

Audi A8 1994 ➤

Auxiliary/additional heater

Edition 05.2002

Audi

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List of Workshop Manual Repair GroupsList of Workshop Manual Repair Groups

Audi A8 1994 ➤

Auxiliary/additional heater

Repair Group

01 - Self-diagnosis, Electrical check

82 - Auxiliary heating

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

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01 - Self-diagnosis, Electrical check

1 - Auxiliary/additional heater self-diagnosis (type "Z/C" heaters only)

1.1 - Auxiliary/additional heater self-diagnosis (type "Z/C" heaters only)

Auxiliary heaters of type "S" (no self-diagnosis) were fitted up to 04.97.

Auxiliary/additional heaters of type "Z/C" (featuring self-diagnosis) were gradually introduced as of 05.97.

Notes:



- ◆ -> Type "S" and "Z/C" heaters can be identified from rating plate or housing shape =>Page 163 .
- ◆ The heater rating plate indicates the version concerned.
 - Type "Z/C-D" with no recirculating pump -V55 = additional heater (for vehicles with diesel engine only)
 - Type "Z/C-D" with recirculating pump -V55 = auxiliary heater with additional heater (for vehicles with diesel engine only)
 - Type "Z/C-B" = auxiliary heater (for vehicles with petrol engine only)
 - Type "S" = auxiliary heater (for vehicles with petrol engine only)
- ◆ Auxiliary/additional heater control functions remain in operation during self-diagnosis.

The second battery -A1 was gradually discontinued after switching to type "Z/C" auxiliary/additional heater.

Heaters of type "Z/C-D" with no recirculating pump -V55 are installed as additional heater on vehicles with 6 or 8-cyl. TDI engine. As additional heater, the heater has no recirculating pump -V55 (actuation via pre-selection clock -E111 or dash panel insert is not possible). The additional heater is switched on by the engine control unit as soon as the specified cut-in criteria are satisfied.

If vehicles with 6 or 8-cyl. TDI engine are fitted with an auxiliary heater, this will be one of type "Z/C-D" with recirculating pump -V55. This auxiliary heater is also used as additional heater.

As additional heater, heaters of type "Z/C-D" up to and including software version "D48" feature different electronics and software to the version used as auxiliary/additional heater.

On vehicles with diesel engine, the additional heater or auxiliary heater additional heating function is switched on by the engine control unit each time the vehicle is started as soon as the following conditions are met.

- Engine speed greater than 600 rpm
- Ambient temperature less than +5° C
- Air conditioner not set to "Econ" mode
- Coolant temperature less than 70° C to 80° C (depending on ambient temperature)



=> Relevant Diesel Direct-injection and Glow Plug System Workshop Manual; Repair Group 01; Reading measured value block Reading measured value block

- Heater control unit -J162 adapted in adaption channel "10" with "0" or "2" as additional heater =>Page **43** (applies to auxiliary heaters with control unit as of software version "D50")

On vehicles with petrol engine and small coolant circuit, auxiliary heater recirculating pump -V55 is switched on each time cold engine is started if earth is applied to auxiliary heater by coolant shut-off valve relay -J541. Prerequisite:

- Heater control unit -J162 adapted in adaption channel "10" with "1" or "3" =>Page **43** (applies to auxiliary heaters with control unit as of software version "D50")
- Vehicles with 12-cyl. engine
- Vehicles with 8-cyl. petrol engine with factory-fitted small coolant circuit (gradual introduction in Model Year 2001)

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1.2 - Operation

Heater control unit -J162 receives information from electrical and electronic components (information transmitters) and processes this information in line with specifications.

The output signals of the control unit then actuate the electrical components (control elements).

To permit rapid determination of the cause of the problem in the event of component failure or open circuit in wiring, heater control unit -J162 is provided with a fault memory which can be read out with fault reader V.A.G 1551, vehicle diagnostic system VAS 5051 or vehicle system tester V.A.G 1552.

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

Before starting fault-finding procedure, always implement self-diagnosis and interrogate stored information with the

Fault reader V.A.G 1551

The

Vehicle system tester V.A.G 1552

Or the

Vehicle diagnostic, testing and information system VAS 5051

The fault information displayed is used in conjunction with a fault table (containing information on possible causes of trouble) to perform pin-pointed repair measures.

Notes on fault indication:

- ♦ If a fault condition exists for longer than a pre-determined period, the fault is stored as being static. If the fault condition is then no longer detected for a pre-determined period, the fault is re-classified as being a sporadic fault. This process is constantly repeated. Sporadic faults are additionally identified as such by / SP on the right of the display.

The possibilities offered by self-diagnosis can only be utilised by way of V.A.G 1551 (mode 1 "Rapid data transfer"), V.A.G 1552 or VAS 5051.

Self-diagnosis is not restricted to storage, interrogation, erasing and final control diagnosis. It also offers basic setting, control unit identification, measured value display, adaption and encoding functions.

Mode -2- (flash code output) is not provided for auxiliary/additional heater. Modes -3- (self-test) and -4- (workshop code) apply only to fault reader V.A.G 1551 and vehicle system tester V.A.G 1552 and are described in the appropriate operating instructions.

Note:

The following description refers solely to implementation of self-diagnosis using fault reader V.A.G 1551.

Self-diagnosis can be performed in the same manner with VAS 5051 or V.A.G 1552. In order to be able to furnish proof of faults in the event of subsequent enquiries, it is appropriate to print out the faults present after interrogating the fault memory.

If fault memory has been read out using V.A.G 1552, connect up V.A.G 1551 or VAS 5051 before erasing memory and print out faults present (V.A.G 1552 has no printer).

1.3 - Technical data of self-diagnosis

▪ Memory	Non-volatile memory
▪ Data output	Rapid data transfer "Mode 1"
▪ Self-diagnosis	Additional/auxiliary heater"Address word 18"
- Interrogating control unit version	Function 01
- Interrogating fault memory	Function 02
- Performing final control diagnosis	Function 03
- Performing basic setting	Function 04
- Erasing fault memory	Function 05
- End of output	Function 06
- Encoding control unit	Function 07
- Reading measured value block	Function 08
- Adaption	Function 10

Notes:

- ◆ Component fitting locations => Page **77**
- ◆ There are several different codes for the auxiliary/additional heater (heater type "Z/C"), e.g. undervoltage cut-out via learnt battery voltage characteristic curve, undervoltage cut-out at fixed battery voltage input value, different codes for different software versions => Page **29** (Encoding control unit).
- ◆ During implementation of functions:
 - Final control diagnosis
 - Basic setting (adaption of battery)
 it is not possible to have auxiliary/additional heater operation.
- ◆ If operating and display unit for air conditioner/Climatronic -E87 remains in operation after switching off ignition, use current flow diagram to check for "Short to positive" in wiring to -E87 (connector -E-, contact -7-).

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

- ◆ On vehicles with auxiliary heater, application of voltage (at connector -E-, contact -7-) with ignition switched off causes operating and display unit for air conditioner/Climatronic -E87 to be switched on.
- ◆ If a fault occurs several times in succession (e.g. fault "flame interruption"), auxiliary/additional heater is interlocked and can only be switched on after erasing fault memory (part number is displayed by way of "Control unit identification" function).
- ◆ If a fault occurs several times in succession (e.g. fault "flame interruption"), auxiliary heater is no longer interlocked. If a fault occurs in additional heating mode, auxiliary and additional heater is interlocked once a fault has occurred 6 times and switch-on is only possible after erasing fault memory (part number is displayed by way of "Control unit identification" function).



-Auxiliary/additional heater with part number 4D0 265 105 as of index "G" or "H"

-Additional heater with part number 4D0 265 071 as of index "B"

- ♦ Auxiliary/additional heaters of type "Z/C" (featuring self-diagnosis) were gradually introduced as of 05.97. With these heaters, it is not possible to adjust CO2 level in exhaust gas.
- ♦ As of January 1999, auxiliary/additional heaters with which CO2 level in exhaust gas can be adjusted were gradually introduced (part number is displayed by way of "Control unit identification" function).

- Auxiliary heater part number 4D0 265 105 as of index "G" (vehicles with petrol engine)

- Auxiliary/additional heater part no. 4D0 265 105 as of index "H" (vehicles with diesel engine)

- Additional heater part no. 4D0 265 071 as of index "B"

- ♦ As the CO2 level in the exhaust gas can be adjusted, auxiliary heaters with a control unit as of software version "D49" designed for the Audi A6 (part number 4B0 265 105 as of index "D" or "E") can be fitted on the Audi A8.

=> Parts List

- ♦ Encoding of auxiliary/additional heater has been modified. Auxiliary heaters with part number 4D0 265 105 as of index "G" and additional heaters with part number 4D0 265 071 as of index "B" are to be encoded to 000XX instead of 0000X => Page 29 (encoding control unit).
- ♦ Auxiliary/additional heater encoding has been modified. Auxiliary heaters with part number 4D0 265 105 as of index "J" are to be encoded to 00XXX instead of 000XX => Page 29 (encoding control unit).

1.4 - Test requirements for self-diagnosis

- ♦ All fuses OK as per current flow diagram
- ♦ Battery voltage OK
- ♦ Battery -A adequately charged
- ♦ Second battery -A1 (if fitted) adequately charged

1.5 - Safety precautions

Pay attention to the following if testers and measuring instruments have to be used in the course of a test drive:

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Attention:

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

2 - Modifications to auxiliary/additional heater

2.1 - Modifications to auxiliary/additional heater

2.2 - Modifications to auxiliary/additional heater introduced in Model Year 1999

Notes:

- ◆ Various modifications to the vehicle as a whole were gradually introduced in Model Year 1999 for the Audi A8. Introduction of a modified dash panel insert resulted in the following:
 - Discontinuation of pre-selection clock -E111 and heater/heat output switch -E16
 - Auxiliary heating/auxiliary ventilation is now set by way of a rotary knob/pushbutton in the centre console. Settings made are indicated on driver information system display in dash panel insert
=>Page 97 .
 - Auxiliary heating/auxiliary ventilation operating time when switched on via remote control depends on setting in dash panel insert (between 30 and 60 min.).
 - Provision of a remote control system, the signal of which contains a time module for an operating period of 60 min. (as opposed to 30 min. with version for vehicles with pre-selection clock).
- ◆ Heater control unit -J162 has been modified, with the addition of certain new functions and changes to existing ones. Auxiliary/additional heaters with modified control unit can be identified from part number and software version indicated on fault reader display by way of "Interrogating control unit version" function. Gradual introduction commenced in January 1999.

Heater control unit -J162 with modified software

-> Control unit -J162 with modified software (as of "D49") can be identified from part number and software version.

4D0 815 071 X	Additional heater
Diesel	D49
Code XXXXX	WSC ZZZZZ

- The following part number and software version are displayed on interrogating control unit version.

Vehicles with petrol engine:

- 4D0 265 105 as of index "G" (auxiliary heater)

Vehicles with diesel engine:

- 4D0 265 105 as of index "J" (auxiliary/additional heater)
- 4D0 265 071 as of index "B" (additional heater)
- "D49" or higher is displayed as software version

Notes:

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- ◆ The following modifications have been made to the heater control unit -J162:
 - CO2 level in exhaust gas can be set by way of "Adaption" function.
 - Encoding has been altered.
 - Additional measured values appear in measured value block, display group "004".
 - Measured value block, display group "008" is new.
- ◆ As the CO2 level in the exhaust gas can be adjusted, auxiliary heaters with a control unit as of software version "D49" designed for the Audi A6 (part number 4B0 265 105 as of index "D" or "E") can be fitted on the Audi A8.

=> Parts List



2.3 - Modifications to auxiliary/additional heater introduced in Model Year 2001

Notes:

- ♦ Various modifications to the auxiliary heater and coolant circuit relating to the auxiliary heater were introduced in Model Year 2001.
- As of October 2000, vehicle electrical system has gradually been converted on vehicles with 8-cyl. petrol engine. Following introduction of modified wiring harness, these vehicles are provided with the pre-fitted electrical system components required for installation of a small coolant circuit (installation of coolant shut-off valve -N279).

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

- As of November 2000, auxiliary heaters with part number as of index "J" with software version "D50" or "D51" have gradually been introduced into production (initially only for vehicles with 8-cyl. petrol engine with index "K", subsequently also for diesel engines with index "J"). Encoding to "small coolant circuit" is possible as of software version "D50".
- As of January 2001, coolant circuit is gradually being converted on vehicles with 8-cyl. petrol engine. Following introduction of modified coolant circuit, auxiliary heater coolant is no longer drawn in via engine in auxiliary heating mode (small circuit).
- Auxiliary heaters with part number as of index "K" or "J" with software version "D52" have been gradually introduced into production since April 2001. With these auxiliary heaters, actuation of recirculating pump may be modified depending on encoding and adaption in adaption channel "10". With code "000XX" (large coolant circuit) and "001XX" (small coolant circuit), output of recirculating pump is reduced up to a coolant temperature of approx. 72 °C so as to increase temperature of coolant exiting from auxiliary heater (actuation time approx. 20 % at less than 60 °C and 100% at greater than 72 °C).

Heater control unit -J162 with modified software

-> Control unit -J162 with modified software (as of "D50") can be identified from part number and software version.

4D0 265 105 X	Aux. heater
Petrol	D50
Code XXXXX	WSC ZZZZZ

- The following part number and software version are displayed on interrogating control unit version.

Vehicles with petrol engine:

- 4D0 265 105 as of index "K" (auxiliary heater)

Vehicles with diesel engine:

- 4D0 265 105 as of index "H" (auxiliary/additional heater)
- 4D0 265 071 as of index "B" (additional heater)
- "D50" or higher is displayed as software version

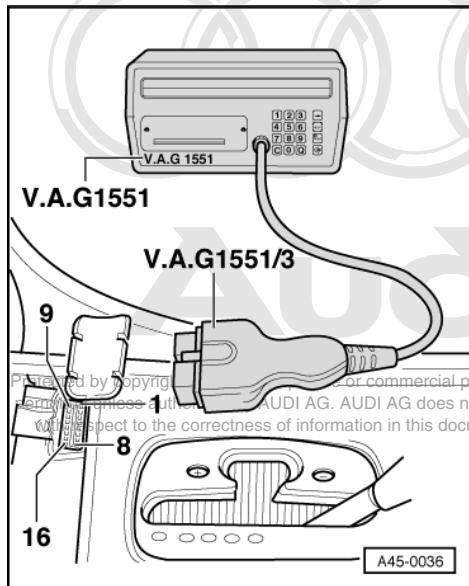
Notes:

- ♦ The following modifications were made to the auxiliary heater software as of software version "D50"/"D51":
- Extension of encoding to include "small coolant circuit" version
- When auxiliary heater is encoded for a small coolant circuit, a square-wave signal is emitted via output for actuation of fresh-air blower (operating and display unit for air conditioner/Climatronic -E87). This signal is processed by coolant shut-off valve relay -J541 (-E87 cannot process signal). This signal is used to output temperature of coolant in auxiliary heater and instantaneous auxiliary heater operating status. A positive signal is output if auxiliary heater is encoded for large coolant circuit (as for software versions "D49" and "D48")=>Page 69.
- Auxiliary heater recirculating pump -V55 can now be switched on via "Additional heater" input with version for "petrol" as well, thus assisting coolant pump of engine or in pump/valve unit on vehicles with small coolant circuit (gradual introduction for vehicles with 12-cyl. engine and 8-cyl. petrol engine).
- Auxiliary heater switching temperatures (from full to part load and to control interval) have been increased by approx. 4 °C.

- ♦ With software version "D50", operating and display unit for air conditioner/Climatronic -E87 is briefly deactivated during run-on on switching from part load mode to control interval. This function is no longer provided as of software version "D51".

3 - Connecting fault reader V.A.G 1551 and selecting function

3.1 - Connecting fault reader V.A.G 1551 and selecting function



- -> Remove cover for diagnostic connector.
- Connect up fault reader V.A.G 1551 with diagnostic wire V.A.G 1551/3 to diagnostic connector.

-> Indicated on display:
 font=symbol charset=fontspecific code=042 Displayed alternately

```
V.A.G self-diagnosis      HELP
1 - Rapid data transfer*
2 - Flash code output*
```

Notes:

- ♦ If there is no display on fault reader V.A.G 1551, use current flow diagram to check wiring of diagnostic connector.

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

- ♦ Depending on the program, additional operating instructions can be printed out by pressing HELP key on V.A.G 1551.
- ♦ Next step in program sequence can be selected by pressing ➔key.
- ♦ Printer is switched on by pressing PRINT key (lamp in key lights).
- ♦ Fault memory must be interrogated before it can be erased.

- Press key -1- for "Rapid data transfer" mode.

-> Indicated on display:

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

- Press keys -1- and -8- to enter address word 18 for vehicle system to be tested (namely "Additional/auxiliary heater").



-> Indicated on display:

Rapid data transfer Q
18 - Additional/auxiliary heater

- Confirm entry with Q key.

-> Indicated on display following entry of address word 18:

Rapid data transfer
Tester transmits address word 18

-> Control unit identification, code and workshop code of V.A.G 1551 are displayed after a brief delay.

4D0 815 071 X Additional heater
Diesel XXX
Code XXXXX WSC ZZZZZ

- ♦ The following versions may be fitted, depending on vehicle equipment:
 - 4D0 815 071 X Additional heater Diesel XXX
(heater type "Z/C-D" with no recirculating pump -V55)
 - 4D0 265 105 X Auxiliary heater Diesel XXX
(heater type "Z/C-D" with recirculating pump -V55)
 - 4D0 265 105 X Auxiliary heater Petrol XXX
(heater type "Z/C-B")

Notes:

- ♦ The first 800 vehicles with diesel engine were fitted with an additional heater for which, instead of the part number 4D0 815 071, the display shows the part number 4B0 815 071.
- ♦ Additional heater is only intended for vehicles with diesel engine. On vehicles with petrol and diesel engine, auxiliary heater can also be used as additional heater. Cut-in is automatic on vehicles with diesel engine.
- ♦ Additional heater can only be switched on when engine is running; undervoltage shutoff is thus not necessary.
- ♦ The additional heater code number was altered on switching from software version X46 to D47 =>Page 10 .
- ♦ Auxiliary and additional heater versions with a control unit with software version "D47/D48" have a different code number to those with a control unit as of software version "D49" =>Page 10 .
- ♦ Auxiliary heater versions with control unit with software version "D49" have a different code number to those with a control unit as of software version "D50" =>Page 10 .
- ♦ Vehicles with 8-cyl. petrol engine and small coolant circuit for auxiliary heater (gradual introduction as standard as of January 2001) and vehicles with 12-cyl. engine are only to be fitted with auxiliary heaters with part number as of index K (software version as of "D50").
- ♦ Vehicles with 8-cyl. diesel engine are only to be fitted with auxiliary heaters with part number as of index "J" and software version as of "D52".
- ♦ Control unit identification (depending on vehicle equipment and encoding, assignment)

=> Parts List

- ♦ WSC ZZZZZ indicates workshop code of V.A.G 1551 with which encoding / adaption was last performed.
- ♦ XXX indicates software version of heater control unit -J162.

Note:

Encoding heater control unit -J162 =>Page 29

List of functions	Page
01 - Interrogating control unit version	7
02 - Interrogating fault memory	13
03 - Final control diagnosis	18
04 - Basic setting	22
05 - Erasing fault memory	28
06 - End of output	28

List of functions	Page
07 - Encoding control unit	29
08 - Reading measured value block	34
10 - Adaption	43

Only the functions listed here can be used for auxiliary/additional heater self-diagnosis.

Note:

"Basic setting" function is to be performed for vehicles with auxiliary heater on which temperature-dependent undervoltage cut-out is activated with code "00XX1" =>Page 22.

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- with Press => key.

-> Indicated on display (function selection, e.g. 02 - Interrogating fault memory):

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

Notes:

- ◆ Pressing HELP key prints out a list of possible functions.
- ◆ Program of V.A.G 1551 returns to start after pressing =>key.
- ◆ If one of the following fault messages appears on the display:

```
Rapid data transfer      HELP
No control unit response
```

-> Press HELP key for printout of possible fault causes.

```
Rapid data transfer      HELP
K-wire not switched to positive
```

-> Use current flow diagram to check diagnostic connector wiring.

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

->

```
Rapid data transfer
No signal from control unit
```

```
Rapid data transfer
Fault in communication link
```

-> If adjacent display appears at the start of or during the program, faults have occurred and data exchange between fault reader V.A.G 1551 and heater control unit -J162 is no longer possible. Use current flow diagram to check diagnostic connector wiring.

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

- After eliminating possible causes of trouble, enter address word 18 for "Additional/auxiliary heater" again and confirm with Q key.

-> Indicated on display following entry of address word 18:

Following display then appears, e.g.:

```
Rapid data transfer
Tester transmits address word 18
```

-> Control unit identification, code and workshop code of V.A.G 1551 are displayed.

```
4D0 815 071 X      Additional heater
XXX
Code XXXXX        WSC ZZZZZ
```



- Press ⇒ key.

-> Indicated on display (function selection, e.g. 02 - Interrogating fault memory):

Rapid data transfer	HELP
Select function XX	

Encoding tables

Notes:

- ♦ As of January 1999, auxiliary/additional heaters with which CO₂ level in exhaust gas can be adjusted were gradually introduced (part number is displayed by way of "Control unit identification" function) => Page 125.

- Auxiliary heater part number 4D0 265 105 as of index "G" (vehicles with petrol engine)

- Auxiliary/additional heater part no. 4D0 265 105 as of index "H" (vehicles with diesel engine)

- Additional heater part no. 4D0 265 071 as of index "B"

=> Parts List

- ♦ Auxiliary heaters with part number as of index "J" with software version "D50" have been gradually introduced into production since November 2000 (initially only for vehicles with 8-cyl. petrol engine). Encoding to "small coolant circuit" is possible as of software version "D50".

=> Parts List

- ♦ If a vehicle provided at the factory with an auxiliary heater with software version "D49" and retrofitted with a small coolant circuit is fitted with an auxiliary heater as of software version "D50", this auxiliary heater is to be encoded - contrary to usual procedure - to "00011" for vehicle with large coolant circuit (no coolant shut-off valve) or vehicle electrical system is to be converted accordingly => Refer to Page 264 and appropriate current flow diagram for vehicles with auxiliary heater and factory-fitted small coolant circuit in Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder (e.g. current flow diagram no. 39 for Model Year 2002 vehicles).

Encoding of additional heater (with control unit -J162 with software version "X46" only):

Code	Significance
0 0 0 0 1	Undervoltage cut-out is effected at voltage value entered in adaption function

Notes:

- ♦ Additional heaters with software version "X46" were fitted at the start of production.
- ♦ The additional heater code number was altered on switching from software version "X46" to "D47".
- ♦ Code "00001" specified by manufacturer is not to be altered.

Encoding of auxiliary/additional heater or additional heater (with control unit -J162 with software version "D47" or "D48"):

Code	Significance
0 0 0 0 1	Undervoltage cut-out is effected at voltage value learnt in basic setting function
0 0 0 0 2	Undervoltage cut-out is effected at voltage value entered in adaption function

Notes:

- ♦ Code "00002" is always to be entered for heaters used as additional heater only.
- ♦ Code "00001" is always to be entered for heaters used as auxiliary/additional heater. "00002" is only to be entered if specifically requested by customer => Page 29 (encoding control unit).
- ♦ Software version "D47" or "D48" is used for
 - Auxiliary/additional heaters with part number 4D0 265 105 up to index "E" or "F"

and for

- Additional heaters with part number 4D0 265 071 up to index "A"

Part number and software version can be called up by way of "Interrogating control unit version" function with fault reader V.A.G 1551.

- ◆ With code "00001", undervoltage cut-out takes place as soon as battery voltage learnt in "Basic setting" function is not reached in auxiliary heating mode. This temperature-dependent cut-out curve is learnt in "Basic setting" function => Page **22**.
- ◆ With code "00002", undervoltage cut-out takes place as soon as battery voltage entered in "Adaption" function is not reached in auxiliary heating mode.
- ◆ If "Undervoltage cut-out (fixed value)" is displayed as fault for auxiliary/additional heater encoded to "00001":

- Encode auxiliary/additional heater to "00002" => Page **29** (encoding control unit).

- Use adaption function to read out value entered for undervoltage cut-out (fixed value) => Page **43** (adaption).

- Alter fixed value by way of "Adaption" function (specification less than 10.5 V).

- Encode auxiliary/additional heater to "00001" => Page **29** (encoding control unit).

Encoding of auxiliary/additional heater (with control unit -J162 with software version "D49"):

Code	Significance
0 0 0 1 1	- Recirculating pump -V55 fitted Undervoltage cut-out is effected at voltage value learnt in basic setting function
0 0 0 1 2	- Recirculating pump -V55 fitted Undervoltage cut-out is effected at voltage value entered in adaption function

Notes:

- ◆ Code "00011" is always to be entered for heaters used as auxiliary/additional heater. "00012" is only to be entered if specifically requested by customer => Page **29** (encoding control unit).
- ◆ Software version "D49" is used for auxiliary/additional heaters with part number 4D0 265 105 and index "G" or "H". Part number and software version can be called up by way of "Interrogating control unit version" function with fault reader V.A.G 1551.
- ◆ With code "00011", undervoltage cut-out takes place as soon as battery voltage learnt in "Basic setting" function is not reached in auxiliary heating mode. This temperature-dependent cut-out curve is learnt in "Basic setting" function=>Page **22**.
- ◆ With code "00012", undervoltage cut-out takes place as soon as battery voltage entered in "Adaption" function is not reached in auxiliary heating mode.
- ◆ If "Undervoltage cut-out (fixed value)" is displayed as fault for auxiliary/additional heater encoded to "00011":

- Encode auxiliary/additional heater to "00012" => Page **29** (encoding control unit).

- Use adaption function to read out value entered for undervoltage cut-out (fixed value) => Page **43** (adaption).

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- Alter fixed value by way of "Adaption" function (specification less than 10.5 V).

- Encode auxiliary/additional heater to "00011" => Page **29** (encoding control unit).

Encoding of additional heater (with control unit -J162 as of software version "D49"):

Code	Significance
0 0 0 0 2	- No recirculating pump -V55 fitted Undervoltage cut-out is effected at voltage value entered in adaption function

**Notes:**

- ♦ Code "00002" is always to be entered for heaters used as additional heater only.
- ♦ Software version "D49" or higher is used for additional heaters with part number 4D0 265 071 as of index "B". Part number and software version can be called up by way of "Interrogating control unit version" function with fault reader V.A.G 1551.
- ♦ If an additional heater is replaced with an auxiliary heater (with no recirculating pump), recirculating pump must additionally be fitted with software version "D49". With this software version, recirculating pump selection cannot be cancelled by way of encoding (only auxiliary heater version is available as replacement part).

Encoding of auxiliary/additional heater (with control unit -J162 as of software version "D50"):

Code		Significance
0		No assignment
	0	No assignment
		Vehicle version
	0	Auxiliary heater in vehicle with no coolant shut-off valve -N279 (large coolant circuit)
	1	Auxiliary heater in vehicle with coolant shut-off valve -N279 (small coolant circuit)
		Auxiliary heater recirculating pump -V55
	0	Not installed (Additional heater for vehicles with diesel engine only)
	1	Installed (Auxiliary/additional heater)
		Nature of undervoltage cut-out
	1	Undervoltage cut-out is effected at voltage value learnt in basic setting function
	2	Undervoltage cut-out is effected at voltage value entered in adaption function

Notes:

- ♦ For encoding nature of undervoltage cut-out, heed notes on Page 11 (same as for software "D49").
- ♦ If a vehicle provided at the factory with an auxiliary heater with software version "D49" and retrofitted with a small coolant circuit is fitted with an auxiliary heater as of software version "D50", this auxiliary heater is to be encoded - contrary to usual procedure - to "00011" for vehicle with large coolant circuit (no coolant shut-off valve) or vehicle electrical system is to be converted accordingly. => Refer to Page 264 and appropriate current flow diagram for vehicles with auxiliary heater and factory-fitted small coolant circuit in Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder (e.g. current flow diagram no. 39 for Model Year 2002 vehicles).
- ♦ As of January 2000, coolant circuit is gradually being converted on vehicles with 8-cyl. petrol engine. Following introduction of coolant shut-off valve -N279 (modified coolant circuit), auxiliary heater coolant is no longer drawn in via engine in auxiliary heating mode (small coolant circuit).
- ♦ When auxiliary heater is encoded for a small coolant circuit, a square-wave signal is emitted via output for actuation of fresh-air blower (operating and display unit for air conditioner/Climatronic -E87). This signal is processed by coolant shut-off valve relay -J541 (-E87 cannot process signal). This signal is used to output temperature of coolant in auxiliary heater and instantaneous auxiliary heater operating status. A positive signal is output if auxiliary heater is encoded for large coolant circuit (as for software versions "D49" and "D48") =>Page 69 .

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- ♦ All vehicles with 12-cyl. engine are fitted with coolant shut-off valve -N279.
- ♦ Software version "D50" or above is used for auxiliary/additional heaters with part number 4D0 265 105 and index "J" or "K". Part number and software version can be called up by way of "Interrogating control unit version" function with fault reader V.A.G 1551.
- ♦ Auxiliary heaters with part number as of index "K" or "J" with software version "D52" have been gradually introduced into production since April 2001. With these auxiliary heaters, actuation of recirculating pump may be modified depending on encoding and adaption in adaption channel "10".
With code "000XX" (large coolant circuit), output of recirculating pump is reduced up to a coolant temperature of approx. 72 °C so as to increase temperature of coolant exiting from auxiliary heater (actuation time approx. 20 % at less than 60 °C and 100% at greater than 72 °C).
With code "001XX" (small coolant circuit), output of recirculating pump is also reduced as a function of coolant temperature => Page 43 .

- ♦ If, on vehicles with diesel engine, auxiliary/additional heater is not switched on and only recirculating pump -V55 starts up instead, check adaption in adaption channel "10" => Page 43 .
- ♦ If, on vehicles with petrol engine, auxiliary/additional heater is switched on as additional heater, check adaption in adaption channel "10" => Page 43 .
- ♦ If, on vehicles with petrol engine and coolant shut-off valve -N279, auxiliary heater is switched on as additional heater, also check encoding of auxiliary heater. If auxiliary heater is encoded for a vehicle with no shut-off valve and earth is applied to contact "3" in 6-pin connector to auxiliary heater (via coolant shut-off valve relay -J541), auxiliary heater is switched on as additional heater => Page 43 .

4 - Interrogating fault memory of auxiliary/additional heater

4.1 - Interrogating fault memory of auxiliary/additional heater

- Connect up fault reader V.A.G 1551, enter address word 18 "Additional/auxiliary heater" and keep switching until "Select function XX" appears on display (=>Page 7 onwards).
- Switch on printer by pressing PRINT key (lamp in key lights).

-> Indicated on display (function selection):

Rapid data transfer HELP
Select function XX

- Press keys -0- and -2- to enter "Interrogating fault memory" function 02.

-> Indicated on display:

Rapid data transfer Q
02 - Interrogating fault memory

- Confirm entry with Q key.

-> The number of stored faults or "No faults detected" appears on the display.

X faults detected

No faults detected

- Press => key.

The stored faults are consecutively displayed and printed out.

- Following display and printout of last fault, select function "Reading measured value block 08, Display Groups 005 to 007"=>Page 34 and display/print out ambient conditions under which faults indicated occurred.
- Following display and printout of last fault, eliminate faults as per fault table (=>Page 14).

As is the case with "No faults detected", program returns to start after pressing =>key.

-> Indicated on display (function selection):

Rapid data transfer HELP
Select function XX

- End output (function 06) =>Page 28 .
- Unplug diagnostic connector.

Notes:

- ♦ If a fault has been detected:
 - 1. Eliminate fault.
 - 2. Interrogate fault memory (function 02).
 - 3. Erase fault memory (function 05).
 - 4. Check encoding (function 01)/encode control unit (function 07).
 - 5. For auxiliary heaters encoded



- "00XX1" perform basic setting (function 04).
 - 6. End output (function 06).
- ◆ Proceed as follows if no fault is detected but there are problems with auxiliary/additional heater (e.g. auxiliary heater does not start, inadequate heat output):
 - 1. Read measured value block (function 08) =>Page 34 .
 - 2. Perform final control diagnosis (function 03) =>Page 18 .
 - 3. Check operation of auxiliary/additional heater => Page 59 .
 - 4. Check adaption of auxiliary heater (only applies to auxiliary heater as of software version "D50")=> Page 46 .

5 - Auxiliary/additional heater fault table

5.1 - Auxiliary/additional heater fault table

Notes:

- ◆ Listed in the following in ascending order of fault codes are all the faults which can be detected by the heater control unit -J162 and displayed on V.A.G 1551.
- ◆ The fault memory can store a maximum of 3 faults. If a further fault occurs, the first fault is erased. The ambient conditions under which they occurred are stored for all faults and can be called up via the function "Reading measured value block 08, display groups 005 to 007" =>Page 34 .
- ◆ If faults only occur intermittently or if fault memory is not erased after fault elimination, such faults are displayed as being "sporadic faults" ("/SP") and content of fault memory is retained until memory is erased ("non-volatile memory").
- ◆ Fault code and flash code (certain components only) only appear on printout in "Rapid data transfer" mode.
Example:
Fault code
5-digit
00532
- ◆ The fault table may also indicate the type of fault (one of the displays marked with an * appears in addition to the component concerned/"info" display).
- ◆ On completion of repair work, always interrogate fault memory again with fault reader V.A.G 1551 and erase it.
- ◆ Before replacing components, always use current flow diagram to check corresponding positive and earth connections (terminals 30 and 31) as well as all connectors (between -J162 and component detected as being faulty).
- ◆ As regards all sporadic faults, pay particular attention to possible loose contacts in connectors.
- ◆ After replacing auxiliary/additional heater component, always read out fault memory, eliminate any faults displayed and erase fault memory (functions 02 and 05).
- ◆ If operating and display unit for air conditioner/Climatronic -E87 remains in operation after switching off ignition, use current flow diagram to check for "Short to positive" in wiring between heater control unit -J162 and -E87 (connector -E-, contact -7-).
- ◆ If no faults are found in spite of problems with auxiliary/additional heater, perform functions "Final control diagnosis 03" and "Reading measured value block 08".
- ◆ If a fault occurs several times in succession (e.g. fault "flame interruption"), auxiliary/additional heater is interlocked and can only be switched on after erasing fault memory (part number is displayed by way of "Control unit identification" function).

-Auxiliary/additional heater with part number 4D0 265 105 up to index "E" or "F"

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-Additional heater with part number 4D0 265 071 up to index "A"

- ◆ If a fault occurs several times in succession (e.g. fault "flame interruption"), auxiliary heater is no longer interlocked. If a fault occurs in additional heating mode, auxiliary and additional heater is interlocked once a fault has occurred 6 times and switch-on is only possible after erasing fault memory (part number is displayed by way of "Control unit identification" function).

-Auxiliary/additional heater with part number 4D0 265 105 as of index "G" or "H"

-Additional heater with part number 4D0 265 071 as of index "B"

- ♦ Check operation of auxiliary/additional heater => Page 59 .

Output on printer of V.A.G 1551	Possible cause of trouble	Fault remedy
00000 No faults detected	Self-diagnosis is over if "No faults detected" appears on completion of repair work and checking operation of auxiliary/additional heater	
00532 Supply voltage * Signal too high /SP	- Electrical system voltage too high with engine running Charger with excessively high charging voltage used to charge battery	- Check alternator and voltage regulator => Electrical System; Repair Group 01 Erase fault memory Check or replace battery
01044 Control unit incorrectly coded 1)	- Newly installed auxiliary/additional heater not encoded	- Encode auxiliary/additional heater => Page 29 Erase fault memory

- 1) This fault can only occur with auxiliary/additional heater (heater with recirculating pump -V55).

Output on printer of V.A.G 1551	Possible cause of trouble	Fault remedy
01406 No flame	- Constriction or leakage in area around air intake or in exhaust system Fault in auxiliary/additional heater fuel supply Combustion air blower -V6 defective Glow plug with flame monitor -Q8 defective Metering pump -V54 defective Leak in auxiliary/additional heater Residue in burner element (operation of auxiliary/additional heater with vegetable-oil methylester fuel only)	- Check air-intake area and exhaust system of auxiliary/additional heater Check fuel delivery =>Page 132

Output on printer of V.A.G 1551	Possible cause of trouble	Fault remedy
01407 Flame stop	- Constriction or leakage in area around air intake or in exhaust system Fault in auxiliary/additional heater fuel supply Combustion air blower -V6 defective Glow plug with flame monitor -Q8 defective Metering pump -V54 defective Leak in auxiliary/additional heater Residue in burner element (operation of auxiliary/additional heater with vegetable-oil methylester fuel only)	- Check air-intake area and exhaust system of auxiliary/additional heater Check fuel delivery =>Page 132

Output on printer of V.A.G 1551	Possible cause of trouble	Fault remedy
01408 Insuff. voltage switch-off (pre-det. value)	- Voltage dips during operation of auxiliary/additional heater to below specified minimum voltage value Contact resistance in wiring to -J162 Battery insufficiently charged or defective Excessive fixed value entered for undervoltage cut-out	- Check alternator and voltage regulator => Electrical System; Repair Group 01 43

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**Notes:**

- ♦ The fixed value for undervoltage cut-out is active with code "00XX2"; it can be entered or altered using the "Adaption" function => Page 34.
- ♦ The fixed value for undervoltage cut-out is also active with code "00XX1", but is not displayed. If the voltage value has been changed for a control unit encoded "00XX2" and the control unit then re-encoded "00XX1", this fault may also be displayed for control units encoded for automatic undervoltage cut-out.
Remedy:
- Encode control unit to "00XX2" => Page 43.
- Re-encode control unit to "00XX1".
- ♦ In the event of frequent use of auxiliary heating mode, the battery may no longer be adequately charged if the vehicle is only used for short journeys, for example.
- ♦ On vehicles with additional heater (heater with no recirculating pump -V55), this fault can only be displayed in the event of contact resistance in the connection between additional heater and vehicle battery (additional heater only operates when engine is running).
- ♦ Depending on last operating status and coolant temperature in auxiliary/additional heater, no-load current input of auxiliary/additional heater may be up to max. 60 mA for a period of up to 5 hours following switch-off. During this time, the degree of cooling of the coolant for the period following switch-off is calculated by the heater control unit -J162.
- ♦ At the latest 5 hours after switch-off, the no-load current input of the heater control unit -J162 is less than 2 mA.

Output on printer of V.A.G 1551	Possible cause of trouble	Fault remedy
01409 Repeated flame interruption	- Constriction or leakage in area around air intake or in exhaust system Fault in auxiliary/additional heater fuel supply Combustion air blower -V6 defective Glow plug with flame monitor -Q8 defective Metering pump -V54 defective Leak in auxiliary/additional heater	- Check air-intake area and exhaust system of auxiliary/additional heater Check fuel delivery =>Page 49 Dismantle auxiliary/additional heater and examine seals

Output on printer of V.A.G 1551	Possible cause of trouble	Fault remedy
01410 Heating unit overheated	- Air in coolant circuit Constriction in coolant circuit No recirculating pump -V55 operation (only applies to auxiliary/additional heater) Fault at temperature sender in heater control unit -J162	- Bleed coolant circuit in specified manner Eliminate constriction in coolant circuit Perform final control diagnosis =>Page 49 Replace auxiliary/additional heater
01411 Temperature sensor -G18 * Defective	- Fault in heater control unit -J162	- Replace auxiliary/additional heater

Output on printer of V.A.G 1551	Possible cause of trouble	Fault remedy
01412 Glow plug with flame monitor -Q8 * Implausible signal * Open circuit * Short to positive * Short to earth	- Fault in wiring between control unit -J162 and glow plug with flame monitor -Q8 Glow plug with flame monitor -Q8 defective Fault in heater control unit -J162	- Perform final control diagnosis =>Page 49 Replace auxiliary/additional heater

Notes:

- ♦ In the case of auxiliary/additional heaters with software version "D47" or "D48", fault "Glow plug with flame monitor Q8, short to positive" may be stored under unfavourable usage conditions. If, for example, "cold" engine is started at the same time as auxiliary heater starts up from control interval, engine coolant pump

pumps cold water through auxiliary heater, auxiliary heater cannot heat the large quantity of water as intended during the starting sequence, the temperature of the water in the auxiliary heater drops and the heater control unit -J162 sets this fault.

- ◆ If this fault is displayed together with "Flame interruption" or "Repeated flame interruption" fault, start by eliminating cause of these faults.
- ◆ If this fault is displayed, additionally check for contact resistance in connector between control unit -J162 and glow plug -Q8 (glow plug is also flame monitor). As the flow of current when interrogating the flame monitor is very low, even a slight contact resistance (e.g. due to inadequate contact pressure) can cause this fault to be stored.

Output on printer of V.A.G 1551	Possible cause of trouble	Fault remedy
01413 Metering pump -V54 * Short to earth * Open circuit * Short to positive	- Fault in wiring between control unit -J162 and metering pump -V54 Metering pump -V54 defective Fault in heater control unit -J162	- Locate and eliminate fault in wiring between -J162 and -V54 Perform final control diagnosis =>Page 49 Replace auxiliary/additional heater
01414 Combustion air blower -V6 * Open circuit * Short to positive	- Fault in wiring between control unit -J162 and combustion air blower -V6 Combustion air blower -V6 defective Fault in heater control unit -J162	- Perform final control diagnosis =>Page 49 Replace auxiliary/additional heater

Output on printer of V.A.G 1551	Possible cause of trouble	Fault remedy
01415 Recirculating pump -V55 1) * Open circuit * Short to positive	- Fault in wiring between control unit -J162 and recirculating pump -V55 Recirculating pump -V55 defective Fault in heater control unit -J162	- Perform final control diagnosis =>Page 49 Replace auxiliary/additional heater
01416 Fresh air blower activation sign. 1) * Short to earth * Open circuit * Short to positive	- Fault in wiring between heater control unit -J162 and operating and display unit for air conditioner/ Climatronic -E87 Fault in heater control unit -J162	- Perform final control diagnosis =>Page 49 Replace auxiliary/additional heater
	- Fault in coolant shut-off valve relay -J541 (only fitted on vehicles with small coolant circuit) 2)	- Check wiring between relay -J541 and control unit -J162 Check operation of relay -J541 => Page 73

1) This fault can only occur with auxiliary/additional heater (heater with recirculating pump -V55).

2) As of October 2000, vehicle electrical system has gradually been converted on vehicles with 8-cyl. petrol engine. Following introduction of modified wiring harness, these vehicles are provided with the pre-fitted electrical system components required for installation of a small coolant circuit (installation of coolant shut-off valve -N279). Prior to introduction of small coolant circuit (gradually as of January 2001), a jumper is inserted in the relay socket instead of coolant shut-off valve relay -J541. Relay is fitted in all vehicles with 12-cyl. engine but is currently not intended for vehicles with 6-cyl. engine and 8-cyl. diesel engine.

Output on printer of V.A.G 1551	Possible cause of trouble	Fault remedy
01443 Matching to battery not carried out 1)	- Basic setting not performed for auxiliary/additional heater encoded to "00XX1" Basic setting not performed after last encoding for auxiliary/additional heater encoded to "00XX1"	- Perform basic setting (learning of temperature-dependent cut-out curve for undervoltage cut-out) =>Page 22

1) This fault can only occur with auxiliary/additional heater (heater with recirculating pump -V55).



Output on printer of V.A.G 1551	Possible cause of trouble	Fault remedy
01444 Insuff. voltage switch-off (automatic) 1)	- Voltage dips during operation of auxiliary/additional heater to below specified minimum voltage value Contact resistance in wiring to -J162 Battery insufficiently charged or defective	- Check alternator and voltage regulator => Electrical System; Repair Group 01 Use current flow diagram to locate and eliminate contact resistance Check, recharge or replace battery

1) This fault can only occur with auxiliary/additional heater (heater with recirculating pump -V55).

Notes:

- ♦ The "automatic" value for undervoltage cut-out is active with code "00XX1" and is learnt in the "Basic setting" function => Page 34 .
- ♦ In the event of frequent use of auxiliary heating mode, the battery may no longer be adequately charged if the vehicle is only used for short journeys, for example.
- ♦ If other faults are displayed together with the fault "Undervoltage cut-out (automatic)", start by eliminating the cause of the fault "Undervoltage cut-out (automatic)".
- ♦ Depending on last operating status and coolant temperature in auxiliary/additional heater, no-load current input of auxiliary/additional heater may be up to max. 60 mA for a period of up to 5 hours following switch-off. During this time, the degree of cooling of the coolant for the period following switch-off is calculated by the heater control unit -J162.
- ♦ At the latest 5 hours after switch-off, the no-load current input of the heater control unit -J162 is less than 2 mA.

Output on printer of V.A.G 1551	Possible cause of trouble	Fault remedy
65535 Control unit (-J162) * Defective	- Open circuit, contact resistance or loose contact in wiring (terminal 30 or 31) to -J162 Fault in heater control unit -J162	- Use current flow diagram to locate and eliminate fault in wiring to -J162 Replace auxiliary/additional heater

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6 - Auxiliary/additional heater final control diagnosis

6.1 - Auxiliary/additional heater final control diagnosis

Notes:

- ♦ Fitting locations of components actuated =>Page 77
- ♦ If final control diagnosis is to be repeated, self-diagnosis must be terminated and re-started.
- ♦ Each component is actuated for a defined period, which can be terminated prematurely by pressing =>key. This simultaneously effects switching to the next component.
- ♦ On completion of envisaged period, next component is to be selected by pressing =>key.

Starting final control diagnosis

- Switch off ignition and all electr. loads.
- Connect up fault reader V.A.G 1551, enter address word 18 "Additional/auxiliary heater" and keep switching until "Select function XX" appears on display=>Page 7 .
- Switch on printer by pressing PRINT key (lamp in key lights).
- Interrogate fault memory => Page 13 .

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

- Press keys -0- and -3- to select "Final control diagnosis" function 03.

Notes:

- ♦ If vehicle is fitted with a second battery -A1 (only applies to vehicles with auxiliary heater and Model Year 1997), current probe is to be connected via positive connection of this battery.
- ♦ Final control diagnosis can be terminated by pressing C key.

- Set measuring instrument to current measurement with current probe (measuring range 0 - 10 A).

-> Indicated on display:

Rapid data transfer Q
 03 - Final control diagnosis

- Confirm entry with Q key.
- Connect up current probe of ammeter (e.g. of multimeter V.A.G 1715) via positive connection of battery -A (-A1).

-> Indicated on display:

Final control diagnosis
 Glow plug with flame monitor -Q8

- Next component can be selected by pressing ⇒key.

Notes:

- ♦ On completion of final control diagnosis, interrogate fault memory => Page 13 .
- ♦ If "Function unknown or cannot be implemented at present" appears on display at start of final control diagnosis, e.g. on account of fault in auxiliary/additional heater, press ⇒ key and interrogate fault memory => Page 13 .

-> Indicated on display:

Function unknown or cannot
 be implemented at present

- Final control diagnosis is over when this display appears.
- Press ⇒key.

Indicated on display	Specified function	Fault remedy
Glow plug with flame monitor -Q8	Glow plug is actuated for 60 s Reading on multimeter V.A.G 1715 increases during actuation of -Q8 by 4 to 10 A	- Check wiring between -Q8 and - J162 Check electrical components of auxiliary/additional heater =>Page 49
- Press ⇒ key		

Notes:

- ♦ Fault in glow plug with flame monitor -Q8 is stored in fault memory.
- ♦ Current input of glow plug is limited by control unit such that power output at glow plug is approx. 96 W (varies with battery voltage).

Indicated on display	Specified function	Fault remedy
Metering pump -V54	Metering pump is actuated for 10 s Pulsation is audible in vicinity of metering pump	- Check wiring between -V54 and -J162 Check electrical components of auxiliary/additional heater =>Page 49
- Press ⇒ key		

**Notes:**

- ♦ Metering pump is installed in area of rear right wheel.
- ♦ On vehicles with diesel engine, fuel consumption of auxiliary/additional heater is included in consumption value displayed by on-board computer. This function is executed by engine control unit, however only when engine is running (metering pump -V54 is connected to engine control unit by a wire).
- ♦ During actuation of metering pump -V54, approx. 4 cm³ of fuel is supplied to auxiliary/additional heater.

Indicated on display	Specified function	Fault remedy
Combustion air blower -V6	Combustion air blower -V6 is actuated for 30 s Running noise is audible in vicinity of auxiliary/additional heater	- Check wiring between -V6 and -J162 Check electrical components of auxiliary/additional heater =>Page 49
- Press => key		
End (for additional heater only)		

Notes:

- ♦ On vehicles with additional heater (heater with with no recirculating pump -V55), actuation of combustion air blower -V6 concludes final control diagnosis.
- ♦ Additional heater has no coolant recirculating pump -V55 and signal for fresh-air blower actuation is not output (additional heater only operates when engine is running).

Indicated on display	Specified function	Fault remedy
Recirculating pump -V55	Recirculating pump -V55 is actuated for 30 s Running noise is audible in vicinity of auxiliary/additional heater	- Check wiring between -V55 and -J162 Check electrical components of auxiliary/additional heater =>Page 49
- Press => key		
Fresh-air blower actuation signal	On vehicles with "large coolant circuit" Operating and display unit for air conditioner/Climatronic -E87 starts up for 30 s Fresh-air blower -V2 is actuated for 30 s by -E87	Check wiring between -E87 and -J162 Check encoding of heater control unit -J162 (only as of software version "D50") => Page 49
Continued ▼		

Indicated on display	Specified function	Fault remedy
Continuation (fresh-air blower actuation signal)	On vehicles with "small coolant circuit" Coolant shut-off valve relay -J541 is actuated by heater control unit -J162 for 30 s Relay -J541 actuates -E87 for 30 s and -E87 starts up Fresh-air blower -V2 is actuated for 30 s by -E87	Check wiring between -E87, -J541 and -J162 Check encoding of heater control unit -J162 (only as of software version "D50") => Page 49

Notes:

- ♦ As of October 2000, vehicle electrical system has gradually been converted on vehicles with 8-cyl. petrol engine. Following introduction of modified wiring harness, these vehicles are provided with the pre-fitted electrical system components required for installation of a small coolant circuit (installation of coolant shut-off valve -N279). Prior to introduction of small coolant circuit (gradually as of January 2001), a jumper is

inserted in the relay socket instead of coolant shut-off valve relay -J541. Relay is fitted in all vehicles with 12-cyl. engine but is currently not intended for vehicles with 6-cyl. engine and 8-cyl. diesel engine.

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

- ♦ Coolant shut-off valve relay -J541 can only be actuated with a square-wave signal by auxiliary heaters for petrol with part number as of index "K" (software version "D50"). Such auxiliary heaters were gradually introduced into production as of November 2000 (initially for vehicles with 8-cyl. petrol engine). Relay is fitted in all vehicles with 12-cyl. engine but is currently not intended for vehicles with 6-cyl. engine and 8-cyl. diesel engine.
- ♦ When auxiliary heater is encoded for a small coolant circuit, a square-wave signal is emitted via output for actuation of fresh-air blower (operating and display unit for air conditioner/Climatronic -E87). This signal is processed by coolant shut-off valve relay -J541 (-E87 cannot process signal). This signal is used to output temperature of coolant in auxiliary heater and instantaneous auxiliary heater operating status. A positive signal is output if auxiliary heater is encoded for large coolant circuit (as for software versions "D49" and "D48") =>Page **69** .
- ♦ On vehicles retrofitted with coolant shut-off valve -N279, valve is actuated from this output via an additional relay in the case of auxiliary heaters with software version "D49". Heed the relevant notes in the corresponding fitting instructions => Pages **243** .

Indicated on display	Specified function	Fault remedy
- Press => key		
End		
For auxiliary heaters up to and including software version "D49"		
For auxiliary heaters as of software version "D50" encoded for vehicle with no coolant shut-off valve -N279 (large coolant circuit)		

Indicated on display	Specified function	Fault remedy
Coolant shut-off valve -N279	Coolant shut-off valve -N279 is actuated via coolant shut-off valve relay -J541 for 30 s at 5 s intervals Pulsation is audible in vicinity of shut-off valve	- Check wiring between relay -J541 and control unit -J162 Check encoding of heater control unit -J162 (only as of software version "D50") => Page 73
- Press => key		
End		

Notes:

- ♦ Coolant shut-off valve relay -J541 can only be actuated by auxiliary heaters for petrol with part number as of index "K" (software version "D50"). Such auxiliary heaters were gradually introduced into production as of November 2000 (initially for vehicles with 8-cyl. petrol engine). Relay is fitted in all vehicles with 12-cyl. engine but is currently not intended for vehicles with 6-cyl. engine and 8-cyl. diesel engine.
- ♦ Coolant shut-off valve -N279 has been gradually introduced for vehicles with 8-cyl. petrol engine since January 2001. Valve is fitted in all vehicles with 12-cyl. engine but is currently not intended for vehicles with 6-cyl. engine and 8-cyl. diesel engine.
- ♦ On vehicles with 8-cyl. petrol engine manufactured between November 2000 and introduction of coolant shut-off valve -N279 (gradually as of January 2001), a link is inserted in relay socket instead of relay -J541. This link connects contacts "1" (from auxiliary heater) and "5" (to operating and display unit for air conditioner/Climatronic -E87).
- ♦ Operation of coolant shut-off valve relay -J541 => Page **70**
- ♦ In auxiliary heating mode with engine stopped, coolant leaving air-conditioner unit heat exchanger by way of pump/valve unit is routed directly back to auxiliary heater via coolant shut-off valve -N279 to provide better heating of passenger compartment => Page **70** (operation of coolant shut-off valve relay -J541).



7 - Basic setting of auxiliary/additional heater

7.1 - Basic setting of auxiliary/additional heater

The "Basic setting" function can be used to perform the following switching operations.

- ♦ Pipe filling(display group number 055)
- This function permits checking of the fuel delivery of the metering pump -V54 =>Page 120 .
- ♦ Auxiliary heater battery adaption (display group number 066)
=>Page 22
- Only for heaters of type "Z/C" encoded for automatic undervoltage cut-out =>Page 29
- ♦ Heater on (display group number 022) =>Page 26
- Start engine before selecting this display group for additional heater (heater with no recirculating pump - V55).

Notes:

- ♦ If link with fault reader is interrupted whilst auxiliary/additional heater is switched on, auxiliary/additional heater is switched off automatically.
- ♦ In the case of heaters with control unit -J162 as of software version "D49", auxiliary/additional heater can be operated by way of this function up to a coolant temperature of 115° C. Starting from control interval is possible. The operating time is limited to max. 8 minutes.
- ♦ Heater off (display group number 033) =>Page 26

Note:

The functions "Pipe filling" (display group number 044) and "Auxiliary heater battery adaption" (display group number 099) apply to the Audi A6 and are not to be used for the Audi A8.

7.2 - Basic setting of auxiliary heater (adaption of battery)

Notes:

- ♦ "Battery adaption" is only to be implemented for vehicles with auxiliary/additional heater (heaters with re-circulating pump -V55) in which automatic (temperature-dependent) undervoltage cut-out is activated with code "00XX1".
- ♦ Basic setting is to be performed with code "00XX1":
 - After replacing vehicle battery
 - After replacing auxiliary/additional heater
 - After performing vehicle wiring work affecting auxiliary/additional heater wires
- ♦ Metering pump is also actuated during battery adaption and roughly 20 cm³ of fuel supplied. As a result, smoke may briefly emerge from exhaust pipe when auxiliary heater is first started up following basic setting.

Requirements

- ♦ Battery fully charged
- ♦ If a new battery has been fitted, it must not have been re-charged after filling with electrolyte
- ♦ If battery has been re-charged, charging must have been completed at least 2 hours previously and no-load voltage of fully charged battery must have settled at a level between 12.5 and 12.7 V
- ♦ Temperature of engine and battery must be greater than 15 °C but less than 30 °C (e.g. ambient temperature)
- ♦ Temperature of coolant in auxiliary heater and vehicle battery must be roughly the same

Notes:

- ◆ Heater control unit -J162 bases its calculation on identical coolant and battery temperatures. If engine is warm and battery temperature less than 20 °C during battery adaption, an incorrect cut-out voltage will result.
- ◆ If battery has been charged using a charger, no-load voltage is often higher than voltage occurring during vehicle operation depending on charger. If basic setting is performed with a battery charged in this manner, the cut-out voltage will be too high and the auxiliary heater may be switched off on account of "undervoltage".
- ◆ Ignition off
- ◆ All electr. loads off (including interior lights and radio)

Performing basic setting

- Connect up fault reader V.A.G 1551, enter address word 18 "Additional/auxiliary heater" and keep switching until "Select function XX" appears on display => Page 7 onwards.
- Switch on printer by pressing PRINT key (lamp in key lights).
Interrogate fault memory => Page 13 and eliminate any faults displayed.
- Erase fault memory => Page 28.
- Check encoding => Page 29 and correct if necessary.

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

- Press keys -0- and -4- to select "Basic setting" function 04.

-> Indicated on display:

Rapid data transfer	Q
04 - Starting basic setting	

- Confirm entry with Q key.

-> Indicated on display:

Start basic setting	HELP
Enter display number XXX	

- Enter display group number 066.
- Confirm entry with Q key.

-> Indicated on display:

System in basic setting	66
Battery adaption	

Notes:

◆ Function unknown or cannot be implemented at present
--

-> If this display appears, heater control unit -J162 has been incorrectly encoded, battery voltage is too high (e.g. engine running) or heater is on.

- ◆ Battery adaption takes approx. 168 s.
- ◆ The following components are then consecutively actuated:
 - Glow plug with flame monitor -Q8
 - Combustion air blower -V6
 - Recirculating pump -V55
 - Metering pump -V54
- ◆ During component actuation, battery voltage dip is measured by heater control unit -J162 and stored. The data determined in this test sequence form the basis for the cut-out value calculated by the heater control unit -J162 for the lowest permissible battery voltage in auxiliary heating mode.



- ♦ If calculated voltage value is not reached, control unit -J162 switches off auxiliary heater and fault "Under-voltage cut-out (automatic)" is entered in fault memory.

-> Wait until the following display appears:

```
System in basic setting      66
END
```

- Press => key.

Checking voltage value learnt

-> Indicated on display (function selection):

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

- Press keys -1- and -0- to select "Adaption" function 10.

-> Indicated on display:

```
Rapid data transfer      Q
10 - Adaption
```

- Confirm entry with Q key.

-> Indicated on display:

```
Adaption      Q
Enter channel number XX
```

- Enter channel number -01-.
- Confirm entry with Q key.

-> Indicated on display:

```
Channel      01      Adaption      XX
Undervoltage cut-out      (-1      3-)
```



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A number between 165 (199 for X46) and 175 (209 for X46) must be displayed as adaption value.

Alter adaption value to 157 to increase availability of auxiliary heater (165 for "D47" and "D48", 190 for "X46"). This value corresponds to roughly 12.25 V.

- Keep pressing key -1- until "157" ("190" for X46) is displayed as adaption value.

-> Indicated on display:

```
Channel 01      Adaption      157
Q
Store altered value?
```

- Confirm entry with Q key.

-> Indicated on display:

```
Channel      01      Adaption      157
□
Altered value stored
```

- Press => key.

-> Indicated on display (function selection):

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


Notes:

- ◆ If value displayed is less than 165 (199 for X46), battery voltage is too low (battery flat or not OK, check).
- ◆ If value displayed is greater than 175 (209 for X46), battery voltage is too high (battery fully charged prior to basic setting or engine operation during basic setting).
- ◆ As of August 2000, 12.25 V has been set at the factory as the lowest permissible cut-out voltage value. This value can also be set for vehicles manufactured prior to the above date (as of software version "D49" of heater control unit -J162).
- ◆ If frequent use is made of the auxiliary heater, the adaption value learnt can be reduced if so requested by customer to 165 (for "D47" and "D48") or 151 (as of "D49") to increase auxiliary heater availability still further. Customers must however be informed of the possible consequences (this setting may lead to engine starting problems on account of high drain on battery).
- ◆ Problems with auxiliary heater operation may be encountered if voltage value learnt is too high (undervoltage cut-out).
- ◆ Engine starting problems may occur if voltage value learnt is too low.

Adaption value displayed		Battery voltage learnt
Software version X46	As of software version D47	
184	151	12.15 V
189	155	12.22 V
194	160	12.29 V
199	165	12.36 V
204	170	12.44 V
209	175	12.51 V
214	180	12.58 V
219	185	12.66 V

Notes:

- ◆ Conversion factors may result in slight differences between actual cut-out voltage and value given in table.

Channel	01	Adaption	157
Undervoltage cut-out		(-1	3-)

- > For auxiliary heaters with code "00XX1" for automatic (temperature-dependent) undervoltage cut-out, cut-out voltage value determined during basic setting may only be varied within the specified limits.
 - The lowest cut-out voltage which can be entered to increase auxiliary heater availability is 12.25V (adaption value "157").
 - For heaters with control unit as of software version "D49", cut-out voltage can be reduced to 12.15V (input value "151"). If cut-out voltage setting is less than 12.25V, customers must be informed of possible consequences (engine starting problems on account of high drain on battery).
 - If greater importance is attached to reliable engine starting, a cut-out voltage of 12.51 V is to be entered (input value e.g. "175" for heater control unit -J162 as of software version "D47").

- ◆ If, however, basic setting was performed following vehicle battery charging and the voltage value determined is too high, the adaption value must be altered by pressing key "1" on fault reader such that the "battery voltage learnt" is less than 12.50 V (display value e.g. "157" for 12.25 V or less with heater control unit -J162 as of software version "D49").

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

- Press key -C- twice.

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

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- Interrogate fault memory =>Page 13 and eliminate any faults displayed.



- For auxiliary / additional heaters with control unit -J162 as of software version "D50", check adaption in adaption channel "10"=>Page 46 .

7.3 - Basic setting of auxiliary/additional heater (switching on and off)

Requirements

- ♦ Battery fully charged (on vehicles with auxiliary/additional heater)
- ♦ Ignition off (on vehicles with auxiliary/additional heater)
- ♦ Engine running (on vehicles with additional heater)

Performing basic setting

- Connect up fault reader V.A.G 1551, enter address word 18 "Additional/auxiliary heater" and keep switching until "Select function XX" appears on display => Page 7 onwards.
- Switch on printer by pressing PRINT key (lamp in key lights).
- Interrogate fault memory =>Page 13 and eliminate any faults displayed.
- Erase fault memory =>Page 28 .

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

- Press keys -0- and -4- to select "Basic setting" function 04.

-> Indicated on display:

Rapid data transfer	Q
04 - Starting basic setting	

- Confirm entry with Q key.

Heater on

-> Indicated on display:

Start basic setting	HELP
Enter display number XXX	

- Enter display group number 022.
- Confirm entry with Q key.

-> Indicated on display:

System in basic setting	22
On Off Heating	

Indicated on line 2 of display		
Position	Text	Significance
1	Test ON	Basic setting
2	- (Fault)	Auxiliary/additional heater is in a mode which does not permit switch-on
3	Heating OFF Heating ON Additional heating	Actuation
4	Heating Ventilation	Mode

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Notes:

- ◆ "Fault" display in line 2 may be caused by the following:
 - Auxiliary/additional heater had been switched on and is currently in "run-on" mode.
 - Fault stored in auxiliary/additional heater which prevents switch-on.
- ◆ To switch off heater, press ➡ key and enter basic setting (display group number 033) ➡ Page 27 .
- ◆ If fault occurs during function "Basic setting, heating on", heater cannot be re-started until it has been switched off by way of "Basic setting, heating off" function.
- ◆ If operation of auxiliary/additional heater is to be observed, it is possible to press ➡ key and enter "08" to switch to "Reading measured value block" function. Pressing ➡ key and entering "04" effects return to "Basic setting" function.
- ◆ If link with fault reader is interrupted whilst auxiliary/additional heater is switched on, auxiliary/additional heater is switched off automatically.
- ◆ Only "heating" mode is possible with additional heater (heater with no recirculating pump -V55).
- ◆ In the case of heaters with control unit -J162 as of software version "D49", auxiliary/additional heater can be operated by way of this function up to a coolant temperature of 115° C. Starting from control interval is possible. The operating time is limited to max. 8 minutes.

Heating off

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

- Press keys -0- and -4- to select "Basic setting" function 04.

-> Indicated on display:

Start basic setting	HELP
Enter display number XXX	

- Enter display group number 033.
- Confirm entry with Q key.

-> Indicated on display:

System in basic setting	33
Off Off Heating	

Indicated on line 2 of display		
Position	Text	Significance
1	Test OFF	Basic setting
2	- (Fault)	Auxiliary/additional heater is in a mode which does not permit switch-on
3	Heating OFF Heating ON Additional heating	Actuation
4	Heating Ventilation	Mode

Note:

"Fault" display in line 2 may be caused by the following:

- Auxiliary/additional heater had been switched on and is currently in "run-on" mode.



- Fault stored in auxiliary/additional heater which prevents switch-on.
- Press ⇒ key.

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

8 - Erasing fault memory, end of output

8.1 - Erasing fault memory, end of output

Requirements

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- ◆ Fault memory interrogated

Erasing fault memory

- Press ⇒key.

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

- Press keys -0- and -5- to enter "Erasing fault memory" function 05.

-> Indicated on display:

Rapid data transfer	Q
05 - Erasing fault memory	

- Confirm entry with Q key.

-> Indicated on display:

Rapid data transfer	
Fault memory erased	

- Press ⇒ key.

-> Indicated on display:

Rapid data transfer	HELP
Select function XX	

Notes:

◆ Attention: Fault memory not interrogated

- > Test sequence has not been correctly implemented if adjacent display appears.
- ◆ Keep exactly to test sequence:
 - Interrogate fault memory.
 - Eliminate any faults.
 - Erase fault memory.
- ◆ If, for example, ignition is switched off between "Interrogating fault memory" and "Erasing fault memory", fault memory is not erased (interrogate fault memory again).

End of output

Note:

Fault memory interrogated/erased and encoding checked.

-> Indicated on display:

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

- Press keys -0- and -6- to enter "End output" function 06.

-> Indicated on display:

```
Rapid data transfer
06 - End of output
```

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- Confirm entry with Q key.

-> Indicated on display:

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

- Unplug diagnostic connector.

9 - Encoding auxiliary/additional heater

9.1 - Encoding auxiliary/additional heater

- Connect up fault reader V.A.G 1551, enter address word 18 "Additional/auxiliary heater" and keep switching until "Select function XX" appears on display (=>Page 7 onwards).
- Switch on printer by pressing PRINT key (lamp in key lights).

-> Indicated on display (function selection):

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

- Press keys -0- and -7- to select "Encoding control unit" function 07.

-> Indicated on display:

```
Rapid data transfer      Q
07 - Encoding control unit
```

- Confirm entry with Q key.

-> Indicated on display:

```
Encoding control unit
Enter code number XXXXX
```

Note:

Next position can be selected by pressing ➔ key.

- Encode heater control unit -J162 in line with version and desired undervoltage cut-out.

Encoding tables =>Page 30

- Confirm entry with Q key.

-> Control unit identification, code and workshop code of V.A.G 1551 are displayed after a brief delay.



4D0 265 071 X	Auxiliary heater
Diesel	XXX
Code XXXXX	WSC ZZZZZ

- If code is "00XX1", perform basic setting =>Page 22 .
- If code is "00XX2", enter cut-out voltage by way of adaption function =>Page 43 .
- For auxiliary/additional heaters with control unit -J162 as of software version "D50", check adaption in adaption channel "10"=>Page 46 .
- ♦ The following versions may be fitted, depending on vehicle equipment:
 - 4D0 815 071 X Additional heater Diesel XXX
(heater type "Z/C-D" with no recirculating pump -V55)
 - 4D0 265 105 X Auxiliary heater Diesel XXX
(heater type "Z/C-D" with recirculating pump -V55)
 - 4D0 265 105 X Auxiliary heater Petrol XXX
(heater type "Z/C-B")

Note:

Additional heater is only intended for vehicles with diesel engine. On vehicles with petrol and diesel engine, auxiliary heater can also be used as additional heater. Cut-in is automatic on vehicles with diesel engine.

Principal differences between the two auxiliary heater codes

- ♦ Code "00XX1" allows for the changes in battery voltage at different temperatures. The voltage dip determined during basic setting also forms part of the calculation =>Page 22 .
- ♦ With code "00XX2", cut-out is effected at the voltage value entered in the "Adaption" function =>Page 43 .

Notes:

- ♦ As a general rule, use is always to be made on vehicles with only one battery for auxiliary/additional heater of code "00XX1", as it permits a higher level of auxiliary heater availability without jeopardising reliable starting of the vehicle.
- ♦ Use is to be made of code "00XX2" for vehicles with a second auxiliary heater battery -A1. If auxiliary/additional heater with control unit with software version as of "D49" has been fitted as replacement, code "00X12" is to be entered for these vehicles.
- ♦ Code "00XX2" or "00X12" is only to be entered for auxiliary/additional heater in exceptional circumstances (e.g. customer request) on vehicles with only one battery. Customers are to be informed that it may no longer be possible to start the engine if the cut-out voltage selected is too low.
- ♦ Heed the following as regards auxiliary heater encoding if auxiliary heater is replaced on vehicles retrofitted with a "small coolant circuit": If vehicles previously fitted with an auxiliary heater with software version "D49" are fitted with an auxiliary heater with software version as of "D50", the new auxiliary heater is to be encoded to "000XX" for "large coolant circuit" => Page 69 .

Encoding tables**Encoding of additional heater (with control unit -J162 with software version "X46" only):**

Code	Significance
0 0 0 0 1	Undervoltage cut-out is effected at voltage value entered in adaption function

Notes:

- ♦ Additional heaters with software version "X46" were fitted at the start of production.
- ♦ The additional heater code number was altered on switching from software version "X46" to "D47".
- ♦ Code "00001" specified by manufacturer is **not to be altered**.

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Encoding of auxiliary/additional heater or additional heater (with control unit -J162 with software version "D47" or "D48"):

Code	Significance
0 0 0 0 1	Undervoltage cut-out is effected at voltage value learnt in basic setting function
0 0 0 0 2	Undervoltage cut-out is effected at voltage value entered in adaption function

Notes:

- ◆ Code "00002" is always to be entered for heaters used as additional heater only.
- ◆ Enter code "00002" for vehicles with auxiliary/additional heater and second battery -A1 (installed up to September 1997).
- ◆ Always enter code "00001" for vehicles with one battery only and heaters used as auxiliary/additional heater. "00002" is only to be entered if requested by customer.
- ◆ Software version "D47" or "D48" is used for
 - Auxiliary/additional heaters with part number 4D0 265 105 up to index "E" or "F" and for
 - Additional heaters with part number 4D0 265 071 up to index "A"
 Part number and software version can be called up by way of "Interrogating control unit version" function with fault reader V.A.G 1551.
- ◆ With code "00001", undervoltage cut-out takes place as soon as battery voltage learnt in "Basic setting" function is not reached in auxiliary heating mode =>Page 22 .
- ◆ With code "00002", undervoltage cut-out takes place as soon as battery voltage entered in "Adaption" function is not reached in auxiliary heating mode.
- ◆ If "Undervoltage cut-out (fixed value)" is displayed as fault for auxiliary/additional heater encoded to "00001":
 - Encode auxiliary/additional heater to "00002" => Page 29 (encoding control unit).
 - Use adaption function to read out value entered for undervoltage cut-out (fixed value) => Page 43 (adaption).
 - Alter fixed value by way of "Adaption" function (specification less than 10.5 V).
 - Encode auxiliary/additional heater to "00001" => Page 29 (encoding control unit).

Encoding of auxiliary/additional heater (with control unit -J162 with software version "D49"):

Code	Significance
0 0 0 1 1	- Recirculating pump -V55 fitted Undervoltage cut-out is effected at voltage value learnt in basic setting function
0 0 0 1 2	- Recirculating pump -V55 fitted Undervoltage cut-out is effected at voltage value entered in adaption function

Notes:

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- ◆ Code "00011" is always to be entered for heaters used as auxiliary/additional heater. "00012" is only to be entered if requested by customer.
- ◆ Software version "D49" is used for auxiliary/additional heaters with part number 4D0 265 105 as of index "G" or "H". Part number and software version can be called up by way of "Interrogating control unit version" function with fault reader V.A.G 1551.
- ◆ With code "00011", undervoltage cut-out takes place as soon as battery voltage learnt in "Basic setting" function is not reached in auxiliary heating mode =>Page 22 .
- ◆ With code "00012", undervoltage cut-out takes place as soon as battery voltage entered in "Adaption" function is not reached in auxiliary heating mode.
- ◆ If "Undervoltage cut-out (fixed value)" is displayed as fault for auxiliary/additional heater encoded to "00011":
 - Encode auxiliary/additional heater to "00012" => Page 29 (encoding control unit).
 - Use adaption function to read out value entered for undervoltage cut-out (fixed value) => Page 43 (adaption).
 - Alter fixed value by way of "Adaption" function (specification less than 10.5 V).
 - Encode auxiliary/additional heater to "00011" => Page 29 (encoding control unit).



- Encode auxiliary/additional heater to "00012" => Page 29 (encoding control unit).
- Use adaption function to read out value entered for undervoltage cut-out (fixed value) => Page 43 (adaption).
- Alter fixed value by way of "Adaption" function (specification less than 10.5 V).
- Encode auxiliary/additional heater to "00011" => Page 29 (encoding control unit).

Encoding of additional heater (with control unit -J162 as of software version "D49"):

Code	Significance
0 0 0 0 2	- No recirculating pump -V55 fitted Undervoltage cut-out is effected at voltage value entered in adaption function

Notes:

- ♦ Code "00002" is always to be entered for heaters used as additional heater only.
- ♦ Software version "D49" is used for additional heaters with part number 4D0 265 071 as of index "B". Part number and software version can be called up by way of "Interrogating control unit version" function with fault reader V.A.G 1551.
- ♦ If an additional heater is replaced with an auxiliary heater (with no recirculating pump), recirculating pump must additionally be fitted with software version "D49". With this software version, recirculating pump selection cannot be cancelled by way of encoding (only auxiliary heater version is available as replacement part).

Encoding of auxiliary/additional heater (with control unit -J162 as of software version "D50"):

Code	Significance
0	No assignment
0	No assignment
	Vehicle version
0	Auxiliary heater in vehicle with no coolant shut-off valve -N279 (large coolant circuit)
1	Auxiliary heater in vehicle with coolant shut-off valve -N279 (small coolant circuit)
	Auxiliary heater recirculating pump -V55
0	Not installed (Additional heater for vehicles with diesel engine only)
1	Installed (Auxiliary/additional heater)
	Nature of undervoltage cut-out
1	Undervoltage cut-out is effected at voltage value learnt in basic setting function
2	Undervoltage cut-out is effected at voltage value entered in adaption function

Notes:

- ♦ For encoding nature of undervoltage cut-out, heed notes on Page 31 (same as for software "D49").
- ♦ If a vehicle provided at the factory with an auxiliary heater with software version "D49" and retrofitted with a small coolant circuit is fitted with an auxiliary heater as of software version "D50", this auxiliary heater is to be encoded - contrary to usual procedure - to "00011" for vehicle with large coolant circuit (no coolant shut-off valve) or vehicle electrical system is to be converted accordingly. => Refer to Page 264 and appropriate current flow diagram for vehicles with auxiliary heater and factory-fitted small coolant circuit in Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder (e.g. current flow diagram no. 39 for Model Year 2002 vehicles).
- ♦ As of January 2000, coolant circuit is gradually being converted on vehicles with 8-cyl. petrol engine. Following introduction of coolant shut-off valve -N279 (modified coolant circuit), auxiliary heater coolant is no longer drawn in via engine in auxiliary heating mode (small coolant circuit).
- ♦ When auxiliary heater is encoded for a small coolant circuit, a square-wave signal is emitted via output for actuation of fresh-air blower (operating and display unit for air conditioner/Climatronic -E87). This signal is

processed by coolant shut-off valve relay -J541 (-E87 cannot process signal). This signal is used to output temperature of coolant in auxiliary heater and instantaneous auxiliary heater operating status. A positive signal is output if auxiliary heater is encoded for large coolant circuit (as for software versions "D49" and "D48") =>Page 69 .

- ◆ All vehicles with 12-cyl. engine are fitted with coolant shut-off valve -N279.
- ◆ Software version "D50" or above is used for auxiliary/additional heaters with part number 4D0 265 105 and index "J" or "K". Part number and software version can be called up by way of "Interrogating control unit version" function with fault reader V.A.G 1551.
- ◆ Auxiliary heaters with part number as of index "K" or "J" with software version "D52" have been gradually introduced into production since April 2001. With these auxiliary heaters, actuation of recirculating pump may be modified depending on encoding and adaption in adaption channel "10".
 With code "000XX" (large coolant circuit), output of recirculating pump is reduced up to a coolant temperature of approx. 72 °C so as to increase temperature of coolant exiting from auxiliary heater (actuation time approx. 20 % at less than 60 °C and 100% at greater than 72 °C).
 With code "001XX" (small coolant circuit), output of recirculating pump is also reduced as a function of coolant temperature.
- ◆ If, on vehicles with diesel engine, auxiliary/additional heater is not switched on and only recirculating pump -V55 starts up instead, check adaption in adaption channel "10" => Page 43 .
- ◆ If, on vehicles with petrol engine, auxiliary/additional heater is switched on as additional heater, check adaption in adaption channel "10" => Page 43 .

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Example:

Significance	Code "00001"	Code "00001"	Code "00002"
- Temperature of coolant in auxiliary heater on starting	+ 20 °C	- 10 °C	Any
Battery output voltage at + 20 °C determined in "Basic setting" function	12.40 V	12.40 V	-
▪ Cut-out voltage entered in "Adaption" function	-	-	11.60 V
- Voltage dip (on account of wiring resistance between battery and heater) determined in "Basic setting" function	(-) 0.2 V	(-) 0.2 V	-
- Specified permissible voltage dip during heater operation (temperature-dependent)	(-) 0.50 V	(-) 0.40 V	-
- Temperature-dependent voltage correction value	(-) 0.00 V	(-) 0.30 V	-
Auxiliary heater voltage at which undervoltage cut-out takes place (indicated in measured value block, display group 003)	11.70 V	11.50 V	11.60 V
- Voltage dip (in wiring) during auxiliary heater operation	(+) 0.2 V	(+) 0.2 V	(+) 0.2 V
Battery voltage at which undervoltage cut-out takes place	11.90 V	11.70 V	11.80 V

Notes:

- ◆ Cut-out voltage determined in "Basic setting" function or entered in "Adaption" function and voltage dip determined in wiring are indicated in measured value block, display groups 003 and 004 => Pages 41 .
- ◆ Battery output voltage at + 20 °C determined in "Basic setting" function can be read out by way of adaption function "10" => Page 24 .
- ◆ Batteries have a tendency to supply less power at low temperatures, however more power is required for starting a cold engine. The temperature-dependent undervoltage cut-out with code "00XX1" ensures that the auxiliary heater remains operative over a broad range under various usage conditions without jeopardising reliable starting of the engine.
- ◆ The voltage dip in the wiring during auxiliary heater operation is governed by the instantaneous current flow. During basic setting, the current flow is approx. 2.6 A.



10 - Reading measured value block

10.1 - Reading measured value block

Notes:

- ♦ There are 7 measured value blocks with 4 measured values each for auxiliary/additional heaters with control unit -J162 up to software version "D48".
- ♦ There are 8 measured value blocks with 4 measured values each for auxiliary/additional heaters with control unit -J162 as of software version "D49".
- ♦ The auxiliary/additional heater function remains active during self-diagnosis ("Reading measured value block" function) and the current measured values are displayed.
- ♦ Provided that printer is switched on, current display is printed out on record slip.

Starting "Reading measured value block" function

- Start engine (applies to additional heater, heater with no recirculating pump).
- Switch off ignition (applies to auxiliary/additional heater, heater with recirculating pump).
- Connect up fault reader V.A.G 1551, enter address word 18 "Additional/auxiliary heater" and keep switching until "Select function XX" appears on display (=>Page 7 onwards).
- Switch on auxiliary/additional heater (e.g. by way of pre-selection clock -E111 or dash panel insert; only applies if operation of auxiliary/additional heater is to be checked).
- Switch on additional heater (by way of "basic setting" function=>Page 26, only applies if operation of additional heater is to be checked).

Notes:

- ♦ Various modifications to the vehicle as a whole were gradually introduced in Model Year 1999 for the Audi A8. Introduction of a modified dash panel insert resulted in the following:
 - Discontinuation of pre-selection clock -E111 and heater/heat output switch -E16
 - Auxiliary heating/auxiliary ventilation is now set by way of a rotary knob/pushbutton in the centre console. Settings made are indicated on driver information system display in dash panel insert.
- ♦ Auxiliary/additional heaters with a modified control unit have been gradually introduced at the factory since January 1999. These auxiliary/additional heaters can be identified from the part number and software version (as of "D49"). The built-in heater control unit -J162 has been modified, with the addition of certain new functions and changes to existing ones=>Page 5.
- ♦ As in normal operation additional heater (heater with no recirculating pump -V55) is only switched on by engine control unit, heater is to be activated via "Basic setting" function.
- ♦ If additional heater operation is to be observed, press ⇒ key and select function "08" to switch from "Basic setting" function to "Reading measured value block" function. Pressing ⇒ key and selecting function "04" effects return to "Basic setting" function.
- ♦ If there is a fault in the auxiliary/additional heater, the measured value blocks are to be read out with the auxiliary/additional heater switched off.

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

- Press keys -0- and -8- to select "Reading measured value block" function 08.

-> Indicated on display:

Rapid data transfer	Q
08 - Reading measured value block	

- Confirm entry with Q key.

-> Indicated on display:

Reading measured value block
Enter display group number XXX

- Enter display group number (list =>Page 35).
- Confirm entry with Q key.

-> Indicated on display:

Reading	measured	value	block X
1	2	3	4

To select different display group:

- Press C key.

-> Indicated on display:

Reading	measured	value	block
Enter	display	group	number XXX

- Enter display group number.

Notes:

- ◆ The next display group can be selected by pressing key "3" or "↑". To return to previous display group, press key "1" or "↓".
- ◆ If readings match specifications in all display zones:
- Press => key.

-> Indicated on display:

Rapid data transfer	HELP
Select function XX	

List of available display group numbers

Display group number	Display zone	Designation	Explanatory notes on Page
001	1-4	Instantaneous operating voltage (in V) Instantaneous coolant temperature (in °C) Current operating status of auxiliary/additional heater	36
002	1-4	Power factors of actuated components (-V6, -Q8, -V54 and -V55)	37
003	1-4	Specified cut-out voltage for auxiliary heater Nature of undervoltage cut-out Desired operating status of auxiliary/additional heater Auxiliary/additional heater mode set (heating/ventilation)	39
004	1	Voltage dip determined during basic setting (only of significance for auxiliary/additional heater with code "00XX1")	41
	2	Auxiliary/additional heater heating time	
	3	Auxiliary/additional heater cut-in time	
	4	Number of pre-heating cycles (starting operations) of auxiliary/additional heater	

Display group number	Display zone	Designation	Explanatory notes on Page
005	1-4	Conditions under which last fault occurred	42
006	1-4	Conditions under which last but one fault occurred	42



Display group number	Display zone	Designation	Explanatory notes on Page
007	1-4	Conditions under which third last fault occurred	42
008	1	Number of instances of auxiliary/additional heater cut-out due to fault in heating operation	42
	2 ... 4	Display zone not used	

Note:

Zones 2 to 4 in display group 004 are only used for heater control units -J162 as of software version "D49".
Display group 008 is only provided for control units -J162 as of software version "D49".

Display group 001**Instantaneous operating voltage, instantaneous coolant temperature, instantaneous operating status**

Display zone	Display
1	Instantaneous voltage at auxiliary/additional heater in V If value displayed with auxiliary/additional heater on and ignition off is less than cut-out voltage specified in display group 003: - Check battery (charge and condition of battery) - Check for contact resistance in wiring between battery and heater (positive and earth) If value displayed with additional heater on and engine running is less than instantaneous alternator voltage: - Check for contact resistance in wiring between battery and heater (positive and earth)
2	Instantaneous temperature of coolant in auxiliary/additional heater in °C

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Display zone	Display
3	Current operating status of auxiliary/additional heater Off No cut-in signal Starting Heater in start sequence Part load Heater in part load operation (coolant temperature in heater between 69°C and 77°C / 73°C and 81°C) Full load Heater in full load operation (coolant temperature in heater less than 71°C / 75°C) Run-on Heater switched off or coolant temperature in excess of 77°C / 81°C (heater switches to control interval) and heater in run-on mode Control interval Heater in control interval (coolant temperature previously greater than 77°C / 81°C and still greater than 73°C / 77°C) Ventilation (only applies to auxiliary/additional heater, heater type "Z/C") Auxiliary ventilation mode, auxiliary heater output connected to earth (heater/heat output switch -E16 closed or "auxiliary ventilation" mode set via dash panel insert) Fault Heater switched off on account of a fault affecting auxiliary/additional heater operation (=> Display groups 005 to 007)

Note:

Fig. shows auxiliary heater switching temperatures applicable up to software version "D49". As of software version "D50" of heater control unit -J162, switching temperatures were increased by 4 °C (as of "D50", switching from full to part load for example takes place at 75 °C instead of 71 °C as used to be the case).

Display zone	Display
4	<p>Output for actuation of operating and display unit for air conditioner/Climatronic -E87</p> <ul style="list-style-type: none"> ▪ Auxiliary/additional heater (heater with recirculating pump -V55) <p>On</p> <p>-E87 switched on (switch in auxiliary/additional heater closed, approx. battery voltage at output to -E87)</p> <p>-J541 is actuated (data telegram; only applies if control unit code is "001XX" for small coolant circuit)</p> <p>Off</p> <p>-E87 switched off (switch in auxiliary/additional heater open)</p> <ul style="list-style-type: none"> ▪ Additional heater (heater with no recirculating pump -V55) <p>Display zone not used (additional heater only operates when engine is running)</p>

Notes:

- ♦ At low coolant temperatures (less than 30 °C), operating and display unit for air conditioner/Climatronic -E87 is not actuated in auxiliary heating mode until coolant temperature has exceeded 30 °C (generally valid up to software version "D49", as of software version "D50" only applicable with code "000XX").
- ♦ In the case of auxiliary heaters as of software version "D50" and with code "001XX" (small coolant circuit), data telegram is transmitted irrespective of coolant temperature to coolant shut-off valve relay -J541, which effects the necessary switching operations.
- ♦ In auxiliary ventilation mode, operating and display unit for air conditioner/Climatronic -E87 is activated immediately irrespective of coolant temperature.
- ♦ As "Additional heating" function is only possible with engine running, output to -E87 remains open in the case of an auxiliary/additional heater which is in "Additional heating" mode.
- ♦ As of October 2000, vehicle electrical system has gradually been converted on vehicles with 8-cyl. petrol engine. Following introduction of modified wiring harness, these vehicles are provided with the pre-fitted electrical system components required for installation of a small coolant circuit (installation of coolant shut-off valve -N279). Prior to introduction of small coolant circuit (gradually as of January 2001), a jumper is inserted in the relay socket instead of coolant shut-off valve relay -J541. Relay is fitted in all vehicles with 12-cyl. engine but is currently not intended for vehicles with 6-cyl. engine and 8-cyl. diesel engine.

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

- ♦ Checking operation of coolant shut-off valve relay -J541 => Page 70 .
- ♦ Coolant shut-off valve relay -J541 can only be actuated with a square-wave signal by auxiliary heaters for petrol with part number as of index "K" (software version "D50"). Such auxiliary heaters were gradually introduced into production as of November 2000 (initially for vehicles with 8-cyl. petrol engine). Relay is fitted in all vehicles with 12-cyl. engine but is currently not intended for vehicles with 6-cyl. engine and 8-cyl. diesel engine.
- ♦ When auxiliary heater is encoded for a small coolant circuit, a square-wave signal is emitted via output for actuation of fresh-air blower (operating and display unit for air conditioner/Climatronic -E87). This signal is processed by coolant shut-off valve relay -J541 (-E87 cannot process signal). This signal is used to output temperature of coolant in auxiliary heater and instantaneous auxiliary heater operating status. A positive signal is output if auxiliary heater is encoded for large coolant circuit (as for software versions "D49" and "D48") =>Page 69 .
- ♦ On vehicles retrofitted with coolant shut-off valve -N279, valve is actuated from this output via an additional relay in the case of auxiliary heaters with software version "D49". Heed the relevant notes in the corresponding fitting instructions => Pages 243 .

Display group 002

Power factor of components actuated

Display zone	Display
1	<p>Combustion air blower -V6</p> <p>0 % = Combustion air blower off</p> <p>10 to 100 % = Combustion air blower in control mode (starting, part load or full load)</p>



Display zone	Display
2	Glow plug with flame monitor -Q8 0 % = Glow plug not actuated 50 to 100 % = Actuation of glow plug (preheating) 10 to 50 % = Actuation of glow plug (post-glow during run-on)
3	Metering pump -V54 0 % = Metering pump not actuated 50 to 100 % = Actuation of metering pump (heating mode with part or full load) 10 to 110 % = Actuation of metering pump (starting)

Notes:

- ♦ Power factors are selected by heater control unit -J162 such that heater functions as close as possible to optimum operating point.
- ♦ The power factors for component actuation are governed by the instantaneous battery voltage and the operating status of the heater.

Display zone	Display
4	Recirculating pump -V55 ▪ Auxiliary/additional heater up to software version "D51" (heater with recirculating pump -V55) Off = Recirculating pump not actuated On = Actuation of recirculating pump with maximum voltage ▪ Auxiliary/additional heater as of software version "D52" (heater with recirculating pump -V55) 0% = Recirculating pump not actuated 20...100% = Recirculating pump in control mode (pulsed actuation) ▪ Additional heater (heater with no recirculating pump -V55) Display can be ignored (no recirculating pump fitted)

Notes:

- ♦ As "Additional heating" function is only possible with engine running, additional heater has no recirculating pump. If auxiliary/additional heater is used as additional heater, recirculating pump -V55 is switched on during "additional heating" as well.
- ♦ Auxiliary heaters with part number as of index "K" or "J" with software version "D52" have been gradually introduced into production since April 2001. With these auxiliary heaters, actuation of recirculating pump may be modified depending on encoding and adaption (=> Page 43) of heater control unit -J162.

- With code "000XX" (large coolant circuit), output of recirculating pump is reduced up to a coolant temperature of approx. 72°C so as to increase temperature of coolant exiting from auxiliary heater (actuation time approx. 20 % at less than 60°C and 100% at greater than 72°C).

- With code "001XX" (small coolant circuit), output of recirculating pump is reduced up to a coolant temperature of approx. 60°C so as to increase temperature of coolant exiting from auxiliary heater (actuation time approx. 20 % at less than 50°C and 100% at greater than 60°C).

- Output is controlled by switching recirculating pump on and off (period is 4 s; with 50%, recirculating pump is switched on for 2 s and off for 2 s for example).

- With code "001XX" (small coolant circuit), coolant temperature is additionally regulated by relay -J541 by actuating coolant shut-off valve -N279. With this code, output of recirculating pump is regulated in line with auxiliary/additional heater control unit version and adaption => Page 43.

Display group 003

Specified values for undervoltage cut-out, nature of undervoltage cut-out, desired auxiliary/additional heater operating status and auxiliary heater operating mode set

Display zone	Display
1	Voltage value for undervoltage cut-out (in V) ▪ Auxiliary heater (heater with recirculating pump -V55) Code "00XX1" "Automatic" displayed in zone 2: Greater than 11.30 V and less than 12.10 V (depending on currently valid temperature and battery voltage determined during basic setting) "Manual" displayed in zone 2: Voltage specified by manufacturer or entered in "Adaption" function (9.5 V or greater) Code "00XX2" Voltage entered in "Adaption" function - Greater than 11.10 V for vehicles with one battery only - 9.5 V or higher for vehicles with second battery -A1 ▪ Additional heater (heater with no recirculating pump -V55) Voltage specified by manufacturer or entered in "Adaption" function (9.5 V or greater)

Notes:

- ◆ Depending on whether "Auxiliary heater" or "Additional heater" setting was last active, the nature of the undervoltage cut-out applicable to this setting is displayed with code "00XX1" in display zone "2". Display zone "1" shows the corresponding voltage value.
- ◆ Cut-out voltage displayed in zone "1" is not active during start sequence. Auxiliary heater is only switched off during start phase if voltage is less than 9.5 V.
- ◆ The correlation between voltage dip and temperature-dependent battery voltage for undervoltage cut-out is shown on the basis of an example on Page 30.
- ◆ If voltage value displayed is not reached for a specific period, undervoltage cut-out is effected (=>Example on Page 30).
- ◆ With code "00XX2", voltage value entered should not be too low so as not to jeopardise reliable starting of the engine on vehicles with auxiliary/additional heater and one battery only.
- ◆ On vehicles with auxiliary heater and second battery -A1 or with additional heater, the voltage value can be varied within specified limits (=> Page 43). The voltage value entered should not however be too high as this could jeopardise the heater function. The cut-out voltage is of secondary importance for a heater with no recirculating pump -V55, as the additional heater only operates when the engine is running.

Display zone	Display
2	Nature of undervoltage cut-out ▪ Auxiliary/additional heater (heater with recirculating pump -V55) Automat. Code "00XX1" entered Auxiliary/additional heater last used as auxiliary heater Manual Code "00XX1" entered Auxiliary/additional heater last used as additional heater or Code "00XX2" entered ▪ Additional heater (heater with no recirculating pump -V55) Manual Specified by manufacturer, cannot be altered

Notes:

- ◆ The following applies if auxiliary/additional heater code is "00XX1":
 - Automatic undervoltage cut-out takes effect if auxiliary/additional heater is operated as auxiliary heater
 - Manual undervoltage cut-out takes effect if auxiliary/additional heater is operated as additional heater
- ◆ So as not to impair auxiliary heater operation with code "00XX1", value for "manual cut-out voltage" must be less than 10.5 V (manual cut-out voltage value is active with this code but is not displayed).



- ♦ Depending on whether "Auxiliary heater" or "Additional heater" setting was last active, the nature of the undervoltage cut-out applicable to this setting is displayed with code "00XX1". Display zone "1" shows the corresponding voltage value.

Display zone	Display
3	Desired operating status of auxiliary/additional heater <ul style="list-style-type: none">▪ Auxiliary/additional heater (heater with recirculating pump -V55) Heating off No cut-in signal from pre-selection clock -E111, dash panel insert or auxiliary heating radio wave receiver -R64 Heating on Cut-in signal from pre-selection clock -E111, dash panel insert or auxiliary heating radio wave receiver -R64 Additional heating (only intended for heater type "Z/C-D" with recirculating pump -V55) Cut-in signal from engine control unit (voltage less than 5V, input of engine control unit connected to earth) <ul style="list-style-type: none">▪ Additional heater (heater with no recirculating pump -V55) Heating off No cut-in signal from engine control unit (voltage greater than 5V, input of engine control unit open) Additional heating Cut-in signal from engine control unit (voltage less than 5V, input of engine control unit connected to earth)

Notes:

- ♦ Additional heater regulated by engine control unit is only provided for vehicles with diesel engine.
- ♦ On vehicles with auxiliary heater remote control and pre-selection clock -E111, actuation is by way of auxiliary heating radio wave receiver -R64.
- ♦ For vehicles with diesel engine the following values relating to the additional heater can be read out from the measured value block of the engine control unit (display group 20):
 - Ambient temperature
 - Fuel consumption of additional heater
 - Additional heater on or off
 - Coolant temperature

=> Relevant Diesel Direct Injection and Glow Plug System Workshop Manual

- ♦ If, on vehicles with diesel engine, auxiliary/additional heater is not switched on and only recirculating pump -V55 starts up instead, check adaption in adaption channel "10" => Page 43.
- ♦ If, on vehicles with petrol engine, auxiliary/additional heater is switched on as additional heater, check adaption in adaption channel "10" => Page 43.

Display zone	Display
4	Auxiliary heater mode set at heater/heat output switch -E16 Auxiliary heater mode set in driver information system in dash panel insert <ul style="list-style-type: none">▪ Auxiliary/additional heater (heater with recirculating pump -V55) Heating Auxiliary heating mode (switch open = earth not applied) Ventilation Auxiliary ventilation mode (switch closed = connected to earth) <ul style="list-style-type: none">▪ Additional heater (heater with no recirculating pump -V55) Display zone not used

Note:

On vehicles with no pre-selection clock -E111 and switch -E16, auxiliary heating and auxiliary ventilation are switched on and off by way of dash panel insert.

Display group 004

Voltage dip determined during basic setting (only applicable to heaters of type "Z/C" encoded "00XX1")

Heating time, cut-in time and preheating cycles (only used for auxiliary/additional heaters with control unit -J162 as of software version "D49")

Display zone	Display
1	Voltage dip between auxiliary/additional heater and battery -A ▪ Auxiliary heater (heater with recirculating pump -V55 encoded to "00XX1") Less than 0.350 V ▪ Auxiliary/additional heater (heater with recirculating pump -V55 encoded to "00XX2") Display can be ignored ▪ Additional heater (heater with no recirculating pump -V55) Display can be ignored

Notes:

- ◆ Display can be ignored for heaters with software X46 (conversion error).
- ◆ Voltage dip is measured during basic setting "Battery adaption".
- ◆ If voltage dip determined is greater than 0.350 V:
 - Check battery
 - Locate and eliminate contact resistance in wiring (positive and earth) between battery and auxiliary/additional heater

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

- ◆ The correlation between voltage dip and temperature-dependent battery voltage for undervoltage cut-out is shown on the basis of an example on Page 30 .

Auxiliary/additional heaters with control unit -J162 up to software version "D48"

Display zone	Display
2	Display zone not used (ignore display)
3	Display zone not used (ignore display)
4	Display zone not used (ignore display)

Auxiliary/additional heaters with control unit -J162 as of software version "D49"

Display zone	Display
2	Auxiliary/additional heater heating time in hours Display: 0 to XXXXX
3	Auxiliary/additional heater operating time (cut-in time) in hours Display: 0 to XXXXX
4	Number of pre-heating cycles (starting operations) of auxiliary/additional heater Display: 0 to XXXXX

Notes:

- ◆ The values displayed in zones 2 to 4 relate to the total operating time of the auxiliary/additional heater. The counter starts at zero on heater production and cannot be reset.
- ◆ Display zone 2 shows the actual heating time (auxiliary heating or additional heating).
- ◆ Display zone 3 shows the time during which a cut-in signal (from dash panel insert, engine control unit or pre-selection clock) was applied to auxiliary/additional heater control unit (auxiliary heating, additional heating, control interval or auxiliary ventilation).



- ♦ Display zone 4 shows the number of starting operations (pre-heating cycles) of the auxiliary/additional heater. If the first attempted start does not produce a flame and start repetition is necessary, this classifies as a separate pre-heating cycle (display is incremented by two, not one).

Display group 005 (conditions under which last fault occurred)

Display group 006 (conditions under which last but one fault occurred)

Display group 007 (conditions under which third last fault occurred)

Display zone	Display
1	Fault code (nature and location => Page 14) for this fault
2	Fault code "1444" or "1408" (undervoltage cut-out) Coolant temperature in heater at start of auxiliary heating/auxiliary ventilation at which fault occurred If auxiliary heating/auxiliary ventilation is switched on several times within a 5-hour period, the applicable value is the one measured on first start (cold start = least favourable condition) Any other fault code Coolant temperature in heater when fault occurred
3	Operating status when fault occurred
4	Voltage at auxiliary/additional heater when fault occurred

Note on display zones 2 and 4:

On starting (first 5 minutes after switch-on) undervoltage cut-out is only implemented if voltage drops below a value of 9.5V (automatic undervoltage cut-out is suppressed). If battery is flat, it is therefore possible for the voltage value displayed in zone 4 to be less than that indicated in zone 1 of display group 003.

Display group 008

Number of instances of auxiliary/additional heater cut-out due to fault in heating operation

Display zone	Display
1	Number of instances of cut-out due to fault in heating operation Display: 0 to XXXX ▪ Version providing auxiliary heating Number of faults since fault memory last erased ▪ Version providing auxiliary/additional heating Number of faults since fault memory last erased "0" if auxiliary/additional heater disabled following 6 consecutive faults in additional heating mode with no correct sequence in between ▪ Version providing additional heating Number of faults since fault memory last erased "0" if additional heater disabled following 6 consecutive faults in additional heating mode with no correct sequence in between (complete sequence without fault)
2	Display zone not used (ignore display)
3	Display zone not used (ignore display)
4	Display zone not used (ignore display)

Notes:

- ♦ Display group "008" is only provided for heater control units -J162 as of software version "D49".

- ◆ Display zone "1" indicates the number of times the auxiliary/additional heater has cut-out on account of a fault in heating operation. The nature of the fault is stored in the fault memory. The faults "No flame" and "Flame interruption" are faults in heating operation.

11 - Adaption of auxiliary/additional heater

11.1 - Adaption of auxiliary/additional heater

The following adaption channels are provided for the auxiliary/additional heater

- ◆ Adaption channel "01"
 - For adaption of fixed undervoltage cut-out value with code "00XX2" => Page 44
 - For adaption of automatic undervoltage cut-out value with code "00XX1" => Page 22
- ◆ Adaption channel "02"
 - Only applies to auxiliary/additional heaters with control unit as of software version "D49"
 - For adaption (adjustment) of CO2 level in auxiliary/additional heater exhaust gas => Page 125
- ◆ Adaption channel "10"
 - Only applies to auxiliary/additional heaters with control unit as of software version "D50"
 - For adaption of auxiliary/additional heater to different usage conditions as additional heater or for actuation of recirculating pump -V55 => Page 46

Notes:

- ◆ "Adaption" function is to be implemented for vehicles with auxiliary/additional heater with control unit -J162 as of software version "D49" for adjusting CO2 level in exhaust gas (channel number "02") => Page 125 .
- ◆ "Adaption" function is to be implemented on vehicles with auxiliary/additional heater (heaters with recirculating pump -V55).
 - If automatic undervoltage cut-out is active with code "00XX1" (cut-out takes place at temperature-dependent voltage value learnt in "Basic setting" function), to check and if necessary alter adaption value learnt => Page 22 .
 - So as not to impair auxiliary/additional heater operation with code "00XX1", value for "manual cut-out voltage" must be less than 10.5 V (manual cut-out voltage value is active with this code but is not displayed).
 - If manual undervoltage cut-out is active with code "00XX2" (cut-out at fixed voltage value), to check, enter or alter cut-out voltage value => Page 44 .
 - So as not to impair reliable engine starting on vehicles with auxiliary/additional heater and only one battery, value entered for undervoltage cut-out with code "00XX2" must be greater than 11.10 V.
- ◆ "Adaption" function is to be implemented on vehicles with additional heater (heaters with no recirculating pump -V55).
 - For checking, entering or altering manual undervoltage cut-out value (cut-out takes place at a fixed voltage value) => Page 44 .
- ◆ "Adaption" function is to be implemented for auxiliary heater as of software version "D50" if, on vehicles with petrol engine, auxiliary heater starts up as additional heater whenever cold engine is started or, on vehicles with diesel engine, if auxiliary heater is not switched on as additional heater => Page 46 .
- ◆ On vehicles with auxiliary/additional heater and second battery -A1 or with additional heater (no auxiliary heater), the voltage value can be varied within specified limits. The voltage value entered should not however be too high, as this could jeopardise operation of the heater (voltage value input e.g. 9.5 V) => Page 44 .
- Cut-out voltage value preset by manufacturer, namely 9.5 V (for software version D47 and above) or 10.25 V (for X46), can be varied within specified limits.



- ♦ The fixed value for undervoltage cut-out is also active with code "00XX1", but is not displayed. If voltage value has been altered for a heater control unit -J162 encoded to "00XX2" and the control unit then re-encoded to "00XX1", fault "Undervoltage cut-out (fixed value)" may be displayed.
- Remedy:
 - Encode control unit to "00XX2" => Page 29.
 - Alter fixed value by way of "Adaption" function (specification less than 10.5 V).
 - Re-encode control unit to "00XX1".
 - Interrogate and erase fault memory.
- ♦ The cut-out voltage is of secondary importance for a heater with no recirculating pump -V55, as the additional heater only operates when the engine is running.

11.2 - Performing adaption (adaption channel "01", fixed value for manual undervoltage cut-out)

- Connect up fault reader V.A.G 1551, enter address word 18 "Additional/auxiliary heater" and keep switching until "Select function XX" appears on display => Page 7 onwards.
- Check encoding of auxiliary/additional heater. Code must be "00XX2" ("00001" for software X46).
- Switch on printer by pressing PRINT key (lamp in key lights).
- Interrogate fault memory => Page 13 and eliminate any faults displayed.
- Erase fault memory => Page 28.

-> Indicated on display (function selection):

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

- Press keys -1- and -0- to select "Adaption" function 10.

-> Indicated on display:

```
Rapid data transfer      Q
10 - Adaption
```

- Confirm entry with Q key.

-> Indicated on display:

```
Adaption      Q
Enter channel number XX
```

- Enter channel number -01-.
- Confirm entry with Q key.

Notes:

- ♦ Only channel "01" is accepted by heater control units -J162 with software version "X46", "D47" or "D48".
- ♦ Heater control units -J162 as of software version "D49" also accept channel number "02". This channel number can be used to adjust CO2 level in exhaust gas => Page 125.

```
Function unknown or cannot
be implemented at present
```

-> If this display appears, a fault has occurred and manual adaption cannot be implemented => Page 22.

-> Indicated on display:

```
Channel      01      Adaption      XX
  □
Undervoltage cut-out      (-1      3-)
```

- Press => key.

-> Indicated on display:

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Channel 01 Adaption XX
Enter adaption value XXXXX

Input	Assignment of cut-out voltages	
	Software version X46	Software version D47, D48 etc.
00000	10.25 V	9.5 V
00005	10.60 V	9.85 V
00010	10.95 V	10.20 V
00015	11.30 V	10.55 V
00020	11.65 V	10.90 V
00025	12.00 V	11.25 V
00030	12.35 V	11.60 V
00035	12.70 V	11.95 V
00040	13.05 V	12.30 V
00045	13.40 V	12.65 V

Notes:

- ◆ Adaption value of between "00000" and "00045" can be entered.
 - ◆ Conversion factors may result in slight differences between actual cut-out voltage and value given in table.
 - ◆ So as not to impair reliable engine starting on vehicles with auxiliary/additional heater and only one battery, value entered for undervoltage cut-out with code "00XX2" must be greater than 11.10 V (input value greater than 00022).
 - ◆ It is also possible to enter voltage values between those indicated in the table. In this case, each number increment corresponds to approx. 0.07 V.
- Enter desired value for undervoltage cut-out (as of software version "D47" e.g. "00025" for 11.25 V for auxiliary/additional heater or "00010" for 10.20 V for additional heater)

-> Indicated on display:

Channel 01 Adaption XX
Q
Enter adaption value 00010

- Confirm entry with Q key.

-> Indicated on display:

Channel 1 Adaption 10	Q
New value 10.20 V	

Note:

Value displayed can be altered by pressing keys 1 and 3 or ↓ and ↑.

- Confirm entry with Q key.

-> Indicated on display:

Channel 01 Adaption 10	Q
Store altered value?	

- Confirm entry with Q key.

-> Indicated on display:

Channel 01 Adaption 10
□
Altered value stored

**Notes:**

- ♦ Current undervoltage cut-out value can be read off in function "Reading measured value block, display group 003" =>Page 34 .
 - ♦ The correlation between voltage dip and temperature-dependent battery voltage for undervoltage cut-out is shown on the basis of an example on Page 30 .
- Press =>key.

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

11.3 - Performing adaption (adaption channel "10", actuation as additional heater/of recirculating pump -V55)

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Notes:

- ♦ Adaption of auxiliary heater actuation as additional heater (on vehicles with diesel engine) and auxiliary heater recirculating pump actuation (to assist coolant pump of engine or pump/valve unit on vehicles with 8-cyl. petrol engine and small coolant circuit, gradual introduction in Model Year 2001, and on vehicles with 12-cyl. engine) is only possible for auxiliary heaters with software version as of "D50" (gradual introduction in Model Year 2001).
 - ♦ On auxiliary/additional heaters with control unit as of software version "D52", adaption can be used to alter recirculating pump actuation.
 - ♦ As regards auxiliary/additional heating function, it is important to ensure matching adaption and encoding. Encoding should therefore be checked before carrying out adaption => Page 29 .
- Connect up fault reader V.A.G 1551, enter address word 18 "Additional/auxiliary heater" and keep switching until "Select function XX" appears on display => Page 7 onwards.
- Check encoding of auxiliary/additional heater=>Page 7 onwards.
- Switch on printer by pressing PRINT key (lamp in key lights).
- Interrogate fault memory =>Page 13 and eliminate any faults displayed.
- Erase fault memory =>Page 28 .

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

- Press keys -1- and -0- to select "Adaption" function 10.

-> Indicated on display:

Rapid data transfer	Q
10 - Adaption	

- Confirm entry with Q key.

-> Indicated on display:

Adaption	Q
Enter channel number XX	

- Enter channel number -10-.
- Confirm entry with Q key.

Notes:

- ♦ Only channel "01" is accepted by heater control units -J162 with software version "X46", "D47" or "D48".

Function unknown or cannot be implemented at present
--

-> If this display appears, a fault has occurred and adaption cannot be implemented =>Page 22 .

-> Indicated on display:

Channel	10	Adaption	XX
□			
(-1	3-)		

- Press ⇒ key.

-> Indicated on display:

Channel	10	Adaption	XX
Enter adaption value XXXXX			

- Enter adaption value for vehicle concerned:

Adaption value for control unit with software versions "D50" and "D51" =>Page 47
 Adaption value for control unit as of software version "D52"
 =>Page 48

Channel	10	Adaption	XX	Q
New value	(-1	3-)		

-> Confirm entry with Q key.

-> Indicated on display:

Channel	10	Adaption	XX	Q
Store altered value?				

- Confirm entry with Q key.

-> Indicated on display:

Channel	10	Adaption	XX
Altered value stored			

- Press ⇒key.

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

- Check function if necessary.

Adaption value in adaption channel for control unit with software versions "D50" and "D51"

Adaption value (input)	Intended for vehicle with	Significance
0 (00000)	6-cyl. diesel engine	- Auxiliary heater operates as additional heater as soon as earth is applied to contact "3" of 6-pin connector at auxiliary heater
1 (00001)	Petrol engine	- Auxiliary heater recirculating pump starts up as soon as earth is applied to contact "3" of 6-pin connector at auxiliary heater This provides assistance for engine coolant pump and pump of pump/valve unit at low coolant temperatures

Notes:

- ♦ On vehicles with diesel engine contact "3" of 6-pin connector at auxiliary heater is connected to engine control unit.



=> Relevant Diesel Direct-injection and Glow Plug System Workshop Manual; Repair Group 01

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

- ♦ On vehicles with petrol engine and coolant shut-off valve relay -J541 (vehicles with 12-cyl. engine and vehicles with 8-cyl. engine, gradual introduction in Model Year 2001), contact "3" of 6-pin connector at auxiliary heater is connected to coolant shut-off valve relay -J541.

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

- ♦ On vehicles with petrol engine and no coolant shut-off valve relay -J541 (vehicles with 6-cyl. engine and vehicles with 8-cyl. engine with no relay -J541; relay -J541 gradually being introduced in Model Year 2001), contact "3" of 6-pin connector at auxiliary heater is not used or not connected in socket for coolant shut-off valve relay -J541. Adaption in channel "10" has no function for these vehicles.

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

- ♦ Only adaption "0" or "1" is envisaged in adaption channel "10" for auxiliary heaters with control unit with software version "D50" or "D51".

Adaption value in adaption channel for control unit as of software version "D52"

Adaption value (input)	Intended for vehicle with	Significance
0 (00000)	- This adaption value is currently not used It can however be entered for vehicles with diesel engine if requested by customer	- Auxiliary heater operates as additional heater as soon as earth is applied to contact "3" of 6-pin connector at auxiliary heater If auxiliary/additional heater is switched on as auxiliary heater, there is no regulation of auxiliary heater recirculating pump delivery
1 (00001)	- This adaption value is currently not used It can however be entered for vehicles with petrol engine if requested by customer	- Auxiliary heater recirculating pump starts up as soon as earth is applied to contact "3" of 6-pin connector at auxiliary heater This provides assistance for engine coolant pump and pump of pump/valve unit at low coolant temperatures - If auxiliary heater is switched on, there is no regulation of auxiliary heater recirculating pump delivery

Adaption value (input)	Intended for vehicle with	Significance
2 (00002)	- This adaption value is intended for vehicles with 6 or 8-cyl. diesel engine Adaption for vehicles with diesel engine by manufacturer	- Auxiliary heater operates as additional heater as soon as earth is applied to contact "3" of 6-pin connector at auxiliary heater If auxiliary/additional heater is switched on as auxiliary heater, auxiliary heater control unit regulates delivery of recirculating pump -V55 as a function of coolant temperature in auxiliary heater (-V55 is pulsed)
3 (00003)	- This adaption value is intended for vehicles with petrol engine Adaption for vehicles with petrol engine by manufacturer	- Auxiliary heater recirculating pump starts up as soon as earth is applied to contact "3" of 6-pin connector at auxiliary heater This provides assistance for engine coolant pump at low coolant temperatures - If auxiliary heater is switched on, auxiliary heater control unit regulates delivery of recirculating pump -V55 as a function of coolant temperature in auxiliary heater (-V55 is pulsed)

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Adaption value (input)	Intended for vehicle with	Significance
4 (00004)	- This adaption value is currently not used	- Corresponds to adaption "2" with the following difference When coolant is cold, recirculating pump -V55 is actuated for at least 35 % of time (as opposed to approx. 25% with adaption "2")
5 (00005)	- This adaption value is currently not used	- Corresponds to adaption "3" with the following difference When coolant is cold, recirculating pump -V55 is actuated for at least 35 % of time (as opposed to approx. 25% with adaption "3")

Notes:

- ♦ On vehicles with diesel engine, contact "3" of 6-pin connector at auxiliary heater is connected to engine control unit.
=> Relevant Diesel Direct-injection and Glow Plug System Workshop Manual; Repair Group 01
=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder
- ♦ On vehicles with petrol engine and coolant shut-off valve relay -J541 (vehicles with 12-cyl. engine and vehicles with 8-cyl. engine, gradual introduction in Model Year 2001), contact "3" of 6-pin connector at auxiliary heater is connected to coolant shut-off valve relay -J541.
=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder
- ♦ On vehicles with petrol engine and no coolant shut-off valve relay -J541 (vehicles with 6-cyl. engine and vehicles with 8-cyl. engine with no relay -J541; relay -J541 gradually being introduced in Model Year 2001), contact "3" of 6-pin connector at auxiliary heater is not used or not connected in socket for coolant shut-off valve relay -J541.
=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder
- ♦ Only adaption "0" to "5" is envisaged in adaption channel "10" for auxiliary heaters with control unit as of software version "D52". Adaption values "4" and "5" are however not used at present. Adaption "2" is entered at the factory for version for vehicles with diesel engine and "3" for version for vehicles with petrol engine.
- ♦ Pulsed actuation of recirculating pump -V55 differs depending on code (adaption "00002" or "00003").
- With code "XX1XX", recirculating pump -V55 is regulated up to a coolant temperature of approx. 60 °C
- With code "XX0XX", recirculating pump -V55 is regulated up to a coolant temperature of approx. 70 °C
If temperature of coolant in auxiliary heater exceeds respective value, recirculating pump -V55 runs with 100% actuation.

12 - Electrical check on auxiliary/additional heater

12.1 - Electrical check on auxiliary/additional heater

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Measuring instruments and testers required

- Portable multimeter V.A.G 1526
- Adapter set V.A.G 1594
- Diode test lamp V.A.G 1527

Test requirements

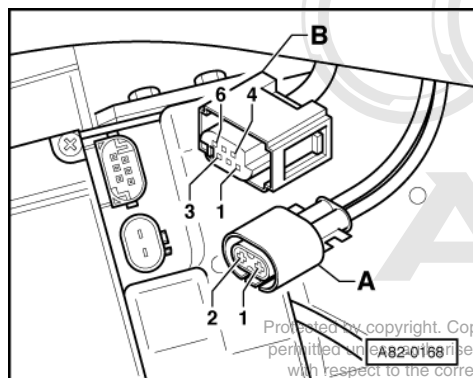
- All fuses OK as per current flow diagram
- Battery -A adequately charged
- Second battery -A1 (if fitted) adequately charged

- Fault memory interrogated =>Page **13** and any faults displayed eliminated

Checking actuation and electrical connections of auxiliary/additional heater

- Switch off ignition.
- Remove noise insulation.

=> General Body Repairs; Repair Group 63; Front Bumper Front Bumper



- Remove bumper (only applies to 8-cyl. diesel engine and 12-cyl. engine).

=> General Body Repairs; Repair Group 63; Front Bumper Front Bumper

- Remove air duct to alternator (8-cyl. petrol engine only).
- -> Unplug connectors -A- and -B- from heater.

Notes:

- ♦ With auxiliary heater switched off, display illumination off and cut-in time not activated, maximum current input of pre-selection clock and auxiliary heater is less than 5 mA.
- ♦ If current input of pre-selection clock and auxiliary heater is not within permitted value range, check wiring in line with current flow diagram as well as actuation of auxiliary heater.

List of electrical checks envisaged

Test step	Component checked	Page
1	Power supply and earth connection To auxiliary/additional heater	51
2	Actuation of auxiliary/additional heater (heater with recirculating pump -V55) By pre-selection clock -E111 (prior to introduction of modified dash panel insert in Model Year 1999) By auxiliary heating radio wave receiver -R64 (with remote control and pre-selection clock - E111 only) By dash panel insert (as of Model Year 1999 with modified dash panel insert, no pre-selection clock -E111)	51
3	Actuation of additional heater (only applies to vehicles with diesel engine, heater type "Z/C-D") By engine control unit	53
4	Connection from auxiliary/additional heater To metering pump -V54	53

Test step	Component checked	Page
5	Auxiliary/additional heater connection (heater with recirculating pump -V55) To heater/heat output switch -E16 (on vehicles with pre-selection clock -E111, prior to introduction of modified dash panel insert in Model Year 1999) To dash panel insert (as of Model Year 1999 with modified dash panel insert, no pre-selection clock -E111) To operating and display unit for air conditioner/Climatronic -E87 To coolant shut-off valve relay -J541 (only fitted on vehicles with small coolant circuit) Input for actuation of recirculating pump -V55 (auxiliary heaters as of software version "D50" and "petrol" version only)	54
6	Actuation of auxiliary/additional heater on vehicles with small coolant circuit (8-cyl. petrol engine as of January 2001 and 12-cyl. engine only) By coolant shut-off valve relay -J541	56

Test step 1 (power supply and earth connection)

Measuring range to be set on portable multimeter V.A.G 1526: Voltage measurement (20 V DC)					
Test step	Heater connection	Testing of	Test conditions - Additional work	Specification	Remedies if specification not attained
1.1	Connector A, contact 1 and connector A, contact 2	Terminal 30 and earth connection at -J162	▪ Ignition off	- approx. battery voltage	- Use current flow diagram to check and repair power supply and earth connection

Notes:

- Depending on last operating status and coolant temperature in auxiliary/additional heater, no-load current input of auxiliary/additional heater may be up to max. 60 mA for a period of up to 5 hours following switch-off. During this time, the degree of cooling of the coolant for the period following switch-off is calculated by the heater control unit -J162.
- At the latest 5 hours after switch-off, the no-load current input of the heater control unit -J162 is less than 2 mA.

Test step 2 (actuation of auxiliary/additional heater)

Measuring range to be set on portable multimeter V.A.G 1526: Voltage measurement (20 V DC)					
Test step	Heater connection	Testing of	Test conditions - Additional work	Specification	Remedies if specification not attained
2.1	Connector B, contact 1 and connector A, contact 2	-J162 actuation by pre-selection clock -E111, auxiliary heating radio wave receiver -R64 or dash panel insert	▪ Ignition off ▪ Auxiliary/additional heater off Switch on auxiliary/additional heater: at pre-selection clock -E111 (via receiver -R64) or at dash panel insert	- Less than 2 V Voltage changes to greater than 7 V	- Use current flow diagram to check wiring and eliminate short circuit Use current flow diagram to check and repair wiring Check power supply to pre-selection clock -E111 (=>Page 104) Check dash panel insert => Electrical System; Repair Group 01

**Notes:**

- ♦ On vehicles with no auxiliary/additional heater remote control, heater is actuated directly by pre-selection clock -E111.
- ♦ On vehicles with auxiliary/additional heater remote control, heater is actuated by auxiliary heating radio wave receiver -R64 as soon as signals are received from pre-selection clock -E111 or remote control (fault determination =>Page 109).

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

- ♦ Pre-selection clock -E111 was discontinued in Model Year 1999 and auxiliary/additional heater is actuated by dash panel insert (modified version).

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

=> Parts List

Measuring range to be set on portable multimeter V.A.G 1526: Voltage measurement (20 V DC)					
Test step	Heater connection	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
2.2	Connector B, contact 1 and connector A, contact 2	- Cut-in function of pre-selection clock -E111 Cut-in function of dash panel insert	▪ Ignition off ▪ Auxiliary/additional heater off Set cut-in time (1, 2 or 3) to approx. 5 minutes before actual time and activate	- At activated cut-in time, voltage changes from less than 2V to greater than 7V	- Check power supply of pre-selection clock -E111 =>Page 114 Replace pre-selection clock Check dash panel insert => Electrical System; Repair Group 01

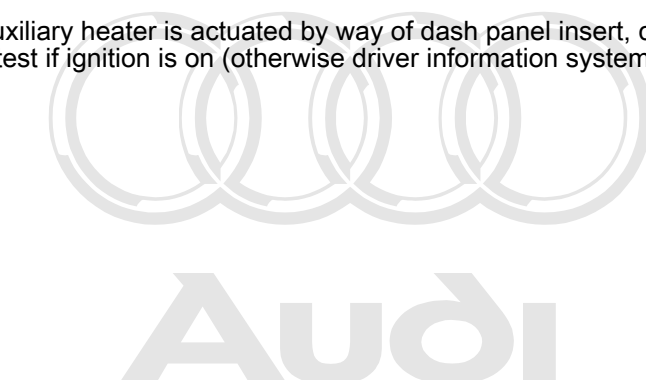
Notes:

- ♦ Pre-selection clock -E111 was discontinued in Model Year 1999 and auxiliary/additional heater is actuated by dash panel insert (modified version). "Auxiliary heating/auxiliary ventilation" must be entered in dash panel insert by way of adaption function.

=> Parts List

=> Electrical System; Repair Group 01

- ♦ On vehicles on which auxiliary heater is actuated by way of dash panel insert, cut-in time can only be set for the purposes of this test if ignition is on (otherwise driver information system is not active).



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Test step 3 (actuation of additional heater)

Measuring range to be set on portable multimeter V.A.G 1526: Voltage tester V.A.G 1527					
Test step	Heater connection	Testing of	Test conditions - Additional work	Specification	Remedies if specification not attained
3.1	Connector B, contact 3 and connector A, contact 1	-J162 actuation by engine control unit	<ul style="list-style-type: none"> Ignition on Engine not running Start engine Start engine final control diagnosis and select control element "Additional heater" => Relevant Diesel Direct-injection and Glow Plug System Workshop Manual; Repair Group 01 	<ul style="list-style-type: none"> Diode in voltage tester does not light Diode in voltage tester lights 	<ul style="list-style-type: none"> Use current flow diagram to check wiring and eliminate short circuit Use current flow diagram to check and repair wiring Check engine control unit => Relevant Diesel Direct-injection and Glow Plug System Workshop Manual; Repair Group 01

Note:

Additional heater is only intended for vehicles with diesel engine=>Page 74.

Test step 4 (auxiliary/additional heater connection to metering pump)

Measuring range to be set on portable multimeter V.A.G 1526: Resistance measurement (200 ω)					
Test step	Heater connection	Testing of	Test conditions - Additional work	Specification	Remedies if specification not attained
4.1	Connector B, contact 6 and connector A, contact 2	Wiring to metering pump -V54	Ignition off	Greater than 3 and less than 20 ω)	<ul style="list-style-type: none"> Use current flow diagram to check and repair wiring Replace metering pump

Notes:

- On vehicles with diesel engine, contact 6 of connector B is also connected to engine control unit. Engine control unit uses metering pump pulse signal to incorporate fuel consumption of additional heater into calculation of consumption signal with engine running.

=> Relevant Diesel Direct-injection and Glow Plug System Workshop Manual; Repair Group 01

- Internal resistance of metering pump is 4.1 ω +/- 0.2 ω



Test step 5 (auxiliary/additional heater connection)

Measuring range to be set on portable multimeter V.A.G 1526: Voltage tester V.A.G 1527					
Test step	Heater connection	Testing of	Test conditions - Additional work	Specification	Remedies if specification not attained
5.1	Connector B, contact 5 and connector A, contact 1	- Heater/heat output switch -E16 (vehicles with pre-selection clock -E111)	<ul style="list-style-type: none"> Ignition on Switch -E16 not pressed Press switch -E16	<ul style="list-style-type: none"> Diode in voltage tester does not light Diode in voltage tester lights 	- Use current flow diagram to check wiring and eliminate short circuit Use current flow diagram to check and repair wiring Replace switch -E16
		- "Auxiliary ventilation mode" function via dash panel insert (vehicles with no pre-selection clock -E111)	<ul style="list-style-type: none"> Ignition off Auxiliary ventilation mode off Switch on auxiliary ventilation mode	<ul style="list-style-type: none"> Diode in voltage tester does not light Diode in voltage tester lights 	- Use current flow diagram to check wiring and eliminate short circuit Use current flow diagram to check and repair wiring Check dash panel insert => Electrical System; Repair Group 01

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Notes:

- ♦ If earth is applied to connector B contact 5, operating and display unit for air conditioner/Climatronic -E87 is switched on but auxiliary/additional heater does not start up (auxiliary ventilation mode).
- ♦ Pre-selection clock -E111 and heater/heat output switch -E16 were discontinued in Model Year 1999 and auxiliary/additional heater is actuated by dash panel insert (modified version). "Auxiliary heating/auxiliary ventilation" must be entered in dash panel insert by way of adaption function.

=> Electrical System; Repair Group 01

=> Parts List

- ♦ On vehicles on which auxiliary heater is actuated by way of dash panel insert, auxiliary ventilation can only be switched on for the purposes of this test if ignition is on (otherwise driver information system is not active).

Measuring range to be set on portable multimeter V.A.G 1526: Current measurement (2000 mA DC)					
Test step	Heater connection	Testing of	Test conditions - Additional work	Specification	Remedies if specification not attained
5.2	Connector B, contact 4 and connector A, contact 1	Actuation of operating and display unit for air conditioner/Climatronic -E87 (vehicles with large coolant circuit)	<ul style="list-style-type: none"> Ignition off 	- Less than 500 mA Operating and display unit starts up	- Use current flow diagram to check and repair wiring Perform air conditioner self-diagnosis => Air Conditioner; Repair Group 01

Measuring range to be set on portable multimeter V.A.G 1526: Current measurement (2000 mA DC)					
Test step	Heater connection	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
		Actuation of coolant shut-off valve relay -J541 (vehicles with small coolant circuit)	▪ Ignition off	- Less than 50 mA	- Use current flow diagram to check and repair wiring between -E87 and -J541 Check operation of coolant shut-off valve relay -J541 => Page 70

Notes:

- ♦ As of October 2000, vehicle electrical system has gradually been converted on vehicles with 8-cyl. petrol engine. Following introduction of modified wiring harness, these vehicles are provided with the pre-fitted electrical system components required for installation of a small coolant circuit (installation of coolant shut-off valve -N279). Prior to introduction of small coolant circuit (gradually as of January 2001), a jumper is inserted in the relay socket instead of coolant shut-off valve relay -J541. Relay is fitted in all vehicles with 12-cyl. engine but is currently not intended for vehicles with 6-cyl. engine and 8-cyl. diesel engine.

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

- ♦ Coolant shut-off valve relay -J541 can only be actuated with a square-wave signal by auxiliary heaters for petrol with part number as of index "K" (software version "D50"). Such auxiliary heaters were gradually introduced into production as of November 2000 (initially for vehicles with 8-cyl. petrol engine). Relay is fitted in all vehicles with 12-cyl. engine but is currently not intended for vehicles with 6-cyl. engine and 8-cyl. diesel engine.
- ♦ When auxiliary heater is encoded for a small coolant circuit, a square-wave signal is emitted via output for actuation of fresh-air blower (operating and display unit for air conditioner/Climatronic -E87). This signal is processed by coolant shut-off valve relay -J541 (-E87 cannot process signal). This signal is used to output temperature of coolant in auxiliary heater and instantaneous auxiliary heater operating status. A positive signal is output if auxiliary heater is encoded for large coolant circuit (as for software versions "D49" and "D48") =>Page 69 .
- ♦ On vehicles retrofitted with coolant shut-off valve -N279, valve is actuated from this output via an additional relay in the case of auxiliary heaters with software version "D49". Heed the relevant notes in the corresponding fitting instructions => Pages 243 .

Measuring range to be set on portable multimeter V.A.G 1526: Voltage tester V.A.G 1527					
Test step	Heater connection	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
5.3	Connector B, contact 3 and connector A, contact 1	- Connection for actuation of auxiliary heater (only applies to auxiliary heaters as of software version "D50", "petrol" version)	▪ Ignition on ▪ Auxiliary heater off	- Diode in voltage tester does not light	- Use current flow diagram to check wiring and eliminate short circuit

Notes:

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- ♦ If, on auxiliary heaters with software version as of "D50", "petrol" version, earth is applied to connector B contact 3, auxiliary heater recirculating pump -V55 is switched on (refer to test step 6).
 - ♦ If, on "diesel" version auxiliary heaters, earth is applied to connector B contact 3, auxiliary heater is switched on as additional heater (refer to test step 3).
 - ♦ On auxiliary heaters with software version as of "D50", auxiliary heater recirculating pump -V55 can be switched on via "Additional heater" input with "petrol" version as well (thus assisting coolant pump of engine



and pump/valve unit on vehicles with small coolant circuit). This connection is however not provided on all vehicles with small coolant circuit =>Page 69 (operation of coolant shut-off valve relay -J541).

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

- ♦ If, on vehicles with diesel engine, auxiliary/additional heater is not switched on and only recirculating pump -V55 starts up instead, check adaption in adaption channel "10" => Page 43 .
- ♦ If, on vehicles with petrol engine, auxiliary/additional heater is switched on as additional heater, check adaption in adaption channel "10" => Page 43 .

Test step 6 (actuation of auxiliary/additional heater on vehicles with small coolant circuit)

Measuring range to be set on portable multimeter V.A.G 1526: Voltage tester V.A.G 1527					
Test step	Heater connection	Testing of	Test conditions - Additional work	Specification	Remedies if specification not attained
6.1	Connector B, contact 3 and connector A, contact 1	-J162 actuation by coolant shut-off valve relay -J541	<ul style="list-style-type: none"> ▪ Ignition on ▪ Engine coolant temperature below 40 °C ▪ Engine not running Start engine	<ul style="list-style-type: none"> ▪ Diode in voltage tester does not light ▪ Diode in voltage tester lights 	<ul style="list-style-type: none"> - Use current flow diagram to check wiring and eliminate short circuit Use current flow diagram to check and repair wiring Check operation of coolant shut-off valve relay -J541 => Page 70

Notes:

- ♦ Relay -J541 is only intended for vehicles with 8-cyl. petrol engine with small coolant circuit (gradual introduction as of January 2001) and for vehicles with 12-cyl. engine. Relay is fitted in all vehicles with 12-cyl. engine but is currently not intended for vehicles with 6-cyl. engine and 8-cyl. diesel engine.
- ♦ Voltage at terminal D+ is used by relay -J541 for detection of whether engine is running (voltage is applied if it is).
- ♦ If engine is running and engine coolant temperature transmitted to -J541 by dash panel insert is less than approx. 80°C, relay -J541 connects earth to contact 3 at heater control unit -J162 and control unit -J162 switches on recirculating pump -V55. Particularly with the 12-cyl. engine, this enhances coolant supply to pump/valve unit and improves heat output.
- ♦ If auxiliary heater starts up as additional heater on starting cold engine on vehicles with petrol engine, check adaption of heater control unit -J162. Adaption "1" must be set in adaption channel "10" for software versions "D50" and "D51". As of software version "D52", the adaption setting must be "3". After adaption of heater control unit -J162 if necessary.
- ♦ As of October 2000, vehicle electrical system has gradually been converted on vehicles with 8-cyl. petrol engine. Following introduction of modified wiring harness, these vehicles are provided with the pre-fitted electrical system components required for installation of a small coolant circuit (installation of coolant shut-off valve -N279). Relay is fitted in all vehicles with 12-cyl. engine but is currently not intended for vehicles with 6-cyl. engine and 8-cyl. diesel engine.

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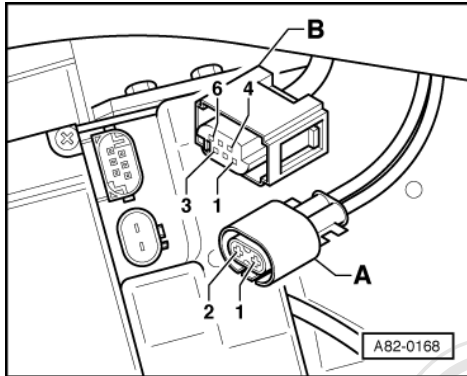
=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

- ♦ Coolant shut-off valve relay -J541 can only be actuated with a square-wave signal by auxiliary heaters for petrol with part number as of index "K" (software version "D50") and this is the only auxiliary heater version which switches on recirculating pump when actuated by -J541 (earth applied to connector "B" contact "3"). Such auxiliary heaters were gradually introduced into production as of November 2000 (initially for vehicles with 8-cyl. petrol engine). Relay is fitted in all vehicles with 12-cyl. engine but is currently not intended for vehicles with 6-cyl. engine and 8-cyl. diesel engine.
- ♦ When auxiliary heater is encoded for a small coolant circuit, a square-wave signal is emitted via output for actuation of fresh-air blower (operating and display unit for air conditioner/Climatronic -E87). This signal is processed by coolant shut-off valve relay -J541 (-E87 cannot process signal). This signal is used to output temperature of coolant in auxiliary heater and instantaneous auxiliary heater operating status. A positive signal is output if auxiliary heater is encoded for large coolant circuit (as for software versions "D49" and "D48") =>Page 69 .

- ♦ On vehicles retrofitted with coolant shut-off valve -N279, valve is actuated from this output via an additional relay in the case of auxiliary heaters with software version "D49". Heed the relevant notes in the corresponding fitting instructions => Pages **243** .

Checking auxiliary/additional heater components

- Switch off ignition.
- Remove noise insulation.

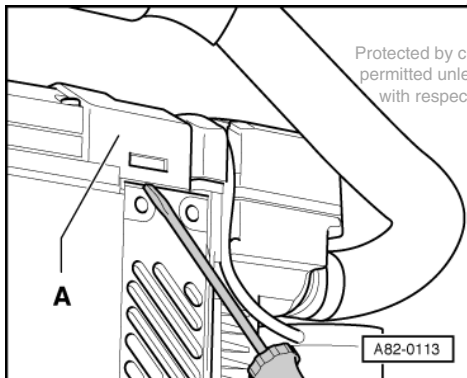


=> General Body Repairs; Repair Group 63; Front Bumper Front Bumper

- Remove bumper (only applies to 8-cyl. diesel engine and 12-cyl. engine).

=> General Body Repairs; Repair Group 63; Front Bumper Front Bumper

- Remove air duct to alternator (8-cyl. petrol engine only).
- -> Unplug connectors -A- and -B- from heater.



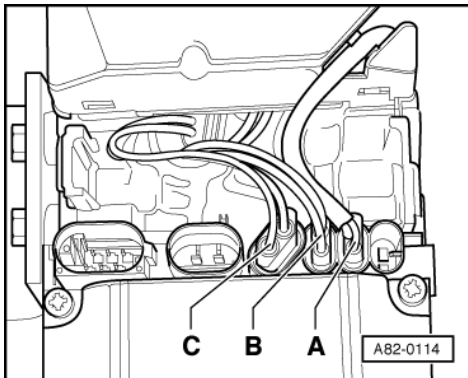
- -> Use screwdriver to prise off cover -A-.

List of electrical checks envisaged

Test step	Component checked	Page
1	Glow plug with flame monitor -Q8	58
2	Combustion air blower -V6	58
3	Recirculating pump -V55 (only applies to auxiliary/additional heater, heater type "Z/C")	59



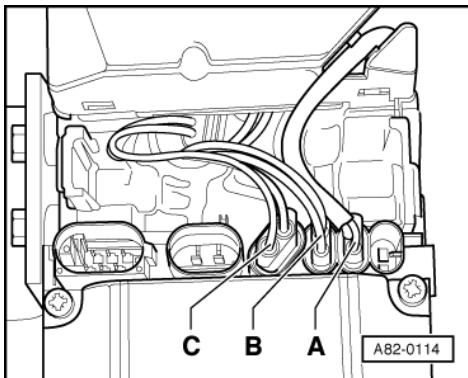
Test step 1 (glow plug with flame monitor -Q8)



- -> Unplug connector -C- from auxiliary/additional heater.
- Measure resistance at connector -C- between contact 1 and housing of heater.

Specification:

$\infty \Omega$



- -> Measure resistance at connector -C- between contacts 1 and 2.

Specification:

Less than 1 Ω

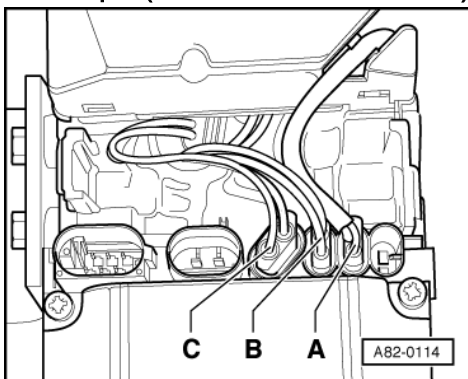
Rated value:

0.236 Ω +/- 0.033 Ω (at 25 °C)

Notes:

- ♦ Resistances of less than 1 Ω can no longer be measured with sufficient accuracy using workshop equipment; this test can therefore only detect major component damage.
- ♦ The heater control unit -J162 can detect whether or not a flame has been formed in the heater by way of the resistance range of -Q8.
- ♦ If a voltage of 9 VDC is applied to the glow plug with flame monitor, the current input is between 9 and 12 A.

Test step 2 (combustion air blower -V6)



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- -> Unplug connector -B- from auxiliary/additional heater.
- Measure resistance at connector -B- between contact 1 and housing of heater.

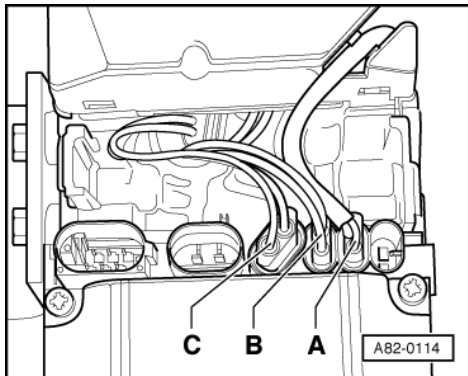
Specification:

$\infty \Omega$

Notes:

- ♦ If a voltage of 12 VDC is applied to combustion air blower -V6, current input is between 2 and 3 A.
- ♦ Internal resistance of combustion air blower -V6 is between 3 and 6 Ω (40 wif blower has not been in operation for a lengthy period). As resistances of less than 10 Ω can no longer be measured with sufficient accuracy using workshop equipment, this internal resistance test can only detect major component damage.

Test step 3 (recirculating pump -V55)



Note:

A recirculating pump is only fitted with auxiliary/additional heater. Heaters used only for additional heating have no recirculating pump.

- -> Unplug connector -A- from auxiliary/additional heater.
- Measure resistance at connector -A- between the two contacts (1 and 2) and housing of heater.

Specification:

$\infty \Omega$

Notes:

- ♦ If a voltage of 12 VDC is applied to the recirculating pump -V55, the current input is between 1 and 1.5 A.
- ♦ Internal resistance cannot be measured for recirculating pump -V55 (prevented by electronics in pump).

13 - Functional description of auxiliary/additional heater (heater type "Z/C")

13.1 - Functional description of auxiliary/additional heater (heater type "Z/C")

Notes on auxiliary heating and auxiliary ventilation:

- ♦ Pre-selection clock -E111 and heater/heat output switch -E16 were discontinued in Model Year 1999 and auxiliary/additional heater is actuated by dash panel insert (modified version). "Auxiliary heating/auxiliary ventilation" must be entered in dash panel insert by way of adaption function.

=> Parts List



=> Electrical System; Repair Group 01

- ♦ Auxiliary/additional heater can be switched at any time from auxiliary ventilation to auxiliary heating by actuating heater/heat output switch -E16 or by switchover in dash panel insert.
- ♦ Operating and display unit for air conditioner/Climatronic -E87/fresh-air blower -V2 are switched on immediately in auxiliary ventilation mode. In auxiliary heating mode, this is only the case when the coolant temperature in the auxiliary heater exceeds 30°C.
 - Operating and display unit for air conditioner/Climatronic -E87 starts up (specified temperature at least 20° C) and fresh-air blower -V2 is actuated (voltage between 3.7 and 6 V).
 - The two valves in the pump/valve unit are opened or closed as a function of actual and specified temperature (pulsed, however open for at least 20 % of operating time).
 - Pump in pump/valve unit remains switched off in auxiliary heating/auxiliary ventilation mode.

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

- ♦ Operating and display unit for air conditioner/Climatronic -E87 actuates left and right heat regulation valves -N175 and -N176 as soon as specified temperature in passenger compartment is attained (valves are connected to terminal 30). To achieve maximum possible warming of the passenger compartment in auxiliary heating mode, it may therefore be appropriate to preselect "HI" temperature setting on -E87 before switching off ignition.

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

- ♦ Depending on the amount of heat supplied by the heat exchangers of the air conditioner unit, the auxiliary heater may remain for a lengthy period in the full load, part load or control interval operating statuses.
- ♦ With auxiliary heater on and cut-in time activated, background illumination of pre-selection clock -E111 (pre-selection clock activated)/symbol in dash panel insert digital clock lights.
- ♦ Auxiliary heating/auxiliary ventilation can be switched off at any time (for example by pressing "Immediate heating" button on pre-selection clock -E111).
- ♦ Auxiliary heating/auxiliary ventilation is switched off automatically after 30 minutes by pre-selection clock -E111/auxiliary heating radio wave receiver -R64.
- ♦ On vehicles where auxiliary heater is actuated by way of dash panel insert, operating time can be set between 30 and 60 minutes => Page 97. If auxiliary heating/auxiliary ventilation is switched on by way of remote control, operating time depends on time module contained in radio signal of hand transmitter (30 or 60 minutes).

Notes on additional heater:

- ♦ Additional heater is only intended for vehicles with diesel engine. It is switched in by engine control unit and can be switched off by pressing "Econ" button on operating and display unit for air conditioner/Climatronic -E87 if additional heat output is not required.
- ♦ As additional heater can only be switched on with engine running, a recirculating pump -V55 is not required. However, if vehicle is fitted with auxiliary/additional heater, recirculating pump also runs in additional heating mode.
- ♦ Heater may remain in full load, part load or control interval operating statuses for lengthy periods depending on amount of heat generated by engine and supplied by heat exchangers of air conditioner unit => Pages 68.
- ♦ As additional heater operates with engine running, it is hardly noticeable during heating mode. Heater run-on is audible if engine is switched off.

General notes:

- ♦ Temperature sensor (for detecting temperature of coolant in heater) is permanently installed in heater control unit -J162 and cannot be checked/removed.
- ♦ To guard against overheating, glow plug with flame monitor -Q8 is actuated with a regulated voltage.
- ♦ To ensure that combustion in the heater is always in the optimum range, the metering pump -V54 (clock frequency) and the combustion air blower -V6 (voltage) are regulated throughout the entire sequence.
- ♦ The temperatures given in the functional description and function chart are approximate.
- ♦ If heater has been interlocked (completely shut down) on account of a fault (e.g. flame interruption or overheating), it cannot be switched on again until the fault memory has been read out and its content erased.
- ♦ If heater is to be switched off when starting, position reached in starting sequence governs whether heater is switched off immediately or whether run-on (burn-off) is necessary.
- ♦ If temperature of coolant exceeds 77 °C (81 °C as of software version "D50") before attaining full load mode (e.g. with a hot engine), heater switches to control interval.
- ♦ Various functions are constantly monitored during operation (switch-off is immediate if a fault occurs).
 - Undervoltage cut-out if supply voltage drops below specified cut-out voltage (e.g. on account of insufficient battery charge)

- Overvoltage cut-out if supply voltage exceeds 15.5 V for more than 6 s
- Cut-out due to flame interruption if resistance of glow plug with flame monitor -Q8 drops below specified value (e.g. flame interruption due to fault in fuel supply)
- Cut-out due to overheating if coolant temperature in heater exceeds 125 °C (e.g. due to absence of coolant or on account of fault in coolant circuit or at recirculating pump -V55)

Prerequisites for sequence described on the following pages (when switching on heater):

Coolant circuit bled and coolant temperature less than 20 °C
Battery -A (second battery -A1) adequately charged
Sufficient fuel in tank
No faults stored in fault memory of heater
Ignition off and "auxiliary heating" mode set (heater with recirculating pump -V55, auxiliary/additional heater, heater/heat output switch -E16 not pressed on vehicles with pre-selection clock -E111 or "auxiliary heating" function active in dash panel insert)
Engine running (heater with no recirculating pump -V55, additional heater)

Notes:

- ◆ Only the main items of the operating sequence are presented on the following pages. Sequences taking place in the background are marked with a "-" and perceptible sequences (which can be heard or measured) with a "•".
- ◆ As the additional heater is only switched on at ambient temperatures less than + 5 °C, it is to be activated for the procedure outlined on the following pages by way of the fault reader V.A.G 1551 ("Basic setting" function).

No.	Control sequence	Possible cause of deviation	Continuation of sequence following deviation
1	Cut-in signal		
	Auxiliary heater • By pre-selection clock • By auxiliary heating radio wave receiver -R64 Interrogation of heater/heat output switch -E16 (switch not pressed) • By dash panel insert (auxiliary heating mode) Interrogation of auxiliary ventilation switch (in dash panel insert)	Switch -E16 pressed Switch closed	Auxiliary ventilation (summer mode) =>No. 11 Auxiliary ventilation (summer mode) =>No. 11
	Additional heating • By engine control unit (fault reader)		
Continued on next page			

No.	Control sequence	Possible cause of deviation	Continuation of sequence following deviation
2	Initiation of starting procedure		
	- Interrogation of fault memory Interrogation of voltage at heater Monitoring of all electrical components and input signals Interrogation of glow plug with flame monitor -Q8 Interrogation of coolant temperature in heater (less than 77 °C/ 81° C as of software version "D50")	- Fault interlock entered Voltage is or becomes lower than specified cut-out voltage Fault determined Resistance of glow plug with flame monitor -Q8 outside specified range Coolant temperature (greater than 77 °C/ 81°C as of software version "D50")	- Termination of starting procedure/fault/off Termination of starting procedure (entry in fault memory)/fault/off See above See above Switchover to control interval (no. 7)
Continued on next page			



No.	Control sequence	Possible cause of deviation	Continuation of sequence following deviation
3	Starting		
	- Monitoring as for no. 2	=>No. 2	=>No. 2
	<ul style="list-style-type: none"> ▪ Recirculating pump -V55 on (for auxiliary/additional heater) ▪ Actuation of operating and display unit -E87 on (auxiliary heater only) Up to software version "D49" if coolant temperature is greater than +30 °C (positive signal to -E87) As of software version "D50" and code "000XX" (large coolant circuit) if coolant temperature is greater than +30 °C (positive signal to -E87) <ul style="list-style-type: none"> ▪ As of software version "D50" and code "001XX" (small coolant circuit), data signal to -J541 irrespective of coolant temperature and instantaneous operating status 		
Continued on next page			

No.	Control sequence	Possible cause of deviation	Continuation of sequence following deviation
3	Starting (continued)	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.	
	<ul style="list-style-type: none"> ▪ Actuation of -Q8 (regulated) ▪ Actuation of combustion air blower -V6 (regulated) ▪ Actuation of metering pump -V54 (regulated) 		
	Stabilisation time <ul style="list-style-type: none"> ▪ Start of full load heating ▪ Switchover of -Q8 from glow plug to flame monitor Interrogation of -Q8 resistance (remains hot)	Resistance of glow plug with flame monitor -Q8 outside specified range Resistance of glow plug with flame monitor -Q8 still outside specified range after repeated starting	Termination of starting procedure (1x start repetition) =>No. 2 Termination of starting procedure (entry in fault memory)/fault/off
Continued on next page			

Notes:

- ♦ "Starting" sequence is described on Page 66.
- ♦ Auxiliary heaters with part number as of index "K" or "J" with software version "D52" have been gradually introduced into production since April 2001. With these auxiliary heaters, actuation of recirculating pump may be modified depending on encoding and adaption in adaption channel "10".
 With code "000XX" (large coolant circuit), output of recirculating pump is reduced up to a coolant temperature of approx. 72 °C so as to increase temperature of coolant exiting from auxiliary heater (actuation time approx. 20 % at less than 60 °C and 100% at greater than 72 °C).
 With code "001XX" (small coolant circuit), output of recirculating pump is also altered with adaption "2" or "3" in adaption channel "10".
- ♦ When auxiliary heater is encoded for a small coolant circuit, a square-wave signal is emitted via output for actuation of fresh-air blower (operating and display unit for air conditioner/Climatronic -E87). This signal is processed by coolant shut-off valve relay -J541 (-E87 cannot process signal). This signal is used to output temperature of coolant in auxiliary heater and instantaneous auxiliary heater operating status. A positive signal is output if auxiliary heater is encoded for large coolant circuit (as for software versions "D49" and "D48") =>Page 69.

Refer to next page for continuation.

No.	Control sequence	Possible cause of deviation	Continuation of sequence following deviation
4	Full load heating (max. heat output)		
	<div>- Monitoring as for no. 2</div> <div>- Voltage at heater remains in excess of that required No interruption of heating Coolant temperature increases and reaches 71 °C (75°C as of software version "D50")</div>	<div>=>No. 2</div> <div>- Voltage drops below specified cut-out voltage Flame goes out Coolant temperature remains less than 71 °C (75°C as of software version "D50")</div>	<div>=>No. 2</div> <div>- Burn-off (entry in fault memory) / fault / off Burn-off and re-start =>No. 2 Heater remains in full load mode until switched off</div>
Continued on next page			

Note:

"Full and part load mode" sequence is described on Page 66.

No.	Control sequence	Possible cause of deviation	Continuation of sequence following deviation
5	Part load heating (approx. 50% of heat output)		
	<div>- Monitoring as for no. 4</div> <div> <ul style="list-style-type: none"> Actuation of metering pump - V54 with reduced clock frequency Actuation of combustion air blower -V6 with reduced voltage Coolant temperature increases and reaches 77 °C (81°C as of software version "D50") </div>	<div>=>No. 4</div> <div>- Coolant temperature remains between 69 and 77 °C (73 and 81°C as of software version "D50") Coolant temperature drops below 69 °C (73 °C as of software version "D50")</div>	<div>=>No. 4</div> <div>- Heater remains in part load mode until switched off Heater switches from part to full load mode =>No. 4</div>
Continued on next page			

Note:

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"Full and part load mode" sequence is described on Page 66.

No.	Control sequence	Possible cause of deviation	Continuation of sequence following deviation
6	Burn-off/run-on		
	<div>- Monitoring as for no. 2</div> <div> <ul style="list-style-type: none"> Metering pump -V54 off Actuation of combustion air blower -V6 with regulated voltage Actuation of -Q8 (post-glow, regulated) Actuation of -Q8 off Interrogation of -Q8 resistance (becomes colder) </div>	<div>=>No. 2</div> <div>Resistance of glow plug with flame monitor -Q8 outside specified range</div>	<div>=>No. 2</div> <div>Burn-off (entry in fault memory)/ fault/off</div>
Continued on next page			

Note:

"Burn-off/run-on" sequence is described on Page 67.

No.	Control sequence	Possible cause of deviation	Continuation of sequence following deviation
7	Control interval		



No.	Control sequence	Possible cause of deviation	Continuation of sequence following deviation
	- Monitoring as for no. 2	=>No. 2	=>No. 2
	- Coolant temperature drops below 73 °C (77 °C as of software version "D50")	- Coolant temperature continues to increase (engine runs and heats up coolant) Coolant temperature remains between 73 and 77 °C (77 and 81 °C as of software version "D50") Coolant temperature rises above 125 °C	- Heater remains in control interval until switched off Fault (entry in fault memory)/off/fault interlock
Continued on next page			

No.	Control sequence	Possible cause of deviation	Continuation of sequence following deviation
8	Starting from control interval	Protected by copyright. Copying for private or commercial purposes, 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. Copyright by AUDI AG.	
	- Monitoring as for no. 2	=>No. 2	=>No. 2
	<ul style="list-style-type: none"> ▪ Actuation of -Q8 (regulated) ▪ Actuation of combustion air blower -V6 (regulated) ▪ Actuation of metering pump ▪ -V54 (regulated) Stabilisation time <ul style="list-style-type: none"> ▪ Start of full or part load heating (depending on coolant temperature) ▪ Switchover of -Q8 from glow plug to flame monitor Interrogation of -Q8 resistance (remains hot) Heating (then as for no. 4)	Resistance of glow plug with flame monitor -Q8 outside specified range Resistance of glow plug with flame monitor -Q8 still outside specified range after repeated starting	Termination of starting procedure (1x start repetition) =>No. 2 Termination of starting procedure (entry in fault memory)/fault/off
Continued on next page			

Note:

Starting from control interval is implemented as described on Page 66. However, as the heater is at operating temperature, the times for the various sequences differ from those for fresh starting (e.g. pre-heating 20 instead of 40 s, fuel supply for 30 instead of 56 s).

No.	Control sequence	Possible cause of deviation	Continuation of sequence following deviation
9	Switch-off		
	Auxiliary heater <ul style="list-style-type: none"> ▪ No further signal from pre-selection clock -E111 ▪ No further signal from auxiliary heating radio wave receiver -R64 ▪ No further signal from dash panel insert 		
	Additional heater <ul style="list-style-type: none"> ▪ No further signal from engine control unit (fault reader) 		
Continued on next page			

Notes:

- ♦ Auxiliary heating/auxiliary ventilation is switched off automatically after 30 minutes by pre-selection clock - E111 and auxiliary heating radio wave receiver -R64.
- ♦ On vehicles where auxiliary heater is actuated by way of dash panel insert, operating time can be set between 30 and 60 minutes => Page 97.

- ♦ If heater is in control interval when switched off, it cuts out without burn-off and run-on.
- ♦ "Burn-off/run-on" sequence is described on Page 67.

No.	Control sequence	Possible cause of deviation	Continuation of sequence following deviation
10	Burn-off		
	- Monitoring as for no. 2	=>No. 2	=>No. 2
	<ul style="list-style-type: none"> ▪ Metering pump -V54 off ▪ Recirculating pump -V55 off ▪ Actuation of operating and display unit -E87 off ▪ Actuation of combustion air blower -V6 with regulated voltage ▪ Actuation of -Q8 (post-glow, regulated) ▪ Actuation of -Q8 off Interrogation of -Q8 resistance (becomes colder) ▪ Off 	Resistance of glow plug with flame monitor -Q8 outside specified range	Burn-off (entry in fault memory)/ fault/off
Continued on next page			

No.	Control sequence	Possible cause of deviation	Continuation of sequence following deviation
11	Auxiliary ventilation (with auxiliary/additional heater only)		
	Cut-in signal <ul style="list-style-type: none"> ▪ From pre-selection clock ▪ From auxiliary heating radio wave receiver -R64 Interrogation of heater/heat output switch -E16 (switch pressed)	Switch -E16 not pressed	Auxiliary heating (winter mode) =>No. 1
	<ul style="list-style-type: none"> ▪ From dash panel insert (auxiliary ventilation mode) Interrogation of auxiliary ventilation switch (in dash panel insert)	Switch in dash panel insert not closed	Auxiliary heating (winter mode) =>No. 1
	- Interrogation of fault memory Interrogation of voltage at heater Monitoring of all electrical components and input signals <ul style="list-style-type: none"> ▪ Actuation of operating and display unit -E87 on 	- Fault interlock entered Voltage is or becomes lower than specified cut-out voltage Fault determined	- Termination / fault / off Termination (entry in fault memory) / fault / off

Notes:

- ♦ Auxiliary ventilation is switched off automatically after 30 minutes by pre-selection clock -E111 and auxiliary heating radio wave receiver -R64.
- ♦ On vehicles where auxiliary ventilation is actuated by way of dash panel insert, operating time can be set between 30 and 60 minutes => Page 97. If auxiliary heating/auxiliary ventilation is switched on via remote control, operating time is between 30 and 60 minutes. Mode of operation (auxiliary heating or auxiliary ventilation) and operating time are governed by setting in dash panel insert. It should be noted that these vehicles are provided with a remote control system, the signal of which contains a time module for an operating period of 60 min. (as opposed to 30 min. with version for vehicles with pre-selection clock).
- ♦ A positive signal is output by heater control unit -J162 with software versions "D48" and "D49" for actuating -E87. As of software version "D50", signal is governed by auxiliary heater encoding. With code "000XX" (large coolant circuit), a positive signal is output, as opposed to a square-wave signal (data signal) with code "001XX" (small coolant circuit). This data signal can only be processed by coolant shut-off valve relay.
- ♦ When auxiliary heater is encoded for a small coolant circuit, a square-wave signal is emitted via output for actuation of fresh-air blower (operating and display unit for air conditioner/Climatronic -E87). This signal is processed by coolant shut-off valve relay -J541 (-E87 cannot process signal). This signal is used to output temperature of coolant in auxiliary heater and instantaneous auxiliary heater operating status. A positive signal is output if auxiliary heater is encoded for large coolant circuit (as for software versions "D49" and "D48") =>Page 69.



- ♦ On vehicles retrofitted with coolant shut-off valve -N279, valve is actuated from this output via an additional relay in the case of auxiliary heaters with software version "D49". Heed the relevant notes in the corresponding fitting instructions => Pages 243 .

"Heater starting" sequence

Sequence	Duration approx.	Actuation			Resistance measurement
		-V6 with	-V54 with	-Q8 with	-Q8
- Commencement of starting sequence	-	0 V	0 Hz	0 V	no
- Flame monitor interrogation	1 s	8 V	0 Hz	0 V	yes
▪ Pre-heating	40 s	8 V	0 Hz	10 V	no
▪ Fuel pre-supply	3 s	0 V	2 Hz	9 V	no
▪ Fuel supply	56 s	2 to 5 V	1 Hz	9 V	no
- Stabilisation time	15 s	5 V	1 Hz	9 V	no
▪ Fuel supply	50 s	4 to 12 V	1 to 3 Hz	9 V	no
- Flame monitor interrogation	45 s	12 V	3 Hz	0 V	yes
- End of starting sequence Start of "full load" heating (=>Page 66)					

Notes:

- ♦ 1 Hertz (Hz) corresponds to 1 pulse per second.
- ♦ The voltages, times and frequencies listed in the table are approximate values regulated by the control unit on the basis of measured values (voltage, temperature etc.).

"Heater full/part load heating" sequence

Sequence	Duration approx.	Actuation			Resistance measurement
		-V6 with	-V54 with	-Q8 with	-Q8
- End of starting sequence	-	12 V	3 Hz	0 V	yes
- Full load heating	Until coolant temperature in heater reaches 71 °C (75 °C as of software version "D50")	12 V	3 Hz	0 V	yes
▪ Switchover from full to part load mode	5 s	from 12 V to 7 V	from 3 Hz to 1.5 Hz	0 V	yes

Continued on next page

Sequence	Duration approx.	Actuation			Resistance measurement
▪ Part load heating	Until coolant temperature in heating unit drops below 69°C or reaches 77°C (73°C/81°C as of software version "D50")	7 V	1.5 Hz	0 V	yes

Continued on next page

Sequence	Duration approx.	Actuation			Resistance measurement
		-V6 with	-V54 with	-Q8 with	-Q8
▪ Switchover from part to full load mode if coolant temperature drops below 69 °C (73 °C as of software version "D50") Full load heating (=>Page 66)	Up to 50 s	from 7 V to 12 V	from 1.5 Hz to 3 Hz	0 V	yes
- Switchover from part load mode to control interval if coolant temperature reaches 77 °C (81 °C as of software version "D50") ▪ Burn-off/run-on (=>Page 67)	-	7 V	1.5 Hz	0 V	yes

Notes:

- ♦ 1 Hertz (Hz) corresponds to 1 pulse per second.
- ♦ The voltages, times and frequencies listed in the table are approximate values regulated by the control unit on the basis of measured values (voltage, temperature etc.).

"Burn-off, run-on" sequence

Sequence	Duration approx.	Actuation			Resistance measurement
		-V6 with	-V54 with	-Q8 with	-Q8
- Switchover from part load mode to control interval Switch-off of heater during full or part load mode Termination of starting procedure on account of a fault	-	7 or 12 V	1.5 or 3 Hz	0 V	yes
▪ Burn-off (of heater)	15 to 60 s	4 to 12 V	0 Hz	6 to 8 V	no
▪ Cooling-down (of heater)	0 to 120 s	8 to 12 V	0 Hz	0 V	no
▪ Switchover to control interval ▪ Off	-	0 V	0 Hz	0 V	no

Notes:

- ♦ 1 Hertz (Hz) corresponds to 1 pulse per second.
- ♦ The voltages, times and frequencies listed in the table are approximate values regulated by the control unit on the basis of measured values (voltage, temperature etc.) and last operating status.

13.2 - Required heat output between 50 and 100 %

Note:

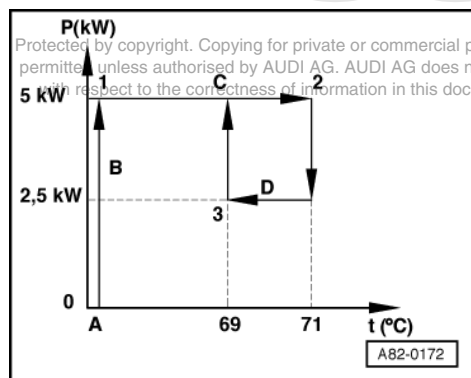




Fig. shows auxiliary heater switching temperatures applicable up to software version "D49". As of software version "D50" of heater control unit -J162, switching temperatures were increased by 4 °C (as of "D50", switching from full to part load for example takes place at 75 °C instead of 71 °C as used to be the case).

-> P (kW) = Heat output in kilowatts

t (°C) = Temperature of coolant in heater

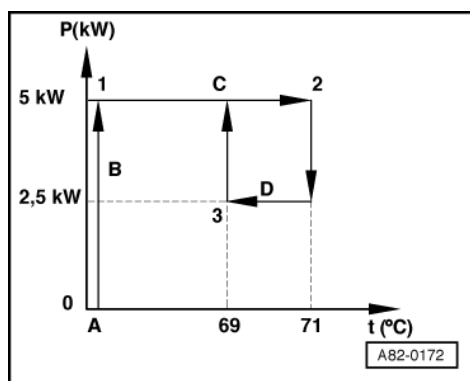
A = Commencement of starting sequence

- Coolant temperature in heater must be less than 73 °C (77 °C as of software version "D50").

B = Starting procedure

C = Full load mode

D = Part load mode



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-> 1 = Start of full load mode

2 = Switchover from full to part load mode

3 = Switchover from part to full load mode

13.3 - Required heat output less than 50 %

Note:

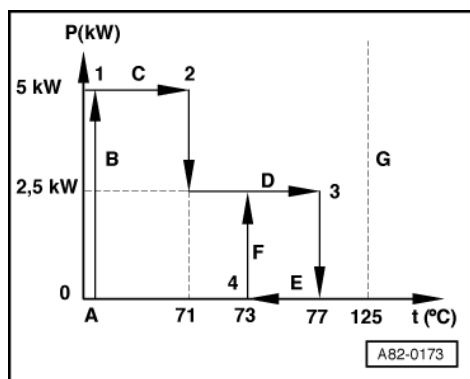
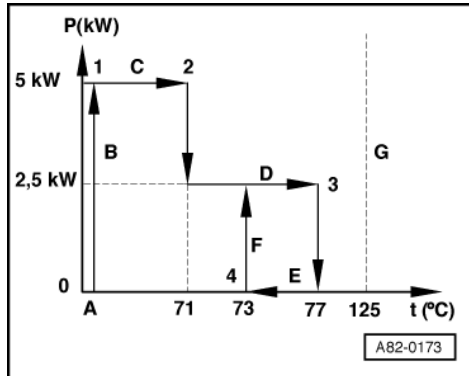


Fig. shows auxiliary heater switching temperatures applicable up to software version "D49". As of software version "D50" of heater control unit -J162, switching temperatures were increased by 4 °C (as of "D50", switching from full to part load for example takes place at 75 °C instead of 71 °C as used to be the case).

-> P (KW) = Heat output in kilowatts

t (°C) = Temperature of coolant in heater

A = Commencement of starting procedure (coolant temperature in heater must be less than 73 °C)



-> B = Starting procedure

C = Full load mode

D = Part load mode

E = Control interval

F = Starting from control interval

G = Excess temperature cut-out

1 = Start of full load mode

2 = Switchover from full to part load mode

3 = Switchover from part load mode to control interval

4 = End of control interval

14 - Coolant shut-off valve relay -J541

14.1 - Coolant shut-off valve relay -J541

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Notes:

- ♦ As of October 2000, vehicle electrical system has gradually been converted on vehicles with 8-cyl. petrol engine. Following introduction of modified wiring harness, these vehicles are provided with the pre-fitted electrical system components required for installation of a small coolant circuit (installation of coolant shut-off valve -N279).

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

- ♦ As of January 2001, coolant circuit is gradually being converted on vehicles with 8-cyl. petrol engine. Following introduction of modified coolant circuit, auxiliary heater coolant is no longer drawn in via engine in auxiliary heating mode (small coolant circuit).



- ♦ Coolant shut-off valve relay -J541 (part number 4D0 909 516) can only be actuated with a square-wave signal by auxiliary heaters for petrol with part number as of index "K" (software version "D50"). Such auxiliary heaters were gradually introduced into production as of November 2000 (initially for vehicles with 8-cyl. petrol engine).
- ♦ When auxiliary heater is encoded for a small coolant circuit, a square-wave signal is emitted via output for actuation of fresh-air blower (operating and display unit for air conditioner/Climatronic -E87). This signal is processed by coolant shut-off valve relay -J541 (-E87 cannot process signal). This signal is used to output temperature of coolant in auxiliary heater and instantaneous auxiliary heater operating status. A positive signal is output if auxiliary heater is encoded for large coolant circuit (as for software versions "D49" and "D48").
- ♦ If -J541 is actuated via a positive signal from auxiliary heater (contact "1"), -J541 does not actuate coolant shut-off valve -N279.
- ♦ On vehicles with 8-cyl. petrol engine manufactured between October 2000 and introduction of coolant shut-off valve -N279 (gradually as of January 2001), a link is inserted in relay socket instead of relay -J541. This link connects contacts "1" (from auxiliary heater) and "5" (to operating and display unit for air conditioner/Climatronic -E87).
- ♦ If a vehicle provided at the factory with an auxiliary heater with software version "D49" and retrofitted with a small coolant circuit is fitted with an auxiliary heater as of software version "D50", this auxiliary heater is to be encoded - contrary to usual procedure - to "00011" for vehicle with large coolant circuit (no coolant shut-off valve) or vehicle electrical system is to be converted accordingly. => Refer to Page 264 and appropriate current flow diagram for vehicles with auxiliary heater and factory-fitted small coolant circuit in Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder (e.g. current flow diagram no. 39 for Model Year 2002 vehicles).

14.2 - Contact assignment and operation of coolant shut-off valve relay -J541

Notes:

- ♦ Incorporation of relay -J541 into vehicle electrical system

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

- ♦ Coolant shut-off valve relay -J541 (part number 4D0 909 516) acts as a control unit. It processes various signals and actuates coolant shut-off valve -N279 as well as operating and display unit for air conditioner/Climatronic -E87 and heater control unit -J162 on the basis of a range of data.
- ♦ Coolant shut-off valve relay -J541 can only be actuated by auxiliary heaters for petrol with part number as of index "K" (software version "D50") and this is the only auxiliary heater version which switches on recirculating pump when actuated by -J541 (earth applied to connector "B" contact "3"). Such auxiliary heaters were gradually introduced into production as of November 2000 (initially for vehicles with 8-cyl. petrol engine). Relay is fitted in all vehicles with 12-cyl. engine but is currently not intended for vehicles with 6-cyl. engine and 8-cyl. diesel engine.

Contact	Contact assignment	Function
1	<ul style="list-style-type: none"> ▪ Input for data signals from heater control unit -J162 (with additional information in the case of auxiliary heater as of "D50" and code "001XX") Auxiliary heating/auxiliary ventilation on Operating status of auxiliary heater (starting, full load, part load, control interval, run-on or auxiliary ventilation) Coolant temperature in auxiliary heater 	<ul style="list-style-type: none"> ▪ -J541 processes data signal and actuates coolant shut-off valve -N279 and -E87 as a function of coolant temperature supplied and operating status of auxiliary heater
	<ul style="list-style-type: none"> ▪ Input for fresh-air blower cut-in signal (for auxiliary heater with "D49" or as of "D50" and code "000XX") Input signal (approx. battery voltage) for actuation of fresh-air blower by heater control unit -J162 	<ul style="list-style-type: none"> ▪ 2 s following detection of voltage, -J541 actuates -E87 only; coolant shut-off valve -N279 is not actuated

Notes:

- ♦ Data signal can only be output by auxiliary heaters as of software version "D50" with code "001XX" for small coolant circuit. Auxiliary heaters with software version "D49" or with software version as of "D50" and code "000XX" for large coolant circuit only output a voltage signal.

- ♦ If auxiliary heater (as of software version "D50" and code "001XX") is in operating statuses (starting, full load, part load or control interval), coolant shut-off valve is actuated as a function of coolant temperature in auxiliary heater. Operating and display unit for air conditioner/Climatronic -E87 is actuated as soon as coolant temperature supplied exceeds 30 °C.
- ♦ If auxiliary heater (as of software version "D50" and code "001XX") is in "Auxiliary ventilation" mode, shut-off valve is not actuated but -E87 is actuated immediately.
- ♦ In the case of auxiliary heaters with software version "D49", -J541 is only fitted on vehicles with 8-cyl. 5-valve petrol engine manufactured as of October 2000 and retrofitted with a "small coolant circuit" => Pages 243.

Contact	Contact assignment	Function
2	▪ Output for actuation of coolant shut-off valve -N279 (for auxiliary heater as of "D50" and code "001XX") In auxiliary heating mode with engine stopped, terminal "30" (voltage) is connected to -N279 as a function of coolant temperature in auxiliary heater	-J541 switches voltage to -N279, which switches from large to small coolant circuit
	▪ Output for actuation of coolant shut-off valve -N279 (for auxiliary heater with "D49" or as of "D50" and code "000XX") In auxiliary heating mode with engine stopped, voltage is not switched to -N279 (application of voltage but no square-wave signal to contact "1")	-N279 is not actuated (and there is thus no switching to small coolant circuit)

Notes:

- ♦ Coolant shut-off valve -N279 is actuated in auxiliary heating mode (as of software version "D50" and code "001XX") up to a coolant temperature of approx. 74 °C in auxiliary heater. Actuation is by way of a square-wave signal every 2 seconds. Duty cycle is governed by coolant temperature (approx. 90 % at 63 °C and 0 % at greater than 74 °C).
- ♦ If auxiliary heater does not output a square-wave signal but rather only a positive signal, -J541 does not actuate -N279. If vehicle is fitted with an auxiliary heater with software version "D49", -J541 (part number 4D0 909 516) cannot be actuated via "Fresh-air blower on" output.
- ♦ In auxiliary heating mode (with engine stopped), coolant leaving air-conditioner unit heat exchanger by way of pump/valve unit is routed directly back to auxiliary heater via coolant shut-off valve -N279 (small circuit) to provide better heating of passenger compartment. If coolant temperature (only applies to auxiliary heaters as of software version "D50" and code "001XX") attains a certain value or if engine is started, shut-off valve is no longer actuated and coolant can flow back to engine (large circuit).
- ♦ If auxiliary heater is on when engine is started, relay -J541 action is governed by coolant temperature in auxiliary heater (only applies to auxiliary heaters as of software version "D50" and code "001XX"). Switching to large circuit takes place immediately if coolant temperature is greater than 65 °C. If coolant temperature then drops below 60 °C, small circuit is selected again (valve is actuated).

Contact	Contact assignment	Function
3	▪ Input for voltage at terminal D+ (for auxiliary heater as of "D50" and code "001XX") If voltage is less than 5 V (no voltage is applied with engine stopped), coolant shut-off valve -N279 is controlled in line with coolant temperature in auxiliary heater and operating and display unit for air conditioner/Climatronic -E87 switched on as soon as coolant temperature supplied by auxiliary heater is greater than 30 °C	Voltage is switched to -N279 and -E87
	- If voltage is greater than 5 V, coolant shut-off valve -N279 is only actuated if auxiliary heater was already on when engine was started; switching to small coolant circuit takes place at different temperatures than in auxiliary heating mode - If voltage is greater than 5 V and engine coolant temperature supplied by dash panel insert less than 80 °C, auxiliary heater recirculating pump -V55 is switched on	Voltage is switched to -N279 - Earth is switched to heater control unit -J162, which switches on -V55
Continued ▼		



Contact	Contact assignment	Function
3 Continued	<ul style="list-style-type: none"> Input for voltage at terminal D+ (for auxiliary heater with "D49" or as of "D50" and code "000XX") If voltage is less than 5 V (no voltage is applied with engine stopped), operating and display unit for air conditioner/Climatronic -E87 is switched on, but coolant shut-off valve -N279 is not actuated 	Voltage is switched to -E87

Notes:

- ♦ Voltage at terminal D+ is used for detection of whether engine is running (voltage is applied if it is).
- ♦ If voltage is applied to D+ and engine coolant temperature supplied by dash panel insert is less than approx. 80 °C, relay -J541 switches earth to contact 3 at heater control unit -J162 (only applies to 8-cyl. petrol engine and 12-cyl. engine) and control unit -J162 switches on recirculating pump -V55 (enhances coolant supply for pump/valve unit with 12-cyl. engine).
- ♦ Relay -J541 acts as control unit. Method of actuation differs. With auxiliary heaters for petrol with part number as of index "K" (software version "D50"), actuation is also governed by auxiliary heater encoding. Such auxiliary heaters were gradually introduced into production as of November 2000 (initially for vehicles with 8-cyl. petrol engine).

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Contact	Contact assignment	Function
4	<ul style="list-style-type: none"> Earth 	
5	<ul style="list-style-type: none"> Output for actuation of operating and display unit for air conditioner/Climatronic -E87 (for auxiliary heater as of "D50" and code "001XX") If "Auxiliary heating mode" is transmitted by heater control unit -J162 with engine stopped, -J541 switches on -E87 as soon as -J162 supplies a coolant temperature greater than 30 °C If "Auxiliary ventilation mode" is transmitted by heater control unit -J162 with engine stopped, -J541 immediately switches on -E87 	- J541 switches on -E87 with engine stopped (auxiliary heating/auxiliary ventilation mode)
	<ul style="list-style-type: none"> Output for actuation of operating and display unit for air conditioner/Climatronic -E87 (for auxiliary heater with "D49" or as of "D50" and code "000XX") If voltage is switched through by heater control unit -J162 with engine stopped, -J541 switches on -E87 	- J541 switches on -E87 with engine stopped (auxiliary heating/auxiliary ventilation mode)

Contact	Contact assignment	Function
6	<ul style="list-style-type: none"> Power supply, terminal "30" 	
7	<ul style="list-style-type: none"> Output for actuation of heater control unit -J162 If coolant temperature less than 80 °C is supplied by dash panel insert with engine running, -J541 connects earth to -J162 	-J162 switches on recirculating pump as long as earth is applied to contact 3 (only applies to auxiliary heater as of "D50" and code "001XX")

Notes:

- ♦ If engine is running and engine coolant temperature transmitted to -J541 by dash panel insert is less than approx. 80°C, relay -J541 connects earth to contact 3 at heater control unit -J162 and control unit -J162 switches on recirculating pump -V55. Particularly with the 12-cyl. engine, this enhances coolant supply to pump/valve unit and improves heat output.
- ♦ If auxiliary heater starts up as additional heater on starting cold engine on vehicles with petrol engine, check adaption of heater control unit -J162. Adaption "1" must be set in adaption channel "10" for software versions "D50" and "D51". As of software version "D52", the adaption setting must be "3". After adaption of heater control unit -J162 if necessary => Page 43.

Contact	Contact assignment	Function
8	<ul style="list-style-type: none"> Output (not used at present) Intended for supplying power to valves of pump/valve unit with engine running 	With engine running, -J541 connects terminal "30" to this contact

Contact	Contact assignment	Function
9	<ul style="list-style-type: none"> Input for coolant temperature determined by dash panel insert If engine coolant temperature supplied by dash panel insert with engine running is less than 80 °C, auxiliary heater recirculating pump -V55 is switched on 	-J541 evaluates coolant temperature and connects earth to -J162 if necessary; -J162 switches on -V55 (only as of software version "D50" and code "001XX")

Note:

If engine is running and engine coolant temperature transmitted to -J541 by dash panel insert is less than approx. 80 °C, relay -J541 connects earth to contact 3 at heater control unit -J162 and control unit -J162 switches on recirculating pump -V55. Particularly with the 12-cyl. engine, this enhances coolant supply to pump/valve unit and improves heat output.

14.3 - Checking coolant shut-off valve relay -J541

Notes:

- ◆ Assignment of contacts at socket for -J541=> Page 70 and
=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder
- ◆ For installation location of relay -J541, refer to
=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder
- ◆ On vehicles with 8-cyl. petrol engine, coolant shut-off valve -N279 is installed at longitudinal member behind left headlight (as opposed to being installed at right longitudinal member above auxiliary heater on 12-cyl. engine).

Checking

- Switch off ignition.
- Switch on auxiliary heater with cold engine.
- Check software version and encoding of heater control unit -J162
=> Page 7.

Control unit -J162 as of software version "D50" is fitted and code "001XX" must be entered.

- Read out auxiliary heater measured value block (display group "001") => Page 34.

As soon as "on" appears in display zone 4, operating and display unit for air conditioner/Climatronic -E87 must start up.

- Check direction of coolant flow in auxiliary heating mode by feeling temperature of coolant hoses.

Coolant is drawn in via coolant shut-off valve -N279 by auxiliary heater directly from pump/valve unit.

- Pull relay -J541 out of socket.

Coolant is now drawn in via coolant shut-off valve -N279 and engine by auxiliary heater from pump/valve unit and -E87 is switched off.



82 - Auxiliary heating

1 - Servicing auxiliary/additional heater

1.1 - Servicing auxiliary/additional heater

1.2 - Contact corrosion

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

For this reason, only connecting elements with a special surface coating are fitted at the factory (can be recognised from their greenish colour), as well as non-conductive rubber components, plastic parts and adhesives.

These checked components, which are compatible with aluminium, are also available as replacement parts.

Only use genuine parts.

Always fit new parts in cases of doubt about re-useability.

Accessories must have been released by Audi AG.

Damage caused by contact corrosion is not covered by warranty.

1.3 - Notes on auxiliary/additional heater

Auxiliary heaters of type "S" (no self-diagnosis) were fitted up to 04.97.

Auxiliary/additional heaters of type "Z/C" (featuring self-diagnosis) were gradually introduced as of 05.97.

Notes:

Fabrikschild-Duplikat gültig nur zusammen mit Original	
Webasto Thermosysteme GmbH MADE IN GERMANY	
HEIZGERÄT Typ	Thermo Top Z/C-B
Spannung / El. Leistung	12V / 45W
Wärmestrom	5kW
Brennstoff	Benzin
zul. Betriebsüberdruck	2,5 bar
Prüfzeichen	
Fabriknummer	
Inbetriebnahmejahr	19 96 97 98
A82-0171	

- -> Type "S" and "Z/C" heaters can be identified from rating plate or housing shape =>Page 163 .
- The heater rating plate indicates the version concerned.
 - Type "Z/C-D" with no recirculating pump -V55 = additional heater (for vehicles with diesel engine only)
 - Type "Z/C-D" with recirculating pump -V55 = auxiliary heater with additional heater (for vehicles with diesel engine only)
 - Type "Z/C-B" = auxiliary heater (for vehicles with petrol engine only)

- Type "S" = auxiliary heater (for vehicles with petrol engine only)

The second battery -A1 for the auxiliary heater was gradually discontinued after switching to heaters of type "Z/C".

Heaters of type "Z/C-D" with no recirculating pump -V55 are installed as additional heater on vehicles with 6-cyl. TDI engine. As additional heater, the heater has neither a recirculating pump -V55 nor a pre-selection clock -E111. The additional heater is switched on by the engine control unit as soon as the specified cut-in criteria are satisfied.

If vehicles with 6 or 8-cyl. TDI engine are fitted with an auxiliary heater, this will be one of type "Z/C-D" with recirculating pump -V55. This auxiliary heater is also used as additional heater.

Problems with auxiliary/additional heater operation may be encountered in cold weather on vehicles with diesel engines if use is predominantly made of vegetable-oil methylester as fuel.

Explanation:

On account of the physical properties, deposits may form during operation on the evaporation fabric in the burner element. These then cause combustion problems if the vehicle is run for lengthy periods on vegetable-oil methylester.

2 - Safety precautions when working on vehicles fitted with auxiliary/additional heater

2.1 - Safety precautions when working on vehicles fitted with auxiliary/additional heater

- ◆ The auxiliary/additional heater is not to be switched on in areas where there is a danger of fire or explosion.
- ◆ The auxiliary/additional heater is not to be switched on in enclosed areas without an exhaust-gas extractor (this also applies to switch-on for a preselected cut-in time).
- ◆ Pay attention to the appropriate safety regulations when working on the fuel system.

=> Relevant Fuel Supply Workshop Manual; Repair Group 20

- ◆ The engine is not to be started if parts of the fuel system (e.g. metering pump, fuel pipe or fuel gauge sender) have been removed or opened.
- ◆ Before starting repair work on auxiliary/additional heater:
 - Dissipate pressure in cooling system by opening cap on coolant expansion tank.
 - Interrupt power and fuel supply for auxiliary/additional heater (e.g. by removing fuse for auxiliary heater -S62).
- ◆ On completion of repairs to auxiliary/additional heater or fuel system check operation of auxiliary/additional heater.
- ◆ Perform self-diagnosis on completion of repair work on auxiliary/additional heater (heater type "Z/C").

3 - Notes on general repair work on vehicles fitted with auxiliary/additional heater

3.1 - Notes on general repair work on vehicles fitted with auxiliary/additional heater

- ◆ Disconnect negative and positive terminals of batteries (first and second battery) before starting electric welding work on vehicle.
- ◆ If wire to positive terminal of second battery -A1 is disconnected, it should be isolated to prevent short circuit.
- ◆ If coolant has been drained, bleed auxiliary/additional heater after filling cooling system (=>Page 149).
- ◆ If parts of fuel system have been removed or replaced, make sure that all components used for diverting fuel to auxiliary/additional heater are properly installed.
- ◆ If main battery -A is replaced on vehicles with auxiliary/additional heater (heater type "Z/C") with no second battery -A1, perform auxiliary heater self-diagnosis and - in the case of code "00XX1" - re-adapt battery characteristic curve using "Basic setting" function (=>Page 22).
- ◆ Depending on last operating status and coolant temperature in auxiliary/additional heater, no-load current input of auxiliary/additional heater may be up to max. 60 mA for a period of up to 5 hours following switch-



off. During this time, the degree of cooling of the coolant for the period following switch-off is calculated by the heater control unit -J162. At the latest 5 hours after switch-off, the no-load current input of the heater control unit -J162 is less than 2 mA.

- ◆ After performing repairs in area of fuel pipe to auxiliary/additional heater:
 - Check that fuel pipes are flush with bottom of vehicle and protected against mechanical damage.
 - Check that fuel pipe to auxiliary/additional heater is protected against heat generation which could affect operation.
 - Check that fuel pipe is not in contact with vehicle components which become warm.

4 - Rules for cleanliness when working on auxiliary/additional heater and fuel system

4.1 - Rules for cleanliness when working on auxiliary/additional heater and fuel system

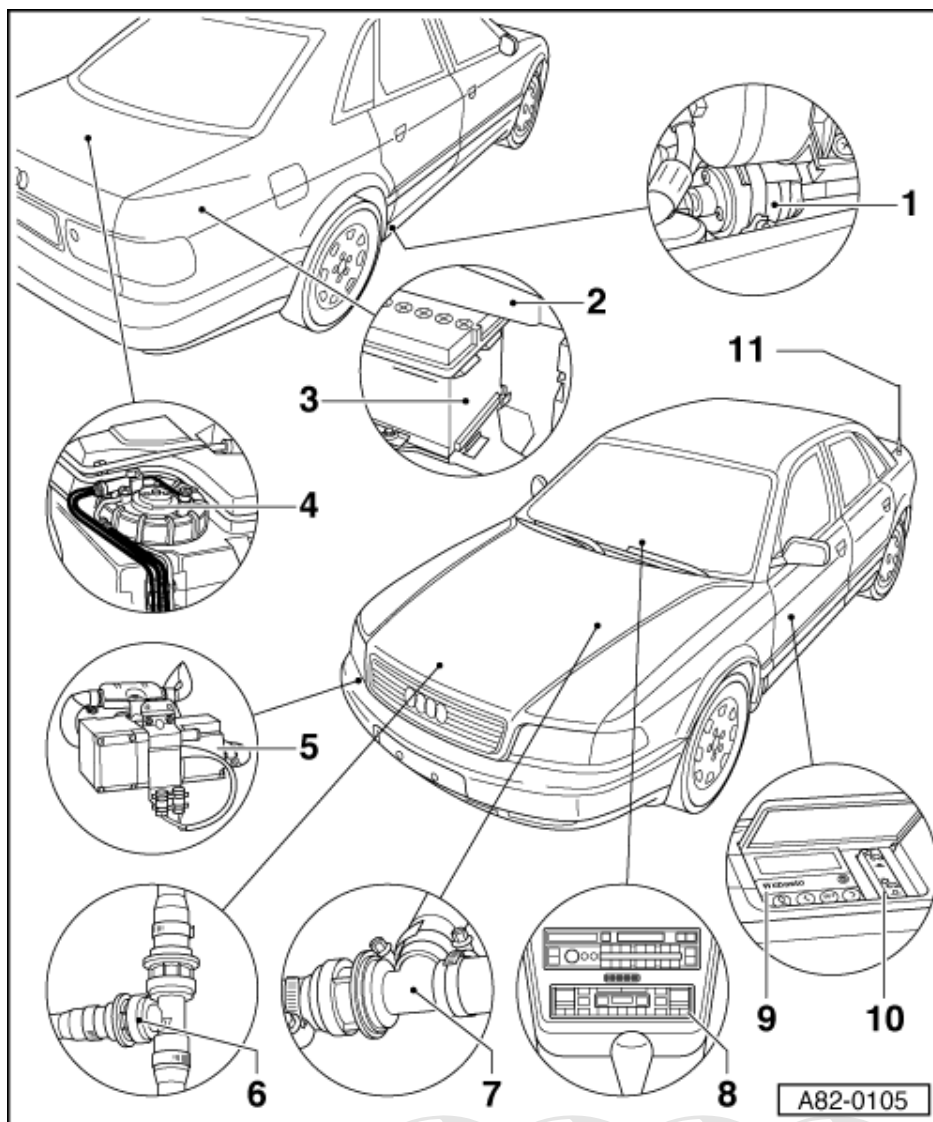
- ◆ Carefully clean all joints and adjacent areas before disconnecting.
- ◆ Set down parts removed on a clean surface (use sheeting or paper, not fluffy cloths) and cover over.
- ◆ Carefully cover or seal opened components if repairs are not to be performed immediately.
- ◆ Only install clean components:
 - Do not remove replacement parts from wrapping until immediately prior to installation.
 - Do not use parts that have been stored loose (e.g. in tool boxes).
- ◆ When fuel system is open:
 - Do not work with compressed air.
 - Do not move vehicle.
 - Do not start engine.
 - Do not switch on auxiliary/additional heater.



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5 - Layout of components for auxiliary/additional heater in vehicle

5.1 - Layout of components for auxiliary/additional heater in vehicle



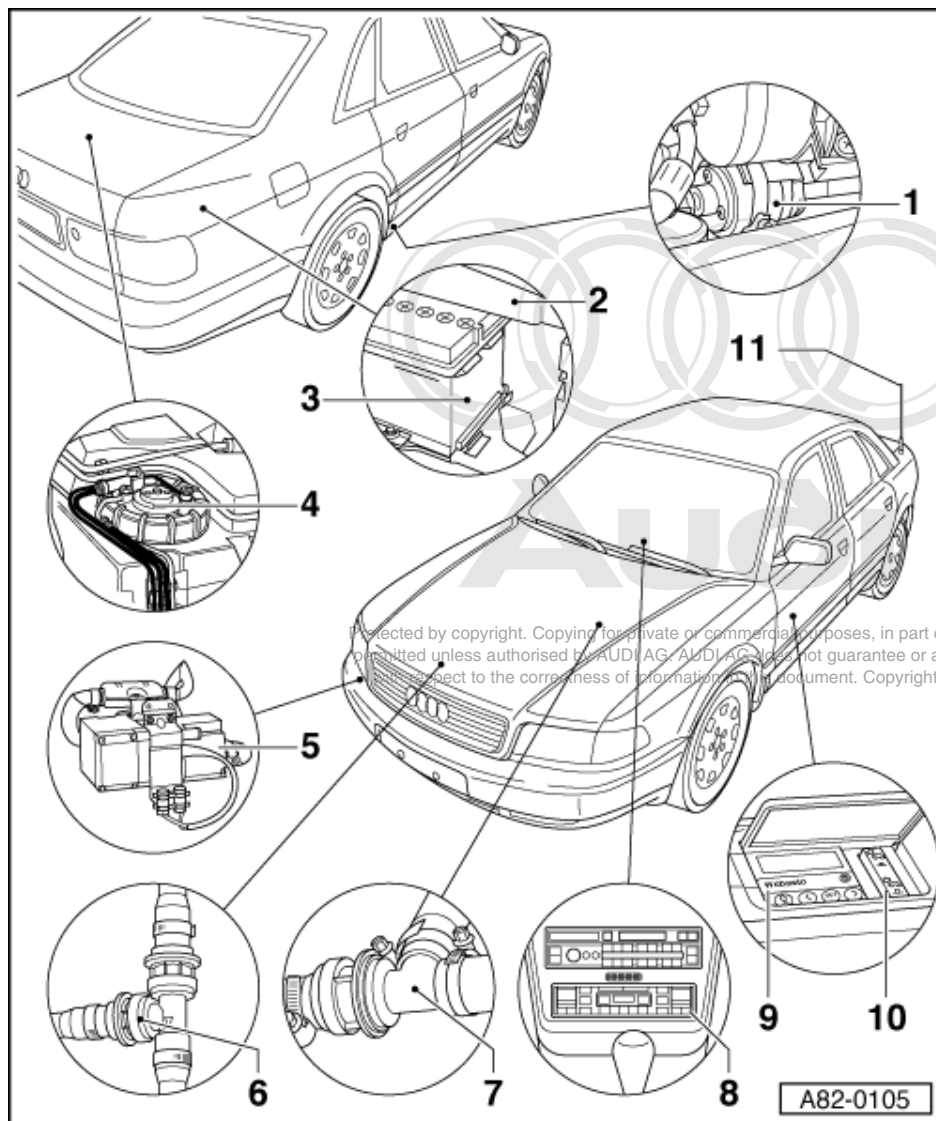
Notes:

- ♦ Fitting locations of various relays and fuses for auxiliary/additional heater
 => Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder
- ♦ Auxiliary/additional heater self-diagnosis can be implemented for type "Z/C" heaters =>Page 1 .

1 Metering pump -V54

- ♦ Removing and installing=>Page 122
- ♦ Diverting fuel for auxiliary/additional heater =>Page 115
- ♦ Checking fuel delivery =>Page 118

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- ♦ Checking actuation
- Heater type "S" =>Page 204
- Heater type "Z/C" =>Page 18

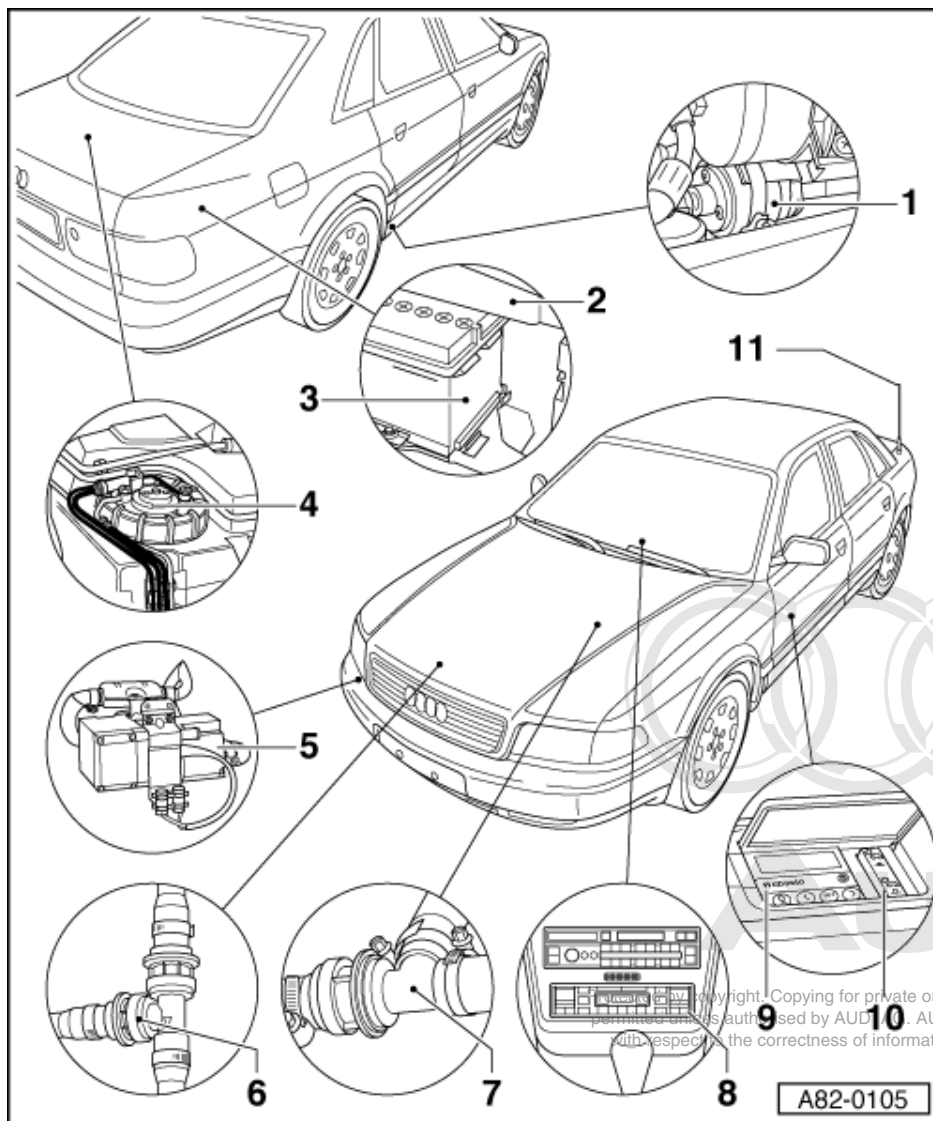
2 Relay and fuse carrier

- ♦ Relay position and fuse assignment as well as other fitting locations of electrical control components in auxiliary/additional heating and auxiliary ventilation mode

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

3 Second battery -A1

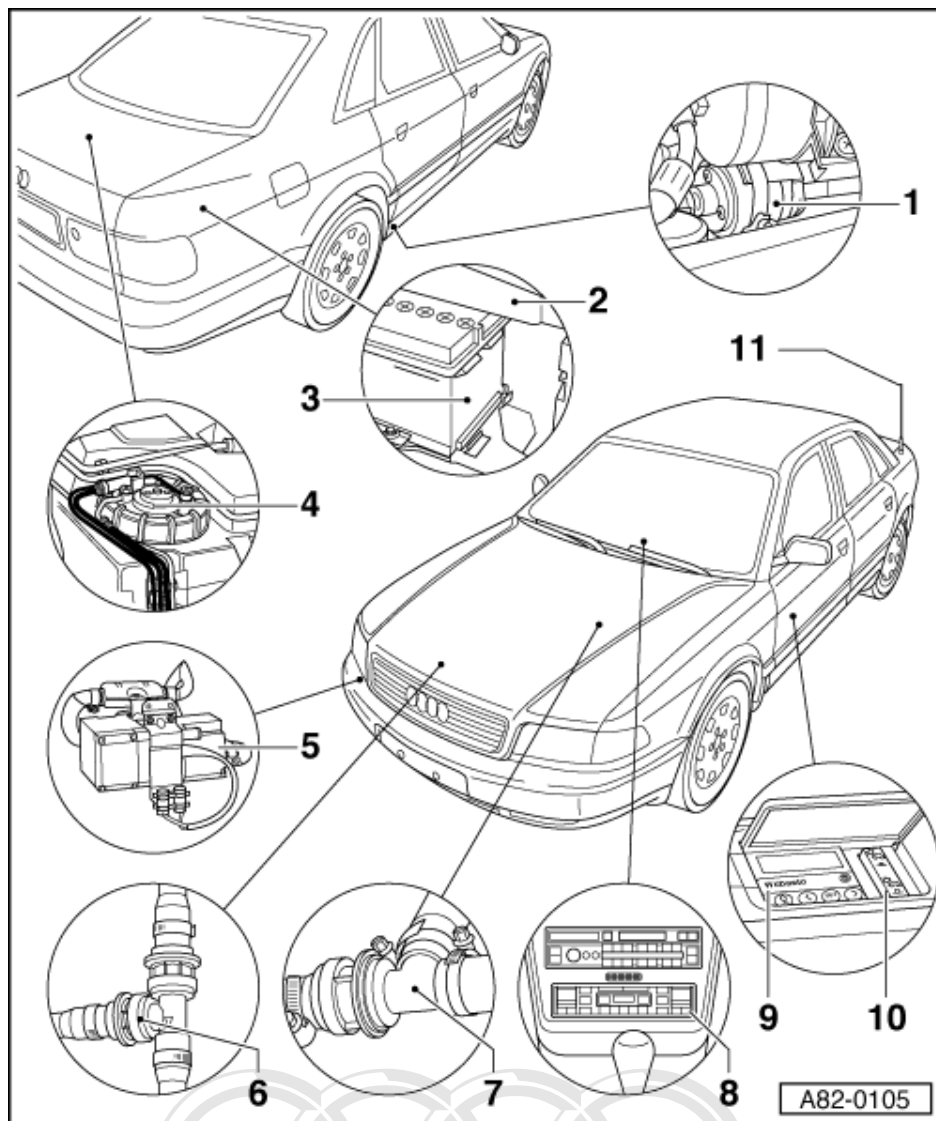
- ♦ Gradually discontinued as of 08.97 (following conversion to auxiliary/additional heaters of type "Z/C")
- ♦ Remove fuse -S65 before disconnecting positive terminal of second battery
- ♦ Insulate positive terminal following disconnection to prevent short circuit
- ♦ Make sure battery breather hose is not kinked



- ♦ Auxiliary heater is switched off by control unit -J162 if battery voltage drops below 10 V in auxiliary heating mode (type "S" heaters)
- ♦ If battery voltage drops below value stored in heater control unit -J162 during auxiliary/additional heating mode, auxiliary heater is switched off by control unit -J162 (type "Z/C" heaters)

4 Housing for fuel pump and fuel gauge

- ♦ With connection for diverting fuel for auxiliary/additional heater
- ♦ Routing of fuel diversion pipe in fuel tank =>Page 118
- ♦ Diverting fuel for auxiliary/additional heater =>Page 115

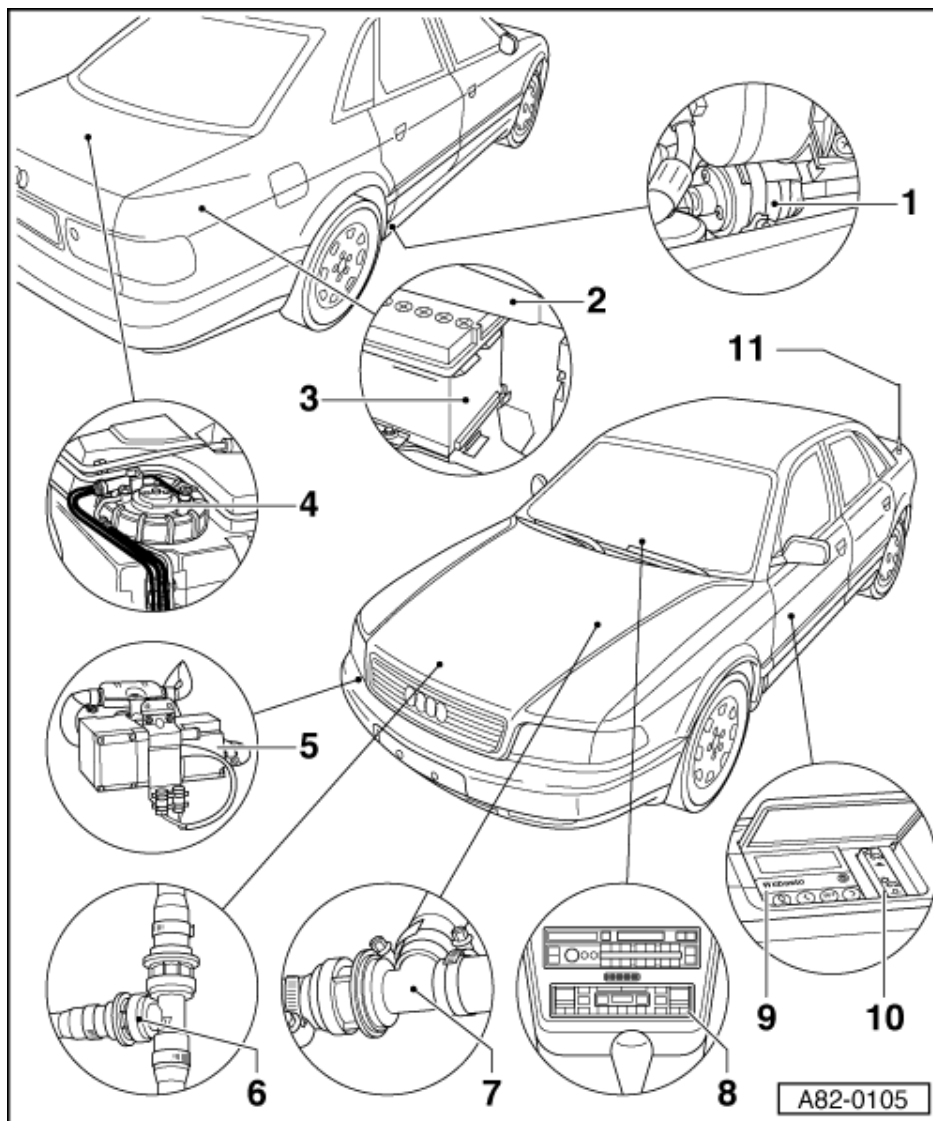


5 Auxiliary/additional heater

Note:

Conversion from heater type "S" to type "Z/C" was implemented gradually as of 04.97. Additional heater is a type "Z/C-D" heater with no recirculating pump -V55.

- ♦ Removing and installing
=>Page 150
- ♦ Incorporation into coolant circuit
=>Page 135
- ♦ Dismantling and assembling (heater type "S") =>Page 154
- ♦ Dismantling and assembling (heater type "Z/C") =>Page 163
- ♦ Checking electrical components of auxiliary heater (heater type "S")
=>Page 205
- ♦ Block diagram of auxiliary heater (heater type "S") =>Page 183



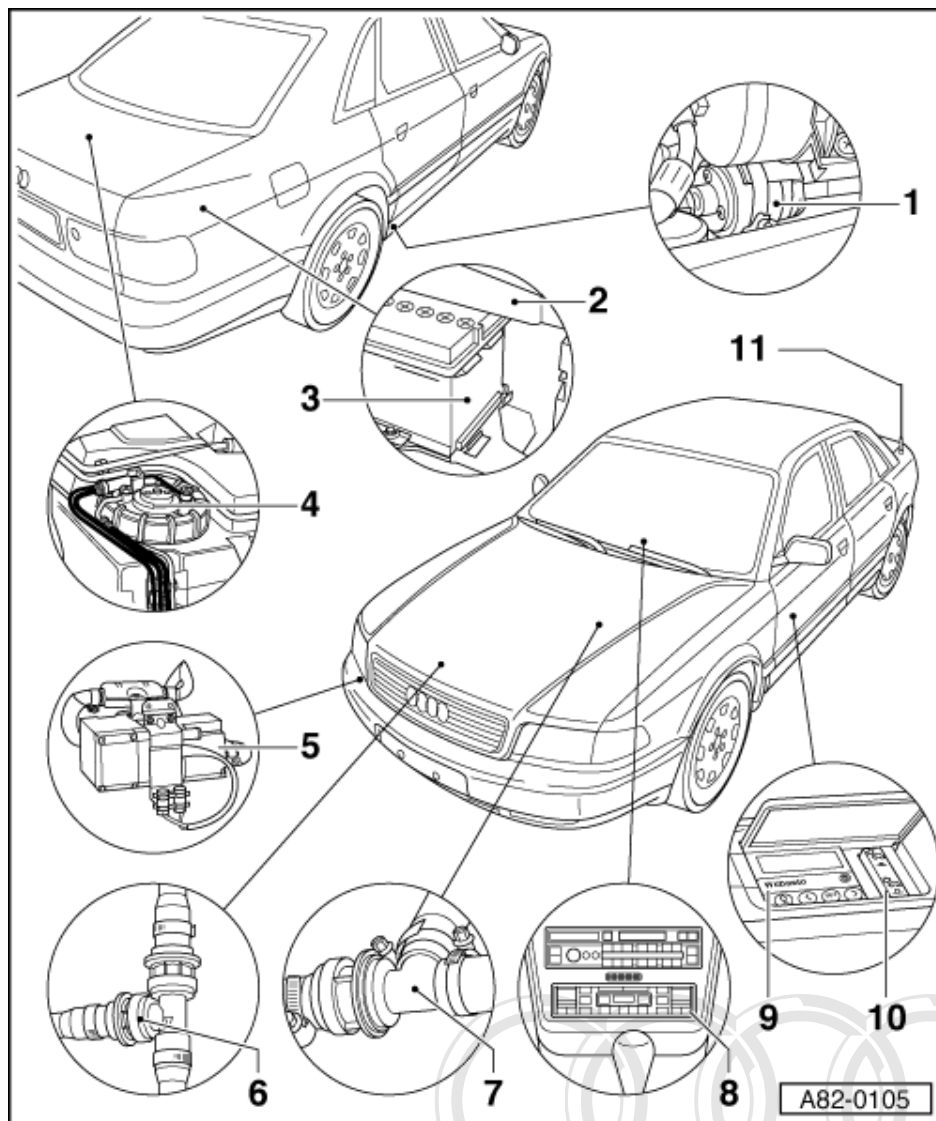
- ♦ Checking electrical components of auxiliary/additional heater (heater type "Z/C") =>Page 49
- ♦ Block diagram of auxiliary/additional heater (heater type "Z/C") =>Page 185

Note:

The auxiliary/additional heater is fitted with the following electrical components:

- Heater control unit -J162
- Combustion air blower -V6
- Recirculating pump -V55 (auxiliary heater only)
- Glow plug -Q6 (heater type "S")

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- Flame monitor -G64 (heater type "S")
- Glow plug with flame monitor -Q8 (heater type "Z/C")

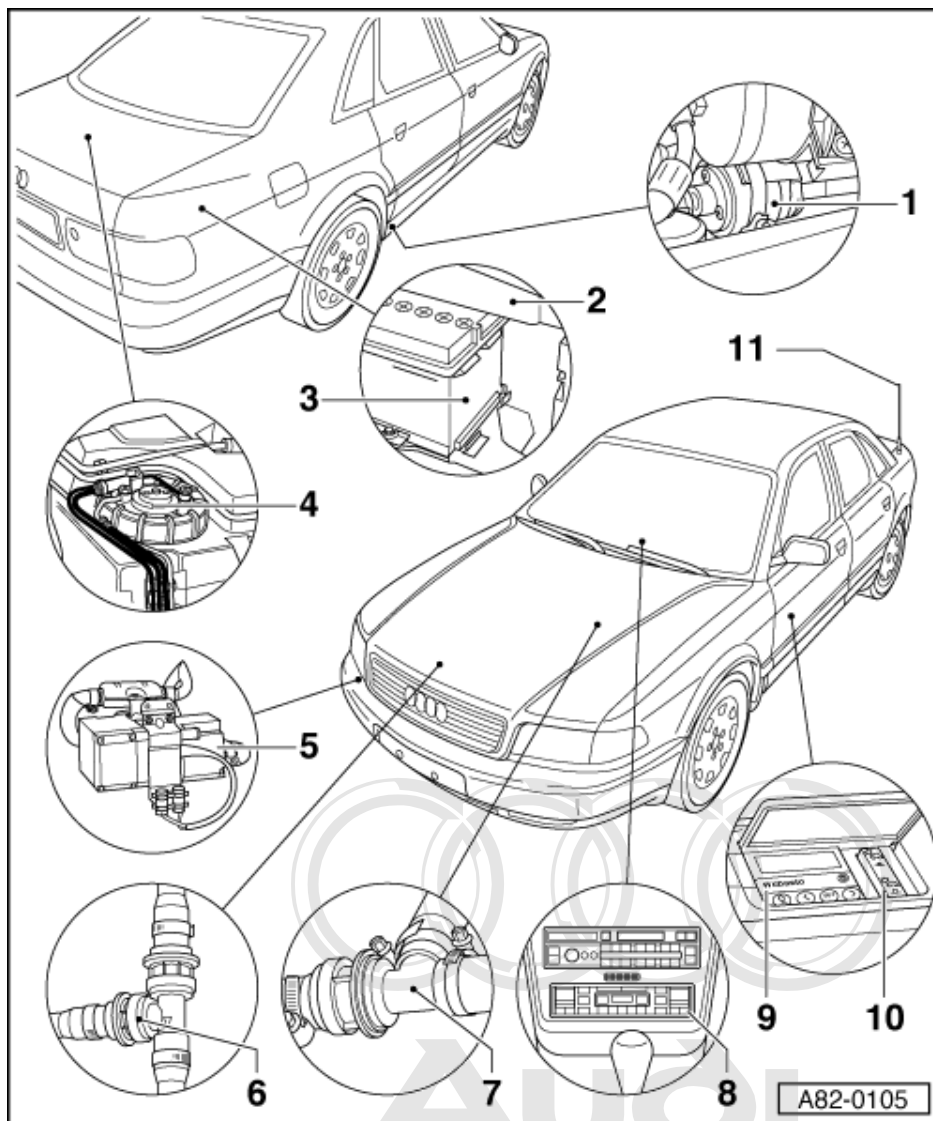
6 Coolant non-return valve

- ◆ Only fitted on vehicles with 6-cyl. petrol engine and "small" coolant circuit
- ◆ Controls direction of coolant flow in auxiliary heating mode
- ◆ Incorporation into coolant circuit
=>Page 144

7 Coolant non-return valve

- ◆ Controls direction of coolant flow in auxiliary heating mode
- ◆ Only fitted on vehicles with 6 or 8-cyl. petrol engine

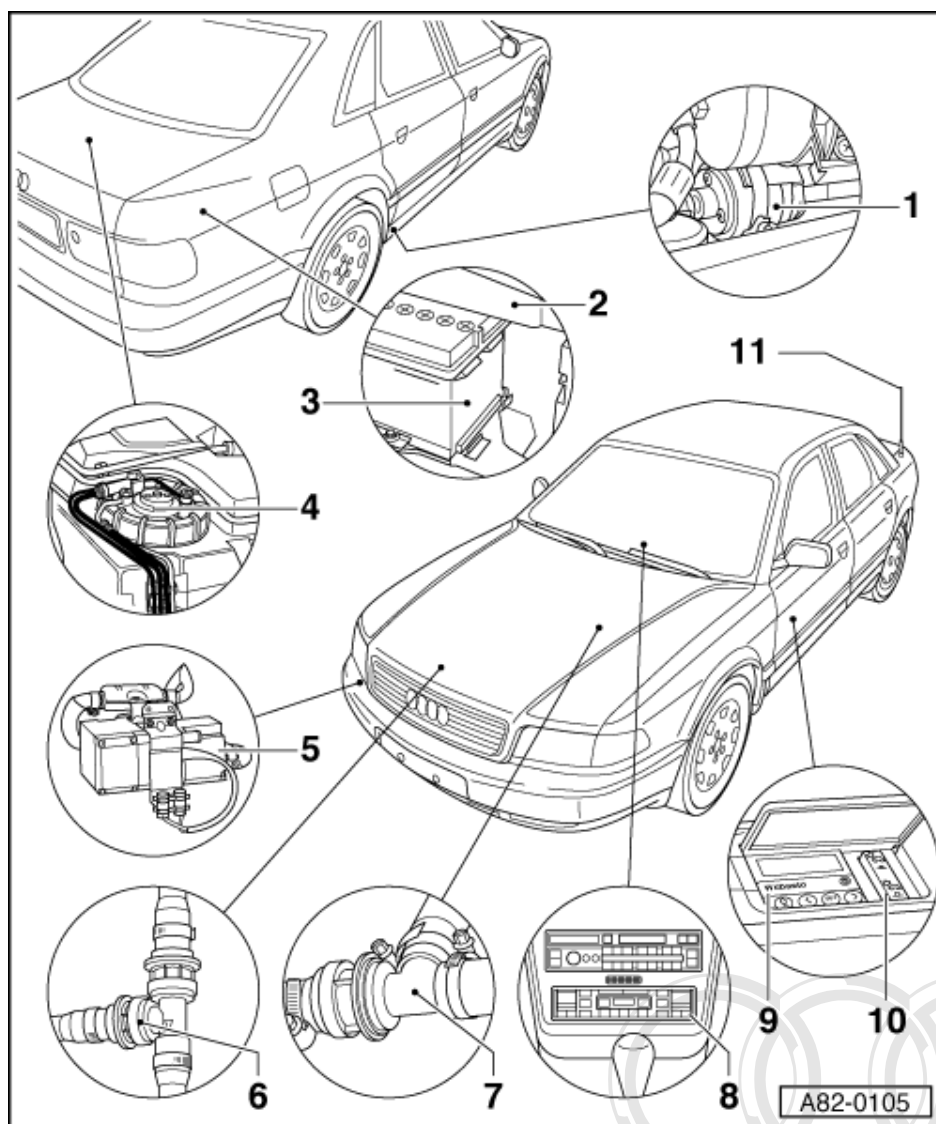
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- ◆ Incorporation into coolant circuit:
- 8-cyl. engine => Page 135
- 6-cyl. petrol engine (with "large" coolant circuit) => Page 142
- 6-cyl. petrol engine (with "small" coolant circuit) => Page 144

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

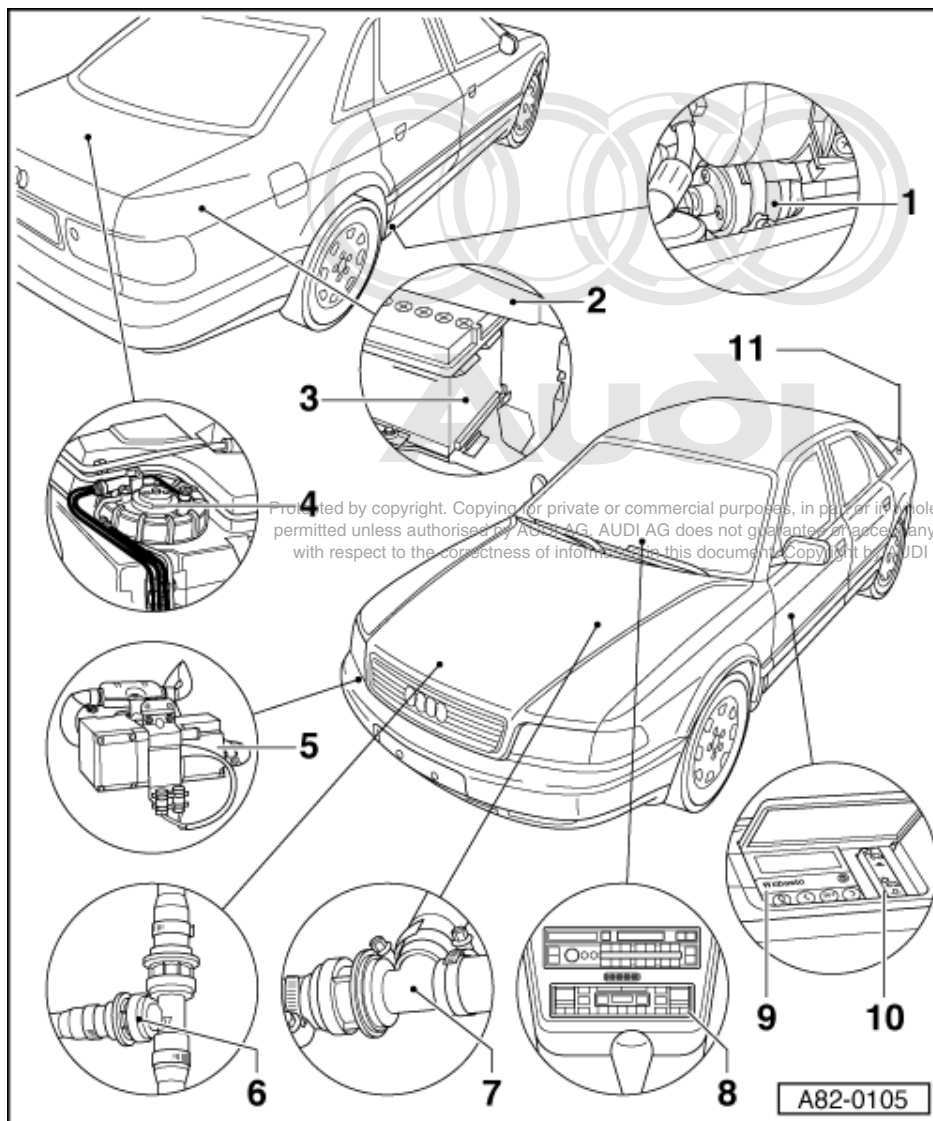
- ◆ Regulates fresh-air blower speed and air distribution
- ◆ Started up by heater control unit -J162
- ◆ Vehicles with diesel engine are only to be fitted with operating and display unit for air conditioner/Climatronic -E87 with part number as of index "E"

**9 Pre-selection clock -E111**

- ◆ Removing and installing=>Page 112
- ◆ Controls and display panel
=>Page 93
- ◆ Only fitted on vehicles with auxiliary/additional heater

Notes:

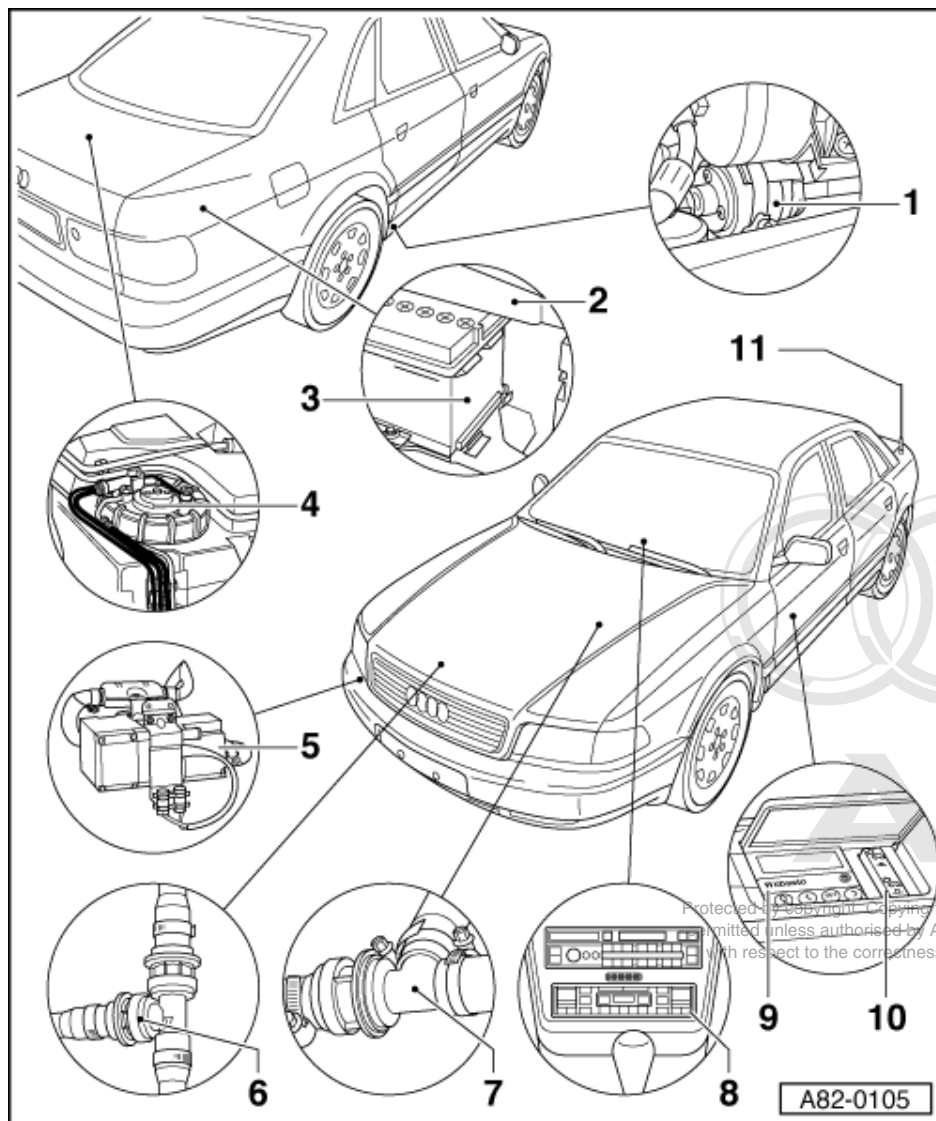
- ◆ Different pre-selection clock versions (60 or 30 min. heating time)
- ◆ Various modifications to the vehicle as a whole were gradually introduced in Model Year 1999 for the Audi A8. Introduction of a modified dash panel insert resulted in the following:
 - Discontinuation of pre-selection clock -E111 and heater/heat output switch -E16



- Auxiliary heating/auxiliary ventilation is now set by way of a rotary knob/pushbutton in the centre console. Settings made are indicated on driver information system display in dash panel insert.

10 Heater/heat output switch -E16

- ♦ Removing and installing=>Page 113
- ♦ Operation =>Page 95
- ♦ Only fitted on vehicles with auxiliary/additional heater and pre-selection clock -E111

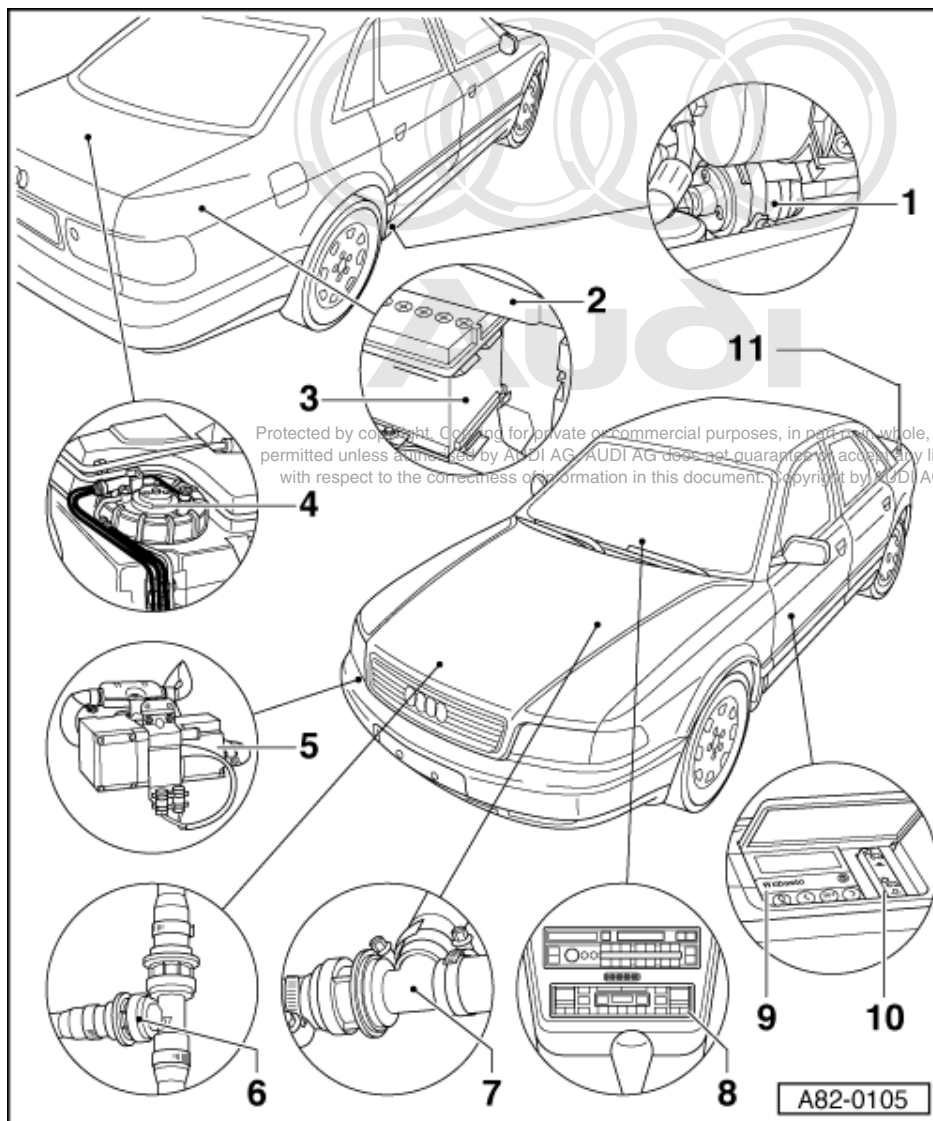


11 Radio/telephone/auxiliary heater aerial -R51

- ◆ Only applies to vehicles with remote control for auxiliary/additional heater
- ◆ Remote control is available as standard or as optional extra for heaters of type "Z/C"
- ◆ Aerial filter has 3 outputs (for telephone, radio and auxiliary heater)

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

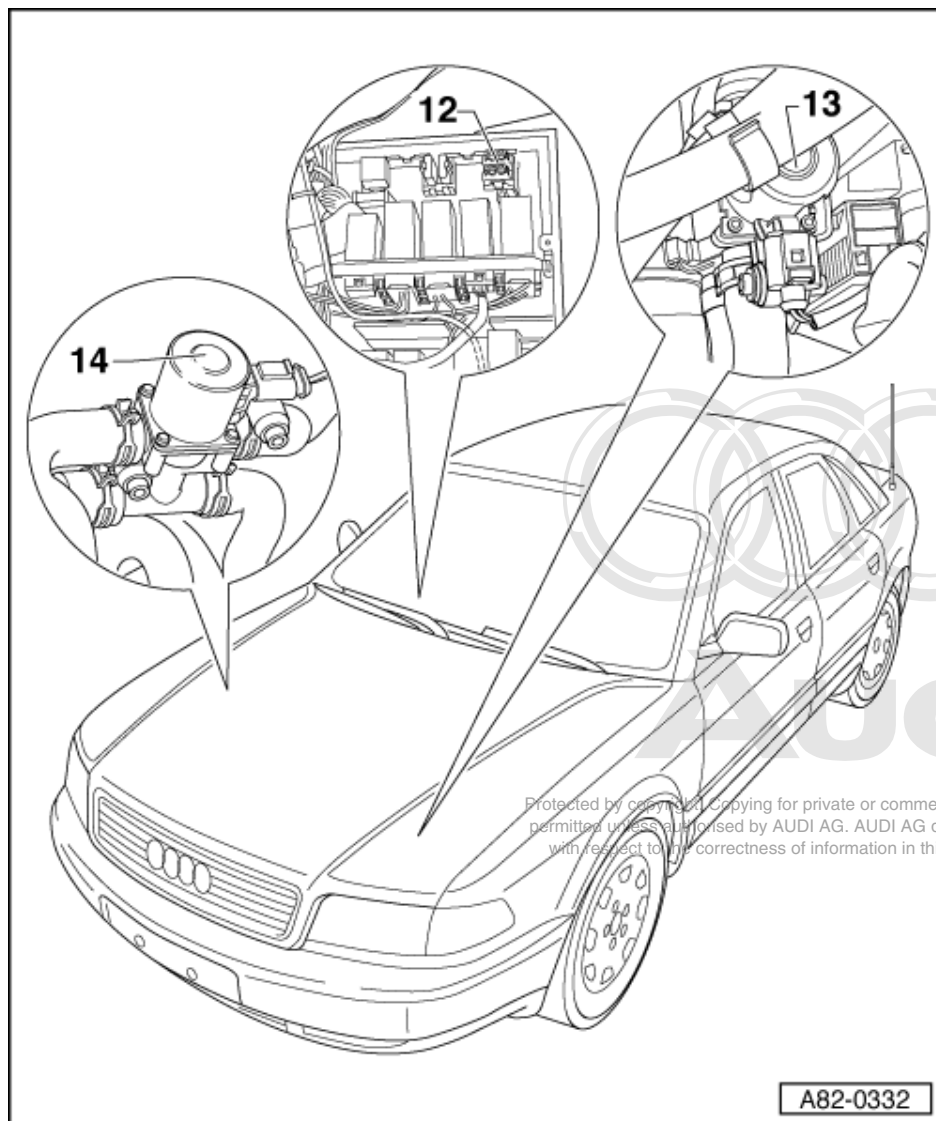
- ◆ Auxiliary heating radio wave receiver -R64
- Switches auxiliary heater on and off when appropriate signals are received (vehicles with pre-selection clock -E111)
- On reception of signals, emits cut-in signal to dash panel insert which switches auxiliary heating/auxiliary ventilation on and off (vehicles with no pre-selection clock -E111)



- R64 emits cut-in signal to auxiliary heater/dash panel insert; cut-in time is governed by time module contained in radio signal =>Page 104
- There are 2 remote control versions (max. operating time 30 or 60 min)
=>Page 104
- Encoding remote control receiver for corresponding remote control unit
=>Page 95

Notes:

- ◆ On vehicles with pre-selection clock -E111, auxiliary heater is switched on via remote control receiver.
- ◆ On vehicles with no pre-selection clock
-E111, cut-in signal is transmitted from remote control receiver to dash panel insert, which switches auxiliary heating/auxiliary ventilation on and off again on completion of operating time set in dash panel insert.



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12 Electronics box on left in passenger's footwell

- ♦ For fitting location of coolant shut-off valve relay -J541 and relay position assignment, refer to

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

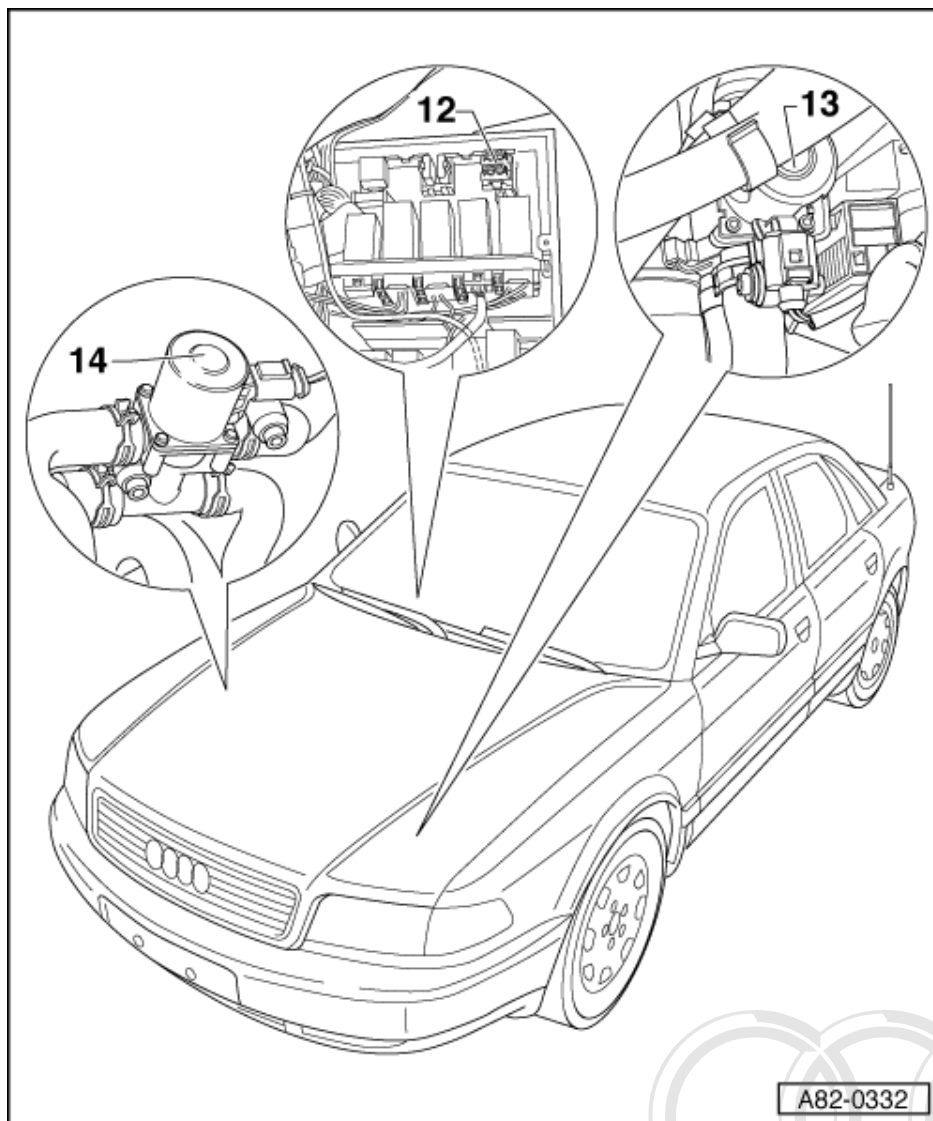
- ♦ Operation of relay -J541
=>Page 69

Note:

Relay -J541 is only fitted on vehicles with coolant shut-off valve -N279.

13 Coolant shut-off valve -N279

- ♦ Fitting location on vehicles with 8-cyl. 5-valve petrol engine
- ♦ Removing and installing=>Page 92

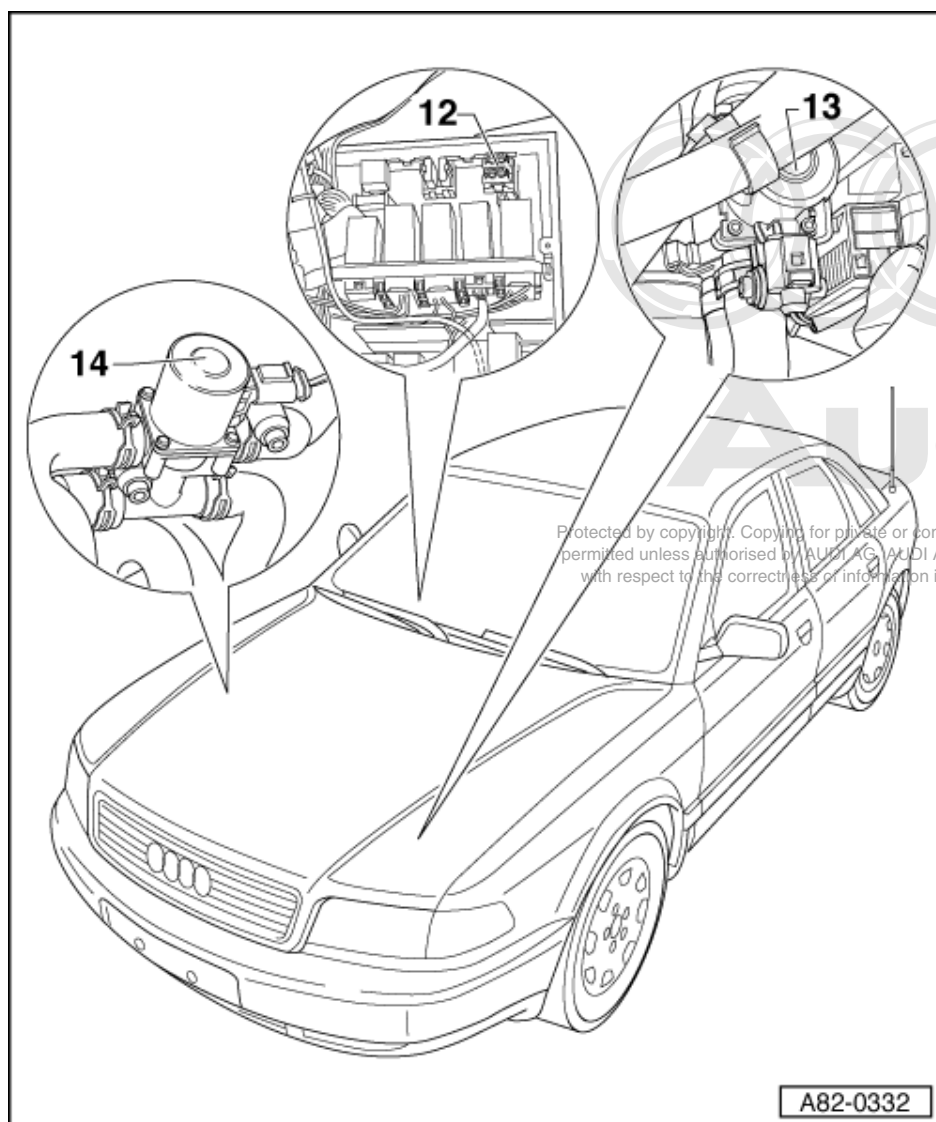


Notes:

- ◆ Shut-off valve can be retrofitted on vehicles with 8-cyl. 4-valve petrol engine =>Page 220 .
- ◆ Shut-off valve can be retrofitted on vehicles with 8-cyl. 5-valve petrol engine manufactured up to January 2001 (with no shut-off valve) =>Page 243 .
- ◆ Installation is not intended for vehicles with 6-cyl. engine or 8-cyl. diesel engine.
- ◆ Coolant shut-off valve -N279 is actuated by coolant shut-off valve relay -J541 =>Page 69 .

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

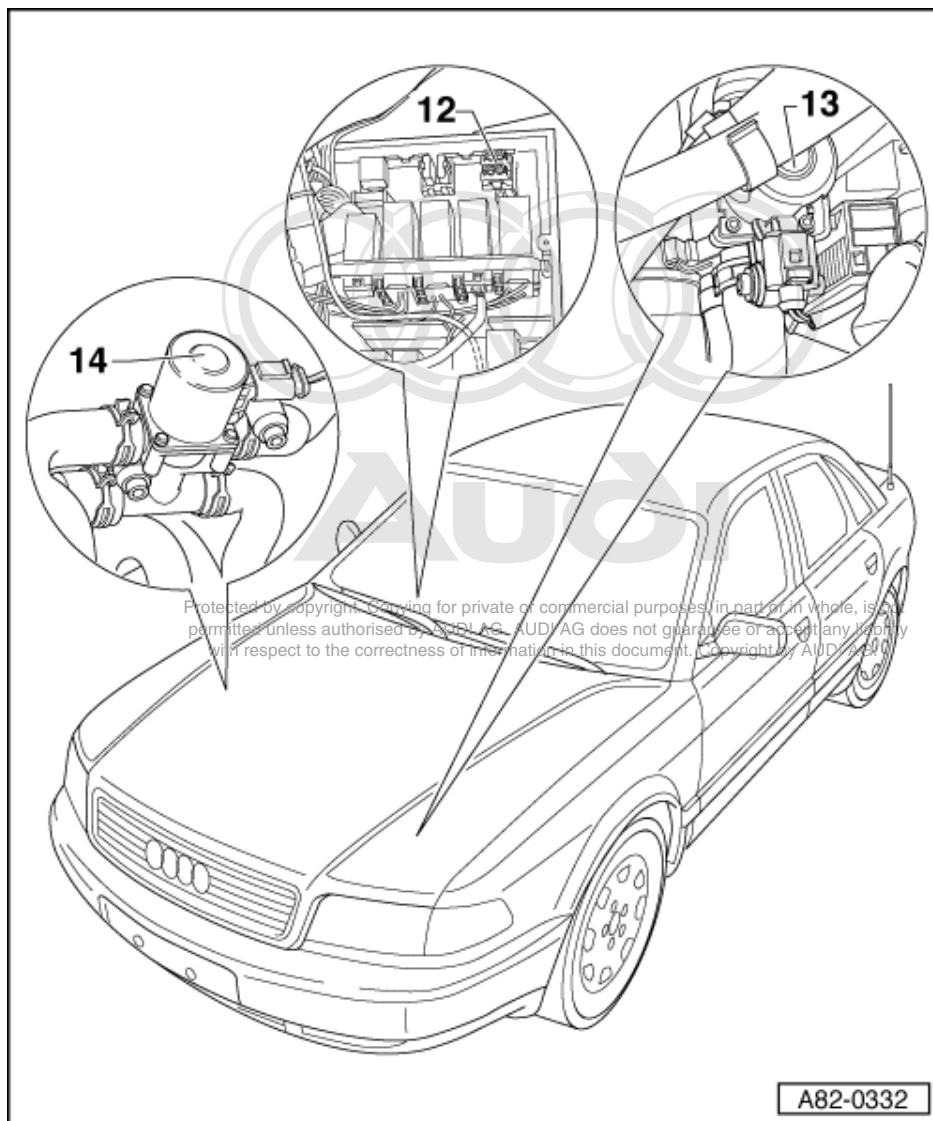
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- ♦ As of January 2001, coolant circuit is gradually being converted on vehicles with 8-cyl. petrol engine. Following introduction of modified coolant circuit, auxiliary heater coolant is no longer drawn in via engine in auxiliary heating mode, but rather directly from pump/valve unit via shut-off valve -N279 (small circuit).
- ♦ As of October 2000, vehicle electrical system has gradually been converted on vehicles with 8-cyl. petrol engine. Following introduction of modified wiring harness, these vehicles are provided with the pre-fitted electrical system components required for installation of a small coolant circuit (installation of coolant shut-off valve -N279).

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



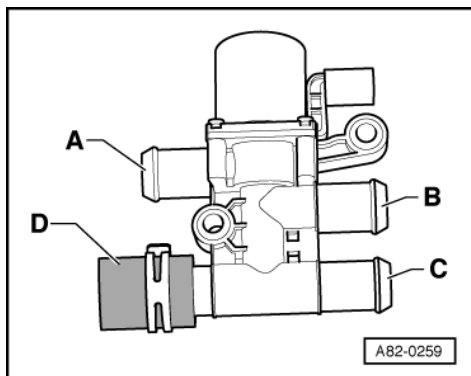
14 Coolant shut-off valve -N279

- ◆ Fitting location on vehicles with 12-cyl. engine
- ◆ Removing and installing=>Page 92
- ◆ Coolant shut-off valve -N279 is actuated by coolant shut-off valve relay -J541 =>Page 69

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



5.2 - Removing and installing coolant shut-off valve -N279



Notes:

- -> If voltage is not applied to coolant shut-off valve -N279 (large coolant circuit), coolant can flow from connection -B- (from pump/valve unit) to connection -A- (to engine).
- If voltage is applied to coolant shut-off valve -N279 (small coolant circuit), coolant can flow from connection -B- (from pump/valve unit) to connection -C- (to auxiliary heater).
- If coolant shut-off valve is replaced, coolant hoses may also have to be replaced due to different connection diameters depending on manufacturer (Bosch or Woco). Only Woco shut-off valves are available as replacement parts.
- Connection -D- (or -C-) is sealed with a plug (depending on installation position).
- Depending on design of -N279, connections of shut-off valve are marked with numbers and arrows ("1" = -A-, "2" = -C-, "3" = -B- and "4" = -D-).

- Fitting location on vehicles with 8-cyl. 4-valve petrol engine (retrofitted) =>Page 220

- Coolant shut-off valve -N279 is actuated by relay J541 in auxiliary heating mode=>Page 69

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Special tools, testers and other items required

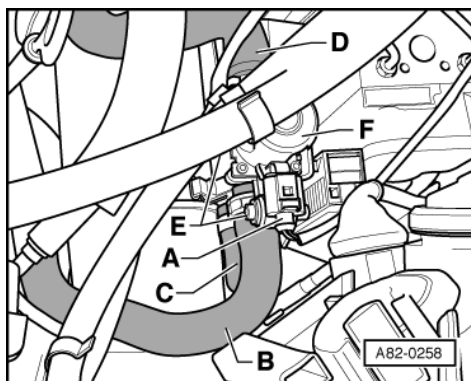
- Hose clamps 3093/3094

Removing

Notes:

- On removal, note down bolt lengths and assignment for re-installation.
 - All cable ties and other wiring harness fasteners released or cut open on removal are to be re-attached in same position on installation.
- Switch off ignition.
 - Dissipate pressure in coolant circuit by opening cap at coolant expansion tank.

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19



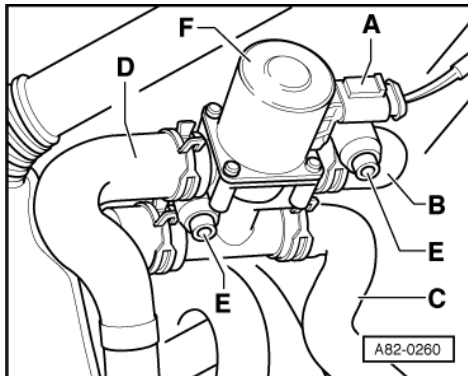
Removal on vehicles with 8-cyl. petrol engine

- -> Unplug connector -A-.
- Mark positions of coolant hoses -B-, -C- and -D-.
- Pinch off coolant hoses to coolant shut-off valve -N279 (e.g. using V.A.G 3094) and detach hoses.
- Remove bolts -E-.
- Remove shut-off valve -F-.

Removal on vehicles with 12-cyl. engine

- Remove air cleaner assembly.

=> Relevant Engine, Mechanics Workshop Manual



- Remove front right wheel housing liner.

=> General Body Repairs; Repair Group 63

- -> Unplug connector -A-.
- Mark positions of coolant hoses -B-, -C- and -D-.
- Pinch off coolant hoses to coolant shut-off valve -N279 (e.g. using V.A.G 3094) and detach hoses.
- Remove bolts -E-.
- Remove shut-off valve -F-.

Installing

- Re-install components removed in reverse order.
- Bleed coolant circuit =>Page 149 and

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19

- If necessary, check operation of shut-off valve =>Page 69 .

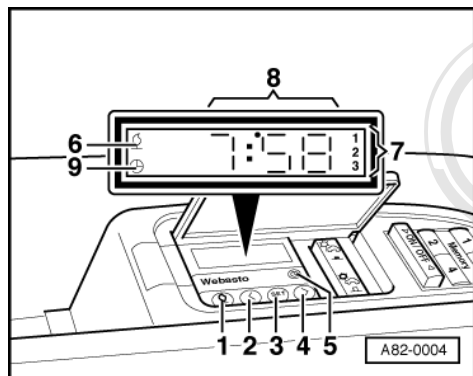
5.3 - Display panel and controls of pre-selection clock -E111

Notes:

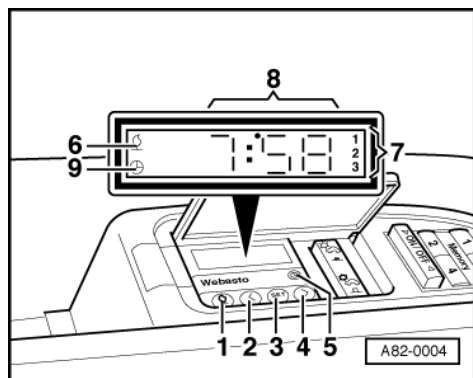
- ◆ Various modifications to the vehicle as a whole were gradually introduced in Model Year 1999 for the Audi A8. Introduction of a modified dash panel insert resulted in the following:
 - Discontinuation of pre-selection clock -E111 and heater/heat output switch -E16
 - Auxiliary heating/auxiliary ventilation is now set by way of a rotary knob/pushbutton in the centre console. Settings made are indicated on driver information system display in dash panel insert.
- ◆ Only fitted on vehicles with auxiliary/additional heater (discontinued in Model Year 1999 following modification of dash panel insert)



- ♦ Operation of pre-selection clock is described in detail in the owner's manual.
- ♦ Illumination of pre-selection clock display goes out within approx. 10 s after releasing adjustment buttons but remains switched on if cut-in time is active.

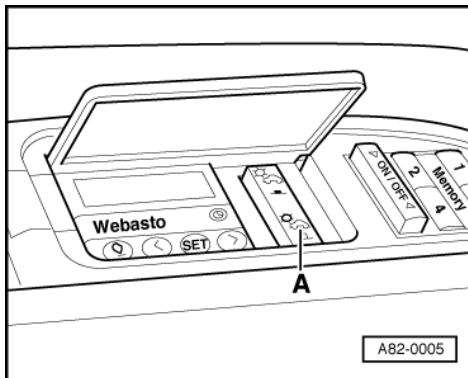


- ♦ Maximum operating time of auxiliary heater is 60 min. for heater type "S" and 30 min. for heater type "Z/C" (60 min. on vehicles with second battery -A1). Operating time is limited by pre-selection clock (on vehicles with remote control => Page 104).
- ♦ -> If "STOP" and "SET" are alternately displayed on panel -8-, check for "short to earth" in wiring between pre-selection clock and auxiliary/additional heater.



- -> Button -1- for switching auxiliary heating/auxiliary ventilation on and off
- Button -2- for downward time setting
- SET button -3- (program selection button) for setting and activating the various cut-in times
- Button -4- for upward time setting
- Button -5- for time display
- Indicator -6- for display of auxiliary heating and auxiliary ventilation mode
- Display -7- for program numbers
 - Three cut-in times can be programmed and activated one at a time.
- Display panel -8- for current time or activated cut-in time
- Symbol -9- for time

5.4 - Operation of heater/heat output switch -E16



Note:

Only fitted on vehicles with auxiliary/additional heater and pre-selection clock -E111

- -> Button -A- not pressed (switch open) = auxiliary heating mode
- Button -A- pressed = auxiliary ventilation mode

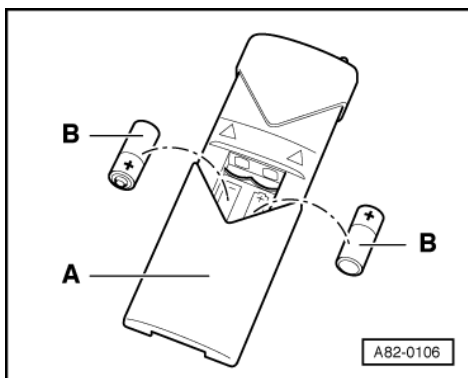
5.5 - Encoding remote control receiver for corresponding remote control unit

Note:

Only intended for vehicles with auxiliary/additional heater (heater type "Z/C") as standard or as optional extra

Requirements

- ◆ Auxiliary/additional heater off



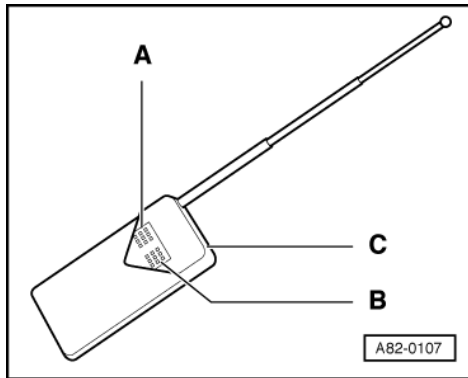
- ◆ Battery -A (and -A1) adequately charged
- ◆ -> Batteries -B- in remote control unit OK and correctly fitted
- ◆ Radio/telephone/auxiliary heater aerial -R51 (on vehicle) OK and correctly installed

Encoding

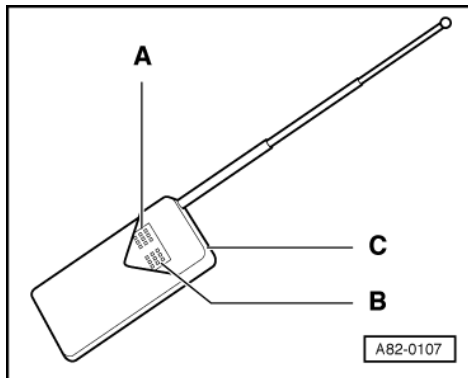
Notes:

- ◆ At close range (less than 3m from vehicle aerial), remote control unit aerial does not have to be extended.

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- ◆ Keep remote control vertical whilst pressing buttons.
 - ◆ Times given must be heeded exactly for encoding purposes. Encoding will not be successful if time is too long or too short and the entire procedure must then be repeated.
 - ◆ -> Each time button (-A- and -B-) is pressed, lamp in remote control -C- lights 3 times.
- Remove fuse for auxiliary heating radio wave receiver -R64 (interrupt power supply to -R64).



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

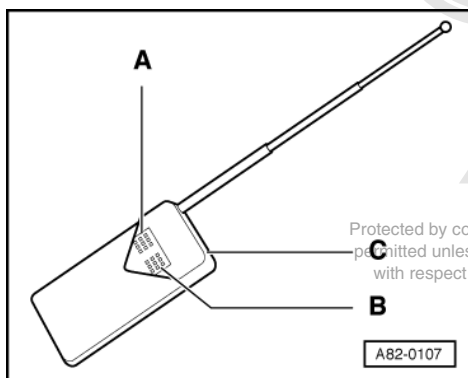
- Wait at least 10 seconds.
- -> Insert fuse and, within 3 s, press "OFF" button -B- on remote control for 1 s.

Lamp -C- on remote control starts to flash (3 times).

- Wait at least 3 s (max. 8 s).
- Press "START" button -A- on remote control for 1 s.

Lamp -C- on remote control starts to flash (initially 3 times).

- Wait at least 3 s (max. 8 s).
- Press "OFF" button -B- on remote control for 1 s.



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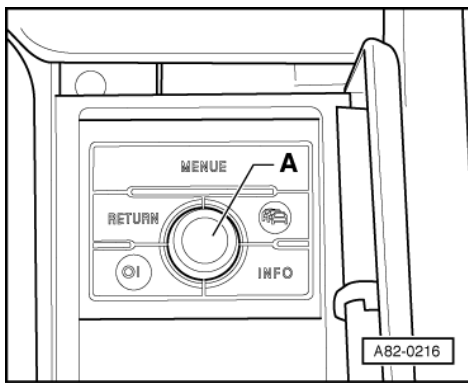
-> Lamp -C- on remote control flashes 3 times. This concludes remote control assignment process.

Notes:

- ◆ Encode second remote control unit in same manner if applicable.
- ◆ A maximum of 2 remote control units can be assigned to one auxiliary heating radio wave receiver -R64.
- ◆ If more than 2 remote control units are assigned to one auxiliary heating radio wave receiver -R64, the first one to be encoded is erased.
- ◆ If lamp -C- does not flash after pressing button -A- or -B-, check charge of batteries.
- Set time on pre-selection clock -E111 (if fitted).
- Use remote control to switch auxiliary heating/auxiliary ventilation on and off (functional test).

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5.6 - Switching auxiliary heating/auxiliary ventilation on and off via dash panel insert

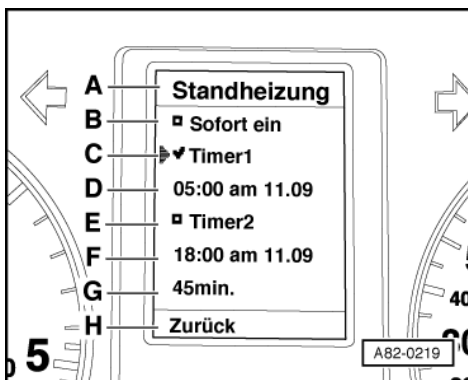


Notes:

- ◆ Various modifications to the vehicle as a whole were gradually introduced in Model Year 1999 for the Audi A8. Introduction of a modified dash panel insert resulted in the following:

=> Parts List

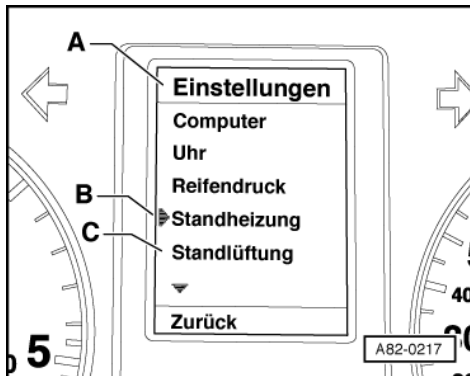
- Discontinuation of pre-selection clock -E111 and heater/heat output switch -E16
- -> Auxiliary heating/auxiliary ventilation is now set by way of a rotary knob/pushbutton -A- in the centre console.



- -> Settings made are indicated on driver information system display in dash panel insert.
- Dash panel insert is actuated by auxiliary heating radio wave receiver -R64. Dash panel insert then switches on auxiliary heating or auxiliary ventilation in line with last setting made.



- ♦ Fuel gauge sender is interrogated before dash panel insert switches on auxiliary heater. If there is not enough fuel in the tank (fuel gauge in "red zone"), auxiliary heater is not switched on (tick cannot be set in front of "Heating on" or it switches back automatically to a box).



- ♦ -> "Auxiliary heating" -B- and "Auxiliary ventilation" -C- must be entered in dash panel insert by way of adaption function.

=> Electrical System; Repair Group 01

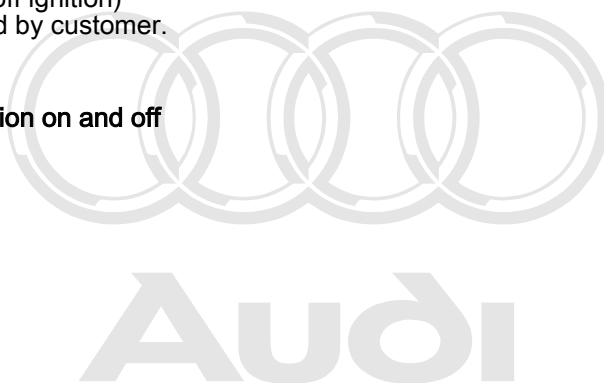
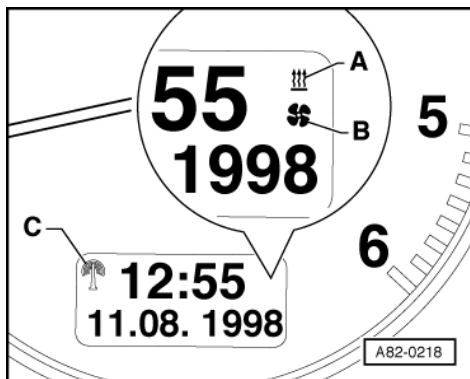
- Start dash panel insert self-diagnosis (address word "17").
- Enter "10" for adaption function.
- Select channel "18".
- Activate display for the various auxiliary heater functions.
 - Display "0" (corresponds to entry "00000")
= No auxiliary/additional heater fitted
 - Display "1" (corresponds to entry "00001")
= Auxiliary/additional heater fitted
Auxiliary heating/auxiliary ventilation switched off automatically on completion of set operating time (as-delivered setting for vehicle)
 - Display "2" (corresponds to entry "00002", "00010" must be entered for certain vehicles)
= This setting is not permissible for Model Year 1999 vehicles
Explanation:
As ignition has to be switched on to activate "Immediate on" auxiliary heating/auxiliary ventilation function, activation of auxiliary heating/auxiliary ventilation is cancelled again on switching off ignition with this dash panel insert version. A modified dash panel insert was fitted as of Model Year 2000.

=> Electrical System; Repair Group 01

- Display "2" (corresponds to entry "00002", "00010" must be entered for certain vehicles)
Permissible for vehicles as of Model Year 2000
= Auxiliary/additional heater fitted
Auxiliary heating/auxiliary ventilation switched off automatically on completion of set operating time or after switching off engine (switching off ignition)
This setting can be made if requested by customer.

=> Electrical System; Repair Group 01

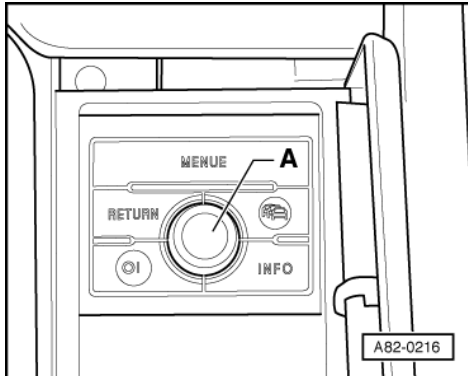
Switching auxiliary heating/auxiliary ventilation on and off



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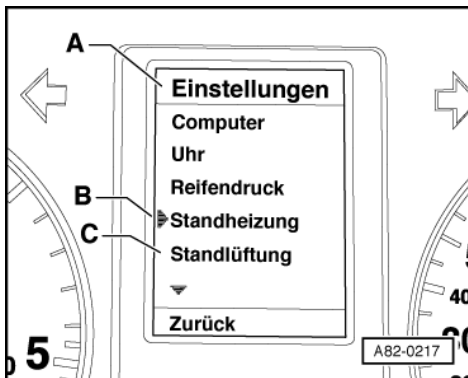
Notes:

- ♦ -> Activation of auxiliary heater timer is indicated by symbol -A- in digital clock. Symbol flashes when auxiliary heater is in operation.
- ♦ Activation of auxiliary ventilation timer is indicated by symbol -B- in digital clock. Symbol flashes when auxiliary ventilation is in operation.



- ♦ -> Auxiliary heating/auxiliary ventilation is controlled by way of settings made on driver information system display. Settings can be made as follows with the rotary knob/pushbutton -A- in the centre console. A full description is given in the owner's manual.
- ♦ Pressing the "MENU" button in front of the rotary knob/pushbutton always permits return to "Settings" menu.

Making settings



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- Switch on ignition.
- -> Select "Settings" menu -A- by way of rotary knob/pushbutton in centre console.

Note:

If "Auxiliary heating" -B- and "Auxiliary ventilation" -C- are not displayed in "Settings" menu, dash panel insert setting must be altered by way of "Adaption" function. If adaption "0" has been entered in dash panel insert, auxiliary heating/auxiliary ventilation function is not active.

=> Electrical System; Repair Group 01

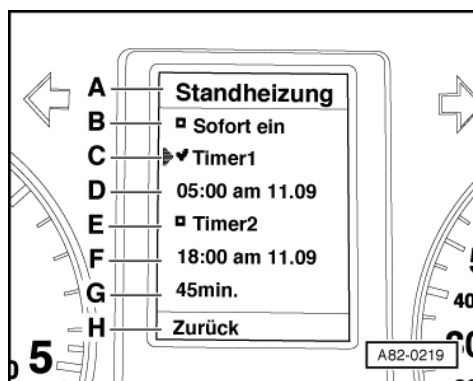
- Use rotary knob/pushbutton to select "Auxiliary heating" -B- or "Auxiliary ventilation" -C- function in "Settings" menu.

Note:

Setting for auxiliary heating mode is described in the following. Auxiliary ventilation mode setting is to be made in the same way.

- Select function -B- "Auxiliary heating" by turning rotary knob/pushbutton.

Note:



Selection arrow in menu panel shows which function can now be activated by pressing rotary knob/pushbutton.

- Activate function -B- "Auxiliary heating" by pressing rotary knob/pushbutton.

-> Auxiliary heating mode menu then appears on driver information system display.

Rotary knob/pushbutton can then be used to make the various settings in "Auxiliary heating" menu -A-.

Tick = yes (function selected)

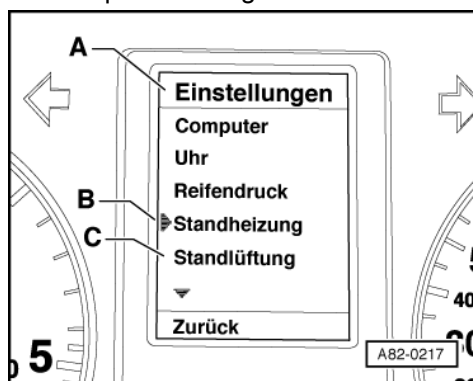
Box = no (function not selected)

- Make desired settings by turning and pressing rotary knob/pushbutton (=> Example, Page 102).

Note:

If tick cannot be set in front of "Heating on" or if it automatically switches back to a box (it is also not possible to switch on auxiliary heater by way of remote control or "Timer" function), check fuel level in fuel tank (display in dash panel insert must not be in red zone).

After required setting has been made:

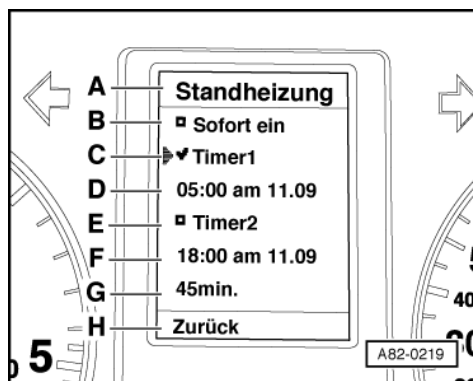


- Position selection arrow in front of "Return" -H- to exit from "Auxiliary heating" menu and press rotary knob/pushbutton.

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-> Driver information system returns to "Settings" function.

Notes:



♦ -> Fig. shows the following settings

-A- "Auxiliary heating" menu panel

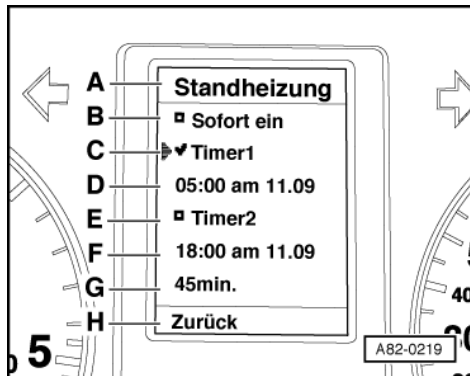
-B- "Immediate on" function off (box)

-C- "Timer 1" starting time on (tick)

-D- Startof auxiliary heating with activated

"Timer 1"-C - at "05:00" hours on "11.09"

(11th September)



-> -E- "Timer 2" starting time off (box)

-F- Startof auxiliary heating with activated

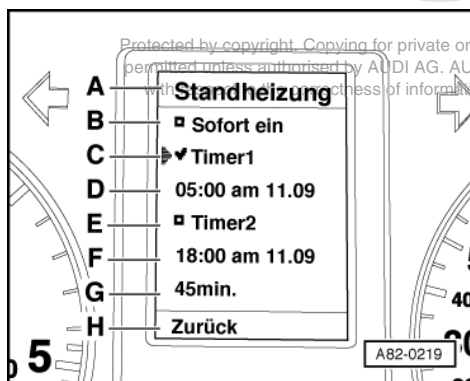
"Timer 2"-E - at "18:00" hours on "11.09"

(11th September)

-G- Auxiliary heating time "45min"

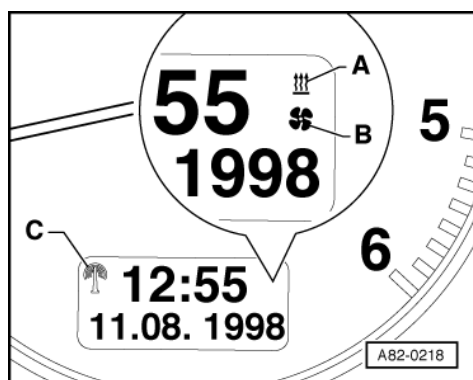
(45 minutes)

- ♦ Only one of the functions -B- "Immediate on", -C- "Timer 1" or -E- "Timer 2" can be activated at any time. Setting a new tick erases the previous one.
- ♦ Operating time -G- can be set between 30 minutes and 60 minutes. Setting can only be made in 5-minute steps.
- ♦ If auxiliary heating/auxiliary ventilation is switched on by way of remote control, operating time depends on setting in dash panel insert (between 30 and 60 min.). These vehicles are provided with a remote control system, the transmission signal of which contains a time module for 60 min. operating time.
- ♦ Any time between 00:00 and 23:59 and any day between 01.01 (1st January) and 31.12 (31st December) can be set as starting time -D- and -F-. Setting can be made up to one month in advance.



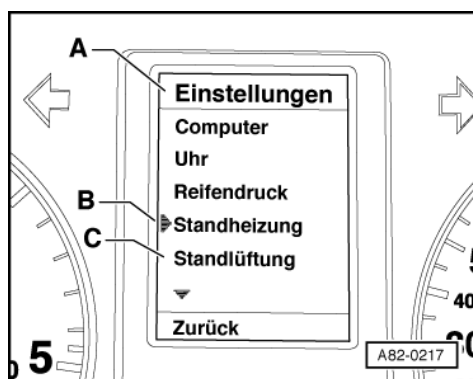


- ♦ -> If the starting time entered on the timer has already passed on the current day, the date automatically switches to the next day on activating the timer.
- ♦ The driver information system uses the time displayed by the digital clock in the dash panel insert to control the auxiliary heating / auxiliary ventilation cut-in times.



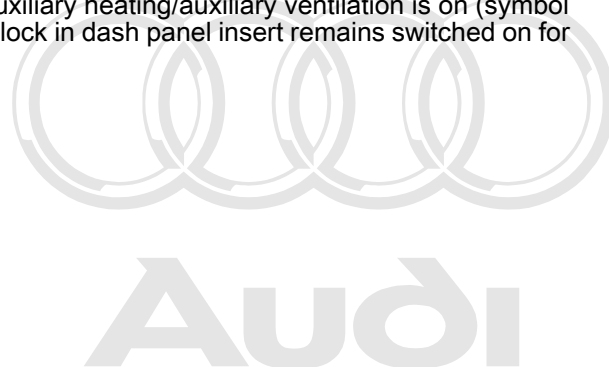
- ♦ -> If the vehicle is fitted with a radio clock, the symbol -C- appears in the digital clock in areas where a radio signal is received. The dash panel insert then always displays the correct time and date.
- The time and date must be checked on vehicles with no radio clock or in areas where radio signal cannot be received.
- ♦ If auxiliary heating/auxiliary ventilation timer is active or auxiliary heating/auxiliary ventilation is on (symbol -A- or -B- appears in digital clock display), illumination of clock in dash panel insert remains switched on for approx. 30 seconds after switching off ignition.

Example:

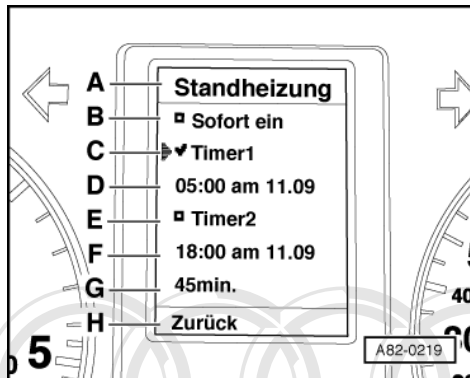


Dash panel insert (driver information system) is to be set such that auxiliary heater is switched on at 5:00 a.m. on 5th September for 45 minutes.

- Switch on ignition.
- Select "Settings" menu in driver information system.
- -> Use rotary knob/pushbutton to set selection arrow in "Settings" menu to "Auxiliary heating" function -B-.
- Confirm setting made by pressing rotary knob/pushbutton.



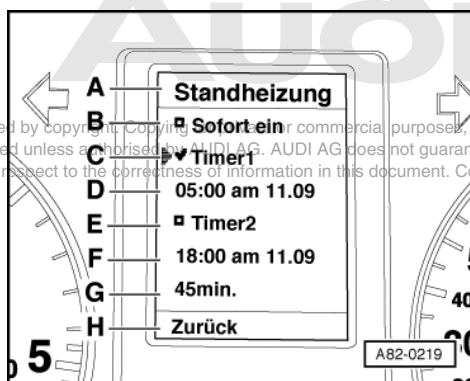
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-> "Auxiliary heating" menu -A- then appears on driver information system display.

- Use rotary knob/pushbutton to set selection arrow to -C- "Timer 1".
- Press rotary knob/pushbutton in centre console.

Display in front of "Timer 1" -C- changes (box disappears, to be replaced by a tick).



- Turn rotary knob/pushbutton to select desired menu panel (e.g. starting time -D- for "Timer 1").
- Confirm setting made by pressing rotary knob/pushbutton.

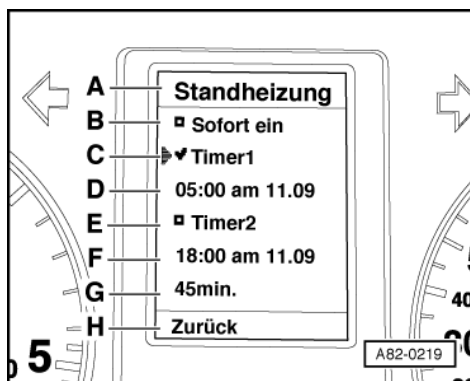
-> Hours display in menu panel -D- starts to flash.

- Set desired hour by turning rotary knob/pushbutton.
- Confirm setting made by pressing rotary knob/pushbutton.

Minutes display in menu panel -D- starts to flash.

- Set desired number of minutes by turning rotary knob/pushbutton (setting can only be made in 5-minute steps).
- Confirm setting made by pressing rotary knob/pushbutton.

Day display in menu panel -D- starts to flash.





- -> Set day and month by turning rotary knob/pushbutton and confirm by pressing.

This completes setting of "Timer 1" starting time.

- Use rotary knob/pushbutton to set selection arrow to "Operating time" function -F-.
- Confirm setting made by pressing rotary knob/pushbutton.
- Set desired operating time in minutes by turning rotary knob/pushbutton, e.g. 45 min. (operating time can be set between 30 and 60 minutes in 5-minute steps only).
- Confirm setting made by pressing rotary knob/pushbutton.

After required setting has been made:

- Position selection arrow in front of "Return" -H- to exit from "Auxiliary heating" menu and press rotary knob/pushbutton or press "Menu" button next to rotary knob/pushbutton.

Driver information system returns to "Settings" function.

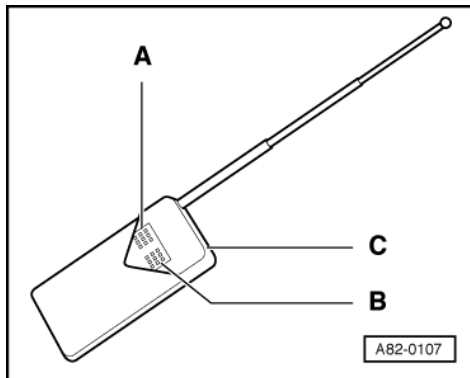
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5.7 - Checking operation of remote control and auxiliary heating radio wave receiver -R64

Notes:

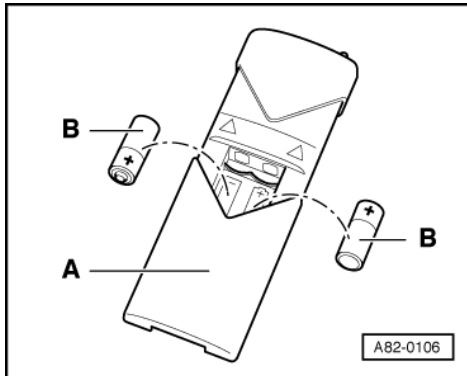
- ♦ Only intended for vehicles with auxiliary/additional heater of type "Z/C" as standard or as optional extra.
- ♦ Remote control can be used to switch auxiliary heating/auxiliary ventilation on and off from a distance of up to 600 m (in open areas). A reduced range must be expected in built-up areas or from inside buildings.
- ♦ Hold remote control vertical whilst pressing buttons (to achieve optimum reception of signals by vehicle aerial and maximum transmitter range).
- ♦ Auxiliary heating/auxiliary ventilation time is determined by remote control on activation (cut-in signal contains a time module). This time module is permanently stored in the remote control and cannot be altered. There are different versions for vehicles with and without pre-selection clock => Pages 110 .

=> Parts List



- ♦ -> Lamp -C- on remote control starts to flash when "START" button -A- is pressed. By way of a check, this lamp flashes
 - In the case of the version with 30 min. operating time (for vehicles with pre-selection clock) until auxiliary heating/auxiliary ventilation is switched off by pressing "OFF" button -B- or until 30 min. running time has elapsed
 - In the case of the version with 60 min. operating time (for vehicles with no pre-selection clock) for approx. 30 s after pressing "START" button
- ♦ The remote control is a transmitter. Switch-on and switch-off of auxiliary heating/auxiliary ventilation via pre-selection clock -E111/dash panel insert is thus not recognised.
- ♦ On vehicles with remote control, auxiliary heating/auxiliary ventilation can be switched on and off by way of remote control independently of pre-selection clock -E111 or dash panel insert setting. Switching signals are evaluated by auxiliary heating radio wave receiver -R64. Receiver
 - switches auxiliary heating/auxiliary ventilation on and off directly on vehicles with pre-selection clock - E111
 - actuates dash panel insert on vehicles with no pre-selection clock -E111 to switch auxiliary heating/auxiliary ventilation on and off

- ◆ The remote control transmits at a frequency of 433.92 MHz (for approx. 3 s each time button is pressed).
- ◆ Auxiliary heating/auxiliary ventilation switched on by way of pre-selection clock -E111/dash panel insert can only be switched off again via pre-selection clock/dash panel insert (not using remote control).



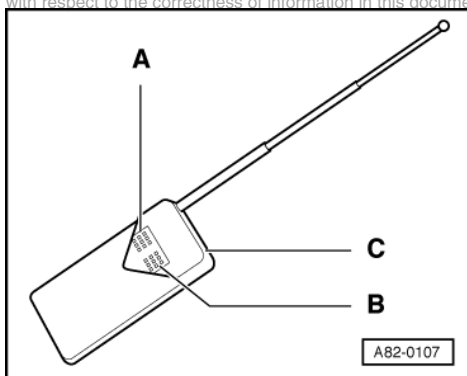
Test requirements

- ◆ Auxiliary heater off
- ◆ -> Batteries -B- in remote control unit OK and correctly fitted
- ◆ Radio/telephone/auxiliary heater aerial -R51 (on vehicle) OK and correctly installed
- ◆ Fault memory interrogated =>Page 13 and any faults displayed eliminated
- ◆ Battery -A (and -A1) OK and adequately charged
- ◆ Remote control aerial fully extended (if distance between vehicle aerial and remote control is more than 3 m)
- ◆ Remote control properly encoded
- ◆ Auxiliary heater set to "Auxiliary ventilation" mode
- Heater/heat output switch -E16 pressed (auxiliary ventilation mode) on vehicles with pre-selection clock - E111 =>Page 95
- On vehicles with no pre-selection clock -E111, "Auxiliary ventilation" function switched briefly on and off again in dash panel insert via rotary knob/pushbutton =>Page 97

Notes:

- ◆ In auxiliary ventilation mode, function can be checked without having to allow for pre-running/run-on times and coolant temperature (operating and display unit for air conditioner/Climatronic -E87 switched on and off immediately).
- ◆ When using remote control dash panel insert activates the function last set via the dash panel insert.

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- ◆ On vehicles with no pre-selection clock -E111, symbol appears in display of digital clock in dash panel insert when auxiliary heating/auxiliary ventilation is switched on => Page 97 .

Checking

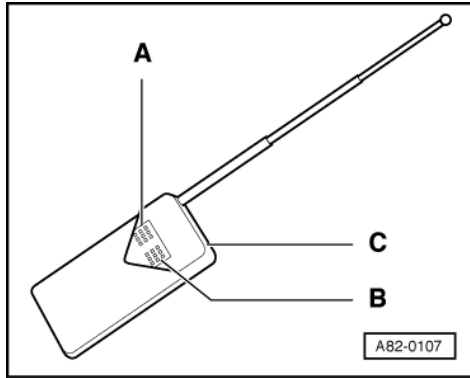
- Switch off ignition.



♦ Switch-on

- -> Press "START" button -A- on remote control.

Lamp -C- on remote control flashes (initially 3 times).



Operating and display unit for air conditioner/Climatronic -E87 starts up (auxiliary ventilation mode).

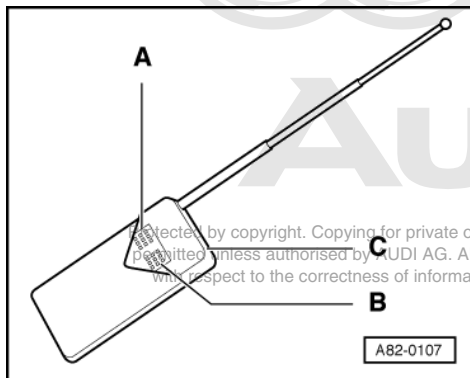
♦ Switch-off

- -> Press "OFF" button -B- on remote control for 1 s.

Lamp -C- on remote control flashes 3 times and then stops.

Operating and display unit for air conditioner/Climatronic -E87 cuts out.

♦ Switch-on



- -> Press "START" button -A- on remote control.

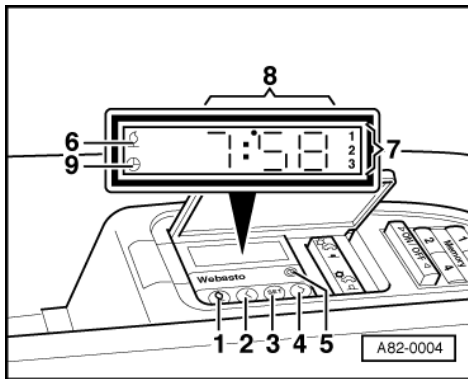
Lamp -C- on remote control flashes.

Operating and display unit for air conditioner/Climatronic -E87 starts up (auxiliary ventilation mode).

♦ Switch-off

Vehicles with no pre-selection clock

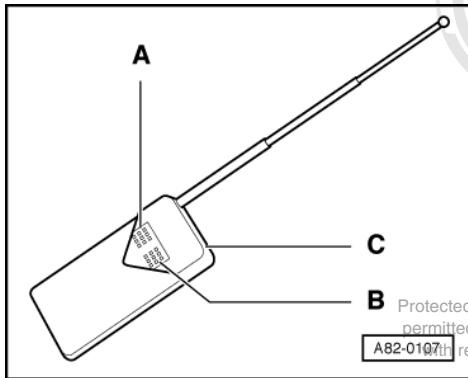
- Switch on ignition.



- Select "Auxiliary ventilation" menu in driver information system in dash panel insert and switch off auxiliary ventilation function by way of rotary knob/pushbutton in centre section of dash panel => Page 97 .
- Switch off ignition.

Vehicles with pre-selection clock

- -> Button -1- of pre-selection clock -E111 for switching auxiliary heating/auxiliary ventilation on and off must be pressed twice (switch-on and switch-off).



Operating and display unit for air conditioner/Climatronic -E87 cuts out.

- > Lamp -C- on remote control continues to flash.
- Press "OFF" button -B- on remote control for 1 s.

Lamp -C- on remote control stops flashing.

- ◆ Switch-on

Vehicles with pre-selection clock

- Press button -1- of pre-selection clock -E111 for switching auxiliary heating/auxiliary ventilation on and off (switch-on).

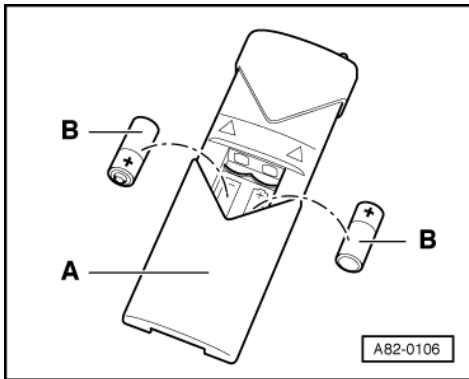
Operating and display unit for air conditioner/Climatronic -E87 starts up (auxiliary ventilation mode).

Vehicles with no pre-selection clock

- Switch on ignition.
- Switch on auxiliary ventilation via rotary knob/pushbutton in centre console =>Page 97 .
- Switch off ignition.

Operating and display unit for air conditioner/Climatronic -E87 remains in operation after switching off ignition (auxiliary ventilation mode).

Diagram illustrating the digital display and control buttons of the A82-0004 device. The display shows the time 7:58. The buttons are labeled 1 through 5, and the numeric keypad is labeled 1 through 9. The label A82-0004 is visible in the bottom right corner.



5.9 - Detecting remote control faults on vehicles with pre-selection clock -E111

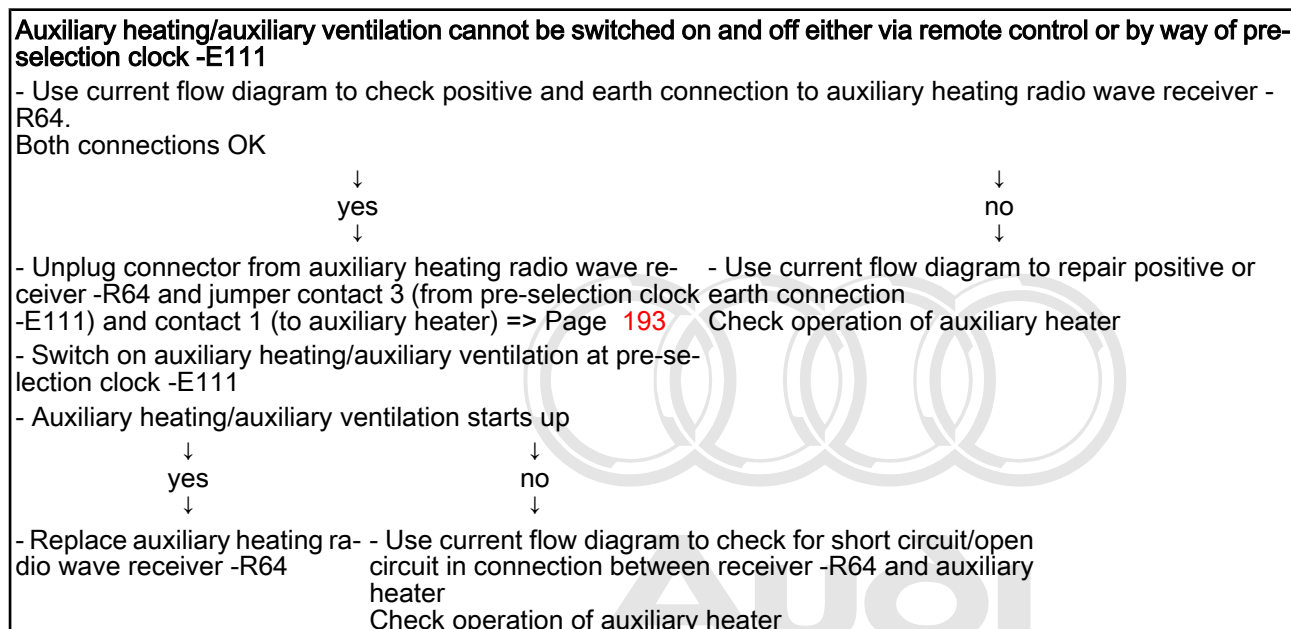
Test requirements

- ◆ Battery -A (and -A1) OK and adequately charged
- ◆ Auxiliary heater fault memory interrogated =>Page 13 and any faults displayed eliminated

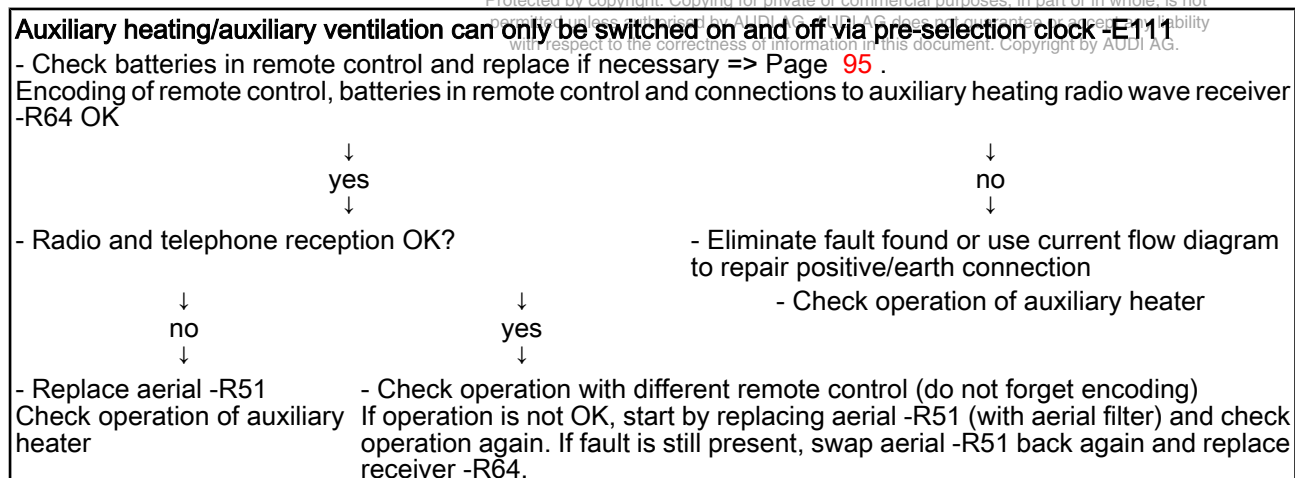
Notes:

- ◆ Various modifications to the vehicle as a whole were gradually introduced in Model Year 1999 for the Audi A8. As a result of introduction of modified dash panel insert, pre-selection clock -E111 and heater/heat output switch -E16 have been discontinued and auxiliary heating/auxiliary ventilation is actuated on these vehicles by way of dash panel insert.
- ◆ Vehicles with pre-selection clock have a remote control with an operating time of 30 min. (60 min. version for vehicles with no pre-selection clock). With this version, lamp flashes until auxiliary heating/auxiliary ventilation is switched off by pressing "OFF" button -B- or until running time of 30 min. has elapsed.

=> Parts List



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**Auxiliary heating/auxiliary ventilation can only be switched on and off using remote control**

- Use current flow diagram to check positive and earth connection to auxiliary heating radio wave receiver - R64.

Both connections OK

↓
yes
↓

↓
no
↓

- Unplug connector from auxiliary heating radio wave receiver - R64 and jumper contact 3 (from pre-selection clock -E111) and contact 1 (to auxiliary heater) => Page 193

- Use current flow diagram to repair positive or earth connection
Check operation of auxiliary heater

- Switch on auxiliary heating/auxiliary ventilation at pre-selection clock -E111

- Auxiliary heating/auxiliary ventilation starts up

↓
yes
↓

↓
no
↓

- Replace auxiliary heating radio wave receiver -R64

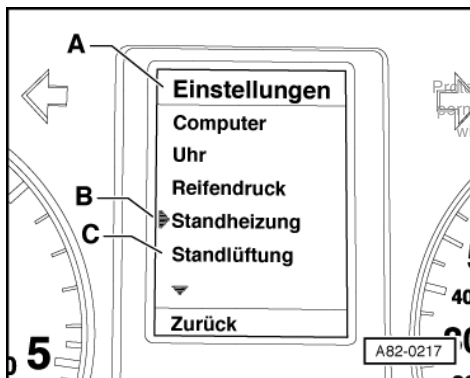
- Use current flow diagram to check for short circuit/open circuit in connection between pre-selection clock -E111 and receiver -R64

Check operation of pre-selection clock -E111 => Page

114

5.10 - Detecting remote control faults on vehicles with no pre-selection clock -E111**Test requirements**

- ♦ Vehicle battery -A OK and adequately charged
- ♦ Sufficient fuel in tank, fuel gauge not in red zone
- ♦ Auxiliary heater fault memory interrogated =>Page 13 and any faults displayed eliminated



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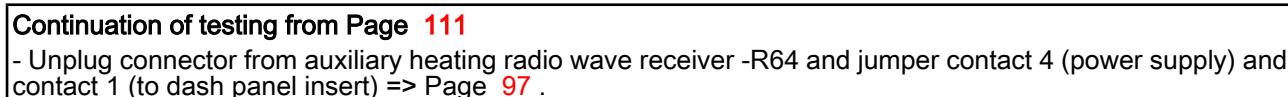
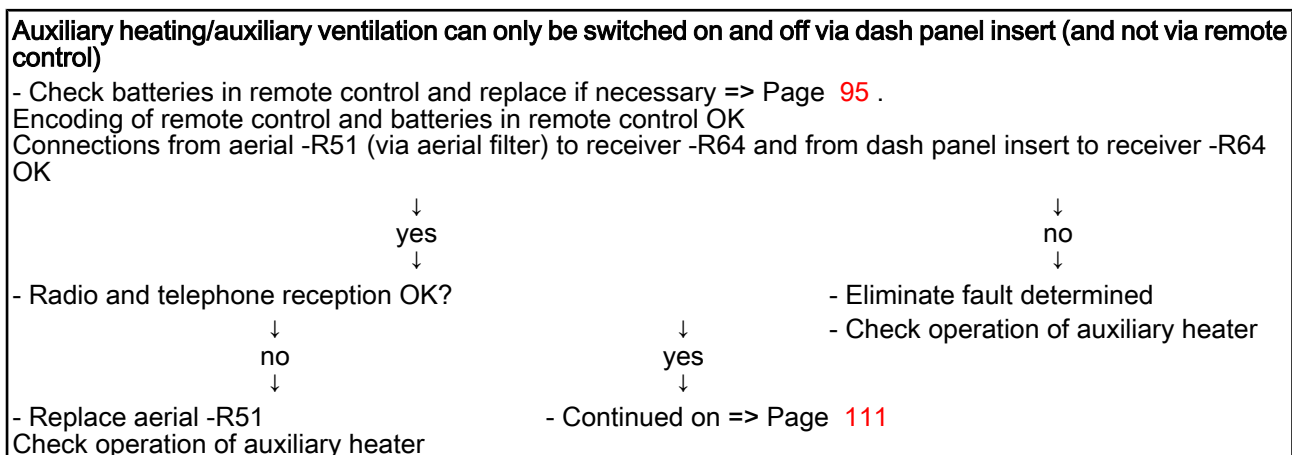
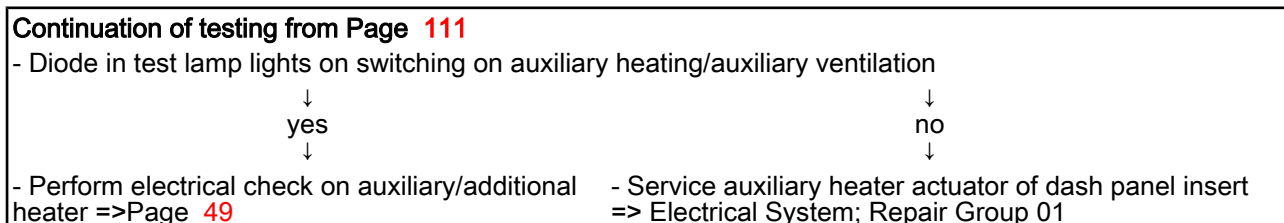
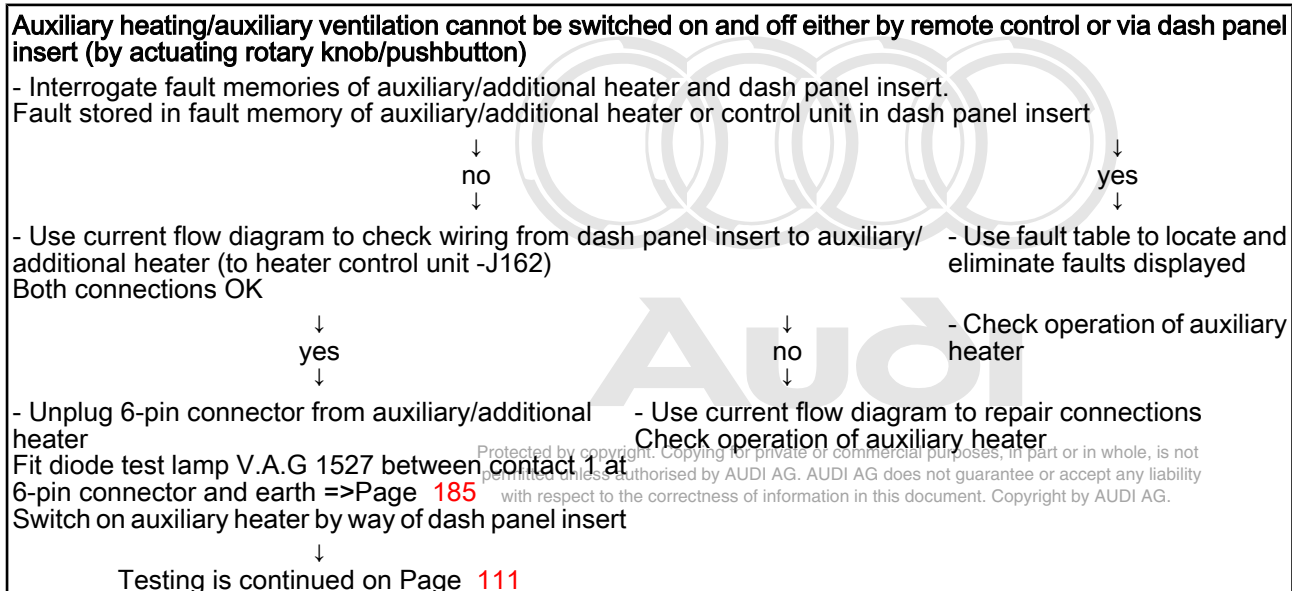
- ♦ -> Dash panel insert properly adapted (functions "Auxiliary heating" -B- and "Auxiliary ventilation" -C- appear in "Settings" menu -A- on driver information system display) => Page 97

Notes:

- ♦ Various modifications to the vehicle as a whole were gradually introduced in Model Year 1999 for the Audi A8. As a result of introduction of modified dash panel insert, pre-selection clock -E111 and heater/heat output switch -E16 have been discontinued and auxiliary heating/auxiliary ventilation is actuated on these vehicles by way of dash panel insert.
- ♦ Fuel gauge sender is interrogated before dash panel insert switches on auxiliary heater. Auxiliary heater is not switched on if there is insufficient fuel in tank (fuel gauge in "red zone").
- ♦ Vehicles with no pre-selection clock have a remote control with an operating time of 60 min. (30 min. version for vehicles with pre-selection clock). Actual auxiliary heating/auxiliary ventilation time is however governed

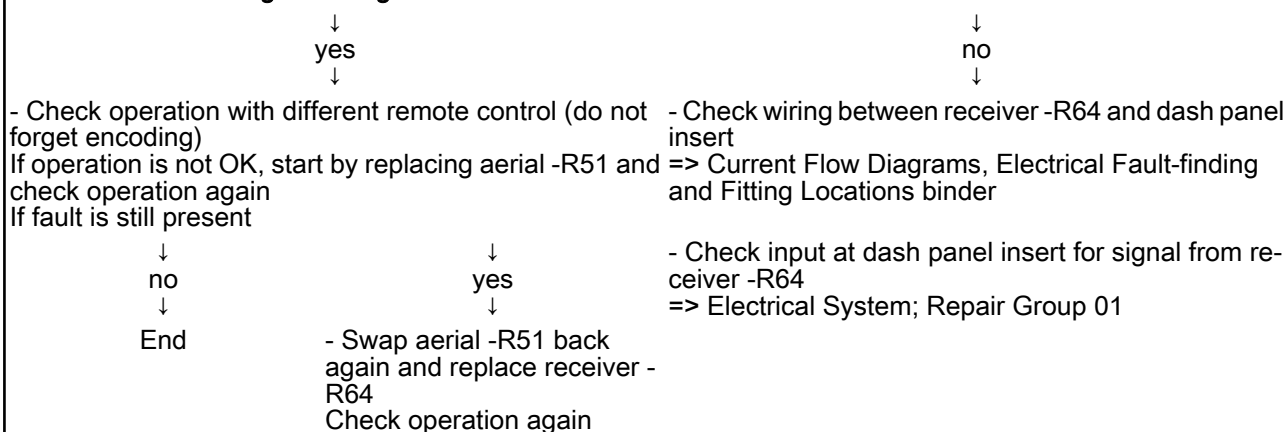
by setting in dash panel insert. With this version, built-in lamp flashes for approx. 30 s as a check after pressing "START" button.

=> Parts List

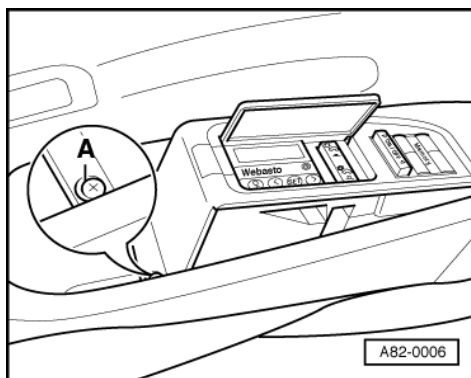




Continuation of testing from Page 111



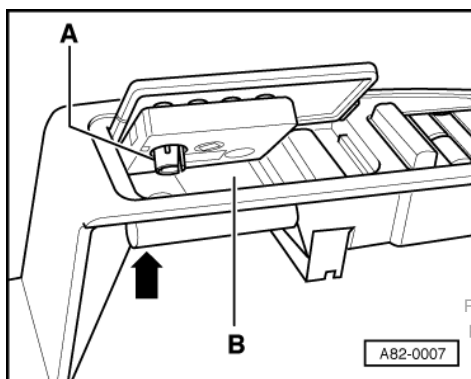
5.11 - Removing and installing pre-selection clock -E111



- -> Remove bolt -A-.
- Carefully lift switch mount out of door trim.

Notes:

- ♦ Various modifications to the vehicle as a whole were gradually introduced in Model Year 1999 for the Audi A8. As a result of introduction of modified dash panel insert, pre-selection clock -E111 and heater/heat output switch -E16 have been discontinued and auxiliary heating/auxiliary ventilation is actuated on these vehicles by way of dash panel insert.
- ♦ On lifting out, pay particular attention to wiring to pre-selection clock and lining of door trim.



- ♦ Prior to installation, check proper positioning of foam for sealing wire penetration through door trim.
- Unplug connectors.

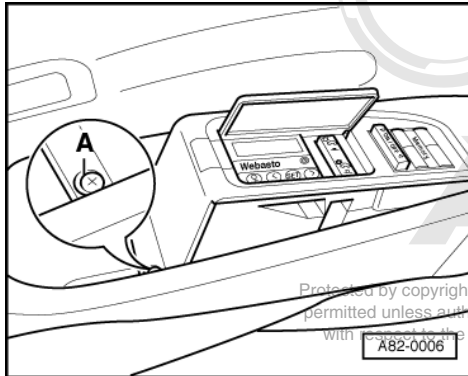
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- -> Press with thumb on connector area -A- to press pre-selection clock out of mount.

Note:

Pre-selection is fixed in position in mount with double-sided adhesive tape -B-.

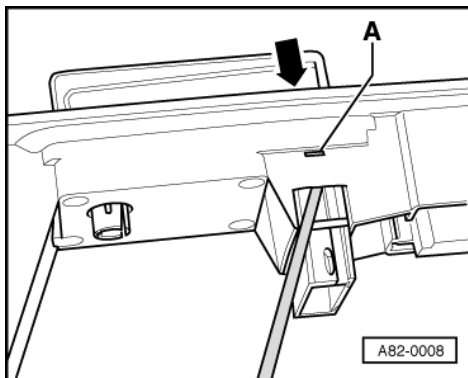
5.12 - Removing and installing heater/heat output switch -E16



- -> Remove bolt -A-.
- Carefully lift switch mount out of door trim.

Notes:

- ◆ On lifting out, pay particular attention to wiring to pre-selection clock and lining of door trim.
- ◆ Various modifications to the vehicle as a whole were gradually introduced in Model Year 1999 for the Audi A8. As a result of introduction of modified dash panel insert, pre-selection clock -E111 and heater/heat output switch -E16 have been discontinued and auxiliary heating/auxiliary ventilation is actuated on these vehicles by way of dash panel insert.

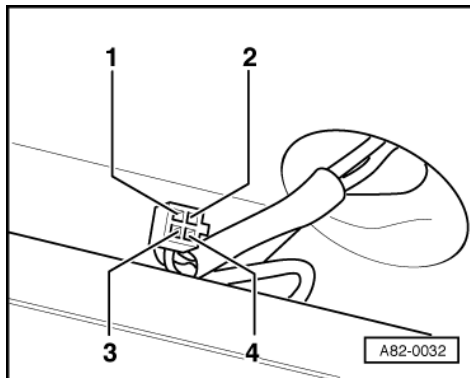


- ◆ Prior to installation, check proper positioning of foam for sealing wire penetration through door trim.
- Unplug connectors.
- -> Use screwdriver to release switch from fasteners -A- of mount and press out downwards.



5.13 - Checking power supply of pre-selection clock

Checking operation of pre-selection clock -E111



- Remove pre-selection clock -E111 with switch mount from door trim =>Page 112 .
- -> Measure voltage between contacts 1 and 2 at connector to pre-selection clock -E111.

Specification:

approx. battery voltage

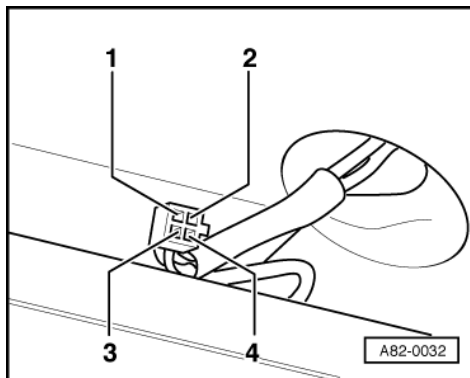
- Measure current between contacts 1 and 3 at connector to pre-selection clock -E111.

Specifications:

10 to 20 mA (cut-in signal to auxiliary/additional heater, to auxiliary heating radio wave receiver -R64)

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

Auxiliary/additional heater starts up.



Notes:

- ♦ -> Pin assignment

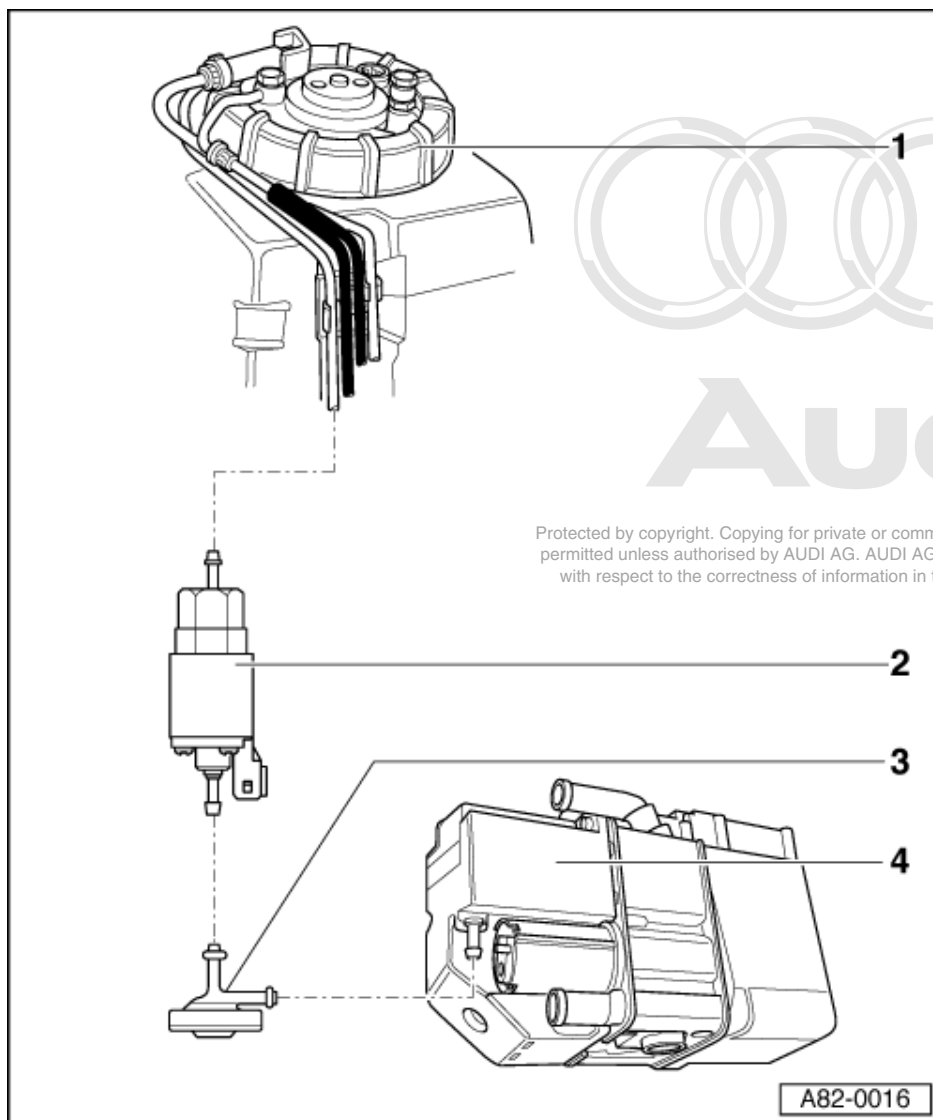
=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

- Contact 1 Positive
- Contact 2 Earth
- Contact 3 Output to auxiliary heater, to auxiliary heating radio wave receiver -R64
- Contact 4 not used
- ♦ With auxiliary heater switched off, display illumination off and cut-in time not activated, maximum current input of pre-selection clock and auxiliary heater is less than 5 mA.

- ♦ If current input of pre-selection clock -E111, auxiliary heating radio wave receiver -R64 or auxiliary/additional heater is outside permitted value range, use current flow diagram to check wiring as well as actuation of auxiliary/additional heater.
- ♦ If auxiliary heating does not start up, check electrical components of auxiliary/additional heater
 - Heater type "S" =>Page 49

6 - Diverting fuel for auxiliary/additional heater

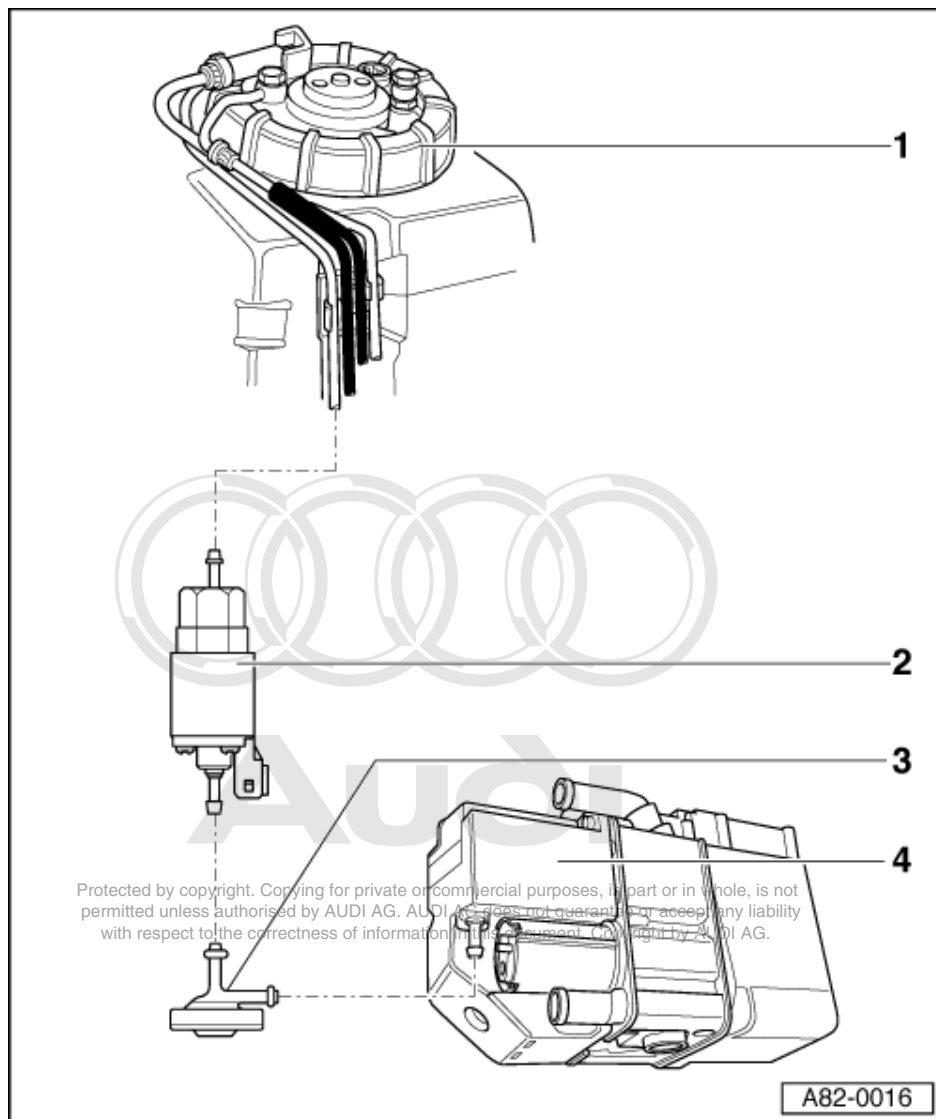
6.1 - Diverting fuel for auxiliary/additional heater



Notes:

The following are prerequisites for operation of auxiliary/additional heater:

- Fuel pipe flush with bottom of vehicle and protected against mechanical damage
- Fuel pipe to auxiliary/additional heater protected against heat generation which could affect operation
- Fuel pipe not in contact with vehicle components which become warm



1 Housing for fuel pump and fuel gauge

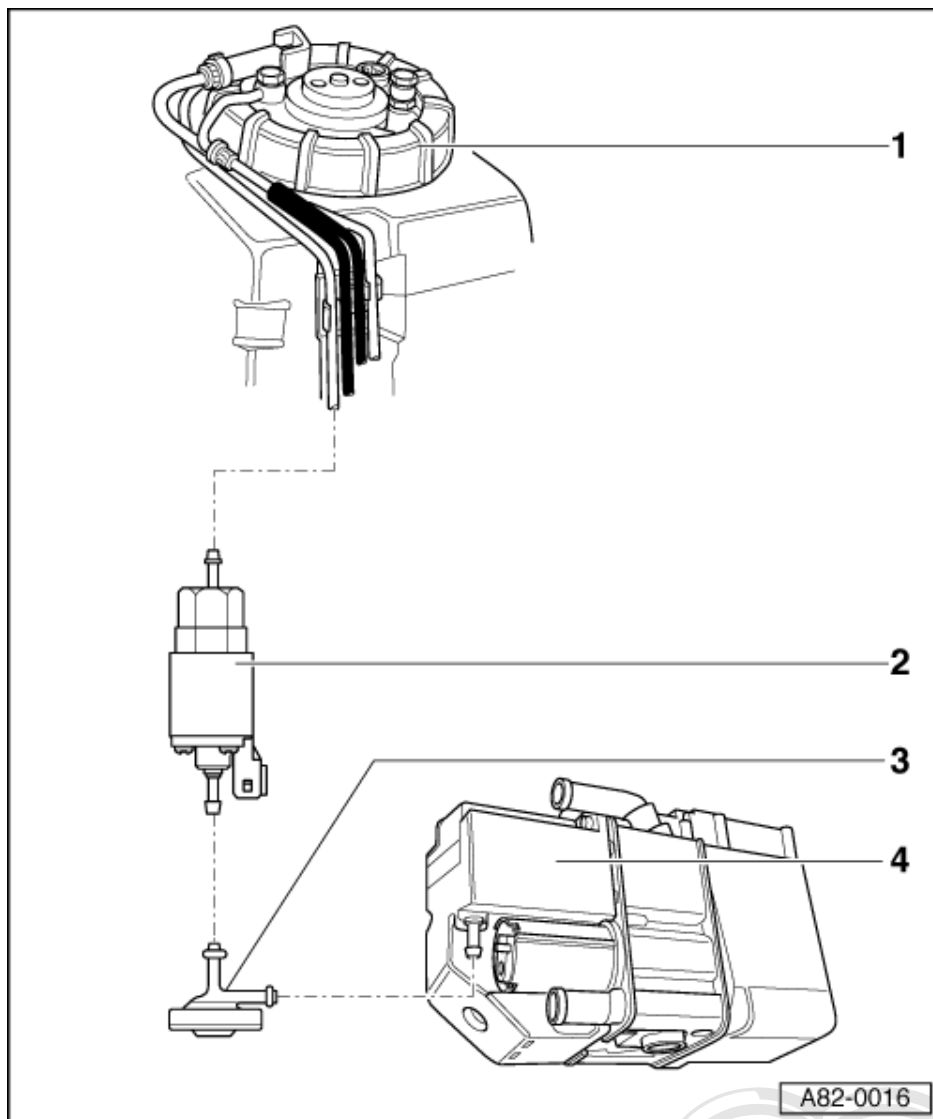
- ♦ Removing and installing

=> Relevant Fuel Supply Workshop Manual; Repair Group 20

- ♦ Diverting fuel from fuel tank
=>Page 118

2 Metering pump -V54

- ♦ Removing and installing=>Page 122
- ♦ Checking fuel delivery
 - Heater type "S"=> Page 118
 - Heater type "Z/C" => Page 120
- ♦ Checking actuation
 - Heater type "S"=> Page 204
 - Heater type "Z/C" => Page 18



3 Pressure damper

- ♦ Only fitted with heaters of type "S"

Notes:

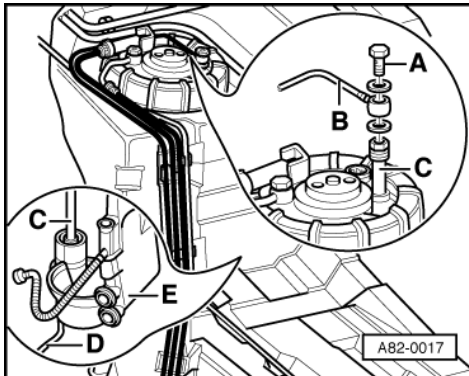
- ♦ This damper is either attached directly to metering pump or installed in combustion air blower unit of auxiliary heater (there may be two dampers on vehicles manufactured up to 10.94).
- ♦ Conversion to combustion air blower unit fitting location took place gradually (up to 10.94).
- ♦ Pressure damper ensures uniform combustion in auxiliary heater (it cushions metering pump pressure surges).

4 Auxiliary/additional heater

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6.2 - Diverting fuel (for auxiliary/additional heater) from fuel tank



- Banjo bolt -A- (tightening torque 10 Nm)
- Fuel pipe -B- to metering pump
- Securing pipe -C- (tightening torque 20 Nm)
- Fuel pipe -D- attached to baffle housing for fuel pump and fuel gauge -E-

Notes:

- ♦ Vehicles with no auxiliary/additional heater have a bolt (no hole) instead of the securing pipe -C-.
- ♦ To reduce volume, an adapter pipe is inserted in the securing pipe -C- hole (length approx. 300 mm, OD approx. 4 mm, ID approx. 2 mm).
- ♦ Fuel is drawn in from the lower part of the fuel tank by way of the fuel pipe -D- (thus ensuring fuel supply even if tank is nearly empty and vehicle is standing at an unfavourable angle).
- ♦ Fuel pipe -D- is only fitted on vehicles equipped as standard with auxiliary/additional heater (cannot be retrofitted).

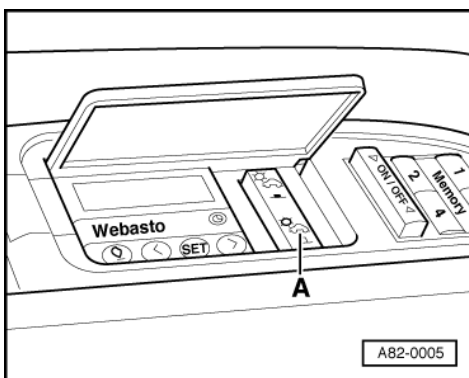
6.3 - Checking fuel delivery of metering pump -V54 (heater type "S")

Test requirements:

- Coolant temperature less than 30°C
- Ambient temperature less than 20°C

Note:

A higher ambient temperature can result in incorrect delivery measurements on account of fuel evaporation.

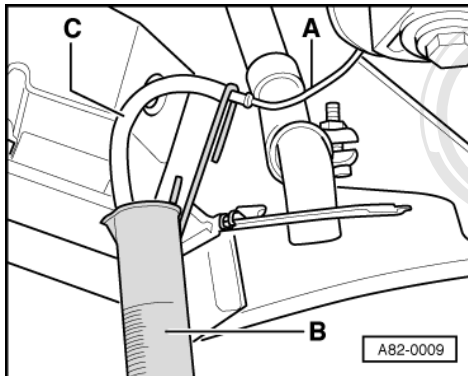


- Second battery -A1 OK and adequately charged
- Sufficient fuel in tank (fuel gauge in dash panel insert not in red zone)
- -> Heater/heat output switch -E16 -A- not pressed (auxiliary heating mode)

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Checking:

- Switch off ignition.
- Remove noise insulation and air duct to alternator.



=> General Body Repairs; Repair Group 50: Removing and installing noise insulation Removing and installing noise insulation

- -> Detach fuel pipe -A- from auxiliary heater.
- Use piece of wire, for example, to secure graduated beaker -B- in area of fuel pipe and hold fuel pipe over beaker.

Note:

If necessary, use hose -C- as extension to fuel pipe.

- Switch on auxiliary heater.
- As soon as fuel flows out of fuel pipe into graduated beaker, switch off auxiliary heater and wait for end of run-on.
- Empty graduated beaker and re-attach.
- Switch on auxiliary heater (start of time measurement).
- Measure voltage of second battery -A1.

Specification:

Greater than 11 V

- Measure metering pump fuel delivery on completion of start repetition (approx. 5 minutes following switch-on).

Specification:

29 to 36 cm³ (millilitres)

Notes:

- ◆ During this test, fuel delivery is not governed by instantaneous battery voltage (delivery is stabilised by heater control unit -J162).
- ◆ There must not be any inclusion of vapour bubbles.
- ◆ If fuel delivery is outside tolerance range:
 - Check fuel pipe for damage and correct routing => Page 115 .
 - Check actuation of metering pump -V54 =>Page 204 .
 - If no fault is found, replace metering pump -V54 => Page 122 .
- ◆ If starting problems are encountered with auxiliary heater although fuel delivery is OK, check and adjust CO₂ level in exhaust gas
 => Page 123 .



6.4 - Checking fuel delivery of metering pump -V54 (heater type "Z/C")

Test requirements:

- Coolant temperature less than 30°C
- Ambient temperature less than 20°C
- Fault memory interrogated =>Page 13 and any faults displayed located and eliminated

Note:

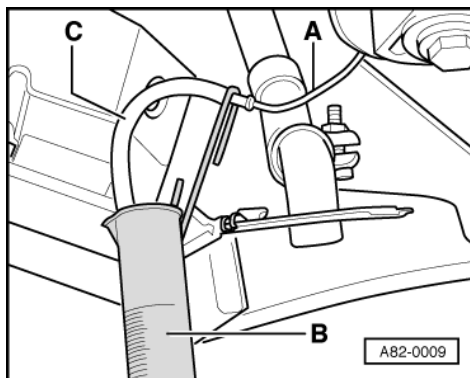
A higher ambient temperature can result in incorrect delivery measurements on account of fuel evaporation.

- Battery -A (and second battery -A1) OK and adequately charged
- Sufficient fuel in tank (fuel gauge in dash panel insert not in red zone)

Checking:

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- Switch off ignition.
- Remove noise insulation and air duct to alternator (8-cyl. petrol engine only).



=> General Body Repairs; Repair Group 50; Removing and installing noise insulation Removing and installing noise insulation

- Remove front right wheel housing liner (8-cyl. diesel engine only).

=> General Body Repairs; Repair Group 63; Front Bumper Front Bumper

- -> Detach fuel pipe -A- from auxiliary/additional heater.
- Use piece of wire, for example, to secure graduated beaker -B- in area of fuel pipe and hold fuel pipe over beaker.

Note:

If necessary, use hose -C- as extension to fuel pipe.

- Start auxiliary/additional heater self-diagnosis and select "Basic setting" function => Page 22 .

-> Indicated on display:

Rapid data transfer Q
04 - Starting basic setting

- Confirm entry with Q key.

-> Indicated on display:

Start basic setting HELP
Enter display number XXX

- Enter display group number 055.
- Confirm entry with Q key.

-> Indicated on display:

System in basic setting	55
Pipe filling	

Notes:

- ◆ Metering pump -V54 is now actuated for 50 s, "first run" (clock frequency 5 Hertz).
- ◆ "Pipe filling" function is to be performed 3 times. Pipe is completely filled during first run; second and third runs are used to measure delivery (on account of low delivery rate 2 runs of 50 s each are required to increase measurement accuracy).

-> Wait until the following display appears:

System in basic setting	55
END	

- Empty graduated beaker and re-attach.
- Press ⇒ key.

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

- Press keys -0- and -4- to select "Basic setting" function 04.

-> Indicated on display:

Rapid data transfer	Q
04 - Starting basic setting	

- Confirm entry with Q key.

-> Indicated on display:

Start basic setting	HELP
Enter display number 055	

- Enter display group number 055.
- Confirm entry with Q key.

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-> Indicated on display:

System in basic setting	55
Pipe filling	

Note:

Metering pump -V54 is now actuated for 50 s, "second run" (clock frequency 5 Hertz).

-> Wait until the following display appears:

System in basic setting	55
END	

- Press ⇒ key.

-> Indicated on display:

Rapid data transfer	Q
04 - Starting basic setting	

- Confirm entry with Q key.

-> Indicated on display:



Start basic setting	HELP
Enter display number 055	

- Enter display group number 055.
- Confirm entry with Q key.

-> Indicated on display:

System in basic setting	55
Pipe filling	

Note:

Metering pump -V54 is now actuated for 50 s, "third run" (clock frequency 5 Hertz).

-> Wait until the following display appears:

System in basic setting	55
END	

- Press ⇒ key.

Note:

To achieve a more accurate measurement result, metering pump -V54 has to be actuated for 100 s (2x implementation of "Pipe filling" function).

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- Measure metering pump fuel delivery on completion of third pipe filling run.

Specification:

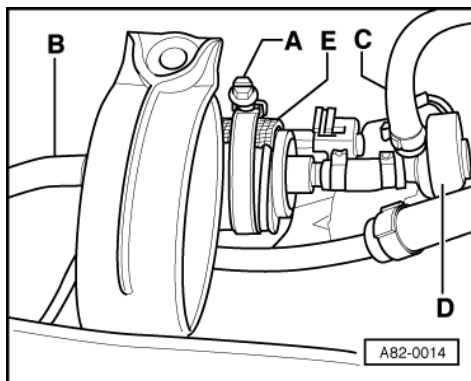
29 to 35 cm3 (millilitres)

Notes:

- ♦ During this test, fuel delivery is not governed by instantaneous battery voltage (delivery is stabilised by heater control unit -J162).
- ♦ There must not be any inclusion of vapour bubbles.
- ♦ If fuel delivery is outside tolerance range:
 - Check fuel pipe for damage and correct routing => Page 115 .
 - If no fault is found, replace metering pump -V54 => Page 122 .
- ♦ If starting problems are encountered with auxiliary/additional heater although fuel delivery is OK, check CO2 level in exhaust gas => Page 125 .

6.5 - Removing and installing metering pump -V54

Vehicles with petrol engine

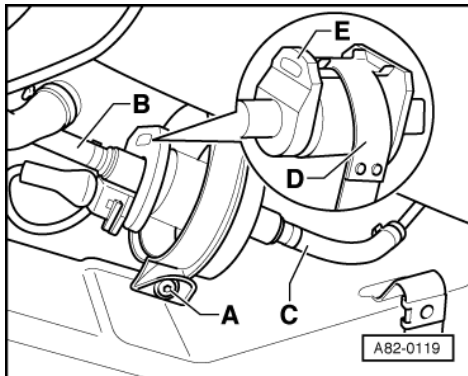


- Switch off ignition.
- Remove guard beneath tank.
- Remove fuel filter.
- -> Unfasten clip -A-.
- Detach fuel pipes -B- and -C- from metering pump and seal off.

Notes:

- ◆ Pressure damper -D- was only fitted with heaters of type "S" (in area of metering pump at start of production, subsequently in combustion air blower unit of heater) => Page **115**.
- ◆ Always use spacer -E- when attaching metering pump to holder.
- ◆ Make sure metering pump and associated fuel pipes are not in contact with other components (noise).

Vehicles with diesel engine



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- Switch off ignition.
- Remove guard beneath tank.
- -> Remove bolt -A-.
- Detach fuel pipes -B- and -C- from metering pump and seal off.

Notes:

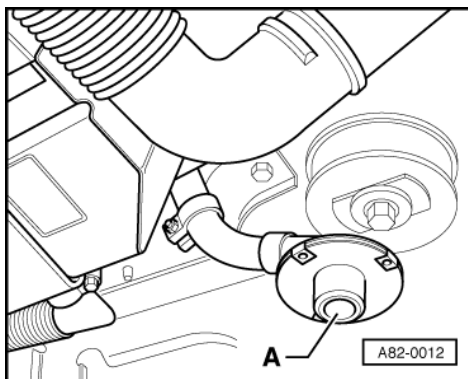
- ◆ On vehicles with diesel engine, metering pump is secured in position in holder -D- with rubber elements -E-.
- ◆ Make sure metering pump and associated fuel pipes are not in contact with other components (noise).

6.6 - Checking and adjusting CO2 level in auxiliary heater exhaust gas (heater type "S")

Test requirements

- Coolant temperature less than 30°C
- Ambient temperature less than 20°C
- Second battery -A1 OK and adequately charged
- Sufficient fuel in tank (fuel gauge in dash panel insert not in red zone)

Checking:





- Switch off ignition.
- -> Switch on exhaust analyzer V.A.G 1788 and insert corresponding hose of exhaust probe into exhaust pipe -A- of auxiliary heater.
- Switch on auxiliary heater.
- As soon as operating and display unit for air conditioner/Climatronic -E87 is switched on (by auxiliary heater), it is to be set to maximum heat output (temperature preselection "Hi").
- Allow auxiliary heater to run in full load mode for approx. 5 minutes and then read off CO₂ (carbon dioxide) level on measuring instrument.

Specification:

9.5 to 12 % by vol. CO₂

Notes:

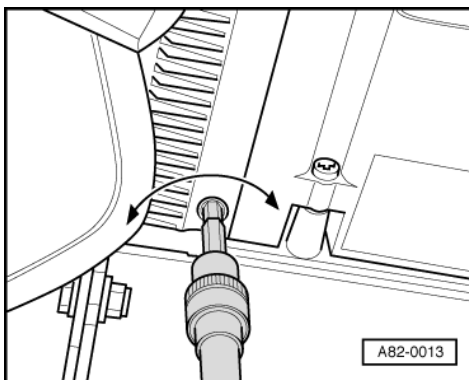
- ♦ Exhaust probe must not impede emergence of exhaust gas from exhaust pipe during test.
- ♦ If measured value is outside permitted range:
 - Check combustion air blower intake area for dirt and clean if necessary.
 - Check fuel delivery => Page 118 .
 - Adjust CO₂ level in exhaust gas.
- ♦ If starting problems are encountered with auxiliary heater although fuel delivery is OK, adjust CO₂ level towards upper specification limit.

Adjusting CO₂ level in exhaust gas:

- Switch off ignition.
- Remove noise insulation.

=> General Body Repairs; Repair Group 50; Removing and installing noise insulation Removing and installing noise insulation

- Switch on exhaust analyzer V.A.G 1788 and insert corresponding hose of exhaust probe into exhaust pipe of auxiliary heater.



- Switch on auxiliary heater.
- -> Allow auxiliary heater to run in full load mode for approx. 5 minutes and then adjust CO₂ (carbon dioxide) level by turning CO₂ adjusting screw.

Setting:

10 to 11.5 % by vol. CO₂

- Following adjustment, secure CO₂ adjusting screw with locking fluid.

Notes:

- ♦ CO₂ level in exhaust gas can only be altered to a limited extent by turning CO₂ adjusting screw (do not screw in screw as far as stop or screw it out such that it projects).
- ♦ If CO₂ level in exhaust gas cannot be adjusted although fuel delivery is OK:
 - Check electrical components of auxiliary heater (combustion air blower) => Page 205 .

- Dismantle auxiliary heater and examine burner element as well as seals =>Page 154 .

7 - Checking and adjusting CO2 level in auxiliary/additional heater exhaust gas for heaters of type "Z/C"

7.1 - Checking and adjusting CO2 level in auxiliary/additional heater exhaust gas for heaters of type "Z/C"

Notes:

- ◆ CO2 level can only be adjusted on heaters with control unit -J162 as of software version "D49". Channel number "02" is accepted for these heaters in function "10 Adaption". CO2 level in exhaust gas can be adjusted by way of this channel number.
- ◆ Only channel "01" is accepted by heater control units -J162 with software version "X46", "D47" or "D48".
- ◆ The adaption function varies the control curve for the combustion air blower -V6 (and thus the delivery rate) by way of the control unit.
- ◆ As soon as operating and display unit for air conditioner/Climatronic -E87 is switched on (by auxiliary heater), it is to be set to maximum heat output (temperature preselection "Hi").

Test requirements

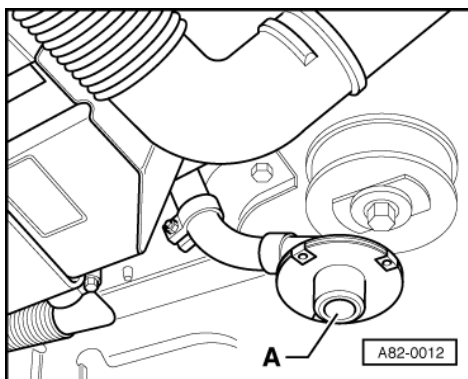
- Coolant temperature at start of test less than 30° C
- Ambient temperature less than 20° C
- Battery -A (and second battery -A1) OK and adequately charged
- Fault memory interrogated =>Page 13 and any faults displayed located and eliminated
- Sufficient fuel in tank (fuel gauge in dash panel insert not in red zone)

7.2 - Checking CO2 level in auxiliary/additional heater exhaust gas (heater with recirculating pump -V55)

Notes:

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- ◆ Auxiliary/additional heater can be switched on via pre-selection clock -E111/dash panel insert or by way of fault reader V.A.G 1551 (basic setting function, display group number 022 =>Page 26).
- ◆ In the case of heaters with control unit -J162 as of software version "D49", auxiliary/additional heater can be operated by way of "basic setting" function up to a coolant temperature of 115° C. Starting from control interval is possible. The operating time is limited to max. 8 minutes.
- ◆ Heed test requirements =>Page 125 .
- Switch off ignition.
- Start auxiliary/additional heater self-diagnosis => Page 7 .
- Interrogate fault memory =>Page 13 and eliminate any faults displayed.



- Erase fault memory =>Page 28 .



- -> Switch on exhaust analyzer V.A.G 1788 and insert corresponding hose of exhaust probe into exhaust pipe -A- of auxiliary/additional heater.

Note:

Exhaust probe must not impede emergence of exhaust gas from exhaust pipe during test.

- Switch on auxiliary/additional heater.
- Wait until auxiliary/additional heater switches from starting to full load mode (roughly 4 minutes, interrogate instantaneous operating status => Reading measured value block, Page 34).
- Allow auxiliary/additional heater to run for at least 1 minute in full load mode.
- Read off measured value for CO₂ (carbon dioxide) level in exhaust gas from CO₂ measuring instrument (as of approx. 5 minutes after switch-on; auxiliary/additional heater must be in full load mode).

Specifications:

- ♦ Diesel engine
8 to 13 % by vol. CO₂
- ♦ Petrol engine
7 to 12 % by vol. CO₂

Notes:

- ♦ As soon as operating and display unit for air conditioner/Climatronic -E87 is switched on (by auxiliary/additional heater), it is to be set to maximum heat output (temperature preselection "Hi").
- ♦ If measured value is outside permitted range:
 - Check combustion air blower intake area and auxiliary/additional heater exhaust system for dirt and clean if necessary.
 - Check fuel delivery => Page 118 .
- ♦ If CO₂ level in exhaust gas and metering pump delivery rate are in lower specified range:
 - Replace metering pump -V54 => Page 122 .
- ♦ If CO₂ level in exhaust gas is not OK although fuel delivery is:
 - Check air intake hose (with intake silencer) and auxiliary/additional heater exhaust system and service if necessary. If no fault is found:
 - In the case of auxiliary/additional heater with control unit with software version "X46", "D47" or "D48" (CO₂ level in exhaust gas not adjustable):
 - Check combustion air blower -V6.
 - Replace auxiliary/additional heater with combustion air blower -V6 => Page 179 .
 - In the case of auxiliary/additional heater with control unit with software version as of "D49" (CO₂ level in exhaust gas adjustable):
 - Check combustion air blower -V6.
 - Adjust CO₂ level in exhaust gas => Page 126 .
 - If CO₂ level in exhaust gas cannot be adjusted, replace combustion air blower -V6 => Page 179 .
- ♦ In the event of auxiliary heater starting problems although fuel delivery OK:
 - Check glow plug with flame monitor -Q8 => Page 49 .
 - Remove residue from burner element (only applies to vehicles with diesel engine frequently run on vegetable-oil methylester as fuel) => Page 132 .
 - Replace burner element => Page 180 .

7.3 - Adjusting CO₂ level in auxiliary/additional heater exhaust gas (heater with recirculating pump -V55)

- Checking CO₂ level in auxiliary/additional heater exhaust gas
=> Page 125

Note:

Prerequisites for adjusting CO₂ level in exhaust gas:

- Auxiliary/additional heater in full load mode
- Fault reader connected and auxiliary/additional heater self-diagnosis started

- CO2 measuring instrument ready for operation and exhaust probe positioned in auxiliary/additional heater exhaust pipe such that emergence of exhaust gas is not impeded

-> Indicated on display (function selection):

Rapid data transfer HELP
Select function XX

- Press keys -1- and -0- to select "Adaption" function 10.

-> Indicated on display:

Rapid data transfer Q
10 - Adaption

- Confirm entry with Q key.

-> Indicated on display:

Adaption Q
Enter channel number XX

- Enter channel number -02-.
- Confirm entry with Q key.

Notes:

Function unknown or cannot be implemented at present

-> If this display appears, a fault has occurred and adaption cannot be implemented (interrogate instantaneous operating status =>Reading measured value block, Page 34).

Channel 02 Adaption XXX
□ Wait

-> If this display appears, auxiliary/additional heater is currently not in full load mode (interrogate instantaneous operating status =>Reading measured value block, Page 34).

- If auxiliary/additional heater is in starting sequence, wait until it switches to full load mode.
- If auxiliary/additional heater is in part load mode or control interval:
 - Switch off auxiliary heater via pre-selection clock -E111/dash panel insert and switch on again by way of fault reader V.A.G 1551 (basic setting function, display group number 022 =>Page 26). In this setting, full load mode is possible up to a coolant temperature of 115° C.
 - Additionally switch on ignition, make temperature preselection "Hi" on operating and display unit for air conditioner/Climatronic -E87 and wait until coolant temperature has dropped to such an extent that auxiliary heater returns to full load mode.

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-> Indicated on display:

Channel 02 Adaption XXX
□ CO2 adjustment (-1 3-)

- Read off measured value for CO2 (carbon dioxide) level on CO2 measuring instrument.

Settings:

- ◆ Diesel engine
9 to 12 % by vol. CO2
- ◆ Petrol engine
8 to 11 % by vol. CO2

-> Indicated on display:

Channel 02 Adaption XXX
□ CO2 adjustment (-1 3-)



- CO2 level in exhaust gas can be altered by pressing button -1- or -3-.
 - CO2 level in exhaust gas is increased by approx. 0.08 % each time button -1- is pressed.
 - CO2 level in exhaust gas is reduced by approx. 0.08 % each time button -3- is pressed.

Notes:

- ♦ Valid setting prior to adjustment remains stored if auxiliary/additional heater is switched off during CO2 adjustment or on exit from full load mode.
- ♦ In the event of a considerable difference between specification and actual value, adaption value can also be entered directly.
- Press ⇒ key.

-> Indicated on display:

Channel	02	Adaption	XXX	Q
Enter adaption value XXXXX				

- Enter desired numerical value and confirm entry with Q key.
- ♦ CO2 level can only be altered within certain limits (adaption value e.g. between "00105" and "00136". Actual adjustment limits depend on basic setting for this unit made by auxiliary/additional heater manufacturer). If CO2 level cannot be set as required, check combustion air blower and air intake, metering pump fuel delivery and auxiliary/additional heater exhaust system.
- Read off measured value for CO2 (carbon dioxide) level on measuring instrument.

-> Indicated on display:

Channel	02	Adaption	XXX
□			
CO2 adjustment		(-1 3-)	

If CO2 level in exhaust gas is in specified range:

- Press ⇒ key.

-> Indicated on display:

Channel	02	Adaption	XXX	Q
Enter adaption value XXXXX				

- Confirm entry with Q key.

-> Indicated on display:

Channel	02	Adaption	XXX
Q			
Store altered value?			

- Confirm entry with Q key.

-> Indicated on display:

Channel	02	Adaption	XXX
□			
Altered value stored			

- Press ⇒ key.

-> Indicated on display:

Rapid data transfer		HELP
Select function XX		

- Press keys -0- and -6- to enter "End output" function 06.

-> Indicated on display:

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Rapid data transfer Q
 06 - End of output

- Confirm entry with Q key.

-> Indicated on display:

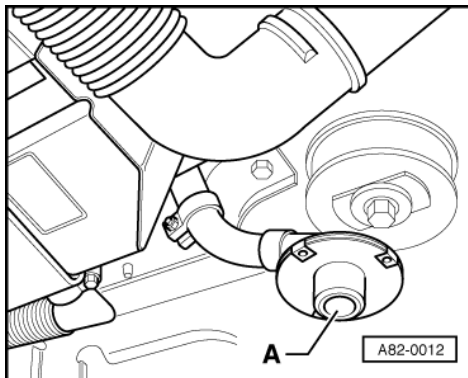
Rapid data transfer HELP
 Enter address word XX

- Unplug diagnostic connector.
- Switch off auxiliary/additional heater.

7.4 - Checking CO₂ level in additional heater exhaust gas (heater with no recirculating pump -V55)

Notes:

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- ◆ Additional heater is switched on by way of fault reader V.A.G 1551 (basic setting function, display group number 022 =>Page 26).
 - ◆ In the case of heaters with control unit -J162 as of software version "D49", auxiliary/additional heater can be operated by way of "basic setting" function up to a coolant temperature of 115° C. Starting from control interval is possible. The operating time is limited to max. 8 minutes.
 - ◆ Heed test requirements =>Page 125 .
 - Start auxiliary/additional heater self-diagnosis => Page 7 .
 - Interrogate fault memory =>Page 13 and eliminate any faults displayed.



- Erase fault memory =>Page 28 .
- -> Switch on exhaust analyzer V.A.G 1788 and insert corresponding hose of exhaust probe into exhaust pipe -A- of additional heater.

Note:

Exhaust probe must not impede emergence of exhaust gas from exhaust pipe during test.

- Start engine.
- Set operating and display unit for air conditioner/Climatronic -E87 to maximum heat output (temperature preselection "Hi").
- Start auxiliary/additional heater self-diagnosis and switch on additional heater by way of "basic setting" function => Page 22 .
- Wait until additional heater switches from starting to full load mode (roughly 4 minutes, interrogate instantaneous operating status =>Reading measured value block, Page 34).
- Allow additional heater to run in full load mode for at least 1 minute.
- Read off measured value for CO₂ (carbon dioxide) level in exhaust gas from CO₂ measuring instrument (as of approx. 5 minutes after switch-on; additional heater must be in full load mode).

**Specifications:**

- ♦ Diesel engine
8 to 13 % by vol. CO₂

Notes:

- ♦ If measured value is outside permitted range:
 - Check combustion air blower intake area and additional heater exhaust system for dirt and clean if necessary.
 - Check fuel delivery => Page 118 .
- ♦ If CO₂ level in exhaust gas and metering pump delivery rate are in lower specified range:
 - Replace metering pump -V54 => Page 122 .
- ♦ If CO₂ level in exhaust gas is not OK although fuel delivery is:
 - Check air intake hose (with intake silencer) and additional heater exhaust system and service if necessary. If no fault is found:
 - In the case of additional heater with control unit with software version "X46", "D47" or "D48" (CO₂ level in exhaust gas not adjustable):
 - Check combustion air blower -V6.
 - Replace additional heater with combustion air blower -V6
=> Page 179 .
 - In the case of additional heater with control unit with software version as of "D49" (CO₂ level in exhaust gas adjustable):
 - Check combustion air blower -V6.
 - Adjust CO₂ level in exhaust gas => Page 130 .
 - If CO₂ level in exhaust gas cannot be adjusted, replace combustion air blower -V6 => Page 179 .
- ♦ In the event of additional heater starting problems although fuel delivery OK:
 - Check glow plug with flame monitor -Q8 => Page 49 .
 - Remove residue from burner element (only applies to operation with vegetable oil methylester fuel) => Page 132 .
 - Replace burner element => Page 177 .

7.5 - Adjusting CO₂ level in additional heater exhaust gas (heater with no recirculating pump -V55)

- Checking CO₂ level in additional heater exhaust gas => Page 129

Note:

Prerequisites for adjusting CO₂ level in exhaust gas:

- Additional heater in full load mode
- Fault reader connected and auxiliary/additional heater self-diagnosis started
- CO₂ measuring instrument ready for operation and exhaust probe positioned in additional heater exhaust pipe such that emergence of exhaust gas is not impeded

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

- Press keys -1- and -0- to select "Adaption" function 10.

-> Indicated on display:

Rapid data transfer	Q
10 - Adaption	

- Confirm entry with Q key.

-> Indicated on display:

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Adaption Q
 Enter channel number XX

- Enter channel number -02-.
- Confirm entry with Q key.

Notes:

Function unknown or cannot
 be implemented at present

-> If this display appears, a fault has occurred and adaption cannot be implemented (interrogate instantaneous operating status => Reading measured value block, Page 34).

Channel 02 Adaption XXX
 □
 Wait

-> If this display appears, additional heater is currently not in full load mode (interrogate instantaneous operating status => Reading measured value block, Page 34).

- If additional heater is in starting sequence, wait until it switches to full load mode.
- If additional heater is in part load mode or control interval, allow coolant to cool down.

-> Indicated on display:

Channel 02 Adaption XXX
 □
 CO2 adjustment (-1 3-)

- Read off measured value for CO2 (carbon dioxide) level on CO2 measuring instrument.

Settings:

- ◆ Diesel engine
9 to 12 % by vol. CO2

-> Indicated on display:

Channel 02 Adaption XXX
 □
 CO2 adjustment (-1 3-)

- CO2 level in exhaust gas can be altered by pressing button -1- or -3-.
 - CO2 level in exhaust gas is increased by approx. 0.08 % each time button -1- is pressed.
 - CO2 level in exhaust gas is reduced by approx. 0.08 % by pressing button -3-.

Notes:

- ◆ Valid setting prior to adjustment remains stored if additional heater is switched off during CO2 adjustment or on exit from full load mode.
- ◆ In the event of a considerable difference between specification and actual value, adaption value can also be entered directly.
- Press ⇒ key.

-> Indicated on display:

Channel 02 Adaption XXX Q
 Enter adaption value XXXXX

- Enter desired numerical value and confirm entry with Q key.
- ◆ CO2 level can only be altered within certain limits (adaption value e.g. between "00105" and "00136". Actual adjustment limits depend on basic setting for this unit made by auxiliary/additional heater manufacturer). If CO2 level cannot be set as required, check combustion air blower and air intake, metering pump fuel delivery and additional heater exhaust system.
- Read off measured value for CO2 level on measuring instrument.



-> Indicated on display:

Channel	02	Adaption	XXX
CO2 adjustment (-1 3-)			

If CO2 level in exhaust gas is in specified range:

- Press => key.

-> Indicated on display:

Channel	02	Adaption	XXX	Q
Enter adaption value XXXXX				

- Confirm entry with Q key.

-> Indicated on display:

Channel	02	Adaption	XXX
Q			
Store altered value?			

- Confirm entry with Q key.

-> Indicated on display:

Channel	02	Adaption	XXX
Q			
Altered value stored			

- Press => key.

-> Indicated on display:

Rapid data transfer	HELP
Select function XX	

- Press keys -0- and -6- to enter "End output" function 06.

-> Indicated on display:

Rapid data transfer	Q
06 - End of output	

- Confirm entry with Q key.

-> Indicated on display:

Rapid data transfer	HELP
Enter address word XX	

- Switch off additional heater by way of "basic setting" function
=> Page 22.
- Unplug diagnostic connector.



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7.6 - Removing residue from burner element (operation with vegetable-oil methylester fuel only)

Notes:

- ♦ Problems with auxiliary/additional heater operation may be encountered in cold weather on vehicles with diesel engines if use is predominantly made of vegetable-oil methylester as fuel.
- ♦ Explanation:
On account of the physical properties, deposits may form during operation on the evaporation fabric in the burner element. These then cause combustion problems if the vehicle is run for lengthy periods on vegetable-oil methylester.
- ♦ Such deposits can be broken down and thus eliminated by the combustion of petrol.

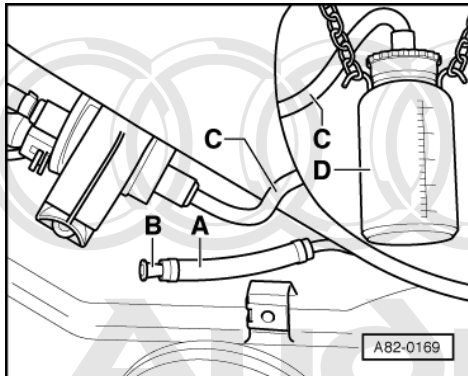
- ♦ If evaporation fabric in burner element is clogged to such an extent that flame can no longer be formed, replace burner element => Page 177 .

Requirements:

- Fault memory interrogated =>Page 13 and any faults displayed located and eliminated
- Coolant temperature (on commencement) less than 30°C

Removing residue:

- Switch off ignition.
- Remove guard beneath tank.

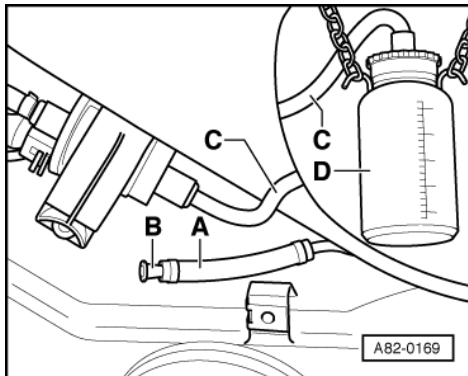


- -> Detach fuel pipe -A- from metering pump and seal with plug -B-.
- Pour 1l of fuel (petrol) into vessel -D-.

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Notes:

- ♦ Vessel -D- must be provided with a riser reaching down to the bottom.
- ♦ There must be an opening in the cap to prevent formation of vacuum whilst drawing off fuel.



- -> Attach vessel -D- (VAS 5086) to vehicle in area of metering pump.
- Squeeze vessel -D- until fuel appears at the end of hose -C- and then attach hose to metering pump.

In the case of additional heater without auxiliary heater (heater type "Z/C-D" with no recirculating pump -V55):

- Start engine.
- Set operating and display unit for air conditioner/Climatronic -E87 to maximum heat output (temperature preselection "Hi").
- Open all windows.
- Start additional heater self-diagnosis and switch on additional heater by way of "Basic setting" function (only applies to additional heater without auxiliary heater) => Page 22 .
- Repeat this procedure 3 times (additional heater must be operated with petrol for at least 30 minutes).

Notes:

- ♦ As the additional heater operating time is limited by way of the function "Basic setting, display group 22" to max. 8 minutes, the function has to be implemented a total of 4 times. For this purpose, the additional heater is to be switched off on completion of the cut-in time and at the end of the run-on time by way of the function



"Basic setting, display group 33" and then switched on again with the function "Basic setting, display group 22".

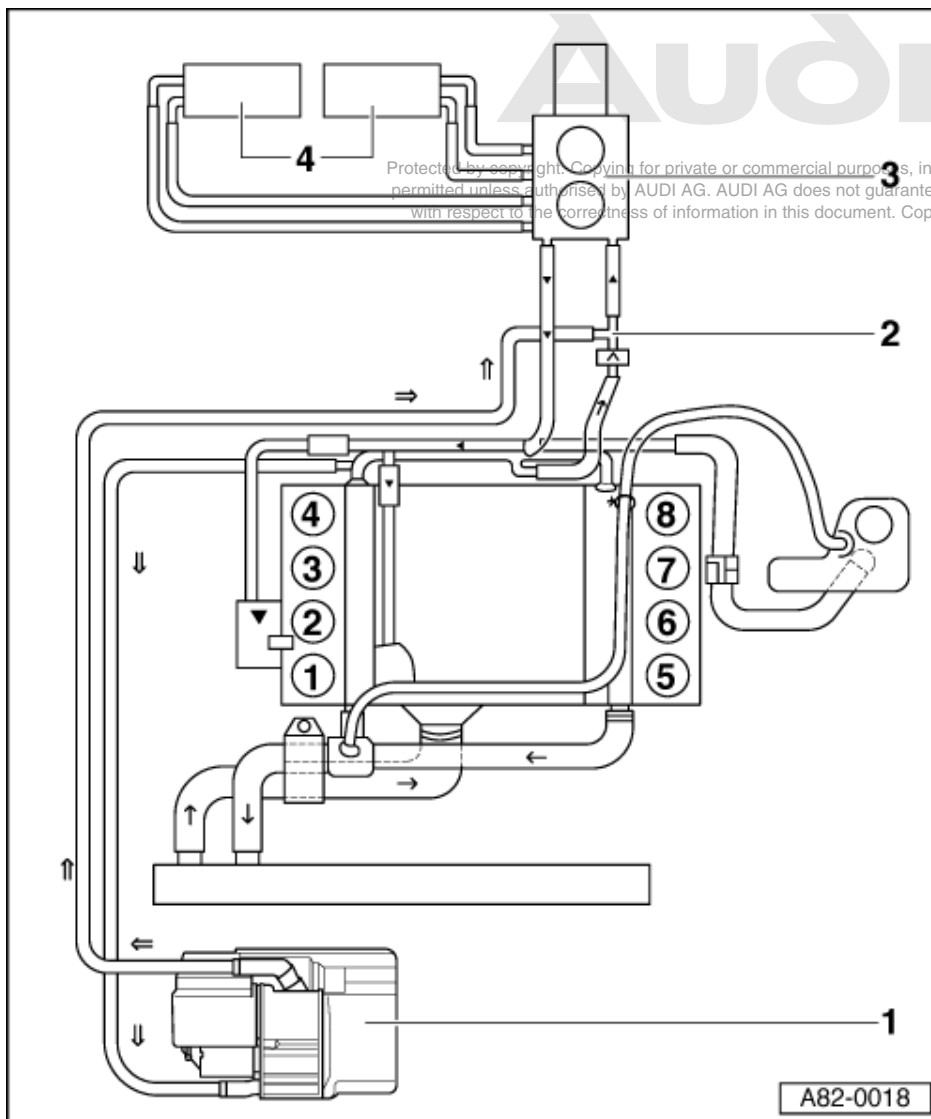
- ♦ The function "Basic setting, display group 22" enables the additional heater to be operated up to a coolant temperature of 115° C. Starting from control interval is possible.

In the case of auxiliary/additional heater (heater type "Z/C-D" with recirculating pump -V55):

- Switch on auxiliary heater.
- Open all windows.
- As soon as operating and display unit for air conditioner/Climatronic -E87 is switched on by heater (on attaining specified coolant temperature), it is to be set to maximum heat output (temperature preselection "Hi").
- Allow auxiliary/additional heater to run on petrol for at least 30 minutes.

8 - Incorporation of auxiliary/additional heater into coolant circuit

8.1 - Incorporation of auxiliary/additional heater into coolant circuit



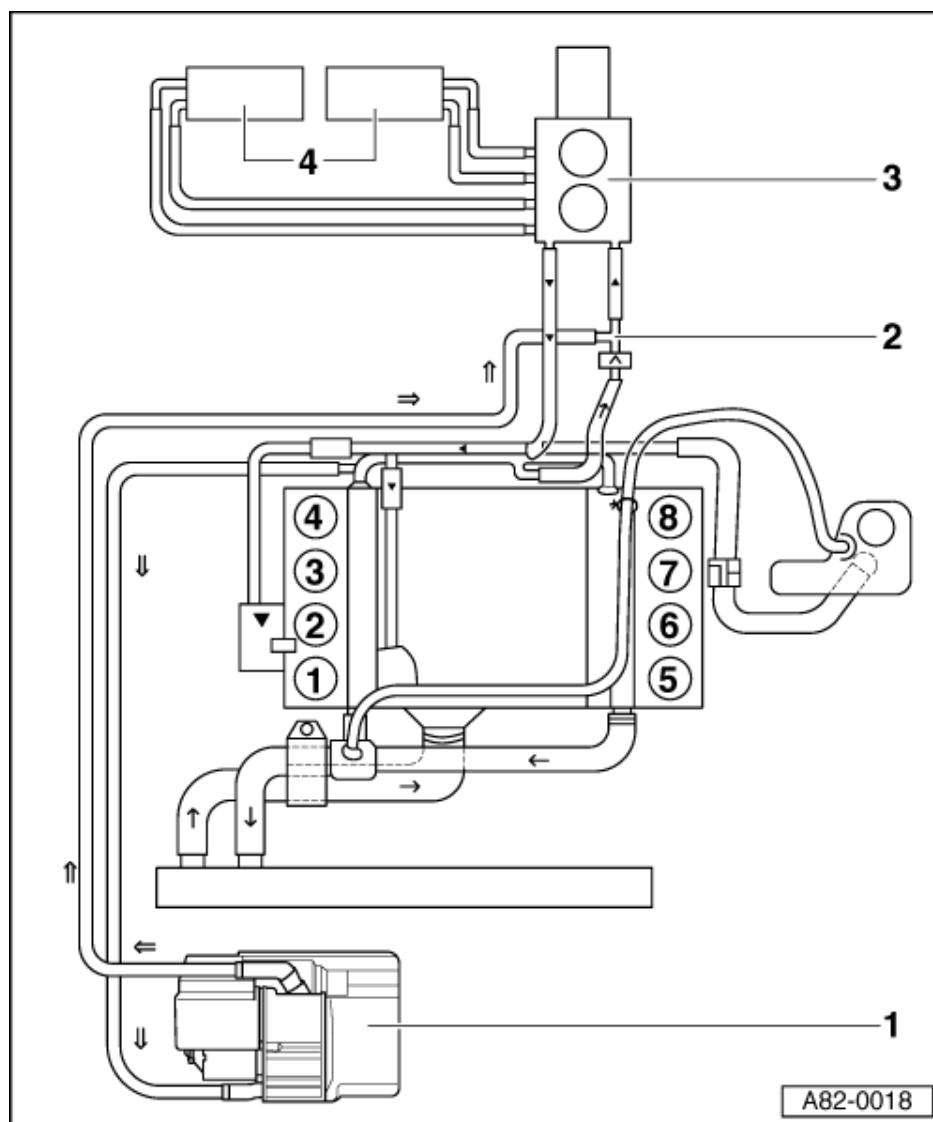
8.2 - Vehicles with 8-cyl. petrol engine (up to January 2001)

Notes:

- ♦ Up to January 2001, all vehicles were fitted with a large coolant circuit. These vehicles can be retrofitted with a coolant shut-off valve -N279 to achieve more efficient heating of the passenger compartment in auxiliary heating mode => Pages 243.
- ♦ All components not mentioned

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=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling



Direction of coolant flow:

► In auxiliary heating mode and with engine running

=> In auxiliary heating mode

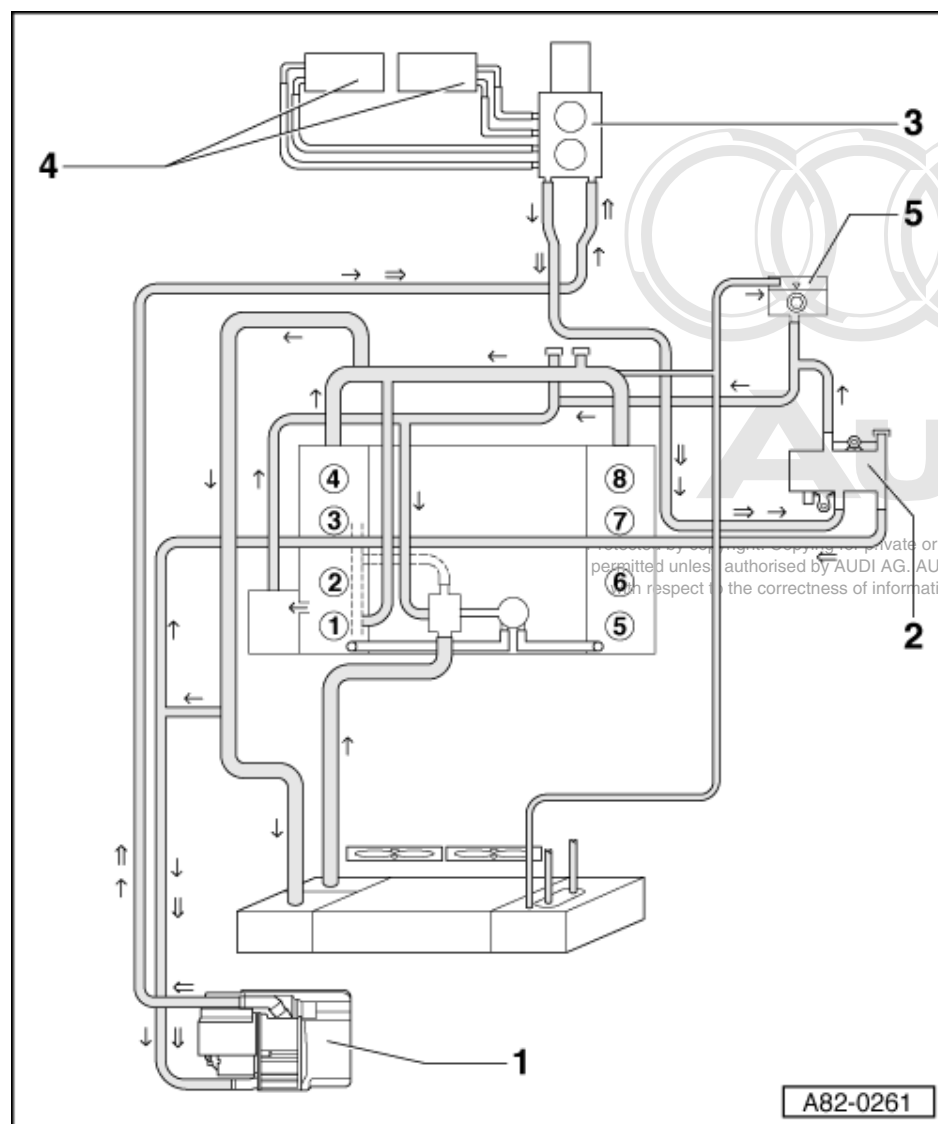
=> With engine running

- 1 Auxiliary heater
- 2 Non-return valve
- 3 Pump/valve unit
- 4 Heat exchanger of heating system/air conditioner unit

=> Air Conditioner; Repair Group 87

=> Heating; Repair Group 80

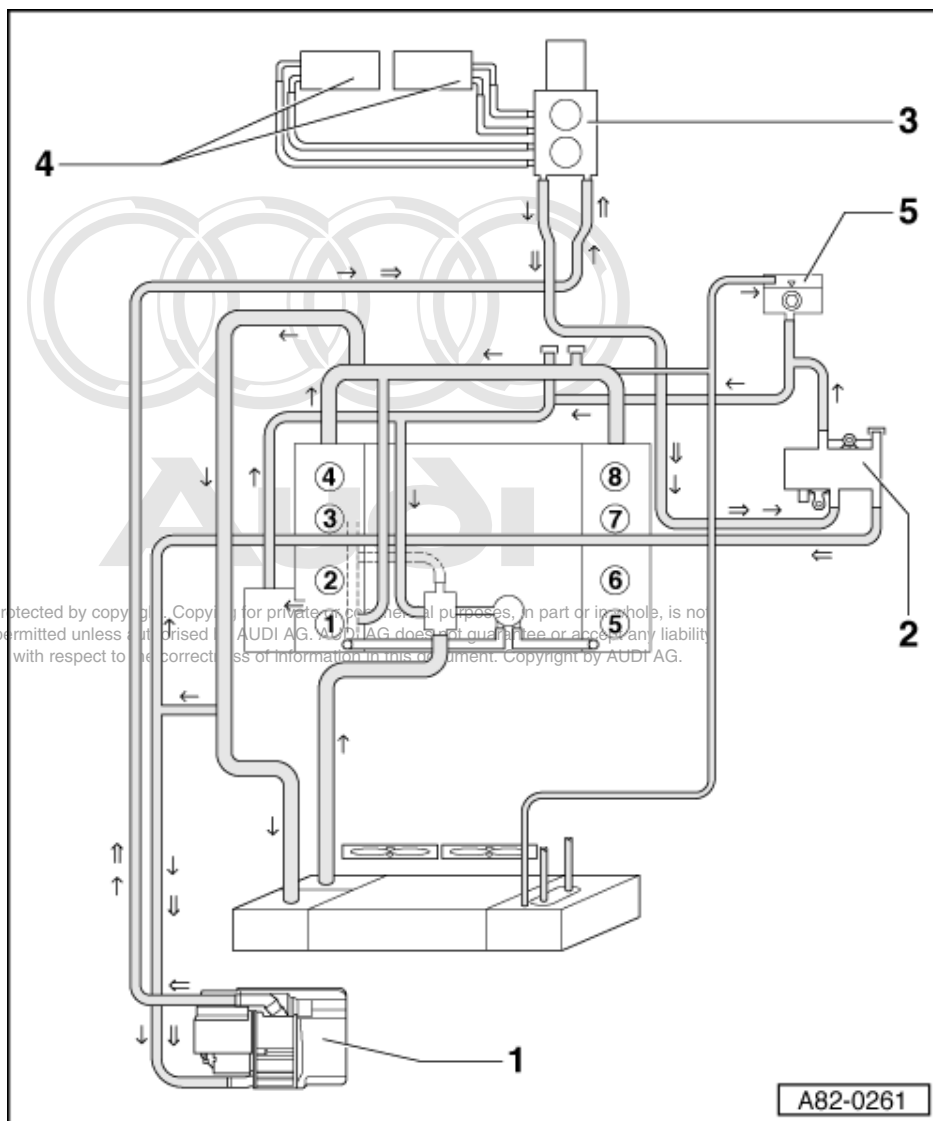
8.3 - Vehicles with 8-cyl. petrol engine (as of January 2001)



Notes:

- ♦ The coolant circuit was gradually converted as of January 2001. Following introduction of the shut-off valve -N279, the coolant only passes through the small coolant circuit in auxiliary heating mode, thus improving passenger compartment heating efficiency.
- ♦ The shut-off valve can be retrofitted on vehicles with 8-cyl. petrol engine manufactured prior to January 2001 (with no shut-off valve) => Pages 243 .
- ♦ All components not mentioned

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling



Direction of coolant flow:

=>In auxiliary heating mode with engine stopped (coolant shut-off valve -N279 actuated)

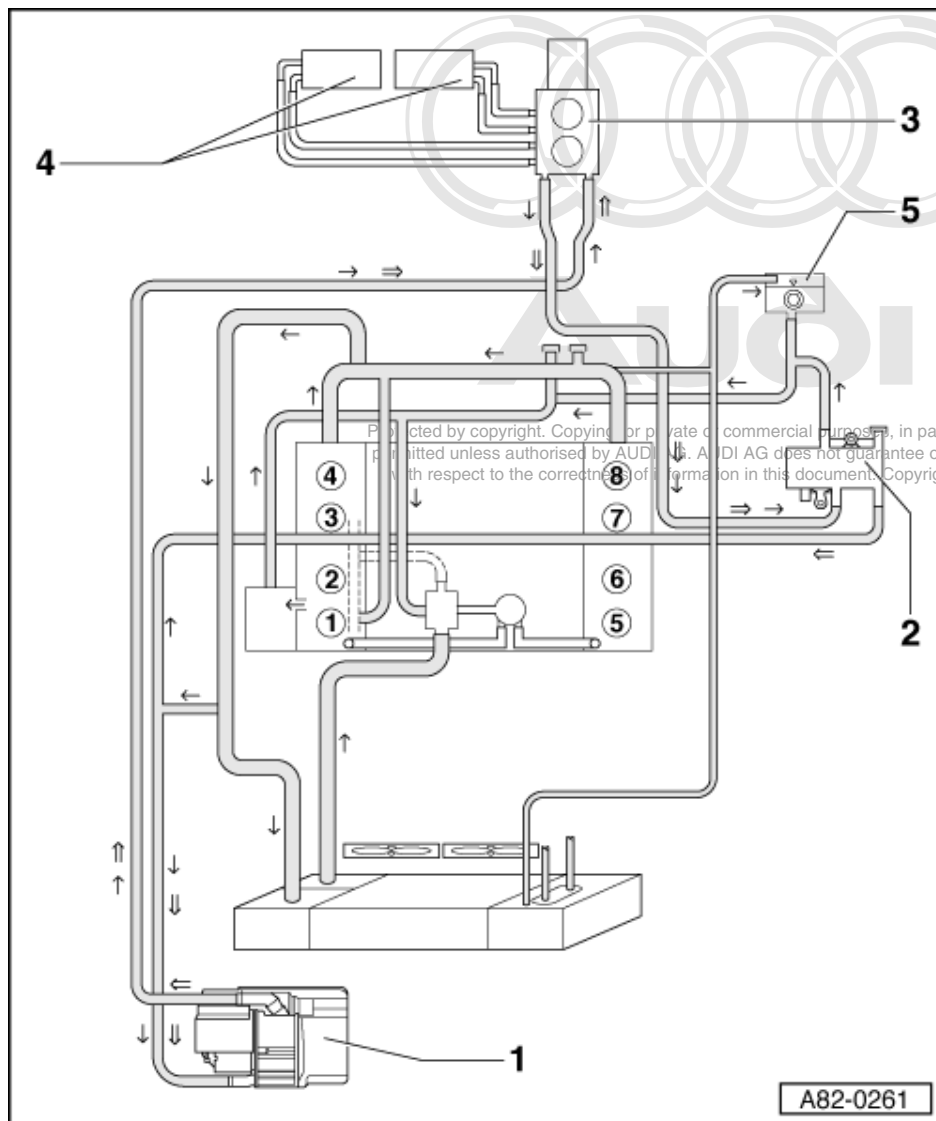
=>With engine running (coolant shut-off valve -N279 not actuated, exceptions =>Page 69)

1 Auxiliary heater

2 Coolant shut-off valve -N279

- ◆ Removing and installing=>Page 92
- ◆ Shut-off valve is actuated by coolant shut-off valve relay -J541
- ◆ Operation of relay -J541
=>Page 69
- ◆ Connection assignment of coolant hoses =>Page 92

3 Pump/valve unit

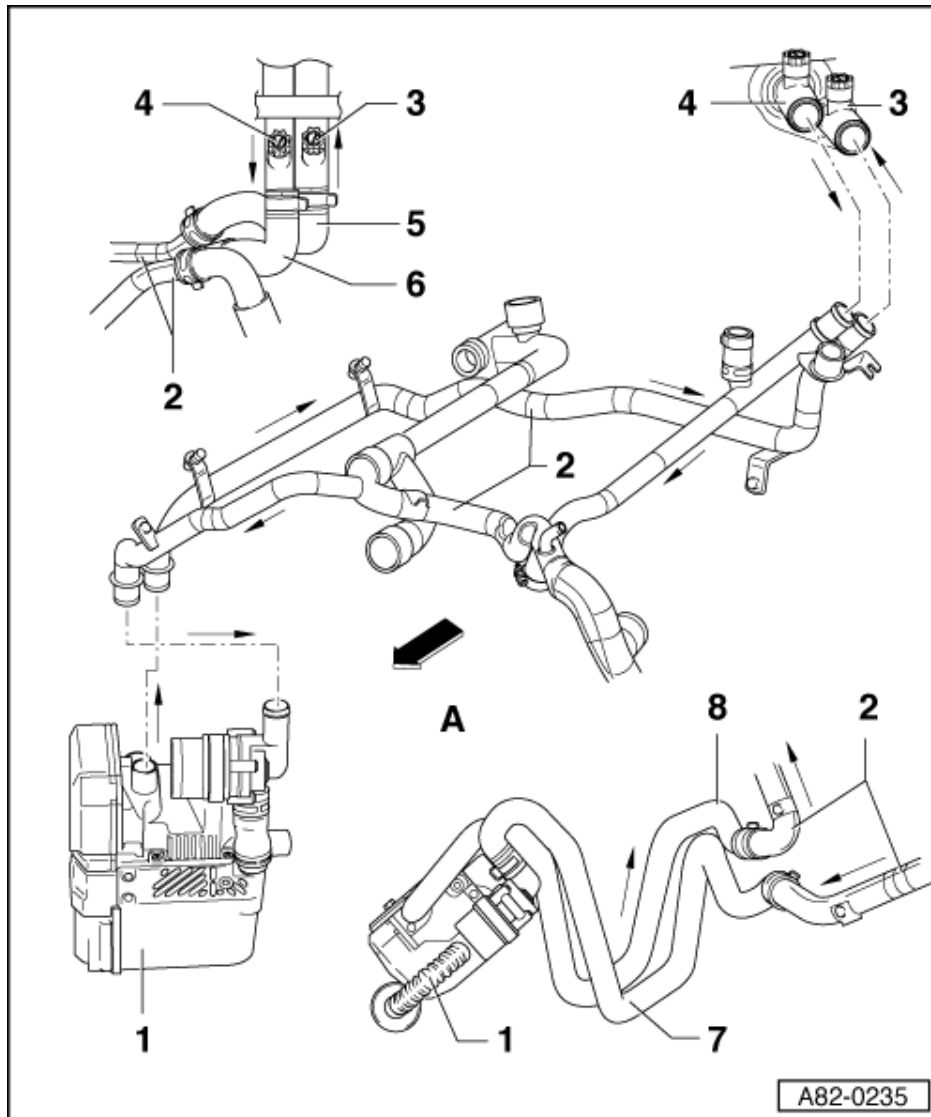


4 Heat exchanger of air conditioner unit

=> Air Conditioner; Repair Group 87

5 Coolant expansion tank

8.4 - Vehicles with 8-cyl. diesel engine



Note:

All components not mentioned

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling

Direction of coolant flow =>

A = Direction of travel

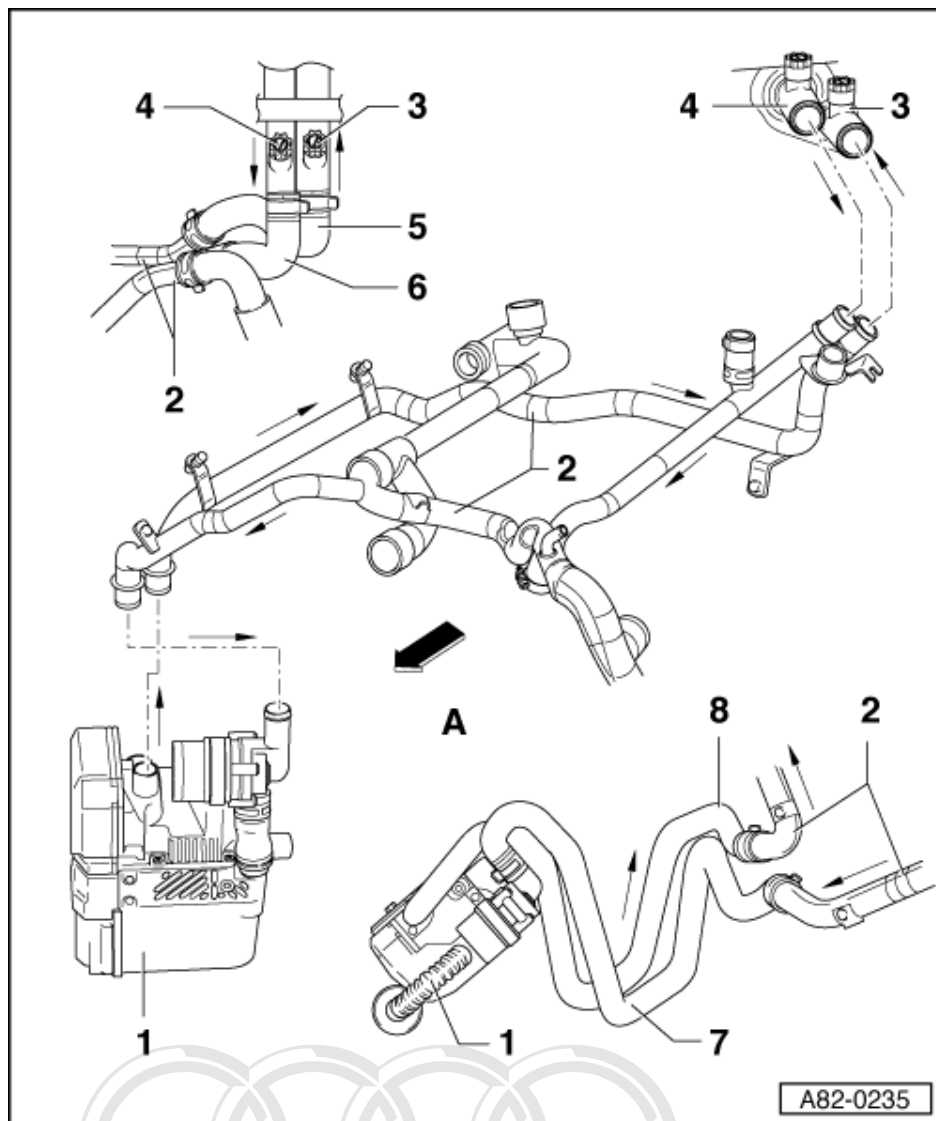
- 1 Auxiliary/additional heater**
- 2 Engine coolant pipes**

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling

3 Coolant supply to pump/valve unit

- ♦ To heat exchanger of air conditioner unit

=> Air Conditioner; Repair Group 87



4 Coolant return from pump/valve unit

- ♦ From heat exchanger of air conditioner unit

=> Air Conditioner; Repair Group 87

5 Coolant hose "Supply"

- ♦ From auxiliary/additional heater to pump/valve unit

6 Coolant hose "Return"

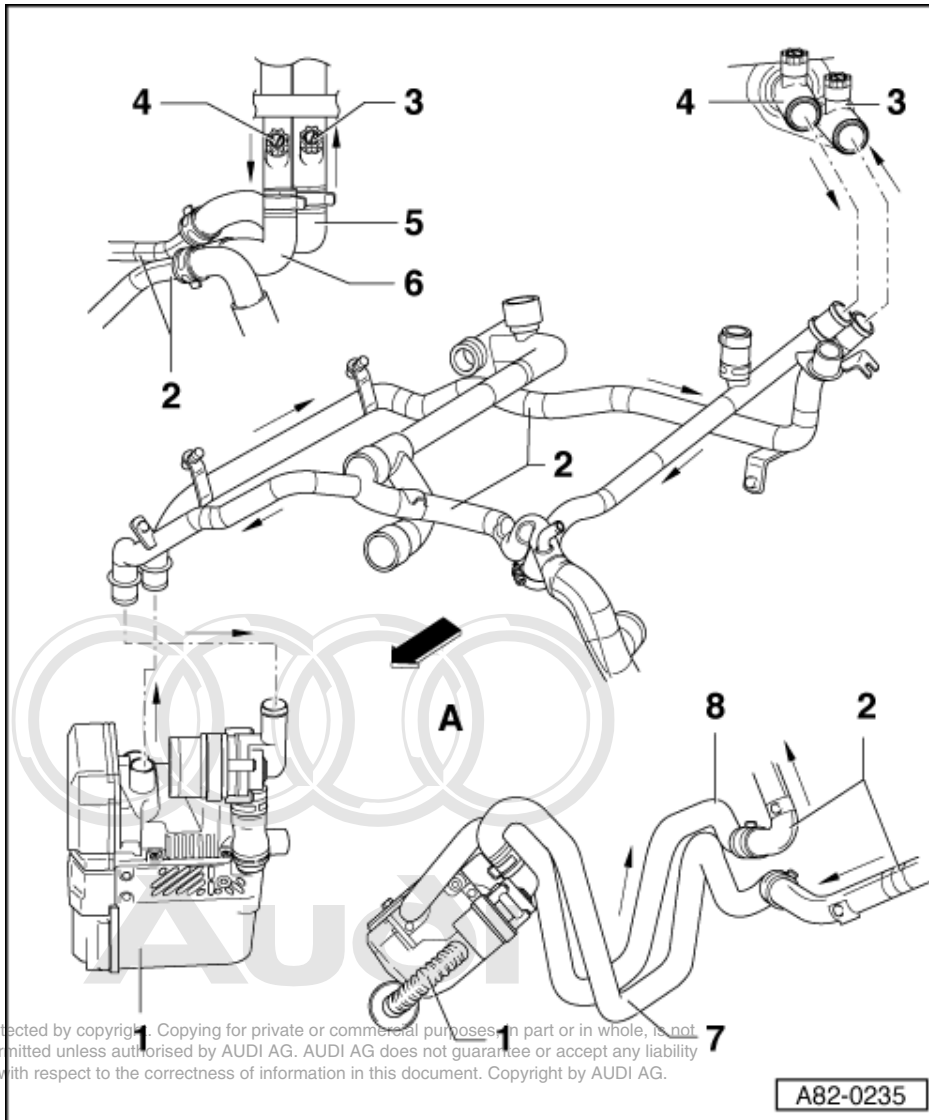
- ♦ From pump/valve unit to engine

7 Coolant hose "Supply"

- ♦ From engine to auxiliary/additional heater

- ♦ Different versions for auxiliary heater and additional heater (with and without recirculating pump)

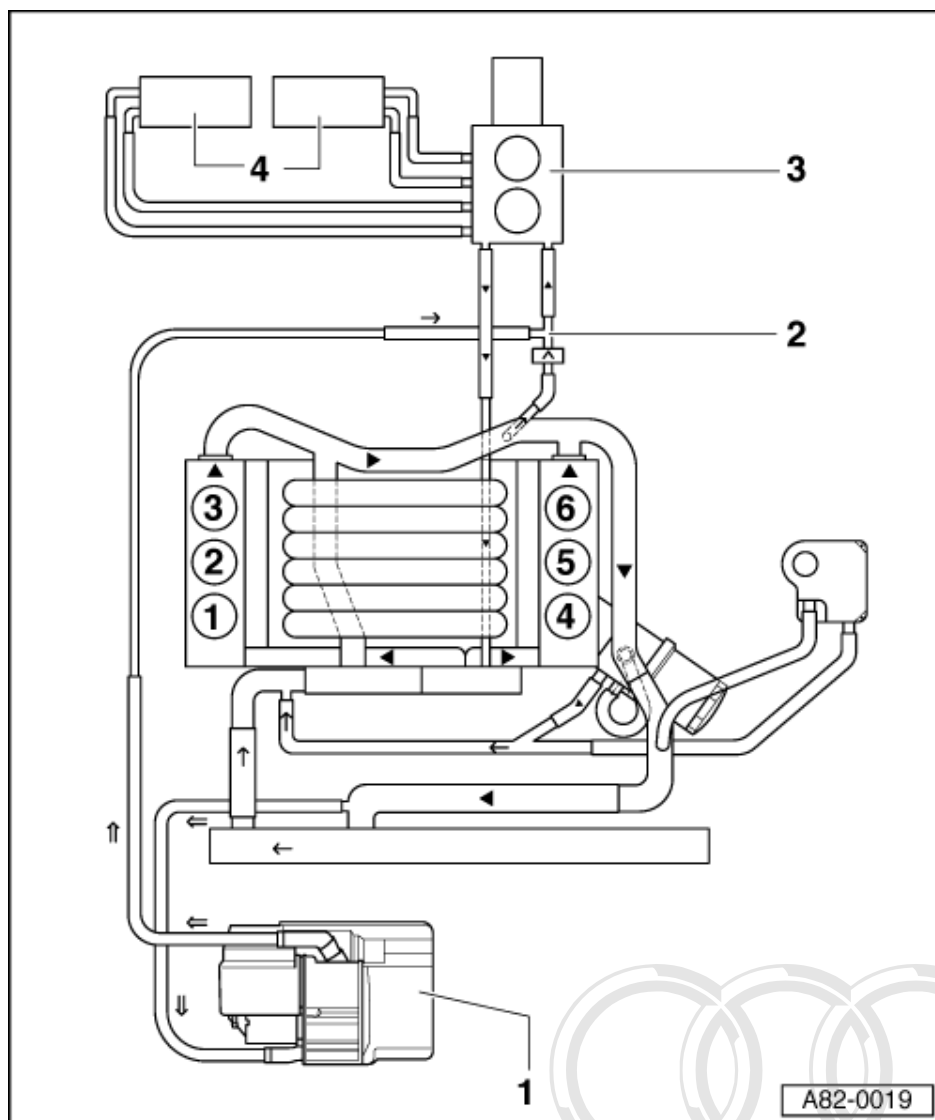
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8 Coolant hose "Return"

- ♦ From auxiliary/additional heater to pump/valve unit

8.5 - Vehicles with 6-cyl. petrol engine and "large" coolant circuit



Note:

All components not mentioned

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling

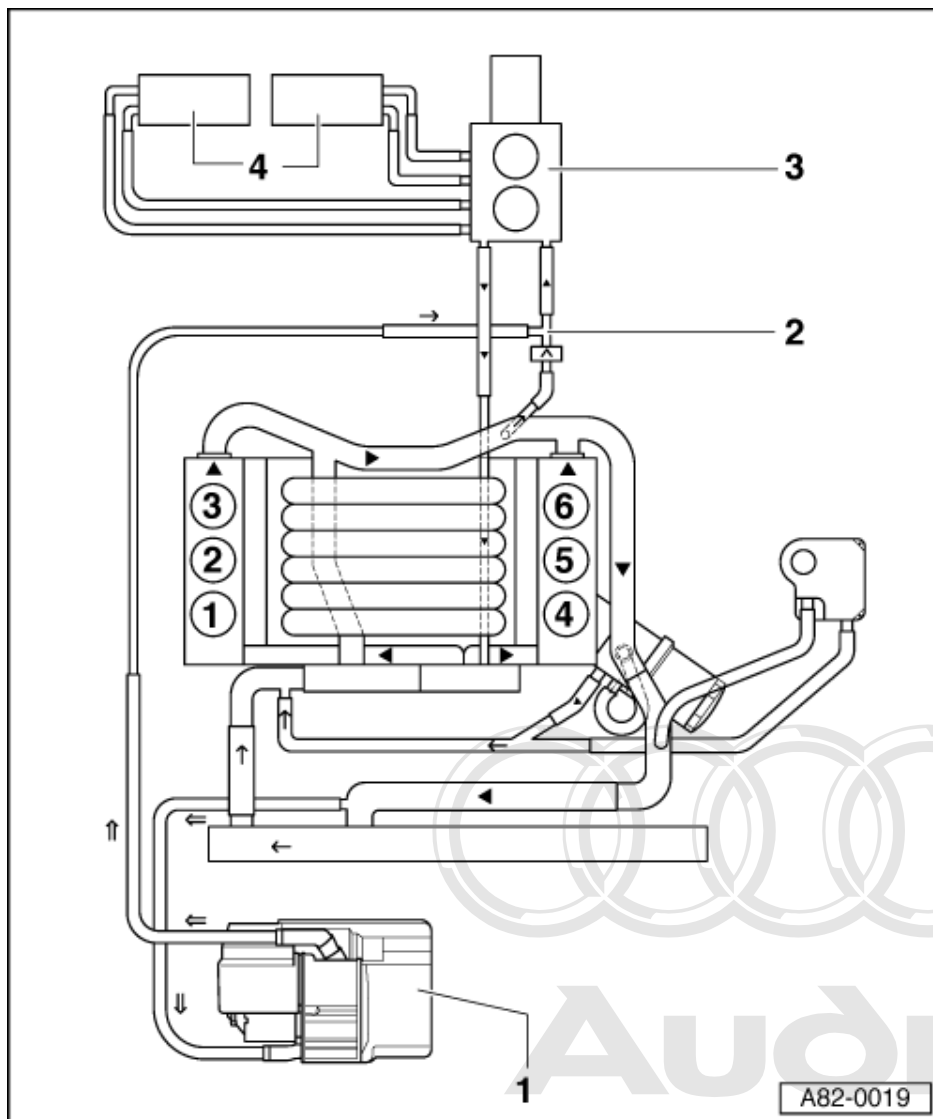
Direction of coolant flow:

- In auxiliary heating mode and with engine running

=>In auxiliary heating mode

=>With engine running

- 1 Auxiliary heater
- 2 Non-return valve



3 Pump/valve unit

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=> Air Conditioner; Repair Group 87

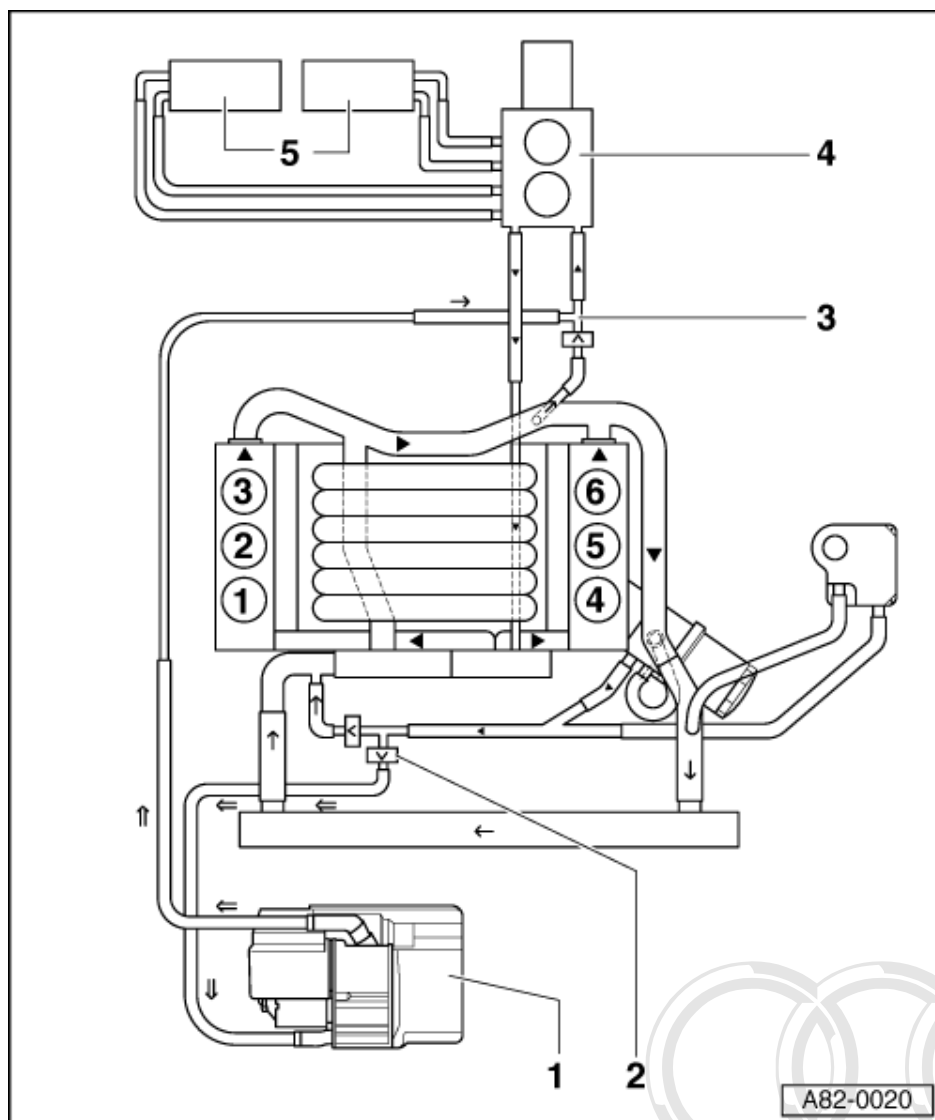
=> Heating; Repair Group 80

4 Heat exchanger of heating system/air conditioner unit

=> Air Conditioner; Repair Group 87

=> Heating; Repair Group 80

8.6 - Vehicles with 6-cyl. petrol engine and "small" coolant circuit



Note:

All components not mentioned

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling

Direction of coolant flow:

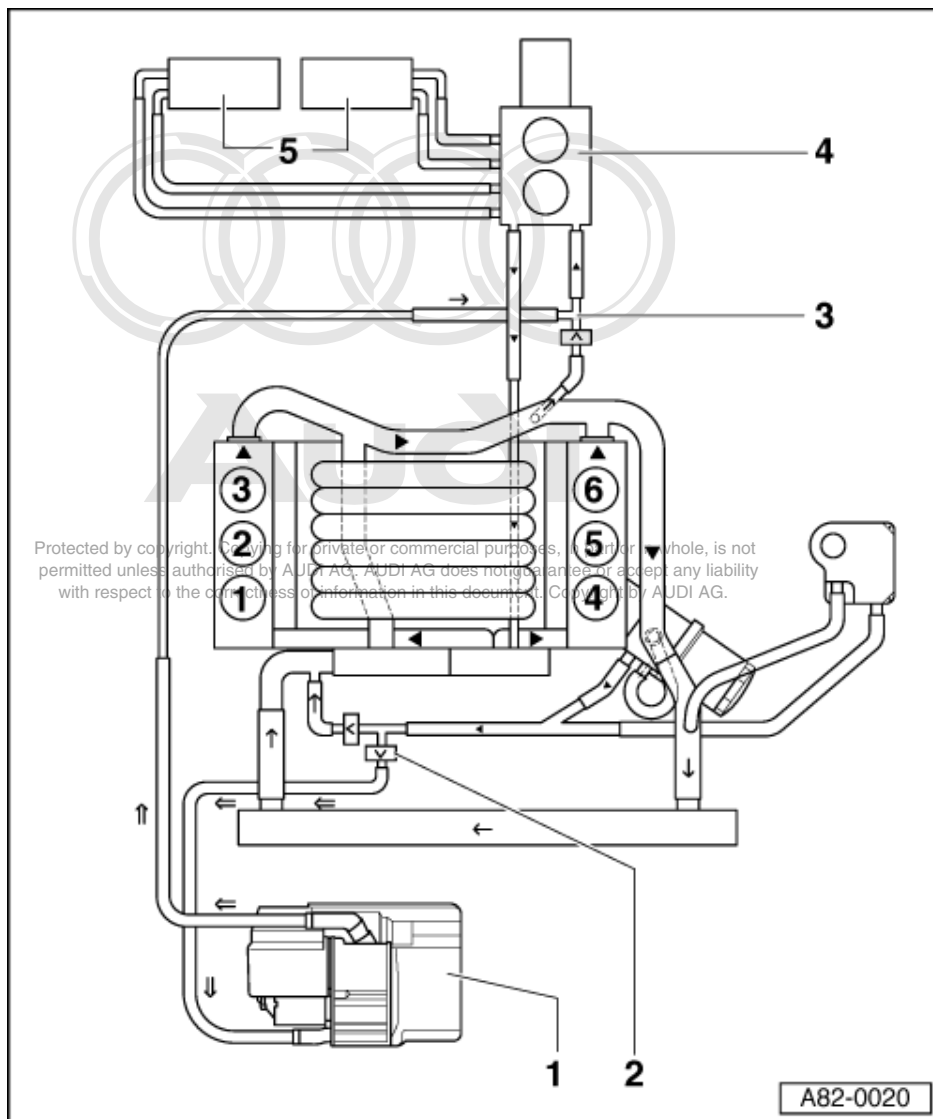
► In auxiliary heating mode and with engine running

=> In auxiliary heating mode

=> With engine running

- 1 Auxiliary heater
- 2 Double non-return valve

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3 Non-return valve

4 Pump/valve unit

=> Air Conditioner; Repair Group 87

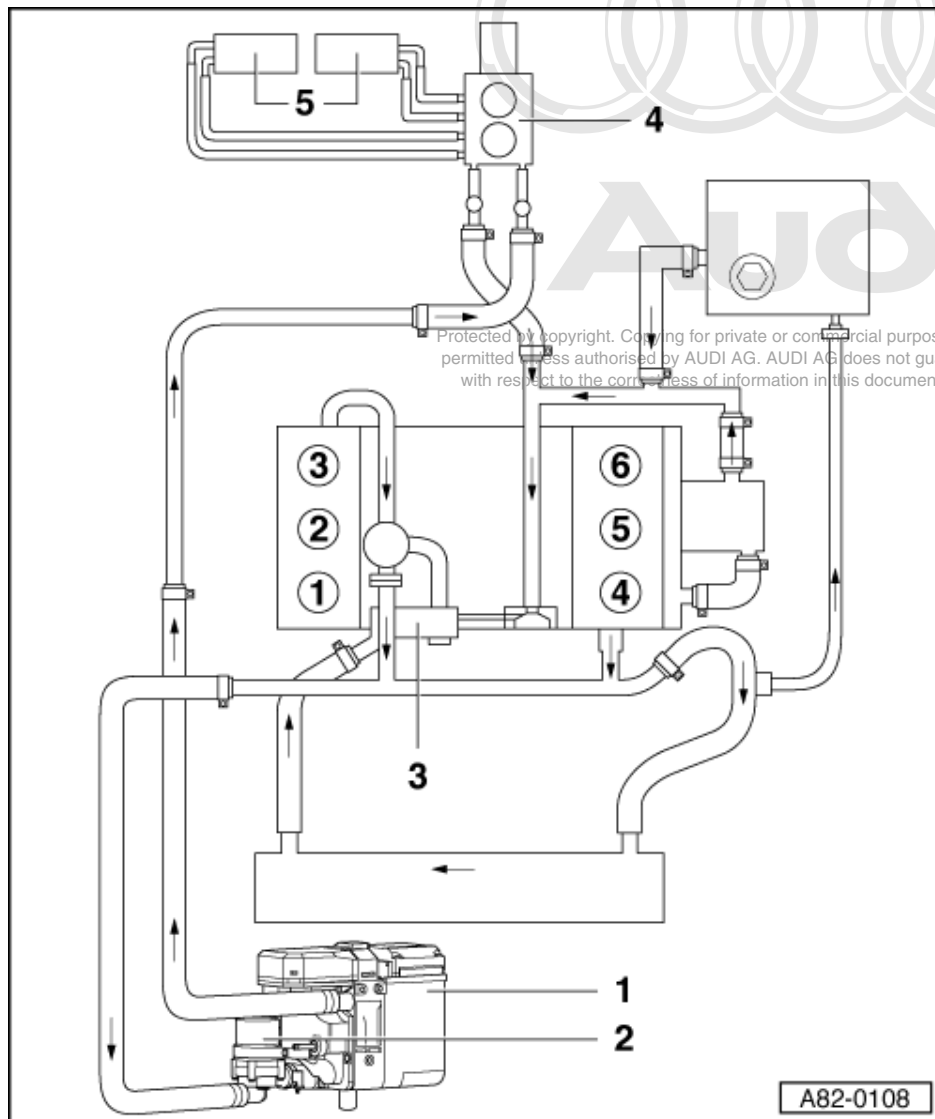
=> Heating; Repair Group 80

5 Heat exchanger of heating system/air conditioner unit

=> Air Conditioner; Repair Group 87

=> Heating; Repair Group 80

8.7 - Vehicles with 6-cyl. TDI engine



Note:

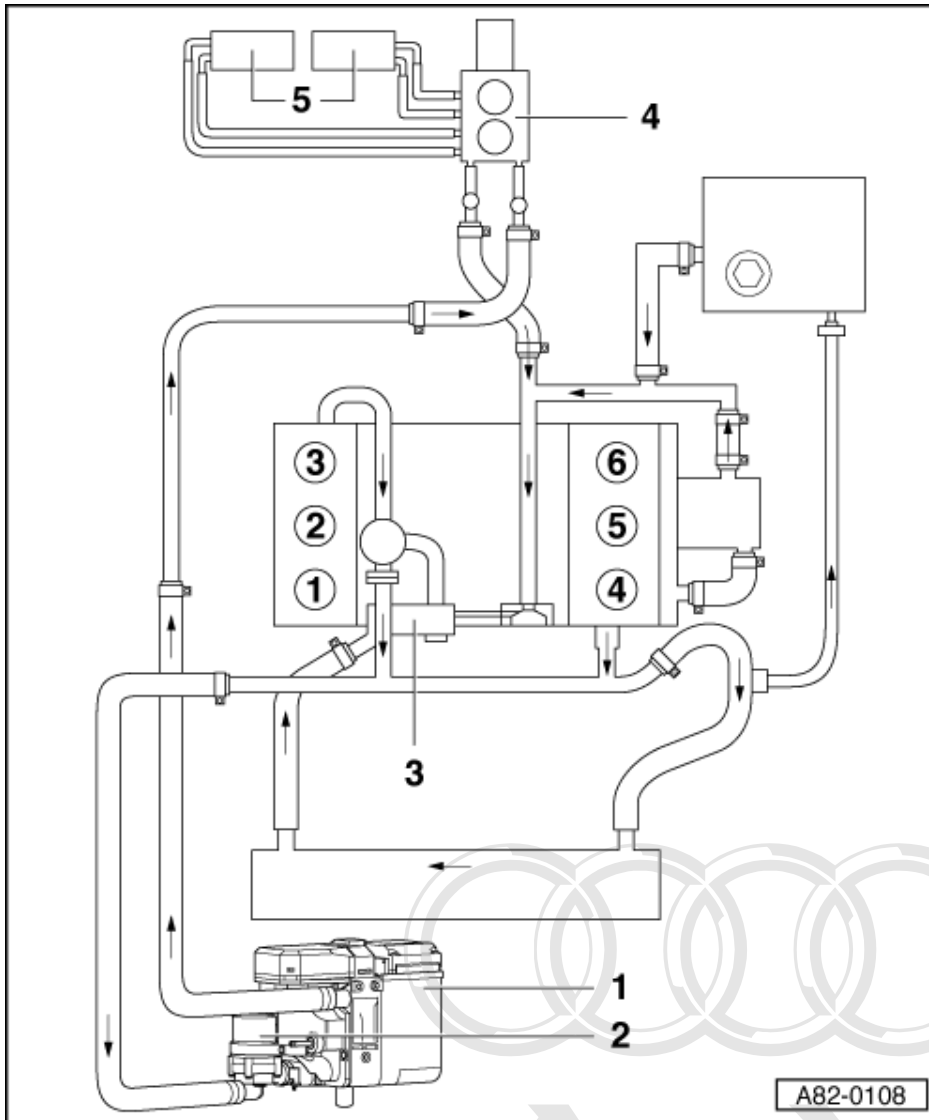
All components not mentioned

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling

Direction of coolant flow=>

- 1 Auxiliary or additional heater**
- 2 Recirculating pump -V55**
 - ♦ Only for auxiliary heater version
- 3 Thermostat**
 - ♦ Checking

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling



4 Pump/valve unit

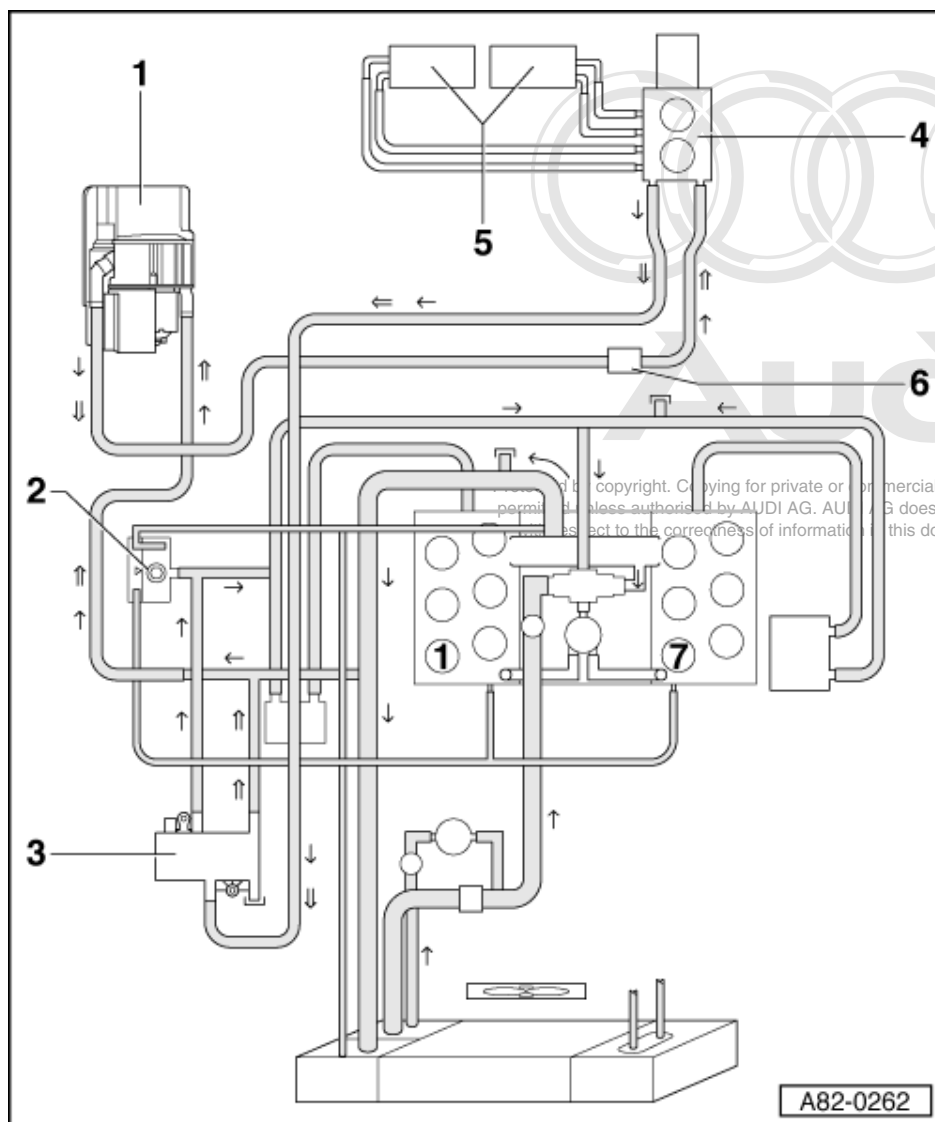
=> Air Conditioner; Repair Group 87

5 Heat exchanger of air conditioner unit

=> Air Conditioner; Repair Group 87

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8.8 - Vehicles with 12-cyl. engine



Note:

All components not mentioned

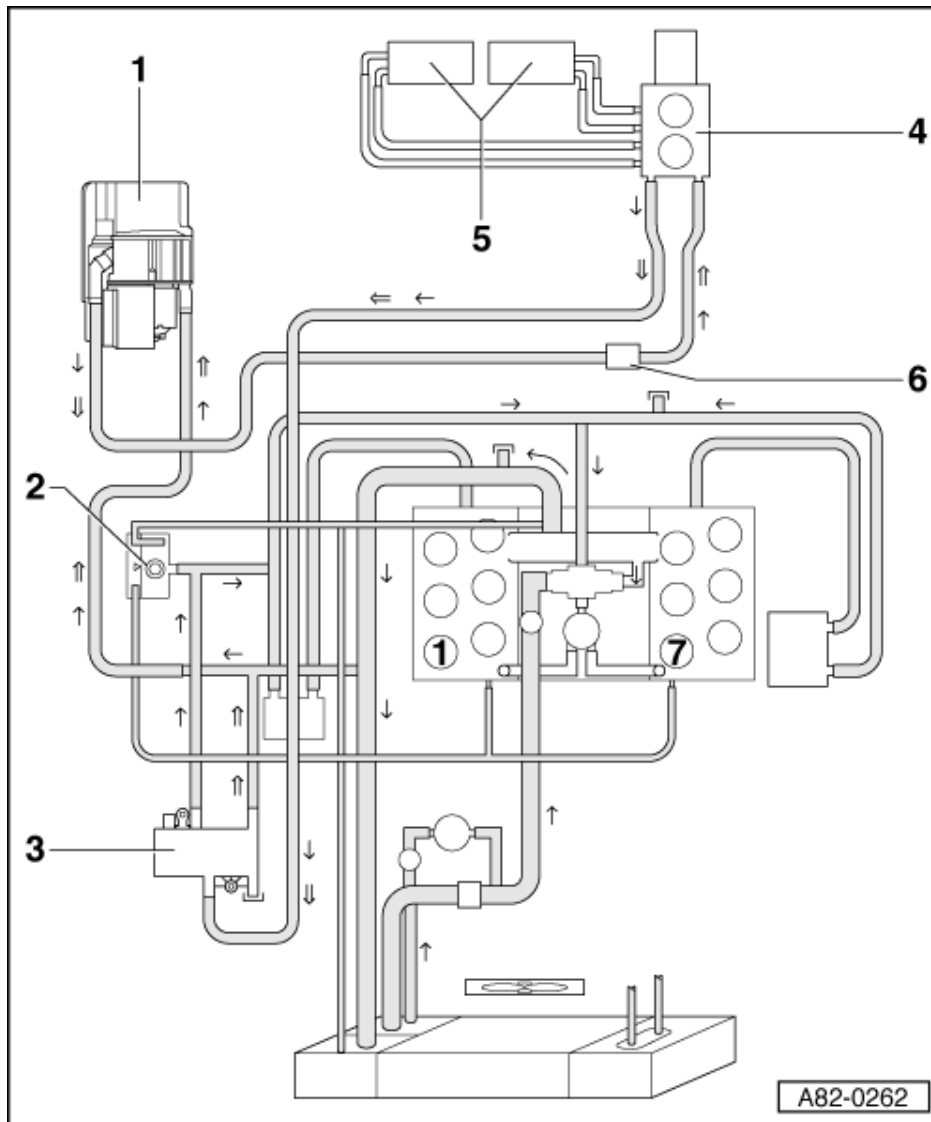
=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling

Direction of coolant flow:

=>In auxiliary heating mode with engine stopped (coolant shut-off valve -N279 actuated)

=>With engine running (coolant shut-off valve -N279 not actuated, exceptions =>Page 69)

- 1 Auxiliary heater
- 2 Coolant expansion tank



3 Coolant shut-off valve -N279

- ◆ Removing and installing=>Page 92
- ◆ Shut-off valve is actuated by coolant shut-off valve relay -J541
- ◆ Operation of relay -J541
=>Page 69
- ◆ Connection assignment of coolant hoses =>Page 92

4 Pump/valve unit

5 Heat exchanger of air conditioner unit

=> Air Conditioner; Repair Group 87

6 Non-return valve

8.9 - Bleeding coolant circuit

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=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling

Note:

On vehicles with coolant shut-off valve -N279, briefly switch on auxiliary heater (approx. 1 min.; sufficient to actuate coolant shut-off valve -N279 and recirculating pump -V55) after filling with coolant and before starting



engine. With ignition switched off, shut-off valve is actuated in auxiliary heating mode and vented via auxiliary heater recirculating pump.

- Once engine has reached operating temperature:
 - Switch on auxiliary heater.
 - Set air conditioner to maximum heat output (temperature preselection "Hi").

Notes:

- ♦ It is sufficient for the auxiliary heater recirculating pump to run (auxiliary heater switches to "control interval" operating status on account of coolant temperature).
- ♦ On vehicles with diesel engine, it is not necessary to switch on auxiliary/additional heater for bleeding, as it is subject to constant through-flow.
- Top up coolant if necessary.

9 - Removing and installing auxiliary/additional heater

9.1 - Removing and installing auxiliary/additional heater

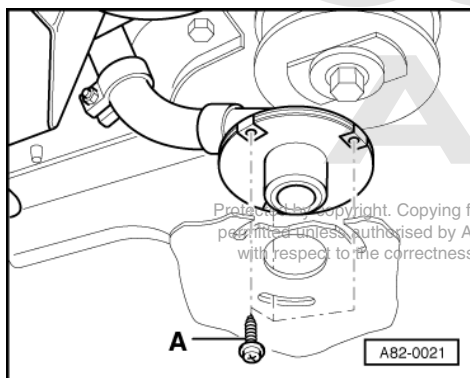
Notes:

- ♦ If on vehicles with 6-cyl. or 8-cyl. diesel engine additional heater is replaced (auxiliary heater with no recirculating pump -V55) and auxiliary/additional heater with software version "D49" is fitted, recirculating pump -V55 is to be additionally installed. Coolant return hose is to be shortened or replaced.

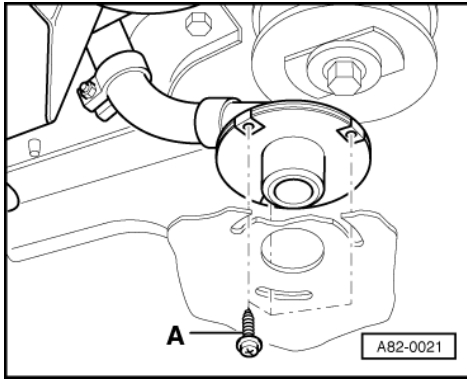
=> Parts List

- ♦ If a vehicle provided at the factory with an auxiliary heater with software version "D49" and retrofitted with a small coolant circuit is fitted with an auxiliary heater as of software version "D50", this auxiliary heater is to be encoded - contrary to usual procedure - to "00011" for vehicle with large coolant circuit (no coolant shut-off valve) or vehicle electrical system is to be converted accordingly. => Refer to Page 264 and appropriate current flow diagram for vehicles with auxiliary heater and factory-fitted small coolant circuit in Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder (e.g. current flow diagram no. 39 for Model Year 2002 vehicles).

9.2 - Vehicles with 6-cyl. engine or 8-cyl. petrol engine



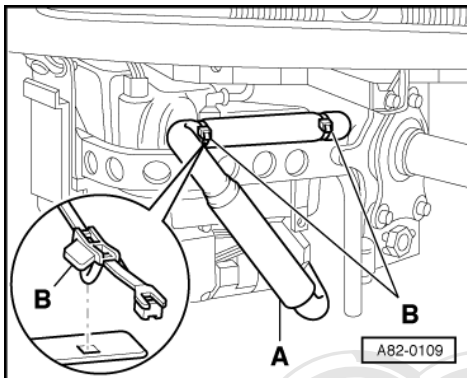
- Dissipate pressure in coolant circuit by opening cap on coolant expansion tank.
- On vehicles with headlight washer system:
 - Remove top part of air cleaner.
 - Detach headlight washer system reservoir from body.
- -> Remove bolts -A-.



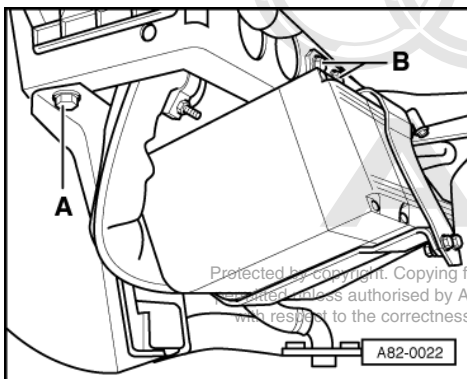
- -> Remove bumper and noise insulation.

=> General Body Repairs; Repair Group 63; Front Bumper Front Bumper

- Remove air duct to alternator (8-cyl. engine only).
- Detach fuel pipe to auxiliary/additional heater and seal off.
- Pinch off both coolant hoses to auxiliary/additional heater (e.g. using V.A.G 3094) and detach.



- -> Unfasten cable tie -B- on vehicles with intake hose -A- (with intake silencer).
- Unplug connectors to auxiliary/additional heater.
- Remove clips between auxiliary/additional heater holder and wheel housing liner.



- -> Remove bolts -A- and -B-.
- Detach auxiliary/additional heater.

Notes on installation:

- ◆ Check exhaust pipes, coolant hoses, fuel pipe and wiring to auxiliary/additional heater to ensure that there is no contact with other components.
- ◆ Before starting up auxiliary/additional heater, bleed coolant circuit
=>Page 149 .



- ♦ Install intake hose (fitted on all heaters except type "S") such that opening is facing downwards (to prevent ingress of water and dirt).

Fabrikschild-Duplikat gültig nur zusammen mit Original	
Webasto Thermosysteme GmbH MADE IN GERMANY	
HEIZGERÄT Typ	Thermo Top Z/C-B
Spannung / El. Leistung	12V / 45W
Wärmestrom	5kW
Brennstoff	Benzin
zul. Betriebsüberdruck	2.5 bar
Prüfzeichen	S
Fabriknummer	
Inbetriebnahmejahr	19 96 97 98

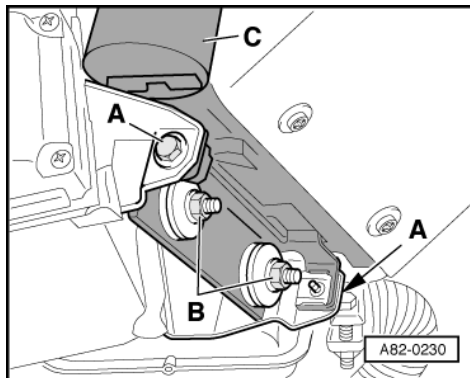
A82-0171

- ♦ -> If auxiliary/additional heater has been replaced, enter year of initial commissioning for newly installed heater on rating plate of heater and on new "duplicate rating plate" (by deleting year of original initial commissioning).
- ♦ Heed the following as regards auxiliary heater encoding if auxiliary heater is replaced on vehicles retrofitted with a "small coolant circuit": If vehicles previously fitted with an auxiliary heater with software version "D49" are fitted with an auxiliary heater with software version as of "D50", the new auxiliary heater is to be encoded to "000XX" for "large coolant circuit" => Page 69 .

9.3 - Vehicles with 8-cyl. diesel engine or 12-cyl. engine

- Dissipate pressure in coolant circuit by opening cap on coolant expansion tank.
- Remove entire air cleaner.

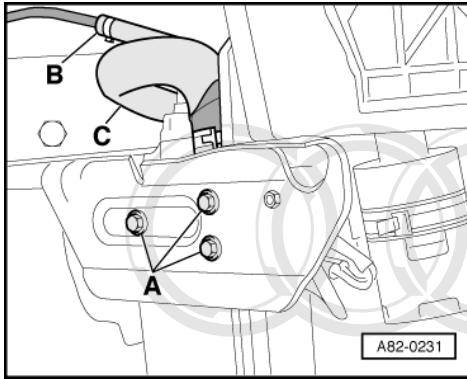
=> Relevant Engine, Mechanics Workshop Manual



- Remove bumper and noise insulation.

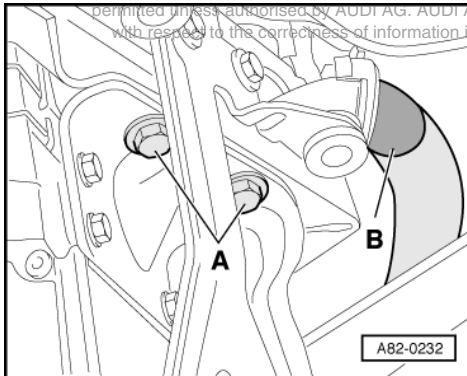
=> General Body Repairs; Repair Group 63; Front Bumper Front Bumper

- Release front right wheel housing liner at front fastening points.
- -> Remove bolts -A- and nuts -B-.
- Separate water cooler for "fuel cooling" circuit -C- from air duct to alternator, detach and swivel aside (only applies to 8-cyl. diesel engine).



- Remove air duct to alternator.
- -> Detach fuel pipe -B- to auxiliary/additional heater and seal off.
- Pinch off coolant hose -C- to auxiliary/additional heater (e.g. using V.A.G 3094).
- Remove bolts -A-.

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- -> Pinch off coolant hose -B- to auxiliary/additional heater (e.g. using V.A.G 3094).
- Detach both coolant hoses to auxiliary/additional heater.
- Unplug connectors to auxiliary/additional heater.
- Remove bolts -A-.
- Detach auxiliary/additional heater.

Notes on installation:

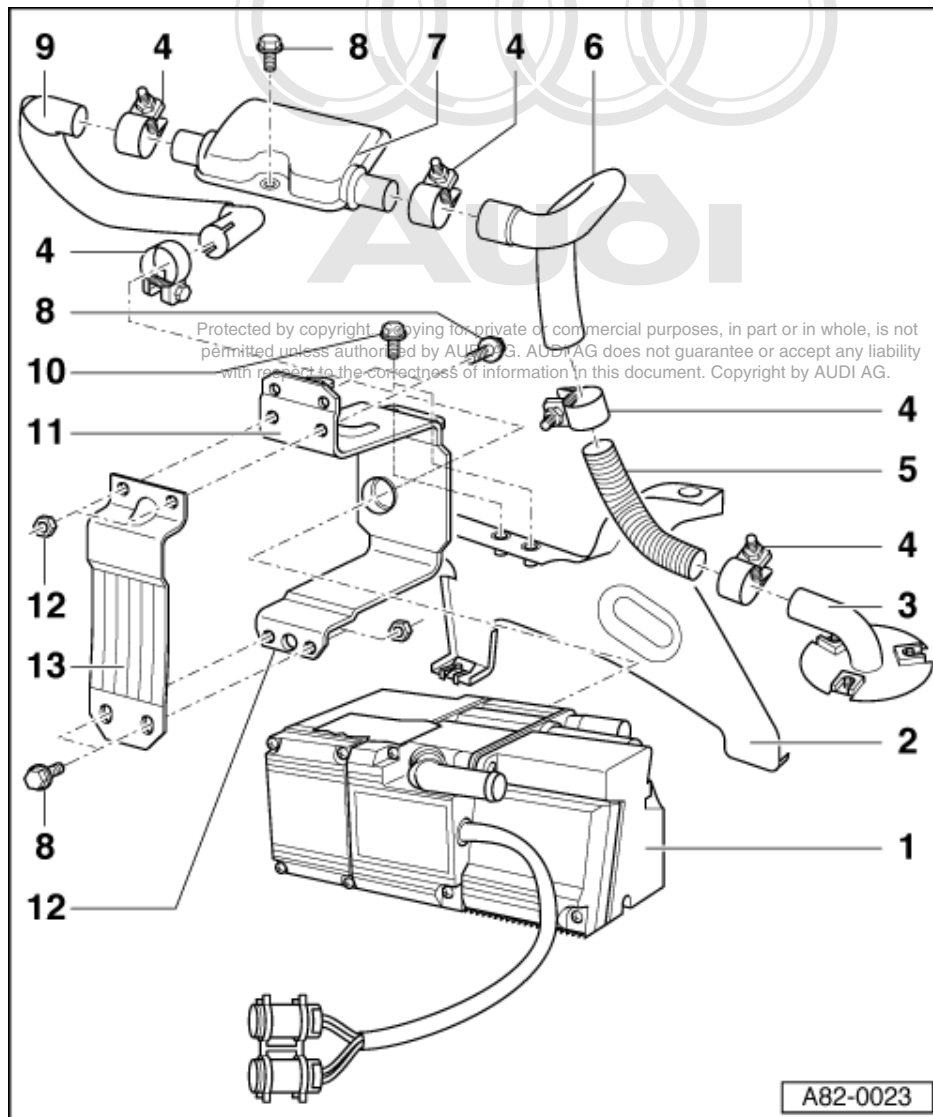
Fabrikschild-Duplikat gültig nur zusammen mit Original	
Webasto Thermosysteme GmbH MADE IN GERMANY	
HEIZGERÄT Typ	Thermo Top Z/C-B
Spannung / El. Leistung	12V / 45W
Wärmestrom	5kW
Brennstoff	Benzin
zul. Betriebsüberdruck	2.5 bar
Prüfzeichen	 S
Fabriknummer	
Inbetriebnahmejahr	19 96 97 98

- ♦ Check exhaust pipes, coolant hoses, fuel pipe and wiring to auxiliary/additional heater to ensure that there is no contact with other components.
- ♦ Before starting up auxiliary/additional heater, bleed coolant circuit
=>Page 149 .
- ♦ -> If auxiliary/additional heater has been replaced, enter year of initial commissioning for newly installed heater on rating plate of heater and on new "duplicate rating plate" (by deleting year of original initial commissioning).



10 - Dismantling and assembling auxiliary heater (heater type "S")

10.1 - Dismantling and assembling auxiliary heater (heater type "S")



Note:

Removing auxiliary heater => Page 150

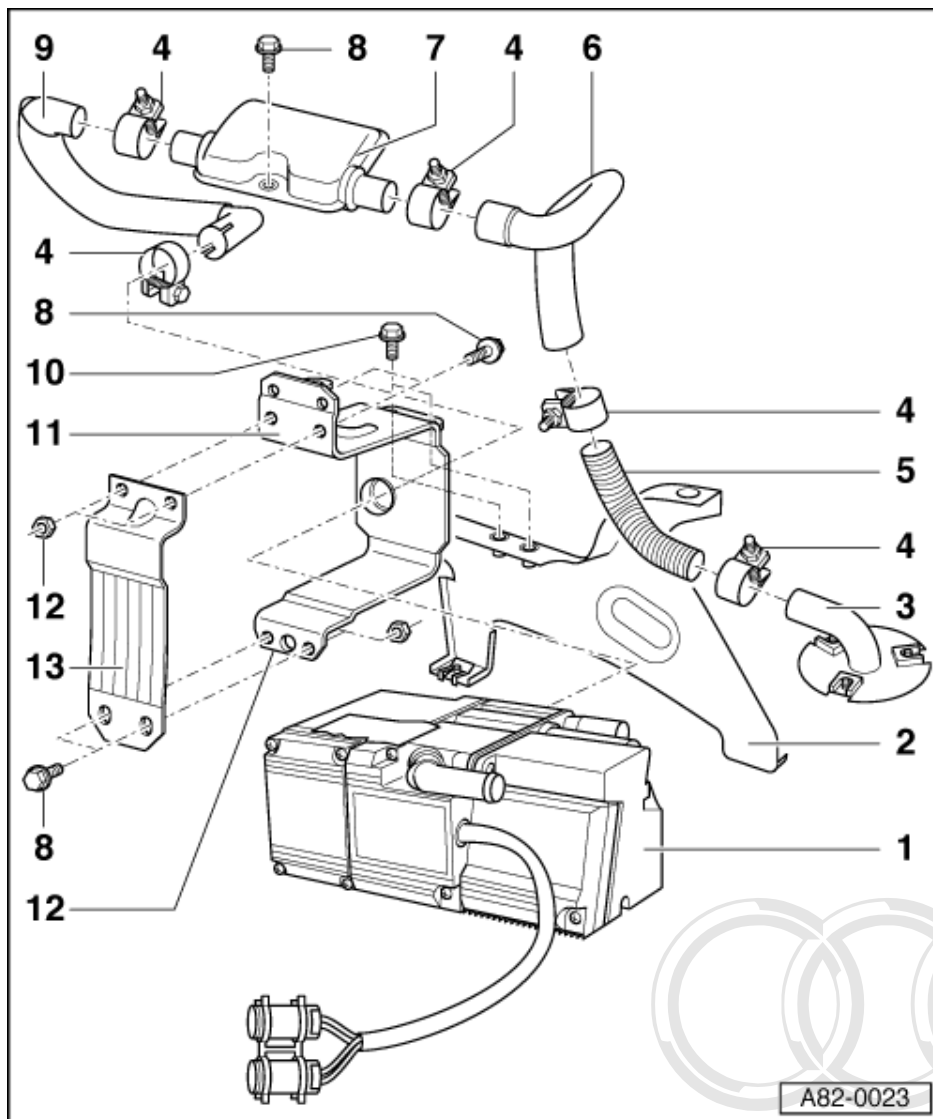
10.2 - Dismantling and assembling bracket, exhaust system and heater

1 Auxiliary heater

- ♦ Dismantling and assembling auxiliary heater =>Page 156
- ♦ Checking electrical components of auxiliary heater =>Page 205

2 Bracket

3 Exhaust pipe tail piece

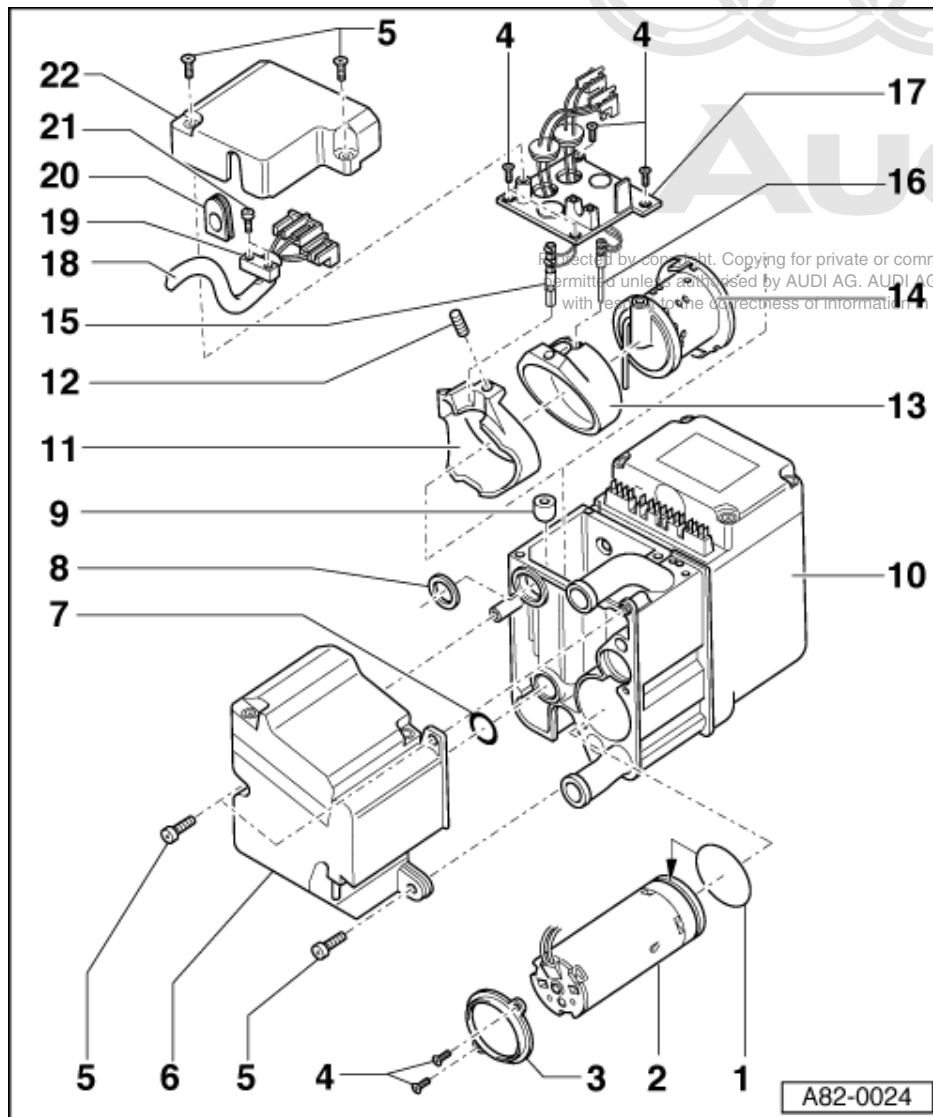


- 4 Clip
- 5 Corrugated exhaust pipe
- 6 Exhaust pipe
- 7 Exhaust silencer
- 8 Hexagon combi bolt
- 9 Exhaust pipe
 - ♦ With thermal insulation mat
- 10 Hexagon combi bolt
- 11 Auxiliary heater holder
 - ♦ With plastic flat seal
- 12 Hexagon nut
- 13 Clip

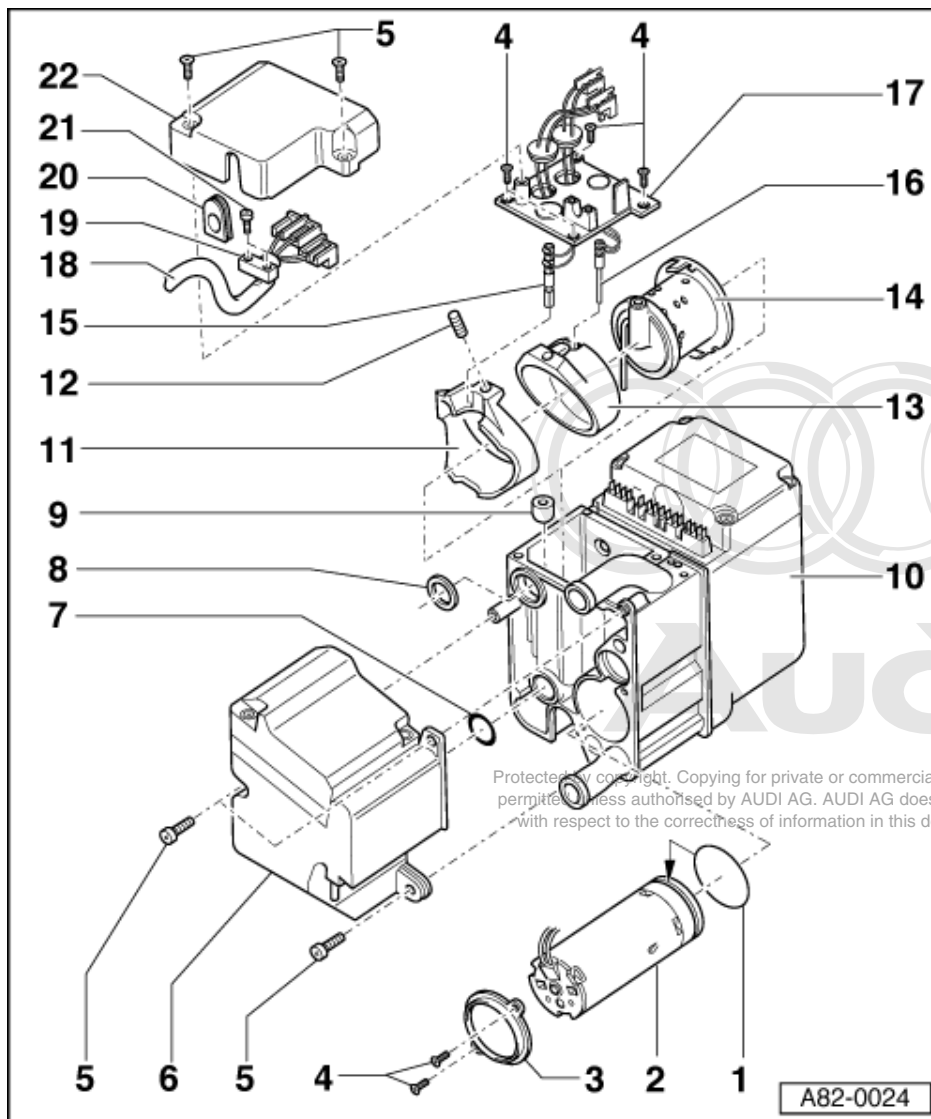
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10.3 - Dismantling and assembling auxiliary heater



- 1 O-ring seal
- 2 Recirculating pump -V55
 - ♦ Checking =>Page 205
 - ♦ Removing and installing
=>Page 162
- 3 Retaining ring
- 4 Bolt
- 5 Bolt
- 6 Combustion air blower unit
 - ♦ With combustion air blower -V6
 - ♦ With fuel pressure damper
=>Page 115
 - ♦ Checking => Page 205
 - ♦ Removing and installing
=> Page 161



- ♦ Intake silencer (hose) can be attached to intake opening to reduce noise

7 O-ring seal

8 Flat packing

9 Moulded gasket

- ♦ Permanently connected to combustion air blower unit =>Page 161

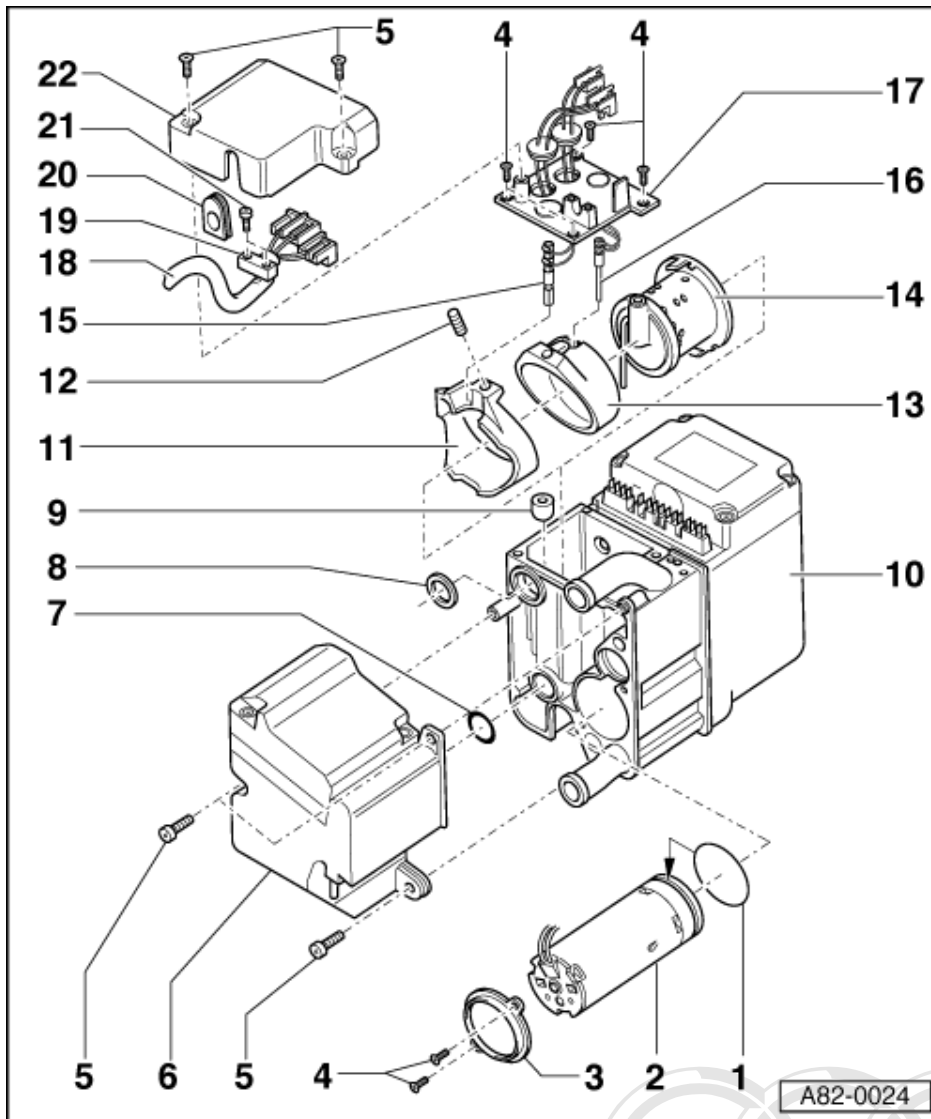
10 Burner housing, heat exchanger and heater control unit -J162

- ♦ Not to be dismantled

11 Air duct

12 Grub screw

13 Burner holder



14 Burner element

- ♦ Removing and installing
=>Page 161

15 Glow plug -Q6

- ♦ With internal heater coils (glow element)
- ♦ Checking => Page 205
- ♦ Removing and installing
=>Page 160

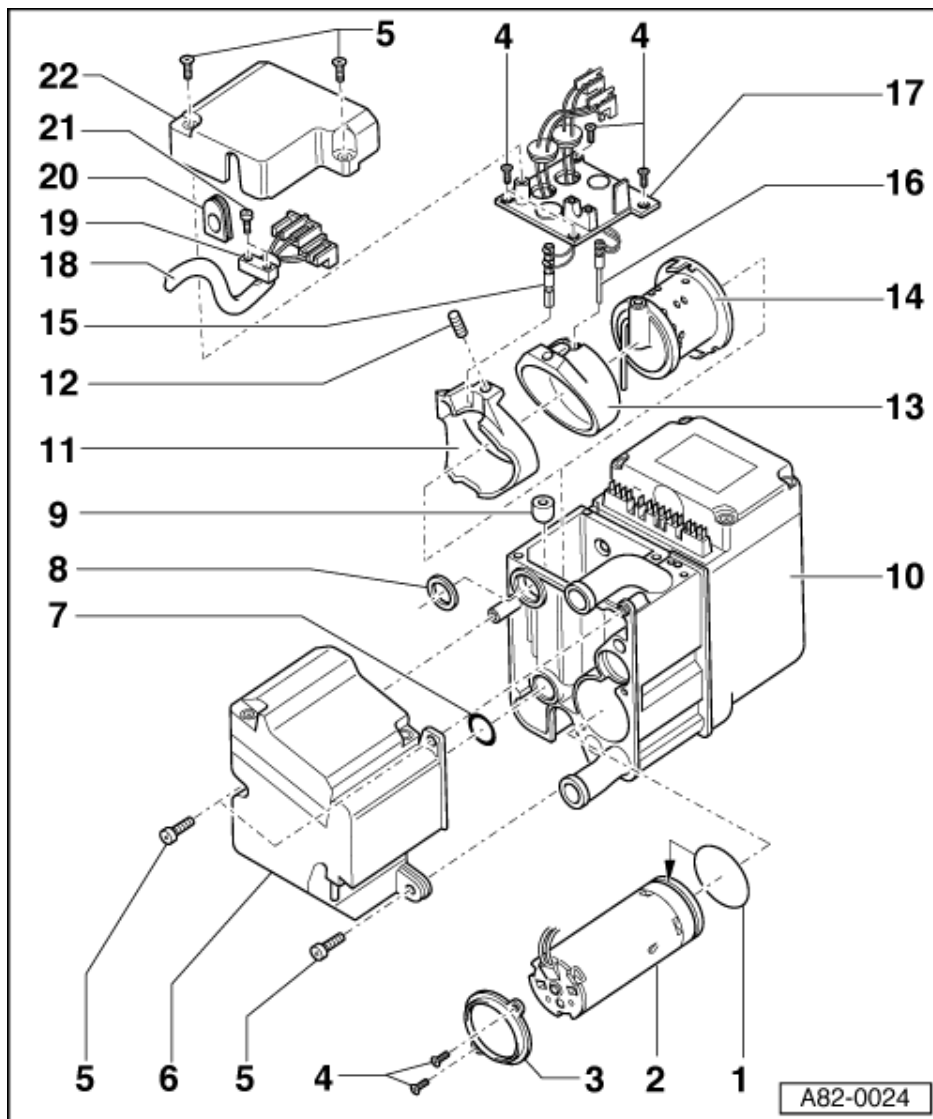
16 Flame monitor -G64

- ♦ Checking => Page 205
- ♦ Removing and installing
=> Page 160

17 Burner cover

- ♦ Sealed off from burner housing by silicone sealant
- ♦ Make sure rubber grommets are properly attached

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18 Wiring to connector point of heater control unit -J162

- ♦ Block diagram of auxiliary heater
 => Page **183**

19 Strain relief device

20 Grommet

21 Bolt

22 Central cover

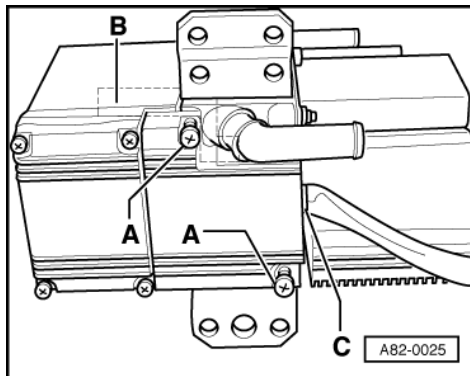
- ♦ Removing and installing
 => Page **160**



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10.4 - Removing and installing central cover

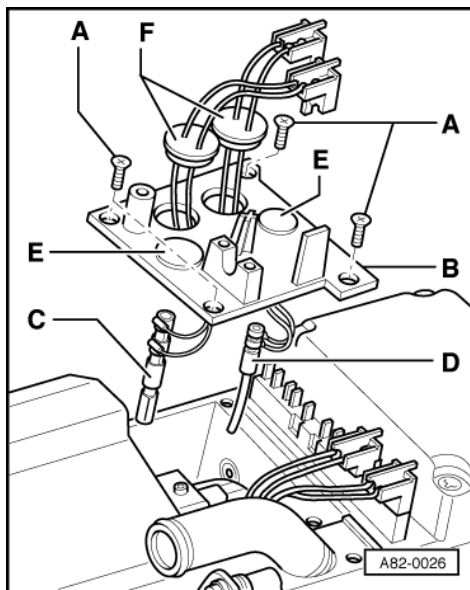


- Detach auxiliary heater from vehicle => Page 150 .
- -> Remove bolts -A-.

Notes:

- ♦ Use adhesive tape or silicone sealant to seal off area -B- of central cover from burner housing such that moisture cannot ingress from above with auxiliary heater in position.
- ♦ Ensure correct positioning of grommet -C- on installation.

10.5 - Removing and installing glow plug and flame monitor



- Remove central cover => Page 160 .
- Remove wiring to connector rail.
- -> Remove bolts -A-.
- Use screwdriver to prise off cover -B-.
- Pull glow plug -C- and flame monitor -D- out of burner element.

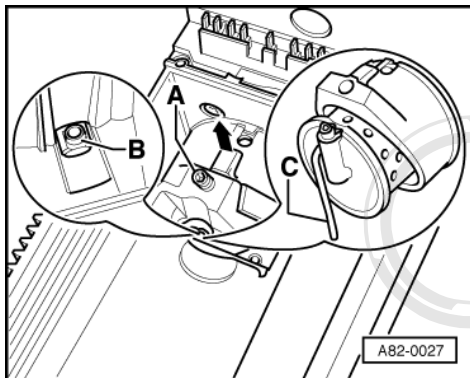
Notes:

- ♦ Prior to assembly clean contact surface between burner cover and heater (to remove remnants of old silicone) and coat with commercially available silicone sealant.
- ♦ Glow plug and flame monitor are held in correct position in burner element by means of rubber grommets -E-.
- ♦ When fitting cover, take care not to jam wires between cover and heater.

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- ♦ Insert grommets -F- after installing cover and check correct positioning.

10.6 - Removing and installing burner element



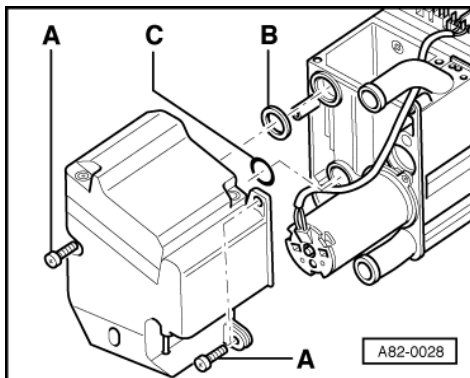
- Remove glow plug and flame monitor =>Page 160 .
- -> Slacken off grub screw -A-.
- Lift burner element out of heater.

Notes:

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- ♦ Before installing burner element, check correct positioning of moulded gasket -B- in combustion air blower unit.
- ♦ On inserting burner element, guide riser -C- into moulded gasket -B-.
- ♦ Only tighten grub screw -A- to the extent required to ensure that burner element is positioned without play in heater.

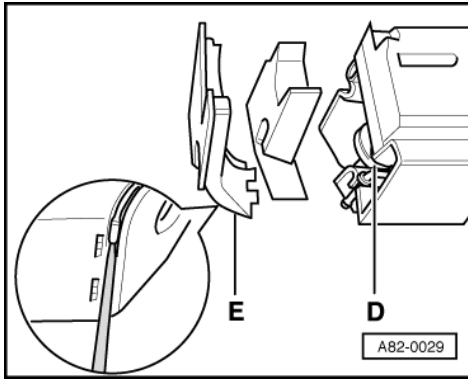
10.7 - Removing and installing combustion air blower unit (with combustion air blower -V6)



- Remove burner element => Page 161 .
- -> Remove bolts -A-.
- Pull combustion air blower unit out of heater.

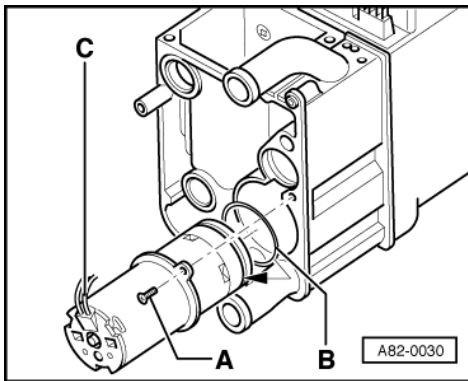
Notes:

- ♦ On assembly, ensure correct positioning of flat packing -B- and O-ring seal -C-.
- ♦ Combustion air blower unit and combustion air blower cannot be dismantled.



- ♦ Combustion air blower unit -D- is fitted with a pressure damper
=> Page 115 .
- ♦ -> To clean intake area for combustion air blower, use screwdriver to prise off cover -E- and take out foam -F-.
- ♦ Intake silencer (hose) can be attached to intake opening to reduce noise.

10.8 - Removing and installing recirculating pump -V55



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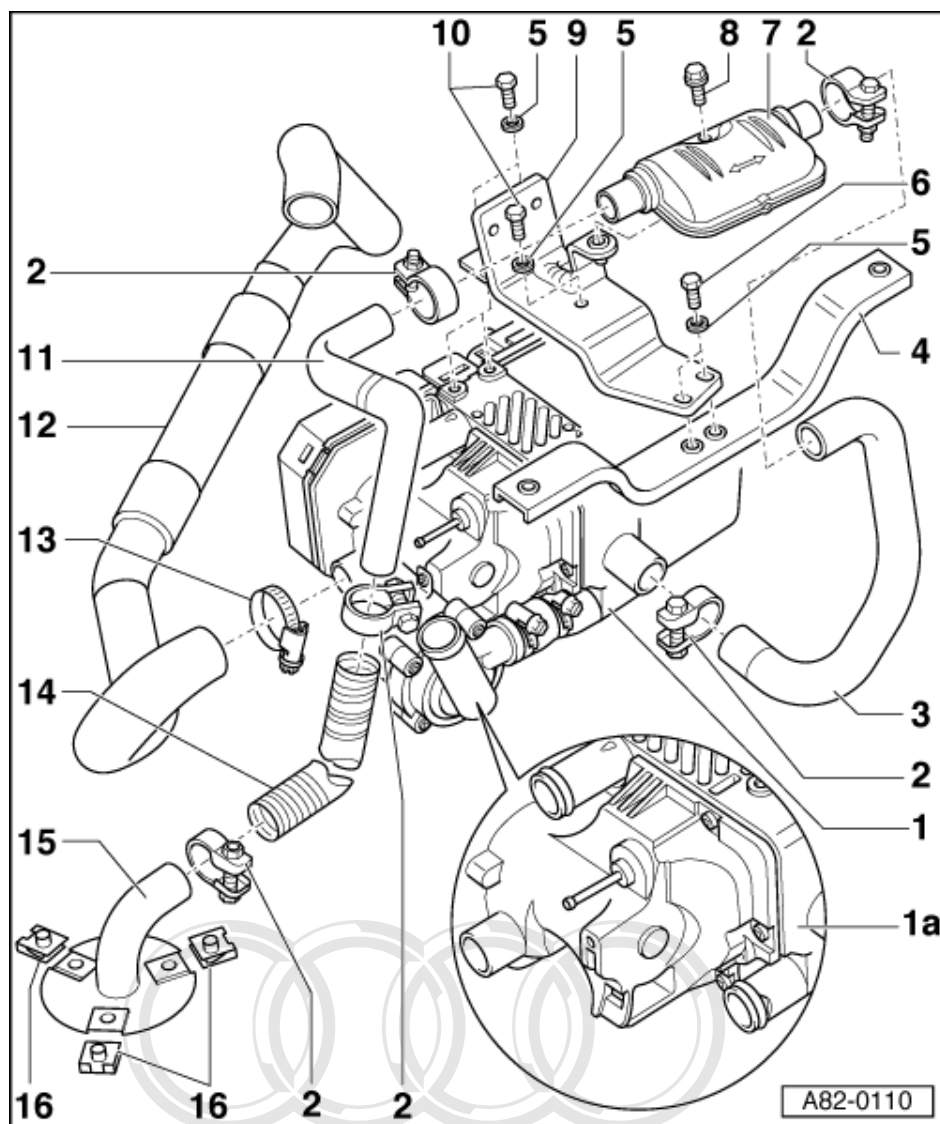
- Remove combustion air blower unit (with combustion air blower)
=> Page 161 .
- -> Remove bolts -A-.

Notes:

- ♦ Before installing recirculating pump, apply thin coat of Vaseline to sealing ring -B-.
- ♦ Pay attention to position of wiring -C- on inserting recirculating pump.

11 - Dismantling and assembling auxiliary/additional heater (type "Z/C")

11.1 - Dismantling and assembling auxiliary/additional heater (type "Z/C")

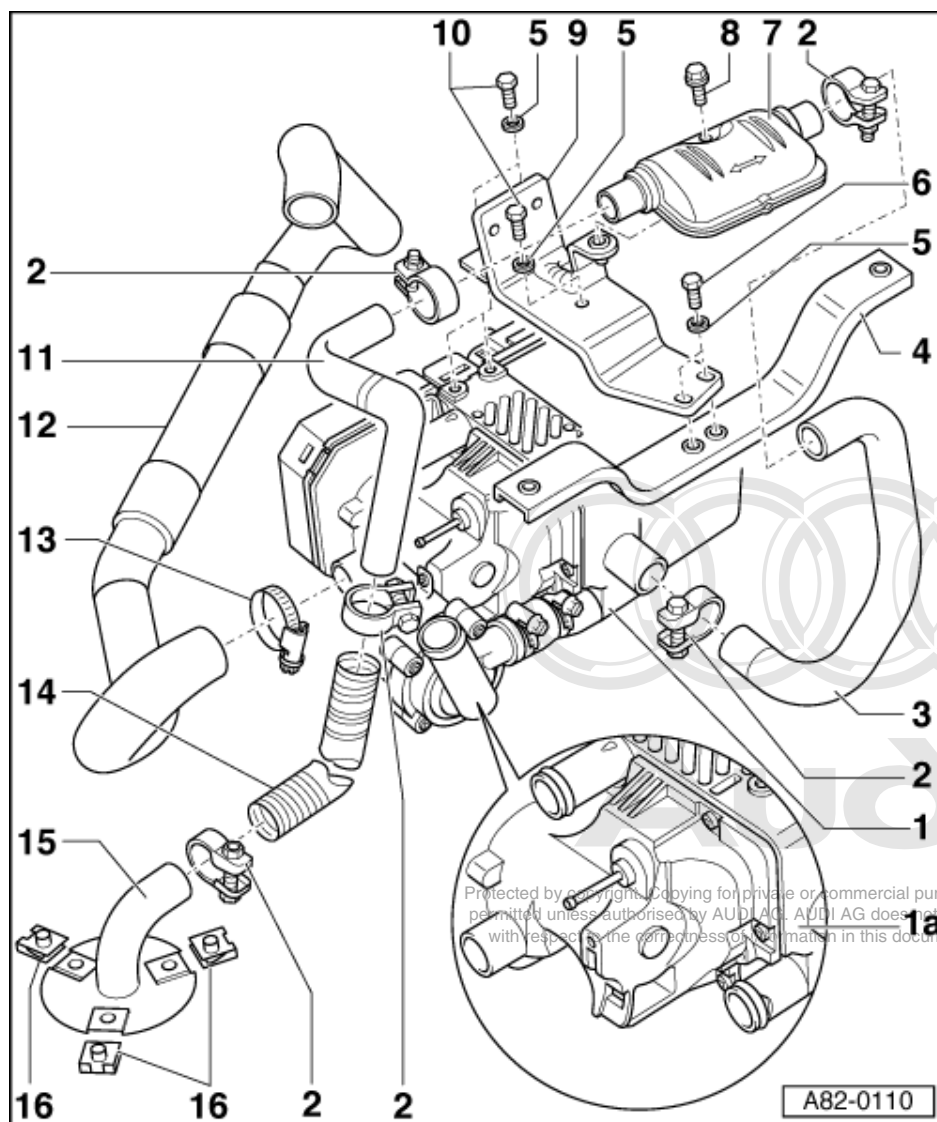


Notes:

- ♦ Removing auxiliary/additional heater
 => Page 150
- ♦ Control unit -J162 for auxiliary and additional heaters differs (up to software version "D48", additional heater version does not feature certain functions).

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 => Parts List

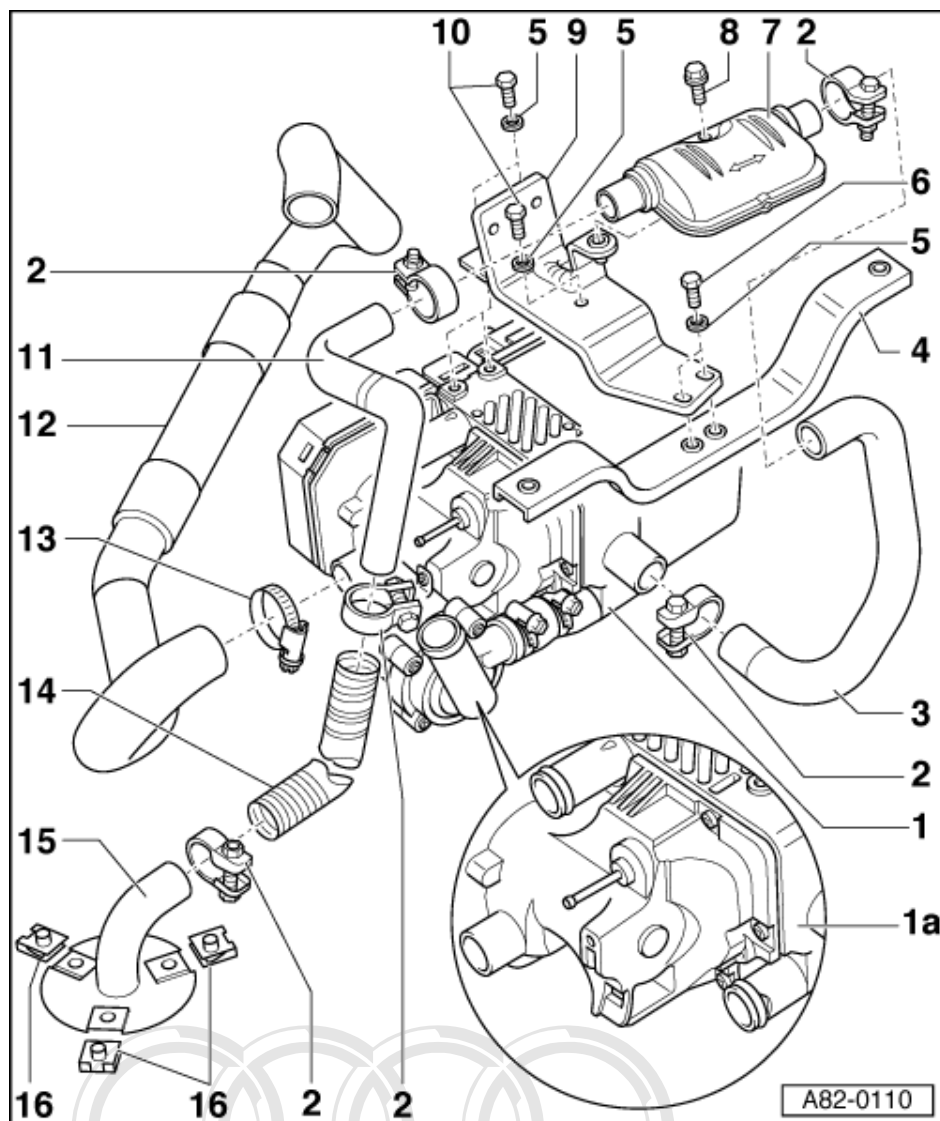
- ♦ As opposed to auxiliary heater, additional heater has no recirculating pump -V55.



- ♦ There are different heater control units -J162. As of software version "D50", the heater control unit -J162 can be encoded for a small coolant circuit. As of software version "D52", the recirculating pump -V55 is actuated as a function of coolant temperature on encoding for a large coolant circuit => Page 6.
- ♦ If on vehicles with 6-cyl. or 8-cyl. diesel engine additional heater is replaced (auxiliary heater with no recirculating pump -V55) and auxiliary/additional heater with software version "D49" is fitted, recirculating pump -V55 is to be additionally installed. Coolant return hose is to be shortened or replaced.

=> Parts List

11.2 - Detaching exhaust system bracket from heater/re-attaching (6-cyl. engines and 8-cyl. petrol engine)



Note:

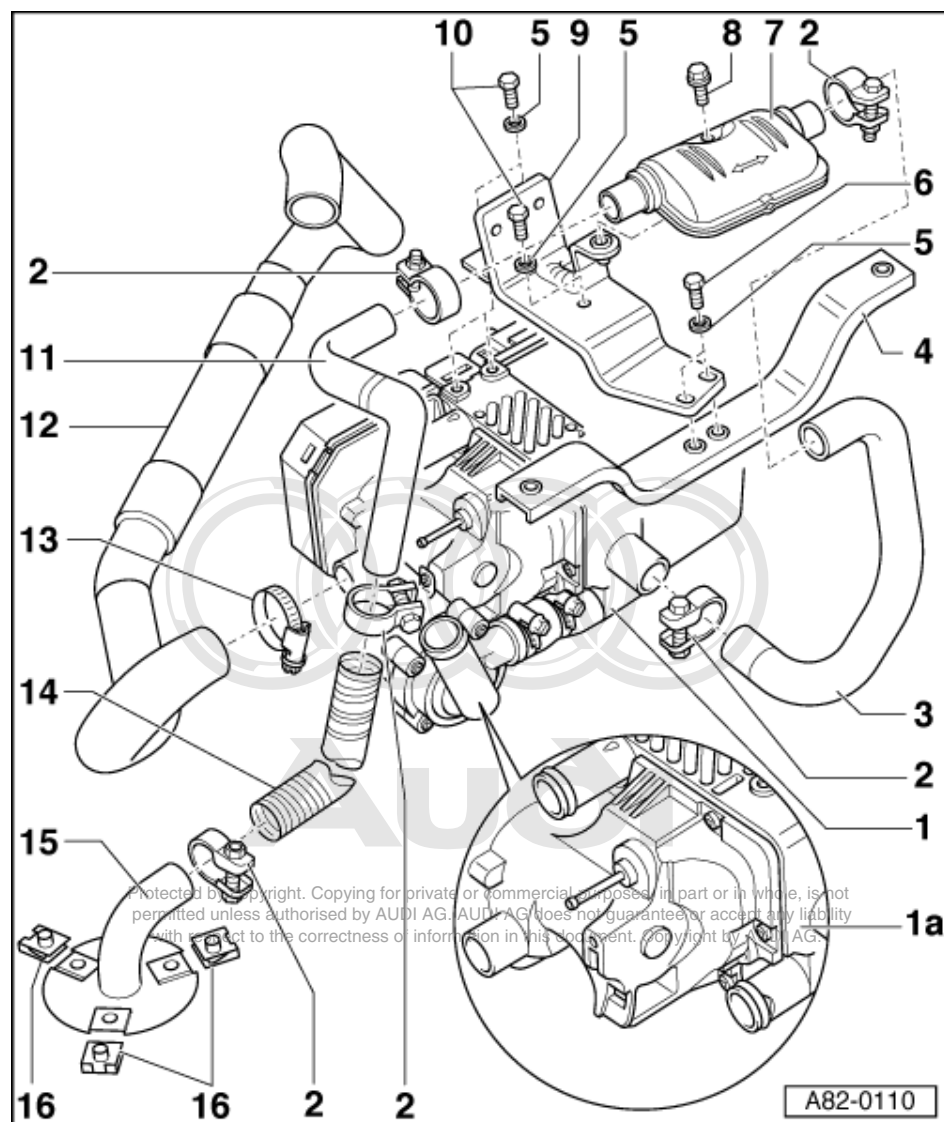
On these vehicles, auxiliary/additional heater is currently installed horizontally.

1 Auxiliary heater

- ♦ Different control units (software versions)

=> Parts List

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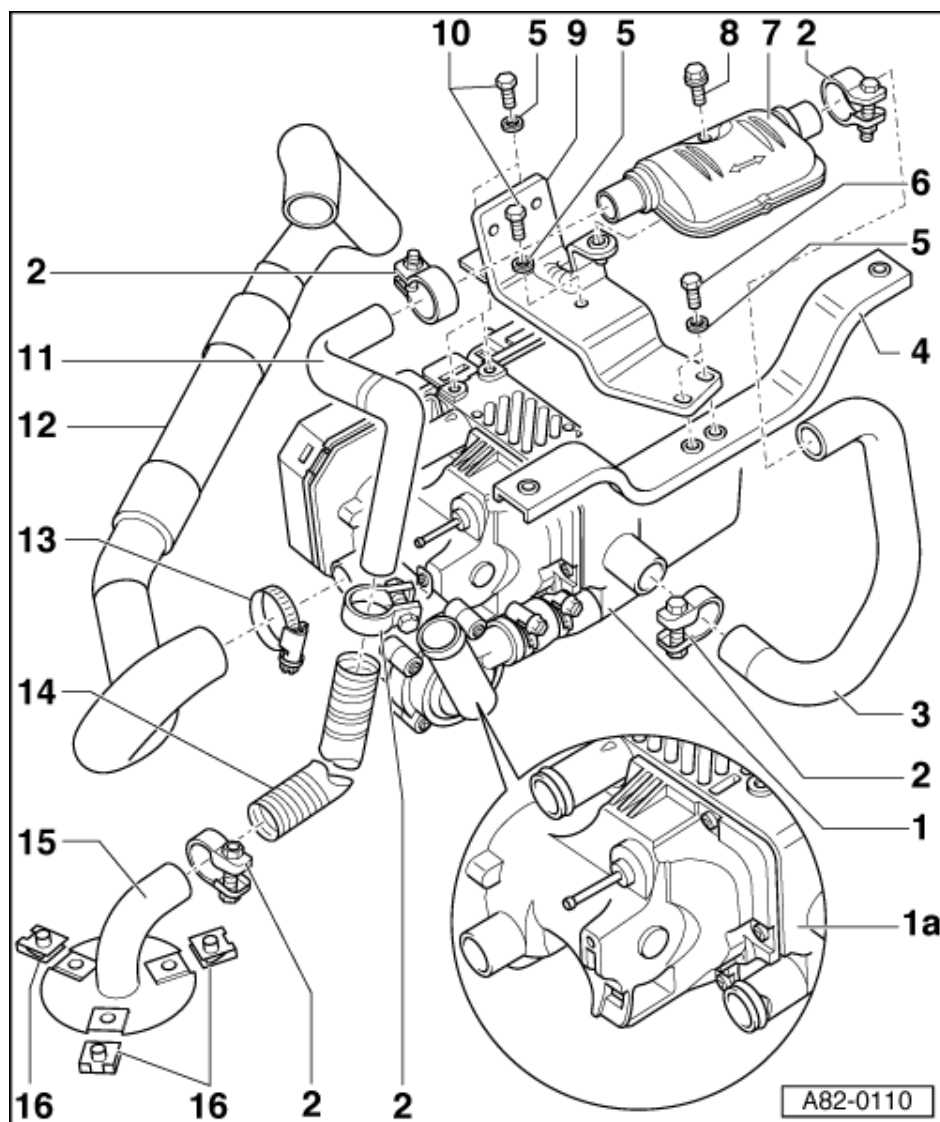


- ♦ Detaching recirculating pump -V55
=>Page 174
- ♦ Dismantling and assembling =>Page 177

1a - Additional heater

- ♦ As opposed to auxiliary heater, there is no recirculating pump -V55
- ♦ Control unit -J162 for auxiliary and additional heaters differs (up to software version "D48", additional heater version does not feature certain functions)
- ♦ Dismantling and assembling
=>Page 177

2 Clip



3 Exhaust pipe

- ♦ Temperature-resistant insulation is fitted on Audi A8 between exhaust pipe and auxiliary/additional heater (on account of contact corrosion)

4 Bracket

5 Washer

6 Bolt

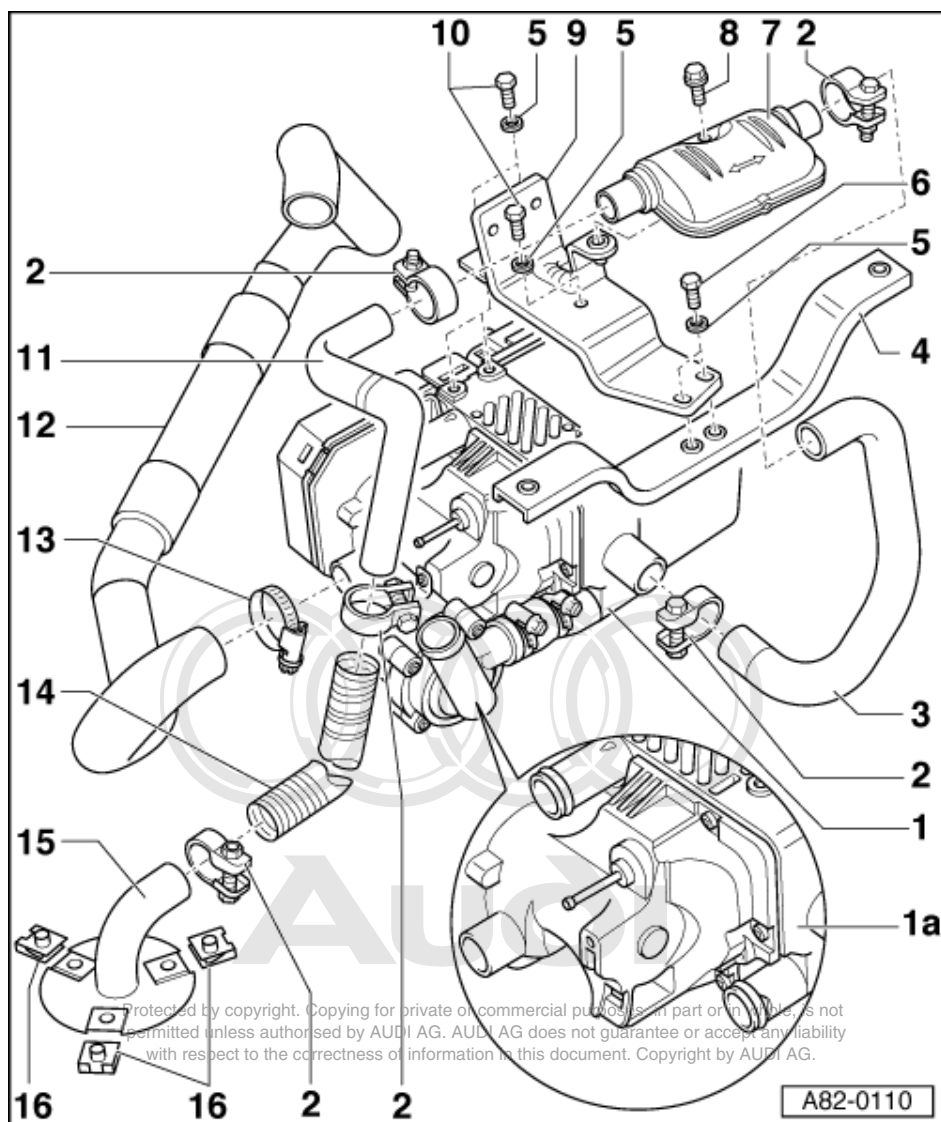
7 Exhaust silencer

8 Hexagon combi bolt

9 Auxiliary heater holder

10 Bolt

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11 Exhaust pipe

12 Intake hose

- ♦ With intake silencer

Note:

Intake silencer with intake hose may be fitted instead of just intake hose=>Page 169.

13 Hose clamp

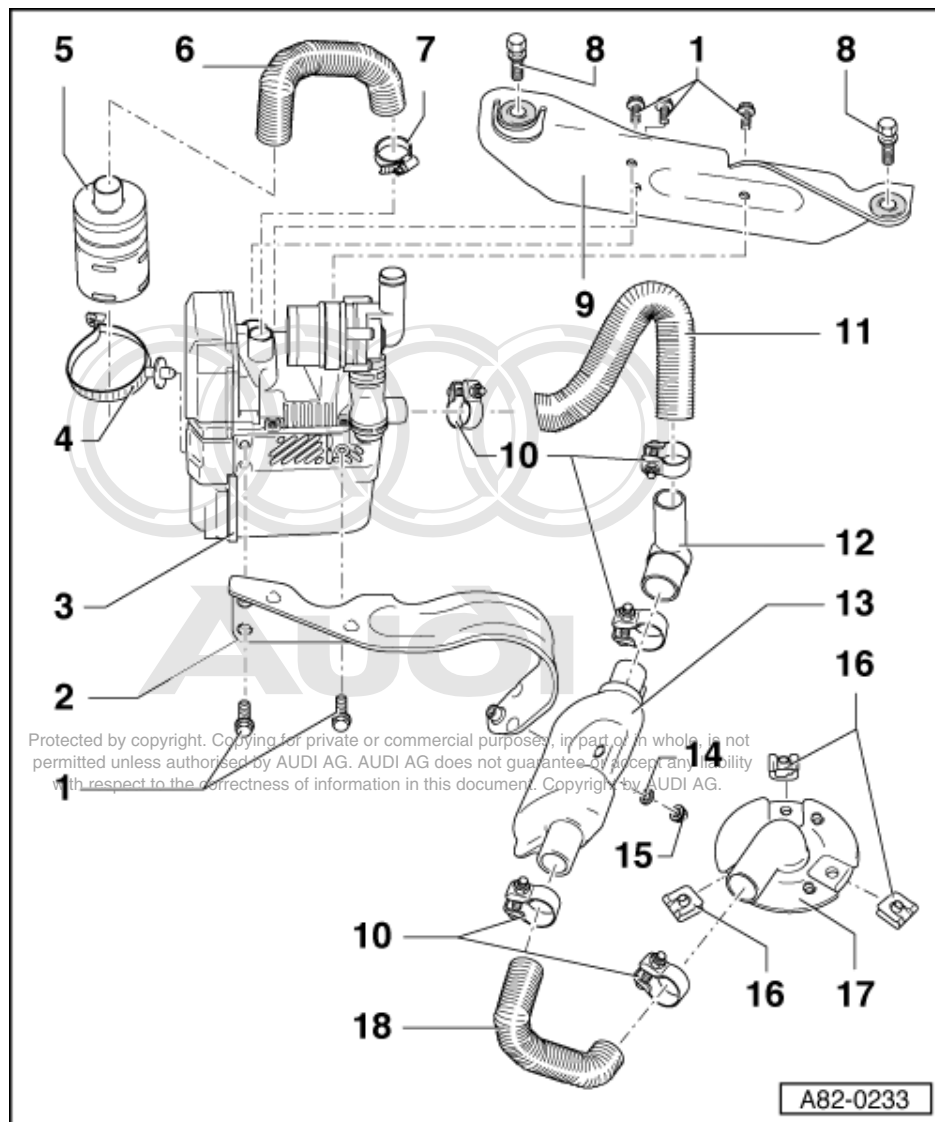
14 Corrugated exhaust pipe

15 Exhaust pipe tail piece

- ♦ With thermal insulation mat

16 Speed nut

11.3 - Detaching exhaust system bracket from heater/re-attaching (8-cyl. diesel engine and 12-cyl. engine)



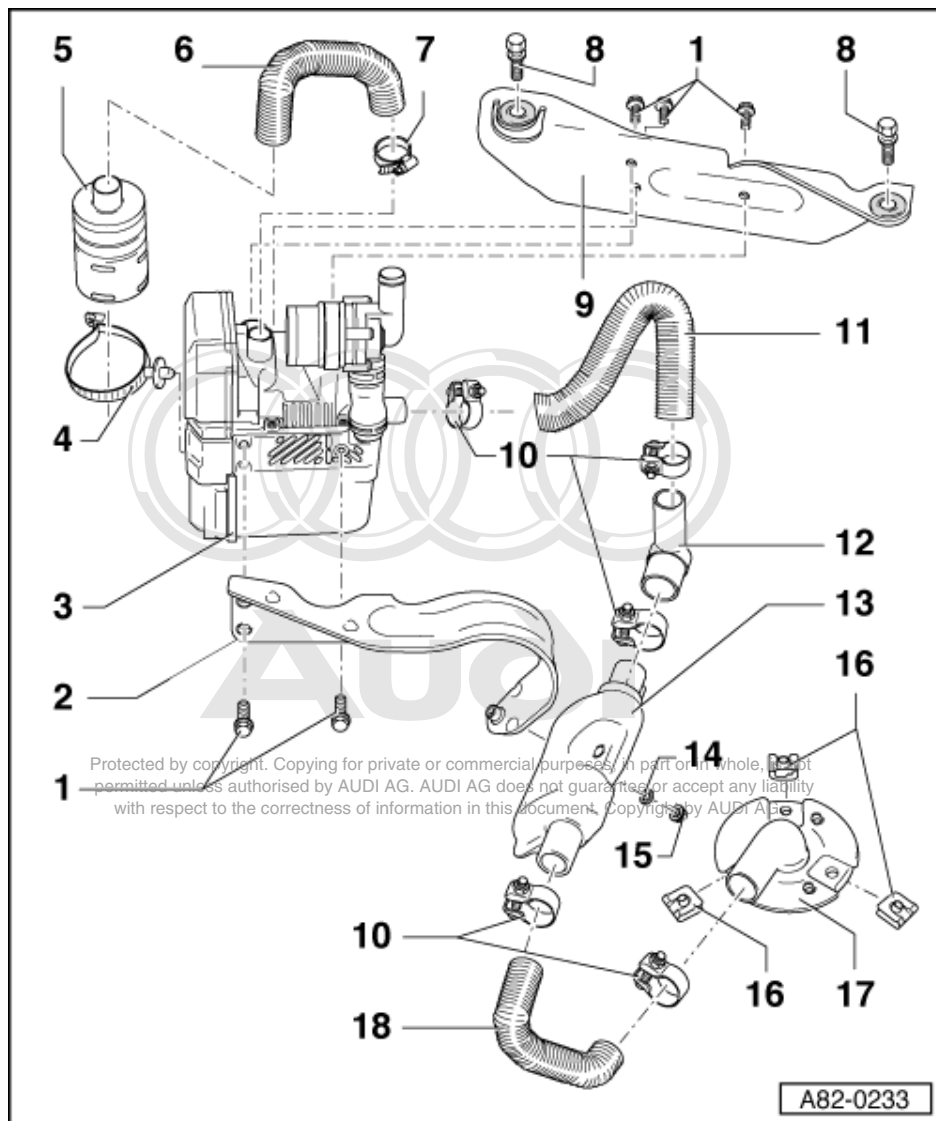
Note:

On these vehicles, auxiliary/additional heater is currently installed vertically.

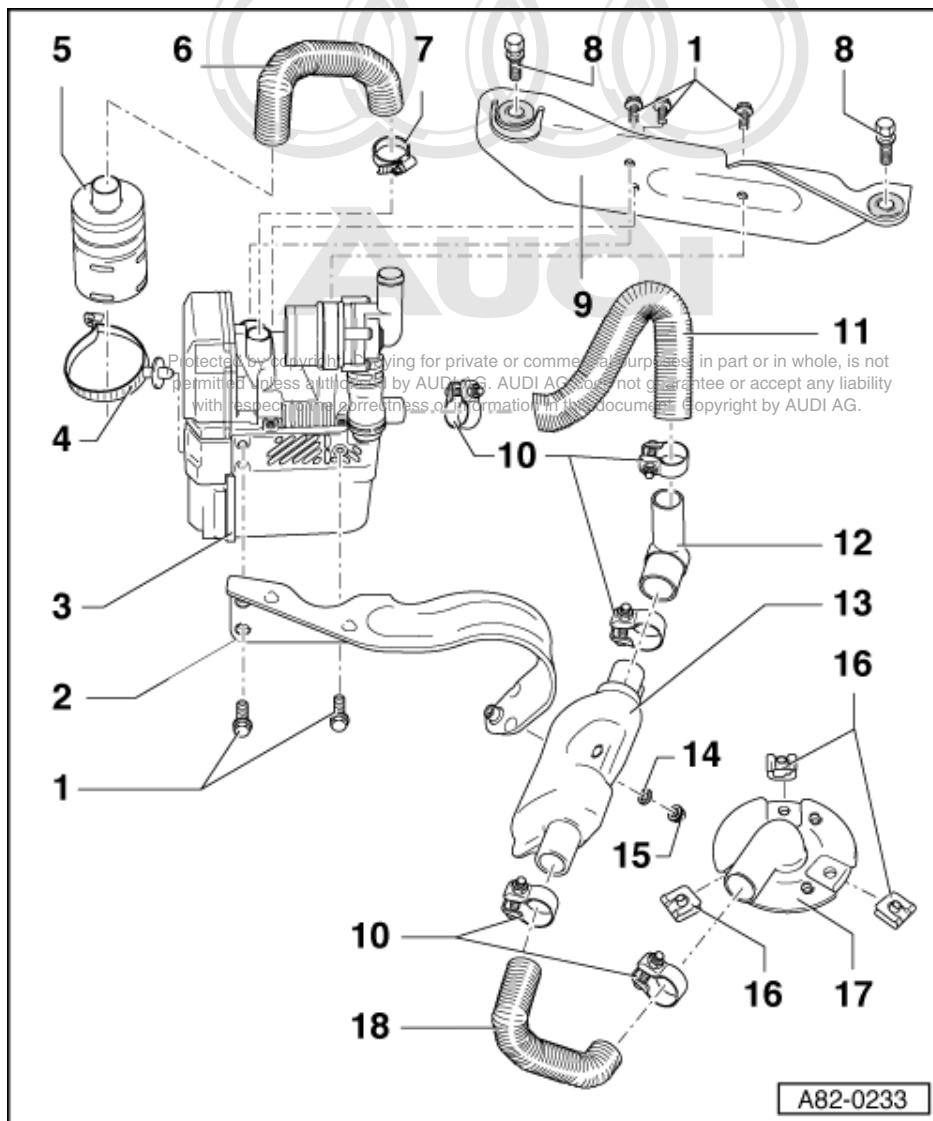
- 1 Bolt**
- 2 Bracket**
- 3 Auxiliary/additional heater**
 - ♦ Different control units (software versions)

=> Parts List

- ♦ Detaching recirculating pump -V55
=>Page **174**
- ♦ Dismantling and assembling
=>Page **177**



- 4 Cable tie
- 5 Intake silencer
 - ♦ Attaching =>Page 173
- 6 Intake hose
 - ♦ Attaching =>Page 173
- 7 Hose clamp
- 8 Hexagon combi bolt
 - ♦ Leave in vehicle on removal



9 Bracket

- ◆ Leave in vehicle on removal
- ◆ With rubber mount

10 Clip

11 Corrugated exhaust pipe

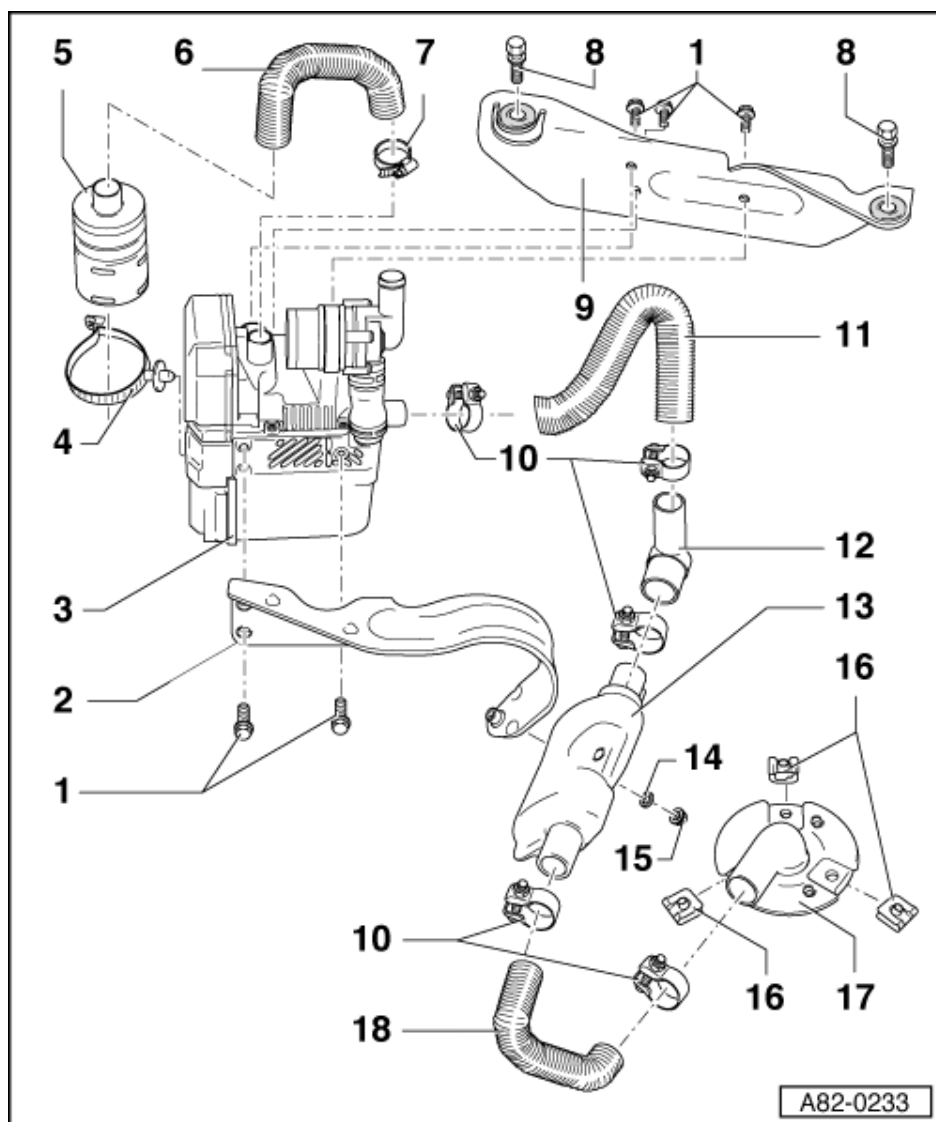
- ◆ Temperature-resistant insulation is fitted on Audi A8 between exhaust pipe and auxiliary/additional heater (on account of contact corrosion)

12 Exhaust pipe

- ◆ 90° bend

13 Exhaust silencer

14 Washer



15 Hexagon nut

16 Speed nut

17 Exhaust pipe tail piece

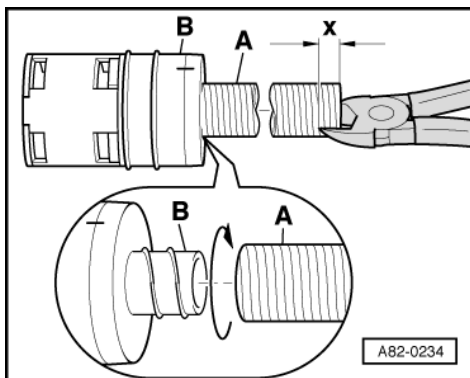
♦ With thermal insulation mat

18 Corrugated exhaust pipe



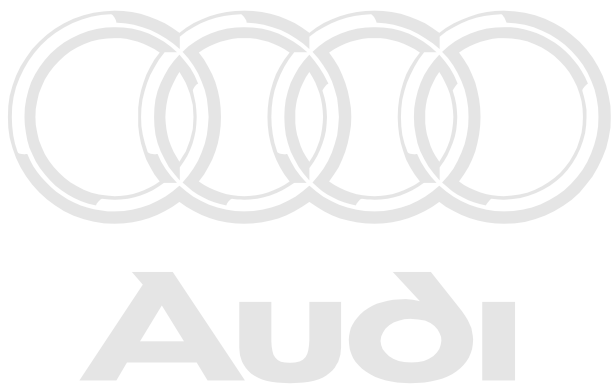
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11.4 - Attaching intake hose with intake silencer



Notes:

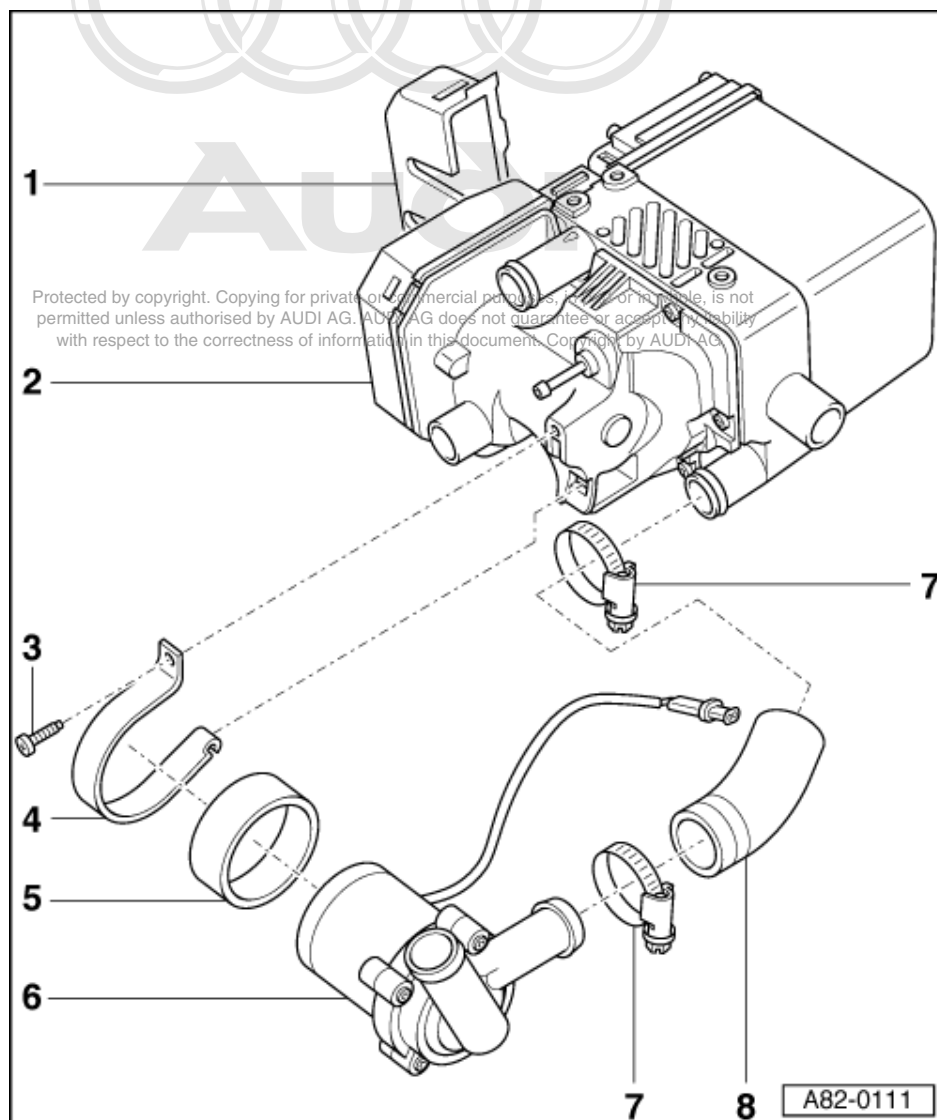
- ◆ -> Intake hose -A- is bolted to intake silencer -B-.
- ◆ To enable intake hose -A- to be attached with a hose clamp to auxiliary/additional heater intake pipe, two cuts of approx. 10 mm each have to be made (dimension X) using side-cutting pliers.
- ◆ Intake silencer -B- is attached to heater with a cable tie.



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11.5 - Detaching recirculating pump -V55 from auxiliary heater/re-attaching



Note:

Removing auxiliary/additional heater

=> Page 150

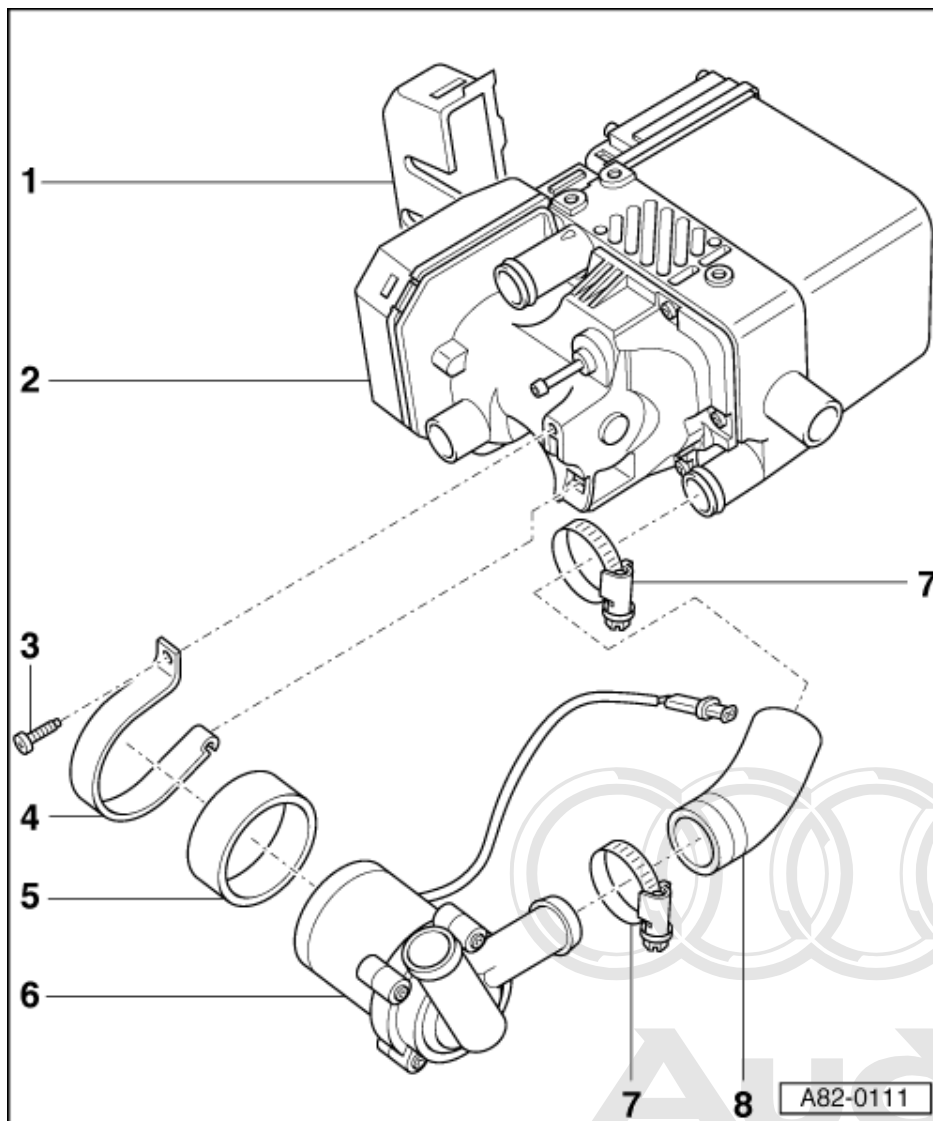
1 Cover

- ◆ For connector rail
- ◆ Removing and installing
=>Page 179
- ◆ Assignment of connector rail
=>Page 179

2 Auxiliary heater

- ◆ Control unit -J162 for auxiliary and additional heaters differs (up to software version "D48", additional heater version does not feature certain functions)

=> Parts List

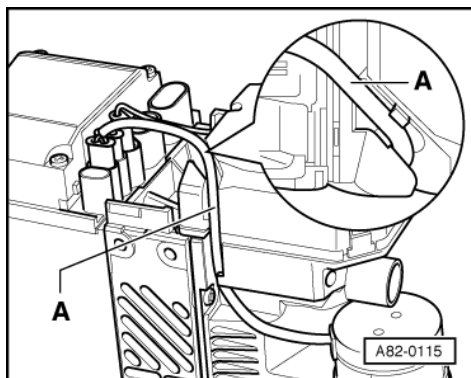


- ♦ Dismantling and assembling
 =>Page 177

- 3 Bolt
- 4 Clip
- 5 Spacer
- 6 Recirculating pump -V55
 - ♦ Wiring to connector rail
 =>Page 176
- 7 Hose clamp
- 8 Coolant hose

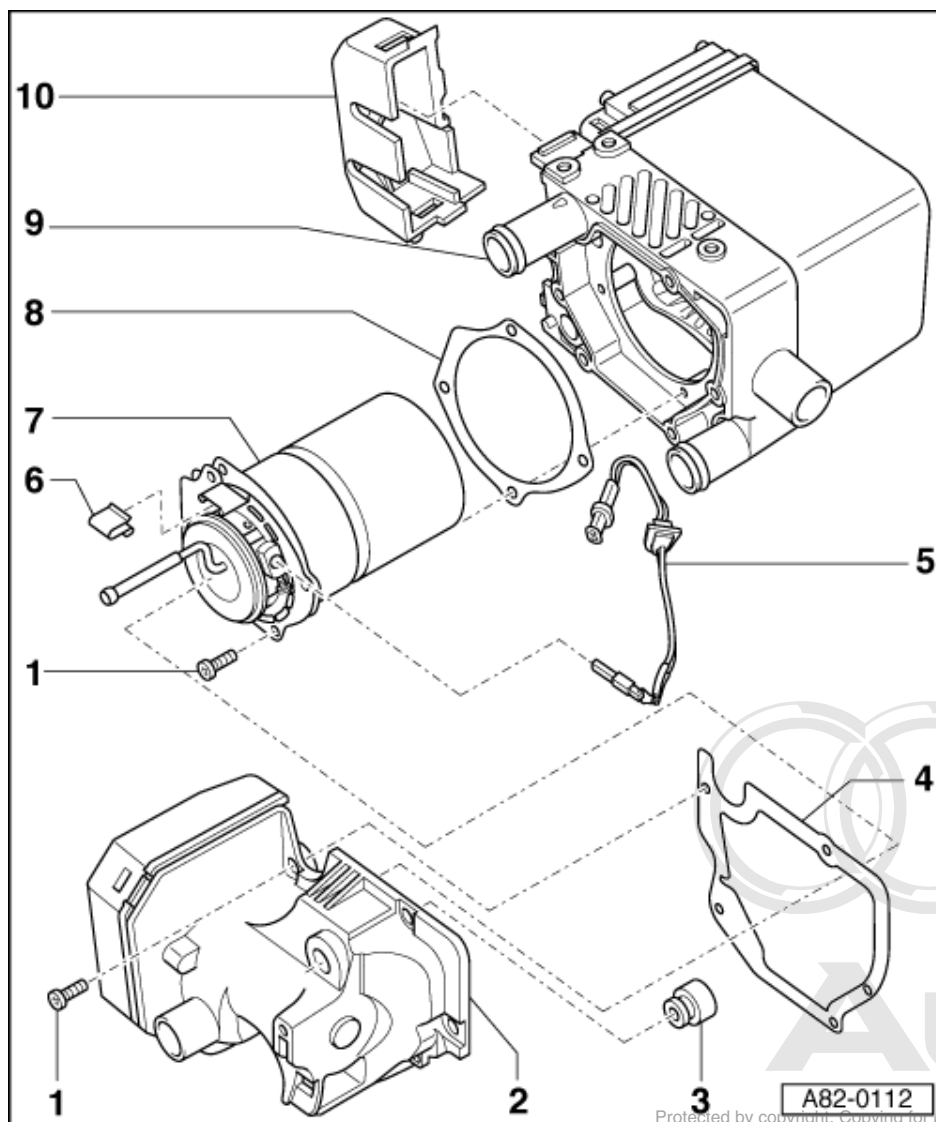
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11.6 - Routing wiring to recirculating pump -V55



- -> Lay wiring -A- in groove as shown.

11.7 - Dismantling and assembling auxiliary/additional heater



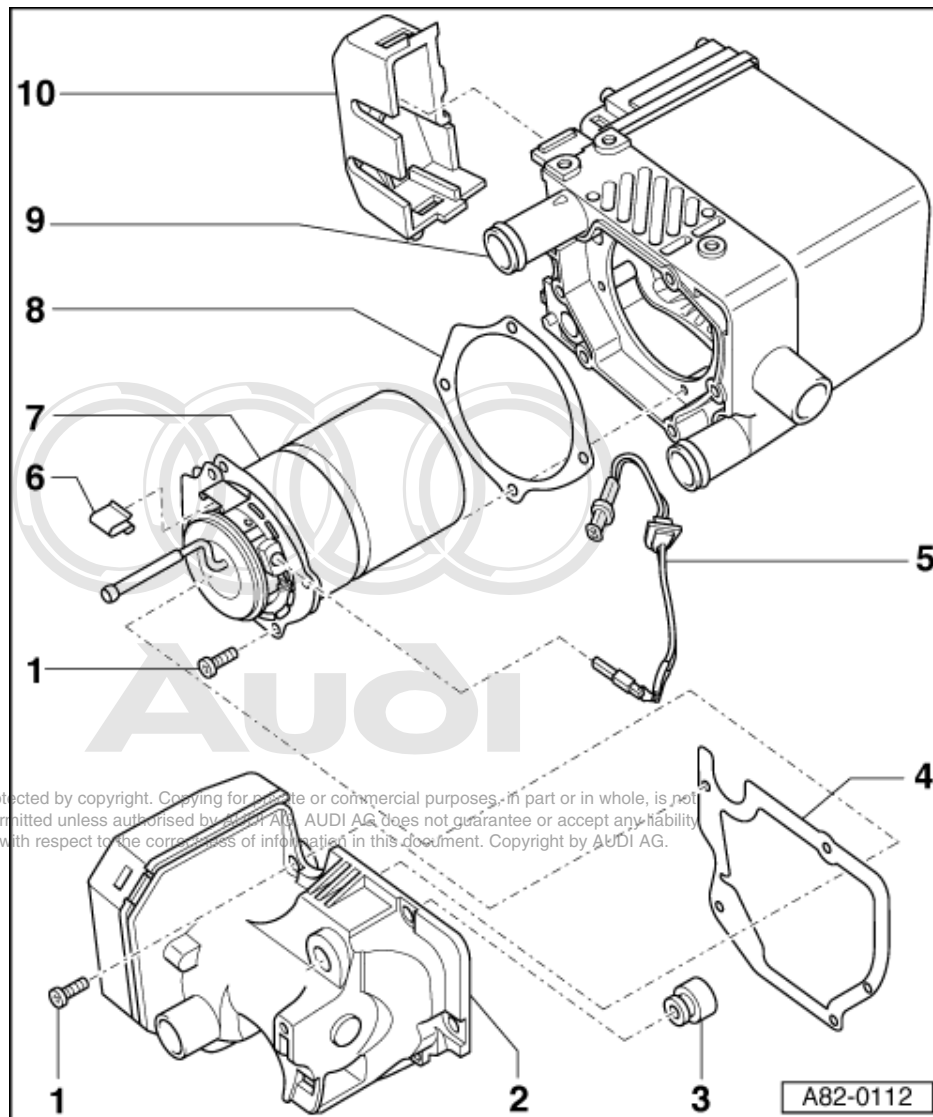
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Note:

Removing auxiliary/additional heater

=> Page 150

- 1 Bolt
- 2 Combustion air blower -V6
 - ♦ Checking => Page 49
 - ♦ Removing and installing
=> Page 179
- 3 Gasket
- 4 Moulded gasket
 - ♦ Replace
- 5 Glow plug with flame monitor -Q8
 - ♦ With internal heater coils
(glow element)



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- ♦ Different versions for attachment with bolt or clip =>Page 181
- ♦ Checking => Page 49
- ♦ Removing and installing

=>Page **181**

6 Clip

- ◆ Ensure correct installation

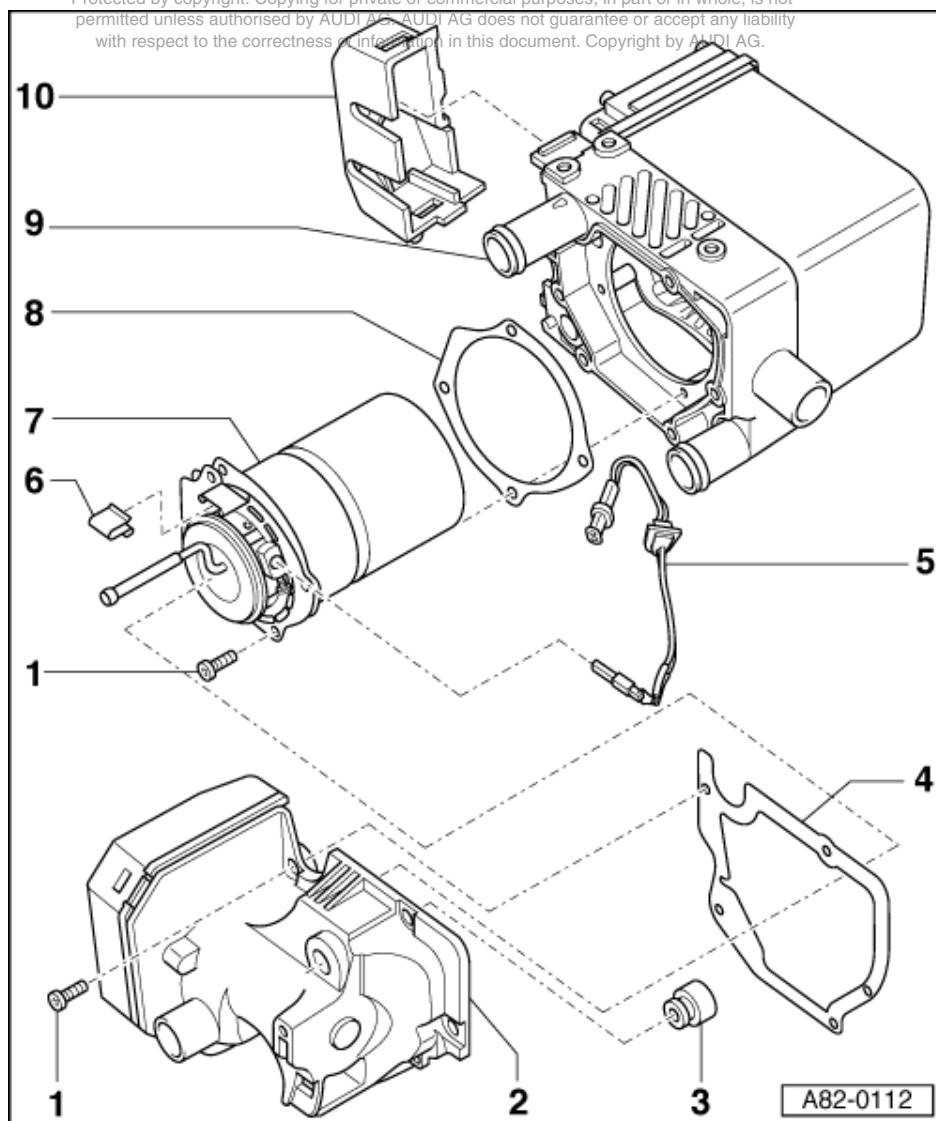
7 Burner element

- ◆ Different versions for attachment of glow plug with flame monitor -Q8 with bolt or clip =>Page **181**
- ◆ Removing and installing
=>Page **180**

8 Moulded gasket

- ◆ Replace

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9 Burner housing, heat exchanger and heater control unit -J162

- ◆ Not to be dismantled
- ◆ Control unit -J162 for auxiliary and additional heaters differs (up to software version "D48", additional heater version does not feature certain functions)

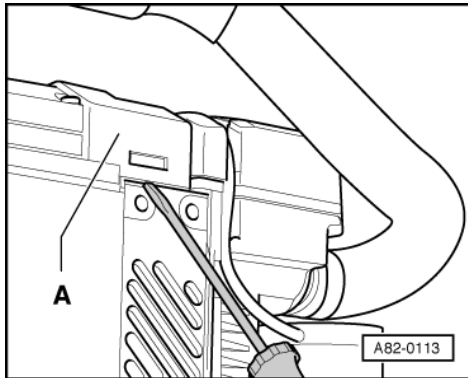
=> Parts List

10 Cover

- ◆ For connector rail
- ◆ Removing and installing
=>Page **179**
- ◆ Assignment of connector rail

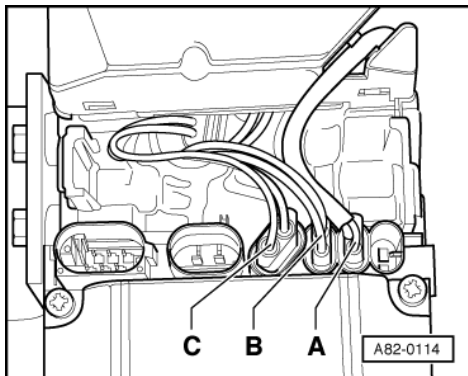
=>Page 179

11.8 - Removing and installing cover for connector rail



- Detach auxiliary/additional heater from vehicle or remove
 => Page 150 .
- -> Use screwdriver to prise off cover -A-.

11.9 - Assignment of auxiliary/additional heater connector rail



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- -> Connector -A- to recirculating pump -V55

Note:

Only fitted on "auxiliary heater" version.

- Connector -B- to combustion air blower -V6
- Connector -C- to glow plug with flame monitor -Q8

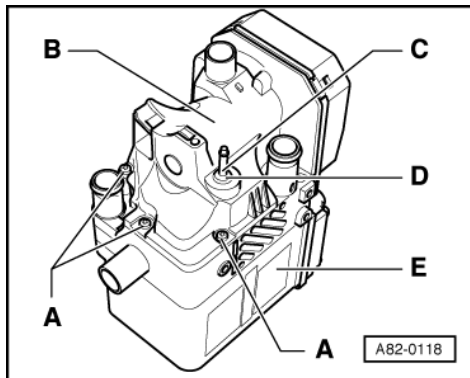
11.10 - Removing and installing combustion air blower -V6

Notes:

- ♦ Combustion air blower can only be replaced separately on auxiliary/additional heaters with control unit - J162 featuring software as of version "D49". Only these heaters permit adjustment of CO2 level in exhaust gas by way of "Adaption" function =>Page 125 .
- ♦ Delivery of combustion air blower is subject to certain tolerances. At the auxiliary/additional heater production stage, the CO2 level in the exhaust gas is set at the heater control unit -J162 on a test bench. This setting cannot be altered on auxiliary/additional heaters with a control unit up to software version "D48". Replacement of combustion air blower on these heaters would lead to a danger of CO2 level in exhaust gas being outside permitted range.



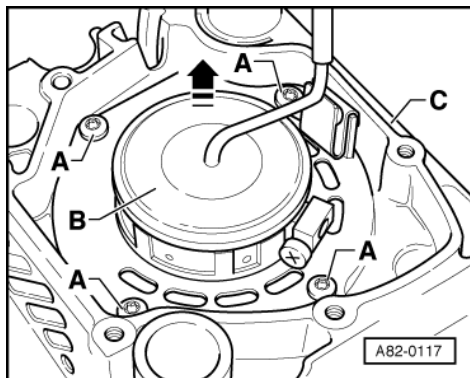
- ♦ After replacing combustion air blower, check and if necessary adjust CO₂ level in exhaust gas => Page 125 .



- Remove auxiliary/additional heater => Page 150 .
- Remove cover for connector rail and unplug connectors to rail => Page 179 .
- Remove recirculating pump -V55 (auxiliary heater only) => Page 174 .
- -> Remove bolts -A-.
- Separate combustion air blower -B- from heater -E-.

Notes on installation:

- ♦ Before fitting combustion air blower, replace moulded gasket (between combustion air blower and heater).
- ♦ When inserting fuel pipe -C-, make sure grommet -D- is properly positioned in combustion air blower -B-.

11.11 - Removing and installing burner element

- Remove combustion air blower -V6 => Page 179 .
- -> Remove bolts -A-.
- Lift burner element -B- with glow plug out of heater -C-.

Notes:

- ♦ Before fitting burner element, replace moulded gasket (between burner element and heater).
- ♦ Problems with auxiliary/additional heater operation may be encountered in cold weather on vehicles with diesel engines if use is predominantly made of vegetable-oil methylester as fuel.

Explanation:

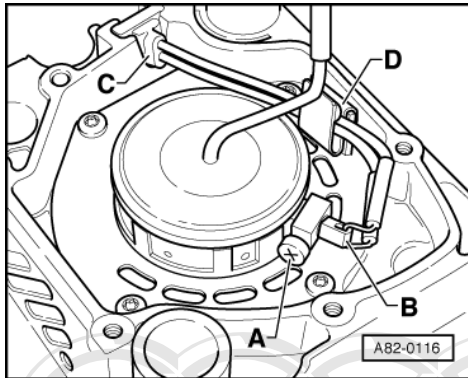
On account of the physical properties, deposits may form during operation on the evaporation fabric in the burner element. These then cause combustion problems if the vehicle is run for lengthy periods on vegetable-oil methylester.

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- ♦ Different versions of burner element (for attachment of glow plug with flame monitor -Q8 with bolt or clip) =>Page 181
- ♦ Removing glow plug with flame monitor -Q8 =>Page 181

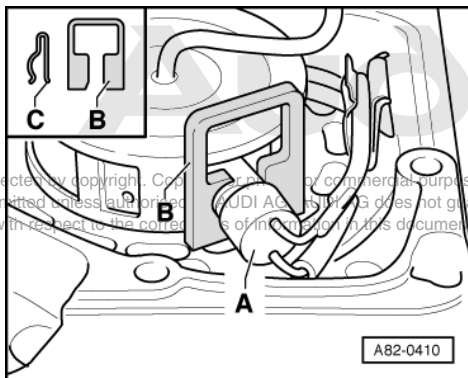
- ♦ If burner element is defective, also replace glow plug with flame monitor -Q8.

11.12 - Removing and installing glow plug with flame monitor -Q8



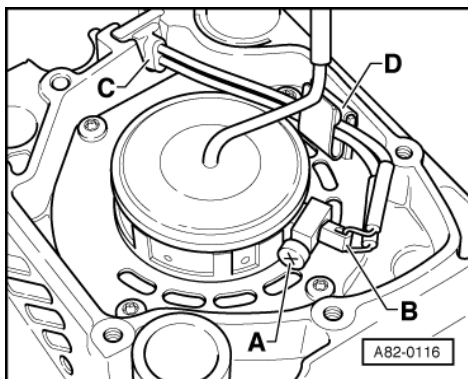
Notes:

- ♦ Different versions of burner element and glow plug with flame monitor -Q8 (attachment with bolt or clip)
- -> Between start of production and 06.99, glow plug with flame monitor -Q8 was attached in burner element with bolt -A- (gradual conversion).



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- -> Between 06.99 and 11.01 (gradual conversion), glow plug with flame monitor -Q8 was attached in burner element with clip -C-.
- As of 11.01 (gradual conversion), glow plug with flame monitor -Q8 has been attached in burner element with clip -B-.
- ♦ The design of clip -B- is such that the dissipation of heat at glow plug -Q8 is better than with clip -C-. Exclusive use is therefore to be made of burner elements where the glow plug is attached with a bolt or clip -B-.
- Remove burner element => Page 180 .

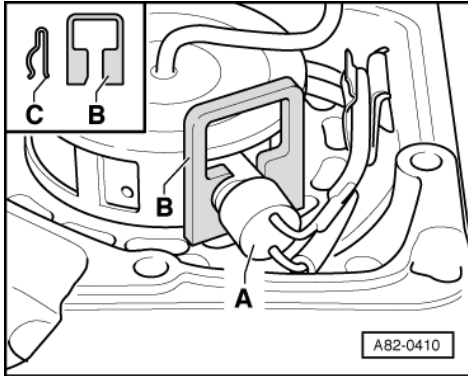




- -> Remove bolts -A- (or clip).
- Pull glow plug with flame monitor -B- out of burner element.

Notes on installation:

- ♦ Bolt -A- is only to be tightened to approx. 0.5 Nm; greater torque could damage glow plug.
- ♦ Replace burner element as well if glow plug is defective.
- ♦ Fix wiring in position in clip -D- and route as shown.



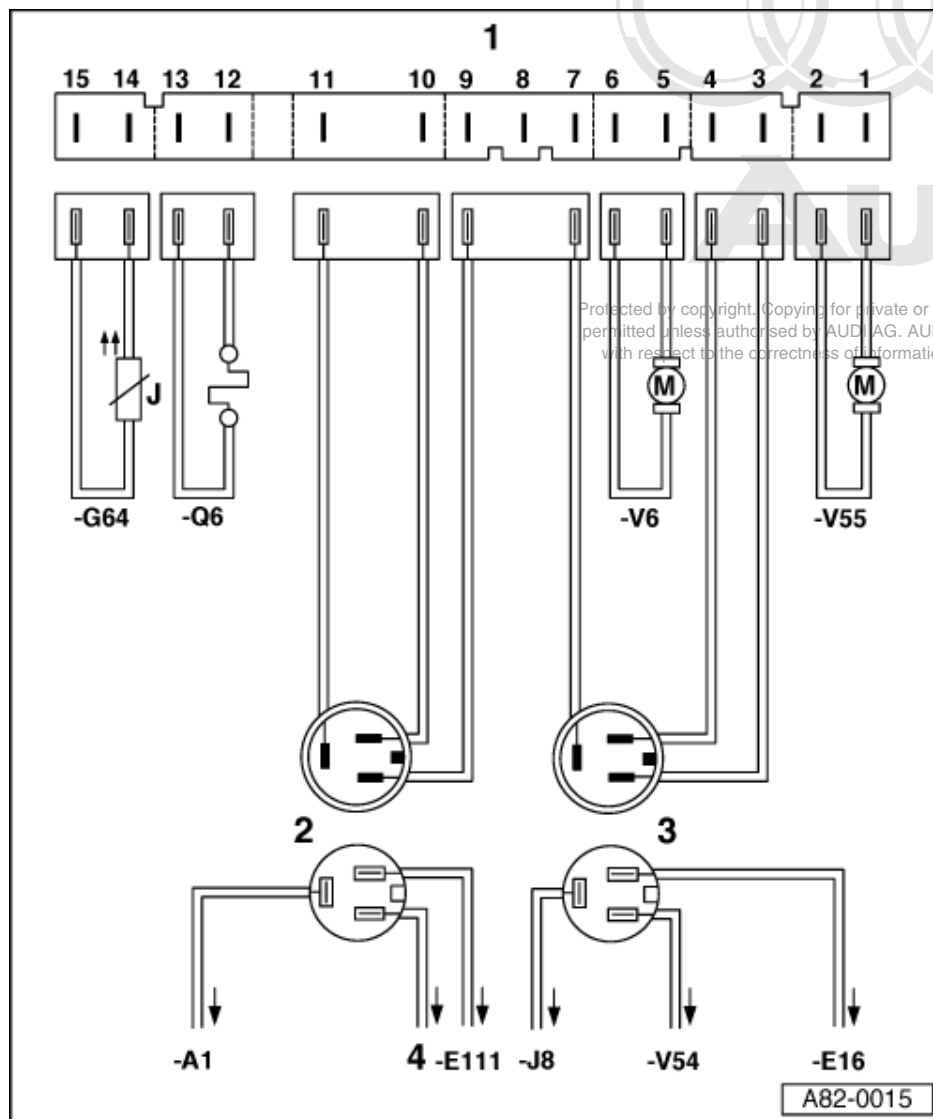
- ♦ Check proper positioning of grommets -C- after installation.
- ♦ Check non-insulated part of wire to glow plug before installing combustion air blower; wires must not make mutual contact or come into contact with other components (danger of short circuit).
- ♦ -> In the case of burner elements where glow plug -Q8 is attached with clip -B-, pay attention to firm fit of clip and make exclusive use of burner elements where glow plug is attached with a bolt or clip -B-.



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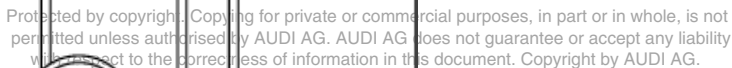
12 - Block diagram of auxiliary heater (heater type "S")

12.1 - Block diagram of auxiliary heater (heater type "S")



Notes:

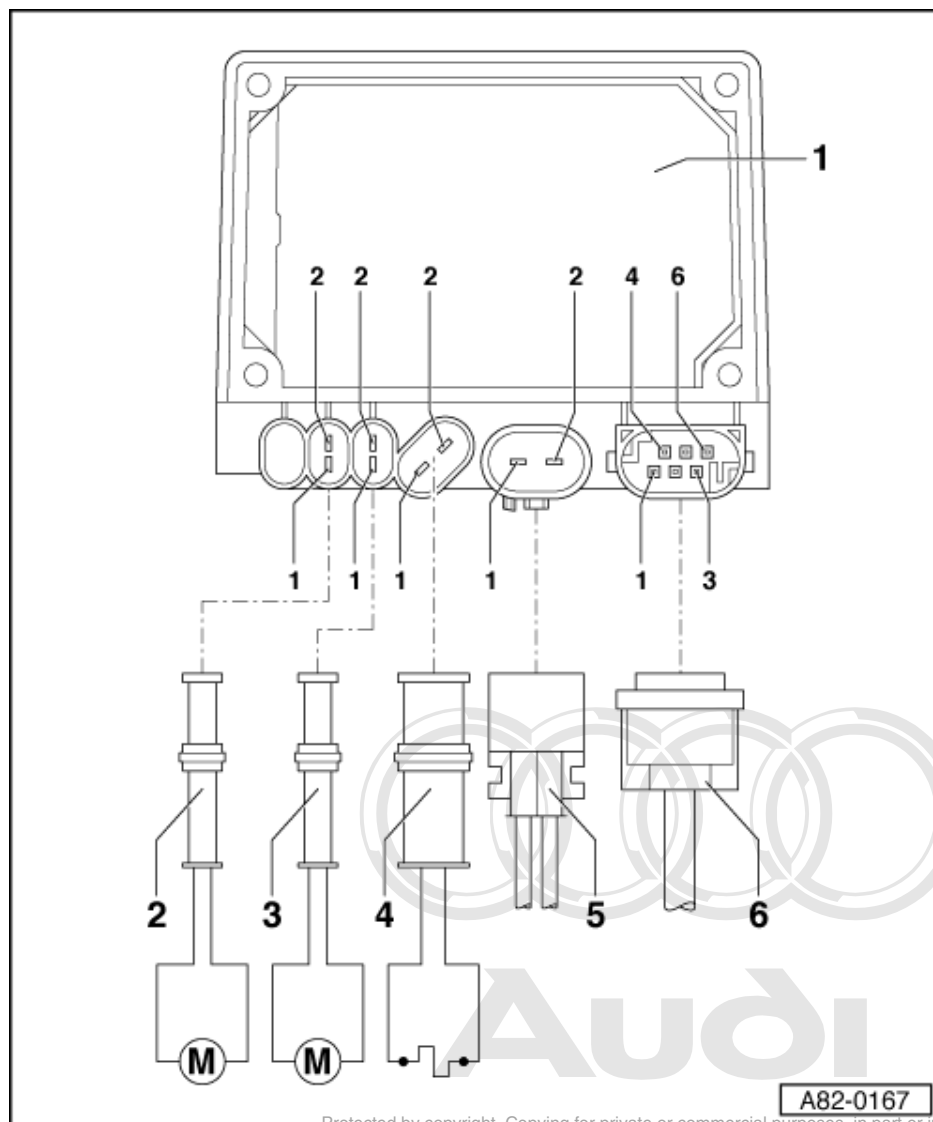
- ♦ Incorporation of auxiliary heater into vehicle electrical system
- => Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder
- ♦ Fig. shows plugs and housings of both 3-pin connectors (2 and 3), each viewed towards plug contacts.
- 1 Connector rail in auxiliary heater
 - ♦ To control unit -J162
 - 2 3-pin black connector in wiring to auxiliary heater
 - 3 3-pin white connector in wiring to auxiliary heater



184 82 - Auxiliary heating

13 - Block diagram of auxiliary/additional heater (type "Z/C")

13.1 - Block diagram of auxiliary/additional heater (type "Z/C")



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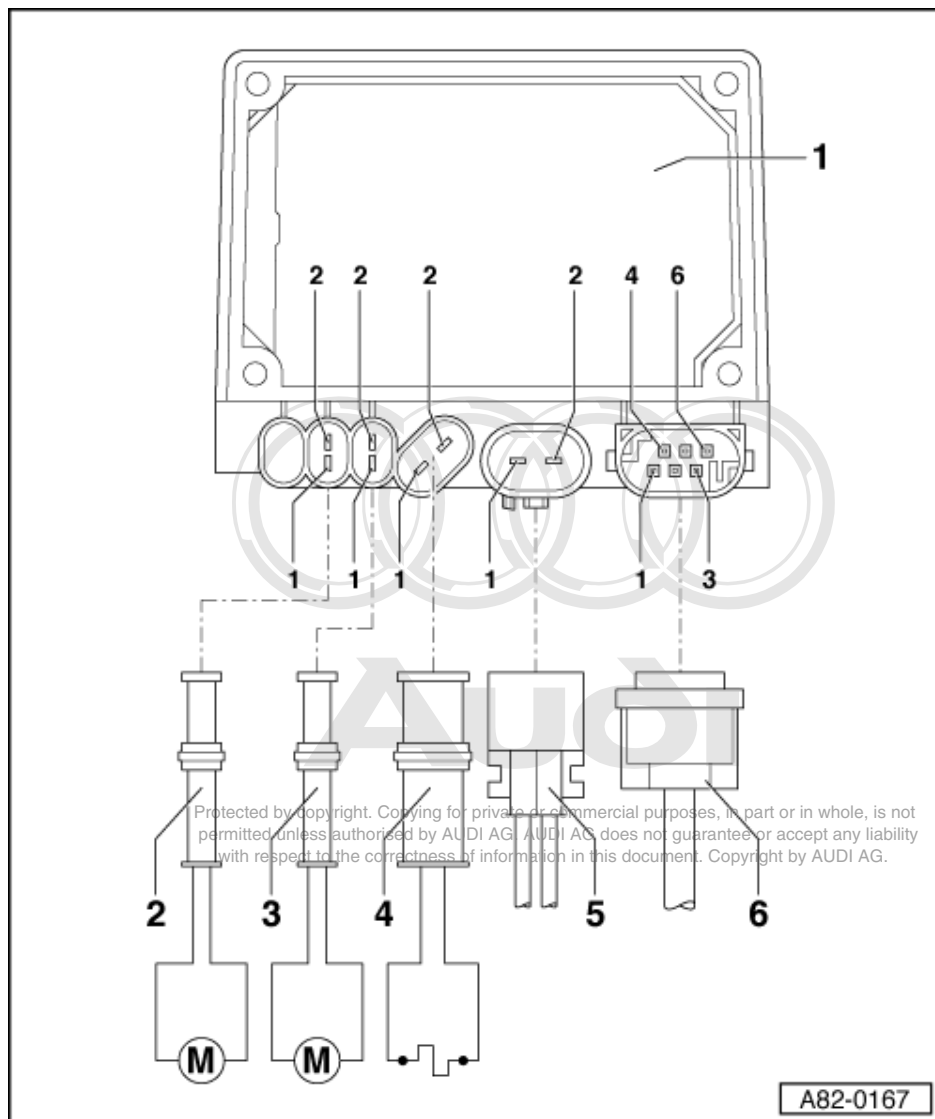
Note:

Incorporation of auxiliary/additional heater into vehicle electrical system

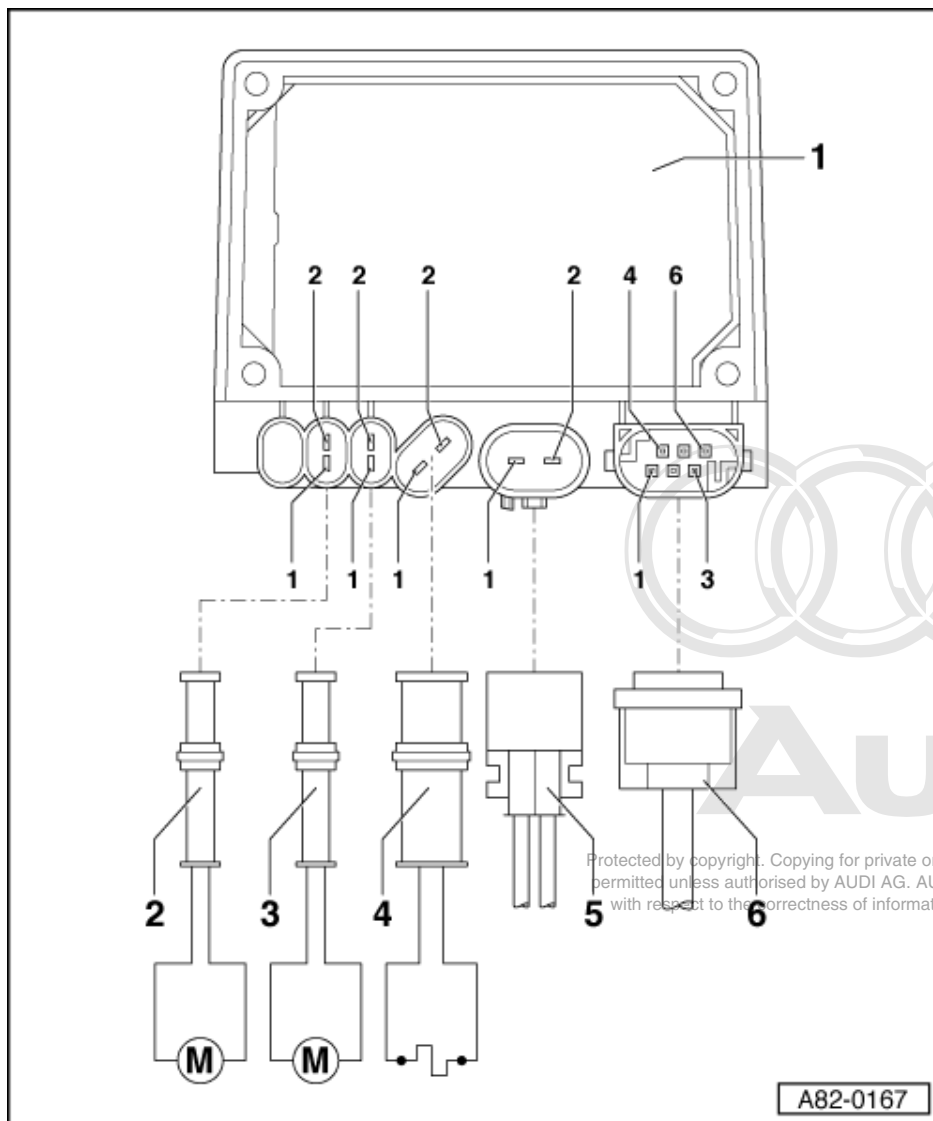
=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

1 Heater control unit -J162 with connector rail

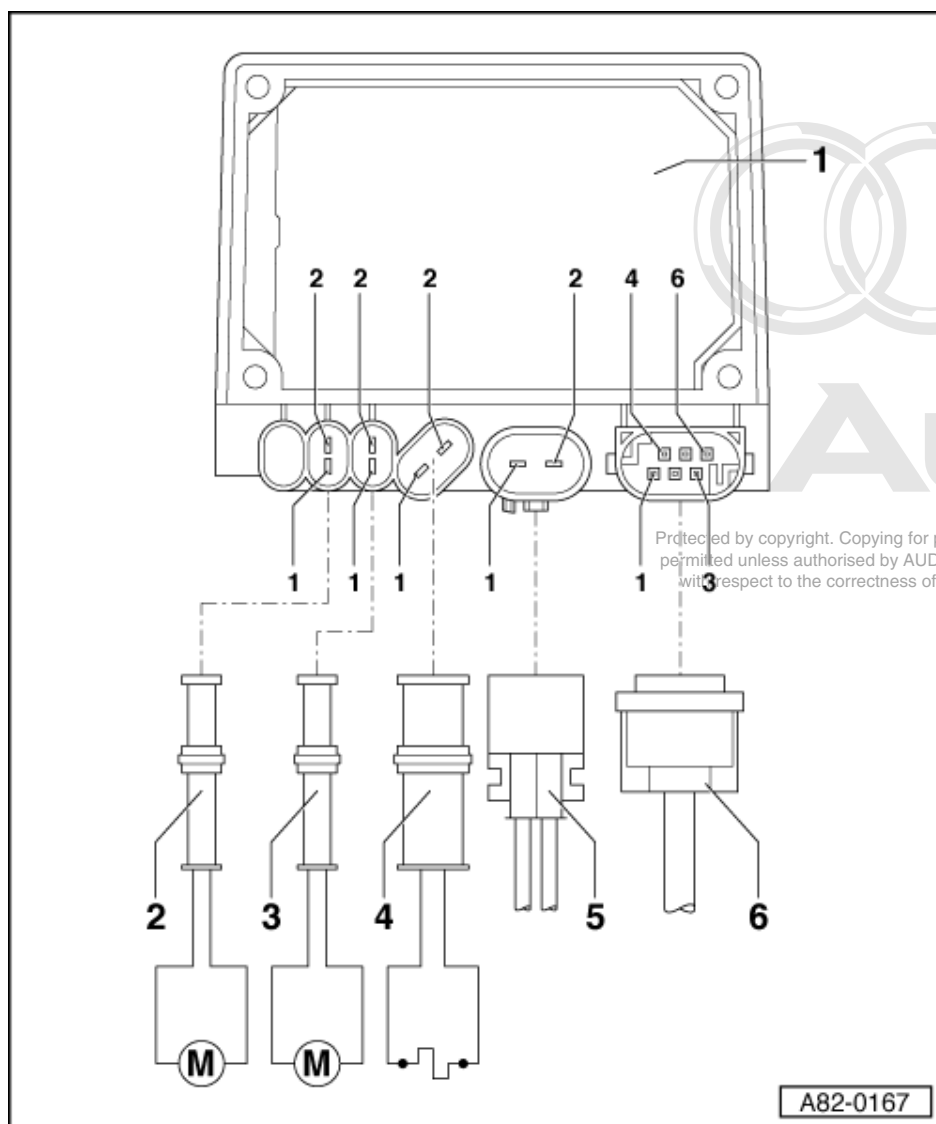
- ♦ Control unit is fitted with temperature sensors for determining coolant temperature and to safeguard against overheating
- ♦ Control unit -J162 for auxiliary and additional heaters differs (up to software version "D48", additional heater version does not feature certain functions)



- ♦ There are different heater control units -J162. As of software version "D50", the heater control unit -J162 can be encoded for a small coolant circuit. As of software version "D52", the recirculating pump -V55 is actuated as a function of coolant temperature on encoding for a large coolant circuit =>Page 6 .
- ♦ Control unit is permanently connected to burner housing/heat exchanger
- ♦ Different software versions =>Page 5 (e.g. CO2 level in exhaust gas adjustable as of software version "D49")

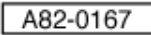


- 2 Recirculating pump -V55**
 - ◆ Only fitted on auxiliary heater
- 3 Combustion air blower -V6**
- 4 Glow plug with flame monitor -Q8**
- 5 2-pin connector**
 - ◆ Contact 1
 - Power supply, terminal 30 (via fuse)
 - ◆ Contact 2
 - Earth connection



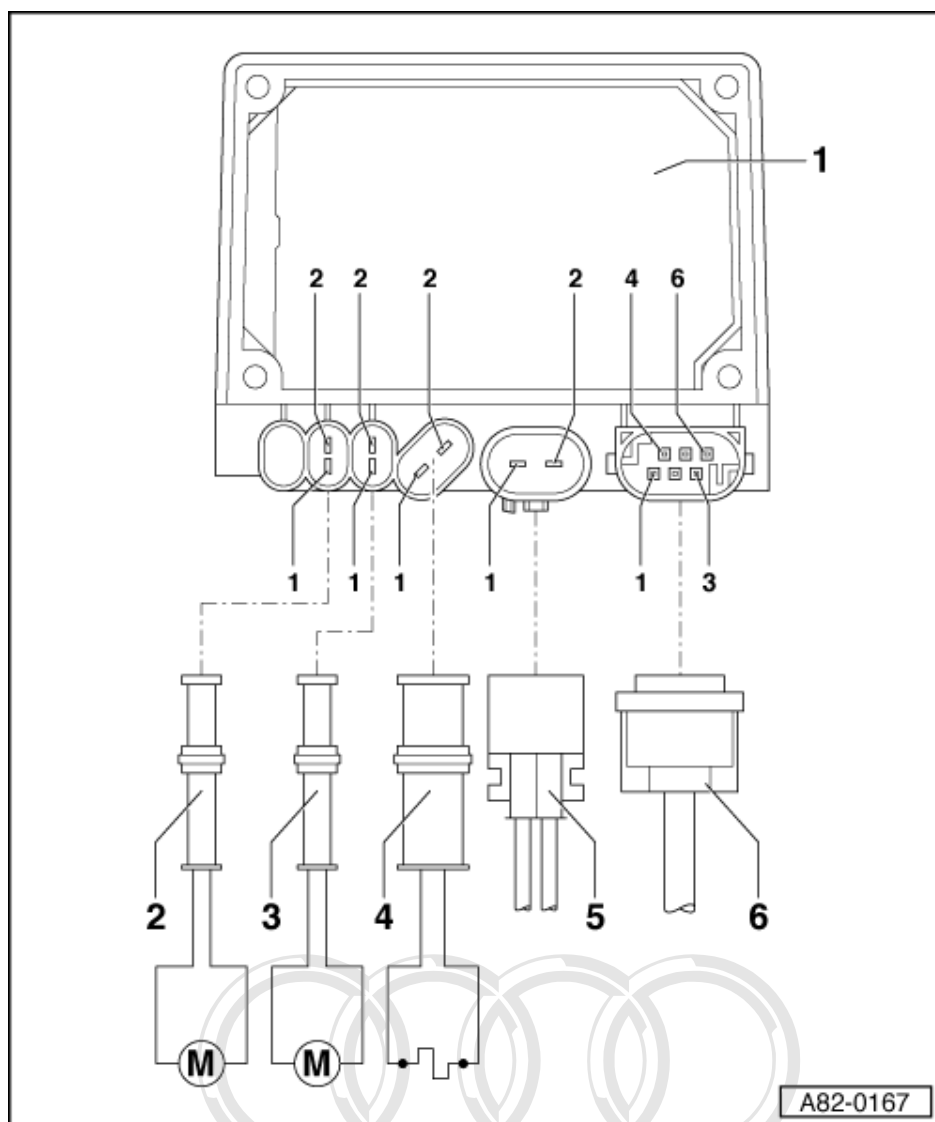
6 6-pin connector

- ◆ Contact 1
 - Cut-in signal for "auxiliary heating/auxiliary ventilation" (positive from pre-selection clock -E111, dash panel insert or -R64)
 - Signal comes from pre-selection clock -E111 (on vehicles with no auxiliary heater remote control)
 - Signal comes from auxiliary heating radio wave receiver -R64 (on vehicles with pre-selection clock -E111 and auxiliary heater remote control)
 - Signal comes from dash panel insert (on vehicles with no pre-selection clock -E111)
 - Not used for additional heater (with no auxiliary heater)



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

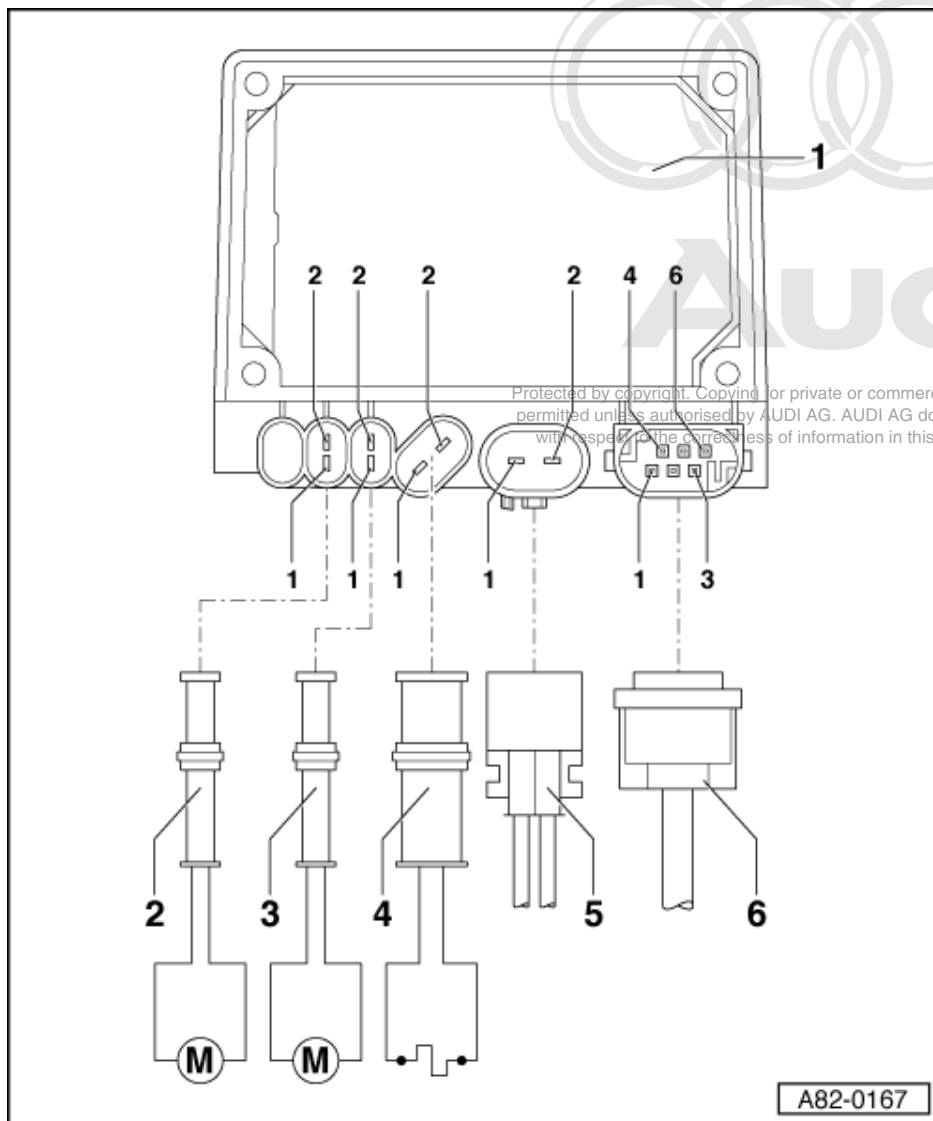


- Used on vehicles with 8-cyl. petrol engine and small coolant circuit (gradual introduction as of October 2000/January 2001) => Page 6 as well as vehicles with 12-cyl. engine

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

- With engine running, coolant shut-off valve relay -J541 applies earth as a function of coolant temperature and -J162 switches on recirculating pump -V55 =>Page 69 (thus enhancing coolant supply of pump/valve unit)
- Not used on vehicles with 6-cyl. petrol engine

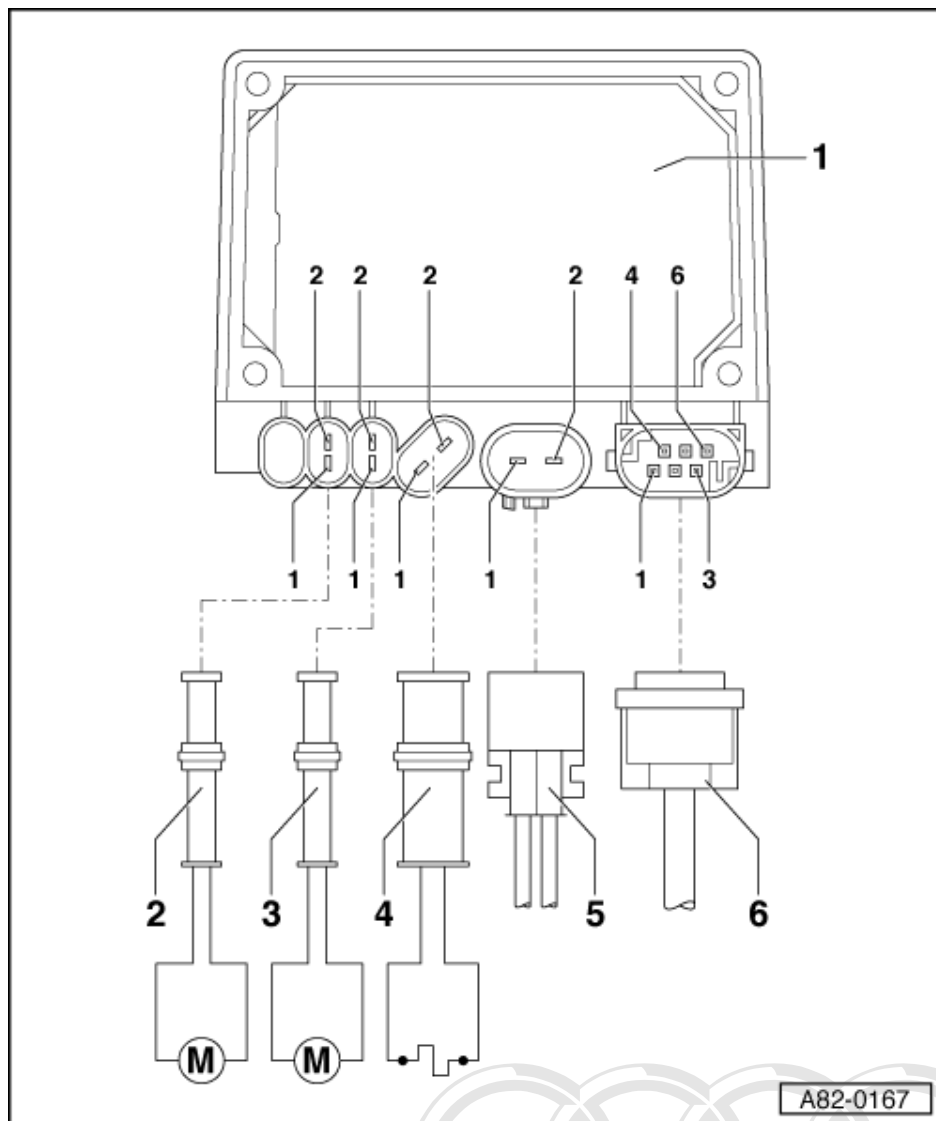
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- Not used on vehicles with 8-cyl. petrol engine and large coolant circuit (up to October 2000 / January 2001)
 => Page 6
- ◆ Contact 4
- Not used for additional heater (with no auxiliary heater)
- Actuation of operating and display unit for air conditioner/Climatronic -E87/-J541 (max. output load 2 A) by auxiliary/additional heater

Notes:

- ◆ On vehicles with small coolant circuit (8-cyl. petrol engine as of January 2001 and 12-cyl. engine), -E87 is actuated via coolant shut-off valve relay -J541.
- ◆ Depending on encoding, positive or square-wave signal is output by heater control unit -J162 as of software version "D50" =>Page 69.

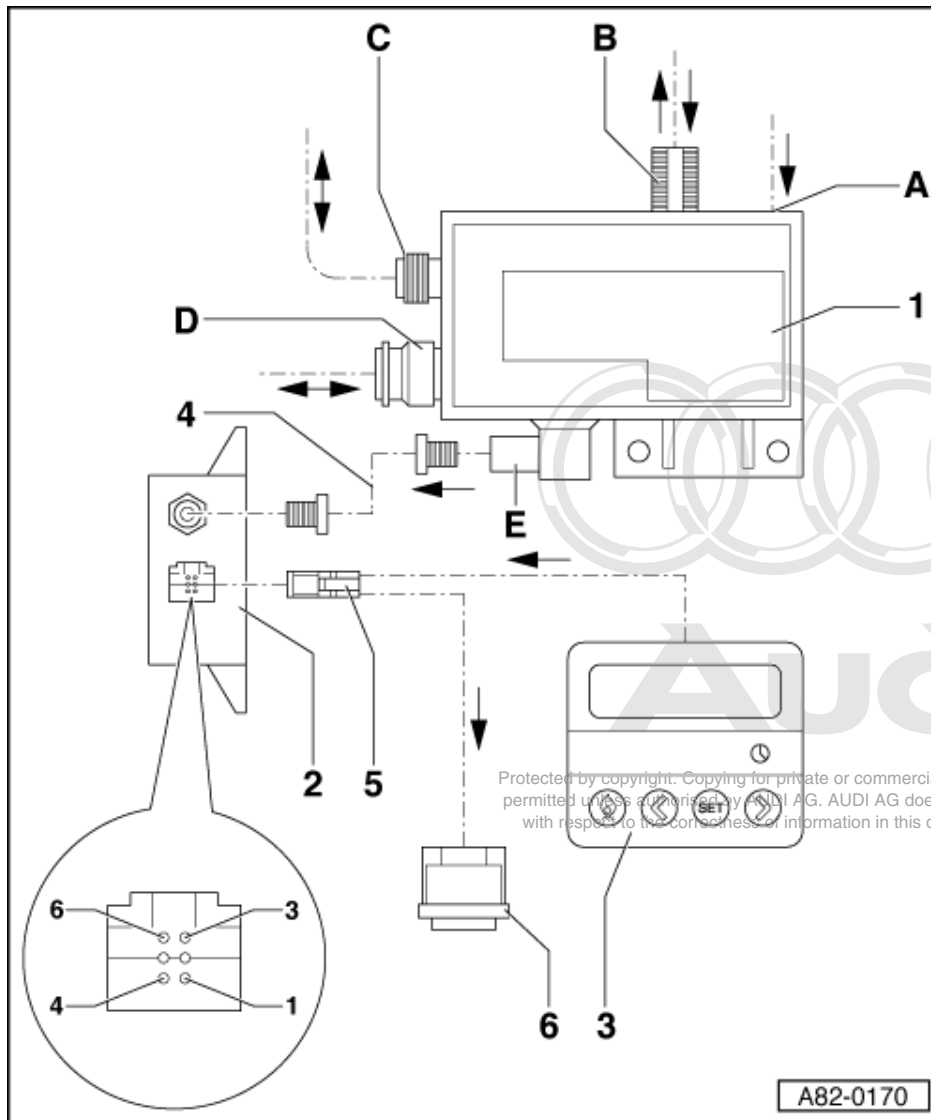


- ◆ Contact 5
 - Input from heater/heat output switch -E16 on vehicles with pre-selection clock -E111 (switch open = auxiliary heating mode, switch closed = earth = auxiliary ventilation mode)
 - Input from switch in dash panel insert on vehicles with no pre-selection clock -E111 (switch open = auxiliary heating mode, switch closed = earth = auxiliary ventilation mode)
 - Not used for additional heater (with no auxiliary heater)
- ◆ Contact 6
 - Actuation of metering pump -V54
 - Delivery of metering pump is determined by frequency of square-wave signal (number of voltage pulses per second)
 - Also connected to engine control unit on vehicles with diesel engine

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14 - Block diagram of auxiliary heater actuation with remote control (heater type "Z/C")

14.1 - Block diagram of auxiliary heater actuation with remote control (heater type "Z/C")

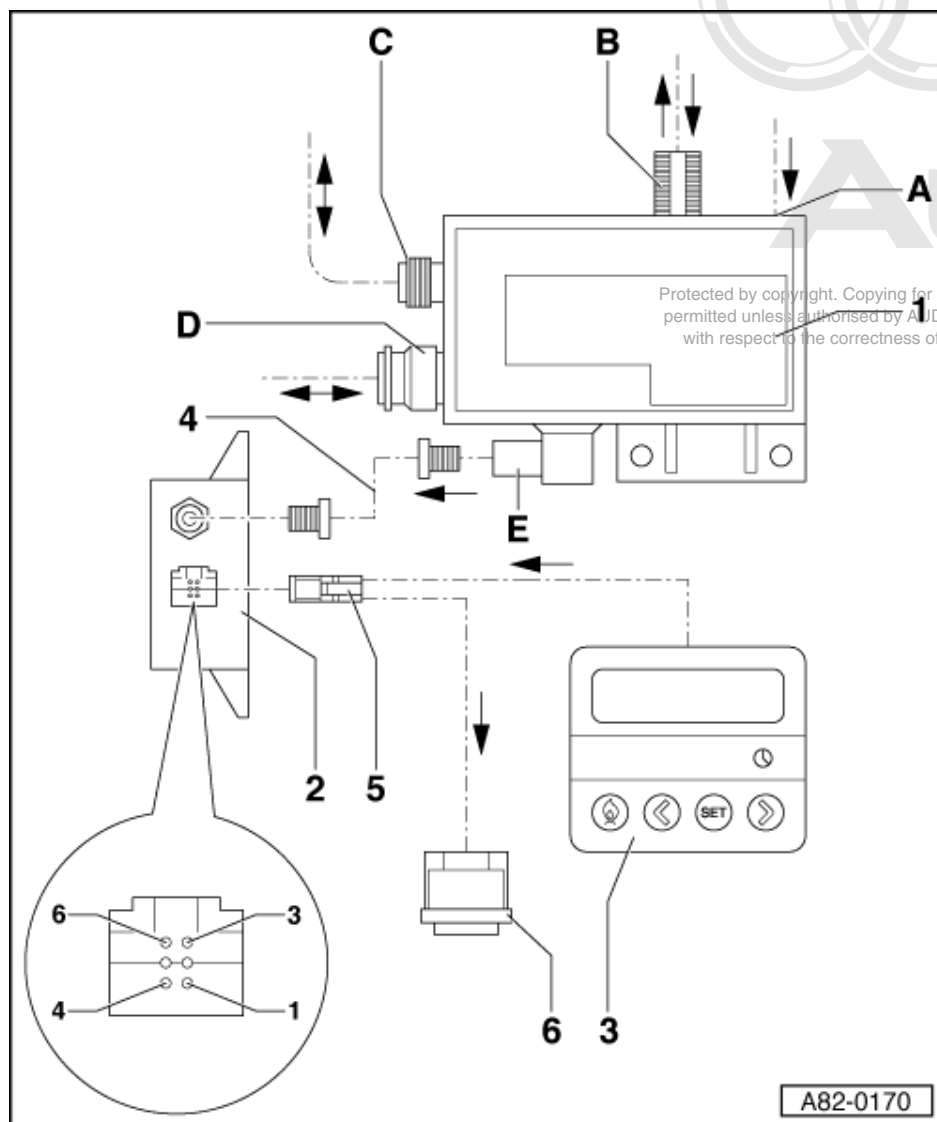


Notes:

- ♦ Remote control is only intended for vehicles fitted with type "Z/C" auxiliary heater as standard or as optional extra.
- ♦ For vehicles without heat-absorbing glass and telephone, rod of radio/telephone/auxiliary heater aerial -R51 is connected directly to auxiliary heating radio wave receiver -R64 (no aerial filter).
- ♦ Auxiliary heating radio wave receiver -R64 and aerial filter are installed in luggage compartment on left in direction of travel behind luggage compartment lining in area of wheel housing.

=> Electrical System; Repair Group 91

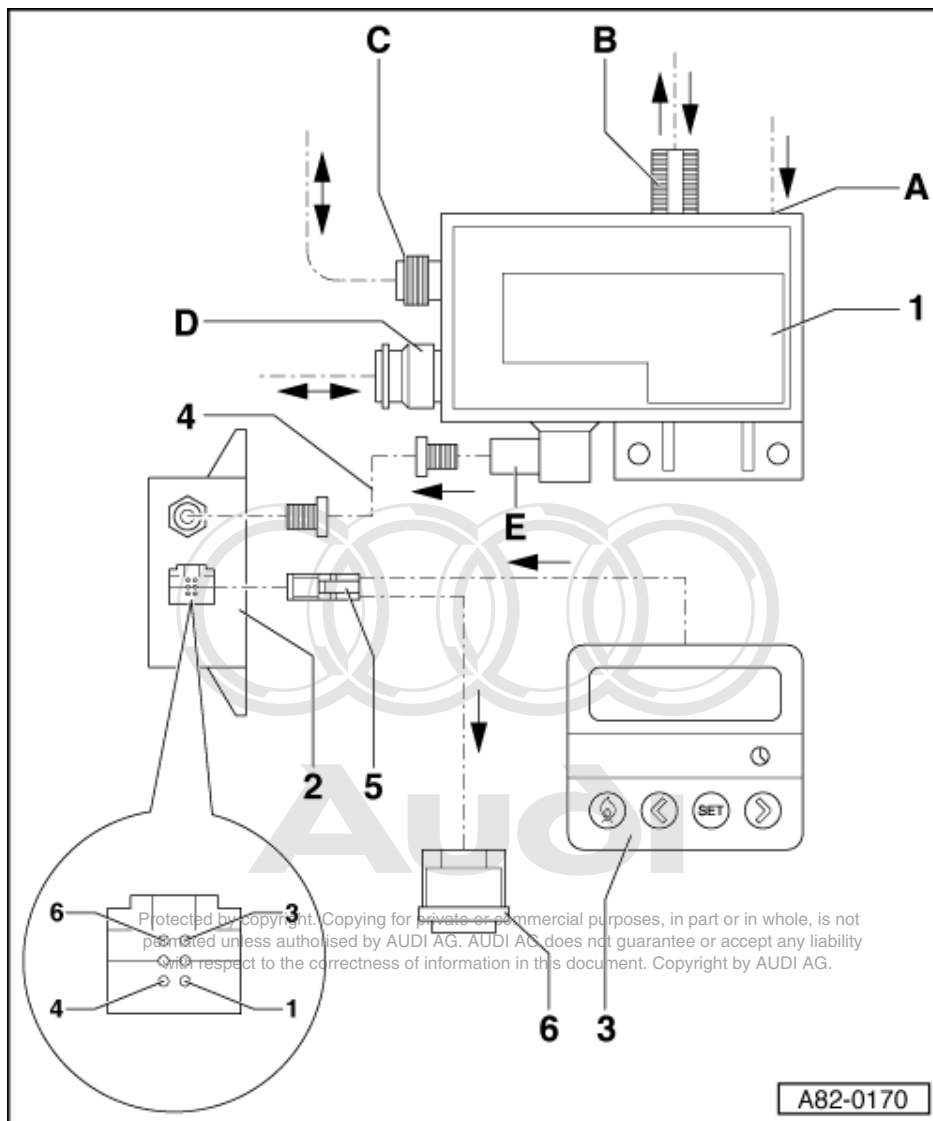
14.2 - Block diagram for vehicles with pre-selection clock -E111



1 Radio/telephone/auxiliary heater aerial -R51

- A- Not used (intended for power supply; not required on vehicles with genuine Audi radios, power is supplied via input "B")
- B- Output to radio/voltage signal input from radio
- C- Input/output to rod of aerial
- D- Input/output to telephone
- E- Output to -R64

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



2 Auxiliary heating radio wave receiver -R64

- Switches auxiliary heater on and off when appropriate signals are received

3 Pre-selection clock -E111

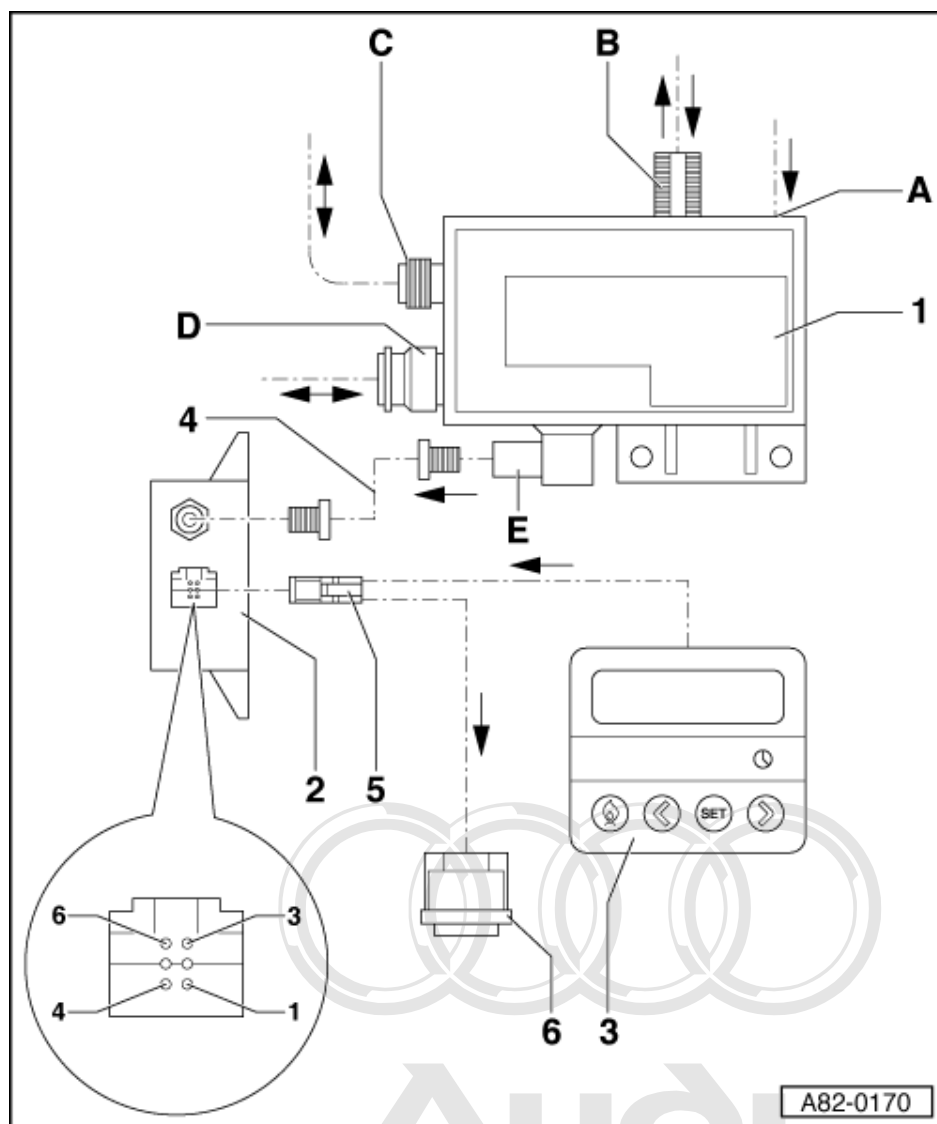
- ♦ Removing and installing
=>Page 112
- ♦ Controls and display panel
=>Page 93

4 Wiring

- ♦ Screened

5 6-pin connector to -R64

- ♦ Contact 1
- Output for cut-in signal to auxiliary heater
- ♦ Contact 2
- Not used

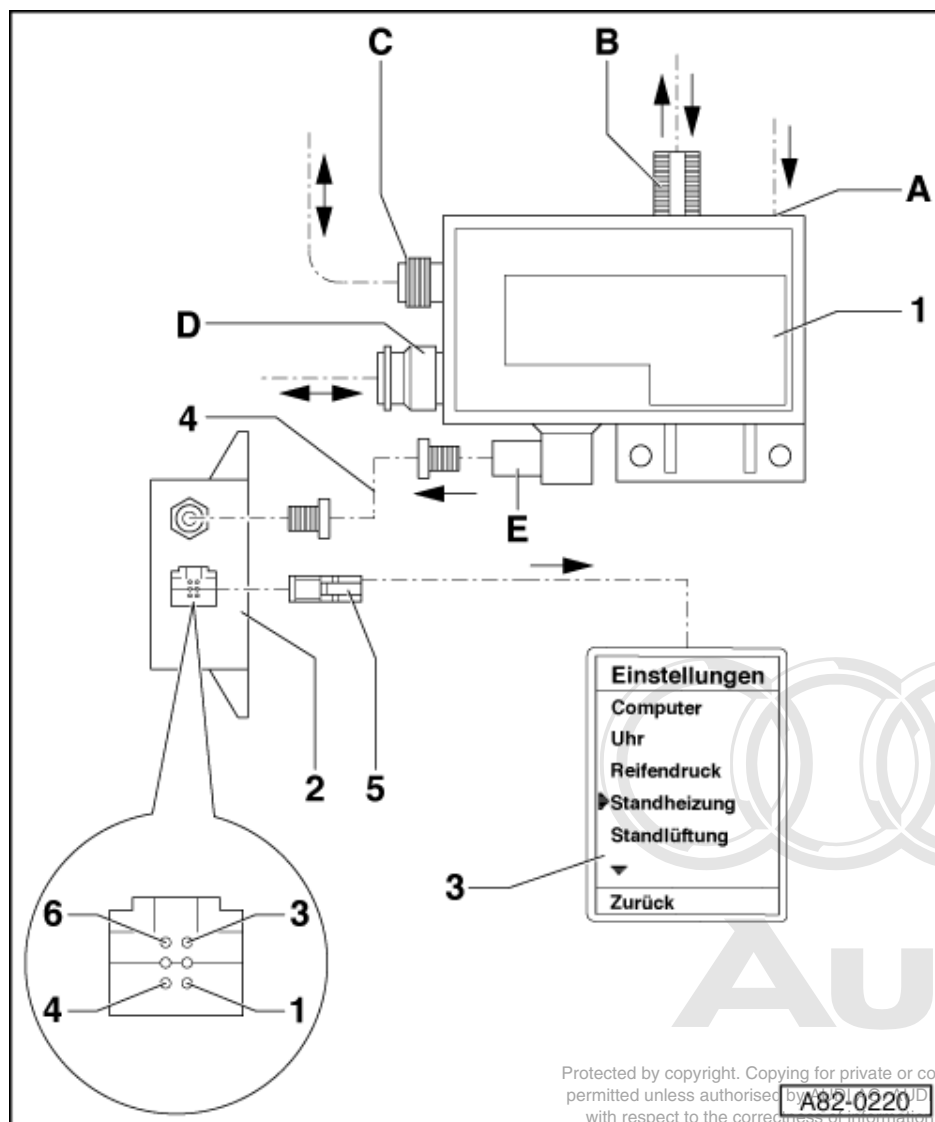


- ◆ Contact 3
- Input for cut-in signal from pre-selection clock -E111
- ◆ Contact 4
- Power supply
- ◆ Contact 5
- Not used
- ◆ Contact 6
- Earth

6 6-pin connector to auxiliary heater

- ◆ Contact 1
- Cut-in signal for auxiliary heater
- ◆ Contacts 2 to 6 =>Page 185

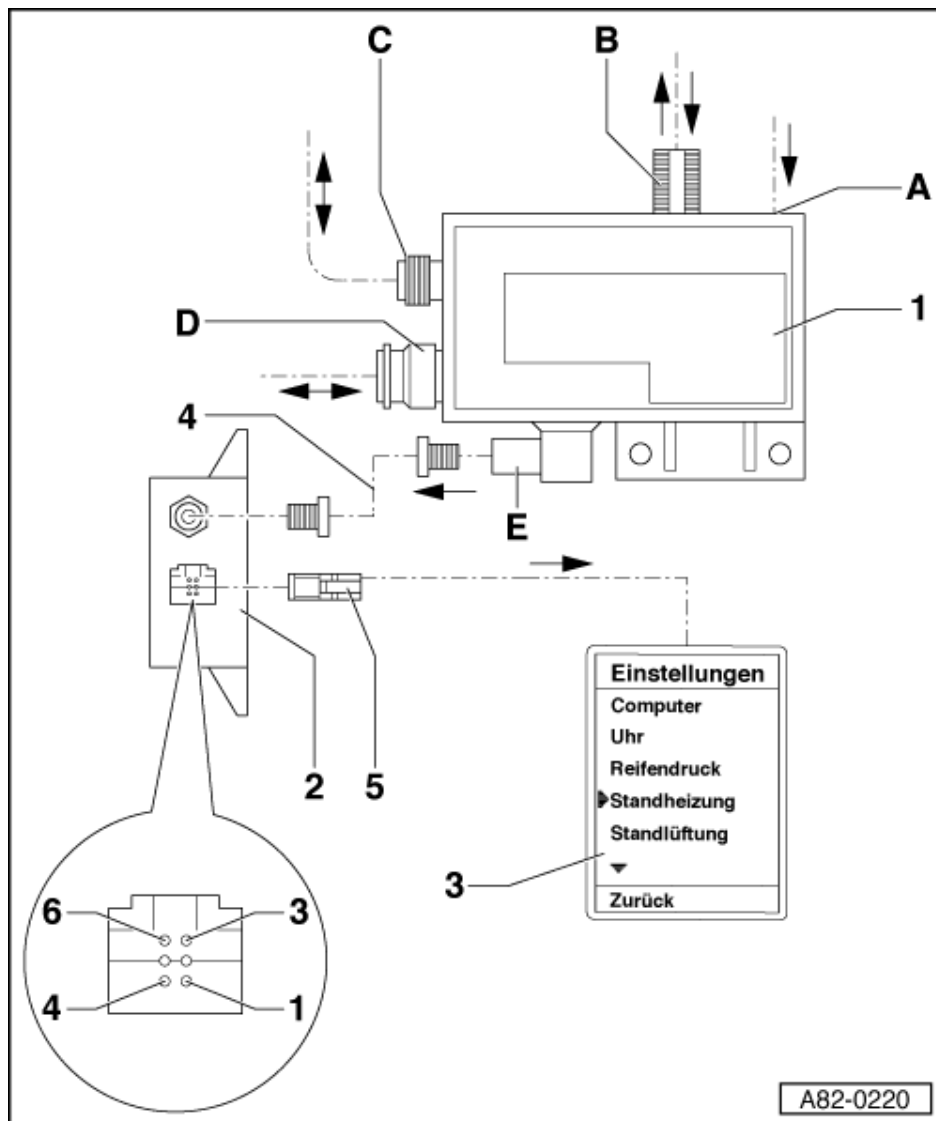
14.3 - Block diagram for vehicles with no pre-selection clock -E111



1 Radio/telephone/auxiliary heater aerial -R51

- A- Not used (intended for power supply; not required on vehicles with genuine Audi radios, power is supplied via input "B")
- B- Output to radio/voltage signal input from radio
- C- Input/output to rod of aerial
- D- Input/output to telephone
- E- Output to -R64

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



2 Auxiliary heating radio wave receiver -R64

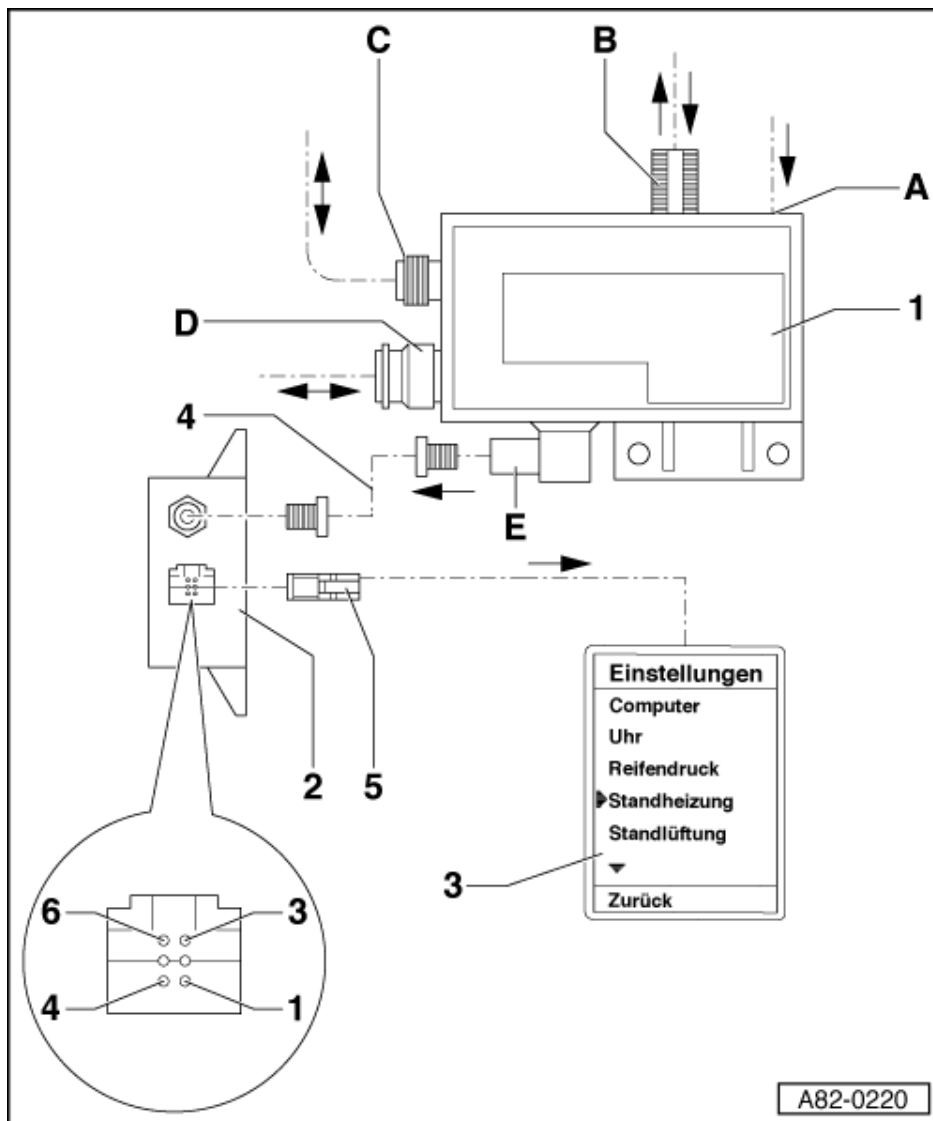
- When signals are received, switches signal (positive) to dash panel insert, which switches auxiliary heating/auxiliary ventilation on and off

3 Control unit in dash panel insert

- ♦ Making settings on display of driver information system =>Page 97
- ♦ Instantaneous switching status of auxiliary heating/auxiliary ventilation appears on digital clock display =>Page 97



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4 Wiring

- ◆ Screened

5 6-pin connector to -R64

- ◆ Contact 1
 - Output for cut-in signal to dash panel insert (which switches auxiliary heating/auxiliary ventilation on and off)
- ◆ Contact 2
 - Not used
- ◆ Contact 3
 - Not used
- ◆ Contact 4
 - Power supply
- ◆ Contact 5
 - Not used
- ◆ Contact 6
 - Earth

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15 - Checking operation of auxiliary heater (heater type "S")

15.1 - Checking operation of auxiliary heater (heater type "S")

Notes:

- ♦ "Checking actuation of auxiliary heater" does not involve extensive removal operations. Bumper, for example, has to be removed for "Checking electrical components of auxiliary heater".
- ♦ Checking operation of type "Z/C" heaters =>Page **18**.

15.2 - Checking actuation of auxiliary heater

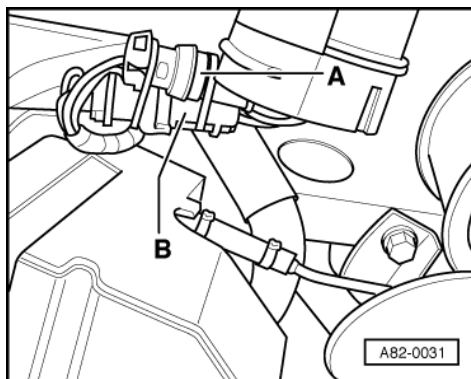
Measuring instruments and other items required

- Portable multimeter V.A.G 1526
 - Adapter set V.A.G 1594
 - Diode test lamp V.A.G 1527
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Test requirements

- All fuses OK as per current flow diagram
- Second battery OK and adequately charged
- Coolant temperature less than 30°C

Checking



- Switch off ignition and auxiliary heater.
- Remove noise insulation.

=> General Body Repairs; Repair Group 50; Removing and installing noise insulation Removing and installing noise insulation

- Remove air duct to alternator (8-cyl. engine only).
- -> Unplug both 3-pin connectors -A- and -B-.

Test step 1 (power supply for auxiliary heater)

Note:

Block diagram of auxiliary heater and pin assignment =>Page **183**

Select measuring range: Voltage measurement (20 V DC) ▪ Measurement location: 3-pin connector -A- (black) on vehicle end					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
1.1	A1 and 4	Power supply to auxiliary heater	<ul style="list-style-type: none"> ▪ Ignition off ▪ Auxiliary heater off 	- approx. battery voltage	- Use current flow diagram to locate and eliminate open circuit in wiring or contact resistance in power supply or in earth connection

Select measuring range: Voltage measurement (20 V DC) ▪ Measurement location: 3-pin connector -A- (black) on vehicle end					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
1.2	A1 and 4	Connection between batteries -A and -A1	<ul style="list-style-type: none"> ▪ Auxiliary heater off ▪ Engine running 	- approx. alternator voltage	<ul style="list-style-type: none"> - Use current flow diagram to locate and eliminate open circuit in wiring or contact resistance in connection between -A and -A1 - Use current flow diagram to check actuation and operation of battery cut-out relay -J7

Test step 2 (actuation of auxiliary heater by pre-selection clock -E111)

Note:

Block diagram of auxiliary heater and pin assignment =>Page 183

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Select measuring range: Voltage measurement (20 V DC) ▪ Measurement location: 3-pin connector -A- (black) on vehicle end					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
2.1	-E111 and 4	Pre-selection clock -E111 cut-in signal	<ul style="list-style-type: none"> ▪ Ignition off ▪ Auxiliary heater off 	- Less than 2V	- Use current flow diagram to locate and eliminate short to positive
2.2	-E111 and 4	Pre-selection clock -E111 cut-in signal	<ul style="list-style-type: none"> ▪ Ignition off ▪ Auxiliary heater on 	- Greater than 7V	<ul style="list-style-type: none"> - Use current flow diagram to locate and eliminate short to earth, open circuit in wiring or contact resistance - Check pre-selection clock power supply=>Page 114



Select measuring range: Voltage measurement (20 V DC) ▪ Measurement location: 3-pin connector -A- (black) on vehicle end					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
2.3	-E111 and 4	Cut-in function of pre-selection clock -E111	▪ Ignition off ▪ Auxiliary heater off Set cut-in time (1, 2 or 3) to approx. 5 minutes before actual time and activate	- At activated cut-in time, voltage changes from less than 2V to greater than 7V	- Check pre-selection clock power supply=>Page 114 Replace pre-selection clock

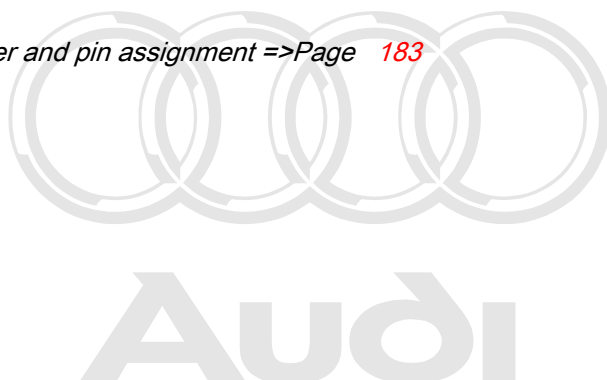
Test step 3 (actuation of metering pump -V54)**Notes:**

- ♦ Block diagram of auxiliary heater and pin assignment =>Page 183
- ♦ Test step 3.1 must be completed within 80 s.

Diode test lamp ▪ Measurement location: 3-pin connector -B- (white) on auxiliary heater end					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
3.1	-V54 (connector -B-) and earth	Actuation of metering pump -V54	▪ Ignition off ▪ 3-pin connector -A- plugged in ▪ Switch -E16 not pressed Switch on auxiliary heater at pre-selection clock - Plug in 3-pin connector -B-	- Diode test lamp starts to flash approx. 32 s after switching on auxiliary heater - Metering pump -V54 is actuated (pulsed)	- Check auxiliary heater connectors for corrosion Check electrical components of auxiliary heater =>Page 205 - Check actuation of metering pump =>Page 204

Test step 4 (actuation of operating and display unit for air conditioner/Climatronic -E87/fresh-air blower -V2)**Note:**

Block diagram of auxiliary heater and pin assignment =>Page 183



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Select measuring range: Current measurement (2 A DC) ▪ Measurement location: 3-pin connectors -A- (black) and -B- (white) on vehicle end					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
4.1	-A1 (connector -A-) and -J8 (connector -B-)	Auxiliary heater relay -J8	▪ Ignition off ▪ Auxiliary heater off	- Operating and display unit/fresh-air blower starts up Current input greater than 100 and less than 300mA	- Use current flow diagram to locate and eliminate short to earth, open circuit in wiring or contact resistance Perform air conditioner self-diagnosis =>Air Conditioner Workshop Manual Use current flow diagram to check relay -J8 and corresponding wiring

Test step 5 (heater/heat output switch -E16)

Note:

Block diagram of auxiliary heater and pin assignment =>Page 183

Diode test lamp ▪ Measurement location: 3-pin connectors -A- (black) and -B- (white) on vehicle end					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
5.1	-A1 (connector -A-) and -E16 (connector -B-)	Operation of switch -E16	▪ Auxiliary heater off ▪ Switch -E16 not pressed	- Diode test lamp does not light	- Use current flow diagram to locate and eliminate short to earth Replace switch -E16
5.2	-A1 (connector -A-) and -E16 (connector -B-)	Operation of switch -E16	▪ Auxiliary heater off ▪ Switch -E16 pressed	- Diode test lamp lights	- Use current flow diagram to locate and eliminate open circuit in wiring or contact resistance Replace switch -E16

Select measuring range: Current measurement (200 mA DC) ▪ Measurement location: 3-pin connector -B- (white) on auxiliary heater end					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained



5.3	-E16 (connector -B-) and earth	Auxiliary heater (output for detection of position of switch -E16)	<ul style="list-style-type: none"> ▪ Ignition off ▪ 3-pin connector - A- plugged in ▪ Auxiliary heater off Switch on auxiliary heater at pre-selection clock Switch off auxiliary heater at pre-selection clock Plug in 3-pin connector -B-	- Less than 1 mA Greater than 1 and less than 20 mA Less than 1 mA	- Check electrical components of auxiliary heater =>Page 205 Replace auxiliary heater
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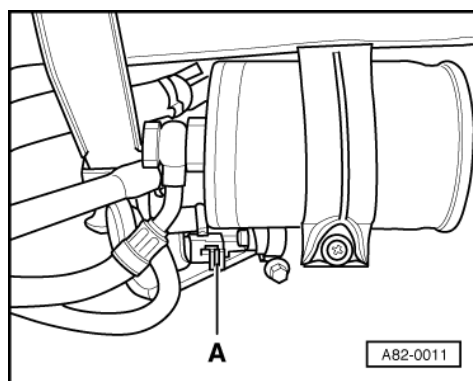
Continued on next page

Test step	Contact	Testing of	Test conditions - Additional work	Specification	Remedies if specification not attained
Continued from Page 203			<ul style="list-style-type: none"> ▪ Switch -E16 pressed Switch on auxiliary heater at pre-selection clock - Actuate switch -E16 (switch no longer pressed)	- Operating and display unit/fresh-air blower starts up Auxiliary heater does not start up - Auxiliary heater starts up Operating and display unit/fresh-air blower initially switched off 1 and then on again2	- Check electrical components of auxiliary heater =>Page 205 - Check electrical components of auxiliary heater =>Page 205

1) Only if coolant temperature in auxiliary heater less than 30°C

2) As soon as coolant temperature in auxiliary heater exceeds 30°C

15.3 - Checking actuation of metering pump -V54



- Switch off ignition.
- Remove guard beneath tank.
- -> Unplug connector -A- from metering pump -V54.
- Fit voltage tester V.A.G 1527 between the two contacts of connector -A-.
- Switch on auxiliary heater (heater/heat output switch -E16 not pressed).
- Lamp (LED) in voltage tester starts to flash after approx. 32 seconds.

Note:

If lamp (LED) does not start to flash:

- Check for open circuit in wiring between auxiliary heater and metering pump, block diagram =>Page **183**.
- Check electrical components of auxiliary heater =>Page **205**.

15.4 - Checking electrical components of auxiliary heater

Measuring instruments and other items required

- Portable multimeter V.A.G 1526
- Adapter set V.A.G 1594
- Diode test lamp V.A.G 1527

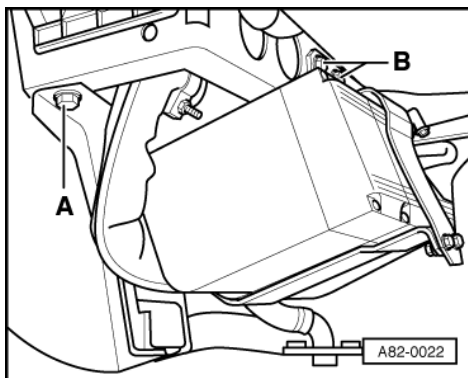
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Test requirements

- All fuses OK as per current flow diagram
- Actuation of auxiliary heater OK
- Coolant temperature less than 30°C

Checking

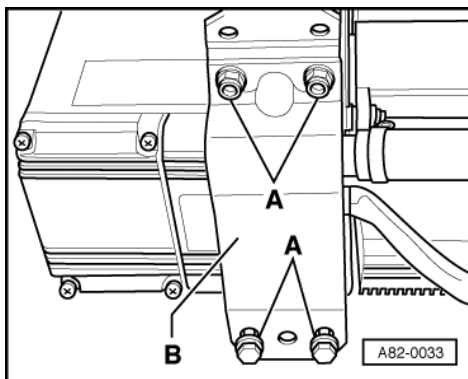
- Switch off ignition and auxiliary heater.
- On vehicles with headlight washer system:
 - Remove top part of air cleaner.
- Detach headlight washer system reservoir from body.



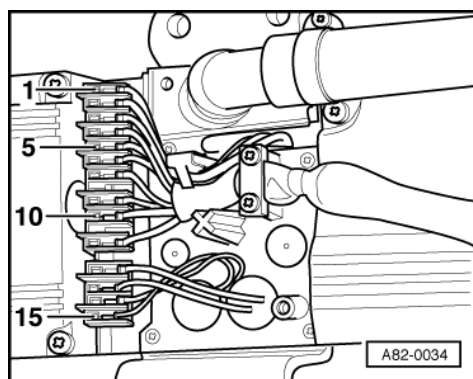
- Remove air duct to alternator (8-cyl. engine only).
- Remove bumper and noise insulation.

=> General Body Repairs; Repair Group 63; Front Bumper Front Bumper

- -> Remove bolts -B-.
- Remove bolts -A-.
- Lower auxiliary heater slightly (leave all connections attached).
- Screw in M 8 x 80 bolts (to secure lowered auxiliary heater).



- -> Remove bolts -A- and detach holder -B-.
- Remove central cover =>Page **160** .



Notes:

- ♦ -> Pin assignment of connector rail corresponds to block diagram of auxiliary heater =>Page **183** .
- ♦ Check plug contacts and connector rail for dirt and corrosion and clean if necessary.

Test step 1 (power supply for auxiliary heater)

Note:

Block diagram of auxiliary heater and pin assignment =>Page **183**

Select measuring range: Voltage measurement (20 V DC)					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
1.1	10 and 11	Power supply to auxiliary heater	▪ Ignition off ▪ Auxiliary heater off	- approx. battery voltage	- Use current flow diagram to locate and eliminate open circuit in wiring or contact resistance in power supply or in earth connection
1.2	10 and 11	Connection between batteries -A and -A1	▪ Auxiliary heater off ▪ Engine running	- approx. alternator voltage	- Use current flow diagram to locate and eliminate open circuit in wiring or contact resistance in connection between -A and -A1 Use current flow diagram to check actuation and operation of battery cut-out relay - J7

Test step 2 (actuation of auxiliary heater by pre-selection clock -E111)

Note:

Block diagram of auxiliary heater and pin assignment =>Page **183**

Select measuring range: Voltage measurement (20 V DC)					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
2.1	9 and 10	Pre-selection clock -E111 cut-in signal	▪ Ignition off ▪ Auxiliary heater off	- Less than 2V	- Use current flow diagram to locate and eliminate short to positive
2.2	9 and 10	Pre-selection clock -E111 cut-in signal	▪ Ignition off ▪ Auxiliary heater on	- Greater than 7V	- Use current flow diagram to locate and eliminate short to earth, open circuit in wiring or contact resistance Check pre-selection clock power supply=>Page 114

Select measuring range: Voltage measurement (20 V DC)					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
2.3	9 and 10	Cut-in function of pre-selection clock -E111	▪ Ignition off ▪ Auxiliary heater off Set cut-in time (1, 2 or 3) to approx. 5 minutes before actual time and activate	- At activated cut-in time, voltage changes from less than 2V to greater than 7V	- Check pre-selection clock power supply=>Page 114 Replace pre-selection clock

Test step 3 (heater/heat output switch -E16)

Note:

Block diagram of auxiliary heater and pin assignment =>Page 183

Select measuring range: Voltage measurement (20 V DC)					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
3.1	3 and 10	Operation of switch -E16	▪ Auxiliary heater on ▪ Switch -E16 not pressed	- Greater than 5V	- Use current flow diagram to locate and eliminate short to earth Check switch -E16 =>Page 203 Replace auxiliary heater
3.2	3 and 10	Operation of switch -E16	▪ Auxiliary heater on ▪ Switch -E16 pressed	- Less than 2V	- Use current flow diagram to locate and eliminate open circuit in wiring or contact resistance Replace switch -E16

Test step 4 (flame monitor -G64)

Note:

Block diagram of auxiliary heater and pin assignment => Page 183



Select measuring range: Resistance measurement (20 ω)					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
4.1	Connector contacts 14 and 15	Flame monitor -G64	▪ Ignition off ▪ Auxiliary heater off	- 2 to 4 ω	- Locate and eliminate short circuit Replace flame monitor
4.2	Connector contacts 14 and 10 (connector rail contact)		▪ Connector unplugged from connector rail (contacts 14 and 15) ▪ Flame monitor at ambient temperature	- $\infty\omega$	- Locate and eliminate short to earth Replace flame monitor

Note:

As temperature rises, resistance changes from 2 to 4 ω (at ambient temperature) to approx. 10 ω (at 1000°C)

Test step 5 (glow plug -Q6, heater control unit -J162)**Note:**

Block diagram of auxiliary heater and pin assignment =>Page 183

Select measuring range: Resistance measurement (20 ω)					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
5.1	12 and 13	Glow plug -Q6	▪ Ignition off ▪ Auxiliary heater off	- 0.3 to 1.0 ω	- Locate and eliminate short circuit Replace glow plug
5.2	12 and 10	Earth connection in auxiliary heater	▪ Ignition off ▪ Auxiliary heater off (all components switched off)	- Less than 1 ω	- Replace auxiliary heater

Note:

In the measuring range less than 1 ω , a change in contact pressure is sufficient to alter the measurement result.

Diode test lamp					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
5.3	13 and 10	Control unit -J162 (in auxiliary heater)	▪ Ignition off ▪ Switch -E16 not pressed Switch on auxiliary heater	Diode test lamp flashes or lights	- Replace auxiliary heater

Notes:

- ♦ If battery voltage is greater than 10.5 V, current supply for glow element is pulsed (to limit temperature).
- ♦ Test step 5.3 must be completed within 80 s.

Test step 6 (actuation of metering pump -V54)

Note:

Block diagram of auxiliary heater and pin assignment =>Page 183

Diode test lamp					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
6.1	4 and 10	Actuation of metering pump -V54	<ul style="list-style-type: none"> ▪ Ignition off ▪ Switch -E16 not pressed Switch on auxiliary heater at pre-selection clock 	- Diode test lamp starts to flash approx. 32 s after switching on auxiliary heater Metering pump -V54 is actuated (pulsed)	- Use current flow diagram to locate and eliminate short to earth in wiring to metering pump Check actuation of metering pump =>Page 204 Replace auxiliary heater

Test step 7 (recirculating pump -V55)

Note:

Block diagram of auxiliary heater and pin assignment =>Page 183

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Select measuring range: Current measurement (20 A) ▪ Connector unplugged from connector rail (contacts 1 and 2) ▪ Link between connector contact 1 and connector rail contact 10					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
7.1	Connector contacts 2 and 11 (connector rail contact)	Recirculating pump -V55	<ul style="list-style-type: none"> ▪ Ignition off ▪ Auxiliary heater off 	- Less than 1.6 A Operation of recirculating pump	- Locate and eliminate short circuit Replace recirculating pump

Select measuring range: Voltage measurement (20 V DC) ▪ All connectors attached to connector rail					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
7.2	2 and 10	Control unit -J162 (in auxiliary heater)	<ul style="list-style-type: none"> ▪ Ignition off ▪ Switch -E16 not pressed ▪ Auxiliary heater on 	- Greater than 10 V Operation of recirculating pump	- Replace auxiliary heater

Note:

In the event of problems with poor heat output:

- ◆ Check incorporation of auxiliary heater into coolant circuit.
- ◆ Check proper operation of non-return valves in coolant circuit.
- ◆ Check for cross-sectional constrictions in coolant circuit.
- ◆ Check operation of air conditioner.



To check maximum heat output of auxiliary heater, unplug connector to both valves of pump/valve unit (valves are open in rest position; coolant can flow through heat exchangers without regulation).

Test step 8 (combustion air blower -V6)

Note:

Block diagram of auxiliary heater and pin assignment =>Page 183

Select measuring range: Current measurement (20 A) ▪ Connector unplugged from connector rail (contacts 5 and 6) ▪ Link between connector contact 5 and connector rail contact 10					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
8.1	Connector contacts 6 and 11 (connector rail contact)	Combustion air blower -V6	▪ Ignition off ▪ Auxiliary heater off	- Less than 4.5 A Operation of combustion air blower	- Locate and eliminate short circuit Replace combustion air blower

Select measuring range: Voltage measurement (20 V DC) ▪ All connectors attached to connector rail					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
8.2	5 and 6	Control unit -J162 (in auxiliary heater)	▪ Ignition off ▪ Switch -E16 not pressed ▪ Auxiliary heater on	- Operation of combustion air blower approx. 4.5 to 7V (on starting and in part load mode) Greater than 10 V (in full load mode)	- Replace auxiliary heater

Notes:

- ♦ Auxiliary heater starts up in part load mode and switches smoothly to full load mode.
- ♦ In the event of problems with auxiliary heater operation:
 - Check air intake area of combustion air blower unit.
 - Check exhaust system.
 - Check fuel delivery of metering pump.
 - Check CO₂ level in exhaust gas.
 - Dismantle auxiliary heater. Check seals between combustion air blower unit and auxiliary heater/burner element as well as burner element.

Test step 9 (actuation of operating and display unit for air conditioner/Climatronic -E87/fresh-air blower -V2)

Note:

Block diagram of auxiliary heater and pin assignment =>Page 183

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Diode test lamp					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
9.1	10 and 7	Actuation of auxiliary heater relay -J8	<ul style="list-style-type: none"> ▪ Ignition off ▪ Switch -E16 pressed Switch on auxiliary heater at pre-selection clock	- Diode test lamp lights Operating and display unit/fresh-air blower starts up	- Use current flow diagram to locate and eliminate short to earth, open circuit in wiring or contact resistance Perform air conditioner self-diagnosis => Air Conditioner Workshop Manual Check actuation =>Page 202

Test step 10 (condition of second battery -A1, power supply for auxiliary heater)

Note:

Block diagram of auxiliary heater and pin assignment =>Page 183

Select measuring range: Voltage measurement (20 V DC)					
Test step	Contact	Testing of	▪ Test conditions - Additional work	Specification	Remedies if specification not attained
10.1	10 and 11	Condition of -A1, power supply to auxiliary heater	<ul style="list-style-type: none"> ▪ Ignition off ▪ Auxiliary heater on ▪ Switch -E16 not pressed 	- Greater than 10 V	- Use current flow diagram to locate and eliminate open circuit in wiring or contact resistance in power supply or in earth connection Check condition of battery -A1; charge or replace battery if necessary

Note:

If voltage at auxiliary heater drops below 10 V (for more than 20 s), heater is switched off (to protect battery against exhaustive discharge).

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16 - Functional description of auxiliary heating/auxiliary ventilation mode (heater type "S")

16.1 - Functional description of auxiliary heating/auxiliary ventilation mode (heater type "S")

Requirements:

Coolant circuit bled and coolant temperature less than 30°C (on starting)
Ignition off
Battery -A1 adequately charged
Sufficient fuel in tank

Notes:

- ♦ It is possible to switch at any time from auxiliary ventilation to auxiliary heating by pressing heater/heat output switch -E16. On switching from auxiliary heating to auxiliary ventilation, operating and display unit for air conditioner/Climatronic -E87/fresh-air blower -V2 is however briefly switched off (until end of auxiliary heater run-on).



- ♦ On switching from control interval to re-start, operating and display unit for air conditioner/Climatronic -E87 is briefly switched off and any manually altered setting is reset, for example, to 23 °C (only applies to vehicles up to and including Model Year 1995 and -E87 with part number with no index or with index "A").
- ♦ Operating and display unit for air conditioner/Climatronic -E87/fresh-air blower -V2 is switched on via auxiliary heater relay -J8 (immediately in auxiliary ventilation mode, in auxiliary heating mode as soon as coolant temperature in auxiliary heater exceeds 30°C.
 - Operating and display unit for air conditioner/Climatronic -E87 starts up (specified temperature at least 20° C) and fresh-air blower -V2 is actuated (voltage between 3.7 and 6 V).
 - The two valves in the pump/valve unit are opened or closed as a function of actual and specified temperature (pulsed, however open for at least 20% of operating time).
 - Pump in pump/valve unit remains switched off in auxiliary heating/auxiliary ventilation mode.

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

- ♦ Depending on the amount of heat supplied by the heat exchangers of the heater/air conditioner unit, the auxiliary heater may remain for a lengthy period in the full load, part load or control interval operating statuses.

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- ♦ With auxiliary heater switched on and cut-in time activated, background illumination of pre-selection clock comes on (pre-selection clock activated).
- ♦ If pre-selection clock alternately displays "STOP and SET" (fault interlock), check electrical components of auxiliary heater => Page 205 (fault in connection between auxiliary heater and pre-selection clock). After rectifying fault, fault interlock can be reset by pressing "SET" button.
- ♦ If neither auxiliary heating nor auxiliary ventilation can be switched on although actuation by pre-selection clock and power supply are OK:
 - Interrupt power supply to auxiliary heater (by unplugging both 3-pin connectors at auxiliary heater or by removing auxiliary heater fuse) for at least 10 seconds (thus resetting possible auxiliary heater fault interlock).
 - Check incorporation of auxiliary heater into coolant circuit.
 - Check operation of recirculating pump -V55 in auxiliary heater (checking electrical components of auxiliary heater => Page 205).
- ♦ Auxiliary heating/auxiliary ventilation can be switched off at any time by pressing "Immediate heating" button on pre-selection clock.
- ♦ Auxiliary heating/auxiliary ventilation is switched off by pre-selection clock after 60 minutes.
- ♦ Temperature sensor -G18 (for coolant in auxiliary heater) is permanently installed in auxiliary heater (in heater control unit -J162) and cannot be checked/removed.
- ♦ To prevent overheating, glow plug is no longer permanently switched on, but rather pulsed if voltage (directly at glow plug) exceeds 10.5 V.
- ♦ The temperatures given in the functional description and function chart are approximate.

16.2 - Functional description

Key

- G64 = Flame monitor
- J8 = Auxiliary heater relay (actuates operating and display unit for air conditioner/Climatronic -E87/fresh-air blower -V2)
- Q6 = Glow plug (pulsed when voltage exceeds 10.5 V)
- V6 = Combustion air blower
- V54 = Metering pump (different clock frequency for full load and part load mode)
- V55 = Recirculating pump (infinitely variable speed increase in full load mode on exceeding a coolant temperature of 62°C and infinitely variable decrease on dropping below 62°C again)
 - = Component switched on
 - = Component switched off
- FL = Component in full load mode (maximum delivery)
- PL = Component in part load mode (approx. 50% of maximum delivery)
- CO = Cold (resistance 2 to 4Ω)

Key

HO = Hot (resistance greater than 6Ω)

Note:

Coolant temperature is measured by temperature sensor -G18 directly in auxiliary heater (in heater control unit -J162). Temperature sensor cannot be checked and removed.

No.	Function	Duration	-G64	-Q6	-V6	-V54	-V55	-J8
1	Switch-on by pre-selection clock		CO	-	-	-	-	-
2	Interrogation of heater/heat output switch - E16		CO	-	-	-	-	-
	- Switch pressed (auxiliary ventilation)		▪ Continued in no. 17 (auxiliary ventilation)					
	- Switch not pressed (auxiliary heating)		▪ Continued in no. 3 (flame monitor interrogation)					
3	Flame monitor interrogation Start of auxiliary heating mode		CO	▪ 2)	▪ (PL)	-	▪	-1)
4	Pre-heating	32 s	CO	▪ 2)	▪ (PL)	-	▪	-1)
5	Safety interval (start of combustion)	Max. 85 s	CO => HO	▪ 2)	▪ (PL)	▪ (FL)	▪	-1)
6	Run-on/start repetition (once as of no. 3 if no combustion at first attempt)	60 s	CO	-	▪ (PL)	-	▪	-1)
7	Stabilisation time	20 s	HO	-	▪ (PL)	▪ (FL)	▪	-1)
▪ Continued on next page								

1) On as soon as coolant temperature exceeds 30°C

2) Pulsed once voltage exceeds 10.5 V (to prevent overheating of glow plug; relay switching noise audible in auxiliary heater)

No.	Function	Duration	-G64	-Q6	-V6	-V54	-V55	-J8
8	Switchover from part load to full load mode (end of starting sequence)	60 s	HO	-	▪ (PL => FL) 3)	▪ (FL)	▪	-1)
9	Heating in full load mode		HO	-	▪ (FL)	▪ (FL)	▪ 4)	-1)
10	Switchover from full load to part load mode (coolant temperature greater than 76°C)	60 s	HO	-	▪ (FL => PL) 6)	▪ (FL => PL) 5)	▪	▪
11	Heating in part load mode		HO	-	▪ (PL)	▪ (PL)	▪	▪
12	Run-on/control interval (coolant temperature greater than 84°C)	120 s			▪ (PL => FL) 7)	-	▪	▪
12a	Run-on/off (switch-off by pre-selection clock)	120 s	HO => CO	-	▪ (PL => FL) 7)	-	▪	-



No.	Function	Duration	-G64	-Q6	-V6	-V54	-V55	-J8
▪ Continued on next page								

- 3) Infinitely variable speed increase
- 4) Infinitely variable speed increase on exceeding coolant temperature of 62°C and infinitely variable decrease on dropping below 62°C again
- 5) Infinitely variable reduction in clock frequency
- 6) Infinitely variable speed reduction
- 7) 35 s PL and 85 s FL if previously FL
25 s PL and 95 s FL if previously PL

No.	Function	Duration	-G64	-Q6	-V6	-V54	-V55	-J8
13	Control interval (as long as coolant temperature is less than 74°C/until switched off by pre-selection clock)		CO	-	-	-	▪	▪
14	Off		CO	-	-	-	-	-
15	Run-on/fault (e.g. on account undervoltage/over-voltage, flame monitor fault or combustion fault)	130 s	HO =>CO	-	▪ (PL=>FL)8	-	▪	-
15a	Fault/off		CO	-	-	-	-	-
16	Run-on/overheating (coolant temperature greater than 105°C)	120 s	HO =>CO	-	▪ (PL=>FL)7	-	▪	-
16a	Overheating/off/fault interlock (fault interlock can only be reset by interrupting power supply to auxiliary heater)		CO	-	-	-	-	-
17	Auxiliary ventilation (heater/heat output switch - E16 pressed, closed)		CO	-	-	-	-	▪

- 7) 35 s PL and 85 s FL if previously FL

25 s PL and 95 s FL if previously PL

- 8) 35 s PL and 85 s FL

16.3 - Function chart

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General notes:

- ♦ The numbers in parentheses {1} to {17} refer to functions of individual components (see functional description, Page 212).
- ♦ Auxiliary heating/auxiliary ventilation is switched off by pre-selection clock after 60 minutes.
- ♦ If auxiliary heater has been interlocked (completely shut down) on account of overheating, it cannot be switched on again until the auxiliary heater power supply has been interrupted for at least 10 seconds.

Notes on starting:

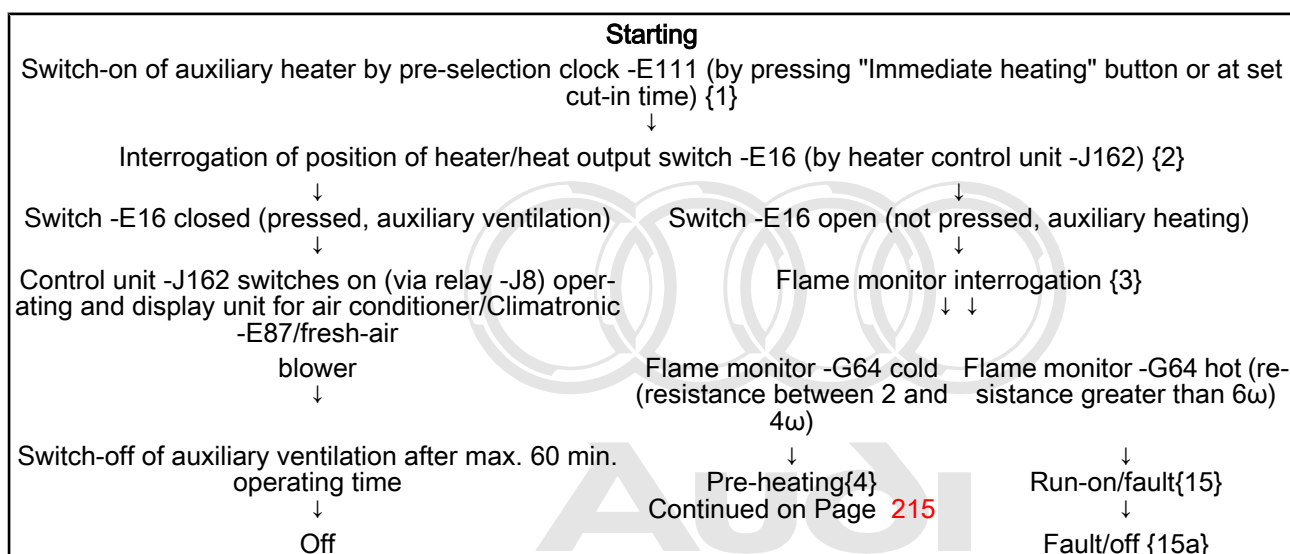
- ♦ If auxiliary heater is switched off by way of pre-selection clock during starting sequence, it initially switches to run-on {12a} and then cuts out.
- ♦ If temperature of coolant exceeds 84°C before attaining full load mode {9} (e.g. with a hot engine), auxiliary heater switches to control interval {13}.

Notes on heating:

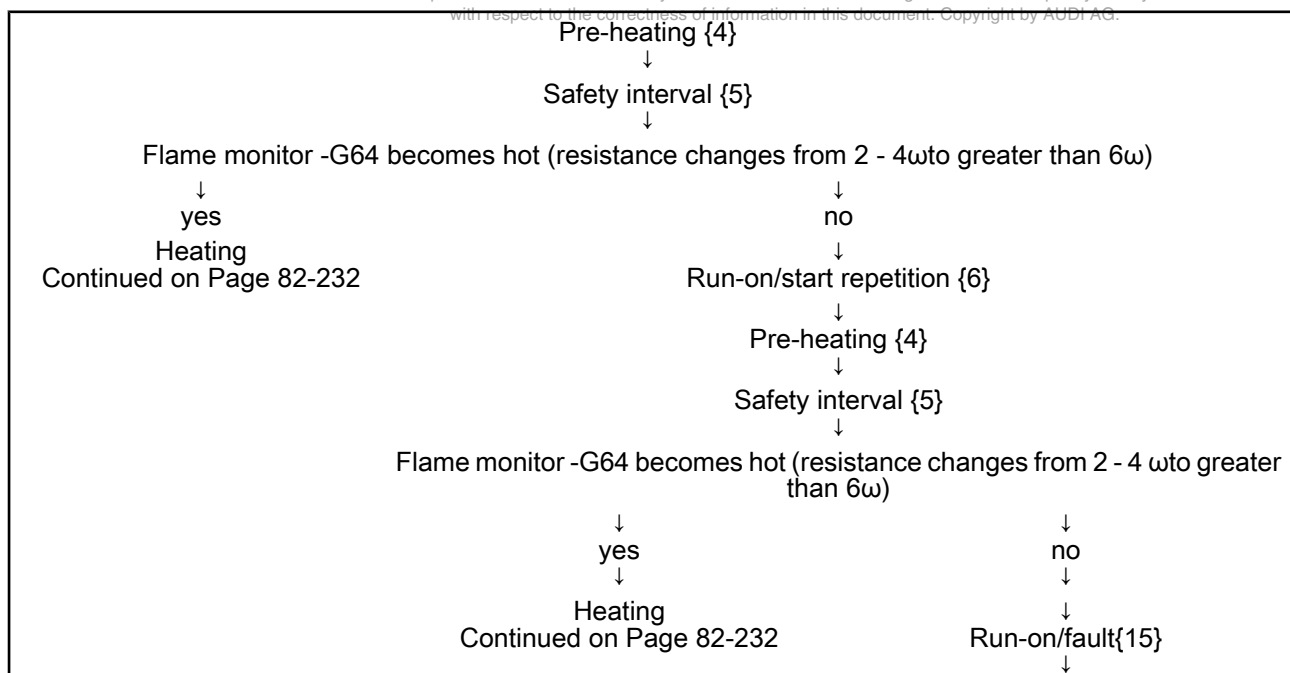
- ♦ Infinitely variable increase/reduction in delivery rate of recirculating pump -V55 takes place as soon as coolant temperature exceeds/drops below 62°C respectively.
- ♦ Various functions are constantly monitored during heating (auxiliary heater is switched off as soon as a fault occurs). - Undervoltage cut-out if supply voltage is less than 10 V for more than 20 s (e.g. on account of inadequately charged battery -A1) => Page 212 , run-on/fault {15}

-Cut-out on account of flame interruption if resistance of flame monitor drops below 6Ω(e.g. due to fault in fuel supply) =>Page 212 , run-on/fault {15}

- Cut-out on account of overheating if coolant temperature in auxiliary heater exceeds 105°C (e.g. due to absence of coolant or on account of fault in coolant circuit or at recirculating pump -V55) => Page 212 , overheating/off/fault interlock {16a}



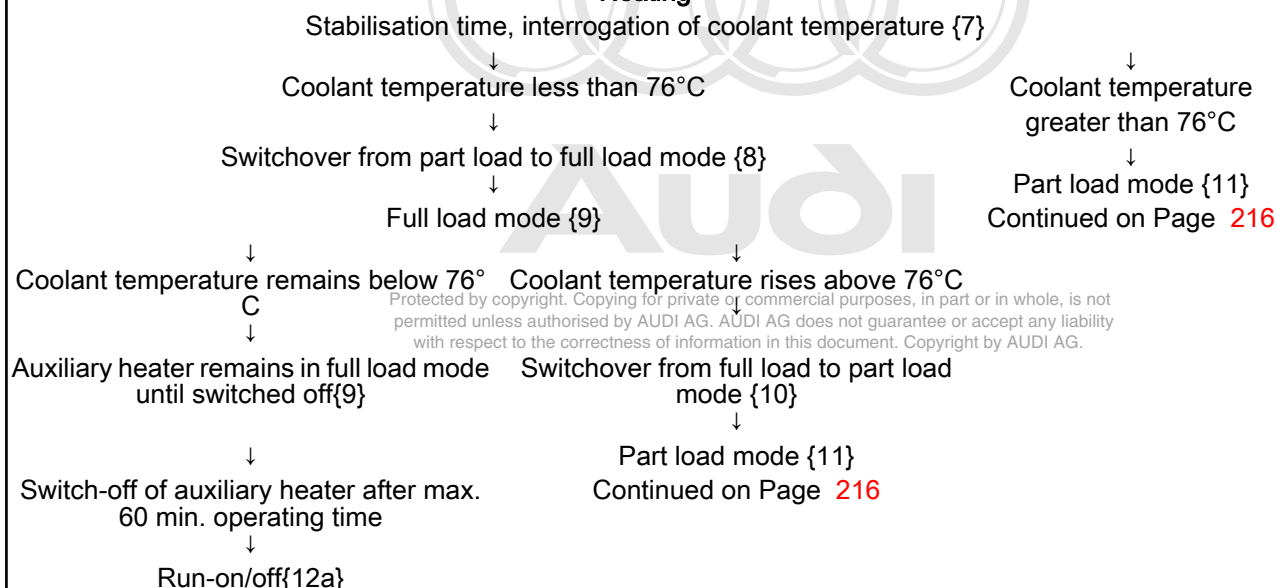
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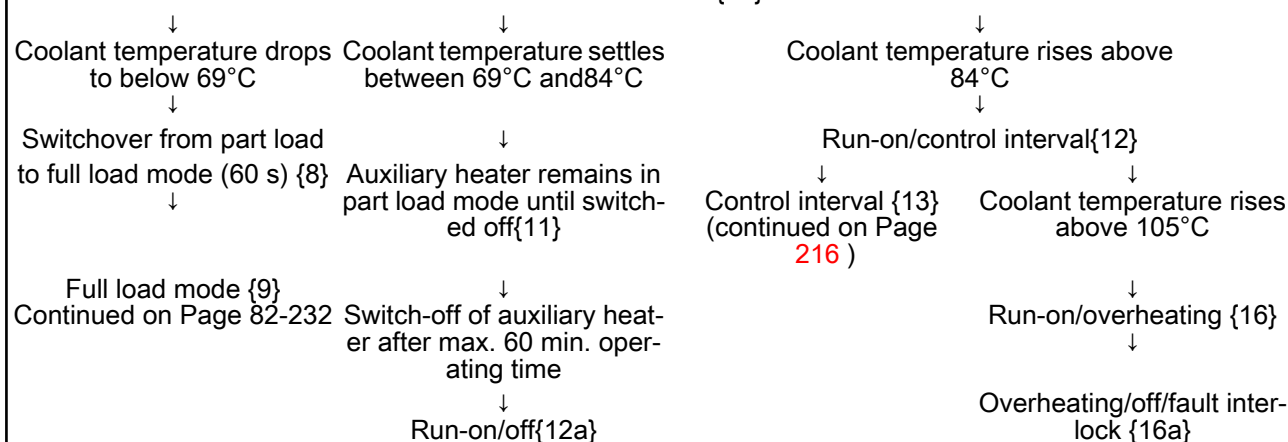


Fault/off {15a}

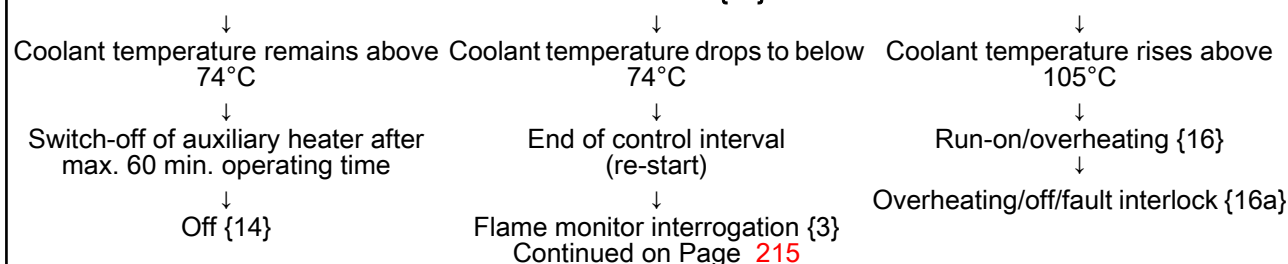
Heating



Part load mode{11}



Control interval {13}



17 - Problem-specific auxiliary heater fault localisation (heater type "S")

17.1 - Problem-specific auxiliary heater fault localisation (heater type "S")

Problem	Possible cause of trouble	Fault localisation and rectification
- No pre-selection clock function "STOP" and "SET" displayed alternately on pre-selection clock	- Fault in wiring to pre-selection clock (open circuit or short to earth/positive) Fault in wiring between pre-selection clock and auxiliary heater Fault in pre-selection clock	- Check pre-selection clock power supply =>Page 200
- Not possible to switch on either auxiliary heating or auxiliary ventilation	- Fault in wiring between pre-selection clock and auxiliary heater Fault in pre-selection clock or heater control unit -J162 Auxiliary heater interlocked on account of overheating - Fault in coolant circuit - No operation of recirculating pump in auxiliary heater Second battery -A1 not adequately charged	- Check actuation of auxiliary heater =>Page 205 Check second battery and re-charge or replace if necessary

Problem	Possible cause of trouble	Fault localisation and rectification
- Auxiliary heater cannot be switched on (auxiliary ventilation OK)	- Heater/heat output switch -E16 pressed Fault in wiring between switch -E16 and auxiliary heater Fault in heater control unit -J162 or at switch -E16 Second battery -A1 not adequately charged	- Actuate switch Check actuation of auxiliary heater =>Page 200 Check second battery and re-charge or replace if necessary
- Auxiliary ventilation cannot be switched on (auxiliary heating OK)	- Heater/heat output switch -E16 not pressed Fault in wiring between switch -E16 and auxiliary heater Fault in heater control unit -J162 or at switch -E16	- Actuate switch Check actuation of auxiliary heater => Page 200

Problem	Possible cause of trouble	Fault localisation and rectification
- Auxiliary heater does not start up Auxiliary heater only starts up after start repetition Auxiliary heater cuts out after approx. 6 minutes	- Constriction or leakage in area around air intake or in exhaust system Combustion air blower defective Glow plug defective Flame monitor defective Fault in auxiliary heater fuel supply Leak in auxiliary heater	- Check air-intake area and exhaust system of auxiliary heater Check electrical components of auxiliary heater => Page 118 Dismantle auxiliary heater and examine seals
- Auxiliary heater cuts out after approx. 120 s starting sequence Auxiliary heater cuts out after start repetition Constant auxiliary heater pre-heating	- Second battery -A1 inadequately charged Flame monitor defective Glow plug defective Combustion air blower defective Fault in auxiliary heater fuel supply	- Check second battery and re-charge or replace if necessary Check electrical components of auxiliary heater =>Page 118



Problem	Possible cause of trouble	Fault localisation and rectification
- Smell of fuel in auxiliary heating mode Fuel leaking out of auxiliary heater	- Leak in auxiliary heater fuel supply Leak in auxiliary heater	- Check fuel supply =>Page 115 Dismantle auxiliary heater and examine seals

Problem	Possible cause of trouble	Fault localisation and rectification
- CO2 level cannot be adjusted Auxiliary heater soot particles Constant "blue smoke" in auxiliary heating mode	- Constriction or leakage in area around air intake or in exhaust system Combustion air blower defective Fault in auxiliary heater fuel supply Severe coking of burner element Leak in auxiliary heater <small>Protected by copyright. Copying for private or 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.</small>	- Check air-intake area and exhaust system of auxiliary heater Check electrical components of auxiliary heater => Page 118 Dismantle auxiliary heater, check burner element and replace if necessary Dismantle auxiliary heater and examine seals
- Coolant leaking out of auxiliary heater Extremely sweet auxiliary heater exhaust gas odour Clouds of white smoke or fumes from auxiliary heater	- O-ring seal at recirculating pump leaking Coolant leaking into combustion chamber in auxiliary heater	- Remove recirculating pump and check seal Checking cooling system for leaks Replace auxiliary heater

Problem	Possible cause of trouble	Fault localisation and rectification
- Auxiliary heater does not switch to full load mode Auxiliary heater does not switch to part load mode Auxiliary heater switching temperatures not OK	- Recirculating pump defective Problem with actuation of valves in pump/valve unit Constriction in coolant circuit Fault at auxiliary heater temperature sensor	- Check electrical components of auxiliary heater => Page 205 Check actuation of valves (perform air conditioner final control diagnosis) Check coolant circuit Replace auxiliary heater
- Loud or whistling noise from auxiliary heater	- Constriction or leakage in area around air intake or in exhaust system Combustion air blower defective Recirculating pump defective	- Check intake area and exhaust system of auxiliary heater Check electrical components of auxiliary heater =>Page 205
- Auxiliary heater cannot be switched off	- Fault in wiring between pre-selection clock and auxiliary heater Fault in pre-selection clock or heater control unit -J162	- Check actuation of auxiliary heater =>Page 200

Problem	Possible cause of trouble	Fault localisation and rectification
- Inadequate coolant throughput through auxiliary heater Auxiliary heater constantly switches to control interval Poor auxiliary heater output	- Recirculating pump defective Actuation of fresh-air blower or valves in pump/valve unit not OK Constriction in coolant circuit Non-return valve in coolant circuit defective	- Check electrical components of auxiliary heater =>Page 205 Check actuation of fresh-air blower and valves (perform air conditioner final control diagnosis) Check coolant circuit
- Pre-selection clock operating display (background illumination) lights, no auxiliary heater operation	- Switch -E16 in auxiliary ventilation setting (pressed) Cut-out of auxiliary heater following unsuccessful starting (and start repetition) Cut-out of auxiliary heater on account of inadequate battery voltage or fault during auxiliary heating mode	- Actuate switch Check operation of auxiliary heater Check operation of auxiliary heater

Possible problems with vehicles up to and including Model Year 1995

Note:

The following problems only apply to vehicles up to and including Model Year 1995 fitted with an operating and display unit for air conditioner/Climatronic -E87 which always starts up in auxiliary ventilation/auxiliary heating mode at 23°C/74°F (-E87 with part number up to index "A").

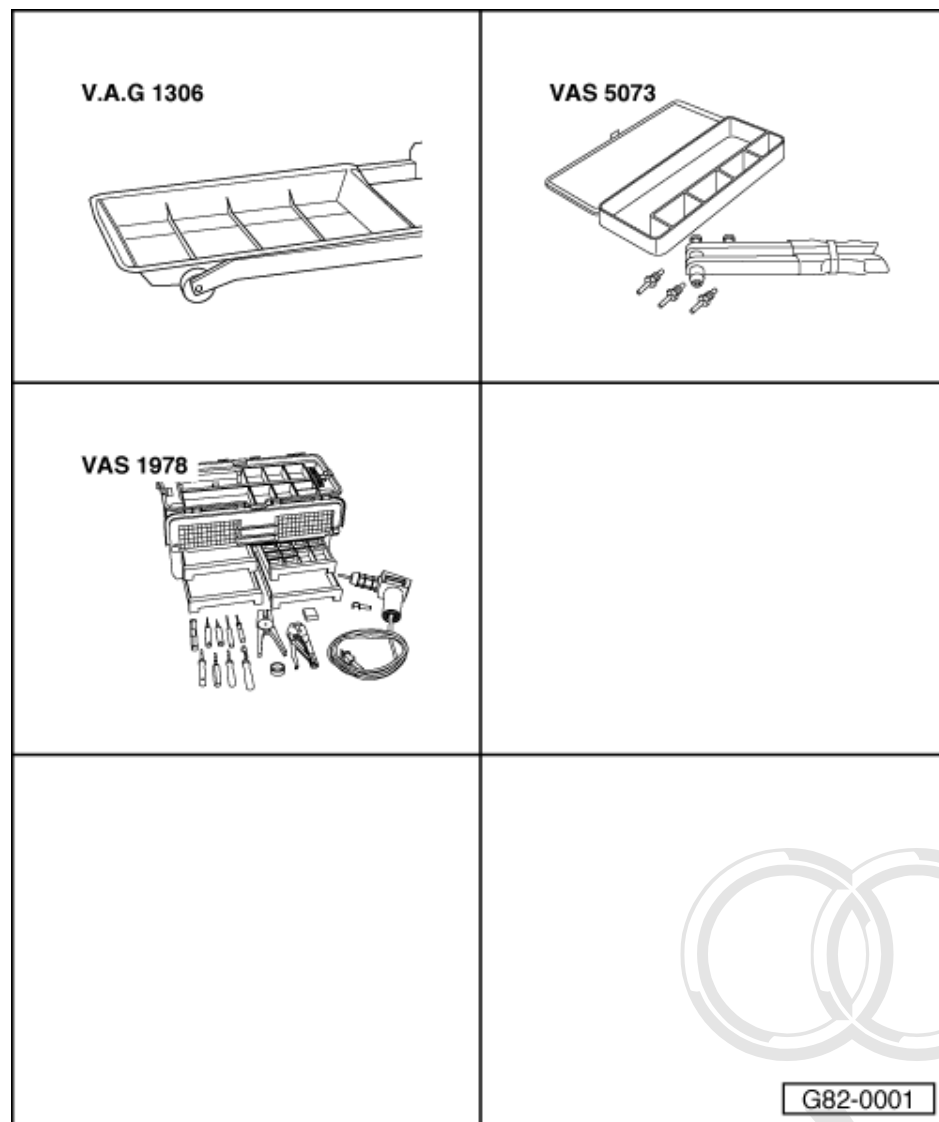
Problem	Possible cause of trouble	Fault localisation and rectification
- Auxiliary heater constantly switches to control interval and starts up again after a brief delay Second battery -A1 is rapidly discharged, auxiliary heater repeatedly cuts out on account of flat battery	- Specified passenger compartment temperature already reached at ambient temperature greater than approx. 5°C although coolant is still predominantly cold; the two valves in the pump/valve unit are then only briefly opened	- Disconnect power supply for both valves of pump/valve unit (-N175 and -N176) from "terminal 30" and connect by way of fuse -S5 to "terminal 15" => Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder Check and if necessary re-charge second battery -A1

Notes:

- ♦ Changing power supply connection means that both valves are always open in auxiliary heating mode (with ignition off). Coolant can thus flow continuously through the two heat exchangers and the engine back to the auxiliary heater.
- ♦ Constant re-starting from control interval causes second battery -A1 to be discharged more rapidly (repeated pre-heating).
- ♦ A modified operating and display unit is being gradually introduced (characterised, e.g., by set temperature (e.g. 27°C) also being used for auxiliary ventilation/auxiliary heating mode).
- ♦ With the modified operating and display unit, the two valves of the pump/valve unit are always open (pulsed) for at least 20% of the operating time to ensure the flow of coolant through the auxiliary heater even under unfavourable usage conditions.

18 - Conversion of auxiliary heater to small coolant circuit (vehicles with 8-cyl. 4V petrol engine)

18.1 - Conversion of auxiliary heater to small coolant circuit (vehicles with 8-cyl. 4V petrol engine)



Note:

The conversion procedure recommended here only applies to vehicles with auxiliary heater type Z/C (gradually introduced as of 04.97 to replace type S auxiliary heater).

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Special tools and workshop equipment required

- ♦ Drip tray V.A.G 1306
- ♦ Pop rivet nut gun VAS 5073
- ♦ Wiring harness repair set V.A.G 1978

18.2 - Conversion kits for vehicles with 8-cyl. 4V petrol engine 3.7 l / 4.2 l

Note

This conversion kit only applies to vehicles with auxiliary heater type Z/C (gradually introduced as of 04.97 to replace type S auxiliary heater).

Part numbers of conversion kits

- Pipe/valve kit	4D0 298 139
- Coolant hose kit	4D0 298 137
- Electrics kit	4D0 998 147

18.3 - Preparation for fitting

- Heed (if necessary obtain) radio code for vehicles with encoded radio.
- Disconnect battery earth strap with ignition switched off.
- Remove glove box.

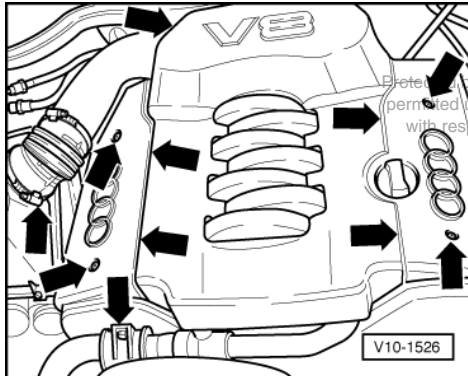
=> Body Interior Equipment; Repair Group 68; Removing glove box Removing glove box

- Remove right B-pillar trim.

=> Body Interior Equipment; Repair Group 70

- Remove inner sill panel trim.

=> Body Interior Equipment; Repair Group 70



- Remove floor covering.

=> Body Interior Equipment; Repair Group 70; Removing and installing front and rear floor covering Removing and installing front and rear floor covering

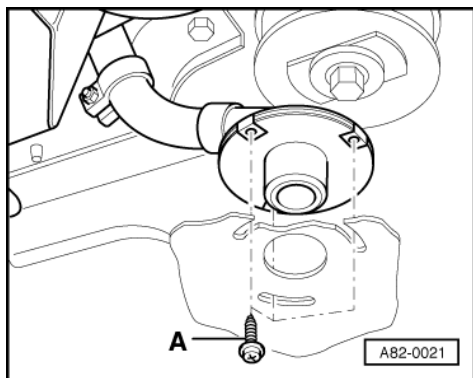
- Dissipate pressure in coolant circuit by opening cap on coolant expansion tank.
- -> Remove engine cover.
- Remove entire air cleaner.

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

- On vehicles with headlight washer system:
 - Detach headlight washer system reservoir from body.
- Disengage throttle cable.
- Unplug wiring harness connectors at throttle valve housing.
- Remove entire throttle valve housing.
- Detach vacuum hose to brake servo.
- Detach crankcase breather hose.



- Unplug wiring harness connectors on back of cylinder heads.



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

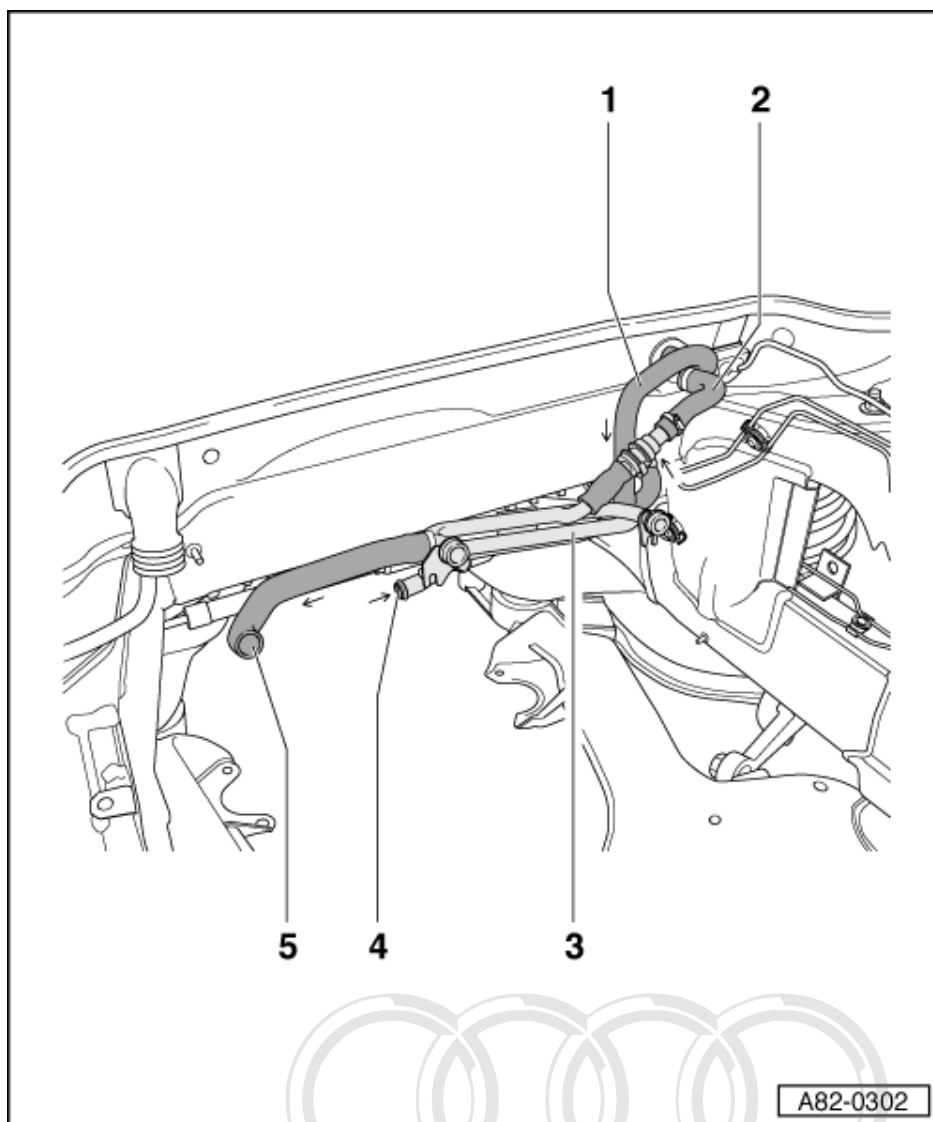
- Remove plenum chamber cover.
- -> Remove bolts -A-.
- Remove bumper and noise insulation.

=> General Body Repairs; Repair Group 63; Front Bumper Front Bumper

- Remove air duct to alternator (8-cyl. engine only).
- Unplug connectors to auxiliary/additional heater.
- Position drip tray V.A.G 1306 beneath engine and drain off coolant.

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling

18.4 - Auxiliary heater/large coolant circuit



Standard hose connections between 03.94 and 10.98

Note:

All components not mentioned

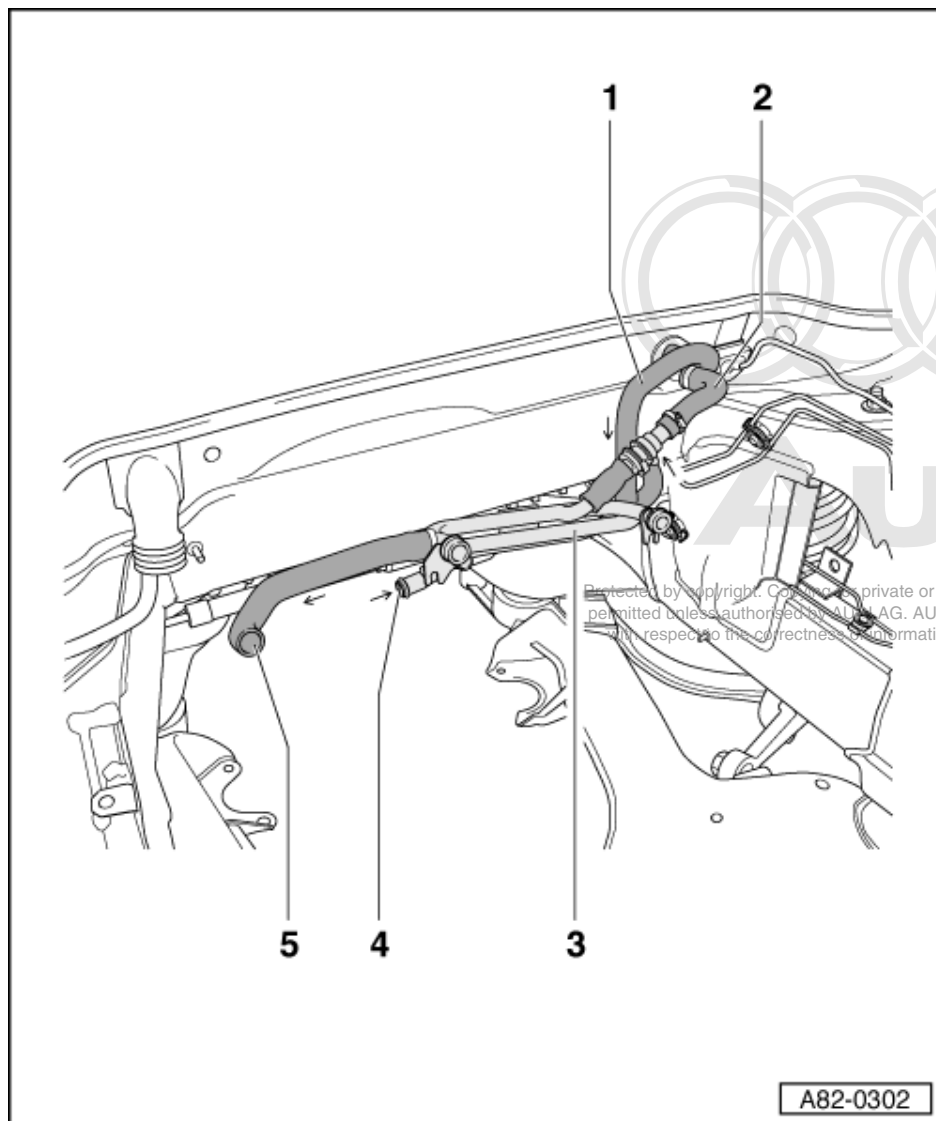
=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling

Direction of coolant flow: Copyright 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.

=> In auxiliary heating mode

1 Coolant hose "Return"

- ◆ From pump/valve unit to rear coolant pipe
- ◆ Replaced by component from conversion kit



2 Coolant hose with non-return valve "Supply"

- ♦ From rear coolant pipe to pump/valve unit
- ♦ Replaced by component from conversion kit

3 Rear coolant pipe

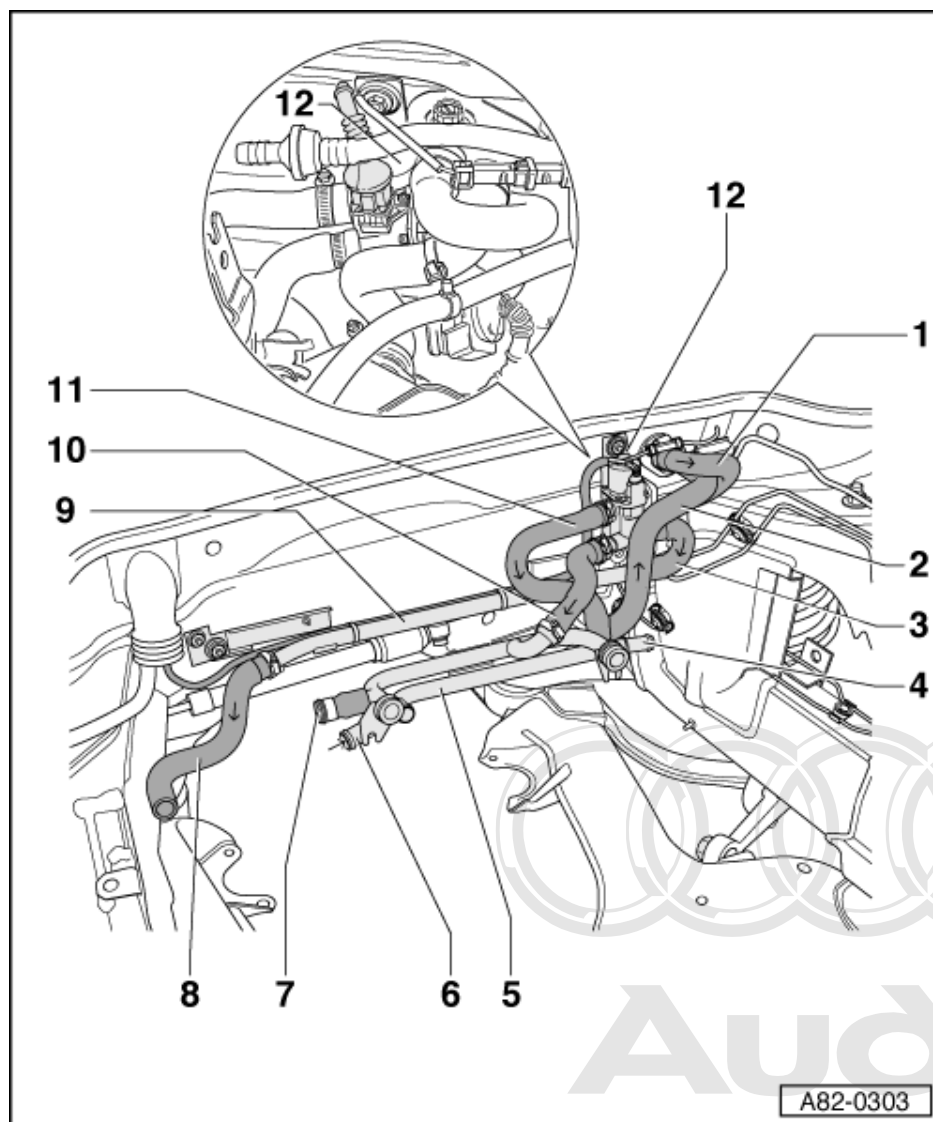
4 Supply connection at rear coolant pipe

- ♦ From auxiliary heater
- ♦ Replaced by component from conversion kit

5 Return connection at rear coolant pipe

- ♦ To auxiliary heater
- ♦ Replaced by component from conversion kit

18.5 - Auxiliary heater/small coolant circuit



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Exploded view

Note:

All components not mentioned

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling

Direction of coolant flow:

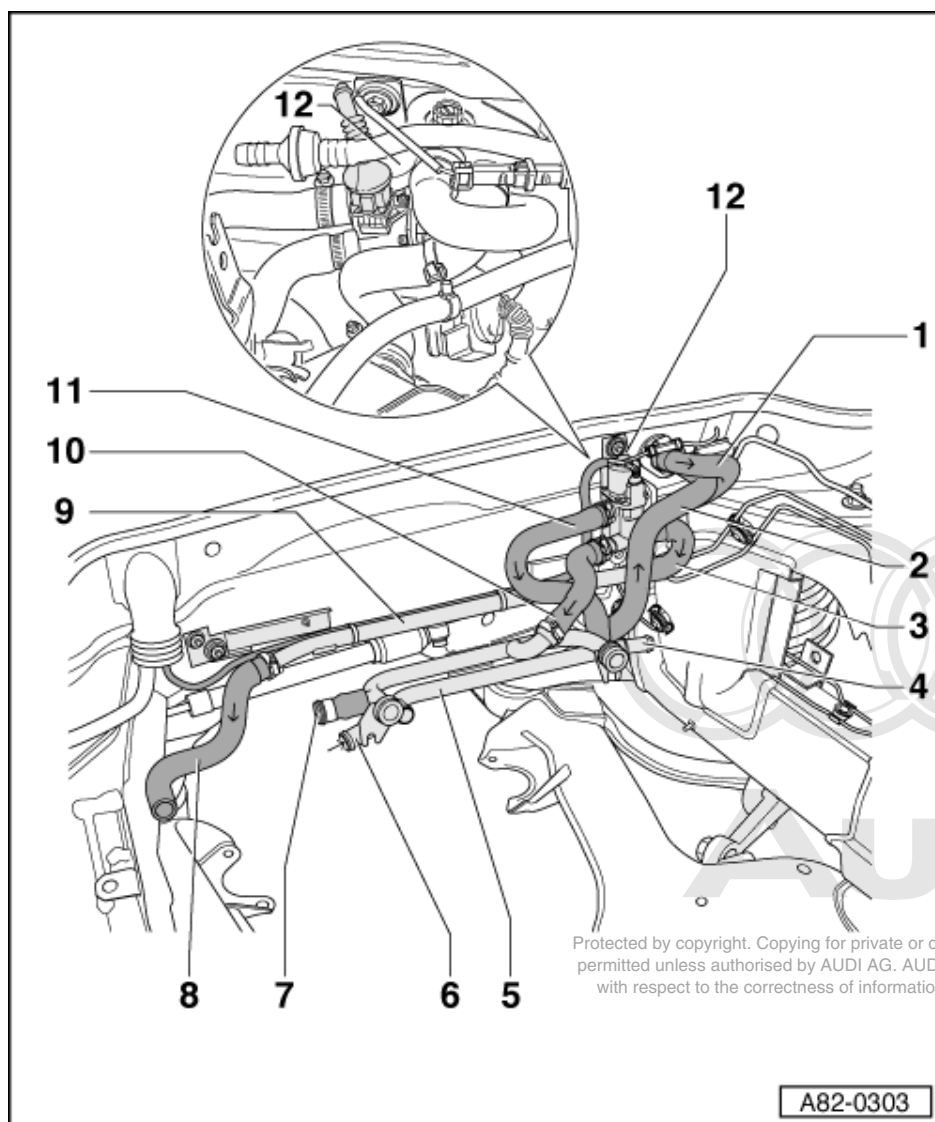
=> In auxiliary heating mode

1 Coolant hose "Return"

- ◆ Installing => Page 231
- ◆ From pump/valve unit to coolant shut-off valve -N279

2 Coolant hose "Supply"

- ◆ Installing => Page 231
- ◆ From rear coolant pipe to pump/valve unit connection



3 Coolant hose "Return"

- ♦ Installing => Page 231
- ♦ From coolant shut-off valve -N279 to pipe/valve holder

4 Hose connection at rear coolant pipe

- ♦ To expansion tank

5 Rear coolant pipe

6 Supply connection at rear coolant pipe

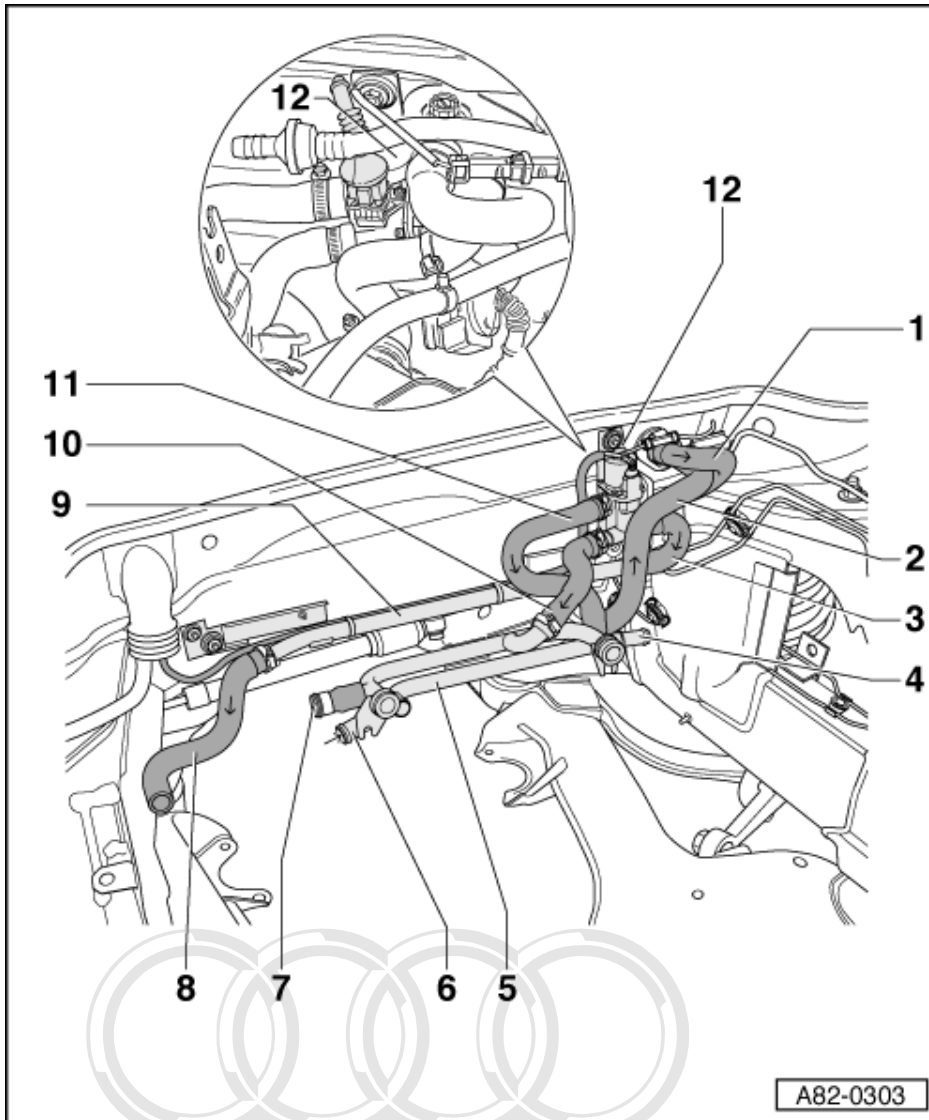
- ♦ From auxiliary heater

7 Pipe terminating hose

- ♦ Installing => Page 232

8 Coolant hose "Return"

- ♦ Installing => Page 232
- ♦ From pipe/valve holder to auxiliary heater



9 Pipe/valve holder

- ♦ Installing => Page 228

10 Coolant hose

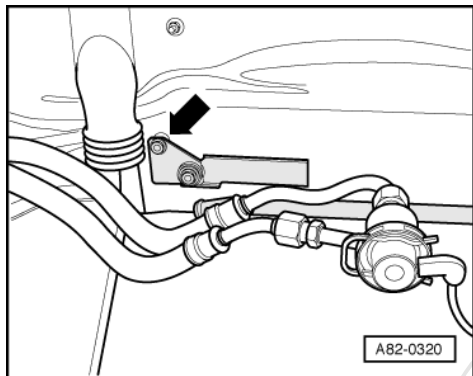
- ♦ Installing => Page 232
- ♦ From coolant shut-off valve -N279 to rear coolant pipe

11 Coolant hose

- ♦ Installing => Page 232
- ♦ From coolant shut-off valve -N279 to rear coolant pipe

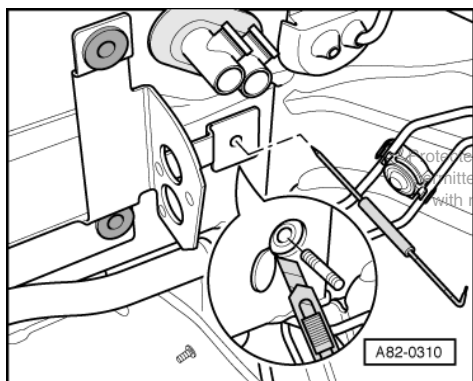
12 Coolant shut-off valve -N279

18.6 - Installing pipe/valve holder and coolant shut-off valve -N279

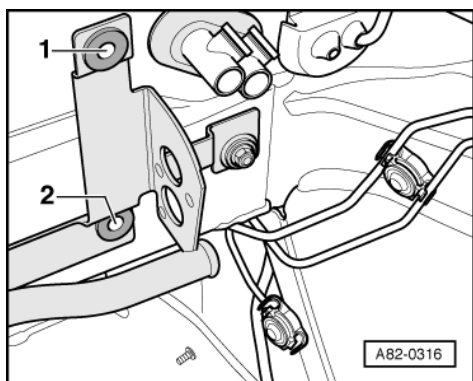


Attachment points

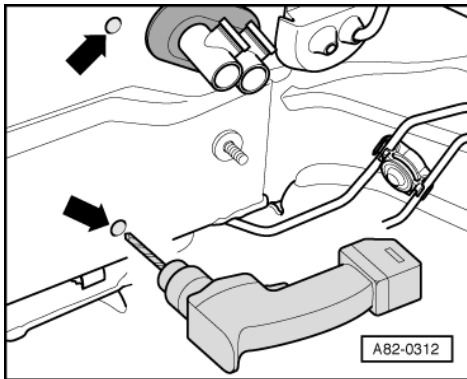
- Unscrew nut at engine wiring-harness holder.
- -> Fix pipe/valve holder in position at stud of engine wiring-harness holder.



- Determine and mark position of rivet nut beneath bulkhead trim.
- -> Cut out bulkhead trim in area above rivet nut.
- Screw in and secure stud.



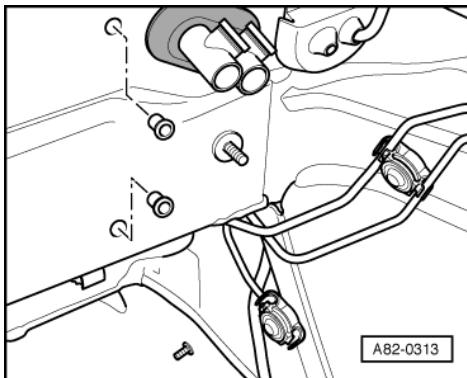
- Attach pipe/valve holder to bulkhead.
- -> Mark positions -1- and -2-.



- -> Pre-drill additional attachment points with angle drill and 4 mm bit.
- Enlarge hole to 9.3 mm.

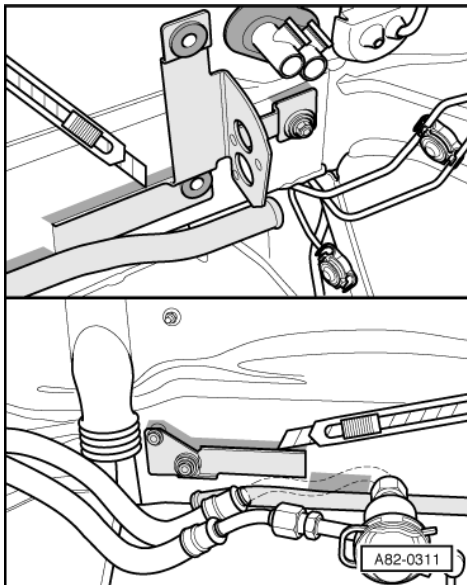
Note

- ◆ Drill carefully so as not to damage surrounding components.



- Cut out bulkhead trim in area above holes.
- -> Apply anti-corrosion agent to rivet nuts and rivet in using VAS 5073.

Vehicles with heavy-duty bulkhead mat



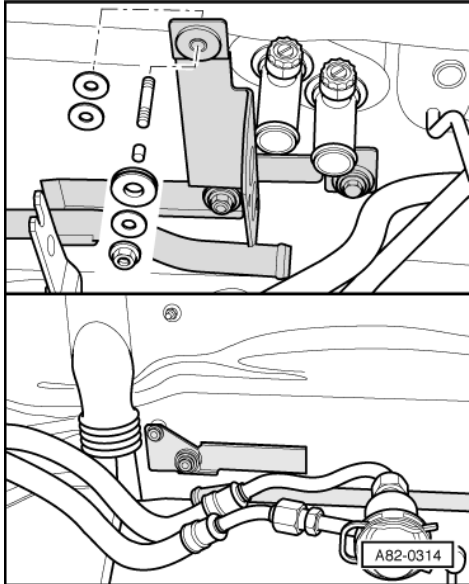
- -> Mark contours of pipe/valve holder in grey area and cut out with a knife.
- Detach pipe/valve holder.



- Carefully pull lower cutting edge forwards and use pointed-nose pliers to remove plastic insulation.

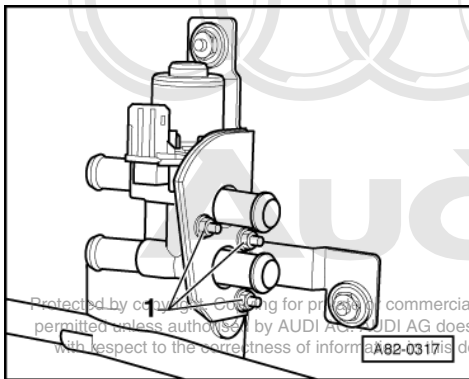
Attention:

Remove plastic insulation such that pipe/valve holder with bulkhead mat can be attached directly to bulkhead. Electrical components could otherwise be damaged due to the proximity of moving engine parts. Danger of fire.



Installing coolant shut-off valve -N279

- Secure studs in rivet nuts and apply body sealant.
- Fit 2 packing plates in each case on studs before inserting pipe/valve holder.
- -> Insert and secure pipe/valve holder.

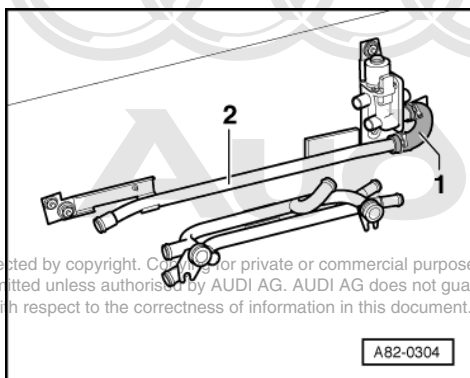


- -> Secure coolant shut-off valve -N279 in position at pipe/valve holder with bolts -1-.

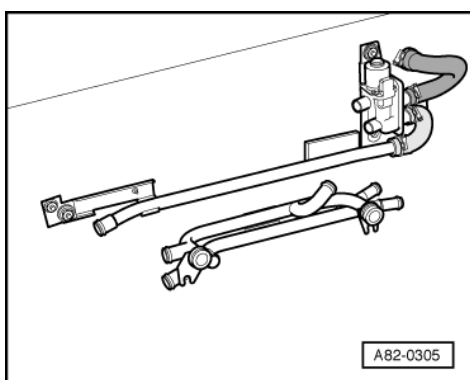
18.7 - Installing coolant hose kit

Notes

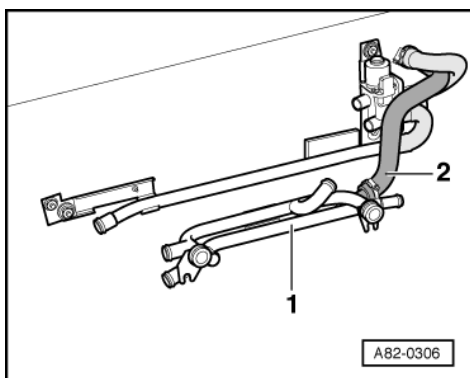
- ♦ Do not kink or strain coolant hoses when laying.
- ♦ Ensure clearance between coolant hoses and assemblies/body components.
- ♦ Attach hose clamps such that hoses, wires and body components cannot be damaged.



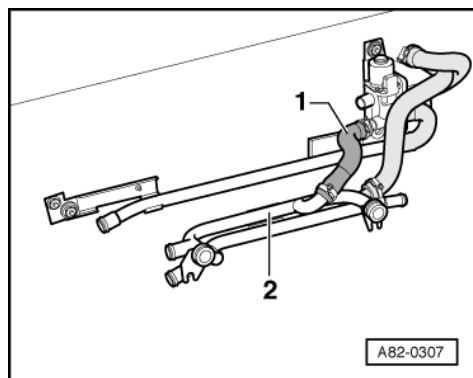
- -> Attach coolant hose -1- to lower connection of coolant shut-off valve -N279 and attach to connection at pipe/valve holder -2-.



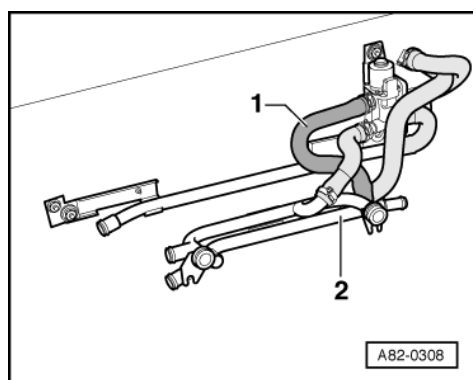
- -> Attach coolant hose to return connection of pump/valve unit. Attach coolant hose to upper connection of coolant shut-off valve -N279.



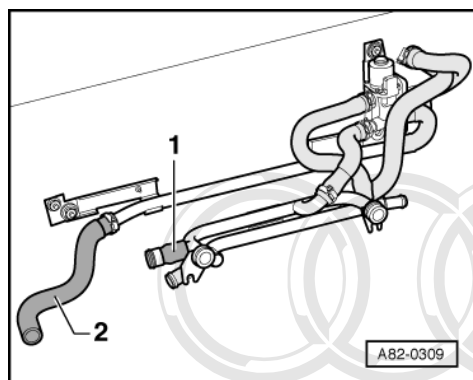
- -> Connect supply connection of pump/valve unit and coolant pipe on back of engine -1- to coolant hose -2-.



- -> Attach coolant hose -1- to lower connection of coolant shut-off valve -N279 and connect to coolant pipe -2-.



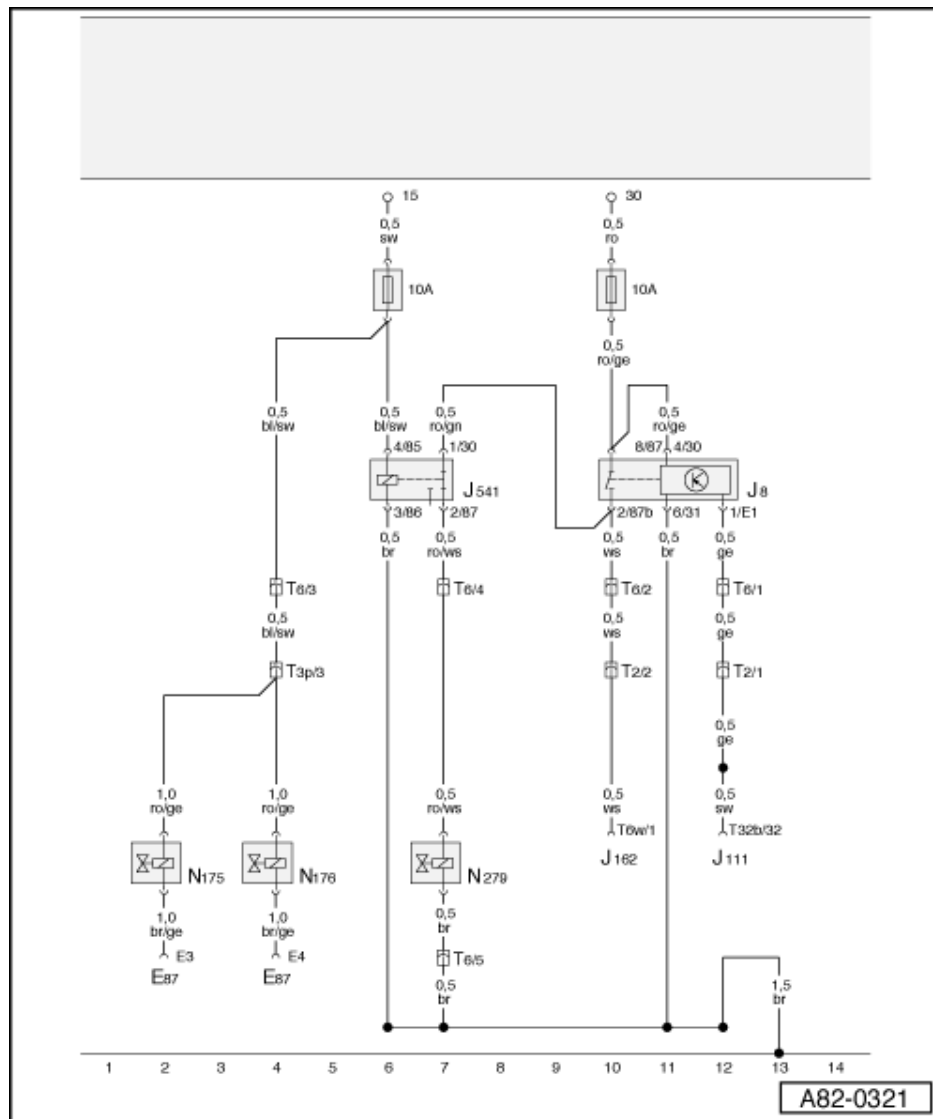
- -> Attach coolant hose -1- to upper connection of coolant shut-off valve -N279 and connect to coolant pipe -2-.



- -> Seal rear coolant pipe with pipe terminating hose -1-.
- Connect pipe/valve holder and return connection of auxiliary heater to coolant hose -2-.

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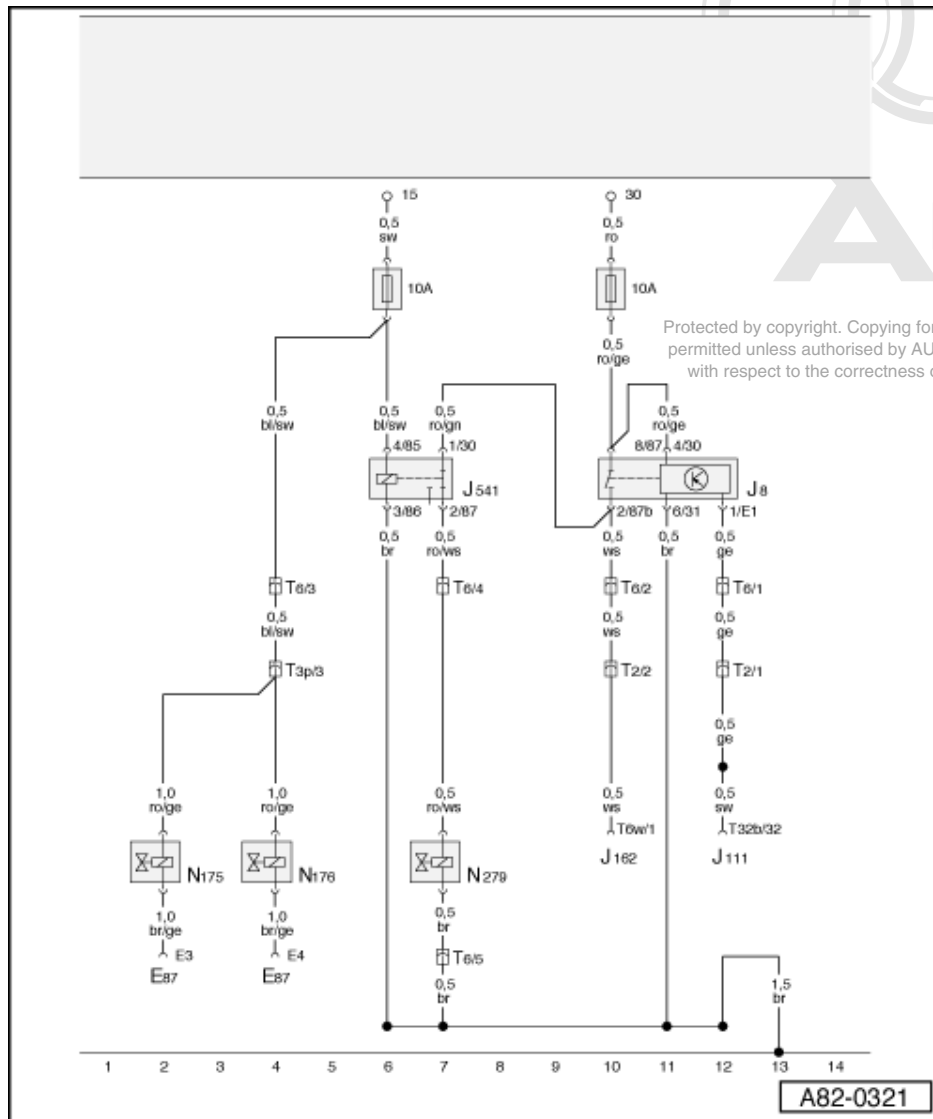
18.8 - Electrics kit (4D0 998 147)



Current flow diagram

Notes:

- ◆ Connector designations and cable colours depend on engine code letters of vehicles to be converted.
- => Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder
- ◆ The following applies if a vehicle provided at the factory with an auxiliary heater with software version "D49" and retrofitted with a small coolant circuit is fitted with an auxiliary heater as of software version "D50":
 - In contrast to the usual specifications, this auxiliary heater is to be encoded to "00011" for a vehicle with large coolant circuit (no coolant shut-off valve).



Or

- The vehicle electrical system is to be converted accordingly. => Refer also to Page 264 and appropriate current flow diagram for vehicles with auxiliary heater and factory-fitted small coolant circuit in Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder (e.g. current flow diagram no. 39 for Model Year 2002 vehicles).

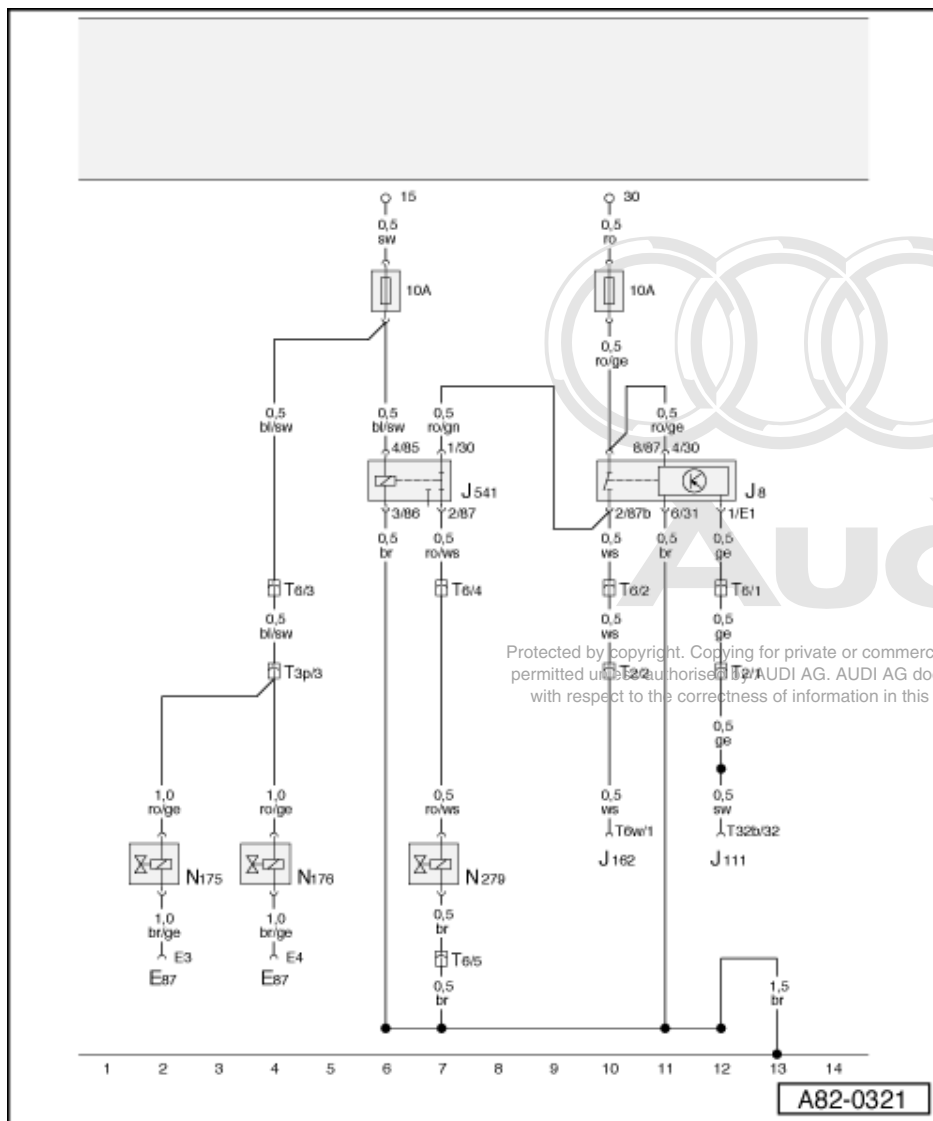
-J8 Auxiliary heater relay

-J541 Coolant shut-off valve relay

-J162 Heater control unit

-E111 Pre-selection clock

(incorrectly labelled -J111 in Fig.)

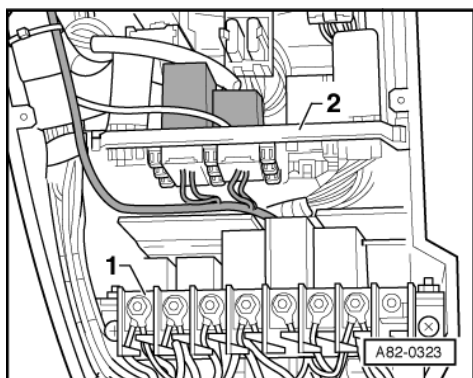


- N175 Heat regulation valve, left
- N176 Heat regulation valve, right
- N279 Coolant shut-off valve
- E87 Operating and display unit for air conditioner/Climatronic

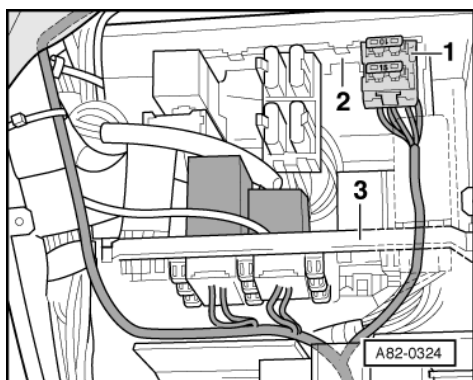


18.9 - Installing electrics kit

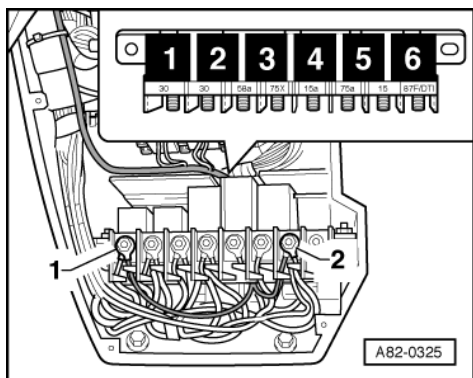
Incorporation into electronics box in passenger's footwell



- Unscrew lid of electronics box.
- Remove central electrics -1-.
- Remove relay carrier -2-.
- -> Insert the two relay sockets of the electrics kit at the two unused relay carrier -2- positions.
- Insert relays -J8 and -J541 in sockets.



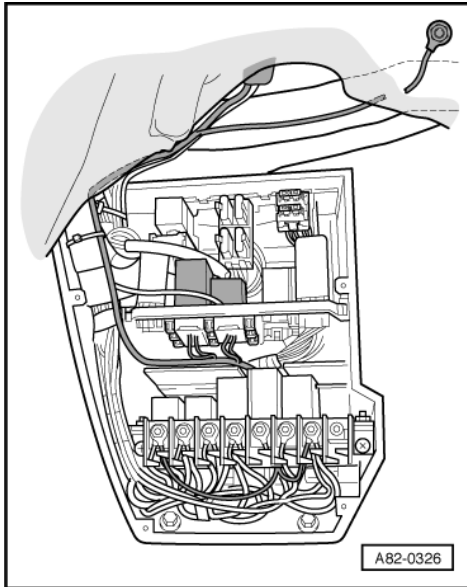
- -> Route wiring harnesses of fuse elements -1- of electrics kit to relay and fuse box -2- and clip into unused holder.
- Install relay carrier -3-.
- Install central electrics.



- -> Connect red wire -1- to terminal 30 of central electrics.
- Connect black wire -2- to terminal 15 of central electrics.

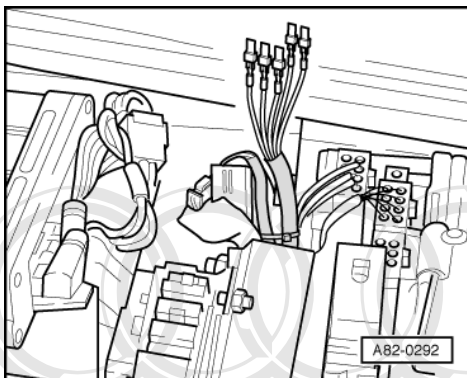


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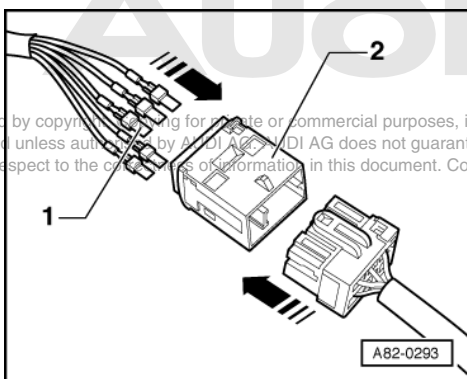


- Route wiring harness to side out of passenger's electronics box and upwards to plenum chamber electronics box.
- Attach harness to existing wiring.
- -> Connect earth wire to earth point next to cable penetration to plenum chamber electronics box.

Connection in plenum chamber electronics box



- -> Bind contacts of main wiring harness together with insulating tape, attach to wire feeder and pull through to plenum chamber electronics box.



- -> Insert contacts -1- into contacts of grey connector housing -2-.

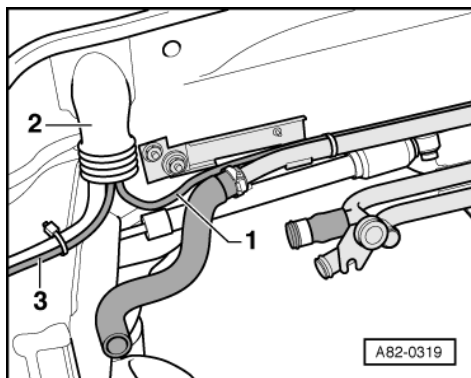
Contact 1 =	Yellow
Contact 2 =	White



Contact 3 =	Black/blue
Contact 4 =	Red/white
Contact 5 =	Brown
Contact 6 =	Not used

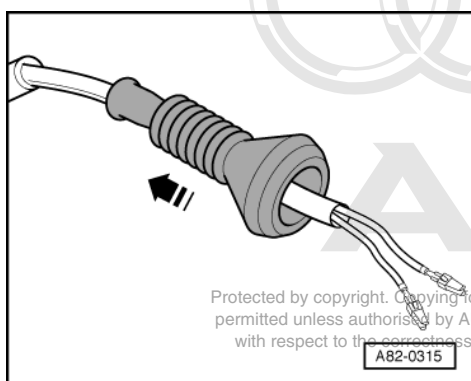
- Connect wiring harness to engine compartment.

Routing wiring harness in engine compartment

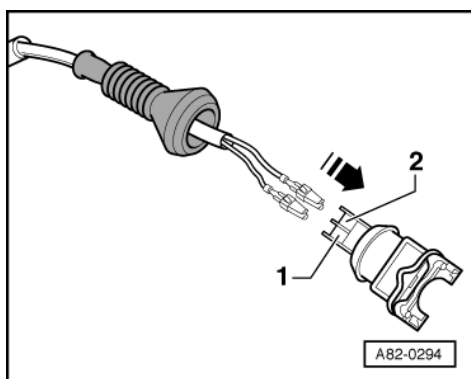


- -> Route wiring harness through existing grommet -2- at electronics box into engine compartment.
- Route red/white, brown and blue/black wiring harnesses along existing engine bulkhead wiring harness to front left wheel housing.
- Route white and yellow wires -3- along existing wiring harness to front right wheel housing.

Connecting coolant shut-off valve -N279

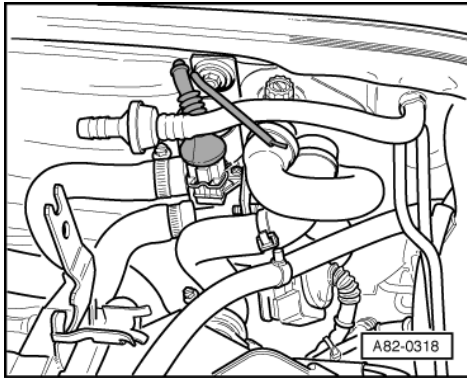


- -> Attach rubber grommet to red/white and brown wiring harness.
- Strip wire and crimp on contact.



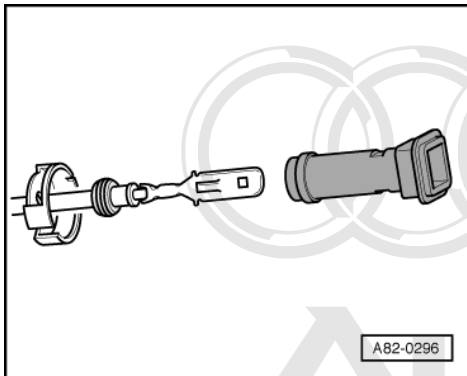
- Fully engage contact in mating contact.
- -> Insert brown wire in contact -1-.

- Insert red/white wire in contact -2-.

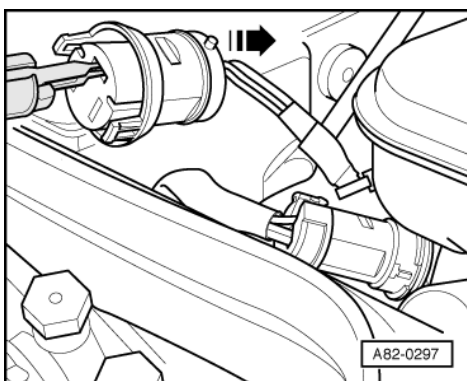


- -> Attach connector to coolant shut-off valve -N279.

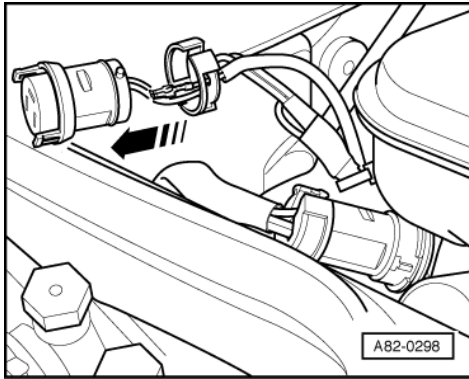
Connection to pump/valve unit



- Attach sealing end to wire.
- Strip wire and crimp on contact.
- -> Fully engage contact in connector contact.
- Use fitting tool to insert sealing end in connector housing. Press on secondary fastener.
- Attach connector and route black/blue wire to pump/valve unit.

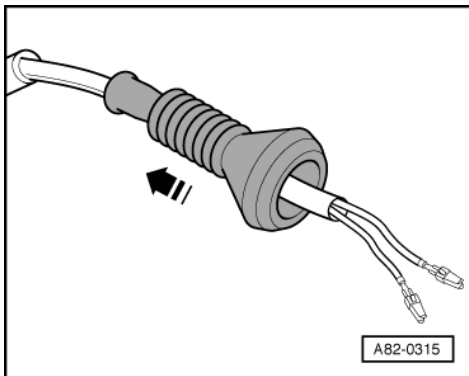


- Unplug connector at pump/valve unit.
- Use small screwdriver to prise off secondary fastener.
- -> Use appropriate tool to release red/yellow wire (previously power supply from terminal 30) from connector housing.
- Insulate wire and bind back at wiring harness.

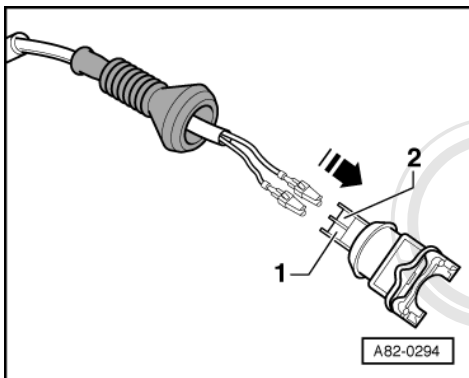


- Attach sealing end to black/blue wire, strip wire and crimp on contact.
- -> Insert black/blue wire in unused contact.
- Use fitting tool to insert sealing end in connector housing. Press on secondary fastener.
- Connect wiring harnesses.

Connecting auxiliary heater

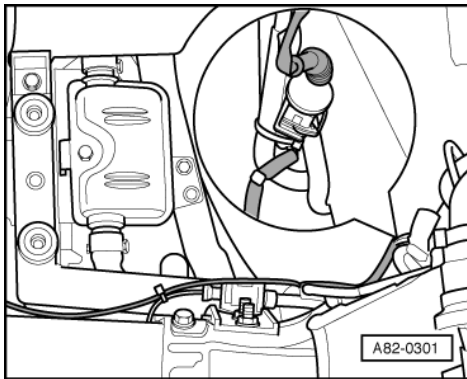


- -> Attach rubber grommet to white and yellow wiring harness.
- Strip wire and crimp on contact.



- Fully engage contact in mating contact.
- -> Insert yellow wire in contact -1-.
- Insert white wire in contact -2-.

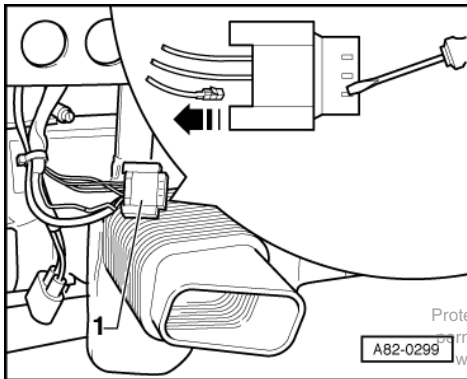
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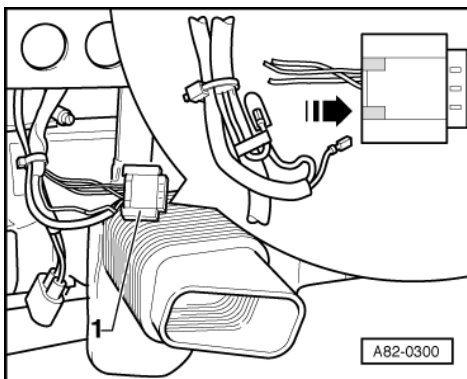
- Connect auxiliary heater wiring harness.
- -> Route wiring harness to auxiliary heater.

Attention:

When laying wiring harness, ensure adequate clearance with respect to auxiliary heater exhaust system. Danger of fire.



- Unplug connector from auxiliary heater control unit.
- -> Release black wire from corresponding contact in connector housing.
- Remove contact at black wire.
- Strip wiring harness.



- -> Twist yellow and black wires together and connect with ferrule.
- Insulate wire with protective cap and bind back at wiring harness.
- Insert white wire in unused contact.
- Attach connector to auxiliary heater control unit.



18.10 - Bleeding coolant circuit

- Bleed engine coolant circuit in specified manner =>Page 149 and

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling

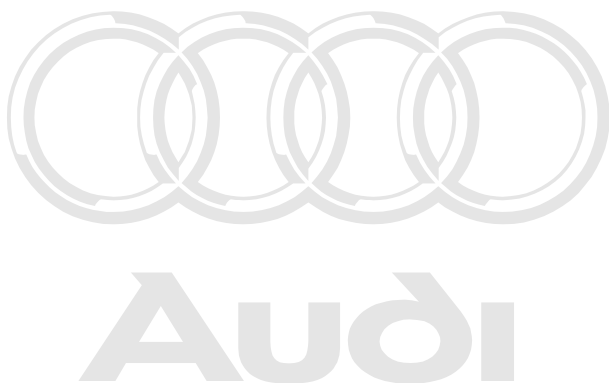
- Once engine has reached operating temperature:
 - Switch on auxiliary heater.
 - Set air conditioner to maximum heat output (temperature preselection "Hi").

Notes:

- ♦ It is sufficient for the auxiliary heater recirculating pump to run (auxiliary heater switches to "control interval" operating status on account of coolant temperature).
- Top up coolant if necessary.

18.11 - Concluding operations

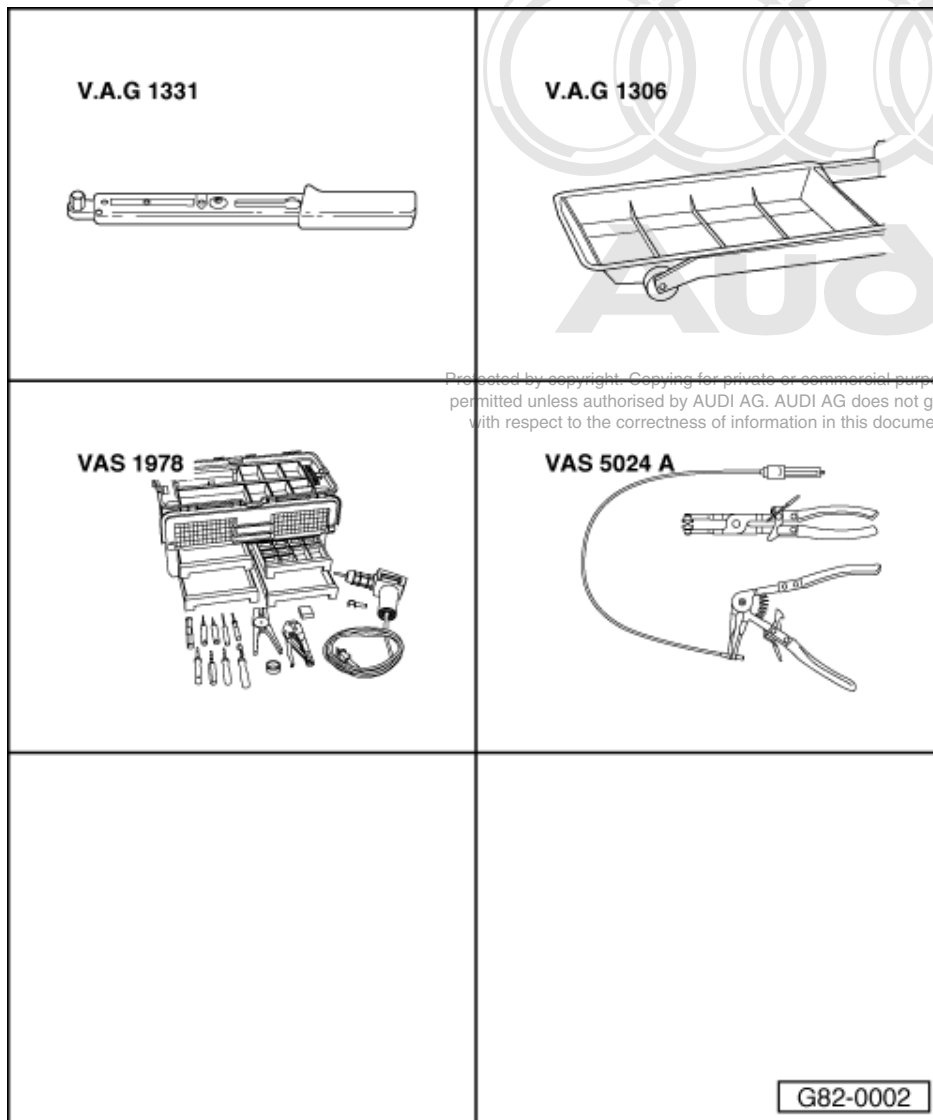
- Check strain-free routing and proper attachment of coolant hoses.
- Check proper attachment of wiring harnesses (cable ties).
- Re-install all components removed under "Preparation for fitting".
- Check operation of auxiliary heater and "small coolant circuit".
- Check operation of pump/valve unit and air conditioner temperature regulation.



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19 - Conversion to small coolant circuit for auxiliary heating mode (vehicles with 8-cyl. 5V petrol engine)

19.1 - Conversion to small coolant circuit for auxiliary heating mode (vehicles with 8-cyl. 5V petrol engine)



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Special tools and workshop equipment required

- ◆ Torque wrench V.A.G 1331
- ◆ Drip tray V.A.G 1306
- ◆ Hose clamp pliers set VAS 5024 A
- ◆ Wiring harness repair set V.A.G 1978

19.2 - Conversion kits for vehicles with 8-cyl. 5V petrol engine 3.7 l / 4.2 l

Notes:

- ◆ The vehicle electrical system is being gradually modified as of October 2000. Following introduction of modified wiring harness, these vehicles are provided with the pre-fitted electrical system components required for installation of a small coolant circuit.



- ♦ On account of the gradual introduction of two coolant shut-off valves (Bosch and Woco) the pipe/valve kit includes an appropriate adapter.
- ♦ The modified coolant circuit has been gradually introduced as standard as of January 2001.

Part numbers of conversion kits

- Pipe/valve kit	4D0 298 139 A
- Hose kit	4D0 298 137 A
- Electrics kit	4D0 998 147 A

19.3 - Preparation for fitting

- Heed (if necessary obtain) radio code for vehicles with encoded radio.
- Disconnect battery earth strap with ignition switched off.
- Remove glove box.

=> Body Interior Equipment; Repair Group 68; Removing glove box Removing glove box

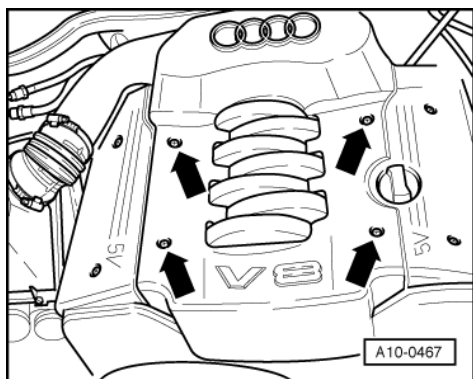
- Remove right B-pillar trim.

=> Body Interior Equipment; Repair Group 70

- Remove inner sill panel trim.

=> Body Interior Equipment; Repair Group 70

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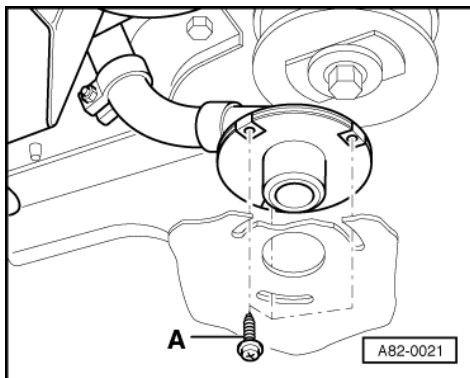
- Remove floor covering.

=> Body Interior Equipment; Repair Group 70; Removing and installing front and rear floor covering Removing and installing front and rear floor covering

- Dissipate pressure in coolant circuit by opening cap on coolant expansion tank.
- -> Remove engine cover.
- Remove entire air cleaner.

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

- On vehicles with headlight washer system:
 - Detach headlight washer system reservoir from body.
- Remove plenum chamber cover.



- -> Remove bolts -A-.
- Remove bumper and noise insulation.

=> General Body Repairs; Repair Group 63; Front Bumper Front Bumper

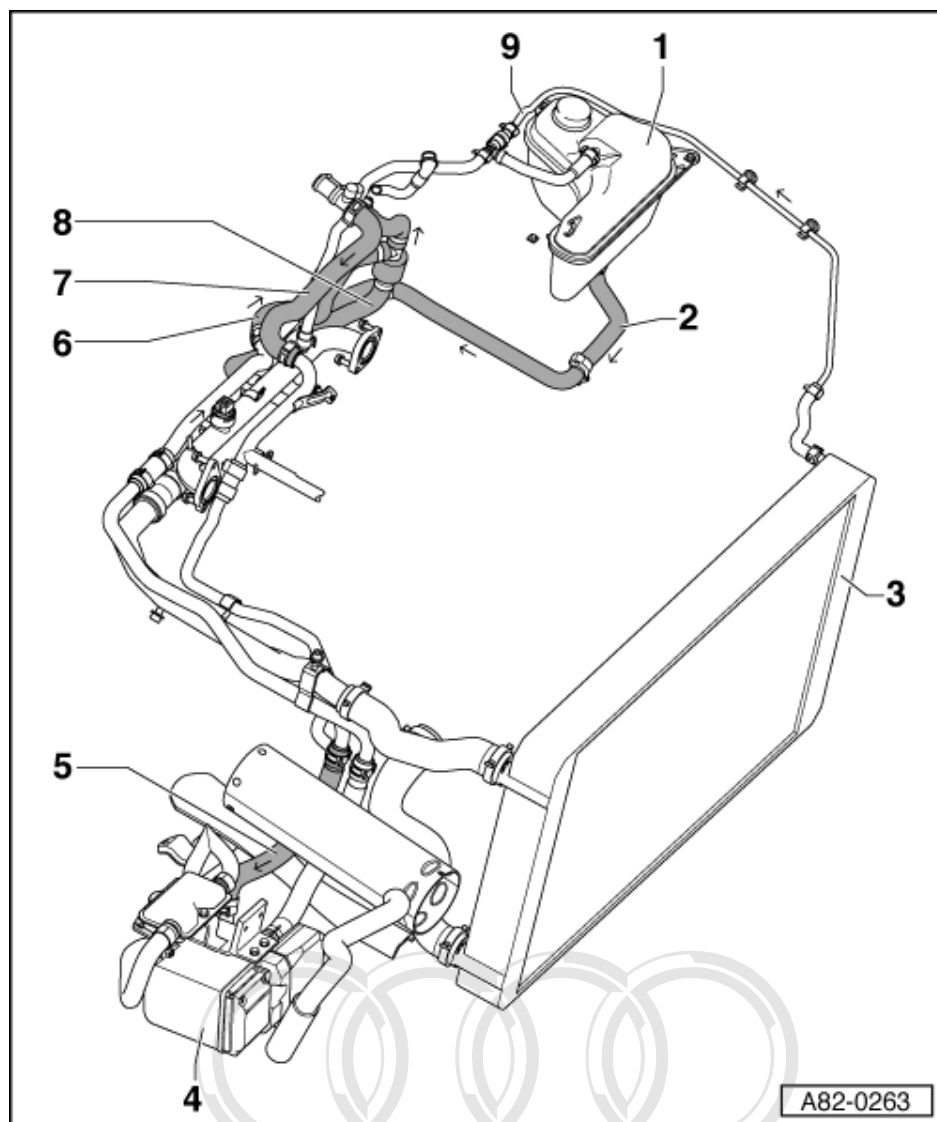
- Remove air duct to alternator (8-cyl. engine only).
- Unplug connectors to auxiliary/additional heater.
- Position drip tray V.A.G 1306 beneath engine and drain off coolant.

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19



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19.4 - Auxiliary heater/large coolant circuit



Standard hose connections up to
January 2001

Note:

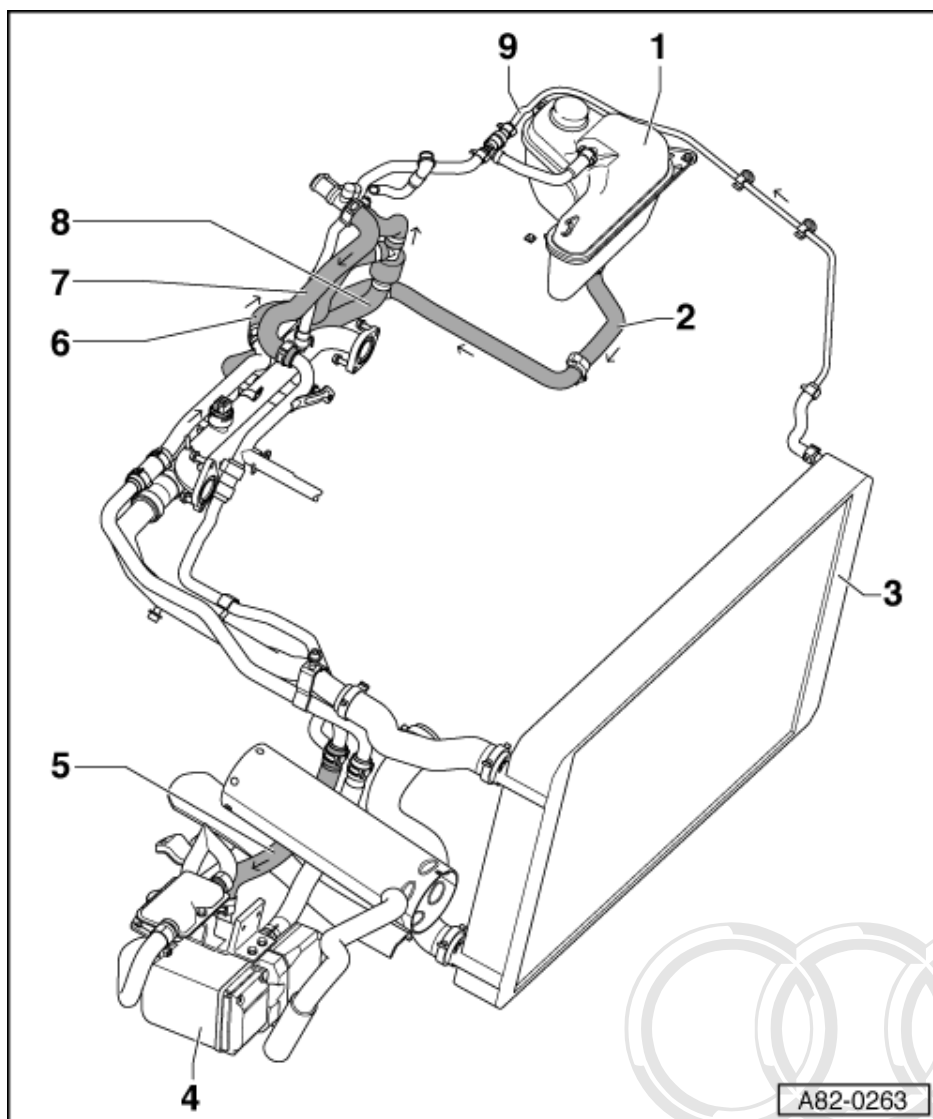
All components not mentioned

=> Relevant Engine Mechanics Workshop Manual: Repair Group 19; Cooling Cooling
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Direction of coolant flow:

⇒ In auxiliary heating mode

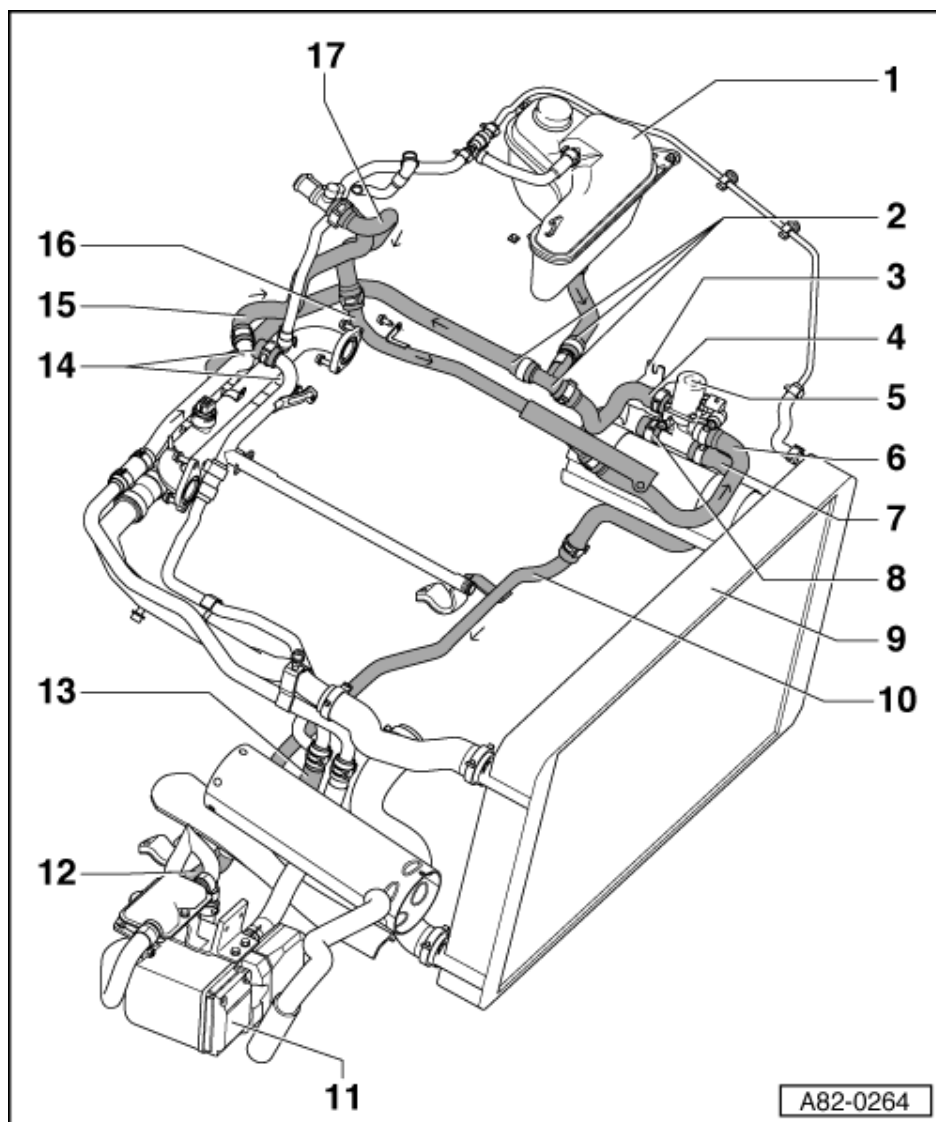
- 1 Expansion tank
- 2 Coolant hose "Return"
 - ◆ Replaced by component from conversion kit
- 3 Radiator
- 4 Auxiliary heater



- 5 Coolant hose "Return"**
 - ◆ Replaced by component from conversion kit
- 6 Coolant hose "Supply"**
 - ◆ Replaced by component from conversion kit
- 7 Coolant hose "Return"**
 - ◆ From pump/valve unit
 - ◆ Replaced by component from conversion kit
- 8 Coolant hose with non-return valve**
 - ◆ To pump/valve unit
 - ◆ Replaced by component from conversion kit
- 9 Coolant hose**
 - ◆ From radiator to expansion tank

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19.5 - Auxiliary heater/small coolant circuit



Exploded view

Note:

All components not mentioned

=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling

Direction of coolant flow:

=> In auxiliary heating mode

1 Expansion tank

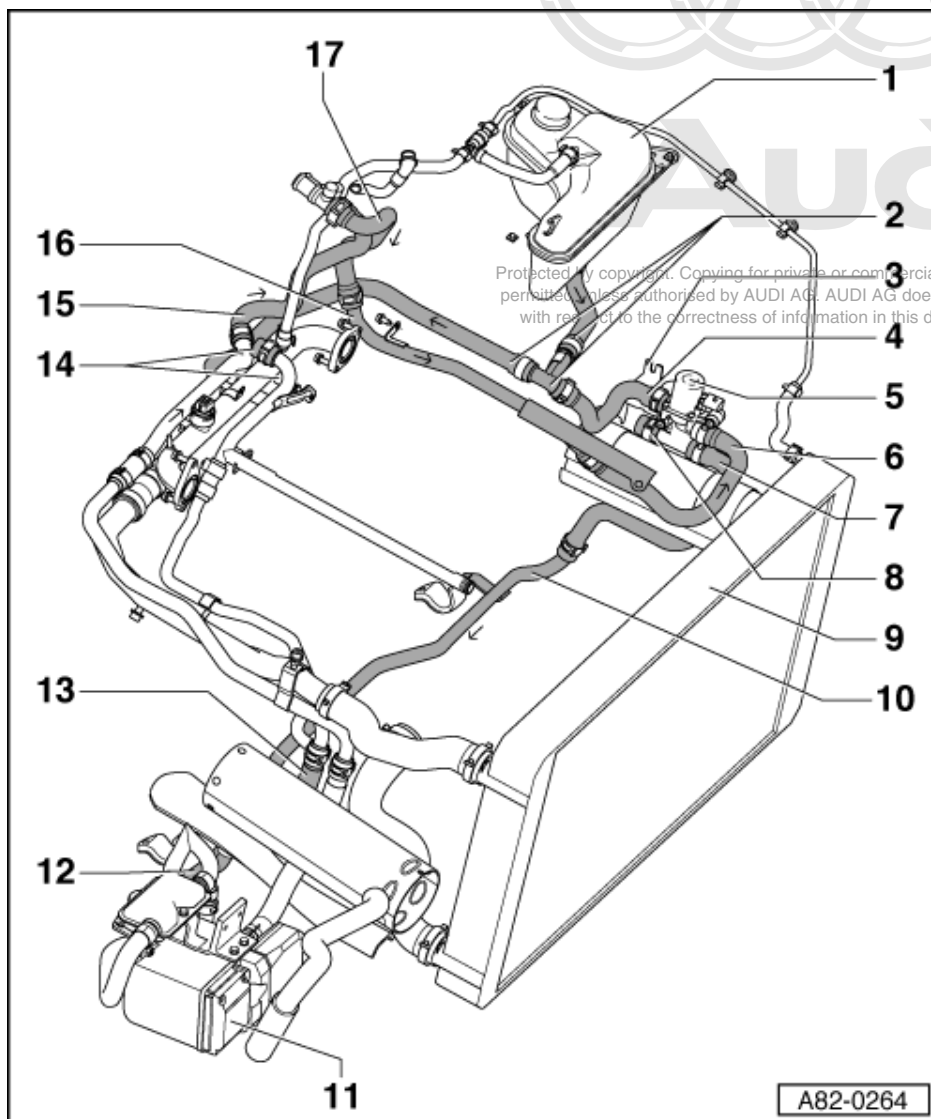
2 Hose module

- ◆ Installing => Page 252
- ◆ Consisting of several coolant hoses and supplied pre-assembled

3 Holder

- ◆ For Bosch valve
- ◆ Installing => Page 254
- ◆ For Woco valve

♦ Installing => Page 255



4 Coolant hose

- ♦ Installing => Page 256
- ♦ From coolant shut-off valve -N279 to hose module

5 Coolant shut-off valve -N279

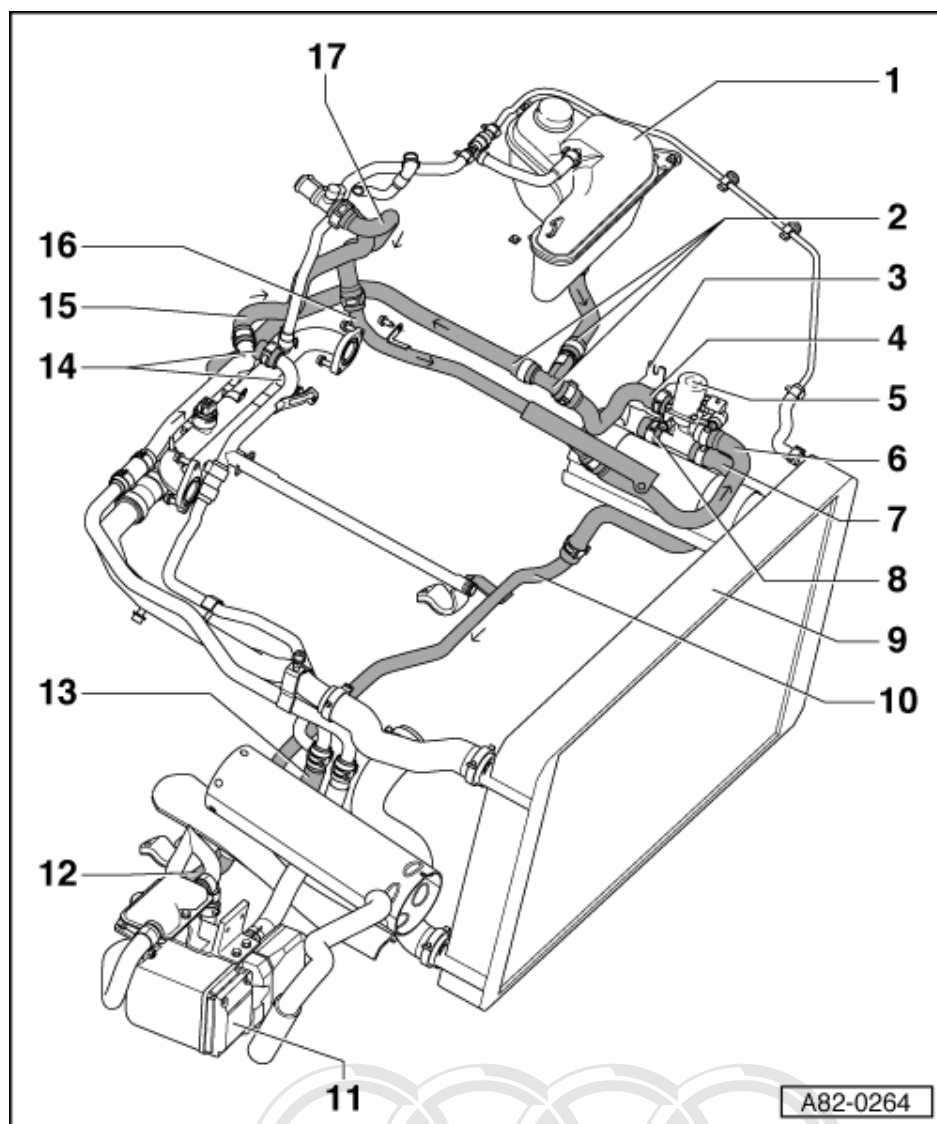
- ♦ Bosch
- ♦ Installing => Page 254
- ♦ Woco
- ♦ Installing => Page 255

6 Coolant hose "Return"

- ♦ Installing => Page 256
- ♦ From coolant pipe to coolant shut-off valve -N279

7 Coolant hose "Return"

- ♦ Installing => Page 256
- ♦ From coolant shut-off valve -N279 to water pipe at subframe



8 Pipe terminating hose

9 Radiator

10 Coolant pipe at subframe "Return"

- ♦ Installing => Page 258
- ♦ From coolant shut-off valve -N279 to auxiliary heater

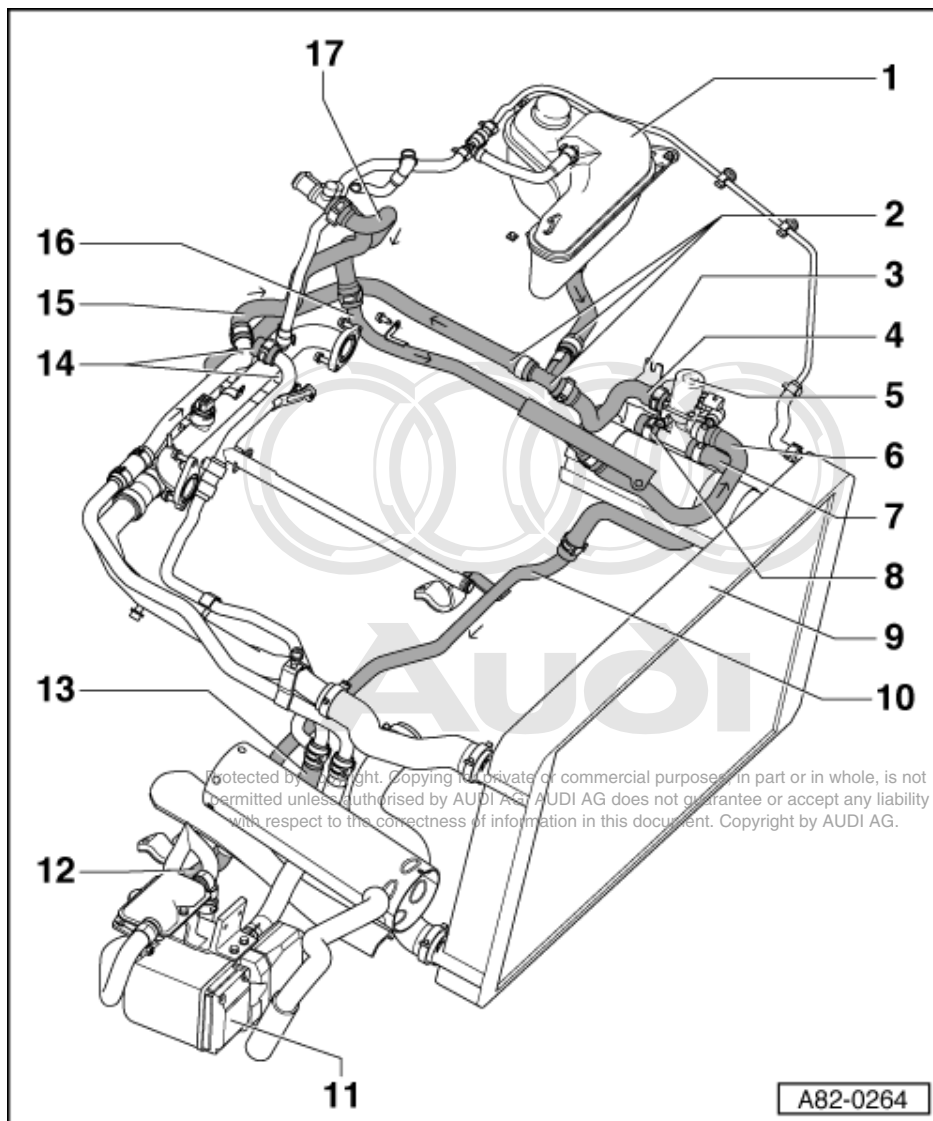
11 Auxiliary heater

12 Coolant hose "Return"

- ♦ Installing => Page 258
- ♦ From coolant pipe at subframe to auxiliary heater

13 Coolant hose "Return"

- ♦ Installing => Page 257
 - ♦ From engine coolant pipe to coolant pipe at subframe
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14 Pipe terminating hose

- ♦ Installing => Page 253

15 Coolant hose "Supply"

- ♦ Installing => Page 257
- ♦ From auxiliary heater to pump/valve unit

16 Coolant pipe "Return"

- ♦ Installing => Page 253
- ♦ From pump/valve unit to coolant shut-off valve -N279

17 Coolant hose "Return"

- ♦ Installing => Page 253

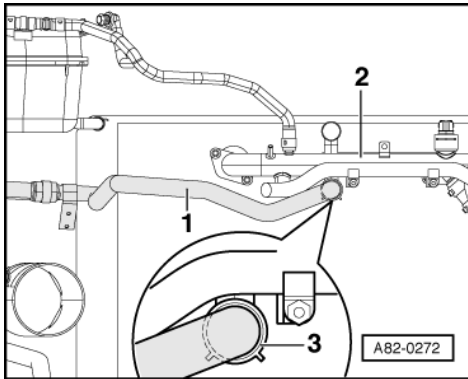
19.6 - Installing hose kit and pipe/valve kit

Notes:

- ♦ Do not kink or strain coolant hoses when laying.
- ♦ Ensure clearance between coolant hoses and assemblies/body components.
- ♦ Attach spring clips such that hoses, wires and body components cannot be damaged.
- ♦ Use special tool VAS 5024 A for fitting spring clips at coolant hoses.

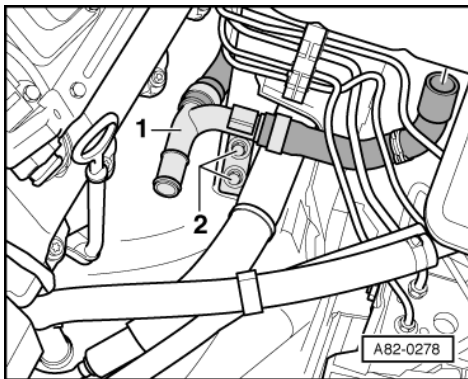


Connecting hose module to engine coolant pipe



- -> Attach rear hose connection of hose module -1- to coolant pipe -2- on back of engine. Secure hose connection with spring clip -3-.

Installing T-piece of hose module



- -> Attach T-piece -1- with bolts -2- to wheel housing (engine compartment).
Tightening torque: 20 Nm

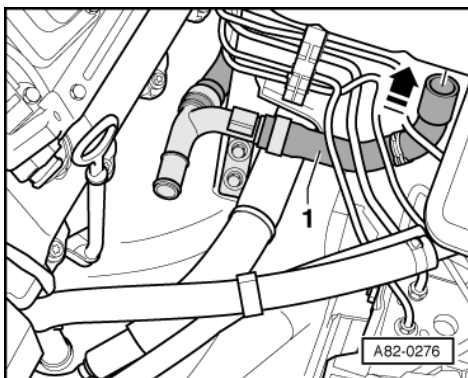
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Notes:

For vehicles with stud in area of hose module attachment point:

- ◆ Remove stud.
- ◆ Insert appropriate rivet nut.
- ◆ Heed anti-corrosion measures.

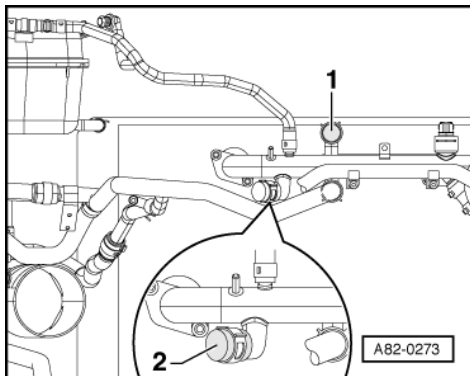
Connecting hose module to expansion tank



- -> Slip coolant hose -1- over bottom connection at expansion tank.

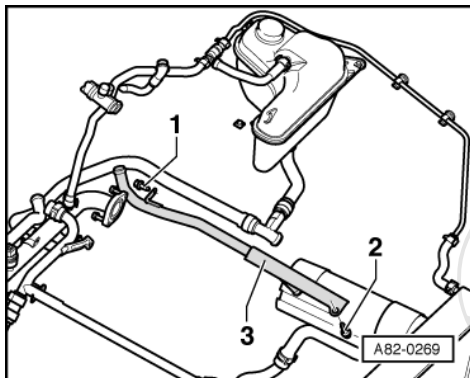
- Use hose clamp pliers VAS 5024 A to slip spring clip over end of hose module and attach to expansion tank.

Sealing coolant pipe connections at engine



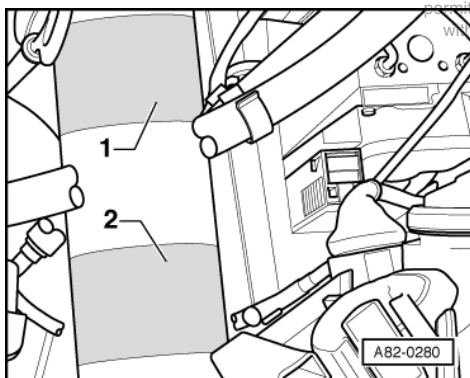
- -> Seal coolant pipe on back of engine with pipe terminating hoses -1- and -2-.
- Secure terminating hoses with spring clips.

Fitting coolant pipe at cylinder head



- Slacken off bolt for attaching dipstick guide tube to cylinder head.
- -> Secure coolant pipe in position at cylinder head with bolt -1-.
Tightening torque: 10 Nm
- Secure coolant pipe holder -3- in position behind dipstick guide tube fastener at cylinder head with bolt -2-.
Tightening torque: 10 Nm

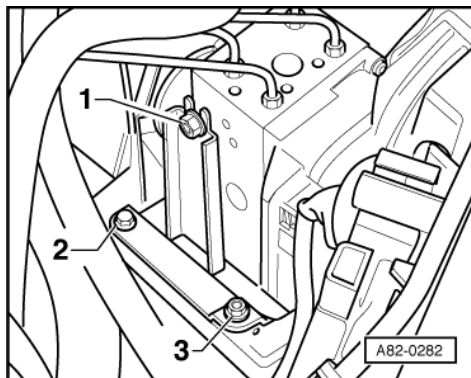
Attaching protective sheeting to longitudinal member



- Protective sheeting is only to be bonded on at ambient temperature.
- Clean surface to be bonded at longitudinal member, treat with silicone remover and rub dry.
- -> Bond on protective sheeting at positions -1- and -2- on longitudinal member.



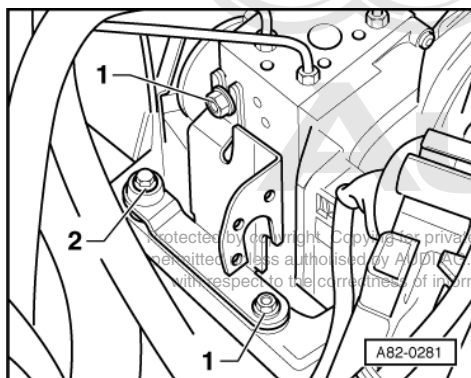
Installing coolant shut-off valve -N279 (Bosch)



- -> Unscrew nut -1- at ESP holder.
- Screw bolt -2- out of holder.
- Unscrew nut -3-.

Note:

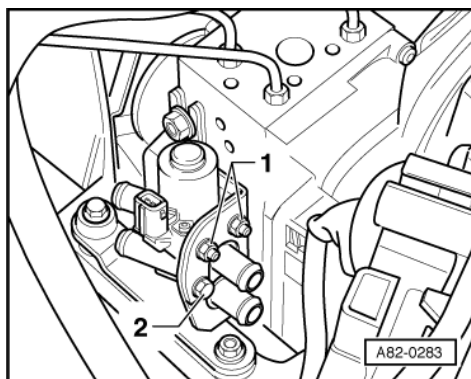
"Bosch" and "Woco" coolant shut-off valves have different connection diameters and thus different coolant hoses.



- -> Insert holder and secure with nuts -1-.
- Tightening torque: 10 Nm
- Tighten bolt -2-.
- Tightening torque: 10 Nm

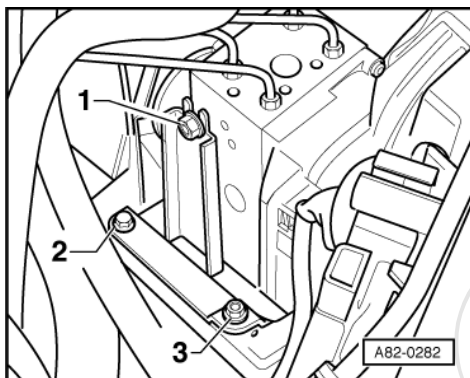
Note:

Bolt -2- is replaced by longer bolt from conversion kit.



- -> Insert shut-off valve and attach to holder with nuts -1- and bolt -2-. Tightening torque: 10 Nm

Installing coolant shut-off valve -N279 (Woco)

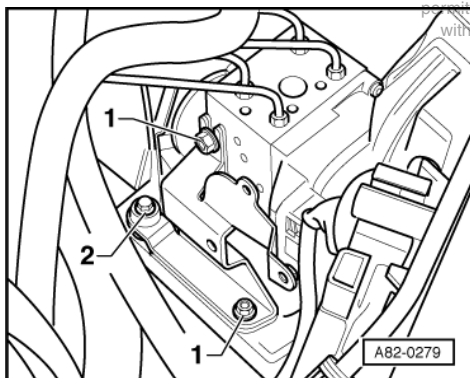


- -> Unscrew nut -1- at ESP holder.
- Unscrew bolt -2- from holder.
- Unscrew nut -3-.

Note:

"Bosch" and "Woco" coolant shut-off valves have different connection diameters and thus different coolant hoses.

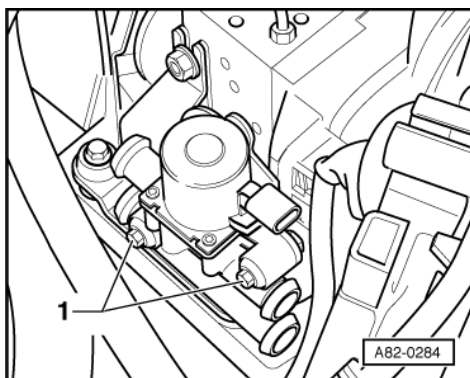
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- -> Insert holder and secure with nuts -1-.
- Tightening torque: 10 Nm
- Tighten bolt -2-.
- Tightening torque: 10 Nm

Note:

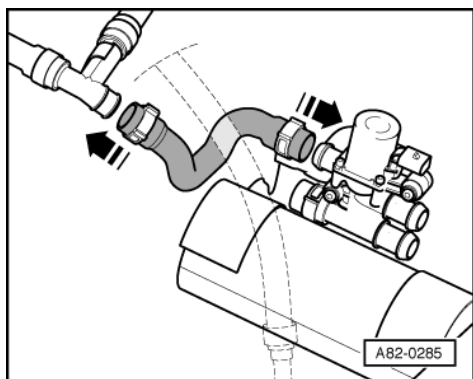
Bolt -2- is replaced by longer bolt from conversion kit.



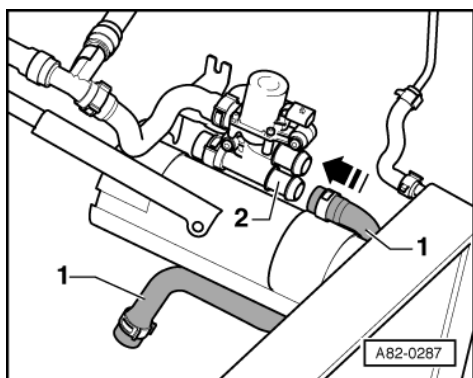
- -> Insert shut-off valve and attach with bolts -1- to holder.

Tightening torque: 10 Nm

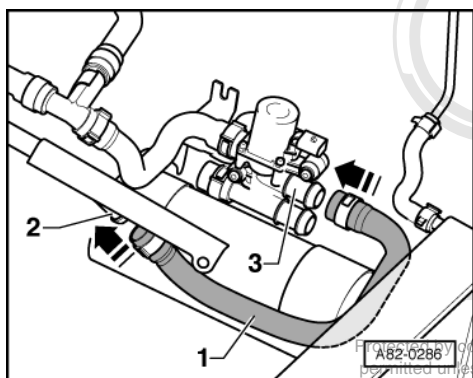
Connecting coolant hoses to coolant shut-off valve -N279



- -> Attach coolant hose to hose module, route beneath power steering expansion hose and connect to coolant shut-valve.

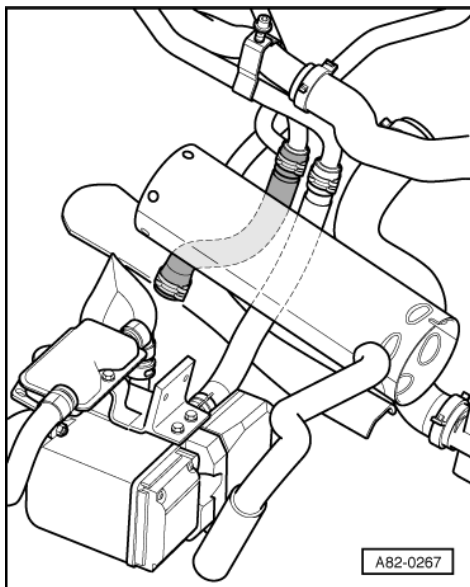


- -> Route coolant hose -1- downwards from bottom connection -2- towards subframe.



- -> Attach coolant hose -1- to connection of coolant pipe -2-.
- Connect opposite end of coolant hose -1- to top connection -3- of coolant shut-off valve -N279.

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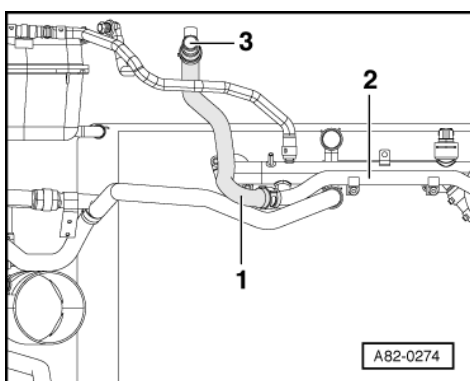


- -> Attach coolant hose of conversion kit to coolant pipe (return) on right side of engine and route downwards towards subframe.

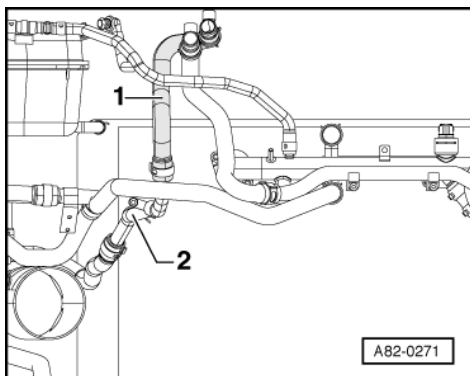
Note:

Longer end of coolant hose must be connected to coolant pipe.

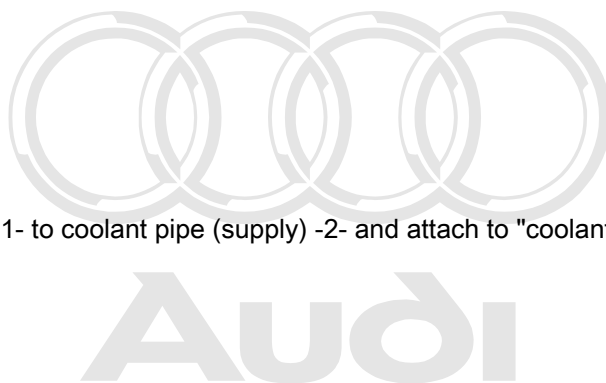
Hose connection at pump/valve unit



- -> On back of engine, connect coolant hose -1- to coolant pipe (supply) -2- and attach to "coolant supply" connection to pump/valve unit -3-.



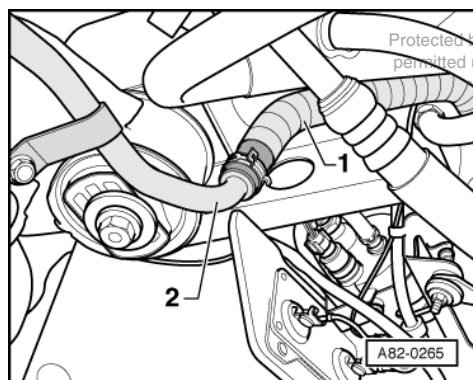
- -> Attach coolant hose -1- of conversion kit to "coolant return" connection of pump/valve unit and connect to coolant pipe -2-.



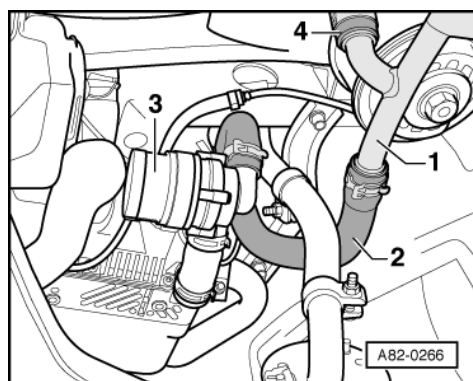
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Installing coolant pipe at subframe

- -> Screw out bolts -1-.
- Clean tapped holes.
- Attach coolant pipe at subframe with bolts -1- to upper anti-roll bar mounts.
Tightening torque 20 Nm

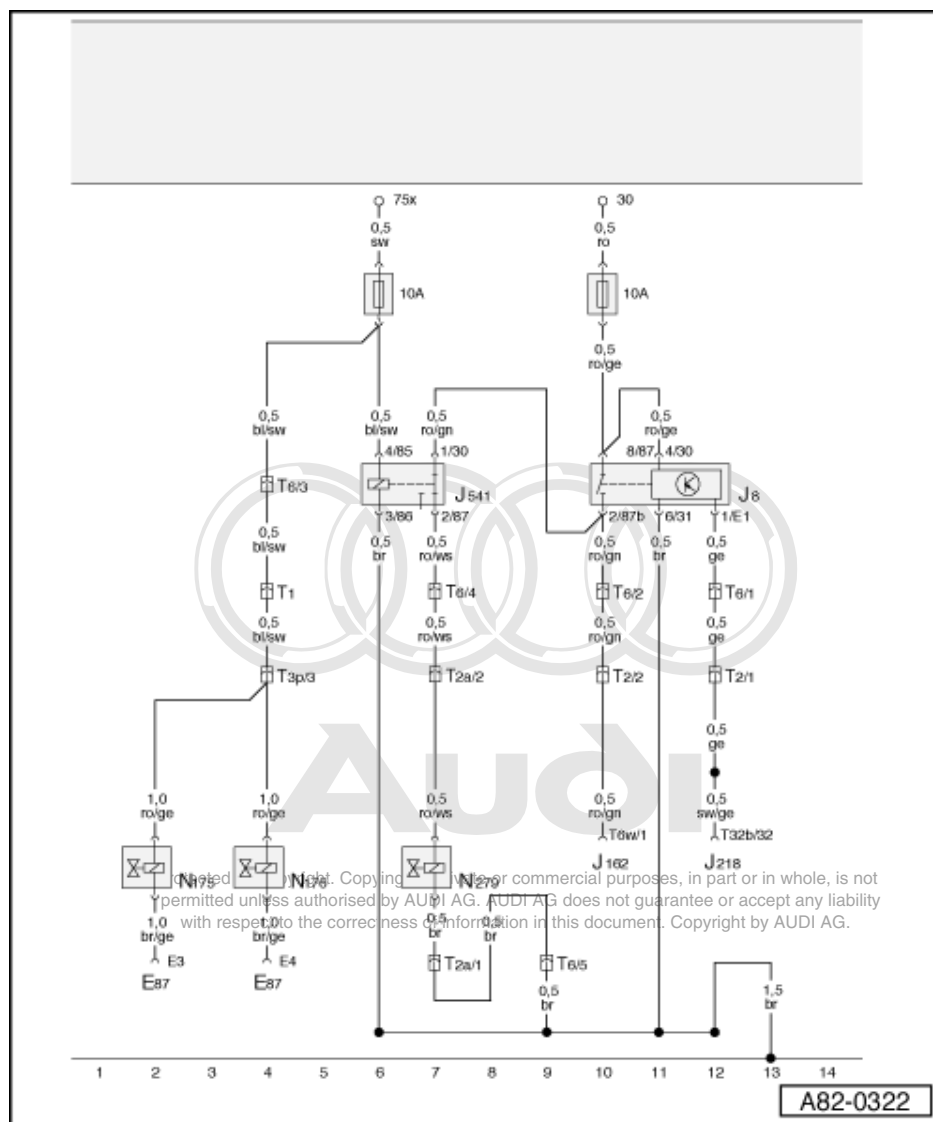


- -> Connect coolant hose -1- to coolant pipe -2-.



- -> Connect coolant pipe -1- at subframe by means of coolant hose -2- from conversion kit to recirculating pump -V55 -3-.
- Attach coolant hose -4- to subframe coolant pipe.

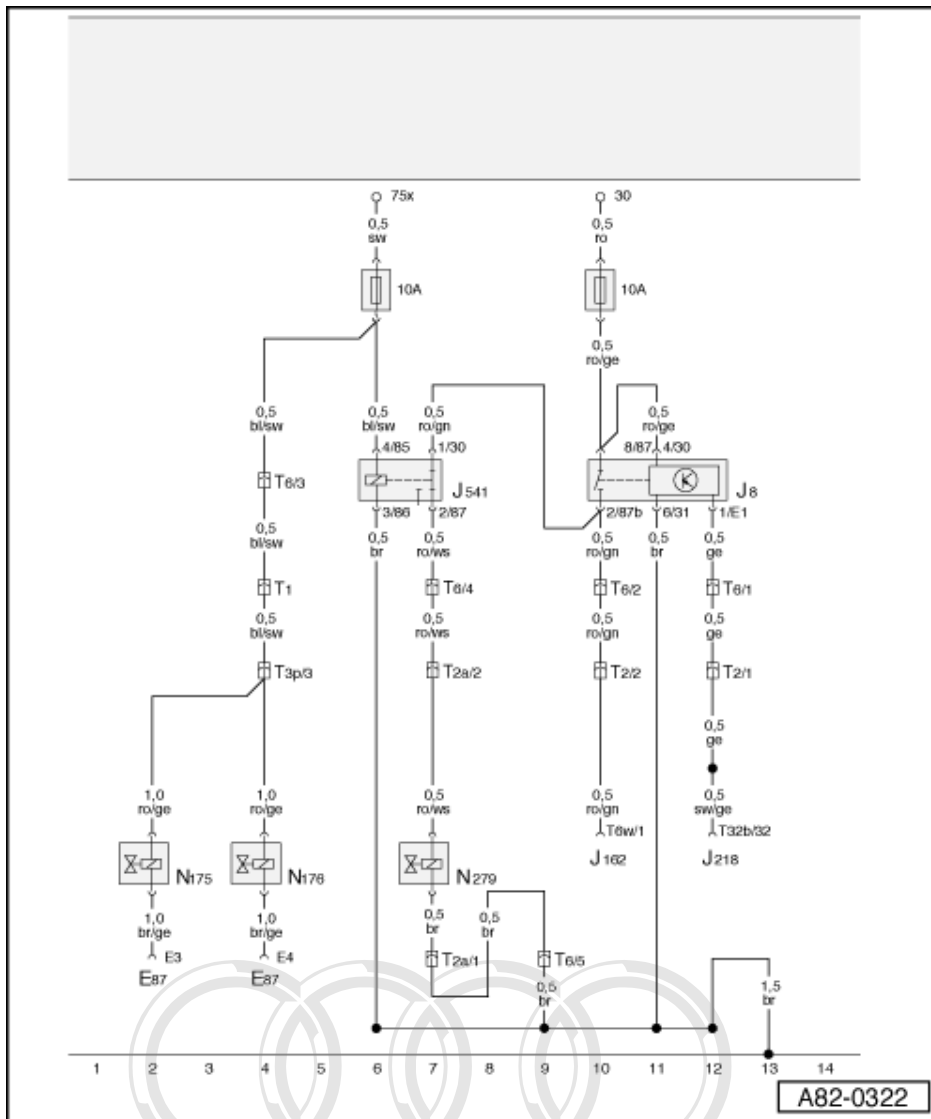
19.7 - Electrics kit (4D0 998 147A)



Current flow diagram for vehicles with no electrical system preparation

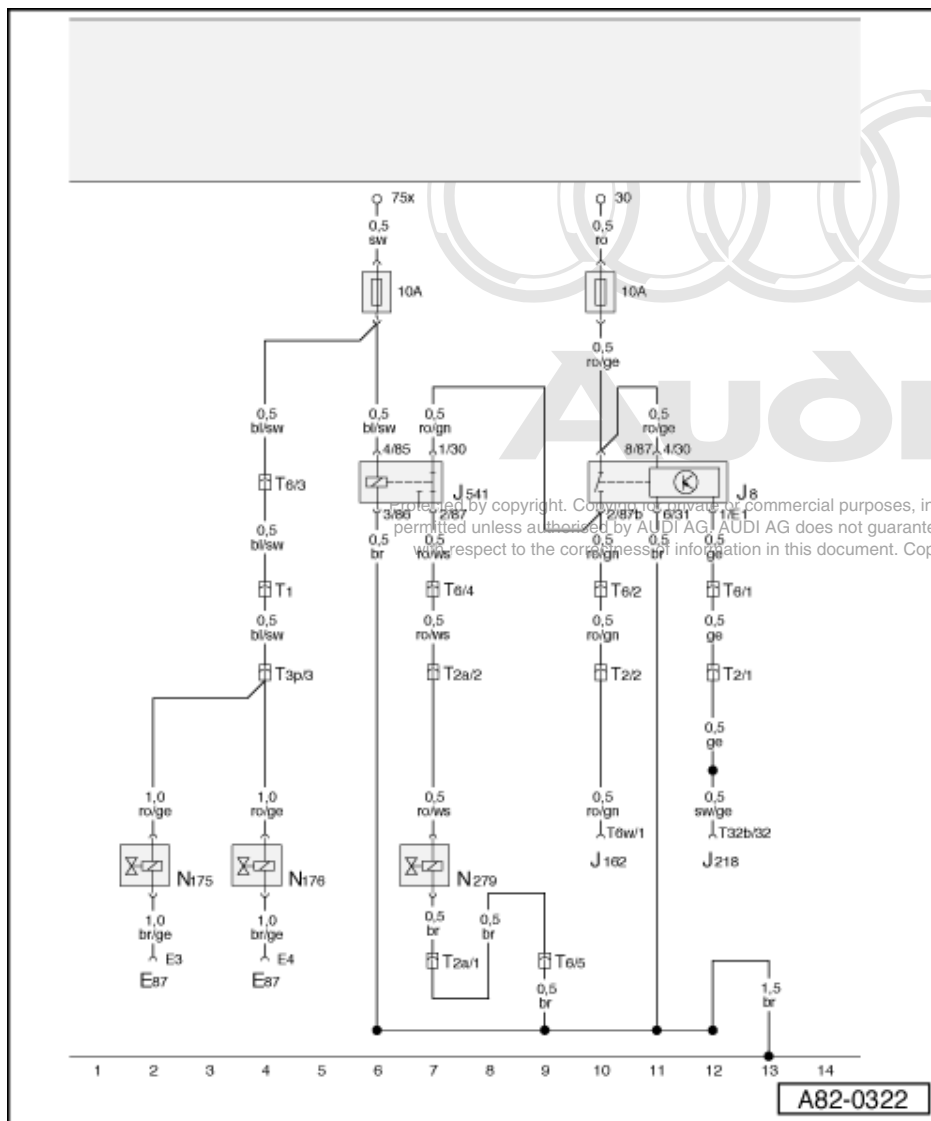
Notes:

- ◆ Connector designations and cable colours depend on engine code letters of vehicles to be converted.
- => Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder
- ◆ The vehicle electrical system is being gradually modified as of October 2000. Following introduction of modified wiring harness, these vehicles are provided with the pre-fitted electrical system components required for installation of a small coolant circuit.



- ♦ If a vehicle provided at the factory with an auxiliary heater with software version "D49" and retrofitted with a small coolant circuit is fitted with an auxiliary heater as of software version "D50", this auxiliary heater is to be encoded - contrary to usual procedure - to "00011" for vehicle with large coolant circuit (no coolant shut-off valve) or vehicle electrical system is to be converted accordingly. => Refer to Page 264 and appropriate current flow diagram for vehicles with auxiliary heater and factory-fitted small coolant circuit in Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder (e.g. current flow diagram no. 39 for Model Year 2002 vehicles).

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- J8 Auxiliary heater relay
- J541 Coolant shut-off valve relay
- J162 Heater control unit
- J218 Combi-processor in dash panel insert
- N175 Heat regulation valve, left
- N176 Heat regulation valve, right
- N279 Coolant shut-off valve
- E87 Operating and display unit for air conditioner/Climatronic



19.8 - Installing electrics kit

Notes:

- ♦ The vehicle electrical system is being gradually modified as of October 2000. Following introduction of modified wiring harness, these vehicles are provided with the pre-fitted electrical system components required for installation of a small coolant circuit.
- ♦ Prior to series use of coolant shut-off valve -N279 (gradual introduction as of January 2001), link will be inserted in relay socket instead of coolant shut-off valve relay -J541. This link connects contacts "1" (from auxiliary heater) and "5" (to operating and display unit of air conditioner/Climatronic -E87).

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

Incorporation into electronics on vehicles with pre-fitted components and auxiliary heater with software version as of "D50"

Notes:

- ♦ Incorporation into vehicle electrical system on vehicles with auxiliary heater with software version as of "D50" is effected by removing link, inserting coolant shut-off valve relay -J541 (part number 4D0 909 516) in socket and attaching connector to coolant shut-off valve -N 279.

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

- ♦ Relay -J541 acts as control unit. Method of actuation differs. With auxiliary heaters for petrol with part number as of index "K" (software version "D50"), actuation is also governed by auxiliary heater encoding. Such auxiliary heaters have been gradually introduced into production since November 2000=>Page 69 .

Incorporation into electronics on vehicles with pre-fitted components and auxiliary heater with software version "D49"

Notes:

- ♦ Incorporation into vehicle electrical system on vehicles with auxiliary heater with software version "D49" (such auxiliary heaters only output positive signal) involves fitting both relays from electrics kit.
- ♦ With the exception of connection to terminal "75" and control wire for cut-in signal to auxiliary heater, all electrical connections are provided at relay socket, position "7" in passenger's footwell electronics box relay carrier.

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

- Remove dash panel insert.

=> Electrical System; Repair Group 90

- Detach connection between combi-processor in dash panel insert -J218 (connector T32b/32) and heater control unit -J162 (connector T6w/1) =>Page 264 .
- Route two-part, 2-pin wiring harness contained in electrics kit (or improvised wiring harness) from connection point into passenger's footwell electronics box.
- Connect one of the two wiring harness wires in each case to the two open wire ends.
- Twist wires together, connect and insulate with ferrules
=>Page 264 .
- Locate connection to terminal 75x in micro central electrics or in fuse box (e.g. ST 2 fuse 8) =>Pages 265 .

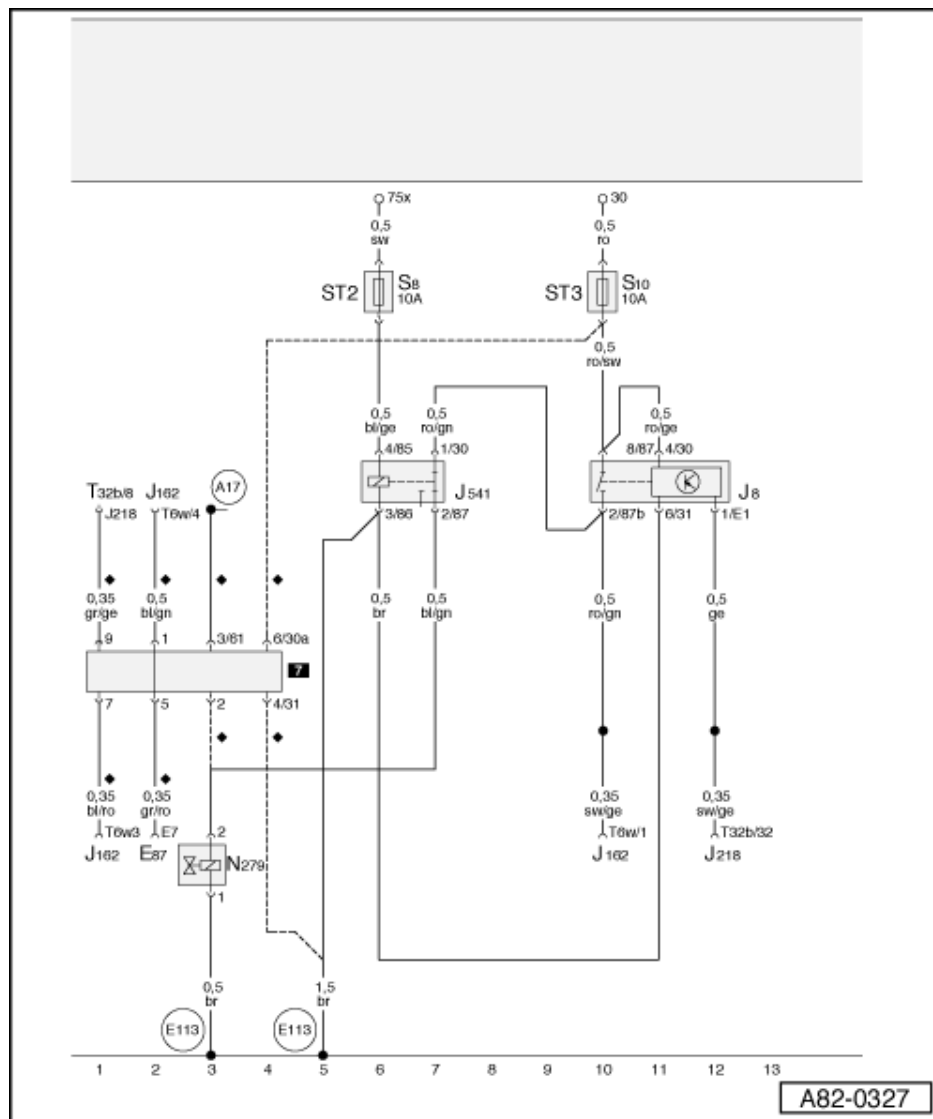
=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

- Make wiring connection from terminal "75x" to fitting location of coolant shut-off valve relay -J541 =>Page 264 .
- Pull fuse "10" out of fuse box "ST 3".
- Release plug contacts for contacts "2" (to -N279), "4" (earth) and "6" (terminal "30") from relay socket "7"
=>Page 264 .

- Convert wiring harness contained in electrics kit with relay carriers such that it corresponds to current flow diagram =>Page 264 .
- Connect the two relays contained in the electrics kit -J541 (part number 431 951 253 D) and -J8 (Webasto part number 83699C) to vehicle electrical system in line with current flow diagram =>Page 264 .
- Insert relay sockets at unused positions in electronics box.
- Re-install all components removed.

Notes:

- ◆ If necessary, shorten the various wiring harness wires as required
- ◆ Remove wires not contained in current flow diagram from wiring harness =>Page 264 .
- ◆ Press home contacts in corresponding mating contact and check engagement in relay socket.
- ◆ Insulate and check all connectors and wires.
- ◆ If customers require maximum heat output at all times in auxiliary heating mode regardless of setting on operating and display unit for air conditioner/Climatronic -E87, power supply of left and right heat regulation valves -N175 and -N176 can be switched from terminal "30" to terminal "75x" =>Pages 265 .
- Switching power supply may cause operating and display unit for air conditioner/Climatronic -E87 to open cold air flap and route cold air out of centre vents into passenger compartment to maintain temperature set in -E87 (Remedy: close centre vents or set higher temperature at -E87).





Current flow diagram for actuation of coolant shut-off valve -N279 for auxiliary heater with software version "D49"

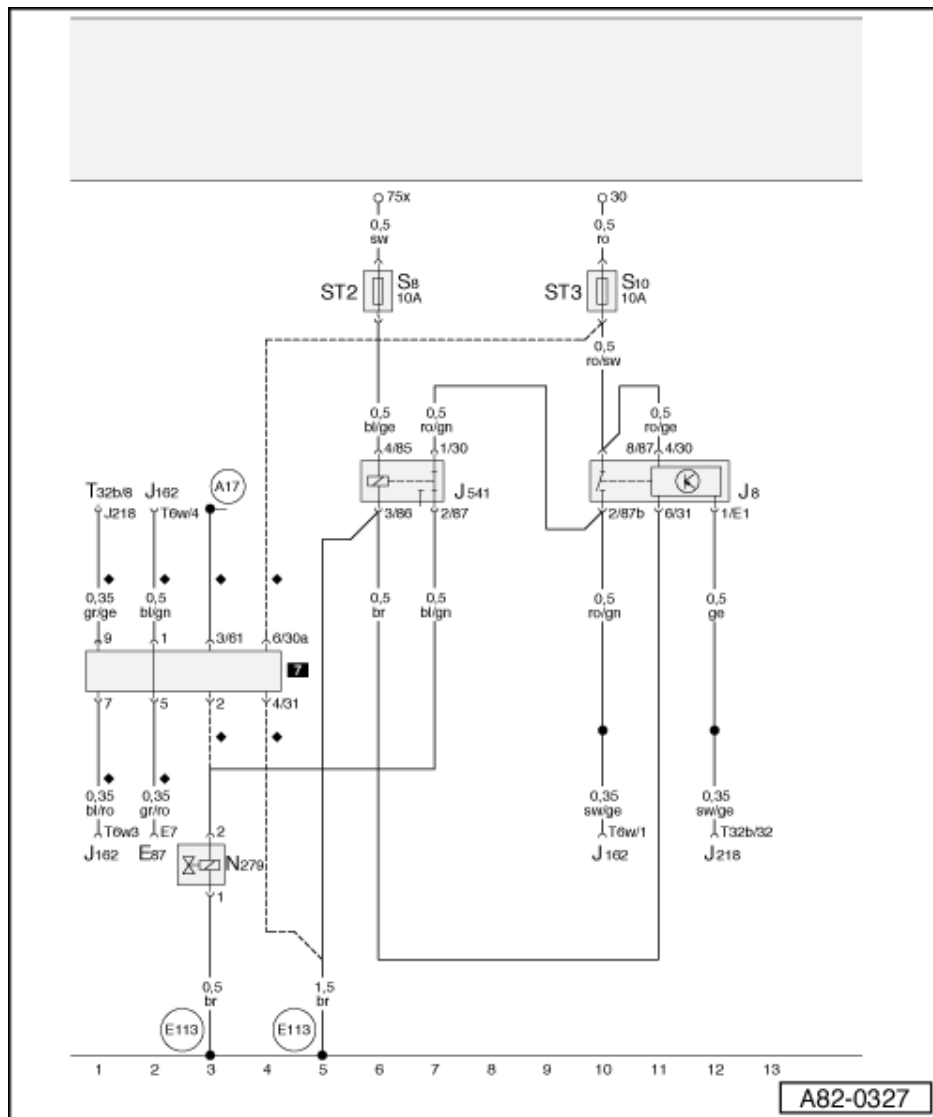
Notes:

- ♦ Connector designations and cable colours depend on engine code letters of vehicles to be converted.

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

- ♦ The vehicle electrical system is being gradually modified as of October 2000. Following introduction of modified wiring harness, these vehicles are provided with the pre-fitted electrical system components required for installation of a small coolant circuit.
- ♦ All connections not mentioned in this current flow diagram

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

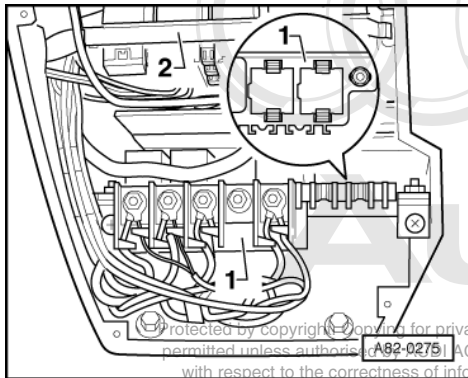


- ♦ If terminal "75x" is picked off directly in micro central electrics =>Page 265 , 10 A fuse protection is to be provided for connection (contained in wiring harness with fuse box).

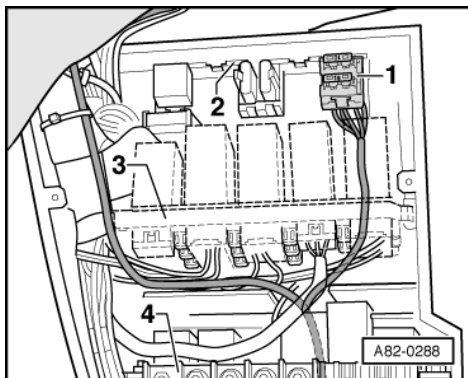
-J8 Auxiliary heater relay

-J541 Coolant shut-off valve relay

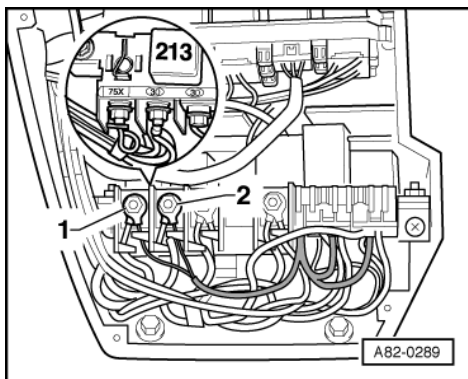
- J162 Heater control unit
 - J218 Combi-processor in dash panel insert
 - N279 Coolant shut-off valve
 - E87 Operating and display unit for air conditioner/Climatronic
 - "7" Relay socket, position "7" in passenger's footwell electronics box
- Incorporation into electronics for vehicles with no pre-fitted components



- Unscrew lid of passenger's footwell electronics box.
- Remove micro central electrics.
- -> Insert the two relay sockets of the electrics kit at the two unused micro central electrics -1- positions.
- Insert relays -J8 and -J541 in sockets.
- Remove relay carrier -2-.

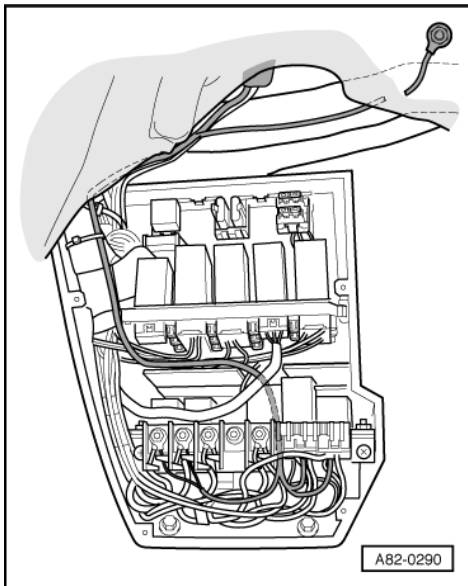


- -> Route wiring harnesses of fuse elements -1- of electrics kit to relay and fuse box and clip into unused holder.
- Install relay carrier -3-.
- Install micro central electrics -2-.



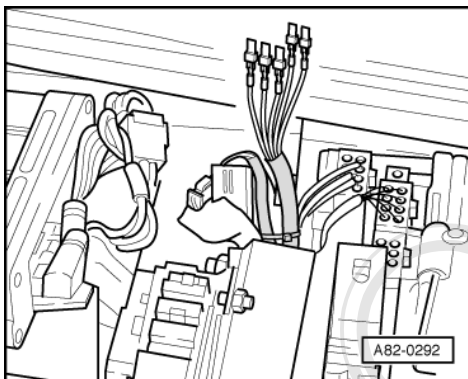


- -> Connect black wire -1- to terminal 75x of micro central electrics.
- Connect red wire -2- to terminal 30 of micro central electrics.

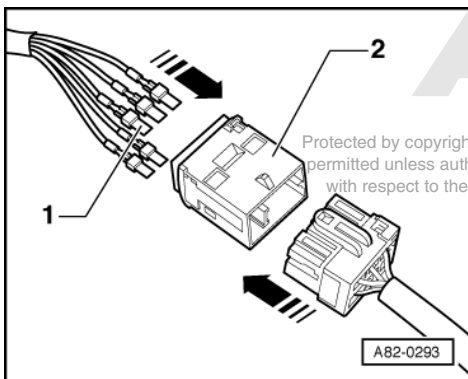


- Route wiring harness to side out of passenger's electronics box and upwards to plenum chamber electronics box.
- Attach harness to existing wiring.
- -> Connect earth wire to earth point next to cable penetration to plenum chamber electronics box.

Connection in plenum chamber electronics box



- -> Bind contacts of main wiring harness together with insulating tape, attach to wire feeder and pull through to plenum chamber electronics box.

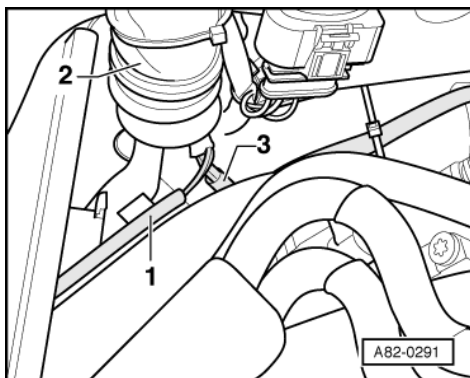


- -> Insert contacts -1- into contacts of black connector housing -2-.

Contact 1 =	Yellow
Contact 2 =	Red/green
Contact 3 =	Black/blue
Contact 4 =	Red/white
Contact 5 =	Brown
Contact 6 =	Not used

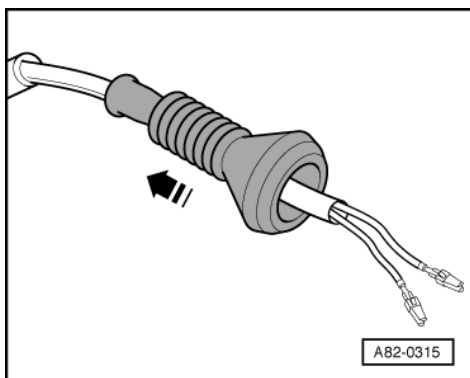
- Connect wiring harness to engine compartment.

Routing wiring harness in engine compartment



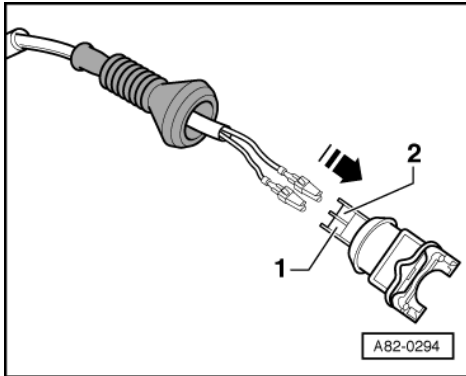
- -> Route wiring harnesses -1- and -3- through existing grommet -2- at electronics box into engine compartment.
- Route red/white, brown and blue/black wiring harnesses along existing engine bulkhead wiring harness to front left wheel housing.
- Route red/green and yellow wires along existing wiring harness to front right wheel housing.

Connecting coolant shut-off valve -N279

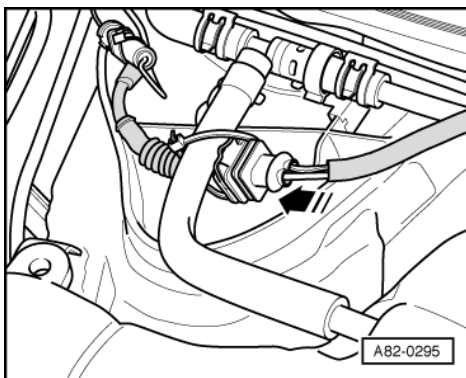


- -> Attach rubber grommet to red/white and brown wiring harness.
- Strip wires and crimp on contacts.

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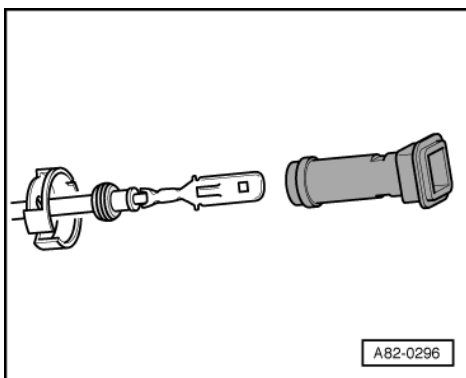


- Fully engage contact in mating contact.
- -> Insert brown wire in contact -1-.
- Insert red/white wire in contact -2-.

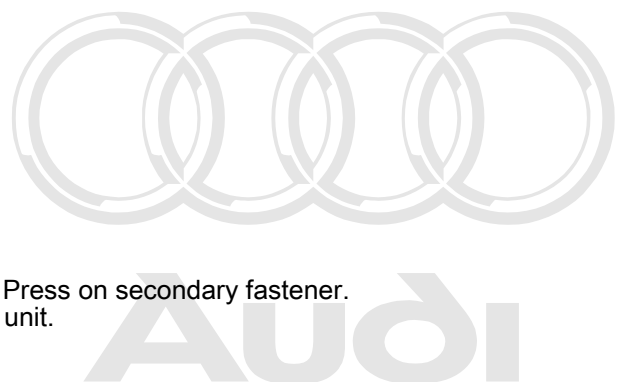


- -> Insert wiring harness to coolant shut-off valve.
- Route wiring harness over spring strut dome along side panel to coolant shut-off valve -N279.
- Attach connector to coolant shut-off valve -N279.

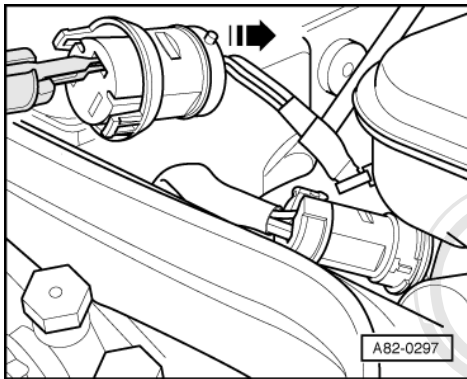
Connection to pump/valve unit



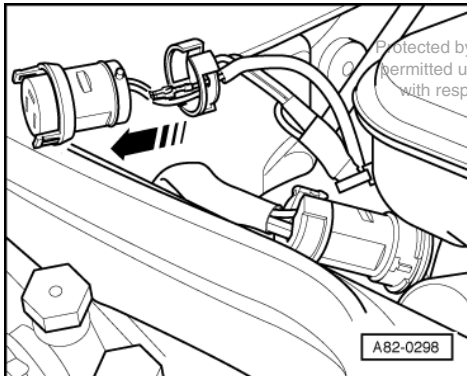
- Attach sealing end to wire.
- Strip wire and crimp on contact.
- -> Fully engage contact in connector contact.
- Use fitting tool to insert sealing end in connector housing. Press on secondary fastener.
- Attach connector and route black/blue wire to pump/valve unit.



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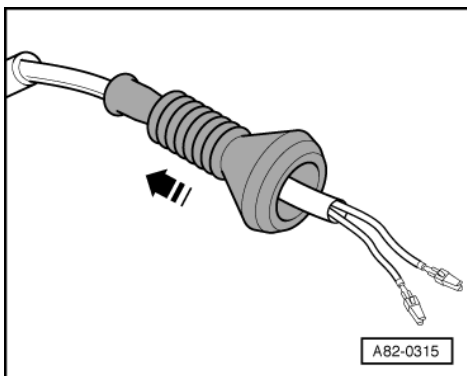


- Unplug connector at pump/valve unit.
- Use small screwdriver to prise off secondary fastener.
- -> Use appropriate tool to release red/yellow wire (previously power supply from terminal 30) from connector housing.
- Insulate wire and bind back at wiring harness.

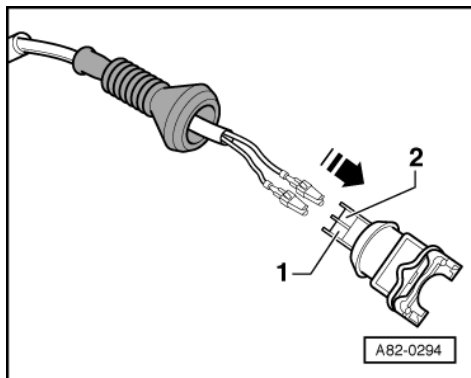


- Attach sealing end to black/blue wire, strip wire and crimp on contact.
- -> Insert black/blue wire in unused contact.
- Use fitting tool to insert sealing end in connector housing. Press on secondary fastener.
- Connect wiring harnesses.

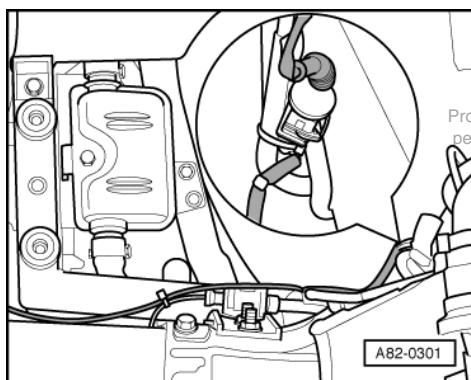
Connecting auxiliary heater



- -> Attach rubber grommet to red/green and yellow wiring harness.
- Strip wires and crimp on contacts.



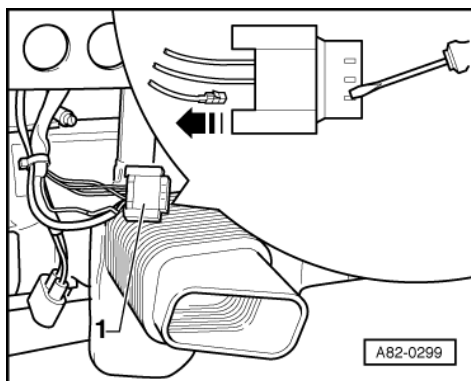
- Fully engage contacts in mating contacts.
- -> Insert yellow wire in contact -1-.
- Insert red/green wire in contact -2-.



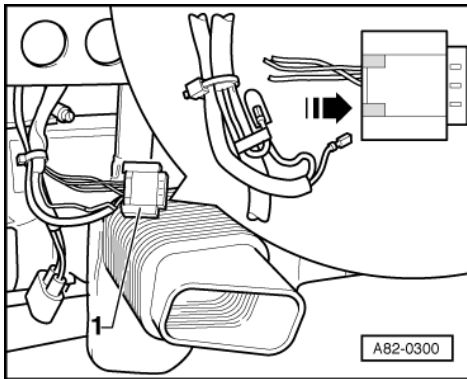
- Connect auxiliary heater wiring harness.
- -> Route wiring harness to auxiliary heater.

Attention:

When laying wiring harness, ensure adequate clearance with respect to auxiliary heater exhaust system. Danger of fire.



- Unplug connector -1- from auxiliary heater control unit.
- -> Release black wire from corresponding contact in connector housing.
- Remove contact at black wire.
- Strip wiring harness.



- -> Twist yellow and black wires together and connect with ferrule.
- Insulate wire with protective cap and bind back at wiring harness.
- Insert red/green wire in unused contact.
- Attach connector -1- to auxiliary heater control unit.

19.9 - Bleeding coolant circuit

- Bleed engine coolant circuit in specified manner =>Page 149 and
=> Relevant Engine, Mechanics Workshop Manual; Repair Group 19; Cooling Cooling

- Once engine has reached operating temperature:
 - Switch on auxiliary heater.
 - Set air conditioner to maximum heat output (temperature preselection "Hi").

Notes:

- ♦ It is sufficient for the auxiliary heater recirculating pump to run (auxiliary heater switches to "control interval" operating status on account of coolant temperature).
- Top up coolant if necessary.

19.10 - Concluding operations

- Check strain-free routing and proper attachment of coolant hoses.
- Check proper attachment of wiring harnesses (cable ties).
- Re-install all components removed under "Preparation for fitting".
- Check operation of auxiliary heater and "small coolant circuit".
- Check operation of pump/valve unit and air conditioner temperature regulation.
- Check encoding of auxiliary heater for vehicles with pre-fitted components. Control unit can be encoded as of software version "D50".