Section 3

Electrical System, Instruments

Specifications

	Metric	US
Battery 12 V, 60 Ah, negative ground		
Specific gravity of electrolyte:		
Fully charged	1,28	
When re-charging is requested	1,21	
Charging current when recharging	5,5 Amps	
Alternator Bosch K1–14 V 55A 20		
Output	770 W	
Max. amp.	55 Amps	
Max. speed	225 r/s	135 00 rmp
Direction of rotation	Clockwise	
Ratio, engine/alternator	1:2	
Slip rings: minimum diameter	31.5 mm	1.3"
max. out-of-round	0.03 mm	0.0012"
Stator coil resistance	0.14 ohm + 10%	
Rotor coil resistance	4.0 ohms + 10%	
Output test	48 Amps at 3000 rpm and approx. 13 V	
Voltage Regutor Bosch K1–14 V 55A 20		
Control voltage of 4000 rpm	13.9 14.8 V	
Load current, lower two contacts	45±1 Amp	
Control range, between upper and lower contact sets	0.04 Volts	
Load current, upper two contacts	3–8 Amp	
Starter Motor Bosch GF 12 V 1.1 PS		
Direction of rotation	Clockwise	
Output	810 W (1.1 hp)	
Pinion teeth	9	
No. of brushes	4	
Mechanical test specifications		
Armature end float	0.01–0.3 mm	0.002–0.012"
Brush spring tension	14–16 N	3.1–3.5 lbs
Distance from pinion end to ring gear face	1.2–4.4 mm	0.047–0.173"
Frictional torque of rotor brake	25–40 Ncm	2.17–3.81 lb.in
Pinion idling torque	14–18 Ncm	1.20–1.56 lb.in
Backlash	0.3–0.5 mm	0.006–0.00
Pinion pitch	2.12	
Commutator min. diameter	33.5 mm	1.318"
Brush min. length	13 mm	0.52 "
Electrical test specifications		
Free-running:		
11.5 Volts and 30–50 Amps	97–130 r/s	5800–7800 rpm
Loaded:		
9.0 Volts and 185–220 Amps	17.5–22.5 r/s	1050–1350 rpm
Locked:		
1 Volts and 400–490 Amps	0 r/s	0 rpm
Solenoid		
Cut-in voltage	Min 8 Volts	

Ignition System

Type	Breakerless electronic ignition	
Firing order	1-3-4-2	
Ignition timing, vacuum unit disconnected	5° B.T.D.C. at 700 rpm	
Spark plugs	Bosch W 200 T 35 or requivalent	
Gap	0.7–0.8 mm	0.028–0.0032"
Tightening torque	25–30 Nm	18–22 lb.ft

Distributor

	Man. transm.	Aut. transm.
Bosch No.	0237 002 002	0237 002 003
Volvo P/N	462896	462762

Ignition coil

Bosch No.	0221 122 006	0221 122 006
Volvo P/N	1219230	1219230

Electronic module

Bosch No.	0221 100 005	0227 100 005
Volvo P/N	462763	462763

Centrifugal governor

Total advance, distributor degrees	14.5±1	14.5±1
Advance begins at, distributor rpm	430–600	430–600
Distributor rpm at 5° advance	830–1010	830–1010
10°	1230–1400	1200–1400
full advance	1600	2200

Vacuum unit

Retard distributor degrees	2.5±1°	2.5±1
Retard begins at, in Hg	1.2–4.4	1.2–4.4
1° retard at, in Hg	1.8–4.6	1.8–4.6
Retard ends at, in Hg	4.8	4.8

Bulbs

	US bulb No.	Power	Socket	No. of bulbs
Headlights	7" Type 2 Sealed Beam			2
Position lights, front	67	5 W/4 cp	Ba 15s	2
Turn signals, front	1073	21 W/32 cp	Ba 15s	2
rear	1073	21 W/32 cp	Ba 15s	2
Tail lights	67	5 W/4 cp	Ba 15s	2
Stop lights	1073	21 W/32 cp	Ba 15s	2
Back-up lights	1073	21 W/32 cp	Ba 15s	2
License plate light		5 W	S 8.5	2
Interior light		10 W	S 8.5	1 (245:2)
Glove box light		2 W	Ba 9s	1
Instrument panel light		2 W	W 2.2 d	3
Engine compartment light		15 W	S 8.5	1
Light, control panel		1.2 W	W 1.8 d	3
—shift positions		1.2 W	W 1.8 d	1
—rear ash tray		1.2 W	W 1.8 d	1
—belt lock mechanism		1.2 W	W 1.8 d	1
Warning charging		1.2 W	W 1.8 d	1
and — oil pressure		1.2 W	W 1.8 d	1
indicator — parking brake		1.2 W	W 1.8 d	1

lights	– brake failure	1.2 W	W 1.8 d	1
	– bulb failure	1.2 W	W 1.8 d	1
	– turn signals	1.2 W	W 1.8 d	2
Warning	– upper beam	1.2 W	W 1.8 d	1
	– overdrive	1.2 W	W 1.8 d	1
	– el heated rear window	1.2 W	W 1.8 d	1
	– seat belt	1.2 W	W 1.8 d	1

Fuses

	No. of fuses
8 amp	4
5 amp	6
16 amp	2

Electrically heated rear window

Power drain	150 W

Speedometer gears

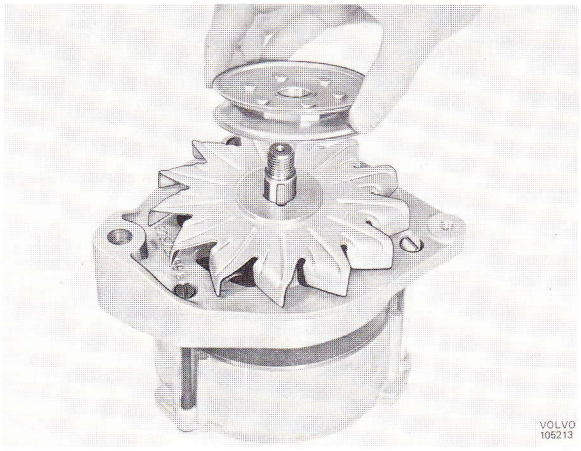
Model	Trans.	Rear axle ratio	Small gear P/N	Small gear Teeth	Large gear P/N	Large gear Teeth	Ratio
242, 244, 245	M 40	3.91	381600	20	381601	6	3,33
		4.10	381603	21	381601	6	3.50
		4.30	381604	22	381601	6	3.66
	M 41	4.10	381659	21	380682	6	3.50
		4.30	381660	22	380682	6	3.66
	BW 35	3.91	381600	21	381602	6	3.50
		4.10	381603	20	381602	6	3.33

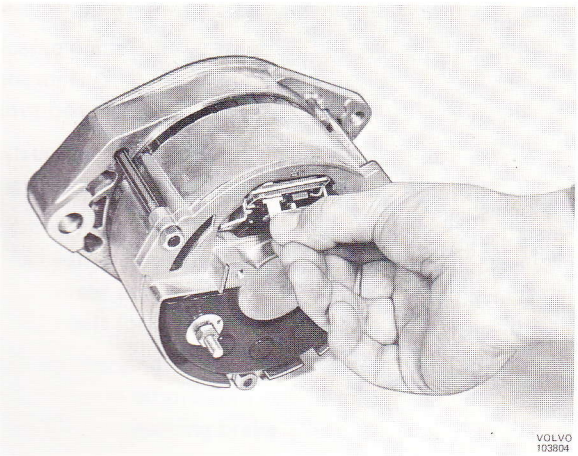
Group 32

Alternator, Bosch

Special instructions for work on alternator equipment

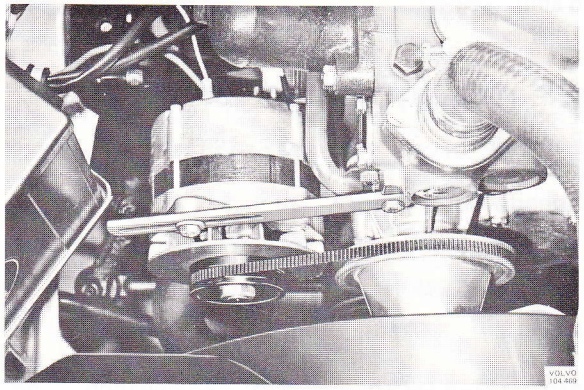
1. When replacing or installing battery, make sure that proper polarity is observed. A misconnected battery will immediately ruin the rectifiers.
2. Never run the alternator with the main circuit broken. The battery and/or alternator and regulator leads must never be disconnected while the engine is running.
3. No attempt should be made to polarize the alternator.
4. When battery in vehicle disconnect the battery ground cable.
5. When using an extra battery as a starting aid, connect it in parallel.
6. When are welding on the vehicle, disconnect the battery ground cable as well as the B+ lead on the alternator and the two-pin plug at the voltage regulator. The welding unit should always be connected close to the weld.





Removing alternator

Op. No. 32102 = replace alternator
Op. No. 32104 = rebuild alternator

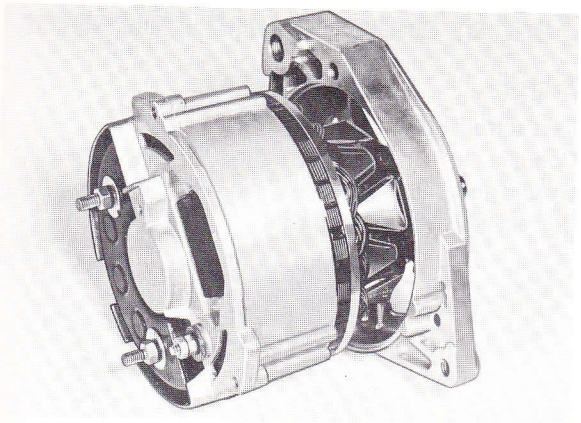


1. Disconnect the battery ground cable.
2. Disconnect the leads to the alternator.
3. Remove the bolt for the adjusting arm.
4. Remove the bolt securing the alternator to the engine block.
5. Remove fan belt and lift out the alternator.

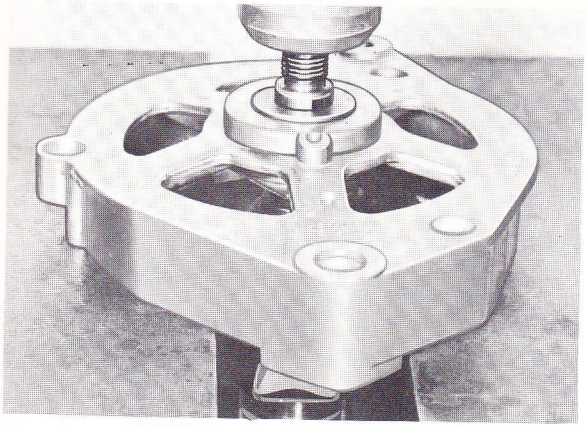
Disassembly

1. Remove nut and washer for pulley. Pull off pulley and fan. Remove the key.

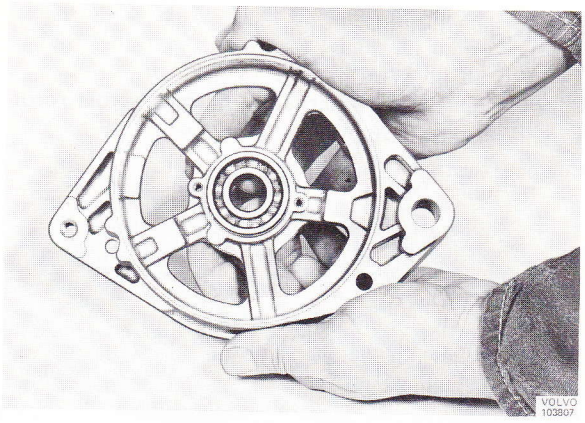
2. Remove the brush holder retaining screws. Remove the brush holder.


VOLVO
103805

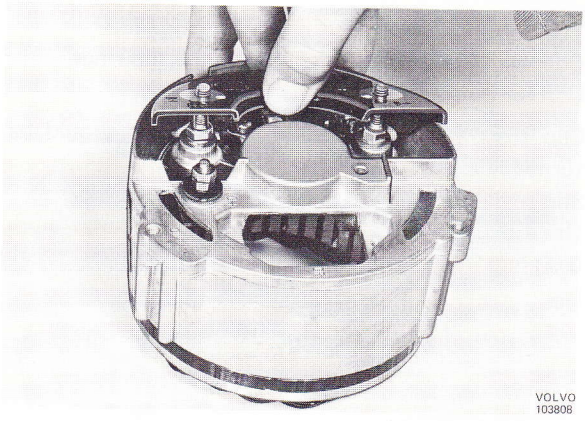
3. Remove nuts and bolts connecting the alternator end shields.
Remove front end shield from stator and rear end shield assembly.


VOLVO

4. Press out the rotor from the front end shield.


VOLVO
103807

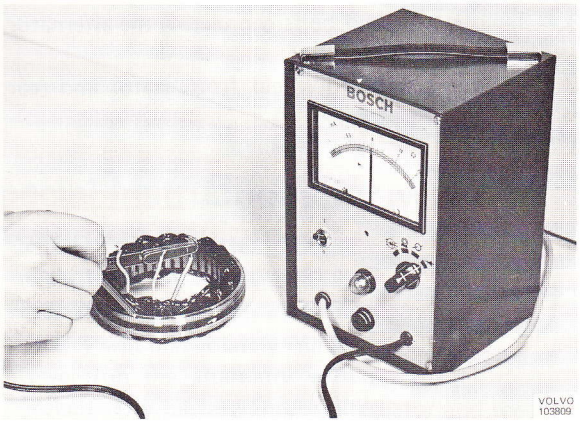
5. Remove the screws retaining the front ball bearing.
Press out the bearing.


VOLVO
103808

6. Remove the nuts for the plus diode plate. Lift up and bend the plate aside.

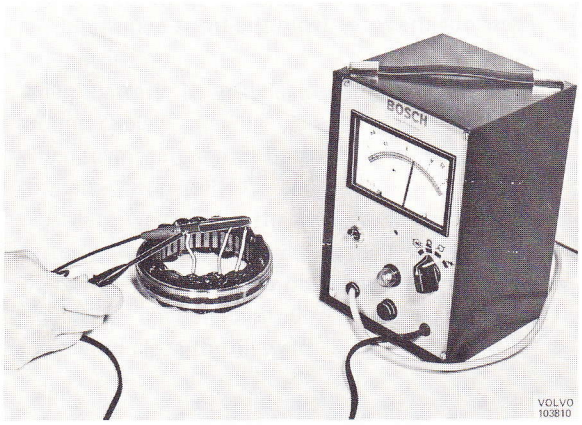
7. Solder loose the stator connections from the terminal points.
Lift off the stator.

Test of disassembled alternator

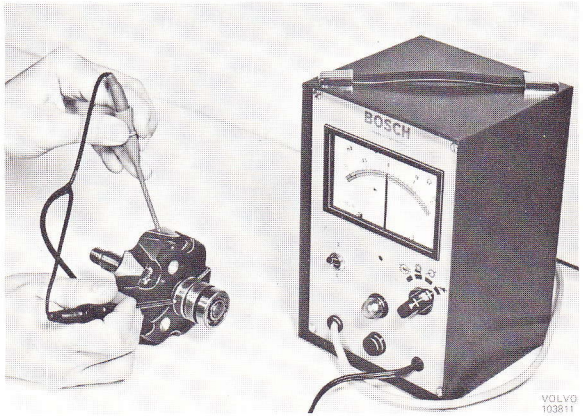


Stator

Test stator insulation.
Connect a 40 Volt alternating current across ground and phase terminal.
Correct resistance: indefinite

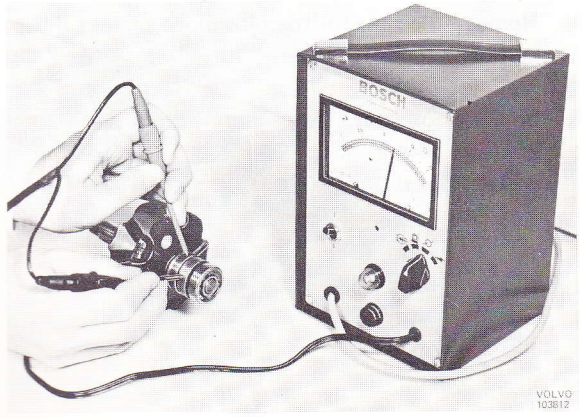


Test stator coil resistance.
Connect the test instrument across the phase terminals.
Correct resistance: 0.14 ohm + 10%.



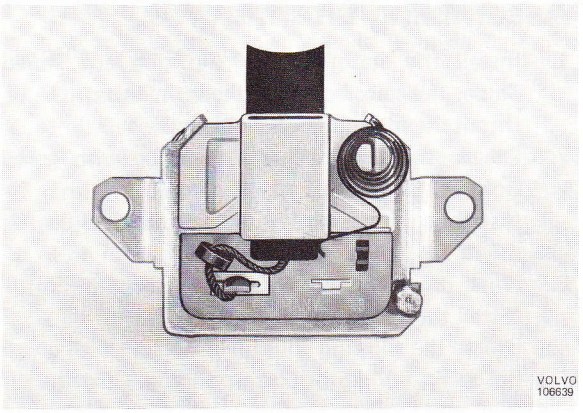
Rotor

Test rotor insulation.
Connect a 40 Volt alternating current across rotor ground and a slip ring.
Correct resistance: indefinite.



Test rotor coil resistance.
Connect the test instrument across the slip rings.
Correct resistance: 4.0 ohms + 10%

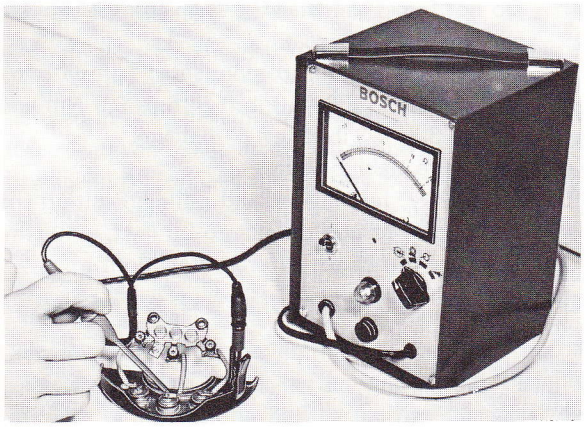
Slip rings which are burned or damaged should be turned in a lathe. Use tail stock.
Slip ring minimum diameter is 31.5 mm = 1.3".
Use a dial indicator to check out-of-round, maximum 0.03 mm = 0.0012".


VOLVO 106639

Brush holder

Test insulation.
Use 40 Volt alternating current.
Correct reading: indefinite

Check that minimum brush length is 14 mm = 0.55"



VOLVO 103814

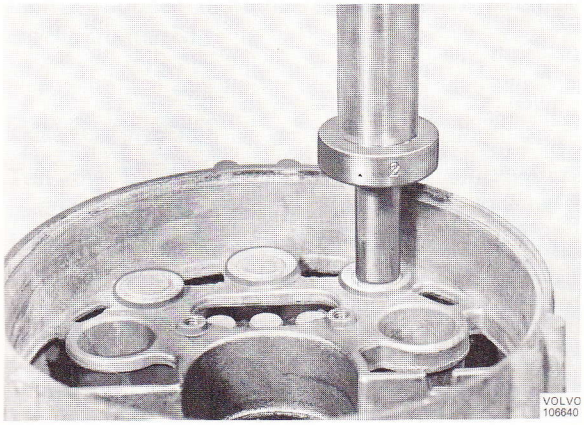
Diodes

Test the diodes with a diode tester.

Replace defective diodes as follows:

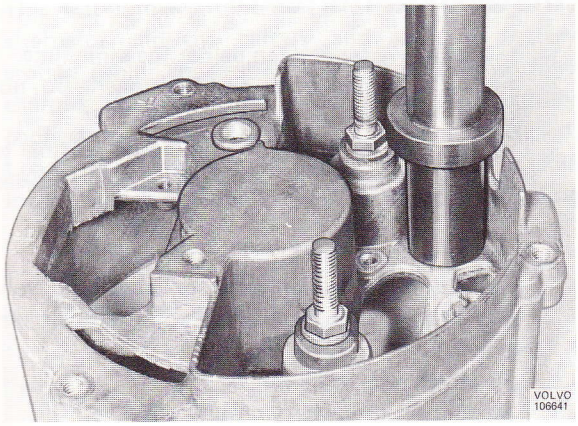
Plus diodes

1. Solder loose the plus diode plate from the terminals. Press out the defective diode.
2. Calibrate the diode hole in the plate. Use tool Bosch EFU 57/0/3 and 57/0/5.
3. Press in the new diode. Lubricating with silicone oil facilitates installation.
4. Paint the new diode and any bare spots on the outside of the plus diode plate. Use chlorinated rubber enamel Bosch Ft 87 V1, or corresponding.
5. Solder the plus diode plate to the terminals. Re-test.


VOLVO 106640

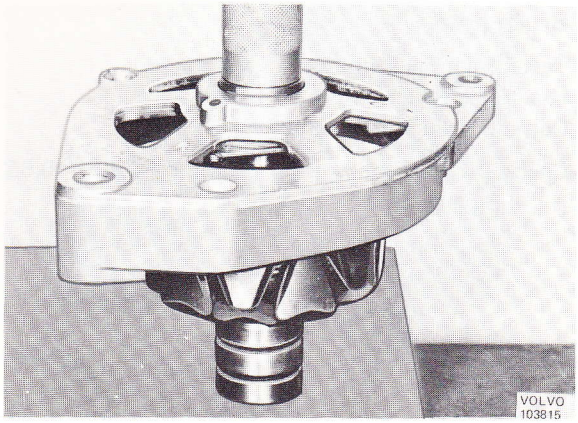
Minus diodes

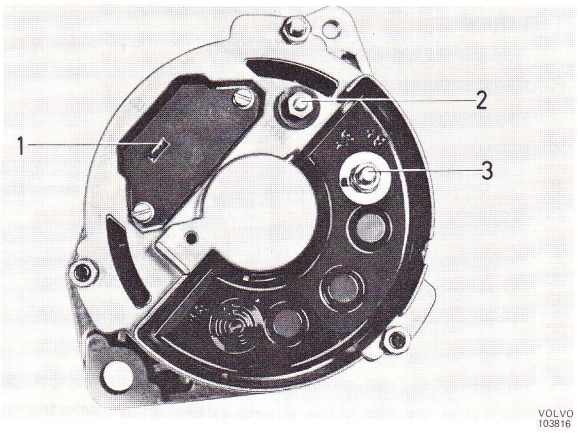
1. Solder loose the minus diodes from the terminals. Remove the plus diode plate assembly.
2. Press out the defective diode.
3. Press in the new diode. Lubricating with silicone oil facilitates installation.
4. Solder the negative diodes to the terminals. Re-test.


VOLVO 106641

Magnetizing diodes

In case of defective magnetizing diodes, replace the entire plate assembly with three diodes.



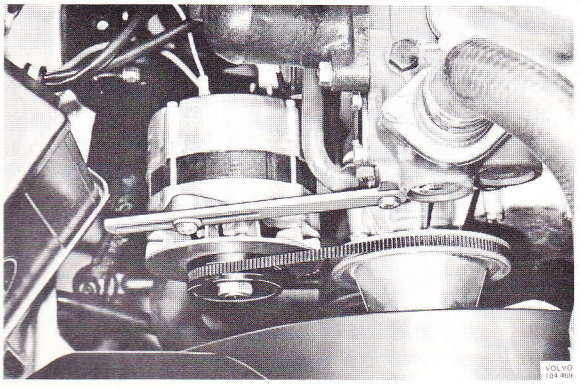


Alternator terminals

1. DF To field winding
2. 61/D+ From magnetizing rectifier
3. B+ To battery

Assembling alternator

1. Install the stator in the slip ring end shield. Solder the stator wires to the terminals.
   Install the plus diode plate assembly.
2. Grease the drive end ball bearing with grease Bosch Ft 1 V 4 or corresponding.
   Install bearing assembly in the drive end bearing shield.
3. Press drive end bearing shiled onto the rotor. Install the spacer ring.
4. Grease the slip ring end shield bearing with grease Bosch Ft 1 V 35 or corresponding. Coat the slip ring end shield bearing seat with Molykote. Assemble the alternator.
   Do not forget to install the spring on the slip ring end shield bearing seat.
   Assemble alternator components. Torque retaining screws to 3.6–4.3 lb.ft. = 5.0–6.9 Nm and nuts to 3.3–4.3 lb.ft. = 4.5–6.0 Nm.
5. Install the brush holder.
6. Install key, fan. spacer and pulley. Position the washer and torque the nut to 29 lb.ft. = 40 Nm.
7 Test on a test bench before installation.



Installing alternator

1. Install alternator and fan belt at the same time.
2. Install attaching bolts and tensioner. Do not tighten the tensioner finally.
3. Adjust the belt tension. It should be possible to depress the belt 3/8" = 8 mm halfway between the pulleys.

   Secure the alternator.
   NOTE: Force may only be applied to the front end of the alternator when adjusting belt tension.
4. Re-attach alternator wires.
5. Re-connect the battery ground cable.

Replacing voltage regulator

Replace voltage regulator = Op. No. 32205

1. Disconnect the battery ground cable.
2. Pull the plug out of the voltage regulator.
3. Remove the screws and change the regulator.
4. Install the new regulator and insert the plug.
5. Reconnect the battery ground cable.
   For regulator adjustment, see "Test the voltage regulator".

Test of alternator and voltage regulator

For all tests of alternator equipment, fixed clamps should be used. So-called crocodile clamps should not be used as they have a certain tendency to loosen. A loose lead can result in alternator and regulator being damaged. Disconnect the battery before connecting any instruments.

Test of alternator circuit

Before any tests on the alternator or regulator in the vehicle are made, check battery and wiring for fault in leads or insulation, loose or corroded lead terminals and poor ground. **Check the fan belt.** Any of the fault mentioned must be repaired before electrical checks are started.

Battery test

Test the battery with a hydrometer and battery tester. If the battery is not fully charged, remove it from the car and charge it or replace it with a new one if necessary. A fully charged battery which is otherwise in good condition should always be used when testing.

Voltage drop test

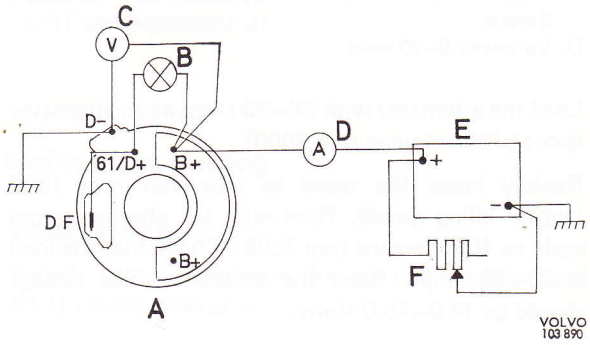
This test is made to check the leads between the alternator and the battery and also the battery ground cable. The test should be made with a fully charged battery in good condition. The battery connections should be well cleaned and tightened. Load the alternator with approx 10 amps. Suitable load: headlights switched on. With the engine running and the alternator supplying 10 amps, measure with a voltmeter the voltage between positive pole of the battery and B+ on the alternator. If the voltage at this test exceeds 0.3 volt, there is a fault in cable or contact, which must be remedied immediately. After repairing defective leads or contacts, measure again.

With the same load as above, measure voltage drop between negative pole of the battery and alternator terminal D−. The voltage drop must not exceed 0.2 Volt. If the voltage drop exceeds 0.2 Volt, check battery ground, alternator contact with engine and engine contact with the chassis. After necessary repairs, measure again.

Alternator test

(In a test bench or in the vehicle)

Test of charging system in vehicle = Op. No. 32174



Wiring diagram for testing alternator

A. Alternator
B. Control lamp 12 volts, 2 watts
C. Voltmeter 0–20 volt
D. Ammeter 0–50 amps.
E. Battery 60 ampèrehours
F. Load resistance

Connect the alternator as shown. Run 6000 rpm. Regulate voltage to approx 14 volts by load resistance F. The alternator should produce 55 amps at 6000 rpm and 14 Volts.

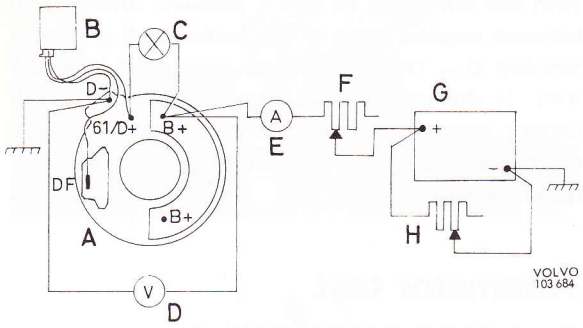
At the same time check to make sure that the charging warning lamp does not light or glow.

If the alternator does not meet above requirements, first check brushes and diodes.

Testing and adjusting voltage regulator

(In a test bench or in the vehicle)

Connect the regulator to an alternator in good condition.

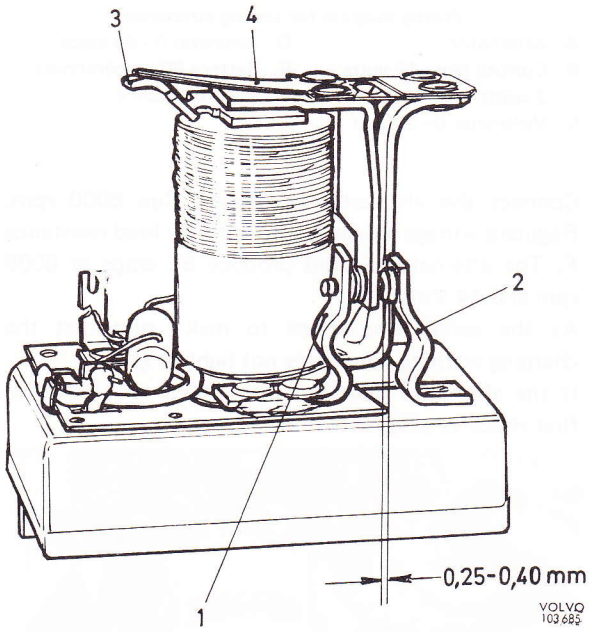


Wiring diagram for testing voltage regulator

A. Alternator
B. Voltage lamp 12 volts
C. Control lamp 12 volts, 2 watts
D. Voltmeter 0—20 volts
E. Ammeter 0—50 amps.
F. Regulator resistance
G. Battery 60 ampèrehours
H. Load resistance

Load the alternator with 28—30 amps at an alternator rpm of 4000 (engine rpm 2000).

Rapidly lower the speed to alternator rpm 1000 (engine idling speed). Then raise the alternator rpm again to 4000 (engine rpm 2000). Check that the load is 28—30 amps. Read the voltmeter. The voltage should be 14.0—15.0 Volts.



Voltage regulator

1. Regulator contact for lower control range
2. Regulator contact for upper control range
3. Spring tensioner
4. Spring upper section: Steel spring
   Lower section: Bi-metal spring

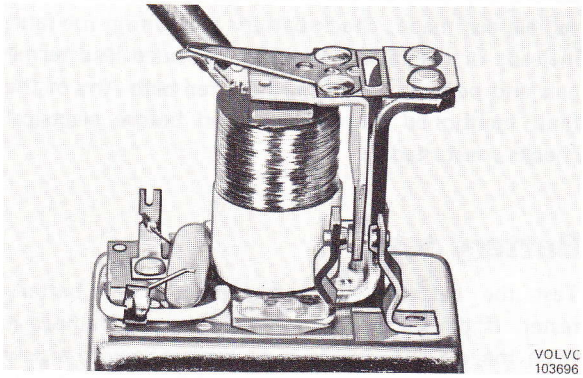
The reading should be made within 30 seconds after the test has begun. Reduce the load on the alternator to 3—8 amps and read the regulating voltage. This voltage should now lie within the tolerance 0 volt to minus 0.3 volt in relation to the first reading.

If the regulating voltage in the upper regulating range is too high or too low in relation to the lower regulating range (0 volt to minus 0.3 volt) this is adjusted by bending the holder for the left (lower) contact and correcting at the same time the gap between the right (upper) contact and the movable contact.

If the holder is bent towards the right (upper) contact, the regulating voltage in the upper regulating range will drop. To avoid faulty adjustments due to residual magnetism in the regulator core, it is necessary to reduce alternator speed to idle after each adjustment and then increase speed and make a new reading.

(If the adjusting is comprehensive and the regulator is hot, it can be cooled to ambient temperature by compressed air before final reading.)

The regulating voltage in the lower regulating range is adjusted by bending the tensioner 3 for the bimetallic spring, see below:



If the tensioner is bent downwards, the regulating voltage should drop, if bent upwards the opposite should be the effect.

Service Diagnosis

Condition: Warning lamp does not light with engine off.

Action	Possible cause
Test lamp (12 volts 2 watts) between B+ and 61/D+ on alternator lights.	Warning lamp burned out or open circuit to D+ on regulator.
Test lamp between B+ and 61/D+ does not light. Test lamp between 61/D+ and ground lights.	A positive diode shorted.
Test lamp between 61/D+ and ground gives a weak light. Remove the plug at the regulator and connect an ammeter between B+ and DF on the alternator. Ammeter reding:	0 amp.: Worn brushes, oxidized slip rings or breakage in rotor coil. 2–2.5 amp.: Open circuit in regulator or in lead DF from regulator to DF on alternator.

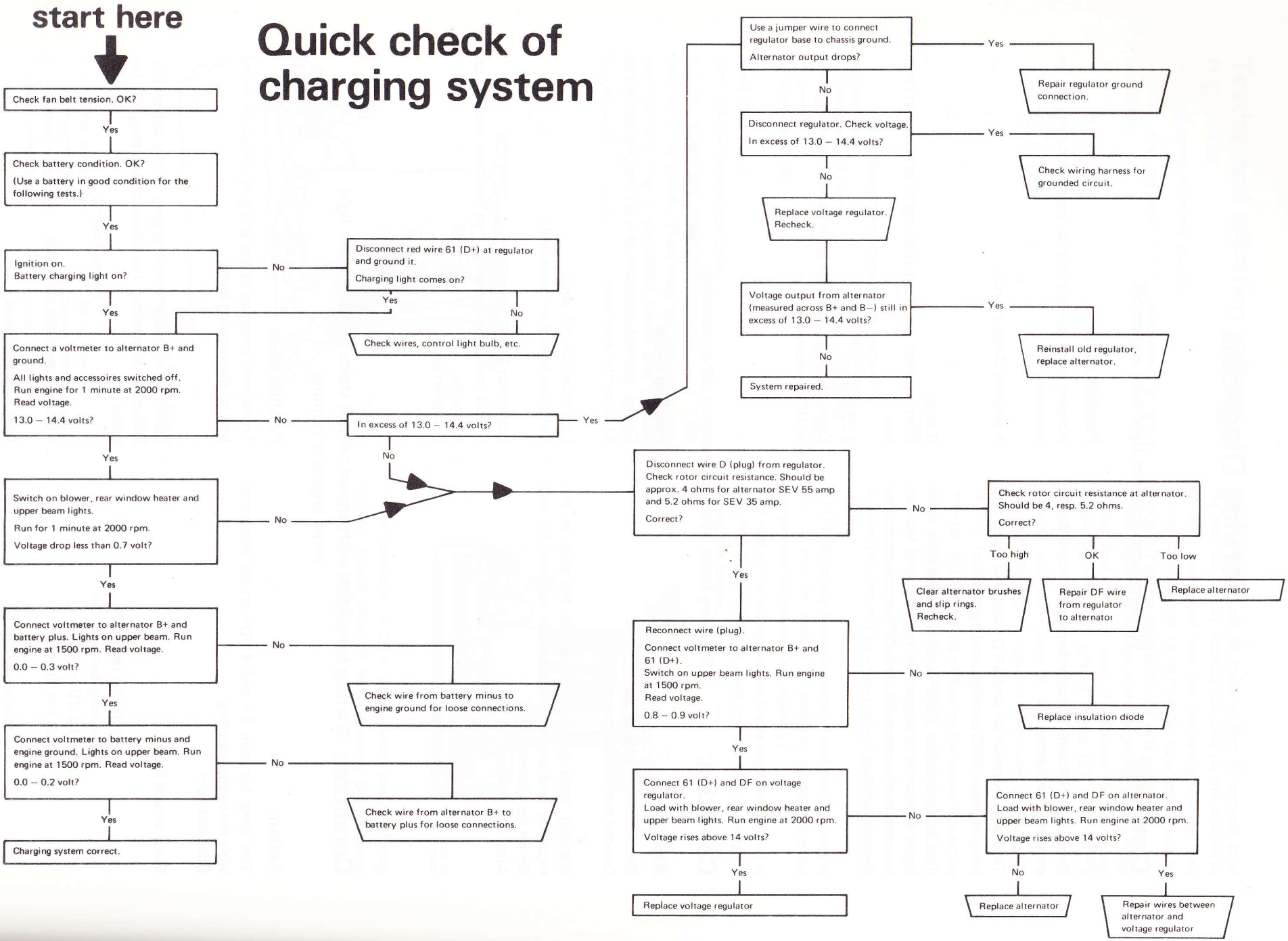
Condition: Warning lamp lights with engine off or running.

Action	Possible cause
Disconnect the plug at the regulator: Control lamp still lights.	Circuit shorted between D+ on the regulator and 61/D on the alternator.
Warning lamp goes out. Re-install the plug in the regulator and connect an ammeter between B+ and D+ on the alternator. Ammeter reading:	Less than 2.0–2.5 amps: Defective regulator (breakage). More than 2.0–2.5 amps: Circuit shorted between DF on regulator and DF on alternator. Coil shorted.

Condition: Warning lamp lights with engine off but starts to give a weak light when engine is running.

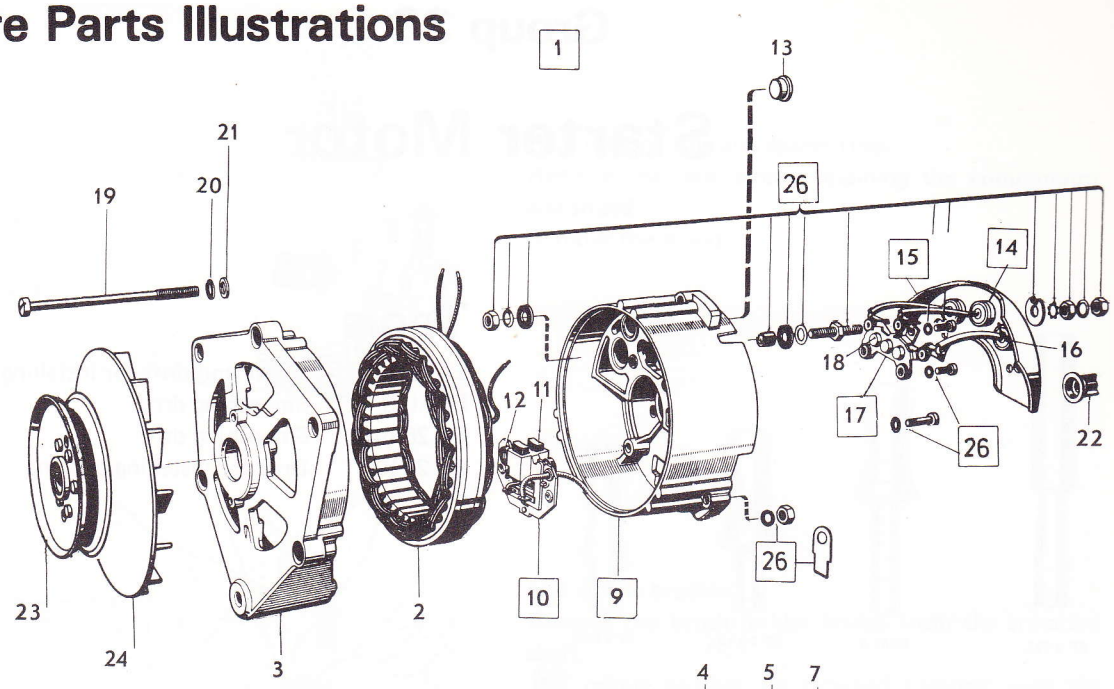
Action:	Possible cause
Test lamp between B+ and 61/D+ on the alternator with the engine running: Does not light.	Transition resistance in the charging circuit or in the lead to the warning lamp.
Gives a weak light.	Defective regulator (overcharging of the battery) or defective alternator (insufficient charging of the battery).
Install new regulator. Test lamp between B+ and 61/D+: Does not light.	Removed regulator defective.
Gives a weak light.	Defective alternator.

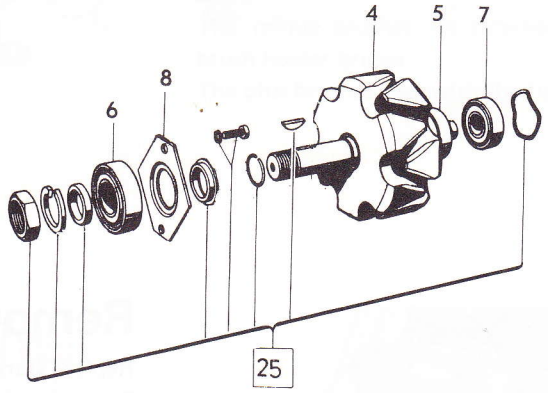
Quick check of charging system



Spare Parts Illustrations

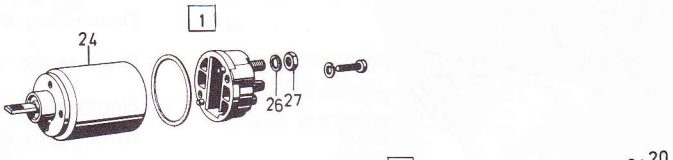
Alternator

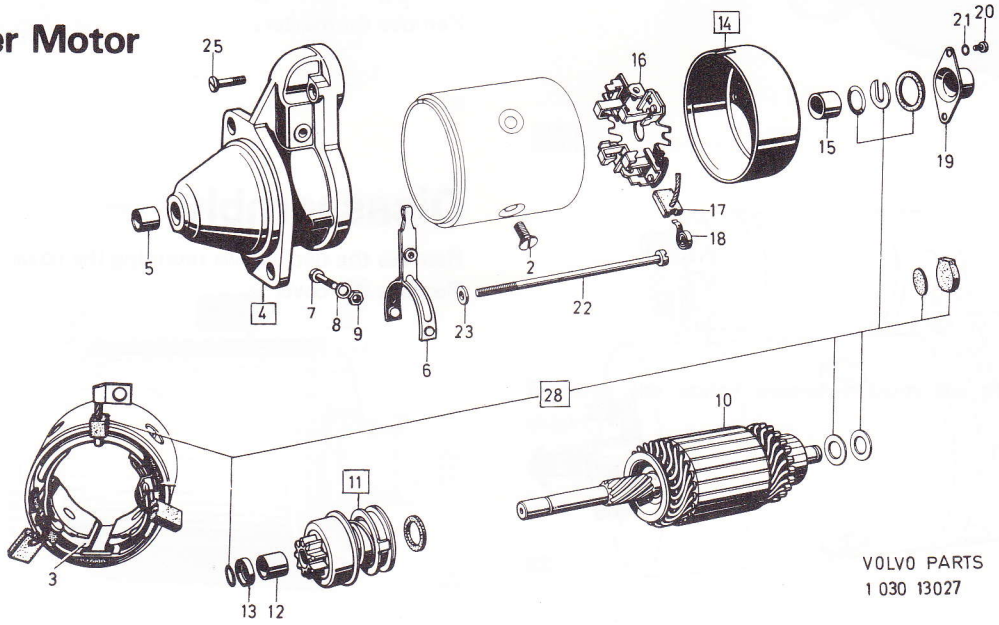




VOLVO PARTS
1 030 13035

Starter Motor

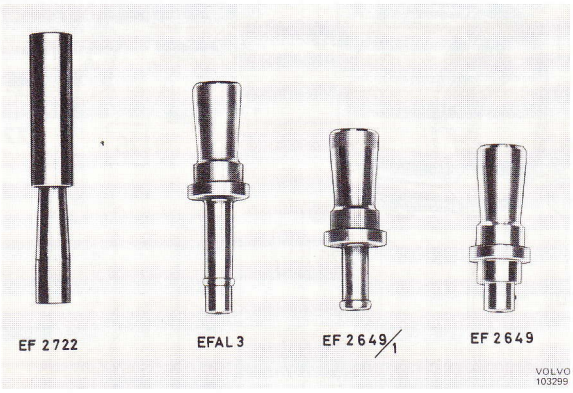




VOLVO PARTS
1 030 13027

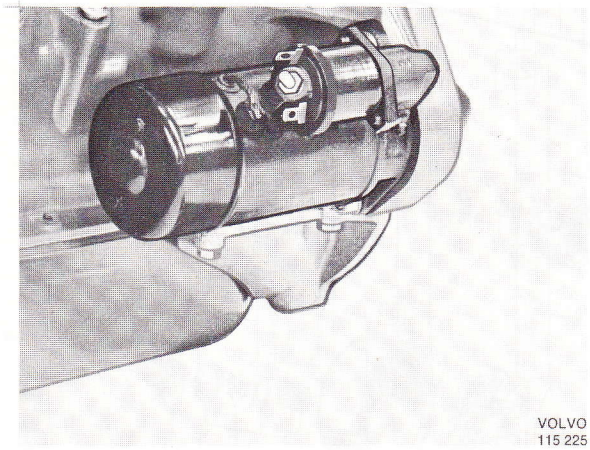
Group 33

Starter Motor



Tools

EF 2722	Sleeve and drift for installing circlip
EFAL 3	Smoothing drift
EF 2649/1	Smoothing drift
EF 2649	Drift for installing bushing



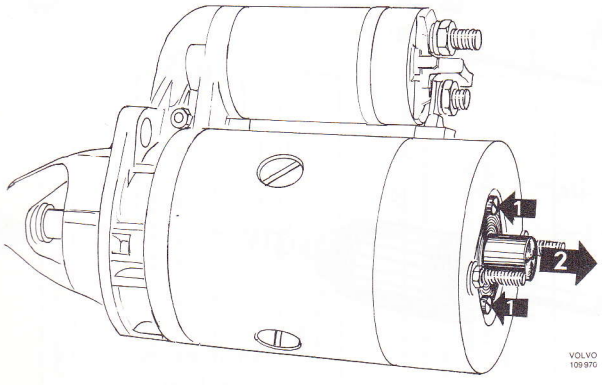
Removal

Replace starter motor = Op. No. 33118
Rebuild starter motor = Op. No. 33102

Disconnect the battery ground cable.

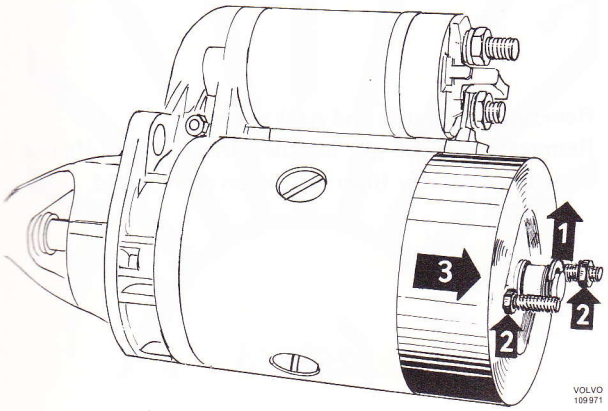
Disconnect the leads from the starter motor.

Remove the bolts which hold the starter motor to the timing gear housing.
Remove the starter.

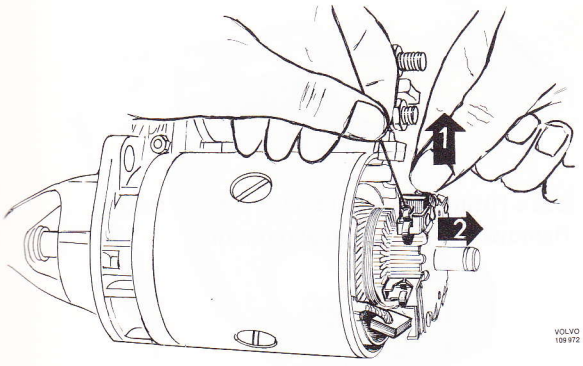


Disassembly

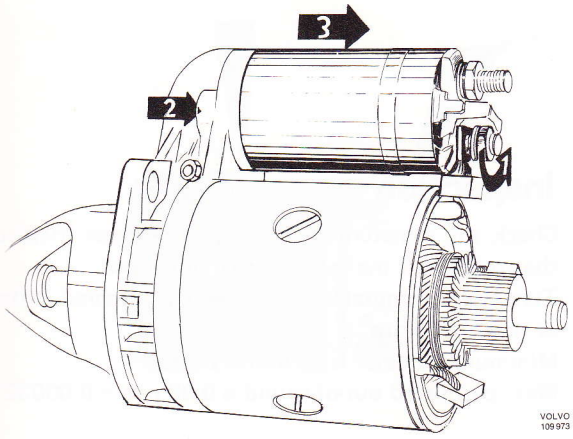
Remove the two screws retaining the cover.
Remove the cover.



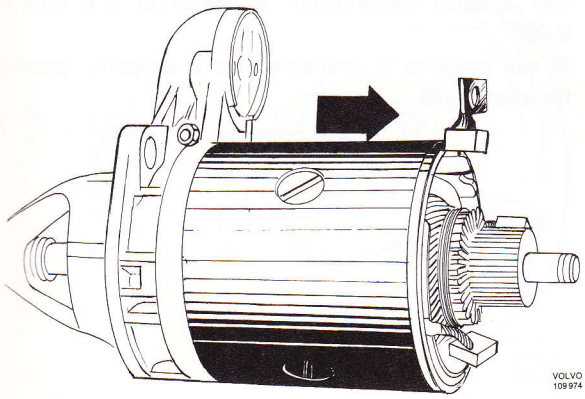
Remove lock ring and spacer rings.
Remove the two screws retaining the commutator end shield.
Remove the shield.



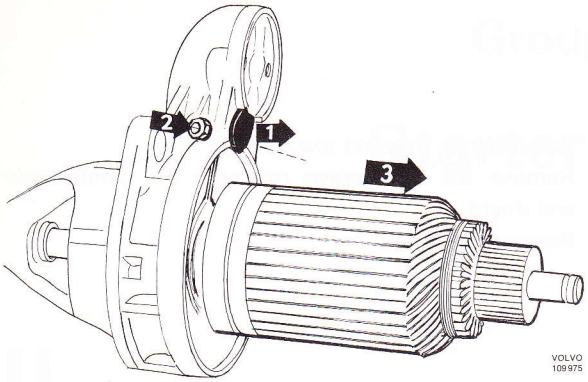
Lift up the brushes.
Remove the brush holder bridge from the armature shaft.
The minus brushes are retained together with the brush holder bridge.
The plus brushes stay with the field coils.



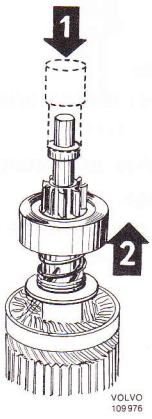
Remove the nut connecting the field coil to the solenoid.
Remove the screws retaining the solenoid to the pinion end shield.
Remove the solenoid.



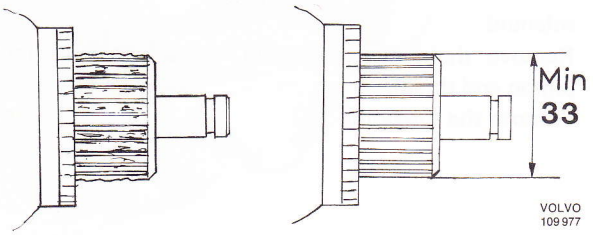
Remove the stator assembly from the pinion end shield.



Remove rubber stop and steel washer.
Remove the pivot pin for the pinion lever. Lift out armature assembly from the pinion drive shield.

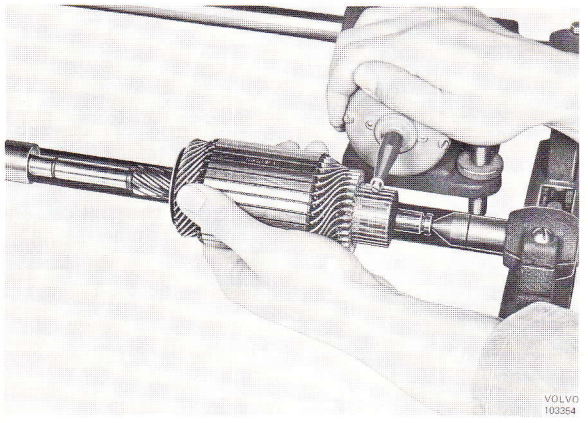


Use a fitting sleeve to remove the end stop.
Remove lock ring, stop and pinion.

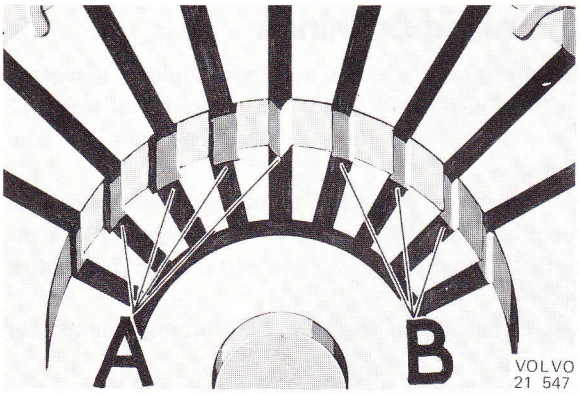


Inspection

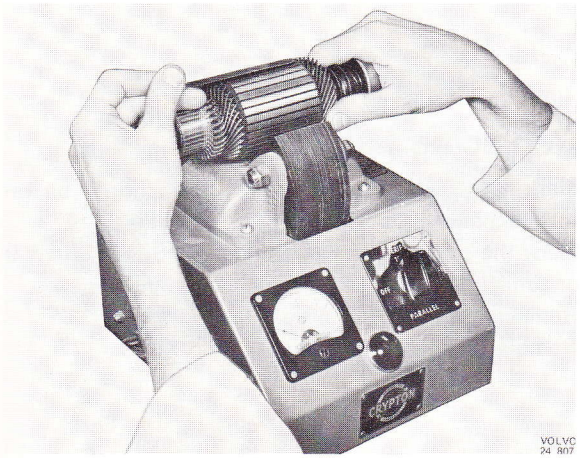
Check the armature for damages and wear. Replace the armature if the shaft is worn or warped.
Turn the commutator in a lathe if it is scored, pitted or unevenly worn.
Minimum diameter is 33 mm = 1.300".
Max. permitted out-of-round is 0.08 mm = 0.00032".



Use a Mica undercutter to undercut 0.4 mm = 0.008".
If no machine is available, use a properly ground hacksaw blade.



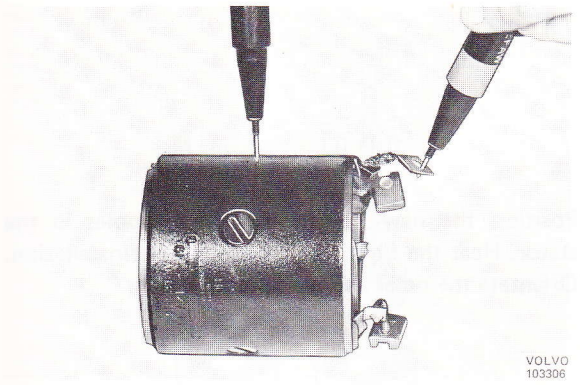
A. Incorrect
B. Correct



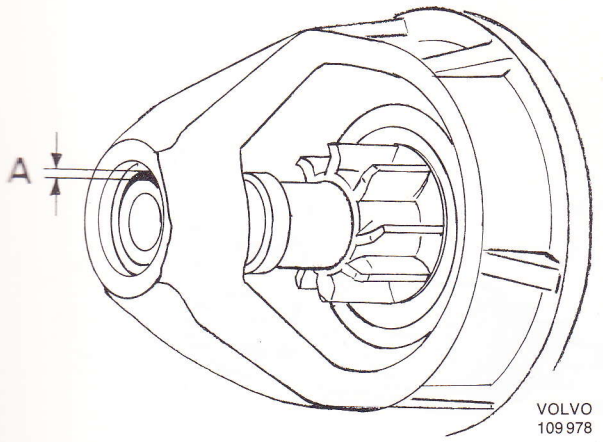
Use a "Growler" to check the armature for shorts. Switch on and hold a hacksaw blade close to the armature. If the blade vibrates in any position, one of the following faults can exist:

- short to ground
- commutator shorted
- windings shorted

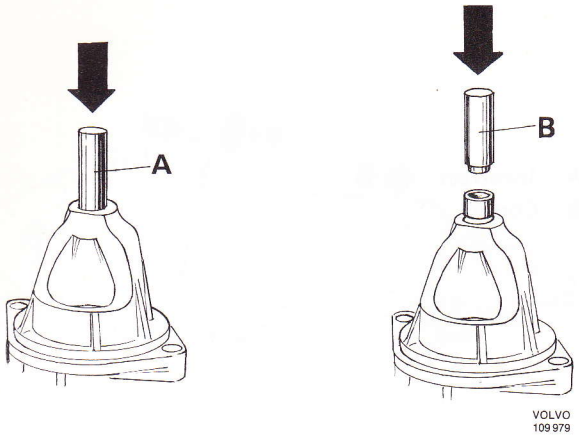
Replace the rotor if faulty.



Use 40 Volts AC to check the stator coil insulation.



Check end shields and brush holder.
Replace worn or damaged parts.
No more than 0.005" (0.12 mm) bushing play is permitted.
Check other parts and replace if worn or damaged.
The lock ring should always be replaced as it might have been damaged or lost its tension when removed.



Installing bushings

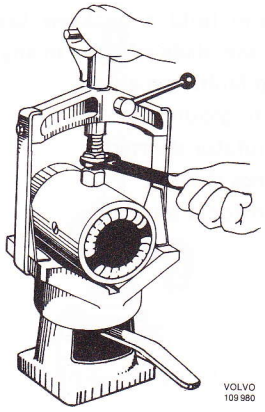
Before installation, new bushings should be immersed in oil, Bosch 01 1 V 13 or similar, for at least 1/2 hour. Otherwise their service time will be considerably reduced.

The bushings are made to correct dimensions and must not be machined. Any machining will block the pore holes which in turn obstructs the lubricating ability.

Use Bosch special tool EF 2649 to press out the old bushing.

Clean the hole and remove any burrs.

Use same Bosch tool to press in the new bushing.



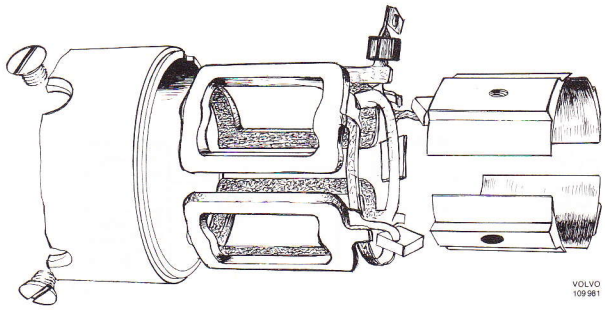
Replacing field coil

Mark poles and housing. The poles should be reinstalled in exact positions.

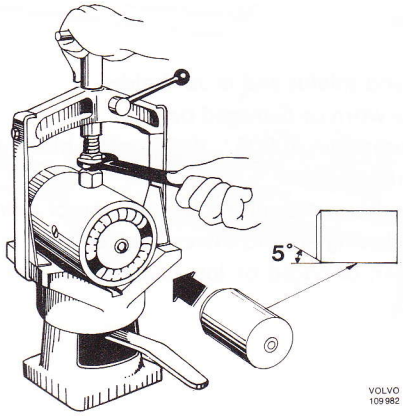
Place the stator in a clamping device, Bosch EFAW 9 or similar, and slacken the pole screws.

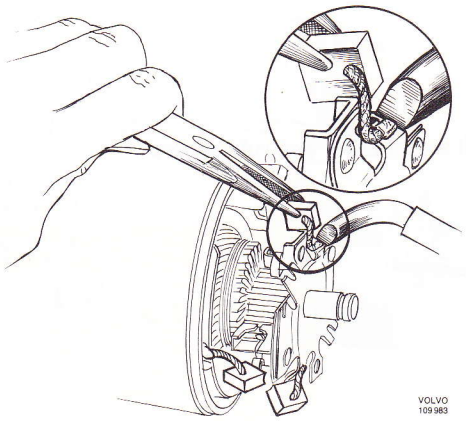
Remove the stator from the clamping device.

Remove poles and field coils.



Position the new field coils and the poles in the stator. Heat the field coils slightly before installation. Orientate the poles according to markings.

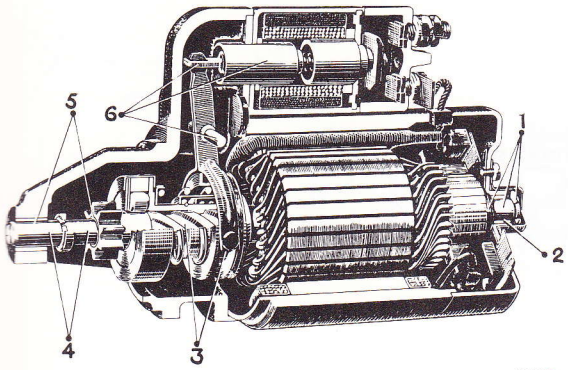




Replacing brushes

Brushes shorter than 9/16" = 14 mm should be replaced.

1. Solder loose the brushes from their attachments.
2. Solder on the new brushes. Use a sufficiently hot soldering iron.
   Do not allow any solder to run down in the brush leads. This would stiffen the leads and prohibit free movements.

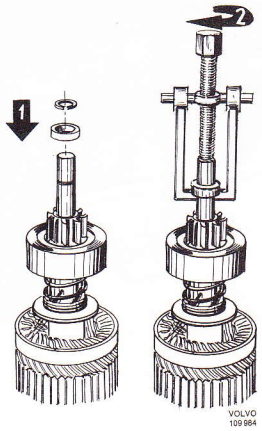


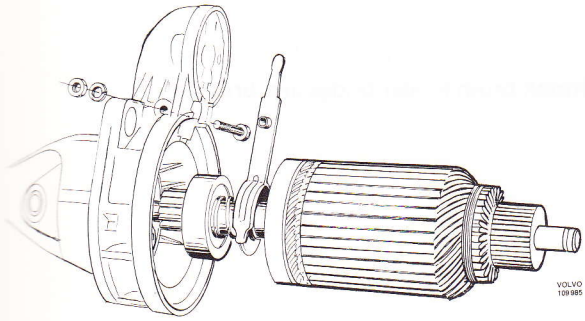
Assembling starter motor

Lubricate as shown. Use Bosch lubricants or similar:

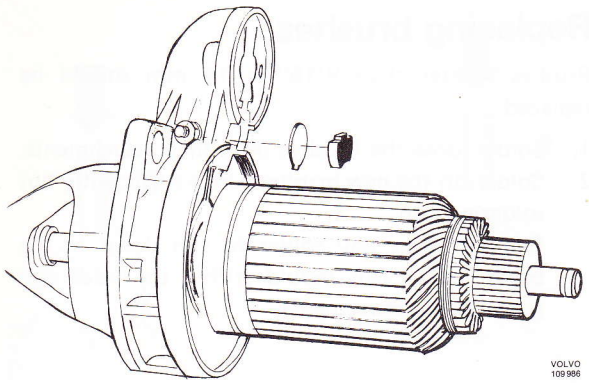
1. Ft 2 V3 — Apply a thin layer of grease on insulation washers, shaft bearing surfaces, spacer washers and lock ring.
2. 01 1 V13 — Immerse the bushing in oil 1/2 hour before installation.
3. Ft 2 V3 — Apply generously of grease in the armature gear guides and in the pinion lever groove.
4. Ft 2 V3 — Apply a thin layer of grease on the shaft bearing surfaces.
5. 01 1 V13 — Immerse the bushings in oil 1/2 hour before installation.
6. Ft 2 V3 — Lubricate shift lever joints and solenoid iron core with a thin layer of grease.

Install pinion, stop ring and lock ring. Tighten the stop ring into place with a fitting puller.

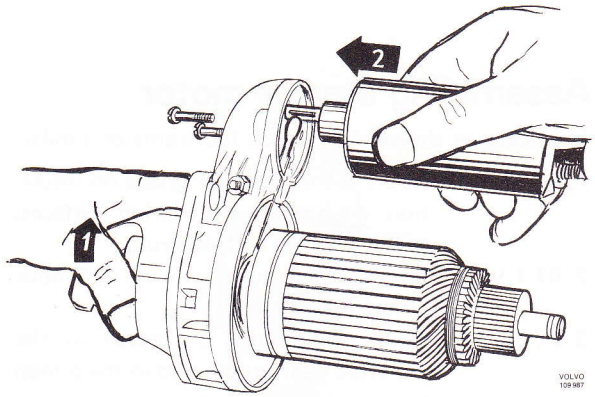




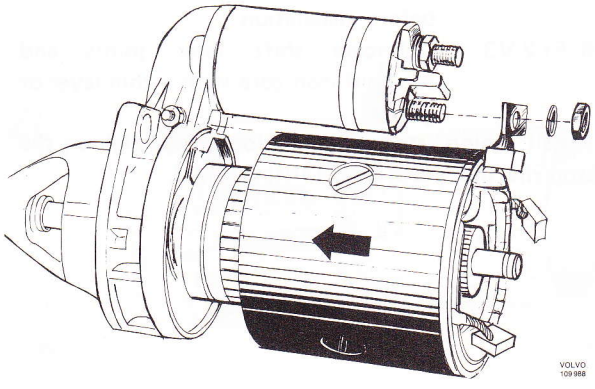
Attach the shift lever to the pinion.
Install the armature in the drive end shield.
Install the shift lever pivot stud.



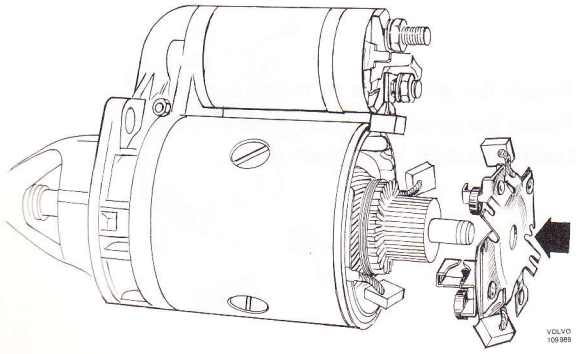
Install steel washer and rubber stop.



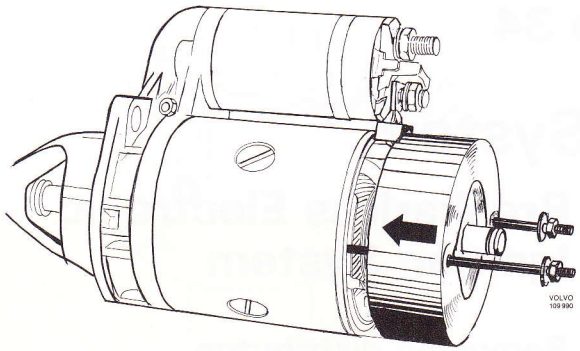
Install solenoid.



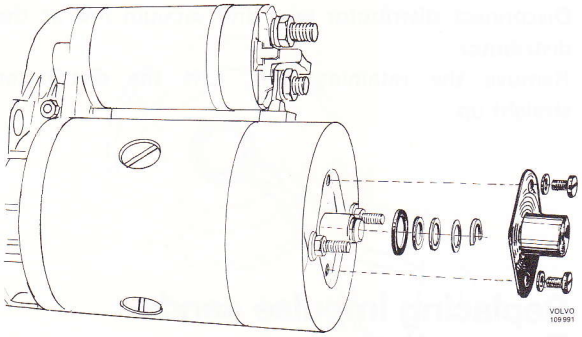
Install stator.



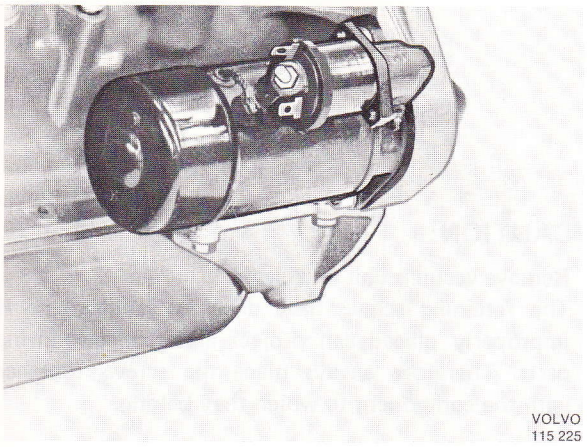
Install brush holder bridge and brushes.



Install commutator end shield.
Install the two long screws that hold the starter motor together.



Install spacer washers and lock ring. The armature end play should be 0.002–0.006" = 0.05–0.3 mm.
Install sufficient amount of washers to keep the end play within these limits.
Attach the small cover over the shaft end.

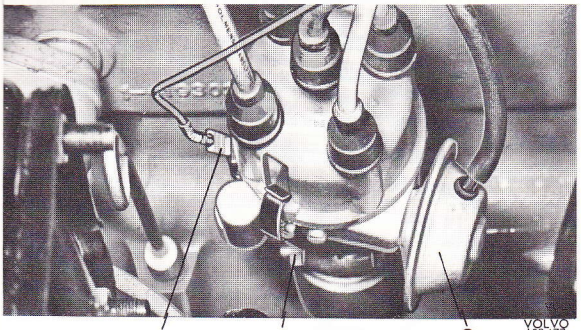


Installing starter motor

Connect the starter motor leads.
Reconnect the battery ground cable.
Start the engine to check the starter motor function.

Group 34

Ignition System

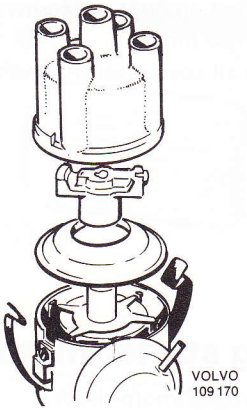


1. Primary connection 2. Attaching screw 3. Vacuum regulator

Breakerless Electronic Ignition System

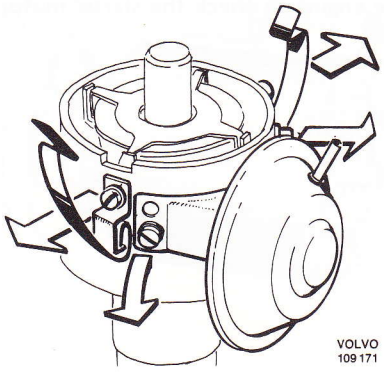
Removing distributor

Remove the ignition high tension leads from the distributor cap.
Disconnect distributor wire and vacuum line at the distributor.
Remove the retaining bolt. Lift the distributor straight up.



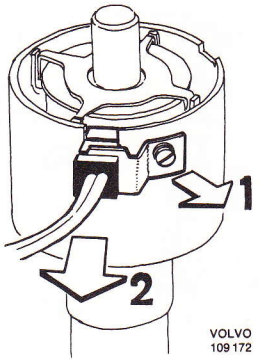
Replacing impulse sender
Removal

Unclasp the lock clasps.
Remove cap, rotor and dust cover.

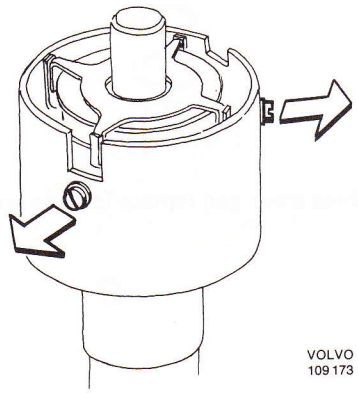


CAUTION:

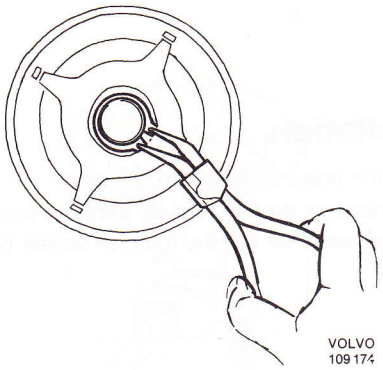
Remove vacuum unit and clasps.
The retaining screws have different lengths and if improperly placed can project and damage moving parts. Therefore always place the screws together with the component to which they belong.



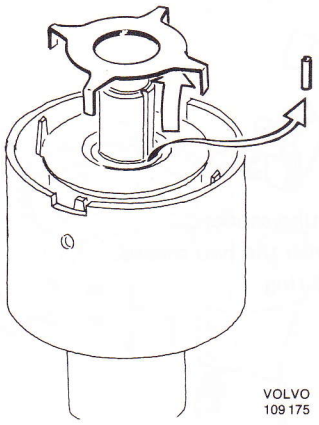
Remove the screws securing the contact.
Remove the contact by pulling it carefully straight out.



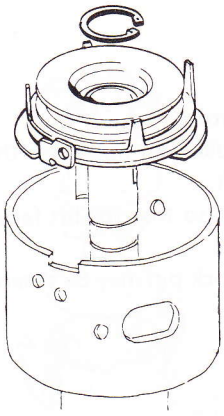
Remove the screws retaining the impulse sender plate.



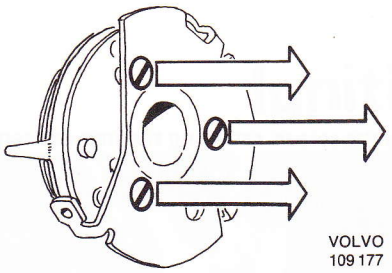
Remove snap ring and shims.



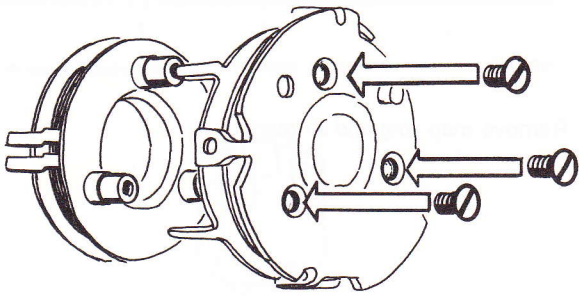
Lift off the armature and the small lock pin.



Use snap ring pliers to remove the snap ring.
Lift up the impulse sender and plate.

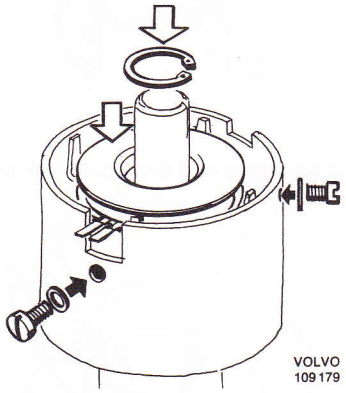


Remove three srews and replace impulse sender.

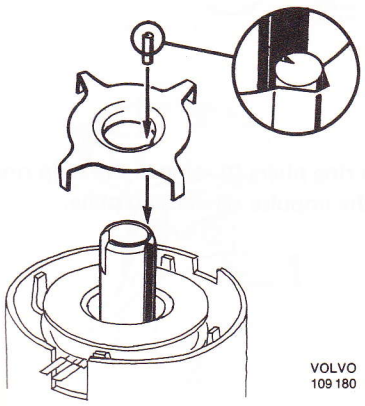


Installation

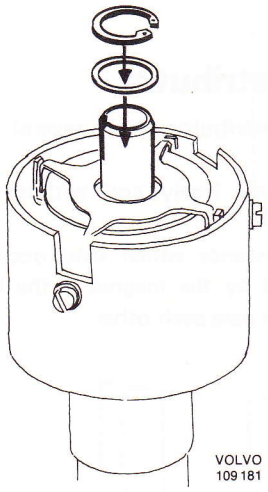
Attach the impulse sender to the plate.
The connector pins should be placed opposite above the attachment ear for the impulse sender plate.



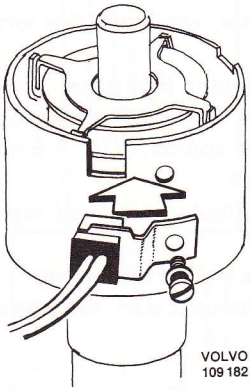
Install impulse sender.
Secure it with the two screws.
Install snap ring.



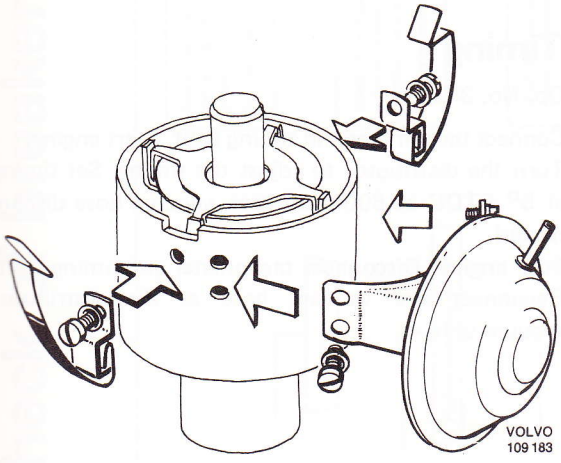
Install the armature.
The slot should be opposite the ridge on the distributor shaft.
Fit the lock pin so that the lift faces the ridge on the distributor shaft.
Otherwise the lock pin may be sheared off.



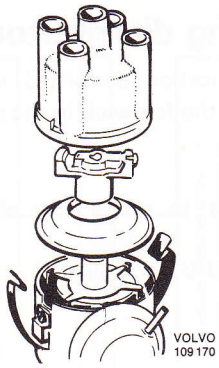
Install shims and snap ring.



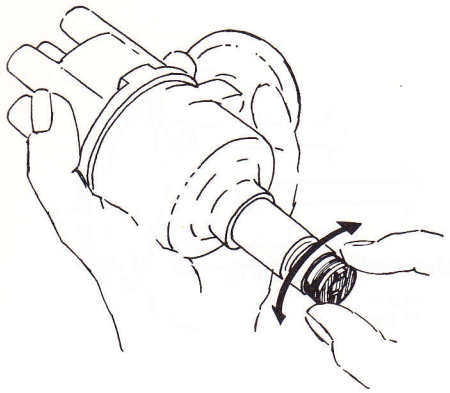
Reconnect the wire connector and tighten the screw.



Install clasps and vacuum unit.

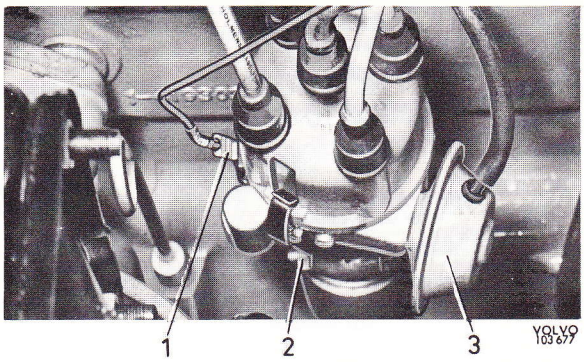


Install dust cover, rotor and cap.



Check distributor

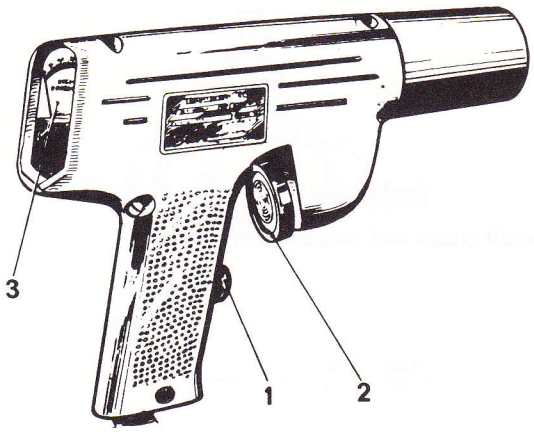
Rotate the distributor shaft several turns in both directions.
It should rotate freely and without any noise or seizure.
The only resistance which may occur is the little stiffnes caused by the magnet in the impulse sender when the teeth pass each other.



1. Primary connection 2. Attaching screw 3. Vacuum regulator

Installing distributor

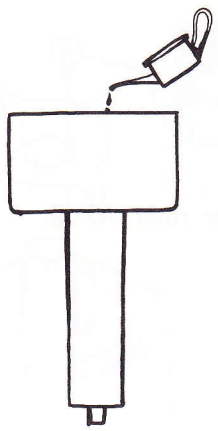
Install distributor, rotor pointing same way as when removed.
Press the distributor into place. The rotor will turn when the gears engage. The distributor is in place when it is down approx. 3/16" = 5 mm and the rotor cannot be turned.
Reconnect distributor wire and high tension leads.
Timing: 1-3-4-2.
Start the engine and set the timing.
(If the engine does not start, turn the distributor until it starts.)



Timing

Op. No. 34279

Connect tachometer and timing light. Start engine.
Turn the distributor to adjust the timing. Set timing at 5° BTDC at 600–800 rpm, vacuum hose disconnected.
Stop engine. Disconnect tachometer and timing light.
Reconnect the vacuum hose at the distributor vacuum unit.

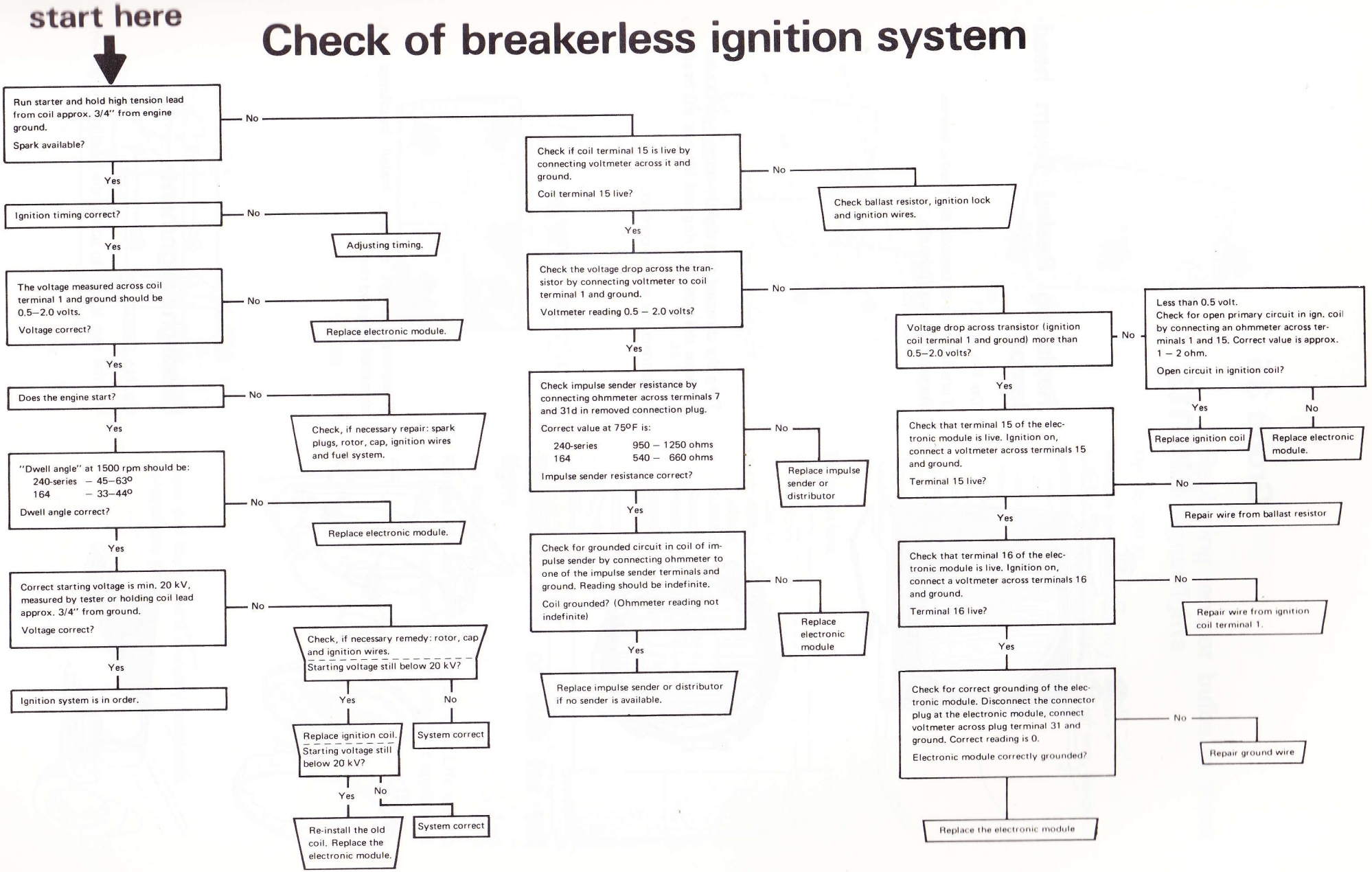


Lubricating distributor

The only lubrication permitted is applying a few drops of oil on the felt wick in the center of the rotor shaft.

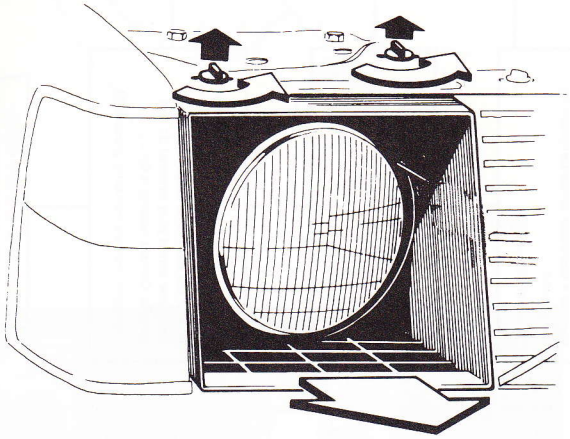
Be careful, not to splash any oil on the impulse sender.
Use oil Bosch 01 V2 or similar.

Check of breakerless ignition system



Group 35

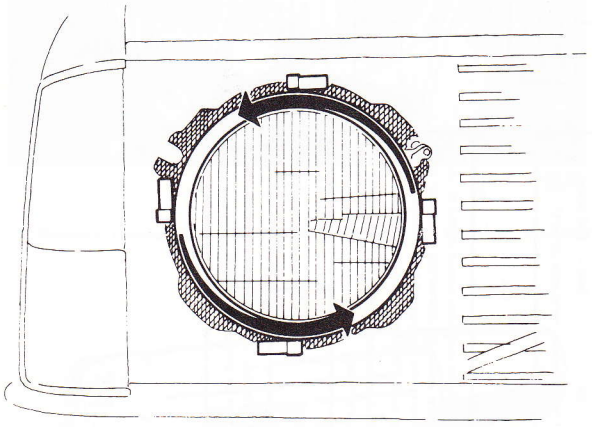
Lights



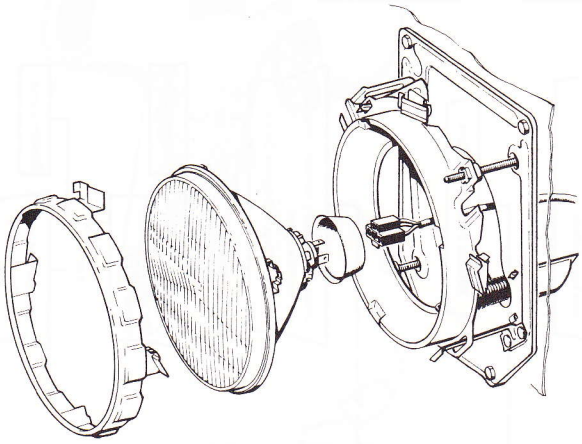
Replacing Sealed Beam headlamps

Op. No. 35121

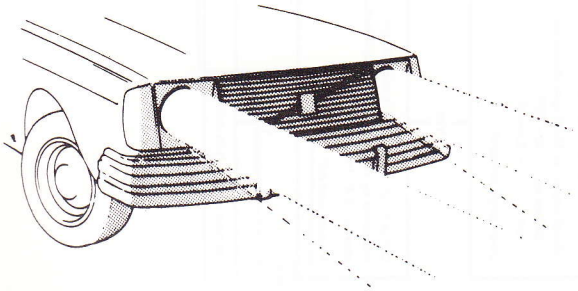
Turn 1/2 turn to remove the plastic screws.
Remove the headlight rim.



Turn the chromed ring slightly counter-clockwise.
Remove the chromed ring and lift out the headlamp unit.
Disconnect the socket contact.



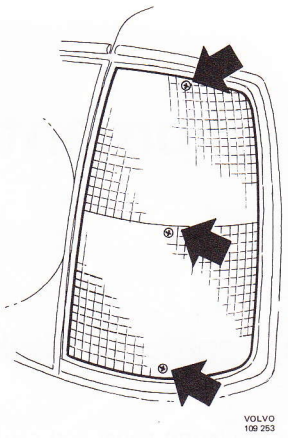
Reconnect socket contact, install headlamp unit, chromed ring and rim.



Headlight alignment

Op. No. 35102

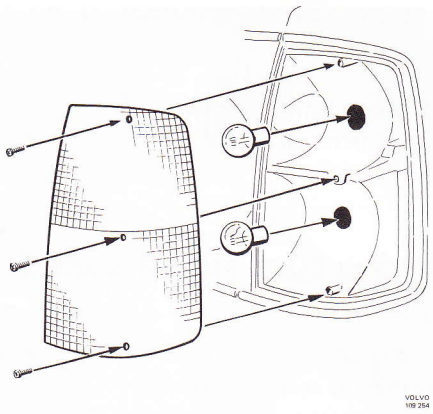
Use the two screws to adjust the headlight alignment.



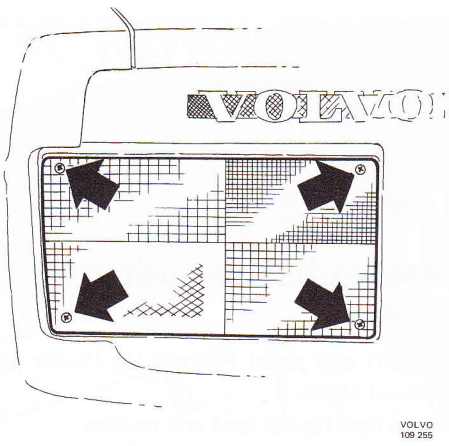
Replacing lens or bulbs in front turn signal lights

Op. No. 36130

Remove the screws retaining the lens.
Lift out the lens and replace bulb (or lens, whichever applicable)



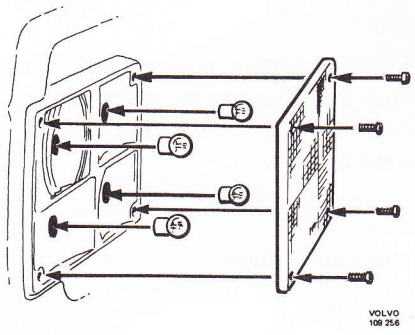
Re-install lens.



Replacing lens or bulb for tail light

Op. No. 36132

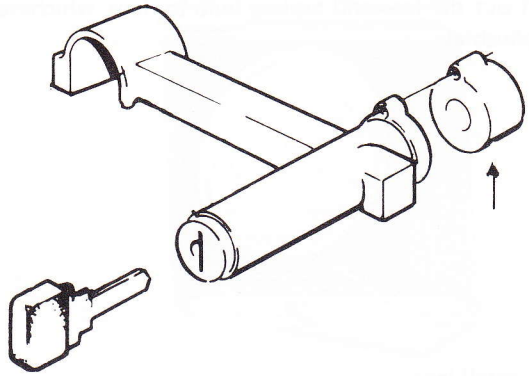
Remove the screws retaining the lens. Lift out the lens and replace bulb (or lens, whichever applicable).



Check that the gasket is correctly positioned.
Re-install the lens.

Group 36

Standard Electrical Equipment



Replacing ignition switch

Op. No. 34002

Remove noise insulation panel and center side panel. Disconnect the terminal block for the ignition switch. Use a stubby screwdriver to remove the ignition switch.

Attach the new ignition switch.
Connect the terminal block.
Re-install panels.

Replacing turn signal switch

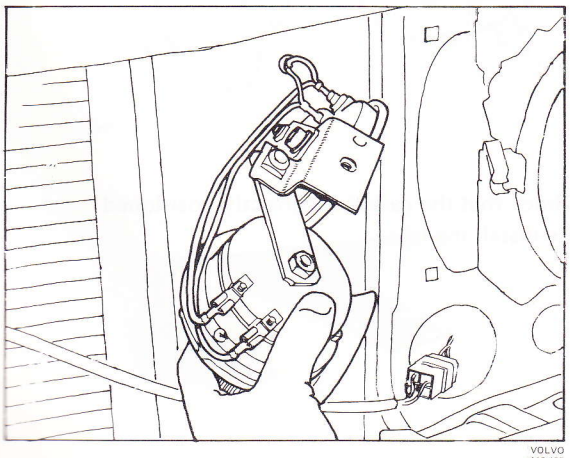
Op. No. 36108.

Remove the two casings round the steering column.
Remove the two retaining screws.
Transfer the wires to the new switch. Restore.

Replacing flasher unit

Op. No. 36102

Remove left side panel. Pull out the flasher unit from the terminal block.
Install the new flasher unit and restore.

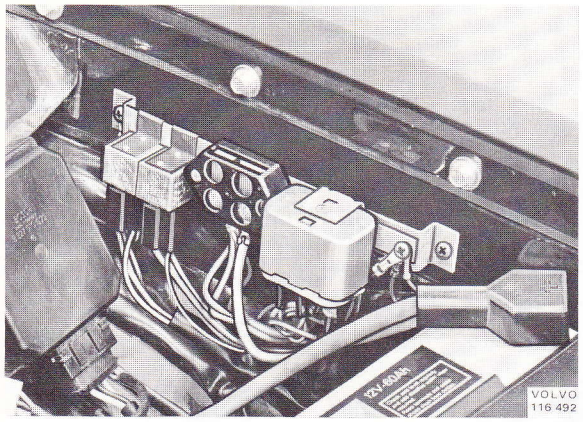


Replacing horn

Op. No. 36202

Disconnect the battery ground cable. Turn and lift off the lock pins. Remove the grille.
Disconnect the wires at the horns.
Remove the horns.

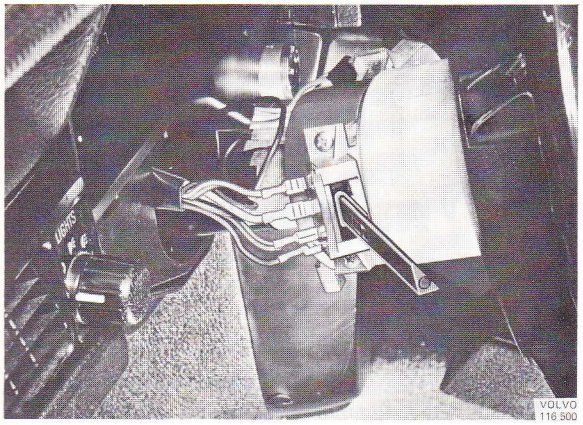
Install the horns.
Attach the wires as shown.
Install the grille and reconnect the battery ground cable.



Replacing control relays

Replace headlight relay = Op. No. 36502
Disconnect the battery ground cable.
Disconnect the relay from the relay panel.
Transfer terminal block and wires to the new relay.

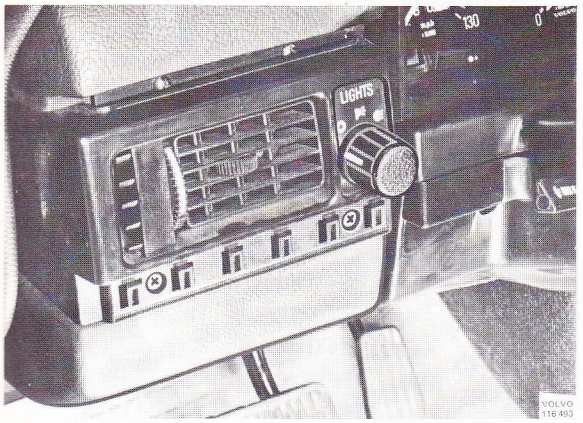
Install the new relay. Reconnect the battery ground cable.



Replacing dimmer switch

Op. No. 36108

Remove the two casings round the steering column. Remove the two retaining screws. Transfer the wires to the new switch. Reinstall the casings round the steering column.

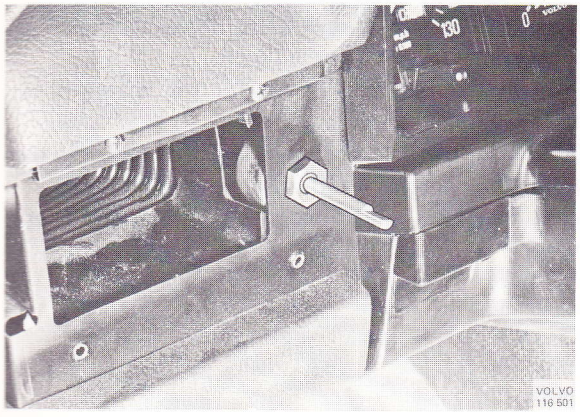


Replacing light switch

Op. No. 36403

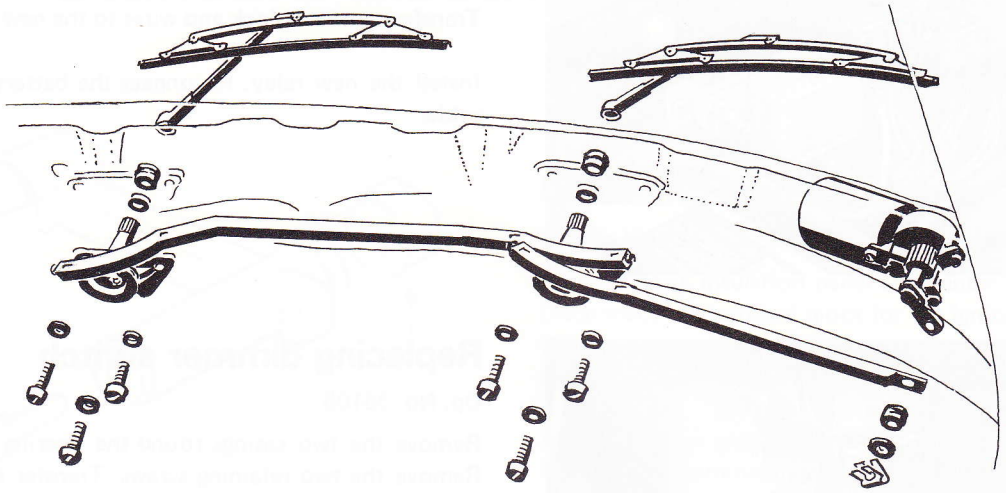
Disconnect the defroster hose from the defroster outlet.
Remove the screws retaining the defroster outlet.
Pull out the switch handle.
Lift out the defroster outlet.
Remove the nut and lift out the switch.

Disconnect the switch from the terminal block. Connect the new switch.
Install switch, defroster outlet, switch handle and defroster hose.



Replacing wiper unit

Op. No. 36302 = replace wiper motor
Op. No. 36320 = replace wiper assembly



VOLVO
116 495

Removal

1. Disconnect the battery ground cable.
   Remove the side panel.
   Remove the panel under the dashboard.

2. Remove the defroster hoses.
   Remove the glove box.

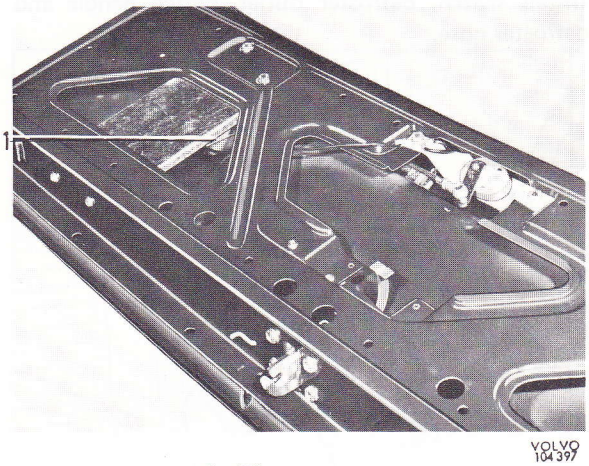
3. Remove the wiper arms.
   Disconnect the wiper assembly and lift it out through the glove box opening.

Installation

1. Install the wiper assembly.
   Remove the device securing the wiper assembly at transport and handling.

2. Install: glove box
   defroster hoses
   side panels
   panel under dashboard

3. Install the wiper arms.
   Reconnect the battery ground cable.
   Check function.



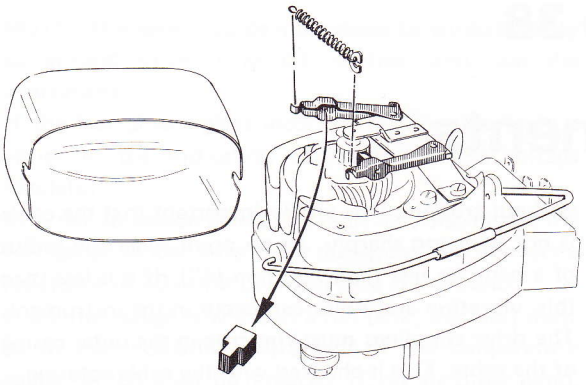
VOLVO
104 397

1. Wiper motor

Tail gate window wiper, 245

Op. No. 36366 = replace

Disconnect the battery ground cable. Remove the panel on the inside of the tail gate.
Remove the retaining screws for the wiper motor protection plate.
Disconnect the link arm at the wiper motor. Fold the protection plate aside and lift out the wiper motor.
Mark the wires, and disconnect them at the wiper motor.



VOLVO 116 496

Replacing brushes

Fold the retaining bracket aside.
Unhook the brush springs.
Remove the brushes from the brush holders. Observe care not to damage the brush holders.
Install the new brushes.
Hook on the brush spring.

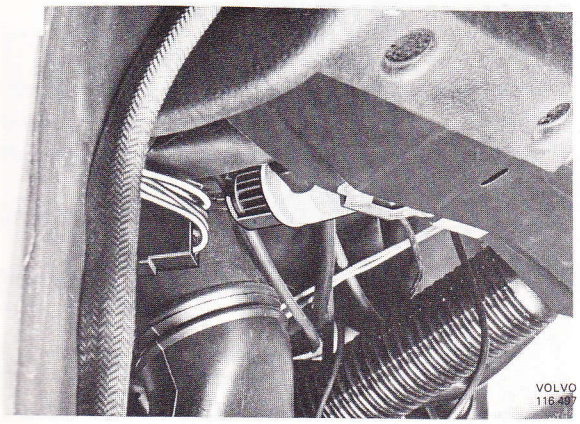
Installation

Reconnect the wires to the motor.
Attach motor and protection plate.
Reconnect the link arm to the wiper motor. Install the protection plate retaining screws.
Install the panel on the inside of the tail gate.
Reconnect the battery ground cable.

Replacing Bulb Failure Warning Light

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.



VOLVO 116 497

Bulb Failure Warning Light, check

NOTE: The Bulb Failure 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 variationes 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 Failure Warning light and the charging control light simultaneously: the alternator does not function.
   The Bulb Failure Warning light is on after the charging control light has gone out: the 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 Failure Warning light is on, but all bulbs for lower beam, parking light, tail light etc are functioning: the 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 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.

Group 38

Instruments

Testing speedometer with odometer

If speedometer or odometer is not functioning, the reason may be a fault in instrument or speedometer cable or the worm gear in the transmission, or in the cable.

Check following:

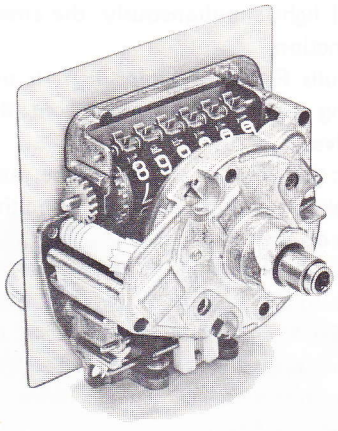
If the speedometer functions while the odometer does not, or vice-versa, the instrument is defective and should be replaced. No attempt should be made to repair the instrument.

When both 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, means it has broken from the worm gear. Check the cable and the drive at the transmission.

Check the drive couplings 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:			
Speedometer reading:			
500	1000	1750	rpm
31.5±2.5	60.5±2.5	104.5±2.5	Mph



VOLVO 107389

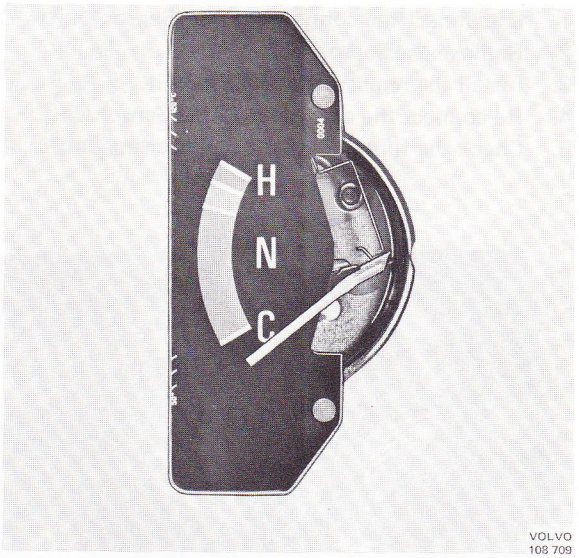
Speedometer and mileometer

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.



VOLVO 108 709

Temperature gauge

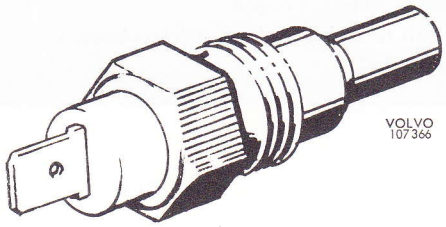
Trouble shoot as follows:

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 (=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 (248°F). With correct indicating instrument function, the sensor is defective and should be replaced.

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.

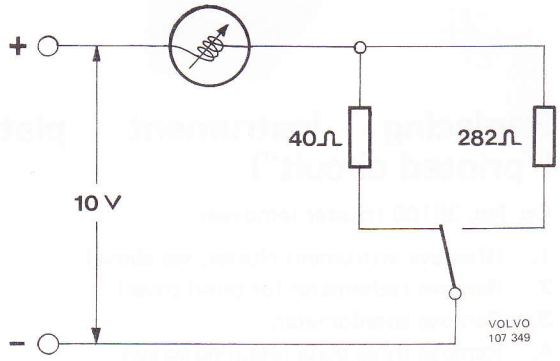
Testing removed temperature sensor



Sensor for temperature gauge

The sensor is checked by heating it and reading resistance and temperature.
(NOTE: The resistance may deviate±10%.)

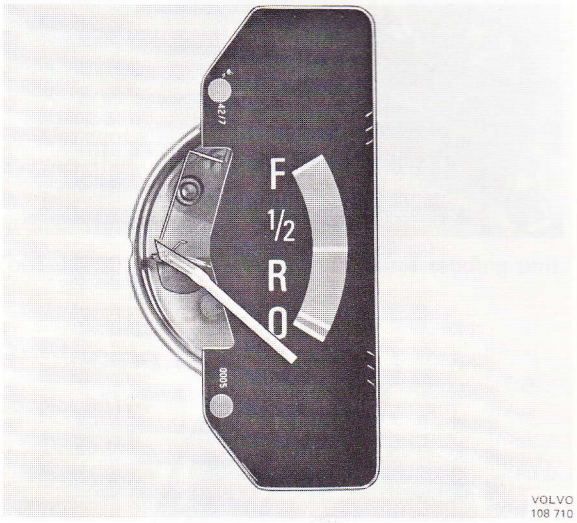
Temperature	50	100	120	C°
	122	212	248	F°
Resistance	282	60	40	ohms



Wiring diagram for checking temperature gauge or fuel gauge indicating instrument

Testing fuel gauge

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

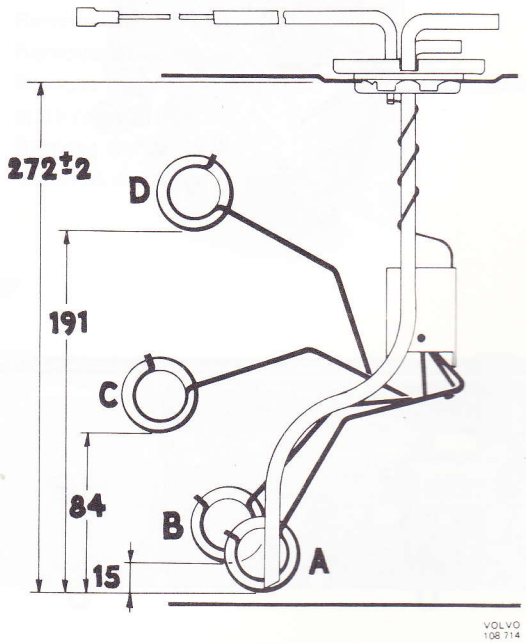


Fuel gauge

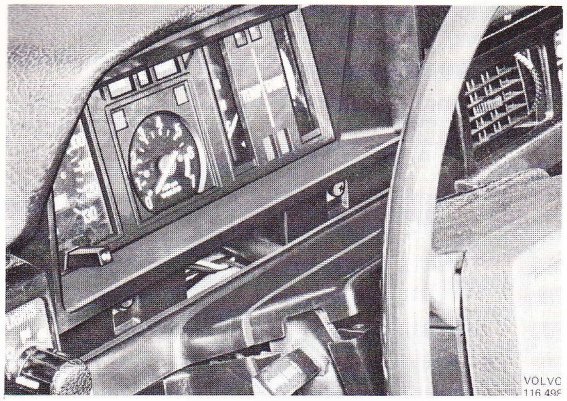
Testing removed fuel gauge sender

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

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



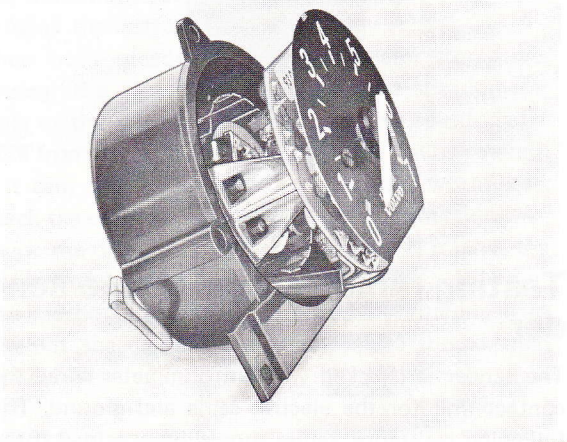
Checking fuel gauge sender



Replacing instrument cluster

Op. No. 38130

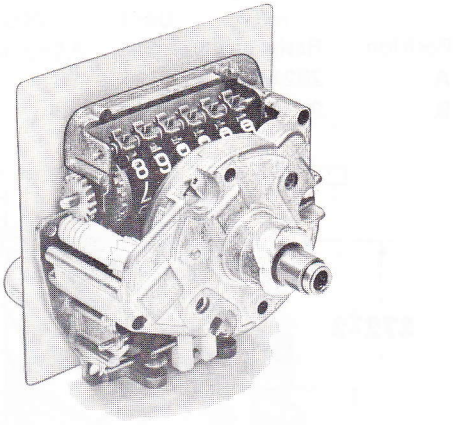
1. Remove the covers round the steering column.
2. Remove the bracket retaining screws.
   Allow the bracket to slip down on the steering column.
   Remove the retaining screws for the instrument cluster.
3. Disconnect speedometer cable.
4. Grip the reverse side of the speedometer and press the instrument up-out until the snap lock at the instruments upper edge releases.
5. Lift out the instrument and disconnect the terminal block on the reverse side.



Replacing tachometer (or blind cover)

Op. No. 38171 (instrument cluster removed)

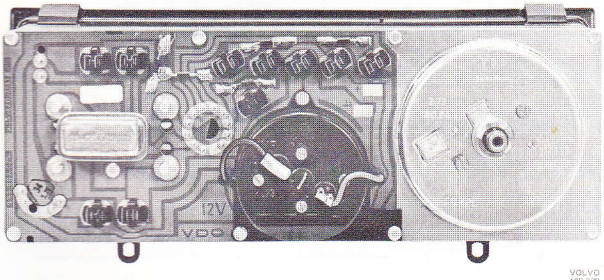
1. (Remove instrument cluster, see above)
2. Remove three retaining screws.
3. Carefully remove the instrument. The terminals can easily be damaged.
4. Install tachometer (or cover) as shown.



Replacing speedometer assembly

Op. No. 38114

1. Remove instrument cluster, see above.
2. Remove tachometer or blind cover.
3. Remove three speedometer retaining screws.
4. Carefully remove the instrument.
   Install as shown.

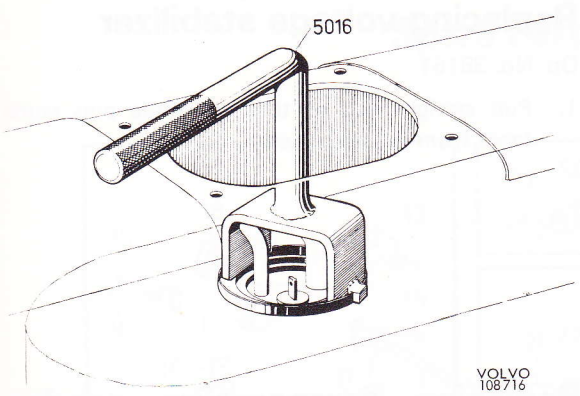


Replacing instrument plate ("printed circuit")

Op. No. 38109 (cluster removed).

1. (Remove instrument cluster, see above)
2. Remove tachometer (or blind cover)
3. Remove speedometer.
4. Remove three plate retaining screws.
5. Carefully remove the plate, not damaging temperature of fuel gauge.

Combined instrument, reverse side

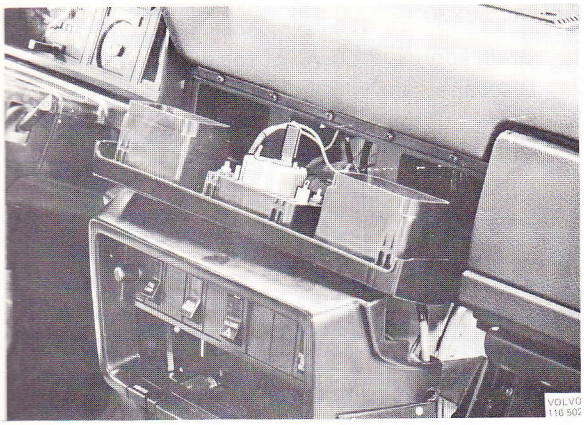


Replacing fuel gauge sending unit

Op. No. 24508

1. Disconnect the battery ground cable.
2. Unfold the mat in the luggage compartment.
3. Remove cover and disconnect ground wire.
4. Disconnect the wire at the sending unit terminal.
5. Disconnect the return hose at the sending unit.
6. Disconnect and move aside the breather hose.
7. Use tool 9995016 to remove the sending unit.
8. Install the new sending unit with a new gasket.
9. Installation is opposite order.

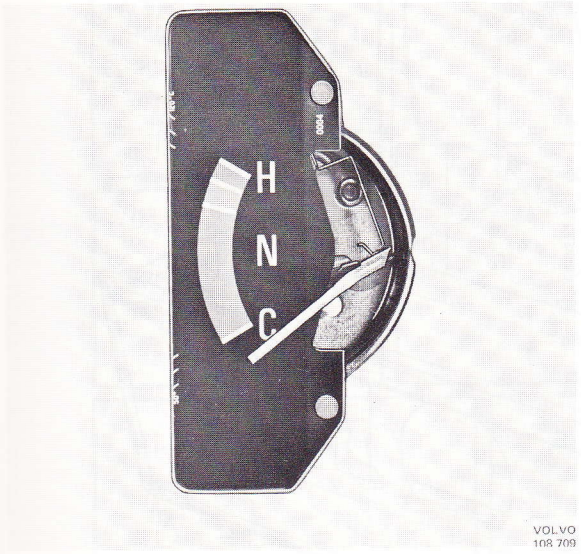
Tool 9995016 for replacing fuel gauge sending unit.



Replacing clock

Op. No. 38124

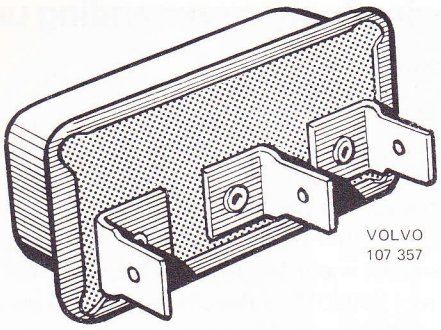
1. Disconnect the battery ground cable.
2. Disconnect the control panel and pull it out.
3. Remove the impact guard by pushing it down.
4. Remove two screws.
5. Lift out defroster outlet and clock. Mark the wires before disconnecting.
6. Remove two retaining screws. Replace clock.
7. Installation is opposite order.



Replacing temperature gauge/fuel gauge

Op. No. 38114

1. Remove instrument cluster, Op. No. 38130.
2. Remove tachometer (or blind cover).
3. Remove speedometer.
4. Remove instrument.
5. Remove two retaining nuts on the instrument plate reverse side.
6. Remove the gauge.
7. Install as shown.



Replacing indicator light bulbs

1. The bulb holders come loose by pressing in the two retaining hooks and then pulling straight out.
2. Pull the bulb straight out.

Replacing voltage stabilizer

Op. No. 38161

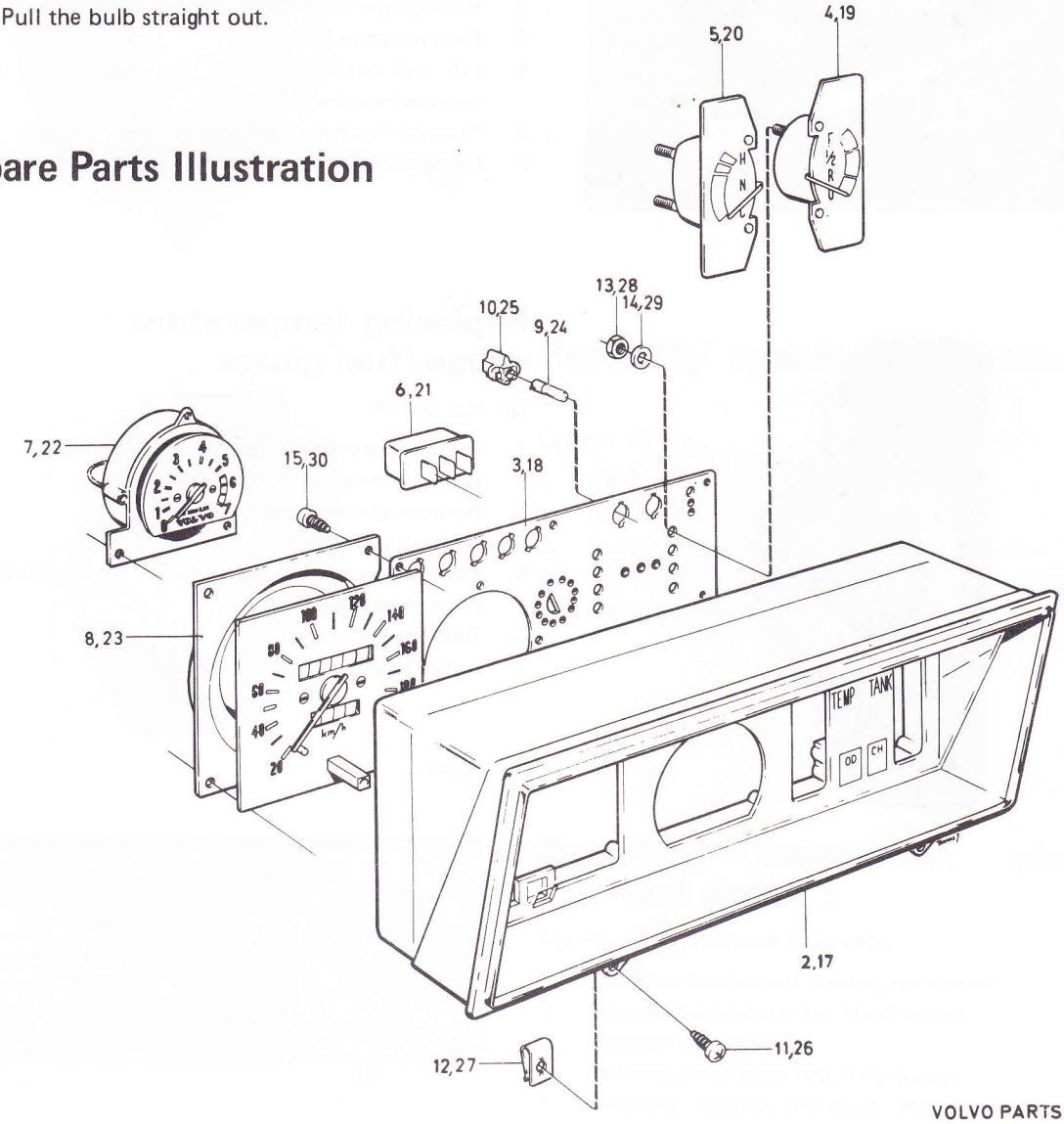
1. Pull straight out so that the three pins come loose from their retainers.

Replacing temperature sender unit

Op. No. 38230

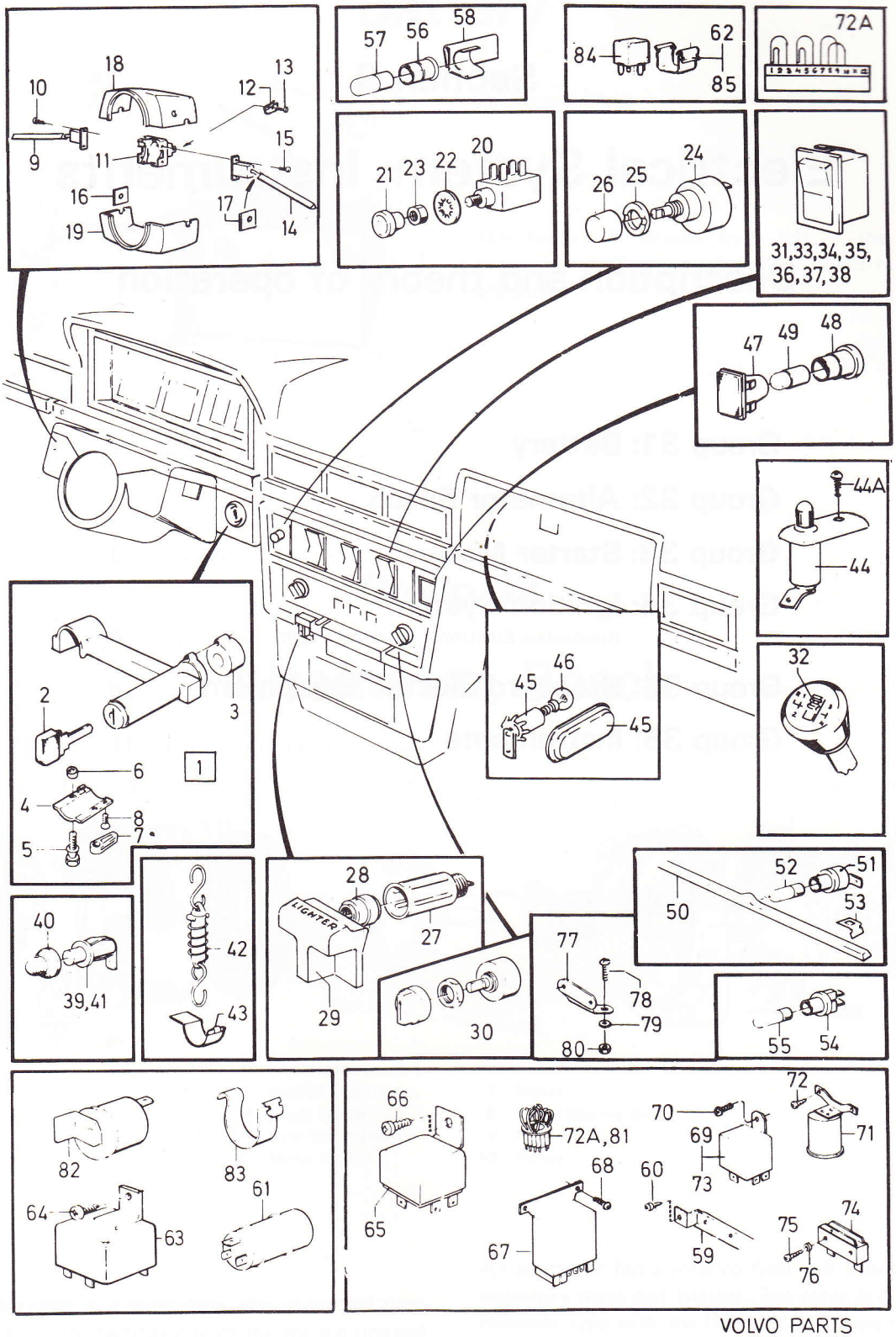
1. Drain approx. 2 quarts of coolant.
2. Disconnect the wire at the sender unit.
3. Screw out the sender and replace it.
4. Installation is opposite order.

Spare Parts Illustration



VOLVO PARTS
1 030 13053

Spare Parts Illustration



VOLVO PARTS
1 030 13050

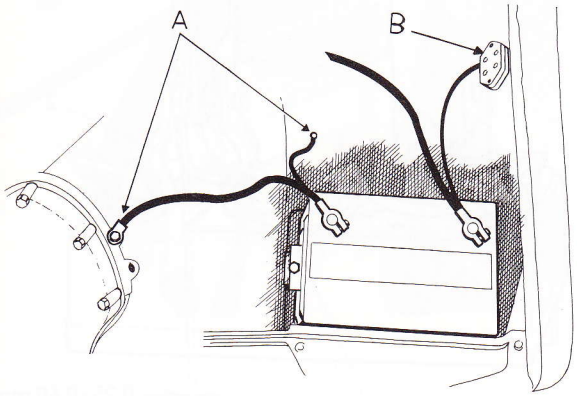
Section 3

Electrical System, Instruments

Description and theory of operation

Group 31

Battery

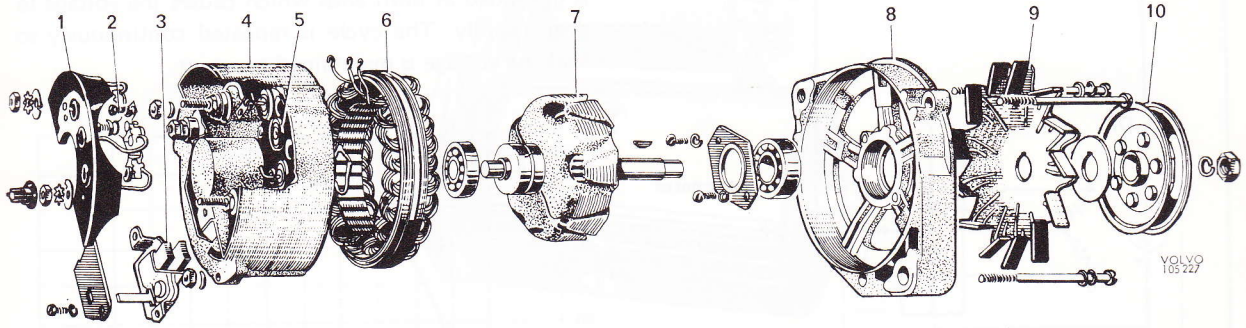


VOLVO
115 898

The battery is located front left in the engine compartment. Two ground cables connect to engine and body.

Group 32

Alternator, Bosch

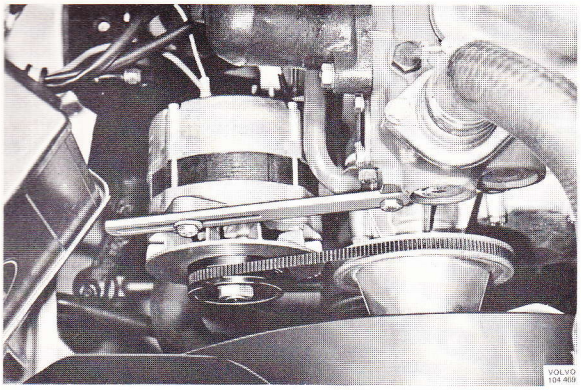


1. Plus diode assembly
2. Magnetizing diodes
3. Brush holder
4. Rear bearing shield
5. Minus diodes
6. Stator
7. Motor
8. Front bearing shield
9. Fan
10. Pulley

The alternator is a three-phase, star connected alternating unit. The rectifier is built into the slip ring end shield and consists of six silicon diodes. Also housed in the slip ring end shield are three so-called magnetizing diodes, which feed the field via the voltage regulator.

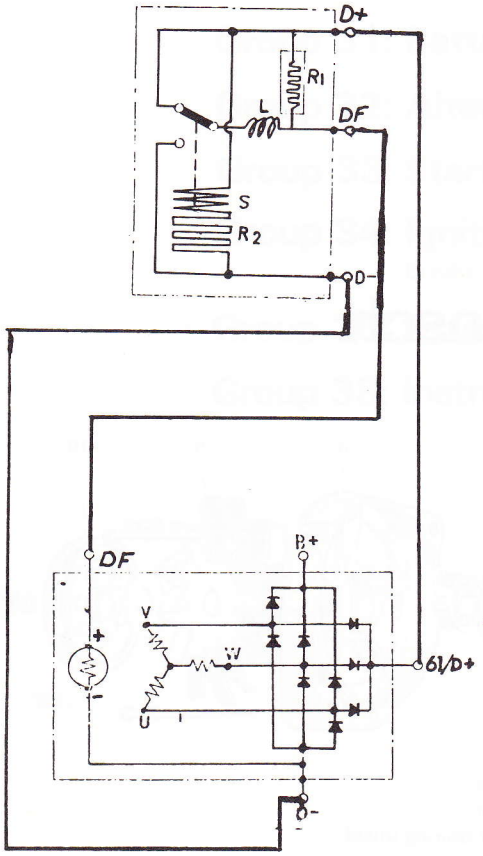
An alternator has a rotating field coil (rotor) and a stationary main coil (stator). The rotor is a 12-pole clawpole type with the field coil fed across two slip rings.

Since the alternator output is self-limited (max. 55 amps), a simple regulator is used. It controls the voltage only.



Alternator

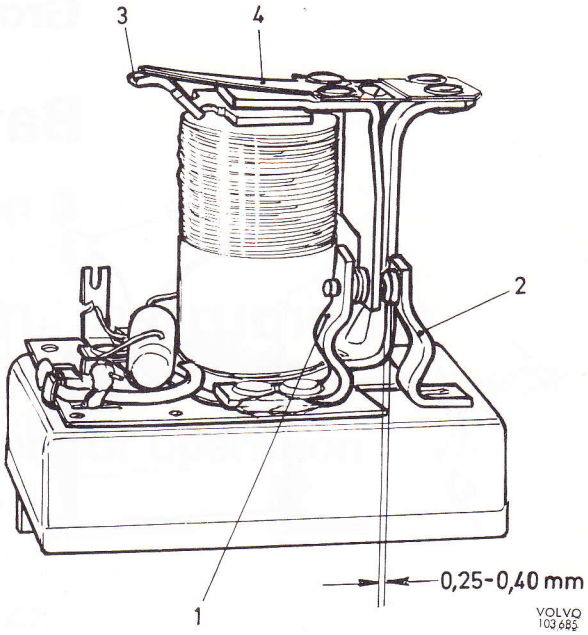
When the ignition is switched on, current flows through the charging warning lamp to terminal D+ on the voltage regulator. Via the regulator, the current is conducted through the field coil to ground.



Regulator

Alternator

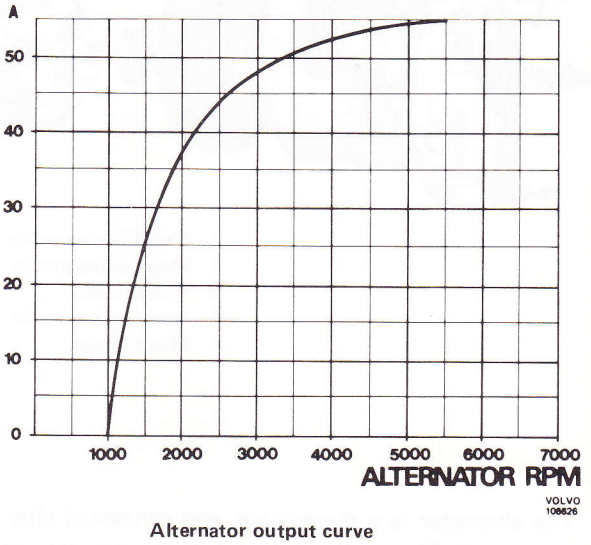
When the rotor starts rotating, alternating current is formed in the stator. Most of the current is rectified by the positive and negative diodes and is conducted via B+ on the alternator to the battery. A small part of the current is rectified by the magnetizing diodes and is led via 61/D+ to the voltage regulator and then to the field winding. This cycle is repeated until the regulating voltage has been reached, at which point the lower control range contacts on the voltage regulator open and field current must pass a control resistance.



Voltage regulator

1. Regulator contact for lower control range
2. Regulator contact for upper control range
3. Spring tensioner
4. Spring upper section: Steel spring
   Lower section: Bi-metal spring

If the voltage rises in spite of this, the armature on the voltage coil is pulled further down so that the upper control range contacts close. Thus the field coil is grounded at both ends which causes the voltage to drop rapidly. The cycle is repeated continuously so that the voltage is maintained constant.



Alternator output curve

A = amps
RM = alternator speed/minute

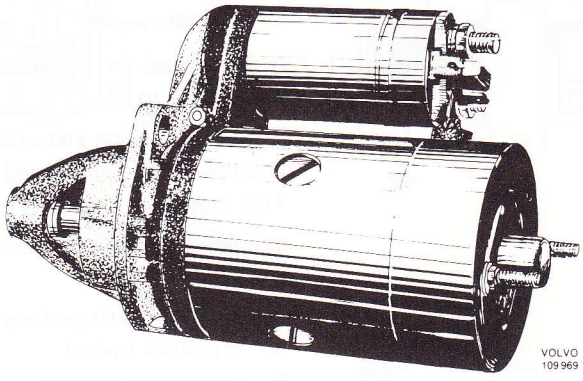
The alternator maximum output is 55 amps. Top speed is 15000 rpm.

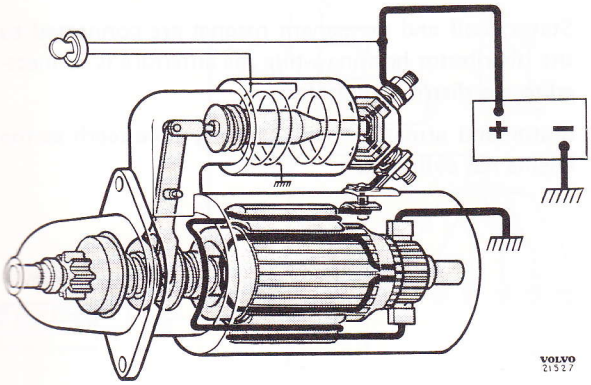
Bosch Voltage Regulator

The voltage regulator is located on the wheel housing at a bracket behind the headlamp. It is a mechanical, single-pole voltage regulator with a lower contact, a movable contact and an upper contact. It is connected to the charging circuit by a three-pole plug. The regulator resistance is placed under a plate underneath the regulator. Temperature compensation is operated by a bimetallic spring which influences the spring tension so that the regulator receives lower regulating voltage at higher temperatures.

Group 33

Starter Motor





Starter motor, general arrangement

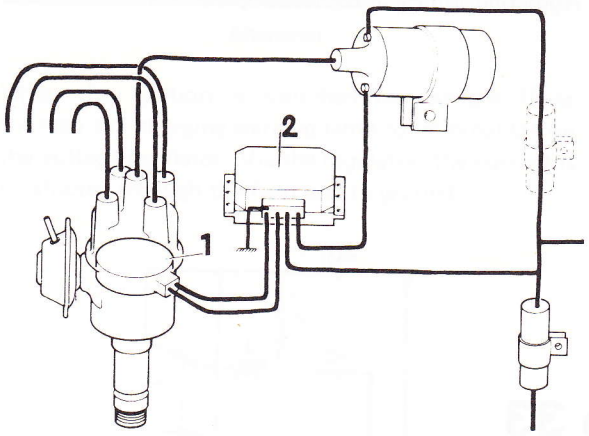
The starter motor is mounted on the flywheel housing on the left side of the engine. It is a 4-pole series-wound motor. The pinion on the starter motor armature shaft moves axially to engage the flywheel ring gear. The pinion is controlled by a solenoid.

Turning the ignition key to starting position cuts in the solenoid, causing the armature in the solenoid to be drawn in and the starter pinion to engage the ring gear on the engine flywheel. When the armature has moved a certain distance, the contacts for the main current close and the starter motor starts running.

Group 34

Ignition System

Breakerless Electronic Ignition System

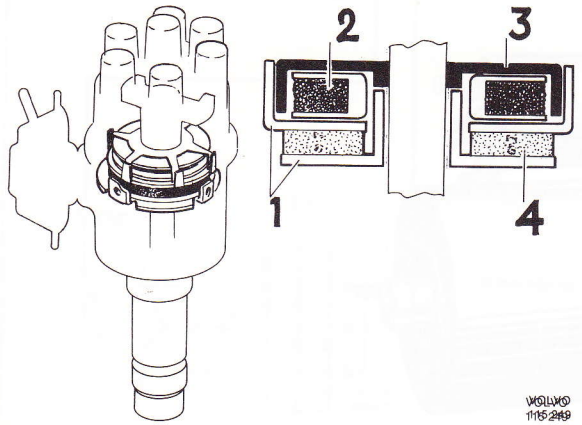


Summary

Two main changes from the conventional ignition system:

1. The breaker points are replaced by an induction type **impulse sender.**
2. An **electronic module** has been added. It is wired between distributor and ignition coil. It amplifies the impulses before sending them on to the ignition coil.

Otherwise the design and function is the same as the conventional system.



Specific Function Information

1. **Impulse sender**

It is located in the distributor where the breaker points used to be.

Instead of closing and opening an electric circuit, the impulse sender opens and closes a magnetic circuit. This induces impulses in a coil (or magnetic pick-up).

The impulse sender consists of:

1. stator
2. coil (magnetic pick-up)
3. armature (rotor)
4. permanent magnet

Stator, coil and permanent magnet are connected to the distributor housing while the armature is connected to the distributor shaft.

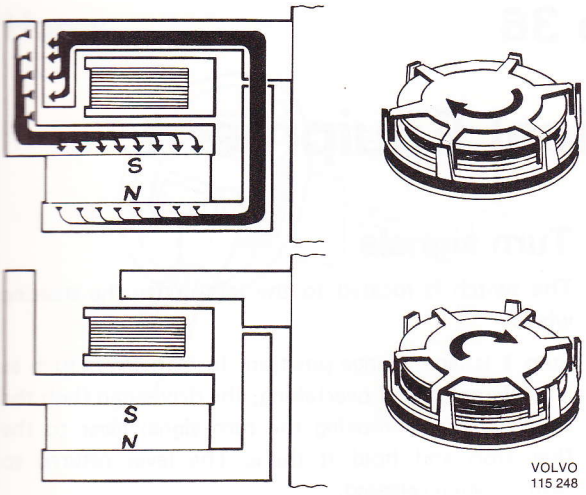
Stator and armature have as many pole teeth as the engine has cylinders.

Note 1:

When using a distributor tester, also the electronic module must be connected in order to get a distributor output signal.

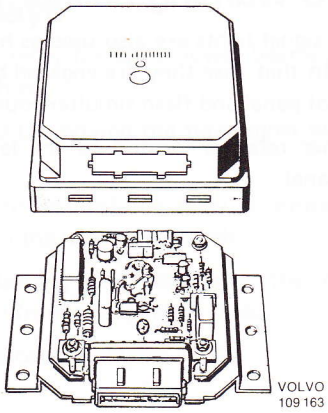
Note 2:

When making Cylinder Balance testing, most instruments require that a special adapter be used (or the engine will die).



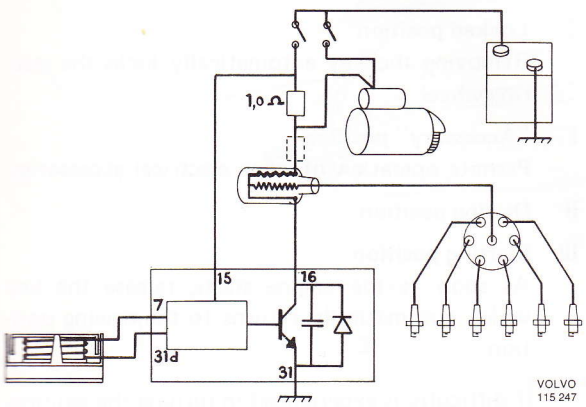
The permamant magnet creates a magnetic field which goes through the stator. The magnetic circuit is **closed** when the pole teeth are opposite each other. The magnetic circuit is **open** when the pole teeth are separated. This means that the armature closes and opens the magnetic field while it is rotating. This generates current pulses in the distributor coil (magnetic pick-up).

Vacuum and centrifugal control of the timing is performed similar to the conventional distributor.



2. Electronic module

The electronic module is a solid state design with transistors. It amplifies the impulses from the impulse sender. It also controls the "dwell angle".



For 240 Series, a 1,0 Ω resistor is located on the firewall

The impulse received from the coil (magnetic pick-up) in the distributor is converted and reinforced in the electronic module and governs the output transistor which in turn governs the ignition coil primary circuit.

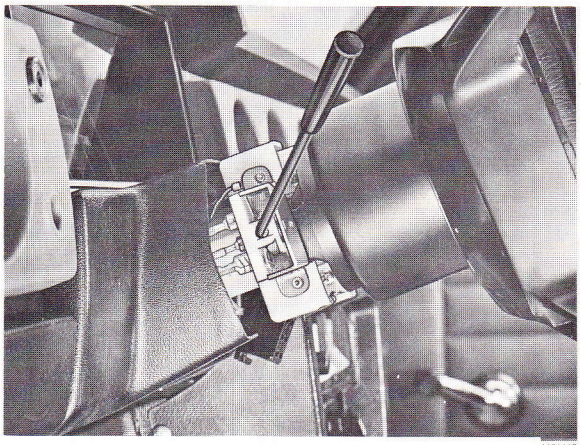
When the pole teeth are in front of each other, the module output transistor breaks the primary circuit, inducing secondary voltage in the coil to fire the spark plugs.

The pole teeth have a function similar to that of the cam lobes in a conventional distributor.

NOTE: The ingition coil is designed specifically for the breakerless solid state ignition system. It is identified by specifications and number only and cannot be replaced by other type coils.

Group 36

Standard Electrical Equipment



VOLVO 107 227

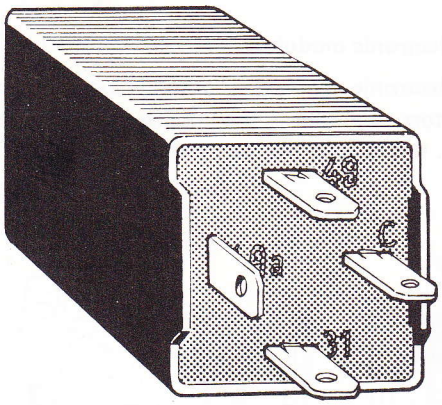
Turn signals

The switch is located to the left under the steering wheel.

Step 1 is lane change position. In maneuvers such as lane changing and overtaking, the driver can flash the turn signals by moving the turn signal lever to the first stop and hold it there. The lever returns to neutral when released.

Step 2 is "normal" turn signal position.

The turn signal pilot light on the panel is wired in parallel across the switch.

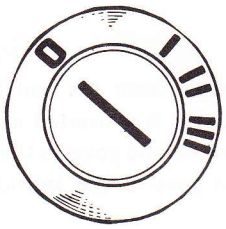


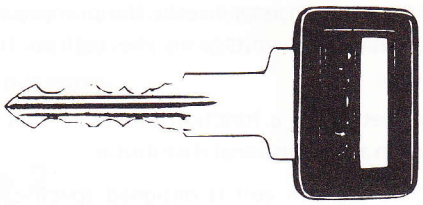
VOLVO 108 628

Hazard warning flasher

The turn signal lights are also used as hazard warning flashers. In that case they are engaged by a switch on the control panel and flash simultaneously.

The flasher relay is located to the left behind the control panel.





Ignition switch/steering wheel lock

It is located on the control panel, to the right of the steering column.

0 Locked position
Removing the key automatically locks the steering wheel.

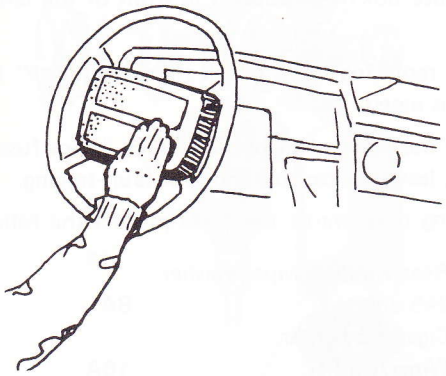
I "Accessory" position
Permits operation of some electrical accessories.

II Driving position

III Starting position
As soon as the engine starts, release the key which automatically returns to the driving position.

If difficulty is experienced in turning the ignition key, turn the steering wheel slightly which will allow the steering lock to release.

Horns



The horns are located to the left behind the radiator grille.

One is low tone and the other high tone.

The horns are engaged by the steering wheel control.

Light relays

1. Stepping relay for upper/lower beams and headlight flashing.

   Activated by moving the turn signal switch lever up.

   Current to control the relay is normally furnished from the headlight switch.

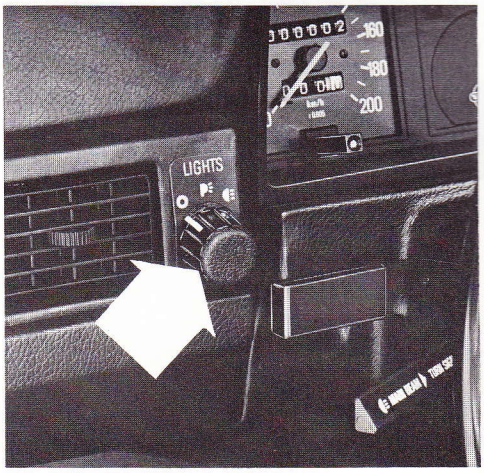
   When flashing the headlights the current is furnished from the terminal rack.

2. Relay for back-up lights.

Windshield wipers

The electric wiper motor is connected to the wiper arms by a system combining cables and links.

Headlight main switch



It is located on the control panel, to the left of the steering column.

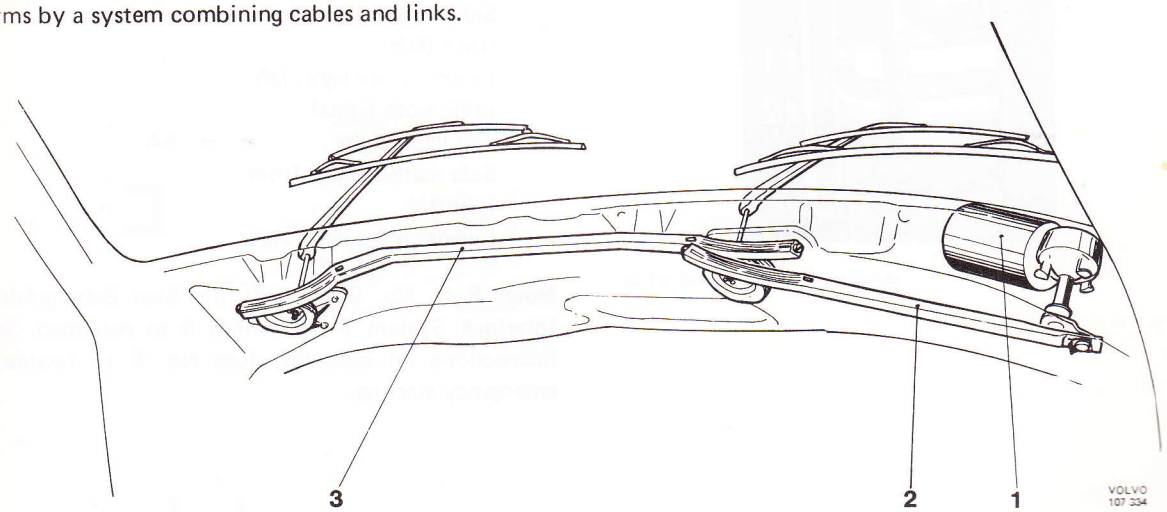
Positions:

- All lights out
- Position lights front and rear on.
- Headlights and position lights on (A buzzer will sound if a front door is opened when the headlights are on).

Switching upper/lower beams

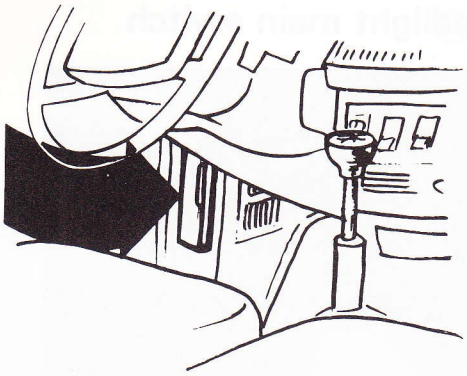
When headlight main switch is on, changing between upper and lower beams is achieved by moving the turn signal switch lever up and releasing.

When headlight main switch is off, the upper beam is on when the turn signal switch lever is moved up and until the lever is released.



Windshield wiper unit

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



Fuses

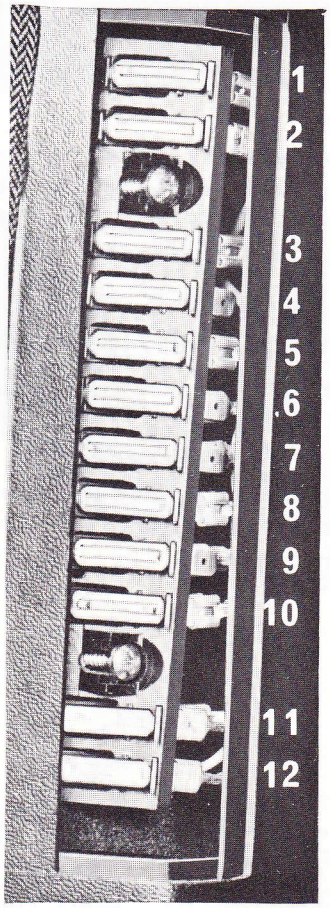
The fuse box is positioned in front of the left door pillar.

When replacing fuses, check that right "size" (amperage) is uesed.

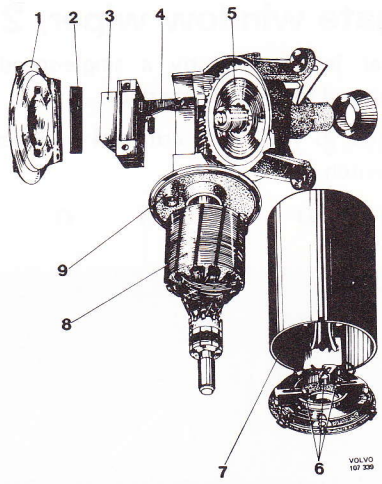
Never use fuses of higher amperage. If one fuse often melts, leave the car to a shop for fault-tracing.

Reading downwards the fuses protect the following:

1.	Rear window wiper/washer 245 only Cigarette lighter	8A
2.	Wiper/washer Horn Blower	16A
3.	El. heated rear window Overdrive	16A
4.	Heater element, driver's seat Back-up light Seat belt pilot light	8A
5.	Turn signals Instruments Warning lights Glove box light	5A
6.	Hazard warning Starter cut-out relay Engine compartment light	8A
7.	Fuel pump Interior light, rear Clock	8A
8.	Stop light Interior light	5A
9.	Ignition interlock Buzzer, seat belt	5A
10.	Instrument lighting	5A
11.	Tail light, left Side marker light, rear and front (left) License plate light, left (245, both lights)	5A
12.	Tail light, right Side marker light, front (right) License plate light, right	5A



Note: Fuse No. 9 controls the Seat Belt/Ignition Interlock System if the vehicle is so equipped. See instructions on removing fuse No. 9 to facilitate emergency starting.



Windshiel wiper motor, Electrolux

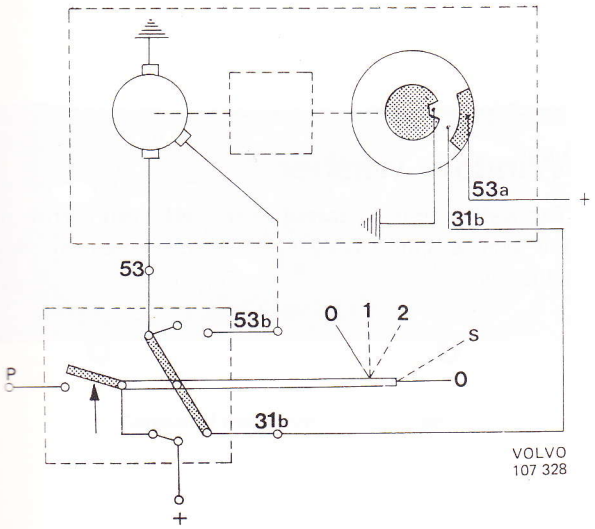
1. Cover
2. Packning
3. Connection contact
4. Contacts
5. Gear with contact bar
6. Electric brushes
7. Stator
8. Rotor
9. End

The wiper motor is permanent magnet type and provided with two plus brushes. These are connected, one at a time, giving two speeds:

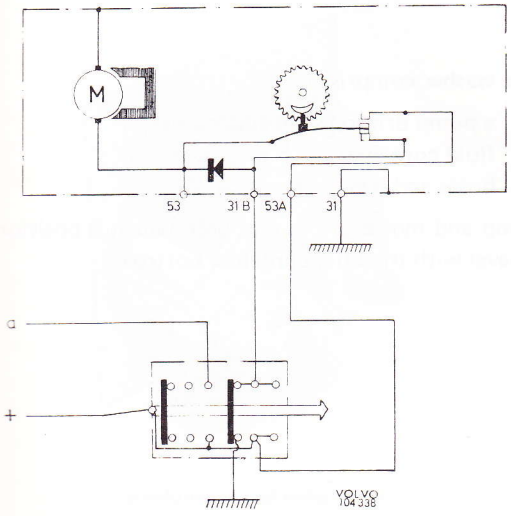
34±4 rpm
55±5 rpm

The parking switch is housed in the gear housing.

The windshield wipers are controlled by a switch on the steering column right side.

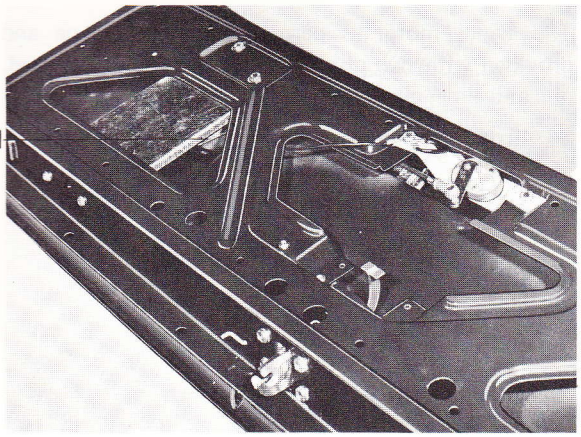


Wiring diagram, windshield wiper motor, Electrolux



Wiring diagram, tail gate window wiper

a. To tail gate window washer



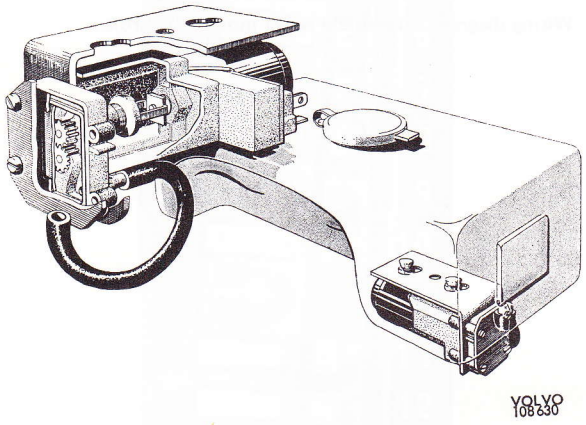
1. Wiper motor

Tail gate window wiper, 245

The wiper is operated by a single-speed electric motor, located in the tail gate door.

It is linked to the wiper arm and provided with a parking switch.

It is controled by a switch on the control panel.



Window washer

The washer unit is located in the left front corner of the engine compartment. It is controled by the wiper switch.

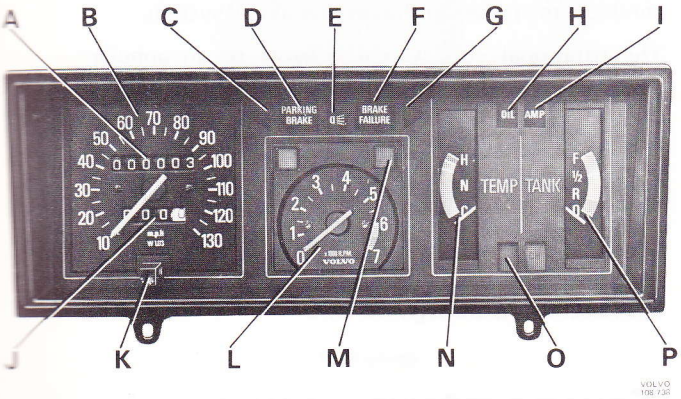
The washer comprises

- a pump driven by an electric motor
- fluid container
- hoses and jets

Pump and motor are in one unit, which is positioned in level with the fluid container bottom.

Group 38

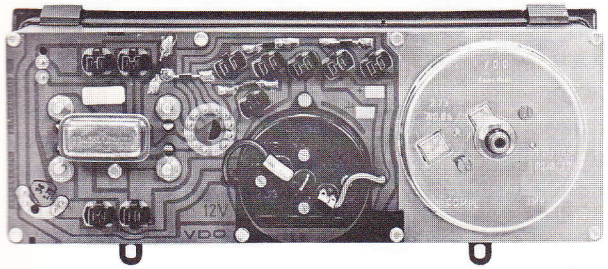
Instruments



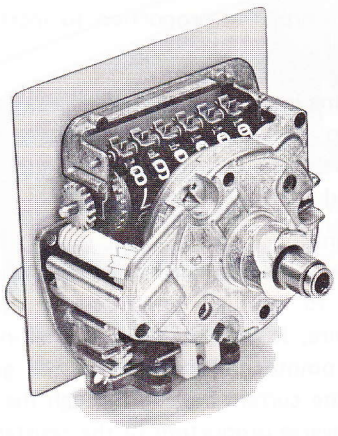
Combined instrument, front side

The instrumentation consists of a combined instrument. It comprises a speedometer and trip meter, tachometer (certain models), temperature gauge, fuel gauge, warning lights for parking brake, brake circuit failure, oil pressure, battery charging, bulb failure warning and overdrive.

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



Combined instrument, reverse side



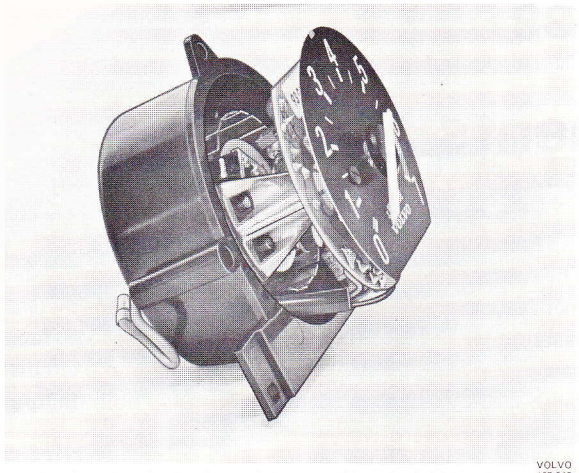
Speedometer and mileometer

Speedometer and Odometer

The speedometer and odometer are integrally built and 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.



VOLVO
107 345

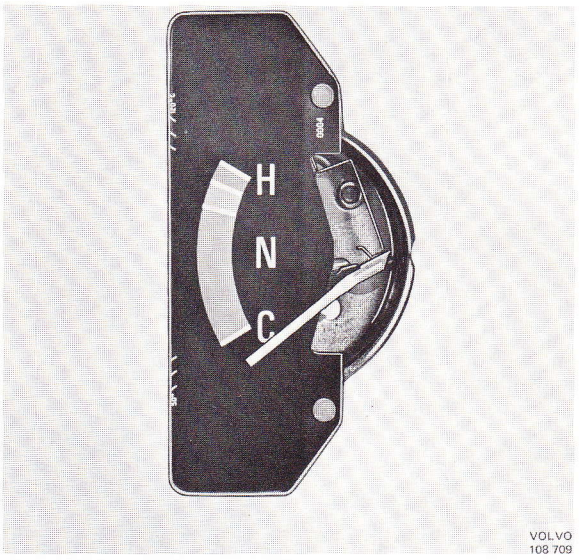
Tachometer

Tachometer

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

The registration part senses 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 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.

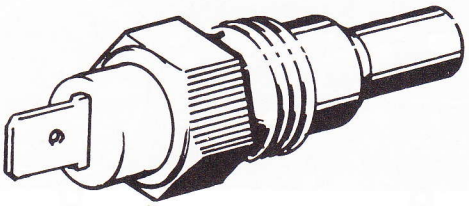


VOLVO
108 709

Temperature gauge

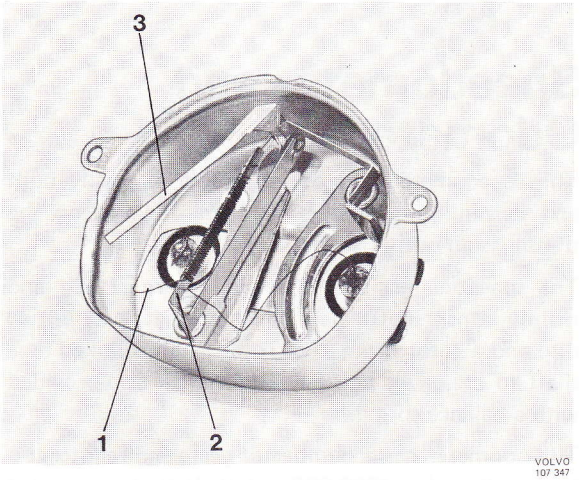
Temperature gauge, coolant

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



Sensor for temperature gauge

VOLVO
107 366



VOLVO
107 347

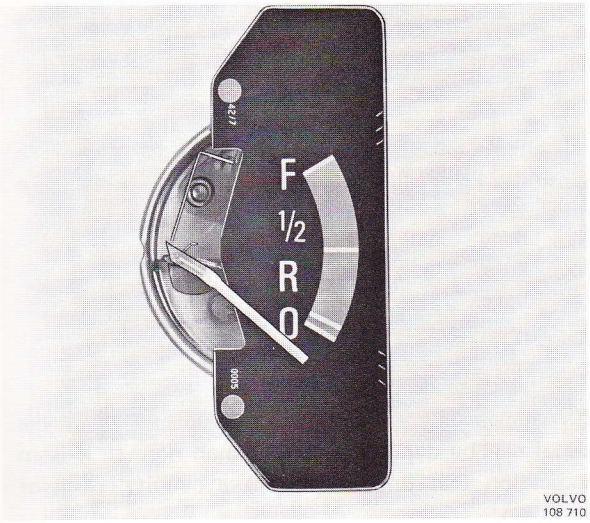
Registering instrument, disassembled

1. Resistance wire
2. Bimetal spring
3. Pointer

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.

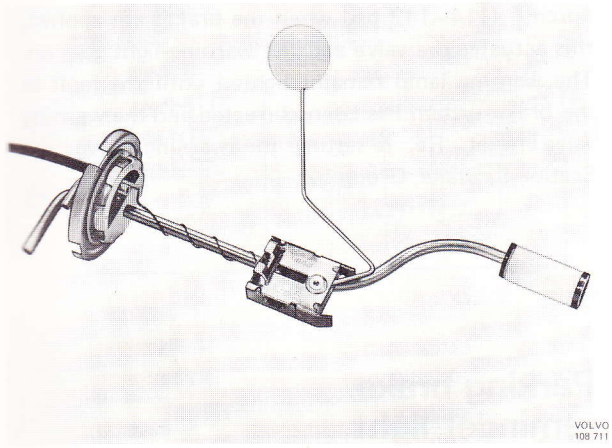


Fuel gauge

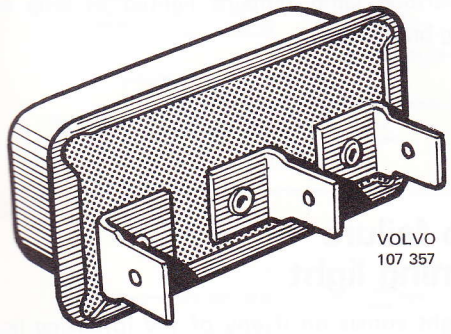
Fuel gauge

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.



Sender for fuel gauge



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 af approx. 10 volts is thereby obtained. The breaking and marking 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.

The warning lights on this page should never light when driving.

These lights will light up when the ignition is turned on, before the engine is started. This is also to prove that the lights function. The light should go out after the engine has started. (However, the parking brake reminder light will not go out until the parking brake is released.)

Oil pressure warning light (red)

If the light comes on during driving, the oil pressure is too low. Stop the engine immediately and check the engine oil level, see page 46. After hard driving, the light will come on occasionally when the engine is idling. This is normal, provided it goes out when the engine speed is increased.

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

Brake failure warning ligth (red)

If the light comes on while driving and the brake pedal can be depressed further than normal, it is an indication that one of the brake circuits is out of function.

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 valve and the warning light 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.

Alternator warning light (red)

If the light comes on when engine is running, check the alternator drive belt tension as soon as possible.

The alternator warning light 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 light goes out, indicating that the alternator is charging.

Parking brake reminder light

This light will be on when the parking brake (hand brake) is set. The parking brake lever is situated between the front seats.

The parking brake reminder light receives current via the ignition switch. When the parking brake is applied, the warning light is gounded by the switch. The warning lamp remains lighted as long as the parking brake is on.

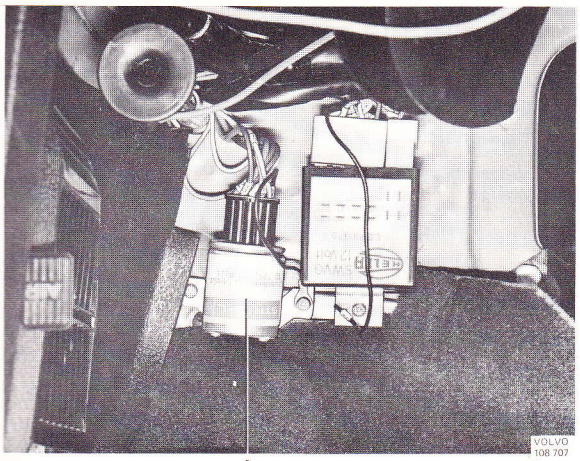
Reminder light, EGR service

If the vehicle is equipped with an EGR (Exhaust Gas Recirculation) 15 000 mile service reminder light, as required by the U.S. Environmental Protection Agency, the light will come on at 15 000 mile intervals. This is a reminder to take your Volvo to the dealer to get the EGR valve serviced. The light will stay on until reset by the dealer.

Bulb failure warning light

The light comes on if any of the following lights is defective:

one of the lower beams
one of the tail lights
one of the license plate lights
one of the brake lights (when the brake pedal is depressed).



1

Reed Relay

Bulb failure warning lights

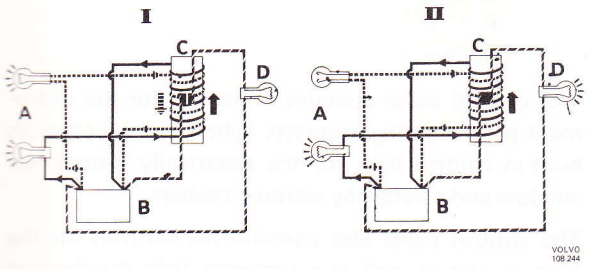
The system consists of a Reed relay and a warning light. It indicates if any of the bulbs for lower beam, tail light or stop light is out of order.

The indication is that the warning light comes on.

The Reed relay is located to the left under the dashboard, and the warning light is located in the combination instrument.

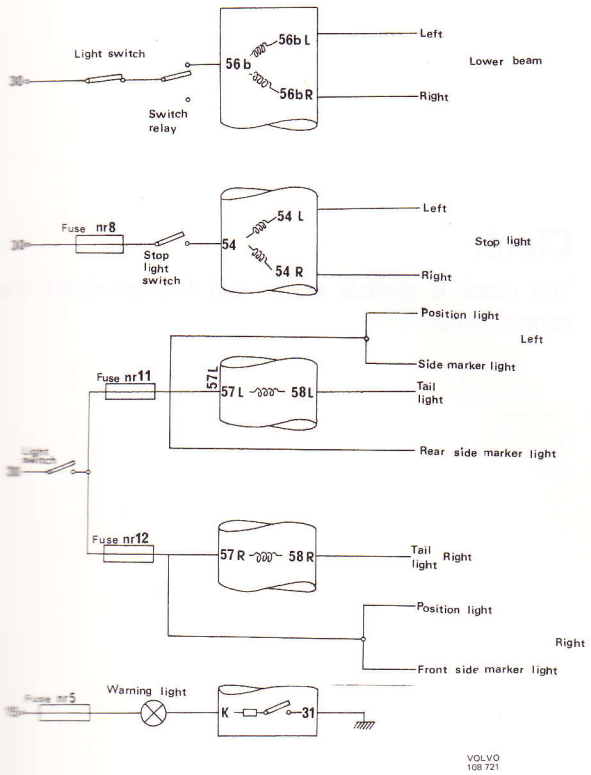
The Reed relay consists of a contact set, surrounded by three coil sets (one for lower beams, one for tail lights, one for stop lights).

Each coil set has two coils, one for left bulb, one for right bulb. The two coils are counteracting each other.



Function

When current flows through both coils in the coil set, that means that the bulbs on both sides are functioning, the two coils are counteracting each other and there is no actuation of the contacts, see I. But if the current flow through one of the oil ceases (the bulb is not functioning), the contacts are actuated and the warning light comes on, see II.



Indicator lights

Overdrive

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

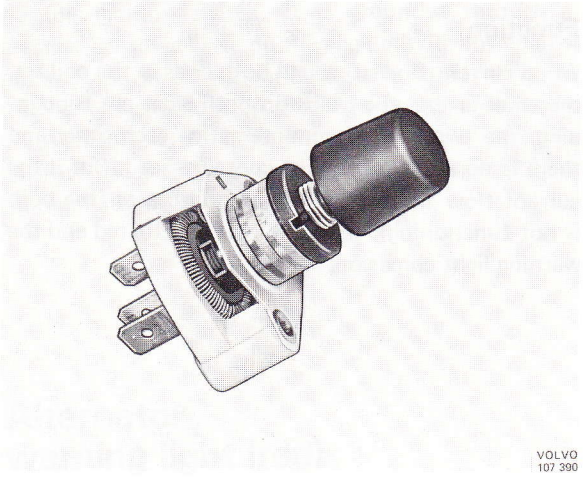
Turn signals

The indicator light for the turn signals flashes when the signals are engaged. It is wired across the switch for the signals.

Headlight

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

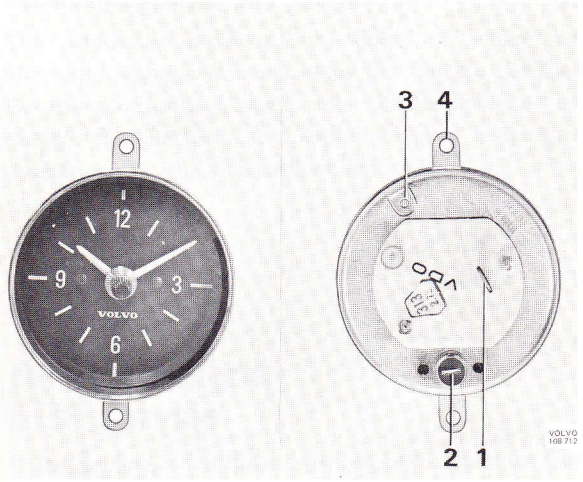
Control panel



Rheostat for instrument light

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.



Electric clock, front and reverse

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

Clock

The clock is electric driven and located above the control panel.

Group 39

Wiring Diagrams

Group 39

Wiring Diagrams

Index

Introduction

The developments of the automotive electrical systems have continously added new functions and components. Many of them have more than one duty to fill. The previously used wiring diagrams have thus been made increasingly complicated and difficult to use and understand.

The wiring diagrams contained herein represent a new method to present the electrical systems. They will make it very easy to find the actual system which will greatly simplify the use.

The wiring diagram has been broken down into circuits, each one dealing with a certain electrical function. Each electrical circuit is described on an inside page containing one left page and one opposite right page. Left is an "electrical road" showing joints and connections as well as normal operating circuits. Right page is shown the actual position of the circuit in the vehicle and position of components as well as marking of connections.

Except for some internal wirings, no symbols are used. Instead, a life-look illustration of the component is used, which should make it easy for anybody to understand the diagram.

See next page for further instructions.

How to use the diagrams

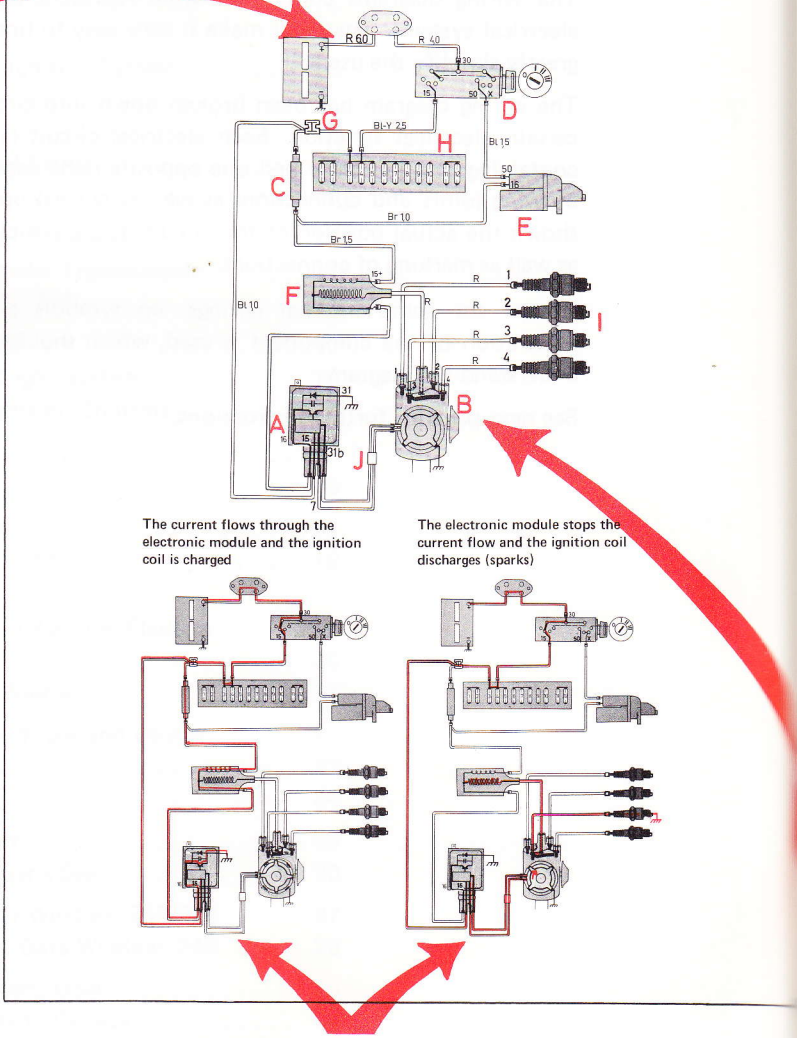
Use the Index to find the particular electrical function.
Let us suggest you want to check the ignition system.
In the Index you find "Breakerless Electronic Ignition System" page 5. Find the page.

Here you can see how the components are interconnected and their inside wiring.

Wire colors:	
SB	– black
GR	– gray
W	– white
R	– red
BR	– brown
Y	– yellow
NL	– blue
GN	– green

Approx wire sizes:	
0.75 mm²	– 18 gauge
1.5	– 16
2.5	– 14
6.0	– 10
10.0	– 8
16.0	– 6

Breakerless Electronic Ignition System



Current flow in various operating positions

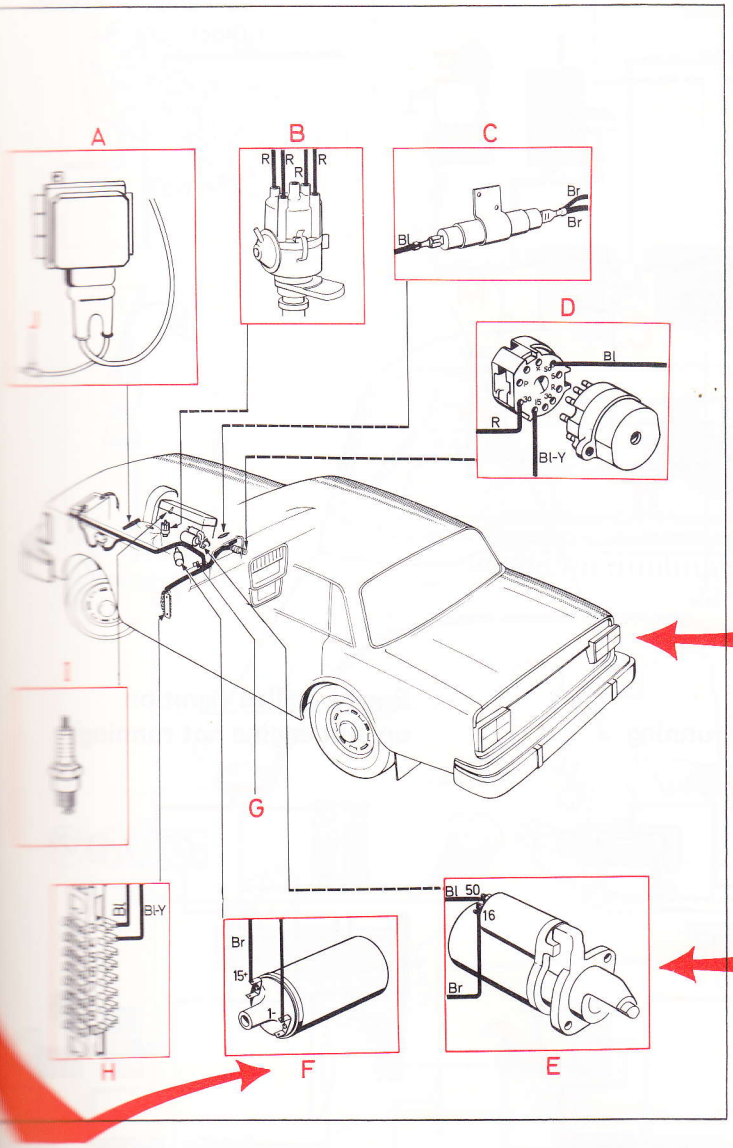
NOTE:

In those cases a fuse serves more than one circuit, it has been pointed out to simplify service diagnosis.

Example: Windshield Wiper/Washer does not operate
If *Blower* and/or *Horns* operate, it is obvious that the fault must be located *after* the fuse box.

If *Blower* and/or *Horns not* operate, the fault must be located before the fuse box.

Start here

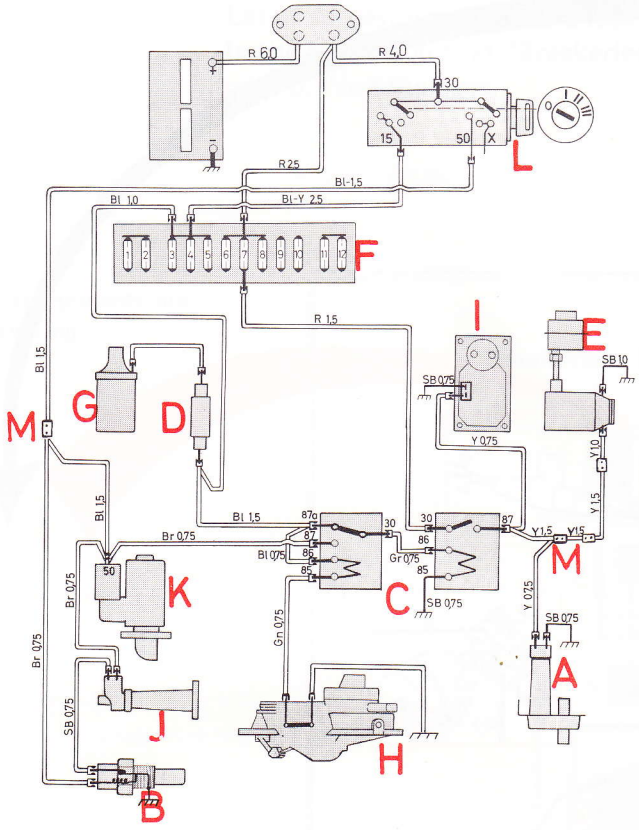


Here are shown the actual locations of the components and the routing of the wiring harness.

Here are shown the wire connections at the component.

The letters make it easy to go from left side to right side of the page.

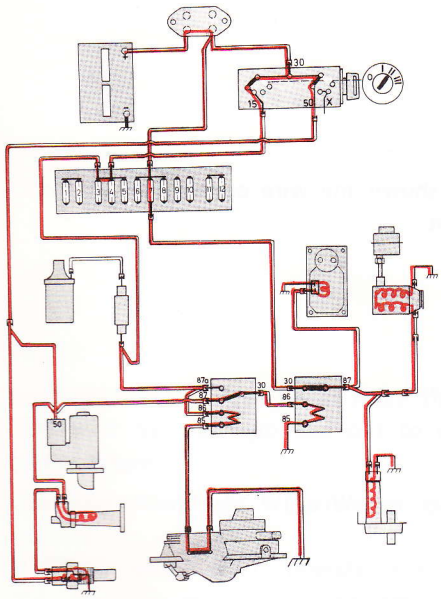
CI Fuel Injection System



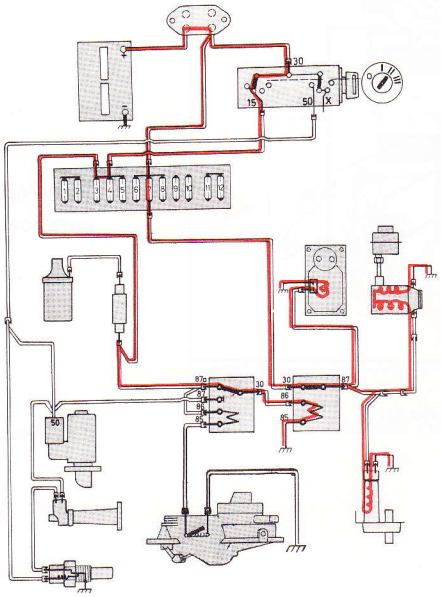
Fuse No 7:

Fuel Pump, CI System + Clock

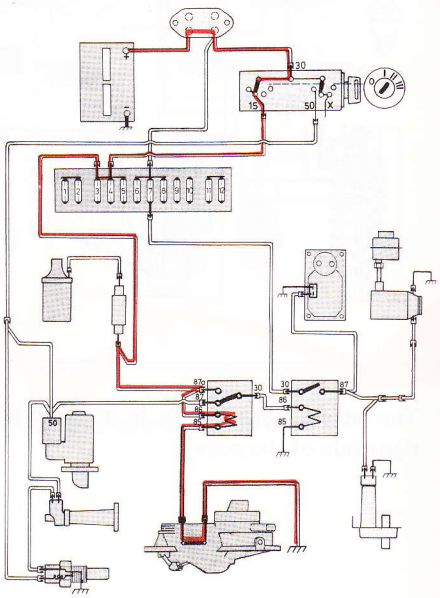
Starting engine



Engine running



Engine stalled (ignition on, but engine not running)



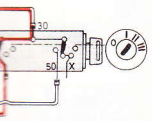
No 7:

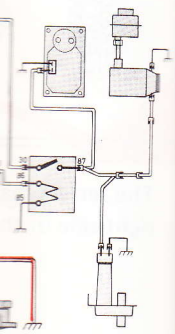
Pump, CI System

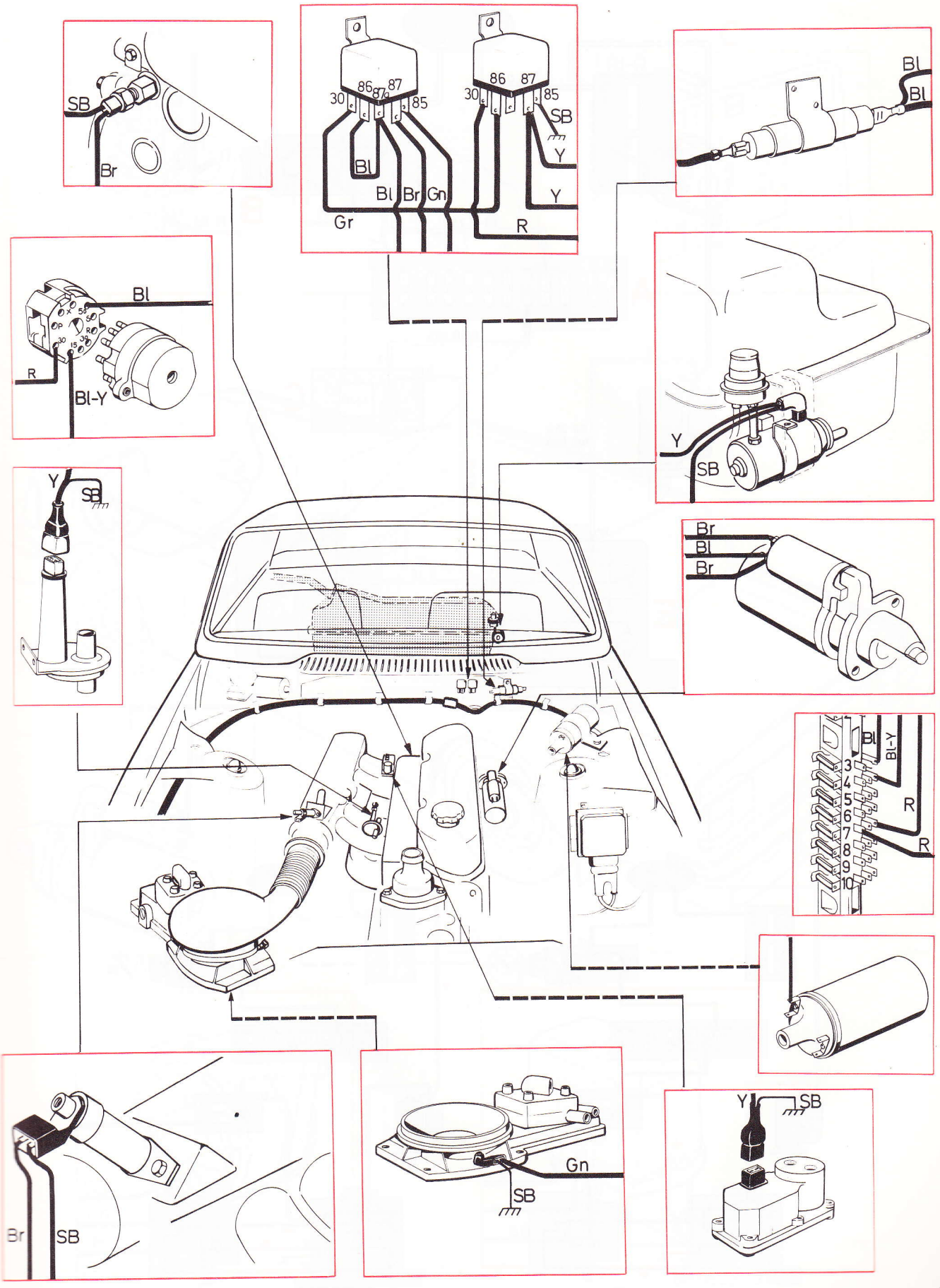
ck

nition

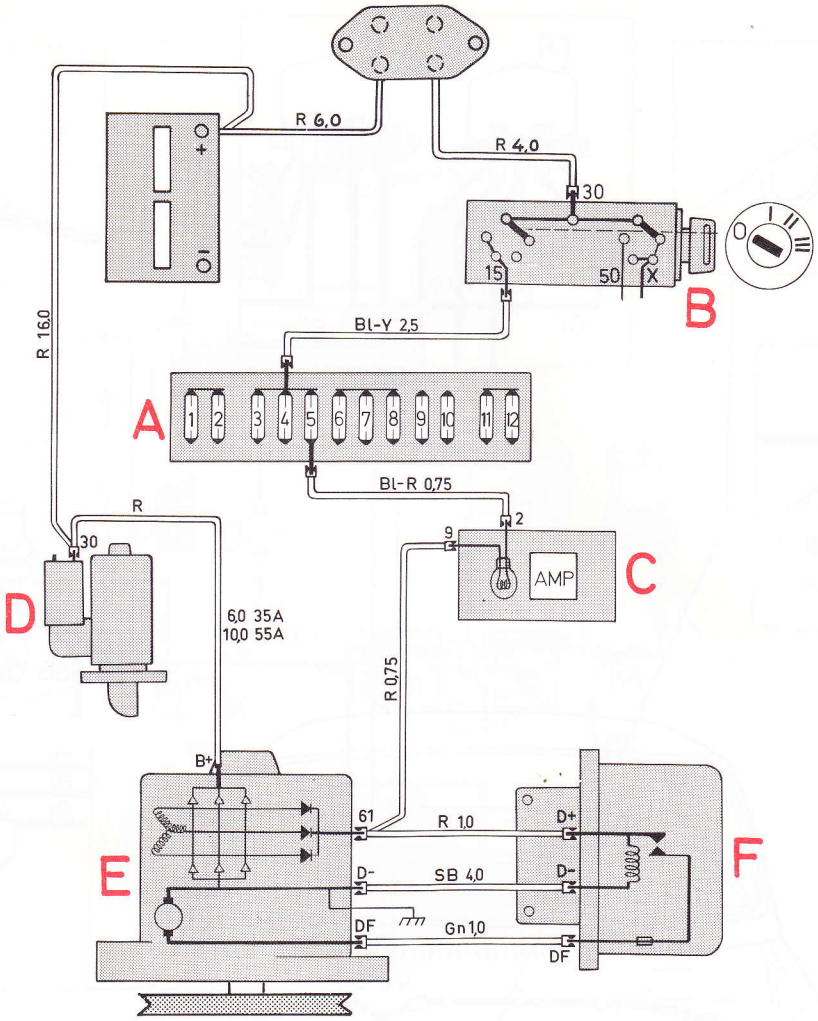
t running)

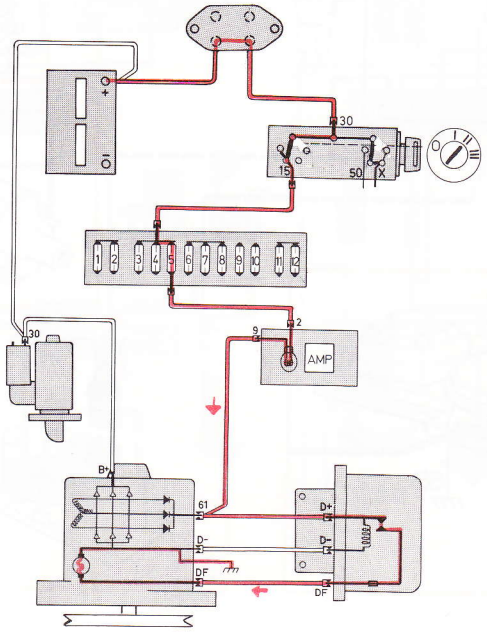


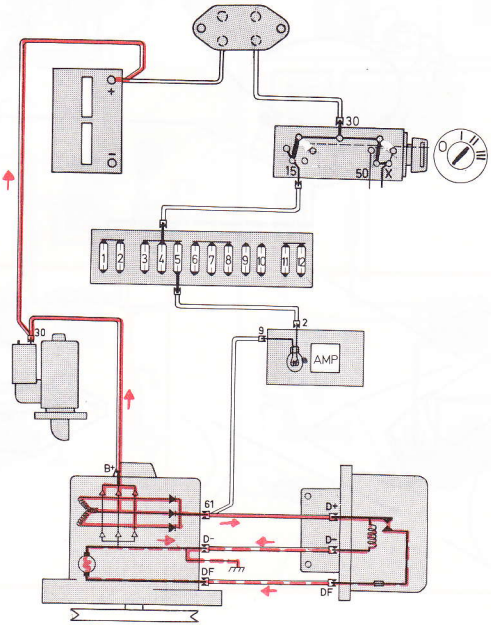


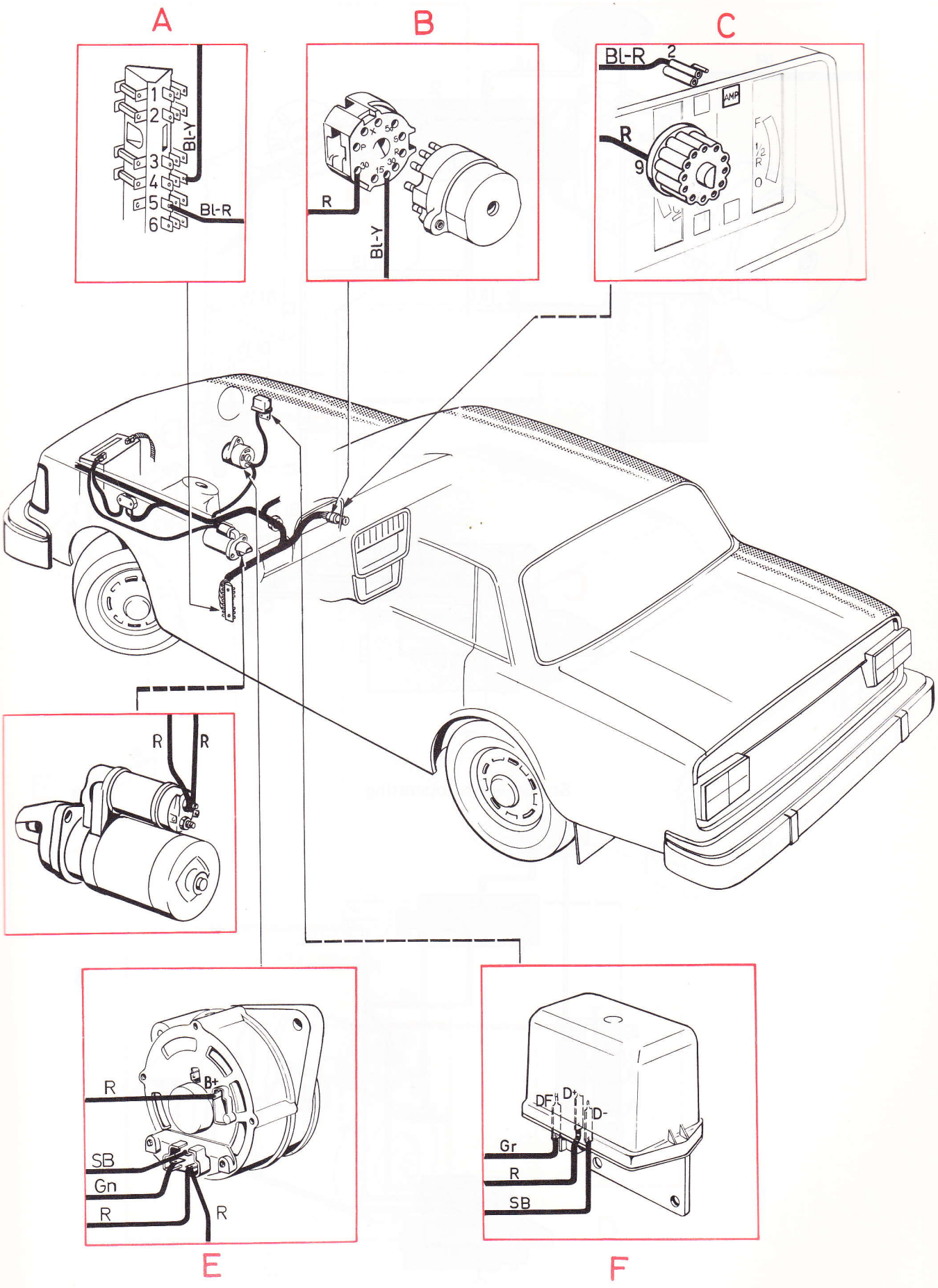


Main Wiring Harness

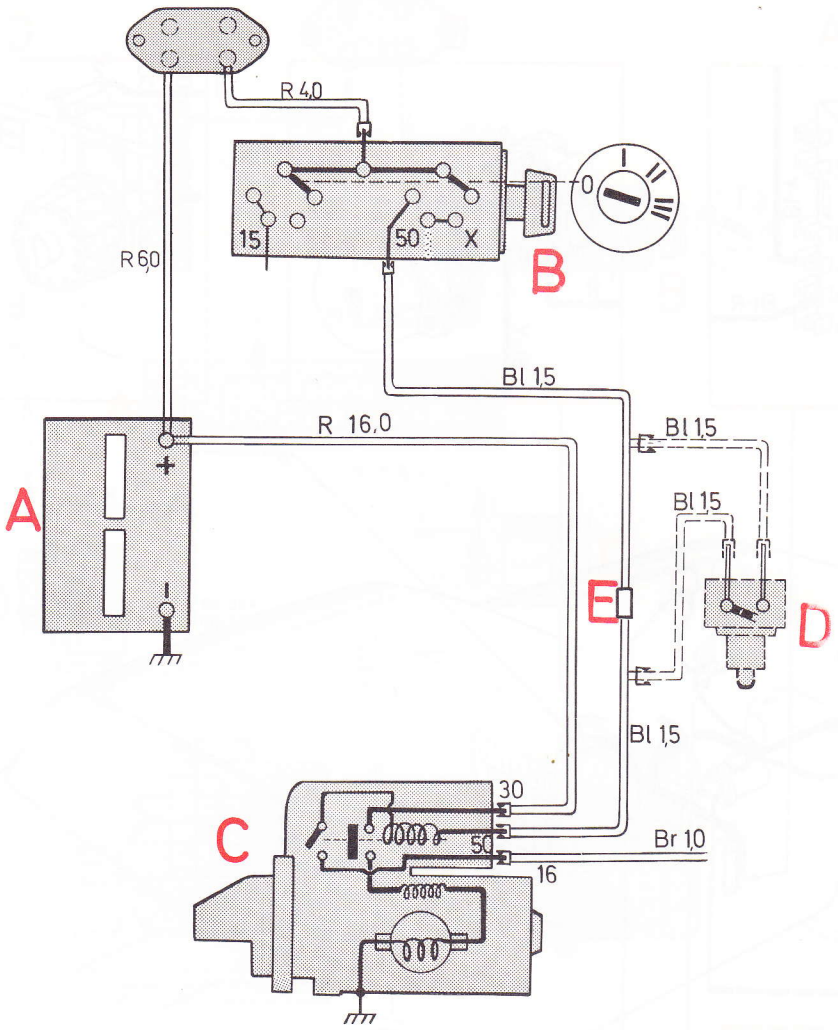




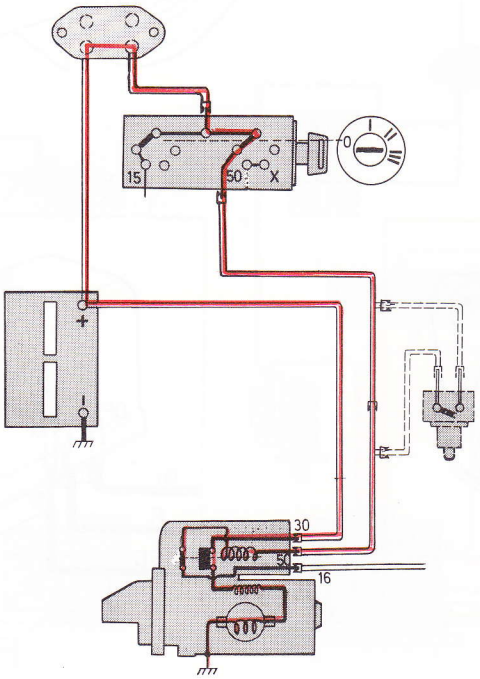


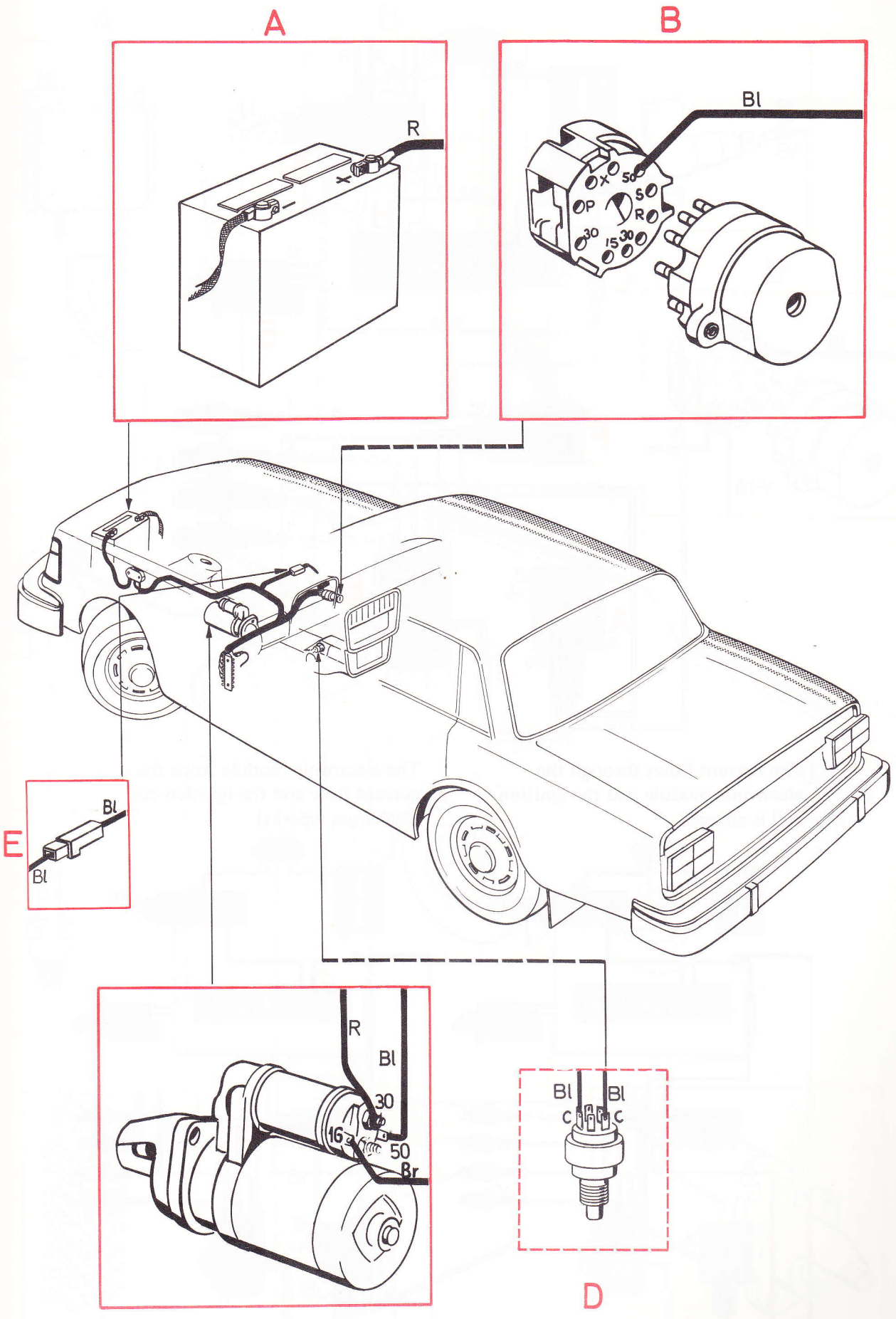

A
B
C
1
2
3
4
5
6
Bl-Y
Bl-R
R
Bl-Y
Bl-R
2
AMP
R
9
F
1/2
R
0
R
R
D
R
B+
SB
Gn
R
R
E
DF
D+
D-
Gr
R
SB
F

Starting Circuits

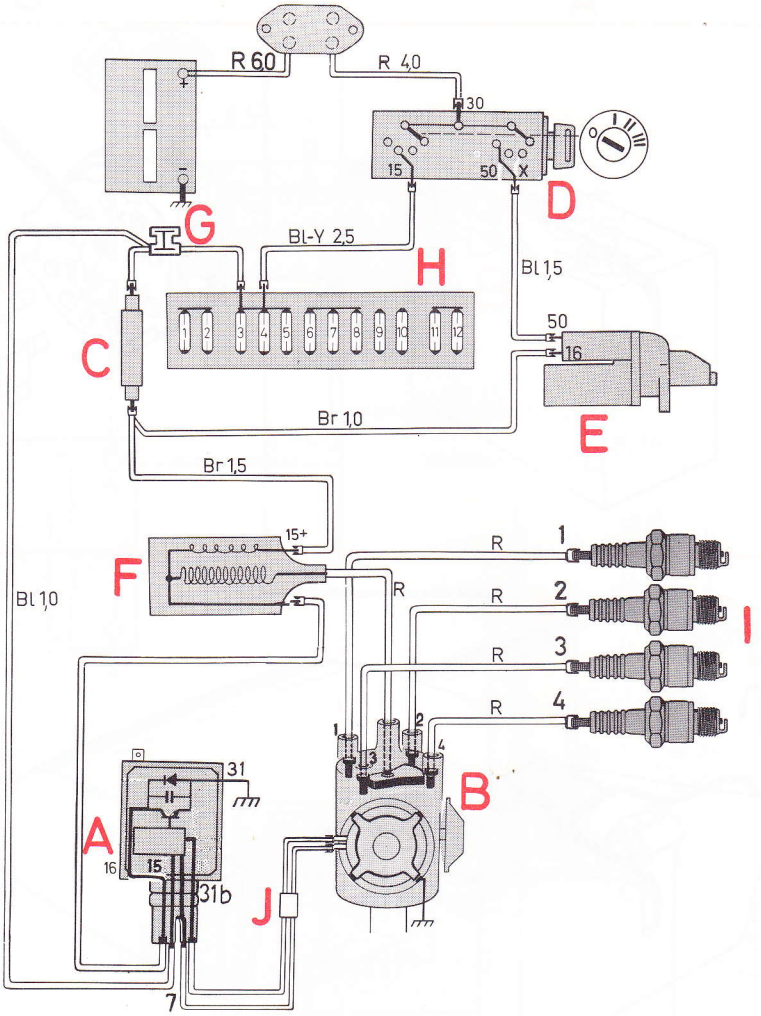


Starter Motor operating

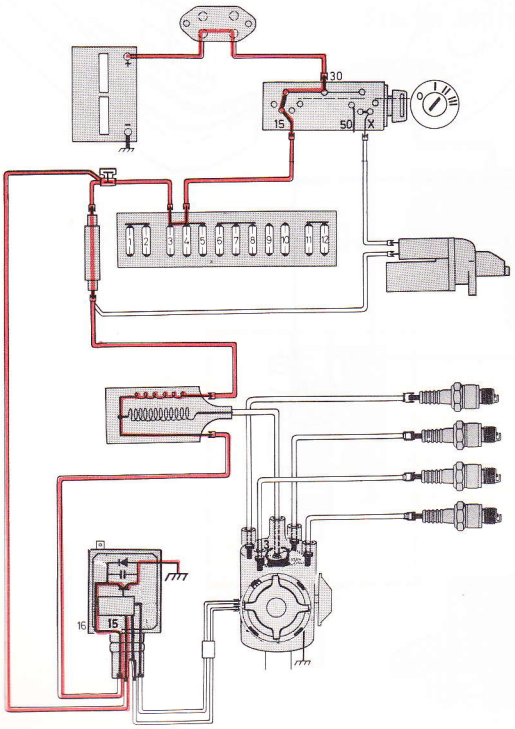



A
R
B
Bl
X
50
S
P
R
30
15
30
E
Bl
Bl
R
Bl
30
16
50
Br
C
Bl
Bl
C
C
D

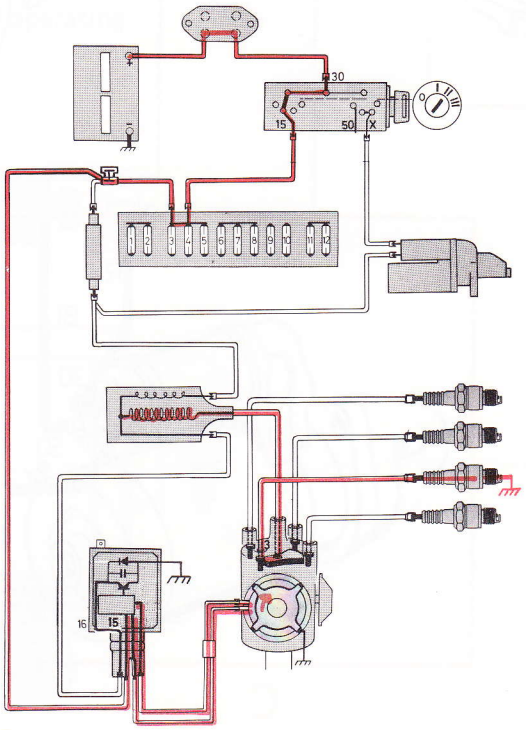
Breakerless Electronic Ignition System

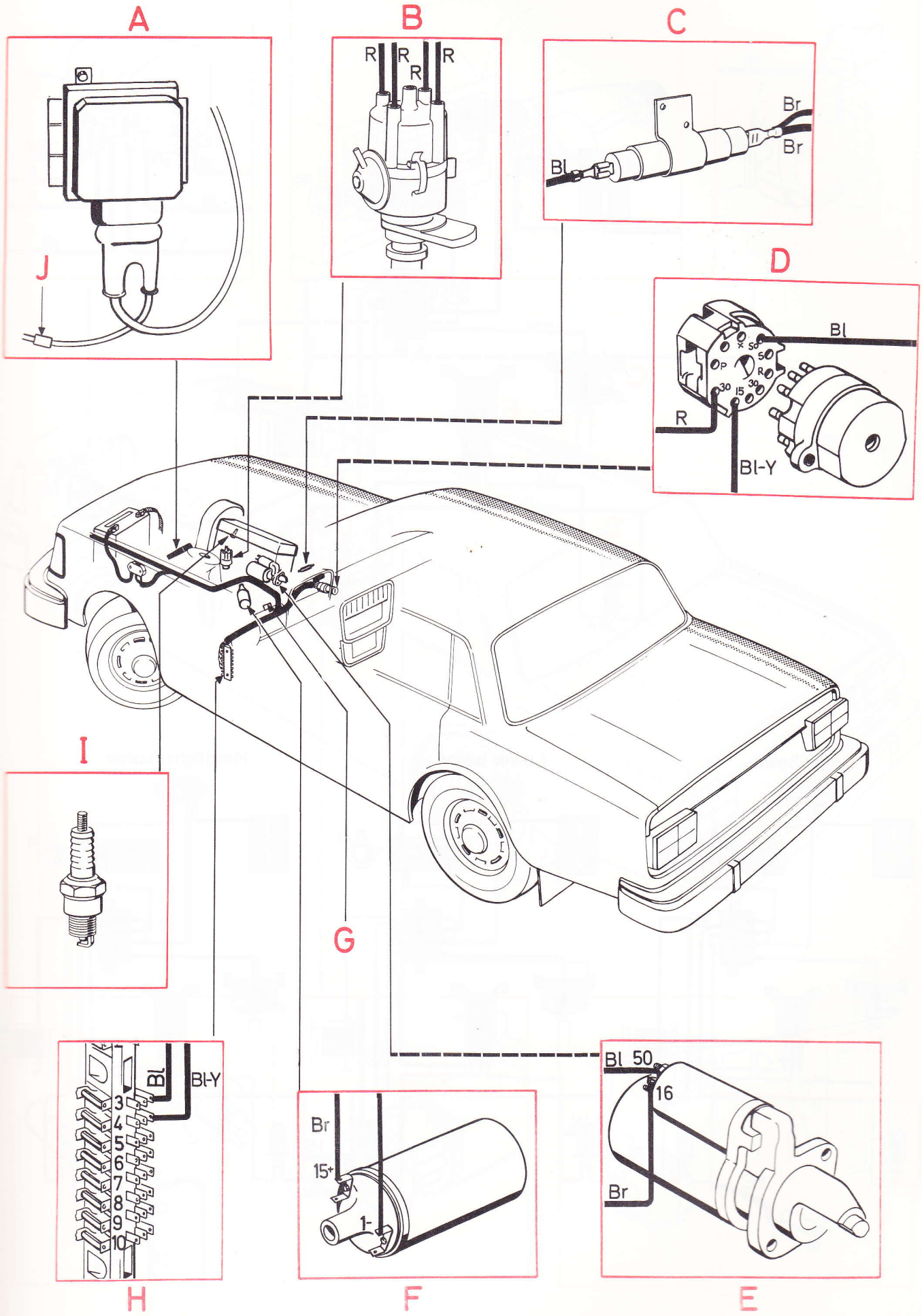


The current flows through the electronic module and the ignition coil is charged

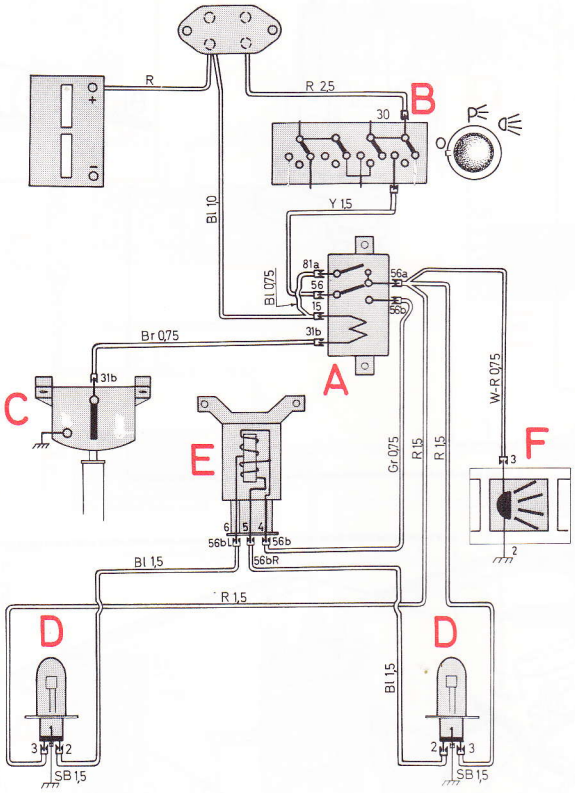


The electronic module stops the current flow and the ignition coil discharges (sparks)

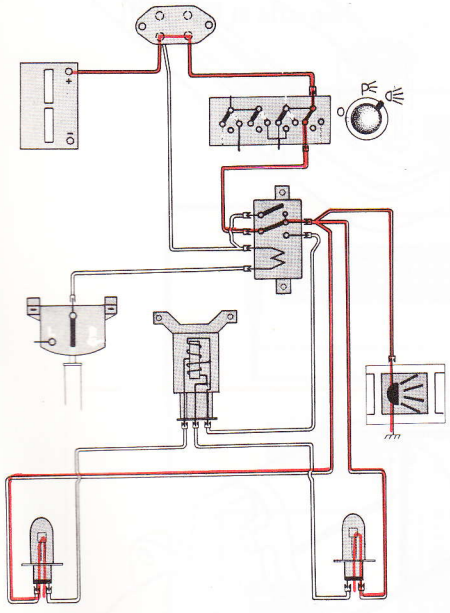



A
J
B
R
R
R
R
C
Br
Br
Bl
D
Bl
50
P
R
30
15
30
R
Bl-Y
G
I
H
Bl
Bl-Y
3
4
5
6
7
8
9
10
F
Br
15+
1-
E
Bl 50
16
Br

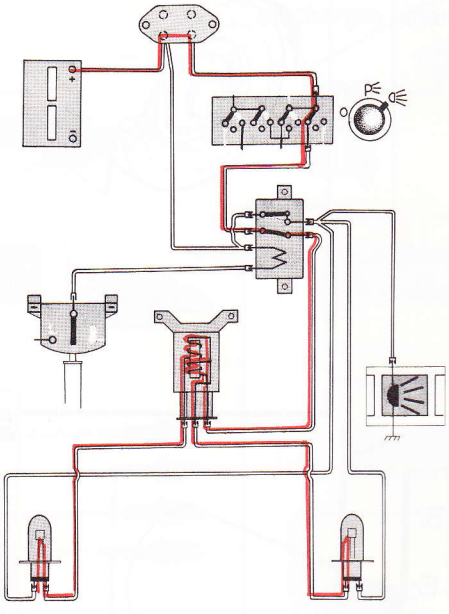
Headlights



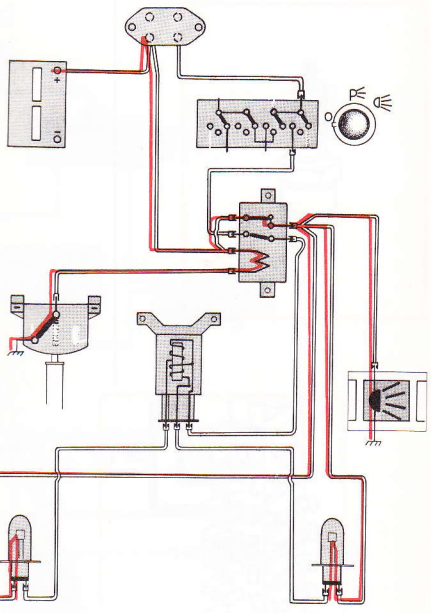
Upper beam

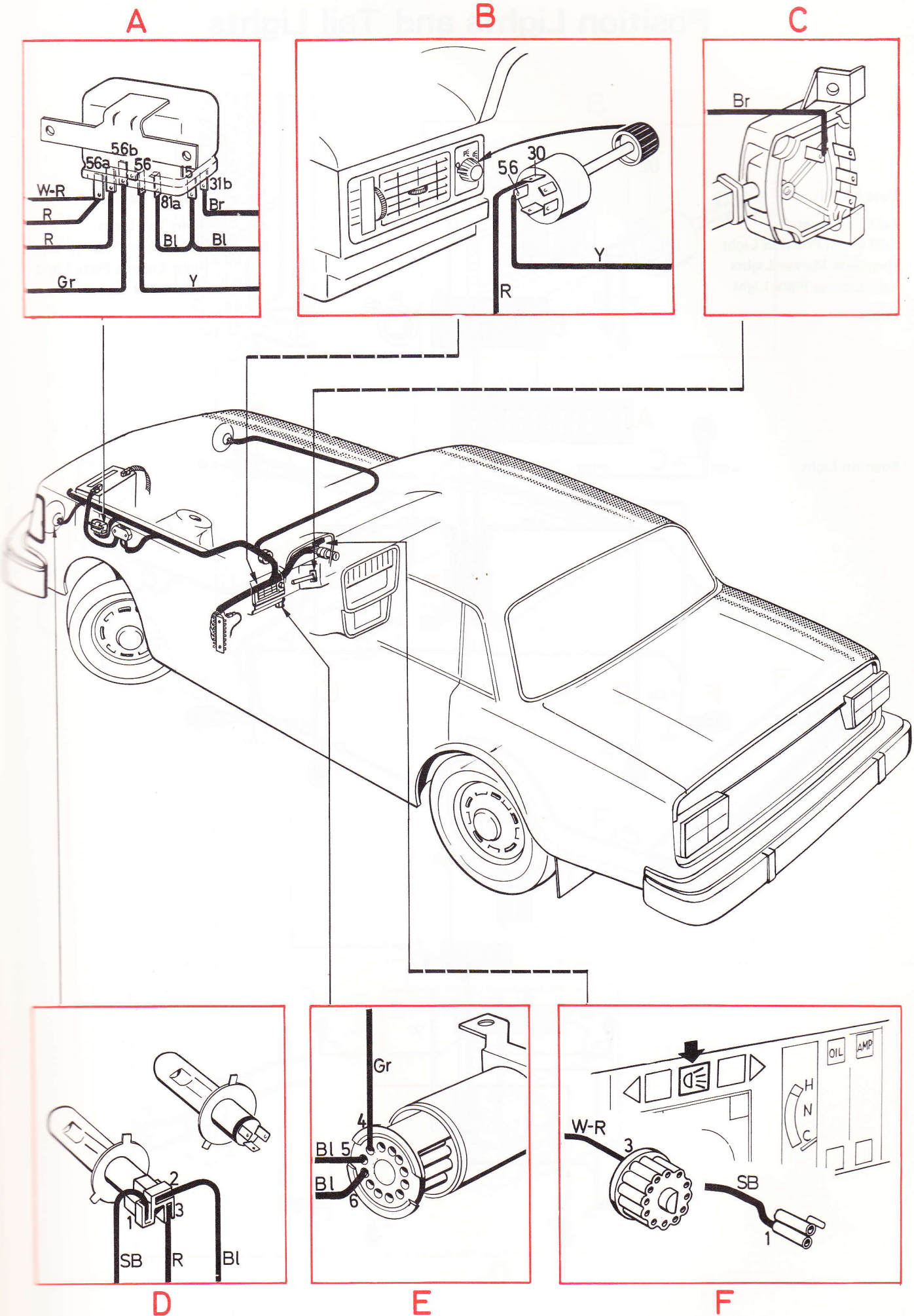


Lower beam



Headlight flasher




A
56b
56a
56
15
31b
W-R
R
R
81a
Br
Bl
Bl
Gr
Y
B
30
56
Y
R
C
Br
D
SB
R
Bl
E
Gr
4
Bl 5
Bl
6
F
OIL
AMP
H
N
C
W-R
3
SB
1

Position Lights and Tail Lights

Fuse No 11:

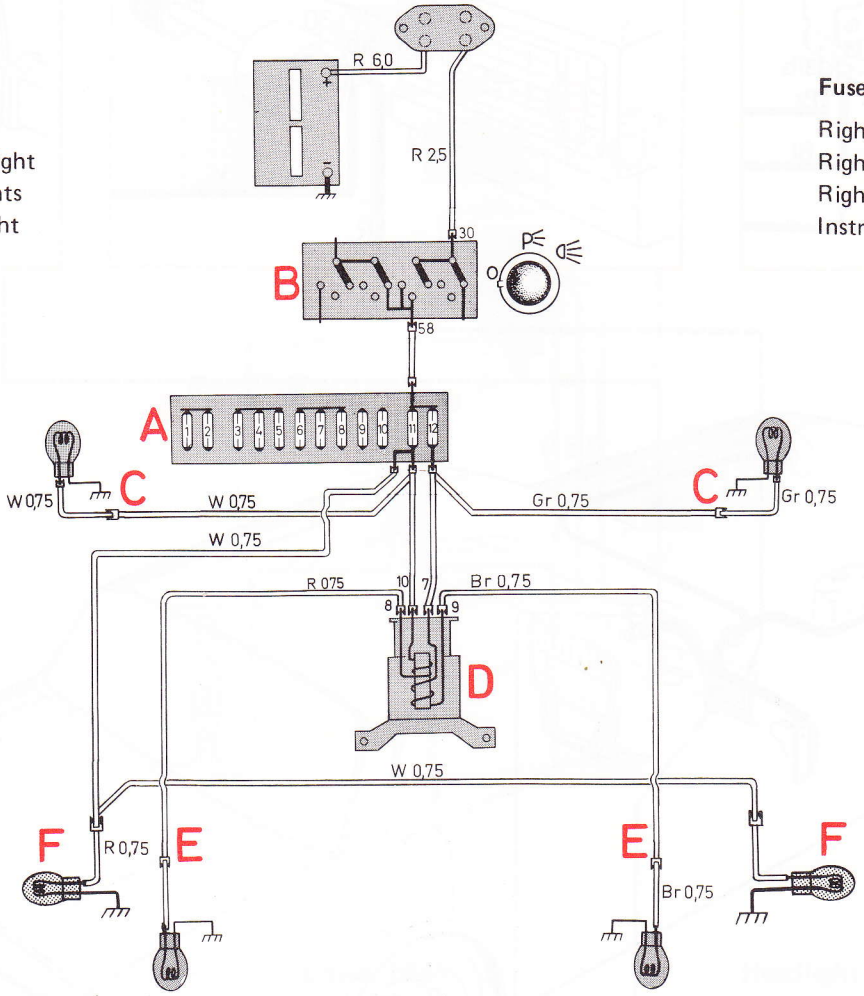
Left Tail Light
Left Front Position Light
Rear Side Marker Lights
Left License Plate Light

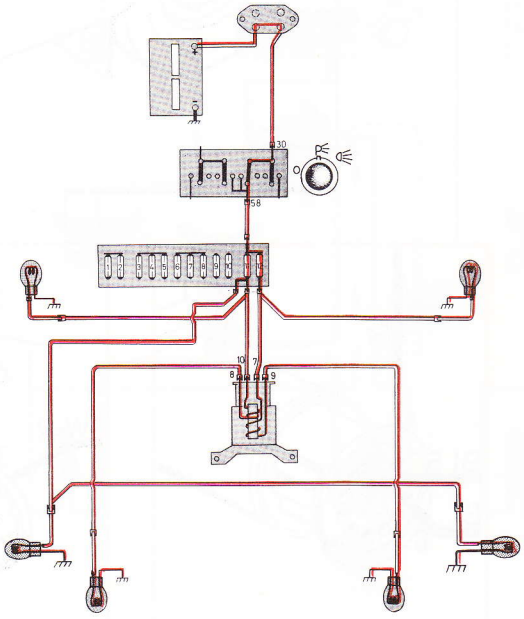
Fuse No 12:

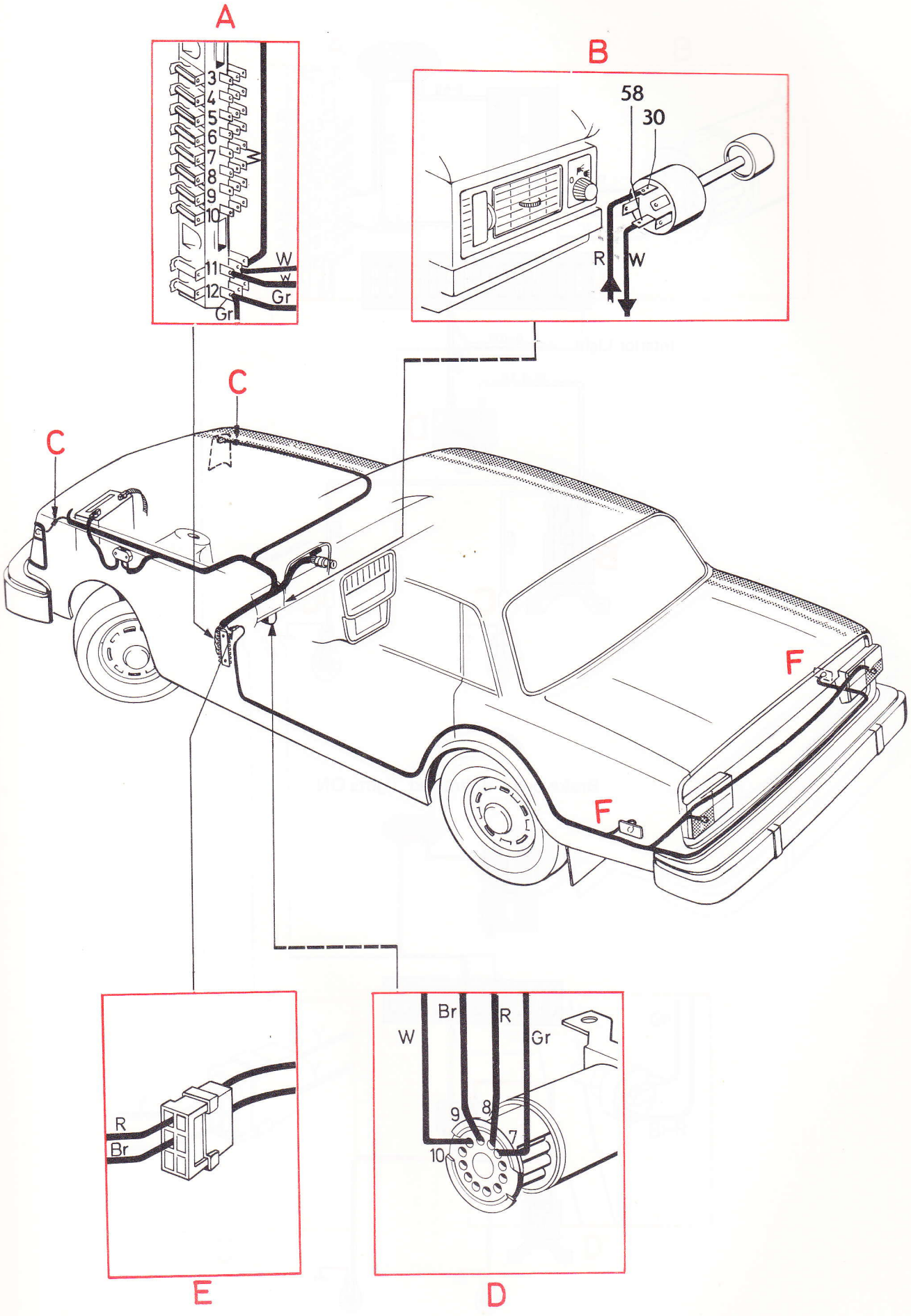
Right Tail Light
Right Front Position Light
Right License Plate Light
Instrument Lights

Position Light

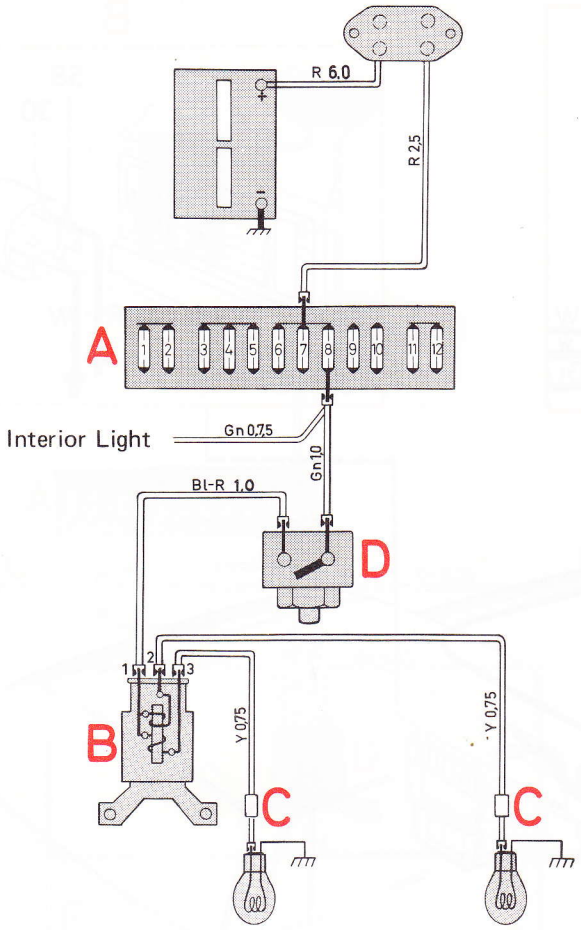
Side Marker Light



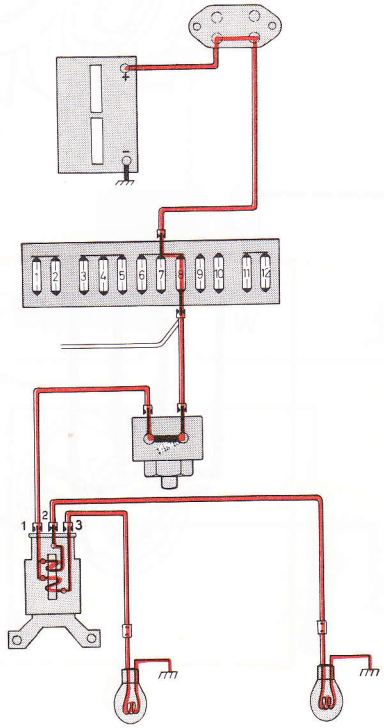


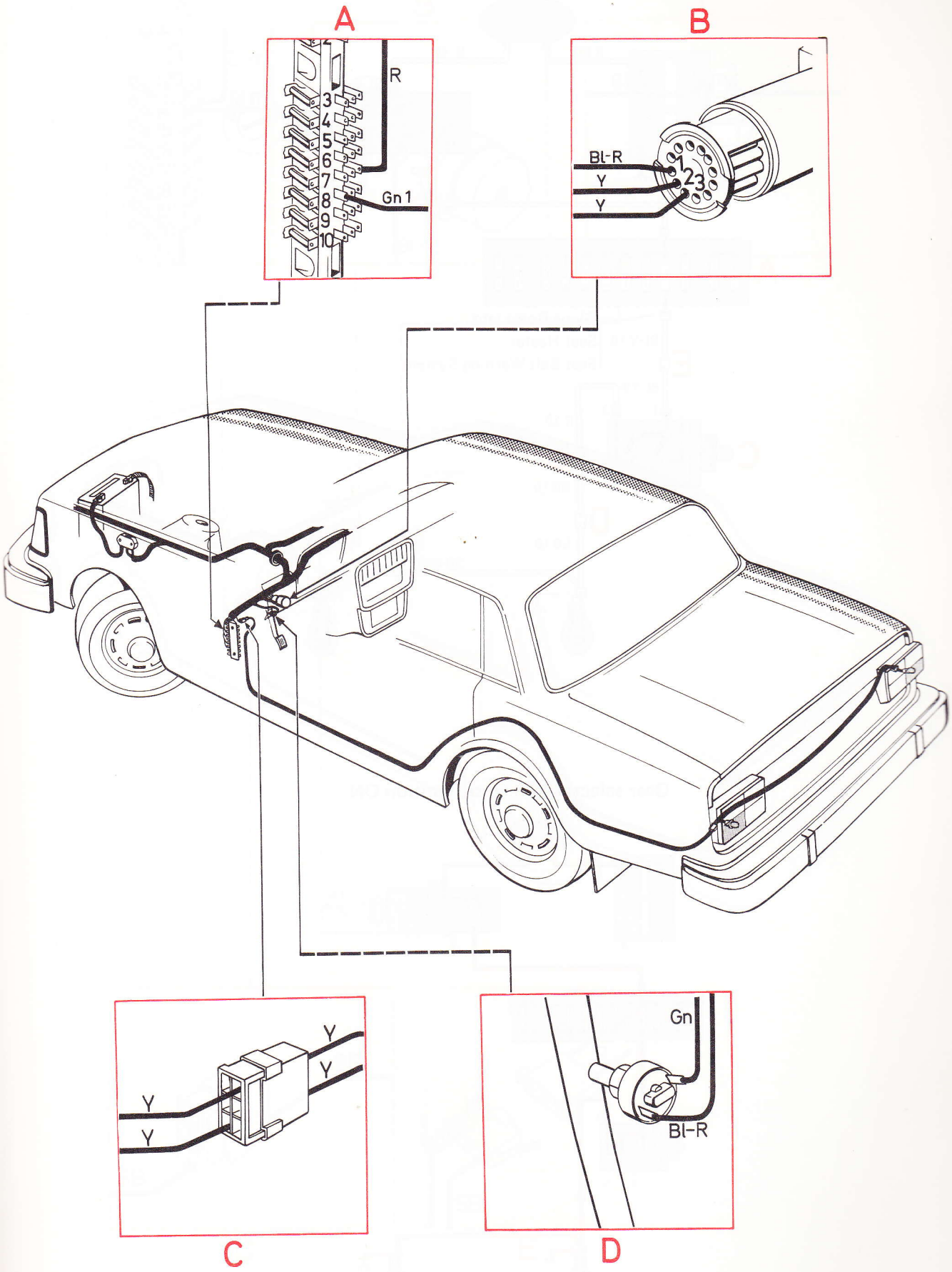

A
3
4
5
6
7
8
9
10
11
12
W
W
Gr
Gr
B
58
30
R
W
C
C
F
F
E
R
Br
D
W
Br
R
Gr
9
8
7
10

Stop Lights

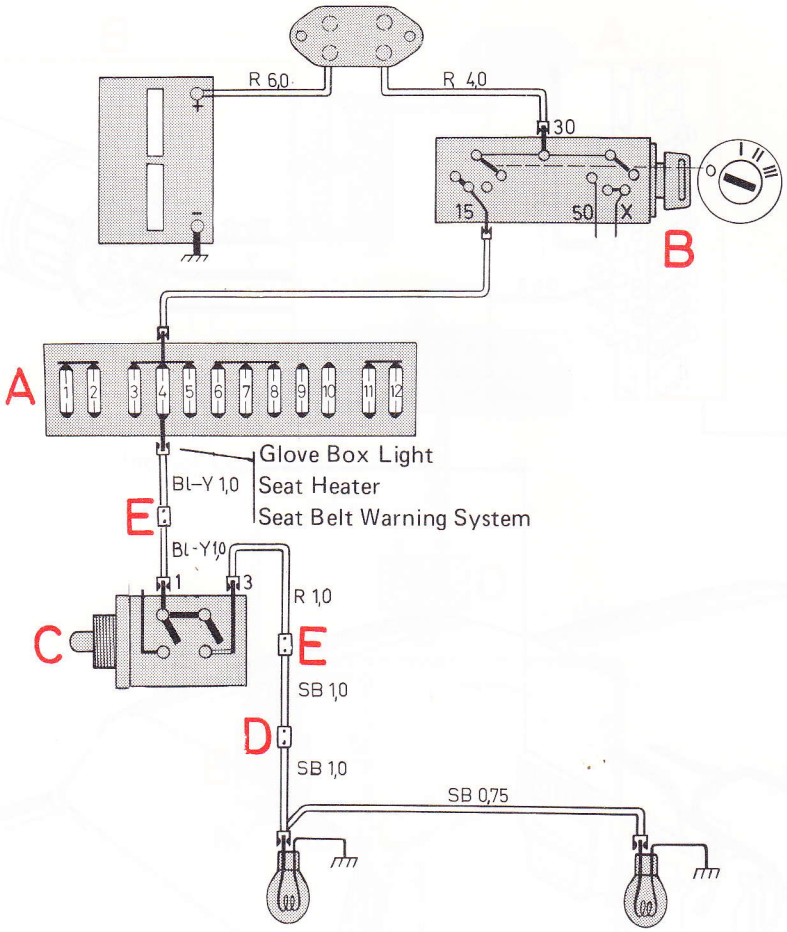


Brake pedal depressed, lights ON

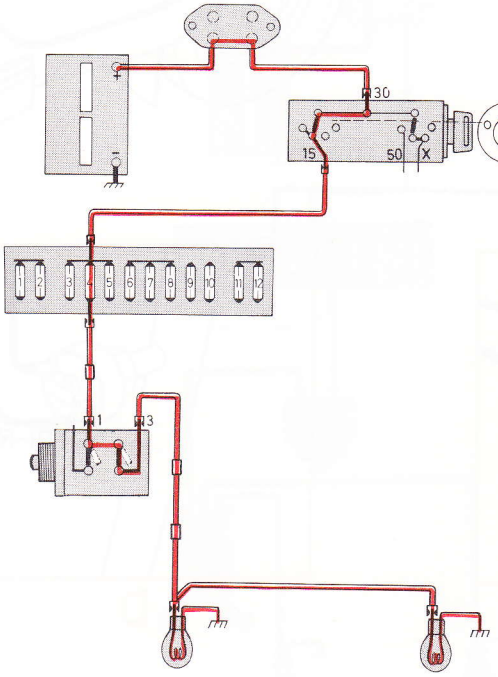


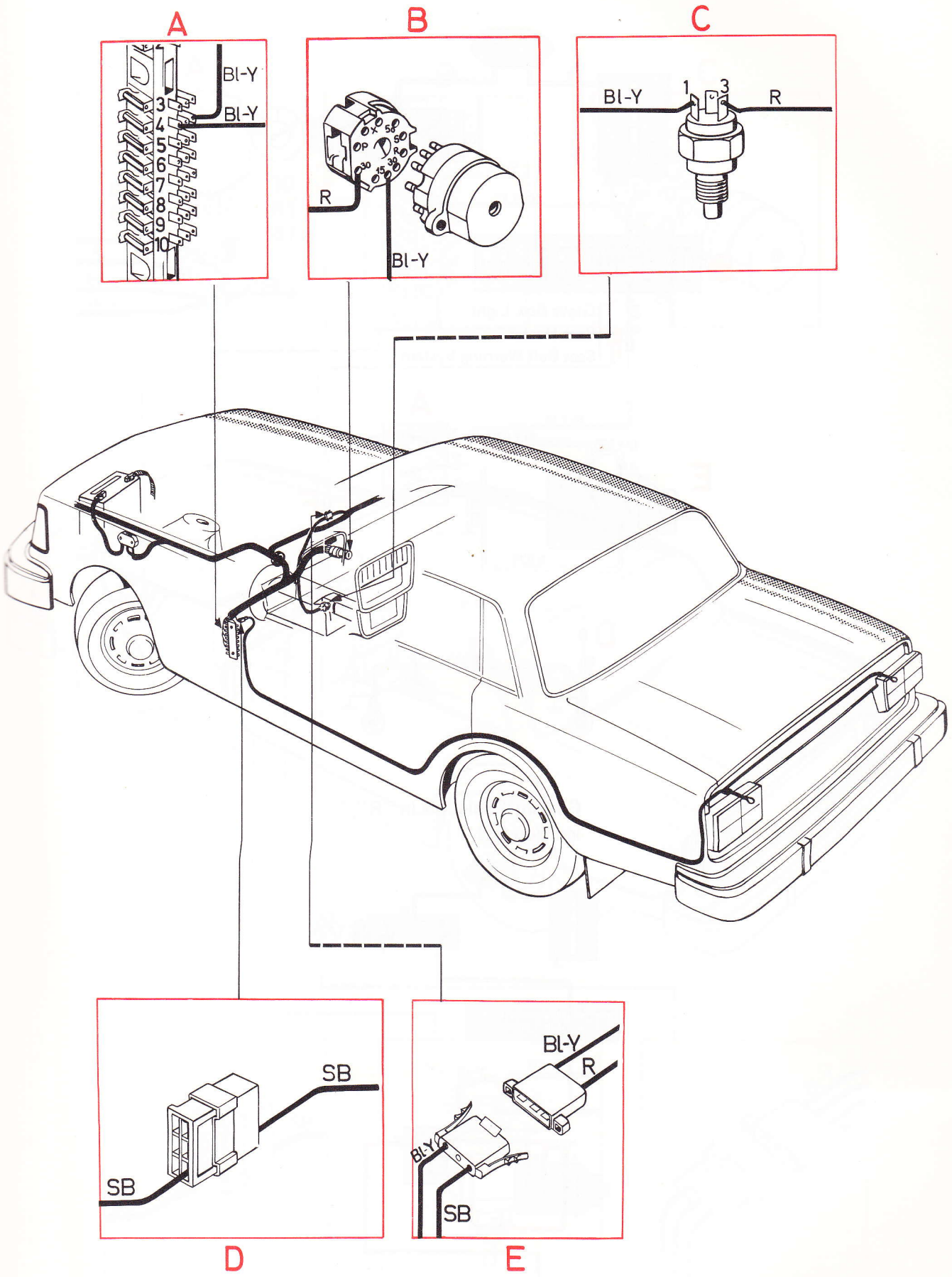

A
R
3
4
5
6
7
8
9
10
Gn 1
B
Bl-R
Y
Y
1
2
3
C
Y
Y
Y
Y
D
Gn
Bl-R

Back-up Lights, Manual Transmission

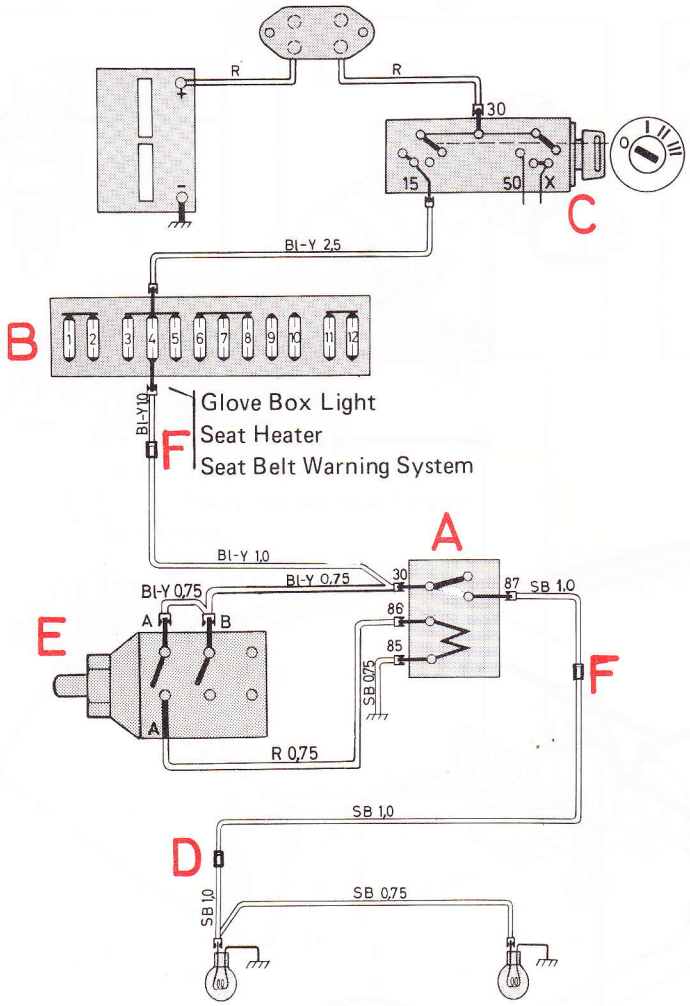


Gear selector in reverse, ignition ON

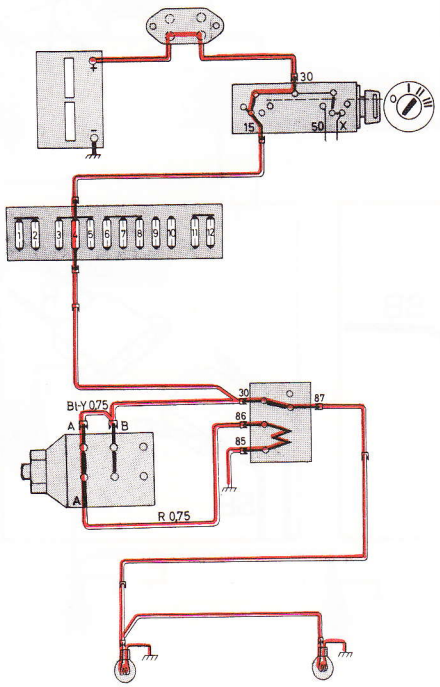


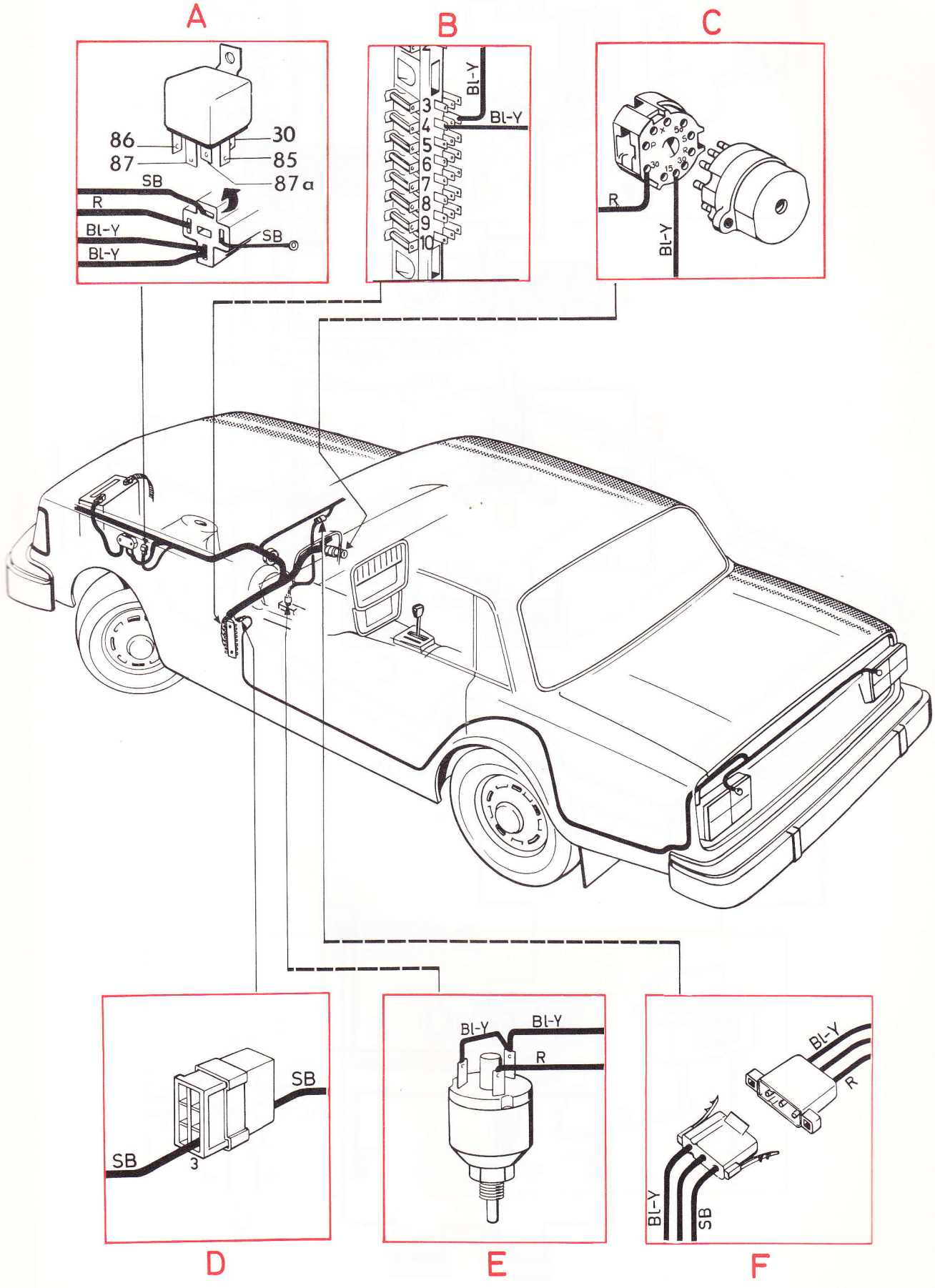

A
Bl-Y
Bl-Y
3
4
5
6
7
8
9
10
B
R
Bl-Y
C
Bl-Y
1
3
R
D
SB
SB
E
Bl-Y
R
Bl-Y
SB

Back-up Lights, Automatic Transmission

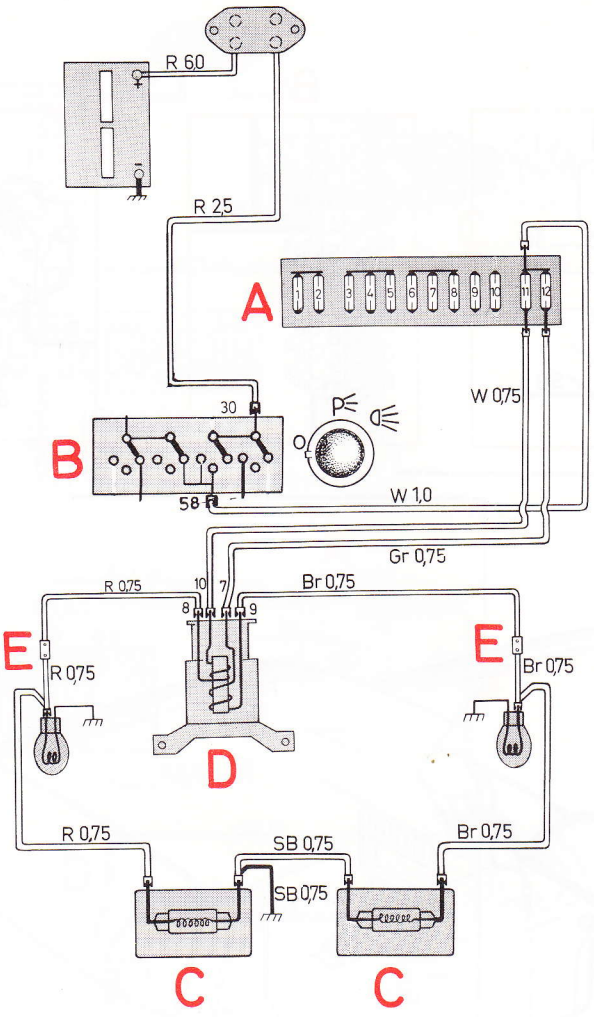


Gearshift Selector in "R", ignition ON

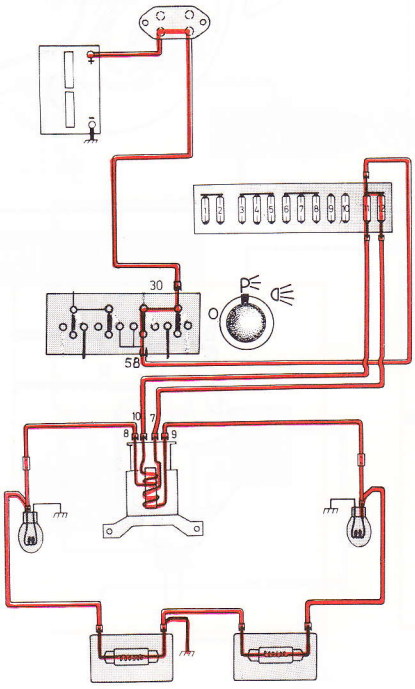


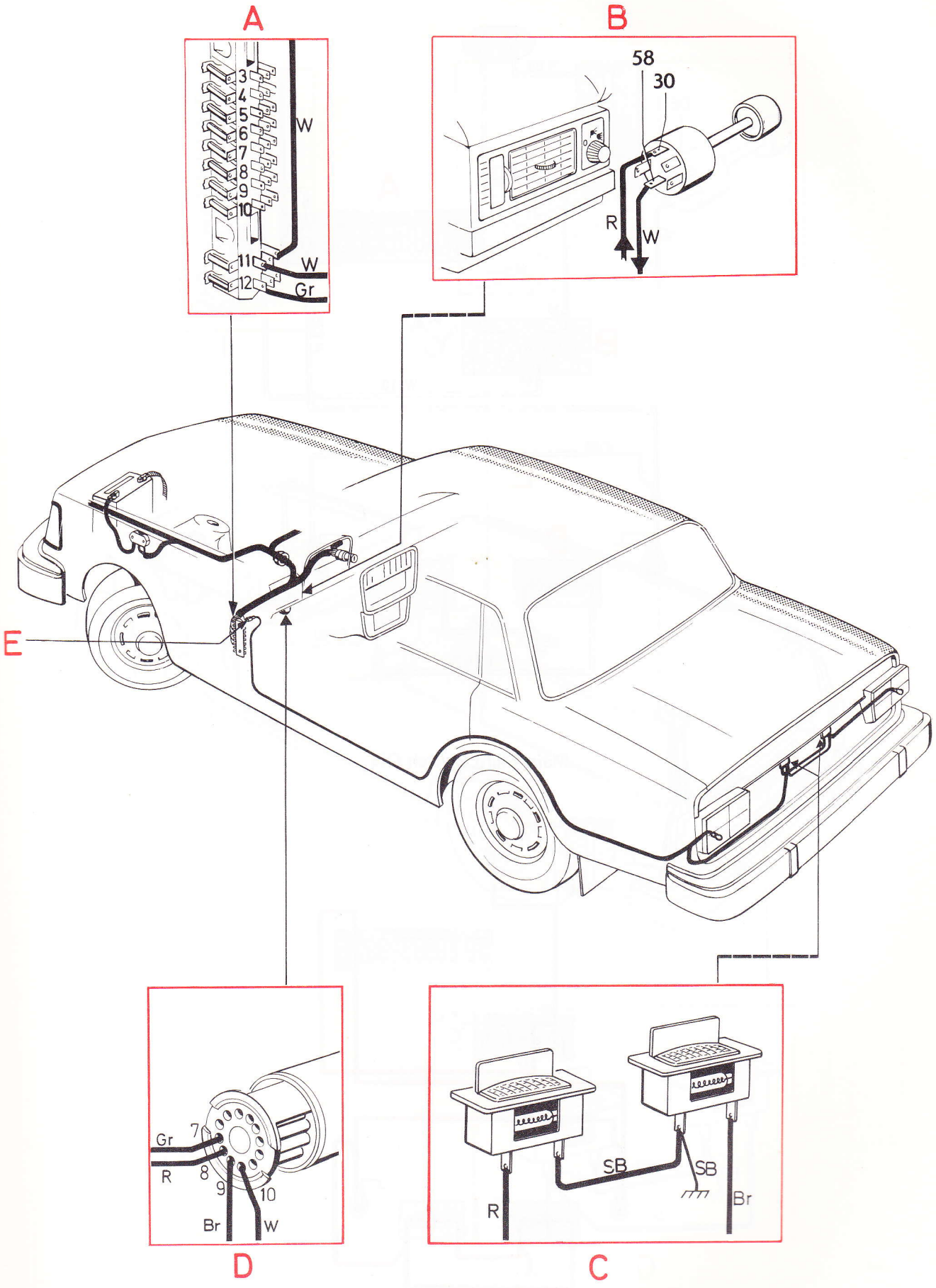

A
86
87
30
85
87 a
SB
R
Bl-Y
Bl-Y
SB
B
Bl-Y
Bl-Y
3
4
5
6
7
8
9
10
C
R
Bl-Y
D
SB
SB
3
E
Bl-Y
Bl-Y
R
F
Bl-Y
R
Bl-Y
SB

License Plate Light 242/244

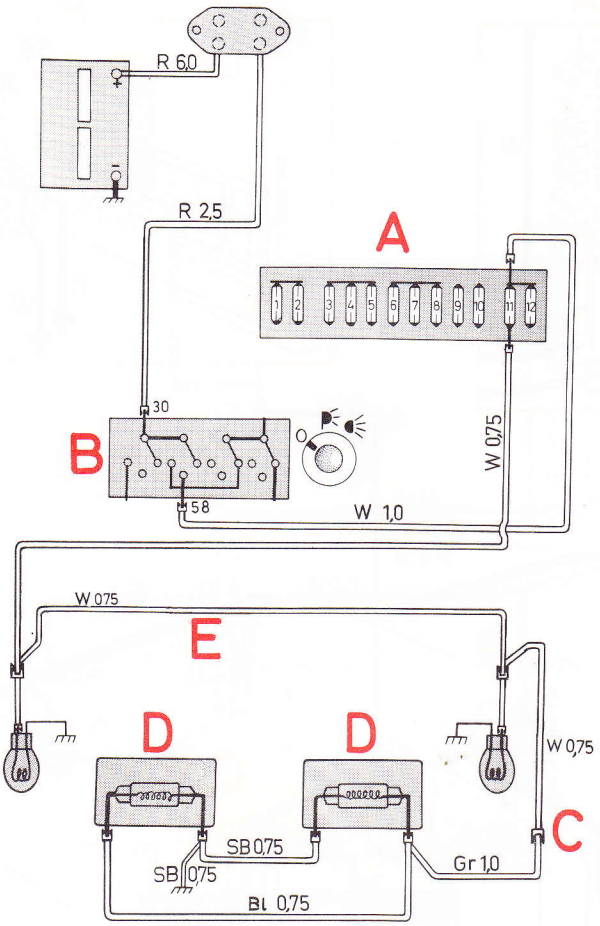


Main light switch ON

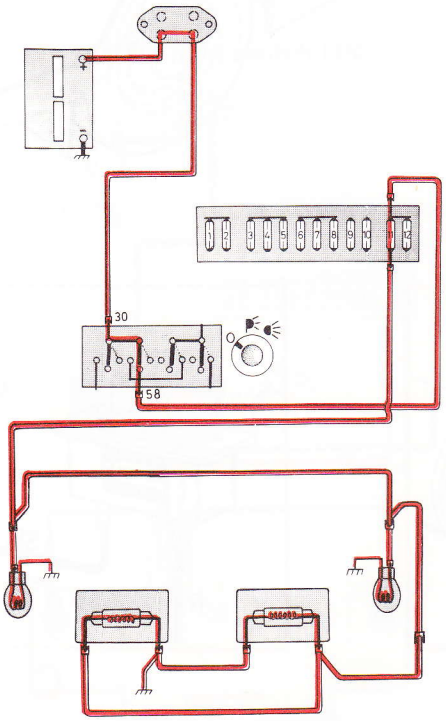


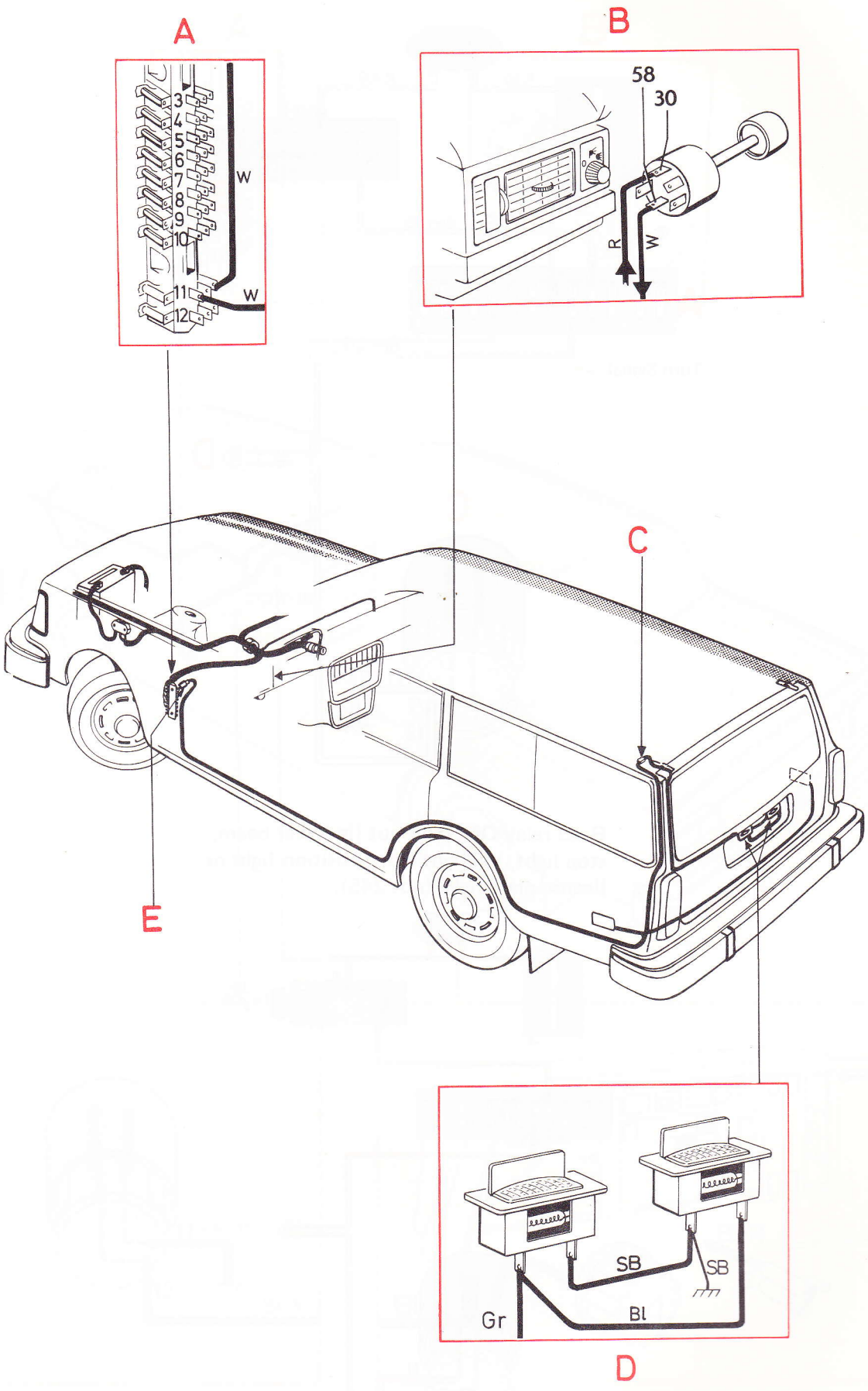

A
3
4
5
6
7
8
9
10
11
12
W
W
Gr
B
58
30
R
W
E
D
Gr
7
R
8
9
10
Br
W
C
SB
SB
R
Br

License Plate Light, 245

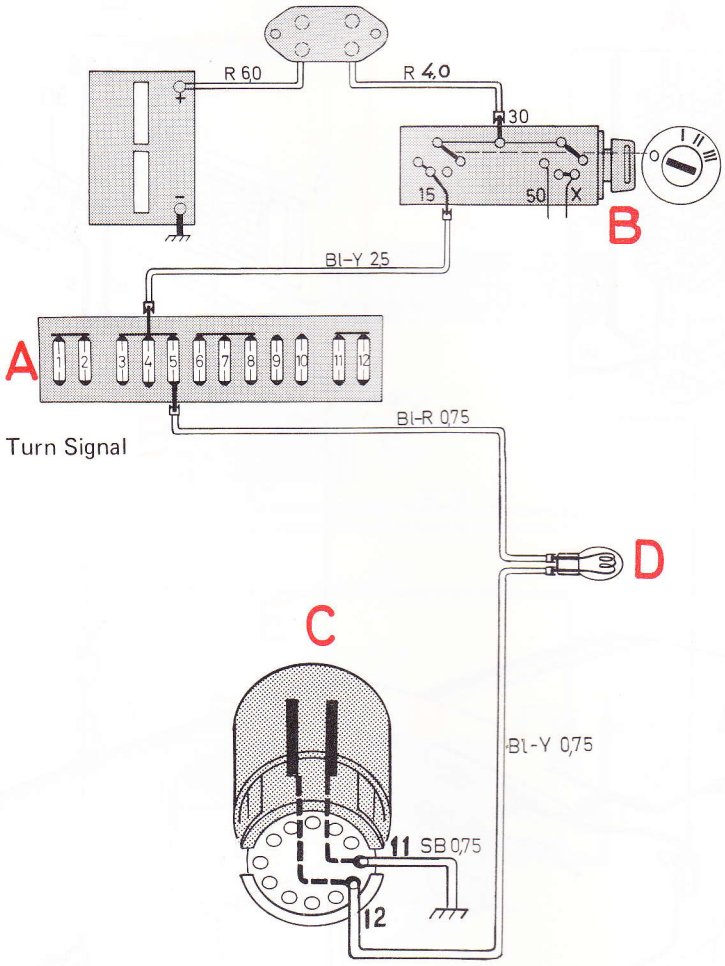


Main Light Switch ON

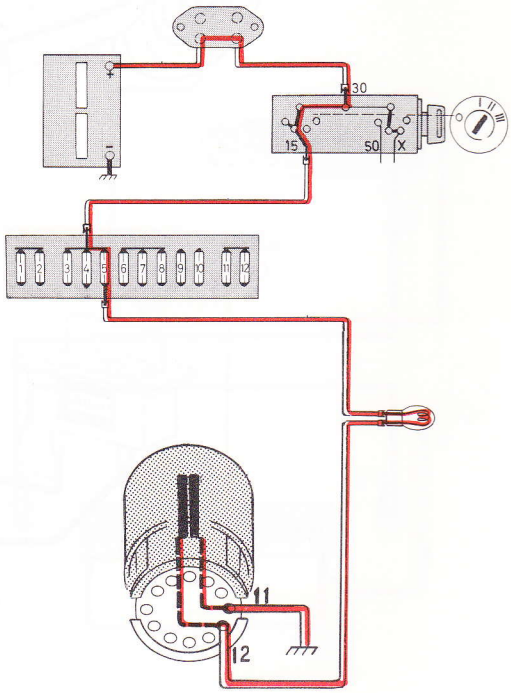


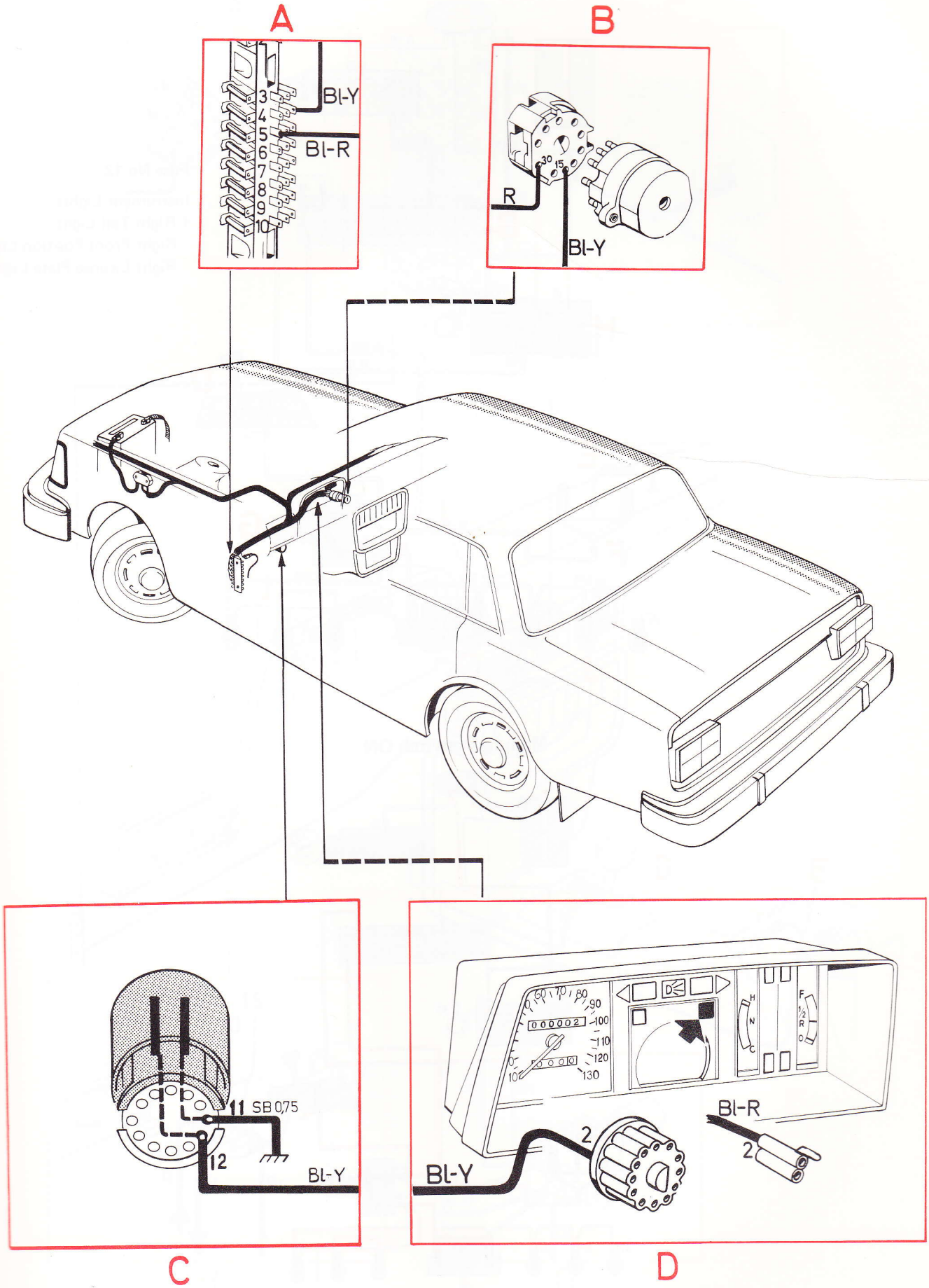

A
3
4
5
6
7
8
9
10
11
12
W
W
B
58
30
R
W
C
E
D
SB
SB
Gr
Bl

Bulb Failure Warning Light System

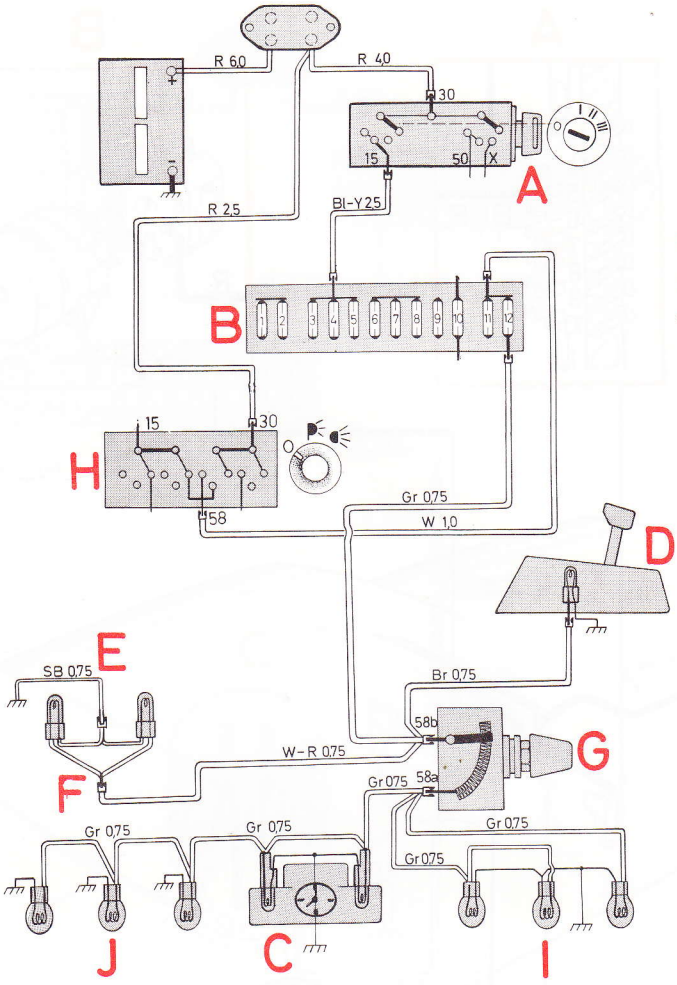


Reed relay ON, bulb out (in lower beam, stop light, tail light front position light or license plate light (not 245).




A
B
3
4
5
6
7
8
9
10
Bl-Y
Bl-R
30
15
R
Bl-Y
11 SB 0,75
12
Bl-Y
Bl-R
2
2
Bl-Y
C
D

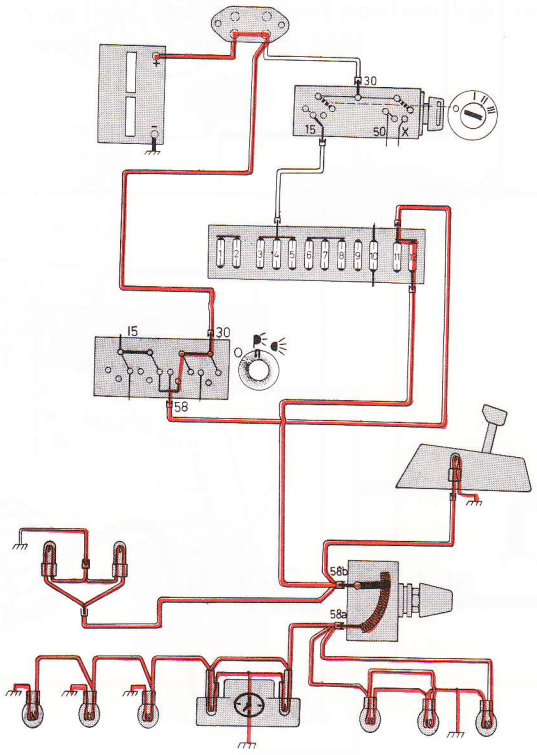
Instruments Lights, Lights on Controls

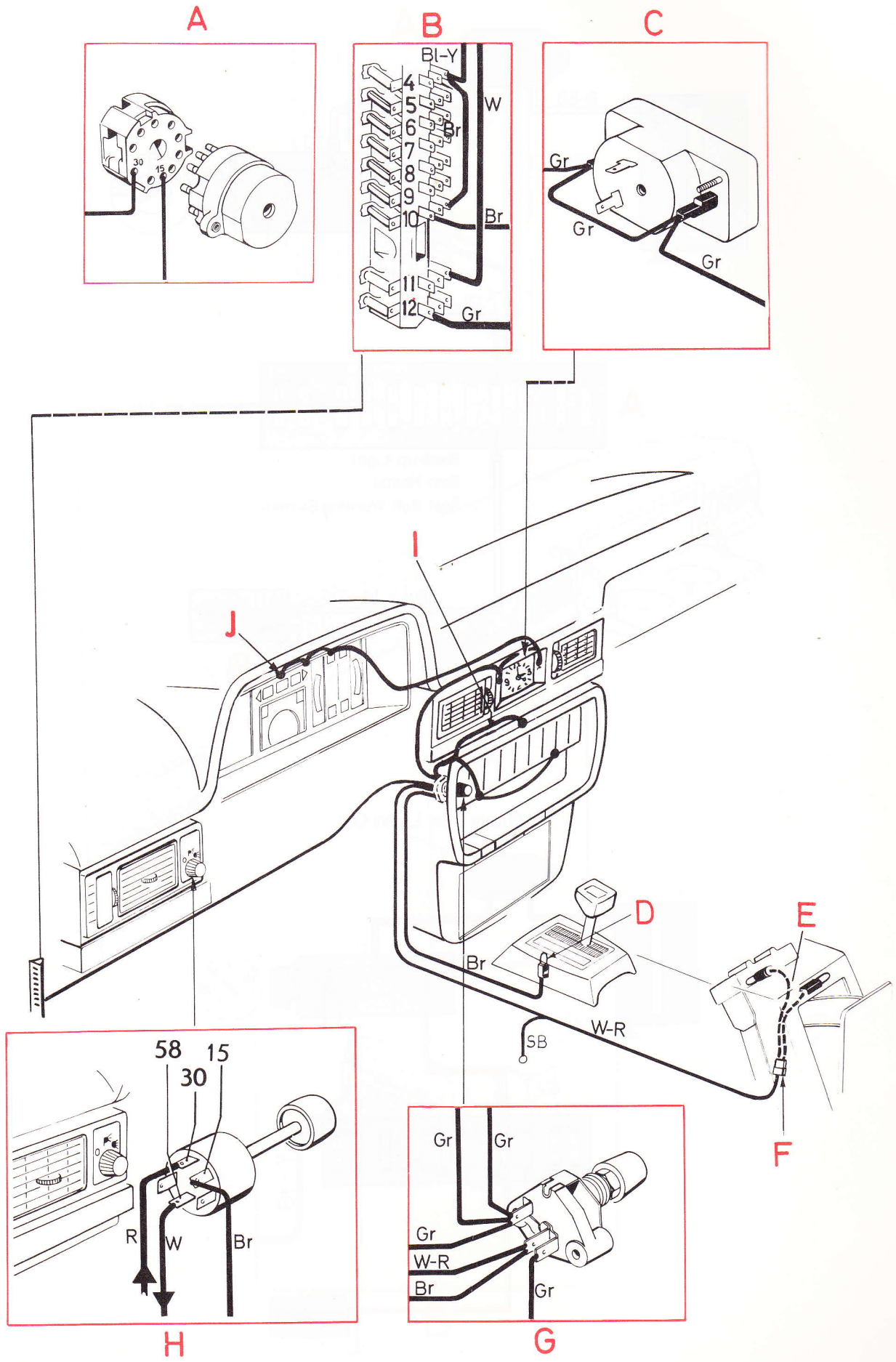


Fuse No 12:

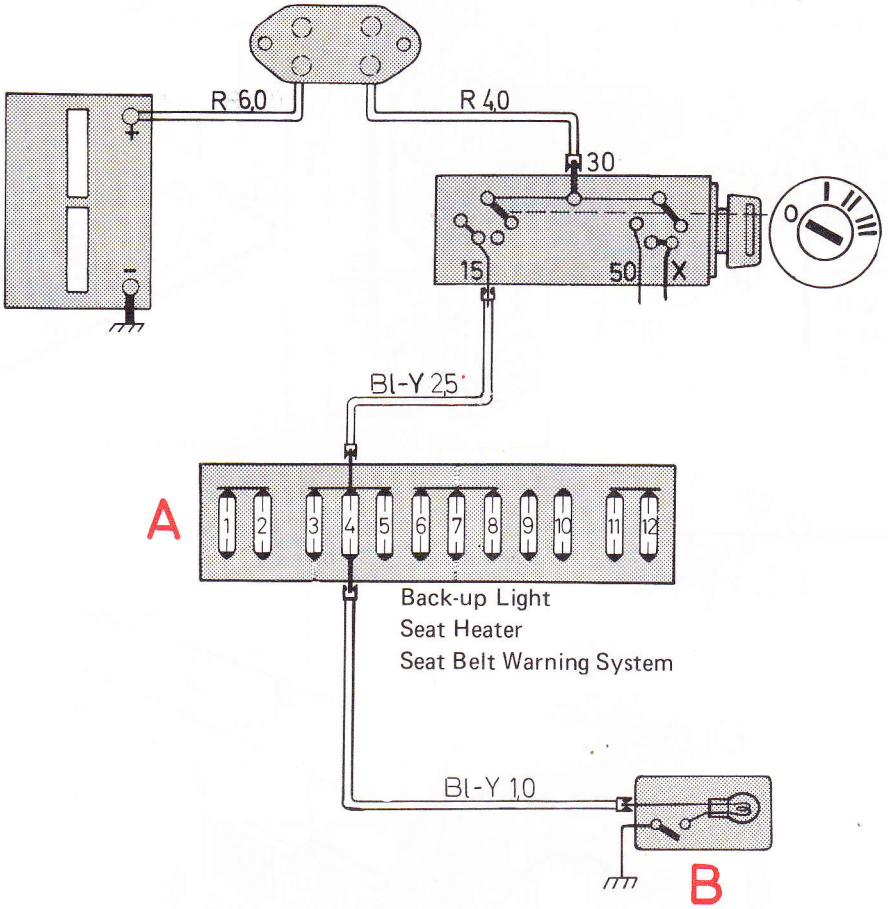
Instrument Lights
+ Right Tail Light
Right Front Position Light
Right License Plate Light

Main light switch ON

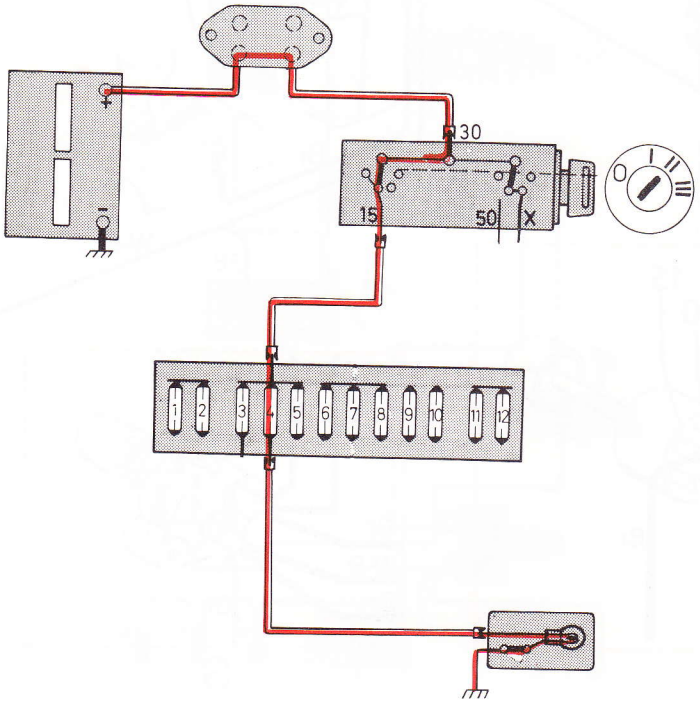


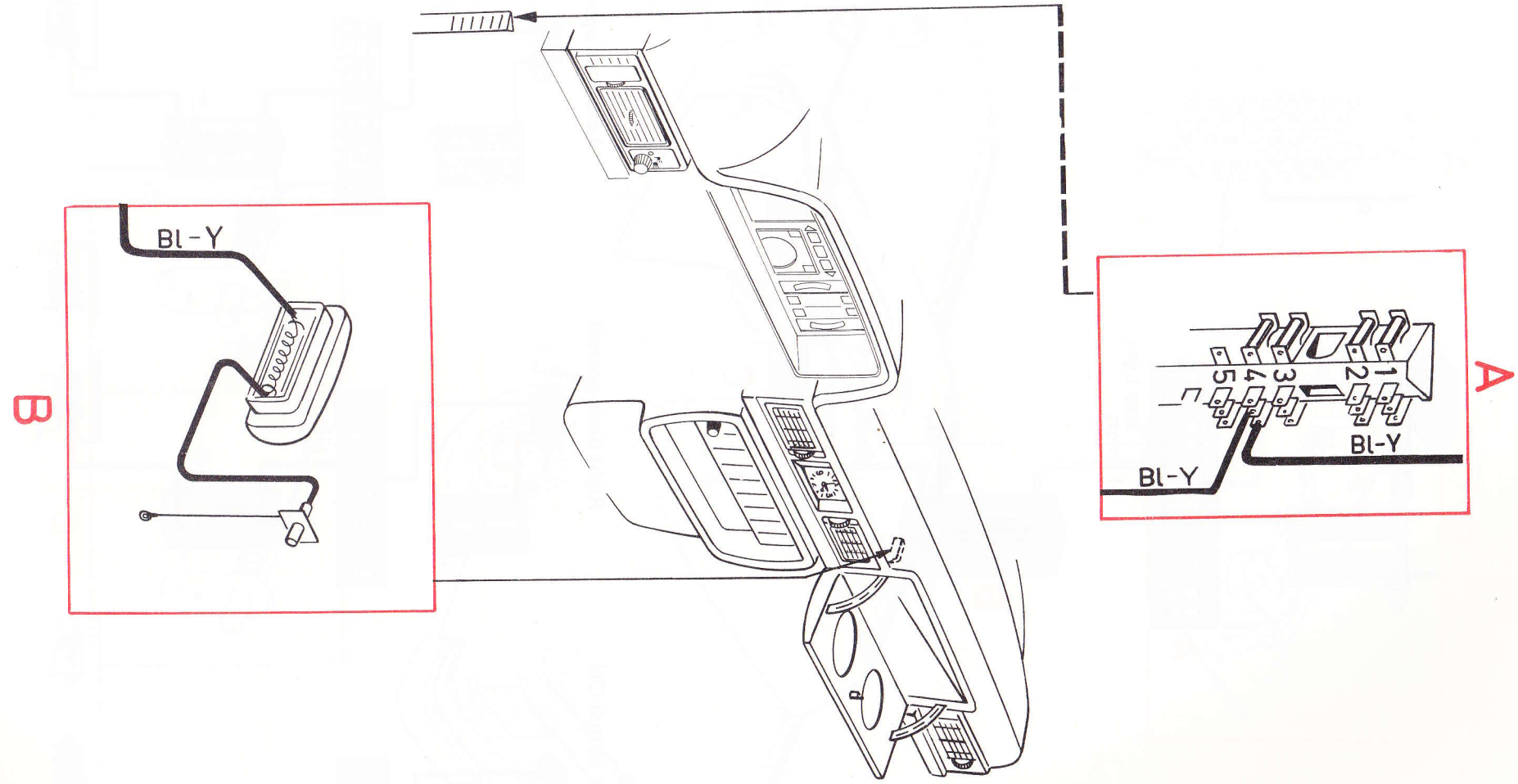

A
B
C
Bl-Y
W
Br
Br
Gr
Gr
Gr
Gr
Gr
4
5
6
7
8
9
10
11
12
30
15
I
J
D
E
F
Br
W-R
SB
58
15
30
R
W
Br
H
Gr
Gr
Gr
W-R
Br
Gr
G

Glove Box Light

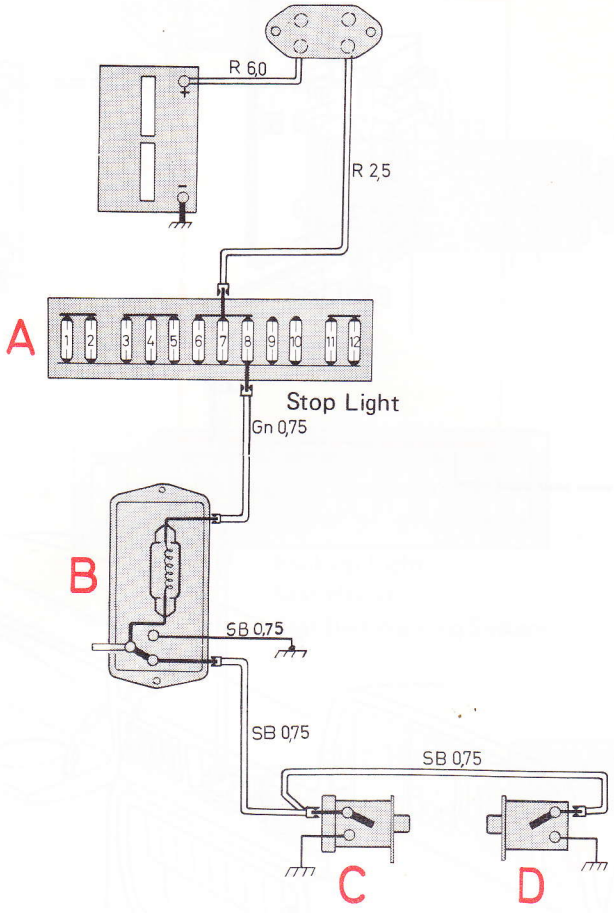


Glove Box Light ON

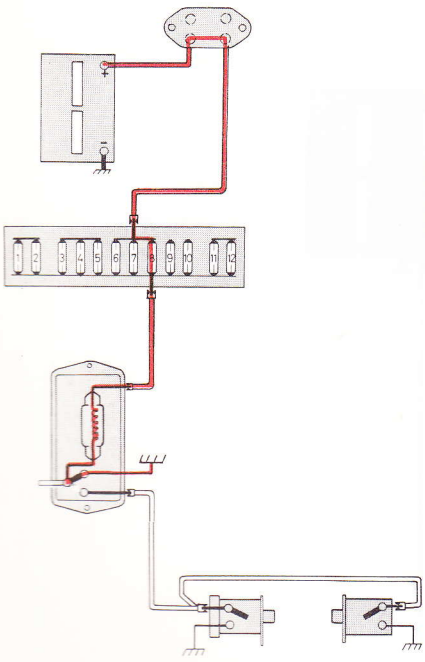



B
Bl-Y
A
1
2
3
4
5
Bl-Y
Bl-Y

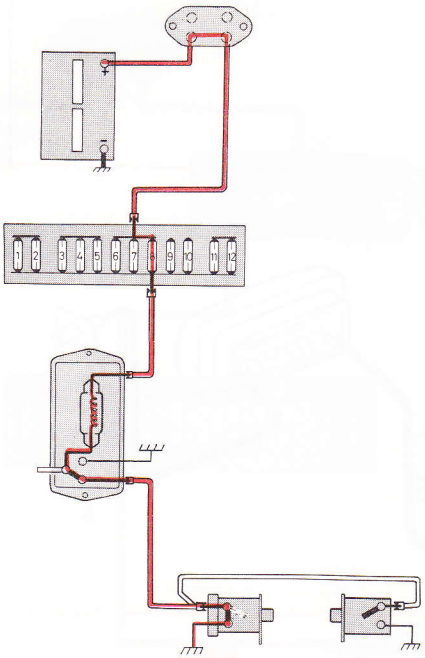
Interior Light



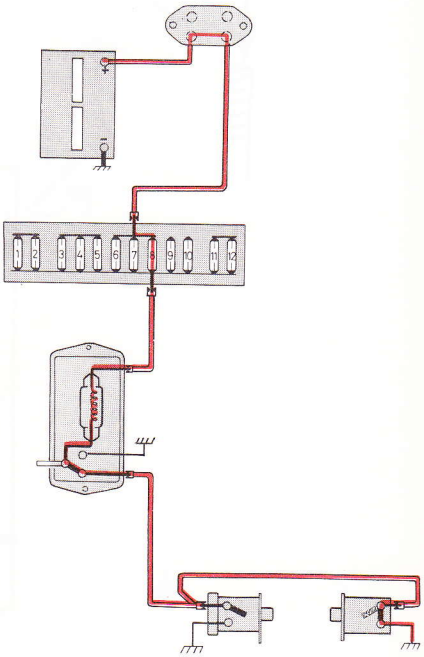
Doors closed,
interior light switch ON

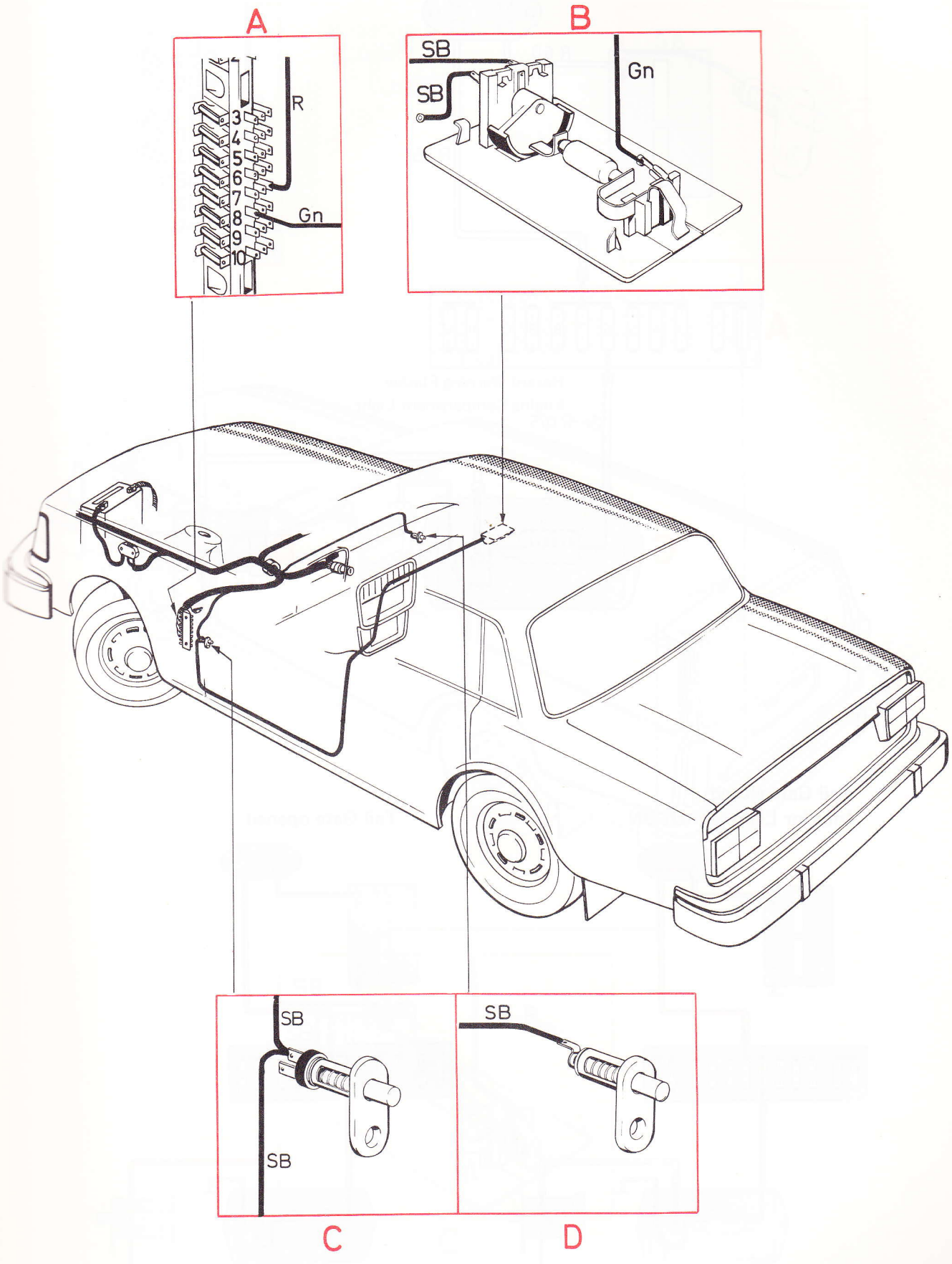


Right door opened

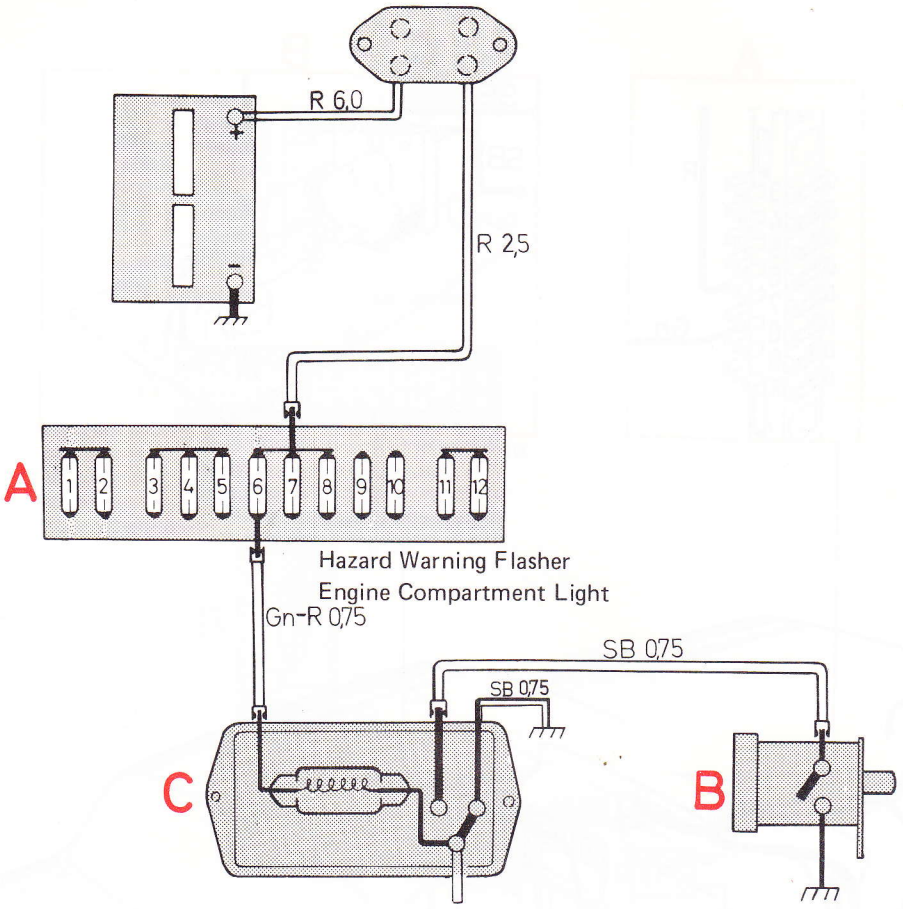


Left door opened

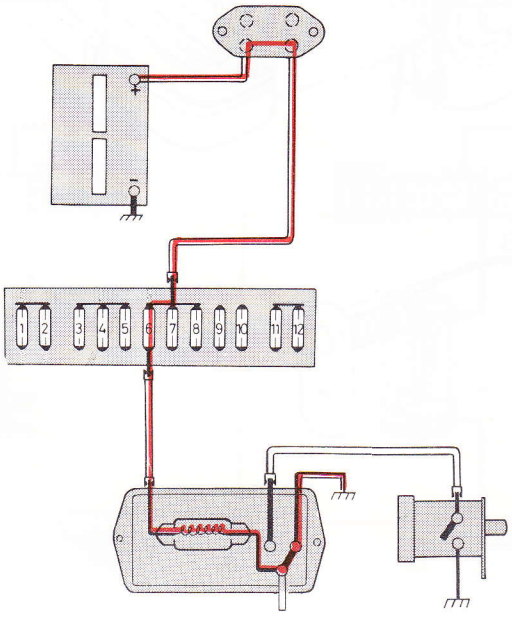



A
B
R
Gn
3
4
5
6
7
8
9
10
SB
SB
Gn
SB
SB
SB
C
D

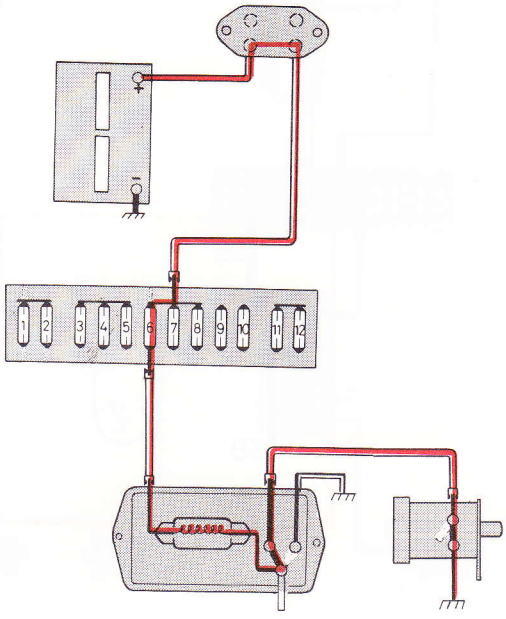
Interior Light, 245, rear

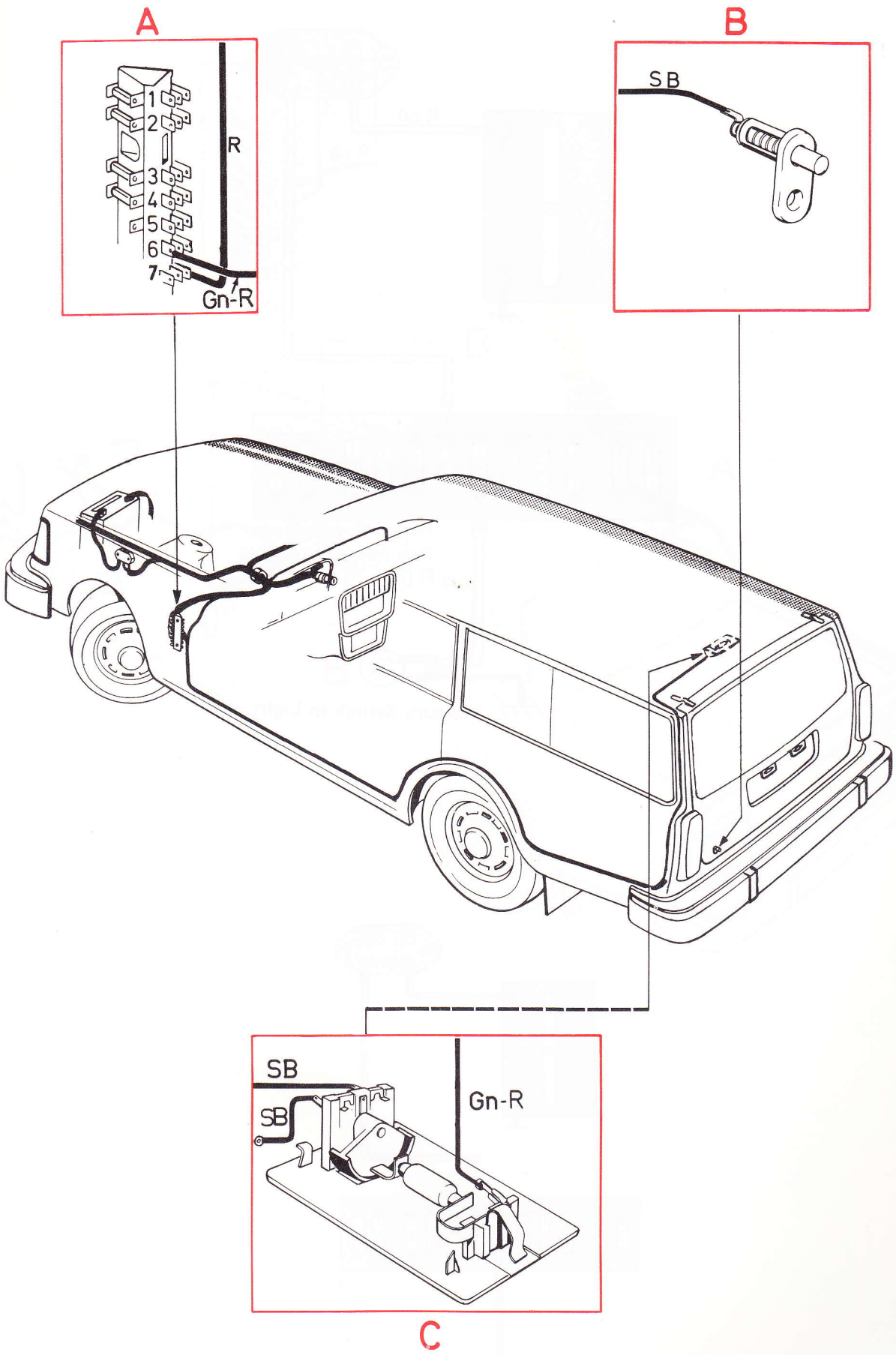


Tail Gate closed,
Interior Light Switch ON

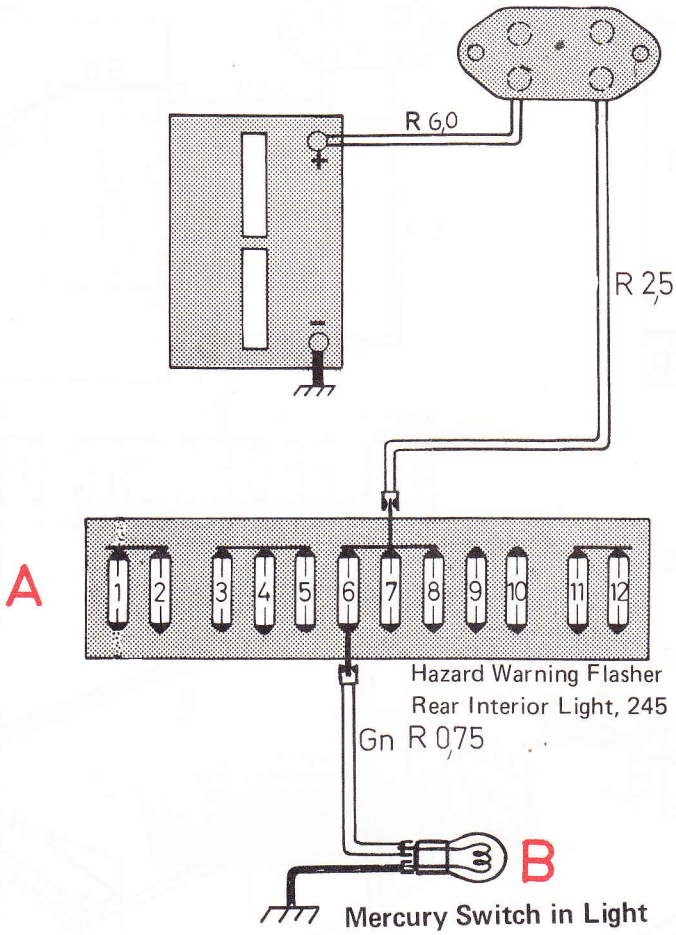


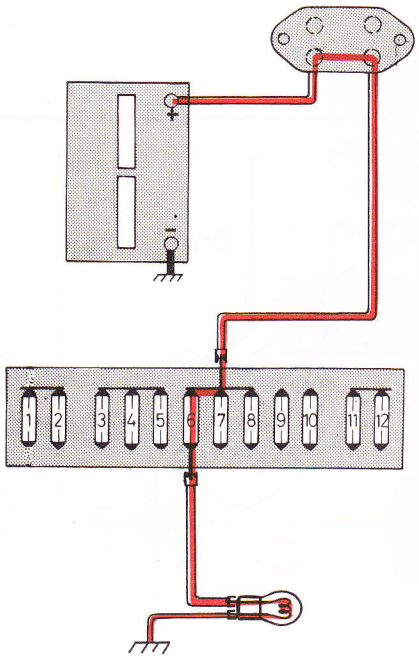
Tail Gate opened

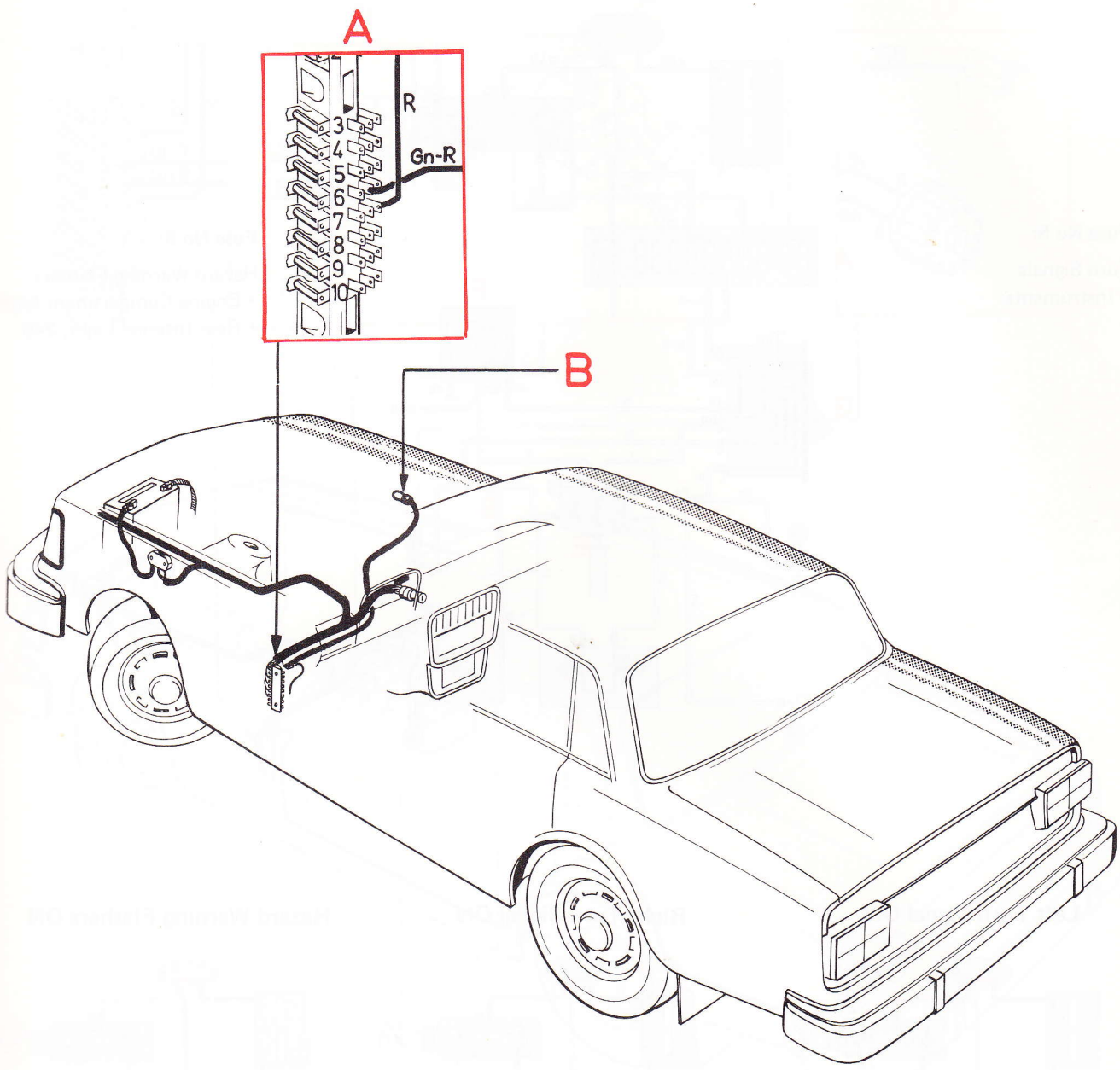



A
1
2
3
4
5
6
7
R
Gn-R
B
SB
SB
SB
Gn-R
C

Engine Compartment Light



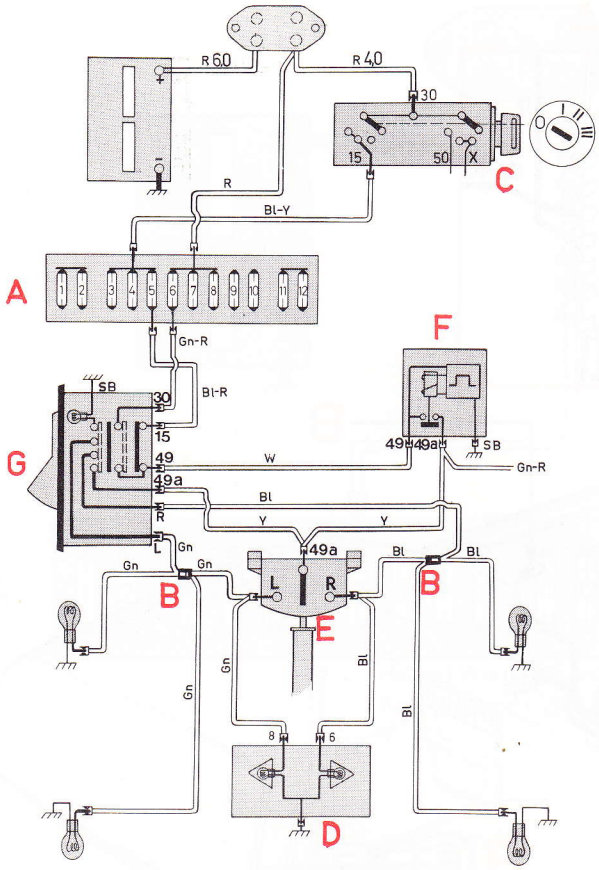



A
R
Gn-R
3
4
5
6
7
8
9
10
B

Turn Signals and Hazard Warning Flashers

Fuse No 5:

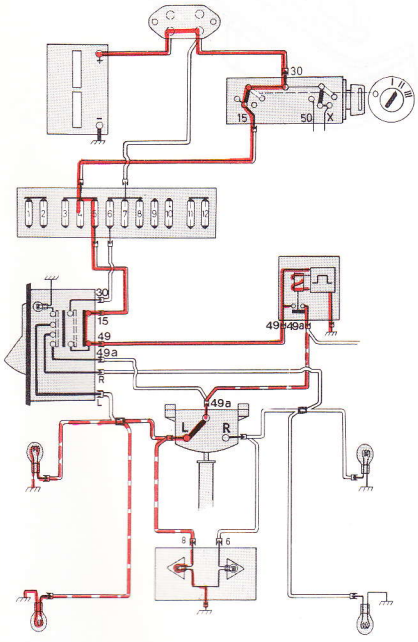
Turn Signals
+ Instruments



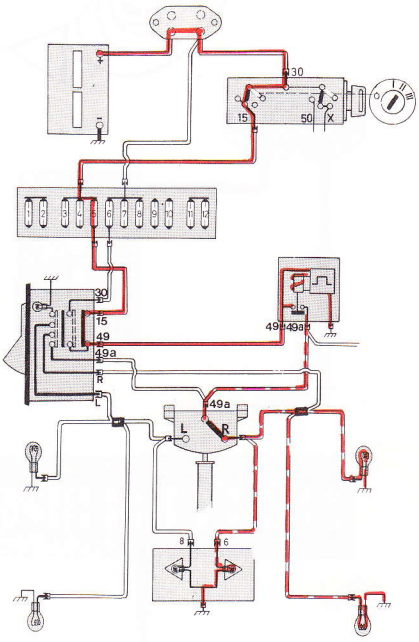
Fuse No 6:

Hazard Warning Flashers
+ Engine Compartment Light
+ Rear Interior Light, 245

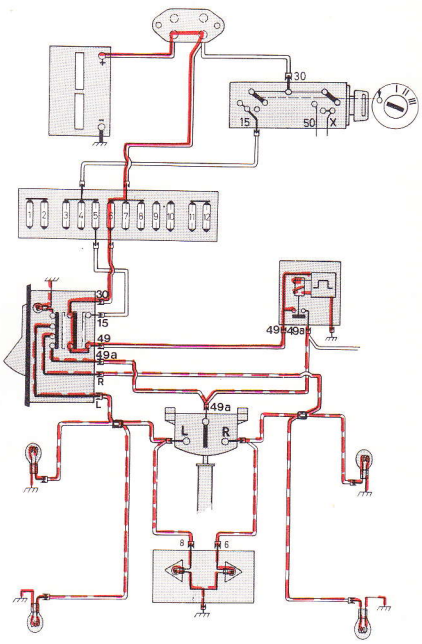
Left Turn Signal ON

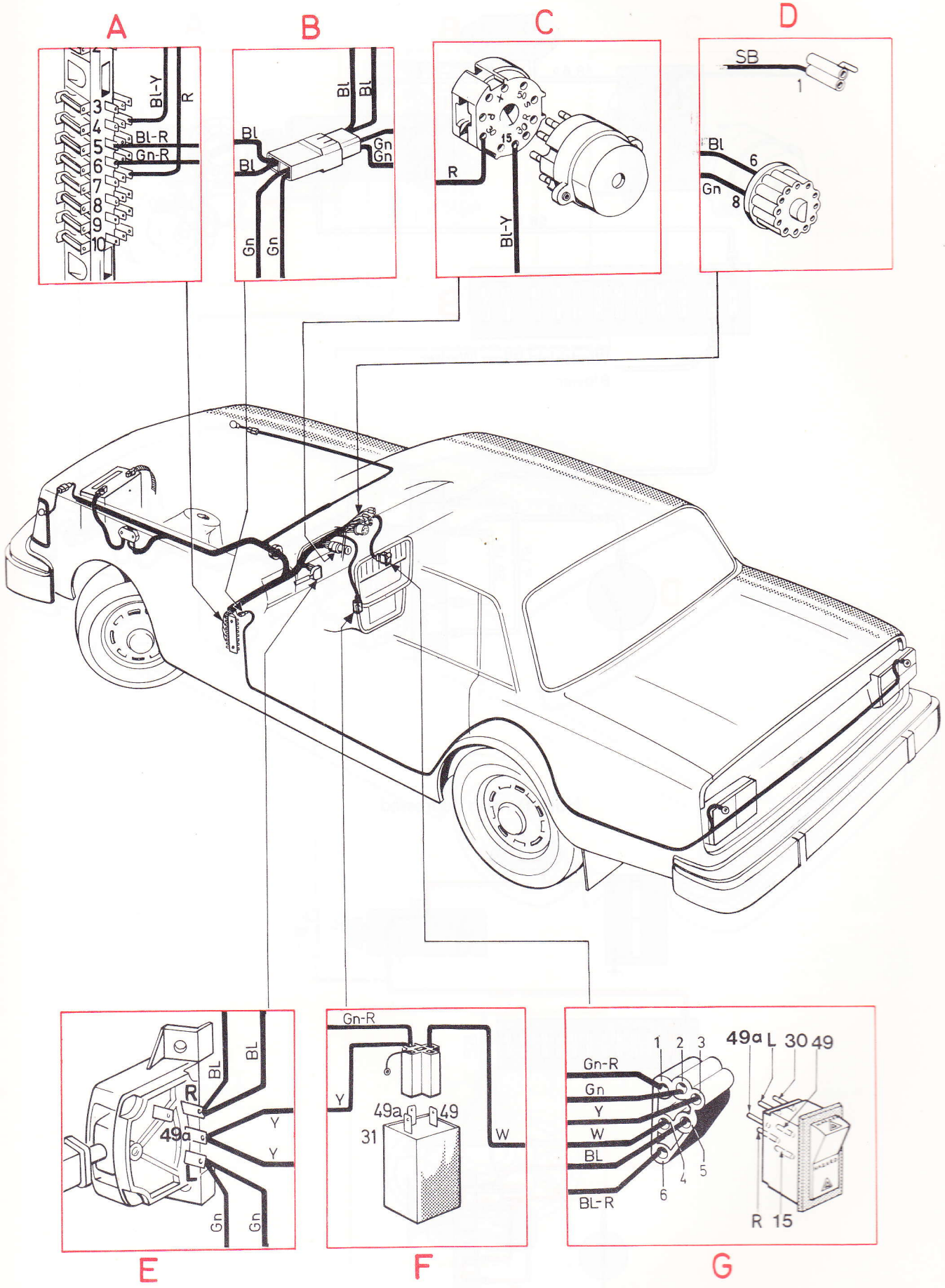


Right Turn Signal ON

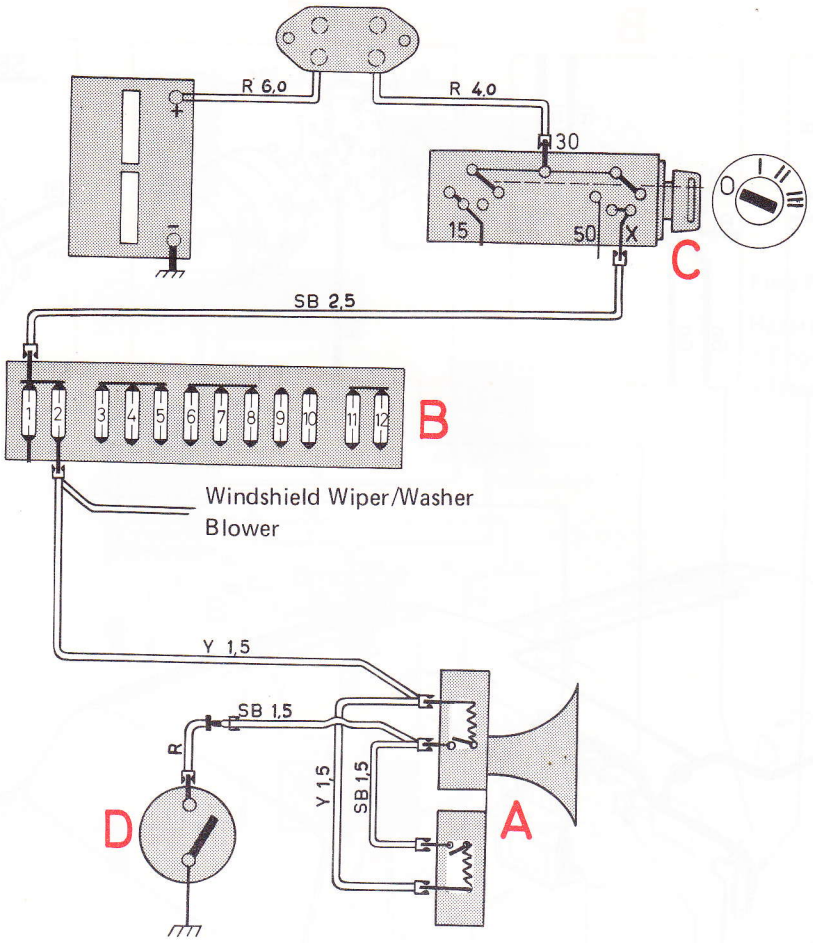


Hazard Warning Flashers ON

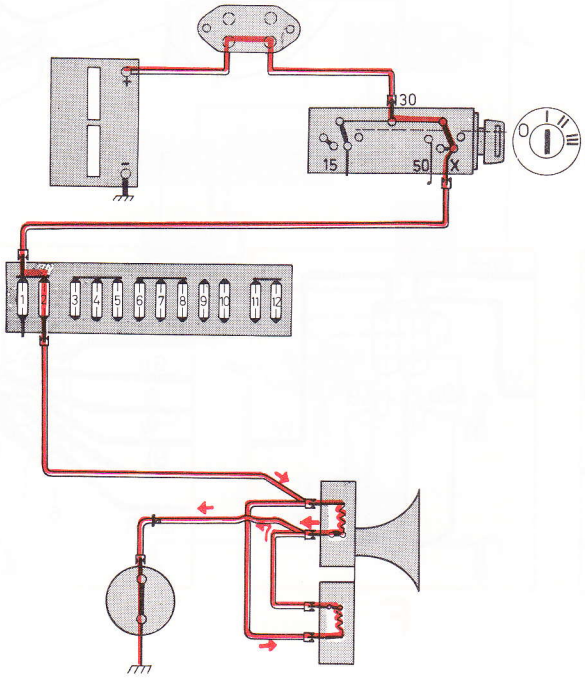


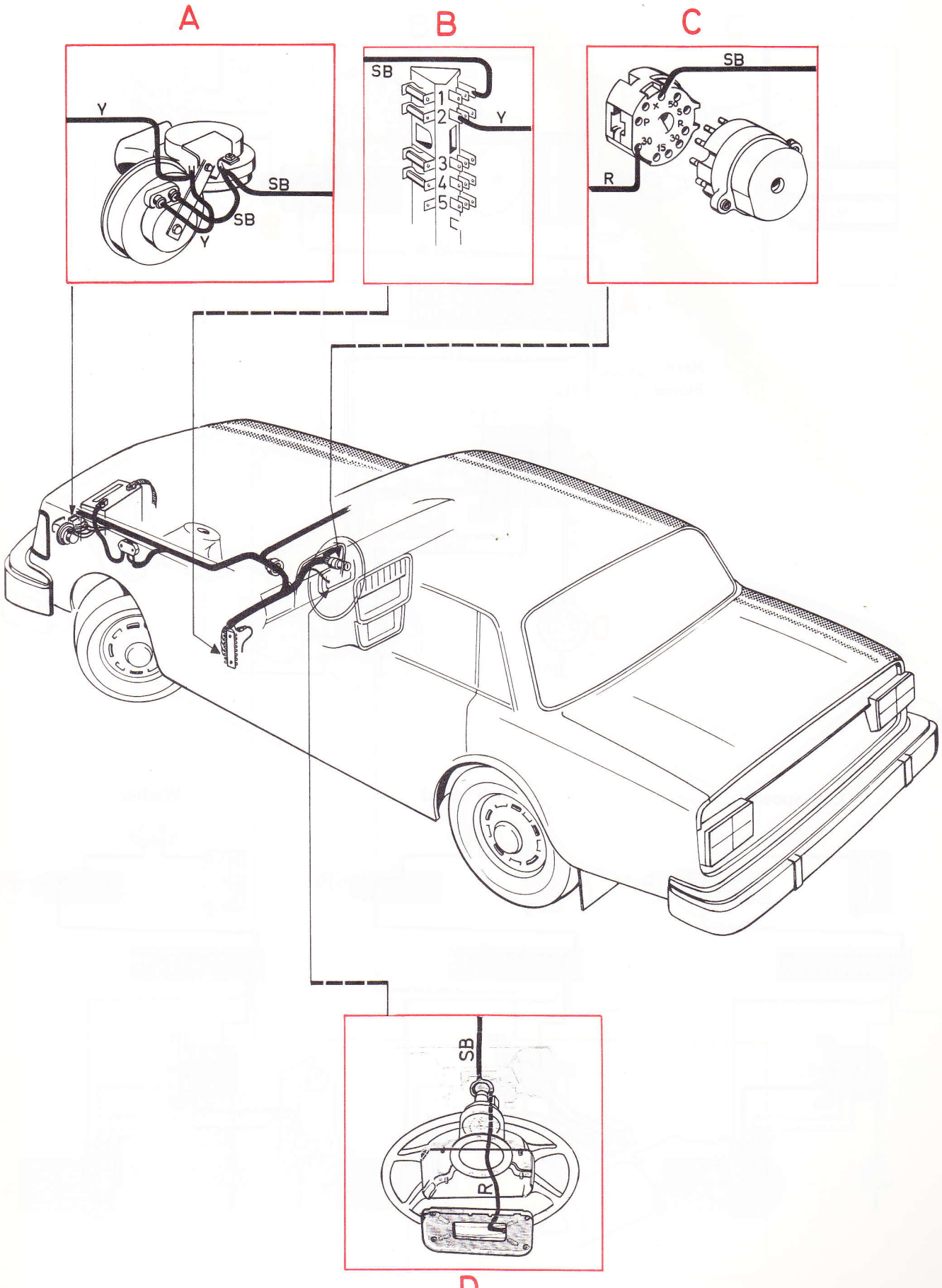

A
B
C
D
3
4
5
6
7
8
9
10
Bl-Y
R
Bl-R
Gn-R
Bl
Bl
Bl
Bl
Gn
Gn
Gn
Gn
50
30
15
R
Bl-Y
SB
1
Bl
6
Gn
8
E
F
G
BL
BL
R
49a
Y
Y
Gn
Gn
Gn-R
Y
49a
49
31
W
1
2
3
49a
L
30
49
Gn-R
Gn
Y
W
BL
BL-R
4
5
6
R
15

Horns

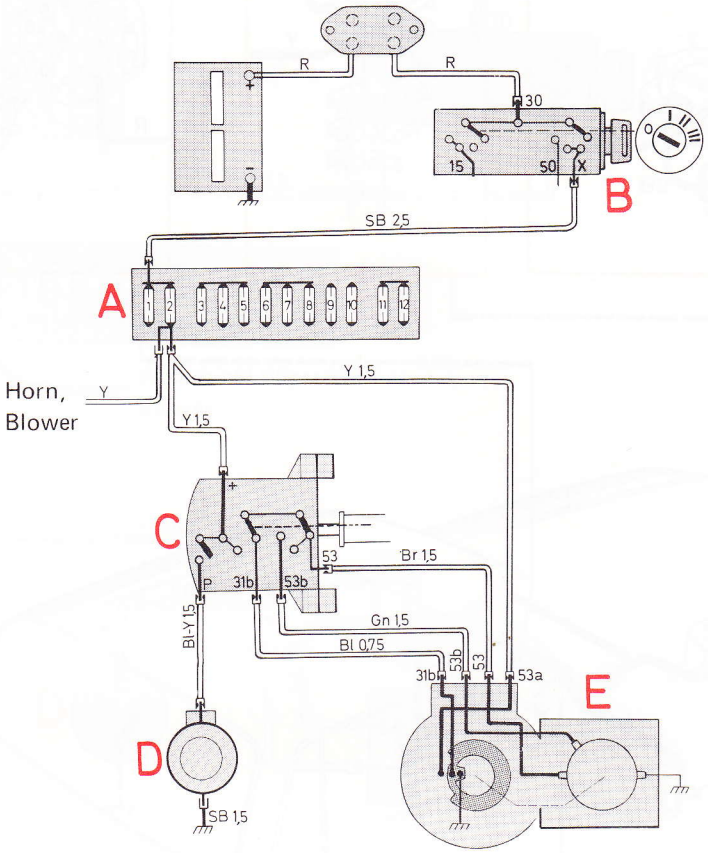


Horn Button depressed

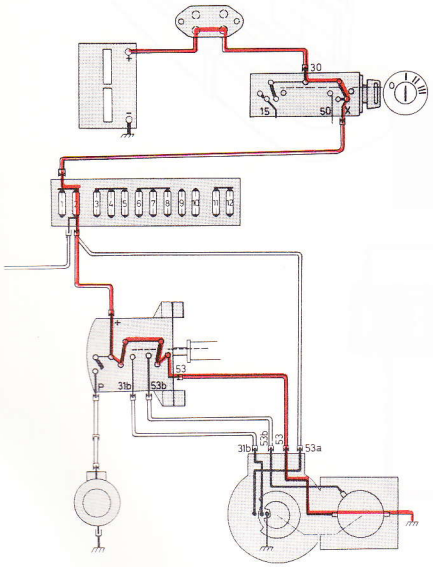



A
Y
SB
SB
Y
B
SB
1
2
Y
3
4
5
C
SB
X
50
P
R
30
15
R
D
SB
R

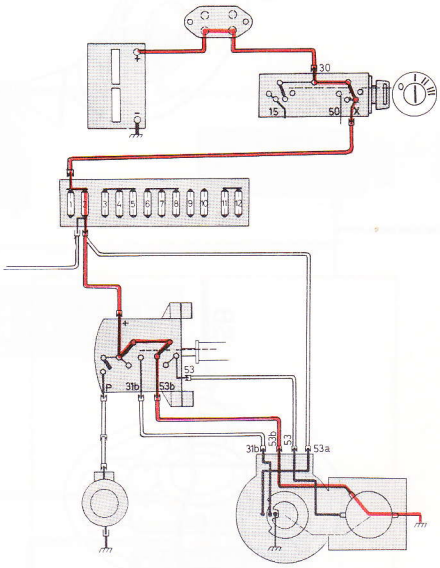
Windshield Wipers and Washers



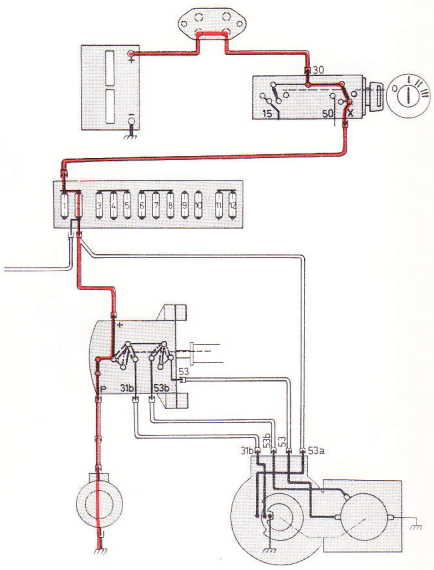
Low speed

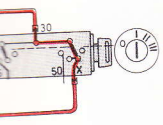


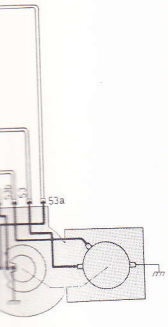
High speed

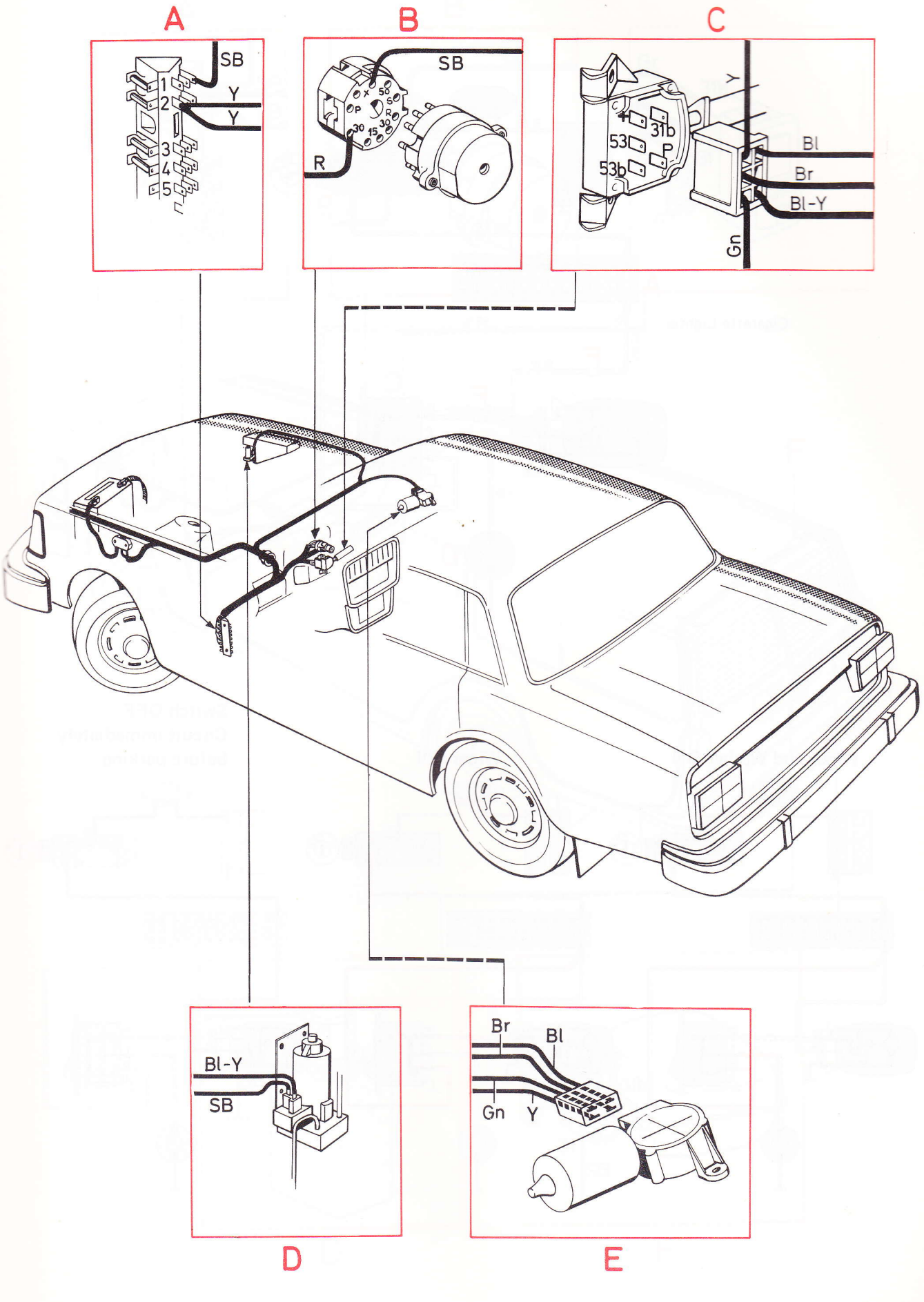


Washer

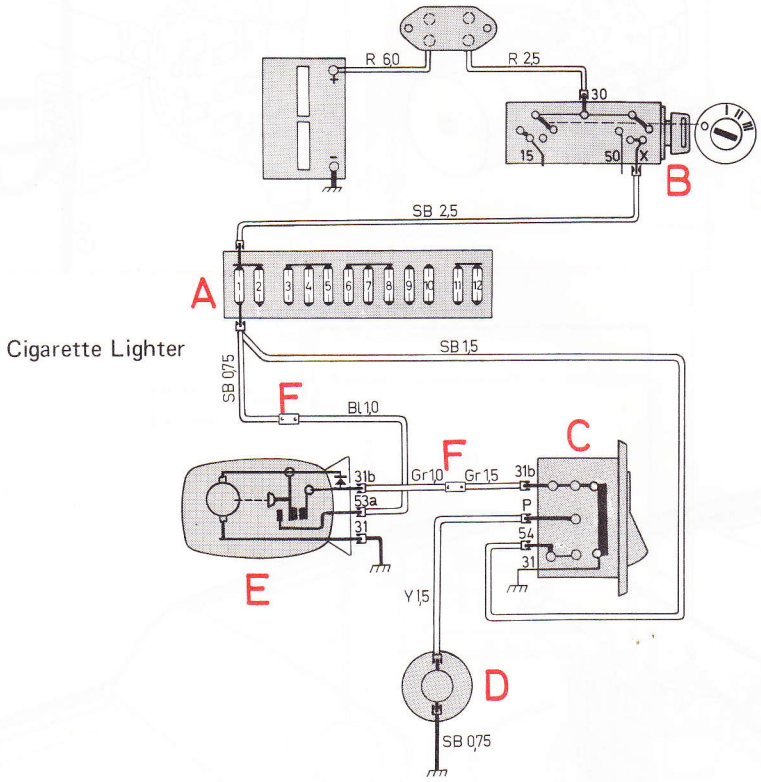




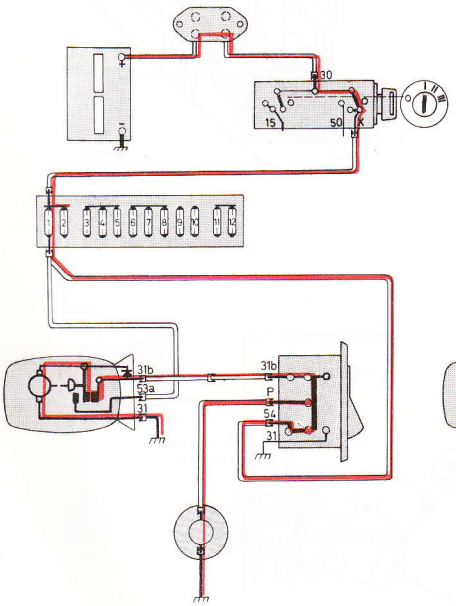



A
SB
Y
Y
1
2
3
4
5
B
SB
R
C
31b
53
53b
P
Bl
Br
Bl-Y
Gn
D
Bl-Y
SB
E
Br
Bl
Gn
Y

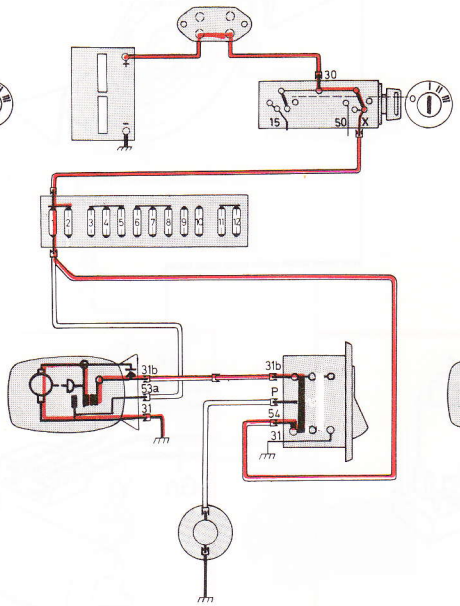
245: Tail Gate Window Wiper and Washer



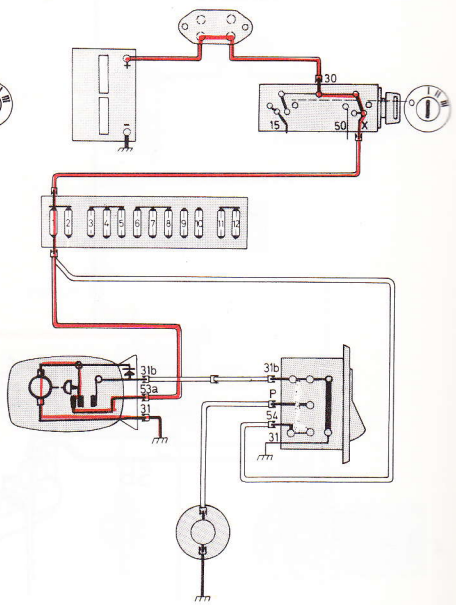
Wiper and Washer ON

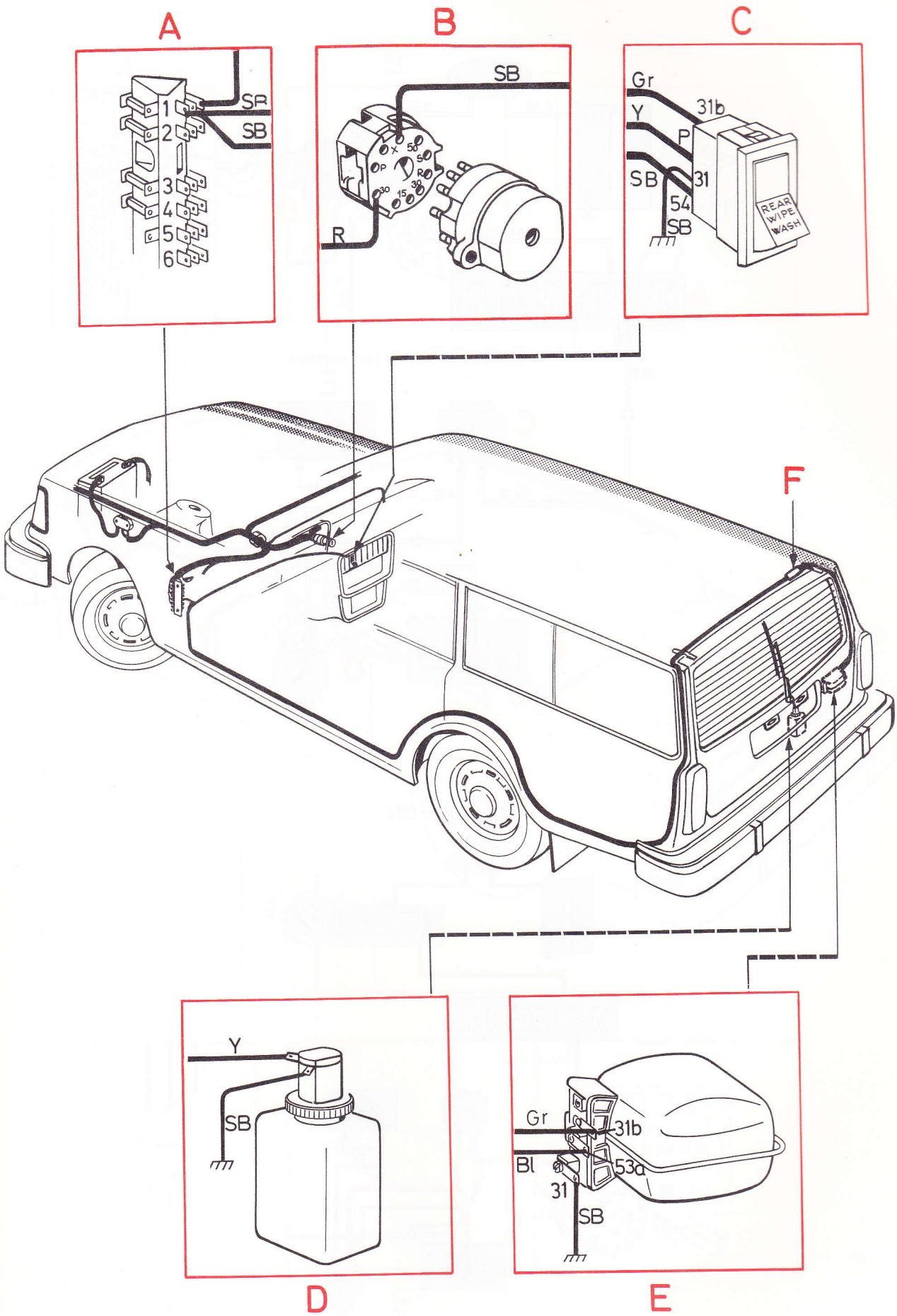


Wiper ON

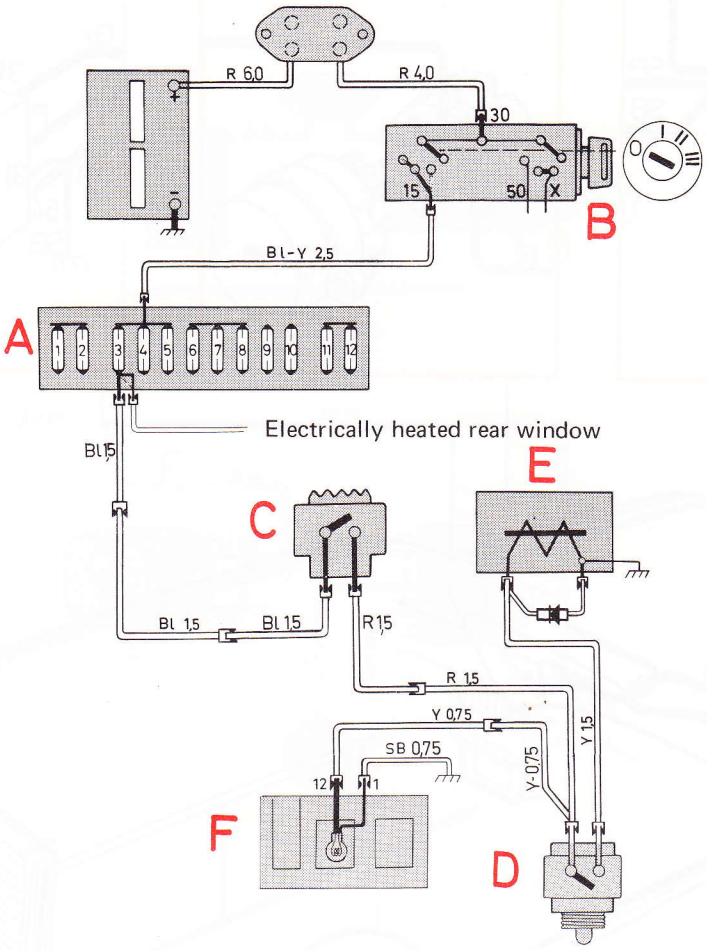


Switch OFF
Circuit immediately before parking

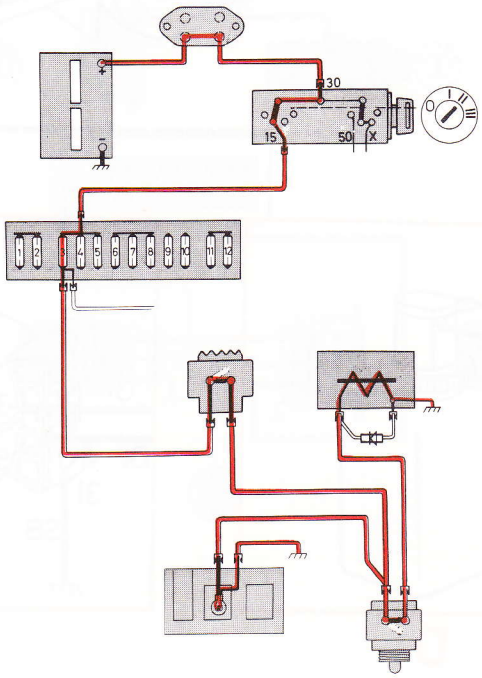


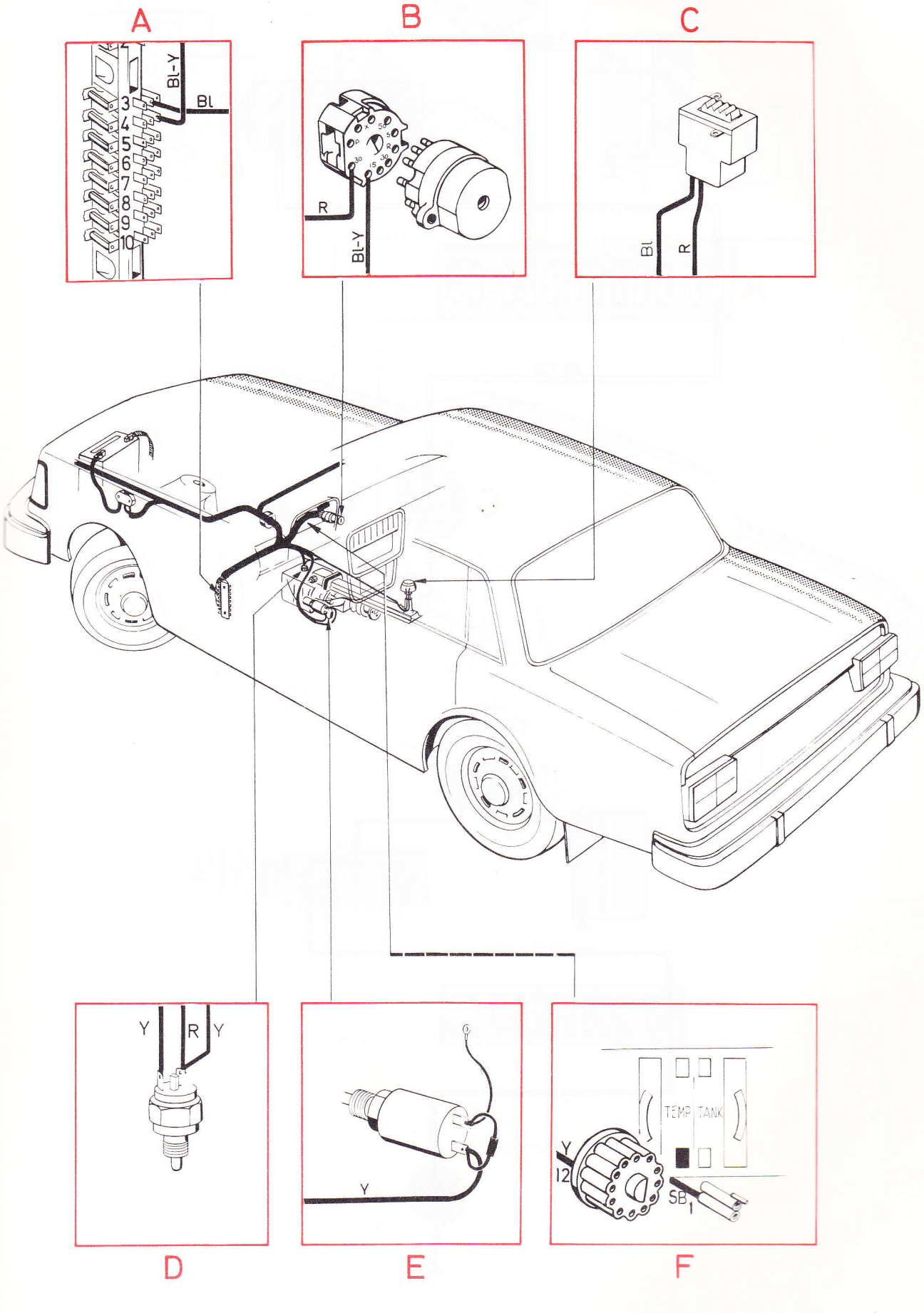

A
1
2
3
4
5
6
SB
SB
B
SB
R
C
Gr
Y
SB
31b
P
31
54
SB
REAR WIPE WASH
F
D
Y
SB
E
Gr
31b
Bl
53a
31
SB

Overdrive

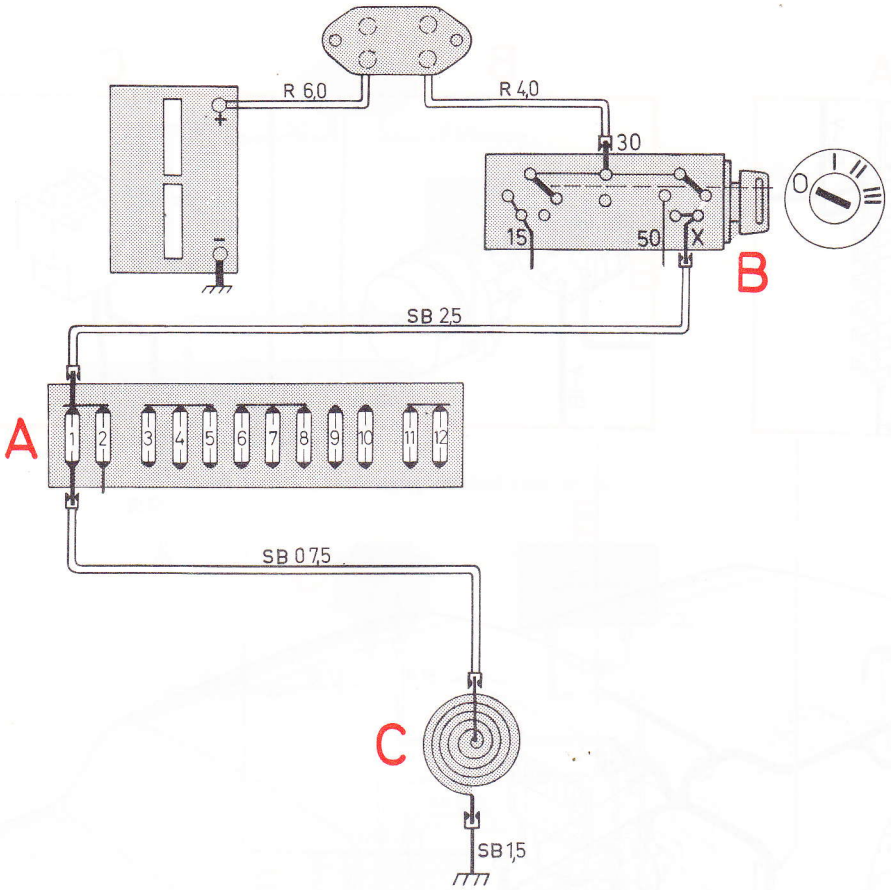


Overdrive ON

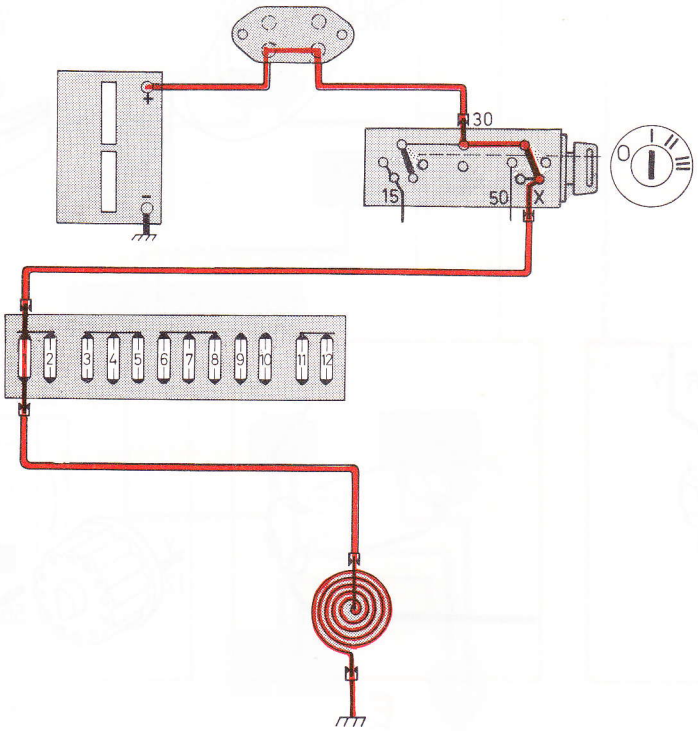


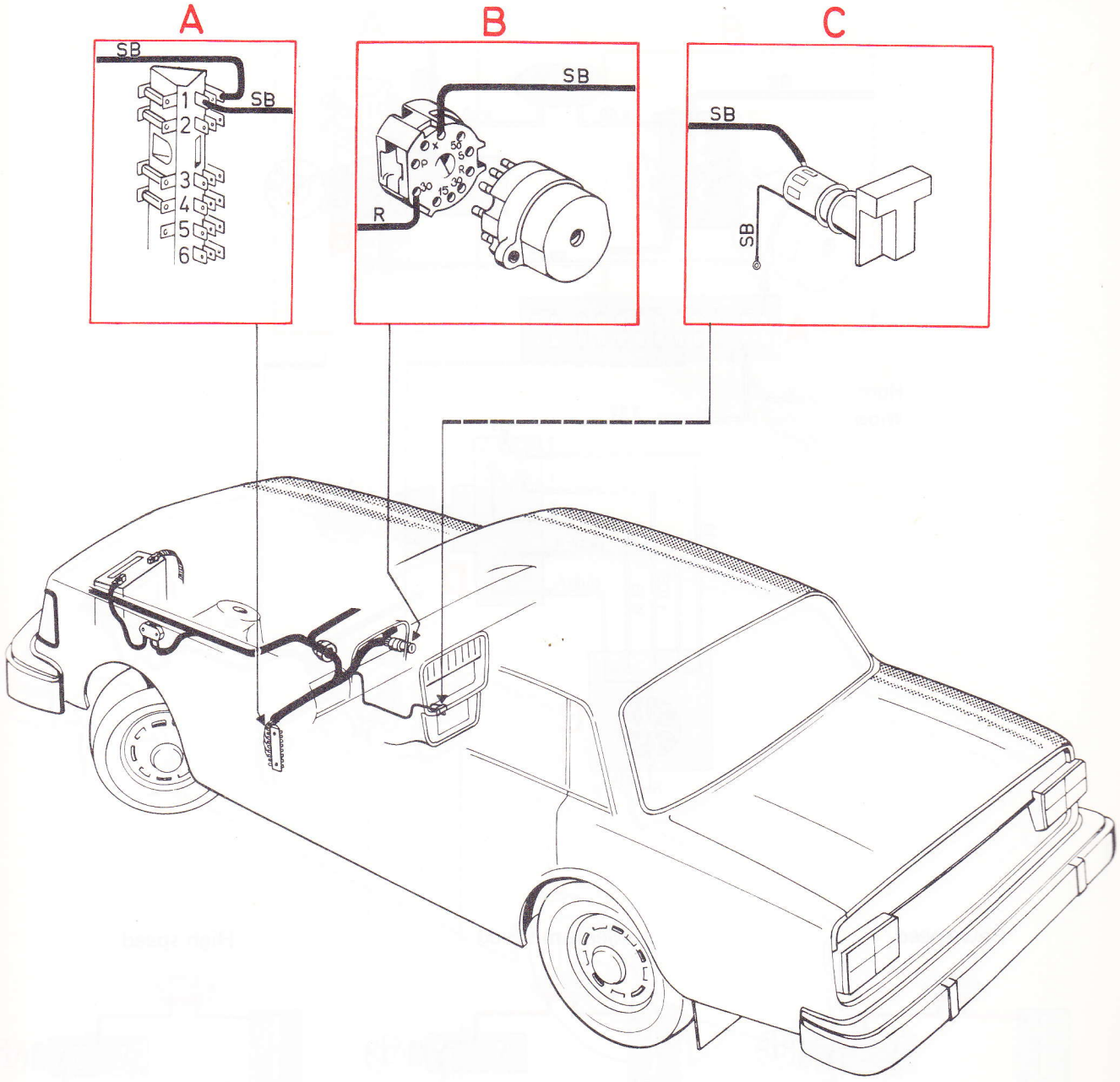

A
B
C
Bl-Y
Bl
3
4
5
6
7
8
9
10
R
Bl-Y
Bl
R
D
E
F
Y
R
Y
Y
TEMP
TANK
Y
12
SB

Cigarette Lighter

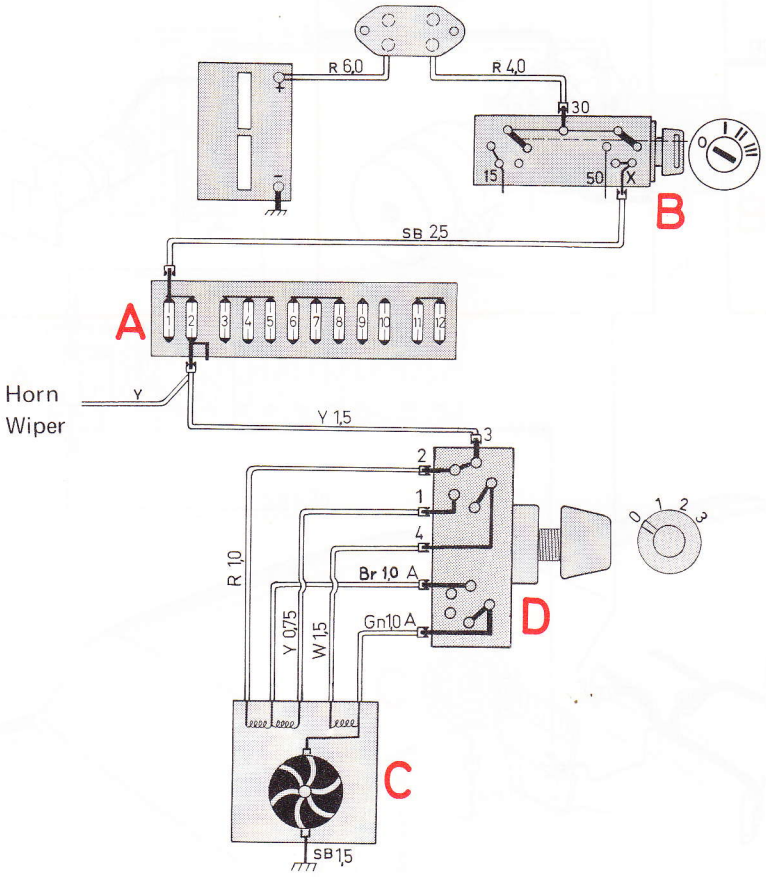


Lighter ON

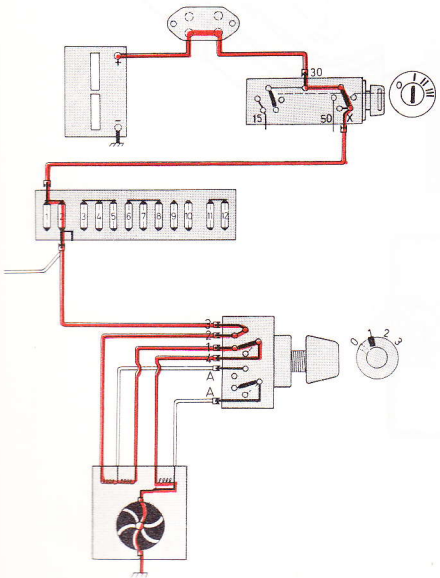



A
B
C
SB
SB
1
2
3
4
5
6
SB
R
SB
SB

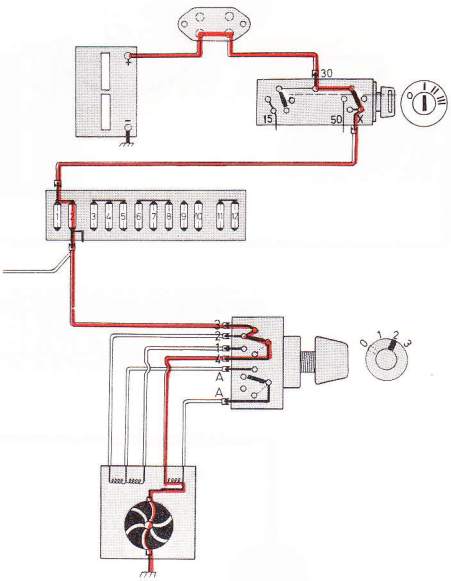
Blower, Combined Unit



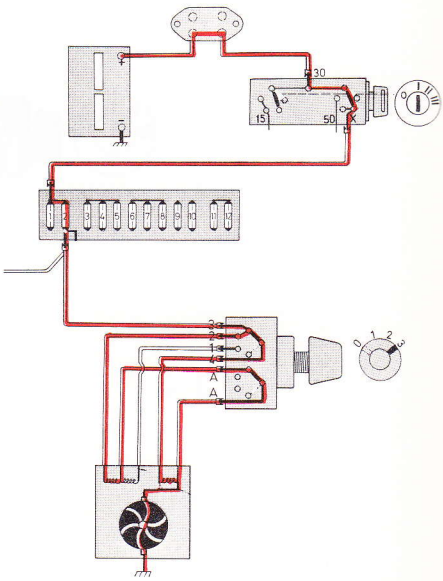
Low speed

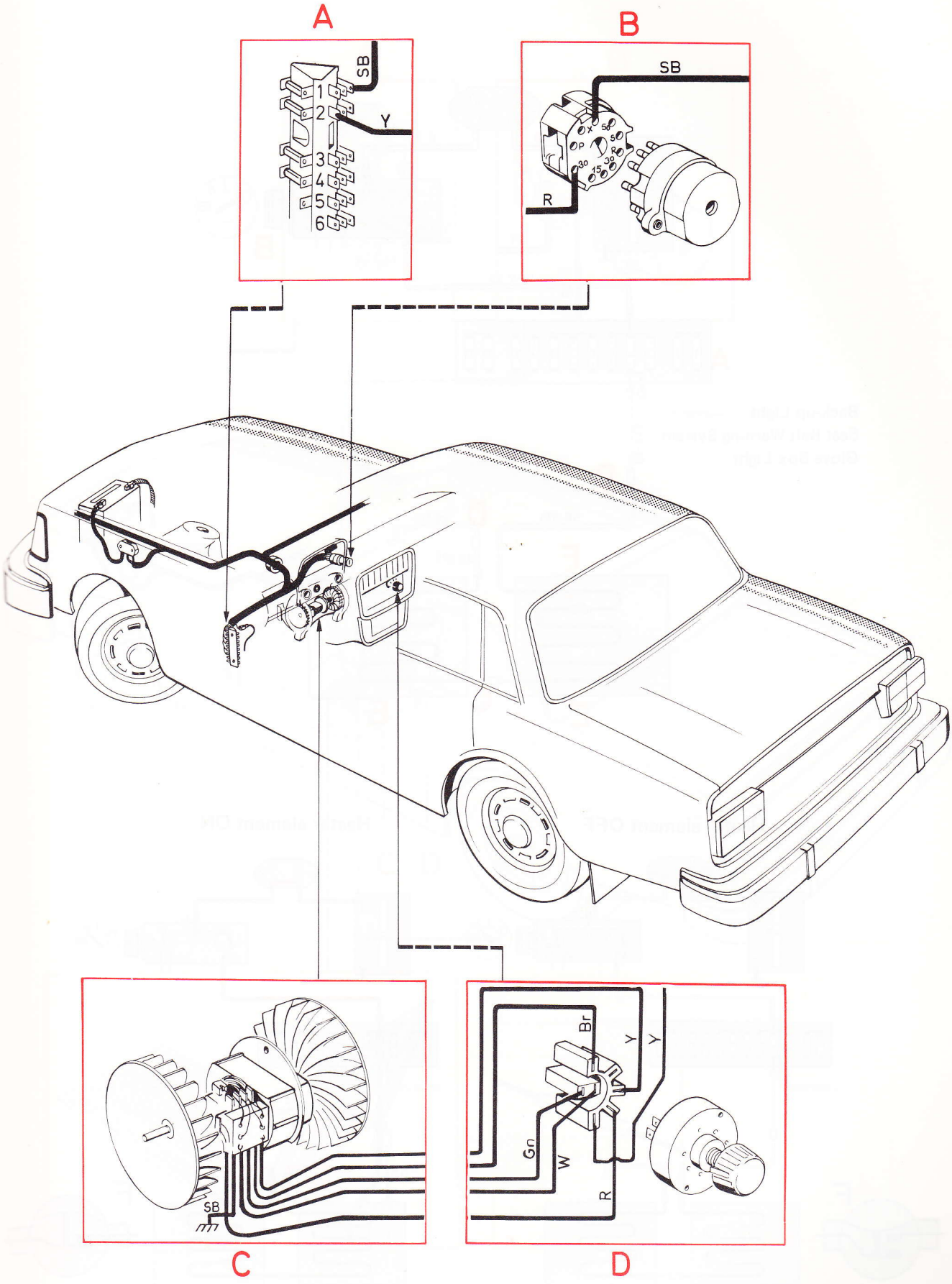


Medium speed

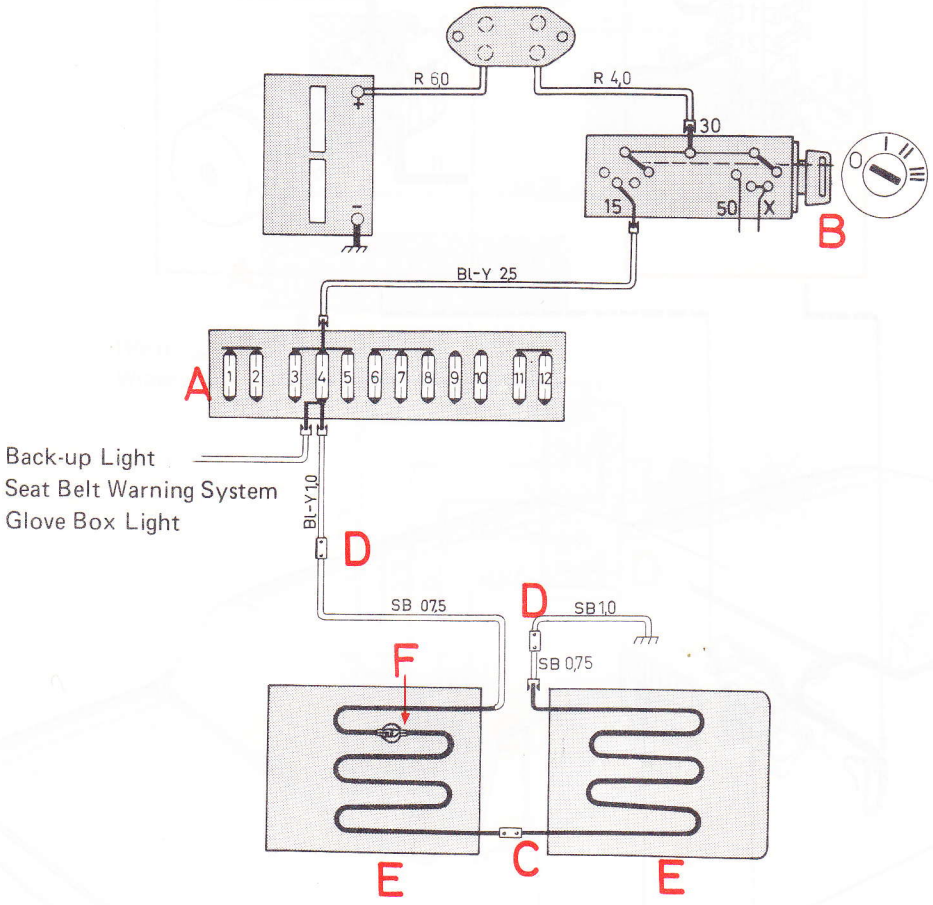


High speed

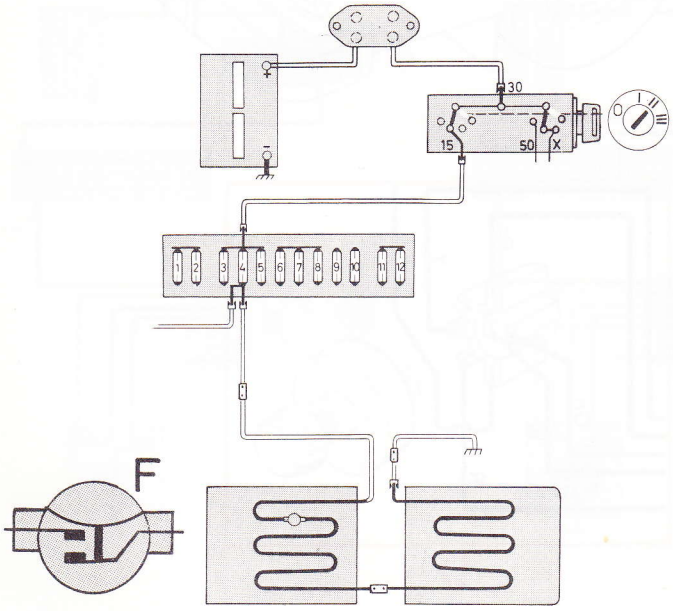



A
B
SB
Y
1
2
3
4
5
6
SB
R
C
D
SB
Br
Y
Y
Gn
W
R

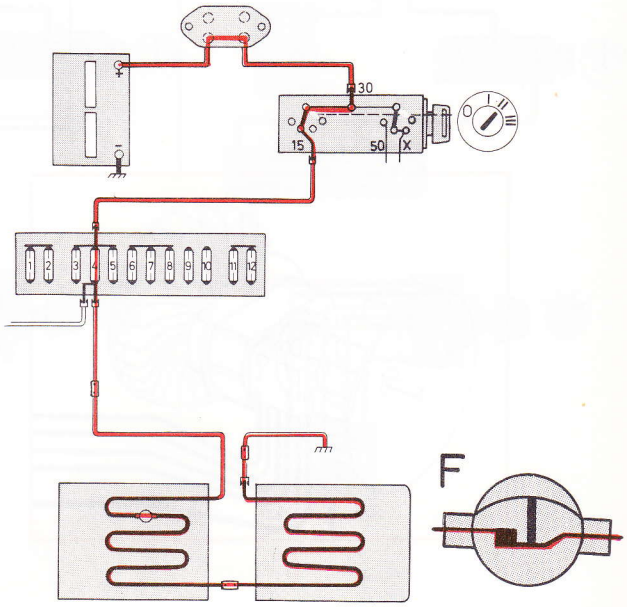
Electrically heated Driver's Seat

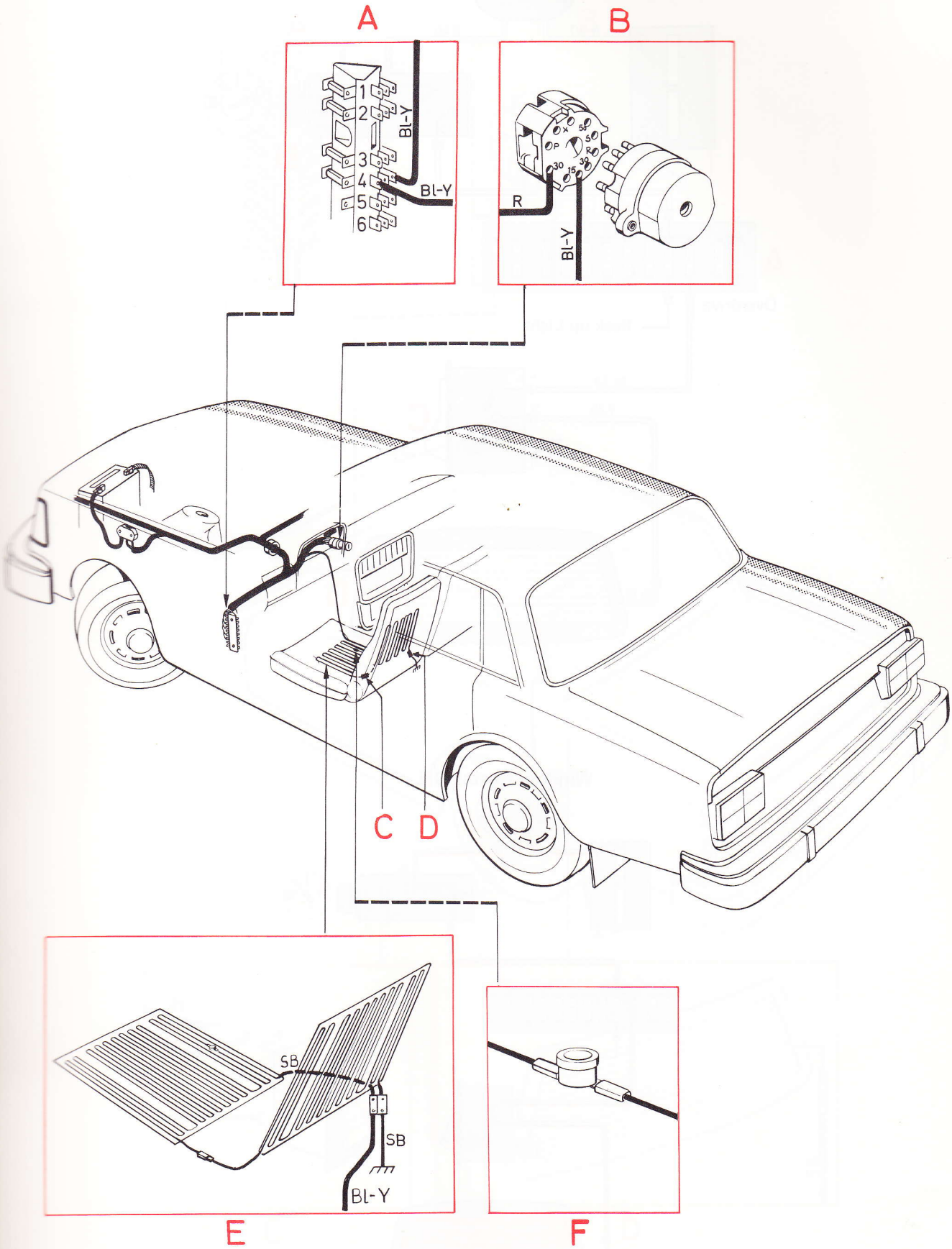


Heater element OFF

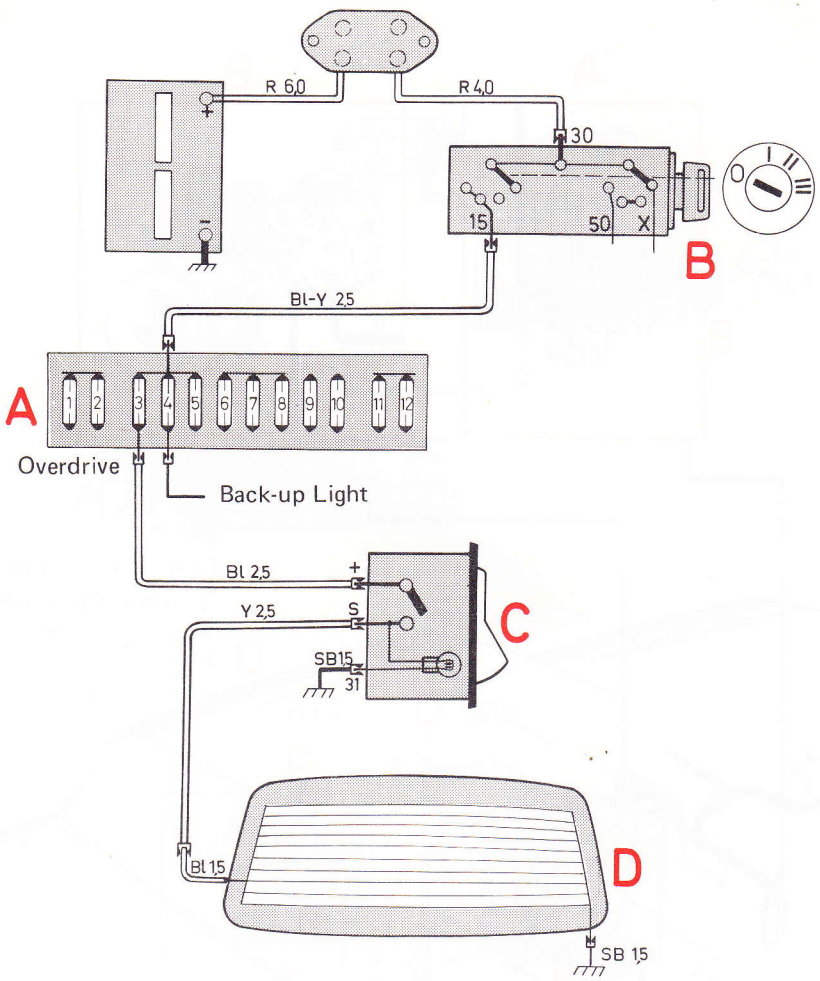


Heater element ON

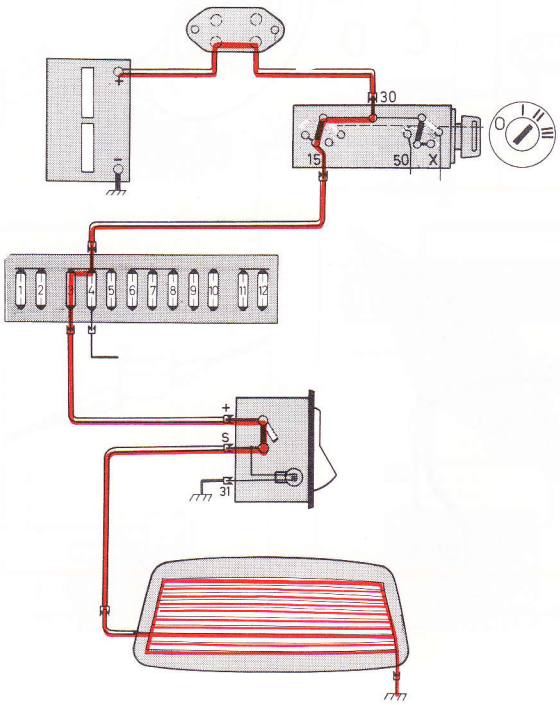


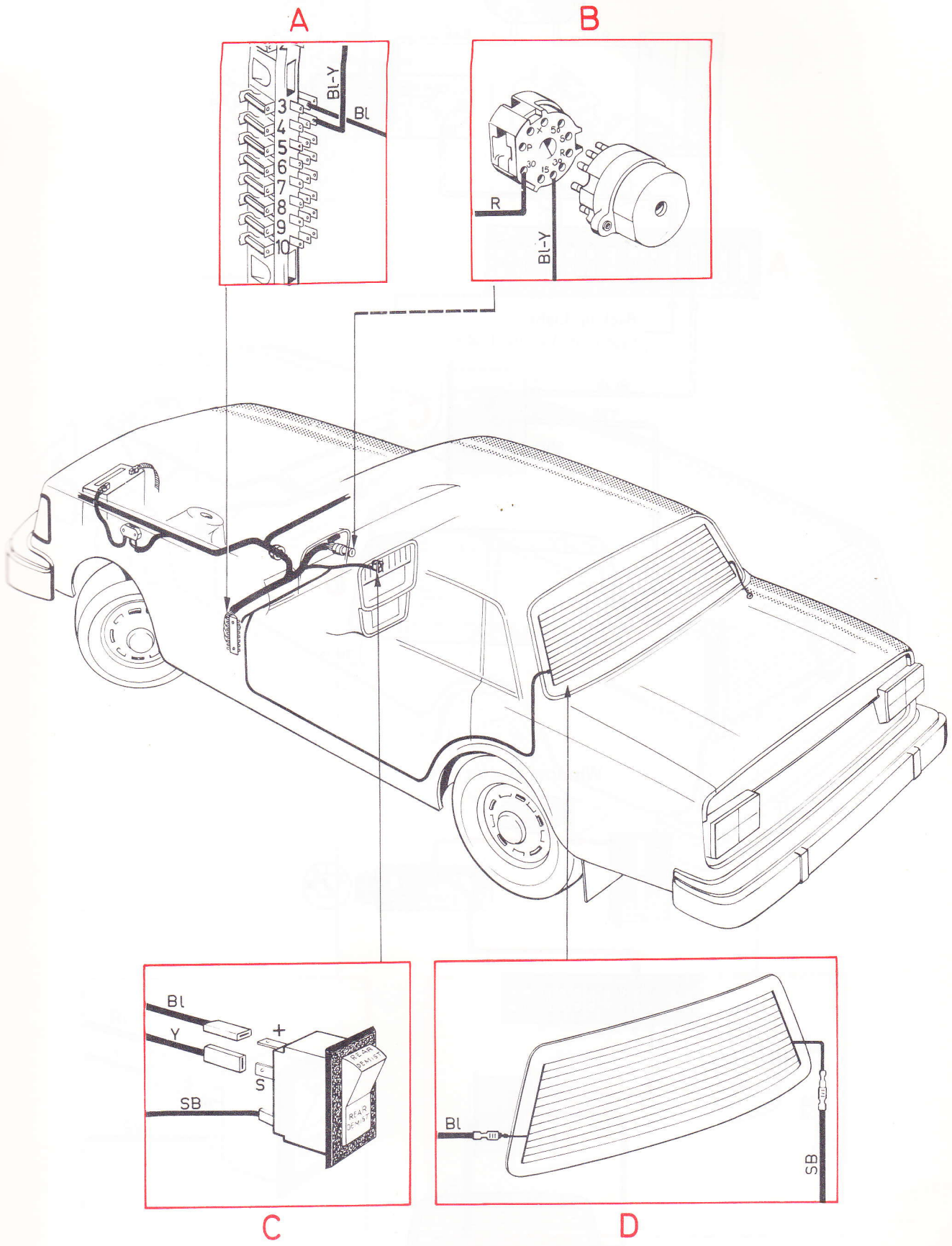

A
B
1
2
3
4
5
6
Bl-Y
Bl-Y
R
Bl-Y
C
D
SB
SB
Bl-Y
E
F

Electrically heated Rear Window, 242/244

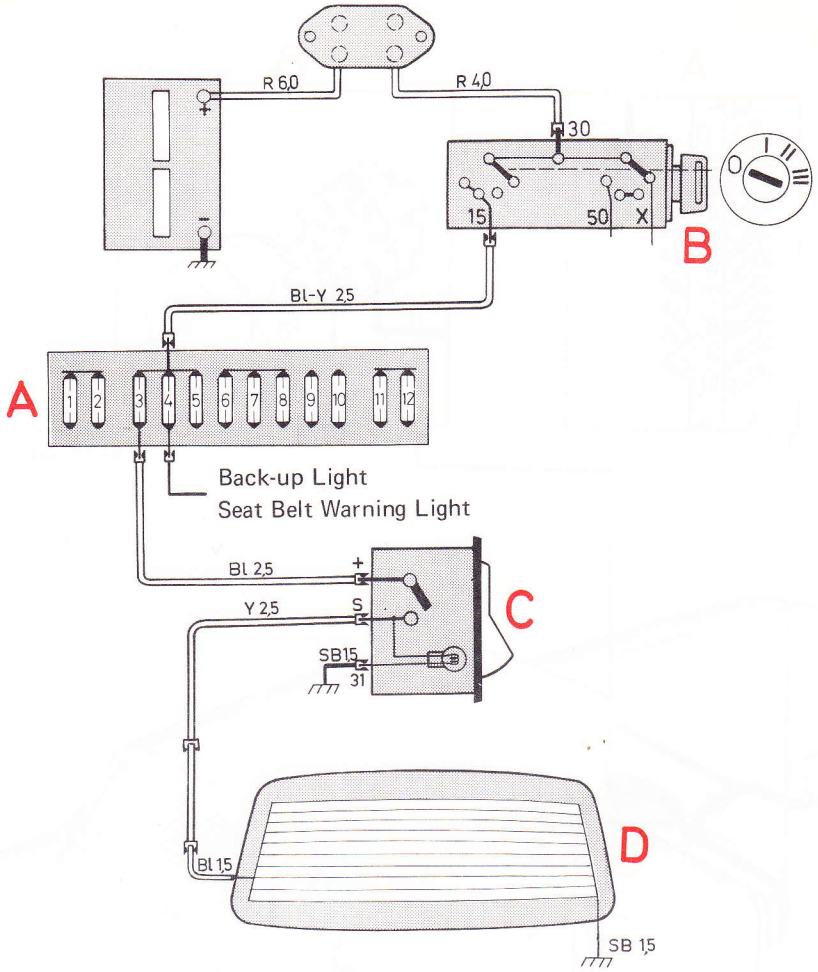


Window Heater ON

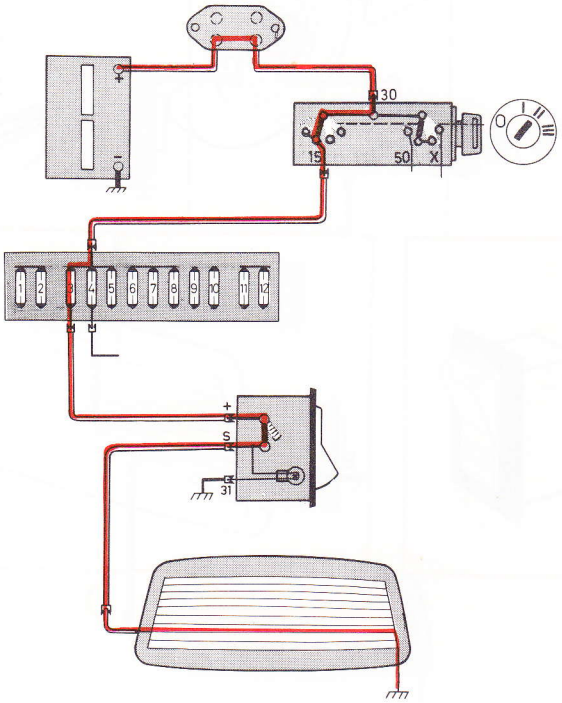


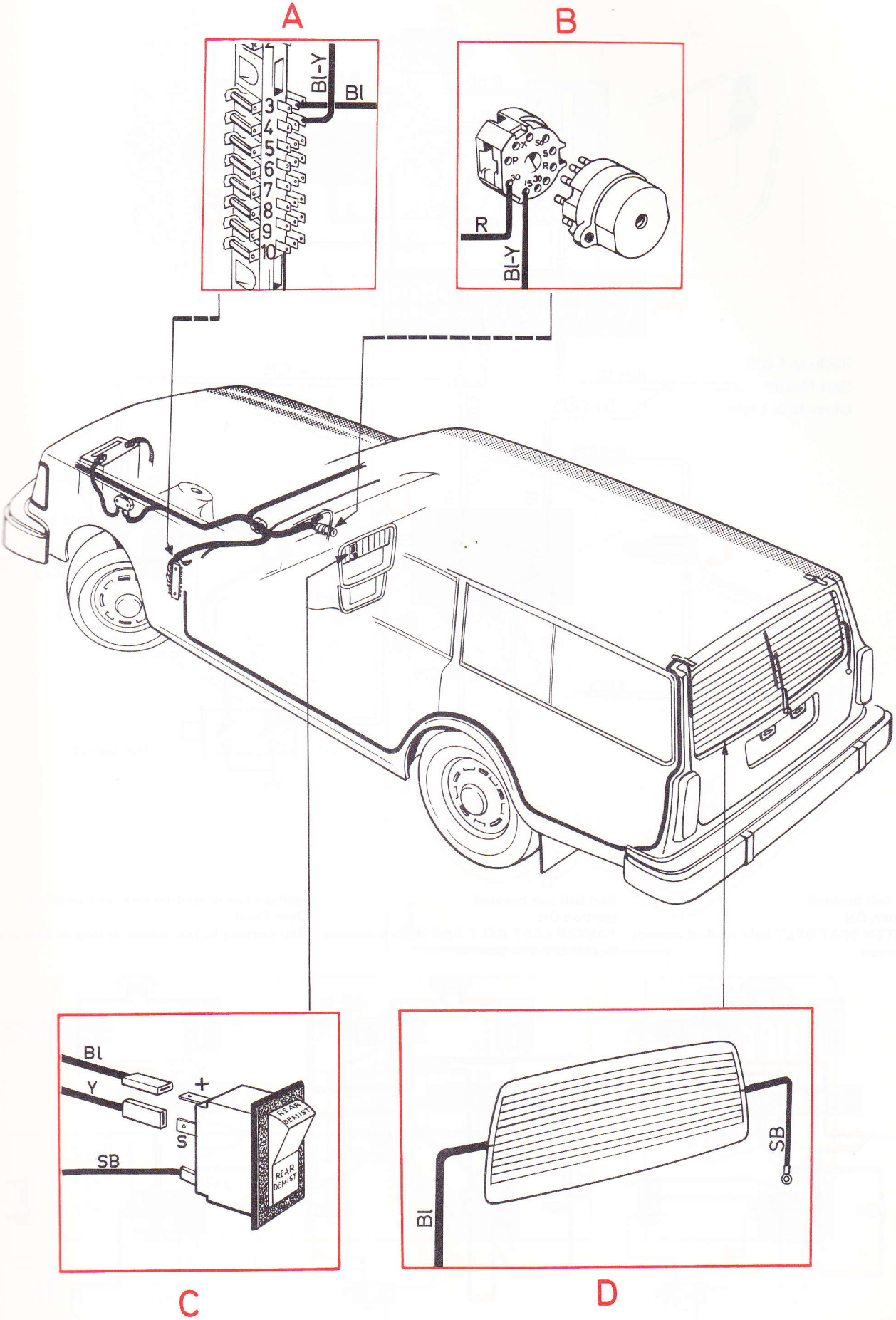

A
B
3
4
5
6
7
8
9
10
Bl-Y
Bl
X
50
P
R
30
15
31
R
Bl-Y
Bl
Y
+
S
SB
REAR DEMIST
REAR DEMIST
Bl
SB
C
D

Electrically heated Tail Gate Window, 245

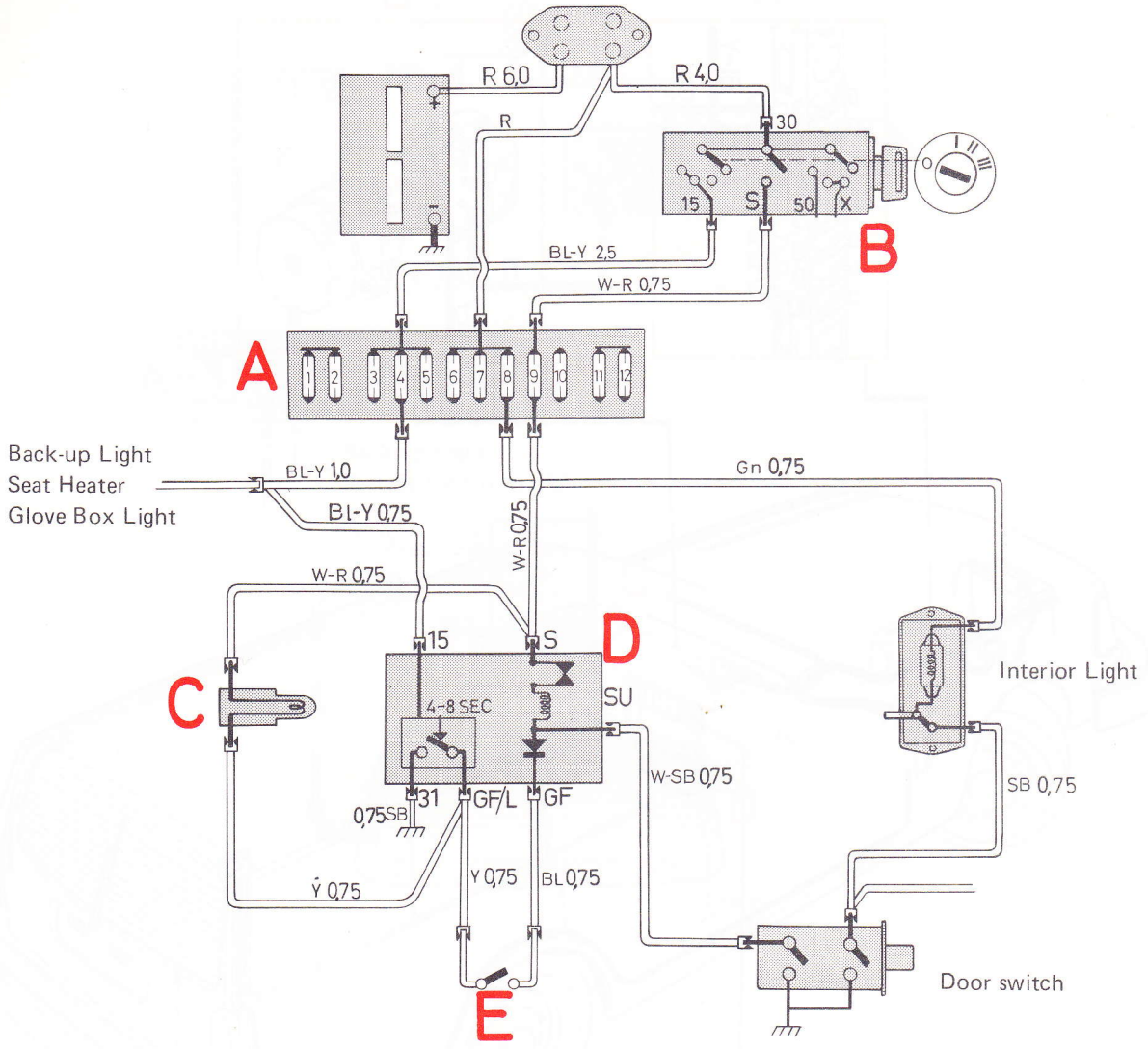


Window Heater ON

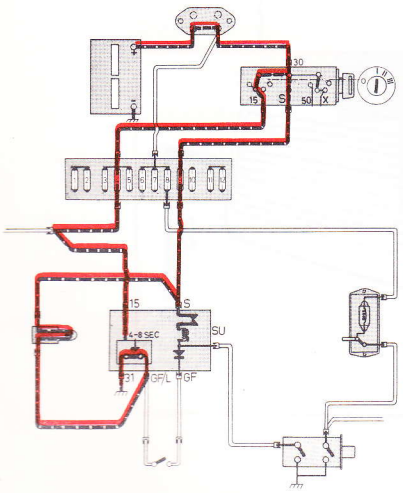



A
Bl-Y
Bl
3
4
5
6
7
8
9
10
B
R
Bl-Y
C
Bl
Y
S
SB
+
REAR DEMIST
REAR DEMIST
D
Bl
SB

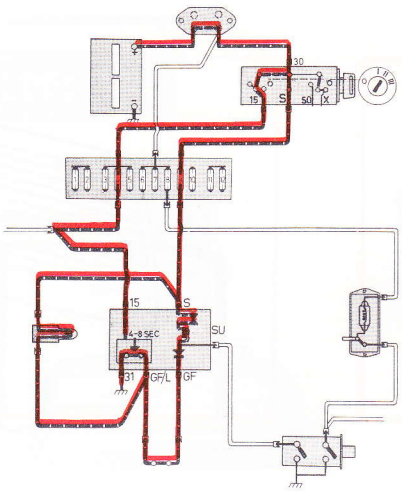
Seat Belt Warning System USA



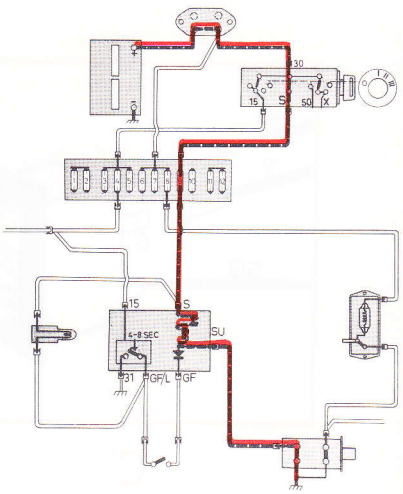
Seat belt buckled
Ignition ON
FASTEN SEAT BELT light on 4–8 seconds
no buzzer

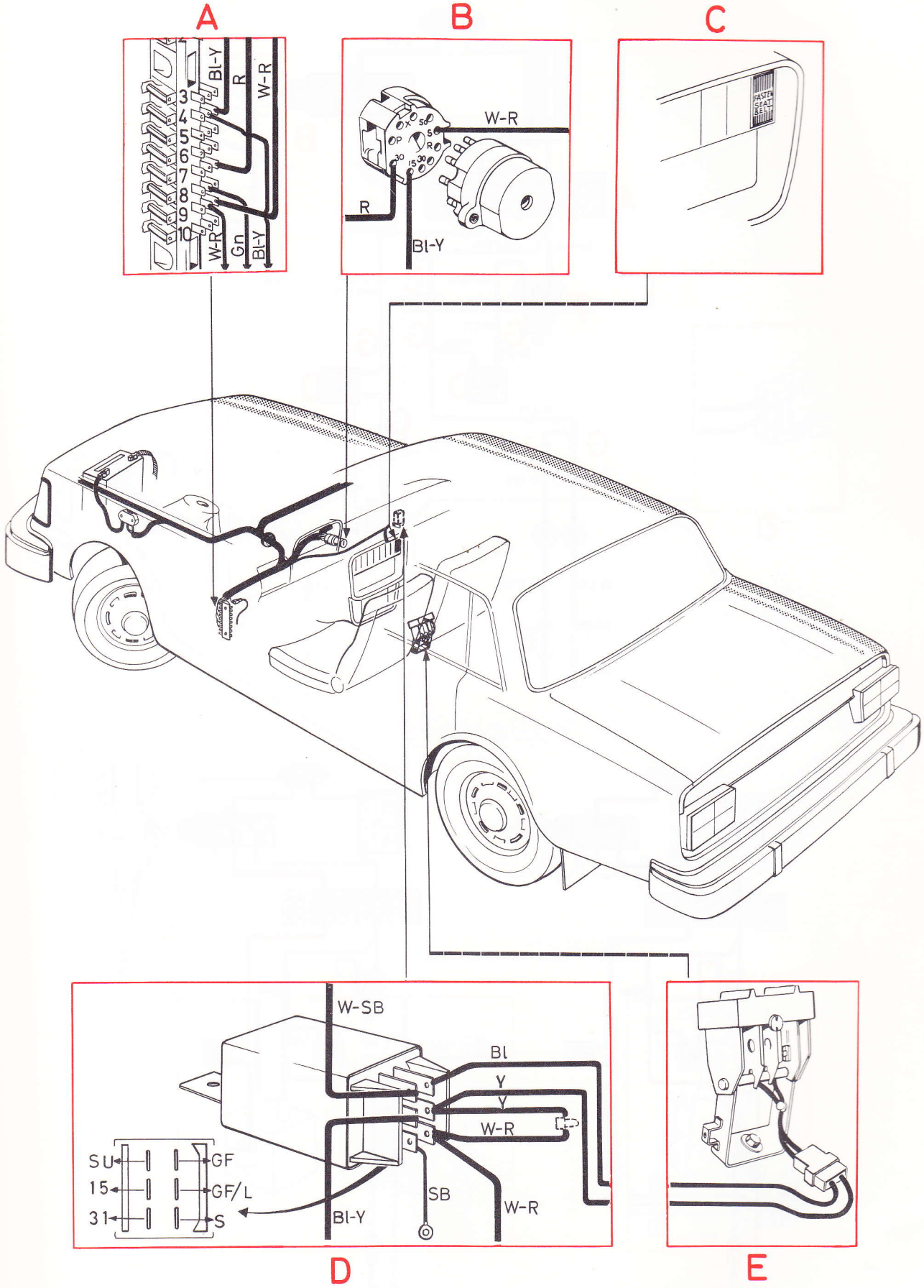


Seat belt not buckled
Ignition ON
FASTEN SEAT BELT light on 4–8 seconds
Buzzer ON 4–8 seconds

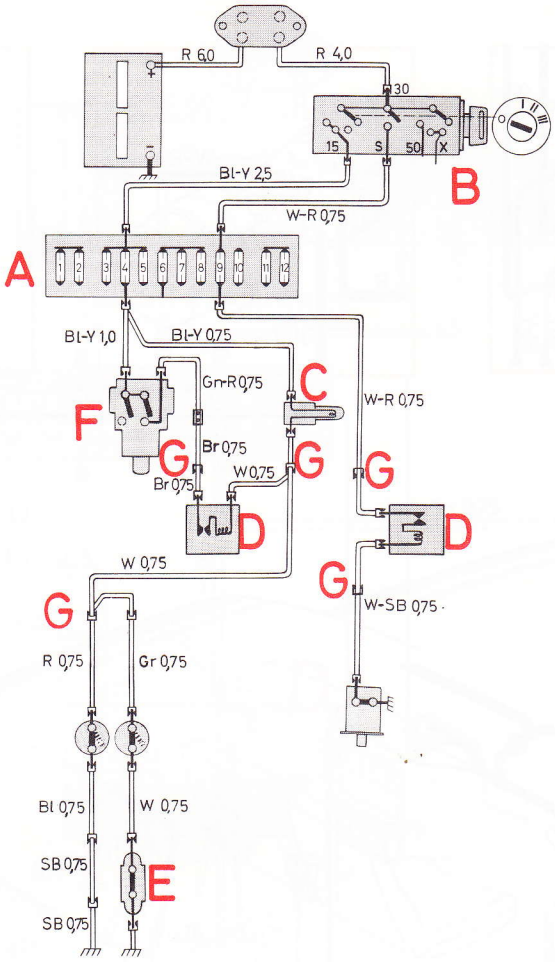


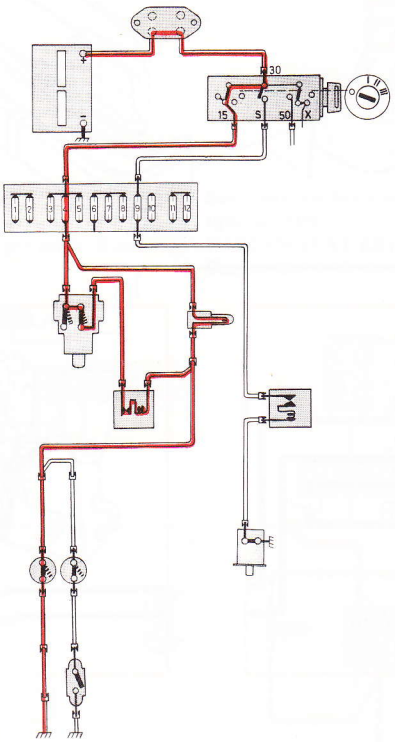
Ignition key in ignition lock (any position)
Door Open
Key Warning buzzer sounds as long as door is open

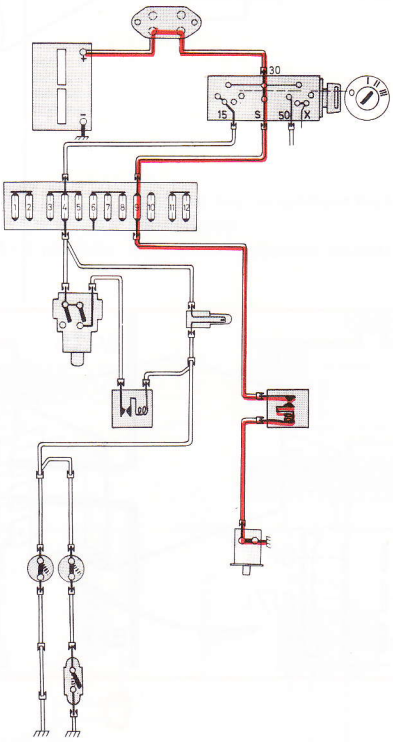


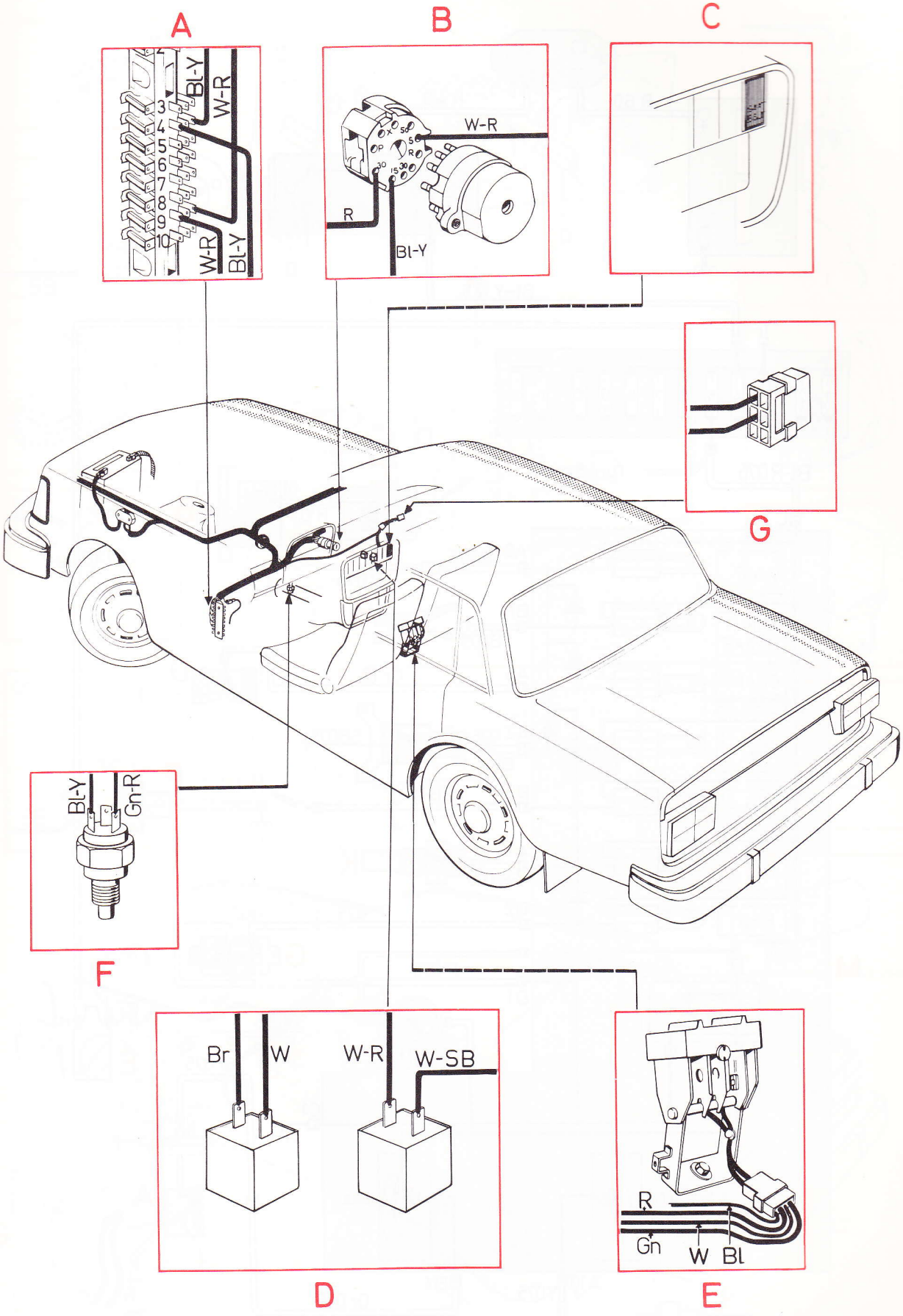

A
B
C
Bl-Y
R
W-R
Gn
Bl-Y
W-R
W-R
R
Bl-Y
W-SB
Bl
Y
W-R
SB
W-R
Bl-Y
SU
15
31
GF
GF/L
S
D
E

Seat Belt Warning System Canada

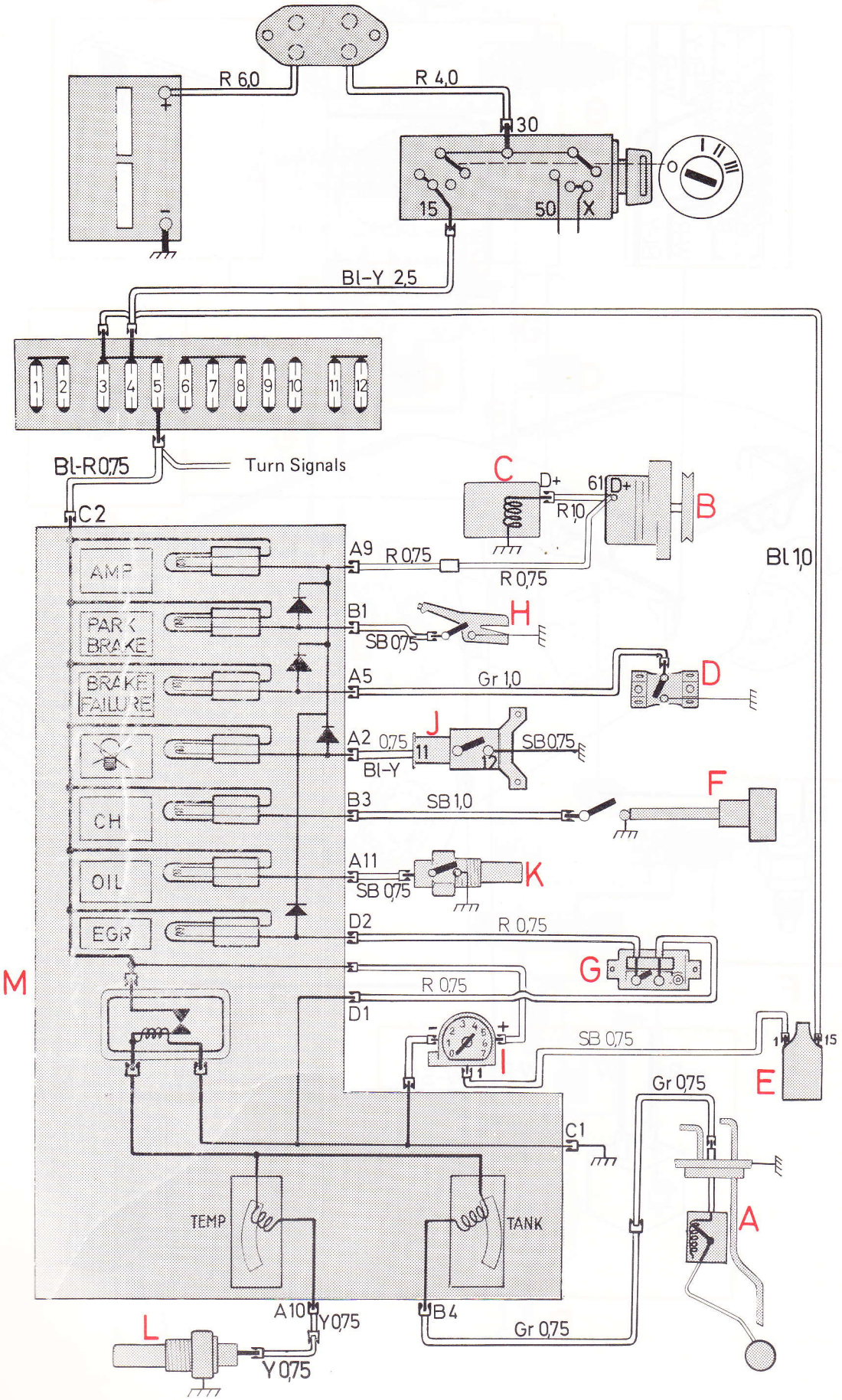


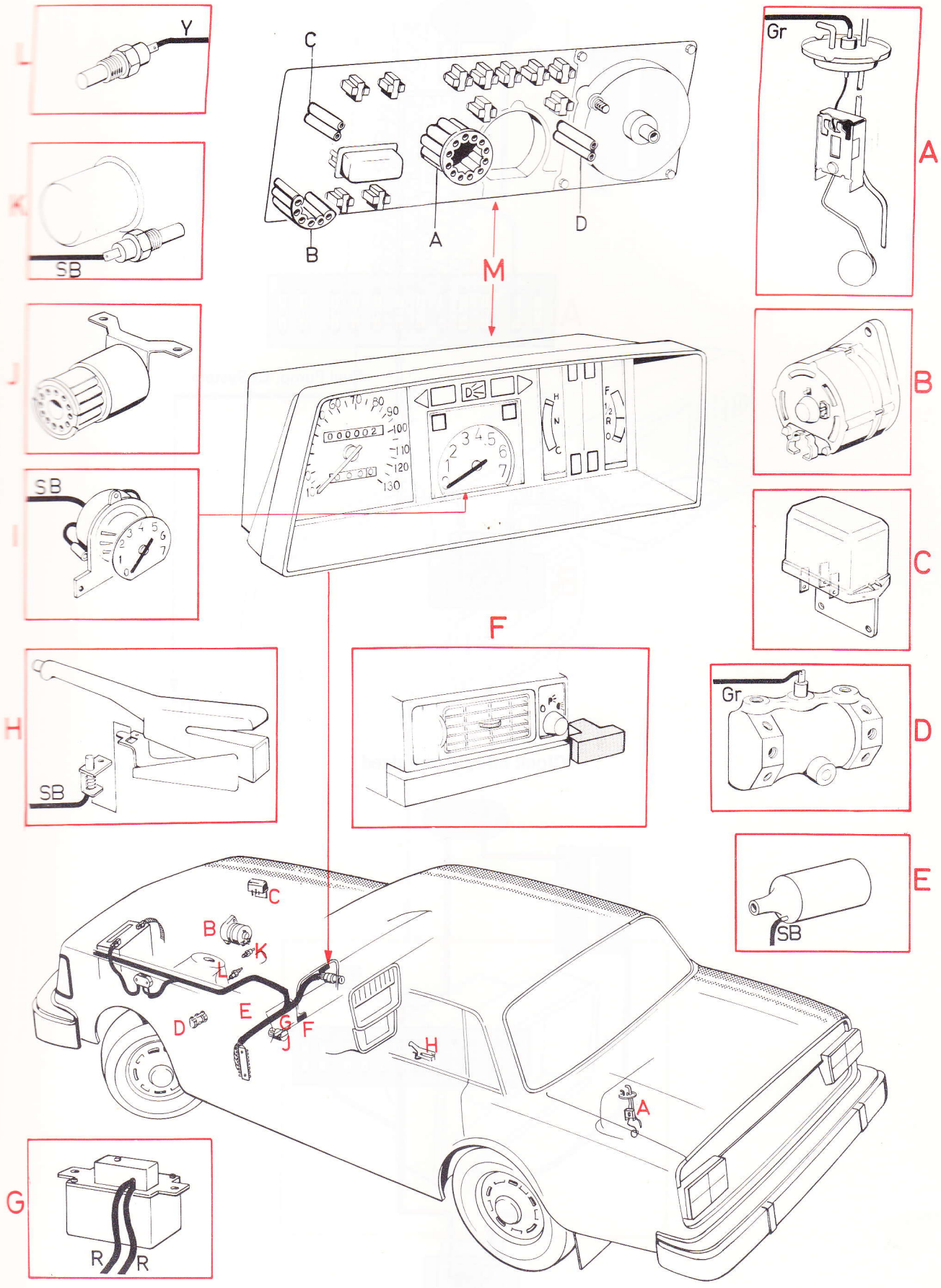




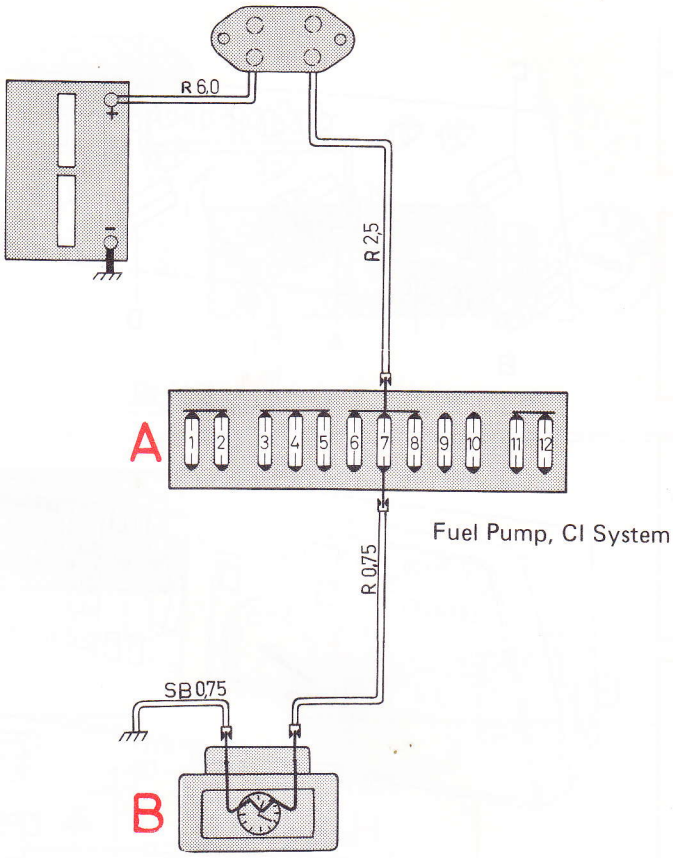

A
Bl-Y
W-R
W-R
Bl-Y
B
W-R
R
Bl-Y
C
G
F
Bl-Y
Gn-R
D
Br
W
W-R
W-SB
E
R
Gn
W
Bl

Instrument Cluster

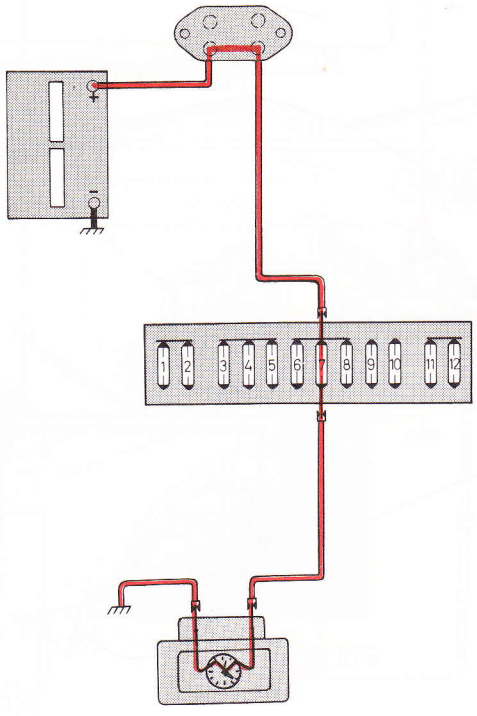


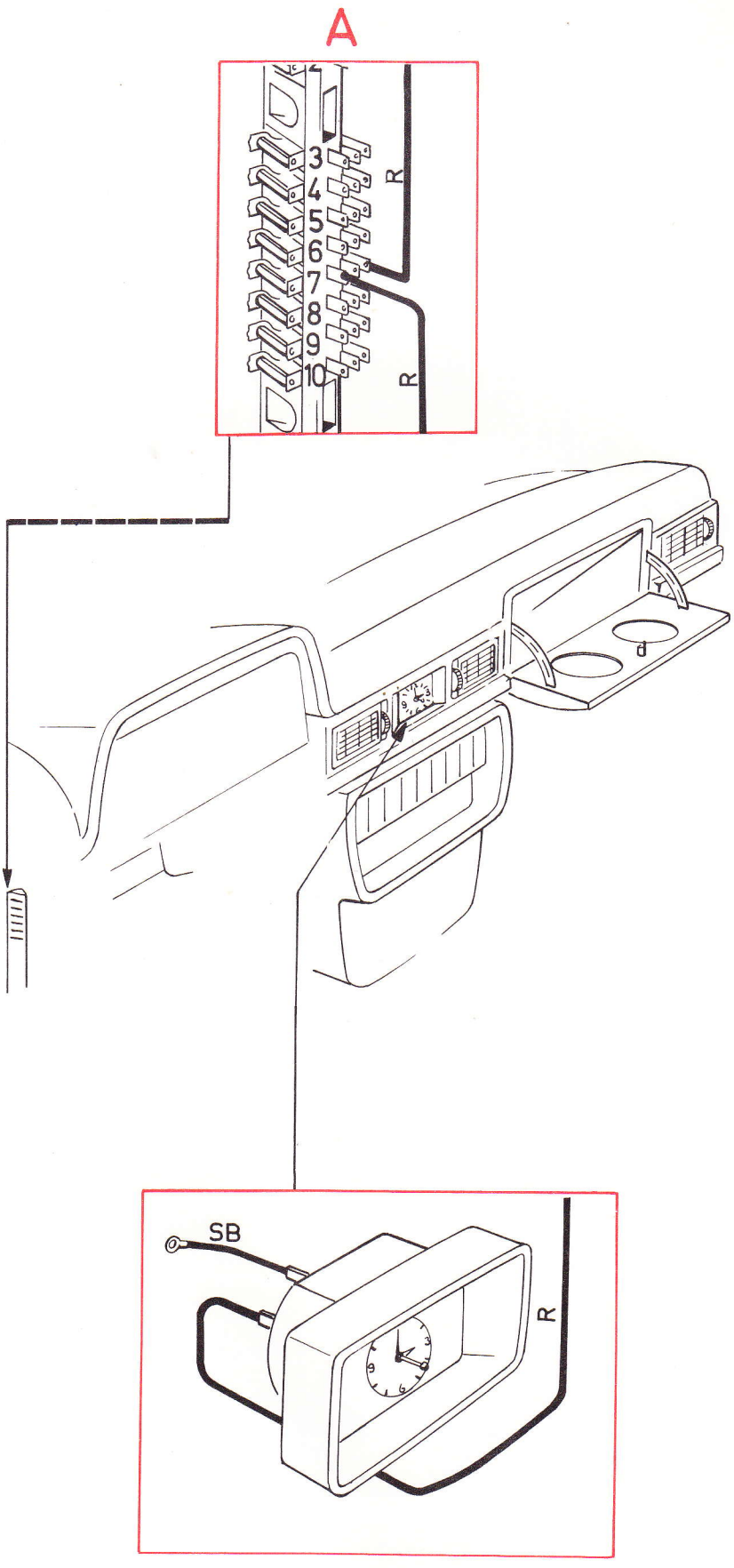

L
Y
K
SB
J
I
SB
H
SB
C
B
A
D
M
F
Gr
A
B
C
Gr
D
SB
E
C
B
K
L
D
E
G
F
J
H
A
G
R
R

Clock



Clock circuit energized

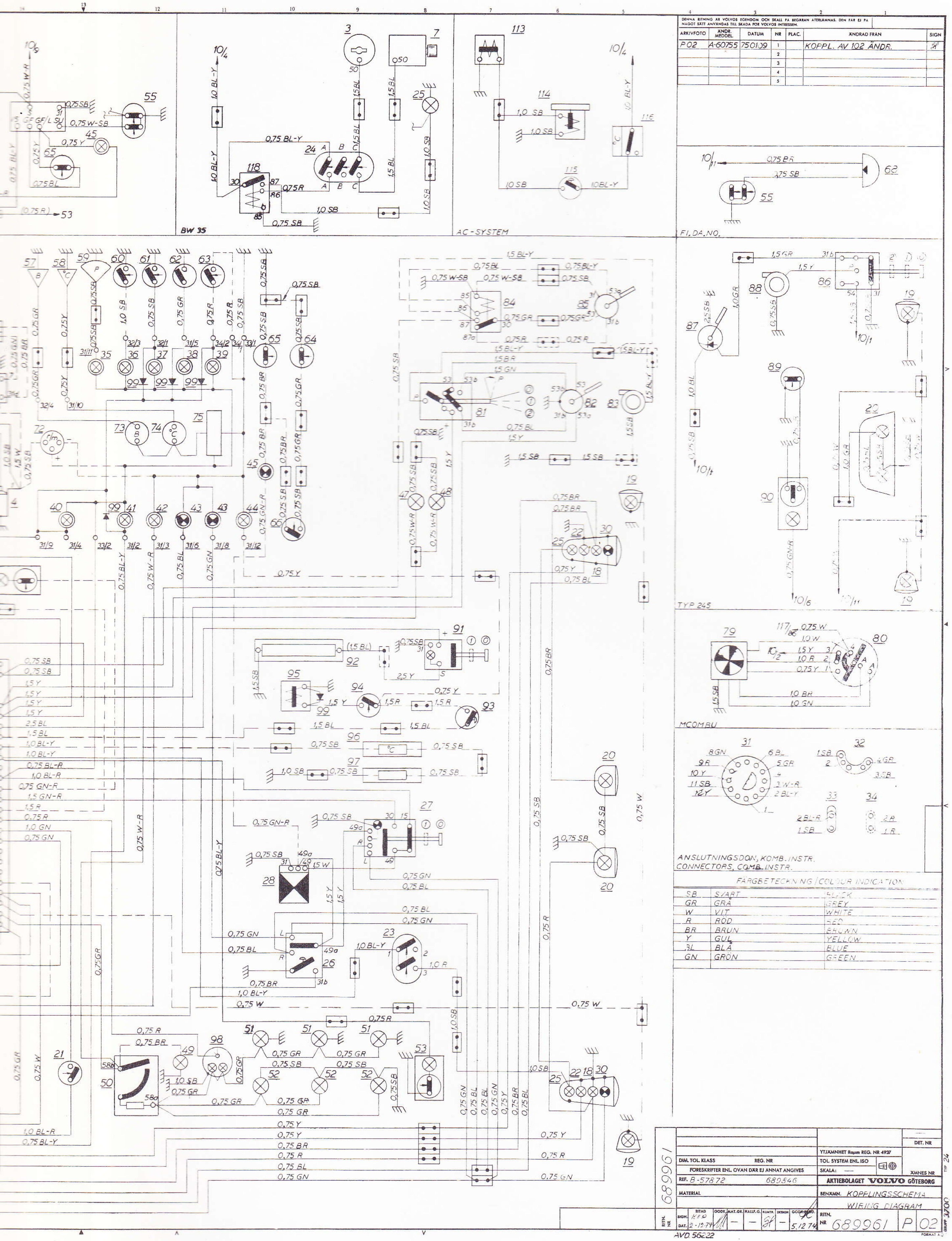



A
3
4
5
6
7
8
9
10
R
R
SB
R
B

POS	BENÄMNING	TITLE	DATA
1	Batteri	Battery	12V
2	Kopplingsdosa	Connection plate	
3	Tändlås	Ignition switch	
4	Tändspole	Ignition coil	1,2 A
5	Fördelare, tändföljd 1-3-4-2	Distributor, Firing order 1-3-4-2	
6	Tändstift	Spark plugs	
7	Startmotor	Starter motor	800W
8	Generator	Alternator 490 alt. 760W	
9	Laddningsregulator	Charging relay	
10	Säkringsdosa	Fuse box	
11	Ljusomkopplare	Light switch	
12	Glödtrådsvakt	Lamp failure warning unit	
13	Stegreläe för hel och halv ljus och ljussignal	Step realy for upper and lower beams and headlight flasher	125A
14	Helljus	Upper beam 60 alt. 45W	
15	Halvljus	Lower beam 55 alt. 40W	
16	Positionslykta	Position lamp 4cp/5W	
17	Varsellius	Observation light 32cp/21W	
18	Baklykta	Tail lamp 4cp/5W	
19	Sidomarkeringslykta	Side marker lamp 2cp/3W	
20	Skyltlykta	License plate lamp 5W	
21	Stoppljuskontakt	Stop light switch	
22	Stoppljykta	Stop lamp 32cp/21W	
23	Kontakt på växellåda M40,M41	Contact on gearbox M40,M41	
24	Kontakt på växellåda BW 35	Contact on gearbox BW 35	
25	Backstrålkastare	Back up lamp 32cp/21W	
26	Körvisaromkopplare	Turn signal switch	
27	Strömst. för varningsblinkljus	Hazard warning signal switch	
28	Blinkdon	Flasher unit	
29	Främre blinklykta	Front turn signal lamp 32cp/21W	
30	Bakre blinklykta	Rear turn signal lamp 32cp/21W	
31	Ansl. vid instrument	Conn. at instrument	
32	Ansl. vid instrument	Conn. at instrument	
33	Ansl. vid instrument	Conn. at instrument	
34	Ansl. vid instrument	Conn. at instrument	
35	Oljetryckskontrollampa	Oil pressure pilot lamp	1,2W
36	Chokekontrollampa	Choke pilot lamp	1,2W
37	Parkeringsbromskontrollampa	Parking brake pilot lamp	1,2W
38	Bromsvarningskontrollampa	Brake failure pilot lamp	1,2W
39	EGR-varningskontrollampa	EGR-pilot lamp	1,2W
40	Laddningskontrollampa	Charging pilot lamp	1,2W
41	Glödtrådskontrollampa	Lamp failure pilot lamp	1,2W
42	Helljuskontrollampa	Upper beam pilot lamp	1,2W
43	Blinkljuskontrollampa	Turn signal light pilot lamp	1,2W
44	Overväxelkontrollampa	Overdrive pilot lamp	1,2W
45	S-bälteskontrollampa fram	Safety belt pilot lamp, front	1,2W
46	Motorrumsbelysning	Engine comp. lighting	15W
47	Spräkbelysning	Buckle lighting	1,2W
48	Askkoppsbelysning bak	Rear ash tray lighting	1,2W
49	Växellägesbelysning	Gear selector lighting	1,2W
50	Reostat för instrumentbel.	Instrument lighting rheostat	
51	Instrumentbelysning	Instrument lighting	2W
52	Reglagepanelbelysning	Control panel lighting	1,2W
53	Handskfackslampa	Glove comp. lamp	2W
54	Taklampa	Interior lamp	10W
55	Dörrkontakt förarsida	Door contact driver's side	
56	Dörrkontakt passagerarsida	Door contact passenger's side	
57	Bränslenivågivare	Fuel level gauge	
58	Temperaturgivare	Temperature gauge	
59	Oljetrycksvakt	Oil pressure guard	
60	Chokereglage kontakt	Choke control contact	
61	Parkeringsbromskontakt	Parking brake contact	
62	Bromsvarningskontakt	Brake failure contact	
63	EGR-varningskontakt	EGR-warning contact	
64	Kontakt s-bälte pass stol	Safety belt contact pass seat	
65	Kontakt, s-bälte, förarstol	Safety belt contact, driver's seat	
66	Kontakt passagerarstol	Contact passengers seat	
67			
68	Varningssummer för ljus	Light buzzer	
69			
70			
71			
72	Varvtalsmätare	Tachometer	
73	Bränslemätare	Fuel meter	
74	Termometer	Thermometer	
75	Spänningsstabilisator	Voltage stabilizer	
76	Signalhorn	Horn	7,5A
77	Signalhornsring	Horn ring	
78	Cigarettändare	Cigar lighter	7A
79	Fläkt	Fan 115 alt. 170W	
80	Omkopplare fläkt	Fan switch	
81	Omk för vindrutetork./spolare	Windshield wipe/wash switch	
82	Vindrutetorkare	Windshield wiper	3,5 A
83	Vindrutespolare	Windshield washer	2,6A
84	Relä för strålkastartorkare	Relay for headlamp wiper	
85	Strålkastartorkare	Headlamp wiper	2A
86	Omk för bakrutetork./spolare	Rear window wipe/wash switch	
87	Bakrutetorkare	Rear window wiper	1A
88	Bakrutespolare	Rear window washer	2,6A
89	Bakre dörrkontakt	Rear door contact	
90	Bakre takbelysning	Rear interior lighting	10W
91	Strömst. för eluppvärmd bakr.	El heated rear window switch	
92	Eluppvärmd bakruta	El heated rear window 160 alt. 200W	
93	Strömst. för överväxel M41	Overdrive switch M41	
94	Kontakt för överväxel på växellåda M41	Overdrive contact on gearbox M41	
95	Manövermagnet för överväxel på växellåda M41	Overdrive solenoid on gearbox M41	2,2A
96	Värmelement med termostat förarstol	Heating element with thermostat, driver's seat	30W
97	Värmelement, förarstol	Heating element, driver's seat	30W
98	Klocka	Clock	
99	Diod	Diode	
100	Skarv =	Junction =	
101			
102	Bältepåminnare	Belt reminder	
103	Startventil	Starting valve	
104	Termotidkontakt	Temperature-time contact	
105	Luftmängdsmätare	Air metering device	
106	Huvudrelä, bränsleinspruta	Main relay, fuel injection	
107	Relä för bränslepump	Relay for fuel pump	
108	Bränslepump	Fuel pump	6,5A
109	Styrtrycksventil	Pressure regulating valve	
110	Tillsatsluftslid	Supplementary air valve	
111	Motstånd	Resistor	0,9Ω
112	Styrenhet tändsystem	Ignition control unit	
113	Manövermagnet kompressor	Solenoid on compressor	3,9A
114	Magnetventil	Solenoid valve	
115	Strömställare för AC	Switch, AC compressor	
116	Termostat	Thermostat	
117			
118	Relä för backstrålkastare	Relay for back up lamp	

USA

CYL1 CYL2 CYL3 CYL4


DENNA RITNING ÄR VOLVOS EGENDOM OCH SKALL PÅ BEGÄRAN ÅTERLÄMNAS. DEN FÅR EJ PÅ NÅGOT SÄTT ANVÄNDAS TILL SKADA FÖR VOLVOS INTRESSEN.
ARKIVFOTO | ÄNDR. MEDDEL. | DATUM | NR | PLAC. | ÄNDRAD FRÅN | SIGN
P 02 | A-60755 | 750109 | 1 | | KOPPL. AV 102 ÄNDR.
BW 35
AC-SYSTEM
FI, DA, NO,
TYP 245
MCOMBU
ANSLUTNINGSDON, KOMB. INSTR.
CONNECTORS, COMB. INSTR.
FÄRGBETECKNING / COLOUR INDICATION
SB SVART BLACK
GR GRÅ GREY
W VIT WHITE
R RÖD RED
BR BRUN BROWN
Y GUL YELLOW
BL BLÅ BLUE
GN GRÖN GREEN
YTJÄMNHET Raµm REG. NR 4937
DET. NR
DIM. TOL. KLASS
REG. NR
TOL. SYSTEM ENL. ISO
FÖRESKRIFTER ENL. OVAN DÄR EJ ANNAT ANGIVES
SKALA: —
ÄMNES NR
REF. B-57872 689846
AKTIEBOLAGET VOLVO GÖTEBORG
MATERIAL
BENÄMN. KOPPLINGSSCHEMA
WIRING DIAGRAM
RITN. NR 689961 P 02
SIGN. KEO
DAT. 2-12-74
5.12.74
AVD. 56222
TYP 24
GRUPP 3700
FORMAT A0