Part 9

INSTRUMENTS, ACCESSORIES AND OTHER EQUIPMENT

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PART 91

INSTRUMENTS
DESCRIPTION

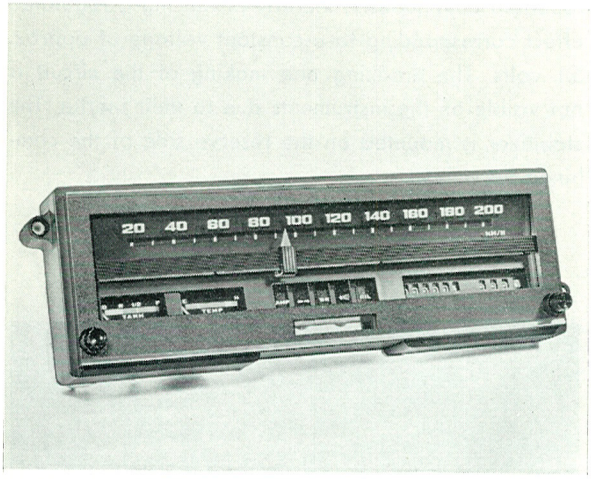

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Fig. 9-1. Combined instrument, front side

Instrumentation consists of a combined instrument, see Figs. 9-1 and 9-2, comprising speedometer, mileo meter and trip meter, voltage stabilizer fed temperature gauge and fuel gauge, warning lamps and rheostat controlled instrument lighting. The temperature gauge, fuel gauge, warning and instrument lighting lamps, voltage stabilizer and rheostat for the instrument panel light are fitted on a common mounting plate, see Figs. 9-3 and 9-4.

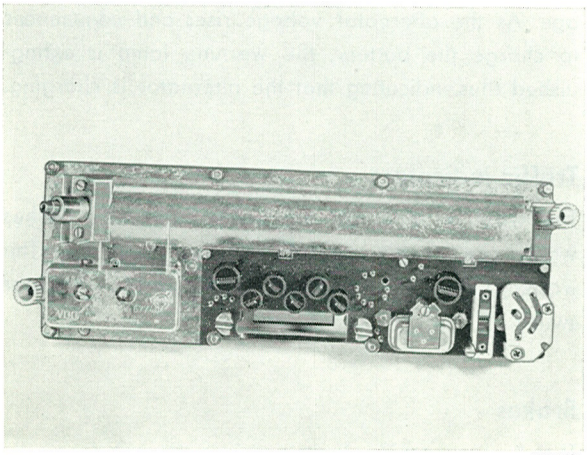

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Fig. 9-2. Combined instrument, reverse side

SPEEDOMETER

The speedometer is of the eddy current type. In the speedometer is a permanent magnet which is mechanically connected with a speedometer cable driven from a worm gear on the gearbox. Surrounding the magnet is a drum, coil spring and roller mounted on a separate shaft. Rotation of the magnet generates eddy currents which produce a turning torque on the drum. The coil spring limits the degree of torque when the speed of the magnet increases. The effect of magnet and coil spring is balanced so that the rotational speed of the roller gives a reading proportional to the speed of the car.

The mileometer and trip meter are driven by a gear drive in the combined instrument.

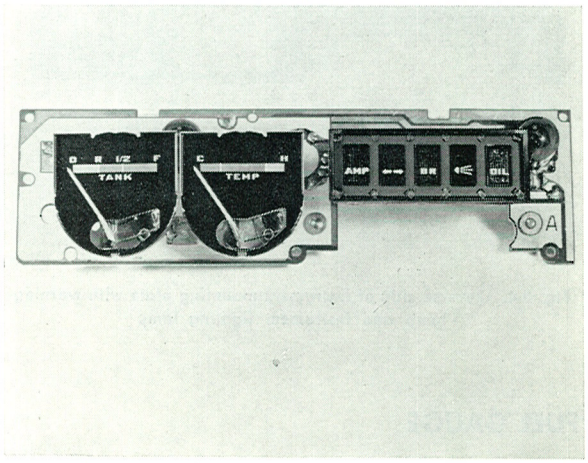

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Fig. 9-3. Mounting plate with instruments and warning lamps

TEMPERATURE GAUGE

Temperature is measured electrically by means of an instrument of bimetal type. This unit consists of a sender, fitted to the engine, and a registering instrument, mounted in the combined instrument, which is fed through a voltage stabilizer. The sender is of the semi-conductor type, i.e. it contains a semi-conductor, the electrical resistance of which alters with the ambient temperature. The amount of current passing through the sender is proportional to the temperature registered by the instrument.

The amount of current passing through the sender and instrument determines the degree of heat in the bimetal of the instrument and, correspondingly, the reading. As the engine warms up, a higher current is passed through the sender and results in a higher instrument indication.

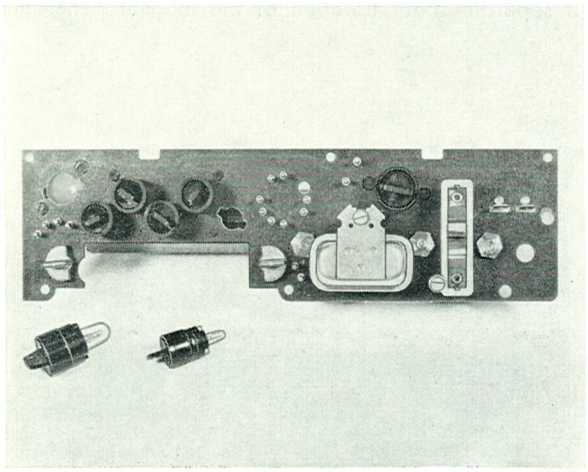

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Fig. 9-4. Reverse side of instrument mounting plate with warning lamp and instrument lighting lamp

FUEL GAUGE

The amount of fuel in the tank is measured electrically. Measurement is achieved by means of an indicating instrument of bimetal type and a pickup mounted in the fuel tank. Current is fed through the same voltage stabilizer as for the temperature gauge. The pickup consists of a variable resistor, a lever and a float. Depending upon the amount of fuel in the tank and, correspondingly, the position of the float, a large or lesser part of the pickup resistor is in circuit. The bimetal instrument used here is of the same type as that in the temperature gauge.

VOLTAGE STABILIZER

The temperature and fuel gauges are powered by a voltage of approx. 5.1 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 bimetal spring of the stabilizer 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, thereby producing a regulated effect corresponding to a constant voltage of approx. 5.1 volts. The breaking and making of the circuit is not visible on the instruments due to their inertia. The stabilizer is mounted on the reserve side of the combined instrument.

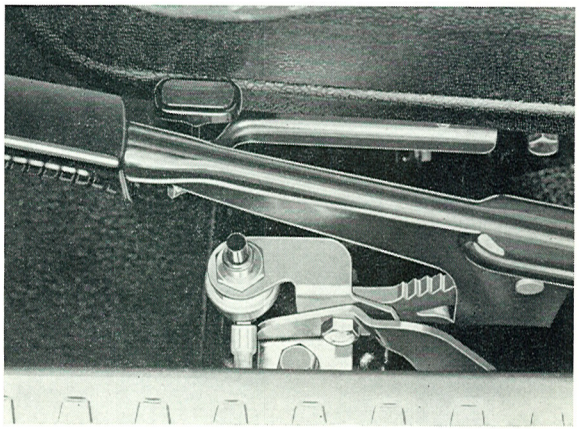

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Fig. 9-5. Switch for handbrake warning lamp

WARNING LAMPS

Charging

The charging warning lamp is connected to D + (61) on the alternator. The warning lamp lights up when the alternator voltage is lower than the battery voltage. As the alternator voltage rises and commences to charge the battery, the warning lamp is extinguished thus indicating that the alternator is charging.

Traffic indicators

The warning lamp for the traffic indicators flashes when one of the indicators is switched on. The warning lamp is connected to the traffic indicator switch.

Brakes

The brake warning lamp receives current from the ignition lock and can be grounded by two procedures.

When the handbrake is applied the warning lamp is grounded by a switch, Fig. 9-5, and thus lights, and continues to do so, as long as the handbrake is applied. Should a fault occur in one of the circuits of the hydraulic brake system so that the difference in pressure between the circuits, on application of the brakes, arises to more than 8—10 kg/cm² (114—142 lb/sq.in.), a warning valve, Fig. 9-6, closes and the warning lamp is lit. The warning lamp signals until the fault in the brake system has been remedied and the warning valve is reset. Concerning resetting the warning valve, see Part 5, Brakes, Group 52.

Full-beam headlights

A warning lamp for full leadlights is lit simultaneous with the full-beam headlights. The warning lamp is connected in parallel with the full-beam headlights at the step relay.

Oil pressure

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

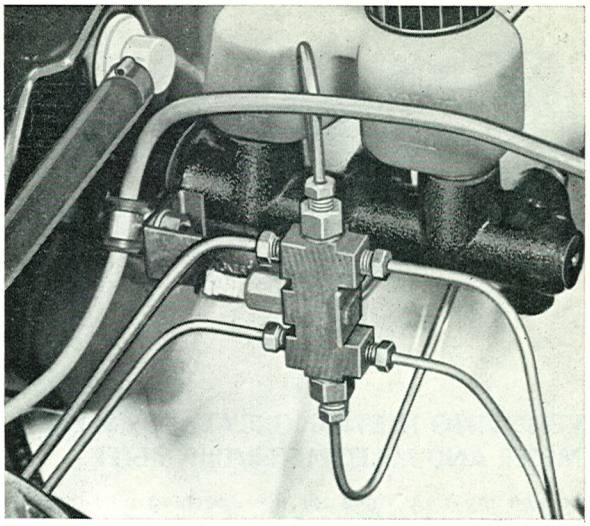

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Fig. 9-6. Warning valve

REPAIR INSTRUCTIONS

During work below the dashboard and instrument panel, the negative cable should de disconnected from the battery to avoid lead short-circuiting.

REMOVING THE COMBINED INSTRUMENT

Remove the panel below the dashboard by loosening the two fixing screws, one on the left-hand side of the body and one beside the glove compartment. Then pull the upper section of the panel rearwards so that it loosens from the clips in the dashboard and loosen the panel from the bonnet release mechanism. Remove the controls for the heater unit and the speedometer cable, and also flange nuts for the instrumentation. Turn the instrument 1/4 turn so that the reverse side of the instrument faces upwards. Detach the electrical connections from the instrument. The instrument can then be lifted out through the opening in the panel.

REMOVING THE WARNING LAMPS AND INSTRUMENT LIGHTING

These lamps, see Fig. 9-4, are mounted in holders which are turned in an anti-clockwise direction to remove them. The bulbs are removed from their holders by pulling them straight out.

REMOVING THE INSTRUMENT BASE PLATE

Pull loose the control knob for the rheostat. (This knob is damaged by removal and must always be replaced for a new one. It may be necessary to break the knob with, e.g. pliers. The new knob is fitted by pressing it onto the shaft from the rheostat.) Loosen the screws for the rheostat and pull it out from the spade terminals. Loosen the five remaining screws and lift up the instrument mounting plate.

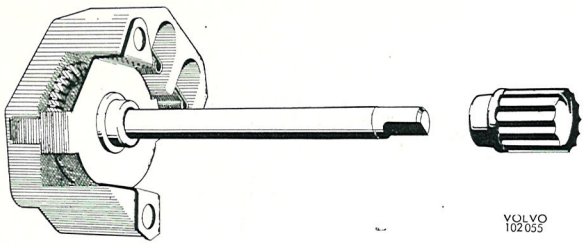

Fig. 9-7. Rheostat for instrument lighting

REMOVING THE FIXING PLATE FOR SPEEDOMETER AND MILEOMETER/TRIP METER

Loosen the snap rings for the attaching nuts and remove the nuts. Loosen the five screws which hold the fixing plate. The fixing plate can be lifted out after all screws for the instrument plate have been removed and the plate is only held in place by the rheostat shaft.

Any repairs or adjustment to the speedometer should always be carried out by an authorized instrument workshop.

CHECKING THE 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 the bending radius 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.

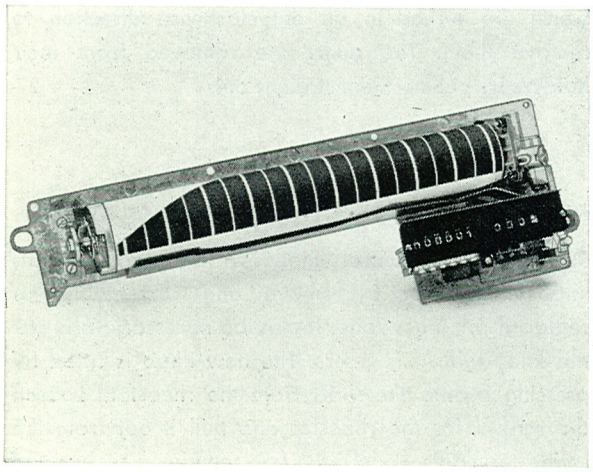

Fig. 9-8. Speedometer with mileometer and trip meter

REMOVING AND CHECKING THE TEMPERATURE GAUGE

The sender and indicating instrument are not repairable and the entire unit must be replaced if damaged. The indicating instrument can be separated from the detached instrument panel when the voltage stabilizer has been removed and the nuts holding the instrument are accessible.

The indicating instrument should be checked with an ohmmeter. The resistance should be approx. 12.5 ohms. Measurement is suitably carried out between the nuts on the reverse side of the instrument plate. The sender should also be checked with an ohmmeter. Resistance in the sender should, at room temperature, be approximately 200 ohms.

The indicating instrument can also be checked by connection to a 12 volt battery, via a voltage stabilizer, and with a previously checked pickup coupled in series. On heating the sender both the instruments should show a corresponding temperature. A check can suitably be made with a thermometer (sender and thermometer submersed in heated water). Checking values are as follows:

Beginning of green area (at "C")	105° F
At dividing line between green areas	158° F
At dividing line between green and red areas	212° F

If checking is carried out with an instrument which is mounted on the instrument plate, then a 12 volt supply should be connected to terminal 2 on the instrument plate (see wiring diagram), the sender to terminal 8 and the grounding cable to terminal 16. Do not forget

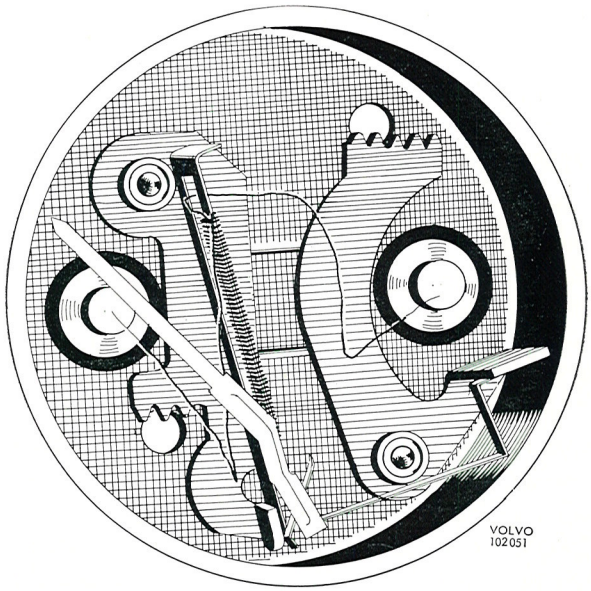

Fig. 9-9. Bimetal type registering instrument

to ground the sender. On no account should the indicator instrument be checked by connecting the sender cable to the car chassis as this will damage the instrument mechanism (too high a voltage on the instrument resistor and overheating of the bimetal spring). If no measuring instrument is available, the above test can be carried out by placing a 10 ohms resistance between the sender cable and the ground connection on the chassis.

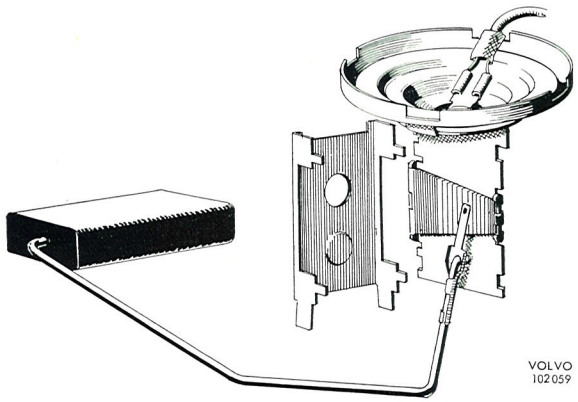

Fig. 9-10. Pickup for fuel gauge

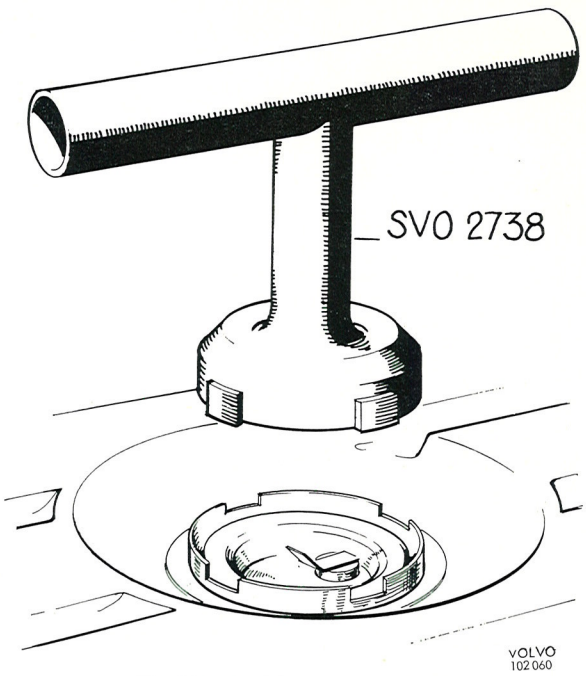

Fig. 9-11. Tool for removing pickup

REMOVING AND CHECKING THE FUEL GAUGE

The pickup and indicating instrument are not repairable and must be exchanged if faulty or damaged.

The indicating instrument can be removed from the detached instrument panel when the voltage stabilizer and rheostat have been loosened and the nuts to the instrument are accessible. The indicating instrument should be checked with an ohmmeter. The resistance should be approx. 12.5 ohms. Measurement can suitably be carried out between the nuts on the rear side of the instrument plate.

The pickup, Fig. 9-10, can be removed after the carpet and wooden fiber board in the luggage boot have been lifted out. The pickup is attached by means of a bayonet fixture. When removing, use tool SVO 2738 as shown in Fig. 9-11. The pickup should be checked with an ohmmeter.

At the upper stop the pickup should have a resistance of approx. 10 ohms and at the lower, approx. 60—85 ohms. Movement of the float arm should not result in a break in the circuit (reading). Checking of the indicating instrument by connecting the pickup lead to earth is not permitted as this will damage the instrument (excessive loading on the resistor wire and overheating of the bimetal spring). If no measuring instrument is available the test can be carried out by connecting a 10 ohms resistor between the lead and grounding point on the chassis.

CHECKING THE VOLTAGE STABILIZER

The voltage stabilizer, shown in Fig. 9-12, is attached to the reverse side of the combined instrument by a screw. After the screw has been loosened, the stabilizer can be pulled out from the contact pin holes on the instrument. A functional test on the voltage stabilizer can be carried out with an adjustable bimetal instrument. The instrument (temperature or fuel gauge), is connected in series with a resistance of approximately 12 ohms and a constant direct current voltage of 5.1 volts. The reading is then noted. After this the constant direct current is replaced by a 12 volt battery and a voltage stabilizer. Do not omit to the cover of the stabilizer. During testing, the stabilizer must lie in the same position as it does in the car. A damaged stabilizer must be replaced by a new unit since it cannot be repaired.

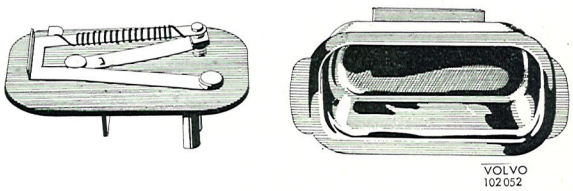

Fig. 9-12. Voltage stabilizer

GROUP 94

HEATING SYSTEM

DESCRIPTION

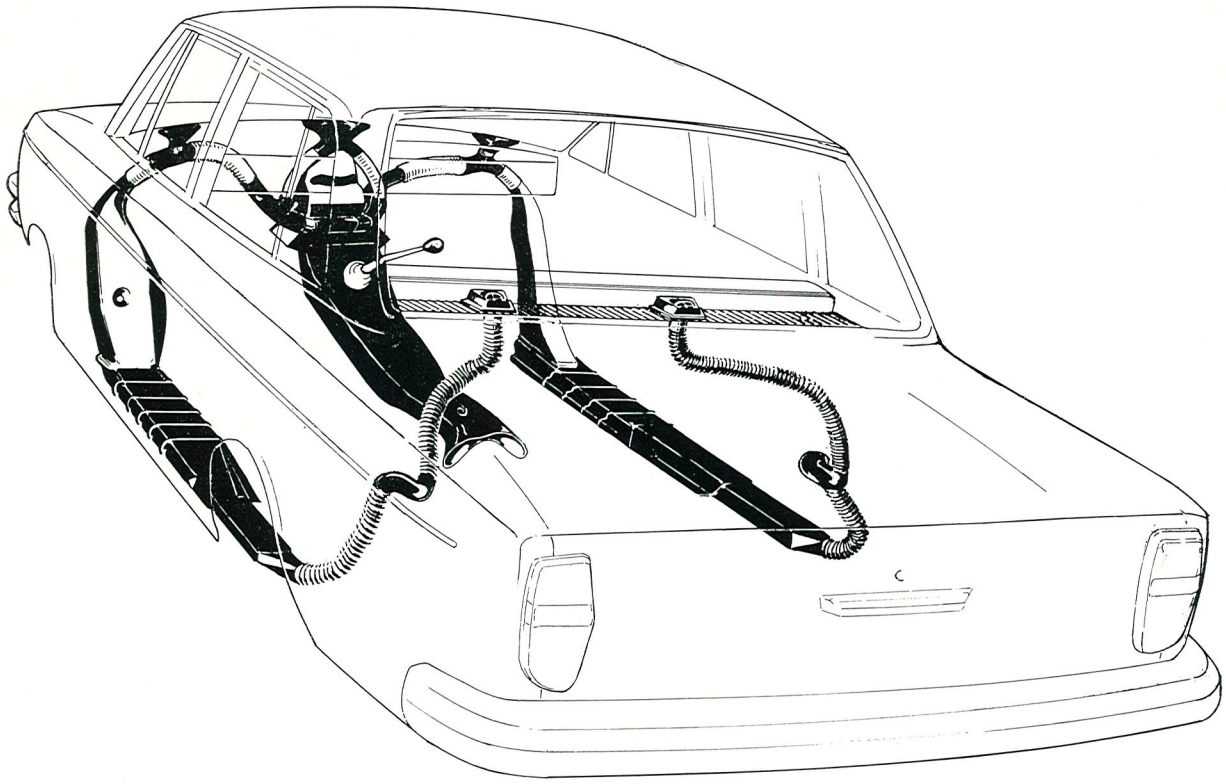

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Fig. 9-13. Heater system air ducts

The heating system is a combined warm air and fresh air system. The incoming air is forced, by a fan, through the cellular system of the heater unit and out into the car. The fresh air can be heated and directed to the required area of the car by means of the various controls.

(Fresh air can also enter the vehicle through the fresh air intakes in the cowl sides.)

The temperature of the heated air is regulated with the aid of a heat control valve. The heat control valve is intended to keep the temperature of the heated air at a pre-determined and constant temperature. This is achieved by means of the thermostat which is incorporated in the control valve. The temperature control regulates the supply of heated coolant to the cell system. The heater control valve is connected in series with the cell system so that all coolant which passes through the cell system also passes through the control valve. The heated coolant warms up the air which is fed through the heater unit by the heater fan or the slipstream. If the coolant temperature increases, the sensitive body of the thermostat expands thus acting on the valve in the control system and resulting in less flow of coolant. This means that the temperature of air flowing through the unit will be lower and the sensitive body will be again effected. The result will be an increased flow of coolant. This cycle is repeated continuosly so that a stable air temperature is achieved.

REMOVING THE HEATER UNIT

Drain off the coolant and disconnect the negative battery lead. Remove the hoses to the control valve. Remove the panel, below the dashboard, by loosening the two fixing screws, one on the left cowl side and one beside the glove compartment. Pull the upper section of the panel rearwards so that it loosens from the clips in the dashboard and free the panel from the bonnet release control. Remove the mat on the transmission tunnel. Loosen and remove the defroster hoses and control wires and remove the switch for the fan and disconnect the cables to the fan motor.

Remove the two screws which hold the fusebox to the heater. Remove the control valve and loosen the upper hose to the heater unit. Care must be taken with the control valve and the copper tube between the valve and the heater. Plug the outlets on the heater so that the remaining coolant does not run into the car on removal. Loosen the grounding cables from the right-hand bracket. Loosen and remove the four screws which hold the heater unit to the brackets and loosen the draining hose. Lift out the heater unit and control valve carefully.

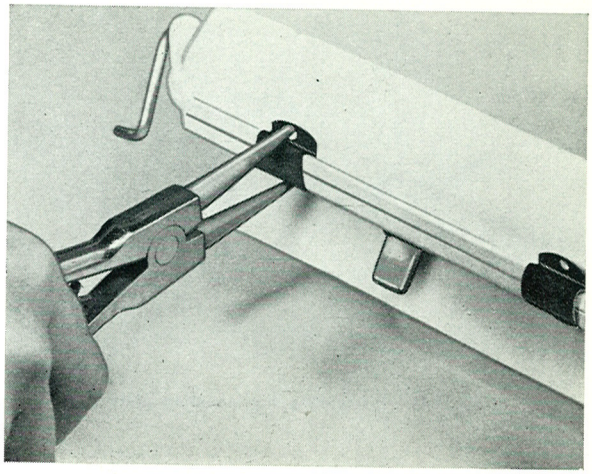

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Fig. 9-14. Removing the spring clips

1. Heat control valve
2. Heater casing
3. Cell system
4. Fan casing
5. Fan
6. Spring clips
7. Heater casing
8. Rubber bushing
9. Sensitive body for heat control valve

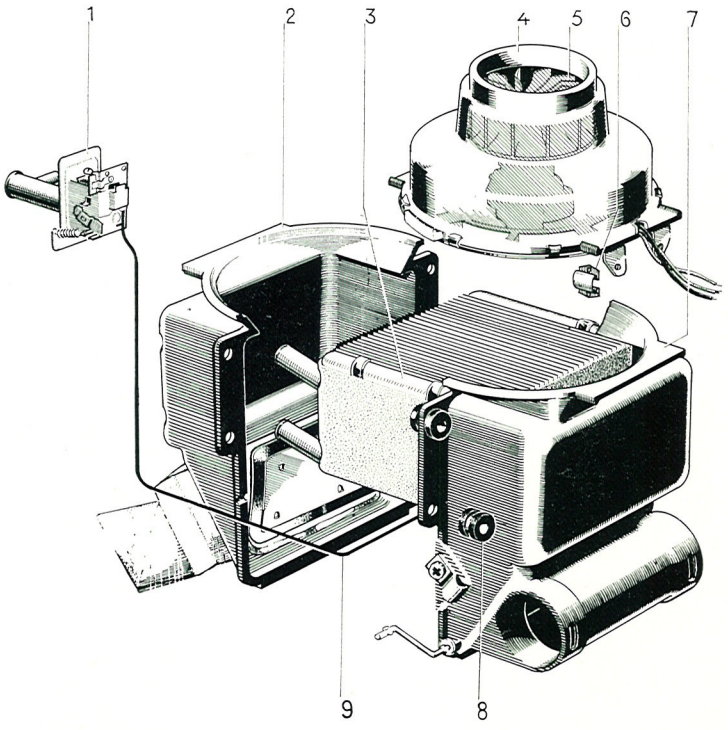

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Fig. 9-15. Heater unit, dismantled

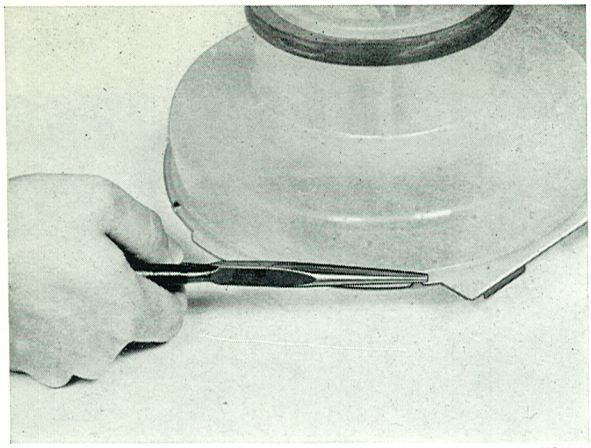

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Fig. 9-16. Dismantling the mounting plate

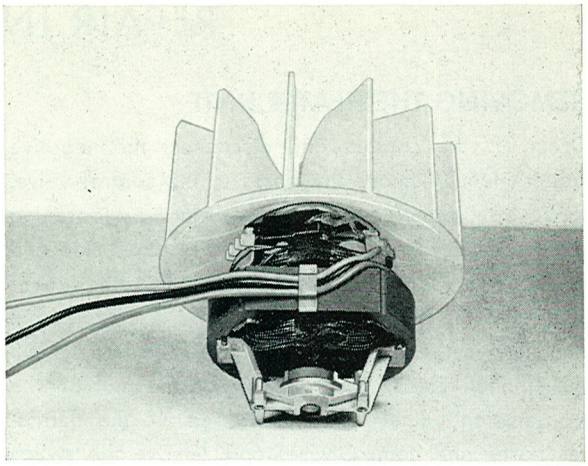

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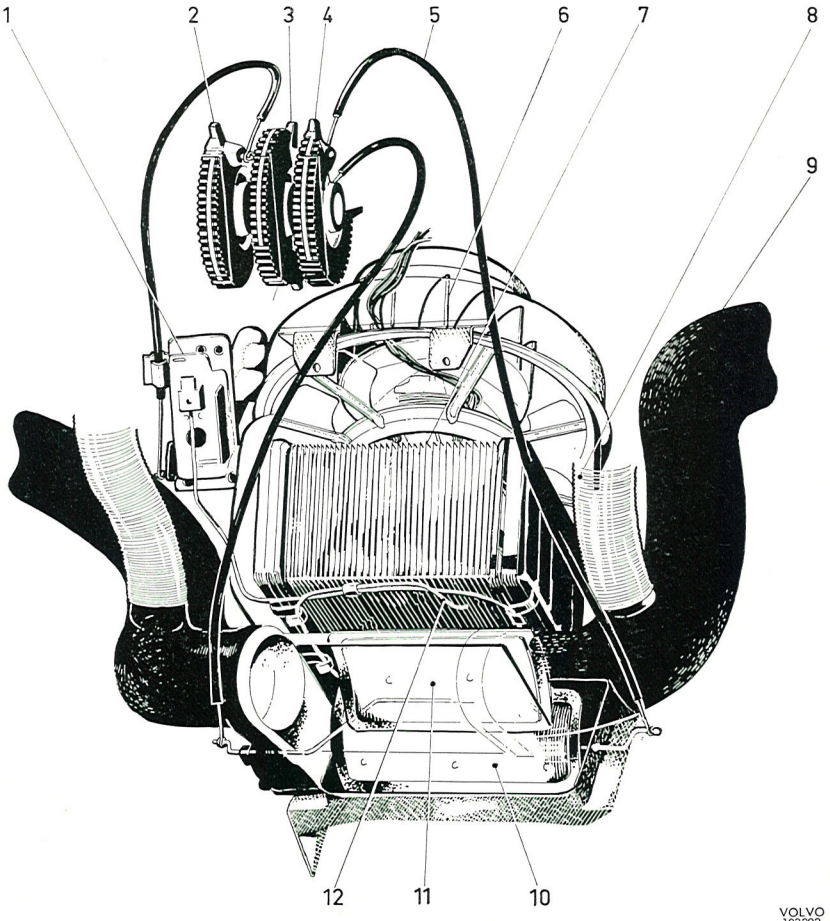
Fig. 9-17. Fan motor



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1. Heat control valve
2. Heater control
3. Defroster control
4. Heat control, floor
5. Cable
6. Fan blade
7. Cell system
8. Air hose to centre defroster nozzle
9. Air hose to side defroster and rear window
10. Shutter for floor
11. Shutter for defroster
12. Sensitive body

Fig. 9-18. Heater unit controls

DISMANTLING THE HEATER UNIT

Remove the four rubber bushings on the sides of the heater unit. Mark the fan casing to facilitate reassembly. Remove the spring clips which hold the heater, Fig. 9-14, and separate the two halves. This exposes both the cell system with sensitive body for control valve and the fan motor.

REPLACING THE FAN MOTOR

Remove the heater unit and dismantle it as described above. Mark the mounting plate in relation to the fan casing. Loosen the mounting plate with fan motor from the fan casing by straightening the tabs as shown in Fig. 9-16.

Remove the screws which hold the fan motor to the mounting plate. Exchange the fan motor and replace the screws which hold it to the mounting plate. Replace the mounting plate on the fan casing.

Reassemble the heater unit and mount it in the vehicle in accordance with the following description.

ASSEMBLING THE HEATER UNIT

Scrape off the previous sealing agent and replace it with a suitably soft sealing agent. Replace the cell system with sensitive body and reassemble the casing halves. Replace the spring clips and the rubber bushings.

FITTING THE HEATER UNIT

Place the heater unit in position and connect the draining hose. Fit the four screws which hold the heater to the brackets. Connect the earthing cables to the right-hand bracket. Fit the control valve and the upper hose to the heater. Fit the fusebox to the heater. Connect the cables from the fan motor to the switch and mount the switch in the dashboard. Fit the control wires to the shutters and control valve. Fit the defroster hoses and replace the mat on the transmission tunnel. Fasten the panel in position below the dashboard. Fit the hoses to the control valve. Connect the negative battery cable and refill the coolant system.

REMOVING THE HEATER UNIT CONTROLS

The controls are of integral design, see Fig. 9-18. The unit is fixed to the dashboard with three nuts. For removal, first loosen the panel below the dashboard. Next loosen the wires on the heater unit and control valve. Removal of the control lighting lamps is carried out by pulling them straight out from the holders. Remove the three nuts and take out the control unit.

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