

# SERVICE MANUAL

P 120  
Part 10  
(6 volt)

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ELECTRICAL SYSTEM

*Service Department*

AKTIEBOLAGET

# VOLVO

GÖTEBORG SWEDEN

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## DESCRIPTION

The Volvo 121/122S has a 6-volt electrical system. The system may be suitably divided into battery, dynamo, charging relay, starter motor, ignition system, lighting and indicator devices as well as the necessary instrumentation.

### Battery

The battery is mounted on a shelf on the front of the bulkhead. It is a lead battery consisting of three cells and has a capacity of 85 amp. hours.

### Dynamo

The dynamo, Fig. 1, is located on the right-hand side of the engine and is driven from the crankshaft by means of a V-belt. It is a shunt-type dynamo, i.e. the field windings are connected in parallel with the

armature. Charging is regulated by means of the charging relay.

### Charging relay

The charging relay, Fig. 2, is fitted close to the dynamo on the right-hand wheel housing. The charging control functions on the constant voltage principle. It consists of a cut-out relay, current control and voltage control.

### Starter motor

The starter motor, Fig. 3, is fitted on the flywheel housing on the right-hand side of the engine. It consists of a four-pole series motor. The drive pinion on the rotor shaft of the starter motor is movable axially and thus can engage with the flywheel ring gear. The pinion is controlled by a solenoid.

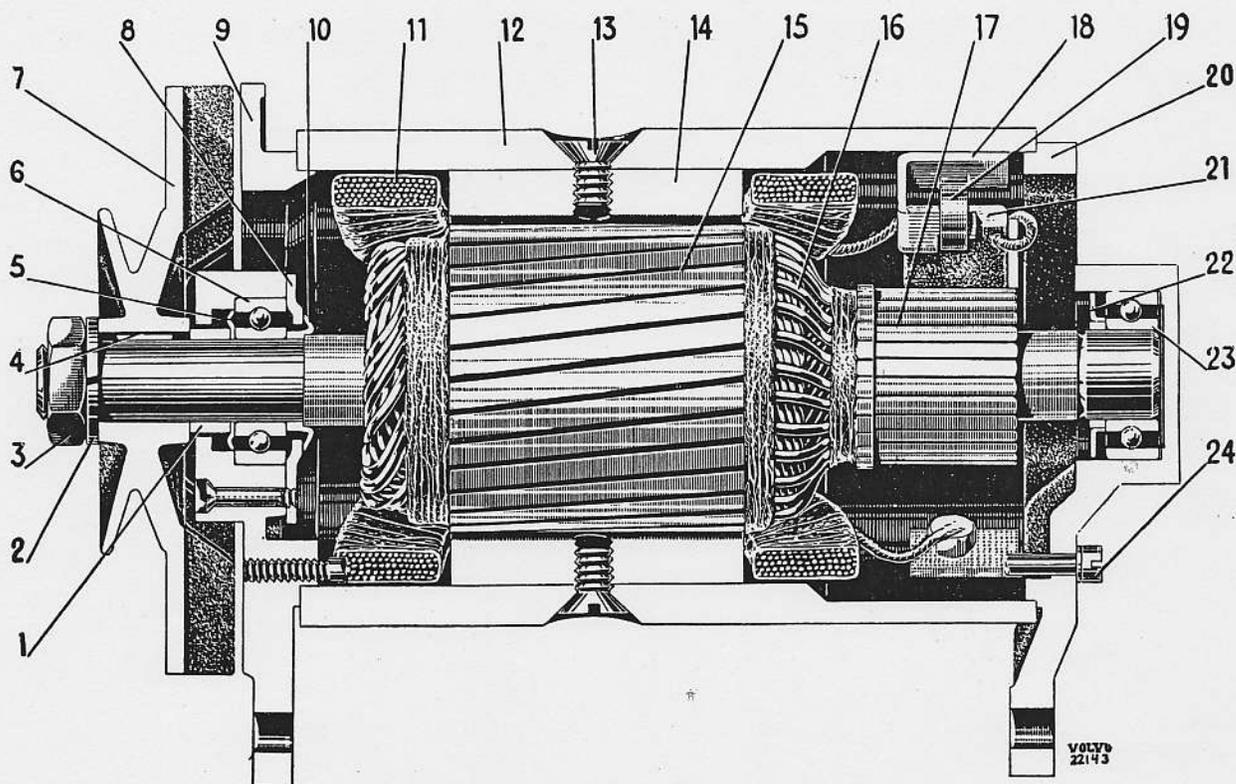
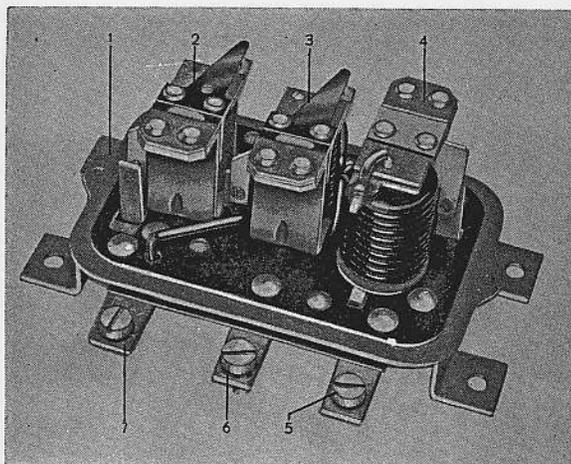


Fig. 1. Dynamo.

- |                     |                        |                      |                        |
|---------------------|------------------------|----------------------|------------------------|
| 1. Distance sleeve  | 7. Pulley              | 13. Pole shoe screw  | 19. Brush spring       |
| 2. Spring washer    | 8. Protector washer    | 14. Pole shoe        | 20. Rear head assembly |
| 3. Nut              | 9. Front head assembly | 15. Armature         | 21. Brush              |
| 4. Woodruff key     | 10. Spacing ring       | 16. Armature winding | 22. Protector washer   |
| 5. Protector washer | 11. Field winding      | 17. Commutator       | 23. Ball bearing       |
| 6. Ball bearing     | 12. Dynamo housing     | 18. Brush holder     | 24. Screw              |



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Fig. 2. Charging relay.

1. Relay body
2. Voltage regulator
3. Current regulator
4. Cut-out relay
5. Battery terminal
6. Field terminal
7. Armature terminal
8. Earth cable terminal

## Ignition system

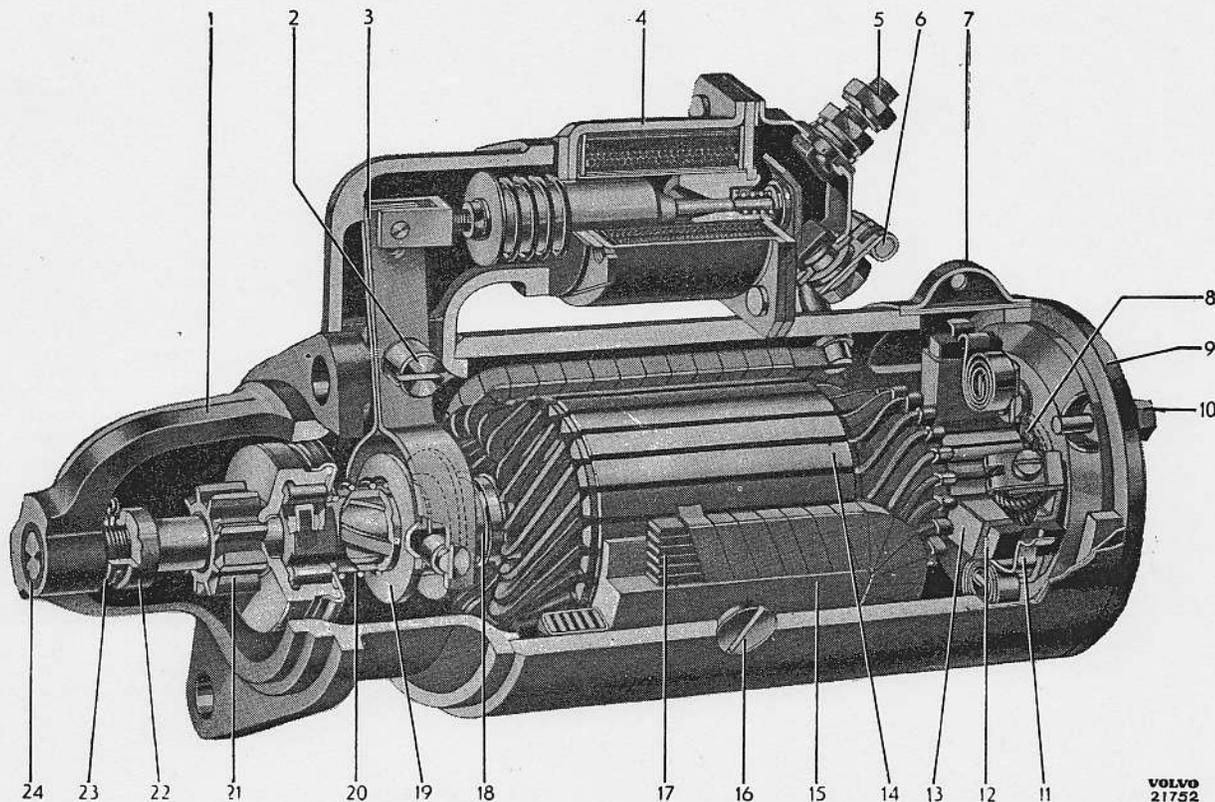
The ignition system is of the battery type. It consists of the following main parts: Ignition coil, distributor, ignition leads and sparking plugs.

## Ignition coil

The ignition coil is fitted on the left-hand side at the front of the bulkhead.

The purpose of this coil is to transform battery voltage to high-tension voltage for the sparking plugs.

It consists of a core of laminated sheet metal around which is wound both a winding of heavy copper wire (the primary winding) and a winding of fine copper wire (the secondary winding).



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Fig. 3. Starter motor.

- |   |                        |                           |                           |
|---|------------------------|---------------------------|---------------------------|
| 1. Rear head assembly                     | 7. Protecting cover    | 13. Brush retainer        | 19. Guide ring            |
| 2. Screw for coupling arm                 | 8. Armature brake      | 14. Armature              | 20. Spring for guide ring |
| 3. Coupling arm                           | 9. Front head assembly | 15. Pole shoe             | 21. Pinion                |
| 4. Solenoid                               | 10. Screw              | 16. Pole screw            | 22. Castle nut            |
| 5. Terminal screw for battery lead        | 11. Brush spring       | 17. Field winding         | 23. Split pin             |
| 6. Connecting lead for field and armature | 12. Brush              | 18. Spring for guide ring | 24. Bushing               |

The primary winding operates on battery voltage. The secondary winding, the high tension winding, is connected to the central tapping point on the distributor cover. From here the high-tension current is supplied to the engine sparking plugs.

## Distributor

The distributor, Fig. 4, is placed on the left-hand side of the engine and is driven from the camshaft.

The distributor has two separate electrical circuits, low and high tension.

Low tension (battery voltage) is supplied to the coil by the breaker contacts, the breaking action of which is imparted by the cam fitted on the distributor shaft.

High tension voltage which is produced in the coil is supplied to the sparking plugs by the rotor arm fitted on the distributor shaft.

The adjustment of the distributor in relation to engine speed is controlled by a centrifugal governor under the breaker arm plate. Adjustment in relation to loading is governed by a vacuum regulator.

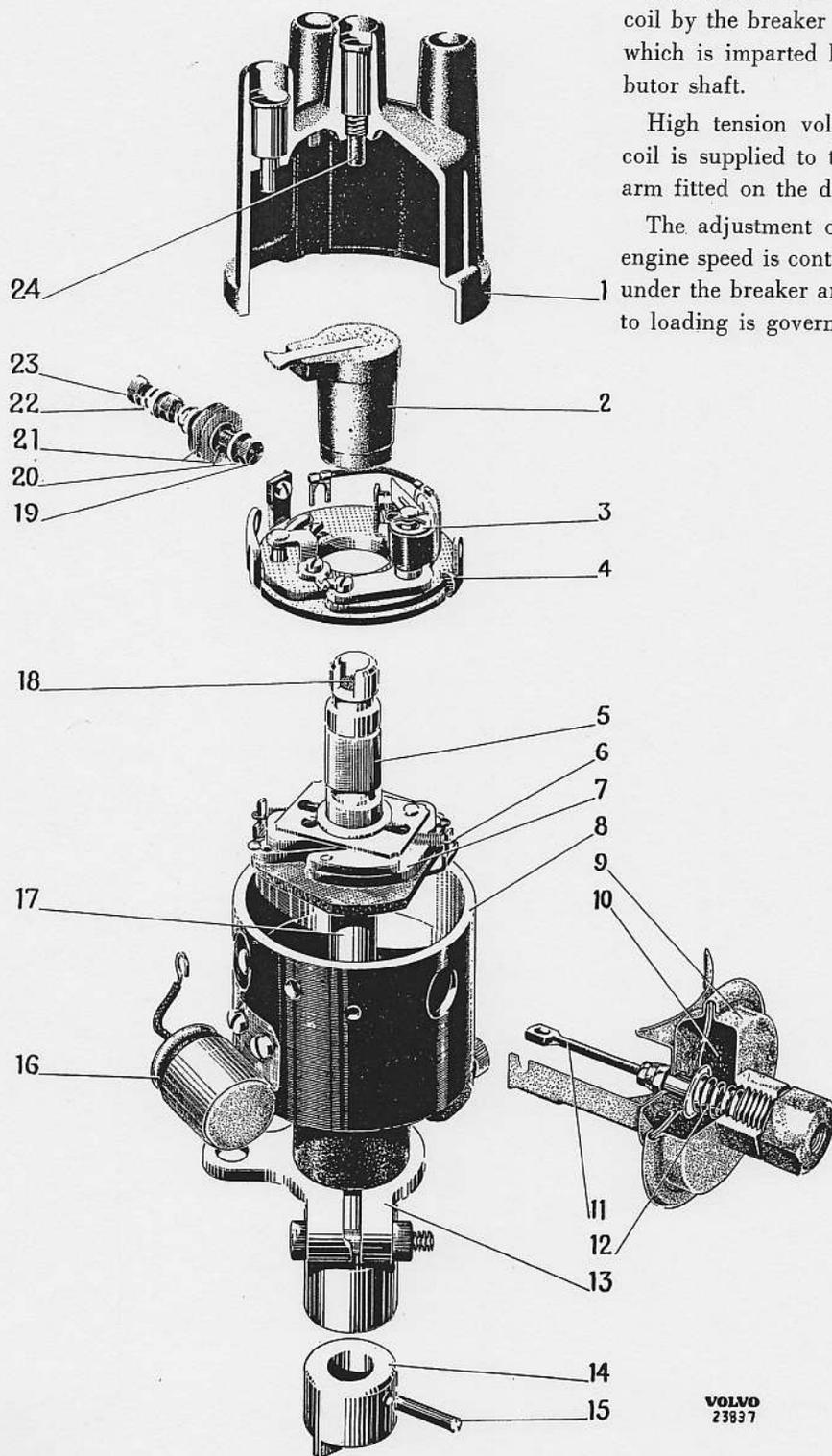
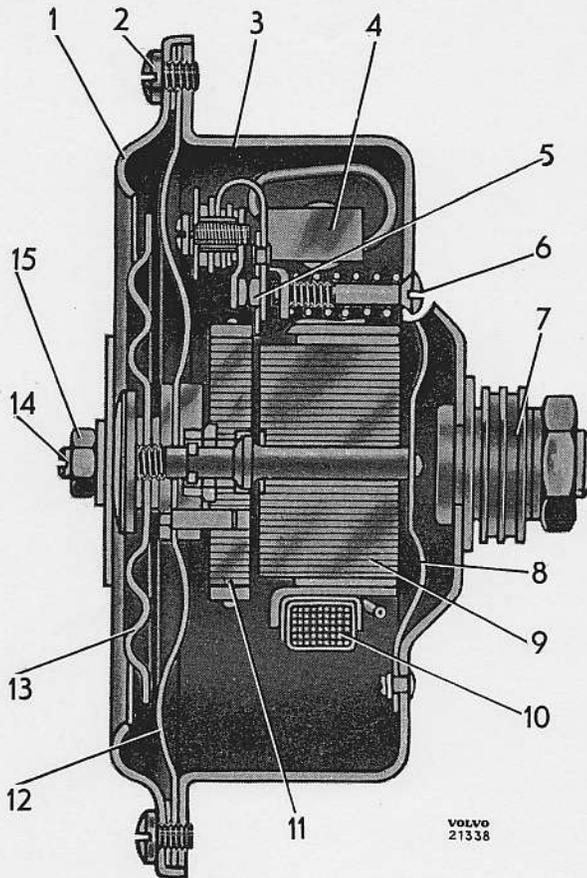


Fig. 4. Distributor.

1. Cover
2. Rotor arm
3. Breaker contacts
4. Breaker plate
5. Breaker cam
6. Spring
7. Governor weight
8. Distributor housing
9. Vacuum governor
10. Diaphragm
11. Link rod
12. Spring
13. Control arm
14. Flange
15. Pin
16. Condenser
17. Distributor shaft
18. Felt packing
19. Screw
20. Flat washer
21. Insulating washer
23. Nut
24. Brush

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1. Cover
2. Screw
3. Housing
4. Condenser
5. Contact breaker
6. Contact adjusting screw
7. Attachment
8. Leaf spring
9. Soft iron core
10. Winding
11. Armature plate
12. Diaphragm
13. Vibrating disc
14. Adjusting screw
15. Lock nut

Fig. 5. Horn (Bosch).

## Lighting

Lighting consists of headlights which can be dimmed, flashing direction indicators and parking lights, rear lights and number plate lights.

The headlights are mounted in the mudguards. They are switched on and off by the main lighting switch on the instrument panel. The headlights are dimmed by means of the foot switch on the floor. The headlights receive current direct from the battery via the control relay fitted beside the radiator. This is to reduce the voltage drop in the circuit to a minimum. The lighting switch is used only for operating the relay. On vehicles with effect from chassis number 21000 the headlights receive current direct from the lighting switch.

The parking lights are located underneath the headlights and contain bulbs for the parking lights, direction indicator lights and long-time parking lights.

## Switches

The lighting switch consists of a combined pull and turn switch. The car lighting is switched on by pulling out this switch and the strength of the instrument lighting can be adjusted by turning it. The direction indicator switch is fitted on the steering column. This switch is self-cancelling.

The switch for the heater is placed beside the heater controls. The switch has positions for both half-speed and full-speed for the fan motor in the heater body.

The windscreen wiper switch is also provided with positions for full and half speeds.

## Horns

The horns, Fig. 5, are fitted in front of the radiator. One of these horns gives a high-frequency note. Operation is by means of the horn ring fitted on the steering wheel. When the ring is depressed a relay is engaged which supplies current to the horns.

## Windscreen wipers

The windscreen wipers are driven by an electric motor. The motor is connected to the wiper blades via a gear and linkage mechanism. The motor has two speeds which can be selected by means of the switch on the instrument panel. The windscreen wipers are self-parking.

## Fuses

There are two types of fuse. These consist partly of melt-type fuses fitted on porcelain or bakelite bodies and partly of a thermal fuse built into the lighting switch.

The latter protects the parking lights, brake lights, glove compartment light, windscreen wipers, roof light and clock. The former individual fuses are grouped in a fusebox fitted to the right on the mounting board underneath the bonnet. A plate under the fusebox indicates which components these protect.

## Instruments

The speedometer is of the eddy current type and is driven by a cable from the gearbox. The fuel

gauge indicates the quantity of fuel in the tank. The gauge is operated by a level indicator fitted in the tank.

## Control lamps

The charging control lamp should extinguish when the engine is running. This shows that the dynamo is charging the battery. If the lamp lights this means that some fault has arisen in the dynamo. At low engine speeds (idling speed) it is normal for the lamp to light.

The oil pressure control lamp receives current from the starter switch via the fusebox and is earthed by means of an oil pressure control unit fitted in the engine. When the engine is running and the oil pressure is normal, contact between the lamp and earth via the pressure control unit is broken. When the oil pressure falls below a predetermined figure, the control unit closes the circuit and the lamp lights.

The control lamp for the direction indicators flashes when one of the signals is switched on. When the headlights are on "full" the control lamp for same lights with a weak blue glow.

## REPAIR INSTRUCTIONS

### Battery

#### Maintenance

See under "Battery" in the general section, Part 10 B.

#### Removal

1. Remove cable clamps from battery terminals. Use a puller if the clamps are very tight.
2. Loosen the wing nuts on the retainer band and lift out the battery.
3. Brush off the battery with a brush and rinse clean with tepid water.
4. Clean the battery shelf and the cable clamps. Use a wire brush or special pliers on the cable clamps.

#### Installation

1. Place the battery in position. Ensure that it is turned the right way. Tighten in position by means of the retainer band and the wing nuts.
2. Tighten the cable clamps on the battery terminals. The negative terminal is earthed.
3. Smear terminals and cable clamps with vaseline.

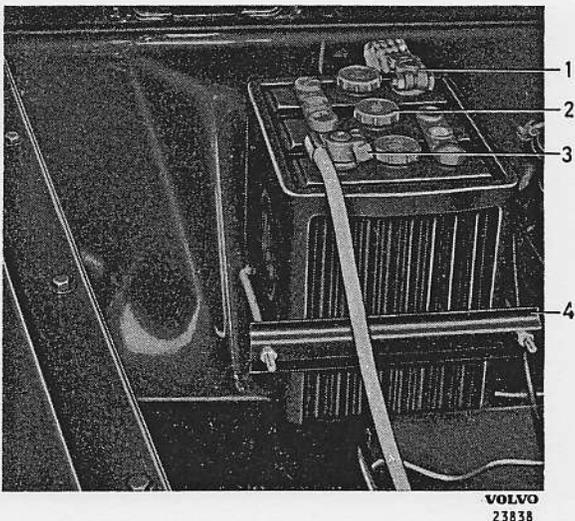


Fig. 6. Battery.

1. Earth cable
2. Filling stopper
3. Lead to starter motor
4. Retaining band

### Dynamo

#### Precautions before removing

See under "Dynamo" in the general section, Part 10 B.

#### Removal

1. Remove cable clamp from battery negative terminal.
2. Disconnect cables from dynamo.
3. Loosen the V-belt tension device and lift off V-belt.
4. Remove the two bolts attaching dynamo to engine and remove.
5. Clean dynamo externally with a cloth soaked in petrol. For dynamo overhaul, see general section, Part 10 B.

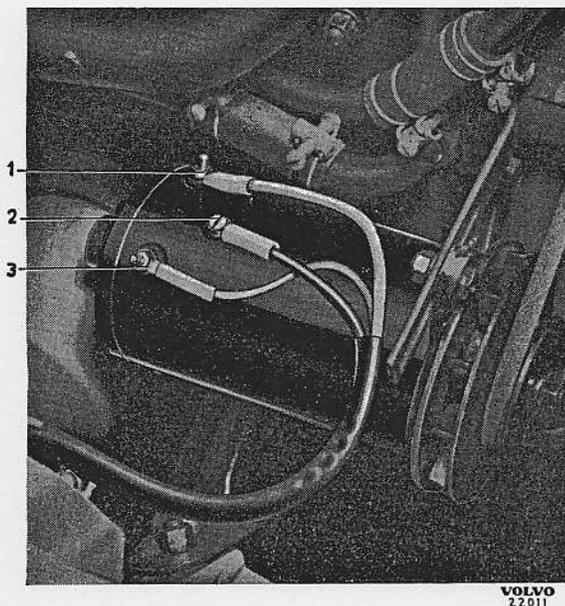


Fig. 7. Dynamo connections.

1. Dynamo positive, D+
2. Earth lead
3. Dynamo field, DF

#### Installation

Installation is carried out in the reverse order to removal. The attachment bolts should be secured by means of lock washers or locknuts and split pins.

## Adjusting the fan belt

1. Turn the engine by means of the fan in its direction of rotation until compression resistance is felt.
2. Attach a spring balance as shown in Fig. 8 and pull on this. When the belt is correctly tensioned the belt pulley should begin to slip round at a pull of 5.5—6.5 kg. (12.1—14.3 lb.).
3. Adjust belt tension if necessary. Recheck the slipping moment.

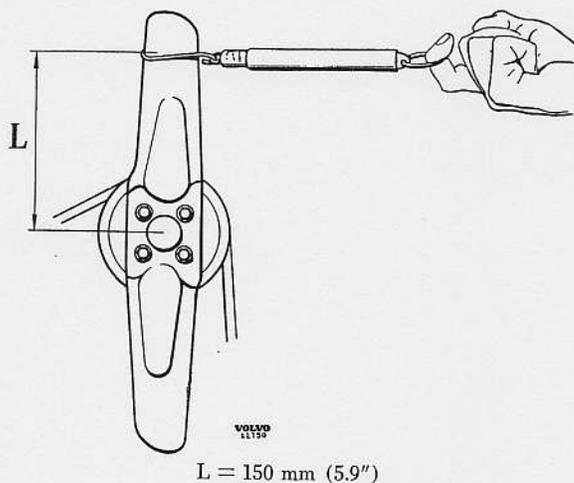


Fig. 8. Checking belt tension.

## Charging relay

### Adjustment in car

See under "Charging relay" in general section, Part 10 B.

### Removal

1. Disconnect the three cables from the charging relay.
2. Remove relay from bulkhead.
3. Clean thoroughly externally.

### Installation

1. If the relay is to be replaced, make sure that the correct type is fitted.
2. Screw into position on the bulkhead.
3. Connect the cables. The cable from the dynamo armature terminal is connected to the terminal marked A, from the dynamo field terminal to the terminal marked F, and from the battery to Bat.

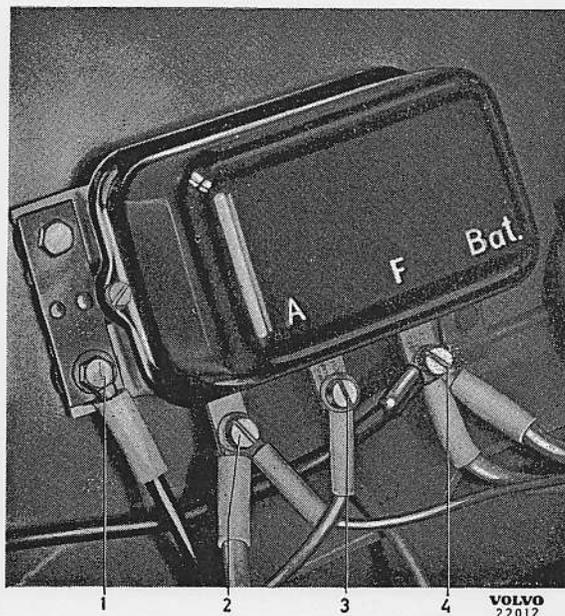


Fig. 9. Charging relay connections.

1. Earth cable
2. Dynamo positive and control lamp, A
3. Dynamo field, F
4. Battery, lighting relay and starter switch, Bat.

## Starter motor

### Precautions before removal

See under "Starter motor" in the general section, Part 10 B.

### Removal

1. Remove cable clamp from battery negative terminal.

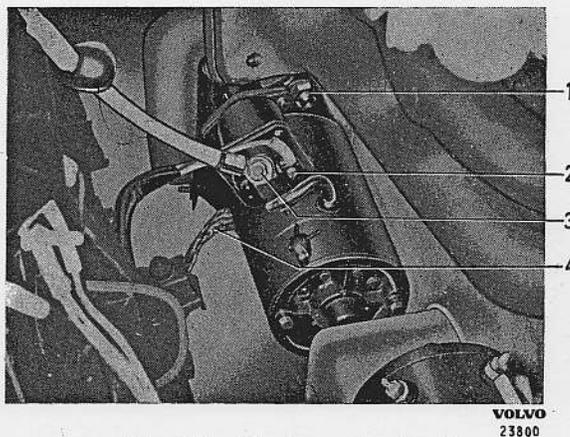


Fig. 10. Starter motor fitted.

1. Attaching bolt
2. Terminal for control lead
3. Battery lead
4. Earth lead

2. Disconnect the cables from the starter motor relay or solenoid switch.
  3. Remove the screws which hold the starter motor in position on the flywheel housing and remove it.
  4. Clean externally with a cloth soaked in petrol.
- For overhaul, see general section, Part 10 B.

### Installation

Installation is carried out in the reverse order to removal. Tighten nuts evenly but not too hard. Connect cables carefully.

## Distributor

### Removal

1. Lift off the distributor cover.
2. Mark the position of the rotor arm on the distributor housing.
3. Remove the primary lead, 3, Fig. 11.
4. Remove the vacuum line on the vacuum regulator.
5. Remove the bolt 6, Fig. 11, on the control arm and lift the distributor off.

### Installation

Installation is carried out in the reverse order to removal. If the engine has not been disturbed whilst the distributor has been removed, it is refitted in accordance with the marking under point 2 above.

### Adjusting the ignition

Concerning ignition adjustment, see Part 1, Engine.

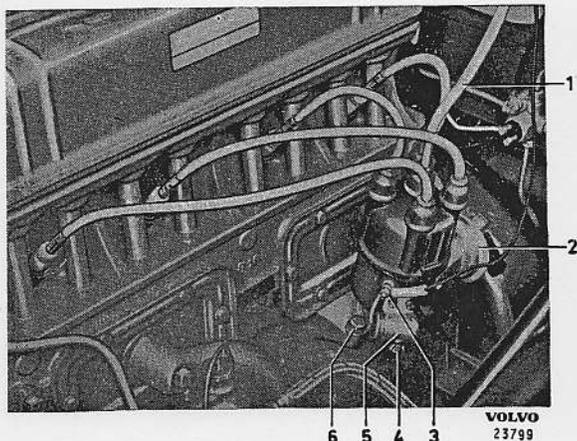


Fig. 11. Distributor fitted.

- |                    |                               |
|--------------------|-------------------------------|
| 1. Lead from coil  | 4. Adjusting screw            |
| 2. Vacuum governor | 5. Condenser                  |
| 3. Primary lead    | 6. Distributor attaching bolt |

## Headlights

### Replacement of headlights

If a headlight is to be completely dismantled or removed from the car, follow the instructions below. For partial dismantling, follow the relevant instructions.

1. Remove the screw for the headlight rim, see Fig. 12. Lift off the rim by pulling out the underpart slightly and then lifting it upwards.

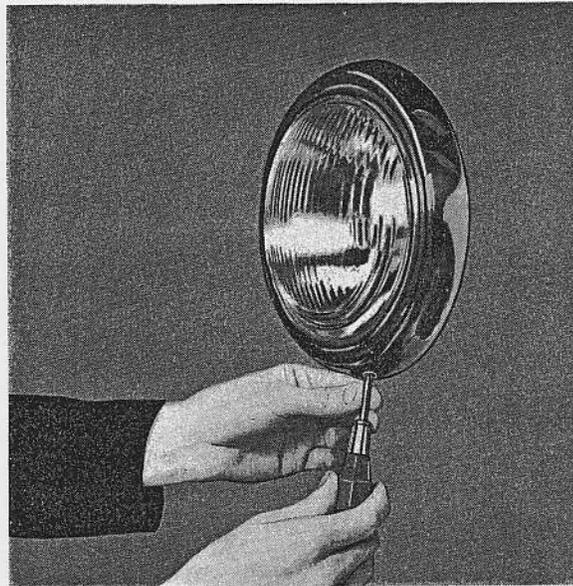
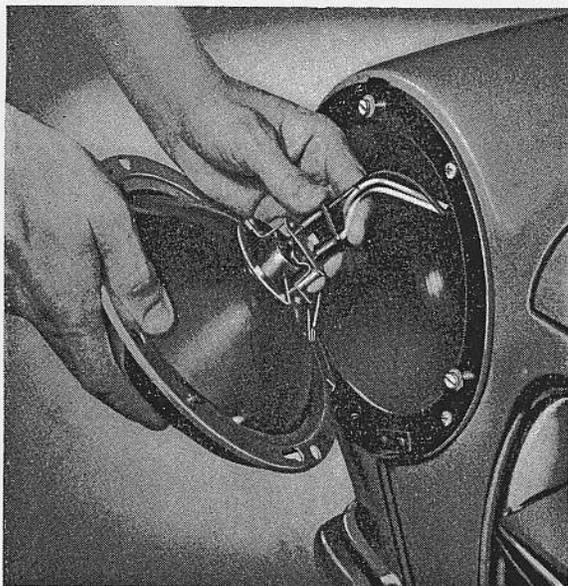


Fig. 12. Removing headlight rim.

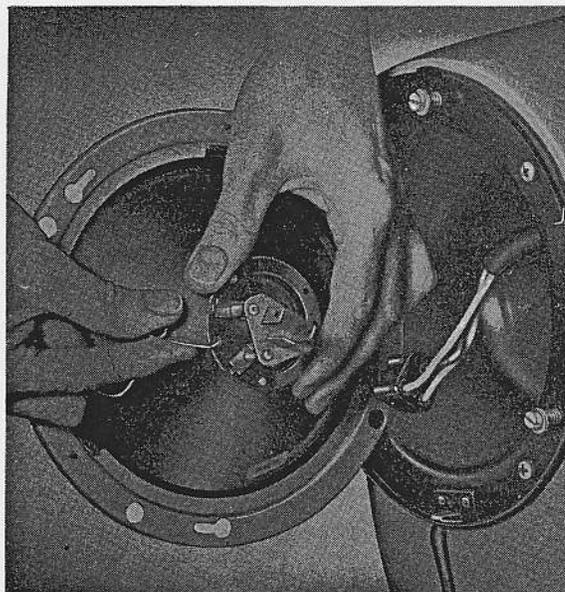


Fig. 13. Removing headlight insert.



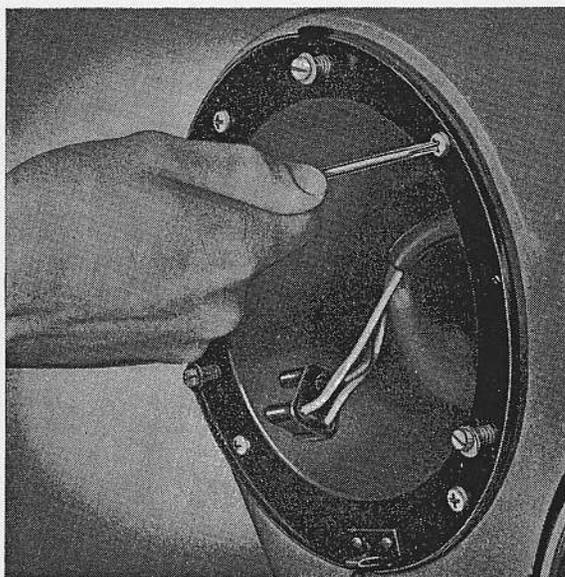
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Fig. 14. Disconnecting leads from headlight insert.



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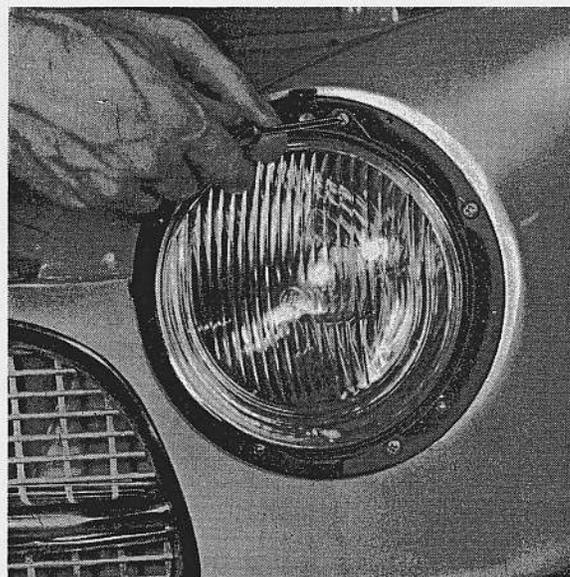
Fig. 16. Removing bulb holder spring.



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Fig. 15. Removing headlight casing.

2. Turn the headlight to the left, see Fig. 13, and lift out the insert.
3. The leads are disconnected from the bulb holder by pulling the contact plug straight out from the bulb holder, see Fig. 14. Also disconnect the leads in the engine compartment.
4. Unscrew the four screws which hold the casing to the mudguard and lift it out, see Fig. 15, together with the headlight lead.



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Fig. 17. Removing retaining ring.

### Replacement of headlights, late production

1. Remove the screw for the headlight rim, see Fig. 12. Remove the rim by pulling out the lower part slightly and then lifting it upwards.
2. Unscrew the screws for the headlight insert retaining ring a few turns, see Fig. 17. Turn the retainer until the hooks release from the screws and lift out the retainer and insert with bulb holder.



Fig. 18. Removing contact plug.

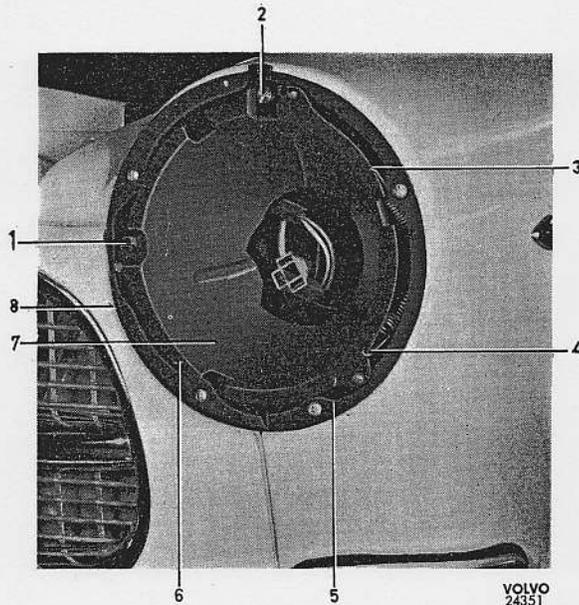


Fig. 19. Headlight bowl.

3. Disconnect the contact plug from the bulb holder by pulling it straight out as shown in Fig. 18.
4. Unscrew the headlight adjusting screws (1 and 2, Fig. 19) 8—10 turns. Unhook the springs (3—6) from the headlight bowl (7). Lift the the headlight bowl from the casing (8).
5. Remove the springs and adjusting screws from the casing.
6. Remove the casing from the mudguard and pull out the cable and rubber bushing.
7. Fitting is done in the reverse order. Ensure

that the leads are connected correctly and that the screws are tightened carefully.

### Replacement of bulbs

1. Proceed as shown in points 1—3 under the heading "Replacement of headlights".
2. Lift off the spring which holds the bulb holder to the body and take out the bulb holder, see Fig. 16. Then remove the old bulb.
3. Fit the new bulb. This is done as shown in Fig. 20. Do not touch the glass with the fingers but just pull the socket as far out of the carton as is necessary to fit the bulb.
4. Fitting is done in the reverse order to removing.

### Alignment of headlights

From a traffic safety point of view it is of the utmost importance that the headlights are adjusted in accordance with the regulations in force.

Adjusting early production headlights is done by turning the three screws as indicated by the arrows in Fig. 21. On late production headlights, adjusting is carried out by turning the screws 1 and 2, Fig. 19.



Fig. 20. Fitting bulb.

### Flashers and parking lamps

1. The glass is removed by unscrewing the two screws in the rim, see Fig. 22.
2. Then unscrew the screw which holds the body and pull this out.

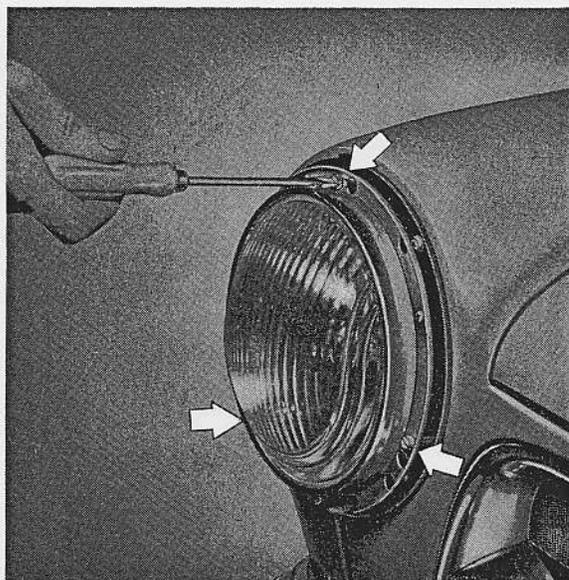


Fig. 21. Adjusting headlights.

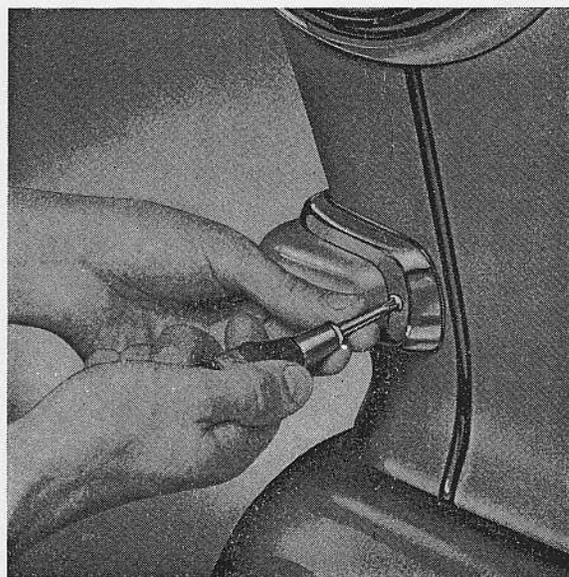


Fig. 22. Removing rim for parking lamp.

3. The bulb is now accessible for replacement. Use the bulb carton as protection for the bulb when fitting.

## Rear lamp

### Replacement of rear lamp (glass)

1. Unscrew the four nuts from inside the luggage compartment, see Fig. 26.
2. Then pull the reflector inwards in the luggage compartment and the glass outwards.

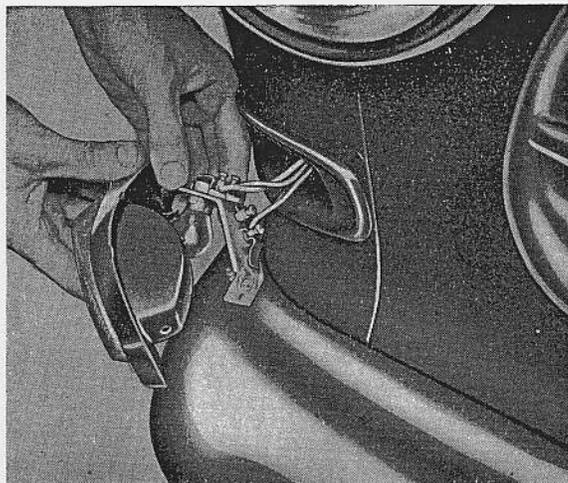


Fig. 23. Parking lamp removed.

Fitting is done in the reverse order, but ensure that the rubber gasket seals properly against the mudguard and that the toothed washers are between the reflector and mudguard. Without these there will be no or only poor earthing of the bulbs.

### Replacing the bulbs

The bulbs are accessible for replacement from inside the luggage compartment. The bulb holder is removed by bending the contact to one side, see Fig. 27. Fit the new bulb without touching the glass with the fingers. Use the protecting carton.

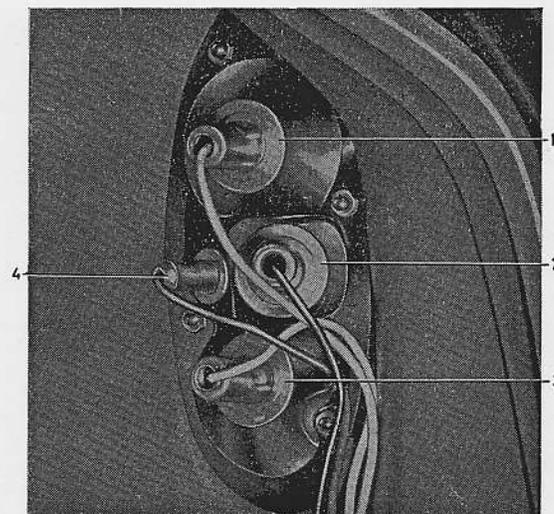


Fig. 24. Position of bulbs in rear lamp, early production.

- |               |                      |
|---------------|----------------------|
| 1. Flasher    | 3. Stop light        |
| 2. Rear light | 4. Long-time parking |

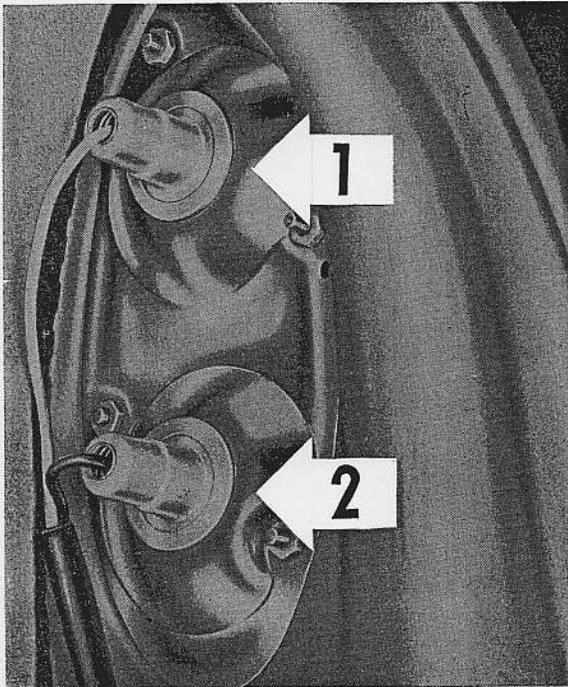


Fig. 25. Position of bulbs in rear lamp, late production.

- 1. Flasher
- 2. Rear light and stop light

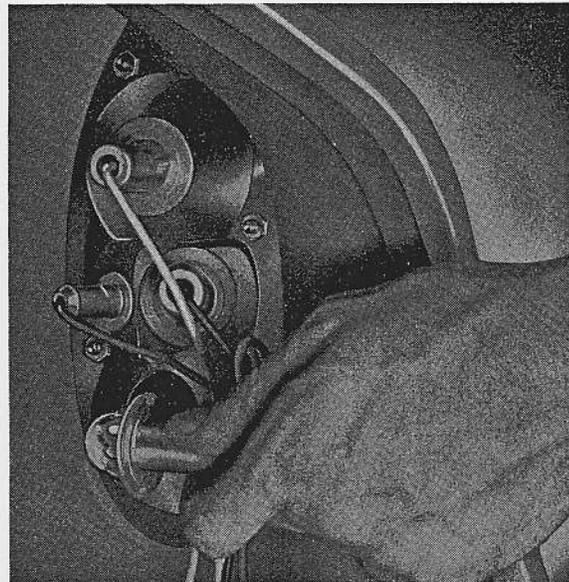


Fig. 27. Removing bulb.

## Number plate light

### Replacing the number plate light

The number plate light is accessible for replacement after the protective paper lining on the inside of the luggage compartment lid has been removed. The two screws which hold the combined lifting handle and number plate light are then removed. The screws are accessible from inside the luggage compartment lid. The bulb and leads do not have to be removed.

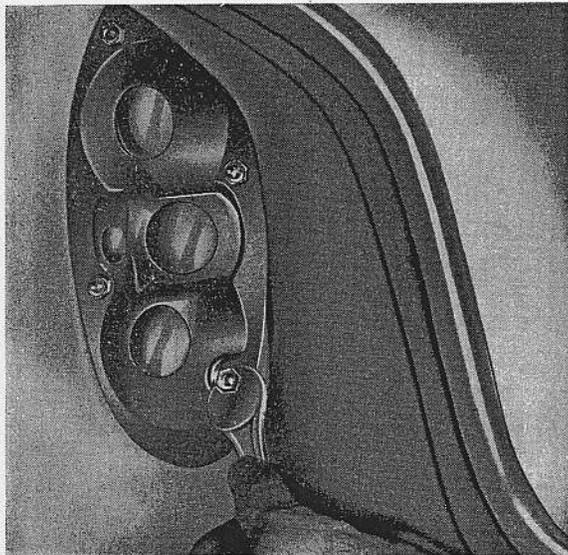


Fig. 26. Dismantling rear lamp (bulbs removed).

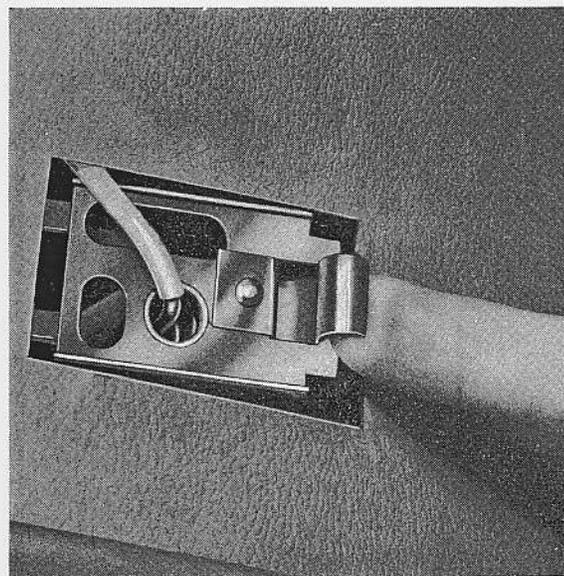


Fig. 28. Removing bulb, early production.

## Replacing the bulb

The bulb is accessible for replacement from inside the luggage compartment lid. The bulb holder is removed by pressing the spring on one side inwards towards the bulb holder, see Fig. 28.

When replacing the bulb do not touch the actual bulb with the fingers but use the protecting carton.

On late production number plate lights (with effect from chassis number 21000), the bulb is placed as shown in Fig. 29.

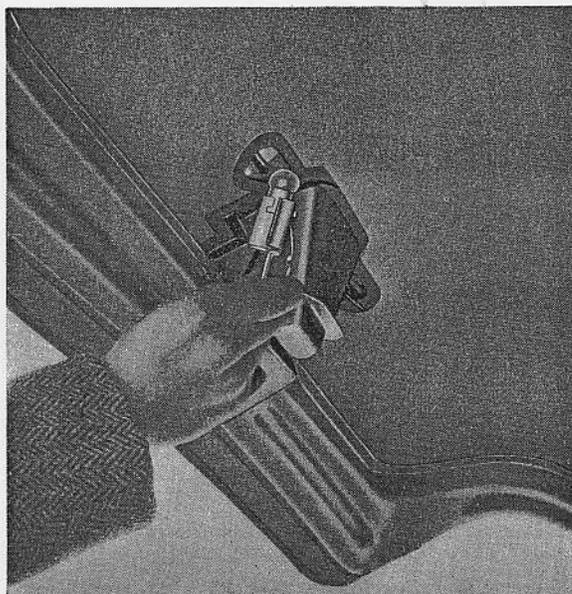


Fig. 29. Removing bulb, late production.

## Instrument and interior lighting

Instrument lighting consists of two bulbs fitted to the instrument unit and is accessible from the reverse side of the instrument panel.

The four control lamps are also fitted in the instrument unit. All control lamps are accessible for replacement from the reverse side of the instrument panel.

Interior lighting consists of a lamp in the roof. The bulb for this is accessible for replacement after the glass has been removed.

Lighting for the glove compartment is operated by means of a separate switch.

The bulb for this is accessible for replacement from the reverse side of the instrument panel.

## Lighting switch

### Early production

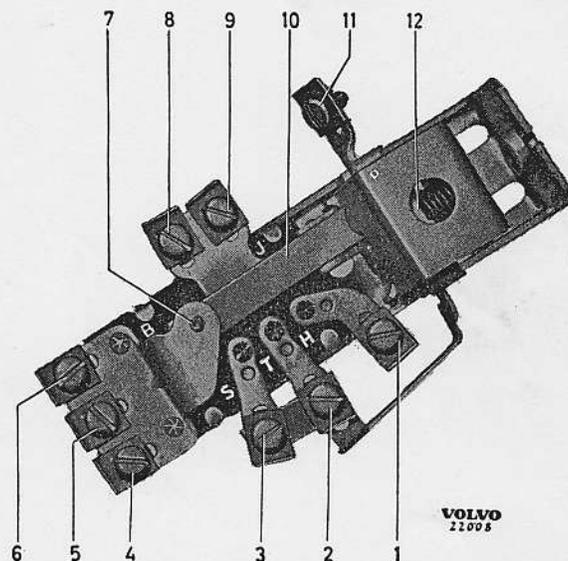


Fig. 30. Lighting switch connections.

- |  |  |
|--|--|
| 1. Full and dimmed headlights              | 7. Breaker contact for thermal fuse              |
| 2. Rear light                              | 8. Live lead from starting switch                |
| 3. Parking light                           | 9. Cigarette lighter                             |
| 4. Windscreen wiper                        | 10. Bimetal spring                               |
| 5. From charging relay, live lead          | 11. Instrument lights                            |
| 6. Brake light and long-time parking light | 12. Rheostat for controlling instrument lighting |

The pull switch for the headlights has three positions: off, parking and full and dimmed headlights. In addition, by turning the knob the strength of the instrument lighting can be controlled.

The switch is removed from the instrument panel as follows:

1. Disconnect the earth lead from the battery.
2. The pull rod is removed by setting the switch to the full headlight position, after which the catch on the switch is pressed in, see the arrow on Fig. 31, and the pull rod pulled out.
3. The nut under the pull rod knob is screwed off. When doing so, ensure that the instrument panel and nut are not damaged.
4. The leads are marked and disconnected.

### Late production

With effect from chassis number 21000 a new lighting switch has been introduced.

The switch is removed from the instrument panel as follows:

1. Remove the knob by unscrewing it.

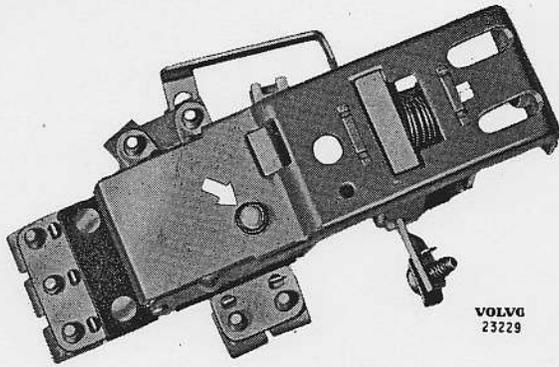


Fig. 31. Lighting switch with pull rod catch.

2. Unscrew the nut holding the lighting switch with a suitable tool, see Fig. 32.
3. Lift off the switch by first pulling it backwards and then downwards. See Fig. 33.
4. The special cable terminals are removed by being pulled out from the cable retainer in the contact.

The foot dimmer switch has two positions: full headlights and dimmed headlights. The switch is accessible for replacement after the rubber mat has been lifted up.

By means of a simple re-wiring operation, the foot dimmer switch can also be used for connecting between parking lights and dimmed headlights. This is preferably done as follows but only applies to cars up to chassis number 20999.

1. Disconnect the bar between H and T on the relay and remove this, see Fig. 34.
2. Re-connect the leads to the respective relay terminals.
3. Disconnect the grey lead which is connected to

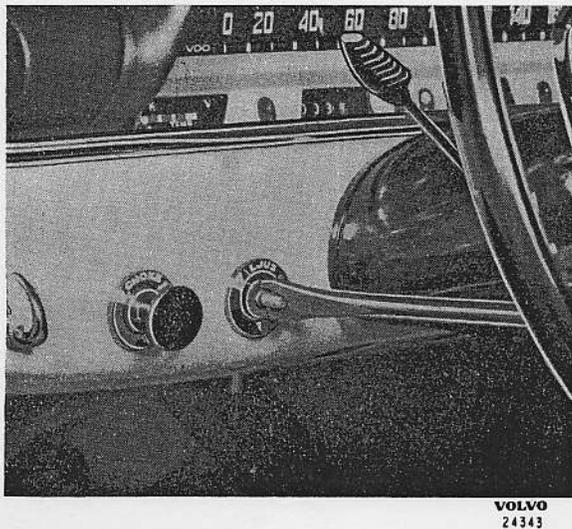


Fig. 30. Removing lighting switch.

terminal H on the lighting switch and move this to terminal T, see Fig. 30.

If the lighting switch is now pulled out one step, the foot dimmer switch can be used for switching between dimmed headlights and parking lights, and if the lighting switch is pulled out fully, for switching between dimmed and full headlights.

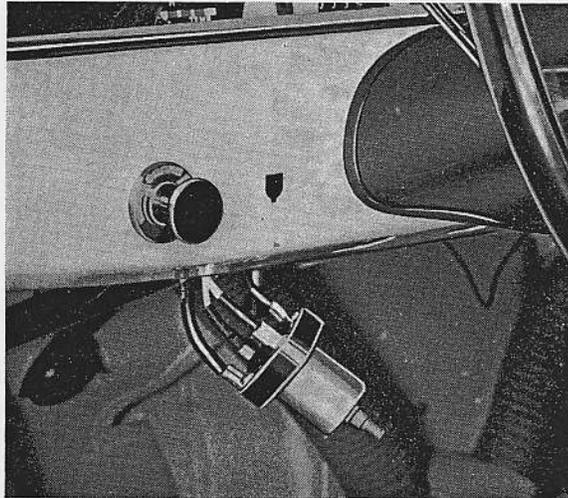


Fig. 33. Lighting switch removed.

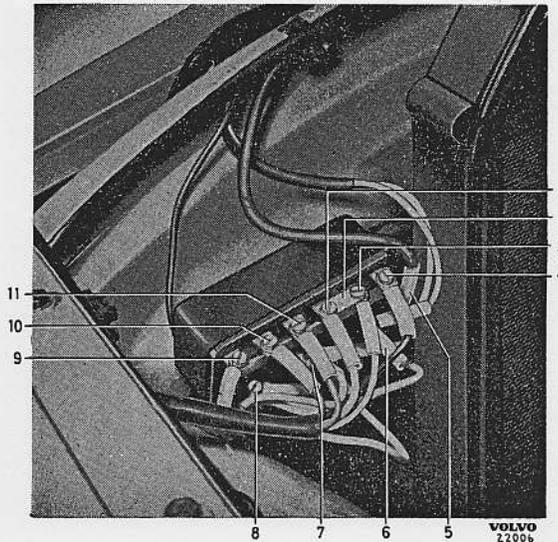


Fig. 34. Control relay connections.

1. From H on lighting switch, yellow lead
2. Connecting bar
3. From H on lighting switch, grey lead
4. From foot dimmer switch, for controlling dimmed headlights
5. From charging relay, live lead
6. To headlights, dimmed
7. To headlights and control lamp, full
8. To horn
9. From horn button
10. From fusebox, live lead (horn relay control current)
11. From foot dimmer switch, for operating full headlights

## Direction indicator switch

### Removal and installation

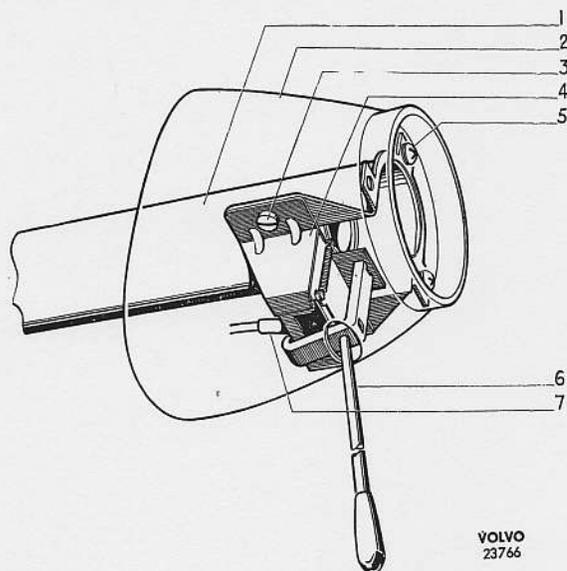


Fig. 35. Direction indicator switch.

- |                |           |                  |
|----------------|-----------|------------------|
| 1. Jacket tube | 4. Switch | 6. Control lever |
| 2. Casing      | 5. Screw  | 7. Earth lead    |
| 3. Screw       |           |                  |

1. Remove the steering wheel in accordance with the instructions in Part 6.
2. Remove the three screws (5, Fig. 35) which hold the casing to the jacket tube and lift this up. Remove the leads on the underside of the switch. These are removed by pulling them out from their retainers.
3. Remove the two screws which hold the switch to the jacket tube.

The position of the switch is adjusted by turning the jacket tube. Concerning this, see Part 6.

Concerning connecting the leads, see Fig. 38.

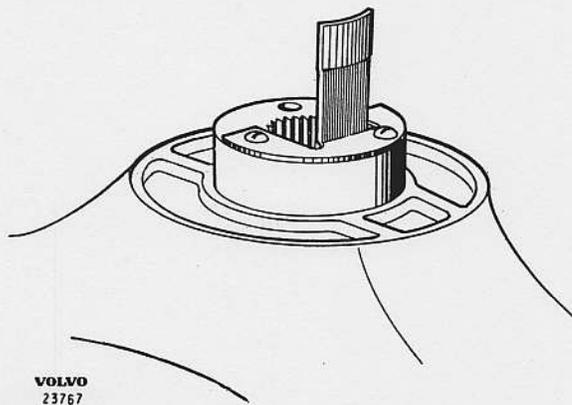


Fig. 36. Actuator for direction indicator switch, early production.

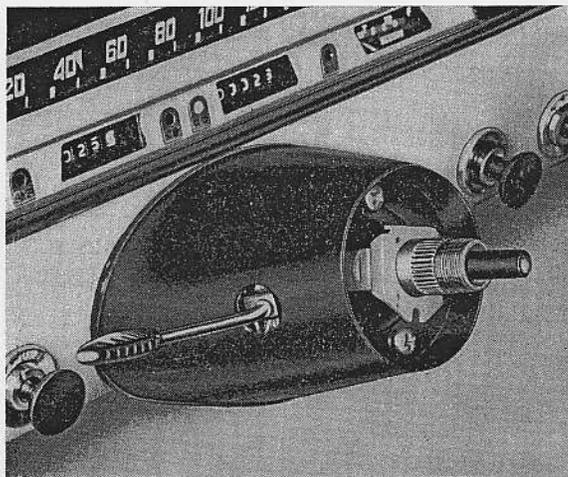


Fig. 37. Actuator for direction indicator switch, late production.

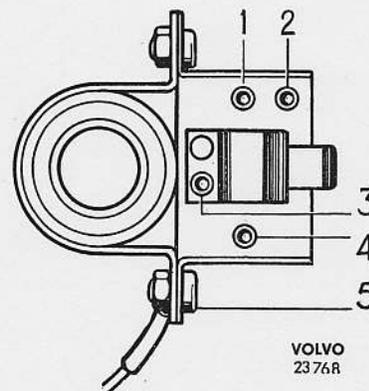


Fig. 38. Connection of direction indicator switch (viewed from underneath).

- |                     |                           |
|---------------------|---------------------------|
| 1. Right flasher    | 4. Lead from flasher unit |
| 2. Left flasher     | 5. Earth lead             |
| 3. Headlight signal |                           |

## Horn

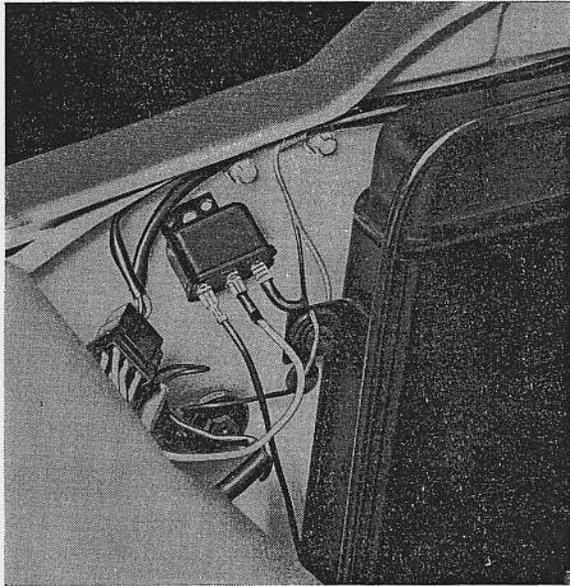
### Examination and adjustment

See under the heading "Horn" in the general section, Part 10 B.

### Removal and installation

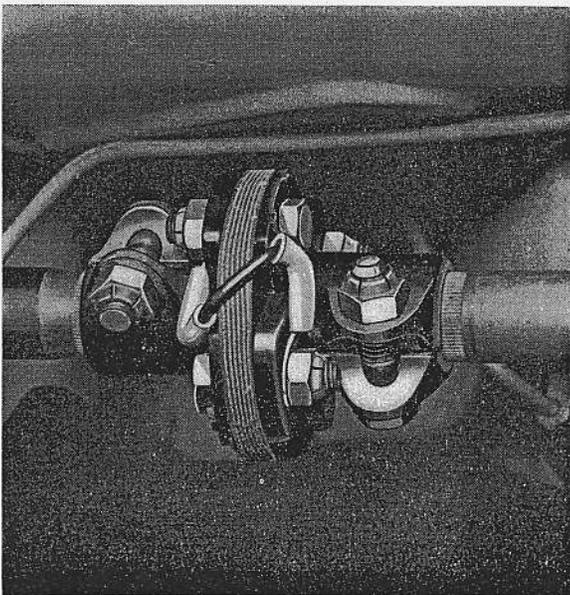
The horns are fitted to the body by means of studs and rubber bushings. When fitting, ensure that the rubber bushings are not deformed or otherwise damaged. The horns are earthed by means of a short lead bolted to the body. When tracing faults and installing, ensure that this lead makes good contact as otherwise the function of the horns can be impaired.

On early production cars the horns obtain current from the horn relay, see Fig. 39. This relay is integrally built with the lighting relay. In the case of damage, the whole relay must be replaced. The horn relay is operated by a horn ring fitted on the steering wheel. The ring is removed by loosening the two screws on the underside of the steering wheel, after which the ring can be lifted up. The lead in the steering column can be pulled out for replacement after the connection on the steering box has been removed.



VOLVO  
24903

Fig. 39. Horn relay, late production.



VOLVO  
23232

Fig. 40. Junction over steering column coupling disc.

The steering column is divided and fitted in the middle with a rubber coupling disc. A junction is fitted over the coupling disc and when carrying out adjustments to the horn, ensure that this fits securely and makes good contact, see Fig. 40.

## Windscreen wiper

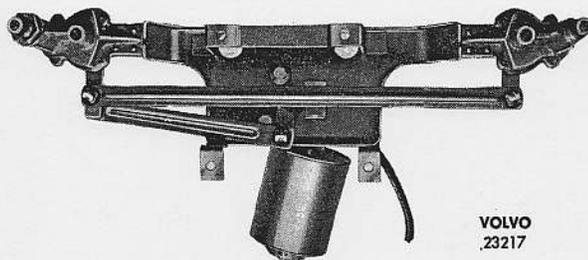
### Removal and installation

1. Pull off the wiper arm.
2. Unscrew the two outer nuts and lift off the washer and seal.
3. Mark the leads and disconnect them.
4. Unscrew the four screws which hold the wiper to the body and lift it off, see Fig. 42.

Fitting is done in the reverse order to removal. Ensure that the seals are undamaged.

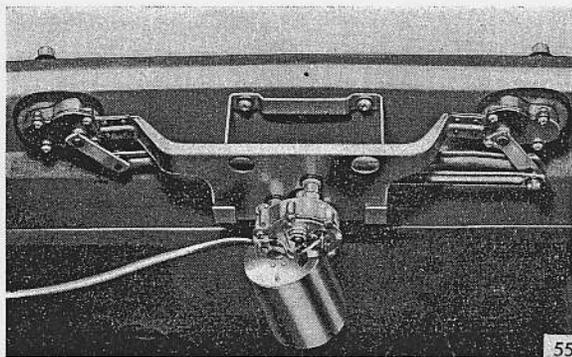
### Lubricating the windscreen wiper mechanism

Bushings and toothed segments on the wiper linkage system are made of nylon and are lubricated during assembly. The linkage arms and nylon segment do not require periodical lubrication and need only be lubricated in conjunction with replacement of the gear wheels.



VOLVO  
23217

Fig. 41. Windscreen wiper.



VOLVO  
23233

Fig. 42. Windscreen wiper fitted.

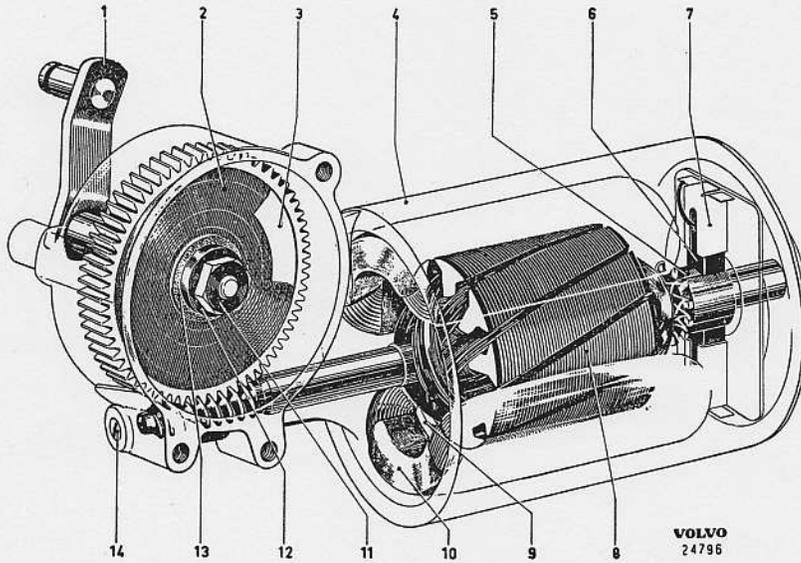


Fig. 43. Windscreen wiper motor, Auto-Lite.

1. Pin
2. Contact disc
3. Gear wheel
4. Stator
5. Commutator
6. Brush
7. Brush holder
8. Rotor
9. Pole shoe
10. Field coil
11. Nut
12. Steel washer
13. Insulating washer
14. Adjusting screw

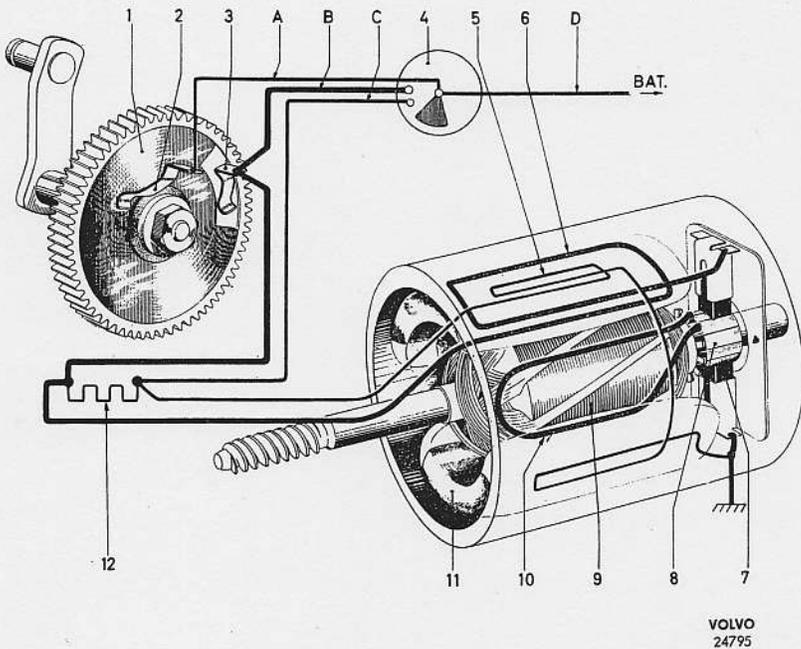


Fig. 44. Wiring diagram for windscreen wiper motor Auto-Lite.

1. Contact disc
2. Contact strip
3. Contact strip
4. Switch
5. Shunt winding
6. Series winding
7. Brush
8. Commutator
9. Rotor
10. Rotor winding
11. Field coil
12. Resistance

Lead colours:

- A Green
- B Black
- C Red
- D Live lead

### Reversing the self-parking mechanism

When delivered from the factory the windscreen wiper parks to the right viewed from the driving position. The parking position can be reversed by turning the contact disc (2, Fig. 43) through 180°

(Auto-Lite wiper). To do this, first remove the nut (11), the steel washer (12), and the fibre washer (13), after which the contact disc (2) on Fig. 43 can be lifted up and turned. The SWF wiper is reversed by removing the pin (1, Fig. 43) and turning it through 180°.

## Electric leads

The wiring diagram shows how the various components are connected together and also shows the marking and cross-sectional area of the different leads. The leads are of different colours in order to facilitate fitting and fault tracing. When carrying out fault tracing it is important that this should be done in accordance with the wiring diagram. If breakage or earthing occurs in a lead it should be replaced.

When doing so it is important that the new lead has at least the same area as the old one. Too small an area can lead to overloading and dangerous overheating of the lead.

### Leads for extra equipment

For fitting extra equipment at the rear of the car, for example, a rear window fan and a reversing light, two leads are included in the cable harness. The cable harness is fitted along the roof of the car under the headlining. The extra leads are accessible under the instrument panel as shown in Fig. 46, and at the rear in the luggage compartment as shown in Fig. 45.

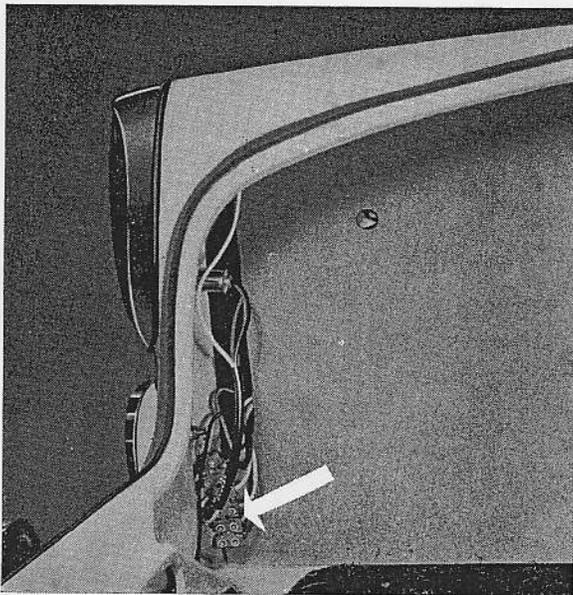


Fig. 45. Junction piece for stop light, rear light, direction indicator and leads for extra equipment.

## Fuses

### Up to chassis number 20999

The fuses consist partly of 8 melt-type fuses fitted in a fusebox and partly of a thermal fuse fitted in the lighting switch.

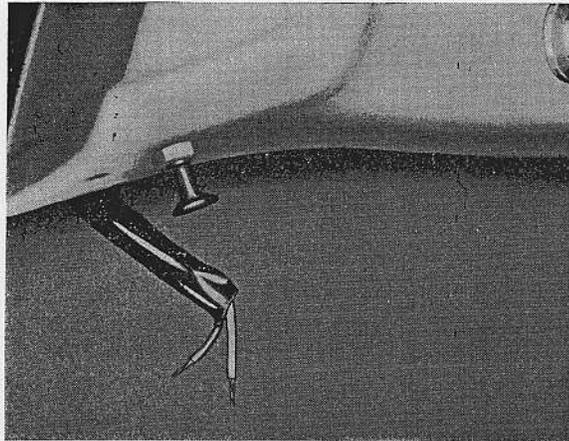


Fig. 46. Leads for extra equipment.

The melt-type fuses in the fusebox should be replaced when they are damaged. The fuses must never be repaired or replaced by nails, iron wire and so on.

The thermal fuse in the lighting switch breaks when short circuiting or overloading occurs. When this happens the powerful current thus caused passes through the bimetal spring and heats it up so that it bends and thus breaks connection between the contacts.

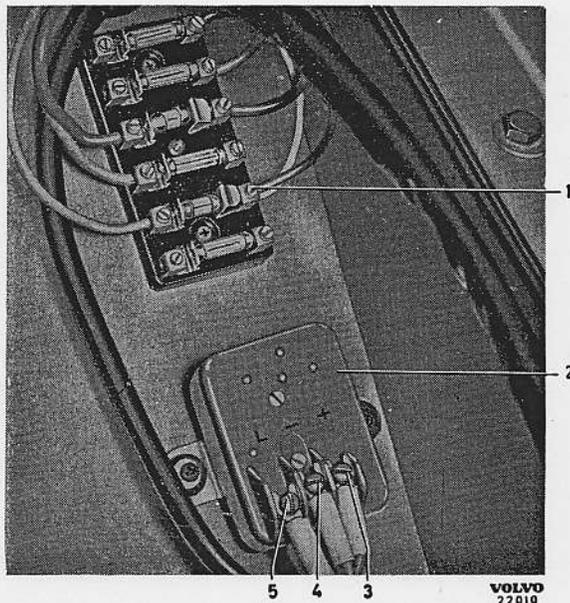
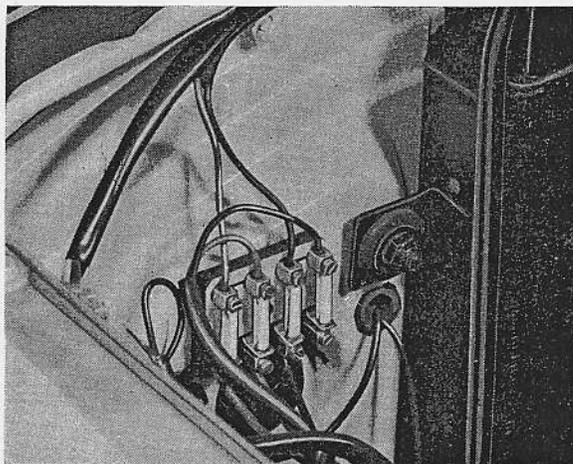


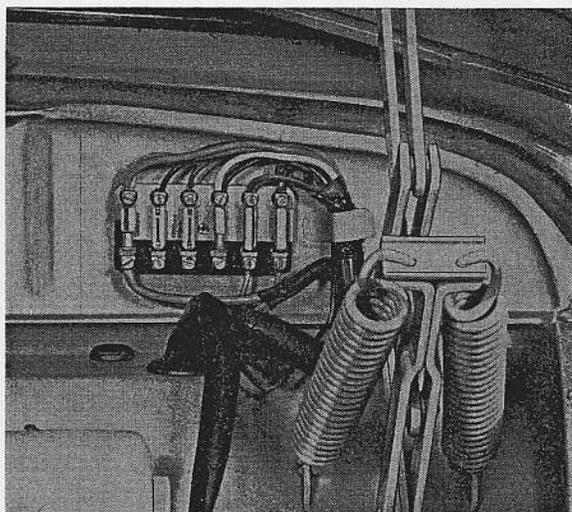
Fig. 47. Fuses up to chassis number 20999.

1. Fusebox
2. Unit for light signal
3. Live lead
4. Lead from light signal knob
5. Lead from headlights

VOLVO  
24319

*Fig. 48. Fuses for full and dimmed headlights, with effect from chassis number 21000 up to chassis number 42999.*

During the time when the contacts are broken (when no current passes), the spring cools and the contacts are reconnected. If the short circuit or overloading persists, breakage occurs again. The contacts will be broken repeatedly as long as short circuiting remains. When repairing, the short circuit must not be allowed to remain on during the whole of the fault tracing time as the fuse can be damaged by this. If the fuse is damaged, then the whole lighting switch must be replaced.

VOLVO  
24916

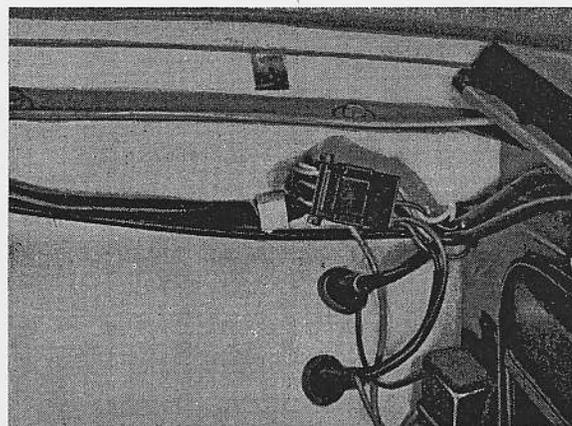
*Fig. 49. Fuses with effect from chassis number 43000.*

### With effect from chassis number 21000 up to chassis number 42999

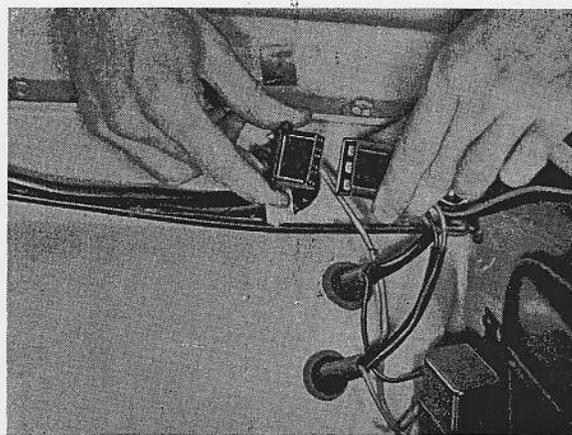
In connection with introducing the new type lighting switch, a fusebox with four fuses, Fig. 48, has been placed beside the radiator. The fuses are connected in pairs, that is to say, separate fuses for full headlights and dimmed headlights.

### With effect from chassis number 43000

The above-mentioned fusebox is discontinued and replaced with a plug and socket contact as shown in Fig. 48. The contact is pulled apart as shown in Fig. 51.

VOLVO  
24341

*Fig. 50. Plug and socket contact for full and dimmed headlights.*

VOLVO  
24342

*Fig. 51. Plug and socket contact pulled apart.*

## Heater

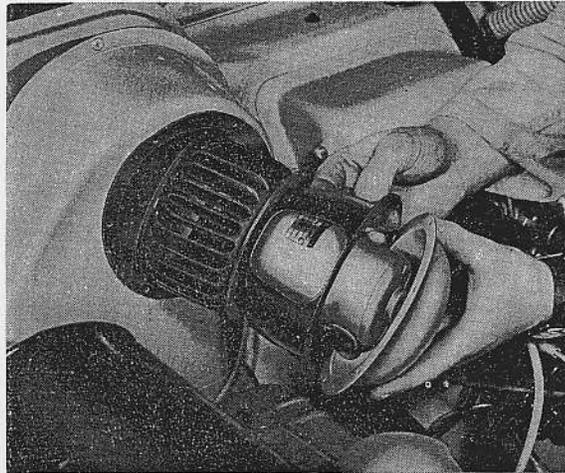
Concerning the function and method of operation of the heater, see Part 11.

### Removing the fan motor

#### Late production

1. Disconnect the live lead on the connecting piece.
2. Unscrew the six screws which hold the fan motor to the radiator casing and lift it out as shown in Fig. 52.

Fitting is done in the reverse order. The fan motor is provided with self-lubricating bushings so that lubricating need not be carried out at set intervals but only in connection with re-conditioning.



VOLVO  
24908

*Fig. 52. Removing the heater fan motor.*

## SPECIFICATIONS

### Battery

Type .....	SAAJ GH 13—6, Tudor 3 Df6 or corresponding
Earth .....	Negative terminal
Voltage .....	6 volt
Battery capacity, standard .....	85 amp. hr. (13 plates)
Electrolyte specific gravity, fully charged battery .....	1.275—1.285
Electrolyte specific gravity when charging is necessary .....	1.230

### Ignition system

Firing order .....	1—3—4—2
Ignition setting, B 16 A engine, 83 octane Research Method. ....	2° A.T.D.C.
87—97 octane Research Method. ....	2—4° B.T.D.C. (factory setting)
B 16 B engine, 93 octane Research Method. ....	4° B.T.D.C.
97 octane Research Method .....	6—8° B.T.D.C.
Ignition coil .....	Bosch ZS/KZ 1/6A (4/1)
Sparking plugs .....	14 mm thread Bosch W175T3 or corresponding
Sparking plug gap. ....	0.7—0.8 mm (0.028—0.032")
tightening torque. ....	3.5 kgm (25.3 lb.ft.)

### Distributor

Type .....	VJU 4 BR 20
------------	-------------

### Test values

Direction of rotation: Clockwise

Ignition advance curves

Centrifugal regulator

Crankshaft degrees .....	0	10	20	27±3
Crankshaft r.p.m. ....	400—800	700—1100	1600—2500	3100—3800

Vacuum regulator:

Crankshaft degrees .....	0	16±2°
Vacuum in. Hg. ....	0.276—0.551	1.969
Vacuum cm Hg. ....	7—14	50

Contact breaker gap .....	0.4—0.5 mm	(0.016—0.020")
Contact breaker pressure .....	0.4—0.5 kg	(14—17 ½ oz.)
Cam angle .....	50±3°	

### Dynamo

Type, B 16 A, early production .....	Bosch LJ/GG 200/6-2300 R6
B 16 A, late production .....	Bosch LJ/GG 200/6-2300 AR6
B 16 B, early production .....	Bosch LJ/GG 200/6 2300 R7
B 16 B, late production .....	Bosch LJ/GG 200/6 2300 AR7
Voltage .....	6 volt
Earth .....	Negative terminal
Output, continuous .....	Max. 49 amp.
Direction of rotation .....	Clockwise
Ratio, engine-dynamo .....	1: 1.8
Brushes, designation, 2 (R6 and R7) .....	WSK 40L8
(AR6 and AR7) .....	WSK 43L2

**Test values**

Brush spring tension.....	0.45—0.60 kg (16—21 oz.)
Field coil resistance .....	1.0±0.1 ohm
Dynamo as motor .....	8 amp at 5 volt
Charging, cold dynamo:	
6.0 volt 0 amp. ....	1500 r.p.m.
200 W .....	2350 r.p.m.
Charging, warm dynamo:	
6.0 volt 0 amp. ....	1500 r.p.m.
200 W .....	2400 r.p.m.

**Charging relay**

Type .....	Bosch RS/UA200/6/23
Balancing resistance AR .....	5.5—6.0 ohm
Control resistance W1 .....	3.2—4.0 ohm
Control resistance W2 .....	3.2—4.0 ohm

**Test values**

Cut-out relay:	
Air gap between magnet and armature (armature depressed) .....	0.3—0.5 mm (0.012—0.20")
Clearance between main contacts .....	0.5—1.2 mm (0.020—0.047")
Adjusted for cutting in at .....	6.3—6.7 volt
Adjusted for cutting out at (reverse current) .....	4—9 amp.
Voltage regulator:	
Air gap between magnet and armature .....	0.8—1.3 mm (0.032—0.050")
Clearance between upper contacts .....	0.25—0.4 mm (0.010—0.016")
Control current adjusted to (at idling and half field current) .....	7.0—7.5 volt
Current control:	
Air gap between magnet and armature .....	1.0—1.45 mm (0.039—0.057")
Control current adjusted to .....	47—51 amp. (warm dynamo)
Test values apply for an ambient temperature of about 20° C	

**Starter motor**

Type .....	Bosch EGD 0.6/6 AR 19
Voltage .....	6 volt
Earth .....	Negative
Direction of rotation .....	Clockwise
Output .....	0.6 h.p. at —10° C
	0.75 h.p. at 20° C
Number of teeth on pinion .....	9
Brushes, designation .....	DSK 35/5
number .....	4

**Test values**

Mechanical:	
Armature axial clearance .....	0.10—0.30 mm (0.006—0.012")
Brush spring tension .....	0.8—0.9 kg (28—32 oz.)
Distance from pinion to flywheel ring gear .....	2.5—3.0 mm (0.098—0.118")
Armature brake friction torque .....	3—5 kgcm (2.61—4.34 lb.in.)
Pinion idling torque .....	1.3—1.8 kgcm 1.13—1.56 lb.in.) (with AKF pinion)

Electrical:

No load:	
Check time .....	max. 15 secs.
5.5 volt and 60—80 amp. ....	4000—6000 r.p.m.
Loaded starter motor:	
4.5 volt and 260 amp. ....	700—1000 r.p.m.
Locked starter motor:	
r.p.m. = 0 .....	3.5 volt and 450—500 amp.

Solenoid

Type .....	SSM 120 L 15 (early) SSM 120 L 45 (late)
Test values:	
Current consumption of coil:	
Between terminal 50 and earth .....	15 amp. at 6.0 volt
Between terminal 50 and 30 .....	60 amp. at 6.0 volt
Operating voltage, cutting in .....	max. 3.5 volt
cutting out .....	0.6—0.8 volt
Distance "a" (see Fig. 31) .....	32.2 ± 0.1 mm (1.268 ± 0.004")

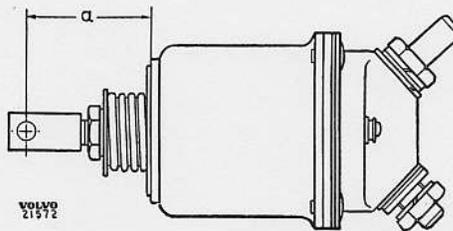


Fig. 51. Adjusting control solenoid (iron core withdrawn).

Fuses

Chassis numbers 1—20999	
Fusebox under bonnet on left side of cowl .....	4 8 amp. 4 25 amp.
Chassis numbers 21000—42999	
Fusebox under bonnet on left side of cowl .....	6 25 amp. 2 25 amp.
Chassis numbers 43000—	
Fusebox under bonnet on left side of cowl .....	4 8 amp. 2 25 amp.

Horns

Voltage .....	6 volt
Type, low tone .....	Bosch HO/FDG 6 (1/9)
Type, high tone .....	Bosch HO/FDG 6 (5/9)
Air gap between magnet and armature:	
low tone .....	0.55—0.65 mm (0.022—0.026")
high tone .....	0.4—0.55 mm (0.016—0.022")
Current consumption:	
Adjusting value, low tone .....	5.0—5.8 amp.
high tone .....	3.5—4.3 amp.
Voltage for armature attraction .....	4 volt
Voltage for obtaining full tone strength .....	5—8 volt
Coil resistance .....	0.17—0.21 ohm

## Bulbs

	Number	Watts	Socket
Headlights .....	2	45/40	BA 20 d
Long-time parking .....	4	2	BA 9 s
Number plate light .....	2	5	BA 15 s
Stop light .....	2	20	BA 15 s
Rear light .....	2	5	BA 15 s
Instrument lighting .....	2	2	BA 9 s
Lamp for direction indicators and parking lights, front .....	2	20/5	BA 15 d spec.
Lamp for direction indicators, rear .....	2	20	BA 15 s
Glove shelf light .....	1	2	BA 9 s
Clock light .....	1	2	BA 9 s
Roof light .....	1	10	S 8
Control lamp for direction indicators .....	1	2	BA 9 s
Control lamp for headlights .....	1	2	BA 9 s
Control lamp for oil pressure .....	1	2	BA 9 s
Control lamp for charging .....	1	2	BA 9 s

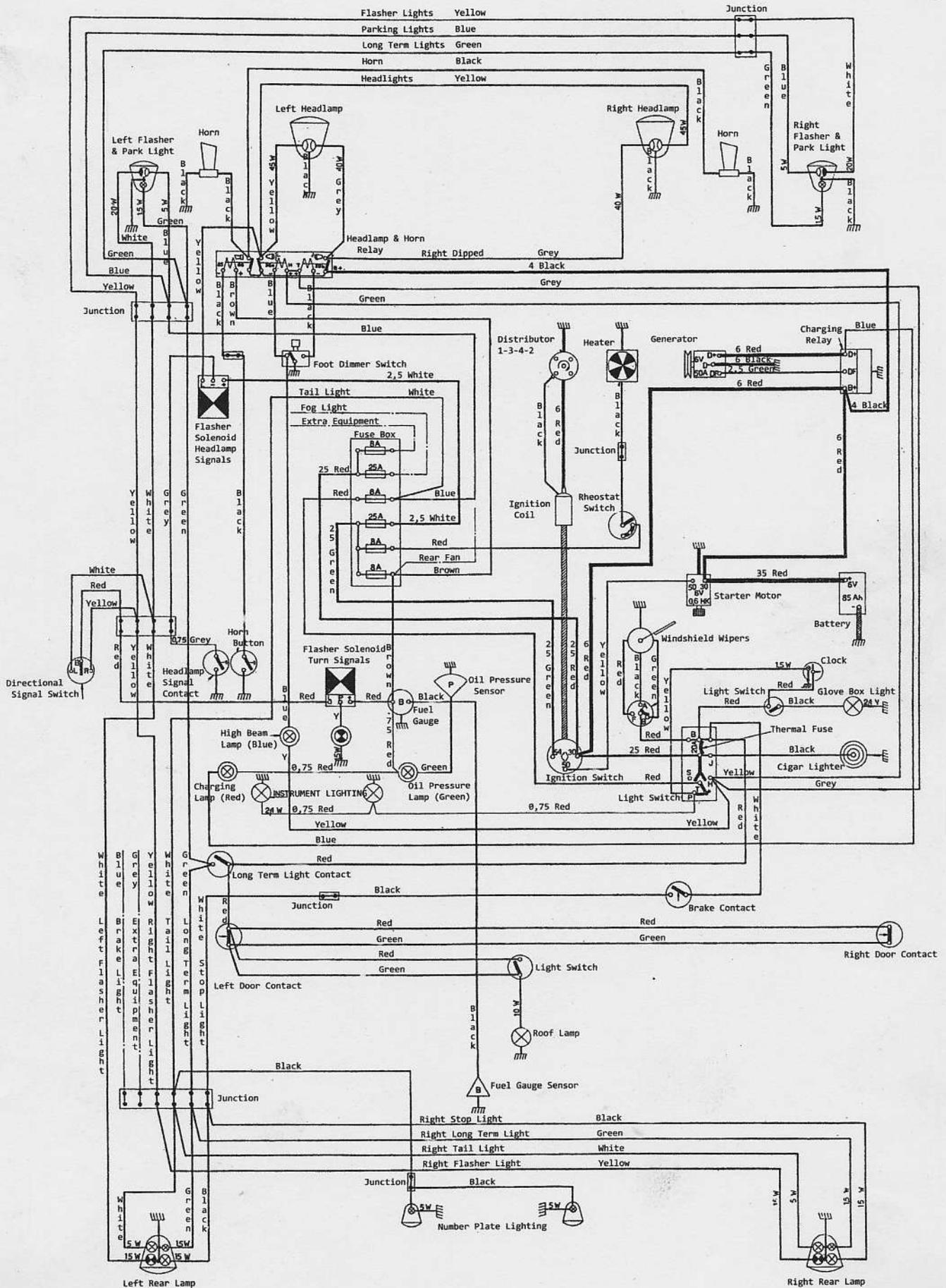


Illustration 1. Wiring diagram for Volvo P 1200 up to chassis number 20999.

