Repair Manual
EuroVan 1992 ➤

Heating, Ventilation and Air Conditioning

Edition 07.2002

List of Workshop Manual Repair Groups

Repair Group

01 - On Board Diagnostic (OBD)

80 - Heating, Ventilation

87 - Air Conditioning

Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

Contents

01 – On Board Diagnostic (OBD)

1 General Information

1.1 Climatronic Digital Climate Control OBD Function

The Climatronic control module -J255- receives input information from various electrical and electronic components (sensors). This information is processed by the control module in accordance with specified values and then provides corresponding output signals that control electrical components (actuators).

The Climatronic control module -J255- is controlled by an internal microprocessor with On Board Diagnostic (OBD) capability. If malfunctions, short or open circuits occur on monitored components, Diagnostic Trouble Codes (DTC) are stored in memory.

Malfunctions recognized by OBD and stored as coded DTCs include an indication of the malfunction type. Tables containing all DTC codes and corresponding repair information guide technicians through the OBD program.

Stored DTCs are checked with Scan Tools -VAG1551- / -VAG1552- (ST) or Vehicle Diagnostic Testing and Information System -VAS5051- .

When DTCs are stored, the Climatronic system will switch off either partially or entirely depending on the severity of the fault.

Component malfunctions on monitored components having a permanent adverse effect on the operation of the Climatronic will cause the A/C control head -E87- display panel to flash for approx. 15 seconds when the ignition is switched on. DTCs are also stored.

Component malfunctions on monitored components not having a permanent adverse effect on the operation of the Climatronic (-E87- display does not flash) will result in the Climatronic operating in emergency mode at default settings. Substitute values are assumed for temperature sensors and door motor positions.

Some components and functions of the Climatronic are not monitored by OBD. If a verified symptom is present and no DTCs are stored in memory, carry out the following tests:

1.2 Scan Tool VAG 1551/1552, Connecting and Selecting Functions

Note

- *Print-out is not possible with Scan Too -VAG1552- I (ST).*
- *The following text display examples apply to -VAG1551- only. -VAG1552- operating sequence and displays may be different.*
- *Always ensure most recent -VAG1551/1552- program card version is used.*

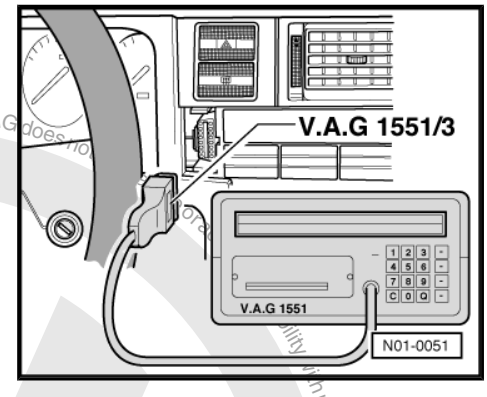
Requirements

- All fuses OK per wiring diagram.
- Battery voltage (B+) minimum 9 Volts.

Vehicles through 09.98

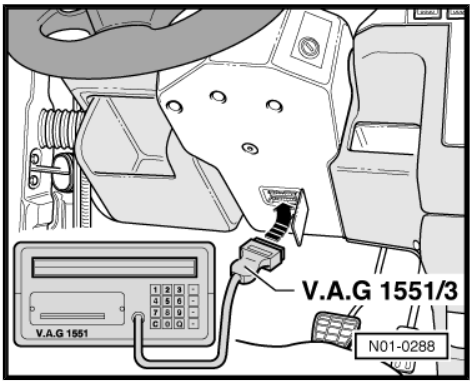
– Remove cover for Data Link Connector (DLC) next to instrument cluster.

– With ignition switched off, connect -VAG1551/1552 - to Data Link Connector (DLC) using adapter cable -VAG1551/3- or -VAG1551/3B- .



Vehicles from 09.98

– Access Data Link Connector (DLC) under steering column.



Note

Illustration is for reference only. Steering column trim may not be as illustrated.

– Connect Scan Tool using adapter cable -VAG1551/3- or -VAG1551/3B- .

Indicated on display:

```
On Board Diagnostic (OBD) HELP
1 - Rapid data transfer*
```

```
On Board Diagnostic (OBD) HELP
2 - Flash code output*
```

* Is displayed alternately

Note

- *Additional operating information can be displayed by pressing the HELP button on Scan Tool -VAG1551- .*
- *The → button is used for moving forward within program.*
- *Pressing PRINT button switches on the printer (indicator lamp in button comes on).*

– Switch on ignition.

Indicated on display

```
Rapid data transfer HELP
Insert address word XX
```

– Press button 1 for “Rapid data transfer” mode.

Indicated on display:

```
Rapid data transfer HELP
Input address word XX
```

– Press buttons 0 and 8 to select “AC/Heating Electronics” address word 08.

Indicated on display

```
Rapid data transfer Q
08 AC/Heating Electronics
```

– Press Q button to confirm input.

Indicated on display

```
Rapid data transfer
Tester sends address word 08
```

and shortly thereafter:

Indicated on display

```
701 907 044 CLIMATRONIC VXX
Coding XXXXX WSC XXXXXXX
```

- 701 906 044 = control module identification (example only)
- Climatronic = System designation

- VXX = Software version of control module
- Coding, vehicles through 09.98 ⇒ page 18
- Coding, vehicles from 09.98 ⇒ page 19
- WSC = Workshop code

Note

- *A blinking A/C Control Head display indicates that, either coding is necessary or a fault is present in the system.*
- *Improper control module coding results in incorrect blower output.*

If one of the following messages are displayed, the possible causes can be printed out by pressing the HELP button.

```
Rapid data transfer HELP
Control module does not answer!
```

The ignition must be switched on!

```
Rapid data transfer HELP
K wire not switching to B+!
```

Check -VAG1551- adapter cables and vehicle wiring to Data Link Connector (DLC) using wiring diagram.

```
Rapid data transfer →
No signal from control module!
```

If this display appears at the beginning of or during the OBD program, malfunctions have occurred and data transfer is no longer possible between the Scan tool -VAG1551- and A/C control module.

```
Rapid data transfer →
Error in communication link
```

– After repairing the possible causes of the malfunction, once again select address word 08 for “AC/Heating electronics” and confirm entry with Q button.

Indicated on display after entering the address word 08:

```
Rapid data transfer Q
08 AC/Heating electronics
```

– Press Q button to confirm input.

Indicated on display

```
Rapid data transfer
Tester sends address word 08
```

Control module identification is displayed

```
701 907 044 A CLIMATRONIC VXX →
Coding 00001 WSC XXXXX
```

– Press → button.

Indicated on display (function selection, e.g. 02 - Checking DTC memory)

```
Rapid data transfer HELP
Select function XX
```

Note

A list of available functions is printed out after pressing the HELP button

1.3 Available Functions

List of Scan Tool Functions		Chapter
01	Check Control Module Version	⇒ page 1
02	Check DTC Memory	⇒ page 6
03	Output Diagnostic Test Mode	⇒ page 15
05	Erase DTC Memory	⇒ page 17
06	End Output	⇒ page 18
07	Code Control Module	⇒ page 18
08	Read Measuring Value Block	⇒ page 19

Note

Only the functions listed here can be used for AC/Heating On Board Diagnostic (OBD) program

After pressing the → button, the OBD program returns to the starting position.

Indicated on display (function selection, e.g. 02 - Checking DTC memory)

```
Rapid data transfer HELP
Select function XX
```

2 Diagnosis and Testing

2.1 Function 02 - Diagnostic Trouble Code Memory, Checking

– Connect Scan Tool -VAG1551- (ST), input address word 08 “AC/Heating electronics” and press → until “Select function XX” is displayed ⇒ page 1 .

– Switch printer on by pressing the PRINT button (indicator lamp in button comes on).

Indicated on display (function selection):

```
Rapid data transfer HELP
Select function XX
```

– Press buttons 0 and 2 to select “Check DTC memory” function 02.

Indicated on display

```
Rapid data transfer Q
02 - Check DTC memory
```

– Press Q button to confirm input.

Number of stored DTCs or “No DTC recognized” is displayed.

```
X faults recognized!
```

```
No DTC recognized! →
```

– Press → button.

Stored DTCs are displayed and printed out one after another.

When all DTCs are displayed/printed out, eliminate malfunctions as described in Diagnostic Trouble Code (DTC) table ⇒ page 7 .

If “No DTC are recognized” is displayed, program returns to the starting position after pressing → button.

Indicated on display (function selection)

```
Rapid data transfer HELP
Select function XX
```

– End output (function 06) ⇒ page 18 .

– Switch off ignition and disconnect Data Link Connector (DLC) adapter harness.

Note

If DTC(s) are recognized:

– Refer to DTC table ⇒ page 7 .
– Rectify malfunction(s).
– Check DTC memory again (scan tool function 02) ⇒ page 6 .
– Erase DTC memory (scan tool function 05) ⇒ page 17 .

◆ If no DTC(s) are recognized:

– Verify customer's complaint.
– Carry out “Output Diagnostic Test Mode (DTM)” function 03 ⇒ page 15 .
– Carry out “Read Measuring Value Block” function 08 ⇒ page 19 .
– Perform Climatronic system troubleshooting ⇒ page 131 .

2.2 DTC Table

Note

◆ *The following table lists all DTCs recognized by the Climatronic control module -J255- and displayed/printed out by VAG 1551.*

◆ *If malfunctions occur only occasionally or if the DTC memory was not erased after repairs, these DTCs are displayed as sporadic, (“SP” appears in the display).*

◆ *DTCs appear only on print-out.*

◆ *Where applicable, an indication of possible malfunction types may also appear below the DTC code and identified component or signal description.*

◆ *After performing repairs, DTC memory should always be checked again and erased with Scan Tool -VAG1551- .*

◆ *Before replacing components, always test the relevant positive and Ground connections as well as all harness connectors and wiring between the component indicated to be malfunctioning and the Climatronic control module. Refer to the wiring diagram.*

◆ *If a customer complaint is verified and no DTCs are stored in memory:*

◆ *- select “Output Diagnostic Test Mode (DTM)” (scan tool function 03) ⇒ page 15*

◆ *- select “Read Measuring Value Block” (scan tool function 08) ⇒ page 19*

◆ *- perform Climatronic troubleshooting ⇒ page 131*

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
No DTC recognized	If “No DTC recognized” appears after performing repairs, On Board Diag	
00532 Supply Voltage (B+) Signal too high[1)]	◆ Generator (GEN) malfunction	– Check voltage su tion 08) ⇒ page 1
Signal too low[1)]	◆ Contact resistance in wiring or connectors from fuse/relay panel terminal Q/4 (15 circuit) to Climatronic control module -J255- , terminal -T5e/2- or from -T5e/1- to Ground	– Check wiring and gram – Check Generator Component locat

1) Either of these is displayed in conjunction with DTC.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00538 Reference Voltage	Voltage at Climatronic control module -J255- terminals -T28a/9- or T28a/13- more than 5.5 V or less than 4.4 V	
Signal too high[2)]	♦ Short or open circuit in wiring or connectors to -J255- terminals -T28a/9- or -T28a/13-	– Check wiring and conne
Signal too low[2)]	♦ Sunlight photo sensor -G107- malfunction	– Disconnect electrical co one at a time and follow
	♦ Temperature regulator door motor position sensor -G92- malfunction	– Erase DTC memory ⇒
	♦ Central door motor position sensor -G112- malfunction	– Check DTC memory ag
	♦ Footwell/defrost door motor position sensor -G114- malfunction	• If “Reference voltage” D applicable component.
	♦ -J255- malfunction	– Replace -J255- if neces

2) Either of these is displayed in conjunction with DTC.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00565 Rear A/C Control Head (Climatronic) -E265-		
Short or open circuit in fault channel [3)]	Short or open circuit in wiring or connectors from Climatronic control module -J255- terminal T28c/14 to Rear A/C control head (Climatronic) -E265- terminal T5/2	– Check wiring and conne
Faulty control element [3)]	Implausible data transfer	– Replace -E265-

3) Either of these is displayed in conjunction with DTC.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00603 Footwell/Defroster Door Motor -V85- [4)]	♦ Short or open circuit in wiring or connectors to footwell/defroster door motor -V85-	– Check wiring and conne
	♦ -V85- incorrectly adjusted or blocked	– Check footwell/defrost ue Block” (function 08)
		– Check and adjust end p
		– Carry out Output Diagn ⇒ page 15
	♦ -V85- malfunction	– Replace -V85-

4) DTC is recognized after approx. 2 seconds.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00631 A/C connection - Motronic		

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
Short circuit to Ground	Short circuit in wiring or connectors from Climatronic control module -J255- terminal T28a/21 to Motronic Engine Control Module (ECM)	– Check wiring and
00632 Climatronic combi interface Short circuit to Ground	Short circuit in wiring or connectors from Climatronic control module -J255- terminal T28c/3 to instrument cluster terminal T32a/26	– Check wiring and

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00658 Operating Module Instrument Panel Temperature Sensor -G56-	♦ Short or open circuit in wiring or connectors to A/C control head -E87-	– Check segments (DTM) (function
	♦ -G56- malfunction[5)]	– Check -G56- usi ⇒ page 19
	♦ -E87- malfunction[5)]	– Replace -E87-
	♦ Climatronic control module -J255- - malfunction[5)]	– Replace -J255- i

5) On vehicles from 09.98, -J255- , -E87- and -G56- with Interior Temperature Sensor Fan -V42- are integrated into a non serviceable unit.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00705 First Speed Engine Coolant (EC) Fan Control (FC) Relay -V7- , -V35-) -J279- [6)] Short circuit to Ground	Short circuit in wiring or connectors from Climatronic control unit -J255- to First Speed Engine Coolant (EC) Fan Control (FC) Relay -V7- , -V35-) -J279- [6)] -J279- malfunction[6)]	– Check -J279- usi – Check wiring and – Replace -J279-
00706 Second Speed Engine Coolant (EC) Fan Control (FC) Relay -V7- , -V35-) -J513- [6)] Short circuit to Ground	Short circuit in wiring or connectors from Climatronic control unit -J255- to Second Speed Engine Coolant (EC) Fan Control (FC) Relay -V7- , -V35-) -J513- [6)] -J513- malfunction[6)]	– Check -J513- usi – Check wiring and – Replace -J513-

6) Wiring diagram may indicate Coolant Fan Control (FC) Relay -J26-

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00707 Center Vent Valve -N236- [7)] Short circuit to B+	Short circuit in wiring or connectors from Climatronic control unit -J255- to Center Vent Valve -N236- [7)] -N236- malfunction[7)]	– Check -N236- us – Check wiring and – Replace -N236-
00739 Coolant Pump -V50-		

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
Short circuit to Ground	♦ Short circuit in wiring or connectors from Climatronic control module -J255- terminal -T5e/3- to Coolant Pump -V50-	– Check -V50- using “Rea ⇒ page 19
		– Check wiring and conne
	♦ -V50- malfunction	– Replace -V50-

7) Where applicable

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00766 Front Vent Temperature Sensor -G152- Open/Short circuit to B+[8)]	♦ Short or open circuit in wiring or connectors to -G152-	– Check -G152- using “R ⇒ page 19 ♦ If DTCs for the outside photo sensor -G107- ar sensor -G110- are also tions from Climatronic c to internal splice junctio Climatronic.
Short circuit to Ground[8)]	♦ -G152- malfunction	– Check wiring and conne
		– Replace -G152-

8) Either of these is displayed in conjunction with DTC.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00767 Rear Evaporator Temperature Sensor -G153- Open/Short circuit to B+[9)]	♦ Short/open circuit in wiring or connections from Climatronic control module -J255- terminal -T28b/15- via rear evaporator temperature sensor -G153- to -J255- - terminal -T28b/3-	– Check -G153- using “R ⇒ page 19 ♦ If a DTC for the rear he also present, first check control module -J255- te (244) for Ground conne
Short circuit to Ground[9)]	♦ -G153- malfunction	– Check wiring and conne
		– Replace -G153-

9) Either of these is displayed in conjunction with DTC.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00768 Rear Heater Core Temperature Sensor -G154- Open/Short circuit to B+[10)]	♦ Short/open circuit in wiring or connections from Climatronic control module -J255- terminal -T28b/17- via rear heater core temperature sensor -G154- to -J255- - terminal -T28b/3-	– Check -G154- using “R ⇒ page 19 ♦ If a DTC for the rear ev first check wiring and c ule -J255- terminal -T28 Ground connections in
Short circuit to Ground[10)]	♦ -G154- malfunction	– Check wiring and conne

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
		– Replace -G154-

10) Either of these is displayed in conjunction with DTC.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00779 Outside Air Temperature Sensor -G17- Open/Short circuit to B+[11]	♦ Short or open circuit in wiring or connectors to outside air temperature sensor -G17-	– Check -G17- usi ⇒ page 19 ♦ If DTCs for the s temperature sens -G152- are also Climatronic contr splice junction -L
Short circuit to Ground[11]	♦ -G17- malfunction	– Check wiring and – Replace -G17-

11) Either of these is displayed in conjunction with DTC.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00791 A/C Evaporator Temperature Switch -E33-[12]	♦ Short or open circuit in wiring or connectors to A/C evaporator temperature switch -E33-	– Check -E33- with ⇒ page 19
	♦ -E33- malfunction	– Replace -E33-
No check possible at this time	♦ This message appears only when Output Diagnostic Test Mode (func Memory and the temperature switch could not be checked (e.g. if outs C / 54 °F). This DTC will be erased from memory when ignition is swi	

12) This DTC is not loaded if the outside air temperature is below 12 °C (54 °F) or if outside air temperature sensor -G17- malfunctions. Condition required for loading of DTC: A/C readiness “On”, and -E33- has been opened for at least 10 minutes or no voltage at Climatronic control module -J255- terminal -T28a/3-.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00792 A/C Pressure Switch -F129- [13]	♦ Short or open circuit in wiring or connectors to A/C pressure switch -F129-	– Check wiring and
	♦ Refrigerant system malfunctions: overcharged insufficient charge condensor or evaporator blocked	– Check operation Block” (function
	♦ -F129- malfunction	– Replace -F129-
No check possible at this time	♦ This message appears only when Output Diagnostic Test Mode (func Memory and the pressure switch could not be checked (e.g. if outside F). This DTC will be erased from memory when ignition is switched of	
00796 Fan for Interior Temperature Sensor -V42-	♦ Air intake for -V42- blocked or restricted	– Carry out visual

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
	♦ Short or open circuit in wiring or connectors to A/C Control head -E87- or to temperature sensor blower -V42-	– Check wiring and conne agram
	♦ -V42- malfunction	– Replace -V42-

13) This DTC is not loaded if the outside air temperature is below 12°C (54°F) or if outside air temperature sensor -G17- malfunctions.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00797 Sunlight Photo Sensor -G107- Open/Short circuit to B+	♦ Open or short circuit circuit in wiring or connectors to sunlight photo sensor -G107-	– Check -G107- using “R ⇒ page 19 ♦ If DTCs for the outside a coolant temperature se ture sensor -G152- are nections from Climatron 14- to internal splice jur for Climatronic.
	♦ -G107- malfunction	– Check wiring and conne – Replace -G107-

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
00799 Engine Coolant Temperature Sensor -G110- Open/Short circuit to B+[14)]	♦ Open or short circuit circuit in wiring or connectors to engine coolant temperature sensor -G110-	– Check -G110- using “R ⇒ page 19 ♦ If DTCs for the outside photo sensor -G107- ar G152- are also present Climatronic control mod splice junction -L56- for
Short circuit to Ground[14)]	♦ -G110- malfunction	– Check wiring and conne – Replace -G110-

14) Either of these is displayed in conjunction with DTC.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
01026 Rear Evaporator Fan -V20-	♦ Short or open circuit in wiring or connectors to rear evaporator fan -V20-	– Check wiring and conne – Check voltage at -V20- Block” (function 08) ⇒ p – Carry out Output Diagn ⇒ page 15
	♦ Control module for blower for evaporator -J349- malfunction	– Replace -J349-
	♦ -V20- malfunction	– Replace -V20-
01027		

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
Rear Warm Air Fan -V47-	♦ Short or open circuit in wiring or connectors to rear warm air fan -V47-	– Check wiring and – Check voltage at Block" (function – Carry out Output ⇒ page 15
	♦ Control module for warm air blower -J350- malfunction	– Replace -J350-
	♦ -V47- malfunction	– Replace -V47-

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
01028 Fan Relay -J323-	Short or open circuit in wiring or connectors from Climatronic control module -J255- terminal T28b/11- to blower relay -J323- or from -J255- terminal -T28a/25- to relay for Climatronic -J254- -J323- malfunction	– Check -J323- usi ⇒ page 19 – Check wiring and – Replace -J323-

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
01086 Speedometer Vehicle Speed Sensor -G22- [15]	♦ Short or open circuit in wiring or connectors from terminal T28/7- (instrument cluster -K-) to Climatronic control module -J255- terminal -T28b/28-	– Check signal fro Value Block" (fur – Check wiring and agram [16]
	♦ Vehicle speed sensor -G54- malfunction	– Replace -G54- 45 ; Removal and
	♦ Speedometer vehicle speed sensor -G22- , on transmission malfunction (only in conjunction with inoperative Speedometer -G21-)	– Replace -G22- 45 ; Removal and
No check possible at this time	This message appears under the following conditions:[16] ♦ Vehicle speed lower than 10 km/h (6.25 mph). or ♦ Output Diagnostic Test Mode (function 03) was performed before che OBD program. display is erased from DTC memory after switching ign	

15) DTC is loaded for speedometer vehicle speed sensor -G22- (on vehicles with electronic speedometer) or vehicle speed sensor -G54- (on vehicles with mechanical speedometer).

16) Supplementary check after repair/replacement: Erase DTC memory, drive vehicle for at least 2 minutes in excess of 15 Km/h (9.5 mph), switch engine off. - Repeat sequence 3 times. If the malfunction has not been rectified the DTC will again load into memory.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
01205 Climatronic Relay -J254- Short circuit to Ground	♦ Short or open circuit in wiring from Climatronic control module -J255- terminal -T28b/14- via -E33- , -F129- , -F163- to Climatronic relay -J254-	– Check wiring and
	♦ -J254- malfunction	– Replace -J254-

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
No check possible at this time	◆ This message appears only when Output Diagnostic Test Mode (function 03 Memory and the Climatronic relay -J254- could not be checked (e.g. if outsi 12°C / 54°F). This DTC will be erased from memory when ignition is switche	

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
01271 Temperature Regulator Door Motor -V68- [17]	◆ Short or open circuit in wiring or connectors to temperature regulator door motor -V68-	– Check wiring and conn
	◆ -V68- incorrectly adjusted	– Check position of tempe Block" (function 08) ⇒ p – Check and adjust end p
	◆ -V68- malfunction	– Carry out Output Diagn ⇒ page 15 – Replace -V68-
01272 Central Air Door Motor -V70- [17]	◆ Short or open circuit in wiring or connectors to central air door motor -V70-	– Check wiring and conn
	◆ -V70- incorrectly adjusted	– Check central door pos Block" (function 08) ⇒ p
	◆ -V70- malfunction	– Carry out Output Diagn ⇒ page 15 – Replace -V70-

17) DTC is recognized after approx. 2 seconds.

Scan Tool -VAG1551- printout	Possible cause	Corrective steps
01273 Fresh Air Blower -V2-	◆ Short or open circuit in wiring or connectors to fresh air blower -V2-	– Check wiring and conn
		– Carry out Output Diagn ⇒ page 15
	◆ Control module for fresh air blower -J126- mal-function	– Replace -J126-
	◆ -V2- malfunction	– Replace -V2-
65535 Control Module Malfunctioning (Climatronic Control Module -J255-)	◆ -J255- malfunction	– Replace -J255-

2.3 Function 03 - Output Diagnostic Test Mode

Note

- *Output Diagnostic Test Mode (DTM) must only be carried out with the engine not running.*
- *For definitive results, output DTM must be carried out at an ambient temperature of at least 12 °C (54 °F) as displayed on A/C control head* ⇒ page 81 .
- *During output DTM, both coolant fans (-V7- and -V35-) are activated.*
- *Climatronic does not function or automatically regulate during output DTM.*
- *Output DTM can be repeated several times If necessary.*

Initiating

– Connect Scan Tool -VAG1551- (ST) and select AC/Heating electronics (address word 08) ⇒ page 1 .

Indicated on display (function selection):

```
Rapid data transfer HELP
Select function XX
```

– Press buttons 0 and 3 to select “Output Diagnostic Test Mode” function 03.

Indicated on display

```
Rapid data transfer Q
03 - Output diagnostic test mode
```

– Press Q button to confirm input.

Indicated on display

```
Output diagnostic test mode
```

The following functional tests are carried out in sequence:

- A/C Control head -E87- display ⇒ page 16
- Door motors ⇒ page 17
- Electrical circuit to (the following) blower motors ⇒ page 17 :

Fresh air blower -V2-

Rear evaporator fan -V20-

Rear warm air fan -V47-

- Electrical circuit to A/C clutch -N25- ⇒ page 17

Indicated on display

```
Function is not recognized or cannot →
be carried out at the moment!
```

– Output DTM is concluded.

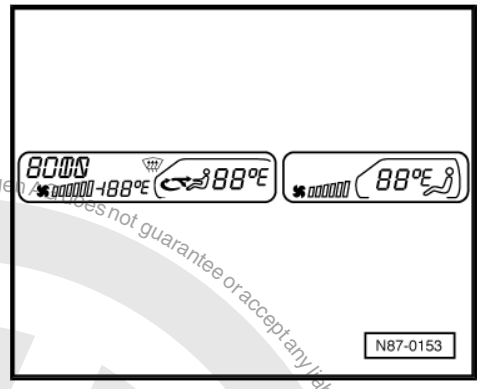
– Press → button.

Note

After completing output DTM, always check DTC memory again and rectify any malfunctions that may have been recognized during output DTM.

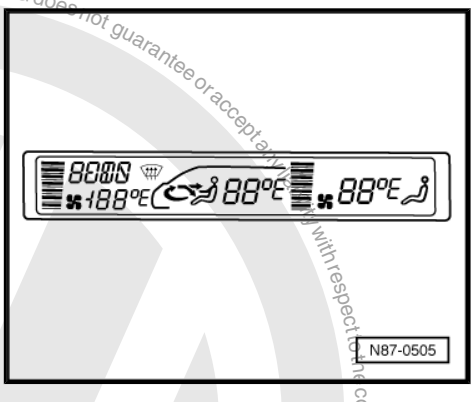
A/C Control Head E87, Display Test

Vehicles through 09.98



Vehicles from 09.98

For both versions, all display segments must appear fully in display. If not, replace -E87- .



Door Motor Test

During output DTM:

- Temperature regulator door motor -V68-
- Central air door motor -V70-
- Footwell/defrost door motor -V85-

are activated in sequence and move over their complete operating range. The first half of the motor movement range will be continuously activated, the remainder will be driven in stages.

The movement will be completed in approx. 30 seconds and the door motor adopts the position selected on the A/C control head.

Note

If after subsequent checking of DTC memory, no DTC is recognized (even though the selected positions were not attained), check the appropriate door motor or air door for mechanical damage.

Electrical Circuit Tests

Blower/fan motors

During output DTM, the following are activated in sequence with 2 different voltages:

- Fresh air blower -V2-
- Rear evaporator fan -V20-
- Rear warm air fan -V47-

Should a malfunction be detected in the electrical circuit to one of the motors listed, it will be stored in DTC memory.

A/C clutch -N25-

During output DTM, the electrical circuit is tested from connector T28b/14 via A/C evaporator temperature switch -E33- to after A/C pressure switch -F129- . Should a malfunction be detected, it will be stored in the DTC memory.

Note

If after subsequent checking of DTC memory, no DTC is detected (even though the A/C clutch is NOT activated during cooling operation), then check wiring and connections from A/C pressure switch -F129- via -F163- and -J32- to A/C clutch -N25- using wiring diagram.

2.4 Function 05 - DTC Memory, Erasing

Prerequisite

- DTC Memory has been checked and malfunctions corrected.

Erasing

- Press ⇨ button.

Indicated on display (function selection):

```
Rapid data transfer HELP
Select function XX
```

– Press buttons 0 and 5 to select the “Erase DTC memory” function 05.

Indicated on display

```
Rapid data transfer Q
05 Erase DTC memory
```

- Press Q button to confirm input.

Indicated on display

```
Rapid data transfer →
DTC memory is erased!
```

- Press → button.

Indicated on display (function selection):

```
Rapid data transfer HELP
Select function XX
```

Note

If this appears in the display, the test sequence is faulty.

```
Warning!
DTC memory was not checked
```

Follow test sequence precisely: first check DTC memory and if correct malfunctions.

2.5 Function 06 - End Output

– Press buttons 0 and 6 to end the OBD program.

Indicated on display

```
Rapid data transfer Q
06 End output
```

– Press Q button to confirm input.

Indicated on display

```
Rapid data transfer Help
Enter address word XX
```

– Switch off ignition.

– Disconnect Scan Tool -VAG1551- (ST) from Data Link Connector (DLC).

2.6 Function 07 - Climatronic Control Module, Coding through 09.98

If the appropriate code is not displayed, or if the control module has been replaced, the control module must be coded as follows:

– Connect Scan Tool -VAG1551- , input address word 08 “AC/ Heating electronics” and press → until “Select function XX” appears in display ⇒ page 1 .

Indicated on display (function selection):

```
Rapid data transfer HELP
Select function XX
```

– Press buttons 0 and 7 to select the “Coding control module” function 07.

Indicated on display

```
Coding control module Q
Enter code number XXXXX (0-32000)
```

– Press Q button to confirm input.

– Determine appropriate code from the following tables and use -VAG1551- keypad to enter.

Coding	For vehicles
00001	Market version: USA/CDN

2.7 Function 07 - Climatronic Control Module, Coding from 09.98

Coding	For vehicles
00032	Market version: USA/CDN Glass: tinted Engine: VR6

– After entering code, press Q button to confirm input.

Indicated on display after entering code (vehicle from 09.98)

```
→
Coding 00001 WSC XXXXX
```

Note

- *Previously published coding 00000 must NOT be entered.*
- *Improper coding results in incorrect blower output.*
- *The ignition must be switched off in order for the desired coding to be loaded into the control module. Always "End Output" (function 06) after coding control module and switch ignition off before proceeding with any additional -VAG1551- tests.*

– Press → button.

Indicated on display (function selection):

```
Rapid data transfer HELP
Select function XX
```

– End output (function 06) ⇒ page 17 .
– Switch off ignition.
– Disconnect Scan Tool -VAG1551- (ST) from Data Link Connector (DLC).

2.8 Function 08 - Measuring Value Block, Reading

Note

- *During the function "Read Measuring Value Block" all Climatronic functions and automatic regulation take place.*
- *7 display groups (measuring value blocks) each contain 4 display fields (measuring values).*
- *If it becomes necessary to read measured values while driving, please use an assistant.*

Initiating

– Connect Scan Tool (ST) -VAG1551- and input address word "08 AC/Heating electronics" and then press → button, until "Select function XX" is shown in display ⇒ page 1 .

Indicated on display (function selection):

```
Rapid data transfer HELP
Select function XX
```

– Press buttons [0] and [8] to select the “Read Measuring Value Block” function 08.

Indicated on display

```
Rapid data transfer Q
08 - Read Measuring Value Block
```

– Press [Q] button to confirm input.

Indicated on display

```
Read Measuring Value Block
Input display group number XX
```

2.9 Selectable Display Group Numbers

Display Group	Display Field	Designation
001	1	Outside air temperature sensor -G17-
	2	Front vent temperature sensor -G152-
	3	Instrument panel interior temperature sensor -G56-
	4	A/C engine coolant temperature sensor -G110-
002	1	Speedometer vehicle speed sensor -G22- or vehicle speed sensor -G54-
	2	Sunlight photo sensor -G107-
	3	Reference voltage supply for sensors -G92- , -G107- , -G112- and -G114-
	4	Voltage supply (terminal15)
003	1	through 09.98: A/C Evaporator temperature switch -E33- from 09.98: A/C clutch -N25- cutoff conditions
	2	A/C pressure switch -F129-
	3	Climatronic readiness/engine start recognition
	4	Climatronic cut-off by kickdown switch

Display Group	Display Field	Designation
004	1	Temperature regulator door position
	2	Central air door position
	3	Footwell/defrost door position
	4	Vacuum valve rail -N53- (fresh/recirculating air door and center air outlet)
005	1	Auxiliary water heater
	2	Fan relay -J323-
	3	Coolant pump -V50-
	4	Voltage signal (terminal X)
006	1	Rear evaporator temperature sensor -G153-
	2	A/C refrigerant shut-off valve -N43-
	3	Rear heater core temperature sensor -G154-
	4	Auxiliary heater valve -N172-
007	1	Fresh air blower -V2-
	2	Rear warm air fan -V47-
	3	Rear evaporator fan -V20-
	4	Not applicable
008	1	Coolant Fan -V7- and -V35- (first speed)
	2	Coolant Fan -V7- and -V35- (second speed)

Indicated on display

```
Read Measuring Value Block 1 →
1 2 3 4
```

Note

- *Decoding display zones readouts Test table, ⇒ page 21 .*
- *With the printer switched on the information on the display will be printed-out.*
- *If the specifications are attained in all display zones:*

– Press ⌧ button.

Indicated on display (function selection):

```
Rapid data transfer HELP
Select function XX
```

Note

After completing the "Read Measuring Value Block" function check DTC Memory ⇒ page 6

Test table

Display Group	Display field	Designation	Test conditions	Specified readout -VAG1551- display
001	1	Measured value of outside air temperature sensor -G17-	Displayed value equates to actual air temperature measured at sensor	... °C
	2	Measured value of front vent temperature sensor -G152-	Displayed value equates to actual air temperature measured at sensor	... °C
	3	Measured value of instrument panel interior temperature sensor -G56-	Displayed value equates to actual air temperature measured at sensor	... °C
	4	Measured value of A/C engine coolant temperature sensor -G110-	Displayed value equates to actual coolant temperature measured at sensor	... °C

18) On vehicles from 09.98, Climatronic Control Module -J255- , A/C Control Head -E87- and -G56- with Interior Temperature Sensor Fan -V42- are integrated into a non serviceable unit.

Display group	Display field	Designation	Test conditions	Specified readout -VAG1551- display
002	1	Speed signal from vehicle road speed sensor -G22- or from vehicle speed sensor -G54-	Displayed value equates to actual road speed measured by sensor[19)]	... km/h
	2	Measurement value of sunlight photo sensor -G107-	Displayed value depends on light intensity	0..100%

Display group	Display field	Designation	Test conditions	Specified readout on -VAG1551- display	Co
Cont.			dark light	0% 100%	

19) Displayed value dependant on transmission and tire options. A functional hall sensor is indicated by speed signal display.

Display group	Display field	Designation	Test conditions	Specified readout on -VAG1551- display	Co
002	3	Reference voltage supply for sensors -G92-, -G107- , -G112- and -G114-	Voltage range: 4.4 to 5.5V	..V	–
	4	Supply voltage at Climatronic control module -J255- terminal -T5e/2-	Displayed value equates to battery voltage	..V	– –

Vehicles through 09.98

Display group	Display field	Designation	Test conditions		Specified readout on -VAG1551- display	Co
003	1	A/C evaporator temperature switch -E33- switched status	Switch	closed	1	
				open	0	
Cont.					-	If " be • • •

Vehicles from 09.98

Display group	Display field	Designation	Test conditions	Specified readout on -VAG1551- display	Cu
003	1	A/C clutch -N25- cutoff conditions (codes 01 to 12 indicate cutout conditions)		0	A/C
				0 1	Ex
				0 2	Blo
				0 3	Ins ba
				0 4	No
				0 5	En

Display group	Display field	Designation	Test conditions	Specified reado on -VAG1551- d play
Cont.				0 6

Vehicles from 09.98, continued

Display group	Display field	Designation	Test conditions	Specified reado on -VAG1551- d play
003 Cont	1	A/C clutch -N25- cutoff conditions (codes 01 to 12 indicate cutout conditions)		0 7 0 8 0 9 1 0 1 1 1 2

Display group	Display field	Designation	Test conditions	Specified reado on -VAG1551- d play
003	2	A/C pressure switch -F129- switched status	No malfunctions in refrigerant circuit Condenser clean and has sufficient air flow (cooling) 2 to 32 bar switch component closed 16 bar switch component open	1 0[20)]
			No malfunctions in refrigerant circuit 2nd speed radiator blower switched on 2 to 32 bar switch component closed 16 bar switch component closed	1 1[20)]
Cont.				

20) Coded value indicating switch component status. First figure indicates 2 to 32 bar switch component status, the second figure indicates 16 bar switch component status (in both cases, 1 = closed, 0 = open).

Display group	Display field	Designation	Test conditions	Specified reado on -VAG1551- d play
003	2			

Display group	Display field	Designation	Test conditions	Specified readout on -VAG1551- display	Co
Cont.					If " •

Display group	Display field	Designation	Test conditions	Specified readout on -VAG1551- display	Co
003	3	Climatronic system readiness [21]/engine start recognized	System readiness recognized and engine started[22]	1 1[23]	If t
			System readiness recognized and engine not started	1 0[23]	–
			System readiness not recognized and engine not started	0 0[23]	
			System readiness not recognized and engine started	0 1[23]	
Cont.					

21) System readiness recognized if voltage is established at connector -T28a/3-

22) A/C clutch -N25- will only be switched on when engine start is recognized.

23) Coded value indicating both the Climatronic readiness and starting status. First figure indicates: 1 = on, 0 = off. The second figure indicates the engine starting status: 1 = started, 0 = not started.

Display group	Display field	Designation	Test conditions	Specified readout on -VAG1551- display	Co
003	4	Climatronic system cut-out by kickdown[24]	Kick-down switch operated (full throttle)	1 1[25]	If " –
			Kick-down switch not operated	0 1[25]	– If "(bec • • •
Cont.					

24) Check possible only when vehicle is driven.

25) Coded value indicating both the kickdown and transmission status. The first figure indicates the kickdown switch status: 1 = closed, 0 = open. The second figure indicates the transmission type: 1 = automatic, 0 = Manual. If a transmission other than indicated is installed, check wiring to -J225- using wiring diagram.

Display group	Display field	Designation	Test conditions	Specified reado on -VAG1551- d play
004	1	Position of temperature regulator door	Maximum heater output “HI” selected with front passenger “warmer” button	90% ..100%
			Minimum heater output “LO” selected with front passenger “cooler” button	0% ..10%
Cont.				

Display group	Display field	Designation	Test conditions	Specified reado on -VAG1551- d play
004	2	Position of central air door	AIr distribution to defrost selected[26] with “defrost” button	0% ..10%
			Air distribution to footwell selected[26] with front passenger “footwell” button	0% ..10%
			Air distribution to vent selected[26] with front passenger “vent” button	90% ..100%
Cont.				

26) For valid test results, air distribution must be set ONLY to level indicated, not in conjunction with other levels.

Display group	Display field	Designation	Test conditions	Specified reado on -VAG1551- d play
004	3	Position of footwell/defrost door	AIr distribution to defrost selected[27] with front passenger “defrost” button	90% ..100%
			Air distribution to footwell selected[27] with front passenger “footwell” button	0% ..10%
Cont.				

27) For valid test results, air distribution must be set ONLY to level indicated, not in conjunction with other levels.

Display group	Display field	Designation	Test conditions	Specified reado on -VAG1551- d play
004	4	Vacuum valve rail -N53- - switch status (fresh air/recirculating air door and center vent)	Recirculating air button not pressed and button for air flow to vent not pressed	0 0
			Recirculating air button not pressed and button for air flow to vent pressed	0 1
			Recirculating air button pressed and button for air flow to vent not pressed	1 0
			Recirculating air button pressed and button for air flow to vent pressed	1 1

Display group	Display field	Designation	Test conditions	Specified readout on -VAG1551- display	Co
005	1	Auxiliary water heater switched status[28]	Auxiliary water heater operating	1	–
			Auxiliary water heater not operating	0	
	2	Fan relay -J323- switched status	Climatronic switched on and auxiliary water heater not operating[29]	1	–
			Climatronic switched off and auxiliary water heater operating[29]	0	
Cont.					

28) If equipped. (This display field indicates whether the water heater is switched on).

29) If equipped. Switching condition appears in display group 05, field 1.

Display group	Display field	Designation	Test conditions	Specified readout on -VAG1551- display	Co
005	3	Coolant pump -V50- switched status	Maximum heater output “HI” selected with front passenger “warmer” button	1	–
			Minimum heater output “LO” selected with front passenger “cooler” button	0	–
	4	Voltage signal (terminal X)	Ignition switched on	1	–
			Auxiliary water heater operating[30]	0	

30) If equipped. Switching condition appears in display group 05, field 1.

Display group	Display field	Designation	Test conditions	Specified readout on -VAG1551- display	Co
006	1	Measured value of rear evaporator temperature sensor -G153- -	Displayed value equates to actual air temperature measured at sensor	... °C	–
					–
	2	A/C refrigerant shut-off valve -N43- switched status	Engine running Air temperature[31] at least 12°C. Minimum heater output “LO” selected with front passenger “cooler” button	1	–
					–
			Maximum heater output “HI” selected with front passenger “warmer” button	0	–
Cont.					–

31) For valid results, A/C control head -E87- must display an outside air temperature of at least 12°C (54°F).

Display group	Display field	Designation	Test conditions	Specified reado on -VAG1551- d play
006	3	Measured value of rear heater core temperature sensor - G154-	Displayed value equates to actual air temperature measured at sensor	... °C
	4	Auxiliary heater valve -N172- switched status	Minimum heater output “LO” selected with front passenger “cooler” button	1
			Maximum heater output “HI” selected with front passenger “warmer” button	0

Display group	Display field	Designation	Test conditions	Specified reado on -VAG1551- d play
007	1	Voltage at fresh air blower -V2-	Engine running. A/C control head -E87- front and rear passenger temperature displays indicate maximum heater output “HI” selected with front passenger “warmer” button Maximum output of Fresh air blower -V2- selected with front passenger “increase blower speed” button	approx. 12 V
Cont.				

Display group	Display field	Designation	Test conditions	Specified reado on -VAG1551- d play
007	2	Voltage at rear warm air fan -V47-	Engine running A/C control head -E87- front and rear passenger temperature displays indicate maximum heater output “HI” selected with front passenger “warmer” button Maximum output of rear warm air fan -V47- with rear passenger “increase blower speed” button	approx. 12 V
Cont.				

Display group	Display field	Designation	Test conditions	Specified reado on -VAG1551- d play
007	2	Voltage at rear warm air fan -V47-	Engine running. A/C control head -E87- front and rear passenger temperature displays indicate minimum heater output “LO” selected with front passenger “cooler” button Maximum output of rear warm air fan -V47- with rear passenger “increase blower speed” button	approx. 0 V
Cont.				

Display group	Display field	Designation	Test conditions	Specified readout on -VAG1551- display	Co
007 Cont.	3	Voltage at rear evaporator fan -V20-	Engine running. A/C control head -E87- front and rear passenger temperature displays indicate minimum heater output “LO” selected with front passenger “cooler” button Maximum output of rear evaporator blower -V20- with rear passenger “increase blower speed” button	approx. 12 V	–

Display group	Display field	Designation	Test conditions	Specified readout on -VAG1551- display	Co
007	3	Voltage at rear evaporator fan -V20-	Engine running. A/C control head -E87- front and rear passenger temperature displays indicate maximum heater output “HI” selected with front passenger “warmer” button Maximum output of rear evaporator fan -V20- with rear passenger “increase blower speed” button	approx. 0 V	–
	4	Not assigned			

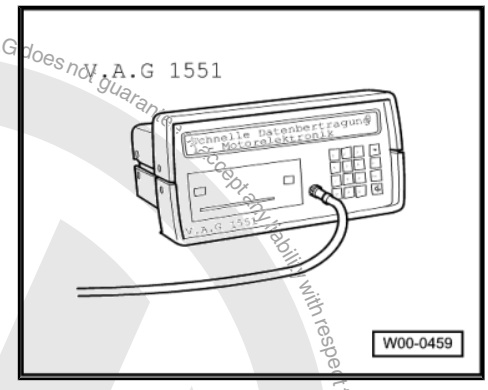
Display group	Display field	Designation	Test conditions	Specified readout on -VAG1551- display	Co
008	1	Coolant fan first speed	– Coolant fan first speed in operation	1	–
			– Coolant fan first speed not in operation	0	–
	2	Coolant fan second speed	– Coolant fan second speed in operation	1	–
			– Coolant fan second speed not in operation	0	–

32) Wiring diagram may indicate Coolant Fan Control (FC) Relay -J26-

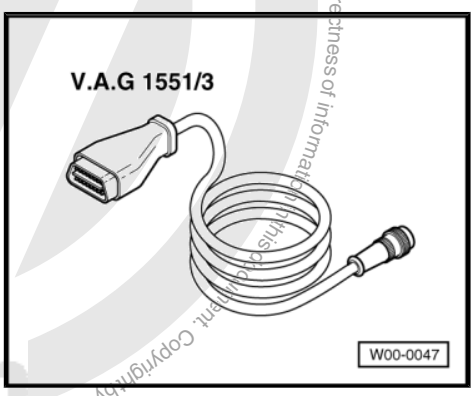
3 Special Tools

Special tools and workshop equipment required

- Scan Tool -VAG1551- (ST)



- Optional: -VAG1552- or Vehicle Diagnostic Testing and Information System -VAS5051-
- Adapter cable -VAG1551/3- or -VAG1551/3B-



80 – Heating, Ventilation

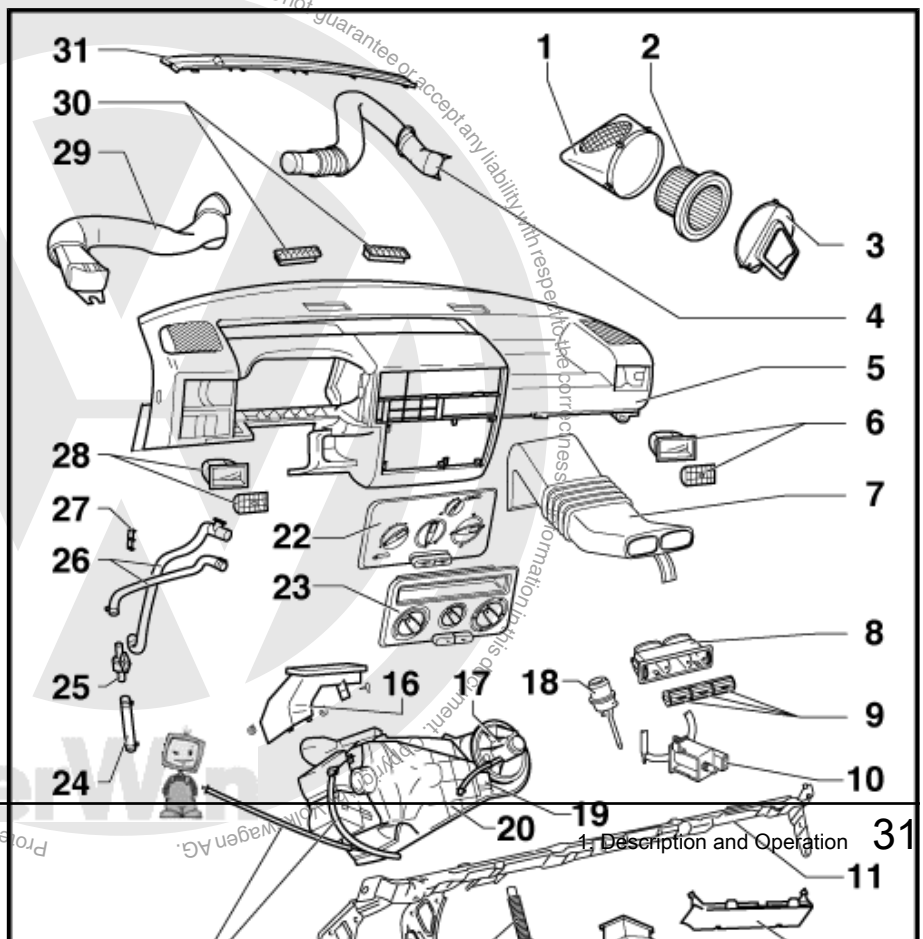
1 Description and Operation

1.1 Heating and Ventilation System

Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*



1 - Filter housing

2 - Dust and pollen filter

- ❑ Removing and installing ⇒ page 56
- ❑ Dust and pollen filter in rear passenger compartment is identical.

3 - Air intake duct

- ❑ On bulkhead
- ❑ Removing and installing ⇒ page 45

4 - Right air duct

- ❑ Replacing
- – Remove glove compartment or passenger's side airbag unit. ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation

5 - Instrument panel

- ❑ Removing and installing ⇒ Body Interior; Rep.

Gr. 70 ; Removal and Installation

6 - Right air outlet

- ❑ Removing and installing ⇒ page 46

7 - Center air duct

- ❑ Replacing
- – Remove heating unit ⇒ Item 20 (page 32) .

8 - Center air outlet housing

- ❑ Removing ⇒ page 47

9 - Air guide

- ❑ Removing ⇒ page 47

10 - Fresh air/recirculating door two-way valve -N63-

- ❑ Cap must be left vented
- ❑ Vacuum hose layout ⇒ page 44
- ❑ Replacing
- – Remove glove compartment, knee padding or passenger side airbag unit. ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation

11 - Carrier

12 - Trim panel

13 - Footwell air outlet console

- ❑ Removing ⇒ page 48
- ❑ Replacing
- – Remove radio.
- – Remove center vent ⇒ Item 9 (page 32) .

14 - Water drain valve

- ❑ Water leak at heater unit housing may result if valve blocked

15 - Water drain pipe

16 - Defroster duct

- ❑ Replacing
- – Remove heating unit ⇒ Item 20 (page 32) .

17 - Fresh air blower -V2-

- ❑ Removing ⇒ page 48

18 - Fresh air/recirculating door vacuum unit

- ❑ Door in fresh air position when no vacuum is present
- ❑ Door in recirculated air position when vacuum is present
- ❑ Vacuum hose layout ⇒ page 44
- ❑ Removing ⇒ page 48

19 - Fresh air blower series resistance and fuse -N24-

- ❑ Removing ⇒ page 48

20 - Heating unit

- ❑ Removing ⇒ page 49
- ❑ Assembly ⇒ page 37

21 - Cables

- ❑ Installing and adjusting ⇒ page 50

22 - Heating and ventilation controls through 09.98

With:

- ❑ Fresh air blower switch -E9-
- ❑ Fresh air/recirculating door switch -E159-
- ❑ Removing and installing ⇒ page 46
- ❑ Disassembling and assembling ⇒ page 34
- ❑ Cables, installing and adjusting ⇒ page 50

23 - Heating and ventilation controls from 09.98

With:

- ❑ Fresh air blower switch -E9-
- ❑ Fresh air/recirculating door switch -E159-
- ❑ Additional rear heater regulation switch -E271-
- ❑ Removing and installing ⇒ page 47
- ❑ Disassembling and assembling ⇒ page 35
- ❑ Cables, installing and adjusting ⇒ page 50

24 - Coolant hose

- ❑ Hose routing diagram ⇒ Engine Mechanical; Rep. Gr. 19 ; Description and Operation

25 - Heater control valve

- ❑ Removing ⇒ page 49

26 - Coolant hoses

- ❑ Hose routing diagram ⇒ Engine Mechanical; Rep. Gr. 19 ; Description and Operation

27 - Clip

28 - Left air outlet

- ❑ Removing and installing ⇒ page 46

29 - Left air duct

- ❑ Replacing

– Remove relay plate cover.

– Remove footwell vent console and trim.

– Remove air duct.

30 - Defroster vents

- ❑ Removing

– Carefully pry out with screwdriver.

31 - Air intake grille

1.2 Heating and Ventilation Controls, through 09.98, Assembly Overview

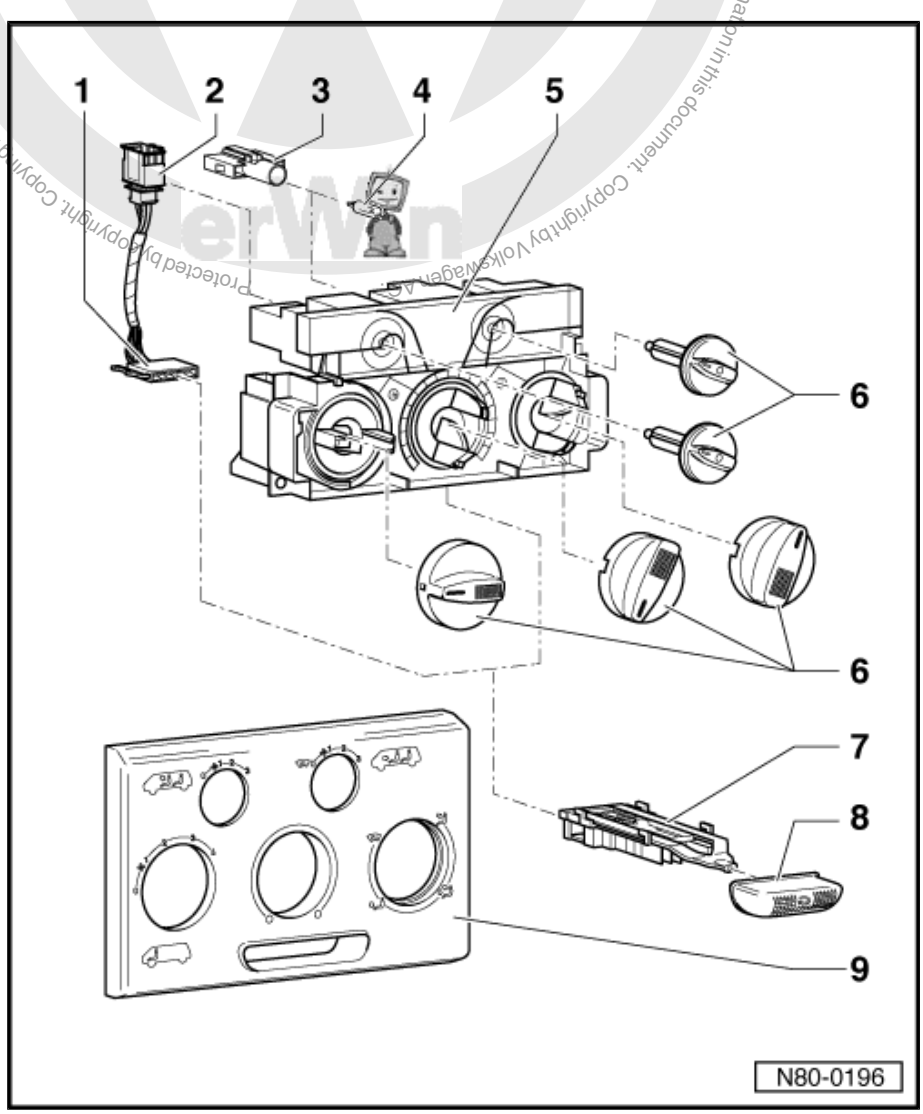
Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*

Note

Illustrated control from vehicle with additional (rear) heat exchanger and rear passenger compartment ventilation (where applicable).



1 - Connector, 6 pin -T6-

2 - Connector, 6 pin -T6c-

3 - Illumination filter

4 - Illumination bulb -L16-

5 - Control assembly

With:

- ❑ Fresh air blower switch -E9-
- ❑ Warm air blower switch -E100-
- ❑ Fresh air blower switch -E179-
- ❑ Removing and installing ⇒ page 46
- ❑ Cables, installing and adjusting ⇒ page 50

6 - Rotary knobs

7 - Fresh air/recirculating door switch -E159-

- ❑ With illumination bulb -L43-
- ❑ Removing:

– Remove assembly ⇒ Item 5 (page 34) .

– Release retainers between push buttons and controls.

– Press switch in direction of push button.

8 - Push button

9 - Control panel trim

1.3 Heating and Ventilation Controls, from 09.98, Assembly Overview

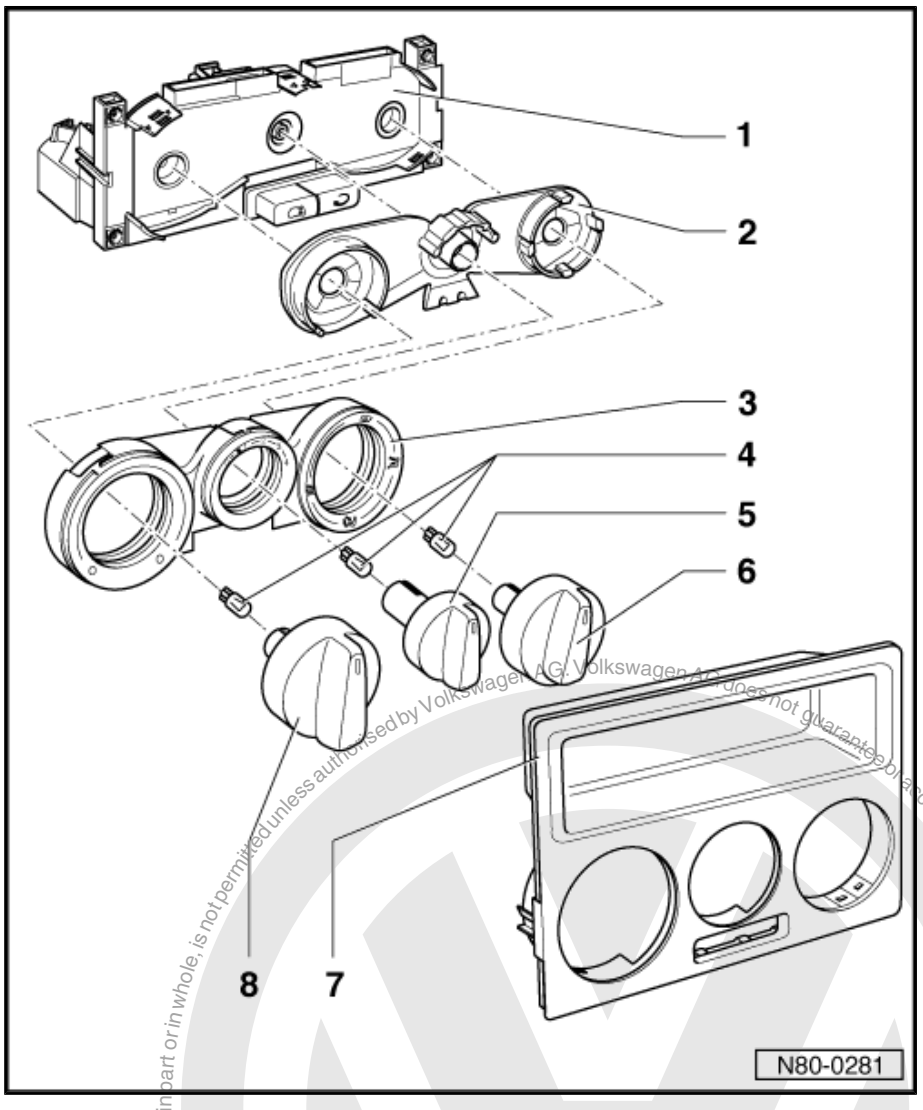
Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*

Note

Illustrated control from vehicle with additional (rear) heat exchanger and rear passenger compartment ventilation (where applicable).



1 - Regulator

With:

- ❑ Fresh air blower switch -E9-
- ❑ Fresh air/recirculating door switch -E159-
- ❑ Additional rear heater regulation switch -E271-
- ❑ Removing and installing ⇒ page 47
- ❑ Cables, installing and adjusting ⇒ page 50

2 - Illumination filter

3 - Trim

4 - Illumination bulb -L16-

- ❑ Qty.: 3

5 - Rotary knob for blower fan speed

- ❑ Removing
  - – Pull off using pliers with rubber or plastic jaw protectors

6 - Rotary knob for air distribution

- ❑ Removing
  - – Pull off using pliers with rubber or plastic jaw protectors

7 - Trim

8 - Rotary knob for temperature control

- ❑ Removing
  - – Pull off using pliers with rubber or plastic jaw protectors

1.4 Heating Unit, Assembly Overview

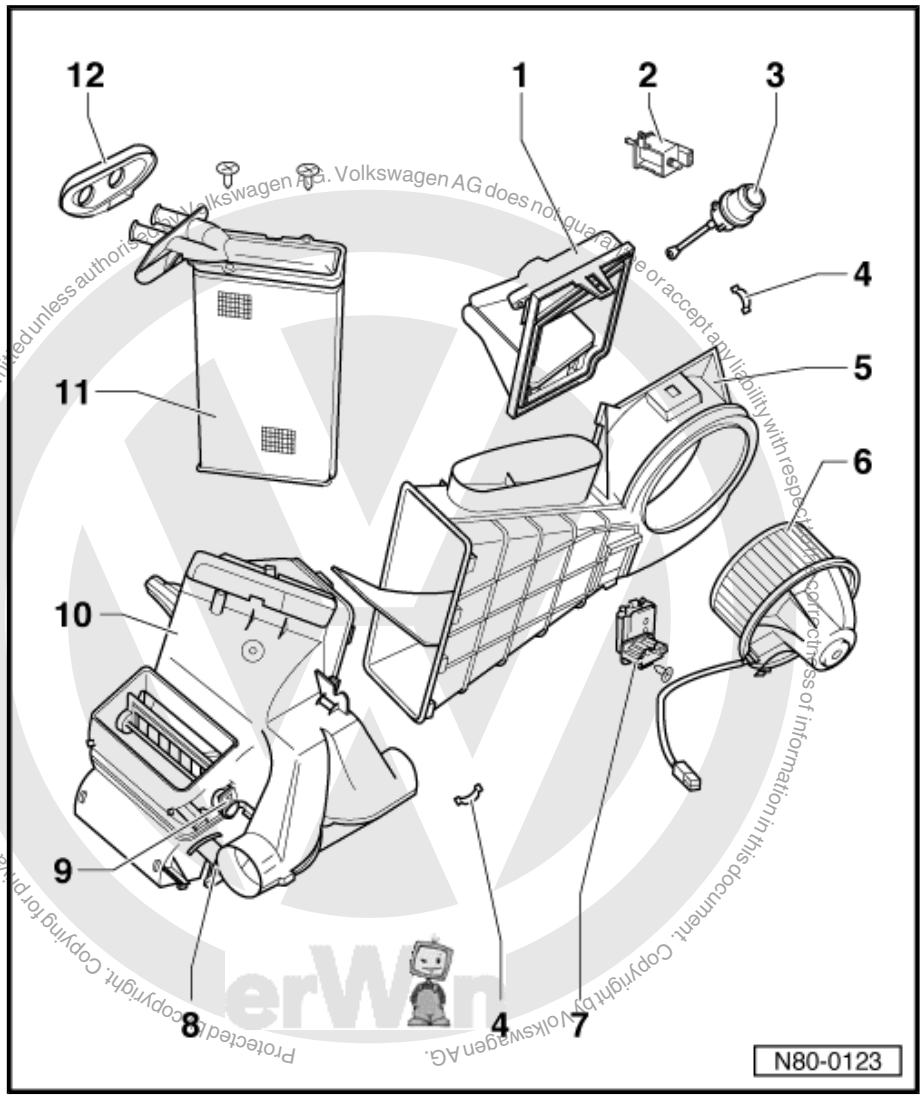
Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*

Note

Heater unit, removing ⇒ page 49



1 - Air intake duct

- ❑ With recirculating air door

2 - Fresh air/recirculating door two-way valve -N63-

3 - Fresh air/recirculating door vacuum unit

- ❑ Vacuum hose, layout ⇒ page 44
- ❑ Removing ⇒ page 48

4 - Clip

5 - Air duct

6 - Fresh air blower -V2-

7 - Fresh air blower series resistance with fuse -N24-

8 - Footwell door lever

- ❑ Removing:
  - – Disconnect lever with a screwdriver.

9 - Defroster door lever

- ❑ Removing:
  - – Disconnect lever with a screwdriver.

10 - Air distribution housing

11 - Heater core

- ❑ Install seals around entire circumference of heater core

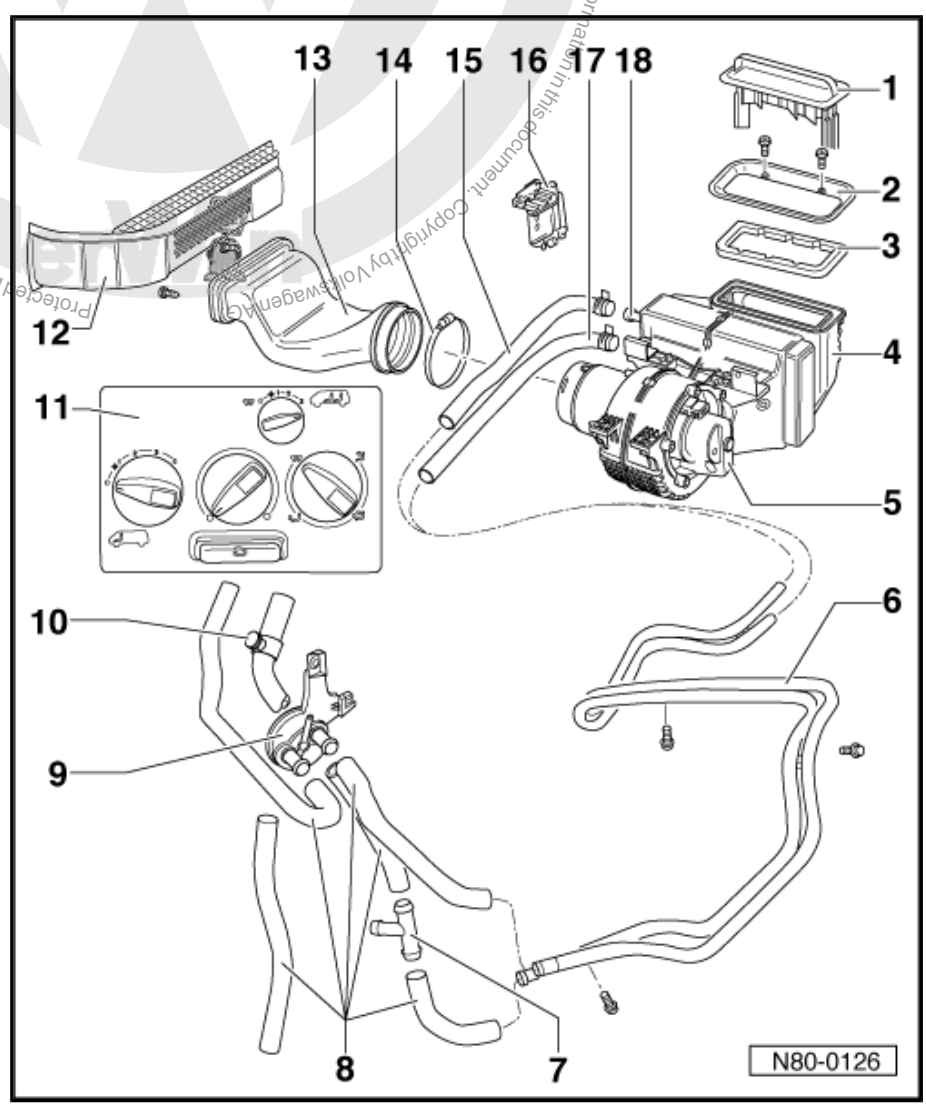
12 - Gasket

1.5 Rear Heater, through 09.98, Assembly Overview

Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*



1 - Air outlet (in rear passenger compartment or cargo area)

- ❑ Removing ⇒ page 52

2 - Cover plate

3 - Gasket

4 - Air distribution housing

- ❑ Rear heater core, removing ⇒ page 51
- ❑ Assembly ⇒ page 42

5 - Rear warm air fan -V47-

- ❑ Removing ⇒ page 42

6 - Coolant pipe

- ❑ Removing ⇒ page 52

7 - T fitting

8 - Coolant hoses in engine compartment

- ❑ Coolant hose connections ⇒ page 43

9 - Rear heater control valve

- ❑ Removing ⇒ page 55

10 - Bleeder screw

11 - Control assembly

With:

- ❑ Warm air blower switch -E100-
- ❑ Fresh air blower switch -E9-
- ❑ Fresh air/recirculating door switch -E159-
- ❑ Disassembling and assembling ⇒ page 34

12 - Sliding door footwell insert

- ❑ Removing ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation

13 - Air intake duct

- ❑ Kombi models (not applicable), removing ⇒ page 52
- ❑ EuroVan and Transporter models, removing ⇒ page 52

14 - Hose clamp

15 - Coolant hose, return

16 - Heater blower series resistance -N72-

17 - Coolant hose, supply

18 - Heater core

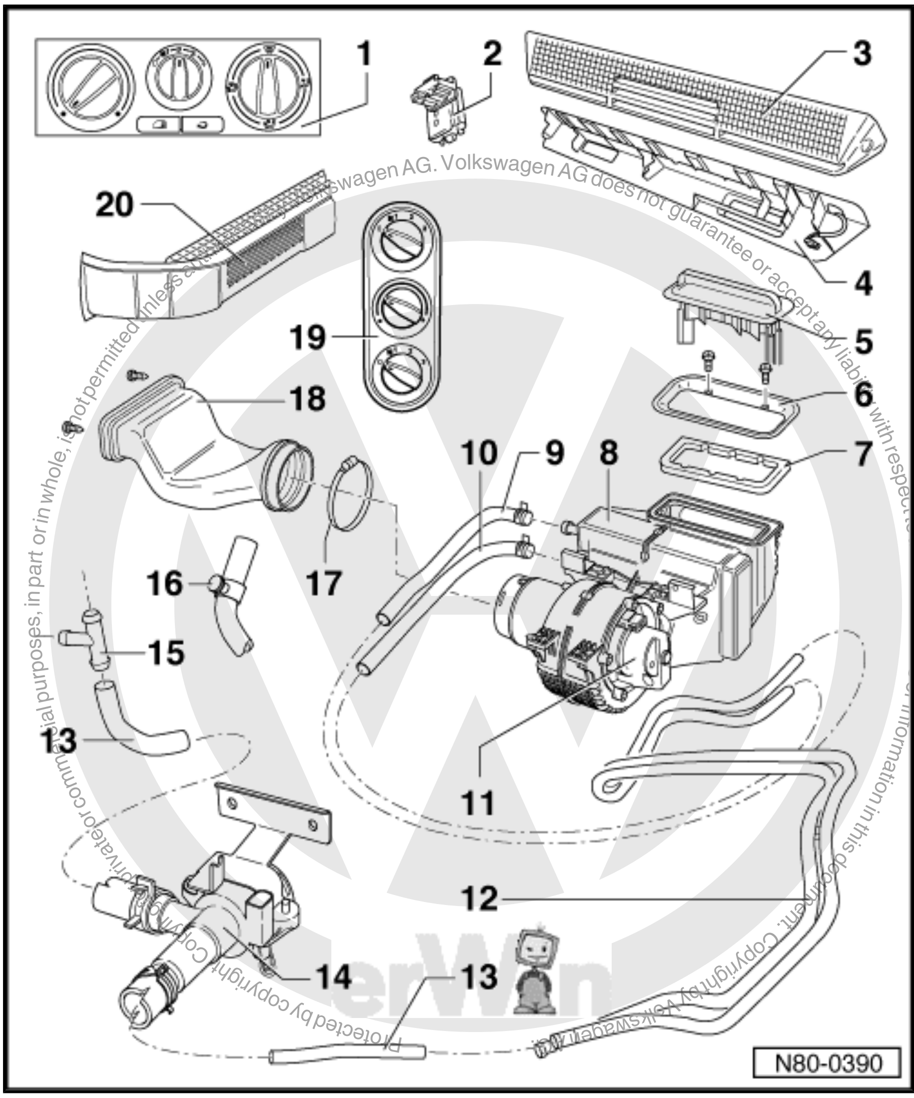
- ❑ Install seals around entire circumference of heater core
- ❑ Removing ⇒ page 42

Note

Always change coolant after repairs.

1.6 Rear Heater, from 09.98, Assembly Overview

> ⚠ Caution
>
> *Before beginning repairs on the electrical system:*
>
> - *Obtain the anti-theft radio security code.*
> - *Switch the ignition off.*
> - *Disconnect the battery Ground (GND) strap.*
> - *After reconnecting battery, recode and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*



1 - Heating and ventilation controls
- ❑ With Fresh Air Blower Switch -E9-
- ❑ With installed Fresh Air/ Recirculating Door Switch -E159-
- ❑ With installed Additional Heater Core Rear Regulation Switch -E271-
- ❑ Assembly ⇒ page 34

2 - Heater Blower Series Resistance -N72-

3 - Vent from 05.99
- ❑ Depending on equipment
- ❑ Removing ⇒ page 53

4 - Cover from 05.99
- ❑ Depending on equipment
- ❑ Removing ⇒ page 54

5 - Air outlet
- ❑ Depending on equipment
- ❑ Removing ⇒ page 54

6 - Cover plate

7 - Seal

8 - Air distribution housing
- ❑ Removing ⇒ page 53 , removing auxiliary heat exchanger

9 - Coolant hose return

10 - Coolant hose, supply

11 - Rear warm air fan -V47-
- ❑ Removing ⇒ page 42

12 - Coolant pipe
- ❑ Removing ⇒ page 52

13 - Coolant hoses in engine compartment

- ❑ Connections for coolant hoses ⇒ page 43

14 - Auxiliary Heater Valve -N172-

- ❑ Removing ⇒ page 53

15 - T-adapter

16 - Air bleeder screw

17 - Hose clamp

18 - Air intake duct

- ❑ Kombi models (not applicable), removing ⇒ page 52
- ❑ EuroVan and Transporter models, removing ⇒ page 52

19 - Rear heater and ventilation controls

- ❑ In driver-side B-pillar
- ❑ With Rear Fresh Air Blower Switch -E179-
- ❑ With Rear Interior Temperature Potentiometer -G275-
- ❑ With Warm Air Blower Switch -E100-
- ❑ Removing ⇒ page 54

20 - Footwell insert

- ❑ Removing ⇒ Body Exterior; Rep. Gr. 58 ; Removal and Installation

1.7 Rear Heater Air Distribution Housing, Assembly Overview

1 - Gasket

2 - Air distribution housing

3 - Bracket

4 - Clip

- ❑ Snaps into position on cross member

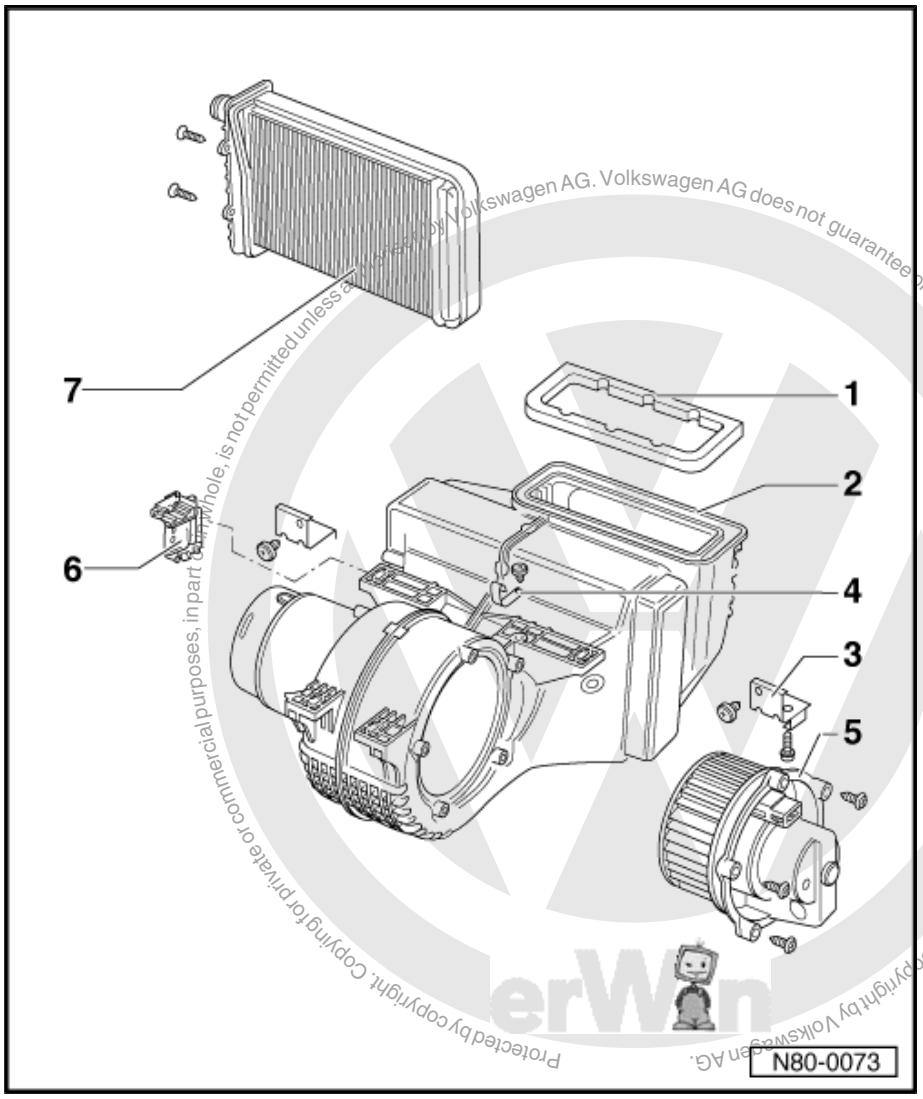
5 - Rear warm air fan -V47-

- ❑ Note installation position

6 - Warm air blower series resistor -N72-

7 - Heater core

- ❑ Install seals around entire circumference of heater core



1.8 Coolant Hose Connection Diagram

Note

- *For routing of all hoses*
- *⇒ Engine Mechanical; Rep. Gr. 19 ; Description and Operation*

1 - Rear heater core

2 - Coolant return hose

(from rear heater core to coolant pipe)

3 - Coolant supply hose

(from coolant pipe to rear heater core)

4 - Coolant pipe

5 - Coolant return hose

(from coolant pipe to rear heater control valve)

6 - Coolant supply hose

(from T-piece to coolant pipe)

7 - Coolant supply hose

(from engine to T-piece)

8 - Engine

9 - Coolant return hose

(from control valve to engine)

10 - Control valve

11 - Coolant supply hose

(from T-fitting to front heater core)

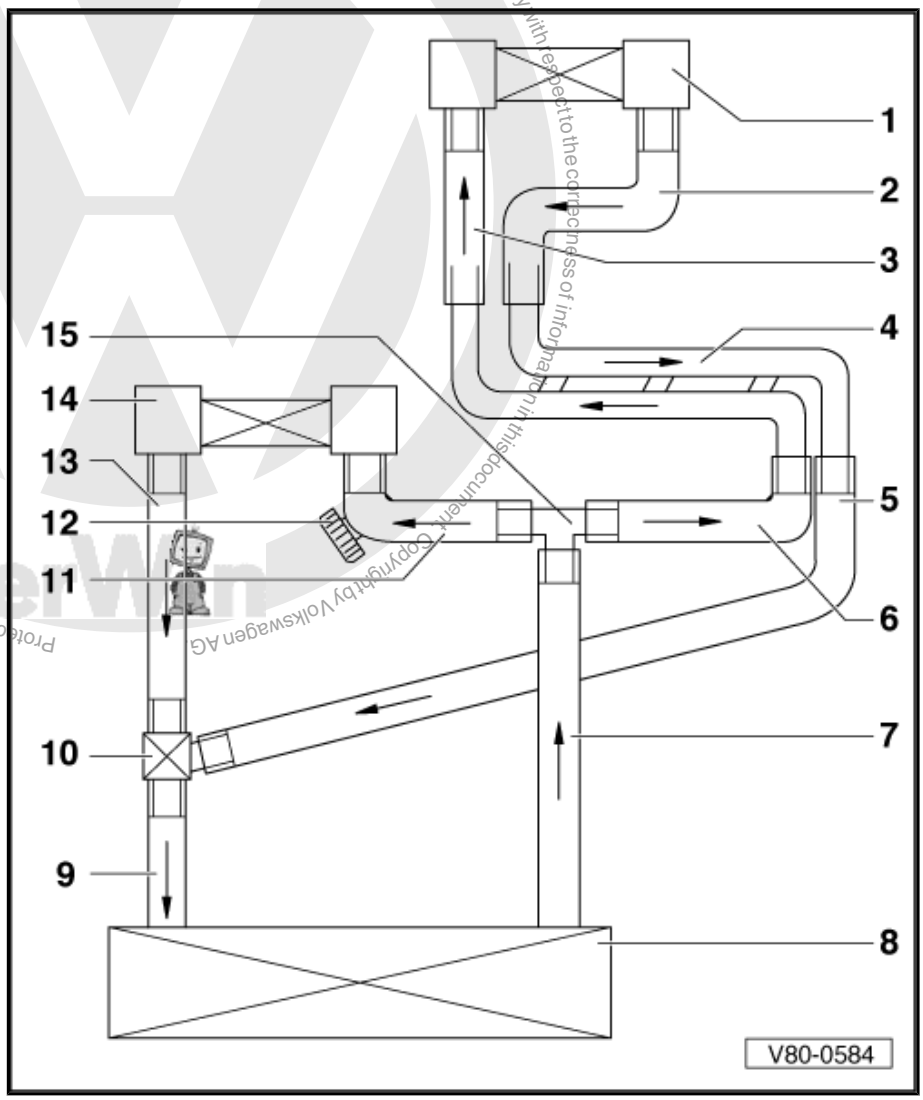
12 - Bleeder screw

13 - Coolant return hose

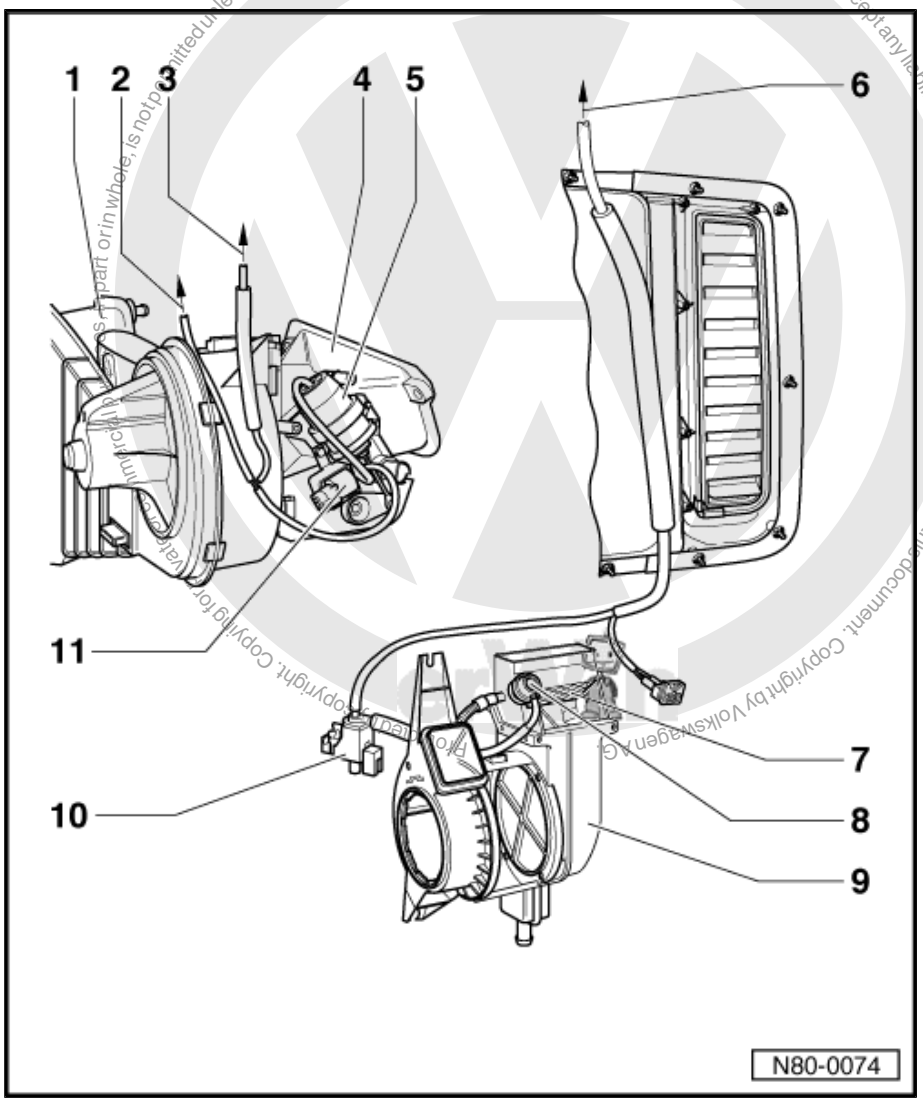
(from front heater core to control valve)

14 - Front heater core

15 - T-piece



1.9 Vacuum Hose Connection Diagram



1 - Heater unit

2 - To brake servo or vacuum pump

3 - Vacuum hose routing

- ❑ Routed through loops to rear fresh and recirculating air door two-way valve -N45- .

4 - Air intake housing

- ❑ With recirculating air door

5 - Vacuum unit for fresh air/ recirculating door

- ❑ Door in fresh air position when no vacuum is present
- ❑ Door in recirculated air position when vacuum is present

Note

The following descriptions apply only to rear ventilation unit (where applicable)

6 - Vacuum hose routing

- ❑ Routed through loops up to instrument panel.

7 - Fresh air /recirculating door

8 - Vacuum unit

- ❑ When switched off vacuum unit is vented.

9 - Air intake

10 - Rear fresh air/recirculating door two-way valve -N45-

- ❑ Cap must be vented

11 - Rear fresh air/recirculating door two-way valve -N63-

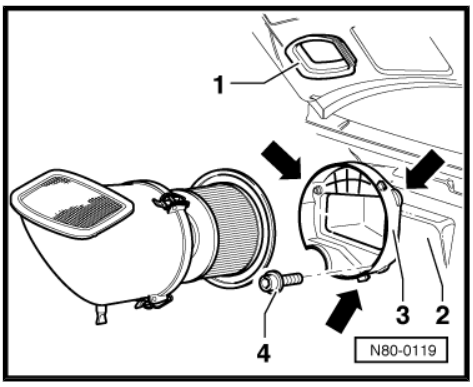
- ❑ Replacing

– Remove glove compartment, knee padding or passenger side airbag unit. ⇒ Body Interior; Rep. Gr. 69 ; Removal and Installation

2 Removal and Installation

2.1 Air Intake Duct

Air intake duct, removing and installing



1 - Hood insert

2 - Bulkhead

3 - Duct

4 - Socket head combination bolt, 3 Nm (26 in. lb)

Removing:

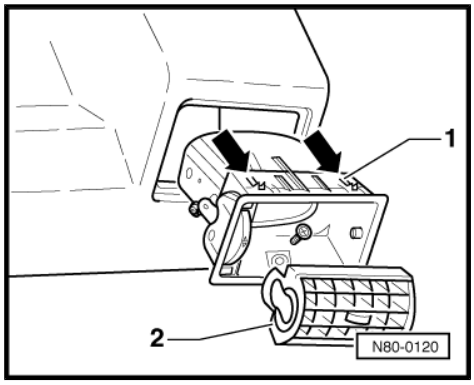
– Remove dust and pollen filter. ⇒ page 56

– Remove screws -arrows-.

Installing:

Reassemble in reverse order. Ensure that duct -3- is not inserted into bulkhead at an angle.

2.2 Air Outlets



Air outlets, removing and installing

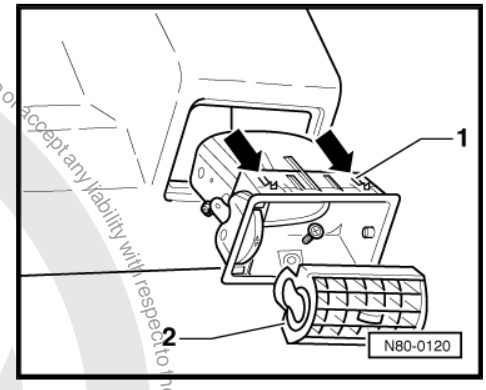
Removing:

- Carefully pull grill -2- out with needle nose pliers.
- Remove screw.
- With a small screwdriver, release locking tabs -arrows- from grille opening while gently pulling on housing -1-.

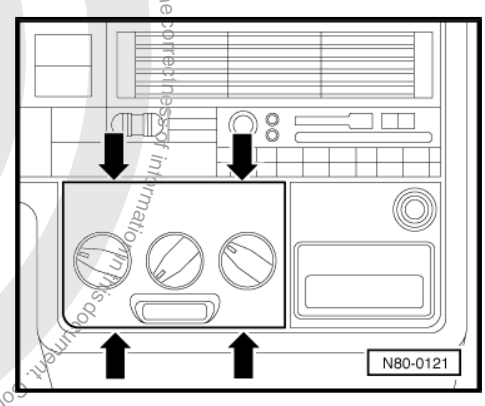
Installing:

Install in reverse order, noting the following:

- First locate grille -2- on the left guide lug of housing -1-.
- Carefully press in vent until locating tabs engage.



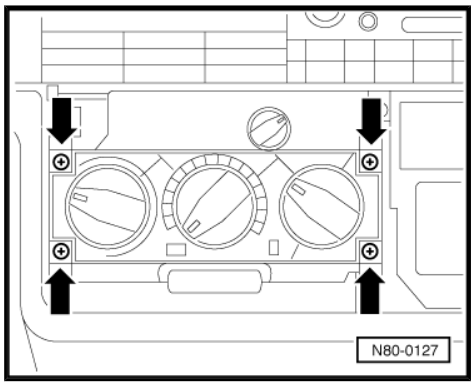
2.3 Heating/Ventilation Controls and Trim Panel, through 09.98



Heating/ventilation controls and trim panel, removing and installing through 09.98

Removing:

- Carefully remove trim panel at locating lugs -arrows- with a screwdriver. Take care not to damage instrument panel.
- Remove ashtray/trim panel.
- Remove footwell vent console. ⇒ page 48
- Remove screws from instrument trim panel -arrows-.
- Push controls with cables attached below instrument panel.
- Disconnect electrical connectors.
- Detach cables from controls.



Installing:

Install in reverse order, noting the following:

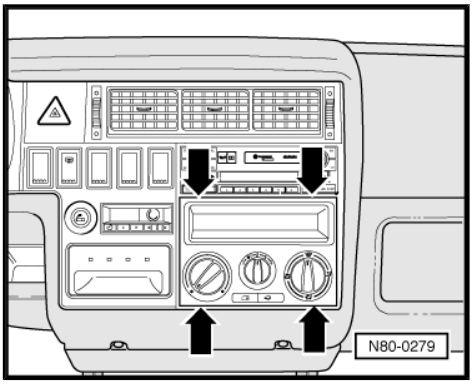
- Before installing controls, attach cables first. ⇒ page 50 , Cables, installing and adjusting

2.4 Heating/Ventilation Controls and Trim Panel, from 09.98

Heating/ventilation controls and trim panel, removing and installing from 09.98

Removing:

– Carefully remove trim panel at locating lugs -arrows- with a screwdriver. Take care not to damage instrument panel.

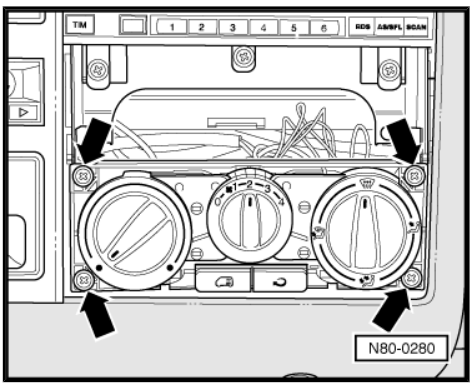


– Remove screws -arrows-
– Push controls (with cables attached) under instrument panel.
– Disconnect electrical connections.
– Detach cables from controls.

Installing:

Install in reverse order, noting the following:

– Before installing controls, attach cables first. ⇒ page 50 , Cables, installing and adjusting

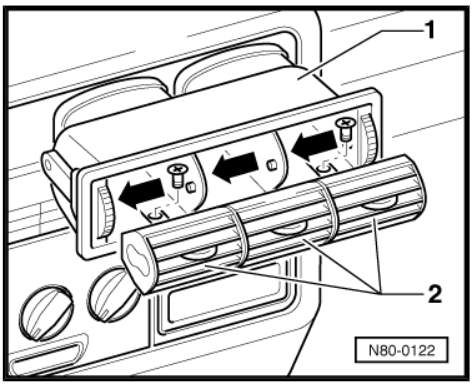


2.5 Center Air Outlet

Center air outlet, removing and installing

Removing:

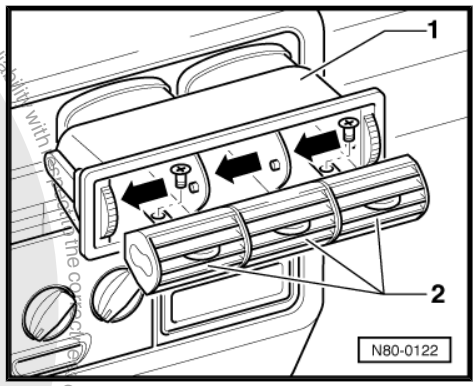
– Carefully pull grille -2- out with needle nose pliers.
– Remove screws.
– Remove vent housing -1-.



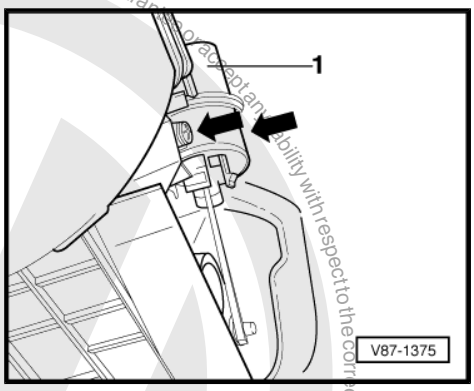
Installing

Install in reverse order, noting the following:

– First locate grille -2- on the left guide lug of housing -1-.
– Carefully press in vent until locating tabs engage.



2.6 Fresh Air/Recirculating Door Vacuum Unit



Fresh air/recirculating door vacuum unit, removing and installing

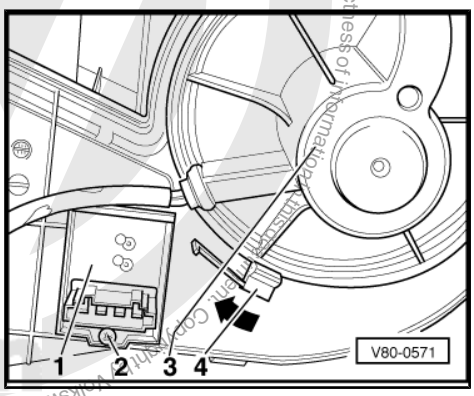
– Remove right air outlet. ⇒ page 46

– Remove glove box, knee padding or passenger side airbag unit. ⇒ Body Interior; Rep. Gr. 69 ; Removal and Installation

– Remove screws -arrows-.

– Rotate and lift vacuum unit -1- from lever.

2.7 Fresh Air Blower Series Resistance with Fuse and Fresh Air Blower



Fresh air blower series resistance with fuse -N24- and fresh air blower -V2- removing

Series resistance -N24- , removing

– Remove screw -2-.

– Remove series resistance module -1-.

Fresh air blower -3-, removing (heater unit installed)

– Remove glove box, knee padding or passenger side airbag unit. ⇒ Body Interior; Rep. Gr. 69 ; Removal and Installation

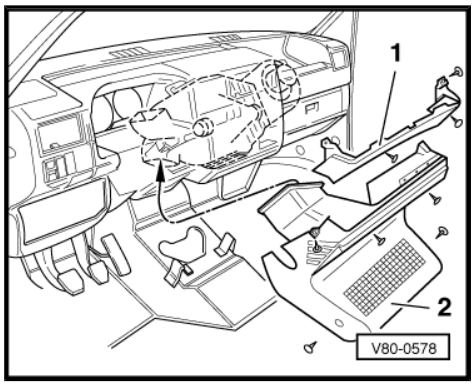
– Remove electrical connector from series resistance -1-.

– Remove right air duct.

– Press retaining tab -4-, turn fresh air blower in direction of -arrow- and remove from housing.

– Guide blower to center of instrument panel and remove.

2.8 Footwell Air Outlet Console

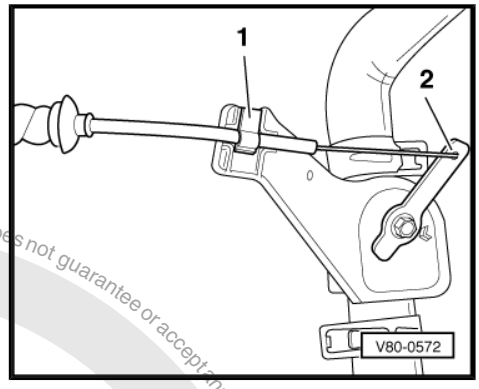


Footwell air outlet console, removing

– Remove trim panel -1-.

– Remove footwell vent console -2-.

2.9 Heater Control Valve

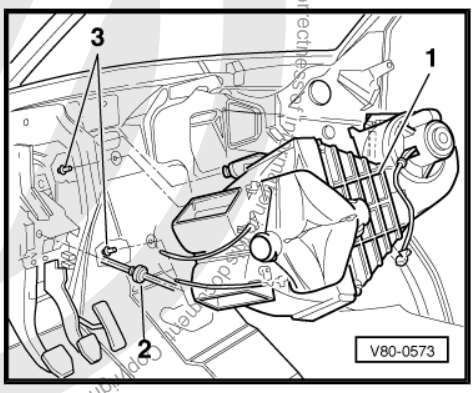


Heater control valve, removing

> **WARNING**
>
> ***Cooling system is pressurized when engine is warm. Before performing repairs, wear gloves, goggles and other appropriate protection while slowly and carefully releasing system pressure.***

– Remove clip -1- and remove cable end -2- from lever.
– Clamp coolant hoses near valve.
– Remove spring clamps from coolant hoses and and remove coolant hoses from valve.
– Remove valve.

2.10 Heating Unit



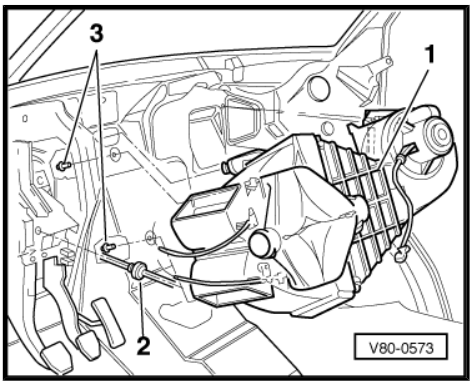
Heating unit removal shown with instrument panel removed.

1 - Heating unit
2 - Rubber grommet
3 - Combination screw

> **WARNING**
>
> ***Cooling system is pressurized when engine is warm. Before performing repairs, wear gloves, goggles and other appropriate protection while slowly and carefully releasing system pressure.***

Removing:

– Remove dust and pollen filter ⇒ page 56
– Remove air intake duct (on bulkhead) ⇒ page 45
– Clamp coolant (heater) hoses near bulkhead.
– Remove right air duct.
– Remove complete instrument panel, passenger side airbag and associated trim ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation .



– Remove bolts -3-.

Note

Lower bolt is located on bulkhead under engine compartment cladding.

– Remove coolant hoses from heater core and plug heater core connections.
– Remove heater unit.

2.11 Heating and Ventilation Cables

Note

- *Attach cables before installing controls.*
- *Place outer cable against stops on controls and secure.*
- *Defroster and footwell door cables are self-adjusting. Adjust by turning air distribution knob fully from stop to stop.*
- *Adjust cable on regulating valve with controls installed.*

Cables, Installing

Heater control valve cable

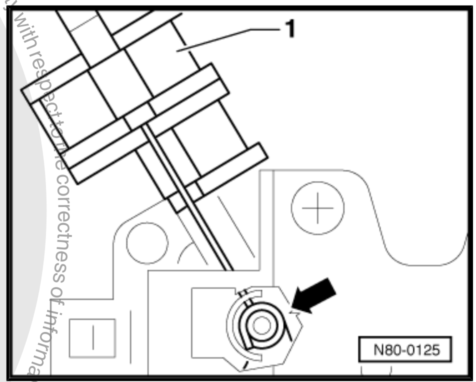
(Identification: red/white)

– Turn heater control valve knob fully to left stop.

– Connect heater control valve cable -arrow-.

– Secure cable to controls -1- with clip.

– Heater control valve cable, adjusting ⇒ page 51



Footwell door cable -1-

(Identification, through 09.98: yellow/white)

(Identification, from 09.98: red/yellow)

– Turn air distribution knob fully to left stop.

– Attach footwell door cable -arrow -D-.

– Secure cable to controls with clip -arrow -B-.

– Adjusting cable ⇒ page 50

Defroster door cable -2-

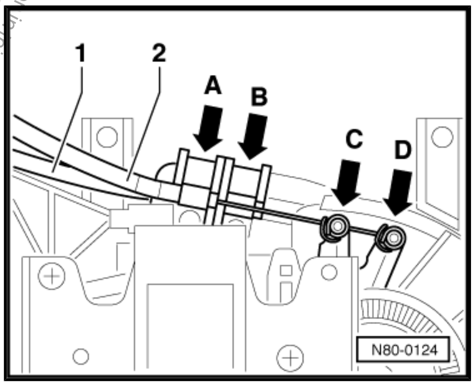
(Identification: red/green)

– Turn air distribution knob fully to left stop.

– Attach defroster door cable -arrow -C-.

– Secure cable to controls with clip -arrow -A-.

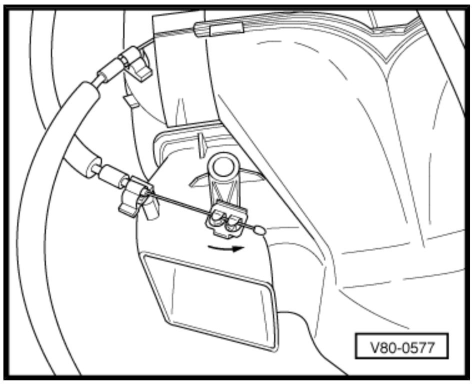
– Adjusting cable ⇒ page 51



Footwell door cable, adjusting

– Secure cable to footwell door while simultaneously pressing lever in direction of arrow.

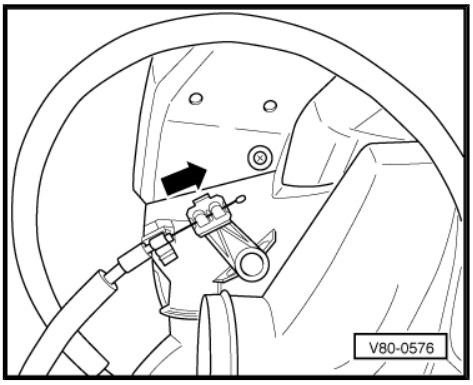
– Turn control knob fully from stop to stop.



Defroster door cable, adjusting

– Secure cable to defroster door while simultaneously pressing lever in direction of arrow.

– Turn control knob fully from stop to stop.

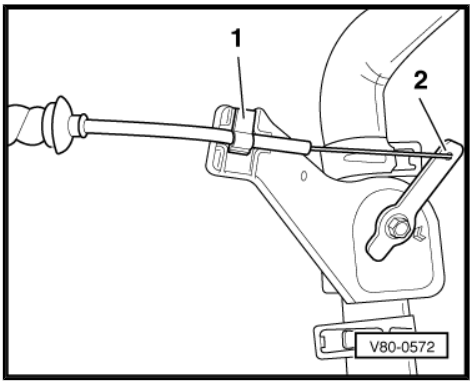


Heater control valve cable, adjusting

– Guide cable through engine compartment bulkhead to valve lever -2- and connect.

– Slide lever -2- left to stop (off/cool).

– Secure cable housing to valve with clip -1-.



2.12 Rear Heater

Rear heater, removing

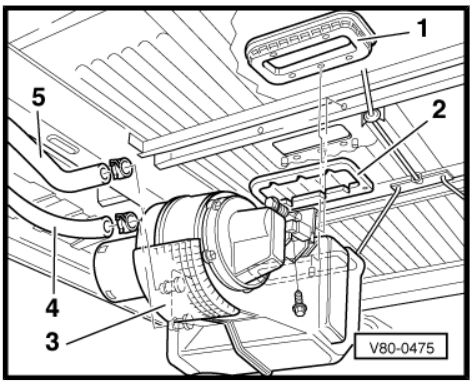
1 - Cover plate, in passenger compartment

2 - Gasket

3 - Rear heater air distribution housing

4 - Coolant supply hose

5 - Coolant return hose



WARNING

Cooling system is pressurized when engine is warm. Before performing repairs, wear gloves, goggles and other appropriate protection while slowly and carefully releasing system pressure.

– Disconnect electrical connectors.

– Clamp coolant hoses as close as possible to heater core.

– Loosen hose clamps and remove coolant hoses. Plug heater core outlet/inlet.

– Remove vent ⇒ page 52 .

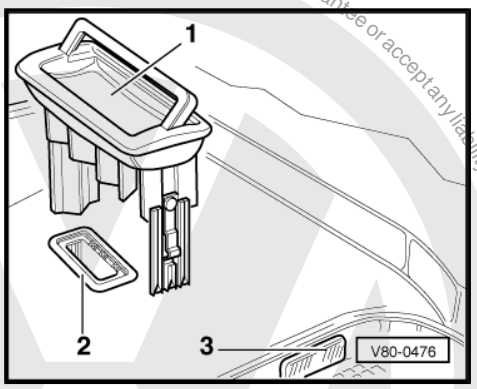
– Remove cover plate.

– Remove bolts.

Vent, removing

1 - Vent
2 - Cover plate
3 - Sliding door footwell insert

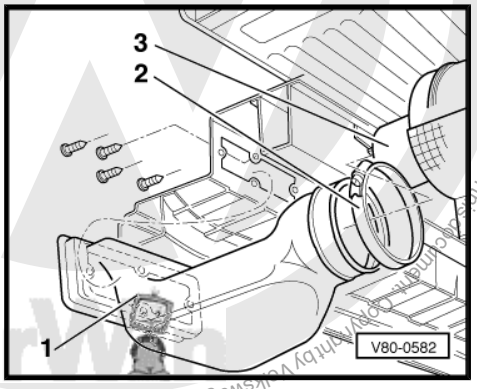
– Pull vent out of floor plate.
– Remove cover plate



Air intake duct (Kombi), removing

1 - Air intake duct
2 - Hose clamp
3 - Rear heater air distribution housing

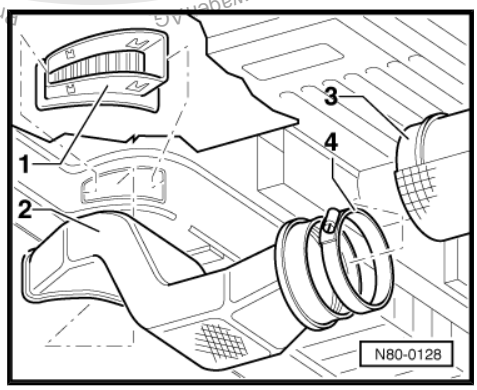
– Remove footwell insert.
– Remove bolts.
– Loosen hose clamp.



Intake duct (EuroVan/Transporter), removing

1 - Intake trim
2 - Intake duct
3 - Rear heater core
4 - Hose clamp

– Carefully remove intake trim -1- with screwdriver.
– Loosen hose clamp.
– Remove intake duct.

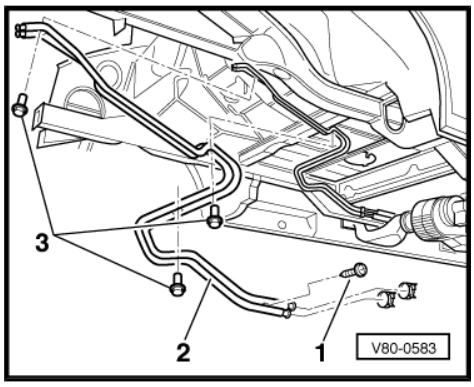


Coolant pipe, removing

1 - Self-tapping screw
2 - Coolant pipe
3 - Hex nut

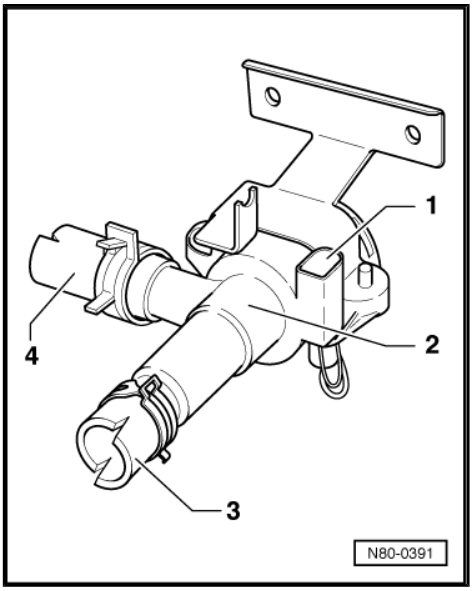
WARNING

Cooling system is pressurized when engine is warm. Before performing repairs, wear gloves, goggles and other appropriate protection while slowly and carefully releasing system pressure.



– Remove fuel tank ⇒ Engine Mechanical; Rep. Gr. 20 ; Removal and Installation
– Remove torsion bar ⇒ Suspension, Wheels, Steering from MY 1997; Rep. Gr. 40 ; Removal and Installation
– Remove screws -3- and -1-.
– Remove coolant pipe -2-.

2.13 Auxiliary Heater Valve



1 - Connection

2 - Auxiliary Heater Valve -N172-

3 - Coolant return hose (from regulator valve to engine)

4 - Coolant return hose (from coolant pipe -auxiliary heat exchanger to regulator valve)

Removing

Note

- *If the cooling system contains coolant, the coolant hoses must be pinched off before disconnecting.*
- *If the engine is warm, the cooling system is under pressure. If necessary, release pressure before performing repairs.*
- *Fill with coolant after installing Auxiliary Heater Valve -N172- .*

– Remove engine cover.

– Disconnect connector from valve for auxiliary heat exchanger.

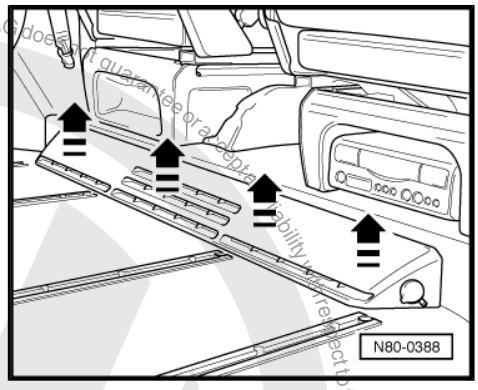
– Loosen spring clamps and disconnect coolant hoses.

– Unscrew Auxiliary Heater Valve -N172- from bulkhead.

Installing

– Installation is the reverse order of removal.

2.14 Outlet Vent for Rear Footwell



Removing

Outlet Vent for Rear Footwell, Removing

– Unclip outlet vent upward.

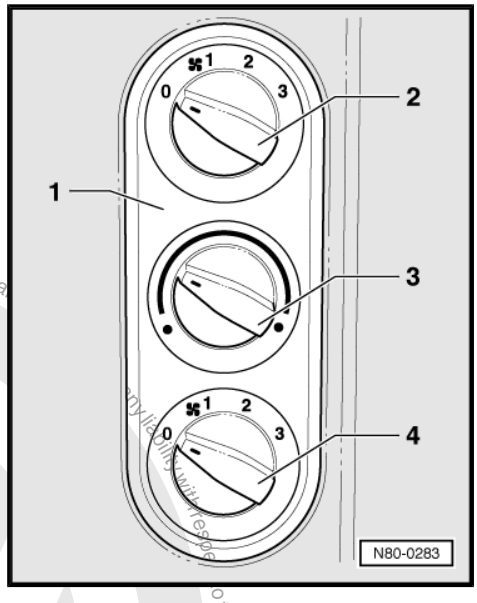
– Disconnect harness connector for 12-Volt outlet.

– Unhook vent.

Installing

– Installation is the reverse order of removal.

2.15 Rear Heating and Ventilation Controls



Rear Heating and Ventilation Controls, Removing

1 - Rear heating and ventilation controls
2 - Switch for fresh air blower - rear -E179-
3 - Rear interior temperature potentiometer
4 - Warm air blower switch

Removing

– Pry out controls from bottom using screwdriver
– Disconnect electrical connections

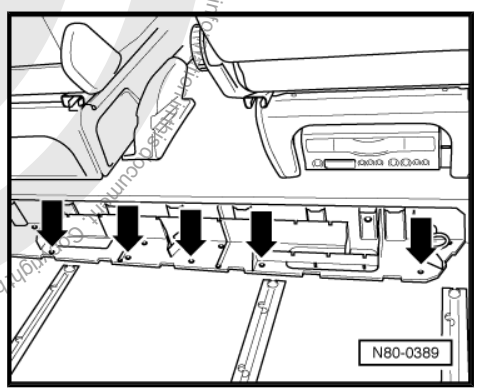
Note

Function and removal of rear heating and ventilation controls is identical on air conditioning equipped models.

Installing

– Installation is the reverse order of removal.

2.16 Rear Footwell Outlet Vent Cover



Removing

Cover for outlet vent for rear footwell, removing

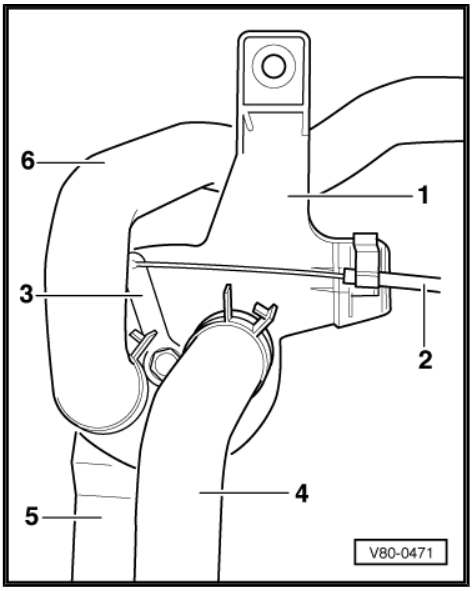
– Removing outlet vent ⇒ page 53
– Remove screws -arrows-.

Installing

– Installation is the reverse order of removal.

2.17 Heater Control Valve

Removing



1 - Control valve

2 - Cable

3 - Lever

4 - Coolant hose, return

(from rear heater core coolant pipe to control valve)

5 - Coolant hose, return

(from control valve to engine)

6 - Coolant hose, return (from front heater core to control valve)

WARNING

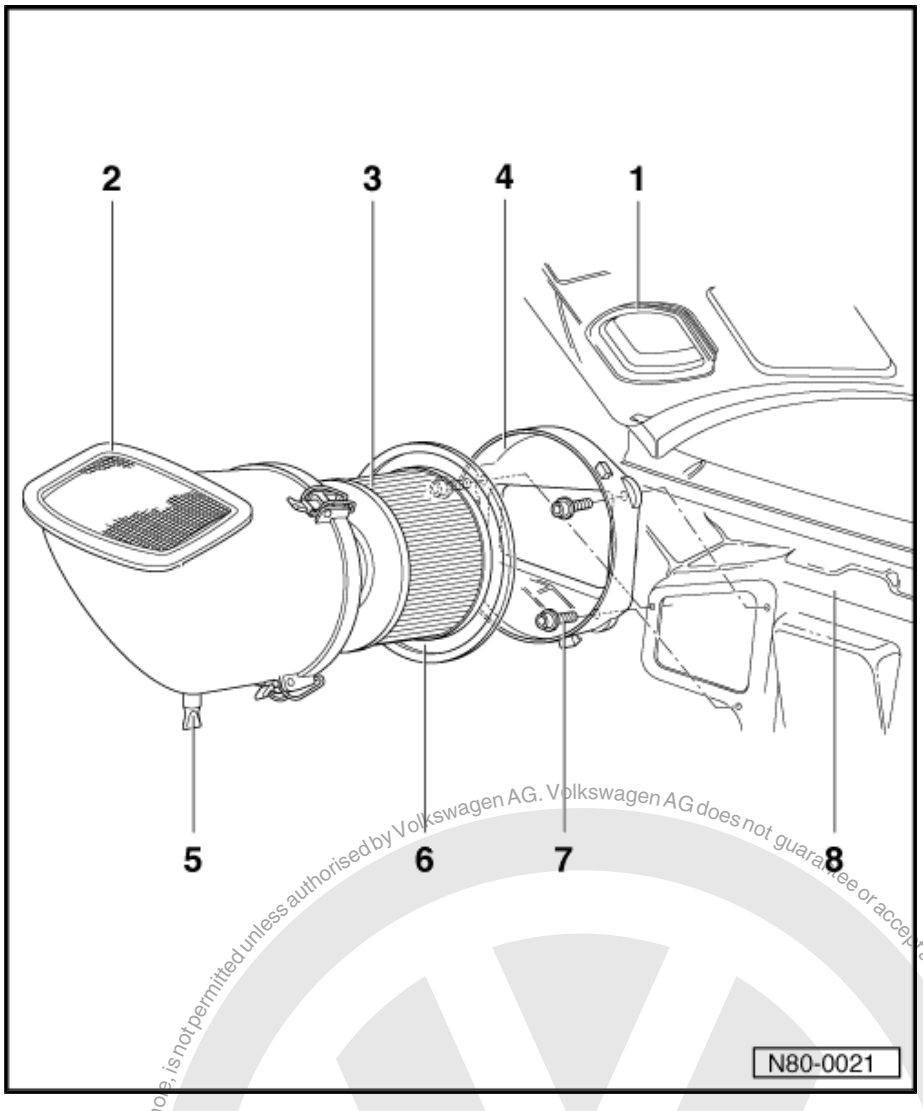
Cooling system is pressurized when engine is warm. Before performing repairs, wear gloves, goggles and other appropriate protection while slowly and carefully releasing system pressure.

– Remove expansion tank.
– Loosen clip and remove cable.
– Clamp coolant hoses as close as possible to valve.
– Loosen spring type hose clamps and pull coolant hoses off.
– Remove regulating valve from expansion tank console.

2.18 Dust and Pollen Filter

1 - Hood seal
2 - Filter housing
3 - Dust and pollen filter
4 - Air intake duct
5 - Valve
6 - Filter retainer
7 - Hex bolt
- ❑ 3 Nm (26 in. lb)

8 - Bulkhead



87 – Air Conditioning

1 General Information

1.1 Safety Precautions

The subassemblies and lines of the air conditioner are filled with Tetrafluoroethane also known as refrigerant R-134a.

WARNING

- *Always use an Underwriter's Laboratory (UL) approved refrigerant recovery/recycling/recharging unit such as Kent-Moore ACR4, or equivalent, whenever discharging an R-134a A/C system*
- *As of January, 1992 any person who services a motor vehicle air conditioner in the USA MUST, by law, be properly trained and certified and use approved refrigerant recycling equipment. Technicians must complete an EPA approved recycling course to be certified*
- *State, Provincial and local governments may have additional requirements regarding air conditioning servicing. Always comply with State, Provincial and local laws*

WARNING

A/C system is filled with refrigerant gas which is under pressure

Always be careful that refrigerant does not come in contact with your skin

If liquid refrigerant has come in contact with your skin or eyes:

- *Do not rub skin or eyes*
- *Immediately flush with cool water for 15 minutes*
- *Rush to a doctor or hospital*
- *Do not attempt to treat yourself*

Work in a well ventilated area because refrigerant gases are heavier than air, displace oxygen and may cause suffocation in areas of poor air circulation, like under the car

Avoid breathing refrigerant vapors. Exposure may irritate eyes, nose and throat

Always wear hand and eye protection (gloves and goggles) when working around the A/C system

Keep refrigerant containers stored below 50°C (122°F) and never drop from high places. DO NOT warm refrigerant containers with an open flame. If refrigerant needs to be wormed, place bottom of tank in warm water.

WARNING

- *Keep refrigerant away from open flames because poisonous gas will be produced if it burns. Do not smoke when refrigerant gases are present for the same reason*
- *Electric welding near refrigerant hoses causes R-134a to decompose from ultraviolet light. Discharge system before electric welding*
- *Pressurized R-134a refrigerant in the presence of oxygen may form a combustible mixture. Never introduce compressed air into any R-134a container (full or empty), A/C component or piece of service equipment*
- *Do not expose any component of the A/C system to high temperatures (for example, open flames). Excessive heat will cause a pressure increase which could burst the system*
- *Do not steam clean condensers or evaporators. Use only cold water or compressed air*

Caution

- *R-12 and R-134a refrigerant are NOT compatible. Never add R-12 refrigerant to an R-134a system or R-134a refrigerant to an R-12 system. If the refrigerants are mixed, total system contamination will occur and compressor failure may result*
- *Refrigerant oils used for the R-134a system and R-12 system are NOT compatible. Use only the specified synthetic oil (Polyalkylene Glycol/PAG) for the R-134a refrigerant system. DO NOT use R-12 system oil in an R-134a system or R-134a system oil in an R-12 system. If the refrigerant oils are mixed, system contamination will occur and compressor failure may result*
- *R-134a refrigerant system oil (PAG oil) absorbs moisture very rapidly. Moisture combines with the refrigerant to form acids which will damage the system. Use only the specified oil from a sealed container and ALWAYS reseal oil container immediately after use. DO NOT use oil if it has become contaminated with moisture*
- *Immediately plug open connections on A/C components to prevent dirt and moisture contamination. Likewise, DO NOT remove new components from packaging until ready to install. Immediately tighten component connections after installation*

Caution

- *Always use separate refrigerant recovery/recycling/recharging servicing equipment for R-12 and R-134a systems. DO NOT use one piece of equipment for both R-12 and R-134a systems. The residual traces of refrigerant will contaminate and damage the equipment. Servicing equipment includes recovery/recycling/recharging unit, charging station, vacuum pump, manifold gauges, etc.*
- *DO NOT use R-12 servicing equipment on R-134a systems or R-134a equipment on R-12 systems or damage to both the vehicle A/C system and servicing equipment may result. Use only equipment designed to meet Society of Automotive Engineers (SAE) standards*
- *R-134a and R-12 systems use different size service fittings. NEVER use adaptors to convert an R-12 fitting to R0134a size or R-134a fitting to R-12 size*
- *R-134a and R-12 A/C components including compressor, hoses, O-rings, evaporator, condenser, receiverdrier, etc. are NOT interchangeable. Components of the R-134a system are identified by lettering (R-134a) or by a green label (or stripe). In addition a label on the upper radiator support identifies which type refrigerant is used. Use only the correct system component for each refrigerant type*

Caution

- *Always replace damaged and/or leaking A/C system components. Do not attempt repair by soldering or welding*
- *Work area must be extremely clean when working on A/C system components*
- *discharge A/C system before removing any A/C system component*
- *Always reinstall caps over A/C service valves*
- *Always replace O-rings, DO NOT reuse. Use only the correct size and type of O-rings specified for use with R-134a refrigerant. Lubricate O-ring with refrigerant oil before installing*

Before working on the electrical system

- *Determine correct coding for anti-theft radio*
- *Disconnect battery Ground (GND) strap*
- *After reconnecting battery, recode and check operation of radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual*

1.2 Climatronic Digital Climate Control

Climatronic is a dual zone, fully automatic climate control system. The temperature of the interior air supply, fresh air blower speeds and passenger compartment air distribution are regulated automatically. The system features fully digital electronic circuitry and On Board Diagnostic (OBD) capability.

In addition to fully automatic function, air distribution settings and fresh air blower speeds can be selected manually to suit individual needs.

The Climatronic control module -J255- is the heart of the system. It receives input information from the A/C control head -E87- and various electronic components (sensors and switches). This information is processed by the control module in accordance with specified values and provides corresponding output signals that control electrical components (actuators).

The system controls interior air temperature and distribution for front and rear passenger zones. The system continually samples and compares the selected interior air temperature with the actual air temperature measured by the system. Blower speeds, air temperature and distribution are then adjusted and regulated accordingly.

⇒ "2.2.1 Climatronic System Function Overview", page 76

⇒ "2.2.2 Climatronic Component Functions, Overview", page 78

1.3 A/C Refrigerant R-134a

For information regarding A/C refrigerant R-134a, refer to ⇒ Refrigerant R134a - Servicing; Rep. Gr. 00 ; A/C System, General Information

1.4 A/C Refrigerant System, Identification

A/C refrigerant systems on EuroVan and Transporter models from m.y. 1993 are charged with refrigerant R-134a.

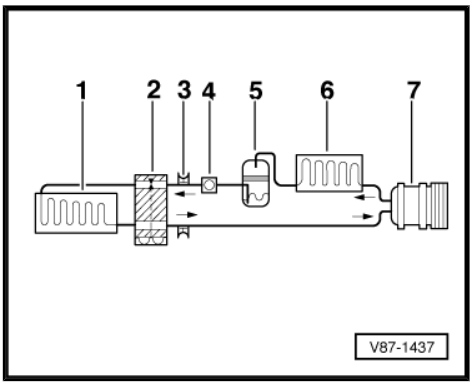
Labels specifying refrigerant type are located on the compressor or radiator support. Before proceeding with refrigerant system servicing or repairs, always confirm refrigerant type used.

⇒ "1.4.1 Manual A/C", page 61

⇒ "1.4.2 Climatronic", page 61

1.4.1 Manual A/C

A/C refrigerant circuit with one evaporator



1 - Evaporator
2 - Expansion valve
3 - High-pressure service valve
4 - Sight glass (if equipped)
5 - Receiver drier
6 - Condenser
7 - Compressor

Note

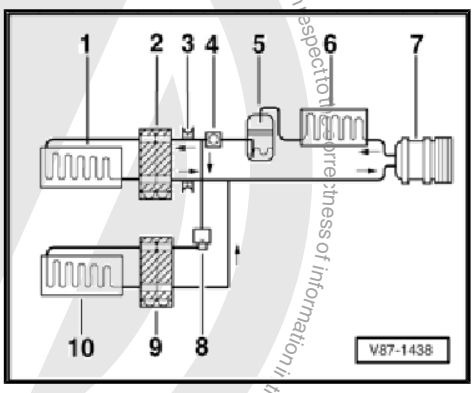
Arrows indicate direction of refrigerant flow.

A/C refrigerant component function descriptions

⇒ page 104

1.4.2 Climatronic

A/C refrigerant circuit with two evaporators



1 - Evaporator
2 - Expansion valve
3 - High-pressure service valve
4 - Sight glass (if equipped)
5 - Receiver drier
6 - Condenser
7 - Compressor
8 - Solenoid valve for refrigerant circuit
9 - Expansion valve
10 - Second evaporator

Note

Arrows indicate direction of refrigerant flow.

A/C refrigerant component function descriptions

⇒ page 104

1.5 A/C Refrigerant System, Replacing Components

Replacement A/C compressors, evaporators and condensers supplied by the Parts Dept. are filled with Nitrogen. If gas (Nitro-

gen) does not escape when component is first opened, the component may be faulty (leaking), do not install.

Replacement A/C compressors are filled with the total refrigerant oil quantity needed for the entire refrigerant system. When an additional, rear evaporator is present, additional compressor oil must be added after replacing the compressor.

Always replace the receiver drier whenever the refrigerant system has been opened. Install receiver drier immediately after opening to prevent moisture contamination of drier desiccant. Moreover, keep refrigerant system and other replacement components sealed for as long as possible to minimize the chance of dirt and moisture contamination.

Always plug open refrigerant line and component connections to prevent dirt and moisture contamination.

If the system has been discharged due to a damaged or leaking component (refrigerant hose/line, compressor, evaporator, condenser, etc.), flush the refrigerant system first with compressed air, then with nitrogen (available locally) and collect the oil that runs out. This will remove the refrigerant oil which may be saturated with moisture.

Caution

DO NOT flush R-134a refrigerant system with R-11. R-11 is not compatible with refrigerant R-134a and PAG oil and will cause total system contamination.

If the compressor is not replaced after flushing the system, fill compressor with the correct type and quantity of refrigerant oil as specified under A/C system capacities ⇒ page 121 . Fill compressor with the total system oil capacity.

If the compressor is replaced, do not add any additional oil as the total amount of oil required is already in the compressor.

Dispose of contaminated refrigerant oil following laws governing hazardous waste disposal. Do not combine any refrigerant oil with any other old oils such as engine oil or transmission fluid.

Follow all applicable Warnings and Cautions when working on the A/C system.

1.6 A/C Refrigerant System, Discharging

WARNING

- ***Always use an Underwriter's Laboratory (UL) approved refrigerant recovery/recycling/recharging unit such as Kent-Moore ACR4, or equivalent, whenever discharging an R-134a A/C system.***
- ***Any person who services a motor vehicle air conditioner MUST, by law, be properly trained and certified and use approved refrigerant recycling equipment. Technicians must complete an EPA approved recycling course to be certified.***
- ***State and local governments may have additional requirements regarding air conditioning servicing. Always comply with state and local laws.***
- ***Always wear safety goggles when charging or discharging system.***

Caution

- *Always use separate refrigerant recovery/recycling/recharging servicing equipment for R-12 and R-134a systems. DO NOT use one piece of equipment for both R-12 and R-134a systems. The residual traces of refrigerant inside the equipment will contaminate and damage the equipment. Servicing equipment includes recovery/recycling/recharging unit, charging station, vacuum pump, manifold gauges, etc.*
- *DO NOT use R-12 servicing equipment on R-134a systems or R-134a equipment on R-12 systems or damage to both the vehicle A/C system and servicing equipment may result. Use only equipment designed to meet Society of Automotive Engineers (SAE) standards.*
- *R-134a and R-12 systems use different size service fittings. NEVER use adaptors to convert an R-12 fitting to R-134a size or R-134a fitting to R-12 size.*

Note

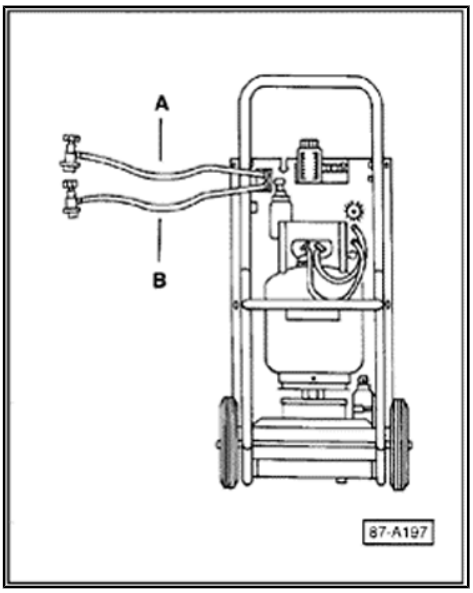
Refer to safety measures starting on ⇒ page 57 , prior to discharging or charging A/C refrigerant system.

Note

Make sure that initial set-up of the refrigerant recovery/recycling/recharging unit has been completed before discharging the A/C system.

– Connect red high-pressure hose -A- of refrigerant recovery/recycling/recharging unit to high side fitting on vehicle and open coupler valve.

– Connect blue low-pressure hose -B- of refrigerant recovery/recycling/recharging unit to low side fitting on vehicle and open coupler valve.



Caution

Always follow manufacturer's instructions when using a refrigerant recovery/recycling/recharging unit.

– Following refrigerant recovery/recycling/recharging unit manufacturer's instructions, discharge A/C system into refrigerant recovery/recycling/recharging unit.

– Disconnect power supply from A/C clutch to prevent accidental compressor operation with A/C system discharged.

1.7 A/C Refrigerant System, Flushing with Compressed Air and Nitrogen

Caution

- *When using compressed nitrogen always use a pressure regulator and the proper adaptor hoses and fittings (available locally). During flushing, use existing exhaust/ventilation systems to draw off the gas mixture escaping from the A/C system.*
- *DO NOT flush R-134a refrigerant system with R-11. R-11 is not compatible with R-134a refrigerant and PAG oil and will cause total system contamination.*

- Use compressed air and nitrogen (available locally) to remove moisture, impurities and old refrigerant oil from A/C refrigerant system.
- First blow out old refrigerant oil and dirt with compressed air, then dry components with nitrogen.
- DO NOT blow compressed air and nitrogen through the compressor or expansion valve. Only blow compressed air and nitrogen through disconnected, free flowing components (i.e. disconnected hose, condenser, evaporator, etc.)
- DO NOT blow compressed air and nitrogen into a capped off A/C component. Pressurized R-134a refrigerant in the presence of oxygen may form a combustible mixture.
- Always flush components in opposite direction of refrigerant flow.
- Flush evaporator through the low-pressure line with the high-pressure line removed.
- If any component has dark thick deposits that cannot be removed with compressed air, replace component.
- Thin light gray deposits in refrigerant lines and hoses are normal and do not impair the function of the system.
- Always replace receiver drier and expansion valve after flushing.
- Dispose of contaminated refrigerant (PAG) oil following laws governing hazardous waste disposal. Do not combine PAG oil with any other old oils such as engine oil or transmission fluid.

Flush refrigerant system with compressed air and nitrogen if:

- Refrigerant oil is dark and viscous (thick)
- Too much refrigerant oil is in the system following compressor replacement
- Unclear or do not know how much refrigerant oil is in the system
- Moisture, dirt or other impurities have entered the refrigerant system (i.e. following an accident)
- Unable to pull a constant vacuum during evacuation of a leak-free system due to excessive moisture in the system
- Refrigerant system has been open longer than the time required for normal repairs (i.e. following an accident)
- Based on temperature and pressure measurements, system is diagnosed with moisture contamination

- Compressor is replaced due to noises or internal damage
- Flushing is required after replacing certain components in certain situations ⇒ page 61

1.8 A/C Refrigerant System, Evacuating and Recharging

WARNING

- *Always use an Underwriter's Laboratory (UL) approved refrigerant recovery/ recycling/recharging unit such as Kent-Moore ACR4, or equivalent, when evacuating and recharging an R-134a A/C system.*
- *Any person who services a motor vehicle air conditioner MUST, by law, be properly trained and certified and use approved refrigerant recycling equipment. Technicians must complete an EPA approved recycling course to be certified.*
- *State and local governments may have additional requirements regarding air conditioning servicing. Always comply with state and local laws.*
- *Always wear safety goggles when discharging, evacuating and recharging an A/C system.*

Caution

Always follow manufacturer's instructions when using a refrigerant recovery/recycling/recharging unit.

Note

- *Refer to R-134a safety measures starting on ⇒ page 57 , prior to discharging or charging A/C refrigerant system.*
- *Follow refrigerant recovery/recycling/recharging unit manufacturer's instructions for evacuating and recharging A/C system.*
- *Evacuate refrigerant system for a minimum of 30 minutes.*
- *When recharging A/C system, add correct amount of refrigerant and PAG oil to system ⇒ page 121 .*
- *After system recharge, manually rotate A/C compressor approx. 10 turns before starting engine. Start engine with A/C OFF. After idle speed has stabilized, switch A/C ON and let engine idle (compressor running) for a minimum of two minutes before raising engine speed.*

2 Description and Operation

2.1 Manual A/C

2.1.1 Heating and A/C Components, Passenger Compartment, Assembly Overview

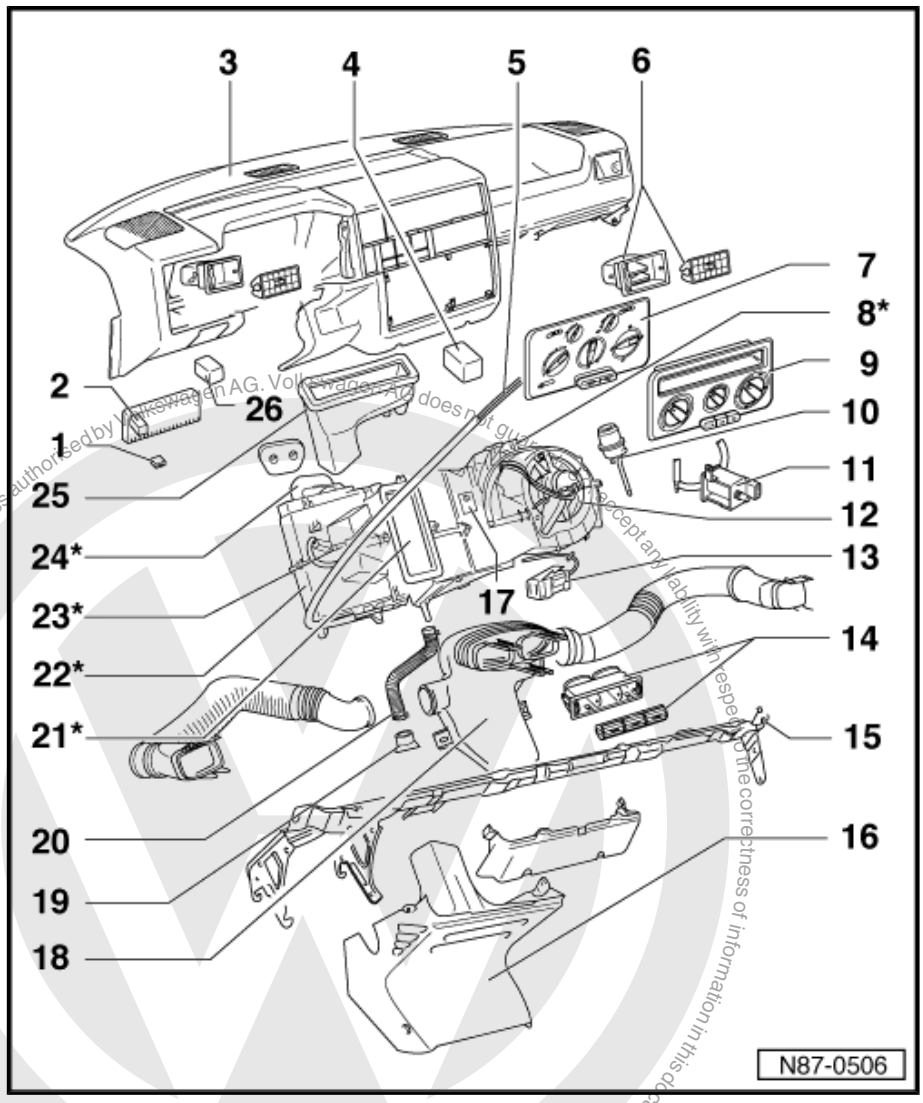
Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*

Note

*System components identified with an * must only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.*



1 - A/C System and Heating fuse -S97-

- ❑ Below relay plate

2 - A/C Relay -J32-

- ❑ Control number 140

3 - Instrument panel

- ❑ Removing and installing ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation

4 - Relay for Fresh Air and Recirculating Air Door Rear -J353-

- ❑ Behind center instrument panel
- ❑ Control number 94

5 - Air temperature and distribution cables

- ❑ Installing and adjusting temperature door cable ⇒ page 141
- ❑ Installing and adjusting footwell/defrost door cable ⇒ page 140
- ❑ Installing and adjusting central door cable ⇒ page 140

6 - Right air outlet

- ❑ Removing and installing ⇒ page 46

7 - Heating and A/C controls through 09.98

With:

- ❑ A/C switch -E35-
- ❑ Fresh air blower switch -E9-
- ❑ Warm air blower switch -E100-
- ❑ Switch for fresh air blower switch rear -E179-
- ❑ Fresh air/recirculating door switch -E159-
- ❑ Controls, removing ⇒ page 139
- ❑ Disassembling ⇒ page 69
- ❑ Installing and adjusting temperature door cable ⇒ page 141
- ❑ Installing and adjusting footwell/defrost door cable ⇒ page 140
- ❑ Installing and adjusting central door cable ⇒ page 140

8 - Air intake housing*

- ❑ With fresh air/recirculating door

9 - Heating and A/C controls from 09.98

With:

- ❑ A/C switch -E35-
- ❑ Fresh air blower switch -E9-
- ❑ Fresh air/recirculating door switch -E159-
- ❑ Rear heater regulation switch -E271-
- ❑ Controls, removing ⇒ page 139
- ❑ Disassembling ⇒ page 69
- ❑ Installing and adjusting temperature door cable ⇒ page 141
- ❑ Installing and adjusting footwell/defrost door cable ⇒ page 140
- ❑ Installing and adjusting central door cable ⇒ page 140

10 - Fresh air/recirculating door vacuum unit

- ❑ Door in fresh air position when no vacuum is present
- ❑ Door in recirculated air position when vacuum is present
- ❑ Vacuum hose routing ⇒ page 75
- ❑ Removing ⇒ page 136

11 - Fresh Air/recirculating Door Two-way Valve -N63-

- ❑ Checking ⇒ page 75
- ❑ Replacing:

– Remove glove compartment, knee padding or passenger side airbag unit. ⇒ Body Interior; Rep. Gr. 69 ; Removal and Installation

12 - Fresh Air Blower -V2-

- ❑ Replacing:

– Remove instrument panel ⇒ Item 7 (page 90) and loosen center air duct ⇒ Item 17 (page 68) on righthand side

- ❑ Before installing coat contact surfaces with sealant/adhesive AMV 176 000 05 or equivalent

13 - A/C Evaporator Temperature Switch -E33-

- ❑ Prevents evaporator icing
- ❑ Insertion depth of sensor tube: 330 mm
- ❑ Replacing ⇒ page 137
- ❑ Switching temperatures: opens below -2 °C (30°F)

14 - Center air outlet

- ❑ Removing ⇒ page 47

15 - Carrier

16 - Footwell air outlet console

- ❑ Removing ⇒ page 137

17 - Fresh Air Blower Series Resistance -N24-

- ❑ Replacing ⇒ page 137

18 - Center air duct

- ❑ Replacing

– Remove instrument panel ⇒ Item 7 (page 90) and carrier ⇒ Item 15 (page 68)

19 - Evaporator water drain valve

- ❑ Water leak at housing may result if valve is blocked

20 - Evaporator drain pipe

- ❑ Removing and installing ⇒ page 137

21 - Central door*

- ❑ Not a replaceable part

22 - Heating and A/C unit*

23 - Footwell/defrost door*

- ❑ Not a replaceable part

24 - Heater core*

- ❑ Install seals around entire circumference of heater core
- ❑ Always replace coolant

25 - Defroster duct

- ❑ Replacing:

– Remove instrument panel ⇒ Item 7 (page 90)

26 - Relay for A/C Shut-off -J365-

- ❑ Above relay plate
- ❑ Only on vehicles with engine codes AES and AXK
- ❑ Control number 147

2.1.2 Heating and A/C Controls through 09.98, Assembly Overview

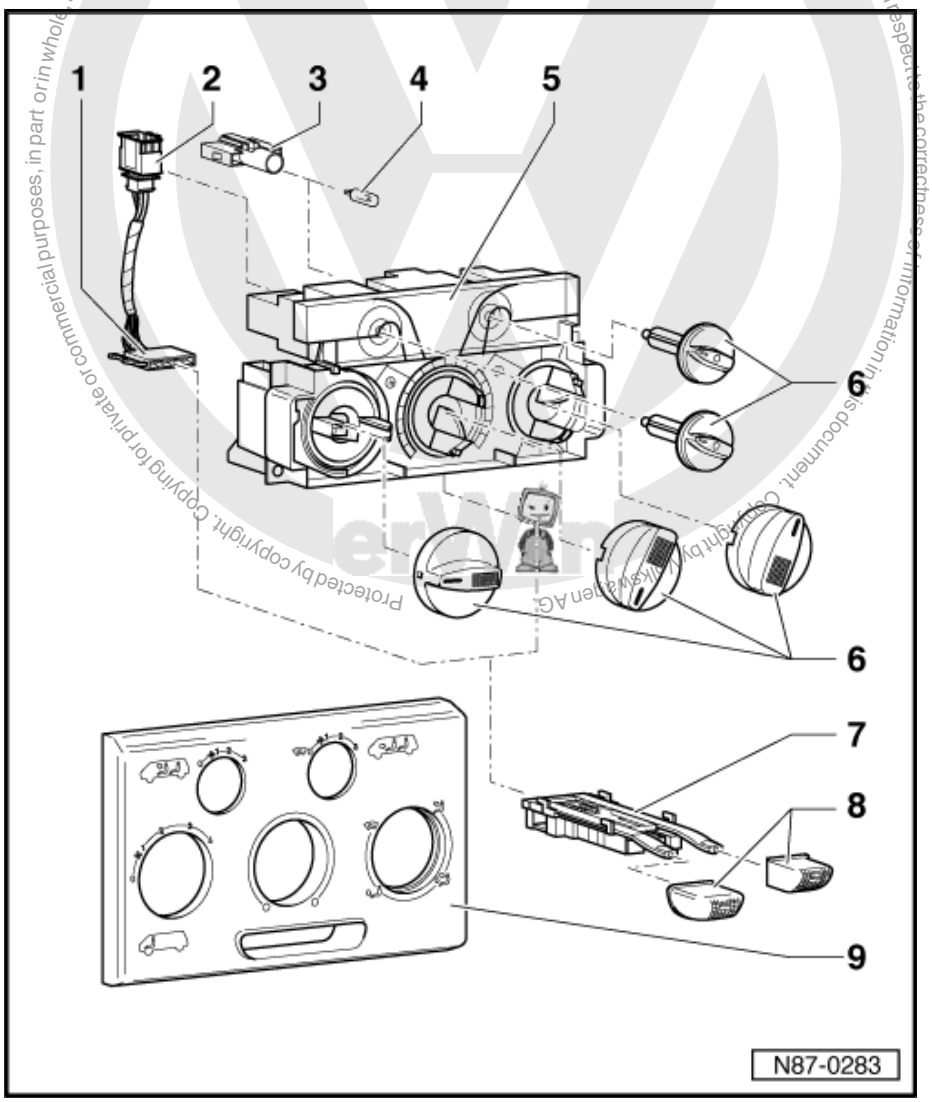
Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*

Note

Illustrated control from vehicle with additional (rear) heat exchanger and (rear) passenger compartment ventilation.



1 - Connector, 6 pin -T6-

2 - Connector, 6 pin -T6c-

3 - Illumination filter

4 - Illumination Bulb -L16-

5 - Control assembly

With:

- ❑ Fresh air blower switch -E9-
- ❑ Warm air blower switch -E100-
- ❑ Fresh air blower switch -E179-
- ❑ Removing and installing ⇒ page 139
- ❑ Temperature door cable, installing and adjusting ⇒ page 141
- ❑ Footwell/defrost door cable, installing and adjusting ⇒ page 140
- ❑ Central door cable, installing and adjusting ⇒ page 140

6 - Rotary knobs

7 - A/C switch

With:

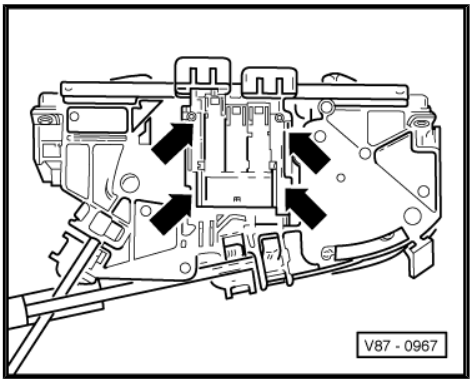
- ❑ A/C switch -E35-
- ❑ Fresh air/recirculating door switch -E159-
- ❑ Illumination bulb -L43-
- ❑ Removing ⇒ page 71

8 - Push button

9 - Control panel trim

A/C Switch -E35- and -E159- , removing

– Remove heating and A/C controls ⇒ page 139 .
– Disconnect electrical connector.
– Press switch at the four locating points -arrows- against the controls and in direction of buttons simultaneously.



2.1.3 Heating and A/C Controls from 09.98, Assembly Overview

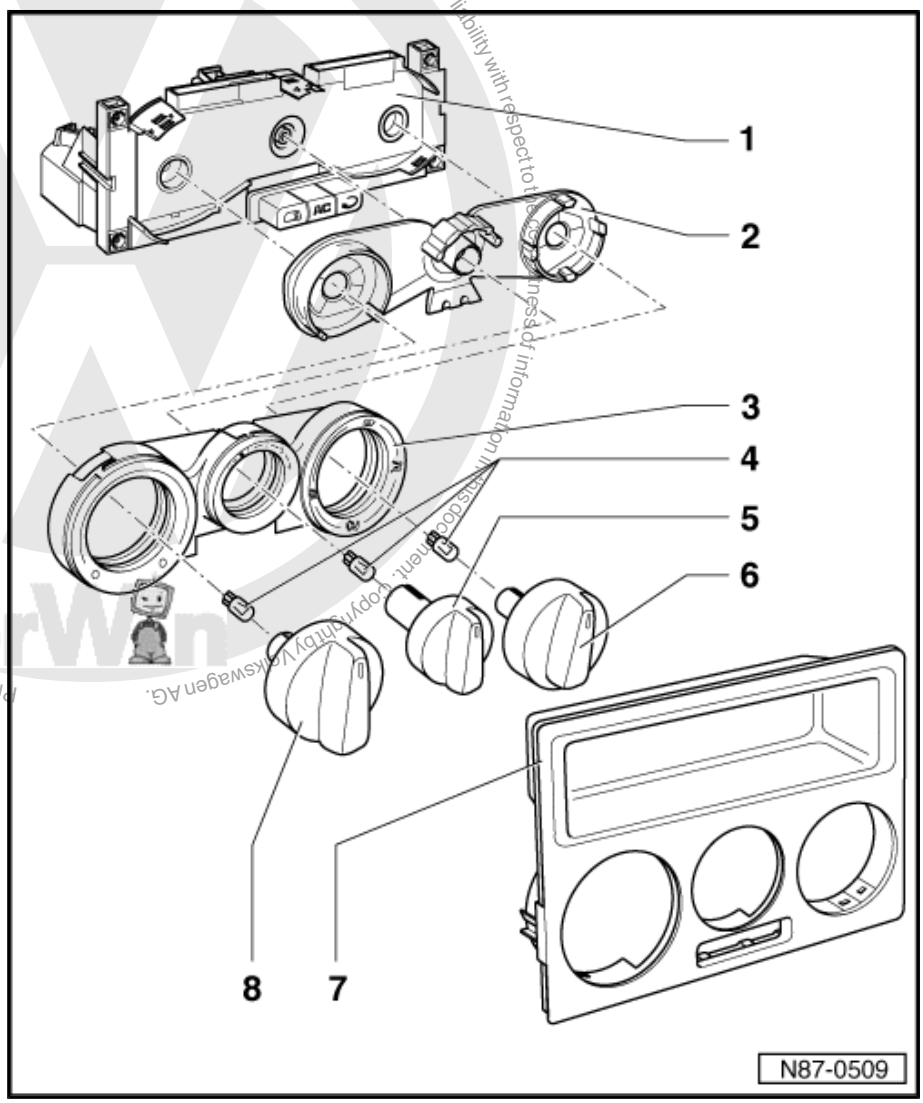
Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*

Note

Illustrated control from vehicle with additional (rear) heat exchanger and rear passenger compartment ventilation (where applicable).



1 - Control assembly

With:

- ❑ A/C switch -E35-
- ❑ Fresh air blower switch -E9-
- ❑ Fresh air/recirculating door switch -E159-
- ❑ Rear heater regulation switch -E271-
- ❑ Controls, removing ⇒ page 139
- ❑ Disassembling ⇒ page 69
- ❑ Installing and adjusting temperature door cable ⇒ page 141
- ❑ Installing and adjusting footwell/defrost door cable ⇒ page 140
- ❑ Installing and adjusting central door cable ⇒ page 140

2 - Illumination filter

3 - Trim

4 - Illumination bulb -L16-

- ❑ Qty.: 3

5 - Rotary knob for blower fan speed

- ❑ Removing
  - – Pull off using pliers with rubber or plastic jaw protectors

6 - Rotary knob for air distribution

- ❑ Removing
  - – Pull off using pliers with rubber or plastic jaw protectors

7 - Trim

8 - Rotary knob for temperature control

- ❑ Removing
  - – Pull off using pliers with rubber or plastic jaw protectors

2.1.4 Heating and A/C Components, Engine Compartment, Assembly Overview

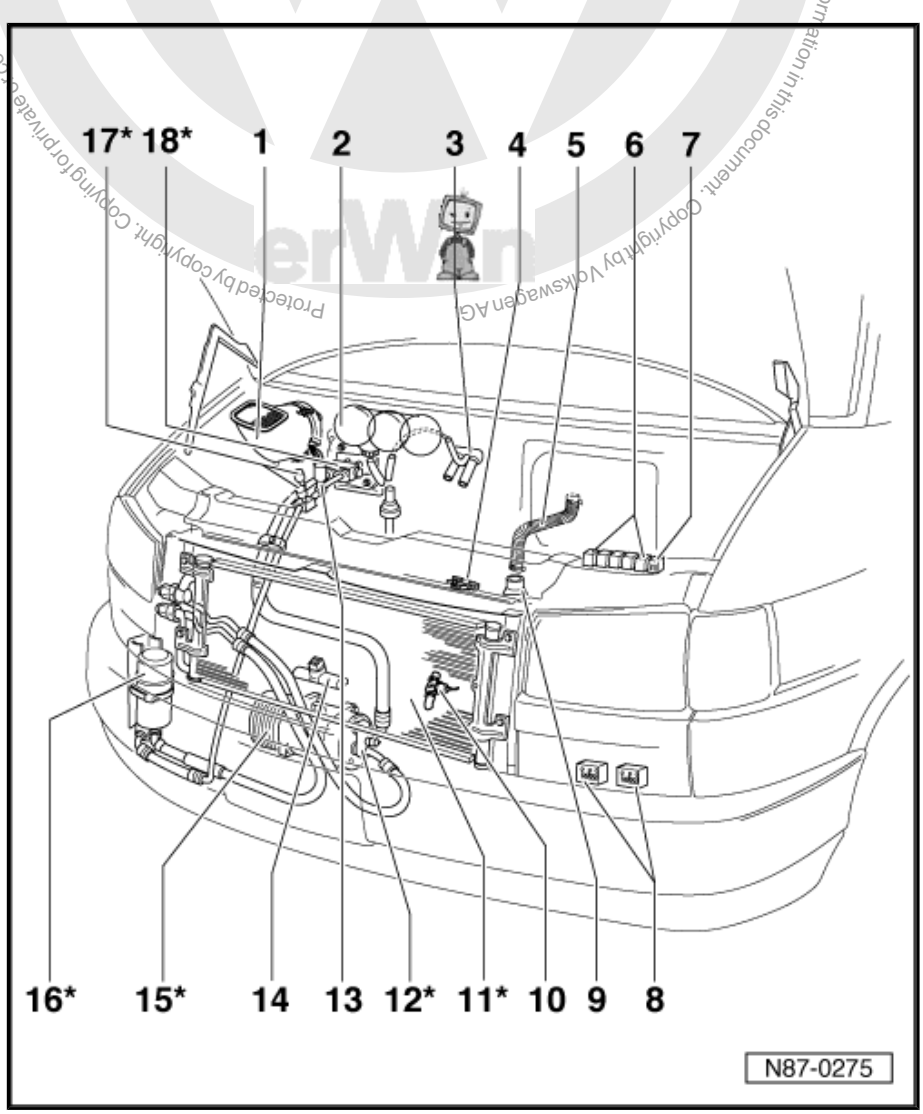
Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*

Note

*System components identified with an * must only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.*



1 - Air intake duct

- ❑ Dust and pollen filter, removing and installing ⇒ page 56

2 - Vacuum reservoir

- ❑ Where applicable
- ❑ Insert vacuum hose: 30 mm (1 3/16 in) into reservoir
- ❑ Vacuum hose layout ⇒ page 75

3 - Heater core and vacuum hose guide at bulkhead

4 - Engine Coolant Two-way Vacuum Valve -N147-

- ❑ Checking ⇒ page 75 , vacuum hose layout

5 - Evaporator drain pipe

- ❑ Removing and installing ⇒ page 137

6 - Relays

Locations and wiring ⇒ Wiring diagrams, Troubleshooting & Component locations

7 - Individual fuses for coolant fan -S42- (2x)

8 - Coolant Fan Control (FC) series resistance -N39-

9 - Evaporator water drain valve

- ❑ Water leak at housing may result if valve blocked.

10 - Coolant shut-off valve

Function:

- ❑ Engine off: Vacuum supply to coolant shut-off valve is controlled by engine coolant two-way vacuum valve -N147- . Valve allows coolant to circulate from engine to radiator when after-run coolant pump operates.

11 - Condenser*

12 - Pressure relief valve*

- ❑ Protects refrigerant circuit against over-pressure
- ❑ Checking ⇒ page 124

13 - A/C Pressure Switch -F129-

- ❑ Checking ⇒ page 123
- ❑ Removing and installing:
  - – Tightening torque 8 Nm
  - – Replace O ring (note Part No.).

14 - A/C Cut-out Thermal Switch -F163- and Third Speed Coolant Fan Control (FC) Thermal Switch -F165-

- ❑ In engine compartment, front

Function:

- ❑ -F165- switches-on coolant fan 3rd speed (on at 112°C / 234°F, off at 108°C / 226°F).
- ❑ -F163- switches off A/C clutch -N25- at excessive coolant temperatures (off at 119°C / 246°F, on at 112° C / 234°F).
- ❑ Removing ⇒ page 138
- ❑ Removing, AES and AXK engine ⇒ page 139

15 - A/C Clutch -N25- *

16 - Receiver drier*

17 - Service valves*

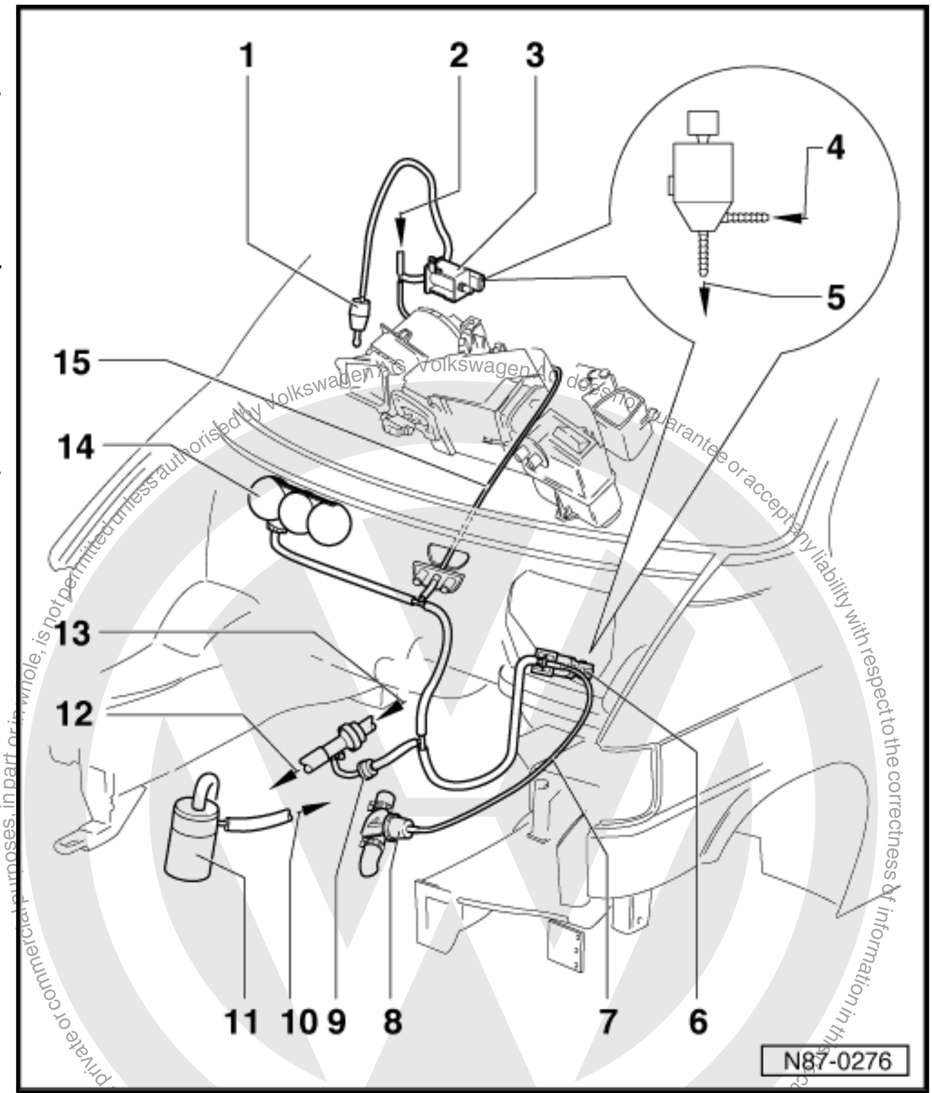
18 - Expansion valve*

- ❑ Opening at bulkhead must be sealed to prevent water ingress
- ❑ Expansion valve insulation ⇒ page 138

2.1.5 Vacuum Hose Connection Diagram

Note

- *Arrows indicate vacuum.*
- *Insert vacuum hose into vacuum reservoir 30 mm (1 3/16 in). Insert vacuum hoses onto plastic connectors 15 mm (19/32 in).*
- *Illustration shows vehicle with engine, code AES and AXK*



1 - Fresh air/recirculating door vacuum unit

2 - Vacuum supply to rear passenger compartment ventilation unit.*

* Where applicable

3 - Fresh Air/recirculating Door Two-way Valve -N63-

- ❑ Controls vacuum flow to fresh air/recirculating door vacuum unit.
- ❑ Replacing:
- – Remove glove compartment, knee padding or passenger side airbag unit. ⇒ Body Interior; Rep. Gr. 69 ; Removal and Installation
- – After attaching vacuum hoses, check:
- ❑ The fresh air/recirculating door vacuum unit must pull in if vacuum and voltage are present at -N63- .
- ❑ The fresh air/recirculating door vacuum unit is vented if vacuum is present and voltage is not (switched off).

4 - Vacuum unit connection

5 - Intake manifold connection

6 - Engine Coolant Two-way Vacuum Valve -N147-

- ❑ Shuts off vacuum flow when no voltage is present.
- – After attaching vacuum hoses, check:
- ❑ When connected the vacuum unit must pull in if voltage and vacuum are present.
- ❑ When connected the vacuum unit is vented if vacuum is present and voltage is not.

7 - Vacuum hose

- ❑ From -N147- to coolant cut-off valve

8 - Coolant cut-off valve

- ❑ When engine running, valve is closed via vacuum by engine coolant two-way vacuum valve -N147-

- ❑ When engine not running (no vacuum), valve opens allowing coolant pump -V50- to circulate coolant through radiator

9 - One-way valve

- ❑ Direction of vacuum indicated by arrow

10 - From brake booster vacuum hose connection

- ❑ Only on engine, code AAB

11 - Vacuum unit

- ❑ Only on engine, code AAB

12 - To intake manifold

13 - From brake booster

14 - Vacuum reservoir

- ❑ Where applicable

15 - Vacuum hose

- ❑ From vacuum reservoir in engine compartment to fresh air/recirculating door vacuum unit

2.2 Climatronic Digital Climate Control

2.2.1 Climatronic System Function Overview

On Board Diagnostic

The Climatronic control module -J255- is controlled by an internal microprocessor with On Board Diagnostic (OBD) capability. If malfunctions, short or open circuits occur on monitored compo-

nents, Diagnostic Trouble Codes (DTC) are stored in memory
⇒ page 1

Front Passenger Zone, Climate Control Options

- Automatic temperature and fan speed mode
- Manual temperature and fan speed mode
- Manual selection of air recirculation mode
- Manual selection of air flow to instrument panel vents
- Manual selection of air flow to footwell vents
- Manual selection of air flow to windshield defroster

Rear Passenger Zone, Climate Control Options

- Automatic temperature and fan speed mode
- Manual selection of temperature and fan speed

Climatronic, Function

The A/C control head -E87- contains all controls and relevant displays needed to operate the Climatronic system. The system's functional status (mode selection, temperature and air distribution) is displayed in two separate LCD readouts. The left display is for the front passenger zone, the right display is for the rear passenger zone ⇒ page 81 .

All automatic or manual function selections are input into the A/C control head via buttons located below both displays.

When AUTO mode is selected, fresh air blower speed and air distribution signals are provided by the A/C control head -E87- . The fresh air blower speed is high when there is a large difference between the selected temperature and the actual interior temperature, and low when the difference is small or the same.

The interior temperature setting, operation modes, approximate outside temperature and blower speed are indicated on the A/C control head display at all times. The defrost, vent and footwell air distribution symbols only appear in the display when air distribution is selected manually (AUTO function override). During manual air distribution, the “AUTO” display remains off until such time the “AUTO” button is pressed.

The system can be switched off completely by pressing the front passenger “decrease fan speed” button until “OFF” appears in the display.

Vehicles through 09.98

The Climatronic control module can be replaced as a separate part. Four screws locate the module behind the center instrument panel trim.

The A/C control head can be replaced as a separate part. Four plastic tabs locate the module in front of the center instrument panel trim.

A ribbon harness is used to electrically connect the A/C control head to the Climatronic control module for processing of selected functions and system regulation.

Vehicles from 09.98

A/C Control Head -E87- , Climatronic Control Module -J255- and Instrument Panel Interior Temperature Sensor -G56- with Interior Temperature Sensor Fan -V42- are integrated into a non serviceable unit.

2.2.2 Climatronic Component Functions, Overview

Sensors and Switches	Function	Input	
Instrument Panel Interior Temperature Sensor -G56-	Interior air temperature measurement (resistance value) for front interior air temperature regulation	→	Climate C
Sunlight Photo Sensor -G107-	Sunlight intensity measurement (resistance value) for interior air temp/fan speed regulation	→	
Front Vent Temperature Sensor -G152- -	Heater/evaporator output measurement (resistance value) for front interior air temperature and fan speed regulation	→	
Rear Evaporator Temperature Sensor -G153-	Rear evaporator temperature measurement (resistance value) for rear interior air temperature and fan speed regulation	→	
A/C Evaporator Temperature Switch -E33-	Rear evaporator temperature monitoring -J255- switches off A/C clutch -N25- in the event of evaporator icing	→	
Continued			

Sensors and Switches	Function	Input	
Outside Air Temperature Sensor -G17-	Outside air temperature measurement (resistance value) for interior air temperature/fan speed regulation and control head display	→	Climate C
Rear Heater Core Temperature Sensor -G154-	Rear heater output measurement (resistance value) for rear interior air temperature regulation	→	
A/C Engine Coolant Temperature Sensor -G110-	Engine coolant temperature measurement (resistance value) for front interior air temperature and fan speed regulation	→	
Temperature Regulator Door Motor Position Sensor -G92-	Temperature regulator door position indication (potentiometer resistance value) for front heater output regulation	→	
Central Air Door Motor Position Sensor -G112-	Central air door position indication (potentiometer resistance value) for front air distribution control - instrument panel vents and footwell vents-	→	
Continued			

Sensors and Switches	Function	Input	
Footwell/Defroster Door Motor Position Sensor -G114-	Footwell/defroster door position indication (potentiometer resistance value) for front air distribution control - defroster vents and footwell vents-	→	Climate C
A/C Pressure Switch -F129-	Refrigerant circuit high/low pressure indication (voltage signal) -J255- switches off A/C clutch -N25- in the event of excess pressure and controls second speed of coolant fan -V7-	→	
Speedometer Vehicle Speed Sensor -G22-	Vehicle speed measurement (hall signal) for fresh air fan speed control	→	
Continued			

	Output	Actuators and Relays	Function
Climate Control Module -J255-	→	Interior Temperature Sensor Fan -V42- -	Draws continuous panel interior air te front interior air ter

	Out-put	Actuators and Relays	Function
	→	Vacuum Valve Rail -N53-	Controls vac controlling a door and foo
	→	Relay for Climatronic -J254-	Activates (ve module -J25 (interior air s circuit opera
	→	Control Module for Fresh Air Blower -J126-	Controls spe ground sign
	→	Fan Relay -J323-	Activates blo rear warm a rior air supp
	→	Control Module for Blower for Evaporator -J349- (rear)	Controls spe V20- (variab ply
	→	Control Module for Warm air Blower -J350- (rear)	Controls blo (variable gro

Continued

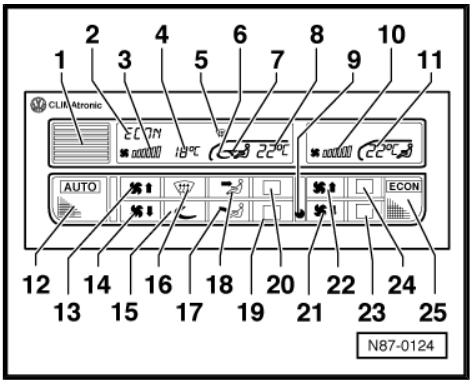
	Out-put	Actuators and Relays	Function
Climate Control Module -J255-	→	Relay for A/C Shut-Off -J365-	Activates re supply) - de out thermal
	→	Temperature Regulator Door Motor -V68-	Motor adjust door (voltag air temperat
	→	Central Air Door Motor -V70-	Motor adjust and ground trol - instrum
	→	Footwell/Defroster Door Motor -V85-	Motor adjust (voltage and tion control
	→	Engine Coolant Two-Way Vacuum Valve -N147-	Controls vac off valve - sh
	→	Auxiliary Heater Valve -N172-	Controls coo (pulsed volta regulation
	→	A/C Refrigerant Shut-Off Valve -N43-	Shuts off ref

Continued

	Out-put	Actuators and Relays	Function
Climate Control Module -J255-	→	A/C Cut-Out Thermo Switch -F163-	Activates re lay for A/C s on switch st F163-
	→	Coolant Fan Control Relay -J26-	Activates co erant circuit
	→	Coolant Pump -V50-	Circulates e
	→	Fresh Air Blower -V2-	Supplies fre rior air heati

	Out-put	Actuators and Relays	Function
	→	Rear Evaporator Fan -V20-	Supplies fresh air f air cooling
	→	Rear Warm Air Fan -V47-	Supplies fresh air f air heating
	→	A/C Clutch -N25-	Engages A/C comp - circulates refriger for interior air cooli

2.2.3 A/C Control Head through 09.98, Display



1 - Instrument panel interior temperature sensor -G56-

2 - “AUTO” (automatic operation), “ECON” (compressor off) or “OFF” (system off) display.

3 - Front passenger “blower speed” display

4 - Ambient (outside) temperature display

Note

- *Temperature is measured by outside air temperature sensor -G17- . In event of malfunction “- - -” appears in display.*
- *If road speed drops below 15 km/h (approx. 9 mph) and the coolant temperature is above 70°C (158°F), the displayed value will not change. Under these conditions, the actual measured value is not displayed because engine heat may adversely affect reading.*

5 - Windshield defrost display

6 - Front passenger “fresh/recirculating air” display

7 - Front passenger “air distribution” display

8 - Front passenger “selected temperature” display

9 - Celsius/Fahrenheit selection button

10 - Rear passenger “blower speed” display

11 - Rear passenger “temperature selection” display

12 - “Automatic operation” button

13 - Front passenger “increase blower speed” button

14 - Front passenger “decrease blower speed” button (this button also switches system off)

15 - Front passenger “fresh/recirculating air” button

16 - “Windshield defrost” button

17 - Front passenger “air flow to foot well” button

18 - Front passenger “air flow to upper body” button

19 - Front passenger “cooler” button

20 - Front passenger “warmer” button

21 - Rear passenger “decrease blower speed” button

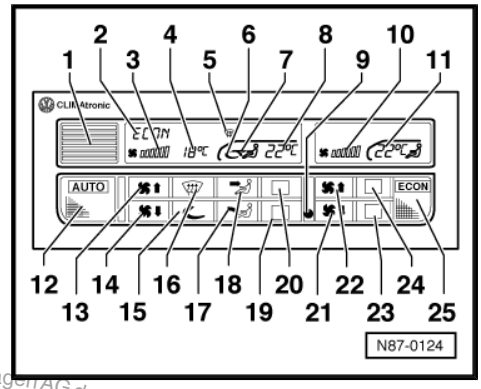
22 - Rear passenger “increase blower speed” button

23 - Rear passenger “cooler” button

24 - Rear passenger “warmer” button

25 - “ECON” (compressor off) button

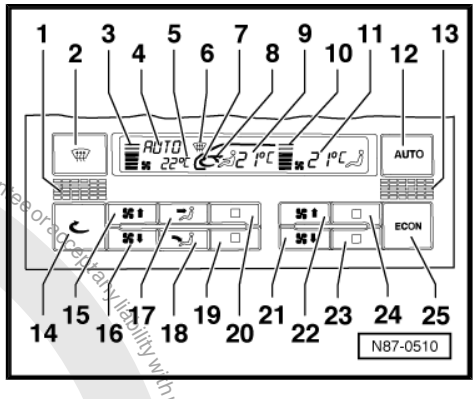
Continued, “Notes”



Note

- *Manual override of fully automatic control is possible with buttons 13 to 18, 21 and 22.*
- *Climatronic can only be completely switched off with button -14-. To do this press button until "OF" appears in the display. Because in this function the doors remain in the last set position, this setting should only be used in exceptional circumstances e.g. in case of a malfunction.*
- *By pressing buttons -24- and -23-, a maximum temperature difference of 3°C (5°F) can be selected between front and rear passenger zones.*
- *When "ECON" operation is selected, only the compressor is switched off. Automatic heating and ventilation operation continues.*
- *When blower speeds and air distribution have been selected manually, pressing "AUTO" button -12- will cancel all manually selected functions.*

2.2.4 A/C Control Head from 09.98, Display



1 - Instrument panel interior temperature sensor -G56-

2 - “Windshield defrost” button

3 - Front passenger “blower speed” display

4 - “AUTO” (automatic operation), “ECON” (compressor off) or “OFF” (system off) display.

5 - Ambient (outside) temperature display

Note

- *Temperature is measured by outside air temperature sensor -G17- . In event of malfunction “- - -” appears in display.*
- *If road speed drops below 15 km/h (approx. 9 mph) and the coolant temperature is above 70°C (158°F), the displayed value will not change. Under these conditions, the actual measured value is not displayed because engine heat may adversely affect reading.*

6 - “Windshield defrost” display

7 - Front passenger “fresh/recirculating air” display

8 - Front passenger “air distribution” display

9 - Front passenger “selected temperature” display

10 - Rear passenger “blower speed” display

11 - Rear passenger “temperature selection” display

12 - “Automatic operation” button

13 - Grille

14 - Front passenger “fresh/recirculating air” button

15 - Front passenger “increase blower speed” button

16 - Front passenger “decrease blower speed” button (this button also switches front system off)

17 - Front passenger “air flow to upper body” button

18 - Front passenger “air flow to foot well” button

19 - Front passenger “cooler” button

20 - Front passenger “warmer” button

21 - Rear passenger “decrease blower speed” button (this button also switches rear system off)

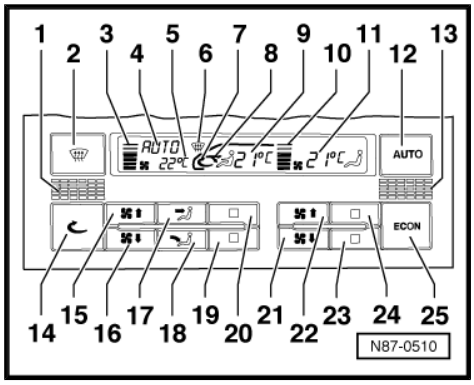
22 - Rear passenger “increase blower speed” button

23 - Rear passenger “cooler” button

24 - Rear passenger “warmer” button

25 - “ECON” (compressor off) button

Continued, “Notes”



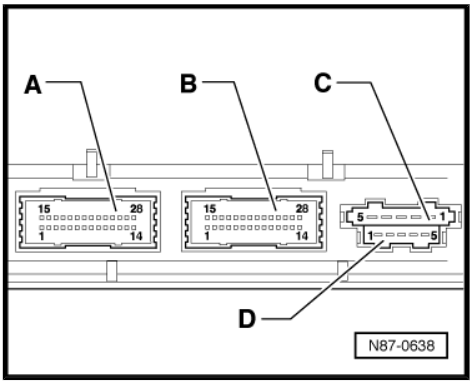
Note

- *Manual override of fully automatic control is possible with buttons 2, 14 to 18, 21 and 22.*
- *Climatronic can only be completely switched off with button -16-. To do this press button until "OFF" appears in the display. Because in this function the doors remain in the last set position, this setting should only be used in exceptional circumstances e.g. in case of a malfunction.*
- *Rear climate control functions can be switched off with button -21-. To do this press button until no fan display appears.*
- *By pressing buttons -24- and -23-, a maximum temperature difference of 3°C (5°F) can be selected between front and rear passenger zones.*
- *When "ECON" operation is selected, only the compressor is switched off. Automatic heating and ventilation operation continues.*
- *When blower speeds and air distribution have been selected manually, pressing "AUTO" button -12- will cancel all manually selected functions.*
- *Depressing and holding buttons -25- ("ECON") and -12- ("AUTO") simultaneously will change the selected temperature display from Fahrenheit to Celsius and vice versa.*

2.2.5 Climatronic Control Module through 09.98, Multi-Pin Connector Assignments

Note

Multi-pin connection D is not used.



28-pin multi-connector -A- (-T28a/-)

1 - X contact

2 - A/C Pressure Switch -F129- pin 1 (diagnosis 2/32 bar) and A/C Cut-Out Thermal Switch -F163- pin 4B

3 - A/C Evaporator Temperature Switch -E33- and A/C Pressure Switch -F129- pin 2

4 - A/C Pressure Switch -F129- pin 3 (diagnosis 16 bar)

5 - Illumination Voltage 58d

6 - Data Link Connector (DLC) K-wire

9 - Central Door Motor Position Sensor -G112- pin T5b/2, Footwell/Defrost Door Motor Position Sensor -G114- pin T5a/2 and Temperature Regulator Door Motor Position Sensor -G92- pin T5/2

10 - Central Air Door Motor -V70- pin T5b/3, Footwell/Defroster Door Motor -V85- and Temperature Regulator Door Motor -V68- pin T5/3

13 - Sunlight Photo Sensor -G107- pin T3a/3

14 - Sunlight Photo Sensor -G107- pin T3a/2; A/C Engine Coolant Temperature (ECT) Sensor -G110- pin 1; Front Vent Temperature Sensor -G152- pin 1 and Outside Air Temperature Sensor -G17- pin 1

15 - Automatic transmission kickdown

16 - Control module for fresh air blower -J126- pin T3/2 and Fresh Air Blower -V2-

17 - Relay for Climatronic -J254- and Fresh Air Blower -V2-

18 - Control module for fresh air blower -J126- pin T3/1

19 - Central Air Door Motor -V70- pin T5b/4

20 - Central Air Door Motor -V70- pin T5b/5

21 - Footwell/Defroster Door Motor -V85- pin T5a/4

22 - Footwell/Defroster Door Motor -V85- pin T5a/5

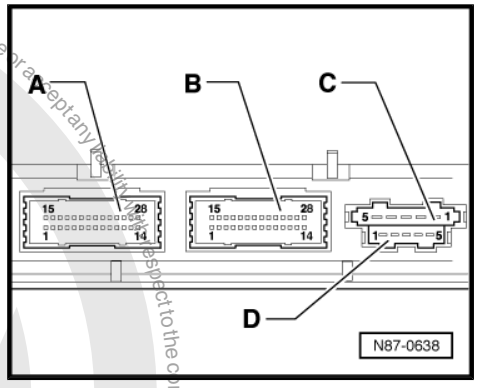
24 - Central Door Motor Position Sensor -G112- pin T5b/1

25 - Relay for Climatronic -J254-

26 - Footwell/Defrost Door Motor Position Sensor -G114- pin T5a/1

28 - Sunlight Photo Sensor -G107- pin T3a/1

28-pin multi-connector -B- (-T28/b-)



2 - Temperature Regulator Door Motor -V68- pin T5/5

3 - Rear Evaporator Temperature Sensor -G153- pin 2 and Rear Heater Core Temperature Sensor -G154- pin 1

4 - Fan Relay -J323- pin 2 and Rear Evaporator Fan -V20- pin 1

5 - Control Module for Blower for Evaporator -J349- pin 2 and Rear Evaporator Fan -V20- pin 2

7 - Temperature Regulator Door Motor -V68- pin T5/4

8 - Temperature Regulator Door Motor Position Sensor -G92- pin T5/1

10 - Hall sender Ground

11 - Fan Relay -J323- pin 6

12 - Coolant Fan Control (FC) Relay -J26- pin T4a/ 1 and Coolant Fan Control (FC) Thermal Switch -F18- pin 1/1

13 - Terminal 30 and Relay for Climatronic -J254-

14 - A/C Evaporator Temperature Switch -E33-

15 - Rear Evaporator Temperature Sensor -G153- pin 1

16 - A/C Engine Coolant Temperature (ECT) Sensor -G110- pin 2

17 - Rear Heater Core Temperature Sensor -G154- pin 2

18 - Control Module for Blower for Evaporator -J349- pin 1

19 - Fan Relay -J323- pin 4 and Rear Warm Air Fan -V47- pin 1

20 - Control module for warm air blower -J350- pin 1 and Rear Warm Air Fan -V47- pin 2

21 - Control module for warm air blower -J350- pin 3

22 - Outside Air Temperature Sensor -G17- pin 2

23 - Front Vent Temperature Sensor -G152- pin 2

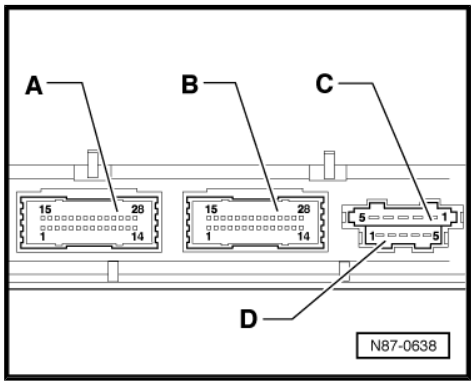
25 - Terminal 58b

26 - Vacuum Valve Rail -N53- pin T5d/4 behind instrument panel

27 - Vacuum Valve Rail -N53- pin T5d/5 behind instrument panel

28 - Hall sender via radio pin T8/1

5-pin multi-connector -C- (-T5e/-)



1 - Terminal 31 (Ground)

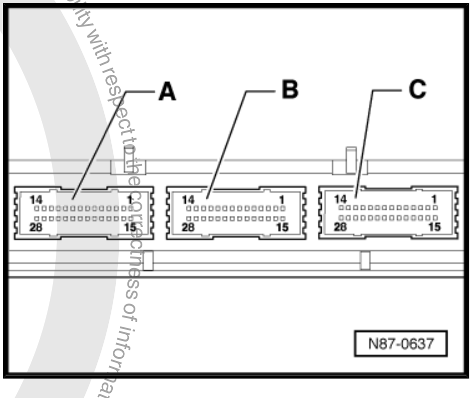
2 - Terminal 15 for refrigerant circulation solenoid valve -N43- pin 1; coolant cut-off valve two-way valve -N147- pin 1 and additional heat exchanger valve -N172- pin 1

3 - Coolant circulation pump -V50- pin 2 and thermo-switch for coolant circulation run-on -F95- pin 1

4 - Additional heat exchanger valve -N172- pin 2

5 - Refrigerant circulation solenoid valve -N43- pin 2

2.2.6 Climatronic Control Module from 09.98, Multi-Pin Connector Assignments



28-pin multi-connector -A- (-T28a/-)

1 - Terminal 15

4 - Heater control module -J162- (where applicable)

5 - Terminal 30

7 - Water pump

8 - Vehicle speed signal from instrument cluster

9 - Data Link Connector (DLC) K wire

10 - A/C Pressure Switch -F129-

11 - First Speed Engine Coolant (EC) Fan Control (FC) Relay -V7- , -V35-) -J279- (or Coolant Fan Control (FC) Relay -J26- where applicable) and to Coolant Fan Control (FC) Thermal Switch -F18-

12 - Relay for Climatronic -J254-

13 - Motronic Engine Control Module (ECM) -J220- (idle speed control)

14 - First Speed Engine Coolant (EC) Fan Control (FC) Relay -V7- , -V35-) -J279- (or Coolant Fan Control (FC) Relay -J26- where applicable) and to Coolant Fan Control (FC) Thermal Switch -F18-

15 - Terminal 31 (Ground)

17 - Front Vent Temperature Sensor -G152- (Ground signal)

18 - A/C Pressure Switch -F129- pin 3 (diagnosis 16 bar)

19 - A/C Pressure Switch -F129- pin 1 (diagnosis 2/32 bar)

20 - X contact

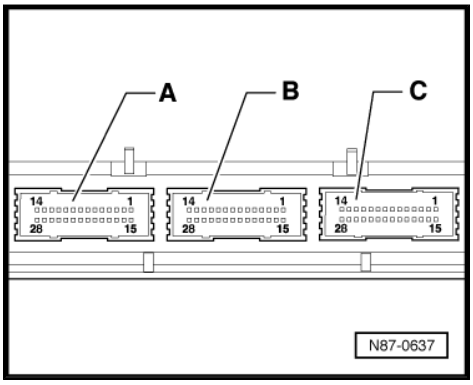
21 - Motronic Engine Control Module (ECM) -J220-

22 - After-Run Coolant Pump -V51- and to After-Run Coolant Thermal Switch -F95-

23 - A/C Engine Coolant Temperature (ECT) Sensor -G110-

24 - Terminal 58b

27 - Outside Air Temperature Sensor -G17-



28-pin multi-connector -B- (-T28b/-)

1 - Vacuum Valve Rail -N53- (center vent)

2 - Vacuum Valve Rail -N53- (recirculation)

3 - Temperature Regulator Door Motor -V68- , (cold above)

4 - Footwell/defroster door motor -V85- (footwell)

5 - Footwell/defroster door motor -V85- (defroster, top)

6 - Central Air Door motor -V70- (lower center vent)

7 - Central Air Door motor -V70- (footwell)

8 - Temperature Regulator Door Motor -V68- , (warm below)

11 - Control module for fresh air blower -J126-

12 - Relay for Climatronic -J254- and Fresh Air Blower -V2- (+)

13 - Relay for Climatronic -J254- and Fresh Air Blower -V2- (-)

14 - Reference voltage 5V (for door position sensors, door motors and Sunlight Photosensor -G107-)

15 - Front Vent Temperature Sensor -G152-

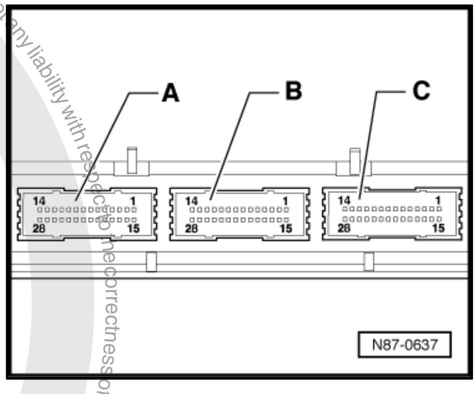
16 - Footwell/Defrost Door Motor Position Sensor -G114- (5 V = cold; 0 V warm)

17 - Central Door Motor Position Sensor -G112- (5 V = cold; 0 V warm)

18 - Temperature Regulator Door Motor Position Sensor -G92- (5 V = cold; 0 V warm)

19 - Sunlight Photosensor -G107-

20 - Ground signal (for Central Air Door Motor -V70- ; for Footwell/ Defroster Door Motor -V85- ; for Temperature Regulator Door Motor Position Sensor -G92-



28-pin multi-connector -C- (-T28c/-)

1 - A/C Refrigerant Shut-Off Valve -N43-

3 - Control module with indicator unit -J285- in instrument panel insert

4 - Control Module for Warm Air Blower -J350-

6 - Fan Relay -J323- and Rear Warm Air Fan -V47- (+)

7 - Control Module for Warm Air Blower -J350- and Rear Warm Air Fan -V47- (-)

8 - Rear A/C Control Head (Climatronic) -E265-

10 - Control Module for Blower for Evaporator -J349- and Rear Evaporator Fan -V20- (-)

11 - Fan Relay -J323-

12 - Control Module for Blower for Evaporator -J349-

14 - Rear A/C Control Head (Climatronic) -E265- (Databus)

15 - Auxiliary Heater Valve -N172-

18 - Rear Evaporator Temperature Sensor -G153-

19 - Rear Heater Core Temperature Sensor -G154-

20 - Ground signal (for Rear Evaporator Temperature Sensor -G153- and Rear Heater Core Temperature Sensor -G154-)

2.2.7 Passenger Compartment Climatronic Components, Assembly Overview

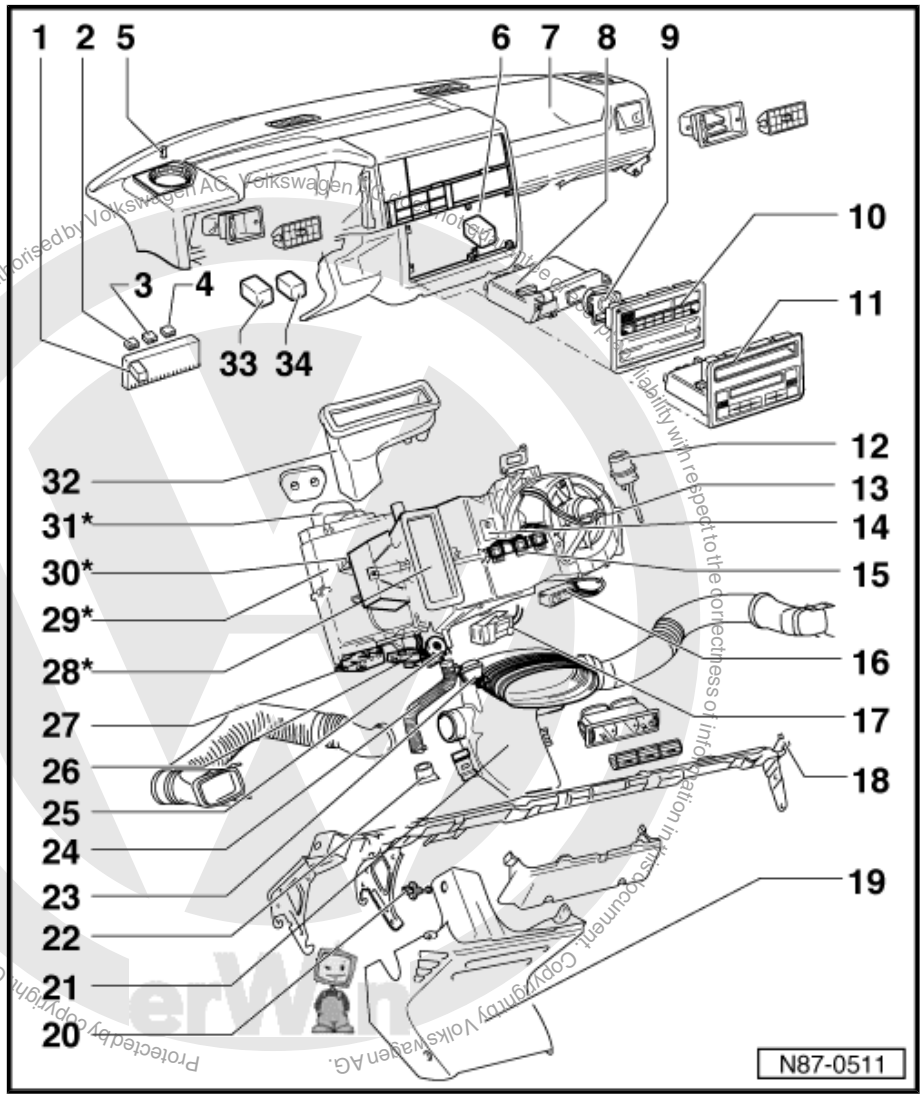
Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*

Note

*System components identified with an * must only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.*



1 - Climatronic Relay -J254-

- ❑ Control number 140
- ❑ Checking ⇒ page 1

2 - Fuse for Climatronic front - S140-

- ❑ Above relay plate

3 - Fuse for Blower for Rear Evaporator -S120-

- ❑ Above fuse-relay plate

4 - Warm Air Blower Fuse - S118-

- ❑ Above fuse-relay plate

5 - Sunlight Photo Sensor - G107-

- ❑ Regulates temperature door position and fresh air blower depending on light intensity
- ❑ In event of malfunction, Climatronic control module -J255- assumes fixed value
- ❑ Checking ⇒ page 1
- ❑ Removing

– Remove cover for left speaker, disconnect harness connector, press sensor out from inside outwards.

6 - Fan Relay -J323-

- ❑ Control number 114
- ❑ Behind center instrument panel trim

- ❑ Controls blower for rear evaporator -V20- and rear warm air fan -V47-
- ❑ Checking ⇒ page 1

7 - Instrument panel

- ❑ Removing and installing ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation

8 - Climatronic Control Module -J255-

- ❑ Vehicles through 09.98 only
- ❑ Checking ⇒ page 1
- ❑ Removing ⇒ page 143
- ❑ Always check control unit coding when installing ⇒ page 18

9 - Interior Temperature Sensor Fan -V42-

- ❑ Vehicles through 09.98 only
- ❑ Mounted to A/C control head -E87-
- ❑ Checking ⇒ page 1
- ❑ Removing

– Carefully pry out with a screwdriver.

10 - A/C Control Head -E87- through 09.98

- ❑ With instrument panel interior temperature sensor -G56-
- ❑ Operation/function ⇒ page 81
- ❑ Checking ⇒ page 1
- ❑ Removing

– Carefully pry out -E87- with a screwdriver and pull out of center instrument panel trim using tray.

11 - A/C Control Head -E87- from 09.98

- ❑ A/C Control Head -E87- , Climatronic Control Module -J255- , Instrument Panel Interior Temperature Sensor -G56- with Interior Temperature Sensor Fan -V42- are integrated into a non serviceable unit.
- ❑ Operation/function ⇒ page 83
- ❑ Checking ⇒ page 1
- ❑ Removing and installing ⇒ page 145

12 - Fresh air/recirculating door vacuum unit

- ❑ Door in fresh air position when no vacuum is present
- ❑ Door in recirculated air position when vacuum is present
- ❑ Vacuum hose layout ⇒ page 103
- ❑ Removing ⇒ page 143

13 - Fresh Air Blower -V2-

- ❑ Checking ⇒ page 1
- ❑ Replacing

– Remove Instrument panel ⇒ Item 7 (page 90) and loosen carrier ⇒ Item 18 (page 91) on right side ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation

- ❑ Before installing coat contact surfaces with AMV 176 000 05 or equivalent

14 - Control Module for Fresh Air Blower -J126-

- ❑ Controls -J126- with variable voltage signal
- ❑ Checking ⇒ page 1
- ❑ Removing ⇒ page 144

15 - 5-Pin connectors for door motors

- ❑ Identification ⇒ page 92

16 - Vacuum Valve Rail -N53-

- ❑ Power supply (15) fuse -S16-

- ❑ Climatronic control module switches ground to -N53- to control vacuum supply to fresh air/recirculating door and footwell/defrost door
- ❑ Checking ⇒ page 1
- ❑ Removing and installing ⇒ page 145
- ❑ Vacuum hose, layout ⇒ page 103

17 - Evaporator Temperature Switch -E33-

- ❑ Prevents evaporator icing
- ❑ Checking ⇒ page 1
- ❑ Sensor tube depth: 330 mm (13 in)
- ❑ Replacing ⇒ page 144
- ❑ Switching temperatures: opens below -2° C

18 - Carrier

19 - Footwell vent console

- ❑ Insert front vent temperature sensor -G152- first before installing vent console (rotate -G152- 90° to lock).

20 - Front Vent Temperature Sensor -G152-

- ❑ If sensor -G152- malfunctions, default value of 42°C (108°F) is assumed
- ❑ Checking ⇒ page 1

21 - Center air duct

- ❑ Replacing

– Remove instrument panel ⇒ Item 7 (page 90) and carrier ⇒ Item 18 (page 91) . ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation

22 - Water drain valve

- ❑ Water leak at housing may result if valve is blocked

23 - Center vent door vacuum unit

- ❑ Center vent closed when no vacuum is present
- ❑ Vacuum hose, layout ⇒ page 103
- ❑ Removing ⇒ page 144

24 - Evaporator drain pipe

- ❑ Removing and installing ⇒ page 144

25 - Temperature Regulator Door Motor -V68-

- ❑ Checking ⇒ page 1
- ❑ End position, checking and adjusting ⇒ page 135
- ❑ Removing

– Remove passenger side footwell vent console and footwell trim.

26 - Central Air Door Motor -V70-

- ❑ Checking ⇒ page 1
- ❑ Removing and installing ⇒ page 145

27 - Footwell/defroster Door Motor -V85-

- ❑ Checking ⇒ page 1
- ❑ End position, checking and adjusting ⇒ page 135
- ❑ Removing

– Remove passenger side footwell vent console and footwell trim.

28 - Central door*

- ❑ Not a replaceable part

29 - Heater/evaporator housing*

30 - Footwell/defrost door*

- ❑ Not replaceable part

31 - Heater core*

- ❑ Install seals around entire circumference
- ❑ Always replace coolant

32 - Defroster duct

- ❑ Replacing

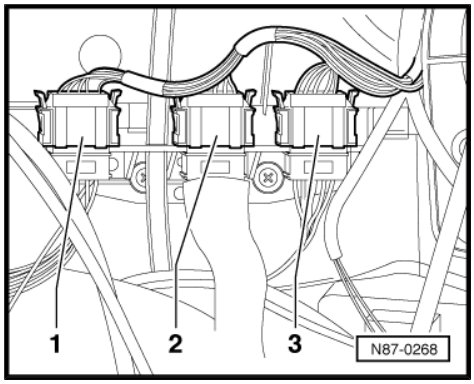
– Remove instrument panel ⇒ Item 7 (page 90) ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation

33 - Relay for A/C Shut-off -J365-

- ❑ Above fuse-relay plate
- ❑ Control number 147

34 - Not applicable

2.2.8 Door Motors 5-Pin Connectors Identification



5-Pin connectors for door motors, identification

1 - Connector T5b (red)

For central door positioning motor -V70-

2 - Connector T5 (black) (housing red)

For temperature door positioning motor -V68-

3 - Connector T5a (yellow)

For footwell/defrost door positioning motor -V85-

Note

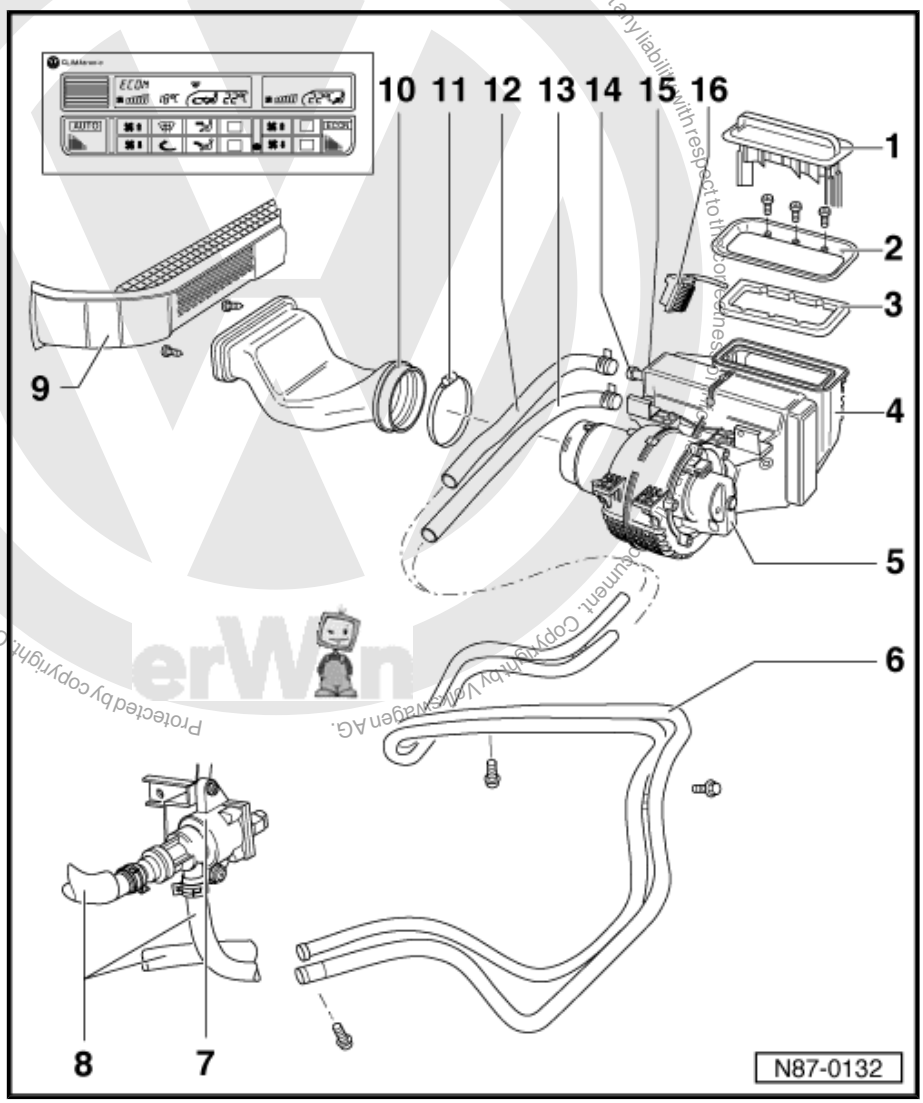
- *Individual electrical terminal assignments:*
- *⇒ Wiring diagrams, Troubleshooting & Component locations*

2.2.9 Rear Heater through 09.98, Assembly Overview

Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*



1 - Vent, for rear passenger zone

- ❑ Removing ⇒ page 147

2 - Cover plate

3 - Gasket

4 - Air distribution housing

- ❑ Removing ⇒ page 146
- ❑ Assembly ⇒ page 42

5 - Rear Warm Air Fan -V47-

- ❑ Protected by fuse -S118- ⇒ Item 4 (page 89)
- ❑ Controlled by control module for warm air blower -J350- and fan relay -J323- ⇒ Item 6 (page 89)
- ❑ Checking ⇒ page 1
- ❑ Removing ⇒ page 42

6 - Coolant pipe

- ❑ Removing ⇒ page 147

7 - Auxiliary Heater Valve -N172-

- ❑ Removing ⇒ page 148

8 - Coolant hose

- ❑ From engine compartment connection diagram
- ❑ Coolant hose connection diagram ⇒ page 102

9 - Sliding door footwell insert

- ❑ Removing ⇒ Body Exterior; Rep. Gr. 58 ; Removal and Installation

10 - Air intake duct

- ❑ Removing, Kombi models* ⇒ page 147
- ❑ Removing, EuroVan and Transporter models ⇒ page 147

11 - Hose clamp

12 - Coolant hose, return

13 - Coolant hose, supply

14 - Heater core

- ❑ Install seals around entire circumference of heater core
- ❑ Removing ⇒ page 42
- ❑ Always change coolant after repairs

* Not applicable

15 - Rear Heater Core Temperature Sensor -G154-

- ❑ Inserted into heater core
- ❑ If sensor -G56- malfunctions, default value of 42°C (108°F) is assumed
- ❑ Checking ⇒ page 1
- ❑ Removing

– Remove rear heater core first ⇒ page 42

16 - Control Module for Warm Air Blower -J350- (rear)

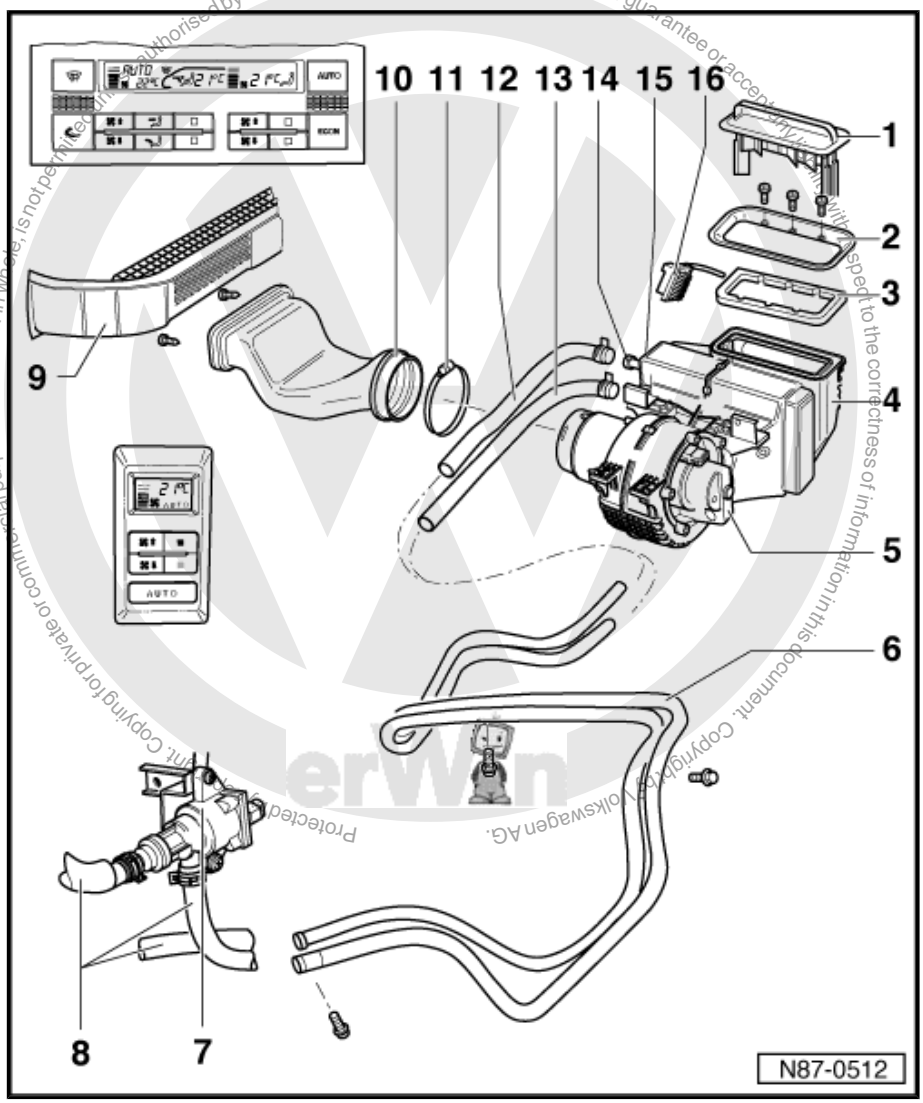
- ❑ Function: Controls blower speed of rear warm air fan -V47- with variable ground signal
- ❑ Checking ⇒ page 1
- ❑ Removing ⇒ page 148

2.2.10 Rear Heater from 09.98, Assembly Overview

Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*



1 - Vent, for rear passenger zone

- ❑ Removing ⇒ page 147

2 - Cover plate

3 - Gasket

4 - Air distribution housing

- ❑ Removing ⇒ page 146
- ❑ Assembly ⇒ page 42

5 - Rear Warm Air Fan -V47-

- ❑ Protected by fuse -S118- ⇒ Item 4 (page 89)
- ❑ Controlled by control module for warm air blower -J350- and fan relay -J323- ⇒ Item 6 (page 89)
- ❑ Checking ⇒ page 1
- ❑ Removing ⇒ page 42

6 - Coolant pipe

- ❑ Removing ⇒ page 147

7 - Auxiliary Heater Valve - N172-

- ❑ Removing ⇒ page 148

8 - Coolant hose

- ❑ From engine compartment connection diagram
- ❑ Coolant hose connection diagram ⇒ page 102

9 - Sliding door footwell insert

- ❑ Removing ⇒ Body Exterior; Rep. Gr. 58 ; Removal and Installation

10 - Air intake duct

- ❑ Removing, Kombi models (not applicable) ⇒ page 147
- ❑ Removing, EuroVan and Transporter models ⇒ page 147

11 - Hose clamp

12 - Coolant hose, return

13 - Coolant hose, supply

14 - Heater core

- ❑ Install seals around entire circumference of heater core
- ❑ Removing ⇒ page 42

Note

Always change coolant after repairs.

15 - Rear Heater Core Temperature Sensor -G154-

- ❑ Inserted into heater core
- ❑ If sensor -G56- malfunctions, default value of 42°C (108°F) is assumed
- ❑ Checking ⇒ page 1
- ❑ Removing

– Remove rear heater core first ⇒ page 42

16 - Control Module for Warm Air Blower -J350- (rear)

- ❑ Function: Controls blower speed of rear warm air fan -V47- with variable ground signal
- ❑ Checking ⇒ page 1
- ❑ Removing ⇒ page 148

2.2.11 Rear Evaporator through 09.98, Assembly Overview

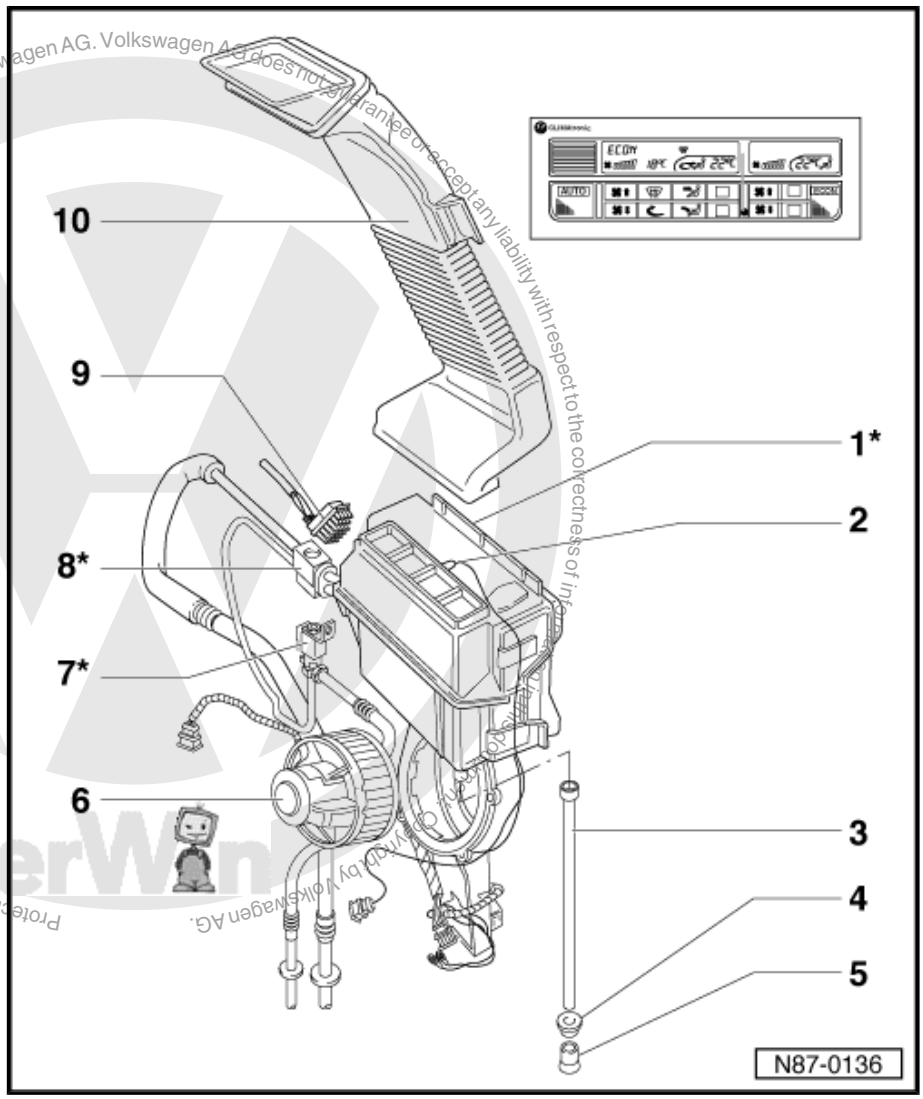
Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*

Note

*System components identified with an * must only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.*



1 - Rear evaporator*

2 - Rear Evaporator Temperature Sensor -G153-

- ❑ Inserted into rear evaporator
- ❑ If sensor -G153- malfunctions, default value of 10°C (50°F) is assumed
- ❑ Checking ⇒ page 1

3 - Evaporator drain pipe

4 - Grommet

5 - Evaporator water drain valve

6 - Rear Evaporator Fan -V20-

- ❑ Protected by fuse -S120- ⇒ Item 3 (page 89)
- ❑ Controlled by fan relay -J323- and control module for blower for evaporator -J349- .
- ❑ Checking ⇒ page 1
- ❑ Removing

– Remove right “D” pillar trim first. ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation

7 - A/C Refrigerant Shut-off Valve -N43- *

- ❑ Checking ⇒ page 1

8 - Expansion valve for rear evaporator*

9 - Blower Control Unit for 2nd Evaporator -J349-

- ❑ Function: Controls blower speed of rear evaporator fan -V20- with variable ground signal

10 - Air duct

- ❑ Removing

– Remove right “D” pillar trim first. ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation

2.2.12 Rear Evaporator from 09.98, Assembly Overview

Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*

Note

*System components identified with an * must only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.*

1 - Rear evaporator*

2 - Rear Evaporator Temperature Sensor -G153-

- ❑ Inserted into rear evaporator
- ❑ If sensor-G153- malfunctions, default value of 10°C (50°F) is assumed
- ❑ Checking ⇒ page 1

3 - Evaporator drain pipe

4 - Grommet

5 - Evaporator water drain valve

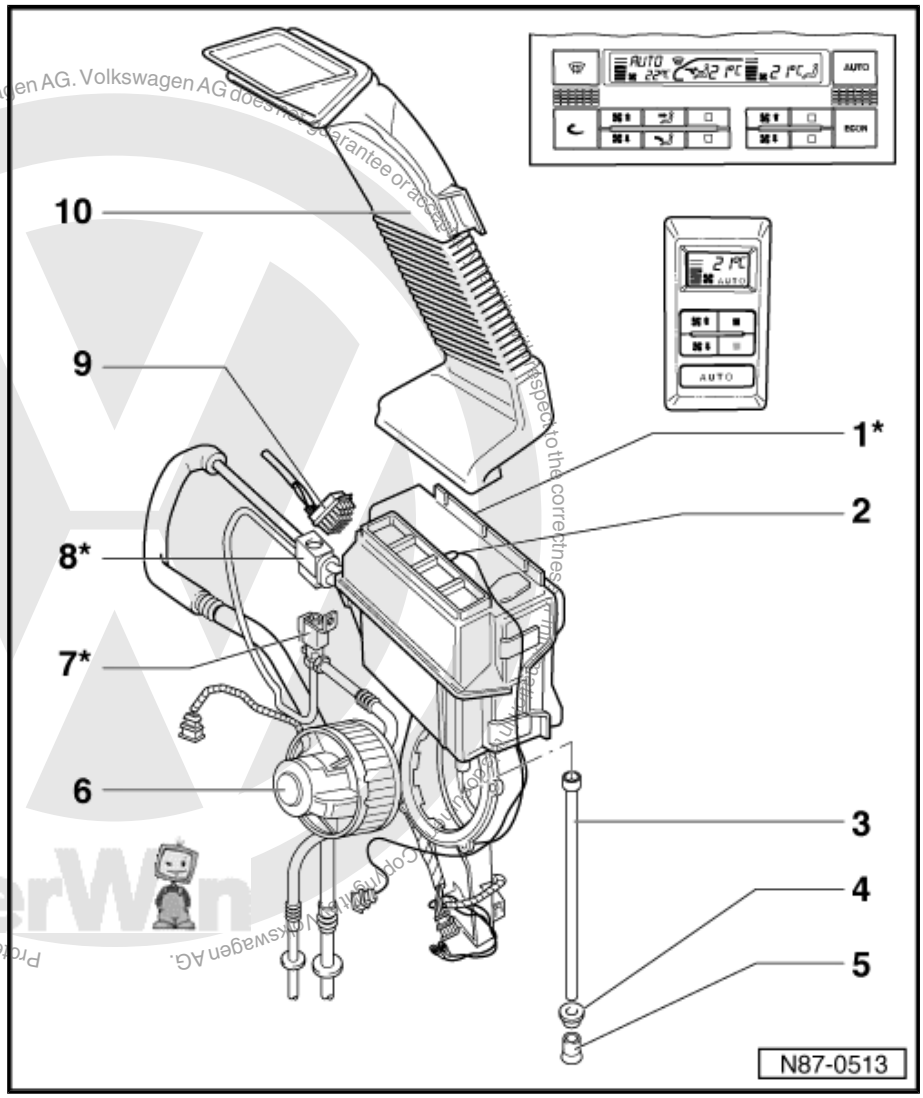
6 - Rear Evaporator Fan -V20-

- ❑ Protected by fuse -S120- ⇒ Item 3 (page 89)
- ❑ Controlled by fan relay -J323- and control module for blower for evaporator -J349- .
- ❑ Checking ⇒ page 1
- ❑ Removing
- – Remove right “D” pillar trim first. ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation

7 - A/C Refrigerant Shut-off Valve -N43- *

- ❑ Checking ⇒ page 1

8 - Expansion valve for rear evaporator*



9 - Blower Control Unit for 2nd Evaporator -J349-

- ❑ Function: Controls blower speed of rear evaporator fan -V20- with variable ground signal

10 - Air duct

- ❑ Removing
- – Remove right “D” pillar trim first. ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation

2.2.13 Rear A/C Control Head from 09.98, Display and Functions

1 - Rear A/C Control Head -E265- (Climatronic)

2 - Rear passenger “blower speed” display

3 - Rear passenger “selected temperature”display

4 - “AUTO” (automatic operation) or “OFF” (system off) display

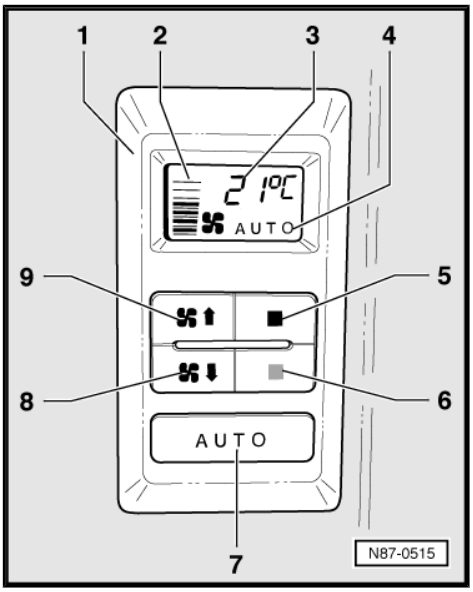
5 - Rear passenger “warmer” button

6 - Rear passenger “cooler” button

7 - “Automatic operation” button

8 - Rear passenger “decrease blower speed” button (this button also switches system off)

9 - Rear passenger “increase blower speed” button



2.2.14 Climatronic Components in Engine Compartment, Assembly Overview

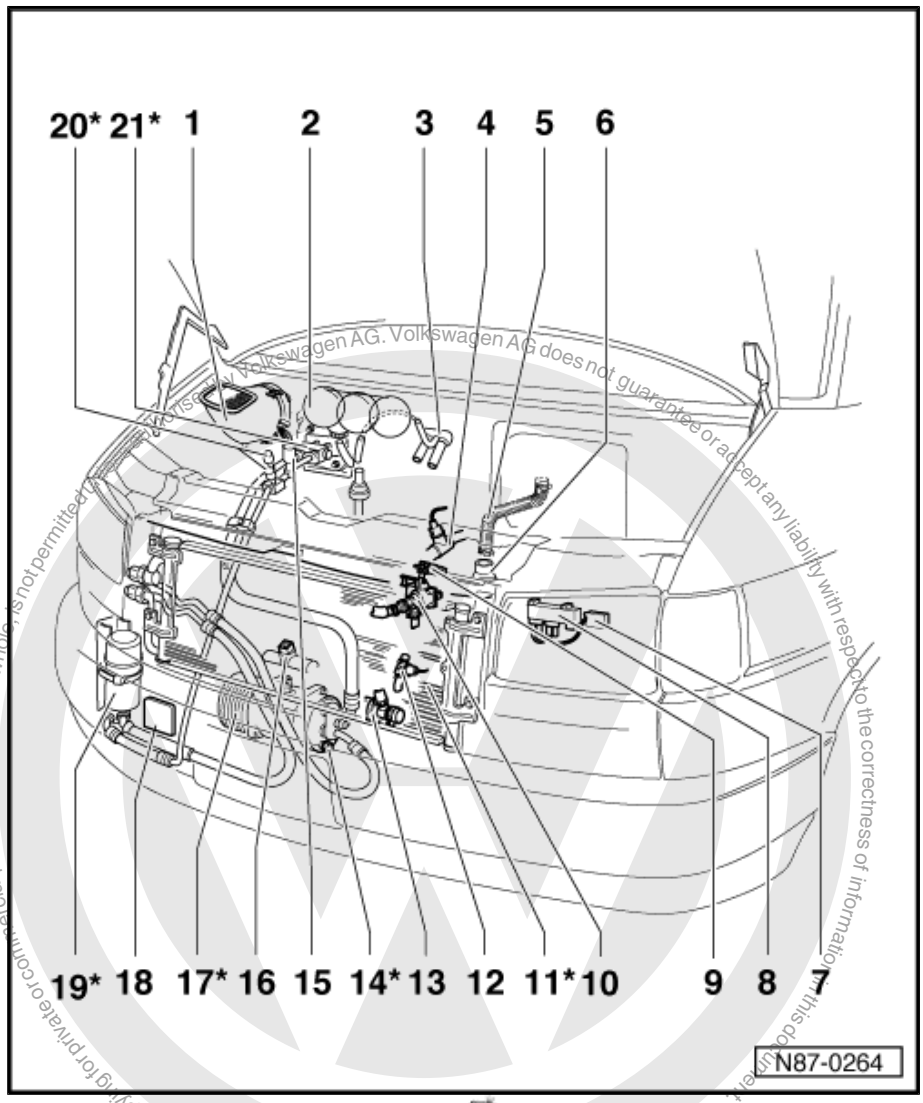
Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*

Note

*System components identified with an * must only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.*



1 - Air intake duct

- ❑ Dust and pollen filter, removing and installing ⇒ page 56

2 - Vacuum reservoir

- ❑ Where applicable
- ❑ Insert vacuum hose: 30 mm (1 3/16 in) into reservoir
- ❑ Vacuum hose layout ⇒ page 103

3 - Heater core and vacuum hose guide at bulkhead

4 - A/C Engine Coolant Temperature Sensor -G110-

- ❑ Function: Provides engine coolant temperature measurement signal to Climatronic control module -J255- for defrost/footwell air distribution and fresh air blower control
- ❑ If sensor -G110- malfunctions, default value of 80°C (176°F) is assumed
- ❑ Checking ⇒ page 1

5 - Evaporator drain pipe

- ❑ Removing and installing ⇒ page 144

6 - Evaporator water drain valve

- ❑ Water leak at housing may result if valve blocked

7 - Individual fuses for coolant fan -S42- (2x)

- ❑ In engine compartment, front left

8 - Coolant Fan Control (FC) Relay -J26-

- ❑ In engine compartment, front left
- ❑ Checking ⇒ page 1

9 - Engine Coolant Two-way Vacuum Valve -N147-

- ❑ Shuts off vacuum flow when no voltage is present.
- – After attaching vacuum hoses, check:
- ❑ When connected the vacuum unit must pull in if voltage and vacuum are present.
- ❑ When connected the vacuum unit is vented if vacuum is present and voltage is not.

10 - Auxiliary Heater Valve -N172- (rear heater)

- ❑ Function: Controls coolant flow through rear heater core

- ❑ Checking ⇒ page 1
- ❑ Removing ⇒ page 148

11 - Condenser*

12 - Coolant shut-off valve

Function:

- ❑ Engine off: Vacuum supply to coolant shut-off valve is controlled by engine coolant two-way vacuum valve -N147- . Valve allows coolant to circulate from engine to radiator when after-run coolant pump operates.

13 - Coolant Pump -V50-

- ❑ Checking ⇒ page 1

14 - Pressure relief valve*

- ❑ Protects refrigerant circuit against over-pressure
- ❑ Checking ⇒ page 124

15 - A/C Pressure Switch -F129-

- ❑ Checking ⇒ page 123
- ❑ Removing and installing:

– Tightening torque 8 Nm

– Replace O ring (note Part No.).

16 - A/C Cut-out Thermal Switch -F163- and Third Speed Coolant Fan Control (FC) Thermal Switch -F165-

- ❑ In engine compartment, front

Function:

- ❑ -F165- switches-on coolant fan 3rd speed (on at 112°C / 234°F, off at 108°C / 226°F).
- ❑ -F163- switches off A/C clutch -N25- at excessive coolant temperatures (off at 119°C / 246°F, on at 112° C / 234°F).
- ❑ Removing ⇒ page 149
- ❑ Removing and installing, engine code AES and AXK ⇒ page 150

17 - A/C Clutch -N25- *

18 - Outside Air Temperature Sensor -G17-

- ❑ Function: Provides outside (ambient) temperature measurement signal to Climatronic control module -J255- for temperature door and fresh air blower control
- ❑ If sensor -G17- malfunctions, default value of 10°C (50°F) is assumed
- ❑ Checking ⇒ page 1
- ❑ Replacing ⇒ page 150

19 - Receiver drier*

20 - Service valves*

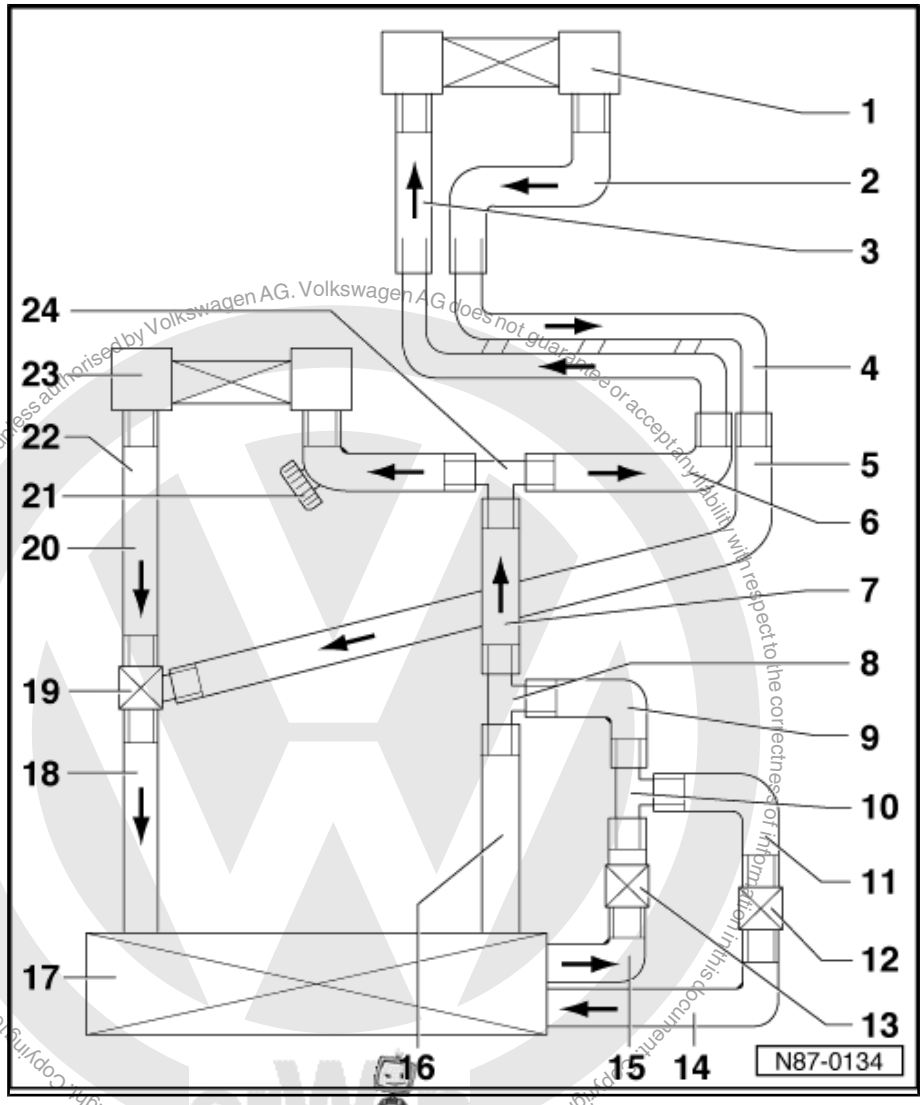
21 - Expansion valve*

- ❑ Opening at bulkhead must be sealed to prevent water ingress
- ❑ Expansion valve insulation, ⇒ page 138

2.2.15 Coolant Hose Connection Diagram

Note

For routing of all hoses ⇒ Engine Mechanical; Rep. Gr. 19 ; Description and Operation



1 - Rear heater core

2 - Coolant return hose

(from rear heater core to coolant pipe)

3 - Coolant supply hose

(from coolant pipe to rear heater core)

4 - Coolant pipe

5 - Coolant return hose

(from coolant pipe to auxiliary heater valve -N172-)

6 - Coolant supply hose

(from T piece to coolant pipe)

7 - Coolant supply hose

(from T piece to T piece)

8 - T piece

9 - Coolant supply hose

(from T piece to T piece)

10 - T piece

11 - Coolant return hose

(from T piece to coolant cut-off valve)

12 - Coolant cut-off valve

13 - Coolant Pump -V50- (for after-run)

14 - Coolant return hose

(from coolant cut-off valve to engine)

15 - Coolant supply hose

(from engine to coolant pump -V50-)

16 - Coolant supply hose

(from engine to T piece)

17 - Engine

18 - Coolant return hose

(from auxiliary heater valve -N172- to engine)

19 - Auxiliary Heater Valve -N172- (for rear heater)

20 - Coolant return hose

(from T piece to front heater core)

21 - Bleeder screw

22 - Coolant return hose

(from front heater core to auxiliary heater valve -N172-)

23 - Front heater core

24 - T piece

2.2.16 Vacuum Hose Connection Diagram

Note

- *Arrows indicate vacuum.*
- *Insert vacuum hose into vacuum reservoir 30 mm (1 3/16 in). Insert vacuum hoses onto plastic connectors 15 mm (19/32 in).*

1 - Vacuum reservoir

- ❑ Where applicable

2 - Fresh air/recirculating door vacuum unit

3 - Vacuum hose

- ❑ From vacuum valve rail -N53- to fresh air/recirculating door vacuum unit
- ❑ Vacuum valve rail connection with green marking

4 - Vacuum hose

- ❑ From vacuum reservoir in engine compartment to vacuum valve rail -N53-
- ❑ Vacuum valve rail connection with black marking

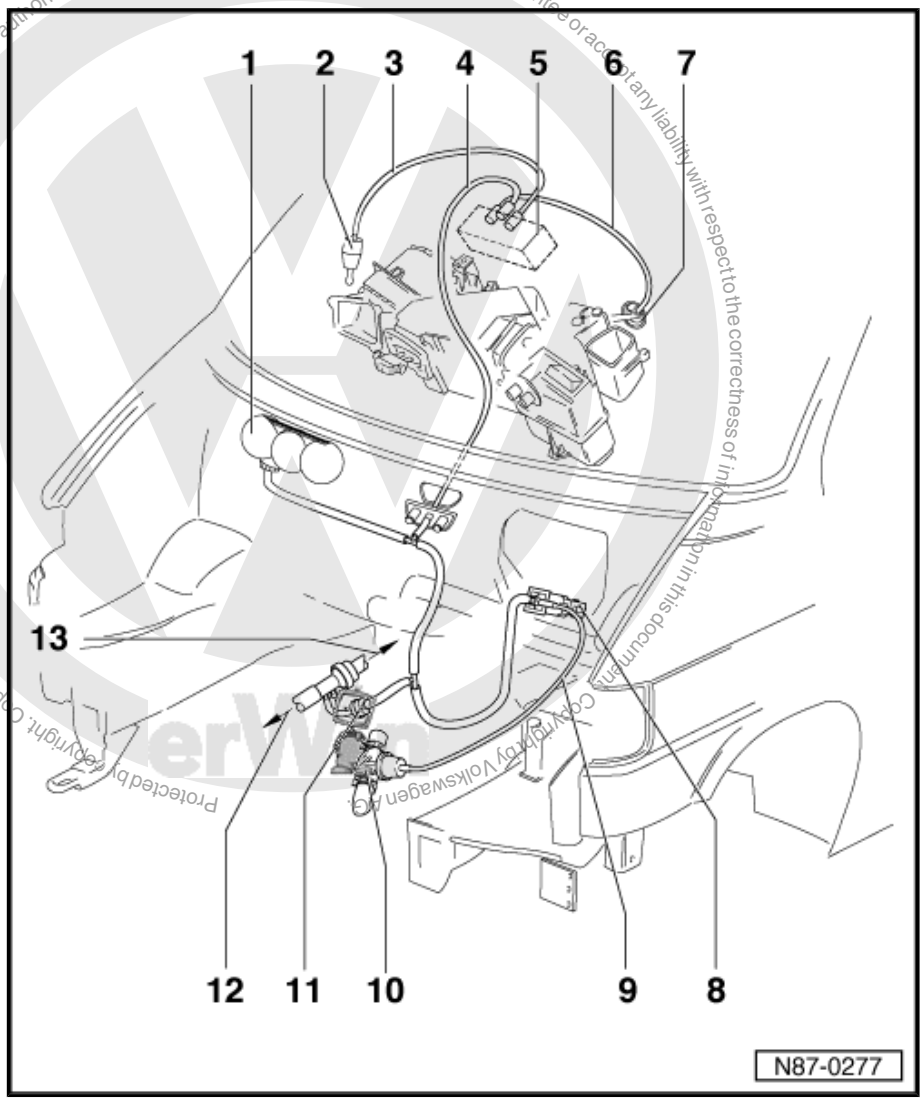
5 - Vacuum valve rail -N53-

- ❑ Connections for vacuum hoses have colored markings

6 - Vacuum hose

- ❑ From Vacuum valve rail -N53- to center vent vacuum unit
- ❑ Vacuum valve rail connection with yellow marking

7 - Central door vacuum unit



8 - Engine coolant two-way vacuum valve -N147-

- ❑ Shuts off vacuum flow when no voltage is present.
- – After attaching vacuum hoses, check:
- ❑ When connected the vacuum unit must pull in if voltage and vacuum are present.
- ❑ When connected the vacuum unit is vented if vacuum is present and voltage is not.

9 - Vacuum hose

- ❑ From -N147- to coolant cut-off valve

10 - Coolant shut-off valve

- ❑ Switched by vacuum from two-way valve -N147- when engine is running

11 - One-way valve

12 - To intake manifold

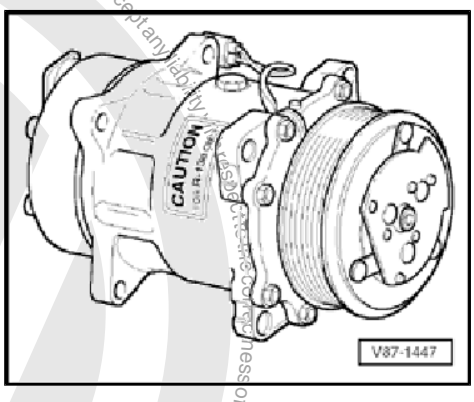
13 - To brake booster

2.3 A/C Refrigerant System Components, Overview

Compressor

The compressor is driven via a belt on the engine when the A/C clutch engages (A/C ON).

Low-pressure refrigerant gas from the evaporator is compressed by the compressor. After compression, the refrigerant gas (now high-pressure) flows to the condenser.

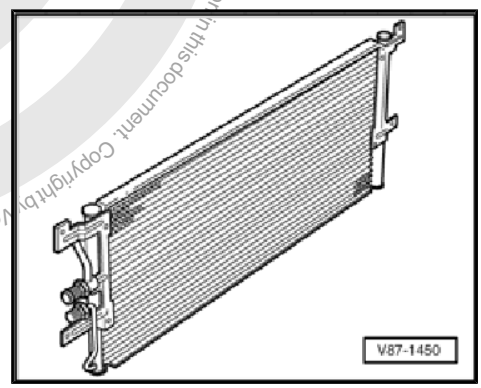


Note

- ♦ *The compressor contains refrigerant oil that is mixable under all temperatures with the refrigerant.*
- ♦ *A label on the compressor indicates that compressor is for R-134a systems only.*

Condenser

The condenser transfers heat from the compressed refrigerant gas to the outside air which causes the refrigerant to change state from a gas to a liquid.



Note

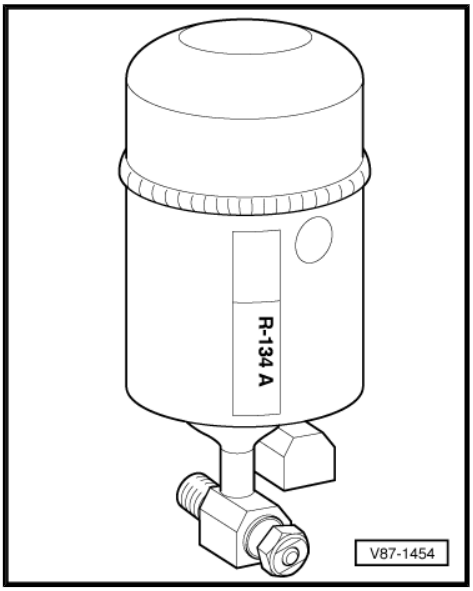
The condenser for the R-134a refrigerant system is identified with a green label.

Receiver Drier

The receiver drier acts as a refrigerant reservoir for the system. Any moisture in the system is absorbed in the drier desiccant.

Caution

The R-134a receiver drier is identified with a green label and MUST NOT be used in R-12 systems (drier desiccant is only compatible with R-134a refrigerant). Likewise, NEVER use an R-12 receiver drier in an R-134a system.

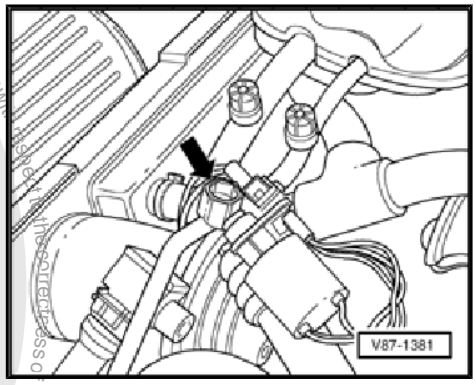


Sight Glass

With a properly charged A/C system and A/C clutch engaged, the sight glass (arrow) should remain clear and bubble-free.

Note

The mixture of R-134a refrigerant and refrigerant oil (PAG oil) may appear milky in the sight glass.

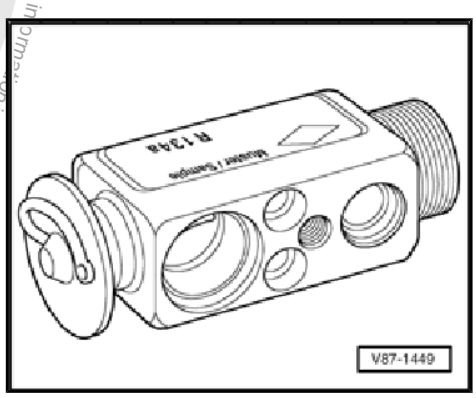


Expansion Valve

The expansion valve restricts and controls refrigerant flow to the evaporator thus lowering refrigerant temperature and pressure.

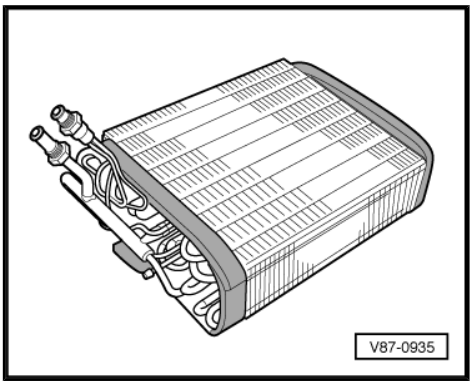
Note

The R-134a expansion valve is identified with a green adhesive label.



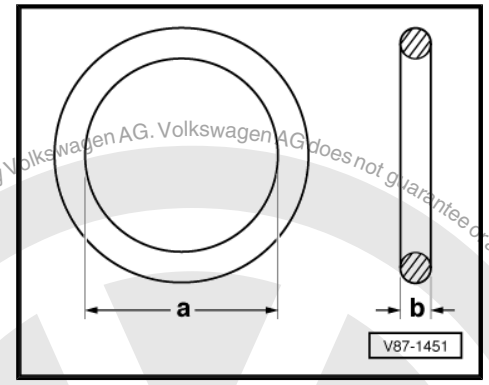
Evaporator

Liquid refrigerant entering the evaporator absorbs heat from air passing through the evaporator fins and cools the air. As the refrigerant absorbs heat it turns to vapor and then is suctioned by the compressor.



O-Rings

O-rings seal connections between A/C system components.

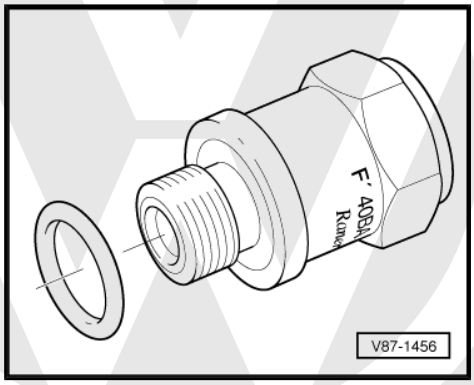


Note

- *Always use correct size O-rings (dimensions -a- and -b-).*
- *Do not reuse O-rings, always replace. Use only new O-rings that are compatible with R-134a refrigerant and refrigerant (PAG) oil on R-134a systems.*
- *Lubricate O-rings with the appropriate refrigerant oil before installing (use PAG oil on R-134a systems).*

Pressure Relief Valve

The pressure relief valve is mounted on the compressor or the receiver drier. At pressures above 40 bar (580 psi), the pressure relief valve opens to vent excessive pressure. When the system pressure is reduced, the valve closes to prevent total refrigerant loss.



On some models, a cap on the pressure relief valve will pop out if the valve has opened.

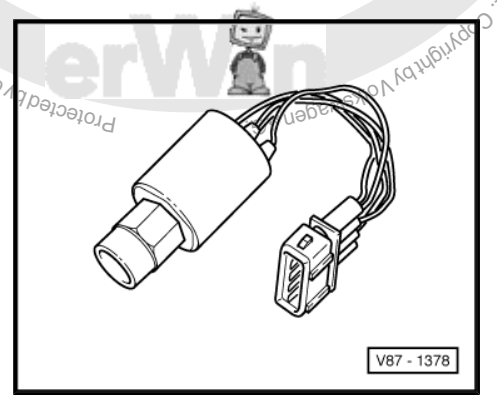
A/C System Hoses and Lines

The mixture of refrigerant oil (PAG oil) and refrigerant R-134a attacks some metals and alloys (for example, copper) and breaks down certain hose material. Use only hoses and lines that are identified with a green mark (stripe) or the lettering “R-134a”.

A/C Pressure Switch F129

Switch has three functions:

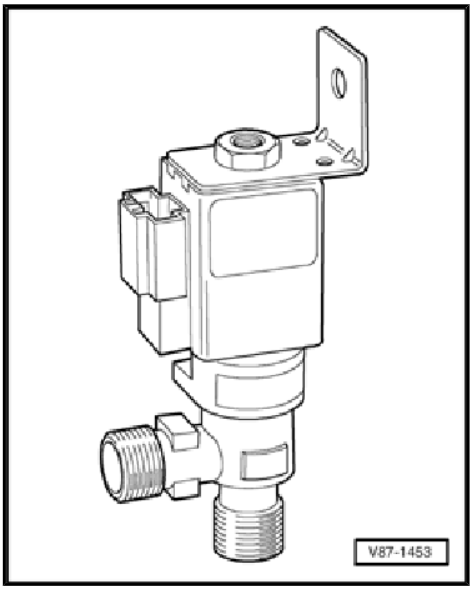
- Switches the A/C clutch -N25- off when excessive refrigerant circuit pressure is present (e.g.: insufficient air flow over condensor or when overcharged).
- Switches the A/C clutch -N25- off when insufficient refrigerant circuit pressure is present (e.g.: when refrigerant has leaked out)
- Switches on the second speed coolant fan -V7- when refrigerant circuit pressure increases.



A/C Refrigerant Shut-Off Valve N43

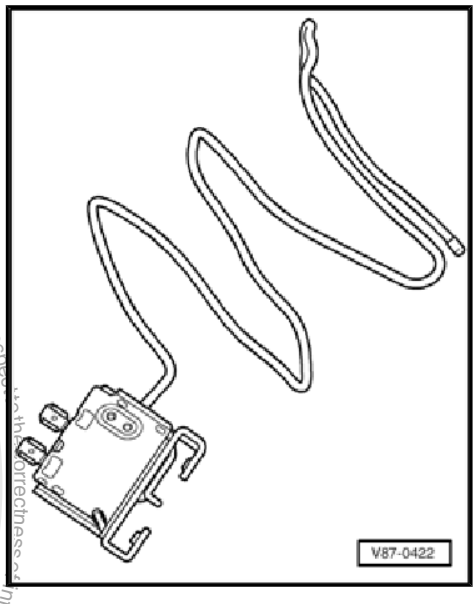
The flow of refrigerant to the second evaporator (where applicable) is controlled by valve -N43- . The valve opens (refrigerant flow) when voltage is applied by A/C control head -E87- .

On models with Climatronic, function of valve is monitored by On Board Diagnostic (OBD).



A/C Evaporator Temperature Switch E33

The temperature switch monitors the temperature between the evaporator fins to prevent evaporator icing. When the evaporator temperature drops to below 0°C (32°F), the A/C clutch -N25- is switched off.



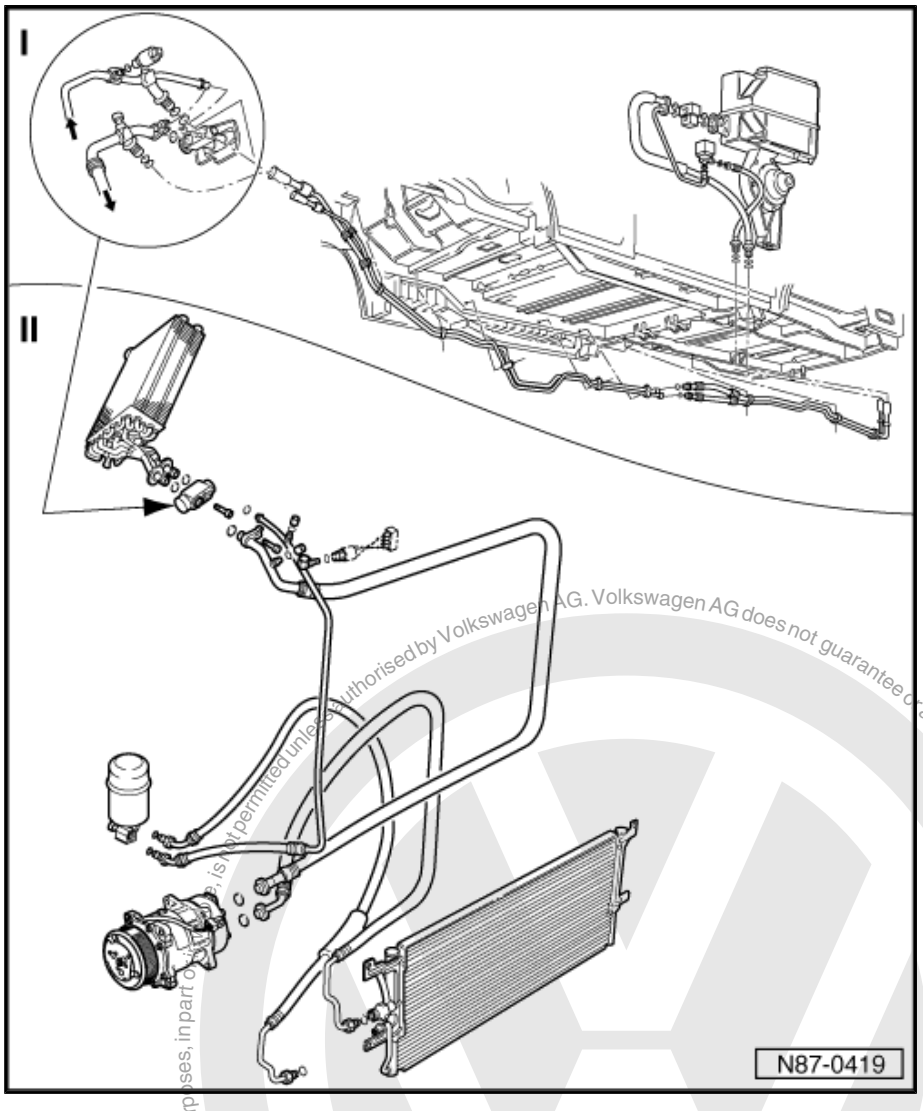
2.4 A/C Refrigerant System, Assembly Overview

1 - A/C refrigerant system components in passenger compartment

- ❑ Servicing ⇒ page 112

2 - A/C refrigerant system components in front passenger and engine compartments

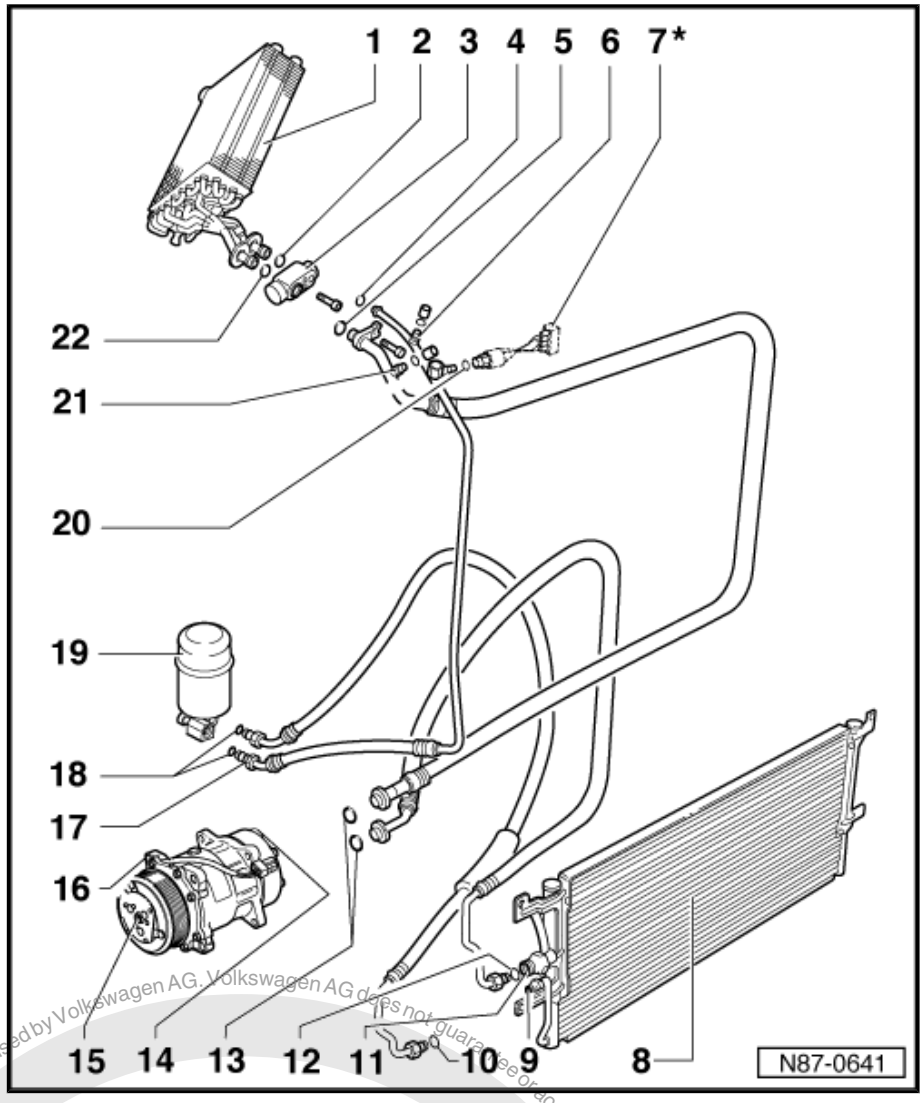
- ❑ System with separate receiver drier and condensor, servicing ⇒ page 108
- ❑ System with integrated receiver drier and condensor, servicing ⇒ page 110



A/C refrigerant system components in front passenger and engine compartments (system with separate condensor and receiver drier), servicing

Note

- *Before proceeding with A/C refrigerant system servicing, always review safety measures ⇒ page 57 .*
- *Discharge and evacuate A/C refrigerant system with Kent More ACR4 or equivalent.*
- *Only system components identified with an * can be removed or replaced without having to discharging refrigerant system.*
- *All opened refrigerant system components must be sealed against moisture and dirt contamination by appropriate sealing caps.*
- *R134a system identification via O-ring color is no longer valid. Black and colored rings are used.*



1 - Evaporator (front)

- In heating and A/C unit
- Removing ⇒ page 116

2 - O-ring

- 10.8 mm; 1.8 mm

3 - Expansion valve

- Removing ⇒ page 153
- Opening at bulkhead must be sealed to prevent water ingress
- Expansion valve insulation, ⇒ page 138

4 - O-ring

- 7.6 mm; 1.8 mm

5 - O-ring

- 17.2 mm; 1.8 mm

6 - High pressure service valve

- Removing and installing ⇒ page 152
- Refrigerant capacities ⇒ page 121

7 - A/C Pressure Switch -F129- *

- Function and checking ⇒ page 123
- Switch can be removed without discharging refrigerant circuit
- Removing and installing
  - Tightening torque 8Nm
  - Always replace O-ring (see parts catalog)

8 - Condenser

- Removing and installing ⇒ page 154

9 - Thread 5/8" - 18 UNF

- Tightening torque 15 Nm

10 - O-ring

- 7.6 mm; 1.8 mm

11 - Thread 3/4" - 16 UNF

- Tightening torque 15 Nm

12 - O-ring

- 10.8 mm; 1.8 mm

13 - O-rings

- 20.5 mm; 3.5 mm
- Qty.: 2

14 - Pressure relief valve

- Function and checking ⇒ page 124

15 - A/C Clutch -N25-

- Sanden

Servicing the A/C clutch installed on compressor should only be done in exceptional circumstances.

- ❑ Servicing (compressor removed) ⇒ page 114

16 - Compressor

- ❑ WIth A/C clutch -N25-
- ❑ SD7-V16 installed as running change from 01.95

17 - Thread 5/8" - 18 UNF

- ❑ Tightening torque 15 Nm

18 - O-rings

- ❑ 7.6 mm; 1.8 mm
- ❑ Qty.: 2

19 - Receiver drier

20 - O-ring

- ❑ 10.8 mm; 1.8 mm

21 - Low pressure service valve

- ❑ Removing and installing ⇒ page 152
- ❑ Refrigerant capacities ⇒ page 121

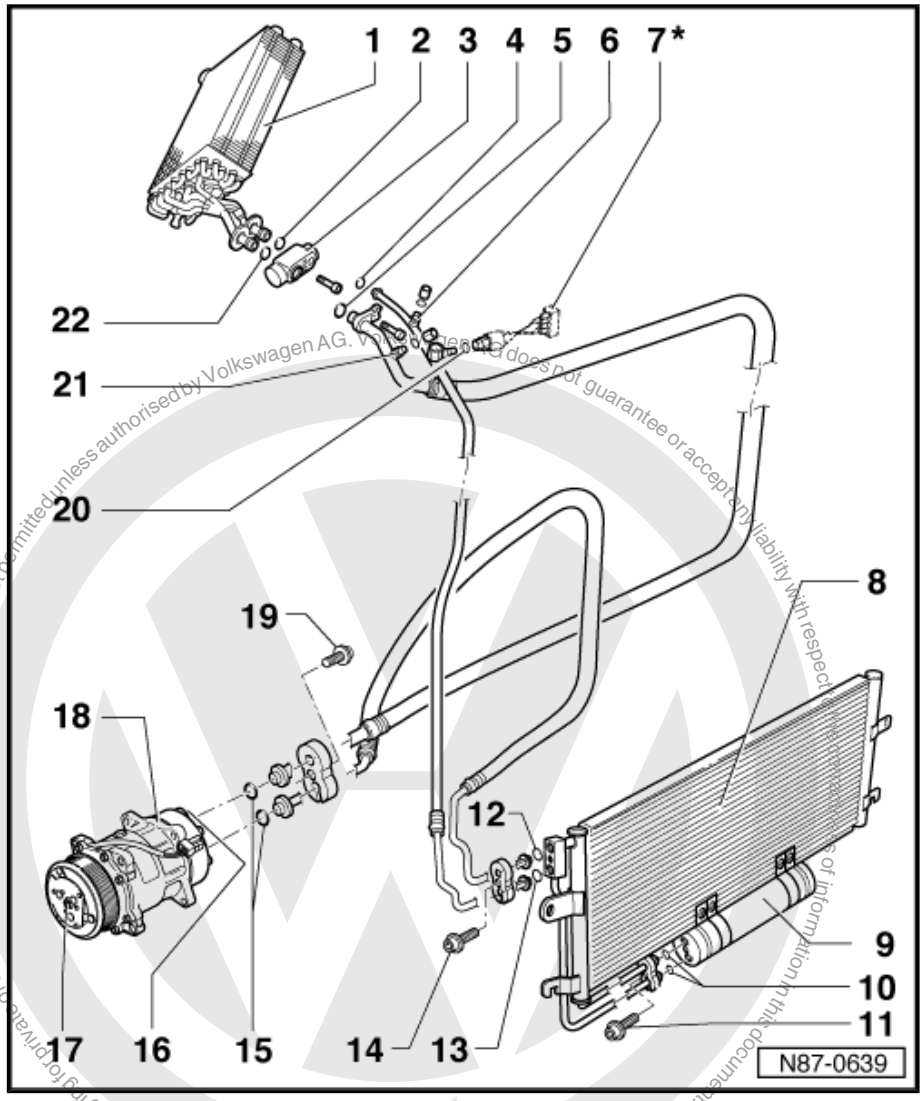
22 - O-ring

- ❑ 14 mm; 1.8 mm

A/C refrigerant system components in front passenger and engine compartments (system with integrated condensor and receiver drier), servicing

Note

- *Before proceeding with A/C refrigerant system servicing, always review safety measures ⇒ page 57 .*
- *Discharge and evacuate A/C refrigerant system with Kent More ACR4 or equivalent.*
- *Only system components identified with an * can be removed or replaced without having to discharging refrigerant system.*
- *All opened refrigerant system components must be sealed against moisture and dirt contamination by appropriate sealing caps.*
- *R134a system identification via O-ring color is no longer valid. Black and colored rings are used.*



1 - Evaporator (front)

- ❑ In heating and A/C unit
- ❑ Removing ⇒ page 116

2 - O-ring

- ❑ 10.8 mm; 1.8 mm

3 - Expansion valve

- ❑ Removing ⇒ page 153
- ❑ Opening at bulkhead must be sealed to prevent water ingress
- ❑ Expansion valve insulation, ⇒ page 138

4 - O-ring

- ❑ 7.6 mm; 1.8 mm

5 - O-ring

- ❑ 17.2 mm; 1.8 mm

6 - High pressure service valve

- ❑ Removing and installing ⇒ page 152
- ❑ Refrigerant capacities ⇒ page 121

7 - A/C Pressure Switch -F129-*

- ❑ Function and checking ⇒ page 123
- ❑ Switch can be removed without discharging refrigerant circuit
- ❑ Removing and installing
- – Tightening torque 8Nm
- – Always replace O-ring (see parts catalog)

8 - Condenser

- ❑ Removing and installing ⇒ page 155

9 - Receiver drier

10 - O-ring

- ❑ 10.8 mm; 1.8 mm

11 - Combi-bolt

- ❑ Tightening torque 7 Nm

12 - O-ring

- ❑ 10.8 mm; 1.8 mm

13 - O-ring

- ❑ 7.6 mm; 1.8 mm

14 - Combi-bolt

- ❑ Tightening torque 7 Nm

15 - O-rings

- ❑ 14.3 mm; 2.4 mm

16 - Pressure relief valve

- ❑ Function and checking ⇒ page 124

17 - A/C Clutch -N25-

- ❑ Sanden

Servicing the A/C clutch installed on compressor should only be done in exceptional circumstances.

- ❑ Servicing (compressor removed) ⇒ page 114

18 - Compressor

- ❑ WIth A/C clutch -N25-
- ❑ SD7-V16 installed as running change from 01.95

19 - Combi-bolt

- ❑ Tightening torque 7 Nm

20 - O-ring

- ❑ 10.8 mm; 1.8 mm

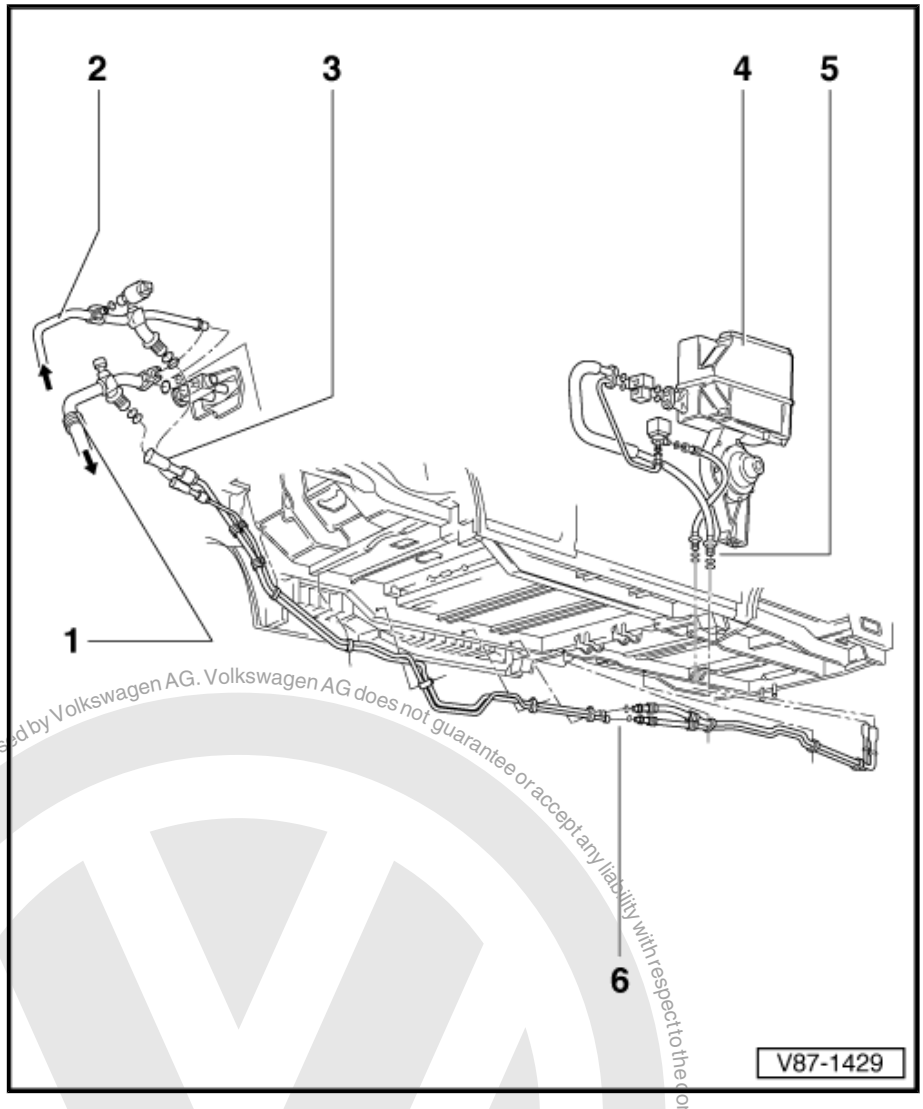
21 - Low pressure service valve

- ❑ Removing and installing ⇒ page 152
- ❑ Refrigerant capacities ⇒ page 121

22 - O-ring

- ❑ 14 mm; 1.8 mm

A/C refrigerant system components in passenger compartment, servicing



1 - Front A/C refrigerant circuit

- ❑ Low pressure side with coupling for refrigerant circuit to rear evaporator
- ❑ O-rings
- ❑ 13 mm; 1.9 mm
- ❑ Qty.: 2

2 - Front A/C refrigerant circuit

- ❑ High pressure side with coupling for refrigerant circuit to rear evaporator
- ❑ O-rings
- ❑ 10.8 mm; 1.8 mm
- ❑ Qty.: 2

3 - Coupling(s)

- ❑ For refrigerant circuits to rear evaporator
- – Separate coupling using release tool ⇒ page 152

4 - Rear evaporator

5 - Coupling

- – Separate coupling using release tool ⇒ page 152
- ❑ O-rings, Qty. 2: 10.8 mm; 1.8 mm
- ❑ O-rings, Qty. 2: 13 mm; 1.9 mm

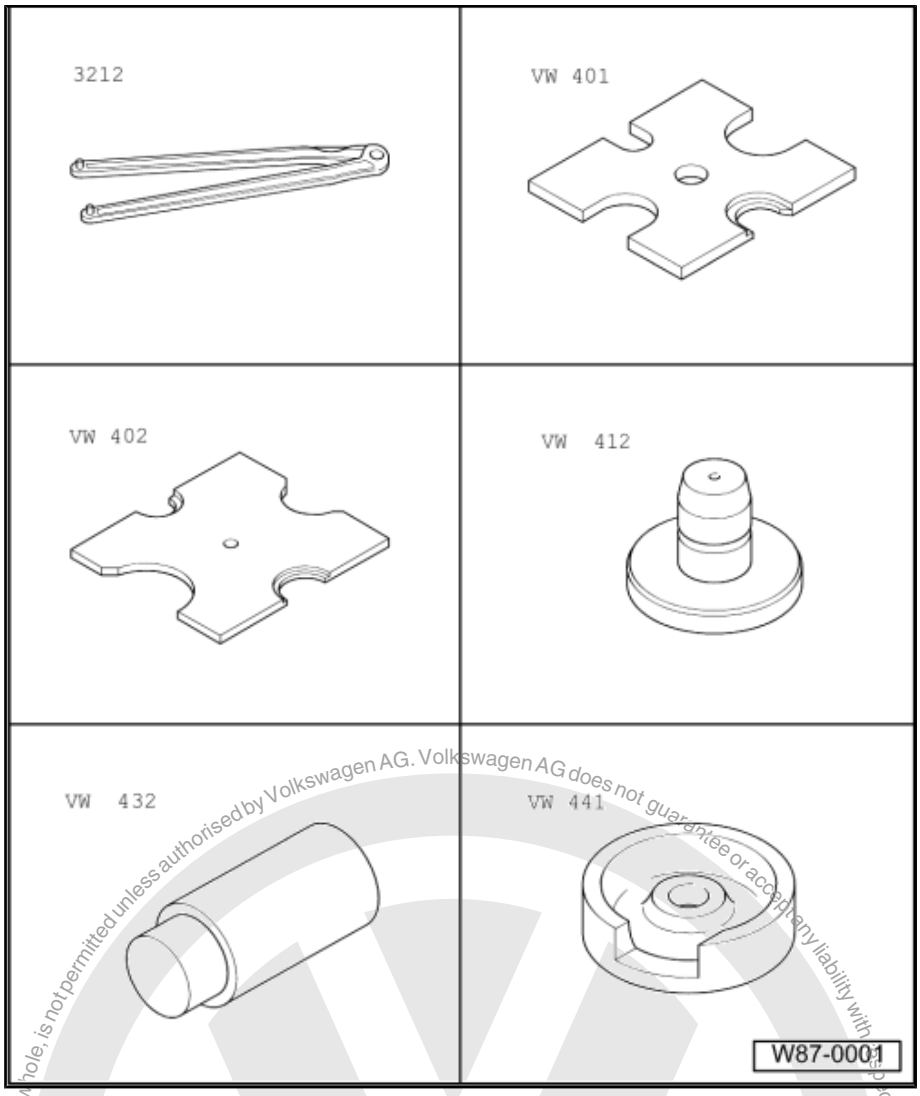
6 - Screw coupling

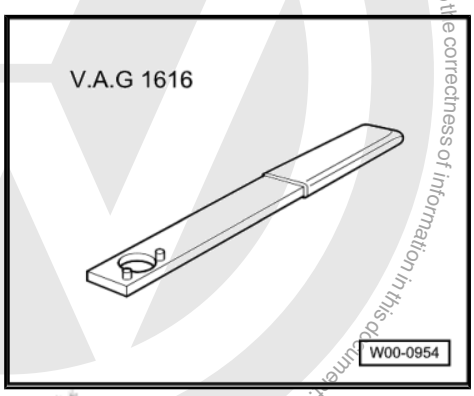
- ❑ Thread: 5/8 " - 18 UNF
- ❑ O ring: 7.9 mm; 1.8 mm
- ❑ Thread: 7/8 " - 14 UNF
- ❑ O ring: 14.3 mm; 1.8 mm
- ❑ Tightening torque: 15 Nm

2.5 A/C Clutch, Sanden, Assembly Overview

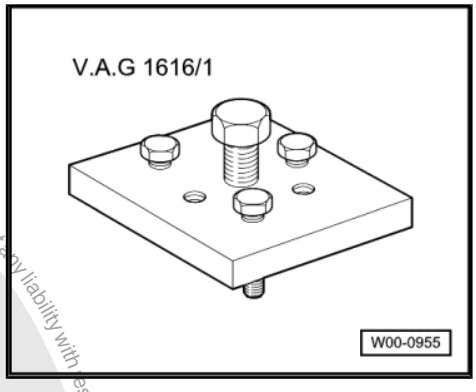
Special tools and workshop equipment required

- Pin wrench -3212-
- Thrust plate -VW401-
- Thrust plate -VW402-
- Thrust disc -VW412-
- Arbor (50 mm) -VW432-
- Base block -VW441-





- Retainer -VAG1616- (for clutch plate)
- Puller -VAG1616/1- (for A/C clutch)

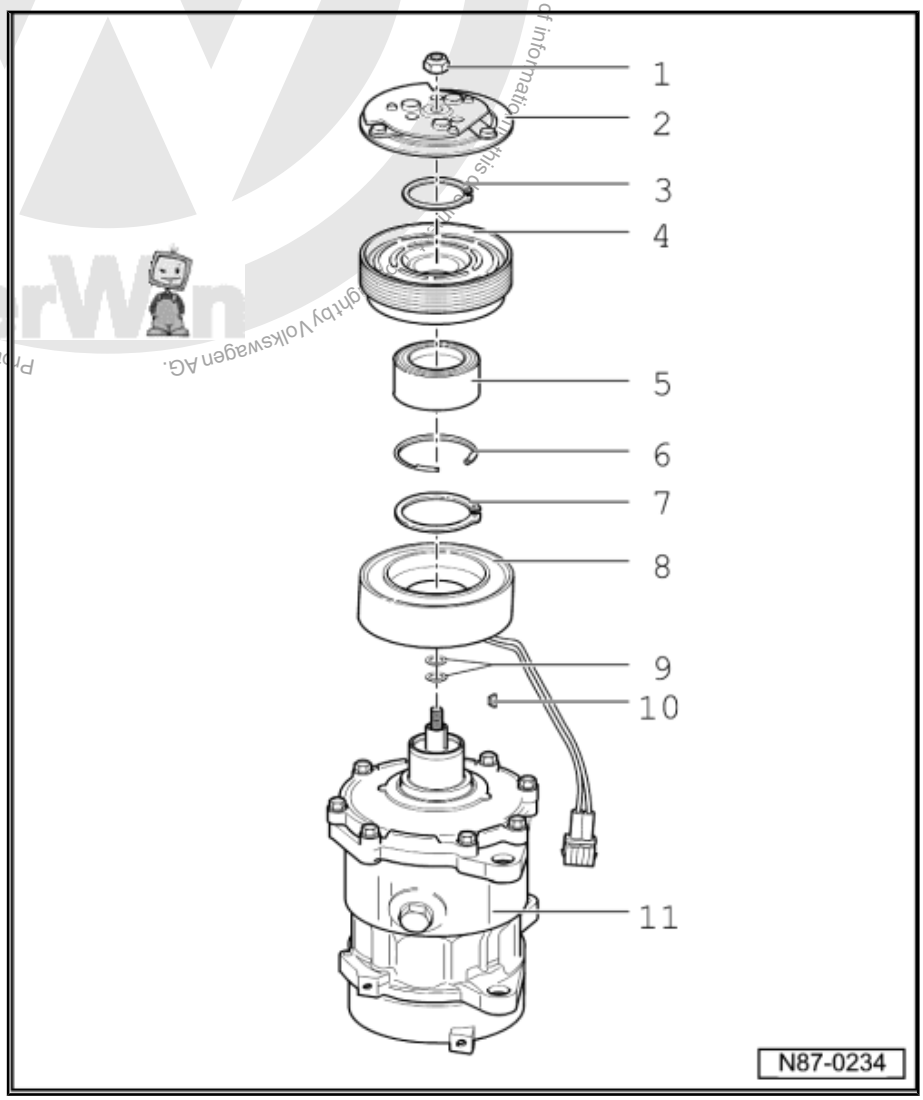


Not shown

- Two-arm puller with 100 mm span depth, such as Kukko 20-10 or equivalent (locally available)
- Depth gauge (locally available)

First do the following:

– Discharge A/C refrigerant system ⇒ page 62
– Disconnect electrical connection for A/C clutch -N25- .
– Remove compressor from bracket.



1 - Self-locking nut

- ❑ Tightening torque 20 Nm
- ❑ Always replace
- ❑ Removing ⇒ page 157

2 - Clutch plate

- ❑ Removing ⇒ page 157
- ❑ Checking/adjusting clearance ⇒ page 158

3 - Circlip

- ❑ Always replace
- ❑ Install correctly: Flat side faces compressor
- ❑ Ensure correct seating in groove

4 - Ribbed belt pulley

- ❑ Removing ⇒ page 157
- ❑ Installing ⇒ page 158

5 - Bearing

- ❑ Removing ⇒ page 157
- ❑ Installing ⇒ page 158

6 - Circlip

- ❑ Always replace
- ❑ Install correctly: Flat side faces compressor
- ❑ Ensure correct seating in groove

7 - Circlip

- ❑ Always replace
- ❑ Install correctly: Flat side faces compressor
- ❑ Ensure correct seating in groove

8 - Clutch coil

- ❑ Secured with fitted pin and circlip ⇒ Item 7 (page 115)

Note

A thermo-fuse is incorporated into the clutch coil. Current to the clutch coil is interrupted in the event of compressor overheating (E.g.: a binding compressor).

9 - Shims

- ❑ Provide clearance between clutch plate and pulley
- ❑ Checking/adjusting clearance ⇒ page 158

10 - Key

11 - Compressor

- ❑ SD7-V16 installed as running change from 01.95

2.6 Front Heating and A/C Unit, Assembly Overview

Caution

Before beginning repairs on the electrical system:

- ***Obtain the anti-theft radio security code.***
- ***Switch the ignition off.***
- ***Disconnect the battery Ground (GND) strap.***
- ***After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.***

Note

- *Illustrated assembly from Manual A/C system.*
- *Except where noted, the basic assembly of Manual A/C and Climatronic heating and A/C units are the same.*
- *Illustrated components that are underlined can only be removed after removal of complete heating and A/C unit.*

Note

- *Before proceeding with A/C refrigerant system servicing, always review safety measures ⇒ page 57 .*
- *Discharge and evacuate A/C refrigerant system with Kent More ACR4 or equivalent.*
- *All opened refrigerant system components must be sealed against moisture and dirt contamination by appropriate sealing caps.*

First do the following:

– Discharge A/C refrigerant system ⇒ page 62

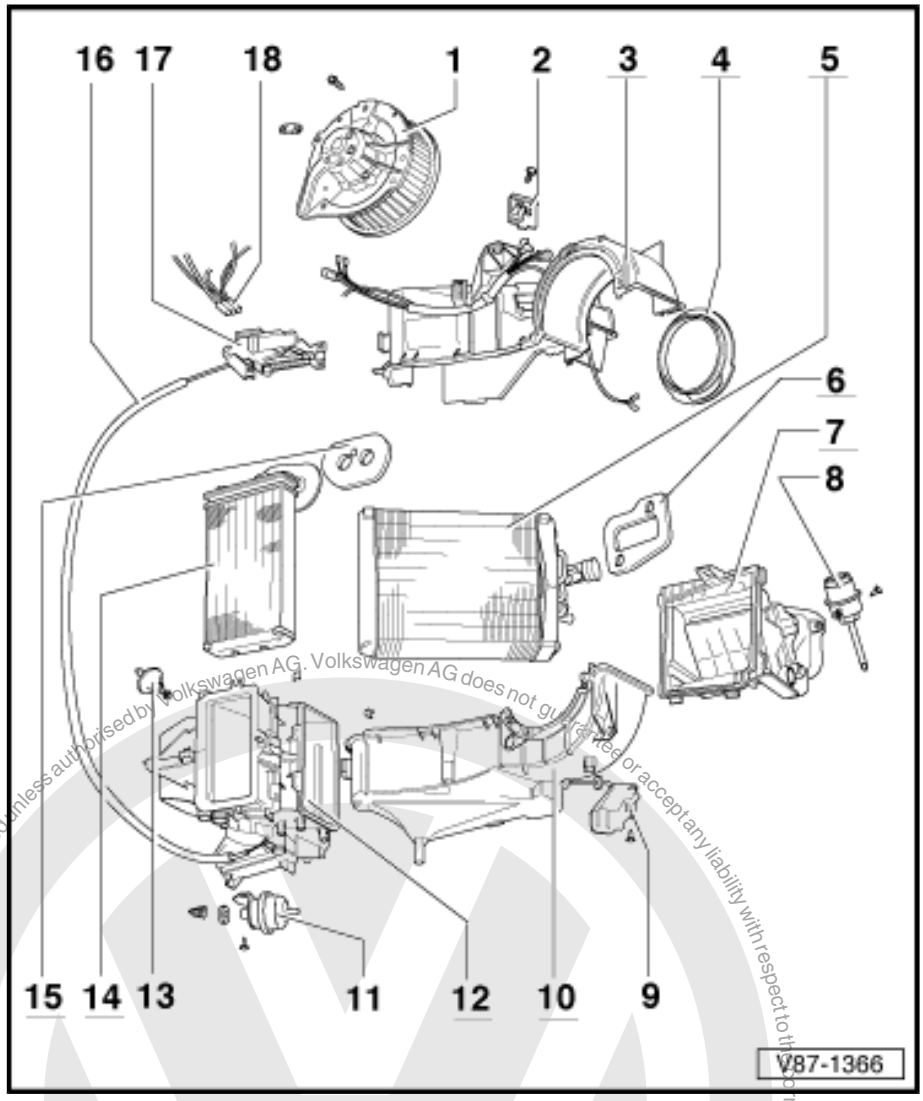
– Drain coolant from cooling system ⇒ Engine Mechanical; Rep. Gr. 19 ; Removal and Installation

Caution

Cooling system is pressurized when engine is warm. Before performing repairs, wear gloves, goggles and other appropriate protection while slowly and carefully releasing system pressure.

– Remove instrument panel ⇒ Body Interior; Rep. Gr. 70 ; Removal and Installation

– Remove heating and A/C unit



1 - Fresh Air Blower -V2-

- ❑ When assembling, lightly coat fitting surfaces with adhesive/sealant AMV 176 000 05 or equivalent

2 - Fresh Air Bower Series Resistance with Fuse -N24-

3 - Housing, upper part

- ❑ With fresh/recirculating air door
- ❑ When assembling, lightly coat fitting surfaces with adhesive/sealant AMV 176 000 05 or equivalent

4 - Intake trim

5 - Evaporator

- ❑ With guide for evaporator temperature sensor probe

6 - Gasket

7 - Frame

- ❑ With recirculating air door

8 - Fresh air/recirculating door vacuum unit

- ❑ Door in fresh air position when no vacuum is present
- ❑ Door in recirculated air position when vacuum is present

Climatronic:

- ❑ Removing ⇒ page 143
- ❑ Vacuum hose layout ⇒ page 103

Manual A/C:

- ❑ Removing ⇒ page 136
- ❑ Vacuum hose layout ⇒ page 75

9 - A/C Evaporator Temperature Switch -E33-

- ❑ Prevents evaporator icing
- ❑ Sensor tube depth: 330 mm (13 in)

- ❑ Switching temperatures: opens below -2° C

10 - Housing, lower part

- ❑ When assembling, lightly coat fitting surfaces with adhesive/sealant AMV 176 000 05 or equivalent

11 - Double vacuum unit

- ❑ Manual A/C only

12 - Air distribution housing

13 - Vacuum unit for footwell/defrost door

- ❑ Manual A/C only
- ❑ Vacuum hose layout ⇒ page 75

14 - Heater core

- ❑ Install seals around entire circumference of heater core
- ❑ Always change coolant after repairs

15 - Gasket

16 - Temperature door cable

- ❑ Manual A/C only

17 - Heating and A/C controls

- ❑ Manual A/C only

18 - Vacuum hose connection

- ❑ Manual A/C only
- ❑ Vacuum hose layout ⇒ page 75

2.7 Rear A/C Unit, Assembly Overview

Caution

Before beginning repairs on the electrical system:

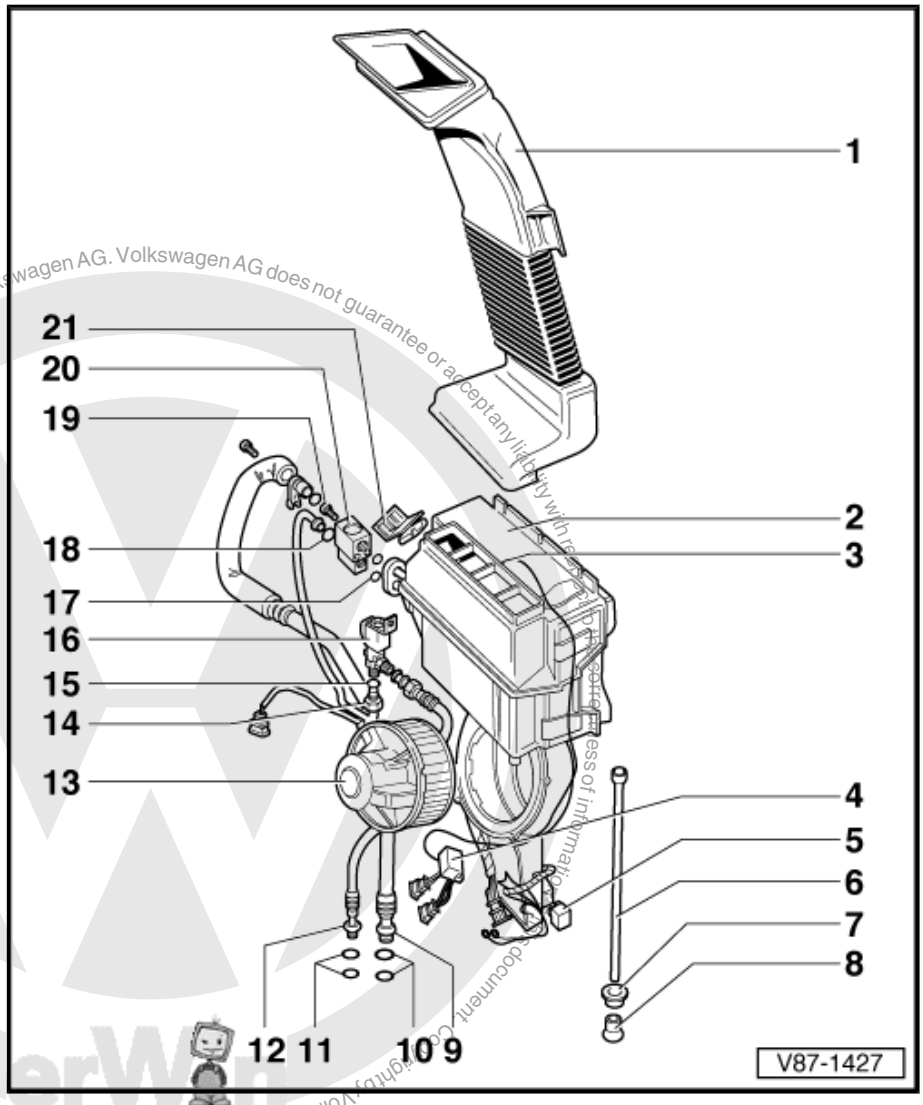
- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*

Note

- *Illustrated assembly from Manual A/C system.*
- *Except where noted, the basic assembly of Manual A/C and Climatronic heating and A/C units are the same.*

Note

- *Before proceeding with A/C refrigerant system servicing, always review safety measures ⇒ page 57 .*
- *Discharge and evacuate A/C refrigerant system with Kent More ACR4 or equivalent.*
- *All opened refrigerant system components must be sealed against moisture and dirt contamination by appropriate sealing caps.*



1 - Air duct

2 - Rear (2nd) evaporator

- ❑ Do not disassemble

3 - Rear evaporator temperature sensor

Climatronic:

- ❑ Uses Rear Evaporator Temperature Sensor -G153-

Manual A/C with rear evaporator (where applicable):

- ❑ Uses Temperature Sensor II -G18-

4 - A/C Programmer -J127-

- ❑ Manual A/C with rear evaporator only (where applicable):

5 - Rear blower fan relay

- ❑ Manual A/C with rear evaporator only (where applicable):

6 - Evaporator drain pipe

7 - Grommet

8 - Evaporator water drain valve

9 - Coupling

- – Separate coupling using release tool ⇒ page 152

10 - O-rings

- ❑ 13 mm; 1.9 mm
- ❑ Qty.: 2

11 - O-rings

- ❑ 10.8 mm; 1.8 mm
- ❑ Qty.: 2

12 - Coupling

- – Separate coupling using release tool ⇒ page 152

13 - Rear Evaporator Fan -V20-

- ❑ When assembling, lightly coat fitting surfaces with adhesive/sealant AMV 176 000 05 or equivalent

14 - Thread 5/8" - 18 UNF

15 - O-rings

- ❑ 7.9 mm; 1.8 mm
- ❑ Qty.: 2

16 - A/C Refrigerant Shut-off Valve -N43-

- ❑ Checking

17 - O-rings

- ❑ Qty.: 2
- ❑ 14 mm; 1.8 mm
- ❑ 10.8 mm; 1.8 mm

18 - O-rings

- ❑ Qty.: 2
- ❑ 7.9 mm; 1.8 mm
- ❑ 17.2 mm; 1.8 mm

19 - Socket head screw

- ❑ Tightening torque: 7 Nm

20 - Expansion valve

- ❑ Identical to front evaporator expansion valve

21 - Resistor with overheat fuse

- ❑ Manual A/C only

3 Specifications

⇒ “3.1 A/C Refrigerant System, Capacities”, page 121

3.1 A/C Refrigerant System, Capacities

Refrigerant R-134a

Compressor/ System	Quantity
Sanden SD7-V16 with one evap-orator	950 g + 50 g (33.5 oz + 1.8 oz)
Sanden SD7-V16 long wheel-base with one evap-orator	1000 g + 50 g (35 oz + 1.8 oz)
Sanden SD7-V16 with two evap-orators	1350 g + 50 g (47.6 oz + 1.8 oz)
Sanden SD7-V16 - through 07.97 long wheel-base with two evap-orators	1400 g + 50 g (49.5 oz + 1.8 oz)
Sanden SD7-V16 - from 07.97 long wheel-base with two evap-orators	1350 g + 50 g (46.5 oz + 1.8 oz)
Sanden SD7-V16 - from 01.99 with one evap-orator	1350 g + 50 g (46.5 oz + 1.8 oz)
Sanden SD7-V16 - from 04.00 with two evap-orators	1100 g + 50 g (38 oz + 1.8 oz)

Obtain R-134a refrigerant under one of the following names:

- R-134a
- Tetrafluoroethane
- CH2F CF3
- H-FKW 134a
- SUVA® TRANS A/C
- ARCTON® 134a

Note

R-134a refrigerant comes in different containers. Some used for commercial applications are sold in cylinders using a 1/4" flare fitting. This does not connect to vehicle fittings and servicing equipment. Use only R-134a which comes in containers having the correct type of service fitting.

Refrigerant Oil

Use only the correct type of refrigerant oil (PAG oil) specified for use with R-134a.

- For Compressor - Sanden SD7 V16

Model	Total system capacity
EuroVan and Transporter with one evaporator	135 cc (4.6 fl. oz.) *
EuroVan two evaporators	135 cc + 105cc = 240 cc (8.1 fl. oz.)**

* Replacement A/C compressors supplied by the Parts Department are filled with 135 cc (4.6 fl. oz) of refrigerant oil. This is the total A/C system refrigerant oil capacity for systems with one evaporator.

** Systems with two evaporators require an additional 105 cc (3.6 fl. oz.) be added to the system after compressor replacement.

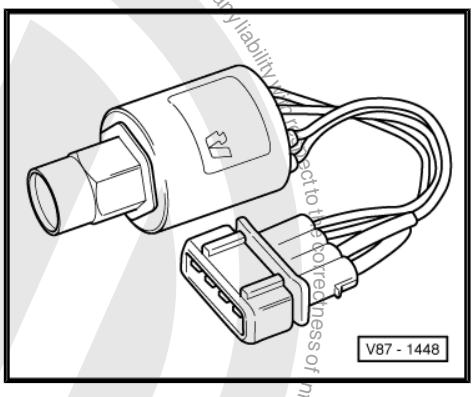
Refrigerant Oil, Distribution

Total refrigerant oil system capacity distribution:

- Compressor, approx. 50%
- Condenser, approx. 10%
- Suction pipe, approx. 10%
- Evaporator, approx. 20%
- Receiver drier, approx. 10%

4 Diagnosis and Testing

4.1 A/C Pressure Switch, Function and Checking



A/C Pressure Switch -F129- , function and checking

- Switch can be removed without discharging refrigerant circuit.
- Ensure O-ring 10.8 mm x 1.8 mm fits properly in groove.

Function

Pressure switch component between blue wires switches A/C clutch -N25- off when too little or excess refrigerant system pressure is present.

- Switch opens (compressor off) below 2 bar (29.4 psi) and closes (compressor on) above 3 bar (43.5 psi).
- Switch opens (compressor off) above 32 bar (464 psi) and closes (compressor on) below 24 bar (348 psi).

Switch, Checking

– Briefly bridge connections from terminal 1 and 2 with engine running.

• If A/C clutch -N25- switches on, refrigerant circuit is empty.

Pressure switch component between red/black wiring switches coolant fan -V7- to 2nd speed when refrigerant pressure rises.

- Switch closes (fan on) above 16 bar (232 psi) and opens again (fan off) below 12.5 bar (181.25 psi).

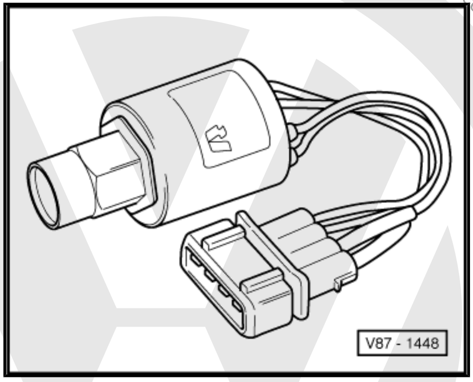
Evaluating Switch Operation

To assess if the A/C refrigerant system is working correctly, evaluate A/C pressure switch -F129- operation in conjunction with the following conditions:

– Confirm refrigerant system is fully charged. Insufficient refrigerant pressure (due to refrigerant leak, for example) will switch system off.

– Confirm coolant fan operation. A normal Increase in refrigerant system pressure (due to high ambient temperatures, for example) will result in coolant fan -V7- switching to the next (higher) speed.

– Confirm A/C system shut-off conditions. Excessive refrigerant system pressure (due to a blocked radiator or dirty condenser, for example) will switch system off.

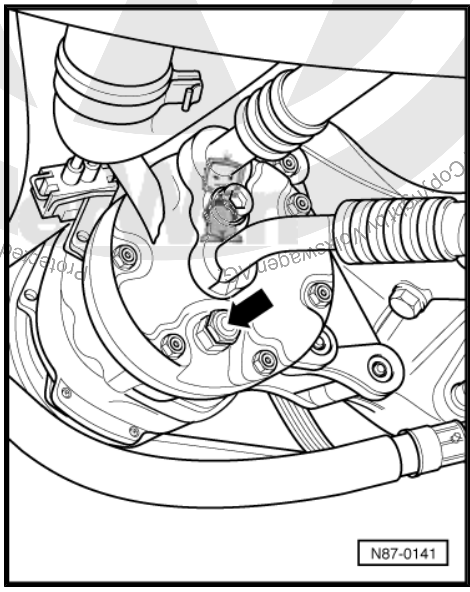


4.2 Pressure Relief Valve, Checking

Pressure relief valve, checking

♦ Function: Protects refrigerant circuit against over-pressure

♦ The pressure relief valve indicates if valve has opened to release pressure. An adhesive plate -arrow- is pushed out.



4.3 A/C Refrigerant System Pressures and Temperatures, Checking

The pressures and temperatures in the A/C system will vary depending on engine speed (RPM), coolant fan speed, engine coolant temperature, A/C clutch engagement, outside temperature, humidity, etc.

Pressure and temperature specifications are based on the following:

♦ Engine speed (RPM) at 1500

♦ Fresh air blower on high speed

♦ A/C switch adjusted to Max. cooling

1 - Evaporator

2 - Low-pressure service valve

3 - Compressor, low pressure side

4 - Compressor, high pressure side

5 - Condenser

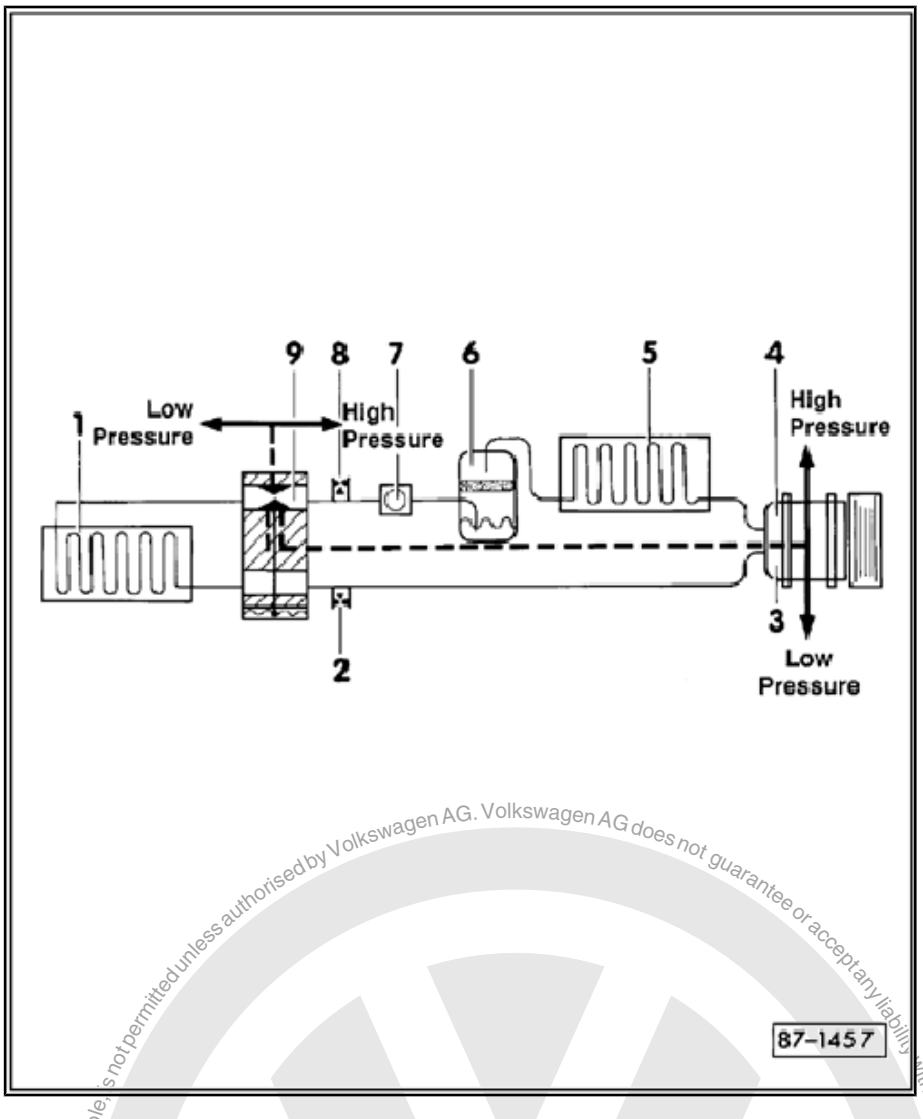
6 - Receiver drier

7 - Sight glass

❑ Not applicable to all vehicles

8 - High-pressure service valve

9 - Expansion valve



Pressure and temperature specifications (⇒ page 124 , and ⇒ Item 9 (page 125) for component identification).

Component	Refrigerant state	Approximate pressure (b
1 - Evaporator, inlet to outlet	Vapor	1.2 bar (17.4 psi) 33) 1.8 bar (26.1 psi) 35)
2, 3 - Compressor, low-pressure side	Gas	1.2 bar (17.4 psi) 1.8 bar (26.1 psi) 35)
4 - Compressor, high-pressure side	Gas	14 bar (203 psi)
5 - Condenser	Gas Vapor Liquid	14 bar (203 psi)
6 - Receiver drier	Liquid	14 bar (203 psi)
7 - Sight glass (if equipped)	Liquid	14 bar (203 psi)
8 - Service valve, high-pressure	Liquid	14 bar (203 psi)
Continued		

Component	Refrigerant state	Approximate pressure (bar/psi)
9 - Expansion valve	Liquid, turns to vapor	inlet: 14 bar (203 psi)
		outlet: 1.2 bar(17.4 psi)

33) This pressure is maintained in the refrigerant system by the variable displacement compressor despite changing conditions and varying engine speeds (RPM).

34) This temperature is maintained in the refrigerant system by the variable displacement compressor despite changing conditions and varying engine speeds (RPM).

35) Test values for vehicles equipped with second (rear) evaporator.

4.4 A/C Refrigerant System, Testing with Pressure Gauges

Due to the constant temperature/pressure relationship of R-12 and R-134a, approximate high-side system temperature can be determined based on system pressure.

Pressure gauges may have one or more temperature scales in addition to the pressure scale. Since various refrigerants have different temperature/pressure relationships, each gauge is specific for a particular refrigerant.

Pressure and Temperature in a Switched-On Refrigerant System, Measuring

Use the A/C refrigerant high-pressure gauge to measure high pressure between the compressor and restrictor (including condenser) with the A/C switched on.

Use the A/C refrigerant low-pressure gauge to measure low pressure between the expansion valve and the compressor inlet (including evaporator) with the A/C switched on.

The temperature displays of the low- and high-pressure gauges apply only to a portion of the low- and high-pressure sides. The low-pressure gauge displays approximate temperature between the expansion valve and evaporator outlet. The high-pressure gauge displays approximate temperature between the compressor outlet and restrictor.

Note

The temperature/pressure relationship only holds true when the refrigerant system contains liquid and vapor, but not when it contains only gas. In the gaseous state, the temperature is approx. 10-30°C (18-54°F) higher than indicated on the pressure gauge.

Pressure and Temperature in a Closed Container or Switched-Off Refrigerant System, Measuring

Due to the constant temperature/pressure relationship of R-12 and R-134a, approximate temperature in a closed container or in a switchedoff A/C system can be determined based on its pressure.

If the temperature displayed on a gauge is lower than the actual temperature of the refrigerant, the refrigerant container or system is empty (discharged).

Note

The temperature/pressure relationship only holds true when the refrigerant system contains liquid and vapor, but not when it contains only gas. In the gaseous state, the temperature is approx. 10-30°C (18-54°F) higher than indicated on the pressure gauge.

4.5 A/C Refrigerant System, Troubleshooting

Requirements

- Electrical systems OK
- Vacuum hoses and control systems OK
- Air flow distribution systems OK

Correct and repair as necessary before proceeding.

If any one of the following system conditions exists, check A/C refrigerant system pressures ⇒ page 127 .

- A/C does not cool (cooling has stopped completely)
- Insufficient cooling during all driving speeds or engine speeds (RPM)
- No cooling or insufficient cooling after driving several miles

A/C Compressor Noisy

– Tighten A/C compressor and compressor bracket mounting bolts using torque wrench.

– Check routing of A/C refrigerant hoses and lines; hoses and lines must not contact other components and must be installed without tension or kinks, reposition or realign as necessary.

A/C Compressor Noisy - System Overcharged

Discharge A/C refrigerant system ⇒ page 62 , then evacuate and recharge ⇒ page 65 .

Water Sprays from Instrument Panel Vents

– Check evaporator drain pipe for proper routing (should not be kinked or pinched).

– Check evaporator water drain valve.

- Must not be plugged with wax, dirt or undercoating (clean if necessary)
- Valve door must open/close properly

– Check plenum tray.

- Must be properly installed and not damaged

4.6 A/C Refrigerant System Pressures, Checking

Check A/C refrigerant system pressures using these three tests:

1 - Air temperature drop from center instrument panel outlet (A/C system cooling performance)

2 - A/C system high pressure

3 - A/C system low pressure

Combined results of these tests determines A/C system component malfunction ⇒ page 129 .

Test Conditions

- A/C refrigerant system fully charged; discharge, evacuate and recharge system if necessary
- Condenser and radiator clean and free of obstructions (spray clean if necessary)
- Air distribution can be adjusted correctly using control knobs (all air distribution doors reach end positions)
- Wiring OK per wiring diagram
- Outside (ambient) air temperature between 20-30°C (68-86° F)
- Drive belts for A/C compressor and Generator in good condition and properly tensioned

⇒ “4.6.1 Test 1: Air Temperature Drop from Center Instrument Panel Outlet, Checking”, page 128

⇒ “4.6.2 Test 2: A/C System High Pressure, Checking”, page 128

⇒ “4.6.3 Test 3: A/C System Low Pressure, Checking”, page 129

4.6.1 Test 1: Air Temperature Drop from Center Instrument Panel Outlet, Checking

– Start engine.

– Set temperature control to maximum “cold” (if Manual A/C) or “LO” (if Climatronic).

– Manual A/C: press “A/C” button and select second blower speed.

– Climatronic: Select minimum blower speed (manual override) by pressing “decrease blower speed” button (observe front “blower speed” display in control head) .

– Adjust air distribution to instrument panel outlets.

– Insert thermometer into center instrument panel outlet and raise engine speed to approximately 1500 RPM.

Specified result

With humidity normal and outside (ambient) temperature between 20-25°C (68-77°F), system is cooling satisfactorily if air temperature from center instrument panel vent drops below 10°C (50°F) within 1 minute.

For higher ambient temperatures and/or higher humidity, specified air temperature from center instrument panel vent can be slightly higher.

If specified reading is not obtained, perform tests 2 and 3, then compare results of all three tests table, ⇒ page 129 .

4.6.2 Test 2: A/C System High Pressure, Checking

– Connect high- and low-pressure hoses of refrigerant recovery/ recycling/recharging unit Kent-Moore ACR4 or equivalent, to high- and lowpressure service valves.

– Disconnect electrical connector from coolant fan.

– Start engine.

– Set temperature control to maximum “hot” (if Manual A/C) or “HI” (if Climatronic).
– Manual A/C: press “A/C” button and select highest blower speed.
– Adjust air distribution to footwell outlets.
– Raise engine speed to approximately 1500 RPM.

Specified result

System high pressure is normal if high-pressure gauge reads 232 psi (16 bar) within 30 seconds.

If specified reading is not obtained, also perform test 3 and compare results of all three tests table, ⇒ page 129 .

4.6.3 Test 3: A/C System Low Pressure, Checking

– Connect high- and low-pressure hoses of refrigerant recovery/recycling/recharging unit Kent-Moore ACR4, or equivalent, to high- and lowpressure service valves.
– Start engine.
– Set temperature control to maximum “cold” (if Manual A/C) or “LO” (if Climatronic).
– Manual A/C: press “A/C” button and select first blower speed.
– Climatronic: Reduce blower speed to lowest setting (manual override) by pressing “decrease blower speed” button (observe front “blower speed” display in control head).
– Adjust air distribution to instrument panel outlets.
– Raise engine speed to 1500 RPM.

Specified result

System low pressure is normal if low-pressure gauge reads 22-36 psi (1.5-2.5 bar) within 30 seconds.

If specified reading is not obtained, compare results of all three tests table, ⇒ page 129 .

Test 1 Temperature from center air vent[36)]	Test 2 High pressure [37)]	Test 3 Low pressure [37)]	Possible causes of incorrect readings	Corrective measures
Normal	Normal	Normal	None	---
Too high	Normal	Normal	Temperature door position incorrect	Adjust temperature door cable
Too high	Too low	Normal	Compressor	Replace compressor
Normal	Too low	Normal	Compressor	Replace compressor
Normal	Normal	Too high or too low	Expansion valve or compressor	Replace expansion valve or compressor
Too high	Normal	Too high or too low	Expansion valve or compressor	Replace expansion valve or compressor
Normal	Too high or too low	Too high or too low	Expansion valve or compressor	Replace expansion valve or compressor

Test 1 Temperature from center air vent[36]	Test 2 High pressure [37]	Test 3 Low pressure [37]	Possible causes of incorrect readings	Corrective measures

36) Normal air outlet temperature approx. 43°F (6°C).

37) For normal system temperatures and pressures ⇒ page 125 .

4.7 A/C System Cooling Performance, Checking

Note

A/C evaporator temperature switch -E33- (if equipped) switches A/C compressor OFF only in special instances so evaporator does not ice up; variable displacement A/C compressor maintains temperature of 0°C (32°F) in evaporator.

Test Conditions

- A/C refrigerant system fully charged
- A/C clutch -N25- and compressor function OK
- Condenser and radiator clean and free of obstructions
- Air distribution can be adjusted properly
- Wiring OK as per wiring diagram
- Outside (ambient) temperature 20°C-30°C (68°F-86°F)

Checking

– Start engine.

– Set temperature control to maximum “cold” (if Manual A/C) or “LO” (if Climatronic).

– Manual A/C: press A/C button and select second blower speed.

– Climatronic: Select minimum blower speed (manual override) by pressing “decrease blower speed” button (observe front “blower speed” display in control head) .

– Adjust air distribution to instrument panel outlets.

– Insert thermometer into center instrument panel outlet.

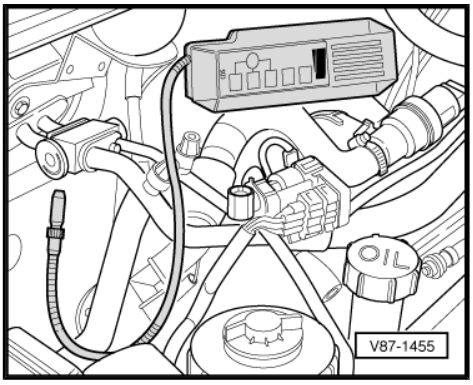
– Raise engine speed to approximately 1500 RPM.

Specified Result

With normal humidity and outside (ambient) temperature between 20°-25°C (68°-77°F), system is sufficiently charged if air temperature from center instrument panel vent drops below 10°C (50°F) within one minute.

For higher ambient temperatures and/or higher humidity, specified air temperature from center instrument panel vent can be slightly higher.

4.8 A/C Refrigerant System, Checking for Leaks



Use halogen leak detector, Hitec HI400A-TEL or equivalent, to check for refrigerant leaks, following the leak detector manufacturer's instructions.

Refrigerant gas dissipates very quickly. To make the job easier, avoid drafty or windy areas when checking for leaks.

If the refrigerant system is discharged (empty), re-charge the system with approx. 100 g (3.5 oz) of refrigerant in order to check for leaks.

4.9 Climatronic Digital Climate Control, Troubleshooting

Note

- *The Climatronic is equipped with On Board Diagnostic (OBD) capabilities. Always check DTC memory with Scan Tool - VAG1551- (ST) function 02 and rectify all indicated malfunctions ⇒ page 6 .*
- *In addition, carry out "Output Diagnostic Test Mode (DTM)" ⇒ page 15 and "Read Measuring Value Block" function 08 ⇒ page 19 .*
- *The following information applies only when the customer's symptom description has been verified and no DTCs are stored in memory.*
- *Before replacing components, always test the relevant positive and Ground connections as well as all harness connectors and wiring between the component indicated to be malfunction and the Climatronic control module. Refer to the wiring diagram.*
- *After performing repairs, DTC memory should always be checked again and if necessary, erased with Scan Tool - VAG1551- .*
- *Climatronic, servicing ⇒ page 76*
- *Refrigerant system, servicing ⇒ page 108*
- *Wiring diagrams ⇒ Wiring diagrams, Troubleshooting & Component locations*

4.9.1 Fresh Air Mode Cannot be Switched Off, No Recirculating Air Function

Test requirements:

- Fuse No. -S140- , -S6- and -S16- OK
- Check DTC memory with Scan Tool -VAG1551- (ST), no DTCs recognized.
- Engine running
- Vacuum being built-up

Test sequence:

- Select “recirculating air mode” at A/C control head -E87- (“recirculating air flow” indicated on A/C control head display)
- Check components and specified functions listed below.

Function check	Correc
Fresh air intake blocked	– Check wiring and connections to vacu
Fresh/recirculating air door vacuum unit has pulled-in	– Check vacuum hoses ⇒ page 103

4.9.2 Air Flow to Center Vents Cannot be Adjusted

Test requirements:

- Fuse No. -S140- , -S6- and -S16- OK
- Check DTC memory with Scan Tool -VAG1551- (ST), no DTCs recognized.
- Engine running
- Vacuum being built-up

Test sequence:

- Adjust air flow to instrument panel outlets (air flow direction indicated on A/C control head display)
- Check components and specified functions listed below.

Function check	Correc
Air flow to center vents	– Check wiring and connections to vacu
Double vacuum unit has pulled-in	– Check vacuum hoses ⇒ page 103

4.9.3 Insufficient or No Heating

Test requirements:

- Fuse No. -S140- , -S6- and -S16- OK

- Check DTC memory with Scan Tool -VAG1551- (ST), no DTCs recognized.
- Engine running and at operating temperature.
- Vacuum being built-up

Test sequence:

- Select “maximum temperature” mode at A/C control head - E87- (air flow direction indicated on A/C control head display)
- Check components and specified functions listed below.

Function check	
Coolant pipes to heater core are warm	– If not warm, check thermostat ⇒ Testing
Coolant shut-off valve open (vacuum unit has pulled in)	– Check wiring and connections ⇒ Wiring diagrams, Troublesho – Check vacuum connections at ⇒ page 103 – Check coolant shut-off valve ⇒ – Check vacuum hoses ⇒ page
No warm air from vents	– Check and adjust temperature

4.9.4 Insufficient Cooling

Test requirements:

- Fuse No. -S140- , -S6- and -S16- OK
- Check DTC memory with Scan Tool -VAG1551- (ST); no DTCs recognized
- Climatronic control module coding correct: must be 00001 (model with dust and pollen filter)
- Vacuum system and hoses OK, air distribution can be adjusted properly
- Wiring OK as per wiring diagram
- A/C refrigerant system fully charged
- A/C clutch and compressor function OK
- Condensor and evaporator clean
- Outside air temperature 20°C to 30°C (68°F to 86°F)

Test sequence:

- Start engine
- Set temperature control to “LO” (maximum cooling) on A/C control head
- Select minimum blower speed (manual override) on A/C control head
- Adjust air distribution to instrument panel outlets
- Insert thermometer into center instrument panel outlet
- Raise engine speed to approximately 1500 rpm
- System is OK if outlet temperature drops below 10°C (50°F) within one minute
- If not OK, check A/C refrigerant system ⇒ page 108

Note

If drops of water spray out of center vents, check evaporator water drain valve (behind bulkhead insulation) in engine compartment.

4.9.5 Fresh Air Fan Does Not Run After Starting Engine or “ZU HZ” Appears in Outside Temperature Display

Test requirements:

- Fuse No. -S6- OK
- Check DTC memory with Scan Tool -VAG1551- (ST), no DTCs recognized.

Possible cause:

- Open circuit in wiring X circuit) to Climatronic control module -J255- .

Remedy:

- Check wiring and connections from fuse/relay panel X circuit) to terminal T28a/1 at Climatronic control module -J255- .

4.9.6 Manually Selected Functions Do Not Remain Stored in Memory

Function:

- Any manual selections of fan speed and air distribution (“AUTO” display off) remain stored in memory for approximately one hour. Fully automatic function resumes after the ignition is switched on again after one hour. Temperature settings input during the previous automatic function are then resumed along with automatic air distribution determined by Climatronic control module -J255- .

Test requirements:

- Fuse No. -S6- OK
- Check DTC memory with Scan Tool -VAG1551- (ST), no DTCs recognized.

Possible cause:

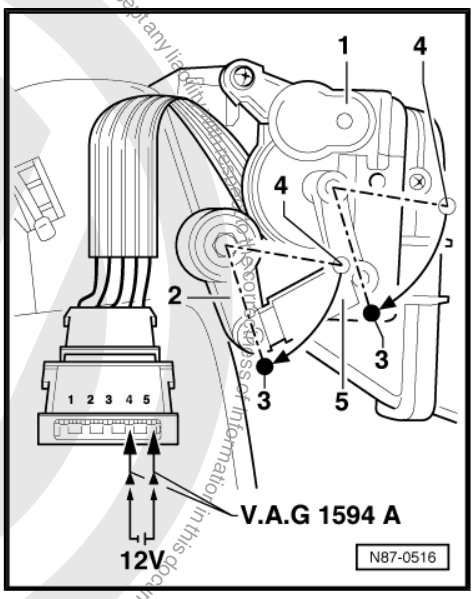
- Open circuit in wiring (30 circuit) to Climatronic control module -J255- .

Remedy:

- Check wiring and connections from fuse/relay panel (30 circuit) to terminal T28a/1 at Climatronic control module -J255- .

4.10 Temperature Regulator Door Motor End Position, Checking and Adjusting

- Remove footwell vent console and footwell trim ⇒ page 137
- Disconnect 5-pin connector T5 for -V68- at heater/evaporator housing ⇒ page 92 .
- Connect appropriate cables from adapter kit -VAG1594- or -VAG1594A- to terminals 4 and 5.
- Connect to 12 V supply. Direction of door motor rotation can be changed by reversing polarity of voltage supply.
- Operate temperature door -2- with door motor -1- from fresh air end position -3- to heater end position -4-.
- Check if temperature door lever -2- reaches stop at end position. If necessary, adjust length of connecting rod -5- with temperature door -2- on stop.

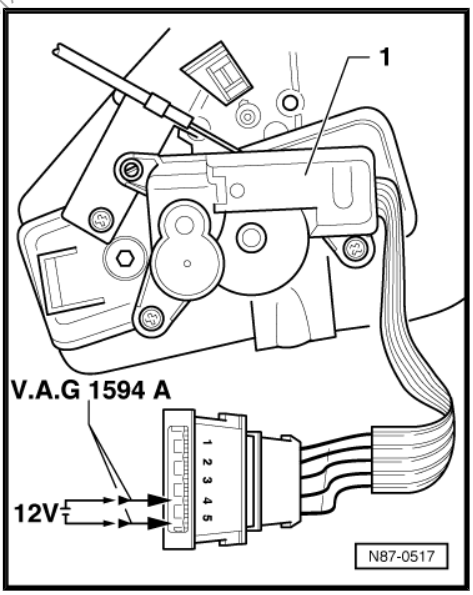


Checking:

By reversing polarity of 12V supply, door motor must move fully to both end positions.

4.11 Footwell/Defroster Door Motor End Position, Checking and Adjusting

- Remove footwell vent console and footwell trim ⇒ page 137
- Disconnect 5 pin connector T5a for -V85- at heater/evaporator housing ⇒ page 92 .
- Connect appropriate cables from adapter kit -VAG1594- or -VAG1594A- to terminals 4 and 5.
- Connect to 12 V supply. Direction of door motor rotation can be changed by reversing polarity of voltage supply.
- Operate door motor -1- from one end position to the other.
- Check if footwell/defrost door lever reaches stop at end position. If necessary, adjust cable.



Checking:

By reversing polarity of 12V supply, positioning motor must move fully to both end positions.

5 Removal and Installation

5.1 Manual A/C

5.1.1 Fresh Air/Recirculating Door Vacuum Unit

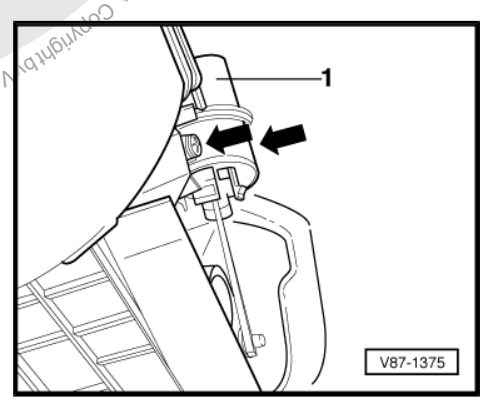
Fresh air/recirculating door vacuum unit, removing and installing

Removing:

– Remove glove box, knee padding or passenger side airbag ⇒ Body Interior; Rep. Gr. 69 ; Removal and Installation

– Remove screws -arrows-.

– Twist and lift vacuum unit -1- from lever.



Installing:

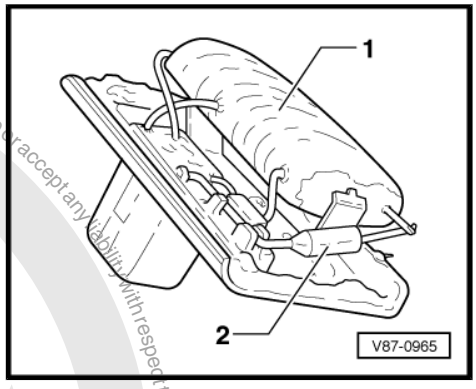
Install in reverse order.

5.1.2 Fresh Air Blower Series Resistance with Fuse

Fresh Air Blower Series Resistance with Fuse -N24- , removing and installing

Caution

Before working on the electrical system, obtain radio security code and disconnect battery Ground (GND) strap.



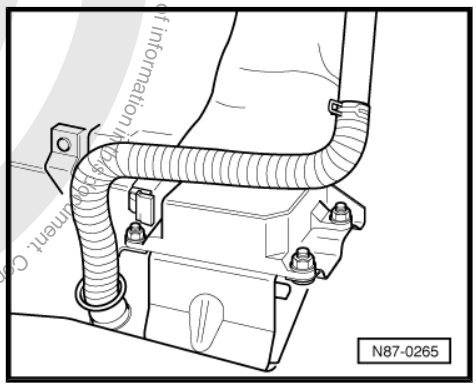
– Remove glove box, knee padding or passenger side airbag ⇒ Body Interior; Rep. Gr. 69 ; Removal and Installation

1 - Series resistance

2 - Fuse

5.1.3 Evaporator Drain Pipe

Evaporator drain pipe



Note

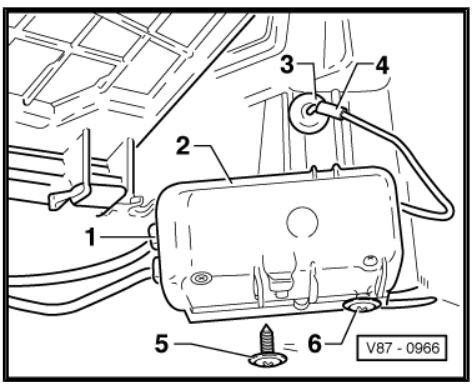
- *Water drain hose must be pushed into distributor box onto stop.*
- *Water may leak into passenger compartment if hose is not located on the drain valve as shown.*
- *Drain valve must not be blocked.*

– Remove footwell vent console ⇒ page 137 .

Install hose so that drain valve grommet seals tightly around hose.

5.1.4 Evaporator Temperature Switch

Evaporator Temperature Switch -E33- , removing and installing



1 - Connector

2 - Temperature switch with housing

3 - Grommet

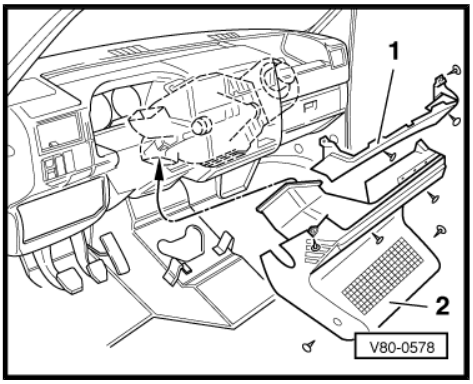
4 - Sensor tube with insertion depth marking at 330mm (13 in)

5 - Screw for evaporator housing cover

6 - Screw

5.1.5 Footwell Vent Console

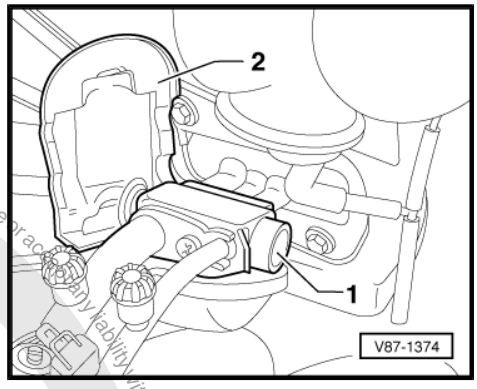
Removing footwell vent console



– Remove trim -1-.

– Remove footwell vent console -2-.

5.1.6 Expansion Valve



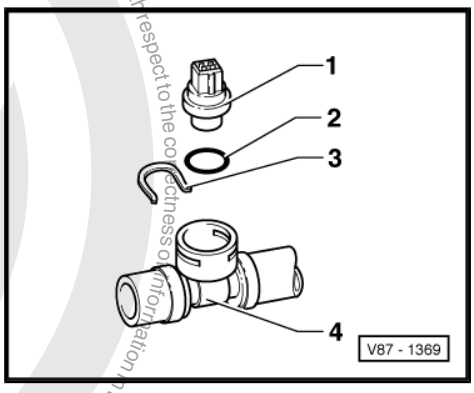
Expansion valve insulation

1 - Expansion valve

2 - Insulator

♦ The insulator protects the expansion valve against high engine compartment temperatures to prevent a decrease in A/C system cooling performance.

5.1.7 A/C Cut-Out Thermal Switch and Third Speed Coolant Fan Control Thermal Switch



A/C Cut-out Thermal switch -F163- and Third Speed Coolant Fan Control (FC) Thermal Switch -F165- , removing and installing

WARNING

Cooling system is pressurized when engine is warm. Before performing repairs, wear gloves, goggles and other appropriate protection while slowly and carefully releasing system pressure.

♦ Refill with coolant after replacing switch.

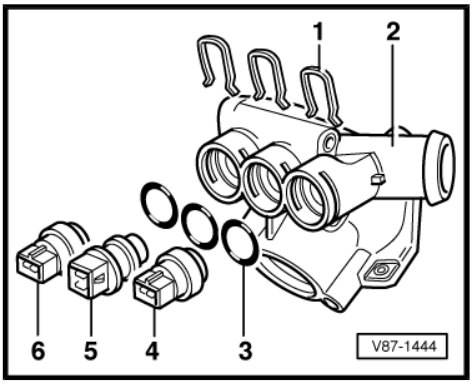
1 - Thermal switch -F163- / -F165-

2 - O ring

3 - Clip

4 - Coolant hose

5.1.8 A/C Cut-Out Thermal Switch and Third Speed Coolant Fan Control Thermal Switch, AES and AXK Engine



A/C Cut-out Thermal Switch -F163- and Third Speed Coolant Fan Control (FC) Thermal Switch -F165- on AES and AXK engine, removing and installing

WARNING

Cooling system is pressurized when engine is warm. Before performing repairs, wear gloves, goggles and other appropriate protection while slowly and carefully releasing system pressure.

♦ Refill with coolant after replacing switch.

1 - Clip

2 - Coolant housing

3 - O ring

4 - Thermal switch -F163- / -F165-

5 - Switches -F163- / -F165-

6 - Sender -G62-

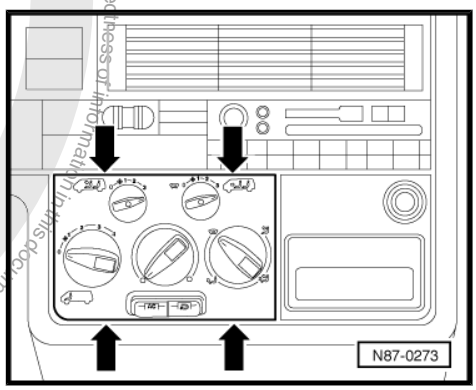
5.1.9 Heating and A/C Controls through 09.98

Removing:

– Carefully remove trim panel locating lugs -arrows- with a screwdriver. Take care not to damage instrument panel.

– Remove ashtray/trim panel.

– Remove footwell vent console ⇒ page 137 .

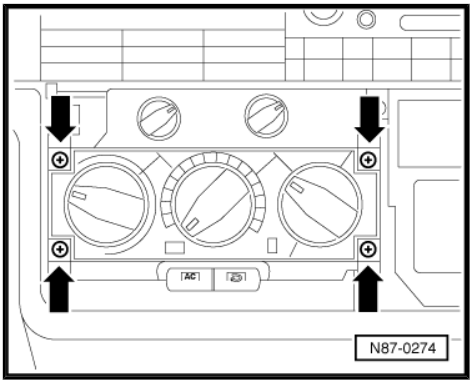


– Remove screws from instrument trim panel -arrows-.

– Push controls with cables attached below the instrument panel.

– Disconnect electrical connectors.

– Detach cables from controls.



Installing:

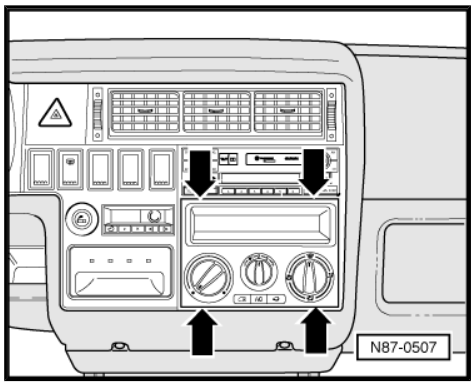
Install in reverse sequence, noting the following:

– Before installing controls, attach cables first. ⇒ page 140 , Cables, installing and adjusting ⇒ page 141 , Temperature door cable, installing and adjusting

5.1.10 Heating and A/C Controls from 09.98

Removing:

– Carefully remove trim panel locating lugs -arrows- with a screwdriver. Take care not to damage instrument panel.

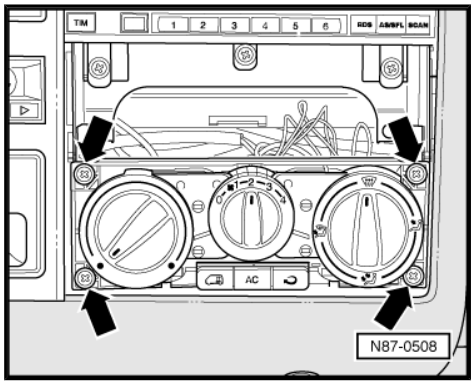


– Remove screws from instrument trim panel -arrows-.

– Push controls with cables attached below the instrument panel.

– Disconnect electrical connectors.

– Detach cables from controls.



Installing:

Install in reverse sequence, noting the following:

– Before installing controls, attach cables first. ⇒ page 140 , Cables, installing and adjusting ⇒ page 141 , Temperature door cable, installing and adjusting

5.1.11 Heating and A/C Cables

Note

- *Attach cables first before installing controls.*
- *Place outer cable against stops on controls and secure.*

Installing

1 - Central door cable

(Identification, though 09.98: yellow/green)

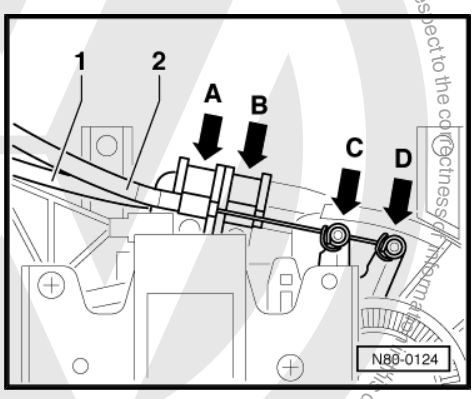
(Identification, from 09.98: blue/yellow)

– Turn air distribution rotary knob fully to left stop.

– Connect central door cable -arrow D-.

– Secure cable to controls with clip -arrow B-.

– Central door cable, adjusting ⇒ page 141

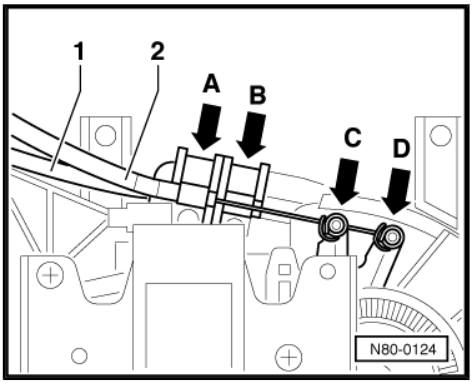


2 - Footwell/defroster door cable

(Identification, through 09.98: yellow/blue)

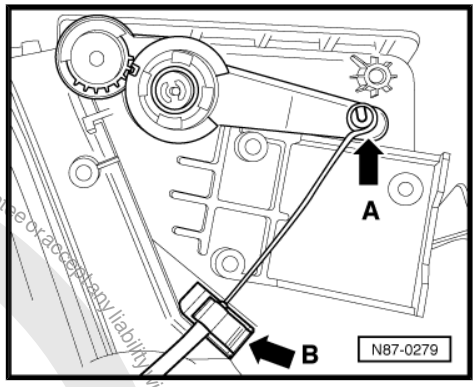
(Identification, from 09.98: blue/green)

– Turn air distribution rotary knob fully to left stop.
– Connect footwell and defrost door cable -arrow C-.
– Secure cable to control with clip -arrow A-.
– Adjust footwell/defroster door cable ⇒ page 141



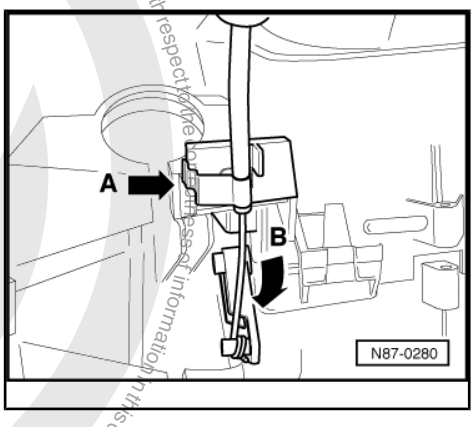
Central door cable, adjusting

– Secure cable to central door -arrow B- while simultaneously pressing lever -arrow A- in direction of arrow.



Footwell/defroster door cable, adjusting

– Secure cable to footwell door -arrow A- while simultaneously pressing lever -arrow B- in direction of arrow.



5.1.12 Temperature Door Cable

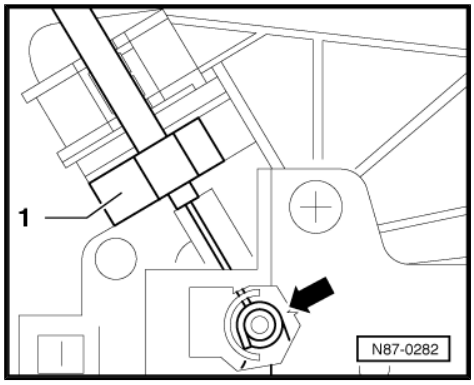
Identification, through 09.98: red/blue

Identification, from 09.98: blue/white

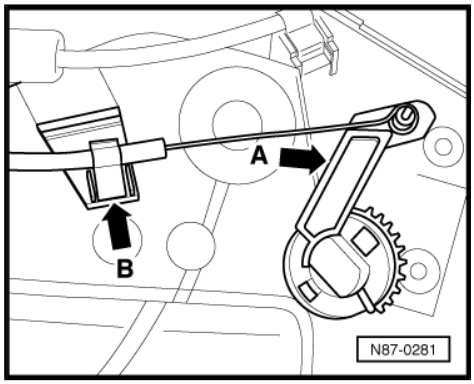
Note

The temperature door must audibly make contact when turning the rotary knob fully from stop to stop.

– Turn temperature control rotary knob fully to left stop.
– Connect temperature door cable -arrow-.
– Secure cable with clip to controls -1-.



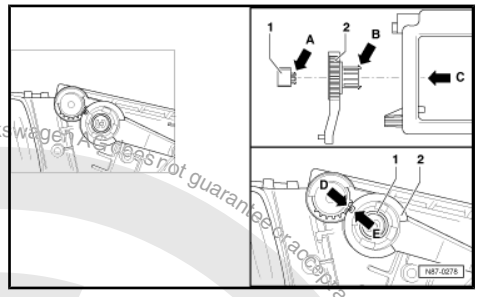
– Press temperature door lever -arrow A- onto stop.
– Secure cable to control with clip -arrow B-.



5.1.13 Central Door Lever

Removing

– Carefully depress tabs -arrow A- from cap -1- with screwdriver at housing -arrow C-.
– Carefully depress tabs -arrow B- at housing -C-.
– Remove central door lever -2-.



Installing

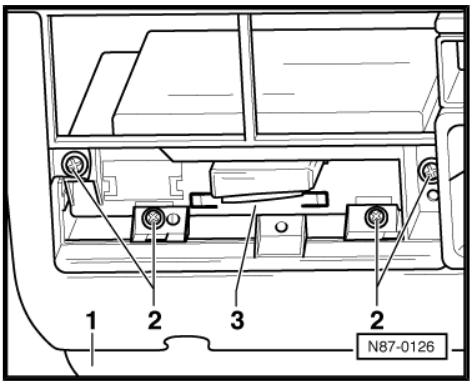
Install in reverse order ensuring correct lever alignment (-arrows-, -D- and -E-)

5.2 Climatronic Digital Climate Control

5.2.1 Climatronic Control Module, through 09.98

Climatronic Control Module -J255- , removing through 09.98

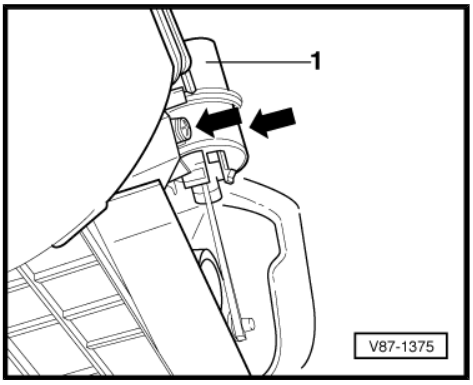
– Remove lower trim -1-.
– Remove screws -2-.
– Disconnect electrical connector and remove unit -3- downwards.



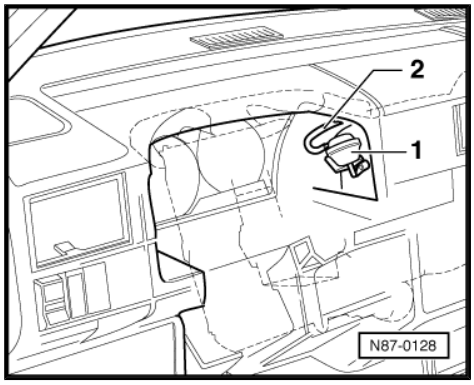
5.2.2 Fresh Air/Recirculating Door Vacuum Unit

Fresh air/recirculating door vacuum unit, removing and installing

– Remove right air outlet ⇒ page 46 .
– Remove glove box, knee padding or passenger side airbag unit ⇒ Body Interior; Rep. Gr. 69 ; Removal and Installation
– Remove screws -arrows-.
– Twist and lift vacuum unit -1- from lever.
– Install in reverse order



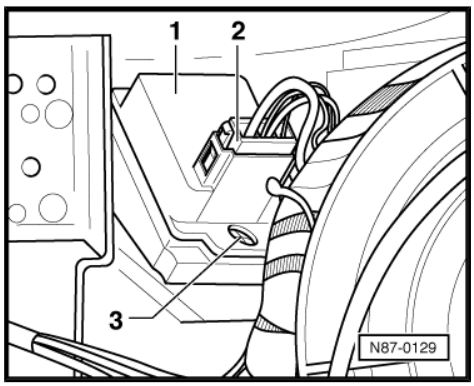
5.2.3 Center Vent Door Vacuum Unit



Center vent door vacuum unit, removing and installing

– Remove Instrument panel insert trim.
– Remove center vent ⇒ page 47 .
– Pull vacuum hose -2- from vacuum unit.
– Twist and lift vacuum unit -1- from lever.
– Install in reverse order.

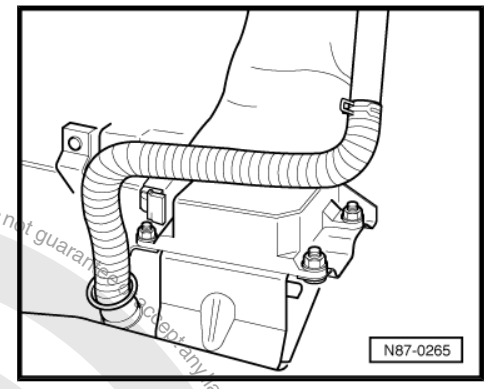
5.2.4 Fresh Air Blower Control Module



Control Module for Fresh Air Blower -J126- , replacing

– Remove glove box, knee padding or passenger side airbag unit ⇒ Body Interior; Rep. Gr. 69 ; Removal and Installation
– Disconnect electrical connector -2- and remove screw -3-.
– Seal area between resistor -1- and air duct with AMV 176 000 05 (or equivalent) before fitting.

5.2.5 Evaporator Drain Pipe



Evaporator drain pipe, installing

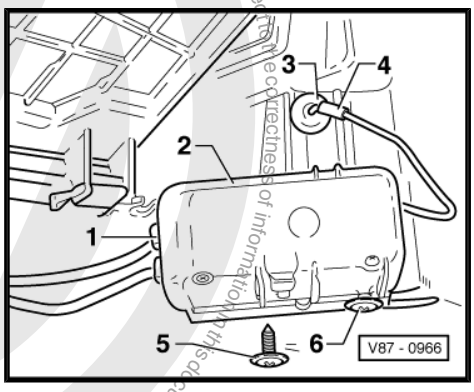
Note

- *Water drain pipe must be pushed into heater/evaporator housing onto stop.*
- *Water may leak into passenger compartment if hose is not located on the drain valve as shown.*
- *Drain valve must not be blocked.*

– Remove footwell vent console ⇒ page 137

Install hose so that drain valve grommet seals tightly around hose.

5.2.6 Evaporator Temperature Switch



Evaporator Temperature Switch -E33- , replacing

1 - Connector
2 - Temperature switch with housing
3 - Grommet
4 - Sensor pipe with insertion depth marking at 330mm (13in)
5 - Screw for evaporator housing cover
6 - Screw

5.2.7 Central Air Door Motor

Central Air Door Motor -V70- , removing and installing

1 - Central air door motor

2 - Intermediate gear

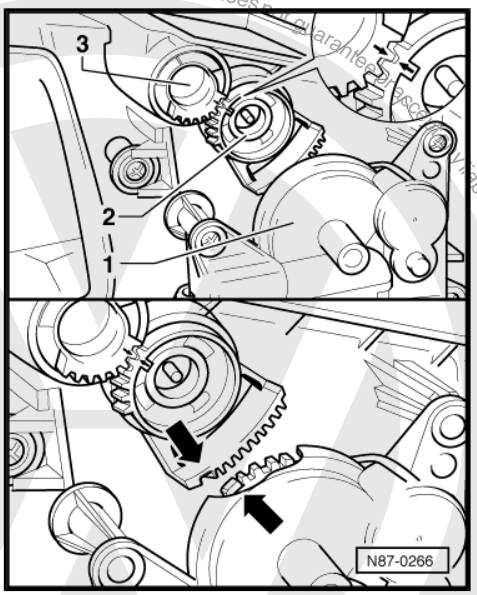
3 - Central door bearing

Removing

– Remove footwell vent console ⇒ page 137 .

– Remove central door motor -V70- from heater/evaporator housing.

– Disconnect 5-pin connector T5b (for door motor) at heater/ evaporator housing ⇒ page 92 .



Installing

Install in reverse order, noting the following:

– Turn central door lever until the recess aligns with lug on door motor -arrows-

5.2.8 Vacuum Valve Rail

Vacuum Valve Rail -N53- , removing and installing

1 - Vacuum valve rail

2 - Vacuum hose, green

3 - Vacuum hose, yellow

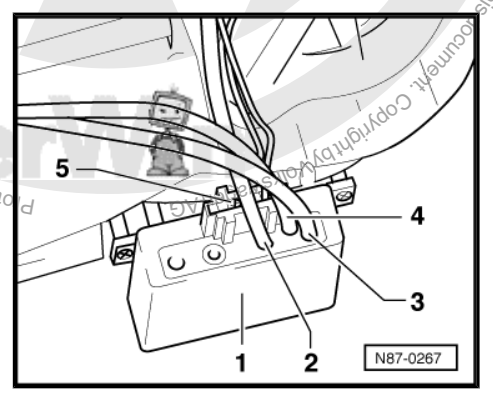
4 - Vacuum hose, black

5 - Connector

– Remove lower trim on passenger side

– Pull off vacuum hoses and electrical connections.

– Remove mounting screws.



Installing

Install in reverse order, noting the following:

– Vacuum hoses connected correctly (according to color coding)

5.2.9 A/C Control Head with Climatronic Control Module, from 09.98

Caution

Before beginning repairs on the electrical system:

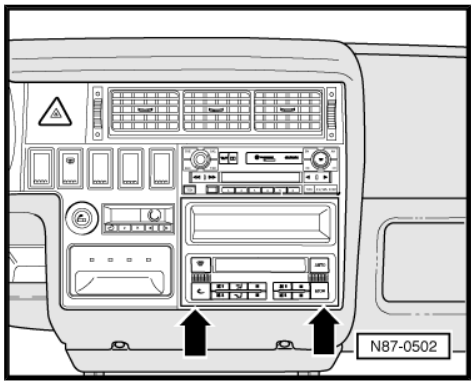
- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect battery Ground (GND) strap*
- *After reconnecting battery, recode and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual*

A/C Control Head -E87- , Climatronic Control Module -J255- , Instrument Panel Interior Temperature Sensor -G56- with Interior

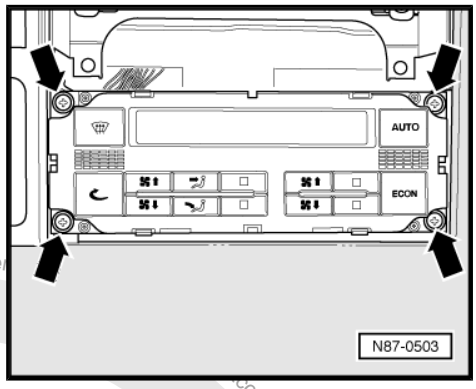
Temperature Sensor Fan -V42- are integrated into a non serviceable unit.

Removing

– Remove storage tray and carefully pry out control head trim at -arrows- with a screwdriver.



– Remove screws - arrows-.
– Pull out control head from instrument panel.
– Disconnect electrical connections.



Installing

– Installation is in reverse order of removal.
– After installation, code control head according to market and equipment variations ⇒ page 19 .

5.2.10 Air Distribution Housing

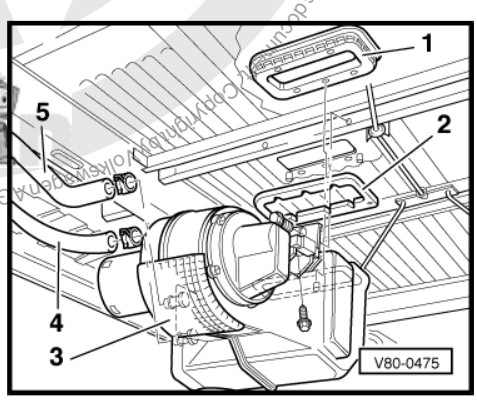
WARNING

Cooling system is pressurized when engine is warm. Before performing repairs, wear gloves, goggles and other appropriate protection while slowly and carefully releasing system pressure.

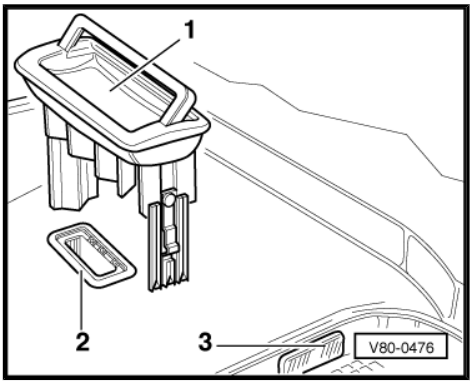
– Disconnect electrical connectors.
– Clamp coolant hoses as close as possible to heater core.
– Loosen hose clamps and remove coolant hoses. Plug heater core outlet/inlet.
– Remove vent ⇒ page 52 .
– Remove cover plate.
– Remove bolts.

Air Distribution Housing, Removing

1 - Cover plate, in passenger compartment
2 - Gasket
3 - Rear heater air distribution housing
4 - Coolant supply hose
5 - Coolant return hose

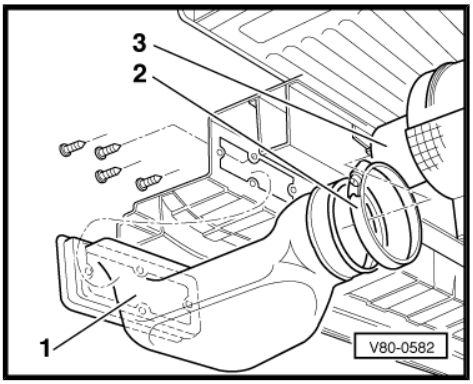


5.2.11 Vent



Vent, Removing

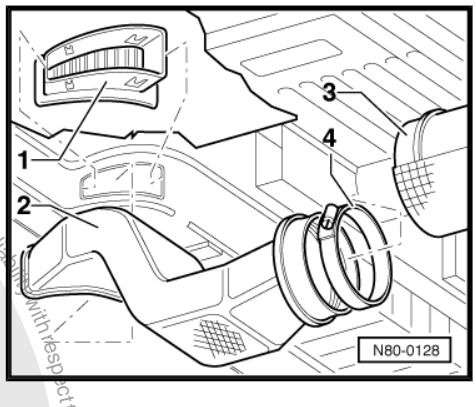
1 - Vent
2 - Cover plate
3 - Sliding door footwell insert
– Pull vent out of floor plate.
– Remove cover plate



Air intake duct (Kombi), removing

1 - Air Intake duct
2 - Hose clamp
3 - Rear heater air distribution housing

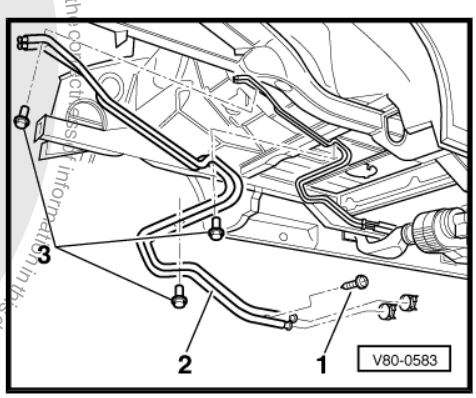
5.2.12 Air Intake Duct



Air Intake Duct, Removing

1 - Intake trim
2 - Intake duct
3 - Rear heater core
4 - Hose clamp
– Remove footwell insert.
– Remove bolts.
– Loosen hose clamp.

5.2.13 Coolant Pipe



Coolant Pipe, Removing

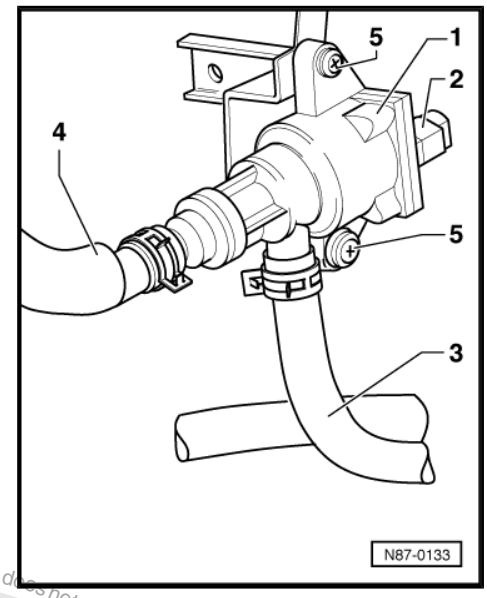
1 - Self-tapping screw
2 - Coolant pipe
3 - Hexagon nut
– Carefully remove intake trim -1- with screwdriver.
– Loosen hose clamp.
– Remove intake duct.

5.2.14 Auxiliary Heater Valve, Rear Heater

WARNING

Cooling system is pressurized when engine is warm. Before performing repairs, wear gloves, goggles and other appropriate protection while slowly and carefully releasing system pressure.

Auxiliary Heater Valve N172, Rear Heater, Removing



1 - Auxiliary heater valve -N172-

2 - Electrical connector

3 - Coolant return hose,

(from rear heater core coolant pipe to valve)

4 - Coolant return hose

(from valve to engine)

5 - Securing screw

– Remove fuel tank ⇒ Engine Mechanical; Rep. Gr. 20 ; Removal and Installation

– Remove torsion bar ⇒ Suspension, Wheels, Steering from MY 1997; Rep. Gr. 40 ; Removal and Installation

– Remove screws -3- and -1-.

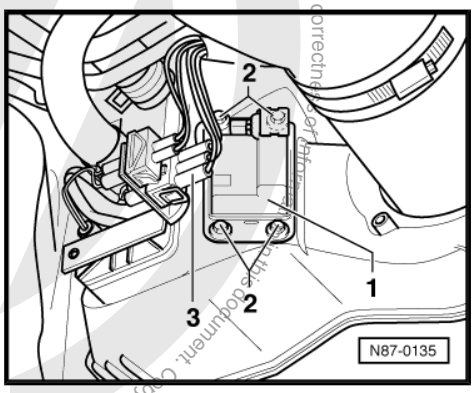
– Remove coolant pipe -2-..

5.2.15 Control Module for Warm Air Blower, Rear

WARNING

Cooling system is pressurized when engine is warm. Before performing repairs, wear gloves, goggles and other appropriate protection while slowly and carefully releasing system pressure.

Control Module for Warm Air Blower J350, Rear, Replacing



1 - Control module for warm air blower -J350-

2 - Bolts (Qty. 4)

3 - Connector

– Disconnect electrical connector -2- from valve.

– Clamp coolant hoses as close as possible to valve.

– Loosen spring type hose clamps and pull coolant hoses off.

– Unbolt valve from bracket and remove.

Note

Fill coolant after installation of valve.

5.2.16 Rear A/C Control Head, from 09.98

Caution

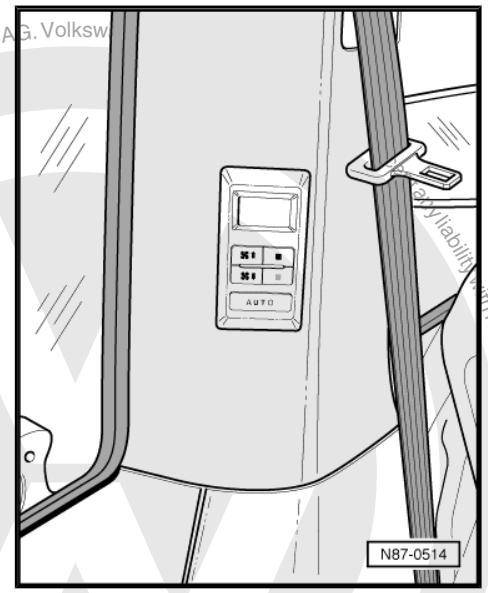
Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect battery Ground (GND) strap*
- *After reconnecting battery, recode and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual*

Removing

– Carefully pry out control head trim from bottom with a screwdriver.

– Disconnect electrical connections.

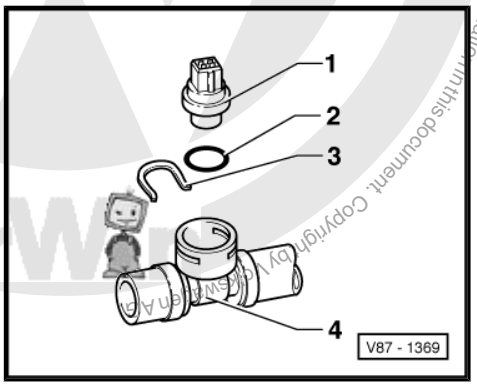


5.2.17 A/C Cut-Out Thermal Switch and Third Speed Coolant Fan Control Thermal Switch

A/C Cut-out Thermal Switch -F163- and Third Speed Coolant Fan Control (FC) Thermal Switch -F165- , removing and installing

WARNING

Cooling system is pressurized when engine is warm. Before performing repairs, wear gloves, goggles and other appropriate protection while slowly and carefully releasing system pressure.



- Refill with coolant after replacing switch.

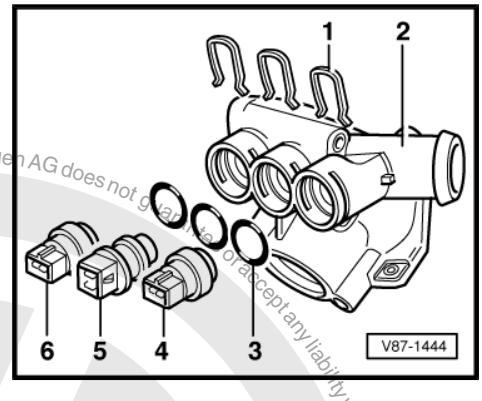
1 - Thermo switch -F163- / -F165-

2 - O ring

3 - Clip

4 - Coolant hose

5.2.18 A/C Cut-Out Thermal Switch and Third Speed Coolant Fan Control Thermal Switch, Engine Code AES and AXK



A/C cut-out thermal switch -F163- and Third Speed Coolant Fan Control (FC) Thermal Switch -F165- engine code AES and AXK, removing and installing

WARNING

Cooling system is pressurized when engine is warm. Before performing repairs, wear gloves, goggles and other appropriate protection while slowly and carefully releasing system pressure.

- Refill with coolant after replacing switch.

1 - Clip

2 - Thermostat housing

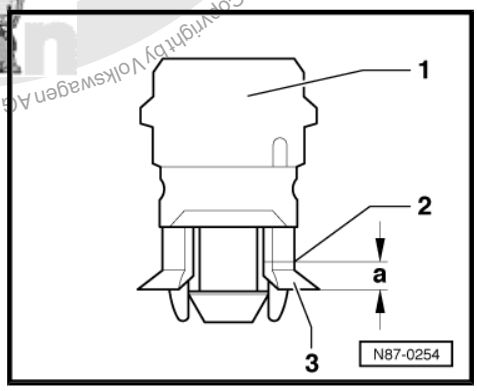
3 - O ring

4 - A/C cut-out thermal switch -F163- and third speed coolant fan control (FC) thermal switch -F165-

5 - Engine coolant temperature (ECT) sensor -G2- and after-run coolant fan control (FC) -F87- .

6 - Engine coolant temperature (ECT) sensor -G62-

5.2.19 Outside Air Temperature Sensor



Note

Prior to installing new sensors, the locating tabs must be shortened to ensure proper seating.

1 - Outside air temperature sensor -G17-

2 - Area to be cut

3 - Locating tabs (3x)

– Mark cutting area, dimension -a- = 3.5 mm (0.13 in)) on all three locating tabs.

– Carefully cut off locating lugs with knife.

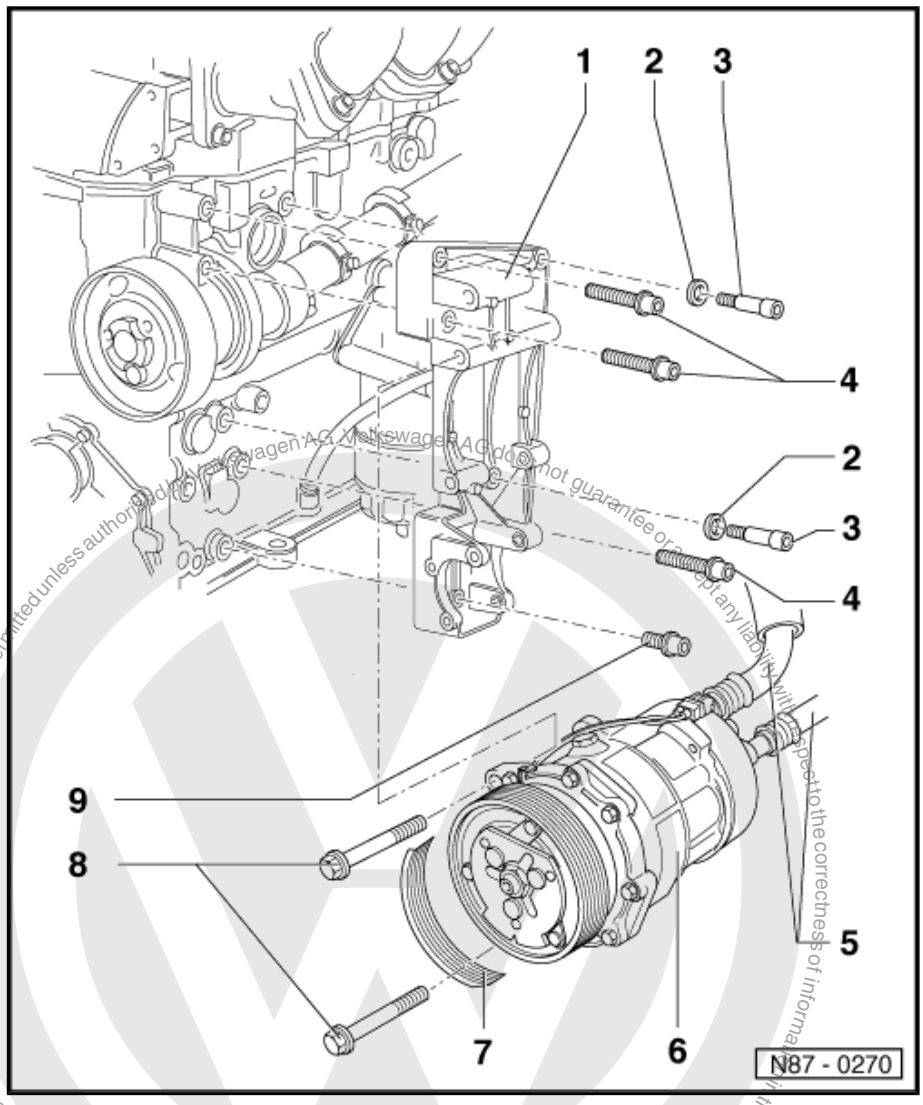
5.3 Compressor Bracket, 2.8L Engine

Required:

- Torque wrench 5 - 50 Nm (44 in lb - 40 ft lb)

Note

Compressor bracket and related parts can be removed and installed without discharging A/C refrigerant system.



1 - Generator (GEN), compressor and power steering pump bracket

- ❑ Removing:
- – Remove Generator (GEN)
- – Remove compressor
- – Remove power steering pump ⇒ Suspension, Wheels, Steering from MY 1997; Rep. Gr. 48 ; Removal and Installation
- ❑ Installing:
- – First install guide bolts ⇒ Item 3 (page 151)

2 - Washer

- ❑ 8.4 x 16 x 1.6

3 - Guide bolt (2x)

- ❑ M8 x 60
- ❑ 25 Nm (18 ft lb)

4 - Socket head bolt

- ❑ M8 x 60
- ❑ 25 Nm (18 ft lb)

5 - Refrigerant hoses

6 - Compressor

- ❑ Removing:
- – Loosen bolts ⇒ Item 8 (page 151) , knock-back clamping sleeves on compressor, then remove bolts completely.

7 - Ribbed drive belt

- ❑ Removal and installing ⇒ Engine Mechanical; Rep. Gr. 13 ; Removal and Installation

8 - Hex bolt

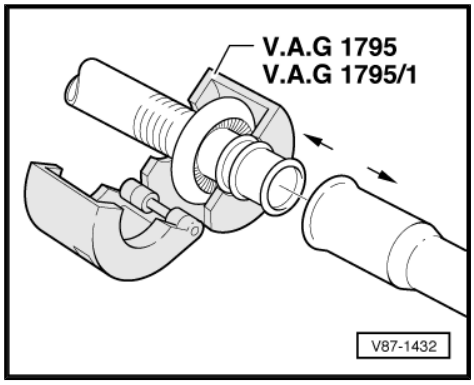
- ❑ M10 x 112
- ❑ 45 Nm (33 ft lb)

9 - Socket head combination bolt

- ❑ M8 x 25
- ❑ 25 Nm (18 ft lb)

5.4 Coupling

Coupling



Note

Coupling flanges are held together by spring pressure. Use appropriate release tool (based on pipe size) to separate coupling.

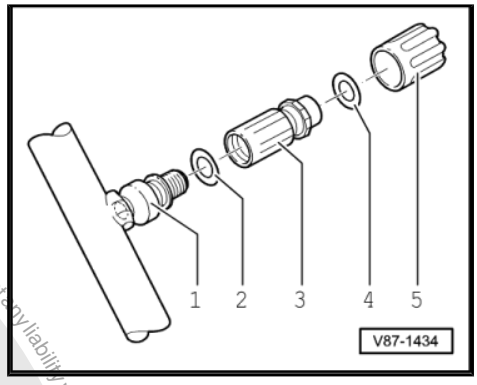
– Tension release tool around coupling flanges and pull apart -arrows-.

5.5 Low Pressure Service Valve

Low pressure service valve, removing

– Discharge refrigerant system ⇒ page 62 .

– Unscrew and remove low pressure service valve -3-.



Note

All opened refrigerant system components must be sealed against moisture and dirt contamination by appropriate sealing caps.

1 - Connection with external thread and groove for O-ring

2 - O-ring, 7.6 mm; 1.8 mm

3 - Low pressure service valve

4 - O-ring, 7.6 mm; 1.8 mm

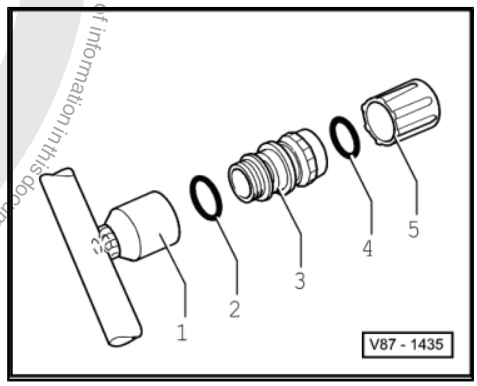
5 - Cap

5.6 High Pressure Service Valve

High pressure service valve, removing

– Discharge refrigerant system ⇒ page 62 .

– Unscrew and remove high pressure service valve -3-.



Note

All opened refrigerant system components must be sealed against moisture and dirt contamination by appropriate sealing caps.

1 - Connection with internal thread

2 - O-ring, 10.8 mm; 1.8 mm

3 - High pressure service valve, with groove for O-ring and internal thread for cap

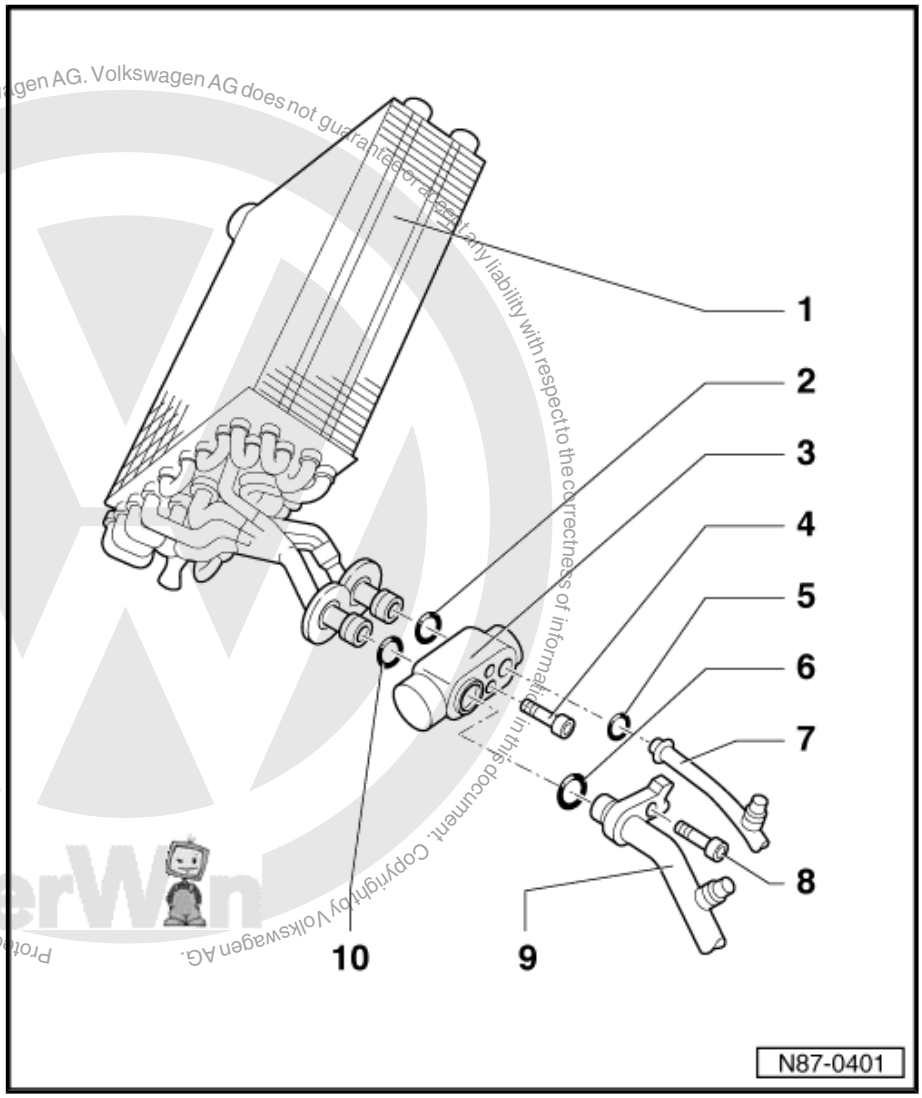
4 - O-ring, 10.8 mm; 1.8 mm

5 - Cap

5.7 Expansion Valve

Note

- *Before proceeding with A/C refrigerant system servicing, always review safety measures ⇒ page 57 .*
- *Discharge and evacuate A/C refrigerant system with Kent More ACR4 or equivalent.*
- *All opened refrigerant system components must be sealed against moisture and dirt contamination by appropriate sealing caps.*
- *R134a system identification via O-ring color is no longer valid. Black and colored rings are used.*



1 - Evaporator (front)

- ❑ In front heating and A/C unit
- ❑ Removing ⇒ page 116

2 - O-ring

- ❑ 10.8 mm; 1.8 mm

3 - Expansion valve

- ❑ Removing
- – Discharge A/C refrigerant system ⇒ page 62
- – Remove bolt ⇒ Item 8 (page 153)
- ❑ Replace O-rings ⇒ Item 5 (page 153) and ⇒ Item 6 (page 153) .
- – Remove bolt ⇒ Item 4 (page 153) .
- – Remove expansion valve.
- ❑ Replace O-rings ⇒ Item 2 (page 153) and ⇒ Item 10 (page 153) .
- ❑ When reinstalling, opening at bulkhead must be sealed to prevent water ingress

4 - Socket head bolt

- ❑ Tightening torque 7 Nm

5 - O-ring

- ❑ 7.6 mm; 1.8 mm

6 - O-ring

- ❑ 17.2 mm; 1.8 mm

7 - Refrigerant pipe

- ❑ From receiver drier to expansion valve

8 - Socket head bolt

- ❑ Tightening torque 7 Nm

9 - Refrigerant pipe

- ❑ From expansion valve to compressor

10 - O-ring

- ❑ 14 mm; 1.8 mm

5.8 Condenser with Separate Receiver Drier

Caution

Before beginning repairs on the electrical system:

- ***Obtain the anti-theft radio security code.***
- ***Switch the ignition off.***
- ***Disconnect the battery Ground (GND) strap.***
- ***After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.***

Note

- *Before proceeding with A/C refrigerant system servicing, always review safety measures* ⇒ page 57 .
- *Discharge and evacuate A/C refrigerant system with Kent More ACR4 or equivalent.*
- *All opened refrigerant system components must be sealed against moisture and dirt contamination by appropriate sealing caps.*

First do the following:

– Discharge A/C refrigerant system ⇒ page 62

– Disconnect refrigerant lines -1- at condenser and seal.

– Remove radiator grille(s) ⇒ Body Exterior; Rep. Gr. 66 ; Removal and Installation

– Loosen and tilt lock carrier assembly forward ⇒ Body Exterior; Rep. Gr. 50 ; Removal and Installation

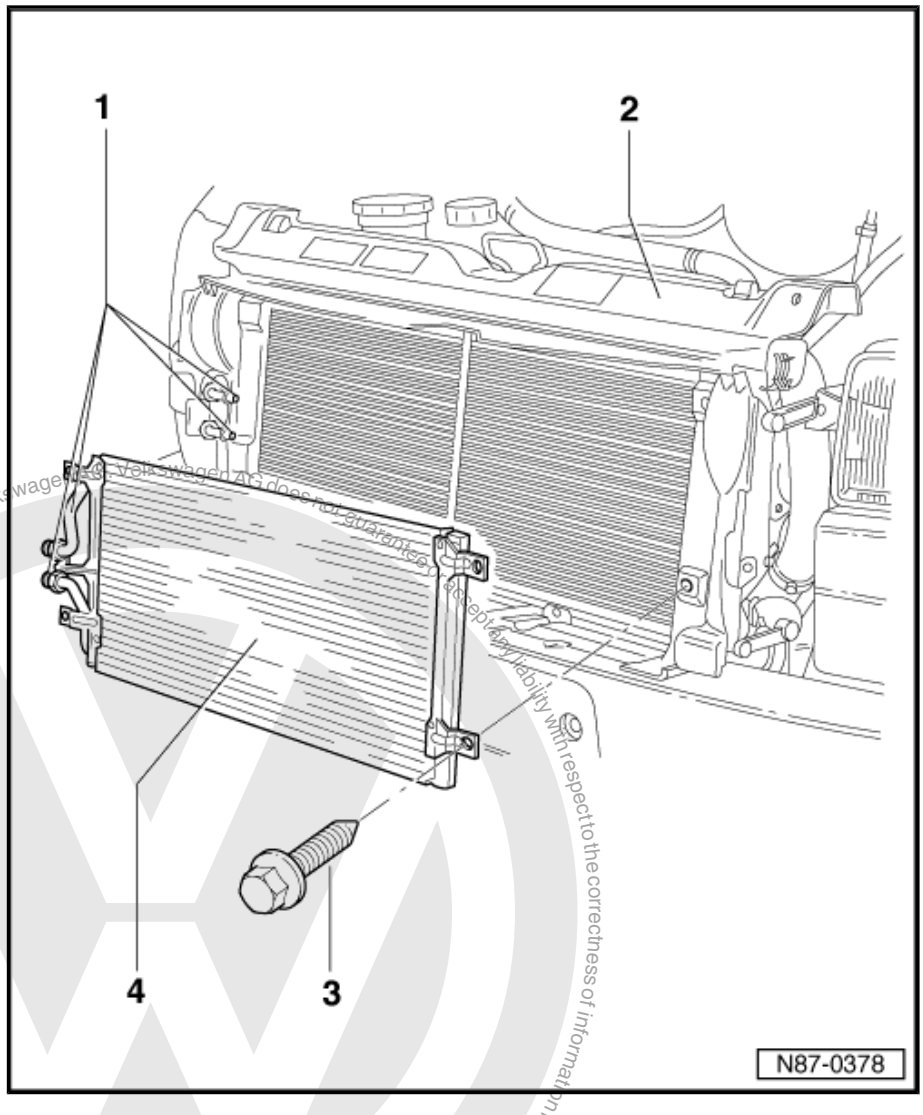
1 - Refrigerant lines

2 - Lock carrier

3 - Threaded screws

- ❑ Tightening torque: 8Nm
- ❑ Qty.: 4

4 - Condenser



5.9 Condenser with Integrated Receiver Drier

Caution

Before beginning repairs on the electrical system:

- *Obtain the anti-theft radio security code.*
- *Switch the ignition off.*
- *Disconnect the battery Ground (GND) strap.*
- *After reconnecting battery, recode and check operation of antitheft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.*

Note

- *Before proceeding with A/C refrigerant system servicing, always review safety measures* *⇒ page 57* *.*
- *Discharge and evacuate A/C refrigerant system with Kent More ACR4 or equivalent.*
- *All opened refrigerant system components must be sealed against moisture and dirt contamination by appropriate sealing caps.*

First do the following:

– Discharge A/C refrigerant system ⇒ page 62

– Remove radiator grille(s) ⇒ Body Exterior; Rep. Gr. 66 ; Removal and Installation

– Disconnect refrigerant lines -1- at condenser and seal.

– Where applicable, remove power steering pump cooler lines -3- from condensor, and set to one side (lines remain connected).

1 - Refrigerant lines

2 - Lock

3 - Power steering cooling lines (where applicable)

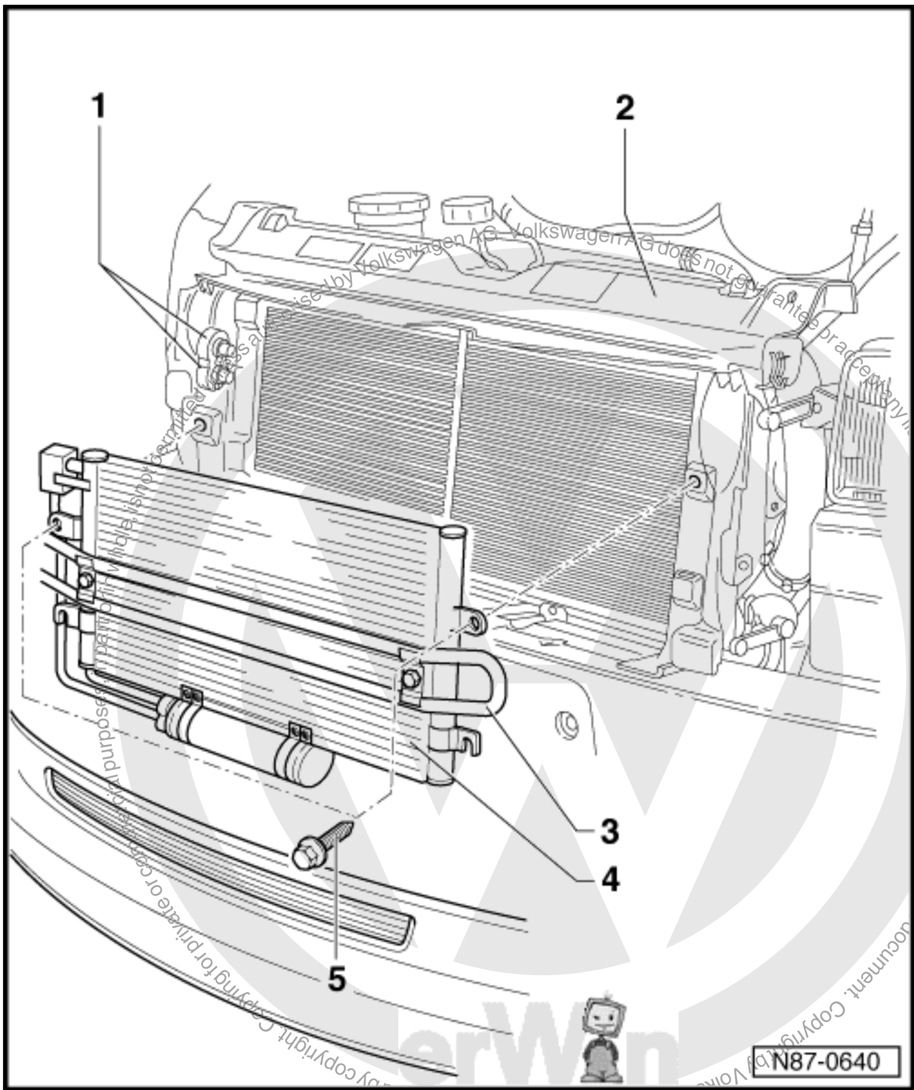
4 - Condenser

❑ To remove, lift up and out from retainers.

5 - Threaded screws

❑ Tightening torque: 8Nm

❑ Qty.: 4



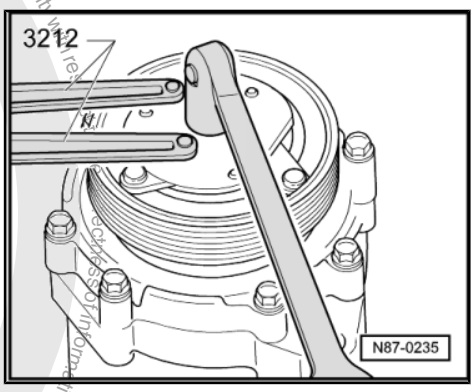
6 Disassembly and Assembly

⇒ “6.1 A/C Clutch”, page 157

6.1 A/C Clutch

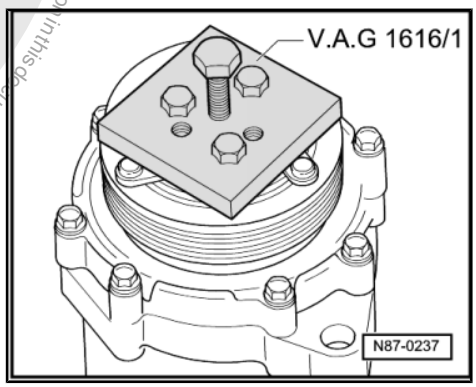
Self-locking nut, removing

– Counter-hold clutch plate using pin wrench -3212- or -VAG1616- and remove nut.



Clutch plate, removing

– Use puller -VAG1616/1- .



Note

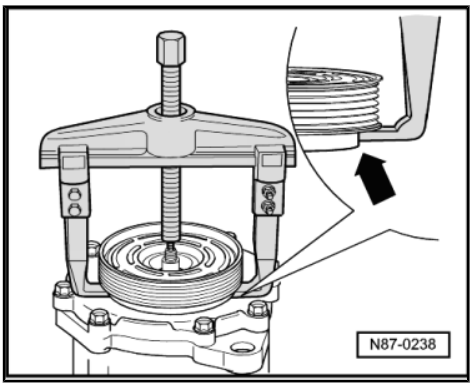
Three retaining bolts on -VAG1616/1- have 1/4"thread.

Ribbed-belt pulley, removing

– Remove circlip ⇒ Item 3 (page 115) .

– Use locally available two-arm puller with 100 mm span depth (E.g.: Kukko 20-10 or equivalent).

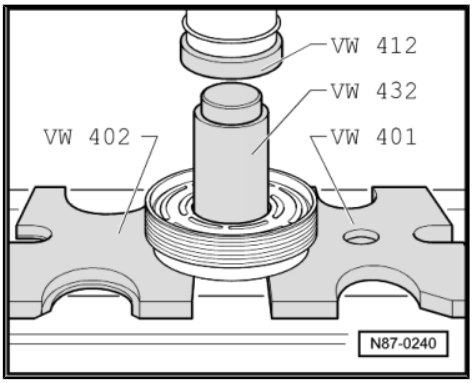
– Place puller arm under pulley as illustrated -arrow-.



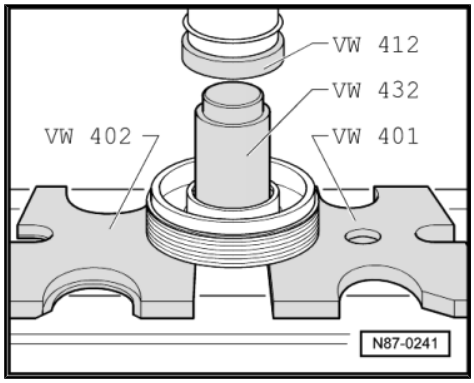
Caution

Place puller arms under pulley only far enough so as to not damage clutch coil upon removal.

Bearing, removing



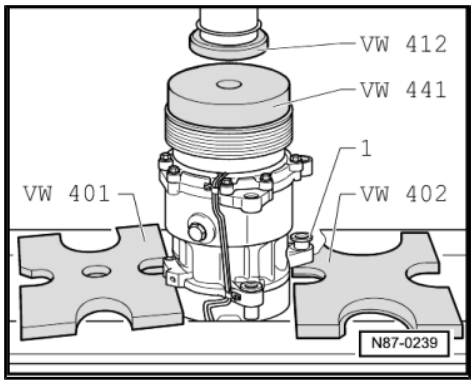
Bearing, installing



Ribbed-belt pulley, installing

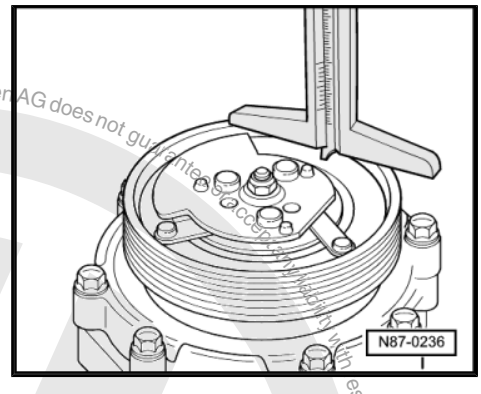
Caution

In order to prevent pulley deformation while pressing, ensure compressor remains flat at all times.



- Displace threaded bushing -1-.
- Install circlip ⇒ Item 3 (page 115) .

Clutch plate, checking/adjusting clearance



- With compressor grounded, repeatedly apply 12V to clutch coil terminal connection.
- Measure clearance between clutch plate and pulley around entire circumference.

♦ Specification: 0.4.....0.8 mm

Note

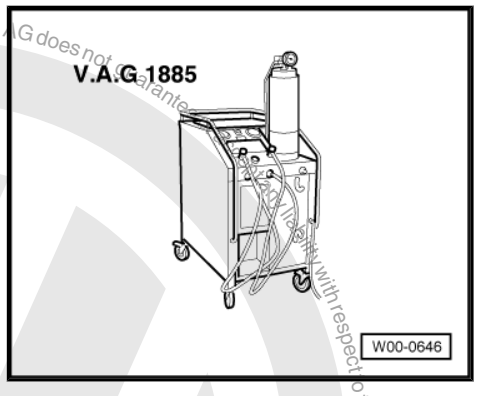
♦ *Clearance must be within tolerance around entire circumference.*

♦ *If clearance is outside the allowable tolerance, remove clutch plate and adjust clearance by removing or installing shims ⇒ Item 9 (page 116) .*

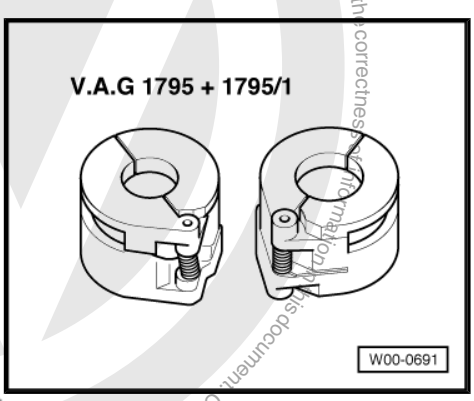
7 Special Tools

Special tools and workshop equipment required

- Refrigerant recovery/recycling/recharging unit Kent Moore ACR4, -VAG1885- or equivalent



- -VAG1795- for 1/2" pipes



- -VAG1795/1- for 5/8"pipes
-

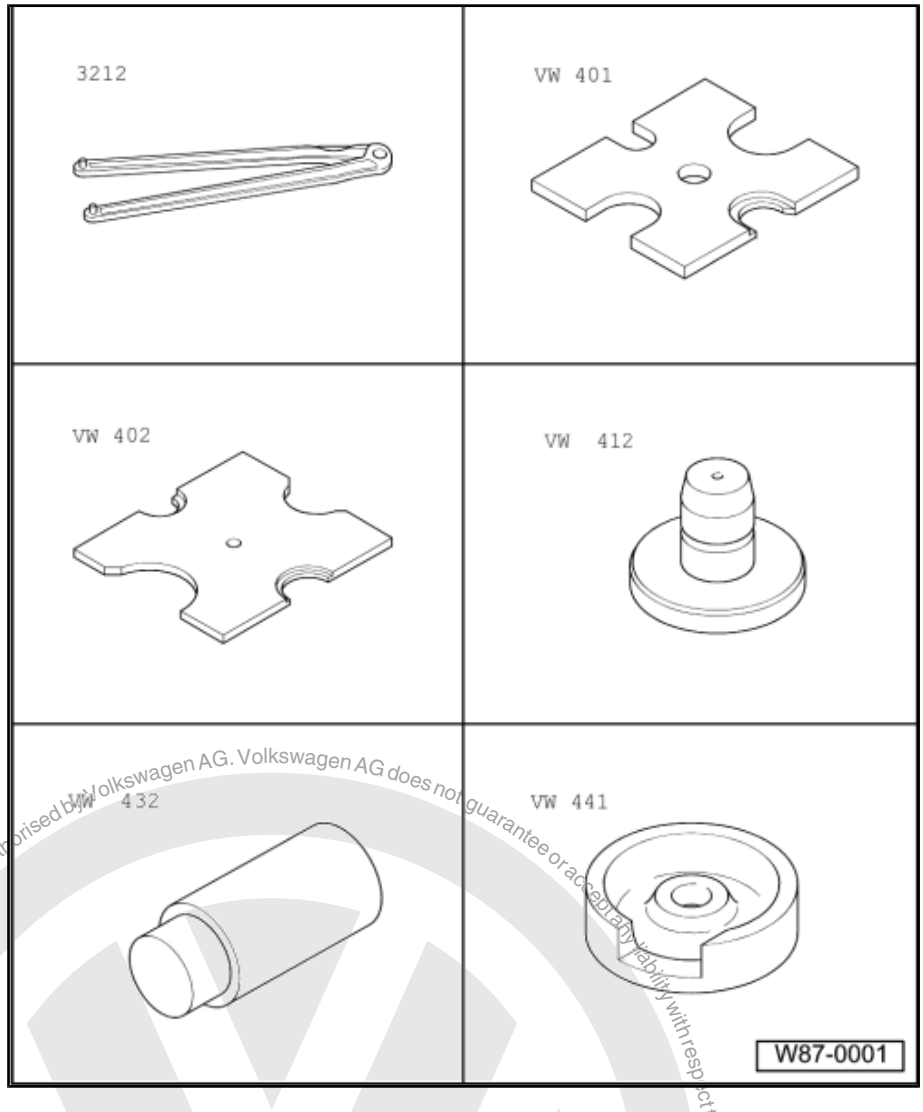
Not shown:

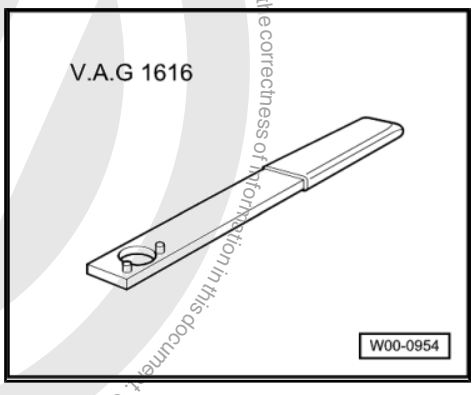
-VAG1795/2- for 3/8 pipes

-VAG1795/3- for 3/4" pipes

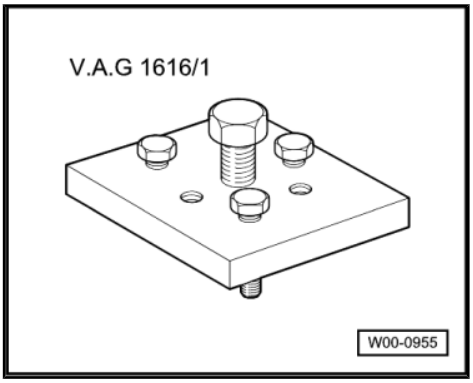
Special tools and workshop equipment required

- Pin wrench -3212-
- Thrust plate -VW401-
- Thrust plate -VW402-
- Thrust disc -VW412-
- Arbor (50 mm) -VW432-
- Base block -VW441-





- Retainer -VAG1616- (for clutch plate)
- Puller -VAG1616/1- (for A/C clutch)



Not shown

- Two-arm puller with 100 mm span depth, such as Kukko 20-10 or equivalent (locally available)
- Depth gauge (locally available)

Cautions & Warnings

Please read these WARNINGS and CAUTIONS before proceeding with maintenance and repair work. You must answer that you have read and you understand these WARNINGS and CAUTIONS before you will be allowed to view this information.

- If you lack the skills, tools and equipment, or a suitable workshop for any procedure described in this manual, we suggest you leave such repairs to an authorized Volkswagen retailer or other qualified shop. We especially urge you to consult an authorized Volkswagen retailer before beginning repairs on any vehicle that may still be covered wholly or in part by any of the extensive warranties issued by Volkswagen.

- Disconnect the battery negative terminal (ground strap) whenever you work on the fuel system or the electrical system. Do not smoke or work near heaters or other fire hazards. Keep an approved fire extinguisher handy.

- Volkswagen is constantly improving its vehicles and sometimes these changes, both in parts and specifications, are made applicable to earlier models. Therefore, part numbers listed in this manual are for reference only. Always check with your authorized Volkswagen retailer parts department for the latest information.

- Any time the battery has been disconnected on an automatic transmission vehicle, it will be necessary to reestablish Transmission Control Module (TCM) basic settings using the VAG 1551 Scan Tool (ST).

- Never work under a lifted vehicle unless it is solidly supported on stands designed for the purpose. Do not support a vehicle on cinder blocks, hollow tiles or other props that may crumble under continuous load. Never work under a vehicle that is supported solely by a jack. Never work under the vehicle while the engine is running.

- For vehicles equipped with an anti-theft radio, be sure of the correct radio activation code before disconnecting the battery or removing the radio. If the wrong code is entered when the power is restored, the radio may lock up and become inoperable, even if the correct code is used in a later attempt.

- If you are going to work under a vehicle on the ground, make sure that the ground is level. Block the wheels to keep the vehicle from rolling. Disconnect the battery negative terminal (ground strap) to prevent others from starting the vehicle while you are under it.

- Do not attempt to work on your vehicle if you do not feel well. You increase the danger of injury to yourself and others if you are tired, upset or have taken medicine or any other substances that may impair you or keep you from being fully alert.

- Never run the engine unless the work area is well ventilated. Carbon monoxide (CO) kills.

- Always observe good workshop practices. Wear goggles when you operate machine tools or work with acid. Wear goggles, gloves and other protective clothing whenever the job requires working with harmful substances.

- Tie long hair behind your head. Do not wear a necktie, a scarf, loose clothing, or a necklace when you work near machine tools or running engines. If your hair, clothing, or jewelry were to get caught in the machinery, severe injury could result.

- Do not re-use any fasteners that are worn or deformed in normal use. Some fasteners are designed to be used only once and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual - replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.

Version 1.0

Cautions & Warnings

- Illuminate the work area adequately but safely. Use a portable safety light for working inside or under the vehicle. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.

- Friction materials such as brake pads and clutch discs may contain asbestos fibers. Do not create dust by grinding, sanding, or by cleaning with compressed air. Avoid breathing asbestos fibers and asbestos dust. Breathing asbestos can cause serious diseases such as asbestosis or cancer, and may result in death.

- Finger rings should be removed so that they cannot cause electrical shorts, get caught in running machinery, or be crushed by heavy parts.

- Before starting a job, make certain that you have all the necessary tools and parts on hand. Read all the instructions thoroughly; do not attempt shortcuts. Use tools that are appropriate to the work and use only replacement parts meeting Volkswagen specifications. Makeshift tools, parts and procedures will not make good repairs.

- Catch draining fuel, oil or brake fluid in suitable containers. Do not use empty food or beverage containers that might mislead someone into drinking from them. Store flammable fluids away from fire hazards. Wipe up spills at once, but do not store the oily rags, which can ignite and burn spontaneously.

- Use pneumatic and electric tools only to loosen threaded parts and fasteners. Never use these tools to tighten fasteners, especially on light alloy parts. Always use a torque wrench to tighten fasteners to the tightening torque listed.

- Keep sparks, lighted matches, and open flame away from the top of the battery. If escaping hydrogen gas is ignited, it will ignite gas trapped in the cells and cause the battery to explode.

- Be mindful of the environment and ecology. Before you drain the crankcase, find out the proper way to dispose of the oil. Do not pour oil onto the ground, down a drain, or into a stream, pond, or lake. Consult local ordinances that govern the disposal of wastes.

- The air-conditioning (A/C) system is filled with a chemical refrigerant that is hazardous. The A/C system should be serviced only by trained automotive service technicians using approved refrigerant recovery/recycling equipment, trained in related safety precautions, and familiar with regulations governing the discharging and disposal of automotive chemical refrigerants.

- Before doing any electrical welding on vehicles equipped with anti-lock brakes (ABS), disconnect the battery negative terminal (ground strap) and the ABS control module connector.

- Do not expose any part of the A/C system to high temperatures such as open flame. Excessive heat will increase system pressure and may cause the system to burst.

- When boost-charging the battery, first remove the fuses for the Engine Control Module (ECM), the Transmission Control Module (TCM), the ABS control module, and the trip computer. In cases where one or more of these components is not separately fused, disconnect the control module connector(s).

- Some of the vehicles covered by this manual are equipped with a supplemental restraint system (SRS), that automatically deploys an airbag in the event of a frontal impact. The airbag is operated by an explosive device. Handled improperly or without adequate safeguards, it can be accidentally activated and cause serious personal injury. To guard against personal injury or airbag system failure, only trained Volkswagen Service technicians should test, disassemble or service the airbag system.

Version 1.0

Cautions & Warnings

- Do not quick-charge the battery (for boost starting) for longer than one minute, and do not exceed 16.5 volts at the battery with the boosting cables attached. Wait at least one minute before boosting the battery a second time.
- Never use a test light to conduct electrical tests of the airbag system. The system must only be tested by trained Volkswagen Service technicians using the VAG 1551 Scan Tool (ST) or an approved equivalent. The airbag unit must never be electrically tested while it is not installed in the vehicle.
- Some aerosol tire inflators are highly flammable. Be extremely cautious when repairing a tire that may have been inflated using an aerosol tire inflator. Keep sparks, open flame or other sources of ignition away from the tire repair area. Inflate and deflate the tire at least four times before breaking the bead from the rim. Completely remove the tire from the rim before attempting any repair.
- When driving or riding in an airbag-equipped vehicle, never hold test equipment in your hands or lap while the vehicle is in motion. Objects between you and the airbag can increase the risk of injury in an accident.

I have read and I understand these Cautions and Warnings.

Version 1.0