

A/C system, On Board Diagnostic (OBD)

Function

The A/C control head -E87- receives input information from various electrical and electronic components (sensors).

This information is processed by the control head in accordance with specified values and then provides corresponding output signals that control electrical components (actuators).

The control head is controlled by an internal microprocessor with On Board Diagnostic (OBD) capability. If faults or open circuits occur on applicable components, Diagnostic Trouble Codes (DTC) are stored in DTC memory. Stored faults are identified using either VAG1551 Scan Tool (ST) or VAG1552 Scan Tool (ST). Tables containing all DTCs and corresponding repair information guide technicians through the OBD process.

Notes:

- ◆ *This Repair Manual describes On Board Diagnostic (OBD) with VAG1551 Scan Tool (ST). OBD procedures can also be performed with VAG1552 Scan Tool (ST) (VAG1552 Scan Tool is not equipped with a printer).*
- ◆ *Scan Tool VAG1551 or 1552 must be used in in operating mode -1- (Rapid data transfer).*
- ◆ *Operating mode -2- (Flash code output) is not provided for A/C and Heating OBD.*
- ◆ *Always check DTC memory and perform necessary repairs before erasing DTC memory.*
- ◆ *DTC output is possible only if ignition is on or engine is running and engine speed is less than 3000 rpm (if engine speed is higher, output is possible only for a limited time or is terminated).*
- ◆ *If a fault exists for a certain time it is stored as a static fault.*
- ◆ *If a static fault is no longer present after a certain time, it is stored as a sporadic fault and the reference "SP" appears on the upper right of the VAG1551 display/print-out.*

- ◆ *Before replacing a suspected malfunctioning component, check all related wiring, connections, harness connectors and Ground (GND) connections according to the appropriate wiring diagram.*
- ◆ *Output Diagnostic Test Mode (DTM), Basic Setting, A/C control head identification and coding functions are also possible.*

Notes:

- ◆ *A/C system component locations: engine compartment ⇒ [page 87-96](#) .*
- ◆ *A/C system component locations: passenger compartment ⇒ [page 87-106](#) .*
- ◆ *If a the display of a newly installed A/C control head -E87- flashes after switching the ignition on (for approximately 2 minutes), code the control head ⇒ [page 01-57](#) and execute basic setting ⇒ [page 01-52](#) .*
- ◆ *If a replacement control head is not coded after installation or if an unrecognized code was entered, code "00042" (4-cyl. gasoline engine USA) is stored.*
- ◆ *Control of A/C compressor, flap motors and fan motors etc. is not possible when executing Output Diagnostic Test Mode (DTM), function 03 and basic setting, function 04. A/C control is possible in all other functions.*

Heating and A/C system changes, 1997



On Board Diagnostic changes

- ◆ New A/C control head -E87- with specific coding for m.y. 1997, 4-cyl. and 6-cyl. engines.

Notes:

- ◆ *Before performing On Board Diagnostic of A/C system, ensure A/C control head -E87- is coded correctly (according to engine application).*
- ◆ *A/C control heads beginning with Part No. 8L0 820 043 should only be installed in m.y. 1997 vehicles.*
- ◆ *A/C control heads beginning with Part No. 8D0 820 043 must only be installed in vehicles through m.y. 1996.*

CAUTION!

- ◆ *Part numbers are for reference only.*
- ◆ *Always check with your Parts Dept. for the latest information.*

Notes:

- ◆ *For m.y. 1997, changes that affect monitoring of the A/C system by A/C control head -E87- were made.*
- ◆ *Monitored components, locations ⇒ [pages 87-101](#) and ⇒ [Page 87-113](#) .*
- ◆ *Additional technical data and notes ⇒ [page 01-1](#) .*
- ◆ *If a replacement A/C control head is not coded after installation or if an unrecognized code was entered, code "04142" (Audi A4 -4cyl. -USA) is stored.*
- ◆ *The A/C control head is no longer connected to terminal 30 (vehicle electronics). The last input setting (into the A/C control head) is stored when the ignition is switched off and retained when the ignition is switched on.*
- ◆ *The duration of time when ignition is off is calculated by the A/C control head. When ignition is switched on, the previous "standing time" is calculated by monitoring a time signal from the instrument cluster. If more than 4 hours pass since ignition was switched off, the actual measured values of the outside*

temperature sensor are used as instantaneous outside and engine temperature inputs for A/C system control. If "standing time" is shorter than 4 hours, the actual measured values of the outside temperature sensor are suppressed and system output temperature control is calculated by the A/C control head. The "standing time" period is monitored and used for this calculation. (Heat radiating from the engine and radiator leads affects the measured value of the temperature sensor).

The following components previously monitored by OBD and triggered by A/C control head -E87- are deleted:

- ◆ Refrigerant low pressure switch -F73-.
- ◆ Refrigerant high pressure switch -F118- (low and high pressure switch functions integrated into A/C pressure switch, -F29-).
- ◆ Fresh air/recirculating flap two-way valve - N63-.

The following new components are monitored by OBD and provide input signals to -E87-:

- ◆ A/C pressure switch -F129-.
- ◆ Sender for outlet temperature, center -G191-.
- ◆ Sender for outlet temperature, floor outlet - G192-.

The following components monitored by OBD or triggered by -E87- are revised:

- ◆ The heater/air conditioner assembly with all servo motors.

- ◆ The fresh air blower and control module.

Following components that provide input signals to the A/C control head -E87- are revised:

- ◆ Instrument cluster

A/C system changes

- ◆ Revised heating/air conditioner assembly with flap motors ⇒ [page 87-174](#) .
- ◆ The air flow flap motor now activates the fresh air/recirculating air flap as well.
- ◆ The two way valve for the circulating/fresh air door, the vacuum unit and the vacuum reservoir are deleted.

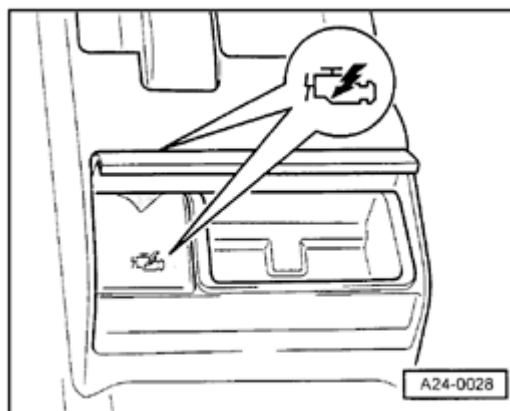
A/C refrigerant circuit changes

- ◆ New service valve connection on low pressure side.
- ◆ Service valve connection for high pressure side installed in high pressure line in plenum panel (deleted at condenser).
- ◆ A/C pressure switch -F129- replaces pressure switches -F73- and -F118-.
- ◆ New version "Zexel" compressor and high pressure line (4-cyl. engines only).

01-8

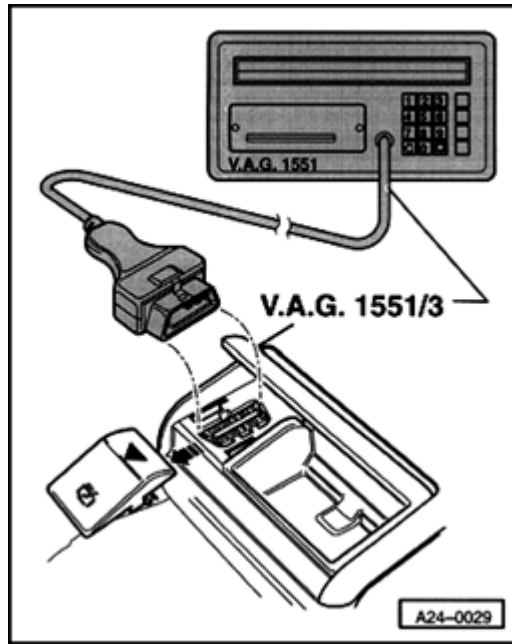
**VAG1551 Scan Tool (ST), connecting;
A/C control head -E87-, checking
version**

- ◆ Battery Voltage OK
- ◆ Fuse 22 (S22) OK
- ◆ Ground (GND) connection on engine and transmission OK

1996 vehicles

- Open rear passenger ashtray in center console and remove cover for Data Link Connector (DLC).

01-9



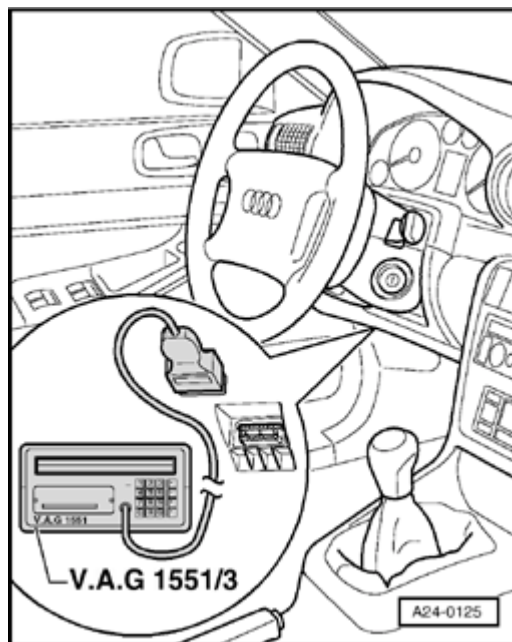
A

- With ignition switched off, connect VAG1551 Scan Tool (ST) to Data Link Connector (DLC) with cable VAG1551/3.

01-10

1997 ➤ vehicles

- With ignition switched off, connect VAG1551 (VAG1552) scan tool to 16-pin Data Link Connector (DLC) under dash to left of steering column, using adapter cable VAG1551/3.

All vehicles**V.A.G - ON BOARD DIAGNOSTIC HELP****1 - Rapid data transfer****2 - Blink code output**

Indicated on display 1)

1) Operating modes 1 and 2 are displayed alternately

- Switch on printer with -PRINT- button (indicator lamp in switch will light up).
- Switch on ignition or start engine.
- Switch A/C compressor on (press "AUTO" button).

01-11

Rapid data transfer

HELP

Enter address word XX

- Press button -1- for operating mode "Rapid data transfer."



Indicated on display

Notes:

If display is blank, check wiring to VAG1551/power supply using Troubleshooting Procedure No. 1 in "Electrical Wiring Diagrams, Troubleshooting and Component Locations" Manual.

- ◆ *Additional operating instructions can be obtained by pressing the HELP button on VAG1551 Scan Tool (ST)*
- ◆ *During testing procedures, the → button advances the program to the next step*
- ◆ *An incorrect entry can be cancelled with the -C- button*

Address word for A/C Heating Electronics: 08

- Press buttons -0- and -8-.



Indicated on display

- Press -Q- button to confirm input.

Rapid data transfer

Q

08 - A/C Heating Electronics

01-12

Rapid data transfer **HELP**
Control module does not answer

If one of the following messages is displayed:

➤ Indicated on display

or

Rapid data transfer **HELP**
K wire not switching to B+

➤ Indicated on display

- Press HELP button to print out list of possible causes.

Rapid data transfer ➡
No signal from control module

➤ - Check wiring to Data Link Connector (DLC) according to wiring diagram ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder.*

Rapid data transfer ➡
Error in communication link

➤ If this display appears at the beginning of or during the OBD program, malfunctions have occurred and data transfer is no longer possible between the VAG1551 Scan Tool (ST) and the A/C control head -E87-.

- Check wiring to DLC.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

Rapid data transfer **Q**
08 - A/C Heating Electronics

➤ - After repairing possible causes of the malfunction, press buttons -0- and -8- to insert "AC/Heating Electronics" address word 08.

- Press -Q- button to confirm input.

Rapid data transfer
Scan Tool sends address word 08

➤ Indicated on display

8D0820043D A4-Klimavollautomat DXX

→ Coding 00062 WSC ZZZZZ



Indicated on display after approx. 5 seconds

- ◆ 8D0 820 043 D: Part Number of A/C control head -E87-
- ◆ A4: A/C Heating Electronics component designation
- ◆ DXX: Software version of A/C control head -E87-
- ◆ Coding: 00062
- ◆ WSC 06812: Dealership code

Readout example shows US/CDN version, Zexel A/C compressor, 6 cylinder gasoline engine

Coding -E87- and code tables ⇒ [page 01-57](#) .

8L0 820 043B A4-A/C fully automatic DXX

Coding XXXXX WSC ZZZZZ



For m.y. 1997 vehicles install only A/C control head -E87- with Part No. 8L0 820 043 up to and including Part No. index letter "C."

8L0 820 043D A4-A/C fully automatic DXX

Coding XXXXX WSC ZZZZZ



For vehicles beginning m.y. 1998 install only A/C control head -E87- with Part No. 8L0 820 043 from Part No. index letter "D."

CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

01-14

Part number	Comments
8D0 820 043 D - G	◆ Regulation is only switched off in On Board Diagnostic (OBD) during output diagnostic test mode and basic setting. ◆ For vehicles with 6 cylinder engines, must only be combined with Zexel compressor.
8D0 820 043 after H	For all vehicles up to m.y. 96.
8L0 820 043 A - C	For all vehicles up to m.y. 97 (lighting via terminal 58 and 58d)
8L0 820 043 after D	For all vehicles up to m.y. 98 without radio navigation system up to VIN 199999 of m.y. 1999 (lighting indirectly activated via terminal 58s).
8D0 820 043 K or L	Version with only one display (for vehicles with radio navigation system up to VIN 199999 of m.y. 1999)
8D0 820 043 after M	Version with only one display (for vehicles as of VIN 200000 of m.y. 1999)

01-15

Notes:

- ◆ *Zexel A/C compressors were installed from start of production. During m.y. 1996, Nippondenso type compressors are installed as a running change. These compressors are not equipped with A/C speed sensor G111.*
- ◆ *The A/C control head is coded to reflect the compressor type installed (Zexel or Nippondenso).*
- ◆ *Vehicles equipped with Nippondenso (Denso) compressors must have A/C control head with Part No. index "H" or higher installed to allow for correct coding.*
- ◆ *Follow coding exactly when replacing an A/C control head -E87-.*

⇒ *Parts catalog microfiche*

- ◆ *A/C control head varies after VIN 200000 of m.y. 1999 for vehicles with and without radio navigation system (or a radio with a large control panel), with and without switch for heated seats (e.g. index "M", "N", "P" or "Q").*

⇒ *Parts catalog microfiche*

- ◆ *Depending on VAG1551 Scan Tool (ST) program card version, 1st and 2nd digit may not be displayed (readout: e.g. 040 instead of 00040).*
- ◆ *Software version of control head is of no significance for service department.*
- ◆ *If a replacement control head is not coded after installation or if an unrecognized code was entered, code "00042" (4-cyl. gasoline engine USA) is stored.*

01-16

Safety precautions

If special testing equipment is required during road test, note the following:

WARNING!

- ♦ *Special testing equipment must always be secured on the back seat and must be operated from there by a 2nd person.*
- ♦ *If special testing equipment were to be operated from the passenger seat, there could be injuries to the person seated there in the event of an accident and air bag deployment.*

On Board Diagnostic (OBD) functions

A list of On Board Diagnostic functions can be printed out by pressing the HELP button.

The following functions are available:

List of functions	Page
01 - Check Control Module Versions	⇒ Page 01-8
02 - Check DTC Memory	⇒ Page 01-18
03 - Output Diagnostic Test Mode	⇒ Page 01-42
04 - Basic Setting	⇒ Page 01-52
05 - Erase DTC Memory	⇒ Page 01-55
06 - End Output	⇒ Page 01-56
07 - Code Control Module	⇒ Page 01-57
08 - Read Measuring Value Block	⇒ Page 01-63

Only the functions listed above can be used for the "AC/Heating Electronics" OBD program.

- Press → button.

Rapid data transfer

HELP

Select function XX



Indicated on display

Check DTC Memory (function 02)

- Press buttons -0- and -8- to insert "AC/Heating Electronics" address word 08 and advance program until "Select function XX" appears on display ⇒ [page 01-17](#) .

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

Rapid data transfer HELP
Select function XX



Indicated on display (function selection)

- Press buttons -0- and -2- to select "Check DTC Memory" function 02.

Rapid data transfer Q
02 - Check DTC Memory



Indicated on display

- Press -Q- button to confirm input.

Rapid data transfer Q
X DTC recognized



Number of stored DTCs is displayed

- Press → button.

Rapid data transfer Q
No DTC recognized



If "No DTC recognized" is displayed, the program returns to the starting position after → button is pressed ⇒ [page 01-20](#) .

- Press → button.

Notes:



If the printer is switched on, stored DTCs are displayed and printed

out in sequence.

- ◆ *If the printer is switched off, the → button must be pressed in order to display the next DTC.*

If DTC are displayed:

- Refer to DTC table and check and repair as instructed ⇒ [page 01-22](#) .
- Operate A/C system and check DTC memory (function 02) to confirm repair.
- Erase DTC memory (function 05).
- Confirm A/C control head -E87- coding (function 01), and if necessary code -E87- (function 07).
- Perform basic setting (function 04).
- Check DTC memory (function 02), if malfunctions are stored, erase DTC memory (function 05).
- VAG1551 Scan Tool (ST) can be returned to the function mode by pressing the → button.

Rapid data transfer

HELP

Select function XX



Indicated on display (function selection)

- End output (function 06) ⇒ [page 01-56](#) .
- Switch ignition off and disconnect VAG1551 Scan Tool (ST) from Data Link Connector (DLC).

If no DTC are displayed and A/C system complaints exist (e.g. compressor does not run or only occasionally, system control unsatisfactory, speed of fresh air blower cannot be regulated etc.):

- Read measuring value block (function 08).
- Perform Output Diagnostic Test Mode (DTM) (function 03).
- Check A/C system cooling performance ⇒ [page 87-213](#) .
- VAG1551 Scan Tool (ST) can be returned to the function mode by pressing the → button.

Rapid data transfer

HELP

Select function XX



Indicated on display (function selection)

- End output (function 06) ⇒ [page 01-56](#) .
- Switch ignition off and disconnect VAG1551 Scan Tool (ST) from Data Link Connector (DLC).

Notes:

- ◆ 1997 ➤ If A/C control head -E87- is unable to determine the duration of time when ignition is off ("standing time"), DTC 01206 "signal for time span ignition off" is loaded into memory. The A/C control head will then default to a standing time greater than 4 hours. The actual measured values of the outside temperature sensor are then used as instantaneous outside and engine temperature inputs for A/C system control. When the "heating" mode is selected under these conditions, fresh air blower -V2- has a delayed start (even when the actual standing time is less than 4 hours and the engine is warm) ⇒ [page 01-86](#) , Read Measuring Value Block. The outside air temperature display - G106- may also indicate incorrect outside temperature values.
- ◆ If both display fields of the A/C control head do not light with ignition switched on check control head coding ⇒ [Page 01-57](#) .

Diagnostic Trouble Code (DTC) table

Notes:

- ◆ DTC changes affecting m.y. 1997 ➤ vehicles ⇒ [page 01-38](#) .
- ◆ Diagnostic Trouble Codes (DTC) recognized by A/C control head -E87- and displayed on VAG1551 Scan Tool (ST) ⇒ [starting on page 01-24](#) .
- ◆ If malfunctions occur only occasionally or if the DTC memory was not erased after repairs, such DTC are displayed as "sporadic faults." (The contents of DTC memory is retained until erased, "permanent memory").
- ◆ DTCs and flash codes (only for specific components) appear only in the printout in operating mode -1-, (Rapid data transfer).
- ◆ In addition to displayed DTC and affected component descriptions, malfunction cause information is listed in the table below the DTC code.
- ◆ After performing repairs and operating the A/C system, DTC memory must always be checked again to confirm the repair.
- ◆ Before replacing a suspected malfunctioning component, check all appropriate wiring, connections, harness connectors and Ground (GND) connections.
- ◆ When checking for the cause of sporadic faults, check all plug connections and wiring between A/C control head -E87- and any component recognized as being inoperative using wiring diagram.
- ◆
After replacing AC/heating system components, always perform basic setting (function 04), check DTC memory (function

02). After repair, erase DTC memory and end output (functions 05 and 06).

- ◆ *Use VAG1598 Test Box with cables VAG1598/11 and VAG1598/12 when testing DTC related wiring/connections to A/C control head -E87- and always refer to current wiring diagram.*
- ◆ *If A/C control head -E87- continues to operate after ignition is switched off, check wiring to -E87- terminal -D1- for short circuit to positive using wiring diagram.*

Notes

- ◆ *If 22 ° C (72 ° F) is always displayed after switching ignition off and on, regardless of last setting, check power supply (terminal 30) to A/C control head -E87- using wiring diagram.*
- ◆ *If a malfunction is recognized at an air/temperature distribution flap motor potentiometer, air distribution can be altered by pressing buttons on A/C control head -E87-.*
- ◆ *To switch display from ° C (Celsius) to ° F (Fahrenheit)(and vice versa), press "Temperature +" button while holding "recirculating air" button.*
- ◆ *If no DTC are displayed and air conditioning system complaints exist (e.g. compressor does not run or only occasionally, system control unsatisfactory, speed of fresh air blower cannot be regulated etc.), perform function 03 "Output Diagnostic Test Mode (DTM)" and 08 "Read Measuring Value block."*

01-24

VAG1551 scan tool display	Possible cause	Corrective action
00000 No DTC recognized	If "no DTC recognized appears after performing repairs, OBD is ended.	
00529 2122 Speed information missing /SP1)	- Open circuit in wiring between Engine Control Module (ECM), instrument cluster and A/C control head -E87- - ECM and instrument cluster supply an unusable engine speed signal	- Diagnose and repair open circuit in wiring using wiring diagram - Read measuring value block ⇒ page 01-63 - Test engine speed signal ⇒ Repair Manual, Fuel Injection & Ignition, Repair Group 24
00532 2234 Supply voltage Signal too low /SP	- Voltage drops in electrical system to levels of less than 9.5 V2) - Contact resistance in cable connection to A/C Refrigerant Low Pressure Switch -F73-	- Test Generator (GEN) and Voltage Regulator (VR) ⇒ Repair Manual, Engine Mechanical, Repair Group 27 - Diagnose and repair contact resistance using wiring diagram

1) This fault may be generated during Output Diagnostic Test Mode (DTM) (no engine speed signal recognized although A/C compressor speed detected).

2) If voltage at -E87-connector -C3- drops below 9.5 V, compressor switches off for a minimum of 25 seconds. Compressor switches on again when voltage exceeds 10.8 V.

01-25

VAG1551 scan tool display	Possible cause	Corrective action
00600 Temperature Regulator Flap Motor Position Sensor -G92- for Temperature Regulator Flap Motor V681) Short circuit to ground /SP Open circuit/short circuit to positive /SP Adaptation limit exceeded Mechanical malfunction.	- Short circuit, open circuit in wiring or incorrect terminal assignment (wires interchanged) of connectors between -G92- and -E87- - Temperature flap not operating freely - -G92- in -V68- inoperative	- Diagnose and repair short circuit, open circuit in wiring or confirm terminal assignment using wiring diagram - Check for free operation of temperature flap - Replace -V68-
00601 Central Flap Motor Position Sensor G112 in Central Air Flap Motor V70 Short circuit to ground /SP Open circuit/short circuit to positive /SP Adaptation limit exceeded2) Mechanical malfunction	- Short circuit, open circuit in wiring or incorrect terminal assignment (wires interchanged) of connectors between - G112- and -E87- - Central flap not operating freely - -G112- in V70 inoperative	- Diagnose and repair short circuit, open circuit in wiring or confirm terminal assignment using wiring diagram - Check for free operation of central flap3) - Replace -V70-

1) If a fault exists at potentiometer -G92-, flap motor V68 can be set manually by operating "+" or "-" button for temperature selection (display range between 0 °C and 50 °C).

2) This fault only recognized during the basic setting.

3) Both end stops must be reached.

01-26

VAG1551 scan tool display	Possible cause	Corrective action
00602 Footwell/Defrost Flap Motor Position Sensor G114 in Footwell/Defroster Flap Motor V85 Short circuit to ground /SP Open circuit/short circuit to positive /SP Adaptation limit exceeded1) Inoperative	- Short circuit, open circuit in wiring or incorrect terminal assignment (wires interchanged) of connectors between -G114- and -E87- - Footwell/defroster flap not operating freely - -G114- in -V85- inoperative	- Diagnose and repair short circuit, open circuit in wiring or confirm terminal assignment using wiring diagram - Check for free operation of footwell/defroster flap2) - Replace -V85-
00603 Footwell/Defroster Flap Motor V85 Blocks or de-energized /SP	- Short circuit, open circuit in wiring or incorrect terminal assignment (wires interchanged) of connectors between V85 and -E87- - Footwell/defroster flap flap not operating freely - -V85- inoperative	- Diagnose and repair short circuit, open circuit in wiring or confirm terminal assignment using wiring diagram - Check for free operation of footwell/defroster flap - Check -V85- using function 03 (Output DTM) ⇒ page 01-42

1) This fault only recognized during basic setting.

2) Both end stops must be reached.

01-27

VAG1551 scan tool display	Possible cause	Corrective action
00604 Back Pressure Flap Motor Position Sensor G113 in Air Flow Flap Motor V71 Short circuit to ground /SP Open circuit/short circuit to positive /SP Adaptation limit exceeded1) Inoperative	- Short circuit, open circuit in wiring or incorrect terminal assignment (wires interchanged) of connectors between - G113- and -E87- - Air flow flap not operating freely - -G113- in -V71- inoperative	- Diagnose and repair short circuit, open circuit in wiring or confirm terminal assignment using wiring diagram - Check for free operation of air flow flap2) - Replace -V71-
00625 Road speed signal Implausible signal /SP	- Loose terminal in wiring/connections between Speedometer Vehicle Speed Sensor (VSS) G22, the instrument cluster or in another component also connected to this signal (e.g. radio or control module for cruise control) and -E87- - Speedometer -G21- or instrument cluster supplying unusable signal or a component disrupts signal	- Diagnose and repair loose terminal using wiring diagram.

		- Test road speed signal from Speedometer G21 or from instrument cluster (check all components connected to this circuit using wiring diagram)
--	--	--

1) This DTC only recognized during basic setting.

2) Both end stops must be reached.

01-28

VAG1551 scan tool display	Possible cause	Corrective action
00779 3133 Outside Air Temperature Sensor G17 Short circuit to ground /SP Open circuit/short circuit to positive /SP	- Short circuit or open circuit between -G17- and -E87- - -G17- malfunction	- Diagnose and repair short circuit or open circuit in wiring using wiring diagram - -G17- electrical test ⇒ page 01-115
00785 3211 Instrument Panel Interior Temperature Sensor G56 Short circuit to ground /SP Open circuit/short circuit to positive /SP	- Short circuit or open circuit between -G56- and -E87- - -G56- malfunction	- Diagnose and repair short circuit or open circuit using wiring diagram - -G56- electrical test ⇒ page 01-115
00787 3213 Fresh Air Intake Duct Temperature Sensor G89 Short circuit to ground /SP	- Short circuit or open circuit between -G89- and -E87- - -G89- malfunction	- Diagnose and repair short circuit or open circuit in wiring using wiring diagram - -G89- electrical test ⇒ page 01-115

Open circuit/short circuit to positive /SP		
--	--	--

01-29

VAG1551 scan tool display	Possible cause	Corrective action
00797 3241 Sunlight Photo Sensor G107 Open circuit/short circuit to positive /SP Short circuit to ground /SP	- Short circuit or open circuit between -G107- and -E87- - Connections to -G107- interchanged - -G107- malfunction	- Diagnose and repair short circuit or open circuit in wiring using wiring diagram - Confirm connection using wiring diagram - Test G107 using function 08 (Read measuring value block) ⇒ page 01-63 - Replace -G107-
00799 3243 A/C Engine Coolant Temperature (ECT) Sensor G1101) Open circuit/short circuit to positive /SP Short circuit to ground /SP	- Short circuit or open circuit between -G110-1) and -E87- - -G110-1) malfunction	- Diagnose and repair short circuit or open circuit in wiring using wiring diagram - Test -G110-1) using function 08 (Read measuring value block) ⇒ page 01-63

1) Not on USA/CDN models.

01-30

VAG1551 Scan Tool display	Possible cause	Corrective action
00785 3211 Instrument panel interior temperature sensor -G56	◆ Short circuit or open circuit between instrument panel interior temperature sensor -G56- and A/C control head -E87-	- Locate short circuit or open circuit using wiring diagram and repair
	◆ Instrument panel interior temperature sensor -G56- malfunctioning	- Check instrument panel interior temperature sensor -G56- ⇒ electrical testing, page 01-115
	Short circuit to Ground /SP Open/Short circuit to B+ /SP	

Note for DTC 00785:

For the A/C control head -E87-, the instrument panel interior temperature sensor -G56- is installed with only one display in the A/C control head -E87-. instrument panel interior temperature sensor-G56- cannot be checked or replaced individually, if malfunctioning replace A/C control head -E87- completely.

VAG1551 Scan Tool display	Possible cause	Corrective action
00796 6) 3234 Interior temperature sensor fan-V42	◆ Open circuit in power supply to -V42- or in wiring connection between -V42- and -E87-	- Locate and repair open circuit using wiring diagram
	◆ Interior temperature sensor fan -V42- malfunctioning	- Replace A/C control head -E87-
Blocked or no voltage /SP		

6) For an A/C control head -E87- with only one display, the interior temperature sensor fan -V42- is installed in the A/C control head -E87-; if malfunctioning replace complete unit.

01-31

VAG1551 scan tool display	Possible cause	Corrective action
00801 3311 A/C Refrigerant High Pressure Switch F118 Open circuit/short circuit to positive /SP	- Open circuit in wiring/connections between -F118- and -E87- - Malfunction in operation of coolant fan V7 (stage 1) - Condenser or radiator dirty - Malfunction of Coolant Fan V7 (stage 2) by A/C Refrigerant High Pressure Switch F23 - -F23-/-F118-1) malfunction - Refrigerant circuit malfunction	- Diagnose and repair open circuit in wiring using wiring diagram - Test fan operation V7 (stage 1) using function 03 (Output DTM) ⇒ page 01-42 - -V7- electrical test ⇒ page 01-115 - Clean condenser and radiator - Test V7 (stage 2) from -F23- ⇒ page 87-64 - Test F23/F118 ⇒ page 87-64 (switching pressures) - Check refrigerant system pressures ⇒ page 87-192 .

1)F118 and F23 are integrated into the same housing.

Note:

If an open A/C Refrigerant High Pressure Switch -F118- was recognized 30 times during a driving period (e.g. because of a loose contact), the compressor is switched off. Compressor can be switched on again by pressing "compressor on" button or by switching ignition off and on. If this fault occurs over several driving periods, compressor cannot be switched on again until DTC memory is erased.

01-32

VAG1551 Scan Tool Display	Possible cause	Corrective action
01044 Control module incorrectly coded	- Coding of A/C control head -E87- not performed according to specifications. - Wrong code entered.	- Code A/C control head -E87- according to specifications ⇒ page 01-61
01087 Basic setting not performed	- A malfunction occurred during the basic setting function or ignition was switched off and the A/C control head -E87- could not complete the function. - Basic setting was not performed after replacement of the A/C control head -E87-. - Basic setting was performed on a non-coded or incorrectly coded A/C control head -E87-.	- Check coding of A/C control head -E87- ⇒ page 01-61 - Perform basic setting of A/C control head -E87- ⇒ page 01-52 .

Note:

The DTCs "Incorrectly coded control module" and "Basic setting not performed" are only stored by A/C control heads -E87- with one display.

01-33

VAG1551 scan tool display	Possible cause	Corrective action
01270 4121 A/C Clutch N251) Open circuit /SP Continued on next page	- Short circuit or open circuit in wiring between A/C compressor speed sensor -G111-2/3) and -E87- - Open circuit in wiring between A/C Clutch Relay J44 and N25 - Open circuit in voltage supply or in wiring/connections between A/C clutch relay J44 and -E87- - J44 malfunction - N25 malfunction - Malfunction in refrigerant circuit (A/C Compressor Speed Sensor G111 not producing signals or compressor siezed2/3)	- Diagnose and repair short or open circuit in wiring using wiring diagram - -G111- electrical test ⇒ page 01-115 - Diagnose and repair open circuit using wiring diagram - Diagnose and repair open circuit using wiring diagram - Replace -J44- - Repair or replace -N25- ⇒ page 87-85 - Replace -G111- ⇒ page 87-63 - Replace compressor ⇒ page 87-38

1)During m.y. 1996, Nippondenso type A/C compressors were installed as a running change. These compressors are not equipped with A/C speed sensor G111. DTC at A/C Clutch -N25- are only detected only on compressors equipped with A/C Compressor speed sensor G111.

2)Sender G111 produces 4 pulses for each compressor revolution.

3)A/C Clutch is switched on for a few seconds after engine starts.

◆ DTC 01270 continued

VAG1551 scan tool display	Possible cause	Corrective action
01270 4121 A/C Clutch N251) Speed difference too great /SP3) Continued on next page.	- Ribbed belt loose, slipping - A/C control head -E87- not coded correctly - Loose terminal or contact resistance in circuit between -N25- and A/C clutch relay -J44- or in wiring/connections between -G111-2)4) and -E87- - N25 slipping - Incorrect crankshaft vibration damper (diameter) - Malfunction in refrigerant circuit (compressor not operating freely).	- Check belt tension ⇒ Repair Manual, Engine Mechanical, Repair Group 13 Compare speeds of engine and compressor using function 08 (Read measuring value block) ⇒ page 01-63 - Code A/C control head -E87- according to compressor type installed4) "Zexel" or "Nippondenso" ⇒ page 01-57 - Diagnose and repair circuit using wiring diagram and perform electrical tests ⇒ page 01-115 - -G111-, -J44- electrical test ⇒ page 01-115 - Repair or replace -N25- ⇒ page 87-85 - Check for proper vibration damper part number - Check compressor for free operation and replace if necessary ⇒ page 87-38

1/2) Continued from ⇒ [page 01-33](#)

3) If speed difference is 30 % to 60 %, A/C Clutch is switched on again by -E87- for not more than 9 times during a driving period (ignition off). If speed difference is greater than 60 %, A/C Clutch remains off until engine is started again.

4) A/C compressor speed sensor G111 is not installed on Nippondenso compressors. If A/C control head -E87- is not coded correctly according to compressor type, A/C Clutch -N25- will only engage briefly and shut off due to no speed signal input.

01-35

◆ DTC 01270 continued

VAG1551 scan tool display	Possible cause	Corrective action
01270 4121 A/C Clutch N251) Mechanical malfunction /SP2)	- Belt and coupling pulley of -N25- are stuck together - Short circuit to positive in wiring/connections between - N25- and for A/C Clutch relay -J44- - -J44- malfunction - Short circuit to ground in wiring/connections between -E87- and -J44-	- Repair or replace -N25- ⇒ page 87-85 - Diagnose and repair short circuit using wiring diagram - Replace -J44- - Diagnose and repair short circuit using wiring diagram.
01271 4122 Temperature Regulator Flap Motor V68 Blocks or de-energized /SP	- Short circuit, open circuit or incorrect terminal assignment (wires interchanged) of connectors between -V68- and -E87- - Temperature flap sticking - -V68- malfunction	- Diagnose and repair short circuit, open circuit or confirm terminal assignment using wiring diagram - Check for free operation of temperature flap - Test -V68- using function 03 (Output DTM) ⇒ page 01-42

1) Continued from ⇒ [page 01-34](#) .

2) Compressor cannot be switched off (this fault is recognized only during Output Diagnosis Test Mode (DTM)).

01-36

VAG1551 scan tool display	Possible cause	Corrective action
01272 4123 Central Air Flap Motor -V70- Blocks or de-energized /SP	- Short circuit, open circuit in wiring or incorrect terminal assignment (wires interchanged) of connectors between - V70- and -E87- - Central flap sticking - -V70- malfunction	- Diagnose and repair short circuit, open circuit or confirm terminal assignment using wiring diagram - Check for free operation of central flap - Test -V70- using function 03 (Output DTM) ⇒ page 01-42
01273 4124 Fresh air blower V2 Control difference /SP	- Short circuit or open circuit in wiring between V2, control module for fresh air blower J126 and/or -E87- - Open circuit in voltage supply or ground connection to - J126- - -J126- malfunction - -V2- mechanical malfunction.	- Diagnose and repair short circuit or open circuit in wiring using wiring diagram - Diagnose and repair open circuit using wiring diagram - -J126- electrical test ⇒ page 01-115 - Replace -V2-
01274 4131 Air flow flap motor V71	- Short circuit, open circuit in wiring or incorrect terminal assignment (wires interchanged) of connectors between V71 and -E87- - Air flow flap sticking	- Diagnose and repair short circuit, open circuit or confirm terminal assignment using wiring diagram

Blocks or de-energized /SP	- -V71- malfunction.	- Check for free operation of air flow flap - Test -V71- using function 03 (Output DTM) ⇒ page 01-42
----------------------------	----------------------	---

01-37

VAG1551 Scan Tool display	Possible cause	Corrective action
01582 Coolant Temperature Signal Short circuit to Ground /SP Open/Short circuit to B+ /SP Incorrect Signal /SP	◆ Short circuit or open circuit between instrument cluster and A/C control head - E87-	- Locate short circuit or open circuit according to wiring diagram and repair
	◆ Instrument cluster malfunctioning	- Check signal from instrument cluster.

Note:

The DTC "Coolant Temperature Signal" is only recognized by A/C control heads -E87- with one display.

Diagnostic Trouble Code (DTC) table, changes specific to vehicles 1997 ➤

Notes:

The following DTCs are no longer recognized beginning m.y. 1997:

- ◆ 00529 Speed info missing (sensor -G111- deleted).
- ◆ 00799 A/C engine coolant temperature (ECT) sensor -G110- (sensor deleted).
- ◆ 00801 A/C refrigerant high pressure switch -F118- (switch deleted).
- ◆ 01270 A/C clutch -N25- (Sensor -G111- deleted).

The following DTCs are new for 1997, or are current DTCs with additional references to 1997 changes. DTCs and component references include various malfunction causes in the display below the DTC, etc.

VAG1551 scan tool display	Possible cause	Corrective action
00604 Back Pressure Flap Motor Position Sensor -G113- in Air Flow Flap Motor -V71-1) Short circuit to ground /SP Open circuit/short circuit to positive /SP	- Short circuit, open circuit in wiring or incorrect terminal assignment (wires interchanged) of connectors between -G113- and -E87- - Air flow flap not operating freely - -G113- in -V71- inoperative	- Diagnose and repair short circuit, open circuit in wiring or confirm terminal assignment using wiring diagram - Check for free operation of air flow flap3) - Replace -V71-

Adaptation limit exceeded2)		
Inoperative		

- 1) For m.y. 1997, -V71- operates the air flow flap as well as the fresh/recirculated air flap.
- 2) This DTC only recognized during basic setting.
- 3) Both end stops must be reached.

01-39

VAG1551 scan tool display	Possible cause	Corrective action
00792 3224 A/C Pressure Switch -F129- Short circuit to ground /SP	- Open circuit in wiring/connections between -F129- and -E87- - Malfunction in operation of coolant fan -V7- (stage 1) - Condenser or radiator dirty. - Malfunction in operation of coolant fan -V7- (stage 2) by A/C pressure switch -F129- - -F129- malfunction - Excess or low refrigerant system pressure	- Diagnose and repair short or open circuit in wiring using wiring diagram. - Test fan operation -V7- (stage 1) using function 03 (Output DTM) ⇒ page 01-42 - -V7- electrical test ⇒ page 01-115 . - Clean condenser and radiator. - Test -V7- (stage 2) via A/C pressure switch -F129- ⇒ page 87-67). - Test -F129- ⇒ page 87-67 . - Check refrigerant system pressures ⇒ page 87-192 .

Notes:

- ◆ A/C pressure switch -F129- contains 2 switching elements. Via terminals 1 & 2, the compressor is shut off due to low or excess refrigerant system pressure (switch open). Via terminals 3 & 4, the second speed coolant fan is switched on (switch closed).
- ◆ When -F129- terminals 1 & 2 open, excess refrigerant pressure is initially recognized by A/C control head -E87- and a DTC is stored. If the measured outside temperature is between 0° C & 50° C (32° F & 122° F) and -F129- terminals 1 & 2 remain open for longer than 30 seconds, -E87- switches over from excess pressure to low pressure (Low pressure switch function) ⇒ [page 01-86](#) , Read measuring value block (Display group 01 compressor shut-off conditions).

- ◆ *When -F129- is recognized to open 30 times during a driving period (Eg.: intermittent contact), the compressor is switched off. The compressor can be switched on again by pressing the "compressor on" button or by switching ignition off (and on). If this malfunction occurs frequently, the compressor can only be switched on after erasing the DTC memory.*

01-40

VAG1551 scan tool display	Possible cause	Corrective action
01206 Signal for time span ignition off1) implausible signal /SP	- Short or open circuit in wiring/connections between instrument cluster and -E87- - Instrument cluster malfunctioning.	- Diagnose and repair short or open circuit in wiring using wiring diagram. - Check signal from instrument cluster using function 08, Read measuring value block ⇒ page 01-86 .
01274 4131 Air Flow Flap Motor - V71- 2) blocked or no current /SP	- Short or open circuit in wiring/connections between -V71- and -E87-. - Air flap or fresh/recirculated air flap binding/sticking - -V71- malfunctioning.	- Diagnose and repair short or open circuit in wiring using wiring diagram. - Check air flap or fresh/recirculated air flap for ease of movement. - Check -V71- using function 03, Output Diagnostic Test Mode (DTM) ⇒ page 01-42 .

1) If A/C control head -E87- is unable to determine the duration of time when ignition is off ("standing time"), DTC 01206 "signal for time span ignition off" is loaded into memory. The A/C control head will then default to a standing time greater than 4 hours. The actual measured values of the outside temperature sensor are then used as instantaneous outside and engine temperature inputs for A/C system control. When the "heating" mode is selected under these conditions, the fresh air blower -V2- has a delayed start (even when the actual standing time is less than 4 hours and the engine is warm) ⇒ [page 01-86](#) , Read measuring value block. The outside air temperature display -G106- may also indicate incorrect outside temperature values.

2) -V71- operates the air flow flap as well as the fresh/recirculated air flap.

01-41

VAG1551 scan tool display	Possible cause	Corrective action
01296 Sender for Outlet Temperature, Center - G191- Short circuit to ground /SP Open circuit/short circuit to positive /SP	- Short or open circuit in wiring/connections between - G191- and -E87- - Sensor -G191- malfunctioning	- Diagnose and repair short or open circuit in wiring using wiring diagram - -G191- electrical check ⇒ page 01-115
01297 Sender for Outlet Temperature, Floor Outlet -G192- Short circuit to ground /SP Open circuit/short circuit to positive /SP	- Short or open circuit in wiring/connections between - G192- and -E87-. - -G192- malfunctioning	- Diagnose and repair short or open circuit in wiring using wiring diagram. - -G192- electrical check ⇒ page 01-115
65535 A/C control head -E87- Malfunction	- Short or open circuit in wiring/connections between terminal -15- or -31- to -E87-, contact resistance or loose connection - -E87- malfunctioning	- Diagnose and repair short or open circuit in wiring to -E87- using wiring diagram - Replace A/C control head -E87-

Output Diagnostic Test Mode (DTM) (function 03)

Function

Output DTM allows functional checking of A/C control head actuated components (DTM components). Actuators receive output signals generated by the control head via VAG1551 Scan Tool (ST) in sequence. Function is confirmed in accordance with specified responses.

The following components are tested in sequence using Output DTM:

- 1 - A/C Clutch -N25-
- 2 - Fresh Air Blower -V2-
- 3 - Coolant Fan -V7-
- 4 - Fresh Air/Recirculating Flap Two-Way Valve
-N63-1)
- 5 - Temperature Regulator Flap Motor -V68-
- 6 - Central Air Flap Motor -V70-

7 - Footwell/Defroster Flap Motor -V85-

8 - Air Flow Flap Motor -V71-

9 - Interior Temperature Sensor Fan -V42-

10 - A/C control head display segment test

11 - Outside Air Temperature Display -G106-
test

¹⁾ Not installed on m.y. 1997 vehicles.

Notes:

- ◆ *During Output DTM on vehicles with Control Head (E87) Part Number 8D0 820 043 D, A/C Compressor Clutch (N25) DTC "01270, mechanical malfunction SP" may be stored even though no malfunction is present. Corrective action: When output DTM is complete, check DTC memory. If above DTC is present, erase DTC memory.*
- ◆ *When starting Output DTM, temperature and air distribution flap flap motors move to pre-determined positions in preparation for individual tests: Temperature Regulator Flap Motor V68: moves to "heat" position. Central Air Flap Motor - V70- moves to "floor & defroster outlet" position. Footwell Defroster Flap Motor V85 moves to "defrost" position.*
- ◆ *Output DTM can be repeated several times, if necessary.*
- ◆ *During Output DTM, vehicle must not be moved and engine speed must be less than 3000 rpm.*
- ◆ *During Output DTM, A/C system control is switched off and all segments in both A/C control head displays are actuated.*
- ◆ *Interior temperature sensor fan -V42- is activated via an A/C control head:*
with one display after activation of the coolant fan.
with two displays after activation of air flow flap motor.
- ◆ *Outside air temperature display -G106- is activated via an A/C control head*
with one display after activation of air flow flap motor.
with two displays after activation of idle regulation.

- ◆ *For the A/C control head -E87-, the instrument panel interior temperature sensor -G56- is installed with only one display in the -E87-. -V42- and -G56- are not individually replaceable. If -E87- is malfunctioning, they must be replaced together.*
- ◆ *A/C control heads with one display indicate that output diagnostic test mode is completed after activation of the last component ("END" is indicated on the Scan Tool display).*

Starting output Diagnostic Test Mode (DTM)

- Start engine, switch on compressor (press "Auto" button), adjust air flow to center instrument panel outlets only.
- Connect Scan Tool VAG1551 or 1552 in operating mode -1-, enter address word 08 "A/C Heating Electronics" and move forward in program until "select function XX" appears in the display.
- Switch on printer by pressing the PRINT button (indicator lamp in button comes on).
- Check DTC memory ⇒ [page 01-18](#) .
- Note any stored DTCs for reference and move forward in program until "select function XX" appears in the display.

Rapid data transfer **HELP**
Select function XX



Indicated on display (function selection)

- Press buttons -0- and -3-.

Rapid data transfer **Q**
03 - Output Diagnostic Test Mode



Indicated on display

- Press -Q- button to confirm input.

Output Diagnostic Test Mode

A/C Clutch - N25



Indicated on display

- Advance through all DTM component checks using → button.
- Refer to output DTM table ⇒ [page 01-46](#) to confirm function of DTM components and test results.

Notes:

- ◆ *If a DTM component fails to respond as specified, perform all corrective actions, checks and tests recommended in output DTM table ⇒ [page 01-46](#) .*
- ◆ *A/C system component locations: engine compartment ⇒ [page 87-96](#) (note specific model year information).*
- ◆ *A/C system component locations: passenger compartment ⇒ [page 87-106](#) (note specific model year information).*
- ◆ *Output DTM can be ended by pressing the -C-button.*
- ◆ *After ending output DTM, check DTC memory ⇒ [page 01-18](#) .*
- ◆ *If the readout "function unknown or cannot be carried out at the moment" appears in the display at the start of output DTM, e.g. when engine not running, press → button and once again select "function 03 Output Diagnosis Test Mode (DTM)" (DTM component "A/C Clutch N25" is no longer actuated for this test).*

- ◆ *If the readout "function unknown or cannot be carried out at the moment" appears in the display ⇒ [page 01-63](#) , Read measuring value block (display group 1).*

Function is unknown or cannot
be carried out at the moment!



Indicated on display

- If this readout appears in the display, output Diagnostic Test Mode (DTM) is ended.
- VAG1551 Scan Tool (ST) can be returned to the function mode by pressing the → button.

Output Diagnostic Test Mode (DTM) table

VAG1551 scan tool display	Specified function	Corrective action
A/C Clutch N25 Notes:	- N25 clicks every 2-seconds - Output of A/C control head -E87- is switched from 0 V to 12 V every 2-seconds2)	- Test voltage supply for - N25- (via A/C Clutch Relay J44) using wiring diagram - Repair or replace -N25- ⇒ page 87-90 - Test circuit and connectors between A/C control head -E87-, J44 and -N25- using wiring diagram - Replace -E87-
◆ "A/C compressor on" output to Engine Control Module (ECM) and -E87- terminal -C12- is also actuated at the same time1)	◆ Output of -E87- switched from 0 V to 12 V every 2 seconds can be confirmed by switching compressor on and off using the "ECON" button while reading the measured value block of engine control module ⇒ Repair Manual, Fuel Injection and Ignition System, Repair Group 01)	

1) Test this "A/C compressor on" signal only if complaints exist. ECM uses signal to compensate for engine load when compressor engages ⇒ Repair Manual, "Fuel Injection & Ignition," Repair Group 24 .

ECM is capable of switching off the A/C compressor from this signal. Confirm via function 08, Read measuring value block, page ⇒ [Page 01-63](#) , display group 01 and Fuel Injection and Ignition System Repair Manual, Repair group 01: Read measured value block of ECM with engine running and at same time switch compressor on and off.

*2)A/C Clutch -N25- cannot be actuated during Output DTM when certain compressor cut-off conditions exist, ⇒ [page 01-63](#) ,
Read measuring value block.*

11/21/2002

		- Check vacuum unit for -N63- - Replace N63
--	--	---

1)Coolant fan 2nd stage is controlled by Second Speed Coolant Fan Control (FC) Relay J101:

When Coolant Fan Control (FC) Thermal Switch F54 closes and when A/C Refrigerant High Pressure Switch F23 closes

2)-N63- deleted for m.y. 1997

11/21/2002

01-49

VAG1551 scan tool display	Specified function	Corrective action
Footwell/Defroster Flap Motor V85 Note: ♦ Wait until footwell/defroster flap is at "defrost" stop before pressing → button.	- V85 moves from stop to stop (fresh air blower running, air flow switches from footwell to defrost)	- Test wiring/connections between V85 and -E87- for open circuit or wrong connection using wiring diagram - Check for free operation of footwell/defroster flap - V85 electrical test ⇒ page 01-115 - Replace -E87-
Air Flow Flap Motor V71 1)	- V71 moves from stop to stop (fresh air blower running, air flow changes)	- Test wiring/connections between V71 and -E87- for open circuit or wrong connection using wiring diagram - Check for free operation of air flow flap - V71 electrical test ⇒ page 01-115 - Replace -E87-

1) For m.y. 1997, -V71- operates the air flow flap as well as the fresh/recirculated air flap.

01-50

VAG1551 scan tool display	Specified function	Corrective action
Interior Temperature Sensor Fan V42	- V42 (for temperature sensor in instrument panel) is switched on and off every 5 seconds ¹⁾	- Test wiring/connections between V42 and -E87- for open circuit or short circuit to ground using wiring diagram - Test voltage supply for V42 using wiring diagram - Check intake slot and intake hose for restriction ⇒ page 87-145 - Replace -E87-

1) Confirm operation by blowing smoke over intake slot on center of instrument panel.

01-51

VAG1551 scan tool display	Specified function	Corrective action
Segment test	- All segments of A/C control head - E87- are switched on and off every 3 seconds	- Replace bulbs ⇒ page 87-126 - Replace -E87-
Outside Air Temperature Display G106 in Auto Check System1)	- Temperature display in Auto Check System1) begins counting up at 3 second intervals	- Test wiring/connections between -E87- and G106 for open circuit or short circuit using wiring diagram - Test positive and ground connections to G106 for open circuit using wiring diagram - Test Auto Check System1) - Replace -E87-

1) If equipped.

Basic setting (function 04)

- Connect Scan Tool VAG1551 or 1552, enter address word 08 "A/C Heating Electronics" and move forward in program until "select function XX" appears in the display.
- Switch on printer by pressing the PRINT button (indicator lamp in the button comes on).
- Check DTC memory (⇒ [page 01-18](#)) and repair all malfunctions which are displayed.
- Erase DTC memory ⇒ [page 01-55](#) .
- Check coding (⇒ [page 01-57](#)) and re-code if necessary.

Rapid data transfer HELP
Select function XX



Indicated on display (function selection)

- Press buttons -0- and -4-.

Rapid data transfer Q
04 - Basic Setting



Indicated on display

- Press -Q- button to confirm input.

Start basic setting HELP
Input display number XXX



Indicated on display

- Press buttons -0- and -1-.

- Press -Q- button to confirm input.

Note:

The following flap motors are actuated in sequence and end positions are stored in A/C control head -E87-:

◆ *Temperature Regulator Flap Motor -V68-*

◆ *Central Flap Motor -V70-*

◆ *Footwell/Defroster Flap Motor -V85-*

◆ *Air Flow Flap Motor -V71-*

End positions are determined from resistance values of potentiometers installed in the air/temperature flap flap motors.

Basic setting 1
XXX XXX XXX XXX



Indicated on display

Basic setting 1
0 0 0 0



Indicated on display

When all display fields indicate "0", basic setting is ended.

- Press → button.

Notes:

- ◆ *For m.y. 1996, because A/C engine coolant temperature sensor G110 is not installed on USA/CDN models, during basic setting, DTC "00799 engine coolant temperature sensor G110" is stored and must be erased.*
- ◆ *For m.y. 1997 A/C engine coolant temperature (ECT) sensor -G110- is deleted, and will no longer load a DTC when checking DTC memory after ending basic setting.*
- Check DTC memory ⇒ [page 01-18](#) .
- Erase DTC memory (function 05) and end output (function 06) ⇒ [page 01-55](#) .

Erase DTC Memory (function 05)

Requirements

- DTC Memory checked

Erasing DTC memory

- Press → button.

◀ Indicated on display

- Press buttons -0- and -5-.

◀ Indicated on display

- Press -Q- button to confirm input.

◀ Indicated on display

- Press → button.

◀ Indicated on display

Notes:

- ◆ *If display appears as shown, check DTC memory and follow test procedures carefully ⇒ [page 01-18](#) .*
- ◆ *If ignition was switched off between "Check DTC Memory" and "Erase DTC memory," the memory is not erased. Check DTC memory once*

Rapid data transfer HELP
Select function XX

Rapid data transfer Q
05 - Erase DTC Memory

Rapid data transfer Q
DTC Memory is erased!

Attention!
DTC Memory is not interrogated

again.

End output (function 06)

Requirements:

- DTC Memory checked
- Malfunctions repaired
- Basic setting performed
- DTC memory erased
- A/C control head coding confirmed

Ending output

- Press → button.



Indicated on display

- Press buttons -0- and -6-.



Indicated on display

- Press -Q- button to confirm input.



Indicated on display

Rapid data transfer HELP
Select function XX

Rapid data transfer Q
06 - End Output

Rapid data transfer HELP

Enter address word XX

- Switch ignition off and disconnect VAG1551 Scan Tool (ST) from Data Link Connector (DLC).

Code Control Module (function 07)

A/C control head -E87- coding, vehicles 1996

Notes:

- ◆ A/C control head coding 1997 ⇒ [page 01-59](#).
- ◆ A/C control head coding 1998 ⇒ [page 01-61](#).

A/C control head -E87- coding shows market application, compressor type and engine type.

Notes:

- ◆ Zexel A/C compressors are installed from start of production. During m.y. 1996, Nippondenso type compressors are installed as a running change. These compressors are not equipped with A/C speed sensor G111.
- ◆ Each time A/C control head -E87- is coded, basic setting must be performed ⇒ [page 01-52](#).
- ◆ If a the display of a newly installed A/C control head -E87- flashes after switching ignition on (for approximately 2 minutes), code the control

head and execute basic setting.

- Connect Scan Tool VAG1551 or 1552 in operating mode -1-, enter address word 08 "A/C Heating Electronics" and move forward in program until "select function XX" appears in the display.
- Switch on printer by pressing the PRINT button (indicator lamp in button comes on).

01-58

Rapid data transfer **HELP**
Select function XX



Indicated on display

- Press buttons -0- and -7-.

Rapid data transfer **Q**
07 - Code Control Module



Indicated on display

- Press -Q- button to confirm input.

Code Control Module
Enter code number XXXXX



Indicated on display

- Press → button.

Coding m.y. 1996:

Code	Market	Compressor	Engine
00062	USA/CDN	Zexel	6-cylinder gasoline
00162	USA/CDN	Nippondenso	6-cylinder gasoline

Note:

Coding example, m.y. 1996: 0 0 1 6 2

0 = open

0 = open

1 = compressor w/o Compressor Speed Sensor -G111-

(0 = compressor with -G111-)

6 = 6-cyl. engine

2 = gasoline engine USA/CDN

A/C control head -E87- coding, vehicles 1997**Note:**

A/C control head coding 1996 ⇒ [page 01-57](#) .

Code	Market	Compressor	Engine
04142	USA/CDN	Zexel	4-cylinder gasoline
04162	USA/CDN	Nippondenso	6-cylinder gasoline

Note:

Coding example, m.y. 1997: 0 4 1 4 2

0 = open

4 = Audi A4

1 = compressor w/o compressor speed sensor - G111-

4 = 4-cyl. engine

(6 = 6-cyl. engine)

2 = gasoline engine USA/CDN

Notes:

- ◆ *A/C control heads beginning with Part No. 8L0 820 043 should only be installed in m.y. 1997 vehicles.*
- ◆ *If a replacement A/C control head -E87- is not coded after installation or if an unrecognized code was entered, code "04142" (Audi A4 4-cyl. - USA) is stored.*

CAUTION!

- ♦ *Part numbers are for reference only.*
- ♦ *Always check with your Parts Dept. for the latest information.*

Coding example:

- Enter code "00062" by pressing applicable buttons on key pad of VAG1551.

Code Control Module
Enter code number 00062



Indicated on display

- Press -Q- button to confirm input.
- Perform basic setting ⇒ [page 01-52](#) .

Notes:

- ♦ *Nippondenso A/C compressors must have A/C control head Part No. index "H" installed to allow coding "00162."*
- ♦ *If an unrecognized code is entered in a control head, it is suppressed and coding "00042" (4-cyl. gasoline engine USA) is then stored.*
- ♦ *When replacing an A/C control head, always refer to the most recent parts information.*

01-61

Part number	Comments
8L0 820 043 after D	For all vehicles up to m.y. 98 without radio navigation system up to VIN 199999 of m.y. 1999 (lighting indirectly activated via terminal 58s).
8D0 820 043 K or L	Version with only one display (for vehicles with radio navigation system up to VIN 199999 of m.y. 1999)
8D0 820 043 after M	Version with only one display (for vehicles as of VIN 200000 of m.y. 1999)

A/C control head -E87- (with one display), coding table vehicles 1998 ➤

Notes:

- ◆ A/C control head coding 1996 ⇒ [page 01-57](#).
- ◆ The following coding table is only valid for A/C control heads with part number 8D0 820 043 after index "K." Additional coding tables and coding A/C control head -E87- ⇒ [page 01-57](#).

A/C control heads -E87- with the part number 8D0 820 043 after index "K" have only one

display, they are installed in the following vehicles:

- ◆ *in vehicles with radio navigation system
(implemented gradually in m.y. 1998)*
- ◆ *in vehicles with radio navigation system after
VIN 200000 of m.y. 1999*

01-62

Code		Meaning
00		Place holder, unallocated
	1	USA
	4	4 cylinder engine
	6	6 cylinder engine
	0	Left Hand Drive gas engine

Coding example

00140	USA 4 cyl. Left Hand Drive gas engine
00160	USA 6 cyl. Left Hand Drive gas engine

Read Measuring Value Block (function 08)

Notes:

- ◆ *10 measuring value blocks each containing 4 measured values are available.*

When performing read measuring value block, function 08:

- ◆ *Control of A/C system is possible (compressor runs, air distribution control is possible etc.)*

01-115

A/C system, electrical testing

Notes:

- ◆ Vehicles 1997 ➤ ⇒ [page 01-135](#) .
- ◆ VAG1598 test box must not be connected to - E87- when performing On Board Diagnostic with VAG1551 Scan Tool (ST)

Test equipment required

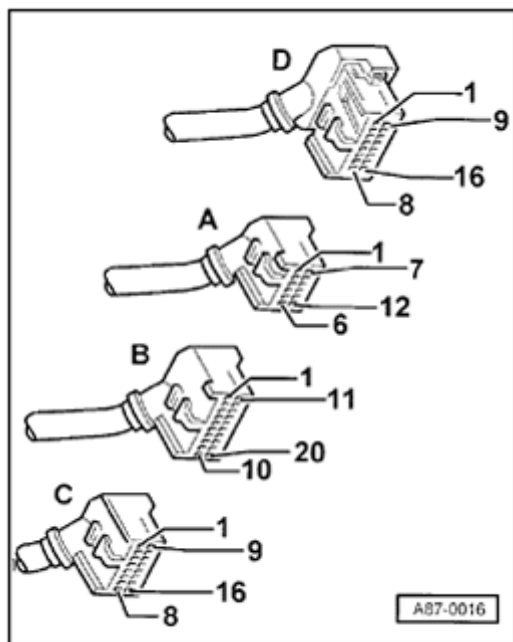
- ◆ VAG1598 test box with adapter cables VAG1598/11, VAG1598/12 and VAG1594 adapter set
- ◆ Fluke 83 multimeter (US 1119) or equivalent
- ◆ US 1115 LED tester
- ◆ Thermometer

Requirements

- Battery Positive Voltage (B+) OK
- Ground (GND) connections on engine and transmission OK
- Fuse No. 42 (S42), 51 (S51), 225 (S225) and 15 (S15) OK

CAUTION!

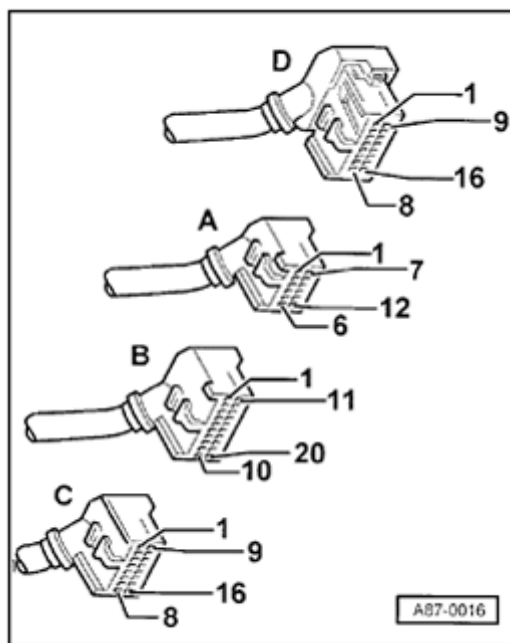
Switch multimeter to the appropriate measuring range before



connecting the test leads to avoid damaging electronic components.

VAG1598 test box, connecting

- Switch off ignition.
- Remove A/C control head -E87- and disconnect all connectors, -A-, -B-, -C- and -D- ⇒ [page 87-120](#) .



- Connect VAG1598/11 and 12 adapter cables to corresponding connectors of the vehicle wiring harness (to -E87-).
- Connect VAG1598 test box to the respective adapter cable for performing measurements.

Notes:

- ◆ Do not connect -E87-.
- ◆ When using VAG1598/12 adapter cable, the terminal assignment of the sockets is identical with the terminal assignment of -E87-.
- ◆ When using VAG1598/11 adapter cable, the terminal assignment of the sockets is not identical to the terminal assignment of -E87- ⇒ [terminal assignment, page 01-117](#) .

Connector terminal assignment of VAG1598 test box with VAG1598/11 adapter cable

Notes:

- ◆ *The terminal assignment of VAG1598/11 adapter cable connectors A and B is not identical to the terminal assignment of sockets on the VAG1598 test box.*
- ◆ *The terminal assignment of VAG1598/11 adapter cable terminal C is identical to the terminal assignment of sockets on the VAG1598 test box.*
- ◆ *The terminal assignment of VAG1598/12 adapter cable terminal D is identical to the terminal assignment of sockets on the VAG1598 test box*
- ◆ *As a result of splitting the connectors to A/C control head -E87- using two adapter cables (VAG1598/11 and 12), no ground connection exists for the test when VAG1598/11 adapter cable is connected. When performing various electrical tests, it is therefore necessary to use an external Ground source (vehicle body etc.) or a second VAG1598 test box (when adapter cable VAG1598/12 is connected, Ground exists at sockets 14 and 15).*

01-118

Connector A -E87-	VAG1598 Socket	E87 Connector B	VAG1598 Socket	E87 Connector C	VAG1598 Socket
1	41	1	21	1	1
2	42	2	22	2	2
3	43	3	23	3	3
4	44	4	24	4	4
5	45	5	25	5	5
6	46	6	26	6	6
7	47	7	27	7	7
8	48	8	28	8	8
9	49	9	29	9	9
10	50	10	30	10	10
11	51	11	31	11	11
12	52	12	32	12	12
		13	33	13	13
		14	34	14	14
		15	35	15	15
		16	36	16	16
		17	37		
		18	38		
		19	39		



Electrical testing, 1996

Note:

Electrical testing, 1997 ➤ ⇒ [page 01-135](#) .

Test number	Component(s) tested:	Page
1	- A/C control head -E87- voltage supply, ground connection and illumination.	⇒ Page 01-120
2	- Temperature sensors G17, G56 and G89	⇒ Page 01-122
3	- Fresh Air Blower V2 and Control module for fresh air blower J126	⇒ Page 01-124
4	- Air/temperature distribution flap motors and related potentiometers V68/-G92-, -V70-/G112, V71/G113 and V85/G114)	⇒ Page 01-126
5	- A/C compressor speed sender G111 - Refrigerant pressure switches -F118- and -F73- - Interior Temperature Sensor Fan V42 - "A/C compressor intervention" output - "Excessive engine temperature" signal	⇒ Page 01-128
6	- A/C Clutch Relay J44 - Actuation for coolant fan stage 1	⇒ Page 01-133

01-120

Test No. 1 (A/C control head -E87- voltage supply, ground connection and illumination)

VAG1598/12 adapter cable Measuring range: Voltage measurement (20 V)					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
1.1	9 + 14	Terminal 75x and ground connection at -E87-	• Ignition on	- approx. battery voltage	- Repair voltage supply or ground connection using wiring diagram.
1.2	9 + 15	Ground connection at -E87-	• Ignition on	- approx. battery voltage	- Repair ground connection using wiring diagram.

VAG1598/11 adapter cable Measuring range: Resistance measurement (200 ohm)					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
1.3	49 + 52	Ground connection at -E87-		- less than 20 W	- Repair ground connection using wiring diagram.

01-121

VAG1598/12 adapter cable Measuring range: Voltage measurement (20 V)					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
1.4	13 and ground	Terminal 30 at E87	Ignition off	- approx. battery voltage	- Repair voltage supply using wiring diagram.
1.5	7 and ground	Terminal 58 at E87	- Ignition on - Parking lights on	- approx. battery voltage	- Repair voltage supply using wiring diagram.
1.6	7 and ground	Terminal 58 at E87	- Ignition on - Parking lights on	- less than 2 V	- Rectify short circuit to positive using wiring diagram.
1.7	45 and ground	Terminal 58D at E87	- Ignition on - Parking lights on	- 0 to 12 V (depends on setting of illumination rheostat)	- Determine and rectify open circuit or short circuit using wiring diagram.
1.8	45 and ground	Terminal 58D at E87	- Ignition on - Parking lights off	- less than 2 V	- Rectify short circuit to positive using wiring diagram.

01-122

Test No. 2 (temperature sensors G17, G56 and G89)

VAG1598/11 adapter cable Measuring range: Resistance measurement (20 kohm)					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
2.1	48 + 52	Outside Air Temperature Sensor G17	Measure temperature at mounting location of sensor	- ⇒ resistance table, page 01-123 (Resistance values depend on measured temperatures at mounting location of sensor(s))	- Determine and rectify short circuit, open circuit in wiring or contact resistance using wiring diagram. - Replace applicable temperature sensor ⇒ page 87-106
2.2	50 + 52	Instrument Panel Interior Temperature Sensor G56	Measure temperature at mounting location of sensor		
2.3	47 + 52	Fresh Air Intake Duct Temperature Sensor G89	Measure temperature at mounting location of sensor		

01-123

Temperature sensor resistances (based on ambient temperature, resistance in k ohm)

Temperature measured at mounting location of sensor	Instrument Panel Interior Temperature Sensor -G56-	Outside Air Temperature Sensor -G17- and Fresh Air Intake Duct Temperature Sensor -G89-
-40 ° C (-40 ° F)	(100)	(34.7)
-30 ° C (-22 ° F)	(52.7)	18.1
-20 ° C (1 ° F)	(28.6)	9.95
-10 ° C (14 ° F)	16.2	5.59
0 ° C (32 ° F)	9.40	3.28
5 ° C (41 ° F)	7.27	2.54
10 ° C (50 ° F)	5.66	1.99
15 ° C (59 ° F)	4.45	1.57
20 ° C (68 ° F)	3.50	1.25
25 ° C (77 ° F)	2.79	1.00
30 ° C (86 ° F)	2.23	0.80
35 ° C (95 ° F)	1.80	0.65
40 ° C (104 ° F)	1.45	0.53
50 ° C (122 ° F)	0.79	0.36
60 ° C (140 ° F)	0.67	0.25

70 ° C (158 ° F)	0.47	-
80 ° C (176 ° F)	0.33	-

01-124

Test No. 3 (Fresh Air Blower V2 and Control module for fresh air blower J126)

VAG1598/11 adapter cable Measuring range: Voltage measurement (20 V)					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
3.1	16 and ground	Control module for fresh air blower J126	Ignition on	- Voltage less than 5 V - Blower does not run.	- Determine and rectify short circuit to positive in wiring/connections between J126 and -E87- using wiring diagram. - Replace J126
3.2	14 and ground	Voltage supply for Fresh Air Blower V2	Ignition on	- approx. battery voltage	- Repair voltage supply using wiring diagram.
3.3	11 and ground	Voltage supply for J126 (via V2)	Ignition on	- approx. battery voltage	

01-125

VAG1598/11 adapter cable LED voltage tester US 1115					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
3.4	13 + 16	Control module for fresh air blower - J126-	Ignition on	- LED in voltage tester comes on - Fresh air blower runs	- Determine and rectify open circuit in wiring/connections between -J126- and -E87-. - Check Fresh Air Blower V2 operates freely. - Replace -J126-.

01-126

Test No. 4 (air/temperature distribution flap motors and related potentiometers)

VAG1598/11 adapter cable Measuring range: Resistance measurement (20 kilo ohm)					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
4.1	52 + 28 29 37 30	Potentiometer (in flap motor) -G92- (-V68-) -G112- (-V70-)) -G113- (-V71-)) -G114- (-V85-))		- greater than 0.1kW and less than 5.7kW (depends on position of flap motor)	- Determine and rectify open circuit in wiring, contact resistance or short circuit using wiring diagram. - Replace applicable flap motor ⇒ page 87-106 .
4.2	8 + 28 29 37 30	Potentiometer (in flap motor) -G92- (-V68-) -G112- (-V70-)) -G113- (-V71-)) -G114- (-V85-))		- greater than 0.1kW and less than 5.7kW (depends on position of flap motor)	

Notes:

- ◆ Potentiometer resistance (Specified values: 3.6 k to 5.7 k between flap motor terminal 3 and 4) can only be measured

directly at the flap motor (parallel circuit).

- ◆ *Potentiometers resistance (between flap motor terminal 3 and 5, plus 4 and 5) depends on the position of the flap motor. Measure only with installed flap motor. The upper specified value is not achieved in test steps 4.1 and 4.2 (to achieve this value, all connectors of the other flap motors would have to be unplugged during the measurement, parallel circuit).*
- ◆ *If -E87- recognizes DTC" potentiometer short circuit to ground or open circuit/short circuit to positive", test all potentiometers.*

01-127

VAG1598/12 adapter cable Measuring range: Resistance measurement (200 ohm)					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
4.3	2 + 10	Temperature Regulator Flap Motor -V68-		20 W to 100 W	- Determine and rectify open circuit in wiring, contact resistance or short circuit using wiring diagram. - Replace applicable flap motor ⇒ page 87-106 .
4.4	4 + 12	Central Flap Motor -V70-		20 W to 100 W	
4.5	5 + 13	Air Flow Flap Motor -V71-		20 W to 100 W	
4.6	3 + 11	Footwell/Defroster Flap Motor -V85-		20 W to 100 W	

01-128

Test No. 5 (A/C Compressor Speed Sensor -G111-, refrigerant pressure switches -F118-, -F73- and Interior Temperature Sensor Fan -V42-)

Note:

Electrical test steps 5.1 to 5.4 do not apply to vehicles equipped with Nippondenso compressors (A/C compressor speed sensor G111 is not installed on Nippondenso compressors).

VAG1598/11 adapter cable Measuring range: Resistance measurement (20 kilo ohm)					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
5.1	5 + 49	A/C Compressor Speed Sender -G111-		- 0.8 kW to 1.5 kW	- Determine and rectify open circuit in wiring, contact resistance or short circuit using wiring diagram. - Replace -G111- ⇒ page 87-63 .
5.2	5 and ground	A/C Compressor Speed Sender -G111-		- greater than 2 kW	- Determine and rectify short circuit using wiring diagram. - Replace -G111- ⇒ page 87-63 .

01-129

VAG1598/11 adapter cable Measuring range: Voltage measurement (20 V)					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
5.3	5 and ground	A/C Compressor Speed Sender -G111-	• Engine running • Compressor not running	- less than 1 V	- Determine and rectify short circuit using wiring diagram.

VAG1598/11 adapter cable Measuring range: Voltage measurement (2 V)					
Note: ⇒ additional test steps before proceeding with this test.					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
5.4	5 and ground	A/C Compressor Speed Sender - G111-	• Engine running • Compressor running - Relay for A/C Clutch removed - Bridge terminals 30 + 87 at relay connector base (A/C Clutch switched on)	- greater than 0.05 V (depends on engine speed)	- Replace -G111- ⇒ page 87-63 .

01-130

VAG1598/11 adapter cable Measuring range: Resistance measurement (200 ohm)					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
5.5	2 + 49	A/C Refrigerant High Pressure Switch -F118-		- less than 20 W	- Determine and rectify open circuit in wiring or contact resistance using wiring diagram.1) - Replace -F118- ⇒ page 87-25 .

1)If code 1 "high-pressure switch -F118 open" is displayed in measuring value block 1 as a compressor cut-off condition: -Test connections to -F118- for loose terminal using wiring diagram. -Test actuation of Coolant Fan V7 stage 1 ⇒ [Output Diagnostic Test Mode, page 01-42](#) . Test actuation of Coolant Fan V7 stage 2 ⇒ [page 01-42](#) . If no fault can be determined, check for refrigerant system malfunction, refrigerant system pressure test ⇒ [page 87-190](#) .

01-131

VAG1598/11 adapter cable Measuring range: Voltage measurement (20 V)					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
5.6	3 + ground	A/C Refrigerant Low Pressure Switch -F73-	Ignition on	- approx. battery voltage	- Determine and rectify open circuit in voltage supply using wiring diagram. -F73- malfunction ⇒ page 87-66 - Refrigerant circuit empty, refrigerant system pressure test ⇒ page 87-190

VAG1598/11 adapter cable Measuring range: Amperage (20 amps (A))					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
5.7	44 + ground	Interior Temperature Sensor Fan -V42-	Ignition on	- less than 1 A - Blower V42 runs	- Determine and rectify open circuit, short circuit to positive/ground in the wiring/connections between V42 and -E87- using wiring diagram.

01-132

VAG1598/11 adapter cable LED voltage tester US 1115					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
5.8	13 + 12	"AC compressor intervention" output	Engine running	- LED in voltage tester does not come on	- Determine and rectify short circuit to ground using wiring diagram. - Rectify cut-off condition for A/C compressor in ECM. - Rectify cut-off condition for A/C compressor in TCM -J217-.
5.9	13 + 51	"Engine temperature too high" signal	Engine running	- LED in voltage tester does not come on	- Determine and rectify short circuit to ground using wiring diagram. - Rectify cut-off condition for A/C compressor in Instrument Cluster.

01-133

Test No. 6 (A/C Clutch Relay J44, actuation of Coolant Fan V7 stage 1)

VAG1598/12 adapter cable Measuring range: Amperage (20 amps (A))					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
6.1	8 + 14	A/C Clutch Relay - J44-	Engine running	- less than 1 A - Compressor engaged and running.	- Determine and rectify open circuit or short circuit to positive in wiring/connections between A/C Clutch - N25-, -J44- and -E87- using wiring diagram. - A/C Refrigerant Low Pressure Switch -F73- open, test ⇒ page 01-131 - Replace -J44-. - Repair or replace A/C Clutch -N25- ⇒ page 87-85 .

01-134

VAG1598/12 adapter cable Measuring range: Amperage (20 amps (A))					
Test step	VAG1598 socket	Test of	Test conditions - additional steps	Specified values	Corrective action
6.2	16 + 14	Control of Coolant Fan control (FC) relay -J26- (for stage 1 operation of Coolant Fan -V7-)	Engine running	- less than 1 A - Fan runs in stage 1.	- Determine and rectify open circuit or short circuit to positive in wiring/connections between -J26- and -E87- using wiring diagram. - Check -V7- ⇒ Repair Group 19

Note:

Testing operation of coolant fan via refrigerant high pressure switch F23 ⇒ [page 87-64](#) .

Electrical testing, 1997 ➤

Note:

Electrical testing, 1996 ⇒ [page 01-119](#).

Notes:

- ◆ VAG1598 test box must not be connected to A/C control head -E87- when performing On Board Diagnostic with VAG1551 Scan Tool (ST)
- ◆ Further notes, test requirements, connecting adapter cables and test equipment ⇒ [page 01-115](#).
- ◆ From m.y. 1997, do not connect VAG1598 test box to -E87- for test steps 1.1 through 5.7. (Test box only to be connected for test steps 5.8, 5.9 and 5.10).

Test number	Component(s) tested:	Page
1	- A/C control head -E87-, voltage supply and ground connection - Signal for time span ignition off	⇒ Page 01-136
2	- Temperature sensors -G17-, G56, -G89- -G191- and -G192-	⇒ Page 01-138
3	- Fresh air blower -V2-, Control module for fresh air blower -J126-	⇒ Page 01-140
4	- Air/temperature distribution flap motors and related potentiometers (-V68-/G92-, -V70-/G112-, -V71-/G113-, -V85-/G114-)	⇒ Page 01-141

5	- A/C pressure switch -F129- - "A/C compressor intervention" output - "Excessive engine temperature" signal - Interior temperature sensor fan -V42-	⇒ Page 01-142
6	- A/C clutch relay -J44-, A/C clutch -N25-, actuation - Coolant fan -V7-, actuation	⇒ Page 01-146

Test No. 1 (A/C control head -E87- voltage supply, ground connection)

Adapter cable VAG1598/12					
Measuring range: Voltage measurement (20 V)					
Test Step	VAG1598 socket	Test of	Test conditions - additional steps	Specified value	Corrective action
1.1	9 + 14	Terminal 15 and ground connection at -E87-	• Ignition on	- approx. battery voltage.	- Repair voltage supply or ground connection using wiring diagram.
1.2	9 + 15	terminal 15 and ground connection at -E87-	• Ignition on	- approx. battery voltage.	- Repair ground connection using wiring diagram.
1.3	⇒ page 01-120				
1.4	Not for 1997. Terminal 30 no longer connected				
1.5 to 1.8	⇒ These test steps are conducted only for vehicles up to and including m.y. 1997 (A/C control head with Part. No. 8D0 820 043 and Part No. 8L0 820 043 up to Part No. index letter "C").				

01-137

Adapter cable VAG1598/11					
LED Voltage tester VAG1527B					
Test Step	VAG1598 socket	Test of	Test conditions - additional work	Specified Value	Corrective action
1.9	term.15 1) + 33	Signal for time span ignition off	Ignition on	- LED lights up	- Diagnose and repair short or open circuit in wiring/connections using wiring diagram.
1.10	term.15 1) + 33	Signal for time span ignition off	Ignition on - Start engine.	- LED lights up - LED flickers briefly (time signal) and then lights up again	- Diagnose and repair short or open circuit in wiring/connections using wiring diagram. - Check signal from instrument cluster.
1) Terminal 15 (ignition) is available at -E87- connector -D-, terminal -9-.					

01-138

Test No. 2 (Temperature Sensors -G17-, -G56-, -G89-, G191-, G192-.)

Adapter cable VAG1598/11					
Measuring range: Resistance measurement (20 KΩ / 200 KΩ)					
Test Step	VAG1598 socket	Test of	Test conditions - additional work	Specified Value	Corrective action
2.1 to 2.3	$\Rightarrow$ page 01-122				
2.4	26 + 49	Sender for outlet temperature, center -G191-.	- Measure temperature at mounting location of sensor.	- Dependant on temperature at mounting location of sensor Confirm using temperature/resistance table $\Rightarrow$ page 01-139	- Diagnose and repair short, open circuit or contact resistance in wiring/connections using wiring diagram. - Replace sensor(s)
2.5	25 + 49	Sender for outlet temperature, floor outlet -G192-.	- Measure temperature at mounting location of sensor.		

01-139

Temperature sensor resistances (based on ambient temperature, resistance in k ohm)

Temperature measured at mounting location of sensor	Sender for outlet temperature, center -G191-	Sender for outlet temperature, floor outlet -G192-
-30 ° C (-22 ° F)	(141)	(52,7)
-20 ° C (1 ° F)	(85)	(28,6)
-10 ° C (14 ° F)	(47)	16,2
0 ° C (32 ° F)	(29)	9,40
5 ° C (41 ° F)	(23,2)	7,27
10 ° C (50 ° F)	18,6	5.66
15 ° C (59 ° F)	15	4,45
20 ° C (68 ° F)	12,2	3,50
25 ° C (77 ° F)	10	2,79
30 ° C (86 ° F)	8,2	2,23
35 ° C (95 ° F)	6,8	1,80
40 ° C (104 ° F)	5,7	1,45
50 ° C (122 ° F)	4,0	0,97
60 ° C (140 ° F)	2,9	0,67
70 ° C (158 ° F)	2,1	0,47

01-140

Test No. 3 (Fresh Air Blower -V2- and Control Module for Fresh Air Blower -J126-)

Adapter cable VAG1598/11					
Measuring range: Voltage measurement (20 V)					
Test Step	VAG1598 socket	Test of	Test conditions - additional work	Specified Value	Corrective action
3.1 to 3.3	⇒ page 01-124				

Adapter cable VAG1598/11					
LED Voltage tester VAG1527B					
Test step	VAG1598 socket	Test of	Test conditions - additional work	Specified Value	Corrective action
3.4	14 + 16	Control module for fresh air blower - J126-	Ignition on	- LED lights up - Fresh air blower running.	- Diagnose and repair open circuit in wiring between -J126- and -E87- using wiring diagram. - Fresh Air Blower -V2- check for ease of movement. - Replace -J126-.

01-141

Test No. 4 (air/temperature distribution flap motors and related potentiometers)

Adapter cable VAG1598/12					
Measuring range: Resistance measurement (20 K Ω)					
Test Step	VAG1598 socket	Test of	Test conditions - additional work	Specified Value	Corrective action
4.1 to 4.6	$\Rightarrow$ page 01-126				
4.7	14 + 2 3 4 5	Short to ground of wiring to flap motors -V68-, -V85-, -V70-, -V71-	Ignition off	- ∞ Ohm	- Diagnose and repair short to ground in wiring/connections using wiring diagram.

Adapter cable VAG1598/12					
Measuring range: Voltage measurement (20 V)					
Test Step	VAG1598 socket	Test of	Test conditions - additional work	Specified Value	Corrective action
4.8	14 + 2 3	Short to positive of wiring to flap motors -V68-, -V85-, -	Ignition on	- less than 1V	- Diagnose and repair short to positive in wiring/connections using wiring

	4 5	V70-, -V71-			diagram.
--	--------	-------------	--	--	----------

Note:

If DTC's for several flap motors are shown and malfunction is not determined in test 4, check wiring for short between individual flap motors (e.g. -V85- and -V70-, measured value between sockets 3 and 4 must be ∞ Ohm).

01-142

Test No. 5 (A/C pressure switch -F129-, "A/C compressor intervention" signal, engine temperature signal from instrument cluster and Interior Temperature Sensor Fan -V42-)

Adapter cable VAG1598/11					
Measuring range: Resistance measurement (200 Ω)					
Test Step	VAG1598 socket	Test of	Test conditions - additional work	Specified Value	Corrective action
5.1 to 5.6	Not for 1997. A/C compressor speed sender -G111-, A/C high pressure switch -F118- and Low pressure switch -F73- are no longer installed				

Adapter cable VAG1598/11					
Measuring range: Current measurement (20 A)					
Test Step	VAG1598 socket	Test of	Test conditions - additional work	Specified Value	Corrective action
5.7	⇒ page 01-131				

01-143

A/C control head -E87- connected to test box with adapter cable VAG1598/11					
LED Voltage tester VAG1527B					
Test Step	VAG1598 socket	Test of	Test conditions - additional work	Specified Value	Corrective action
5.8	14 + 12	"A/C compressor intervention" output.	- Engine running. - A/C compressor off - Switch on A/C compressor	- LED lights up - LED lights up slightly dimmer.	- Diagnose and repair open or short circuit in wiring/connections using wiring diagram. - Diagnose and eliminate A/C compressor cut-off condition(s) from Engine Control Module (ECM) or Transmission Control Module (TCM) - Diagnose and repair short circuit to ground in wiring/connections using wiring diagram.
5.9	Ground and 51	"Engine temperature too high" signal.	Engine running.	- LED lights up.	- Diagnose and repair short circuit to ground in wiring/connections using wiring diagram. - Diagnose and eliminate A/C compressor cut-off condition from Instrument cluster

01-144

A/C control head -E87- connected to test box with adapter cable VAG1598/11					
Measuring range: Current measurement (200 mA)					
Test Step	VAG1598 socket	Test of	Test conditions - additional work	Specified Value	Corrective action
5.10	Ground and 12	"A/C compressor intervention" output.	• Engine running. • A/C compressor off - Switch on A/C compressor - Remove multimeter connector probes from test box	- Less than 5 mA - Less than 50 mA - Compressor does not engage - Compressor engages	- Diagnose and repair short circuit to positive in wiring/connections using wiring diagram. - Replace A/C control head -E87-. - Diagnose and eliminate A/C compressor cut-off condition(s) from Engine Control Module (ECM) or Transmission Control Module (TCM) ⇒ Repair Manual, Fuel Injection and Ignition ⇒ Repair Manual, Automatic Transmission - Diagnose and repair short circuit to ground in wiring/connections using wiring diagram.

01-145

Adapter cable VAG1598/11 connected.					
Measuring range: Resistance measurement (200 Ω)					
Test Step	VAG1598 socket	Test of	Test conditions - additional work	Specified Value	Corrective action
5.11	2 + 42	A/C pressure switch - F129- (between terminals 1 and 2)	Ignition off	- Less than 20 Ω	- Diagnose and repair open circuit or contact resistance in wiring/connections using wiring diagram.1). - Check A/C pressure switch -F129- ⇒ page 87-67 .

1) If compressor cut-off condition code 1, "A/C pressure switch -F129- open" etc. appears in read measuring value block, display group 1, display field 1: - check for intermittent contact in wiring/connections to -F129- using wiring diagram - check function of Coolant Fan -V7- stage 1 with Output DTM (function ⁰³) ⇒ [page 01-42](#) - check A/C pressure switch -F129- function (actuation of -V7- stage 2, terminals 3 and 4 ⇒ [page 87-67](#)). If no fault is determined, check A/C refrigerant system pressures ⇒ [page 87-190](#) .

Test No. 6 (A/C Clutch Relay -J44-, actuation of Coolant Fan -V7- stage 1)

Adapter cable VAG1598/12 connected.					
Measuring range: Amperage measurement (20 A)					
Test Step	VAG1598 socket	Test of	Test conditions - additional work	Specified Value	Corrective action
6.1 + 6.2	⇒ page 01-133				

Note:

Actuation of -V7- stage 2 via A/C pressure switch -F129- ⇒ [page 87-67](#) .

01-147

Notes:

The following test steps are only performed for A/C control heads -E87- with two displays:

- ◆ Teststep 2.2 (the instrument panel interior temperature sensor -G56- is installed in A/C control heads -E87- with one display)
- ◆ Test step 5.7 (the interior temperature sensor fan -V42- is installed in A/C control heads -E87- with one display)

Switch on test area at VAG1526 multimeter: voltage test (20 V =)					
• VAG1598/11 adapter cable connected					
Test step	VAG1598A socket	Test of	Test requirements - additional operations	Specified value	Corrective action
1.15 4)	46 + Ground 3)	Power supply terminal 58 of A/C control head -E87-	• Ignition switched on • Park light switched on	◆ approx. battery voltage	- Locate and repair open circuit or short circuit to Ground in wiring connection to A/C control head -E87- using wiring diagram
1.16 4)	46 + Ground 3)	Power supply terminal 58 of A/C control head -E87-	• Ignition switched on • Park light		- Locate and repair open circuit or short circuit to Ground in wiring connection to A/C control head -E87- using wiring diagram.

			switched off	◆ smaller than 2 V	
--	--	--	--------------	-----------------------	--

3) Ground is at, for example, connector D, socket 14 and 15.

4) Only perform this test step for an A/C control head with one display.

01-148

Switch on test area at VAG1526 multimeter: voltage test (20 V)					
• VAG1598/12 adapter cable connected					
Test step	VAG1598A socket	Test of	Test requirements - additional operations	Specified value	Corrective action
1.17 4)	8 + 14	◆ Terminal 15 and Ground connection at A/C control head -E87- (power supply for A/C clutch)	• Ignition switched on	◆ approx. battery voltage	- Repair power supply or Ground connection according to wiring diagram

4) Only perform this test step for an A/C control head with one display.

01-149

VAG1527 B Voltage Tester					
- A/C control head -E87- connected at test box (VAG1598/11 and /12 adapter cables) - VAG1598/11 adapter cable connected					
Test step	VAG1598A socket	Test of	Test requirements - additional operations	Specified value	Corrective action
5.9 5)	Ground + 51	"Engine temperature too high" signal	Engine running	◆ LED on voltage tester lights	- Locate short circuit to Ground and repair according wiring diagram - Eliminate A/C compressor cut-off conditions in instrument cluster

5) Only perform this test step for vehicles of m.y. 1997 or later

Notes:

- ◆ Ignition key coding is transmitted to the A/C control head -E87- from the instrument cluster along with the coolant temperature and the signal "engine temperature too high" when ignition is switched on for vehicles as of m.y. 1999 (data message). Key coding can only be processed by A/C control heads -E87- with part number 8D0 820 043 after index "M." No information can be transmitted if the coolant temperature is too high.
- ◆ When ignition is switched on, A/C control head -E87- begins with the setting that was valid when the ignition was last switched off with this key (temperature, air distribution, fresh air blower RPM).

◆ *The signal from instrument cluster (data message) cannot be checked with tools available.*

⇒ [Repair Manual, "Electrical Equipment," Repair Group 90, instrument cluster, repairing.](#)

List of changes to electrical tests, 1998

VAG1527B voltage tester					
VAG1598/11 adapter cable connected					
Test step	VAG1598 sockets	Test of	Test conditions - additional operations	Specified value	Corrective action
1.9	33 + GND	Signal for "ignition off" period	Ignition switched on	LED on voltage tester lights	- Repair open circuit or short circuit according to wiring diagram.
1.10	33 + GND	Signal for "ignition off" period	- Ignition switched on - Start engine.	LED in voltage tester lights up When starting engine, LED briefly flickers in voltage tester (time signal) and then lights constantly	- Repair open circuit or short circuit according to wiring diagram. - Check instrument cluster.
Note: <i>Test steps 1.9 and 1.10 apply only for vehicles beginning m.y. 1997 (A/C control head with Part No. 8L0 820 043 up to Part No. index letter "C").</i>					

01-151

Voltage test - switch multimeter to 20V measuring range					
VAG1598/11 adapter cable connected					
Test step	VAG1598 sockets	Test of	Test conditions - additional operations	Specified value	Corrective action
1.11	7 + GND	Terminal 58s on - E87-	- Ignition switched on - Parking light switched on	0 to 12 V	- Repair open circuit or short circuit according to wiring diagram.
1.12	7+ GND	Terminal 58s on - E87-	- Ignition switched on - Parking light switched off	approx. 0 V.	- Repair short to B+ according to wiring diagram.

Notes:

- ◆ Test steps 1.11 to 1.14 apply for vehicles beginning m.y. 1998 (A/C control head with Part No. 8L0 820 043 from Part No. index letter "D").
- ◆ The Ground connection can be made via connector D, terminals 14 and 15 (for example).
- ◆ The voltage at terminal 58s is dependent on the adjustment of the illumination dimmer control.

01-152

Voltage test - switch multimeter to 20V measuring range					
VAG1598/11 adapter cable connected					
Test step	VAG1598 sockets	Test of	Test conditions - additional operations	Specified value	Corrective action
1.13	45 + GND	Terminal 58d on - E87-	- Ignition switched on - Parking light switched on	0 to 12 V	- Repair open circuit or short circuit according to wiring diagram.
1.14	45 + GND	Terminal 58d on - E87-	- Ignition switched on - Parking light switched off	0 to 12 V	- Repair open circuit or short circuit according to wiring diagram.

Notes:

- ◆ Test steps 1.11 - 1.14 apply for vehicles beginning m.y. 1998 (A/C control head with Part No 8L0 820 043 from Part No. index letter "D").
- ◆ The Ground connection can be made via connector D, terminals 14 and 15 (for example).
- ◆ The voltage to terminal 58d is created as a square-wave signal from the instrument cluster. The brightness of the display on A/C control head -E87- is determined by the period of activation. The multimeter will indicate the average value.

- ◆ *The period of activation for terminal 58d is dependent on the setting of the illumination dimmer control and on the brightness level detected by the photo sensor in the instrument cluster.*

01-153

Rear window heating, electrical testing

Note:

Only perform this test on A/C control heads -E87- with only one display (switch for rear window heating is integrated in the A/C control head -E87-).

Special tools and equipment

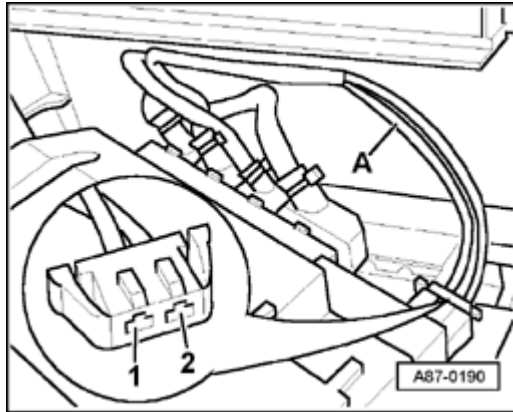
- ◆ VAG1715 multimeter (with voltage probe)
- ◆ VAG1594A Measuring Appliance Adapter

Test requirements

- All fuses OK

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- Switch ignition off.
- Remove A/C control head -E87- ⇒ [page 87-120](#) .



- Disconnect harness connector E from A/C control head -E87-.
- A** - Connect multimeter between terminal 1 and 2 for voltage measurement.

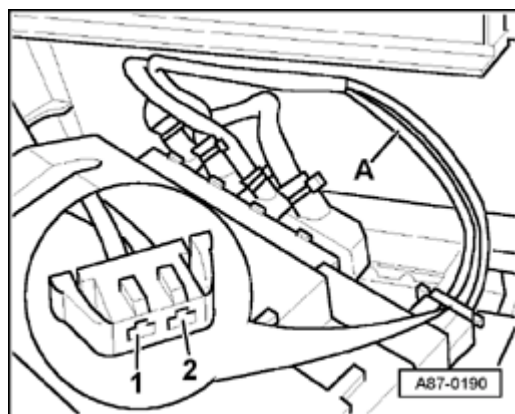
01-154

- Turn ignition on.

Specification: approx. battery voltage

- Switch ignition off.

- Connect harness connector E at A/C control head -E87-.



- Route wire -A- to harness connector E through current probe on VAG1715.

Note:

All harness connectors at A/C control head -E87- must be connected.

- Select "Amperage measurement via amperage probe" function on VAG1715 (with voltage probe).

01-155

- Start engine.
- Switch rear window heating on via A/C control head -E87- (indicator lamp in button lights up).

Specified value: The display on VAG1715 will change from approx. 0 amps to less than 25 amps.

- Wait approx. 10 minutes.

Specified value: The display on the VAG1715 will change from less than 25 amps to approx. 0 amps (indicator lamp in button goes out).

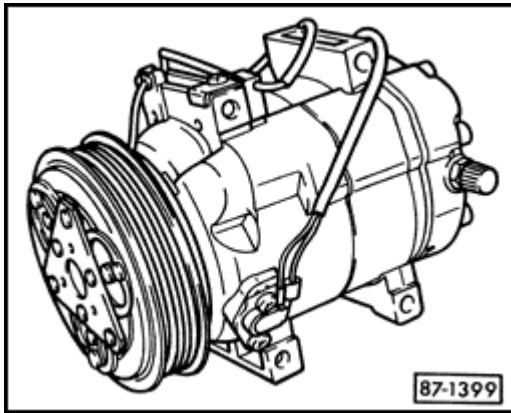
Notes:

- ◆ *The current probe may be influenced by stray current which could cause the display to show a low current reading when rear window heating is switched off.*
- ◆ *The A/C control head -E87- will switch rear window heating off after 10 minutes.*
- ◆ *When the outside temperature is less than 0 ° C the heating function of the rear window will remain on until the ignition is switched off (it can*

be turned off manually at any time). If the temperature while driving exceeds 0 ° C, the rear window heater is turned off after the operating time stored in -E87- (max. 10 minutes) elapses.

Refrigerant system (R-134a), components

A/C compressor



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

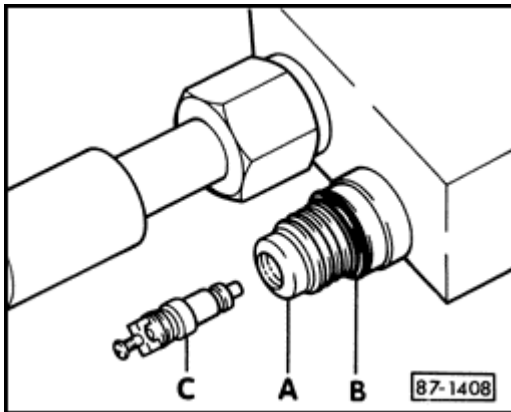
Low pressure refrigerant gas from the evaporator is compressed by the compressor. After compression, the refrigerant gas (now high pressure) flows to the condenser.

The variable displacement A/C compressor varies piston stroke and output depending on load requirements and suction pressure.

Notes:

- ◆ Zexel A/C compressors were installed from start of production. During m.y. 1996, Nippondenso (Denso) type compressors are installed as a running change. These compressors are not equipped with A/C speed sensor G111.
- ◆ The compressor contains PAG type refrigerant oil that is mixable under all temperatures with refrigerant R-134a.
- ◆ A label on the compressor indicates that compressor is for R-134a systems only.

Valve connections for pressure switches



4

A Schrader valve is installed under A/C system pressure switches to allow replacement without discharging the refrigerant system.

- A/C system low and high pressure switches use different size threads.
- Use only the correct switches and O-ring seals specified for use with R-134a refrigerant and PAG oil.

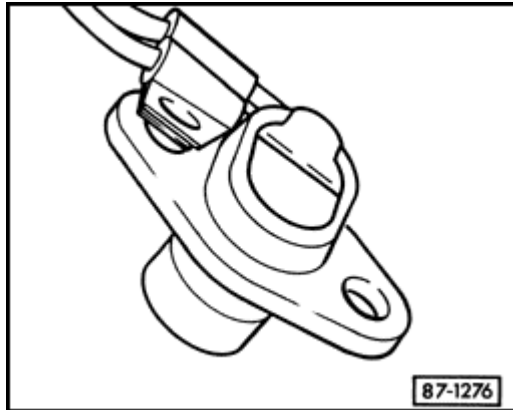
A - Switch connection (soldered)

B - O-ring seal

C - Schrader valve insert

Note:

A/C system switches are available in different versions. Always refer to the latest parts information to ensure correct switch application.



⚡ **A/C compressor speed sensor -G111-, (Zexel compressors only)**

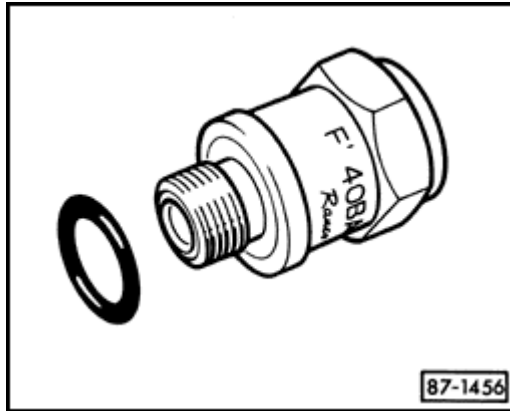
- Inductive sensor (4 pulses per compressor rotation)
- Determines A/C compressor speed; the A/C compressor clutch control module (Manual A/C) or the A/C control head (Automatic climate control) compares compressor speed to engine speed and calculates belt slippage (as a percentage) and switches compressor OFF if slippage is too large (for example, if belt is too loose.)

Note:

- ◆ *A/C compressor speed sensor -G111- is not installed on Nippondenso compressors.*
- ◆ *A thermo-fuse is incorporated into the clutch coil of Nippondenso compressors. Current to the clutch coil is interrupted in the event of compressor overheating.*

87-24

Pressure relief valve

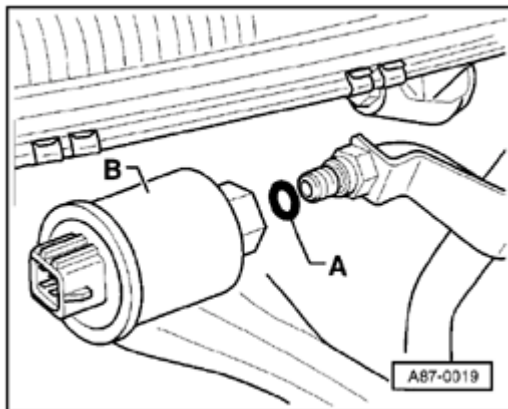


The pressure relief valve is mounted on the compressor. At approx. 38 bar (551 psi), the valve opens to vent excessive pressure. When system pressure is reduced to approx. 30-35 bar (435-508 psi), the valve closes to prevent total refrigerant loss.

A/C refrigerant high pressure switch - F23- and A/C clutch switch -F118-

Note:

Beginning with m.y. 1997, A/C pressure switch - F129- replaces pressure switches -F23-, and - F118- ⇒ [page 87-67](#) .



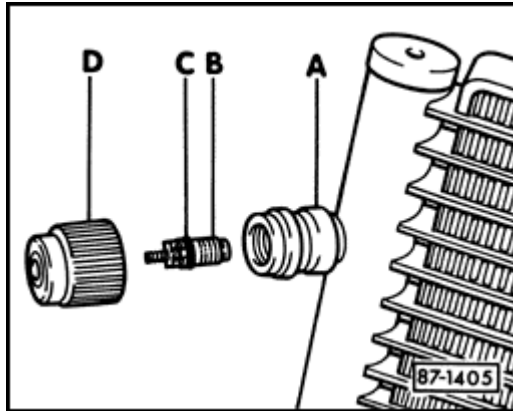
- ⚡ Both switches are incorporated into a single housing.

F23 function

- Switches coolant fan (V7) to second speed when A/C system pressure increases.

F 118 function

- Switches A/C clutch -N25- OFF if system pressure is too high.



High pressure service valve assembly

- 4
- A - Service valve connection (located on condenser inlet line)
 - B - Schrader valve insert
 - C - O-ring seal
 - D - Cap with seal

Notes:

- ◆ Only a high pressure service valve is used for A/C system servicing. A low pressure service valve is not installed in the A/C system. Perform all A/C system service operations (i.e. discharging, evacuating, and charging) through the high pressure service valve only.
- ◆ Use only the specified R-134a quick coupling connectors when servicing the refrigerant system.
- ◆ Before removing the valve insert from the high pressure service valve, discharge refrigerant system ⇒ [page 87-201](#).
- ◆ Always reinstall cap -D- over service valve.
- ◆ Illustration shows the condenser from an Audi 100 model.

87-27

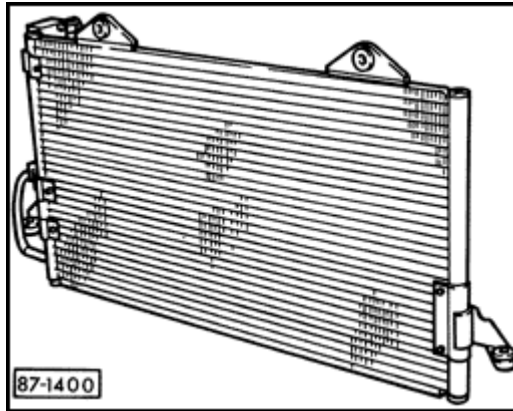
Condenser

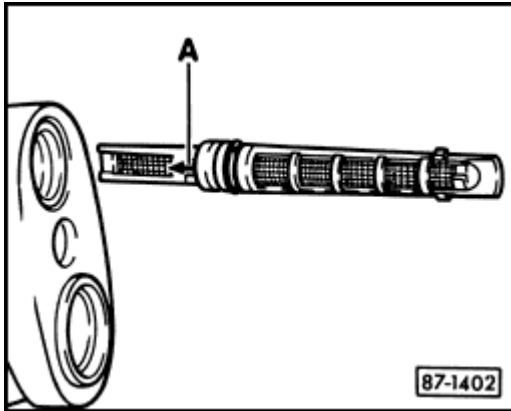


The condenser transfers heat from the compressed refrigerant gas to the outside air which causes the refrigerant to change state from a gas to a liquid.

Note:

Illustration shows the condenser from an Audi 100 model.





Restrictor



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

Upstream of the restrictor, the refrigerant is hot and under high pressure. Downstream of the restrictor, the refrigerant is cold and under low pressure.

A strainer located upstream of the restrictor filters out any dirt or particles. Another strainer located downstream of the restrictor atomizes the refrigerant before it enters the evaporator.

Notes:

- ◆ *Insert restrictor so that Arrow -A- points to evaporator.*
- ◆ *Illustration shows the evaporator from an Audi 90 model.*

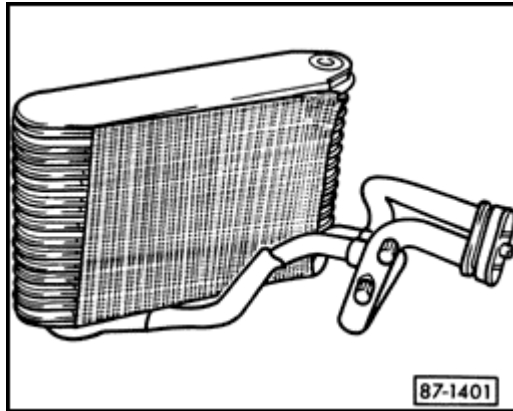
Evaporator



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

Note:

Illustration shows the evaporator from an Audi 90 model.



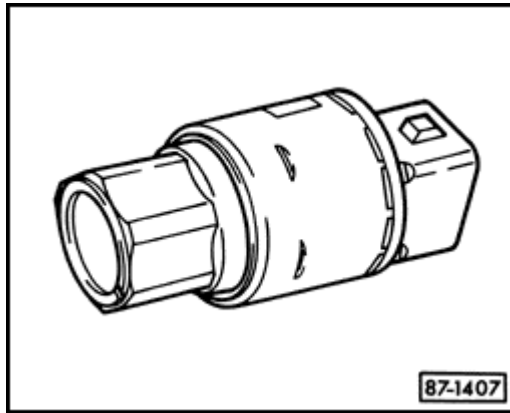
87-30

A/C refrigerant low pressure switch - F73-

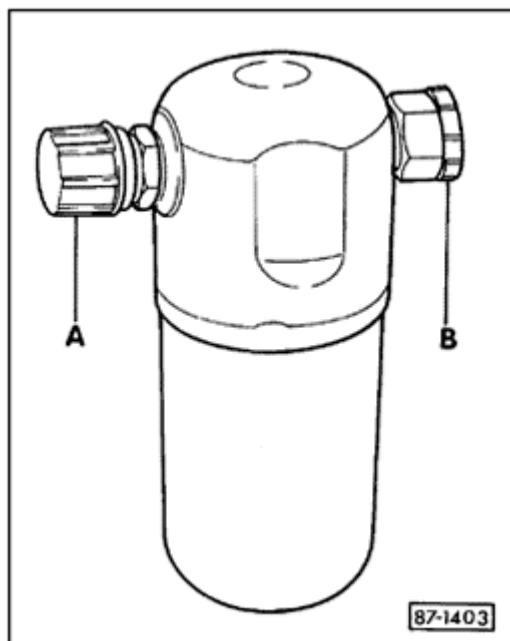
Function



Switches A/C Clutch -N25- OFF if system suction pressure is too low (low refrigerant charge). This switch protects the compressor if the refrigerant system is empty.



Accumulator



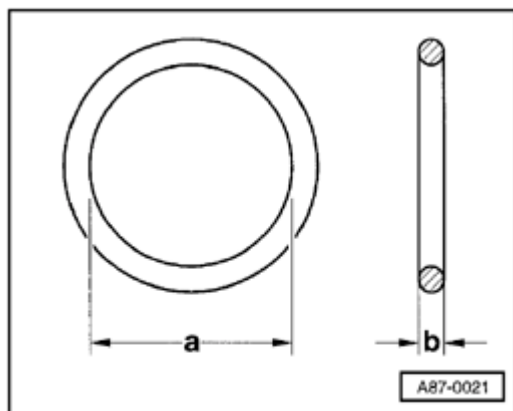
The accumulator traps the mixture of refrigerant vapor and gas coming from the evaporator. While in the accumulator, the refrigerant vapor turns to gas and, along with the refrigerant oil, is then suctioned by the compressor.

An oil extraction passage is incorporated into the accumulator to ensure that refrigerant oil flowing with the refrigerant does not remain in the accumulator.

Any moisture in the system is absorbed by the desiccant in the accumulator.

Note:

Do not remove caps -A- and -B- until ready to install new accumulator. If caps are removed too soon, the dessicant becomes saturated with moisture after a very short time. If this occurs, the accumulator must be replaced.



O-rings



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

Use only O-rings which are compatible with R-134a refrigerant and refrigerant (PAG) oil. Refer to the most recent parts information when obtaining new O-rings.

Notes:

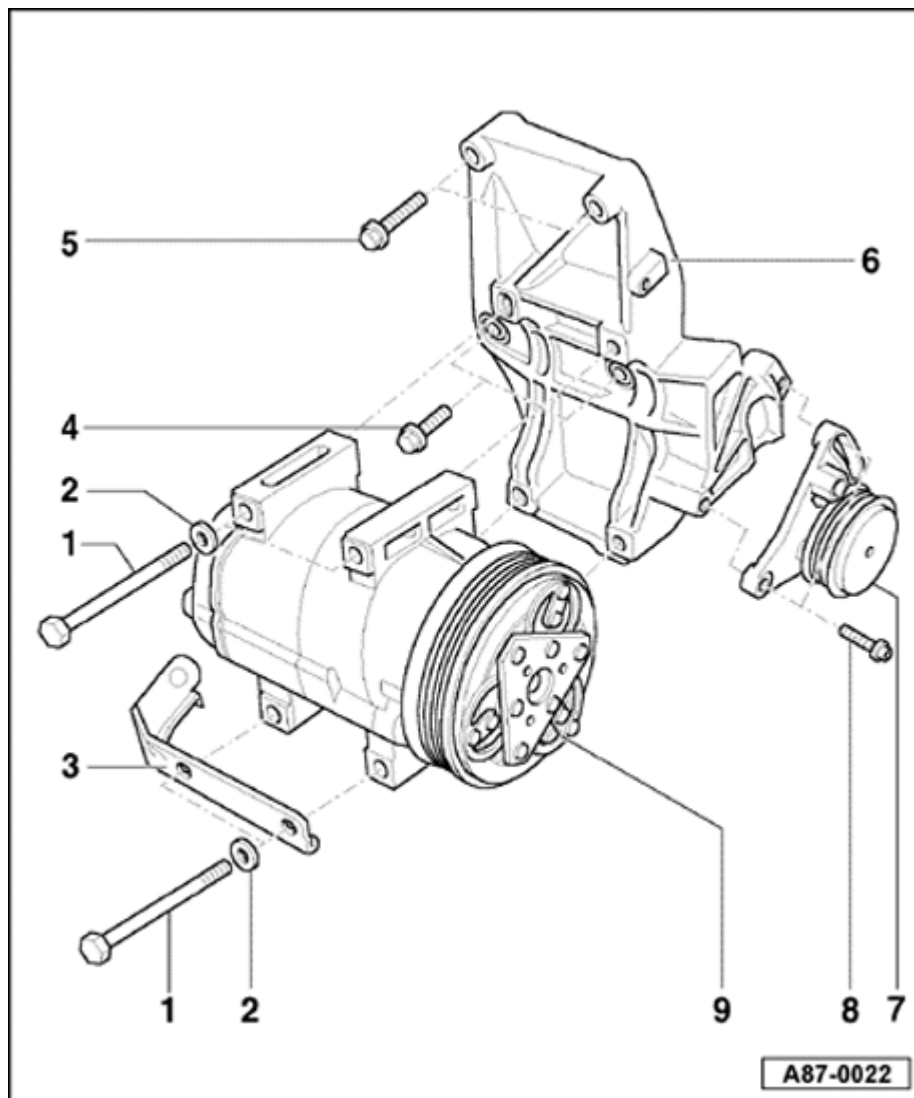
- ◆ *Handle O-rings only in a clean working environment.*
- ◆ *Do not reuse O-rings, always replace.*
- ◆ *Always use correct size O-rings (dimensions -a- and -b-).*
- ◆ *Lubricate O-rings with refrigerant (PAG) oil before installing.*
- ◆ *Always ensure O-rings are properly installed on pipe/component mounting flanges/grooves.*
- ◆ *O-ring and torque specifications also apply to threaded connections in the A/C lines.*

Hoses and lines

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

Hoses and lines are secured with threaded connections. Always properly torque hose and line connections.

87-76



A/C compressor brackets

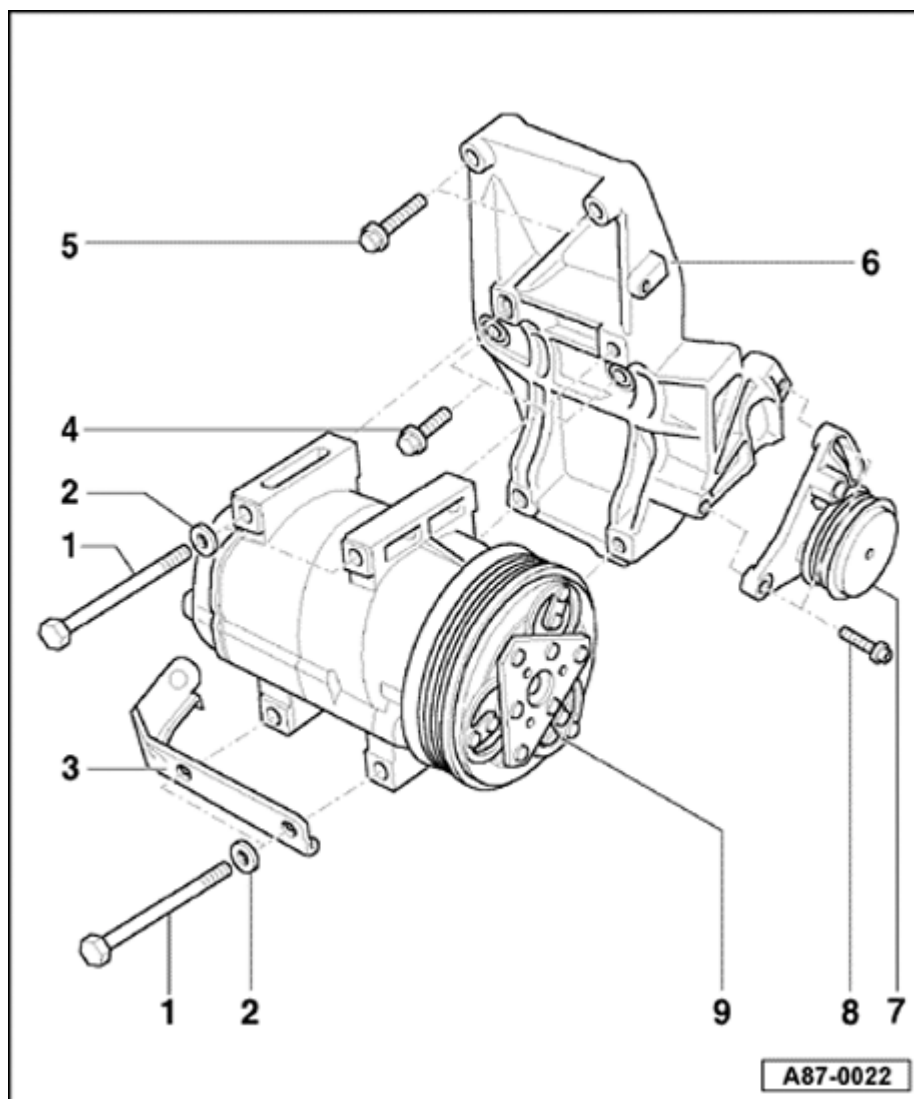
A/C compressor bracket (4-cyl. engine), removing and installing

- Remove front noise insulation panel under engine, detach complete front bumper/grille assembly ("service position") ⇒ Repair Manual, Body Exterior, Repair Groups 50 and 63.
- Remove ribbed drive belt ⇒ [page 87-84](#) .

CAUTION!

- ♦ **Do not discharge refrigerant system and do not disconnect refrigerant hoses from compressor unless removing or replacing compressor.**
- ♦ **Mark running direction of ribbed belt before removing (if belt is installed in the opposite running direction, belt damage may result).**
- ♦ **After loosening/removing compressor, attach to frame member e.g. with wire; do not suspend compressor from coolant hoses.**

87-77

**1 - Bolt**

- ◆ 25 Nm (18 ft lb)

2 - Washer**3 - Refrigerant hose bracket**

- ◆ Attach to refrigerant hose clamp first

4 - Combination screw and washer assembly

- ◆ 25 Nm (18 ft lb)

5 - Combination screw and washer assembly

- ◆ 25 Nm (18 ft lb)

6 - Compressor bracket

- ◆ Check compressor centering bushing for correct fit

7 - Tensioning roller

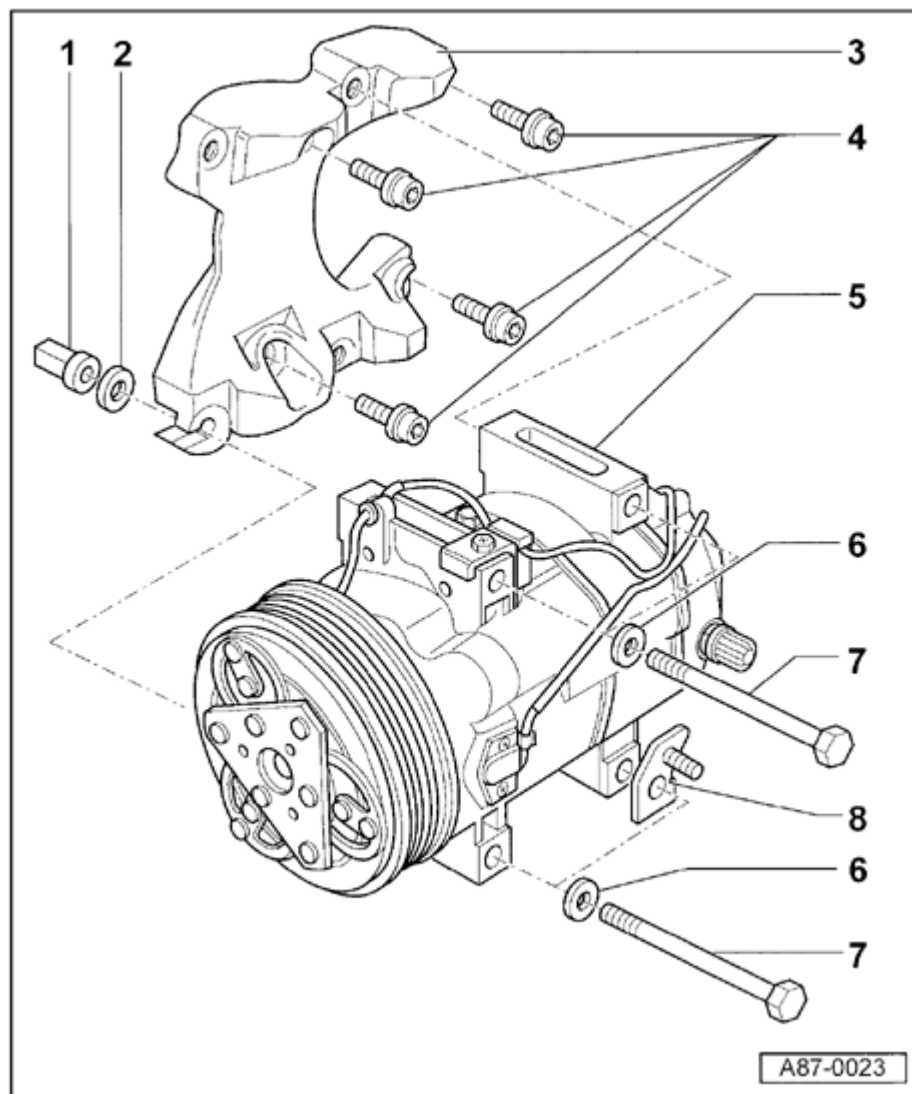
- ◆ For ribbed drive belt
- ◆ Ribbed drive belt, removing and installing
⇒ [page 87-84](#)

8 - Hex socket bolt with washer

- ◆ 20 Nm (15 ft lb)

9 - Compressor with magnetic clutch

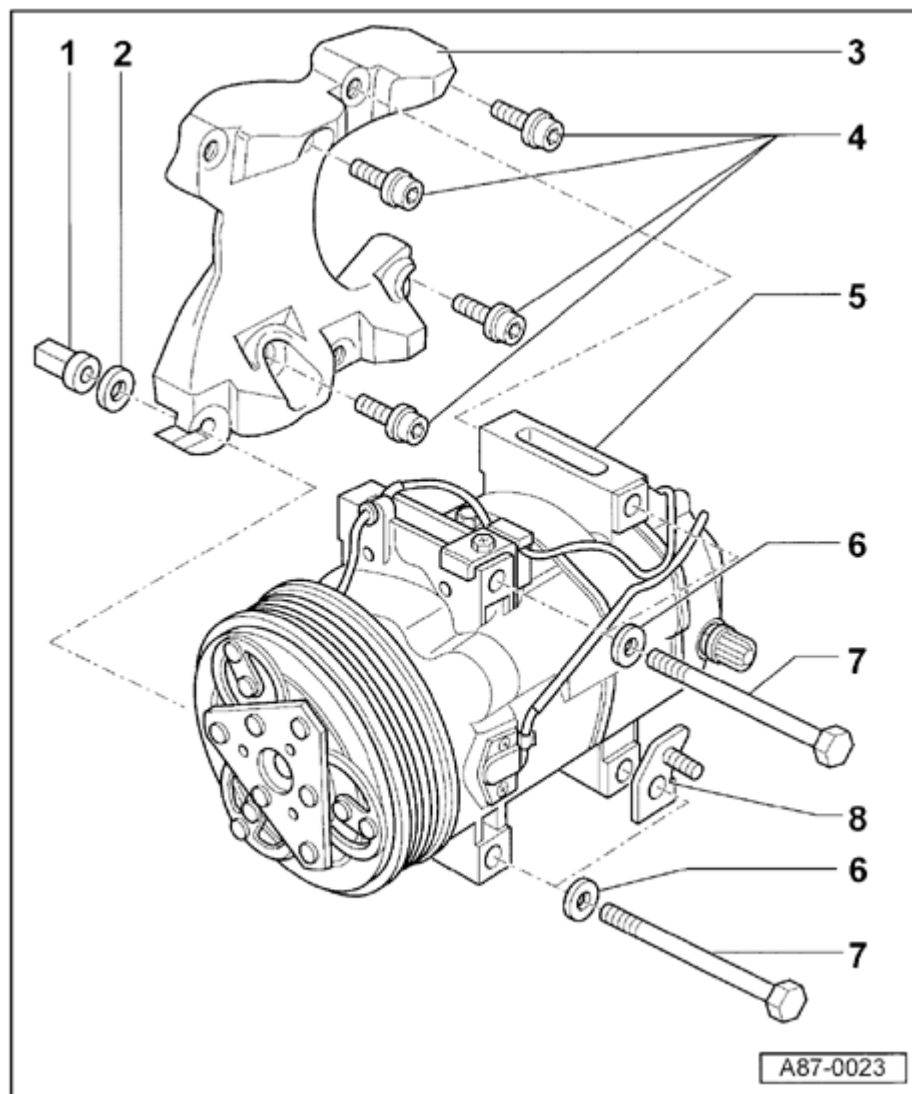
87-78



A/C compressor bracket (6-cyl. engine - Zexel compressor), removing and installing

- Remove front noise insulation panel under engine, and detach complete front bumper/grille assembly (service position) ⇒ Repair Manual, Body Exterior, Repair Groups 50 and 63
- Remove ribbed belt ⇒ Repair Manual, General Engine, Repair Group 13
- Remove oil filter ⇒ Repair Manual, General Engine, Repair Group 17.

87-79

**CAUTION!**

- ♦ *Do not discharge refrigerant system and do not disconnect refrigerant hoses from compressor unless removing or replacing compressor.*
- ♦ *Mark running direction of ribbed belt before removing (if belt is installed in the opposite running direction, belt damage may result).*
- ♦ *Cover sealing surface for oil cooler on engine block before removing compressor.*
- ♦ *After loosening/removing compressor, attach to frame member e.g. with wire; do not suspend compressor from coolant hoses.*

1 - Nut

2 - Washer

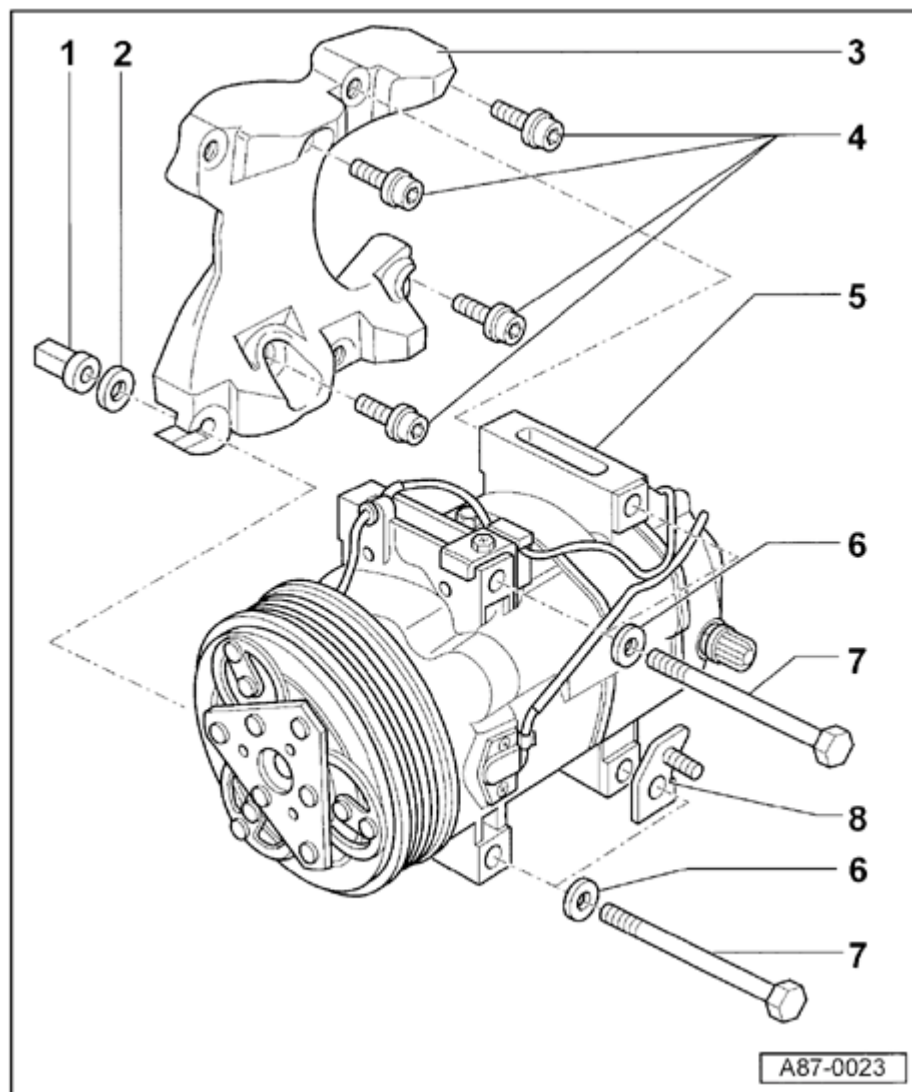
3 - Compressor mounting bracket

4 - Hex socket bolt with washer

♦ 25 Nm (18 ft lb)

5 - Compressor with clutch

87-80

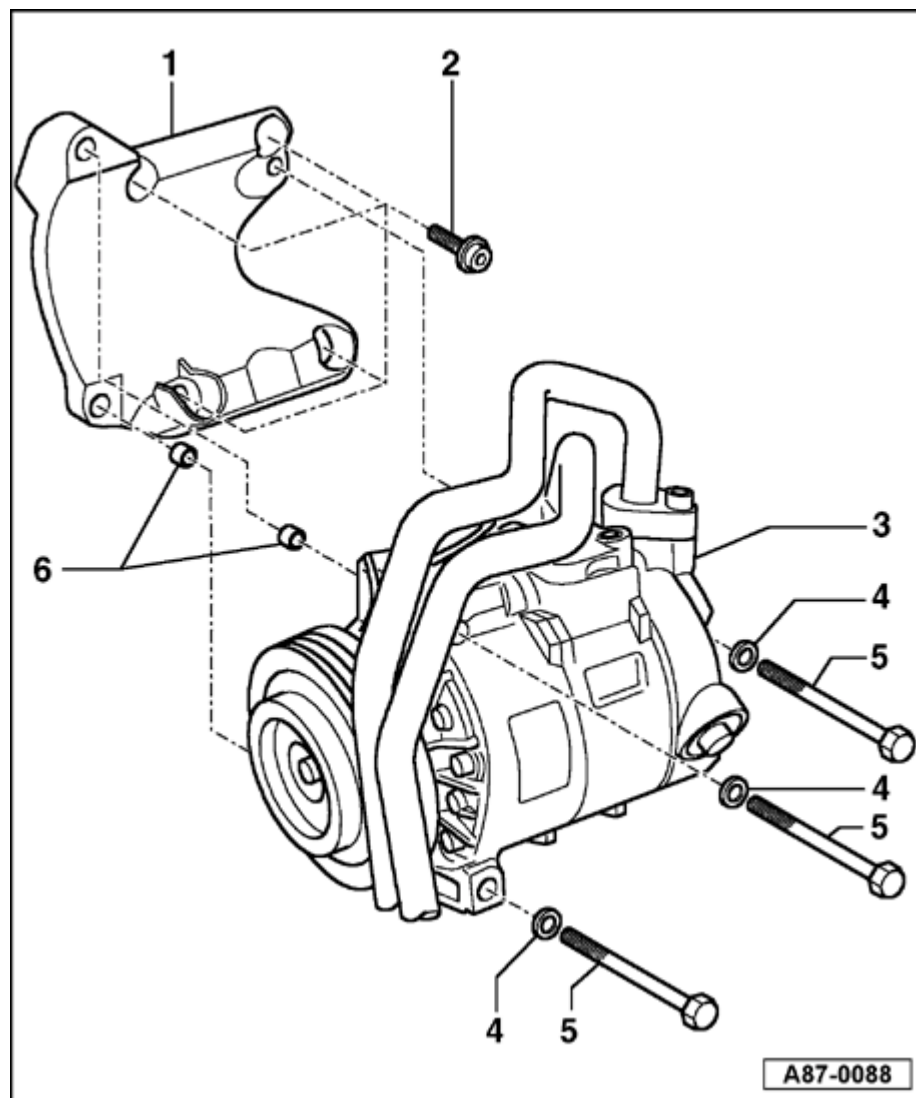
**6 - Washer****7 - Bolt**

◆ 25 Nm (18 ft lb)

8 - Refrigerant hose bracket

◆ Attach to refrigerant hose clip first

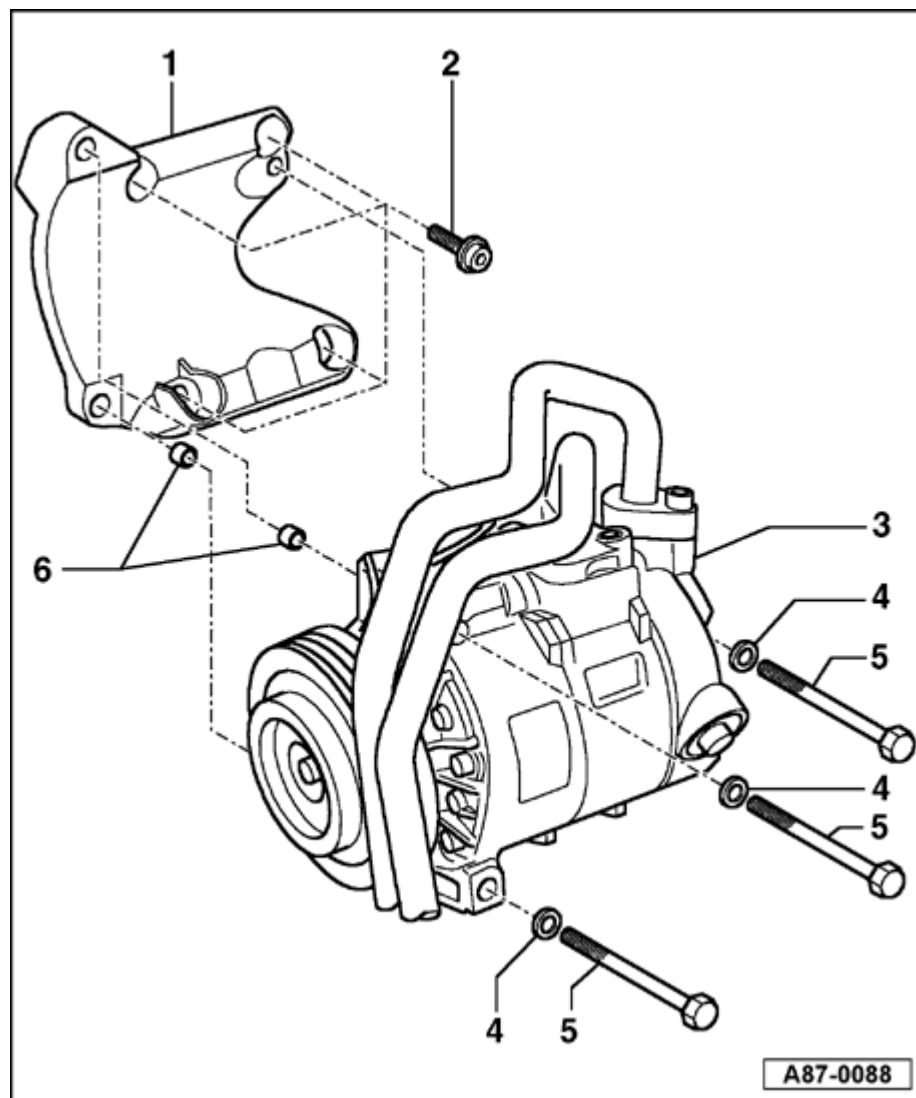
87-81



A/C compressor bracket, (6-cyl. engine - Nippondenso compressor), removing and installing

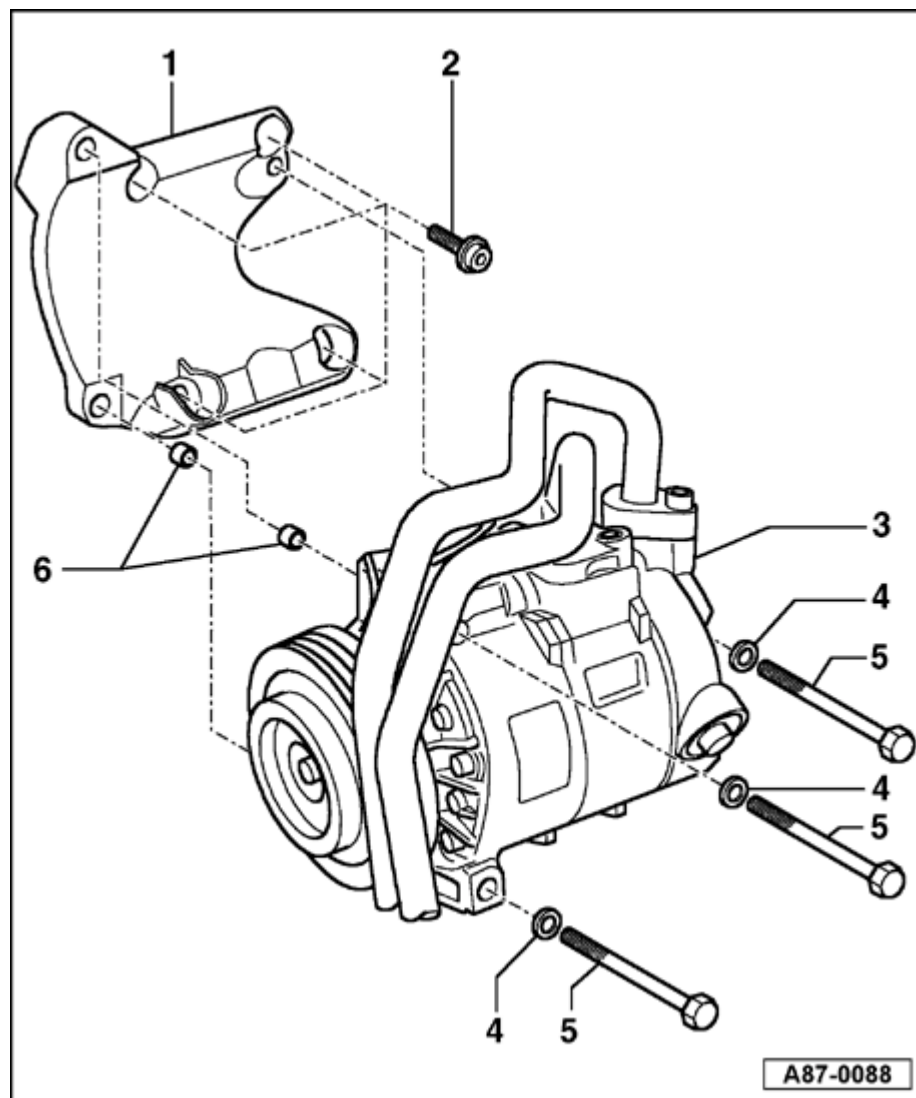
- Remove front noise insulation panel under engine, and detach complete front bumper/grille assembly (service position) ⇒ Repair Manual, Body Exterior, Repair Groups 50 and 63
- Remove ribbed belt ⇒ Repair Manual, General Engine, Repair Group 13
- Remove oil filter ⇒ Repair Manual, General Engine, Repair Group 17

87-82

**CAUTION!**

- ♦ *Do not discharge refrigerant system and do not disconnect refrigerant hoses from compressor unless removing or replacing compressor.*
- ♦ *Mark running direction of ribbed belt before removing (if belt is installed in the opposite running direction, belt damage may result).*
- ♦ *Cover sealing surface for oil cooler on engine block before removing compressor.*
- ♦ *After loosening/removing compressor, attach to frame member e.g. with wire; do not suspend compressor from coolant hoses.*

87-83



1 - Compressor mounting bracket

2 - Hex socket bolt with washer

◆ 25 Nm (18 ft lb)

3 - Compressor with clutch (Nippondenso)

4 - Washer

5 - Bolt

◆ 25 Nm (18 ft lb)

6 - Spacer bushing

87-84

Ribbed drive belt for A/C compressor (4-cyl. engine), removing and installing

Removing:

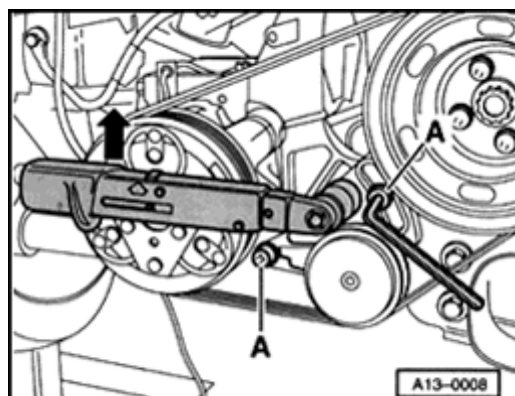
Note:

Removing and installing ribbed belt (6-cylinder engine) ⇒ Repair Manual, "General Engine," Repair Group 13.

- Detach complete front bumper/grille assembly (service position) ⇒ Repair Manual, Body Exterior, Repair Group 50 and 63.

CAUTION!

Mark running direction of ribbed belt before removing (if belt is installed in the opposite running direction, belt damage may result).

**A**

- Loosen both hex socket bolts -A-.

Installing:

- Position ribbed belt over drive pulleys and check for correct position.
- Using torque wrench using (⇒ illustration) and tension ribbed belt via tensioner pulley in direction of arrow to 25 Nm (18 ft lb).
- Tighten both hex socket bolts -A- to 20 Nm (15 ft lb).

87-120

Climate control components in passenger compartment, servicing

Component electrical testing ⇒ [page 01-115](#) .

A/C control head -E87-, removing and installing

Notes:

- ◆ *Always check DTC memory before removing E87.*
- ◆ *After replacing E87, always:*
 - Check coding or enter new coding.
 - Perform basic setting.
 - Check DTC memory.
- ◆ *Vehicles equipped with Nippondenso compressors must have A/C control head E87 with Part No. index "H" and higher installed to allow for correct coding. Coding E87 ⇒ [page 01-8](#) .*

- ◆ *If 22 ° C (71 ° F) is always displayed after switching on the ignition regardless of the last setting, check voltage supply to E87 (terminal 30) using wiring diagram.*
- ◆ *E87 readout can be switched over from ° C to ° F and vice versa by pressing the "temperature +" and "recirculating air" buttons simultaneously.*
- ◆ *If E87 remains in operation after switching off the ignition, test cable connection to E87 connector -D- contact -1- for short circuit to positive (connection for auxiliary heater operation) using wiring diagram.*

87-121

Notes:

- ◆ *If both display fields do not light up with ignition switched on, check coding of -E87- and conduct electrical tests if necessary ⇒ [page 01-135](#) .*
- ◆ *For m.y. 1997, the illumination of the display field and the operating button is via light emitting diode (LED), and can not be replaced.*
- ◆ *Always refer to parts information for correct control head versions.*
- ◆ *Control heads with part number 8D0 820 043 should only be installed in vehicles through m.y. 1996.*
- ◆ *Control heads with part number 8L0 820 043 should only be installed in vehicles beginning m.y. 1997.*
- ◆ *A/C control head -E87- with Part No. 8D0 820 043 can only be installed in vehicles up to and including m.y. 1996.*
- ◆ *M.y. 1997 vehicles can only have A/C control head -E87- with the Part No. 8L0 820 043 up to and including Part No. index letter "C."*
- ◆ *For m.y. 1998 the harness connector to A/C control head -E87- has*

8L0 820 043B A4-A/C fully automatic DXX
Coding XXXXX WSC ZZZZZ



changed (connections for illumination, terminal 58, terminal 58s).

8L0 820 043D A4-A/C fully automatic DXX
Coding XXXXX WSC ZZZZZ



- ◆ *For vehicles beginning m.y. 1998 there is only one A/C control head - E87- (Part No. 8L0 820 043 beginning with Part No. index letter "D") that can be used.*

Notes:

- ◆ *If both display fields of A/C control head -E87- (Part No. 8L0 820 043 beginning with Part No. index letter "D") are not illuminated when the ignition is switched on, check the voltage supply from terminal 58d (dimmer) to A/C control head -E87- ⇒ [page 01-115](#) (Electrical test).*
- ◆ *If the buttons for A/C control head -E87- (Part No. 8L0 820 043 beginning at Part No. index letter "D") do not light up when the light is switched on, check the voltage supply from terminal 58s (illumination) to A/C control head -E87- ⇒ [page 01-115](#) (Electrical test).*
- ◆ *If an A/C control head -E87- with the Part No. 8L0 820 043 beginning with Part No. index letter "D" is installed in a 1997 m.y. vehicle, the brightness in the switch cannot be changed ⇒ [page 01-115](#) (Electrical test).*
- ◆ *If an A/C control head -E87- with Part No. 8L0 820 043 including Part No. index letter "C" is installed in a 1998 m.y. vehicle, the brightness in the switch cannot be changed ⇒ [page 01-115](#) (Electrical test).*

87-123

Removing and installing (A/C control head with double display)

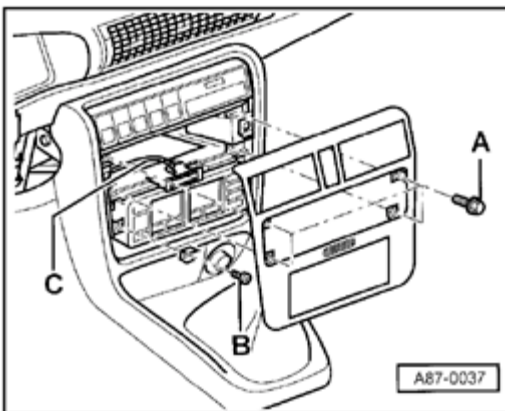
- Check DTC memory.

CAUTION!

- ♦ **Obtain security code for anti-theft radio.**
- ♦ **Note customer's pre-set radio stations.**
- ♦ **Disconnect battery Ground (GND) strap.**

Remove Radio

⇒ [Repair Manual, Radio, Telephone, Navigation, Repair Group 91](#)



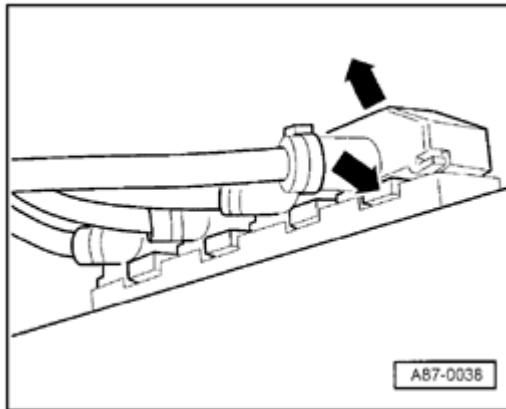
4

- Remove screws -A-.

Remove center instrument panel trim ⇒ [Repair Manual, Body Interior, Repair Group 70](#)

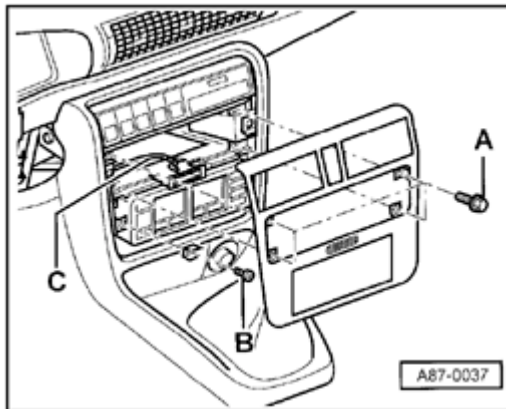
- Remove screws -B-.
- Remove A/C control head.

87-124



A

- Push back connector locks and unplug electrical connectors.
- Install in reverse order of removal.

Notes:

A

- ◆ After installing E87, check that shaped hose -C- of temperature sensor G56 (blower V42) is routed correctly (not kinked).
- ◆ When installing screws -B-, position the center trim mounts correctly.
- ◆ After installing E87, always confirm correct coding, perform basic setting and check DTC memory.

Removing and installing (A/C control head with single display)

Removing

CAUTION!

- ♦ **Obtain security code for anti-theft radio.**
- ♦ **Note customer's pre-set radio stations.**
- ♦ **Disconnect battery Ground (GND) strap.**

Remove radio or radion with navigation system

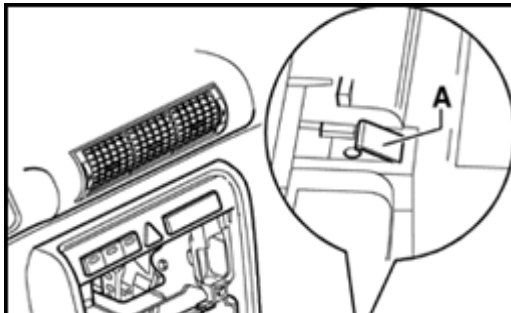
⇒ [Repair Manual, Radio, Telephone, Navigation, Repair Group 91](#)

- Grip control head through radio opening and slide rearward.

Notes:

- ♦ The control head is held in the center console with 4 clips -A-.
- ♦ Before replacing the control head, ensure correct application (e.g. with or without knockouts for switches for seat heaters)

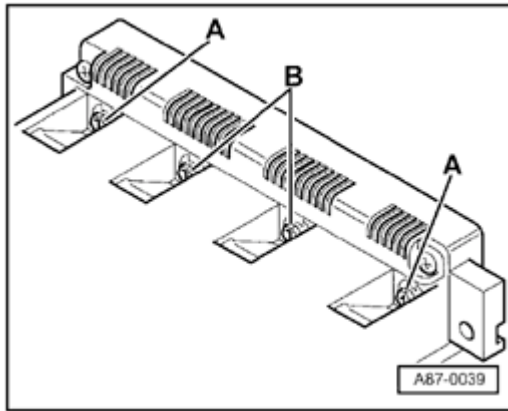
⇒ [Parts catalog](#)



- ◆ *Press seat heater switches -C- back into control head so that latches -B- are engaged.*
- ◆ *Make sure that the hose for the instrument panel interior temperature sensor -G56- is not kinked or otherwise closed off.*

A/C control head -E87- illumination bulbs, removing and installing

- Remove A/C control head ⇒ [page 87-120](#) .



- Turn bulbs 90° and remove.
- Install in reverse order of removal.

Notes:

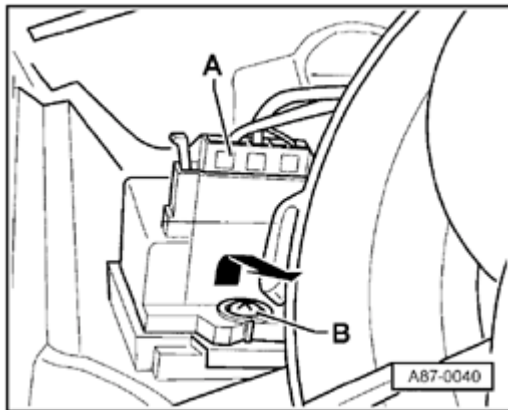
- ◆ Always replace with bulb of the same power rating; refer to current parts information.
- ◆ Bulbs -A- illuminate control panel.
- ◆ Bulbs -B- illuminate display panels.
- ◆ Testing, output Diagnostic Test Mode (DTM) ⇒ [page 01-42](#) .

87-127

Control module for fresh air blower - J126-, removing and installing (1996)

Remove glovebox and glovebox mounting

⇒ [Repair Manual, Body Interior, Repair Group 70](#)



4

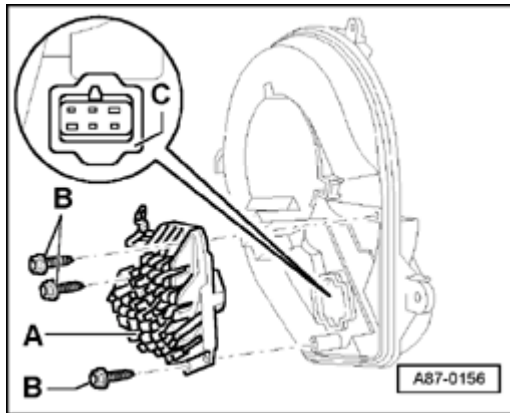
- Unplug electrical connector -A-.
- Remove screw -B- and remove module in direction of arrow.
- Install in reverse order of removal.

Note:

Electrical test ⇒ [page 01-115](#) .

Control module for fresh air blower - J126- , removing and installing (1997 ➤)

- Remove fresh air blower -V2- and separate from base plate ⇒ [page 87-130](#) .

**A**

- Remove bolts -B-.
- Remove control module -A- from mounting plate.

Note:

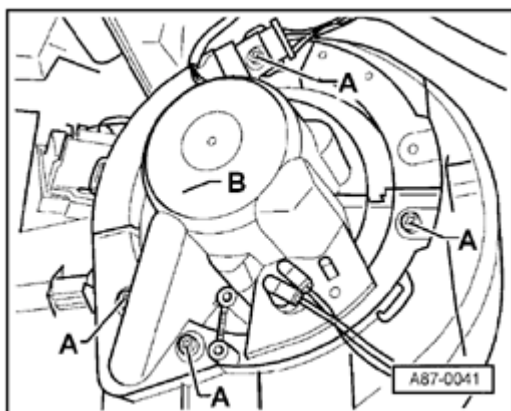
When installing control module, check foam seal -C-, must be used to seal mounting plate.

87-129

Fresh air blower (V2), removing and installing (1996)

Remove glovebox, glovebox mounting and mounting for passenger airbag

⇒ [Repair Manual, Body Interior, Repair Group 70](#)



- Remove 4 screws -A- and remove fresh air blower from heater/air conditioner assembly.
- Install in reverse order of removal.

Notes:

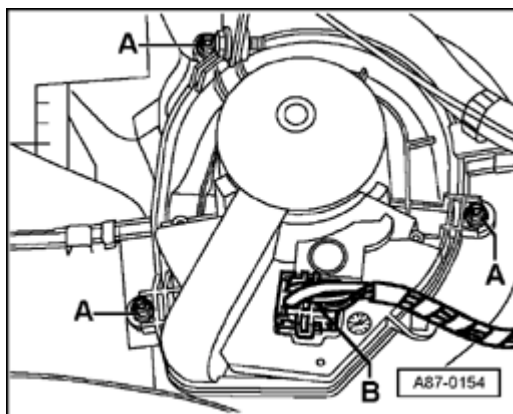
- ◆ The fresh air blower must be turned slightly to allow removal from heater/air conditioner assembly.
- ◆ Testing V2, output Diagnostic Test Mode (DTM) ⇒ [page 01-42](#) .
- ◆ Electrical test ⇒ [page 01-115](#) .

87-130

Fresh air blower -V2-, removing and installing (1997 ➤)

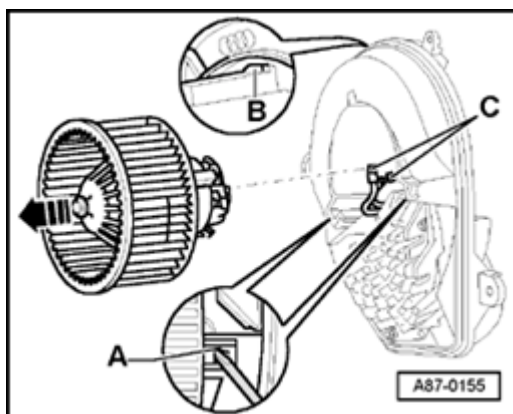
Remove glovebox

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

**A**

- Remove electrical connector -B-
- Remove bolts -A- and remove fresh air blower with mounting plate from heater/air conditioner assembly.

Separating fresh air blower -V2- and mounting plate

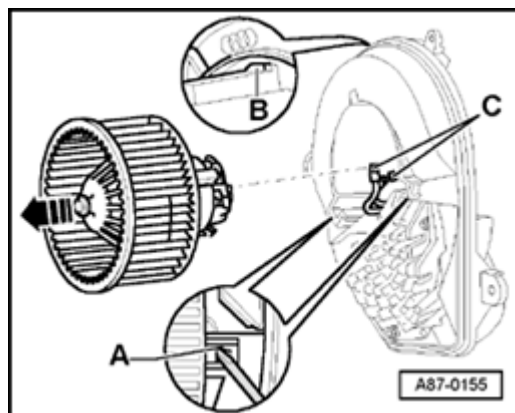
**A**

- Depress locking tabs -A- and -B- with screwdriver.
- Separate fresh air blower from mounting plate.
- Disconnect electrical harness connectors -C-.

87-131

Notes:**A**

- ◆ When re-installing the fresh air blower to the mounting plate, check for correct installation position of tabs -A- and -B-.
- ◆ After installation check for correct fit of fresh air blower in heater/air conditioner assembly.



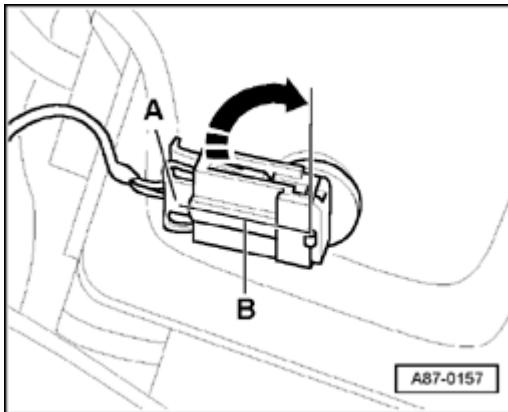
87-132

Sensor for outlet temperature, center - G191-, removing and installing (1997 ➤)

Remove Radio

⇒ [Repair Manual, Radio, Telephone, Navigation, Repair Group 91](#)

Remove trim for instrument panel center part

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

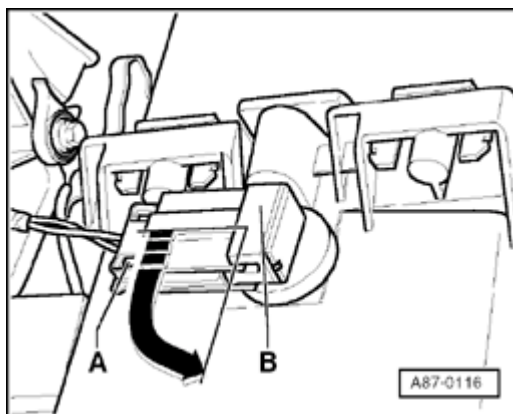
- Disconnect electrical connector -A-.
- Turn sensor -B- 90° and remove.

87-133

Sensor for outlet temperature, center - G192-, removing and installing (1997 ➤)

Remove driver side under-dash panel

⇒ [Repair Manual, Body Interior, Repair Group 70](#)



- Disconnect electrical connector -A-.
- Turn sensor -B- 90° and remove.

87-134

Footwell air outlets, removing and installing

Remove glovebox, lower shelf on driver side and center section of instrument panel complete (trim and supports)

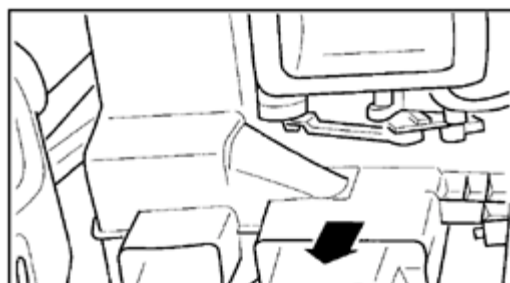
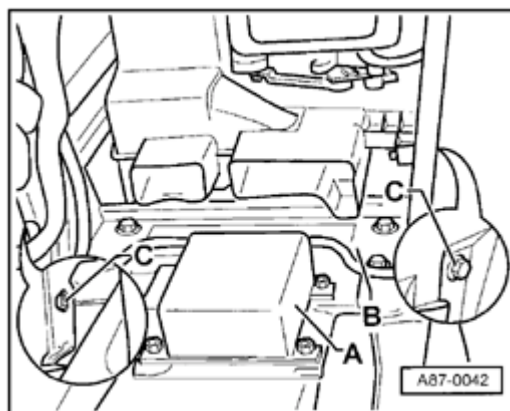
⇒ [Repair Manual, Body Interior, Repair Group 70](#)

- Remove connection ducts between footwell and rear passenger compartment air outlets.

Remove airbag control module -A- ⇒ [Repair Manual, "Body Interior, Repair Group 69](#)

Remove fixture for instrument panel -B- at center tunnel ⇒ [Repair Manual, Body Interior, Repair Group 70](#)

- Remove screws -C-.

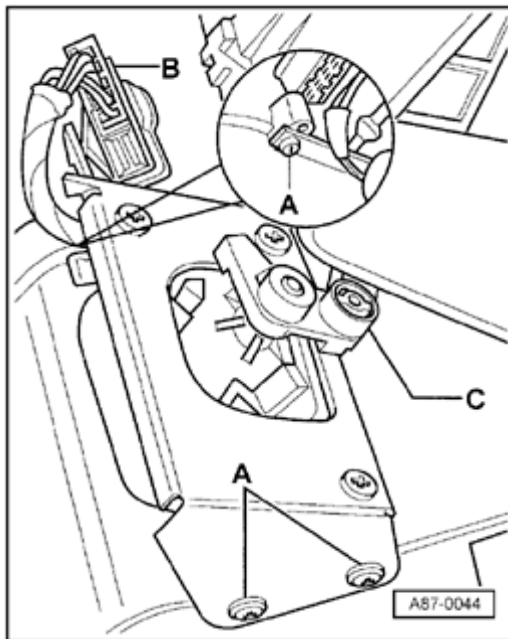


A

- Carefully remove footwell air outlet toward the passenger compartment.
- Install in reverse order of removal.

Footwell/defroster flap motor -V85-, removing and installing (1996)

- Remove footwell air outlet ⇒ [page 87-134](#) .



A

- Remove 3 screws -A-.
- Separate electrical connection -B- ("red" connector housing).
- Release relay lever -C- and remove flap motor.
- Install in reverse order of removal.

Notes:

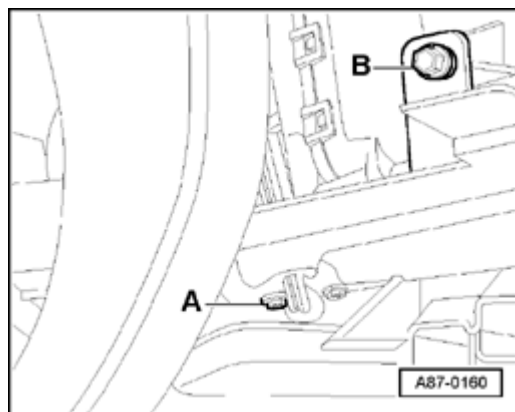
- ◆ After installing, always check DTC memory ⇒ [page 01-18](#) .
- ◆ When installing flap motor, ensure that relay lever -C- is correctly positioned.
- ◆ Testing -V85-, output Diagnostic Test Mode (DTM) ⇒ [page 01-42](#) .
- ◆ Electrical test ⇒ [page 01-115](#) .

87-136

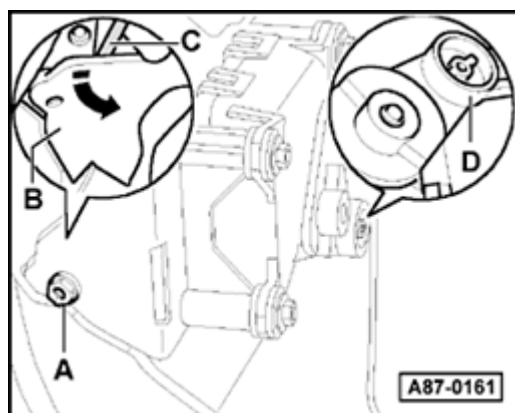
**Footwell/defroster flap motor -V85-,
removing and installing (1997 ➤)**

Remove driver side under dash panel

⇒ [Repair Manual, Body Interior, Repair Group 70](#)



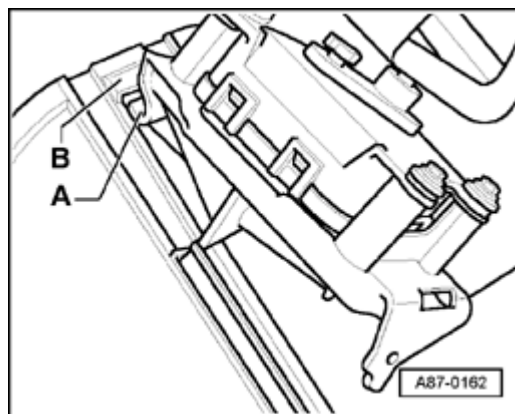
- A**
- Remove bolts -A- and -B- (for left instrument panel support).
 - Remove floor outlet ⇒ [page 87-134](#) .
 - Disconnect electrical connector from motor.



- A**
- Remove bolt -A-.
 - Unhook lower strap -B- of bracket with screw driver -C-.
 - Remove motor and unhook lever -D- (color: white).

Notes for installing:

- ◆ When installing flap motor, ensure that relay lever -D- is correctly positioned (⇒ [illus. A87-0161 on page 87-136](#)).

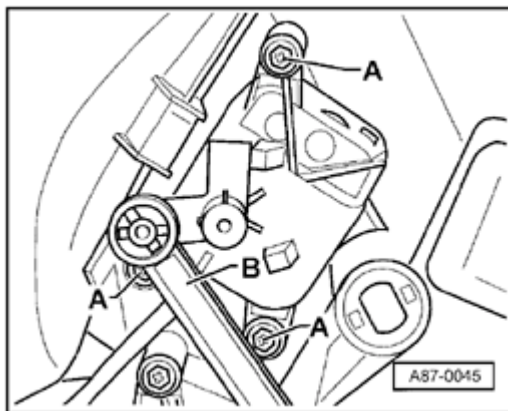


A

- ◆ Install strap -A- (on bracket for motor) first into mounting -B- (on heater/air conditioning assembly).
- ◆ After installing, always check DTC memory ⇒ [page 01-18](#) .
- ◆ Testing -V85- ⇒ [page 01-42](#) (output DTM).
- ◆ Electrical test ⇒ [page 01-115](#) .
- ◆ Wiring harness must be installed so that it does not come in contact with moving components (e.g. motor linkage).
- ◆ If the crank on the motor is positioned so that the lever can not be hooked in or the motor can not be installed, connect motor to the wiring harness, switch on ignition and place lever in appropriate position by activating the button for air distribution on A/C control head -E87-.

Temperature regulator flap motor -V68-, removing and installing (1996)

- Remove footwell air outlet ⇒ [page 87-134](#) .



4

- Remove 3 screws -A-.
- Separate electrical connection to flap motor ("black" connector housing).
- Release relay lever -B- and remove flap motor.
- Install in reverse order of removal.

Notes:

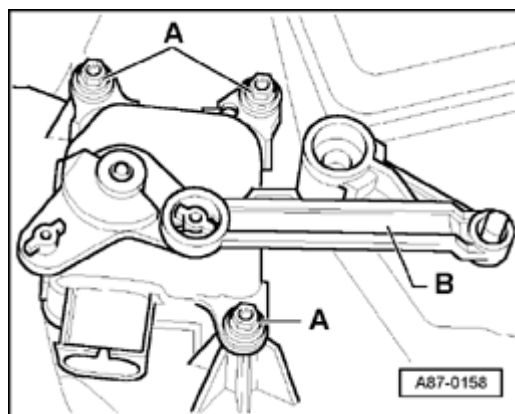
- ◆ After installing, always check DTC memory ⇒ [page 01-18](#) .
- ◆ When installing flap motor, ensure that relay lever -B- is correctly positioned.
- ◆ Testing -V68-, output Diagnostic Test Mode (DTM) ⇒ [page 01-42](#) .
- ◆ Electrical test ⇒ [page 01-115](#) .

Temperature regulator flap motor -V68-, removing and installing (1997 ➤)

Remove complete front section of center console

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

- Loosen floor outlet from the right instrument panel support ⇒ [page 87-134](#) .



4

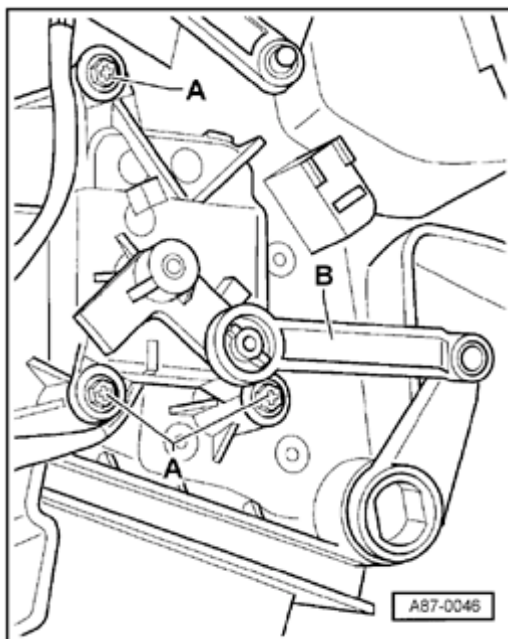
- Identify and mark electrical connectors at flap motor prior to disconnecting (to prevent mix up) and remove from motor.
- Remove 3 bolts -A-.
- Remove motor and unhook lever -B- (color: red).

Notes for installing:

- ◆ After installing, always check DTC memory ⇒ [page 01-18](#) .
- ◆ When installing flap motor, ensure that relay lever -B- is correctly positioned.
- ◆ Testing -V68- ⇒ [page 01-42](#) (output DTM).
- ◆ Electrical test ⇒ [page 01-115](#) .
- ◆ Wiring harness must be installed so that it does not come in contact with moving components (e.g. motor linkage).

Central air flap motor -V70-, removing and installing (1996)

- Remove footwell air outlet ⇒ [page 87-134](#) .



A

- Remove 3 screws -A-.
- Separate electrical connection to flap motor ("blue" connector housing).
- Release relay lever -B- and remove flap motor.
- Install in reverse order of removal.

Notes:

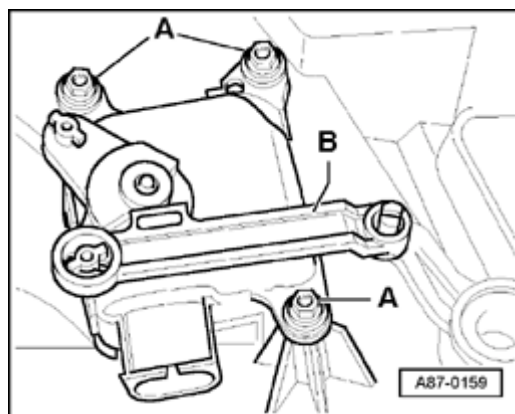
- ◆ After installing, always check DTC memory ⇒ [page 01-18](#) .
- ◆ When installing flap motor, ensure that relay lever -B- is correctly positioned.
- ◆ Testing -V70-, output Diagnostic Test Mode (DTM) ⇒ [page 01-42](#) .
- ◆ Electrical test ⇒ [page 01-115](#) .

Central air flap motor -V70-, removing and installing (1997 ➤)

Remove complete front section of center console

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

- Loosen floor outlet from the right instrument panel support ⇒ [page 87-134](#) .



- Identify and mark electrical connectors at flap motor prior to disconnecting (to prevent mix up) and remove from motor.
- Remove 3 bolts -A-.
- Remove motor and unhook lever -B- (color: blue).

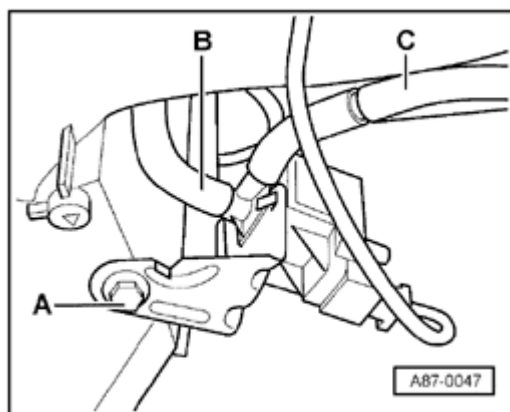
Notes for installing:

- ◆ After installing, always check DTC memory ⇒ [page 01-18](#) .
- ◆ When installing flap motor, ensure that relay lever -B- is correctly positioned.
- ◆ Testing -V70- ⇒ [page 01-42](#) (output DTM).
- ◆ Electrical test ⇒ [page 01-115](#) .
- ◆ Wiring harness must be installed so that it does not come in contact with moving components (e.g. motor linkage).

Fresh air/recirculating flap two-way valve -N63-, removing and installing

Remove glovebox

⇒ [Repair Manual, Body Interior, Repair Group 70](#)



4

- Remove bolt -A-.
- Separate electrical connection.
- Install in reverse order of removal.

Notes:

- ◆ Connect vacuum hoses correctly (hose -B- to vacuum reservoir, hose -C- to vacuum unit).
- ◆ Vacuum hose layout ⇒ [page 87-184](#) .
- ◆ Testing -N63-, output Diagnostic Test Mode (DTM) ⇒ [page 01-42](#) .
- ◆ Electrical test ⇒ [page 01-115](#) .

Instrument panel interior temperature sensor -G56-, removing and installing

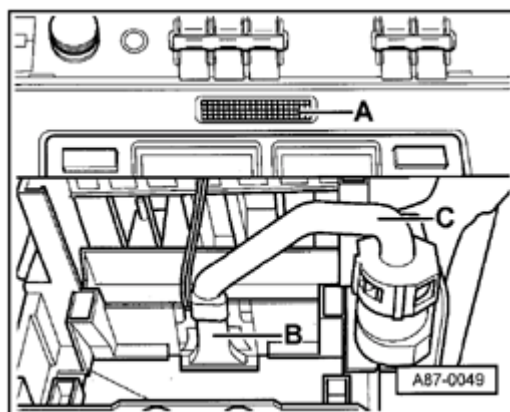
Remove radio and center section of instrument panel complete (trim and supports)

⇒ [Repair Manual, Radio, Telephone, Navigation, Repair Group 91](#) and

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

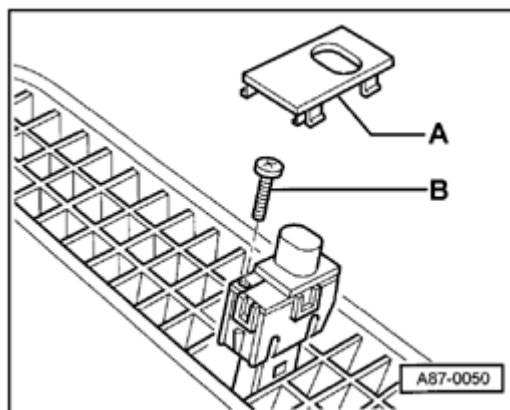
Notes:

- ◆ Check temperature sensor intake -A- and intake hose -C-; air flow must not be restricted by dust or debris.
- ◆ Temperature sensor -B- is attached to switch mounting; replace complete unit.
- ◆ Electrical test ⇒ [page 01-115](#) .



87-144

Sunlight photo sensor -G107-, removing and installing



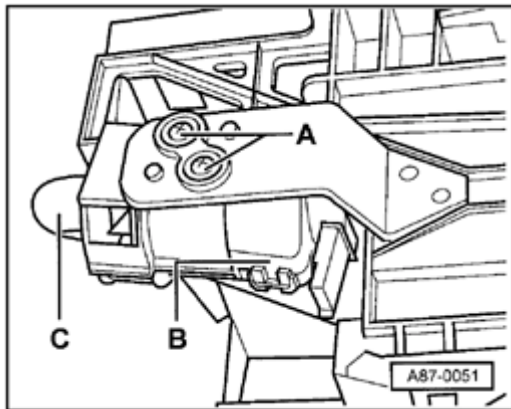
- Carefully pry off cover -A-.
- Remove screw -B-.
- Remove sensor.
- Separate electrical connection.
- Install in reverse order of removal.

Note:

Testing -G107- ⇒ [page 01-63](#) .

Interior temperature sensor fan -V42-, removing and installing

- Remove lower shelf on passenger side, radio and center section of instrument panel complete (trim and supports) ⇒ Repair Manual, Electrical Equipment, Repair Group 90 and Repair Manual, Body Interior, Repair Group 70.



A

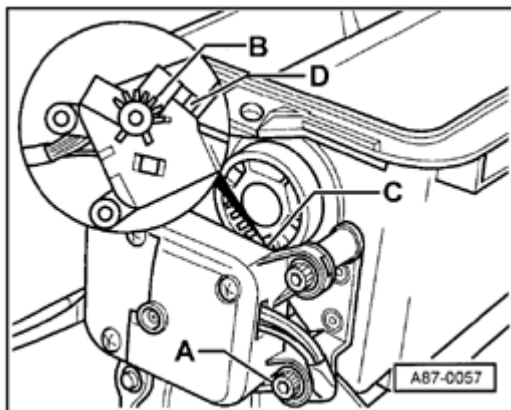
- Remove 2 screws -A-.
- Remove suction hose -C- and remove blower-B-.
- Install in reverse order of removal.

Notes:

- ◆ Check suction hose -C-; air flow must not be restricted by dust or debris.
- ◆ Testing -V42-, output Diagnostic Test Mode (DTM) ⇒ [page 01-42](#) .
- ◆ Electrical test ⇒ [page 01-115](#) .

Air flow flap motor -V71-, removing and installing (1996)

- Remove heater/air conditioner assembly complete with instrument panel ⇒ [page 87-159](#) .

**A**

- Remove 3 screws -A- and remove flap motor.
- Install in reverse order of removal noting the following.

Notes:

- ◆ Markings on the gears of flap motor -B- and air flow flap -C- must be aligned (longer tooth and continuous tooth intermediate space).
- ◆ If lever of flap motor rests against stop D, the intake shaft through the air flow flap must be closed when the flap motor is installed (longer side of air flow flap faces in direction of travel).
- ◆ After installing, check DTC memory ⇒ [page 01-18](#) .
- ◆ Testing V71, output Diagnostic Test Mode (DTM) ⇒ [page 01-42](#) .
- ◆ Electrical test ⇒ [page 01-115](#) .

87-147

Air flow flap motor -V71-, removing and installing (1997 ➤)

Note:

Motor is installed between heater/air conditioning assembly and bulkhead and operates the air flow flap and fresh air/recirculating air flap.

Remove glovebox

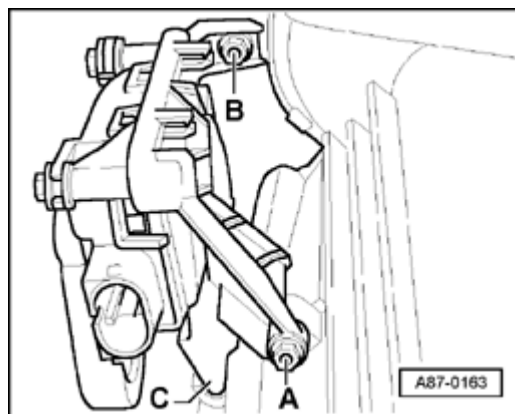
⇒ [Repair Manual, Body Interior, Repair Group 70](#)

- Disconnect electrical connector from motor.

4

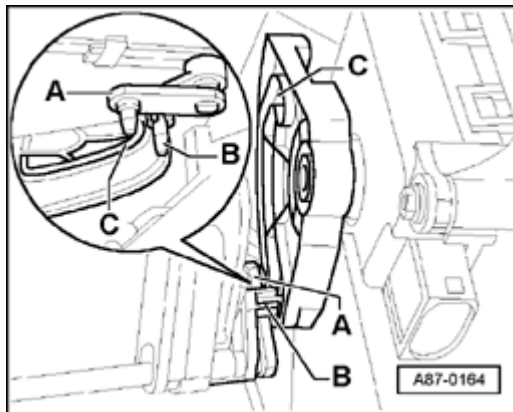
- Remove bolts -A- and -B-.

- Unhook strap -C- of bracket from heater/air conditioner assembly mounting and remove motor.



Notes for installing:

- ◆ After installing, always check DTC memory ⇒ [page 01-18](#) .
- ◆ Testing -V71- ⇒ [page 01-42](#) (output DTM).
- ◆ Electrical test ⇒ [page 01-115](#) .
- ◆ Wiring harness must be installed so that it does not come in contact with moving components (Eg.: motor linkage).
- ◆ Metal lever -A- moves the air flow flap and is inserted in the closed guide groove -C-.
- ◆ Plastic lever -B- moves the fresh air/recirculating air flap, runs mostly on the rear of the curved disc and only assumes an open guide groove position when in "recirculating operation."



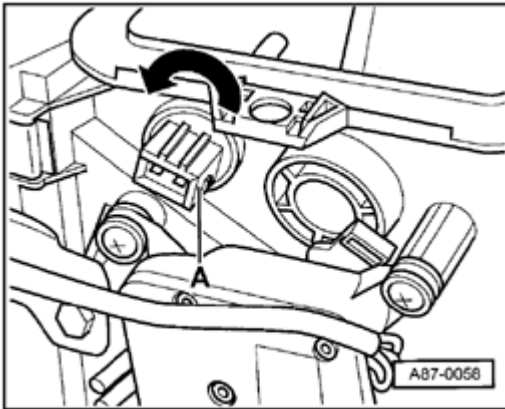
87-149

Fresh air intake duct temperature sensor -G89-, removing and installing (1996)

- Remove heater/air conditioner assembly complete with instrument panel ⇒ [page 87-159](#) .
- Turn temperature sensor -A- 90° to remove.
- Install in reverse order of removal.

Notes:

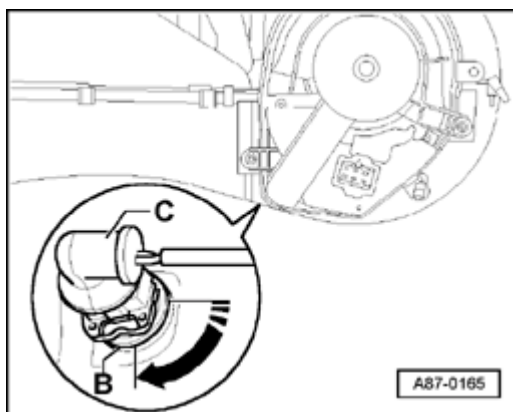
- ◆ Testing -G89- ⇒ [page 01-63](#) .
- ◆ Electrical test ⇒ [page 01-115](#) .



Fresh air intake duct temperature sensor -G89-, removing and installing (1997 ➤)

Remove glovebox

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

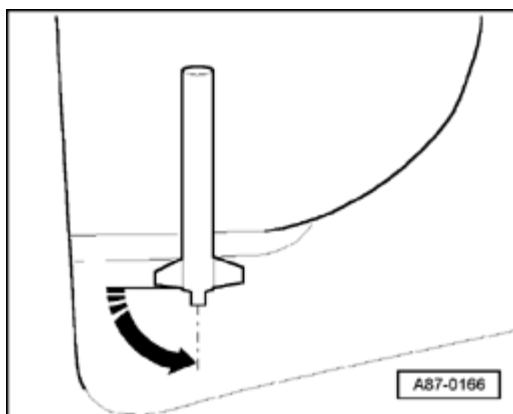


- Reach in-between heater/air conditioner assembly and bulkhead and turn sensor -B- 90° (arrow) (connector -C- remains connected).

Notes:

- ◆ Temperature sensor -G89- is easily accessible with air flow flap motor -V71- removed.
- ◆ If sensor can not be turned:

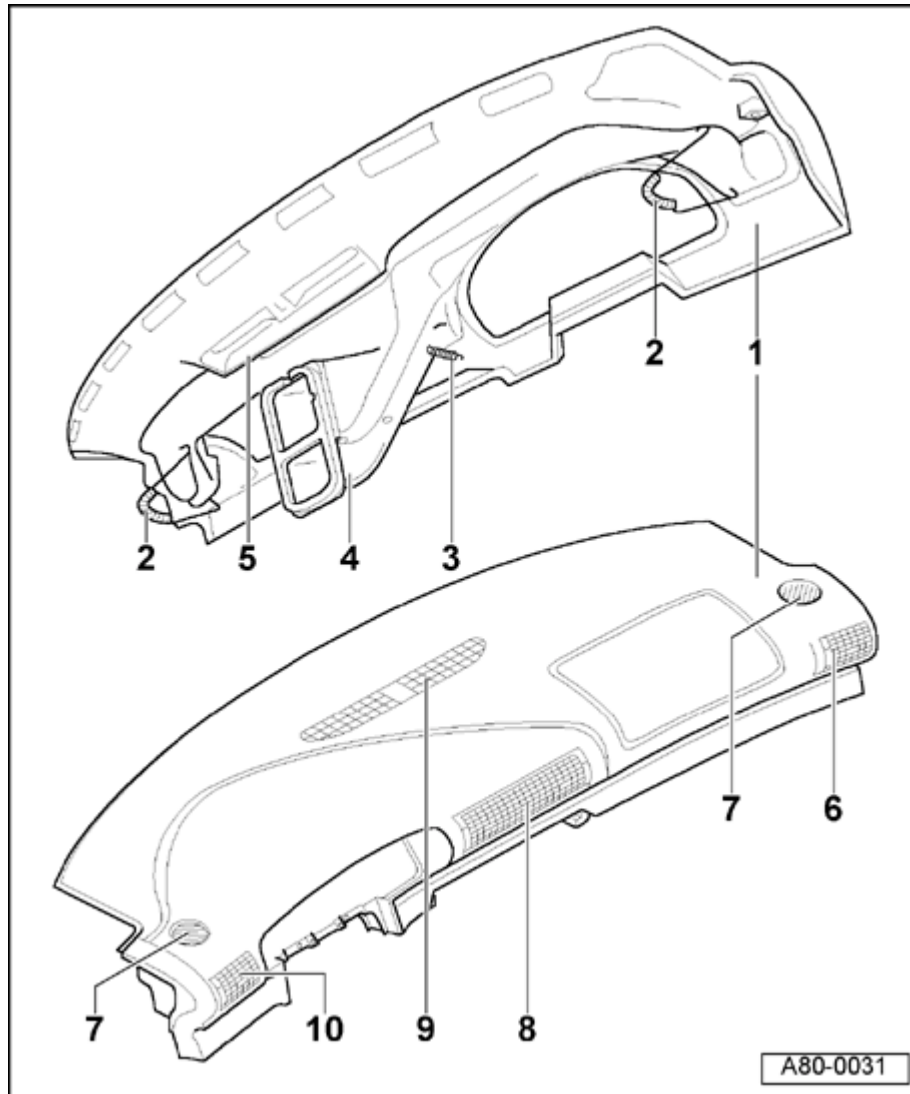
- Carefully spray contact surface of rubber grommet -B- with silicone spray.



- Remove dust and pollen filter ⇒ [page 87-158](#) .
- Reach into intake and turn temperature sensor 90° .

- ◆ After installing, always check DTC memory ⇒ [page 01-18](#) .
- ◆ Electrical test ⇒ [page 01-115](#) .

87-151



Heating and ventilation system, servicing

Instrument panel air outlets and air guide ducts

CAUTION!

Before working on the electrical system:

- ♦ Obtain security code for anti-theft radio.
- ♦ Note customer's pre-set radio stations.
- ♦ Disconnect battery Ground (GND) strap.

Note:

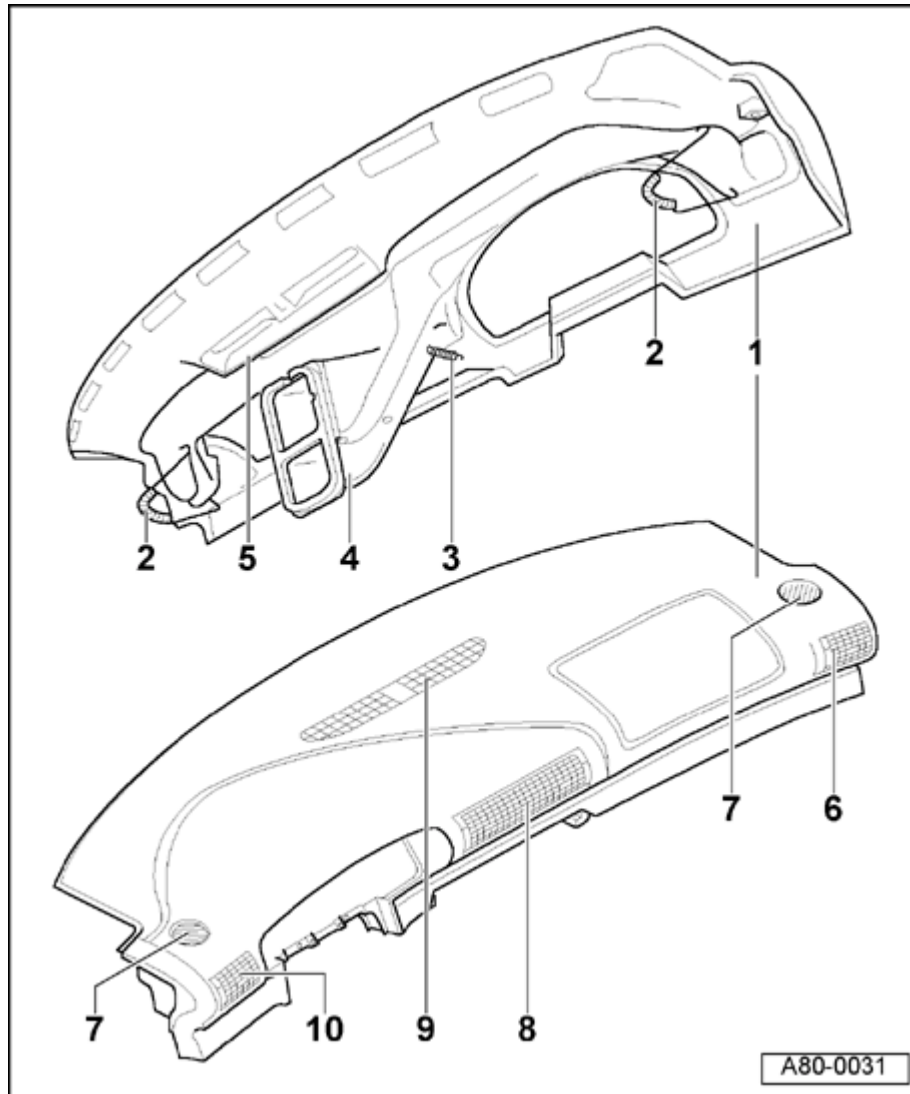
Air is extracted from the passenger compartment through 2 outlets located on both sides of the rear luggage compartment area near the bumper ⇒ [page 87-157](#).

1 - Instrument panel top cover

Removing and installing ⇒ [Repair Manual, Body Interior, Repair Group 70](#)

2 - Retaining spring for air guide duct

87-152



3 - Retaining spring for air guide duct

4 - Air guide duct

5 - Defroster duct

6 - Right instrument panel air outlet

◆ Removing and installing ⇒ [page 87-155](#)

7 - Side window defroster vent

◆ Removing and installing ⇒ [Repair Manual, Body Interior, Repair Group 70](#)

8 - Center instrument panel air outlet

◆ Removing and installing ⇒ [page 87-154](#)

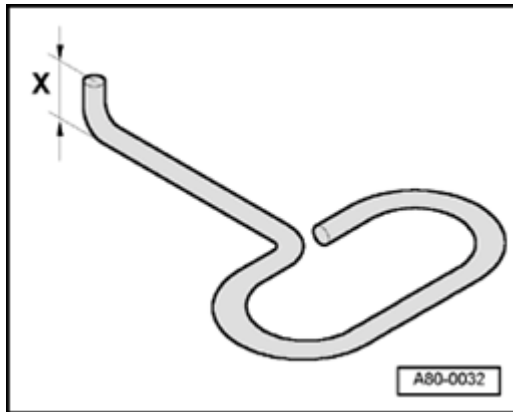
9 - Windshield defroster vent

◆ Removing and installing ⇒ [page 87-156](#)

10 - Left instrument panel air outlet

◆ Removing and installing ⇒ [page 87-155](#)

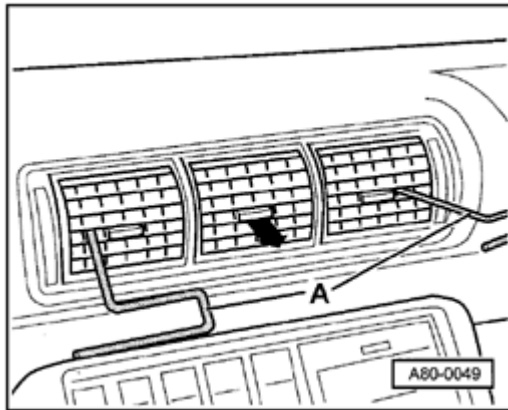
87-153

Tool for removing instrument panel air outlets, locally made

- Bend 3 mm (1/8 in.) diameter wire as shown.
Dimension X = 6 mm (1/4 in.)

87-154

Instrument panel air outlet (center), removing and installing

**A**

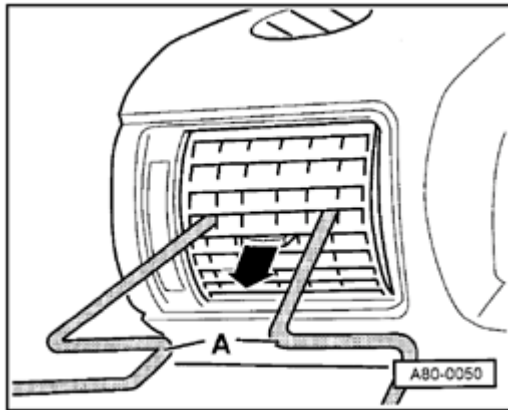
- Insert tools -A- into the instrument panel air outlet and pull outlet evenly out of the instrument panel.

Note:

Should a swivel insert become detached from the air outlet when removing, re-install swivel insert so that it locks in place on both sides.

87-155

Instrument panel air outlets (left and right), removing and installing

**A**

- Insert tools -A- into the instrument panel air outlet and pull air outlet evenly out of the instrument panel.

Note:

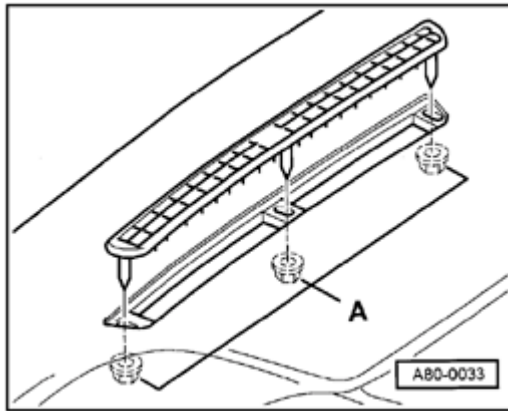
Should a swivel insert become detached from the air outlet when removing, re-install swivel insert so that it locks in place on both sides.

87-156

Instrument panel windshield defroster vent, removing and installing

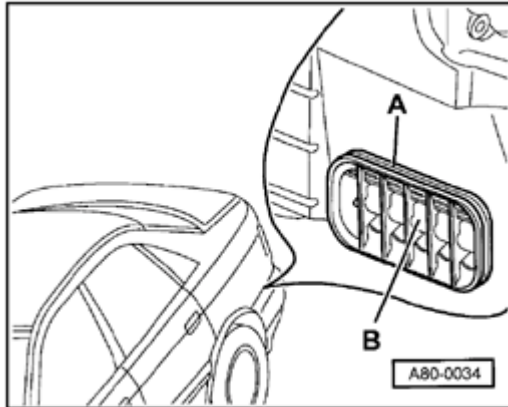
Remove instrument panel top cover

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

**A**

- Remove nuts -A- and remove vent from instrument panel top cover.

Air extraction vents, checking



- Sealing lips -B- in air extraction vents -A- must move freely and close by themselves.

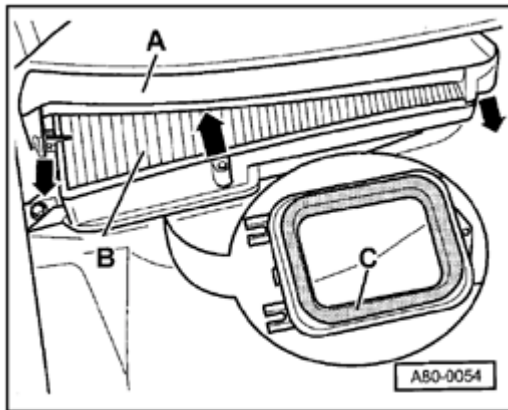
Notes:

- ◆ *Illustration shows air extraction vent with rear bumper removed.*
- ◆ *2 air extraction vents (left and right) are installed for forced ventilation.*
- ◆ *Extraction of air from the passenger compartment can only function properly if rear shelf air guides are not blocked.*

Dust and pollen filter, removing and installing

Remove right air plenum cover

⇒ [Repair Manual, Body Exterior, Repair Group 66](#)



4

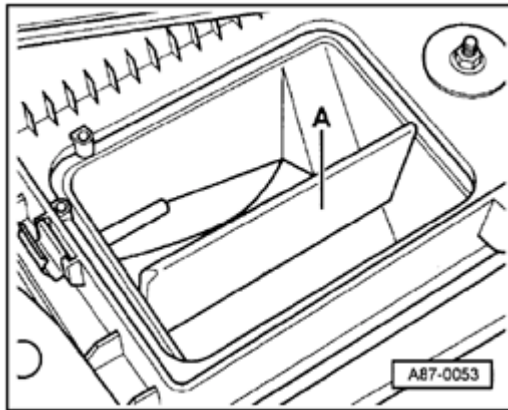
- Remove water guide -A-.
- Remove dust and pollen filter -B- from housing.

Notes:

- ◆ The water guide and the plenum cover must be properly installed to ensure no water flows onto the dust and pollen filter and into the heater housing.
- ◆ Gasket -C- must be attached to the housing of the dust and pollen filter; before installing the housing, check that it is correctly located and not damaged.
- ◆ The dust and pollen filter should be replaced at regular intervals ⇒ [Repair Manual, Maintenance](#).

Heater/air conditioner assembly complete with instrument panel, removing and installing (1996)

- Using VAG1551 function 03, initiate output Diagnostic Test Mode (DTM) ⇒ [page 01-42](#) .

**A**

- Proceed through output DTM and wait until air flow flap -A- closes via air flow flap motor V71.
- Cancel output DTM (press VAG1551 button -C-) with closed air flow flap -A-.
- Discharge refrigerant system ⇒ [page 87-201](#) .
- Remove dust and pollen filter ⇒ [page 87-158](#) .

CAUTION!

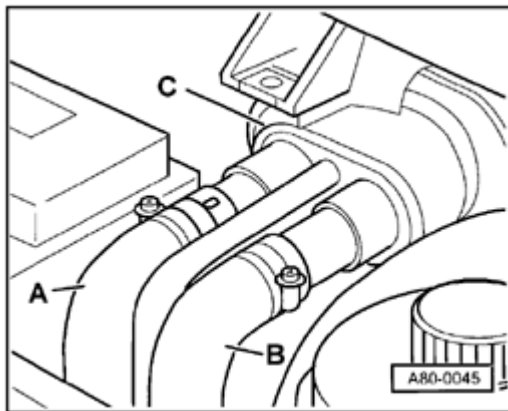
Before proceeding with removal of instrument panel and heater/air conditioner complete:

- ♦ **Obtain security code for anti-theft radio.**
- ♦ **Note customer's pre-set radio stations.**
- ♦ **Move power seats to most rearward position.**
- ♦ **Disconnect and remove battery.**

- Release pressure in coolant system by opening cap at coolant expansion tank.

WARNING!

- ♦ *With hot engine, cooling system is under pressure.*
- ♦ *Coolant expansion tank cap must be removed slowly.*

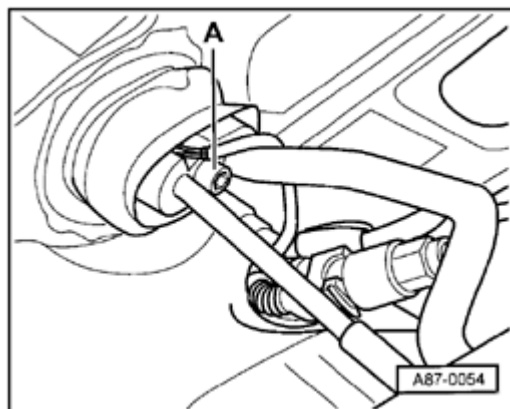
**A**

- Clamp coolant hoses -A- and -B- with VAG3094 (or equivalent) and remove from heater core inlet/outlet.
- Place catch basin below heater core connection -A- and carefully blow coolant out of heater core with compressed air through connection -B-.
- Remove A/C system vacuum supply hose from engine and attach at heater core inlet/outlet.
- Remove boot -C-.

CAUTION!

- ♦ *Dispose of used coolant properly. Check local regulations.*
- ♦ *Do not re-use used coolant.*

87-161



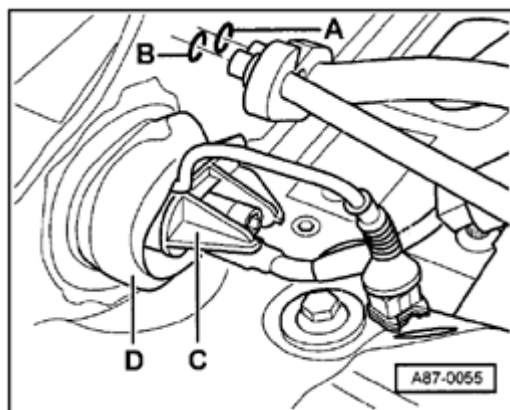
A

- Remove bolt -A-: tightening torque 15 Nm (11 ft lb).
- Loosen refrigerant line clamp and remove lines from evaporator.
- Secure refrigerant lines in engine compartment to allow unobstructed evaporator re-installation.

CAUTION!

Immediately plug open connections on A/C components and lines to prevent dirt and moisture contamination.

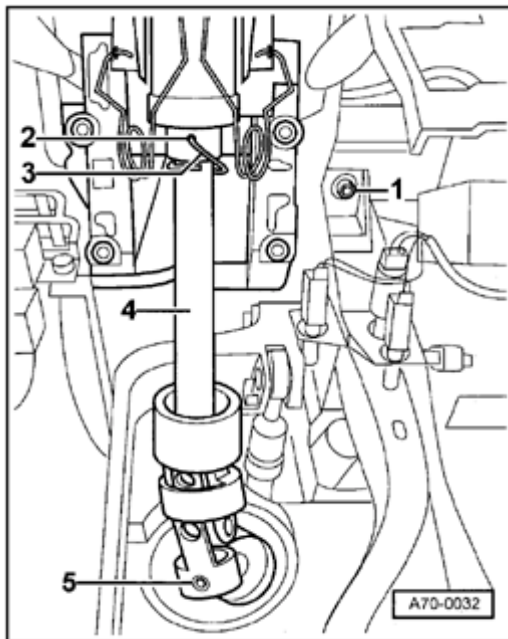
- Use blank plug from a replacement evaporator -C- to seal the connections at the evaporator; this also aids with evaporator re-installation.



A

- Remove boot -D-.
- Disconnect low pressure switch -F73- electrical connection and secure connector end to evaporator fixture.

87-162



Remove glovebox, lower shelf on driver side and center section of instrument panel complete (trim and supports)

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

Detach pedal assembly from instrument panel mounting (bolt -1-) ⇒ [Repair Manual, Brake System, Repair Group 46](#)

Remove drivers Airbag unit ⇒ [Repair Manual, Body Interior, Repair Group 69](#)

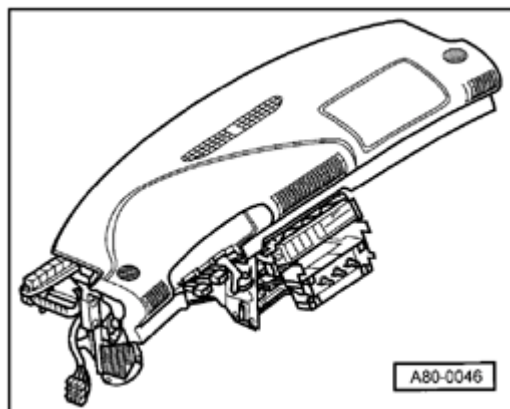
Remove steering wheel ⇒ [Repair Manual, Electrical Equipment, Repair Group 96](#)

Remove steering column -4- from steering gear (bolt -5-) and secure with wire -3- at hole -2- to prevent unit from sliding apart ⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 48](#)

Disconnect affected electrical connections to Electronic box (integrated auxiliary fuse/relay panel) in left air plenum chamber) ⇒ [Repair Manual, Electrical Equipment, Repair Group 97](#)

Disconnect all affected electrical connections between instrument panel assembly and vehicle ⇒ [Repair Manual, Electrical Equipment, Repair Group 97](#)

87-163



Remove heater/air conditioner assembly complete with instrument panel ⇒ [Repair Manual, Body Interior, Repair Group 70](#)

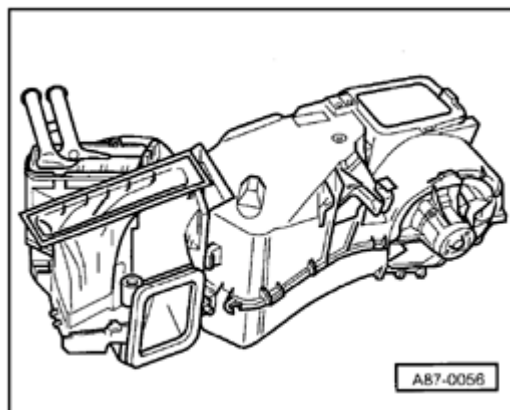
Note:

The instrument panel must only be placed on a clean, covered workbench to avoid damaging the top cover.

- Remove footwell air outlet ⇒ [page 87-134](#) .
- Disconnect all electrical connections between instrument panel and heater/air conditioner assembly.
- ◀ - Remove all screws/bolts between instrument panel mounting and heater/air conditioner assembly.
- Separate Instrument cluster from heater/air conditioner assembly.
- Install in reverse order of removal noting the following.

Notes:

- ◆ *Before removing screws/bolts, mark installation position.*
- ◆ *All cable ties removed in order to separate the instrument panel from the heater/air conditioner assembly must be re-attached at*

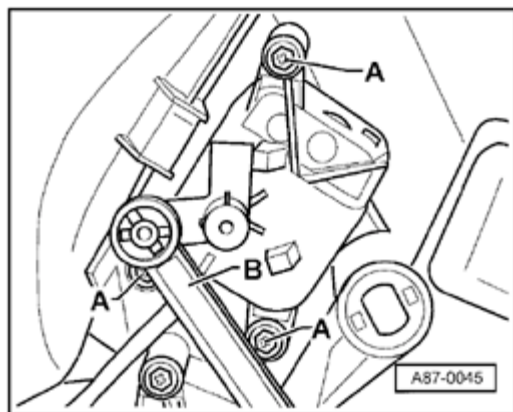


the same point after assembly.

Notes:

- ◆ When re-installing instrument panel and heater/air conditioner assembly, ensure the A/C system vacuum supply hose with heater core fixture, and low pressure switch electrical connector and evaporator fixture are inserted together through the plenum chamber openings.

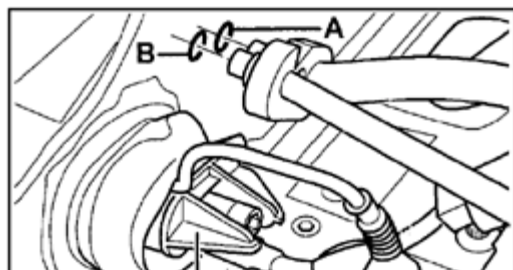
- ◆ Ensure evaporator drain is correctly positioned
⇒ [page 87-169](#).



- ◆ Ensure boot -C- is correctly installed.

Connect coolant hoses correctly:

- ◆ Hose -A-: return flow to water pump (with vent hole).
- ◆ Hose -B-: supply from cylinder head.



- ◆ Replace refrigerant line O-rings -A- and -B-.
- ◆ Evaporator refrigerant line fixture bolt tightening torque: 15 Nm (11 ft lb).
- ◆ Ensure boot -D- and wiring to low pressure switch are correctly located and secured when installing.

- ◆ *Install refrigerant lines free of stress.*
- ◆ *Evacuate refrigerant circuit and charge system with refrigerant R134a
⇒ [page 87-204](#) .*
- ◆ *Fill with fresh coolant/anti-freeze and bleed cooling system ⇒ Repair
Manual, "General, Engine," Repair Group 19.*

Heater/air conditioner assembly, removing and installing (1997 ➤)

CAUTION!

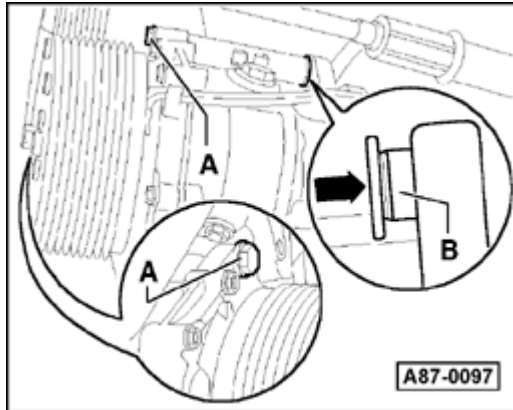
- ♦ *Obtain security code for anti-theft radio.*
- ♦ *Note customer's pre-set radio stations.*
- ♦ *Move power seats to most rearward position.*
- ♦ *Switch off ignition and disconnect battery ground (GND) strap.*
- Release pressure in coolant system by opening cap at coolant expansion tank.

WARNING!

- ♦ *With hot engine, cooling system is under pressure.*
- ♦ *Coolant expansion tank cap must be removed slowly.*
- ♦ *Dispose of used coolant properly. Check local regulations.*

♦ *Do not re-use used coolant.*

87-166



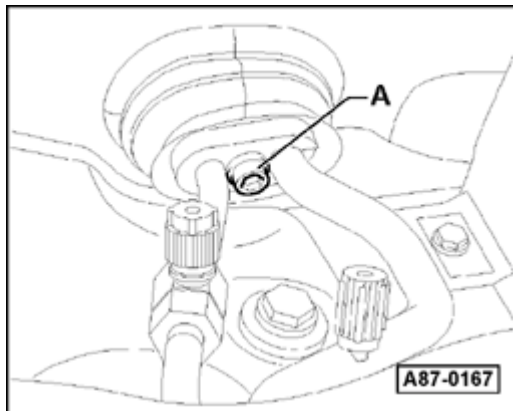
A

- Clamp coolant hoses -A- and -B- with VAG3094 (or equivalent) and remove from heater core inlet/outlet.
- Place catch basin below heater core connection -A- and carefully blow coolant out of heater core with compressed air through connection -B-.
- Remove boot -C-.

CAUTION!

A/C refrigerant system must be discharged before removing heater/air conditioner assembly.

- Discharge refrigerant system ⇒ [page 87-201](#) .



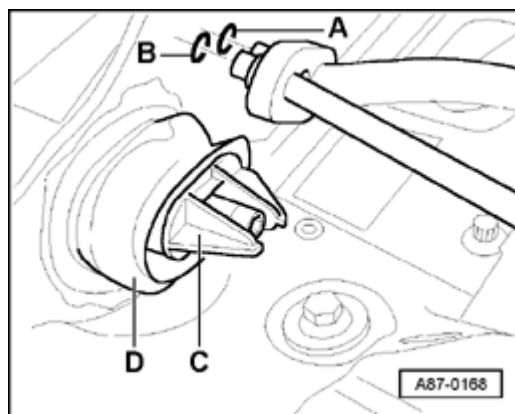
A

- Remove bolt -A-.
- Remove refrigerant lines from evaporator and secure with tie wraps to prevent interference during installation.

CAUTION!

Immediately plug open connections on A/C components and lines to prevent dirt and moisture contamination.

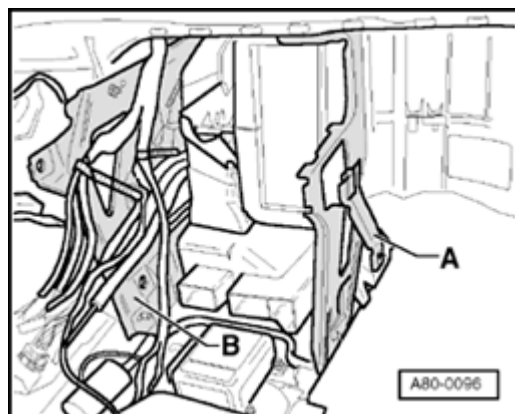
87-167



- A
- Plug evaporator openings using cap supplied with replacement evaporator -C-.
 - Remove bulkhead grommet -D-.

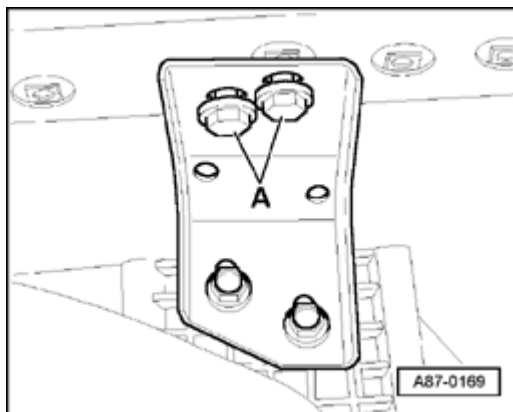
Remove glovebox ⇒ [Repair Manual, Body Interior, Repair Group 70](#)

Remove driver side under-dash panel, center console and instrument panel outer skin ⇒ [Repair Manual, Body Interior, Repair Group 70](#)



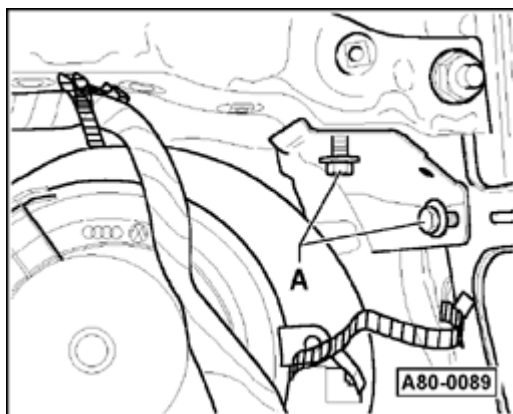
- A
- Remove instrument panel support -A-.
 - Loosen instrument panel support -B- (the upper mounting bolt to the heater/air conditioning assembly can not be removed).
 - Remove floor outlet ⇒ [page 87-134](#) .

87-168



A

- Remove bolts -A-.
- Disconnect all electrical connections from instrument panel harness to heater/air conditioner assembly.



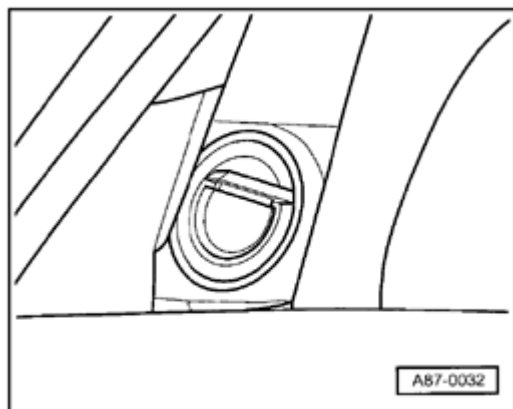
A

- Remove bolts -A-.
- Remove heater/air conditioner assembly towards passenger side.
- Install in reverse order of removal.

Notes on installation:

- ◆ Replace all damaged heater/air conditioner assembly seals.
- ◆ Replace all removed cable tie wraps in the same location.
- ◆ Always replace evaporator inlet/outlet O-rings.
- ◆ Ensure refrigerant lines fit into evaporator without binding.
- ◆ Check evaporator line and heater core bulkhead grommets for correct fit.
- ◆ Check evaporator drain and evaporator drain valve for correct fit (1996 ⇒ [page 87-169](#) ; 1997 ➤ ⇒ [page 87-171](#)).

Evaporator housing drain, checking (1996)

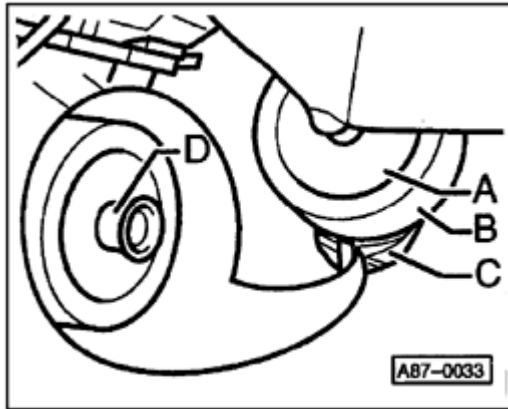
**A**

- Evaporator drain valve flap -A- must not stick, must close completely and drain opening must be pointing downwards.

Notes:

- ◆ Remove drain valve downwards out of the floor panel.
- ◆ When installed, the drain valve must not be touching the heat shield.
- ◆ The drain valve must not stick as a result of wax or underbody sealant.
- ◆ If complaints of moisture in passenger compartment exist, check evaporator drain and drain valve and clean if necessary.

87-170

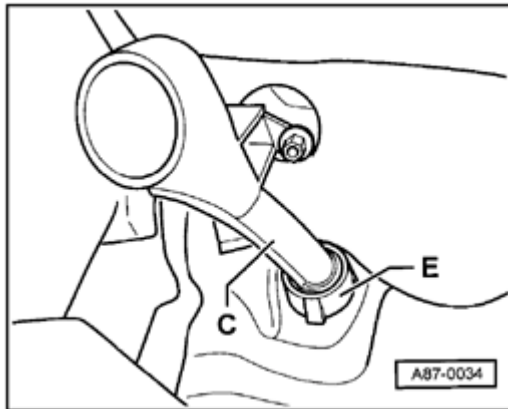


A

- Foam seal -B- must fit tightly against drain funnel -C-.
- Plate -A- must be fitted at drain in order to support foam seal.

Notes:

- ♦ The drain funnel and foam seal can only be replaced with A/C housing with evaporator assembly removed (removing and installing heater/air conditioner assembly ⇒ [page 87-172](#)).
 - ♦ The stopper -D- on drain prevents liquid flowing back into the foam seal.
- A
- ♦ Drain funnel -C- must be secured to floor panel and must not impede operation of drain valve -E-.

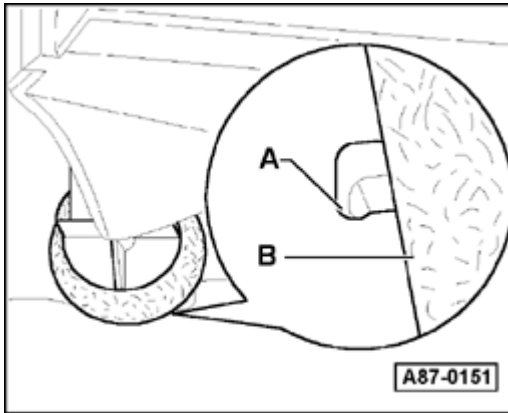


A

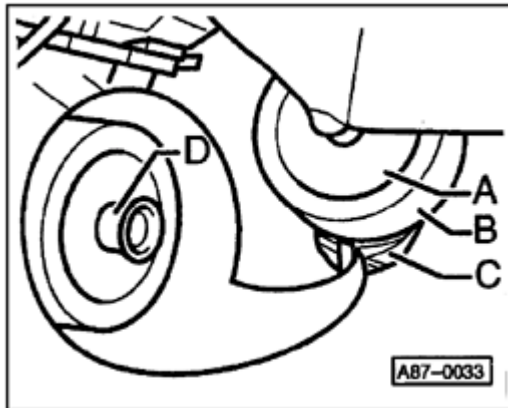
87-171

Evaporator housing drain, checking (1997 ➤)

Notes:

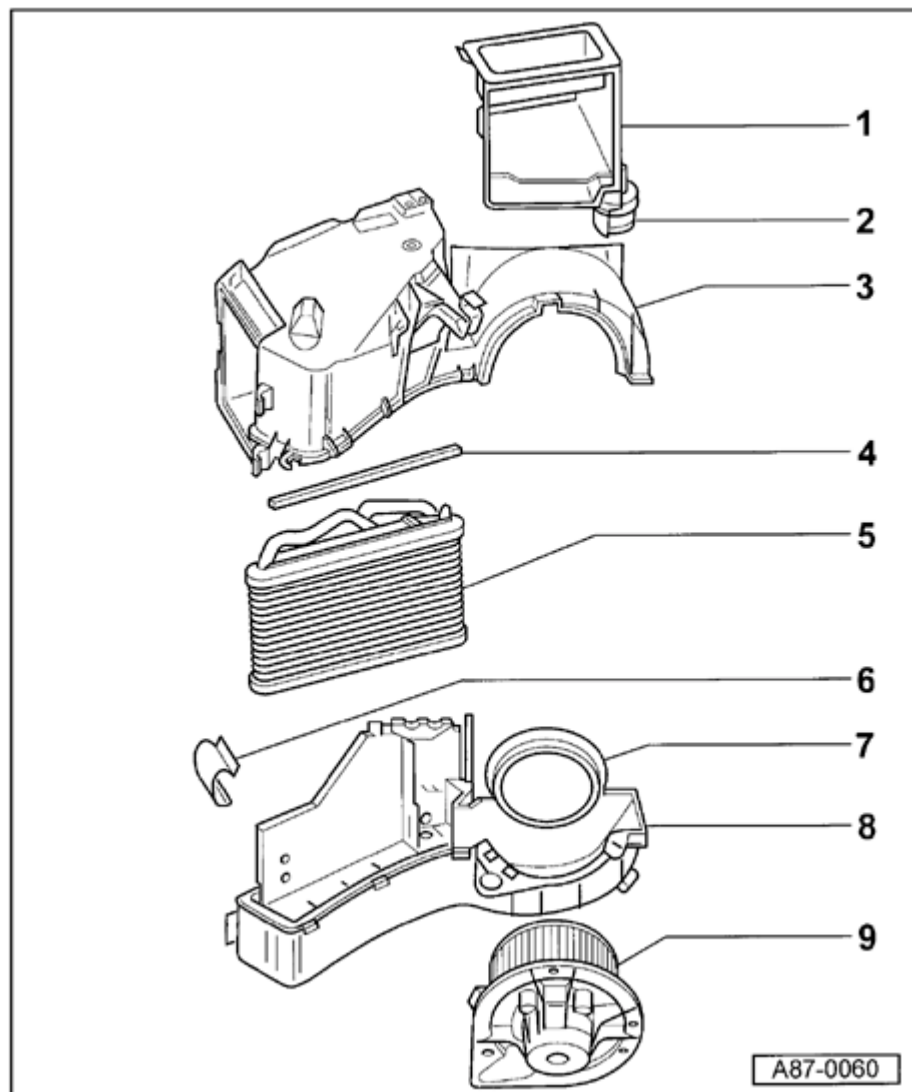


- ◆ Drip guide -A- on the evaporator housing drain prevents liquid from flowing back into the foam seal -B-.



- ◆ Should drip guide break off, install stopper -D- and seal with silicone adhesive to the drain tube.

87-181



Evaporator housing, assembly

- Remove heater/air conditioner assembly complete with instrument panel ⇒ [page 87-159](#) .
- Heater/air conditioning assembly ⇒ [page 87-165](#) .

1 - Intake duct

- ◆ Removing and installing air flow flap ⇒ [page 87-183](#)

- ◆ Coat sealing surfaces of housing halves with silicone rubber before assembling

2 - Fresh/recirculating air flap vacuum unit

- ◆ Removing and installing ⇒ [page 87-186](#)

3 - Top part of evaporator housing

4 - Gasket

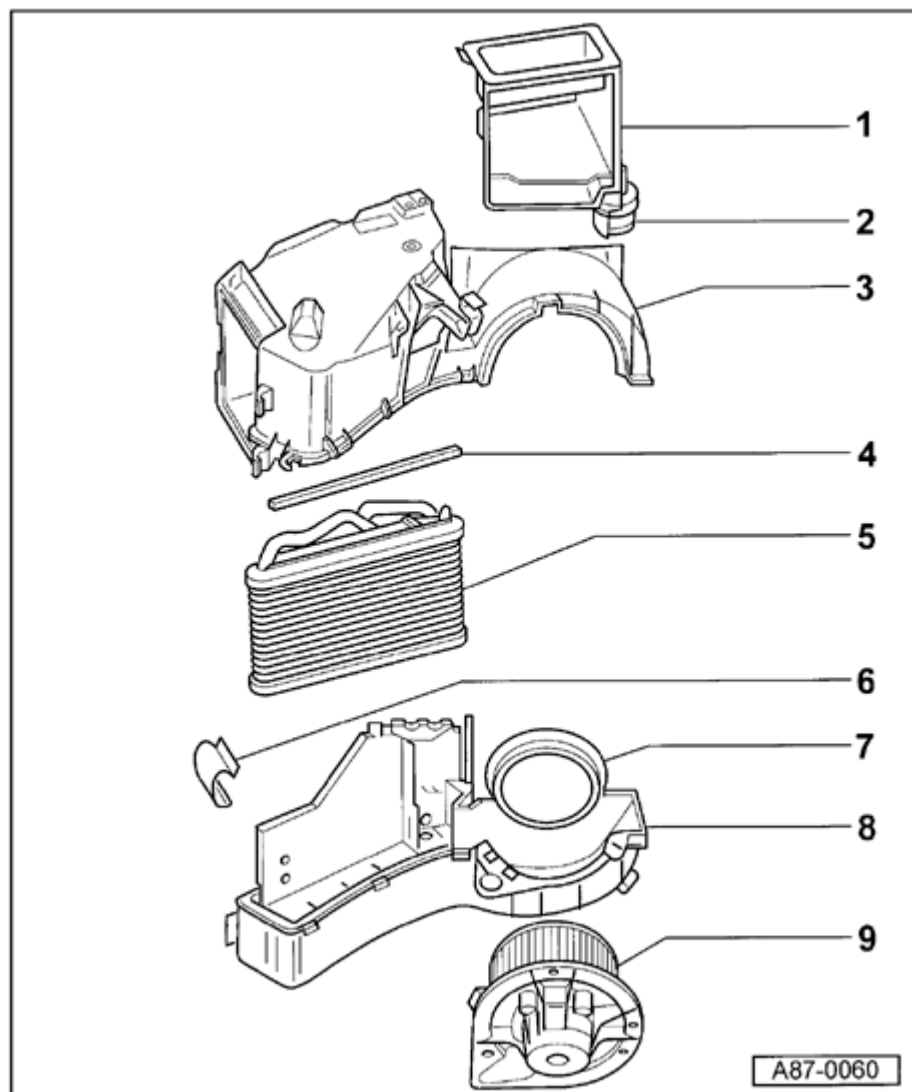
- ◆ Glued into top part of evaporator housing

5 - Evaporator

6 - Retaining clip

- ◆ Carefully pry off with screwdriver

87-182

**7 - Intake ring**

- ◆ Secured from turning by cast stud on bottom half of housing

8 - Bottom part of evaporator

- ◆ Coat sealing surfaces to upper housing half with silicone rubber before assembling

9 - Fresh air blower -V2-

1996 vehicles:

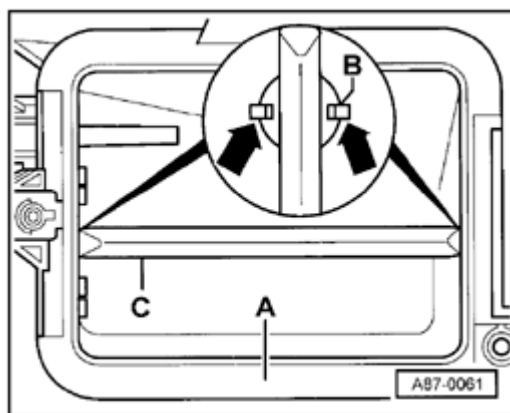
- ◆ Removing and installing ⇒ [page 87-129](#)

1997 ➤ vehicles:

- ◆ Removing and installing ⇒ [page 87-130](#)

Air flow flap, removing and installing

- Remove heater/air conditioner assembly complete with instrument panel ⇒ [page 87-159](#) .
- Remove flap motor V71 for air flow flap:
 - ♦ 1996 vehicles ⇒ [page 87-146](#) .
 - ♦ 1997 ➤ vehicles ⇒ [page 87-147](#) .



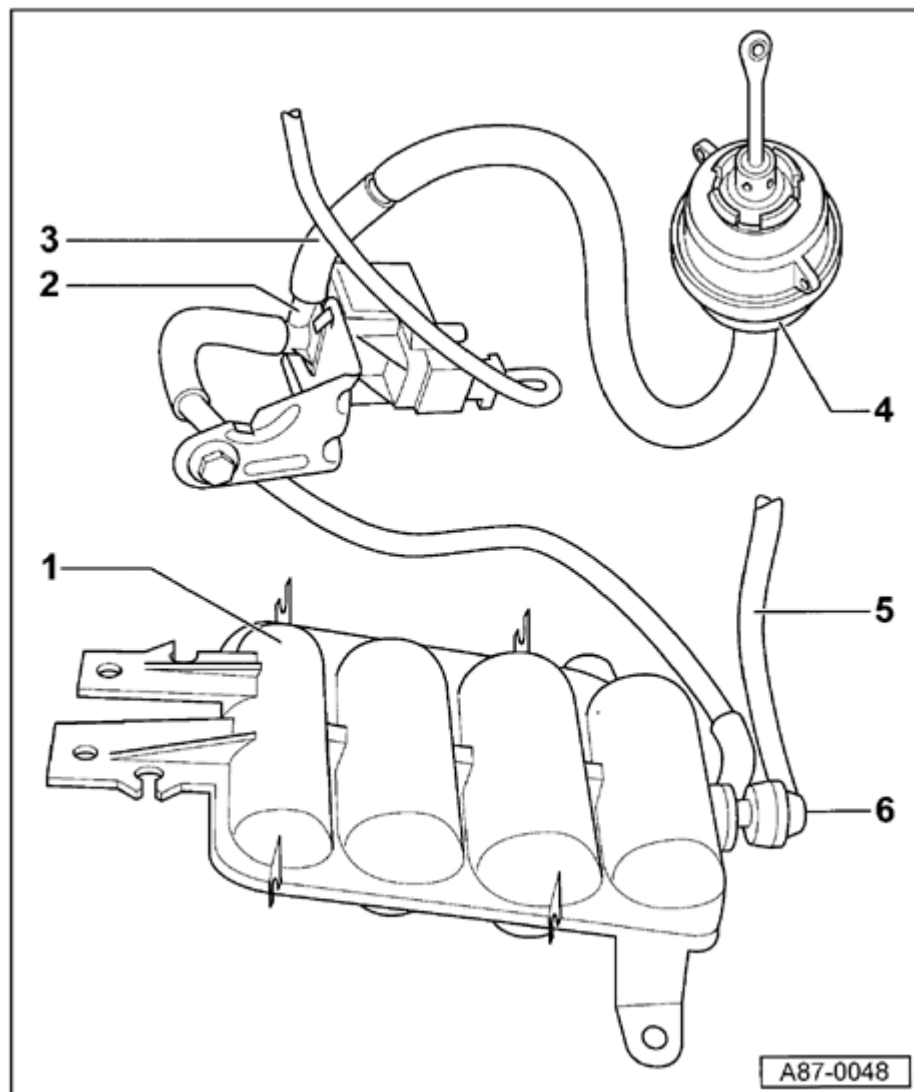
A

- Separate intake duct -A- from evaporator housing ⇒ [page 87-181](#) .
- Press back both catches -B- and remove both bearings.
- Remove air flow flap -C-.
- Install in reverse order of removal.

Note:

Insert air flow flap correctly (longer side of air flow flap faces in direction of travel and the teeth of the bearing face down).

87-184



Vacuum system, hose layout

Note:

Testing vacuum system ⇒ [page 87-187](#) .

1 - Vacuum reservoir

◆ Removing and installing ⇒ [page 87-188](#)

2 - Two-way valve for fresh/ recirculating air flap -N63-

◆ Removing and installing ⇒ [page 87-142](#)

3 - Restrictor

4 - Fresh/recirculating air flap vacuum unit

◆ Removing and installing ⇒ [page 87-186](#)

5 - Vacuum supply hose from engine

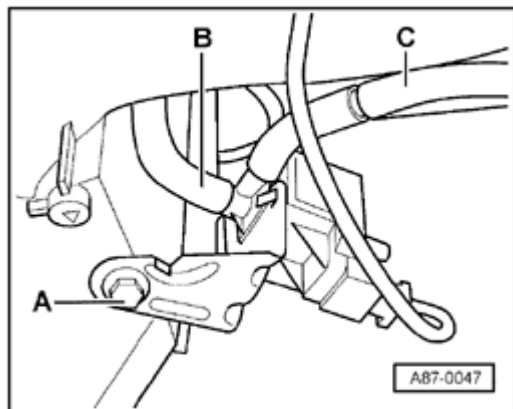
6 - One-way valve

◆ Removing and installing ⇒ [page 87-188](#)

87-185

Vacuum system, servicing

Fresh/recirculating air flap vacuum unit, testing



A

- Detach hose -C- from two-way valve and connect vacuum pump US 8026, VAG1390 (or equivalent) to hose.
- Produce a vacuum (fresh/recirculating air flap moves against stop in recirculating air mode position and remains in this position).

Note:

Removing and installing vacuum unit ⇒ [page 87-186](#) .

Fresh/recirculating air flap vacuum unit, removing and installing

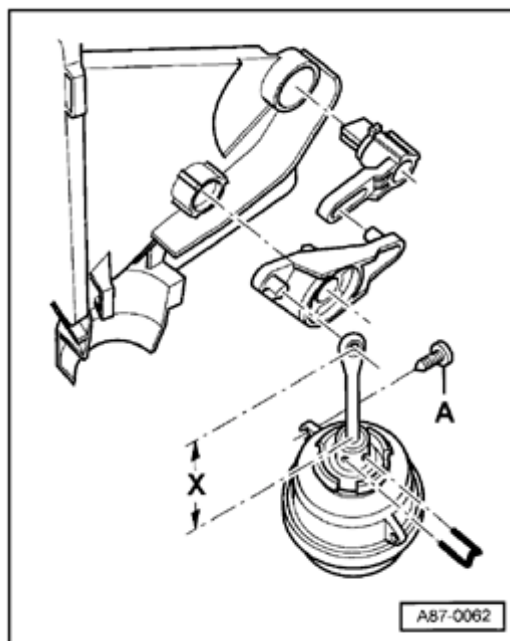
- Remove heater/air conditioner assembly complete with instrument panel ⇒ [page 87-159](#) .



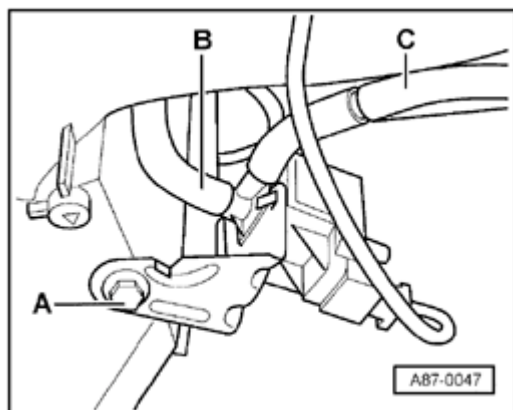
- Remove screw A.
- Detach vacuum unit.
 - ◆ Setting X = 50 mm (1-31/32 in)
- Install in reverse order of removal.

Notes:

- ◆ Do not disassemble air conditioner.
- ◆ When installing, check for free operation.
- ◆ Test vacuum system ⇒ [page 87-187](#) .



Vacuum supply and one-way valve, testing

**A**

- Detach hose -B- from two-way valve (N63) and connect vacuum gauge VAG1368 (or equivalent) to hose.
- Start engine and run at idle until the readout has stabilized.
- Switch off engine. Vacuum reading on gauge must not drop by more than 50 mbar within 2 minutes.

Notes:

- ◆ *Specification for vacuum when engine running: greater than 250 mbar.*
- ◆ *Removing and installing vacuum reservoir and one-way valve ⇒ [page 87-188](#)*
- ◆ *Testing -N63-, output Diagnostic Test Mode (DTM) ⇒ [page 01-42](#) .*

Vacuum reservoir with one-way valve, removing and installing

- Remove heater/air conditioner assembly complete with instrument panel ⇒ [page 87-159](#) .



- Remove screws -A-.
- Install in reverse order of removal.

Note:

Testing vacuum system ⇒ [page 87-187](#) .

