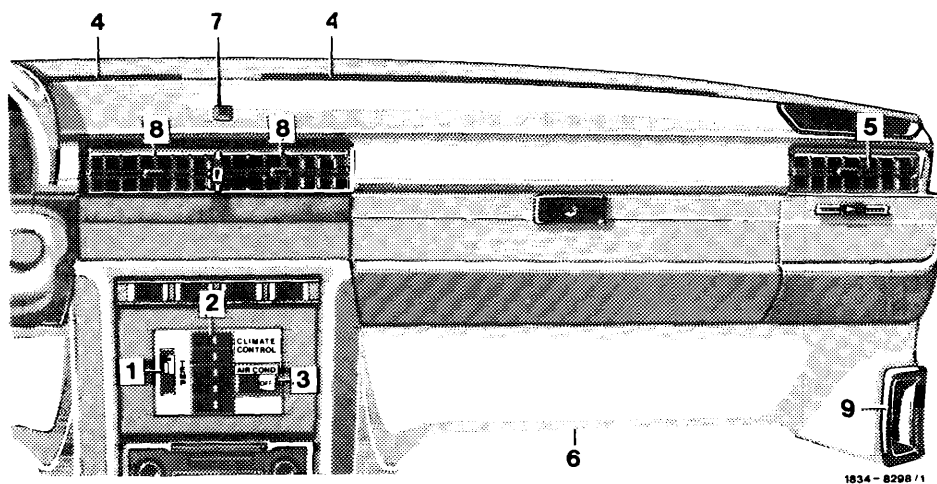


A. General



- |  |                                    |                             |
|--|------------------------------------|-----------------------------|
| 1 Temperature dial                       | 4 Air outlet from defroster nozzle | 7 In-car temperature sensor |
| 2 Pushbutton switch                      | 5 Lateral ventilation              | 8 Cooling air outlet center |
| 3 „ON/OFF” switch refrigerant compressor | 6 Air outlet in legroom            | 9 Air outlet in doors       |

The automatic climate control system is provided with an automatic temperature control, by means of which a given temperature between 18 °C to approx. 30 °C (64 °F to 86 °F) can be set, which will then be maintained automatically and independent of changes in outside temperature.

Apart from the automatic control which is covered in detail below, the basic components of the heating and air conditioning system are similar to those described in repair instructions air conditioning system I.

The automatic climate control system comprises the following main components:

Control unit (with temperature dial, pushbutton switch and „ON/OFF“ switch for refrigerant compressor)

In-car and ambient temperature sensor

Amplifier

Regulating valve

Electrical and vacuum system for controlling entire installation

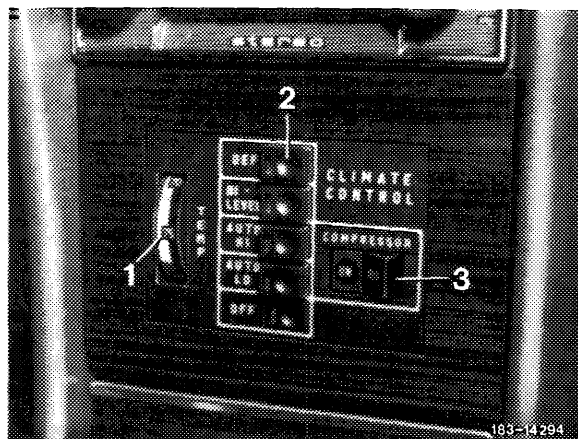
Temperature control

## B. Control unit

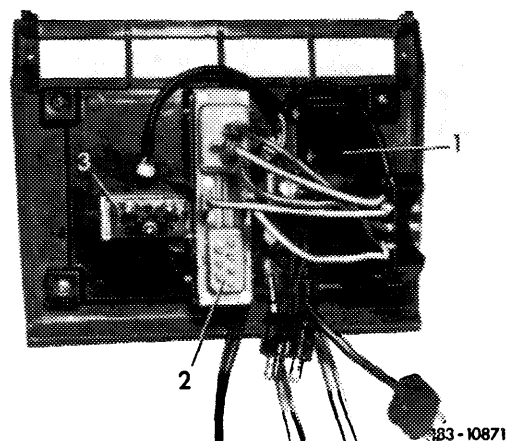
The control unit is located in dome and comprises a temperature dial (1), a pushbutton switch (2) and the refrigerant compressor „ON/OFF“ switch (3). The temperature dial (1) serves to adjust vehicle inside temperatures from 18 °C to approx. 30 °C (approx. 64 °F to 86 °F).

### Layout of control unit

- 1 Temperature selector
- 2 Pushbutton switch
- 3 „ON/OFF“ switch refrigerant compressor



The temperature dial carries 5 numerals (65 – 70 – 75 – 80 – 85) to set the desired temperature. Turning of temperature dial will adjust a resistance-potentiometer. Together with the inside and outside temperature sensor (in-car and ambient temp sensor) the potentiometer provides the desired value for temperature control.



- 1 Temperature dial with potentiometer
- 2 Pushbutton switch
- 3 „ON/OFF“ switch of refrigerant compressor

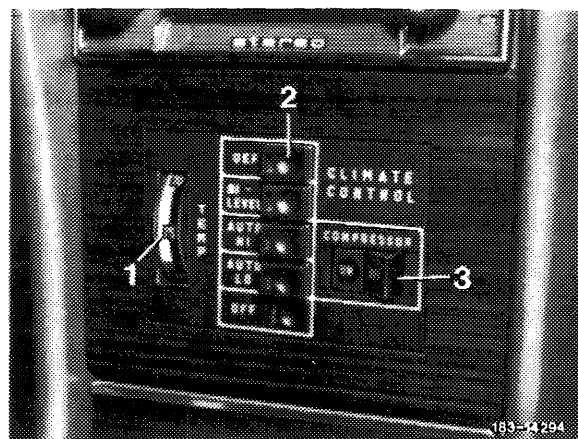
The pushbutton switch (2) is a component of the control unit (controller) and comprises 5 pushbuttons:

**OFF** — blower switched off, no fresh air input.

The electronic system continues to operate while driving and the regulating valve remains in operating position. The fresh air flap in blower housing is closed and the refrigerant compressor is inoperative.

#### **AUTO-LO** — for normal driving

In cooling range the system operates with 5 blower stages, in heating range with 4 stages. The max. blower speed in cooling range is higher than the max. blower speed in heating range. The temperature is held to preselected level. In heating range, the system begins to operate only when the coolant has attained 40 °C (approx. 104 °F). The fresh air flap will open only then and the blower will be switched on. In cooling range, the blower will usually start immediately.



In heating range, tempered air will flow out of legroom nozzles, with a leak air share from defroster nozzles. In cooling range, cooled air will come out of center jet and lateral jets, with a leak air share from defroster nozzles (up to July 1978, starting August 1978 no more leak air in cooling range. The changeover is automatic. In addition, tempered air will always come out of lateral venting jets. Closing and opening of these jets is always manually.

#### **AUTO-HI** — with higher blower output

Operation similar to „AUTO-LO“ but with higher blower stages. In cooling range, the system operates with 3 stages, in heating range with 2 stages.

This kind of adjustment permits:

1. Maintaining a breathing temperature also in city traffic, when the air supply decreases due to a lower driving speed.
2. Providing enough fresh air for passengers on rear seats also under extreme temperature conditions.
3. Fast evacuation of cigarette smoke.

#### BI-LEVEL under fog conditions

The blower operates in the higher stages 1 and 2 and will start already at a coolant temperature below 40 °C (104 °F). When „heating”, all the air will enter trough defroster nozzle, into legroom and through nozzles of lateral ventilation; when „cooling” through defroster nozzles, into legroom, at center nozzles and nozzles of lateral ventilation, if they are open. The air is tempered in accordance with the setting of temperature dial and in-car temperature. This function serves the purpose of removing the fog from the window. In addition, this mode is particularly recommended at low outside temperatures.

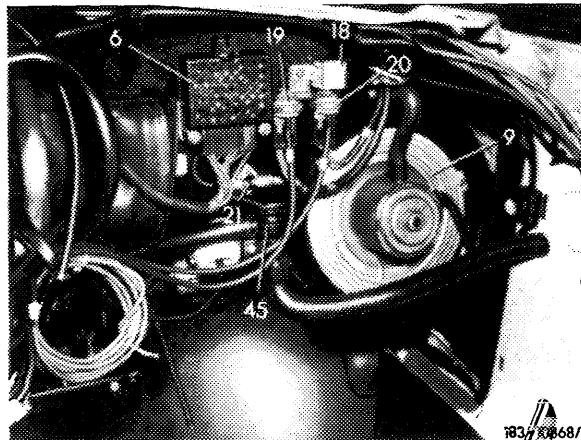
#### DEF — defrosting windows

The blower starts immediately and operates in higher 4th stage only. Max. heated air flows out of defroster nozzles, independent of outside or inside (ambient or in-car temperature) or adjustment of temperature dial (83–605).

**Note:** In position „DEF” the blower is immediately switched on independent of the vacuum directly via double contact relay (18) and in poition „BI-LEVEL” by means of a vacuum circuit. But if at a coolant temperature below 40 °C (104 °F) the mode „AUTO-LO” or „AUTO-HI” is subsequently pushed, the blower remains engaged, since the main switch (19) is already activated by a vacuum. In such a case, the blower can only be switched off by way of the position „OFF” when the coolant temperature is above 40 °C (104 °F).

#### Layot of blower with amplifier

- |  |  |
|--|--|
| 6 Amplifier                              | 20 Vacuum switch<br>(refrigerant compressor, yellow) |
| 9 Blower                                 |  |
| 18 Double contact relay                  | 21 Temperature switch<br>for heating water pump      |
| 19 Vacuum switch<br>(main switch, green) | 45 Air jet nozzle                                    |



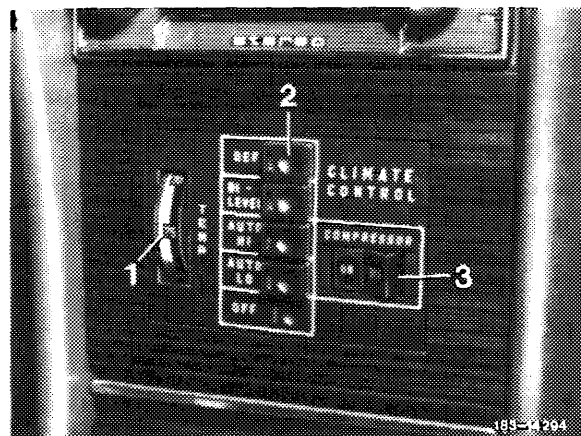
The fresh air-recirculated air changeover switch in blower housing has 3 positions:

During mode selection „OFF”: No fresh air input.

In all operating stages: 100 % fresh air, except  
during max. cooling: 20 % fresh air and  
80 % recirculated air.

#### ON/OFF switch refrigerant compressor

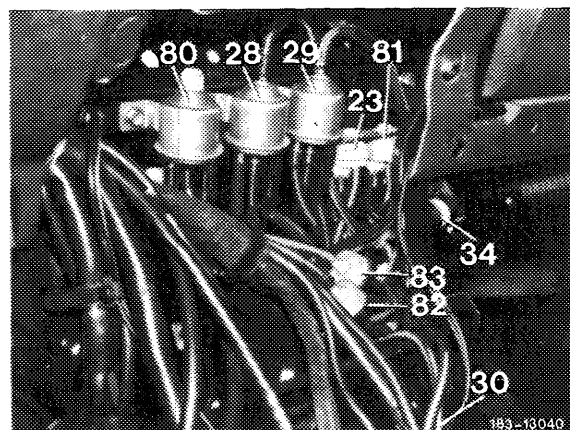
Since the refrigerant compressor is always operating at an outside temperature above 2 °C (36 °F), the compressor can be completely switched off in positions „AUTO-LO” and „AUTO-HI”; e.g. to save fuel or if no cooling is desired. However, the refrigerant compressor will nevertheless run along in modes „BI-LEVEL” and „DEF” to support the effect of this mode by drying the air.



In position „OFF” of refrigerant compressor switch (3) and in range of max. cooling, the switchover valves (28 and 29) will open the flap in blower housing into position of 100 % fresh air as well as the flaps in air ducts – center for legroom under climate control cabinet.

#### Layout of switchover valves with vacuum switch

- |  |                                       |
|--|---------------------------------------|
| 23 Vacuum switch for refrigerant compressor at „BI-LEVEL” only | 34 Check valve                        |
| 28 Switchover valve  | 38 Specified leak point               |
| 29 Switchover valve  | 80 Switchover valve („BI-LEVEL”)      |
| 30 Vacuum lines  | 81 Vacuum switch (at „BI-LEVEL” only) |
|  | 82 Check valve                        |
|  | 83 Check valve                        |

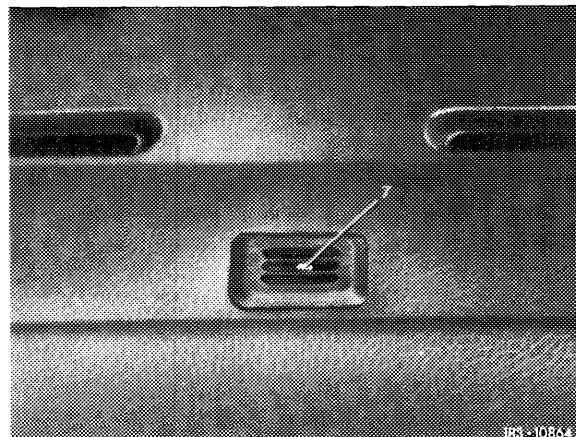


#### C. In-car and ambient temperature sensor

The in-car temperature sensor (7) is located under a grille at top in instrument panel. The sensor feels the in-car temperature and transmits that temperature to the amplifier (6) to balance the temperature as set.

#### Layout of in-car temperature sensor

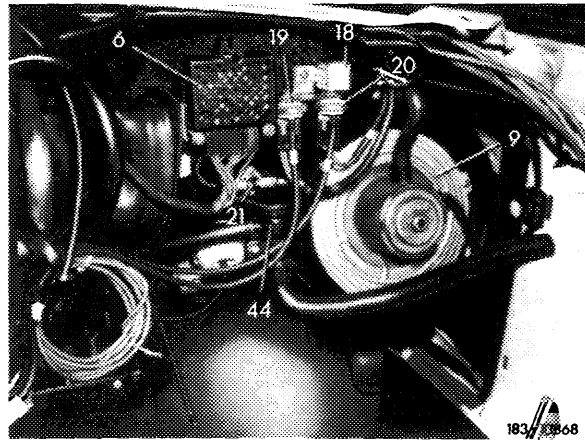
- 7 In-car temperature sensor



An air jet nozzle (45) attached to blower housing will draw air from interior of vehicle by way of the in-car temperature sensor while the blower is running. As a result, the response period of the sensor is shortened and the control accuracy is increased.

#### Layot of blower with amplifier

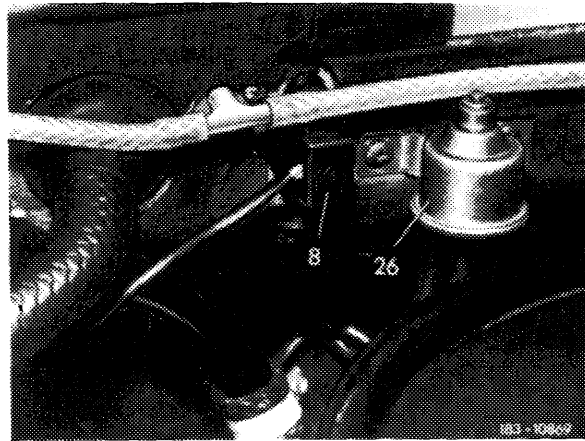
- |                         |                                  |
|-------------------------|----------------------------------|
| 6 Amplifier             | 20 Vacuum switch                 |
| 9 Blower                | (refrigerant compressor, yellow) |
| 18 Double contact relay | 21 Temperature switch for        |
| 19 Vacuum switch        | heating water pump               |
| (main switch, green)    | 45 Air jet nozzle                |



The ambient temperature sensor (8) for the drawn-in fresh air is located in air duct (water tank) in front of blower. With the blower running, the fresh air is constantly circulating around sensor, which in turn results in a short response period. Both sensors are temperature-sensitive resistors (thermistors) and are connected in series with potentiometer on temperature dial.

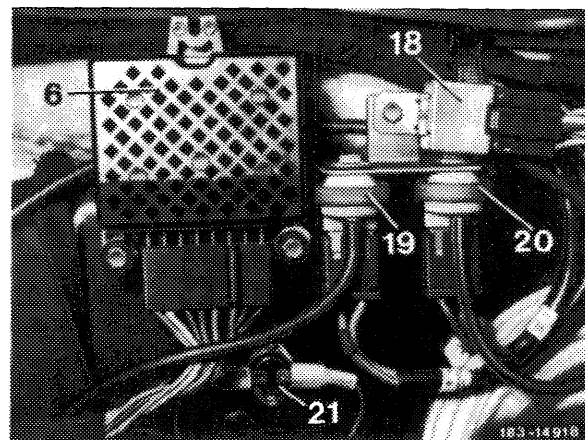
#### Layot of ambient temperature sensor

- |  |
|--|
| 8 Ambient temperature sensor                       |
| 26 Switchover valve for maintaining contant speed, |
| not on model 116.020/120 (ignition switchover      |
| color code yellow)                                 |



## D. Amplifier

The amplifier (6) is attached to blower housing and compares the entire resistance of the chain: In-car temperature sensor, ambient temperature sensor, adjusting potentiometer and feed back potentiometer by means of a fixed resistor in amplifier. If these components are not balanced, a difference in potential will result which, in amplified condition, will drive the servo motor in regulating valve until both resistors are once a again in balance.



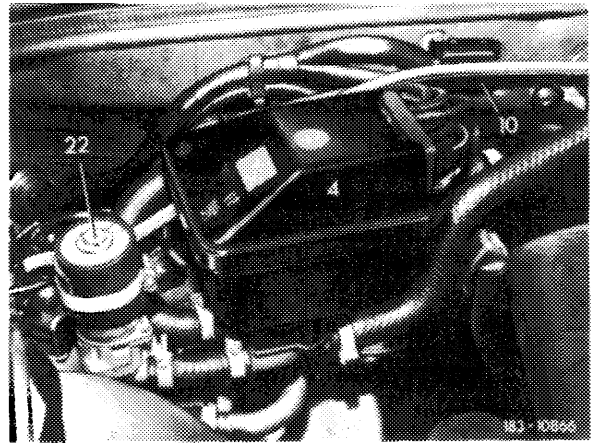
If the ignition is switched off the amplifier, independent of sensor temperatures and temperature setting, sends the signal to the regulating valve to move into „parking position“ (2nd cooling stage). When the „DEF“ button is pushed the amplifier, again independent of the temperature adjustment or sensor temperature, sends the signal to the regulating valve to move into the max. heating position (higher 4th stage „DEF“.

## E. Regulating valve

The regulating valve (4) is driven by a gear motor and runs through the positions from max. heating to max. cooling, while adjusting a feed back potentiometer by means of which the amplifier (6) regulates the respective position. The following adjustments are made while running from heating to cooling:

Layout of regulating valve with heating water pump

- 4 Regulating valve
- 10 Preresistor for blower
- 22 Heating water pump

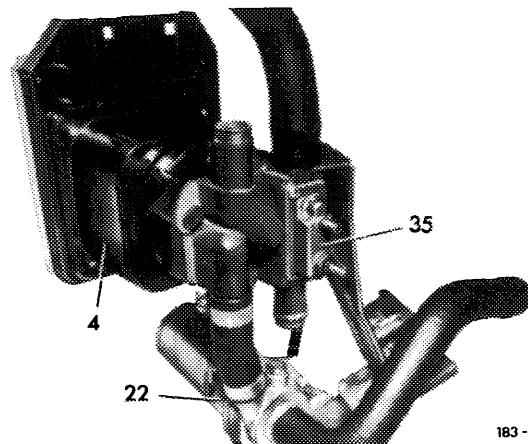


- a) The water valve which controls the heating water flow from max. flow to 0.
- b) Sliding contacts for connection of preresistance group (10), for all blower stages.
- c) The vacuum valve, which controls the various flap positions of the air outlet nozzles and the flap in blower housing.

## F. Electrical and vacuum system for controlling entire installation

### a) Temperature switch for blower (cold engine lock)

This switch (35) is at bottom of regulating valve (4) and consists of a bimetallic vacuum switch. The switch releases vacuum starting at a coolant temperature of 40 °C (104 °F) or at an ambient temperature above 20 °C (68 °F). In position „AUTO-LO“ or „AUTO-HI“ the blower will start only if one of the specified temperatures is attained. The temperature switch (35) can be individually replaced.



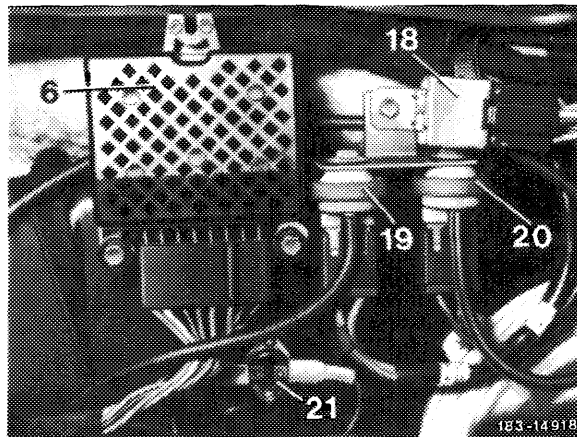
Layout of temperature switch in regulating valve

- 4 Regulating valve
- 22 Heating water pump
- 35 Temperature switch  
(water valve)

183 - 10872

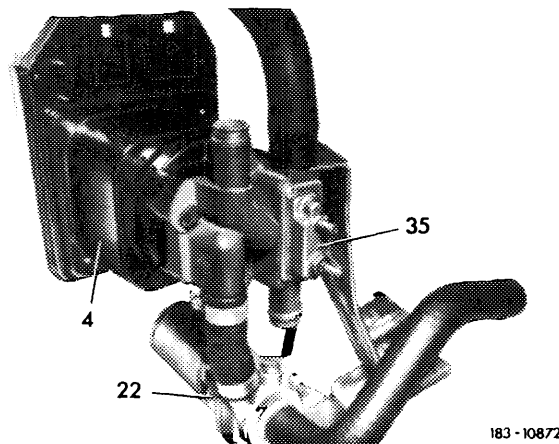
### b) Vacuum-solenoid switch (main switch)

This switch (19), color code green is actuated by a vacuum. The vacuum arrives by way of temperature switch (35) and engages the blower, if set to „AUTO-LO“ or „AUTO-HI“ and a vacuum of more than 125 mbar (0.18 atu) is applied. In position „DEF“ the blower is switched on directly via double contact relay (18) independent of vacuum.



### c) Vacuum-solenoid switch for refrigerant compressor

This switch (20), color code yellow, is also actuated by a vacuum. The vacuum is also supplied via temperature switch (35) and engages the refrigerant compressor if a vacuum of more than 78.5 mbar (0.08 atu) is available and if the pressure switch (25) and the ETR-switch (24) have an unobstructed passage (refer to 83-612).

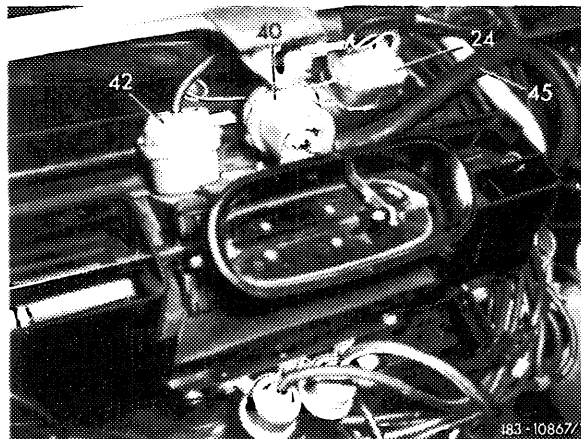


Layout of temperature switch in regulating valve

- |                       |                       |
|-----------------------|-----------------------|
| 4 Regulating valve    | 35 Temperature switch |
| 22 Heating water pump | (water valve)         |

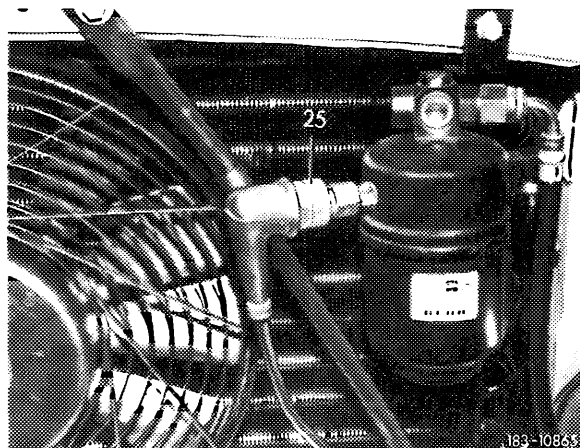
Layout ETR-switch and vacuum elements for center and defroster nozzles

- |  |
|--|
| 24 ETR-switch                                |
| 40 Vacuum element for center nozzles         |
| 42 Vacuum element for defroster nozzles      |
| 45 Hose from in-car sensor to air jet nozzle |

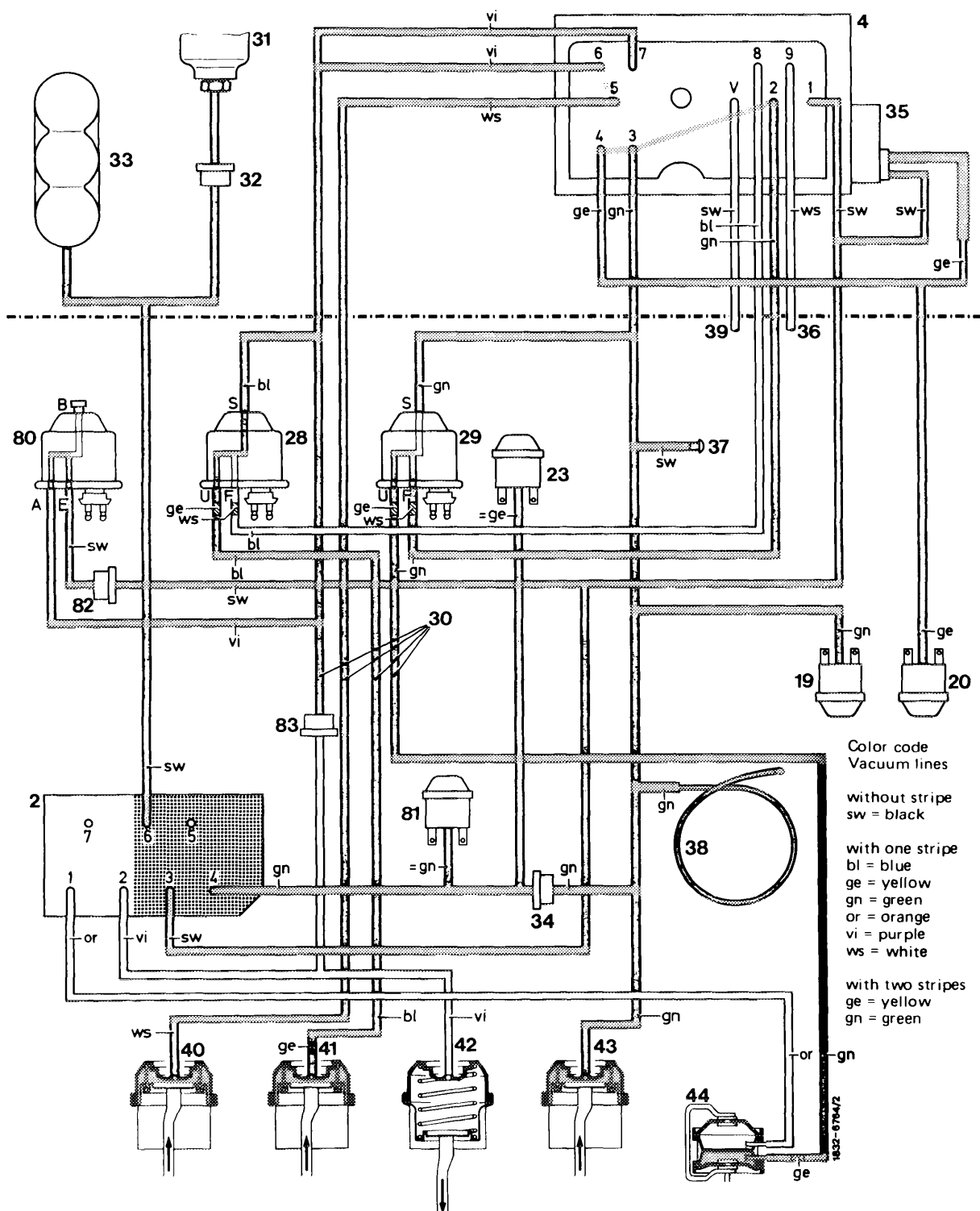


Layout of pressure switch in receiver dehydrator

- |                    |
|--------------------|
| 25 Pressure switch |
|--------------------|







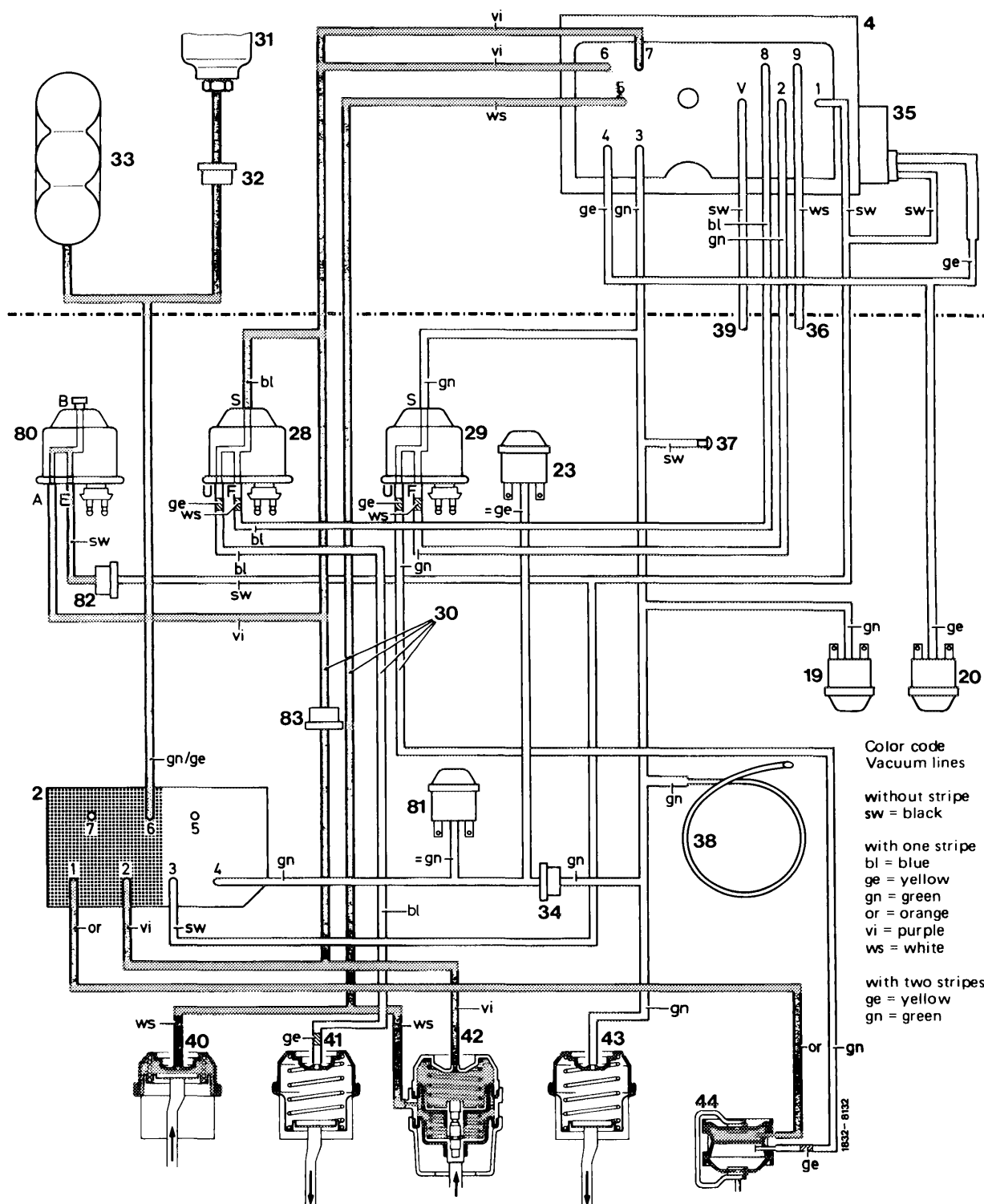
Vacuum function diagram (version 1 up to July 1978)

Pushbutton switch at „BI-LEVEL“, „ON/OFF“ switch refrigerant compressor at „ON“

Regulating valve in position „cooling“, coolant temperature  $< 40^{\circ}\text{C}$  ( $< 104^{\circ}\text{F}$ ),

(temperature switch [35] without influence)

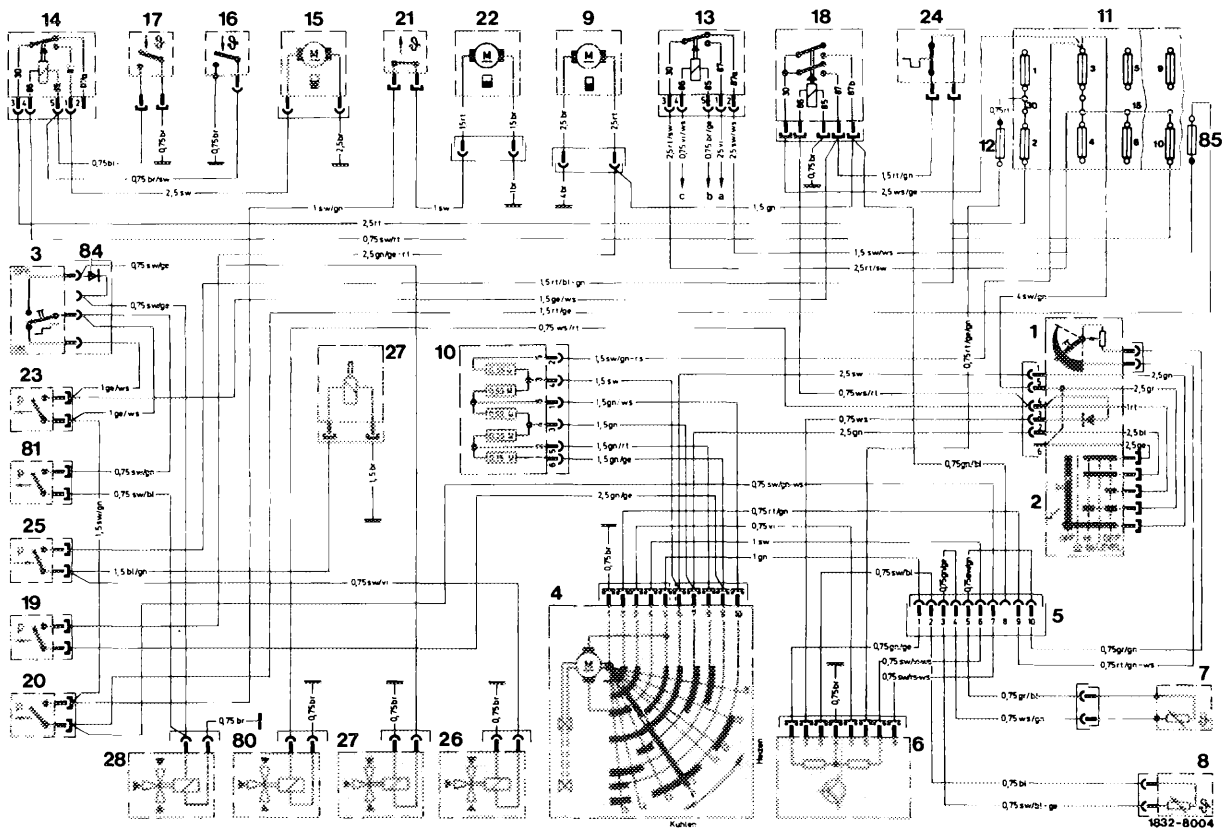
- |   |  |  |
|---|--|--|
| 2 Pushbutton switch   | 33 Vacuum reservoir                                | 42 Vacuum element for defroster nozzles (flaps „open“)   |
| 4 Regulating valve  | 34 Check valve                                     | 43 Vacuum element for fresh air portion of fresh air-recirculating air changeover switch                 |
| 19 Vacuum switch (main switch, green)                               | 35 Temperature switch                              | 44 Vacuum element for fresh air-recirculating air changeover switch (flap „open“ 100 % fresh air supply) |
| 20 Vacuum switch (refrigerant compressor, yellow)                   | 36 Vent line for legroom flaps                     | 80 Switchover valve „BI-LEVEL“ (at „DEF“ only)   |
| 23 Vacuum switch (for refrigerant compressor, at „BI-LEVEL“ only)   | 37 Vacuum connection for tester                    | 81 Vacuum switch (at „BI-LEVEL“ only)  |
| 28 Switchover valve (legroom flaps)                                 | 38 Specified leak point                            | 82 Check valve   |
| 29 Switchover valve (fresh air-recirculating air changeover switch) | 39 Vent line for regulating valve                  | 83 Check valve   |
| 30 Vacuum lines   | 40 Vacuum element for center nozzles (flap „open“) |  |
| 31 Vacuum connection at intake pipe                                 | 41 Vacuum element for legroom flaps (flaps „open“) |  |



Vacuum function diagram (version 2 starting August 1978)

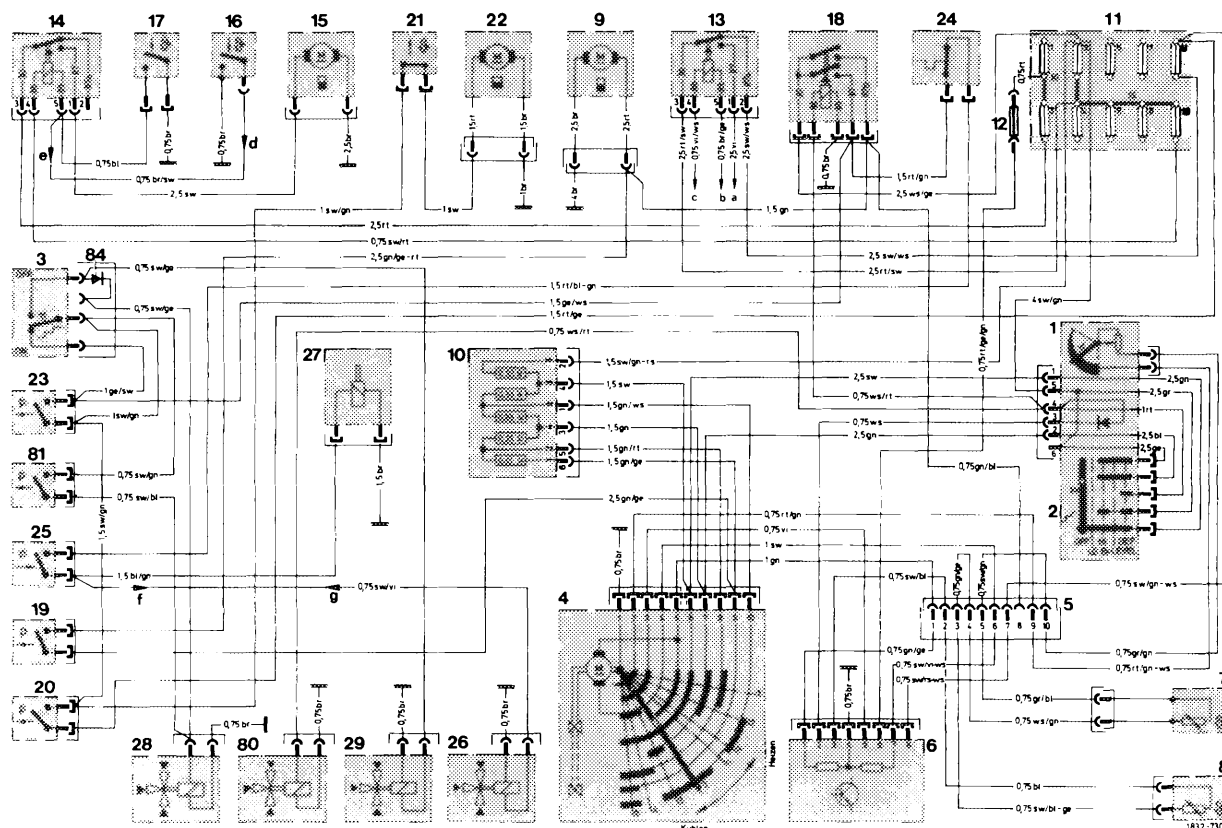
Pushbutton switch at „OFF“, „ON/OFF“ switch refrigerant compressor at „ON“

- |   |  |   |
|---|--|---|
| 2 Pushbutton switch   | 33 Vacuum reservoir                                  | 42 2-stage vacuum element for defroster nozzles (flaps „closed“)  |
| 4 Regulating valve  | 34 Check valve                                       | 43 Vacuum element for fresh air portion of fresh air-recirculating air changeover switch                |
| 19 Vacuum switch (main switch, green)                               | 35 Temperature switch                                | 44 Vacuum element for fresh air-recirculating air changeover switch (flap „closed“ no fresh air supply) |
| 20 Vacuum switch (refrigerant compressor, yellow)                   | 36 Vent line for legroom flaps                       | 80 Switchover valve „BI-LEVEL“ (at „DEF“ only)  |
| 23 Vacuum switch (for refrigerant compressor, at „BI-LEVEL“ only)   | 37 Vacuum connection for tester                      | 81 Vacuum switch (at „BI-LEVEL“ only)   |
| 28 Switchover valve (legroom flaps)                                 | 38 Specified leak point                              | 82 Check valve  |
| 29 Switchover valve (fresh air-recirculating air changeover switch) | 39 Vent line for regulating valve                    | 83 Check valve  |
| 30 Vacuum lines   | 40 Vacuum element for center nozzles (flap „open“)   |   |
| 31 Vacuum connection at intake pipe                                 | 41 Vacuum element for legroom flaps (flaps „closed“) |   |
| 32 Check valve  |  |   |



Electric wiring diagram, ignition off, regulating valve in position „parking“ (standard)

- 1 Temperature dial
- 2 Pushbutton switch
- 3 „ON/OFF“ switch refrigerant compressor
- 4 Regulating valve
- 5 10-point plug connection for tester
- 6 Amplifier
- 7 In-car temperature sensor
- 8 Ambient temperature sensor
- 9 Blower
- 10 Pre-resistance for blower
- 11 Main fuse box  
Fuse 2 : 16 amps  
Fuse 3 : 16 amps  
Fuse 10 : 16 amps
- 12 Additional fuse for amplifier (2 amps)
- 13 Relay air conditioning system
- 14 Relay auxiliary fan
- 15 Auxiliary fan
- 16 Temperature switch 100 °C (212 °F) thermostat housing for auxiliary fan
- 17 Temperature switch 62 °C (142 °F) in receiver dehydrator for auxiliary fan
- 18 Double contact relay
- 19 Vacuum switch (main switch, closes with vacuum higher than 175 mbar or 0.18 atu)
- 20 Vacuum switch (refrigerant compressor, closes with vacuum higher than 78.5 mbar or 0.08 atu)
- 21 Temperature switch for heating water pump (22) 16 °C (61 °F) ON, 26 °C (79 °F) OFF
- 22 Heating water pump
- 23 Vacuum switch (for refrigerant compressor, closes with vacuum higher than 78.5 mbar or 0.08 atu, at „BI-LEVEL“ only)
- 24 ETR-switch 2 °C (36 °F)
- 25 Pressure switch refrigerant compressor  
ON 2.6 bar gauge pressure (2.6 atu)  
OFF 2.0 bar gauge pressure (2.0 atu)
- 26 Switchover valve for constant speed (not on model 116.020)
- 27 Electromagnetic clutch for refrigerant compressor
- 28 Switchover valve for vacuum element of legroom flaps
- 29 Switchover valve for vacuum element of fresh air recirculating air changeover switch
- 30 Switchover valve „BI-LEVEL“ (at „DEF“)
- 31 Vacuum switch (closes with vacuum higher than 78.5 mbar or 0.08 atu, at „BI-LEVEL“ only)
- 32 Diode
- 33 Additional fuse (5 amps) for heating water pump, refrigerant compressor and amplifier
  - a Cable connector starter terminal 50
  - b Starter lockout and back-up lamp switch
  - c Ignition starter switch terminal 50



Electric wiring diagram, ignition off, regulating valve in position „parking“ (USA)

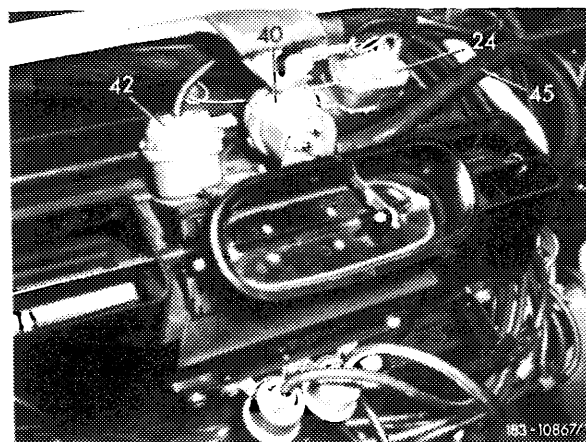
- |   |   |
|---|---|
| 1 Temperature dial  | 20 Vacuum switch (refrigerant compressor, closes with vacuum higher than 78.5 mbar or 0.08 atu)                           |
| 2 Pushbutton dial   | 21 Temperature switch for heating water pump (22)<br>16 °C (61 °F) ON, 26 °C (79 °F) OFF                                  |
| 3 „ON/OFF“ switch refrigerant compressor  | 22 Heating water pump   |
| 4 Regulating valve  | 23 Vacuum switch (for refrigerant compressor, closes with vacuum higher than 78.5 mbar or 0.08 atu, at „BI-LEVEL“ only)   |
| 5 10-point plug connection for tester   | 24 ETR switch 2 °C (36 °F)  |
| 6 Amplifier   | 25 Pressure switch refrigerant compressor<br>ON 2.6 bar gauge pressure (2.6 atu),<br>OFF 2.0 bar gauge pressure (2.0 atu) |
| 7 In-car temperature sensor   | 26 Switchover valve for constant speed<br>(not on model 116.020)  |
| 8 Ambient temperature sensor  | 27 Electromagnetic clutch for refrigerant compressor  |
| 9 Blower  | 28 Switchover valve for vacuum element of legroom flaps   |
| 10 Pre-resistance for blower  | 29 Switchover valve for vacuum element of fresh air recirculating air changeover switch                                   |
| 11 Main fuse box<br>Fuse 2 : 16 amps<br>Fuse 3 : 16 amps<br>Fuse 9 : 16 amps<br>Fuse 10 : 16 amps | 80 Switchover valve „BI-LEVEL“ (at „DEF“)   |
| 12 Additional fuse for amplifier (2 amps)   | 81 Vacuum switch (closes with vacuum higher than 78.5 mbar or 0.08 atu, at „BI-LEVEL“ only)                               |
| 13 Relay air conditioning system  | 84 Diode  |
| 14 Relay auxiliary fan  | a Cable connector starter terminal 50   |
| 15 Auxiliary fan  | b Starter lockout and back-up lamp switch   |
| 16 Temperature switch 100 °C (212 °F) thermostat housing for auxiliary fan                        | c Ignition starter switch terminal 50   |
| 17 Temperature switch 62 °C (142 °F) in receiver dehydrator for auxiliary fan                     | d Via relay ignition switchover terminal 85   |
| 18 Double contact relay   | e Via relay decoupling terminal 30  |
| 19 Vacuum switch (main switch, closes with vacuum higher than 175 mbar or 0.18 atu)               | f Via relay ignition switchover terminal 87 a   |
|   | g Via relay ignition switchover terminal 30   |

#### d) ETR-switch (evaporator temperature regulator)

The ETR-switch (24) is attached at top of climate cabinet. The capillary of the switch is between the ribs of evaporator.

Layout of ETR-switch and vacuum elements for center and defroster nozzles (version 1)

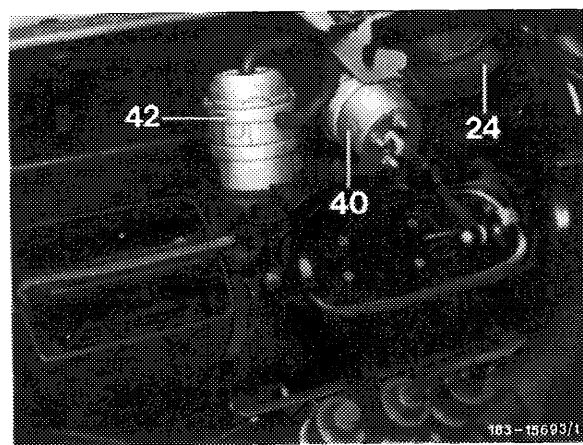
- 24 ETR-switch
- 40 Vacuum element for center nozzles
- 42 Vacuum element for defroster nozzles (up to July 1978)
- 45 Hose from in-car sensor to air jet nozzle



The switch interrupts the current flow to refrigerant compressor clutch, as soon as the rib temperature is below 2 °C (36 °F). This will prevent any icing up of evaporator.

Layout of ETR-switch and vacuum elements for center and defroster nozzles (version 2)

- 24 ETR-switch
- 40 Vacuum element for center nozzles
- 42 2-stage vacuum element for defroster nozzles (starting August 1978)

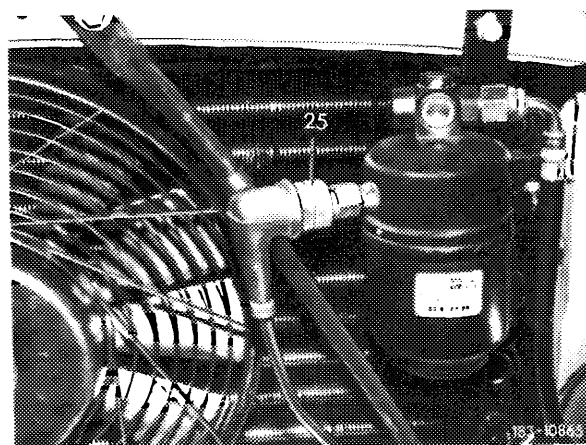


#### e) Pressure switch for refrigerant compressor

This switch (25) is located at receiver dehydrator of refrigerant circuit. When the refrigerant is not yet completely lost (high pressure too low) the pressure switch will switch off the electromagnetic clutch and thereby prevent damage to refrigerant compressor.

Layout of pressure switch in receiver dehydrator

- 25 Pressure switch

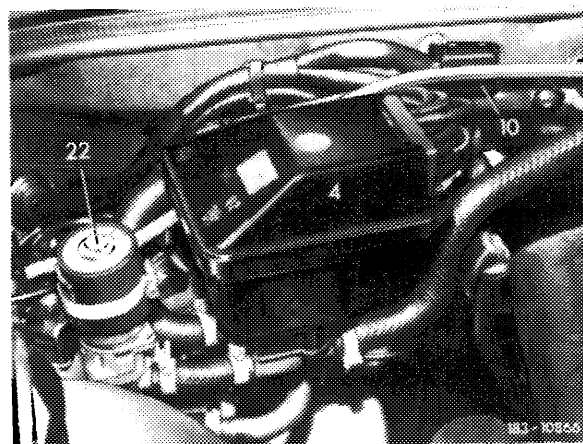


#### f) Resistor group for blower

The resistor group (10) has 5 resistors with ohmic values of different size (refer to wiring diagram). It is installed in air duct (water tank) in front of blower.

Layout of regulating valve with heating water pump

- 4 Regulating valve
- 10 Preresistor for blower
- 22 Heating water pump

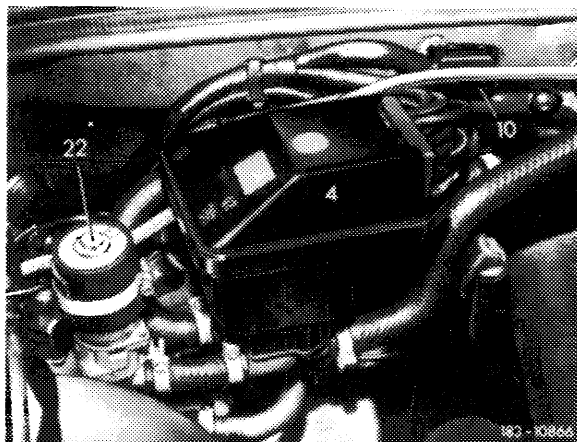


#### g) Heating water pump

The heating water pump (22) is located adjacent to regulating valve (4) and serves for maintaining a uniform heating water flow through heat exchanger also at low engine speed. The heating water pump (22) will be energized only, if the vacuum-solenoid switch (20) is closed.

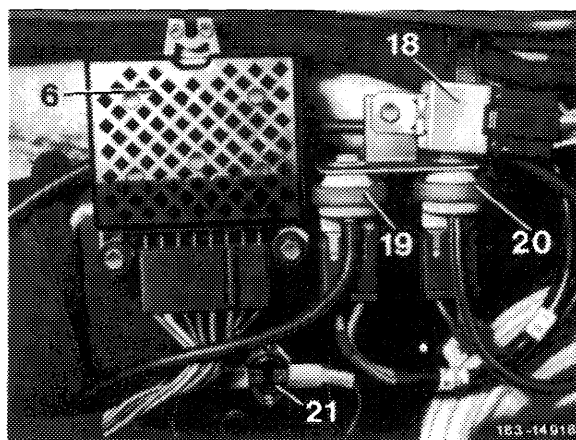
Layout of regulating valve with heating water pump

- 4 Regulating valve
- 10 Preresistor for blower
- 22 Heating water pump



In position „OFF“ or at an outside temperature above 26 °C (79 °F) the heating water pump is switched off by the temperature switch (21).

- 6 Amplifier
- 18 Double contact relay
- 19 Vacuum switch (main switch, green)
- 20 Vacuum switch (refrigerant compressor, yellow)
- 21 Temperature switch for heating water pump



#### h) Double contact relay

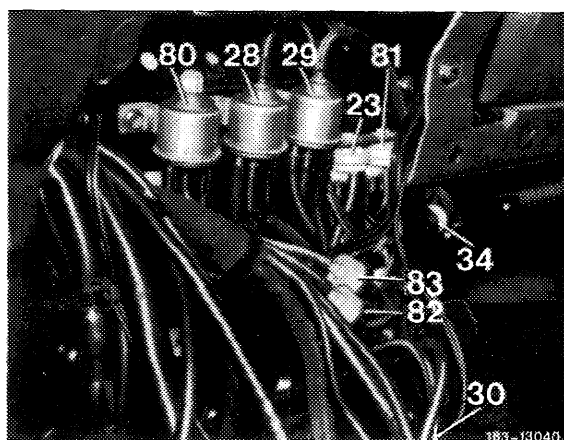
During mode „DEF“ and in the event of a malfunction of vacuum supply, the double contact relay (18) will bridge the main switch (19) and thereby permit defrosting of windows and heating as an emergency operation.

#### i) Vacuum-actuated „BI-LEVEL“ switch

During „BI-LEVEL“ mode this switch (23) will short the circuit if the „ON/OFF“ switch of the refrigerant compressor is in „OFF“ position. As a result, the refrigerant compressor will therefore always run along in these modes to de-humidify the air except when it is switched off via the temperature switch.

Layout of switchover valves with vacuum switch

- 23 Vacuum switch for refrigerant compressor only at „BI-LEVEL“
- 28 Switchover valve
- 29 Switchover valve
- 30 Vacuum lines
- 34 Check valve
- 38 Specified leak point
- 80 Switchover valve („BI-LEVEL“)
- 81 Vacuum switch (at „BI-LEVEL“ only)
- 82 Check valve
- 83 Check valve



#### j) Vacuum lines

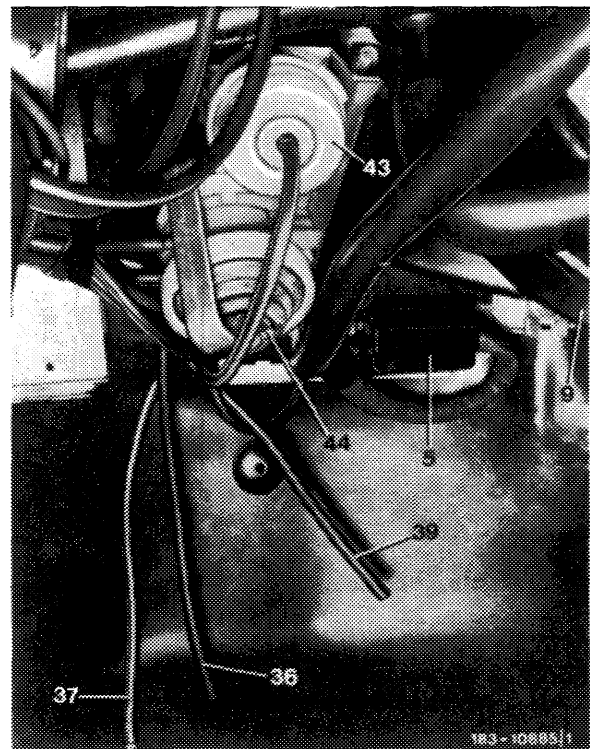
For the entire vacuum system the vacuum lines (30) are designed in such a manner (color coded or hose lines vulcanized into couplings), that mistakes are hardly possible.

#### k) Connection for tester

For connection of tester to system a 10-point plug connection is located underneath instrument panel at the right. The electrical connection and the vacuum connection are accessible upon removal of righthand lower panelling.

##### Layout of 10-point plug connection for tester

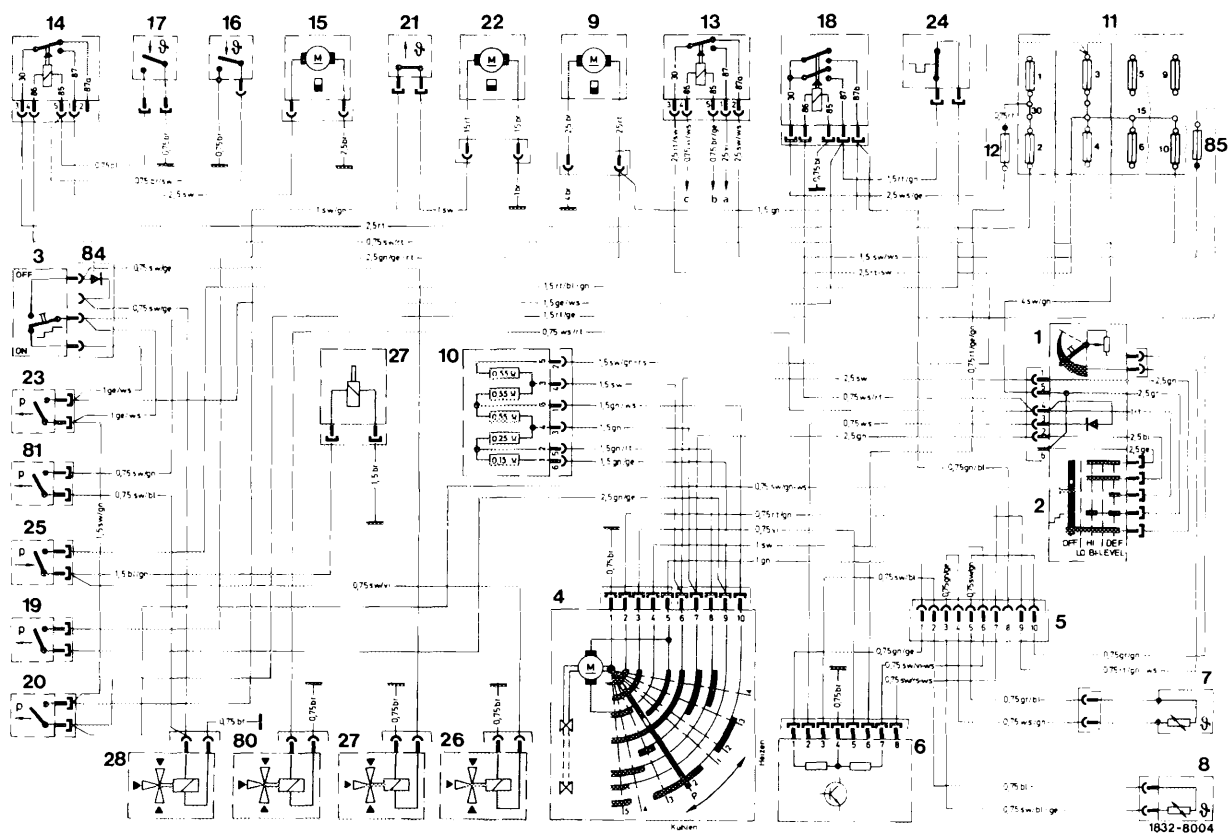
- 5 10-point plug connection for tester
- 9 Blower
- 36 Vent line for legroom flaps
- 37 Vacuum connection for tester
- 39 Vent line for regulating valve
- 43 Vacuum element for fresh air portion of fresh air-recirculating air changeover switch
- 44 Vacuum element of fresh air-recirculating air changeover switch



#### G. Temperature control

The in-car temperature sensor (7) and the ambient temperature sensor (8) are temperature-sensitive resistors (thermistors) and are connected in series with potentiometer of temperature dial (1) and feed back potentiometer in regulating valve (4). This resistor chain is compared with a fixed resistor in amplifier (6). Any deviations result in a difference in potential which is amplified by the amplifier (6) and drives the servo motor in regulating valve.

The regulating valve will continue changing its position until the resistor chain is once again in balance under influence of feedback potentiometer. At this moment the potential difference = 0. The amplifier is no longer delivering any current to servomotor in regulating valve.



Electric wiring diagram, ignition off, regulating valve in position „parking“ (standard)

- |   |   |
|---|---|
| 1 Temperature dial  | 20 Vacuum switch (refrigerant compressor, closes with vacuum higher than 78.5 mbar or 0.08 atu)                         |
| 2 Pushbutton switch   | 21 Temperature switch for heating water pump (22) 16 °C (61 °F) ON, 26 °C (79 °F) OFF                                   |
| 3 „ON/OFF“ switch refrigerant compressor  | 22 Heating water pump   |
| 4 Regulating valve  | 23 Vacuum switch (for refrigerant compressor, closes with vacuum higher than 78.5 mbar or 0.08 atu, at „BI-LEVEL“ only) |
| 5 10-point plug connection for tester   | 24 ETR switch 2 °C (36 °F)  |
| 6 Amplifier   | 25 Pressure switch refrigerant compressor ON 2.6 bar gauge pressure (atu) OFF 2.0 bar gauge pressure (atu)              |
| 7 In-car temperature sensor   | 26 Switchover valve for constant speed (not on model 116.020)   |
| 8 Ambient temperature sensor  | 27 Electromagnetic clutch for refrigerant compressor  |
| 9 Blower  | 28 Switchover valve for vacuum element of legroom flaps   |
| 10 Pre-resistance for blower  | 29 Switchover valve for vacuum element of fresh air-recirculating air changeover switch                                 |
| 11 Main fuse box<br>Fuse 2 : 16 amps<br>Fuse 3 : 16 amps<br>Fuse 10 : 16 amps       | 80 Switchover valve „BI-LEVEL“ (at „DEF“)   |
| 12 Additional fuse for amplifier (2 amps)   | 81 Vacuum switch (closes with vacuum higher than 78.5 mbar or 0.08 atu, at „BI-LEVEL“ only)                             |
| 13 Relay air conditioning system  | 84 Diode  |
| 14 Relay auxiliary fan  | 85 Additional fuse (5 amps) for heating water pump, refrigerant compressor and amplifier                                |
| 15 Auxiliary fan  | a Cable connector starter terminal 50   |
| 16 Temperature switch 100 °C (212 °F) thermostat housing for auxiliary fan          | b Starter lockout and back up lamp switch   |
| 17 Temperature switch 62 °C (142 °F) in receiver dehydrator for auxiliary fan       | c Ignition starter switch terminal 50   |
| 18 Double contact relay   |   |
| 19 Vacuum switch (main switch, closes with vacuum higher than 175 mbar or 0.18 atu) |   |

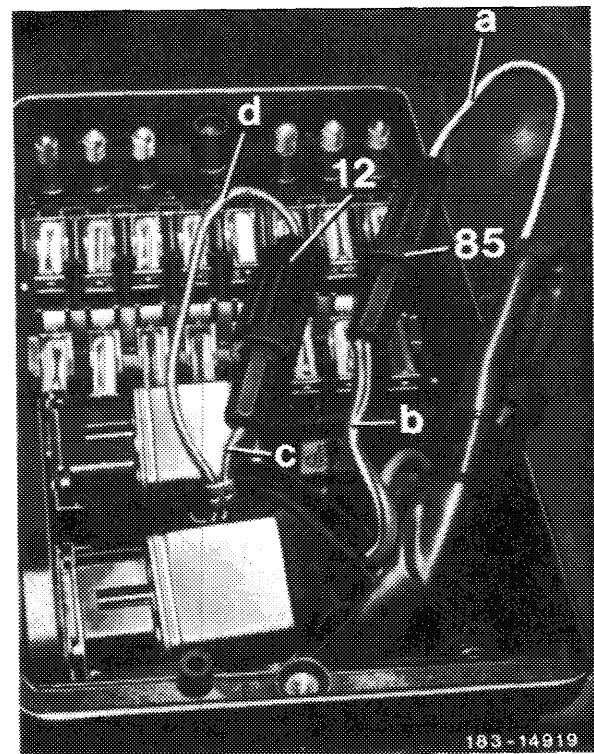
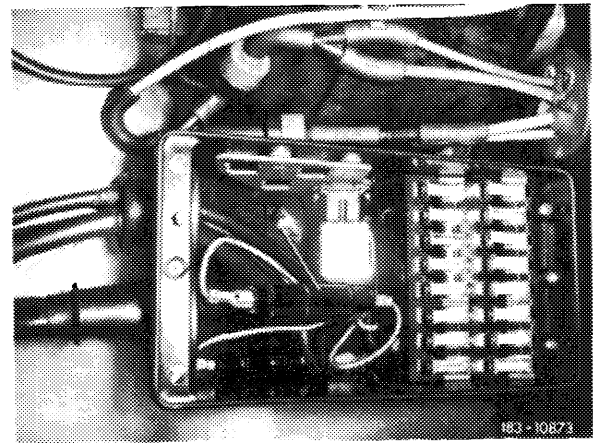
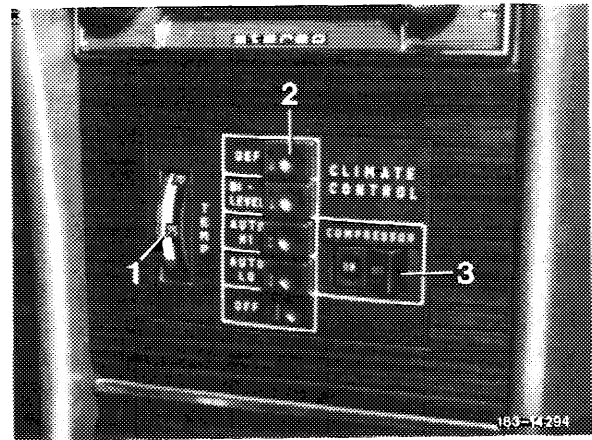


Example:

If the temperature dial (1) is set higher for a few degrees, the resistance of the potentiometer increases and thereby that of the entire resistor chain. A comparison with the fixed resistance results in a difference in potential which, upon amplification, drives the servo motor. The regulating valve will run in direction of „heating“ until the chain and the fixed resistor are again in balance. The vehicle will heat up, the in-car temperature sensor will then become a few degrees warmer, its resistance will drop. Another difference in potential in amplifier will result, this time a negative one. In amplified condition it will drive the servo motor in regulating valve in reverse until the system is again in balance and the preset temperature is attained.

When the ignition is switched off, the regulating valve moves into a parking position. The amplifier receives a direct electrical signal from battery (fuse 12). The amplifier will then make sure that the regulating valve moves into parking position (blower stage 2 — cooling). When the specified setting is attained, the valve will automatically switch off.

Layout of additional fuse for amplifier  
12 Additional fuse (USA)



Layout of additional fuses for refrigerant compressor,  
amplifier and heating water pump (standard)

- 12 Additional fuse for amplifier
- 85 Additional fuse for heating water pump, refrigerant compressor and amplifier

### Conventional tools

1 Tester ATC 331

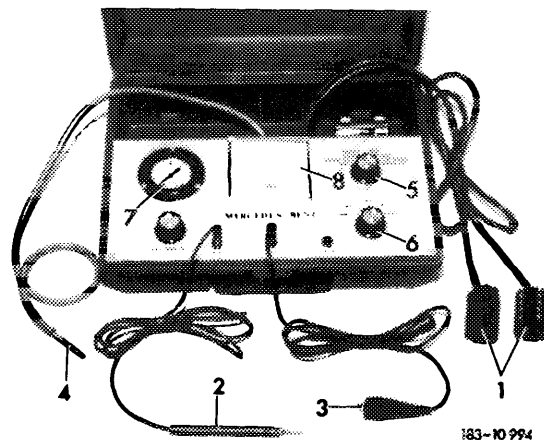
made by Deutsche Ranco GmbH  
Postfach 1560  
6832 Hockenheim

The tester is an auxiliary tool which puts artificial operating conditions into the automatic temperature control system for all its modes, from blower max. cooling to blower max. heating, without any regard to weather conditions.

When the tester is connected to the system, the ambient temperature sensor, the in-car temperature sensor and the temperature dial are bypassed by the tester. The bypass circuit takes the place of electrical signals as an input into the amplifier section to switch the system through its steps.

The vacuum measuring instrument (7) shows the vacuum in the system supplied to the main switch. The instrument shows when a flap changes its position by slight and fast descending and ascending (fluctuations) on vacuum readout.

- |                               |                               |
|-------------------------------|-------------------------------|
| 1 10-point plug connection    | 5 Voltmeter switch            |
| 2 Volt or ohmmeter needle     | 6 Mode switch                 |
| 3 Connection (vehicle ground) | 7 Vacuum measuring instrument |
| 4 Vacuum connection line      | 8 Voltmeter                   |

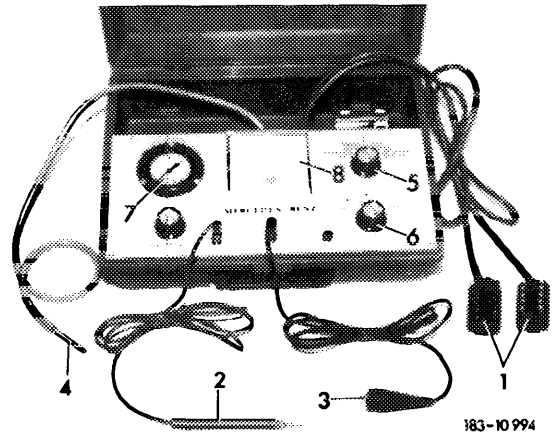


The voltmeter (8) shows changes of blower motor speeds and additionally checks the condition of the in-car and ambient temperature sensor, as well as temperature dial, amplifier and regulating valve.

A tester not used for testing should be in the „OFF“ position; damage may result if the tester remains switched on.

## Control knob — positions of tester

- |                               |                               |
|-------------------------------|-------------------------------|
| 1 10-point plug connection    | 5 Voltmeter switch            |
| 2 Volt or ohmmeter needle     | 6 Mode switch                 |
| 3 Connection (vehicle ground) | 7 Vacuum measuring instrument |
| 4 Vacuum connection line      | 8 Voltmeter                   |



The **voltmeter switch** (5) is a switch with six positions:

### OFF position:

In this position no voltage can be read on measuring instrument. If it is not used, leave knob in its position and put knob back into this position inbetween tests.

### BLOWER VOLTS position:

In this position, the blower motor voltage is read directly on voltmeter.

### AMBIENT SENSOR position:

In this position the voltage drop is measured via ambient temperature sensor.

### TEMPERATURE CONTROL position:

In this position the voltage drop is measured via temperature dial.

### IN-CAR SENSOR position:

In this position the voltage drop is measured via the in-car temperature sensor.

### SERVO AMP position:

In this position the amplifier output voltage to regulating valve is indicated on voltmeter.

**Mode switch (6)** is a switch with 5 positions.

**PARK position:**

In this position the regulating valve moves to the position indicated as parking position, which occurs each time when the ignition is switched off.

Both park positions on tester are similar to each other. When the tester is in this position, the blower remains switched on because the „OFF“ knob must be pushed to bleed the main switch.

**A/C position:**

In this position the operating conditions of a hot day are fed into amplifier and the regulating valve is set to position max. „cooling“.

**MID position:**

In this position the regulating valve is set to a low blower speed (not included in test program).

**HEAT position:**

In this position the operating conditions of a cold day are fed into amplifier and the regulating valve is set to max. „heating“.