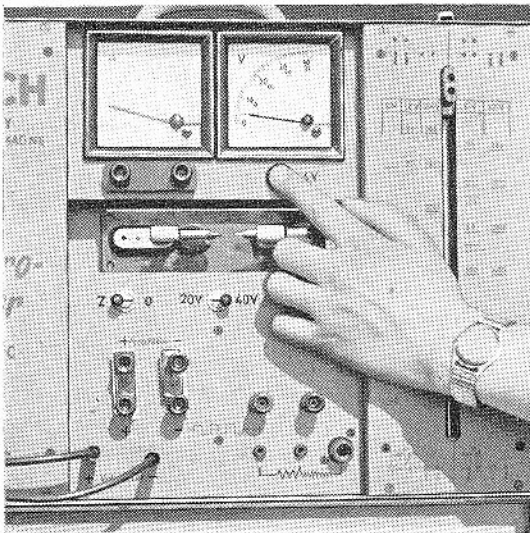
1. Take off glass cap of the flasher light to be checked.
2. Loosen hex screw SW 9. Remove flasher transmitter from the dashboard.
3. Disconnect cable from terminals 15 and 54 of flasher transmitter and connect together (Fig. 7 - 3/1).

By connecting the cables together: current supply black/lilac and black/white-green (to flasher switch) the circuit in way of the flasher transmitter is closed so that after shifting the flasher switch for a change of direction either to the right or to the left, the flasher lamp will give an uninterrupted light. Thus, a precise reading of the voltage drop on the voltmeter will be possible as otherwise the pointer of the voltmeter will swing in the sequence of the current impulses delivered by the flasher transmitter.

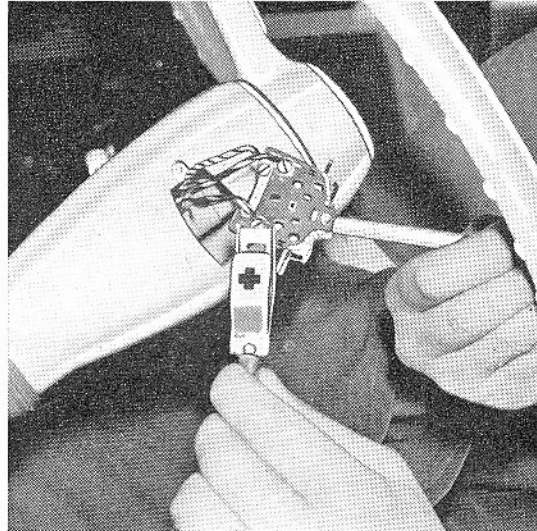
Flasher system

4. Remove flasher switch from steering column jacket.
5. Connect cable of voltmeter as follows:
 - a) positive (+) cable to the connection of the current circuit being tested (left or right that is, upper or lower connection on the flasher switch). The figures 7 - 4/2 and 7 - 4/3 show the testing procedure in attempting to shift the flasher switch for a change of direction to the right.
 - b) negative (-) cable to the contact bow (current supply) of the flasher bulb.
9. Read drop of voltage. If the maximum permissible drop of 0.4 volt is exceeded, the tested circuit must be defective. In this case, the circuit should be tested in a step by step procedure.

For testing other circuits, right or left, change over direction indicator. Positive cable is to be connected to the terminal of this circuit (see also Figure 7 - 4/1) on the flasher switch and the negative cable to the contact bow of a bulb.

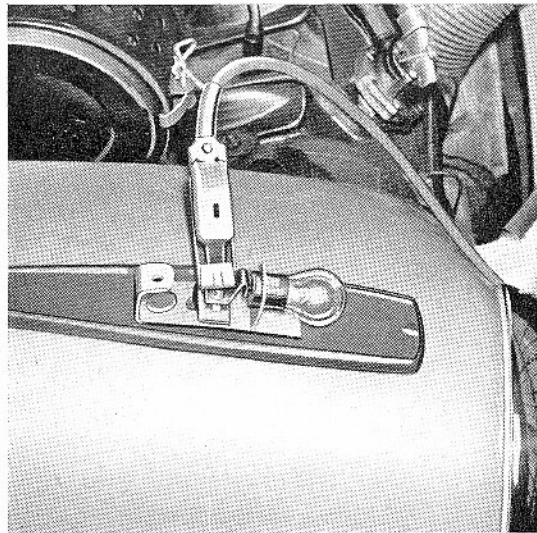


7 - 4/1



7 - 4/2

6. The maximum permissible voltage drop is 0.4 volt and is to be marked as reference value with the red needle below the voltmeter.
7. Turn on ignition and connect flasher switch to the circuit being tested, either left or right.
8. Connect tester to the 0-40 volts range. Press push-button below voltmeter, this effecting reduction of the 0-40 volts range to 0-4 volts so that a true reading can be made.

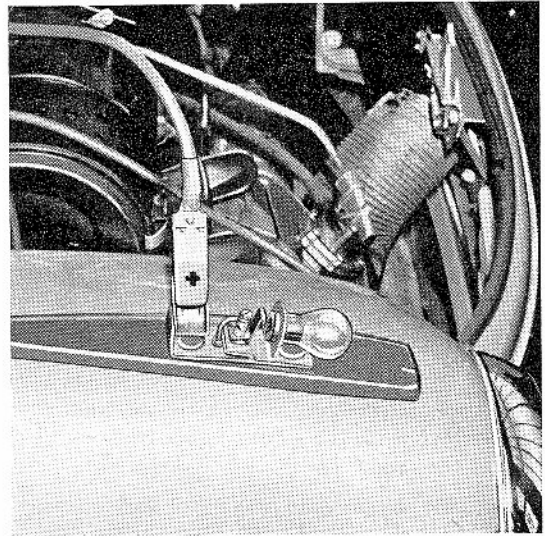


7 - 4/3

Measuring Voltage Drop in the Return Line (ground) of the Flasher System

1. Unscrew hex screw SW 9 and disconnect flashing transmitter from the dashboard.
2. Disconnect cable from terminals 15 and 54 of the flasher transmitter and connect together. (See also Fig. 7-3/1).

3. Connect cable of voltmeter as follows:
 - a) negative (-) cable to negative (-) pole on the battery.
 - b) positive (+) cable to the ground connection of the flasher light being checked (Fig. 7 - 5/1).



7 - 5/1

4. The maximum permissible voltage drop should in the return as well as in the supply line not exceed 0.4 volts. The reference value is to be set with the red needle below the voltmeter.
5. Turn on ignition and flasher lamp; press push-button below voltmeter and read voltage drop.

If the maximum value of 0.4 volts is exceeded, the fault is due to poor ground connection.

Dismantling and Reinstalling Flasher Transmitter

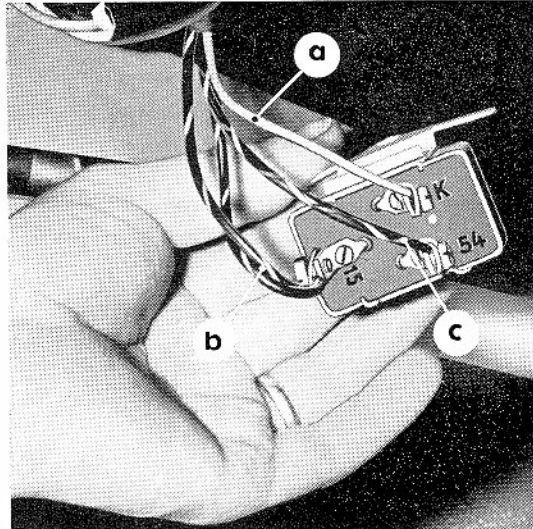
When dismantling a flasher transmitter, especially when installing a new transmitter, it must be borne in mind that these transmitters are very sensitive units. They are precisely adjusted by the Manufacturer before leaving the factory. Greatest care is to be taken while dismantling and reinstalling as well as while being kept on stock (packing) if the flasher transmitter shall function properly. All flasher transmitters can withstand normal vibrations when installed in the car and will not be injured in their function by vibrations occurring with the vehicle in motion.

Dismantling

1. Unscrew hex screw SW 9 from dashboard and remove flasher transmitter. (See also Fig. 7 - 2/1).
2. Remove cable connections from flasher transmitter.

Reinstalling

1. Connect cable to flasher transmitter as follows:
 - a) cable blue to terminal marked K
 - b) cable black/lilac (current supply from fuse) to terminal 15. The second cable leads to the windscreen wiper switch.
 - c) Cable black/white-green (to flasher switch) on terminal 54 (Fig. 7 - 6/1).
2. Put flasher transmitter in proper functioning position and fasten with hex bolt M 5 x 15 and hex nut M 5 to the dashboard. Interpose spring washer.



7 - 6/1

Dismantling and Reinstalling Flasher Switch

In the vehicles LP/LS 600 the flasher switches are fitted to the instrument panel at the left and in the LT/LTK 600 at the left to the instrument plate in close proximity of the steering wheel. In the LLOYD Alexander the flasher switch is installed at the left side of the steering column jacket so that the driver needs not to take his hand off the wheel to actuate the switch.

Dismantling

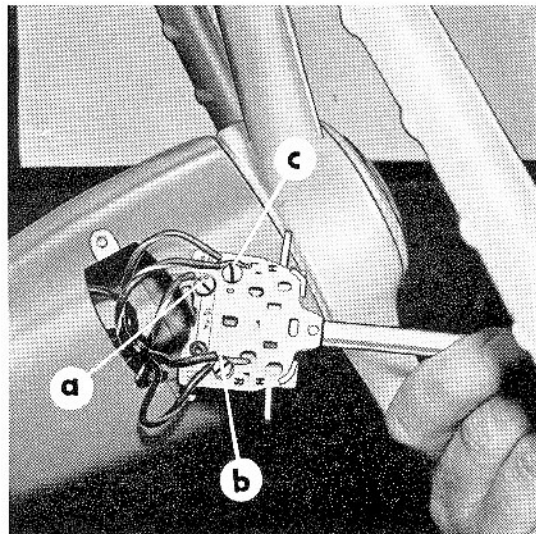
1. Loosen half-round headed screws on the flasher switch; withdraw switch and disconnect cables. (See also Main Group V, Fig. 9 - 4/1 and Fig. 9 - 5/1).

Reinstalling

Reinstalling is to be effected in the reverse order. Give care to the cable connections and colour of cables (Fig. 7 - 6/2).

Connect cable as follows:

- a) Cable black/white-green (a single cable) to terminal 15-54.
- b) Cable black/white (combined) to terminal for flasher light, right.
- c) Cable black/green (combined) to terminal for flasher light, left.

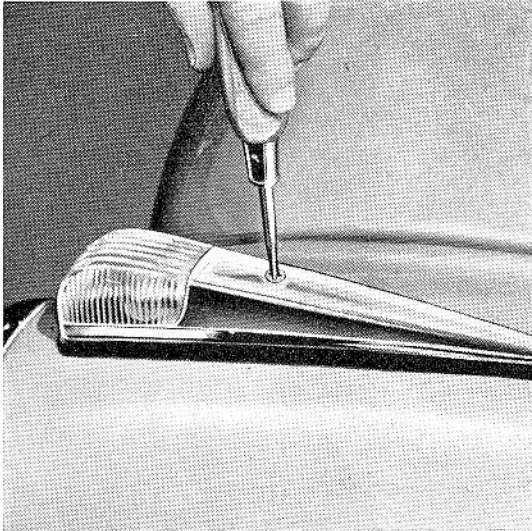


7 - 6/2

Dismantle Front Flasher; Replacing Bulb and Reinstalling

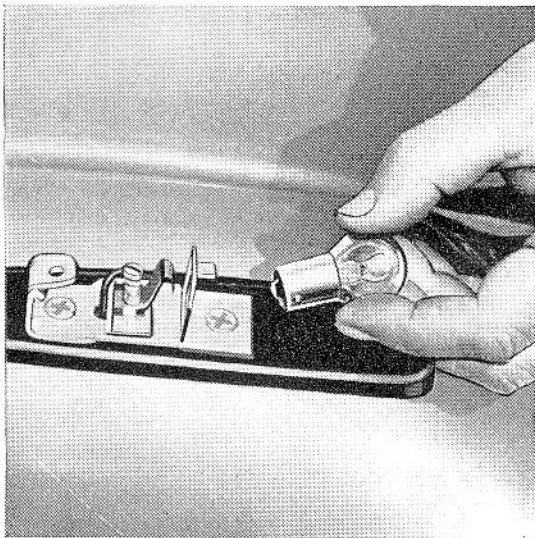
Dismantling

1. Unscrew cross-slotted head screw and take off lamp casing (Fig. 7 - 7/1).



7 - 7/1

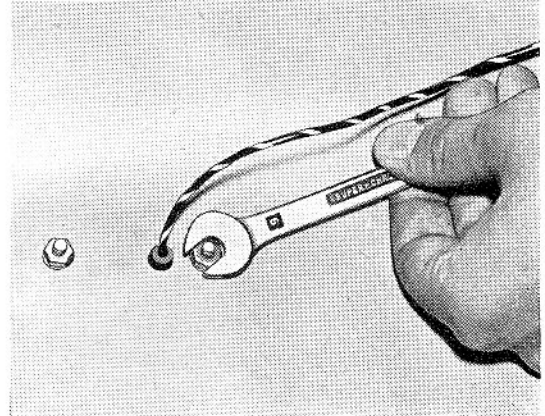
2. Push lamp rearward against the spring; rotate it a quarter turn to the left and take out. (Fig. 7 - 7/2).



7 - 7/2

3. Disconnect cable connections.

4. Open engine hood. Unscrew both nuts on the lamp support with an open wrench SW 9 and remove lamp support from side part (Fig. 7 - 7/3).



7 - 7/3

Reinstalling

Reinstalling has to be made in the reverse order. In doing so, the following points should be noted:

1. Be sure the rubber seals of the glass caps tighten well, otherwise water may seep in later on. Replace porous and defective rubber seals by new ones.
2. In connecting the cables watch for proper colour identification:

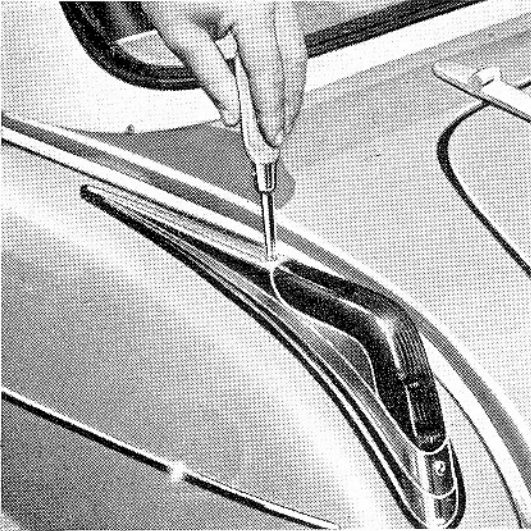
Cable, front, right: black/grey

Cable, front, left: black/green

Dismantle Rear Flasher; Replacing and Dismantling Bulb

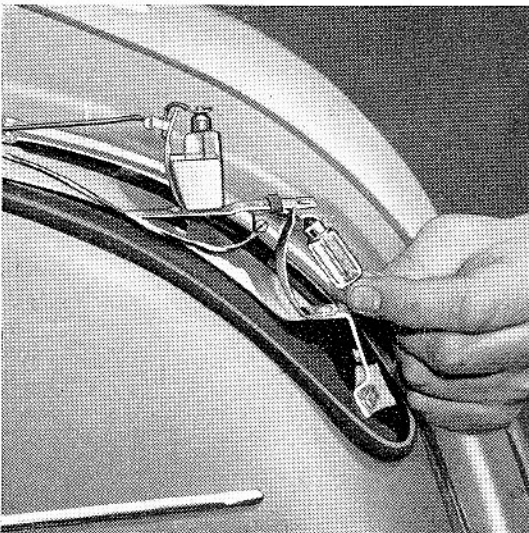
Dismantling

1. Loosen both cross-slotted head screws rear and at top on the cap and remove cap from rear side part (Fig. 7 - 8/1).



7 - 8/1

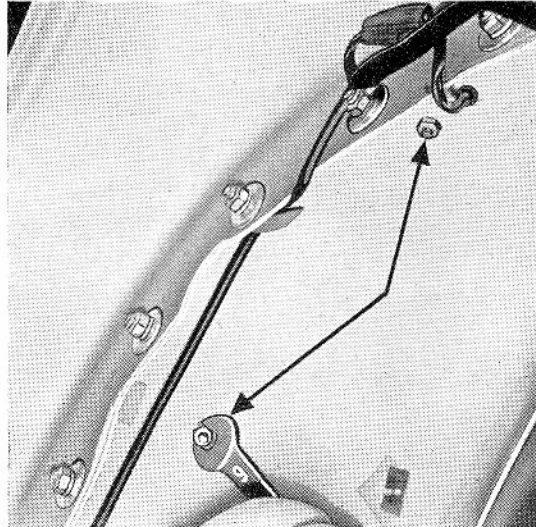
2. Push contact bow upwards and take bulb out. (Fig. 7 - 8/2).



7 - 8/2

The figure shows the procedure of removing the bulb 6 volts/15 watts from the flasher; the upper bulb belongs to the brake light.

3. Open trunk lid. Bent open retaining clips and loosen the interior trim of the trunk room at the side of the lamp support to be dismantled.
4. Unscrew both hex nuts SW 9 and disconnect cable connections. Remove lamp support from side part (Fig. 7 - 8/3).



7 - 8/3

Reinstalling

Reinstalling is to be made in the reverse order. In doing this, the following pointers should be noted:

1. Be sure the rubber seals of the glass caps tighten well so as to avoid any entrance of water with resultant corrosive attacks. Replace defective rubber seals.
2. In connecting the cable, give care to colour identification.

Rear right

Cable black/red for brake light
Cable black/green for flasher

Rear left

Cable black/red for brake light
Cable black/white for flasher

Tail Light

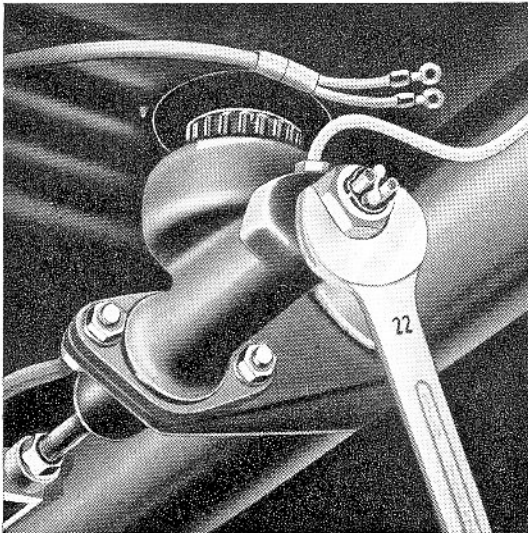
General

Actuating the brake pedal effects, closing the brake lamp circuit by means of the brake light switch (oil pressure switch), and as soon as the pressure exerted by the foot, and thus also the oil pressure (pressure of brake fluid) cease the brake lamp circuit is interrupted again. This makes both lamp to light up from beginning to the end of the braking action, control being effected by the brake light switch. In the vehicles LP/LS 600 and Alexander the brake light together with the flasher are housed in the same casing, whereas in the standard type the brake light is located together with the tail lamp and flashers in a common casing. The vehicles LT/LTK 600 are equipped with flashers fitted to the sides of the car. For this reason, the brake lights are housed only together with the tail light in one casing each. In all vehicles the brake light are fitted on the side at the rear, right and left.

Dismantling and Reinstalling Brake Light Switch

Dismantling

1. Thoroughly clean master brake cylinder, brake light switch and cable connections to prevent foreign substances from entering the wiring system while dismantling.
2. Loosen both cable connections and unscrew brake light switch with an open wrench SW 22. (Fig. 8 - 1/1).



8 - 1/1

3. Press plug into the screw hole.

4. Thoroughly clean contact surface of the brake light switch.

Reinstalling

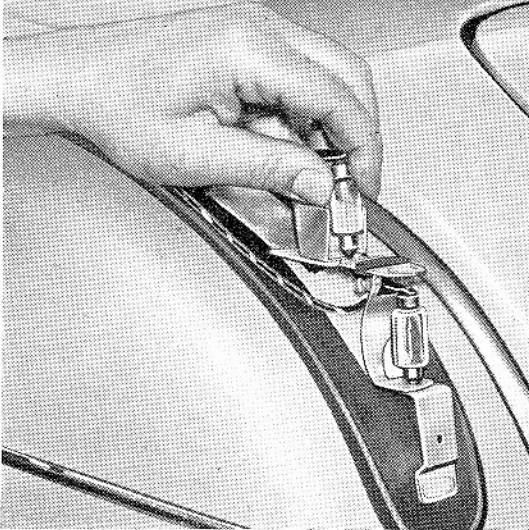
Reinstalling the brake light switch is to be made in the reverse order. Care is to be given to ensure that no air may enter the master brake cylinder and the braking system will be bled after completion of the installation.

Brake and tail light

Brake Light – Dismantling and Reinstalling Bulb

Dismantling

1. Unscrew cross-slotted head screws; remove glass cap from the side at rear end.
2. Slightly lift contact bow and remove lamp. (Fig. 8 - 2/1).



8 - 2/1

Bulb 6 volts 15 watts.
(The lower bulb belongs to the flasher system)

3. Remove, if necessary, lamp support. (See page 7 - 7 Item 3 and 4)

Reinstalling

Reinstalling should be made in the reverse order by observing the following points:

1. Be sure that the glass caps tighten well. Replace damaged rubber seals, if any.
2. When connecting cables, watch for proper colours:

Rear right

Cable black/red for brake light.
Cable black/green for flasher light.

Rear left

Cable black/red for brake light.
Cable black/white for flasher light.

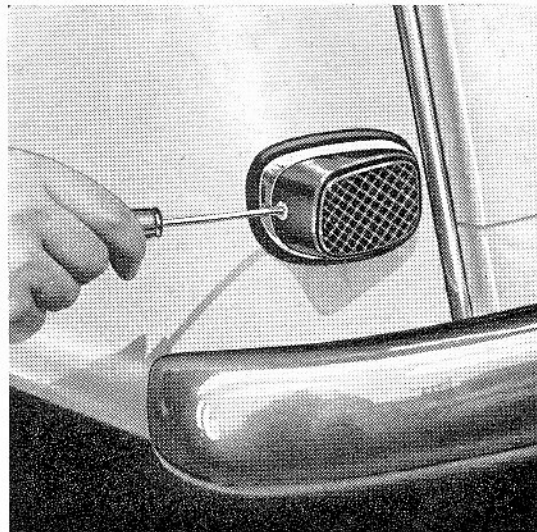
3. Check for proper seat and good contact of bulbs.
4. Check proper functioning of the brake light.

Dismantling Tail Light: Replacing and Installing

In the following full particulars as to the installation and dismantling of the tail lamps in the vehicles LP/LS 600 and Alexander are given. In the LLOYD 600 Standard the tail light with brake and flasher light are housed in one casing, whereas the brake and tail light in the case of flashers fitted on the side of the cars (LT/LTK 600) are housed together.

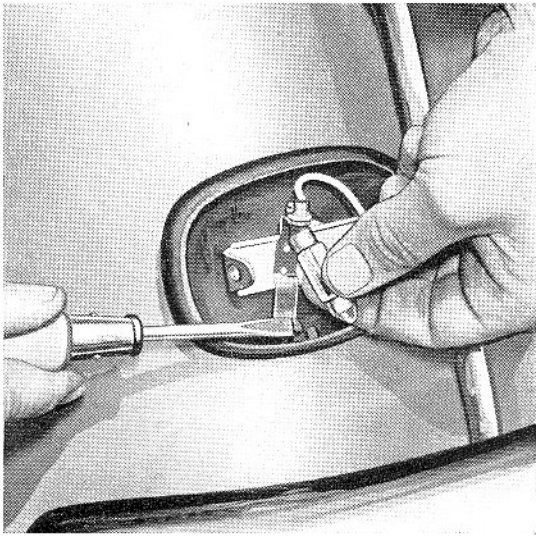
Dismantling

1. Unscrew the lateral cross slotted head screw and remove glass cap (Fig. 8 - 2/2).



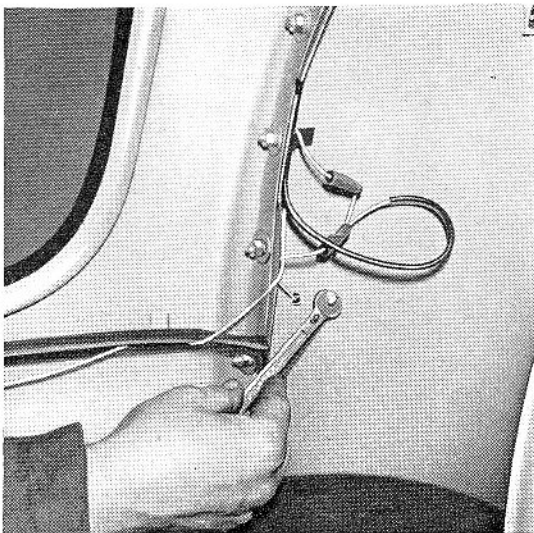
8 - 2/2

2. Press down contact bow with a screwdriver or other tool and take out lamp 6 volts 15 watts (Fig. 8 - 3/1).



8 - 3/1

3. Open trunk lid. Bent open sheet-metal clips of the interior trimming at the side and withdraw trimming until the lamp support can be reached.
4. Unscrew hex nut SW 9 and cable connection. Disconnect lamp support with rubber seal from the side part at the rear (Fig. 8 - 3/2).



8 - 3/2

Reinstalling

For reinstalling proceed in the reverse order by following the instructions hereunder:

1. To avoid the entrance of water (danger of corrosion) all rubber seals should tighten well. Defective rubber seals should be replaced.
2. In reinstalling the glass cap, the following pointers should be noted:
First insert side of cap towards contact bow and thereafter fasten with cross-slotted head screw.
3. Check lamp for fast seat.

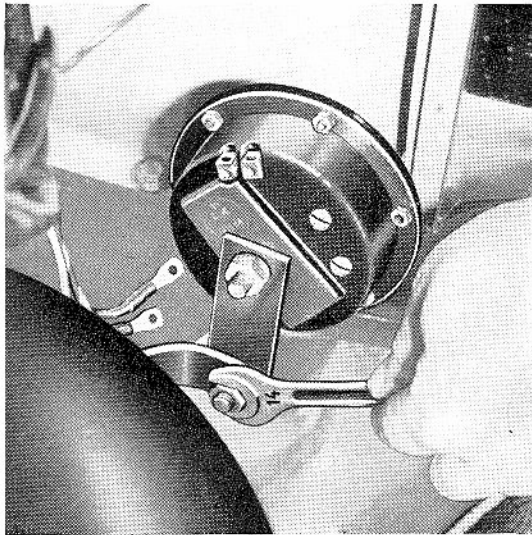
Horn

General

By actuating the horn press-button the circuit of the horn is closed, the current flowing across the metal of the vehicle to the negative pole of the battery. An electromagnet, in combination with a breaker, transmits the current pulses to the diaphragm, the vibrations of which are emitted as an acoustical signal. To diminish sparking, a condenser is interconnected between the breaker points.

In the course of time the contacts of the horn will wear out so that the signal will sound weaker and will be out of tune. In such a case a readjustment of the breaker points is necessary. For this purpose you will find an adjusting screw on back of the casing.

Dismantling and Reinstalling Horn



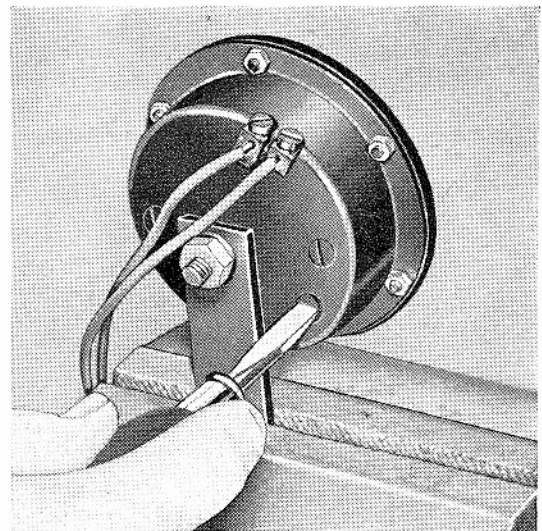
9 - 1/1

1. Open engine hood. Disconnect cable connection from the horn terminals. Remove horn. (Fig. 9 - 1/1)

Reinstalling should be made in the reverse order. In doing this, take care that no contact between horn and car body parts will be established.

Readjusting Horn

1. Dismantle horn (Dismantling is not absolutely necessary. However, it is preferable to effect the adjustment procedure on the dismantled horn).
2. Clamp the free spring set in a vice and connect terminals to a 6 volt battery, if possible, through a breaker switch.
3. Rotate adjusting screw with a screw-driver slowly to the right and to the left until the largest intensity of sound at normal sound frequency, without interference of masking noise, is attained. If, while adjusting, no proper tone quality can be obtained, the horn should be replaced. (Fig. 9 - 1/2)



9 - 1/2

Windscreen Wiper

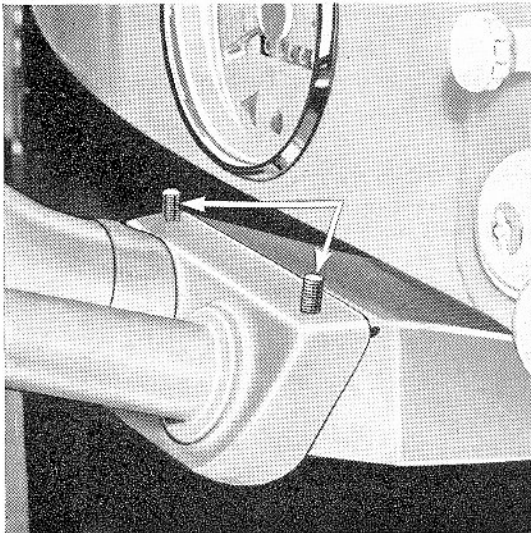
General

Both LLOYD car types LP/LS 600, Alexander and LT/LTK 600 are equipped with standard windscreen wiper systems of SWF and Bosch make. In the SWF-make the windscreen wiper rods can be adjusted lengthwise, whereas the rods in the Bosch-type are not shiftable. In the case of adjustable linkages it is advisable to maintain always their basic adjustment. To compensate for production tolerances in the rods and bearings of the wiper arms, the supports of the windscreen wiper motors are provided with long holes in horizontal direction. Thus, this allows the wiper field to shift either to the right or to the left.

Dismantling and Reinstalling Windscreen Wiper Motor

Dismantling

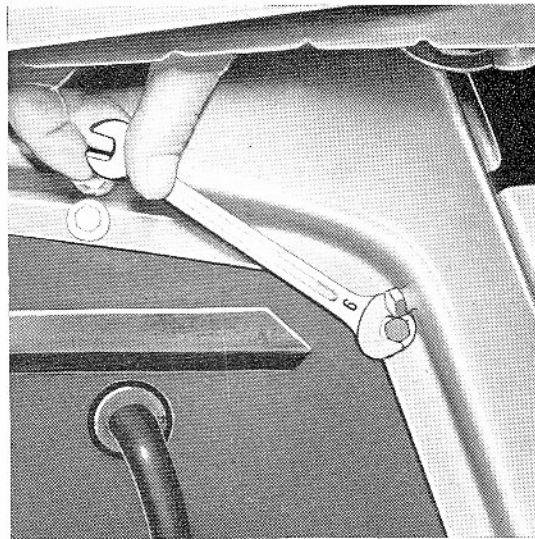
1. Loosen fastening of bearing bracket for steering and gearshifting (hex screws SW 10 – see arrow) and force bearing bracket with care off the instrument panel (Fig. 9 - 2/1).



9 - 2/1

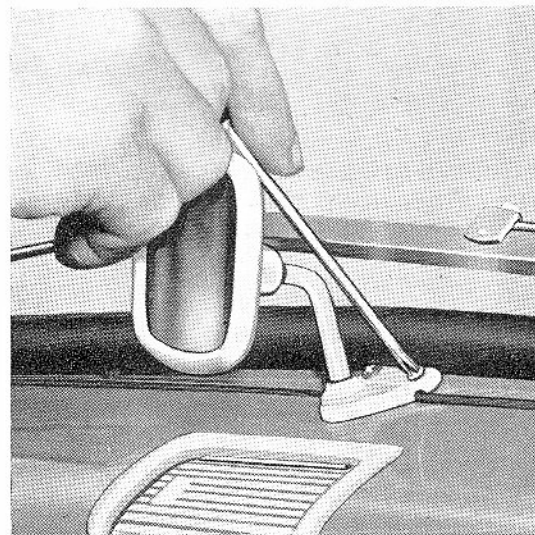
It is not necessary to take off the entire bearing bracket or to disconnect gearshift rods and steering column. Merely the two screws are to be loosened so that the instrument panel can be withdrawn.

2. Open engine hood and loosen on either side screwings of the instrument panel (SW 9) (Fig. 9 - 2/2).



9 - 2/2

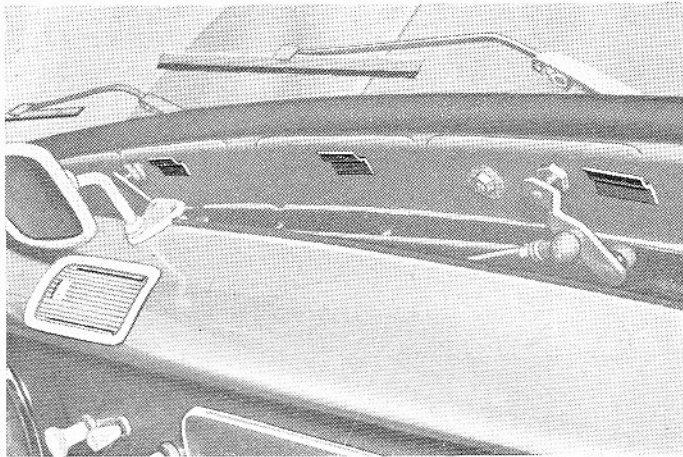
3. Remove cross-slotted head screws of the inside mirror fastening (Fig. 9 - 2/3).



9 - 2/3

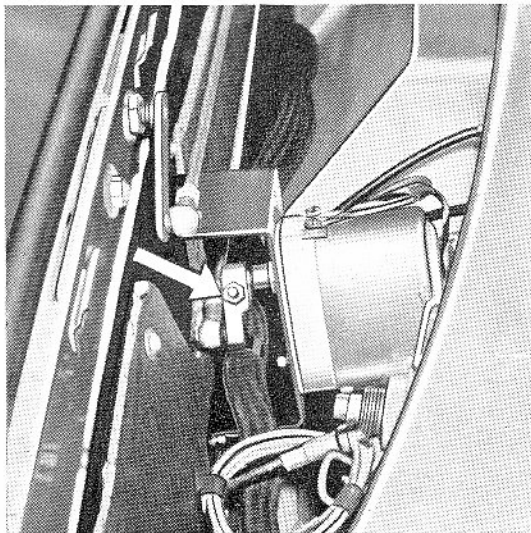
These cross-slotted head screws simultaneously serve to fasten the instrument panel.

- Lift instrument panel and withdraw. By lifting the panel the upper edge slips out of the holding plates attached to the front wall (Fig. 9 - 3/1).



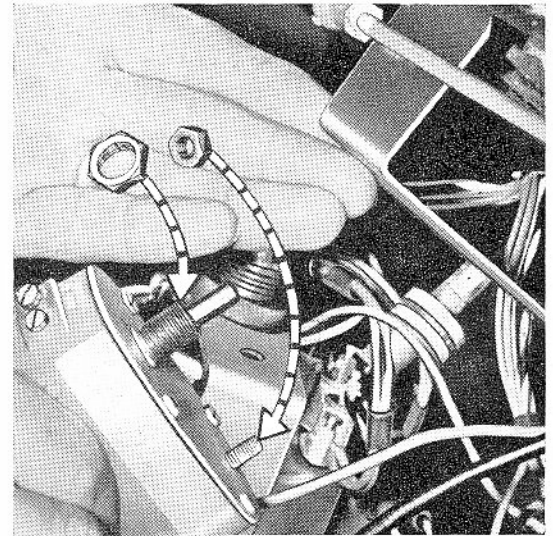
9 - 3/1

- Unscrew cap screw. Remove speedometer spiral and continue to withdraw the instrument panel.
- Force off rods. Loosen clamping screw SW 9 (see arrow) and withdraw drive crank from the windscreen wiper motor shaft (Fig. 9 - 3/2).



9 - 3/2

- Disconnect cable from windscreen wiper motor.
- Unscrew hex nuts SW 14 and SW 9 (on support bracket) and remove windscreen wiper motor. (Fig. 9 - 3/3).

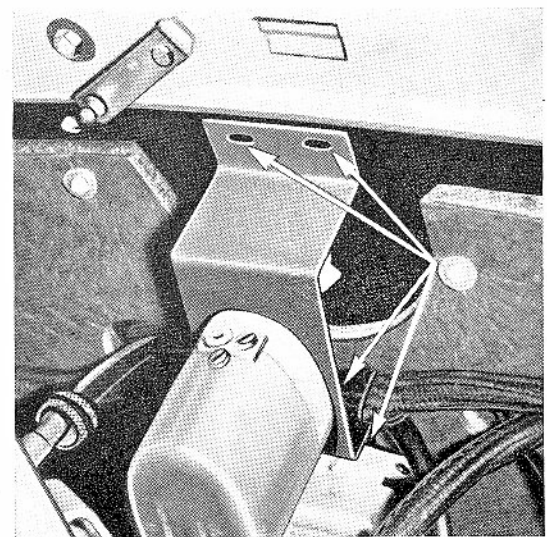


9 - 3/3

Reinstalling

Reinstalling of the windscreen wiper is to be made in the reverse order. In doing so, the following points should be noted:

- The bracket support of windscreen wiper motor is fitted with oblong holes so that it can be shifted horizontally for the purpose of displacing the wiper field either to the right or to the left (Fig. 9 - 3/4).



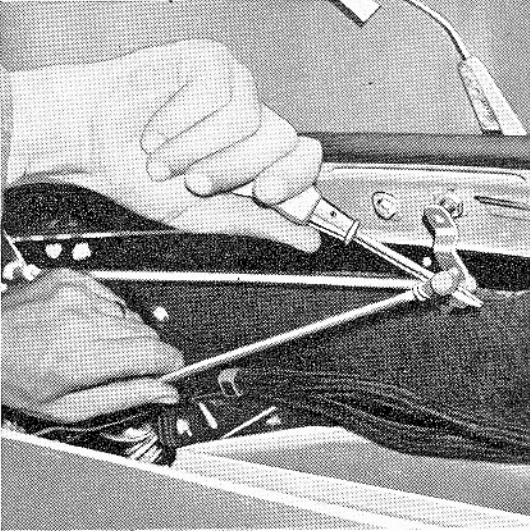
9 - 3/4

- From Chassis-No. 6-327 023 rubber strips are used in lieu of plastic strips. It is recommended to use these rubber strips in reinstalling the instrument panel. Thus squeaking noises will be avoided.

Dismantling and Reinstalling Windscreen Wiper Rods, Arm and Support

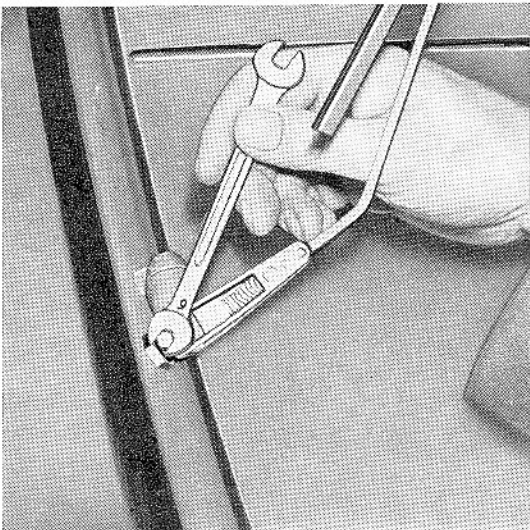
Dismantling

1. Dismantle instrument panel see pages 9 - 2 and 9 - 3, Item 1 - 6.
2. Force linkage rods off by means of a screwdriver or by other tool (Fig. 9 - 4/1).



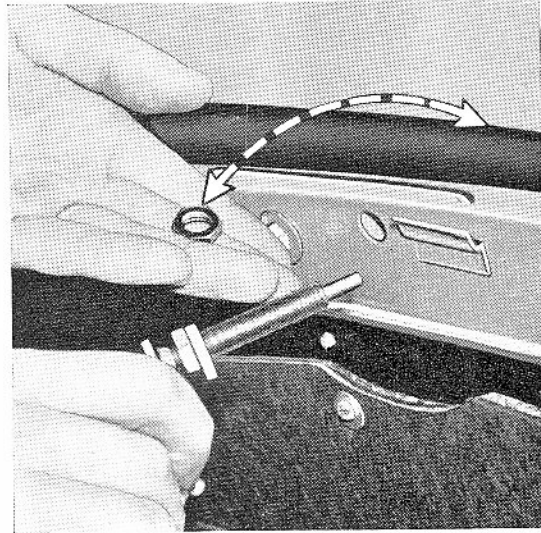
9 - 4/1

3. Loosen clamping screw SW 6 and remove windscreen wiper arm from axle (Fig. 9 - 4/2).



9 - 4/2

4. Unscrew hex nut SW 14 on the side of windscreen wiper arm and take out bearing with axle rearward towards the interior of car (Fig. 9 - 4/3).



9 - 4/3

Reinstalling

Reinstalling the windscreen wiper arm, bearing and linkage rods should be made in the reverse order.