

V.A.G. Service

CLIMAtronic

Construction and Function
Self-Study Program 135

CLIMAtronic

Introduction

The cooling circuits of this air conditioning equipment will be known to you from the manual air conditioning in the Passat. What's new about this equipment is the electronic control – hence the name: Climatronic. The essential concept of the electronic control is the continuous comparison between the actual temperature and the temperature in the sun to regulate the air temperature, airflow rate and distribution. This corresponds with your knowledge of air conditioning regulation in Audi cars.

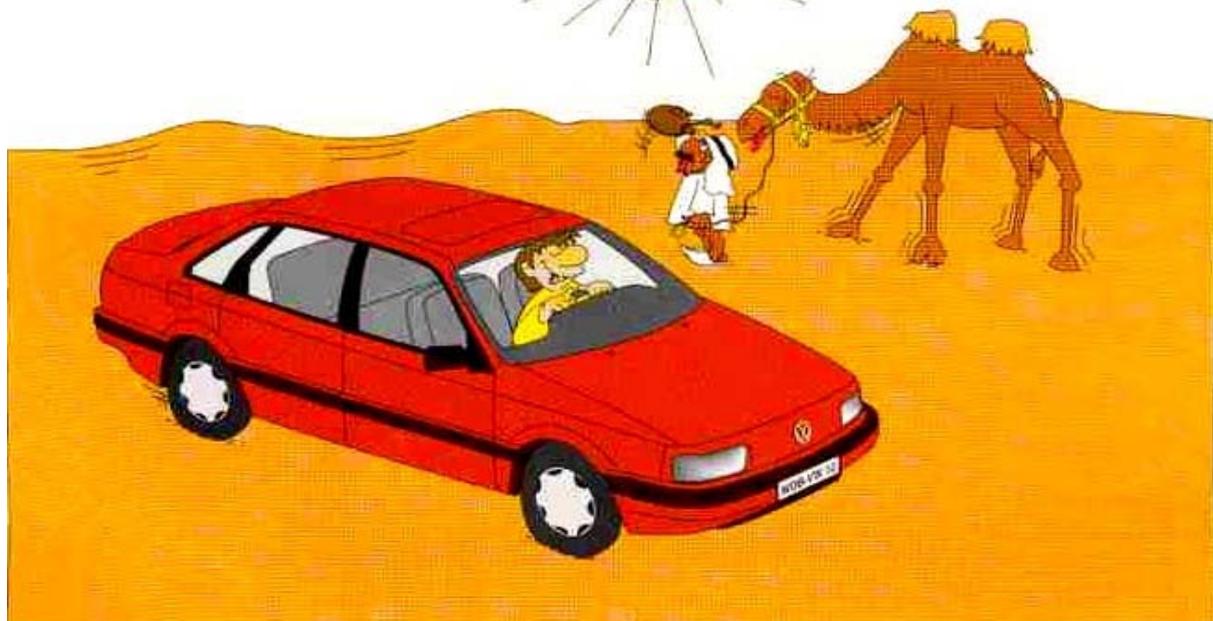
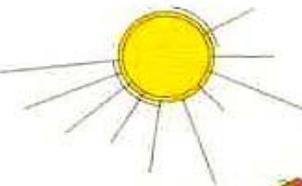
Climatronic Features:

User Friendly

- automatic regulation of the climate in the vehicle, including comfort in extreme weather conditions;
- the regulation can be adjusted to suit personal preferences:
 - temperature
 - air distribution
 - blower speed, etc.

Repair Service Friendly:

- The Climatronic has substantial self-diagnosis functions.



This document is an **UNOFFICIAL** translation of:

V.A.G. Service
CLIMAtronic
Konstruktion and Funktion
Selbststudienprogramm Nr. 135

USE AT YOUR OWN RISK

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Notice:

The meaning of error codes is contained in the appropriate repair manuals or error look-up programs.

NOTICE

**The ERROR CODES have been “obtained”
from “the net”, and are located at the end of
this document.**

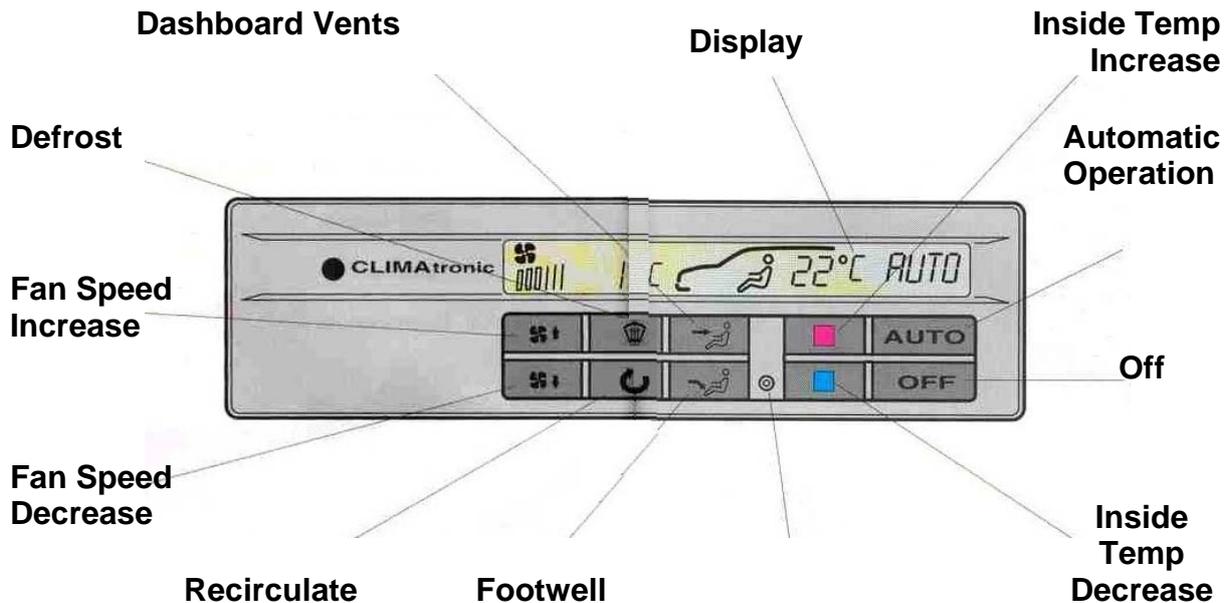
NOTICE

Operation

The operation of Climatronic is simple.

It operates fully automatically and maintains the inside temperature almost constant at the selected value.

Automatic operation is normally sufficient for all weather extremes and vehicle conditions. When the displayed temperature is reached, the blower motor's speed is reduced.



Display Shows:

- Mode of Operation (AUTO/OFF)
- Temperature (Outside/Desired Inside)
- Air Distribution
- Blower Motor Speed
- Diagnostic Function and Error Code Number

Air Conditioning Off

The last selected inside temperature is remembered and the blower operation is shut off.

Selector for Temperature Scale

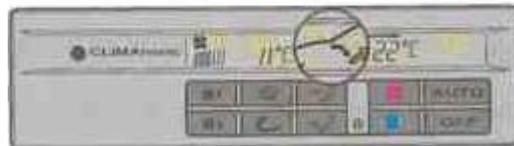
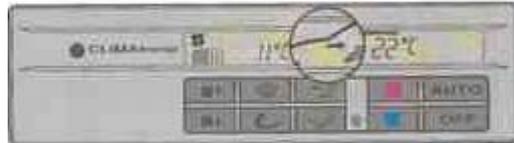
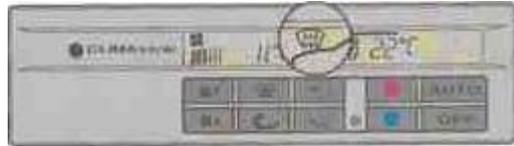
°C or °F

Air Distribution

Automatic operation



Individually selected air distribution



Air recirculation



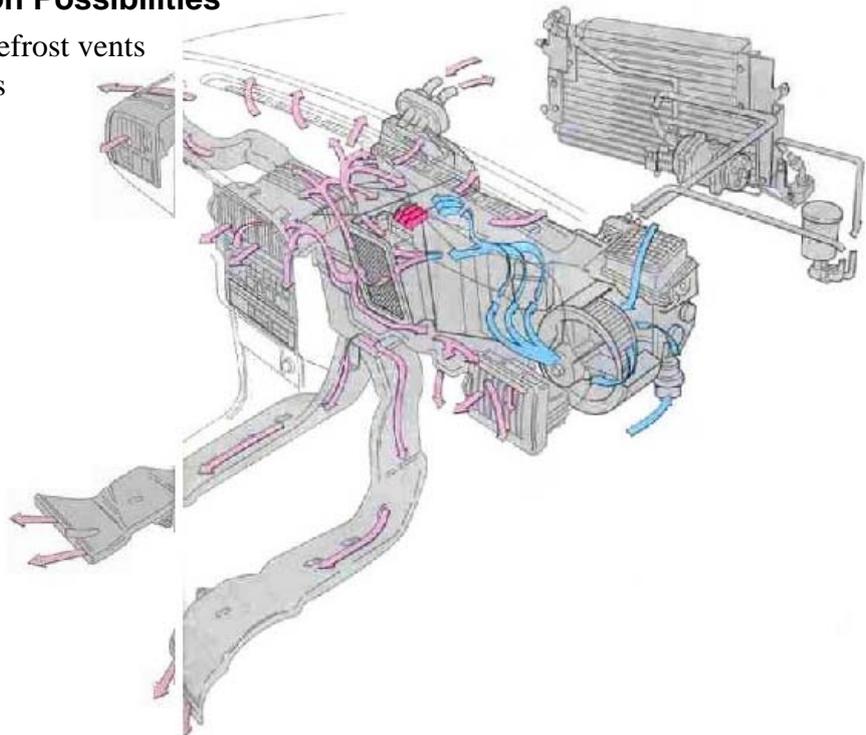
Off



Air distribution Selection Possibilities

- to windshield through defrost vents
- through dashboard vents
- through footwell vents

All selections can be controlled individually.



System Overview

The heart of the Climatronic system is the Control Unit.

All the sensor inputs are fed into the microcomputer in the Control Unit.

The microcomputer calculates the output signals based on pre-programmed values.

The output signals are amplified so that they can drive the actuators.

Sensors

Inside Temp Sensor
(G 56) with Blower
(V 42)

Intake Air Duct Temp
Sensor (G 89)

Outside Temp Sensor
(G 17)

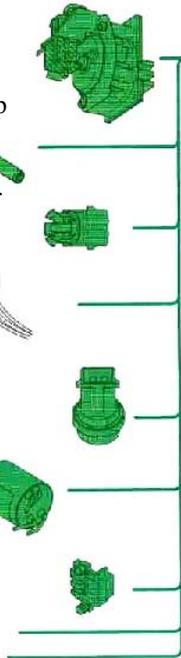
Photosensor
(G 107)

Refrigerant Temp
Sensor (G 62)

Pressure Switch
(F 129)

Speed Sensor (G 68)

Kick-down Sw (F 8)
Evaporator Temp
Switch (E 33)



Actuators

Temperature Flap Servo
Central Flap Servo
Dynamic Pressure Flap
Servo (V 68, 70, 71)

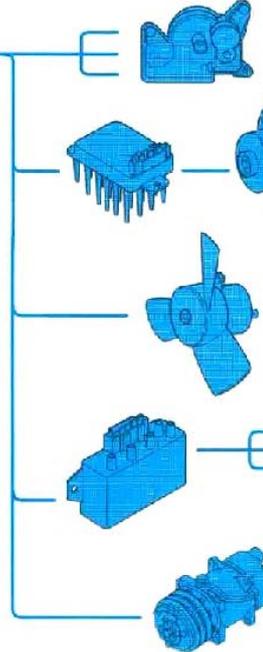
Blower Motor
Control (J 126)
Blower Motor
(V 2)

Refrigerant Cooling
Fan (V 7)

Valve Unit
(N 53)
Vacuum Units

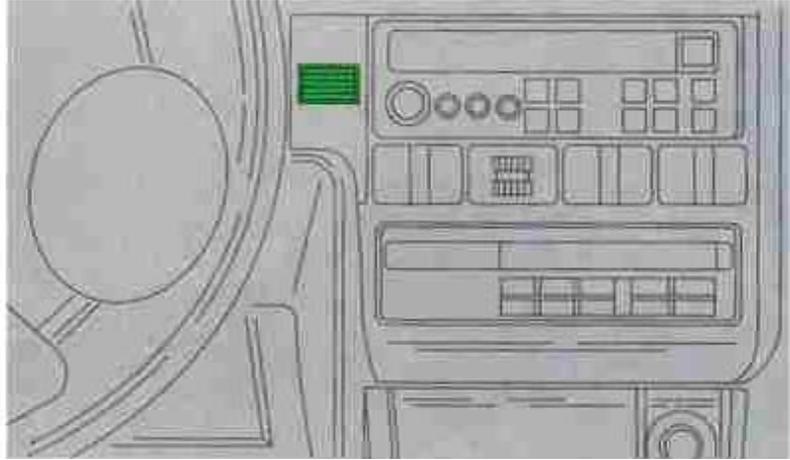
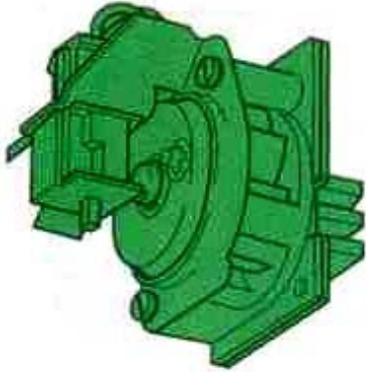
Magnetic Compressor
Clutch (N 25)

Relay for Magnetic Clutch (J 253)
Thermal Switch for
Refrigerant Cooling Fan (F 18)



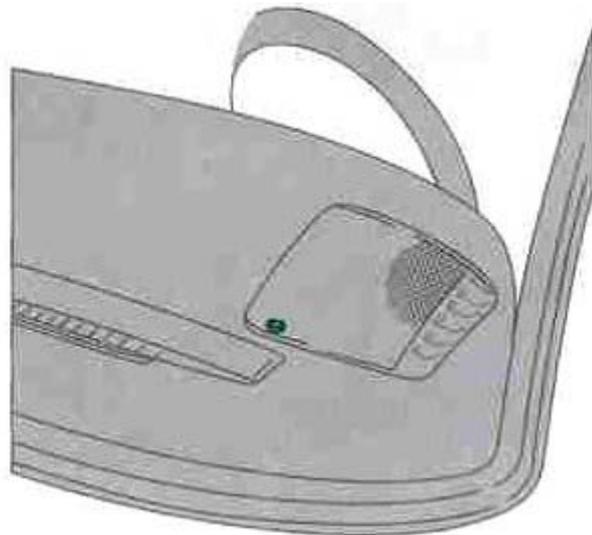
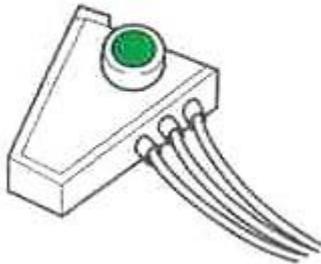
Sensors and Actuators

**Dashboard-mounted temperature switch (G 56)
with blower motor (V 42) for inside temperature sensor**



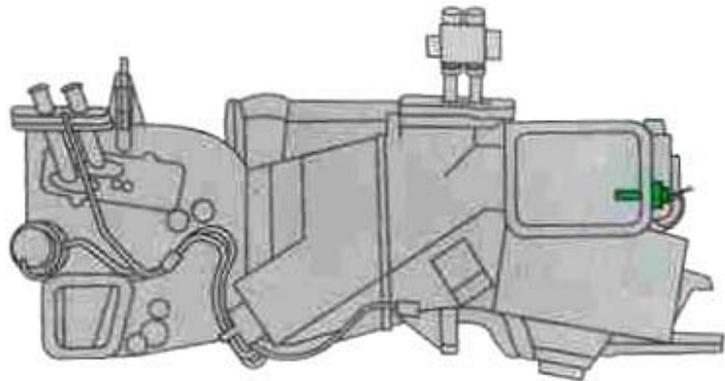
This temperature sensor constantly monitors the inside air temperature

Photosensor

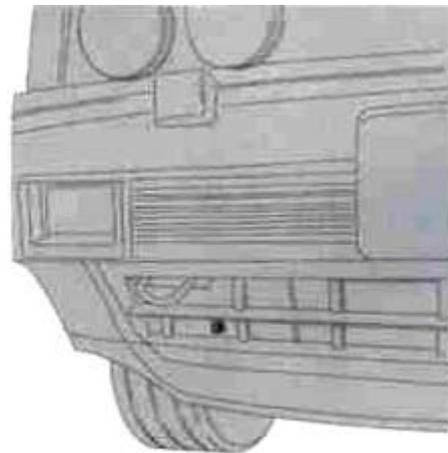
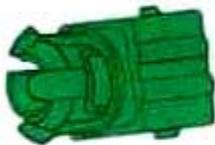


The signal from the photosensor causes the temperature and blower speed to increase or decrease to maintain the inside temperature constant under different sunshine conditions.

Intake Air Duct Temperature Sensor (G 89)

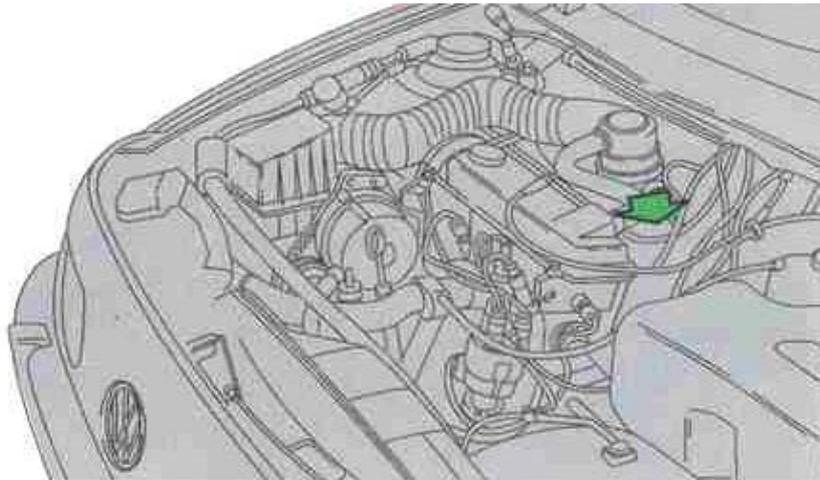
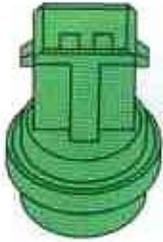


Outside Air Temperature Sensor (G 17)



The sensors (G 89 and G 17) constantly monitor the outside air temperature. The Control Unit evaluates the outputs of the two outside air temperature sensors and uses the lower of the 2 measured outside air temperatures to determine the control signal.

Refrigerant Temperature Sender (G 62)

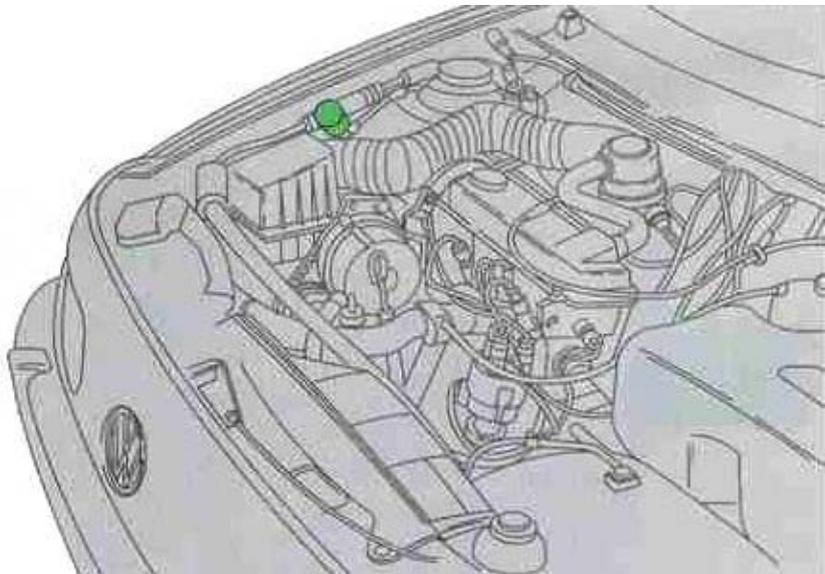
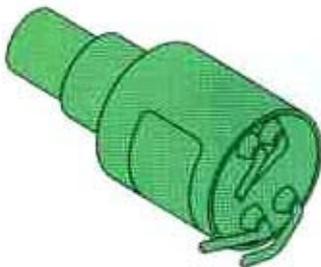


The refrigerant temperature is used to provide the maximum heat output whether the motor is warm or cold.

This sensor causes the following actions when the motor is warming up:

- Reduces blower speed
- Control of air circulation
- Preventing the Compressor from turning.

Air Conditioning Pressure Switch (F 129)

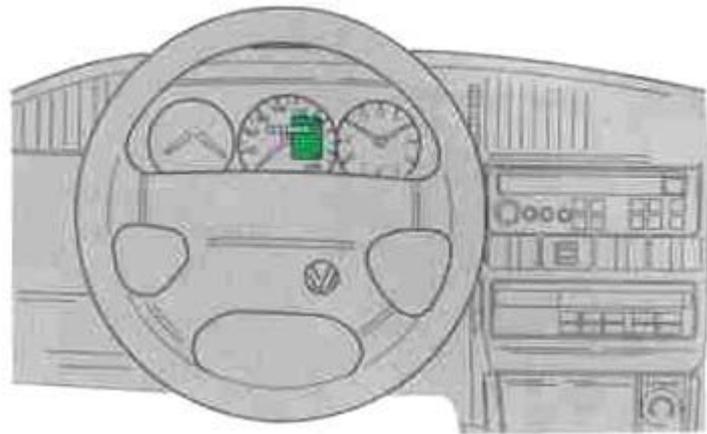


This switch constantly watches the refrigerant circuits for safety reasons.

The following information about the air conditioning system is provided by this switch:

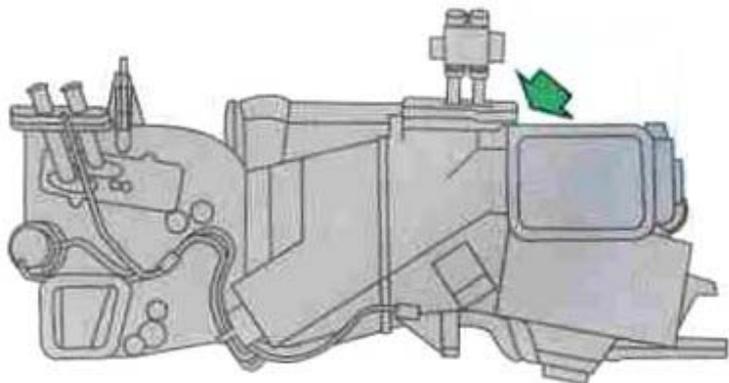
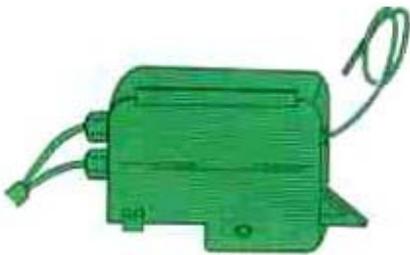
- Pressure < 2 Bar (low pressure switch) – refrigerant requires refilling >> Compressor off
- Pressure > 15 Bar (high pressure switch) – the second-stage of the refrigerant fan (V 7) is turned on
- Pressure > 32 Bar (safety shut-off switch) – Compressor off

Vehicle Speed Sender (G 68)



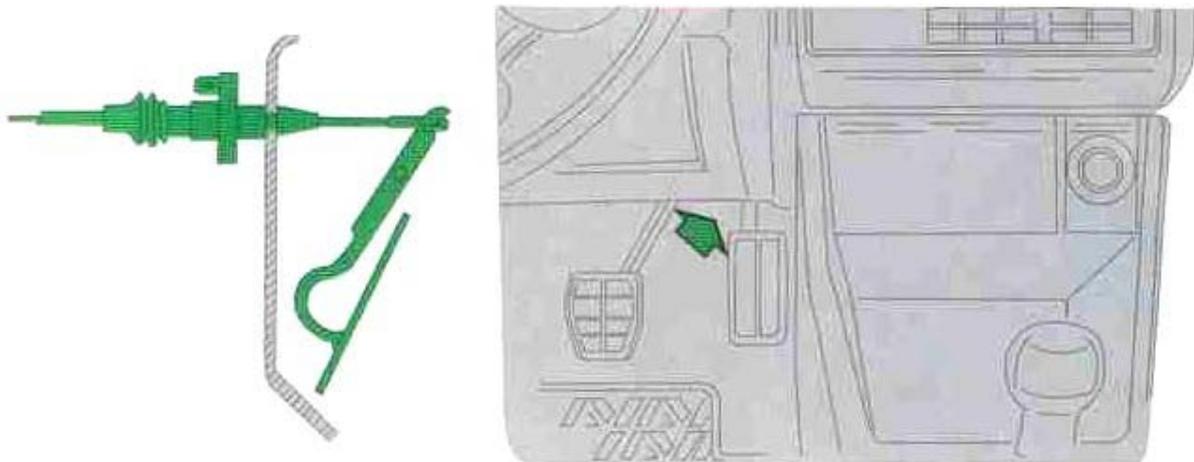
The signal from this sensor controls the dynamic pressure Flap .
Therefore, the air flow and temperature in the vehicle are kept constant despite varying vehicle speeds.

Evaporator Temperature Switch (E 33)



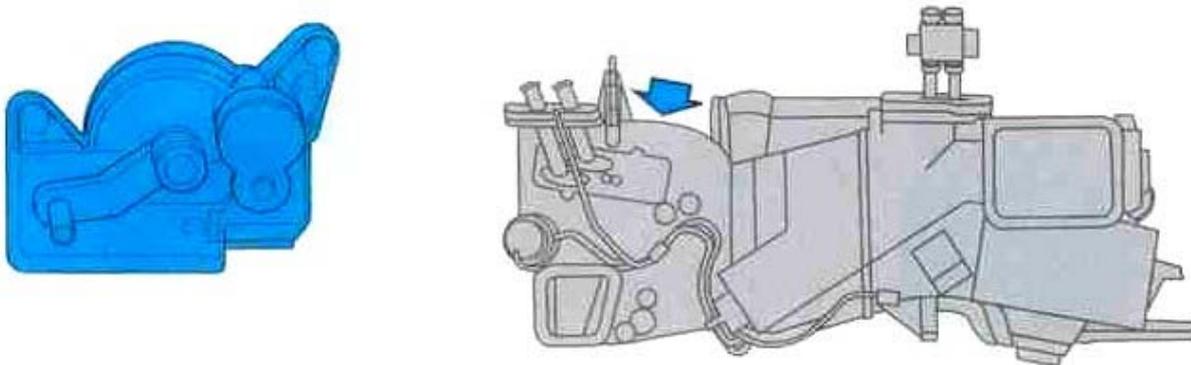
This temperature switch monitors the evaporator. When the evaporator begins to ice up, the Compressor will be shut off.

Kick-down Switch (F 8)



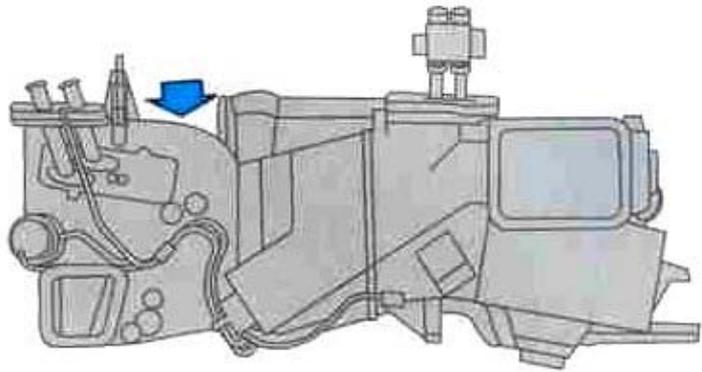
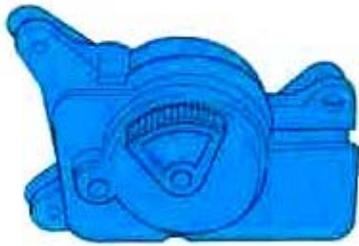
The kick-down switch is installed on cars with automatic transmissions. When this switch is activated, the Digimat Control Unit (J 217) will stop the Compressor so that the vehicle can use all the vehicle's power to accelerate.

Temperature Flap Servo (V 68)



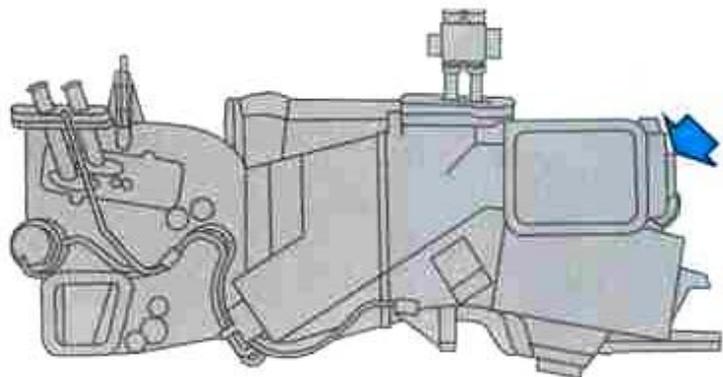
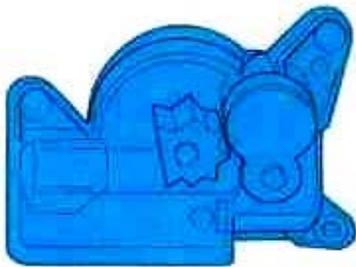
The servo is aligned to the Temperature Flap and is used by the Control Unit to maintain the selected inside temperature. The Temperature Flap varies the mixture of warm air so that the inside temperature is maintained as close as possible to the selected temperature under all driving conditions

Central Flap Servo (V 70)



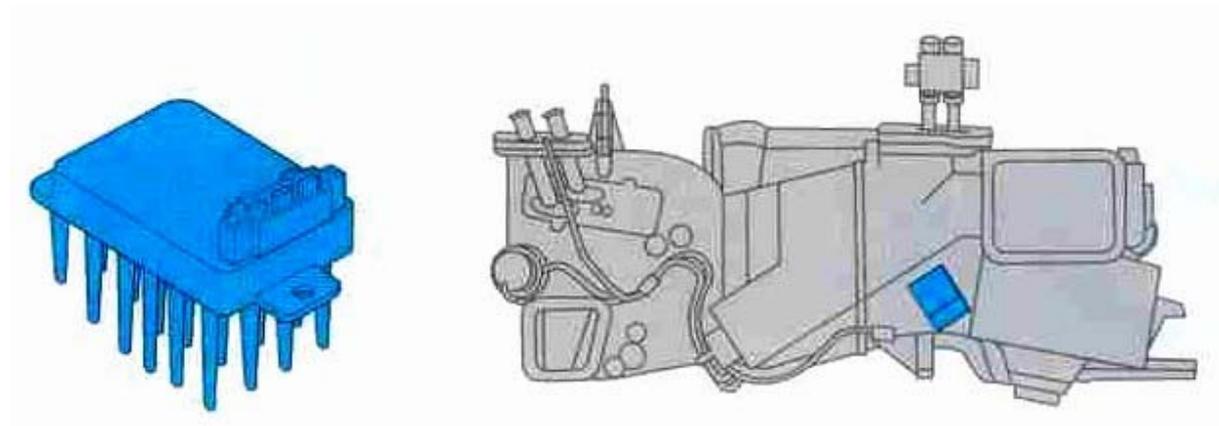
The position of the Central Flap is used by the Climatronic Control Unit to control air distribution as selected. The Central Flap controls the distribution of air to the dashboard vents or to the defrost and footwell vents.

Dynamic Pressure Flap Servo (V 71)



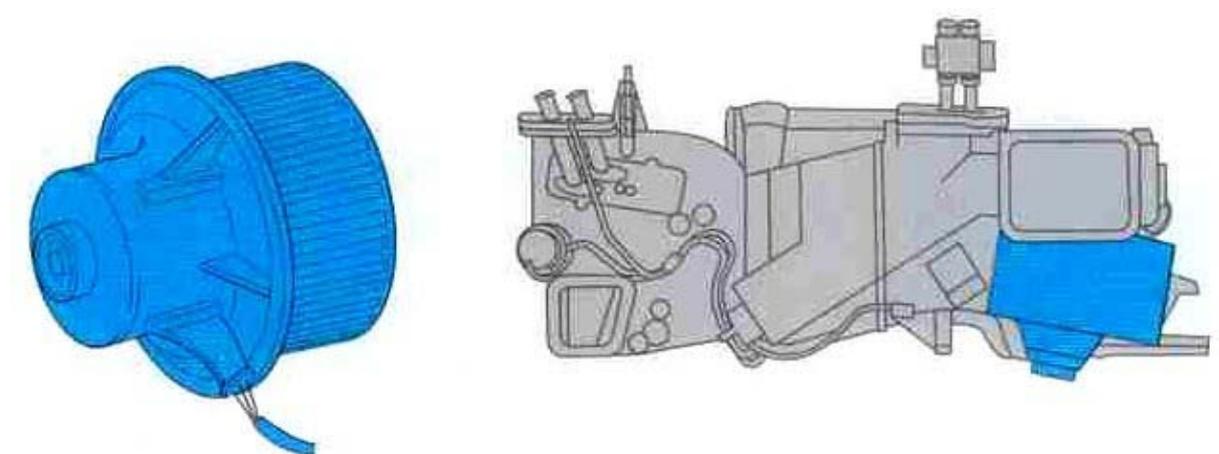
The position of the Dynamic Pressure Flap, the driving speed and the fan speed are used by the Climatronic to determine the control signals to the Dynamic Pressure Flap. The Dynamic Pressure Flap regulates the fresh airflow rate, allowing the inside temperature to be maintained constant.

Blower Motor Control (J 126)



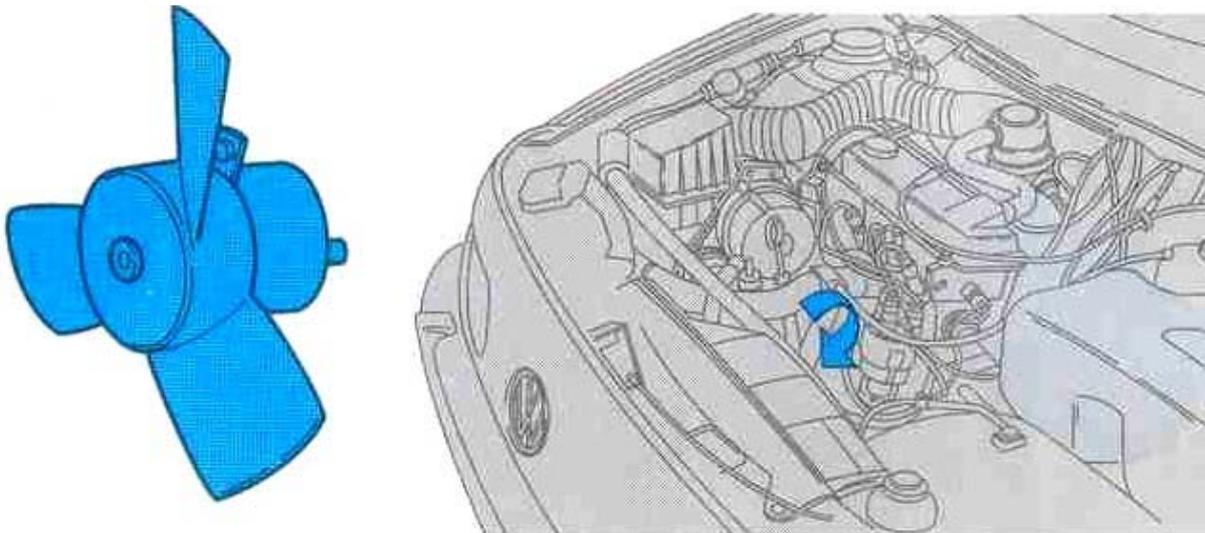
This control amplifies the Blower Motor control signal so that it can be used by the Blower Motor. This maintains the Blower Motor at the desired speed.

Blower Motor (V 2)



The Blower Motor is driven to the desired fan speed. When the Defrost mode is selected, the Blower Motor is automatically driven at its maximum speed.

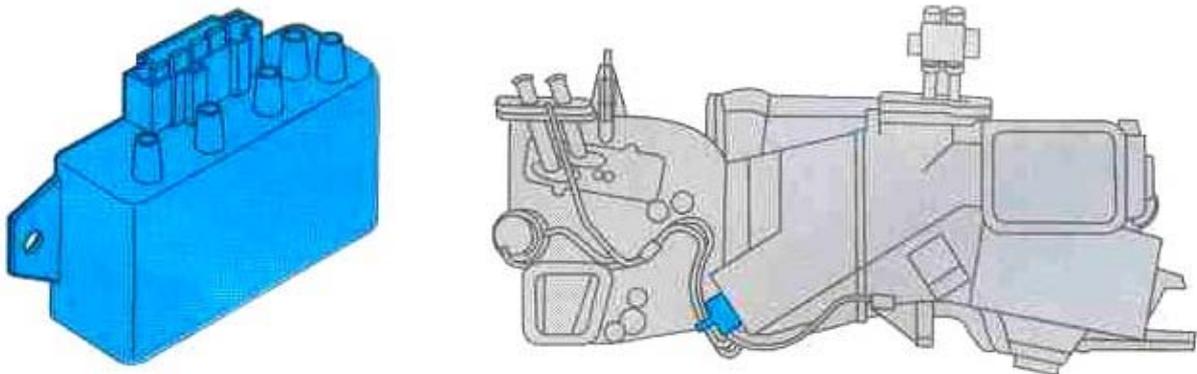
Refrigerant Cooling Fan (V 7)



The 2-stage fan is controlled by the Climatronic system.

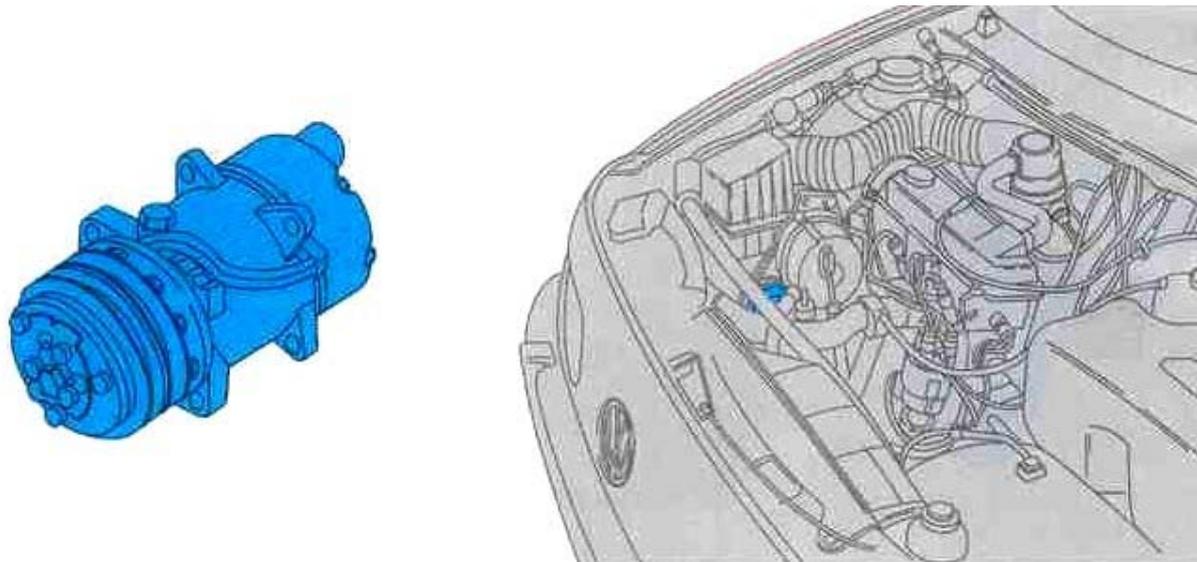
- 1st Stage: power supplied by Relay for Climatronic (J 254) or refrigerant fan thermal switch #1 (F 18)
- 2nd Stage: power supplied by Relay for 2nd stage Refrigerant Cooling Fan (J 101) or Refrigerant Fan Thermal Switch #2 (F 18)

Valve Unit (N 53)



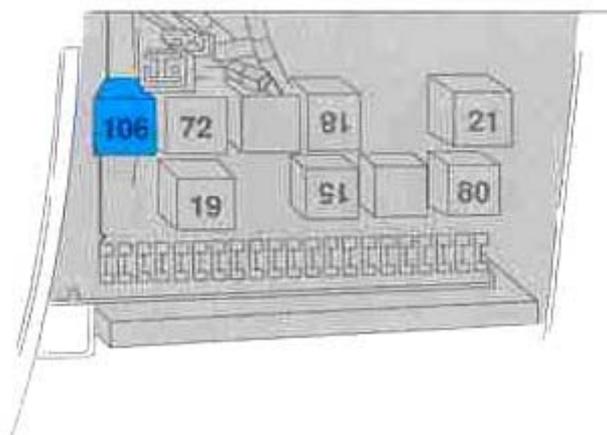
There are 4 magnetic valves built into the Valve Unit.
Depending on the air distribution, positive to negative air pressure (vacuum) will be detected.
The expected pressures change according to the Climatronic's air distribution program.

Magnetic Compressor Clutch (N 25)



The magnetic clutch stops the Compressor based on signals from the Climatronic Control Unit.

Air Conditioning Relay (J 254)



This relay, the Climatronic Combination Relay (106), is located in the main fuse panel. It supplies power to both the Blower Motor (V 2) and to the 1st Stage Refrigerant Cooling Fan (V 7).

Relay for 2nd-Stage Refrigerant Cooling (J 101)

This relay (98) serves to trigger 2nd -Stage Refrigerant Cooling Fan (V 7).

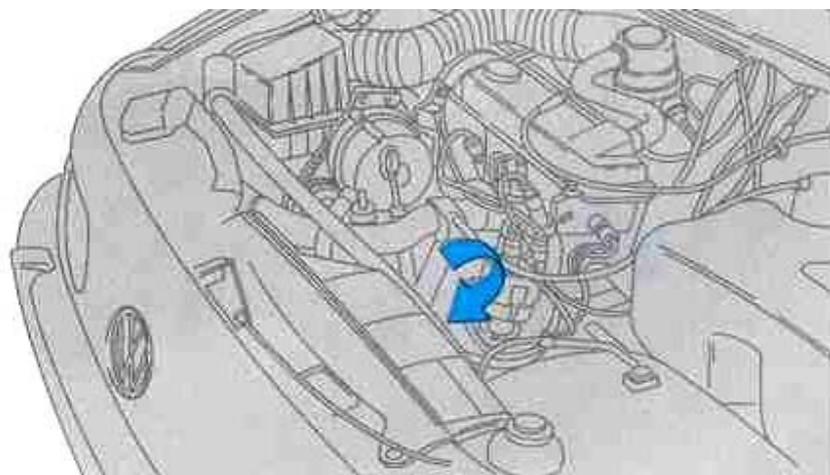
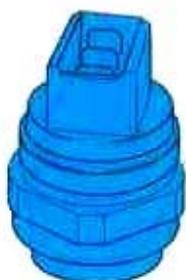
Relay for the Magnetic Clutch (J 253)

This relay (107) is supplied power from the Evaporator Temperature Switch (E 33). The electric circuit is combined with the path of the Compressor Pressure Switch (F 129) to complete the circuit to the Climatronic Control Unit. This prevents operation of the Compressor while there is insufficient refrigerant.



Thermal Switch for Refrigerant Cooling Fan (F 18)

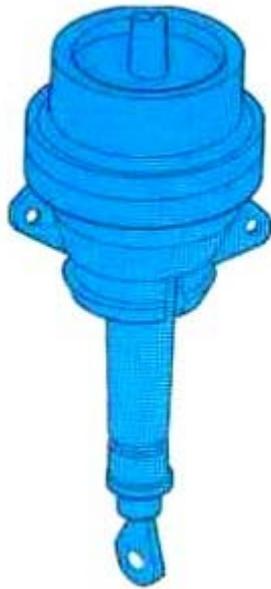
The thermal switch controls both the relays for the after-run system and both Stages of the Refrigerant Cooling Fan.



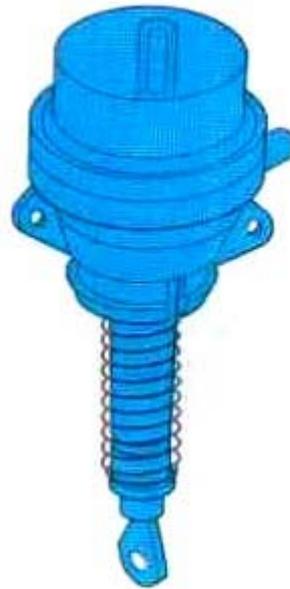
Vacuum Units

The Vacuum Units are connected to the Valve Unit (N 53) by vacuum lines, and are used to determine the position of the air distribution valves. The Climatronic's air distribution program uses the signals from these Vacuum Units.

The Vacuum Units for the fresh/recirculated air valve and the valve for closing the middle plates are functionally identical.

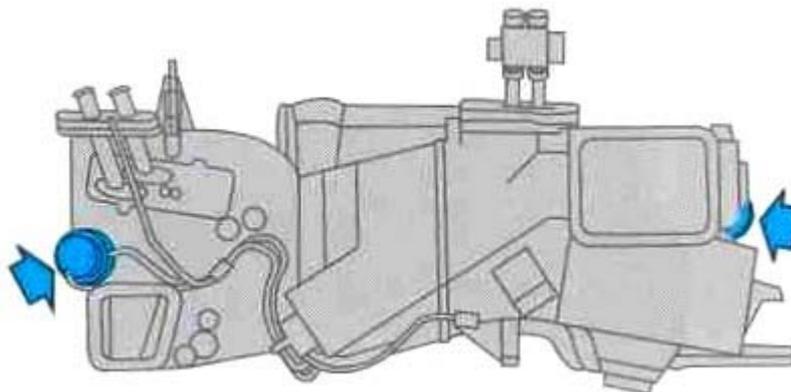


The Vacuum Unit for the middle airstream closing flap (behind the middle shut-off flap)



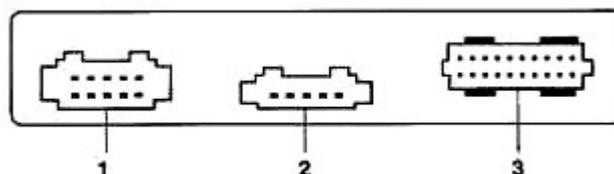
The Vacuum Unit for the footwell/defrost switching flap

The Vacuum Unit for switching the fresh/recirculated air



Connector Pin Assignments

The following list shows the pin assignments for the plugs on the rear of the Climatronic Control Unit.



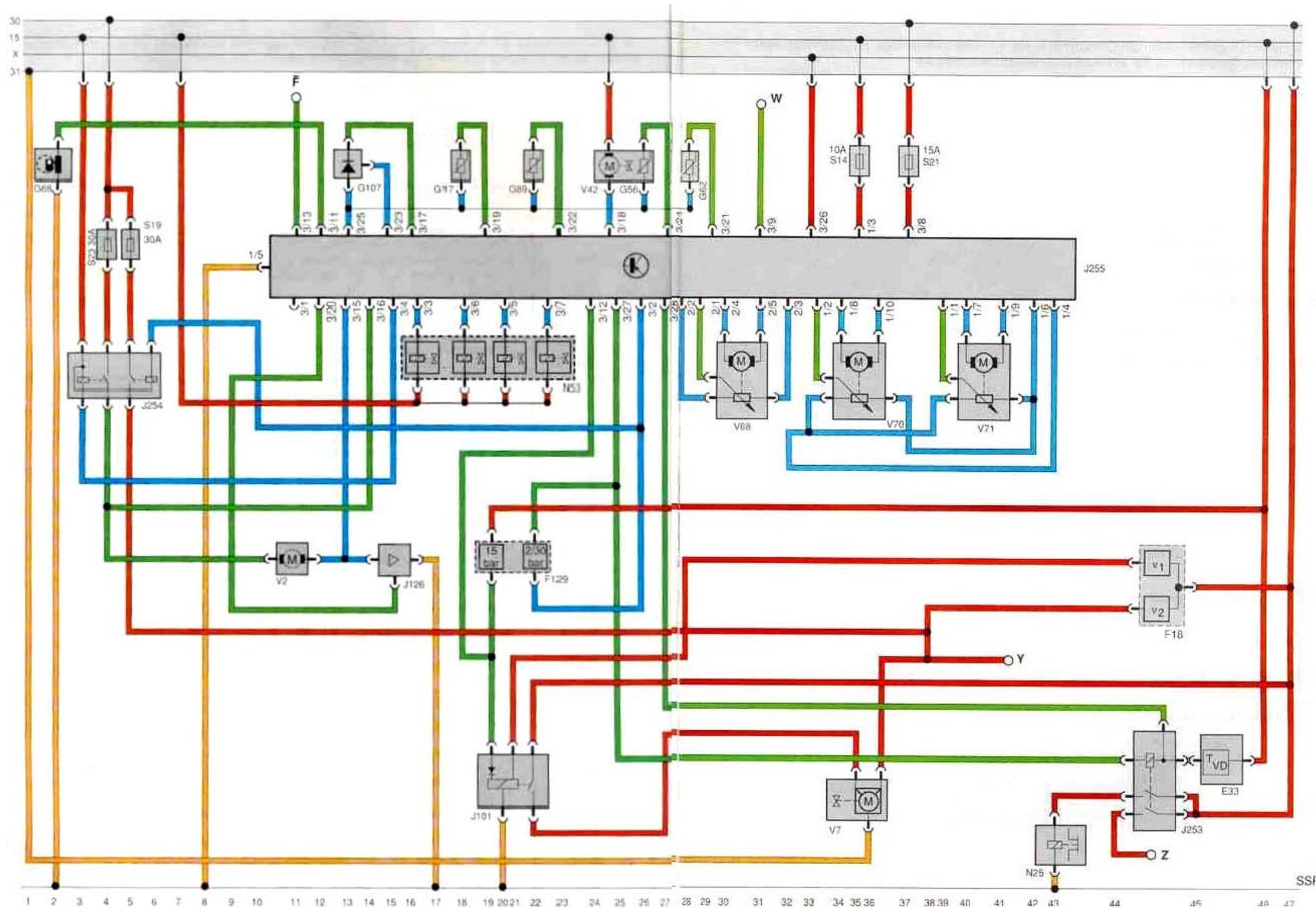
Plug/Pin	Function
1/1	Feedback pick-up for Dynamic Pressure Flap (V 71)
1/2	Feedback pick-up for Central Flap (V 70)
1/3	Power Supply from Circuit 15
1/4	Positive Power Source for Feedback Pick-ups (V 70 & V 71)
1/5	Ground
1/6	Negative Power Source for Feedback Pick-ups (V 70 & V 71)
1/7	Power Source for Dynamic Pressure Flap Motor
1/8	Power Source for Central Flap Motor
1/9	Power Source for Dynamic Pressure Flap Motor
1/10	Power Source for Central Flap Motor
2/1	Feedback Potentiometer Pick-Up for Temperature Flap (V 68)
2/2	Positive Power Source for Temperature Flap (V 68)
2/3	Negative Power Source for Temperature Flap (V 68)
2/4	Power Source for Temperature Flap (V 68) Motor
2/5	Power Source for Temperature Flap (V 68) Motor
3/1	Not used
3/2	Air Conditioning Ready
3/3	Air Distribution II Magnetic Flap Foot/Defrost switching
3/4	Relay for Blower Motor
3/5	Magnetic Shut-off Flap
3/6	Air Distribution I Magnetic Flap Foot/Defrost switching
3/7	Fresh/Recirculated Air Switching
3/8	Power Supply from Circuit 30
3/9	Panel Lighting (Dimming)
3/10	Ground Connection (Not used)
3/11	Vehicle Speed Potentiometer
3/12	15-Bar Pressure Switch Diagnosis Input
3/13	Signal from Kick-Down Switch (Automatic Transmission)
3/14	Not used
3/15	Negative Power Source for Blower Motor (V 2)
3/16	Positive Power Source for Blower Motor (V 2)
3/17	Signal from Photosensor (G 107)
3/18	Fan Motor for Dash-Mounted Temperature Sensor (V 42)
3/19	From Outside Air Temperature Sensor (G 17)
3/20	Control Signal to Blower Motor Amplifier (J 126)
3/21	Signal from Refrigerant Temperature Sensor (G 62)
3/22	Signal from Intake Air Duct Temperature Sensor (G 89)
3/23	+5V Power Source for Photosensor (G 107)
3/24	Dash-Mounted Temperature Sensor (G 56)
3/25	Ground for Sensors (G 56, G 62, G 89, G 107)
3/26	Power Supply from Circuit X
3/27	Diagnose Air Conditioning Pressure Switch (F 129)
3/28	Diagnose Temperature Switch on Evaporator (E 33)

Functional Diagram

The functional diagram shows the connection between the various components.

It is not a wiring diagram.

E 33	Evaporator Temperature Switch
F 18	Refrigerant Fan Thermal Switch
F 129	Compressor Pressure Switch
G 17	Outside Air Temperature Sensor
G 56	Dashboard-Mounted Temperature Sensor
G 62	Refrigerant Temperature Sender
G 68	Driving Speed Sender
G 89	Intake Air Duct Temperature Sensor
G 107	Photosensor
J 101	Relay For 2 nd -Stage Refrigerant Cooling Fan
J 126	Blower Motor Control Unit
J 253	Relay for Magnetic Clutch
J 254	Relay for Climatronic
J 255	Control Unit for Climatronic
N 25	Magnetic Clutch for Compressor
N 53	Vacuum Valve Unit
S 14	Fuse in Fuse Panel (10 A)
S 19	Fuse in Fuse Panel (30 A)
S 21	Fuse in Fuse Panel (15 A)
S 23	Fuse for Heating System (30 A)
V 2	Blower Motor
V 7	Refrigerant Fan
V 42	Blower for Inside Air Temperature Sensor
V 68	Servo for Temperature Flap
V 70	Servo for Central Flap
V 71	Servo for Dynamic Pressure Flap
F	Signal from Kick-Down Switch
W	Dash Lighting (Dimmable)
Y	Radiator Fan (Cooling) After-Run
Z	Prevention of Running Compressor While Empty



Self-Diagnosis

The Climatronic can use its integrated Diagnostic system to test the air conditioning system. It uses innovative test methods conforming to the VW-Audi Self-Diagnostics structure.

The Climatronic has 3 diagnostic functions:

- Retrieving stored error codes
- Reading measured (actual) values
- Self-test

With these Diagnostic functions you can easily, quickly and safely test the overall effectiveness of the entire system.

This means that you can diagnose:

- **without separate test equipment**

Using your special knowledge, you can invoke the self-test function to:

- **read-out codes on the Climatronic Control Unit's display**

In order to **activate** the Diagnostic functions, you must exit normal operations. To do this, you must:

- Turn the ignition off
- and**
- press 2 buttons on the Control Unit simultaneously

The selected Diagnostic function will be shown on the Control Unit's display

When the Diagnostic function is invoked, it will be displayed like this:

Diagnostic Function 00 » Retrieving Stored Error Codes

- Ignition **ON**
- press 2 buttons **simultaneously**



Diagnostic Function 01 » Reading measured (actual) values

- Ignition **ON**
- press 2 buttons **simultaneously**



Diagnostic Function 02 » Perform Self-Test

- Ignition **OFF**
- press 2 buttons **simultaneously**
- Ignition **ON**



To exit the diagnostic functions, press the OFF button briefly.

More information on the self-test procedures can be found in the:
Reparaturleitfaden Passat 1988 >
and in the Trouble-Shooting folder of the Heating and Air Conditioning assemblies.

NOTICE

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this document.

NOTICE

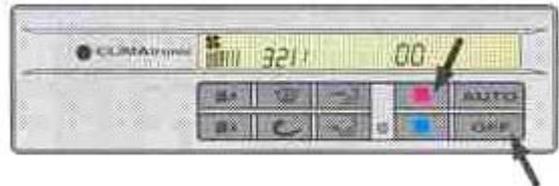
CAUTION

The following PROCEDURES and ERROR CODES were obtained from "the net".

CAUTION

Diagnostic Function 00 » Retrieving Stored Error Codes

XXXx 00



- Ignition **ON**
- Press the **AUTO** key
- press the **OFF** and **TEMPERATURE INCREASE** buttons **simultaneously** for at least 3 seconds
- the **XXXx** above will be filled with the 4-digit Stored Error Code
- press the **TEMPERATURE INCREASE** button **again** for the **next** Stored Error Code
- when the Stored Error Code of **0000** is displayed, there are no further Stored Error Codes
- to **DELETE** the Stored Error Codes, press the **OFF** button for at least 3 seconds or until the code **4444** is displayed. Then release the **OFF** button.
- To exit the diagnostic function, press the OFF button once briefly

Climatronic Error Codes:

- 0000 No (More) Codes
- 1111 Control Unit defective
- 2312 Refrigerant Temperature Sender
- 3133 Outside Temperature Sender
- 3211 Dash-Mounted Inside Air Temperature Sensor
- 3213 Intake Air Duct Temperature Sensor
- 3223 Thermal Relays For Evaporators
- 3224 Pressure Switches Possible Too Little Cooling Agents
- 3234 Blowers For 3211
- 3241 Photosensor
- 4122 Actuator Temperature Flap
- 4123 Actuator Central Flap
- 4131 Actuator Stagnation Pressure Flap
- 4444 No Errors Available

Diagnostic Function 01 » Reading Measured (actual) Values

XXXx 01



- **START** the engine
- Press the **AUTO** key
- press the **OFF** and **TEMPERATURE DECREASE** buttons **simultaneously** for at least 3 seconds
- The display will now alternate between two displayed values. The first is a 4-digit code to indicate which Measured Values is being read, and the second is the actual value.
- press the **TEMPERATURE INCREASE** button **again** for the **next** Measured Value
- To exit the diagnostic function, press the OFF button once briefly

Measured Values Codes:

1231 driving speed Km/h

1323 kick-down switch 1=on 0=off (with automatic transmission)

2312 coolant temperature

3133 outside temperature

3211 temperature sensor, cockpit

3213 temperature sensors intake air duct

3223 thermal relays for evaporator 0 = openly, 1 = geschl.

3224 push button switches various shifting processes

3241 photo sensor for sun exposure announcement to 100

4121 magnetic clutch for Compressor 0=OFF, 1=ON over 5 degrees of outside temperature, otherwise from 0000 No (more) codes

Diagnostic Function 02 » Perform Self-Test

XXXx 02



- Ignition **OFF**
- press the **OFF** and **TEMPERATURE INCREASE** buttons **simultaneously** for at least 3 seconds **after** you switch the Ignition **ON**
- To exit the diagnostic function, press the OFF button once briefly

CAUTION

**The above PROCEDURES and ERROR CODES
were obtained from "the net".**

CAUTION