

Audi A4 1995 ➤

Heating, Air Conditioner

Edition 04.1998



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List of Workshop Manual Repair GroupsList of Workshop Manual Repair Groups

Audi A4 1995 ➤

Heating, Air Conditioner

Repair Group

01 - Self-diagnosis, Electrical check

80 - Heating

87 - Air conditioning



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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.

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01 - Self-diagnosis, Electrical check

1 - Air conditioner self-diagnosis

1.1 - Air conditioner self-diagnosis

1.2 - Assignment of the operating and display unit -E87

Part number	Special features
8D0 820 043 C	Static self-diagnosis, control is deactivated during self-diagnosis
8D0 820 043 D...G	- During the self-diagnosis, control is only switched off for final control diagnosis and basic setting - In vehicles with 6-cylinder engines, may only be combined with Zexel compressors
8D0 820 043 from H	For all vehicles up to Model Year 96
8L0 820 043 A...C	For all vehicles of Model Year 97 (lighting via terminals 58 and 58d)
8L0 820 043 from D	For all vehicles from Model Year 98 without radio navigation system up to chassis number 199999 of Model Year 1999 (lighting also controlled by terminal 58s)

Part number	Special features
8D0 820 043 K or L	Design with only one display (in vehicles with radio navigation system up to chassis number 199999 of Model Year 1999)
8D0 820 043 from M	Design with only one display (for vehicles from chassis number 200000 of Model Year 1999)

Notes:

- ♦ Note the precise assignment when replacing an operating and display unit:

=> Parts List

- ♦ Different designs for the operating and display from chassis number 200000 of Model Year 1999 in vehicles with and without a radio navigation system (or radio with large display zone) with and without switches for heated seats (e.g. index "M", "N", "P" or "Q")

=> Parts List



1.3 - Technical data of self-diagnosis

Features

- ♦ The fault memory is a non-volatile memory and thus independent of the power supply.
- ♦ Data transfer between control unit and fault reader V.A.G 1551 or vehicle system tester V.A.G 1552 is carried out in "Rapid data transfer" operating mode.

1.4 - Function

The operating and display unit -E87 for the air conditioner is equipped with a fault memory.

After evaluating the information, the operating and display unit -E87 differentiates between different faults => fault table on Page 7 and stores them until the fault memory is erased after interrogation.

1.5 - Fault recognition

If faults occur in the monitored sensors and components, these are stored in the fault memory together with an indication of type of fault.

Always commence fault finding by starting self-diagnosis and interrogating the stored faults. The following units are available for interrogation of the stored data:

- ♦ Fault reader V.A.G 1551
- ♦ Vehicle system tester V.A.G 1552

The fault information which is displayed indicates specific repair measures via a fault table.

Notes on fault remedy:

- ♦ The data output is only possible with the ignition switched on or with the engine running and an engine speed of less than 3000 rpm. At higher engine speeds, data output is restricted or terminated (for example, final control diagnosis is only possible up to an engine speed of 3000 rpm, if this speed is exceeded, the self-diagnosis is terminated).
- ♦ If a fault situation exists for longer than a specific period, the fault is stored as a static fault. If the fault is no longer present after a specified period, it becomes a sporadic fault. This process is constantly repeated. Sporadic faults are also identified as such (the letters /SP appear on the display).
- ♦ If a sporadic fault ceases to occur for a specific period, it is automatically erased.

Self-diagnosis is only possible using fault reader V.A.G 1551 or vehicle system tester V.A.G 1552, mode 1, "Rapid data transfer".

Self-diagnosis is not restricted to storage, interrogation, erasing and final control diagnosis. It also has basic setting, control unit identification and encoding functions.

Operating mode -2- (flash code output) is not envisaged for the air conditioner/heating electronics. Operating modes-3- (self-test) and -4- (dealership identification) only apply to fault reader V.A.G 1551 and the vehicle system tester V.A.G 1552 and are described in the relevant operating instructions.

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Notes:

- ♦ This workshop manual describes self-diagnosis using the fault reader V.A.G 1551.
- ♦ Self-diagnosis can also be performed in the same manner using vehicle system tester V.A.G 1552. In order to be able to furnish proof of faults in the event of subsequent queries it is appropriate, before erasing the fault memory, to connect up to fault reader V.A.G 1551 and print out the faults found (V.A.G 1552 has no printer).
- ♦ Fitting locations for components up to Model Year 1996=>from Page 139 .

- ♦ Fitting locations for components from Model Year 1997=>from Page **167**.
- ♦ If a new operating and display unit -E87 is installed and not encoded, the E87's display flashes for approximately 2 minutes (after the ignition is switched on).
- ♦ When starting the self-diagnosis with operating and display unit - E87, Part No. 8D0 820 043 up to index "C", the air conditioner control is switched off (the compressor, the positioning motors, the radiator fan etc are not actuated).
- ♦ When starting the self-diagnosis with operating and display unit - E87, Part No. 8D0 820 043 from index "D", the air conditioner control is no longer terminated, but it is switched off when the following functions are selected:
 - Final control diagnosis
 - Perform basic setting
 When the other functions are selected, the control function remains fully operative.

Available functions

Fault reader V.A.G 1551 or vehicle system tester V.A.G 1552		Ignition on, engine stopped	Engine idling	Vehicle being driven ¹⁾	Page
Address words					
08	Electronic climate/heating control	yes	yes	yes	5
00	Automatic test sequence	yes	yes	yes	5
Functions					
01	Interrogating control unit version	yes	yes	yes	6
02	Interrogating fault memory	yes	yes	yes	6
03	Final control diagnosis	yes	yes	no	18
04	Performing basic setting	yes	yes	no	24
05	Erase fault memory	yes	yes	yes	25
06	End of output	yes	yes	yes	26
07	Encoding control unit	yes	yes	no	27
08	Reading measured value block	yes	yes	yes	30

1) At engine speeds below 3000 rpm. With operating and display unit -E87, Part No. 8D0 820 043 up to index "C", only a restricted self-diagnosis is possible at high engine speeds, or the self-diagnosis is terminated. With -E87 with Part No. 8D0 820 043 from index "D", the self-diagnosis is terminated at high engine speeds.

1.6 - Safety precautions

Note the following points if testers and measuring instruments have to be used during a road test:

Important:

- ♦ **Always attach testers and measuring instruments to the back seat and have a second person operate them from there.**
- ♦ **If test equipment were operated from the front passenger seat, the person sitting there could be injured if the front passenger airbag were triggered in the event of an accident.**



2 - Performing the self-diagnosis

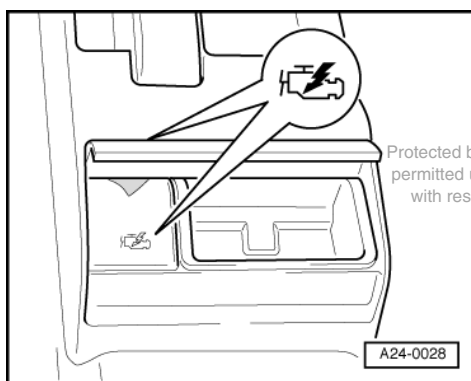
2.1 - Performing the self-diagnosis

2.2 - connecting fault reader V.A.G 1551 and selecting functions

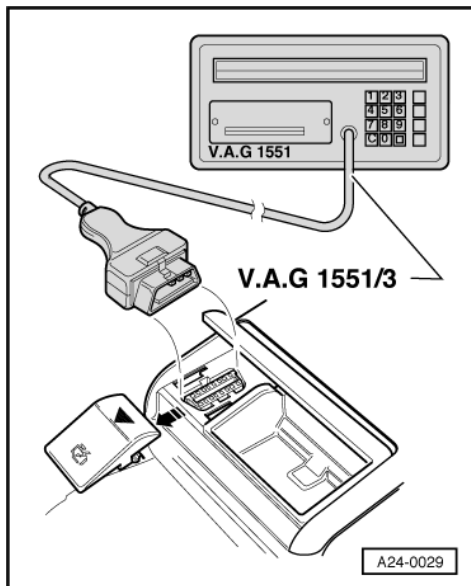
Test requirements:

- Supply voltage of vehicle electrical system OK
- Fuses OK.

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder



- -> Open rear ashtray (in centre console) and remove cover for diagnostic connection.



- -> Connect fault reader V.A.G 1551 with lead V.A.G 1551/3 (ignition switched off).

-> Indicated on display:

V.A.G SELF DIAGNOSIS	HELP
1 - Rapid data transfer 1)	
2 - Flash code output 1)	

- 1) appears alternately

Note:

If the display remains blank, use the current flow diagram to check the power supply and wiring.

Depending on which function is required => "Available functions" table, Page 3 :

- Switch the ignition on.
- or
- Start the engine.
- Set the operating mode "Auto" on the operating and display unit -E87 (compressor running).
- Press the PRINT key to switch on the printer - (indicator lamp in key lights up).
- Enter "1" to select "Rapid data transfer".

-> Indicated on display

Rapid data transfer HELP Enter address word XX
--

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Note:

Address word 00 implements the automatic test sequence, i.e. the interrogation of the fault memory via rapid data transfer for all vehicle systems with a self-diagnosis capability.

- Enter "08" for the address word "Air conditioner/heating electronics".

Note:

With the operating and display unit -E87 with Part No. 8D0 820 043, index "C", the air conditioner control is now switched off.

-> Indicated on display

Rapid data transfer Q 08 AC/heating electronics

- Confirm entry with Q key.

-> Indicated on display

Rapid data transfer Tester sends address word 08

- Wait until the next display appears.

-> The display on the fault reader V.A.G 1551 will show the control unit identification code (example).

8D0820043X A4 Fully automatic air conditioner DX Coding XXXXX WSC XXXXX

Note:

You may print out the control unit identification by pressing the PRINT key on the fault reader V.A.G 1551.

Control unit identification (example)

- 8D0 820 043 X - or - 8L0 820 043 X - A4 Fully automatic air con- ditioner	Part-No.; assignment => Parts List Audi A4 control unit for fully automatic air condi- tioner
---	---



- DXX	Control unit data status (software type)
- Code XXXXX:	Different codings => Page 28
- WSC XXXXX:	Workshop Code for the V.A.G 1551 which was used to perform the last encoding

- Press =>key.

-> Display function selection):

Rapid data transfer HELP
Select function XX

Notes:

- ♦ The control unit identification can be displayed again by entering function "01" for "Interrogating control unit version" and confirming with the Q key.

Rapid data transfer HELP
No reply from control unit

-> Indicated on display

- Print out possible cause of trouble by pressing HELP key.

Rapid data transfer HELP
K-wire not switched to positive

Use the current flow diagram to check the wiring for the diagnostic connector.

Rapid data transfer
No signal from control unit

Rapid data transfer
Communication problem

-> If this display appears at the start of or during the program, faults have occurred and data exchange is no longer possible between the fault reader V.A.G 1551 and the operating and display unit -E87.

- Use the current flow diagram to check the wiring for the diagnostic connector.
- After rectifying the possible causes of the fault, re-enter "08" for the address word "Air conditioner/heating electronics" => Page **5**.

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3 - Interrogating fault memory

3.1 - Interrogating fault memory

- Connect the fault reader V.A.G 1551 (V.A.G 1552) and use "Address word" 08 to select the air conditioner/heating electronics.
(Connecting fault reader => Page **4** .)

-> Indicated on display

Rapid data transfer HELP
Select function XX

- Enter "02" for function "Interrogating fault memory".

-> Indicated on display

Rapid data transfer Q
02 - Interrogate fault memory

- Confirm entry with Q key.

-> Indicated on display

No fault recognised!

- Press =>key.

Notes:

- ◆ If no faults have been detected and complaints have been received about the air conditioner (e.g. the compressor is not functioning or only functioning intermittently, system control unsatisfactory, fresh air blower speed cannot be regulated):
 - 1. Read measured value block (Function 08) =>Page 30 .
 - 2. Perform final control diagnosis (Function 03)=> Page 18 .
 - 3.Check refrigeration capacity of air conditioner => Page 192 .

-> Indicated on display

X fault(s) detected

The stored faults are displayed and printed in sequence when the printer is switched on.

Notes:

- ◆ If the printer is switched off, press the => key to display the next fault.
- ◆ If fault(s) was/were detected:
 - 1. Rectify fault.
 - 2. Interrogate fault memory (function 02).
 - 3. Erase fault memory (function 05).
 - 4. Check code (function 01) or encode control unit (function 07).
 - 5. Perform basic setting (function 04).
 - 6. Interrogate fault memory (function 02) and erase if applicable (function 05).
 - 7. End output (function 06).
- Press =>key.

When the =>key is pressed, the program returns to its original status, as with "no fault detected".

-> Indicated on display

Rapid data transfer HELP
Select function XX

- End output (Function 06) =>Page 26 .
- Switch off ignition and detach diagnostic connector.

3.2 - Fault table

Notes:

- ◆ Listed below, by fault code number, are all the possible faults which may be detected by the operating and display unit -E87 and displayed on the V.A.G 1551 or V.A.G 1552 when the fault memory is interrogated.
- ◆ The content of the fault memory is retained until it is erased. => Page 25 .
- ◆ In the "Rapid Data Transfer" mode, the fault code is only printed out if the V.A.G 1551 printer is switched on. Example: Fault code (5-position) 01270.
- ◆ Sporadic faults are marked "/SP" on the display.
- ◆ With all sporadically occurring faults, pay particular attention to the possibility of loose contacts in the connectors.



- ♦ If defective components are detected when the fault memory is read out, also use the current flow diagram to check the wiring to the components for short circuits and open circuits.

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

- ♦ Check the appropriate connector contacts before replacing a component.
- ♦ Before renewing the operating and display unit -E87, also check the power supply and the earth connections.

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

- ♦ If the operating and display unit -E87 continues to operate when the ignition has been switched off, check the wiring to the operating and display unit -E87, connector D, contact 1 for a short to positive.
- ♦ After renewing a component of the air conditioner/heating system, the basic setting (function 04) should always be performed and then the fault memory interrogated and any faults indicated rectified and erased from the memory (functions 02 and 05).
- ♦ Vehicles up to Model Year 1996: If 22 °C (72 °F) continues to be displayed after the ignition has been switched off and on, irrespective of the last setting, repair the power supply (terminal 30) to the operating and display unit -E87 in accordance with the current flow diagram.
- ♦ The display is switched from °C (Celsius) to °F (Fahrenheit) and vice versa by actuating the "Temperaturere" key when the "Air recirculation" key is pressed.
- ♦ Check refrigeration capacity of air conditioner => Page 192.
- ♦ If on vehicles with a air conditioner compressor speed sender -G111, the compressor only comes on briefly when the engine is started and then switches off again immediately, check the wiring between the air conditioner compressor speed sender -G111 and the operating and display unit -E87 for an open circuit:

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

- ♦ In vehicles with Nippondenso/Denso compressors (without air conditioner compressor speed sender -G111), the compressor only comes on briefly when the engine starts and then switches off again immediately; check the encoding for the operating and display unit -E87 => Page 27.
- ♦ Vehicles from Model Year 1997: If the switch between contacts 1 and 2 is open in the pressure switch -F129, the operating and display unit -E87 recognises this as a fault in the refrigerant circuit. If the measured ambient temperature is less than + 2 °C (or less than - 5 °C in air recirculation mode), an open switch is not stored as a fault (at very low temperatures, the pressure in the refrigerant circuit may drop below the switch pressure). At these temperatures, the magnetic clutch is not engaged. The switch is only stored as faulty if it has opened at least twice during one driving period.
- ♦ If an open high-pressure switch -F118 (vehicles up to Model Year 1996) or -F129 (vehicles from Model Year 1997) is detected 30 times within one driving period, for example due to a loose contact, the compressor is switched off. The compressor can be switched on again by actuating the "Compressor on" button or by switching the ignition off and on again. If this fault occurs over several driving cycles, the compressor cannot be switched on again until the fault memory has been erased.
- ♦ If a fault is detected on the potentiometer in one of the positioning motors for air distribution, the air distribution may be influenced by actuating the keys on the operating and display unit -E87.
- ♦ If a fault is detected in the temperature control and no fault is displayed:
 - Check that the temperature sensors are installed correctly.
 - Check whether the cabling to the sunlight penetration photosensor -G107 has been interchanged..
 - Check the dash panel temperature sensor blower -V42 and the associated hose connections (only in the case of an operating and display unit -E87 with two displays).

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
00000 No fault detected	If no fault is detected despite complaints about the air conditioner/heating electronics, the functions "Final control diagnosis 03" and "Read measured value block 08" should be performed.	
00529 2122 No speed info /SP 1)	- Open circuit between engine control unit, dash panel insert and -E87	- Locate and rectify the open circuit using the current flow diagram

	- Engine control unit or dash panel insert supplies an unusable engine speed signal	- Read measured value block =>Page 30 . Check engine speed signal => Electrical System; Repair group 01; Dash panel insert self-diagnosis
--	---	---

1) This fault is only detected in vehicles up to Model Year 1996 with Zexel compressors and air conditioner compressor speed sensor -G111 during the final control diagnosis (no engine speed signal detected despite presence of compressor speed).

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
00532 2234 Power supply	- Voltage dips in electrical system to values below 9.5 V 2)	- Check alternator and voltage regulator: => Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder
Signal too low /SP	- Contact resistance in the wiring to the low-pressure switch -F73 (only in vehicles up to Model Year 1996)	- Use current flow diagram to locate and rectify contact resistance: => Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

2) If the vehicle's voltage (at connector -C- contact -3-) drops to a value below 9.5 V, the compressor is switched off for at least 25 s. It is only switched on again when the voltage exceeds a value of 10.8 V.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
00600 Potentiometer -G92 in positioning motor -V68 (for temperature flap) 3)	- Short circuit, open circuit or cabling fault between -G92 and --E87	- Use current flow diagram to locate and rectify short circuit, open circuit or wiring fault
Short to earth/SP Open circuit/short to positive /SP	- Potentiometer -G92 in -V68 defective	- Renew positioning motor -V68
Adaption limit exceeded 4)	- Temperature flap stiff	- Check ease of movement of temperature flap5)
Defective	- Potentiometer -G92 in -V68 defective	- Renew positioning motor -V68

3) In the event of a fault on the potentiometer -G92, the positioning motor -V68 may be set manually by actuating the "+" or "-" button for temperature selection (display range 0 - 50 °C

4) This fault is only detected during basic setting.

5) Both end stops must be reached.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
00601 Potentiometer -G112 in the positioning motor -V70 (for central flap)	- Short circuit, open circuit or cabling fault between -G112 and -E87	- Use current flow diagram to locate and rectify short circuit, open circuit or wiring fault
Short to earth/SP Open circuit/short to positive /SP	- Potentiometer -G112 in -V70 defective	- Replace positioning motor -V70



Adaption limit exceeded 4)	- Central flap stiff	- Check freedom of movement of central flap5)
Defective	- Potentiometer -G112 in -V70 defective	- Replace positioning motor -V70

4) This fault is only detected during basic setting.

5) Both end stops must be reached.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
00602 Potentiometer -G114 in the positioning motor -V85 (for footwell/defroster flap)	- Short circuit, open circuit or cabling fault between -G114 and -E87	- Use current flow diagram to locate and rectify short circuit, open circuit or wiring fault
Short to earth/SP Open circuit/short to positive /SP	- Potentiometer -G114 in -V85 defective	- Replace positioning motor -V85
Adaption limit exceeded 4)	- Footwell/defroster flap stiff	- Check freedom of movement of footwell/defroster flap5)
Defective	- Potentiometer -G114 in -V85 defective	- Replace positioning motor -V85

4) This fault is only detected during basic setting.

5) Both end stops must be reached.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
00603 Positioning motor -V85 for footwell/defrost flap	- Short circuit, open circuit or cabling fault between -V85 and -E87	- Use current flow diagram to locate and rectify short circuit, open circuit or wiring fault
Blocked or without voltage /SP	- Footwell/defroster flap stiff	- Check freedom of movement of footwell/defroster flap5)
	- Positioning motor -V85 defective	- Check positioning motor -V85 => Final control diagnosis, Page 21

5) Both end stops must be reached.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
00604 Potentiometer -G113 in the positioning motor -V71 (for air-flow flap)	- Short circuit, open circuit or cabling fault between -G113 and -E87	- Use current flow diagram to locate and rectify short circuit, open circuit or wiring fault
Short to earth/SP Open circuit/short to positive /SP	- Potentiometer -G113 in -V71 defective	- Renew positioning motor -V71
Adaption limit exceeded 4)	- Air-flow flap or fresh-air and recirculated-air flap stiff	- Check freedom of movement of air-flow flap or fresh-air and recirculated-air flap 5)



Short to earth/SP Open circuit/short to positive /SP	- Fresh air intake duct temperature sensor - G89 defective	- Check fresh air intake duct temperature sensor - G89 =>Electrical testing, Page 59
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Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
00792 3224 Air conditioner pressure switch -F129	- Open circuit or loose contact between -F129 and -E87	- Use current flow diagram to locate and rectify open circuit or loose contact
Short to positive/SP	- Actuation of the radiator fan - V7 (speed 1) faulty	- Check the actuation of the radiator fan-V7 (speed 1) =>Final control element diagnosis, Page 69
	- Condenser or radiator dirty	- Clean condenser and radiator
	- Actuation of the radiator fan - V7 (speed 2) from air conditioner pressure switch -F129 faulty	- Check the actuation of the radiator fan -V7 (speed 2 via switch -F129) =>Page 192 onwards
	- Air conditioner pressure switch - -F129 defective	- Check pressure switch -F129 =>Page 192 onwards
	- Fault in refrigerant circuit (excess pressure or vacuum)	- Send vehicle to an VW/Audi air conditioner service centre

Note:

The pressure switch -F129 (installed in vehicles from Model Year 1997) consists of two switching elements (pressure switch for magnetic clutch and pressure switch for radiator fan) and replaces the high-pressure switches -F118 and -F23.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
00796 6) 3234 Temperature sensor blower -V42 (dash panel)	- Open circuit in the power supply to the - V42 or in the wiring between the -V42 and - E87	- Locate and rectify the open circuit using the current flow diagram
Blocked or without voltage /SP	- Temperature sensor blower -V42 defective	- Replace the operating and display unit -E87
00797 3241 Sunlight penetration photosensor -G107	- Short circuit or open circuit between -G107 and -E87	- Use current flow diagram to locate and rectify short circuit or open circuit
Open circuit/short to earth /SP Short to positive/SP	- Sunlight penetration photosensor -G107 defective	- Check sunlight penetration photosensor -G107 =>Reading measured value block, Page 38

6) With an operating and display unit -E87 with only one display, the blower for temperature sensor -V42 is installed in the -E87.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
00799 3243 Check coolant temperature sender -G110	- Short circuit or open circuit between -G110 and -E87	- Use current flow diagram to locate and rectify short circuit or open circuit

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
Short to earth/SP Open circuit/short to positive /SP	- Check coolant temperature sender -G110 defective	- Check refrigerant temperature sensor -G110 =>Reading measured value block, Page 38

Note:

The installation of the refrigerant temperature sensor -G110 (only in vehicles up to Model Year 1996) is dependent upon equipment and therefore it is not installed in all vehicles (e.g. not in vehicles with 6-cylinder engines).

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
00801 High-pressure switch for magnetic clutch -F118	- Open circuit in the wiring between -F118 and -E87	- Locate and rectify the open circuit using the current flow diagram
3311 Open circuit/short to positive /SP	- Actuation of the radiator fan -V7 (speed 1) faulty	- Check the actuation of the radiator fan-V7 (speed 1) =>Final control element diagnosis, Page 69
	- Condenser or radiator dirty	- Clean condenser and radiator
	- Actuation of the radiator fan -V7 (speed 2) by air conditioner high-pressure switch -F23 faulty	- Check the actuation of the radiator fan -V7 (speed 2 via switch -F23) =>Page 192 onwards
	- High-pressure switch -F23/-F118 defective	- Check high-pressure switch -F23/-F118 =>Page 192 onwards
	- Fault in refrigerant circuit	- Send vehicle to an VW/Audi air conditioner service centre

Note:

The high-pressure switches -F118 and -F23 (only installed in vehicles up to Model Year 1996) are located in a joint housing.

V.A.G 1551 printer	Possible causes of fault	Fault remedy
01044 Control unit incorrectly encoded	- Proper encoding procedure for -E87 was not followed Wrong code was entered	- Code operating and display unit -E87 as specified =>Page 27
01087 Basic setting not performed	- Either a fault occurred during the "basic setting" function, or the ignition was switched off and -E87 was not able to complete the function. When -E87 was replaced, no basic setting was performed. The basic setting was performed on an -E87 that was incorrectly encoded or not encoded at all	- Check the coding of operating and display unit -E87 =>Page 24

Note:

The faults "control unit incorrectly encoded" and "basic setting not performed" are only displayed by an operating and display unit with one display.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
01206		



Signal for ignition off time	- Short circuit or open circuit between dash panel insert and -E87	- Use current flow diagram to locate and rectify short circuit or open circuit
Implausible signal /SP	- Dash panel insert defective	- Check signal from dash panel insert =>Reading measured value block, Page 44

Note:

If, when the ignition is switched on, no signal for "ignition off time" was recognised by the -E87 (from Model Year 1997, this will be sent by the dash panel insert), the -E87 assumes a standing time of more than 4 hours and it is assumed that the engine temperature is the same as the ambient temperature. Possible consequences:

- When the engine is warm, there may be a delay before the fresh-air blower starts, even though the engine is at operating temperature.

- The outside temperature display -G106 in the dash panel insert may display incorrect outside temperature values.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
01270 4121 Air conditioner magnetic clutch -N257)	- Short circuit or open circuit between - air conditioner compressor speed sender -G111 7) 8) and -E87	- Use current flow diagram to locate and rectify short circuit or open circuit Check air conditioner compressor speed sender -G111 =>Page 64
Open circuit /SP	- Open circuit between magnetic clutch relay -J44 and air conditioner magnetic clutch -N25	- Locate and rectify the open circuit using the current flow diagram
	- Open circuit in the power supply or in the wiring between the magnetic clutch relay -J44 and -E87	- Locate and rectify the open circuit using the current flow diagram
	- Magnetic clutch relay -J44 defective	- Renew magnetic clutch relay -J44
	Continued ▼	

7) Faults on the magnetic clutch are only detected on vehicles up to Model Year 1996 with sensor -G111 (Zexel compressor in combination with 6-cylinder engines).

8) The sensor -G111 generates 4 pulses per compressor revolution.

9) Magnetic clutch is engaged for a few seconds after the engine is started.

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Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
01270 4121 Air conditioner magnetic clutch -N257)	(Fault 01270 continued) - Air conditioner magnetic clutch -N25 defective	- Repair air conditioner magnetic clutch -N25 =>Page 131
Open circuit /SP	- Fault in the refrigerant circuit (sensor -G111 does not generate any signals or compressor blocked) 9)	- Send vehicle to an VW/Audi air conditioner service centre
Speed deviation too great /SP 10)	- Ribbed belt too slack	- Check belt tension: => Relevant Workshop Manual Engine, Mechanical Components; Repair group 13

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
	- Operating and display unit -E87 incorrectly encoded (to "Zexel"- instead of "Nippondenso/Denso" compressor) Continued ▼	- Check the coding of the operating and display unit -E87 => Page 27

7) Faults on the magnetic clutch are only detected on vehicles up to Model Year 1996 with sensor -G111 (Zexel compressor in combination with 6-cylinder engines).

9) Magnetic clutch is engaged for a few seconds after the engine is started.

10) If there is a deviation in speed of 30 %...60 %, the magnetic clutch is re-engaged by the -E87 max. 9 times during one driving period (ignition off).

If there is deviation in speed greater than 60 %, the magnetic clutch is disengaged until the engine is next started.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
01270 4121 Air conditioner magnetic clutch -N257)	(Fault 01270 continued) - Loose contact or contact resistance in the wiring between -N25 and -J44 or the wiring between -G111 and -E87	- Use current flow diagram to check and rectify open circuit => Electrical testing, Page 39
Speed deviation too great /SP 10)	- Air conditioner magnetic clutch -N25 defective (slip)	- Repair air conditioner magnetic clutch -N25 =>Page 131
Protected by copyright. Copying for private or commercial purposes is permitted unless authorised by AUDI AG. AUDI AG does not guarantee with respect to the correctness of information in this document. Copyright by AUDI AG.	- Incorrect crankshaft vibration damper (diameter)	- Check vibration damper => Parts List
	- Fault in refrigerant circuit (compressor stiff)	- Check freedom of movement of compressor, if still, send vehicle to an Audi and VW air-conditioning service centre.
	Continued ▼	

7) Faults on the magnetic clutch are only detected on vehicles up to Model Year 1996 with sensor -G111 (Zexel compressor in combination with 6-cylinder engines).

10) In the event of a speed deviation of 30 % - 60 %, the magnetic clutch is re-engaged by the -E87 max. 9 times during one driving period (ignition off).

If there is deviation in speed greater than 60 %, the magnetic clutch is disengaged until the engine is next started.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
01270 4121 Air conditioner magnetic clutch -N257)	(Fault 01270 continued) - Belt and clutch plate in the air conditioner magnetic clutch -N25 are stuck together.	- Repair magnetic clutch - N25 => Page 131
Mechanical fault /SP 11)	- Short to positive in wiring between air conditioner magnetic clutch -N25 and magnetic clutch relay -J44	- Locate and rectify the short circuit using the current flow diagram
	- Magnetic clutch relay - J44 defective	- Renew magnetic clutch relay -J44



	- Short to positive in the wiring between -E87 and -J44	- Locate and rectify the short circuit using the current flow diagram
--	---	---

7) Faults on the magnetic clutch are only detected on vehicles up to Model Year 1996 with sensor -G111 (Zexel compressor in combination with 6-cylinder engines).

11) Compressor runs continuously, cannot be switched off.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
01271 4122 Temperature flap positioning motor -V68 Blocked or without voltage /SP	- Short circuit, open circuit or wiring fault between -V68 and -E87 - Temperature flap stiff - Temperature flap positioning motor -V68 defective	- Use current flow diagram to locate and rectify short circuit, open circuit or wiring fault - Check the freedom of movement of the temperature flap - Check temperature flap positioning motor -V68 =>Final control diagnosis, Page 21
01272 4123 Central flap positioning motor -V70 Blocked or without voltage /SP	- Short circuit, open circuit or cabling fault between -V70 and -E87 - Central flap stiff - Central flap positioning motor -V70 defective	- Use current flow diagram to locate and rectify short circuit, open circuit or wiring fault - Check the freedom of movement of the central flap - Check central flap positioning motor -V70 =>Final control diagnosis, Page 21

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
01273 4124 Fresh-air blower -V2 Control difference /SP	- Short circuit or open circuit between fresh-air blower -V2, fresh-air blower control unit -J126 and/or -E87 - Open circuit in the power supply or earth connection to the control unit for the fresh-air blower -J126 - Fresh-air blower control unit -J126 defective - Fresh-air blower -V2 defective	- Use current flow diagram to locate and rectify short circuit or open circuit - Use the current flow diagram to locate and rectify the open circuit: - Check fresh-air blower control unit -J126 =>Electrical testing, Page 61 - Renew fresh-air blower -V2

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
01274 4131 Air-flow flap positioning motor -V71	- Short circuit, open circuit or wiring fault between -V71 and -E87	- Use current flow diagram to locate and rectify short circuit, open circuit or wiring fault

Blocked or without voltage /SP	- Air-flow flap or fresh-air and recirculated-air flap stiff	- Check freedom of movement of air-flow flap or fresh-air and recirculated-air flap
	- Air-flow flap positioning motor -V71 defective	- Check air flow flap positioning motor -V71 => Final control diagnosis, Page 21

Notes:

- ♦ Up to Model Year 1996, the installation of the positioning motor -V71 was dependent upon equipment and it is therefore not installed in all vehicles (e.g. not in right-hand drive vehicles).
- ♦ In vehicles from Model Year 1997, in addition to the air-flow flap, the positioning motor also controls the fresh-air and recirculated-air flap. In right-hand drive vehicles, the positioning motor only controls the fresh-air and recirculated-air flap. There is no air-flow flap.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
01296 Centre vent temperature sensor -G191 Short to earth/SP Open circuit/short to positive /SP	- Short circuit or open circuit between -G191 and -E87 Centre vent temperature sensor -G191 defective	- Use current flow diagram to locate and rectify short circuit or open circuit Centre vent temperature sensor -G191 Check -G191 =>Page 60
01297 Footwell vent temperature sensor -G192 Short to earth/SP Open circuit/short to positive /SP	- Short circuit or open circuit between -G192 and -E87 - Footwell vent temperature sensor -G192 defective	- Use current flow diagram to locate and rectify short circuit or open circuit - Check footwell vent temperature sensor -G192 =>Page 60

Note:

The centre vent temperature sensor -G191 and footwell vent temperature sensor -G192 are installed in vehicles from Model Year 1997.

Output on the V.A.G 1551 printer	Possible causes of fault	Fault remedy
01582 Coolant temperature signal Short to earth/SP Open circuit/short to positive /SP Implausible signal /SP	- Short circuit or open circuit between dash panel insert and -E87	- Use current flow diagram to locate and rectify short circuit or open circuit
	- Dash panel insert defective	- Check signal from dash panel insert =>Reading measured value block, Page 44
65535 Control unit defective	- Open circuit to -E87 (terminal 15 or terminal 31) - Loose contact or contact resistance in the wiring between the control unit and -E87	- Use the current flow diagram to locate and rectify the fault in the wiring
	- Operating and display unit -E87 defective	- Replace the operating and display unit -E87

Note:

The fault "signal for refrigerant temperature" is only detected by the operating and display units with one display.



4 - Final control diagnosis

4.1 - Final control diagnosis

Notes:

- ♦ Fitting locations for actuated components up to Model Year 1996=>from Page 166 .
- ♦ Fitting locations for actuated components as of Model Year 1997=>from Page 173 onwards.
- ♦ If necessary, the final control diagnosis may be repeated several times.
- ♦ Final control malfunctions are stored in the fault memory.
- ♦ To check the function "idle control" => Page 22 .
- ♦ During the final control diagnosis, the vehicle must not be moved and the engine speed must be less than 3000 rpm.
- ♦ During the final control diagnosis, the control is switched off and all segments in the -E87 displays are actuated.
- ♦ Vehicles up to Model Year 1996: With -E87 with Part No. 8D0 820 043 index "D", it may happen that during the final control diagnosis, the fault "air conditioner magnetic clutch -N25 mechanical fault /SP" is stored in the -E87 without any fault being present.
Remedy: After completing the final control diagnosis, interrogate the fault memory and erase it.
- ♦ Vehicles up to Model Year 1996: The air conditioner positioning motors are driven into a pre-defined position by the -E87 (from Part No. 8D0 820 043 index "D") after the function "Final control diagnosis" is selected.
 - Temperature flap positioning motor -V68: "Heating" stop
 - Central flap positioning motor -V70: "Air distribution footwell/defroster flap" stop
 - Footwell/defroster flap positioning motor -V85: "Air distribution windscreen" stopTherefore, during the final control diagnosis, it is no longer necessary to wait until the positioning motors have reached a specified position.
- ♦ In contrast to the subsequent software versions, with software version "D61", the following should be noted:
 - The specified position of the temperature flap positioning motor -V68 is the stop "Cold" (instead of the stop "Heating").
 - The specified position of the central flap positioning motor -V70 is the stop "Air to dash panel -vents" (instead of the stop "Air to footwell /defroster flap")The function of the footwell/defroster flap positioning motor -V85 and the footwell/ defroster flap can therefore not be checked during the final control diagnosis in the software version "D61".
Remedy:
 - Terminate the final control diagnosis.
 - Select function "Reading measured value block" and actuate positioning motors using the control buttons on the -E87 and observe the change in the measured values on the V.A.G 1551 (display group 004) and the air distribution.
- ♦ Vehicles from Model Year 1997: After the selection of the function "Final control diagnosis", the -E87 moves the air conditioner positioning motors into a predefined position. Therefore, during the final control diagnosis, it is not necessary to wait until the positioning motors have reached a specified position.

Starting final control diagnosis

- Connect the fault reader V.A.G 1551 (V.A.G 1552) and use "Address word" 08 to select the air conditioner/heating electronics.
(Connecting fault reader => Page 4 .)
- Start the engine.
- Set the operating mode "Auto" on the operating and display unit -E87 (compressor running).
- Open the dash panel vents.
- Set air distribution to dash panel vents.
- Press the PRINT key to switch on the printer - (indicator lamp in key lights up).
- Interrogate fault memory => Page 6 .

-> Indicated on display

Rapid data transfer	HELP
Select function XX	

- Enter "03" to select the function "Final control diagnosis".

-> Indicated on display

Rapid data transfer	Q
03 - Final control diagnosis	

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- Confirm entry with Q key.

-> Indicated on display

Final control diagnosis
Magnetic clutch -N25

- Press the =>key to switch to the next component. Function and sequence =>Table of final controls actuated, Page 19 .

-> Indicated on display

Function unknown or cannot
be executed at present.

The final control diagnosis is complete.

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Notes:

- ◆ Final control diagnosis can be terminated by pressing the C key.
- ◆ Interrogating fault memory on completion of final control diagnosis => Page 6 .
- ◆ On the termination of the final control diagnosis, interrogate the fault memory => Page 42 .
- ◆ The actuation of the temperature sensor blower -V42 is performed on an operating and display unit
 - with one display after the actuation of the radiator fan.
 - with two displays after the actuation of the air-flow flap positioning motor.
- ◆ The actuation of the outside air temperature display -G106 is performed on an operating and display unit
 - with one display after the actuation of the air-flow flap positioning motor.
 - with two displays after the actuation of the idle control.
- ◆ On operating and display units with one display, after the actuation of the last component, the end of the final control diagnosis is indicated (display on the fault reader "END").

Final controls actuated

Indicated on display	Desired function	Fault remedy
Air conditioner magnetic clutch - N25	- The magnetic clutch is engaged and disengaged in a 3-second cycle -, the compressor is driven with the magnetic clutch engaged	- Use the current flow diagram to check the power supply for the magnetic clutch -N25 (via relay - J44) Repair magnetic clutch -N25 => Page 131
▪ The output "Compressor intervention" connector C, contact 12 is actuated at the same time 1)	The output from the operating and display unit-E87 is switched in a 2-second cycle from 0 V to 12 V; checking => Page 23	- Use the current flow diagram to check the cabling between -E87, - J44 and -N25 Replace operating and display unit -E87 => Page 154

- 1) Only check the output "Compressor intervention", if complaints have been received.

Notes:

- ◆ The engine control unit uses the signal "air conditioner intervention" to compensate the brief additional engine loading when the compressor is switched on. The compressor may also be switched off by the motor control unit via this output (input) =>Reading measured value block, display group 001, Page 42 or:

=> Relevant Workshop Manual for Injection and Ignition System; Repair group 24

=> Relevant Workshop Manual for Diesel Direct Injection and Glow Plug System; Repair group 23



- ♦ Check the output, for example by switching the compressor on and off using the "Frost symbol" button or ECON button, while the control unit's measured value block is read with the engine running:

=> Relevant Workshop Manual for Injection and Ignition system; Repair group 24

=> Relevant Workshop Manual for Diesel Direct Injection and Glow Plug System; Repair group 23

Indicated on display	Desired function	Fault remedy
Fresh-air blower -V2	- Fresh-air blower -V2 running ▪ Fresh-air blower voltage for 2 seconds in each case: ▪ 0 V, 3 V, 6 V, 9 V, 12 V, 15 V, ▪ 0 V etc.	- Check the freedom of movement of the fresh-air blower - Use the current flow diagram to check the earth connection for the fresh-air blower control unit -J126 Check fresh-air blower control unit - J126 => Page 154
DANGER: Fan is switched on	Info display WARNING: After the next actuation of the ➔key, the radiator fan -V7 is switched on. Do not reach into the fan area.	

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Indicated on display	Desired function	Fault remedy
Radiator fan -V7	- The radiator fan -V7 is switched on and off in a 5-second-cycle.	- Use the current flow diagram to check the wiring between the operating and display unit -E87 and the radiator fan relay -J26 for open circuit or short to positive Check the actuation of the radiator fan -V7 from the radiator fan relay -J26: => "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder Check the function of the radiator fan relay -J26 => Page 154

Note:

The radiator fan -V7 is switched to the 2nd speed by the radiator fan 2nd speed relay -J101:

- when radiator fan thermoswitch-F54 is closed

- when air conditioner high-pressure switch -F23 / air conditioner pressure switch -F129 is closed (switch section for radiator fan).

Indicated on display	Desired function	Fault remedy
Two-way valve for fresh-air and recirculated-air flap - N63	- Fresh-air and recirculated-air flap switches in a 5-second cycle between fresh air - and air recirculation mode.	- Check vacuum supply via the two-way valve -N63 => Page 164 Replace two-way valve - N63

Notes:

- ♦ The "two-way valve for the fresh-air and recirculated-air flap -N63" is only present in vehicles up to Model Year 1996 and is addressed in the final control diagnosis.

- ♦ Vehicles from Model Year 1997 are not fitted with the "two-way valve for the fresh-air and recirculated-air flap -N63" (the fresh-air and recirculated-air flap is operated by the positioning motor -V71).

Indicated on display	Desired function	Fault remedy
Temperature flap positioning motor -V68 - With -E87 with Part No. 8D0 820 043 up to index "C": Wait until the temperature flap is at the "Heating" stop, then press the ➡key	- Positioning motor -V68 moves from stop to stop ▪ Fresh air blower is running ▪ Air temperature from the vents changes	- Check the freedom of movement of the temperature flap - Use current flow diagram to check the wiring between the temperature flap positioning motor -V68 and the operating and display unit -E87 for open circuit or interchange Check temperature flap positioning motor -V68 => Page 154

Indicated on display	Desired function	Fault remedy
Central flap positioning motor -V70 - With -E87 with Part No. 8D0 820 043 up to index "C": Wait until the central flap is at the stop "Air to footwell/defroster flap", then press ➡key Close all dash panel vents	- Positioning motor -V70 moves from stop to stop ▪ Fresh air blower is running ▪ Air distribution changes from footwell/defroster to dash panel vents	- Check the freedom of movement of the central flap - Use current flow diagram to check wiring between positioning motor -V70 and the control and display -E87 for open circuit or interchange Check air-flow flap positioning motor -V70 => Page 154
Positioning motor for footwell/ defroster flap -V85 - With -E87 with Part No. 8D0 820 043 up to index "C": Wait until the footwell/defroster flap is at the stop "Air to windscreen", then press ➡key	- Positioning motor -V85 moves from stop to stop ▪ Fresh air blower is running ▪ Air distribution changes from footwell to defrost	- Check freedom of movement of footwell/defroster flap - Use current flow diagram to check wiring between positioning motor -V85 and the control and display -E87 for open circuit or interchange Check footwell/defroster flap positioning motor -V85 => Page 154

Indicated on display	Desired function	Fault remedy
Air-flow flap positioning motor -V71	- Positioning motor -V71 moves from stop to stop Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted. This document is the property of Audi AG. Audi AG does not accept any liability for errors or omissions. Fresh air blower is running ▪ Air throughput changes (air-flow flap) Additionally, on vehicles from Model Year 1997: ▪ Air conditioner changes between fresh-air and air recirculation mode (fresh-air and recirculated-air flap)	- Check freedom of movement of air-flow flap or fresh-air and recirculated-air flap - Use current flow diagram to check the wiring between the positioning motor -V71 and the operating and display unit -E87 for open circuit or interchange Check air flow flap positioning motor -V71 => Page 154

Notes:

- ♦ Up to Model Year 1996, the installation of the positioning motor -V71 was dependent upon equipment and it is therefore not installed in all vehicles (e.g. not in right-hand drive vehicles).
- ♦ In vehicles from Model Year 1997, in addition to the air-flow flap, the positioning motor also controls the fresh-air and recirculated-air flap. In right-hand drive vehicles, the positioning motor only controls the fresh-air and recirculated-air flap. There is no air-flow flap.



Indicated on display	Desired function	Fault remedy
Temperature sensor blower -V42 2) - Test operation of blower - V42, for example using smoke test (hold smoke source in front of the intake frame in the centre part of the dash panel)	- Temperature sensor blower -V42 in the dash panel is switched on and off in a 5-second cycle - (smoke is drawn in by blower)	- Use the current flow diagram to check the wiring between the blower -V42 and operating and display unit - E87 for open circuit or short to earth - Use current flow diagram to check power supply for blower -V42 Check intake frame and intake hose for blockage => Page 154
Segment test	- All segments of the operating and display unit - E87 are switched on and off in a 3-second cycle	- Replace the bulbs in the operating and display unit - E87=> Page 154

2) The temperature sensor blower -V42 is installed in the operating and display unit -E87 with only one display.

3) In vehicles from Model Year 1997, LEDs are installed instead of bulbs and these cannot be replaced individually.

Indicated on display	Desired function	Fault remedy
Idle control 4)	- The output from the operating and display unit - E87 is switched in a 5-second cycle from 0 V to 12 V; checking => Page 23	
External temperature display -G106 (in driver information system)	- Ambient temperature display -G106 (in the driver information system) is incremented from 40 °C or °F (approx. 3 seconds per increment) 5)	- Use current flow diagram to check wiring and connectors between the driver information system and the operating and display unit -E87 for open circuit or short circuit Use current flow diagram to check positive and earth connection for ambient temperature display -G106 for open circuit Check driver information system => Electrical System; Repair group 01; Dash panel insert self-diagnosis 154
End	Info display (only in operating and display units with one display)	

4) Depending upon the vehicle equipment, when the rear window heating is switched on, a positive signal is applied to this output (switch off heated rear window for the test).

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

5) In vehicles with an automatic gearbox and driver information system, the external temperature is only displayed with gear engaged

=> Owner's manual

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Starting the "idling speed control" final control diagnosis.

- Switch ignition off.
- Remove the engine control unit and connect the appropriate test box to the connector to the engine control unit (the engine control unit is not connected to the test box):

=> Relevant Workshop Manual for Injection and Ignition System; Repair group 24;

=> Relevant Workshop Manual for Diesel Direct Injection and Glow Plug System; Repair group 23

Note:

Pin assignment on connector to engine control unit

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

- Connect the fault reader V.A.G 1551 (V.A.G 1552) and use "Address word" 08 to select the air conditioner/heating electronics.
(Connecting fault reader => Page 4.)
- Press the PRINT key to switch on the printer - (indicator lamp in key lights up).
- Switch the ignition on.
- Switch off rear window heating.

-> Indicated on display

Rapid data transfer HELP
Select function XX

- Enter "03" to select the function "Final control diagnosis".

-> Indicated on display

Rapid data transfer Q
03 - Final control diagnosis

- Confirm entry with Q key.

-> Indicated on display

Function unknown or cannot
be executed at present.

- Press =>key.
- Enter "03" again.

-> Indicated on display

Rapid data transfer Q
03 - Final control diagnosis

- Confirm entry with Q key.

Note:

*Re-entering the function "Final control diagnosis" does not cause the magnetic clutch -N25 to be actuated
=>Reading measured value block, display group 001 => Page 42.*

- Connect the V.A.G 1527 B voltage tester between the earth and the input to be tested (to the engine control unit) on the test box.
- Press the =>key repeatedly until "idling speed regulation" appears on the display.



Indicated on display	Desired function	Fault remedy
Idling speed regulation 1)	- The output from the operating and display unit -E87, connector A, contact 2 is switched in a 5-second cycle from 0 V to 12 V (LED in the V.A.G 1527 B flashes)	- Use current flow diagram to check wiring and connectors between the operating and display unit -E87 and the engine control unit 2) Replace operating and display unit -E87 => Page 154

1) Causes an increase in the idle speed or a change in the pilot control value in the engine control unit.

2) Check with the engine control unit installed:

=> Relevant Workshop Manual for Injection and Ignition System; Repair group 24; Checking additional signals; Checking signals from/to the air conditioner

=> Relevant Workshop Manual for Diesel Direct Injection and Glow Plug System; Repair group 23; Checking signals from/to the air conditioner

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The output "increase idle speed" is not actuated if the compressor is switched off manually (during normal control).

5 - Basic setting

5.1 - Basic setting

Preconditions:

- Coding checked and corrected if necessary => Page 27 .
- Fault memory interrogated => Page 25 .
- Engine still idling after the interrogation of the fault memory
- Air conditioner switched on ("auto" mode).

-> Indicated on display

Rapid data transfer HELP
Select function XX

- Enter "04" for the function "Starting basic setting".

-> Indicated on display

Rapid data transfer Q
04 - Starting basic setting

- Confirm entry with Q key.

-> Indicated on display

Initiate basic setting Q
Enter display group number XXX

- Enter "001" for "display group number 001" and confirm entry with Q key.

The following positioning motors are actuated consecutively and their end positions stored in the operating and display unit -E87 (resistances of potentiometers installed in the positioning motors).

- ♦ Temperature flap positioning motor -V68
- ♦ Central flap positioning motor -V70
- ♦ Footwell/defroster flap positioning motor -V85:

- ♦ Air-flow flap positioning motor -V71

Note:

Up to Model Year 1996, the installation of the positioning motor -V71 was dependent upon equipment and it is therefore not installed in all vehicles (e.g. not in right-hand drive vehicles).

-> Display readout:

Basic setting 1			
XXX	XXX	XXX	XXX

It is possible to track the movement of the positioning motors on the display (feedback values change).

-> Display readout:

Basic setting 1			
0	0	0	0

When the display zones show 0, the basic setting is finished.

- Press ⇒key.

-> Indicated on display

Rapid data transfer	HELP
Select function XX	

- Interrogate fault memory => Page 6 .
- When the last fault has been displayed and printed out, rectify the faults according to the fault table => Page 7 .

Notes for vehicles up to Model Year 1996:

- ♦ The positioning motor -V71 or the refrigerant temperature sensor -G110 depend upon the equipment and are therefore not installed in all vehicles. During the basic setting, equipment-related absence is stored as a fault.
 - Refrigerant temperature sensor -G110 "Open-circuit /short to positive /SP".
 - Potentiometer -G113 in positioning motor-V71 "Open-circuit/short to positive /SP".
 - Check whether these components are installed in the vehicle.
 - If they are not installed, when the last fault has been displayed and printed out, press the ⇒ key.
 - Erase the fault memory => Page 01-67.
- ♦ The interrogation and erasure of the fault memory immediately after the basic setting cause an equipment-related absence of the positioning motor -V71 and/or the refrigerant temperature sensor -G110 to be stored and no longer displayed until the initiation of the next basic setting.

6 - Erasing fault memory, ending output

6.1 - Erasing fault memory, ending output

Prerequisite:

- Fault memory interrogated.

Erase fault memory Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> Indicated on display

Rapid data transfer	HELP
Select function XX	



- Enter "05" for function "Erasing fault memory".

-> Indicated on display

Rapid data transfer Q
05 - Erase fault memory

- Confirm entry with Q key.

-> Indicated on display

Rapid data transfer
Fault memory is erased

- Press =>key.

-> Indicated on display:

Rapid data transfer HELP
Select function XX

Notes:

-> Indicated on display

Important:
Fault memory has not been interrogated

- ♦ Sequence has not been correctly followed.
 - Interrogate fault memory.
 - Rectify any faults.
- ♦ Fault memory is not erased if, for example, ignition is switched off between interrogating and erasing fault memory.

End of output

Note:

The fault memory has been interrogated and erased, basic setting has been performed, and the encoding has been checked.

-> Indicated on display

Rapid data transfer HELP
Select function XX

- Press keys 0 and 6 for the function "End output".

-> Indicated on display

Rapid data transfer Q
06 - End of output

- Confirm entry with Q key.

-> Indicated on display

Rapid data transfer HELP
Enter address word XX

- Switch off ignition and detach diagnostic connector.

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7 - Encoding operating and display unit -E87

7.1 - Encoding operating and display unit -E87

Note:

After each coding, basic setting must be performed => Page 24 .

- Connect the fault reader V.A.G 1551 (V.A.G 1552) and use "Address word" 08 to select the air conditioner/heating electronics.
(Connecting fault reader => Page 4 .)

-> Indicated on display

Rapid data transfer HELP
Select function XX

- Enter "07" for the function "Coding control unit"

-> Indicated on display

Rapid data transfer Q
07 - Coding control unit

- Confirm entry with Q key.

-> Indicated on display:

Code control unit Q
Enter code number XXXXX 0-32000

- Enter the control unit code according to the Model Year and the Part No. of the operating and display unit -E87 as shown in the encoding table => from Page 28 .

Assignment of the operating and display unit -E87

Part number	Special features
8D0 820 043 C	Static self-diagnosis, control is deactivated during self-diagnosis
8D0 820 043 D...G	- During the self-diagnosis, control is only switched off for final control diagnosis and basic setting - In vehicles with 6-cylinder engines, may only be combined with Zexel compressors
8D0 820 043 from H	For all vehicles up to Model Year 96
8L0 820 043 A...C	For all vehicles of Model Year 97 (lighting via terminals 58 and 58d)
8L0 820 043 from D	For all vehicles from Model Year 98 without radio navigation system up to chassis number 199999 of Model Year 1999 (lighting also controlled by terminal 58s)

Part number	Special features
8D0 820 043 K or L	Design with only one display (in vehicles with radio navigation system up to chassis number 199999 of Model Year 1999)



Part number	Special features
8D0 820 043 from M	Design with only one display (for vehicles from chassis number 200000 of Model Year 1999)

Notes:

- ♦ Precise assignment of the operating and display unit -E87

=> Parts List

- ♦ If a new -E87 operating and display unit is installed and not encoded, the -E87's display flashes for approximately 2 minutes (after the ignition is switched on).
- ♦ Vehicles up to Model Year 1996: If an invalid code is entered in the operating and display unit -E87, it is suppressed and the code "00042" (4-cyl. petrol engine / USA) is stored.
- ♦ Vehicles up to Model Year 1996: With a Nippondenso-/Denso compressor, only one operating and display unit -E87 with Part No. as of index "H" can be installed (it is only from this index on that the -E87 can be coded for example on a 6-cylinder engine for a compressor without air conditioner compressor speed sender -G111).
- ♦ Vehicles from Model Year 1997: If an invalid code is entered in the operating and display unit -E87, it is suppressed and the code "04142" (Audi A4 - 4-cyl. petrol engine / USA) is stored.

7.2 - Encoding table up to Model Year 1996

Code	Meaning
00	Filling characters, no assignment
0	Zexel compressor
1	Nippondenso or Denso compressor (only possible from index "H")
4	4-cylinder engine
6	6-cylinder engine
0	Left-hand drive petrol engine
1	Right-hand drive petrol engine
2	USA petrol engine
3	Left-hand drive TDI engine
4	Right-hand drive TDI engine
5	USA TDI engine

Examples of code

00040	4-cyl. left-hand drive petrol engine with Zexel compressor
00160	6-cyl. left-hand drive petrol engine with Nippondenso/Denso compressor

7.3 - Encoding table from Model Year 1997 to Model Year 1998 /1999

Notes:

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- ♦ In vehicles with an operating and display unit -E87 with two displays
 - not in vehicles with a radio navigation system
 - in vehicles without a radio navigation system up to chassis number 199999 of Model Year 1999

Code	Meaning
------	---------

0	Filling position, no assignment
4	Audi A4
1	Compressor without speed sensor -G111
4	4-cylinder engine
6	6-cylinder engine
0	Left-hand drive petrol engine
1	Right-hand drive petrol engine
2	USA petrol engine
3	Left-hand drive TDI engine
4	Right-hand drive TDI engine
5	USA TDI engine

Examples of code

04140	4-cyl. left-hand drive petrol engine
04163	6-cyl. left-hand drive TDI engine

7.4 - Encoding table from Model Year 1998/1999 (for -E87 with one display)

Notes:

- ♦ In vehicles with an operating and display unit -E87 with one display
- ♦ Operating and display units -E87 with Part Number 8D0 820 043 and index "K" or "L" have only one display and are installed in the following vehicles:
 - in vehicles with a radio navigation system (gradually introduced in Model Year 1998) up to chassis number 199999 for Model Year 1999
- ♦ Operating and display units -E87 with Part Number 8D0 820 043 from Index "M" have only one display and are installed in the following vehicles:
 - vehicles as from chassis number 200000 for Model Year 1999

Code	Meaning
04	Vehicle type (04 = Audi A4) for -E87 with index "K" or "L"
00	Filling characters, no assignment for -E87 as of index "M"
0	Rest of the world (ROW) except for USA and Japan
1	USA
2	Japan
4	4-cylinder engine
6	6-cylinder engine
0	Left-hand drive petrol engine
1	Right-hand drive petrol engine
3	Left-hand drive TDI engine
4	Right-hand drive TDI engine

Example of code (for -E87 as of index "M")

00040	ROW 4-cyl. left-hand drive petrol engine
00041	ROW 4-cyl. right-hand drive petrol engine



8 - Reading measured value block

8.1 - Reading measured value block

Note:

To check the speed signal after switching on the ignition, move the vehicle a few metres at walking speed.

Preconditions:

- Fault memory interrogated => Page 25 .
- Engine still idling after the interrogation of the fault memory
- Air conditioner system switched on.
- Run fresh-air blower for approx. 1 minute at a high speed (only operating and display unit with Part No. 8D0 820 043 index "C").

-> Indicated on display

Rapid data transfer	HELP
Select function XX	

- Press the PRINT key to switch on the printer - (indicator lamp in key lights up).
- Enter "08" for the function "Reading measured value block" and confirm entry with Q key.

-> Indicated on display

Rapid data transfer	Q
08 - Read measured value block	

- Confirm entry with Q key.

-> Indicated on display

Reading measured value block	Q
Enter display group number XXX	

- Enter the display group number. =>Overview of display group numbers to be selected.
 - Vehicles to Model Year 1996 =>Page 31 .
 - Vehicles from Model Year 1997 =>from Page 41 .

-> Display readout:

Reading measured value block X
1 2 3 4

The measured value block shows 4 display zones:

Note:

To change to another display group, proceed as follows:

Display group	V.A.G 1551	V.A.G 1552
Higher	Press key 3	Press ↑ key
Lower	Press key 1	Press ↓ key
Skip	Press the C key	Press the C key

Notes:

- ♦ If the printer is switched on, the current display will be recorded in the form of a printout.
- ♦ If displayed values are to be read out while moving, a second operator is required.
- ♦ Observe safety precautions=> Page 3 .

- Press ⇒key if specified values are attained.

-> Display function selection):

Rapid data transfer HELP
Select function XX

Notes for -E87 with Part No. 8D0 820 043 index "C":

During the self-diagnosis, the air conditioner control is switched off. When reading the different measured value blocks, note the following:

- ◆ All display zones marked with an * indicate the measured value valid on entering self-diagnosis mode.
- ◆ All display zones not marked with a * indicate the current measured value.
- ◆ If the displayed values are in display groups 002 - 005 (display zones 1 and 2) are ambient the permitted tolerances:
 - Terminate the self-diagnosis.
 - If necessary, alter setting on the operating and display unit -E87.
 - Run fresh-air blower at high speed for approx. 1 minute.
 - Initiate self-diagnosis and read out measured value block.

Notes for -E87 with Part No. 8D0 820 043 from index "D" or Part No. 8L0 820 043 from index "A":

- ◆ During the self-diagnosis, the air conditioner control is kept on.
- ◆ The display groups 002 - 005 display the currently valid actual or specified value or the last value learnt and stored for the limit stops of the individual positioning motors during the basic setting.
- ◆ The control button on the -E87 may be pressed to change the setting of the positioning motors and hence the flaps during the self-diagnosis. The current actual and specified values may be read directly from the fault reader display.
- ◆ In Model Year 1996, in vehicles with 6-cylinder engines, compressors from the manufacturer "Nippondenso/Denso" are gradually replacing the former Zexel compressor. The air conditioner compressor speed sensor -G111 is omitted.

8.2 - Vehicles up to Model Year 1996

List of available group numbers

Display group no.	Display zone	Designation	Details on Page
001	1*	Compressor shutoff criteria	32
	2*	Voltage for magnetic clutch -N25	
	3*	Voltage, terminal "75" in V	
	4	Display zone not used.	
002	1...4*	Temperature flap positioning motor -V68	35
003	1...4*	Central flap positioning motor -V70	46
004	1...4*	Footwell/defroster flap positioning motor -V85:	36
005	1...4*	Air flow flap positioning motor -V71 1)	37

1) Up to Model Year 1996, the air-flow flap positioning motor -V71 was dependent upon equipment and it is therefore not installed in all vehicles (e.g. not in right-hand drive vehicles).

Display group no.	Display zone	Designation	Details on Page
006	1*	Calculated ambient temperature (for ambient temperature display -G106)	38
	2	Fresh air intake duct temperature sensor -G89	
	3	Outside temperature sensor -G17	
	4	Display zone not used.	
007	1	Sunlight penetration photosensor -G107	38
	2	Dash panel temperature sensor -G56	



Display group no.	Display zone	Designation	Details on Page
008	3	Coolant temperature	39
	4	Display zone not used.	
	1*	Specified voltage at fresh-air blower -V2	
	2*	Actual voltage at fresh-air blower -V2	
	3*	Voltage at terminal "58D" (downstream of light control -E20) in V	
	4*	Side lights, terminal "58"	

Display group no.	Display zone	Designation	Details on Page
009	1*	Engine speed	39
	2*	Compressor speed	
	3*	Vehicle speed	
	4	Auxiliary heater	
010	1	Kickdown switch for air conditioner	40
	2	Temperature switch for coolant "too hot"	
	3	Air conditioner compressor cut-in	
	4	High-pressure switch for magnetic clutch - F118	

Display group 001:

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Compressor shut-off criteria, voltage for the magnetic clutch and at terminal "15" or "75"**Notes:**

- ♦ If one of the compressor shutoff criteria 1, 8, 11 or 12 exists, the magnetic clutch -N25 cannot be actuated during the final control diagnosis (=>Page 18).
- ♦ If the compressor shutoff criterion "5" appears in addition to another compressor shutoff condition, ignore shutoff criterion "5".
- ♦ If several compressor shutoff conditions exist simultaneously (display zone 1), the display will either show them all alternately or it will show only the shutoff condition which is assigned the highest priority by the operating and display unit -E87.

Display zone	Meaning	Cause of fault/fault remedy
1	Code	Compressor shutoff criteria
	0	Compressor on No compressor shutoff criterion detected
	1	Compressor off High-pressure switch for magnetic clutch -F118 open
	2	Compressor off

Display zone	Meaning	Cause of fault/fault remedy
(cont.) t	a) No compressor speed signal detected	- Open circuit or short to earth / positive terminal between air conditioner compressor speed sensor -G111 and connector C, contact 5 to operating and display unit -E87 1) - Magnetic clutch -N25 defective Repair magnetic clutch -N25 => Page 64

1) After each re-start of the operating and display unit -E87, the air conditioner compressor should be deactivated and reactivated after a short time, as no speed signals are detected.

Display zone	Meaning	Cause of fault/fault remedy
1	Code	Compressor shutoff criteria
	2	Compressor off
	b) Operating and display unit -E87 incorrectly encoded	- Operating and display unit -E87 encoded to Zexel instead of "Nippondenso/Denso" compressor) Check coding of operating and display unit -E87 => Page 27
	c) Belt slip greater than 60% once or greater than 30%, but less than 60%, ten times	- Open circuit or loose contact between air conditioner compressor speed sensor -G111 and connector C, contact 5 for the operating and display unit - -E87 1) - Belt tension not OK - Compressor stiff
(cont.) t	3	Compressor off Low-pressure switch for refrigerant circuit -F73 open2)
		- Check refrigeration capacity => Page 54 onwards

1) After each re-start of the operating and display unit -E87, the air conditioner compressor should be deactivated and reactivated after a short time, as no speed signals are detected.

2) Voltage at connector C, contact 3 less than 6 V

Display zone	Meaning	Cause of fault/fault remedy
1	Code	Compressor shutoff criteria
	4	Compressor off (for 12 s) Kickdown
	5	Compressor off a) Engine speed less than 300 rpm

- Control unit for automatic gearbox -J217 has switched input to earth

- Kickdown switch for air conditioner -F46 (depending upon equipment) closed

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

=> Relevant Workshop Manual for Automatic Gearbox; Repair group 01, Self-diagnosis

- Short to earth in the wiring between the control unit -J217/kickdown switch -F46 and connector C, contact 1 to operating and display unit -E87

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Display zone	Meaning	Cause of fault/fault remedy
(cont.) t	b) No engine speed detected	- Open circuit between dash panel insert, engine control unit and connector C, contact 6 to the operating and display unit -E87 - Motor control unit or dash panel insert does not output a speed signal Test the engine speed signal: => Electrical System; Repair group 90; Checking the multiple connectors in the dash panel insert Checking the multiple connectors in the dash panel insert

Display zone	Meaning	Cause of fault/fault remedy
1 t	Code Compressor shutoff criteria	
	6 Compressor off Compressor switched off by "ECON" button (button with the frost symbol) on the operating and display unit -E87	- Switch the compressor on
	7 Compressor off Air conditioner switched off by the "-"-button for fresh-air blower on the operating and display unit -E87	- Switch the air conditioner on
(cont.) t	8 Compressor off Measured ambient temperature lower than 2 °C	- Ambient temperature lower than +5 °C Place the vehicle in a heated room for the test - Ambient temperature sensor -G17 or fresh air intake duct temperature sensor -G89 supply incorrect values Check the ambient temperature sensor -G17 and the fresh air intake duct temperature sensor -G89 => display group 006, Page 38

Display zone	Meaning	Cause of fault/fault remedy
1	Code	Compressor shutoff criteria
	9	Display zone not used.
	10	Compressor off Supply voltage at the magnetic clutch -N25 less than 9.5 V
	11	Compressor off Engine temperature too high

- => Display zone 2 and fault table, Page 7
Use the current flow diagram to check the power supply for the magnetic clutch -N25 (via relay J44)

- Dash panel insert has detected an excessive engine temperature
=> Electrical System; Repair group 90; Checking the multiple connectors in the dash panel insert
Checking the multiple connectors in the dash panel insert
- Short to earth in the wiring between the dash panel insert and connector A, contact 11 to the operating and display unit -E87

Display zone	Meaning	Cause of fault/fault remedy
(cont.) t	Control unit for the diesel direct-injection system -J248 has switched to earth input	- Interrogate fault memory for control unit for diesel direct-injection system -J28, if necessary rectify any faults => Relevant Workshop Manual for Diesel Direct Injection and Glow Plug System; Repair group 01 - Short to earth in the wiring between the control unit -J248 and connector A, contact 11 to the operating and display unit -E87

Display zone	Meaning	Cause of fault/fault remedy
1	12 Compressor off Air conditioner compressor cut-in	- Motor control unit has switched off the air conditioner compressor => display group 010, Page 18
	13 Compressor off Compressor cut-in delay (approx. 10 seconds) at engine speeds above 6000 rpm	Of no significance for customer service
	14 Compressor off High-pressure switch -F118 switched off 30 times during the current driving period	- Loose contact in the wiring between the high-pressure switch -F118 and operating and display unit -E87 - Fault at switch -F118 or in the refrigerant circuit => Fault table, Page 64 .

Display zone	Meaning	Explanatory Notes
2	Supply voltage for the magnetic clutch -N25 in V, connector C, contact 3	- Greater than 9.5 V, when magnetic clutch -N25 is switched on => Display zone 1, code 10 and Fault table, Page 7
3	Voltage, terminal 190.50 cm V	Connector D, contact 9 to the operating and display unit -E87
4	Display zone not used.	

Note on display zone 2:

If a voltage of between 4 and 6 V is displayed => display zone 1, code 3 and electrical testing => Page 54 onwards.

Note on display zone 3:

If the display value with the engine running is less than 12 V, check the positive or earth connection of operating and display unit -E87:

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

Display group 002: Temperature flap positioning motor -V68

Display zone	Meaning	Explanatory Notes
1	Actual feedback value of potentiometer -G92 (in the positioning motor -V68)	▪ Display value greater than 5 and less than 250 ▪ Maximum permissible deviation 3 units from the specified feedback value (only in the range greater than 55 but less than 200)



Display zone	Meaning	Explanatory Notes
2	Specified feedback value for potentiometer -G92 (calculated by -E87)	▪ Display range 5 - 250
3	-G92 value determined during the "basic setting" and stored in the -E87 with positioning motor in the setting "Heating stop" (the temperature flap guides the air flow through the heat exchanger)	▪ Display value greater than 5 and less than 55
4	-G92 value determined during the "basic setting" and stored in the -E87 with positioning motor in the setting "Cooling stop" (the temperature flap guides the air flow past the heat exchanger)	▪ Display value greater than 200 and less than 250

Notes:

- ♦ If the feedback value in display zone 1 is less than 5 (short circuit) or greater than 250 (open circuit), perform electrical test => Page 54 onwards.
- ♦ The actual feedback value (between 5 and 55 and between 200 and 250) is specified as the permitted tolerance range for the positioning motor stop or the flap in the operating and display unit -E87.
- ♦ If the display values in display zones 3 or 4 are ambient the permitted range => Fault table, Page 7 .

Display group 003: Central flap positioning motor -V70

Display zone	Meaning	Explanatory Notes
1	Actual feedback value for potentiometer -G112 (in the positioning motor -V70)	▪ Display value greater than 5 and less than 250 ▪ Maximum permissible deviation 3 units from the specified feedback value (only in the range greater than 55 but less than 200)
2	Specified feedback value for potentiometer -G112 (calculated by -E87)	▪ Display range 5 - 250
3	-G112 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Lower stop" (the temperature flap guides the air flow to the footwell/defroster flap)	▪ Display value greater than 5 and less than 55
4	-G112 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Upper Stop" (the temperature flap guides the air flow to the dash panel vents)	▪ Display value greater than 200 and less than 250

Notes:

- ♦ If the feedback value in display zone 1 is less than 5 (short circuit) or greater than 250 (open circuit), perform electrical test => Page 54 onwards.
- ♦ The actual feedback value (between 5 and 55 and between 200 and 250) is specified as the permitted tolerance range for the positioning motor stop or the flap in the operating and display unit -E87.
- ♦ If the display values in display zones 3 or 4 are ambient the permitted range => Fault table, Page 7 .

Display group 004: Footwell/defroster flap positioning motor -V85:

Display zone	Meaning	Explanatory Notes
1	Actual feedback value for potentiometer -G114 (in the positioning motor -V85)	▪ Display value greater than 5 and less than 250 ▪ Maximum permissible deviation 3 units from the specified feedback value (only in the range greater than 55 but less than 200)
2	Specified feedback value for potentiometer -G114 (calculated by -E87)	▪ Display range 5 - 250

Display zone	Meaning	Explanatory Notes
3	-G114 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Lower stop" (the footwell/defroster flap guides the air flow to the dash panel defroster vents)	▪ Display value greater than 5 and less than 55
4	-G114 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Upper stop" (the footwell/defroster flap guides the air flow to the vents in the footwell)	▪ Display value greater than 200 and less than 250

Notes:

- ♦ If the feedback value in display zone 1 is less than 5 (short circuit) or greater than 250 (open circuit), perform electrical test => Page 54 onwards.
- ♦ The actual feedback value (between 5 and 55 and between 200 and 250) is specified as the permitted tolerance range for the positioning motor stop or the flap in the operating and display unit -E87.
- ♦ If the display values in display zones 3 or 4 are ambient the permitted range => Fault table, Page 7.

Display group 005: Air-flow flap positioning motor -V71

Display zone	Meaning	Explanatory Notes
1	Actual feedback value of potentiometer -G113 (in the positioning motor -V71)	▪ Display value greater than 5 and less than 250 ▪ Maximum permissible deviation 3 units from the specified feedback value (in the range greater than 55 but less than 200)
2	Specified feedback value for potentiometer -G113 (calculated by -E87)	▪ Display range 5 - 250
3	The -G113 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Lower stop" (the air-flow flap in the evaporator intake area is closed)	▪ Display value greater than 5 and less than 55
4	The -G113 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Upper stop" (the air-flow flap in the evaporator intake area is open)	▪ Display value greater than 200 and less than 250

Notes on display group 005 => Page 37.

Notes on display group 005:

- ♦ Up to Model Year 1996, the installation of the positioning motor -V71 was dependent upon equipment and it is therefore not installed in all vehicles (e.g. not in right-hand drive vehicles). In vehicles without an air-flow flap, ignore display group.
- ♦ If the feedback value in display zone 1 is less than 5 (short circuit) or greater than 250 (open circuit), perform electrical test => Page 54 onwards.
- ♦ The actual feedback value (between 5 and 55 and between 200 and 250) is specified as the permitted tolerance range for the positioning motor stop or the flap in the operating and display unit -E87.
- ♦ If the display values in display zones 3 or 4 are ambient the permitted range => Fault table, Page 7.



Display group 006:

Calculated ambient temperature for ambient temperature display -G106, measured values for fresh air intake duct temperature sensor -G89 and ambient temperature sensor -G17

Display zone	Meaning	Explanatory Notes
1	Calculated ambient temperature for the ambient temperature display -G106 in °C	▪ In the dash panel insert
2	Measured value for the fresh air intake duct temperature sensor -G89 in °C	▪ Checking=> Electrical testing, Page 59
3	Measured value for the ambient temperature sensor -G17 in °C	▪ Checking=> Electrical testing, Page 59
4	Display zone not used.	

Note:

The measured value from a faulty temperature sensor or pickup is suppressed by the -E87 and the -E87 then uses an internal calculated value for the further control (this value is also displayed).

Notes on display zone 1:

- The basis for the display in display zone 1 is the lower of the two ambient temperatures measured => display zones 2 and 3. When the ignition is switched off, the value is stored for up to 4 hours.
- In vehicles with automatic gearboxes, the ambient temperature is only displayed with gear engaged.

Display group 007:

Sunlight penetration photosensor -G107, Temperature sensor- dash panel -G56 and calculated refrigerant temperature

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Display zone	Meaning	Explanatory Notes
1	Measured value of sunlight penetration photosensor -G107 as % or in V (only-E87 with Part No. 8D0 820 043 index "C")	▪ Depending upon the intensity of the sunlight 0 - 100 % (corresponding to 4.5 - 0.5 V)
2	Measured value of the dash panel temperature sensor- -G56 in °C	▪ Checking=> Electrical testing, Page 59

Notes on display zone 1:

- The display value for the sunlight penetration photosensor -G107 may be changed by shining an appropriate lamp at the sensor.
- If, regardless of the light shining on the sunlight penetration photosensor -G107, the display always shows about 90% or approx. 1V of the maximum sunlight penetration, use the current flow diagram to check the cabling to the sunlight penetration photosensor -G107 for interchanges.

Note on display zone 2:

The measured value from a faulty temperature sensor -G56 is suppressed by the -E87 and the -E87 then uses an internal calculated value for the further control (this value is also displayed).

Display zone	Meaning	Explanatory Notes
3	Measured value of the air conditioner refrigerant temperature sensor -G110 or calculated refrigerant temperature in °C	▪ Checking=> Electrical testing, Page 60

Display zone	Meaning	Explanatory Notes
4	Display zone not used.	

Notes on display zone 3:

- ♦ The sensor -G110 is only installed vehicles with 4-cylinder engines
- ♦ In the event of encoding for a 6-cylinder engine, there is no display.
- ♦ In vehicles without a sensor -G110, the refrigerant temperature is calculated by the -E87 taking into account different input signals (engine speed, engine running time, time since the ignition was switched on, ambient temperature determined, vehicle standing time etc.).

Display group 008: Voltage at fresh-air blower -V2, voltage at terminal 58d and side lights

Display zone	Meaning	Explanatory Notes
1	Specified voltage at the fresh-air blower -V2 (calculated by the operating and display unit -E87)	▪ 0...12.5 V
2	Actual voltage at the fresh-air blower -V2	▪ Deviation from the specified voltage (in the vehicle voltage range): max. 0.7 V
3	Voltage for the illumination of the display elements in the operating and display unit -E87	▪ Approx. battery voltage when side lights are off ▪ Approx. 2.0 12.5 V with side lights on ▪ Voltage at connector A, contact 5 to -E87 depending upon the position of the control for lighting and instruments -E20 from terminal 58d
4	With -E87 with Part No. 8D0 820 043 index "C": Ignore display With -E87 with Part No. 8D0 820 043 from index "D": Display zone not used.	

Note on display zone 3:

Checking input voltage for terminal 58 and terminal 58d at the operating and display unit -E87 => Electrical testing, Page 56.

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Display group 009: Engine speed, compressor speed, vehicle speed and auxiliary heater

Display zone	Meaning	Explanatory Notes
1	Engine speed in rpm	
2	Compressor speed in rpm	

Notes on display zone 2:

- ♦ Compressor speed at 0 % belt slip = transmission ratio 1.28 x engine speed.
- ♦ Vehicles with 6-cylinder engines and Zexel compressors are fitted with an air conditioner compressor sensor -G111.
- ♦ The air conditioner compressor speed sender -G111 generates 4 pulses per compressor revolution.
- ♦ Vehicles with Nippondenso-/Denso compressors have no air conditioner compressor speed sender -G111. The display has no significance for these vehicles.

Display zone	Meaning	Explanatory Notes
3	Display 0 = No speed signal detected since the ignition was switched on Display 1 = Since the ignition was switched on, a vehicle speed signal has been detected at least once by speedometer -G21	



Display zone	Meaning	Explanatory Notes
4	Display 0 = Auxiliary heater mode off Display 1 = Auxiliary heating mode on	▪ Voltage at connector D, contact 1 to - E87 less than 5 V ▪ Voltage at connector D, contact 1 to - E87 greater than 5 V

Note on display zone 3:

If the vehicle is moving at more than 1 km/h on entry into self-diagnosis mode, this speed will be displayed.

Notes on display zone 4:

- ♦ At present, it is not planned to install an auxiliary heater.
- ♦ If the operating and display unit -E87 remains in operation after the ignition is switched off and if the display shows "1", locate and rectify short to positive to connector D, contact 1.

Display group 010:

Kickdown switch, refrigerant temperature switch, air conditioner compressor intervention and high-pressure switch -F118

Display zone	Meaning	Explanatory Notes
1	Display 0 = Kickdown switch open Protected by copyright. Copying for private or commercial purposes, in part or in full, is prohibited without the written permission of Audi AG. Audi AG does not guarantee or accept any liability in respect to the correctness of information in this document. Copyright by Audi AG. Display 1 = Kickdown switch closed	▪ Voltage at connector C, contact 1 to - E87 greater than 5 V ▪ Voltage at connector C, contact 1 to - E87 less than 5 V
2	Display 0 = Temperature switch for "refrigerant too hot" open (refrigerant temperature OK) Display 1 = Temperature switch for "refrigerant too hot" closed (refrigerant temperature OK)	▪ Voltage at connector A, contact 11 to - E87 greater than 5 V ▪ Voltage at connector A, contact 11 to - E87 less than 5 V => Display group 001, display zone 1, Page 42

Notes on display zone 1:

- ♦ When the switch closes, the magnetic clutch -N25 is disengaged for 12 s.
- ♦ Depending upon the vehicle equipment, the kickdown switch is installed in the automatic gearbox control unit -J217 or as an individual component -F46.

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Note on display zone 2:

Checking the refrigerant temperature and the dash panel insert:

=> Electrical System; Repair group 90; Repair dash panel insert

Display zone	Meaning	Explanatory Notes
3	Display 0 = Output, compressor intervention open Display 1 = Output, compressor intervention closed	▪ Voltage at connector C, contact 12 to - E87 less than 5 V ▪ Voltage at connector C, contact 12 to - E87 greater than 5 V
4	Display 0 = High-pressure switch for magnetic clutch -F118 closed Display 1 = High-pressure switch for magnetic clutch -F118 open	▪ Voltage at connector C, contact 2 to - E87 less than 2 V ▪ Voltage at connector C, contact 2 to - E87 greater than 2 V

Notes on display zone 3:

- ◆ When magnetic clutch - N25 is engaged, the output is closed (voltage greater than 5 V).
- ◆ If, when the magnetic clutch is engaged, the voltage drops below 5 V (engine control unit or automatic gearbox control unit switches input to earth), the magnetic clutch is disabled by the operating and display unit -E87 =>display group 001, display zone 1, Page **42**.

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Note on display zone 4:

When the switch is open, the compressor is switched off =>display group 001, display zone 1, Page **42**.

8.3 - Vehicles from Model Year 1997

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List of available group numbers

Display group no.	Display zone	Designation	Details on Page
001	1	Current compressor shut-off criteria	42
	2	Supply voltage for the magnetic clutch -N25 in V	
	3	Voltage, terminal "15" in V	
	4	Signal for "ignition off time" (standing time) in minutes	
002	1... 4	Temperature flap positioning motor -V68	45
003	1... 4	Central flap positioning motor -V70	46
004	1... 4	Footwell/defroster flap positioning motor -V85:	47
005	1... 4	Air-flow flap positioning motor -V71	47

Display group no.	Display zone	Designation	Details on Page
006	1	Calculated ambient temperature (for ambient temperature display -G106)	48
	2	Fresh air intake duct temperature sensor -G89	
	3	Ambient temperature sensor -G17	
	4	Sunlight penetration photosensor -G107	
007	1	Centre vent temperature sensor -G191	49
	2	Footwell vent temperature sensor -G192	
	3	Dash panel temperature sensor -G56	
	4	Coolant temperature	
008	1	Specified voltage at fresh-air blower -V2	50
	2	Actual voltage at fresh-air blower -V2	
	3	Voltage at terminal "58d"	
	4	Not used (with an operating and display unit with two displays) Voltage at terminal "58s"(with an operating and display unit with one display)	

Display group no.	Display zone	Designation	Details on Page
009	1	Engine speed	50
	2	Vehicle speed	



Display group no.	Display zone	Designation	Details on Page
	3	Auxiliary heater (with an operating and display unit with two displays)	
		Terminal 58 (with an operating and display unit with one display)	
	4	Not used (with an operating and display unit with two displays)	
		Auxiliary heater (with an operating and display unit with one display)	
010	1	Temperature switch for coolant "too hot"	51
	2	Air conditioner compressor cut-in	
	3	Air conditioner pressure switch -F129	
	4	Not used (with an operating and display unit with two displays)	
		Heated rear window (with an operating and display unit with one display)	

Display group no.	Display zone	Designation	Details on Page
011	1...4	The last four compressor shut-off criteria which were effective for longer than 20 seconds.	52
012	1	Increase in idle speed	52
	2	Actuation of the radiator fan -V7 speed 1	
	3	Ignition key assignment	
	4	Display zone not used.	

Note:

The display groups "011" and "012" are only present on operating and display units with the Part Number 8D0 820 043 from index "M" (version with one display).

Display group 001:

Current valid compressor shutoff criteria, voltage at the magnetic clutch, voltage at terminal "15" and signal for "ignition off period"

Notes:

- ♦ If one of the compressor shutoff criteria 1, 8, 11 or 12 exists, the magnetic clutch -N25 cannot be actuated during the final control diagnosis (=>Page 18).
- ♦ If the compressor shutoff criterion "5" appears in addition to another compressor shutoff condition, ignore shutoff criterion "5".
- ♦ If several compressor shutoff conditions exist simultaneously (display zone 1), the display will either show them all alternately or it will show only the shutoff condition which is assigned the highest priority by the operating and display unit -E87.
- ♦ If the magnetic clutch pressure switch -F129 is open, the compressor shutoff criterion "1" (overpressure) appears first and the compressor is switched off. If the magnetic clutch pressure switch -F129 remains open for more than 30 s, there is a change to compressor shutoff criterion "3" (vacuum, refrigerant circuit empty).
- ♦ Display zone 1 shows the current compressor shutoff criteria.
- ♦ In vehicles with an operating and display unit with one display and the Part Number 8D0 820 043 from index "M", the last four compressor shutoff criteria which were effective for longer than 20 seconds are shown in display group 011.

Display zone	Meaning	Cause of fault/fault remedy
1	Code	Compressor shutoff criteria
	0	Compressor on

Display zone	Meaning	Cause of fault/fault remedy
(cont.) t	No compressor shutoff criterion detected	- If the compressor is not switched on, perform the final control diagnosis => Page 54 onwards
	1 Compressor off Pressure switch -F129 (between contacts 1 and 2) open	- Open circuit or loose contact in the wiring between -F129 and -E87 Fault remedy => Fault table, Page 54 onwards
	2 Display zone not used.	
	3 Compressor off Pressure switch -F129 (between contacts 2 and 1) open	- Pressure in refrigerant circuit too low (refrigerant circuit empty) - Open circuit or loose contact in the wiring between -F129 and -E87 Fault remedy => Fault table, Page 54 onwards

Display zone	Meaning	Cause of fault/fault remedy
1	Code Compressor shutoff criteria	
	4 Display zone not used.	
	5 Compressor off	
	a) Engine speed less than 300 rpm	
	b) No engine speed detected	- Open circuit between dash panel insert, engine control unit and connector C, contact 6 to the operating and display unit -E87 - Motor control unit or dash panel insert does not output a speed signal Test the engine speed signal: => Electrical System; Repair group 90; Checking the multiple connectors in the dash panel insert Checking the multiple connectors in the dash panel insert
	6 Compressor off Compressor switched off by "ECON" button (button with the frost symbol) on the operating and display unit -E87	- Switch the compressor on

Display zone	Meaning	Cause of fault/fault remedy
1	Code Compressor shutoff criteria	
	7 Compressor off Air conditioner switched off by the "-"-button for fresh-air blower on the operating and display unit -E87	- Switch the air conditioner on
	8 Compressor off	



		Measured ambient temperature lower than 2 °C	- Ambient temperature lower than 2 °C Place the vehicle in a heated room for the test - Ambient temperature sensor -G17 or fresh air intake duct temperature sensor -G89 supply incorrect values Check the ambient temperature sensor -G17 and the fresh air intake duct temperature sensor -G89 => Display group 014, Page 49
	9	Display zone not used.	
(cont.) t	10	Supply voltage to the operating and display unit -E87 less than 9.5 V	- => Display zone 3 and fault table, Page 7

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Display zone	Meaning	Cause of fault/fault remedy
	Code	Compressor shutoff criteria
1	11	Compressor off Engine temperature too high
		- Dash panel insert has detected an excessive engine temperature and switched input to earth - Short to earth in the wiring between the dash panel insert and connector A, contact 11 to the operating and display unit -E87 => Electrical System; Repair group 90; Checking the multiple connectors in the dash panel insert Checking the multiple connectors in the dash panel insert
(cont.) t	12	Compressor off Air conditioner compressor cut-in
		- Motor control unit has switched off the air conditioner compressor => Display group 010, Page 18

Display zone	Meaning	Cause of fault/fault remedy
	Code	Compressor shutoff criteria
1	13	Compressor off Compressor cut-in delay (approx. 10 seconds) at engine speeds above 6000 rpm
		Of no significance for customer service
	14	Compressor off Pressure switch -F129 switched off 30 times during the current driving period
		- Loose contact in the wiring between the pressure switch -F129 and operating and display unit-E87 - Fault at switch -F129 or in the refrigerant circuit => Fault table, Page 68 .

Display zone	Meaning	Explanatory Notes
2	Supply voltage for the magnetic clutch -N25 in V	- Greater than 9.5 V, when magnetic clutch -N25 is switched on => Display zone 1, code 10 and Fault table, Page 7
3	Voltage, terminal 15 in V	Connector D, contact 9 to the operating and display unit -E87
4	Signal for "ignition off time" (standing time) in minutes	- Time between the last switching off and switching on of the ignition - Display value 0 - 240

Note on display zone 3:

If the display value with the engine running is less than 12 V, check the positive or earth connection of operating and display unit -E87:

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Note on display zone 4:

If, when the ignition is switched on, no signal for "ignition off time" was recognised by the -E87 (sent by the dash panel insert), the -E87 assumes a standing time of more than 4 hours and it is assumed that the engine temperature is the same as the ambient temperature. Possible consequences:

- When the engine is warm, there may be a delay before the fresh-air blower starts, even though the engine is at operating temperature.
- The ambient temperature display -G106 in the dash panel insert may display incorrect ambient temperature values.

Display group 002: Temperature flap positioning motor -V68

Display zone	Meaning	Explanatory Notes
1	Actual feedback value of potentiometer -G92 (in the positioning motor -V68)	▪ Display value greater than 5 and less than 240 ▪ Maximum permissible deviation 3 units from the specified feedback value (in the range greater than 50 but less than 180)
2	Specified feedback value for potentiometer -G92 (calculated by -E87)	▪ Display range 5 - 240
3	Operating and display unit up to index "L" and from index "R" -G92 value determined during the "basic setting" and stored in the -E87 with positioning motor in the setting "Heating stop" (the temperature flap guides the air flow through the heat exchanger)	▪ Display value greater than 5 and less than 50
	Operating and display unit with index "M", "N", "P" or "Q" -G92 value determined during the "basic setting" and stored in the -E87 with positioning motor in the setting "Cooling stop" (the temperature flap guides the air flow past the heat exchanger)	▪ Display value greater than 180 and less than 240

Display zone	Meaning	Explanatory Notes
4	Operating and display unit up to index "L" and from index "R" -G92 value determined during the "basic setting" and stored in the -E87 with positioning motor in the setting "Cooling stop" (the temperature flap guides the air flow past the heat exchanger)	▪ Display value greater than 180 and less than 240
	Operating and display unit with index "M", "N", "P" or "Q" -G92 value determined during the "basic setting" and stored in the -E87 with positioning motor in the setting "Heating stop" (the temperature flap guides the air flow through the heat exchanger)	▪ Display value greater than 5 and less than 50

Notes:

- ♦ If the feedback value in display zone 1 is less than 5 (short circuit) or greater than 240 (open circuit), perform electrical test => Page 54 onwards.



- ♦ The actual feedback value (between 5 and 50 and between 180 and 240) is specified as the permitted tolerance range for the positioning motor stop or the flap in the operating and display unit -E87.
- ♦ If the display values in display zones 3 or 4 are ambient the permitted range => Fault table, Page 7.
- ♦ With operating and display units -E87 with Part No. 8D0 820 043 and index "M", "N", "P" or "Q" the display in zones 3 and 4 is swapped over.

Display group 003: Central flap positioning motor -V70

Display zone	Meaning	Explanatory Notes
1	Actual feedback value for potentiometer -G112 (in the positioning motor -V70)	▪ Display value greater than 25 and less than 250 ▪ Maximum permissible deviation 3 units from the specified feedback value (only in the range greater than 75 but less than 200)
2	Specified feedback value for potentiometer -G112 (calculated by -E87)	▪ Display range 25 - 250
3	Operating and display unit up to index "L" and from index "R" -G112 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Lower stop" (the temperature flap guides the air flow to the footwell/defroster flap)	▪ Display value greater than 25 and less than 75
	Operating and display unit with index "M", "N", "P" or "Q" -G112 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Upper Stop" (the temperature flap guides the air flow to the dash panel vents)	▪ Display value greater than 200 and less than 250

Display zone	Meaning	Explanatory Notes
4	Operating and display unit up to index "L" and from index "R" -G112 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Upper Stop" (the temperature flap guides the air flow to the dash panel vents)	▪ Display value greater than 200 and less than 250
	Operating and display unit with index "M", "N", "P" or "Q" -G112 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Lower stop" (the temperature flap guides the air flow to the footwell/defroster flap)	▪ Display value greater than 25 and less than 75

Notes:

- ♦ If the feedback value in display zone 1 is less than 25 (short circuit) or greater than 250 (open circuit), perform electrical test => Page 54 onwards.
- ♦ The actual feedback value (between 25 and 75 and between 200 and 250) is specified as the permitted tolerance range for the positioning motor stop or the flap in the operating and display unit -E87.
- ♦ If the display values in display zones 3 or 4 are ambient the permitted range => Fault table, Page 7.
- ♦ With operating and display units -E87 with Part No. 8D0 820 043 and index "M", "N", "P" or "Q" the display in zones 3 and 4 is swapped over.

Display group 004: Footwell/defroster flap positioning motor -V85:

Display zone	Meaning	Explanatory Notes
1	Actual feedback value for potentiometer -G114 (in the positioning motor -V85)	▪ Display value greater than 25 and less than 250 ▪ Maximum permissible deviation 3 units from the specified feedback value (only in the range greater than 75 but less than 200)
2	Specified feedback value for potentiometer - G114 (calculated by -E87)	▪ Display range 25 - 250
3	Operating and display unit up to index "L" and from index "R" -G114 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Lower stop" (the footwell/defroster flap guides the air flow to the dash panel defroster vents) Operating and display unit with index "M", "N", "P" or "Q" -G114 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Upper stop" (the footwell/defroster flap guides the air flow to the vents in the footwell)	▪ Display value greater than 25 and less than 75 ▪ Display value greater than 200 and less than 250

Display zone	Meaning	Explanatory Notes
4	Operating and display unit up to index "L" and from index "R" -G114 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Upper stop" (the footwell/defroster flap guides the air flow to the vents in the footwell) Operating and display unit with index "M", "N", "P" or "Q" -G114 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Lower stop" (the footwell/defroster flap guides the air flow to the dash panel defroster vents)	▪ Display value greater than 200 and less than 250 ▪ Display value greater than 25 and less than 75

Notes:

- ♦ If the feedback value in display zone 1 is less than 25 (short circuit) or greater than 250 (open circuit), perform electrical test => Page 54 onwards.
- ♦ The actual feedback value (between 25 and 75 and between 200 and 250) is specified as the permitted tolerance range for the positioning motor stop or the flap in the operating and display unit -E87.
- ♦ If the display values in display zones 3 or 4 are ambient the permitted range => Fault table, Page 7.
- ♦ With operating and display units -E87 with Part No. 8D0 820 043 and index "M", "N", "P" or "Q" the display in zones 3 and 4 is swapped over.

Display group 005: Air-flow flap positioning motor -V71

Display zone	Meaning	Explanatory Notes
1	Actual feedback value of potentiometer -G113 (in the positioning motor -V71)	▪ Display value greater than 5 and less than 250 ▪ Maximum permissible deviation 3 units from the specified feedback value (in the range greater than 60 but less than 190)



Display zone	Meaning	Explanatory Notes
2	Specified feedback value for potentiometer - G113 (calculated by -E87)	▪ Display range 5 - 250
3	Operating and display unit up to index "L" and from index "R" -G113 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Lower stop" (the air-flow flap in the evaporator intake area is closed, the air conditioner is in air recirculation mode)	▪ Display value greater than 5 and less than 60
	Operating and display unit with index "M", "N", "P" or "Q" The -G113 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Lower stop" (the air-flow flap in the evaporator intake area is open, the air conditioner is in fresh air operation)	▪ Display value greater than 190 and less than 250

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Display zone	Meaning	Explanatory Notes
4	Operating and display unit up to index "L" and from index "R" The -G113 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Lower stop" (the air-flow flap in the evaporator intake area is open, the air conditioner is in fresh air operation)	▪ Display value greater than 190 and less than 250
	Operating and display unit with index "M", "N", "P" or "Q" -G113 value determined during the "basic setting" and stored in the -E87 with the positioning motor in the setting "Lower stop" (the air-flow flap in the evaporator intake area is closed, the air conditioner is in air recirculation mode)	▪ Display value greater than 5 and less than 60

Notes:

- ♦ In right-hand drive vehicles, the positioning motor -V71 only controls the fresh-air and recirculated-air flap. There is no air-flow flap.
- ♦ If the feedback value in display zone 1 is less than 5 (short circuit) or greater than 250 (open circuit), perform electrical test => Page 54 onwards.
- ♦ The actual feedback value (between 5 and 60 and between 190 and 250) is specified as the permitted tolerance range for the positioning motor stop or the flap in the operating and display unit -E87.
- ♦ If the display values in display zones 3 or 4 are ambient the permitted range => Fault table, Page 7.
- ♦ With operating and display units -E87 with Part No. 8D0 820 043 and index "M", "N", "P" or "Q" the display in zones 3 and 4 is swapped over.

Display group 006:

Calculated ambient temperature for ambient temperature display -G106, measured values for fresh air intake duct temperature sensor -G89, ambient temperature sensor -G17 and sunlight penetration photosensor -G107

Display zone	Meaning	Explanatory Notes
1	Calculated ambient temperature for the ambient temperature display -G106 in °C	▪ In the dash panel insert
2	Measured value for the fresh air intake duct temperature sensor -G89 in °C	▪ Checking=> Electrical testing, Page 59

Note:

The measured value from a faulty temperature sensor or pickup is suppressed by the -E87 and the -E87 then uses an internal calculated value for the further control (this value is also displayed).

Notes on display zone 1:

- ♦ The basis for the display in display zone 1 is the lower of the two ambient temperatures measured => display zones 2 and 3. When the ignition is switched off, the value is stored for up to 4 hours.
- ♦ In vehicles with automatic gearboxes, the ambient temperature is only displayed with gear engaged.

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Display zone	Meaning	Explanatory Notes
3	Measured value for the ambient temperature sensor -G17 in °C	▪ Checking=> Electrical testing, Page 59
4	Measured value of the sunlight penetration photosensor-G107 as %	▪ 0...100 %, depending upon the intensity of the sunlight

Note:

The measured value from a faulty temperature sensor or pickup is suppressed by the -E87 and the -E87 then uses an internal calculated value for the further control (this value is also displayed).

Notes on display zone 4:

- ♦ The display value for the sunlight penetration photosensor -G107 may be changed by shining an appropriate lamp at the sensor.
- ♦ If, regardless of the light shining on the sunlight penetration photosensor -G107, the display always shows about 90% of the maximum sunlight penetration, use the current flow diagram to check the cabling to the sunlight penetration photosensor -G107 for interchanges.

Display group 007:

Sensors for centre vent temperature -G191 and footwell vent temperature -G192, dash panel temperature sensor -G56 and calculated refrigerant temperature

Display zone	Meaning	Explanatory Notes
1	Measured value of the centre vent temperature sensor -G191 in °C	▪ Checking=> Electrical testing, Page 60
2	Measured value of the footwell vent temperature sensor -G192 in °C	▪ Checking=> Electrical testing, Page 60
3	Measured value of the dash panel temperature sensor- -G56 in °C	▪ Checking=> Electrical testing, Page 59
4	Refrigerant temperature supplied from dash panel insert in °C	▪ Auxiliary variable for control of fresh-air blower speed

Note:

The measured value from a faulty temperature sensor or pickup is suppressed by the -E87 and the -E87 then uses an internal calculated value for the further control (this value is also displayed).

Note on display zone 1:

In the event of a faulty display, also check encoding of the operating and display unit -E87.

**Notes continued:****Note on display zone 3:**

The dash panel temperature sensor -G56 is installed in the operating and display unit -E87 with only one display. The -G56 cannot be checked and replaced individually, in the event of a defect, replace the complete -E87.

Notes on display zone 4:

- ♦ The -E87 only uses the refrigerant temperature from 40 °C to control the fresh-air blower speed.
- ♦ In the absence of a signal, -53 °C is displayed as the refrigerant temperature and the refrigerant temperature calculated by the -E87.

Display group 008: Voltage at fresh-air blower -V2, voltage at terminal 58d, terminal 58s

Display zone	Meaning	Explanatory Notes
1	Specified voltage at the fresh-air blower -V2 (calculated by the operating and display unit -E87)	▪ 0...12.5 V
2	Actual voltage at the fresh-air blower -V2	▪ Deviation from the specified voltage (in the vehicle voltage range): max. 0.7 V
3	Voltage for illumination of the display elements in the operating and display unit -E87 (terminal 58d)	▪ 0...100% or up to 12.5 V with ignition activated ▪ Voltage at connector A, contact 5 to -E87 depending upon the position of the control for lighting and instruments -E20 from terminal 58d
4	In the case of an -E87 with two displays: Display zone not used. In the case of an -E87 with one display: Voltage for the illumination of the switches in the operating and display unit -E87 (terminal 58s)	▪ 0...100% depending on the position of the control for illumination and instruments -E20 with side lights on ▪ 10% or less than 1.0 V when side lights are off

Notes on display group 008 => Page 50 .

Notes on display zone 3:

- ♦ Checking input voltage for terminal 58 and terminal 58d at the operating and display unit -E87 => Electrical testing, Page 56 .
- ♦ The operating controls of the operating and display unit -E87 are only illuminated when voltage is applied to terminal 58.
- ♦ If the displays on the operating and display unit -E87 are not illuminated when the side lights are off, check the encoding of the -E87 => Page 27 .

Display group 009: Engine speed, vehicle speed and auxiliary heater

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Display zone	Meaning	Explanatory Notes
1	Engine speed in rpm	
2	Display 0 = No speed signal detected since the ignition was switched on Display 1 = Since the ignition was switched on, a vehicle speed signal has been detected at least once by speedometer -G21	
3	In the event of an -E87 with two displays Display 0 = Auxiliary heater mode off Display 1 = Auxiliary heating mode on	▪ Voltage at connector D, contact 1 to -E87 less than 5 V ▪ Voltage at connector D, contact 1 to -E87 greater than 5 V

Display zone	Meaning	Explanatory Notes
	In the case of an -E87 with one display: Display 0 = Side lights off Display 1 = Side lights on	▪ Voltage at connector A, contact 6 to -E87 less than 5 V (terminal 58) ▪ Voltage at connector A, contact 6 to -E87 greater than 5 V (terminal 58)

Display zone	Meaning	Explanatory Notes
4	In the event of an -E87 with two displays Display zone not used.	
	In the case of an -E87 with one display: Display 0 = Auxiliary heater mode off Display 1 = Auxiliary heating mode on	▪ Voltage at connector D, contact 1 to -E87 less than 5 V ▪ Voltage at connector D, contact 1 to -E87 greater than 5 V

Note on display zone 2:

If the vehicle is moving at more than 1 km/h during the self-diagnosis, this speed will be displayed.

Notes on display zones 3 /4:

- ♦ At present, it is not planned to install an auxiliary heater.
- ♦ If the operating and display unit -E87 remains in operation after the ignition is switched off and if the display shows "1", locate and rectify short to positive to connector D, contact 1.

Display group 010:

Temperature switch for refrigerant, air conditioner compressor intervention, pressure switch -F129 and actuation of the heated rear screen

Display zone	Meaning	Explanatory Notes
1	Display 0 = Temperature switch for "refrigerant too hot" open (refrigerant temperature OK)	▪ Voltage at connector A, contact 11 to -E87 greater than 5 V
	Display 1 = Temperature switch for "refrigerant too hot" closed (refrigerant temperature OK)	▪ Voltage at connector A, contact 11 to -E87 less than 5 V
2	Display 0 = Output, compressor intervention open	▪ Voltage at connector C, contact 12 to -E87 less than 5 V
	Display 1 = Output, compressor intervention closed	▪ Voltage at connector C, contact 12 to -E87 greater than 5 V

Notes on display zone 1:

- ♦ Checking the refrigerant temperature and the dash panel insert:

=> Electrical System; Repair group 90; Repairing the dash panel insert; Checking multiple connectors in the dash panel insert

- ♦ In vehicles from Model Year 1999, the assignment of the ignition key will be notified to the -E87 by the dash panel insert together with the refrigerant temperature and the signal "Engine temperature too high" when the ignition is switched on (data telegram). The assignment of the code can only be processed by operating and display units with the Part Number 8D0 820 043 from index "M". If the refrigerant temperature is too high, no information may be transmitted.

**Notes on display zone 2:**

- ♦ When magnetic clutch -N25 is engaged, the output is closed (voltage greater than 5 V).
- ♦ If, when the magnetic clutch is engaged, the voltage drops below 5 V (engine control unit or automatic gearbox control unit switches input to earth), the magnetic clutch is disabled by the operating and display unit -E87 => display group 001, display zone 1, Page 42.

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

Display zone	Meaning	Explanatory Notes
3	Display 0 = Air conditioner pressure switch -F129 closed Display 1 = Air conditioner pressure switch -F129 open	▪ Voltage at connector C, contact 2 to -E87 less than 2 V ▪ Voltage at connector C, contact 2 to -E87 greater than 2 V
4	In the event of an -E87 with two displays Display zone not used.	
	In the case of an -E87 with one display: Display 0 = Heated rear window off Display 1 = Heated rear window on	▪ Voltage at connector F, contact 1 (output from -E87 to the heated rear window) less than 5 V ▪ Voltage at connector F, contact 1 (output from -E87 to the heated rear window) greater than 5 V

Note on display zone 3:

When air conditioner pressure switch -F29 is open (high/low-pressure switch between contacts 1 and 2), the compressor is switched off (=> display group 001, display zone 1, Page 42).

Note on display zone 4:

Check the actuation of the heated rear window => Page 69.

Display group 011: The last four compressor shut-off criteria

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Display zone	Meaning	Explanatory Notes
1	Fourth last compressor shutoff criterion	▪ Coding => Page 42 display group 001, display zone 1
2	Third last compressor shutoff criterion	
3	Last but one compressor shutoff criterion	
4	Last compressor shutoff criterion	

Notes:

- ♦ The display group "011" is only present on operating and display units with the Part Number 8D0 820 043 from index "M" (version with one display).
- ♦ Only the last four compressor shut-off criteria which were effective for longer than 20 seconds are stored.

Display group 012: Increase in idle speed, actuation of radiator fan, assignment of ignition key**Note:**

The display group "012" is only present on operating and display units with the Part Number 8D0 820 043 from index "M" (version with one display).

Display zone	Meaning	Explanatory Notes
1	Display 0 = Idling speed regulation off Display 1 = Idling speed regulation on	▪ Voltage at connector A, contact 2 to - E87 less than 2 V ▪ Voltage at connector A, contact 2 to - E87 greater than 2 V
2	Display 0 = Actuation of relay for radiator fan speed 1 off Display 1 = Actuation of relay for radiator fan speed 1 on	▪ Voltage at connector A, contact 2 to - E87 greater than 5 V (fan off) ▪ Voltage at connector A, contact 2 to - E87 less than 5 V (fan on)

Notes on display zone 1:

- ♦ Checking the idling speed regulation function (increase in idling speed) => Page 23 Starting final control diagnosis for "idling speed regulation".
- ♦ The condition for the switching on of the idling speed regulation is that no compressor shutoff criterion exists which does not allow the magnetic clutch to be switched on (e.g. pressure switch -F129 open, engine not running or operating mode "Econ" selected).

Note on display zone 2:

The radiator fan is switched by the -E87 to 1st speed as long as no compressor shutoff criterion exists which does not permit the magnetic clutch to be switched on (e.g. engine not running or operating mode "Econ" selected).

Display zone	Meaning	Explanatory Notes
3	Display 0 = The ignition was switched on with a key for which there is no assignment in the dash panel insert. No information was received from the dash panel insert. Display 1 = The ignition was switched on with the key (2, 3 or 4) which was set to position 1 (2, 3 or 4) in the dash panel insert.	▪ Check adaption of the ignition key. => Electrical System; Repair group 90; Repair dash panel insert Repair dash panel insert ▪ Up to 4 keys may be assigned.
4	Display zone not used.	

Notes on display zone 3:

- ♦ In vehicles from Model Year 1999, the assignment of the ignition key will be notified to the -E87 by the dash panel insert together with the refrigerant temperature and the signal "Engine temperature too high" when the ignition is switched on (data telegram). The assignment of the code can only be processed by operating and display units with the Part Number 8D0 820 043 from index "M". If the refrigerant temperature is too high, no information may be transmitted.
- ♦ The assignment of the ignition key can only be recognised and therefore transmitted by the dash panel insert on vehicles fitted with an immobiliser.

=> Electrical System; Repair group 90; Repair dash panel insert Repair dash panel insert

- ♦ When the ignition is switched on, the -E87 starts with the setting which was valid the last time the ignition was switched off with this key (temperature, air distribution, fresh air blower speed).
- ♦ Check signal from dash panel insert => Electrical check, Page 66 .

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9 - Electrical check

9.1 - Electrical check

9.2 - Checking wiring and components with test box V.A.G 1598

Special tools, testers and auxiliary equipment required

- ♦ Test box V.A.G 1598 A and the associated adapter cables V.A.G 1598/11 and V.A.G 1598/12
- ♦ Hand-held multimeter V.A.G 1526 or V.A.G 1526 A
- ♦ Voltage tester V.A.G 1527 B
- ♦ Measuring tool set V.A.G 1594 A
- ♦ Temperature sensor with appropriate tester

Note:

When working with the fault reader, no adapter cable from the test box V.A.G 1598 A may be connected to the operating and display unit -E87.

Test requirements:

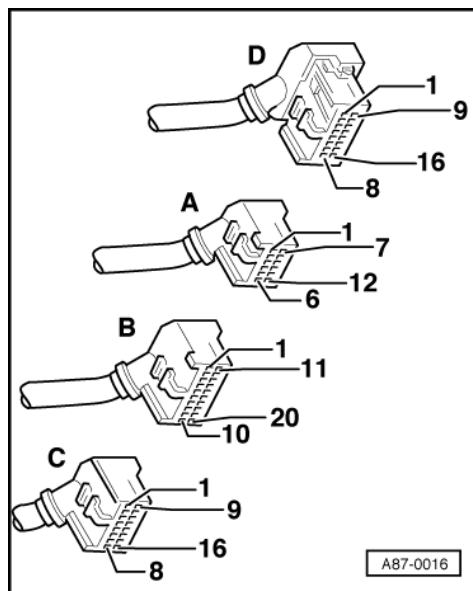
- All fuses OK:

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

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Connecting the test box V.A.G 1598 A to the connectors of the operating and display unit -E87

- Switch ignition off.
- Remove the operating and display unit -E87 =>Page 154 .



- -> Connect the adapter cables V.A.G 1598/11 and V.A.G 1598/12 to the detached connectors of the operating and display unit -E87.

Notes:

- ♦ Do not connect the operating and display unit -E87 (except for test steps 5.10, 5.11 and 5.12 in vehicles from Model Year 1997).
- ♦ For measurement purposes, connect test box V.A.G 1598A to the respective adapter cable.
- ♦ On the adapter cable V.A.G 1598/12, the socket assignment is identical to the connector assignment of the operating and display unit -E87.

- ♦ On the adapter cable V.A.G 1598/11, the socket assignment is not identical to the connector assignment of the operating and display unit -E87. =>Connector assignment, Page 55.

Pin assignment of test box V.A.G 1598 A with adapter cable V.A.G 1598/11

Notes:

- ♦ With adapter cable V.A.G 1598/11, the contact assignment of connectors A and B is not identical to the socket assignment on the test box V.A.G 1598 A.
- ♦ With adapter cable V.A.G 1598/11, the contact assignment of connector C is identical to the socket assignment on the test box V.A.G 1598 A.
- ♦ The contact assignment of connector D with adapter cable V.A.G 1598/12 is identical to the assignment of the sockets on the test box V.A.G 1598A.
- ♦ Due to the use of two adapter cables for the connectors for the operating and display unit -E87(V.A.G 1598/11 and 12), no earth connection is possible when the adapter cable V.A.G 1598/11 is connected. To perform the electrical tests, it is therefore necessary in some test steps to take measurements against a suitable earthing point on the vehicle body or to use a second V.A.G 1598 A (when the adapter cable 1598/12 is connected, sockets 14 and 15 are earthed).

Connector A contact	V.A.G 1598 A Socket	Connector B contact	V.A.G 1598 A Socket	Connector B contact	V.A.G 1598 A Socket
1	41	1	21	13	33
2	42	2	22	14	34
3	43	3	23	15	35
4	44	4	24	16	36
5	45	5	25	17	37
6	46	6	26	18	38
7	47	7	27	19	39
8	48	8	28	20	40
9	49	9	29		
10	50	10	30		
11	51	11	31		
12	52	12	32		

Overview of the electrical tests on the operating and display unit -E87

Test step	Component tested	Page
1	- Power supply and earth connection for the operating and display unit -E87 - Illumination of the operating and display unit -E87 (only vehicles up to Model Year 1997) - Illumination of the operating and display unit -E87 (only vehicles from Model Year 1998) - Signal for "ignition off time" (only vehicles from Model Year 1997)	58
2	- Temperature sensors/pickups -G17, -G56, -G89 - -G110 (only vehicles up to Model Year 1996) - -G191, -G192 (only vehicles from Model Year 1997)	60
3	- Fresh-air blower-V2 and fresh-air blower control unit -J126	61
4	- Positioning motors for the air conditioner and associated potentiometers -V68/-G92, -V70/-G112, -V71/-G113, -V85/-G114	62
5	- Air conditioner compressor speed sensor -G111 (only vehicles up to Model Year 1996 with Zexel compressors and 6-cylinder engines) - System-operated switches -F73, -F118 (only vehicles up to Model Year 1996) - Temperature sensor blower-V42 (not with -E87 with only one display) - "Air conditioner intervention" output, signal for "engine temperature too high" - Pressure switch for air conditioner -F129 (only vehicles from Model Year 1997)	68



Test step	Component tested	Page
6	- Magnetic clutch relay -J44 - Actuation of the radiator fan -V7 (speed 1)	69

Test step 1:

Power supply, earth connection, illumination of the operating and display unit -E87 and signal for "ignition off time"

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20V =) ▪ Adapter cable V.A.G 1598/12 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
1.1	9 + 14	- Terminal 75 and earth connection on the -E87 (up to Model Year 1996) - Terminal 15 and earth connection on the -E87 (from Model Year 1997)	▪ Ignition switched on	- approx. battery voltage	- Use current flow diagram to repair power supply or earth connection
1.2	9 + 15	Earth connection at the -E87	▪ Ignition switched on	- approx. battery voltage	- Use current flow diagram to repair earth connection to -E87

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (200 ω) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
1.3	49 + 52	Earth connection at the -E87	▪ Ignition off	- Less than 20 ω	- Use current flow diagram to repair earth connection to -E87
Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V =) ▪ Adapter cable V.A.G 1598/11 connected					
1.4 1)	13 + Earth	Power supply, terminal 30 of -E87	▪ Ignition off	- approx. battery voltage	- Use current flow diagram to rectify power supply to terminal 30 to or earth connection to -E87

1) Only perform test step on vehicles up to Model Year 1996.

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V =) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
1.52)	7 + Earth3)	Power supply, terminal 58 of -E87	▪ Ignition switched on ▪ Side lights on	- approx. battery voltage	- Use current flow diagram to rectify power supply to terminal 58 to or earth connection to -E87

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V =) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
1.62)	7 + Earth3)	Power supply, terminal 58 of -E87	▪ Ignition switched on ▪ Side lights off	- Less than 2 V	- Use current flow diagram to locate and rectify short to positive to -E87

- 2) Only perform test step on vehicles up to Model Year 1997.
- 3) Earth is connected, for example, to connector D, contacts 14 and 15.

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V =) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
1.72)	45 + Earth3)	Power supply terminal 58d of the -E87	▪ Ignition switched on ▪ Side lights on	- Governed by brightness setting for instrument illumination	- Use current flow diagram to locate and rectify open circuit or short to positive to -E87
1.82)	45 + Earth3)	Power supply terminal 58d of the -E87	▪ Ignition switched on ▪ Side lights off	- Less than 2 V	- Use current flow diagram to locate and rectify short to positive to -E87

- 2) Only perform test step on vehicles up to Model Year 1997.
- 3) Earth is connected, for example, to connector D, contacts 14 and 15.

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V =) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
1.9 4)	7 + Earth3)	Power supply, terminal 58s of the -E87	▪ Ignition switched on ▪ Side lights on	- 0...12 V	- Use current flow diagram to locate and rectify open circuit or short to positive to -E87
1.10 4)	7 + Earth3)	Power supply terminal 58s of the -E87	▪ Ignition switched on ▪ Side lights off	- approx. 0 V	- Use current flow diagram to locate and rectify short to positive to -E87

- 3) Earth is connected, for example, to connector D, contacts 14 and 15.
- 4) Only perform test step on vehicles as of Model Year 1998.

Note:

The voltage at terminal 58s is governed by the setting of the instrument illumination control.



Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V =) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
1.114)	45 + Earth3)	Power supply terminal 58d of the - E87	▪ Ignition switched on ▪ Side lights on	- 0...12 V	- Use current flow diagram to repair open circuit or short to positive to -E87
1.124)	45 + Earth3)	Power supply terminal 58d of the - E87	▪ Ignition switched on ▪ Side lights off	- 0...12 V	- Use current flow diagram to repair open circuit or short to positive to -E87

3) Earth is connected, for example, to connector D, contacts 14 and 15.

4) Only perform test step on vehicles as of Model Year 1998.

Notes:

- ♦ The voltage at terminal 58d is generated as a square wave signal by the dash panel insert; the brightness of the displays on the operating and display unit -E87 is determined by the actuation period. The averaged value is displayed on the measuring instrument.
- ♦ The actuation period at terminal 58d is governed by the setting of the illumination control and the brightness level determined by the photosensor in the dash panel insert.

Voltage tester V.A.G 1527 B ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
1.13 5)	33 + Earth3)	Signal for "ignition off time"	▪ Ignition switched on	- LED in voltage tester lights	- Use current flow diagram to locate and rectify short circuit or open circuit
1.14 5)	33 + Earth3)	Signal for "ignition off time"	▪ Ignition switched on Start engine	- LED in voltage tester lights - When the engine is started, the LED in the voltage tester flickers briefly (time signal) and then remains lit	- Use current flow diagram to locate and rectify short circuit or open circuit Check dash panel insert => Electrical System; Repair group 90; Repair dash panel insert Repair dash panel insert

3) Earth is connected, for example, to connector D, contacts 14 and 15.

5) Only perform test step on vehicles as of Model Year 1997.

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V =) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
1.154)	46 + Earth3)	Power supply, terminal 58 of -E87	▪ Ignition switched on ▪ Side lights on	- approx. battery voltage	- Use current flow diagram to locate and rectify open circuit or short to earth in the wiring to the -E87
1.164)	46 + Earth3)	Power supply, terminal 58 of -E87	▪ Ignition switched on ▪ Side lights off	- Less than 2 V	- Use current flow diagram to locate and rectify short to positive in the wiring to the -E87

3) Earth is connected, for example, to connector D, contacts 14 and 15.

4) Test step only to be performed on vehicles with an operating and display unit with one display.

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20V =) ▪ Adapter cable V.A.G 1598/12 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
1.17 4)	8 + 14	- Terminal 15 and earth connection on the -E87 (power supply for the magnetic clutch)	▪ Ignition switched on	- approx. battery voltage	- Use current flow diagram to repair power supply or earth connection

4) Test step only to be performed on vehicles with an operating and display unit with one display.

Test step 2:

Temperature sensor/sender

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Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 k Ω / 200 k Ω) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
2.1	48 + 52	Outside temperature sensor -G17	▪ Ignition off Measure temperature at the sensor fitting location	- Governed by the temperature at the sensor/pickup fitting location	- Use current flow diagram to locate and rectify short circuit, open circuit or contact resistance
2.26)	50 + 52	Dash panel temperature sensor - G56		=> Table, Page 60	- Renew temperature sensor/pickup



Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 kΩ/ 200 kΩ) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
2.3	47 + 52	Fresh air intake duct temperature sensor -G89			

6) Test step only to be performed with operating and display unit -E87 with two displays.

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 kΩ/ 200 kΩ) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
2.4 2)	27 + 52	Air conditioner refrigerant temperature sensor -G110	▪ Ignition off Measure temperature at the sensor fitting location	- Governed by the temperature at the sensor fitting location => Table, Page 60	- Use current flow diagram to locate and rectify short circuit, open circuit or contact resistance - Replace temperature sensor
2.5 5)	26 + 49	Centre vent temperature sensor -G191			
2.6 5)	25 + 49	Footwell vent temperature sensor -G192			

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2) Test step only to be performed on vehicles up to Model Year 1996 with 6-cylinder engine and Zexel compressor.

5) Only perform test step on vehicles as of Model Year 1997.

Temperature-dependent resistances of sensors/pickups

Temperature measured at sensor/sender fitting location °C	Resistance of sensor -G56 kΩ	Resistance of sensors -G17 and -G89 kΩ	Resistance of sensor -G110 kΩ	Resistance of sensor -G191 kΩ	Resistance of sensor -G192 kΩ
- 30	(52.70)	18.10	26.50	(141.00)	(52.70)
- 20	(28.60)	9.95	14.70	(85.00)	(28.60)
-10	16.20	5.59	9.20	(47.00)	(16.20)
0	9.40	3.28	5.60	29.00	9.40
5	7.27	2.54	4.63	23.20	7.27
10	5.66	1.99	3.67	18.60	5.66
15	4.45	1.57	3.06	15.00	4.45
20	3.50	1.25	2.45	12.20	3.50
25	2.79	1.00	2.06	10.00	2.79
30	2.23	0.80	1.67	8.20	2.23

Temperature measured at sensor/sender fitting location °C	Resistance of sensor -G56 kw	Resistance of sensors -G17 and -G89 kw	Resistance of sensor -G110 kw	Resistance of sensor -G191 kw	Resistance of sensor -G192 kw
35	1.80	0.65	1.41	6.80	1.80
40	1.45	0.53	1.16	5.70	1.45
50	0.97	0.36	0.83	4.00	0.97
60	0.67	0.25	0.60	2.90	0.67
70	0.47		0.44	2.10	0.47
80	0.33		0.33		
90			0.24		
100			0.19		

Test step 3:

Fresh-air blower-V2 and fresh-air blower control unit -J126

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V =)					
▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
3.1	16 + Earth3)	Control unit -J126	▪ Ignition switched on	- Voltage less than 5 V - Fresh-air blower not running	- Use current flow diagram to locate and rectify short to positive in the wiring between -J126 and -E87 Renew control unit -J126
3.2	14 + Earth3)	Power supply for fresh-air blower - V2	▪ Ignition switched on	- approx. battery voltage	- Use current flow diagram to repair power supply
3.3	11 + Earth3)	Power supply for control unit -J126 (via fresh-air blower -V2)	▪ Ignition switched on	- approx. battery voltage	- Use current flow diagram to repair power supply

3) Earth is connected, for example, to connector D, contacts 14 and 15.

Voltage tester V.A.G 1527 B					
▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
3.41)	13 + 16	Control unit -J126	▪ Ignition switched on	- LED in voltage tester lights - Fresh air blower is running	- Use current flow diagram to locate and rectify open circuit in the wiring between -J126 and -E87 - Check freedom of movement of fresh-air blower -V2 Renew control unit -J126



3.55)	14 + 16	Control unit -J126	▪ Ignition switched on	- LED in voltage test-lights - Fresh air blower is running	- Use current flow diagram to locate and rectify open circuit in the wiring between -J126 and -E87 - Check freedom of movement of fresh-air blower -V2 Renew control unit -J126
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1) Only perform test step on vehicles up to Model Year 1996.

5) Only perform test step on vehicles as of Model Year 1997.

Test step 4:

Positioning motors for air conditioner and associated potentiometers

Notes:

- ♦ The resistance of potentiometers in the positioning motors (specified value: 3.6... 5.7 k Ω between contacts 3 and 4) can only be measured directly at the positioning motor (parallel connection).
- ♦ The resistance of the potentiometers in the positioning motors (between contacts 3 and 5 and contacts 4 and 5) is governed by the setting of the positioning motor; it must only be measured with the positioning motor installed. The upper specified value is not achieved in test steps 4.1 and 4.2. (To achieve the upper specified value, it would be necessary to pull all the connectors of the other positioning motors during the measurement - parallel connection).
- ♦ If the -E87 detects the fault "potentiometer short to earth" or "open circuit/short to positive", check all the potentiometers (in the 4 positioning motors) and the associated wiring.
- ♦ If several positioning motors are simultaneously indicated as faulty in the fault memory and no fault is detected in test step 4, check the positioning motor for a short circuit between the individual positioning motors (e.g. between -V85 and -V70, measured value between sockets 3 and 4 must be $\infty \Omega$).
- ♦ Up to Model Year 1996, the installation of the positioning motor -V71 was dependent upon equipment and it is therefore not installed in all vehicles (e.g. not in right-hand drive vehicles).
- ♦ In right-hand drive vehicles, contacts 1 and 2 and contacts 3 and 4 on the air-flow flap positioning motor -V71 are interchanged.

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 k Ω) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
4.1	52 + 28/ 29/ 37/ 30	Potentiometer (in the positioning motor) -G 92 (-V68) -G112 (-V70) -G113 (-V71) -G114 (-V85)	▪ Ignition off	- Greater than 0.1 k Ω and less than 5.7 k Ω (depends on the setting of the positioning motor)	- Use current flow diagram to locate and rectify short circuit, open circuit or contact resistance Renew positioning motor
4.2	8 + 28/ 29/ 37/ 30	Potentiometer (in the positioning motor) -G 92 (-V68) -G112 (-V70) -G113 (-V71) -G114 (-V85)	▪ Ignition off	- Greater than 0.1 k Ω and less than 5.7 k Ω (depends on the setting of the positioning motor)	- Use current flow diagram to locate and rectify short circuit, open circuit or contact resistance Renew positioning motor

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 k ω) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
4.3	14 + 28/ 29/ 37/ 30	Potentiometer (in the positioning motor) -G 92 (-V68) -G112 (-V70) -G113 (-V71) -G114 (-V85)	▪ Ignition off	- $\infty \omega$	- Use the current flow diagram to locate and rectify short to earth. Renew positioning motor

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (200 ω) ▪ Adapter cable V.A.G 1598/12 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
4.4	2 + 10	Temperature flap positioning motor - V68	▪ Ignition off	- 20...100 ω	- Use current flow diagram to locate and rectify short circuit, open circuit or contact resistance - Renew positioning motor
4.5	4 + 12	Central flap positioning motor -V70		- 20...100 ω	
4.6	5 + 13	Air-flow flap positioning motor -V71		- 20...100 ω	
4.7	3 + 11	Footwell/defroster flap positioning motor -V85:		- 20...100 ω	

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 k ω) ▪ Adapter cable V.A.G 1598/12 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
4.8	14 + 2/ 3/ 4/ 5	Wiring to the positioning motors -V68 -V85 -V70 -V71 for short to earth	▪ Ignition off	- $\infty \omega$	- Use the current flow diagram to rectify short to earth

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V =) ▪ Adapter cable V.A.G 1598/12 connected					
4.9	14 + 2/ 3/ 4/ 5	Wiring to the positioning motors -V68 -V85 -V70 -V71 for short to positive	▪ Ignition switched on	- Less than 1 V	- Use the current flow diagram to rectify short to positive



Test step 5:

Air conditioner compressor speed sensor -G111, magnetic clutch high-pressure switch -F118, air conditioner low-pressure switch -F73, temperature sensor blower -V42, air conditioner compressor intervention output and engine temperature too high signal

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 kΩ)

▪ Adapter cable V.A.G 1598/11 connected

Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
5.1 2)	5 + 49	Air conditioner compressor speed sender -G111	▪ Ignition off	- 0.8...1.5 kΩ	- Use current flow diagram to locate and rectify open circuit, contact resistance or short circuit Sender -G111 defective. Send vehicle to an VW/Audi air conditioner service centre

2) Test step only to be performed on vehicles up to Model Year 1996 with 6-cylinder engine and Zexel compressor.

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (20 kΩ)

▪ Adapter cable V.A.G 1598/11 connected

Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
5.2 2)	5 + Earth	Air conditioner compressor speed sender -G111	▪ Ignition off	- greater than 2 kΩ	- Locate and rectify the short circuit using the current flow diagram Sender -G111 defective. Send vehicle to an VW/Audi air conditioner service centre

2) Test step only to be performed on vehicles up to Model Year 1996 with 6-cylinder engine and Zexel compressor.

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V =)

▪ Adapter cable V.A.G 1598/11 connected

Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
5.3 2)	5 + Earth	Air conditioner compressor speed sender -G111	▪ Engine running ▪ Compressor not running	- Less than 1 V	- Locate and rectify the short circuit using the current flow diagram

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (2 V font=

Adapter cable V.A.G 1598/11 connected

- Magnetic clutch relay -J44 removed

- Jumper between terminals 30 and 87 at relay panel (air conditioner magnetic clutch engaged)

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V =) ▪ Adapter cable V.A.G 1598/11 connected					
5.4 2)	5 + Earth	Air conditioner compressor speed sender -G111	▪ Engine running ▪ Compressor running	- greater than 0.05 V (depends upon the engine speed)	- Sender -G111 defective. Send vehicle to an VW/Audi air conditioner service centre

2) Test step only to be performed on vehicles up to Model Year 1996 with 6-cylinder engine and Zexel compressor.

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (200 ω) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
5.5 1)	2 + 49	High-pressure switch for magnetic clutch - F118 Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.	▪ Ignition off	- Less than 20 ω	- Use current flow diagram to locate and rectify open circuit, contact resistance or short circuit 7) Renew high-pressure switch -F118

1) Only perform test step on vehicles up to Model Year 1996.

7) If code 1 "high pressure switch -F118 open" is displayed in measured value block 1 as a compressor shutoff criterion:

- Also use current flow diagram to check the wiring to the -F118 for a loose contact.
- Check the actuation of the radiator fan-V7 speed 1 (=>Final control diagnosis, Page 20).
- Check actuation of the radiator fan -V7 speed 2:
- at the magnetic clutch high pressure switch -F118 between contacts 1 and 2 (=>Page 116).
- If no fault can be determined, the vehicle should be sent to an Audi and VW air conditioner service centre.

Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V =) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
5.6 1)	3 + Earth	Air conditioner low-pressure switch - F73	▪ Ignition switched on	- approx. battery voltage	- Locate and rectify the open circuit in the power supply using the current flow diagram: Low pressure switch -F73 defective or refrigerant circuit empty (checking =>Page 192 onwards)
Select measuring range on hand-held multimeter V.A.G 1526: Current measurement (20 A =) ▪ Adapter cable V.A.G 1598/11 connected					



Select measuring range on hand-held multimeter V.A.G 1526: Voltage measurement (20 V =) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
5.7 6)	44 + Earth	Temperature sensor blower -V42	▪ Ignition switched on	- Less than 1 A - Fresh air blower is running	- Use current flow diagram to locate and rectify open circuit, short to positive or earth in the wiring between -V42 and -E87

1) Only perform test step on vehicles up to Model Year 1996.

6) Test step only to be performed with operating and display unit -E87 with two displays.

Voltage tester V.A.G 1527 B ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
5.8 1)	13 + 12	"Air conditioner compressor cut-in" output	▪ Engine running	- LED in voltage tester does not light	- Use the current flow diagram to locate and rectify short to earth. Rectify air conditioner compressor shut-off condition in the engine control unit. Rectify the air conditioner compressor shutoff condition in the automatic gearbox control unit.
5.9 1)	13 + 51	Signal "Engine temperature too high"	▪ Engine running	- LED in voltage tester does not light	- Use the current flow diagram to locate and rectify short to earth. Rectify air conditioner compressor shut-off condition in the dash panel insert or in the diesel direct-injection system control unit.

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1) Only perform test step on vehicles up to Model Year 1996.

Voltage tester V.A.G 1527 B ▪ Operating and display unit -E87 connected to the test box (adapter cable V.A.G 1598/11 and /12) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
5.10 5)	14 + 12	"Air conditioner compressor cut-in" output	▪ Engine running ▪ Compressor switched off (frost symbol in the display zone of -E87 is not lit)	- LED in voltage tester lights	- Use current flow diagram to locate and rectify open circuit or short circuit

			- Switch on compressor	- LED in voltage tester lights slightly less brightly	- Rectify air conditioner compressor shutoff condition in the engine control unit. Rectify the air conditioner compressor shutoff condition in the automatic gearbox control unit. Use the current flow diagram to locate and rectify short to earth.
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5) Only perform test step on vehicles as of Model Year 1997.

Voltage tester V.A.G 1527 B ▪ Operating and display unit -E87 connected to the test box (adapter cable V.A.G 1598/11 and /12) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
5.11 5)	Earth + 51	Signal "Engine temperature too high"	▪ Engine running	- LED in voltage tester lights	- Use the current flow diagram to locate and rectify short to earth. Rectify the air conditioner compressor shutoff condition in the dash panel insert

5) Only perform test step on vehicles as of Model Year 1997.

Notes:

- ◆ In vehicles from Model Year 1999, the assignment of the ignition key will be notified to the -E87 by the dash panel insert together with the refrigerant temperature and the signal "Engine temperature too high" when the ignition is switched on (data telegram). The assignment of the code can only be processed by operating and display units with the Part Number 8D0 820 043 from index "M". If the refrigerant temperature is too high, no information may be transmitted.
- ◆ The assignment of the ignition key can only be recognised and therefore transmitted by the dash panel insert on vehicles fitted with an immobiliser.
- ◆ When the ignition is switched on, the -E87 starts with the setting which was valid the last time the ignition was switched off with this key (temperature, air distribution, fresh air blower speed).
- ◆ The signal from the dash panel insert (data telegram) cannot be checked with workshop tools.

=> Electrical System; Repair group 90; Repair dash panel insert Repair dash panel insert

Select measuring range on hand-held multimeter V.A.G 1526: Current measurement (200 mA =) ▪ Operating and display unit -E87 connected to the test box (adapter cable V.A.G 1598/11 and /12) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
5.12 5)	Earth + 12	"Air conditioner compressor cut-in" output	▪ Engine running ▪ Compressor switched off	- Less than 5 mA	- Use the current flow diagram to locate and rectify short to positive



			- Switch on compressor - Pull connecting cable to V.A.G 1526 out of the sockets	- Less than 50 mA - Compressor is not switched on - Compressor is switched on	- Replace the operating and display unit - E87 =>Page 154 . - Rectify air conditioner compressor shutoff condition in the engine control unit. Rectify the air conditioner compressor shutoff condition in the automatic gearbox control unit. Use the current flow diagram to locate and rectify short to earth.
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5) Only perform test step on vehicles as of Model Year 1997.

Select measuring range on hand-held multimeter V.A.G 1526: Resistance measurement (200 ω) ▪ Adapter cable V.A.G 1598/11 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
5.13 5)	2 + 42	Air conditioner pressure switch -F129 (switch between the contacts 1 and 2)	▪ Ignition off	- Less than 20 ω	- Use current flow diagram to locate and rectify open circuit or contact resistance 8) Renew air conditioner pressure switch - F129

5) Only perform test step on vehicles as of Model Year 1997.

8) If code 1 "pressure switch - F129 open" is displayed in measured value block 1 as a compressor shutoff criterion:

- Also use current flow diagram to check the wiring to the -F129 for a loose contact.
- Check the actuation of the radiator fan -V7 speed 1 (=>Final control diagnosis, Page 20).
- at the air conditioner pressure switch -F129 between contacts 3 and 4 (=>Page 122).
- If no fault can be determined, the vehicle should be sent to an Audi and VW air conditioner service centre.

Test step 6:

Magnetic clutch relay -J44, actuation of radiator fan -V7

Select measuring range on hand-held multimeter V.A.G 1526: Current measurement (20 A =) ▪ Adapter cable V.A.G 1598/12 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained

6.1	8 + 14	Magnetic clutch relay -J44	▪ Engine running	- Less than 1 A - Compressor is driven	- Use current flow diagram to locate and rectify open circuit or short to positive in the wiring between -N25 and -E87 Only vehicles up to Model Year 1996) Check low-pressure switch -F73 => Test step 5.6, Page 131
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Select measuring range on hand-held multimeter V.A.G 1526: Current measurement (20 A =) ▪ Adapter cable V.A.G 1598/12 connected					
Test step	V.A.G 1598 A Socket	Testing of	▪ Test conditions - Additional operations	Specified value	Remedies if specified value not attained
6.2	16 + 14	Actuation of 1st speed for radiator fan -V7	▪ Engine running	- Less than 1 A - Fan running at speed 1	- Use current flow diagram to locate and rectify open circuit or short to positive in the wiring between -J26 and -E87 Check the actuation of fan -V7: => "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

Notes:

- ♦ On vehicles up to Model Year 1996, the radiator fan is actuated by the air conditioner high-pressure switch -F23. Checking => Page **116**.
- ♦ Check the actuation of the radiator fan (speed 2) using the pressure switch -F129 => Page **122**.

10 - Electrical check of rear window heating

10.1 - Electrical check of rear window heating

Note:

This test should only be performed with an operating and display unit with only one display (switch for heated rear window integrated in the -E87).

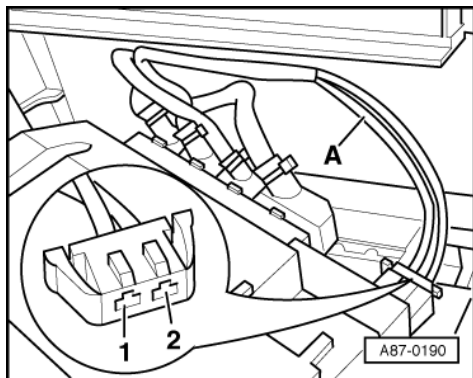
Special tools, testers and auxiliary equipment required

- ♦ Multimeter V.A.G 1715 (with current probe)
- ♦ Measuring tool set V.A.G 1594 A

Test requirements:

- All fuses OK:

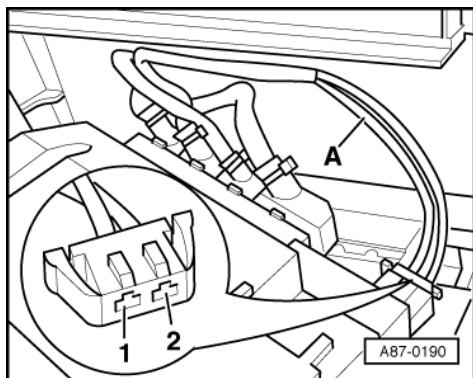
=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder



- Switch ignition off.
- Remove operating and display unit -E87 => Page 182.
- Pull the connector "E" off the operating and display unit -E87.
- -> Connect multimeter between contacts 1 and 2 to measure voltage.

- Switch the ignition on.
 - Specified value: approx. battery voltage
- Switch ignition off.
- Fit the connector "E" to the -E87.

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- -> Route lead -A- to connector "E" through V.A.G 1715's current probe.

Note:

All the connectors on the -E87 must be inserted

- Select the function "Current measurement via current probe" on V.A.G 1715.
- Start the engine.
- Switch on heated rear window at the -E87 (telltale in button lights).
 - Specified value: display changes from approx. 0 A to less than 25 A
- Wait for approx. 10 minutes
 - Specified value: The display changes from less than 25 A to approx. 0 A (telltale in button goes out)

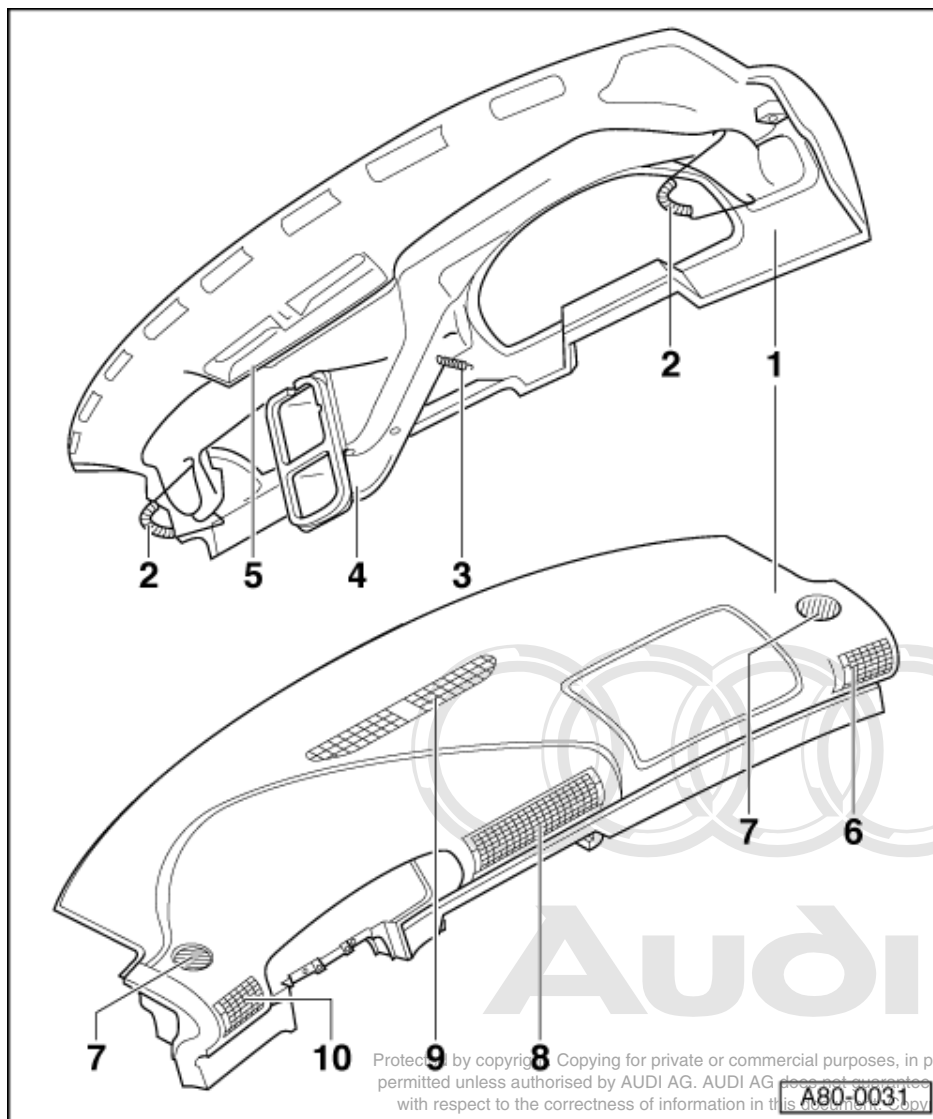
Notes:

- ♦ The current probe may be influenced by stray current which could cause the display to show a low current reading when the rear window heating is switched off.
- ♦ If the ambient temperature is below 0 °C, the rear window heating remains activated until ignition is switched off (can be deactivated manually at any time). If, during the journey, the temperature rises above 0 °C, the rear window heating is deactivated after the operating period stored in -E87 (approx. 12 minutes) has elapsed.
- ♦ If the ambient temperature is above 0 °C, the rear window heating is automatically deactivated by -E87 after the operating period stored within it (approx. 12 minutes) has elapsed.

80 - Heating

1 - Dash panel vents and air ducts

1.1 - Dash panel vents and air ducts



Note:

The passenger compartment is ventilated by two venting frames (in the boot, on the left and right in the area of the bumper) =>Page 76.

1 Dash panel

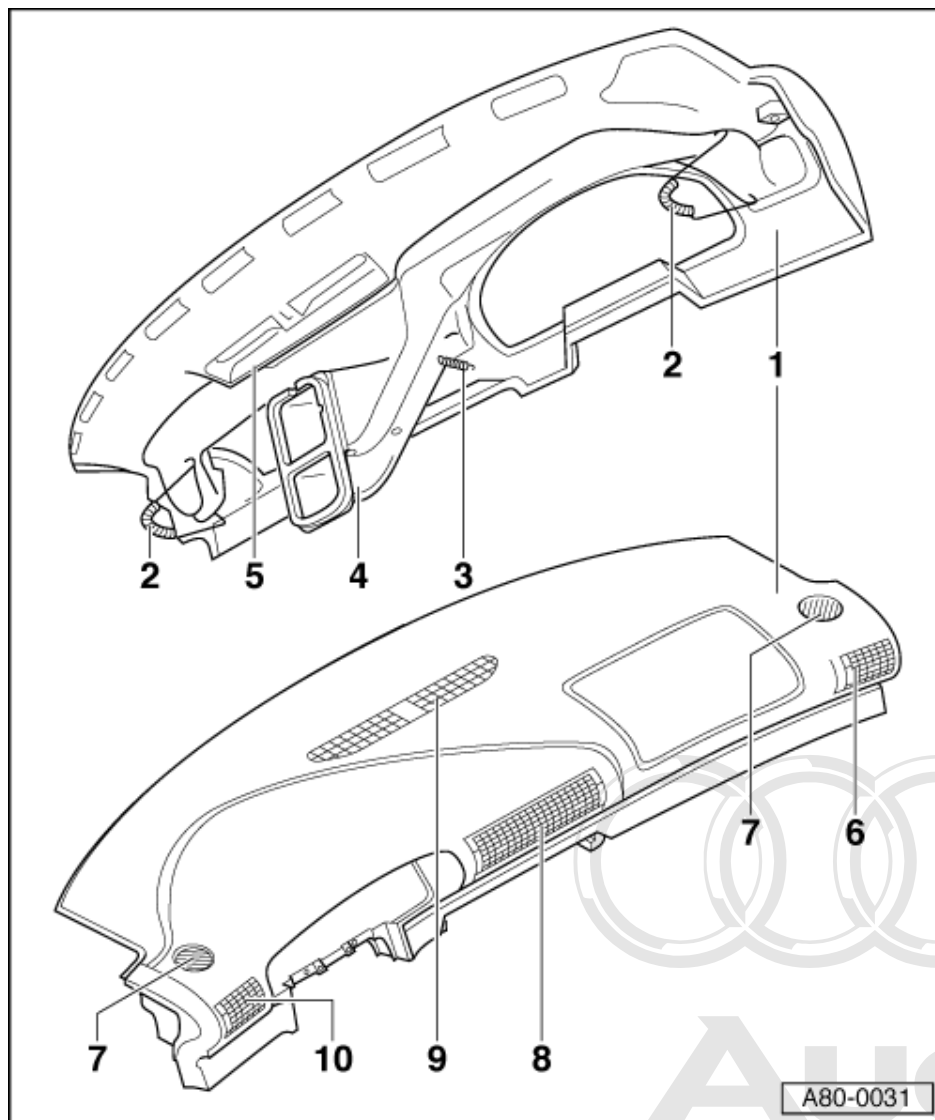
- ♦ Removing and installing:

=> General Body Assembly, Interior; Repair group 70; Dash panel; Removing dash panel Dash panel Removing dash panel

2 Retention spring

- ♦ For air duct/vent

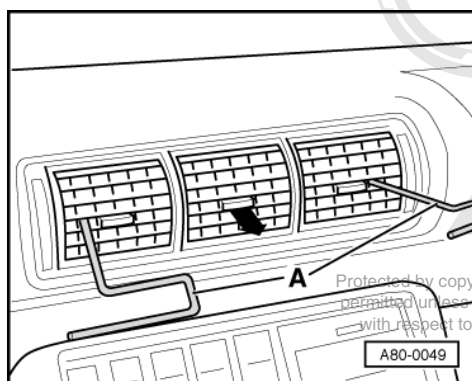
- 3 Retention spring
 - ◆ For air duct/vent
- 4 Air duct/vent
- 5 Defroster duct



- 6 Dash panel vent
 - ◆ Passengers' side
 - ◆ Removing and installing =>Page 74
- 7 Defroster vent
 - ◆ For side window
 - ◆ Latched into the dash panel
- 8 Dash panel vent
 - ◆ Centre
 - ◆ Removing and installing =>Page 73
- 9 Defroster vent
 - ◆ For windscreen
 - ◆ Removing and installing =>Page 74
- 10 Dash panel vent
 - ◆ Driver's side
 - ◆ Removing and installing =>Page 74

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1.2 - Removing and installing centre dash-panel vent



- -> Insert the auxiliary tool -A- into the holes in the dash panel vents.
- Evenly pull the dash-panel vents out of the dash-panel centre section.

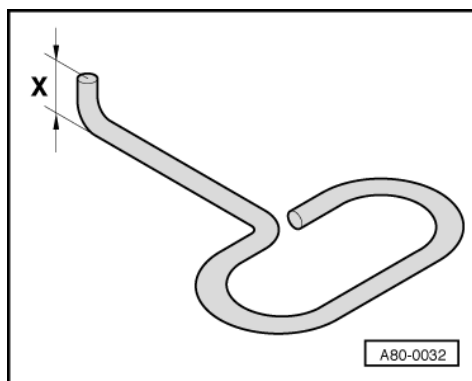
Note:

If a swivel insert should become detached from the vent on removal, replace it correctly (both sides of the swivel insert must lock into place).

Notes:

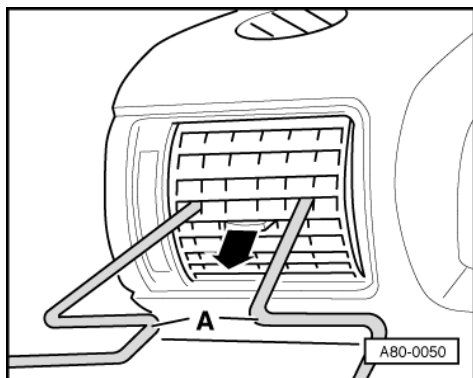
- ♦ If the swivel insert should become detached from the vent on removal, replace it correctly (both sides of the swivel insert must lock into place).
- ♦ In vehicles from vehicle chassis number 200000 of Model Year 1999, the adjusting knurl is illuminated.
 - The connector -B- should be inserted in the air duct in the cable grommet
 - The lamp for the illumination is installed in the adjusting knurl and cannot be replaced.

Making an auxiliary tool for dismantling the dash panel vents



- -> Bend a 3 mm $\varnothing$ wire as shown in the illustration.
- Dimension x = 6 mm

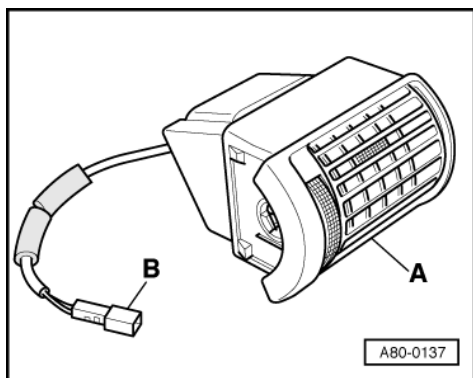
1.3 - Removing and installing left or right dash panel vent



- -> Insert the auxiliary tool -A- into the holes in the dash panel vent.
- Evenly pull the dash-panel vents out of the dash-panel centre section.

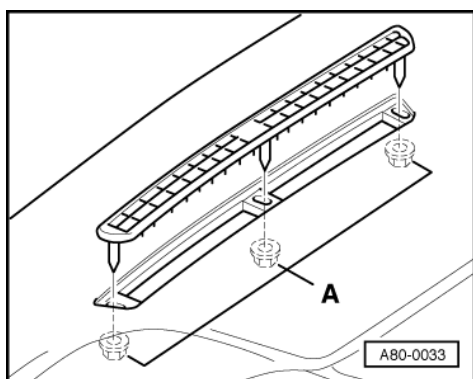
Notes:

- ♦ If the swivel insert should become detached from the vent on removal, replace it correctly (both sides of the swivel insert must lock into place).



- ♦ -> In vehicles as of vehicle chassis number 200000, Model Year 1999, the adjusting knurl -A- is illuminated.
- The connector -B- should be inserted in the air duct in the cable grommet
- The lamp for the illumination is installed in the adjusting knurl and cannot be replaced.

1.4 - Removing and installing windscreen defroster vent



- Remove the dash panel:

=> General Body Assembly, Interior; Repair group 70; Dash panel: Removing and installing dash panel Dash panel: Removing and installing dash panel

- -> Unscrew the 3 nuts -A-.
- Remove the defroster vent from the dash panel.

1.5 - Removing and installing dust and pollen filter

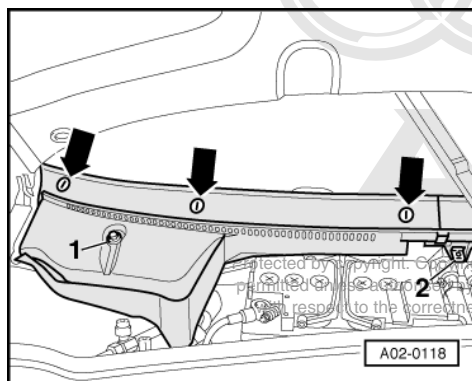
Note:

Replacement interval for dust and pollen filter:

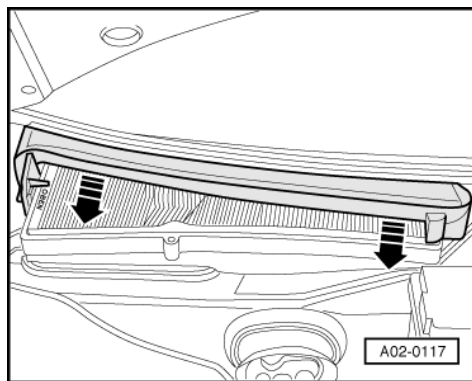
=> Maintenance manual

The filter is located beneath the right scuttle panel trim.

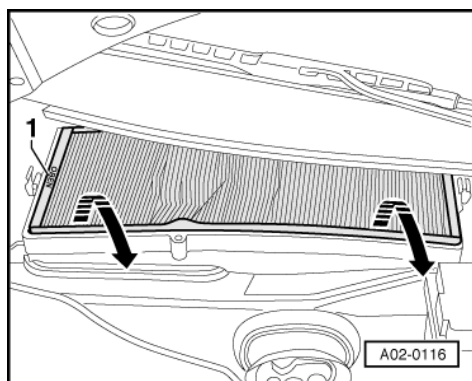
- Switch on the ignition and the windscreen wipers.
- When the wipers reach half-way position on the windscreen, switch the ignition off.



- -> Remove right scuttle panel trim: Turn quick-release fasteners -arrows- through 90°, unscrew bolt-1- and release clip -2-.



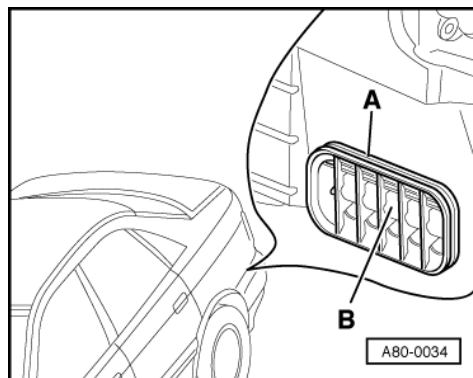
- -> Unclip the rain channel and pull it out towards the front -arrows-.





- -> Remove the dust and pollen filter from the housing -arrows-.
- Install filter element
 - Installation position: Note the marking "TOP" -1-
- When installing, ensure that the rain channel is properly fitted, otherwise water will run down into the dust and pollen filter and into the heating system.

1.6 - Checking vent frame



- -> Check that air ducts are not blocked.
 - The sealing lips -B- in the vent frame -A- must move freely and close automatically
 - Blocked ducts could cause the windows to mist up

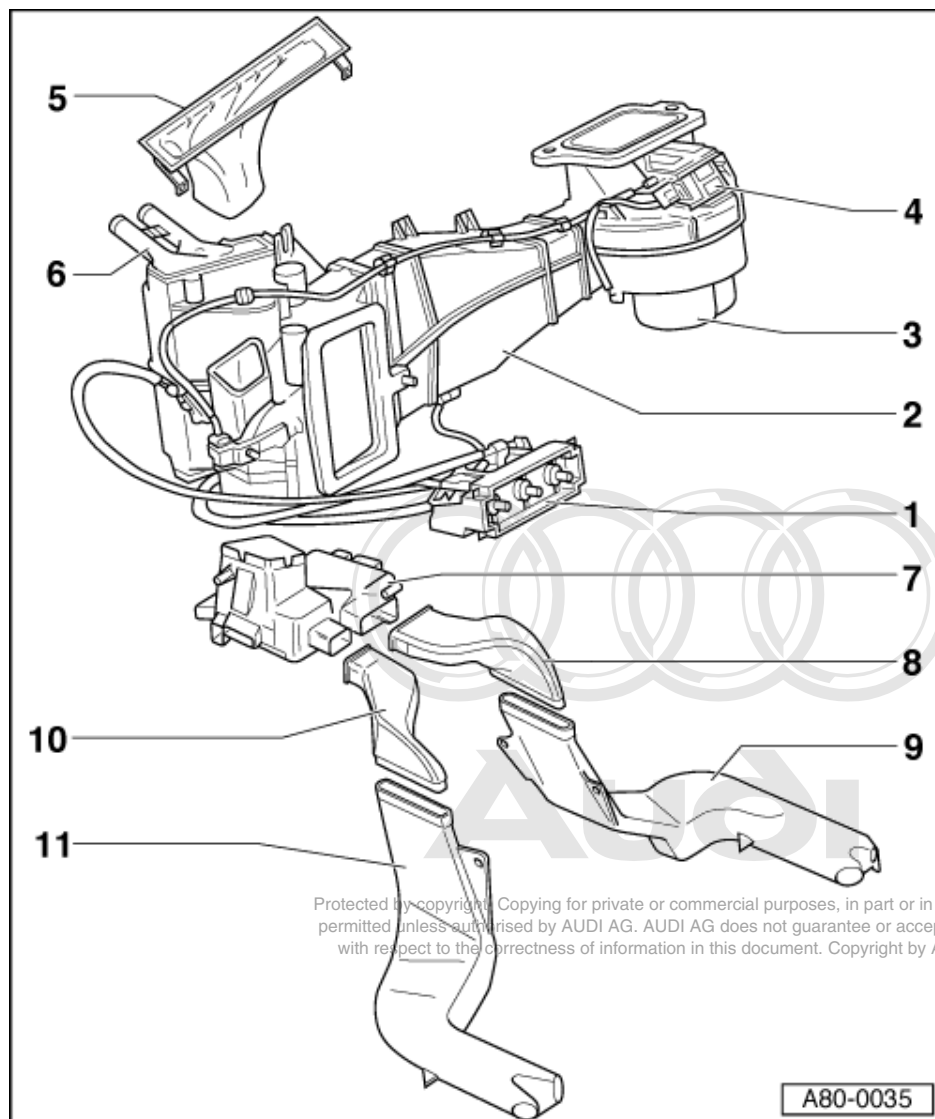
Notes:

- ♦ The diagram shows the vent frame with the rear bumper removed
- ♦ For the forced air extraction, vent frames are installed on the right and left.
- ♦ For proper venting of the passenger compartment, the air ducts must not be blocked.

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2 - Repairing heating - vehicles up to Model Year 1996

2.1 - Repairing heating - vehicles up to Model Year 1996



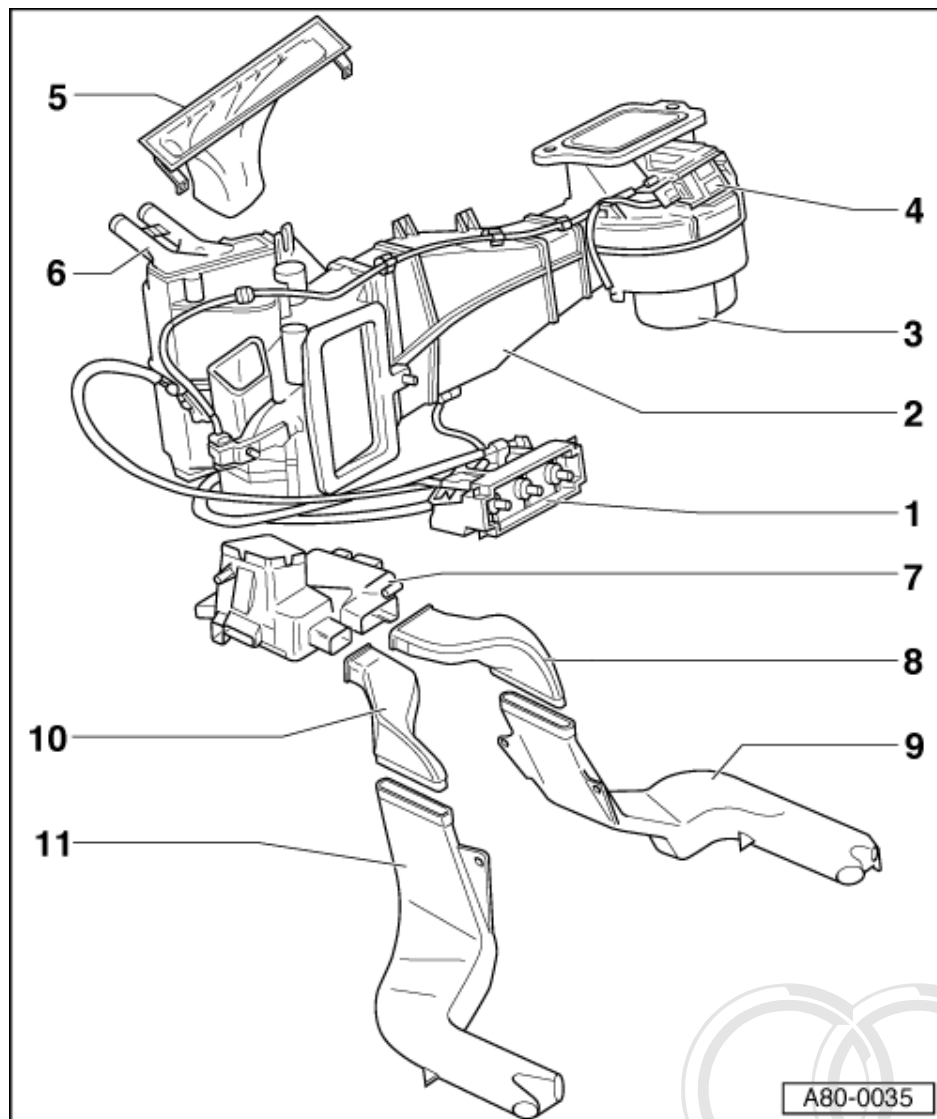
2.2 - Heating, heater control and air ducts

Note:

The fresh air is drawn in through a dust and pollen filter; removing and installing =>from Page 75.

1 Heater control

- ◆ Removing and installing =>Page 81 .
- ◆ Removing and installing Bowden cables =>Page 82
- ◆ Installing Bowden cable if lug has broken off =>Page 83
- ◆ Connection diagram for Bowden cables =>Page 83



2 Heater

- ◆ Removing and installing =>Page 87
- ◆ Removing and installing Bowden cables =>Page 84
- ◆ Connection diagram for Bowden cables =>Page 83

3 Fresh-air blower -V2

- ◆ Removing and installing =>Page 86

4 Fresh-air blower series resistor -N24

- ◆ Removing and installing =>Page 85

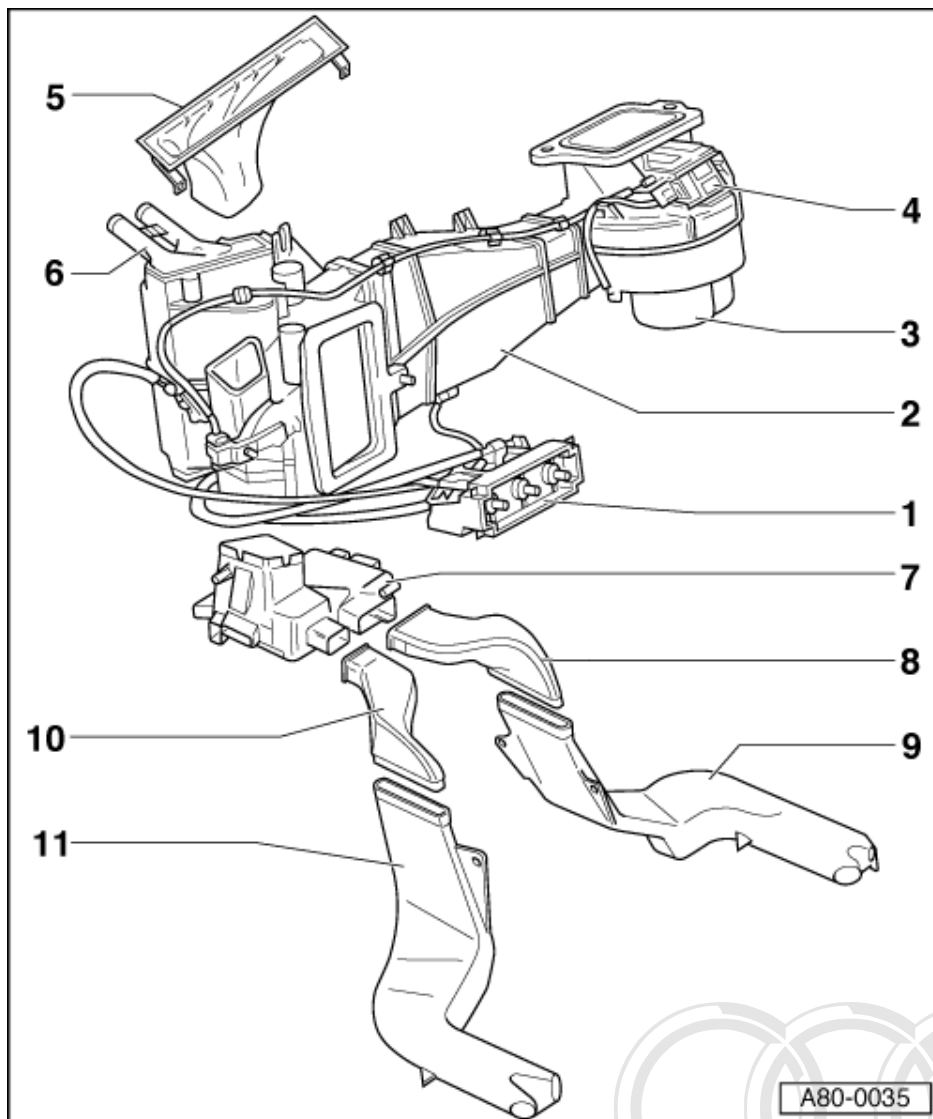
5 Intermediate piece

- ◆ For defroster duct

6 Heat exchanger

- ◆ Removing and installing =>Page 90
- ◆ Attaching self-adhesive seal=> Page 91

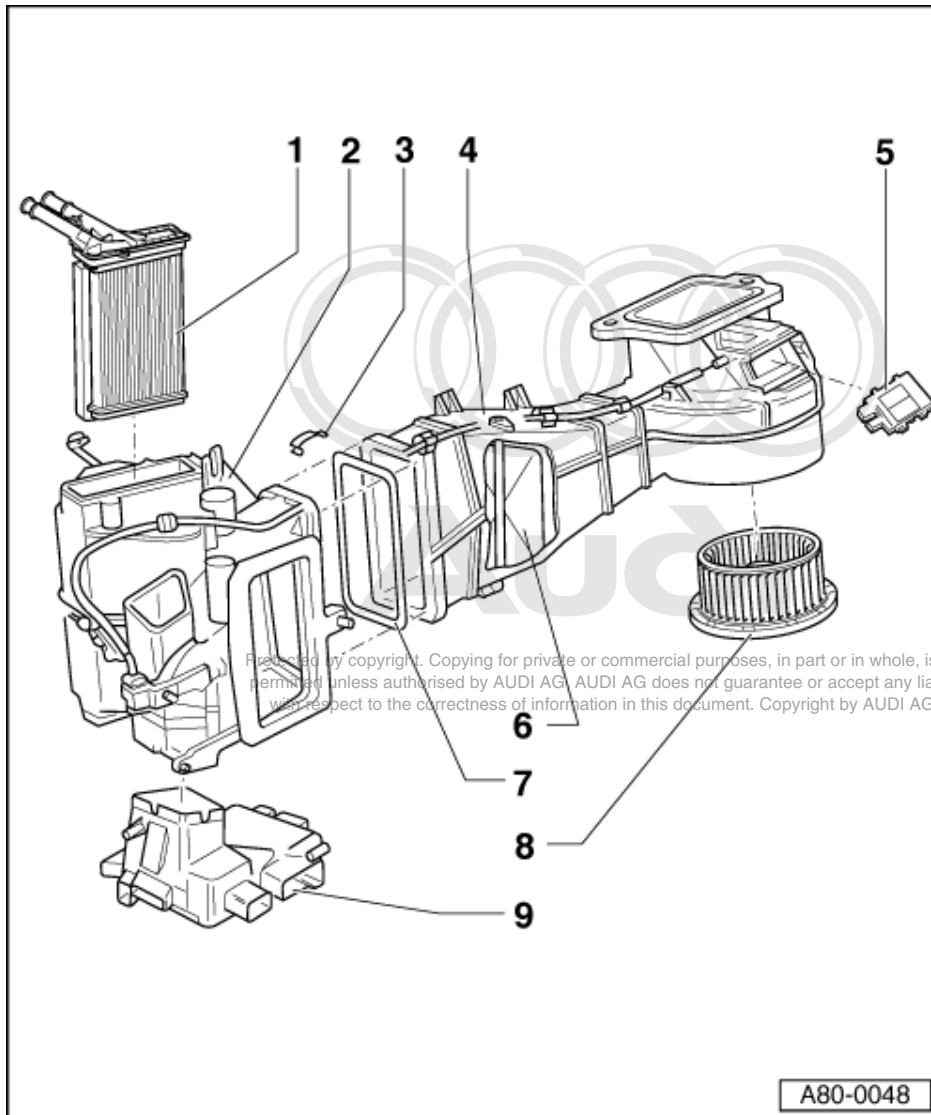
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- 7 Footwell vent**
 ♦ Removing and installing =>Page 86
- 8 Connector**
 ♦ For air duct to rear footwell on passenger side
- 9 Air duct**
 ♦ For footwell at rear on passenger side
- 10 Connector**
 ♦ For air duct to rear footwell on driver's side
- 11 Air duct**
 ♦ For rear footwell on driver's side

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2.3 - Dismantling and assembling heating



1 Heat exchanger

- ◆ Removing and installing =>Page 90
- ◆ Attaching self-adhesive seal => Page 91

2 Heater flap unit

- ◆ Do not dismantle

3 Bracket

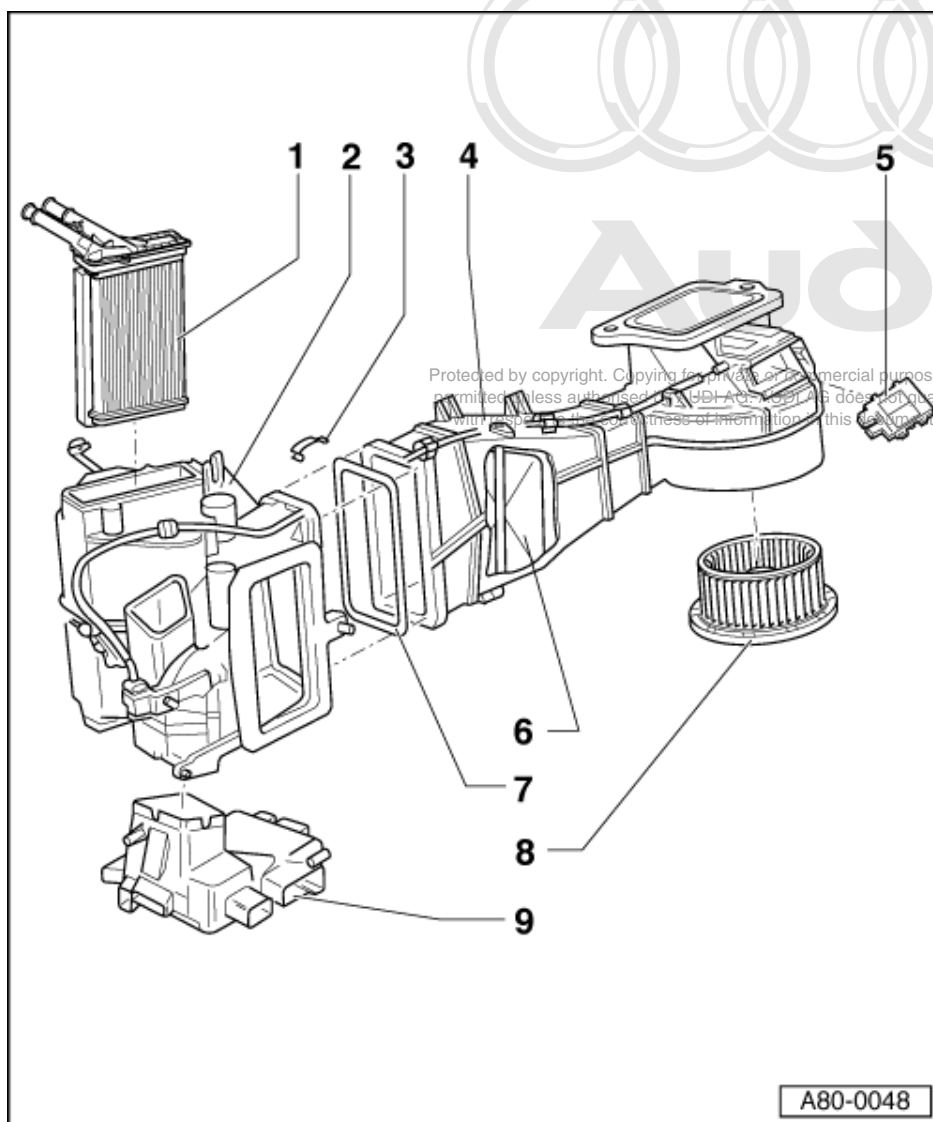
- ◆ Prise off using a screwdriver

4 Air duct

- ◆ Do not dismantle

5 Fresh-air blower series resistor -N24

- ◆ Removing and installing =>Page 85



- 6 Fresh-air shutoff flap
- 7 Gasket
- 8 Fresh-air blower -V2
 - ♦ Removing and installing =>Page 86
- 9 Footwell vent
 - ♦ Removing and installing =>Page 86

2.4 - Removing and installing heater control

Note:

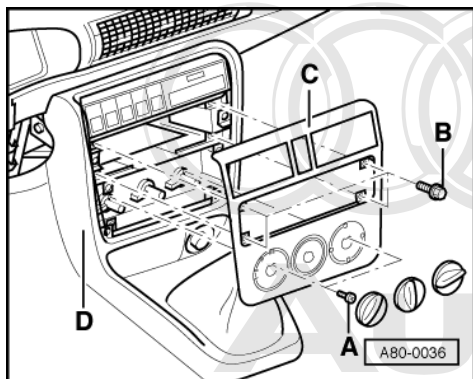
The rotary switches are illuminated by light guides; there is only one bulb. To replace the bulb, remove the trim on the centre section of the dash panel.

Removing

- Remove radio.



=> Electrical System; Repair group 91; Repairing radio; Removing and installing radio Repairing radio Removing and installing radio



- -> Detach rotary switches from the heater control.
- Screw out the bolts -A- and -B-.
- Pull off the trim on the centre section of the dash panel -C-. If necessary, prise off with a small screwdriver.
- Remove the centre console from -D-.

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing front part of centre console Storage compartments/covers Removing and installing front part of centre console

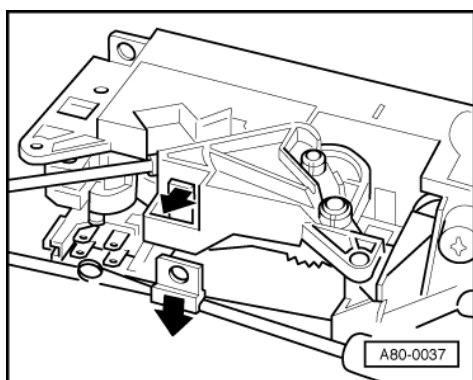
- Remove the central section of the dash panel:

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing central section of dash panel Storage compartments/covers Removing and installing central section of dash panel

Installing

Install in reverse order.

2.5 - Removing and installing heater control Bowden cables



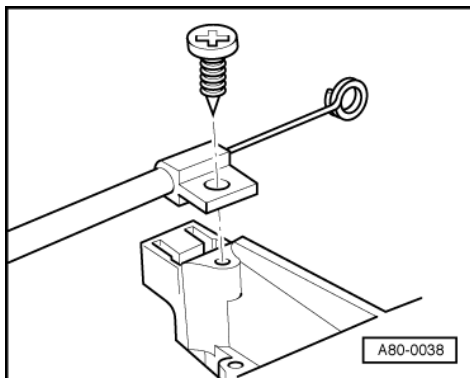
Removing

- -> Carefully disengage the lug -top arrow- and remove the Bowden cable holder from the heater control - bottom arrow-.
- Carefully remove the Bowden cable from the lever arm.

Installing

Installation is carried out in the reverse order; note the following:

- Check the Bowden cables before fitting, replace stiff or damaged Bowden cables



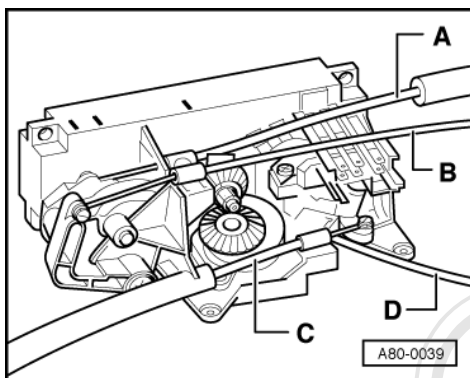
Notes:

- ◆ Connection diagram for Bowden cables =>Page 83 .
- ◆ -> If a support bracket fastener on the heater control has become detached, use a suitable bolt to secure the Bowden cable support bracket.

2.6 - Connection diagram for Bowden cables on the heater control

Note:

Colours in brackets apply to right-hand drive vehicles.



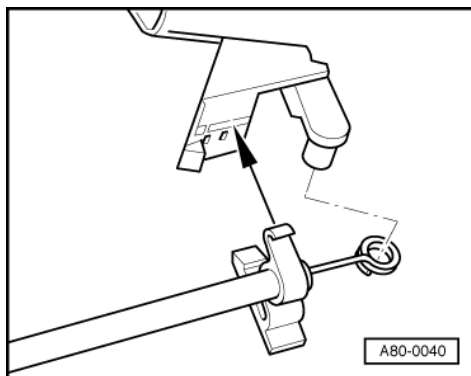
-> Bowden cables

- A - To footwell/defrost flap
- Colour of support bracket: white (green)
- B - To central flap
- Colour of support bracket: black (yellow)
- C - To fresh-air shutoff flap
- Colour of support bracket: blue (brown)
- D - To temperature flap
- Colour of support bracket: red (orange)

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2.7 - Removing and installing Bowden cables on the heater control



Removing

- -> Detach the Bowden cable support bracket.
- Carefully remove the Bowden cable from the lever arm.

Installing

Installation is carried out in the reverse order; note the following:

- Check the Bowden cables before fitting, replace stiff or damaged Bowden cables

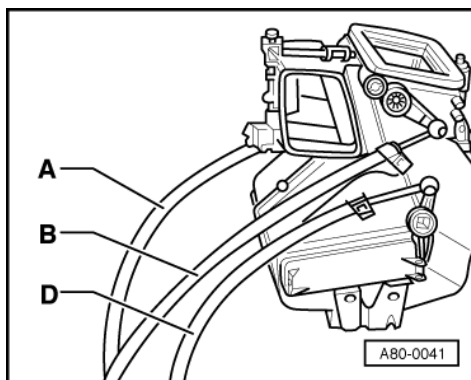
Notes:

- ♦ Connection diagram for Bowden cables =>Page 84 .
- ♦ When assembling, secure the Bowden cables with cable ties and clips so that they cannot come into contact with moving parts.

2.8 - Connection diagram for Bowden cables on the heater control

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Note:

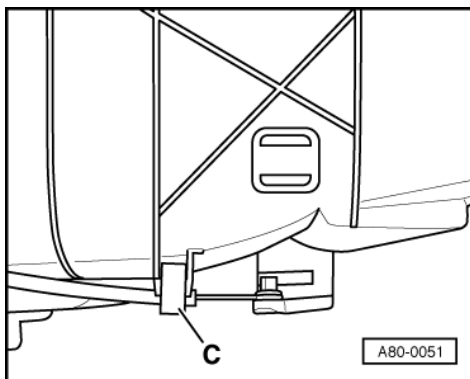


Colours in brackets apply to right-hand drive vehicles.

-> Bowden cables

- A - To footwell/defrost flap
- Colour of support bracket: white (green)
- B - To central flap
- Colour of support bracket: black (yellow)
- D - To temperature flap

-Colour of support bracket: red (orange)



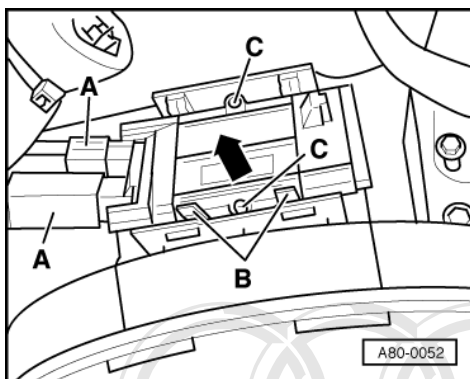
C - -> To fresh-air shutoff flap
-Colour of support bracket: blue (brown)

2.9 - Removing and installing fresh-air blower series resistor -N24

Removing

- Remove the glove box

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box



- -> Detach connector -A-
- Press back the catches -C-
- Remove the series resistor.

Installing

Installation is carried out in the reverse order; note the following:

- After installation, check that the series resistor is seated correctly, if necessary secure with suitable screws to the eyelets -C-

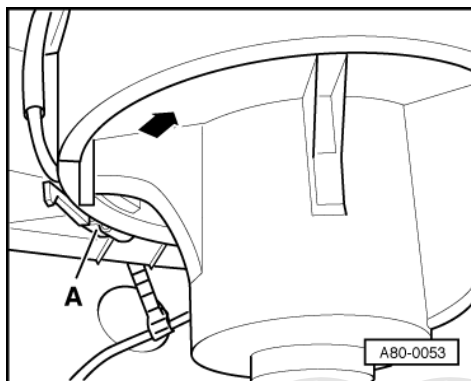
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2.10 - Removing and installing the fresh-air blower -V2-

Removing

- Remove the glove box

=> General Body Assembly, Interior; Repair group 68; Storage compartments, covers and trim parts; Removing and installing glove box Storage compartments, covers and trim parts Removing and installing glove box



- -> Remove the connectors in the wiring to the fresh air blower from the series resistor.
- Release the catch -A- and turn the fresh-air blower in a clockwise direction.

Installing

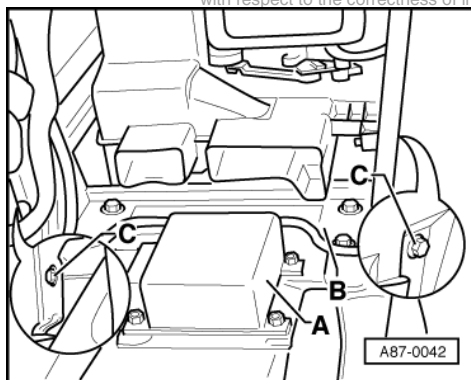
Installation is carried out in the reverse order; note the following:

- After installation, check that the fresh-air blower is seated correctly.

2.11 - Removing and installing footwell vent

Removing

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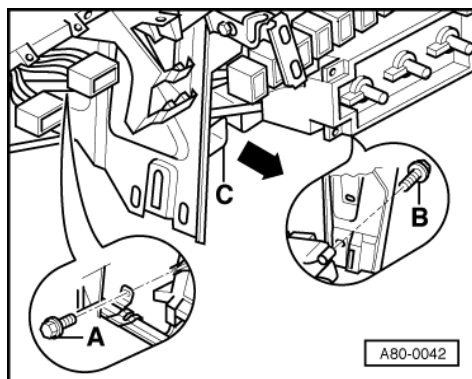


- Remove the dash panel and dash panel cross piece

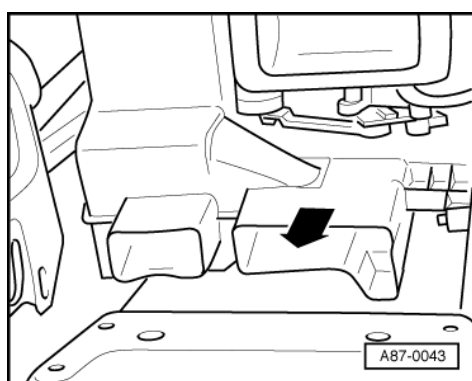
=> General Body Assembly, Interior; Repair group 70; Dash panel Dash panel

- Remove connection pieces between footwell vent and rear footwell air duct.
- -> Remove the bracket -B- for the dash panel on the transmission tunnel.
- Remove the airbag control unit -A-:

=> Electrical System; Repair group 96; Repairing airbag; Removing and installing air bag control unit (triggering unit) Repairing airbag Removing and installing air bag control unit (triggering unit)



- -> Screw out the bolts -A- and -B-.



- -> Carefully remove the footwell vent -C- in the direction of the passenger compartment -arrow-.

Installing

Install in reverse order.

2.12 - Removing and installing heater

Special tools, testers and auxiliary equipment required

- ◆ Hose clamps 3093 or 3094
- ◆ Commercially available compressed air gun

Notes:

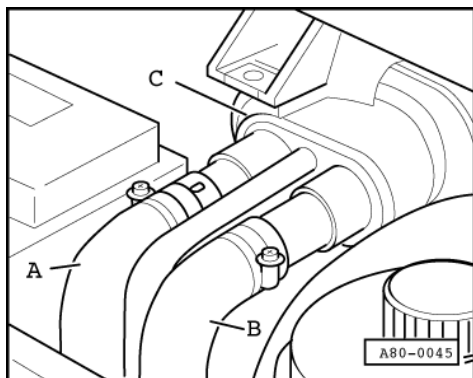
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- ◆ On removal, note the bolt lengths and assignment for re-installation.
- ◆ All cable ties which are released or cut open when the heater is removed must be replaced in the same position when installing.

Removing

- Cover the driver's and passenger's seat with protective covers.
- Switch the ignition on.
- In vehicles with electrically adjustable seats, move them back as far as possible before disconnecting the battery.
- Observe or obtain radio code on vehicles with coded radio.
- Disconnect earthing strap at battery with ignition switched off.
- Remove the battery.

- Open the cover of the coolant expansion tank



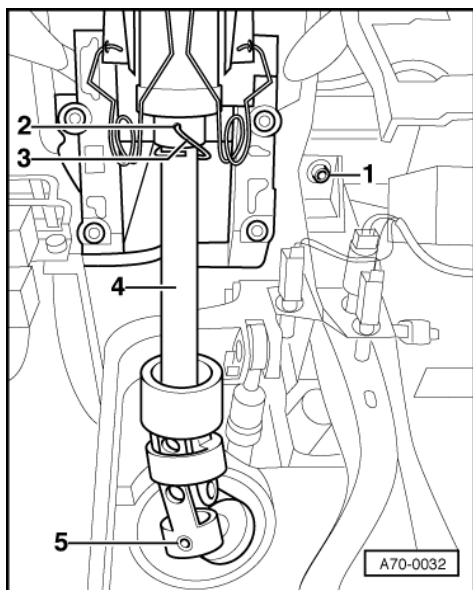
- -> Mark the layout of the coolant hoses -A- and -B-.
- Pinch off the coolant hoses to the heat exchanger with hose clamps V.A.G 3094 and detach the hoses.
- Place a container under the connection for hose -A-.
- Use the compressed air pistol to blow the coolant carefully out of the heat exchanger through the coolant hose -B-.
- Remove the grommet -C-.
- Remove the glove box, the shelf on the driver's side and the centre part of the dash panel:

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box

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=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing driver's storage compartment Storage compartments/covers Removing and installing driver's storage compartment

=> General Body Assembly, Interior; Repair group 70; Dash panel Dash panel



- -> Loosen the bolt -1- for attaching the pedal cluster to the cross piece for the dash panel:

=> Running Gear, Front-wheel Drive and Four-wheel Drive; Repair group 46; Removing and installing pedal cluster Removing and installing pedal cluster

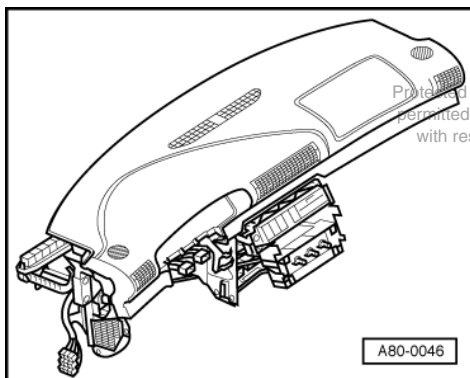
- Loosen the bolt -5- on the steering box/steering column -4-.
- After removing the steering column from the steering box, secure the steering column -4- with wire -3- at hole -2- to prevent it coming apart.

Important:
Never detach mesh section between top and bottom part of steering column on assembly.

- Remove the E-box in the plenum chamber and detach the connector in the connector point and between the dash panel and the vehicle:

=> Electrical System; Repair group 97; Fitting locations for control units and electrical components Fitting locations for control units and electrical components

- Remove the footwell vents => Page 86 .



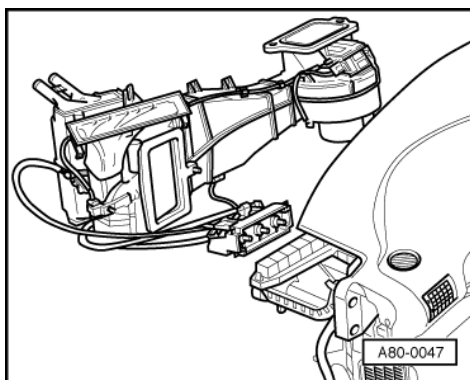
- -> Remove the dash panel with the dash panel and heater cross piece:

=> General Body Assembly, Interior; Repair group 70; Dash panel Dash panel

Note:

To ensure that the outer surface of the dash panel is not damaged, the dash panel may only be placed on a clean work bench which should be covered with clean cardboard, for example.

- Separate all the electrical connections between the dash panel and heater at the connectors.



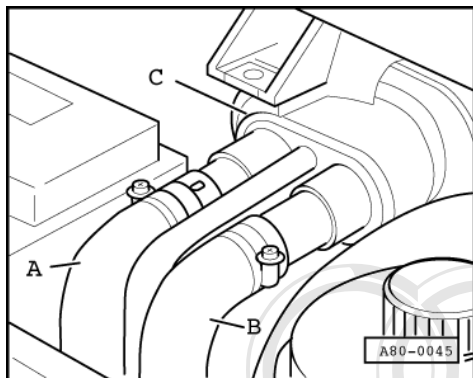
- -> Loosen all the bolts between the dash panel and the heater.
- Remove the heater from the dash panel.

Installing

Installation is carried out in the reverse order; note the following:

Note:

Check all seals on the heater for damage before installation and replace any damaged seals.



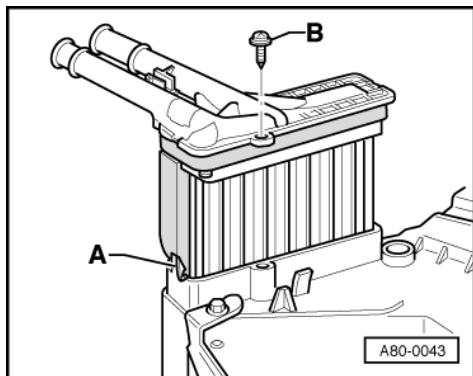
- -> Connect the coolant hoses to the heat exchanger correctly. Note the markings:
 - A - Return hose to the water pump (with vent hole)
 - B - Inlet hose from the cylinder head
- After the installation of the dash panel, check that the grommet -C- is seated correctly.
- Bleed the coolant circuit:

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 19

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2.13 - Removing and installing heating system heat exchanger

Removing



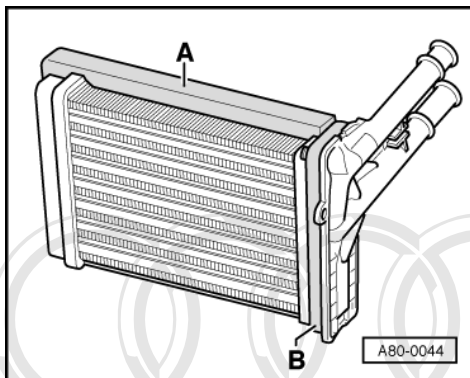
- Remove the heater => Page 87 .
- -> Press back the catches -A- and pull the heat exchanger out of the heater.

Installing

Installation is carried out in the reverse order; note the following:

Notes:

- ♦ If the heat exchanger does not engage in the heater unit on installation, secure it with two bolts -B-.



- ♦ When replacing the heat exchanger, it is not necessary to remove the heater from the dash panel (vehicles up to Model Year 1996 only).

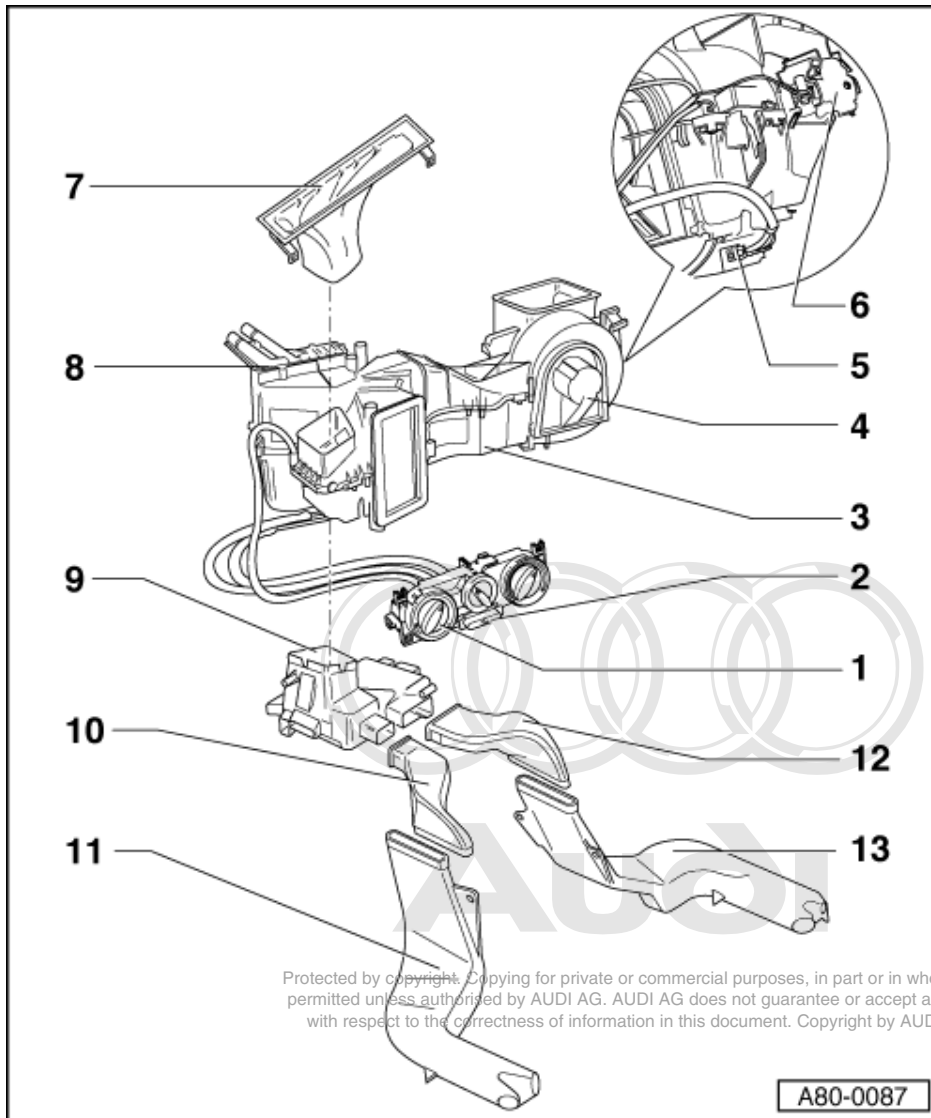
Attaching seals to the heat exchanger

- -> Bond the seals -A- and -B- all round the heat exchanger with no gaps.

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3 - Repairing heating - vehicles from Model Year 1997

3.1 - Repairing heating - vehicles from Model Year 1997



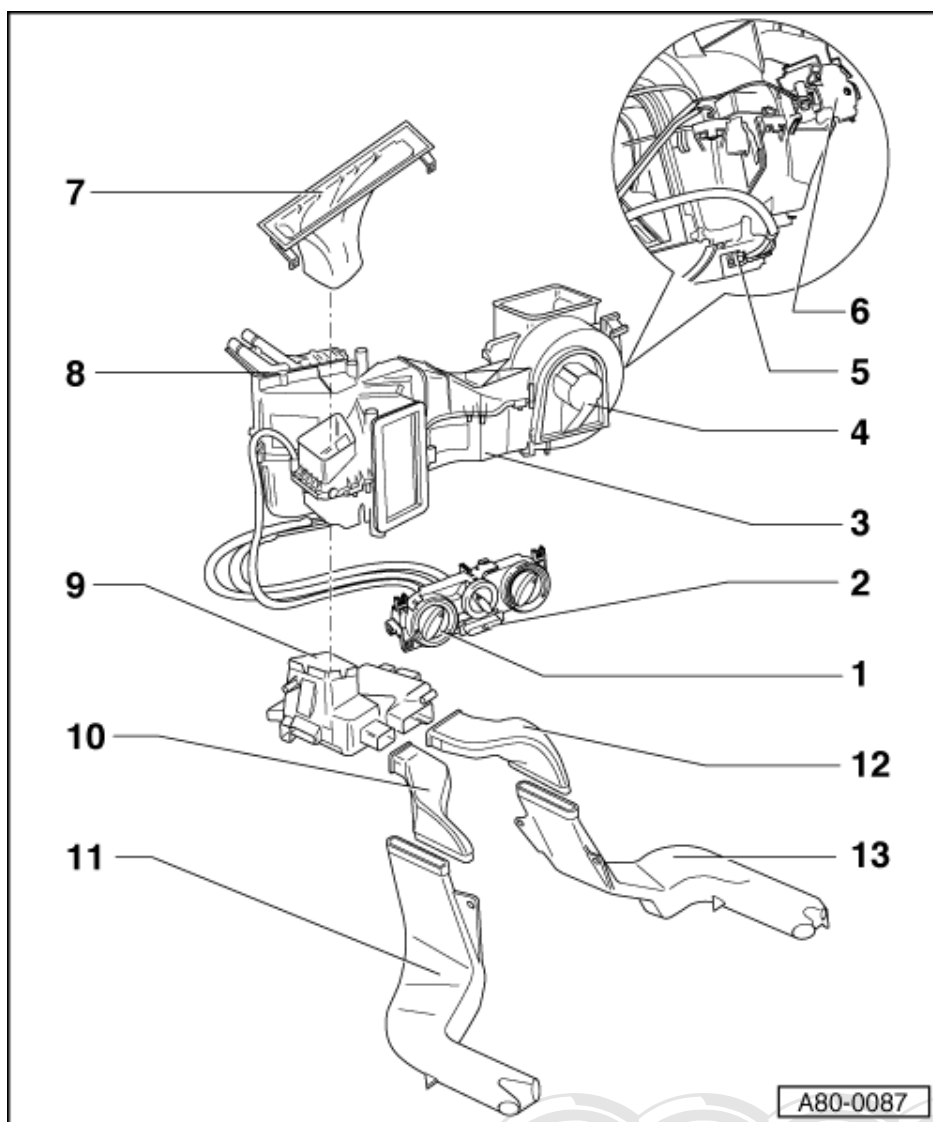
3.2 - Heating, heater control and air ducts

Note:

The fresh air is drawn in through a dust and pollen filter; removing and installing =>from Page 75.

1 Heater control

- ◆ Removing and installing =>Page 96
- ◆ Removing and installing Bowden cables =>Page 97
- ◆ Connection diagram for Bowden cables =>Page 98
- ◆ Replacing bulb =>Page 100



2 Switch for fresh-air and recirculated-air flap -E159

- ♦ Testing operation => Page 104
- ♦ Permanently connected to the heater control
- ♦ In "defrost mode", air recirculation is not possible (air recirculation mode is switched off approx. 15° before the rotary control for air distribution reaches the limit stop "air to windscreen")

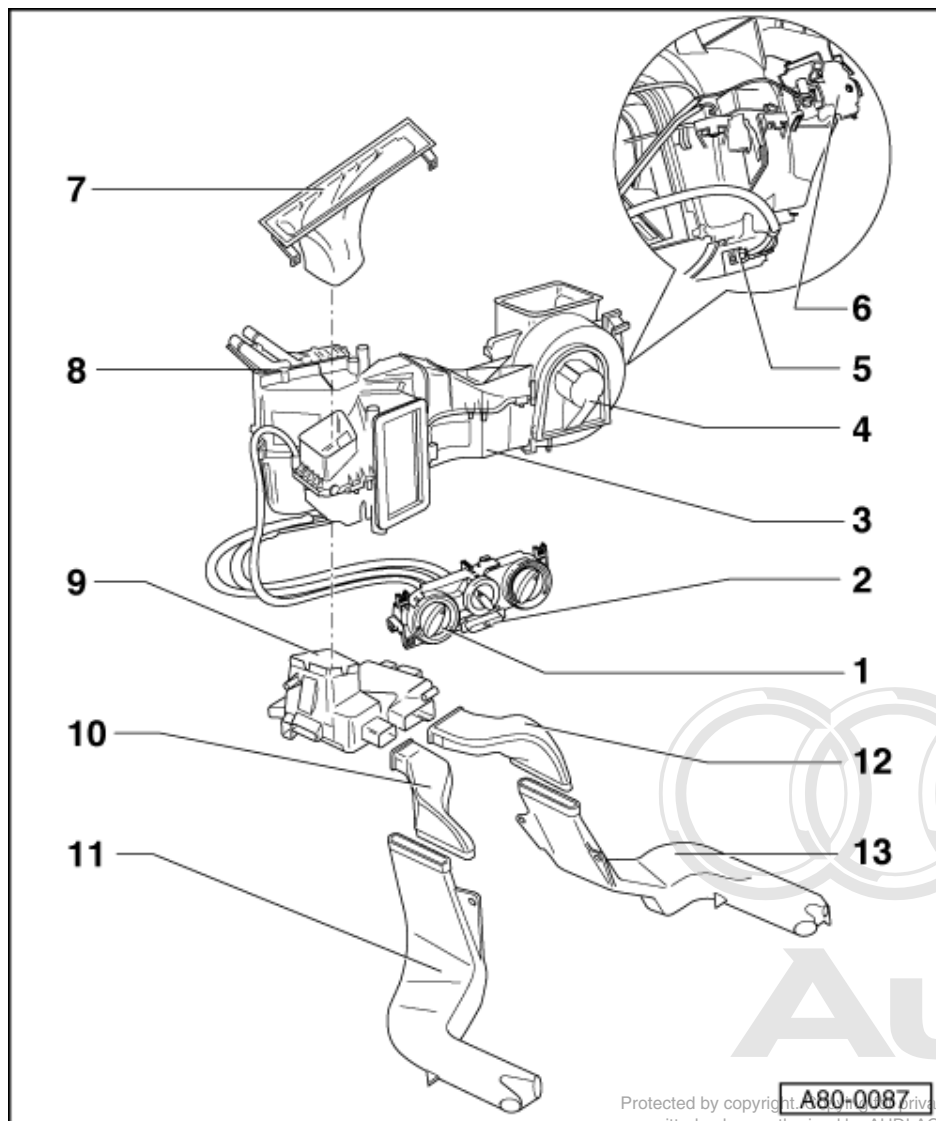
3 Heater

- ♦ Removing and installing =>Page 105
- ♦ Removing and installing Bowden cables =>Page 98
- ♦ Connection diagram for Bowden cables =>Page 99

4 Fresh-air blower -V2

- ♦ Removing and installing =>Page 101

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5 Fresh-air blower series resistor -N24

- ♦ Removing and installing =>Page 100

6 Positioning motor for fresh-air/recirculated-air flap -V154

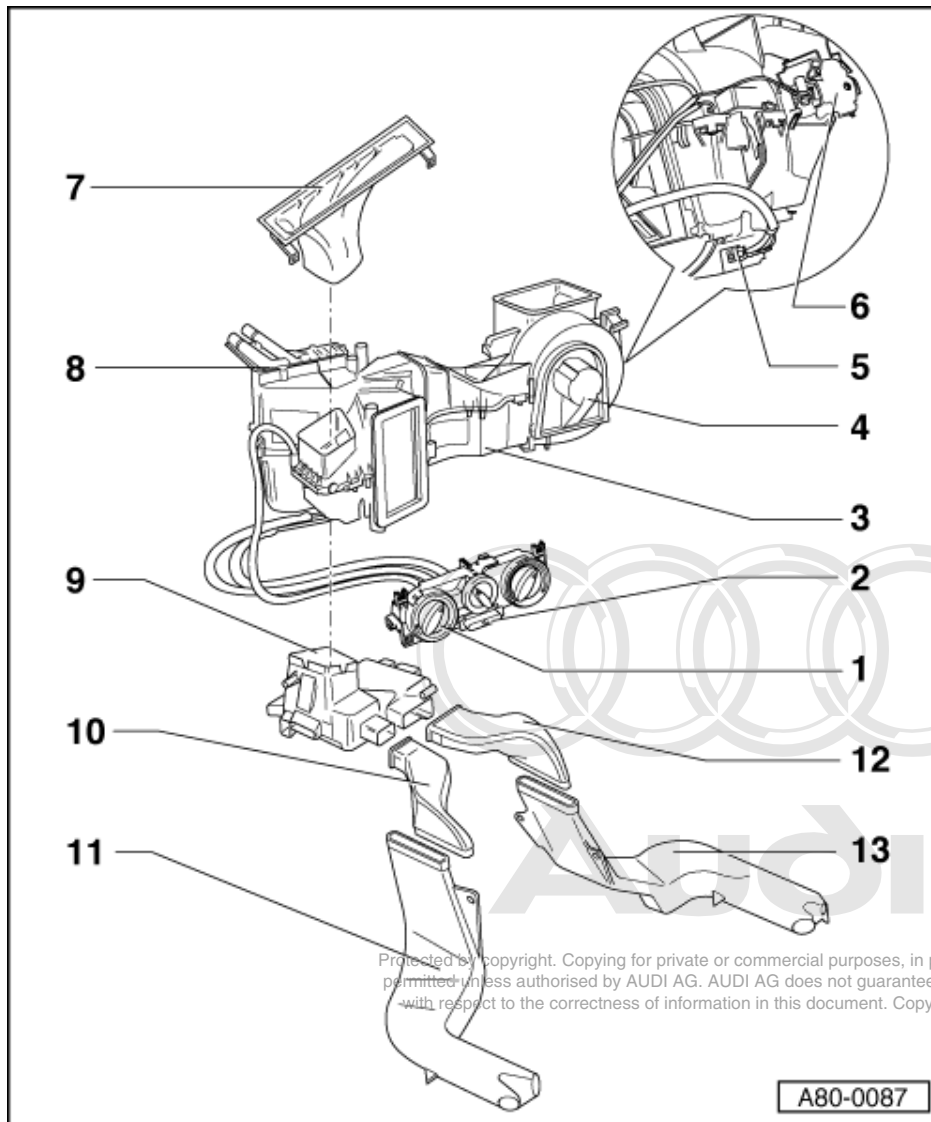
- ♦ Testing operation => Page 103
- ♦ Removing and installing =>Page 102

7 Intermediate piece

- ♦ For defroster duct
- ♦ Removing and installing =>Page 99

8 Heat exchanger

- ♦ Removing and installing =>Page 90
- ♦ To remove, remove the heater => Page 105
- ♦ Attaching self-adhesive seal => Page 91



9 Footwell vent

- ♦ Removing and installing =>Page 86

10 Connector

- ♦ For air duct to rear footwell on driver's side

11 Air duct

- ♦ For rear footwell on driver's side

12 Connector

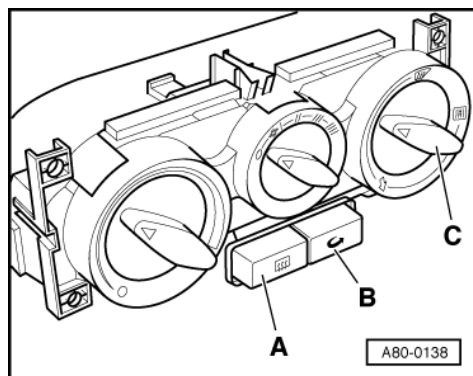
- ♦ For air duct to rear footwell on passenger side

13 Air duct

- ♦ For footwell at rear on passenger side

3.3 - Removing and installing heater control

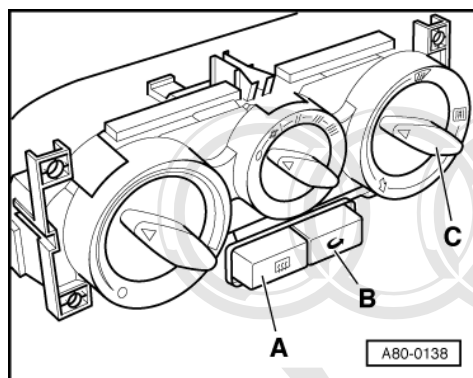
Notes:



- -> Vehicles as of chassis number 200000, Model Year 1999, are fitted with heater controls in which the switch for the heated rear window -A- is installed.

Note the following:

- In these vehicles, the heated rear window is switched on via a relay which is controlled by the control unit installed in the heater control.
- The control unit switches off the heated rear window after a heating period of approx. 15 minutes and the switch-on telltale in switch -A- goes out.
- If the voltage on the control unit for the heated rear window falls below 9V, the heated rear window remains switched off until it is above 10 V again.
- When the heated rear window is switched on, the telltale in switch -A- is lit.
- When the air recirculation mode is selected, the telltale in switch -B- is lit.
- The control unit for the heated rear window and fresh-air/recirculated air switchover and the lamps (LEDs = light emitting diodes) for illuminating the switches and rotary switches may not be replaced individually.
- If the ignition is switched off and then back on again, the heated rear window remains switched off and the heating changes to or remains in fresh air mode.



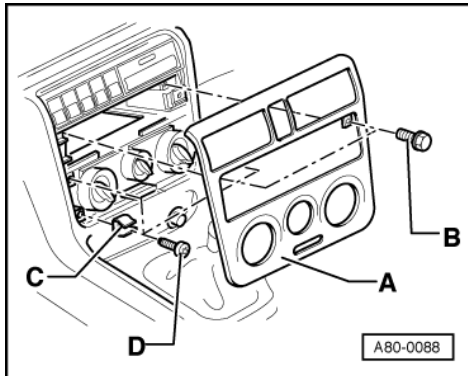
- -> To ensure misted windows are demisted as quickly as possible, recirculated air mode is not possible with "air distribution to windscreen". The control unit switches off the air recirculation mode approx. 15° before the rotary switch for air distribution -C- reaches its final position (air to windscreen) and the switch-on telltale in switch -B- goes out. If the rotary switch is turned back again, the heating remains in fresh air mode (this applies to all heater control designs).
- The rotary switches and switches on the heater control are illuminated via terminals 58s and 58d.

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

Removing

- Remove radio.

=> Electrical System; Repair group 91; Repairing radio; Removing and installing radio Repairing radio Removing and installing radio



- -> Remove screws -B-.
- Pull off the trim on the centre section of the dash panel -A-. If necessary, prise off with a small screwdriver.
- Screw out the bolts -D-.
- Remove front centre console:

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing front part of centre console Storage compartments/covers Removing and installing front part of centre console

Installing

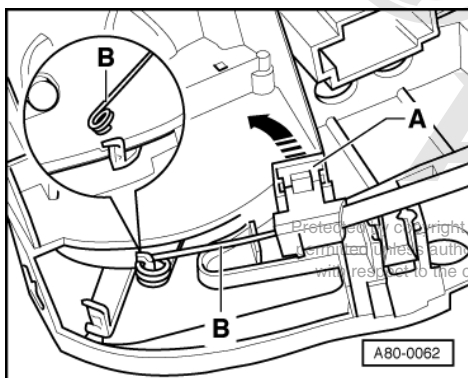
Installation is carried out in the reverse order; note the following:

- When installing, ensure that the spring clips -C- are in the correct position.

3.4 - Removing and installing heater control Bowden cables

Removing

- Remove heater controls =>Page 96 .



- -> Unclip Bowden cable support bracket -A-.
- Carefully remove the Bowden cable from the lever arm.

Installing

Installation is carried out in the reverse order; note the following:

- Check the Bowden cables before fitting, replace stiff or damaged Bowden cables
- Suspend the Bowden cable -B- in the correct position (coiled section at bottom).



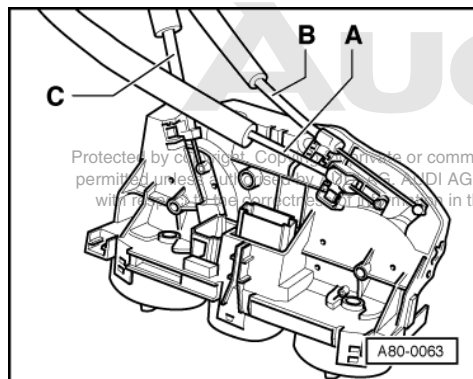
Note:

Connection diagram for Bowden cables =>Page 98 .

3.5 - Connection diagram for Bowden cables on the heater control

Note:

Colours in brackets apply to right-hand drive vehicles.

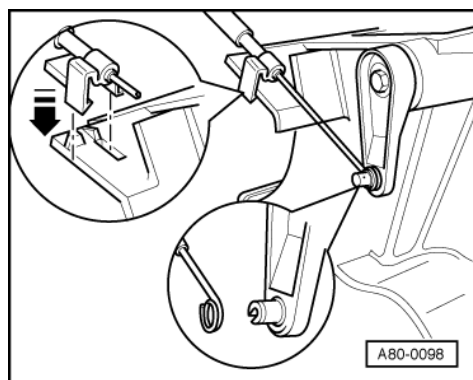


-> Bowden cables

- A - To footwell/defrost flap
-Colour code: white (green)
- B - To central flap
-Colour code: black (yellow)
- C - To temperature flap
-Colour code: red (orange)

3.6 - Removing and installing Bowden cables on the heater control

Removing



- -> Detach the Bowden cable support bracket.
- Carefully remove the Bowden cable from the lever arm.

Installing

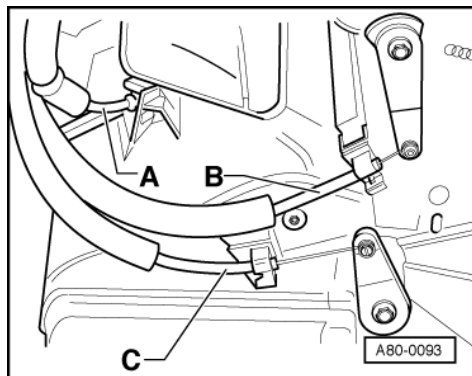
Installation is carried out in the reverse order; note the following:

- Check the Bowden cables before fitting, replace stiff or damaged Bowden cables

Notes:

- ◆ Connection diagram for Bowden cables =>Page 99 .
- ◆ When assembling, secure the Bowden cables with cable ties and clips so that they cannot come into contact with moving parts.
- ◆ After installing the Bowden cables, turn the rotary control from limit stop to limit stop (both stops must be reached).

3.7 - Connection diagram for Bowden cables on the heater control



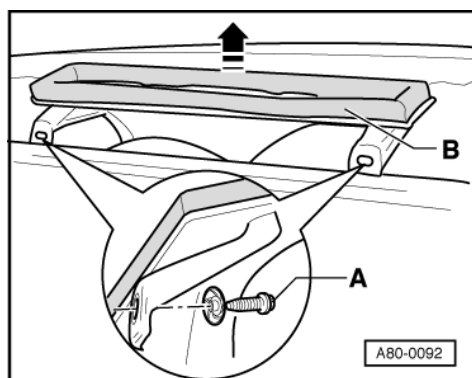
Note:

Colours in brackets apply to right-hand drive vehicles.

-> Bowden cables

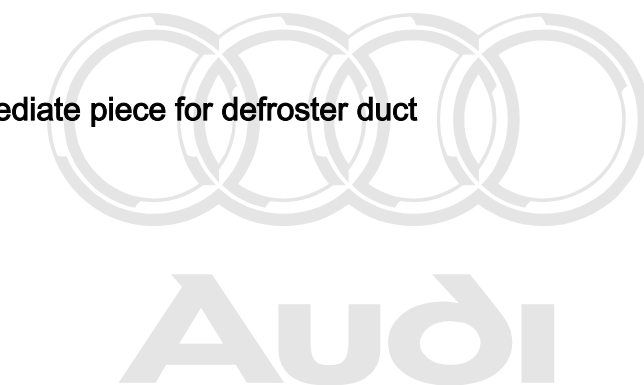
- A - To footwell/defrost flap
-Colour code: white (green)
- B - To central flap
-Colour code: black (yellow)
- C - To temperature flap
-Colour code: red (orange)

3.8 - Removing and installing intermediate piece for defroster duct



- Remove the dash panel:

=> General Body Assembly, Interior; Repair group 70; Dash panel; Removing dash panel Dash panel Removing dash panel



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- -> Screw out the bolts -A- (with spring lock washer).
- Remove the intermediate piece -B- upwards.

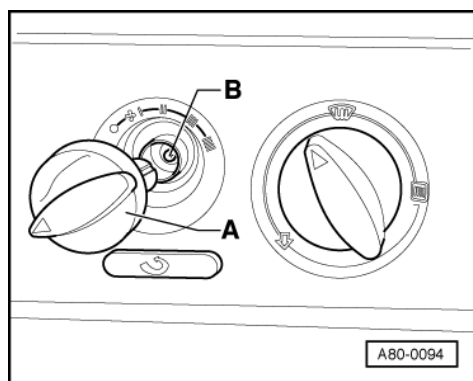
3.9 - Replacing the bulb for heater control

Special tools, testers and auxiliary equipment required

- ♦ Puller for 5 mm diameter lamps (available from electronic equipment dealers)

Notes:

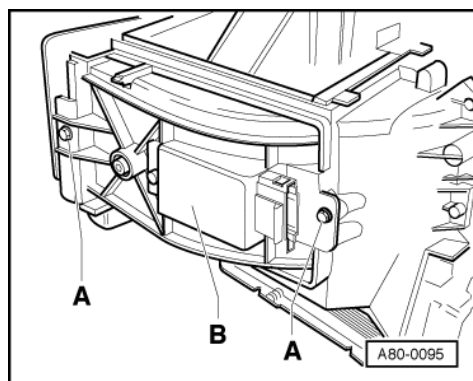
- ♦ At the start of production, the rotary switches are illuminated by a bulb. Later, there will be a change to LEDs which cannot be replaced.
- ♦ To avoid damaging the knob on the rotary control when using long-nose pliers, place a thick cloth, for example, between the knob and the jaws of the pliers, or use pliers with plastic or rubber jaws.



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- -> Pull the rotary switch -A- on the switch for the fresh-air blower off the heater control.
- Pull the glass-base lamp -B- out of the socket (do not turn).

3.10 - Removing and installing fresh-air blower series resistor -N24

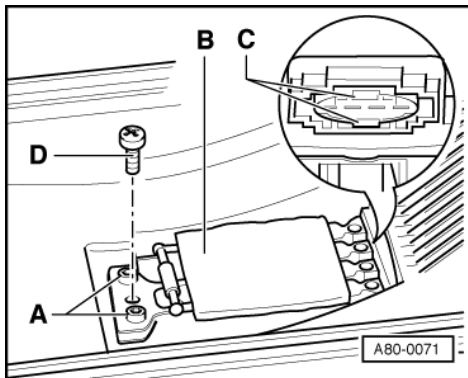


- Remove the glove box

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box

- -> Detach connector from series resistor.
- Remove the bolts -A- and detach the resistor holder -B-.

Removing the series resistor from its holder

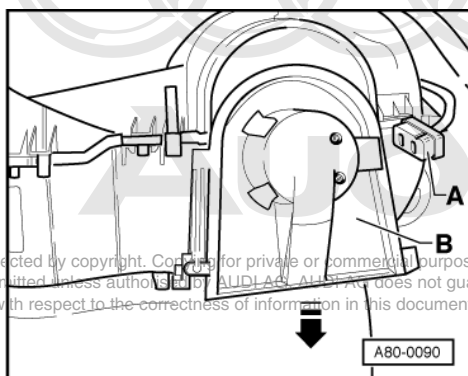


- -> Drill off the fasteners -A- on the series resistor, break off if necessary.
- Press back the lugs -C-.
- Remove the series resistor -B-.

Note:

When installing the series resistor, secure with a self-tapping screw -D- $\varnothing 3.2 \times 10$ mm.

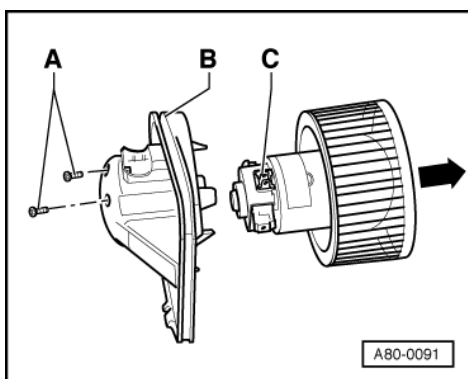
3.11 - Removing and installing the fresh-air blower -V2



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- Remove series resistor -N24 => Page 100 .
- -> Detach connector -A-.
- Pull fresh-air blower -B- downwards out of heater.

Detaching fresh-air blower -V2 and base plate



- -> Screw out the bolts -A-.



- Pull fresh-air blower -B- out of the base plate.

Notes:

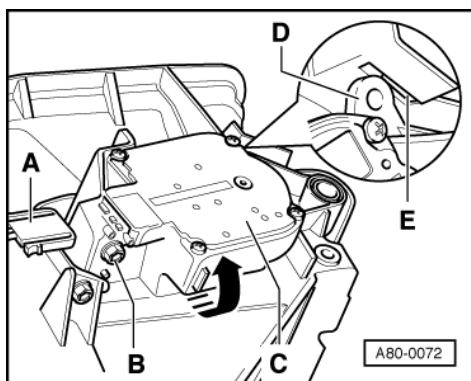
- ♦ When installing the blower in the base plate, make sure that connectors -C- are correctly positioned.
- ♦ Following installation, ensure that the fresh air blower is properly positioned in the heater.

3.12 - Removing and installing positioning motor for fresh-air/recirculated-air flap -V154

Removing

- Remove the glove box

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box



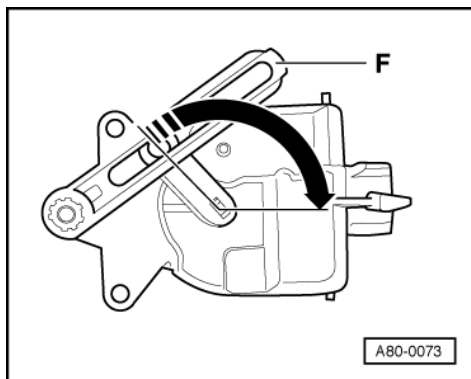
- -> Detach connector -A-.
- Remove bolt -B-.
- Remove positioning motor -C- in the direction of the arrow.

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Installing

Installation is carried out in the reverse order; note the following:

- When inserting the positioning motor, ensure that the bracket -D- is correctly positioned in slot -E-.
- Install the positioning motor.
- If the lever is positioned so unfavourably that the motor cannot be installed, insert connector -A-.
- Switch the ignition on.



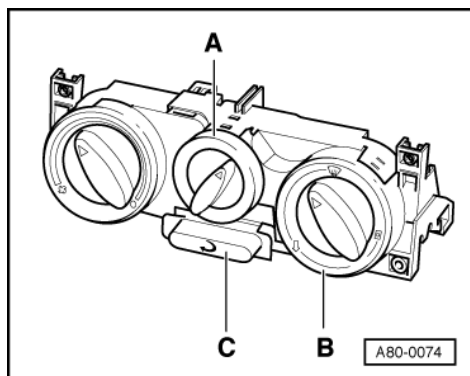
- -> Now actuate the fresh-air/recirculated-air flap until the lever -F- on the positioning motor is in the centre position.

3.13 - Checking the function of the positioning motor for the fresh-air/recirculated-air flap - V154 and the switch -E159

Notes:

- ♦ To ensure misted up windows are demisted as soon as possible, air recirculation mode will not operate with "air to windscreen". (Switch -E159 is released mechanically via the rotary switch).
- ♦ In recirculated air mode the windows may become misty (the air humidity inside the vehicle increases and moisture condenses on the windows and the air is not dried as it is in vehicles with air conditioners).

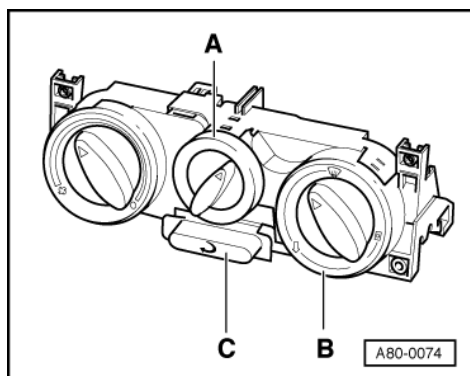
Special tools, testers and auxiliary equipment required



- ♦ Voltage tester V.A.G 1527 B

Checking the function of the positioning motor for the fresh-air/recirculated-air flap

- Switch the ignition on.
- -> Set the switch -A- for the fresh-air blower -V2 to speed 3.
- Turn the air distribution control -B- to the "dash panel vents".



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- -> Do not actuate switch -C- for fresh-air/recirculated-air flap -E159 (fresh air mode, telltale in the switch does not light).
 - The air is drawn in via the dust and pollen filter
- Actuate switch -C- (air recirculation mode, telltale in switch lights).
 - The air is drawn out of the passenger's footwell area.
- Turn the air distribution control -B- to the "windscreen" stop.
 - Telltale in switch -C- goes out, fresh-air/recirculated-air flap goes into the position "fresh air mode" (-E159 is released via rotary switch -B-)

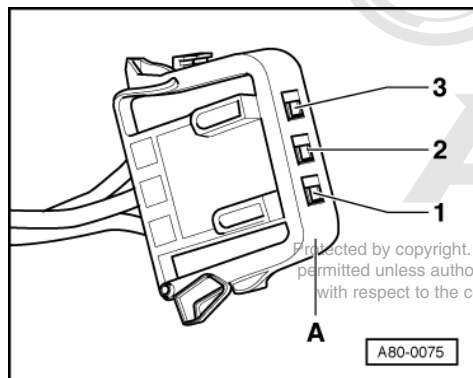
Notes:

- ♦ If the function is OK, but the windows mist up:
 - Check dust and pollen filter for contamination =>Page 75 .
 - Check forced air extraction =>Page 76 .
 - Check passenger compartment for the ingress of water.



- ♦ If the system is not OK, test switch -E159.

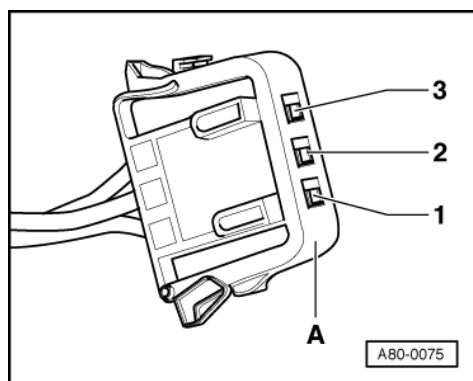
Check the function of the switch for the fresh-air/recirculated-air flap -E159



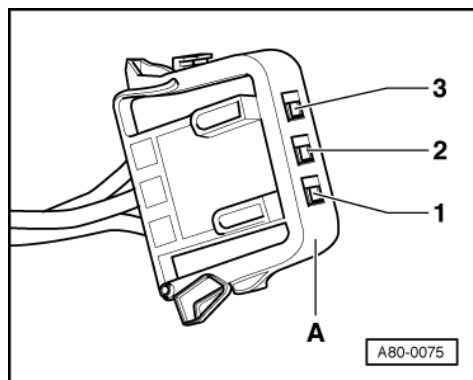
- Remove the glove box

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box

- -> Detach connector -A-.
- Switch the ignition on.
- Turn air distribution control to "dash panel vents".
- Do not actuate switch for fresh-air/recirculated-air flap -E159 (the telltale in the switch does not light).



- -> Connect the voltage tester V.A.G 1527 B between contacts 1 and 3 in connector -A- (contacts 2 and 3 in right-hand drive vehicles).
- The LED should light up.
- Actuate switch for fresh-air/recirculated-air flap -E159 (the telltale in the switch lights).
- Test lamp should not light up



- -> Connect the voltage tester V.A.G 1527 B between contacts 1 and 3 in connector -A- (contacts 2 and 3 in right-hand drive vehicles).
- The LED should light up.
- Turn the air distribution switch to the "windscreen" stop.

- The LED must not light, the telltale in the switch goes out.

Notes:

- ♦ If no faults are determined during this test:
 - Check the freedom of movement of the fresh-air/recirculated-air flap.
 - Replace positioning motor for fresh air-/recirculated-air flap -V154
- ♦ If the function is NOK:
 - Check the wiring between -E159 and -V154 for open circuit or short circuit.

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

- Check the power supply and earth connection to switch -E159.
- Replace the heater control => Page 96 .

3.14 - Removing and installing heater

Special tools, testers and auxiliary equipment required

- ♦ Hose clamps 3093 or 3094
- ♦ Commercially available compressed air gun

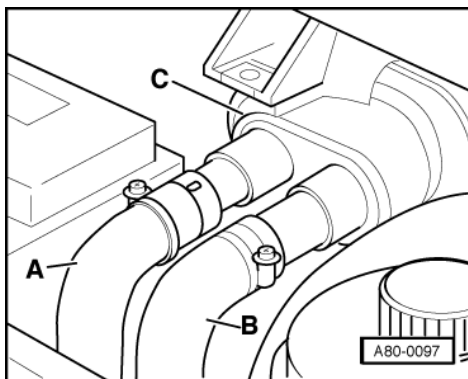
Notes:

- ♦ On removal, note the bolt lengths and assignment for re-installation.
- ♦ All cable ties which are released or cut open when the heater is removed must be replaced in the same position when installing.

Removing

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- Cover the driver's and passenger's seat with protective covers.
- Switch the ignition on.
- In vehicles with electrically adjustable seats, move them back as far as possible before disconnecting the battery.
- Observe or obtain radio code on vehicles with coded radio.
- Disconnect earthing strap at battery with ignition switched off.
- Open the cover of the coolant expansion tank



- -> Mark the layout of the coolant hoses -A- and -B-.
- Pinch off the coolant hoses to the heat exchanger with hose clamps V.A.G 3094 and detach the hoses.
- Place a container under the connection for hose -A-.
- Use the compressed air pistol to blow the coolant carefully out of the heat exchanger through the coolant hose -B-.
- Remove the grommet -C-.
- Remove the glove box, the shelf on the driver's side, the centre console and the dash panel:



=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box

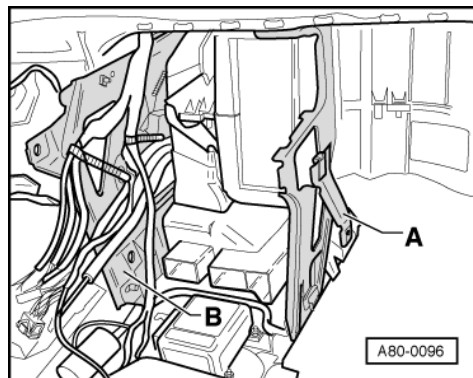
=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing driver's storage compartment Storage compartments/covers Removing and installing driver's storage compartment

=> General Body Assembly, Interior; Repair group 70; Dash panel Dash panel

Note:

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To ensure that the outer surface of the dash panel is not damaged, the dash panel may only be placed on a clean work bench which should be covered with clean cardboard, for example.

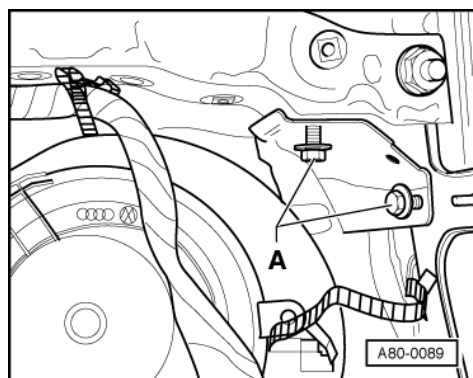


- -> Remove the dash panel support -A-.
- Detach the dash panel support -B- from the vehicle.

Note:

The upper fastening bolt on the heater cannot be removed.

- Remove the footwell vents => Page 86 .
- Separate all the electrical connections between the vehicle and the heater at the connectors.



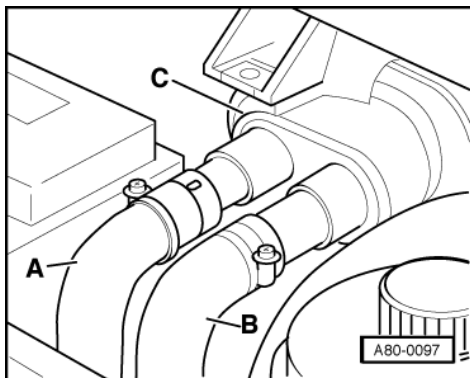
- -> Screw out the bolts -A-.
- Remove the heater towards passenger's side.

Installing

Installation is carried out in the reverse order; note the following:

Note:

Check all seals on the heater for damage before installation and replace any damaged seals.



- -> Connect the coolant hoses to the heat exchanger correctly. Note the markings:

- A - Return hose to the water pump (with vent hole)
- B - Inlet hose from the cylinder head

- After the installation of the dash panel, check that the grommet -C- is seated correctly.
 - Bleed the coolant circuit:

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 19

4 - Servicing electrical additional heater - Vehicles with TDI engine 06.94 ä

4.1 - Servicing electrical additional heater - Vehicles with TDI engine 06.94 ä

4.2 - Checking function of electrical additional heater

Electrical additional heater is activated by control unit for diesel direct injection system -J248 when following conditions occur at the same time:

- ◆ Ambient or intake manifold air temperature measured (at start of engine) less than 5 °C
- ◆ Refrigerant temperature less than 70 °C
- ◆ Engine speed above 800 rpm
- ◆ Other actuation conditions:

=> Relevant Workshop Manual Diesel Direct Injection and Glow Plug System; Repair group 01; Reading measured value block

Test sequence

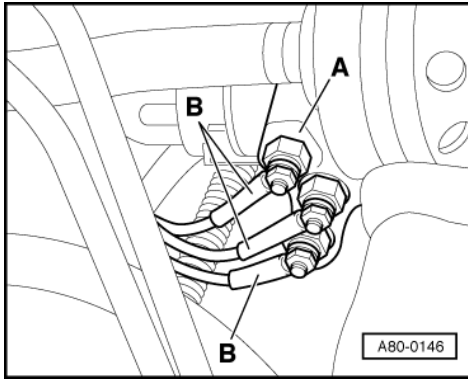
- Check low heating output relay -J359 or high heating output relay -J360:

=> Relevant Workshop Manual Diesel Direct Injection and Glow Plug System; Repair group 01; Final control diagnosis

If the relays are OK:

- Test wiring for open circuit and short to positive or earth.

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder



- -> Check earth wiring to refrigerant stump -A- (in which the glow lamps are screwed into) to the cylinder head.

If no wiring fault is detected:

- Check glow plugs:
- Remove the electrical wiring -B- from the glow plugs.
- Connect multimeter for resistance measurement to the glow plug and measure resistance between glow plug and refrigerant stud -A-.
- Specified value: 0.5...0.7 Ω at room temperature

If specified value is not attained:

- Replace glow plug.
- Check refrigerant level:

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 19

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87 - Air conditioning

1 - Safety precautions when working on cars with air conditioners and when handling refrigerant

1.1 - Safety precautions when working on cars with air conditioners and when handling refrigerant

The assemblies and pipes in the air conditioner are filled with the following refrigerant:

1.1.1.2 tetrafluorethane (CF₃-CH₂F or CH₂F-CF₃)

This refrigerant is currently known in Germany by the trade names R134a, H-FKW 134a, SUVA 134a and KLEA 134a (other trade names may be used in other countries).

Safety precautions

The following precautions should be observed with these refrigerants in Germany (additional regulations may be applicable in other countries).

If it is necessary to open the refrigerant circuit during repair work, first drain the refrigerant circuit (=> Page 109). All contact with liquid refrigerant or refrigerant vapours should be avoided. If, despite the observance of the safety precautions, refrigerant should escape, the refrigerant/air mixture must not be inhaled.

For this reason, always switch on the extractor systems, and protect hands with gloves and eyes with safety goggles.

Reason:

The intensive action of refrigerants will cause frostbite on unprotected parts of the body.

Warning:

It is recommended that an eye bath be kept to hand.

If liquid refrigerant comes into contact with the eyes, the eyes should be thoroughly rinsed for about 15 minutes. Then apply eye drops and consult a doctor immediately, even if the eyes are not painful.

The doctor should be informed of the type of refrigerant which caused the frostbite.

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If, despite observance of all the security precautions, refrigerant should come into contact with other parts of the body, they should also be thoroughly rinsed immediately for at least 15 minutes in cold water.

Although refrigerants do not represent a fire hazard, smoking, welding, soldering and brazing are not permitted in areas exposed to refrigerant.

Reason:

The high temperature of a naked flame or hot objects causes refrigerant gas to undergo chemical decomposition. The inhalation of the toxic decomposition products results in dry coughing and nausea.

Draining the refrigerant circuit

Refrigerant must not be allowed to escape into the environment, it should be extracted from the refrigerant circuit by means of a suction unit or service station. The extracted refrigerant is then reprocessed on site or returned to the manufacturer for environmentally friendly disposal (in other countries, different or additional



regulations may apply). For these reasons, vehicles should be sent to VW/Audi air conditioner servicing centres (these workshops have the relevant equipment and tools)

Reason:

If the refrigerant R134a escapes into the earth's atmosphere, it helps to aggravate the greenhouse effect.

Notes:

- ♦ The greenhouse effect of refrigerant R134a is much less than that of refrigerant R12.
- ♦ The refrigerant R134a does not effect the ozone layer in the earth's atmosphere (R134a is an H-FC with no chlorine atoms). The depletion of the ozone in the upper atmosphere is only caused by the splitting of carbon-chlorine bonds (as is the case, for example, with the refrigerant R12).

When the air conditioner has been drained, disconnect the power supply to the air conditioner magnetic clutch -N25 (e.g. detach the connector from the low pressure switch for the air conditioner circuit -F73 or off the pressure switch for the air conditioner -F129).

Reason:

Disconnecting the voltage supply ensures that the compressor cannot be activated by mistake while the refrigerant circuit is empty.

Working on the refrigerant circuit

Work on the refrigerant circuit must only be performed in well ventilated rooms. Care should be taken to ensure that there are no inspection pits, shafts or cellar entrances within a radius of 5 metres. Switch on the extraction systems.

Reason:

The refrigerant is not only colourless and odourless, but also heavier than air and therefore displaces oxygen. If, despite the observance of all the safety precautions, refrigerant gas is emitted, there may be a negligible risk of asphyxiation in poorly ventilated rooms and workshop pits.

Note:

The mixture of gas and air which forms when refrigerant gas escapes must not be inhaled - it must be extracted using suitable extraction systems (workshop extractor).

Welding, brazing and soldering must not be performed on parts of the filled air conditioner. The same applies to welding and soldering work on the vehicle if there is a risk that parts of the air conditioner could become warm.

Reason:

The application of heat creates a severe build-up of pressure in the system which could cause it to burst.

Remedy:

Drain the refrigerant circuit (=>Page 109).

Note:

Damaged or leaking parts of the air conditioner may not be repaired by welding or soldering - they should be renewed.

During repair work on the air conditioner, all open components and pipe connections in the air conditioner should be re-sealed immediately.

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Reason:

Moisture penetrates air conditioner components left open for a lengthy period. Air conditioners which have been left open for a lengthy period cannot, therefore, be re-filled without replacing parts of the system.

Painting work on vehicles with air conditioner

When carrying out paintwork repairs, ensure that the vehicle is not exposed to temperatures of more than 80 °C in the drying ovens or their preheating zones.

Reason:

The application of heat creates a severe build-up of pressure in the system which could cause it to burst.

2 - Notes on general repairs

2.1 - Notes on general repairs

The air conditioner refrigerant circuit may only be emptied and opened (=> Page 110) or if it is necessary to renew parts of the air conditioner refrigerant circuit.

The air conditioner refrigerant circuit must remain closed during all other normal repair operations.

Repair work which may be performed on the heating and air conditioner without opening the refrigerant circuit are described in this workshop manual => Page 111 onwards.

Note:

The connections for the switches described in the workshop manual are fitted with a valve which closes automatically when the switches are unscrewed. These switches may therefore be renewed in any VW/Audi workshop without draining the refrigerant circuit.

Repair work on the air conditioner that requires the refrigerant circuit to be drained and hence cannot be performed in every VW/Audi workshop, is described => from Page 196 (vehicles should be sent to a VW/Audi air conditioner service centre for the refrigerant circuit to be drained).

3 - Repair work on the coolant circuit - vehicles up to Model Year 1996

3.1 - Repair work on the coolant circuit - vehicles up to Model Year 1996

Notes:

- ♦ Servicing the refrigerant circuit => Page 196 .
- ♦ All parts/operations marked 1) may be repaired, replaced or performed in any Audi and VW workshop (work which does not affect the refrigerant circuit).
- ♦ All parts of the refrigerant circuit not marked with 1) and all refrigerant hoses and pipes may only be repaired or renewed in an VW/Audi air conditioner service centre.
- ♦ The compressor manufacturer "Nippondenso" has now changed its name to "Denso".

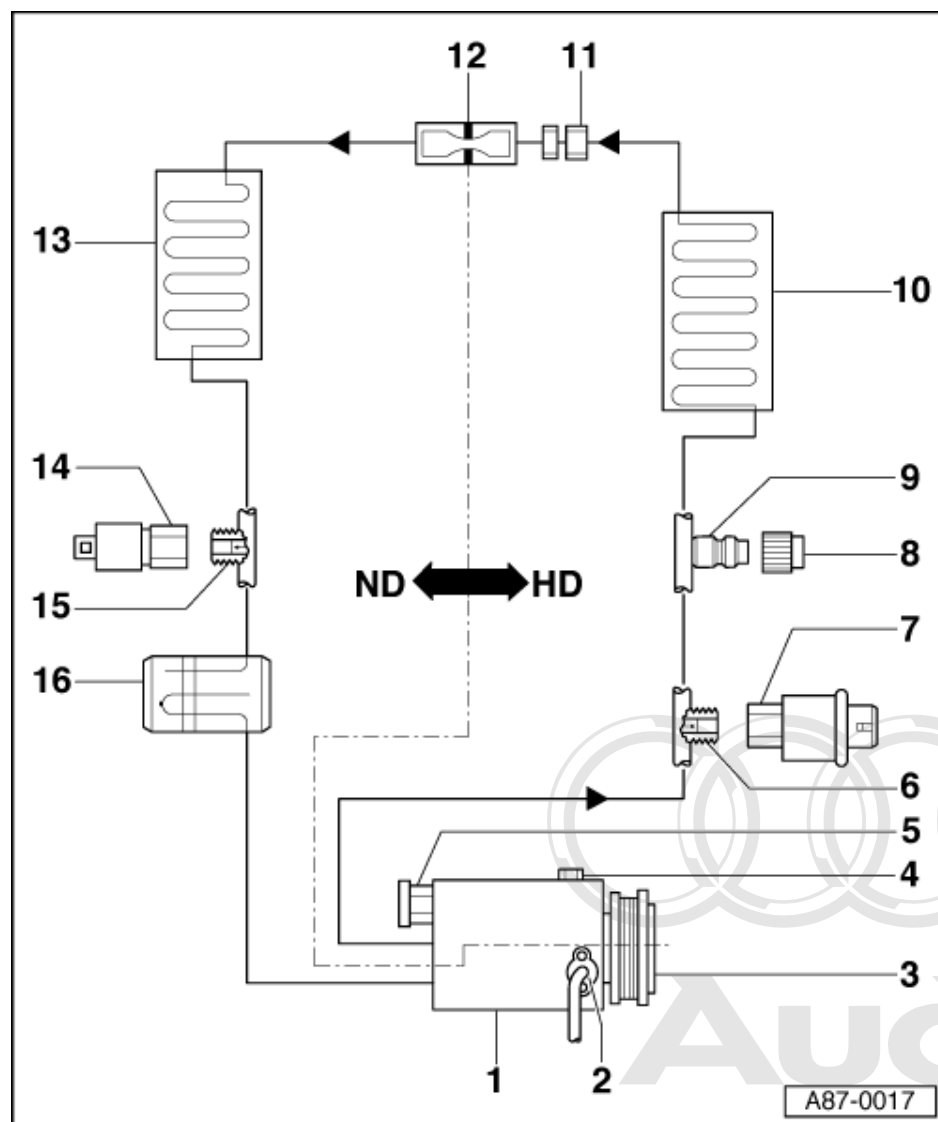
3.2 - Assignment of air conditioner compressors

Engine	Make	Special features
4-cylinder grey cast iron	Zexel	without -G111 1)

Engine	Make	Special features
6-Cylinder up to MY 96	Zexel	With -G111 1)
6-Cylinder as of MY 96 (gradual introduction)	Nippondenso/ Denso	without -G111 1)

1) -G111 = Air conditioner compressor speed sensor

3.3 - Fitting locations overview



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HD = High-pressure end

ND = Low-pressure end

1 Compressor

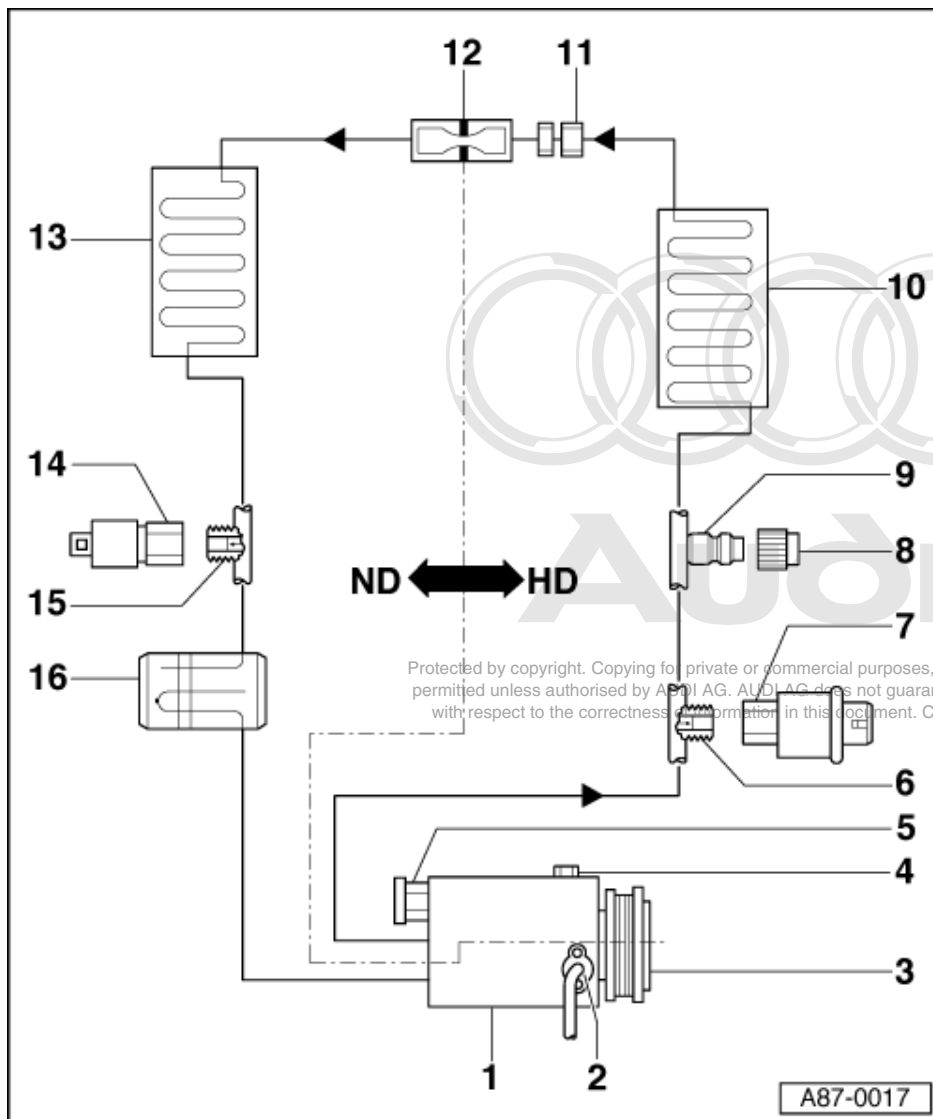
- ◆ Removing and installing compressor bracket:
4-cyl. engines => Page 127 onwards
- ◆ Removing and installing ribbed belt

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 13

- ♦ Ribbed belt assignment

=> Parts List

- ♦ When installing the refrigerant pipes and the associated bracket, ensure that there is sufficient spacing between the belt, bracket and belt pulley



2 Air conditioner compressor speed sender -G111

- ♦ Only installed with Zexel compressor for 6-cyl. engines
- ♦ Checking => Page 64

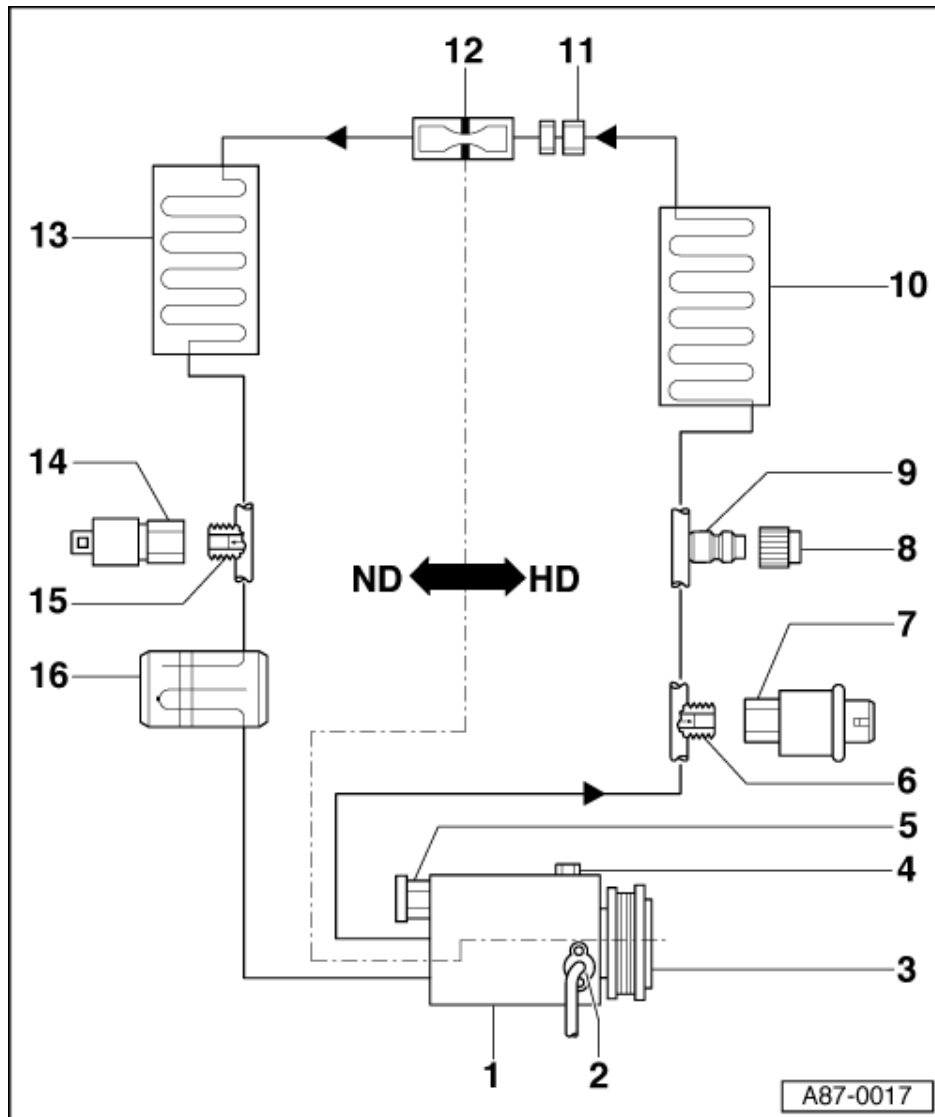
3 Magnetic clutch -N25 1)

- ♦ => Page 131 onwards.
- ♦ Checking and, if necessary, adjusting gap between belt pulley and clutch plate=> Page 131 onwards

4 Oil drain plug

5 Pressure relief valve

6 Connection with valve



7 High pressure switches for air conditioner -F23 and magnetic clutch -F118 1)

- ♦ Function, removing and installing =>Page **116**

8 Cap

- ♦ With seal
- ♦ Must be fitted

9 Service connection

- ♦ At the condenser
- ♦ For measurement, drainage and filling at VW/Audi air-conditioning service centres

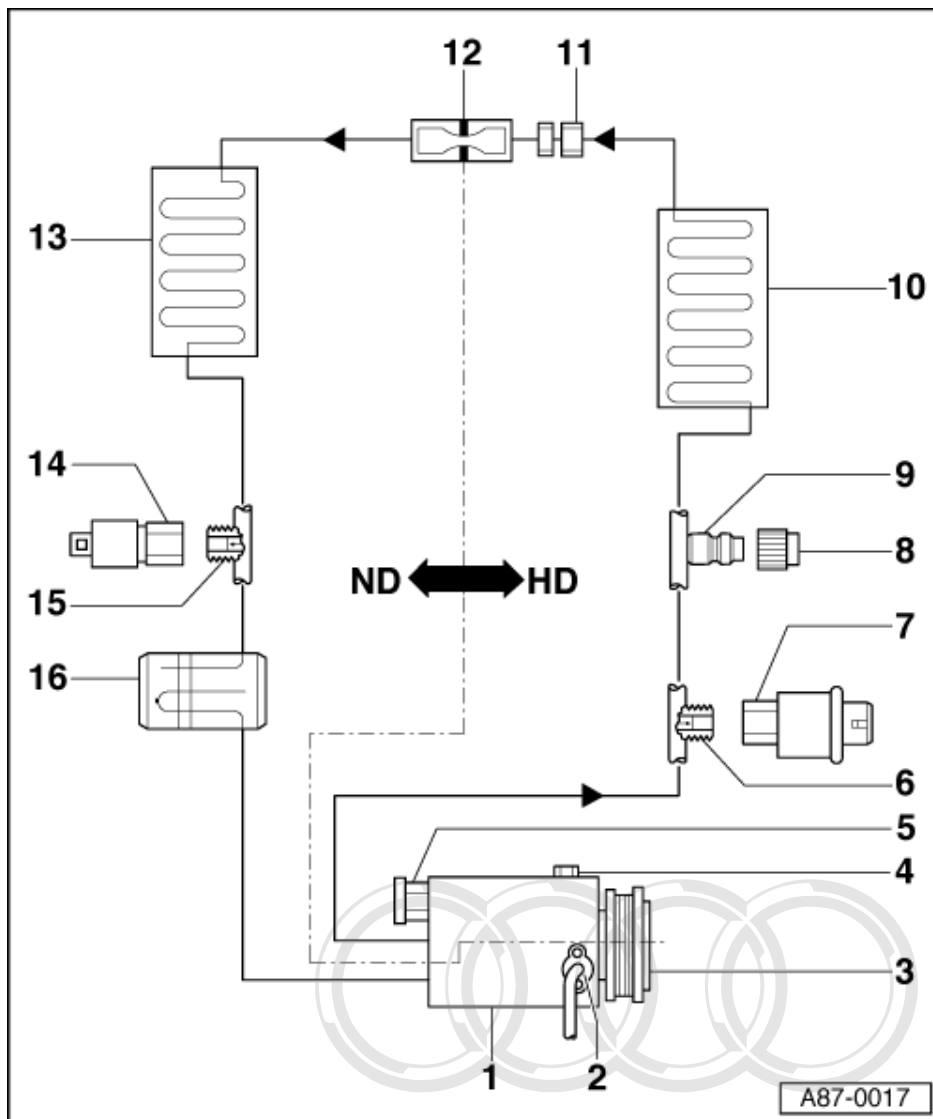
10 Condenser

11 Union in the refrigerant pipe

12 Restrictor

- ♦ In the screwed connection - **11** -

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13 Evaporator

14 Air conditioner low pressure switch -F73 1)

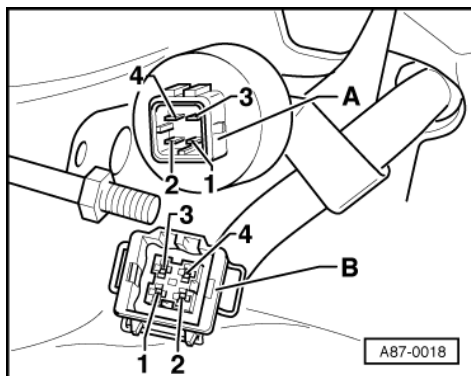
- ♦ Function, removing and installing =>Page 117

15 Connection with valve

16 Container

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3.4 - High-pressure switches for air conditioner -F23 and for magnetic clutch -F118



- ♦ -> The high-pressure switch for the air conditioner -F23 -A- switches the radiator fan -V7 to speed 2 via contacts -1- and -2-.

Magnetic clutch high pressure switch -F23	Switching pressure (in bar)	Function
Closes at	14.3...17.3 bar	Fan on
Opens at	10.9...15.3 bar	Fan off

Difference in pressure between the switching points: 2.0...3.4 bar

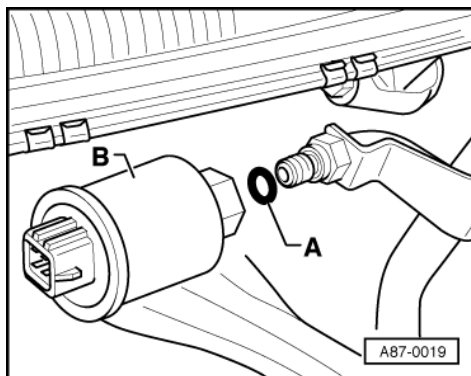
- ♦ The high-pressure switch for the magnetic clutch -F118 -A- switches off the compressor (via the operating and display unit -E87) via contacts -3- and -4- in the event of overpressure in the refrigerant circuit.

Magnetic clutch high pressure switch -F118	Switching pressure (in bar)	Function
Opens at	28.2 ...31.0 bar	Compressor off
Closes at	11.5...15.0 bar	Compressor on

Removing

- Remove the front bumper:

=> General Body Assembly, Exterior; Repair group 63; Front bumper; Removing and installing front bumper
 Front bumper Removing and installing front bumper



- -> Detach connector.
- Remove the switch, the refrigerant circuit remains closed (valve)

Installing

- Renew O-ring seal -A- => Page 117 .

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- Tighten switch to 5 Nm.

Note:

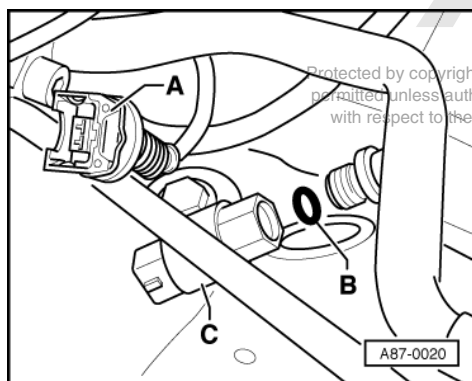
To check the refrigerant capacity, connect the removed switch -B- to the wiring harness.

3.5 - Low-pressure switch for air conditioner -F73

- ♦ The low-pressure switch switches the compressor off in the event of vacuum in the refrigerant circuit.

Low-pressure switch -F73	Switching pressure (in bar)	Function
Opens at	1.45 ...1.60 bar	Compressor off
Closes at	2.9...3.4 bar	Compressor on

Removing



- -> Detach connector -A-.
- Remove the switch, the refrigerant circuit remains closed (valve)

Installing

- Renew O-ring seal -B- => Page 117 .
- Tighten switch to 5 Nm.

Note:

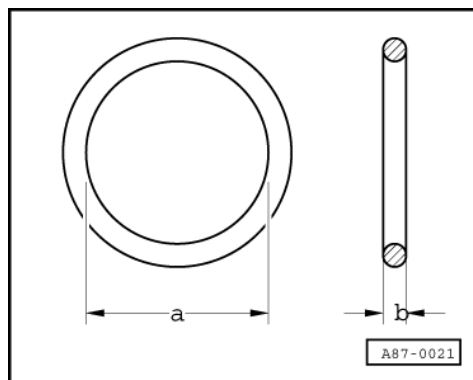
To check the refrigeration capacity with the switch -C- removed, jumper the contacts in the connector -A-.

3.6 - O-ring seals for refrigerant circuit

- ♦ Only use once and then replace.
- ♦ Moisten with refrigerant oil before use.
- ♦ Ensure that they are positioned correctly on the pipe or in the groove.
- ♦ Take care to avoid dirt.

Notes:

- ♦ Only O-ring seals which are resistant to the refrigerant R134a and the associated refrigerant oil may be installed. These O-ring seals are colour-coded to prevent confusion (currently "red", "lilac" or "violet"):



=> Parts List

- ♦ In addition to the coloured O-ring seals, black O- rings are also used during production for certain connections.
- ♦ -> Dimensions -a- and -b- vary according to the fitting location of the O-ring seal:

=> Parts List

4 - Repair work on the coolant circuit - vehicles from Model Year 1997

4.1 - Repair work on the coolant circuit - vehicles from Model Year 1997

Notes:

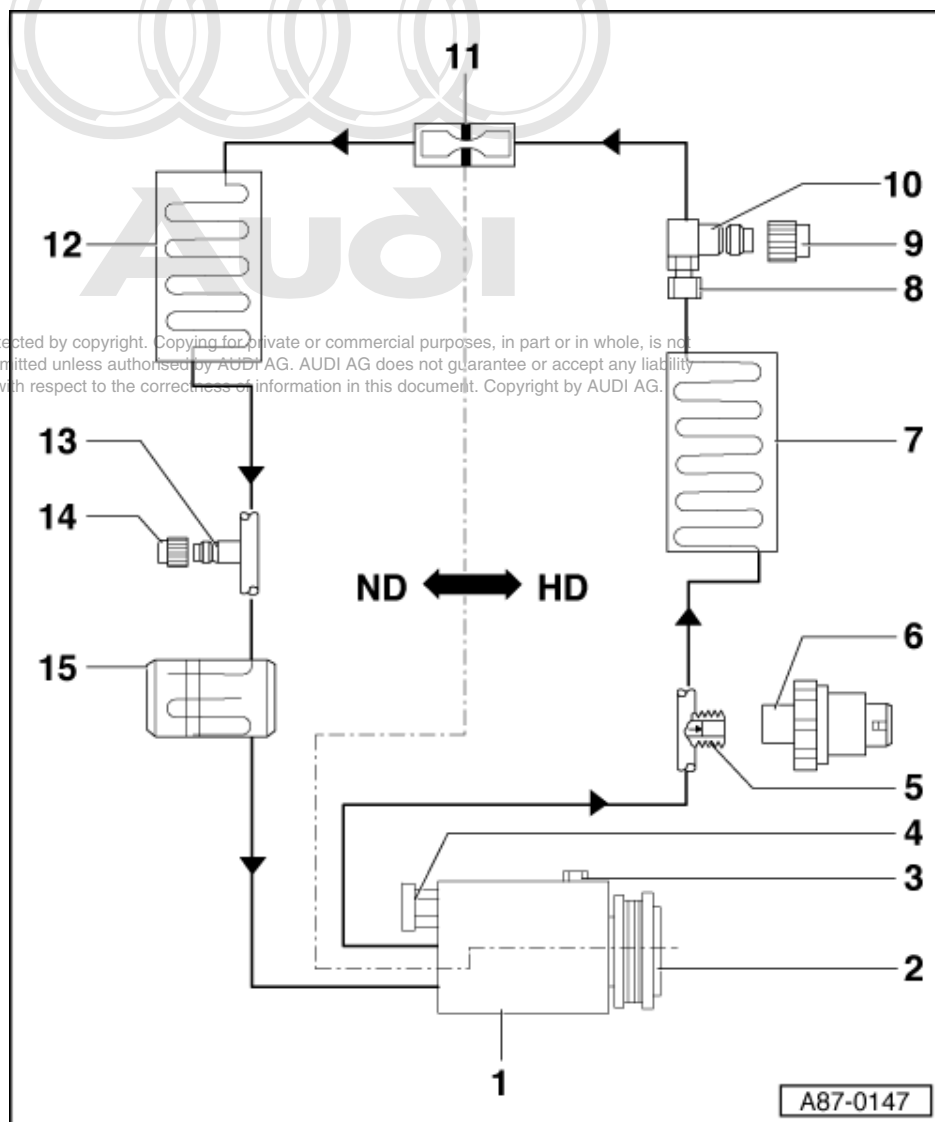
- ♦ Servicing the refrigerant circuit => Page 224 .
- ♦ All parts/operations marked 1) may be repaired, renewed or performed in any VW/Audi workshop (work which does not affect the refrigerant circuit).
- ♦ All parts of the refrigerant circuit not marked with 1) and all refrigerant hoses and pipes may only be repaired or renewed in an VW/Audi air conditioner service centre.

4.2 - Assignment of air conditioner compressors

Engine	Make
4-cylinder grey cast iron	Zexel
4-cylinder light alloy	Nippondenso/Denso
6-Cylinder	Nippondenso/Denso

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4.3 - Fitting locations overview



HD = High-pressure end

ND = Low-pressure end

1 Compressor

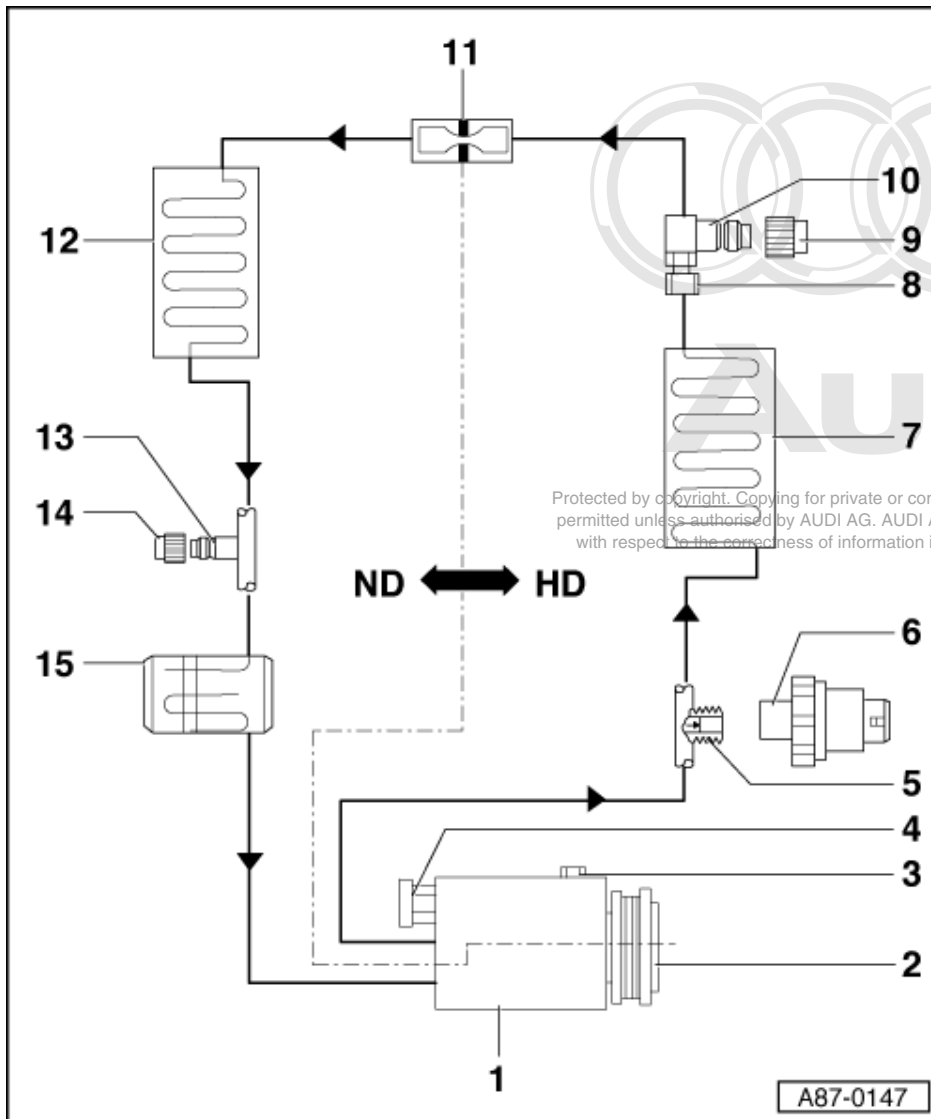
- ♦ Removing and installing compressor bracket:
4-cyl. engines => Page 129
- ♦ Removing and installing ribbed belt

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 13

- ♦ Ribbed belt assignment

=> Parts List

- ♦ When installing the refrigerant pipes and the associated bracket, ensure that there is sufficient spacing between the belt, bracket and belt pulley.



2 Magnetic clutch-N25 1)

- ◆ => Page 131 onwards
- ◆ Checking and, if necessary, adjusting gap between belt pulley and clutch plate=> Page 131 onwards

3 Oil drain plug

4 Pressure relief valve

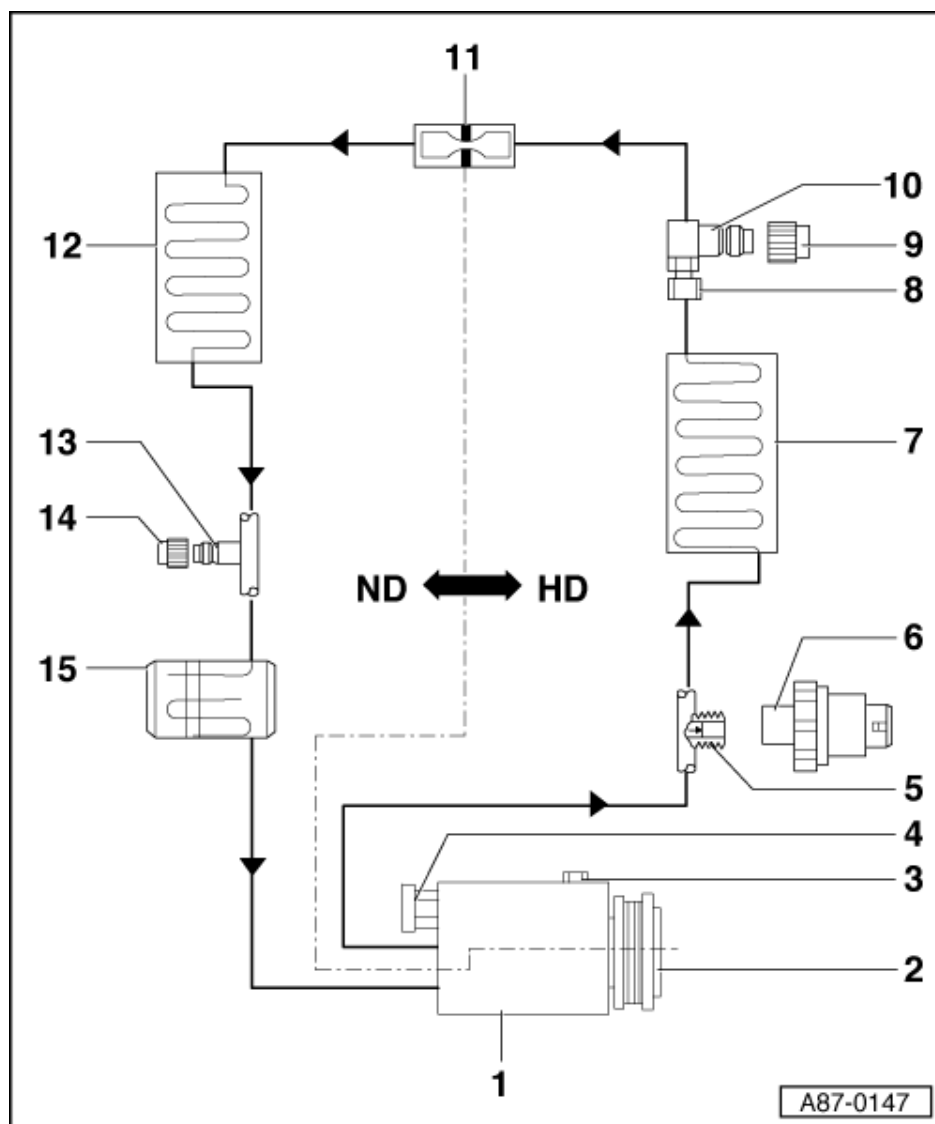
5 Connection with valve

6 Air conditioner pressure switch -F129

- ◆ Function, removing and installing =>Page 122

7 Condenser

8 Union in the refrigerant pipe



9 Cap

- ♦ With seal
- ♦ Must be fitted

10 Service connection

- ♦ High-pressure side
- ♦ For measurement, drainage and filling at VW/Audi air-conditioning service centres

11 Restrictor

- ♦ In the screwed connection - **8** -

12 Evaporator

13 Service connection

- ♦ Low-pressure end

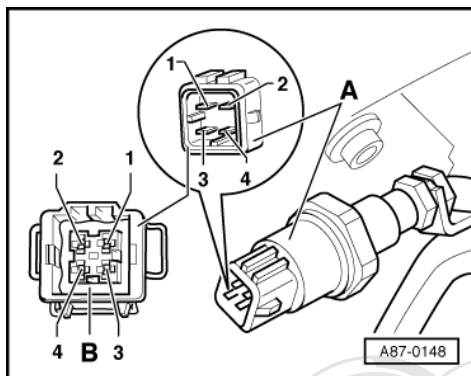
14 Cap

- ♦ With seal
- ♦ Must be fitted

15 Container

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4.4 - Air conditioner pressure switch - F129



- -> The low /high pressure switch (between the contacts -1- and -2-) deactivates the compressor in the event of a vacuum or excess pressure in the refrigerant circuit (via the operating and display unit -E87).

Switch	Switching pressure (in bar)	Function
Low-pressure switch contacts 1 and 2		
Opens below	1.2 bar	Compressor off
Closes above	1.8 bar	Compressor on
High-pressure switch contacts 1 and 2		
Opens above	30 bar	Compressor off
Closes below	14.5 bar	Compressor on

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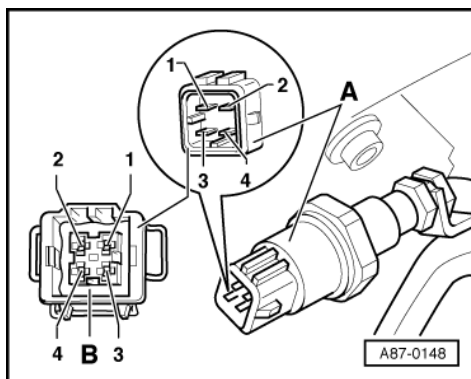
- The high-pressure switch (switch between contacts 3 and 4), switches the radiator fan -V7 to speed 2.

Switch	Switching pressure (in bar)	Function
High-pressure switch contacts 3 and 4		
Closes at	16.8 bar	Fan on
Opens at	12.7 bar	Fan off

checking function

- Start the engine.
- Compressor switched on (set "Auto" mode on the operating and display unit).

If the compressor is driven:



- -> Detach connector -B-.
 - The compressor stops (low-pressure switch open)
- Remove the switch -A- and attach the connector.
 - The compressor is not switched on (low-pressure switch open)

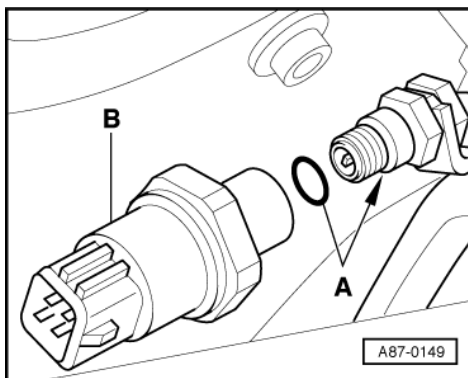
If the compressor is not driven:

- Pull off the connector -B- and jumper contacts 1 and 2 in the connector.
- Compressor is switched on

Notes:

- ◆ If the compressor is switched on when jumpered, either the pressure in the refrigerant circuit is too low (refrigerant circuit empty) or the switch is defective.
- ◆ To check the pressures in the refrigerant circuit, send the vehicle to an VW/Audi air-conditioning service centre.
- ◆ If the compressor is not switched on and the switch -F129 is displayed as a compressor shutoff criterion in the measured value block, locate and rectify the open circuit in the wiring between the switch -F129 and the operating and display unit -E87 =>Page 01-173.

Removing

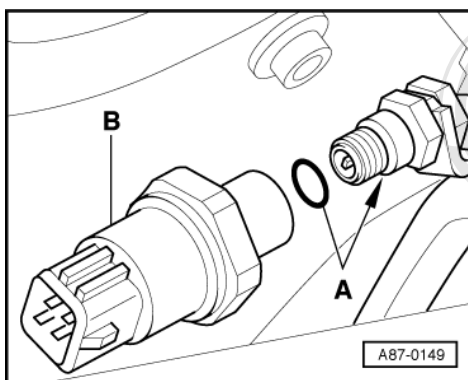


- Remove the front bumper:

=> General Body Assembly, Exterior; Repair group 63; Front bumper; Removing and installing front bumper
 Front bumper Removing and installing front bumper

- Pull off the connector.
- -> Unscrew the switch -B-; the refrigerant circuit remains closed (valve).

Installing

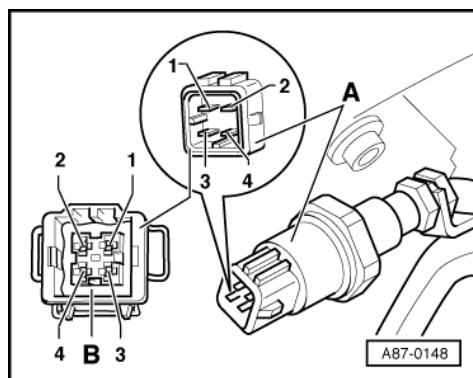


- -> Renew O-ring seal -A- => Page 117
- Tighten switch to 5 Nm.

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Note:



-> To check the refrigeration capacity with the switch removed, jumper contacts -1- and -2- of connector -B-.

5 - Removing compressor from and attaching it to bracket; removing and installing compressor bracket

5.1 - Removing compressor from and attaching it to bracket; removing and installing compressor bracket

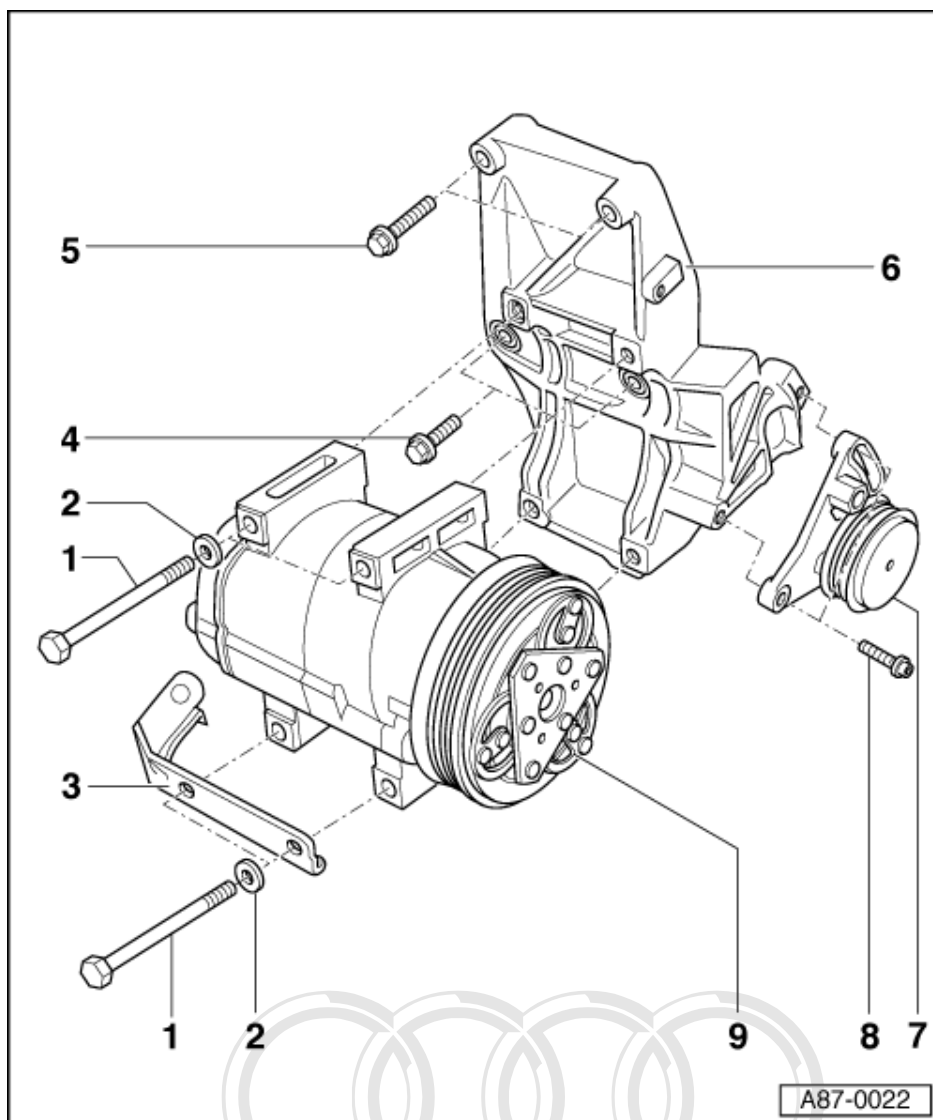
Notes:

- ♦ You may remove and install the compressor bracket without opening the refrigerant pipes.
- ♦ Do not drain the refrigerant circuit, do not detach the refrigerant hoses and lines at the compressor.
- ♦ After removal, secure the compressor with a wire, for example, to the side member. Do not leave compressor hanging from the refrigerant pipes.
- ♦ Mark the direction of rotation with chalk or felt pen before removing the ribbed belt. If the belt rotates in the wrong direction when it is refitted, this can cause breakage.



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5.2 - 4-cylinder engines



Removing and installing compressor bracket

- Observe notes => Page 124
- Slacken off the ribbed belt:

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 13

1 Hexagon bolt - 25 Nm

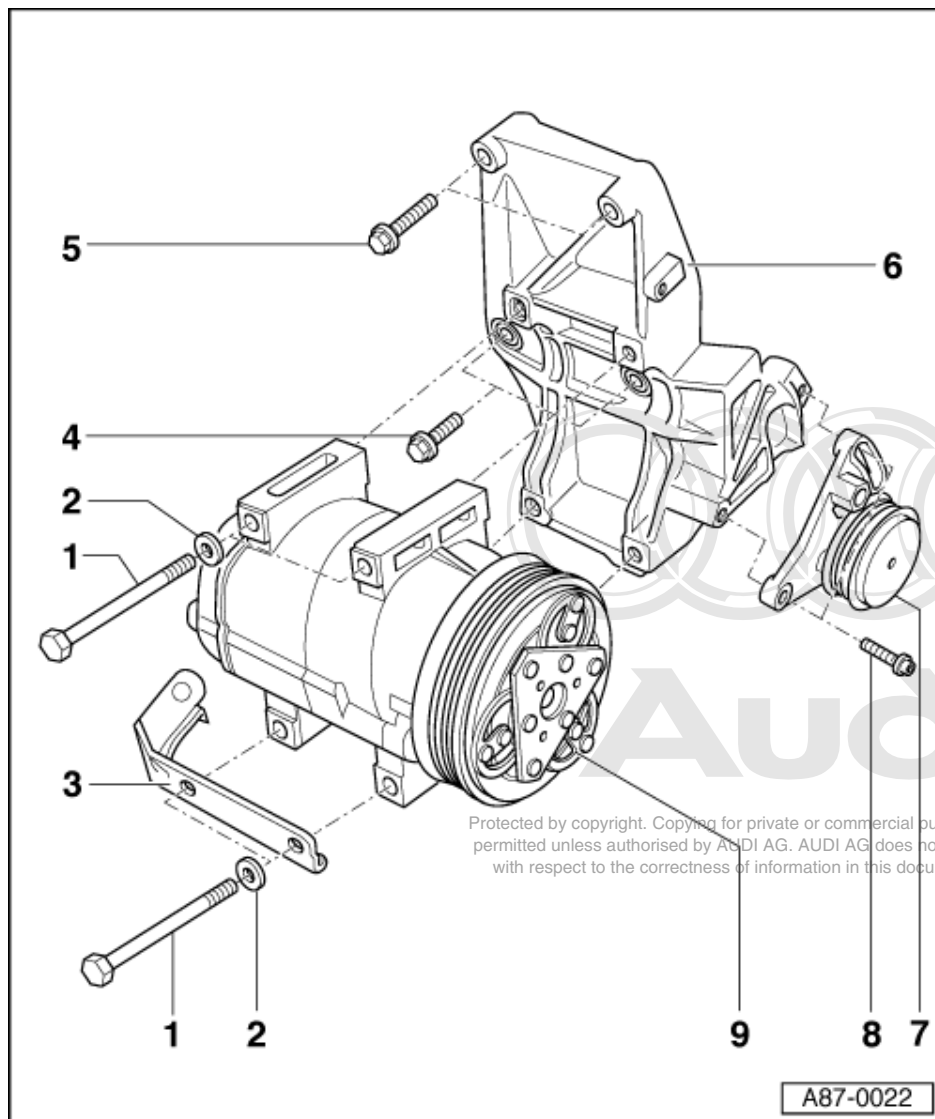
2 Washer

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3 Bracket

- ♦ For refrigerant hoses
- ♦ First attach to the clip of the refrigerant hoses

4 Combi screw - 25 Nm



5 Combi screw - 25 Nm

6 Compressor bracket

- ♦ Check that the locating sleeve for the compressor is seated correctly

7 Tensioner

- ♦ For ribbed belt

8 Hexagon socket-head bolt - 20Nm

9 Compressor with air-conditioner magnetic clutch

- ♦ Diagram shows Zexel make for grey cast iron engines

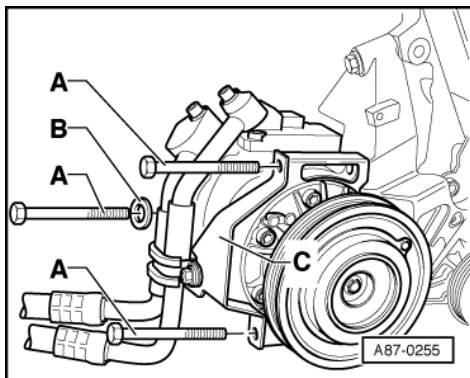
Removing Nippondenso/Denso compressor from bracket

- Move lock carrier to service position.

=> General Body Assembly, Exterior; Repair group 50; Body front; Lock carrier service position

- Slacken off the ribbed belt:

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 13



- -> Screw out the bolts -A- (25 Nm).

Notes:

- ◆ Do not loosen refrigerant pipes and bracket -C-
- ◆ Fit a washer -B- where no bracket -C- is attached.

5.3 - 6-cylinder petrol engines

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Removing and installing compressor bracket

- Observe notes => Page 124 .
- Move lock carrier to service position.

=> General Body Assembly, Exterior; Repair group 50; Body front; Lock carrier service position

- Remove the noise insulation.

=> General Body Assembly, Exterior; Repair group 50; Body front; Noise insulation -assembly overview

- Remove the oil filter. Protect the sealing surfaces from damage

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 17

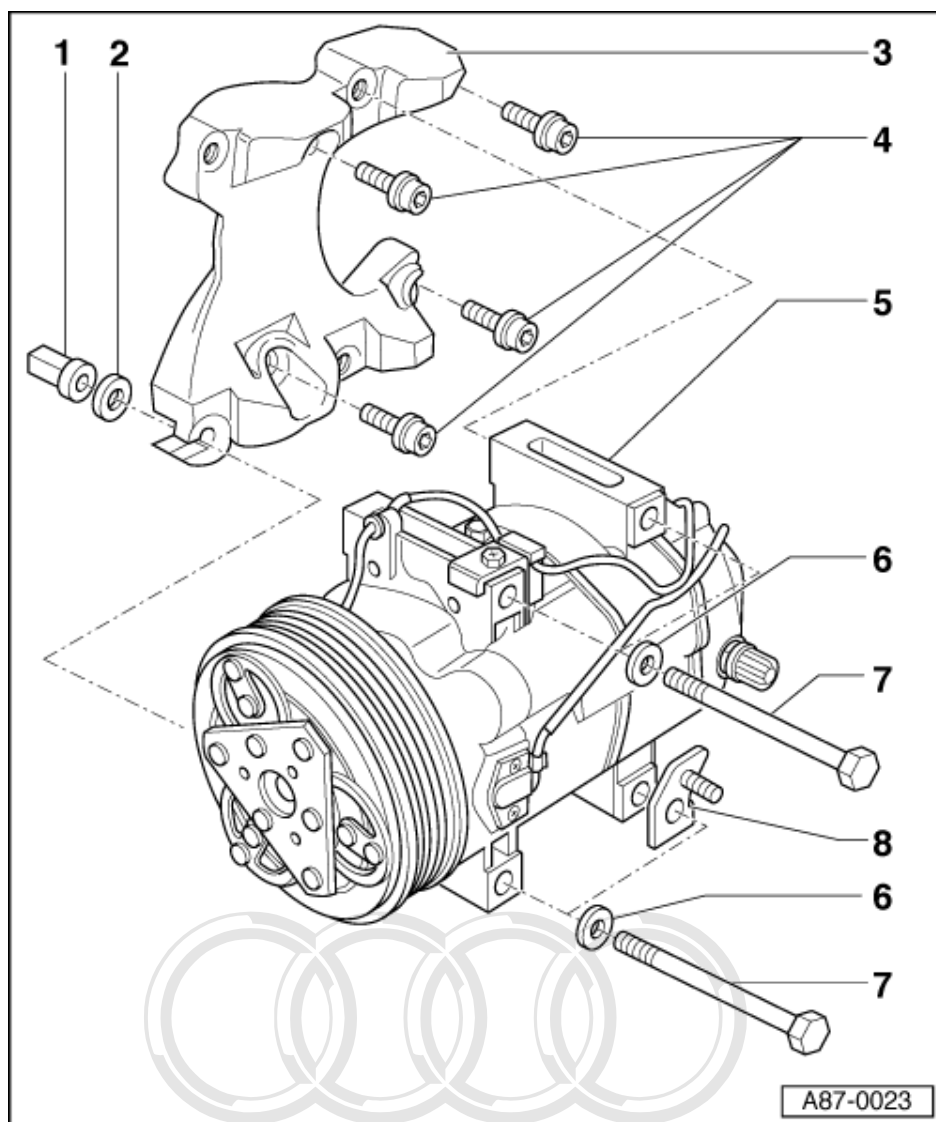
- Slacken off the ribbed belt:

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 13

Note:

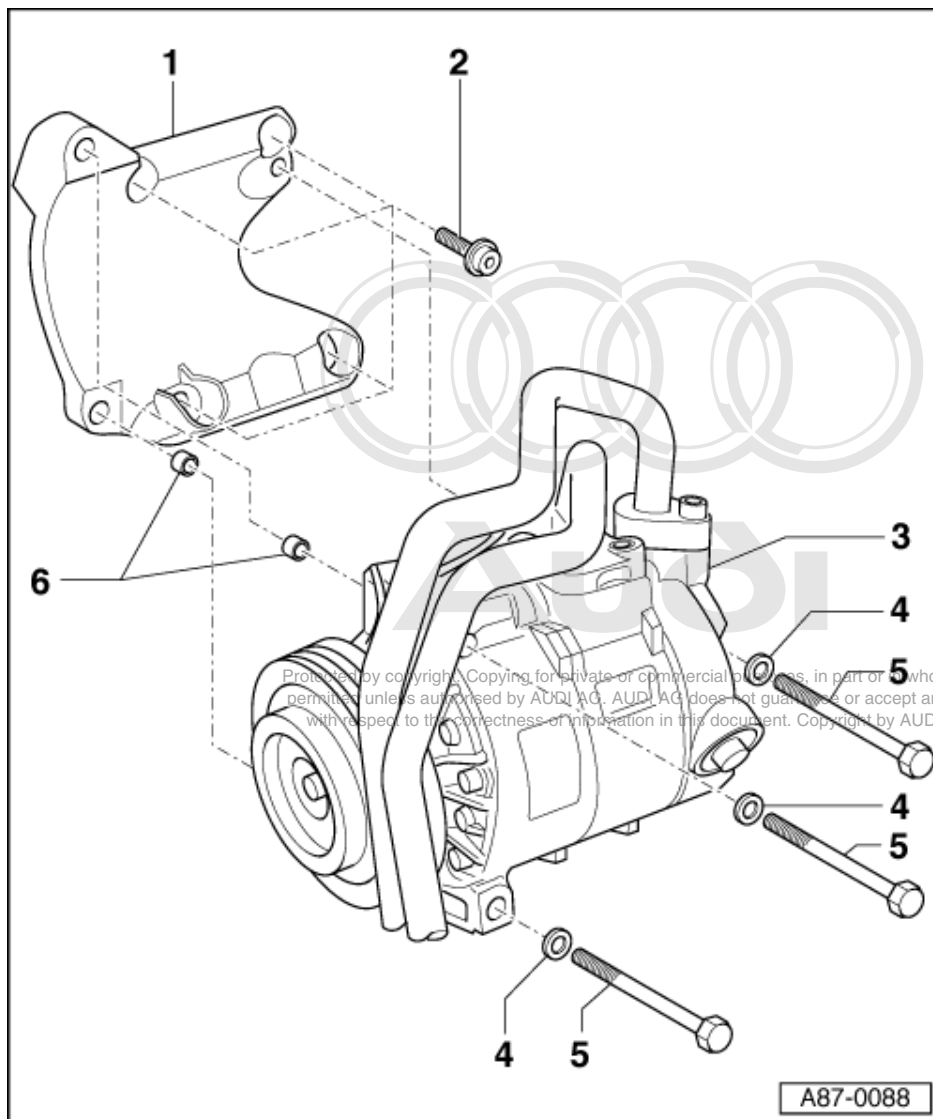
Zexel and Nippondenso/Denso compressors have different ribbed belts. Assignment:

=> Parts List



Zexel compressor

- 1 Nut
- 2 Washer
- 3 Compressor bracket
- 4 Hexagon socket-head bolt - 25 Nm
 - ♦ With washer
- 5 Compressor with air-conditioner magnetic clutch
- 6 Washer
- 7 Hexagon bolt - 25 Nm
- 8 Bracket
 - ♦ For refrigerant hoses
 - ♦ First attach to the clip of the refrigerant hoses



Nippondenso/Denso compressor

- 1 Compressor bracket
- 2 Hexagon socket-head bolt - 25 Nm
 - ♦ With washer
- 3 Compressor with air-conditioner magnetic clutch
- 4 Washer
- 5 Hexagon bolt - 25 Nm
- 6 Locating sleeve

5.4 - 6-cylinder TDI engines

Removing and installing compressor bracket

- Observe notes => Page 124 .
- Move lock carrier to service position.

=> General Body Assembly, Exterior; Repair group 50; Body front; Lock carrier service position

- Remove the noise insulation.

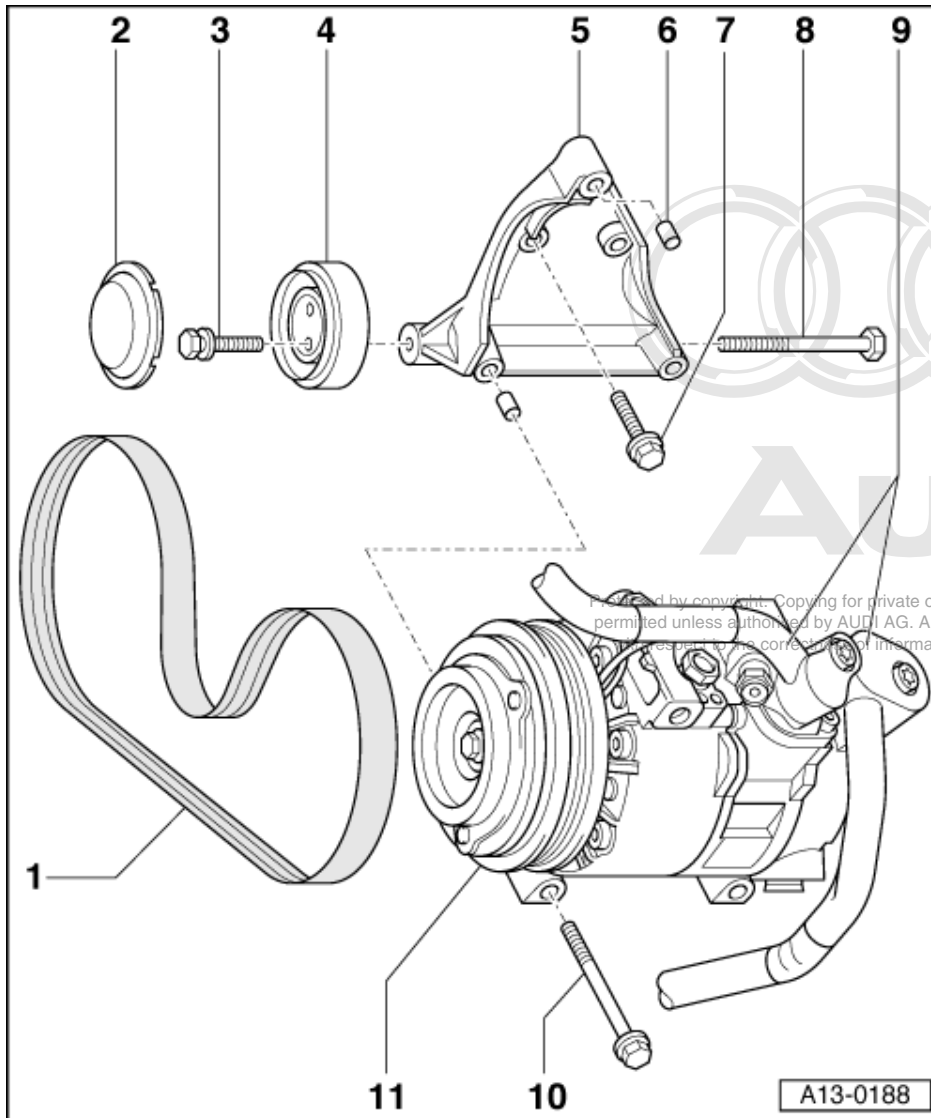
=> General Body Assembly, Exterior; Repair group 50; Body front; Noise insulation -assembly overview

- Remove the viscous fan.

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 13

- Slacken off the ribbed belt:

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 13



- 1 Ribbed V-belt**
 - ♦ Check for wear
- 2 Cover**
 - ♦ For tensioning roller
- 3 22 Nm**
- 4 Tensioner**
 - ♦ For ribbed belt
- 5 Bracket**
 - ♦ For A/C compressor

- ♦ Mark the direction of rotation with chalk or felt pen before removing the ribbed belt. If the belt rotates in the wrong direction when it is refitted, this can cause breakage.

- Move lock carrier to service position.

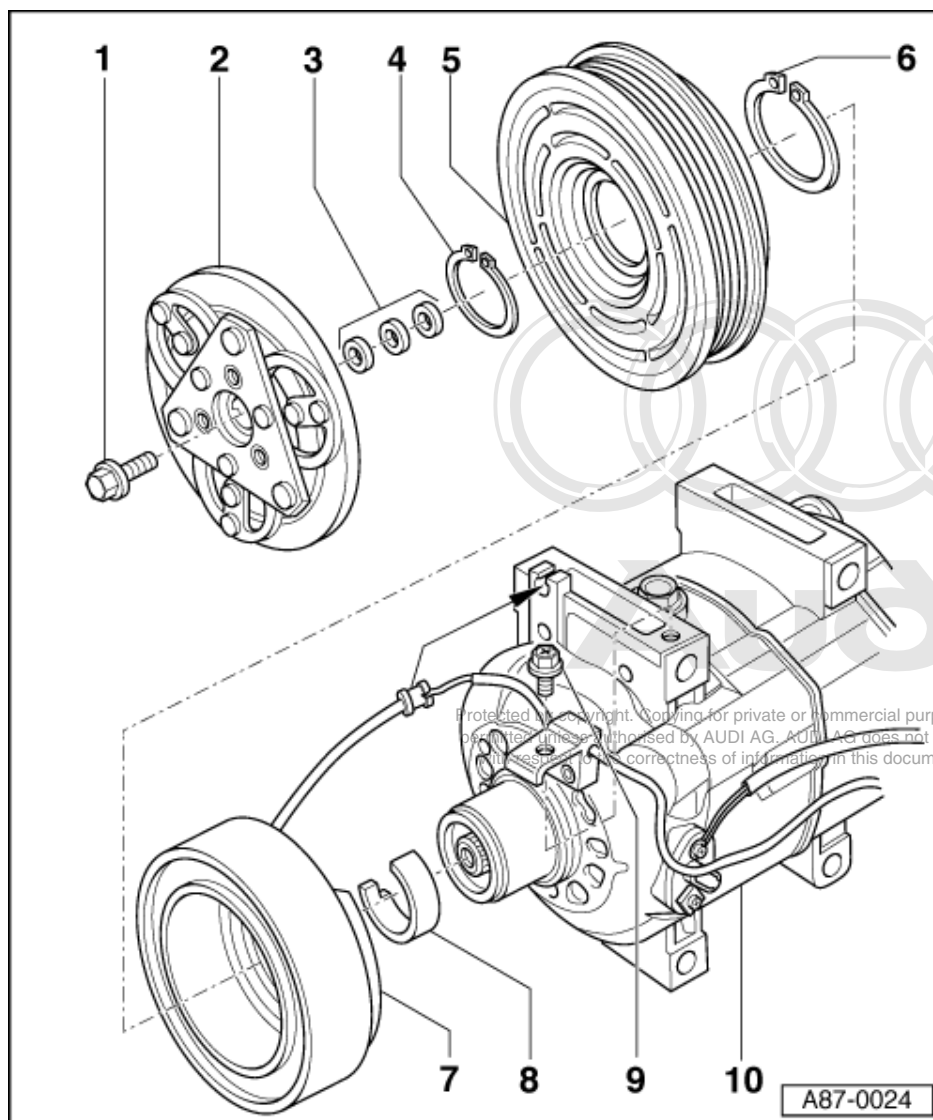
=> General Body Assembly, Exterior; Repair group 50; Body front; Lock carrier service position Body front Lock carrier service position

- Remove the ribbed belt:

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 13

- Detach the compressor from the bracket:
 - Vehicles with 4-cylinder engine => Page 125
 - Vehicles with 6-cylinder petrol engine=>Page 127
 - Vehicles with 6-cylinder TDI engine=>Page 129

6.2 - Zexel compressor



1 Release and tighten bolt -15 Nm

- ♦ Loosening and tightening => Fig. 1

2 Detach clutch plate

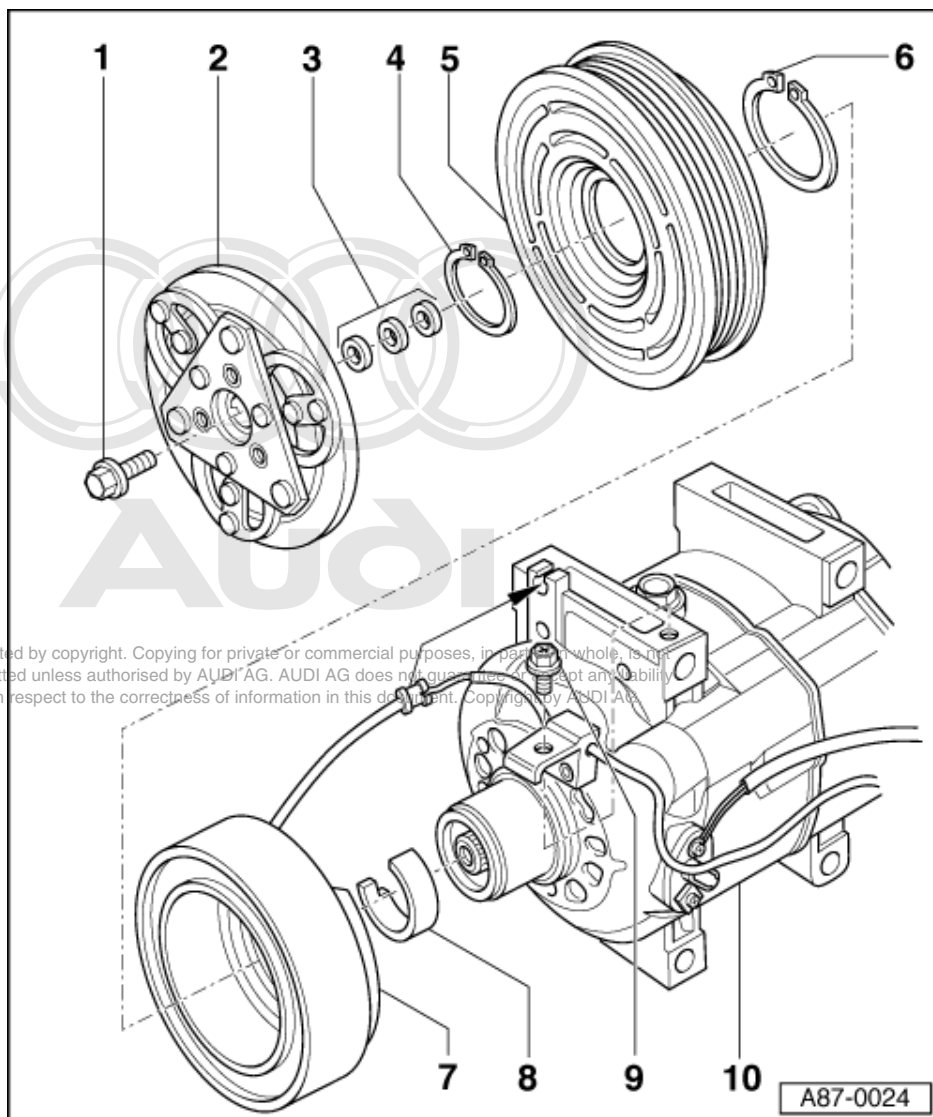
- ♦ Pulling off => Fig. 2

3 Spacer

- ♦ For adjusting the gap width
- ♦ Checking gap width => Fig. 6

4 Circlip

- ♦ Replace
- ♦ Install on correct side (flat side facing compressor)
- ♦ Ensure correct seating in groove



5 Pulley

- ♦ Pulling off => Fig. 3
- ♦ Installing => Fig. 4

6 Circlip

- ♦ Replace
- ♦ Install on correct side (flat side facing compressor)
- ♦ Ensure correct seating in groove

7 Solenoid

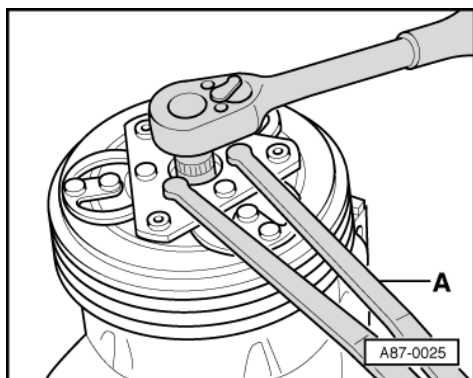
- ♦ Installing => Fig. 5

8 Felt ring

- ♦ Replace

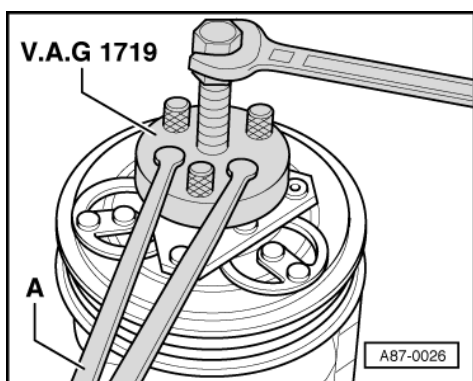
9 Bolt

10 Compressor



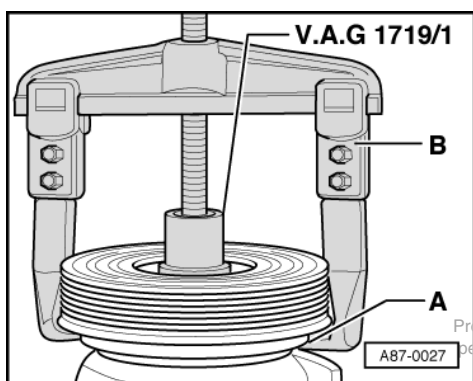
-> Fig.1 Loosening and tightening hexagon bolt

- Counterhold using a commercially available 2-hole pin wrench -A- (pin-ø 4 mm).
- Tighten bolt to 15 Nm.



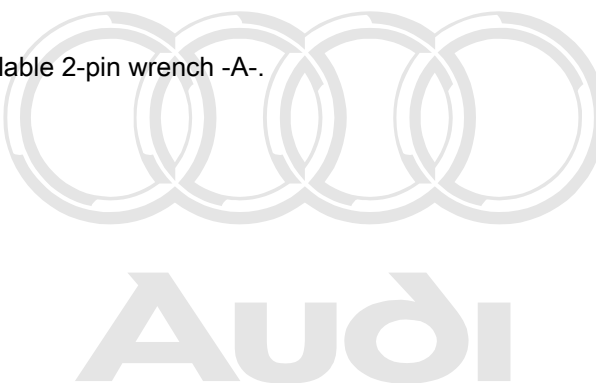
-> Fig.2 Detaching clutch plate

- Counterhold with a commercially available 2-pin wrench -A-.

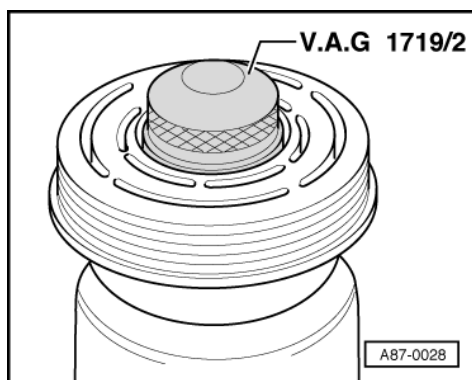


-> Fig.3 Removing pulley

- Remove the felt ring.
- Fit the special tool V.A.G 1719/1.
- Position the two-arm puller -B- on the shoulder -A-, to prevent any damage to the pulley.

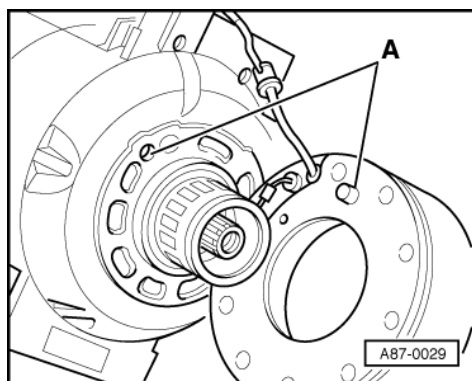


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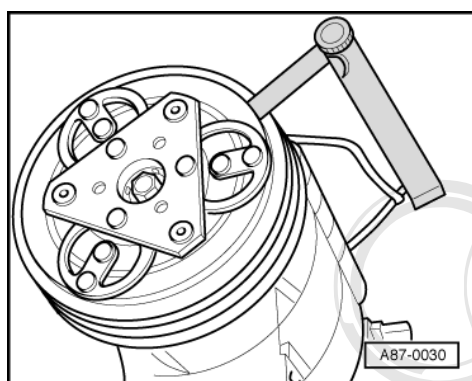
-> Fig.4 Installing pulley

- Clean the contact surface.
- Install the pulley with the special tool V.A.G 1719/2 and a plastic-headed hammer.



-> Fig.5 Installing solenoid

- Place the lug -A- in the recess.



-> Fig.6 Checking gap width

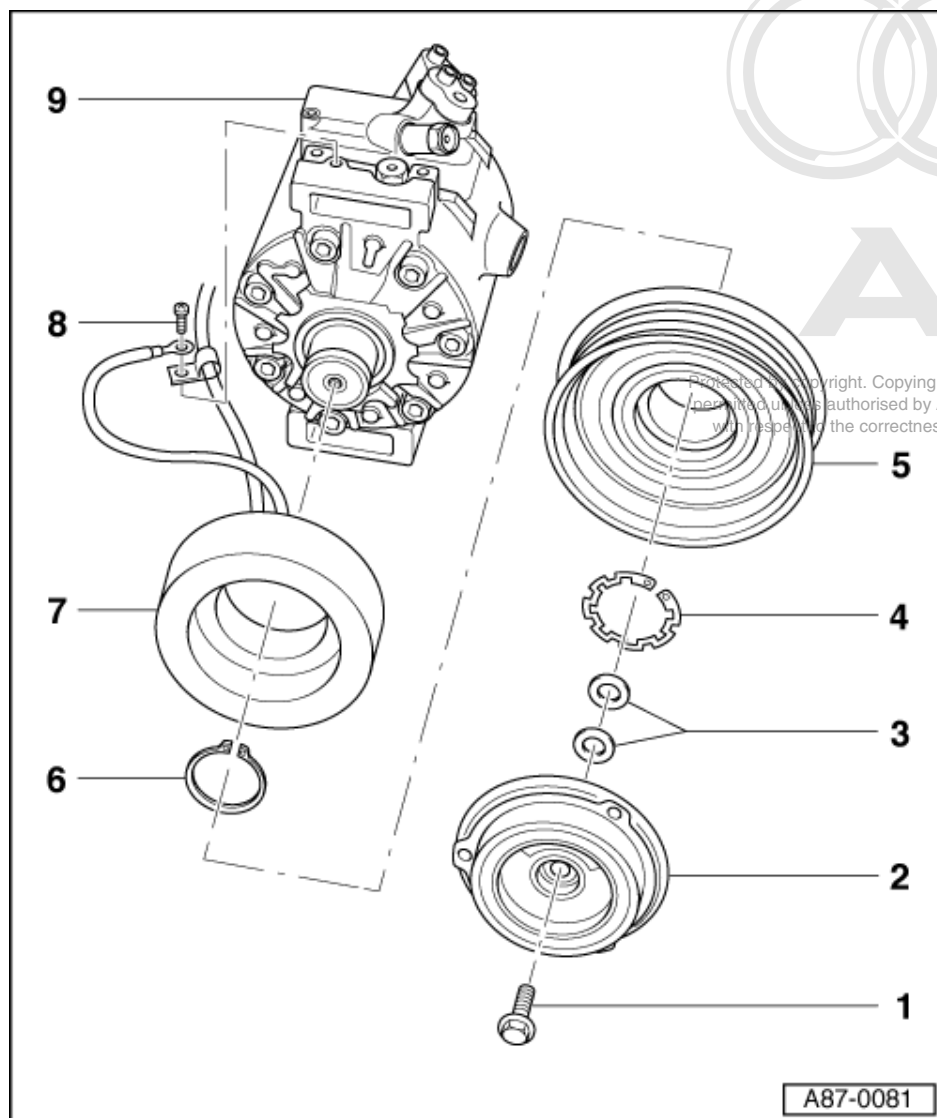
- Check the gap width between the pulley and clutch plate:
 - Gap width = 0.3 - 0.6 mm

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Note:

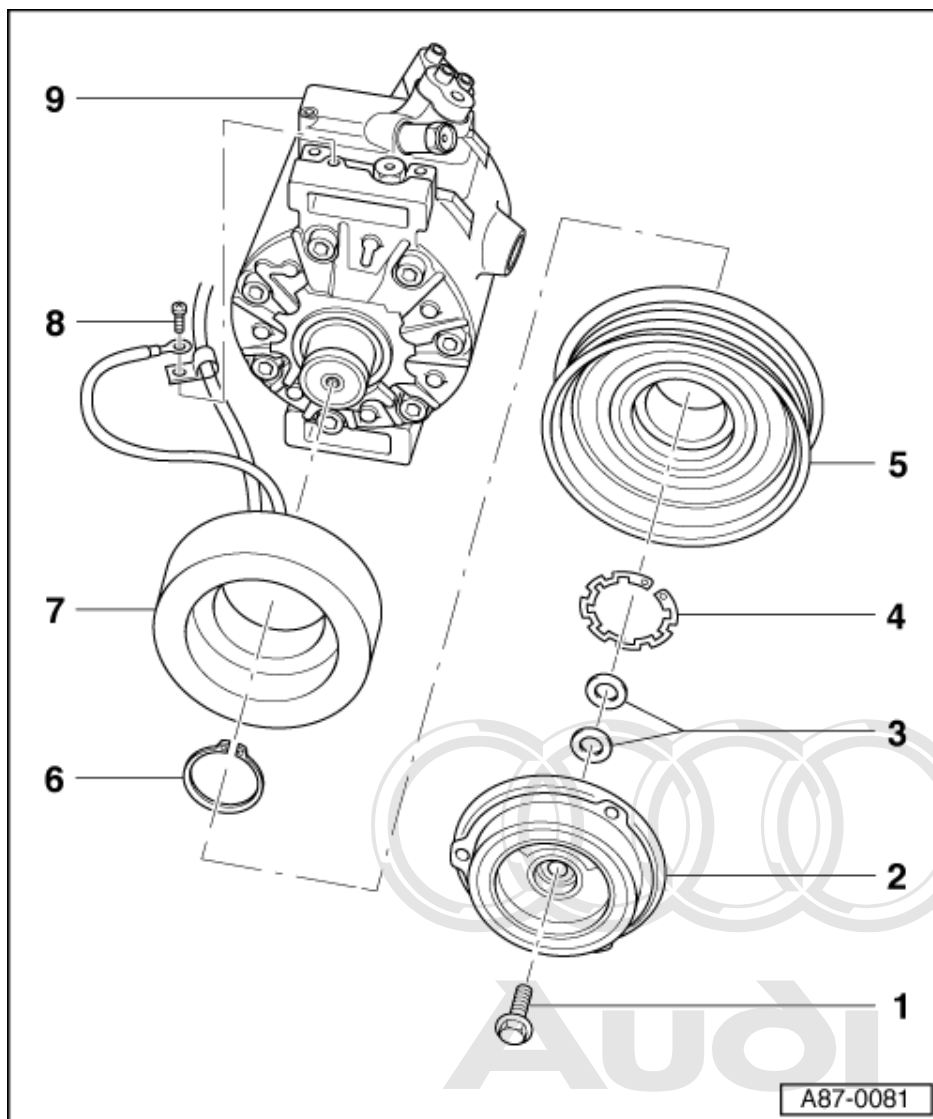
The gap width must be within the tolerance over the entire periphery.

6.3 - Nippondenso/Denso compressor



- 1 Release and tighten bolt -15 Nm
 - ♦ Loosening and tightening => Fig. 1
- 2 Detach clutch plate
 - ♦ Pulling off => Fig. 2
- 3 Spacers
 - ♦ For adjusting the gap width
 - ♦ Checking and adjusting gap width => Fig. 4
- 4 Circlip
 - ♦ Replace
 - ♦ Install on correct side (flat side facing compressor)
 - ♦ Ensure correct seating in groove
- 5 Pulley

- ♦ Pull off seized belt pulley, for example with a two- and three-arm puller. Do not damage belt pulley.



6 Circlip

- ♦ Replace
- ♦ Install on correct side (flat side facing compressor)
- ♦ Ensure correct seating in groove

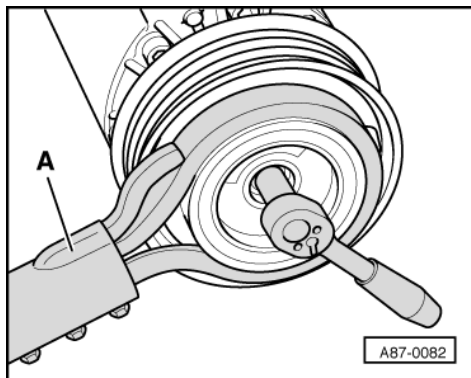
7 Solenoid

- ♦ With overheating cut-out fitted. It interrupts the solenoid as soon as the magnetic clutch becomes too hot (for example, if the compressor is stiff)
- ♦ The protective diode -J201 previously used is fitted (reduces the voltage peaks which may occur when the magnetic clutch is disengaged)
- ♦ Installing => Fig. 3

8 Bolt

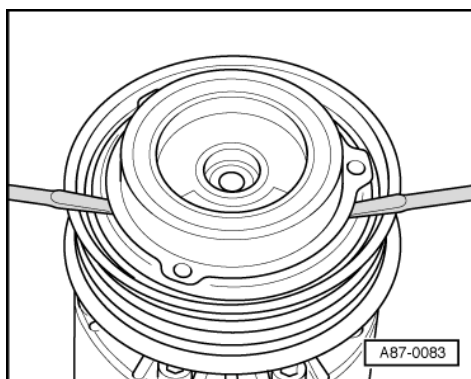
9 Compressor

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-> Fig.1 Loosening and tightening hexagon bolt

- Use a commercially available fabric strap wrench -A- to counterhold at the clutch plate.
- Tighten bolt to 15 Nm.

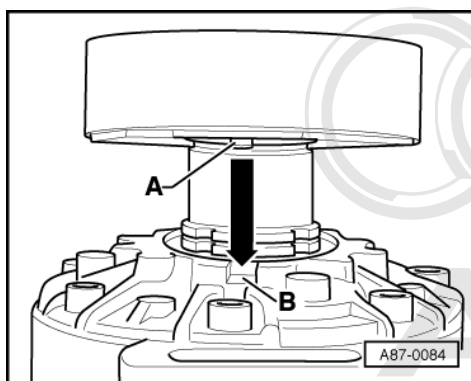


-> Fig.2 Detaching clutch plate

- Carefully prise off the clutch plate with two screwdrivers.

Note:

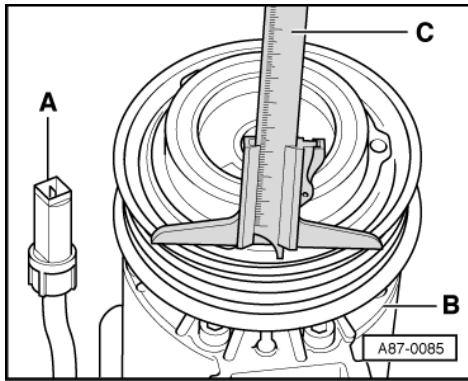
Use a two-arm or three-arm puller if the clutch plate is seized.



-> Fig.3 Installing solenoid

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- Install the lug -A- in the recess -B-.



-> Fig.4 Checking and adjusting gap width

- Use a depth gauge -C- to measure dimension "1" between the belt pulley and clutch plate at 3 points.
- Apply a voltage of 12 V to the solenoid.

A - Positive at 1-way connector
B - Earth at compressor housing

- Use a depth gauge -C- to measure dimension "2" between the belt pulley and clutch plate at 3 points.
- Calculate the gap width from the difference between measurements "1" and "2".
 - Specified value: 0.4...0.6 mm

Notes:

- ♦ The gap width must be within the tolerance over the entire periphery.
- ♦ You may also measure the gap width with the compressor fitted.
- ♦ If the gap width is not within the tolerance, remove the clutch plate and set the gap width by removing or inserting spacers.

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7 - Components for the control and regulation of air conditioners up to Model Year 1996

7.1 - Components for the control and regulation of air conditioners up to Model Year 1996

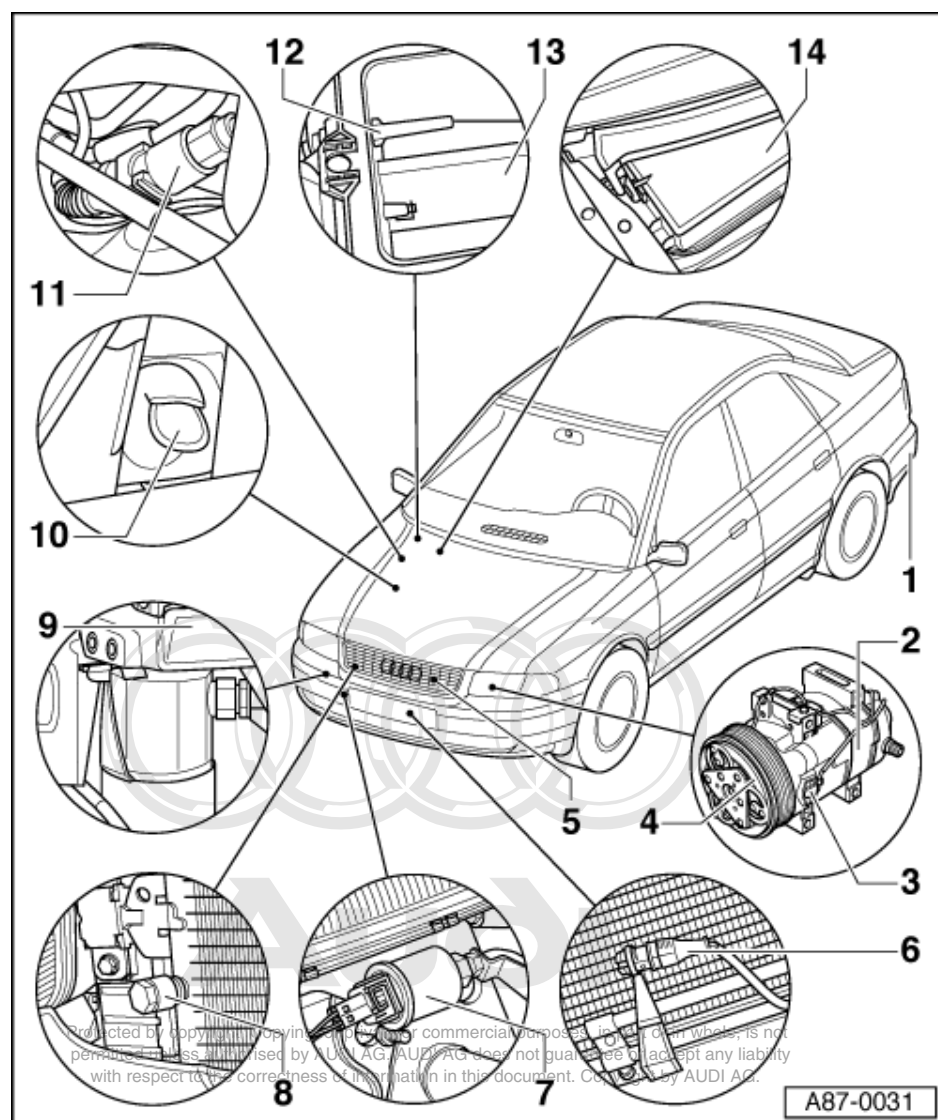
Notes:

- ♦ Servicing the refrigerant circuit => Page 196 .
- ♦ Perform the following operations after completing the repair work:
Interrogate fault memory => Page 24 .
- ♦ Electrical testing on all components marked 1) => Page 55 onwards.
- ♦ All components marked 2) are actuated in the final control diagnosis => Page 18 .
- ♦ An adhesive label indicating the filling quantity and the type of refrigerant is applied in the engine compartment.
- ♦ The windscreen vent (defrost) may only be renewed if the dash panel is removed (separate the dash panel from the panel cross member).

=> General Body Assembly, Interior; Repair group 70; Dash panel Dash panel



7.2 - Components in the engine compartment

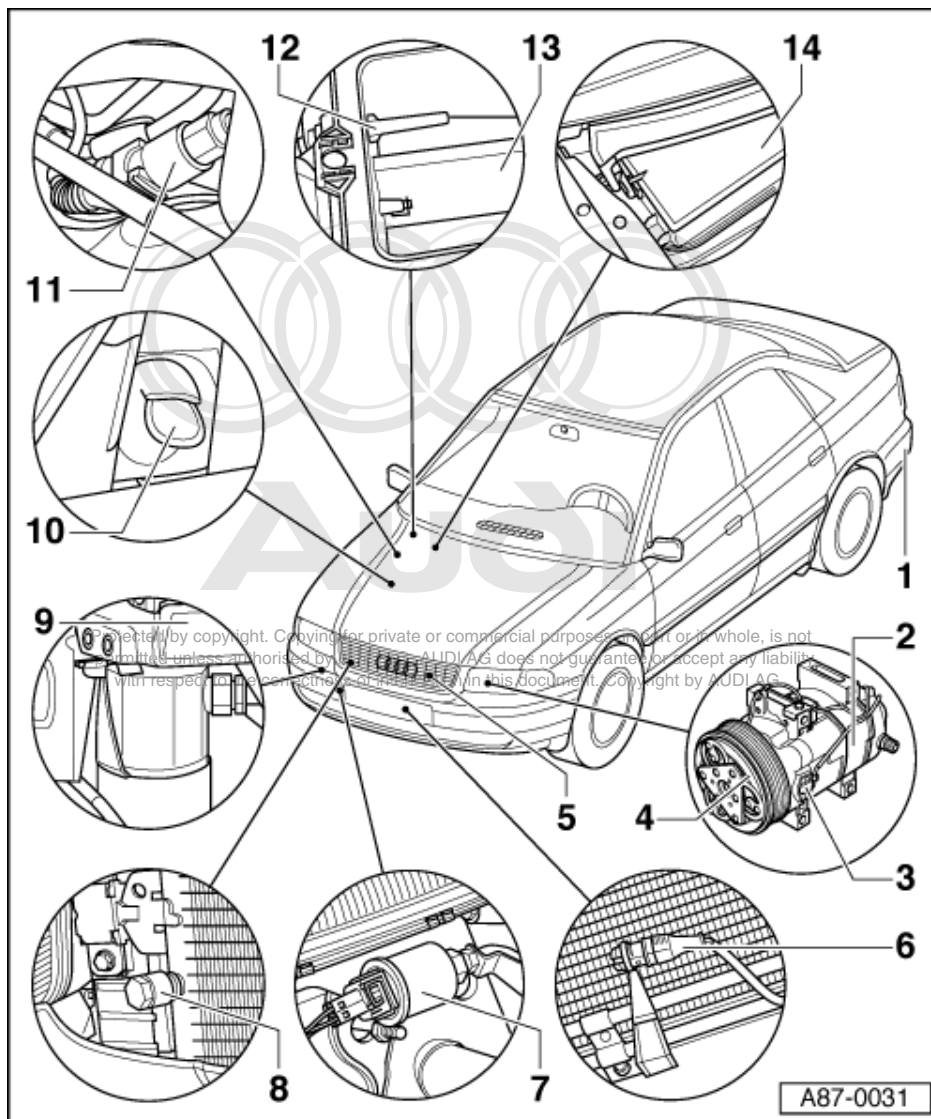


1 Through-flow exit vents

- ◆ Sealing lips must move freely and close automatically
- ◆ The passenger compartment ventilation will only function properly if the air ducts are not blocked by the luggage compartment trim (to the rear shelf)
- ◆ Checking => Page **76**

2 Compressor

- ◆ May only be removed if the refrigerant circuit is empty; send vehicle to an VW/Audi air conditioner service centre



- ♦ Removing and installing compressor bracket=> Page 124
- ♦ Removing and installing ribbed belt

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 13

3 Air conditioner compressor speed sender -G111

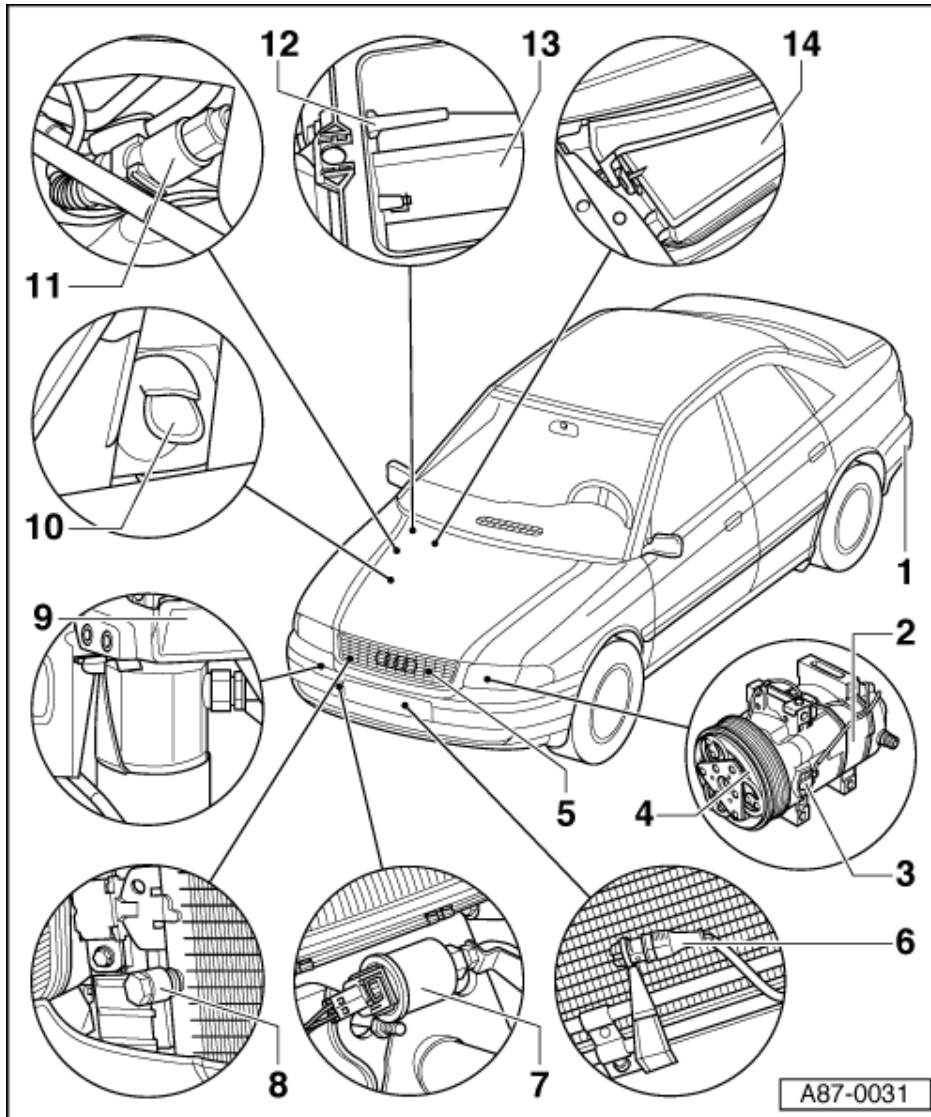
- ♦ Not fitted with Nippondenso/Denso compressor
- ♦ May only be removed if the refrigerant circuit is empty; send vehicle to an VW/Audi air conditioner service centre

4 Air conditioner magnetic clutch -N25 2)

- ♦ => Page 131 onwards.

5 Condenser

- ♦ May only be removed if the refrigerant circuit is empty; send vehicle to an VW/Audi air conditioner service centre

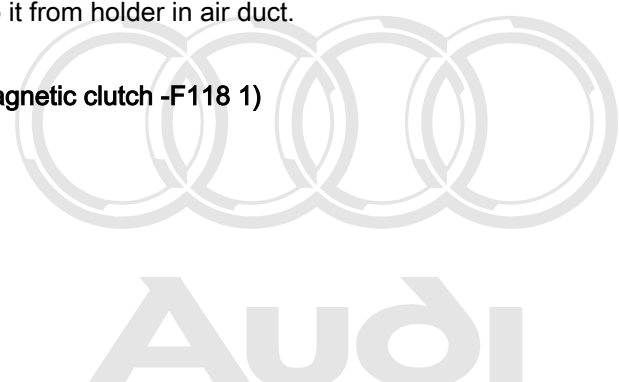


6 Ambient temperature sensor -G17 1)

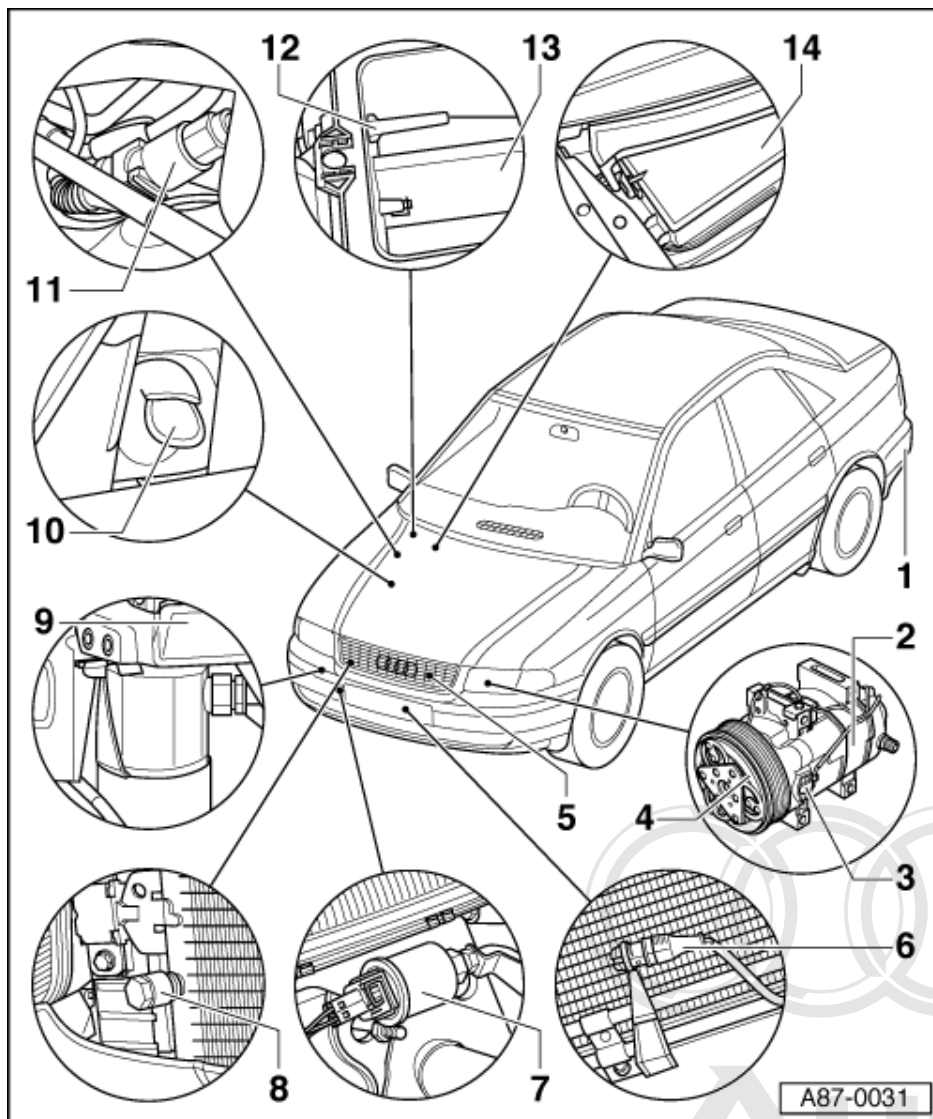
- ◆ Removing:
 - Remove front bumper:
 - Detach connector at temperature sensor and unclip it from holder in air duct.
- ◆ Resistance values =>Page 60

7 High pressure switches for air conditioner -F23 and magnetic clutch -F118 1)

- ◆ Function, removing and installing =>Page 116



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8 Service connection

- ♦ For measurement, drainage and filling at VW/Audi air-conditioning service centres
- ♦ Always screw on cap with seal

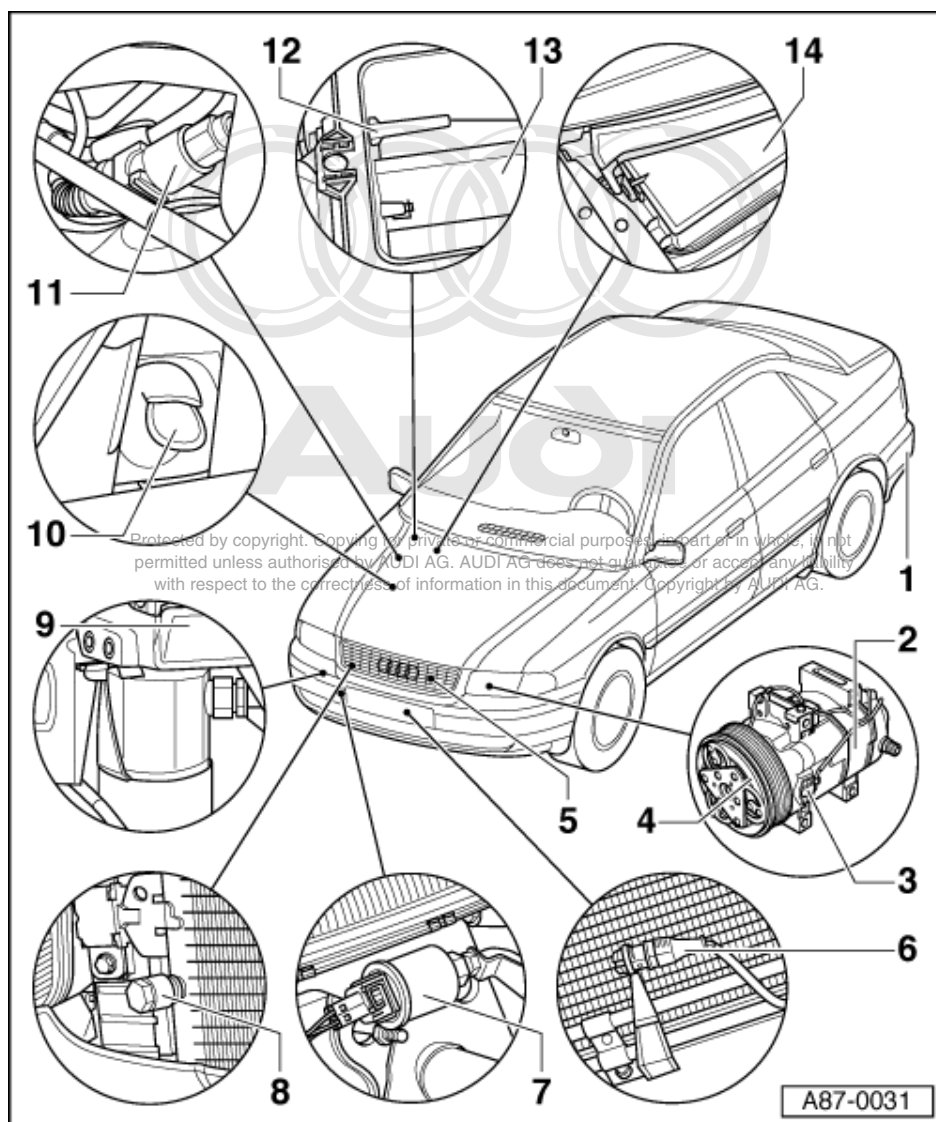
9 Container

- ♦ May only be removed if the refrigerant circuit is empty; send vehicle to an VW/Audi air conditioner service centre
- ♦ Removing and installing =>Page 208

10 Condensation drainage valve

- ♦ Checking => Page 145
- ♦ Removing and installing =>Page 145

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11 Low-pressure switch for air conditioner -F731)

- ♦ Function, removing and installing =>Page **117**

12 Fresh air intake duct temperature sensor -G89 1)

- ♦ Checking => Page **59**
- ♦ Removing and installing =>Page **218**

13 Air flow flap positioning motor -V71 2)

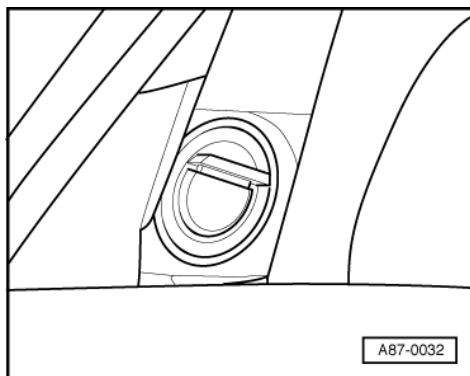
- ♦ With air-flow flap positioning motor potentiometer -G113
- ♦ Removing and installing =>Page **189**

14 Dust and pollen filter:

- ♦ Removing and installing =>Page **75**
- ♦ Observe change intervals

=> Maintenance manual

7.3 - Check condensation drain valve



- ◆ -> The drain aperture is at the bottom.
- ◆ When installed, the condensation drainage valve must not lie on the heat shield.
- ◆ Condensate drain valve must not be gummed up with wax or underseal; it must close properly.
- ◆ In the event of moisture in passenger compartment:
 - Use wire, for example, to check the condensation water drain from the air conditioner for contamination and clean if necessary
 - Check the water drain hose, the associated valve and the area under the air conditioner for contamination.

If no fault is found:

- Check passenger compartment forced air extraction (via luggage compartment) => Page 140 .

7.4 - Removing and installing the condensation drainage valve

Removing

- Remove the glove box

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box

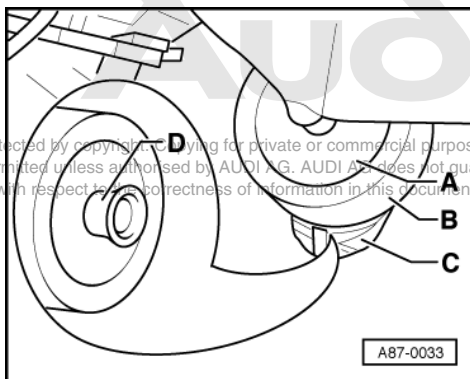
- Remove the condensation drainage hose and valve downwards out of the floor panel

Note:

The drain funnel and the foam seal may only be replaced with the air conditioner removed => Page 213 .

Installing

Installation is carried out in the reverse order; note the following:



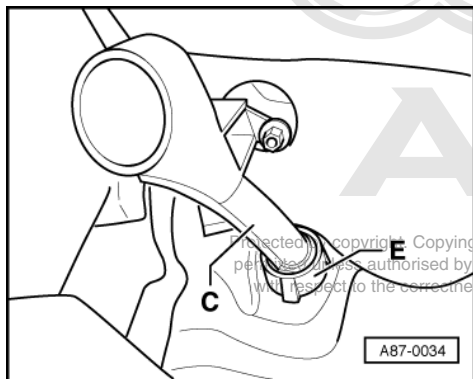
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- ♦ -> The foam seal -B- must lie flat on the drain funnel -C-.
- ♦ The washer -A- must be attached to the condensation drain to support the foam seal.

Note:

The grommet -D- on the air conditioner's condensation drain prevents the condensation water from running back into the foam seal.

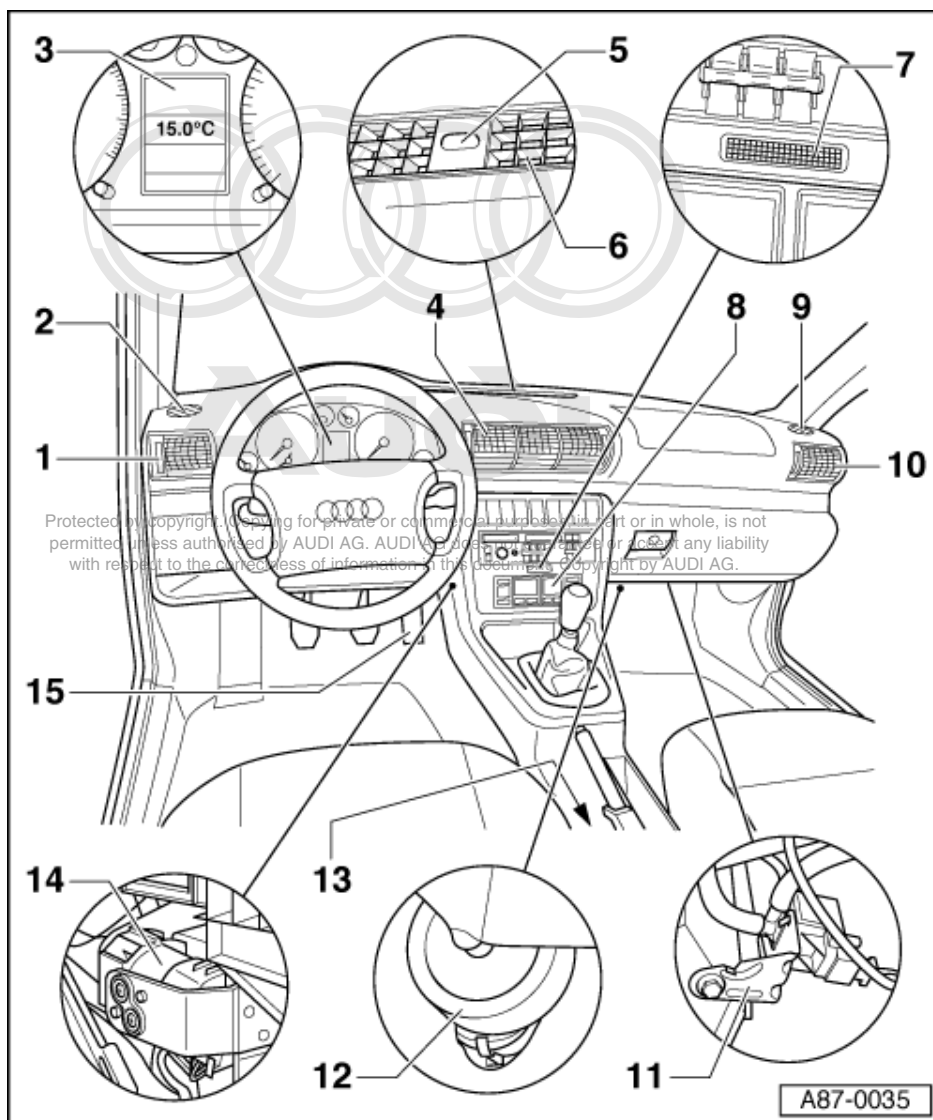


- ♦ -> The funnel -C- must be screwed to the floor panel.

Note:

The function of the drain valve -E- must not be impaired.

7.5 - Components in the passenger compartment



1 Dash panel vent

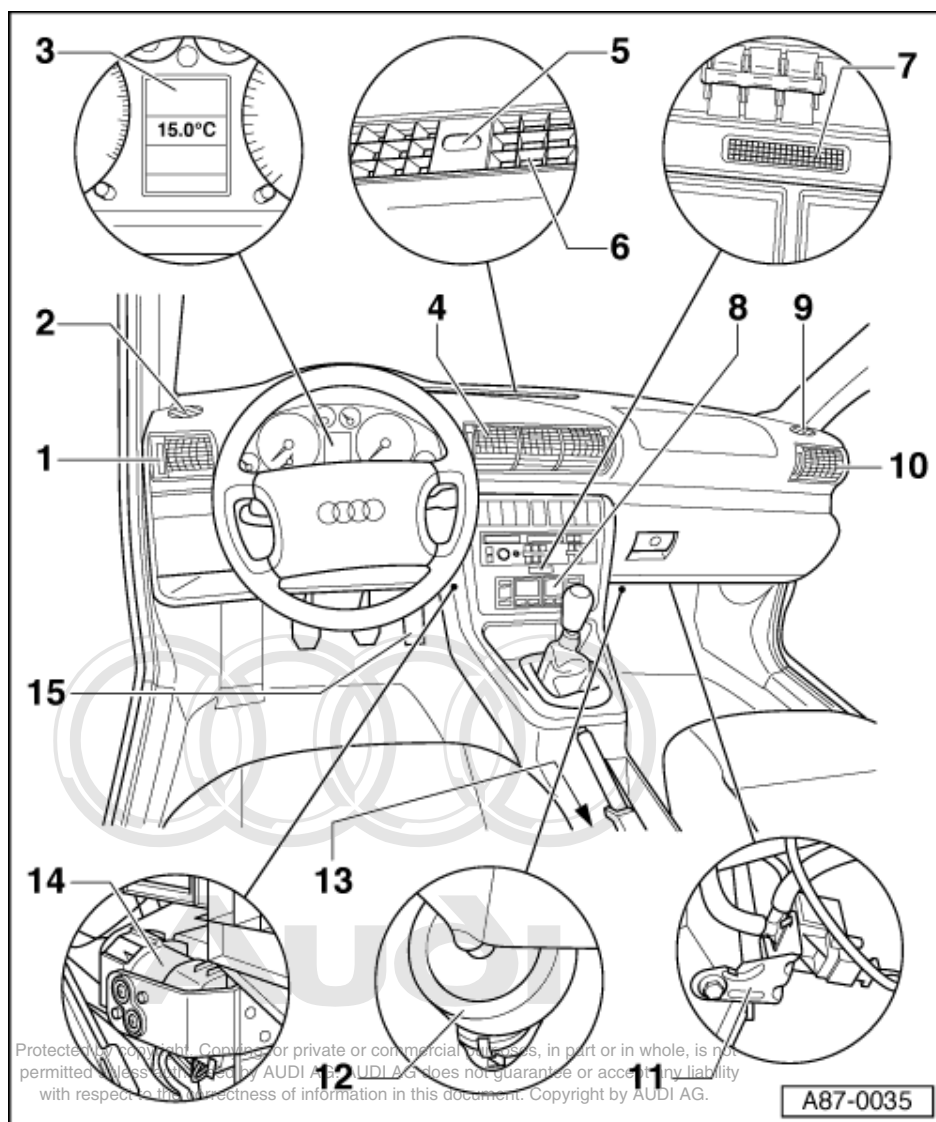
- ◆ Driver's side
- ◆ Removing and installing =>Page 74

2 Defroster vent

- ◆ For left side window
- ◆ Latched into the dash panel

3 Auto- check system

- ◆ With ambient temperature display -G1062)
- ◆ On vehicles with automatic gearboxes, the external temperature output by the operating and display unit -E87 is only displayed with gear engaged.
- ◆ If the temperature display is incorrect, check the temperature sensor measured values =>Page 60



4 Dash panel vent

- ◆ Centre
- ◆ Removing and installing =>Page 73

5 Sunlight penetration photosensor -G107 1)

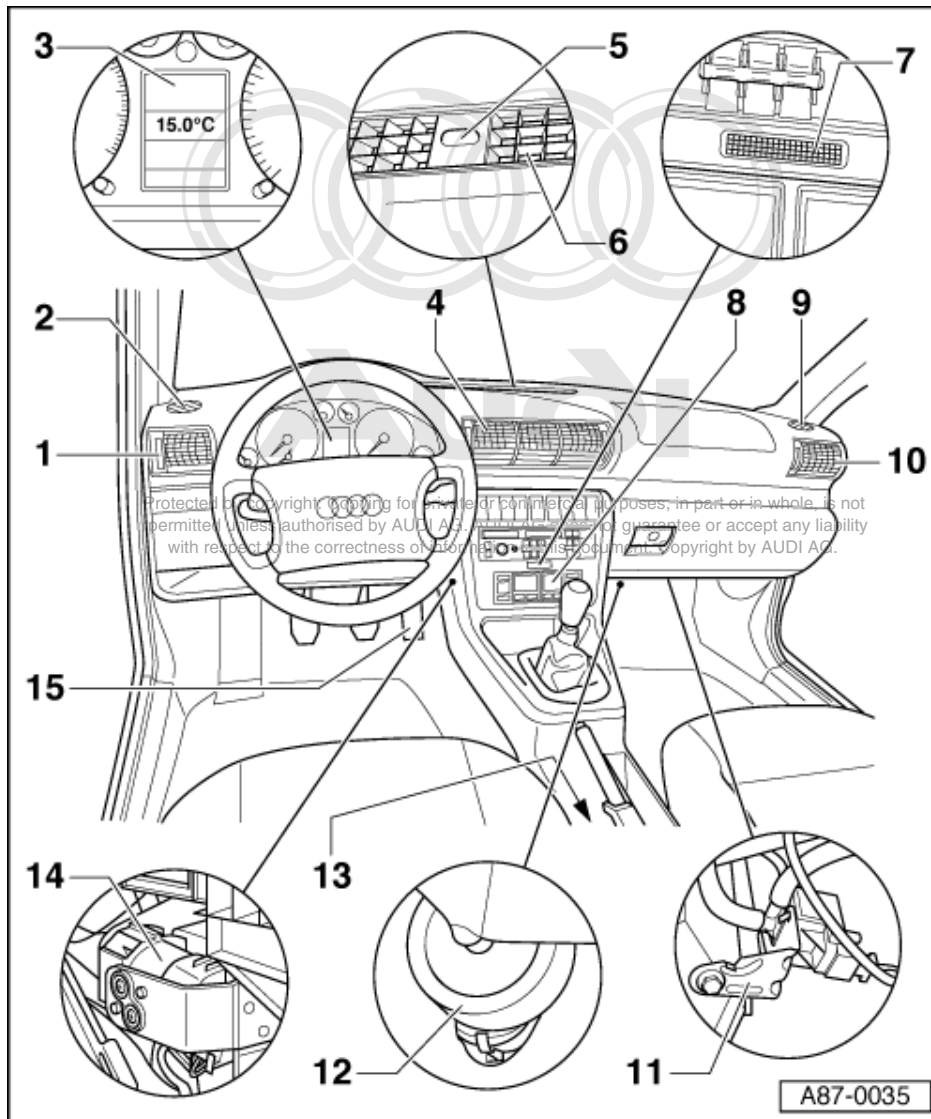
- ◆ Removing and installing =>Page 165

6 Defroster vent

- ◆ For windscreen
- ◆ Removing and installing =>Page 74

7 Dash panel temperature sensor -G56 1)

- ◆ Removing and installing =>Page 164



8 Operating and display unit -E87

- ♦ Allocation

=> Parts List

- ♦ Assignment, removing and installing =>Page 154
- ♦ Checking and setting code => Page 27
- ♦ Replacing bulbs => Page 156

9 Defroster vent

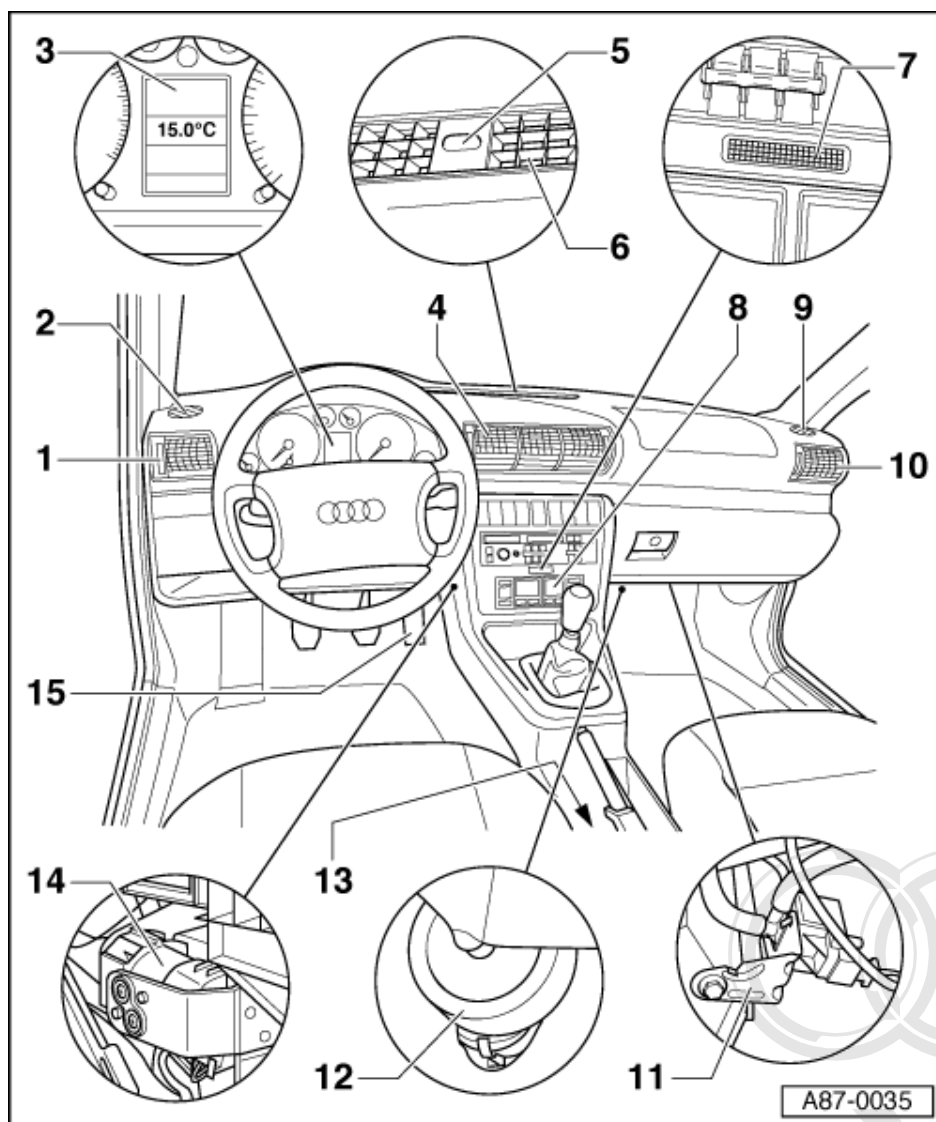
- ♦ For right side window
- ♦ Latched into the dash panel

10 Dash panel vent

- ♦ Passengers' side
- ♦ Removing and installing =>Page 74

11 Two-way valve for fresh-air and recirculated-air flap -N63

- ♦ Checking => Page 163
- ♦ Removing and installing =>Page 161



12 Condensation drainage valve

- ♦ Checking => Page **145**

13 Diagnostic connector

14 Temperature sensor blower -V42 2)

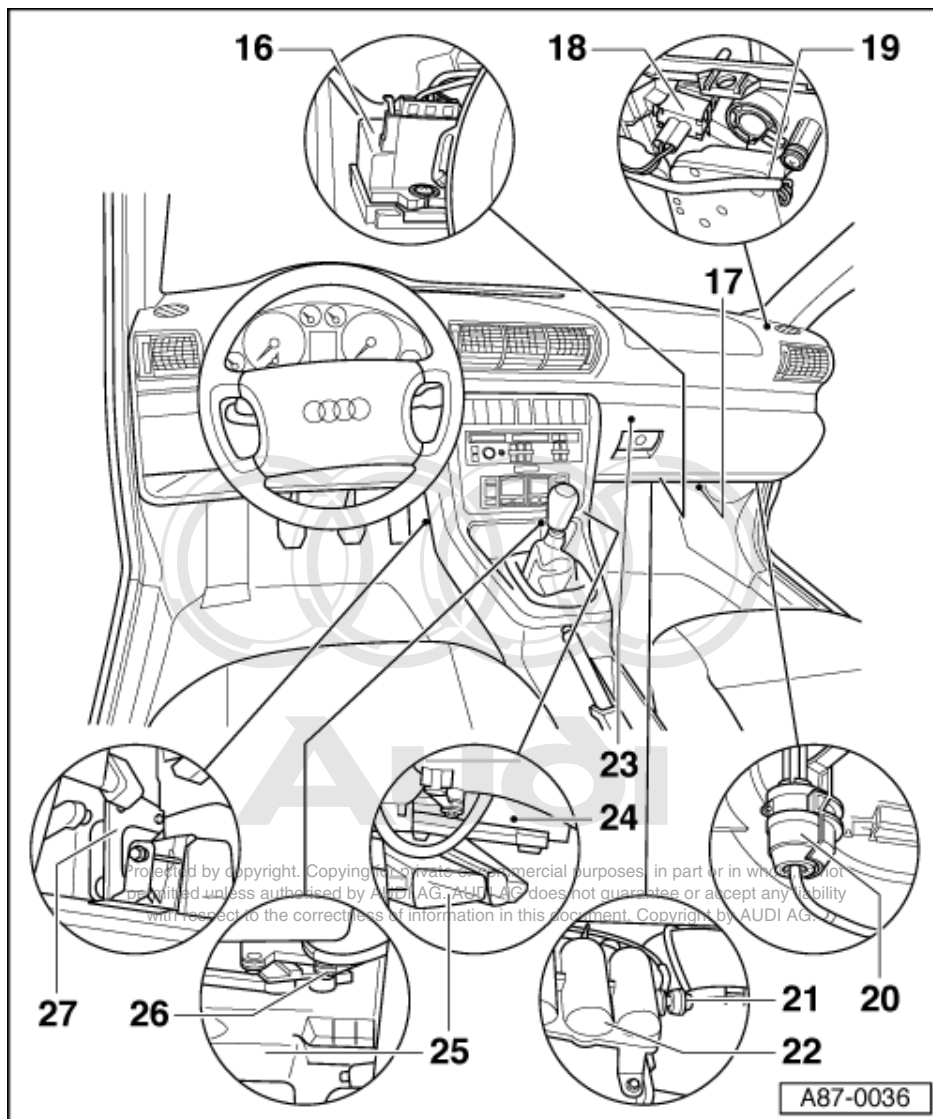
- ♦ Removing and installing =>Page **166**

15 Kickdown switch for air conditioner -F46

- ♦ Not installed in all vehicles
- ♦ Kickdown deactivation without kickdown switch -F46 via the engine control unit or the automatic gearbox control unit

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=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder



16 Fresh-air blower control unit -J126 2)

- ♦ Removing and installing =>Page **157**

17 Fresh-air blower -V2 2)

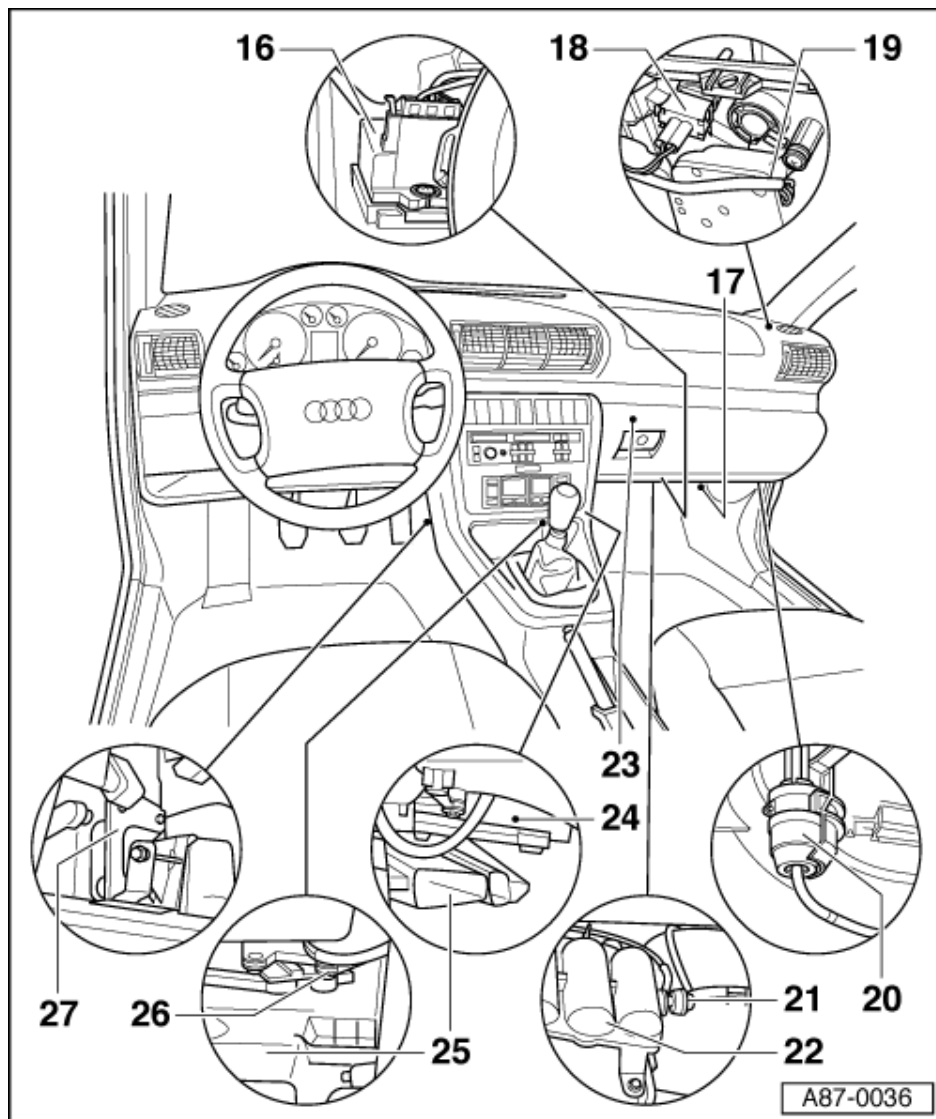
- ♦ Removing and installing =>Page **157**

18 Fresh air intake duct temperature sensor -G89 1)

- ♦ Removing and installing =>Page **191**

19 Air flow flap positioning motor -V71 2)

- ♦ With air-flow flap positioning motor potentiometer -G113
- ♦ Removing and installing =>Page **218**



20 Vacuum unit

- ♦ For fresh-air and recirculated-air flap
- ♦ Checking => Page 163
- ♦ Removing and installing =>Page 219

21 Non-return valve

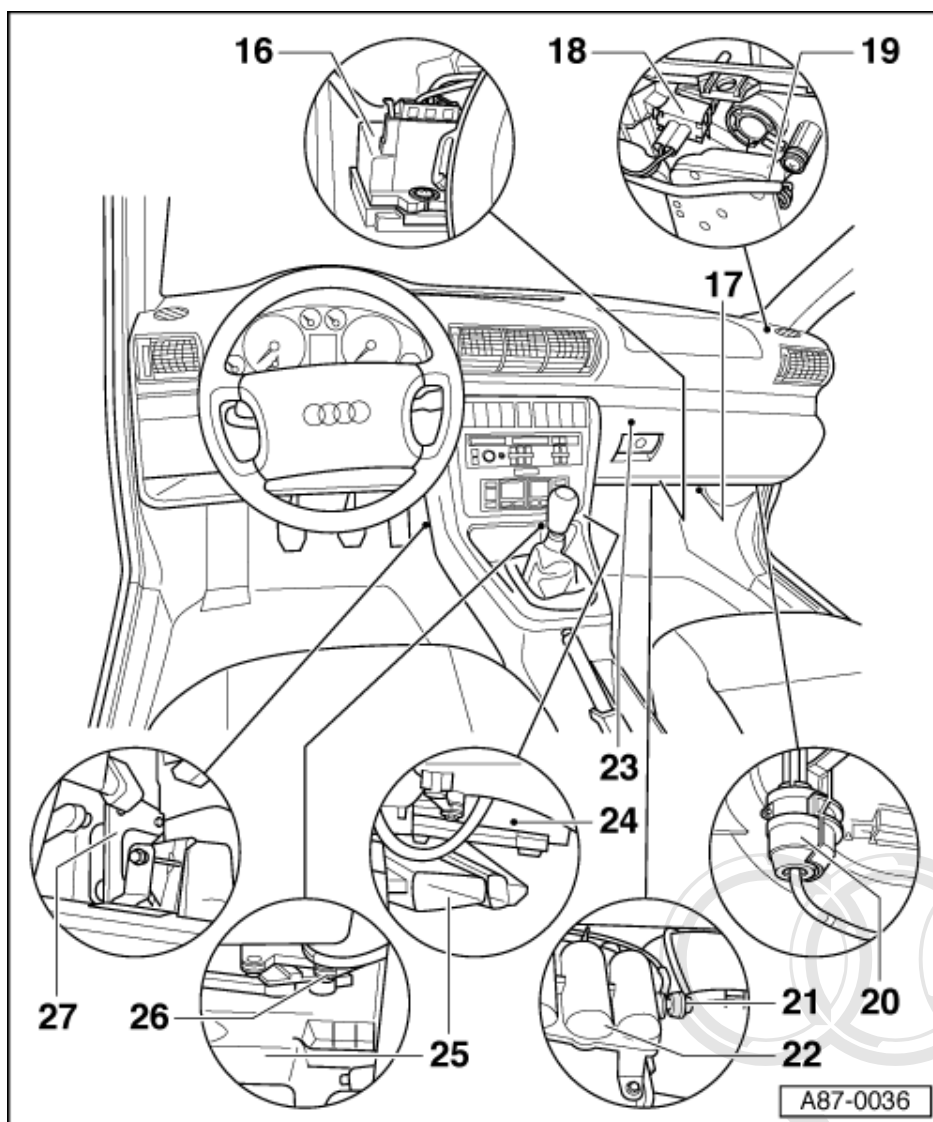
- ♦ For the vacuum supply to the air conditioner
- ♦ Checking => Page 163
- ♦ Removing and installing =>Page 219

22 Vacuum reservoir

- ♦ Checking => Page 163
- ♦ Removing and installing =>Page 219



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23 Air conditioner with evaporator

- ♦ Removing and installing =>Page 213
- ♦ Dismantling and assembling => Page 221
- ♦ May only be removed if the refrigerant circuit is empty; send vehicle to an VW/Audi air conditioner service centre

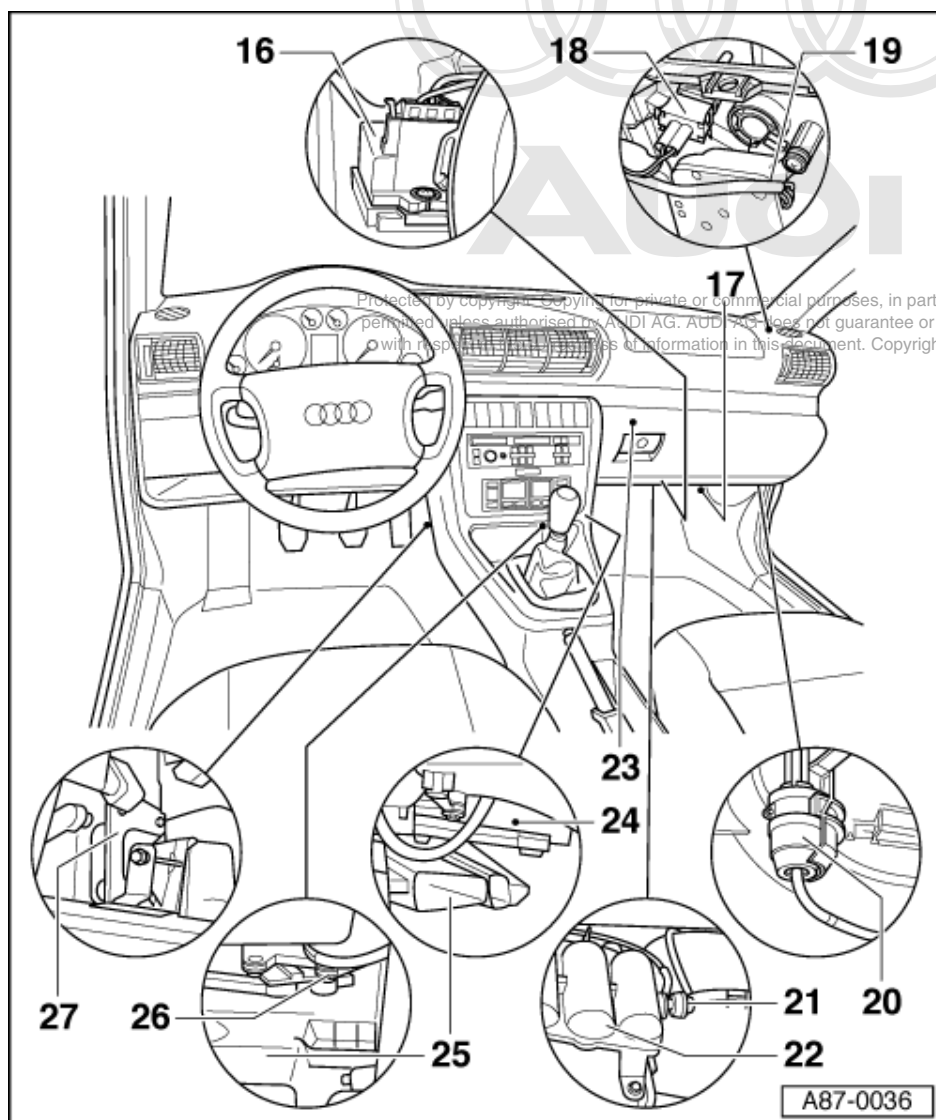
24 Temperature flap positioning motor -V68 2)

- ♦ With temperature flap positioning motor potentiometer -G92
- ♦ Removing and installing =>Page 159

25 Footwell vent

- ♦ Removing and installing =>Page 158

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26 Central flap positioning motor -V70 2)

- ♦ With central flap positioning motor potentiometer -G112
- ♦ Removing and installing =>Page 160

27 Footwell/defrost flap positioning motor -V85 2)

- ♦ With footwell/defrost flap positioning motor potentiometer -G114
- ♦ Removing and installing =>Page 158

7.6 - Removing and installing operating and display unit -E87

Assignment of the operating and display unit -E87 -E87 up to Model Year 1996

Part number	Special features
8D0 820 043 C	Static self-diagnosis, control is deactivated during self-diagnosis

Part number	Special features
8D0 820 043 D...G	- During the self-diagnosis, control is only switched off for final control diagnosis and basic setting - In vehicles with 6-cylinder engines, may only be combined with Zexel compressors
8D0 820 043 from H	For all vehicles up to Model Year 1996

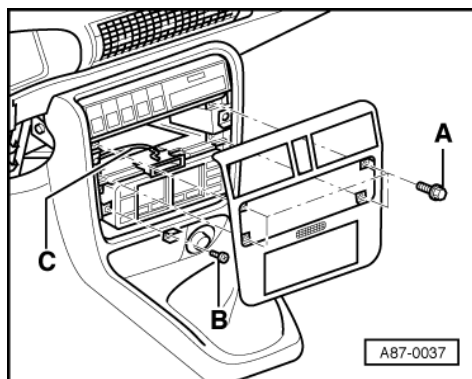
Notes:

- ◆ Before removing -E87, interrogate fault memory => Page 6 .
- ◆ Note the precise assignment when replacing an operating and display unit:

=> Parts List

- ◆ After renewing the -E87, always:
 - Check/correct code =>Page 6 .
- ◆ If a new installed operating and display unit -E87 flashes after the ignition is switched on (for approx. 2 minutes), encode the -E 87 =>Page 27 .
- ◆ If display is always 22 °C (71°F) after switching on ignition, regardless of the last setting, use the current flow diagram to rectify the power supply to -E87 (terminal 30).
- ◆ The display on the -E87 may be switched from °C°F and vice versa by pressing the "temperature +" button with the "recirculated air" button pressed.

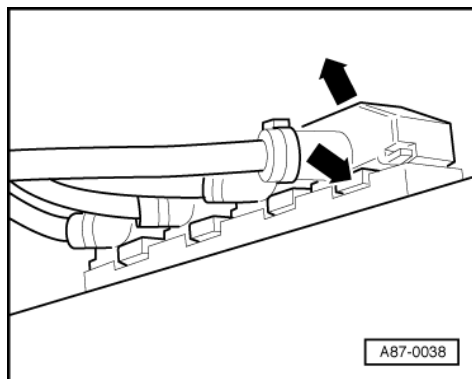
Removing



- Remove radio.

=> Radio, Telephone and Navigation System; Repair group 91; Radio systems; Removing and installing radio
Radio systems Removing and installing radio

- -> Screw out the bolts -A-.
- Pull off the trim on the centre section of the dash panel. If necessary, prise off with a small screwdriver.
- Remove screws -B-.
- Pull the operating and display unit out of the centre section of the dash panel.

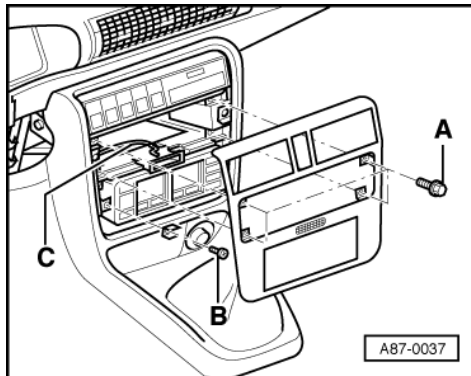




- -> Press back the connector catch -bottom arrow- and pull off the connector.

Installing

Installation is carried out in the reverse order; note the following:



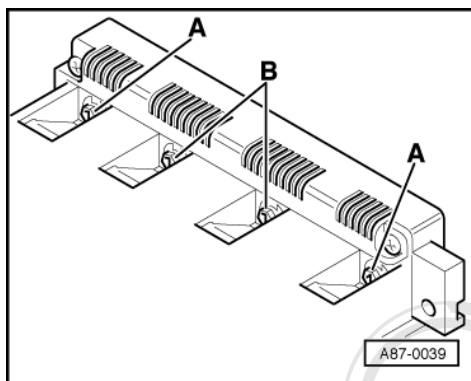
- -> After installing the operating and display unit -E87, check the correct seating of the moulded hose -C- from the temperature sensor -G56 to the temperature sensor blower -V42.

Note:

When installing the bolts -B-, insert the spring clips for the trim on the correct side.

7.7 - Replacing the bulbs in the operating and display unit -E87

- Remove operating and display unit -E87 => Page [154](#)



- -> Turn the bulbs through 90° and remove.

- A - Bulb for the illumination of the control buttons
- B - Bulb for the illumination of the display zones

Note:

Only replace bulbs with bulbs of the same power.

=> Parts List

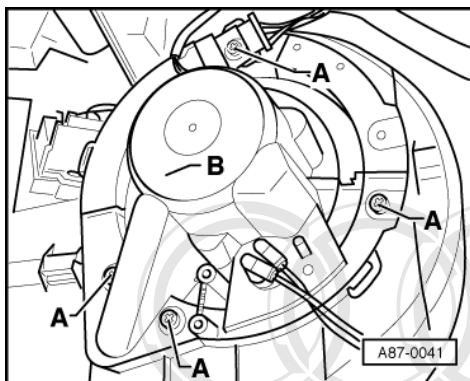
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7.8 - Removing and installing the fresh-air blower -V2

Removing

- Remove the glove box, centre holder for glove box and holder for passenger airbag:

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box



- -> Screw out the bolts -A-.
- Pull out the fresh-air blower -B- from the air conditioner.

Note:

The fresh-air blower may only be removed from the air conditioner by turning.

Installing

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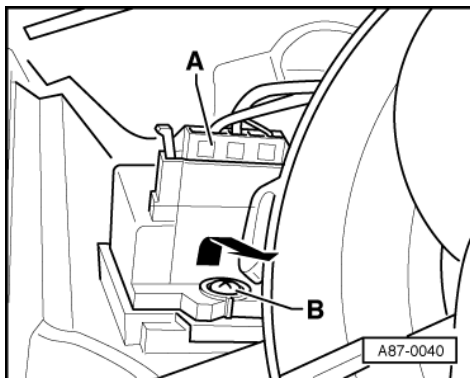
Install in reverse order.

7.9 - Removing and installing fresh-air blower control unit -J126

Removing

- Remove the glove box and the holder for the glove box:

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box



- -> Detach connector -A-.
- Screw out the bolt -B- and pull out the fresh-air blower control unit in the direction of the arrow.

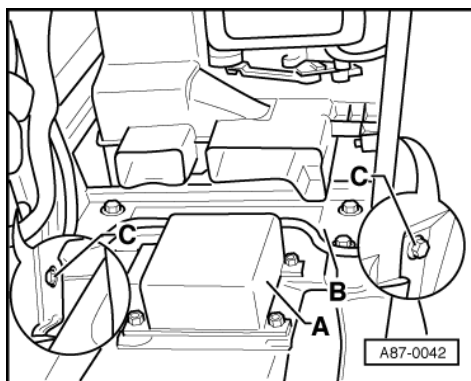


Installing

Install in reverse order.

7.10 - Removing and installing footwell vent

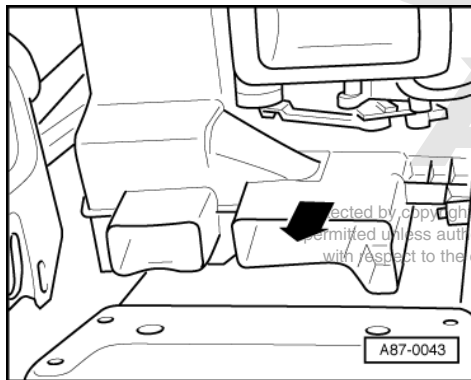
Removing



- Remove the dash panel and dash panel cross piece

=> General Body Assembly, Interior; Repair group 70; Dash panel Dash panel

- Remove connection pieces between the footwell vent and rear vent.
- -> Remove the bracket -B- for the dash panel on the transmission tunnel.
- Screw out the bolts -C-.



- -> Carefully remove the footwell vent -C- in the direction of the passenger compartment -arrow-.

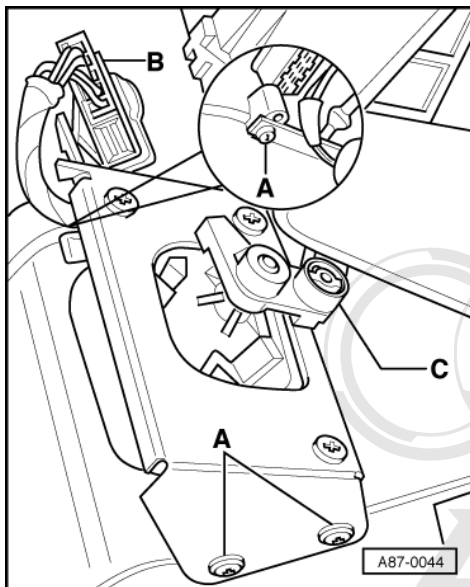
Installing

Install in reverse order.

7.11 - Removing and installing footwell/defrost flap positioning motor -V85

Removing

- Remove the footwell vents => Page 158 .



- -> Screw out the bolts -A-.
- Detach connector -B- (colour code: red).

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Note:

In right-hand drive vehicles, the colour coding for the connector is yellow.

- Unclip the reversing lever -C-.
- Remove the positioning motor.

Installing

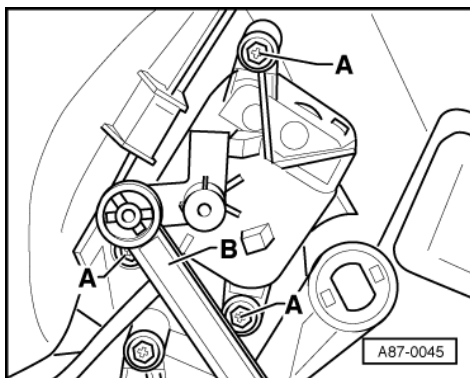
Installation is carried out in the reverse order; note the following:

- When installing the positioning motor, check that the reversing lever -C- is correctly seated.
- Interrogate fault memory => Page 24 .

7.12 - Removing and installing temperature flap positioning motor -V68

Removing

- Remove the footwell vents => Page 158 .



- -> Screw out the bolts -A-.
- Detach the connector (colour code black) to the positioning motor.



Note:

In right-hand drive vehicles, the colour coding for the connector is violet.

- Unclip the reversing lever -B-.
- Remove the positioning motor.

Installing

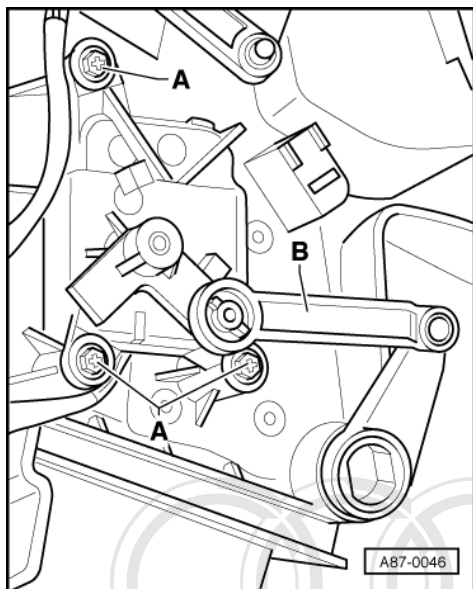
Installation is carried out in the reverse order; note the following:

- When installing the positioning motor, check that the reversing lever -B- is correctly seated.
- Interrogate fault memory => Page 24 .

7.13 - Removing and installing central flap positioning motor -V70

Removing

- Remove the footwell vents => Page 158 .



- -> Screw out the bolts -A-.
- Detach the connector (colour code blue) to the positioning motor.

Note:

In right-hand drive vehicles, the colour coding for the connector is green

- Unclip the reversing lever -B-.
- Remove the positioning motor.

Installing

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Installation is carried out in the reverse order; note the following:

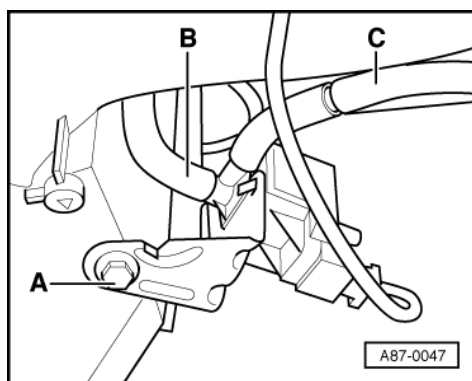
- When installing the positioning motor, check that the reversing lever -B- is correctly seated.
- Interrogate fault memory => Page 24 .

7.14 - Removing and installing the two-way valve for the fresh-air and recirculated-air flap - N63

Removing

- Remove the glove box

=> General Body Assembly; Repair group 70; Dash panel; Removing and installing glove box Dash panel
Removing and installing glove box



- -> Screw out the bolts -A-.

- B - To the vacuum reservoir
- C - To the vacuum unit for the fresh-air and recirculated-air flap

Installing

Installation is carried out in the reverse order; note the following:

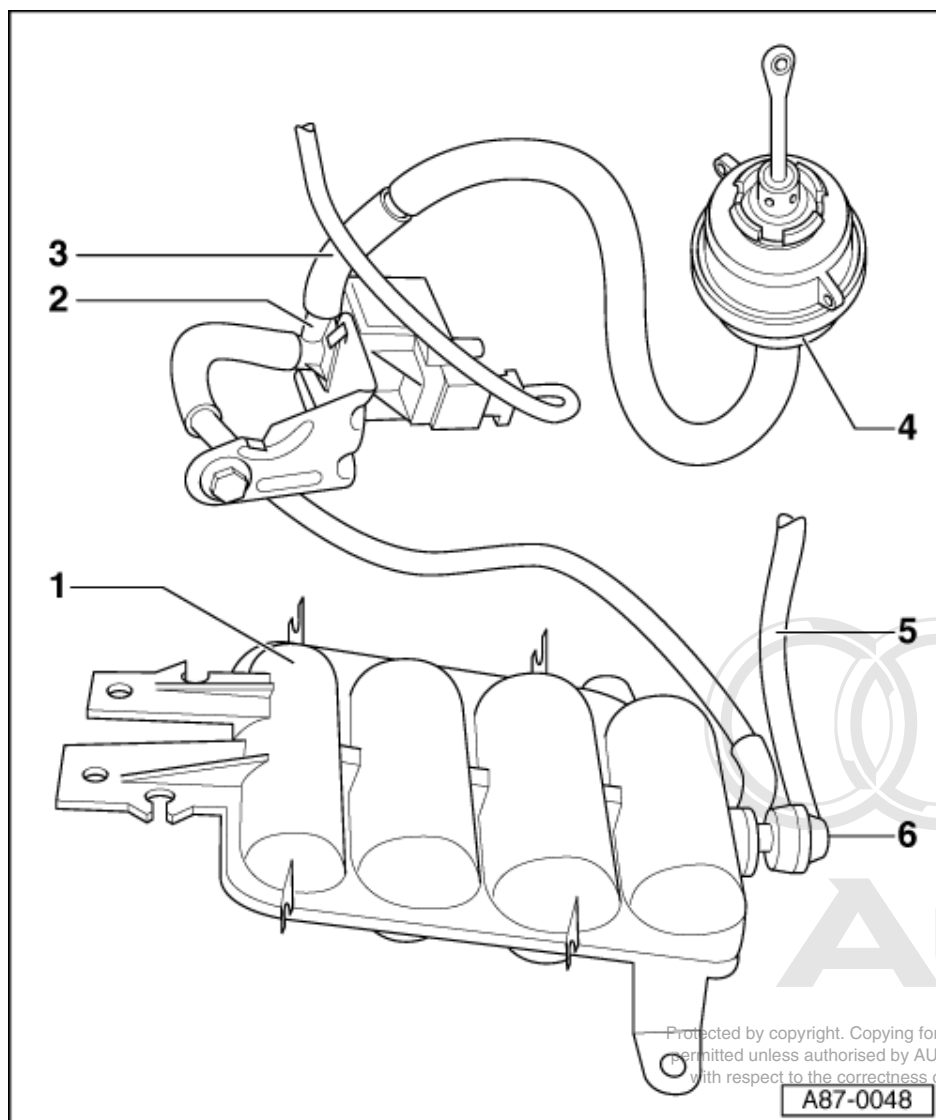
Note:

Connection diagram for vacuum hoses =>Page 162.



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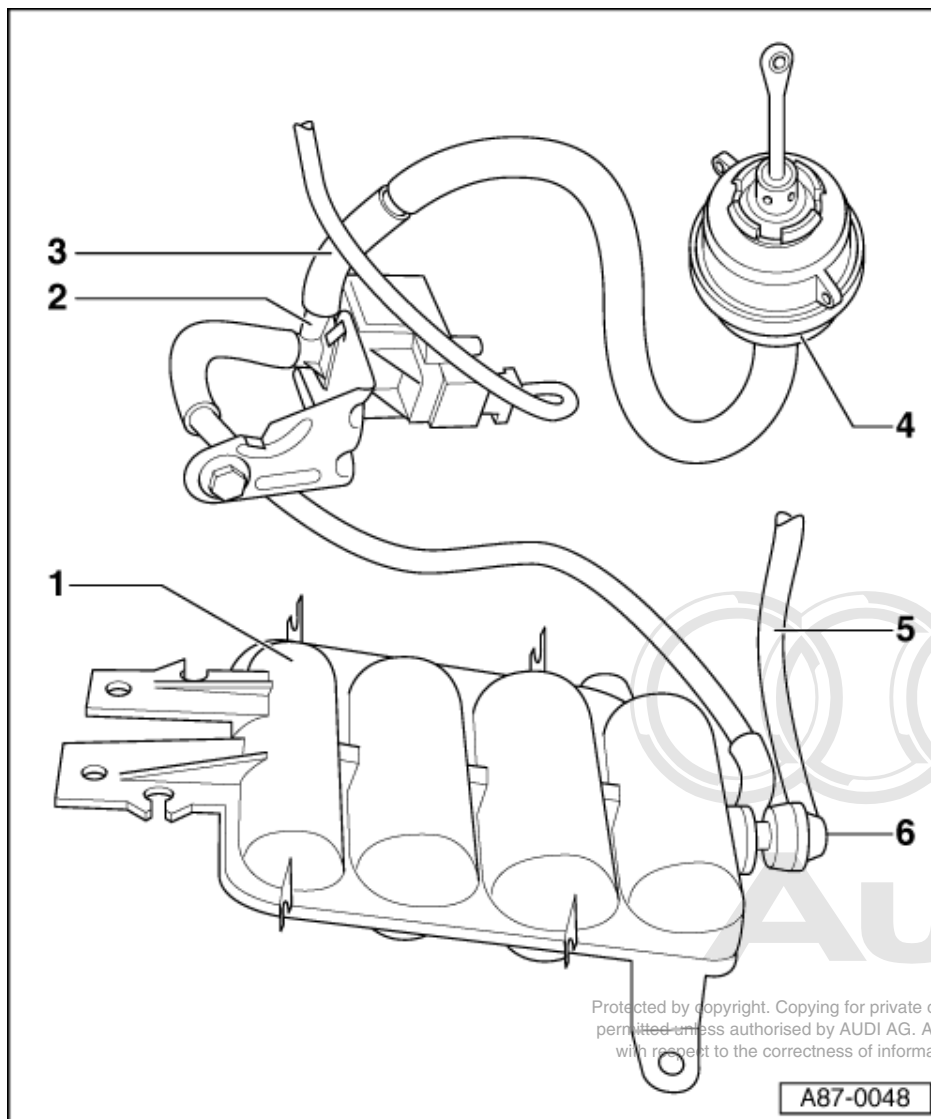
7.15 - Connection diagram for vacuum hoses



Note:

Checking vacuum system =>Page 163 .

- 1 Vacuum reservoir
 - ♦ Removing and installing =>Page 219
- 2 Two-way valve for fresh-air and recirculated-air flap -N63
 - ♦ Removing and installing =>Page 161
- 3 Restrictor
- 4 Vacuum unit for fresh-air and recirculated-air flap
 - ♦ Removing and installing =>Page 219



5 Vacuum line

- ♦ To engine

6 Non-return valve

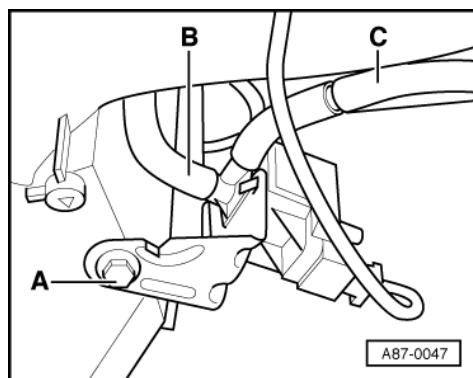
- ♦ Removing and installing =>Page 219

7.16 - Testing vacuum system

Special tools, testers and auxiliary equipment required

- ♦ Vacuum tester V.A.G 1368
- ♦ Vacuum hand pump V.A.G 1390

Checking vacuum unit

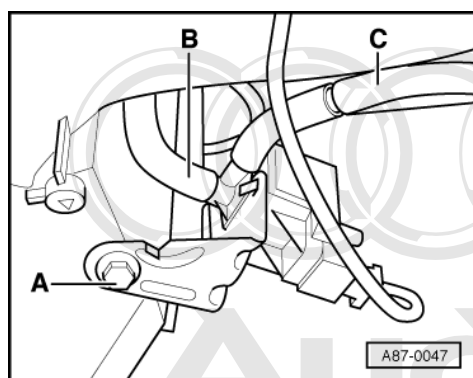


- -> Pull off the vacuum line -C- on the two-way valve.
- Connect hand pump V.A.G 1390 to the vacuum line.
- Actuate the vacuum hand pump until the fresh-air and recirculated-air flap is at the stop setting "Air recirculation mode".

If the fresh-air and recirculated-air flap does not move:

- Replace the vacuum unit => Page 219 .

Checking the vacuum supply and non-return valve.



- -> Pull off the vacuum line -B- on the two-way valve.
- Connect the vacuum tester V.A.G 1368 to the vacuum line.
- Start the engine and run in idle until the display has stabilised.
- Specified value: greater than 250 mbar
- Switch the engine off and note the vacuum reading on the vacuum tester.
 - The vacuum may fall by a maximum of 50 mbar within 2 minutes.

If the vacuum falls by more than 50 mbar:

- Test the two-way valve for the fresh-air and recirculated-air flap -N63 => Page 18 .
- Replace the vacuum reservoir with the non-return valve => Page 219 .

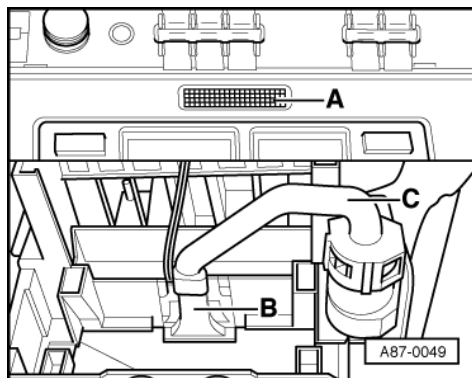
7.17 - Removing and installing the dash panel temperature sensor -G56

Removing

- Remove the central section of the dash panel:

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing central section of dash panel Storage compartments/covers Removing and installing central section of dash panel

Notes:



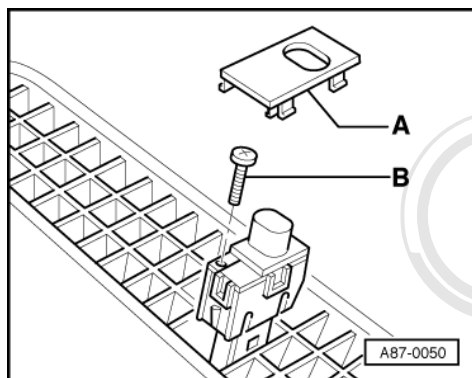
- ◆ -> The temperature sensor intake housing -A- must not be sealed.
- ◆ The temperature sensor -B- is permanently attached to the switch mount; renew as a complete unit.
- ◆ In the event of an incorrect measurement, check the blower -V42 and the associated intake hose -C- =>Page 166 .

Installing

Install in reverse order.

7.18 - Removing and installing the sunlight penetration photosensor -G107

Removing



- -> Carefully prise the cover -A- out of the windscreen defroster vent.
- Remove bolt -B-.
- Remove the sunlight penetration photosensor from the windscreen defroster vent.

Installing

Install in reverse order.

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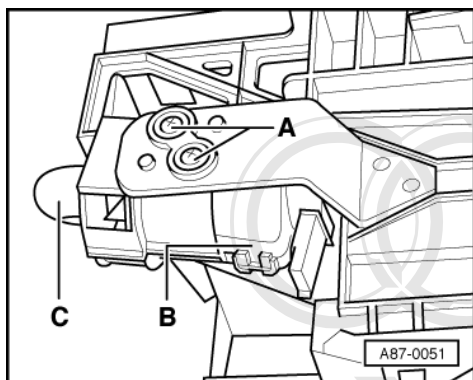
7.19 - Removing and installing the dash panel temperature sensor blower -V42

Removing

- Remove the shelf on the driver's side and the centre part of the dash panel:

=> General Body Assembly; Repair group 70; Dash panel; Removing and installing the driver's storage compartment Dash panel Removing and installing the driver's storage compartment

=> General Body Assembly; Repair group 70; Dash panel; Removing and installing the front centre console Dash panel Removing and installing the front centre console



- -> Screw out the bolts -A-.
- Pull off the suction hose -C-.
- Remove the temperature sensor blower -B-.

Installing

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Installation is carried out in the reverse order; note the following:

- Check the suction hose -C-.
- It must not be sealed and must be firmly attached to the temperature sensor connection piece

Note:

Test operation =>Final control diagnosis, Page **22**.

8 - Components for the control and regulation of the air conditioner from Model Year 1997

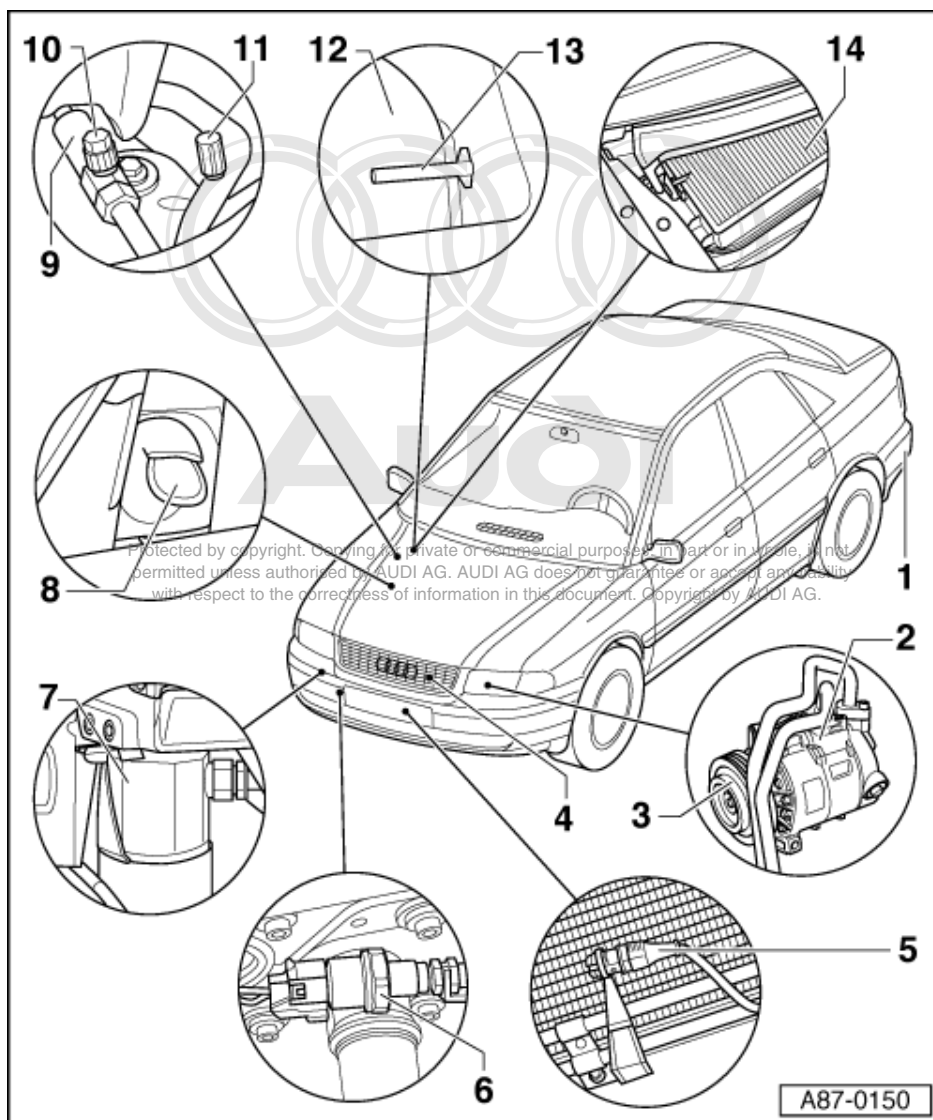
8.1 - Components for the control and regulation of the air conditioner from Model Year 1997

Notes:

- ♦ Servicing the refrigerant circuit => Page **224**.
- ♦ Perform the following operations after completing the repair work:
 - Interrogate fault memory => Page **24**.
 - Electrical testing on all components marked 1) => Page **55** onwards.
- ♦ All components marked 2) are actuated in the final control diagnosis => Page **18**.
- ♦ The windscreen vent (defrost) may only be renewed if the dash panel is removed (separate the dash panel from the panel cross member).

=> General Body Assembly, Interior; Repair group 70; Dash panel Dash panel

8.2 - Components in the engine compartment



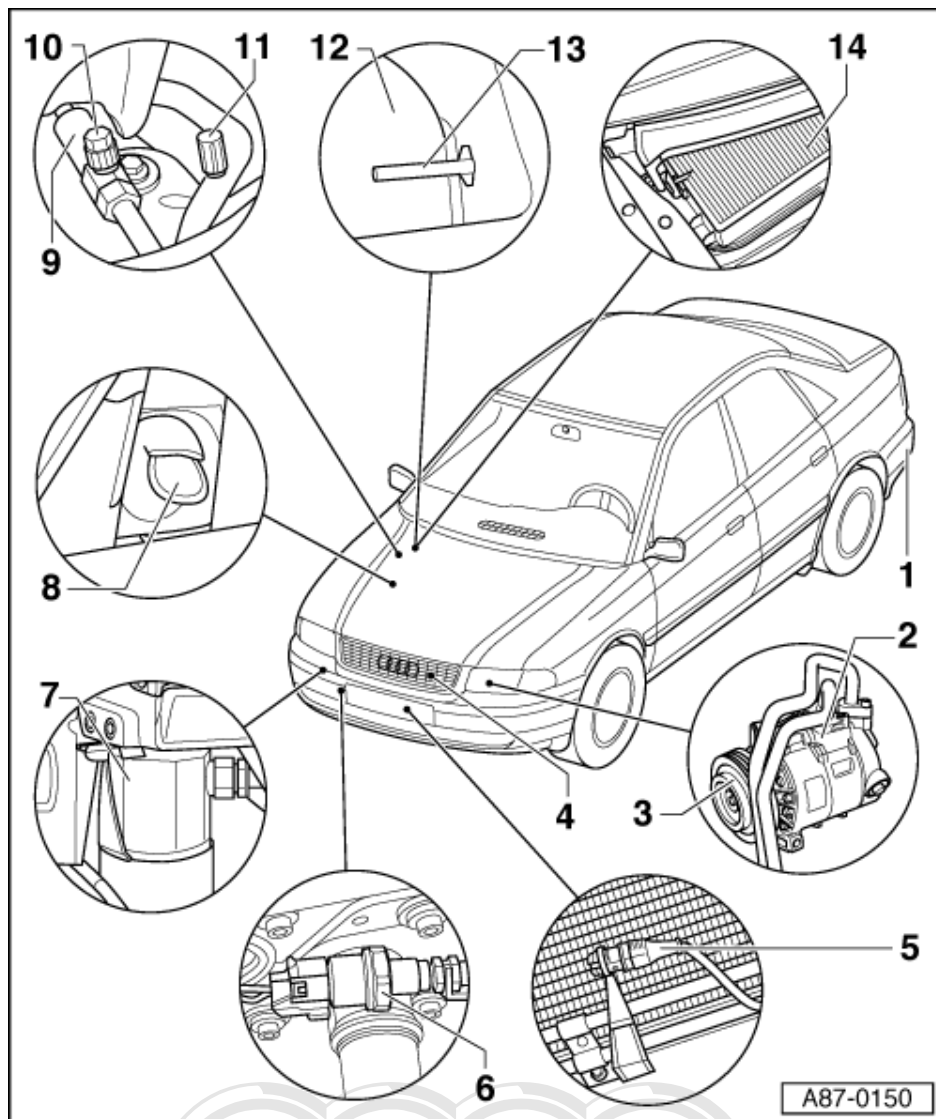
1 Through-flow exit vents

- ♦ Sealing lips must move freely and close automatically
- ♦ The passenger compartment ventilation will only function properly if the air ducts are not blocked by the luggage compartment trim (to the rear shelf)
- ♦ Checking => Page 76

2 Compressor

- ♦ Removing and installing compressor bracket=> Page 124
- ♦ Removing and installing ribbed belt

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 13



3 Air conditioner magnetic clutch -N25 2)

- ♦ => Page **131** onwards

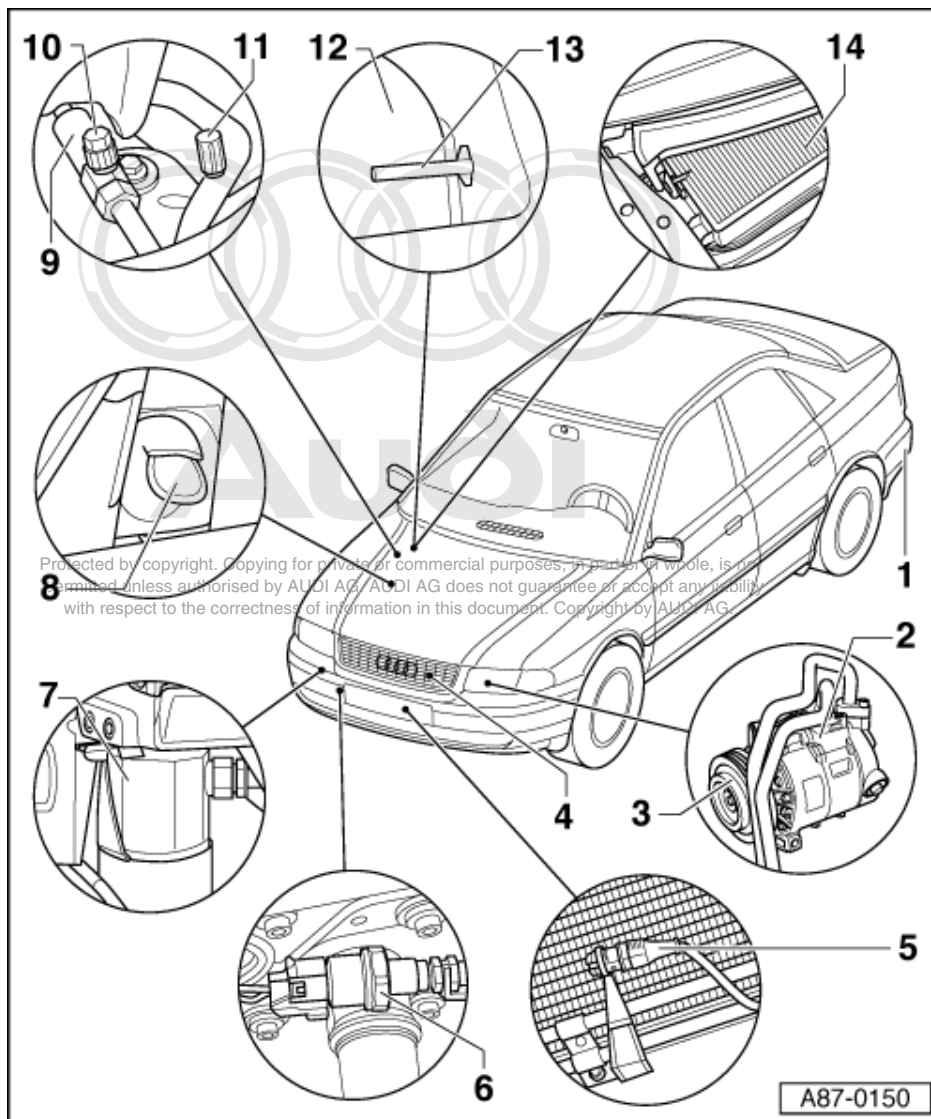
4 Condenser

- ♦ May only be removed if the refrigerant circuit is empty; send vehicle to an VW/Audi air conditioner service centre

5 Ambient temperature sensor -G171

- ♦ Removing:
 - Remove front bumper:
 - Detach connector at temperature sensor and unclip it from holder in air duct.
- ♦ Resistance values =>Page **60**

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6 Air conditioner pressure switch -F129

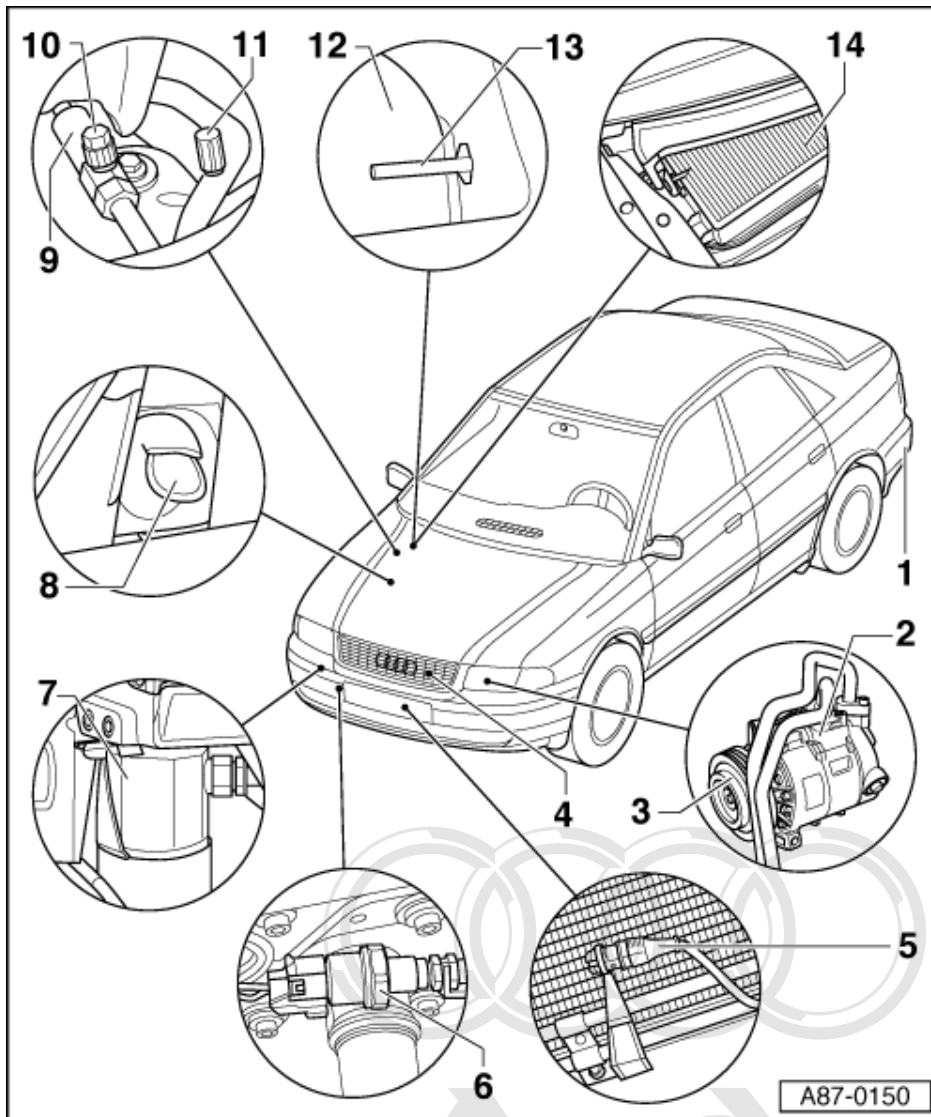
- ♦ Function, removing and installing =>Page 122

7 Container

- ♦ May only be removed if the refrigerant circuit is empty; send vehicle to an VW/Audi air conditioner service centre
- ♦ Removing and installing =>Page 208

8 Condensation drainage valve

- ♦ Checking => Page 145
- ♦ Removing and installing =>Page 145
- ♦ Drip channel on condensation drain => Fig. 1



9 Restrictor

- ◆ Installed in the refrigerant pipe
- ◆ May only be removed if the refrigerant circuit is empty; send vehicle to an VW/Audi air conditioner service centre

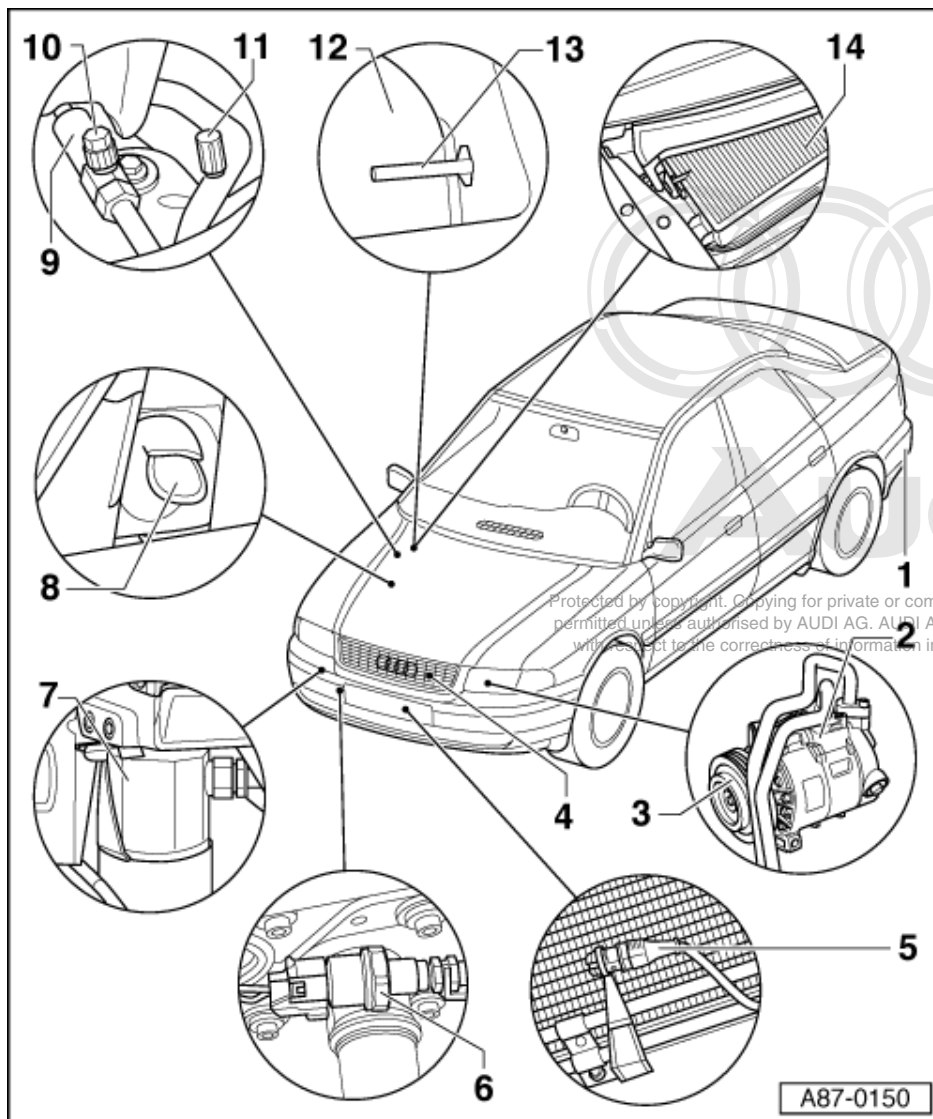
10 Service connection

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- ◆ High-pressure side
- ◆ For measurement, drainage and filling at VW/Audi air-conditioning service centres
- ◆ Always screw on cap with seal

11 Service connection

- ◆ Low-pressure end
- ◆ For measurement, drainage and filling at VW/Audi air-conditioning service centres
- ◆ Always screw on cap with seal



12 Air flow flap positioning motor -V71 2)

- ♦ Also actuates the fresh-air and recirculated-air flap
- ♦ With air-flow flap positioning motor potentiometer -G113
- ♦ Removing and installing =>Page 189

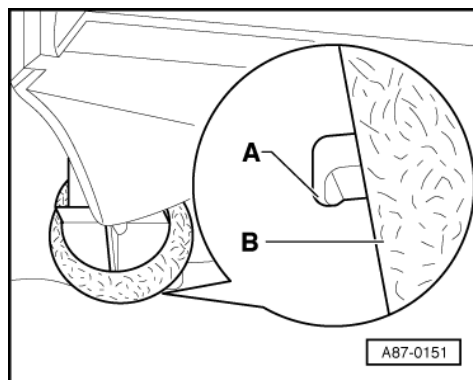
13 Fresh air intake duct temperature sensor -G89 1)

- ♦ Checking => Page 59
- ♦ Removing and installing =>Page 191

14 Dust and pollen filter:

- ♦ Removing and installing =>Page 75
- ♦ Observe change intervals

=> Maintenance manual

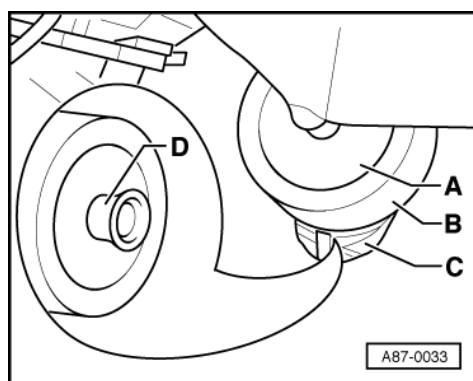


-> Fig.1 Drip channel on condensation drain

- ♦ A drip channel -A- is provided at the condensation drain (this prevents the condensation water from running back into the foam seal -B-).

Note:

No drip channel is provided on the condensation drain on right-hand drive vehicles, these vehicles should always be fitted with a grommet => Page 145.

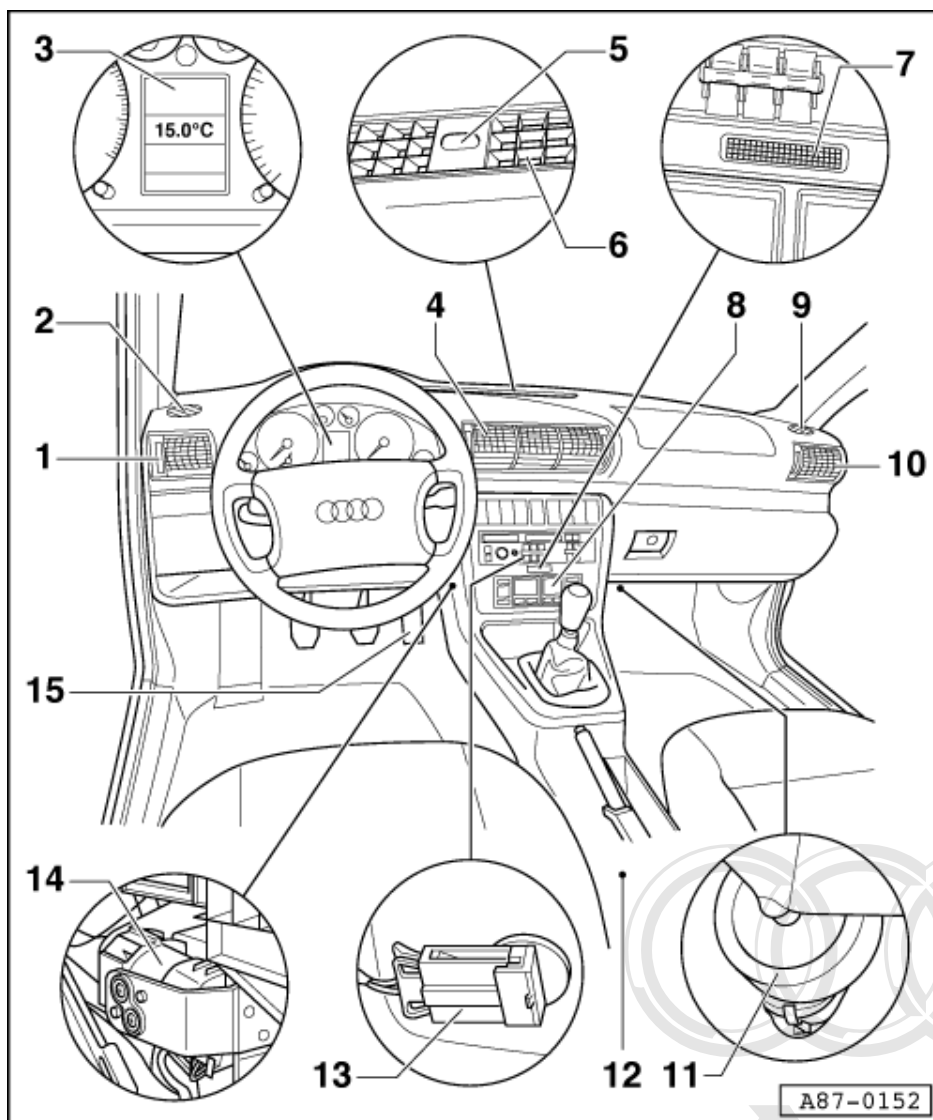


- ♦ -> If the drip channel has become detached:
 - Attach a grommet -D- as shown in the diagram.
 - Seal the grommet to the drain pipe with sealing compound, e.g. D 176 404 A2.



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8.3 - Components in the passenger compartment



1 Dash panel vent

- ◆ Driver's side
- ◆ Removing and installing =>Page 74

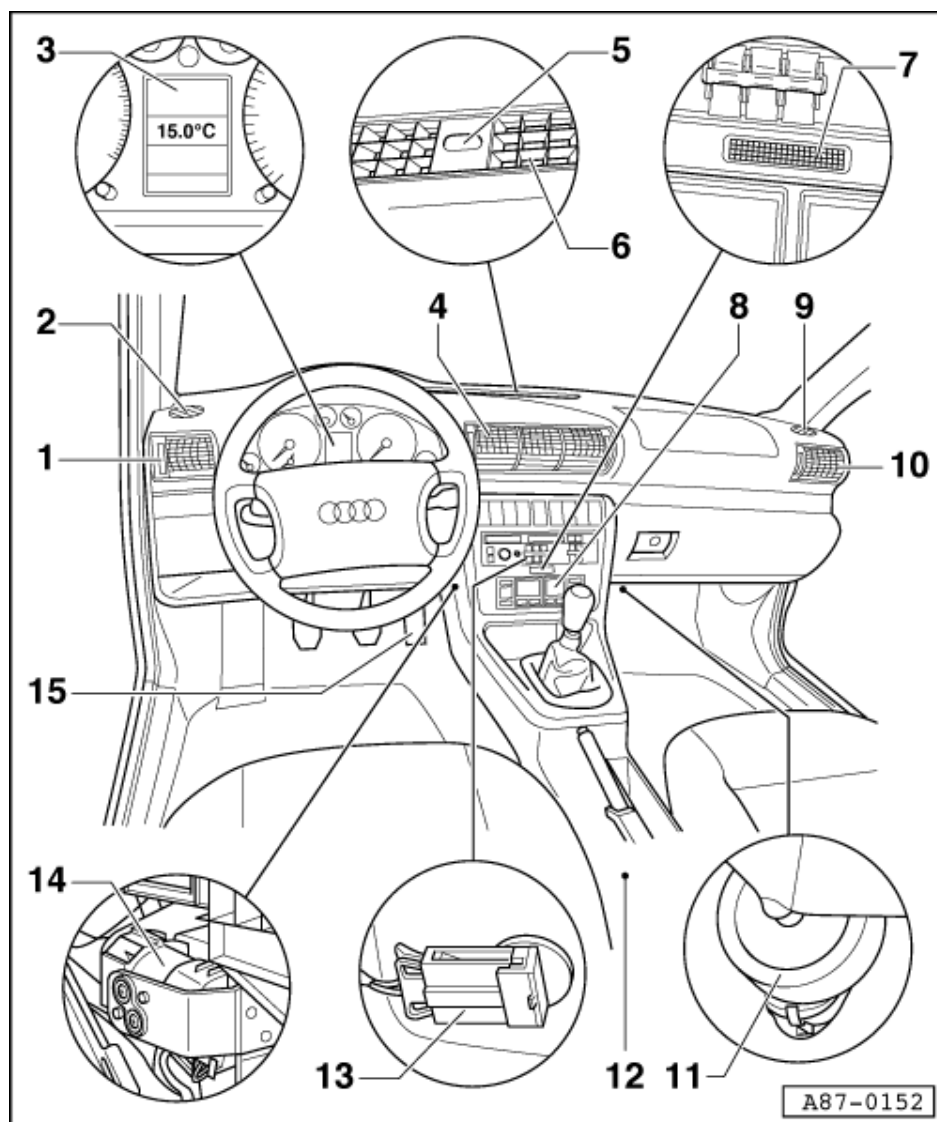
2 Defroster vent

- ◆ For left side window
- ◆ Latched into the dash panel

3 Auto- check system

- ◆ With ambient temperature display -G1062)
- ◆ On vehicles with automatic gearboxes, the external temperature output by the operating and display unit -E87 is only displayed with gear engaged.
- ◆ If the temperature display is incorrect, check the temperature sensor measured values =>Page 60

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4 Dash panel vent

- ◆ Centre
- ◆ Removing and installing =>Page **73**

5 Sunlight penetration photosensor -G107 1)

- ◆ Removing and installing =>Page **165**

6 Defroster vent

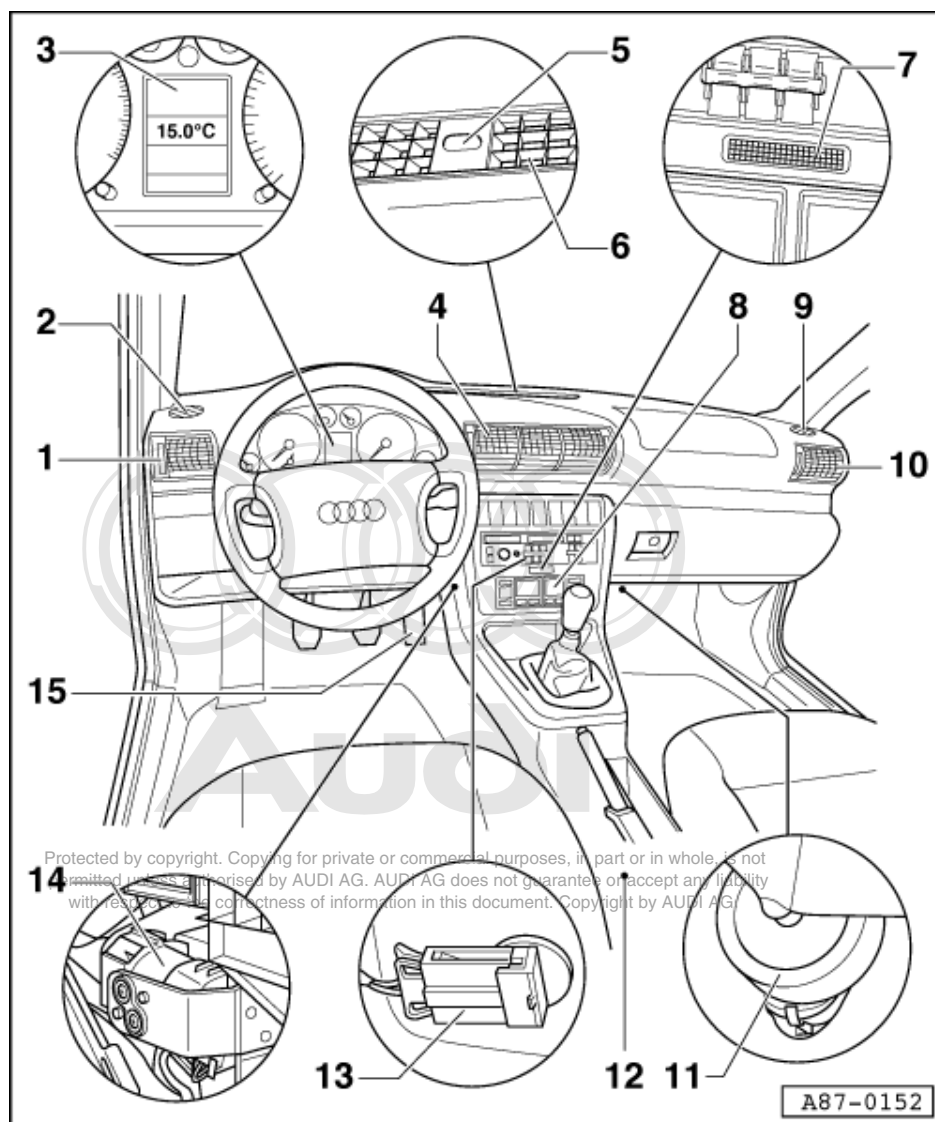
- ◆ For windscreen
- ◆ Removing and installing =>Page **74**

7 Dash panel temperature sensor -G56 1)

- ◆ Removing and installing =>Page **164**
- ◆ Integrated in -E87 with only one display



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8 Operating and display unit -E87

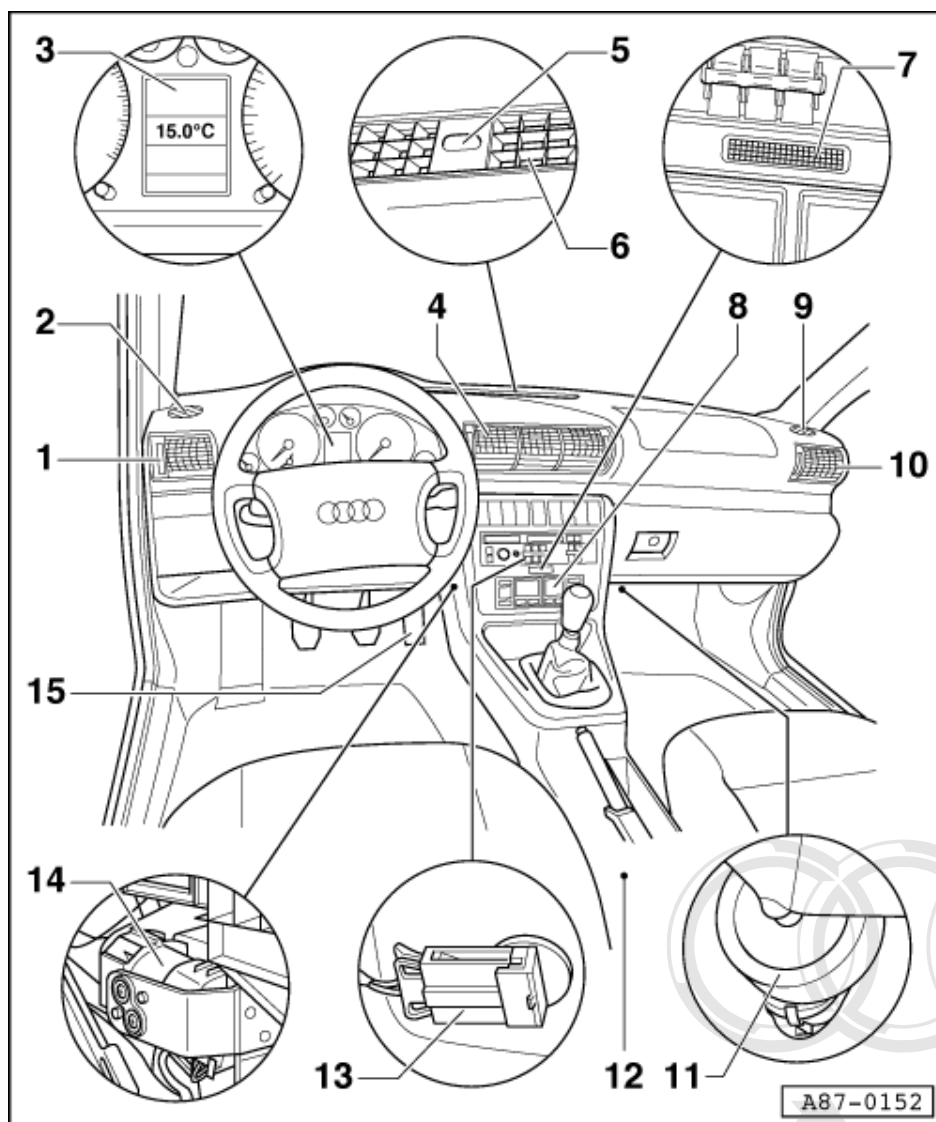
- ♦ Allocation

=> Parts List

- ♦ Removing and installing -E87 with two displays => Page 154
- ♦ Removing and installing -E87 with one display => Page 182
- ♦ Assignment, additional notes => Page 180
- ♦ Checking and setting code => Page 27
- ♦ Illumination of the display zones by LEDs, not replaceable

9 Defroster vent

- ♦ For right side window
- ♦ Latched into the dash panel



10 Dash panel vent

- ♦ Passengers' side
- ♦ Removing and installing =>Page **74**

11 Condensation drainage valve

- ♦ Checking => Page **145**

12 Diagnostic connector

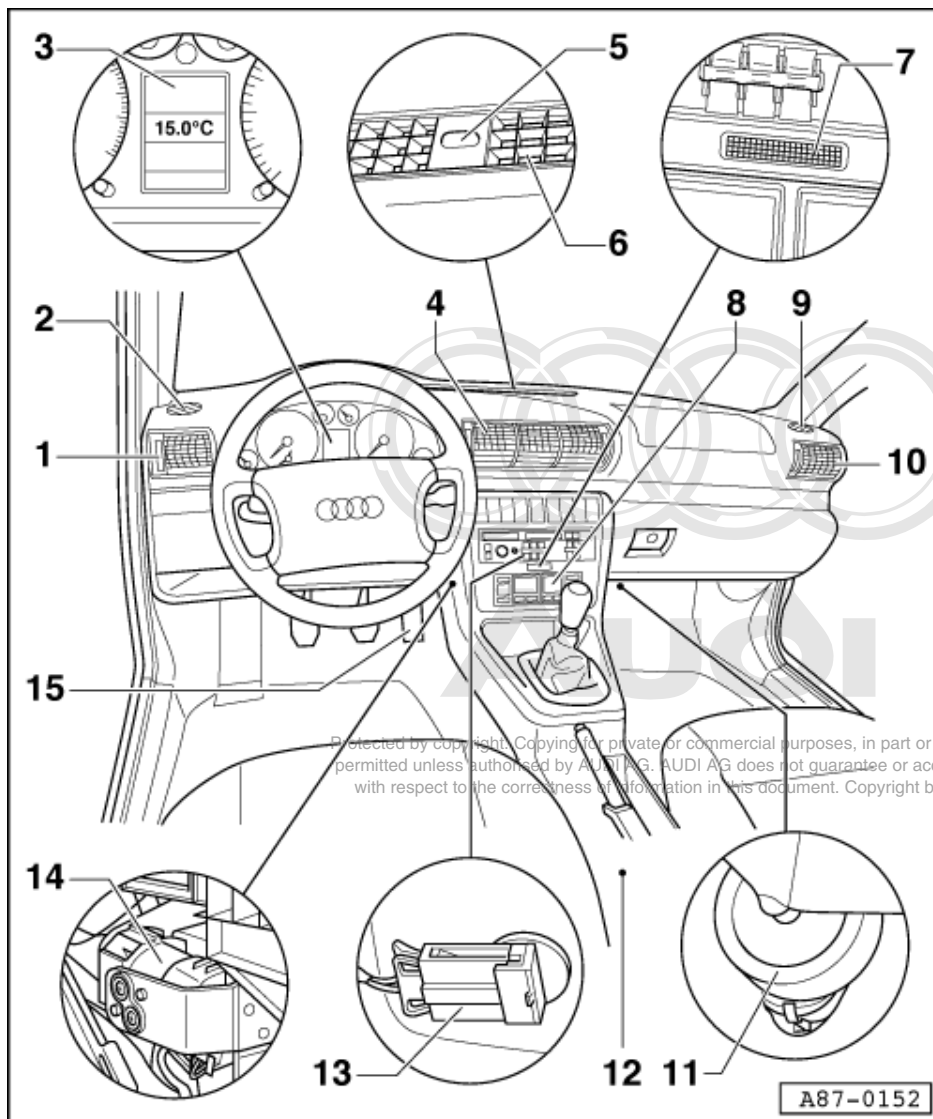
13 Centre vent temperature sensor -G191 in 1)

- ♦ Removing and installing =>Page **185**

14 Temperature sensor blower -V42 2)

- ♦ Removing and installing with -E87 with two displays => Page **166**
- ♦ Removing and installing with -E87 with only one integrated display => Page **183**

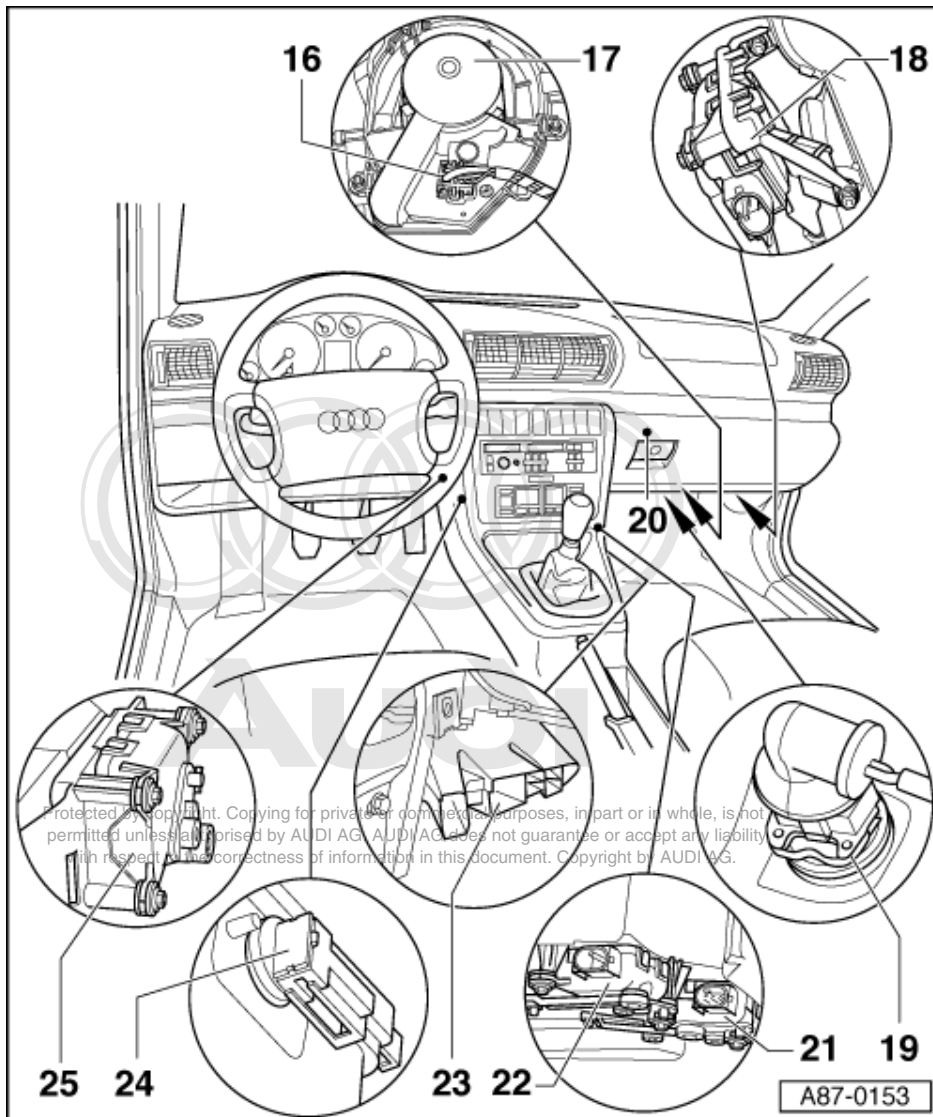
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15 Kickdown switch for air conditioner -F46

- ◆ Not installed in all vehicles
- ◆ Kickdown deactivation without kickdown switch -F46 via the engine control unit or the automatic gearbox control unit

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder



16 Fresh-air blower control unit -J126 2)

- ♦ Removing and installing =>Page ??

17 Fresh-air blower -V2 2)

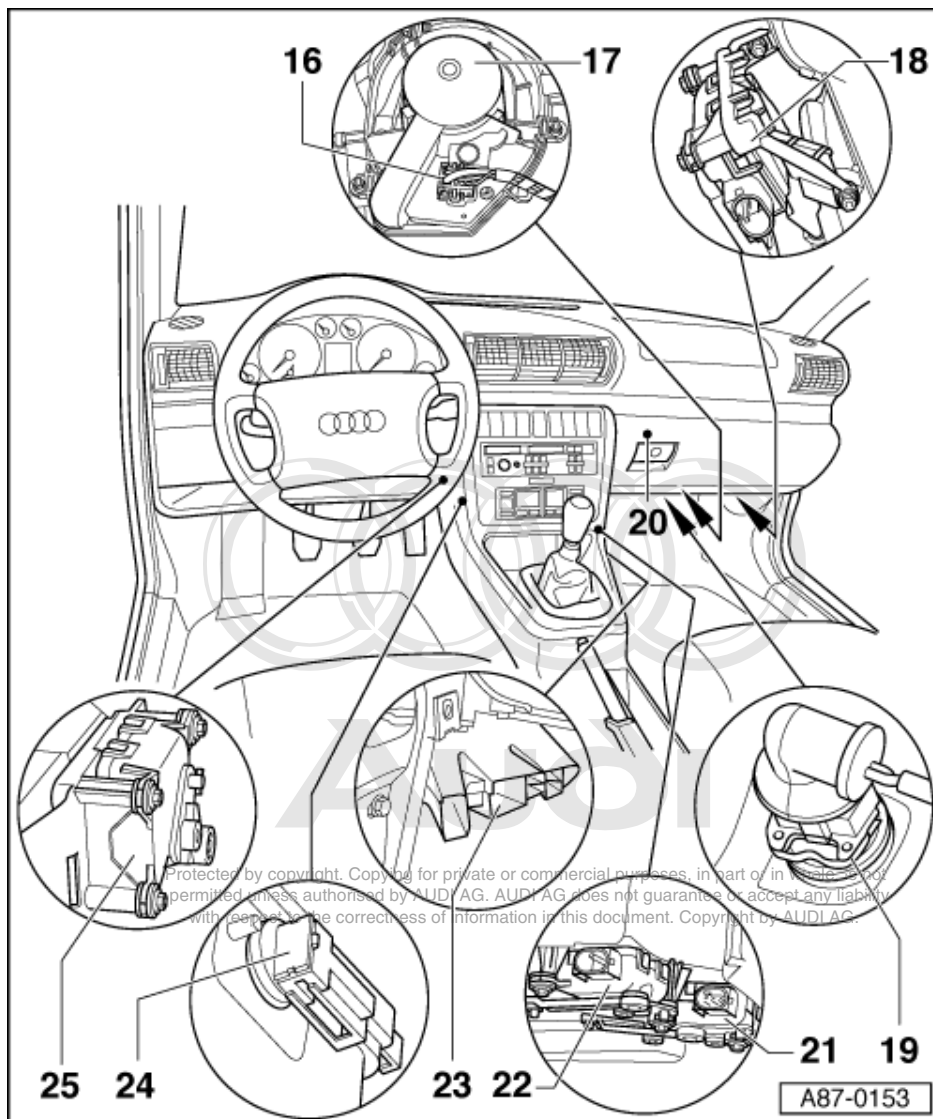
- ♦ Removing and installing =>Page 183

18 Air flow flap positioning motor -V71 2)

- ♦ Also actuates the fresh-air and recirculated-air flap
- ♦ With air-flow flap positioning motor potentiometer -G113
- ♦ Removing and installing =>Page 189

19 Fresh air intake duct temperature sensor -G89 1)

- ♦ Removing and installing =>Page 191
- ♦ Checking => Electrical testing,Page 59

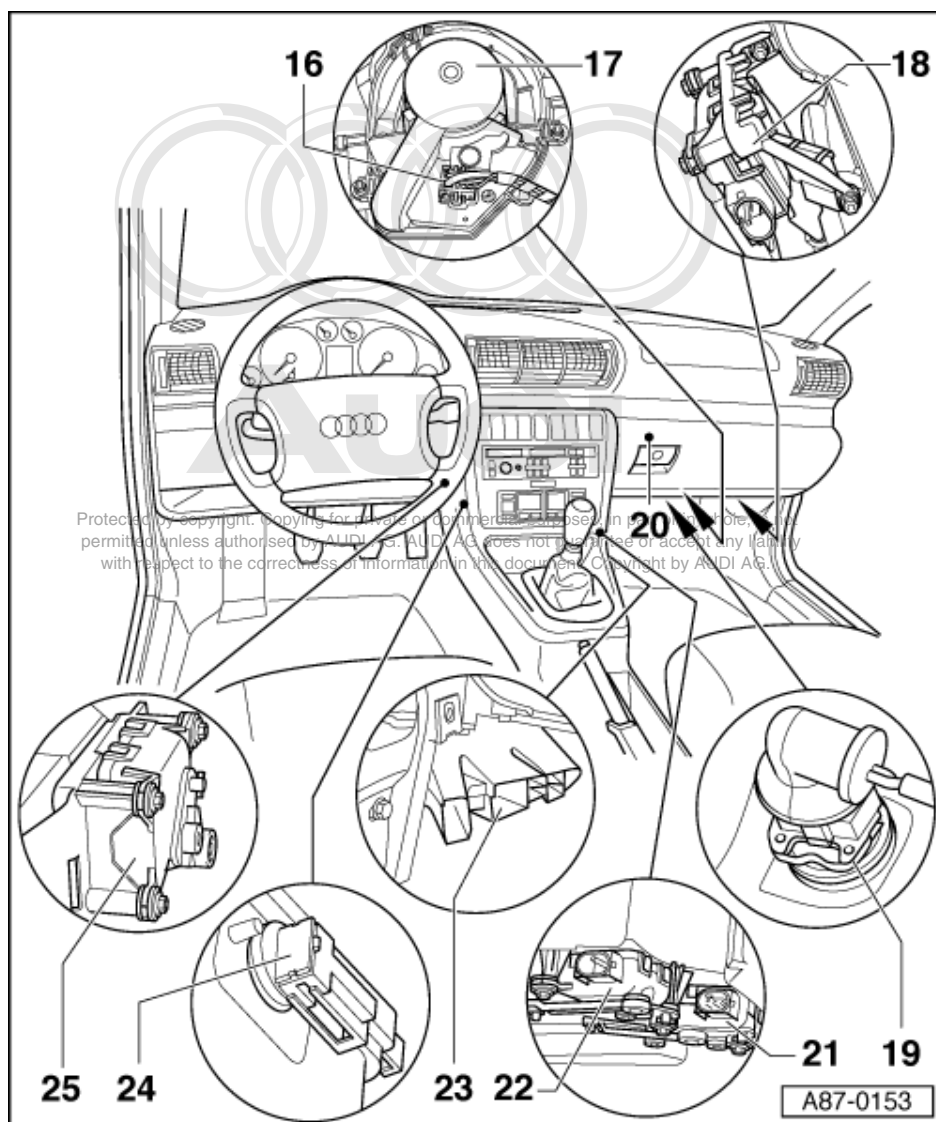


20 Air conditioner with evaporator

- ♦ Removing and installing =>Page **236**
- ♦ Dismantling and assembling => Page **240**
- ♦ May only be removed if the refrigerant circuit is empty; send vehicle to an VW/Audi air conditioner service centre

21 Temperature flap positioning motor -V68 2)

- ♦ With temperature flap positioning motor potentiometer -G92
- ♦ Colour code for the reversing lever red
- ♦ Removing and installing =>Page **186**



22 Central flap positioning motor -V70 2)

- ♦ With central flap positioning motor potentiometer -G112
- ♦ Colour code for the reversing lever Blue
- ♦ Removing and installing =>Page 187

23 Footwell vent

- ♦ Removing and installing =>Page 158

24 Footwell vent temperature sensor -G192 1)

- ♦ Removing and installing =>Page 186

25 Footwell/defrost flap positioning motor -V85 2)

- ♦ With footwell/defrost flap positioning motor potentiometer -G114
- ♦ Removing and installing =>Page 188

8.4 - Removing and installing operating and display unit -E87

- Removing and installing the operating and display unit -E87 with two displays => Page 154 .
- Removing and installing the operating and display unit -E87 with one display => Page 182 .

Assignment of the operating and display unit -E87 -E87 as of Model Year 1997

Part number	Special features
8L0 820 043 A...C	For all vehicles of Model Year 97 (lighting via terminals 58 and 58d)
8L0 820 043 from D	For all vehicles from Model Year 98 without radio navigation system up to chassis number 199999 of Model Year 1999 (lighting also controlled by terminal 58s)

Part number	Special features
8D0 820 043 K or L	Design with only one display (in vehicles with radio navigation system up to chassis number 199999 of Model Year 1999)
8D0 820 043 from M	Design with only one display (for vehicles from chassis number 200000 of Model Year 1999)

Notes:

- ◆ Note the precise assignment when replacing an operating and display unit.

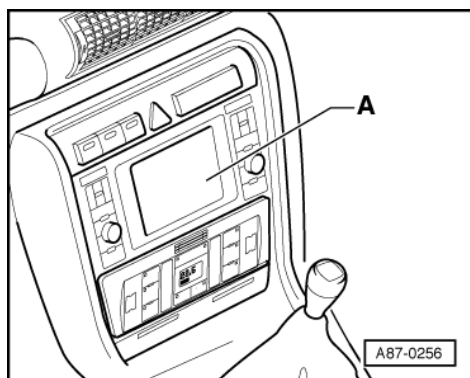
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=> Parts List

- ◆ Different designs for the operating and display from chassis number 200000 of Model Year 1999 in vehicles with and without a radio navigation system (or radio with large display zone) with and without switches for heated seats (e.g. index "M", "N", "P" or "Q")

=> Parts List

- ◆ If the two display zones are not illuminated when the ignition is switched on, check the encoding of the -E87 and perform Electrical testing, Page 54
- ◆ If the two display zones are not illuminated on the operating and display unit -E87 with Part No. 8L0 820 043 from index "D" when the ignition is switched on, check the voltage supply from terminal 58d (dimmer) to the -E87 =>Electrical testing, Page 57 .
- ◆ If the buttons on the operating and display unit -E87 with Part Number 8L0 820 043 from index "D" are not illuminated when the light is switched on, check the power supply 58s (locating light) to the -E87 =>Electrical testing, Page 57 .



- ◆ When installing an operating and display unit -E87 with Part No. 8L0 820 043 from index "D" into a model year 1997 vehicle, or with Part No. 8L0 820 043 up to index "C" into a model year 1998 vehicle, it is not possible to adjust the brightness of the switch illumination.
- ◆ -> Vehicles with a radio navigation system -A- are fitted with an operating and display unit -E87 with only one display. The selected functions are displayed in the buttons by the illumination of LEDs in the buttons.

With this design of the -E87, the dash panel temperature sensor -G56, the temperature sensor blower -V42 and the heated rear window switch are integrated in the -E87.

- ♦ After renewing the -E87, always:
 - Check/correct code =>Page **6**.
- ♦ If a new installed operating and display unit -E87 flashes after the ignition is switched on (for approx. 2 minutes), encode the -E 87 =>Page **27**.
- ♦ The display on the -E87 may be switched from °C°F and vice versa by pressing the "temperature +" button with the "recirculated air" button pressed.
- ♦ If an -E87 operating and display unit with Part Number as of index "M" is replaced, the temperature is displayed on -E87 in °F in vehicles in which the allocation of the ignition key is transferred from the dash panel insert. The display can be switched from °F to °C on these vehicles by pressing the "temperature +" button and the "recirculated air button" button simultaneously. Each ignition key must be converted individually (as all ignition keys are not generally available in the workshop, the customer must be instructed as to how to perform the conversion).

Removing and installing the operating and control unit -E87 with only one display

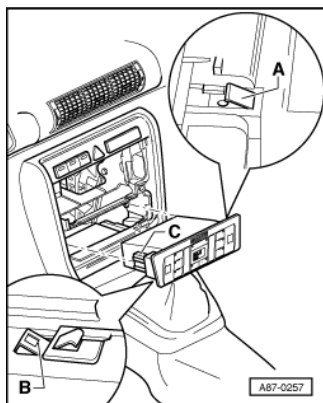
Removing

- Remove radio or radio navigation system:

=> Radio, Telephone and Navigation System; Repair group 91: Navigation system; Removing and installing navigation components

- Reach through the opening and push the operating and display unit back

Notes:



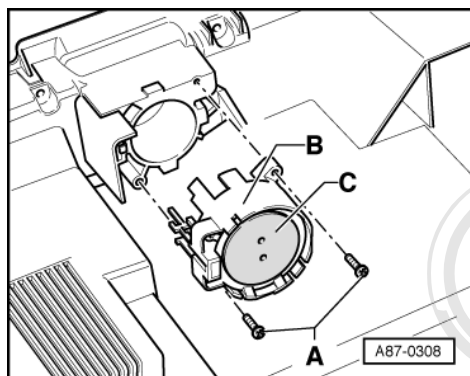
- ♦ -> The operating and display unit is secured with 4 retaining clips -A- in the centre console.
- ♦ When replacing an operating and display unit, note the precise layout (e.g. with or without breakthrough for the heated seat switches)

=> Parts List

- ♦ To remove the switches for the heated seats, press back the lugs -B- and pull the switch -C- back out of the operating and display unit.
- ♦ If the dash panel temperature sensor -G56 produces a faulty measurement, check the intake grille on the trim panel - must not be closed.

8.5 - Removing and installing dash panel temperature sensor blower -V42

In vehicles with an operating and display unit -E87 with one display



- Removing and installing the operating and display unit -E87 with one display => Page 182 .
- -> Remove bolts -A-.
- Remove Blower -V42 -B- from -E87.

Note:

Do not press motor -C- when installing blower -V42 but hold the blower at the housing.

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8.6 - Removing and installing the fresh-air blower -V2

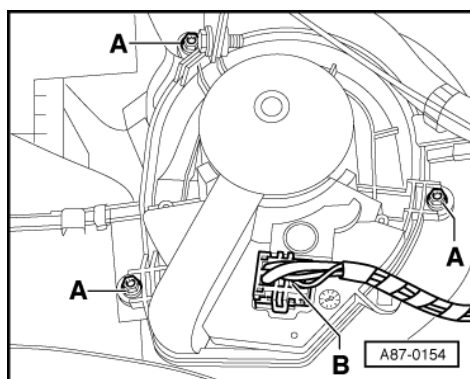
Note:

In right-hand drive cars, remove the fresh-air blower as described on Page 157 .

Removing

- Remove the glove box

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box

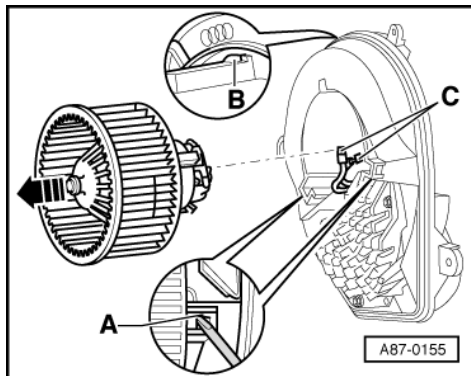


- -> Detach connector -B-.
- Screw out the bolts -A-.
- Pull the fresh-air blower with base plate out of the air conditioner.

Installing

Install in reverse order.

Detaching/assembling the fresh-air blower -V2 and base plate



Detaching

- -> Press the catches -A- and -B- back with a screwdriver.
- Pull fresh-air blower out of the base plate.
- Detach the connectors -C-.

Assembling

- When assembling the fresh-air blower in the base plate, ensure that the catches -A- and -B- are located correctly.
- After installing the fresh-air blower, check that it is correctly seated in the air conditioner.

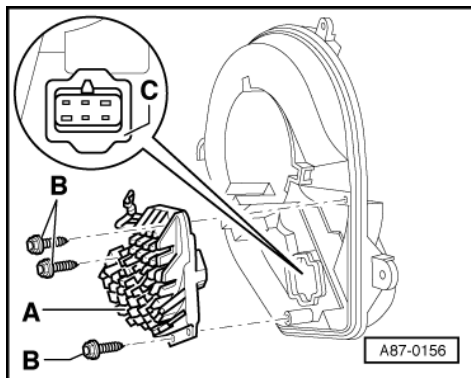
8.7 - Removing and installing fresh-air blower control unit -J126

Note:

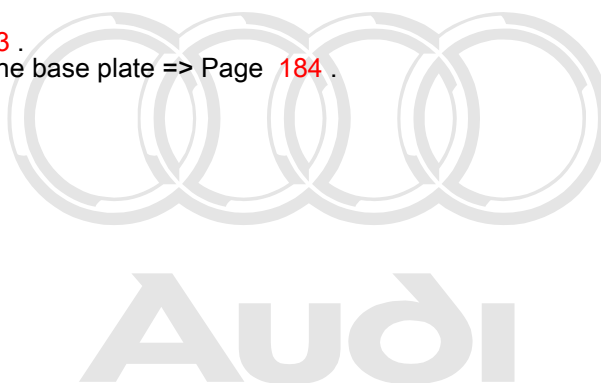
In right-hand drive cars, remove the control unit as described on Page **157**.

Removing

- Remove fresh air blower -V2 => Page **183**.
- Disconnect the fresh air blower -V2 from the base plate => Page **184**.



- -> Remove screws -B-.
- Remove the control unit -A- from the base plate.



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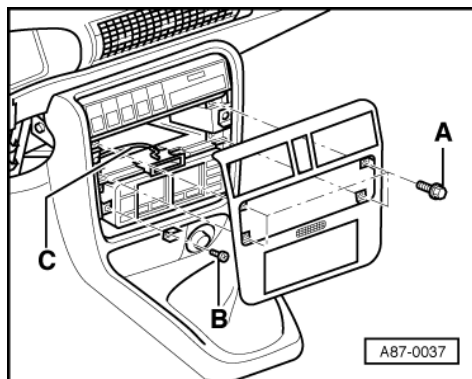
Installing

Installation is carried out in the reverse order; note the following:

- When installing the control, check the foam seal -C-, it must form a seal with the base plate.

8.8 - Removing and installing centre vent temperature sensor -G191

Removing



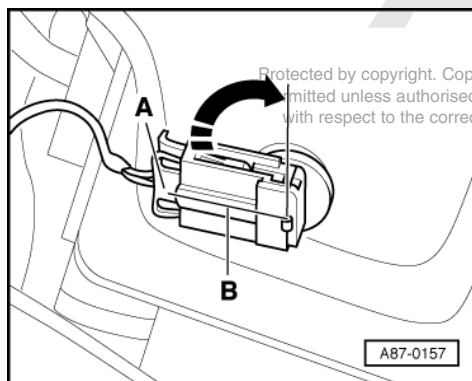
- Remove radio.

=> Radio, Telephone and Navigation System; Repair group 91; Radio systems; Removing and installing radio
 Radio systems Removing and installing radio

Note:

In the event of an operating and display unit -E87 with only one display, it is necessary to remove the radio and the -E87.

- -> Screw out the bolts -A-.
- Pull off the trim on the front centre console. If necessary, prise off with a small screwdriver.



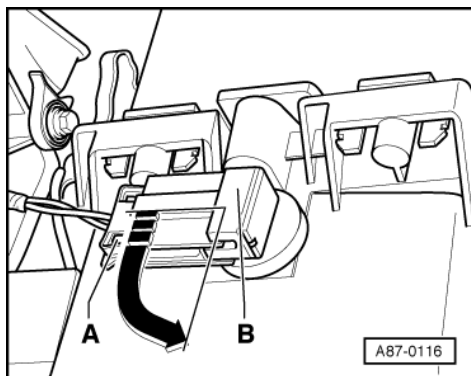
- -> Detach connector -A-.
- Turn the vent temperature sender -B- approx. 90° in the direction of the arrow.
- Pull out vent temperature sender.

Installing

Install in reverse order.



8.9 - Removing and installing the footwell temperature sensor -G192



Removing

- Removing driver's stowage compartment:
- -> Detach connector -A-.
- Turn the vent temperature sender -B- approx. 90° in the direction of the arrow.
- Pull out vent temperature sender.

Installing

Install in reverse order.

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8.10 - Removing and installing temperature flap positioning motor -V68

Removing

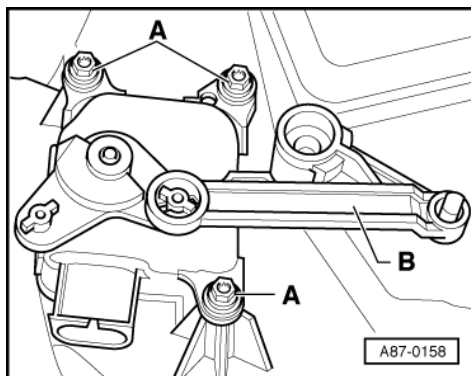
- Remove front centre console:

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing front part of centre console Storage compartments/covers Removing and installing front part of centre console

- Loosen footwell vent from the right dash panel support => Page 158 .
- Detach the connector from the positioning motor.

Note:

Mark the connectors on the positioning motor, so they are not interchanged.

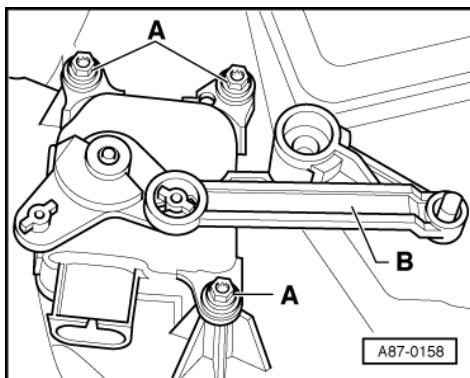


- -> Screw out the bolts -A-.
- Remove the positioning motor.

- Unclip the reversing lever -B- (colour code: red).

Installing

Installation is carried out in the reverse order; note the following:



- -> When installing the positioning motor, check that the reversing lever -B- is seated correctly.
- Lay the wiring harness so that it cannot come into contact with moving components (e.g. the positioning motor lever)
- Interrogate fault memory => Page 24 .

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8.11 - Removing and installing central flap positioning motor -V70

Removing

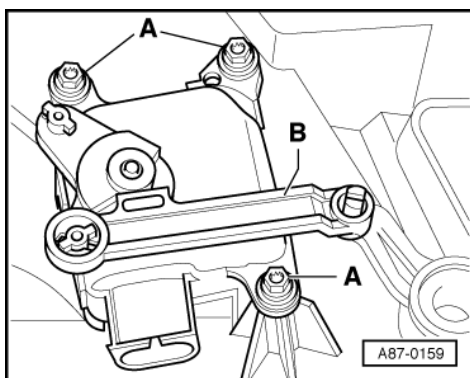
- Remove front centre console:

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing front part of centre console Storage compartments/covers Removing and installing front part of centre console

- Loosen footwell vent from the right dash panel support => Page 158 .
- Detach the connector from the positioning motor.

Note:

Mark the connectors on the positioning motor, so they are not interchanged.

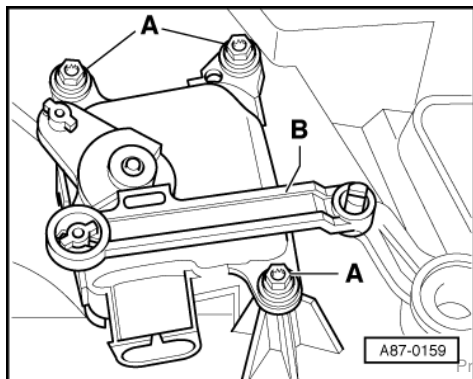


- -> Screw out the bolts -A-.
- Remove the positioning motor.
- Clip in the actuating arm -B- (colour code: blue).



Installing

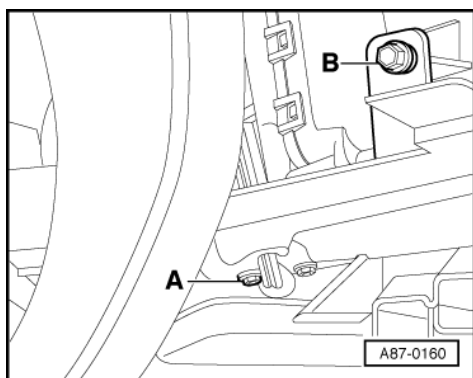
Installation is carried out in the reverse order; note the following:



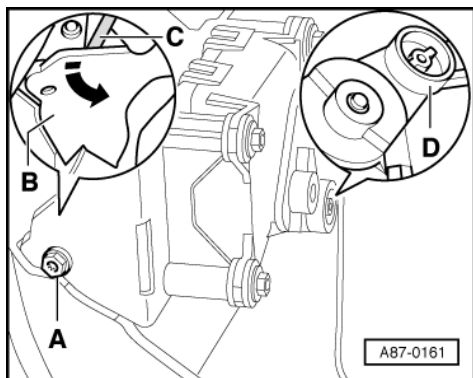
- -> When installing the positioning motor, check that the reversing lever -B- is seated correctly.
- Lay the wiring harness so that it cannot come into contact with moving components (e.g. the positioning motor lever)
- Interrogate fault memory => Page 24 .

8.12 - Removing and installing footwell/defrost flap positioning motor -V85

Removing



- Removing driver's stowage compartment:
- -> Screw out the bolts -A- and -B- for the left dash-panel support.
- Remove the footwell vents => Page 158 .



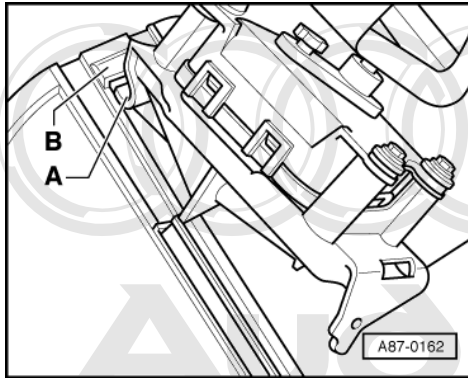
- Detach the connector from the positioning motor.
- -> Remove bolt -A-.
- Use a screwdriver -C- to prise out the lower tab -B- of holder.

- Remove the positioning motor.
- Unclip the reversing lever -D- (colour code: white).

Installing

Installation is carried out in the reverse order; note the following:

- When installing the positioning motor, check that the reversing lever -C- is correctly seated.



- -> First, place the tab -A- (on the holder for the positioning motor) in the mount -B- (on the air conditioner).
- If the lever is so unfavourably positioned that the reversing lever or motor cannot be installed, connect the motor to the wiring harness.
- Connect the ignition and actuate the lever by pressing the air distribution keys on the -E87 until the reversing lever may be engaged.
- Lay the wiring harness so that it cannot come into contact with moving components (e.g. the positioning motor lever)
- Interrogate fault memory => Page 24 .

8.13 - Removing and installing air-flow flap positioning motor -V71

Left-hand drive vehicles

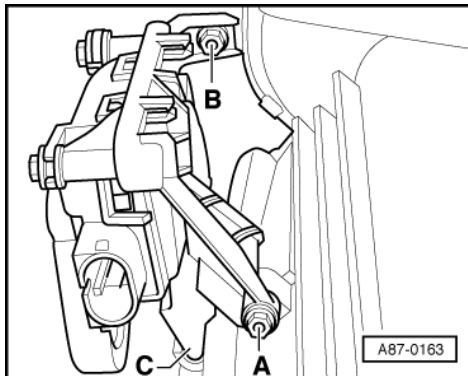
This positioning motor actuates the air-flow flap and fresh-air and recirculated-air flap. It is installed between the air conditioner and the bulkhead.

Removing

- Remove the glove box

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box

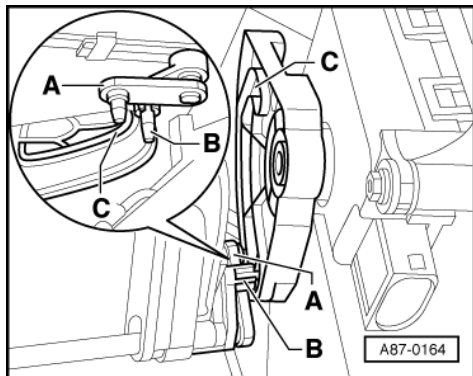
- Detach the connector from the positioning motor.



- -> Screw out the bolts -A- and -B-.
- Lift the tab -C- on the air conditioner mount and remove the positioning motor.

Installing

Installation is carried out in the reverse order; note the following:



- -> The lever -A- (metal) moves the air-flow flap and must be inserted in the closed guide groove -C-.

Note:

The lever -B- (plastic) moves the fresh-air and recirculated-air flap, it mainly runs on the rear of the cam and is only fixed in position in the open guide groove in "air recirculation mode".

- Lay the wiring harness so that it cannot come into contact with moving components (e.g. the positioning motor lever)
- Interrogate fault memory => Page 24 .

Right-hand drive vehicles

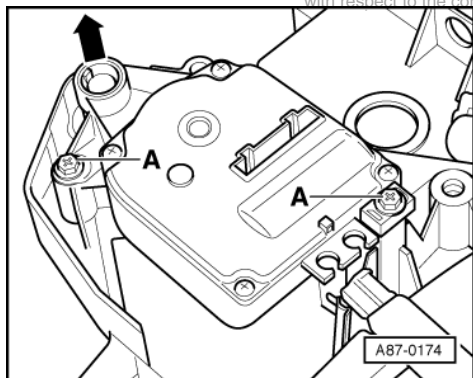
This positioning motor only actuates the fresh-air and recirculated-air flap (it is not an air-flow flap). It is installed between the air conditioner and the left A-pillar.

Removing

- Remove the glove box

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box

- Detach the connector from the positioning motor.



- -> Screw out the bolts -A-.

Installing

Installation is carried out in the reverse order; note the following:

- When inserting the positioning motor, check that the fresh-air and recirculated-air flap is seated correctly. It is placed directly on the positioning motor shaft.
- Lay the wiring harness so that it cannot come into contact with moving components (e.g. the positioning motor lever)
- Interrogate fault memory => Page 24 .

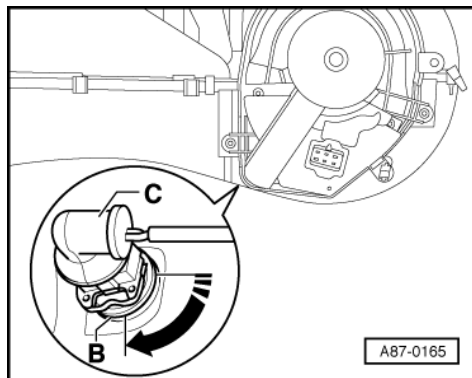
8.14 - Removing and installing the fresh air intake duct temperature sensor -G89

Removing

- Remove the glove box

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box

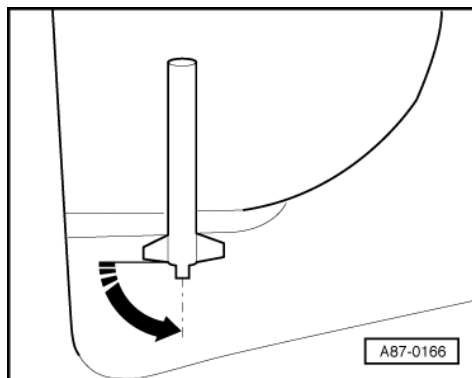
- Reach between the bulkhead and air conditioner



- -> Turn the temperature sensor -A- through approx. 90° and remove it from the intake with the connector -C- attached.

Notes:

- ♦ It is easier to remove the temperature sensor, if the air-flow flap positioning motor -V71 is removed.
- ♦ If the temperature sensor cannot be turned:
 - Carefully spray silicone spray onto the rubber grommet's contact surface -B- at the intake.
 - Remove the dust and pollen filter =>Page 75 .



- -> Reach into the intake and turn the temperature sensor through approx. 90°.



Installing

Install in reverse order.

9 - Checking air conditioner refrigeration capacity

9.1 - Checking air conditioner refrigeration capacity

Special tools, testers and auxiliary equipment required

- ♦ Fault reader V.A.G 1551 (or vehicle system tester V.A.G 1552) with cable V.A.G 1551/3
- ♦ Minitester V.A.G 1362

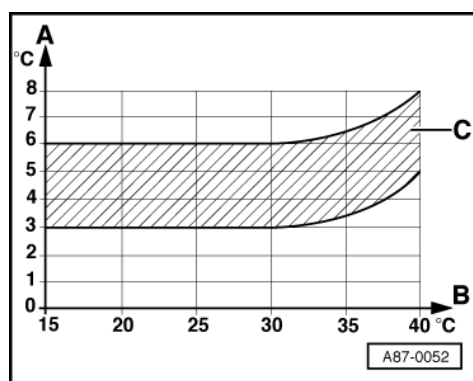
Test requirements:

- Cooler and condenser clean; clean if necessary
- Ribbed belt for compressor drive OK and correctly tensioned.
- All air ducts, covers and seals are OK and properly fitted.
- Air flow through dust and pollen filter not impeded by dirt.
- Connection between evaporator and heating does not draw in any secondary air at maximum fresh-air blower speed.
- Vehicle is not exposed to sunlight.
- Engine at operating temperature.
- Fault memory interrogated => Page 25 .
- Coding checked and corrected if necessary => Page 27 .
- Basic setting performed => Page 24 .
- All dash panel vents open
- Settings on operating and display unit -E87:
 - "Auto" mode
 - "LO" temperature selected
 - Compressor on (frost symbol illuminated in the display /telltale in the "ECON" button not lit)
- Functions with engine running:
 - Compressor is driven (the magnetic clutch is engaged).
 - Radiator fan -V7 running (at least speed 1).
 - Fresh-air blower -V2 running at maximum speed.
 - Fresh-air and recirculated-air flap goes into "air recirculation mode" (approx. 1 minute after the vehicle is started).
 - Temperature flap is in the position "cooling".

Note:

If one of these conditions is not met, interrogate fault memory => Page 18 .

Checking



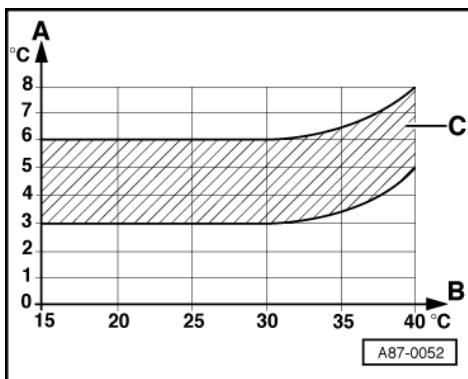
- A - -> Air temperature from the "centre" dash panel vents
B - Ambient temperature

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C - Permissible tolerance range

Depending upon the ambient temperature, the air temperature from the "centre" dash panel vents must be within the stated tolerance range within 5 minutes.

- Close bonnet.
- Measure the ambient temperature
- Close the doors, windows and sunroof.
- Close the "right" and "left" dash panel vents.
- Switch the ignition on.
- Open the "centre" dash panel vents.
- Set the "auto" mode.
- Preselect temperature "LO".
- Start the engine.
- Press the button for the recirculated-air flap (symbol for "air recirculation mode" in the right display or in the button is lit).
- Increase the engine speed to 2000 rpm (start of time measurement).



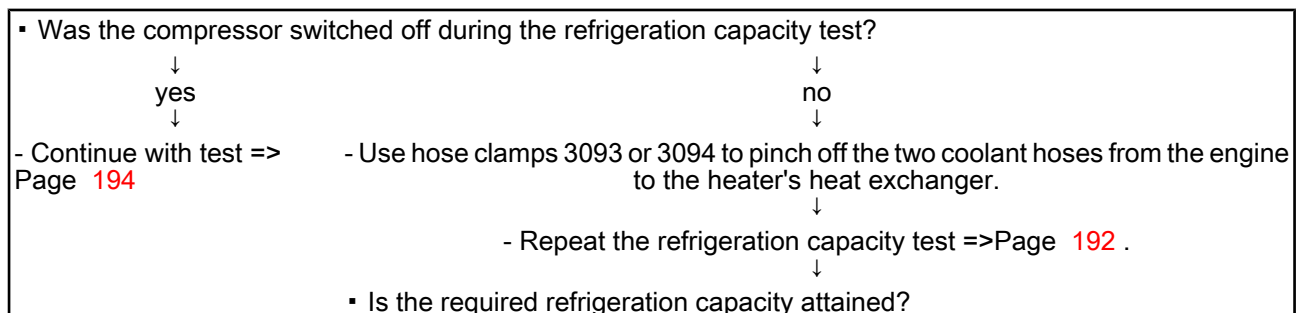
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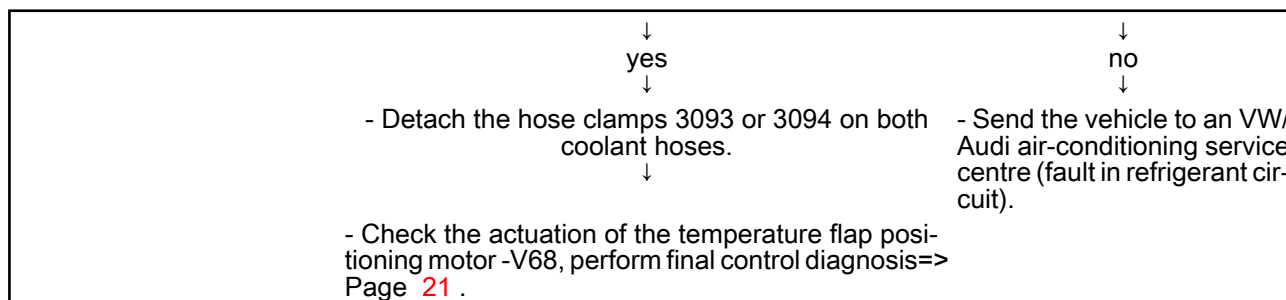
- Measure the temperature of the air flowing from the "centre" dash panel vents, e.g. with a Minitest V.A.G 1362.
- -> Compare measured values with values in the diagram.

Notes:

- ◆ It is recommended that two independent thermometers are used for this measurement.
- ◆ If the required values are not attained => Page 193 (determine fault if specified value not attained).
- ◆ During self-diagnosis, with an operating and display unit -E87 with Part No. 8D0 820 043 from index "D", the air conditioner control is no longer switched off.
- ◆ The air temperature in the air conditioner's mixing chambers (downstream of heat exchanger) can be measured in the measured value block with V.A.G 1551 during the refrigeration capacity test => display group 014, Page 49.
- ◆ The function of the air conditioner may be recognised, for example, from the fact that the refrigerant pipe at the low-pressure end (thick pipe) cools down.
- ◆ From Model Year 1997, the air conditioner pressure switch -F129 (=> Page 41).

Fault determination in the event of deviation from specified value





Continuation of test - compressor was deactivated during the refrigeration capacity test

- Interrogate fault memory => Page 42 .

Repeat the refrigeration capacity test.

▪ Is the required refrigeration capacity attained (compressor was not switched off)?

↓ yes

End

↓ no

- Vehicles in which the control was not deactivated during the self-diagnosis:

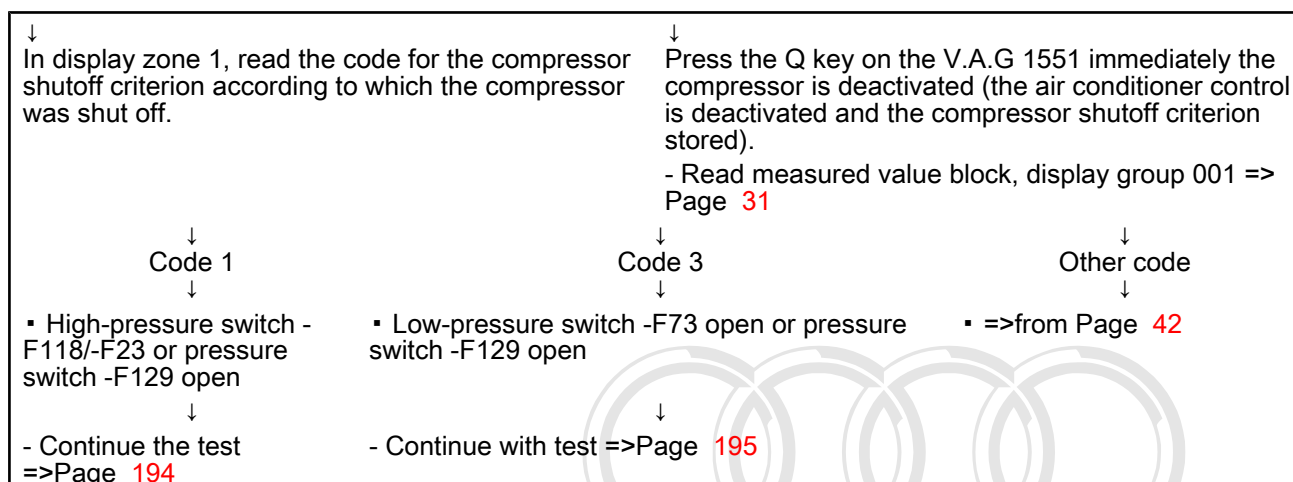
Continued t

↓ no

- Vehicles in which the control was deactivated during the self-diagnosis:

Continued t

- 1) Control deactivated during self-diagnosis.
- 2) Control not deactivated during self-diagnosis.



Continuation of test - compressor shutoff criterion code "1"

▪ Was the radiator fan -V7 switched to speed 2 during the test?

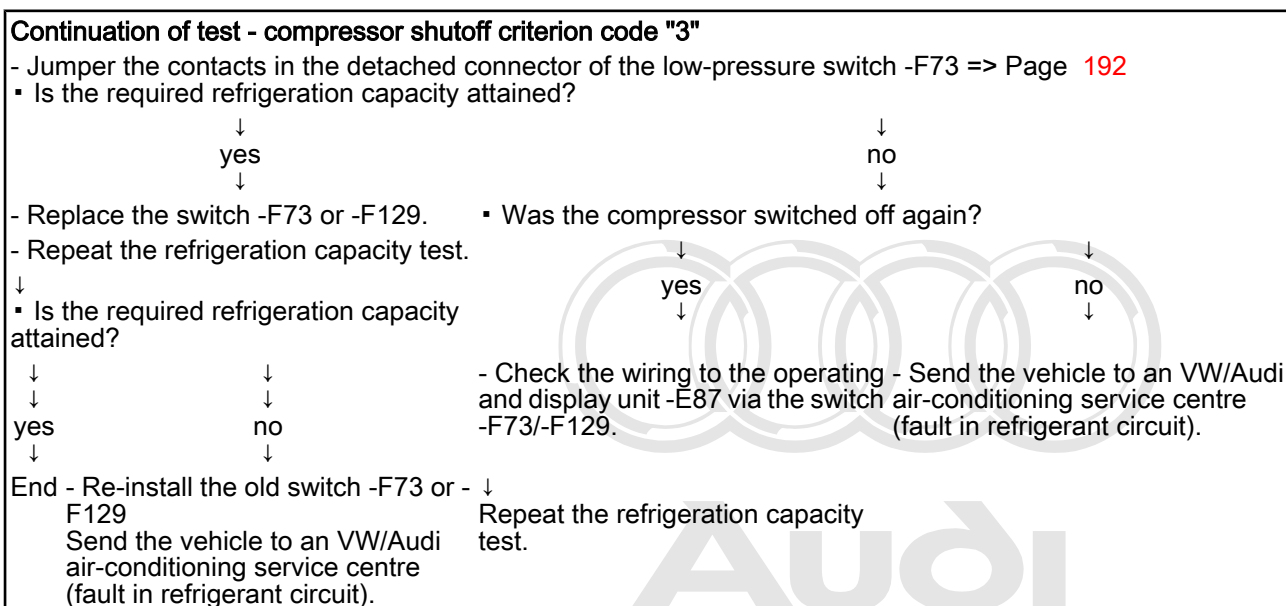
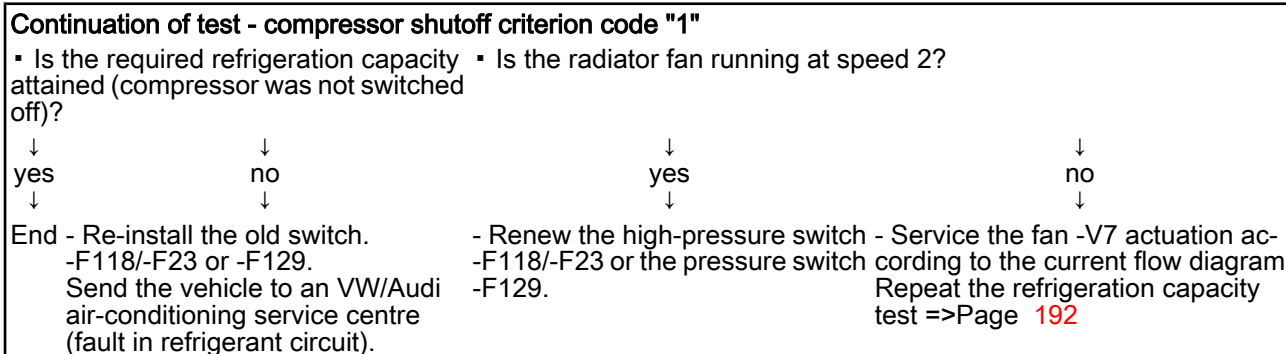
↓ yes

- Renew the high-pressure switch - F118/-F23 or the pressure switch - F129.

Repeat the refrigeration capacity test.

↓ no

- Jumper contacts "1" and "2" in the detached connector of the high pressure switch -F118/-F23 => Page 122



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10 - Servicing electrical additional heater - Vehicles with TDI engine 06.94 ä

10.1 - Servicing electrical additional heater - Vehicles with TDI engine 06.94 ä

10.2 - Checking function of electrical additional heater

Electrical additional heater is activated by control unit for diesel direct injection system -J248 when following conditions occur at the same time:

- ◆ Ambient or intake manifold air temperature measured (at start of engine) less than 5 °C
- ◆ Refrigerant temperature less than 70 °C
- ◆ Engine speed above 800 rpm
- ◆ Other actuation conditions:

=> Relevant Workshop Manual Diesel Direct Injection and Glow Plug System; Repair group 01; Reading measured value block

Test sequence

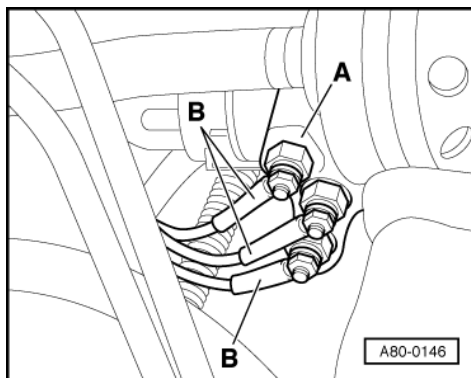
- Check low heating output relay -J359 or high heating output relay -J360:

=> Relevant Workshop Manual for Diesel Direct Injection and Glow Plug System (TDI 4-cyl.); Repair group 01;
Final control diagnosis

If the relays are OK:

- Test wiring for open circuit and short to positive or earth.

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder



- -> Check earth wiring to refrigerant stump -A- (in which the glow lamps are screwed into) to the cylinder head.

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If no wiring fault is detected:

- Check glow plugs:
- Remove the electrical wiring -B- from the glow plugs.
- Connect multimeter for resistance measurement to the glow plug and measure resistance between glow plug and refrigerant stud -A-.
- Specified value: 0.5...0.7 Ω at room temperature

If specified value is not attained:

- Replace glow plug.
- Check refrigerant level:

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 19

11 - Repairing the refrigeration circuit - vehicles up to Model Year 1996

11.1 - Repairing the refrigeration circuit - vehicles up to Model Year 1996

Notes:

- ♦ In Model Year 1996, in vehicles with 6-cylinder engines, compressors from the manufacturer "Nippondenso/Denso" are gradually replacing the former Zexel compressor. The air conditioner compressor speed sensor -G111 is omitted. In the event of a stiff compressor, the magnetic clutch is disengaged by an overheating fuse in the magnetic clutch's solenoid.
- ♦ Never top up refrigerant in refrigerant circuit (empty circuit, evacuate and re-fill).
- ♦ The replacement compressor contains all the refrigerant oil to be used to fill the refrigerant circuit.

=> Air conditioner - with refrigerant R134a; Filling Quantities; Approved refrigerant oils

- ♦ Different types of refrigerant are specified for Zexel and Nippondenso/Denso compressors:

=> Air conditioner - with refrigerant R134a; Filling Quantities; Approved refrigerant oils

- ♦ The specified diameter for the O-ring seals and the tightening torque also apply to the screwed connections in the refrigerant pipes or hoses between the individual components.

- ◆ Only install O-ring seals which are approved for the refrigerant R134a:

=> Air conditioner - with refrigerant R134a; Components of the refrigerant circuit

- ◆ On the Zexel compressor, the O ring seals are not colour coded (for air conditioner compressor speed sender-G111, oil drain screw and pressure-relief valve) They are supplied as a set:

=> Parts List

- ◆ Check refrigeration capacity => Page **192** .
- ◆ Checking pressures in the refrigerant circuit:

=> Air conditioner - with refrigerant R134a

- ◆ All other repairs and tests not described in this workshop manual

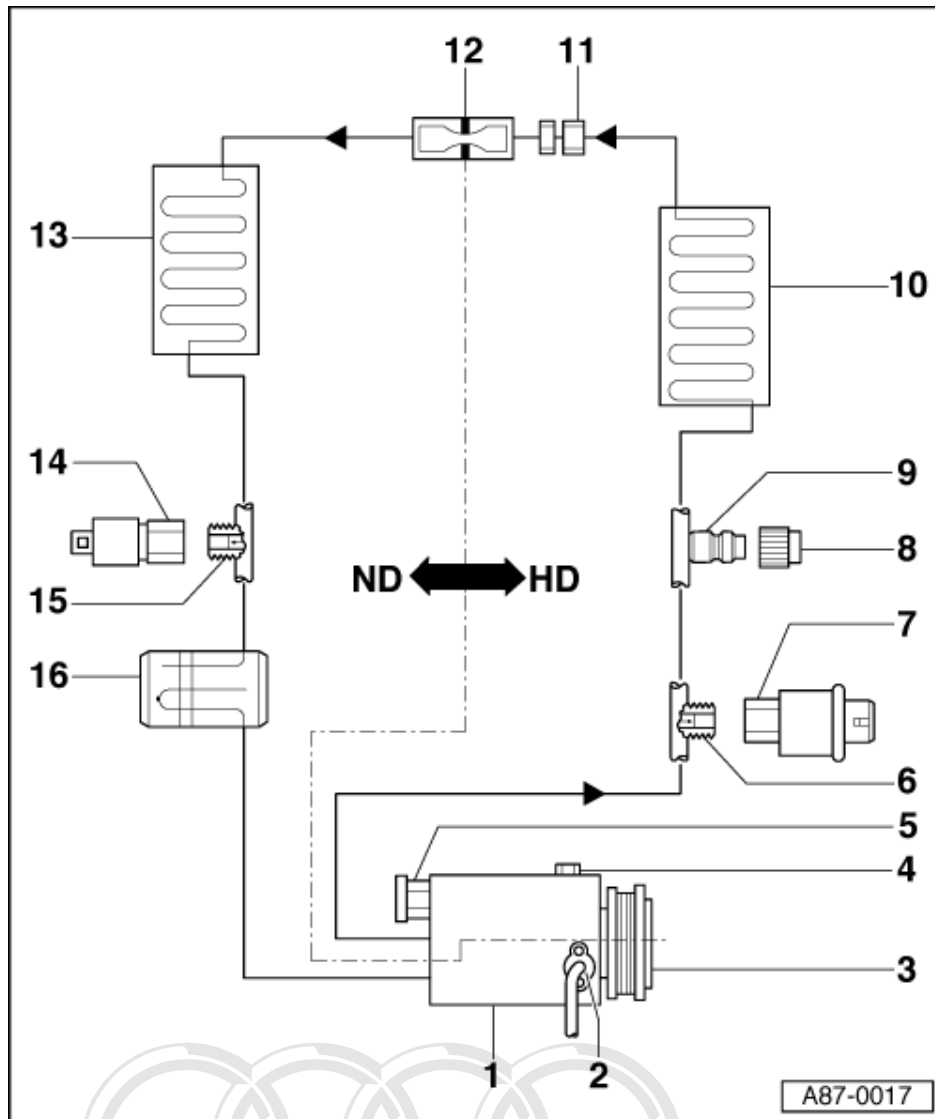
=> Air conditioner - with refrigerant R134a

11.2 - Assignment of air conditioner compressors

Engine	Make	Special features
4-cylinder grey cast iron	Zexel	Without -G111 1)
6-Cylinder up to MY 96	Zexel	With -G111 1)
6-Cylinder as of MY 96 (gradual introduction)	Nippondenso/ Denso	without -G111 1)

- 1) -G111 = Air conditioner compressor speed sensor

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HD = High-pressure end

ND = Low-pressure end

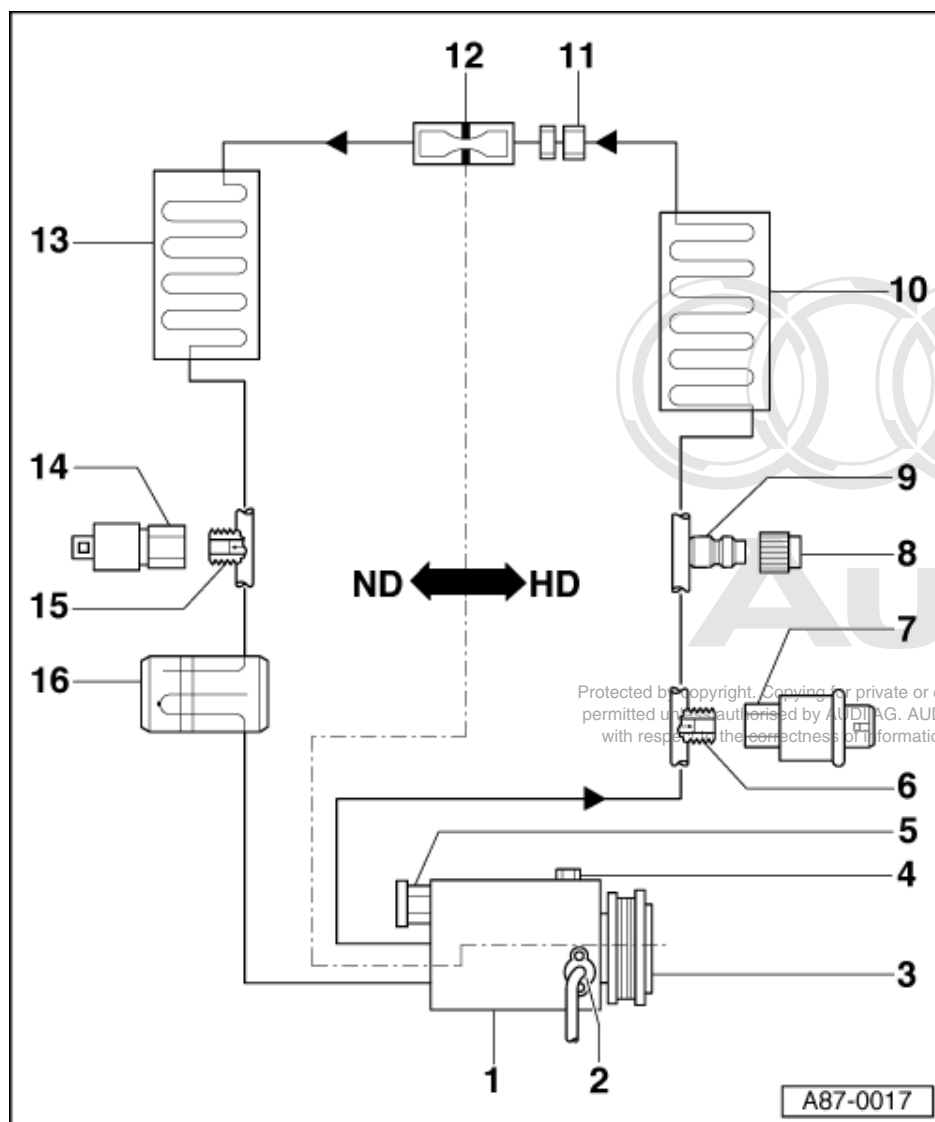
1 Compressor

- ◆ O-ring seal for Zexel compressor):
for low-pressure connection:
17.2 mm/1.8 mm
for high-pressure connection:
14.0 mm/1.8 mm

◆ Tightening torque for Zexel compressor):
low-pressure connection: 40 Nm
high-pressure connection: 30 Nm

- ◆ Removing and installing refrigerant pipe on Nippondenso/Denso compressor => Page 210
- ◆ Removing and installing ribbed belt

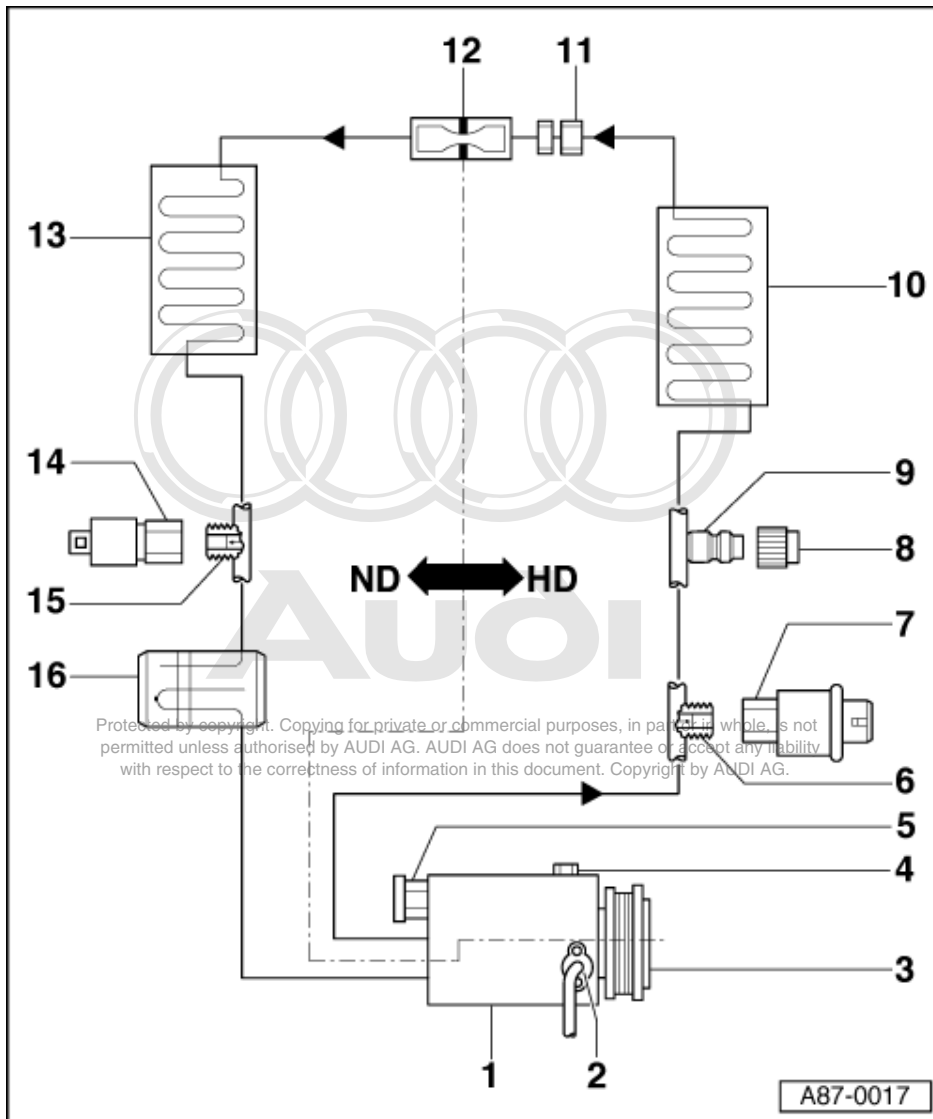
=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 13



- ♦ Removing and installing compressor => Page 211
- ♦ After the installation of a new compressor or filling with fresh refrigerant oil (e.g. after blowing out the refrigerant circuit), turn the compressor 10 revolutions by hand before the first start to avoid damage to the compressor.

2 Air conditioner compressor speed sender -G111

- ♦ Only installed with Zexel compressor for 6-cyl. engines
- ♦ O- ring seal 15.5 mm; 1.8 mm
- ♦ Checking => Page 64
- ♦ Removing and installing =>Page 211
- ♦ May only be unscrewed if the refrigerant circuit is empty.
- ♦ May only be renewed when the compressor has been removed

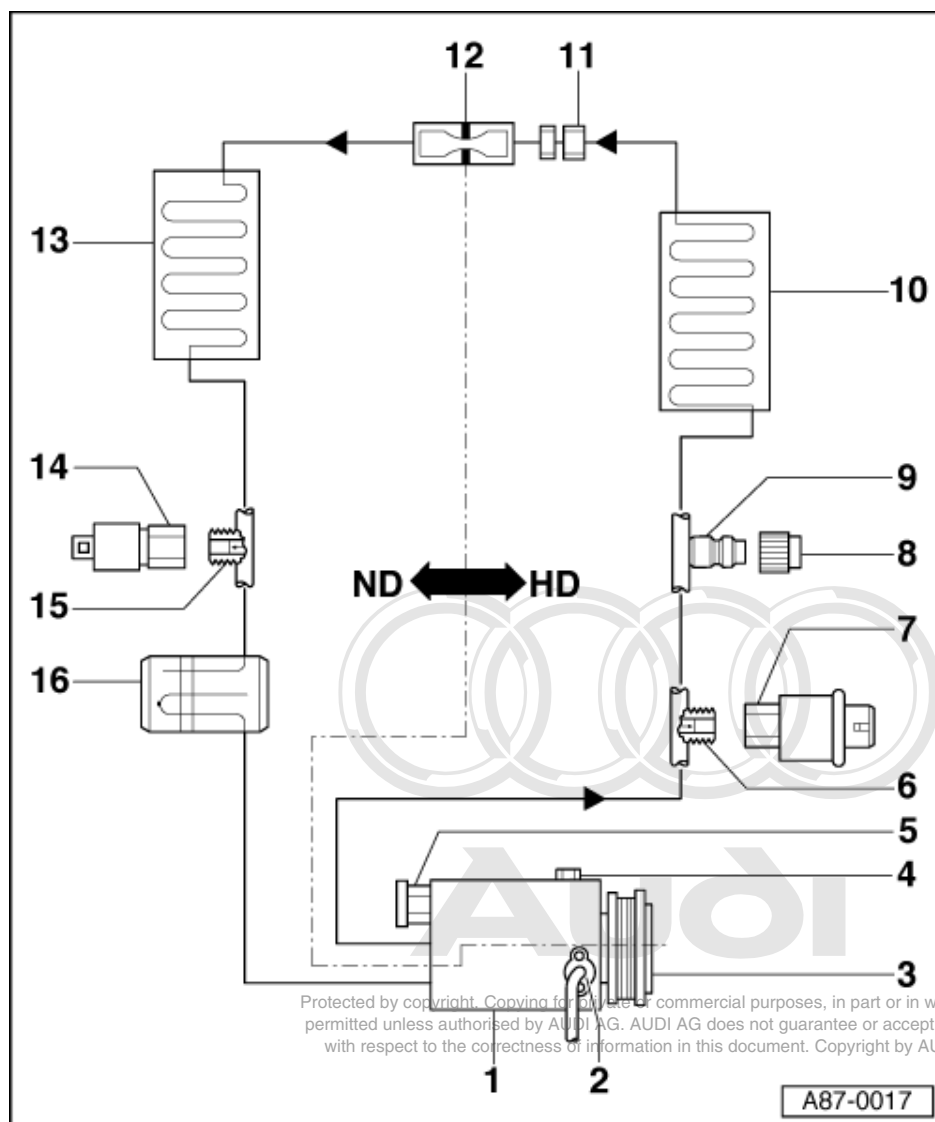


3 Air conditioner magnetic clutch -N25

- ♦ Repairing:
Zexel compressor => Page **136**

4 Oil drain plug

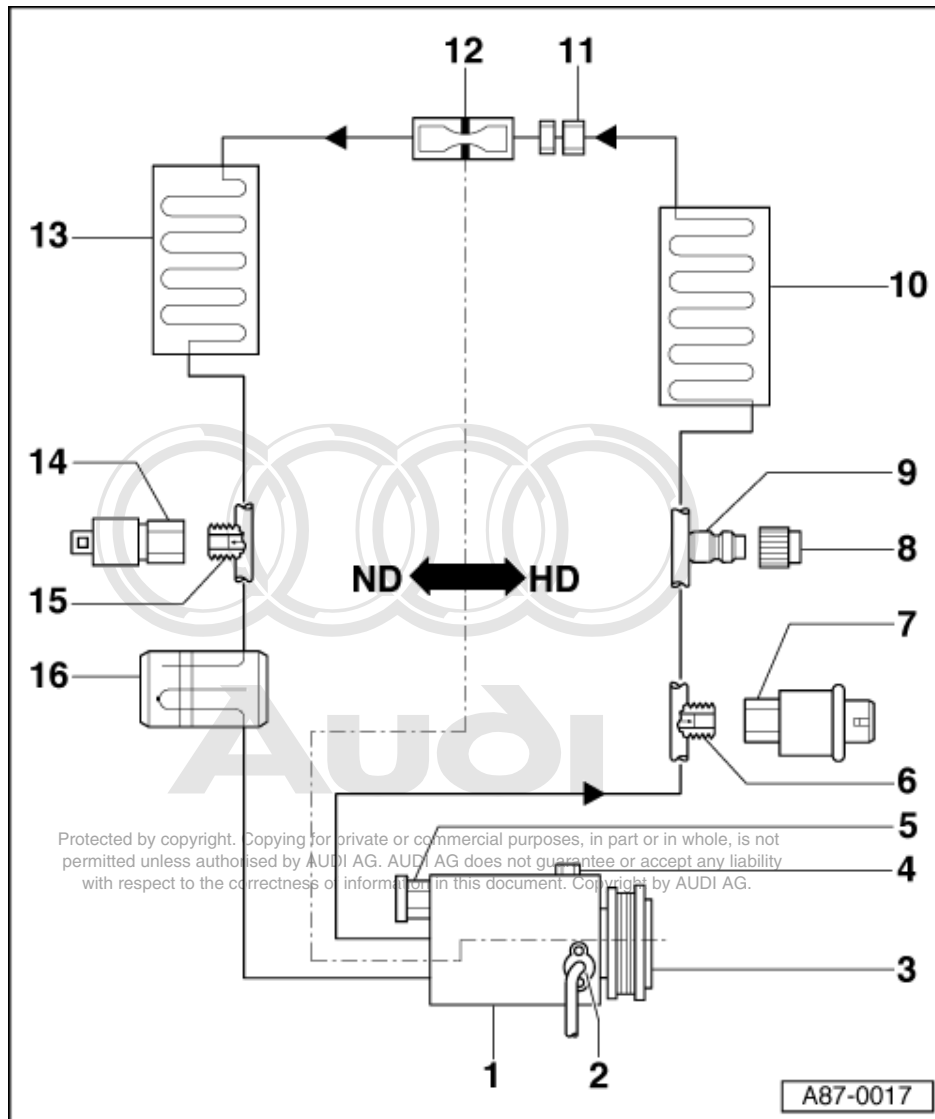
- ♦ In the Nippondenso/Denso compressor, a sealing ring is installed instead of an O-ring seal.
- ♦ Always renew
- ♦ O-ring seal for Zexel compressor):
7.8 mm/1.9 mm
- ♦ Tightening torque:
Zexel compressor: 10 Nm
- ♦ Tightening torque:
Nippondenso/Denso compressor: 30 Nm



- ♦ May only be unscrewed to drain refrigerant oil if compressor is removed.
Crank compressor with the magnetic clutch plate to accelerate extraction of refrigerant oil

5 Pressure relief valve

- ♦ O-ring seal
8.8 mm/1.9 mm
- ♦ Tighten to 10 Nm
- ♦ Connection without valve May only be unscrewed if the refrigerant circuit is empty

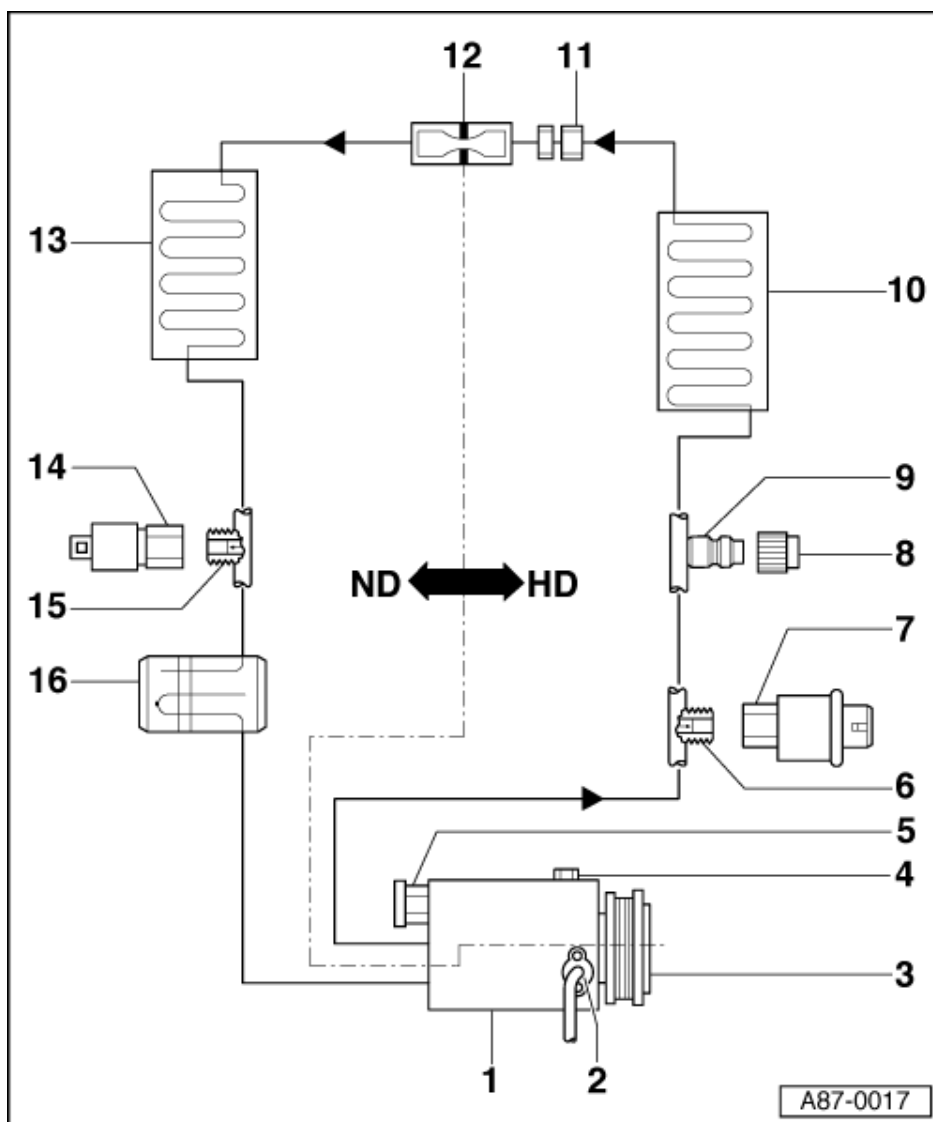


6 Connection with valve

- ♦ For air conditioner high-pressure switch -F23 and magnetic clutch high-pressure switch -F118
- ♦ For pressure measurements in the refrigerant circuit at this connection, connect the switch to the connector and use adapter V.A.G 1785/9

7 High-pressure switches for air conditioner -F23 and for magnetic clutch -F118

- ♦ Function, removing and installing
=>Page 116
- ♦ O-ring seal
7.6 mm/1.8 mm
- ♦ Tightening torque: 5 Nm



8 Cap

- ♦ With seal
- ♦ Must be fitted

9 Service connection

- ♦ High-pressure side
- ♦ For measuring, draining and filling with service station

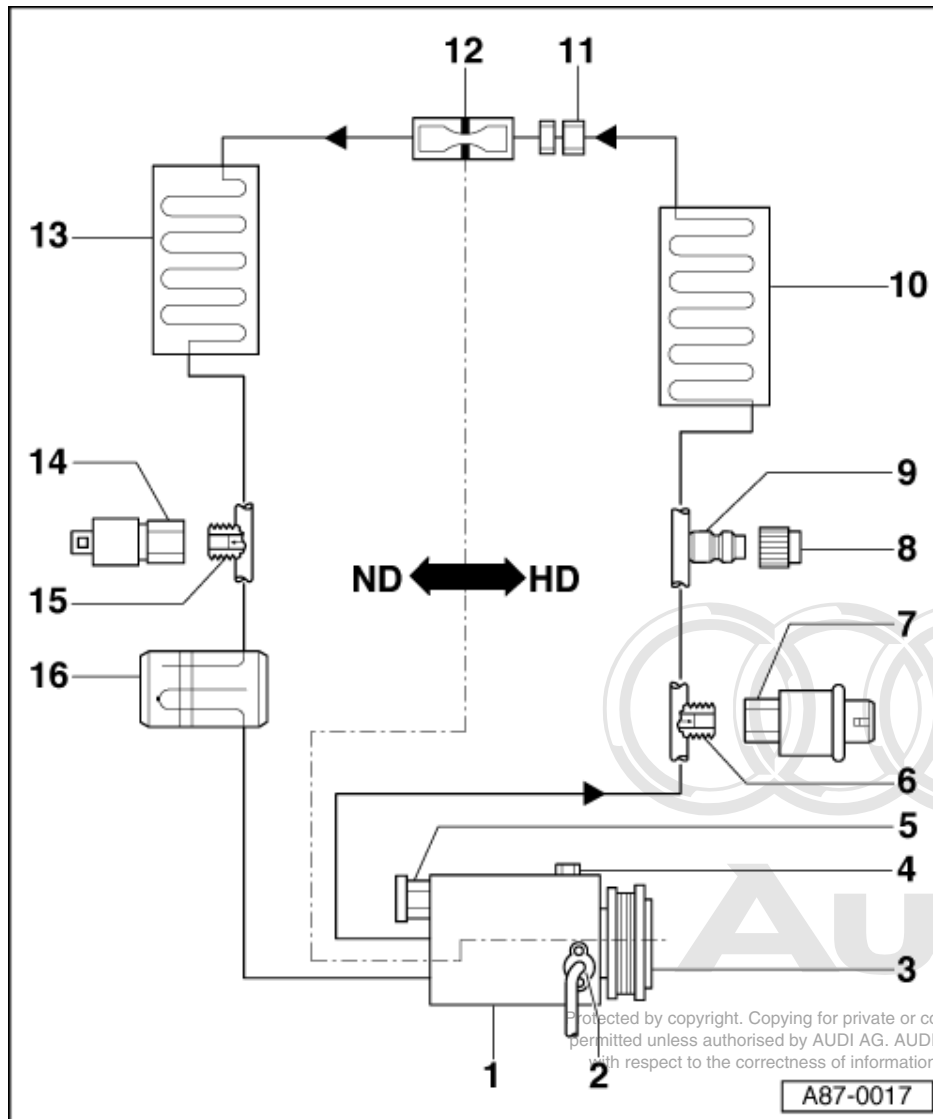
10 Condenser

- ♦ O-ring seal
 Inlet: 14.0 mm/1.8 mm
 Outlet: 10.8 mm/1.8 mm
- ♦ Tightening torque:
 Inlet: 30 Nm
 Outlet: 15 Nm

11 Union in the refrigerant pipe

- ♦ O-ring seal
 10.8 mm/1.8 mm
- ♦ Tightening torque: 15 Nm

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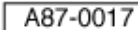


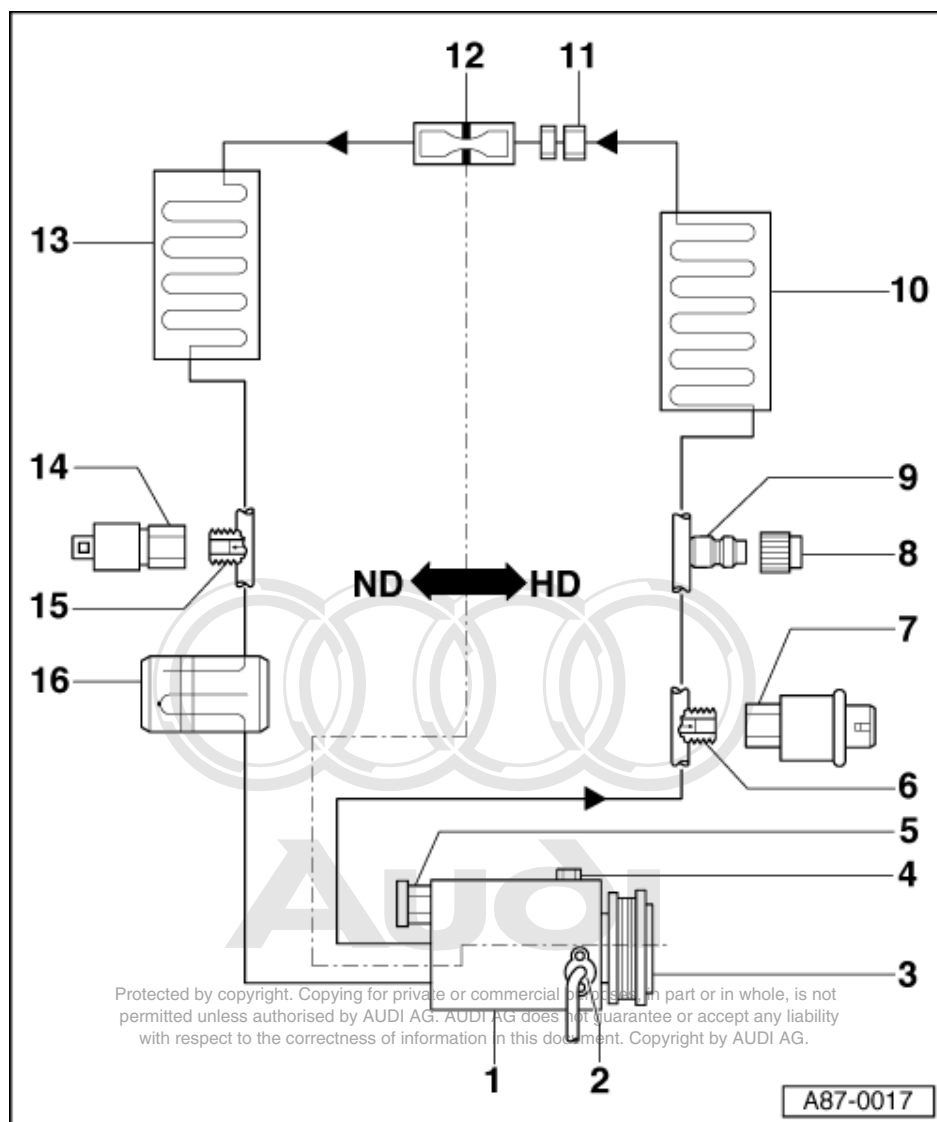
12 Throttle

- ♦ In the screwed connection - **11** -
- ♦ Replace restrictor with O-ring seal
- ♦ Removing and installing =>Page **207**
- ♦ Apply a small amount of refrigerant oil to the O-ring seal before installing the restrictor

13 Evaporator

- ♦ O-ring seal at air conditioner
Inlet: 10.8 mm/1.8 mm
Outlet: 17.2 mm/1.8 mm
- ♦ Tightening torque: 15 Nm
- ♦ O-ring seal at evaporator
Inlet: 13.4 mm/2.4 mm
Outlet: 13.4 mm/2.4 mm
- ♦ Tightening torque: 5 Nm
- ♦ Removing and installing refrigerant lines => Page **207**
- ♦ Removing and installing =>Page **222**

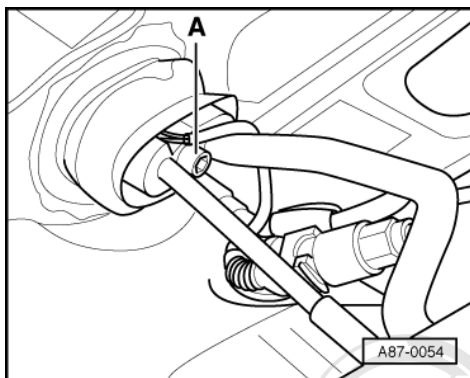




16 Container

- ♦ O-ring seal
Inlet: 17.2 mm; 1.8 mm
Outlet: 17.2 mm; 1.8 mm
- ♦ Tightening torque:
Inlet: 40 Nm
Outlet: 40 Nm
- ♦ Removing and installing =>Page 208

11.3 - Removing and installing refrigerant lines to the evaporator



Removing

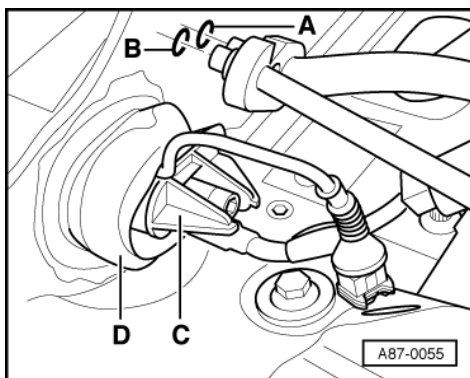
- Drain the refrigerant circuit
- => Air conditioner - with refrigerant R134a
- -> Screw out the bolts -A- (15 Nm).
 - Remove the refrigerant lines from the evaporator.

Note:

Cap -C-, an evaporator spare part, for example, is suitable for sealing the open connections on the evaporator.

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Installing



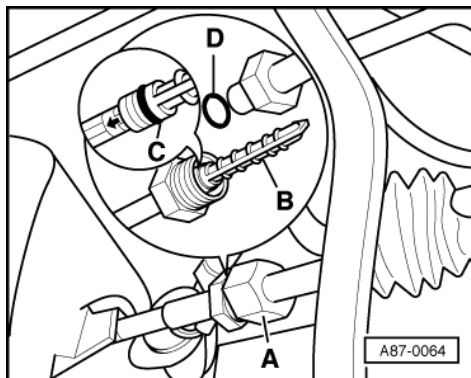
Installation is carried out in the reverse order; note the following:

- -> Replace the O-ring seals -A- (17.2 mm/1.8 mm) and -B- (10.8 mm/1.8 mm).
- Install the refrigerant lines with no tension.
- Check that the grommet -D- and the cable insert are seated correctly.

11.4 - Removing and installing restrictor

Removing

- Drain the refrigerant circuit
- => Air conditioner - with refrigerant R134a



- -> Separate the refrigerant line to the screwed connection -A- (close open connections).
- Use long-nose pliers to pull the restrictor -B- out of the refrigerant pipe

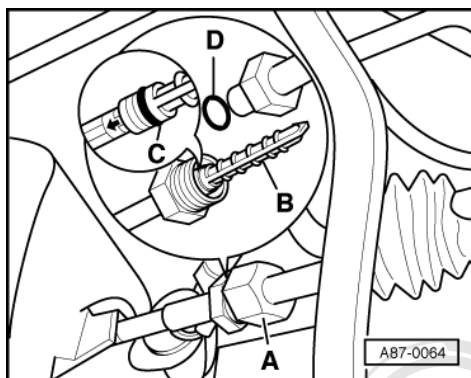
Installing

Note:

Only fit restrictors of the same design (colour). Restrictors of different colours have different bore diameters:

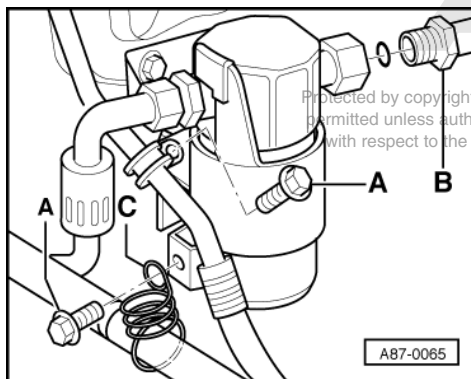
=> Parts List

- Install the restrictor -B- on the correct side (arrow on the restrictor pointing towards the evaporator)
- Restrictor must sit in the refrigerant pipe with no play



- -> Check that the O-ring seals -C- (7.5 mm/1.5 mm) are seated correctly in the groove.
- Replace the O-ring seal -D- (10.8 mm/1.8 mm).
- Apply a small amount of refrigerant oil to the O-ring seal in the restrictor
- Install the refrigerant lines with no tension.
- Tighten the screwed connection -A- to 15 Nm.

11.5 - Removing and installing reservoir



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Removing

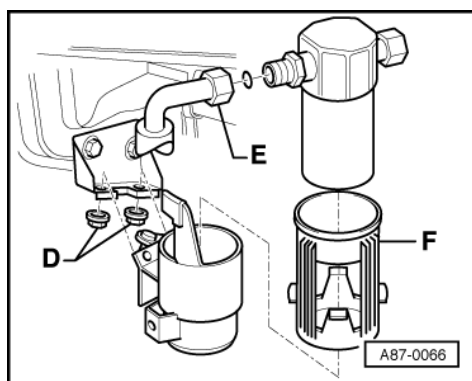
- Drain the refrigerant circuit

=> Air conditioner - with refrigerant R134a

- Move lock carrier to the service position.

=> General Body Assembly, Exterior; Repair group 50; Body front; Lock carrier-service position Body front Lock carrier-service position

- -> Screw out the bolts -A-.
- Remove the refrigerant line -B-



- -> Screw out the nuts -D-.
- Remove the drip tray and holder.
- Remove the refrigerant line -E-

Notes:

- ◆ Close the open pipe connections.
- ◆ The refrigerant line attachment differs according to the engine version.

=> Parts List

- ◆ Keep the reservoir closed for as long as possible, only remove the caps immediately before installation (the reservoir contains a desiccant bag which soon becomes saturated with moisture and hence unusable when the reservoir is open)

Installing

Installation is carried out in the reverse order; note the following:

Before installing the reservoir:

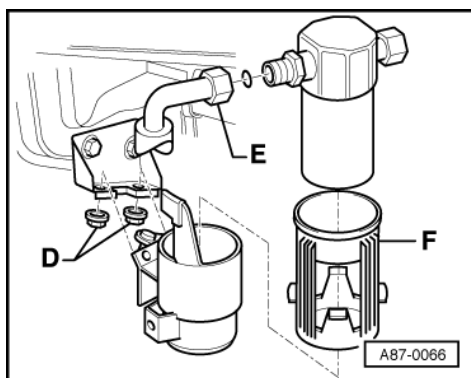
=> Air conditioner - with refrigerant R134a; Replacing components of the refrigerant circuit

Notes:

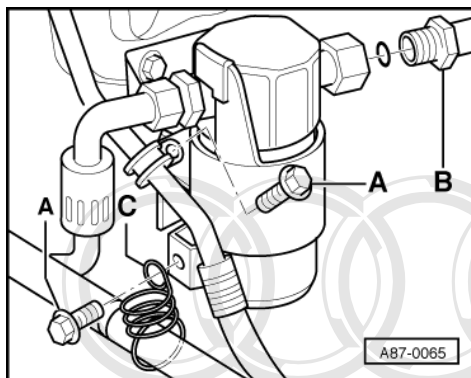
- ◆ The removed reservoir contains refrigerant oil which has to be returned to the refrigerant circuit (with a new reservoir)
- ◆ The correction of the oil quantity depends upon the type of complaint:
 - If, for example, the reservoir has been damaged in an accident (no refrigerant has escaped, no moisture or dirt has penetrated the refrigerant circuit), the air conditioner may be repaired without extensive repair work by weighing the old and new reservoirs: Fill the new container with refrigerant oil until it reaches the weight of the removed reservoir.
 - If an indeterminate quantity of refrigerant oil has escaped or dirt and moisture has penetrated the refrigerant circuit, clean the refrigerant circuit with compressed air and nitrogen.



=> Air conditioner - with refrigerant R134a; Replacing components of the refrigerant circuit



- -> Only install the drip tray in the holder with insulation -F-
- Replace the O-ring seals (17.2 mm/1.8 mm).
- Install the refrigerant lines with no tension (tightening torque 40 Nm) and note the clearance to components.



- -> Install the spring -C- so that it is in contact with the mark on the refrigerant hose and is locked at the holder.

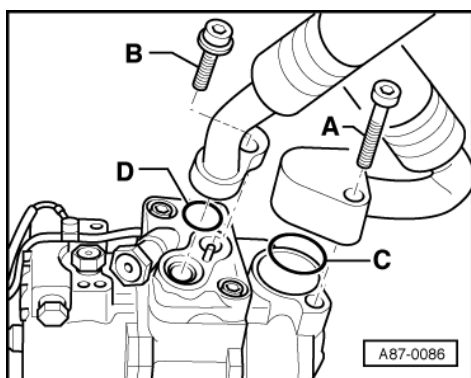
11.6 - Removing and installing refrigerant line on Nippondenso/Denso compressor

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Removing

- Drain the refrigerant circuit

=> Air conditioner - with refrigerant R134a



- -> Screw out the bolts -A- and -B-.

Installing

Installation is carried out in the reverse order; note the following:

- Renew the O-ring seals -C- (23.8 mm/1.8 mm) and -D- (11.1 mm/1.8 mm).
- Tighten the bolts -A- and -B- to 25 Nm.

Notes:

- ◆ The diagram shows the layout on a vehicle with an 8-cylinder engine.
- ◆ Close the open pipe connections.
- ◆ The O-ring seals from the caps for the spare part compressor may not be used.

11.7 - Removing and installing compressor

Removing

- Drain the refrigerant circuit

=> Air conditioner - with refrigerant R134a

- Remove the refrigerant lines from the compressor.
- Detach compressor from bracket => Page 124 onwards

Installing

Installation is carried out in the reverse order; note the following:

Before installing the compressor:

=> Air conditioner - with refrigerant R134a; Replacing components of the refrigerant circuit

- Tightening torques and O-ring seals =>Page 198 onwards
After the installation of a new compressor or filling with fresh refrigerant oil (e.g. after blowing out the refrigerant circuit), turn the compressor 10 revolutions by hand before the first start to avoid damage to the compressor
- Note the following when starting the compressor for the first time:
 - Start the engine with the compressor switched off (mode "OFF") and wait until the idle speed has stabilised.
 - Now, switch on the compressor and allow it to run for at least 10 minutes at idle speed.

11.8 - Removing and installing air conditioner compressor speed sender -G111

Note:

The air conditioner compressor speed sensor -G111 is only installed in Zexel compressors in conjunction with 6-cylinder engines.

Removing

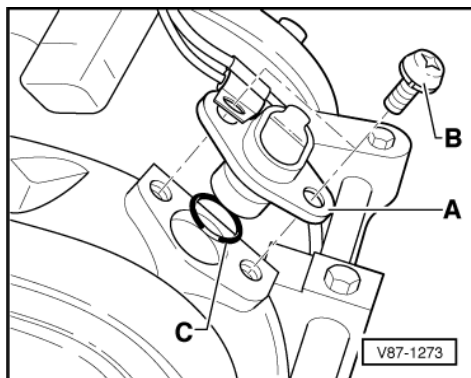
- Drain the refrigerant circuit

=> Air conditioner - with refrigerant R134a

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- Detach compressor from bracket => Page 124 onwards

- Detach the connector.



- -> Remove screws -B-.
- Pull the sensor -A- out of the compressor.

Installing

- With the sender removed, perform a visual inspection of the lugs on the pulse wheel (4x around the periphery).
- Replace the O-ring seal -C- (15.5 mm/1.8 mm).
- Tighten the screwed connection -B- with 5 Nm.

11.9 - Filling quantities

Filling quantities for refrigerant R134a and refrigerant oil:

=> Air conditioner - with refrigerant R134a; Filling quantities

Notes:

- ♦ Always fill the refrigerant circuit right up to the upper tolerance limit (some refrigerant remains in the filling hoses).
- ♦ The refrigerant circuit may only be filled with approved refrigerant oils:

=> Parts List

- ♦ Different types of refrigerant oils are specified for Zexel and Nippondenso/Denso compressors:

=> Air conditioner - with refrigerant R134a; Filling Quantities; Approved refrigerant oils

- ♦ For Zexel compressors, in addition to the refrigerant oil G 052 154 A2, it is also possible to use the refrigerant oil G 052 200 A2 in the retrofit kit Part No. 4A0 298 107.
- ♦ The refrigerant oil G 052 300 A2 to be used for Nippondenso/Denso compressors is also contained in the retrofit kit 4A0 298 107 A.
- ♦ Refrigerant oil from containers which have been open for a long time is unusable (PAG oil absorbs moisture) and may not be used again.
- ♦ Further notes:

=> Air conditioner - with refrigerant R134a

12 - Removing and installing air conditioner - vehicles up to Model Year 1996

12.1 - Removing and installing air conditioner - vehicles up to Model Year 1996

Special tools, testers and auxiliary equipment required

- ◆ Hose clamps 3093 or 3094
- ◆ Commercially available compressed air gun

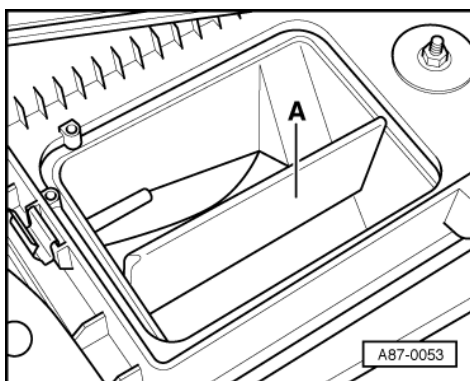
Removing

Notes:

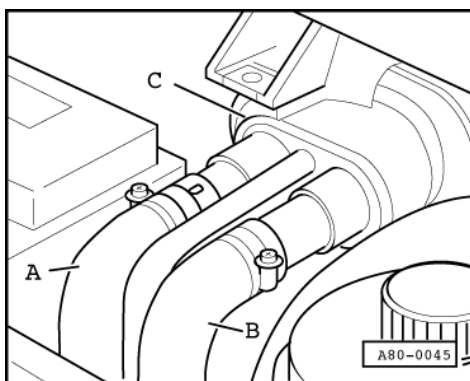
- ◆ On removal, note the bolt lengths and assignment for re-installation.
- ◆ All cable ties which are released or cut open when the air conditioner is removed must be replaced in the same position when installing.

- Drain the refrigerant circuit

=> Air conditioner - with refrigerant R134a

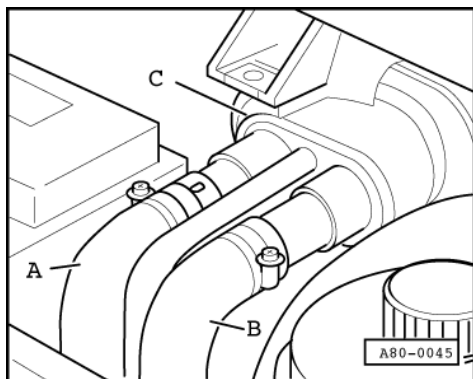


- Cover the driver's and passenger's seat with protective covers.
- Remove the dust and pollen filter =>Page 75 .
- Start the final diagnosis in vehicles with an air-flow flap => Page 18 .
- -> Wait until the air-flow flap -A- has moved to the "closed" position.
- Terminate the final control diagnosis with a closed air-flow flap.
- Switch the ignition on.
- In vehicles with electrically adjustable seats, move them back as far as possible before disconnecting the battery.
- Observe or obtain radio code on vehicles with coded radio.
- Disconnect earthing strap at battery with ignition switched off.
- Remove the battery.
- Open the cover of the coolant expansion tank

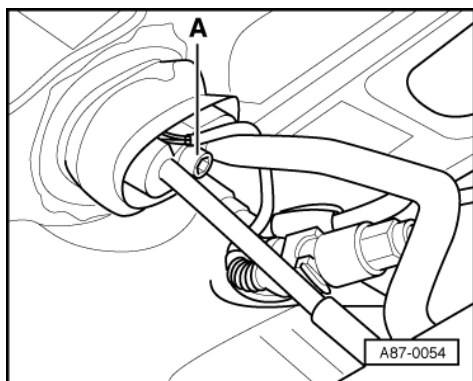




- -> Mark the layout of the coolant hoses -A- and -B-.
- Pinch off the coolant hoses to the heat exchanger with hose clamps V.A.G 3094 and detach the hoses.
- Detach the vacuum pipe to the engine and secure to the water pipes in the heat exchanger.
- Place a container under the connection for hose -A-.



- -> Use the compressed air pistol to blow the coolant carefully out of the heat exchanger through the coolant hose -B-.
- Remove the grommet -C-.

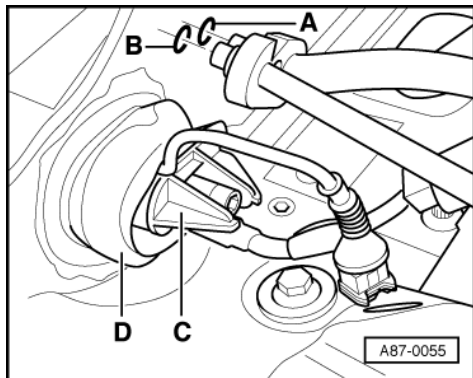


- -> Remove bolt -A-.
- Remove the refrigerant lines to the evaporator => Page 207 and secure them (e.g. with a cable tie), so they do not get in the way during installation.

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Notes:

- ♦ Close the open pipe connections.
- ♦ Cap -C-, an evaporator spare part, for example, is suitable for sealing the open connections on the evaporator. It is also used as a guide during assembly.

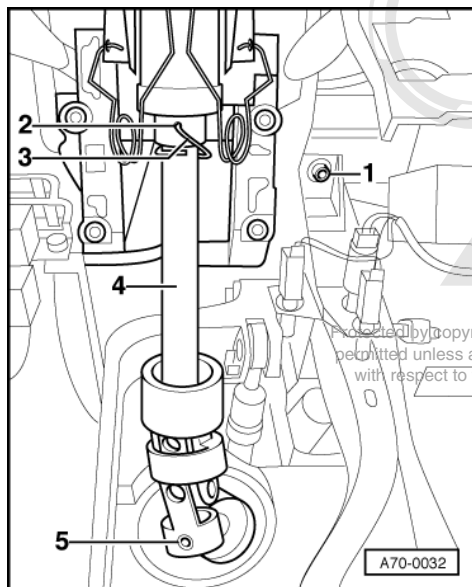


- -> Remove the grommet -D-.
- Detach the connector from the air conditioner low pressure switch -F73 and secure the lines and connector to the connection point.

- Remove the glove box, the shelf on the driver's side and the centre console:

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box

=> General Body Assembly, Interior; Repair group 70; Dash panel Dash panel



- -> Loosen the bolt -1- for attaching the pedal cluster to the cross piece for the dash panel:

=> Running gear, front-wheel drive and four-wheel drive; Repair group 46; Removing and installing pedal cluster Removing and installing pedal cluster

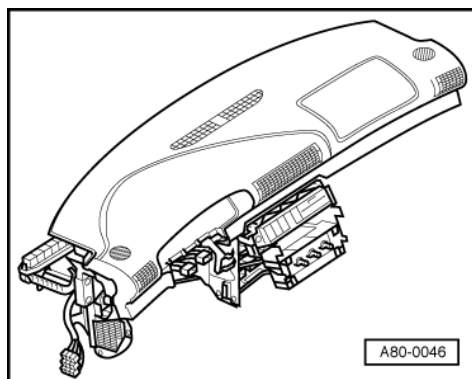
- Loosen the bolt -5- on the steering box/steering column -4-.
- After removing the steering column from the steering box, secure the steering column -4- with wire -3- at hole -2- to prevent it coming apart.

Important:
Never detach mesh section between top and bottom part of steering column on assembly.

- Remove the E-box in the plenum chamber and detach the connector in the connector point and between the dash panel and the vehicle:

=> Electrical System; Repair group 97; Fitting locations for control units and electrical components Fitting locations for control units and electrical components

- Remove the footwell vents => Page 158 .



- -> Remove the dash panel with the dash panel and air conditioner cross piece:

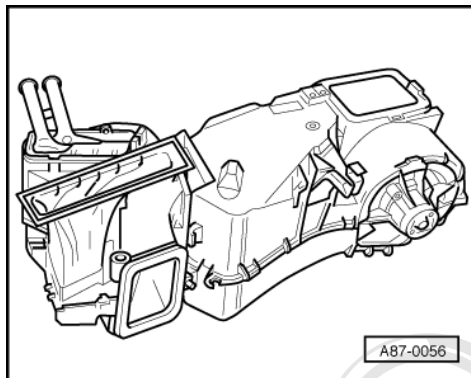


=> General Body Assembly, Interior; Repair group 70; Dash panel Dash panel

Note:

To ensure that the outer surface of the dash panel is not damaged, the dash panel may only be placed on a clean work bench which should be covered with clean cardboard, for example.

- Separate all the electrical connections between the dash panel and air conditioner at the connectors.



- -> Loosen all the bolts between the dash panel and the air conditioner.
- Remove the air conditioner from the dash panel.

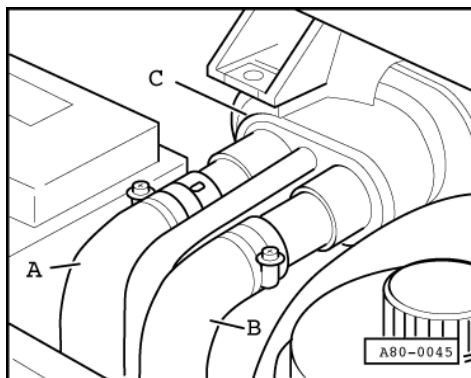
Installing

Installation is carried out in the reverse order; note the following:

Note:

Check all the seals on the air conditioner for damage, replace damaged seals.

- When installing the dash panel, ensure that the vacuum hose and connector to the -F73 are inserted through the openings in the back wall of the plenum chamber with the refrigerant pipes and the evaporator flange respectively.
- Install the refrigerant lines to the evaporator => Page 207.



- -> Connect the coolant hoses to the heat exchanger correctly. Note the markings:
 - A - Return hose to the water pump (with vent hole)
 - B - Inlet hose from the cylinder head
- After the installation of the dash panel, check that the grommet -C- is seated correctly.
- Check that the condensation drain hoses are seated correctly => Page 145 .
- Bleed the coolant circuit:

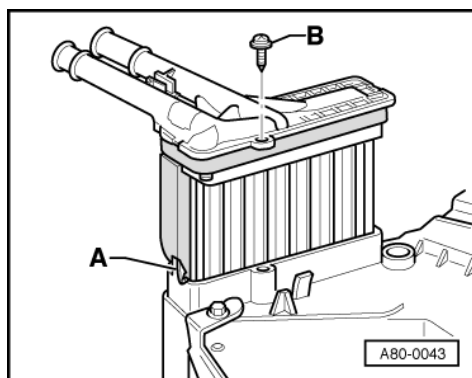
=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 19

- Evacuate refrigerant circuit and refill:

=> Air conditioner - with refrigerant R134a

12.2 - Removing and installing the air conditioner heat exchanger

Removing



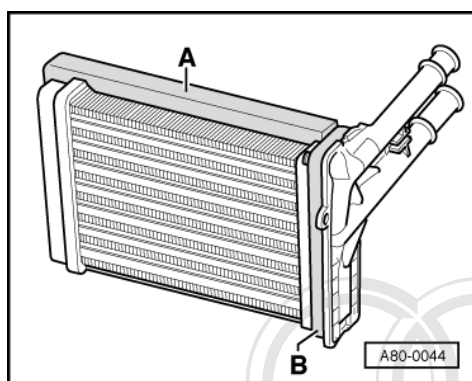
- Remove the air conditioner => Page 213 .
- -> Press back the catches -A- and pull the heat exchanger out of the air conditioner.

Installing

Installation is carried out in the reverse order; note the following:

Notes:

- ♦ If the heat exchanger does not engage in the heater unit on installation, secure it with two bolts -B-.



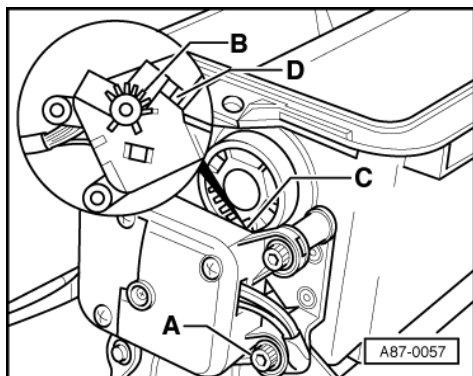
- ♦ When replacing the heat exchanger, it is not necessary to remove the air conditioner from the dash panel (vehicles up to Model Year 1996 only).

Attaching seals to the heat exchanger

- -> Bond the seals -A- and -B- all round the heat exchanger with no gaps.

12.3 - Removing and installing air-flow flap positioning motor -V71

Removing

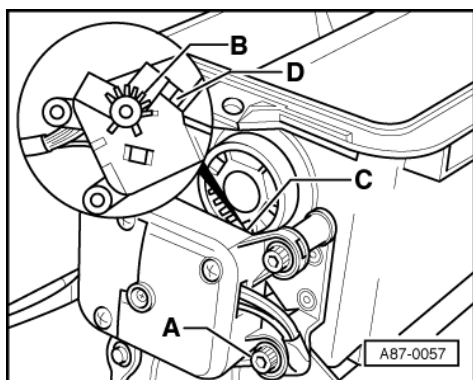


- Remove the air conditioner => Page 213.
- -> Screw out the bolts -A-.
- Remove the positioning motor.

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Installing

- Before installing the positioning motor, check the mark on the gearwheels and the air-flow flap.
 - The gearwheel -B- must coincide with the air-flow flap -C- (longer tooth and continuous tooth space).

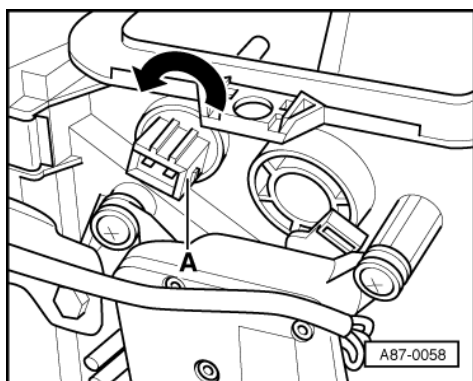


Note:

-> If the positioning motor lever is in contact with stop -D-, when the positioning motor is installed, the intake must be closed by the air-flow flap (the longer side of the air-flow flap is facing in the direction of travel).

- Interrogate fault memory => Page 24 .

12.4 - Removing and installing the fresh air intake duct temperature sensor -G89



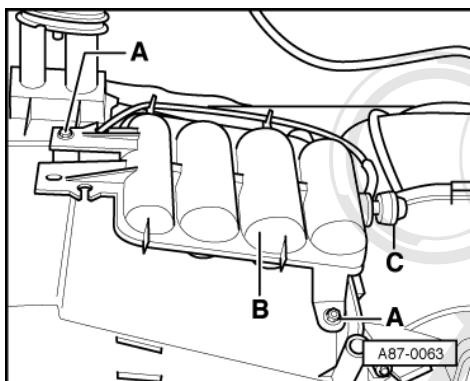
Removing

- Remove the air conditioner => Page 213 .
- -> Turn temperature sensor -A- through approx. 90° and remove.

Installing

Install in reverse order.

12.5 - Removing and installing vacuum reservoir with non-return valve



Removing

- Remove the air conditioner => Page 213 .
- -> Screw out the bolts -A-

Installing

Install in reverse order.

Note:

Checking vacuum system =>Page 163 .

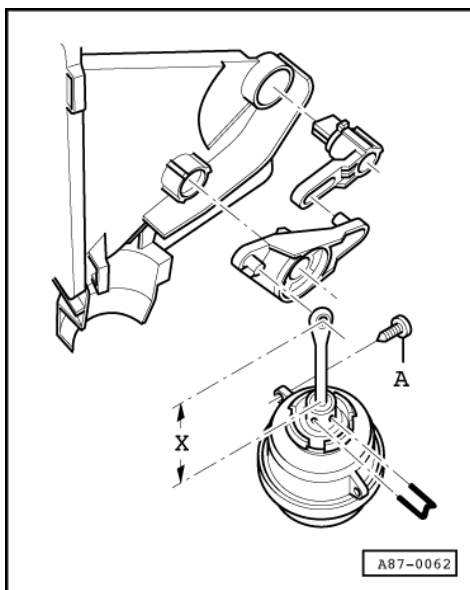
12.6 - Removing and installing the vacuum unit for the fresh-air and recirculated-air flap

Note:

This task does not require the air conditioner to be dismantled.

Removing

- Remove the air conditioner => Page 213 .





- -> Screw out the bolts -A-.
- Disengage the vacuum unit.

Installing

Installation is carried out in the reverse order; note the following:

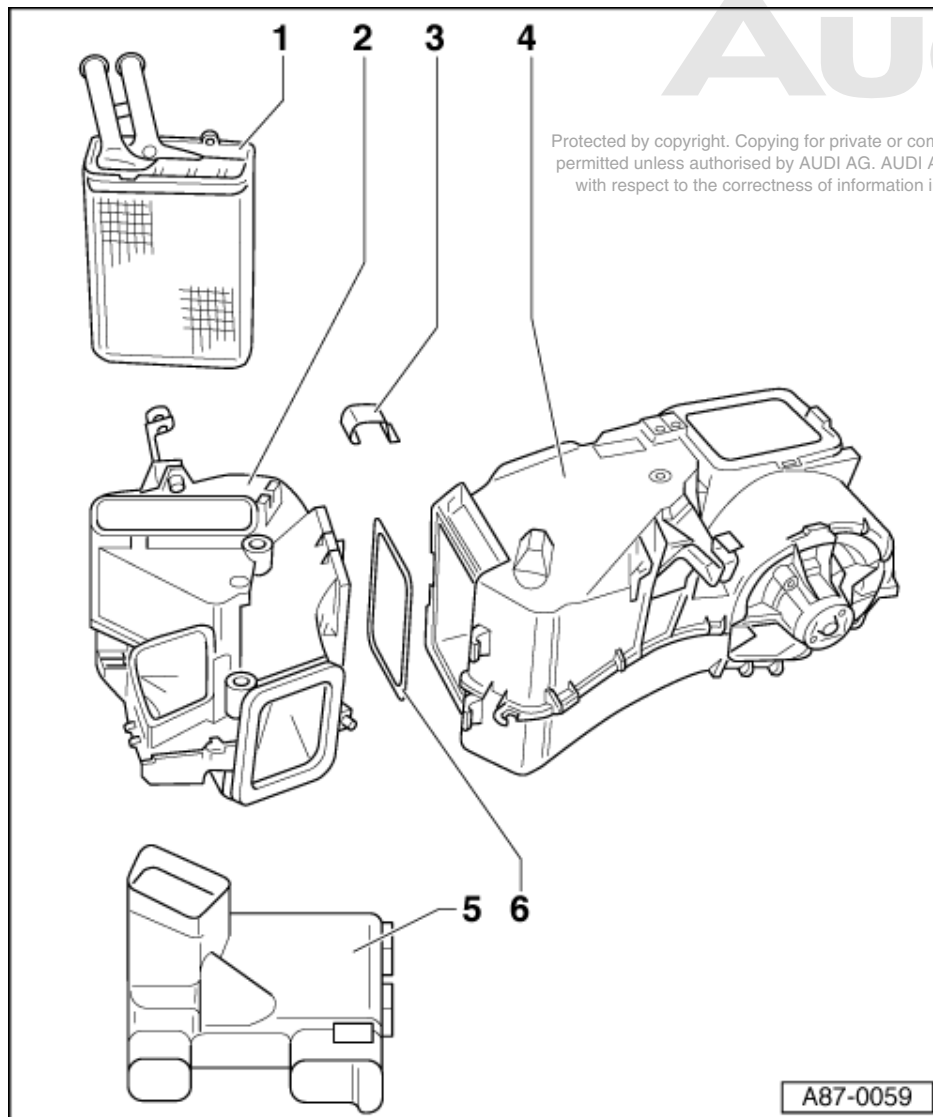
- Adjust the actuating rod.
 - Dimension x = 50 mm
- On assembly, check the freedom of movement of the fresh-air and recirculated-air flap and the vacuum unit linkage.

Note:

Checking vacuum system =>Page **163**.

13 - Dismantling and assembling air conditioner - vehicles up to Model Year 1996

13.1 - Dismantling and assembling air conditioner - vehicles up to Model Year 1996



- Remove the air conditioner=>Page 213

1 Heat exchanger

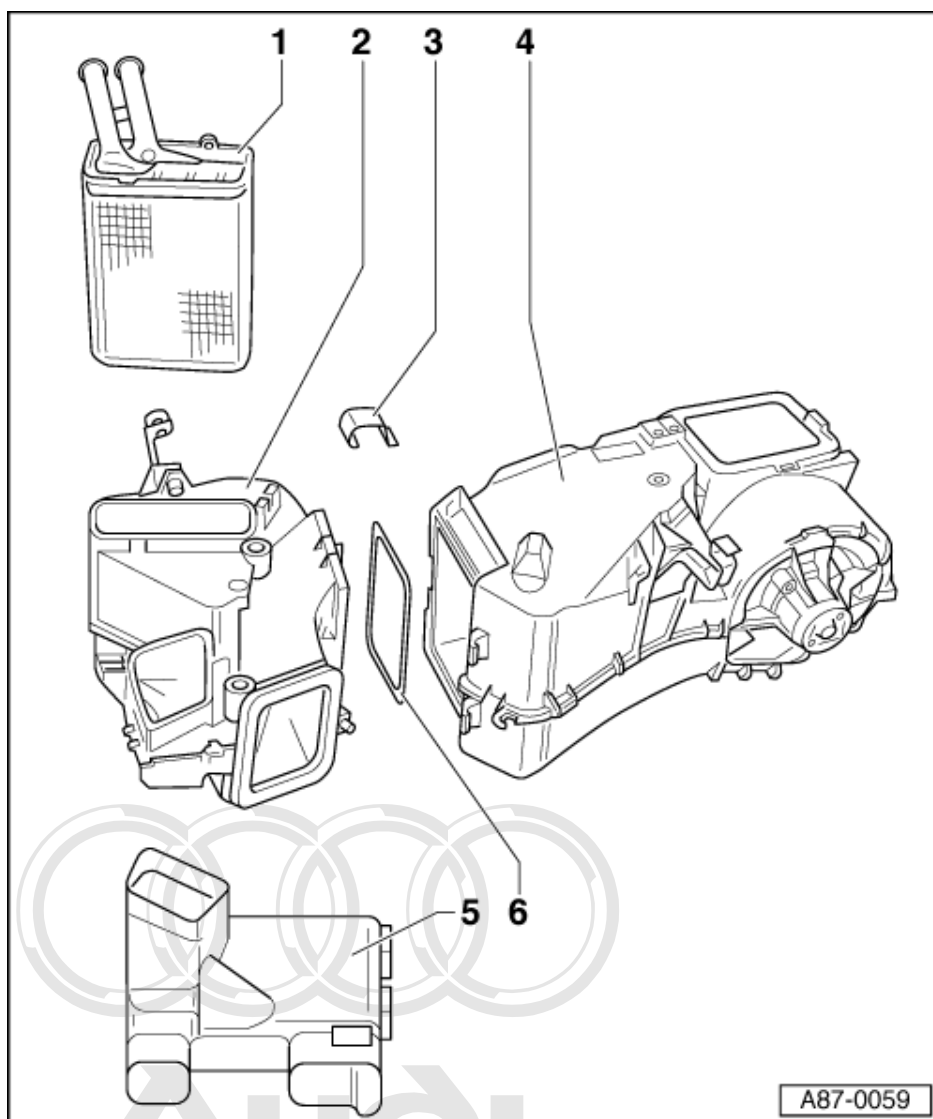
- ♦ Removing and installing =>Page 90
- ♦ Attaching self-adhesive seal => Page 91

2 Heater flap unit

- ♦ Do not dismantle

3 Bracket

- ♦ Prise off using a screwdriver



4 Evaporator housing

- ♦ Dismantling and assembling => Page 222

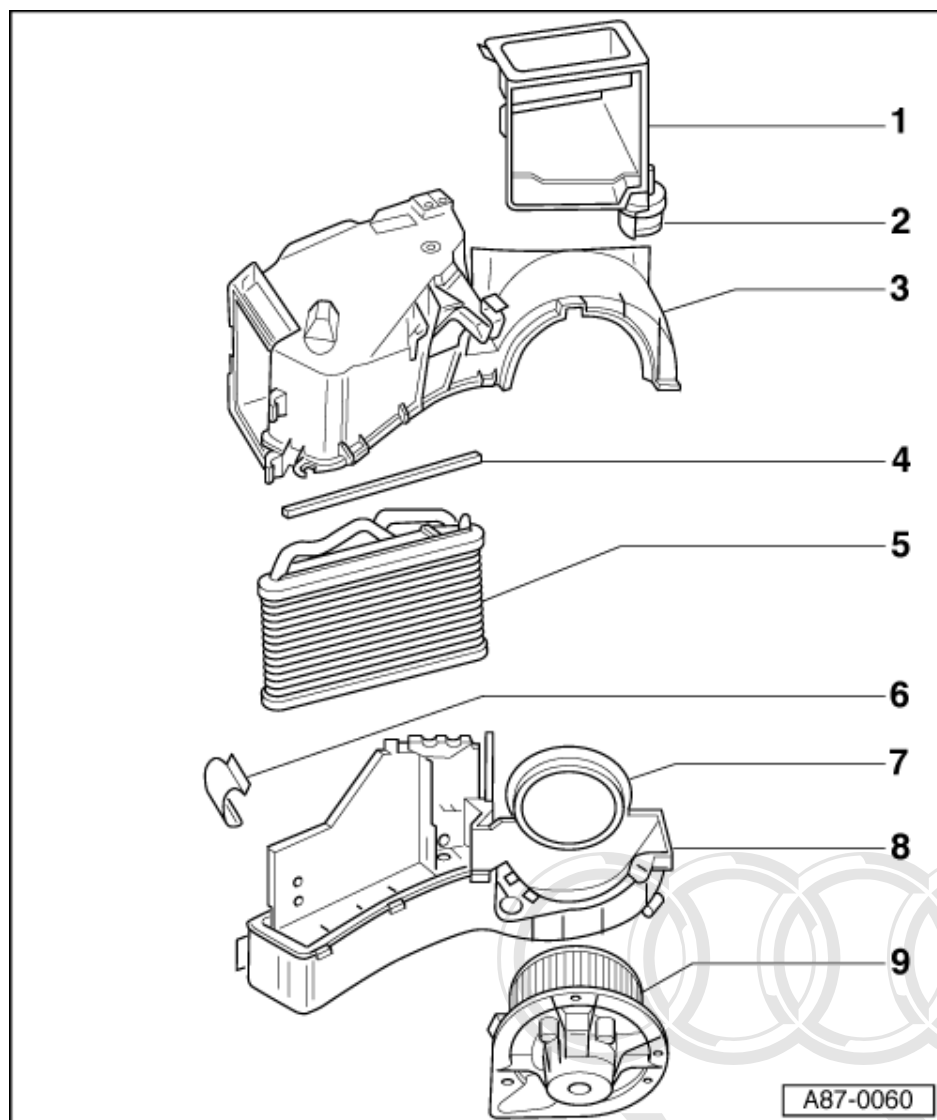
5 Footwell vent

- ♦ Removing and installing =>Page 158

6 Gasket

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13.2 - Disassembling and assembling evaporator housing



- Dismantle the air conditioner =>Page 221

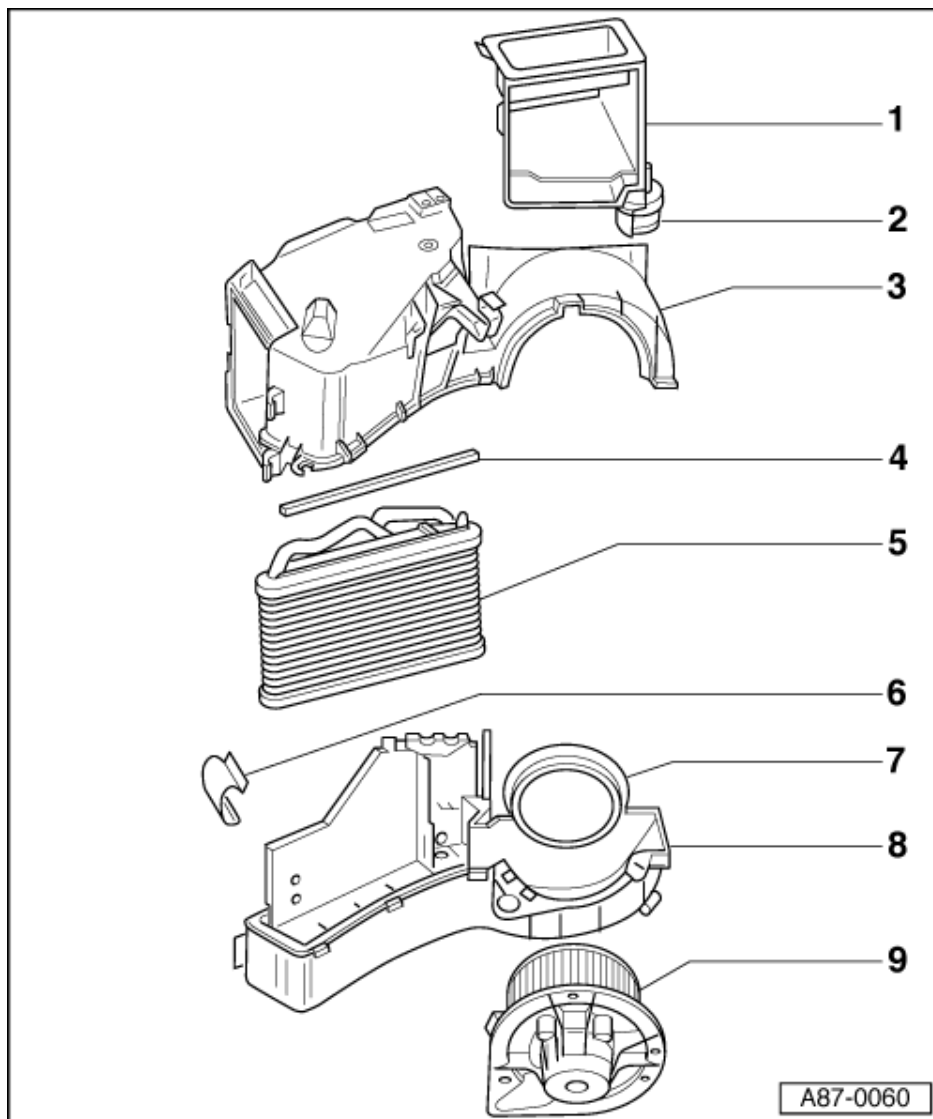
1 Intake

- ◆ With air-flow flap
- ◆ Removing and installing air flow flap =>Page 223
- ◆ Before assembly, coat the sealing surfaces to the top half of housing with silicone rubber.

2 Vacuum unit for fresh-air and recirculated-air flap

- ◆ Removing and installing =>Page 219

3 Upper section of housing



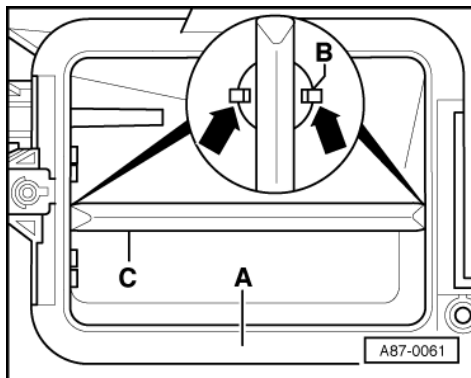
- 4 **Gasket**
 - ♦ Glued into the top half of the evaporator housing
- 5 **Evaporator**
- 6 **Bracket**
 - ♦ Prise off using a screwdriver
- 7 **Intake ring**
 - ♦ Secured by a cast pin to the lower half of the housing to prevent turning
- 8 **Bottom part of housing**
 - ♦ Before assembly, coat the sealing surfaces to the top half of housing with silicone rubber.
- 9 **Fresh-air blower -V2**
 - ♦ Removing and installing =>Page 157

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13.3 - Removing and installing air-flow flap

Removing

- Remove the air flow flap positioning motor -V71 => Page 218 .



- -> Disconnect the intake housing -A- from the evaporator housing => Page 222 .
- Press the two lugs back -B- and remove both mounts.
- Remove the air-flow flap -C-

Installing

Installation is carried out in the reverse order; note the following:

- Insert the air-flow flap at the correct side:
 - The longer side of the air-flow flap faces in the direction of travel and the teeth of the mount point downwards.

14 - Repairing refrigerant circuit - vehicles from Model Year 1997

14.1 - Repairing refrigerant circuit - vehicles from Model Year 1997

Notes:

- ♦ Never top up refrigerant in refrigerant circuit (empty circuit, evacuate and re-fill).
- ♦ The replacement compressor contains all the refrigerant oil to be used to fill the refrigerant circuit.

=> Air conditioner - with refrigerant R134a; Filling Quantities; Approved refrigerant oils

- ♦ Different types of refrigerant are specified for Zexel and Nippondenso/Denso compressors:

=> Air conditioner - with refrigerant R134a; Filling Quantities; Approved refrigerant oils

- ♦ The specified diameter for the O-ring seals and the tightening torque also apply to the screwed connections in the refrigerant pipes or hoses between the individual components.
- ♦ Only install O-ring seals which are approved for the refrigerant R134a:

=> Air conditioner - with refrigerant R134a; Components of the refrigerant circuit

- ♦ On the Zexel compressor, the O ring seals are not colour coded (for air conditioner compressor speed sender -G111, oil drain screw and pressure-relief valve) They are supplied as a set:

=> Parts List

- ♦ Check refrigeration capacity => Page 192 .
- ♦ Checking pressures in the refrigerant circuit:

=> Air conditioner - with refrigerant R134a

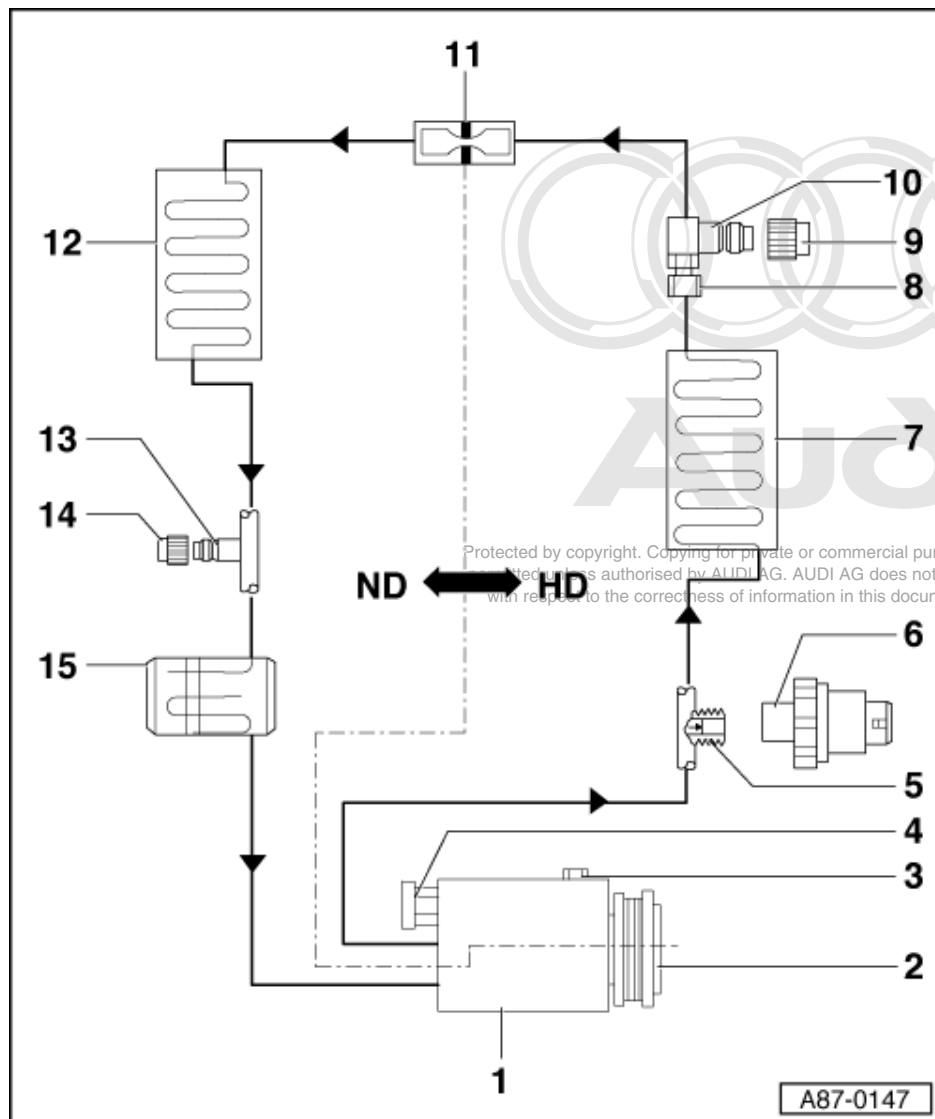
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- ♦ All other repairs and tests not described in this workshop manual

=> Air conditioner - with refrigerant R134a

14.2 - Assignment of air conditioner compressors

Engine	Make
4-cylinder grey cast iron	Zexel
4-cylinder light alloy	Nippondenso/Denso
6-Cylinder	Nippondenso/Denso



HD = High-pressure end

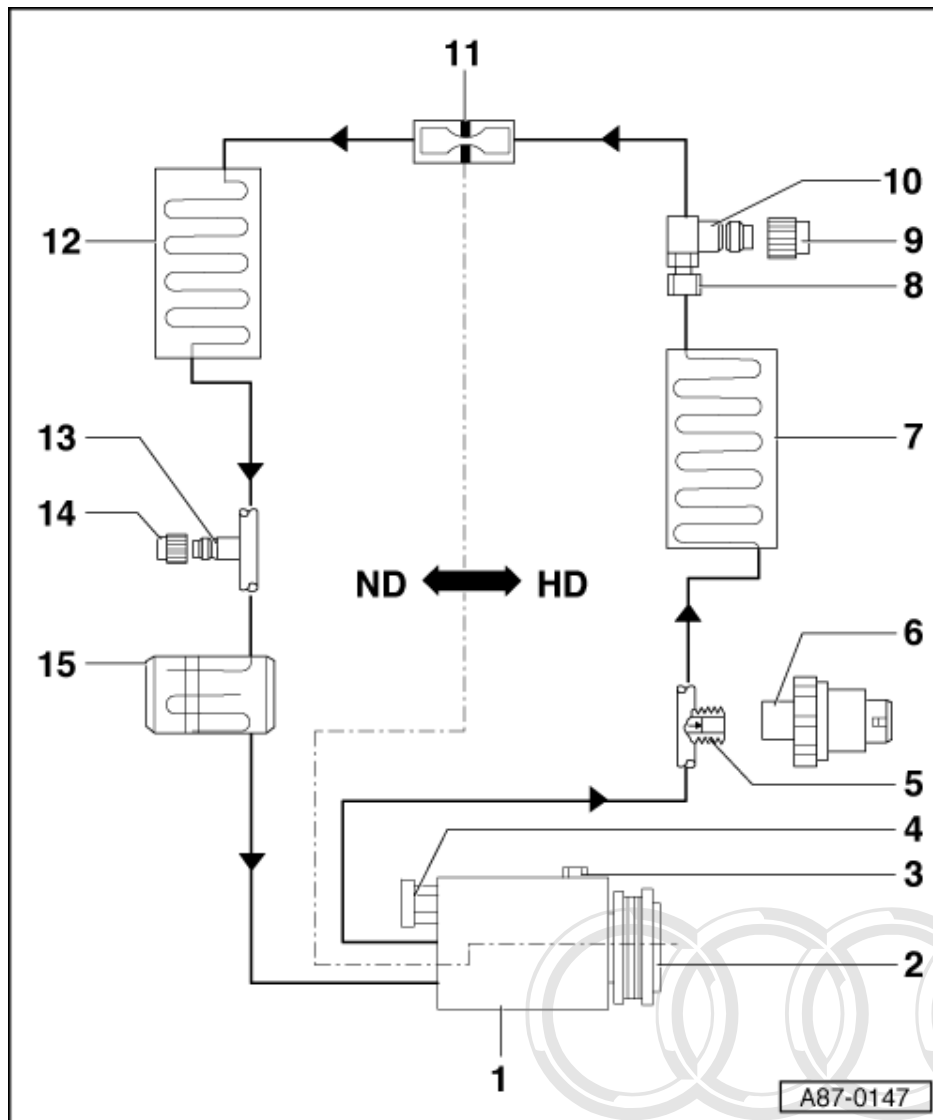
ND = Low-pressure end

1 Compressor

- ♦ O-ring seal for Zexel compressor):
for low-pressure connection:
17.2 mm/1.8 mm
for high-pressure connection:
14.0 mm/1.8 mm
- ♦ Tightening torque for Zexel compressor):
low-pressure connection: 40 Nm
high-pressure connection: 30 Nm
- ♦ Removing and installing refrigerant pipe on Nippondenso/Denso compressor => Page 210

- ♦ Removing ribbed belt.

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 13

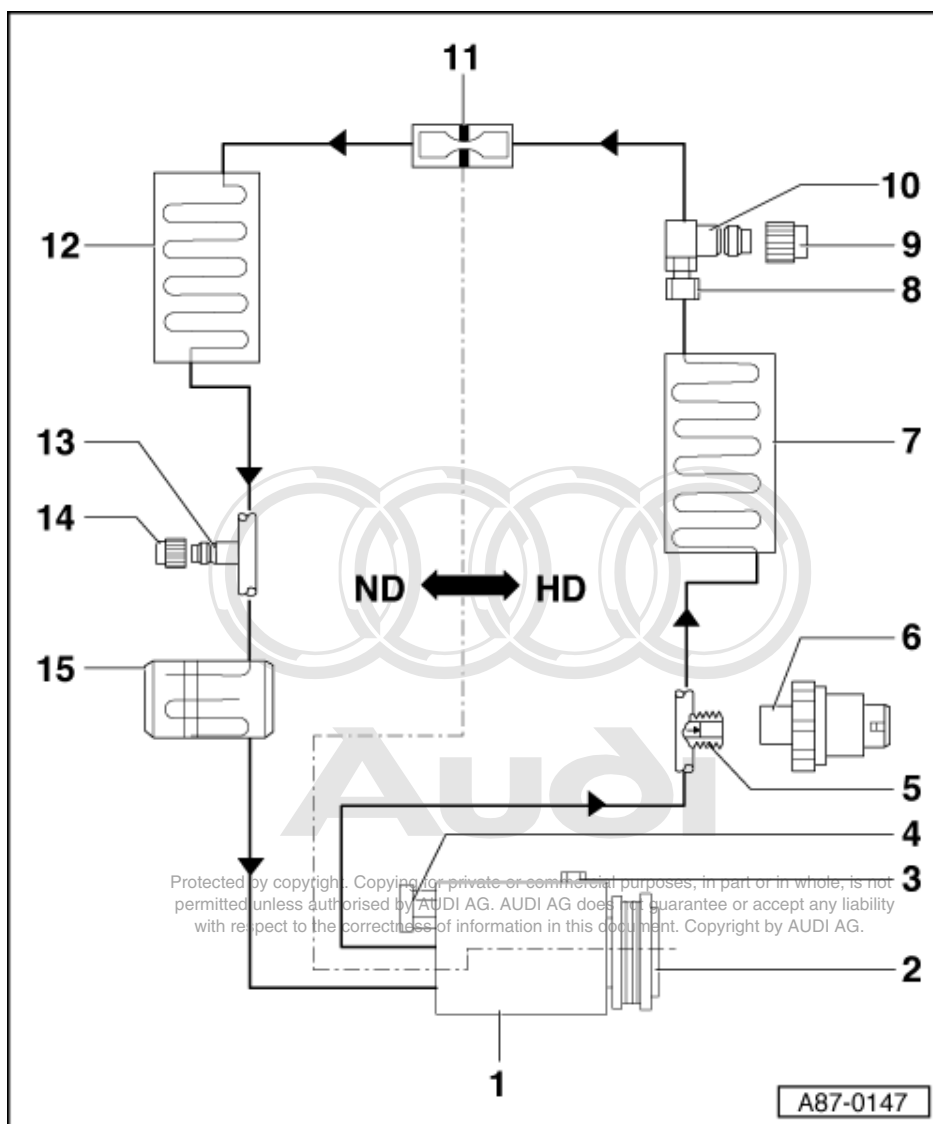


- ♦ Removing and installing compressor => Page 211
- ♦ After the installation of a new compressor or filling with fresh refrigerant oil (e.g. after blowing out the refrigerant circuit), turn the compressor 10 revolutions by hand before the first start to avoid damage to the compressor.

2 Air conditioner magnetic clutch -N25

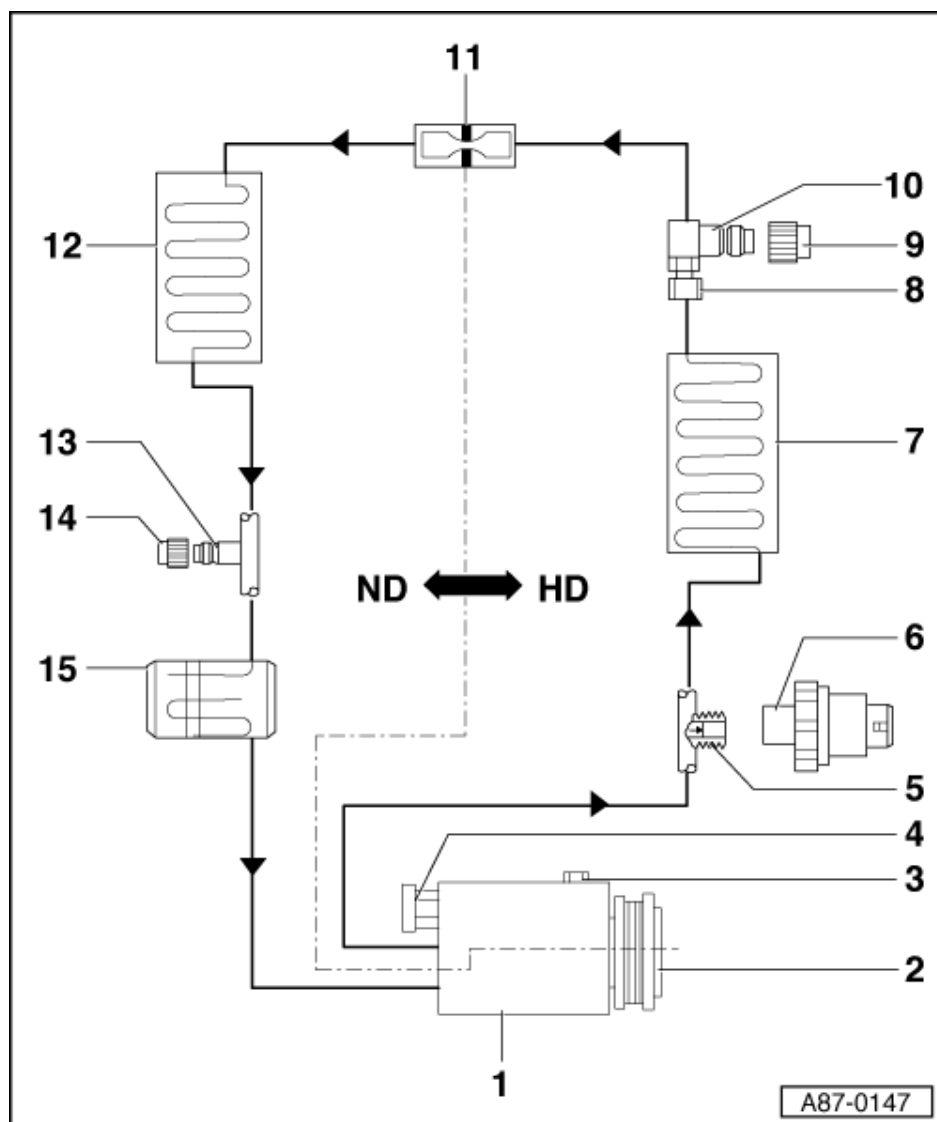
- ♦ Repairing.
Zexel compressor => Page 136

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3 Oil drain plug

- ◆ In the Nippondenso/Denso compressor, a sealing ring is installed instead of an O-ring seal.
- ◆ Always renew
- ◆ O-ring seal for Zexel compressor:
7.8 mm/1.9 mm
- ◆ Tightening torque:
Zexel compressor: 10 Nm
- ◆ Tightening torque:
Nippondenso/Denso compressor: 30 Nm
- ◆ May only be unscrewed to drain refrigerant oil if compressor is removed.
Crank compressor with the magnetic clutch plate to accelerate extraction of refrigerant oil.



4 Pressure relief valve

- ♦ O-ring seal
8.8 mm/1.9 mm
- ♦ Tighten to 10 Nm
- ♦ Connection without valve May only be unscrewed if the refrigerant circuit is empty

5 Connection with valve

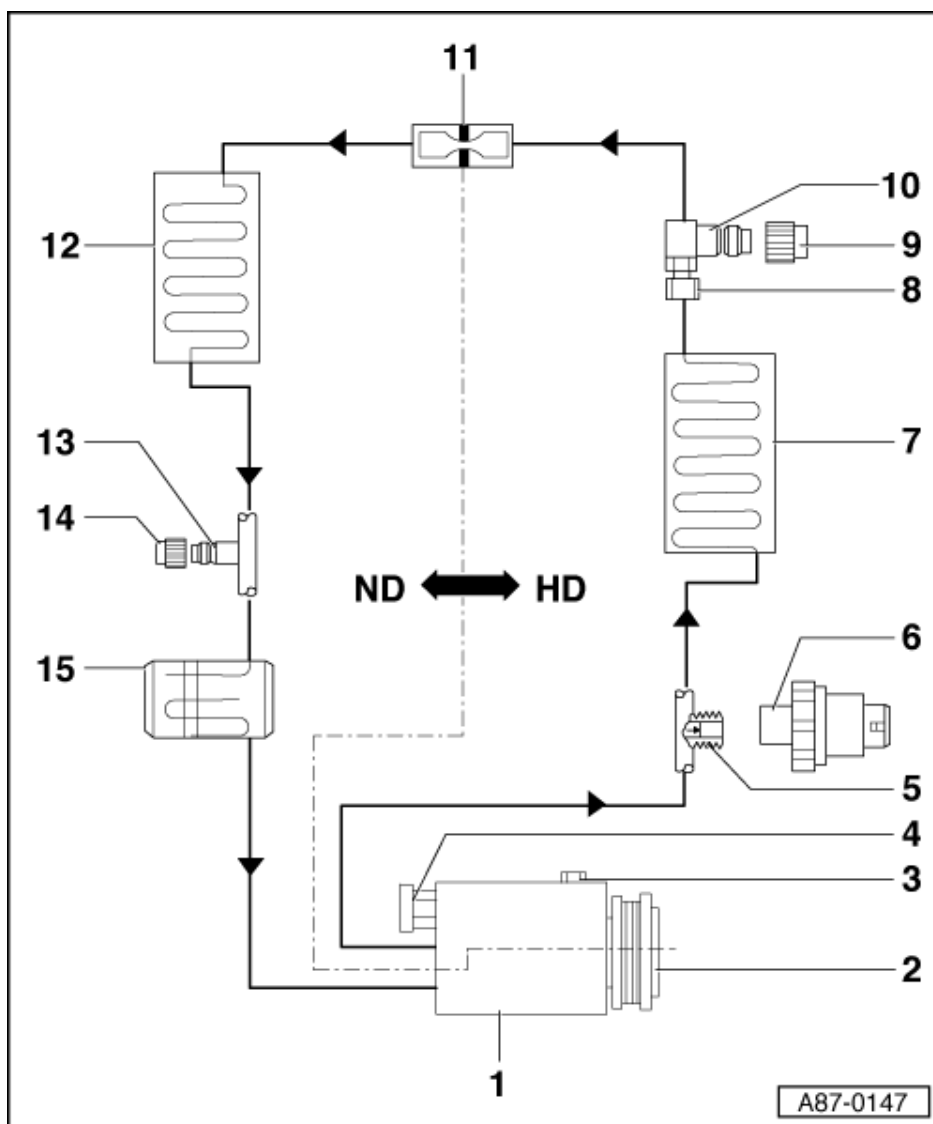
6 Air conditioner pressure switch -F129

- ♦ Function, removing and installing =>Page 122

7 Condenser

- ♦ O-ring seal
Inlet: 14.0 mm/1.8 mm
Outlet: 10.8 mm/1.8 mm
- ♦ Depending upon the engine version, the refrigerant lines may have screw connections or block connections

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- ♦ Tightening torque for screw connection
 Inlet: 30 Nm
 Outlet: 15 Nm
- ♦ Removing and installing refrigerant lines with block connection => Page 233

8 Union in the refrigerant pipe

- ♦ O-ring seal
 10.8 mm/1.8 mm
- ♦ Tightening torque: 15 Nm

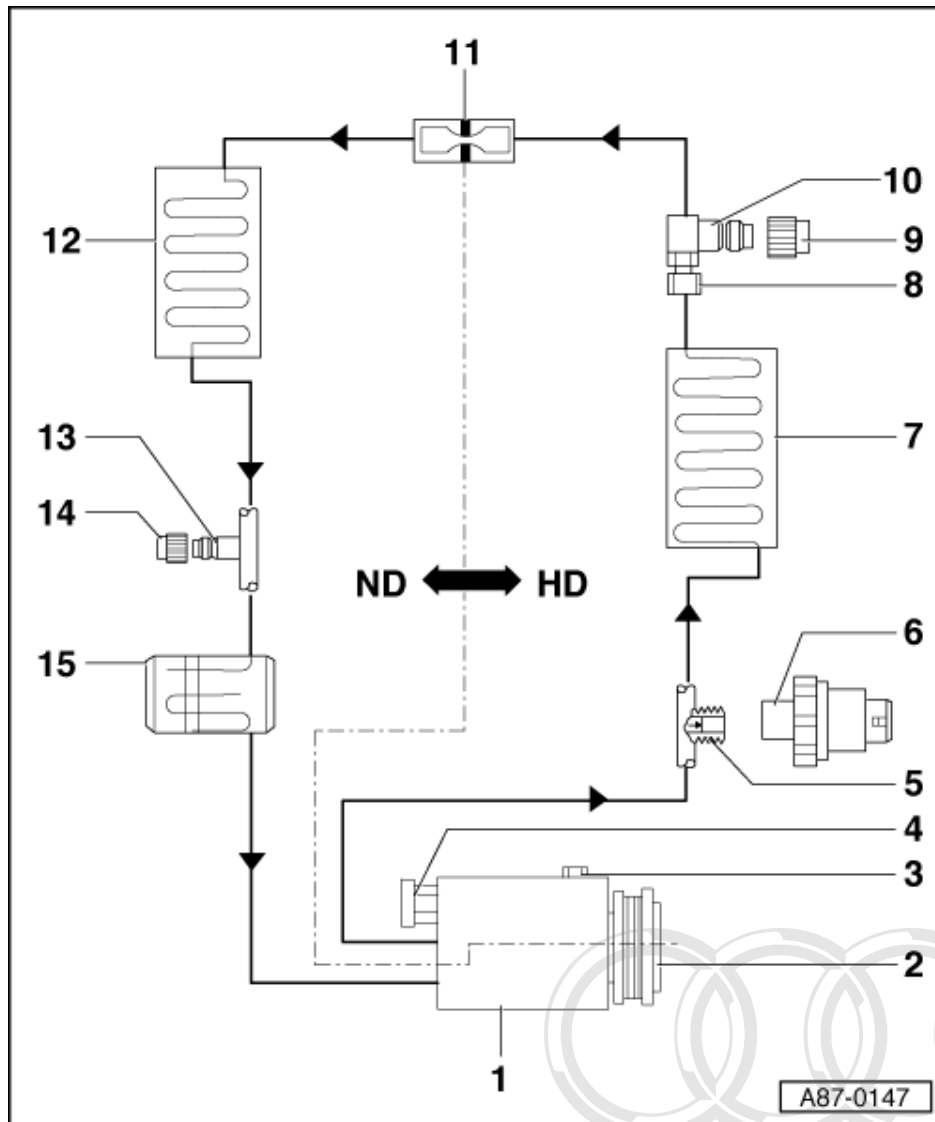
9 Cap

- ♦ With seal
- ♦ Must be fitted

10 Service connection

- ♦ High-pressure side
- ♦ For measuring, draining and filling with service station

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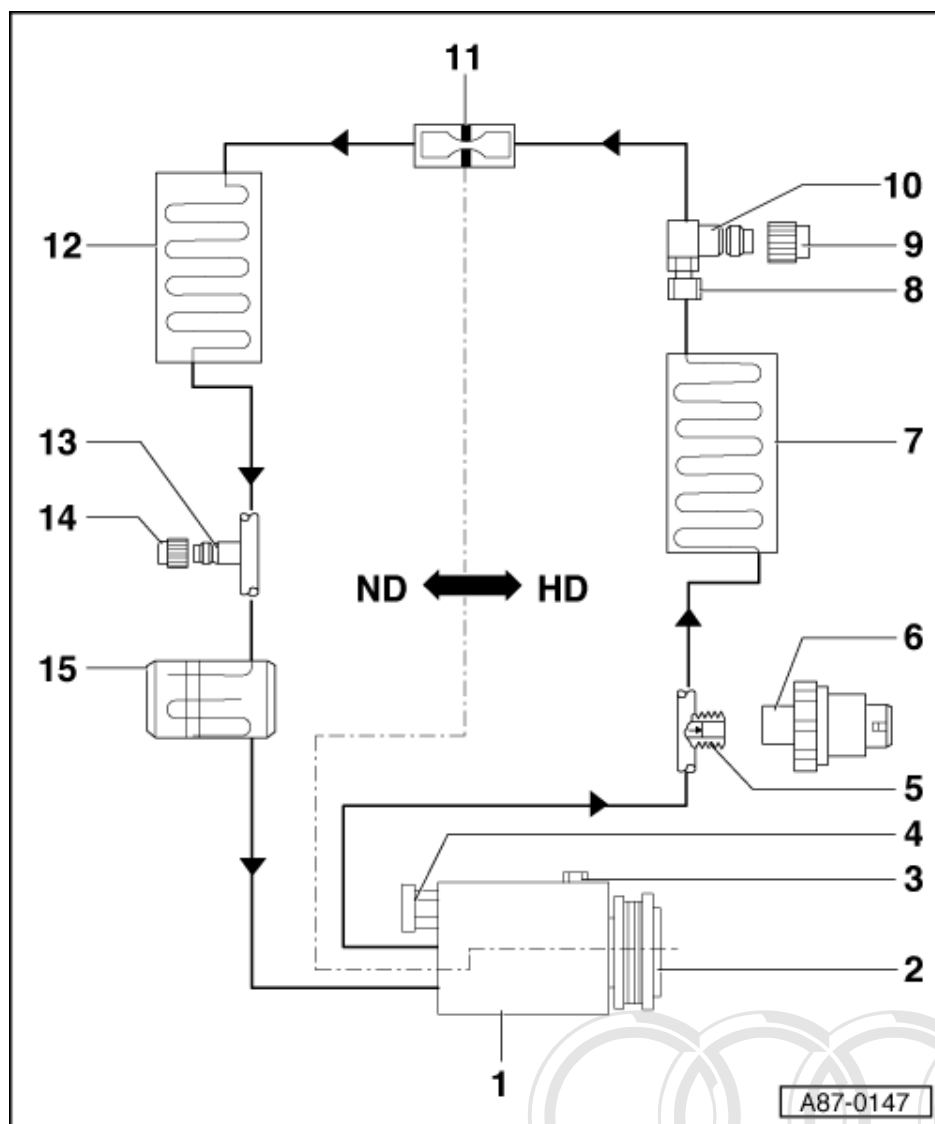
**11 Restrictor**

- ◆ In the screwed connection - **8** -
- ◆ O-ring seal
7.5 mm/1.5 mm
- ◆ Replace restrictor with O- ring seal
- ◆ Removing and installing =>Page **207**
- ◆ Apply a small amount of refrigerant oil to the O- ring seal before installing the restrictor

12 Evaporator

- ◆ O-ring seal at air conditioner
Inlet: 10.8 mm/1.8 mm
Outlet: 17.2 mm/1.8 mm
- ◆ Tightening torque: 25 Nm
- ◆ O-ring seal at evaporator
Inlet: 13.4 mm/2.4 mm
Outlet: 13.4 mm/2.4 mm
- ◆ Tightening torque: 5 Nm
- ◆ Removing and installing refrigerant line => Page **233**
- ◆ Removing and installing =>Page **245**

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13 Service connection

- ♦ Low-pressure end

14 Cap

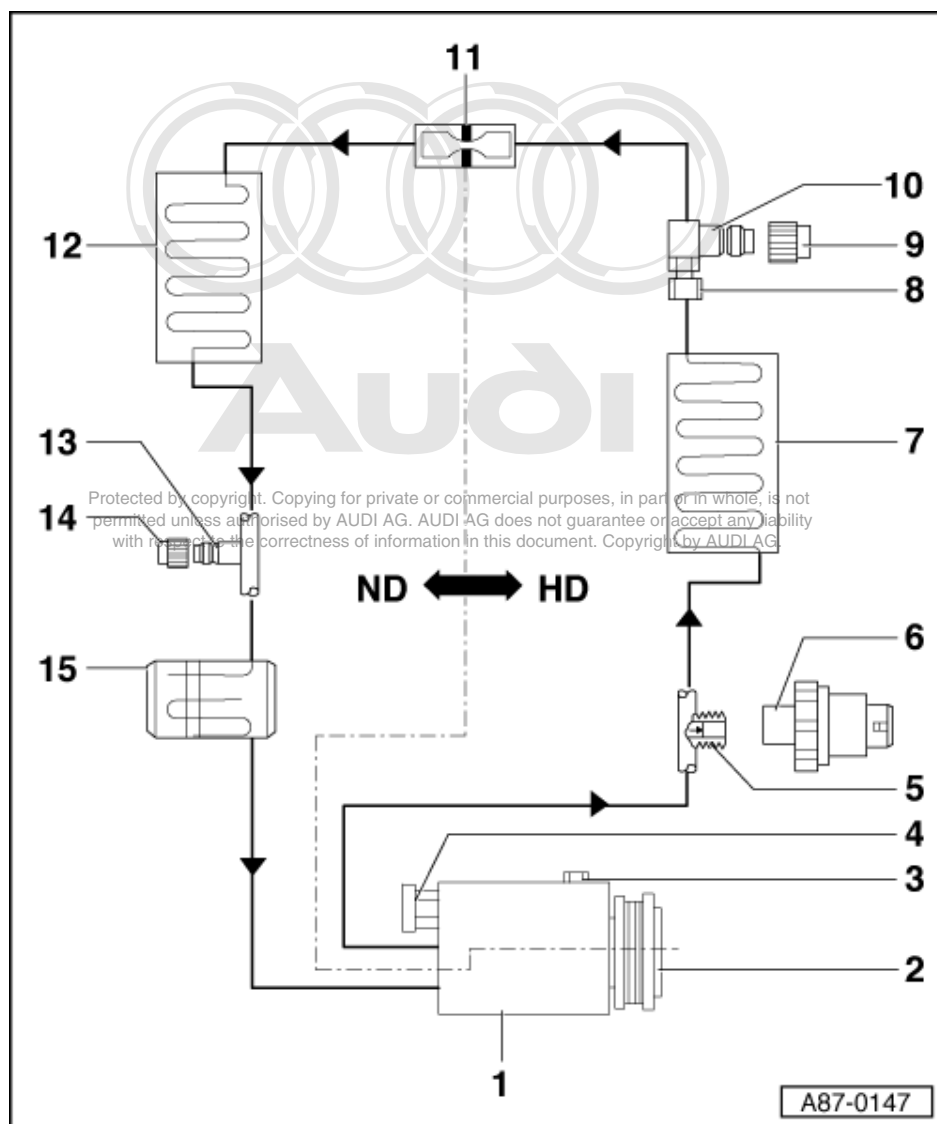
- ♦ With seal
- ♦ Must be fitted

15 Reservoir

Note:

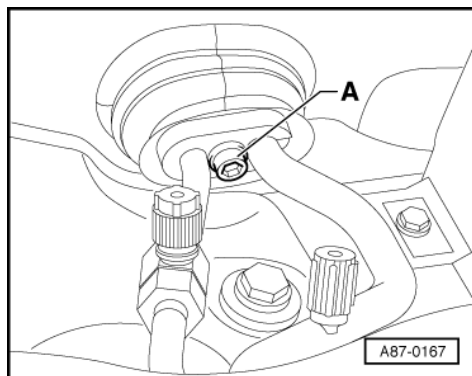
The Audi RS4 currently uses reservoirs with block connections.

- ♦ O-ring seals:
 - Design with screw connections
 Inlet: 17.2 mm; 1.8 mm
 Outlet: 17.2 mm; 1.8 mm
 - Design with block connections => Page 234



- ◆ Tightening torque for refrigerant lines:
 - Design with screw connections
 - Inlet: 40 Nm
 - Outlet: 40 Nm
 - Design with block connections => Page 234
- ◆ Removing and installing:
 - Design with screw connections => Page 208
 - Design with block connections => Page 234

14.3 - Removing and installing refrigerant lines to the evaporator



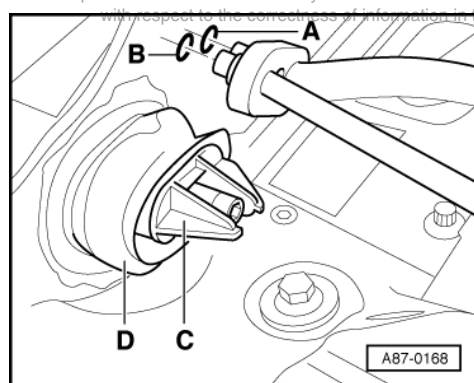
Removing

- Drain the refrigerant circuit
- => Air conditioner - with refrigerant R134a
- -> Screw out the bolts -A- (15 Nm).
 - Remove the refrigerant lines from the evaporator.

Note:

Cap -C-, an evaporator spare part, for example, is suitable for sealing the open connections on the evaporator.

Installing



Installation is carried out in the reverse order; note the following:

- -> Replace the O-ring seals -A- (17.2 mm/1.8 mm) and -B- (10.8 mm/1.8 mm).
- Install the refrigerant lines with no tension.
- Check that the grommet -D- is seated correctly.

14.4 - Removing and installing refrigerant pipes on a condenser with block connection

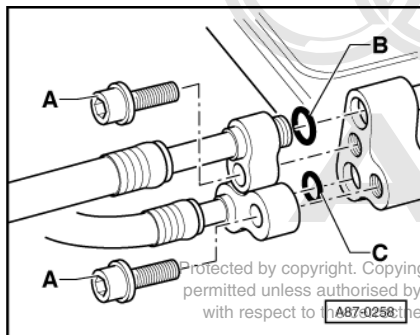
Removing

- Move lock carrier to service position.

=> General Body Assembly, Exterior; Repair group 50; Body front; Lock carrier service position

- Drain the refrigerant circuit

=> Air conditioner - with refrigerant R134a



- -> Screw out the bolts -A- (20 Nm).
- Remove the refrigerant pipes from the condenser.

Installing

Installation is carried out in the reverse order; note the following:

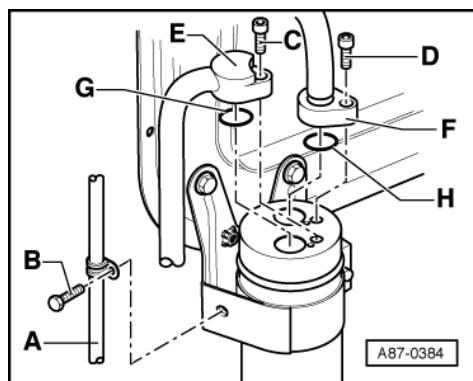
- Replace the O-ring seals -B- (14.0 mm/1.8 mm) and -C- (10.8 mm/1.8 mm).

14.5 - Removing and installing reservoir with block connections

Note:

The Audi RS4 currently uses reservoirs with block connections.

Removing



- Drain the refrigerant circuit

=> Air conditioner - with refrigerant R134a

- Move lock carrier to the service position.

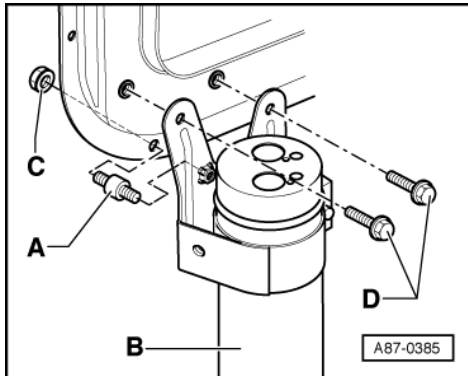
=> General Body Assembly, Exterior; Repair group 50; Body front; Lock carrier-service position Body front Lock carrier-service position

- Remove the charge air cooler.

=> Relevant Workshop Manual Engine, Mechanical Components

- -> Detach the refrigerant line -A- from the reservoir by unscrewing and removing bolt -B-.
- Unscrew and remove the bolts -C- and -D-.

- Detach the refrigerant lines -E- (to the compressor) and -F- (from the evaporator) from the reservoir.



- -> Unscrew and remove the nut -C- and the bolts -D-.
- Take off the reservoir -B-.

Notes:

- ◆ Close the open pipe connections.
- ◆ The refrigerant line attachment differs according to the engine version.

=> Parts List

- ◆ Keep the reservoir closed for as long as possible, only remove the caps immediately before installation (the reservoir contains a desiccant bag which soon becomes saturated with moisture and hence unusable when the reservoir is open)

Installing

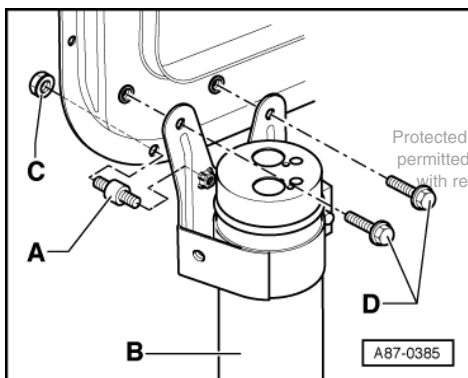
Installation is carried out in the reverse order; note the following:

Before installing the reservoir:

=> Air conditioner - with refrigerant R134a; Replacing components of the refrigerant circuit

Notes:

- ◆ The removed reservoir contains refrigerant oil which has to be returned to the refrigerant circuit (with a new reservoir)
- ◆ The correction of the oil quantity depends upon the type of complaint:
 - If, for example, the reservoir has been damaged in an accident (no refrigerant has escaped, no moisture or dirt has penetrated the refrigerant circuit), the air conditioner may be repaired without extensive repair work by weighing the old and new reservoirs: Fill the new container with refrigerant oil until it reaches the weight of the removed reservoir.

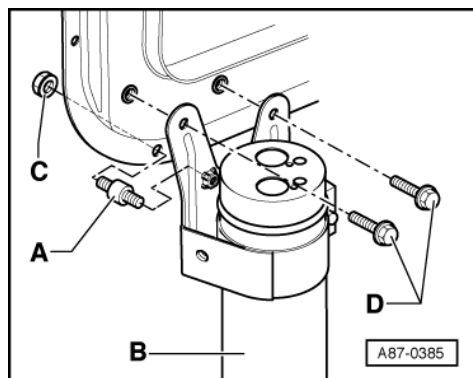


- If an indeterminate quantity of refrigerant oil has escaped or dirt and moisture has penetrated the refrigerant circuit, clean the refrigerant circuit with compressed air and nitrogen.

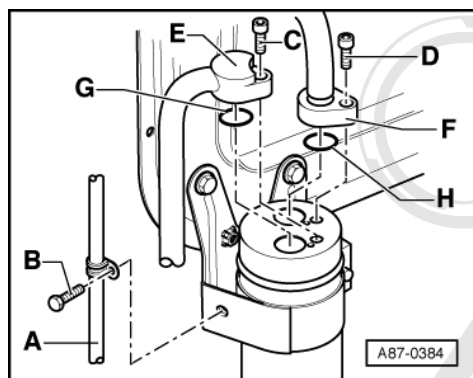


=> Air conditioner - with refrigerant R134a; Replacing components of the refrigerant circuit

- ♦ -> The connections on reservoir -B- may be marked with "IN (from the evaporator) and "OUT"(to the compressor).



- -> Install the bonded rubber bush -A- in the reservoir.



- -> Replace the O-ring seals -G- and -H- (14.3 mm / 2.4 mm).
- Install the refrigerant lines with no tension and ensure that there is adequate clearance to other components.
- Tighten the bolts -C- and -D- to 20 Nm.
- Refit all removed parts.
- Evacuate and refill the refrigerant circuit.

=> Air conditioner - with refrigerant R134a

15 - Removing and installing air conditioner - vehicles from Model Year 1997

15.1 - Removing and installing air conditioner - vehicles from Model Year 1997

Special tools, testers and auxiliary equipment required

- ♦ Hose clamps 3093 or 3094
- ♦ Commercially available compressed air gun

Removing

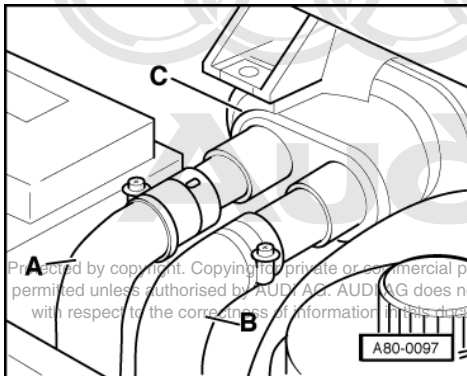
Notes:

- ♦ On removal, note the bolt lengths and assignment for re-installation.

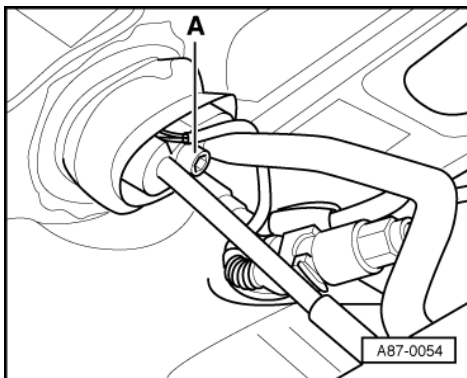
- ♦ All cable ties which are released or cut open when the air conditioner is removed must be replaced in the same position when installing.
- Drain the refrigerant circuit

=> Air conditioner - with refrigerant R134a

- Cover the driver's and passenger's seat with protective covers.
- Switch the ignition on.
- In vehicles with electrically adjustable seats, move them back as far as possible before disconnecting the battery.
- Observe or obtain radio code on vehicles with coded radio.
- Disconnect earthing strap at battery with ignition switched off.
- Open the cover of the coolant expansion tank



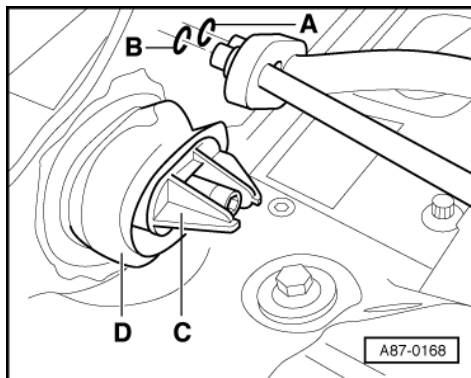
- -> Mark the layout of the coolant hoses -A- and -B-.
- Pinch off the coolant hoses to the heat exchanger with hose clamps V.A.G 3094 and detach the hoses.
- Place a container under the connection for hose -A-.
- Use the compressed air pistol to blow the coolant carefully out of the heat exchanger through the coolant hose -B-.
- Remove the grommet -C-.



- -> Remove bolt -A-.
- Remove the refrigerant lines to the evaporator => Page 233 and secure them (e.g. with a cable tie), so they do not get in the way during installation.

Notes:

- ♦ Close the open pipe connections.
- ♦ Cap -C-, an evaporator spare part, for example, is suitable for sealing the open connections on the evaporator. It is also used as a guide during assembly.



- -> Remove the grommet -D-.
- Remove the glove box, the shelf on the driver's side, the centre console and the dash panel:

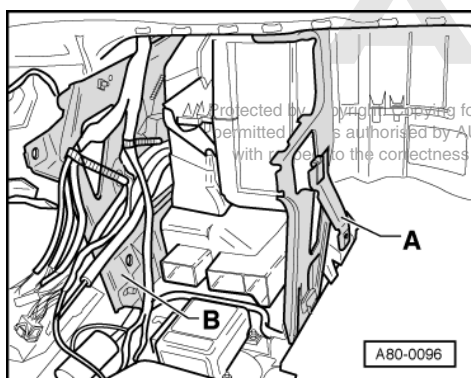
=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing glove box Storage compartments/covers Removing and installing glove box

=> General Body Assembly, Interior; Repair group 68; Storage compartments/covers; Removing and installing driver's storage compartment Storage compartments/covers Removing and installing driver's storage compartment

=> General Body Assembly, Interior; Repair group 70; Dash panel Dash panel

Note:

To ensure that the outer surface of the dash panel is not damaged, the dash panel may only be placed on a clean work bench which should be covered with clean cardboard, for example.

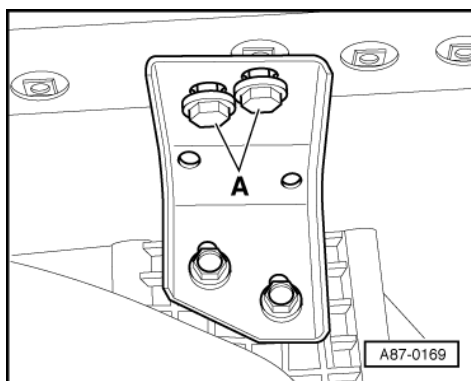


- -> Remove the dash panel support -A-.
- Detach the dash panel support -B- from the vehicle.

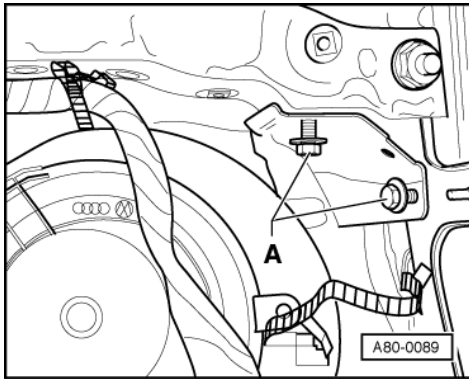
Note:

The upper fastening bolt on the air conditioner cannot be removed.

- Remove the footwell vents => Page 158 .



- -> Screw out the bolts -A-.
- Separate all the electrical connections between the vehicle and the air conditioner at the connectors.



- -> Screw out the bolts -A-.
- Remove the air conditioner towards the passenger's side.

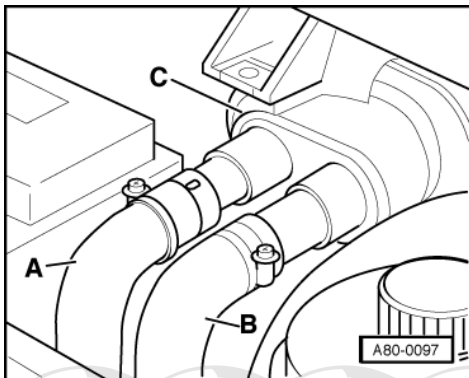
Installing

Installation is carried out in the reverse order; note the following:

Note:

Check all the seals on the air conditioner for damage, replace damaged seals.

- Install the refrigerant lines to the evaporator => Page 233 .



- -> Connect the coolant hoses to the heat exchanger correctly. Note the markings:
 - A - Return hose to the water pump (with vent hole)
 - B - Inlet hose from the cylinder head
- After the installation of the dash panel, check that the grommet -C- is seated correctly.
- Check that the condensation drain hoses are seated correctly => Page 145 .
- Bleed the coolant circuit:

=> Relevant Workshop Manual Engine, Mechanical Components; Repair group 19

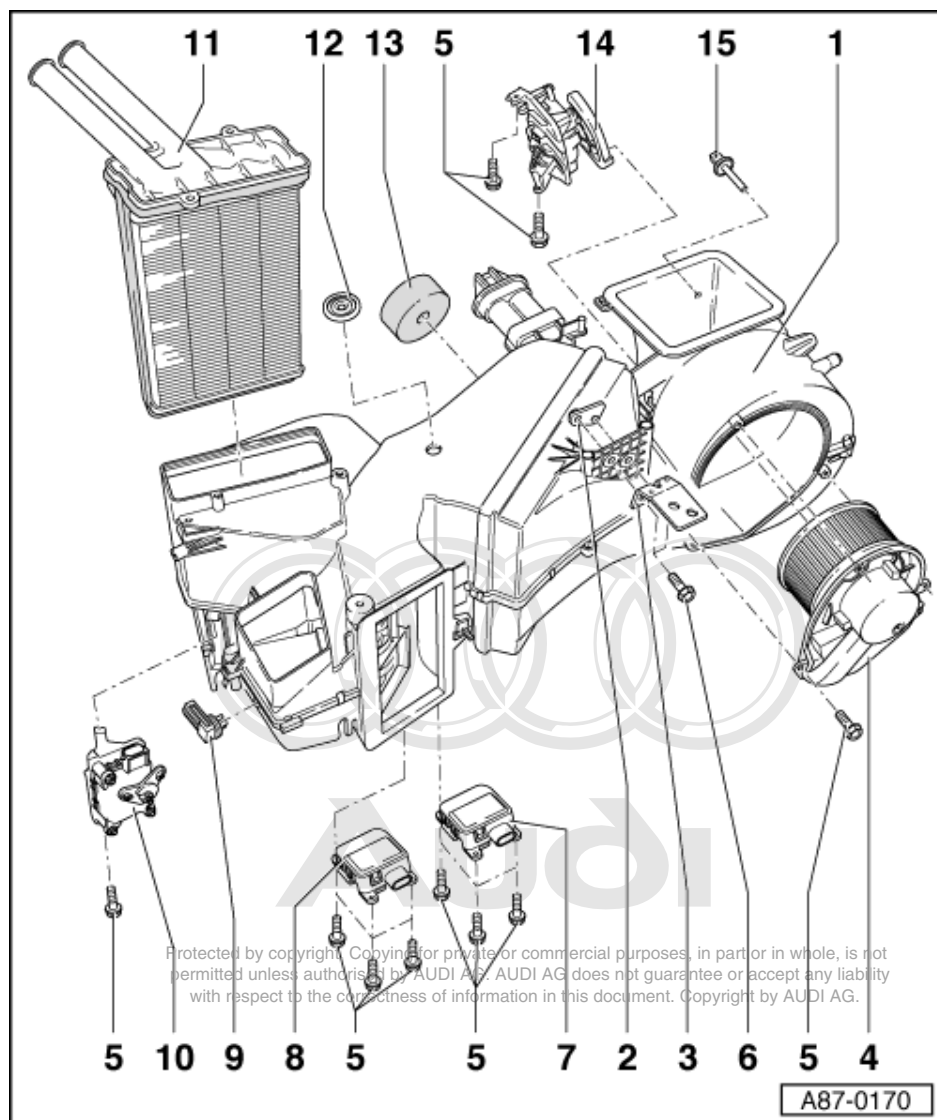
- Evacuate refrigerant circuit and refill:

=> Air conditioner - with refrigerant R134a

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16 - Dismantling and assembling air conditioner - vehicles from Model Year 1997

16.1 - Dismantling and assembling air conditioner - vehicles from Model Year 1997



Note:

In right-hand drive vehicles, the air conditioner is dismantled and assembled in the same way as vehicles up to Model Year 1996 => Page 221 .

- Remove the air conditioner=>Page 236

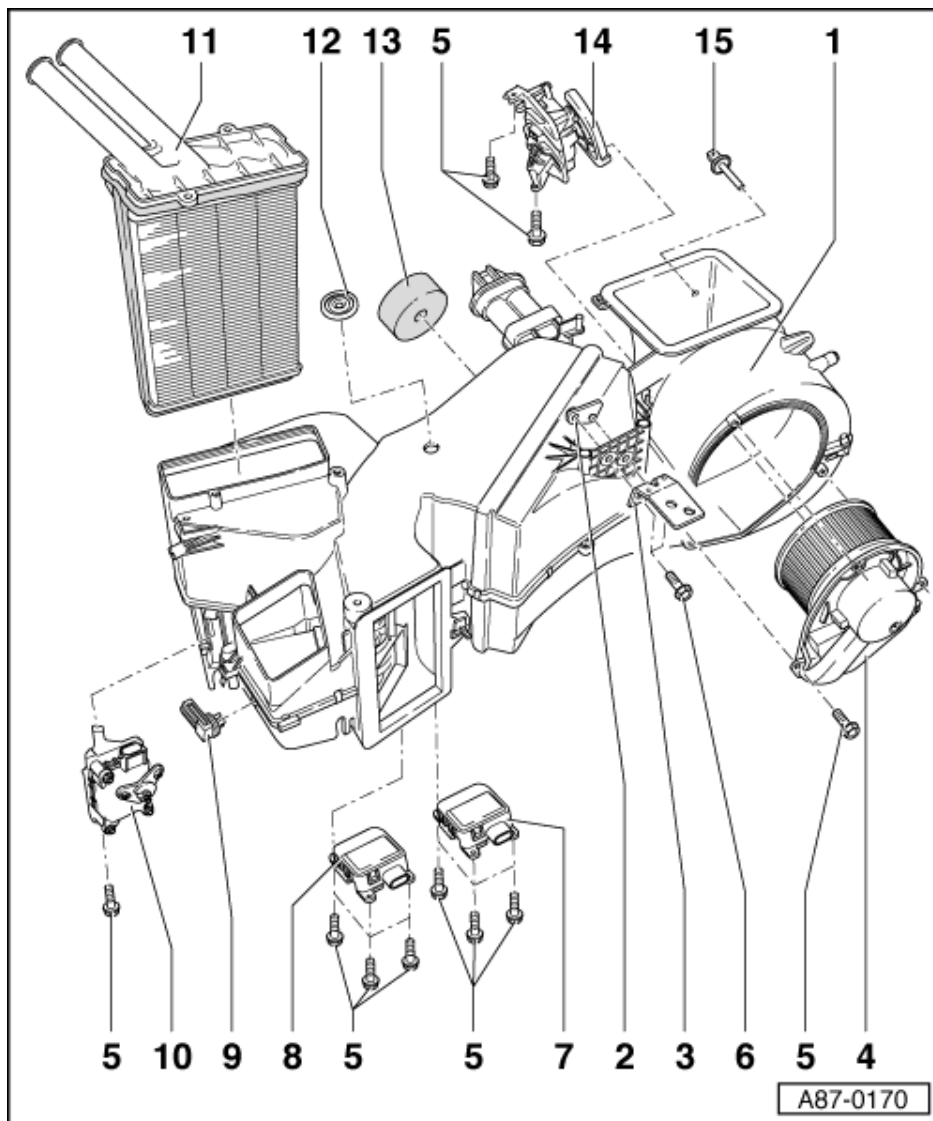
1 Evaporator housing

- ♦ Dismantling and assembling => Page 245

2 Threaded plate

3 Bracket

- ♦ Mark the installation position before loosening the bolts.



4 Fresh-air blower -V2

- ◆ With fresh-air blower control unit -J126
- ◆ Removing and installing fresh air blower -V2 => Page **183**
- ◆ Removing and installing fresh air blower control unit -J126 => Page **184**

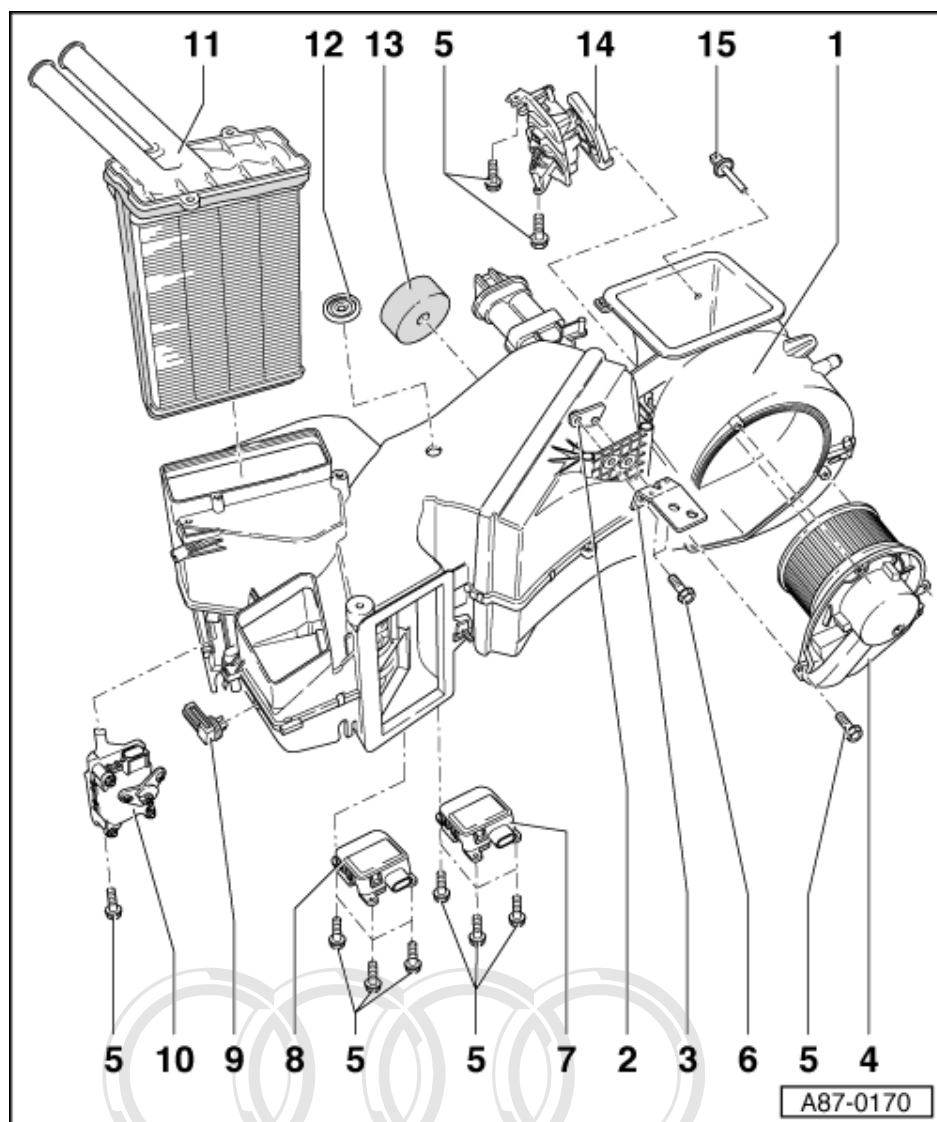
5 Bolt

6 Bolt

7 Temperature flap positioning motor -V68

- ◆ With temperature flap positioning motor potentiometer -G92
- ◆ Colour code for the reversing lever red
- ◆ Removing and installing =>Page **186**

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8 Central flap positioning motor -V70

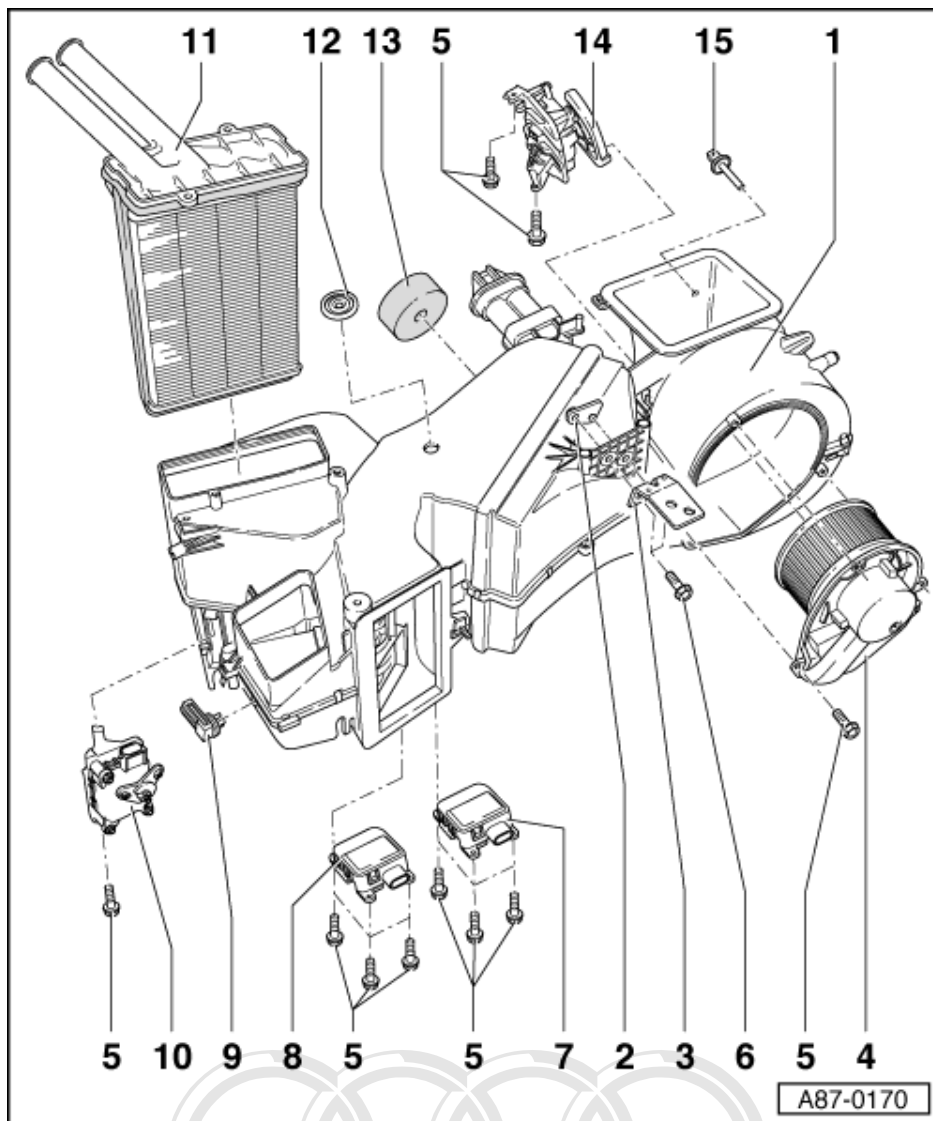
- ◆ With central flap positioning motor potentiometer -G112
- ◆ Colour code for the reversing lever Blue
- ◆ Removing and installing =>Page **187**

9 Footwell vent temperature sensor -G192

- ◆ Removing and installing =>Page **186**

10 Footwell/defroster flap positioning motor -V85:

- ◆ With footwell/defrost flap positioning motor potentiometer -G114
- ◆ Removing and installing =>Page **188**



11 Heat exchanger

- ♦ Removing and installing =>Page 90
- ♦ Attaching self-adhesive seal => Page 91

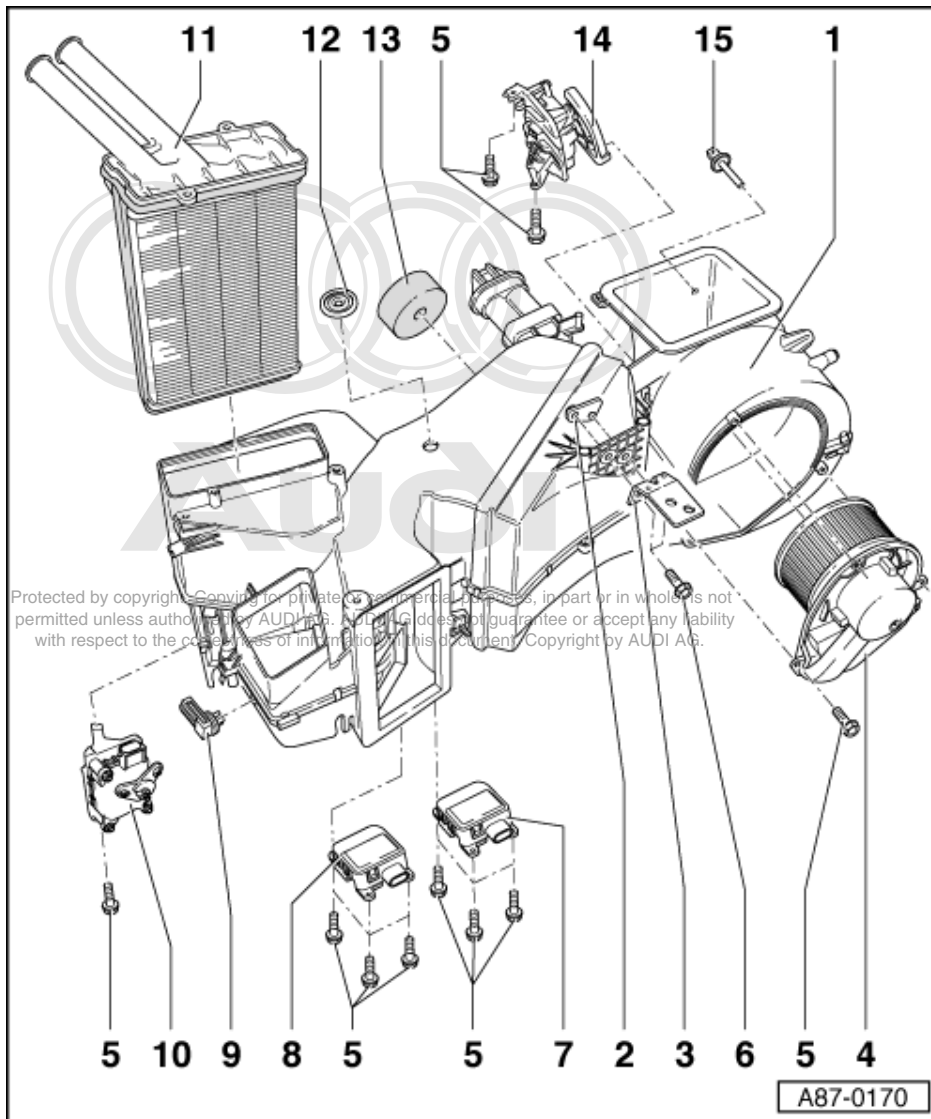
12 Grommet

- ♦ Check correct seating
- ♦ In the grommet is not fitted, cold air may enter the footwell

13 Foam seal

- ♦ Provides a seal between the air conditioner's condensation drain and the drain funnel =>Page 172

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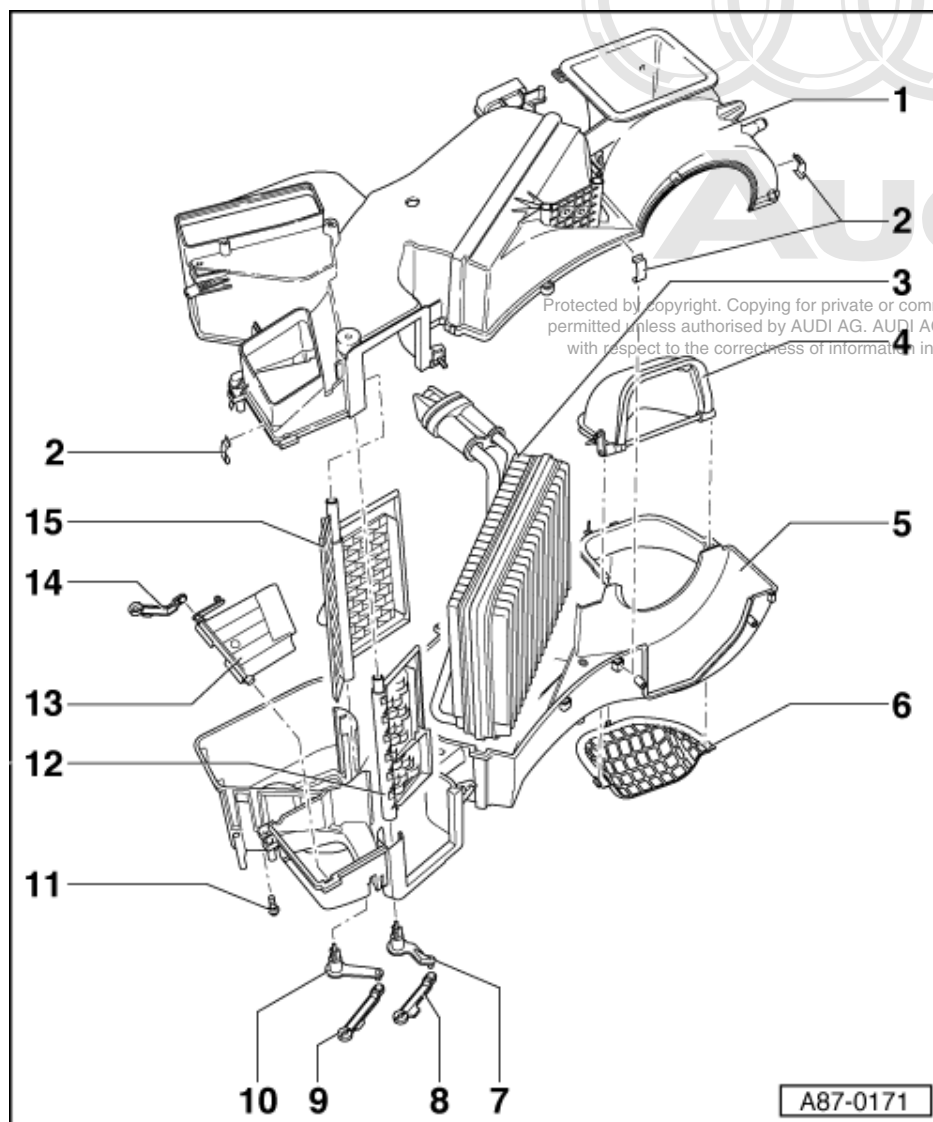
14 Air-flow flap positioning motor -V71

- ◆ With air-flow flap positioning motor potentiometer -G113
- ◆ Actuates the air-flow flap and fresh-air and recirculated-air flap
- ◆ Removing and installing =>Page [189](#)

15 Fresh air intake duct temperature sensor -G89

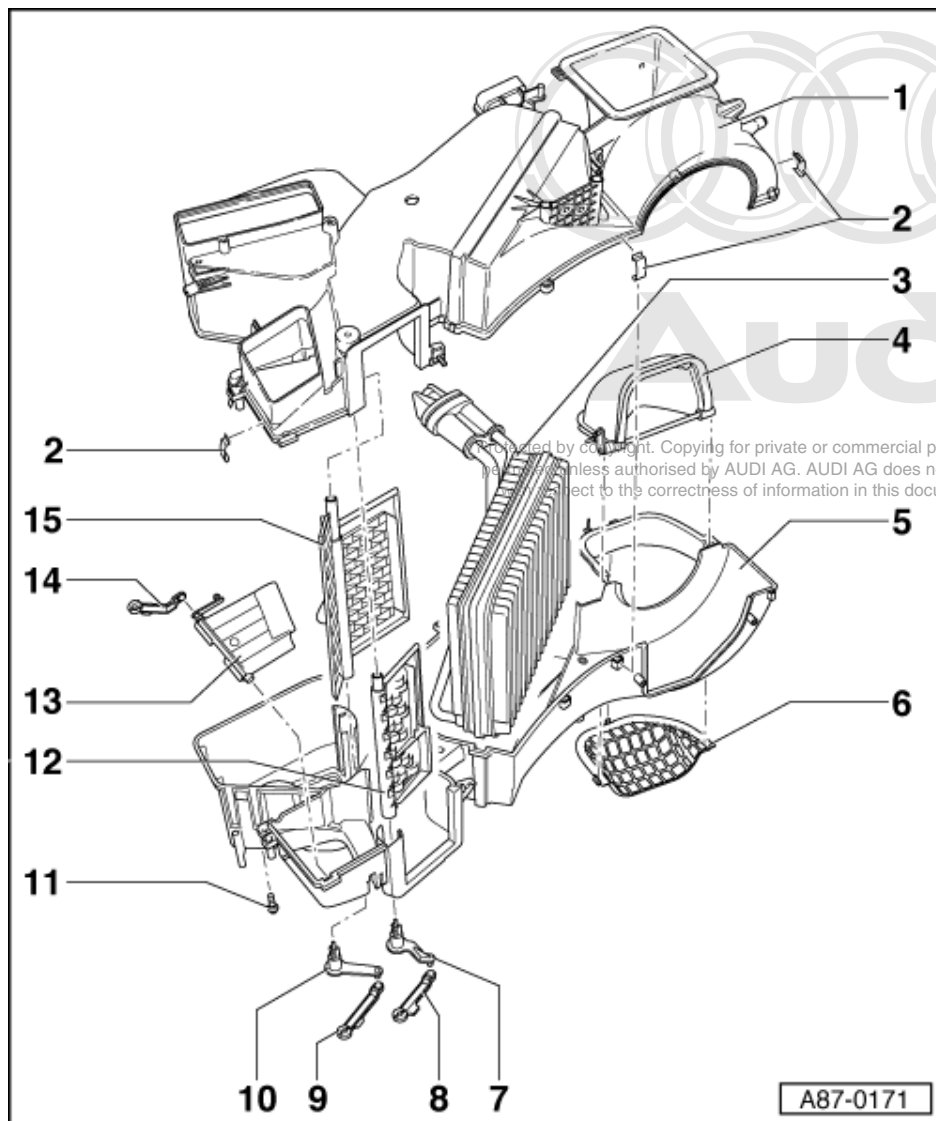
- ◆ Removing and installing =>Page [191](#)

16.2 - Disassembling and assembling evaporator housing

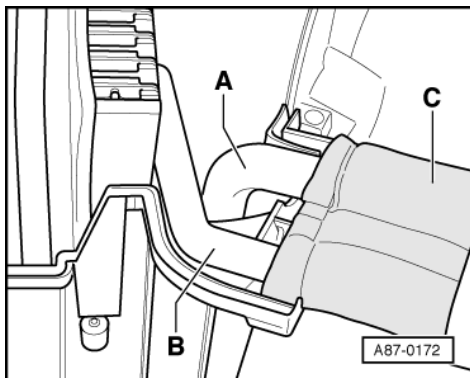


- Dismantle the air conditioner =>Page 240

- 1 Upper section of housing
- 2 Bracket
 - ♦ Prise off using a screwdriver
- 3 Evaporator
 - ♦ Attaching seal to the refrigerant lines =>Fig. 1
 - ♦ Attaching seal to evaporator => Fig. 2
- 4 Air flow flap
 - ♦ With fresh-air and recirculated-air flap
- 5 Bottom part of housing

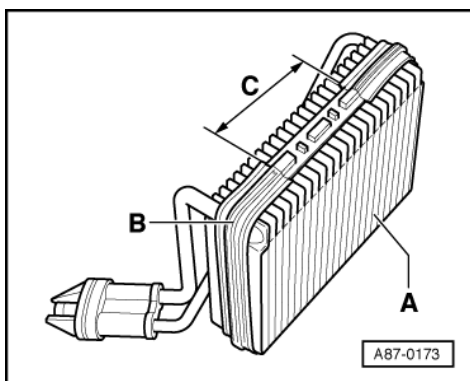


- 6 Protective grille**
 - ◆ For intake
- 7 Blue lever**
 - ◆ For central flap
 - ◆ Latches in the flap
- 8 Blue reversing lever**
- 9 Red reversing lever**
- 10 Red lever**
 - ◆ For temperature flap
 - ◆ Latches in the flap
- 11 Bolt**
- 12 Central flap**
- 13 Footwell/defroster flap**
- 14 White reversing lever**
- 15 Temperature flap**



-> Fig.1 Attaching seal to the evaporator refrigerant lines

- Seal the refrigerant lines -A- and -B- with the seal -C- to the two halves of the housing.



-> Fig.2 Attaching seal to evaporator

- Use the seal -B-, to provide an all-round seal between the evaporator -A- and the evaporator housing.

Note:

Attach the seal -B- so that the area -C- is on the lower side of the evaporator (so the condensation can drain off).

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