

Workshop Manual Audi A2 2001 ➤

Heating, air conditioning system

Edition 05.2004



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List of Workshop Manual Repair Groups

Repair Group

01 - Self-diagnosis

80 - Heating

87 - Air conditioning system



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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

1 Air conditioner self-diagnosis



Note

- ◆ *There are various versions of the operating and display unit for air conditioner/Climatronic -E87- .*
- ◆ *When replacing an operating and display unit for air conditioner/Climatronic -E87- , attention must be paid to exact assignment ⇒ Parts List .*

1.1 Technical data for self-diagnosis

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1.1.1 Equipment

- ◆ The fault memory is a non-volatile memory and thus independent of the power supply.
- ◆ Data transmission between the operating and display unit for air conditioner/Climatronic -E87- and the vehicle diagnostic, testing and information system -VAS 5051- , the fault reader -V.A.G 1551- or the vehicle system tester -V.A.G 1552- takes place in "rapid data transfer" mode.

1.2 Function

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

Following data analysis, the operating and display unit for air conditioner/Climatronic -E87- distinguishes between different faults ⇒ [page 11](#) (fault table) and stores them until the fault memory is erased after interrogation.

1.3 Fault recognition

Faults occurring in monitored sensors or components are stored in the fault memory together with an indication of the 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:

- ◆ Vehicle diagnostic, testing and information system -VAS 5051-
- ◆ 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.



Note

- ◆ *If a fault situation exists for longer than a certain 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 additionally identified as such (by /SP on the display).*
- ◆ *A sporadic fault is erased automatically if it does not occur for a specific period of time.*



The self-diagnosis possibilities can be utilised, for example, by using the vehicle diagnostic, testing and information system - VAS 5051- , the fault reader -V.A.G 1551- or the vehicle system tester -V.A.G 1552- , "1 rapid data transfer" mode.

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 electronic climate/heating control. Operating modes "3" (self-test) and "4" (workshop code) only apply to the fault reader - V.A.G 1551- and the vehicle system tester -V.A.G 1552- and are described in the appropriate operating instructions.

1.3.1 Available functions

Vehicle diagnostic, testing and information system -VAS 5051-	Ignition on, engine stopped	Engine idling	Vehicle running	Page
Address words				
08 AC/heating electronics	yes	yes	yes	⇒ page 4
00 Automatic test sequence	yes	yes	yes	⇒ page 4
Functions				
01 Interrogate control unit version	yes ¹⁾	yes ¹⁾	yes ¹⁾	⇒ page 4
02 Interrogate fault memory	yes	yes	yes	⇒ page 9
03 Final control diagnosis	yes/no ²⁾	no/yes ²⁾	no ²⁾	⇒ page 29
04 Perform basic setting	yes	yes	no	⇒ page 36
05 Erase fault memory	yes	yes	yes	⇒ page 38
06 End of output	yes	yes	yes	⇒ page 38
07 Encode control unit	yes ³⁾	yes ³⁾	no	⇒ page 40
08 Read measured value block	yes	yes	yes	⇒ page 42

1) 1 - The control unit version is always displayed on the vehicle diagnostic, testing and information system -VAS 5051- during self-diagnosis.

2) 2 - The final control diagnosis is only possible up to an engine speed of 3000 rpm and below a vehicle speed of 5 km/h. The air conditioner compressor regulating valve -N280- is only actuated by the operating and display unit for air conditioner/Climatronic -E87- if the engine is not running. Request for actuation of the radiator fans (speeds 1 and 2) is always sent by the operating and display unit for air conditioner/Climatronic -E87- to the control unit for radiator fans -J293- . The control unit only actuates the fans if the engine is running (voltage present at terminal 61). ⇒ Electrical System; Repair Group 01 and ⇒ Relevant Workshop Manual, Injection and Ignition System; Repair group 01

3) 3 - The operating and display unit for air conditioner/Climatronic -E87- is encoded in the Audi A2 by means of the dash panel insert and the convenience system central control unit -J393- . The data is transferred via the convenience data bus to operating and display unit for air conditioner/Climatronic -E87- ; the code which is currently valid is displayed in the measured value block ⇒ [page 42](#) . There is no facility at present for direct code input into the operating and display unit for air conditioner/Climatronic -E87- (however, this feature may be introduced for optional extras at a later date). ⇒ Electrical System; Repair group 01



Note

- ◆ *Self-diagnosis with the vehicle diagnostic, testing and information system -VAS 5051- is described in this Workshop Manual.*
- ◆ *Self-diagnosis can be performed similarly with the fault reader -V.A.G 1551- or the vehicle system tester -V.A.G 1552-. In order to be able to furnish proof of faults in the event of later queries, it is advisable to connect the vehicle diagnostic, testing and information system -VAS 5051- or the fault reader -V.A.G 1551- before erasing the fault memory and to print out the faults present (the vehicle system tester -V.A.G 1552- does not feature a printer).*
- ◆ *If a new operating and display unit for air conditioner/Climatronic -E87- has been installed and, following installation, no basic setting has been performed, the air conditioner compressor regulating valve -N280- is not actuated, and compressor shut-off condition "6" appears in the measured value block "2".*
- ◆ *The air conditioner control is not terminated on entering into self-diagnosis mode. However, it is deactivated if the following functions are selected:*
 - ◆ - Final control diagnosis
 - ◆ - Performing basic setting
- ◆ *When the other functions are selected, the controls remain fully operative.*
- ◆ *Fitting locations of components ⇒ [page 178](#)*

1.4 Safety precautions

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



WARNING

- ◆ *Always attach the testers and measuring instruments to the back seat and have them operated from there by a second person.*
- ◆ *If the testers and measuring instruments are operated from the front passenger's seat, the person sitting there could suffer injury in the event of an accident due to the triggering of the front passenger's airbag.*

2 Performing self-diagnosis

2.1 Connecting vehicle diagnostic, testing and information system -VAS 5051- and selecting functions

Requirements

- ◆ Supply voltage of vehicle electrical system OK
- ◆ Fuses OK ⇒ "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations"



Note

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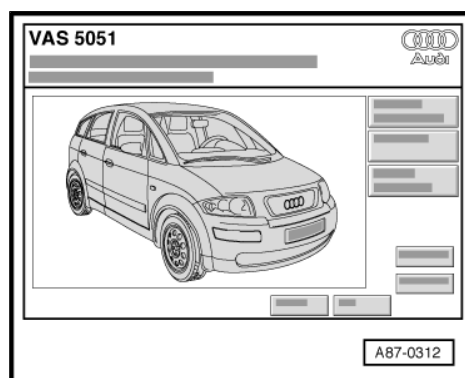
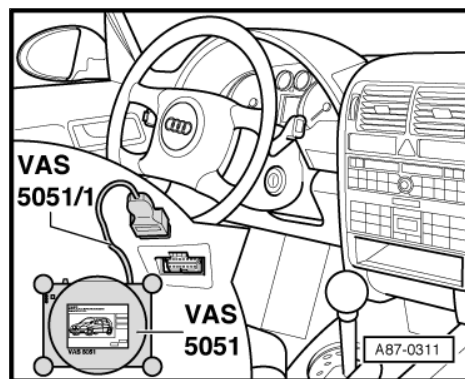
- ◆ *The various functions of the vehicle diagnostic, testing and information system -VAS 5051- are described in the system operating manuals.*
 - ◆ *The design and function of the vehicle diagnostic, testing and information system -VAS 5051- are described in the ⇒ Self-study programme No. 202 ; Vehicle diagnostic, testing and information system . This also contains some examples of the correct application of this system.*
 - ◆ *Self-diagnosis can also be performed with the fault reader - V.A.G 1551- or the vehicle system tester -V.A.G 1552- in "1 rapid data transfer" mode. The various functions are described in the relevant system operating manuals.*
 - With the ignition off, connect the vehicle diagnostic, testing and information system -VAS 5051- , by the diagnostic cable -VAS 5051/5A- , for example, to the 16-pin diagnostic socket in the vehicle.
 - Switch on the ignition.
- Or
- Start the engine.



Note

Observe the notes for final control diagnosis on Page [⇒ page 29](#) .

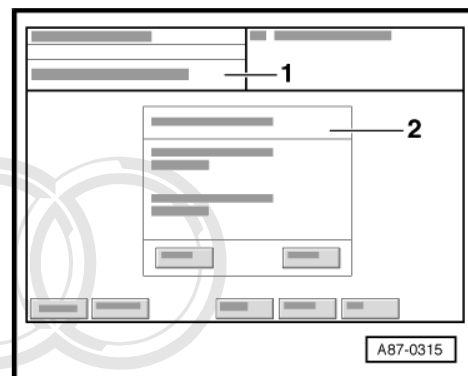
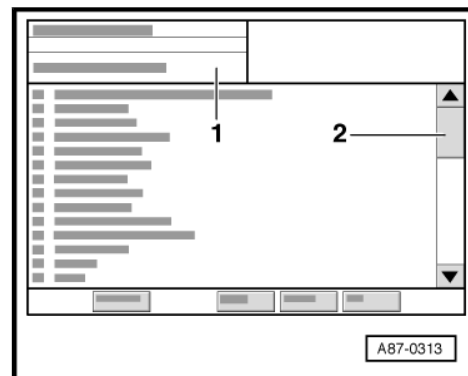
- Set the operating mode to "Auto" on the operating and display unit for air conditioner/Climatronic -E87- .
- Select the "vehicle self-diagnosis" function on the vehicle diagnostic, testing and information system -VAS 5051- .



- Select the vehicle system "08 - Electronic climate/heating control".

i Note

- ◆ *The vehicle system selection prompt appears in display zone -1-.*
- ◆ *"Scrolling" the screen display with the scroll bar -2- allows you to display the vehicle systems (for all vehicle models and equipment levels) which are intended for self-diagnosis but which cannot be displayed on-screen at present.*
- Wait until "Select diagnostic function" appears in display zone -1- of the vehicle diagnostic, testing and information system - VAS 5051- .

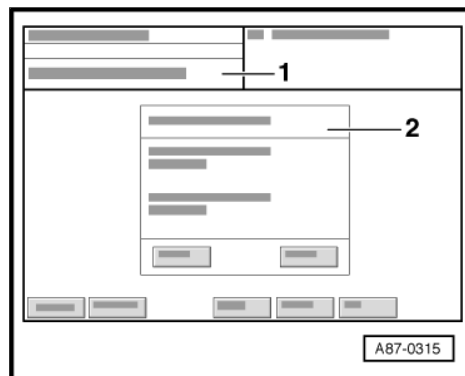


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Note

- ◆ Control unit identification now appears in display zone -2- of the vehicle diagnostic, testing and information system - VAS 5051- ➔ [page 8](#) .
- ◆ Check the following if "Vehicle system not available" appears in display zone -1- of the vehicle diagnostic, testing and information system -VAS 5051- display:
- ◆ The power supply to the operating and display unit for air conditioner/Climatronic -E87- as per current flow diagram ➔ "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations"
- ◆ The wiring from the 16-pin diagnostic socket to the operating and display unit for air conditioner/Climatronic -E87- .
- ◆ Check the following if an additional display zone -2- with the message "Diagnostic bus fault" and references to possible cause of trouble appears on the vehicle diagnostic, testing and information system -VAS 5051- display:
- ◆ The power supply to the 16-pin diagnostic socket using the current flow diagram ➔ "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations"
- ◆ The voltage and the status of the battery -A- ➔ Electrical System; Repair group 01
- ◆ The "Diagnostic bus fault" display with references to the possible cause of trouble also appears on the vehicle diagnostic, testing and information system -VAS 5051- if a problem has occurred during self-diagnosis or in the event of interruption of data exchange between the vehicle diagnostic, testing and information system -VAS 5051- and the operating and display unit for air conditioner/Climatronic -E87- .
- ◆ The current screen display can be printed by selecting the "Print" function on the vehicle diagnostic, testing and information system -VAS 5051- display.
- ◆ Possible causes of trouble can be displayed by selecting the "Help" function on the vehicle diagnostic, testing and information system -VAS 5051- display.
- ◆ Pressing the keys shown on the vehicle diagnostic, testing and information system -VAS 5051- display makes it possible to move forwards or backwards in the program (arrow keys) or to switch functions.

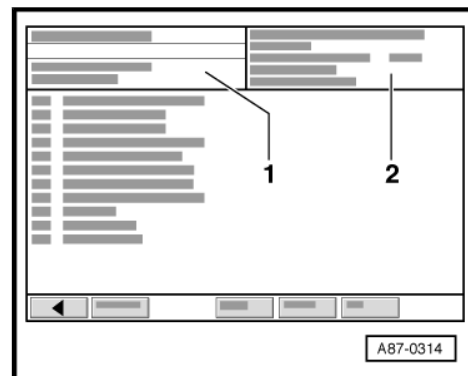


- The desired function can now be started via the vehicle diagnostic, testing and information system -VAS 5051- display ⇒ [page 2](#) ("Available functions" table).



Note

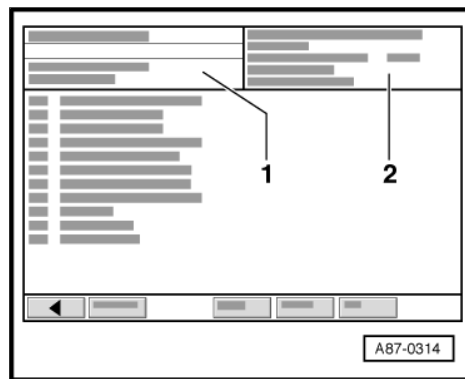
- ◆ Depending on the version of the operating and display unit for air conditioner/Climatronic -E87- in use, the operating and display unit for air conditioner/Climatronic -E87- switches to "Econ" mode automatically if, following the installation of a new operating and display unit for air conditioner/Climatronic -E87-, no basic setting has been performed or if the pressure measured by the high-pressure sender -G65- is too low or too high (the compressor must not be switched on) ⇒ [page 42](#). (Read measured value block).
- ◆ If the operating and display unit for air conditioner/Climatronic -E87- automatically goes into "Off" mode after the ignition has been switched on and can only be switched to "Def" mode when the ignition is on (whereby other settings are not possible), this indicates that the ignition has, for example, been switched on with a key that has not been enabled for this vehicle or that the control unit in the dash panel is not transmitting a key number via the convenience data bus (depending on the version of the operating and display unit for air conditioner/Climatronic -E87- in use).



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2.1.1 Control unit identification (in display zone -2-, example)

- ◆ 08 - Electronic climate/heater control Selected vehicle system
- ◆ 8Z0 820 043 X Part No.; assignment. ⇒ Parts List
- ◆ A2 Automatic climate control system Audi A2 Air conditioner control unit
- ◆ XXXX Data level (hardware and software version) of the control unit
- ◆ Code XXXXX: Currently not in use (planned for optional vehicle extras which may be added later on) ⇒ [page 40](#)
- ◆ WSC XXXXX: Currently not in use as there is no direct entry planned for encoding the operating and display unit for air conditioner/Climatronic -E87- until further notice (workshop number of the workshop where the last encoding took place).



Note

- ◆ *Only operating and display unit for air conditioner/Climatronic -E87- with a part number starting from index "D" can be installed in vehicles built from 2002 (different panel surface, adapted to the radios installed as of model year 2002). ⇒ Parts List*
- ◆ *Vehicles with a 1.6 l petrol direct injection engine (FSI) must only have operating and display units for air conditioner/Climatronic -E87- with a part number starting from index "D" and the hardware/software version "XX12" installed ⇒ [page 186](#).*



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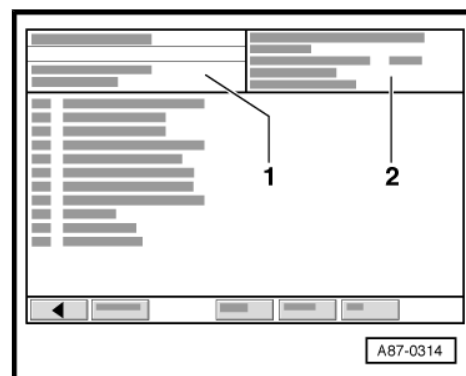
3 Interrogating fault memory

- With the ignition off, connect the vehicle diagnostic, testing and information system -VAS 5051- with the diagnostic cable -VAS 5051/5A- to the 16-pin diagnostic socket in the vehicle and use the address word "08" to select electronic climate/heater control ⇒ [page 4](#) .

Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- Select function "02 - Interrogate fault memory".

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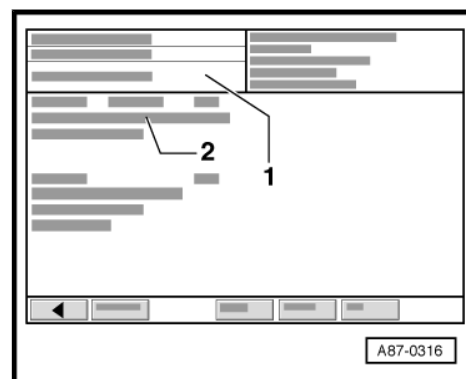
Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- ◆ The number of stored faults appears in display zone -1-.
- ◆ The fault code, fault location and type of faults stored appear in display zone -2-.



Note

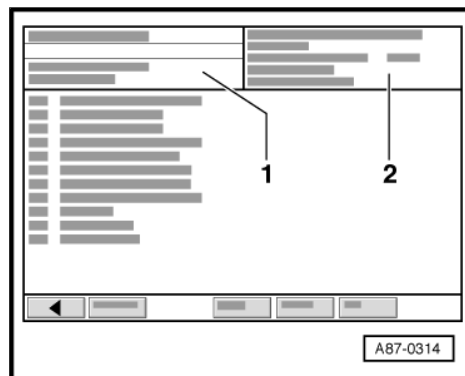
- ◆ Press the  key to return to the selection program.
- ◆ If there has been no fault detected but complaints have been received about the air conditioner (e.g. compressor cooling not operating or only intermittently, inadequate system regulation, no control of the fresh-air blower speed):
- ◆ 1. Read measured value block 08 ⇒ [page 42](#)
- ◆ 2. Perform final control diagnosis (Function 03) ⇒ [page 29](#) .
- ◆ 3. Check air conditioner refrigeration capacity ⇒ [page 201](#) .
- ◆ If fault(s) was/were detected:
- ◆ 1. Rectify fault.
- ◆ 2. Interrogate fault memory (function 02).
- ◆ 3. Erase fault memory (function 05).
- ◆ 4. Check the encoding of the operating and display units for air conditioner/Climatronic -E87- or of the dash panel insert control unit -J285- ⇒ [page 40](#) .
- ◆ 5. Perform basic setting (function 04).
- ◆ 6. Interrogate fault memory (function 02) and erase if applicable (function 05).
- ◆ 7. End output (function 06).





Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- End output (function 06) ⇒ [page 38](#) .
- Switch off the ignition and unplug the diagnostic connector.



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3.1 Fault table



Note

- ◆ *All the possible faults detected by the operating and display units for air conditioner/Climatronic -E87- and displayed on the vehicle diagnostic, testing and information system -VAS 5051- when the content of the fault memory is interrogated are listed below on the basis of the fault codes.*
- ◆ *The content of the fault memory is retained until it is erased*
 ⇒ [page 38](#)
- ◆ *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"
- ◆ *Check the appropriate plug contacts before replacing a component.*
- ◆ *Before replacing the operating and display units for air conditioner/Climatronic -E87-, also check the voltage supply and the earth connections: ⇒ Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations*
- ◆ *If the operating and display units for air conditioner/Climatronic -E87- remains in operation after the ignition has been switched off; check the wiring for the operating and display units for air conditioner/Climatronic -E87-, connector "D", contact "10", for a "short-circuit to positive".*
- ◆ *Always perform the basic setting (function "04") after replacing an air conditioner/heater component. Then read out the fault memory, rectify any faults displayed and erase the fault memory (functions "02" and "05").*
- ◆ *The display is switched from "°C" (Celsius) to "°F" (Fahrenheit) and vice versa by actuating the "Temperature +" button when the "Recirculated air" button is pressed.*
- ◆ *Check the cooling output of the air conditioner ⇒ [page 201](#)*
- ◆ *If during one driving cycle the compressor output was limited 30 times due to high pressure in the refrigerant circuit, e.g. due to an intermittent electrical fault, then the air conditioner compressor regulating valve -N280- is no longer actuated, and the compressor is switched off as a result. The compressor can be re-actuated by pressing the "Compressor on" button or by switching the ignition off and on again.*
- ◆ *If a potentiometer fault is detected in one of the air distribution positioning motors, air distribution can be influenced by pressing the buttons on the operating and display units for air conditioner/Climatronic -E87-.*
- ◆ *If a fault is detected in the temperature control and no fault is displayed:*
 - ◆ - *Check that the temperature sensors (senders) are correctly installed.*
 - ◆ - *Check if the wiring to the sunlight penetration photosensor - G107- has become interchanged.*



- ◆ - Check the function of the temperature sensor blower -V42- (installed in the operating and display units for air conditioner/ Climatronic -E87-).

Display on the vehicle diagnostic, testing and information system - VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
No fault detected	If no faults are detected despite complaints about the electronic climate/ heater control, perform "Final control diagnosis 03" and "Read measured value block 08" functions and check the encoding of the operating and display units for air conditioner/Climatronic -E87- and of the control unit in the dash panel insert -J285- ⁴⁾ ⇒ page 40	

4) In this vehicle the encoding is performed in the control unit in the dash panel insert -J285- and is transferred to the connected vehicle systems via the convenience data bus; the encoding which is currently valid is displayed in the measured value block ⇒ [page 42](#) . There is no facility at present for direct code input into the operating and display units for air conditioner/Climatronic -E87- (however, this feature may be introduced for optional extras at a later date). ⇒ Electrical System; Repair group 01

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
00532 Power supply		
Signal too small /SP	◆ Voltage in the vehicle electrical system drops to values below 9.5 V ⁵⁾	– Check the alternator and voltage regulator: ⇒ Current Flow Diagrams, Electrical Fault-Finding, Fitting Locations
Signal too great/SP	◆ The voltage in the vehicle's electrical system was greater than 15 V ⁶⁾	– Check the alternator and voltage regulator: ⇒ Current Flow Diagrams, Electrical Fault-Finding, Fitting Locations

5) If the vehicle system voltage (at connector "D", contact "12") drops below 9.5 V, the heated rear window -Z1- for example is deactivated.

6) This fault may also be displayed if the battery -A- has been charged using an unsuitable charger.

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
00600 Potentiometer - positioning motor for temperature flap - G92- in the positioning motor for temperature flap -V68- (for the temperature flap) ⁹⁾ 6		

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
Short circuit to earth / SP open circuit/short circuit to positive / SP	◆ Short circuit, open circuit or wiring fault between the potentiometer - positioning motor for temperature flap -G92- and the operating and display unit for air conditioner/Climatronic -E87- ◆ Potentiometer - positioning motor for temperature flap -G92- in the positioning motor for temperature flap -V68- defective	- Use the current flow diagram to locate and rectify the short circuit, open circuit or wiring fault - Replace the positioning motor for temperature flap -V68-
Adaption limit exceeded ^{7) 4}	◆ Temperature flap is stiff ◆ Potentiometer - positioning motor for temperature flap -G92- in the positioning motor for temperature flap -V68- defective	- Check that the temperature flap is moving freely ^{8) 5} - Replace the positioning motor for temperature flap -V68-
Fault	◆ Potentiometer - positioning motor for temperature flap -G92- in the positioning motor for temperature flap -V68- defective	- Replace the positioning motor for temperature flap -V68-

7) 4- This fault is only detected during basic setting. If this fault is present, "30" or "230" is stored as the adaption value (learned value for this potentiometer) and displayed in the relevant measured value block.

8) 5- Both end stops must be reached
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9) 6- If there is a fault in the potentiometer - positioning motor for temperature flap -G92-, the positioning motor for temperature flap -V68- can be adjusted manually by pressing the "+" or "-" buttons for the temperature preselection (display range 0 ... 50 °C)

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
00601 Potentiometer - positioning motor for central flap -G112- in the positioning motor for central flap -V70-		
Short circuit to earth / SP open circuit/short circuit to positive / SP	◆ Short circuit, open circuit or wiring fault between the potentiometer - positioning motor for central flap -G112- and the operating and display units for air conditioner/Climatronic -E87- ◆ Potentiometer - positioning motor for central flap -G112- in the positioning motor for central flap -V70- is defective	- Use the current flow diagram to locate and rectify the short circuit, open circuit or wiring fault - Replace the positioning motor for central flap -V70-

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
Adaption limit exceeded ¹⁰⁾ 4	◆ Central flap is stiff ◆ Potentiometer - positioning motor for central flap -G112- in the positioning motor for central flap -V70- is defective	– Check that the central flap is moving freely ¹¹⁾ 5 – Replace the positioning motor for central flap -V70-
Fault	◆ Potentiometer - positioning motor for central flap -G112- in the positioning motor for central flap -V70- is defective	– Replace the positioning motor for central flap -V70-

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10) 4- This fault is only detected during basic setting. If this fault is present, "30" or "230" is stored as the adaption value (learned value for this potentiometer) and displayed in the relevant measured value block.

11) 5- Both end stops must be reached.

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
00710 Defroster flap positioning motor -V107-		
Short circuit to earth / SP open circuit/short circuit to positive / SP	◆ Short circuit, open circuit or wiring fault between the positioning motor for defrost flap - V107- and the operating and display units for air conditioner/ Climatronic -E87- ◆ The defrost flap positioning motor -V107- is defective	– Use the current flow diagram to locate and rectify the short circuit, open circuit or wiring fault – Check the defrost flap positioning motor -V107- ⇒ page 29 (final control diagnosis)
Blocked or deenergised /SP	◆ Defrost flap is stiff ◆ Defrost flap positioning motor - V107- is defective	– Check that the defrost flap is moving freely – Checking the defrost flap positioning motor -V107- ⇒ page 29 (final control diagnosis)

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
00716 Recirculated air flap positioning motor -V113-		

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
Short circuit to earth / SP open circuit/short circuit to positive / SP	◆ Short circuit, open circuit or wiring fault between the positioning motor for recirculated-air flap -V113- and the operating and display units for air conditioner/Climatronic -E87- ◆ The recirculated-air flap positioning motor -V113- is defective	– Use the current flow diagram to locate and rectify the short circuit, open circuit or wiring fault – Check the recirculated-air flap positioning motor -V113- ⇒ page 29 (final control diagnosis)
Blocked or deenergised /SP	◆ The fresh or recirculated-air flap is sticking ◆ The recirculated-air flap positioning motor -V113- is defective	– Check that the fresh and recirculated-air flap is moving freely. – Check the recirculated-air flap positioning motor -V113- ⇒ page 29 (final control diagnosis)



Note

The recirculated-air flap positioning motor -V113- moves both the recirculated-air flap and the fresh-air flap (air flow flap).

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
00727 Potentiometer in the positioning motor for defrost flap - G135- in the positioning motor for defrost flap -V107-		
Short circuit to earth / SP open circuit/short circuit to positive / SP	◆ Short circuit, open circuit or wiring fault between the potentiometer in the positioning motor for defrost flap -G135- and the operating and display units for air conditioner/Climatronic - E87- ◆ Potentiometer in the positioning motor for defrost flap - G135- in the positioning motor for defrost flap -V107- is defective	– Use the current flow diagram to locate and rectify the short circuit, open circuit or wiring fault – Replace the defrost flap positioning motor -V107-
Adaption limit exceeded ^{12) 4)}	◆ The defrost flap is stiff	– Check that the defrost flap is moving freely ^{13) 5)}
Fault	◆ Potentiometer in the positioning motor for defrost flap - G135- in the positioning motor for defrost flap -V107- is defective	– Replace the defrost flap positioning motor -V107-

12) 4- This fault is only detected during basic setting. If this fault is present, "30" or "230" is stored as the adaption value (learned value for this potentiometer) and displayed in the relevant measured value block.

13) 5- Both end stops must be reached.

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
00735 Potentiometer in the positioning motor for recirculated-air flap -G143- in the positioning motor for recirculated-air flap -V113-		
Short circuit to earth / SP open circuit/short circuit to positive / SP	◆ Short circuit, open circuit or wiring fault between the potentiometer in the positioning motor for recirculated-air flap -G143- and the operating and display units for air conditioner/Climatronic -E87- ◆ Potentiometer in the positioning motor for recirculated-air flap -G143- in the positioning motor for recirculated-air flap -V113- is defective	– Use the current flow diagram to locate and rectify the short circuit, open circuit or wiring fault – Replace the positioning motor for recirculated-air flap -V113-
Adaption limit exceeded ¹⁴⁾ 4)	◆ The fresh/recirculated-air flap is sticking ◆ Potentiometer in the positioning motor for recirculated-air flap -G143- in the positioning motor for recirculated-air flap -V113- is defective	– Check that the fresh and recirculated-air flap is moving freely¹⁵⁾ 5 – Replace the positioning motor for recirculated-air flap -V113-
Fault	◆ Potentiometer in the positioning motor for recirculated-air flap -G143- in the positioning motor for recirculated-air flap -V113- is defective	– Replace the positioning motor for recirculated-air flap -V113-

14) 4- This fault is only detected during basic setting. If this fault is present, "30" or "230" is stored as the adaption value (learned value for this potentiometer) and displayed in the relevant measured value block.

15) 5- Both end stops must be reached.

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
00785 Dash panel temperature sensor -G56- ¹⁶⁾ 7		
Short circuit to earth / SP open circuit/short circuit to positive / SP	◆ Dash panel temperature sensor -G56- is defective	– Replace the operating and display unit for air conditioner/Climatronic -E87-
00787 Fresh-air intake duct temperature sensor -G89-		

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
Short circuit to earth / SP open circuit/short circuit to positive / SP	◆ Short circuit or open circuit between the fresh-air intake duct temperature sensor -G89- and the operating and display unit for air conditioner/Climatronic -E87- ◆ Fresh-air intake duct temperature sensor -G89- is defective	– Use the current flow diagram to locate and rectify the short circuit/open circuit in the wiring – Check the fresh-air intake duct temperature sensor -G89- ⇒ page 78 (electrical check).

16) 7- The dash panel temperature sensor -G56- is installed into the Climatronic operating and display unit -E87-. The dash panel temperature sensor -G56- cannot be tested and replaced separately; in the event of a defect, replace the entire operating and display unit for air conditioner/Climatronic -E87-.

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
00796 Temperature sensor blower -V42- ^{17) 8} Blocked or deenergised /SP	◆ Temperature sensor blower -V42- is defective	– Replace the temperature sensor blower -V42- ⇒ page 199
00797 Sunlight penetration photosensor -G107- Open circuit / short circuit to earth / SP short circuit to positive / SP	◆ Short circuit or open circuit between the sunlight penetration photosensor -G107- and -E87- ◆ the sunlight penetration photosensor -G107- is defective	– Use the current flow diagram to locate and rectify the short circuit/open circuit in the wiring – Check the sunlight penetration photosensor -G107- ⇒ page 57 (Read the measured value block)

17) 8- The temperature sensor blower -V42- is installed in the operating and display unit for air conditioner/Climatronic -E87-.

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
00818 Evaporator outflow temperature sender -G263- Short circuit to earth / SP open circuit/short circuit to positive / SP	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 for errors or omissions in this document. ◆ Short circuit or open circuit between the evaporator outflow temperature sender -G263- and the operating and display unit for air conditioner/Climatronic -E87- ◆ Evaporator outflow temperature sender -G263- is defective	– Use the current flow diagram to locate and rectify the short circuit or open circuit – Check the evaporator outflow temperature sender -G263- ⇒ page 78 (electrical check).



Note

If a defect is detected in the evaporator outlet temperature sender -G263-, the operating and display unit for air conditioner/Climatronic -E87- switches to emergency running and the air conditioner compressor regulating valve -N280- is only actuated with a max. control current of approx. 0.3 to 0.5 A at that time (as a result, the refrigeration capacity of the air conditioner is reduced and, at higher temperatures, the cooling performance may no longer prove to be adequate) ⇒ [page 46](#) (Read the measured value block).

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
00819 High-pressure sender - G65- Short circuit to earth / SP open circuit/short circuit to positive / SP	♦ Short circuit or open circuit between the high-pressure sender -G65- and the operating and display unit for air conditioner/Climatronic -E87- ♦ High-pressure sender -G65- is defective	– Use the current flow diagram to locate and rectify the short circuit or open circuit – Check the high-pressure sender -G65- ⇒ page 78 (electrical check).
Signal too small /SP	♦ Open circuit in the power supply or in the earth connection to high-pressure sender -G65- ♦ High-pressure sender -G65- is defective ♦ Too little refrigerant in the refrigerant circuit	– Use the current flow diagram to locate and rectify the open circuit: – Check the high-pressure sender -G65- ⇒ page 78 (electrical check). – Check the pressure in the refrigerant circuit (this can only be done in a specialist air conditioner workshop) ⇒ Air conditioner - with refrigerant R134a
Signal too great /SP	♦ High-pressure sender -G65- is defective ♦ Fault in radiator fan actuation ♦ Too much refrigerant in the refrigerant circuit	– Check the high-pressure sender -G65- ⇒ page 78 (electrical check). – Check actuation of the radiator fan ⇒ page 29 – Check the pressure in the refrigerant circuit (this can only be done in a specialist air conditioner workshop). ⇒ Air conditioner - with refrigerant R134a

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
00975 Heated rear window -Z1-		

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
Output not switched / short circuit to positive /SP	◆ Short circuit or open circuit between the heated rear window -Z1- and the operating and display unit for air conditioner/Climatronic -E87- ◆ Open circuit in the earth connection for the heated rear window -Z1- ◆ Heated rear window -Z1- is defective	- Use the current flow diagram to locate and rectify the short circuit or open circuit - Check actuation and power consumption of the heated rear window -Z1- → page 103 (electrical check).
Output does not switch/short circuit to earth /SP open circuit /SP	◆ Short circuit between the heated rear window -Z1- and the operating and display unit for air conditioner/Climatronic - E87- ◆ Heated rear window -Z1- is defective	- Locate and rectify the short circuit using the current flow diagram - Check actuation and power consumption of the heated rear window -Z1- → page 103 (electrical check).
Open circuit /SP	◆ Open circuit in the heated rear window -Z1- , in the earth connection to the heated rear window -Z1- or in the connection between the heated rear window -Z1- and the operating and display unit for air conditioner/Climatronic -E87- ◆ Open circuit in the power supply to the connector "F" on the operating and display unit for air conditioner/Climatronic - E87-	- Use the current flow diagram to locate and rectify the open circuit: - Check actuation and power consumption of the heated rear window -Z1- → page 103 (electrical check).

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
01044 The control unit is incorrectly encoded		

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
	◆ The dash panel insert control unit encoding has not been performed as specified. ◆ The encoding of the convenience system central control unit -J393- has not been performed as specified. ◆ Fault in the factory convenience data bus ◆ The encoding of the operating and display unit for air conditioner/Climatronic -E87- has not been performed as specified.	- Check the encoding transferred to the operating and display unit for air conditioner/Climatronic -E87- ⇒ page 42 (Read the measured value block) - Check the encoding of the control unit in dash panel insert -J285- and encode it in the specified manner if necessary. ⇒ Electrical System; Repair group 01 - Check the encoding of the convenience system central control unit -J393- and encode it in the specified manner if necessary. ⇒ Electrical System; Repair group 01 - Interrogate the fault memory for all the control units connected to the data bus system and identify and rectify the faults displayed on the data bus system ⇒ Electrical System; Repair group 01 - Check the encoding of the operating and display unit for air conditioner/Climatronic -E87- ⇒ page 40 (the encoding of the operating and display unit for air conditioner/Climatronic -E87- is only required if certain optional extras are deployed).

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
01087 Basic setting is not performed	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. ◆ During the "basic setting" a fault occurred or the ignition was switched off, and the operating and display unit for air conditioner/Climatronic -E87- was unable to complete the function. ◆ After replacing the operating and display unit for air conditioner/Climatronic -E87- no basic setting was performed. ◆ The basic setting was performed on a operating and display unit for air conditioner/Climatronic -E87- which was not (correctly) encoded	- Perform the operating and display unit for air conditioner/Climatronic -E87- basic setting ⇒ page 36 . - Check the encoding transferred to the operating and display unit for air conditioner/Climatronic -E87- ⇒ page 42 (Read the measured value block)

 Note

(Depending on the version of the operating and display unit for air conditioner/Climatronic -E87-), it switches automatically to "Econ" mode if no basic setting is performed following the installation of a new operating and display unit for air conditioner/Climatronic -E87- .

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
01206 Ignition-off time-span signal Implausible signal /SP	◆ The dash panel insert performed a restart (reset) after the connection of the battery and therefore could not send a time signal ◆ Fault in the control unit in the dash panel insert -J285-	– Start the engine and let it run for 30 sec. – Switch off the engine – Switch on the ignition. – Interrogate and erase the fault memory for the operating and display unit for air conditioner/Climatronic -E87- – Check the time signal from the dash panel insert ⇒ page 42 (Read the measured value block, display group "014") – Interrogate the fault memory of the control unit in the dash panel insert -J285- . ⇒ Electrical System; Repair group 01

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 Note

If the operating and display unit for air conditioner/Climatronic -E87- does not detect an "ignition-off time-span signal" when the ignition is switched on (sent by the control unit in the dash panel insert -J285- via the convenience data bus), the operating and display unit for air conditioner/Climatronic -E87- assumes that the vehicle has been standing for more than 4 hours, and that the engine temperature is the same as the ambient temperature. In heating mode, this may result in the start-up of the fresh-air blower being delayed, even though the engine is warm. The ambient temperature indicator -G106- in the control unit in the dash panel insert -J285- may possibly also show rogue ambient temperature readings.

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
01232 Air conditioner compressor regulating valve - N280- ^{18) 9}		

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible causes of fault	Fault remedy
Short circuit to earth / SP short circuit to positive / SP open circuit / SP	◆ Short circuit or open circuit between the air conditioner compressor regulating valve - N280- and the operating and display unit for air conditioner/ Climatronic -E87- ◆ Open circuit in the voltage supply to the air conditioner compressor regulating valve - N280- ◆ Air conditioner compressor regulating valve -N280- is defective	– Use the current flow diagram to locate and rectify the short circuit or open circuit – Check the air conditioner compressor regulating valve -N280- ⇒ page 78 (electrical check) and ⇒ page 42 (Read the measured value block)

18) 9- The regulating valve is installed in the compressor (the compressor can only be replaced in a specialist air conditioner workshop). ⇒ Air conditioner with refrigerant R134a

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible cause of the fault	Fault remedy
01271 Temperature flap positioning motor -V68- Short circuit to earth / SP open circuit/short circuit to positive / SP	◆ Short circuit, open circuit or wiring fault between the positioning motor for temperature flap - V68- and the operating and display unit for air conditioner/ Climatronic -E87- ◆ The positioning motor for temperature flap -V68- is defective	– Use the current flow diagram to locate and rectify the short circuit, open circuit or wiring fault – Check the positioning motor for temperature flap -V68- ⇒ page 29 (final control diagnosis)
Blocked or deenergised /SP	◆ Temperature flap is stiff ◆ The positioning motor for temperature flap -V68- is defective	– Check that the temperature flap is moving freely – Check the positioning motor for temperature flap -V68- ⇒ page 29 (final control diagnosis)

Display on the vehicle diagnosis, testing and information system -VAS 5051- and output on the printer	Possible cause of the fault	Fault remedy
01272 Central flap positioning motor -V70-		

Display on the vehicle diagnosis, testing and information system -VAS 5051- and output on the printer	Possible cause of the fault	Fault remedy
Short circuit to earth / SP open circuit/short circuit to positive / SP	◆ Short circuit, open circuit or wiring fault between the positioning motor for central flap -V70- and the operating and display unit for air conditioner/Climatronic -E87- ◆ The central flap positioning motor -V70- is defective	– Use the current flow diagram to locate and rectify the short circuit, open circuit or wiring fault – Check the positioning motor for central flap -V70- ⇒ page 29 (final control diagnosis)
Blocked or deenergised /SP	◆ Central flap is stiff ◆ The central flap positioning motor -V70- is defective	– Check that the central flap is moving freely – Check the positioning motor for central flap -V70- ⇒ page 29 (final control diagnosis)

Display on the vehicle diagnosis, testing and information system -VAS 5051- and output on the printer	Possible cause of the fault	Fault remedy
01273 Fresh-air blower -V2- System deviation / SP blocked or deenergised / SP short circuit to positive / SP defective	◆ Short circuit or open circuit between the fresh-air blower -V2-, the control unit for the fresh-air blower -J126- and/or the operating and display unit for air conditioner/Climatronic -E87- ◆ Open circuit in power supply or earth connection to the control unit for the fresh-air blower -J126- ◆ The control unit for the fresh-air blower -J126- is defective ◆ The fresh-air blower -V2- is defective	– Use the current flow diagram to locate and rectify the short circuit or open circuit – Use the current flow diagram to locate and rectify the open circuit: – Check the control unit for the fresh-air blower -J126- ⇒ page 83 (electrical check). – Replace the fresh-air blower -V2-
Power supply too low /SP	◆ The voltage in the vehicle electrical system drops to values below 9.5 V ◆ Open circuit or contact resistance in the power supply to the fresh-air blower -V2-	– Check the alternator and voltage regulator: ⇒ "Current Flow Diagrams, Electrical Fault-Finding, Fitting Locations" – Check the wiring according to the current flow diagram.
Power supply too high /SP	◆ The voltage in the vehicle's electrical system was greater than 15 V ^{19) 3}	– Check the alternator and voltage regulator: ⇒ "Current Flow Diagrams, Electrical Fault-Finding, Fitting Locations"

19) 3- This error may also appear if the battery -A- has been charged using an unsuitable charger.

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible cause of the fault	Fault remedy
01296 Centre vent temperature sender -G191- Short circuit to earth / SP open circuit/short circuit to positive / SP	◆ Short circuit or open circuit between the centre vent temperature sender -G191- and the operating and display unit for air conditioner/Climatronic -E87- ◆ The centre vent temperature sender -G191- is defective	– Use the current flow diagram to locate and rectify the short circuit or open circuit – Check the centre vent temperature sender -G191- ⇒ page 78 (electrical check).
01297 Footwell vent temperature sender -G192- Short circuit to earth / SP open circuit/short circuit to positive / SP	◆ Short circuit or open circuit between the footwell vent temperature sender -G192- and the operating and display unit for air conditioner/Climatronic -E87- ◆ The footwell vent temperature sender -G192- is defective	– Use the current flow diagram to locate and rectify the short circuit or open circuit – Check the footwell vent temperature sender -G192- ⇒ page 78 (electrical check).

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible cause of the fault	Fault remedy
01312 Drive data bus Read out the fault memory	◆ The dash panel insert cannot output the required data due to a fault and emits a fault message. ◆ The dash panel insert cannot output the required data due to a fault in an upstream component and emits a fault message. ◆ A control unit which is connected to the drive data bus does not supply the required data or there is a drive data bus fault.	– Interrogate the fault memory of the dash panel insert. – Locate and rectify the causes of all the faults stored in the fault memory of the dash panel insert. – Interrogate the fault memory for all the control units connected to the drive data bus and identify and rectify the faults displayed on the data bus system ⇒ Electrical System; Repair group 01



Note

If, for example, the engine control unit does not supply information on the current engine speed (via the drive data bus), the control unit and display unit in the dash panel insert -J285- cannot incorporate this information into the data telegram on the convenience data bus, and this fault is entered in the fault memory of the operating and display unit for air conditioner/Climatronic -E87-.

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible cause of the fault	Fault remedy
01317 Control unit and display unit in the dash panel insert -J285- Read out the fault memory	◆ The control unit in the dash panel insert -J285- cannot output the required data because of a fault and emits a fault message. ◆ The control unit in the dash panel insert -J285- cannot output the required data due to a fault in an upstream component and emits a fault message.	– Interrogate the fault memory of the control unit in the dash panel insert -J285- . ⇒ Electrical System; Repair group 01 – Locate and rectify the causes of all the faults stored in the fault memory of the control unit in the dash panel insert -J285- .
No communication / SP	◆ An open circuit in both signal wires (convenience data bus) between the dash panel insert and the operating and display unit for air conditioner/Climatronic -E87-	– Locate and rectify an open circuit or intermittent electrical fault in both signal wires (convenience data bus) between the control unit in the dash panel insert -J285- and the operating and display unit for air conditioner/Climatronic -E87- in accordance with the current flow diagram. – Check the (convenience) data bus system ⇒ page 71 .
No communication / SP	◆ There is a fault affecting data output in the control unit in the dash panel insert -J285- or in a component connected to it.	– Interrogate the fault memory of the control unit in the dash panel insert -J285- . ⇒ Electrical System; Repair group 01



Note

The reception of the information is displayed in the measured value block display group "016" ⇒ [page 69](#) .

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible cause of the fault	Fault remedy
01330 Central control unit for the convenience system - J393-		

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible cause of the fault	Fault remedy
Read out the fault memory	◆ The central control unit for the convenience system -J393- cannot output the required data because of a fault and emits a fault message. ◆ The central control unit for the convenience system -J393- cannot output the required data due to a fault in an upstream component and emits a fault message.	– Interrogate the fault memory for the central control unit for the convenience system -J393- . ⇒ Electrical System; Repair group 01 – Locate and rectify the causes of all the faults stored in the fault memory of the central control unit for the convenience system -J393- .
No communication (time out) / SP	◆ An open circuit in the (convenience) data bus between the central control unit for the convenience system -J393- and the operating and display unit for air conditioner/Climatronic -E87- ◆ There is a fault affecting data output in the central control unit for the convenience system -J393- or in a component connected to it. ◆ The central control unit for the convenience system -J393- does not transmit a data message. ◆ The operating and display unit for air conditioner/Climatronic -E87- is unable to read the data message sent by the central control unit for the convenience system -J393- . ◆ The voltage supply to the engine control unit was or has been interrupted while the ignition was switched on.	– Locate and rectify an open circuit or intermittent electrical fault on both signal wires (convenience data bus) between the central control unit for the convenience system -J393- and the operating and display unit for air conditioner/Climatronic -E87- in accordance with the current flow diagram. – Check the (convenience) data bus system ⇒ page 71 . – Interrogate the fault memory for the central control unit for the convenience system -J393- . ⇒ Electrical System; Repair group 01 – Check the (convenience) data bus system ⇒ page 71 . – Interrogate and erase the fault memories of all control units connected to the data bus system. ⇒ Electrical System; Repair group 01



Note

- ◆ The reception of the information is displayed in the measured value block display group "016" ⇒ [page 69](#) .
- ◆ The central control unit for the convenience system -J393- transmits information, for example, on whether the vehicle is LHD or RHD to the bus system (convenience data bus) ⇒ Electrical System; Repair group 01

Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible cause of the fault	Fault remedy
01336 Group convenience data bus Fault (bus off)	◆ Open circuit, short circuit to earth or positive in one of the data bus system's signal wires. ◆ Short circuit between the data bus system's signal wires. ◆ The data bus system's signal wires are interchanged. ◆ A control unit connected to the data bus system has disrupted the transmitted data message. ◆ There is a control unit connected to the data bus system which is not designed for the data bus.	- Use the current flow diagram to locate and rectify a short circuit (to earth, positive or between signal wires) or open circuit in the data bus system. - Use the current flow diagram to check the data bus system's signal wires (convenience data bus). - Check the (convenience) data bus system ⇒ page 71 . - Check the part numbers of all the control units connected to the data bus system: ⇒ Parts List
In single-wire operating mode	◆ Open circuit, short circuit to earth or positive in one of the data bus system's signal wires. ◆ A control unit connected to the data bus system has disrupted the transmitted data message on one of the two signal wires.	- Use the current flow diagram to locate and rectify a short circuit (to earth, positive or between signal wires) or open circuit in the (convenience) data bus system. - Check the (convenience) data bus system ⇒ page 71 .
missing messages (time-out for several control units)	◆ Open circuit e.g. on a distribution node on the data bus system's signal wires. ◆ Open circuit in the power supply to one or more control unit(s) which are connected to the data bus system.	- Locate and rectify the open circuit in the data bus system using the current flow diagram ◆ Use the current flow diagram to locate and rectify an open circuit in the voltage supply to one or more control units which are connected to the data bus system.



Note

- ◆ The reception of the information is displayed in the measured value block display group "016" ⇒ [page 69](#) .
- ◆ If a fault is saved in the convenience data bus in vehicles built since 2002, check the part number of the operating and display unit for air conditioner/Climatronic -E87- . There may only be a operating and display unit for air conditioner/Climatronic -E87- installed with a part number from index "D". The operating and display units for air conditioner/Climatronic -E87- are coordinated with the factory-fitted radios in vehicles built since 2002. (The radio has been integrated into the data bus system in vehicles built since 2002). ⇒ *Electrical System; Repair group 01* ⇒ *Parts List*



Display on the vehicle diagnostic, testing and information system -VAS 5051- and output on the printer	Possible cause of the fault	Fault remedy
65535 Control unit defective /SP	◆ Open circuit to the operating and display unit for air conditioner/Climatronic -E87- (terminal "30", "15", "75" or terminal "31") ◆ Intermittent electrical fault or contact resistance in the wiring to the operating and display unit for air conditioner/Climatronic -E87- ◆ The control buttons of the operating and display unit for air conditioner/Climatronic -E87- are constantly pressed (button remains in). ◆ Errors in the program sequence for the operating and display unit for air conditioner/Climatronic -E87- . ◆ The operating and display unit for air conditioner/Climatronic -E87- is defective.	– Use the current flow diagram to locate and rectify the fault in the wiring – Check for dirt on the buttons for the operating and display unit for air conditioner/Climatronic -E87- . Clean them, if necessary. – Replace the operating and display unit for air conditioner/Climatronic -E87-



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4 Final control diagnosis

Note the following as regards final control diagnosis:

- The air conditioner compressor regulating valve -N280- is only actuated by the operating and display unit for air conditioner/ Climatronic -E87- if the engine is not running.
- The request for actuation of the radiator fans (speeds “1” and “2”) is always sent by the operating and display unit for air conditioner/Climatronic -E87- to the control unit for the radiator fans -J293- . However, the control unit for the radiator fans - J293- only switches the fans on if the engine is running (voltage present at terminal “61”).
- The final control diagnosis is only possible up to an engine speed of 3000 rpm and below a vehicle speed of 5 km/h.



Note

- ◆ *Fitting locations of the components which are actuated*
⇒ [page 178](#) .
- ◆ *If necessary, the final control diagnosis may be repeated several times.*
- ◆ *Control element malfunctions are stored in the fault memory.*
- ◆ *The control and display of the operating and display unit for air conditioner/Climatronic -E87- are deactivated during the final control diagnosis. The “segment test” function is the only function during which the display segments of the operating and display unit for air conditioner/Climatronic -E87- are actuated.*
- ◆ *The air conditioner positioning motors are moved into a pre-determined position by the operating and display unit for air conditioner/Climatronic -E87- after the “final control diagnosis” function has been selected. Therefore, during the final control diagnosis, there is no need to wait for the positioning motors to reach a specified position.*

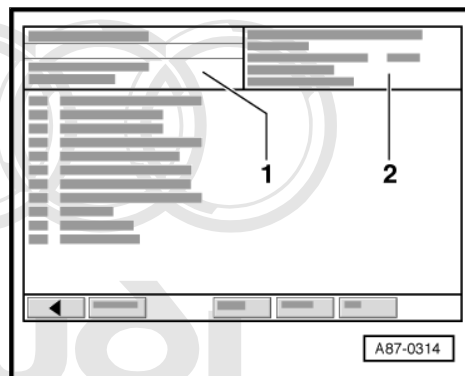
4.1 Final control diagnosis

4.1.1 Starting the final control diagnosis

- With the ignition off, connect the vehicle diagnostic, testing and information system -VAS 5051- by the diagnostic cable - VAS 5051/5A- , for example, to the 16-pin diagnostic socket in the vehicle ⇒ [page 4](#) .
- Switch the ignition on (engine not running)
- Set the operating and display unit for air conditioner/Climatronic -E87- to “Auto” mode.
- Use the address word “08” to select the electronic climate/heater control ⇒ [page 4](#) .
- Open the dash panel vents.
- Interrogate the fault memory ⇒ [page 9](#) .

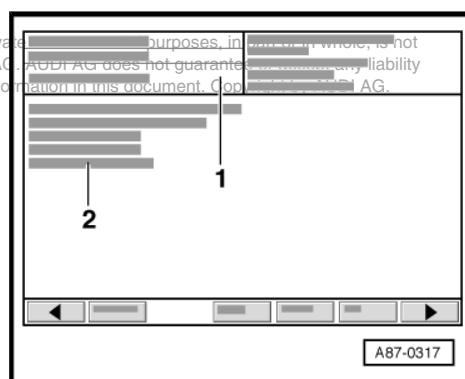
Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- Select the function " 03 - Final control diagnosis".



Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- ◆ Display zone -1- shows which control element is currently being actuated (e.g. 1st control element in the test).
- ◆ Display zone -2- gives a consecutive list of control elements which have already been actuated and the one which is currently being actuated. The control element which is currently being actuated appears in the bottom line.
- Press the key to select the next component. Function and sequence ⇒ [page 30](#) . (Table of actuated components)



Note

- ◆ Press the key to return to the selection program.
- ◆ The final control diagnosis can be terminated by pressing the key.
- ◆ Once the final control diagnosis has been completed, interrogate the fault memory ⇒ [page 9](#) .
- ◆ If the final control diagnosis is aborted, interrogate the fault memory ⇒ [page 9](#) and read the measured value block (display group 002) ⇒ [page 50](#) .

4.1.2 Actuated control elements

Indicated on the display	Desired function	Fault remedy
Air conditioner compressor regulating valve - N280-	◆ The regulating valve is switched on and off at 5 second intervals. - This results in the compressor being switched on and off. - The regulating valve is actuated so that a current of approx. 0.8 A (or 0.65 A, depending on the version of the operating and display unit for air conditioner/Climatronic -E87- used) flows.	- Rectify the fault which is causing the compressor to shut off ⇒ page 42 (Read the measured value block) - Check the air conditioner compressor regulating valve -N280- ⇒ page 78 (electrical check)



Note

- ◆ The air conditioner compressor regulating valve -N280- control element is only actuated if the engine is not running. If the engine is running, this control element is not displayed in the final control diagnosis on the display for the vehicle diagnostic, testing and information system -VAS 5051- and is not actuated by the operating and display unit for air conditioner/Climatronic -E87-
- ◆ The air conditioner compressor regulating valve -N280- is installed (the compressor can only be replaced in specialist air conditioner workshop). ⇒ Air conditioner with refrigerant R134a
- ◆ The current which flows when the air conditioner compressor regulating valve -N280- is switched on can be measured with a current probe, for example ⇒ [page 78](#) (electrical check)
- ◆ The air conditioner compressor regulating valve -N280- is not actuated if there is a further compressor shut-off criterion present in addition to "5 = Engine speed less than 300 rpm".

Indicated on the display	Desired function	Fault remedy
Fresh-air blower -V2-	◆ The fresh air blower -V2- is running – The voltage at the fresh air blower -V2- is continuously changed between 0% and 100% within 5 seconds	– Check that the fresh-air blower is moving freely – Use the current flow diagram to check the earth connection for the control unit for the fresh-air blower -J126- – Check the control unit for the fresh-air blower -J126- ⇒ page 83 – Replace the operating and display unit for air conditioner/Climatronic -E87- ⇒ page 188
DANGER: The fan is switched on	Info display WARNING: The next time the button is pressed, the radiator fan -V7- is switched on. Keep hands away from the fan area	



Note

Start the engine if you wish to check actuation of the fan. The control unit for the radiator fans -J293- only switches the radiator fans -V7- on if the engine is running (voltage present at terminal "61").

Indicated on the display	Desired function	Fault remedy
The control unit for the radiator fans, speeds "1"+"2" (control unit for the radiator fans -J293- switches fan speed "1")	◆ The request for the 1st fan speed is activated and deactivated every 5 seconds. – With the engine running, the control unit for the radiator fans -J293- switches the fan on and off every 5 seconds.	– Using the current flow diagram, check the wiring between the operating and display unit for air conditioner/Climatronic -E87- and the control unit for the radiator fans -J293- for open circuits or a short circuit to earth ⇒ "Current Flow Diagrams, Electrical Fault-Finding, Fitting Locations" – Check actuation of the radiator fan -V7- ⇒ page 78 (electrical check) – Check actuation of the radiator fan -V7- . ⇒ "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations"



Note

Start the engine if you wish to check actuation of the fan. The control unit for the radiator fans -J293- only switches the fans -V7- on if the engine is running (voltage present at terminal "61").

Indicated on the display	Desired function	Fault remedy
The control unit for the radiator fans, speeds "1"+"2" (control unit for the radiator fans -J293- switches fan speeds "1" and "2")	◆ The request for the 2nd fan speed is activated and deactivated every 5 seconds. – With the engine running, the control unit for the radiator fans -J293- switches the fan on and off every 5 seconds.	– Using the current flow diagram, check the wiring between the operating and display unit for air conditioner/Climatronic -E87- and the control unit for the radiator fans -J293- for open circuits or a short circuit to earth ⇒ "Current Flow Diagrams, Electrical Fault-Finding, Fitting Locations" – Check actuation of the radiator fan -V7- ⇒ page 78 (electrical check) – Check actuation of the radiator fan -V7- . ⇒ "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations"
Temperature sensor blower -V42-	◆ The temperature sensor blower -V42- in the dash panel is switched on and off at 5 second intervals. – Smoke is drawn in by the blower	– Check that there is clear access through intake opening ⇒ page 188 – Remove the operating and display unit for air conditioner/Climatronic -E87- and replace the temperature sensor blower -V42- ⇒ page 188 .



Note

Use smoke, for example, to check operation of the temperature sensor blower -V42- (hold the smoke generator in front of intake opening in the operating and display unit for air conditioner/Climatronic -E87-).

Indicated on the display	Desired function	Fault remedy
Temperature flap positioning motor -V68-	◆ The positioning motor for temperature flap -V68- moves from one limit stop to the other	– Check that the temperature flap is moving freely

Indicated on the display	Desired function	Fault remedy
– Open all the dash panel vents	– The fresh air blower is running – The air temperature from the vents changes	– Using the current flow diagram, check the wiring between positioning motor for temperature flap -V68- and the operating and display unit for air conditioner/Climatronic -E87- for an open circuit or to see if the wiring has been interchanged. – Check the temperature flap positioning motor -V68- ⇒ page 86 – Replace the operating and display unit for air conditioner/Climatronic -E87- ⇒ page 188

Indicated on the display	Desired function	Fault remedy
Central flap positioning motor -V70- – Open all the dash panel vents	◆ The positioning motor for central flap -V70- moves from one limit stop to the other – The fresh air blower is running – Air distribution is switched from the footwell to the dash panel vents	– Check that the central flap is moving freely – Using the current flow diagram, check the wiring between positioning motor for central flap -V70- and the operating and display unit for air conditioner/Climatronic -E87- for an open circuit or to see if the wiring has been interchanged – Check the central flap positioning motor -V70- ⇒ page 86 – Replace the operating and display unit for air conditioner/Climatronic -E87- ⇒ page 188
positioning motor for defrost flap -V107- – Close all the dash panel vents	◆ The positioning motor for defrost flap -V107- moves from one limit stop to the other – The fresh air blower is running – Air distribution is switched from the footwell to defrost	– Check that the defrost flap is moving freely – Using the current flow diagram, check the wiring between positioning motor for defrost flap -V107- and the operating and display unit for air conditioner/Climatronic -E87- for an open circuit or to see if the wiring has been interchanged – Check the defrost flap positioning motor -V107- ⇒ page 86 – Replace the operating and display unit for air conditioner/Climatronic -E87- ⇒ page 188

Indicated on the display	Desired function	Fault remedy
positioning motor for recirculated-air flap -V113-	◆ The positioning motor for recirculated-air flap -V113- moves from one limit stop to the other	– Check that the fresh-air and recirculated-air flap is moving freely.

Indicated on the display	Desired function	Fault remedy
	– The fresh-air blower is running – The air conditioner switches between fresh-air and recirculated-air mode (fresh-air and recirculated-air flap)	– Using the current flow diagram, check the wiring between positioning motor for recirculated-air flap -V113- and the operating and display unit for air conditioner/Climatronic -E87- for an open circuit or to see if the wiring has been interchanged – Check the recirculated-air flap positioning motor -V113- ⇒ page 86 – Replace the operating and display unit for air conditioner/Climatronic -E87- ⇒ page 188



Note

This positioning motor moves both the recirculated-air flap and the fresh-air flap (air flow flap).

Indicated on the display	Desired function	Fault remedy
Segment test	◆ All the segments in the display, the function feedback warning lamps in the buttons and the illumination of the operating and display unit for air conditioner/Climatronic -E87- are switched on and off every 2 seconds.	– Replace the operating and display unit for air conditioner/Climatronic -E87- ⇒ page 188
Heated rear window -Z1-	◆ The heated rear window -Z1- is switched on once for 10 seconds – The rear window is heated in the vicinity of the heating wires.	– Check actuation and power consumption of the heated rear window -Z1- ⇒ page 103 (electrical check). – Replace the operating and display unit for air conditioner/Climatronic -E87- ⇒ page 188
END	Info display – End of the control element test	



Note

- ◆ *The switch-on function in the operating and display unit for air conditioner/Climatronic -E87- for the heated rear window -Z1- can be tested during final control diagnosis, for example, with the multimeter -V.A.G 1715-. Place the current probe over the positive lead running from the operating and display unit for air conditioner/Climatronic -E87- to the heated rear window -Z1- and select the "current measurement via the current probe" function on the multimeter. The display changes from approx. 0 A to greater than 7 A.*
- ◆ *If the control element "Heated front windscreen" is displayed following the control element Heated rear window -Z1-, check the encoding of the operating and display unit for air conditioner/Climatronic -E87- → [page 40](#). The Audi A2 will not be available with a heated front windscreen for the time being. However, the operating and display unit for air conditioner/Climatronic -E87- already supports the possibility of activating this output for final control diagnosis via possible encoding in the future.*



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5 Basic setting

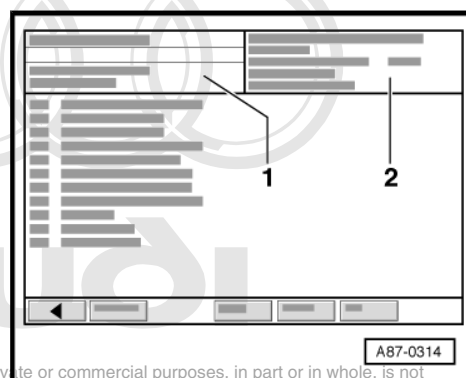
- With the ignition off, connect the vehicle diagnostic, testing and information system -VAS 5051- by the diagnostic cable - VAS 5051/5A- , for example, to the 16-pin diagnostic socket in the vehicle and use the address word "08" to select the electronic climate/heater control ⇒ [page 4](#) .

Prerequisite:

- The encoding must have been checked and corrected if necessary ⇒ [page 42](#) (the encoding which is currently valid is displayed in the measured value block) and ⇒ [page 40](#) .
- The fault memory must have been interrogated ⇒ [page 9](#) , displayed faults rectified and the fault memory erased ⇒ [page 38](#) .
- The air conditioner must be switched on ("Auto" mode).

Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

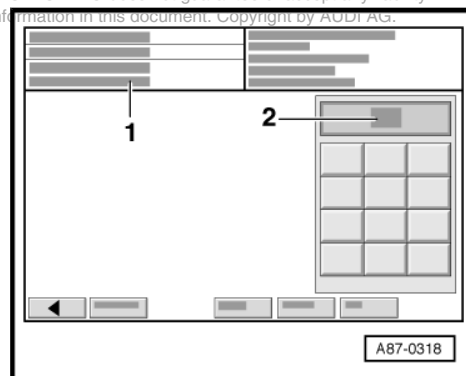
- Select the function " 04 - Basic setting".



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Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- The prompt for entering a display group appears in display zone -1-.
- The input keypad appears in display zone -2-.
- Use the input keypad in display zone -2- to enter "01" or "001" for display group number "001" and confirm by pressing the  button.



The following positioning motors are actuated in consecutive order, and their settings are saved in the operating and display unit for air conditioner/Climatronic -E87- . (The resistance value of the potentiometers which are installed in the positioning motors) :

- Temperature flap positioning motor -V68-
- Central flap positioning motor -V70-
- Defrost flap positioning motor -V107-
- Recirculated-air flap positioning motor -V113-

Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

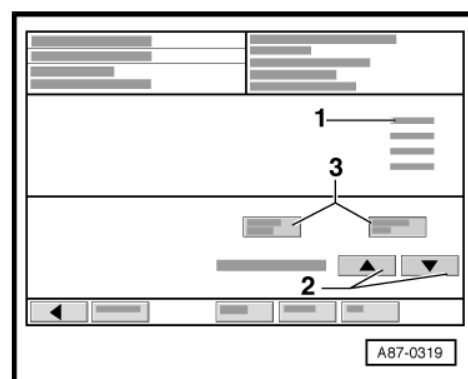
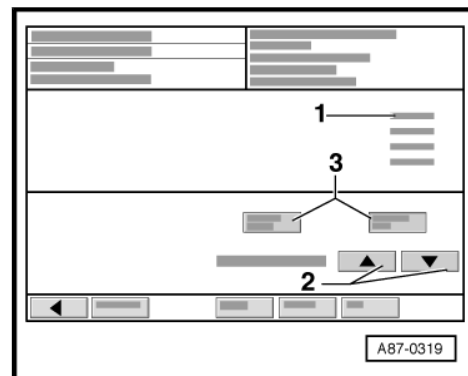
It is possible to track the movement of the positioning motors on the display (display zone -1-) (feedback values in display zones 1 to 4 change).

Wait until display "0" appears in display zone -1- for all the feedback values indicated.



Note

- ◆ The basic setting has been completed when "0" appears in all the display zones.
- ◆ Press the  button to return to the selection program.
- ◆ Press the -2- button to switch to a different display group.
- ◆ Press the -3- button to switch to a different function (e.g. from "Basic setting" to "Read measured value block" and back again).
- Interrogate the fault memory ⇒ [page 9](#) .
- Following the display and print-out of the last fault, rectify the faults as per the fault table ⇒ [page 11](#) .
- ◆ If there is a fault detected on a positioning motor potentiometer during basic setting, "30" or "230" is stored as an adaption value (learned value for this potentiometer) and displayed in the appropriate measured value block.



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6 Erasing fault memory, end of output

- With the ignition off, connect the vehicle diagnostic, testing and information system -VAS 5051- with the diagnostic cable -VAS 5051/5A- to the 16-pin diagnostic socket in the vehicle and use the address word "08" to select electronic climate/heater control ⇒ [page 4](#) .

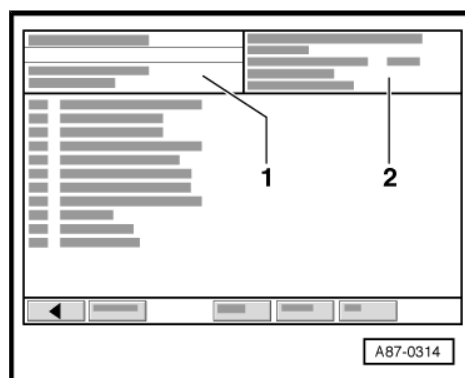
6.1 Erasing fault memory

Prerequisite:

- The fault memory must have been interrogated ⇒ [page 9](#) and all the displayed faults rectified.

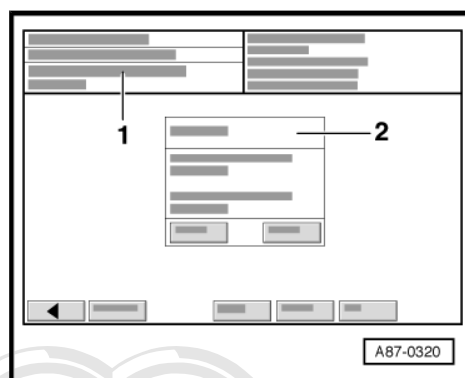
Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- Select the function " 05 - Erase fault memory".



Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- There is no display in display zone -1-.
- A box appears in display zone -2- with the message that (fault memory) data will be erased when the user presses **[O.K.]** and requesting confirmation that the function is to be executed.



Note

- If "Fault memory not yet interrogated" appears in display zone -1-.
- Interrogate the fault memory.
- Rectify any faults.
- The fault memory is not erased if, for example, the ignition is switched off between interrogating and erasing the fault memory.

- On the display of vehicle diagnostic, testing and information system -VAS 5051- , press **[O.K.]** in display zone -2-.

As soon as the fault memory has been erased, zone -1- displays "Fault memory erased".

- On the display of vehicle diagnostic, testing and information system -VAS 5051- , press **[O.K.]**.

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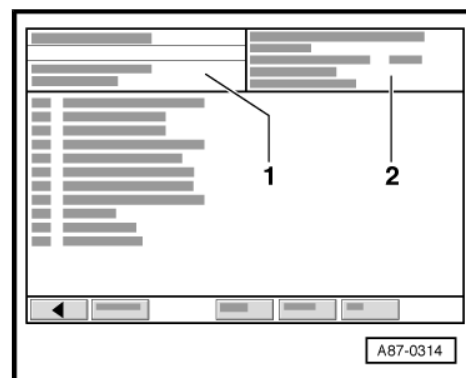
6.2 End of output

Prerequisite:

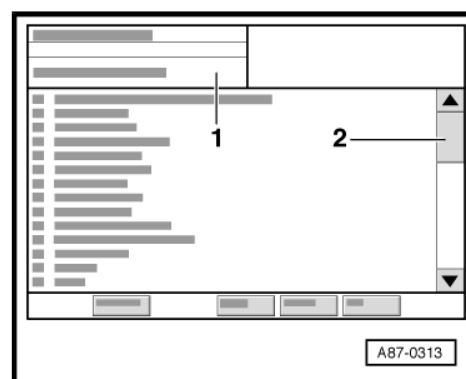
- The fault memory must have been interrogated and erased, the basic setting performed and the encoding checked (the encoding which is currently valid is displayed in the measured value block ⇒ [page 42](#)).

Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- Select the function "06 - End of output".



- Wait until this display (start menu) appears on the vehicle diagnostic, testing and information system -VAS 5051- .
- Switch off the ignition and unplug the diagnostic connector.



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7 Encoding the operating and display unit for air conditioner/Climatronic - E87-



Note

- ◆ *The operating and display unit for air conditioner/Climatronic -E87- is encoded in the Audi A2 by means of the control unit in the dash panel insert -J285- and the convenience system central control unit -J393-. The data is transmitted to the operating and display unit for air conditioner/Climatronic -E87- via the "data bus system". The encoding which is currently valid is displayed in the measured value block ⇒ [page 42](#) . and ⇒ Electrical System; Repair group 01*
- ◆ *There is no facility at present for direct code input into the operating and display unit for air conditioner/Climatronic -E87- (however, this feature may be introduced for optional extras at a later date).*
- ◆ *If the control unit in the dash panel insert -J285- was encoded for the "Japan" country variant, the air conditioner remains in recirculated-air mode after switching the ignition off and on again, if recirculated-air mode had been selected before the ignition was switched off.*

7.1 Encoding the control unit



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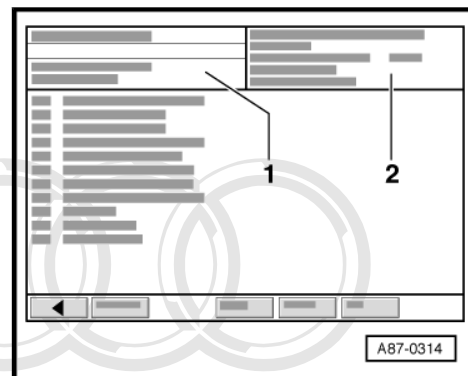
- ◆ *Control unit encoding is only possible using testers in which a workshop code has been entered.*
- ◆ *If encoding is performed on operating and display units for air conditioner/Climatronic -E87- installed at the start of production, "Function unknown or currently unable to be performed" appears in display zone -1-.*
- ◆ *The operating and display units for air conditioner/Climatronic -E87- will be modified before the Audi A2 is available with a "heated front windscreen" or a "sunroof with integrated solar cells". The modified operating and display units for air conditioner/Climatronic -E87- will then have to be encoded.*
- With the ignition off, connect the vehicle diagnostic, testing and information system -VAS 5051- by the diagnostic cable -VAS 5051/5A-, for example, to the 16-pin diagnostic socket in the vehicle and use the address word "08" to select the electronic climate/heater control ⇒ [page 4](#) .

Prerequisite:

- ◆ The fault memory must have been interrogated ⇒ [page 9](#) , displayed faults rectified and the fault memory erased ⇒ [page 38](#) .
- ◆ The air conditioner must be switched on ("Auto" mode).
- ◆ An operating and display unit for air conditioner/Climatronic -E87- must be installed which is intended for encoding

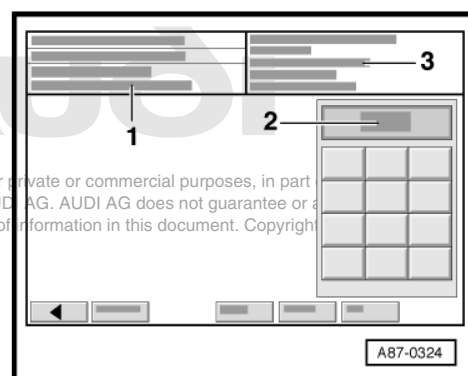
Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- Select the function "07 - Encoding the control unit".

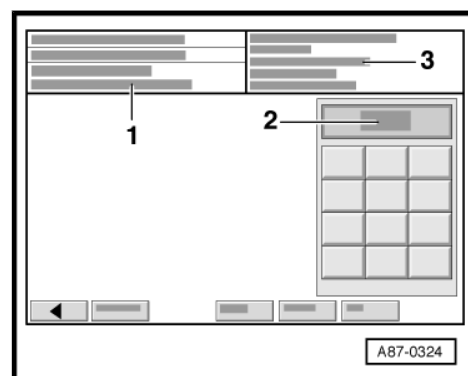


Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

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- ◆ The prompt for entering the code appears in display zone -1-.
- ◆ An input keypad appears in display zone -2-.
- ◆ The fourth line of display zone -3- indicates the current valid code, with the previous code shown in brackets.
- ◆ The fifth line of display zone -3- indicates the workshop code which is entered in your vehicle diagnostic, testing and information system -VAS 5051- .
- The specified code can now be entered in display zone -2- in the operating and display unit for air conditioner/Climatronic - E87- which is intended for encoding.



8 Reading the measured value block



Note

- ◆ In order to check the speed signal after switching on the ignition, move the vehicle a few metres at or above walking speed (above 5 km/h).
- ◆ Fitting locations of the actuated components ⇒ [page 178](#).
- With the ignition off, connect the vehicle diagnostic, testing and information system -VAS 5051- by the diagnostic cable -VAS 5051/5A-, for example, to the 16-pin diagnostic socket in the vehicle ⇒ [page 4](#).
- Switch on the ignition or start the engine.
- Set the operating and display unit for air conditioner/Clima-tronic -E87- to "Auto" mode.
- Use the "address word" 08 to select the electronic climate/heater control ⇒ [page 4](#).

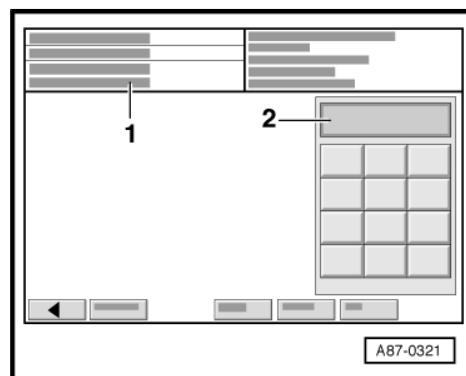
Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- Interrogate the fault memory ⇒ [page 9](#).
- Select the function "08 - Reading the measured value block".



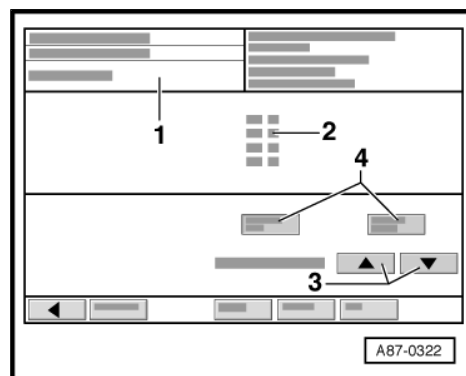
Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- ◆ The prompt for entering a display group appears in display zone -1-.
- ◆ An input keypad appears in display zone -2-.
- Use the input keypad to enter the desired display group in display zone -2- (e.g. "001" or "01" for "display group number 001") ⇒ [page 43](#) (List of available display group numbers) and confirm by pressing **Q**.

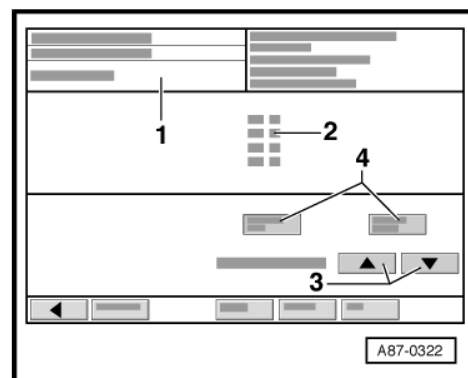


Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- ◆ The display group selected appears in display zone -1-.
- ◆ The values for the four display zones appear in display zone -2-:
- The value for display zone "1" appears on the first line.
- The values for each of the display zones appear in the second, third and fourth lines.
- This line remains blank if a display zone is not used.



- ◆ Press -3- to switch to a different display group.
- ◆ Press -4- to switch to a different function (e.g. from “Read measured value block” to “Basic setting” and back again).
- Enter desired display group number ➔ [page 43](#) (List of available display group numbers).



8.1 List of available display group numbers

8.1.1 Table of intended display group numbers

Display group number	Display zone	Designation	Explanatory notes
001	1	Control current for actuating the air conditioner compressor regulating valve -N280- (in amps)	➔ page 46
	2	Actuating the air conditioner compressor regulating valve -N280- (signal value as percentage)	
	3	Signal from the high-pressure sender -G65- (signal ratio, depending on the refrigerant circuit pressure in percentage terms)	
	4	Refrigerant circuit pressure transmitted by the high-pressure sender -G65- (via the signal ratio of the operating and display unit for air conditioner/Climatronic -E87- converted into bar)	
002	1 ... 4	The last four compressor shut-off conditions which were active for longer than 20 seconds.	➔ page 50
003	1 ... 4	Temperature flap positioning motor -V68-	➔ page 53
004	1 ... 4	Defrost flap positioning motor -V107-	➔ page 54
005	1 ... 4	Central flap positioning motor -V70-	➔ page 55
006	1 ... 4	Recirculated-air flap positioning motor -V113-	➔ page 56

Display group number	Display zone	Designation	Explanatory notes
007	1	Value measured by the footwell vent temperature sender -G192-	➔ page 57
	2	Value measured by the middle vent temperature sender -G191-	
	3	Value measured by the evaporator vent temperature sender -G263-	
	4	Value measured by the fresh-air intake duct temperature sensor -G89-	
008	1	Calculated value (filtered value) for the current valid ambient temperature, transmitted by the control unit in the dash panel insert -J285-	➔ page 57
	2	Measured value (unfiltered value) for the ambient temperature sensor -G17- , transmitted by the control unit in the dash panel insert -J285-	
	3	Value measured by the dash panel temperature sensor -G56-	



Display group number	Display zone	Designation	Explanatory notes
	4	Actuation of the temperature sensor blower -V42-	
009	1	Coolant temperature transmitted by the control unit in the dash panel insert -J285-	⇒ page 59
	2	Signal for idling speed increase	
	3	Current engine speed transmitted by the control unit in the dash panel insert -J285-	
	4	Vehicle speed transmitted by the control unit in the dash panel insert -J285-	

Display group number	Display zone	Designation	Explanatory notes
010	1	Status of the torque required for operating the compressor, displayed in display zone "2"	⇒ page 61
	2	Calculated engine torque required for operating the compressor (in Nm)	
	3	Voltage at terminal "58d" (in volts) transmitted by the control unit in the dash panel insert -J285-	
	4	Voltage at terminal "58s" (in volts) transmitted by the control unit in the dash panel insert -J285-	
011	1	Actual voltage at the fresh-air blower -V2- (in volts).	⇒ page 62
	2	Target voltage at the fresh-air blower -V2- (in volts).	
	3	Actuation of the radiator fans -V7-	
	4	Request for fresh-air/recirculated-air mode	

Display group number	Display zone	Designation	Explanatory notes
012	1	Actuation of the heated rear window -Z1-	⇒ page 64
	2	Display zone not used. – Provided for actuation of the heated front windscreen (use as an optional extra as yet undecided)	
	3	Actuation of the additional heater – Need only be heeded for vehicles with a diesel engine – Different versions (electric or fuel-powered additional heater)	
	4	Display zone not used Provided for the Open-Sky roof setting (dual spoiler roof)	
013	1	Value measured by the sunlight penetration photosensor -G107-	⇒ page 66
	2	Voltage at terminal "15" (in volts) transmitted by the control unit in the dash panel insert -J285-	
	3	Display zone not used.	
	4	Voltage at terminal "30" (in volts).	

Display group number	Display zone	Designation	Explanatory notes
014	1	Standing time transmitted by the control unit in the dash panel insert -J285- (signal for the "ignition-off time-span" in hours) – Time since the ignition was last switched off	⇒ page 67

Display group number	Display zone	Designation	Explanatory notes
	2	Ignition key assignment transmitted by the control unit in the dash panel insert -J285-	
	3	Signal for windscreen wipers in operation – Wiper/washer or wiper operation	
	4	Encoding transmitted by the control unit in the dash panel insert -J285- and by the central control unit for the convenience system -J393-	
015	1	Display zone not used. – Provided for the auxiliary heater cut-in signal – At present, there are no plans to install an auxiliary heater (as an optional extra)	⇒ page 68
	2	Display zone not used.	
	3	Display zone not used.	
	4	Counter for compressor shut-off operations not requested by the operating and display unit for air conditioner/Climatronic -E87- .	

Display group number	Display zone	Designation	Explanatory notes
016	1	Information from the control unit in the dash panel insert on the convenience bus system	⇒ page 69
	2	Information from convenience system's control unit on the convenience bus system	
	3	Display zone not used.	
	4	Operating status of the convenience bus system	

8.1.2 Additional display groups not to be used by Customer Service at present

Display group number	Display zone	Designation	Explanatory notes
017	1	Network management version number – Operating level of the convenience data bus	
	2	Version of the communication matrix – Data level with which the determining control unit for the convenience data bus operates (the control unit in the dash panel insert -J285-).	
	3	Communication matrix version in the operating and display unit for air conditioner/Climatronic -E87- – Data level of operating and display unit for air conditioner/Climatronic -E87- on which information is transmitted on the convenience data bus and expected by other control units	
	4	Display zone not used.	
080	1	Manufacturer and manufacturer's works identification marking	
	2	Date of production of the operating and display unit for air conditioner/Climatronic -E87-	
	3	Manufacturer's modification status of the operating and display unit for air conditioner/Climatronic -E87-	

Display group number	Display zone	Designation	Explanatory notes
	4	Number of the test bench on which the operating and display unit for air conditioner/Climatronic -E87- was checked during production or the manufacturer's serial number	

8.2 Display groups 001 to 005

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8.2.1 Display group 001:

Air conditioner compressor regulating valve -N280- and high-pressure sender -G65-



Note

- ◆ *In the event of a compressor shut-off criterion (see display group "002"), the air conditioner compressor regulating valve -N280- cannot be actuated, even during final control diagnosis (⇒ [page 29](#)).*
- ◆ *If there is no pressure signal detected from the high-pressure sender -G65-, the air conditioner compressor regulating valve -N280- may not be actuated.*

Display zone	Meaning	Explanatory Notes
1	Measured control current for air conditioner compressor regulating valve -N280- (in amps) ◆ Display = less than 0.050 A – Compressor switched off ◆ Display = 0.3 A to 0.8 A – Compressor in control mode; the control current is governed by the required refrigeration capacity	• Current flowing via the air conditioner compressor regulating valve -N280- .



Note

- ◆ *Display zone "1" shows the intensity of current that flows via the air conditioner compressor regulating valve -N280- .*
- ◆ *The current intensity is calculated by the operating and display unit for air conditioner/Climatronic -E87-. It is dependent on the required refrigeration capacity, the selected operating and display unit for air conditioner/Climatronic -E87- mode and the vehicle system voltage. For safe regulation on the part of the regulating valve, however, a prescribed minimum current must flow. For the regulating valves installed at present this is 0.3 A.*
- ◆ *If the air conditioner compressor regulating valve -N280- is fully actuated, there is a maximum current of approx. 0.8 A or 0.65 A depending on the vehicle system voltage and the version of the operating and display unit for air conditioner/Climatronic -E87- in use.*

Display zone	Meaning	Explanatory Notes
2	Signal ratio for actuation of the air conditioner compressor regulating valve -N280- (in %) ◆ Display = 0% – Compressor switched off ◆ Display = 30...40% to 100% Compressor in control mode; the actuation time depends on the required refrigeration capacity, the mode selected and the vehicle system voltage. However, the actuation time is at least long enough for a mean current of 0.3 A to flow and no longer than required for a mean current of approx. 0.8 A or 0.65 A not to be exceeded (depending on the version of the operating and display unit for air conditioner/Climatronic -E87-).	• Time proportion of actuation of the air conditioning system compressor regulating valve -N280-

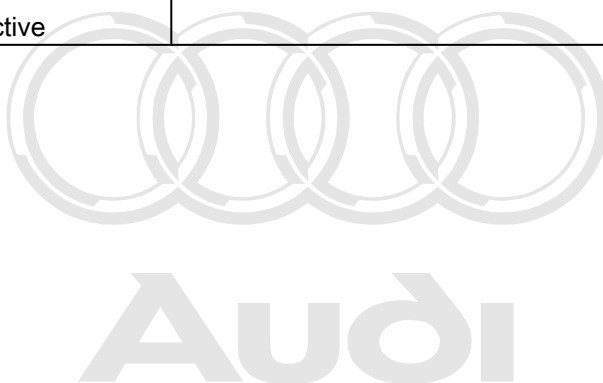


Note

- ◆ *The signal ratio for the time during which the current can actually flow is displayed in display zone "2".*
- ◆ *The operating frequency for the operating and display unit for air conditioner/Climatronic -E87- is 500 Hz (500 Hertz = 500 cut-in pulses per second). The signal ratio indicates the proportion of cut-in time per pulse.*
- ◆ *The cut-in signal can be tested with the vehicle diagnostic, testing and information system -VAS 5051- in the measuring instrument function, for example ⇒ [page 95](#) .*
- ◆ *The signal ratio is selected by operating and display unit for air conditioner/Climatronic -E87- in such a way that the target temperature of the evaporator, which is dependent upon various factors, is achieved on the evaporator outlet temperature sender -G263- ⇒ [page 57](#) .*
- ◆ *If a defect is detected in the evaporator outlet temperature sender -G263- , the operating and display unit for air conditioner/Climatronic -E87- switches to emergency running and the air conditioner compressor regulating valve -N280- is only actuated with a max. control current which is specified by the software for the operating and display unit for air conditioner/Climatronic -E87- . The maximum control current is governed by the version of operating and display unit for air conditioner/Climatronic -E87- in use. With the operating and display unit for air conditioner/Climatronic -E87- currently installed, this may be approx. 0.3 A to 0.5 A (as a result of which, the refrigeration capacity of the air conditioner is reduced and, at higher temperatures, the cooling performance may no longer prove to be adequate).*

Display zone	Meaning	Explanatory Notes
3	Signal ratio for the pressure signal from the high-pressure sender -G65- (in %)	• Time proportion of the positive signal from the high-pressure sender -G65-

Display zone	Meaning	Explanatory Notes
	◆ Display = 0...0.5% – Open circuit in the wiring between the high-pressure sender -G65- and the operating and display unit for air conditioner/Climatronic -E87- – Open circuit in the power supply or in the earth connection to high-pressure sender -G65- – High-pressure sender -G65- is defective ◆ Display = 5% to 12% – Pressure in the refrigerant circuit is too low (system empty) – High-pressure sender -G65- is defective ◆ Display = 12% to 87.5% – Pressure in the refrigerant circuit is within the permissible range. ◆ Display = greater than 87.5 ...90% – Pressure in the refrigerant circuit too high. – Actuation of radiator fans -V7- is not OK. – High-pressure sender -G65- is defective – Radiator and/or condenser are dirty – Fault in the refrigerant circuit ◆ Display = 90....100% – Short circuit to earth in the wiring between the high-pressure sender -G65- and the operating and display unit for air conditioner/Climatronic -E87- – Open circuit in the power supply or in the earth connection to the high-pressure sender -G65- – High-pressure sender -G65- is defective	• If, at an ambient temperature above 20° C, a signal ratio of below 16.5 % is displayed, the measured value of the high-pressure sender -G65- is not OK or there is too little refrigerant in the circuit



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**Note**

- ◆ *The signal ratio for the time is displayed in display zone "3" whilst the signal is actually present.*
- ◆ *The operating and display unit for air conditioner/Climatronic -E87- calculates the pressure in the refrigerant circuit via the signal ratio. The calculated pressure is displayed in display zone "4".*
- ◆ *At a signal ratio of less than 12.5% (corresponds to approx. 1.5 bar absolute) and greater than 87.5% (corresponds to approx. 32 bar absolute), the operating and display unit for air conditioner/Climatronic -E87- does not switch on the compressor (the air conditioner compressor regulating valve N280- is not actuated). The compressor is only reactivated once the signal ratio exceeds 12.5% (corresponding to an absolute pressure of 1.5 bar) or drops below 84% (corresponding to an absolute pressure of 29 bar).*
- ◆ *In order to prevent abrupt compressor shut-off on account of excessive pressure in the refrigerant circuit or an excessive coolant temperature, the compressor output is reduced by the operating and display unit for air conditioner/Climatronic -E87- :*
 - ◆ *- As soon as the pressure in the refrigerant circuit exceeds 30 bar (absolute) (full compressor output is not released again until the pressure has dropped below 27 bar).*
 - ◆ *- As soon as the coolant temperature exceeds 115° C (it is shut down completely at 118° C).*
- ◆ *At a signal ratio of approx. 47% (equivalent to an absolute pressure of 16 bar in the refrigerant circuit), the operating and display unit for air conditioner/Climatronic -E87- sends a signal to the control unit for the radiator fans -J293- , thereby switching the radiator fan -V7- to speed 2. The signal remains on until the signal ratio has fallen below approx. 40% (equivalent to an absolute pressure of approx. 13 bar).*
- ◆ *An absolute pressure of 0 bar represents an absolute vacuum. Therefore normal ambient pressure is equivalent to approx. 1 bar absolute. On the dials of most pressure gauges 0 bar is equivalent to an absolute pressure of one bar (recognisable by the datum -1 below 0).*
- ◆ *The pressure in the refrigerant circuit and therefore the signal ratio depends on various factors. In general, however, at maximum compressor output and an ambient temperature of 20 to 25 °C, the pressure should not exceed 20 bar (absolute). Under extreme conditions of use (e.g. in hot countries with high ambient temperatures, "stop and go traffic" and high relative humidity), the extremely high refrigeration capacity involved may also result in pressures of up to 30 bar (absolute).*
- ◆ *The high-pressure sender operates at a frequency of 50 Hz (50 Hertz = 50 cut-in pulses per second). The signal ratio indicates the proportion of cut-in time per pulse.*
- ◆ *The cut-in signal from the high-pressure sender -G65- can be tested, for example, with the vehicle diagnostic, testing and information system -VAS 5051- in the measuring instrument function ⇒ [page 93](#) .*
- ◆ *The signal generated by the high-pressure sender -G65- is also used for engine control (the required compressor drive torque is governed by the refrigerant circuit pressure). Depending on the engine control unit version, the signal is displayed as a signal ratio in the measured value block.*

- ◆ *The signal transmitted at a refrigerant circuit pressure of approx. 6 bar absolute is equivalent to a signal ratio of approx. 22% (automatic adjustment with the compressor at a standstill, at an ambient temperature of 20 °C, and with a properly filled refrigerant circuit).*

Display zone	Meaning	Explanatory Notes
4	Pressure in the refrigerant circuit (in bar absolute) ◆ Display = less than 2.6 bar – Pressure in the refrigerant circuit is too low (system empty) – High-pressure sender -G65- is defective ◆ Display = 2.6 bar to 29 bar – Pressure in the refrigerant circuit is within the permissible range ◆ Display = greater than 29 bar (also for brief periods) – Pressure in the refrigerant circuit is too high. – Actuation of radiator fans -V7- is not OK. – High-pressure sender -G65- is defective – Radiator and/or condenser are dirty – Fault in the refrigerant circuit	• The pressure is calculated via the signal ratio shown in display zone 3 by the operating and display unit for air conditioner/Climatronic -E87- . • If, at an ambient temperature above 20 °C, a pressure of below 4 bar is displayed, the measured value from the high-pressure sender -G65- is not OK or there is too little refrigerant in the circuit



Note

- ◆ *Heed the notes on display zone "3".*
- ◆ *The operating and display unit for air conditioner/Climatronic -E87- calculates the pressure in the refrigerant circuit via the signal ratio (display zone "3").*
- ◆ *If a refrigerant circuit has been properly charged, the pressure settles at 2.6 bar at a temperature of -3 °C. To avoid a fault being stored at low temperatures, the operating and display unit for air conditioner/Climatronic -E87- only detects a fault in the refrigerant circuit at pressures below 1.8 bar (attained at -12 °C). However, the high-pressure sender -G65- is no longer interrogated at this temperature.*

8.2.2 Display group 002:

The last four compressor shut-off conditions

Display zone	Meaning	Explanatory Notes
1	Currently valid compressor shut-off criterion	• Explanatory notes → page 51
2	Last compressor shut-off criterion	
3	Penultimate compressor shut-off criterion	
4	Third last compressor shut-off criterion	

Note

- ◆ In the event of there being several simultaneous compressor shut-off criteria (see display zone "1"), the shutoff criteria are either displayed alternately or the display only shows the criterion assigned the highest priority by the operating and display unit for air conditioner/Climatronic -E87- .
- ◆ Display zone "1" shows the current compressor shut-off criteria.
- ◆ Only compressor shut-off criteria marked with an * are stored in display zones "2", "3" and "4". However, they are only stored when they have been active for more than 20 sec. (shut-off criterion "12" is stored after just 12 seconds).
- ◆ Display group "015" in display zone "4" shows the sum of the compressor shut-off operations performed since the fault memory was last erased. However, only those cut-off conditions which were not initiated by the operating and display unit for air conditioner/Climatronic -E87- will be saved; they are identified by an *.

8.2.3 Explanation of the compressor shut-off criteria in display zone 1...4 (of display group "002"):

Note

All the numbers which are not listed (e.g. 2, 4) are currently not assigned any compressor shut-off criteria.

Display zone	Meaning	Cause of fault/fault remedy
1...4	Code	Compressor shut-off criteria
	0	Compressor on No compressor shut-off criterion detected – If the compressor is not switched on, interrogate the fault memory ⇒ page 9 , perform the final control diagnosis ⇒ page 29 and the electrical check ⇒ page 78 .
	1	Compressor off The pressure in the refrigerant circuit was or is too high – Fault remedy ⇒ page 11 (fault table) and electrical check ⇒ page 78 – Current value measured by the high-pressure sender -G65- (see display group "001" display zones "3" and "4")
	3*	Compressor off The pressure in the refrigerant circuit was or is too low – Fault remedy ⇒ page 11 (fault table) and electrical check ⇒ page 78 – Current value measured by the high-pressure sender -G65- (see display group "001" display zones "3" and "4")
	5	Compressor off Engine speed is less than 300 rpm – Start the engine.

Display zone	Meaning	Cause of fault/fault remedy
	No engine speed detected	◆ No data received via the convenience data bus. – Interrogate the fault memory ⇒ page 9 ◆ The engine control unit or the control unit in the dash panel insert -J285- does not output a speed signal – Check the engine speed signal: ⇒ Electrical System; Repair group 90
6	Compressor off Compressor switched off via the Econ button on the operating and display unit for air conditioner/Climatronic -E87- . Following the replacement of the operating and display unit for air conditioner/Climatronic -E87- , the "basic setting" function has not been performed.	– Switch the compressor on – Perform the air conditioner basic setting in the specified manner ⇒ page 36
7	Compressor off Air conditioner switched off via the Off button on the operating and display unit for air conditioner/Climatronic -E87-	– Switch the air conditioner on
8	Compressor off The ambient temperature reading is less than 5 °C The ambient temperature reading was less than 2 °C and, since then, has not risen above 5 °C	◆ Ambient temperature is less than 5 °C – Move the vehicle into a heated area for testing ◆ Rogue values are delivered by the control unit in the dash panel insert -J285- or by the fresh-air intake duct temperature sensor -G89- – Check the measured values for the ambient temperature sensor -G17- (transmitted by the control unit in the dash panel insert -J285- via the convenience data bus) ⇒ page 57 and the fresh-air intake duct temperature sensor -G89- ⇒ page 57 (display group "007")
10*	Compressor off The vehicle voltage is or was below 9.5V with the engine running	– Vehicle system voltage (at connector -D- contact -12-) is too low or there is a fault in the earth connection to the operating and display unit for air conditioner/Climatronic -E87- (measured value ⇒ page 11 , display group "008") – Check the voltage supply using the current flow diagram.
11*	Compressor off Engine temperature too high	◆ The control unit in the dash panel insert -J285- has detected an excessively high engine temperature (over 118 °C) and transmitted this to the operating and display unit for air conditioner/Climatronic -E87- via the convenience data bus. ⇒ Electrical System; Repair group 90
12*	Compressor off Air conditioner compressor intervention is currently active (see display zone "1") Air conditioner compressor intervention was active for more than 12 seconds (display zone 2...4)	◆ Air conditioner compressor shut off by the engine control unit; interrogate the fault memory of the engine control unit ⇒ Relevant Workshop Manual, Ignition and Injection System; Repair group 01
14*	Compressor off	

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Display zone	Meaning	Cause of fault/fault remedy
	The high-pressure sender -G65- has delivered a pressure signal with a signal ratio greater than 78% at least 30 times during the current driving cycle (pressure is too high). No pressure signal has been received from the high-pressure sender -G65- at least 30 times during the current driving cycle	◆ Intermittent electrical fault in the power supply or the earth connection to the high-pressure sender -G65- ◆ Intermittent electrical fault in the wiring between the high-pressure sender -G65- and the operating and display unit for air conditioner/Climatronic - E87- ◆ Fault on the high-pressure sender -G65- or in the refrigerant circuit – In order to limit the fault ⇒ page 11 (fault table) and electrical check ⇒ page 90
15	Compressor off The temperature measured by the evaporator outlet temperature sender -G263- is under 2 °C (is displayed in display zone "1")	◆ The temperature of the air in the area of the evaporator is below 2 °C – Check the evaporator outlet temperature sender - G263- ⇒ page 57 (display group "007") – If the value measured by the sender is OK and the temperature drops below 2 °C while the compressor is running, check actuation of the air conditioner compressor regulating valve -N280- ⇒ page 29 (final control diagnosis) and electrical check ⇒ page 78 . If actuation is OK, there is a fault in the refrigerant circuit which can only be located and rectified in a specialist air conditioner workshop. ⇒ Air conditioner with refrigerant R134a
16	Compressor off No data received via the convenience data bus.	◆ Fault in the convenience data bus or in a control unit connected to it. – Interrogate the fault memory ⇒ page 9 and read the display group "016" on the measured value block ⇒ page 69

8.2.4 Display group 003:

Temperature flap positioning motor -V68-

Display zone	Meaning	Explanatory Notes
1	Actual feedback value for the potentiometer -G92- (in the temperature flap 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 50 but less than 200)
2	Target feedback value for the potentiometer -G92- (calculated by the operating and display unit for air conditioner/Climatronic -E87-)	• Display range 5 ... 250
3	Potentiometer -G92- value ascertained during "basic setting" and saved in the operating and display unit for air conditioner/Climatronic -E87- with the positioning motor in the "heating stop" position (the temperature flap directs the air flow through the heat exchanger)	• Display value greater than "5" and less than "50"

Display zone	Meaning	Explanatory Notes
4	Potentiometer -G92- value ascertained during "basic setting" and saved in the operating and display unit for air conditioner/Climatronic -E87- with the positioning motor in the "cooling stop" position (the temperature flap directs the air flow past the heat exchanger)	Display value greater than "200" and less than "250"



Note

- ◆ If the feedback value in display zone "1" is less than "5" (short circuit) or greater than "250" (open circuit), perform an electrical check ⇒ [page 78](#) .
- ◆ The actual feedback value (between 5 and 50 as well as between 200 and 250) is specified as the permissible tolerance range for the stop on the positioning motor or flap in the operating and display unit for air conditioner/Climatronic -E87- .
- ◆ If a value is determined in the basic setting that is above or below the permitted adaption value (learned value), the fault "adaption limit exceeded" is entered in the fault memory and "30" or "230" are displayed as substitute values in the measured value block display zones "3" and "4" for this positioning motor.
- ◆ If the display values in display zones "3" or "4" are outside the permissible range ⇒ [page 11](#) . (Fault table)

8.2.5 Display group 004:

Defrost flap positioning motor -V107-

Display zone	Meaning	Explanatory Notes
1	Actual feedback value for the potentiometer -G135- (in the defrost flap positioning motor -V107-)	- 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 50 but less than 200)
2	Target feedback value for the potentiometer in the defrost flap positioning motor -G135- (calculated by the operating and display unit for air conditioner/Climatronic -E87-)	Display range 5 ... 250
3	Value for the potentiometer in the defrost flap positioning motor -G135- ascertained during "basic setting" and saved in the operating and display unit for air conditioner/Climatronic -E87- with the positioning motor in the "very bottom" position (the defrost flap closed)	Display value greater than "5" and less than "50"
4	Value for the potentiometer in the defrost flap positioning motor -G135- ascertained during "basic setting" and saved in the operating and display unit for air conditioner/Climatronic -E87- with the positioning motor in the "very top" position (the defrost flap open)	Display value greater than "200" and less than "250"



Note

Note the instructions on display group "003" ⇒ [page 53](#)

8.2.6 Display group 005:

Central flap positioning motor -V70-

Display zone	Meaning	Explanatory Notes
1	Actual feedback value for the potentiometer - central flap positioning motor -G112- (in the central flap 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 50 but less than 200)
2	Target feedback value for the potentiometer - central flap positioning motor -G112- (calculated by the operating and display unit for air conditioner/Climatronic -E87-)	• Display range 5 ... 250
3	Value for the potentiometer - central flap positioning motor -G112- ascertained during "basic setting" and saved in the operating and display unit for air conditioner/Climatronic -E87- with the positioning motor in the "very bottom" position (the central flap and the footwell flap are closed, the air flow is directed to the defrost flap)	• Display value greater than "5" and less than "50"
4	Value for the potentiometer - central flap positioning motor -G112- ascertained during "basic setting" and saved in the operating and display unit for air conditioner/Climatronic -E87- with the positioning motor in the "very top" position (the central flap is open, the footwell flap is closed, the air flow is directed to the dash panel vents)	• Display value greater than "200" and less than "250"



Note

- ◆ The following air conditioner operating statuses (and all intermediate settings) are possible via the levers fitted on the flaps depending on the positioning motor setting:
- ◆ - Footwell flap and central flap closed = Defrost mode (air to windscreen)
- ◆ - Footwell flap open and central flap closed = Air to the footwell (feedback value in display zones "1" and "2" between "80" and "120").
- ◆ - Footwell flap closed and central flap open = Air out of the dash panel vents
- ◆ Further information ⇒ [page 53](#) (Display group "003")

8.3 Display groups 006 to 016

8.3.1 Display group 006:

Recirculated-air flap positioning motor -V113-

Display zone	Meaning	Explanatory Notes
1	Actual feedback value for the potentiometer in the positioning motor for recirculated-air flap -G143- (in the positioning motor for recirculated-air flap -V113-	- Display value greater than "5" and less than "250" - Maximum permissible deviation: 3 units from the specified feedback value (in the range greater than 50 but less than 200)
2	Target feedback value for the potentiometer in the recirculated-air flap positioning motor -G143- (calculated by the operating and display unit for air conditioner/ Climatronic -E87-)	Display range 5 ... 250
3	Value for the potentiometer in the recirculated-air flap positioning motor -G143- ascertained during "basic setting" and saved in the operating and display unit for air conditioner/Climatronic -E87- with the positioning motor in the "very bottom" position (recirculated-air mode)	Display value greater than "5" and less than "50"
4	Value for the potentiometer in the recirculated-air flap positioning motor -G143- ascertained during "basic setting" and saved in the operating and display unit for air conditioner/Climatronic -E87- with the positioning motor in the "very top" position (air flow mode)	Display value greater than "200" and less than "250"



Note

- ◆ The "air flow mode" position is only obtained with a stationary vehicle during final control diagnosis.
- ◆ In fresh-air mode, a feedback value between "135" and "145" is displayed in display zones "1" and "2".
- ◆ The following air conditioner operating statuses are possible via the levers fitted on the flaps depending on the positioning motor setting:
 - ◆ - Fresh-air flap closed and recirculated-air flap open = Recirculated-air mode
 - ◆ - Fresh-air flap open and recirculated-air flap closed = Fresh-air mode (feedback value in display zones "1" and "2" between "135" and "145").
 - ◆ - Recirculated-air flap closed and fresh-air flap closed = Air flow mode
- ◆ The position of the fresh-air flap is program-controlled in air flow mode. Depending on vehicle speed, the fresh-air blower speed, the selected and actual temperature readings and the selected operating and display unit for air conditioner/Climatronic -E87- mode, the flap is closed from a speed of approx. 80 km/h. However, the fresh-air flap is not completely closed in air flow mode (it always remains open far enough to maintain the necessary air throughput).
- ◆ Further information ⇒ [page 53](#) (Display group "003")

8.3.2 Display group 007:

Footwell vent temperature sender -G192- , centre vent temperature sender -G191- , evaporator outlet temperature sender -G263- and fresh-air intake duct temperature sensor -G89-

Display zone	Meaning	Explanatory Notes
1	Value measured by the footwell vent temperature sender -G192- in °C	• Check ⇒ page 78 (electrical check).
2	Value measured by the centre vent temperature sender -G191- in °C	• Check ⇒ page 78 (electrical check).
3	Value measured by the evaporator outlet temperature sender -G263- in °C	• Check ⇒ page 78 (electrical check).
4	Value measured by the fresh-air intake duct temperature sensor -G89- in °C	• Check ⇒ page 78 (electrical check).



Note

- ◆ If the temperature measured by the evaporator outlet temperature sender -G263- is lower than 2 °C, the operating and display unit for air conditioner/Climatronic -E87- switches the compressor off.
- ◆ The value measured by the evaporator outlet temperature sender -G263- is used to regulate the evaporator temperature. The evaporator temperature is changed by actuation of the air conditioner compressor regulating valve -N280- ⇒ [page 46](#).
- ◆ Depending on the operating and display unit for air conditioner/Climatronic -E87- setting, the temperature on the evaporator outlet temperature sender -G263- is regulated to the following values:
 - ◆ - In normal control mode between 2 and 10 °C
 - ◆ - At temperatures below 13 °C, at least 3 °C below the determined ambient temperature but not below 2 °C.
 - ◆ - At temperatures below 16 °C and in the rain (windscreen wiper switched on), at least 6 °C below the determined ambient temperature but not below 2 °C.
- ◆ - When the temperature preselection is set to "Lo" on the operating and display unit for air conditioner/Climatronic -E87- at 2 °C.
- ◆ - When "recirculated-air mode" is set on the operating and display unit for air conditioner/Climatronic -E87- at at least 5 °C but not below 2 °C.
- ◆ At higher ambient temperatures, specified temperatures are not always attained on the evaporator outlet temperature sender -G263- (even though the compressor is operating at maximum capacity).
- ◆ Actuation of the air conditioner compressor regulating valve -N280- for regulating the compressor output is displayed in display zones "1" and "2" of display group "001" ⇒ [page 46](#).

8.3.3 Display group 008:

Ambient temperature measured by the ambient temperature sensor -G17- and calculated by the control unit in the dash panel insert -J285- , value measured by the dash panel temperature

sensor -G56- and actuation of the temperature sensor blower - V42-

Display zone	Meaning	Explanatory Notes
1	Calculated ambient temperature transmitted by the control unit in the dash panel insert -J285-	- Data is exchanged via the convenience data bus. - The control unit in the dash panel insert -J285- calculates the current ambient temperature allowing for the incoming temperature readings (ambient temperature sensor - G17- , fresh-air intake duct temperature sensor -G89-), the vehicle speed, the vehicle standing time, etc.
2	The value measured by the ambient temperature sensor -G17- in °C, transmitted by the control unit in the dash panel insert -J285-	- Data is transmitted via the convenience data bus - The ambient temperature sensor - G17- is connected to the control unit in the dash panel insert -J285-

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Note

- ◆ Check the value measured by the ambient temperature sensor -G17- . ⇒ Electrical System; Repair group 01
- ◆ Values measured by the ambient temperature sensor -G17- and by the fresh-air intake duct temperature sensor -G89- are impaired, for example, by heat radiating from the radiator and the exhaust system when the vehicle is stationary. Therefore, the control unit in the dash panel insert -J285- features a program which causes a higher temperature reading (resulting from the vehicle being held up in a traffic jam or urban traffic) to be suppressed and the lower temperature reading to be indicated on the ambient temperature display.
- ◆ The basis for the display in display zone "1" is the lower of the two ambient temperature readings (see display zone "2" and display group "007" display zone "4". The value is saved for up to 4 hours after the ignition is switched off.

Display zone	Meaning	Explanatory Notes
3	Value measured by the dash panel temperature sensor -G56- in °C	Installed in the operating and display unit for air conditioner/Climatronic -E87-
4	Actuation of the temperature sensor blower -V42- ◆ Display = 0 – Blower is not running ◆ Display = 1 – Blower is running.	Installed in the operating and display unit for air conditioner/Climatronic -E87-

Note

- ◆ *The dash panel temperature sensor -G56- is ventilated by the temperature sensor blower -V42-. If the intake aperture in the trim panel of the operating and display unit for air conditioner/Climatronic -E87- is closed or if the temperature sensor blower -V42- is not in operation, the temperature sensor cannot record the actual temperature of the passenger compartment properly, and there will be problems with system regulation.*
- ◆ *The dash panel temperature sensor -G56- is permanently installed in the operating and display unit for air conditioner/Climatronic -E87- and cannot be replaced separately.*
- ◆ *The temperature sensor blower -V42- is installed in the operating and display unit for air conditioner/Climatronic -E87- and can be replaced separately ⇒ [page 199](#).*
- ◆ *The temperature sensor blower -V42- is always in operation when the ignition is switched on.*

8.3.4 Display group 009:

The coolant temperature and engine speed transmitted by the control unit in the dash panel insert -J285-, the idling speed regulation and vehicle speed

Display zone	Meaning	Explanatory Notes
1	Coolant temperature transmitted by the control unit in the dash panel insert -J285- in °C	• Data is transmitted via the convenience data bus
2	Idling speed regulation (idling speed increase) ◆ Display = Off – No increase in idling speed requested by the operating and display unit for air conditioner/Climatronic -E87- ◆ Display = On – Increase in idling speed requested by the operating and display unit for air conditioner/Climatronic -E87-	• Data is transmitted via the convenience data bus

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Note

- ◆ *To avoid the compressor having to be shut down suddenly due to an excessively high coolant temperature, its output is regulated by the operating and display unit for air conditioner/ Climatronic -E87- as soon as the coolant temperature transmitted by the control unit in the dash panel insert -J285- exceeds 115° C (at 118° C the compressor is shut down completely).*
- ◆ *Check the idling speed regulation function (idling speed increase). ⇒ Relevant Workshop Manual, Injection and Ignition system; Repair group 01*
- ◆ *A prerequisite for switching on the idling speed regulation is the absence of any compressor shut-off criterion preventing actuation of the air conditioner compressor regulating valve - N280- (e.g. the engine is not running or "Econ" mode is selected). The operating and display unit for air conditioner/ Climatronic -E87- switches a positive signal, for example, at the "Lo" or "Hi" temperature preselection setting*
- ◆ *The engine control unit is informed via this output (for idling speed regulation) that the air conditioner needs a higher engine speed to achieve the specified setting (a higher compressor speed or increased heat output from the engine).*

Display zone	Meaning	Explanatory Notes
3	Engine speed (rpm) transmitted by the control unit in the dash panel insert -J285-	• Data is transmitted via the convenience data bus
4	Vehicle speed (km/h) transmitted by the control unit in the dash panel insert -J285- ◆ Display = 0 – No vehicle-speed signal detected since the ignition was switched on ◆ Display = 1 – A speed signal of over 5 km/h has been received from the control unit in the dash panel insert -J285- at least once since the ignition was switched on ◆ Display = 1..... – Current vehicle speed in km/h	• Data is transmitted via the convenience data bus



Note

If, after the ignition was switched on prior to the start of self-diagnosis, the vehicle travelled at more than 5 km/h, when the vehicle is at a standstill the display "1" indicates that a speed signal has been received at least once.

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8.3.5 Display group 010:

Status and value of the compressor torque transmitted to the control unit in the dash panel insert -J285- and the voltage transmitted to terminals "58d" and "58s"

Display zone	Meaning	Explanatory Notes
1	Display zone is currently not used Intended to indicate the compressor torque status transmitted to the control unit in the dash panel insert -J285- ◆ Display = 0 Transmitted compressor torque is no longer valid ◆ Display = 1 Transmitted compressor torque is up-to-date	- Data is transmitted via the convenience data bus - Displayed if, for example, the engine is not running and no calculation occurs.
2	Display zone is currently not used Intended to indicate the engine torque status required to operate the compressor, calculated by the operating and display unit for air conditioner/Climatronic - E87- and transmitted to the control unit in the dash panel insert -J285- ◆ Display = 0 Compressor off (the air conditioner compressor regulating valve -N280- is not actuated) ◆ Display = 1..... XX Nm Compressor on (the air conditioner compressor regulating valve -N280- is actuated)	- Data is transmitted via the convenience data bus - Is displayed if, for example, when "ECON" is set on the operating and display unit for air conditioner/Climatronic -E87- . - The torque is determined by various factors (e.g. ambient temperature, relative humidity, pressure in the refrigerant circuit, etc.)

Display zone	Meaning	Explanatory Notes
3	Voltage at terminal "58d" transmitted by the control unit in the dash panel insert -J285- ◆ Display = 0....100% - Depending on the setting of the controller for switch and instrument illumination -E20-	- Data is transmitted via the convenience data bus - The illumination in the display on the operating and display unit for air conditioner/Climatronic -E87- is controlled via the voltage at terminal "58d"
4	Voltage at terminal "58s" transmitted by the control unit in the dash panel insert -J285- ◆ Display = 0....100% - Depending on the setting of the controller for switch and instrument illumination -E20- - With parking lights switched off - below 5%	- Data is transmitted via the convenience data bus - The illumination of the switches on the operating and display unit for air conditioner/Climatronic -E87- is controlled via the voltage at terminal "58s" - If "0%" is displayed, the switches are not illuminated



Note

The voltage at terminal "58d" for illuminating the display is always output by the control unit in the dash panel insert -J285- when the ignition is on.

8.3.6 Display group 011:

Voltage at the fresh-air blower -V2- , actuation of the radiator fan -V7- , fresh-air or recirculated-air mode request

Display zone	Meaning	Explanatory Notes
1	Target voltage at the fresh-air blower -V2- (calculated by the operating and display unit for air conditioner/ Climatronic -E87-)	• 0 ... 12.5 V
2	Actual voltage at the fresh-air blower -V2-	• Deviation from the target voltage (in the vehicle system voltage range): max. 0.7 V



Note

- ♦ The "target voltage" indicates the difference in voltage which is meant to apply between the two outputs of the blower control unit -J126- for the fresh-air blower -V2- .
- ♦ The "actual voltage" relates to the voltage applied to the output of the control unit for the fresh-air blower -J126- . Since the control unit for the fresh-air blower -J126- and the fresh-air blower -V2- are connected via wires, the actual voltage at the fresh-air blower -V2- cannot be measured.

Display zone	Meaning	Explanatory Notes
3	Actuation of the radiator fan -V7- ♦ Display = 0 – Activation for speeds 1 and 2 for the radiator fan -V7- is off ♦ Display = 1 – Actuation for speed 1 for the radiator fan -V7- is on – Actuation for speed 2 for the radiator fan -V7- is off ♦ Display = 2 – Actuation for speeds 1 and 2 for the radiator fan -V7- is on	



Note

- ♦ The radiator fan -V7- is switched to speed 1 by the operating and display unit for air conditioner/Climatronic -E87- while there is no compressor shut-off criterion which prevents the air conditioner compressor regulating valve -N280-) from cutting in (e.g. the engine is not running or "Econ" mode has been selected).
- ♦ The radiator fan -V7- is switched to speed 2 by the operating and display unit for air conditioner/Climatronic -E87- as soon as the pressure in the coolant circuit exceeds a specified value
⇒ [page 46](#) .
- ♦ However, the fan control unit -J293- only controls the radiator fan -V7- while the engine is running

Display zone	Meaning	Explanatory Notes
4	Cod e 00	Request for fresh-air/recirculated-air mode ◆ System in fresh-air mode – Fresh-air flap in “fresh-air mode” position – Recirculated-air flap closed
	10	Currently not used Request for recirculated-air mode ◆ Intended for a request for recirculated air by the air quality sensor; this sensor is not installed in the Audi A2 for the time being.
	20	Request for recirculated-air mode ◆ The air conditioner is switched to recirculated-air mode (warning lamp in the button lights up) via the “recirculated-air button” – Fresh-air flap closed, recirculated-air flap open

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Display zone	Meaning	Explanatory Notes
4	Cod e 40	Request for fresh-air/recirculated-air mode ◆ The air conditioner is in recirculated-air mode so as to reach the required temperature in the passenger compartment as quickly as possible at a high ambient temperature (increased refrigeration capacity) ◆ Recirculated-air mode is maintained until the target and actual temperatures in the passenger compartment have reached the specified temperature difference. – Fresh-air flap closed, recirculated-air flap open
	50	Request for recirculated-air mode ◆ The air conditioner has been switched off via the Off button on the operating and display unit for air conditioner/Climatronic -E87- – Fresh-air flap closed, recirculated-air flap open



Note

- ◆ If there is no request for recirculated-air mode, “0” can be displayed instead of “00”.
- ◆ To clear misted windows as quickly as possible, recirculated-air mode is not possible in “defrost mode”.
- ◆ All the numbers which are not listed (e.g. “10”, “11” etc. apply to recirculated-air requests which are currently not implemented in the Audi A2). ⇒ Audi A8, Air Conditioner; Repair group 01

8.3.7 Display group 012:

Actuation of the heated rear window, actuation of the heated windscreen, actuation of the additional heater and position of the Open-Sky sunroof

Display zone	Meaning	Explanatory Notes
1	Actuation of the heated rear window -Z1- ♦ Display = Off – Actuation of the heated rear window -Z1- is off ♦ Display = On – Actuation of the heated rear window -Z1- is on	



Note

Check actuation of the heated rear window -Z1- ⇒ [page 103](#)

Display zone	Meaning	Explanatory Notes
2	Currently not used (ignore the display for the time being) Intended for a request for a heated windscreen; a heated windscreen is not being installed in the Audi A2 for the time being	
	Display 00 = (or 0) Actuation of heated windscreen off Heated windscreen off	- Switch in the operating and display unit for air conditioner/Climatronic -E87- is open - The voltage at connector A, contact 6 for the operating and display unit for air conditioner/Climatronic -E87- is greater than 5 V
	Display 10 = Actuation of heated windscreen on Heated windscreen off	- Switch in the operating and display unit for air conditioner/Climatronic -E87- is closed - Switch at the control unit for the heated windscreen -J505- output for the operating and display unit for air conditioner/Climatronic -E87- is open - The voltage at connector A, contact 6 for the operating and display unit for air conditioner/Climatronic -E87- is less than 5 V
	Display 11 = Actuation of heated windscreen on Heated windscreen on	- Switch in the operating and display unit for air conditioner/Climatronic -E87- is closed - Switch at the control unit for the heated windscreen -J505- output for the operating and display unit for air conditioner/Climatronic -E87- is closed - The voltage at connector A, contact 6 for the operating and display unit for air conditioner/Climatronic -E87- is greater than 5 V and less than 8 V

 Note

- ◆ *If the vehicle is not fitted with a heated windscreen and a control unit for a heated windscreen -J505-, "0" or "00" are displayed.*
- ◆ *The control unit for the heated windscreen -J505- switches the approx. battery voltage to the operating and display unit for air conditioner/Climatronic -E87- output while the voltage at the control unit for the heated windscreen -J505- is greater than 12.70 V and the control unit is not too hot.*
- ◆ *If the windscreen heating is to be switched on, the operating and display unit for air conditioner/Climatronic -E87- actuates a transistor which halves the voltage at connector "A", contact "6". The control unit for the heated windscreen -J505- switches on the heated windscreen.*
- ◆ *If, while the windscreen is heating up, the voltage (vehicle system voltage at the control unit for the heated windscreen -J505-) drops below 12.70 V or if the control unit for the heated windscreen -J505- overheats, a switch in the control unit for the heated windscreen -J505- opens, and the voltage at the operating and display unit for air conditioner/Climatronic -E87- output becomes lower than 5 V, the heated windscreen is switched off at the same time by the control unit for the heated windscreen -J505-.*

Display zone	Meaning	Explanatory Notes
3	Actuation of the additional heater – Exclusive to vehicles with diesel engines – Disregard the display in vehicles with petrol engines ◆ Display = Off – No request to the engine control unit for additional heating ◆ Display = On – Request to the engine control unit for additional heating	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.

 Note

- ◆ *The additional heating request is transmitted via the convenience data bus to the control unit in the dash panel insert -J285- and from there via the drive data bus to the engine control unit.*
- ◆ *The operating and display unit for air conditioner/Climatronic -E87- actuates the engine control unit. It then decides whether the additional heating is to be switched on. Depending on the engine control unit version, different measured value blocks of the engine control unit indicate why the additional heater is not switched on or that it is being actuated. ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01*
- ◆ *An electric or fuel-powered additional heater may be fitted depending on the vehicle features and country version
 ⇒ [page 106](#).*

Display zone	Meaning	Explanatory Notes
4	Currently not in use (ignore the display for the time being) Intended for detecting the position of the "Open-Sky sunroof" (double spoiler roof) ◆ Display = Closed – "Open-Sky sunroof" closed ◆ Display = Open – "Open-Sky sunroof" open	– There is no earth applied to connector "A", contact "11" for the operating and display unit for air conditioner/Climatronic -E87- – Earth applied to connector "A", contact "11" for the operating and display unit for air conditioner/Climatronic -E87-

8.3.8 Display group 013:

Value measured by the photosensor for sunlight penetration, voltage at terminal "15" and terminal "30"

Display zone	Meaning	Explanatory Notes
1	Value measured by the sunlight penetration photosensor -G107- in watts/m ²	Depending on the sunlight intensity 0 ... 1000
2	Voltage at terminal "15" transmitted by the control unit in the dash panel insert -J285- ◆ Display = On – Voltage applied to terminal "15" (ignition on) ◆ Display = Off – No voltage applied to terminal "15" (ignition off)	Data is transmitted via the convenience data bus
3	Display zone not used.	
4	Voltage measured at terminal "30" (in volts)	– Voltage applied to connector "D", contact "12" for the operating and display unit for air conditioner/Climatronic -E87-



Note

- ◆ The value displayed by the sunlight penetration photosensor -G107- can be varied by shining a suitable lamp on the sensor.
- ◆ If approx. 900 watt/m² is always displayed irrespective of the intensity of light shining on the sunlight penetration photosensor -G107-, use the current flow diagram to check if the wiring to the sunlight penetration photosensor -G107- is interchanged.
- ◆ The value displayed for the sunlight penetration is largely dependent on the time of year and time of day, as well as on the location of the vehicle (in Central Europe with max. sunlight penetration in summertime, the measured value is approx. 300 to 500 watt/m²).

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8.3.9 Display group 014:

"Ignition-off" time-span, ignition key assignment, windscreen wiper operation signal and the encoding transmitted by the control unit in the dash panel insert -J285-

Display zone	Meaning	Explanatory Notes
1	Period of time transmitted by the control unit in the dash panel insert -J285- for the interval between the ignition being switched on and off ◆ Display = 00:00....03:59 h – Ignition-off period (stationary time) in hours and minutes	Data is transmitted via the convenience data bus
2	Ignition key assignment transmitted by the control unit in the dash panel insert -J285- ◆ Display = 0 – The ignition was switched on with a key for which there is no assignment in the control unit in the dash panel insert -J285- . ◆ Display = 1, 2.... – The ignition was switched on with the key which was set to position 1 (2, 3 or 4) in the control unit in the dash panel insert -J285- .	- Data is transmitted via the convenience data bus - Check the matching of the ignition key. ⇒ Electrical System; Repair group 90 - Up to 4 keys can be assigned



Note

- ◆ *If the operating and display unit for air conditioner/Climatronic -E87- does not detect an "ignition-off period" signal when the ignition is switched on, the operating and display unit for air conditioner/Climatronic -E87- assumes that the vehicle has been standing for more than 4 hours, and that the engine temperature is the same as the ambient temperature. Possible consequences: (the fresh-air blower may be delayed in starting up, even though the engine is warm, the ambient temperature display -G106- in the control unit in the dash panel insert -J285- may indicate incorrect ambient temperature readings).*
- ◆ *The ignition key assignment can only be detected and thus transmitted by control unit in the dash panel insert -J285- in vehicles fitted with an immobilizer. ⇒ Electrical System; Repair group 90; Repairing the dash panel insert*
- ◆ *When the ignition is switched on, the operating and display unit for air conditioner/Climatronic -E87- starts with the setting which was valid when the ignition was last switched off using the key concerned (temperature, air distribution, fresh-air blower speed).*

Display zone	Meaning	Explanatory Notes
3	Signal for the windscreen wiper operating status (voltage at terminal "31 b") ◆ Display = 0 – Windscreen wipers or wiper/washer system are not switched on (wipers in park position) ◆ Display = 1 – Windscreen wipers or wiper/washer system are switched on	- Earth is applied to connector "C", contact "14" for the operating and display unit for air conditioner/Climatronic -E87- (via the windscreen wiper motor) - There is no earth applied to connector "C", contact "14" for the operating and display unit for air conditioner/Climatronic -E87-

Display zone	Meaning	Explanatory Notes
4	Encoding transmitted by the control unit in the dash panel insert -J285- and by the central control unit for the convenience system -J393- ◆ Display = XX XXX – Explanatory notes ⇒ page 68 – For example: Display “00 000” = A vehicle for Germany with a petrol engine and a central control unit for convenience system -J393- for a LHD vehicle	- Data is transmitted via the convenience data bus - If the encoding deviates from the details in the table ⇒ page 68, check the encoding of the control unit in the dash panel insert -J285- and the assignment of the central control unit for the convenience system -J393- ⇒ Electrical System; Repair group 01 and ⇒ Parts List

8.3.10 Table of the codes displayed in display zone 4 of display group 014

Codes transmitted by the control unit in the dash panel insert -J285- and by the central control unit for the convenience system -J393-

Code	Meaning
Code transmitted by the central control unit for convenience system -J393-	
0	Vehicle for right-hand traffic (LHD vehicle)
1	Vehicle for left-hand traffic (RHD vehicle)
Filling characters, no assignment	
Code transmitted by the control unit in the dash panel insert -J285-	
0	Vehicles with petrol engine
1	Vehicles with diesel engine
Filling characters, no assignment	
000	Vehicles for Germany
001	Vehicles for Europe (except Germany and Great Britain)
010	Vehicles for the USA
011	Vehicles for Canada
100	Vehicles for Great Britain
101	Vehicles for Japan
110	Vehicles for Saudi Arabia
111	Vehicles for Australia

8.3.11 Display group 015:

Input signal from the auxiliary heater and counter for compressor shut-off criteria

Display zone	Meaning	Explanatory notes
1	Display zone not in use Intended for the cut-in signal from an auxiliary heater ◆ Display = Off – No auxiliary heater signal ◆ Display = On – Auxiliary heater cut-in signal is applied	- Voltage applied to connector “D”, contact “10” for the operating and display unit for air conditioner/Climatronic -E87- less than 5 V - Voltage applied to connector “D”, contact “10” for the operating and display unit for air conditioner/Climatronic -E87- greater than 5 V

Note

- ◆ *At present, there are no plans to install an auxiliary heater.*
- ◆ *If the operating and display unit for air conditioner/Climatronic -E87- remains in operation after the ignition has been switched off and "1" is displayed, locate and rectify the short circuit to positive at connector "D", contact "10".*
- ◆ *In the case of vehicles with a diesel engine and a fuel-powered additional heater, there is no connection for actuation between the auxiliary heater and the operating and display unit for air conditioner/Climatronic -E87-. The additional heater does not actuate the output reserved for this signal either ⇒ Additional Heater; Repair group 01*

Display zone	Meaning	Explanatory notes
2	Display zone not used.	
3	Display zone not used.	
4	Counter for compressor shut-off operations which are not requested by the operating and display unit for air conditioner/Climatronic -E87- . ◆ Display = 0 – The compressor has not been switched off by another control unit since the fault memory was last erased. ◆ Display = 1.... X – The compressor has often been switched off by one or more other control units since the fault memory was last erased ⇒ page 50 (display group "002").	

8.3.12 Display group 016:

Information on the convenience data bus and operating status of the data bus system

Display zone	Meaning	Explanatory notes
1	Information from the control unit in the dash panel insert -J285- ◆ Display = Dash panel insert 0 – No messages are received from the dash panel insert ◆ Display = Dash panel insert 1 – Messages are being received from the control unit in the dash panel insert -J285-	Protected by copyright. Copying for private or commercial use, in whole or in part, 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. • If "0" appears on the display, interrogate the fault memory ⇒ page 9 and check the convenience data bus ⇒ page 71
2	Information from the central control unit for convenience system -J393- ◆ Display = Central 0 – No messages received from the central control unit for the convenience system -J393- ◆ Display = Central 1 – Messages are being received from the central control unit for the convenience system -J393-	• If "0" appears on the display, interrogate the fault memory ⇒ page 9 and check the convenience data bus ⇒ page 71
3	Display zone not used.	

Display zone	Meaning	Explanatory notes
4	Operating status of the convenience data bus ◆ Display = Two-wire – Convenience data bus in two-wire mode (normal state) – Reception of information transmitted on convenience data bus at both inputs ("Can-Hi" and "Can-Lo") ◆ Display = One-wire – Convenience data bus in one-wire mode (emergency operation) – Reception of information transmitted on convenience data bus at one input only ("Can-Hi" or "Can-Lo")	• If "one-wire" appears on the display, interrogate the fault memory ⇒ page 9 and check the convenience data bus ⇒ page 71



Note

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- ◆ *In contrast to the drive data bus system, the convenience data bus system can also operate in one-wire mode. However, the system is then set to emergency operation.*
- ◆ *If information is not received on convenience data bus, the operating and display unit for air conditioner/Climatronic -E87- does not actuate the air conditioner compressor regulating valve -N280- (compressor is off).*

9 Checking the convenience data bus system

9.1 Function of data bus systems

Data bus:

Data bus is the term used to describe a data transfer and distribution system.

Two different bus systems are used in the Audi A2. These systems work on different levels. The control unit in the dash panel insert -J285- forms the interface (gateway) between the two data bus systems.

CAN:

"Controller Area Network" refers to a data bus system which operates with two wires. They are called data bus wires. These data bus wires are used for serial transmission of data, i.e. data is sent to each of the connected control units in turn.

These control units communicate, i.e. exchange data, with the aid of the data bus system ⇒ Self-study programme No. 186 ; The CAN data bus

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◆ The convenience data bus

- Operates at a transmission rate of 100 kbaud (100,000 data units per second)
- Continues to operate even if there is a fault in one of the two wires, albeit in emergency operation mode (e.g. on account of an open circuit in the wiring)
- The following control units are connected, for example
- The control unit in the dash panel insert -J285- (interface to drive data bus)
- The operating and display unit for air conditioner/Climatronic -E87- of the air conditioner
- The central control unit for the convenience system -J393-
- Other connected control units ⇒ "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations"

◆ The drive data bus

- Operates at a transmission rate of 500 kbaud (500,000 data units per second)
- Only operates if data can be transmitted on both wires (safety circuit)
- The following control units are connected, for example
- Control unit in the dash panel insert (interface)
- Engine control unit
- Other connected control units ⇒ "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations"

**Note**

- ◆ *"CAN bus" is the term used to describe a data transfer and distribution system.*
- ◆ *Depending on the vehicle features, various control units are linked to the convenience or drive data bus. ⇒ "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations"*
- ◆ *The data is transmitted in the data bus systems simultaneously via the "CAN-Hi" and "CAN-Lo" signal wires (two-wire bus systems). Depending on the design of the data bus system, these wires take the form of twisted pairs to keep interference from other systems as low as possible, they may also be screened from the other wires. ⇒ "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations"*
- ◆ *The wires between the control units on which data is transmitted are referred to as signal wires.*
- ◆ *Data is transmitted in series via these signal wires to the connected control units and cannot be checked using workshop equipment.*
- ◆ *Data is transmitted at regular intervals by the various control units and received in the form of messages. The interval between two messages transmitted by a control unit is governed by the priority rating of the data transmitted and amounts to between 0.01 and 0.2 seconds.*
- ◆ *If a connected control unit does not receive information within a specified period or if the data messages received cannot be evaluated, a fault is stored in the fault memory.*
- ◆ *In the air conditioner for example, the reception of the information is displayed in measured value block, display group "016" ⇒ [page 69](#).*
- ◆ *If a control unit cannot provide the data requested (or only a certain item of information) due to a component fault, transmission of the data message is accompanied by a fault message requesting readout of fault memory in this control unit.*
- ◆ *For example:*
- ◆ *The sender for the ambient temperature sensor -G17- is not connected; therefore, the control unit in the dash panel insert -J285- cannot transmit the value measured by this sender in its data message.*
- ◆ *The control unit in the dash panel insert stores this fault and inserts a fault message in its data message instead of the measured value.*
- ◆ *On evaluating the message, the operating and display unit for air conditioner/Climatronic -E87- detects the fault message and stores the following information in the fault memory "control unit in dash panel insert; read out fault memory".*

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9.2 Checking convenience data bus



Note

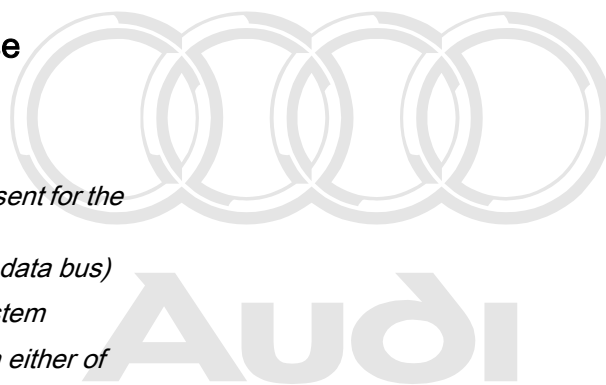
- ◆ *If the connector has been detached from a control unit connected to the convenience data bus and the ignition is switched on, this may result in a fault entry in the other control units connected to the data bus system. The same applies if, for example, the power supply is interrupted by removing a fuse.*
- ◆ *The control unit in the dash panel insert -J285- forms the interface between the two data bus systems. It is also the dominant control unit in the convenience data bus, into which those control units which are linked to the convenience data bus in the vehicle concerned (depending on features) are entered by way of the adaption function. ⇒ Electrical System; Repair group 01*
- ◆ *The number of control units which are connected to the convenience data bus can be seen from the current flow diagrams. ⇒ "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations"*

9.2.1 Locating the possible fault cause



Note

- ◆ *The following fault locations and fault types are present for the convenience data bus:*
- ◆ *Fault in the data bus system (factory convenience data bus)*
- ◆ *"Fault": Data cannot be transmitted via the bus system*
- ◆ *"In one-wire mode": No data can be transmitted on either of the two data bus wires ("CAN-Hi" or "CAN-Lo")*
- ◆ *"No messages" ("Time out" for several control units): No data has been received from one or more control units during the specified time-span.*
- ◆ *Control unit in the dash panel insert -J285-*
- ◆ *"No communication": No data has been received from the control unit in the dash panel insert -J285-*
- ◆ *"Read out fault memory": The control unit in the dash panel insert -J285- cannot transmit information due to a fault on an upstream component.*
- ◆ *Central control unit for the convenience system -J393-*
- ◆ *"No communication": No data has been received from the central control unit for the convenience system -J393-*
- ◆ *"Read out fault memory": The central control unit for the convenience system -J393- cannot transmit information due to a fault on an upstream component.*



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9.2.2 Fault table for convenience data bus faults

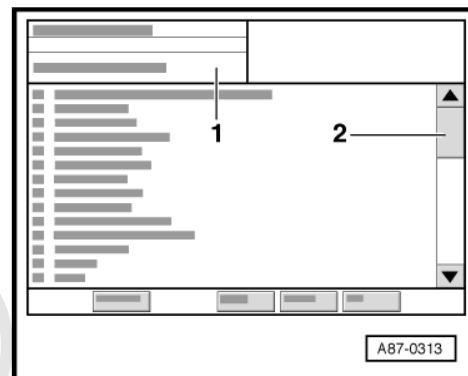
Fault location	Group convenience data bus			Control unit in the dash panel insert - J285-		Central control unit for the convenience system -J393-	
Type of fault	Fault	In one-wire operating mode	Messages missing	No communication	Read out fault memory	No communication	Read out fault memory
Possible cause of fault							
Both signal wires interrupted	X		X	X		X	
Short circuit on or between both signal wires	X		X	X		X	
The two signal wires have been interchanged	X		X				
One of the two signal wires interrupted		X					
Short circuit on one of the two signal wires		X					
Open circuit in earth connection or voltage supply to this control unit				X		X	
Fault in a control unit connected to the data bus system	X	X		X		X	
Fault on the drive data bus system			X		X		X
Fault in a component upstream of this control unit					X		X
Control unit not encoded as specified				X		X	
Control unit adaption not as specified				X		X	
Control unit data levels do not match (wrong control unit installed)	X		X	X		X	

9.2.3 Locating faults in convenience data bus

- With the ignition off, connect the vehicle diagnostic, testing and information system -VAS 5051- via the diagnostic cable -VAS 5051/5A- , for example, to the 16-pin diagnostic socket in the vehicle ⇒ [page 4](#) .
- Switch on the ignition.
- Select function “00 - Interrogate fault memory - Total system”.

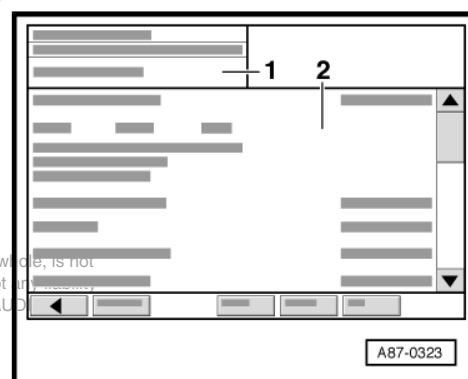
Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

All the address words stored in the vehicle diagnostic, testing and information system -VAS 5051- are now transmitted in succession to the vehicle via the signal wire



Indicated on the display of the vehicle diagnostic, testing and information system -VAS 5051- :

- ◆ Display zone -1- shows the address word which is currently being transmitted by the vehicle diagnostic, testing and information system -VAS 5051- .
 - ◆ The control units that have responded are displayed in display zone -2-. The number and type of the faults stored in this control unit are also displayed.
- Wait until “Function completed” appears in display zone -1-.



Note

- ◆ *If a different or additional fault has been stored in a control unit with which the other control units cannot exchange data, then this fault must be rectified before checking the data bus wiring system.*
- ◆ *If there is a fault in a control unit, problems may be encountered with data exchange with other control units although the fault does not directly affect the data bus system.*
- ◆ *Check the part no. and corresponding index of the control unit with which there is no communication. ⇒ Parts List*

9.2.4 The fault(s) in the convenience data bus is/are only indicated by the operating and display unit for air conditioner/Climatronic -E87- :

- Check the signal wires leading to the operating and display unit for air conditioner/Climatronic -E87- for an open circuit or line resistance. Line resistance: max. 1.5 ohms ⇒ “Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations”



Note

Pay particular attention to the possibility of loose contacts in wiring and connectors.

If you cannot find any fault, this indicates that the fault lies in the operating and display unit for air conditioner/Climatronic -E87- .

9.2.5 The fault(s) in the convenience data bus is/are also displayed in another control unit:

- Check the signal wires and corresponding screening between the various control units connected to the convenience data bus for open circuits, line resistance, mutual short circuit or short circuits to earth or positive, line resistance: max. 1.5 ohms ⇒ "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations" .



Note

- ♦ *Pay particular attention to the possibility of loose contacts in wiring and connectors.*
- ♦ *If this error is not indicated for all the control units connected, the problem may be an open circuit at a connection point in the wiring.*

If no fault can be found, but this fault is displayed for all the control units connected to the convenience data bus, the problem is located in one of the connected control units.

- Check the version, encoding and the entered adaption of the control unit in the dash panel insert -J285- ⇒ Parts List ⇒ Electrical System; Repair group 01
- Check the version and the encoding of the central control unit for the convenience system -J393- . ⇒ Parts List ⇒ Electrical System; Repair group 01
- Disconnect all the control units apart from the control unit in the dash panel insert -J285- (interface with the drive data bus) and, for example, the operating and display unit for air conditioner/Climatronic -E87- from the convenience data bus. ⇒ "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations"
- Erase the fault memory of the control unit in the dash panel insert -J285- ⇒ Electrical System; Repair group 01
- Interrogate the fault memory of the control unit in the dash panel insert -J285- ⇒ Electrical System; Repair group 01

If the fault is now no longer displayed in the convenience data bus, the fault is to be found in one of the disconnected control units.

- Re-connect the various control units one after another.
- Interrogate the fault memory after each control unit is connected
- Replace the control unit after the installation of which the fault re-appears.

If the fault in the convenience data bus continues to be displayed, this indicates that there is a fault in the control unit in the dash panel insert -J285- or in the operating and display unit for air conditioner/Climatronic -E87- .

- Disconnect the operating and display unit for air conditioner/Climatronic -E87- and connect another control unit, such as the central control unit for the convenience system -J393- . ⇒ "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations"
- Interrogate the fault memory of the control unit in the dash panel insert -J285- again.



Note

The defective control unit can be determined by disconnecting the operating and display unit for air conditioner/Climatronic -E87- and connecting another control unit.

- Replace the defective control unit.



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10 Electrical check

10.1 Wiring and component check using test box -V.A.G 1598 A-

10.1.1 Special tools, testers and auxiliary equipment required

- ◆ Test box -V.A.G 1598 A- and corresponding adapter -V.A.G 1598/11- and adapter -V.A.G 1598/12-
- ◆ Vehicle diagnostic, testing and information system -VAS 5051- with multimeter leads -VAS 5051/7- , probe -VAS 5051/8- and current probe 50 A -VAS 5051/9-
- ◆ Voltage tester -V.A.G 1527/B-
- ◆ Adapter set -V.A.G 1594 C-
- ◆ Temperature sensor with appropriate tester



Note

During vehicle self-diagnosis, none of the adapter cables from the test box -V.A.G 1598 A- must be connected to the operating and display unit for air conditioner/Climatronic -E87- .

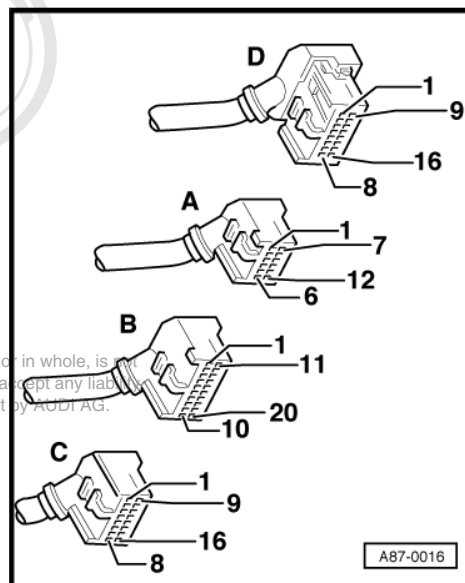
10.1.2 Connecting the test box -V.A.G 1598 A- to the operating and display unit for air conditioner/Climatronic -E87-

- Switch off the ignition.
- Remove the operating and display unit for air conditioner/Climatronic -E87- → [page 188](#) .
- Connect the adapter cables -V.A.G 1598/11- and adapter -V.A.G 1598/12- to the unplugged connections on the operating and display unit for air conditioner/Climatronic -E87- .



Note

- ◆ Do not connect the operating and display unit for air conditioner/Climatronic -E87- .
- ◆ For measurement purposes, connect test box -V.A.G 1598 A- to the relevant adapter cable.
- ◆ The assignment of the sockets on the adapter -V.A.G 1598/12- is identical to the connection configuration on the operating and display unit for air conditioner/Climatronic -E87- .
- ◆ The assignment of the sockets on the adapter cable -V.A.G 1598/11- is not identical to the connection configuration on the operating and display unit for air conditioner/Climatronic -E87- → [page 79](#) .



10.1.3 Connector configuration of the test box -V.A.G 1598 A- and adapter cable - V.A.G 1598/11-



Note

- ◆ *The contact assignment of connectors "A" and "B" in the adapter cable -V.A.G 1598/11- is not identical to the socket configuration on the test box -V.A.G 1598 A-.*
- ◆ *The contact assignment of connector "C" in the adapter cable -V.A.G 1598/11- is identical to the socket configuration on the test box -V.A.G 1598 A-.*
- ◆ *The contact assignment of connector "D" in the adapter -V.A.G 1598/12- is identical to the socket configuration on the test box -V.A.G 1598 A-.*
- ◆ *The connectors for the operating and display unit for air conditioner/Climatronic -E87- are split between two adapter cables -V.A.G 1598/11- and adapters -V.A.G 1598/12-. Consequently, when the adapter cable -V.A.G 1598/11- is connected, there is no earth connection for testing. To perform the electrical tests, it is therefore necessary in some test steps to take measurements against a suitable earth point on the vehicle body or to use a second test box -V.A.G 1598 A- (when the Adapter -V.A.G 1598/12- is connected, sockets "13" and "14" are earthed).*

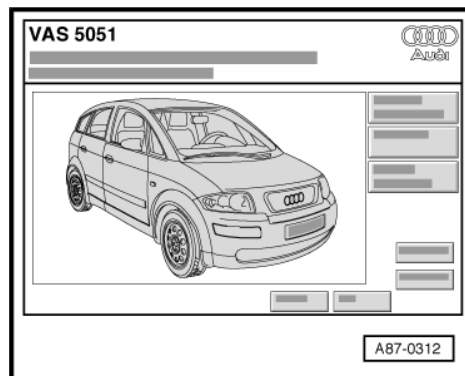
Connector "A" contact	Socket on the test box -V.A.G 1598 A-	Connector "B" contact	Socket on the test box -V.A.G 1598 A-	Connector "B" contact	Socket on the test box -V.A.G 1598 A-
1	41	1	21	13	33
2	42	2	22	14	34
3	43	3	23	15	35
4	44	4	24	16	36
5	45	5	25	17	37
6	46	6	26	18	38
7	47	7	27	19	39
8	48	8	28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

10.1.4 Checking

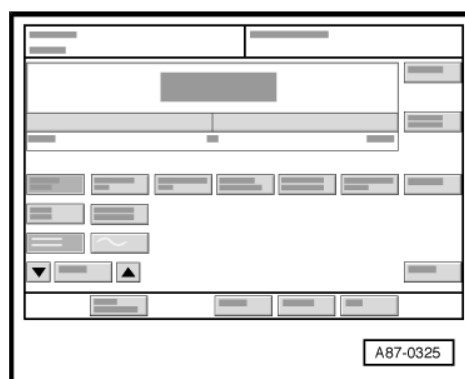
Prerequisite

- ◆ All the fuses are OK ⇒ "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations"
- ◆ The adapter cables -V.A.G 1598/11- and adapters -V.A.G 1598/12- on the test box are connected to the unplugged connections on the operating and display unit for air conditioner/Climatronic -E87-.

- Set the vehicle diagnostic, testing and information system - VAS 5051- to “measuring instrument” mode.



- On the vehicle diagnostic, testing and information system - VAS 5051- , select the type of measuring instrument required in the different testing steps by pressing the appropriate button on the vehicle diagnostic, testing and information system - VAS 5051- display.



10.1.5 Overview of the electrical tests on the operating and display unit for air conditioner/Climatronic -E87-

Test step	Component checked	Page
1	◆ Voltage supply and earth connection on the operating and display unit for air conditioner/Climatronic -E87- .	⇒ page 81
2	◆ Fresh-air intake duct temperature sensor -G89- ◆ Centre vent temperature sender -G191- , footwell vent temperature sender -G192- and evaporator outlet temperature sender -G263-	⇒ page 82
3	◆ Fresh-air blower -V2- and fresh-air blower control unit -J126-	⇒ page 83
4	◆ positioning motors for the air conditioner and corresponding potentiometers	⇒ page 86
5	◆ Pressure signal from the high-pressure sender -G65-	⇒ page 90
6	◆ Actuation of air conditioner compressor regulating valve -N280-	⇒ page 94
7	◆ Actuation of radiator fan -V7- (speeds 1 and 2)	⇒ page 98
8	◆ Signal for windscreen wiper operation ◆ Wiring for the sunlight penetration photosensor -G107-	⇒ page 99
9	◆ Input for the signal from the switch for the Open-Sky sunroof ◆ Input for the cut-in signal from the auxiliary heater	⇒ page 101

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Note

In the Audi A2, various information is transmitted via the convenience data bus ⇒ [page 51](#) (Read the measured value block), there are no further electrical checks planned in this Workshop Manual for this information

10.2 Test steps 1 to 4

10.2.1 Test step 1:

Voltage supply and earth connection on the operating and display unit for air conditioner/Climatronic -E87- .

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Vehicle diagnostic, testing and information system -VAS 5051- measurement instrument mode: Multi-meter, voltage measurement (20 V =)					
• Adapter -V.A.G 1598/12- connected					
Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if specification is not attained
1.1	12 + 14	♦ Terminal “30” and earth connection on the operating and display unit for air conditioner/Climatronic -E87- .	• Ignition off	♦ approx. battery voltage	– Use the current flow diagram to repair the power supply or earth connection
1.2	12 + 13	earth connection on the operating and display unit for air conditioner/Climatronic -E87- .	• Ignition off	♦ approx. battery voltage	– Use the current flow diagram to repair the earth connection for the operating and display unit for air conditioner/Climatronic -E87-
1.3	3 + 13	Terminal “15” on the operating and display unit for air conditioner/Climatronic -E87- .	• Ignition on	♦ approx. battery voltage	– Use the current flow diagram to repair the voltage supply to the operating and display unit for air conditioner/Climatronic -E87-

10.2.2 Test step 2:

Temperature sensor and sender

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, resistance measurement (20 kΩ~/ 200 kΩ)					
• Adapter -V.A.G 1598/11- connected					
Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if specification is not attained
2.1	33 + 25	Fresh-air intake duct temperature sensor -G89-	- Ignition off - Measure the temperature at the sensor fitting location	Governed by the temperature at the sensor/sender fitting location	Use current flow diagram to locate and rectify the short circuit, open circuit or contact resistance
2.2	35 + 25	Evaporator outlet temperature sender -G263-		Temperature-dependent ⇒ page 82	Replace the temperature sensor/sender
2.3	31 + 25	Centre vent temperature sender -G191-			
2.4	32 + 25	Footwell vent temperature sender -G192-			

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10.2.3 Temperature-dependent resistance values of the sensors/senders:

Temperature measured at the sensor/sender fitting location	Resistance value of the fresh-air intake duct temperature sensor -G89- (and of the ambient temperature sensor -G17-)	Resistance value of the centre vent temperature sender -G191- and of the footwell vent temperature sender -G192-	Resistance value of the evaporator outlet temperature sender -G263-
°C	K	K	K
- 30	18,10	(141,00)	(52,20)
- 20	9,95	(85,00)	(27,75)
-10	5,59	(47,00)	(15,50)
0	3,28	29,00	9,00
5	2,54	23,20	6,96
10	1,99	18,60	5,44
15	1,57	15,00	4,28
20	1,25	12,20	3,40
25	1,00	10,00	2,72
30	0,80	8,20	2,19
35	0,65	6,80	1,78
40	0,53	5,70	1,46
50	0,36	4,00	1,00
60	0,25	2,90	-

10.2.4 Test step 3:

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

Voltage tester -V.A.G 1527/B- • Adapter -V.A.G 1598/11- connected					
Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
3.1	Terminals "30" ²⁰⁾ + 43	Fresh-air blower control unit -J126-	• Ignition on	◆ LED in the voltage tester lights up ◆ The fresh air blower -V2- is running	– Locate and rectify the open circuit in the wiring between the fresh-air blower control unit -J126- and the operating and display unit for air conditioner/Climatronic -E87- – Check the voltage supply to the fresh-air blower -V2- ⇒ page 84 – Check that the fresh-air blower -V2- is moving freely – Replace the fresh-air blower control unit -J126-

20) Terminal "30" (positive) is at connector "D", contact "12".

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, voltage measurement (20 V =) • Adapter -V.A.G 1598/11- connected					
Voltage tester -V.A.G 1527/B-					
Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
3.2	45 + 44	Voltage feedback at the fresh-air blower -V2-	• Ignition on	◆ Voltage less than 2 V ◆ Fresh-air blower is not running	– Using the current flow diagram, check the wiring between control unit for the fresh-air blower -J126- and the operating and display unit for air conditioner/Climatronic -E87- – Check the voltage supply to the fresh-air blower -V2- ⇒ page 84 – Replace the fresh-air blower control unit -J126-

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, voltage measurement (20 V =)

- Adapter -V.A.G 1598/11- connected

Voltage tester -V.A.G 1527/B-

Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
3.3	45 + 44	Voltage feedback at the fresh-air blower -V2-	• Ignition on – Switch the voltage tester between socket “43” and terminal “30” ²¹⁾	♦ Voltage above 2 V ♦ The fresh-air blower -V2- is running	– Locate and rectify the open circuit in the wiring between the fresh-air blower control unit -J126- and the operating and display unit for air conditioner/Climatronic -E87- – Check the voltage supply to the fresh-air blower -V2- ⇒ page 84 – Replace the fresh-air blower control unit -J126-

21) Terminal “30” (positive) is at connector “D”, contact “12”.

10.2.5 Checking the voltage supply to the fresh-air blower -V2-

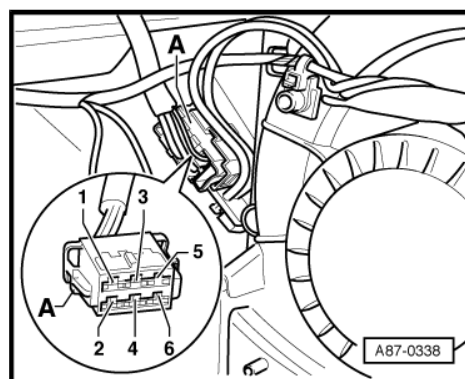
- Switch off the ignition.
- Disconnect the adapter -V.A.G 1598/11- and adapter -V.A.G 1598/12- from the test box.
- Connect the operating and display unit for air conditioner/Climatronic -E87- to the vehicle wiring harness.
- Remove the glove compartment. ⇒ General Body Assembly, Interior; Repair group 68
- Unplug connector -A- from the fresh-air blower control unit -J126- .
- Measure the voltage between contact -2- (or contact -5-) and contact -4- on connector -A-

Specification: Battery voltage

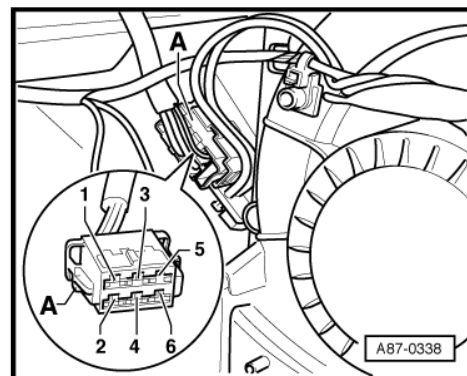


Note

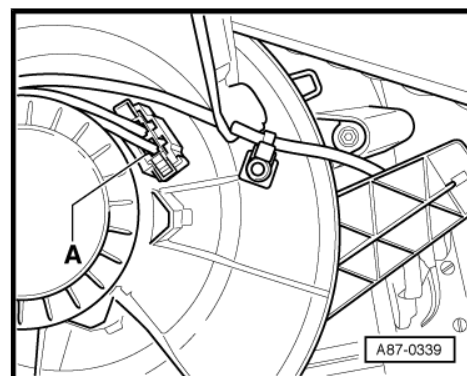
- ♦ If there is no connection to contact -2-, check whether there is a connection to contact -5-. The fresh-air blower control unit -J126- can be powered via both inputs.
- ♦ If the voltage is below the battery voltage, repair the voltage supply or earth connection in accordance with the current flow diagram.



- Attach connector -A- to the fresh-air blower control unit -J126- .



- Unplug connector -A- from the fresh-air blower -V2- .
- Connect the multimeter leads -VAS 5051/7- to connector -A- .
- Set the vehicle diagnostic, testing and information system - VAS 5051- to “measuring instrument: voltage measurement” mode.
- Switch on the ignition.
- Set the operating and display unit for air conditioner/Climatronic -E87- to “Auto” mode.
- Change the fresh-air blower speed by pressing the “+” and “-” speed control buttons on the operating and display unit for air conditioner/Climatronic -E87- .



When the operating and display unit for air conditioner/Climatronic -E87- setting is adjusted, the voltage displayed on the vehicle diagnostic, testing and information system -VAS 5051- changes

i Note

The target fresh-air blower speed appears as a bar chart on the display of the operating and display unit for air conditioner/Climatronic -E87- .

- In order to ensure that the fresh-air blower -V2- starts up reliably, the first bar corresponds to approx. 3.5 to 4.5 V.
- The voltage is increased by approx. 0.7 V with each additional bar.



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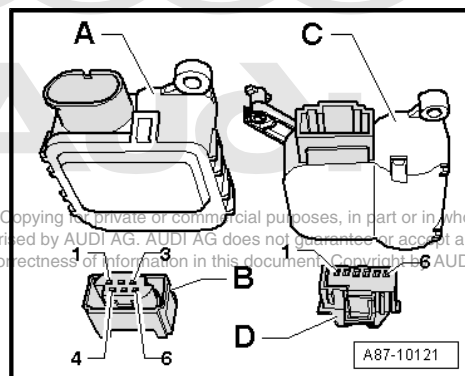
10.2.6 Test step 4:

positioning motors for the air conditioner and associated potentiometers



Note

- ◆ The resistance value for the potentiometers in the positioning motors (specification: 3.6 ... 5.7 k Ω between contacts 1 and 3) can only be measured directly on the positioning motor (parallel connection).
- ◆ Depending on the vehicle production dates, the positioning motors and connectors vary. Up to 01/04 the positioning motors -A- were installed with corresponding connectors -B-; since then (progressive introduction) the positioning motors -C- have been installed with the corresponding connectors -D-.
- ◆ The resistance value of the potentiometers in the positioning motors (between contacts "1" and "2", as well as "3" and "2") depends on the position of the positioning motor. The resistance value should only be measured with the positioning motor installed. The upper specification is not reached in test steps 4.1 and 4.2. (In order to reach the upper specification, all the connectors would have to be unplugged from the other positioning motors during measurement - parallel connection).
- ◆ The assignment of the contacts in the connectors varies; in the positioning motors -A-, the motor is connected to contacts -4- and -6-, and in the positioning motors -C-, the motor is connected to contacts -5- and -6-.
- ◆ If the operating and display unit for air conditioner/Climatronic -E87- detects the fault "potentiometer short circuit to earth" or "open circuit/short circuit to positive", check all the potentiometers (in the 4 positioning motors) and the corresponding wiring.
- ◆ If there is more than one positioning motor indicated as faulty at the same time in the fault memory and no fault is detected in test step "4", check the potentiometers in all the positioning motors and the wiring connecting the individual positioning motors for a short circuit (e.g. between the positioning motor for defrost flap -V107- and the positioning motor for central flap -V70-). If the connectors are unplugged from all the positioning motors and from the operating and display unit for air conditioner/Climatronic -E87-, the meter between sockets "1", "2" and "3" in the relevant connector must indicate $\infty \Omega$).



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Vehicle diagnostic, testing and information system -VAS 5051-, measurement mode: Multimeter, resistance measurement (20 k Ω)

- Adapter -V.A.G 1598/11- connected

Test step	Test box -V.A.G 1598 A-socket	Being tested: (the wiring to the)	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
4.1	25 and 36	Potentiometer - positioning motor for temperature flap -G92- (in the positioning motor for temperature flap -V68-)	• Ignition off	◆ greater than 0.1 k Ω and less than 5.7 k Ω (depends on the position of the positioning motor)	– Use the current flow diagram to locate and rectify the short circuit, open circuit or contact resistance – Replace the positioning motor

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, resistance measurement (20 kΩ)
• Adapter -V.A.G 1598/11- connected

Test step	Test box -V.A.G 1598 A-socket	Being tested: (the wiring to the)	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
	25 and 38	Potentiometer - positioning motor for central flap - G112- (in the positioning motor for central flap -V70-)			
	25 and 39	Potentiometer in positioning motor for recirculated-air flap -G143- (in the positioning motor for recirculated-air flap -V113-)			
	25 and 37	Potentiometer in positioning motor for defrost flap - G135- (in the positioning motor for defrost flap - V107-)			

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, resistance measurement (20 kΩ)
• Adapter -V.A.G 1598/11- connected

Test step	Test box -V.A.G 1598 A-socket	Being tested: (the wiring to the)	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
4.2	34 and 36	Potentiometer - positioning motor for temperature flap -G92- (in the positioning motor for temperature flap -V68-)	• Ignition off	♦ greater than 0.1 kΩ and less than 5.7 kΩ (depends on the position of the positioning motor)	– Use the current flow diagram to locate and rectify the short circuit, open circuit or contact resistance – Replace the positioning motor
	34 and 38	Potentiometer - positioning motor for central flap - G112- (in the positioning motor for central flap -V70-)			
	34 and 39	Potentiometer in positioning motor for recirculated-air flap -G143- (in the positioning motor for recirculated-air flap -V113-)			

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Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, resistance measurement (20 kΩ)

- Adapter -V.A.G 1598/11- connected

Test step	Test box -V.A.G 1598 A-socket	Being tested: (the wiring to the)	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
	34 and 37	Potentiometer in positioning motor for defrost flap - G135- (in the positioning motor for defrost flap - V107-)			

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Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, resistance measurement (20 kΩ)

- Adapter -V.A.G 1598/11- connected

Test step	Test box -V.A.G 1598 A-socket	Being tested: (the wiring to the)	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
4.3	Earth ²²⁾ and 36	Potentiometer - positioning motor for temperature flap -G92- (in the positioning motor for temperature flap -V68-)	• Ignition off	♦ ∞ Ω	– Use the current flow diagram to locate and rectify the short circuit to earth
	Earth ²²⁾ and 38	Potentiometer - positioning motor for central flap - G112- (in the positioning motor for central flap -V70-)			
	Earth ²²⁾ and 39	Potentiometer in positioning motor for recirculated-air flap -G143- (in the positioning motor for recirculated-air flap -V113-)			
	Earth ²²⁾ and 37	Potentiometer in positioning motor for defrost flap - G135- (in the positioning motor for defrost flap - V107-)			

22) Earth is at connector "D", contacts "13" and "14".

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, resistance measurement (200 Ω) • Adapter -V.A.G 1598/11- connected					
Test step	Test box -V.A.G 1598 A-socket	Being tested: (the wiring to the)	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
4.4	21 + 22	Temperature flap positioning motor - V68-	• Ignition off	◆ 20 ... 100 Ω	– Use the current flow diagram to locate and rectify the short circuit, open circuit or contact resistance – Replace the positioning motor
4.5	26 + 27	Central flap positioning motor - V70-			
4.6	28 + 29	Recirculated-air flap positioning motor -V113-			
4.7	23 + 24	Defrost flap positioning motor - V107-			

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, resistance measurement (200 Ω) • Adapter -V.A.G 1598/11- connected					
Test step	Test box -V.A.G 1598 A-socket	Being tested: (the wiring to the relevant positioning motor for a short circuit to earth)	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
4.8	Earth ²²⁾ and 21	Temperature flap positioning motor - V68-	• Ignition off	◆ ∞ Ω	– Use the current flow diagram to locate and rectify the short circuit to earth
	Earth ²²⁾ and 23	Defrost flap positioning motor - V107-			
	Earth ²²⁾ and 26	Central flap positioning motor - V70-			
	Earth ²²⁾ and 28	Recirculated-air flap positioning motor -V113-			

22) Earth is at connector "D", contacts "13" and "14".

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, voltage measurement (20 V =)

- Adapter -V.A.G 1598/11- connected

Test step	Test box -V.A.G 1598 A-socket	Being tested: (the wiring to the relevant positioning motor for a short circuit to positive)	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
4.9	Earth ²⁴⁾ and 21	Temperature flap positioning motor - V68-	• Ignition on	◆ Less than 1 V	– Use the current flow diagram to rectify the short circuit to positive
	Earth ²⁴⁾ and 23	Defrost flap positioning motor - V107-			
	Earth ²⁴⁾ and 26	Central flap positioning motor - V70-			
	Earth ²⁴⁾ and 28	Recirculated-air flap positioning motor -V113-			

24) Earth is at connector "D", contacts "13" and "14".

10.3 Test steps 5 to 9

10.3.1 Test step 5:

Pressure signal from the high-pressure sender -G65-

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: DSO (Digital Storage Oscilloscope)

Setting: 5V/Div =, 5 ms / Div (5 VDC and 5 milliseconds per unit)

- Adapter -V.A.G 1598/12- connected

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Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
5.1	7 and 14	Pressure-dependent square-wave signal from the high-pressure sender -G65-	• Ignition on	– Square-wave signal (as a function of pressure in the refrigerant circuit) ⇒ page 92 ◆ Signal ratio greater than 16.5% and less than 50 %	• No detectable signal – Using the current flow diagram, locate and rectify an open circuit, contact resistance or short circuit between the operating and display unit for air conditioner/Climatronic - E87- and the high-pressure sender -G65- – Check the voltage supply and earth connection to the high-pressure sender -G65- ⇒ page 92 . – Replace the high-pressure sender -G65-

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: DSO (Digital Storage Oscilloscope)
Setting: 5V/Div =, 5 ms / Div (5 VDC and 5 milliseconds per unit)
• Adapter -V.A.G 1598/12- connected

Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
					• Signal ratio under 5 % and over 95 % – Check the voltage supply and earth connection to the high-pressure sender -G65- ⇒ page 92 . – The high-pressure sender -G65- is defective; replace it • Signal ratio at or above 5 % or under 16.5 % – Not enough refrigerant in the circuit, the vehicle must be taken to a specialist air conditioner workshop
					• Signal ratio over 50 % or under 95 % – The high-pressure sender -G65- is defective; replace it – Fault in the refrigerant circuit, the vehicle must be taken to a specialist air conditioner workshop



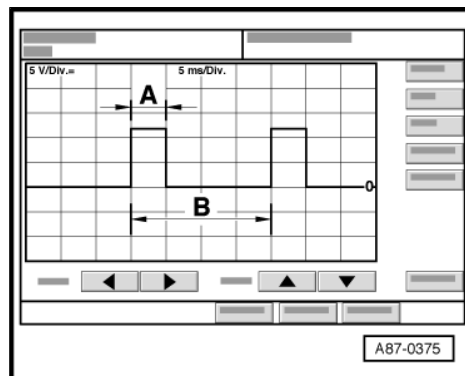
Note

- ◆ *The pressure and, thus, the signal ratio change with the ambient temperature if the refrigerant circuit has been filled with the correct amount of refrigerant.*
- ◆ *The signal ratio and the pressure calculated by the operating and display unit for air conditioner/Climatronic -E87- are displayed in the measured value block in display group "001" [⇒ page 46](#)*
- ◆ *The signal which is transmitted at a refrigerant circuit pressure of approx. 6 bar absolute is equivalent to a signal ratio of approx. 22 % (automatic adjustment with the compressor at a standstill, at an ambient temperature of 20 °C, and with a properly filled refrigerant circuit).*
- ◆ *The signal which is transmitted at a refrigerant circuit pressure of approx. 16 bar absolute is equivalent to a signal ratio of approx. 47 %. When the compressor is not running, this is only the case under extreme conditions, e.g. at very high ambient temperatures and when the engine is hot.*

10.3.2 Checking the pressure signal from the high-pressure sender -G65-

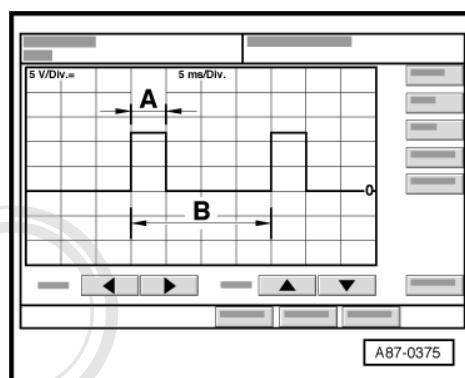
This display appears on the oscilloscope screen if the following conditions have been satisfied.

- Ignition switched on (positive and earth applied to the high-pressure sender -G65-)
- Oscilloscope settings: 5 V/div. = (5 V per unit DC voltage) 5 ms/div. (5 milliseconds per unit)
- Test lead (signal lead) connected to socket -7- on the test box.
- Test lead (screening) connected to socket -14- on the test box (earth).



Note

- ◆ The illustration shows the signal transmitted at a refrigerant circuit pressure of approx. 7 bar absolute, corresponding to a signal ratio of approx. 25 % (level occurring with the compressor not running, at an ambient temperature of 30 °C and with the refrigerant circuit charged).
- ◆ The pulse width -A- is governed by the pressure in the refrigerant circuit (area -A- becomes broader as the pressure increases).
- ◆ The signal interval -B- is always 20 milliseconds (corresponding to a frequency of 50 Hertz).
- ◆ The signal ratio is derived from the ratio of pulse width -A- to signal interval -B-.



10.3.3 Pin assignment on the high-pressure sender -G65-

Contact -1- Earth

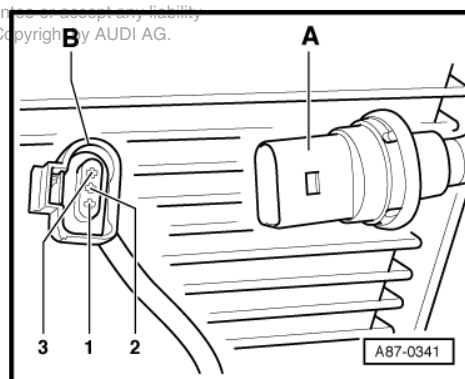
Contact -2 - signal output (square-wave signal to the operating and display unit for air conditioner/Climatronic -E87- and to the engine control unit)

Contact -3-, positive (terminal "75")



Note

- ◆ The compressor is not switched on if connector -B- is unplugged.
- ◆ The high-pressure sender -A- is an electronic control unit which generates a square-wave signal with a ratio which varies with the pressure in the refrigerant circuit ⇒ [page 93](#) .



10.3.4 The pressure signal from the high-pressure sender -G65-

-A- Pressure at the high-pressure end of the refrigerant circuit in bar (absolute)

-B- Signal ratio of the square-wave signal

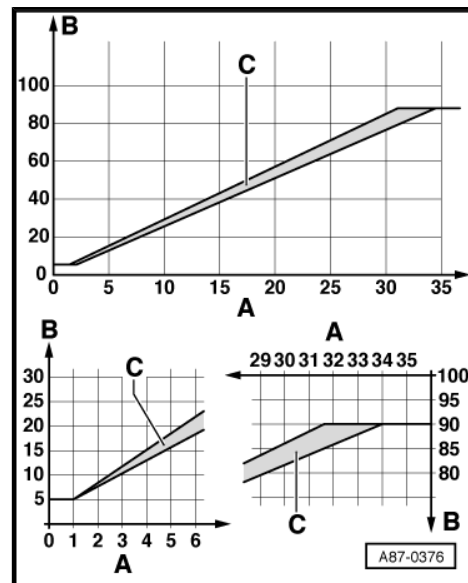
-C- Characteristic curve



Note

- ◆ As soon as there are no compressor shut-off criteria, the operating and display unit for air conditioner/Climatronic -E87- switches on the compressor (by actuating the air conditioner compressor regulating valve -N280-):
- ◆ If there is a signal ratio greater than 12.5 % (corresponding to approx. 1.5 bar absolute) and less than 87.5 % (corresponding to approx. 32 bar absolute)
- ◆ If the signal ratio is less than 12.5 % or greater than 87.5 %, the compressor is not switched on (the air conditioner compressor regulating valve -N280- is not actuated).
- ◆ The signal ratio and the pressure calculated by the operating and display unit for air conditioner/Climatronic -E87- are displayed in the measured value block in display group "001"
⇒ [page 46](#)

- ◆ An absolute pressure of 0 bar represents an absolute vacuum. Therefore normal ambient pressure is equivalent to approx. 1 bar absolute. On the dials of most pressure gauges 0 bar is equivalent to an absolute pressure of one bar (recognisable by the datum -1 below 0).
- ◆ The operating and display unit for air conditioner/Climatronic -E87- switches the radiator fans -V7- to speed 1, independent of the pressure in the refrigerant circuit, as soon as the compressor is switched on:
- ◆ The operating and display unit for air conditioner/Climatronic -E87- switches the radiator fans -V7- to speed 2. As soon as the pressure in the refrigerant circuit exceeds approx. 16 bar (absolute pressure) (the duty factor becomes greater than 47%). If the pressure drops below 13 bar (signal ratio drops below 40%), the fans are switched back to speed 1.
- ◆ The signal generated by the high-pressure sender -G65- is also used for engine control (the required compressor drive torque is governed by the refrigerant circuit pressure). Depending on the engine control unit version, the signal is displayed as a signal ratio in the measured value block. ⇒ Relevant Workshop Manual, Injection and Ignition System; Repair group 01



10.3.5 Test step 6:

Actuation for the air conditioner compressor regulating valve - N280-

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, voltage measurement (20 V =)

- Adapter -V.A.G 1598/12- connected

Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
6.1	3 + 14	Voltage supply for the air conditioner compressor regulating valve -N280-	• Ignition on	◆ Battery voltage	– Using the current flow diagram, locate and rectify an open circuit in the wiring between the air conditioner compressor regulating valve -N280- , the operating and display unit for air conditioner/Climatronic -E87- and terminal "75"
6.2	4 + 14	Voltage supply via the air conditioner compressor regulating valve -N280-	• Ignition on	◆ Battery voltage	– Using the current flow diagram, locate and rectify an open circuit in the voltage supply to the air conditioner compressor regulating valve -N280- or in the wiring connecting the air conditioner compressor regulating valve -N280- and the operating and display unit for air conditioner/Climatronic -E87- – Open circuit in the air conditioner compressor regulating valve - N280- , replace the compressor (vehicle must be taken to a specialist air conditioner workshop)

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Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, current measurement (10 A =)					
• Adapter -V.A.G 1598/12- connected					
Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
6.3	4 + 14	Current measurement via the air conditioner compressor regulating valve -N280-	• Ignition on	♦ Less than 1 A	– Using the current flow diagram, locate and rectify a short circuit to positive in the wiring between the air conditioner compressor regulating valve -N280- and the operating and display unit for air conditioner/Climatronic -E87- – The air conditioner compressor regulating valve -N280- is defective; replace the compressor (the vehicle must be taken to a specialist air conditioner workshop)



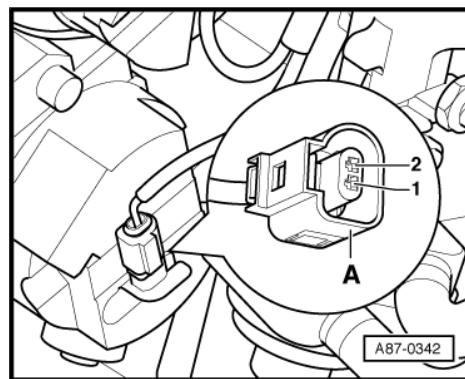
Note

- ♦ During operation the compressor output is influenced by the air conditioner compressor regulating valve -N280- .
- ♦ The operating and display unit for air conditioner/Climatronic -E87- controls the current which flows via the air conditioner compressor regulating valve -N280- and, thus, the compressor output ⇒ [page 46](#) (Read the measured value block in display group "001").

10.3.6 Checking the cut-in signal for the air conditioner compressor regulating valve -N280-

- Switch off the ignition.
- Connect the operating and display unit for air conditioner/Climatronic -E87- to the vehicle wiring harness.

- Unplug the connector -A- from the air conditioner compressor.
- Use the adapter cable from the adapter set -V.A.G 1594C- to restore the connection between connector -A- and the connector on the air conditioner compressor regulating valve - N280- .
- Connect the probe -VAS 5051/8- to the adapter leads.
- Test lead (signal lead) to contact -2-
- Test lead (screening) to contact -1-
- Set the vehicle diagnostic, testing and information system - VAS 5051- , to measurement mode "DSO" (Digital Storage Oscilloscope).
- Setting 5V/Div =, 0.5 ms/Div (5 VDC and 0.5 milliseconds per unit)
- Start the engine.
- Set the temperature preselection to "Lo" on the operating and display unit for air conditioner/Climatronic -E87- .
- On the operating and display unit for air conditioner/Climatronic -E87- , press the buttons "Auto" and "Econ" to actuate the air conditioning system compressor regulating valve - N280- on and off.



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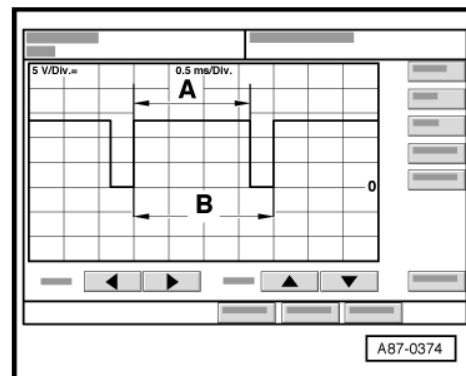
The oscilloscope screen displays the following, depending on the setting on the operating and display unit for air conditioner/Climatronic -E87- :

- In “OFF” or “Econ” mode: No square-wave signal (the air conditioner compressor regulating valve -N280- is not actuated).
- In “Auto” mode and at “Lo” temperature setting: there is a square-wave signal with a pulse width between 75% and 100% (the air conditioner compressor regulating valve -N280- is actuated).



Note

- ◆ The illustration shows a signal with a signal ratio of approx. 80 %.
- ◆ The pulse width -A- is governed by the required refrigeration capacity, the vehicle system voltage etc. (over the width of area -A-, current is controlled via the air conditioner compressor regulating valve -N280- by the operating and display unit for air conditioner/Climatronic -E87-).
- ◆ The signal interval -B- is always 2 milliseconds (corresponding to a frequency of 500 Hertz).
- ◆ The signal ratio is derived from the ratio of pulse width -A- to signal interval -B-.
- The setting on the operating and display unit for air conditioner/Climatronic -E87- and the measured ambient influences govern the pulse width of the square-wave signal (a signal ratio between 100 % and greater than 30 %, the air conditioner compressor regulating valve -N280- is actuated such that compressor output required to obtain the specified temperature is achieved).



Note

- ◆ In “Auto” mode with a “Lo” temperature setting, the air conditioner compressor regulating valve -N280- is actuated such that the max. permissible current of approx. 0.65 A to 0.8 A flows via air conditioner compressor regulating valve -N280- (maximum compressor output).
- ◆ In control mode, the actuation time is governed by the required refrigeration capacity, the vehicle system voltage, etc. However, it always lasts long enough to achieve a mean current of 0.3 A.

10.3.7 Test step 7:

Actuation of the radiator fan -V7- (speeds 1 and 2)

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, current measurement (10 A =)					
• Adapter -V.A.G 1598/12- connected					
Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
7.1	8 + 14	Actuation of speed 1 for the radiator fan -V7-	• The engine is running – The fan does not start running until the test lead has been connected	◆ Greater than 0.1 A and less than 1.0 A ◆ Fan running at speed 1	– Using the current flow diagram, locate and rectify a short circuit to earth in the wiring between the operating and display unit for air conditioner/Climatronic -E87- and the control unit for the radiator fans -J293- – Using the current flow diagram, locate and rectify an open circuit in the wiring between the operating and display unit for air conditioner/Climatronic -E87- and the control unit for the radiator fans -J293- – Check the actuation of the radiator fan -V7- . ⇒ Electrical System; Repair group 01
7.2	9 + 14	Actuation of speed 2 for the radiator fan -V7-	• The engine is running – The fan does not start running until the test lead has been connected	◆ Greater than 0.1 A and less than 1.0 A ◆ Fan running at speed 2	– Using the current flow diagram, locate and rectify a short circuit to earth in the wiring between the operating and display unit for air conditioner/Climatronic -E87- and the control unit for the radiator fans -J293- – Using the current flow diagram, locate and rectify an open circuit in the wiring between the operating and display unit for air conditioner/Climatronic -E87- and the control unit for the radiator fans -J293- – Check actuation of the radiator fan -V7- . ⇒ Electrical System; Repair group 01

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Note

- ◆ The operating and display unit for air conditioner/Climatronic -E87- switches a signal to the control unit for the radiator fans -J293- as soon as the compressor is switched on (speed 1) and, when the compressor is switched on, as soon as the pressure in the coolant circuit exceeds a specified value (speeds 1 and 2) ⇒ **page 46** (measured value block in display group "001"). The control unit for the radiator fans -J293- switches on the radiator fan -V7-.
- ◆ Actuation of the radiator fan -V7- by the control unit for the radiator fans -J293- only occurs when the engine is running (voltage at terminal "61").
- ◆ The control unit for radiator fan -J293- switches the radiator fan -V7- to speed 1 when the thermostatic switch for the radiator fan -F54- is closed (between contacts "1" and "2" it closes at approx. 95 °C) and to speed 2 when the thermostatic switch for the radiator fan -F18- is closed (between contacts "3" and "2" it closes at approx. 102 °C) ⇒ **Current Flow Diagrams; Electrical Fault-Finding and Fitting Locations**, ⇒ **Relevant Workshop Manual, Injection and Ignition System; Repair group 01** and ⇒ **Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01**

10.3.8 Test step 8:

Windscreen wiper operation signal and wiring to the photosensor for sunlight penetration -G107-

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, voltage measurement (20 V =)					
• Adapter -V.A.G 1598/11- connected					
Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
8.1	14 + Earth ²⁵⁾	Input for signal for windscreen wiper operation (terminal "31 b")	• Ignition on • Windscreen wiper switched off – Switch on the windscreen wipers (speed 1)	◆ Less than 2 V ◆ approx. battery voltage	– Use the current flow diagram to locate and rectify a short to positive – Using the current flow diagram, locate and rectify an open circuit in the wiring between the operating and display unit for air conditioner/Climatronic -E87- and the switch for windscreen wiper operation (terminal "31b")

25) Earth is at connector "D", contacts "13" and "14".

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, voltage measurement (20 V =)

- Adapter -V.A.G 1598/11- connected

Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
8.2	48 + earth ²⁶⁾ 1	Wiring to the sunlight penetration photosensor - G107-	• Ignition on	♦ Less than 2 V	– Use the current flow diagram to locate and rectify a short to positive

26) 1- Earth is at connector "D", contacts "13" and "14".

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, resistance measurement (20 kΩ)

- Adapter -V.A.G 1598/12- and adapter -V.A.G 1598/11- connected

Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
8.3	48 ²⁷⁾ 2 and earth ²⁶⁾ 1	Wiring to the sunlight penetration photosensor - G107-	• Ignition on	♦ $\infty \Omega$	– Use the current flow diagram to locate and rectify the short circuit to earth
8.4	48 ²⁷⁾ 2 and 2 ²⁸⁾ 3	Wiring to the sunlight penetration photosensor - G107-	• Ignition on	♦ less than 10 kΩ	– Using the current flow diagram, locate and rectify an open circuit in the wiring between the operating and display unit for air conditioner/ Climatronic -E87- and the sunlight penetration photosensor - G107-

27) 2- Adapter -V.A.G 1598/11-

28) 3- Adapter -V.A.G 1598/12-



Note

The photosensor is connected to connector "A" contact "8" (signal lead) and to connector "D" contact "2" (signal earth).

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10.3.9 Test step 9:

Input for the signal from the switch for the Open-Sky sunroof and input for the cut-in signal from the auxiliary heater

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, voltage measurement (20 V =)					
• Adapter -V.A.G 1598/11- connected					
Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
9.1	51 + Earth ²⁹⁾	Input for signal from switch for "Open-Sky sunroof"	• Ignition on • Open-Sky sunroof closed – Open the Open-Sky sunroof	♦ Less than 2 V ♦ approx. battery voltage	– Use the current flow diagram to locate and rectify a short to positive – Using the current flow diagram, locate and rectify an open circuit in the wiring between the operating and display unit for air conditioner/ Climatronic -E87- and the switch – Check the switch for the "Open-Sky sunroof"

29) Earth is at connector "D", contacts "13" and "14".

Note

There is no wire connected to connector "A" contact "11" for the time being; nor on vehicles with an Open-Sky sunroof (dual spoiler roof).

Vehicle diagnostic, testing and information system -VAS 5051- , measurement mode: Multimeter, voltage measurement (20 V =)					
• Adapter -V.A.G 1598/12- connected					
Test step	Test box -V.A.G 1598 A-socket	Being tested:	• Test conditions – Additional operations	Specification	Remedies if the specification is not attained
9.2	10 + 14	Input for the cut-in signal from the auxiliary heater	• Ignition off	♦ Less than 2 V	– Use the current flow diagram to locate and rectify a short to positive

**Note**

- ◆ *There no plans to install an auxiliary heater at present.*
- ◆ *If the operating and display unit for air conditioner/Climatronic -E87- remains in operation after the ignition has been switched off and "1" is displayed in display zone "1" of display group "015" in the measured value block, locate and rectify the short to positive at connector "D", contact "10".*
- ◆ *In the case of vehicles with a diesel engine and a fuel-powered additional heater, there is no connection for actuation between the additional heater and the operating and display unit for air conditioner/Climatronic -E87-. The additional heater does not actuate the output reserved for this signal either → Additional Heater; Repair group 01*



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11 Electrical check of heated rear window

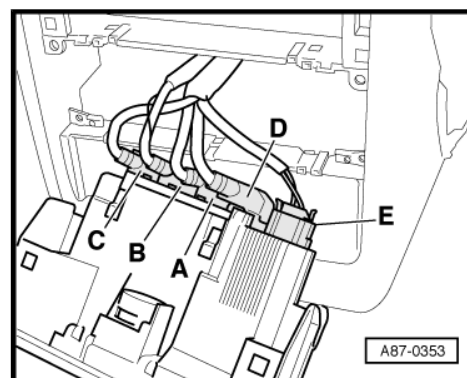
11.1 Electrical check for actuation of the heated rear window -Z1-

11.1.1 Special tools, testers and auxiliary equipment required

- ◆ Vehicle diagnostic, testing and information system -VAS 5051- (with a 50 A current probe -VAS 5051/9-)
- ◆ Adapter set -V.A.G 1594C-

Prerequisite

- ◆ All the fuses are OK → "Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations"
- Switch off the ignition.
- Remove the operating and display unit for air conditioner/Climatronic -E87- → [page 188](#) .
- Unplug connector -E- from the operating and display unit for air conditioner/Climatronic -E87- .
- Switch on the ignition.
- Measure the voltage at connector -E- between contacts "1" and "2".
- ◆ Specification: approx. battery voltage
- Switch off the ignition.

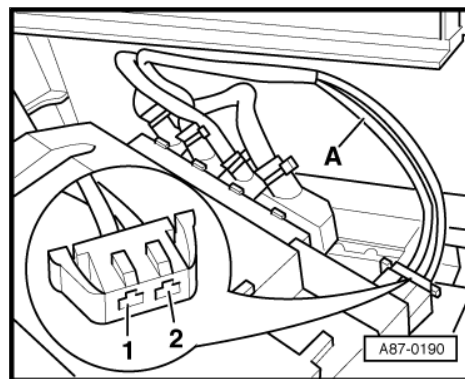


- Plug in the connector -E- on the operating and display unit for air conditioner/Climatronic -E87- .
- Guide the supply lead -A- to the connector -E- through the 50A current probe -VAS 5051/9-
- Set the vehicle diagnostic, testing and information system - VAS 5051- to “multimeter measuring: 50A current probe” mode.



Note

All the operating and display unit for air conditioner/Climatronic - E87- connectors must be plugged in.



- Start the engine.
- Switch on heated rear window on the operating and display unit for air conditioner/Climatronic -E87- (the warning lamp in the button lights up).
- ◆ Specification: the display on the vehicle diagnostic, testing and information system -VAS 5051- changes from approx. 0 A to less than 25 A
- Wait for approx. 12 minutes
- ◆ Specification: the display on the vehicle diagnostic, testing and information system -VAS 5051- changes from less than 25 A to approx. 0 A (the warning lamp in the button goes out)



Note

- ◆ *Stray current may cause a low current reading on the current probe with the heated rear window switched off.*
- ◆ *If the ambient temperature is below 0 °C, the rear window heating remains activated until the ignition is switched off (can be deactivated manually at any time). If the temperature during a driving cycle rises above 0 °C, the heated rear window is deactivated on completion of operating period stored in the operating and display unit for air conditioner/Climatronic -E87- (currently approx. 12 minutes).*
- ◆ *At ambient temperatures greater than 0 °C, the heated rear window is switched off automatically by the operating and display unit for air conditioner/Climatronic -E87- on completion of the operating period stored in the operating and display unit for air conditioner/Climatronic -E87- (currently approx. 12 minutes).*

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12 Checking electric additional heater



Note

- ◆ *In the case of vehicles with an electric additional heater, the air is supplied with heat energy immediately after it exits the heat exchanger of the air-conditioner / heater.*
- ◆ *Vehicles with a 1.2 l TDI engine (except for 3 L Öko for Germany with exhaust emissions standard "D 4") are currently fitted with an electric additional heater rated at approx. 900 watt capacity. Production changeover to the electric additional heater rated at 1500 Watt capacity will not apply to the 2003 models of these vehicles. This will happen at a later date (implementation is as yet undecided). → Audi sales range*
- ◆ *Vehicles with a 1.2 litre TDI engine with exhaust emissions standard "D 4" (3 litre Öko for Germany) do not feature an additional heater at present.*
- ◆ *An electric additional heater rated at approx. 900 watt capacity was installed in vehicles with 1.4 l TDI engine (only in vehicles for "non-cold countries", e.g. Italy, Spain, etc.) up to 2002. There is a running production changeover to the electric additional heater rated at 1500W capacity in models from 2003. → Audi sales range*
- ◆ *On vehicles with 1.4 L TDI engine for "cold countries" up to model year 2002 (e.g. Austria, Switzerland and all countries northward from there) no electric additional heater was or is installed. These vehicles are fitted with a fuel-powered additional heater which supplies additional heat energy to the coolant. → Audi Sales Range → Additional heater .*
- ◆ *An electric additional heater rated at approx. 1500 watts will be installed as a running change in vehicles with 1.4 l TDI engine for "cold countries" in models from 2003. The fuel-powered additional heater will no longer be used on these vehicles once this fuel-powered additional heater is implemented.*
- ◆ *No additional heater is currently provided in vehicles with a petrol engine.*
- ◆ *The heating elements for the electric additional heater are actuated by the engine control unit; check → Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01 and → Current flow diagrams, Electrical fault finding and Fitting locations*
- ◆ *On vehicles without an air conditioner (only with a heater) the Econ button was discontinued from 2003 (implementation of the 1500 Watt additional heater, fuel-powered additional heater is no longer used on all vehicles). On these vehicles the electric additional heater can no longer be switched off by the driver.*
- ◆ *The operating and display unit for air conditioner/Climatronic -E87- heater control electronics actuates the engine control unit, which then decides whether the additional heating is to be switched on. Depending on the engine control unit version, different measured value blocks of the engine control unit indicate why the additional heater is not switched on or that it is being actuated. → Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01*
- ◆ *The engine control unit receives an additional heating request:*
- ◆ *On vehicles with an air conditioner via the data bus system (convenience data bus and drive data bus)*

- ◆ *On vehicles with heater via wiring from the heater control electronics to the engine control unit (the input in the heater control electronics is switched to earth). On vehicles without an Econ button in the heater controls, this engine control unit output is always switched to earth. ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01 and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations*
- ◆ *The electrical additional heater is actuated by the control unit for the diesel direct injection and glow plug system when certain conditions occur at the same time: ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01*
- ◆ *The engine control unit switches on the additional heater if e.g. the following preconditions are met:*
- ◆ *The operating and display unit for air conditioner/Climatronic -E87- transmits a request via the convenience data bus, or the heater control electronics have switched the input to earth (the Econ button is not pressed, the ambient temperature is below 6 °C).*
- ◆ *Engine speed greater than 600 rpm*
- ◆ *The coolant temperature is less than 70 °C (or less than 80 °C at very low ambient temperatures).*
- ◆ *The load of the alternator -C- is less than 60% (only with electric additional heater rated at 900 watts). ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01*

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12.1 Checking actuation of electric additional heater by engine control unit



Note

- ◆ *The electric additional heater is activated by the engine control unit (control unit for the diesel direct injection and glow plug system) as soon as certain preconditions are met: ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System*
- ◆ *The following values relating to the additional heater can be read out from the measured value block of the engine control unit for vehicles with diesel engines:*
- ◆ *The ambient temperature is less than +5 °C (transmitted by the control unit in the dash panel insert -J285-).*
- ◆ *The additional heater is switched on or off ("Econ" mode is not switched on and "heat output" requested with air conditioner)*
- ◆ *The current coolant temperature ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01*
- ◆ *Different engine control unit versions are installed depending on the version of the heating element for additional air heating -Z35- (900 or 1500 watts). ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System and ⇒ Parts List*
- ◆ *Depending on the version of the engine control unit used, if "01" is displayed in the measured value block, for example, on vehicles with an electric additional heater rated at 1500 watt capacity, this merely indicates that the additional heater is actuated. Heat output control of this additional heater is via the electronics installed in the heating element for additional heater -Z35- (by evaluating the alternator load). ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System*
- ◆ *On vehicles with a 1500 W heating element for additional heater -Z35-, the alternator load is controlled by the heating element for additional heater -Z35- in such a way that it is at approx. 90%. If the alternator load exceeds 95 % (e.g. due to switching on an additional electrical consumer), the heating element for additional heater -Z35- automatically reduces the current consumption and, thus, the heat output.*
- ◆ *Vehicles with a 900 watt heating element for additional heater -Z35- are currently fitted with a 120 A alternator -C-, whereas vehicles with a 1500 watt heating element for additional heater -Z35- are currently fitted with a 140 A alternator -C-. ⇒ Parts List*

12.1.1 Test requirements:

- ◆ The engine is at ambient temperature (the coolant temperature is lower than 50 °C at the start of the test).
- ◆ There is no fault saved in the engine control unit and in the operating and display unit for air conditioner/Climatronic -E87- ⇒ [page 9](#) and ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System
- ◆ Depending on the vehicle features, the following is set:
 - On the operating and display unit for air conditioner/Climatronic -E87- in vehicles with air conditioning: - Target temperature greater than 28 °C (e.g. "Hi") - "Auto" mode (not "Econ")
 - When the heater is activated in vehicles with a heater system:
 - Temperature rotary knob turned fully to "Warm" - Rotary knob

for the fresh-air blower set to speed "3" - and with the **Econ** button not pressed (if there is one)

- ◆ Additional consumers (e.g. heated rear window, heated seats) are switched off.

12.1.2 Checking actuation of additional heater by engine control unit:

- With the ignition off, connect the vehicle diagnostic, testing and information system -VAS 5051- by the diagnostic cable - VAS 5051/5A- , for example, to the 16-pin diagnostic socket in the vehicle ➔ [page 4](#) .
- Spray the sender for the ambient temperature sensor -G17- (installed in the area of the front bumper ➔ [page 178](#)) at an ambient temperature above 5 °C continuously with a cold spray until the sender drops below -10 °C.
- Switch on the ignition.
- Set the maximum heat output on the heater control or the operating and display unit for air conditioner/Climatronic -E87- (with the **Econ** button not pressed, the rotary knob for temperature preselection set fully to "heat" or temperature preselection "Hi").
- Start the engine and select the display group intended for this function in the measured value block in the engine control unit (depending on the engine control unit, e.g. display group "016") ➔ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System
- Increase the engine speed to approx. 2000 rpm and monitor the display for actuation of the electric additional heater.

Read out the display group with the shut-off criteria for the electric additional heater in the engine control unit measured value block.
 ➔ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01

If the engine control unit measured value block indicates that the additional heater is being actuated and the additional heater is not heating, check the current consumption of the heating element for additional heater -Z35- depending on the version of the additional heater element:

- In vehicles fitted with a 900 watt heating element for additional heater -Z35- ➔ [page 110](#)
- In vehicles fitted with a 1500 watt heating element for additional heater -Z35- ➔ [page 113](#)

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12.2 Checking electric additional heater with a capacity of 900 watts



Note

- ◆ *The heating element for additional heater -Z35- with a power rating of 900 watts consists of several layers of resistance elements, which are capable together of producing a heat output of a maximum of 1000 W (if all 3 inputs are actuated). These resistance elements have a positive temperature coefficient (the resistance increases with the temperature and the current consumption decreases).*
- ◆ *The resistance heating elements are actuated individually; however, as they are all combined in the heating element for additional heater -Z35-, the current in the heating element for additional heater -Z35- flows to the earth connection via the individual resistance elements in the heating element -Z35- in such a way that it is exposed to minimal resistance.*
- ◆ *The heating element for additional heater -Z35- is designed such that, when it is switched on, it is not possible for a current in excess of 35 A to flow via any of the contacts (the resistance increases immediately after switch-on, and the current decreases).*
- ◆ *To reach the maximum heat output of 1000 W (3 x 333 W), the temperature of the resistance heating elements must be very low and sufficient current must be supplied from the alternator.
⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01*
- ◆ *Since workshop equipment is not capable of measuring resistances smaller than 10 Ω with sufficient accuracy, it is not possible to establish if there is a short circuit in the additional heater element..*

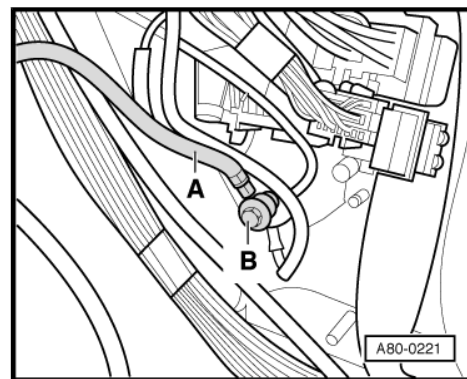
12.2.1 Checking current consumption of additional heater

- ◆ You can check actuation of the heating element for additional heater -Z35- in the measured value block for the engine control unit by selecting the designated display group for this function (depending on the engine control unit, e.g. display group "016") ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System
- ◆ The specified test requirements must be fulfilled ⇒ [page 108](#)
- Switch off the ignition.
- Remove the trim from the bottom of the right "A" pillar. ⇒ General Body Assembly, Interior; Repair group 70
- Set the measurement device used for this measurement (e.g. the Multimeter -V.A.G 1715/-) to current measurement with the use of the current probe (a current of up to a maximum of 105 A is measured).

- Place the current probe from an ammeter over the earth lead -A- running to the heating element for additional heater -Z35-
- Read the ammeter value

Specification: 0 A

- Spray the ambient temperature sensor -G17- (installed in the area of the front bumper ➔ [page 178](#)) at an ambient temperature above 5 °C continuously with a cold spray until it drops below -10 °C.
- Switch on the ignition.
- Read the ambient temperature display in the dash panel insert; it must show a temperature below 0 °C (if necessary, spray the temperature sensor again).



Note

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- ◆ *In the case of vehicles without an ambient temperature display in the dash panel insert, you can view the ambient temperature sensor -G17- reading in measured value block "008" in the Climatronic unit ➔ [page 57](#).*
- ◆ *Refer to the measured value block on the engine control unit to see which cut-in conditions are met for the additional heater.
➔ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System*

- Read the ammeter value

Specification: 0 A

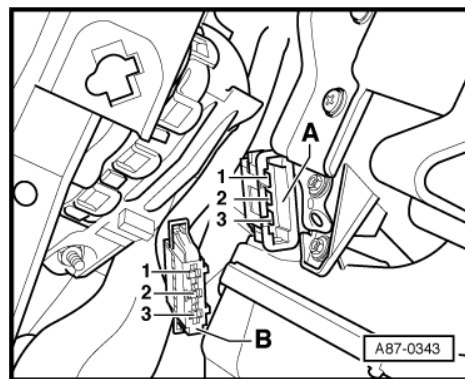
- Set the maximum heat output on the heater control or the operating and display unit for air conditioner/Climatronic -E87- (with the **Econ** button not pressed, the rotary knob for temperature preselection set fully to "heat" or temperature preselection "Hi").
- Start the engine.
- Increase the engine speed to approx. 2000 rpm.
- Monitor the display on the meter

After some time, the current flowing via the additional heater rises from 0 A to over 40 A.



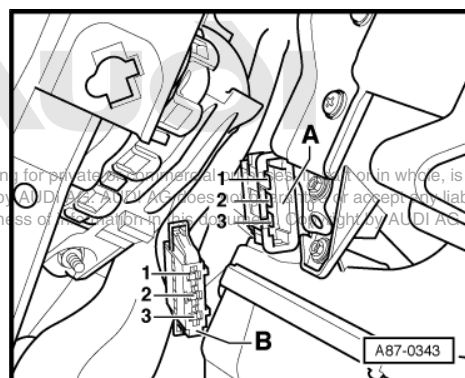
Note

- ◆ The resistance of the additional heating element increases sharply during warm-up, and the current flowing via the additional heater decreases.
- ◆ To ensure that the temperature of the ambient temperature sensor -G17- remains under +5 °C throughout the test, spray the ambient temperature sensor -G17- with cold spray repeatedly.
- ◆ If there is too little current flowing, check the voltage supply, activation and the operation of the two relays for low and high heat output on the basis of the current flow diagram. ⇒ Current flow diagrams, Electrical fault finding and Fitting locations
- ◆ The engine control unit activates the heating element for additional heater -Z35- in 3 stages. Voltage is applied to the contacts in the connector -B- as follows for this purpose.
- ◆ Voltage is applied to one contact for speed "1" (display in the measured value block, e.g. "01").
- ◆ In the case of speed "2", speed "1" is deactivated, and voltage is applied to the other two contacts (display in the measured value block, e.g. "10").
- ◆ In the case of speed "3", speed "1" is connected to speed "2" (display in the measured value block, e.g. "11"). ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01 and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations



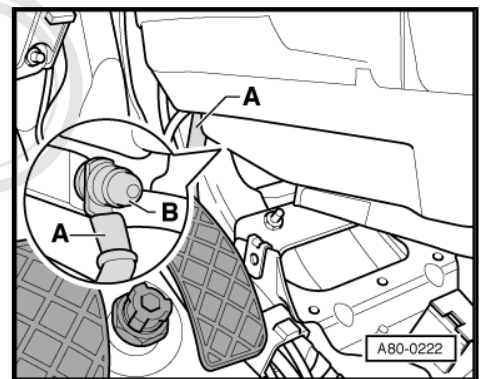
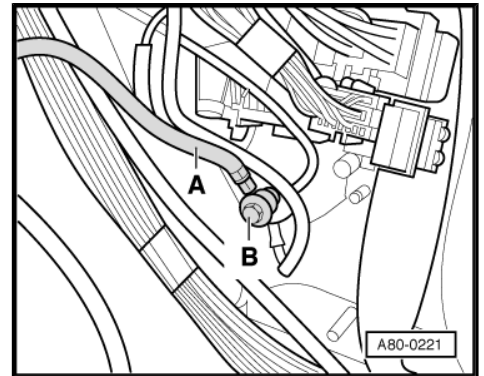
12.2.2 Checking

- In order to test the additional heater elements, remove the driver's storage compartment: ⇒ General Body Assembly, Interior; Repair group 68
- Unplug the connector.
- Check the individual heater elements. The measured value between the individual contacts in connector -A- (from contact "1" to contact "3") and earth is dependant on the temperature and between 0.2 and 5 Ω.



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12.3 Checking the electric additional heater with a capacity of 1500 watts



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Note

- ◆ The heating element for additional heater -Z35- with a power rating of 1500 watts consists of several layers of resistance elements, which are capable together of producing a heat output of a maximum of 1700 W. These resistance elements have a positive temperature coefficient (the resistance increases with the temperature and the current consumption decreases).

- ◆ The resistance heating elements are actuated and controlled by an electronics module installed in the heating element for additional heater -Z35-.

- ◆ To reach the maximum heat output of 1700 W, the temperature of the resistance heating elements must be very low and sufficient current must be supplied from the alternator -C-. ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01

- ◆ The current which flows via the heating element for additional heater -Z35- is discharged to the earth screw point -B- at the pillar "A" via the earth connection -A-.

- ◆ The voltage supply (terminal "30") to the heating element for additional heater -Z35- takes place via a fuse and the wiring -A- to screw point -B-. There is a plastic cap on the hexagonal nut on screw point -B- (tightening torque "9" Nm) (risk of short circuit).

- ◆ The electronics for the heating element for additional heater -Z35- are designed in such a way that the maximum current cannot flow immediately upon switch-on. The electronic module regulates the current in such a way that the intensity of the current rises steadily until the max. permissible alternator load is reached. However, as the heating element for additional heater -Z35- warms up, its resistance increases. Consequently, the current intensity decreases sharply again (the maximum current of approx. 130 A only flows when the heating element for additional heater -Z35- is cold and only for a short time).

- ◆ On vehicles with a 1500 W heating element for additional air heating -Z35-, the alternator load is controlled by the electronic module of the heating element for additional heater -Z35- in such a way that it is at approx. 85 to 95%. If the alternator -C- load rises (e.g. due to switching on an additional electrical consumer), the heating element additional air heating -Z35- automatically reduces the current consumption and, thus, the heat output.

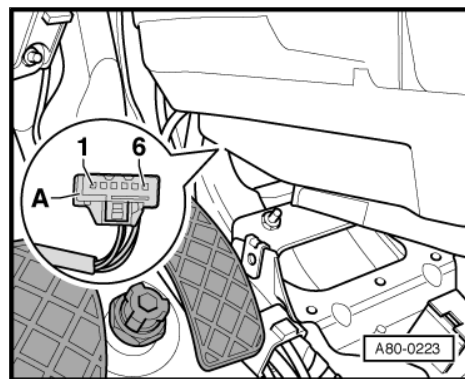
- ◆ If the alternator load rises above 99%, the engine control unit deactivates the additional heater.

- ◆ The electronic module in the heating element for additional heater -Z35- only switches the additional heater on if:

- ◆ The alternator -C- load is greater than 15 % and less than 90 % (the alternator load is calculated via the "DF signal", the load is generally always greater than 15 % when the engine is running).

- ◆ The voltage at terminal "15" is greater than 12.6 V (if the voltage is less than 12.6 V, the output from the heating element for additional heater -Z35- is reduced and at 12.0 V or less the heating element for additional heater -Z35- is switched off).

- ◆ If the temperature of the heating element for additional heater -Z35- rises above 110 °C, the additional heater is deactivated by the electronic module.



- ◆ *In order to ensure that the electronic module activates the heating element for additional heater -Z35-, there must be a dynamic "DF signal" (in the case of a static "DF signal" e.g. from a function generator, the additional heater is not switched on).*
- ◆ *The electronic module in the heating element for additional heater -Z35- is actuated via connector -A- (inaccessible when it is installed). The additional heater is only activated by the installed electronic module if the following cut-in conditions are met:*
- ◆ *There is voltage at contact "1" (from terminal "15").*
- ◆ *The earth is at contact "2" (as a cut-in signal from the engine control unit).*
- ◆ *The earth is at contact "3".*
- ◆ *The square-wave signal "DF terminal" (dynamo field) for actuating the alternator is at contact "4" ⇒ [page 117](#).*

12.3.1 Checking the current consumption of the additional heater

- ◆ You can check actuation of the heating element for additional heater -Z35- in the measured value block for the engine control unit by selecting the designated display group for this function (depending on the engine control unit, e.g. display group "016") ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System
- ◆ The specified test requirements must be fulfilled ⇒ [page 108](#)
- Switch off the ignition.
- Remove the trim from the bottom of the right pillar "A". ⇒ General Body Assembly, Interior; Repair group 70
- Set the measurement device used for this measurement (e.g. the Multimeter -V.A.G 1715/-) to current measurement with the use of the current probe (a current of up to a maximum of 130 A is measured).

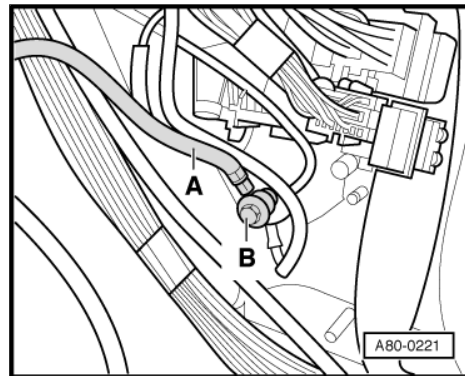


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- Place the current probe from an ammeter over the earth lead -A- running to the heating element for additional heater -Z35-
- Read the ammeter value

Specification: 0 A

- Spray the ambient temperature sensor -G17- (installed in the area of the front bumper ⇒ [page 178](#)) at an ambient temperature above 5 °C continuously with a cold spray until it drops below -10 °C.
- Switch on the ignition.
- Read the ambient temperature display in the dash panel insert; it must show a temperature below 0 °C (if necessary, spray the temperature sensor again).



Note

- ◆ *In the case of vehicles without an ambient temperature display in the dash panel insert, you can view the ambient temperature sensor -G17- reading in measured value block "008" in the Climatronic unit ⇒ [page 57](#) .*
- ◆ *Refer to the measured value block on the engine control unit to see which cut-in conditions are met for the additional heater. ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System*

- Read the ammeter value

Specification: 0 A

- Set the maximum heat output on the heater control or the operating and display unit for air conditioner/Climatronic -E87- (with the **Econ** button not pressed, the rotary knob for temperature preselection set fully to "heat" or temperature preselection "Hi").
- Start the engine.
- Increase the engine speed to approx. 2000 rpm.
- Monitor the display on the meter

After some time, the current flowing via the additional heater rises from 0 A to over 60 A.

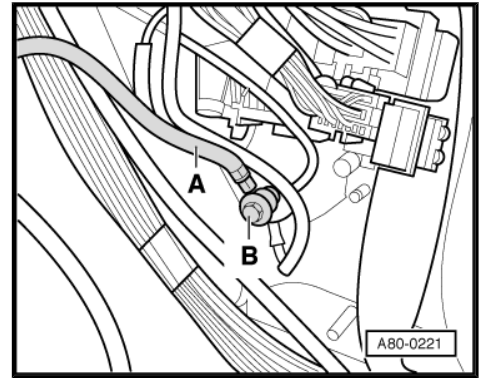
- Let the engine run at idling speed
- Change the alternator load, e.g. by switching electrical consumers (heated rear window, light, etc.) on and off
- The current flowing via the heating element for additional heater -Z35- (or the alternator load) changes.

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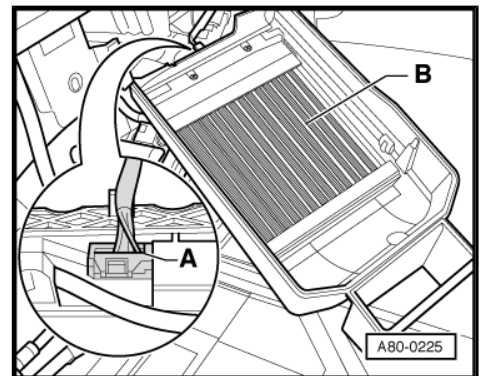
Note

- ◆ You can check actuation of the heating element for additional heater -Z35- and the alternator load in the measured value block for the engine control unit by selecting the designated display group for this function (depending on the engine control unit, e.g. display group "016") ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System
- ◆ To ensure that the temperature of the ambient temperature sensor -G17- remains under +5 °C throughout the test, spray the ambient temperature sensor -G17- with cold spray repeatedly.
- ◆ If there is too little current flowing (and the alternator load is under 50%, for example), even though the additional heater is actuated, check actuation of the heating element for additional heater -Z35- ⇒ [page 117](#).
- ◆ Current may only flow via the heating element for additional heater -Z35- if this is actuated by the engine control unit
- ◆ As small currents cannot be measured with the current probe, if the vehicle's no-load current consumption is too great, with the ignition switched off, loosen the hexagon nut -B- at the earth point and measure the current directly via the meter; no current may flow (less than 1 mA).



12.3.2 Checking actuation of heating element for additional heater -Z35-

Detach the bottom of the air distributor housing with the additional heating element -B- from the heater / air conditioner and set it aside ⇒ [page 147](#).





Note

- ◆ The electronic module in the heating element for additional heater -Z35- is actuated via connector -A-, which is inaccessible when it is installed.
- ◆ The gear shift lever must be re-installed to ensure that the vehicle is not in gear when the engine is started.
- ◆ When you remove the air distributor housing, pay particular attention to the positive connection with additional heater -A- and the corresponding attachment nut -B-; these parts may not come into contact with other parts of the vehicle (risk of short circuit).

- After detaching the additional heater, re-install the gear shift lever and put it in idle position.
- Apply the vehicle handbrake.
- Release the connector locking mechanism and unplug connector -A- from the additional heating element.
- Re-connect the battery.

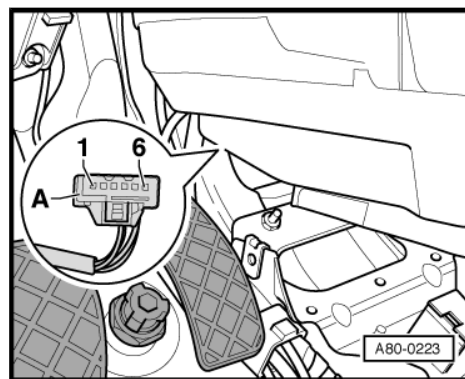
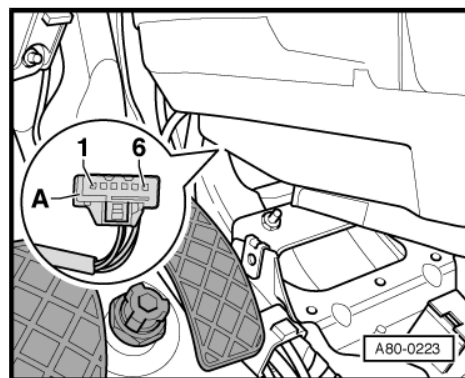
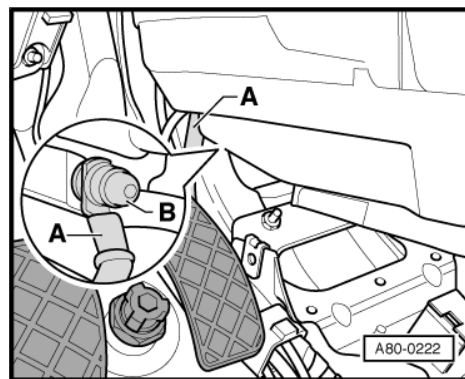
Check terminal "15" and the earth connection

- Switch on the ignition
- Measure the voltage at connector -A- between contacts "1" and "3"

Specification: approx. battery voltage

Check the signal from the DF terminal (dynamo field)

- Switch off the ignition.
- Connect the probe -VAS 5051/8- to connector -A-
- Test lead (signal lead) to contact -4-.
- Test lead (screening) to contact -3-.
- Set the vehicle diagnostic, testing and information system - VAS 5051- , to measurement mode "DSO" (Digital Storage Oscilloscope).
- Setting 5V/Div =, 2 ms/Div (5 VDC and 2 milliseconds per unit)
- Start the engine.



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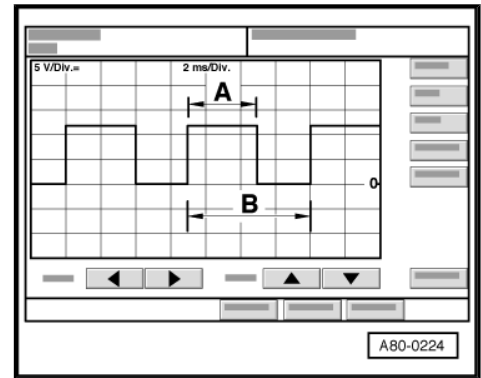
This display appears on the oscilloscope screen if the following conditions have been satisfied.

- The engine runs at approx. 900 rpm
- The alternator load is approx. 40 %
- Change the alternator load, e.g. by switching electrical consumers on and off.

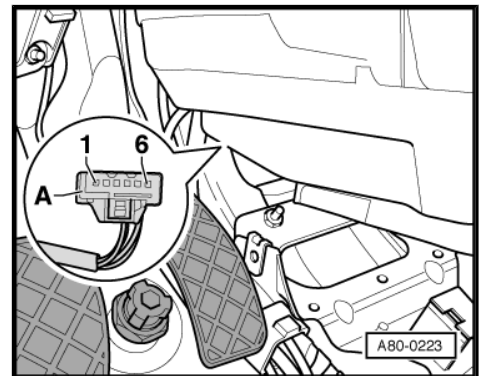
The image on the oscilloscope changes with the alternator load

 Note

- ◆ The signal width -A- and interval changes with the alternator load and engine speed (the higher the load, for example, the shorter the signal width -A- and interval -B-).
- ◆ To ensure that the additional heater does not cut in when the ignition is switched on if, for example, there is a short circuit to earth in the wiring to the engine control unit, there must be a signal at contact "4" with a frequency greater than 3 Hertz (pulses per sec.).

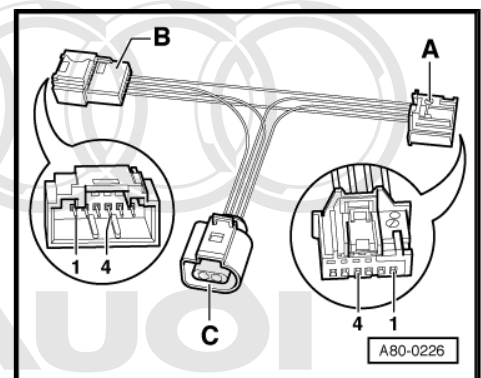


Check actuation of the engine control unit



 Note

- ◆ To enable operation to be checked, create all the electrical connections to the heating element for additional air heating -Z35- on the vehicle.
- ◆ The engine control unit controls the earth to contact "2" in connector -A-, and the electronic module switches the additional heater (signal at contact "4") on when the engine is running.
- ◆ If actuation of the additional heater needs to be checked when it is installed, an adapter cable can be created with the following components:
- ◆ 6-pin connector part number 6Q0 972 706 with appropriate connectors -A-.
- ◆ 6-pin connector part number 6Q0 972 716 with appropriate connectors -B-.
- ◆ Cables with a cross-section of 0.35 mm² or 0.5 mm² (length as required).
- ◆ 2-pin connector e.g. part number 1J0 973 722 with appropriate connectors -C-.



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- Use the 4 adapters from the adapter set -V.A.G 1594C- or a self-assembled adapter lead to connect contacts “1” to “4” on connector -A- to the heating element for additional air heating -Z35- (paying attention to the connector assignment).
- With the ignition off, connect the vehicle diagnostic, testing and information system -VAS 5051- by the diagnostic cable -VAS 5051/5A- , for example, to the 16-pin diagnostic socket in the vehicle ⇒ [page 4](#) .
- Spray the ambient temperature sensor -G17- (installed in the area of the front bumper ⇒ [page 178](#)) at an ambient temperature above 5 °C continuously with a cold spray until it drops below -10 °C.
- Switch on the ignition.
- Measure the voltage at connector -A- between contacts “2” and “3”

Specification: approx. battery voltage

- Read the ambient temperature display in the dash panel insert; it must show a temperature below 0 °C (if necessary, spray the temperature sensor again).

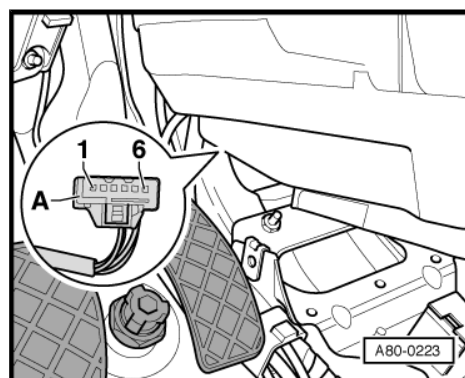
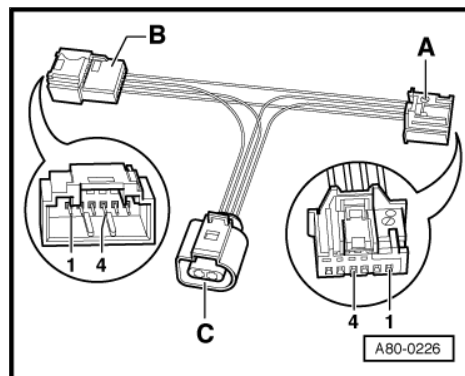


Note

- ◆ In the case of vehicles without an ambient temperature display in the dash panel insert, you can view the ambient temperature sensor -G17- reading in measured value block “008” in the Climatronic unit ⇒ [page 57](#) .
- ◆ Depending on the version of the engine control unit, the output for actuation of the additional heater is also activated via the “final control diagnosis” function. ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System
- ◆ Refer to the measured value block on the engine control unit to see which cut-in conditions are met for the additional heater. ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System

- Set the maximum heat output on the heater control or the operating and display unit for air conditioner/Climatronic -E87- (with the **[Econ]** button not pressed, the rotary knob for temperature preselection set fully to “heat” or temperature preselection “H”).

- Start the engine.
- Start self-diagnosis for the engine control unit ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System
- In the “Read measured value block” function, select the measured value block with the display of the cut-in conditions for the additional heater (depending on the engine control unit, e.g. display group “016”).
- Increase the engine speed to approx. 2000 rpm.
- Monitor the display on the vehicle diagnostic, testing and information system -VAS 5051- and read the voltmeter display as soon as all the cut-in criteria have been met in the engine control unit and cut-in of the additional heater is indicated.
- After a brief period of time the voltage value displayed changes from approx. battery voltage to a value below 3 volts (cut-in signal from the engine control unit).

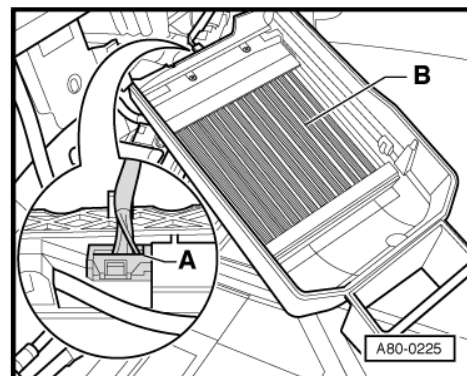


- After the additional heater has cut in, check the additional heating element -B- carefully (e.g. with an electric thermometer). It must warm up evenly.



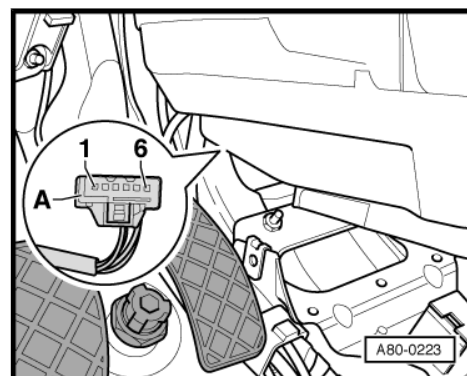
WARNING

Don't try to hold the additional heating element -B- in your hand. It could be hot.



Note

- ◆ If you connect contact "2" on the heating element for additional heater -Z35- to earth while the engine is running (e.g. via contact "3" in connector -A-) via an ammeter, the additional heater also cuts in. There may be a max. current of 30 mA flowing.
- ◆ Only a limited current can be connected to earth via the engine control unit (max. 50 mA).
- ◆ If there is a fault in the wiring to contacts "2" and "4" in connector -A- (e.g. a short circuit or a loose contact), the electronic module switches off the additional heater, depending on the version of the additional heater, and does not switch it back on again until the ignition has been switched off and on.



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80 – Heating

1 Dash panel vents and air ducts

1.1 Air distribution in vehicle interior



Note

The passenger compartment is ventilated via two venting frames (on the left and right of the luggage compartment in the bumper area) ⇒ [page 126](#).

1 - Air duct/footwell vent

- ☐ Driver's side

2 - Heating/air conditioner

- ☐ Removing and installing heater ⇒ [page 150](#)
- ☐ Removing and installing air conditioner ⇒ [page 221](#)

3 - Intermediate piece/defroster duct

- ☐ Removing and installing ⇒ [page 125](#)

4 - Fresh-air intake duct (in the passenger compartment)

5 - Dash panel vent

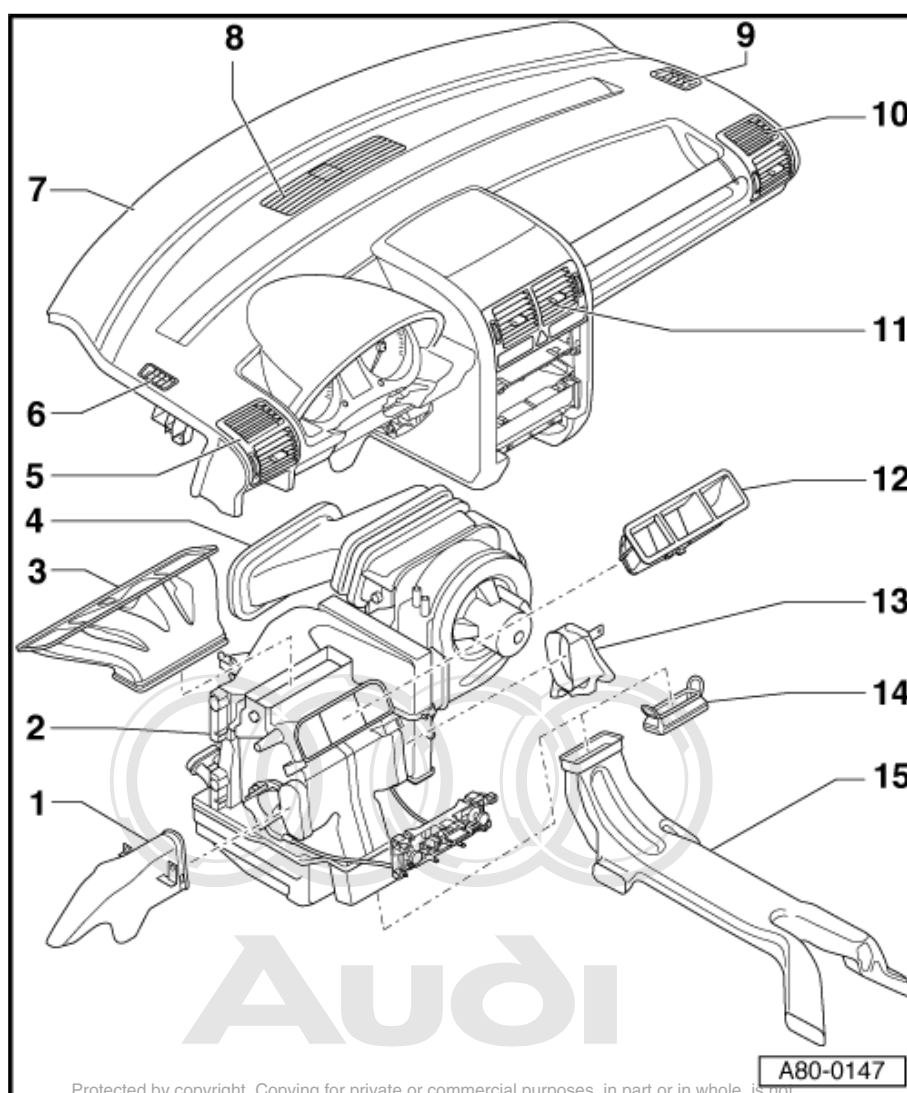
- ☐ Driver's side
- ☐ Removing and installing: ⇒ General Body Repairs, Interior; Repair group 70; Dash panel: Removing and installing the dash panel

6 - Defroster vent

- ☐ Side window on driver's side
- ☐ Removing and installing: ⇒ General Body Repairs, Interior; Repair group 70; Dash panel: Removing and installing the dash panel

7 - Dash panel

- ☐ Removing and instal-



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ling: ⇒ General Body
Repairs, Interior; Repair group 70; Dash panel: Removing and installing the dash panel

8 - Defroster vent

- ☐ For windscreen
- ☐ Removing and installing: ⇒ General Body Repairs, Interior; Repair group 70; Dash panel: Removing and installing the dash panel
- ☐ If the intermediate piece was crushed between heater/air conditioner and air duct upon installation of the dash panel, then the air ducting to the front windscreen is irregular or insufficient. ⇒ General Body Repairs, Interior; Repair group 70; Dash panel; Removing the dash panel

9 - Defroster vent

- ☐ Passenger's side window
- ☐ Removing and installing: ⇒ General Body Repairs, Interior; Repair group 70; Dash panel: Removing and installing the dash panel

10 - Dash panel vent

- ☐ Passenger's side
- ☐ Removing and installing: ⇒ General Body Repairs, Interior; Repair group 70; Dash panel: Removing and installing the dash panel

11 - Dash panel vent

- ☐ Centre
- ☐ Removing and installing: ⇒ General Body Repairs, Interior; Repair group 70; Dash panel: Removing and installing the dash panel

12 - Air duct/dash panel vent

- ☐ Centre

13 - Air duct/footwell vent

- ☐ Passenger's side

14 - Air duct seal

- ☐ Only installed in vehicles without rear vents.

15 - Air duct/rear vent

- ☐ Not installed in all vehicles.
- ☐ To remove, the gearshift mechanism must be removed. ⇒ Relevant Workshop Manual, Gearbox

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1.2 Air duct in heater/ in air conditioner

A - Fresh air intake

- ❑ Via fresh-air intake ducts in the engine compartment and the passenger compartment and via an air duct installed under the bonnet
⇒ [page 128](#) and
⇒ [page 126](#)

B - Interior air intake (recirculated air mode)

- ❑ Via the passenger's footwell

C - Fresh-air blower -V2-

D - Dust and pollen filter

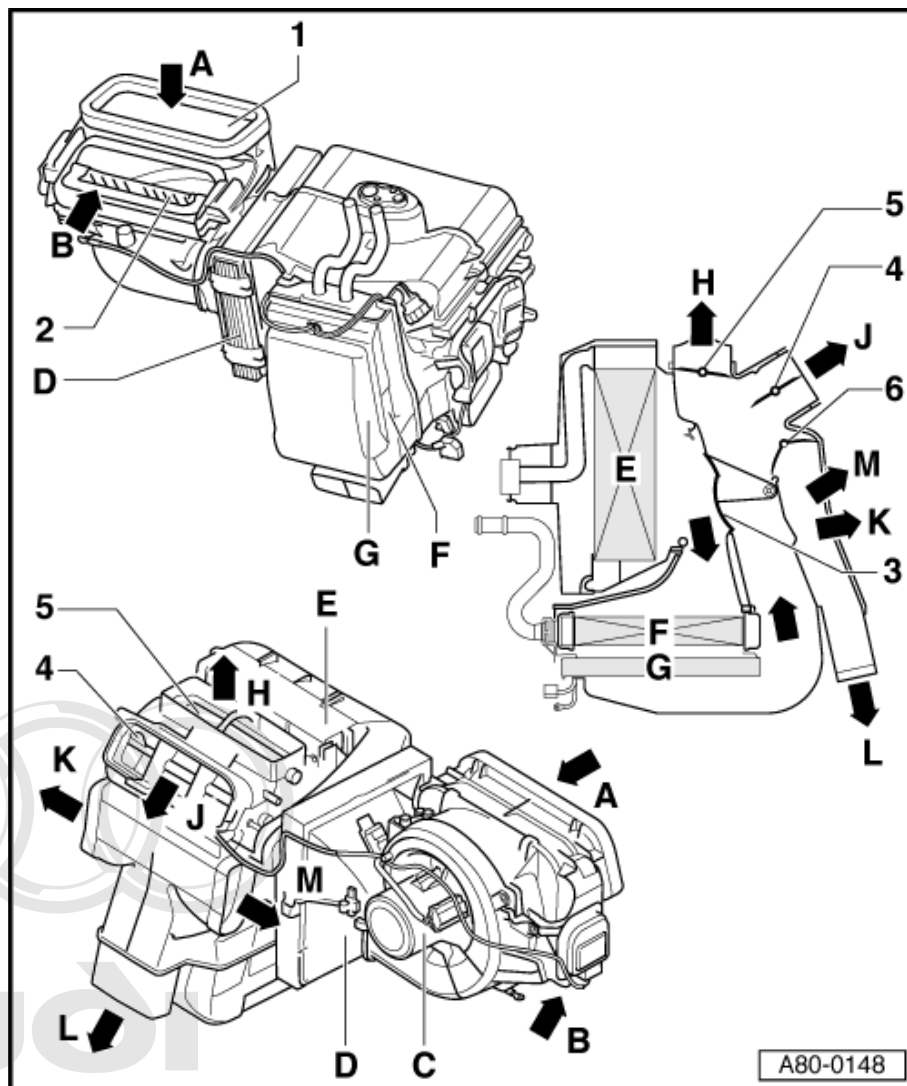
E - Evaporator

- ❑ Only in vehicles with an air conditioner

F - Heat exchanger

G - Heating element for additional heater -Z35-

- ❑ Only provided for vehicles with diesel engine, installation depends on equipment level
⇒ [page 106](#) .
- ❑ Different versions
⇒ [page 106](#) .
- ❑ Depending on the equipment level, vehicles built up to 2002 may have an electric additional heater or a fuel-powered additional heater
⇒ [page 106](#) .



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⇒ [page 149](#) , ⇒ Relevant Workshop Manual Diesel Direct Injection and Glow Plug System; Repair group 01 and ⇒ Additional Heater; Repair group 82

H - To the windscreen vents

J - To the dash panel vents

K - To the driver's side footwell vent

L - To the rear footwell vents

M - To the driver's side footwell vent

1 - Fresh-air flap

- ☐ Shown in the "closed" position

2 - Recirculated air flap

- ☐ Shown in the "open" position

3 - Temperature flap "1"

- ☐ Shown in the "heating" position

4 - Central flap

- ☐ Shown in the "open" position
- ☐ The shape of the two outer flaps allows air to flow to the vents when the centre flap is closed.

5 - Defrost flap

- ☐ Shown in the "closed" position

6 - Footwell flap

- ☐ Shown in the "closed" position

1.3 Removing and installing intermediate piece for windscreen defroster vent

- Remove the dash panel: ⇒ General Body Repairs, Interior; Repair group 70; Dash panel; Removing and installing the dash panel



Note

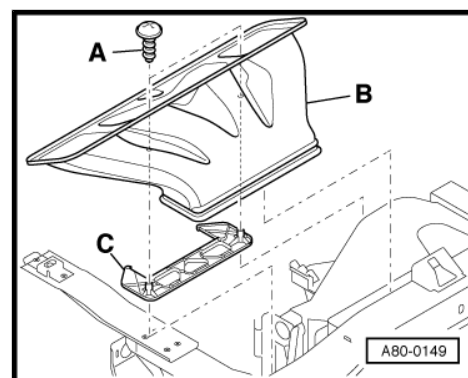
- ◆ When installing the dash panel ensure that the intermediate piece for defrost is properly seated on the defroster vent and that it is not crushed.
- ◆ After installing the dash panel, check the vent direction and distribution of the air stream exiting from the defroster vent onto the windscreen.

- Remove bolt - A-.
- Remove the intermediate piece -B-.



Note

When installing the intermediate piece -B-, ensure that the bracket -C- is properly seated (on the heater, the air conditioner).



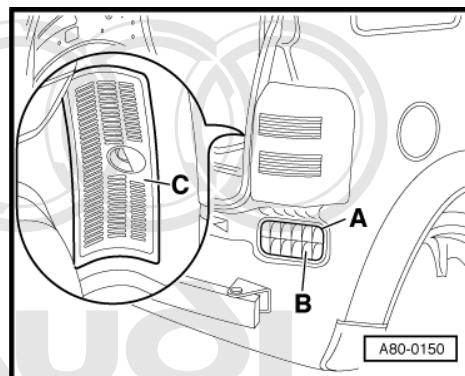
1.4 Checking the vent frame

- Check the air ducts to both the vent frames -A- for blockage (left and right).
- ◆ The sealing lips -B- in the vent frame-A- must move freely and be able to close by themselves.
- ◆ Blocked ducts could cause the windows to mist up



Note

- ◆ The illustration shows the vent frame with the rear bumper removed.
- ◆ One vent frame is installed on the left and right for forced air extraction.
- ◆ To ensure that the passenger compartment ventilation functions properly, the vent openings -C- in luggage compartment lining may never be sealed off.



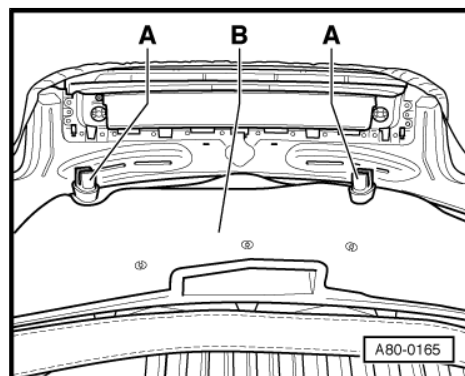
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1.5 Checking, removing and installing fresh air intake duct (in the engine compartment)

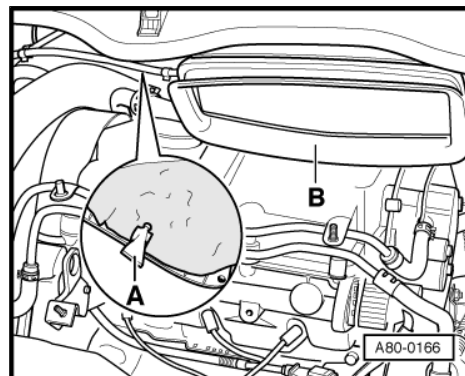
- Remove the bonnet. ⇒ General Body Repairs, Exterior; Repair group 55

1.5.1 Checking the fresh-air intake

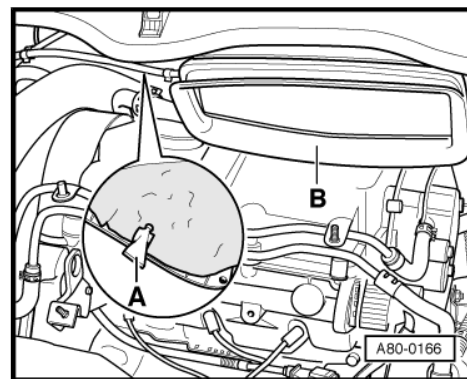
- Check for dirt in the two water drains -A-.
- Check the valve function of the water drains; water must be able to drain but no air must be drawn in from the engine compartment.
- Check the air duct -B- for dirt (the water drain and the fresh-air intake may not be obstructed) and for damage.



- Check for dirt in the water drain -A-.
- Check the valve function of the water drain; water must be able to drain but no air must be drawn in from the engine compartment.
- Check the fresh-air intake duct for dirt (the water drain and the fresh-air intake may not be obstructed) and for damage.



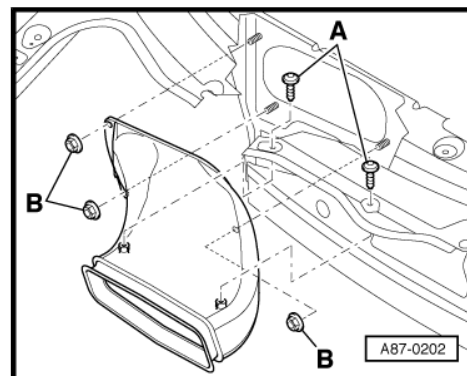
- Check the seal -B- for damage.



1.5.2 Removing and installing the fresh-air intake duct

Note

- ◆ *Before installing, check the seals attached to the fresh-air intake duct and the actual intake duct for damage.*
- ◆ *After installing the fresh-air intake duct, check the water drain -A- for clearance from other components.*
- ◆ *Replace the fresh air intake duct if the heat insulation is damaged.*
- ◆ *After installing the new fresh-air intake duct, coat the seal with "Krytox" lubricant, part number G052 172.A2 (this will ensure that the front of the seal is seated more tightly against the sealing surface when the flap is installed for first time).*
- Detach the windscreen wiper arm and the scuttle panel trim.
⇒ Electrical System; Repair group 92
- Remove both bolts -A- and the three hexagon nuts -B-.
- Remove the fresh-air intake duct (e.g. in direction of the brake booster on the 1.2 l TDI engine).



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2 Heater components

2.1 Checking, removing and installing components

1 - Heating element for additional heater -Z35-

- ❑ Only provided for vehicles with diesel engine, installation depends on equipment level
⇒ [page 106](#) .
- ❑ Different versions
⇒ [page 106](#) .
- ❑ Depending on the equipment level, vehicles built up to 2002 may have an electric additional heater or a fuel-powered additional heater ⇒ [page 106](#) ,
⇒ [page 149](#) , ⇒ Relevant Workshop Manual Diesel Direct Injection and Glow Plug System; Repair group 01 and ⇒ Additional Heater; Repair group 82
- ❑ Removing and installing
⇒ [page 147](#)
- ❑ Checking function
⇒ [page 106](#)

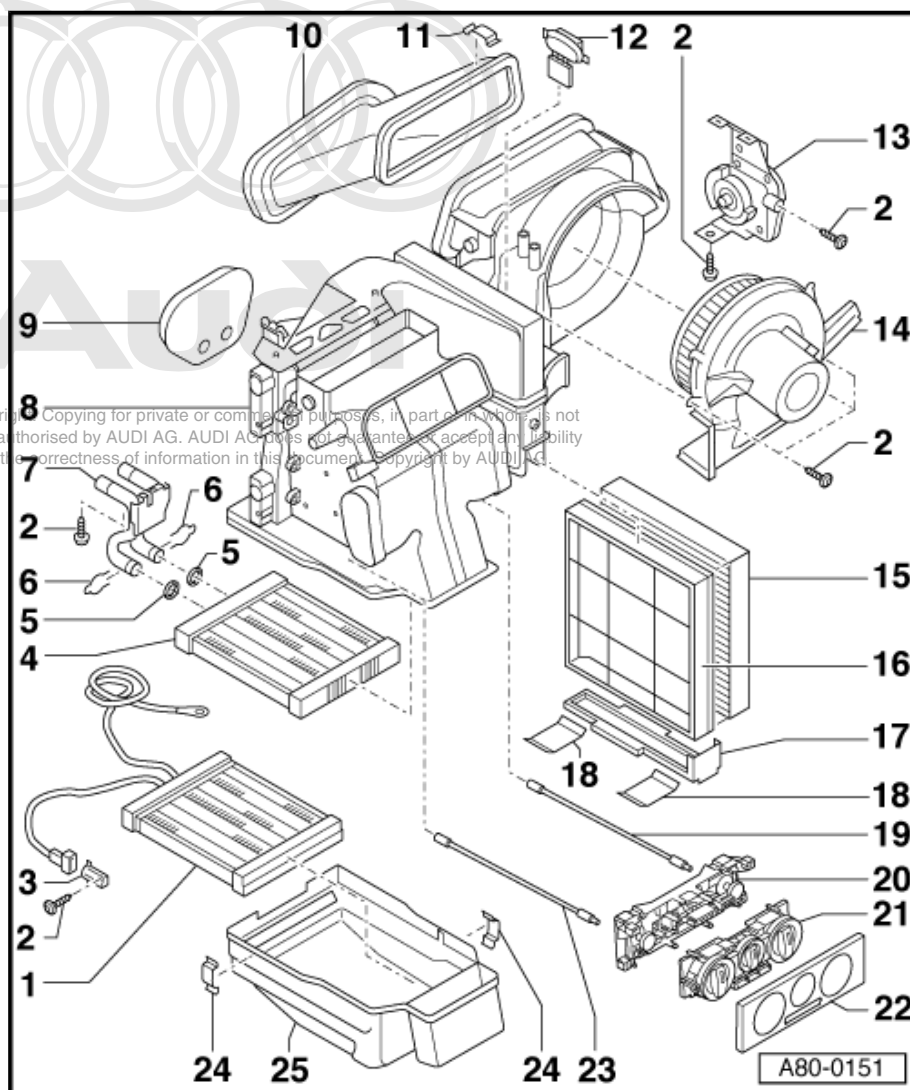
2 - Bolt

3 - Connector bracket

- ❑ Only in vehicles with a heating element for additional heater -Z35-

4 - Heat exchanger

- ❑ Removing and installing



[⇒ page 155](#)

5 - O-ring seal

- ☐ Replacing

6 - Clip

- ☐ Replacing

7 - Coolant pipes

8 - Heater

- ☐ Removing and installing [⇒ page 150](#)
- ☐ Dismantling and assembling the heater [⇒ page 161](#)

9 - Sealing plate

- ☐ Check, and replace if the gasket is damaged.

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10 - Fresh-air intake duct (in the passenger compartment)

11 - Clip

12 - Series resistor for a fresh-air blower with an overheating cut-out -N24-

- ☐ Removing and installing [⇒ page 137](#)

13 - Fresh-air/recirculated-air flap positioning motor -V154- (and bracket)

- ☐ Check function [⇒ page 142](#)
- ☐ Removing and installing [⇒ page 138](#)

14 - Fresh air blower -V2-

- ☐ Removing and installing [⇒ page 137](#)

15 - Dust and pollen filter

- ☐ Removing and installing [⇒ page 130](#)
- ☐ Observe the replacement interval for dust and pollen filter ⇒ Maintenance ; Booklet

16 - Filter frame

- ☐ for dust and pollen filter

17 - Filter cover

- ☐ for dust and pollen filter

18 - Push-fit components

- ☐ for filter cover

19 - Flexible shaft

- ☐ to step-up gear/air distribution
- ☐ Removing and installing [⇒ page 136](#)

20 - Heater controls/base plate

- ☐ Removing and installing [⇒ page 131](#)

21 - Heater controls/electronics

- ☐ There are different versions in vehicles with petrol and diesel engines (with and without an **Econ** button) [⇒ page 149](#) and ⇒ Parts List
- ☐ There are different versions in vehicles with petrol engine (in the 1.6 l petrol direct injection engine (FSI) there is an additional switch installed in the heater control electronics) [⇒ page 131](#) and ⇒ Parts List .
- ☐ Removing and installing [⇒ page 131](#)
- ☐ Check the function of the fresh-air and recirculated-air switch -E159- [⇒ page 143](#)
- ☐ Check the function of the heated rear window switch -E15- [⇒ page 163](#)
- ☐ Check the function of the **Econ** button [⇒ page 149](#)
- ☐ In “defrost mode”, air recirculation is not possible (recirculated-air mode is switched off approx. 15° before the rotary knob for air distribution reaches the “air to windscreen” limit stop.

22 - Trim panel

- ☐ For heater controls

23 - Flexible shaft

- ☐ To step-up gear/temperature flap
- ☐ Removing and installing ⇒ [page 136](#)

24 - Clip

25 - Bottom section of air distributor housing

- ☐ Different versions in vehicles with and without a heating element for additional heater -Z35-
- ☐ With a cutout for routing electrical wiring in vehicles with an heating element for additional heater -Z35-

2.2 Contact corrosion!

Contact corrosion can occur if use is made of unsuitable connecting elements (bolts, nuts, washers...), rivets, plugs, sockets, adhesives etc.

For this reason, all the connecting elements fitted have been subjected to special surface treatment by the manufacturer. This can be seen from the greenish colour of these elements. Use is also made of rubber and plastic parts, as well as adhesives which are not electrically conductive ⇒ Parts List .

These tested, aluminium-compatible components are also available as replacement parts.

Always use genuine parts!

In case of doubt concerning the re-usability of parts, always fit new ones.

Accessories must be approved by Audi AG.

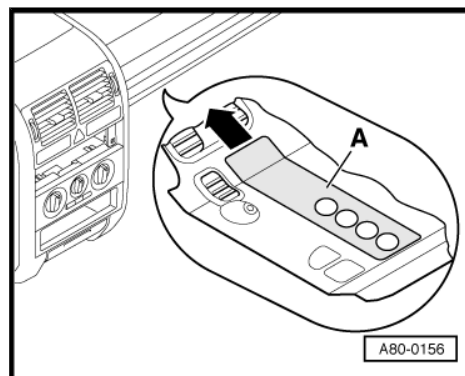
Damage resulting from contact corrosion is not covered by the warranty.

2.3 Removing and installing dust and pollen filter

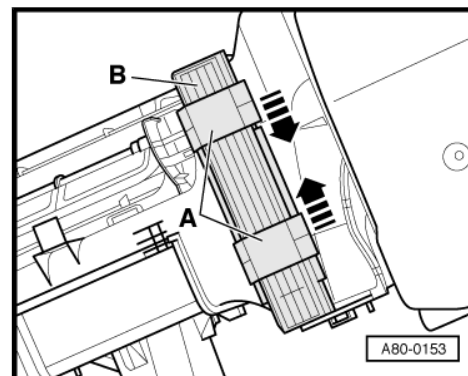


Note

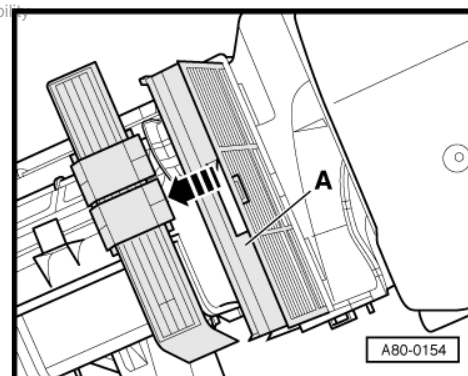
- ◆ *Replacement interval for dust and pollen filter: ⇒ Maintenance ; Booklet*
- ◆ *The filter element is available in various versions. Only the dust and pollen filter version is currently fitted by Audi. A combined filter version (with integral odour filter) is provided for VW models, for example.*
- Remove the flap -A- (in the direction of the arrow) from the trim under the glove box: ⇒ General Body Repairs, Interior; Repair group 68
- Cover the carpet in the passenger's side footwell, below the dust and pollen filter with paper (in order to catch any dirt which falls out).



- Push the two sliders -A- together to the centre.
- Remove the filter cover -B-.

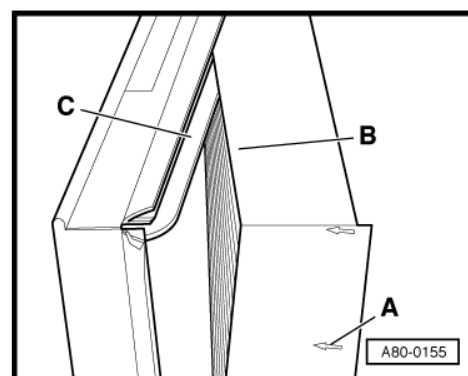


- Remove the dust and pollen filter and filter frame -A- from the housing.
- Separate filter from filter frame.

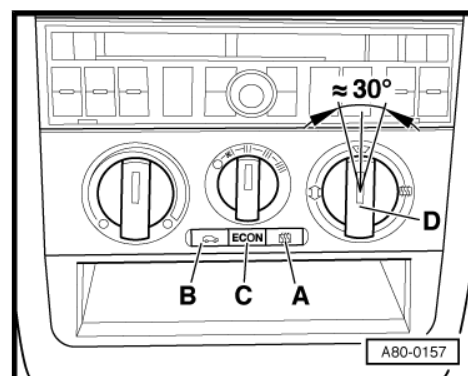


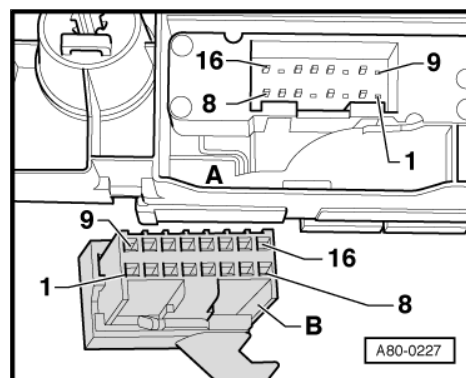
Note

- ◆ When inserting the filter into the frame, pay attention to throughflow direction "arrow" -A-.
- ◆ Insert the first layer of the filter -B- in the filter frame -C- according to the illustration. It must be ensured that air cannot flow past the filter.



2.4 Removing and installing heater controls

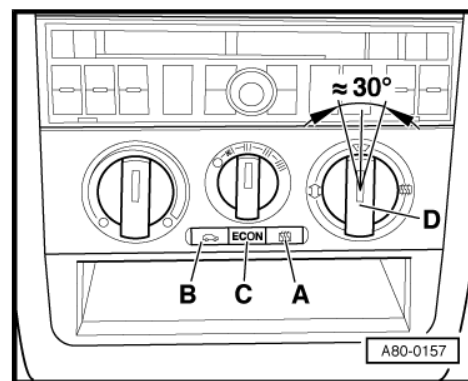




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Note

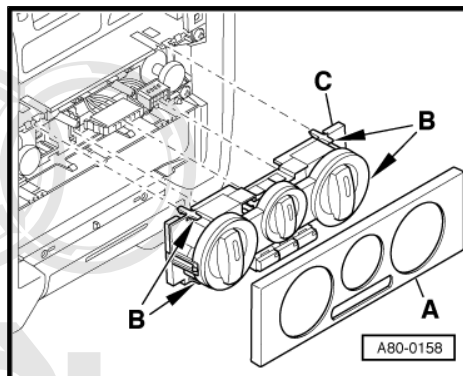
- ◆ The heated rear window is switched via a relay actuated by the control unit in the heater controls; check the function of the heated rear window switch -E15- ➤ [page 163](#) and ➤ Current flow diagrams, Electrical fault finding and Fitting locations.
- ◆ The warning lamp in button -A- lights up when heated rear window is switched on.
- ◆ The warning lamp in button -B- lights up when recirculated-air mode is selected (check the function of the fresh-air and recirculated-air flap switch -E159- ➤ [page 143](#)).
- ◆ Button -C- is exclusive to vehicles with diesel engine (apart from vehicles with a 1.2 l TDI engine with emissions standard "D 4", 3 l Öko for Germany ➤ [page 106](#)). Not all vehicles with diesel engine built since 2003 feature the button -C-; it depends on the vehicle's equipment. This can be used to switch off the "additional heater" function ("Econ" operation). Check the function of the **Econ** button ➤ [page 149](#)) and the ➤ Owner's Manual ➤ Current flow diagrams, Electrical fault finding and Fitting locations
- ◆ In vehicles with a 1.6 l petrol direct injection engine (FSI), there is an additional switch installed in the heater control electronics. This switch is operated via the temperature preselection rotary knob and using this, the position of the temperature rotary knob is communicated to the engine control unit.
- ◆ A voltage of approx. 1.0 V is output via contact "13" of the heating controls and the connector -A- if the temperature rotary knob is within a range from the "cold" limit switch up to a maximum of approx. "11 o'clock" (1/3 of the way towards warm). If the temperature rotary knob is turned past "11 o'clock" towards "warm", the voltage switches to approx. 3.5 V.
- ◆ A voltage of approx. 5 V is applied at the 16-pin connector -B- between contacts "14" and "12" when the ignition is switched on. ➤ Current flow diagrams, Electrical fault finding and Fitting locations
- ◆ If, in the engine control unit, there is a voltage of approx. 3.5 V at the input for the signal from the heater controls when the coolant temperature is low, the mixture formation is changed in order to achieve better heating output and, when the engine is warm, the engine cooling map is influenced, and the coolant temperature is thereby limited to approx. 95 °C). For further information ➤ Relevant Workshop Manual, Injection and Ignition system
- ◆ Individual components of the heater controls (heated rear window control unit, the button for switching between recirculated air and fresh air and the lamps (LEDs) for illuminating the buttons and rotary knobs) cannot be replaced separately.
- ◆ When the ignition is switched off and on again, the heated rear window remains off and the heater switches to or remains in fresh-air mode.
- ◆ To clear misted windows as quickly as possible, recirculated-air mode cannot be implemented with "air to windscreen". The control unit switches off the recirculated-air mode approx. 15° before the rotary knob for air distribution -D- reaches the (air to windscreen) position, and the "ON" warning lamp in button -B- goes out. The heater remains in fresh-air mode when the rotary knob is turned back again.



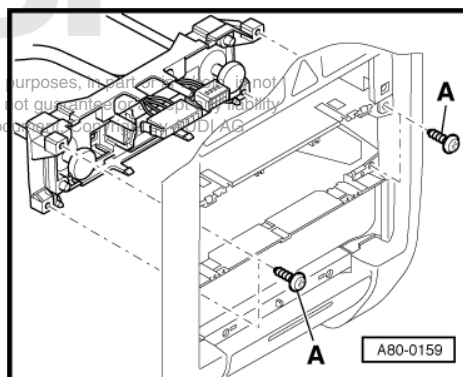
- ◆ The rotary switches and switches on the heater control are illuminated via terminals "58s" and "58d". ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

2.4.1 Removing

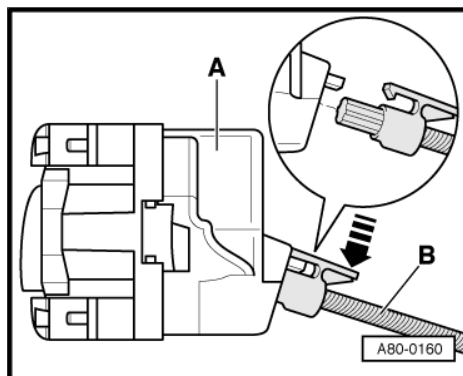
- Detach the panel for the heater controls -A- (lever off with a small screwdriver, if necessary).
- Release the catches -B-.
- Detach the section of heater controls with the electronics -C-.
- Unplug the connectors for the heater control electronics.



- Remove the bolts -A-.
- Remove the radio or radio-navigation system ⇒ Radio, Telephone and Navigation System; Repair group 91; Navigation system; Removing and installing navigation components



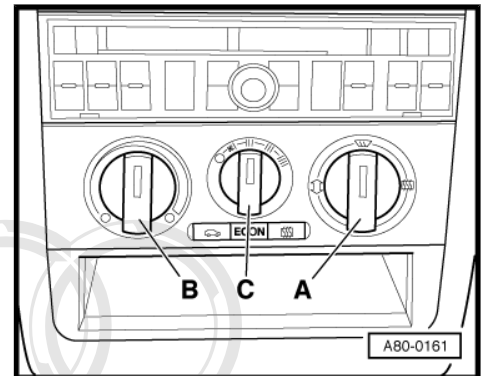
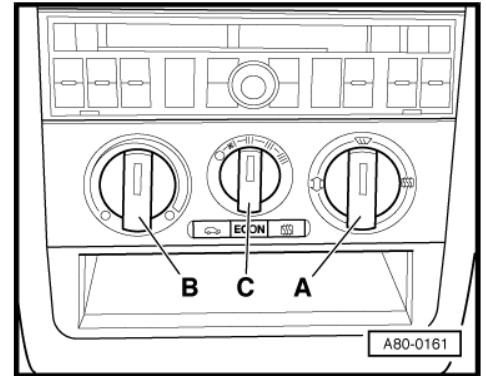
- Reach through the radio opening and release the catches -A- of both flexible shafts -B-.
- Reach through the radio opening and remove the base plate of the heater controls.



2.4.2 Installing

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

- Before installing the radio, check the function of the controls for air distribution -A- and temperature setting -B-.

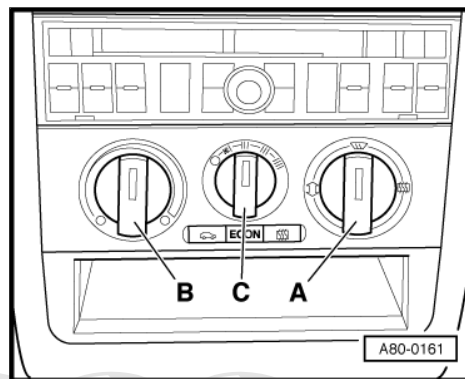


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Note

- ◆ The base plate of the heater controls is fitted with a step-up gear. For one rotation of the rotary knobs for temperature setting or air distribution, the flexible shaft turns twice.
- ◆ Given that the position of the flaps is not visible with the dash panel installed, the correct flap position may be checked as follows:
- ◆ Position of air distribution flaps:
- ◆ Assemble the base plate and the heater control electronics and connect them to the vehicle electrical system.
- ◆ Switch on the ignition.
- ◆ Switch the fresh-air blower -V2- via the rotary knob -C- to speeds "3" or "4".
- ◆ Turn the rotary knob for air distribution -A- and check that the direction in which the air flows out corresponds to the position of the rotary switch.
- ◆ Position of the temperature control flaps:
- ◆ Assemble the base plate and the heater control electronics and connect them to the vehicle electrical system.
- ◆ Turn the rotary knob for temperature setting -B-; both end positions must be reached.
- ◆ If the check reveals that the installation of one or both shafts is not OK:
- ◆ Detach the relevant shaft from the base plate.
- ◆ Give the appropriate rotary knob half a turn (180°).
- ◆ Reattach the shaft to the base plate and check the function again.

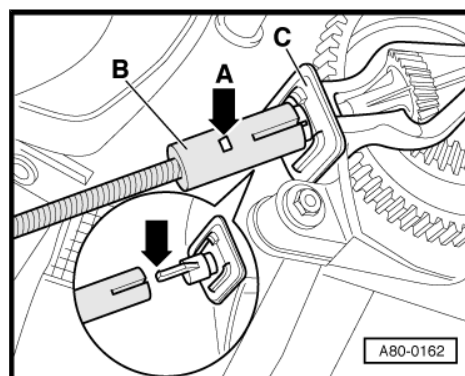


2.5 Removing and installing flexible shafts

- Remove the heater controls ⇒ [page 131](#) .

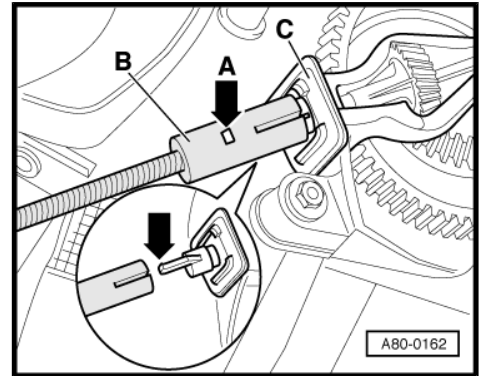
2.5.1 Removing the flexible shaft for air distribution

- Remove the glove box: ⇒ General Body Repairs, Interior; Repair group 68
- Remove the dash panel right support ⇒ General Body Repairs, Interior; Repair group 68
- Press back the retainer tab -A- and detach the shaft -B- from the step-up gear/air distribution.



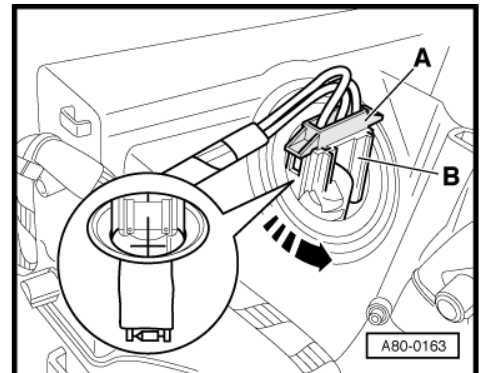
2.5.2 Removing the flexible shaft for temperature control

- Remove the driver's storage compartment: ⇒ General Body Repairs, Interior; Repair group 68
- Remove the dash panel left support ⇒ General Body Repairs, Interior; Repair group 68
- Press back the retainer tab -A- and detach the shaft -B- from the step-up gear / temperature flap.



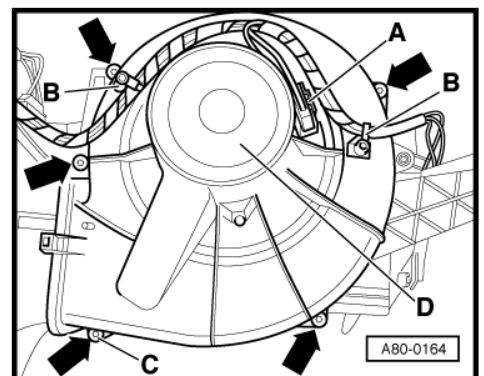
2.6 Removing and installing the fresh-air blower series resistor with overheating cut-out -N24-

- Remove the glove box: ⇒ General Body Repairs, Interior; Repair group 68
- Unplug the connector -A- from the series resistor -B-.
- Turn the series resistor -B- anti-clockwise through 45° and take the series resistor out of the heater.



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

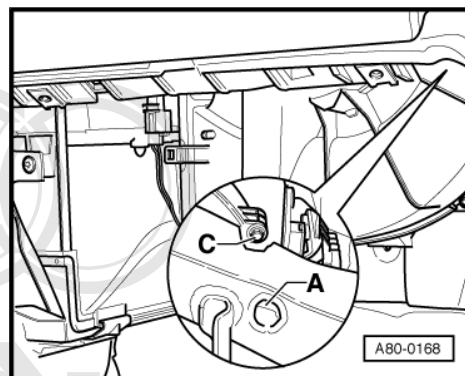
- Remove the glove box: ⇒ General Body Repairs, Interior; Repair group 68
- Unplug the connector -A-.
- Unfasten the cable ties -B-.
- Remove the bolts -C-.
- Pull the fresh-air blower -D- out of the heater.





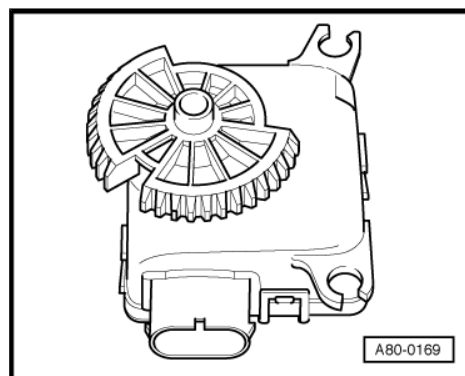
Note

- ◆ To permit access to all the bolts -C-, an aperture is provided in the dash panel cross member -A-.
- ◆ Installation is in reverse order.
- ◆ During installation, take care to ensure that the fresh-air blower -V2- is correctly seated in the heater / air conditioner.
- ◆ Remember that there are different fresh-air blower -V2- versions for vehicles with heating and air conditioning. ⇒ Parts List



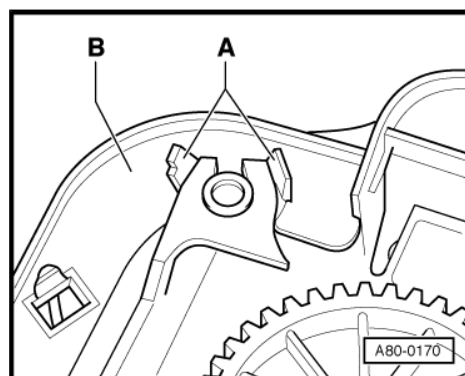
2.8 Removing and installing the fresh-air/re-circulated-air flap positioning motor - V154-

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Note

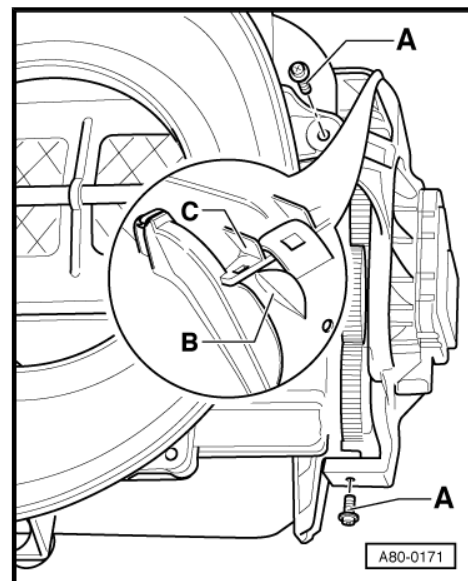
- ◆ If the positioning motor is to be replaced and the position of the gear wheel on the positioning motor being fitted is not known (the illustration shows the position of the gear wheel in the "recirculated-air mode stop"):
- ◆ Start by removing glove box and attach the new positioning motor to the connector, which is unplugged from the installed positioning motor.
- ◆ Then switch on the ignition and set the heater to recirculated-air mode via the heater controls.
- ◆ Once the positioning motor is in the "recirculated-air mode" position, switch off the ignition and disconnect the positioning motor.
- ◆ If the positioning motor which is being removed has to be re-installed, also set the heater to recirculated-air mode before disconnecting the battery.
- ◆ When removing the positioning motor from the bracket -B-, make sure that the retainer tabs -A- do not break off.



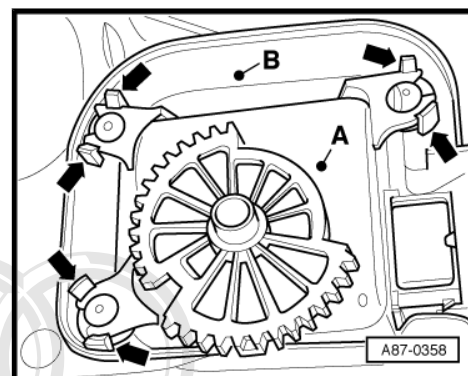
2.8.1 Removing

- Remove the dash panel insert: ⇒ General Body Repairs, Interior; Repair group 70; Dash panel
- Remove the fresh-air blower -V2- ⇒ [page 137](#) .

- Unplug the connector from the positioning motor.
- Unscrew the bolts -A-.
- Release the catches between the bracket -B- and the heater -C-.
- Remove the positioning motor and bracket.



- Press the retaining tabs outwards carefully and remove the positioning motor -A- from the bracket -B-.



2.8.2 Installing

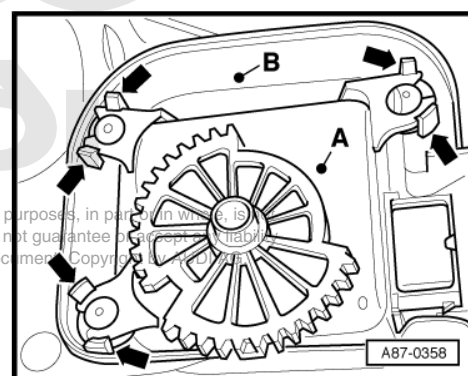
- Press the positioning motor -A- into the retaining tabs of the bracket -B-.



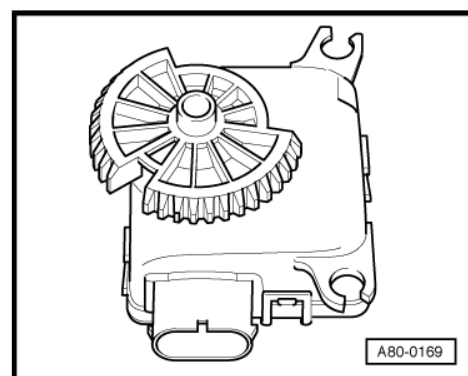
Note

If any of the retaining tabs in the bracket -B- are broken off, replace the bracket.

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- Check the position of the gear wheel on the positioning motor; it must be at the "recirculated-air mode" stop.





Note

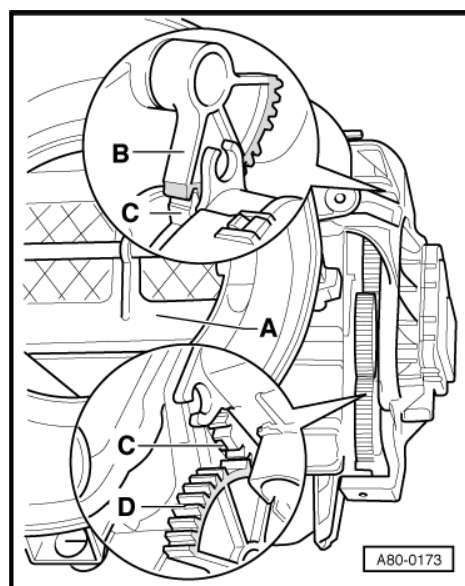
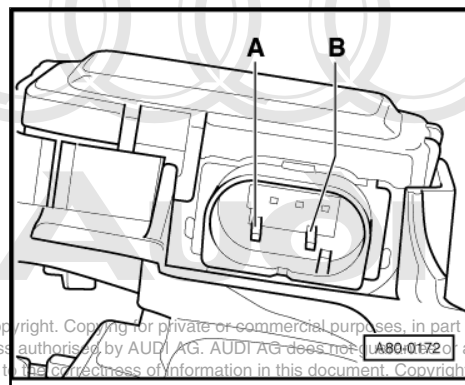
- ◆ If the positioning motor gear wheel is not at the "recirculated air mode" stop position:
- ◆ Apply a 12V voltage to the contacts -A- and -B- in the positioning motor connector (using an adapter cable ⇒ [page 141](#)) and wait until the positioning motor has reached the "recirculated-air mode" stop position.
- ◆ Exchange the positive and negative connections if the positioning motor does not move into the "recirculated-air mode" position.
- ◆ Wait until the positioning motor has reached the "recirculated-air mode" position.

– Insert the positioning motor bracket into the upper guides.

– Close the fresh-air flap -A-.

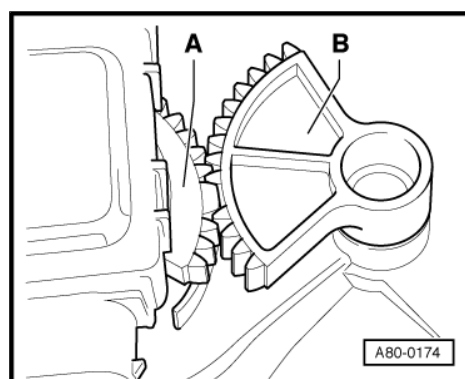
– Assemble the gear wheels for the positioning motor -C- and the fresh-air flap -B- as shown in the illustration (the first tooth of the gear wheel -C- engages in the first tooth space in the gear wheel -B-).

– Assemble the gear wheels for the positioning motor -C- and the recirculated-air flap -D- as shown (the broad tooth of the gear wheel -C- must coincide with the broad tooth space in the gear wheel -B-).



Note

- ◆ There is a large tooth space on the front of each of the gear wheels of the lever of the recirculated-air and fresh-air flap -B-. To ensure that the positioning motor functions properly, the two broad teeth of the gear wheel on the positioning motor -A- must each engage in the tooth spaces of the lever -B-.
- ◆ If the relative positioning of the gear wheels is not correct, the positioning motor is blocked as soon as the normal tooth of a gear wheel comes into contact with a narrower tooth space.

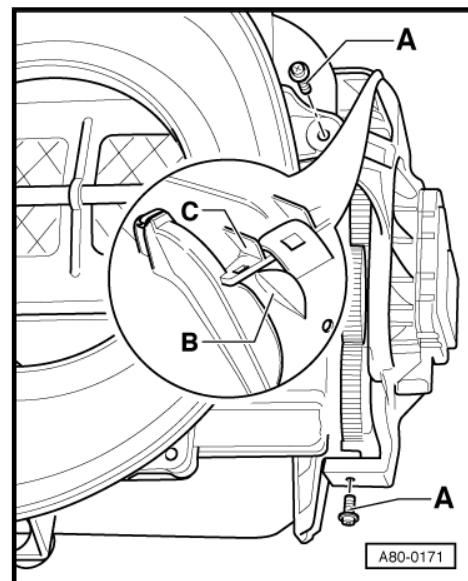


- Insert the bolts -A-.
- Reinstall all the components which have been removed except the glove box and the fresh-air blower.
- Switch on the ignition.
- Check the function of the positioning motor and the position of the flaps by switching between fresh-air and recirculated-air mode several times.

i Note

If the gear wheels do not coincide (whereby the positioning motor is blocked), the relative positions of the gear wheels can be altered after removing the bolts -A-.

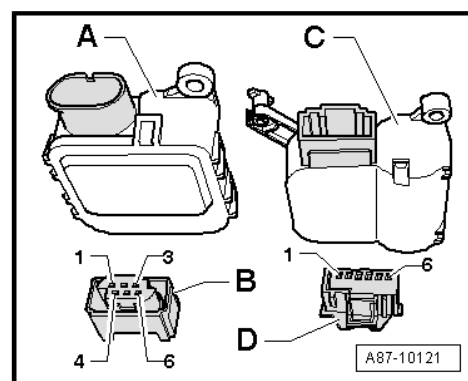
- Install the remaining components.



2.9 Preparing adapter cables for positioning motor actuation

i Note

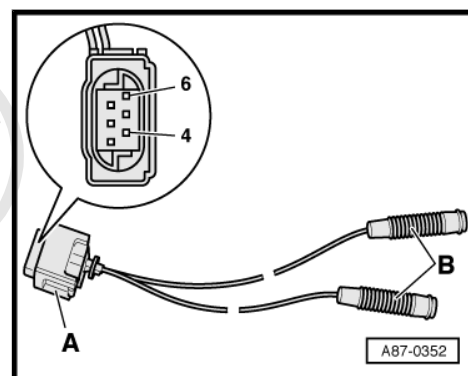
- ◆ Depending on the production dates of vehicles with air conditioning, the positioning motors and connectors vary. Up to 01/04 the positioning motors -A- were installed with corresponding connectors -B-; since then (gradual introduction) the positioning motors -C- have been installed with the corresponding connectors -D-.
- ◆ The assignment of the contacts in the connectors varies; in the positioning motors -A-, the motor is connected to the contacts -4- and -6-, and in the positioning motors -C-, the motor is connected to the contacts -5- and -6-.



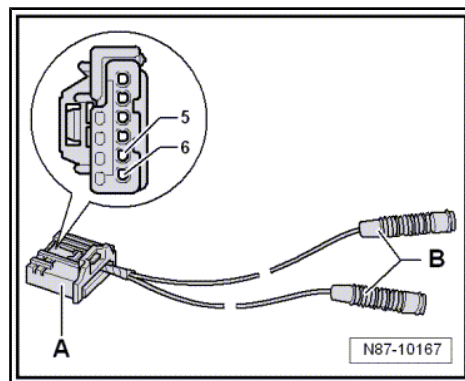
Adapter cables for the heater positioning motor and air conditioning positioning motor up to 01/04.

- Connect to the contacts “4” and “6” on the connector -A- (part number 7M0 973 119 or 4B0 972 571) using lead with a cross section of 0.25 mm² in each case. ➔ Parts List
- Connect the other end of the lead to a commercially available banana plug -B-.
- ◆ Check that the positioning motor is working.
- Connect a 12 V supply to the contacts “4” and “6” on the positioning motor and check the movement of the levers in the guide grooves. The direction of rotation is reversed by interchanging the positive and negative.

Adapter cables for the air conditioning positioning motor from 01/04.



- Make a connection to contacts “5” and “6” of a connector -A- (part number 6Q0 972 706) using a lead with a cross section of 0.25 mm² in each case.
- Connect the other end of the lead to a commercially available banana plug -B-.
- ◆ Check that the positioning motor is working.
- Connect a 12 V supply to the contacts “5” and “6” on the positioning motor and check the movement of the levers in the guide grooves. The direction of rotation is reversed by interchanging the positive and negative.



2.10 Checking the function of the positioning motor for the fresh-air/recirculated-air flap -V154- and the fresh-air/recirculated-air button in the heater controls



Note

- ◆ *Windows may mist up in recirculated-air mode (the humidity of the air in the passenger compartment increases and then condenses on windows; the air does not dry as it does in vehicles with air conditioning).*
- ◆ *The “recirculated-air mode” function is cancelled when the ignition is switched off. Switching the ignition back on actuates the positioning motor for the fresh-air/recirculated-air flap -V154-, and the heater switches from recirculated-air mode to fresh-air mode (if recirculated-air mode had previously been selected).*
- ◆ *In order to enable misted-up windows to be cleared as quickly as possible, recirculated-air mode is not possible in “air to windscreen” position (the switch in the heater control electronics switches over to fresh-air mode). If the rotary knob is turned to “air to windscreen” and the recirculated-air button is pressed, the LED in the button lights up briefly and goes out again when the button is released.*

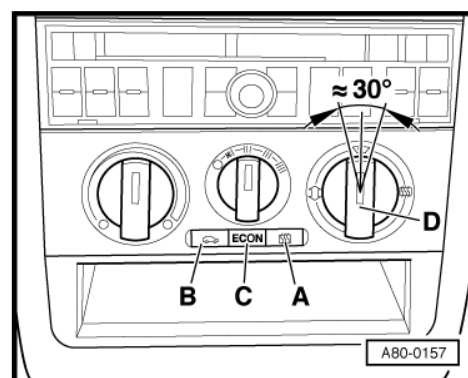
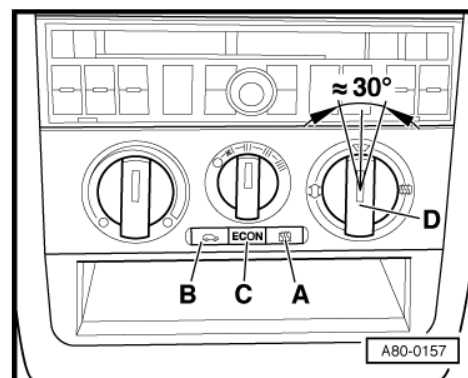
2.10.1 Special tools, testers and auxiliary equipment required

- ◆ Voltage tester -V.A.G 1527/B-

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

- Switch on the ignition.

- Set the switch for the fresh-air blower -V2- to speed “3”.
- Turn the controller -D- for air distribution to the “dash panel vents”.
- The button -B- for the fresh-air/recirculated-air flap is not pressed (fresh air mode; the warning lamp in the button does not light up).
- ◆ Air is drawn in via the fresh-air intake ducts in the passenger compartment/engine compartment and bonnet air inlet.
- Press the button -B- (recirculated-air mode; the warning lamp in the button lights up).
- ◆ Air is drawn in from the front passenger's footwell area (recirculated-air mode).
- Turn the controller -D- for air distribution to the “windscreen” position.
- ◆ The warning lamp in the button -B- goes out; the fresh-air flap opens and the recirculated-air flap closes (fresh-air mode).



Note

- ◆ *If it is functioning OK but the windows mist up, check the following:*
- ◆ *dirt in the dust and pollen filter ⇒ [page 130](#)*
- ◆ *the forced-air extractor ⇒ [page 126](#) .*
- ◆ *ingress of water into the passenger compartment*
- ◆ *the fresh-air intake via the air duct under the bonnet ⇒ [page 126](#)*
- ◆ *damage or contamination of the water drain valves in the air duct under the bonnet and in the fresh-air intake duct in the engine compartment ⇒ [page 126](#)*
- ◆ *damage or contamination of the fresh-air intake duct (in the engine compartment) and of the fresh-air intake duct (in the passenger compartment)*
- ◆ *Damage to/leaks in seals between individual fresh air intake components*
- ◆ *If the function is not OK, check the heater control electronics ⇒ [page 143](#) .*

2.10.3 Checking the function of the fresh-air/recirculated-air button in the heater control electronics

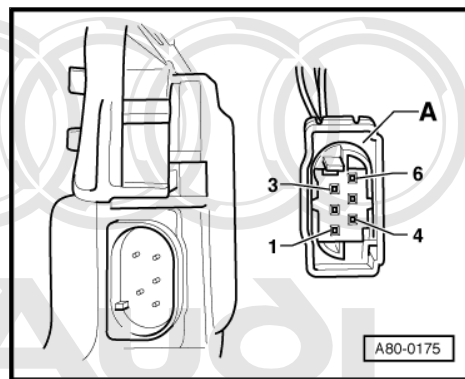
- Remove the glove box: ⇒ General Body Repairs, Interior; Repair group 68

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- Unplug the connector -A- from the fresh-air/recirculated-air flap positioning motor -V154- .
- Switch on the ignition.
- Turn the air distribution controller to the "dash panel vents".

The button for the fresh-air/recirculated-air flap is not pressed (the warning lamp in the button does not light up).

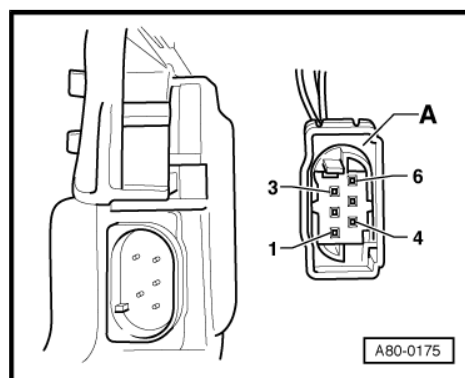
- Connect the voltage tester -V.A.G 1527/B- between contacts -4- and -6- in the connector -A-.
- ◆ If one of the LEDs in the voltage tester -V.A.G 1527/B- lights up, this indicates that positive is being applied to the contact -4- and earth to the contact -6- (fresh-air mode).



Note

The positioning motor connectors are interchanged on RHD vehicles. → Current flow diagrams, Electrical fault finding and Fitting locations

- Press the button for the fresh-air/recirculated-air flap (recirculated-air mode; the warning lamp in the button lights up).
- ◆ If the other LED in the voltage tester -V.A.G 1527/B- lights up, this indicates that positive is being now applied to contact -6- and earth to contact -4- (recirculated-air mode).
- Turn the knob for air distribution to the "air to windscreen" position.
- ◆ The warning lamp in the button for recirculated-air mode goes out.
- ◆ If the other LED in the voltage tester -V.A.G 1527/B- lights up, this indicates that positive is now being applied to the contact -4- and earth to the contact -6- (fresh-air mode).



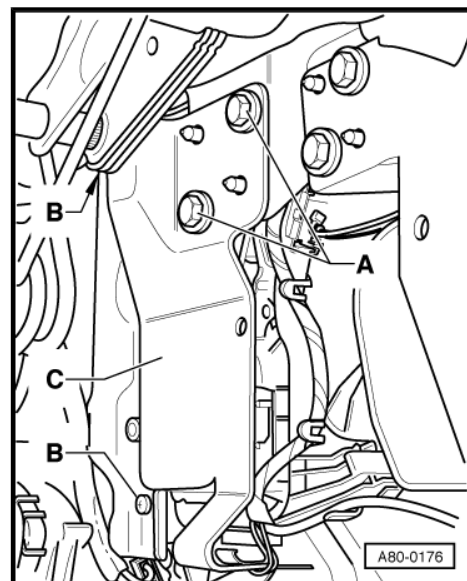
Note

- ◆ *If there is no fault found in this test:*
- ◆ *Check that the fresh-air/recirculated-air flap is moving freely*
- ◆ *Replace the fresh-air/recirculated-air flap positioning motor -V154-*
- ◆ *If the function is not OK:*
- ◆ *Check for an open circuit or short circuit in the wiring between the heater control electronics and the fresh-air/recirculated-air flap positioning motor -V154-. → Current flow diagrams, Electrical fault finding and Fitting locations*
- ◆ *Check the power supply and earth connection to the heater control electronics.*
- ◆ *Replace the heater control electronics → [page 131](#).*

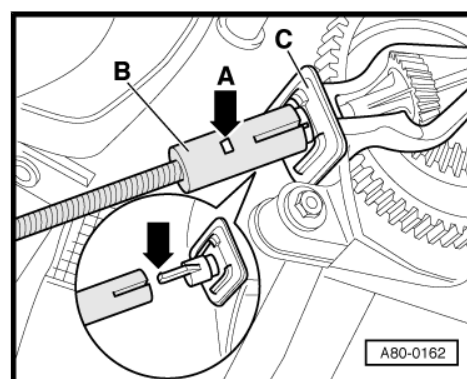
2.11 Removing and installing the step-up gear/temperature flap

- Remove the driver's storage compartment: → General Body Repairs, Interior; Repair group 68

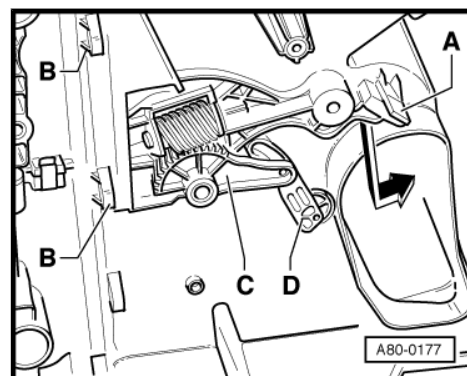
- Remove the bolts -A- and -B-.
- Remove the bracket -C-.



- Press back the retainer tab -A- and detach the shaft -B- from the step-up gear / temperature flap.



- Release the catch -A- and remove the step-up gear.

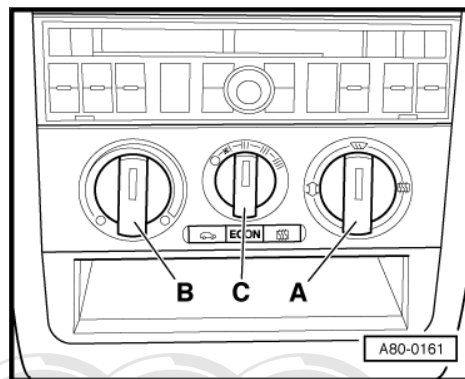


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Note

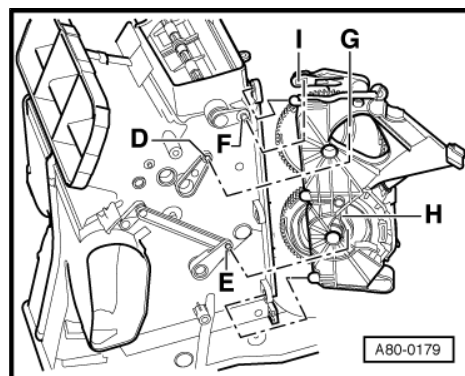
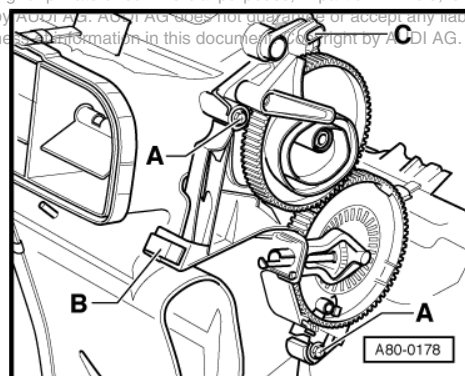
- ◆ During installation, insert the step-up gear into the mounts -B- first and then join the two levers -C- and -D- together.
- ◆ After installing the shaft, check the function and freedom of movement of the temperature setting controller.
- ◆ The base plate of the heater controls is fitted with a step-up gear. One turn of the rotary knobs for temperature setting -B- or air distribution -A- causes the flexible shaft to turn twice.
- ◆ If the check reveals that the installation of the shaft is not OK:
- ◆ Detach the shaft again.
- ◆ Give the temperature setting rotary knob half a turn (180°).
- ◆ Reattach the shaft and check the function again.



2.12 Removing and installing the step-up gear/air distribution

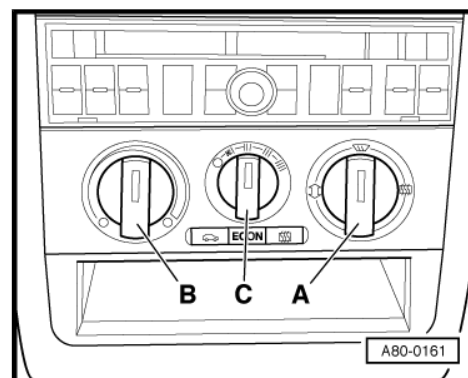
- Remove the heater ⇒ [page 150](#)
- Detach the air distributor housing from the heater ⇒ [page 161](#).
- Remove the bolts -A-.
- Release the catch -B- and remove the step-up gear.

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 Note

- ◆ During installation, start by inserting the step-up gear into mounts -C-.
- ◆ Then assemble the levers -D-, -E- and -F- into the ones with the guides on the gear wheels (cam plates) -G-, -H- and the lever -I-.
- ◆ After installing the step-up gear, turn the gear wheels to check the function and proper installation of the levers in the cam plates of the gear wheels.
- ◆ After installing the shaft, check the function and freedom of movement of the air distribution controller.
- ◆ The base plate of the heater controls is fitted with a step-up gear. One turn of the rotary knobs for temperature setting -B- or air distribution -A- causes the flexible shaft to turn twice.
- ◆ Check the direction in which the air flows depending on the position of the rotary knob for air distribution.
- ◆ If the check reveals that the shaft has not been correctly installed:
- ◆ Detach the shaft again.
- ◆ Give the air distribution rotary knob half a turn (180°).
- ◆ Reattach the shaft and check the function again.



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2.13 Removing and installing the heating element for additional heater -Z35-

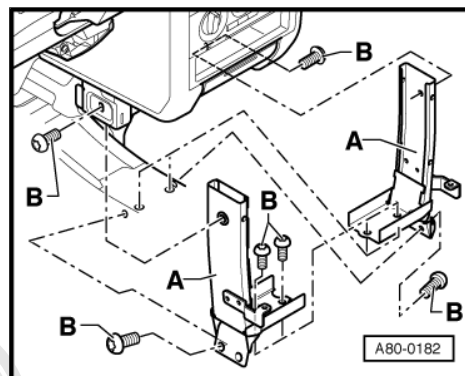
 Note

- ◆ Check that the heating element for additional heater -Z35- is working properly ⇒ [page 106](#).
- ◆ Check the function of the **Econ** button in the heater control electronics ⇒ [page 149](#).

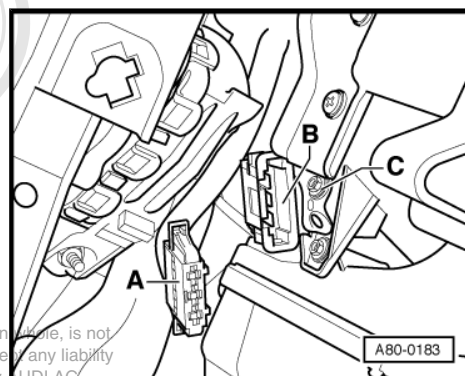
2.13.1 Removing

- Switch on the ignition.
- In vehicles with electrically adjustable seats, move them back as far as possible before disconnecting the battery -A-.
- Pay attention to the code in vehicles with a coded radio. If necessary, find out the code.
- Switch off the ignition.
- Disconnect the battery -A- earth strap with the ignition switched off or interrupt the voltage supply to the heating element for additional heater -Z35- (only for vehicles with a 1500 Watt additional heater). ⇒ Current flow diagrams, Electrical fault finding and Fitting locations
- Remove the driver's storage compartment and the glove box: ⇒ General Body Repairs, Interior; Repair group 68
- Remove the centre console and the gearshift mechanism ⇒ General Body Repairs, Interior; Repair group 68 and the ⇒ relevant workshop manual on gearboxes

- Remove the bolts -B- and the dash panel supports -A- completely ⇒ General Body Repairs, Interior; Repair group 70; Dash panel
- Loosen the earth connection for the auxiliary air heating element -Z35- on the right "A" pillar. ⇒ Electrical System; Repair group 01

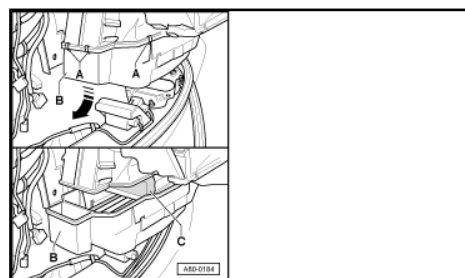


- Unplug the connector -A- (in the case of an heating element for additional heater -Z35- with an output of 900 watt).
- Remove the bolt -C- (in the case of an heating element for additional heater -Z35- with an output of 900 watt).
- Remove the rear heating duct (not fitted on all vehicles).

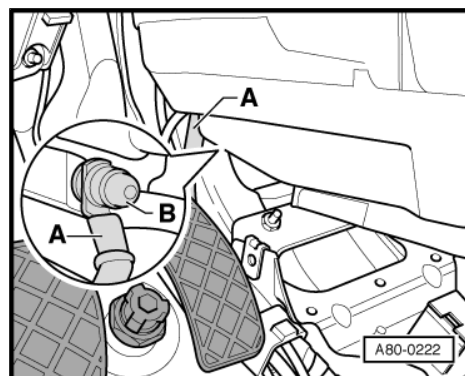


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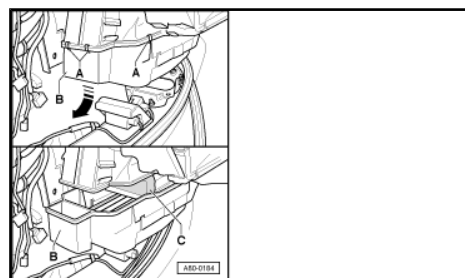
- Remove the clips -A-.



- Detach the positive connection -A- to the heating element for additional heater -Z35- by removing the hexagon nuts -B- (tightening torque of 9 Nm) and insulate the positive connection that has been removed (in the case of an heating element for additional heater -Z35- with an output of 1500).

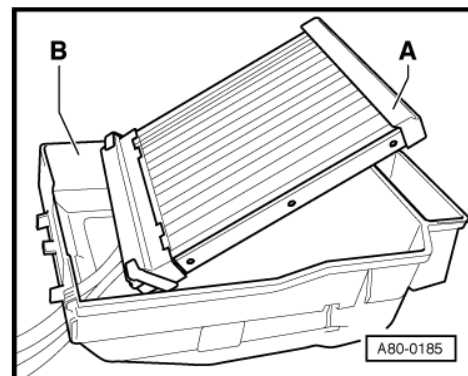


- Remove the bottom part of the air duct housing -B- (with the heating element for additional heater -Z35-) in the direction of the arrow.
- Unlock and remove the additional heater electronics connector (in the case of an heating element for additional heater -Z35- with an output of 1500 watt).
- Remove the heating element for additional heater -A- from the bottom part of the air duct housing -B-



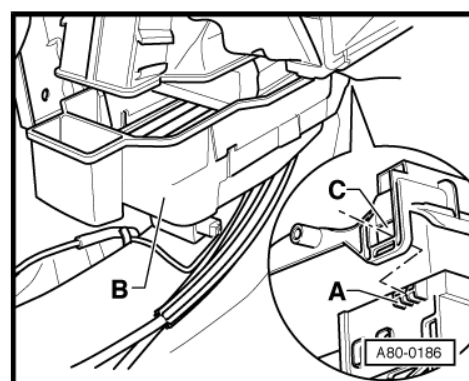
Note

- ◆ Leave the heat exchanger -C- installed.
- ◆ Up to model year 2002, only heater elements for additional heater with a nominal output of 900 Watt were installed. From 2003, vehicles have also been built with a heating element for additional heater -Z35- with an output of 1500 watt
⇒ [page 106](#)
- ◆ There are two versions of air duct housing -B- (with and without an opening for the heating element for additional heater -Z35-).



2.13.2 Installing

- When installing the air duct housing -B-, insert the two retaining tabs -A- into the opening -C- first of all.
- Then reassemble the other components in reverse order.



2.14 Check the function of the **Econ** button in the heater control electronics

Note

- ◆ Depending on the equipment, the engine type, the country variant, the model year, and the required exhaust emissions standard of the vehicle, an electrical or fuel-powered additional heater or no additional heater at all may be installed in vehicles with a diesel engine ⇒ [page 106](#).
- ◆ There is currently no additional heater installed in vehicles with a petrol engine (and, therefore, no heater control via the **Econ** button).
- ◆ The **Econ** button is exclusive to diesel vehicles (apart from vehicles with a 1.2 l TDI engine with the emissions standard "D4", 3 l Öko for Germany ⇒ [page 106](#)). This can be used to switch off the "additional heater" function ("Econ" operation). Vehicles built since 2003 are not always fitted with the **Econ** button, depending on the vehicle equipment).
- ◆ Check that the heating element for additional heater -Z35- is working properly ⇒ [page 106](#) .
- ◆ Check the function of the fuel-powered auxiliary heating ⇒ Auxiliary Heating; Repair group 01

2.14.1 Checking

- Switch on the ignition.
- In self-diagnosis mode for the engine control unit, select the "Read measured value block" function in the ⇒ Relevant

Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01

- Select the measured value block where the status of the heater control electronics output signal is displayed for the additional heater actuation. ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01
- Press the button -C-.

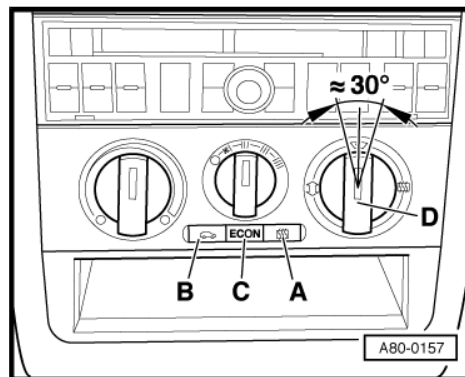
If the warning lamp in the button lights up, this indicates that the “Econ” function has been selected and that the additional heater is not to be switched on. The input on the heater controls is open; earth is not applied.

The measured value block for the engine control unit shows that there is no input signal requesting actuation of the additional heater.

- Press the button -C-.

The warning lamp in the button does not light up; the “Econ” function is not selected, and the additional heater can be switched on by the engine control unit once the other switch-on criteria have also been met. The input on the heater controls is closed, and the earth is applied to the engine control unit via the heater control electronics. ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01

The measured value block for the engine control unit shows that there is an input signal which prompts the additional heater to be switched on (the earth is applied). ⇒ Relevant Workshop Manual, Diesel Direct Injection and Glow Plug System; Repair group 01



Note

The selected “Econ” function is not cancelled when the ignition is switched off, it remains active until the “Econ” function is switched off (additional heater switched off).

2.15 Removing and installing heater

2.15.1 Special tools, testers and auxiliary equipment required

- ◆ Hose clamps up to Ø 40 mm -3093- or hose clamps up to Ø 25 mm -3094-
- ◆ Commercially available compressed-air gun



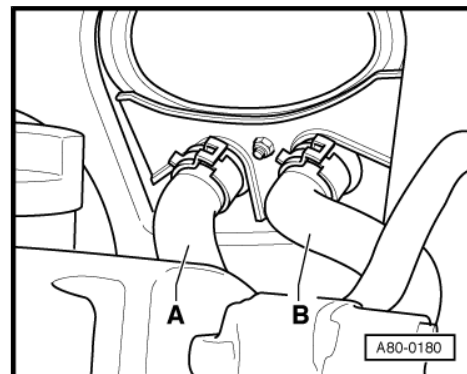
Note

- ◆ *On removal, note down the bolt lengths and assignment for re-installation.*
- ◆ *All cable ties unfastened or cut open on removing the heater must be reattached in the same position on installation.*

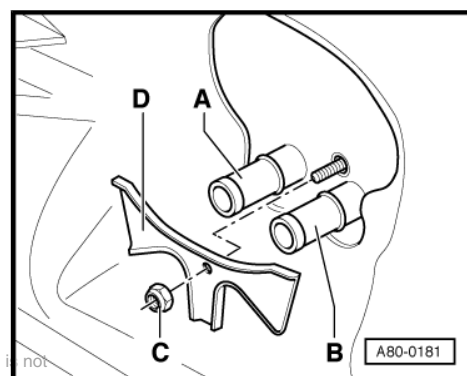
2.15.2 Removing

- Cover the driver's and passenger's seats with protective covers.
- Switch on the ignition.

- In vehicles with electrically adjustable seats, move them back as far as possible before disconnecting the battery -A- .
- Pay attention to the code in vehicles with a coded radio. If necessary, find out the code.
- Switch off the ignition.
- Disconnect the earth strap on the battery -A- with the ignition switched off.
- Remove the fresh-air intake duct in the engine compartment for the heater ⇒ [page 126](#)
- Open the sealing cap of the coolant expansion tank.
- Mark the positions of the coolant hoses -A- and -B-.
- Pinch off the coolant hoses to the heat exchanger using hose clamps up to Ø 25 mm -VAS 3094- and detach these hoses.



- Attach a piece of hose onto the connection -B- and place a container underneath the other end of this hose.
- Use a compressed air pistol to carefully blow the coolant out of the heat exchanger through connection -A- (into the container).
- Remove the hexagon nuts -C- and remove the bracket -D-.
- Remove the glove box, the driver's storage compartment, the centre console and the dash panel: ⇒ General Body Repairs, Interior; Repair group 70; Dash panel

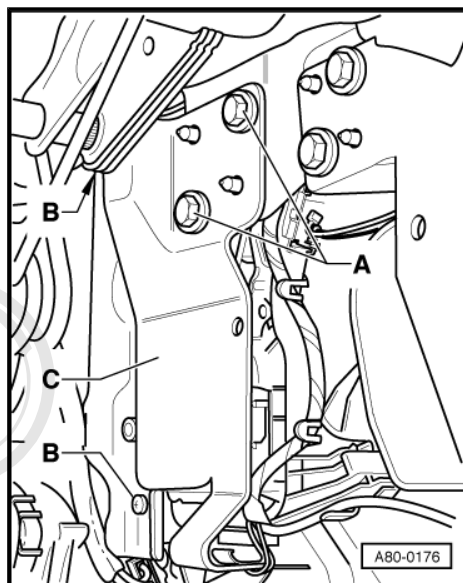


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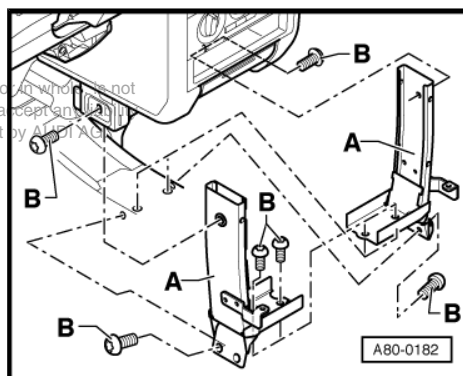
So as not to damage the dash panel fascia, the dash panel may only be placed on a clean workbench covered, for example, with clean cardboard.

- Remove the bolts -A- and -B-.
- Remove the bracket -C-.
- Remove the gearshift mechanism. ⇒ Relevant Workshop Manual, Gearbox

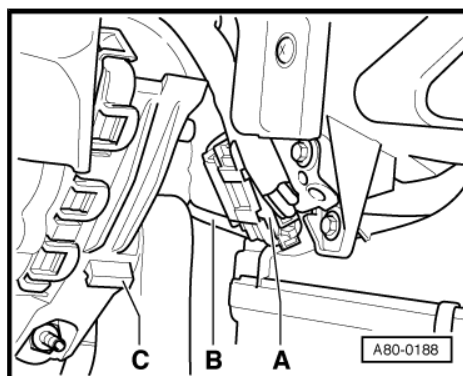


- Remove the bolts -B- and the dash panel supports -A- completely ⇒ General Body Repairs, Interior; Repair group 70; Dash panel
- Detach the additional heater earth strap on the right "A" pillar (only for vehicles with a TDI engine and an electric additional heater). ⇒ Electrical System; Repair group 01

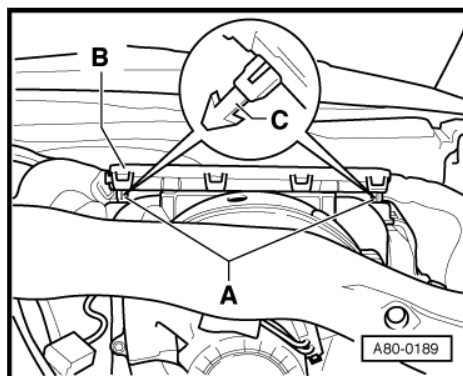
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- Remove the throttle mechanism -C-. ⇒ Relevant Workshop Manual, Fuel Supply
- Unplug the connector -A- or detach the positive connection to the heating element for additional heater -Z35- (only for vehicles with a TDI engine and an electric additional heater) ⇒ [page 147](#).
- Detach the vehicle wiring harness mounting -B- (with cable tie) on the heater.



- Loosen the cable duct -B- by pressing the catches -C- at the two fastening points -A- of the heater together.
- Remove the intermediate piece for the defroster vent ⇒ [page 125](#)

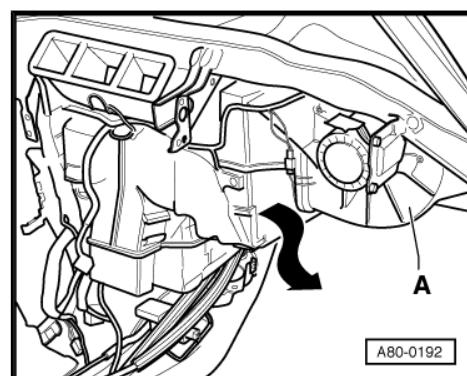
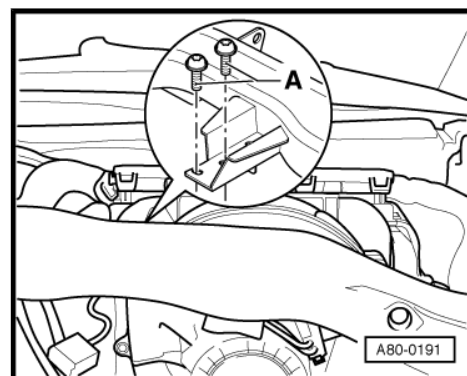
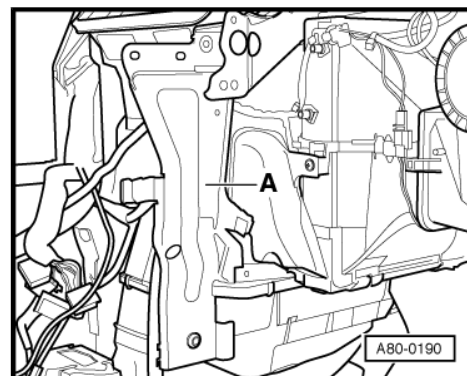


- Remove the right dash panel support -A-. ⇒ General Body Repairs, Interior; Repair group 70; Dash panel
- Unplug all the electrical connections between the vehicle and the heater.

- Unscrew the bolts -A-.

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- Remove the heater -A- towards passenger's side.



2.15.3 Installing

Install in reverse order; note the following:



Note

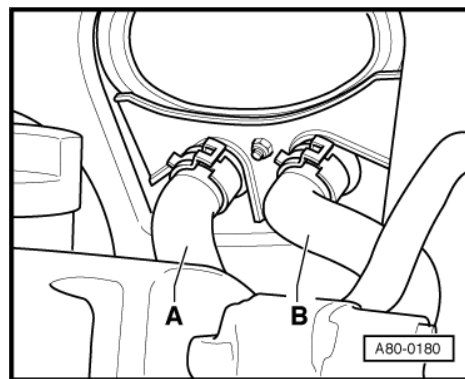
- ◆ Check all the seals on the heater for damage prior to installation and replace any damaged seals.
- ◆ Check that the sealing plate at the connections for the coolant hoses is seated properly and check the condition of the appropriate gasket.

- Connect the coolant hoses to the heat exchanger correctly.
Note the markings:
- ◆ Inlet hose from the cylinder head -A-
- ◆ Return hose to the water pump -B-
- Bleed the coolant circuit ⇒ Engine, Mechanics; Repair group 19



Note

- ◆ *When installing the dash panel, ensure that the defrost intermediate piece is properly seated on the heater upon insertion and that the defroster vent does not squeeze the intermediate piece upon installation.*
- ◆ *After installing the dash panel, check the vent direction and distribution of air flow from the defroster vent to the wind-screen.*



2.16 Note for vehicles with 1.6 L FSI engine (if heater output is poor)

- ◆ In vehicles with a 1.6 l petrol direct injection engine (FSI), there is an additional switch installed in the heater control electronics. This switch is operated via the temperature preselection rotary knob and using this, the temperature rotary knob position is signalled to the engine control unit.
- If, in the engine control unit, a voltage of approx. 3.5 V is present at the input for the signal from the heater controls when the coolant temperature is low, the mixture formation is changed in order to achieve better heating output and, when the engine is warm, the engine cooling map is influenced, and the coolant temperature is thereby limited to approx. 95 °C). For further information ⇒ [page 131](#) and ⇒ Relevant Workshop Manual, Injection and Ignition system

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3 Removing and installing the heating system heat exchanger

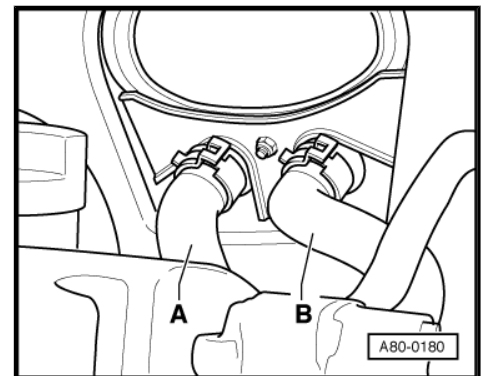
3.1 Removing and installing the heat exchanger with the heater and air conditioner fitted

3.1.1 Special tools, testers and auxiliary equipment required

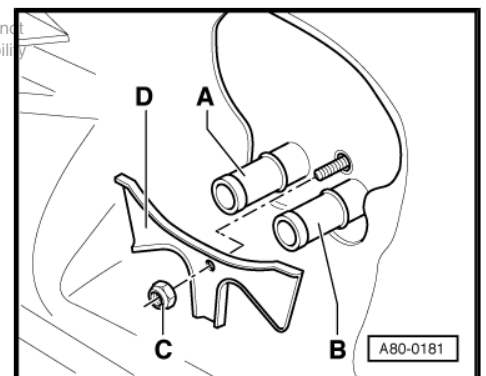
- ◆ Hose clamps up to Ø 40 mm -VAS 3093- / hose clamps up to Ø 25 mm -VAS 3094-
- ◆ Commercially available compressed-air gun
- ◆ Installation device -T40041-

3.1.2 Removing

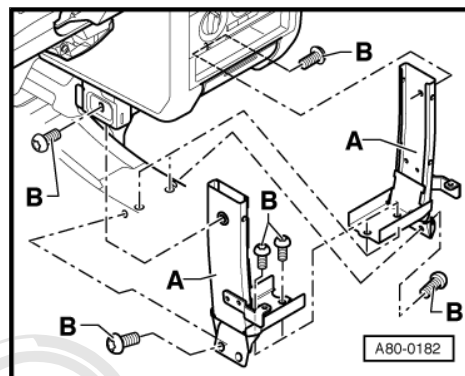
- Cover the driver's and passenger's seats with protective covers.
- Switch on the ignition.
- In vehicles with electrically adjustable seats, move them back as far as possible before disconnecting the battery -A- .
- Switch off the ignition.
- Remove the fresh-air intake duct in the engine compartment for the heater ⇒ [page 126](#)
- Open the sealing cap of the coolant expansion tank.
- Mark the positions of the coolant hoses -A- and -B-.
- Pinch off the coolant hoses to the heat exchanger using hose clamps up to Ø 25 mm -VAS 3094- and detach these hoses.



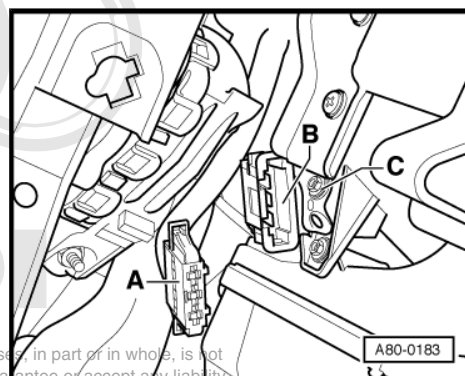
- Attach a length of hose onto the connection -B- and place a container underneath the other end of this hose.
- Use a compressed air gun to carefully blow the coolant out of the heat exchanger through connection -A- (into the container).
- Remove the driver's storage compartment and the glove box: ⇒ General Body Repairs, Interior; Repair group 68; Storage Compartments/Covers
- Remove the centre console and the gearshift mechanism ⇒ General Body Repairs, Interior; Repair group 68; Storage Compartments/Covers and the ⇒ relevant Workshop Manual, Gearbox



- Remove the bolts -B- and the dash panel supports -A- completely ⇒ General Body Repairs, Interior; Repair group 70; Dash panel
- Disconnect the additional heater earth connection on the “A” pillar on the right (if present). ⇒ Electrical System; Repair group 01

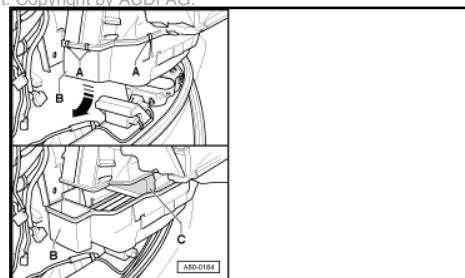


- Unplug the connector -A- (if present).
- Remove the bolt -C- (if present).
- Remove the rear heating duct (if present).
- Remove the accelerator pedal module. ⇒ Relevant Workshop Manual, Fuel System; Repair group 20
- Remove the condensation drain hose (only in vehicles with air conditioning) ⇒ [page 180](#)

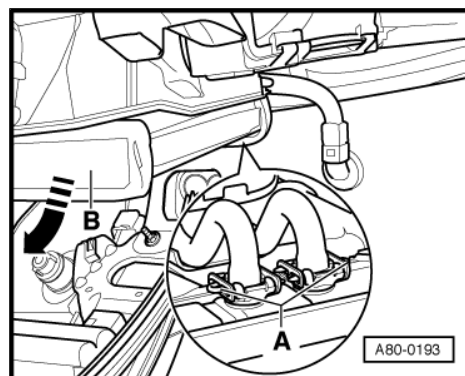


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- Remove the clips -A-.
- Remove the bottom part of the air duct housing -B- (with the heating element for additional heater -Z35-) in the direction of the arrow ⇒ [page 147](#)).

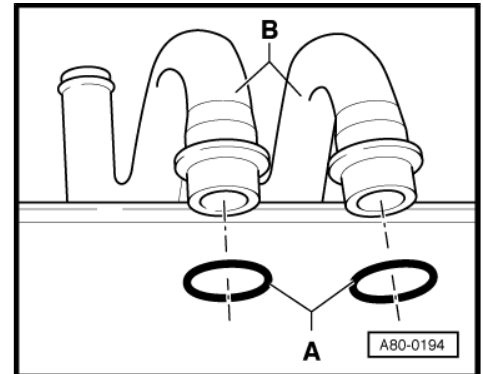


- Remove the clips -A-.
- Remove the heat exchanger -B- in direction of arrow

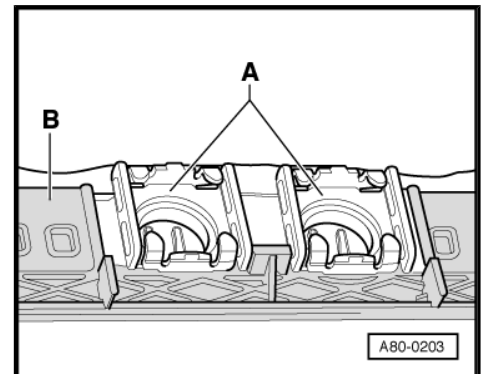


3.1.3 Installing

- Attach the new O-ring seals -A- (included in the scope of delivery of the heat exchanger) to both coolant pipes -B-.
- Apply a light coating of lubricant (included as a spare part in the scope of delivery of the O-ring seals and retaining clips) to the O-ring seals -A- or moisten the O-ring seals -A- with coolant (acting as a lubricant). ⇒ Parts List



- Insert the heat exchanger -A- the right way round in the air duct housing -B- (the two connections are not centred on the heat exchanger).
- Mark the position of the heat exchanger (e.g. with "top")
- Remove heat exchanger -A- from the air duct housing -B-.

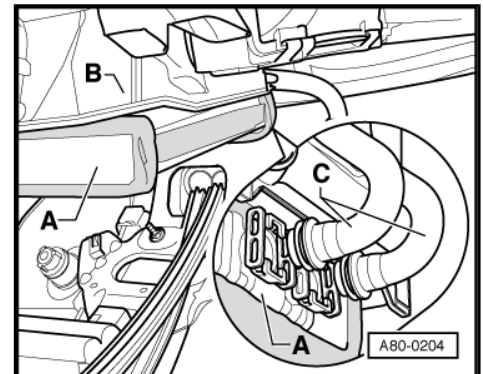


- Insert the heat exchanger -A- the right way round in the heater/air conditioner -B-; note the two coolant pipes -C- (the two connections are not centred on the heat exchanger).

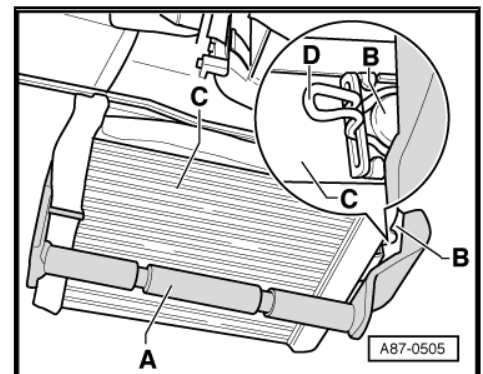
Note

- ◆ You require the assistance of a second mechanic to install the two clips on the coolant pipes unless you are using the intended installation device -T40041-. He must hold the heat exchanger in position while you carefully push the pipes (against the resistance of the O-ring seals, with a screwdriver and a block of wood for example) into the heat exchanger until you can insert the clips.

- ◆ When inserting the heat exchanger and attaching the clips, make sure that the coolant pipes and connections on the heat exchanger are not bent or damaged.



- Place the installation fixture -T40041- -A- onto the coolant pipes -B- and the heat exchanger -C- as shown in the diagram
- Turning the spindle on the installation fixture -A-, tighten the coolant pipes -B- in the heat exchanger -C- carefully until you can insert the clips -D-.

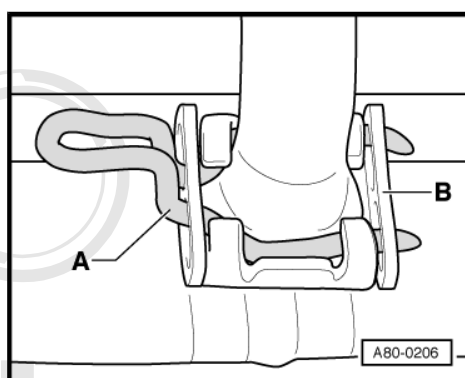
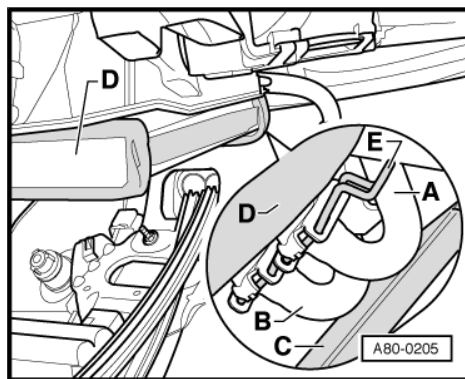


- Fit the new clips -E- (included in the scope of delivery of the heat exchanger) - from the outside to the middle, the right clip from the right and the left clip from the left.

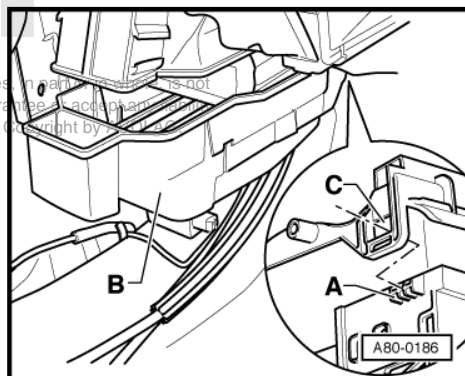


Note

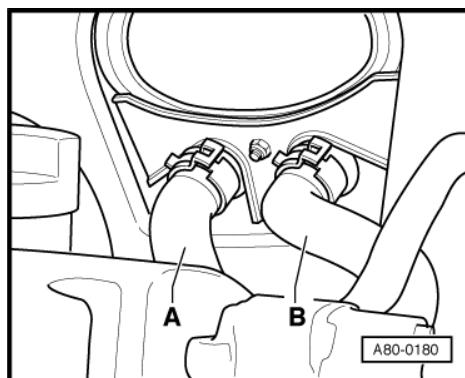
- ◆ *Carefully push in the clips; the mounts in the heat exchanger must not be bent.*
- ◆ *When inserting the clips, make sure that they are fitted in the mounts of the heat exchanger in the way shown in the illustration.*
- ◆ *Slide in the two clips as far as they will go.*
- Detach the installation tool.
- Check that the clips -A- are sitting correctly in the heat exchanger -B- (with the aid of a mirror, for example).



- When installing the air duct housing -B-, insert the two retaining tabs -A- into the opening -C- first of all.
- Assemble the heater and the air duct housing and secure it in place with the appropriate clips.



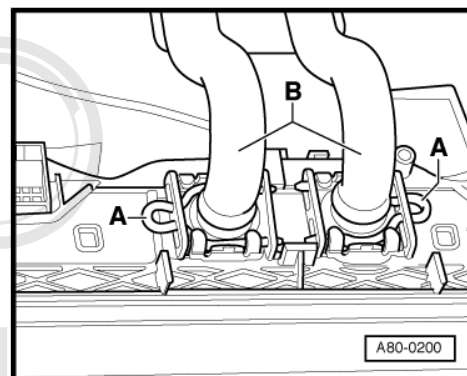
- Connect the coolant hoses to the heat exchanger correctly. Note the markings:
 - ◆ Inlet hose from the cylinder head -A-
 - ◆ Return hose to the water pump -B-
- Bleed the coolant circuit ⇒ Engine, Mechanical Components; Repair group 19
- Check the coolant circuit for leaks, paying particular attention to the connection between the coolant pipes and the heat exchanger.
- Check that the condensation drain is correctly positioned in vehicles with an air conditioner ⇒ [page 180](#).
- Then reinstall the other components in reverse order.



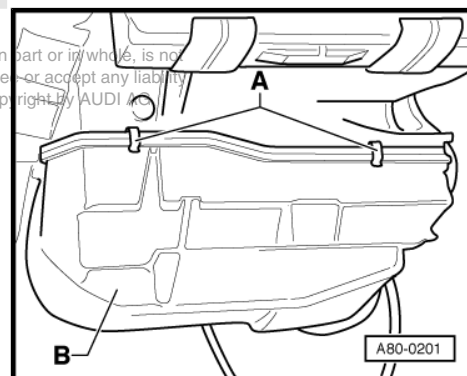
3.2 Removing and installing the heat exchanger with the heating system and air conditioner removed

3.2.1 Removing

- Remove the clips -A-.

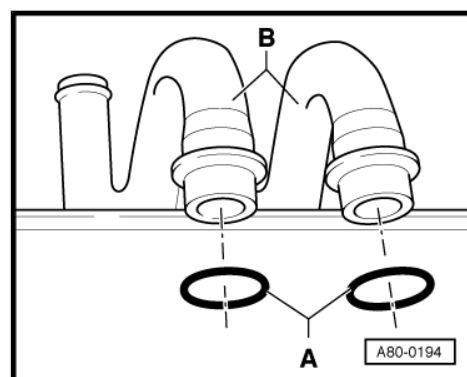


- Lift off the clips -A-.
- Remove the bottom part of the air duct housing -B- with the heat exchanger (and the heating element for additional heater -Z35-) in the direction of the arrow.

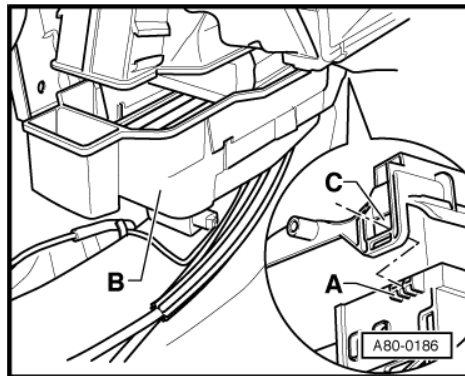


3.2.2 Installing

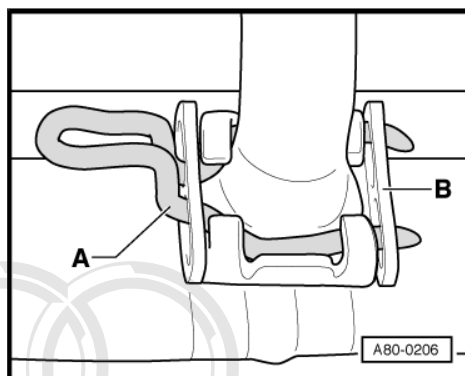
- Attach the new O-ring seals -A- (included in the scope of delivery of the heat exchanger) to both coolant pipes -B-.
- Apply a light coating of lubricant (included as a spare part in the scope of delivery of the O-ring seals and retaining clips) to the O-ring seals -A- or moisten the O-ring seals -A- with coolant (acting as a lubricant).
- Insert the heat exchanger the right way round into the air duct housing (the two connections are not centred on the heat exchanger).



- When installing the air duct housing -B-, insert the two retaining tabs -A- into the opening -C- first of all.
- Assemble the heater, air conditioner and air duct housing.
- Secure the air duct housing in place with the appropriate clips.



- Push the two coolant pipes carefully into the heat exchanger with the assembly device -T40041- (with the O-ring seals).
- Insert the new clips -A- (which are included in the scope of delivery of the heat exchanger).
- Slide the clips -A- in as far as they will go.
- Check that the clips -A- are sitting properly in the heat exchanger -B-
- Reinstall the heater and the air conditioner.
- Bleed the coolant circuit ⇒ Engine, Mechanics; Repair group 19
- Check the coolant circuit for leaks, paying particular attention to the connection between the coolant pipes and the heat exchanger.
- Then reinstall the other components in reverse order.



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4 Dismantling and assembling heating system



Note

- ◆ Remove the heater ⇒ [page 150](#)
- ◆ Removing and installing heater components ⇒ [page 128](#)

1 - Removing and installing

- ☐ step-up gear/temperature flap ⇒ [page 144](#)

2 - Bolt

3 - Air distributor housing

- ☐ Do not dismantle
- ☐ With temperature flap and air distribution flaps

4 - Clip

5 - Air duct channel/lower part

- ☐ Assemble the upper and lower parts
⇒ [page 162](#)

6 - Air duct channel/upper part

- ☐ Assemble the upper and lower parts
⇒ [page 162](#)

7 - Intake housing

- ☐ with recirculated air flap/fresh air flap

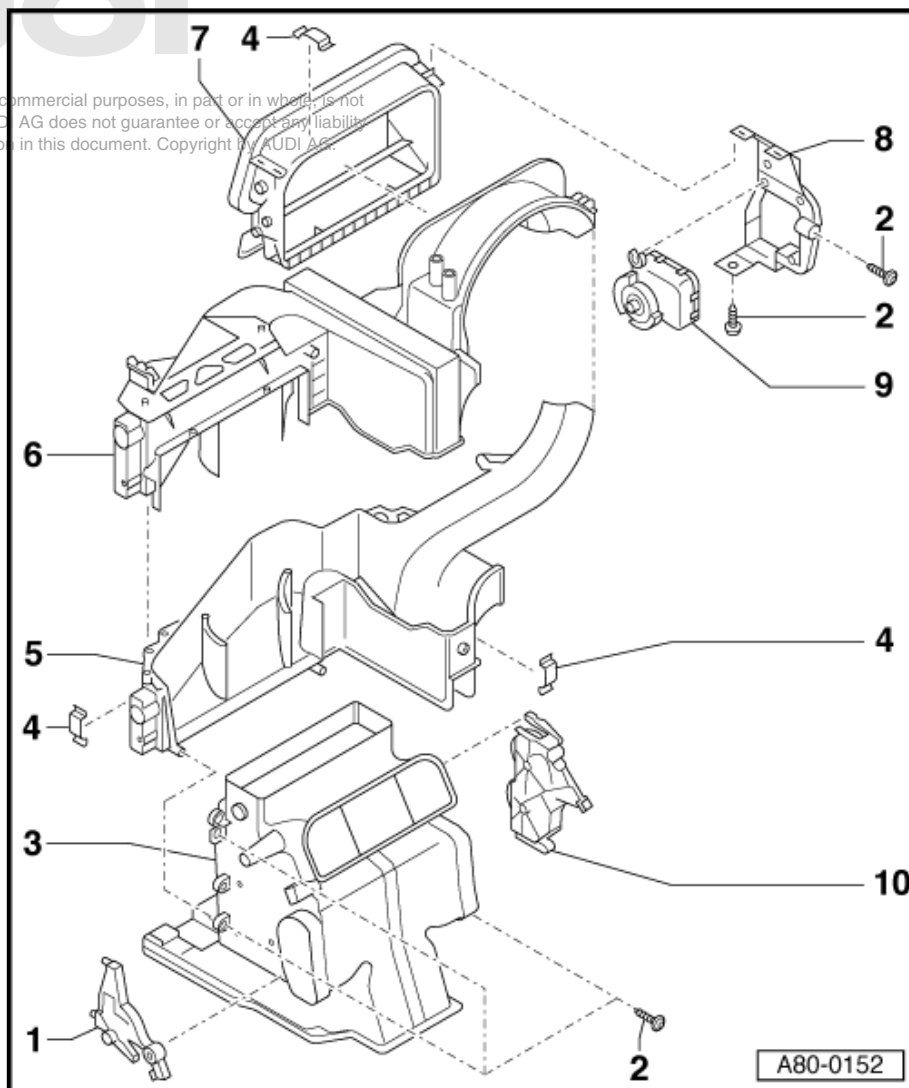
8 - Bracket for fresh-air/recirculated-air flap positioning motor -V154-

9 - Fresh-air/recirculated-air flap positioning motor -V154-

- ☐ Check the function
⇒ [page 142](#)
- ☐ Removing and installing
⇒ [page 138](#)

10 - Removing and installing

- ☐ step-up gear/air distribution ⇒ [page 146](#)

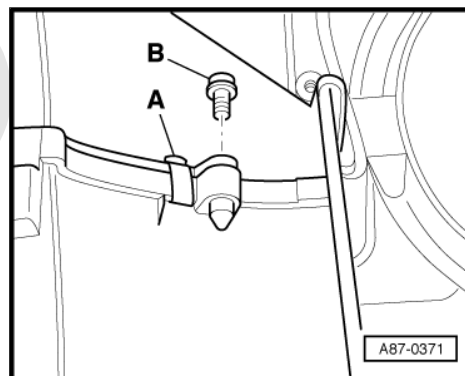


Assembling the air duct channel

- Insert the clips -A- at the locations provided.

**Note**

Several locations have circumferential screw connections, which may be used as additional fastening means for the air duct channels if necessary. Use the same type of screws as also used for the air conditioner screwed connections.



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5 Electrical check on the heated rear window

5.1 Electrical check on the heated rear window

5.1.1 Special tools, testers and auxiliary equipment required

- ◆ Vehicle diagnostic, testing and information system -VAS 5051- (with a 50 A current probe -VAS 5051/9-)
- ◆ Adapter set -V.A.G 1594C-

5.1.2 Test requirements:

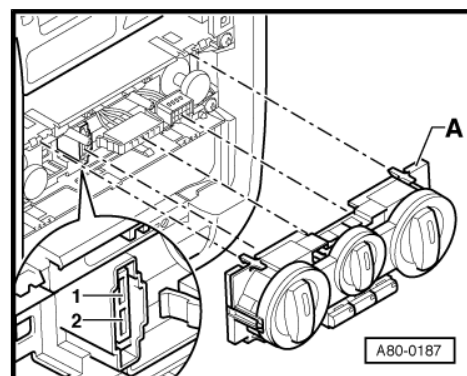
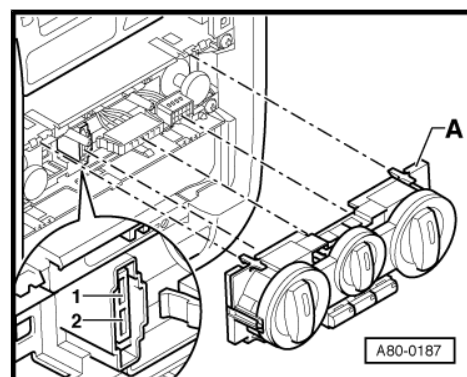
All fuses OK in accordance with current flow diagram ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

- Switch off the ignition.
- Remove the electronics from the heating controls -A- ⇒ [page 131](#)
- Switch on the ignition.
- Measure the voltage at connector -B- between contacts "1" and "2".
- ◆ Specification: approx. battery voltage
- Switch off the ignition.
- Attach all the connectors, except the connector for the heated rear window (contacts "1" and "2") to the heater control electronics.
- Use adapter leads from the adapter set -V.A.G 1594C- to connect both the contacts ("1" and "2") of the connector for the heated rear window to the heater control electronics.
- Guide one of the two adapter leads through the 50A current probe -VAS 5051/9- .
- Set the vehicle diagnostic, testing and information system - VAS 5051- to "multimeter measuring: 50A current probe" mode.
- Start the engine.



Note

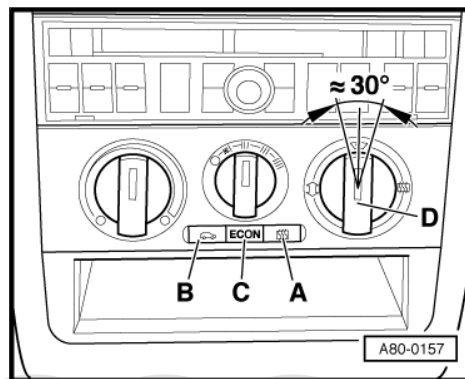
- ◆ The cut-in time for the heated rear window is limited to approx. 15 minutes by the electronics in the heater controls -A-.
- ◆ Stray current may cause a low current reading on the current probe with the heated rear window switched off.
- ◆ The selected "heated rear window on" function is cancelled when the ignition is switched off.



- Switch on the heated rear window on the heater control electronics by pressing button -A- (the warning lamp in the button lights up).
- ◆ Specification: display changes from approx. 0 A to less than 25 A
- Wait for approx. 15 minutes
- ◆ Specification: the display changes from less than 25 A to approx. 0 A (the warning lamp in the button goes out)


Note

- ◆ *The control unit switches off the heated rear window after a heating period of approx. 15 minutes, and the cut-in warning lamp in switch -A- goes out.*
- ◆ *If the voltage at the heater controls drops below 9 V, the heated rear window is switched off (the LED in the button goes out) until the voltage is higher than 10 V.*



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87 – Air conditioning system

1 Safety precautions when working on vehicles 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 Tetrafluoroethane (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).

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

1.1.1 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 166](#)). 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.

Should liquid refrigerant come into contact with the eyes, rinse them thoroughly with water for about 15 minutes.

Then apply eye drops and consult a doctor immediately, even if the eyes are not painful.

Always inform the doctor of the type of refrigerant involved.

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.

1.1.2 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 refrigerant removed should then be re-processed on site or returned to the manufacturer for proper disposal (different or additional regulations may apply in other countries). Therefore, vehicles have to be taken to a specialist air conditioning workshop (which will have the necessary equipment and tools).

Reason:

Should it escape into the earth's atmosphere, refrigerant R134a will have a detrimental effect in terms of global warming.



Note

- ◆ *The greenhouse effect of refrigerant R134a is much less than that of refrigerant R12.*
- ◆ *Refrigerant R134a does not affect the ozone layer in the earth's atmosphere. (R134a is an HFC and does not possess any atoms of chlorine). 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).*

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After draining the air conditioning system, unplug the connector from the air conditioner compressor regulating valve -N280- or from the high-pressure sender -G65- .

Reason:

The air conditioner compressor regulating valve -N280- is then no longer actuated and the compressor runs at idle. The compressor is designed such that the lubrication of the compressor components is ensured by way of an internal oil circuit at idle (provided there is sufficient refrigerant oil in the compressor).

1.1.3 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 escaping refrigerant is not only colourless and odourless, but also heavier than air and therefore displaces oxygen. If, despite 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 166](#)).



Note

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

When servicing the air conditioner, all open components and pipe connections must be immediately re-sealed.

Reason:

Moisture will ingress into the air conditioner components if they are 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.

1.1.4 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.

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2 Notes on general repairs

It is only permissible to drain and open the air conditioner refrigerant circuit if so required by the pertinent safety regulations (⇒ [page 166](#)), or if parts of the air conditioner refrigerant circuit have to be replaced, (⇒ [page 166](#)).

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

Service work which can be performed on the heater and air conditioner without opening the refrigerant circuit is described in this Workshop Manual ⇒ [page 178](#).



Note

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

For air conditioner servicing work which involves draining the refrigerant circuit and can therefore not be carried out at every VW/Audi workshop, refer to the Workshop Manual ⇒ [page 210](#) (vehicle must be taken to a specialist air conditioner workshop for drainage of the refrigerant circuit)⇒ Air conditioner - with refrigerant R134a.

2.1 Contact corrosion

Contact corrosion can occur if use is made of unsuitable connecting elements (bolts, nuts, washers...), rivets, plugs, sockets, adhesives etc.

For this reason, all the connecting elements fitted have been subjected to special surface treatment by the manufacturer. This can be seen from the greenish colour of these elements. Use is also made of rubber and plastic parts, as well as adhesives which are not electrically conductive ⇒ Parts List.

These tested, aluminium-compatible components are also available as replacement parts ⇒ Parts List.

Always use genuine parts!

Always fit new parts in cases of doubt about reusability.

Accessories must be approved by Audi AG.

Damage resulting from contact corrosion is not covered by the warranty.

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3 Servicing the refrigerant circuit

Note

- ◆ Servicing work on the refrigerant circuit ⇒ [page 210](#)
- ◆ All parts or procedures marked ¹⁾ can be serviced and re-placed/performed in any workshop (work not involving the refrigerant circuit).
- ◆ Any parts of the refrigerant circuit not marked ¹⁾ as well as all refrigerant hoses and pipes can only be serviced or replaced in a specialist air conditioner workshop ⇒ Air conditioner - with refrigerant R134a .

3.1 Overview of components

HD = High-pressure side

ND = Low-pressure side

1 - Air conditioner compressor regulating valve -N280-

- ☐ Checking actuation and function ⇒ [page 94](#)

2 - Compressor

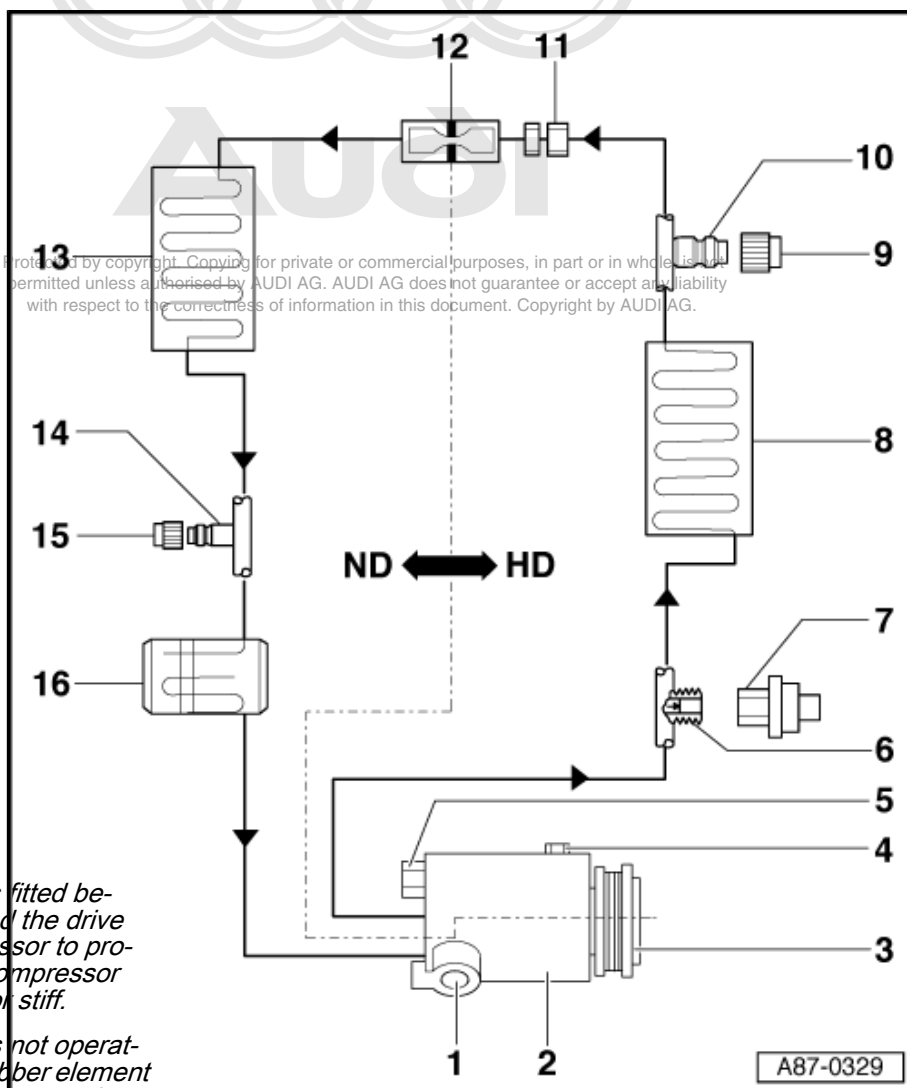
- ☐ Detaching and re-attaching compressor from/onto bracket ⇒ [page 172](#) ¹⁾
- ☐ When installing the refrigerant pipes and the associated bracket, ensure that there is sufficient spacing between the belt, bracket and pulley.

3 - Pulley¹⁾

- ☐ Replacing ⇒ [page 173](#)
- ☐ Removing and installing the poly-V-belt ⇒ Engine Mechanical Components; Repair group 13
- ☐ Poly-V-belt assignment: ⇒ Parts List

Note

- ◆ A rubber element is fitted between the pulley and the drive shaft of the compressor to protect the belt if the compressor becomes jammed or stiff.
- ◆ If the compressor is not operating smoothly, the rubber element interrupts the power transmission to the compressor.



- ◆ *Vibrations occurring during operation of the compressor are dissipated by the rubber element (damper function in the event of torque fluctuations).*

4 - Oil drain plug**5 - Pressure relief valve****6 - Connection with valve****7 - High-pressure sender -G65- 1)**

- ☐ Removing and installing ⇒ [page 170](#)
- ☐ Checking signal ⇒ [page 90](#)

8 - Condenser**9 - Screw cap**

- ☐ with seal
- ☐ Must be fitted

10 - Service connection

- ☐ High-pressure side
- ☐ For specialist air conditioner workshops for measurement, drainage and filling

11 - Union in the refrigerant pipe**12 - Restrictor**

- ☐ Installed in the threaded connection, Item ⇒ [Item 11 \(page 212\)](#)

13 - Evaporator**14 - Service connection**

- ☐ Low-pressure side
- ☐ For specialist air conditioner workshops for measurement, drainage and filling

15 - Screw cap

- ☐ with seal
- ☐ Must be fitted

16 - Reservoir

3.2 Removing and installing air conditioner high-pressure sender -G65-

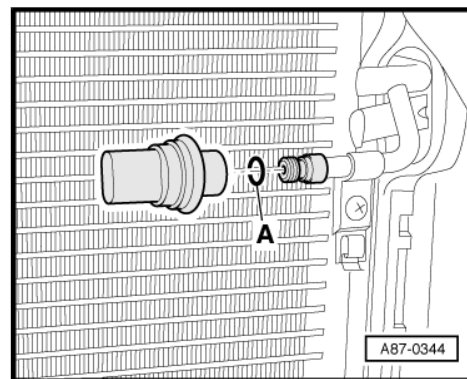
- Remove the front bumper: ⇒ General Body Repairs, Exterior; Repair group 50; Body - front .

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- Unplug the connector.
- Remove the high-pressure sender -G65- Tightening torque: 5 Nm.
- Replace the O-ring seal -A- (10.8 mm; 1.8 mm) ⇒ [page 171](#)

i Note

- ◆ *The refrigeration capacity cannot be tested if the high-pressure sender -G65- is removed; the Climatronic control and display unit -E87- does not activate the compressor (the regulating valve for the air conditioner compressor -N280- is not activated).*
- ◆ *The refrigerant circuit remains closed, connection with valve.*
- ◆ *Checking the function of the high-pressure sender -G65- and the signal supplied ⇒ [page 93](#).*

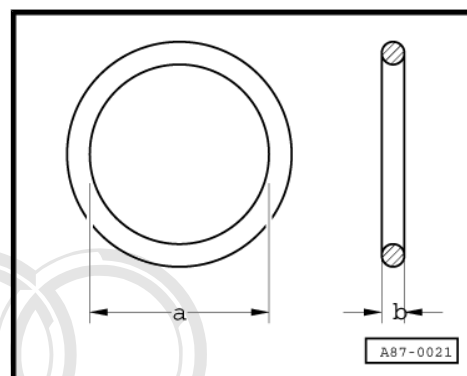


3.3 O-ring seals for refrigerant circuit

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

i Note

- ◆ *Only O-ring seals which are resistant to refrigerant R134a and the associated refrigerant oil may be installed. These O-ring seals are colour-coded to prevent interchanging (currently "red", "lilac" or "violet"): ⇒ [Parts List](#)*
- ◆ *In addition to the coloured O-ring seals, black O-rings are also used in production for certain connections.*
- ◆ *Dimensions -a- and -b- differ depending on where the O-ring seal is fitted: ⇒ [Parts List](#)*

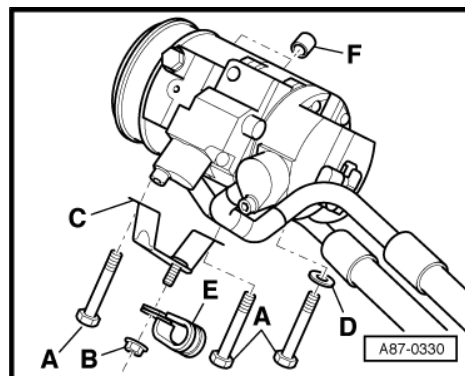


3.4 Detaching and attaching compressor from/onto bracket



Note

- ◆ The compressor can be detached/re-attached from/onto the bracket without opening the refrigerant circuit.
- ◆ Do not drain the refrigerant circuit, do not detach the refrigerant hoses and pipes from the compressor.
- ◆ After removal, secure the compressor with a wire, for example, to the side member. Never leave it hanging from the refrigerant pipes.
- ◆ Before removing, mark the running direction of the poly-V-belt with chalk or a felt-tipped pen. If the belt runs in the opposite direction when it is refitted, this can cause breakage.
- ◆ The figure shows the set-up for a 1.2 l TDI engine. The installation position in the 1.4 l TDI and petrol engines only differs slightly from this. However, the torques are identical. For this reason, only the set-up for the 1.2 l TDI is illustrated here.



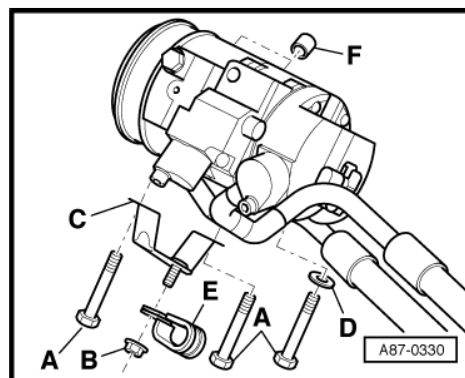
3.4.1 Detaching and re-attaching compressor from/onto bracket

- Remove the noise insulation ⇒ General Body Repairs, Exterior; Rep. Gr. 50 .
- Slacken the poly-V-belt ⇒ Engine Mechanical Components; Repair group 13
- Unscrew the bolts -A- (25 Nm).



Note

- ◆ Do not detach the refrigerant pipes and clamp -E-.
- ◆ Fit a washer -D- where there is no bracket -C- attached.
- ◆ Once nut -B- has been loosened (torque 20 Nm), tighten the bolts -A- first, and then tighten the clamp -E- using the nut -B-.
- ◆ Before fastening the compressor, check the position of both bushes -F- in the bracket or in the compressor.



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4 Replacing compressor pulley

Note

- ◆ Various pulley designs are fitted depending on the type of compressor and the engine design ⇒ Parts List .
- ◆ Detaching and re-attaching pulley from/onto compressor ⇒ [page 174](#)

1 - Bolt

- ☐ Replace
- ☐ Tightening torque 20 Nm
- ☐ Loosening and tightening ⇒ [page 174](#)

Note

- ◆ Use the bolt which has been removed in order to adjust the gap.
- ◆ Insert the new bolt only after the gap has been adjusted (because of thread-locking compound).

2 - Drive plate

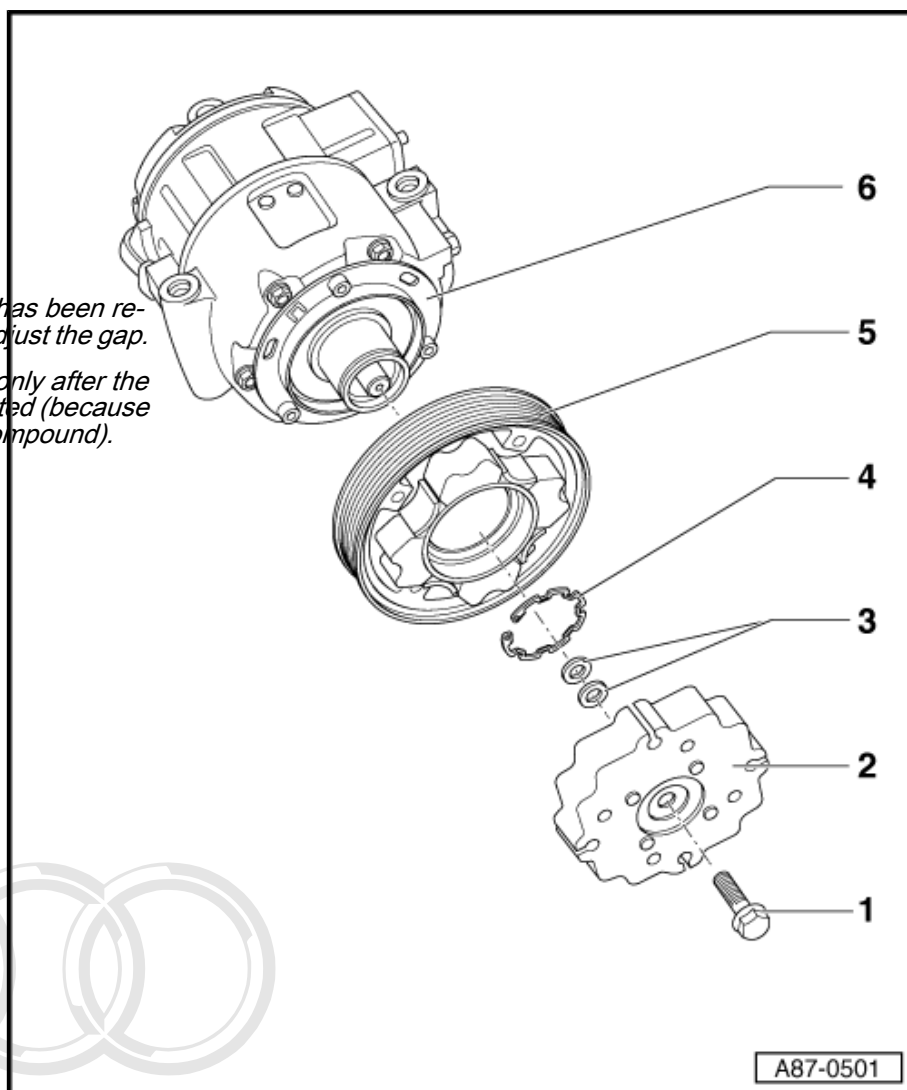
- ☐ Different versions ⇒ Parts List
- ☐ Detaching and attaching ⇒ [page 174](#)
- ☐ Releases in the event of excessive torque (e.g. compressor stiff)
- ☐ Checking and adjusting gap between rubber element of pulley and drive plate ⇒ [page 176](#)

3 - Shims for adjusting the gap width

- ☐ Checking and adjusting gap between rubber element of pulley and drive plate ⇒ [page 176](#)
- ☐ Gap 0.5 + / - 0.2 mm
- ☐ Use up to 3 shims

Note

- ◆ If the gap is still too small after installing up to 3 shims, check the pulley and the flange on the compressor.
- ◆ The gap must be within the tolerance over the entire circumference of the drive plate circumference (all 4 measuring locations).



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4 - Circlip

- ☐ Replace
- ☐ Ensure correct positioning (flat side facing compressor)
- ☐ Removing and installing ⇒ [page 174](#)

5 - Pulley

- ☐ The rubber element of the pulley releases in the event of excessive torque (e.g. stiff compressor) and the pulley turns without driving the compressor.
- ☐ Different versions ⇒ Parts List
- ☐ Detaching and attaching ⇒ [page 174](#)
- ☐ Checking and adjusting gap between rubber element of pulley and drive plate ⇒ [page 176](#)



Note

Under certain conditions (e.g. rough engine running), the rubber element of the pulley may release when there is no fault in the compressor or refrigerant circuit.

6 - Compressor

- ☐ Different models are fitted depending on the engine (and the country version of the vehicle). ⇒ Parts List
- ☐ Clean the flange of the compressor before fitting the pulley.

4.1 Detaching and re-attaching pulley from/onto compressor



Note

- ◆ *If the pulley overload safeguard has been released, check that the compressor is moving freely before replacing the pulley. Replace the entire compressor if stiff.*

- ◆ *The pulley overload protection function is described e.g. in*
⇒ *Self-study programme No. 240 Audi A2 Technology*

- ◆ *Depending on the engine version, detaching the pulley may involve detaching the compressor from the engine*
⇒ [page 172](#).

- ◆ *The compressor can be removed from the bracket and re-attached to it without opening the refrigerant pipes.*

- ◆ *Before removing it, mark the running direction of the poly-V-belt with chalk or a felt-tipped pen. If the belt runs in the opposite direction when it is refitted, this can cause breakage.*

- ◆ *Different compressors are installed depending on the engine, the vehicle type (A2, A3, A4 etc.), and the country version (attached to the right or left of engine, 6 cyl. petrol or diesel engine, hot or cold country). Check that the arrangement is correct ⇒ Parts List*

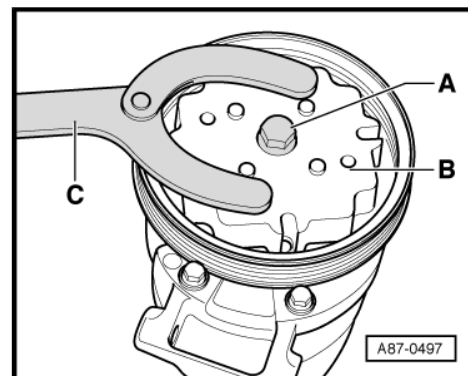
4.1.1 Removing pulley

- Remove the noise insulation ⇒ General Body Repairs, Exterior; Rep. Gr. 50.
- Slacken the poly-V-belt and remove it ⇒ Engine Mechanical Components; Repair group 13

- Unscrew the bolt -A- (tightening torque 20 Nm).

i Note

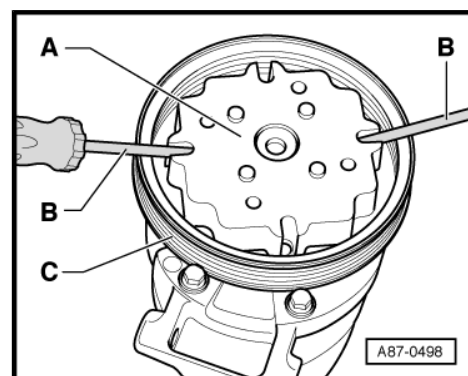
- ◆ *Should it not be possible to detach the pulley when the compressor is in position, detach the compressor from the engine ⇒ [page 172](#).*
- ◆ *To loosen or tighten the bolt -A-, counterhold using a commercially available 2-hole pin wrench -C- (pin diameter 5.0 mm) on the drive plate -B-.*
- ◆ *The bolt -A- must be replaced (on account of locking fluid).*
- ◆ *Use the bolt -A-, which has been removed to adjust the gap.*



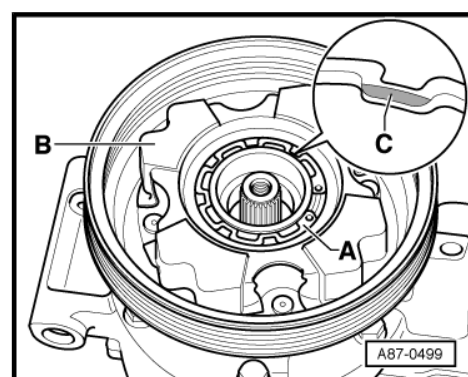
- Carefully and evenly lever off the drive plate -A- using 2 screwdrivers -B-.

i Note

- ◆ *When levering off the drive plate -A-, take care not to damage the collar of the pulley -C-.*
- ◆ *There are different types of pulley -C- and drive plate -A-. Therefore, ensure that you use the right types. ⇒ [Parts List](#)*

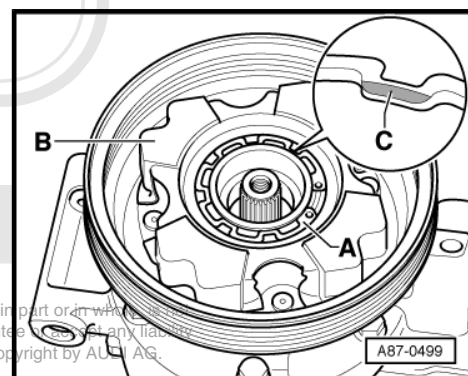


- Remove circlip -A-.
- Detach the pulley -B-.

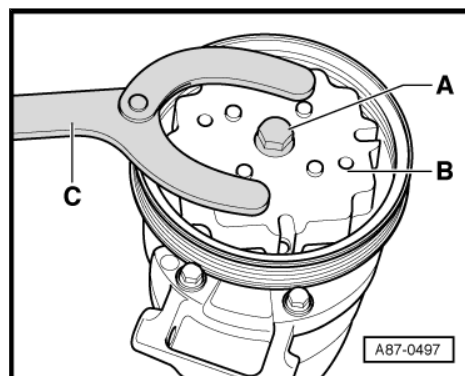
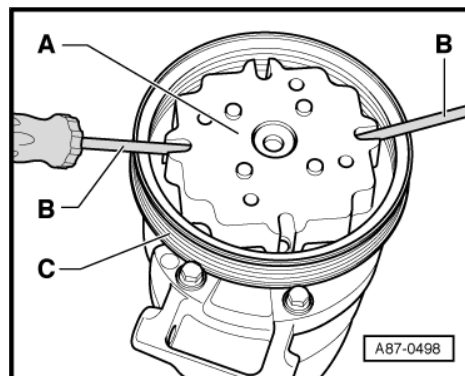


4.1.2 Attaching pulley

- Assembly is carried out in the reverse order, for this purpose, note the following instructions:



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Note

- ◆ Replace the circlip -A-.
- ◆ Ensure that the circlip -A- is correctly seated in the groove on the compressor flange.
- ◆ Clean the compressor flange before installing the pulley bolt, the pulley must attach easily. (attachment must be possible without applying undue force).
- ◆ When fitting the circlip -A-, take care not to bend it open more than necessary.
- ◆ Ensure that the circlip -A- is inserted correctly. The beveled side -C- faces away from the compressor (flat side faces compressor).
- ◆ There are different types of pulley -C- and drive plate -A-. Therefore, ensure that you use the right types. → Parts List
- ◆ The bolt -A- must be replaced (on account of locking fluid).
- ◆ Use the bolt -A-, which has been removed to adjust the gap.
- ◆ To adjust the gap, install the drive plate -B- with only 2 shims at first and then only tighten the bolt -A- by hand. Then check the gap ⇒ [page 176](#).
- ◆ Only insert the new bolt -A- once you have set the gap (on account of locking fluid) and tighten it to a torque of 20 Nm.

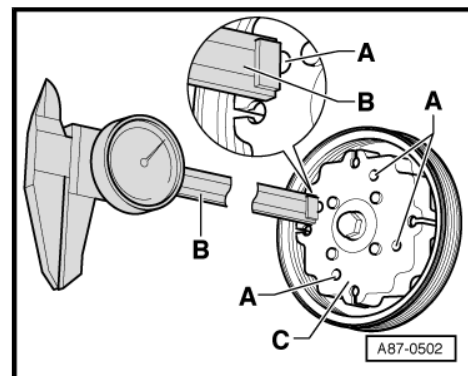
4.2 Checking and adjusting gap between pulley and drive plate



Note

- ◆ In order to check the gap, only remove the components which hinder access to the 4 measuring points.
- ◆ When measuring the gap, do not apply any undue force (so as not to produce any incorrect measurement results; perform the measurement with the depth gauge against a rubber element).

- Measure the space between the top of the drive plate -C- and the rubber element of the pulley using a depth gauge (e.g. calipers-B-) via the 4 bores -A-.
- Calculate the gap from the measurement result.



Gap -A- = measurement result-B- - 1.6 mm (thickness of the drive plate -C-)

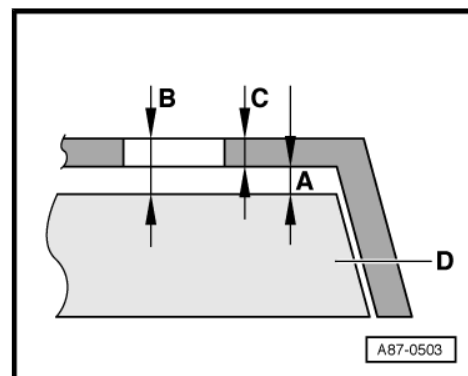
Setting for the gap = 0.5 ± 0.2 mm

- Adjust the width of the gap by removing or inserting a shim in such a way that all 4 bores lie within the permissible tolerance.



Note

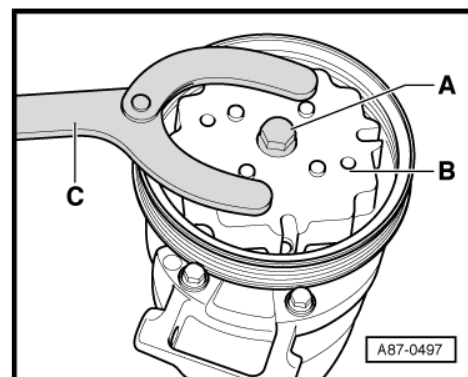
- ◆ When measuring the gap, do not apply any undue force (so as not to produce any incorrect measurement results; perform the measurement with the depth gauge against a rubber element -D-).
- ◆ If the gap is still too small after installing up to 3 shims, check the pulley and the flange on the compressor.



- Once the gap has been set to the required value, insert the new bolt -A- and tighten it with the specified torque

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→ page 175



5 Components for control and regulation of air conditioner



Note

- ◆ Servicing work on the refrigerant circuit ⇒ [page 210](#)
- ◆ Once you have completed the repairs, perform the following procedures: interrogate fault memory ⇒ [page 9](#), erase fault memory ⇒ [page 38](#) and perform basic setting ⇒ [page 36](#).
- ◆ The electrical test can be performed on any components marked ¹⁾ ⇒ [page 80](#).
- ◆ All the components marked ²⁾ are actuated in the final control diagnosis ⇒ [page 29](#).
- ◆ The windscreen vent (defrost) can only be replaced if the dash panel insert is removed. ⇒ General Body Repairs, Interior; Rep. Gr. 70

5.1 Components in the engine compartment and in the rear of the vehicle

1 - Forced air extractor

- ❑ The sealing lips on the vent frame must move freely and close automatically
- ❑ To ensure proper functioning of the passenger compartment ventilation, the air ducts must not be blocked by the the luggage compartment lining
- ❑ Checking ⇒ [page 126](#)

2 - Fresh-air intake duct (in the engine compartment)

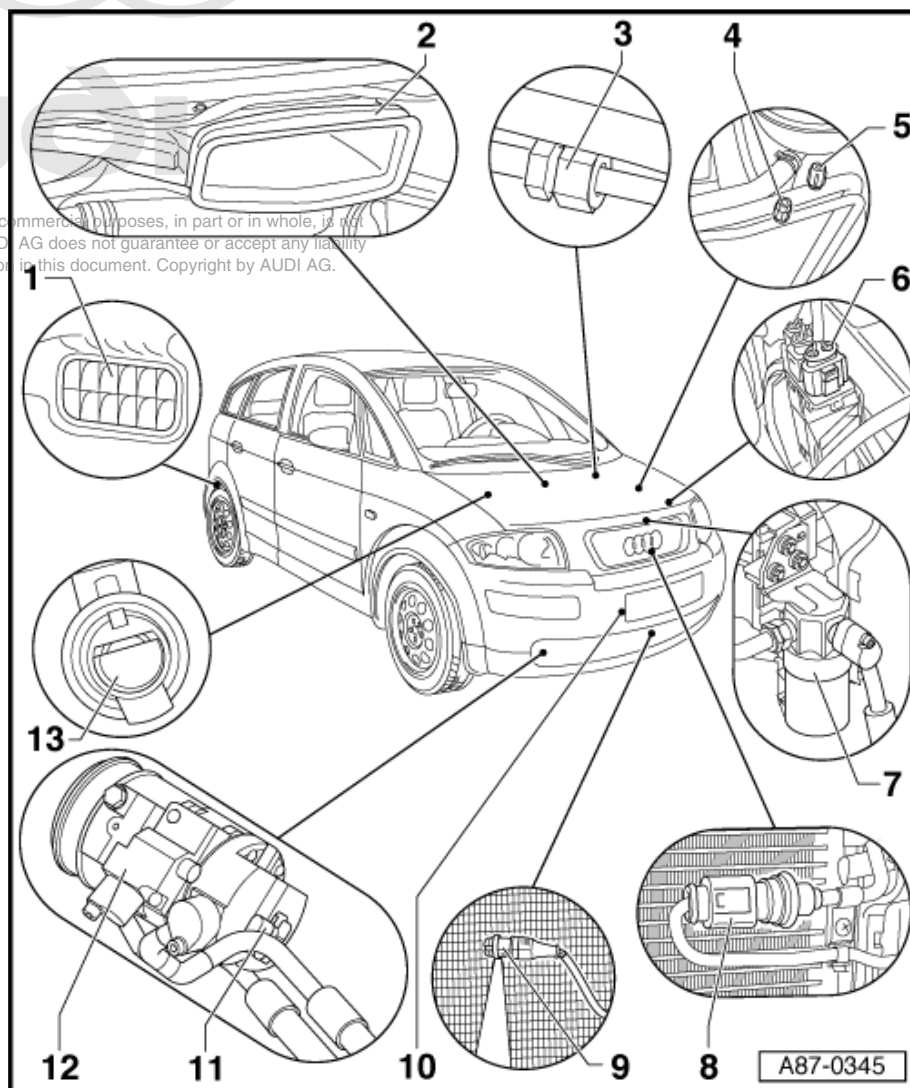
- ❑ Fresh air is drawn in via the fresh-air intake ducts in the engine compartment and passenger compartment and via an air duct installed under the bonnet ⇒ [page 128](#) and ⇒ [page 126](#)

3 - Union in the refrigerant pipe (with restrictor)

- ❑ The union is only to be opened after draining the refrigerant circuit; the vehicle must be taken to a specialist air conditioner workshop.

4 - Service connection

- ❑ High-pressure side
- ❑ for specialist air condi-



tioner workshop for
 measuring, draining and filling

- ☐ Always screw on the cap with the seal

5 - Service connection

- ☐ Low-pressure side
- ☐ for specialist air conditioner workshop for measuring, draining and filling
- ☐ Always screw on the cap with the seal

6 - Radiator fan control unit -J293- 2)

- ☐ Actuated by the engine control unit, by the control unit in the dash panel insert -J285- , radiator fan thermoswitch -F18- , radiator fan thermoswitch -F54- and operating and display unit for air conditioner/ Climatronic -E87- . ⇒ Current flow diagrams, Electrical fault finding and Fitting locations
- ☐ Switches the radiator fan -V7- to the different stages.
- ☐ Installed in different versions depending on the vehicle equipment ⇒ Parts List
- ☐ Checking ⇒ Electrical System; Repair group 01

7 - Reservoir

- ☐ Must only be removed after draining the refrigerant circuit; the vehicle must be taken to a specialist air conditioner workshop
- ☐ Removing and installing ⇒ [page 218](#)

8 - High-pressure sender -G65- 1)

- ☐ Function, removing and installing ⇒ [page 170](#)
- ☐ The measured value for the high-pressure sender -G65- is displayed in the "Read measured value block" function by the operating and display unit for air conditioner/Climatronic -E87- ⇒ [page 93](#)

9 - Ambient temperature sensor -G17-

- ☐ Removing
 - Removing front bumper; ⇒ General Body Repairs, Exterior; Repair group 63
 - Unplug the connector at the ambient temperature sensor -G17- and unclip from the mount in the air duct.
- ☐ Resistance values ⇒ [page 82](#)
- ☐ The measured value of the ambient temperature sensor -G17- is evaluated by the control unit in the dash panel insert -J285- and transmitted via the convenience data bus to the operating and display unit for air conditioner/Climatronic -E87- . ⇒ Electrical System; Repair group 01

10 - Condenser

- ☐ Must only be removed after draining the refrigerant circuit; the vehicle must be taken to a specialist air conditioner workshop
- ☐ Detaching and re-attaching refrigerant pipes ⇒ [page 215](#)
- ☐ Removing and installing condenser ⇒ [page 216](#)

11 - Air conditioner compressor regulating valve -N280- 1 ,2)

- ☐ Checking actuation and function ⇒ [page 94](#)

12 - Compressor

- ☐ Detaching and re-attaching compressor from/onto bracket ⇒ [page 172](#)
- ☐ Detaching and attaching refrigerant pipe from/to the compressor ⇒ [page 213](#)
- ☐ Removing and installing compressor ⇒ [page 214](#)
- ☐ Removing and installing poly-V-belt ⇒ Engine Mechanical Components; Repair group 13
- ☐ Replacing pulley ⇒ [page 173](#)

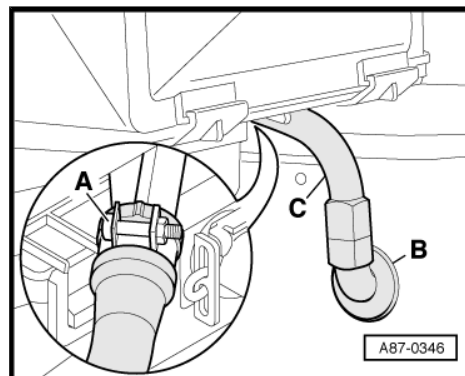
13 - Condensation drainage valve

- ☐ Checking ⇒ [page 180](#)
- ☐ Removing and installing ⇒ [page 180](#)

5.2 Removing and installing condensation drainage valve

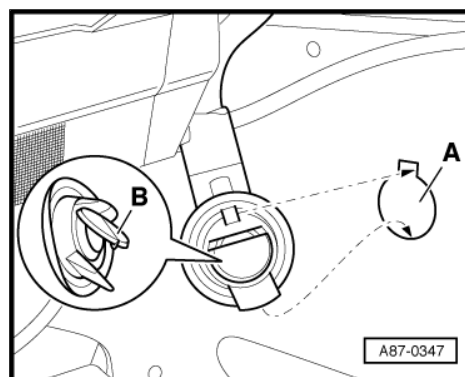
5.2.1 Removing

- Remove the glove box and foot mat on the passenger side ⇒ General Body Repairs, Interior; Repair group 68; Storage compartments/covers
- Unfasten the clip -A-.
- Pull the condensation drainage hose -B- with valve out of the floor panel.
- Remove the condensation drainage duct with valve.

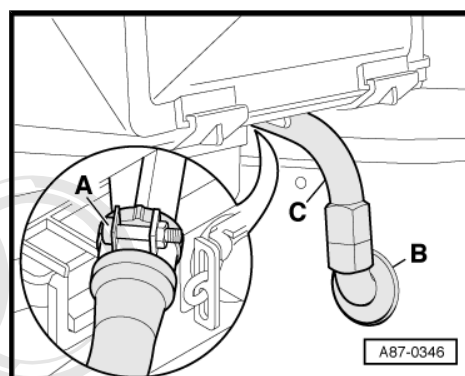


5.2.2 Installing

- Check the space between the sound-proofing mat -A- and the floor panel (the sound-proofing mat must not make contact with the installed condensation drainage valve).
- Check the condensation drainage valve -B-; it must not be gummed up with wax or underseal and must close properly.



- Completely insert the condensation drainage valve -B- as shown.
- Check the condensation drainage hose -C-; it must not be twisted or crushed.
- Fasten the clip -A-.
- Re-install all the components in reverse order.

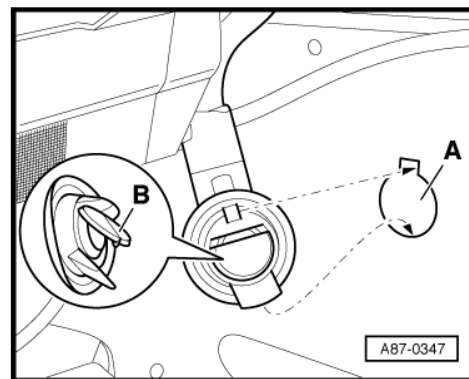


5.3 Checking condensation drainage valve

- Check the routing of the condensation drainage hose; it must not be twisted or crushed.
- Remove the condensation drainage valve and condensation drainage hose ⇒ [page 180](#)

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- Check the space between the sound-proofing mat -A- and the floor panel (the sound-proofing mat must not make contact with the installed condensation drainage valve).
- Check the condensation drainage valve -B-; it must not be gummed up with wax or underseal and it must close properly.
- Use wire, for example, to check the condensation drain on the air conditioner for contamination and clean if necessary
- ◆ In the event of moisture in passenger compartment:
 - Check the fresh-air intake in the engine compartment and the corresponding water drainage valves ➔ [page 128](#) and ➔ [page 126](#) .
 - Check the passenger compartment forced air extraction (via the luggage compartment) ➔ [page 126](#) .
 - Check the signal for detecting windscreen wiper operation on the operating and display unit for air conditioner/Climatronic - E87- ➔ [page 67](#) (Read the measured value block for display group "014")
 - Check the various positioning motors and the appropriate levers, paying particular attention to the position of recirculated air flap positioning motor -V113- and the flaps belonging to it.
 - Check the measured value for the evaporator outlet temperature sender -G263- ➔ [page 42](#) (Read the measured value block, display group "007"). If the measured value from the sender is too low under the conditions of use described by the customer (colder than 0 °C for lengthy periods at an ambient temperature above 0 °C), follow the instructions on testing the refrigeration capacity ➔ [page 201](#) .



5.4 Components in the passenger compartment



The different vents in the dash panel insert are described ➔ [page 122](#) .



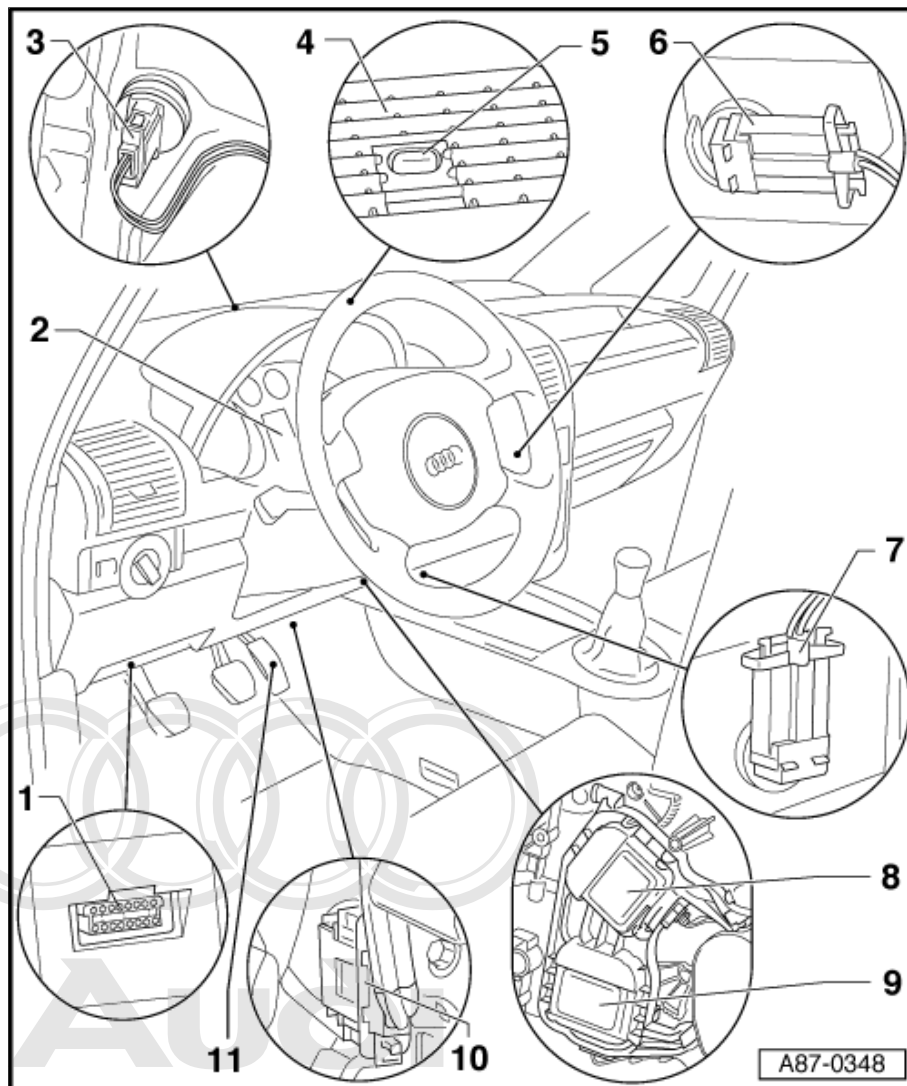
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1 - Diagnostic connector

- ❑ Performing air conditioner self-diagnosis
⇒ [page 4](#)

2 - Dash panel insert

- ❑ With the control unit in the dash panel insert - J285-
- ❑ With the ambient temperature display -G106-2)
- ❑ On vehicles with an automatic gearbox, the ambient temperature output by the operating and display unit for air conditioner/Climatronic -E87- is only displayed with gear engaged.
- ❑ If incorrect temperatures are displayed, check the measured values from the ambient temperature sensor - G17- and fresh-air intake duct temperature sensor -G89-
⇒ [page 82](#)
- ❑ The measured value from the ambient temperature sensor -G17- is evaluated by the control unit in the dash panel insert -J285- and transmitted via the convenience data bus to the operating and display



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unit for air conditioner/
 Climatronic -E87- . ⇒ Electrical System; Repair group 01

3 - Evaporator outlet temperature sender -G263- ¹⁾

- ☐ Removing and installing ⇒ [page 189](#)

4 - Defrost vent

- ☐ For windscreen
- ☐ Removing and installing ⇒ General Body Repairs, Interior; Repair group 70; Dash panel: Removing and installing the dash panel

5 - Sunlight penetration photosensor -G107- ¹⁾

- ☐ Removing and installing ⇒ [page 200](#)

6 - Centre vent temperature sender -G191- ¹⁾

- ☐ Removing and installing ⇒ [page 190](#)

7 - Footwell vent temperature sender -G192- ¹⁾

- ☐ Removing and installing ⇒ [page 190](#)

8 - Defrost flap positioning motor -V107- ²⁾

- ☐ With defrost flap positioning motor potentiometer -G135- ¹⁾
- ☐ Gear wheel colour code: white
- ☐ Removing and installing ⇒ [page 194](#)

9 - Temperature flap positioning motor -V68- ²⁾

- ☐ With temperature flap positioning motor potentiometer -G92- ¹⁾
- ☐ Gear wheel colour code: black
- ☐ Removing and installing ⇒ [page 194](#)

10 - Connector for heating element for additional heater -Z35-

- ☐ Present only in vehicles with a TDI engine destined for certain countries.
- ☐ Different versions, the diagram shows the version with a power rating of 900 watts ⇒ [page 106](#)

11 - Throttle mechanism

- ☐ The kick-down shutoff of the air conditioner compressor regulating valve -N280- takes place via the engine control unit ⇒ Relevant Workshop Manual for Injection and Ignition System; Repair group 01 and ⇒ Relevant Workshop Manual for Diesel Direct Injection and Glow Plug System; Repair group 01

12 - Operating and display unit for air conditioner/Climatronic - E87-

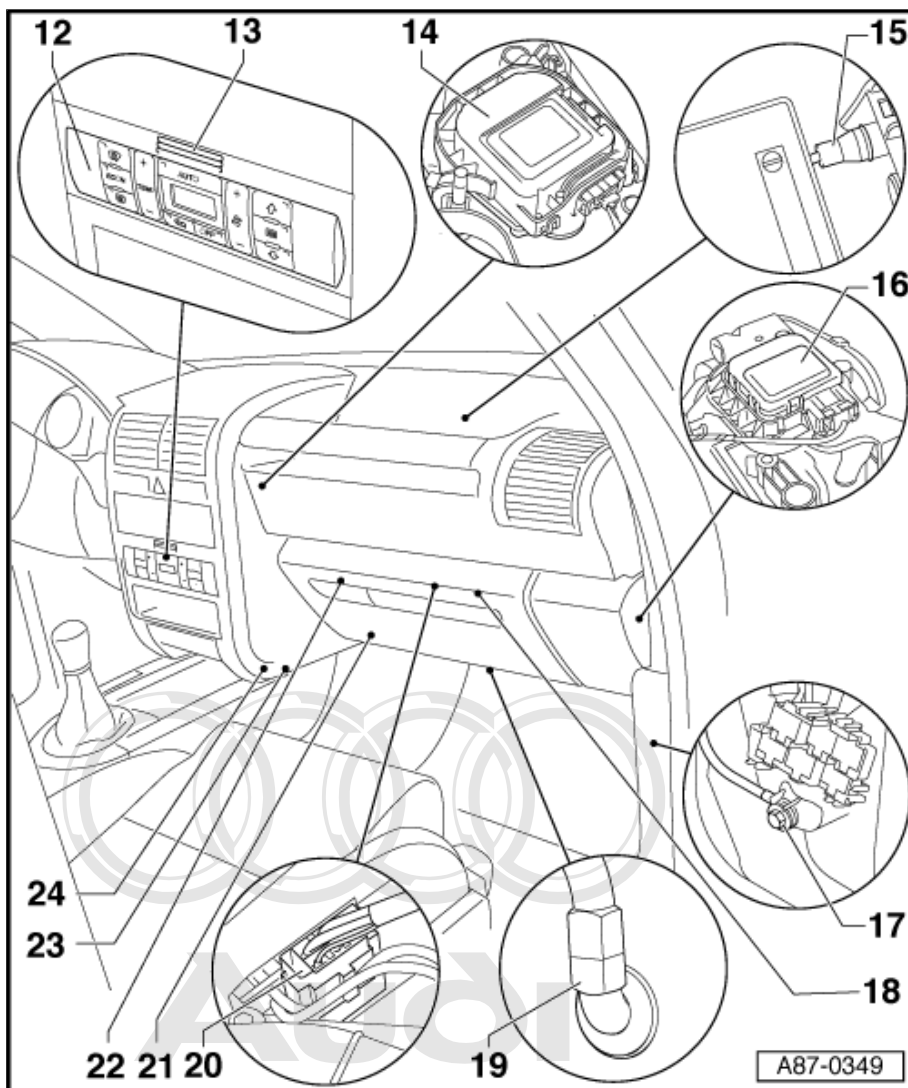
- ❑ Assignment ⇒ Parts List
- ❑ Removing and installing ⇒ [page 188](#)
- ❑ The dash panel temperature sender -G56- is integrated into the operating and display unit for air conditioner/Climatronic -E87-
- ❑ Observe additional notes ⇒ [page 186](#)
- ❑ Checking and setting code ⇒ [page 40](#)
- ❑ Illumination of the display zones by LEDs, not replaceable
- ❑ Different versions, depending on the model year and vehicle equipment ⇒ [page 186](#)

13 - Temperature sensor blower -V42- 2)

- ❑ Installed in the operating and display unit for air conditioner/Climatronic -E87-
- ❑ Removing and installing ⇒ [page 199](#)

14 - Central flap positioning motor -V70- 2)

- ❑ With central flap positioning motor potenti-



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ometer -G112-

- ☐ Removing and installing ⇒ [page 191](#)

15 - Fresh-air intake duct temperature sensor -G89- ¹⁾

- ☐ Checking ⇒ [page 82](#)
- ☐ Removing and installing ⇒ [page 199](#)

16 - Recirculated air flap positioning motor -V113- ²⁾

- ☐ Also actuates the fresh-air flap (air flow flap)
- ☐ With a recirculated air flap positioning motor potentiometer -G143- ¹⁾
- ☐ Removing and installing ⇒ [page 197](#)

17 - Earth connection for heating element for additional heater -Z35-

- ☐ Present only in vehicles with a TDI engine destined for certain countries.
- ☐ Different versions of heating element for additional heater -Z35- ⇒ [page 106](#)

18 - Fresh-air blower -V2- ²⁾

- ☐ Removing and installing ⇒ [page 137](#)

19 - Condensation drain with valve

- ☐ Checking ⇒ [page 180](#)
- ☐ Removing and installing ⇒ [page 180](#)

20 - Fresh-air blower control unit -J126- ²⁾

- ☐ Removing and installing ⇒ [page 189](#)

21 - Dust and pollen filter

- ☐ Removing and installing ⇒ [page 130](#)
- ☐ Observe replacement intervals ⇒ Maintenance ; Booklet

22 - Air conditioner with evaporator

- ☐ Removing and installing ⇒ [page 221](#)
- ☐ Dismantling and assembling ⇒ [page 226](#)
- ☐ Only to be removed after draining the refrigerant circuit; the vehicle must be taken to a specialist air conditioner workshop.

23 - Heating element for additional heater -Z35-

- ☐ Only provided for vehicles with a diesel engine, installation depends on equipment level ⇒ [page 106](#) .
- ☐ Different versions ⇒ [page 106](#) .
- ☐ Depending on the equipment level, vehicles built up to 2002 feature either an electric additional heater or a fuel-powered additional heater ⇒ [page 106](#) , ⇒ [page 149](#) , ⇒ Relevant Workshop Manual for Diesel Direct Injection and Glow Plug System; Repair group 01 and ⇒ auxiliary heating; repair group 82
- ☐ Removing and installing ⇒ [page 147](#)
- ☐ Checking function ⇒ [page 106](#)

24 - Heating system heat exchanger

- ☐ Removing and installing ⇒ [page 155](#)

5.5 Removing and installing the heating system heat exchanger



Note

- ◆ *The sequence of operations for removing and installing the heat exchanger is identical for vehicles with heating and air conditioning ⇒ [page 155](#) .*
- ◆ *The heat exchanger may be removed and installed with the air conditioner installed ⇒ [page 155](#) .*

5.6 Removing and installing heating element for additional heater -Z35-



Note

- ◆ *The sequence of operations for removing and installing the additional heater element is identical for vehicles with heating and air conditioning ⇒ [page 147](#) .*
- ◆ *The heating element for additional heater -Z35- can be removed and installed without removing the air conditioner ⇒ [page 147](#) .*
- ◆ *Checking function of heating element for additional heater -Z35- ⇒ [page 106](#) .*
- ◆ *Different versions ⇒ [page 106](#) .*

5.7 Removing and installing operating and display unit for air conditioner/Climatronic -E87-

- Removing and installing operating and display unit for air conditioner/Climatronic -E87- ⇒ [page 188](#) .



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**Note**

- ◆ *Note the precise assignment when replacing an operating and display unit: ⇒ [Parts List](#)*
- ◆ *Vehicles with and without a radio/navigation system (or radio with large control panel), with and without switches for heated seats (e.g. index "without", "A", "B" or "C") feature different versions of the operating and display unit for air conditioner/Climatronic -E87-. ⇒ [Parts List](#)*
- ◆ *Only a operating and display unit for air conditioner/Climatronic -E87- with a part number starting from index "D" can be installed in vehicles from model year 2002 onwards (different trim panel surface, adapted to the radios installed as of model year 2002). ⇒ [Parts List](#)*
- ◆ *If an operating and display unit for air conditioner/Climatronic -E87- with a part number up to index "C" is installed in vehicles built from 2002 onwards, then this may lead to problems with the data transfer on the convenience data bus.*
- ◆ *Vehicles with a 1.6 l petrol direct injection engine (FSI) may only have an operating and display unit for air conditioner/Climatronic -E87- with a part number starting from index "D" and the hardware/software version "XX12" installed.*
- ◆ *If the coolant temperature is low in vehicles with a 1.6 l petrol direct injection engine, a signal is transmitted from the operating and display unit for air conditioner/Climatronic -E87- via the data bus system to the engine control unit (but only if heating output is requested by the operating and display unit for air conditioner/Climatronic -E87-). This signal is used to change the mixture formation of the engine control unit in order to achieve better heating of the coolant. This signal is not transmitted by an operating and display unit for air conditioner/Climatronic -E87- up to hardware / software version "XX11".
⇒ [Relevant Workshop Manual, Injection and Ignition system](#)*
- ◆ *Following installation, perform air conditioning basic setting in the specified manner ⇒ [page 36](#).*
- ◆ *If a new operating and display unit for air conditioner/Climatronic -E87- is installed without the basic settings being performed, the air conditioning compressor regulating valve - N280- will not be activated, and the shutoff condition "6" is displayed in measured value block "002" during air conditioner self-diagnosis.*
- ◆ *The functions selected are indicated by LEDs lighting up in the various operating and display unit for air conditioner/Climatronic -E87- buttons.*
- ◆ *The temperature sensor control panel -G56- and the switch for the rear windscreen heating are integrated into this version of the operating and display unit for air conditioner/Climatronic -E87-. The blower for the temperature sensor -V42- is installed and can be replaced individually.*
- ◆ *The following steps are essential after replacing the operating and display unit for air conditioner/Climatronic -E87- :*
- ◆ *Perform basic setting ⇒ [page 36](#).*
- ◆ *Interrogate fault memory ⇒ [page 9](#).*
- ◆ *The display panel for the operating and display unit for air conditioner/Climatronic -E87- can be switched from °C to °F, and vice versa, by pressing the "Temperature +" button while the "Recirculated air button" is pressed.*

- ◆ If an operating and display unit for air conditioner/Climatronic -E87- is replaced, the display for the operating and display unit for air conditioner/Climatronic -E87- appears in °F in vehicles in which the assignment of the ignition key is transmitted by the control unit in the dash panel insert -J285-. With these vehicles, the temperature display can be switched from °F to °C by pressing the "Temperature +" button while the "Recirculated air button" is pressed. 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).

5.7.1 Removing and installing the operating and display unit for air conditioner/Climatronic -E87-

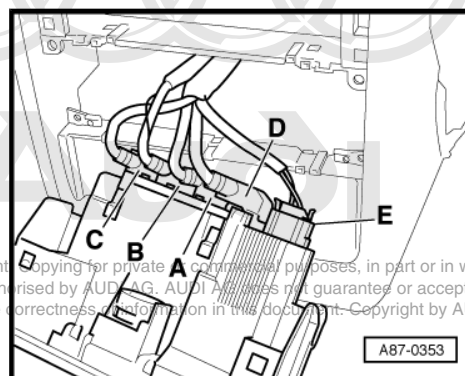
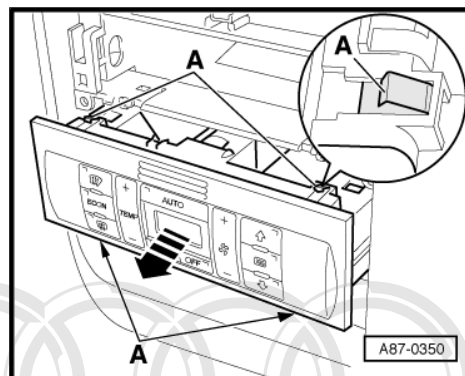
5.7.2 Removing

- Remove the 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 for air conditioner/Climatronic -E87- back.



Note

- ◆ The operating and display unit for air conditioner/Climatronic -E87- is held in position in the centre console by means of 4 retainers -A-.
- ◆ When replacing an operating and display unit for air conditioner/Climatronic -E87-, take note of the precise assignment (e.g. with or without holes for the heated seat switches) ⇒ Parts List
- Release the connectors -A- to -E- by pressing the retainer tabs and unplug them.

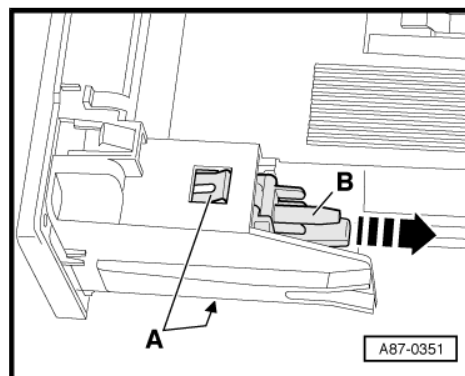


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Note

- ◆ In the event of incorrect dash panel temperature sensor -G56- measurements, check the intake grille of the operating and display unit for air conditioner/Climatronic -E87- trim panel, which must not be sealed off, as well as the operation of the temperature sensor blower -V42-.
- ◆ In order to remove the switches for heated seats, press back the retainer tabs -A- and pull or slide the switch -B- back from the operating and display unit for air conditioner/Climatronic -E87-.



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

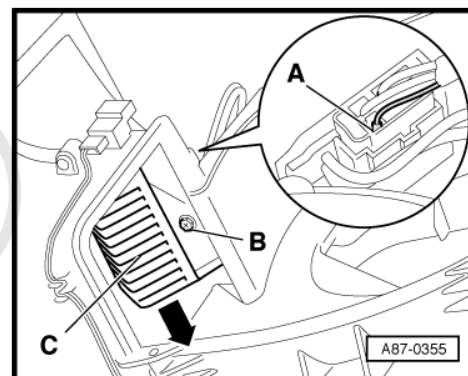


- ◆ The sequence of operations for removing and installing the fresh-air blower -V2- is identical for vehicles with heating and air conditioning ⇒ [page 137](#).
- ◆ After installing the fresh-air blower -V2-, check that it is correctly positioned in the air conditioner.
- ◆ Remember that there are different fresh-air blower -V2- versions for vehicles with heating and air conditioning. ⇒ Parts List

5.9 Removing and installing the fresh-air blower control unit -J126-

5.9.1 Removing

- Remove the fresh-air blower -V2- ⇒ [page 189](#).
- Unplug the connector -A-.
- Remove the screws -B-.
- Remove the control unit -C- from the air conditioner in the direction of the arrow.

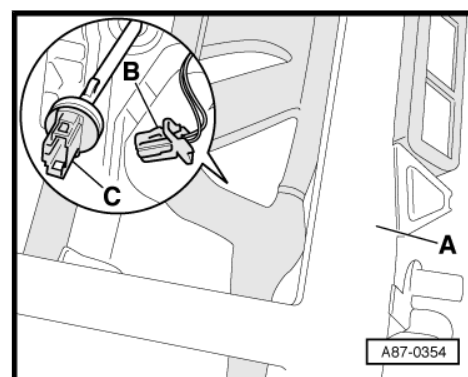


5.9.2 Installing

Installation is in reverse order.

5.10 Removing and installing the evaporator outlet temperature sender -G263-

- Remove the glove box, the driver's storage compartment and the dash panel ⇒ General Body Repairs, Interior; Repair group 68
- Reach in behind the dash panel cross member -A- and unplug the connector -B- from the evaporator outlet temperature sender -G263-.
- Disconnect the sender -C- from the air conditioner.



5.11 Removing and installing the footwell vent temperature sender -G192-

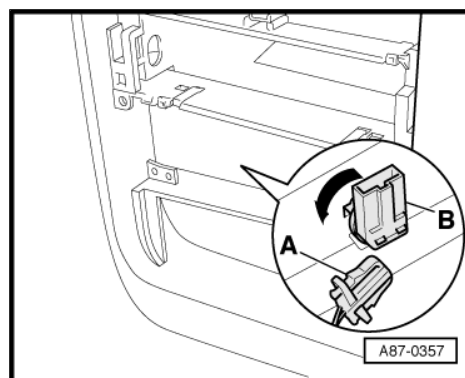
5.11.1 Removing

- Remove the radio or radio/navigation system. ⇒ Electrical System; Repair group 91
- Remove the operating and display unit for air conditioner/Climatronic -E87- ⇒ [page 188](#) .
- Remove the storage compartment on the driver's side and the storage compartment underneath the operating and display unit for air conditioner/Climatronic -E87- ⇒ General Body Repairs, Interior; Repair group 68
- Reach through the opening for the operating and display unit for air conditioner/Climatronic -E87- and unplug the connector -A-.
- Turn the vent temperature sender -B- through approx. 90° in the direction of the arrow.



Note

Use your other hand to push the vehicle wiring harness to the side (from the left via the opening created by removing the driver's storage compartment).



- Pull the footwell vent temperature sender -G192- out of the air conditioner.

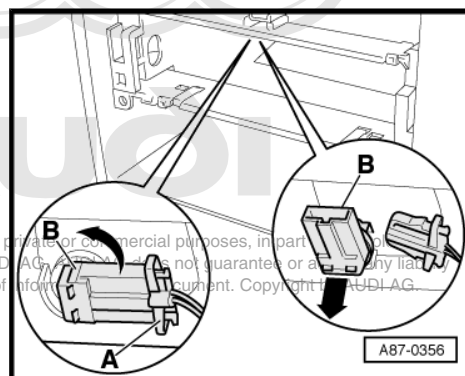
5.11.2 Installing

Installation is in reverse order.

5.12 Removing and installing the centre vent temperature sender -G191-

5.12.1 Removing

- Remove the radio or radio/navigation system. ⇒ Radio, Telephone and Navigation System; Repair group 91
- Remove the operating and display unit for air conditioner/Climatronic -E87- ⇒ [page 188](#) .
- Reach through the opening for the radio or operating and display unit for air conditioner/Climatronic -E87- and unplug the connector -A-.
- Turn the centre vent temperature sender -G191- -B- through approx. 90° in the direction of the arrow.
- Pull the centre vent temperature sender -G191- out of the air duct.



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5.12.2 Installing

Installation is in reverse order.

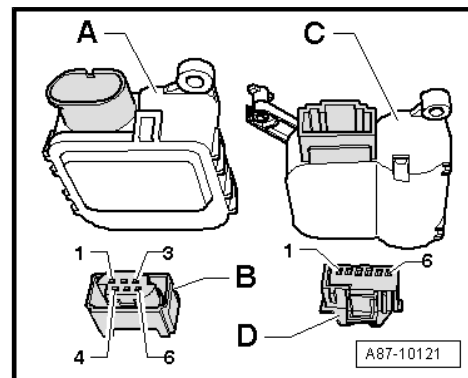
5.13 Removing and installing the central flap positioning motor -V70-



Note

Depending on when vehicles are produced, the positioning motors and connectors may vary. Until 01/04 the positioning motors -A- were installed with corresponding connectors -B-; since then (gradual introduction) the positioning motors -C- have been installed with the corresponding connectors -D- ➔ [Parts List](#)

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5.13.1 Removing

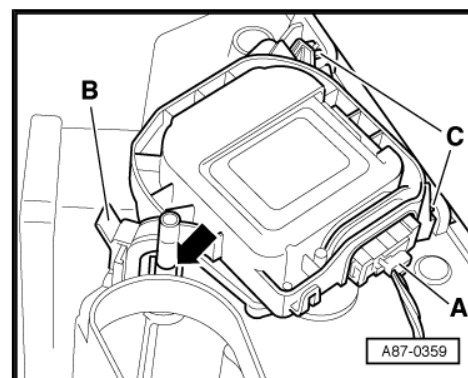
- Remove the air conditioner ➔ [page 221](#)



Note

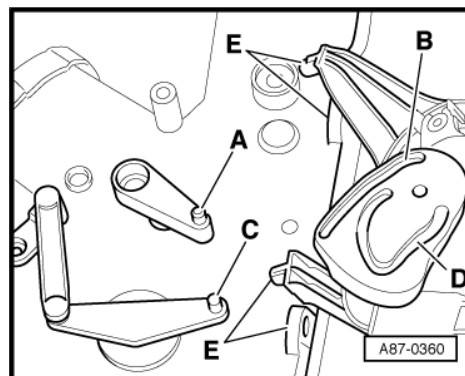
In vehicles with right hand drive, the positioning motor may be removed without removing the air conditioner. The air duct leading to the air distributor housing runs along the left side, and the positioning motor can be replaced without having to remove the air conditioner, provided the dash panel cross member is removed ➔ [page 194](#). (Removing and installing the temperature flap positioning motor -V68- and the defrost flap positioning motor -V107-).

- Remove the air distributor housing from the air conditioner ➔ [page 228](#)
- Unplug connector -A-.
- Release catch -B-.
- Pull the bracket from the retainers -C- and remove it along with the central flap positioning motor -V70-.
- Remove the positioning motor from the bracket ➔ [page 192](#)



5.13.2 Installing

- Insert the positioning motor into the bracket ⇒ [page 192](#)
- Insert the positioning motor bracket into the retainer -E-
- Insert lever -A- into guide groove -B- and lever -C- into guide groove -D- of the positioning motor.

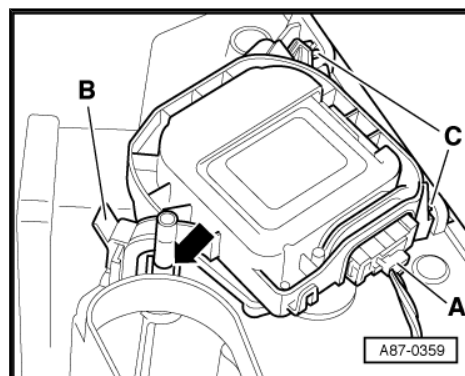


- Lock the bracket in place with the catch -B- on the air-distributor housing
- After installing the positioning motor, check that the levers are correctly seated in the guide grooves of the positioning motor.



Note

The operation of the positioning motor can be checked as follows, for example: Connect the contacts "4" (or "5") and "6" in the positioning motor connector to a 12V DC source. The positioning motor moves as far as the limit stop in one direction. Interchanging positive and negative reverses the direction. Use the adapter cable for this purpose ⇒ [page 193](#).



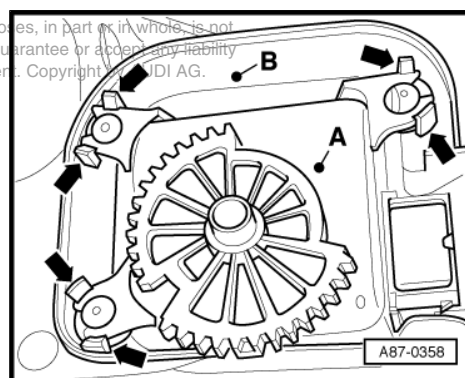
Then reinstall all the parts removed in reverse order, paying attention to the following:

- Lay the wiring harness so that it cannot come into contact with the moving components (e.g. positioning motor lever).
- Interrogate fault memory ⇒ [page 9](#), erase fault memory ⇒ [page 38](#); and perform basic setting ⇒ [page 36](#).

5.14 Removing and re-installing the positioning motor from/onto bracket

5.14.1 Removing

- Carefully press the retaining tabs outwards and remove positioning motor -A- from bracket -B-.



5.14.2 Installing

- Press the positioning motor -A- into the retaining tabs of bracket -B-

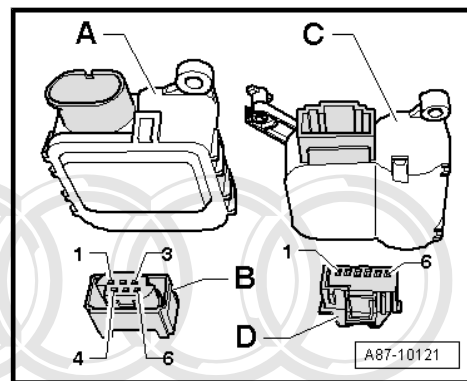
i Note

If any of the retaining tabs in bracket -B- are broken off, replace the bracket.

5.15 Preparing adapter cables for positioning motor actuation

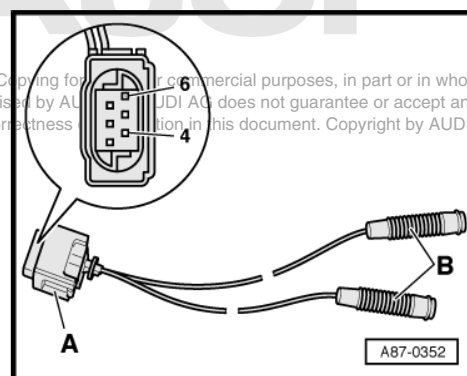
i Note

- ◆ Depending on when vehicles with air conditioning are produced, the positioning motors and connectors vary. Until 01/04 the positioning motors -A- were installed with corresponding connectors -B-; since then (gradual introduction) the positioning motors -C- have been installed with the corresponding connectors -D-.
- ◆ The assignment of the contacts in the connectors varies; in the positioning motors -A-, the motor is connected to the contacts -4- and -6-, and in the positioning motors -C-, the motor is connected to the contacts -5- and -6-.



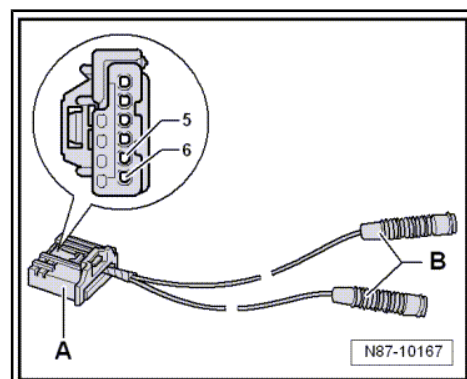
Adapter cables for the heating positioning motor and air conditioning positioning motor up to 01/04.

- Connect to the contacts "4" and "6" on the connector -A- (part number 7M0 973 119 or 4B0 972 571) using wire with a cross section of 0.25 mm² in each case. ⇒ Parts List
- Connect the other end of each wire to a commercially available banana plug -B-.
- ◆ Check that the positioning motor is working.
- Connect a 12 V supply to the contacts "4" and "6" on the positioning motor and check the movement of the levers in the guide grooves. The direction of rotation is reversed by interchanging the positive and negative wires.



Adapter cables for the air conditioning positioning motor from 01/04.

- Make a connection to contacts "5" and "6" of connector -A- (part number 6Q0 972 706) using wire with a cross section of 0.25 mm² in each case.
- Connect the other end of each wire to a commercially available banana plug -B-.
- ◆ Check that the positioning motor is working.
- Connect a 12 V supply to the contacts "5" and "6" on the positioning motor and check the movement of the levers in the guide grooves. The direction of rotation is reversed by interchanging the positive and negative wires.

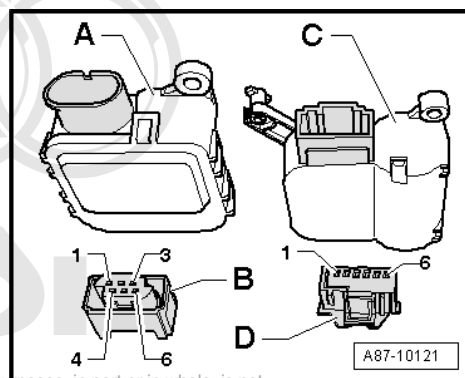


5.16 Removing and installing the defrost flap positioning motor -V107- and the temperature flap positioning motor -V68-



Note

Depending on when vehicles are produced, the positioning motors and connectors may vary. Until 01/04 the positioning motors -A- were installed with corresponding connectors -B-; since then (gradual introduction) the positioning motors -C- have been installed with the corresponding connectors -D- ⇒ Parts List



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5.16.1 Removing

- Remove the glove box, the driver's storage compartment, the centre console and the dash panel: ⇒ General Body Repairs, Interior; Repair group 70; Dash panel



Note

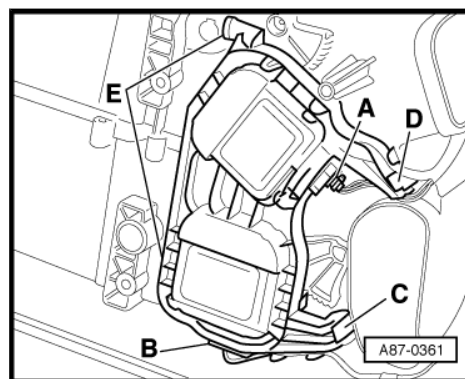
- So as not to damage the dash panel fascia, the dash panel may only be placed on a clean workbench covered, for example, with clean cardboard.
- On vehicles with right-hand drive, the positioning motors may only be replaced with the air conditioner removed (the dash panel cross member need not be removed). Air is routed to the air distributor housing via the left side, and the positioning motors can only be removed after separating the air distributor housing and the air conditioner ⇒ [page 191](#). (Removing and installing the central flap positioning motor -V70-)

- Remove the dash panel cross member ⇒ General Body Repairs, Interior; Repair group 70; Dash panel
- Remove connector -A- from the defrost flap positioning motor -V107- and connector -B- from the temperature flap positioning motor -V68-.
- Release catches -C- and -D-.
- Disengage the bracket from the retainers -E- and remove it with the temperature flap positioning motor -V68- and the defrost flap positioning motor -V107-.
- Remove the positioning motor from the bracket ⇒ [page 192](#)



Note

The temperature flap positioning motor -V68- and the defrost flap positioning motor -V107- are different, which is why they possess different colours of gear wheel (black in the temperature flap positioning motor -V68- and white in the defrost flap positioning motor -V107-).



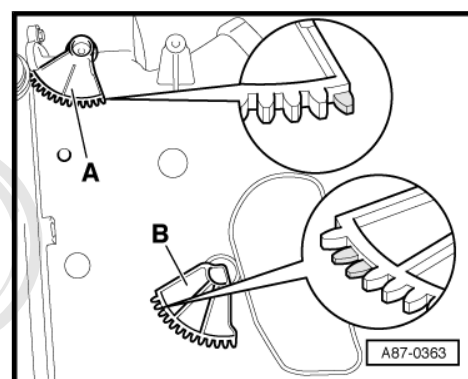
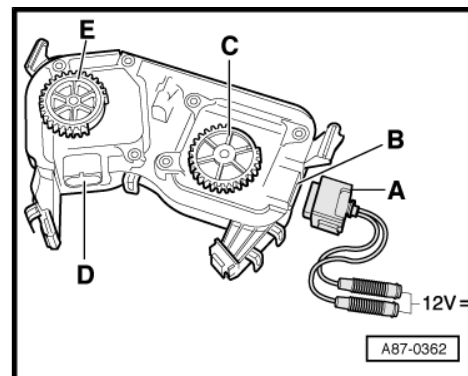
5.16.2 Installing

- Insert the positioning motors into the bracket ([⇒ page 192](#)):
- Temperature flap positioning motor -V68- -C- with black gear wheel
- Defrost flap positioning motor -V107- -C- with white gear wheel
- Connect the contacts “4” (or “5”) and “6” in both positioning motor connectors -B- and -D- to a 12 V DC power source one after another, the positioning motor moves into one direction up to the limit stop; interchanging positive and negative causes a change in rotation direction. Use an adapter cable -A- for this purpose [⇒ page 193](#) .
- Move the gear wheels on positioning motors -C- and -E- to the stop positions shown in the illustration)
- Move the levers -A- (for the defrost flap) and -B- (for the temperature flap) on the air distributor housing of the air conditioner to the position shown.

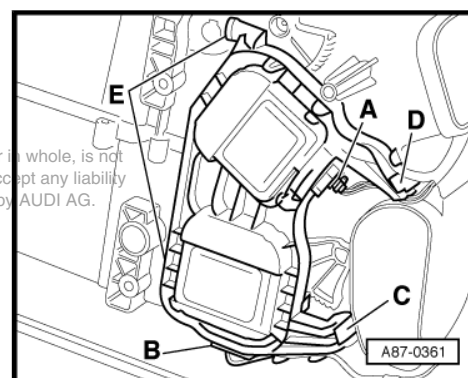


Note

Pay attention to the shorter tooth on both levers and the larger tooth space at this location.



- Insert the positioning motor bracket into the retainer -E-



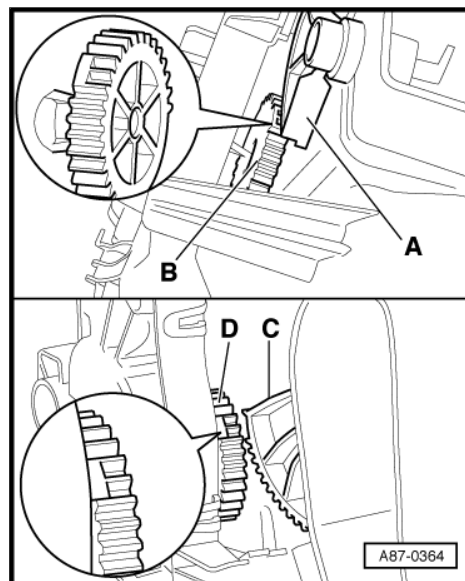
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- Now move the defrost flap positioning motor -V107- -A- with the lever -B- and the temperature flap positioning motor -V68- -C- with the lever -D- together. Ensure, in particular, that the gear wheels are in the right position relative to the levers.

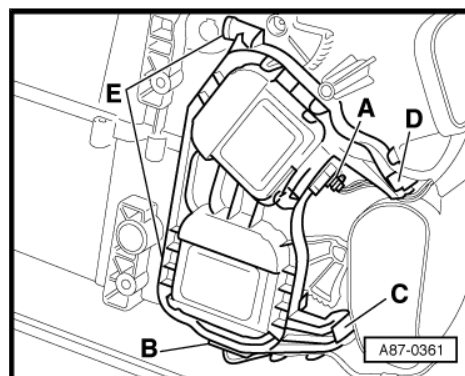


Note

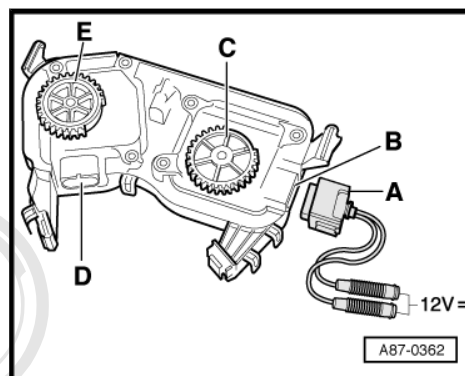
If the gear wheel and lever do not coincide as specified, the positioning motor becomes blocked as soon as the large tooth no longer comes into contact with a broad tooth space.



- Lock the bracket in place with the catches -C- and -D- on the air-distributor housing
- Then proceed as follows to check the function of the positioning motors:



- Connect the contacts “4” (or “5”) and “6” in the connector for each positioning motor to a 12V DC power source in consecutive order (using an adapter cable ⇒ [page 193](#)).
- Monitor the movement of the positioning motor. Wait until the positioning motor has reached an end position.
- Now interchange the positive and negative connection in order to change the direction of rotation of the positioning motor. Wait until the positioning motor has reached an end position.



Note

If the gears and levers of both positioning motors do not match as specified, the positioning motor becomes blocked or the air conditioner will emit noise during operation because the flaps are not closing properly.

Then reinstall all the parts removed in reverse order, paying attention to the following:

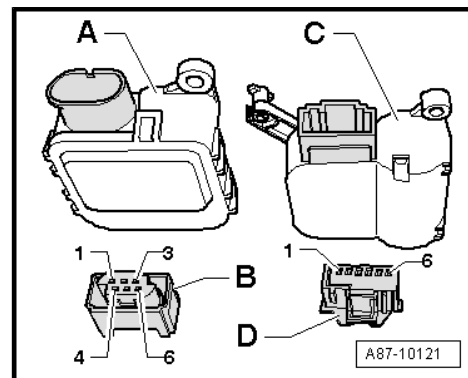
- Lay the wiring harness so that it cannot come into contact with the moving components (e.g. positioning motor lever).
- Interrogate fault memory ⇒ [page 9](#) , erase fault memory ⇒ [page 38](#) , and perform basic setting ⇒ [page 36](#) .

5.17 Removing and installing the recirculated air flap positioning motor -V113-



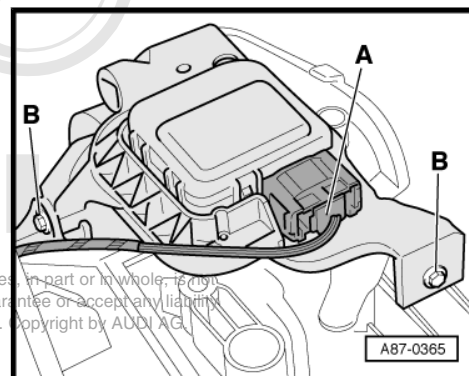
Note

Depending on when vehicles are produced, the positioning motors and connectors may vary. Until 01/04 the positioning motors -A- were installed with corresponding connectors -B-; since then (gradual introduction) the positioning motors -C- have been installed with the corresponding connectors -D- ⇒ Parts List

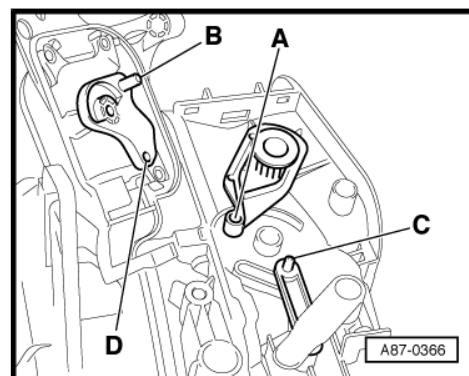


5.17.1 Removing

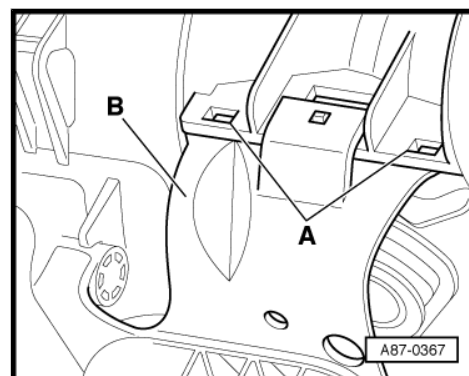
- Remove the dash panel insert: ⇒ General Body Repairs, Interior; Repair group 70; Dash panel
- Remove the fresh-air blower -V2- ⇒ [page 137](#).
- Unplug connector -A- from the positioning motor.
- Unscrew the bolts -B-.



- Carefully release the lug -B- from the lever for the fresh-air flap -A- and the lug -C- of the recirculated air flap lever from hole -D- in the positioning motor lever.



- Loosen the catches -A- between the bracket -B- and the air conditioner.
- Remove the positioning motor from the bracket ⇒ [page 192](#)



5.17.2 Installing

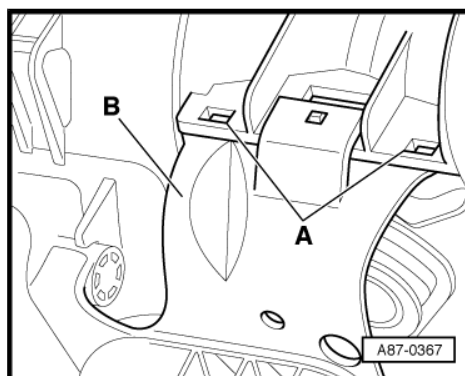
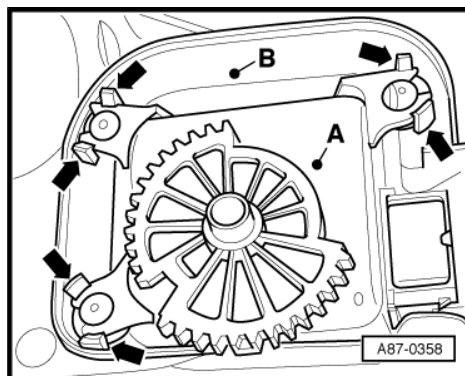
- Press the positioning motor -A- into the retaining tabs of bracket -B-



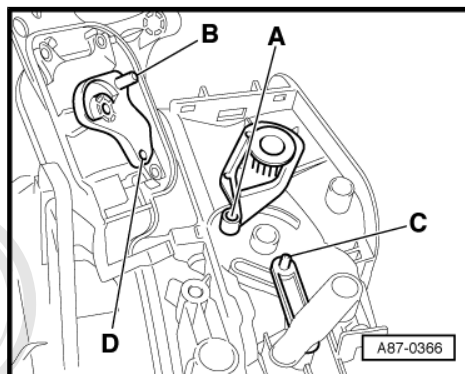
Note

- ◆ If any of the retaining tabs in bracket -B- are broken off, replace the bracket.
- ◆ The illustration shows the positioning motor for the fresh-air and recirculated air flap -V154- ; insert the positioning motor for the recirculated air flap -V113- into the bracket in the same manner.

- Insert the bracket -B- into the catches for the air conditioner -A-.



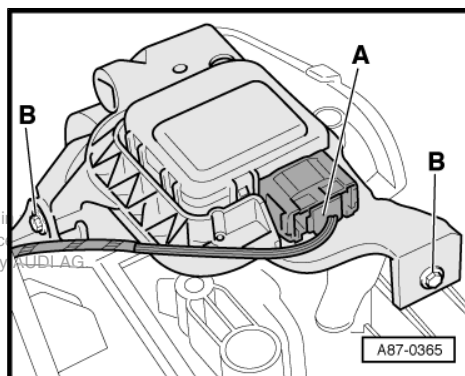
- Insert the lug -B- into the lever for the fresh-air flap -A- and the lug -C- of the recirculated air flap lever into the hole -D- in the positioning motor lever.



- Insert the bolts -B-.
- Insert the connector -A- on the positioning motor.

Then reinstall all the parts removed in reverse order, paying attention to the following:

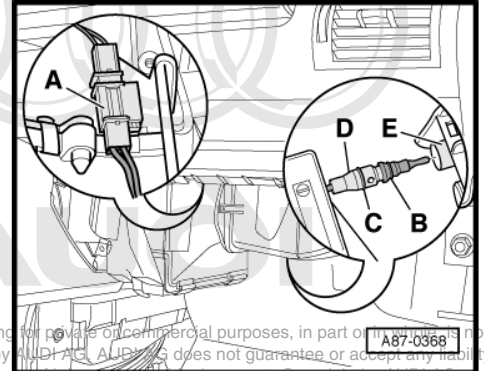
- Lay the wiring harness so that it cannot come into contact with the moving components (e.g. positioning motor lever).
- Interrogate fault memory ⇒ [page 9](#), erase fault memory ⇒ [page 38](#), and perform basic setting ⇒ [page 36](#).



5.18 Removing and installing the fresh-air intake duct temperature sensor -G89-

5.18.1 Removing

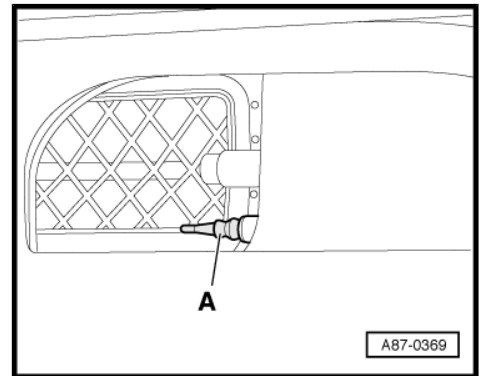
- Remove the glove box: ⇒ General Body Repairs, Interior; Repair group 68
- Unplug connector -A-.
- Reach between the bulkhead and the air conditioner and pull the temperature sensor -B- out of the air conditioner intake housing.



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Note

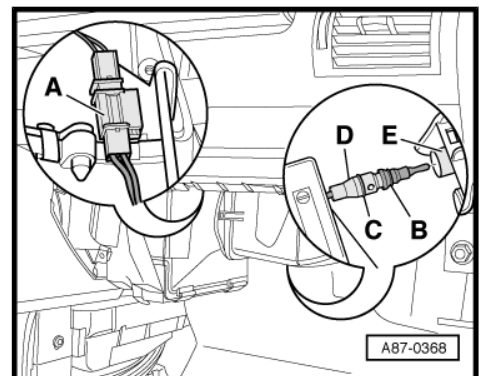
- ◆ Should it not be possible to remove the temperature sensor:
- ◆ Remove the fresh-air intake duct for the air conditioning (in the engine compartment) ⇒ [page 126](#).
- ◆ Slide the temperature sensor -A- from the intake housing in the direction of the passenger compartment.



5.18.2 Installing

- Check that the O-ring seal -C- is seated correctly.
- Slide the temperature sensor -B- far enough into the air conditioner -E- until it engages noticeably (you should still be able to feel the cone -D-).

Then re-install all the removed components in reverse order.



5.19 Removing and installing the temperature sensor blower -V42- dash panel

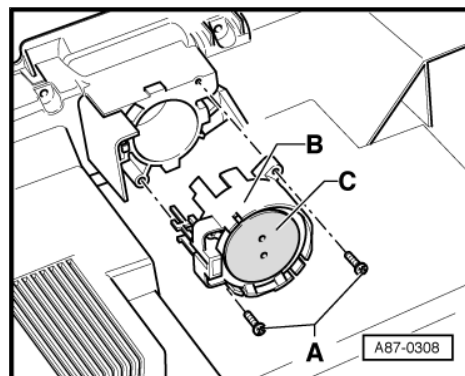
- Remove the operating and display unit for air conditioner/Climatronic -E87- ⇒ [page 188](#).

- Remove bolts -A-.
- Remove the temperature sensor blower -V42- -B- from the Climatronic control unit -E87- .



Note

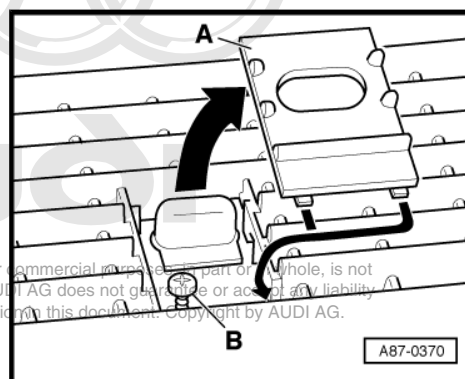
When installing the temperature sensor blower -V42- , do not press unduly on the motor -C- rather hold the blower against the housing.



5.20 Removing and installing the sunlight penetration photosensor -G107-

5.20.1 Removing

- Carefully lever the cover -A- off the front windscreen defrost vent in the direction of the arrow.
- Unscrew the bolt -B-.
- Remove the sunlight penetration photosensor -G107- from the front windscreen defrost vent.



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5.20.2 Installing

Installation is in reverse order.

6 Checking air conditioner refrigeration capacity

6.1 Checking air conditioner refrigeration capacity

6.1.1 Special tools, testers and auxiliary equipment required

- ◆ Vehicle diagnostics, measuring and information system -VAS 5051- (or fault reader -V.A.G 1551/- or vehicle system tester - V.A.G 1552/-) and, for example, the diagnostic cable -VAS 5051/5A-)
- ◆ Mini tester -V.A.G 1362-



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**Note**

- ◆ *The ambient temperature is above 15 ° C.*
- ◆ *Clean the radiator and condenser as necessary.*
- ◆ *The poly-V-belt for the compressor drive is OK and tensioned correctly.*
- ◆ *All the air ducts, covers and seals are OK and properly fitted.*
- ◆ *The air flow through the dust and pollen filter is not impeded by contamination.*
- ◆ *The fresh air intake is via the fresh air intake ducts in the engine compartment and in the passenger compartment.*
- ◆ *The water drainage valves in the fresh air intake ducts in the engine compartment are OK.*
- ◆ *The vehicle is not exposed to sunlight.*
- ◆ *The engine at operating temperature.*
- ◆ *The fault memory has been interrogated [⇒ page 9](#), all the displayed faults have been rectified, and the fault memory has been erased [⇒ page 38](#).*
- ◆ *The encoding has been checked and corrected where necessary [⇒ page 40](#); read the measured value block [⇒ page 42](#).*
- ◆ *Basic setting has been performed [⇒ page 36](#).*
- ◆ *All the dash panel vents are open.*
- ◆ *The bonnet is installed.*
- ◆ *Settings on the operating and display unit for air conditioner/ Climatronic -E87-.*
- ◆ *"Auto" mode*
- ◆ *"LO" temperature preselection.*
- ◆ *Compressor on (the lamp in **Econ** button is not lit).*
- ◆ *Functions with the engine running:*
- ◆ *The radiator fan -V7- is running (at least at speed 1).*
- ◆ *The fresh-air blower -V2- is running at maximum speed.*
- ◆ *The fresh and recirculated air flap switches to "Recirculated air mode" position (approx. 1 minute after the vehicle is started, air is drawn in by the fresh-air blower -V2- from the passenger's footwell).*

**Note**

If any of these test requirements is not met, interrogate fault memory [⇒ page 9](#) and perform final control diagnosis [⇒ page 29](#).

6.1.2 Checking

- Measure the ambient temperature (it must be over 15 °C).
- Close the doors, windows and sunroof.
- Close the "right" and "left" vents on the dash panel.
- Switch on the ignition.

- Set the “Econ” mode on the operating and display unit for air conditioner/Climatronic -E87- (the lamp in the **Econ** button is lit).
- Start the engine.
- Start the air conditioner self-diagnosis ⇒ [page 4](#)
- Select the display group “001” ⇒ [page 42](#) in the “Read measured value block” function ⇒ [page 46](#)
- Check the display in the display zones:
- Display zone “2” shows 0% (the compressor is off).
- Display zone “4” indicates that the pressure in the refrigerant circuit at the measured ambient temperature is equal to or greater than the value in the table.

Ambient temperature in °C	Displayed pressure (in bar absolute)
15	4,7
20	5,6
25	6,6
30	7,6
35	8,8



Note

- ◆ *An absolute pressure of 0 bar represents an absolute vacuum. Normal ambient pressure thus corresponds to roughly 1 bar absolute. On the dials of most pressure gauges 0 bar is equivalent to an absolute pressure of one bar (recognisable by the datum -1 below 0).*
- ◆ *The pressure in the refrigerant circuit depends on the ambient temperature. Due to heat irradiated by components (e.g. the radiator fan) a rather higher pressure is indicated for a warm engine than that displayed for the relevant ambient temperature.*
- ◆ *If the displayed pressure is lower than that given in the table:*
- ◆ *Check the measured value for the high-pressure sender for the air conditioner -G65- ⇒ [page 42](#) (“Read the measured value block”) and ⇒ [page 90](#) (“Electrical Check Step 5”)*
- ◆ *If no fault can be found on the high-pressure sender for the air conditioner -G65-, this indicates that there is too little refrigerant in the circuit. The vehicle must be taken to a specialist air conditioner workshop.*
- Open the “centre” dash panel vents.
- Set the operating and display unit for air conditioner/Climatronic -E87- to “Auto” mode.
- Select the temperature preselection “Lo” on the operating and display unit for air conditioner/Climatronic -E87- .
- Set the air vent direction on the operating and display unit for air conditioner/Climatronic -E87- to “dash panel vents”.
- Select the display group “001” ⇒ [page 42](#) in the “Read measured value block” function ⇒ [page 46](#)
- Check the display in the display zones:



- Display zone “2” shows a signal ratio of greater than 30% (the air conditioner compressor regulating valve -N280- is actuated, the compressor is switched on).
- Display zone “1” shows a current greater than 0.3 A (the current is flowing via the air conditioner compressor regulating valve -N280- , the compressor is switched on).
- The pressure displayed in zone “4” rises above the value when the compressor is switched off.

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Note

- ◆ *The air conditioner compressor regulating valve -N280- is actuated by the operating and display unit for air conditioner/ Climatronic -E87- such that the temperature of the air downstream of the evaporator reaches the specified value (approx. 2 to 5 °C): Following the vehicle start, a value above 75 % (0.55 A) is displayed, dependent on the measured temperature, the engine speed, and the vehicle voltage. As soon as the temperature measured by the evaporator outlet temperature sender -G263- approaches the specified value, actuation is cancelled and the compressor output thus reduced.*
- ◆ *Under certain operating conditions, residual moisture in the coolant circuit may lead to the formation of ice on the air conditioner compressor regulating valve -N280-. Such ice formation impairs compressor control, the evaporator is cooled excessively and ices up. The icing-up of the evaporator may give rise to the following problems:*
- ◆ *Repeated or sporadic failure of the air conditioner (no cooling/heating output) after a long journey; the air conditioner functions properly again after a short delay following engine shut-off.*
- ◆ *Misting up of the windows on the inside after a long journey; the windows are initially not cleared even by pressing the "Defrost" button; the air conditioner functions properly again after a short delay following engine shutoff.*
- ◆ *Remedy:*
- ◆ *Check the measured value of the evaporator outlet temperature sender -G263- ⇒ [page 42](#) in the "Read measured value block" function, display group "007". If the measured value of the sender is too low under the operating conditions described by the customer (at an ambient temperature over 0 °C, colder than 0 °C for a long period of time even though the air conditioner compressor regulating valve -N280- is currently not actuated), take the vehicle to a specialist air conditioner workshop. If the measured value is too large (e.g. greater than 10 °C even though the air conditioner is working properly, check the evaporator outlet temperature sender -G263-.*
- ◆ *Check the refrigerant pipe between the evaporator and the reservoir (thick pipe, low-pressure side) with the engine running. If this pipe is severely iced up when the problem occurs (a thin layer of ice is permissible), this also indicates that the evaporator temperature is too low and the vehicle is to be taken to a specialist air conditioner workshop.*
- ◆ *Make the specialist air conditioner workshop aware of the problem that you have encountered. The necessary work can only be performed by them (draining the refrigerant circuit, replacing the reservoir and subsequently evacuating the refrigerant circuit for at least 3 hours).*
- ◆ *If display zone "1" does not show sufficient current, or none at all, check the actuation of the air conditioner compressor regulating valve -N280- ⇒ [page 90](#) ("Electrical Check Step 6").*
- ◆ *If the pressure indicated in display zone "4" does not change and the compressor actuation is OK (display zones "1" and "2"), there is a fault in the refrigerant circuit and the vehicle is to be taken to a specialist air conditioner workshop.*
- *Press the button for the recirculated air flap (the symbol for "recirculated air mode" in the button lights up).*

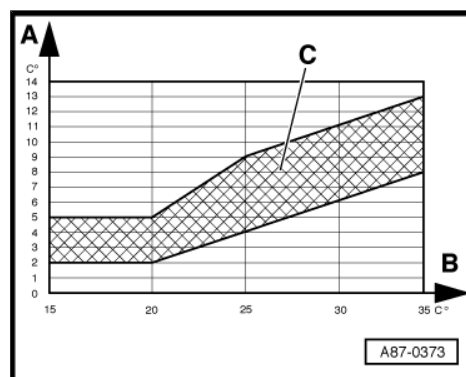
- Increase the engine speed to 2000 rpm (start of time measurement).
- Select the display group “007” ⇒ [page 42](#) in the “Read measured value block” function ⇒ [page 57](#)
- Compare the measured value indicated in display zone “3” (for the evaporator outlet temperature sender -G263-) to the values in the graph.

The air temperature -A- measured by the evaporator outlet temperature sender -G263-

Ambient temperature -B-

Permissible tolerance range -C-

Depending upon the ambient temperature, the measured air temperature must be within the stated tolerance range after 5 minutes.



- Compare the measured values shown in display zones “3” and “2” (for the evaporator outlet temperature sender -G263- and for the centre vent temperature sender -G191-). After 5 minutes, the measured value in display zone “2” (for the centre vent temperature sender -G191-) may exceed the value in display zone “3” by max. 3 °C.

If the required values are not attained, compare the measured values indicated in display zones “2” and “3”.

- If the measured value in display zone “2” is lower than that in display zone “3”. Check that the evaporator outlet temperature sender -G263- has been installed properly and check the electrical connections for contact resistance; replace the defective sender, if necessary.
- If the measured value in display zone “2” matches that in display zone “3”. Perform the fault-finding measures if the readout does not match the specification ⇒ [page 207](#)

Compare the measured values shown in display zones “3” and “2” (for the evaporator outlet temperature sender -G263- and for the evaporator outlet temperature sender -G263-). The measured value in display zone “2” (for the centre vent temperature sender -G191-) must not be higher than 3 °C after 5 minutes.

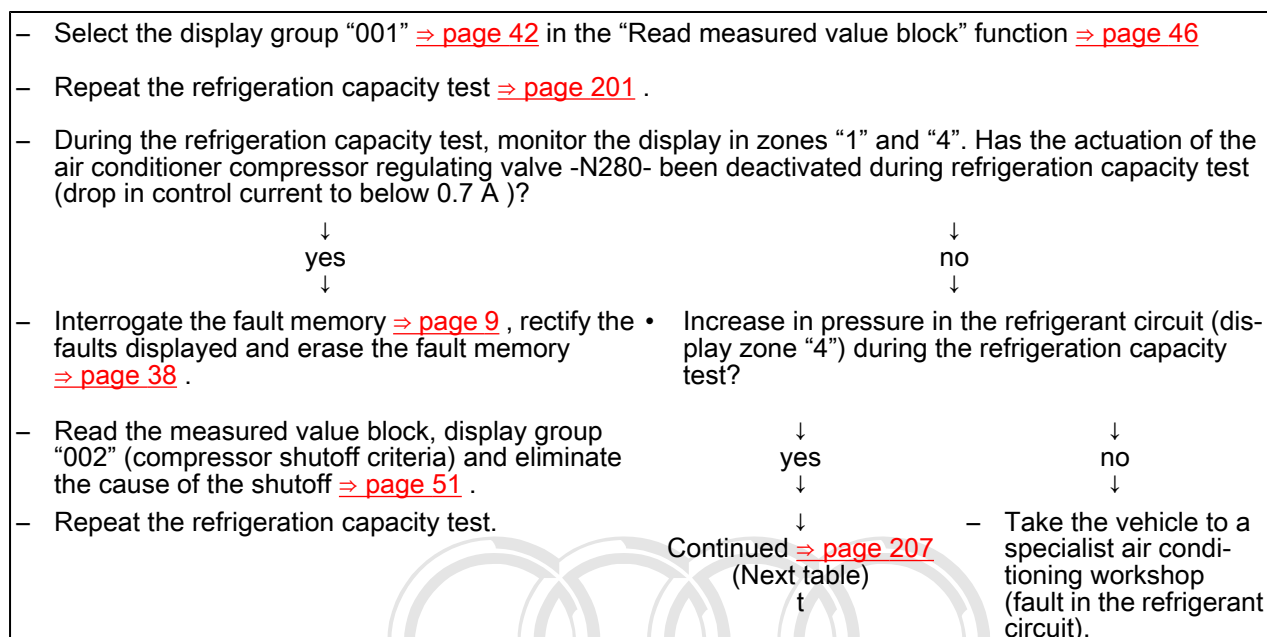
- If the measurement in display zone “2” is more than 3 °C higher than the value in display zone “3”, perform the fault-finding measures if the temperature rises downstream of the evaporator ⇒ [page 208](#)



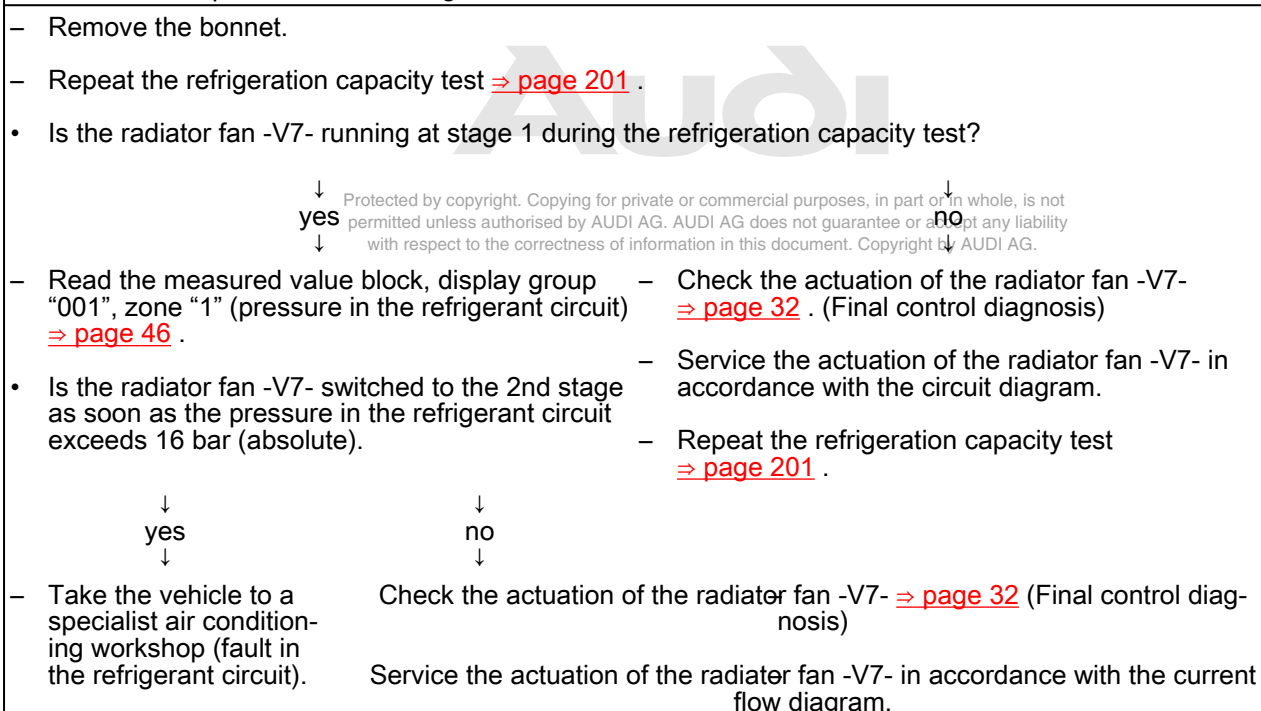
Note

- ◆ The temperature of the air flow from the “centre” dash panel vents can additionally be measured, for example, using a Mini tester -V.A.G 1362- .
- ◆ The air conditioner function can be detected, for example, from the fact that the refrigerant pipe at the low pressure side (thick pipe) cools down.
- ◆ If the temperature measured by the centre vent temperature sender -G191- is too high, perform the fault-finding measures if the temperature rises downstream of the evaporator ⇒ [page 208](#) .

6.1.3 Fault determination in the event of deviation from specification



Test contd.- The pressure in the refrigerant circuit rises



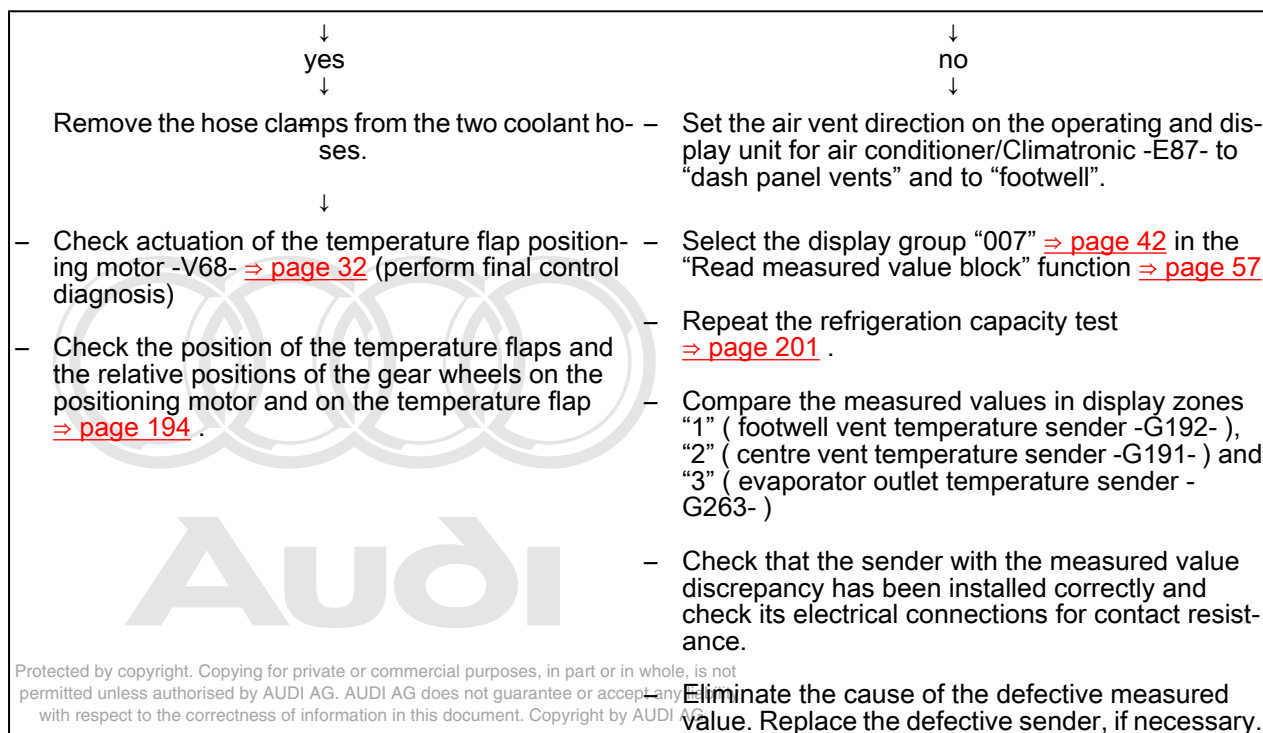


Note

- ◆ *The pressure in the refrigerant circuit is influenced by various factors. In general, however, the pressure should not exceed 20 bar at an ambient temperature of 20 to 25 °C. Under extreme conditions of use (e.g. in hot countries with high ambient temperatures, "stop and go traffic" and high relative humidity), the extremely high refrigeration capacity involved may also result in pressures of up to 31 bar.*
- ◆ *At ambient temperatures below 25 °C the pressure in the refrigerant circuit does not usually rise above 16 bar (the radiator fan -V7- runs at stage 1 and cools the condenser). The air intake ducts in the front bonnet and the bumper may be closed off briefly in order to cause the pressure to rise to 16 bar until the cut-in pressure of the 2nd stage of the radiator fan -V7- .*
- ◆ *The operating and display unit for air conditioner/Climatronic -E87- calculates the pressure in the refrigerant circuit via the signal ratio (display zone "3").*
- ◆ *At a signal ratio of less than 12.5 % (corresponds to approx. 1.5 bar absolute) and greater than 87.5 % (corresponds to approx. 32 bar absolute), the operating and display unit for air conditioner/Climatronic -E87- does not switch on the compressor (the air conditioner compressor regulating valve -N280- is not actuated). The compressor is only reactivated once the signal ratio exceeds 12.5 % (corresponding to an absolute pressure of 1.5 bar) or drops below 84 % (corresponding to an absolute pressure of 29 bar).*
- ◆ *In order to prevent abrupt compressor shutoff on account of excessive pressure in the refrigerant circuit or an excessive coolant temperature, the compressor output is reduced by the operating and display unit for air conditioner/Climatronic -E87- :*
- ◆ *- As soon as the pressure in the refrigerant circuit exceeds 30 bar (absolute pressure), (the full compressor output is not released again until the pressure has dropped below 27 bar).*
- ◆ *- As soon as the coolant temperature exceeds 115° C (it is shut down completely at 118° C).*
- ◆ *If the pressure in the refrigerant circuit had been in excess of 32 bar (signal ratio greater than 87.5 %), the operating and display unit for air conditioner/Climatronic -E87- would not have re-activated the compressor until the pressure had dropped below 29 bar (signal ratio less than 84 %).*
- ◆ *You can find further information on the pressure in the refrigerant circuit in [⇒ page 42](#) ("Read measurement value block", display group "001")*

6.1.4 Fault location for temperature rise downstream of evaporator

- Use hose clamps up to Ø 25 mm -3094- , for example, to pinch off the two coolant hoses between the engine and the heat exchanger on the air conditioner.
- Select the display group [007 ⇒ page 42](#) in the "Read measured value block" function [⇒ page 57](#)
- Repeat the refrigeration capacity test [⇒ page 201](#) .
- During the inspection, pay particular attention to the measured values for the evaporator outlet temperature sender -G263- and for the centre vent temperature sender -G191- in display group "007"
- Do the measured values in the display zones deviate from each other by less than 3 °C?



6.2 Note for vehicles with a 1.6 L FSI engine (if heater output is poor)

- ◆ Vehicles with a 1.6 l petrol direct injection engine (FSI) may only have an operating and display unit for air conditioner/Climatronic -E87- with a part number starting from index "D" and the hardware/software version "XX12" installed.
- If the coolant temperature is low in vehicles with a 1.6 l petrol direct injection engine, a signal is transmitted from the operating and display unit for air conditioner/Climatronic -E87- via the data bus system to the engine control unit (but only if heating output is requested by the operating and display unit for air conditioner/Climatronic -E87-). This signal is used to change the mixture formation of the engine control unit in order to achieve better heating of the coolant. This signal is not transmitted by the operating and display unit for air conditioner/Climatronic -E87- up to hardware / software version "XX11". Additional relevant information ➔ [page 188](#) . ➔ Relevant Workshop Manual, Injection and Ignition system

7 Repairing refrigerant circuit



Note

- ◆ *The refrigerant in the refrigerant circuit must never be topped up (drain, evacuate and refill circuit).*
- ◆ *The compressor is always driven when the engine is running; there is no magnetic clutch. Therefore, the engine is not to be started unless the refrigerant circuit has been properly assembled. If, for example, the refrigerant pipes are not connected to the compressor, the compressor may become so hot when the engine is running that it is destroyed (by internal heating). The internal heating is caused by the compressor operating even at almost 0 % delivery rate against a fixed resistance (sealed circuit).*
- ◆ *To stop the compressor being destroyed when the refrigerant circuit is empty, it is designed such that delivery is reduced to roughly 0 % and lubrication is maintained by way of an internal oil circuit with the oil left in the compressor.*
- ◆ *Replacement compressors contain the full quantity of refrigerant oil required for the refrigerant circuit. ⇒ Air conditioner - with refrigerant R134a*
- ◆ *Different types of refrigerant oil are specified for Zexel, Sanden and Denso compressors. ⇒ Air conditioner - with refrigerant R134a*
- ◆ *The specified diameters for the O-ring seals and the tightening torques also apply to the screwed connections in the refrigerant pipes or hoses between the individual components.*
- ◆ *Only fit O-rings approved for refrigerant R134a ⇒ Air conditioner - with refrigerant R134a .*
- ◆ *Check the refrigeration capacity ⇒ [page 201](#)*
- ◆ *Check pressures in the refrigerant circuit ⇒ Air conditioner - with refrigerant R134a*
- ◆ *For all other service and testing work not described in this Workshop Manual, refer to ⇒ Air conditioner - with refrigerant R134a*

7.1 Repairing refrigerant circuit

HD = High-pressure side

ND = Low-pressure side

1 - Air conditioner compressor regulating valve -N280-

- ☐ Do not remove
- ☐ Checking actuation and function ⇒ [page 94](#)

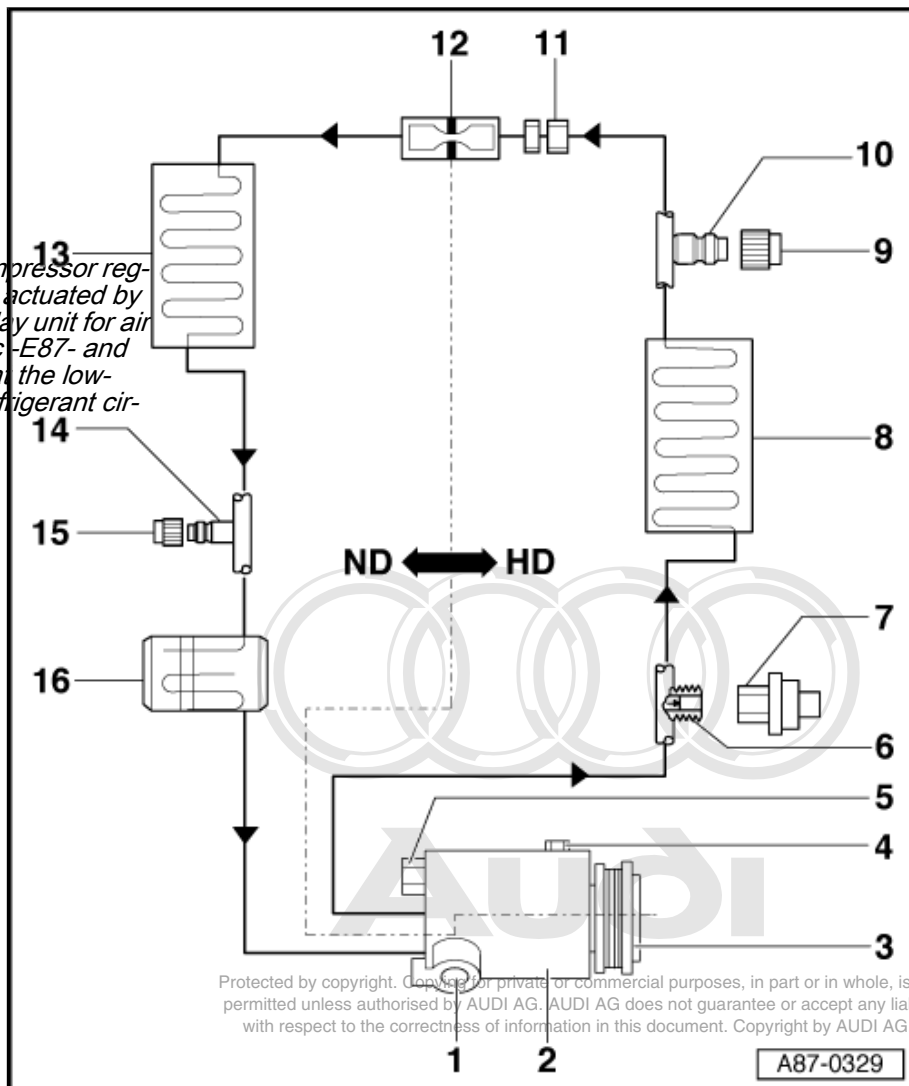


Note

The air conditioner compressor regulating valve -N280- is actuated by the operating and display unit for air conditioner/Climatronic-E87- and controls the pressure at the low-pressure side of the refrigerant circuit.

2 - Compressor

- ☐ O-ring seal for the compressor: for an LP connection: 23.8 mm; 2.4 mm for an HP connection: 11.1 mm; 1.8 mm
- ☐ Detaching and attaching refrigerant pipe from/to the compressor ⇒ [page 213](#)
- ☐ To protect the compressor the engine must only be started when the refrigerant circuit is completely assembled.
- ☐ Remove the poly-V-belt ⇒ Relevant Workshop Manual, Engine Mechanical Components; Repair group 13
- ☐ Removing and installing



compressor

⇒ [page 214](#)

- ☐ After the installation of a new compressor or filling with fresh refrigerant oil (e.g. after blowing out the refrigerant circuit), turn the compressor manually 10 revolutions before the first start to avoid damage to the compressor.

3 - Oil drain plug

- ☐ A sealing ring is installed on the Denso compressor, always replace it
- ☐ Tightening torque: 30 Nm
- ☐ May only be unscrewed to drain refrigerant oil if the compressor is removed. Turn the compressor via the clutch plate of the magnetic coupling to accelerate discharge of the refrigerant oil

4 - Pulley

- ☐ Replace ⇒ [page 173](#)

5 - Pressure relief valve, 10 Nm

- ☐ Do not remove

6 - Connection with valve

7 - Air conditioner high-pressure sender -G65-

- ☐ Removing and installing ⇒ [page 170](#)
- ☐ Checking signal ⇒ [page 90](#)

8 - Condenser

- ☐ O-ring seal: input: 11.1 mm; 1.8 mm output: 11.1 mm; 1.8 mm
- ☐ Detaching and re-attaching refrigerant pipes ⇒ [page 215](#)
- ☐ Removing and installing condenser ⇒ [page 216](#)

9 - Screw cap

- ☐ with seal
- ☐ Must be fitted

10 - Service connection

- ☐ High-pressure side
- ☐ For measuring, draining and filling at the service station

11 - Union in the refrigerant pipe

- ☐ O-ring seal: 11.1 mm / 1.8 mm
- ☐ Tightening torque: 15 Nm

12 - Restrictor

- ☐ Installed in the threaded connection, Item ⇒ [Item 11 \(page 212\)](#)
- ☐ O-ring seal: 7.5 mm / 1.5 mm
- ☐ Replace restrictor with O- ring seal
- ☐ Removing and installing ⇒ [page 217](#)
- ☐ Apply a small amount of refrigerant oil to the O-ring seal before installing the restrictor.

13 - Evaporator

- ☐ O-ring seal: input: 11.1 mm; 1.8 mm output: 16.7 mm; 1.8 mm
- ☐ Tightening torque of the hexagon socket-head bolts: 25 Nm
- ☐ Removing and installing refrigerant pipe ⇒ [page 215](#)
- ☐ Removing and installing ⇒ [page 228](#)

14 - Service connection

- ☐ Low-pressure side

15 - Screw cap

- ☐ with seal
- ☐ Must be fitted

16 - Reservoir

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- ❑ O-ring seal: input: 16.7 mm; 1.8 mm output: 16.7 mm; 1.8 mm
- ❑ Tightening torque: input (hexagon socket-head bolt on the block connection): 25 Nm output (screwed pipe coupling): 40 Nm
- ❑ Removing and installing ⇒ [page 218](#)

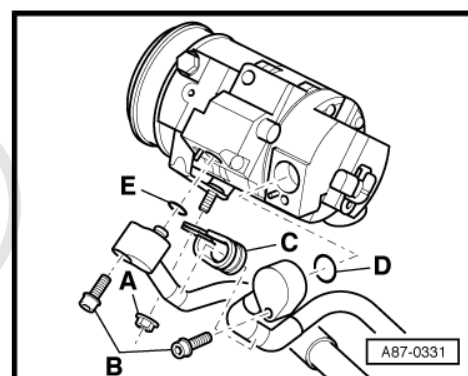
7.2 Detaching and attaching refrigerant pipes from/to the compressor

Note

The compressor is always driven when the engine is running; there is no magnetic clutch. The engine must therefore not be started unless the refrigerant circuit has been properly assembled. If, for example, the refrigerant pipes are not connected to the compressor, the compressor may become so hot when the engine is running that it is destroyed (by internal heating).

7.2.1 Removing

- Drain the refrigerant circuit: ⇒ Air conditioner - with refrigerant R134a .
- Remove the noise insulation ⇒ General Body Repairs, Exterior; Rep. Gr. 50 .
- Remove the nuts -A-.
- Unscrew the bolts -B-.



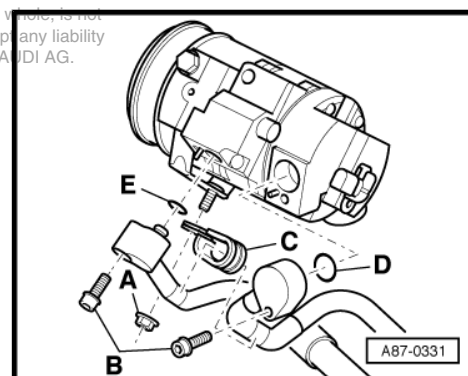
7.2.2 Installing

Install in reverse order, paying attention to the following:

- Replace the O-ring seals -D- (23.8 mm; 2.4 mm) and -E- (11.1 mm; 1.8 mm).
- Tighten the bolts -B- to 25 Nm.
- Tighten the nuts -A- to 20 Nm.

Note

- ◆ Start by tightening bolts -B-, then secure clip -C- with the nut -A-.
- ◆ Seal the open pipe connections.
- ◆ The O-ring seals from the screw caps for the replacement compressor may not be used.



7.3 Removing and installing compressor

7.3.1 Removing

- Drain the refrigerant circuit: ⇒ Air conditioner - with refrigerant R134a .
- Detach the refrigerant pipes from the compressor
⇒ [page 213](#) .
- Remove the compressor from the bracket ⇒ [page 172](#) .

7.3.2 Installing

Install in reverse order, paying attention to the following:

Before fitting the compressor: ⇒ Air conditioner - with refrigerant R134a

- ◆ Tightening torques and O-ring seals ⇒ [page 172](#) and
⇒ [page 213](#) .
- Do not start the engine until the refrigerant circuit has been assembled
- 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 of the engine to avoid damage to the compressor.
- If possible only start the engine with a full refrigerant circuit



Note

- ◆ *The compressor is always driven by the pulley (there is no magnetic clutch).*
- ◆ *The compressor is equipped with an "internal oil circuit" to prevent damage if the refrigerant circuit is empty. A precondition for this internal lubrication is that there is still a residual quantity of refrigerant in the compressor.*
- ◆ *The engine must be only started with a correctly assembled refrigerant circuit. If, for example, the refrigerant pipes are not connected to the compressor, the compressor may become so hot when the engine is running that it is destroyed (by internal heating).*
- ◆ *The air conditioning compressor regulating valve -N280- is not actuated if the refrigerant circuit is empty and the compressor runs at idle with the engine.*
- ◆ *Since there is no refrigerant available, the refrigerant required to lubricate the compressors is not transported.*
- ◆ *Compressor lubrication is maintained by way of an "internal oil circuit" to prevent damage.*
- ◆ *If it is necessary to start the engine with an empty refrigerant circuit:*
 - ◆ - *The refrigerant circuit must have been fully assembled.*
 - ◆ - *The compressor must contain at least a quarter of the amount of refrigerant oil specified for this refrigerant circuit.*
 - ◆ - *The engine speed must not exceed 2500 rpm.*
 - ◆ - *The engine should not be left running for longer than is absolutely necessary.*



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Pay attention to the following on starting the engine for the first time after charging the refrigerant circuit:

- Start the engine with the compressor switched off (“Econ” mode) and wait for idling speed to stabilise.
- Open the dash panel vents.
- Select the temperature preselection “Lo” on the operating and display unit for air conditioner/Climatronic -E87- .
- Then switch the compressor on (“Auto” mode) and let it run for a minimum of 5 min with the engine at idling speed.

7.4 Detaching and attaching refrigerant pipes from/to evaporator connection

7.4.1 Detaching

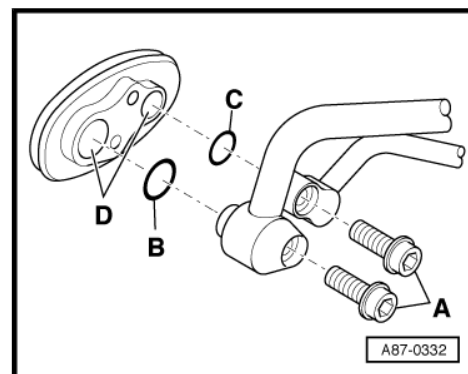
- Drain the refrigerant circuit: ⇒ Air conditioner - with refrigerant R134a .
- Remove the fresh-air intake duct for the air conditioner in the engine compartment ⇒ [page 126](#)
- Remove the bolts -A- (tightening torque 25 Nm).
- Detach the refrigerant pipes from the evaporator.



Note

A screw cap from a replacement evaporator, for example, is suitable for sealing the open connections on the evaporator -D-.

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7.4.2 Attaching

Install in reverse order, paying attention to the following:

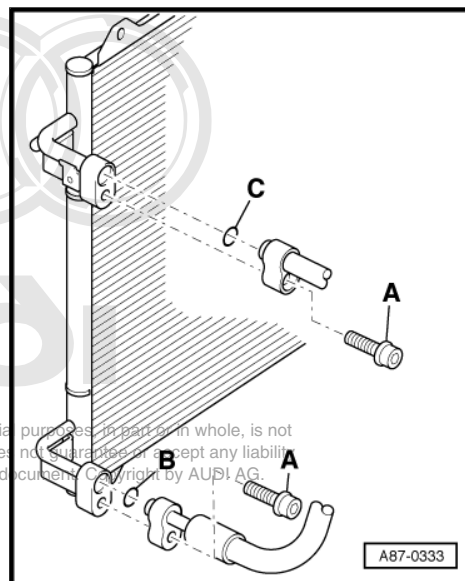
- Replace the O-ring seals -B- (16.7 mm; 1.8 mm) and -C- (11.1 mm; 1.8 mm).
- Install the refrigerant pipes such that they are not strained.

7.5 Detaching and re-attaching refrigerant pipes from/to condenser

7.5.1 Detaching

- Remove the noise insulation ⇒ General Body Repairs, Exterior; Rep. Gr. 50 .
- Drain the refrigerant circuit: ⇒ Air conditioner - with refrigerant R134a .

- Unscrew the bolts -A- (tightening torque 25 Nm).
- Remove the refrigerant pipes from the condenser.



7.5.2 Attaching

Install in reverse order, paying attention to the following:

- Replace the O-ring seals -B- (11.1 mm; 1.8 mm) and -C- (11.1 mm; 1.8 mm).

7.6 Removing and installing condenser

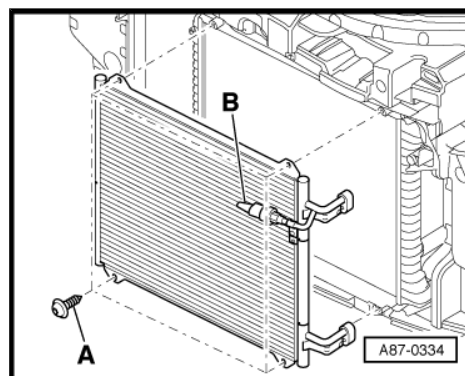


Note

Until model year 2001, only condensers with part number 8Z0 260 401 -403- and the index "B" or "C" were installed. Condensers from index "D" in models built since 2002; the internal volume of these condensers is different, which means that the filling quantity for the refrigerant R134a is different. ⇒ Parts List and ⇒ Air conditioner - with refrigerant R134a

7.6.1 Removing

- Remove the front bumper completely ⇒ General Body Repairs, Exterior; Rep. Gr. 63 .
- Drain the refrigerant circuit: ⇒ Air conditioner - with refrigerant R134a .
- Detach the refrigerant pipes from the condenser
⇒ [page 215](#) .
- Unplug the connector from the high-pressure sender -G65-B-.
- Unscrew the bolts -A- (tightening torque 5 Nm).



7.6.2 Installing

Installation is in reverse order.

7.7 Removing and installing restrictor

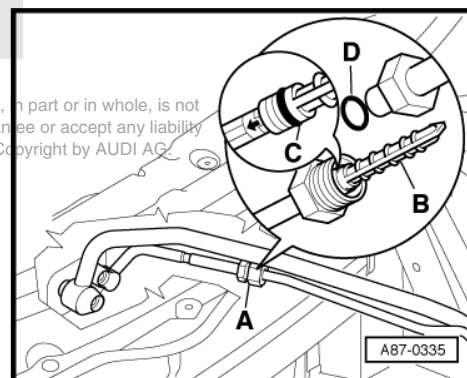


Note

Until model year 2001, yellow restrictors were fitted (diameter of bore/constriction 1.54 mm). Vehicles built since 2002 are fitted with red (or orange) coloured restrictors (diameter of bore/constriction 1.42 mm), which means that the filling quantity for the refrigerant R134a is different. ⇒ Parts List and ⇒ Air conditioner - with refrigerant R134a

7.7.1 Removing

- Drain the refrigerant circuit: ⇒ Air conditioner - with refrigerant R134a .
- Remove the fresh-air intake duct for the air conditioner in the engine compartment ⇒ [page 126](#)
- Detach the refrigerant pipe at screw connection -A- (seal open connections).
- Use pointed pliers to pull the restrictor -B- out of the refrigerant pipe.



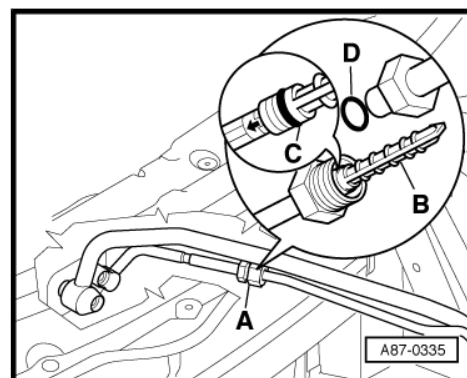
7.7.2 Installing



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 (with the arrow on the restrictor pointing towards the evaporator).
- ◆ Check that the restrictor is correctly seated, fitted tightly in the refrigerant pipe.
- Check that the O-ring seal -C- (7.5 mm; 1.5 mm) is correctly seated in the groove.
- Replace the O-ring seal -D- (11.1 mm; 1.8 mm).
- Apply a small amount of refrigerant oil to the O-ring seal in the restrictor
- Install the refrigerant pipes such that they are not strained.
- Tighten the screw connection -A- to 15 Nm.



7.8 Removing and installing reservoir

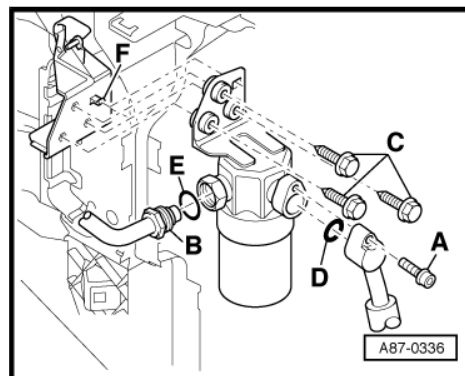
7.8.1 Removing

- Drain the refrigerant circuit: ⇒ Air conditioner - with refrigerant R134a .
- Remove the screw -A- and detach the refrigerant pipe.
- Loosen the screw fitting on the refrigerant pipe -B-.
- Remove the bolts -C-.
- Remove the refrigerant pipe -B-.
- Remove the reservoir and bracket.



Note

- ◆ Seal the open pipe connections.
- ◆ The connection of the refrigerant pipes differs depending on 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)



7.8.2 Installing

Install in reverse order, paying attention to the following:

Before installing the reservoir ⇒ Air conditioner with refrigerant R134a



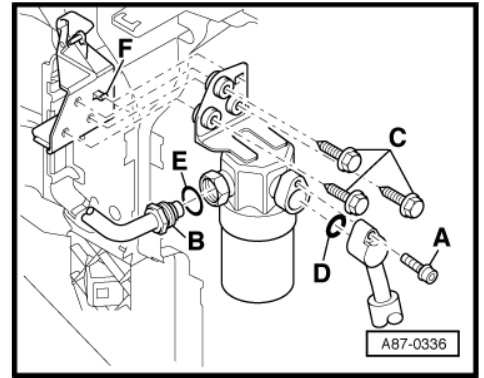
Note

- ◆ The removed reservoir contains refrigerant oil which has to be returned to the refrigerant circuit (with a new reservoir)
- ◆ The adjustment of the quantity of oil depends on the nature of the complaint.
- ◆ If the reservoir has become damaged in an accident, for example, (whereby no refrigerant has escaped, and there is no moisture or dirt ingress into the refrigerant circuit), the air conditioner can be overhauled by simply weighing the old and new reservoirs, without having to go to the trouble of costly repairs - top up the refrigerant oil until it matches the weight of the reservoir which has been removed.
- ◆ If an indeterminate amount of refrigerant oil has escaped or dirt and moisture have ingressed into the refrigerant circuit, it must be cleaned using compressed air and nitrogen. ⇒ Air conditioner - with refrigerant R134a



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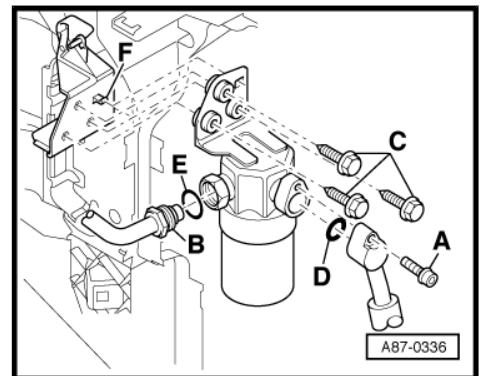
- Replace the O-ring seals -D- (16.7 mm; 1.8 mm) and -E- (16.7 mm; 1.8 mm).
- Engage the reservoir at the lug -F-.
- Fasten the refrigerant pipe -B- to the reservoir
- Insert the bolts -C- and tighten them securely (tightening torque 8 Nm).
- Tighten the refrigerant pipe union nut (tightening torque 40 Nm), counterhold at the reservoir hex. Check for tension-free installation of the refrigerant circuit pipes and make sure there is clearance to other components.
- Fasten the refrigerant pipe with the block connection to the reservoir with the bolt -A- (tightening torque 25 Nm).



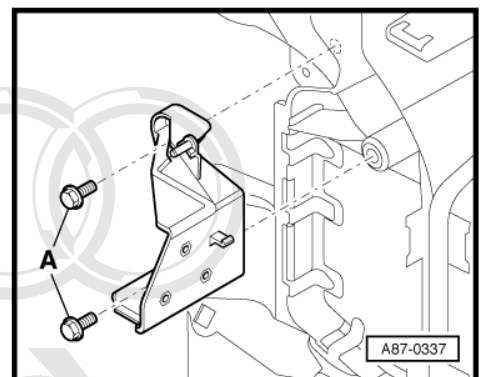
7.9 Removing and installing reservoir bracket

Note

- ◆ *The reservoir can be removed and re-attached from/to the bracket without opening the refrigerant pipes.*
- ◆ *Do not drain the refrigerant circuit, do not detach the refrigerant pipes from the reservoir.*
- Remove the bolts -C- (tightening torque 8 Nm).
- Detach the reservoir at the lug -F-.
- Detach the reservoir from the bracket



- Remove the bolts -A- (tightening torque 8 Nm).
- Remove the bracket.



7.10 Capacities

Refrigerant R134a and refrigerant oil capacities: ⇒ Air conditioner
- with refrigerant R134a

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**Note**

- ◆ *Always fill the refrigerant circuit as far as upper tolerance limit (some refrigerant remains in filler hoses).*
- ◆ *The refrigerant circuit must only be filled with approved refrigerant oils. ⇒ Parts List*
- ◆ *Different types of refrigerant oil are specified for Zexel, Sanden and Denso compressors. ⇒ Air conditioner - with refrigerant R134a*
- ◆ *The refrigerant oil G 052 300 A2 is currently to be used for Denso compressors ⇒ Parts List and ⇒ Air conditioner - with refrigerant R134a .*
- ◆ *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 information: ⇒ Air conditioner - with refrigerant R134a*



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8 Removing and installing air conditioner

8.1 Removing and installing air conditioner

8.1.1 Special tools, testers and auxiliary equipment required

- ◆ Hose clamps up to Ø 25 mm -3094- or hose clamps up to Ø 40 mm -3093-
- ◆ Commercially available compressed-air gun

8.1.2 Removing

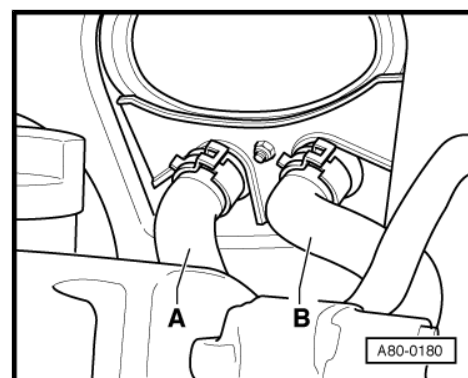


Note

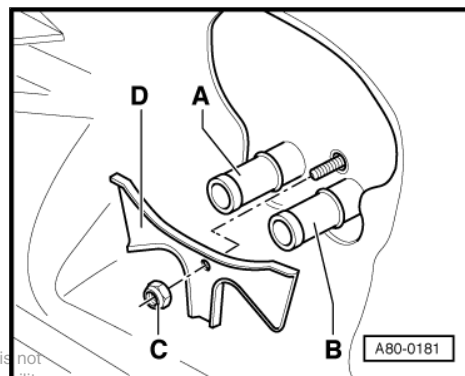
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◆ ***On removal, note down bolt lengths and assignment for re-installation.***

- ◆ ***All cable ties unfastened or cut open on removing the air conditioning unit are to be re-attached in same position on installation.***
- Drain the refrigerant circuit: ⇒ Air conditioner - with refrigerant R134a .
- Cover the driver's and passenger's seat with protective covers.
- Switch on the ignition.
- In vehicles with electrically adjustable seats, move them back as far as possible before disconnecting the battery -A- .
- Note the radio code on vehicles with a coded radio, and obtain if necessary
- Switch off the ignition.
- Remove the fresh-air intake duct in the engine compartment for the air conditioner ⇒ [page 126](#)
- Disconnect the earth strap from the battery -A- with the ignition switched off.
- Open the screw cap of the coolant expansion tank.
- Mark the positions of the coolant hoses -A- and -B-.
- Pinch off the coolant hoses to the heat exchanger (e.g. using hose clamps up to Ø 25 mm -VAS 3094-) and detach these hoses.



- Attach a piece of hose onto the connection -B- and place a container underneath the other end of this hose.
- Use a compressed-air gun to carefully blow the coolant out of the heat exchanger through connection -A- (into the container).
- Remove the hexagon nuts -C- and remove the bracket -D-.
- Detach refrigerant pipes to the evaporator ⇒ [page 215](#) and secure them (e.g. with a cable tie) so that they do not impede installation.


Note

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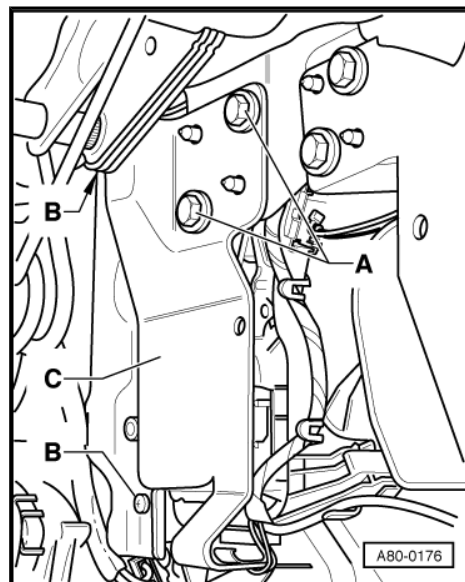
- ◆ *Seal the open pipe connections.*
- ◆ *A screw cap from a replacement evaporator, for example, is suitable for sealing the open connections on the evaporator -C-.*

- Remove the glove box, the driver's storage compartment, the centre console and the dash panel: ⇒ General Body Repairs, Interior; Repair group 70; Dash panel

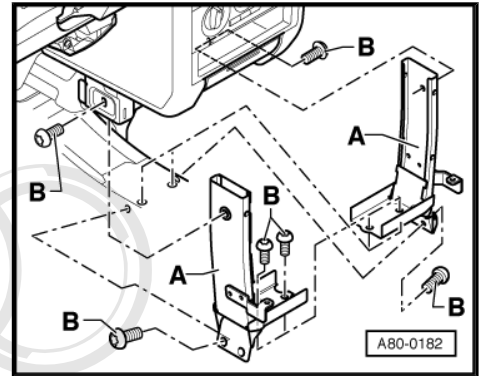

Note

So as not to damage the dash panel fascia, the dash panel may only be placed on a clean workbench covered, for example, with clean cardboard.

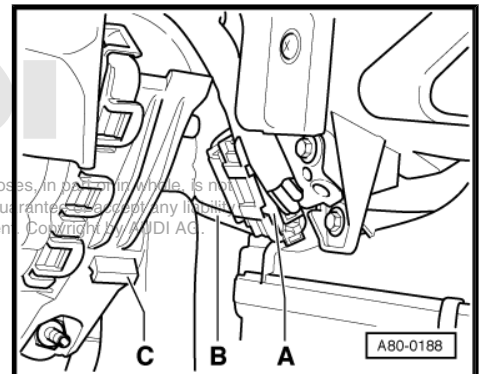
- Remove bolts -A- and -B-.
- Remove bracket -C-.
- Remove the gearshift mechanism. ⇒ Relevant Workshop Manual, Gearbox



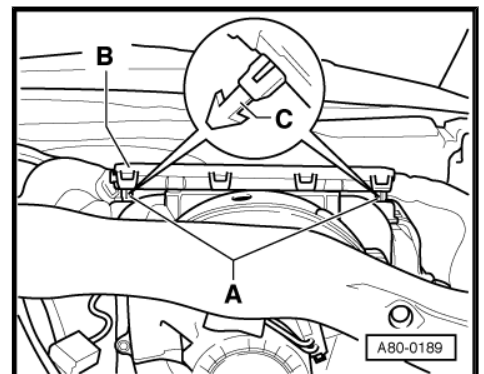
- Remove the bolts -B- and the dash panel supports -A- completely ⇒ General Body Repairs, Interior; Repair group 70; Dash panel
- Detach the additional heater earth strap on the right “A” pillar (only for vehicles with a TDI engine and an electric additional heater). ⇒ Electrical System; Repair group 01



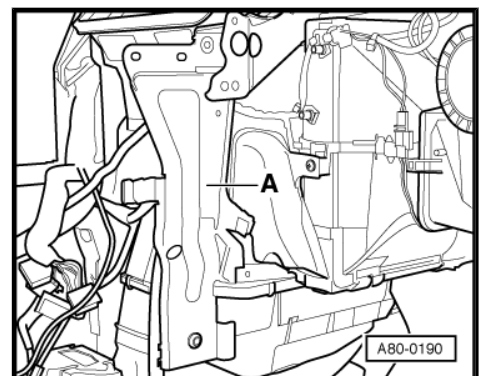
- Remove the throttle mechanism -C-. ⇒ Relevant Workshop Manual, Fuel Supply
- Unplug the connector -A- or detach the positive connection to the heating element for additional heater -Z35- (only for vehicles with a TDI engine and an electric additional heater) ⇒ [page 147](#).
- Detach the vehicle wiring harness mounting -B- (with cable tie) on the air conditioner.



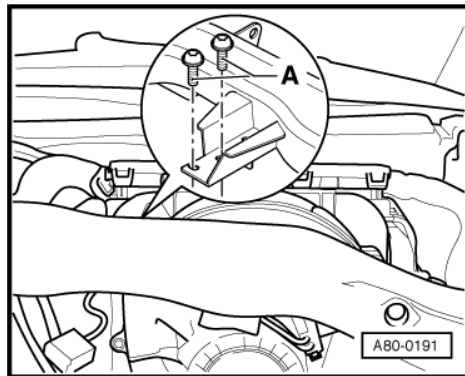
- Detach the cable duct -B- by pressing the catches -C- at the two fastening points -A- of the air conditioner together
- Remove the adapter for the defrost vent ⇒ [page 125](#)



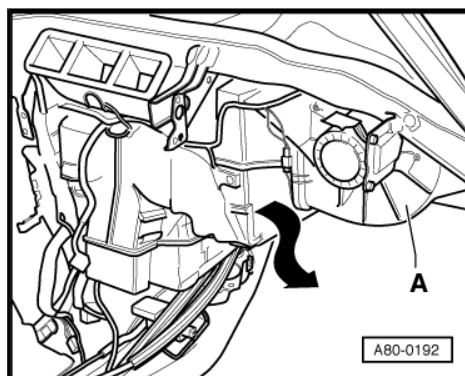
- Remove the right dash panel support -A-. ⇒ General Body Repairs, Interior; Repair group 70; Dash panel
- Detach all the electrical connections between the vehicle and the air conditioner at the connectors.
- Detach the condensation drain hose from the vehicle ⇒ [page 180](#).



- Unscrew bolts -A-.



- Remove the air conditioner -A- towards the passenger's side.



8.1.3 Installing

Install in reverse order, paying attention to the following:



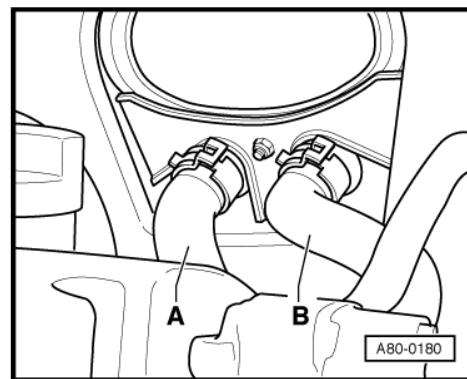
Note

- ◆ Check all seals on the air conditioner for damage prior to installation and replace any that are damaged.
- ◆ Check that the sealing plate at the connections for the coolant hoses is seated properly and check the condition of the appropriate gasket.



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- Connect the coolant hoses to the heat exchanger correctly. Note the markings:
- Inlet hose from the cylinder head -A-
- Return hose to water pump -B-
- Fit the refrigerant pipes to the evaporator ⇒ [page 215](#) .
- Bleed the coolant circuit: ⇒ Relevant Workshop Manual, Engine Mechanical Components; Repair group 19 .
- Check that the condensation drainage hose is correctly positioned ⇒ [page 180](#) .
- Evacuate and refill the refrigerant circuit ⇒ Air conditioner - with refrigerant R134a



i Note

- ◆ *When installing the dash panel, ensure that the “defrost” adapter is properly positioned on the air conditioner unit on insertion and that the defrost vent does not squash the adapter during installation.*
- ◆ *After installing the dash panel, check the vent direction and distribution of air flow from the defrost vent to the windscreen.*

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9 Dismantling and assembling air conditioner

– Remove the air conditioner ⇒ [page 221](#) .

9.1 Detaching and attaching components from/to the air conditioner

1 - Heating element for additional heater -Z35-

- ☐ Only provided for vehicles with a diesel engine, installation depends on equipment level ⇒ [page 106](#) .
- ☐ Different versions ⇒ [page 106](#) .
- ☐ Depending on the equipment level, vehicles built up to 2002 feature either an electric additional heater or a fuel-powered additional heater ⇒ [page 106](#) , ⇒ [page 149](#) , ⇒ Relevant Workshop Manual for Diesel Direct Injection and Glow Plug System; Repair group 01 and ⇒ Additional Heater; Repair group 82
- ☐ Removing and installing ⇒ [page 147](#)
- ☐ Checking function ⇒ [page 106](#)

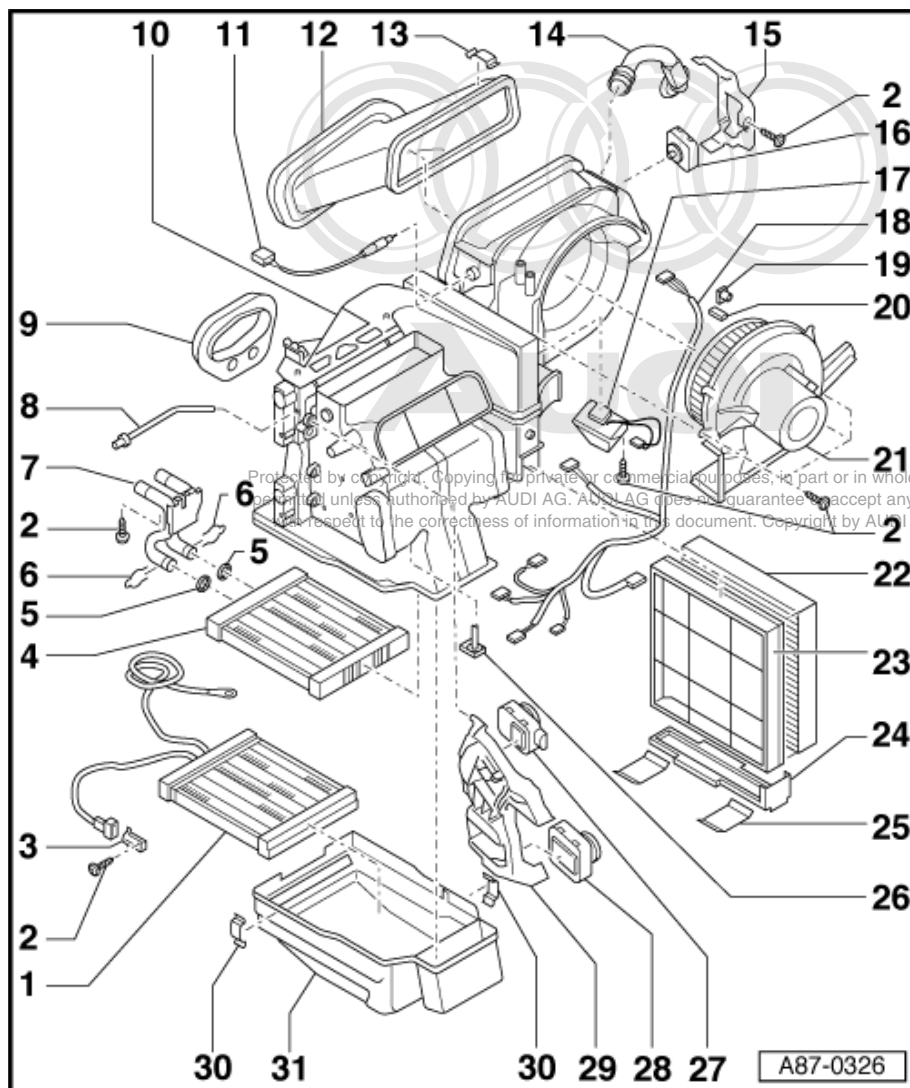
2 - Bolt

3 - Connector bracket

- ☐ Only in vehicles with a heating element for additional heater -Z35-

4 - Heat exchanger

- ☐ Removing and installing



⇒ [page 155](#)

5 - O-ring seal

- ☐ Replacing

6 - Clip

- ☐ Replacing

7 - Coolant pipes

8 - Evaporator outlet temperature sender -G263-

- ☐ Removing and installing ⇒ [page 189](#)

9 - Sealing plate

- ☐ Check, and replace if the gasket is damaged.

10 - Air conditioner

- ☐ Removing and installing ⇒ [page 221](#)
- ☐ Dismantling and assembling ⇒ [page 228](#)

11 - Fresh-air intake duct temperature sensor -G89-

- ☐ Removing and installing ⇒ [page 199](#)

12 - Air duct/fresh-air intake in the passenger compartment

13 - Clip

14 - Condensation drain with valve

- ☐ Checking ⇒ [page 180](#)
- ☐ Removing and installing ⇒ [page 180](#)

15 - Bracket for recirculated air flap positioning motor -V113-

16 - Recirculated air flap positioning motor -V113-

- ☐ With recirculated air flap positioning motor potentiometer -G143-
- ☐ Actuates the fresh-air and recirculated-air flaps
- ☐ Removing and installing ⇒ [page 197](#)
- ☐ Different versions ⇒ [page 193](#) and ⇒ Parts List

17 - Fresh-air blower control unit -J126-

- ☐ Removing and installing ⇒ [page 189](#)

18 - "Air conditioner" wiring harness

- ☐ Different versions ⇒ [page 193](#) and ⇒ Parts List

19 - Bracket for wiring harness

20 - Cable ties

21 - Fresh-air blower -V2-

- ☐ Removing and installing ⇒ [page 189](#)

22 - Dust and pollen filter

- ☐ Observe the replacement intervals for dust and pollen filter
- ☐ Removing and installing ⇒ [page 130](#)

23 - Filter frame

- ☐ For dust and pollen filter

24 - Filter cover

- ☐ For dust and pollen filter
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25 - Push-fit components

- ☐ for filter cover

26 - Footwell vent temperature sender -G192-

- ☐ Removing and installing ⇒ [page 190](#)

27 - Defrost flap positioning motor -V107-

- ☐ With a defrost flap positioning motor potentiometer -G135-
- ☐ Gear wheel colour code: "white"
- ☐ Removing and installing ⇒ [page 194](#)
- ☐ Different versions ⇒ [page 193](#) and ⇒ Parts List

28 - Temperature flap positioning motor -V68-

- ☐ With a temperature flap positioning motor potentiometer -G92-
- ☐ Gear wheel colour code: "black"
- ☐ Removing and installing ⇒ [page 194](#)
- ☐ Different versions ⇒ [page 193](#) and ⇒ Parts List

29 - Brackets for temperature flap positioning motor -V68- and defrost flap positioning motor -V107-

- ☐ Removing and installing ⇒ [page 194](#)

30 - Clip**31 - Bottom section of air distributor housing**

- ☐ Different versions in vehicles with and without heating element for additional heater -Z35-
- ☐ With a hole for feeding through electrical connections in vehicles with heating element for additional heater -Z35-

9.2 Dismantling and assembling air conditioner

- Detach air conditioner attaching parts ⇒ [page 226](#) .

1 - Air distributor housing

- ☐ Do not dismantle
- ☐ With a temperature flap and air distribution flaps

2 - Air duct channel/lower part

- ☐ Assembling the upper and lower parts
⇒ [page 230](#)

3 - Clip

4 - Evaporator

- ☐ Attaching seal to the refrigerant pipes
⇒ [page 229](#)
- ☐ With seal at the evaporator
- ☐ Checking seal at the evaporator ⇒ [page 230](#)

5 - Air duct channel/upper part

- ☐ Assembling the upper and lower parts
⇒ [page 230](#)

6 - Intake housing

- ☐ With recirculated air and fresh-air flap (air flow flap)

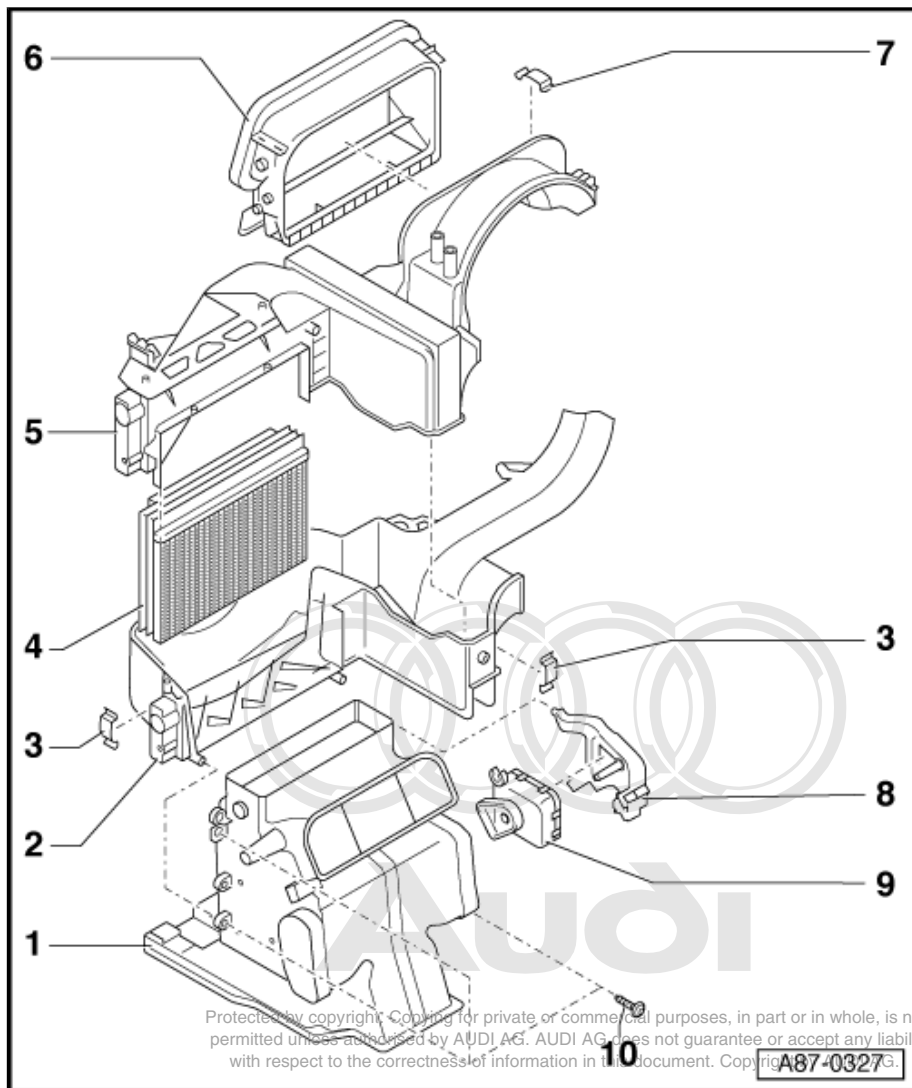
7 - Clip

8 - Bracket for a central flap positioning motor -V70-

9 - Central flap positioning motor -V70-

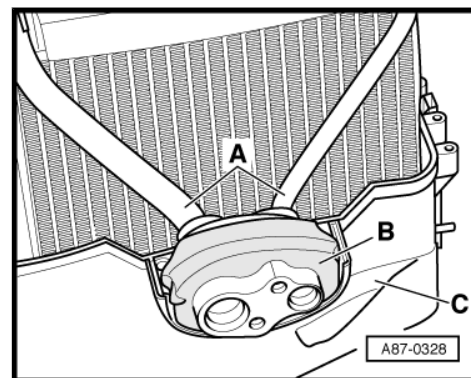
- ☐ With a central flap positioning motor potentiometer -G112-
- ☐ Removing and installing ⇒ [page 191](#)
- ☐ Different versions ⇒ [page 193](#) and ⇒ Parts List

10 - Bolt



Attaching seal to the evaporator refrigerant pipes

- Seal the refrigerant pipes -A- against both housing sections
- C- with the gasket-B-.



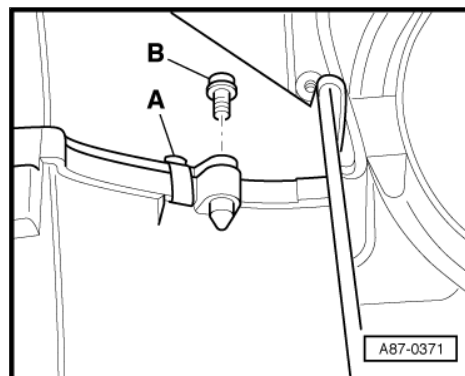
Assemble the air duct channel

- Insert the clips -A- at the locations provided.



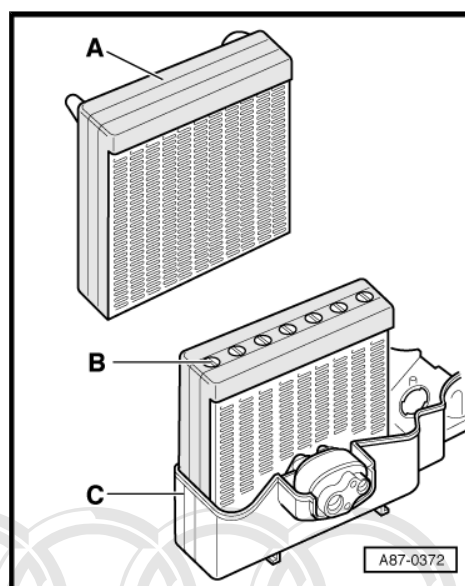
Note

Several locations have circumferential screwed connections, which may be used as additional fastening means for the air duct channels, if necessary. Use the same type of screws also used for the air conditioner screwed connections.



Checking the seal at the evaporator

- Check the installation position of the seal, the seal -A- must be installed so as to allow the condensation to run to the condensation drain with the evaporator installed.
- With the evaporator installed, the water drain openings -B- must be on the bottom (-C- is the air duct channel upper part).



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