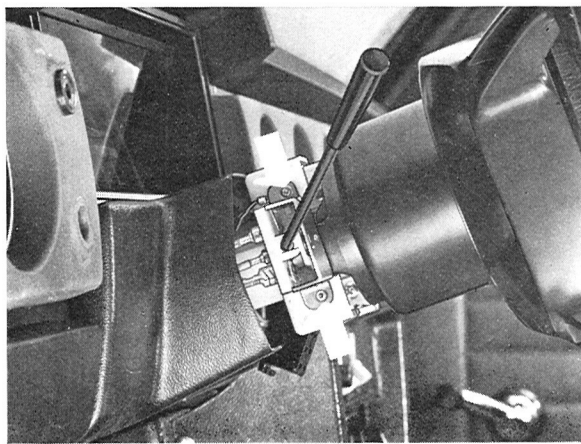


SERVICE PROCEDURES

REPLACING SWITCHES FOR TURN SIGNALS AND WINDSHIELD WIPERS

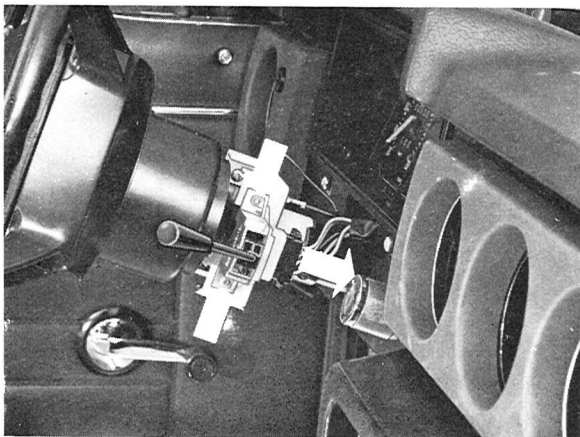
Replace turn signal switch=Volvo Standard Times Op. No. 36108



VOLVO
107331

Fig. 3-133. Switch for flashers

1. Remove the casings over the steering column.
2. Remove the screws for the switch.
3. Connect the electric wires to the new switch.
4. Install the new switch and check its function.
5. Restore.



VOLVO
107332

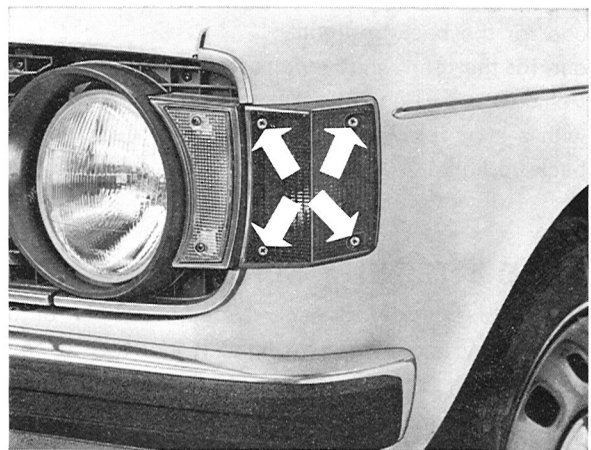
Fig. 3-134. Switch for windshield wipers

REPLACING TURN SIGNAL LIGHT

Replace turn signal light lens or bulb=Volvo Standard Times Op. No. 36106

Replace complete light=Op. No. 36124

1. Remove the electric cable from the the wiring harness in engine compartment.



VOLVO
107361

Fig. 3-135. Removing light glass

2. Remove the light lens, see Fig. 3-135.
3. Remove the housing from the fender. Pull out the electric cable with its grommet.
4. Install the new electric cable with grommet and install the housing.
5. Install the bulb, connect the electric cable to the harness.
6. Check the flasher function and install the lens.

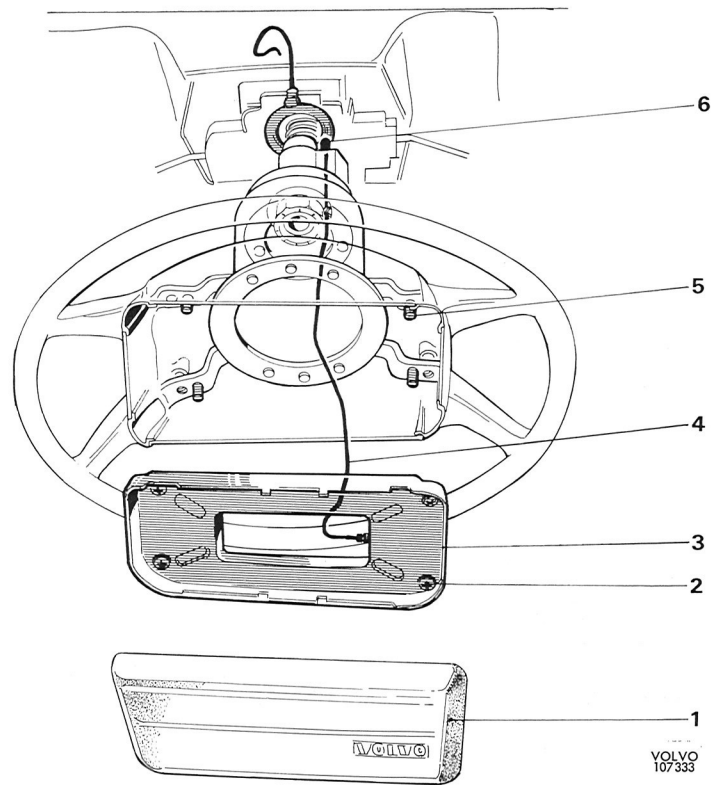


Fig. 3-136. Contact bar

- | | |
|--------------------|------------------|
| 1. Impact guard | 4. Electric wire |
| 2. Attaching screw | 5. Contact pin |
| 3. Contact bar | 6. Slip contact |

REMOVING HORN CONTACT BAR

Replace = Volvo Standard Times Op. No. 36214

1. Remove the impact guard (1, Fig. 3-136). (Carefully lever it loose with the help of a screwdriver.)
2. Disconnect the electric wire (4, Fig. 3-136) from the contact bar (3, Fig. 3-136).
3. Remove the four attaching screws (2, Fig. 3-136) for the contact bar and lift off the bar. Installation of the contact bar is in reverse order to removal. After installation, check the flasher function.

WINDSHIELD WIPERS

Volvo Standard Times, see page 3:51

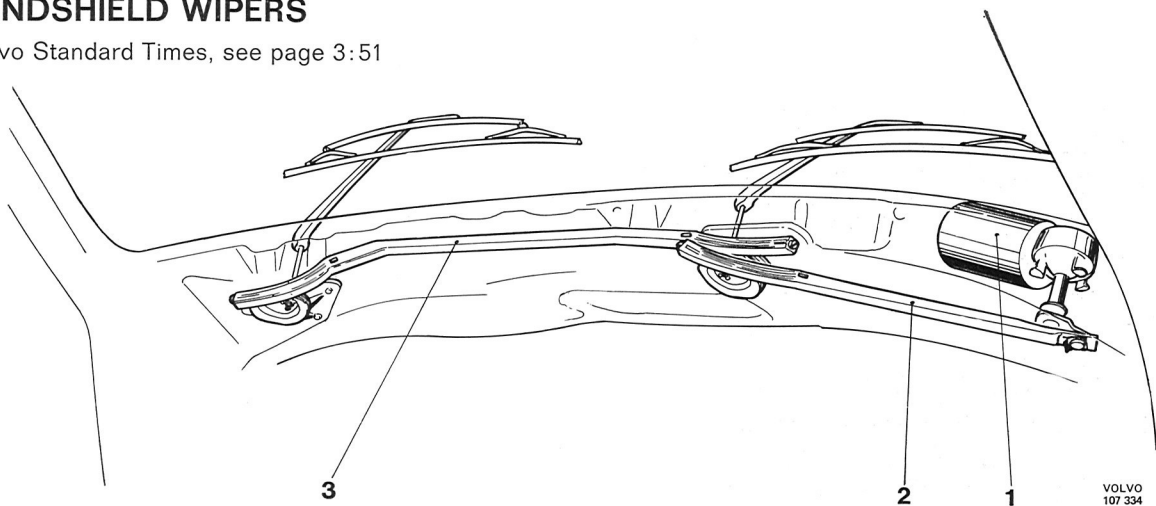


Fig. 3-137. Windshield wiper unit

1. Wiper motor
2. Drive link
3. Parallel drive link

REMOVING WIPER MOTOR

1. Remove the drive link from the output arm on the wiper motor after having first removed the lock device, see Fig. 3-138.

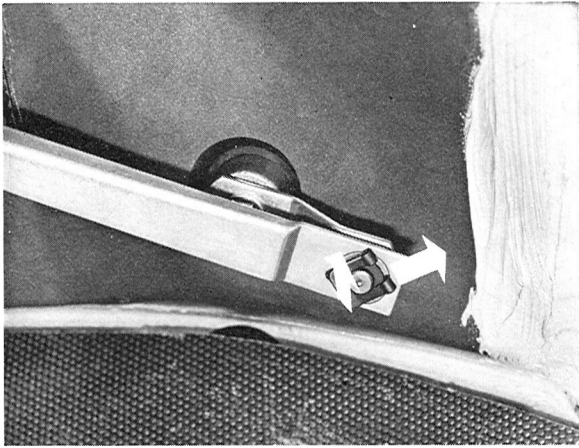


Fig. 3-138. Removing lock

2. Remove the contact from the wiper motor.
3. Remove the three attaching screws (Fig. 3-139). Lift out the wiper motor.

When replacing a wiper motor, transfer the output arm, rubber seal, damper rubber and spacer sleeves to the new wiper motor.

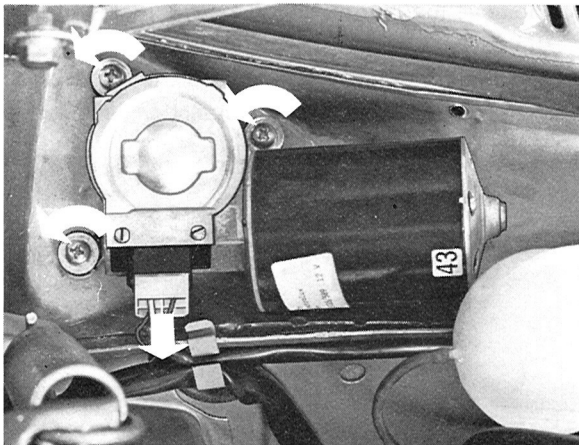


Fig. 3-139. Removing windshield wiper motor

INSTALLING WIPER MOTOR

1. Place the wiper motor in position and install the attaching screws, see Fig. 3-139.
2. Connect the contact to the wiper motor.
3. Install the drive link to the output arm on the wiper motor.
4. Check the wiper function.

REMOVING DRIVE LINK

(vehicles with standard heating system)

1. Remove the right-hand side panel and the defroster hoses.
2. Remove the drive link for the wiper motor lever and unscrew the nut for the cable stretcher. Lift off the drive link.

REMOVING DRIVE LINK

(vehicles with combined heating system)

1. Remove the glove locker.
 2. Remove the right defroster nozzle.
- Otherwise see "Removing drive link" (vehicles with standard type air conditioner).

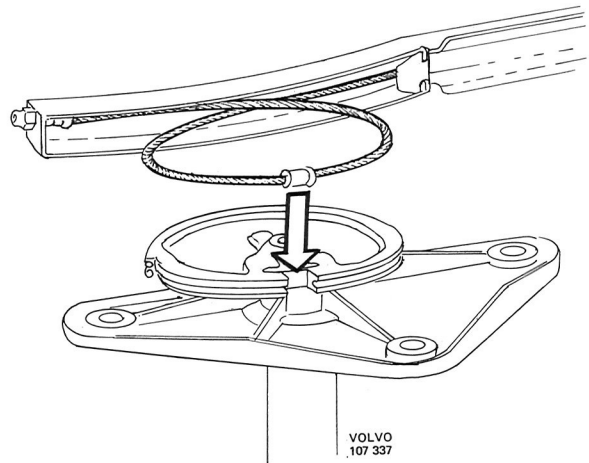


Fig. 3-140. Installing cable for drive link and parallel drive link, left-hand side

INSTALLING DRIVE LINK

(vehicles with standard heating system)

1. Place the cable's flange nipple in the segment recess and then lever the cable over the segment, see Fig. 3-140. This work should be done with the greatest care in order not to score the segment or damage it in any other way, as this would lead to disturbance in operation.
2. Install the connecting rod for the wiper motor lever. Thereafter tension the cable.
3. Check to make sure the wipers are functioning properly.
4. Install the defroster hoses and side panel.

INSTALLING DRIVE LINK

(vehicles with combined heating system)

- See points 1—3 under "Installing drive link" (vehicles with standard heating system).
4. Install the defroster nozzle and glove locker.

REPLACING CABLE

1. Remove the drive link and the parallel drive link.
2. Bend up the lock washer with the help of a screwdriver, and remove the washer. Remove the old cable.
3. Install the new cable in position and also a new lock washer.
4. Re-install the cable stretcher in the drive link. The nut should be screwed on only a couple of threads.
5. Install the drive link and parallel drive link.

REMOVING PARALLEL DRIVE LINK

Left-hand side

1. Remove the defroster hose.
(On vehicles with combined heating system, remove the air duct between the defroster nozzle and the air vent in the dashboard.)
2. Remove the nut for the cable stretcher and disconnect the cable from the segment.

Right-hand side

1. Remove the side panel and defroster hose.
(On vehicles with air conditioning of combined type, remove glove locker and right-hand defroster nozzle.)
2. Disconnect the drive link and remove it.
3. Remove the nut for the cable stretcher and disconnect the cable from the segment.
4. Lift forward the parallel drive link.

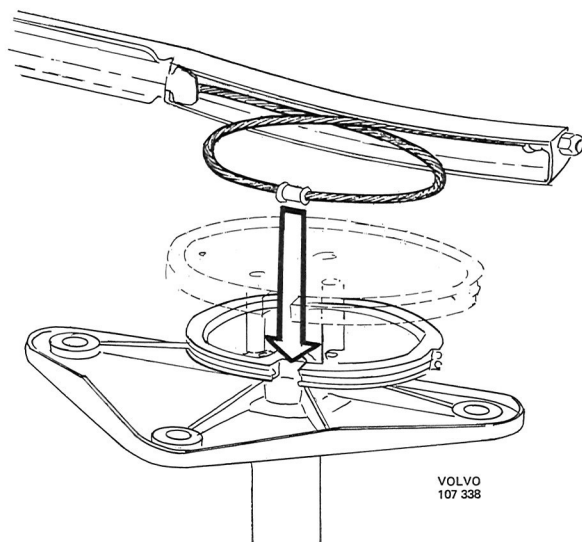


Fig. 3-141. Installing cable for parallel drive link, right-hand side

INSTALLING PARALLEL DRIVE LINK

Left-hand side

1. Place the cable's flange nipple in the large segment recess and thereafter prise the cable over the segment, see Fig. 3-140. Great care should be observed when doing this in order not to score the segment or damage it in any other way, otherwise this might lead to disturbance in operation.

Right-hand side

1. Place the cable's flange nipple in the small segment recess and thereafter prise the cable over the inner segment, see Fig. 3-141. Great care should be observed when doing this work so as not to score the segment or damage it in any other way, as this could lead to disturbance in operation. Tension the cable.
2. Place the drive link cable's flange nipple in the front segment recess and thereafter prise the cable over the segment, see Fig. 3-140. Attach the drive link to the lever on the wiper motor. Tension the cable.
3. Check the wiper function.
4. Install the defroster hoses and the side panel.
(On vehicles with combined heating system, install the defroster nozzle and the glove locker.)

REPLACING WIPER ARM BEARING

1. Remove the wiper arm.
2. Remove the drive link and parallel drive link.
3. Remove the attaching screws and lift off the wiper arm bearing.
4. Transfer the seal to the new wiper arm bearing. A worn or deformed seal should be replaced by a new one.
5. Install the wiper arm.
6. Check the wiper function.

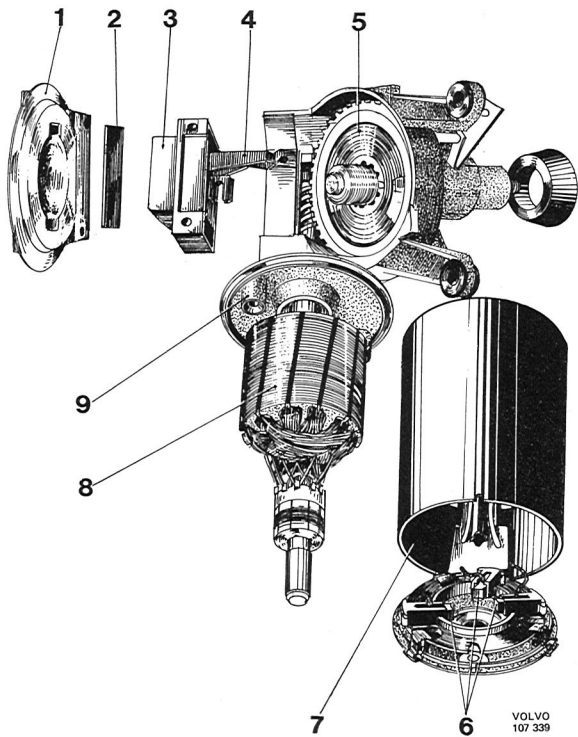


Fig. 3-142. Windshield wiper motor, Electrolux

- | | |
|--------------------------|---------------------|
| 1. Cover | 6. Electric brushes |
| 2. Packing | 7. Stator |
| 3. Connection contact | 8. Rotor |
| 4. Contacts | 9. End |
| 5. Gear with contact bar | |

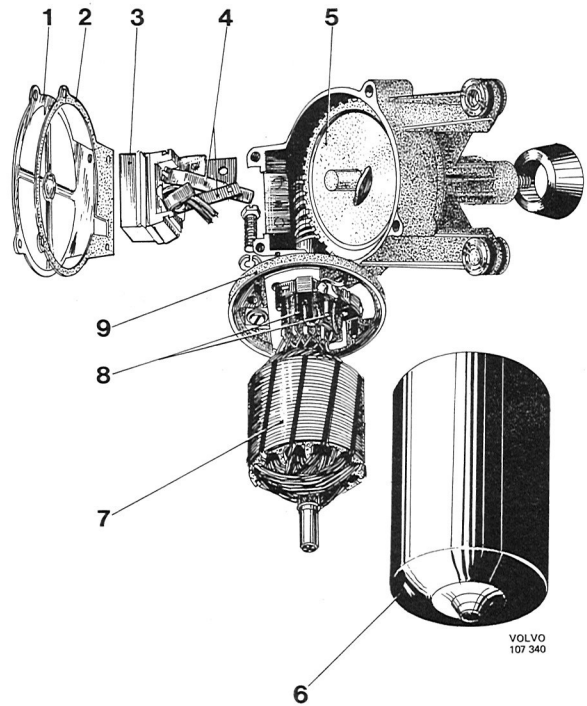


Fig. 3-143. Windshield wiper motor, SWF

- | | |
|-----------------------|---------------------|
| 1. Cover | 6. Stator |
| 2. Packing | 7. Rotor |
| 3. Connection contact | 8. Electric brushes |
| 4. Contacts | 9. End |
| 5. Gear with breakers | |

TAIL GATE WINDOW WIPER, 145 REMOVING

1. Remove the negative (ground) battery lead from the battery.
2. Remove the panel on the inside of the tail gate.
3. Remove the screws securing the reinforcing plate under the wiper motor.
4. Disconnect the link arm and bend the reinforcing plate to the side and take down the wiper motor.
5. Mark and disconnect the electric wires from the motor.

EXAMINING PARKING SWITCH

If the wiper blade does not park in the proper position when the wiper is switched off, the fault can be sought in the switch or in the wiper motor parking switch, provided that the wiper blade arms are correctly fitted on the output shaft. If there is current up to connection 53a on the wiper motor and if connection 31b is grounded, the switch and cables are functioning properly and the fault will lie in the parking switch in the wiper motor, see Fig. 3-144.

Check that the parking switch is functioning as follows:

With the lift tab in the inner position, the spring with contact 53 (6, Fig. 3-144) should lie against contact 53a (5, Fig. 3-144). When the wiper blade is in the parking position, the lift tab is lifted by an eccentric in the drive housing. This causes contact 53 (6, Fig. 3-144), to be pressed against contact 31b (7, Fig. 3-144).

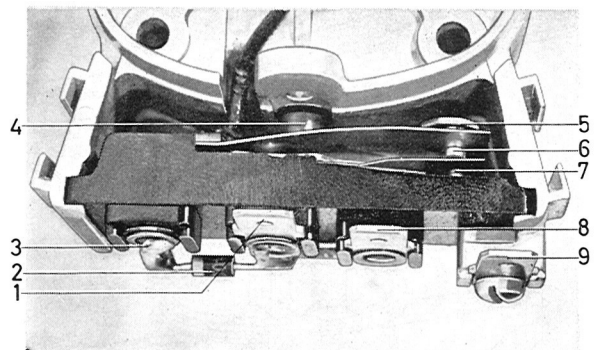


Fig. 3-144. Parking switch

- | | |
|-------------------|--------------------|
| 1. Connection 31b | 6. Contacts (2) 53 |
| 2. Riode | 7. Contact 31b |
| 3. Connection 53 | 8. Connection 53a |
| 4. Lift tab | 9. Connection 31 |
| 5. Contact 53a | |

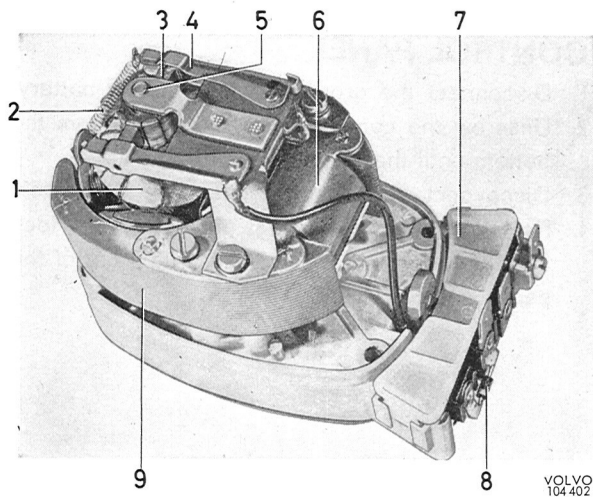


Fig. 3-145. Tail gate window wiper motor

- | | |
|-----------------------|---------------------|
| 1. Rotor | 6. Permanent magnet |
| 2. Brush spring | 7. Parking switch |
| 3. Brush | 8. Diode |
| 4. Brush holder | 9. Pole shoe |
| 5. Stop tab for rotor | |

DISASSEMBLING TAIL GATE WINDOW WIPER MOTOR

1. Remove the cover.
2. Unhook the brush spring.
3. Disconnect the two screws holding the brush holder plate and bend the plate out of the way.
4. Pull the rotor straight up. Note the small ball on the lower shaft end.
5. Disconnect the two screws holding the pole shoe and lift off the shoe.
6. Remove the drive housing cover by unscrewing the four small screws.
7. Pull the intermediate drive and drive on the output shaft straight out, see Fig. 3-146. Note the washer on the top side of the output shaft drive and flat washer underneath.

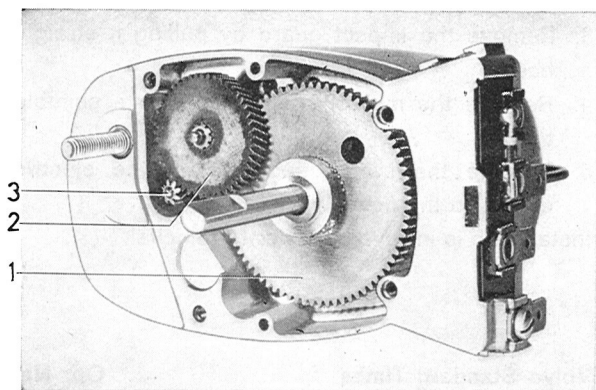


Fig. 3-146. Drive housing

1. Gear on output shaft
2. Intermediate drive, fiber
3. Rotor shaft drive

INSPECTING

Clean all the parts and check them for wear and mechanical damage. Check the rotor for short-circuiting between commutator and rotor frame and also for short-circuiting between and breakage in the winding coils. Short-circuiting between the commutator and rotor frame is tested by connecting a 40 V test lamp (alternating current) between them. The lamp must not light. Short-circuiting between the coils is tested with a small type of growler or with Bosch coil tester EFAW 90 or 95 with armature tester EFAW 96 or corresponding. Total disconnection to any commutator disc is checked with a 12 V test lamp (direct current). One of the measuring leads of the test lamp is placed on a commutator disc and the other is wound round the commutator. The lamp should light. If one of the wires to any commutator disc is broken, this is noticed by considerable burning damage on one or several of the diametrically placed discs.

Check with a test lamp or voltmeter that the diode is in circuit from connection 31b to connection 53 (+ to 31b and — to 53) and that it checks current flow in the opposite direction.

ASSEMBLING TAIL GATE WINDOW WIPER MOTOR

1. Apply plenty of grease to the drive housing, Bosch Ft 1 V 35 or corresponding.
2. Place the large drive with the output shaft and intermediate drive in position in the drive housing, see Fig. 3-146 (do not forget the two washers) and install the cover.
3. Place the pole shoe in position and secure it firmly with the two screws.
4. Apply a light oil film to the rotor shaft and its bushing.
5. Install the rotor. Make sure that the ball on the end of the rotor shaft is in position.
6. Screw the brush holder bridge firmly into position and hook on the brush spring.
7. Test-run the motor and install the cover.

INSTALLING

1. Connect the electric cables to the motor.
2. Attach the link arm at the motor and place the motor and reinforcing plate in position.
3. Install and screw tightly the screws securing the motor and reinforcing plate.
4. Connect the link arm to the output shaft and install the panel on the inside of the tail gate.
5. Connect the ground lead to the battery.

REPLACING INTERIOR LIGHT BULB

Replace interior light=Volvo Standard Times Op. No. 35154

Replace bulb=Op. No. 35153

Pull down the glass at the short side opposite the switch. Pull out the bulb. The glass is re-fitted by hooking it securely at the side where the switch is situated and then pressing in the glass firmly.

REPLACING BRAKE LIGHT SWITCH

Volvo Standard Times Op. No. 36408

When replacing the brake light switch, make sure that the new switch is adjusted correctly so that it functions satisfactorily. The distance between the brake pedal released and the threaded bronze hub on the switch should be 4 ± 2 mm ($.16 \pm .08''$) (A, Fig. 3-147). If the distance must be adjusted, release the attaching screw for the bracket and move the bracket until the correct distance is obtained.

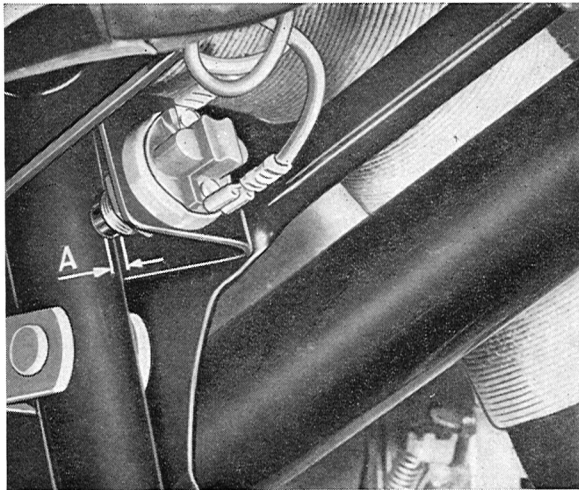


Fig. 3-147. Brake light switch

REPLACING IGNITION SWITCH

Volvo Standard Times Op. No. 34002

1. Remove the contact by pulling it straight forwards.
2. Remove both the attaching screws with a screwdriver.
3. Lift out the ignition switch.

Installation of the ignition switch is in reverse order to removal.

3:62

REPLACING SWITCHES ON CONTROL PANEL

1. Disconnect the ground cable from the battery.
2. Unscrew the control panel and lift up from the bottom until the contacts are accessible.
3. Disconnect the contact harness from the switch.
4. Remove the switch by first pressing in the lock springs and then pressing the switch out of the panel, see Fig. 3-148.

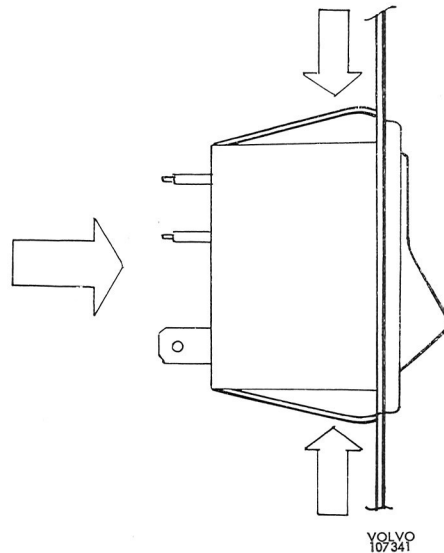


Fig. 3-148. Removing headlight switch

REPLACING HEADLIGHT SWITCH

1. Remove the switch knob.
2. Pull out the choke. (Does not apply to injection engines.)
3. Remove the impact guard by pulling it straight back.
4. Remove the nut for the switch with a suitable tool.
5. Remove the switch and transfer the electric cables to the new switch.

Installation is in reverse order to removal.

Volvo Standard Times

Replace toggle switch
Replace push-pull switch
Replace back-up light switch
Replace stop light switch

Op. No.

36412
36404
36421
36408

BULB INTEGRITY SENSOR, CHECK

NOTE: The Bulb Integrity Sensor warning light may come on if the connected bulbs current draw is distorted. A short indication may sometimes occur, when the headlight is switched on, depending on variations in "starting" time for the bulbs.

1. Switch on the ignition.
The warning light should come on.
If the warning light does not come on, it is defective.
2. Start the engine.
The warning light should go out.
The Bulb Integrity warning light and the charging control light light simultaneously: the alternator does not function.
The Bulb Integrity warning light is on after the charging control light has gone out: the Bulb Integrity Sensor is defective.
NOTE: the light switch should be pushed in and the brake pedal not actuated during the test.
3. Switch on the headlight lower beam.
The warning light should be out.
The Bulb Integrity warning light is on, but all bulbs for lower beam, parking light, tail light etc are functioning: the Bulb Integrity Sensor is defective.
4. Switch off the headlight lower beam.
5. Remove fuse No. 11 or 12.
The warning light should come on. If not, the Bulb Integrity Sensor is defective.
Re-connect the fuse.
6. Switch off the light.
7. Depress the brake pedal.
The warning light should be out. If it comes on and both brake lights function, it is defective.
8. Switch off the ignition.

BULB INTEGRITY SENSOR UNIT, REPLACEMENT

Volvo Standard Times Op. No. 36504

1. Disconnect the connector at the Sensor Unit.
2. Remove the Sensor Unit.
3. Install the replacement Sensor Unit.
4. Re-connect the connector to the Sensor Unit.
5. Check the function of the replacement unit.

INTERLOCK CONTROL UNIT, REPLACEMENT

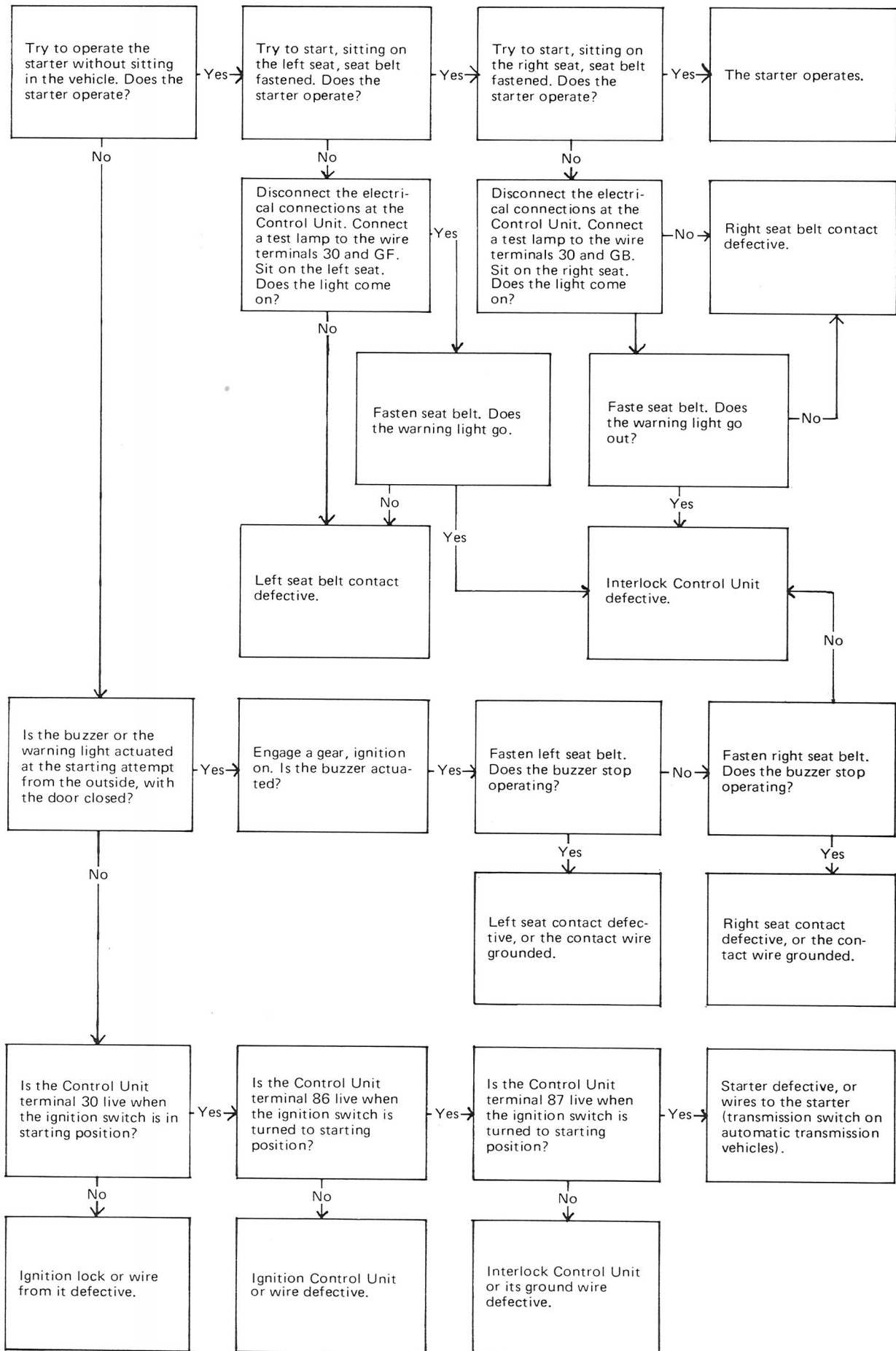
Volvo Standard Times Op. No. 36506

1. Disconnect the electrical connections at the unit.
2. Remove the control unit.
3. Install the replacement unit.
4. Test the unit, as follows:
 - a. Get seated
Move the gear lever to "Neutral" position.
Turn the ignition switch to starting position.
The starter should fail to operate.
 - b. Fasten the seat belt.
Turn the ignition switch to starting position.
The starter should operate.
Switch off the ignition.
Disconnect the seat belt and leave the vehicle.

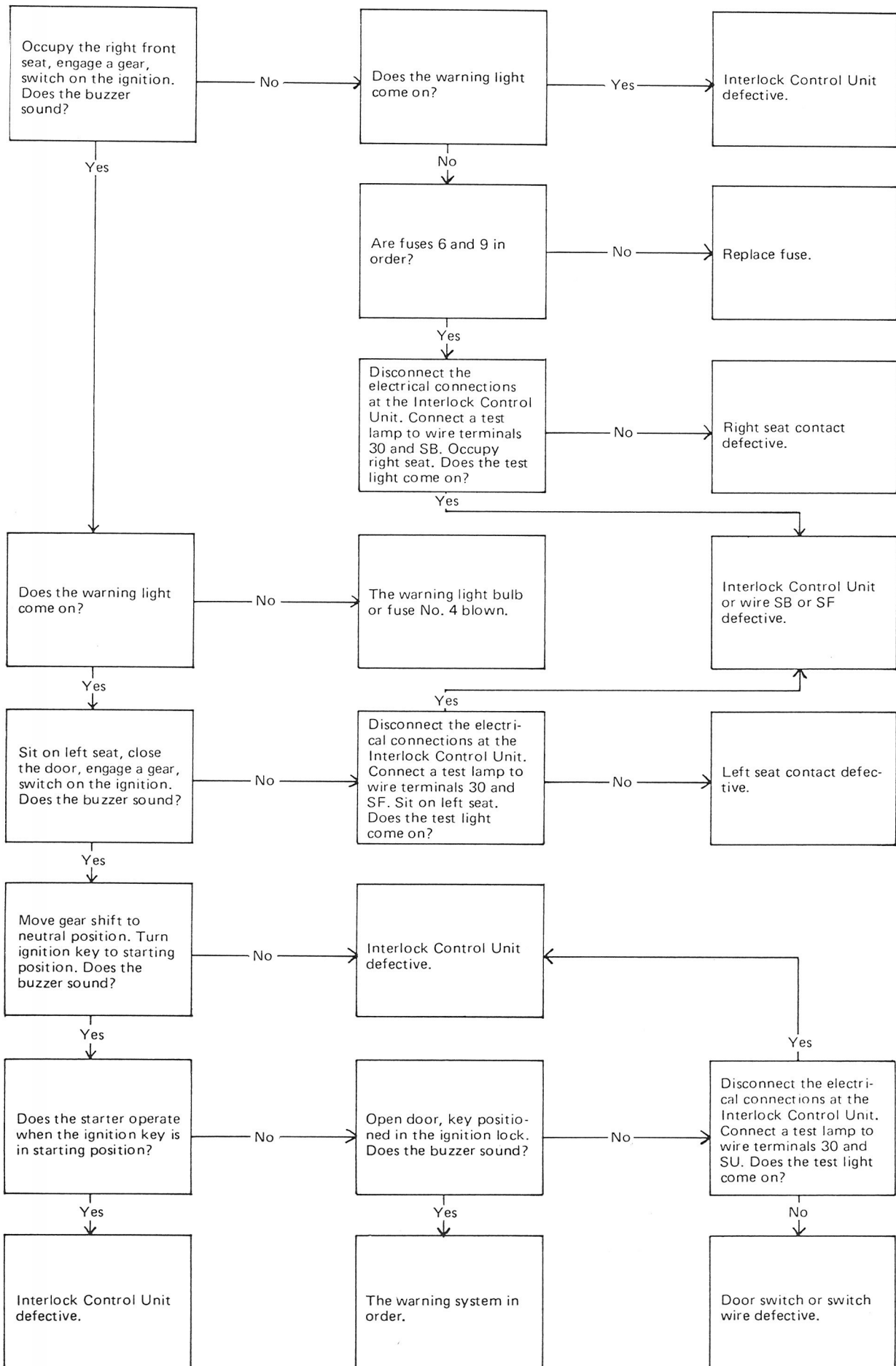
SERVICE DIAGNOSIS

For Service Diagnosis, Ignition Interlock System, see pages 3:64 through 3:66.

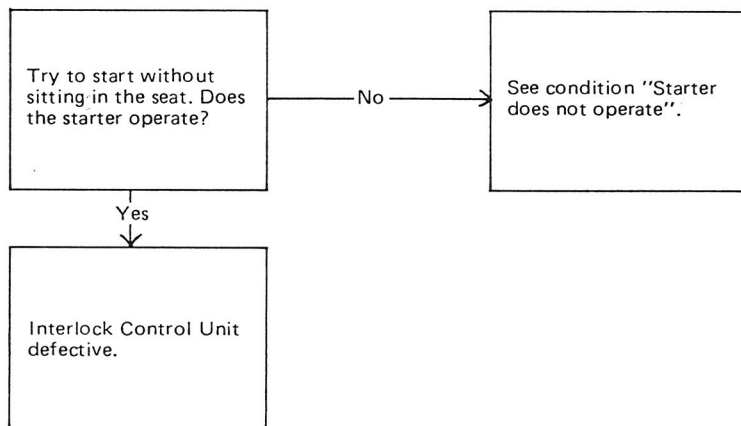
THE STARTER DOES NOT OPERATE



WARNING SYSTEM DOES NOT FUNCTION



WARNING SYSTEM OPERATES CONTINUOUSLY



GROUP 38

INSTRUMENTS TOOLS

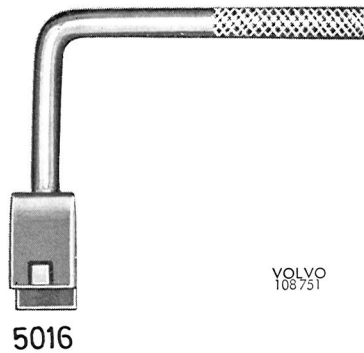


Fig. 3-149. Special tool for removing and installing tank fittings

Special tools may now be preceded by SVO or 999, e.g., SVO 1801 or 999 1801.

GENERAL INFORMATION

The instrumentation consists of a combined instrument, see Figs. 3-150 and 3-151. It comprises a speedometer and trip meter, tachometer (certain models), temperature gauge, fuel gauge, warning lamps for parking brake, brake circuit failure, oil

pressure, battery charging, choke, bulb failure warning and overdrive.

Also connected to the combined instrument is a voltage regulator which maintains the feed voltage constant for the instrumentation.

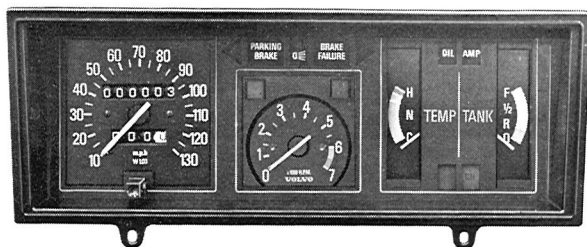


Fig. 3-150. Combined instrument, front side

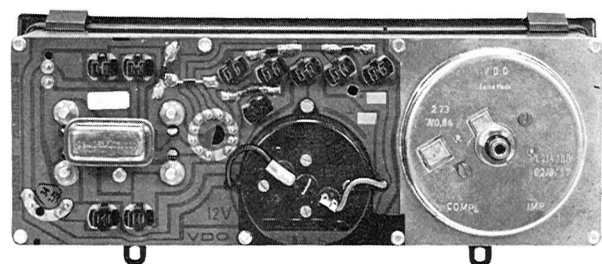


Fig. 3-151. Combined instrument, reverse side

SPEEDOMETER AND ODOMETER

The speedometer and odometer are integrally built and are driven by a drive line from a worm on the transmission output shaft.

The speedometer is of the eddy current type and mainly consists of a permanent magnet, a mounting disc and a rotor drum. The rotor drum is linked by a shaft to the gauge pointer. The shaft is also provided with a balance spring.

The odometer has a number of gears and registers up to 1 million km (600 000 miles). It is also provided with a trip meter. The ratio of the mileometer is so chosen that the drive line should rotate 640 times in order for the gauge to register 1 km.

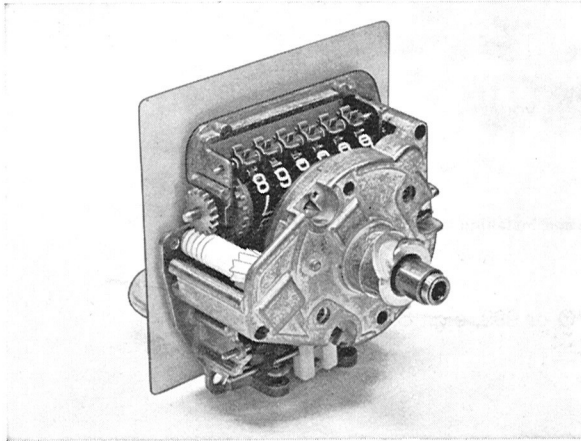


Fig. 3-152. Speedometer and mileometer

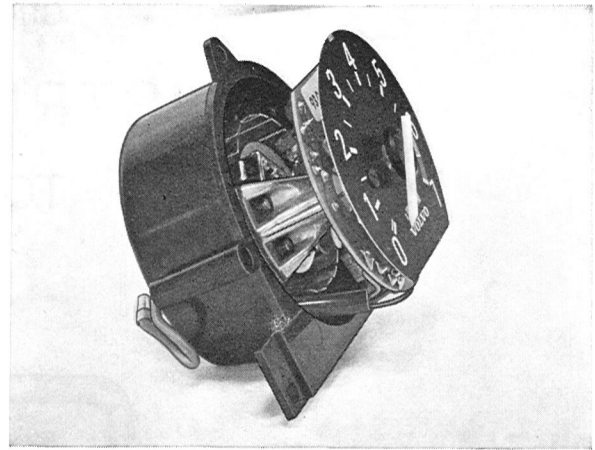
When the vehicle starts running, the drive line and the permanent magnet connected to the drive line rotate. This generates a rotating magnetic field, which gives rise to eddy currents in the rotor drum. The rotating effect which the magnetic field as well as the induced eddy currents have on the rotor drum increase with increased speed on the permanent magnet. The rotation of the rotor drum is counteracted by the balance spring, this giving a proportional reading of the pointer to the magnetic rotation.

TACHOMETER

The tachometer consists partly of a transistorized registration and amplifier unit and partly of a rotational coil system.

The registration part senses, through a sender line, the pulse frequency of the ignition coil. The amplifier part amplifies and conducts the pulses to the rotational coil system.

The rotational coil system consists of an annular shaped permanent magnet round which a coil is fitted. The coil is movable the length of the magnet



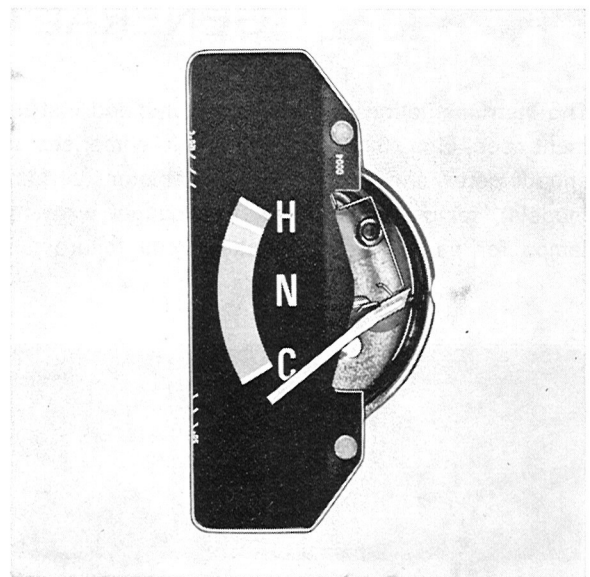
YOLVO
107345

Fig. 3-153. Tachometer

and is linked to a shaft to which the tachometer gauge pointer is attached. When pulses from the amplifier are conducted through the coil, this forms a magnetic flow which coils the length of the permanent magnet. The rotational force is proportional to the current flow through the coil.

TEMPERATURE GAUGE, COOLANT

The temperature gauge is of the bimetal type and consists of a sensor and a registering instrument. The sensor is mounted on the engine and senses the coolant temperature. The registering instrument is included in the combined instrument.



YOLVO
108709

Fig. 3-154. Temperature gauge

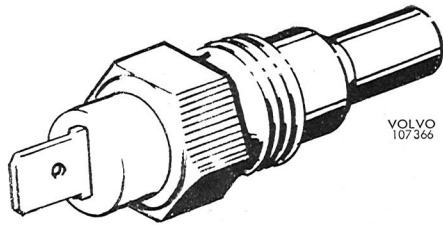


Fig. 3-155. Sensor for temperature gauge

The sensor, which is of the semi-conductive type, has a negative temperature coefficient, which means that its resistance drops in proportion to increased temperature.

The registering instrument consists of a bimetal spring connected to a pointer. A resistance wire, connected in series with the voltage stabilizer and sensor, is wound round the bimetal spring.

When the ignition is switched on, current flows from the voltage stabilizer through the resistance wire and the sensor to ground. When current passes the resistance wire, it heats up the metal spring and this causes the pointer to indicate on the gauge. The volume of the current passing through the resistance wire is in inverse proportion to the resistance of the sensor, and for this reason the gauge reading increases with increased engine temperature.

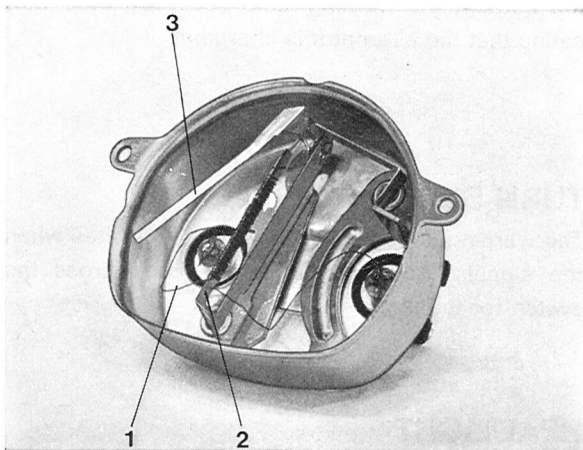


Fig. 3-156. Registering instrument, disassembled

1. Resistance wire
2. Bimetal spring
3. Pointer

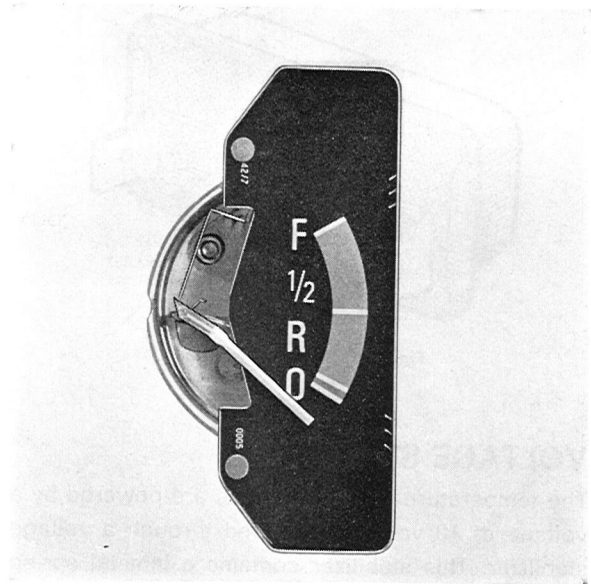


Fig. 3-157. Fuel gauge

FUEL GAUGE

The fuel gauge consists of a sender and indicating instrument. The sender in the fuel tank consists of a moving resistance, a lever and a float. The indicating instrument is of the same type as for the temperature gauge.

The function is exactly the same as for the temperature gauge, apart from the fact that the sender is mechanical. The amount of sender resistance engaged will depend on the amount of fuel in the tank and thereby the location of the float. In other words, an empty tank results in large sender resistance while a full tank produces minimum sender resistance. This has a corresponding effect on the indicating instrument.

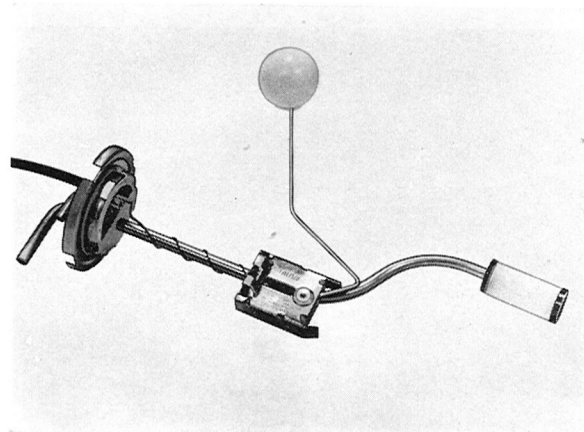


Fig. 3-158. Sender for fuel gauge

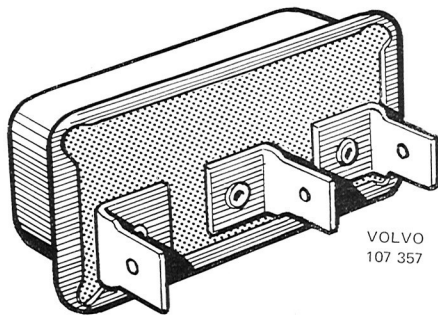


Fig. 3-159. Voltage stabilizer

VOLTAGE STABILIZER

The temperature and fuel gauges are powered by a voltage of 10 volts and are fed through a voltage stabilizer. This stabilizer contains a bimetal spring and a contact breaker. When the ignition is switched on, current flows through the stabilizer and out to the instruments. This heats the stabilizer bimetal spring which bends and thus breaks the circuit. As the spring cools down, it returns to its original position and the circuit is closed again. This cycle is repeated continuously. A regulated effect corresponding to a constant voltage of approx. 10 volts is thereby obtained. The breaking and making of the circuit is not visible on the instruments due to their inertia. The stabilizer is mounted on the reverse side of the combined instrument.

BRAKES

PARKING BRAKE

The parking brake warning lamp receives current via the ignition switch. When the parking brake is applied, the warning lamp is grounded by the switch, Fig. 3-160, and this switches on the warning lamp which remains lighted as long as the parking brake is on.



Fig. 3-160. Switch for parking brake control

BRAKE CIRCUIT FAILURE

Should a fault arise in any of the two circuits of the hydraulic brake system, so that there is a pressure difference between the circuits of more than 8—10 kp/cm² (114—142 psi) when the brakes are applied, this actuates the warning valve, Fig. 3-161 and the warning lamp goes on. The warning lamp remains lighted until the fault in the brake system has been corrected and the warning valve re-set. Re. re-setting the warning valve, see Section 5, Brake, Group 52.

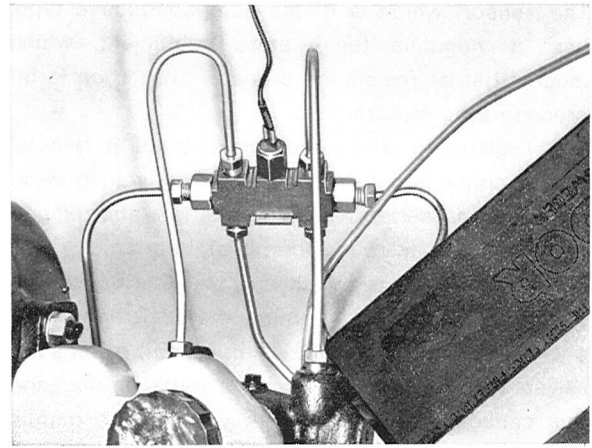


Fig. 3-161. Warning valve

BATTERY CHARGING

The battery charging warning lamp is connected to the alternator. It lights up when the alternator voltage is lower than the battery voltage. As the alternator voltage rises and commences to charge the battery, the warning lamp goes out, thus indicating that the alternator is charging.

TURN SIGNALS

The warning lamp for the turn signals flashes when the signals are engaged. It is wired across the switch for the signals.

HEADLIGHT

The control light for the headlight upper beams comes on simultaneously with the full-beam headlights. It is wired parallel with the headlights at the relay.

OIL PRESSURE

The warning lamp for the oil pressure receives current via the ignition switch and is grounded through a pressure sensitive valve on the engine. With the engine running and at normal pressure, the connection between this lamp and ground (through the engine) is open. When the oil pressure drops below a pre-determined value, the pressure sensitive valve closes the circuit and the warning lamp lights.

CONTROL PANEL

The control panel contains a rheostat for the instrument panel lighting, cigarette lighter and switch with built-in control light for the electrically heated rear window and emergency warning flashers. The control panel also contains the controls for the heating unit as well as a reminder light for the seat belts.

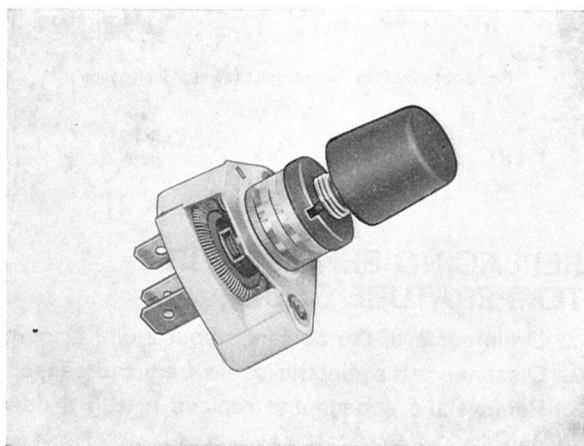


Fig. 3-162. Rheostat for instrument light

VOLVO
107390

OVERDRIVE

The control light for the overdrive is connected between the switch for the overdrive and ground, and thus lights when the overdrive is engaged.

CHOKE

When the engine is choked, a contact in the choke control cuts in the circuit and this grounds the control light, which lights.

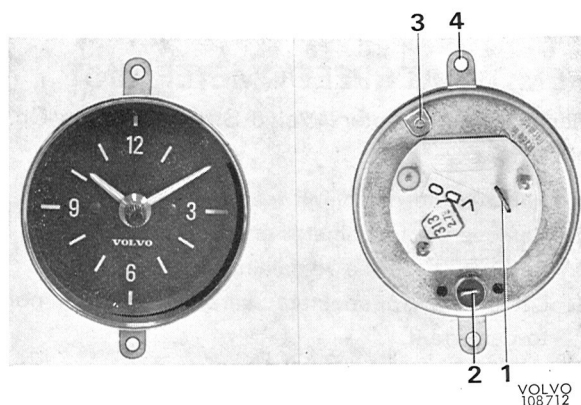


Fig. 3-163. Electric clock, front and reverse

1. Battery connection
2. Bulb
3. Battery connection
4. Attaching screws

VOLVO
108712

CLOCK

The clock, Fig. 3-163, is electrically driven and above the control panel.

SERVICE PROCEDURES

For all work under the dashboard, the battery ground cable should be disconnected to avoid any short-circuiting.

REMOVING COMBINED INSTRUMENT

1. Remove the casings over the steering column.
2. Remove the attaching screw for the bracket and allow it to drop down towards the steering

column. The combined instrument's attaching screws can now be removed.

3. Disconnect the speedometer cable from the instrument.
4. Take hold of the reverse side of the speedometer gauge with the hand and press the instrument upwards — inwards until the snap lock in the upper edge of the instrument releases.
5. Lift forward the instrument and disconnect the connection from its reverse side. (On vehicles with tachometer, the tachometer cable should also be disconnected.)

REMOVING WARNING LIGHTS

1. The lights are mounted in holders which are removed by pushing in their attaching hooks and then pulling the holder straight out.
2. The bulbs are released from their sockets by pulling them straight out.

REMOVING TACHOMETER OR GUARD COVER

1. Remove the combined instrument.
2. Remove the three screws.
3. Lift off the tachometer or the guard cover carefully in order not to damage the pole connections.

REMOVING SPEEDOMETER UNIT

Replace speedometer=Volvo Standard Times Op. No. 38171

1. Remove the combined instrument.
2. Remove the tachometer or guard cover.
3. Remove the three remaining screws.
4. Lift off the speedometer carefully in order not to damage it.

REMOVING VOLTAGE STABILIZER

The voltage stabilizer is removed by pulling it straight up so that the three connection pins release from their retainers.

REMOVING CABLE PLATE

1. Remove the combined instrument.
2. Remove the tachometer or guard cover.
3. Remove the speedometer.
4. Remove the three remaining screws.
5. Carefully lift up the cable plate so that the temperature gauge or fuel gauge is not damaged.

REMOVING TEMPERATURE GAUGE AND FUEL GAUGE

Replace gauge=Volvo Standard Times Op. No. 38114

1. Remove the tachometer or guard cover.
2. Remove the speedometer.
3. Remove the contact device.
4. Remove both nuts on the reverse side of the contact device.
5. Lift out the gauge.

The components in the combined instrument are installed in reverse order to removal.

REMOVING SENDER FOR FUEL GAUGE

Replace sender or gasket=Volvo Standard Times Op. No. 23418

The sender, which is located in the fuel tank, is held in position with a bayonet fixture. When removing, use tool 5016 see Fig. 3-164.

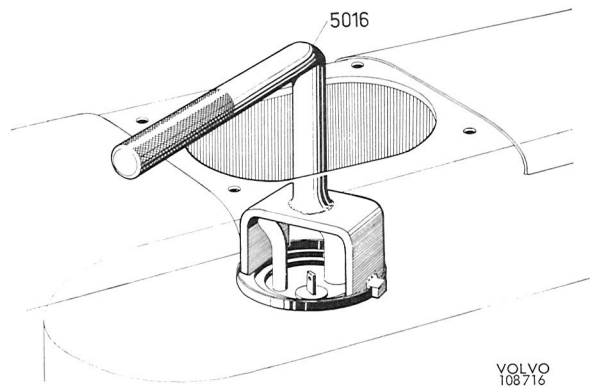


Fig. 3-164. Tool for removing sender for fuel gauge

REPLACING SENSOR FOR TEMPERATURE GAUGE

1. Drain some of the coolant, about 2 dm³ (2 qts).
2. Disconnect the electric cable from the sensor.
3. Remove the sensor and replace it with a new one.
4. Install the new sensor and connect the electric wire.
5. Fill coolant.

REMOVING CLOCK

Replace clock=Volvo Standard Times Op. No. 38124

1. Remove the impact pad.
2. Remove the control panel attaching screws.
3. Lift forward the panel sufficiently to get at the reverse side of the clock.
4. Disconnect the electric cable from the clock.
5. Remove the clock's two attaching screws and lift forward the clock.

Installation is in reverse order to removal.

TESTING SPEEDOMETER WITH MILEOMETER

If the speedometer or mileometer is not functioning, the reason may be due to a fault in the instrument or speedometer cable or the worm gear, which is located on the transmission for driving the cable. In order to decide which component is faulty, check following:

If the speedometer functions while the odometer does not, or vice-versa, then the instrument is defective and should be replaced. No attempt should be made to repair the instrument.

When both the speedometer and odometer stop functioning, the fault is probably in the speedometer cable or the worm gear. Disconnect the speedometer cable from the instrument and see if it can be rotated. If it can, this means that it has broken from the worm gear. Check the cable and the drive at the transmission.

Check to see whether the drive couplings can rotate easily. If it jams, the instrument should also be replaced.

The speedometer can be checked by running it at different speeds. The following values should then apply:

Speed of drive couplings			
8.35 (500)	16.70 (1000)	29.20 (1750)	r/s (r/m)
Speedometer reading			
31.5±2.5	60.5±2.5	104.5±2.5	Mph

TESTING SPEEDOMETER CABLE

It is most important that the speedometer cable is correctly fitted if the speedometer is to function without trouble. It is vitally important that the cable is not bent too sharply. At no point must the radius of a bend be less than 100 mm (4"). If it is less than this, vibration and noise can occur in the instrument. The drive couplings must run true in the outer casing of the cable. This is checked with the cable rotating.

TESTING TEMPERATURE GAUGE

If the temperature gauge is faulty, the faulty component (sensor, indicating instrument or voltage regulator) must first be traced and then the fault remedied. In order to trace the faulty component, two or possibly three resistors are required, one or two at 40 ohms and one at 282 ohms.

Trouble shoot as follows:

First disconnect the electric cable from the temperature sensor and then connect up the 282 ohm resistor between cable and ground.

With the ignition switched on, the pointer on the indicating instrument should be at the beginning of the green field (50° C=122° F). Instead of the 282 ohm resistor, then connect the 40 ohm resistor. The pointer on the indicating instrument should be at the beginning of the red field (120° C=248° F). With correct indicating instrument function, the sensor is defective and should be replaced by a new one.

NOTE: The sensor cable must **never** be wired directly to ground since it would overheat and ruin the instrument.

If the instrument gives incorrect reading, the fault is either in the indicating instrument or the voltage regulator.

In order to decide where the fault lies, disconnect the fuel gauge sender wire from the sender and connect a resistance of 40 ohms between wire and ground.

If the fuel gauge now shows a full tank, the fault must be in the indicating instrument of the temperature gauge, which must be replaced. If, on the other hand, the temperature gauge and fuel gauge give the same, but incorrect, reading, then the voltage regulator must be defective and should be replaced.

TESTING REMOVED TEMPERATURE SENSOR

The sensor is checked by heating it up and then reading resistance and temperature. The following values should be obtained if the sensor is in order: (NOTE: The resistances may deviate ±10 %.)

Temperature	50	100	120	°C
	(122)	(212)	(248)	°F
Resistance	282	60	40	ohms

TESTING FUEL GAUGE

The fuel gauge is checked in the same way as the temperature gauge.

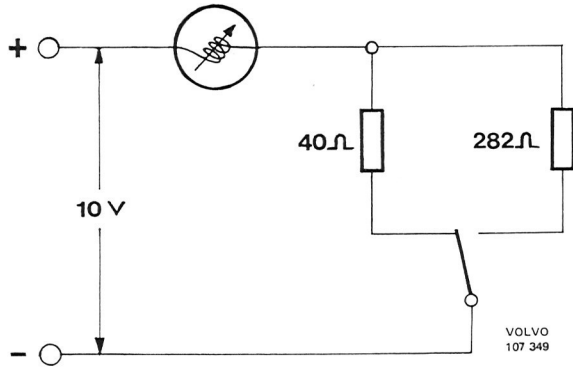


Fig. 3-165. Wiring diagram for checking temperature gauge or fuel gauge indicating instrument

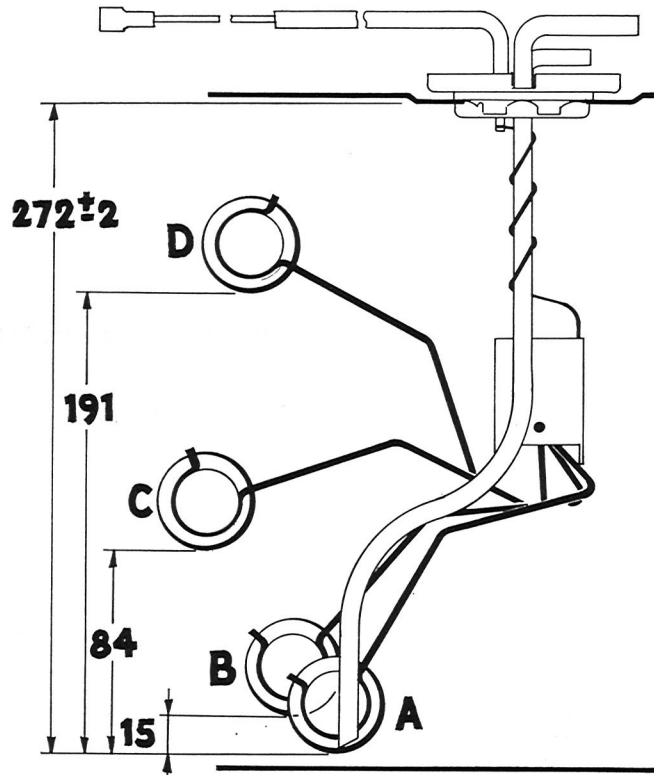
TESTING REMOVED FUEL GAUGE SENDER

The sender is checked with an ohmmeter which is wired between the contact unit for the electric cable and ground. The following resistance values should be obtained if the sender is functioning correctly:

Regarding various positions of the float, see Fig. 3-166. Its measurement indications indicate the number of mm the float should be lifted from its bottom position.

TESTING REMOVED VOLTAGE STABILIZER

The function of the voltage stabilizer can be checked with an adjustable bimetal instrument. The instrument is wired in series with a resistance of about 60 ohms and a constant D.C. voltage of 10 volts. The indicating instrument should be read off. The constant D.C. voltage is thereafter replaced by a 12 volt battery (check that the voltage is really 12 volts) and the voltage stabilizer. The indicating instrument should give a similar reading. During the test, the stabilizer should have the same position as it had in the vehicle. A damaged stabilizer is replaced by a new one, although it can of course be repaired, but this is pointless both from an economic and reliability point of view.



Position	Resistance in ohms		
A	282 ± 48	C	98 ± 14
B	$223 \pm 26,5$	D	40 ± 5

Fig. 3-166. Checking fuel gauge sender

- Pos. Unit
1. Battery
 2. Connection box
 3. Ignition switch
 4. Ignition coil
 5. Distributor, firing order 1-3-4-2
 6. Spark plugs
 7. Starter motor
 8. Alternator
 9. Voltage regulator
 10. Fuse box
 11. Light switch
 12. Bulb Integrity Sensor
 13. Switch relay, upper and lower beams
 14. Upper beams
 15. Lower beams
 16. Position light
 17. Tail light
 18. Side marker light
 19. License plate light
 20. Stop light switch
 21. Stop light
 22. Contact on transmission, M40—M41
 23. Contact on transmission, BW 35
 24. Back-up light
 25. Flasher
 26. Turn signal switch
 27. Hazard warning light switch
 28. Front turn signal
 29. Rear turn signal
 30. Connection at instrument
 31. Connection at instrument
 32. Brake warning light
 33. Connection at instrument
 34. Tachometer
 35. Temperature gauge
 36. Fuel gauge
 37. Voltage stabilizer
 38. Turn signal control light
 39. Diode
 40. Upper beam control light
 41. Bulb Integrity Sensor warning light
 42. Charging warning light
 43. Parking brake control light
 44. Choke control light
 45. Oil pressure warning light
 46. Contact, passenger's seat
 47. Contact, driver's seat
 48. Contact, parking brake
 49. Contact, choke
 50. Temperature sensor
 51. Oil pressure sender
 52. Contact, brake warning
 53. Starter cut-out relay
 54. Fuel gauge sender
 55. Horn
 56. Horn ring
 57. Switch, wiper/washer
 58. Wiper
 59. Washer
 60. Blower switch
 61. Blower
 62. Switch, electrically heated rear window
 63. Electrically heated rear window
 64. Clock
 65. Cigarette lighter
 66. Instrument light rheostat
 67. Instrument light
 68. Control panel light
 69. Gear shift panel light
 70. Contact, glove locker
 71. Light, glove locker
 72. Interior light
 73. Door contact, driver's side
 74. Door contact, passenger's side
 75. Relay, headlight wiper
 76. Interlock Control Unit
 77. Buzzer, seat belt
 78. Warning light, seat belt
 79. Seat belt contact, passenger's side
 80. Seat belt contact, driver's side
 81. Connection
 82. Switch, overdrive M 41
 83. Switch for overdrive, on transmission M 41
 84. Solenoid for overdrive, on transmission M 41
 85. Overdrive control light
 - 86.
 87. Headlight wiper
 - 88.
 89. Heater pad with rheostat, drivers's seat
 90. Heater pad, driver's seat
 91. Light reminder buzzer.
 - 92.
 - 93.
 - 94.
 - 95.
 - 96.
 97. Relay, fuel pump
 98. Main relay, fuel injection
 99. Cold start injector
 100. Thermal time switch
 101. Control pressure regulator
 102. Fuel pump
 103. Air flow sensor
 104. Auxiliary air valve

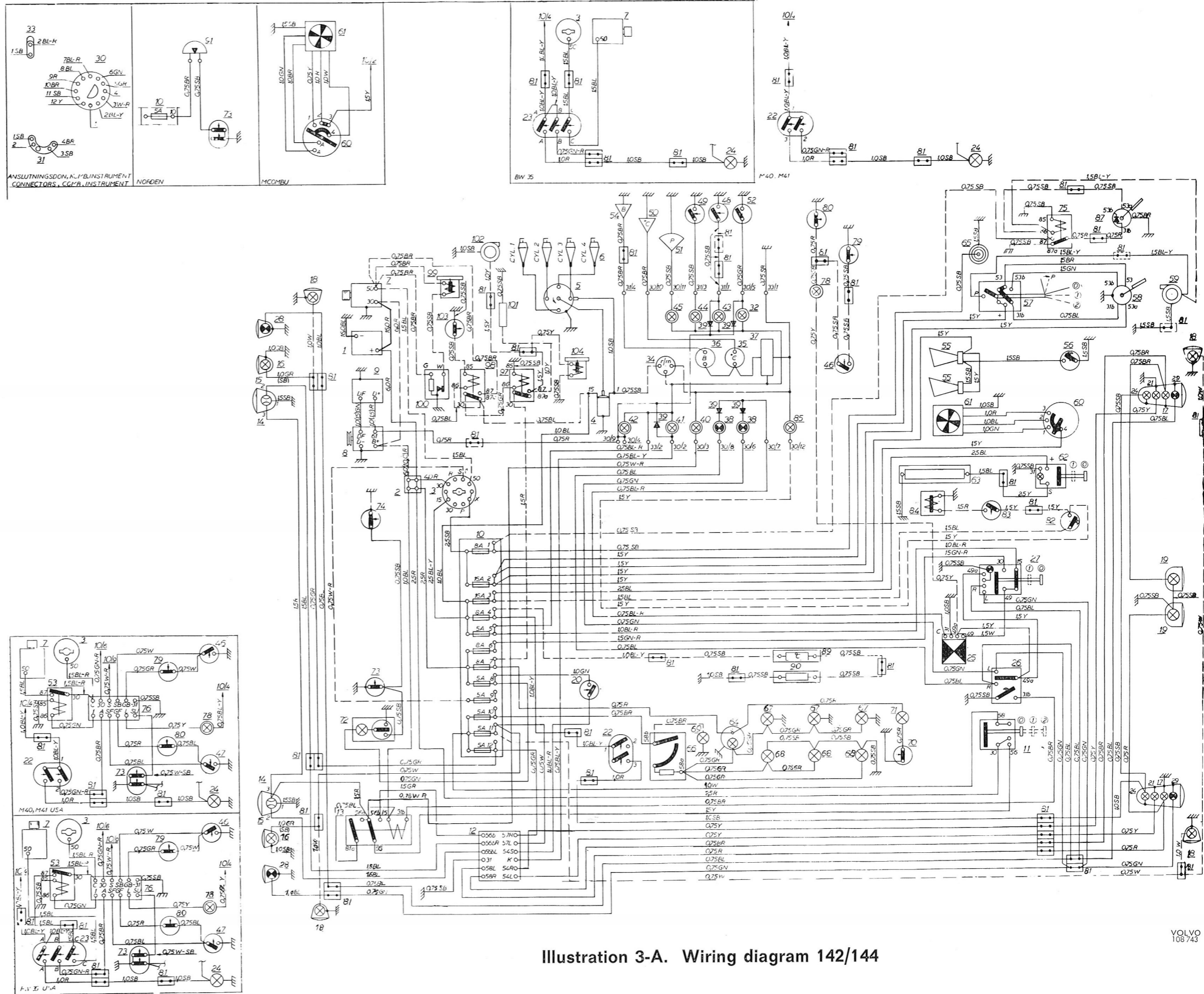


Illustration 3-A. Wiring diagram 142/144

- Pos. Unit
- Battery
 - Connection box
 - Ignition switch
 - Ignition coil
 - Distributor, firing order 1-3-4-2
 - Spark plugs
 - Starter motor
 - Alternator
 - Voltage regulator
 - Fuse box
 - Light switch
 - Bulb Integrity Sensor
 - Switch relay, upper and lower beams
 - Upper beams
 - Lower beams
 - Position light
 - Tail light
 - Side marker light
 - License plate light
 - Stop light switch
 - Stop light
 - Contact on transmission, M40—M41
 - Contact on transmission, BW 35
 - Back-up light
 - Flasher
 - Turn signal switch
 - Hazard warning light switch
 - Front turn signal
 - Rear turn signal
 - Connection at instrument
 - Connection at instrument
 - Brake warning light
 - Connection at instrument
 - Tachometer
 - Temperature gauge
 - Fuel gauge
 - Voltage stabilizer
 - Turn signal control light
 - Diode
 - Upper beam control light
 - Bulb Integrity Sensor warning light
 - Charging warning light
 - Parking brake control light
 - Choke control light
 - Oil pressure warning light
 - Contact, passenger's seat
 - Contact, driver's seat
 - Contact, parking brake
 - Contact, choke
 - Temperature sensor
 - Oil pressure sender
 - Contact, brake warning
 - Starter cut-out relay
 - Fuel gauge sender
 - Horn
 - Horn ring
 - Switch, wiper/washer
 - Wiper
 - Washer
 - Blower switch
 - Blower
 - Switch, electrically heated rear window
 - Electrically heated rear window
 - Clock
 - Cigarette lighter
 - Instrument light rheostat
 - Instrument light
 - Control panel light
 - Gear shift panel light
 - Contact, glove locker
 - Light, glove locker
 - Interior light
 - Door contact, driver's side
 - Door contact, passenger's side
 - Relay, headlight wiper
 - Interlock Control Unit
 - Buzzer, seat belt
 - Warning light, seat belt
 - Seat belt contact, passenger's side
 - Seat belt contact, driver's side
 - Connection
 - Switch, overdrive M41
 - Switch for overdrive, on transmission M 41
 - Solenoid for overdrive, on transmission M 41
 - Overdrive control light

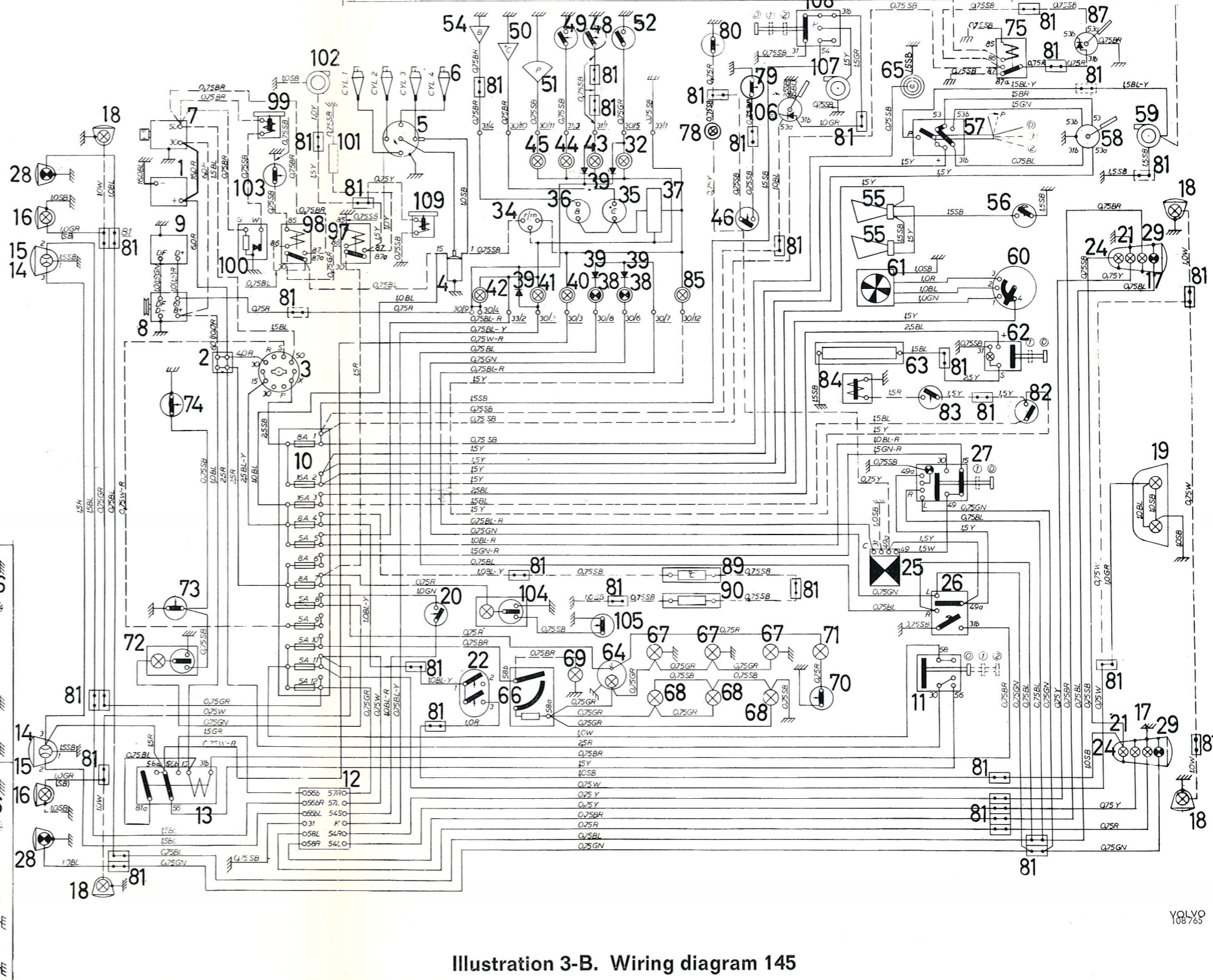
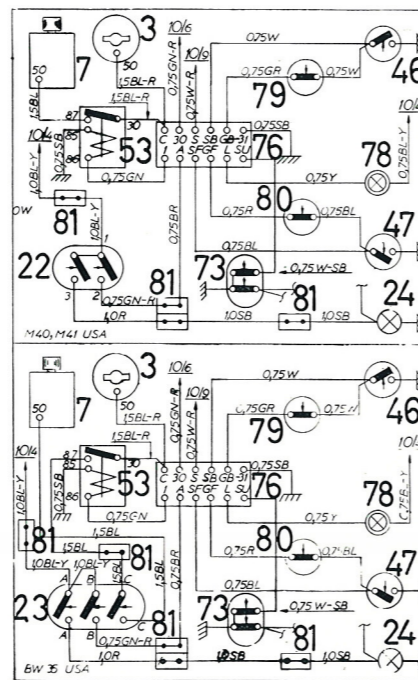
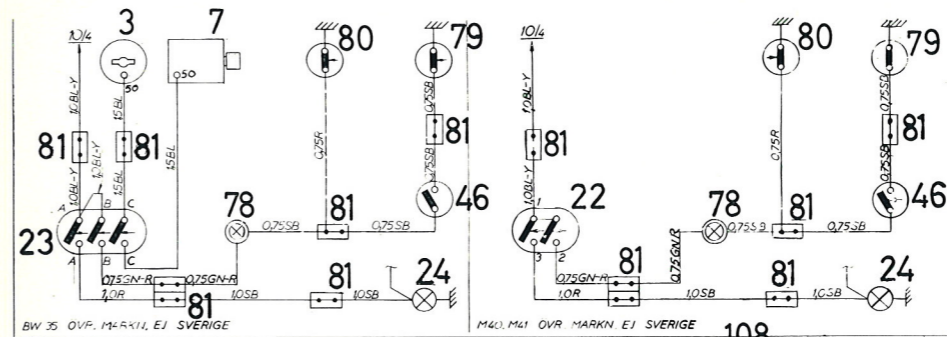
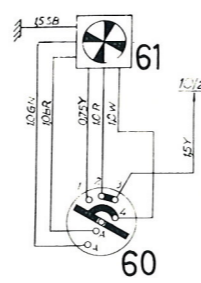
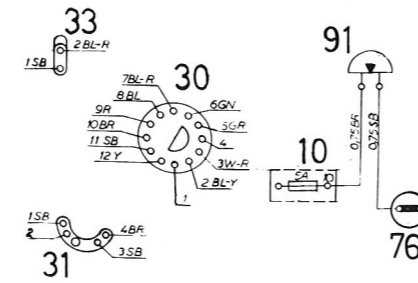


Illustration 3-B. Wiring diagram 145

- Headlight wiper
- Heater pad with rheostat drivers's seat
- Heater pad, driver's seat
- Light reminder buzzer
- Relay, fuel pump
- Main relay, fuel injection
- Cold start injector
- Termal time switch
- Control pressure regulator
- Fuel pump
- Air flow sensor
- Rear interior lamp
- Rear door contact
- Rear window wiper
- Rear window washer
- Rear window wipe/wash switch
- Auxiliary air valve

- SB Black
GR Grey
W White
R Red
BR Brown
Y Yellow
BL Blue
GN Green