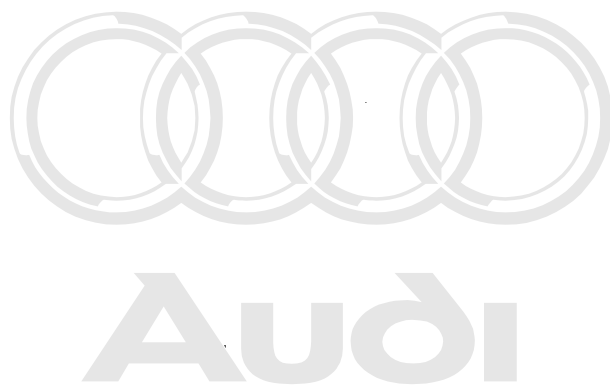


Workshop Manual Audi 80 1992 ►

Booklet Heater, Air conditioner

Edition 09.91



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Audi 80 1992 ►

Please note: the technical supplements given here start at page 88

[illegible]

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SELF-DIAGNOSIS (SD)

=====

Function:

- o The control unit for the magnetic coupling -J153 (for manually controlled air conditioners only on vehicles on which compressor is driven with ribbed belt) and the operating and indicating unit -E87 (on fully automatic air conditioners) are equipped with a fault memory. If malfunctions occur in monitored sensors or components, these are stored together with fault type in fault memory.

Note:

- On vehicles with manually controlled air conditioners on which compressor is driven with V-belt, no self-diagnosis is provided.
- Always interrogate contents of fault memory as first test step.
- Faults which occur only occasionally become sporadic faults. Sporadically occurring faults are also characterized as such - in this case /SP appears on right of display.
- o The control unit for the magnetic coupling distinguishes after evaluating the data between 6 different codes (see Fault Table, Page 01-18) and stores these until ignition is switched off.

01-1

- o The operating and indicating unit differentiates, after evaluating the data, between 19 different codes (see Fault Table, Page 01-56) and stores these until fault memory content is cleared after fault memory interrogation with fault reader V.A.G 1551.

- o The possibilities of self-diagnosis can only be used by employing fault reader V.A.G 1551, Operating Mode 1 "Rapid Data Transmission".

Note:

Data output via fault reader V.A.G 1551 is only possible with ignition switched on or motor running at speed below 4000 rpm (at higher engine speeds data output is interrupted). SD is not limited to just storing, interrogation and clearing, and final control element diagnosis, but also offers additional uses with basic setting, control unit identification and coding. Operating Mode -2- (Flash Code Output) is not provided for air conditioners/heater electronics. Operating Modes -3- (Self-Test) and -4- (Dealership Identification) apply only to the fault tester and are described in the operating instructions of V.A.G 1551.

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01-2

- o Notes on fault recognition:
 - If a fault condition exists for longer than a certain time, the fault is stored as a static fault. If the fault condition is no longer given for a certain time, the fault becomes a sporadic fault. This process is constantly repeated.
 - The conversion of a fault from static to sporadic only occurs if the fault no longer exists for a certain time.
 - If a sporadic fault no longer occurs over a certain time period, it is automatically cleared.

01-3

SELF-DIAGNOSIS TECHNICAL DATA

=====

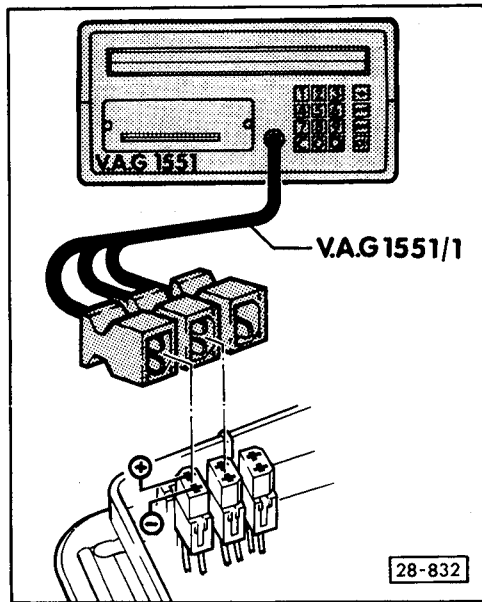
	Control unit for magnetic coupling -J153 (manually controlled air conditioner *)	Operating and indicating unit -E87 (fully automatic air conditioner)**
o Memory	Volatile memory (cleared when ignition switched off)	Permanant memory
o Data output	Rapid data transmission	Rapid data transmission
o Final control element diagnosis	Yes	Yes
o Basic setting	No	Yes
o Reading measured value block	Yes (1 measuring value block with 4 measuring values)	Yes (10 measuring value blocks with 4 measuring values each)
o Codable control unit	No (observe part number and index)	Yes
o Component locations	See Repair Group 87	

** Self-diagnosis is only provided on vehicles on which compressor is driven with ribbed belt.

** No regulation takes place during self-diagnosis (compressor, radiator fan etc. are not controlled).

Note:

The possibilities of operating mode -1- "Rapid Data Transmission" are described on the following pages.



V.A.G - Self-diagnosis	HELP
1 - Rapid data transmission*	
2 - Flash code output*	

INTERROGATING FAULT MEMORY WITH V.A.G 1551 ===== (Manually controlled air conditioner)

- o Note:
 - Only on vehicles on which compressor is driven with ribbed belt.
 - Do not switch off engine after test drive (fault memory will be cleared).
- o Test condition:
 - All fuses OK as per current flow diagram.
- o Interrogating:
 - Carry out test drive of at least 5 minutes with air conditioner switched on and ambient temperature greater than 10°C (higher engine speed).
 - Allow engine to run after test drive.
 - Air conditioner remains switched on.
 - Connect fault reader V.A.G 1551 to diagnosis plugs (in relay socket 1 in left side of plenum chamber) with diagnosis lead V.A.G 1551/1 as follows.
 - Black plug on black diagnosis plug.

◀ Display:
 * Appears alternately

Note:
 If no display appears, check voltage supply for black diagnosis plug - Page 01-77.

- White plug on white diagnosis plug.

Note:
Blue plug is not required.

01-5

- Note:
- o Additional information can be requested using HELP button of V.A.G 1551
 - o --> button is used to step through program sequence.
 - Switch on printer with Print button (button lights up).
 - Press button 1 for "Rapid data transmission" mode.

◀ Display:

- Press keys 0 and 8
 (08 enters address word air conditioner/heater electronics).

◀ Display:

- Acknowledge input with Q button.

Rapid data transmission	HELP
Enter address word XX	

Rapid data transmission	Q
08 - Air conditioner/heater electronics	

4A0919579 X Ctl. Air cond. XXX DX

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◀ Control unit identification and number are displayed.

Display on V.A.G 1551	Respective engine
4A0 919 579 A Ctl. Air cond. 6-cyl.	6-cyl. - petrol
4A0 919 579 C Ctl. Air cond. 4-cyl.	4-cyl. - TDI (Turbo Diesel Direct Injection)
4A0 919 579 D Ctl. Air cond. 4-D	4-cyl. - SC-TD (Swirl Chamber Turbo Diesel)

Note:

- Display "DXX" indicates software version of control unit -J153, and is meaningless for Service Dept.
- For assignment of control unit -J153 - also see parts list.
- If control unit number does not correspond to vehicle engine, renew control unit.

01-7

Control unit does not answer! HELP

or

K wire does not switch to earth/positive! HELP

◀If display indicates:

- Print out list of possible fault causes by pressing HELP button.
- Check wiring connection of diagnosis plug - Page 01-77.
- Check additional voltage supply to control unit for magnetic coupling -J153 Pins 30 and 75, and earth connection using current flow diagram.
- After eliminating possible fault causes, input address word 08 for air conditioner/heater electronics and acknowledge with Q button.

Fault in communication set-up

◀If display indicates:

- Fault elimination - Page 01-79.
- Press ---> button.

Rapid data transmission
Select function XX HELP

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◀Display:

Note:

Pressing HELP button displays overview of possible functions.

01-8

Rapid data transmission 02 - interrogate fault memory	Q
--	---

X Fault recognized!

or

No fault recognized!

- Press buttons 0 and 2
(02 selects "Interrogate fault memory" function)

◀Display:

- Acknowledge input with Q button.

◀Display indicates number of stored faults or message "No fault recognized".

- Press ---> button.

Stored faults are displayed and printed out one after another - see Fault Table, Page 01-18.

- After display and print out of last fault - press ---> button.
- Switch off ignition.
- Eliminate faults.

Note:

Fault memory is cleared when ignition is switched off.

- Carry out test drive and then inter-ogate fault memory.

Note:

If magnetic coupling does energize although no fault was recognized.

- o Read measuring value block - Page 01-10.
- o Carry out final control element diagnosis - Page 01-14.

01-9

READING MEASURING VALUE BLOCK WITH V.A.G 1551 =====

o Note:

- Measuring value block with 4 measuring values provided.
- If printer is switched on, current display is printed out.

o Reading

- Interrogate fault memory - Page 01-5 - and eliminate any faults indicated.
- Allow engine to continue to run at idle after interrogating fault memory.
- Air conditioner is switched on.

Rapid data transmission Select function	XX	HELP
--	----	------

◀Display:

Note:

Pressing HELP button prints out overview of available functions.

- Press buttons 0 and 8
(08 selects "Read measuring value block" function).

Rapid data transmission 08 - Read measuring value block	Q
--	---

◀Display:

- Acknowledge input with Q button.

Read measuring value block Enter display group no.	HELP XX
---	------------

◀Display:

- Press buttons 0 and 1.
- Acknowledge input with Q button.

Read measuring value block 1			
1	2	3	4

◀Display:

Meaning of displays

- Display sector "1"
Compressor switch-off conditions - see Page 01-12 for break-down.
- Display sector "2"
Current engine speed in rpm.
- Display sector "3"
Current compressor speed in rpm.
- Display sector "4"
Current belt slip in %.

Note:

- Belt slippage of up to 30 % is permissible.
- Belt slippage greater than 30 % but less than 60 % leads to switching off of compressor for approx. 10 sec. If belt slippage greater than 30 % but less than 60 % is determined 10 times within one driving period, compressor is no longer switched on.
- Belt slippage greater than 60 % leads to compressor being switched off for entire driving period.

01-11

o Break-Down of Display Sector "1" - Compressor Switch-Off Conditions

Display	Meaning/Fault Remedy
0	Compressor on, no compressor switch-off condition recognized. Note: If compressor is not switched on, carry out final control element diagnosis (Page 01-13).
1	Compressor off: a) Switch-on delay approx. 3 sec. after starting engine. b) Engine speed too low or not recognized. - Engine speed below 600 rpm. - Break in wiring between pin "TD" of control unit -J153 and dash panel insert. - Dash panel insert does not output speed signal (checking - see "Electrical System" Workshop Manual).
2	Compressor off: a) Voltage at pin "75" of control unit -J153 less than 3 V - Air conditioner switched off. - High-pressure switch for magnetic coupling -F118 open. - Ambient temperature below approx. 5°C or ambient temperature switch -F38 open. - Break in wiring. b) Voltage at pin "30" of control unit -J153 less than 10 V. - Low-pressure switch for refrigerant circuit -F73 open. - Break in wiring. - Voltage dip in electrical wiring.
3	Compressor off: a) Coolant temperature warning light - Short circuit to frame in wiring to pin "HLS" of control unit -J153. - Contact "R" of electronic thermoswitch -F76 closed, coolant temperature warning switch -F14 too hot closed or control unit for Diesel direct injection system -J248 input switched to earth (equipment-dependent - see current flow diagram).

01-12

Display	Meaning/Fault Remedy
4	Compressor off: a) Air conditioner compressor engagement. No voltage at Pin "87a" of control unit -J153. - Short circuit to frame in wiring to pin "87a". - Control unit for engine electronics has switched to earth (also see "Fuel Injection and Ignition System" Workshop Manual).
5	Compressor off: a) Belt slippage 1 x greater than 60 % or 10 x greater than 30 % but lesser than 60 %. - Belt tension not OK. - Compressor does not turn freely. b) Control unit for magnetic coupling -J153 incorrect. c) No compressor speed signal recognized. - Sender for air-conditioner compressor speed -G111 defective (checking - see Repair Group 87). - Magnetic coupling -N25 defective (servicing - see Repair Group 87). - Break in wiring, short circuit in wiring between pin "K" of control unit -J153 and sender -G111. - Break in wiring between pin "87" of control unit -J153 and magnetic coupling -N25, or in earth connection of magnetic coupling -N25. Note: - If switch-off condition "2" is also alternately displayed, first eliminate cause of this switch-off condition. - For belt slippage see display sector 4.
6	Kick-down, compressor off for 12 sec. after kick-down switch closes.
7	Kick-down switch closed, no voltage at pin "U" of control unit -J153. - Short circuit to frame in wiring to pin "U". - Kick-down switch -F46 and gear box switch -F15 closed or control unit for automatic gearbox -J217 has switched to earth (equipment-dependent - see current flow diagram).

01-13

FINAL CONTROL ELEMENT DIAGNOSIS WITH V.A.G 1551 =====

(Manually controlled air conditioner)

- Interrogate fault memory and eliminate any faults displayed (Page 01-5).
- Allow engine to continue to run at idle after interrogating fault memory.
- Read measuring value block - Page 01-10 (no compressor switch-off condition may be present).
- Air conditioner switched on (A/C button pressed).

Rapid data transmission HELP
Select function XX

◀Display:

Note:
Pressing HELP button prints overview of available functions.

- Press buttons 0 and 3.
(03 selects "Final control element diagnosis" function).

Rapid data transmission Q
03 - Final control element
diagnosis

◀Display:

- Acknowledge input with Q button.

Final control element diagnosis
A/C compressor engagement

◀Display:

Note:
Only check this final control element (Page 01-15) if following complaint is present:
o Precontrol value of idling stabilization too high.
o Compressor does not run and code "5" is displayed in display sector in measuring value block.

or
00624
Final control element: 0270 (Info from literature)

01-14

- o Engine speed fluctuates or irregular idle during air conditioner operation.
- o Fault message "A/C compressor engagement" - short circuit to positive.

- Press ---> button.

Final control element diagnosis
Magnetic coupling for A/C -N25

◀Display:

- Magnetic coupling is switched on and off in 3 sec. rhythm, compressor is driven with magnetic coupling switched on.

Note:

If "Function is unknown or currently cannot be carried out" appears in display after initial switching-on of magnetic coupling, interrogate fault memory again (Page 01-5). A fault exists which is only recognized during final control element diagnosis.

- If compressor is not driven:

- a) Check voltage supply of magnetic coupling using current flow diagram.
- b) Check compressor by hand for ease of movement with ignition switched off.
- c) Service magnetic coupling - see Repair Group 87.

- Press ---> button.

Carrying out final control element diagnosis "A/C compressor engagement"

- Switch off ignition.
- Wait 30 sec.

01-15

- Remove engine control unit (see "Fuel Injection and Ignition System" Workshop Manual).
- Connect test box V.A.G 1598 to plug for engine control unit.
- Connect voltage tester V.A.G 1527 on test box between earth and input for compressor engagement (from control unit for magnetic coupling -J153, pin "87a") - see current flow diagram and "Fuel Injection and Ignition System" Workshop Manual.
- Switch on ignition.

V.A.G - Self-diagnosis HELP
1- Rapid data transmission*
2- Flash code output*

◀Display:

- * Appears alternately

Rapid data transmission HELP
Enter address word XX

◀Display:

- Press button 0 and 8 (08 enters address word).

Rapid data transmission Q
08 - Air conditioner/heater electronics

◀Display:

- Acknowledge input with Q button.

4A0919579 X Ct1. A/C comp. XXX DXX

◀Display indicates control unit identification and coding. (See Page 01-5 "Interrogate fault memory").

01-16

Rapid data transmission Select function XX	HELP
---	------

◀Display:

- Press buttons 0 and 3.
(03 selects "Final control element diagnosis" function).

Rapid data transmission 03 - Final control element diagnosis	Q
--	---

◀Display:

- Acknowledge input with Q button.

Final control element diagnosis A/C compressor engagement
--

or

0624 Final control element: 0270 (Info from literature)

◀Display:

- Voltage tester V.A.G 1527 lights up in 3 sec. rhythm.
- If voltage tester does not flash: Check wiring between control unit for magnetic coupling
- J153 and plug to control unit for engine electronics for short circuit or break using current flow diagram.
- Press ----> button.

Final control element diagnosis Magnetic coupling for A/C -N25

◀Display:

- Magnetic coupling clicks in 3 sec. rhythm.
- Press ----> button.

01-17

FAULT TABLE

=====

(Manually controlled air conditioner)

- o The following chart lists all possible faults which can be detected by the control unit for the magnetic coupling -J153 and displayed/printed by V.A.G 1551 according to fault code.

Note:

- Only for vehicles on which compressor is driven with ribbed belt.
- Fault memory is cleared each time ignition is switched off.
- o Before renewing component, plug contacts of this component should always be checked.
- o Before renewing control unit for magnetic coupling -J153, also check voltage supply and earth connection using current flow diagram (Pins "30", "75" and "31" on control unit -J153).
- o Sporadically occurring faults are marked in display with /SP.
- o Faults not marked with /SP are not stored, but are only indicated as long as they exist.
- o If defective components are discovered, also check wiring to components for short circuit or break using current flow diagram.
- o Fault code (5-position) is not indicated in display of V.A.G 1551, but only printed out with printer.
- o One of the messages marked with * will be displayed in addition to appropriate component or information.

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V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>00000</u> No fault detected	If faults are present - Read measuring value block - Page 01-10. - Check cooling performance - see Repair Group 87.		
<u>00532</u> Supply voltage for -N25 * Signal too weak	- Air conditioner switched off (A/C button in switch -E30 not pressed). - Low-pressure switch -F73 open. - High-pressure switch -F118 open. - Break in wiring to control unit -J153 (Pins "30" and "75"). - Wiring system voltage less than 10 V at control unit -J153 (Pin "30").	- Compressor does not run. - No or too little cooling performance.	- Locate and eliminate break in wiring to control unit -J153 (Pins "30" and "75") using current flow diagram. - Switching pressures and function of switches -F73 and F118 (see Repair Group 87). - Check ambient temperature switch -F38 (see Repair Group 87). - Locate and eliminate cause for voltage dip using current flow diagram.

01-19

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>00624</u> A/C compressor engagement * Short circuit to positive/SP	- Short circuit to positive in wiring connection between control unit -J153 (Pin "87a") and engine control unit. - Engine control unit defective.	- Precontrol value of idling stabilization too high. - Engine speed fluctuates when compressor is switched on. <u>Note:</u> Symptom depends on type of engine control.	- Locate and eliminate short circuit using current flow diagram. - Carry out final control element diagnosis - Page 01-14. - Check engine control unit (see "Fuel Injection and Ignition System" Workshop Manual).

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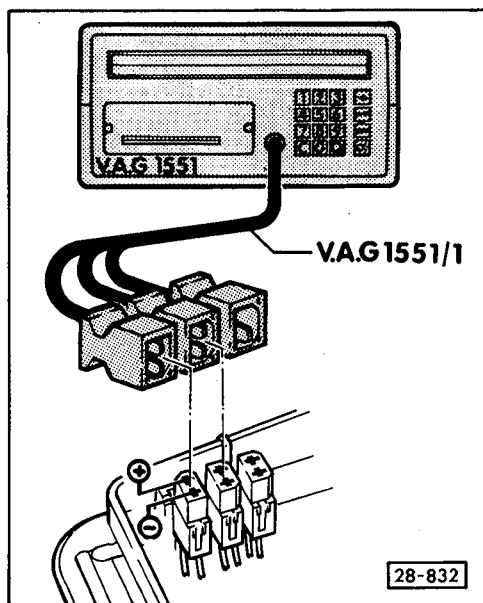


V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>01270</u> Magnetic coupling for A/C -N25 * Speed deviation too large/SP	- Belt tension too low. - Control unit -J153 incorrect. - Magnetic coupling slips. - Compressor does not turn freely.	- Compressor does not run. - Compressor does not run after a few driving kilometers. - No cooling capacity or too low after a few driving kilometers.	- Check belt tension (see "Engine Mechanics" Workshop Manual). - Check control unit version - Page 01-5. - Service magnetic coupling -N25 - see Repair Group 87. - Renew compressor (bring vehicle to specially equipped VW and Audi workshop).
* Break/SP Continued on next	- Break in wiring between Pin "87" on control unit -J153 and magnetic coupling -N25. - Break in wiring between pin "K" on control unit -J153 and sender for A/C compressor speed -G111. - Magnetic coupling defective. - Sender -G111 defective. - Compressor does not	- Compressor does not run. - No cooling performance.	- Locate and eliminate break in wiring using current flow diagram - Check sender -G111 - see Repair Group 87. - Service magnetic coupling - see Repair Group 87. - Renew compressor (bring vehicle to specially equipped VW and Audi A/C workshop).

01-21

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>01270</u> Magnetic coupling for A/C -N25 * Mechanical fault/SP	- Belt and coupling pulley of magnetic coupling -N25 "stuck". - Short circuit to positive in wiring connection between Pin "K" on control unit -J153 and magnetic coupling -N25. - Control unit -J153 defective.	- Compressor always runs. - A/C system iced up.	- Service magnetic coupling -N25 - see Repair Group 87. - Locate and eliminate short circuit between control unit -J153 and magnetic coupling -N25 using current flow diagram. - Renew control unit -J153.
<u>00529</u> No speed info./SP Note: This fault is only recognized during final control element diagnosis. - No additional fault message.	- Break in wiring between dash panel insert and pin "TD" on control unit -J153. - No engine speed signal output by dash panel insert. - Control unit -J153 defective.	- Compressor does not run. - No cooling performance.	- Read measuring value block - Page 01-10. - Locate and eliminate break in wiring between dash panel insert and control unit -J153 using current flow diagram. - Check engine speed signal at dash panel insert (see "Electrical System" Workshop Manual). - Renew control unit -J153.

01-22



V.A.G - Self-diagnosis HELP
 1- Rapid data transmission*
 2- Flash code output*

INTERROGATING AND CLEARING FAULT MEMORY WITH ===== V.A.G 1551 (Fully automatic air conditioner) =====

- o Test condition:
 All fuses OK as per current flow diagram.
- o Note:
 - Fault memory can only be cleared after interrogation.
 - Main program of operating and indicating unit is switched off during self-diagnosis. No regulation takes place (compressor, radiator fan etc. are not switched on).
- o Interrogating
 - Start engine.
 - Press "Auto" button of operating and indicating unit.
 - Drive vehicle a few meters at walking speed.
 - Connect fault reader V.A.G 1551 to relay socket 1 in left side of plenum chamber with diagnosis wire V.A.G 1551/1 as follows.
- Connect black connector to black diagnostic plug.

◀ Display:
 * Appears alternately

Note:
 If no display appears, check voltage supply for black diagnosis plug - Page 01-77.

- White plug to white diagnosis plug.

01-23

Note:

- o Blue plug is not required.
- o Additional operating information can be requested using HELP key of V.A.G 1551.
- o ----> button is used to step through program sequence.
- Switch on printer with print button (button lights up).
- Press button 1 for "Rapid data transmission" operating mode.

◀ Display:

- Press buttons 0 and 8.
 (08 enters address word air conditioner/heater electronics).

◀ Display:

- Acknowledge input with Q button.

Rapid data transmission HELP
 Enter address word XX

Rapid data transmission Q
 08 - Air conditioner/heater electronics

8A0 820 043 Fully auto. A/C DXX
 Coding XXX

◀ Control unit identification and coding are displayed.

Coding versions:

1st Position

Code	Meaning
0	no allocation

2nd Position

Code	Engine
4	4-cylinder
5	5-cylinder
6	6-cylinder

01-24

3rd Position

Code	Country version	Engine type
0	LHD	Petrol
1	RHD	
2	USA	
3	LHD	TDI (Turbo-Diesel - Direct Injection)
4	RHD	
5	USA	
6	LHD	SC-TD (Swirl Chamber Turbo Diesel)
7	RHD	
8	USA	

Note:

- Coding operating and indicating unit - Page 01-52.
- The display DXx indicates software version of operating and indicating unit -E87 and is meaningless for Service Department.
- For allocation of operating and indicating unit -E87 - also see parts list.

Control unit does not answer! HELP

or

K wire does not switch to earth/
positive HELP

◀If display indicates:

- Print out list of possible causes using HELP button.
- Check wiring connection of diagnosis plug - Page 01-77.
- ◀ After eliminating possible fault causes, enter address word 08 for air conditioner/heater electronics again and acknowledge with Q button.

01-25

Fault in communications set-up

◀If display indicates

- Fault elimination - Page 01-79.
- Press ---> button.

Rapid data transmission
Select function XX HELP

◀Display:

- Press buttons 0 and 2.
(02 selects "Interrogate fault memory" function).

Rapid data transmission
02 Interrogate fault memory Q

◀Display:

- Acknowledge input with Q button.

X Fault recognized!



◀Displays number of stored faults or message "No fault recognized".

- Press ---> button.
- Stored faults are displayed and printed out one after another - see Fault Table, Page 01-56.
- Press ---> button after last fault has been displayed and printed.

Note:

- If magnetic coupling does not pick up, or if fresh air blower speed cannot be controlled although no fault was recognized
- o Read measuring value block - Page 01-32.
- o Carry out final control element diagnosis - Page 01-45.

01-26

Rapid data transmission
Select function XX

Rapid data transmission Q
05 - Clear fault memory

Important!
Fault memory was not interrogated

Rapid data transmission
Fault memory cleared

Rapid data transmission HELP
Select function XX

o Clearing

◀Display:

- Press buttons 0 and 5.
(05 clears fault memory).

◀Display:

- Acknowledge input with Q button.

◀If display indicates:

Note:

- Follow sequence exactly, i.e. first interrogate fault memory.
- If, for example, ignition was switched off or engine was run at over 4000 rpm between fault memory interrogation and clearing fault memory, fault memory will not be cleared.

◀If fault memory is cleared, following appears in display:

- Press ---> button.

◀Display:

- Carry out basic setting - Page 01-28.

01-27

BASIC ENGINE SETTING WITH V.A.G 1551
=====

- o Readiness OK as per current flow diagram.
 - Fault memory was interrogated and any stored faults were eliminated and cleared.
 - Interrogate fault memory - Page 01-23.
- o Basic setting:

Rapid data transmission HELP
Select function XX

◀Display:

Note:

Pressing HELP button will print out overview of available functions.

- Press buttons 0 and 4. (04 selects "Initiate basic setting" function).

◀Display:

- Acknowledge input with Q button.

◀Display:

- Press buttons 0 and 1.
- Acknowledge input with Q button.

Note:

Now following components will be triggered and their final position stored.

Rapid data transmission Q
04 - Initiate basic setting

Initiate basic setting HELP
Enter display group No. XX

01-28

- Positioning motor for temperature flap -V68.
- Positioning motor for central flap -V70.
- Positioning motor for footwell/defroster flap -V85.
- Positioning motor for air flow flap -V71 (not installed on all vehicles, equipment-dependent).

System in basic setting 1			
0	0	0	0

◀Wait until display indicates:

- Press ----> button.

Rapid data transmission	HELP
Select function XX	

◀Display:

- Press buttons 0 and 2.
(02 selects "Interrogate fault memory" function).

Rapid data transmission	Q
02 - Interrogate fault memory	

◀Display:

- Acknowledge input with Q button.

X Fault recognized!

◀Displays number of stored faults or message "No fault recognized".

- Press ----> button.

Stored faults are displayed and printed out one after another - see Fault Table, Page 01-56.

01-29

Note:

Following faults are now indicated depending on vehicle equipment:

- o Coolant temperature sender -G110 "Break/short circuit to positive/SP"
- o Potentiometer in V71/G113 "Break/short circuit to positive/SP" and "Adaptation limit exceeded".

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Check whether these components are installed in vehicle.

- If they are not installed, after display and printing of last fault
- Press ----> button.

Note:

- o If positioning motor -V71 and/or sender -G110 is installed, or if additional faults are also indicated.
- o Eliminate printed fault using Fault Table - Page 01-56 and initiate basic setting again.

Rapid data transmission	HELP
Select function XX	

◀Display:

- Press buttons 0 and 5.
(05 clears fault memory).

Rapid data transmission	Q
05 - Clear fault memory	

◀Display:

- Acknowledge input with Q button.

Important!
Fault memory was not interrogated

◀If display indicates:

01-30

Note:

- Follow sequence exactly, i.e. interrogate fault memory first.
- If, for example, ignition was switched off or engine was run at over 4000 rpm between fault memory interrogation and clearing fault memory, fault memory is not cleared.

Rapid data transmission
Fault memory cleared

◀If fault memory is cleared, display indicates:

Note:

By clearing fault memory, equipment-dependent lack of positioning motor for air flow flap -V71 and of air-conditioner coolant temperature sender -G110 is stored and not indicated again until initiation of next basic setting.

Rapid data transmission HELP
Select function XX

◀Display:

- Press buttons 0 and 6.
(06 ends output).

Rapid data transmission Q
06 - end output

◀Display:

- Acknowledge input with Q button.

Rapid data transmission HELP
Output ended

◀Display:

Note:

If measuring value block is to be read as next text step, run air conditioner at highest fresh air blower speed for 1 min. before inputting address word 08 again.

01-31

READING MEASURING VALUE BLOCK WITH V.A.G 1551

=====

(Fully automatic air conditioner)

o Note:

- 10 display sectors with 4 measuring values each are provided.

If printer is switched on, current display is printed out.

o Reading

- Before reading measuring value block, interrogate fault memory (Page 01-23), eliminate all indicated faults and then clear fault memory.
- After interrogating fault memory, continue to run engine at idle.

Rapid data transmission HELP
Select function XX

◀Display:

- Press buttons 0 and 8.
(08 selects "Output measuring value block" function).

Rapid data transmission Q
08 - Read measuring value block

◀Display:

- Acknowledge input with Q button.

Read measuring value block HELP
Enter display group no. XX

◀Display:

- Input display sector number.

Note:

For display in display sectors 01 to 10, see Pages 01-34 to 01-40.

- Acknowledge input with Q button.

01-32

Read measuring value block	XX
1 2 3 4	

◀Display:

Note:

- For description of 4 display values in individual display sectors - see Pages 01-34 to 01-40.
- For all display sectors marked with *, the value is indicated which was valid when self-diagnosis "Rapid data transmission" was initiated.
- All display sectors not marked with * indicate current value.

Selecting another display group:

- Press "C" button.

Read measuring value block	HELP
Enter display group no.	XX

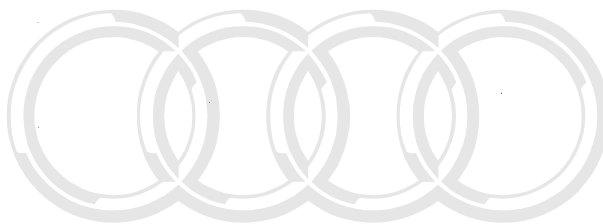
◀Display:

- Enter display group number.
- Acknowledge input with Q button.

Note:

To test electrical inputs

- Connect test box V.A.G 1598 to plugs to operating and indicating unit with adapter wires V.A.G 1598/11 and V.A.G 1598/12 - Page 01-71.
- For socket assignment of test box with adapter wire V.A.G 1598/11 connected, see Page 01-72.



01-33

Display group no.	Display sector	Display
01	Compressor switch-off conditions, voltage at magnetic coupling -N25 and terminal 75	
	1*	Compressor switch-off conditions, for description, see Page 01-41. Note: Of the compressor switch-off conditions effective at initiation of self-diagnosis, max. 2 are simultaneously displayed.
	2*	Supply voltage at magnetic coupling -N25 in volts at initiation of self-diagnosis. (Plug -C-, socket 3 for -E87)
	3	Voltage at terminal 75 in volts. (Plug -D-, slot 9 to -E87)
	4	Display sector not in use.
=====		
02	Positioning motor for temperature flap -V68 with potentiometer -G92	
	1	- Display value greater than 5 but less than 250. - Actual feedback value of potentiometer -G92 in positioning motor for temperature flap -V68. - Deviation from setpoint feedback value less than 3, in range greater than 30 but less than 200.
	2*	- Display value greater than 5 but less than 250. - Setpoint feedback value of -G92.
	3*	- Display value greater than 5 but less than 30. - Feedback value of -G92 with positioning motor -V68 in final position "Heat" (air guided through heat exchanger of heater) learned during "Basic setting" function.

Display group no.	Display sector	Display
02	4*	- Display value greater than 200 but smaller than 250. - Feedback value of -G92 with positioning motor -V68 in final position "Cool" (air not guided through heat exchanger of heater) learned during "Basic setting" function.
=====		
03	Positioning motor for central flap -V70 with potentiometer -G112	
	1	- Display value greater than 5 but less than 250. - Actual feedback value of potentiometer -G112 in positioning motor for central flap -V70. - Deviation from setpoint feedback value less than 3 in range greater than 30 but less than 200.
	2*	- Display value greater than 5 but less than 30. - Setpoint feedback value of -G112.
	3*	- Display value greater than 5 but less than 30. - Feedback value of -G112 with positioning motor -V70 in final position "Down" (air guided to footwell/defrost control flap) learned during "Basic setting" function.
	4*	- Display value greater than 200 but less than 250. - Feedback value of -G112 with positioning motor -V70 in final position "Up" (air guided to dash panel air outlets) learned during "Basic setting" function.
=====		
04	Positioning motor for footwell/defrost flap -V85 with potentiometer -G114	
	1	- Display value greater than 5 but less than 250. - Actual feedback value of potentiometer -G114 in footwell/defrost positioning motor -V85. - Deviation from setpoint feedback value less than 3 in range greater than 30 but less than 200.
	2*	- Display value greater than 5 but less than 250. - Setpoint feedback value of -G114.

01-35

Display group no.	Display sector	Display
04	3*	- Display value greater than 5 but less than 30. - Feedback value of -G114 with positioning motor -V85 in final position "Down" (air guided to dash panel defroster vents) learned during "Basic setting" function.
	4*	- Display value greater than 200 but less than 250. - Feedback value of -G114 with positioning motor -V85 in final position "Up" (air guided to footwell air outlets) learned during "Basic setting" function.
=====		
05	Positioning motor for ram pressure flap -V71 with potentiometer -G113**	
	1	- Display value greater than 5 but less than 250. - Actual feedback value of potentiometer -G113 in positioning motor for air flow flap -V71. - Deviation from setpoint feedback value less than 3 in range greater than 30 but less than 200.
	2*	- Display value greater than 5 but less than 250. - Setpoint feedback value of -G113.
	3*	- Display value greater than 5 but less than 30. - Feedback value of -G113 with positioning motor -V71 in final position "Down" (air flow flap in evaporator closed) learned during "Basic setting" function.
	4*	- Display value greater than 200 but less than 250. - Feedback value of -G113 with positioning motor -V71 in final position "Up" (air flow flap in evaporator open) learned during "Basic setting" function.

** Positioning motor for air flow flap -V71 is not installed in all vehicles (equipment-dependent). If -V71 missing, ignore display.

01-36

Display group no.	Display sector	Display
06	1*	- Temperature value for ambient temperature gauge -G106 (in instrument panel). - Lower of two measured ambient temperatures in °C. - <u>Note:</u> -G106 not installed in all vehicles (equipment-dependent).
	2	- Measuring value of temperature sensor - fresh air intake duct -G89 (on evaporator) in °C (checking - Page 01-73, Test step 3).
	3	- Measuring value of ambient temperature sensor -G17 (on intake duct) in °C (checking - Page 01-73, Test step 4).
	4	Display sector not in use.
07	Measuring value of temperature sensor - roof -G86, - dash panel -G56, of coolant temperature sender -G110 and calculated coolant temperature	
	1	- Measuring value of temperature sensor - roof -G86 (near interior light) in °C (checking - Page 01-73, Test step 1).
	2	- Measuring value of temperature sensor - dash panel -G56 in °C (checking - Page 01-73, Test step 2).
	3	- Coolant temperature in °C calculated for fully automatic fresh-air blower control. - <u>Note:</u> - If coolant temperature sender -G110 is installed, value is composed of measured temperature and temperature calculated based on existing engine speed and engine running time. - If no -G110 installed, temperature value is calculated from engine speed and engine running time.



Display group no.	Display sector	Display
07	4	- Measuring value of coolant temperature sensor - A/C -G110 in °C (checking - Page 01-73, Test step 5). - <u>Note:</u> - Not installed in all vehicles (equipment-dependent). - No display on vehicles without -G110.
08	Voltage at fresh air blower -V2, for instrument lighting and side lights	
	1*	3.5 V to 12.5 V - Setpoint voltage at fresh air blower -V2.
	2*	3.5 V to 12.5 V - Actual voltage at fresh air blower -V2. - Deviation from setpoint voltage in range of wiring system voltage max. 0.5 V.
	3	0 to 12.5 V - Voltage at terminal 58 D (Dependent on position of instrument/dash panel lighting control -E20).
	4	0 or 1 0 = Side lights off (Voltage at plug C, slot 7 to -E87 less than 2 V) 1 = Side lights on (Voltage at plug C, slot 7 to -E87 greater than 2 V)

Display group no.	Display sector	Display
09	Engine speed, compressor speed, speed, auxiliary heater	
	1*	Engine speed in rpm.
	2*	Compressor speed in rpm. <u>Note:</u> - Only on vehicles on which compressor is driven with ribbed belt. - Compressor speed with 0 % slip is engine speed multiplied by 1.28.
	3*	0 or 1 0 = No speed signal recognized since ignition switched on. 1 = Speed signal from speed ometer -G21 recognized at least 1 x since ignition switched on. <u>Note:</u> - Speed will be indicated if existent at initiation of self-diagnosis "Rapid data transmission".
	4	0 <u>Note:</u> For display "1", check wiring to plug D using current flow diagram (slot 1 must not be in use).
10	Switch inputs: Kick-down, hot light, compressor engagement, high-pressure switch -F118	
	1	0 or 1 0 = Kick-down switch open (Voltage at plug C, slot 1 to -E87 greater than 5 V). 1 = Kick-down switch closed (Voltage at plug C, slot 1 to -E87 less than 5 V). <u>Note:</u> - Also see compressor switch-off conditions - Page 01-41. - When switch closes, compressor switched off for 12 sec.

01-39

Display group no.	Display sector	Display
10	2	0 or 1 0 = Coolant temperature warning switch -F14 or electronic thermost switch -F76 (Contact "R") open (Voltage at plug A, slot 11 to -E87 greater than 2 V). 1 = -F14 or -F76 (Contact "R") closed (Voltage at plug A, slot 11 to -E87 less than 2 V). <u>Note:</u> - See also compressor switch-off conditions - Page 01-41. Compressor is switched off with switch closed.
	3	0 or 1 0 = Compressor engagement output open (to engine control unit), voltage at plug C, slot 12 to -E87 less than 5 V. 1 = Compressor engagement output switched (to engine control unit), voltage at plug C, slot 12 to -E87 greater than 5 V). <u>Note:</u> - See also compressor switch-off conditions - Page 01-41. - If voltage from engine control unit drops from above 5 V to below 5 V with output switched on (compressor on), compressor is switched off. - If display 1 appears while reading measuring value block (Voltage at plug C, slot 12 to -E87 greater than 5 V), locate and eliminate short circuit to positive using current flow diagram.
	4	0 or 1 1 = High-pressure switch for magnetic coupling -F118 closed (voltage at plug C, slot 2 to -E87 less than 2 V). 0 = High-pressure switch for magnetic coupling -F118 open (voltage at plug C, slot 2 to -E87 greater than 2 V). <u>Note:</u> - Also see compressor switch-off conditions - Page 01-41. - With switch open, compressor is switched off.

o Description of Display Group 1, Display Sector 1 (Compressor Switch-Off Conditions)

Display	Meaning/Fault Remedy
0	Compressor on: No switch-off condition recognized. <u>Note:</u> If compressor is not switched on, carry out final control element diagnosis - Page 01-45.
1	Compressor off: a) Belt slip was greater than 60 % 1 x or greater than 30 % but less than 60 % 10 x. - Belt tension not OK. - Compressor binds. b) Operating and indicating unit incorrectly coded (checking - Page 01-52). c) No compressor speed signal recognized. - A/C compressor speed sender -G111 defective. - Magnetic coupling -N25 defective. <u>Note:</u> See display group 9 and fault types - Page 01-56.
2*	Compressor off: High-pressure switch -F118 open. (Voltage at plug C, slot 2 to -E87 greater than 2 V). <u>Note:</u> For fault remedy see fault types - Page 01-56.
3	Compressor off: Low-pressure switch -F73 open. (Voltage at plug C, slot 3 to -E87 less than 5 V). <u>Note:</u> For fault remedy see cooling performance test - Repair Group 87.

* If display "5" or "6" appears in addition to this display, ignore display "5" or "6".

01-41

Display	Meaning/Fault Remedy
4	Compressor off: Kick-down (Voltage at plug C, slot 1 to -E87 less than 5 V). - Short circuit to earth in wiring. - Control unit for automatic transmission -J217 has switch input to earth (see "Current Flow Diagrams, Electrical Faults Finding and Fitting Locations" Binder and "Automatic Gear Box" Workshop Manual). <u>Note:</u> Depending on equipment, kick-down switch -F46 (with gearbox switch -F15) may also be installed (see related current flow diagram).
5*	Compressor off: Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG. a) Switch-on delay approx. 3 sec. after starting engine. b) Engine speed below 600 rpm (see Display Sector 9). c) No engine speed signal recognized. - Break in wiring between dash panel insert and plug C, slot 6 to -E87. - Dash panel insert does not send speed signal (checking - see "Electrical System" Workshop Manual).
6*	Compressor off: Compressor switched off with "Econ" button ("ice crystal" symbol for compressor does not light up). <u>Note:</u> Switch on compressor, start engine.
7*	Compressor off: A/C switched off with "Minus" button for fresh air blower speed on operating and indicating unit. <u>Note:</u> Switch on A/C.

*If display "5" or "6" appears in addition to this display, ignore display "5" or "6".

01-42

Display	Meaning/Fault Remedy
8*	Compressor off: Ambient temperature below 3 °C. <u>Note:</u> - Check ambient temperature sensors -G17 and -G89. (see display group 6 and "Electrical check" - Page 01-73).
9*	Compressor off: <u>Note:</u> - Display not permissible, as no temperature sensor - fresh air blower -G109 installed check wiring to operating and indicating unit -E87 using current flow diagram (plug A, slot 6 must not be in use).
10	Compressor off: Voltage supply too low - Voltage at plug C, slot 3 to -E87 less than 10 V. <u>Note:</u> See fault types - Page 01-56.
11	Compressor off: Overheating indicator light - Short circuit to frame in wiring from plug A, slot 11 to -E87. - Contact "R" of electronic thermost switch -F76 closed. - Coolant temperature warning switch -F14 too hot - closed, or control unit for Diesel Direct Injection System -J248 has input switched to earth (equipment-dependent - see "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" Binder).

* If display "5" or "6" appears in addition to this display, ignore display "5" or "6".

01-43

Display	Meaning/Fault Remedy
12	Compressor off: A/C compressor engagement (Voltage at plug C, slot 12 to -E87 less than 5 V). - Short circuit to frame in wiring to engine control unit. <u>Note:</u> Carry out final control element diagnosis - Page 01-45. - Check engine control unit (see "Fuel Injection and Ignition System" Workshop Manual).
13	Compressor off: Compressor switch-on delay (approx. 10 sec.) for engine speed greater than 6000 rpm. <u>Note:</u> Meaningless for Service Dept.
14*	Compressor off: High-pressure switch -F118 has switched 30 x during current driving period. <u>Note:</u> For fault remedy see fault types - Page 01-56.

* If display "5" or "6" appears in addition to this display, ignore display "5" or "6".

FINAL CONTROL ELEMENT DIAGNOSIS WITH V.A.G 1551
=====

Note:

- For fitting locations of controlled components, see Repair Group 87.
- If necessary, final control element diagnosis may be repeated several times.
- Malfunction of final control elements marked with * are stored in fault memory.

Final control element diagnosis:

- Interrogate fault memory (Page 01-23).
- Carry out basic setting (Page 01-28).
- Switch off engine.

Note:

To check idling control and A/C compressor engagement functions.

- o Remove engine control unit (see "Fuel Injection and Ignition System" Workshop Manual).
- o Connect test box V.A.G 1598 between wiring loom and engine control unit.

- Start engine.

01-45

V.A.G - Self-diagnosis	HELP
1 - Rapid data transmission*	
2 - Flash code output*	

Rapid data transmission	HELP
Enter address word XX	

Rapid data transmission	Q
08 - Air conditioner/heater electronics	

8A0820043 Fully automatic A/C DX	XXX
Coding	

Control unit does not answer!	HELP
-------------------------------	------

- ◀ Press button 1 for "Rapid data transmission" operating mode.

◀ Display:

- Press buttons 0 and 8.
(08 enters address word air conditioner/heater electronics).

◀ Display:

- Acknowledge input with Q button.

- ◀ Control unit identification and coding are displayed.

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◀ If display indicates:

- See "Interrogating fault memory", Page 01-23.

Rapid data transmission HELP
Select function XX

- ◀Display:
- Press buttons 0 and 3.
(03 selects "Final control element diagnosis" function).

Rapid data transmission Q
03 - Final control element
diagnosis

- ◀Display:
- Acknowledge input with Q button.

Final control element diagnosis
Magnetic coupling -N25

- ◀Display:
- Pressing --> button switches to next component.

Note:

- Final control element diagnosis can be terminated by pressing C button.
- Interrogate fault memory after completing final control element diagnosis (Page 01-23).
- If "Function not recognized or cannot currently be carried out" appears on display, interrogate fault memory and read measuring value block (Display Group 01).

01-47

Display	Specified Function	Remedy
Magnetic coupling -N25 <u>Note:</u> At the same time output "A/C compressor engagement" also triggered. - Balances out brief higher engine load when compressor is switched on (see "Fuel Injection and Ignition System" Workshop Manual). - Compressor can be switched off by control unit for engine electronics via this input (see "Fuel Injection and Ignition System" Workshop Manual).	Magnetic coupling clicks in 3 sec. rhythm, compressor is driven. - Output of operating and indicating unit (plug C, slot 12) is switched from 0 to 12 V in 3 sec. rhythm. <u>Note:</u> Connect voltage tester V.A.G 1527 between earth and A/C compressor engagement connection (for terminal assignment on plug to engine control unit, see "Fuel Injection and Ignition System" Workshop Manual).	- Service voltage supply for magnetic coupling -N25 via relay for magnetic coupling -J44 using current flow diagram. - Service magnetic coupling - see Repair Group 87. - Check wiring using current flow diagram. - Read measuring value block 10 - see Page 01-39 (Display Group 10). - Check control unit for engine electronics using Workshop Manual and interrogate fault memory. - Renew operating and indicating unit.
Fresh air blower -V2	Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for the use of information in this document. Fresh air blower runs (Fresh air blower voltage every 2 sec. - 0, 4, 8, 12 V).	- Check fresh air blower for ease of movement. - Check earth connection for control unit -J126 using current flow diagram. - Check control unit for blower -J126 (Page 01-75, test steps 11 to 14). - Renew blower control unit -J126 - see Repair Group 87.

Display	Specified Function	Remedy
Radiator fan, 1st stage	1st fan stage is switched on and off in 2 sec. rhythm	Check voltage supply for radiator fan via series resistance -N39 and relay for radiator fan 1st stage.
Two-way valve for recirculating/fresh air flap -N63	Recirculating/fresh air flap switches from recirculating to fresh air operation in 5 sec. rhythm.	- Check vacuum supply via two-way valve -N63 - see Repair Group 87. - Check voltage supply for two-way valve -N63 from operating and indicating unit. - Renew two-way valve -N63.
Positioning motor for temperature flap -V68* <u>Note:</u> Wait until temperature flap is in "Heat" position, then press --> button.	Temperature flap moves from stop to stop. <u>Note:</u> - Fresh air blower running. - Air temperature changes.	- Check temperature flap for ease of movement. - Check wiring between positioning motor -V68 and operating and indicating unit using current flow diagram. - Renew positioning motor -V68.
Positioning motor for central flap -V70* <u>Note:</u> Wait until central flap is in position air distribution to footwell/defroster flap, then select positioning motor -V85 by pressing --> button.	Central flap moves from stop to stop. <u>Note:</u> - Fresh air blower running. - Open instrument panel air outlets. - Air distribution changes from footwell/defroster flap to instrument panel air outlets.	- Check central flap for ease of movement. - Check wiring between positioning motor -V70 and operating and indicating unit using current flow diagram. - Renew positioning motor -V70.

01-49

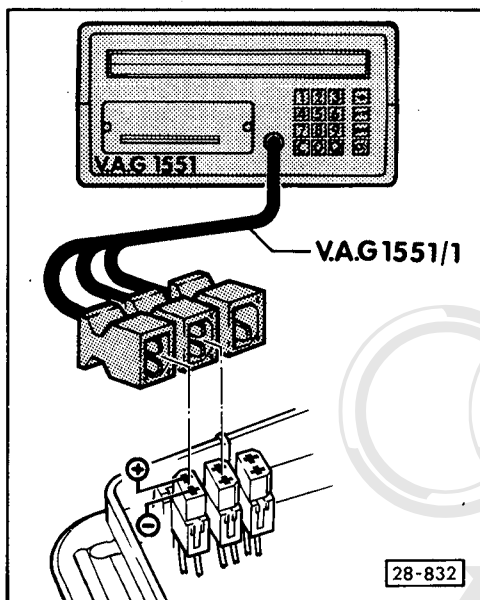
Display	Specified Function	Remedy
Positioning motor for footwell/defroster flap -V85 * <u>Note:</u> Close all instrument panel air outlets.	Footwell/defroster flap moves from stop to stop. <u>Note:</u> - Fresh air blower running. - Air distribution changes from footwell to defrost (to windscreen).	- Check footwell/defroster flap for ease of movement. - Check wiring between positioning motor -V85 and operating and indicating unit -E87 using current flow diagram. - Renew positioning motor -V85.
Positioning motor for air flow flap -V71 * <u>Note:</u> Not installed on all vehicles.	Air flow flap moves from stop to stop. <u>Note:</u> - Fresh air blower running. - Air throughflow changes.	- Check air flow flap for ease of movement. - Check wiring between positioning motor -V71 and operating and indicating unit -E87 using current flow diagram. - Renew positioning motor -V71 (bring vehicle to specially equipped VW and Audi A/C workshop).**
Temperature sensor blower -V42	Blower switched on/off in 5 sec. rhythm. <u>Note:</u> To check, lay sheet of paper on suction opening of instrument panel.	- Check voltage supply using current flow diagram. - Check air guide hose between blower and temperature sensor for proper seating. - Renew blower -V42.

** Note:

In order to renew positioning motor -V71, refrigerant circuit must be discharged and heater removed (see Repair Group 87).

Display	Specified Function	Remedy
Segment test	All segments of both displays of operating and indicating unit light up in 3 sec. rhythm.	- Check lamps in operating and indicating unit. - Renew operating and indicating unit.
Ambient temperature indicator -G106 <u>Note:</u> Not installed On all vehicles.	Counting upwards in 5° C steps starting at -45° C.	- Check wiring using current flow diagram. - Renew ambient temperature indicator. - Renew operating and indicating unit.
Idling control <u>Note:</u> - Increases idling speed or changes precontrol value (see "Fuel Injection and Ignition System" Workshop Manual).	- Output of operating and indicating unit plug A, slot 2 (to engine control unit) switched in 5 sec. rhythm from 0 to 12 V. <u>Note:</u> Connect voltage tester V.A.G 1527 between earth and idling control connection (on engine control unit) (for terminal assignment on plug see, "Fuel Injection and Ignition System" Workshop Manual).	- Check wiring using current flow diagram. - Check control unit for engine electronics using Workshop Manual. - Renew operating and indicating unit.

01-51



CODING OPERATING AND INDICATING UNIT WITH

V.A.G 1551

Note:

Basic setting must be made after each coding - Page 01-28.

- Connect fault reader V.A.G 1551 to diagnostic plugs in relay socket on left-hand side in plenum chamber with diagnosis wire V.A.G 1551/1 as follows.

Note:

- o Additional information can be requested using HELP key of V.A.G 1551 (after connecting).
- o --> button is used to step through program sequence.

- Connect black plug to black diagnostic plug.

V.A.G - Self-diagnosis HELP
 1 - Rapid data transmission
 2 - Flash code output

◀ Display:

* Appears alternately

Note:

If no display appears, check voltage supply for black diagnostic plug - Page 01-77.

- Connect white plug to white diagnostic plug.

Note:

Blue plug is not required.

01-52

- Switch on ignition.
- Switch on printer with print button (button lights up).
- Press button 1 for "Rapid data transmission" operating mode.

Rapid data transmission Enter address word XX	HELP
--	------

◀Display:

- Press buttons 0 and 8.
(08 enters address word air conditioner/heater electronics).

Control unit does not answer! HELP

◀If display indicates:

- See Page 01-23 "Interrogating fault memory".

Rapid data transmission 08 - Air conditioner/heater electronics
--

◀Display:

- Acknowledge input with Q button.

8A0820043 Fully automatic A/C Coding	DXX XXX
--------------------------------------	------------

◀Control unit identification and coding are displayed.

Coding versions:

Note:

- Operating and indicating unit as replacement part, coding 000.
- For assignment of operating and indicating unit - also see parts list.

01-53

1st Position

Code	Meaning
0	No allocation

2nd Position

Code	Engine
4	4-cylinder
5	5-cylinder
6	6-cylinder

3rd Position

Code	Ctry.version	Engine Type
0	LHD	Petrol
1	RHD	
2	USA	
3	LHD	TDI (Turbo-Diesel - Direct Injection)
4	RHD	
5	USA	
6	LHD	SC TD (Swirl Chamber Turbo Diesel)
7	RHD	
8	USA	

Note:

- Display DXX indicates software version of operating and indicating unit -E87 and is meaningless for Service Dept.

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Rapid data transmission Select function XX	HELP
--	------

- ◀Display:
- Press buttons 0 and 7.
(07 selects "Code control unit" function).

Rapid data transmission 07 Code control unit	Q
---	---

- ◀Display:
- Acknowledge input with Q button.

Code control unit Enter code No.	XXX
-------------------------------------	-----

- ◀Display:
- Code operating and indicating unit according to engine.
Example:
5-cylinder > 050 < LHD Petrol Engine.
 - Acknowledge input with Q button.

8A0822043 Fully automatic A/C Coding XXX	DXX
--	-----

- ◀Input codes appear on display.
- Press --> button.

Rapid data transmission Select function	HELP XX
--	------------

- ◀Display:
- Carry out basic setting and interrogate fault memory - Page 01-28.

01-55

FAULT TABLE

=====

(Fully automatic air conditioner)

- o The following chart lists all faults which can be detected by the operating and indicating unit -E87- of the fully automatic air conditioner and displayed/printed by V.A.G 1551 according to the fault code.

Note:

The contents of the fault memory is retained until cleared (see Page 01-5).

- o Before renewing faulty components, always check their positive and earth connections (Terminal 75, 30 and 31) and their connectors using the current flow diagram.
- o After a component of the fully automatic air conditioner is renewed, the basic setting must always be set and then the fault memory interrogated.
- o Use test box V.A.G 1598 to check the electrical connections of the operating and indicating unit - E87.
- o Sporadically occurring faults will be marked with SP on the display.
- o The fault code (5-position) is not indicated on the display, but is only printed with the printer.
- o One of the messages marked with * will be displayed in addition to the appropriate component for information.
- o If the operating and indicating unit continues to operate after the ignition is switched off, check the wiring to the operating and indicating unit -E87 (plug D, slot 1 must not be in use) using the current flow diagram.
- o If, after switching the ignition off and on again, 22° C (71° F) is indicated regardless of the last setting, repair the voltage supply (terminal 30) to the operating and indicating unit -E87 using the current flow diagram.

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V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>0000</u> No fault recognized	If faults are present: - Read measuring value block Page 01-32. - Carry out final control element diagnosis - Page 01-45. - Check cooling performance - see Repair Group 87.		
<u>00529</u> No speed info/SP**	- No engine speed signal recognized. - Break in wiring between dash panel insert and operating and indicating unit -E87.	- Compressor does not run. - No cooling performance.	- Read measuring value block - Page 01-32. - Locate and eliminate break in wiring between dash panel insert and -E87 using current flow diagram. - Check engine speed signal from dash panel insert (see "Electrical System" Workshop Manual).

**** Note:**

This fault is only recognized on vehicles with compressor drive via ribbed belt (speed sender - A/C compressor) during final control element diagnosis.

01-57

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>00532</u> Supply voltage * Value too small/SP	- Voltage dips in wiring system. <u>Note:</u> If wiring system voltage at plug C, slot 3 to -E87 less than 9.5 V, compressor off until voltage increases to 10.8 V, but at least for 20 sec. - Transition resistance in wiring to magnetic coupling -N25.	- No or minimal cooling performance. - Magnetic coupling is switched off for at least 20 sec.	- Check alternator and voltage regulator (see "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" Binder). - Locate and eliminate transition resistance in wiring to magnetic coupling -N25 using current flow diagram.

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erWin 

01-58

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>00600</u>			
Potentiometer -G92 in positioning motor -V68** * Short circuit to earth/SP * Break/short circuit to positive/SP * Defective/SP * Adaptation limit exceeded	- Short circuit or break in wiring between -G92 and -E87. - Potentiometer -G92 defective. - Temperature flap binds. - Potentiometer -G92 defective.	- Faulty temperature control (Position of temperature flap is not recognized). - Faulty temperature control (temperature flap binds or final positions are not reached).	- Locate and eliminate short circuit, break in wiring or wiring fault using current flow diagram. - Check temperature flap for ease of movement. - Renew positioning motor -V68.
<u>00601</u>			
Potentiometer -G112 in positioning motor -V70 * Short circuit to earth/SP * Break/short circuit to positive/SP * Defective/SP * Adaptation limit exceeded	- Potentiometer -G112 defective. - Short circuit, break in wiring or wiring fault in wiring between -G112 and -E87. - Central flap binds. - Potentiometer -G112 defective.	- Air distribution faulty (position of central flap not recognized). - Air distribution faulty (central flap sticks or final positions are not reached).	- Locate and eliminate short circuit, break in wiring or wiring fault using current flow diagram. - Renew positioning motor -V70. - Check central flap for ease of movement. - Renew positioning motor -V70.

** If fault is present in -G92, positioning motor -V68 can be manually adjusted by pressing "+" or "-" button for temperature preselection (display range between 0° C and 50° C).

01-59

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>00602</u>			
Potentiometer -G114 in positioning motor -V85 * Short circuit to earth/SP * Break/short circuit to positive/SP * Defective/SP * Adaptation limit exceeded	- Potentiometer -G114 defective. - Short circuit, break in wiring or wiring fault in wiring between -G114 and -E87. - Footwell/defroster flap binds. - Potentiometer -G114 defective.	- Air distribution faulty (position of footwell/defroster flap is not recognized). - Air distribution faulty (footwell/defroster flap sticks or final positions are not reached).	- Locate and eliminate short circuit, break in wiring or wiring fault using current flow diagram. - Renew positioning motor -V85. - Check footwell/defroster flap for ease of movement. - Renew positioning motor -V85.
<u>00603</u>			
Positioning motor for footwell/defroster flap -V85 * Blocked or no voltage/SP	- Footwell/defroster flap binds. - Short circuit, break in wiring or wiring fault between -V85 and -E87.	- Air distribution faulty.	- Check footwell/defroster flap for ease of movement. - Locate and eliminate short circuit, break in wiring or wiring fault using current flow diagram. - Carry out final control element diagnosis - Check positioning motor - Page 01-73, test step 10

01-60

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>00604</u> Potentiometer -G113 in positioning motor -V71 Note: Not installed in all vehicles, equipment-dependent. * Short circuit to earth/SP * Break/short circuit to positive/SP * Defective/SP * Adaptation limit exceeded	- Potentiometer -G113 defective. - Short circuit, break in wiring or wiring fault in wiring between -G113 and -E87. - Air flow flap binds. - Potentiometer -G113 defective.	- Draft at high vehicle speed. - Air throughflow at high fresh air blower speed too low (position of air flow flap is not recognized). - Draft at high vehicle speed. - Air throughflow at high fresh air blower speed too low (air flow flap sticks or final positions are not reached).	- Locate and eliminate short circuit, break in wiring or wiring fault using current flow diagram. - Renew positioning motor -V71 (bring vehicle to specially equipped VW and Audi A/C workshop).** - Check air flow flap for ease of movement. - Renew positioning motor -V71 (bring vehicle to specially equipped VW and Audi A/C workshop).**

**** Note:**
To renew positioning motor -V71, refrigerant circuit must be discharged and heater removed (see Repair Group 87).

01-61

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>00624</u> A/C compressor engagement * Short circuit to positive/SP	- Short circuit to positive in wiring connection between operating and indicating unit -E87 and engine control unit. - Engine control unit defective.	- Idling speed fluctuates when compressor is switched on. - Precontrol value of idling-stabilization characteristic zero point shifted. Note: Symptom dependent on engine control.	- Locate and eliminate short circuit using current flow diagram. - Carry out final control element diagnosis. - Check engine control unit (see "Fuel Injection and Ignition System" Workshop Manual).
<u>00625</u> Speed signal * Implausible signal	- Loose contact in wiring between speed sender -G21 and -E87 or another control unit also connected (see "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" Binder). - Speed sender supplies unusable signal or signal is falsified by another control unit.	- Air throughflow changes without fresh air blower speed changing.	- Locate and eliminate loose contact in wiring using current flow diagram. - Check speed sender -G21 (see "Electrical System" Workshop Manual and "Fault Finding with V.A.G 1466").

01-62

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>00779</u> Temperature sensor - Ambient temperature -G17 * Short circuit to earth/SP * Break/short circuit to positive/SP	- Temperature sensor -G17 defective. - Short circuit or break in wiring between -G17 and -E87.	- Temperature control faulty. - Ambient temperature indication incorrect.	- Check temperature sensor -G17 - Page 01-73, test step 4. - Locate and eliminate short circuit or break in wiring using current flow diagram.
<u>00785</u> Temperature sensor - Dash panel -G56 * Short circuit to earth/SP * Break/short circuit to positive/SP	- Temperature sensor -G56 defective. - Short circuit or break in wiring between -G56 and -E87.	- Temperature control faulty.	- Check temperature sensor -G56 - Page 01-73, test step 2. - Locate and eliminate short circuit or break in wiring using current flow diagram.
<u>00786</u> Temperature sensor - Roof -G86 * Short circuit to earth/SP * Break/short circuit to positive/SP	- Temperature sensor -G86 defective. - Short circuit or break in wiring between -G86 and -E87.	- Temperature control faulty.	- Check temperature sensor -G86 - Page 01-73, test step 1. - Locate and eliminate short circuit or break in wiring using current flow diagram.

01-63

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>00787</u> Temperature sensor - fresh air intake duct -G89 * Short circuit to earth/SP * Break/short circuit to positive/SP	- Temperature sensor -G89 defective. - Short circuit or break in wiring between -G89 and -E87.	- Temperature control faulty. - Ambient temperature display incorrect.	- Check temperature sensor -G89 - Page 01-73, test step 3. - Locate and eliminate short circuit or break in wiring using current flow diagram.
<u>00799</u> Coolant temperature sensor -G110 Note: Not installed in all vehicles, equipment-dependent. * Short circuit to earth/SP * Break/short circuit to positive/SP	- Temperature sensor -G110 defective. - Short circuit or break in wiring between -G110 and -E87.	- Symptom only noticeable at very low ambient temperatures (coolant temperature is calculated by -E87).	- Check temperature sensor -G110 - Page 01-73, test step 5. - Locate and eliminate short circuit or break in wiring using current flow diagram.
<u>00800</u> Temperature sensor - Blower -G109 * Short circuit to earth/SP * Break/short circuit to positive/SP	- Wiring fault to plug A of -E87. Note: Display not permissible, as -G109 not installed.	- Sporadically occurring faults may no longer be cleared.	- Check plug -A- and related wiring (Page 01-73, test step 6). Carry out basic setting and interrogate and clear fault memory.

01-64

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>00801</u> High-pressure switch for magnetic coupling -F118** * Break/short circuit to positive/SP	- Break in wiring between -F118 and -E87. - Triggering of radiator fan faulty. - Fault in refrigerant circuit.	- No cooling performance. - No cooling performance after several kilometers. - Magnetic coupling -N25 does not energize (compressor does not run).	- Locate and eliminate break in wiring using current flow diagram. - Check high-pressure switch -F118 - see Repair Group 87. - Check triggering of radiator fan. - For 1st stage see final control element diagnosis - Page 01-46. - 2nd stage via high-pressure switch -F23 - Repair Group 87. - Bring vehicle to specially equipped VW and Audi A/C workshop (fault in refrigerant circuit).

** If open high-pressure switch -F118 was recognized 30x during one driving period, e.g. due to loose contact, compressor is switched off.

Compressor can be switched on again by pressing "Compressor on" button.

If this fault occurs repeatedly over several driving periods, compressor cannot be switched on again until fault memory has been cleared.

01-65

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>01270</u> Magnetic coupling for A/C -N25** * Break/short circuit to positive/SP	- Short circuit or break in wiring between speed sender - A/C compressor -G111 and -E87. - Break in wiring to magnetic coupling -N25. - Speed sensor -G111 defective. - Magnetic coupling -N25 defective. - Magnetic coupling relay -J44 defective. - Compressor blocked.	- No cooling performance. - No cooling performance after several kilometers. - Magnetic coupling energizes and cuts out again after 2 sec.	- Locate and eliminate break in wiring using current flow diagram. - Carry out final control element diagnosis - Page 01-45. - Check speed sensor -G111 - see Repair Group 87. - Check compressor for ease of movement (if compressor binds, bring vehicle to specially equipped VW and Audi A/C workshop). - Service magnetic coupling -J44 using current flow diagram. - Servicing magnetic coupling - see Repair Group 87.

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Continued on next page

** Note:

- Faults in magnetic coupling are only recognized on vehicles with compressor drive via ribbed belt (speed sender - A/C compressor).

01-66

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>01270</u> Magnetic coupling for A/C -N25** * Speed deviation too large/SP Continued on next page	- Ribbed belt not correctly tensioned. - Operating and indicating unit incorrectly coded. - Magnetic coupling -N25 slips. - Compressor binds. - Crankshaft vibration damper of incorrect diameter.	- No cooling performance. - No cooling performance after several kilometers. - Magnetic coupling energizes and cuts out again after 2 sec.	- Check ribbed-belt tension (see "Engine Mechanics" Workshop Manual). - Check coding of operating and indicating unit - Page 01-23. - Check crankshaft vibration damper using parts list. - Check compressor for ease of movement (if compressor binds, bring vehicle to specially equipped VW and Audi A/C workshop). - Service magnetic coupling -N25 - see Repair Group 87.

**** Note:**

- Faults in magnetic coupling are only recognized on vehicles with compressor drive via ribbed belt (speed sender - A/C compressor).
- If "Speed deviation too large" and "Break" are displayed, first check for break in wiring.

01-67

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>01270</u> Magnetic coupling for A/C -N25 * Mechanical faults/SP**	- Belt and coupling pulley of magnetic coupling stuck together. - Short circuit to positive in wiring connection between relay -J44 and magnetic coupling -N25. - Magnetic coupling relay -J44 defective.	- Compressor always runs. - A/C iced up.	- Locate and eliminate short circuit using current flow diagram. - Service magnetic coupling -N25 - see Repair Group 87. - Renew magnetic coupling relay -J44.
<u>01271</u> Positioning motor for temperature flap -V68 * Blocked or no voltage/SP	- Temperature flap binds. - Short circuit, break in wiring or wiring fault between -V68 and -E87. - Positioning motor -V68 defective. - Triggering of -E87 faulty.	- Temperature control faulty.	- Check temperature flap for ease of movement. - Locate and eliminate short circuit, break in wiring or wiring fault using current flow diagram. - Carry out final control element diagnosis. - Check positioning motor - Page 01-73, test step 7.

**** Note:**

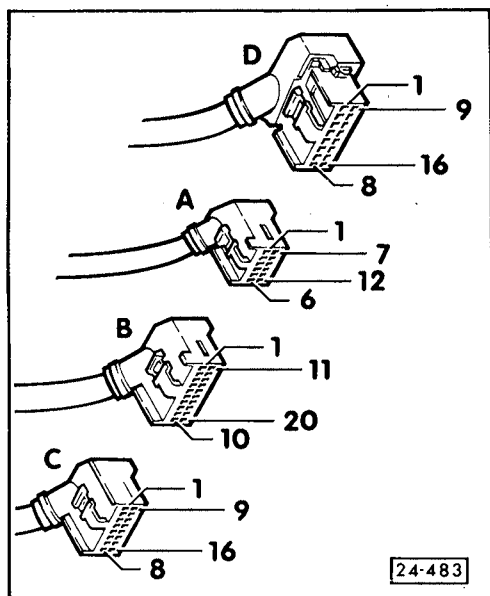
This fault is only recognized on vehicles with compressor drive via ribbed belt (speed sender - A/C compressor) during final control element diagnosis.

01-68

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>01272</u> Positioning motor for central flap -V70 * Blocked or no voltage/SP	- Central flap binds. - Short circuit, break in wiring or wiring fault between -V70 and -E87. - Positioning motor -V70 defective. - Triggering of -E87 faulty.	- Air distribution faulty.	- Check central flap for ease of movement. - Locate and eliminate short circuit, break in wiring or wiring fault using current flow diagram. - Carry out final control element diagnosis. - Check positioning motor - Page 01-73, test step 8.

01-69

V.A.G 1551 Printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>01274</u> Positioning motor for air flow flap -V71 * Blocked or no voltage/SP Note: Not installed on all vehicles, equipment-dependent.	- Air flow flap binds. - Short circuit, break in wiring or wiring fault between -V71 and -E87.	- Draft at high vehicle speed. - Air throughflow at high fresh air blower speed too low.	- Check air flow flap for ease of movement. - Locate and eliminate short circuit, break in wiring or wiring fault using current flow diagram. - Carry out final control element diagnosis. - Check positioning motor - Page 01-73, test step 9.



CONNECTING TEST BOX V.A.G 1598 TO PLUG OF =====

Note:
While using fault reader V.A.G 1551, no adapter
cables from test box V.A.G 1598 may be connected
to operating and indicating unit -E87.

- Switch off ignition.
- Remove operating and indicating unit - see
Repair Group 87.
- ◀ Connect adapter cables V.A.G 1598/11 and
1598/12 between -E87 and dash panel wiring
loom.
- Connect test box V.A.G 1598 to respective
adapter cable for measurement.

Important!
Test box socket assignment is identical to
plug assignment of operating and indicating
unit -E87 unless adapter cable V.A.G 1598/11
is connected - see test box connector plug
assignment, Page 01-72.



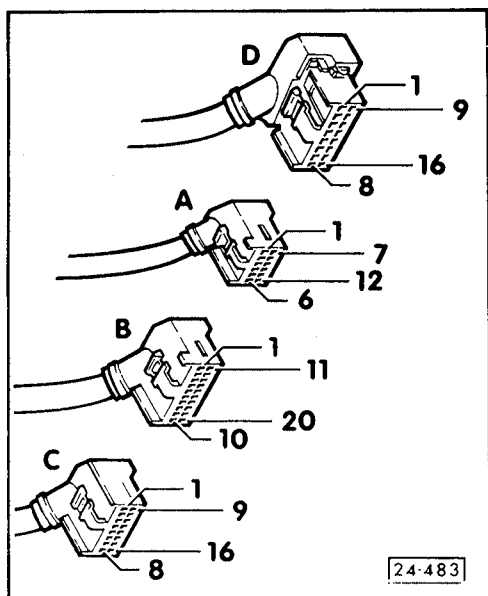
01-71

TEST BOX V.A.G 1598 CONNECTOR PLUG ASSIGNMENT =====

- Note:
- o The contact assignment of plug A and B is not identical with test box socket assignment with adapter cable V.A.G 1598/11 connected.
 - o The contact assignment of plug C is identical to test box socket assignment with adapter cable V.A.G 1598/11 connected.
 - o The contact assignment of plug D is identical to test box socket assignment with adapter cable V.A.G 1598/12 connected.

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Plug A	V.A.G 1598 Socket	Plug B	V.A.G 1598 Socket	Plug C	V.A.G 1598 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		
		20	40		



ELECTRICAL CHECK OF FULLY-AUTOMATIC AIR CONDITIONER COMPONENTS

o Necessary tools

- Hand multimeter V.A.G 1526
- Test box V.A.G 1598 with adapter cables V.A.G 1598/11 and 12
- Auxiliary test set V.A.G 1594
- Diode test lamp V.A.G 1527
- Minitester with temperature sensor V.A.G 1362

o Test conditions

- All fuses OK as per current flow diagram

o Testing

- Switch off ignition.
- Remove operating and indicating unit -E87 - see Repair Group 87.
- ◀ Connect adapters V.A.G 1598/11 and 1598/12 to plugs.
- Connect test box V.A.G 1598 to adapter cable for measurement.

Important!

- Test box socket assignment is identical to plug assignment of operating and indicating unit -E87 unless adapter cable V.A.G 1598/11 is connected - see test box plug assignment, Page 01-72.
- In order to avoid destroying electronic components, respective measuring range must be set on measuring unit before connecting measuring wires.

Note:

- Do not connect operating and indicating unit.

01-73

- 20 kohms resistance measurement measuring range selected.
- Adapter wire V.A.G 1598/11 connected.

Test Step	V.A.G 1598 Socket	Tested	o Test conditions - addl. work	Specified values
1	43 and 52	Temperature sensor - roof -G86	- Measure temperature at sensor fitting location.	Resistance value temperature-dependent - Page 01-76.
2	50 and 52	Temperature sensor - dash panel -G56	- Measure temperature at sensor fitting location. - Check temperature sensor blower -V42 for function (see final control element diagnosis).	- Resistance value temperature-dependent - Page 01-76.
3	47 and 52	Temperature sensor - fresh air intake duct -G89	- Measure temperature at sensor fitting location.	- Resistance value temperature-dependent - Page 01-76.
4	48 and 52	Temperature sensor - ambient temperature -G17	- Measure temperature at sensor fitting location.	- Resistance value temperature-dependent - Page 01-76.
5	27 and 52	- Coolant temperature sender -G110	- Measure temperature at sensor fitting location.	- Resistance value temperature-dependent - Page 01-76.
6	46 and 52	- Connection for temperature sensor - blower -G109 (-G109 is not installed).	- None.	- ohms.

- 200 ohms resistance measurement measuring range selected.
- Adapter wire V.A.G 1598/12 connected.

Test Step	V.A.G 1598 Socket	Tested	Test conditions - addl. work	Specified values
7	2 and 10	Positioning motor for temperature flap -V68	----	20 to 100
8	4 and 12	Positioning motor for central flap -V70	----	20 to 100
9	5 and 13	Positioning motor for air flow flap -V71	----	20 to 100
10	3 and 11	Positioning motor for footwell/defroster flap -V85	----	20 to 100

- 20 V D.C. voltage measurement measuring range selected.
- Adapter wire V.A.G 1598/11 connected.

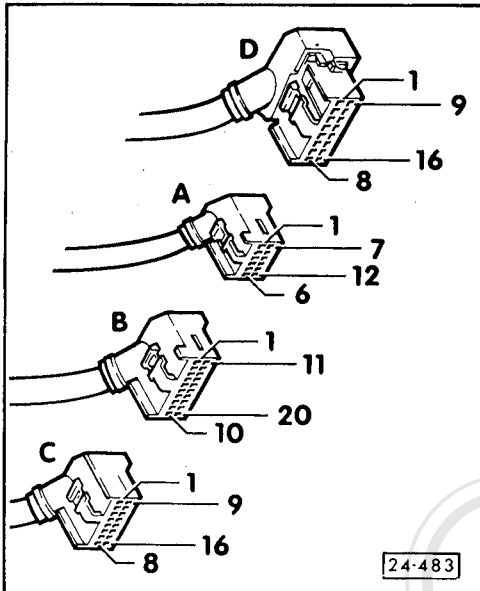
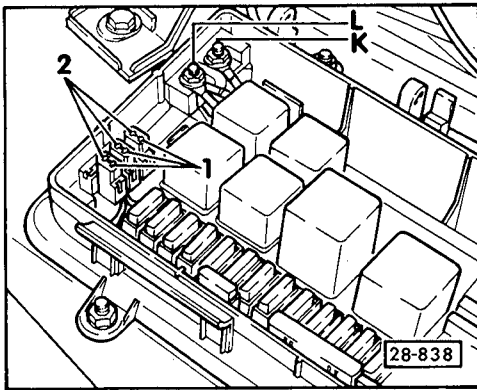
11	16 and earth	Control unit -J126	Ignition on	- Less than 0.5 V. - Fresh air blower not running.
12	14 and earth	Voltage supply for fresh air blower -V2	Ignition on	Battery voltage
13	11 and earth	Voltage supply for control unit -J126	Ignition on	Battery voltage

- Diode test lamp V.A.G 1527.
- Adapter wire V.A.G 1598/11 connected.

14	13 and 16	Control unit -J126	Ignition on	- Diode test lamp lights up. - Fresh air blower running.
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01-75

Temperature in °C (degrees Celsius) measured at temperature sensor fitting location	Temperature-dependent resistance value of temperature sensor in (ohms) -G17 (Ambient temperature), -G89 (Fresh air intake duct), -G56 (Dash panel), -G86 (Roof), -G110 (Coolant temperature)		
-30.0	18121		14700
-20.0	9951		9200
-10.0	5591		5600
0.0	3281		
5.0	2544	7273	4635
10.0	1991	5666	3670
15.0	1571	4446	3060
20.0	1250	3513	2450
25.0	998	2795	2060
30.0	804	2237	1670
35.0	652	1801	1415
40.0	533	1459	1160
45.0	437	1188	995
50.0	361	972	830
55.5	300	803	715
60.0	250	667	600
65.0		556	520
70.0		466	440
75.0			380
80.0			320
85.0			281
90.0			242
95.0			216
100.0			190
110.0			143



CHECKING DIAGNOSTIC SOCKET WIRING

Note:

- ◀ - The diagnostic sockets and the "K" adapter are located in relay station 1 (in plenum chamber, left).
- For wiring colours and additional vehicle systems connected to "white" diagnostic socket, see "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" Binder.
- Use hand multimeter V.A.G 1526, auxiliary test set V.A.G 1594 and test box V.A.G 1598 for testing.
- Switch off ignition before testing wiring connections.

o Black diagnostic socket (Voltage supply)

- Contact 1
connected to earth
- Contact 2
positive (via fuse 21 at terminal 30)

o White diagnostic socket (Data transmission)

- Contact 1
is not required for heater/air conditioner.
- ◀ - Contact 2
Data wire for "Rapid Data Transmission". Wiring connection from diagnostic socket is routed via "K" adapter to operating and indicating unit -E87 (plug A, slot 1), or to magnetic coupling control unit -J153 (Pin "D").

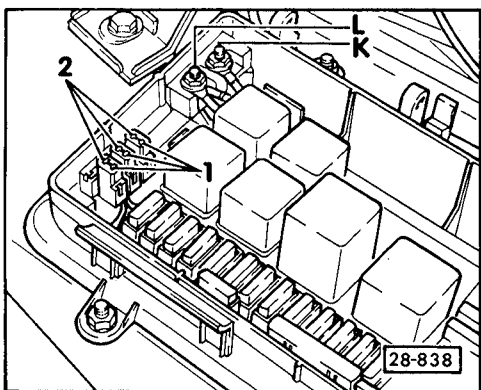
01-77

Note:

- Check wiring connection with V.A.G 1526 for breaks and short circuits to positive or to earth.
- All other vehicle systems with "Rapid Data Transmission" self-diagnosis are also connected via adapter (see "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" Binder).
- For fully automatic air conditioner, remove operating and indicating unit (see Repair Group 87), connect test box V.A.G 1598 with adapter wire V.A.G 1598/11 (Page 01-71) and measure at socket 41 of test box.

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Checking wiring connection when V.A.G 1551 display indicates "Fault in communication set-up"

- ◀- Check wiring connection between other vehicle systems with "Rapid Data Transmission" self-diagnosis in sequence and disconnect white diagnostic plug contact 2 on "K" adapter (in relay station 1).

Note:

For additional systems with self-diagnosis, see "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" Binder.

- After each time wiring connection to a vehicle system has been interrupted, re-enter address word "08" in "Rapid Data Transmission" operating mode.
- If after this control unit identification and coding are indicated, check wiring connection to control unit last disconnected using current flow diagram. If no fault is located, renew control unit last disconnected and reconnect all wiring connections.

Note:

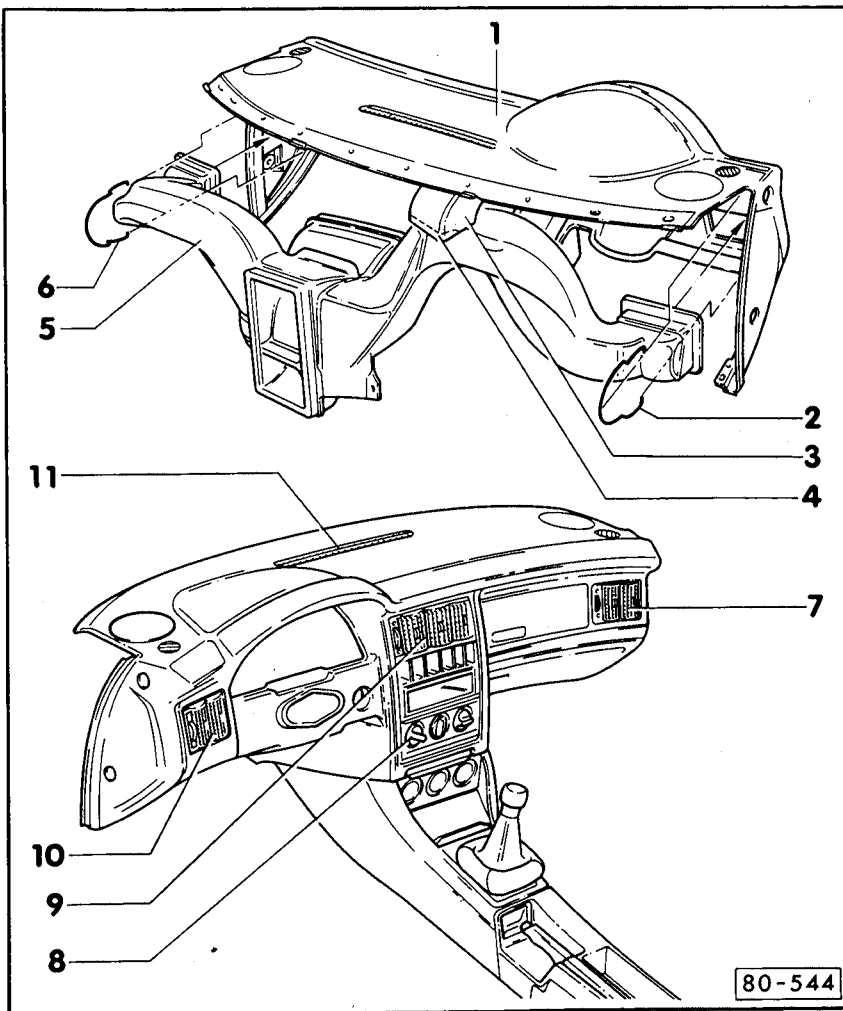
If "Control unit does not answer" is indicated, wiring connection to control unit for magnetic coupling -J153 or to operating and indicating unit -E87 was also interrupted at some point.

01-79



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SERVICING HEATER

=====

(Instrument panel air outlets and air guides)

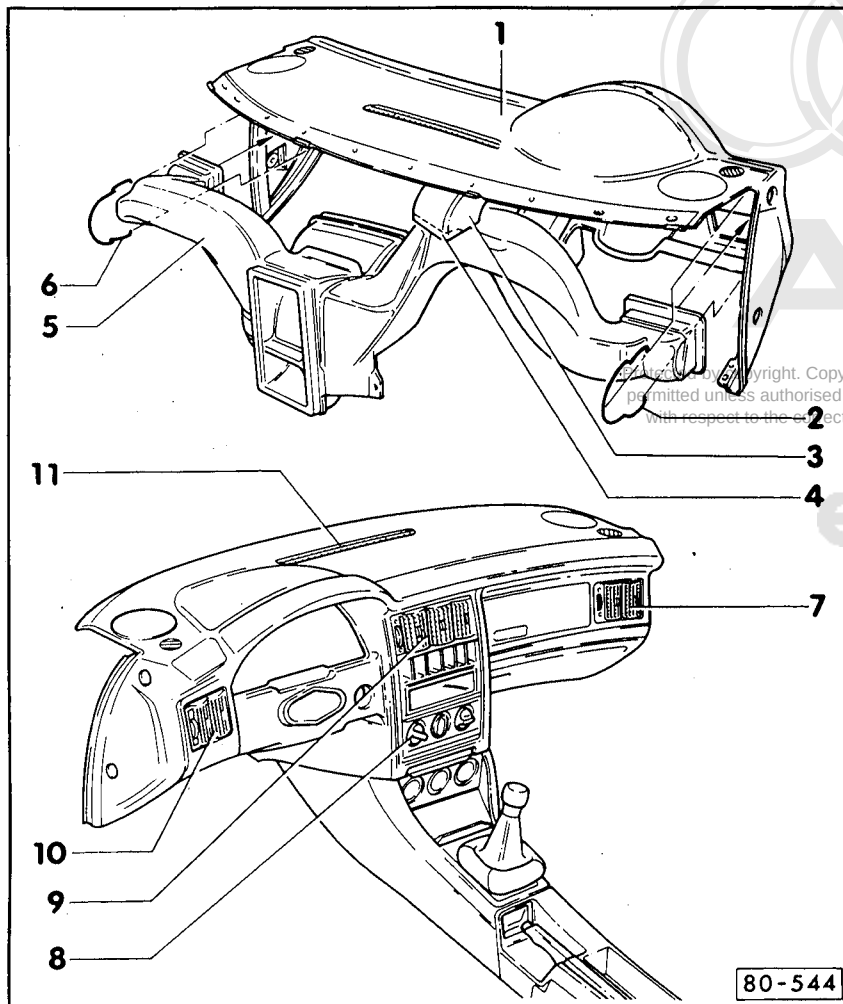
Note:

Air exits via 2 vent openings (in left and right of luggage boot), checking - Fig. 3.

- 1- Instrument panel
 - o Removing and installing - see "General Body Repairs" Workshop Manual
- 2- Bracket
- 3- Defroster duct
- 4- Defroster duct - shorten
- 5- Air guide duct
- 6- Bracket
- 7- Instrument panel air outlet (passenger side)
 - o Removing and installing - Fig. 2
 - o Removing and installing swivel fittings - Fig. 1

80-544

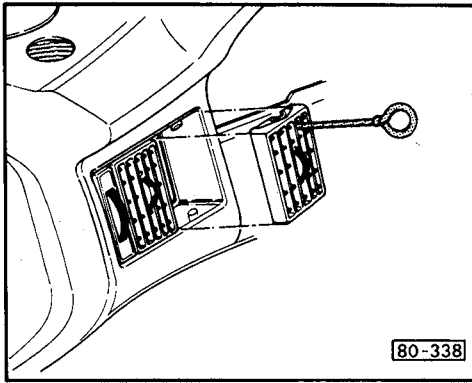
80-1



- 8- Heater controls
 - o Removing and installing - Page 80-8
- 9- Instrument panel air outlets (centre)
 - o Removing and installing - see "General Body Repairs" Workshop Manual
 - o Removing and installing swivel fittings - Fig. 1
- 10- Instrument panel air outlet (driver's side)
 - o Removing and installing - Fig. 2
 - o Removing and installing swivel fittings - Fig. 1
- 11- Defroster vent (windscreen)
 - o Removing and installing - Page 80-4

80-544

80-2



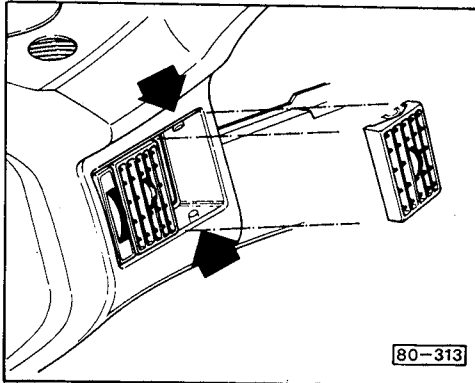
◀ Fig. 1 Swivel fittings

Removing and installing:

- Pull out with auxiliary tool (e.g. angled wire).

Note:

- Install on correct side. (large notch at top).
- Manufacture auxiliary tool - Page 80-5.



◀ Fig. 2 Instrument panel air outlet (side)

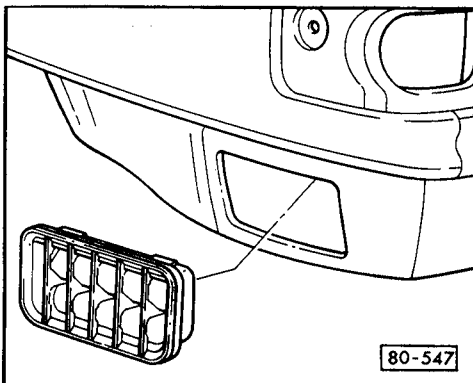
Removing and installing:

- Remove swivel fittings.
- Pull air outlet out of instrument panel.

Note:

Air outlet must engage in place.

80-3



◀ Fig. 3 Vent openings

- Installed at right and left in luggage boot.
- Sealing lips in vent openings must move smoothly and close by themselves.

Note:

Diagram shows view with bumpers removed.

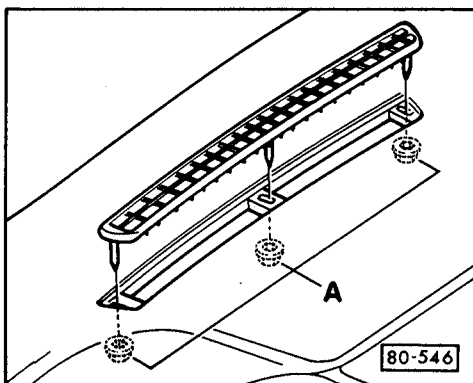
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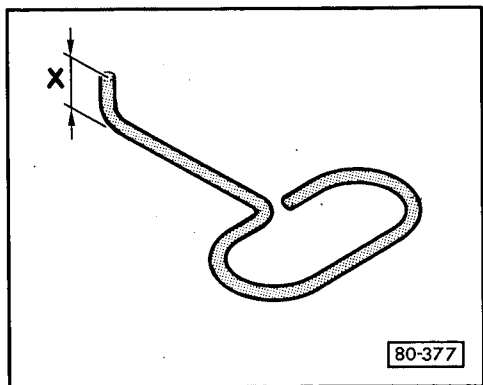
REMOVING AND INSTALLING DEFROSTER VENT (WINDSCREEN)

- Remove instrument panel - see "General Body Repairs" Workshop Manual.

- ◀ Remove three self-threading nuts -A-.



80-4



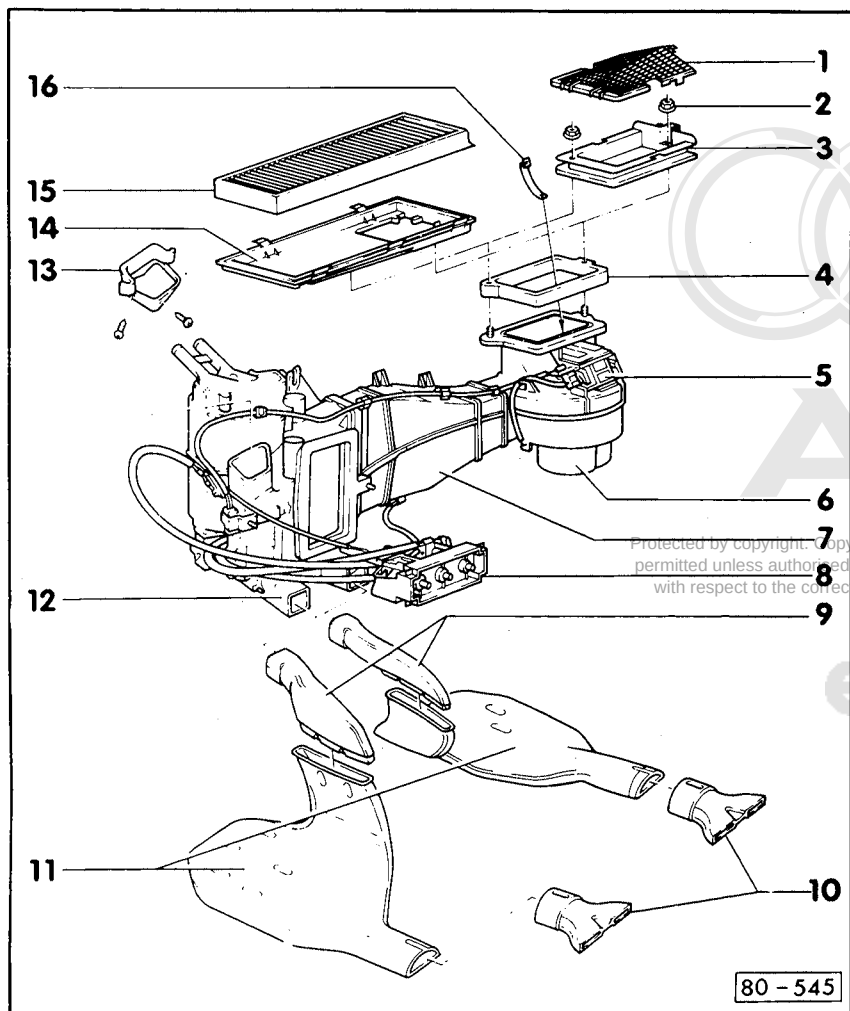
◀ MAKING AUXILIARY TOOL

- Wire diameter = 3 mm.
- Dimension X = 6 mm.

Note:

For removing instrument panel air outlets.

80-5



SERVICING HEATER

=====

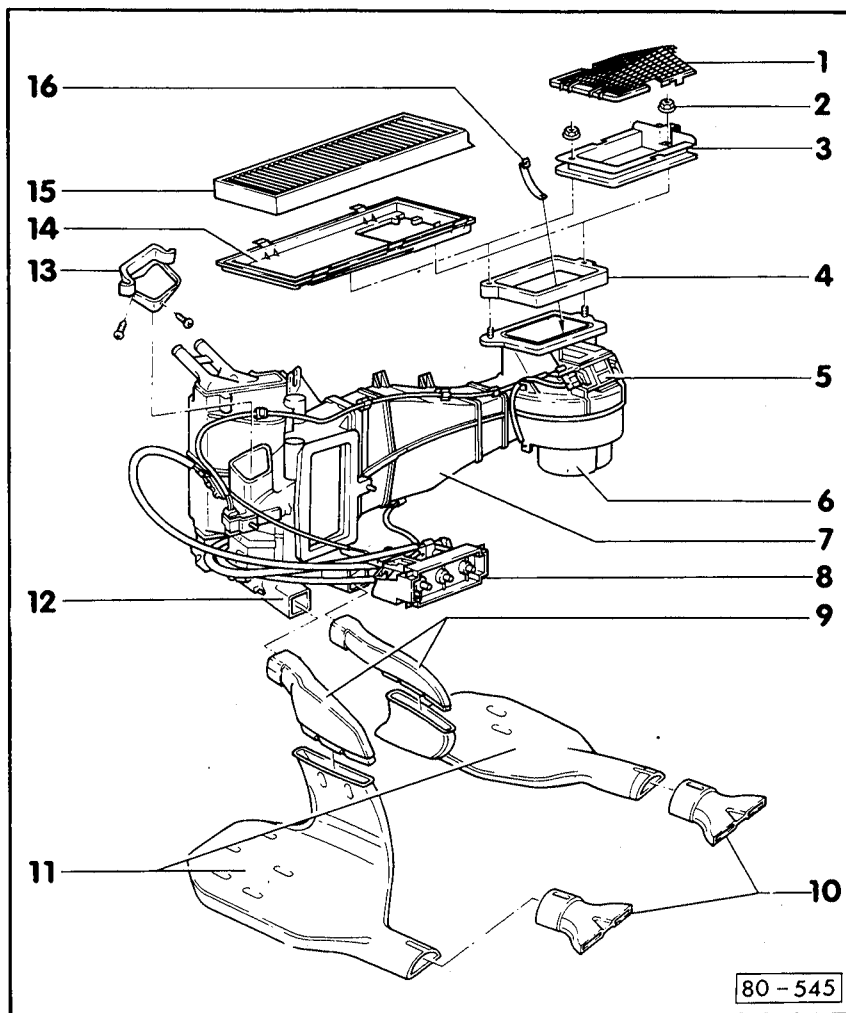
(Heater, heater control and air guides)

- 1- Leaf screen*
- 2- Hexagon nuts
- 3- Intake duct*
 - o Removing and installing - Page 80-12
- 4- Seal
- 5- Series resistance for fresh air blower -N24
 - o Removing and installing - Page 80-15
- 6- Fresh air blower -V2
 - o Removing and installing - Page 80-15
- 7- Heater
 - o Removing and installing - Page 80-11
- 8- Heater controls
 - o Removing and installing - Page 80-8
 - o Removing and installing Bowden cables - Page 80-9

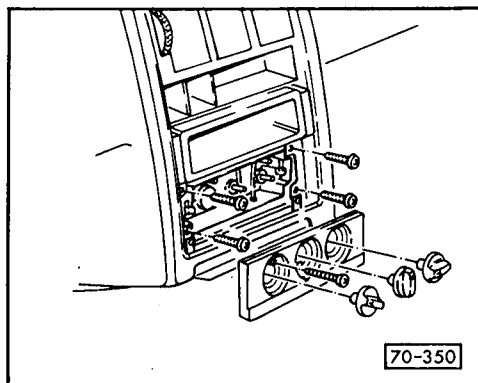
* Not installed on vehicles with dust and pollen filter

80-545

80-6

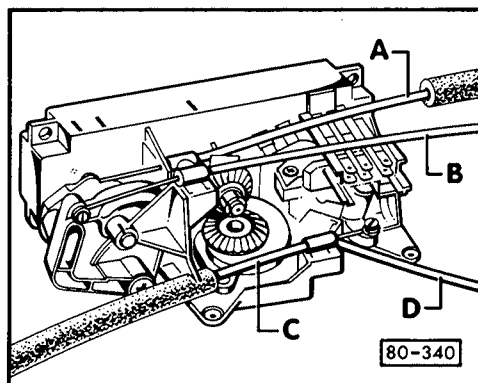


- 9- Connecting ducts*
 - 10- Footwell air outlets (rear)*
 - 11- Rear heater ducts*
 - 12- Footwell air outlet
o Removing and installing - Page 80-16
 - 13- Connector piece for defroster duct
o Only on vehicles with air bag
 - 14- Intake duct**
 - 15- Dust and pollen filter**
o Removing and installing - Page 80-17
 - 16- Retaining clip
- * Not installed on all vehicles, equipment-dependent
- ** Only on vehicles with dust and pollen filter



REMOVING AND INSTALLING HEATER CONTROLS

- ◀- Pull off knobs.
- Unscrew trim plate.
- Remove centre section of dash panel (see "General Body Repairs" Workshop Manual).



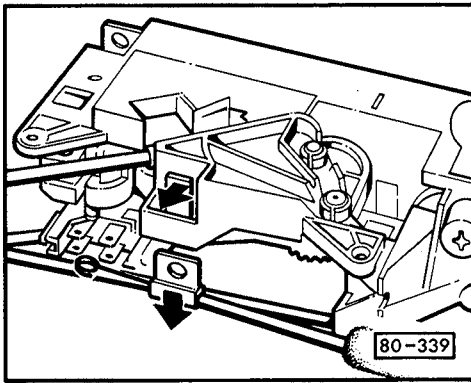
CONNECTION DIAGRAM FOR BOWDEN CABLES ON HEATER CONTROLS

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- ◀- Bowden cable -A- to footwell/defroster control flap.
Bracket colour: white
- Bowden cable -B- to central flap.
Bracket colour: black
- Bowden cable -C- to fresh air shut-off flap.
Bracket colour: blue

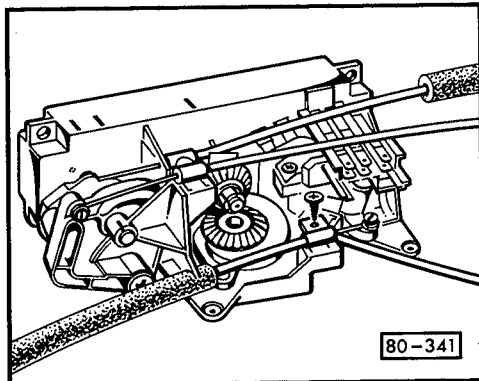
Note:
Not installed on vehicles with air conditioner.

- Bowden cable -D- to temperature flap.
Bracket colour: red



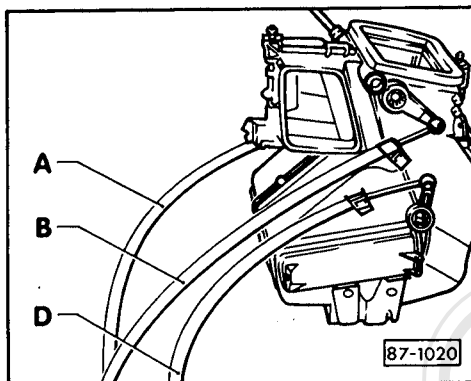
REMOVING AND INSTALLING BOWDEN CABLES FROM/ON HEATER CONTROLS

- ◀ - Unclip Bowden cable bracket (arrows).
- Unhook Bowden cable.



- ◀ Note:
 - If bracket lug breaks off, Bowden cable bracket should be screwed on.
 - Renew sticky or damaged Bowden cables.

80-9

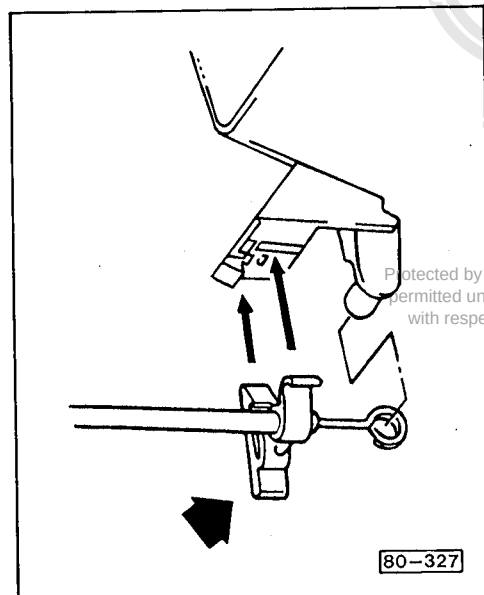


CONNECTION OF BOWDEN CABLES TO HEATER FLAP BOX

- ◀ - Bowden cable -A- from footwell/defroster control flap to air distribution controller.
Bracket colour: white
- Bowden cable -B- from central flap to air distribution controller.
Bracket colour: black
- Bowden cable -D- from temperature flap to temperature controller.
Bracket colour: red
- Bowden cable -C- (not shown) from rotary blower switch to fresh air shut-off flap (in air duct).
Bracket colour: blue

Note:
Not installed on vehicles with air conditioner.

REMOVING AND INSTALLING BOWDEN CABLES FROM/ON HEATER

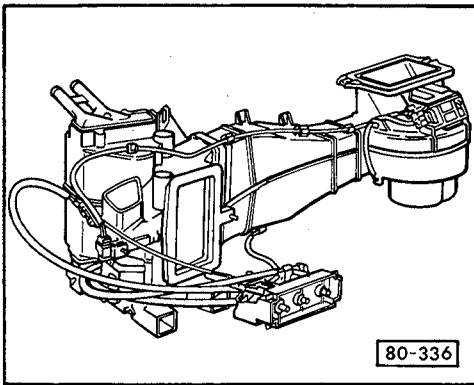


Remove Bowden cable bracket.

- Carefully press Bowden cable off lever arm.

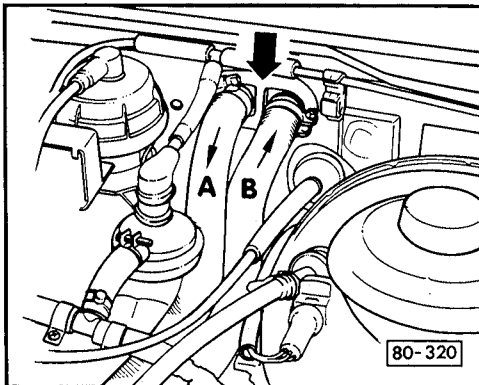
Note:
Renew sticky or damaged Bowden cables.

80-10



◀ REMOVING AND INSTALLING HEATER

- Disconnect battery.
- Remove instrument panel - see "General Body Repairs" Workshop Manual.
- Release pressure in coolant circuit.
- Disconnect coolant hoses to heater (e.g. with V.A.G 3094).



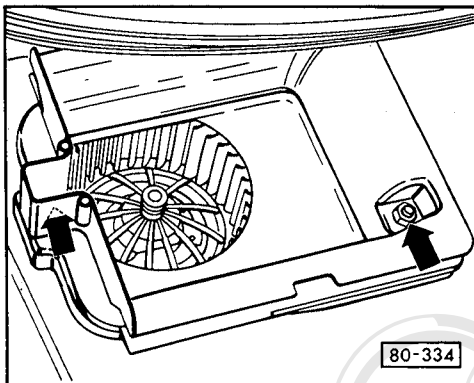
◀- Disconnect all coolant hoses to heater

- A - Return hose to water pump
- B - Supply hose from cylinder head.

Note:

Seal connections on heater with plugs.

80-11



- Remove windscreen wipers - see "Electrical System" Workshop Manual.
- Remove plenum chamber cover.

Note:

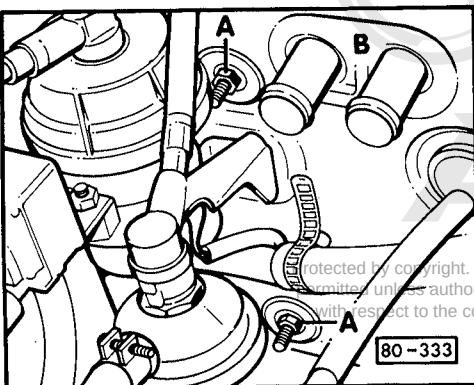
Check seal when installing, renew butyl cord if necessary.

◀- Remove intake duct.

Note:

Ensure that seal is properly seated when installing.

- Separate all connections between vehicle and heater.



◀- Remove two screws -A-.

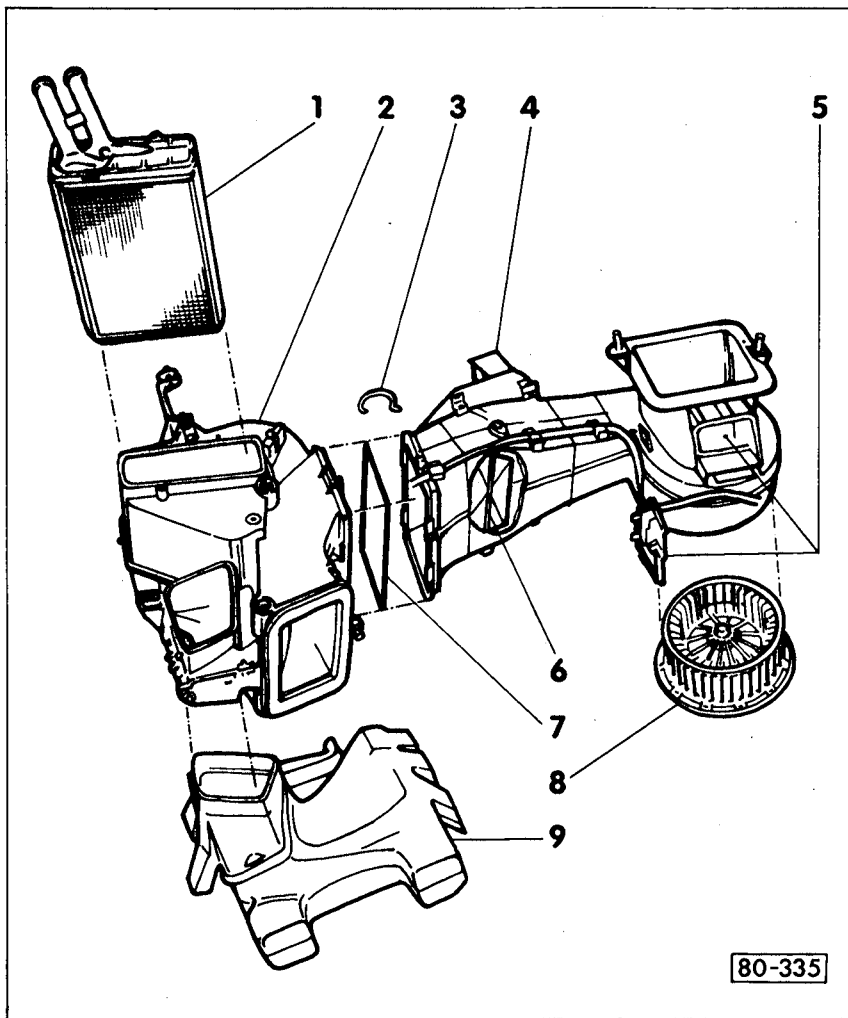
- Remove heater.

Notes:

- Ensure proper seating and seal of rubber grommet -B- when installing.
- Check Bowden cables for ease of movement before installing heater.

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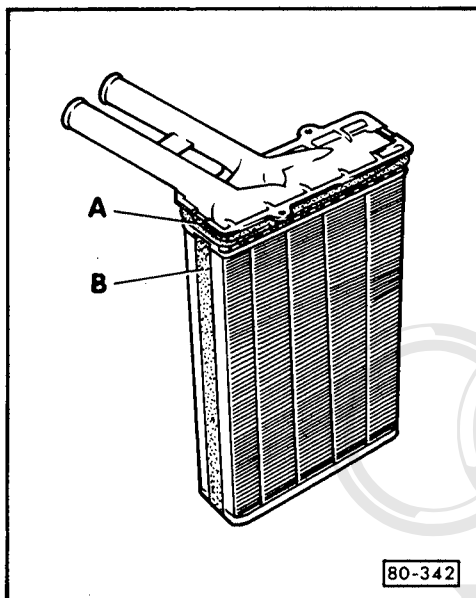


80-335

DISMANTLING AND ASSEMBLING HEATER

- 1- Heat exchanger
o Sealing, Notes on installation
- Fig. 1
- 2- Heater flap box
o Do not dismantle
- 3- Retaining clip
o Lever off with screwdriver
- 4- Air duct
o Do not dismantle
- 5- Series resistance for fresh air blower -N24
o Removing and installing - Page 80-15
- 6- Fresh air shut-off flap
- 7- Gasket
- 8- Fresh air blower -V2
o Removing and installing - Page 80-15
- 9- Footwell air outlet
o Removing and installing - Page 80-16

80-13



80-342

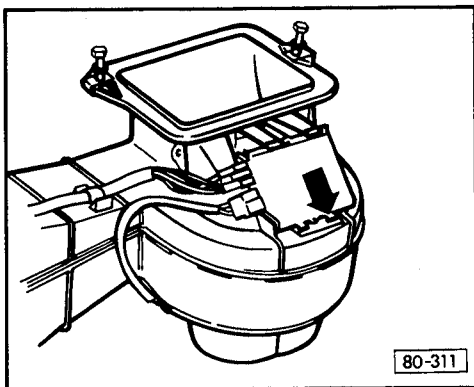
◀ Fig. 1 Heat exchanger

Sealing:

- Seals -A- and -B- must be bonded gap-free over entire surface.

Notes on installing:

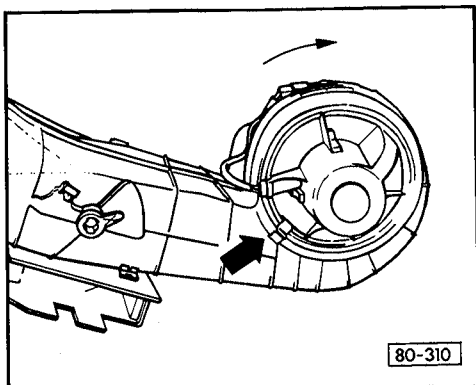
If heat exchanger does not engage in heater flap box when installing, it must be secured with 2 self-tapping screws.



REMOVING AND INSTALLING SERIES RESISTANCE FOR FRESH AIR BLOWER -N24

- Remove glove box - see "General Body Repairs" Workshop Manual.
- Separate connector.
- ◀ - Remove screw at bottom of series resistance.
- Press back locking lug.

Note:
Check for proper seating.

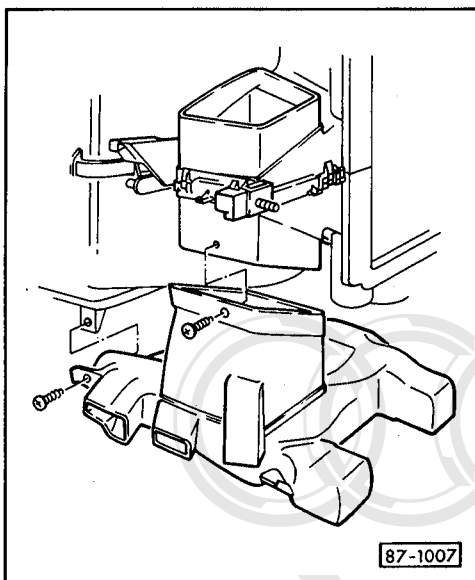


REMOVING AND INSTALLING FRESH AIR BLOWER -V2

- Remove glove box - see "General Body Repairs" Workshop Manual.
- Separate connector.
- ◀ - Press back locking lug and turn blower clockwise.

Note:
Ensure proper seating when installing.

80-15

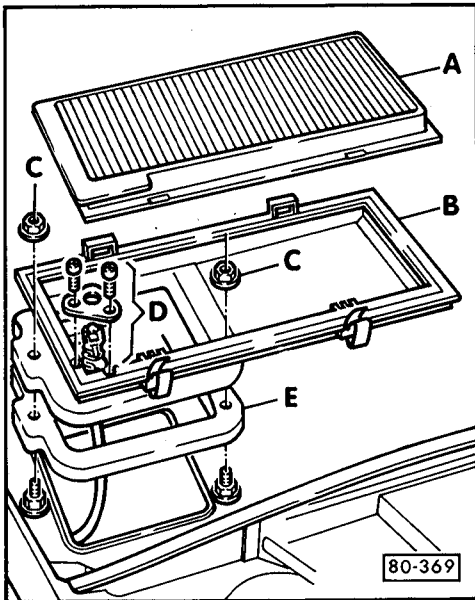


REMOVING AND INSTALLING FOOTWELL AIR OUTLET

- Remove centre console - see "General Body Repairs" Workshop Manual.
- Remove driver's side storage tray and passenger side cover - see "General Body Repairs" Workshop Manual.
- Remove ashtray - see "General Body Repairs" Workshop Manual.
- Remove entire instrument panel support at centre tunnel.
- ◀ - Remove securing screws.
- Remove rear ducts for footwell air outlets (only on vehicles with rear heater duct).
- Carefully pull out footwell air outlets.

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REMOVING AND INSTALLING DUST AND POLLEN FILTER

- Remove windscreen wipers - see "Electrical System" Workshop Manual.

- Remove plenum chamber cover.

Note:

Check gasket (between cover and windscreen flange) when installing, and renew butyl cord if necessary.

◀ - Before installing filter housing -B-, check gasket -E- for damage and proper seating

- Renew both self-locking hexagon nuts -C- (tightening torque: 5 Nm).

- On vehicles with manually controlled air conditioner, secure ambient temperature switch -D- to filter housing -B- with two screws.

- Install dust and pollen filter -A-.

Note:

- Check sealing cord -B- in filter housing for damage.

- Dust and pollen filter should be renewed at regular intervals - see operating instructions.

- Dust and pollen filter can be retrofitted.

80-17



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erWin 

SAFETY PRECAUTIONS WHEN WORKING WITH AIR-
CONDITIONED VEHICLES AND WHEN DEALING WITH
REFRIGERANT

The units and pipe system of the air conditioner are filled with difluorodichlormethane (CF_2Cl_2) or dichlorodifluoromethane (CCL_2F_2) as refrigerants. These refrigerants are known under the trade name Frigen R 12 and Freon R 12 respectively.

The following safety precautions should be taken when dealing with these refrigerants (in individual countries additional regulations may apply).

- 1- If it is necessary to open the refrigerant circuit during repairs on the vehicle, first drain the refrigerant circuit (see Point -2-). When doing this, avoid all contact with liquid refrigerant or refrigerant vapour!

Wear rubber gloves and goggles to protect hands and eyes!

Reason:

Direct contact of refrigerant with unprotected body areas will cause frostbite.

Important!

It is advisable to have an eye rinsing bottle handy at all times.
Should liquid refrigerant get into eyes, rinse eyes thoroughly with water for about 15 minutes.
Then apply eye drops and see a doctor immediately, even if no pain is felt.

87-1

The doctor must be informed that the frostbite was caused by R 12 refrigerant.

If, despite compliance with safety precautions, the refrigerant does come into contact with other areas of the body, these areas must be rinsed immediately with cold water for at least 15 minutes.

- 2- Refrigerant must not be discharged into open. It must be extracted using an extraction station and then returned to the manufacturer for processing or for environmentally friendly disposal (in individual countries additional regulations may apply). For this reason, bring the vehicle to a specially equipped VW and Audi A/C workshop (these workshops have the required systems).

Reason:

Refrigerant is harmful to the ozone layer of the earth's atmosphere.

- 3- The refrigerant circuit should only be worked on in well-ventilated rooms. Ensure that there are no inspection pits, shafts or cellar entrances within a radius of 5 m. Where present, ventilation systems must be switched on.

Reason:

If, despite compliance with safety precautions, refrigerant escapes, it can cause suffocation without prior warning in badly ventilated rooms or workshop pits.

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87-2

The escaping refrigerant is not only colourless and odorless, but also heavier than air and displaces oxygen.

- 4- Never weld, brace or solder parts of a charged air conditioner. This also applies to welding and soldering work on vehicle if there is a danger of air conditioner parts becoming hot. Within the scope of paintwork repair, object temperatures in drying booth or its preheating zone must not exceed 80° C.

Reason:

Application of heat results in considerable pressure increase in system, and this may cause system to burst.

Remedy:

Open and discharge refrigerant circuit (see Page 87-2, Point -2-).

Note:

- Damaged or leaky air conditioner parts must not be repaired by welding or soldering.
- If an air conditioner is kept open for several hours, parts of system must be replaced before it can be recharged. Therefore, close refrigerant circuit again carefully at once.

87-3



- Disconnect voltage supply for magnetic coupling -N25- (e.g. disconnect plug from high-pressure switch for magnetic coupling -F118-, or separate connector in wiring to magnetic coupling - see current flow diagram), so that system is not damaged if accidentally switched on with refrigerant circuit discharged.

- 5- Although refrigerant is not inflammable, smoking must be prohibited in rooms filled with refrigerant gas.

Reason:

The high temperatures produced by a burning cigarette result in chemical decomposition of refrigerant gas. Inhalation of the resulting toxic products leads to nausea and dry coughing.

NOTES ON GENERAL REPAIRS

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The refrigerant circuit may only be opened if the air conditioner must be discharged due to the safety precautions on Page 87-2, Points 3 and 4.



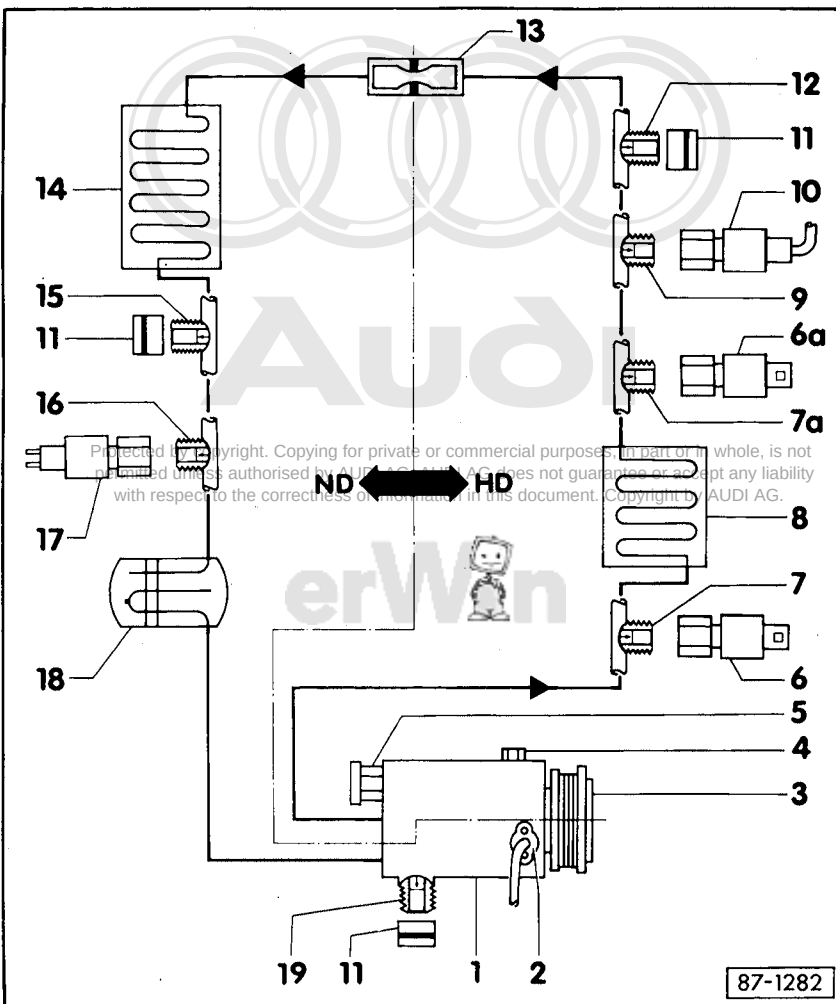
It is also necessary to open the refrigerant circuit if electric welding must be carried out near refrigerant hoses. During electric welding, invisible ultraviolet rays are given off which penetrate the refrigerant hoses and decompose the refrigerant.

87-4

Repair work which can be performed on the air conditioner without opening the refrigerant circuit is described on the following pages.

For all other ordinary vehicle repairs, the refrigerant circuit also remains closed.

87-5



REFRIGERANT CIRCUIT

=====

All parts marked with * can be repaired or replaced in any VW and Audi workshop (see "Repairs Which Do Not Affect Refrigerant Circuit").

All parts of refrigerant circuit not marked with * and all refrigerant hoses and refrigerant pipes can only be repaired or replaced in a specially equipped VW and Audi A/C workshop.

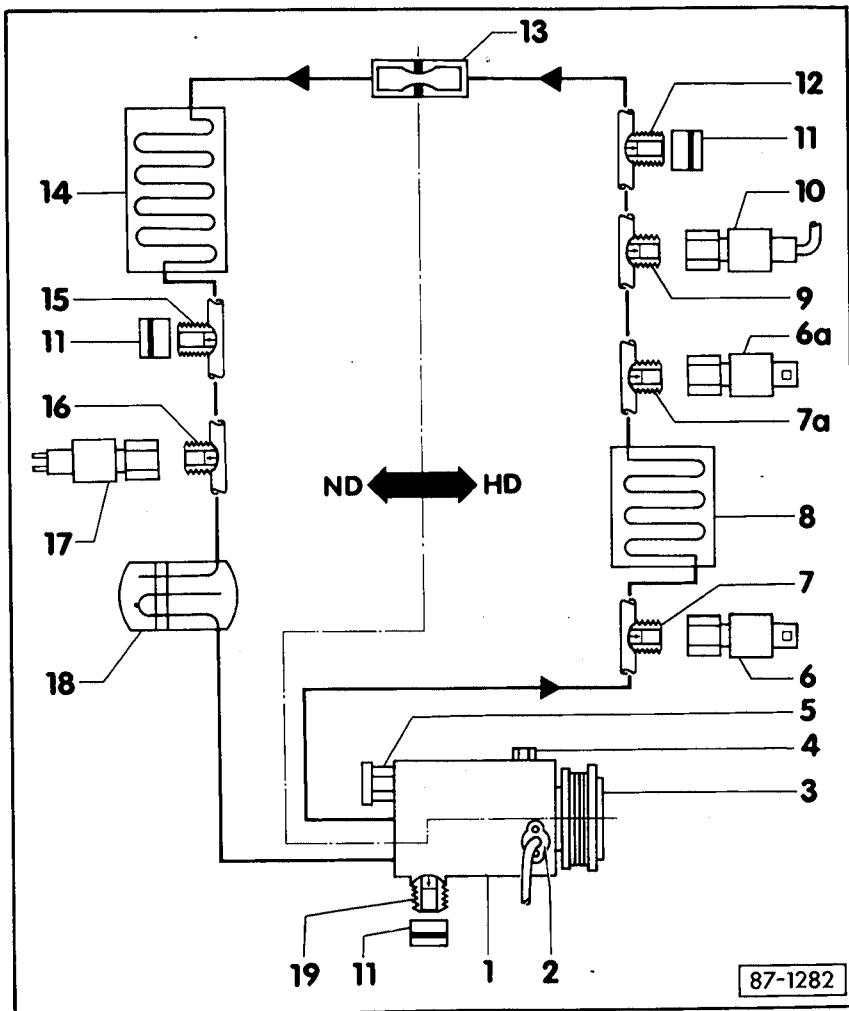
HD = High-pressure
ND = Low-pressure

- 1- Compressor (Zexel)
 - o Removing and installing compressor bracket* on:
 - 4-cyl. engine - Page 87-20
 - 5-cyl. engine - Page 87-21
 - 6-cyl. engine - Page 87-23
 - o Tensioning V-belt*
 - 4-cyl. engine - Page 87-18
 - 5-cyl. engine - Page 87-19

Note:

- o Removing and installing ribbed belt* - see appropriate "Engine Mechanics" Workshop Manual.
- o Heat insulation must be applied to refrigerant pipes.

87-6



- 2- Speed sensor for A/C compressor -G111
 - o Checking* - Page 87-9
 - o May only be removed with refrigerant circuit discharged - bring vehicle to specially equipped VW and Audi A/C workshop
 - o Only install if compressor is driven with ribbed belt

- 3- Magnetic coupling -N25-*
 - o Servicing - Page 87-13

Note:

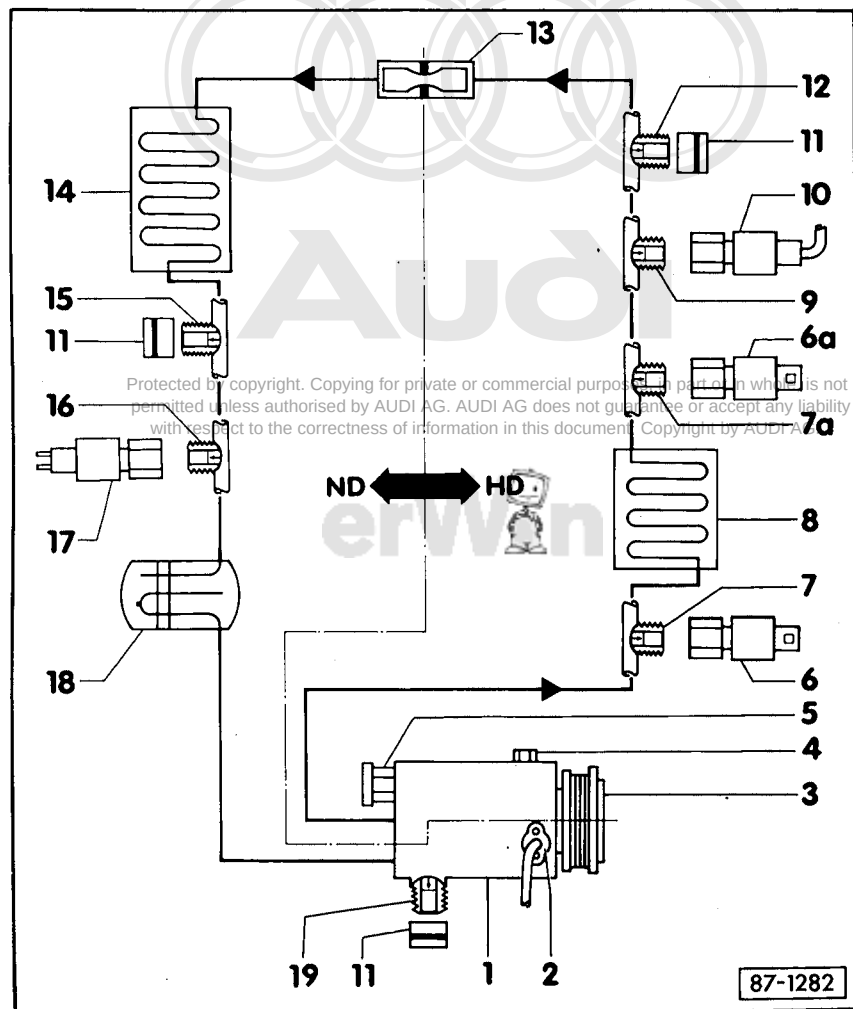
- Due to equipment, switching on of magnetic coupling with engine stopped is not possible on some vehicles (see self-diagnosis Repair Group and "Ignition and Fuel Injection System" Workshop Manual).
- Kick-down function carried out via kick-down switch or via control unit for automatic gearbox (see CFD).

- 4- Oil drain plug

- 5- Pressure relief valve

- 6- High-pressure switch for magnetic coupling -F118-* (4 and 6-cyl. engine)
 - o Function, fitting location, removing and installing - Page 87-10

87-7



- 6a- High-pressure switch for magnetic coupling -F118-* (5-cyl. engine)
 - o Function, fitting location, removing and installing - Page 87-10

- 7,7a- Valve connection

- 8- Condenser

- 9- Valve connection

- 10- High-pressure switch for air conditioner -F23*
 - o Function, fitting location, removing and installing - Page 87-11

- 11- Cap

- 12- Valve connection

- 13- Restrictor

- 14- Evaporator

- 15- Valve connection

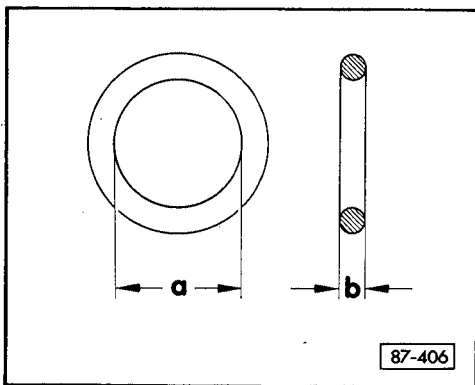
- 16- Valve connection

- 17- Low-pressure switch for refrigerant circuit -F73-*
 - o Function, fitting location, removing and installing - Page 87-12

- 18- Reservoir

- 19- Valve connection

87-8

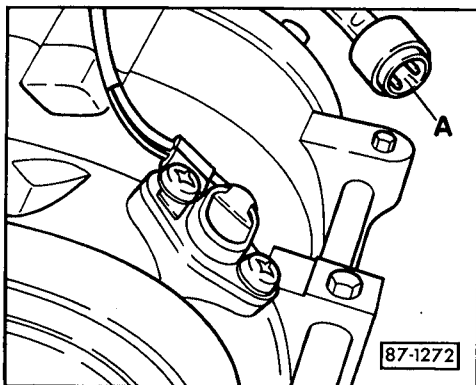


◀ O-RINGS

- o Never use more than once.
- o Lubricate with refrigerant oil before installing.
- o Ensure proper seating in groove.
- o Make sure work area and components are dirt-free.

Note:

Only install O-rings resistant to refrigerant and refrigerant oil.



CHECKING SPEED SENSOR FOR A/C COMPRESSOR -G111

- Switch off ignition.
- Separate connector to -G111 in front left of engine compartment.

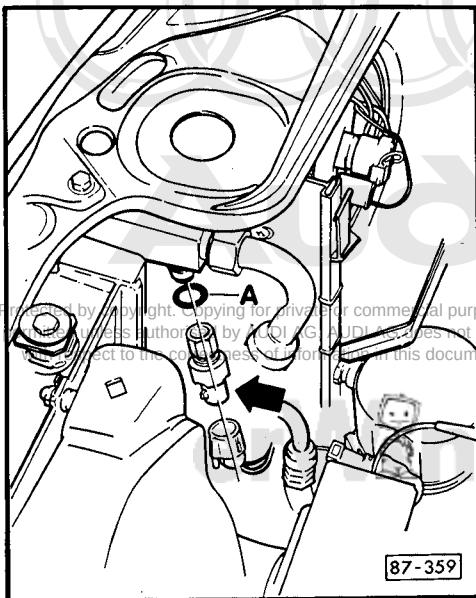
- #### ◀
- Measure resistance at -A- between two contacts to -G111.
Specified value: 1.0 kohm to 1.5 kohms.

Measure resistance between earth and two contacts in plug -A- to -G111.
Specified value: ohms.

Note:

Defective sender may only be removed with refrigerant circuit discharged - bring vehicle to specially equipped VW and Audi A/C workshop.

87-9



◀ HIGH-PRESSURE SWITCH FOR MAGNETIC COUPLING -F118

Function

Switches magnetic coupling:

Off at 28.2 - 31.0 bar

On at 10.3 - 17.3 bar

pressure in refrigerant circuit.

Removing and installing:

- Connector housing: red.

- Refrigerant circuit remains closed (valve).

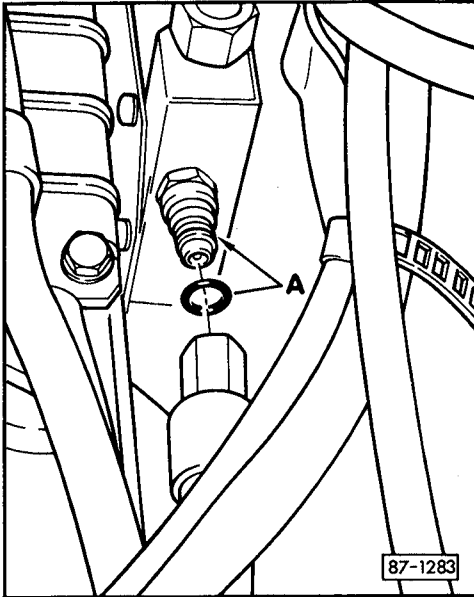
- Renew O-ring: -A- 9.3 mm; -B- 1.8 mm.

- Tightening torque: 5 Nm.

Note:

- Diagram shows layout for 4 and 6-cylinder engine.

- Fitting location for vehicles with 5-cyl. engine: In front of condenser.



◀ HIGH-PRESSURE SWITCH FOR AIR CONDITIONER -F23

Function

Switches radiator fan -V7- to 2nd stage
On at 13.1 - 17.5 bar (switch closes).
Off at 10.6 - 15.0 bar.
(Pressure difference of at least 2 bar between switching points).

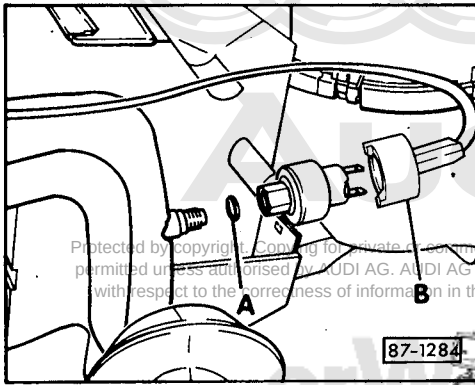
Removing and installing:

- Green housing colour with bonded connection wires.
- Refrigerant circuit remains closed (valve).
- Renew O-ring -A-: 9.3 mm x 1.8 mm.
- Tightening torque: 5 Nm.

Note:

- Diagram shows layout for 4 and 6-cylinder engine.
- Fitting location for vehicles with 5-cyl. engine: In front of condenser.

87-11



◀ LOW-PRESSURE SWITCH FOR REFRIGERANT CIRCUIT -F73-

Function:

Switches off magnetic coupling when pressure falls to 1.45 - 1.60 (switch opens)
On at 2.9 - 3.2 bar
(Pressure difference between switching points 1.4 - 1.6 bar).

Prevents evaporator from icing up.
Protects compressor when refrigerant circuit is empty.

Fitting location:

Passenger side between bulk head and heater.

Removing and installing:

- Remove cover on passenger side.
- Remove control unit (for ignition and injection system).
- Pull off connector -B-.
- Refrigerant circuit remains closed (valve).
- Always renew O-ring -A-, lubricate with refrigerant oil and ensure proper seating.
- Tightening torque: 5 Nm.

Note:

- Diagram shows low-pressure switch with heater removed.
- Make sure work area and components are dirt-free.
- To remove use commercial 16mm open-end spanner shortened to approx. 80 mm.

87-12

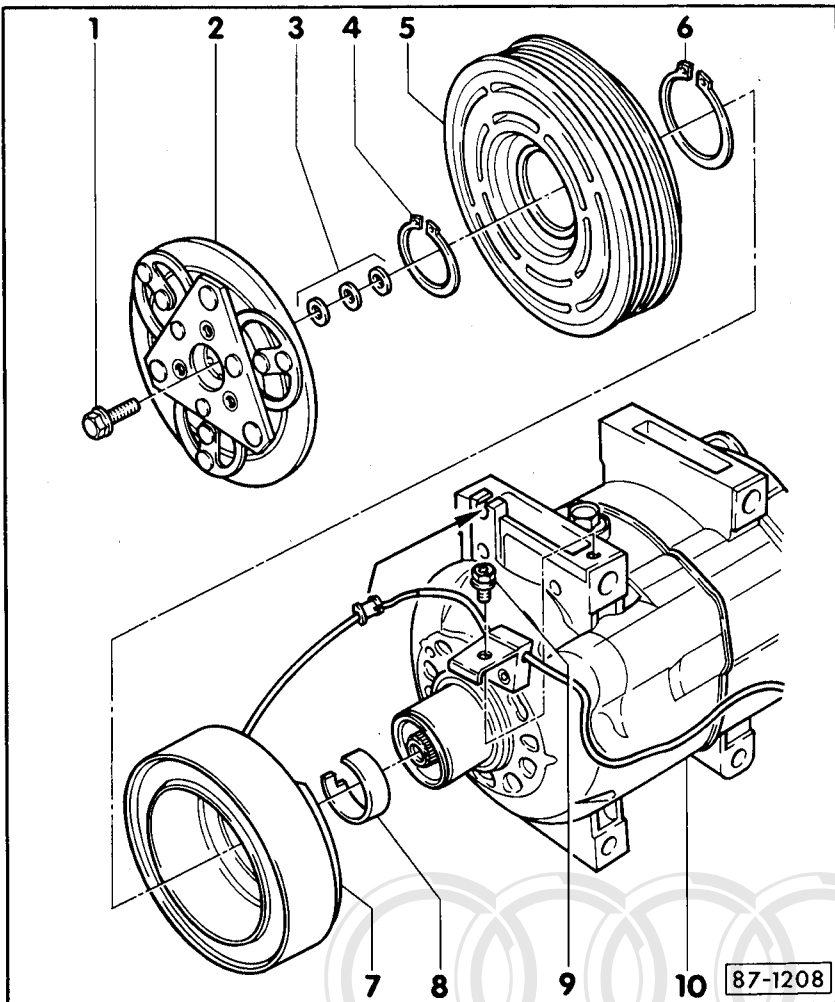
SERVICING MAGNETIC COUPLING -N25-

Note:

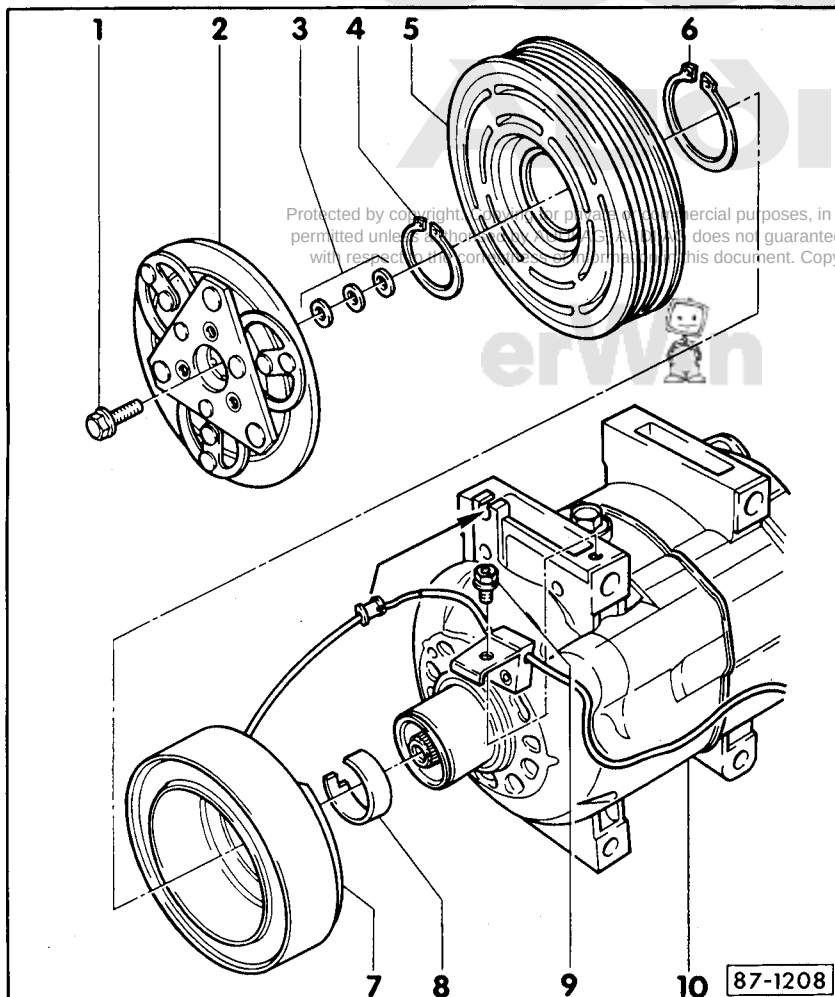
- Magnetic coupling can be serviced with refrigerant circuit charged.
- Remove compressor from bracket
 - 4-cyl. engine - Page 87-20
 - 5-cyl. engine - Page 87-21
 - 6-cyl. engine - Page 87-23
- On vehicle with 6-cyl. engine, clearance between compressor belt pulley and crankshaft belt pulley must be checked and, if necessary, readjusted each time after removal and installation - Page 87-25.
- On vehicles with ribbed belts, mark direction of belt travel before removing.
- Removing and installing ribbed belts - see "Engine Mechanics" Workshop Manual.

- 1- Bolt - 15 Nm
 - o Loosening and tightening - Fig. 1

- 2- Clutch plate
 - o Pulling off - Fig. 2



87-13



- 3- Spacer ring for adjusting gap
 - o Gap between belt and coupling pulleys: 0.3 - 0.6 mm
 - o Checking gap - Fig. 6

- 4- Circlip
 - o Renew
 - o Install facing correct direction (flat side faces compressor) and ensure proper seating in groove

- 5- Belt pulley
 - o Pulling off - Fig. 3
 - o Installing - Fig. 4

- 6- Circlip
 - o Renew
 - o Install facing correct direction (flat side faces compressor) and ensure proper seating in groove

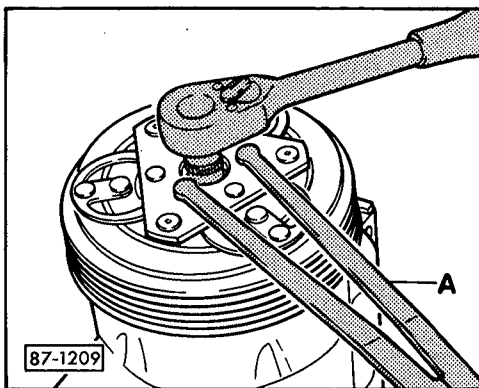
- 7- Solenoid
 - o Installing - Fig. 5

- 8- Felt ring
 - o Renew

- 9- Screw

- 10- Compressor (Zexel)

87-14

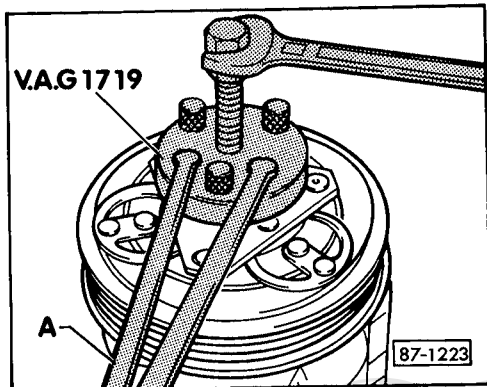


◀ Fig. 1 Loosening and tightening hexagon bolt

- Tightening torque: 15 Nm.

Note:

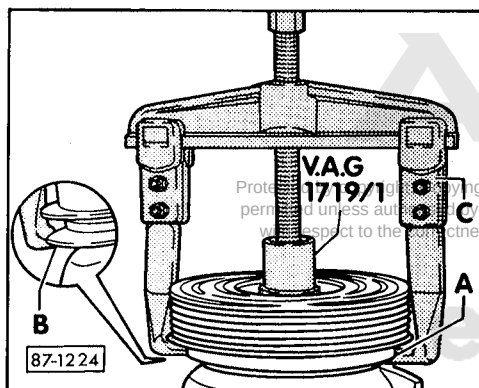
Use commercial two-hole spanner -A-. Pin diameter: 4 mm.



◀ Fig. 2 Pulling off clutch plate

- Use commercial two-hole spanner -A- to brace.

87-15



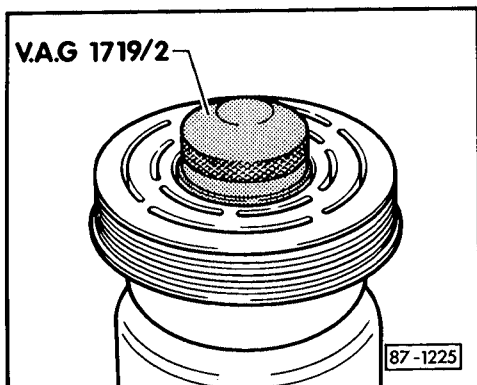
◀ Fig. 3 Pulling off belt pulley

- Remove felt ring.

Note:

In order to avoid damaging belt pulley when pulling off, insert two-arm puller -C- at shoulder -A- on belt pulleys for ribbed belts.

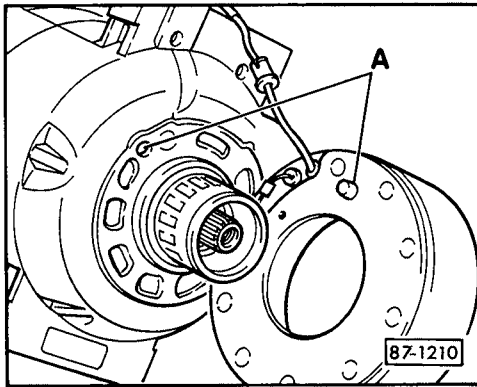
- behind belt pulley ridge -B- for belt pulleys for V-belts.



◀ Fig. 4 Installing belt pulley

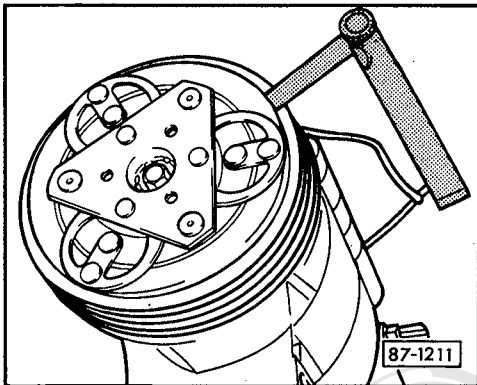
- Clean contact surface.
- Install belt pulley with installing tool and plastic hammer.

87-16



◀ **Fig. 5 Installing solenoid**

- Insert pin -A- into recess.



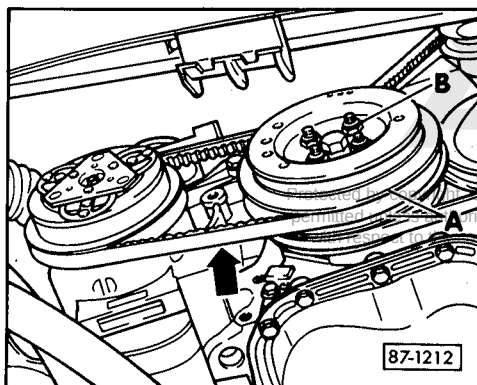
◀ **Fig. 6 Checking gap**

- Gap: 0.3 - 0.6 mm.

Note:

Gap must be within tolerance around entire circumference.

87-17



◀ **TENSIONING COMPRESSOR V-BELT
(4-CYL. ENGINE)**

Note:

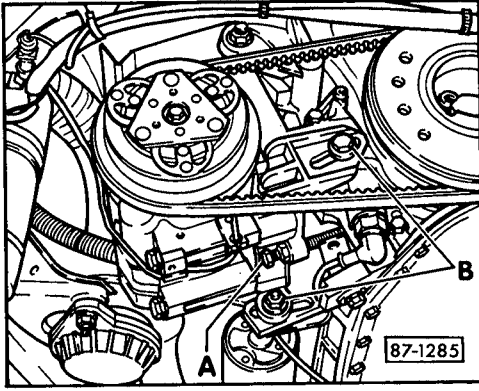
- V-belt is correctly tensioned when there is 5 mm play when depressed with thumb (with thumb pressure of approx. 50 N).

Compressor is fixed rigidly to engine.

Tensioning:

- V-belt pulley on crankshaft is divided into sections. Belt can be tightened and loosened by placing a larger or smaller number of spacers between two belt pulley halves -A-.
- Redundant spacers should be placed in front of and behind two halves of V-belt pulley.
- Crankshaft should be rotated when tightening 4 nuts -B- on V-belt pulley.
- Tightening torque: 20 Nm.

87-18



◀ TENSIONING COMPRESSOR V-BELT (5-CYL. ENGINE)

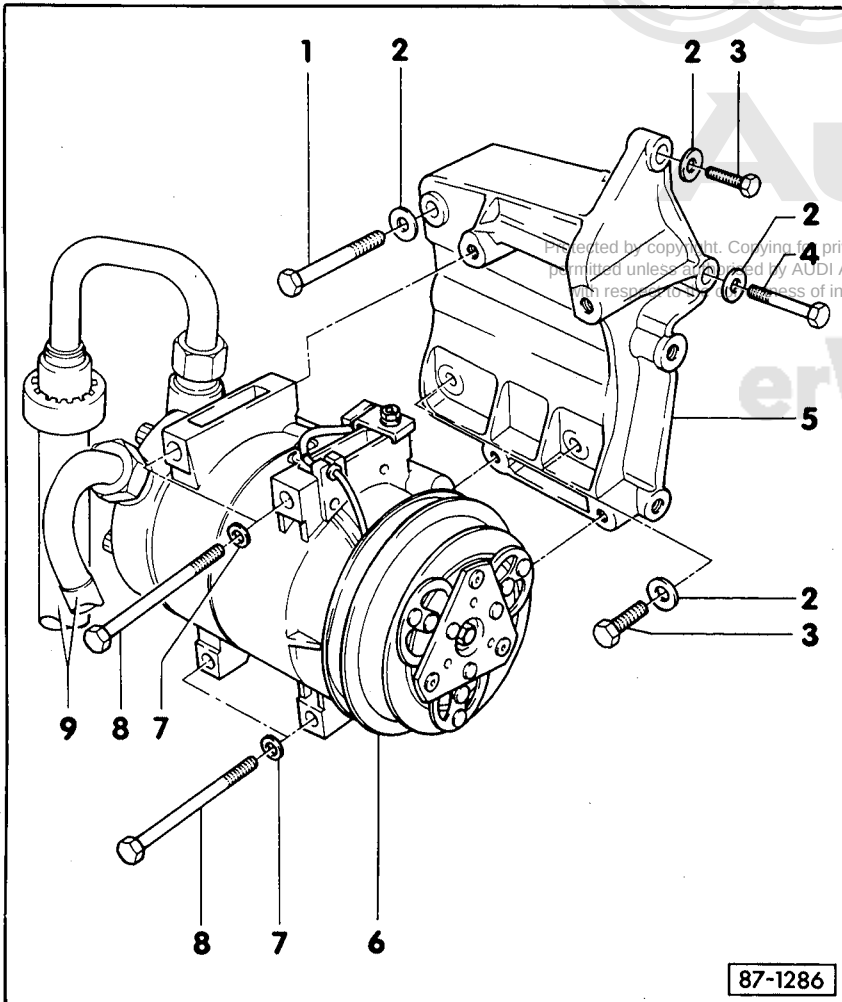
Note:

- V-belt is correctly tensioned when there is 5 mm play when depressed with thumb (with thumb pressure of approx. 50 N).

Tensioning:

- Loosen two bolts -B-.
- Tension V-belt by screwing in bolt -A-.
- Tighten two bolts -B-.
- Tightening torque: 20 Nm.
- Loosen bolt -A- and turn back (distance from engine block greater than 5mm).
- Lock bolt -A- with nut.

87-19



REMOVING AND INSTALLING COMPRESSOR BRACKET (4-CYLINDER ENGINE)

Note:

- Compressor bracket can be removed and installed without opening refrigerant circuit.
- After removing secure compressor, e.g. with wire on longitudinal member. Do not allow to hang from refrigerant pipes.
- Tensioning compressor V-belt - Page 87-18.

- 1- Hexagon bolt - 25 Nm
- 2- Washer
- 3- Hexagon bolt - 25 Nm
- 4- Hexagon bolt - 25 Nm
- 5- Compressor bracket
- 6- Compressor with magnetic coupling
- 7- Washer
- 8- Hexagon bolt - 25 Nm
- 9- Refrigerant hoses

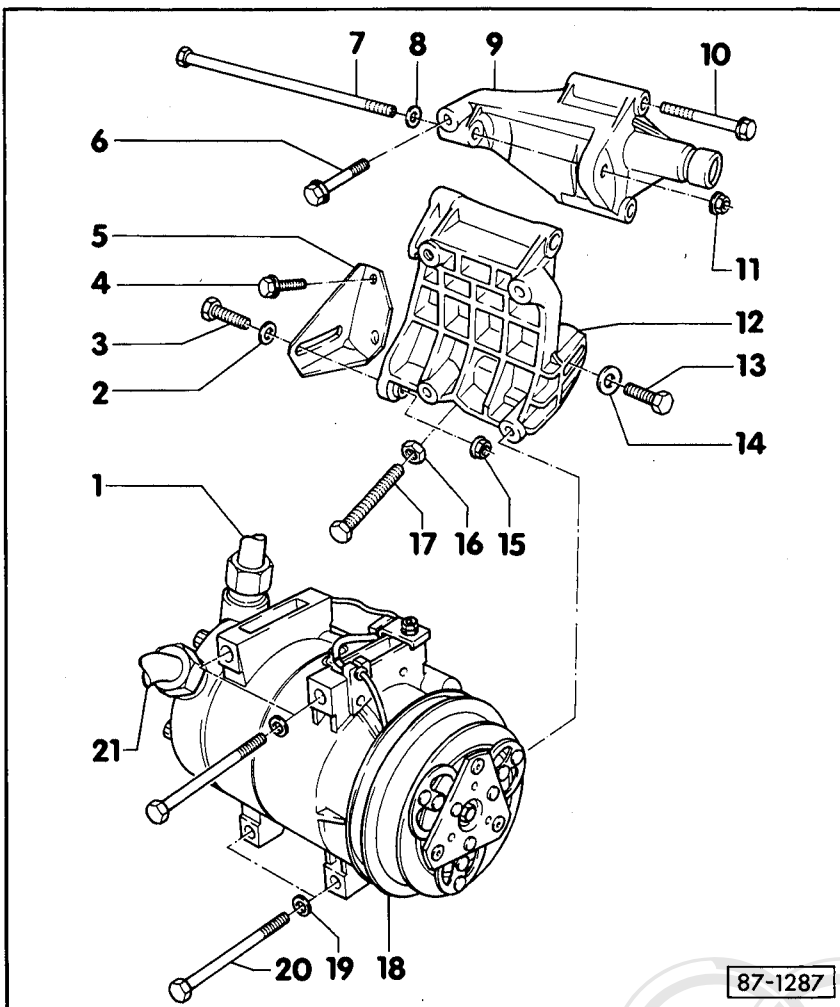
87-20

REMOVING AND INSTALLING COMPRESSOR
 =====
 BRACKET (5-CYLINDER ENGINE)
 =====

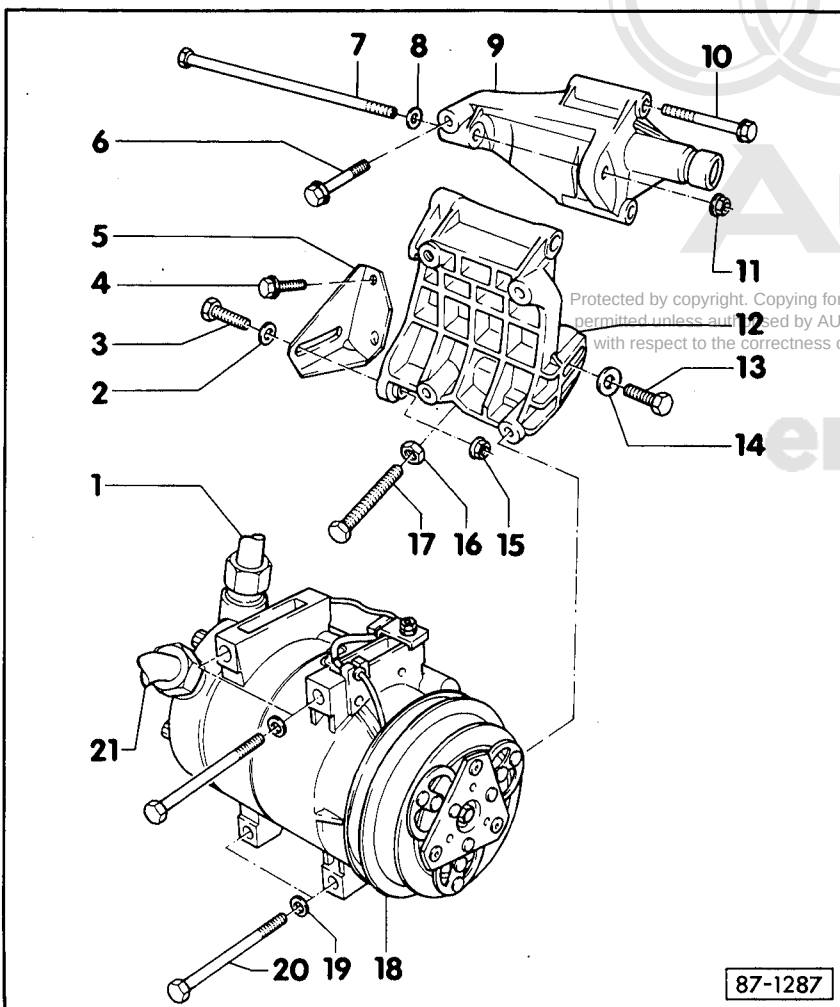
Note:

- Compressor bracket can be removed and installed without opening refrigerant circuit.
- Tensioning compressor V-belt - Page 87-19.

- 1- Refrigerant hose - low-pressure side
- 2- Washer
- 3- Hexagon bolt
- 4- Combi bolt - 20 Nm
- 5- Support bracket
o Fit tension-free
- 6- Combi bolt - 20 Nm
- 7- Hexagon bolt
- 8- Washer
- 9- Torque bracket
- 10- Combi bolt - 40 Nm
- 11- Self-locking hexagon nut - 40 Nm
o Renew

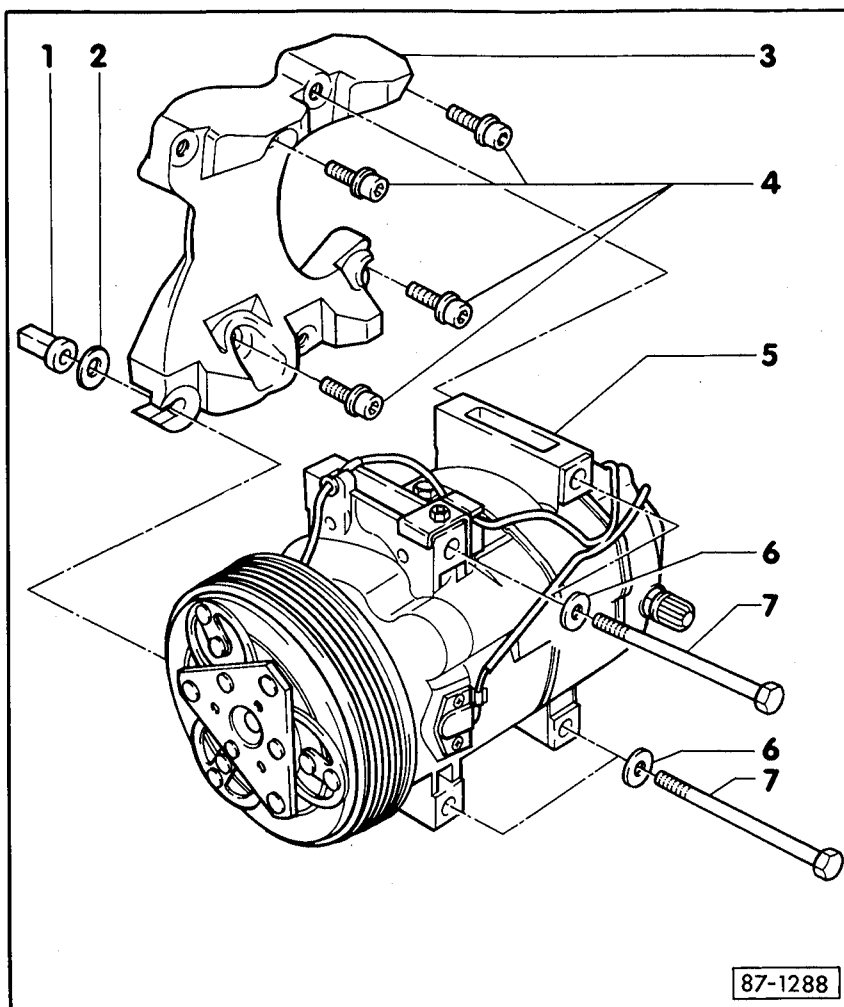


87-21



- 12- Compressor bracket
- 13- Hexagon bolt- 20 Nm
- 14- Washer
- 15- Self-locking hexagon nut - 20 Nm
o Renew
- 16- Hexagon nut
- 17- Hexagon bolt
- 18- Compressor with magnetic coupling
- 19- Washer
- 20- Hexagon bolt - 20 Nm
- 21- Refrigerant hose - high-pressure side

87-22

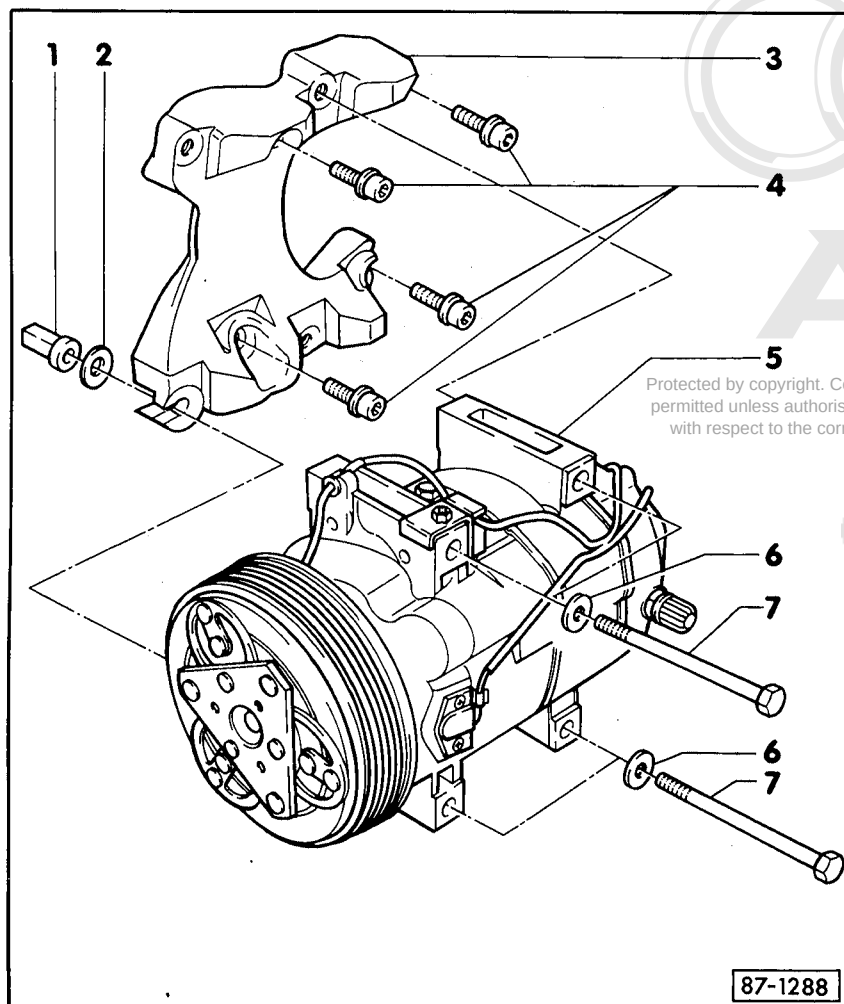


REMOVING AND INSTALLING COMPRESSOR
 =====
 BRACKET (6-CYLINDER ENGINE)
 =====

Note:

- o Compressor bracket can be removed and installed without opening refrigerant circuit.
- o Remove oil filter and oil cooler (see "Engine Mechanics" Workshop Manual).
- o Pinch off coolant hoses with V.A.G 3094, disconnect hoses and hang oil cooler out of way downward.
- o Separate connectors.
- o Remove compressor and secure to control arm with wire. Do not allow to hang from refrigerant hoses.
- o Before removing ribbed belt, mark direction of travel.
- o Removing and installing ribbed belts (see "Engine Mechanics" Workshop Manual).
- o Clearance between compressor belt pulley and crankshaft belt pulley must be readjusted each time compressor is removed from bracket - Page 87-25.
- o Remove torque arm to facilitate mounting.

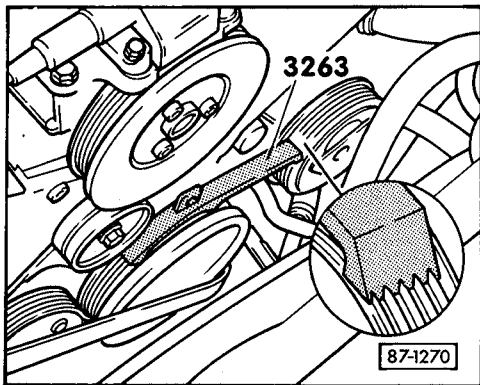
87-23



- 1- Nut
- 2- Washer
- 3- Compressor bracket
- 4- Allen screw with washer - 25 Nm
- 5- Compressor with magnetic coupling
- 6- Washer
- 7- Hexagon bolt - 25 Nm
 - o Adjust V-belt pulley clearance before tightening - Page 87-25

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87-24



ADJUSTING V-BELT PULLEY CLEARANCE (6-CYL. ENGINE)

- Remove noise insulation.
- Relax ribbed belt and remove idler pulley (see "Engine Mechanics" Workshop Manual).

Note:

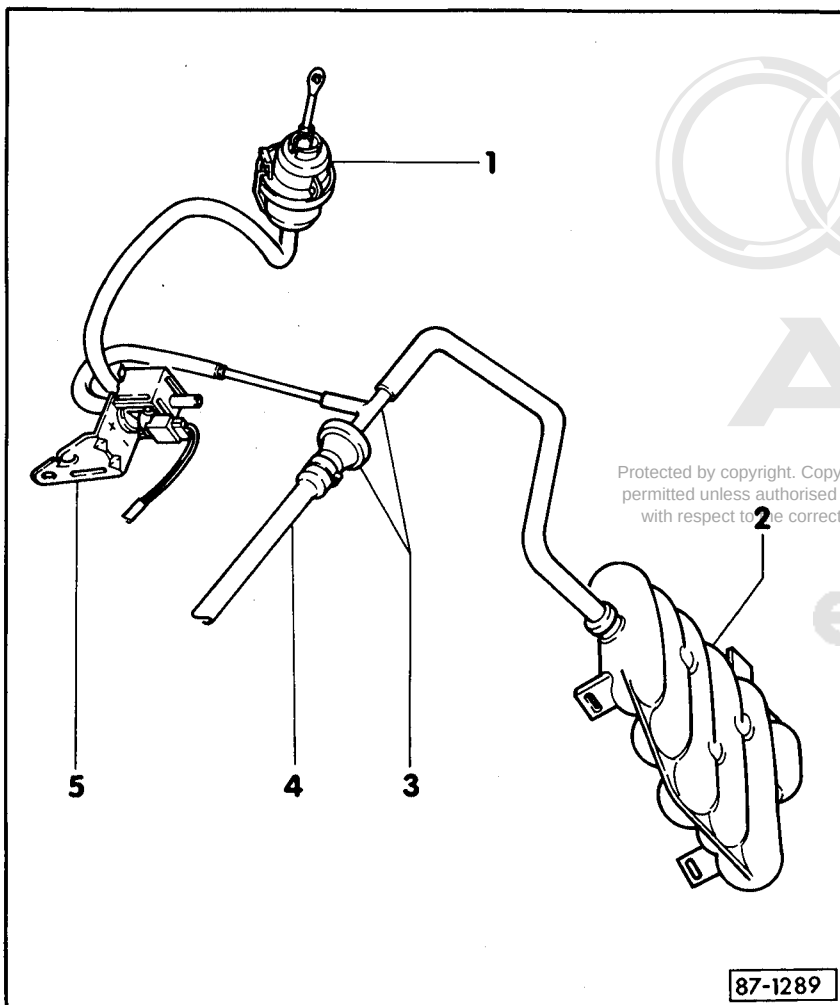
Before removing ribbed belt, mark direction of travel. Reversing direction of travel destroys belt.

- ◀ - Loosen 4 bolts (see Item 7 on Page 87-24).
- Position clearance gauge 3263 on belt pulley of vibration damper.
- Slide compressor so that clearance gauge can be inserted tension-free into grooves of compressor belt pulley (see "Engine Mechanics" Workshop Manual).

Note:

Clearance deviations greater than 0.4 mm lead to belt wear.

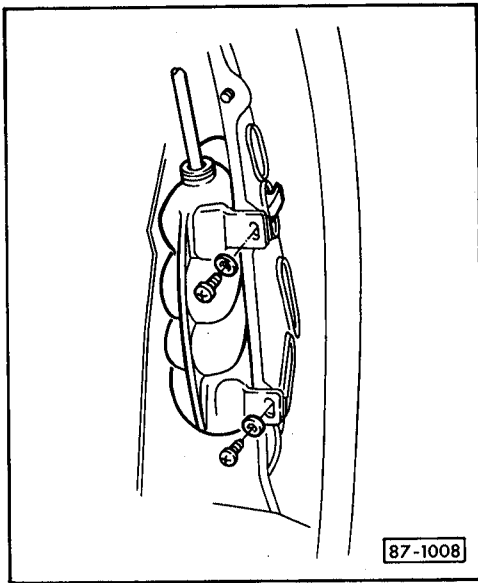
87-25



CONNECTION DIAGRAM FOR VACUUM HOSES

- 1- Vacuum unit for recirculating/fresh air flap
o Fitting location, checking - Page 87-28
- 2- Vacuum reservoir
o Removing and installing - Page 87-27
- 3- Non-return valve with T-connection
- 4- Vacuum pipe
o Note:
Depending on vehicle equipment, either to engine or to vacuum pump.
- 5- Two-way valve for recirculating/fresh air flap
o Fitting location, checking - Page 87-29

87-26



REMOVING AND INSTALLING VACUUM RESERVOIR

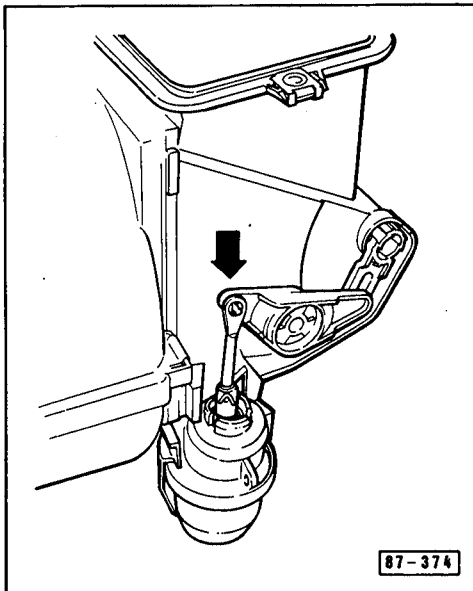
- Remove left front wheel housing liner (see "General Body Repairs" Workshop Manual).
- ◀ - Remove two self-tapping screws.

CHECKING VACUUM SYSTEM

Connection diagram for vacuum hoses - Page 87-26.

- Connect vacuum pressure gauge (e.g. V.A.G 1368) and vacuum pump (e.g. V.A.G 1390).
- Produce vacuum pressure of 300 mbar with vacuum pump.
- Vacuum may fall by max. 10 % in 2 minutes.

87-27



◀ VACUUM UNIT FOR RECIRCULATING/FRESH AIR FLAP

Fitting location:

Passenger side on right of heater housing.

Checking:

- Remove cover on passenger side.
- Pull off vacuum hose at vacuum unit.
- Connect vacuum pump (e.g. V.A.G 1390) to vacuum unit.
- Produce vacuum (recirculating/fresh air flap moves to stop in recirculating mode).
- Recirculating/fresh air flap must remain in position.

Note:

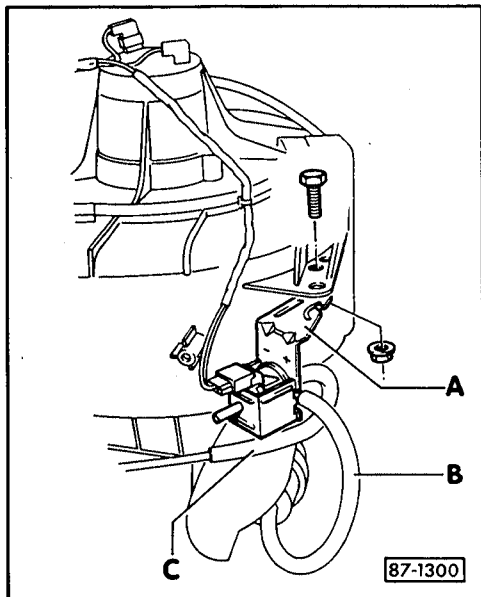
Defective vacuum unit can only be renewed at specially equipped VW and Audi A/C workshop.

Note:

Diagram shows vacuum unit with heater removed.

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◀ TWO-WAY VALVE FOR RECIRCULATING/FRESH AIR FLAP -N63

Function:

Switches vacuum through to vacuum unit.

Fitting location:

Passenger side on right of heater housing.

Removing and installing:

- Remove cover on passenger side.

Note:

Checking - Page 87-32.

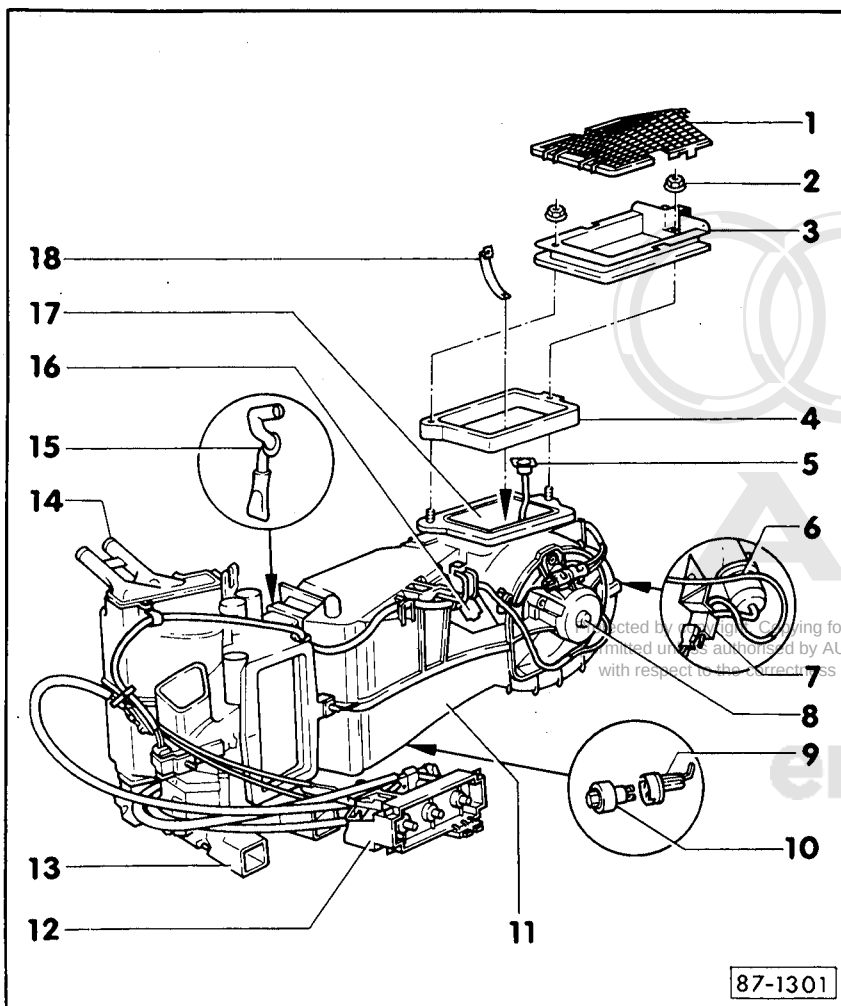
Connections:

A = Two-way valve

B = Vacuum pipe to vacuum unit for recirculating/fresh air flap

C = Vacuum pipe from vacuum reservoir

87-29



SERVICING COMPONENTS OF MANUALLY CONTROLLED AIR CONDITIONER

1- Leaf screen*

2- Hexagon nuts

3- Intake duct*

4- Seal
o Ensure proper seating

5- Ambient temperature switch -F38
o Checking function, removing and installing - Page 87-35

6- Vacuum unit for recirculating/ fresh air flap
o Checking fitting location - Page 87-28

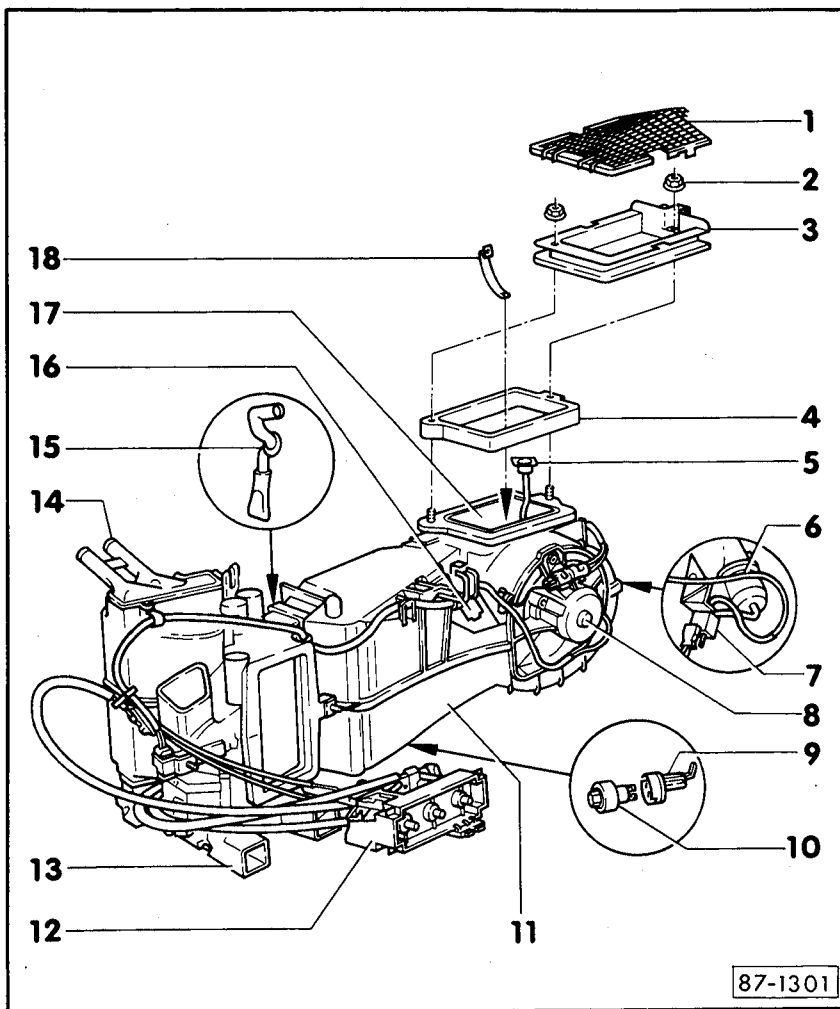
Note:

Can only be renewed with heater removed.

7- Two-way valve for recirculating/ fresh air flap -N63
o Function, checking - Page 87-29

* Depending on equipment, dust and pollen filter may also be installed, removing and installing - Page 80-17

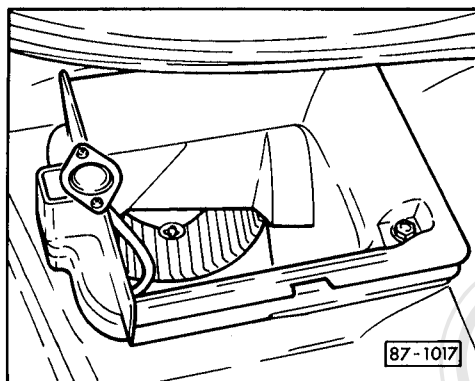
87-30



87-1301

- 8- Fresh air blower -V2
o Rem. and inst. - Page 87-33
- 9- Connector
- 10- Low-pressure switch for refrigerant circuit -F73
o Function, rem. and inst. - Page 87-12
- 11- Heater
o Can only be removed with refrig. circuit discharged - bring vehicle to specially equipped VW and Audi A/C workshop
- 12- Heater controls
o Rem. and inst. - Page 80-8
o Bowden cable connection diagram - Page 80-8
- 13- Footwell air outlet
o Rem. and inst. - Page 80-16
- 14- Heat exchanger
o Can only be renewed with heater removed
- 15- Water drain valve/hose
o Checking, fitting location - Page 87-36
- 16- Series resistance for fresh air blower -N24
o Rem. and inst. - Page 87-33
- 17- Recirculating/fresh air flap
o Checking - Page 87-32
- 18- Retaining spring

87-31



◀ CHECKING RECIRCULATING/FRESH AIR FLAP

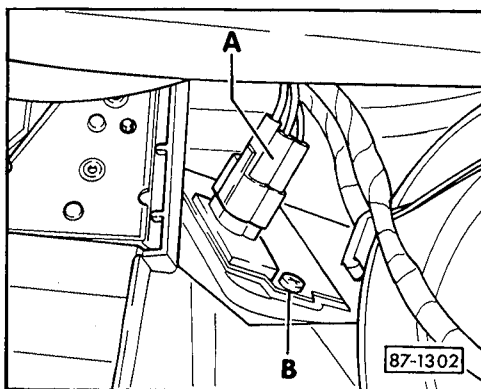
- Remove right plenum chamber cover.
- Run engine at idle.
- Press -A/C- switch for air conditioner. Warning lamp lights up.
- Press -Rec- switch for recirculating/fresh air flap. Warning lamp lights up.
- Recirculating/fresh air flap must close.
- If recirculating/fresh air flap does not close:
Check voltage supply for two-way valve -N63 using CFD. Check vacuum system - Page 87-27, check vacuum unit - Page 87-28.

Note:

- If vacuum supply fails, system switches to fresh air.
- Fresh air flap itself can only be serviced when removed from heater. Bring vehicle to specially equipped VW and Audi A/C workshop.
- Connection diagram for vacuum hoses - Page 87-26.

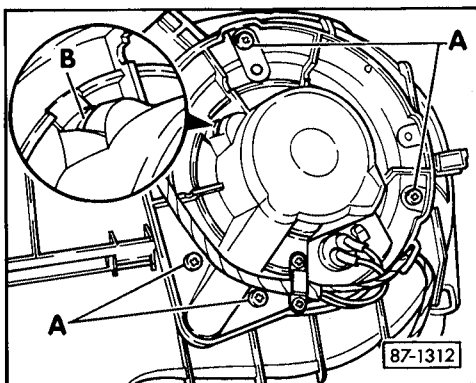
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REMOVING AND INSTALLING SERIES RESISTANCE FOR FRESH AIR BLOWER -N24

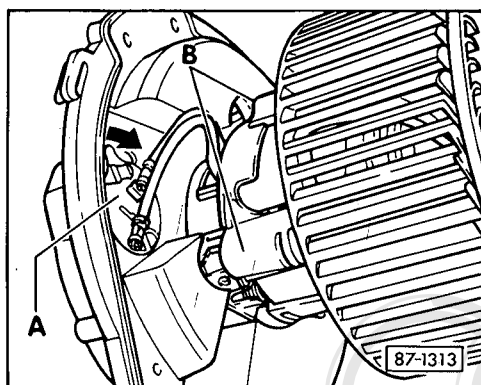
- Remove glove box (see "General Body Repairs" Workshop Manual).
- ◀ - Separate connector -A-.
- Remove screw -B-.



REMOVING AND INSTALLING FRESH AIR BLOWER -V2

- Remove glove box (see "General Body Repairs" Workshop Manual).
- ◀ - Separate connector at motor (ensure proper connection).
- Remove four screws -A-.
- Detach anchor plate with blower motor from heater housing.
- Press back three rubber locking lugs -B-.
- Separate anchor plate and blower motor and remove.

87-33



- ◀ - Detach connector -A- from anchor plate by turning.

Notes on installation:

- Spray three bearings for blower motor -B- with silicone.
- Coat fitting surface of anchor plate with silicone sealant.
- Lay blower motor in heater housing.
- Attach anchor plate on blower motor (watch installation position).
- Locking lugs -B- must engage.

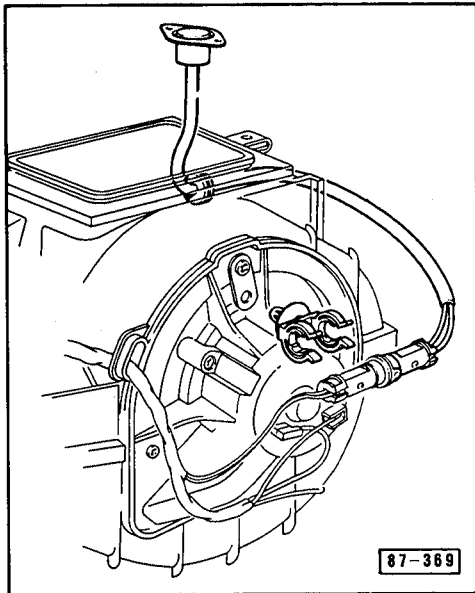
Note:

If necessary, reach through intake shaft and hold blower motor in place.

Audi

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erWin



◀ AMBIENT TEMPERATURE SWITCH -F38

Function:

At low ambient temperatures, switches magnetic coupling

off at: - 1° C
on at: + 7° C

Fitting location:

Right side of plenum chamber in intake shaft of heater housing.

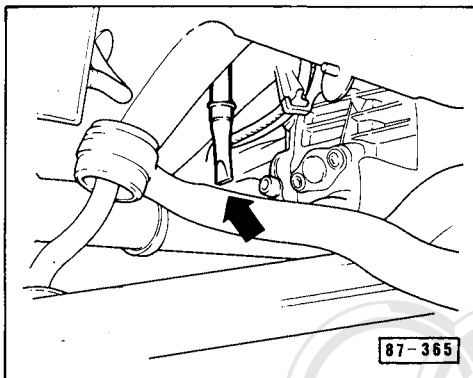
Checking:

For example, by spraying with commercially available cold spray.

Removing and installing:

- Remove plenum chamber cover.
- Remove glove box (see "General Body Repairs" Workshop Manual).

87-35



◀ WATER DRAIN VALVE

Fitting location:

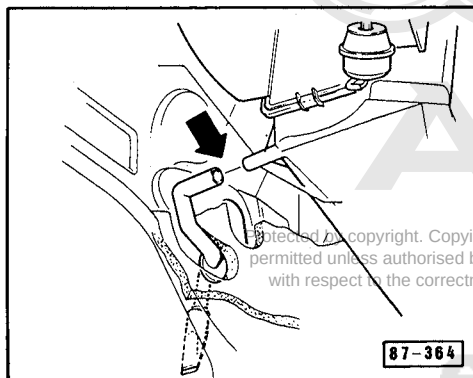
Lower right engine compartment, next to gearbox housing.

Checking:

By pressing together - valve must open.

Note:

Sealing lips must not be stuck with wax or undercoating.



◀ WATER DRAIN HOSE

Fitting location:

Passenger side between heater and bulkhead.

Installing:

- Lightly grease with Vaseline before installing.
- Push on as far as possible.

Note:

Hose must allow water to flow off unimpaired.

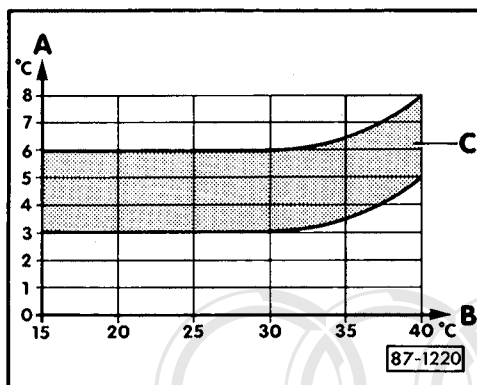
87-36

CHECKING COOLING PERFORMANCE OF MANUALLY CONTROLLED AIR CONDITIONER

Test conditions:

- o Radiator and condenser are clean (clean if necessary).
- o V-belts for compressor and alternator OK and correctly tensioned (on 4 and 5-cyl. engines).
- o Ribbed belt OK and correctly tensioned (on 6-cyl. engine).
- o All air guides, covers and seals OK and correctly mounted.
- o Vehicle not exposed to direct sunlight.
- o Engine at normal operating temperature.
- o Evaporator and heater do not draw secondary air (at fresh air blower stage 4).
- o With engine running and switches -A/C- for air conditioner and -Rec- for recirculating/fresh air flap pressed (both warning lamps light up):
 - Compressor driven or cuts in.
 - Fresh air blower runs.
 - Radiator fan runs.
 - Recirculating/fresh air flap in "recirculating air" position.

87-37



◀ Checking:

Temperature of air blown out of "centre" instrument panel air outlets, must, depending on ambient temperature and cooling time, lie within tolerance range -diagram- after 5 minutes.

A - Temperature of air blown out of "centre" instrument panel air outlets

B - Ambient temperature

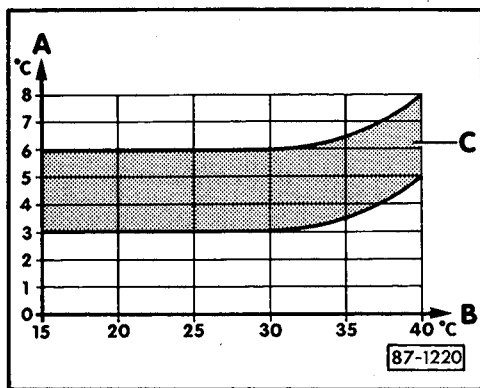
C - Permissible tolerance range

- Close front flap.
- Measure ambient temperature.
- Close doors, windows and sliding roof.
- Switch on ignition.
- Press switches -A/C- for air conditioner and -Rec- for recirculating/fresh air flap (both warning lamps light up).
- Set temperature knob to max. "cold" position.
- Open all instrument panel air outlets.
- Select "fresh air" blower stage 4.
- Set air distribution knob so that air is blown out of instrument panel air outlets.

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87-38



- Start engine (start of time measurement).
- Increase engine speed to 2000 rpm.
- Measure temperature of air blown out of "centre" instrument panel air outlets (e.g. with V.A.G 1362).

◀ Compare measured values with diagram.

If desired values are not obtained:

- Check control of radiator fan -V7 via high-pressure switch for air conditioner -F23 (for switching pressures, see Page 87-11) using current flow diagram.
- Check position of temperature flap (lever on heater must reach end position).
- If compressor was switched off by control unit for magnetic coupling -J153 during cooling performance check.

yes

no

- If compressor is driven with V-belt - continued on Page 87-40.

- Bring vehicle to specially equipped VW and Audi A/C workshop - fault in refrigerant circuit.

- If compressor driven with ribbed belt - continued on Page 87-41.

87-39

o Continuation of check for vehicles on which compressor is driven with V-belts (w/o self-diagnosis)

- Electrically bridge low-pressure switch -F73.
- Repeat check.
- Desired values are obtained,

yes

no

Renew low-pressure switch -F73.

Repeat check.

Desired values are obtained.

yes

End

no

Reinstall old low-pressure switch -F73.

Was compressor switched off during cooling performance check

no

yes

Locate and eliminate cause for compressor switch-off using current flow diagram.

Note:

If compressor was switched off by high-pressure switch -F118 (for switching pressures see Page 87-10).

Bring vehicle to specially equipped VW and Audi A/C workshop - fault in refrigerant circuit.

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Bring vehicle to specially equipped VW and Audi A/C workshop - fault in refrigerant circuit.



87-40

o Continuation of check for vehicle on which compressor is driven with ribbed belt (with self-diagnosis)

- Connect fault reader V.A.G 1551, select function 08 "read measuring value block" and carry out cooling performance check again.
- Code "2" is indicated in first display segment as compressor switch-off condition (low-pressure switch -F73 open, high-pressure switch -F118 open or wiring system voltage less than 10 V).

yes

- Electrically bridge low-pressure switch -F73.
- Repeat check and measure wiring system voltage at bridge installed for -F73 against earth with hand multimeter V.A.G 1526.

- Desired values are obtained

yes

- Renew low-pressure switch -F73.
- Repeat check.
- Desired values are obtained.

yes

End

no

For additional codes see "Self-Diagnosis" (Reading measuring value block)

Note:

If code "5" is indicated alternately to code "2", first eliminate fault cause for code "2".

Compressor was switched off again and code "2" indicated as compressor switch-off condition.

no

yes

Reinstall old low-pressure switch -F73.

Bring vehicle to specially equipped VW and Audi A/C workshop - fault in refrigerant circuit

Continued on Page 87-42.

87-41

o Continuation of check from Page 87-41, compressor switch-off condition code "2"

- Dips in wiring system voltage to values less than 10 V occurred during cooling performance check

no

Check wiring to control unit -J153, pin 75 via high-pressure switch -F118 for break or loose contact using current flow diagram.

If no fault is determined:

- Renew high-pressure switch -F118.

- Repeat cooling performance check.

- If code "2" is indicated again as compressor switch-off condition:

- Reinstall old high-pressure switch -F118.

Bring vehicle to specially equipped VW and Audi A/C workshop - fault in refrigerant circuit.

yes

Locate and eliminate cause for voltage dip (see "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" Binder).

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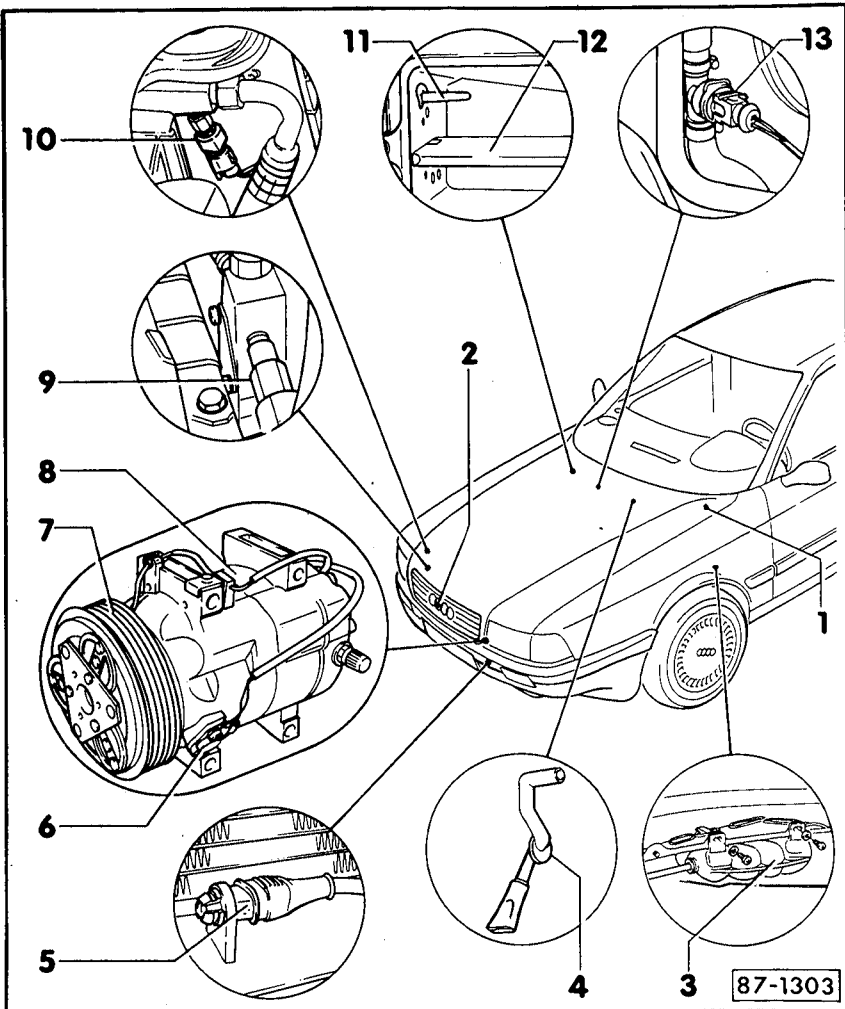
COMPONENTS FOR CONTROLLING AND
REGULATING FULLY AUTOMATIC AIR
CONDITIONER

(In engine compartment)

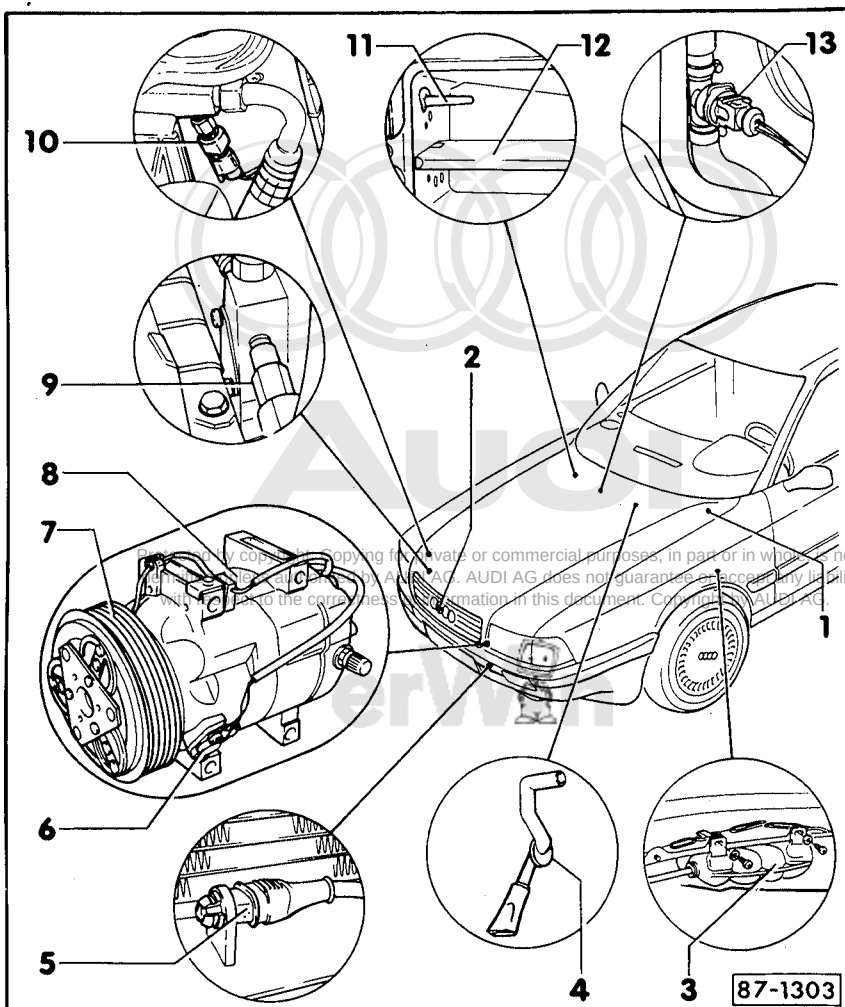
Note:

- After completing repair work, fault memory must always be cleared and basic setting set.
- Refrigerant circuit - Page 87-6.
- Connection diagram for vacuum hoses - Page 87-26.
- Checking cooling performance - Page 87-58.
- For electrical check of all components marked with * see "Self-Diagnosis".
- All components marked with ** are actuated in Test Step 2 "Final Control Element Diagnosis" - see "Self-Diagnosis".
- Depending on equipment, fitting location of individual components may deviate from diagram.
- Depending on equipment, dust and pollen filter may also be installed, removing and installing - Page 80-17.

- 1- Relay plate with connector for V.A.G 1551
 - o For tests possible with tester V.A.G 1551, see "Self-Diagnosis"

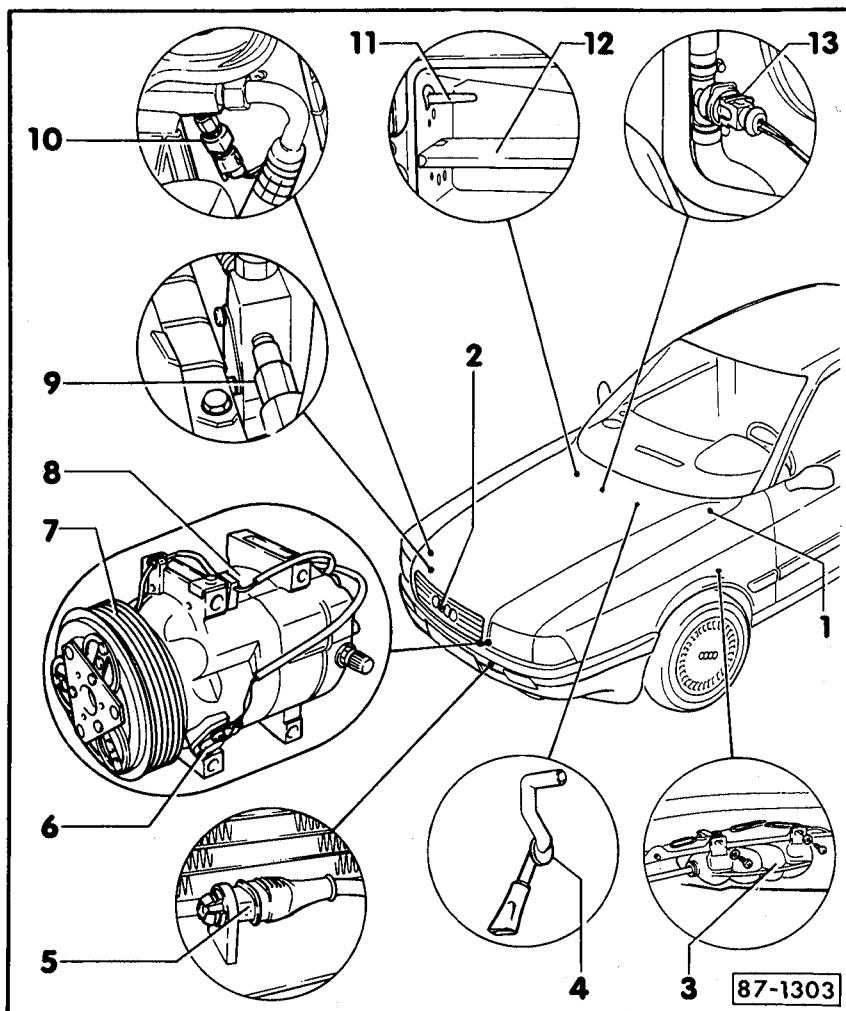


87-43



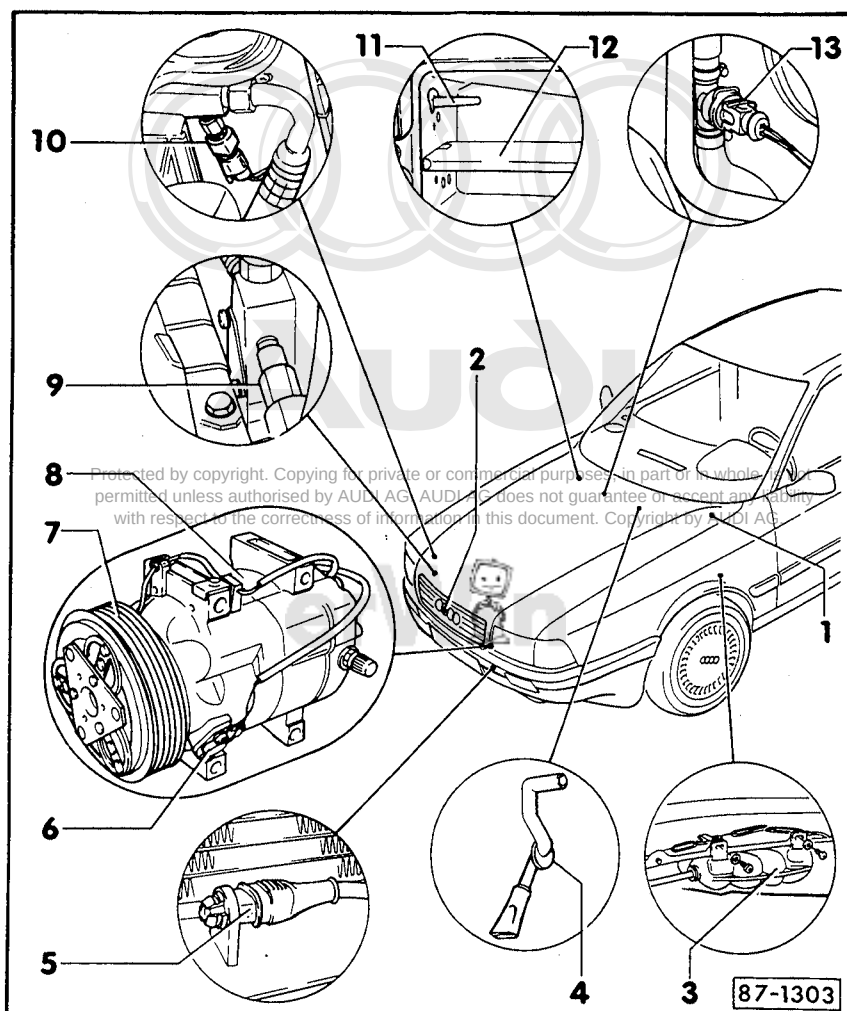
- 2- Condenser
 - o May only be removed with refrigerant circuit discharged - bring vehicle to specially equipped VW and Audi A/C workshop.
- 3- Vacuum reservoir
 - o Removing and installing vacuum reservoir - Page 87-27
 - o Non-return valve - see "Connection diagram for vacuum hoses" - Page 87-26
- 4- Condensation water drain hose with valve
 - o Valve must not be blocked with wax or undercoating
 - o Removing and installing - Page 87-36
- 5- Ambient temperature sensor -G17*
- 6- Compressor speed sender -G111
 - o Checking - Page 87-9
 - o May only be removed with refrigerant circuit discharged - bring vehicle to specially equipped VW and Audi A/C workshop
 - o Only installed on vehicles on which compressor is driven with ribbed belt
- 7- Magnetic coupling -N25**
 - o Servicing - Page 87-13

87-44



- 8- Compressor
 - o May only be removed with refrigerant circuit discharged
 - bring vehicle to specially equipped VW and Audi A/C workshop
 - o Removing and installing compressor bracket
 - 4-cyl. engine - Page 87-19
 - 5-cyl. engine - Page 87-20
 - 6-cyl. engine - Page 87-21
 - o Tensioning compressor V-belt
 - 4-cyl. engine - Page 87-18
 - 5-cyl. engine - Page 87-19
 - o Removing and installing ribbed belt (6-cyl. engine) - see "Engine Mechanics" Workshop Manual
 - o Aligning belt pulleys (6-cyl. engine) - Page 87-25
- 9- High-pressure switch for air conditioner -F23
 - o Function, removing and installing - Page 87-11
- 10- High-pressure switch for magnetic coupling -F118
 - o Function, removing and installing - Page 87-10
- 11- Temperature sensor for fresh air intake duct -G89*
 - o Removing and installing -Page 87-51

87-45



- 12- Air flow flap
 - o Not installed on all vehicles, equipment-dependent
 - o Can only be renewed with heater removed - bring vehicle to specially equipped VW and Audi A/C workshop
 - o Positioning motor for air flow flap -V71** with potentiometer -G113 - Page 87-49, item 14
- 13- Coolant temperature sender -G110*
 - o Not installed on all vehicles, equipment-dependent
 - Note:**
Before removing, release pressure in coolant circuit by opening cap on coolant expansion tank.

87-46

COMPONENTS FOR CONTROLLING AND
REGULATING FULLY AUTOMATIC AIR
CONDITIONER

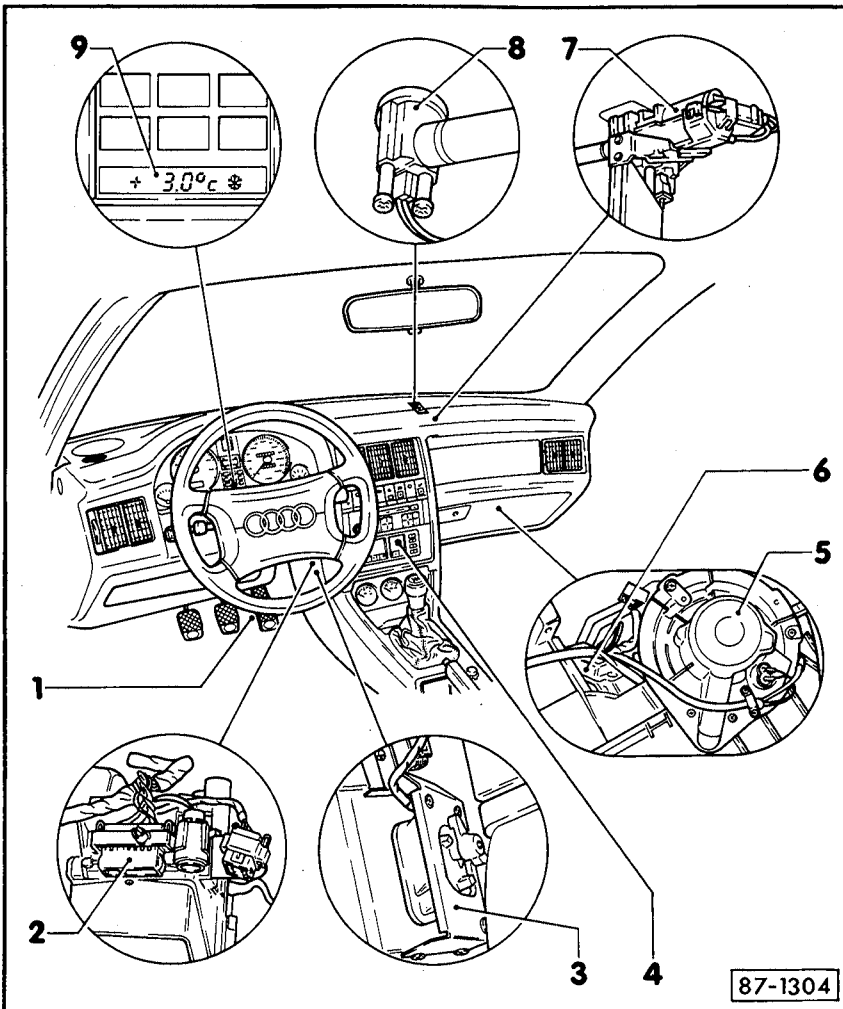
(In passenger compartment)

Note:

- After completing repair work, fault memory must always be cleared and basic setting made.
- Refrigerant circuit - Page 87-6.
- Connection diagram for vacuum hoses - Page 87-26.
- Checking cooling performance - Page 87-58.
- For electrical check on all components marked with * - see "Self-Diagnosis".
- All components marked with ** are triggered in Test Step 2 "Final Control Element Diagnosis" - see "Self-Diagnosis".

- 1- Kick-down switch -F46
 - o Not installed on all vehicles
 - o Depending on vehicle equipment, kick-down switch-off may also take place via control unit for engine electronics or via control unit for automatic gearbox (see "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" Binder).

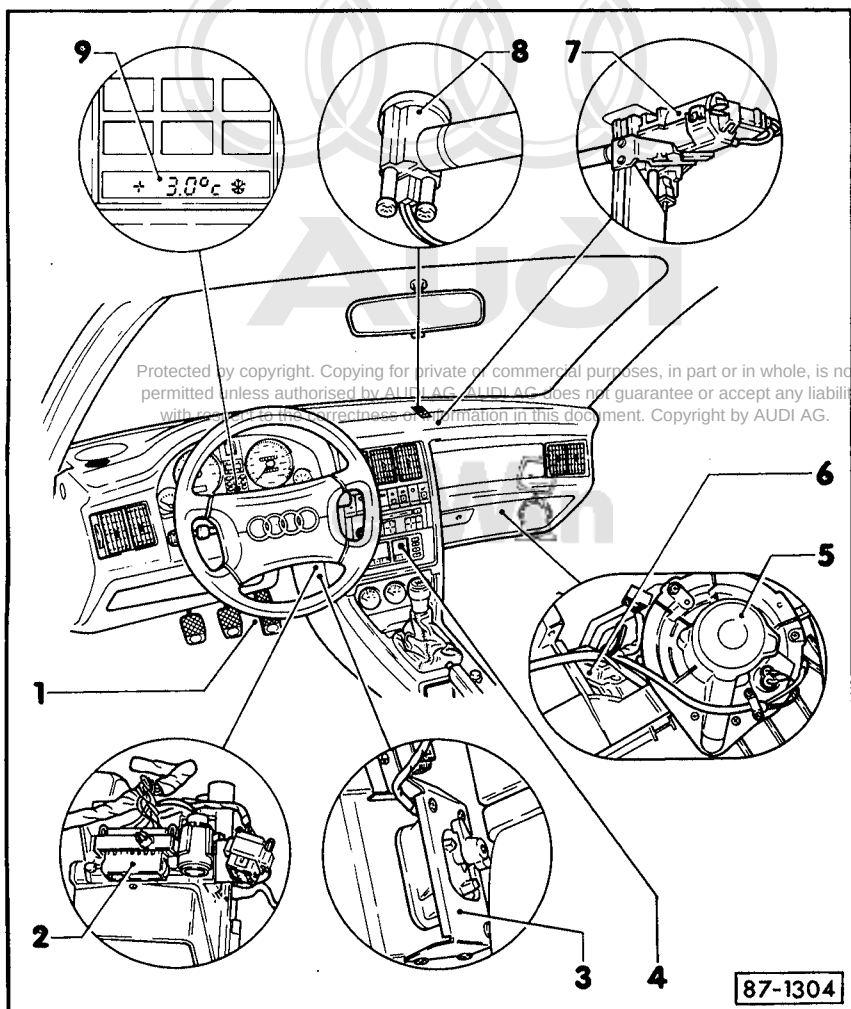
87-47



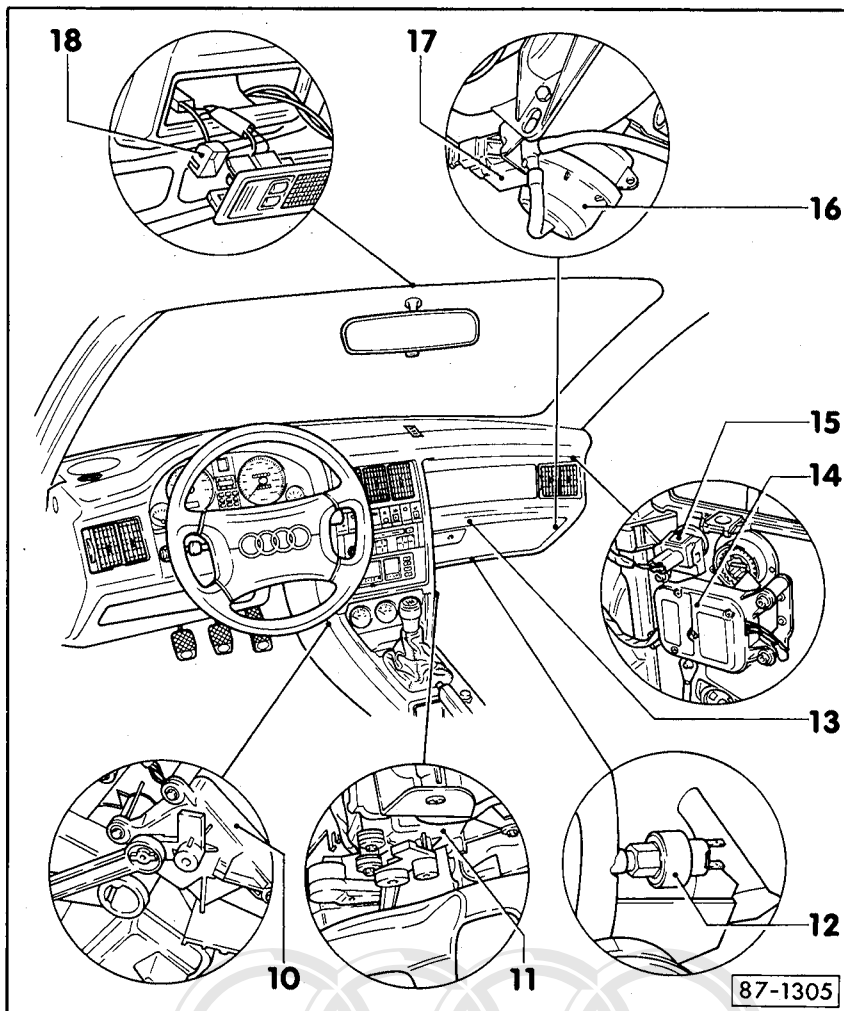
87-1304

- 2- Connector station
- 3- Positioning motor for footwell/defroster flap -V85** with potentiometer -G114
 - o Removing and installing - Page 87-54
- 4- Operating and indicating unit -E87
 - o Removing and installing - Page 87-52
 - o Checking and performing coding - see "Self-Diagnosis"
 - o Renewing lamps - Page 87-53
- 5- Fresh air blower -V2**
 - o Removing and installing - Page 87-33
- 6- Blower control unit -J126**
 - o Removing and installing - Page 87-56
- 7- Blower temperature sensor -V42**
 - o Removing and installing - Page 87-57
- 8- Temperature sensor - instrument panel -G56*
 - o Removing and installing - Page 87-57
- 9- Ambient temperature sensor - G106**
 - o Removing and installing (see "Electrical System" Workshop Manual)
 - o Not installed on all vehicles, equipment-dependent

87-48

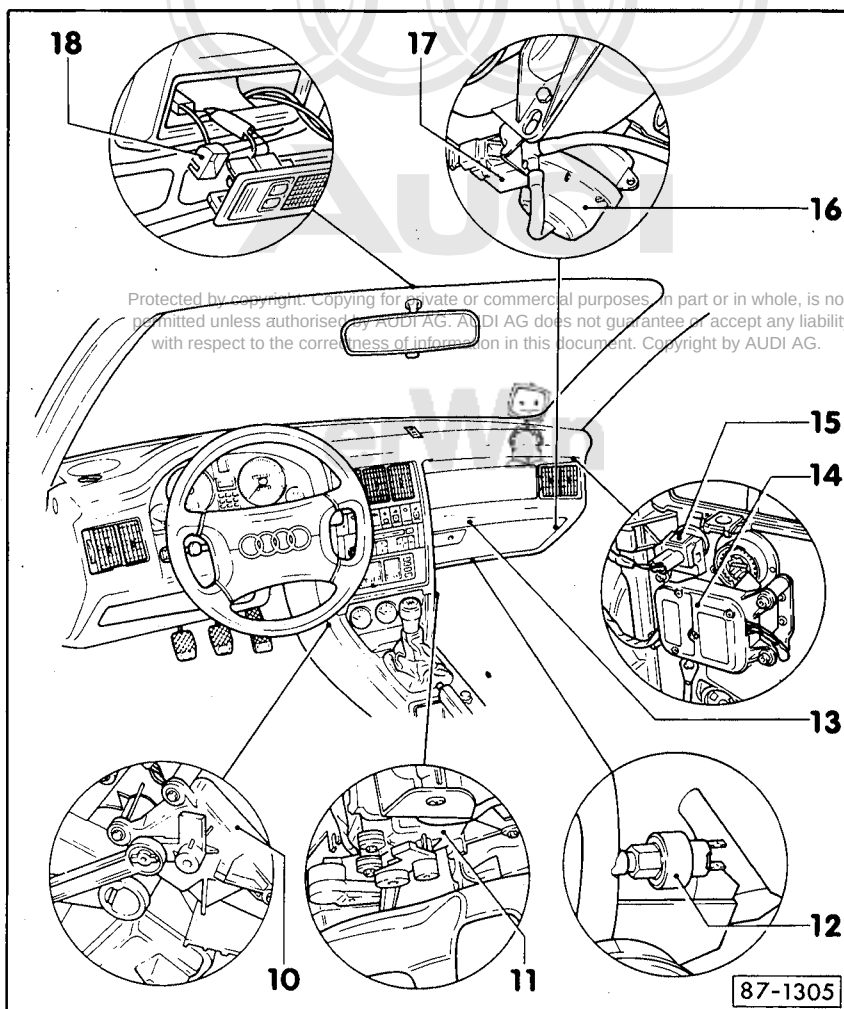


87-1304



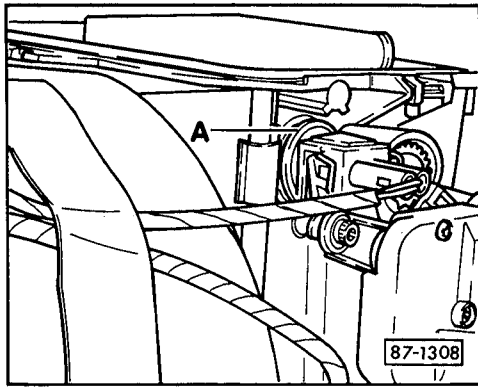
- 10- Positioning motor for temperature flap -V68** with potentiometer
o Removing and installing - Page 87-55
- 11- Positioning motor for central flap -V70 ** with potentiometer -G112
o Removing and installing - Page 87-55
- 12- Low-pressure switch for refrigerant circuit -F73
o Function, removing and installing - Page 87-12
- 13- Heater with evaporator
o Can only be removed with refrigerant circuit discharged
- bring vehicle to specially equipped VW and Audi A/C workshop
- 14- Positioning motor for air flow flap -V71** with potentiometer -G113
o Not installed on all vehicles, equipment-dependent
o Can only be renewed with heater removed
- 15- Temperature sensor - fresh air intake duct -G89*
o Removing and installing - Page 87-51
- 16- Vacuum unit for recirculating/fresh air flap
o Checking - Page 87-28

87-49



- 17- Two-way valve for recirculating/fresh air flap
o Checking - Page 87-29
- 18- Temperature sensor - roof -G86*

87-50



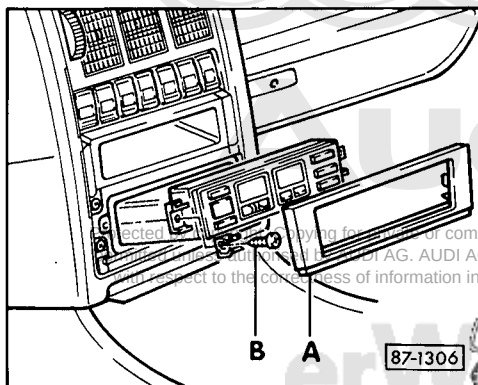
REMOVING AND INSTALLING TEMPERATURE SENSOR FOR FRESH AIR DUCT -G89

- Remove plenum chamber cover.
- Remove leaf screen and dust and pollen filter.
- Remove glove box (see "General Body Repairs" Workshop Manual).
- ◀ - Turn temperature sensor -A- (bayonet mount) and remove with connector and cable.

Note:

- o Diagram shows temperature sensor with heater removed.
- o Spray seal with silicone spray before installing.

87-51



REMOVING AND INSTALLING OPERATING AND INDICATING UNIT -E87

- Switch off ignition.
- ◀ - Carefully lever off trim plate -A-.
- Remove 2 screws -B-.
- Pull operating and indicating unit out of instrument panel console.

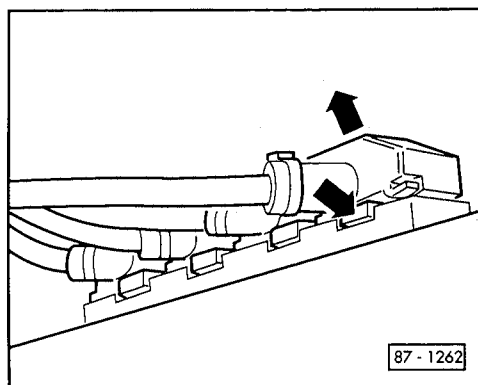
Note:

- To switch display from ° C (centigrade) to ° F (fahrenheit) and vice-versa, press down "recirculating air" button and hold, then operate temperature "+" switch.
- If 22° C always appears after switching on and off ignition, regardless of value set, check voltage supply to operating and indicating unit -E87 (terminal 30) using CFD.

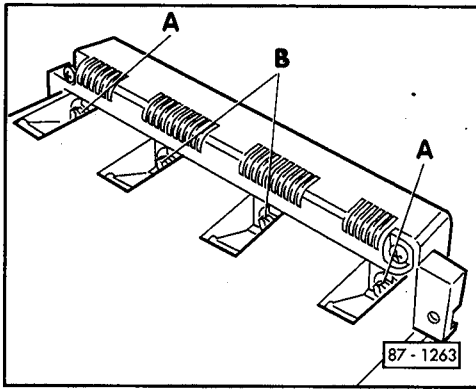
- ◀ - Press back connector locking lugs and pull off connector.

Note:

- Before removing, interrogate fault memory (see "Self-Diagnosis").
- After installing, check coding and carry out basic setting (see "Self-Diagnosis").



87-52



RENEWING LAMPS OF OPERATING AND INDICATING UNIT

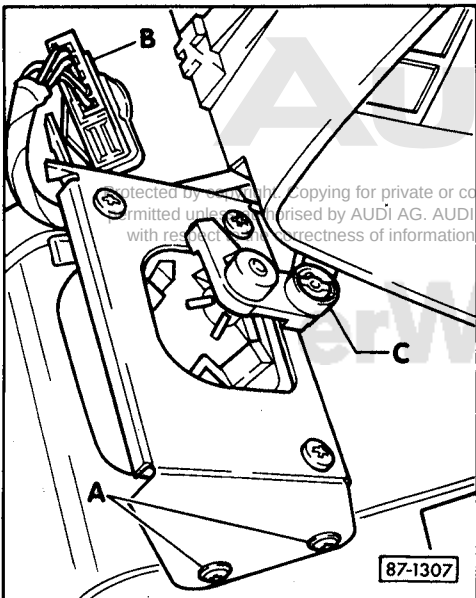
- Remove operating and indicating unit -
Page 87-52.

◀ - Rotate lamp 90°.

Note:

- Lamps -A- for illuminating operating buttons.
- Lamps -B- for illuminating indicating panels.

87-53



REMOVING AND INSTALLING POSITIONING MOTOR FOR FOOTWELL/DEFROSTER FLAP -V85 WITH POTENTIOMETER -G114

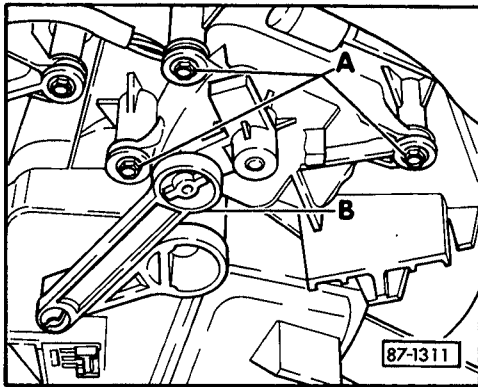
- Remove footwell air outlet - Page 80-16.

◀ - Remove 2 screws -A-.

- Separate connector -B- (red housing colour).

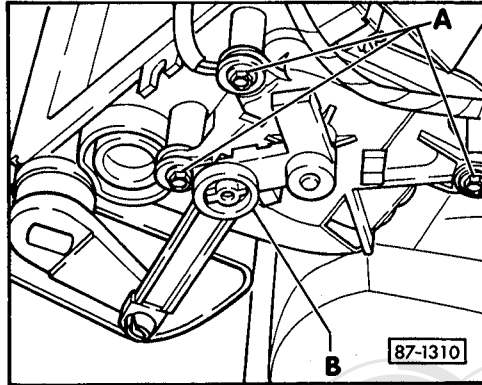
- Detach linkage -C-.

87-54



REMOVING AND INSTALLING POSITIONING MOTOR FOR
TEMPERATURE FLAP -V68 WITH POTENTIOMETER
-G92

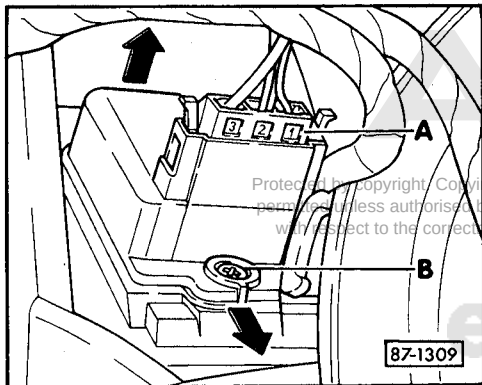
- Remove footwell air outlet - Page 80-16.
- ◀ - Remove three bolts -A-.
- Detach linkage -B-.
- Separate connector (brown housing colour).



REMOVING AND INSTALLING POSITIONING MOTOR FOR
CENTRAL FLAP -V70 WITH POTENTIOMETER -G112

- Remove footwell air outlet.
- ◀ - Remove three bolts -A-.
- Detach linkage -B-.
- Separate connector (black housing colour).

87-55

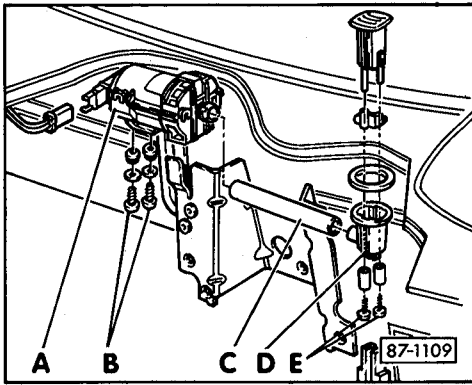


REMOVING AND INSTALLING BLOWER CONTROL UNIT -J126

- Remove glove box (see "General Body Repairs" Workshop Manual).
- ◀ - Separate connector -A-.
- Remove screw -B-.
- Pull control unit out of notch in direction of arrow and swivel out of heater box at top.

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REMOVING AND INSTALLING BLOWER FOR TEMPERATURE SENSOR - DASH PANEL -V42

- Remove glove box (see "General Body Repairs" Workshop Manual).
- ◀ - Remove two screws -B-.
- Pull off hose -C-.
- Separate connector.

Note:

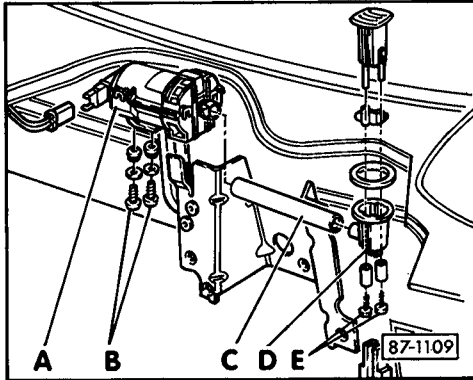
After installing, check seating of hose -C- on temperature sensor.

REMOVING AND INSTALLING TEMPERATURE SENSOR - DASH PANEL -G56 (-D-)

- Remove glove box (see "General Body Repairs" Workshop Manual).
- ◀ - Remove two screws -E-.
- Pull off hose -C-.

Note:

Ensure proper seating of hose -C-.



87-57

CHECKING COOLING PERFORMANCE OF FULLY AUTOMATIC AIR CONDITIONER

Test conditions:

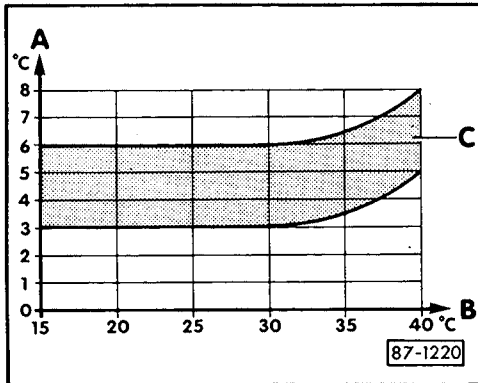
- o Radiator and condenser are clean (clean if necessary).
- o V-belts for compressor and alternator OK and correctly tensioned (on 4 and 5 cyl. engines).
- o Ribbed belt OK and correctly tensioned (on 6-cyl. engine).
- o All air guides, covers and seals OK and correctly mounted.
- o Vehicle not exposed to direct sunlight.
- o Engine at normal operating temperature.
- o Evaporator and heater do not draw secondary air at highest fresh air blower speed.
- o With engine running, "Auto" operating mode, "LO" temperature setting, instrument panel air outlets open, "recirculating air" button pressed (recirculating air symbol lights up in display) and compressor switched on (compressor symbol "ice crystal" lights up in display)
 - Radiator fan runs (electric fan).
 - Fresh air blower runs at highest speed.
 - Recirculating/fresh air flap in "recirculating air mode" position.
 - Air is blown out of instrument panel air outlets.
 - Temperature flap in "cooling" position.
 - Compressor runs (magnetic coupling has energized).

Note:

If one of these test conditions is not fulfilled, interrogate fault memory and carry out final control element diagnosis (see "Self-Diagnosis").

Preparations:

- Interrogate fault memory (see "Self-Diagnosis") and eliminate any faults stored.
- Carry out basic setting (see "Self-Diagnosis").
- Close front flap.
- Measure ambient temperature.
- Close doors, windows and sliding roof.



◀ Checking:

Temperature of air blown out of "centre" instrument panel air outlets must, depending on ambient temperature lie within tolerance range -diagram- after 5 minutes.

- A - Temperature of air blown out of "centre" instrument panel air outlets
- B - Ambient temperature
- C - Permissible tolerance range

87-59

- Switch on ignition.
- Set "Auto" operating mode.
- Select "LO" temperature setting.

Note:

Do not select blower speed or air outlets.

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- Open all instrument panel air outlets.

- Start engine (compressor symbol "ice crystal" in left display sector of operating and indicating unit lights up).
- Increase engine speed to 2000 rpm (start of time measurement).
- Measure temperature of air blown out of "centre" instrument panel air outlets (e.g. with V.A.G 1362).

◀ - Compare measured values with diagram.

If desired values are not obtained

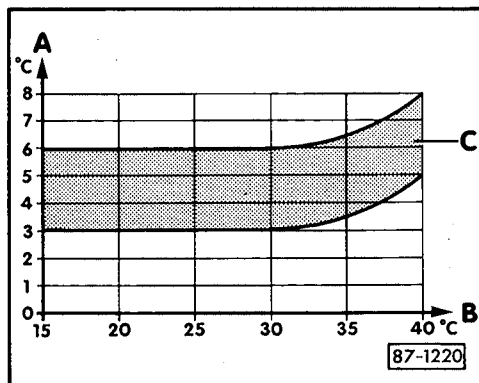
- Check control of radiator fan -V7- (2nd stage) via high-pressure switch -F23 (for switching pressures, see Page 87-11) using current flow diagram.
- Compressor was switched off during cooling performance check

yes

Continued on
Page 87-61.

no

Bring vehicle to specially equipped VW and Audi A/C workshop - fault in refrig. circuit



o Continuation of check from Page 87-60

- Interrogate fault memory and eliminate indicated faults (see "Self-Diagnosis").
- Clear fault memory.
- Terminate rapid data transmission - V.A.G 1551 remains connected.
- Repeat cooling performance check.
- As soon as compressor is switched off, immediately enter address word 08 and acknowledge with Q button with compressor switched off.
- Then "read measuring value block" (display group 1) and eliminate cause of compressor switch-off (see "Self-Diagnosis").
- Code "3" (low-pressure switch -F73 open) or code "2" (high-pressure switch -F118 open) is indicated as compressor switch-off condition.

yes

Continued on
Page 87-62.

no

For additional codes
see "Self-Diagnosis"
("Reading measuring
value block").

87-61

o Continuation of check from Page 87-61, compressor switch-off condition code "2"

- Terminate rapid data transmission.
- Check wiring between operating and indicating unit -E87 and high-pressure switch -F118 for break or loose contact using current flow diagram. If no fault is determined, renew high-pressure switch -F118.
- Repeat cooling performance check.

- If code "2" is indicated again as compressor switch-off condition, bring vehicle to specially equipped VW and Audi A/C workshop - fault in refrigerant circuit.

o Continuation of check from Page 87-61, compressor switch-off condition code "3"

- Terminate rapid data transmission.
- Electrically bridge low-pressure switch -F73.
- Repeat cooling performance check.
- Code "3" is indicated again as compressor switch-off condition

yes

Locate and eliminate loose contact or break in wiring to operating and indicating unit -E87 via low-pressure switch -F73 using current flow diagram.

no

Continued on Page 87-63.

- Desired values are obtained

yes

- Renew low-pressure switch -F73

- Repeat check.

- Desired values are obtained.

yes

End

no

Reinstall old low-pressure switch -F73.

Bring vehicle to specially equipped VW and Audi A/C workshop - fault in refrigerant circuit.

no

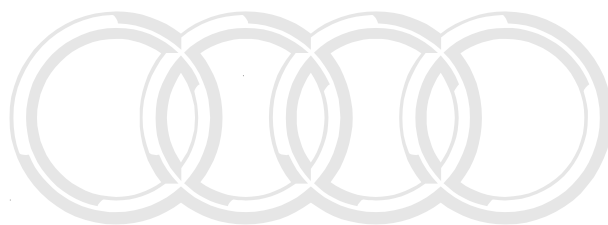
Bring vehicle to specially equipped VW and Audi A/C workshop - fault in refrigerant circuit.

87-63



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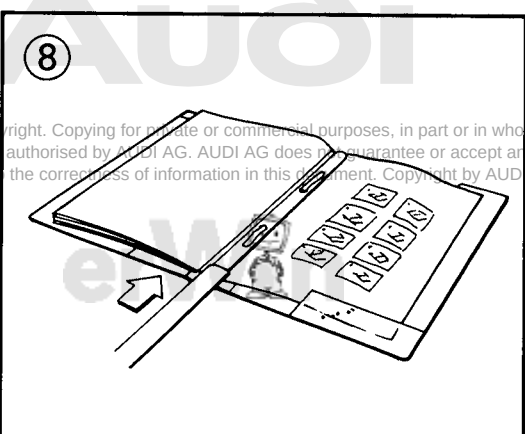
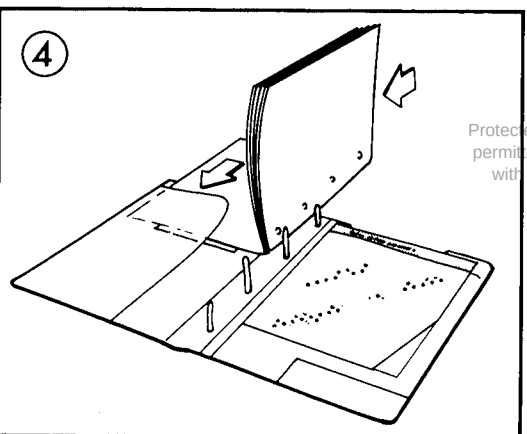
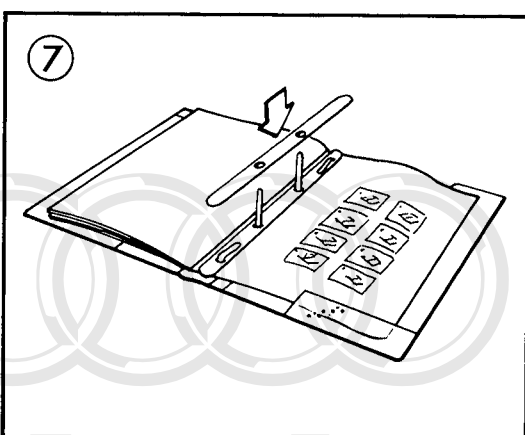
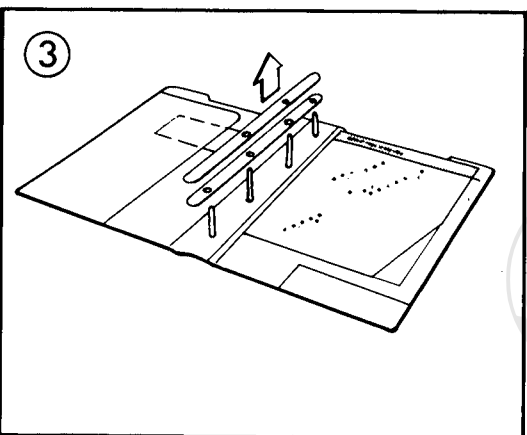
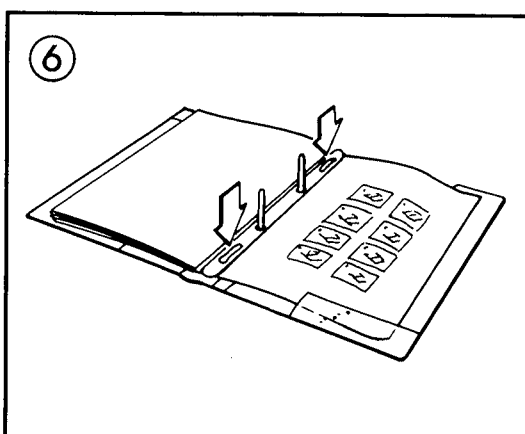
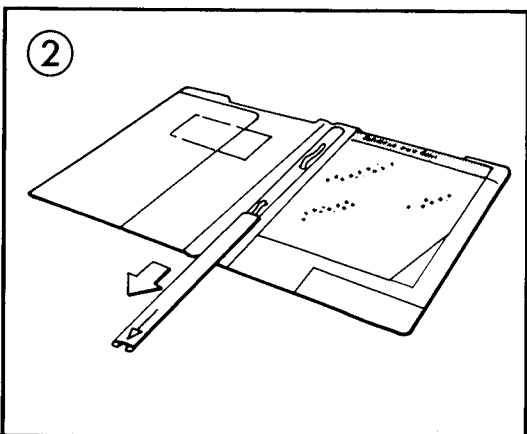
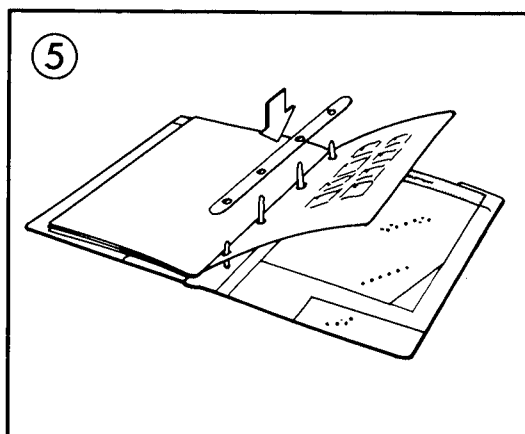
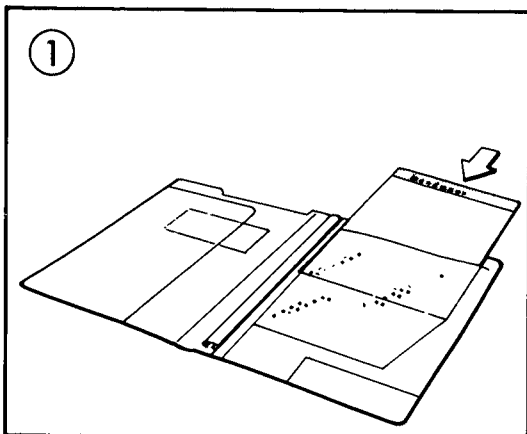




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Service.

Technical Bulletin to Workshop Manual

Audi 80 1992 ►

Booklet Heater, Air conditioner

Edition 09.91

Enter in Repair Group list

Repair Group 01

Bulletin No. **1**

Affected: Vehicles with fully automatic air conditioner

Subject

Amendment to Fault table

Contents	Bulletin page	Booklet from page
Fault table	1	01-56



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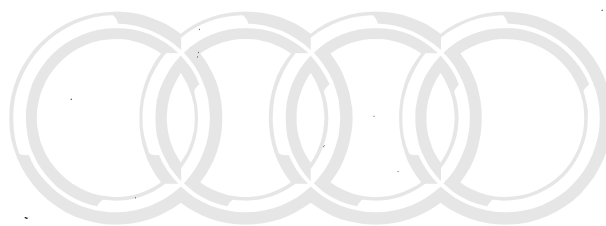
Printed in Germany

000.5453.31.20

Bulletin Edition: 10.91

FAULT TABLE
=====

V.A.G 1551 printer output	Possible cause	Possible symptoms	Remedy
Fault code			
<u>01273</u> Fresh air blower -V2 * Regulating difference/SP	- Short circuit or break in wiring between operating and indicating unit -E87 and control unit for blower -J126 or fresh air blower -V2. - Break in wiring for power supply or earth connection to control unit -J126. - Control unit -J126 defective. - Operating and indicating unit -E87 defective.	- Fresh air blower -V2 does not run. - Fresh air blower -V2 runs continuously or cannot be regulated.	- Trace and repair short circuit or break in wiring using current flow diagram. - Check control unit -J126 (electrical test, page 01-75, test steps 11 to 14). - Renew operating and indicating unit -E87.



Audi

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Technical Bulletin to Workshop Manual

Audi 80 1992 ►

Booklet

Heating, Air Conditioning Edition 09.91

Enter in Repair Group list
Repair Group 87

Bulletin No. **2**

Affected: Vehicles with air conditioner from 10.92

Subject

CFC*-free refrigerant R 134a in air conditioner circuit

Contents	Bulletin page	Booklet from page
Basic information on air conditioner with R 134a refrigerant	1	
Safety precautions when working on vehicles with air conditioner and when handling R 134a refrigerant	3	87-1
Refrigerant circuit	4	87-6
O-ring seal	8	87-9
Service connection	8	—
Switches on refrigerant circuit		
– High-pressure switch for magnetic coupling – F118	9	87-10
– High-pressure switch for air conditioner – F23	10	87-11
– Low-pressure switch for refrigerant – F73	11	87-12
* Chlorofluorocarbon		

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430/434/—



Basic information on air conditioner with R 134a refrigerant

- Vehicles in which the refrigerant R 134a has been filled into the refrigerant circuit of the air conditioner can be recognized from
 - A - a sticker in the engine compartment with the inscription "CFC-free refrigerant"
 - B - a new service connection at the condenser (⇒ page 8).
- Apart from the work on the switches of the refrigerant circuit, all the other servicing and inspection operations contained in the Workshop Manual Heating, Air Conditioning do not affect the refrigerant circuit. Such work can therefore also be performed on vehicles with R 134a refrigerant as described for air conditioners with R 12 refrigerant.
- R 134a refrigerant does not affect the ozone layer of the earth's atmosphere (R 134a is a HFC and does not possess any chlorine atoms; the ozone depletion in the upper atmosphere is the result only of the separation of the carbon-chlorine bonds).

1

- R 134a is not a smog former and has a significantly lower greenhouse effect in comparison to R 12. Nevertheless, R 134a must not be drained off into the environment but should be extracted with suitable equipment from the refrigerant circuit (check your vehicle into a VW and Audi air conditioner service centre).
- Different refrigerants must not be mixed with each other (also not in small quantities) because of their chemical composition.
- Components which have been developed for a particular refrigerant (R 134a or R 12) must on no account be installed in refrigerant circuits with different refrigerants. To prevent this, components which have been developed for air conditioners with R 134a refrigerant are so designed that it is not possible to mix them up with components for air conditioners with R 12 refrigerant (different thread, colour-coded).
- On the basis of present-day knowledge, the only possibility for switching over from R 12 refrigerant to R 134a refrigerant is if all the components which are in contact with the refrigerant are replaced.

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Safety precautions when working on vehicles with air conditioner and when handling R 134a refrigerant

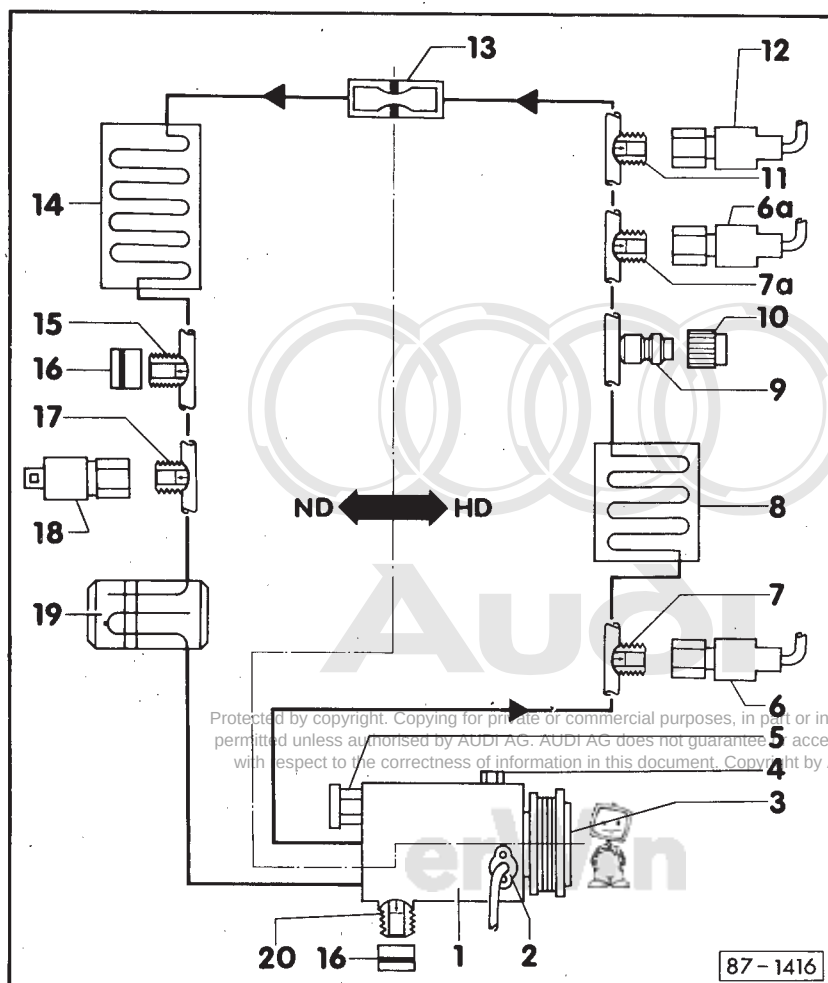
The components and the piping system of the air conditioner are filled with 1.1.1.2 tetrafluoroethane ($\text{CF}_3\text{-CH}_2\text{F}$ or $\text{CH}_2\text{F-CF}_3$) as a refrigerant. Such refrigerants are also known under the trade designations HFC 134a, SUVA 134a or ARCTON 134a.

The safety precautions as described in the Workshop Manual, page 87-1 should be observed for such refrigerant (other or additional regulations may apply in individual countries).

Note:

Should refrigerant gas escape from the refrigerant circuit despite observing all the safety precautions, the gas-air mixture produced must not be inhaled but should be extracted using suitable extraction systems (workshop extraction system).

3



Refrigerant circuit

All the parts marked with an * can be serviced or replaced at any VW and Audi service centre (servicing work not affecting the refrigerant circuit).

All the parts **not** marked with an * as well as all refrigerant hoses and refrigerant pipes can only be serviced or replaced in a VW and Audi air conditioner service centre.

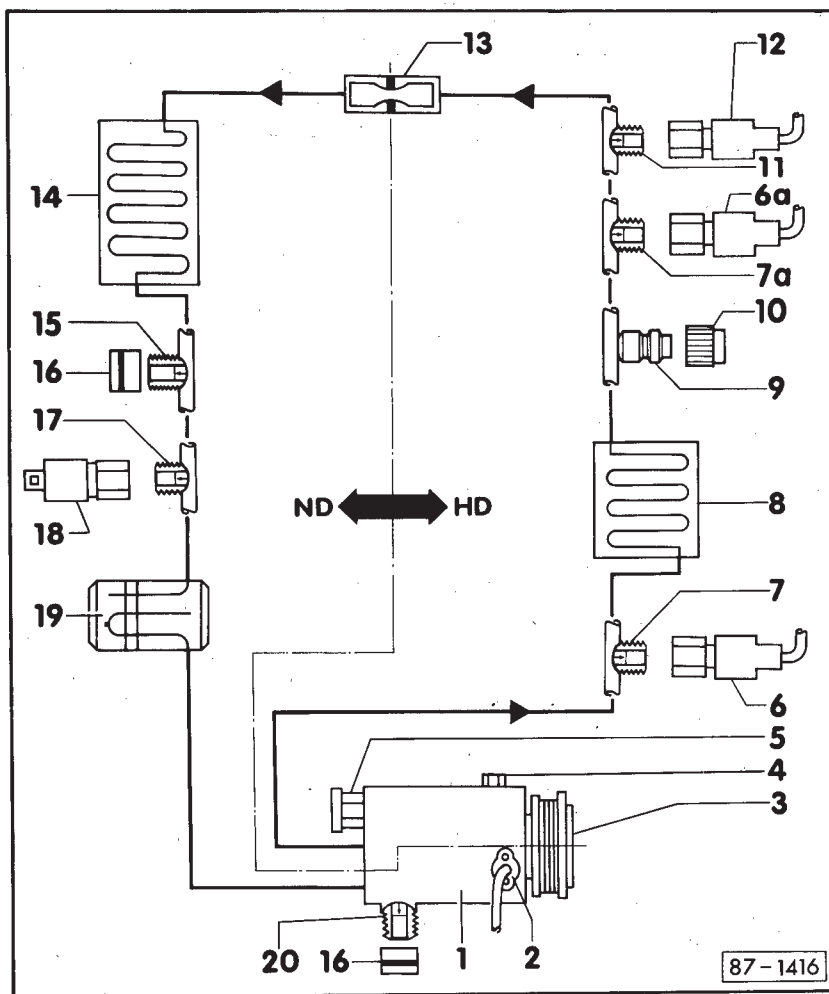
HD = High pressure
ND = Low pressure

1 - Compressor (Zexel)

- Removing and installing compressor bracket * on:
4-cyl. engine - booklet page 87-20
5-cyl. engine - booklet page 87-21
6-cyl. engine - booklet page 87-23
- Tensioning V-belt*
4-cyl. engine - booklet page 87-18
5-cyl. engine - booklet page 87-19

Notes:

- Removing and installing ribbed V-belt* ⇒ relevant Workshop Manual Engine Mechanics.
- A heat protecting mat must be attached to the coolant pipes on vehicles with 5- and 6-cylinder engine (⇒ Parts programme).



2 – A/C compressor speed sensor –G111

- Testing* ⇒ booklet page 87–9
- May only be removed when refrigerant circuit drained. Take vehicle to a VW and Audi air conditioner service centre.
- Only installed if the compressor is driven by ribbed V-belt.

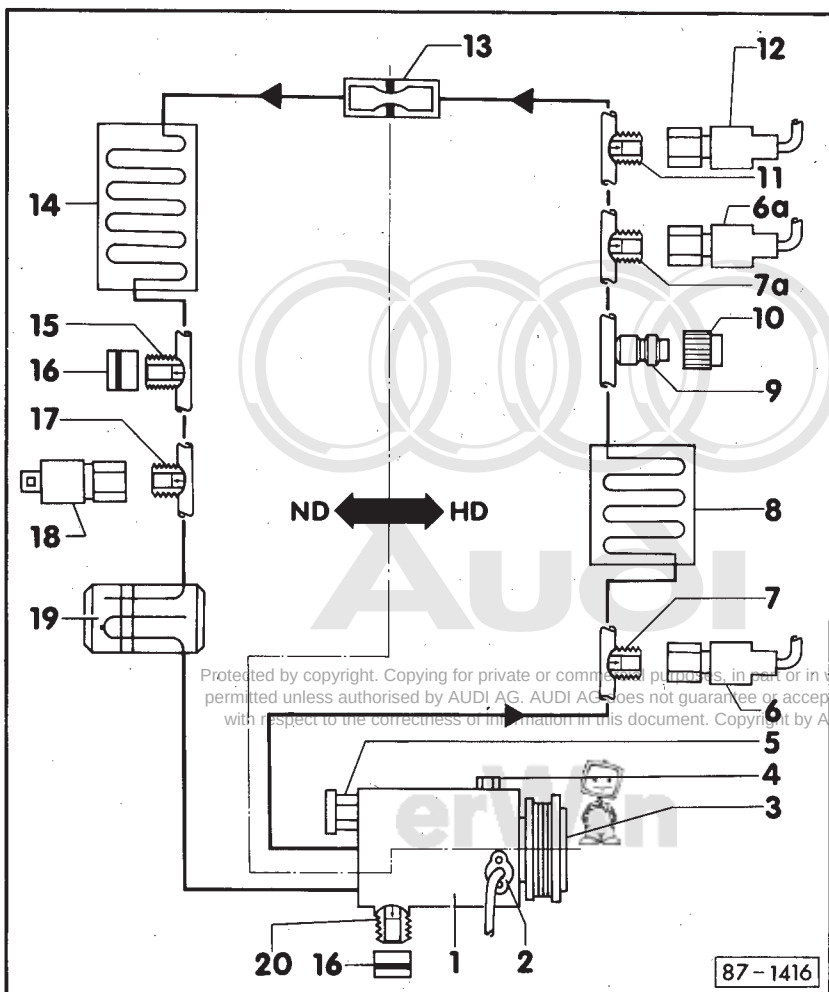
3 – Magnetic coupling –N25–*

- Servicing ⇒ booklet page 87–13

Notes:

- The magnetic coupling cannot be switched on when the engine is not running (⇒ Repair Group Self-diagnosis and Workshop Manual Fuel Injection and Ignition System).
- The kickdown function is activated by the kickdown switch or by the automatic gear-box control unit (⇒ Current Flow Diagram).

5



4 – Oil drain plug

5 – Pressure relief valve

6 – High-pressure switch for magnetic coupling –F118–* (4- and 6-cyl. engine)

- Function, fitting location, removing and installing ⇒ page 9

6a – High-pressure switch for magnetic coupling –F118* (5-cyl. engine)

- Function, fitting location, removing and installing ⇒ page 9

7, 7a – Connection with valve

8 – Condenser

9 – Service connection

- Function, fitting location ⇒ page 8

10 – Cap

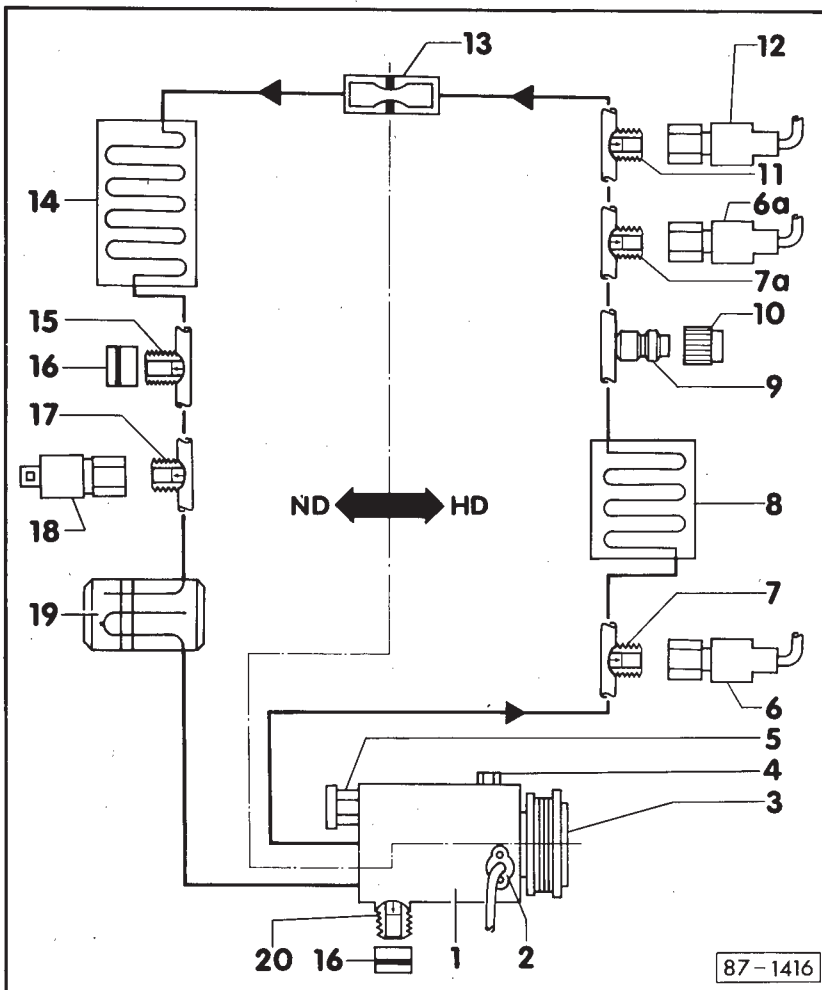
- With seal, always screw on

11 – Connection with valve

12 – High-pressure switch for air conditioner –F23–*

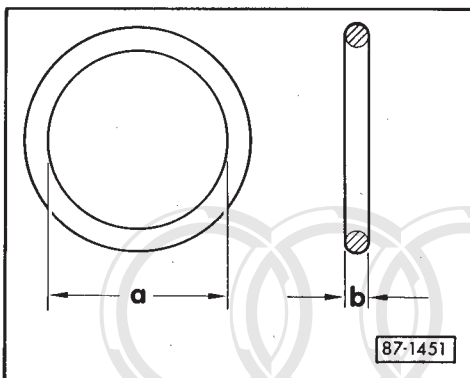
- Function, fitting location, removing and installing ⇒ page 10

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- 13 – Restrictor
- 14 – Evaporator
- 15 – Connection with valve
- 16 – Cap
 - With seal, always screw on
- 17 – Connection with valve
- 18 – Low-pressure switch for refrigerant circuit –F73–*
 - Function, fitting location, removing and installing ⇒ page 11
- 19 – Receiver
- 20 – Connection with valve

7

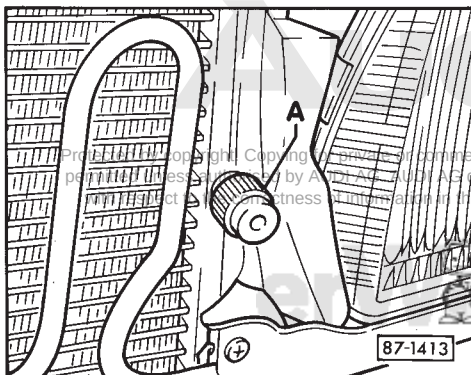


◀ O-ring seals

- Always use seals only once.
- Oil with refrigerant oil before inserting.
- Ensure the seals are correctly seated in the groove
- Ensure clean conditions when working

Note:

Only O-ring seals which are resistant to R 134a refrigerant and the matching refrigerant oil may be installed. Such O-ring seals are colour-coded to avoid any confusion (at present red ⇒ Parts programme).

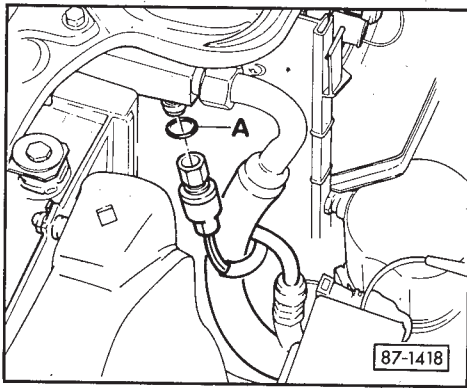


◀ Service connection

- For VW and Audi air conditioner service centre for measuring, draining and filling.
- Figure shows location on 4- and 6-cylinder engine.
- Fitting location on vehicles with 5-cylinder engine in front of condenser.

Note:

Cap (with seal) –A– must be screwed on.



◀ High-pressure switch for magnetic coupling –F118–

Function:

Switches off the magnetic coupling if overpressure in refrigerant circuit

28.2 – 31.0 bar (overpressure) off (switch opens)

10.3 – 17.2 bar (overpressure) on

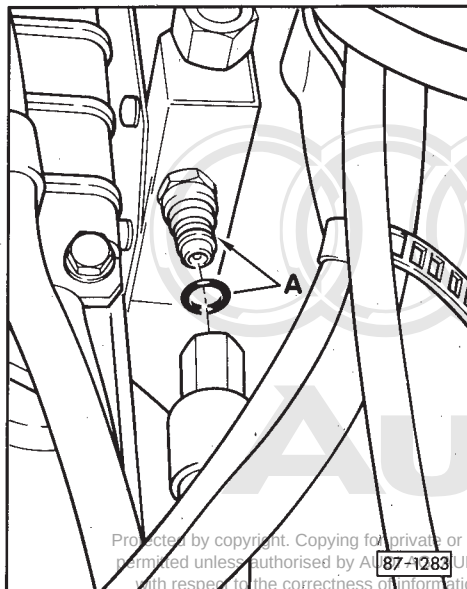
Removing and installing:

- Housing colour "red" with welded connection pipes.
- Refrigerant circuit remains closed (valve).
- Replace O-ring seal –A– 7.6 mm, 1.8 mm (⇒ page 8).
- Tightening torque: 5 Nm.

Notes:

- Figure shows location on 4- and 6-cylinder engine.
- Fitting location on vehicles with 5-cyl. engine: in front of condenser.

9



◀ High-pressure switch for magnetic coupling –F23–

Function:

Switches the coolant fan –V7– into 2nd stage.

14.2 – 17.4 bar (overpressure) on (switch closes).

11.7 – 15.0 bar (overpressure) off.

(Pressure difference between the switching points at least 2 bar.)

Removal and installation:

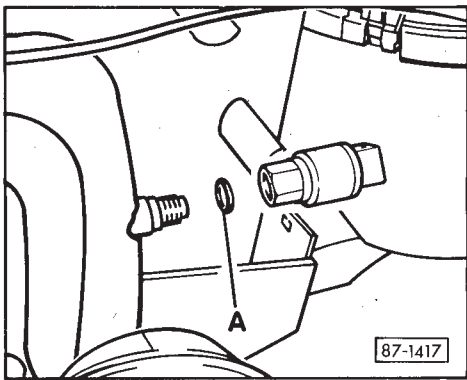
- Housing colour "green" with welded connection pipes.
- Refrigerant circuit remains closed (valve).
- Replace O-ring seal –A– 7.6 mm, 1.8 mm (⇒ page 8).
- Tightening torque: 5 Nm.

Notes:

- Figure shows location on 4- and 6-cylinder engine.
- Fitting location on vehicles with 5-cyl. engine: in front of condenser.

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◀ **Low-pressure switch for refrigerant circuit –F73–**

Function:

Switches off the magnetic coupling in event of pressure drop (protects compressor if refrigerant circuit empty).

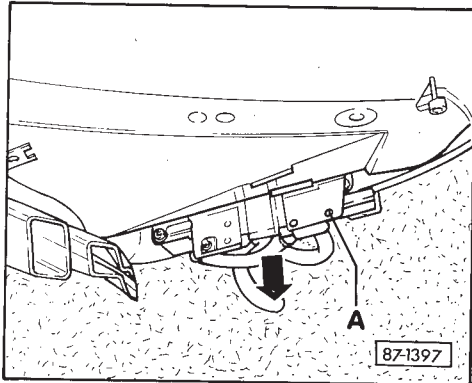
1.45 – 1.6 bar (overpressure) off (switch opens).
2.9 – 3.4 bar (overpressure) on

Fitting location:

In passenger compartment on front passenger's side between bulkhead and heater.

Removing and installing:

– Remove cover on front passenger's side.



◀ – Remove control unit –A– (for fuel injection and ignition system).

– Refrigerant circuit remains closed (valve).

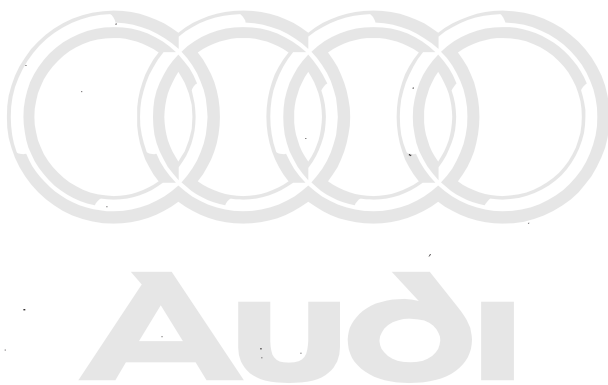
– Replace O-ring seal –A– 8.9 mm, 1.8 mm (⇒ page 8).

– Tightening torque: 5 Nm.

Notes:

– Figure shows low-pressure switch with heater removed.

– For removing, cut commercially available open-end wrench size 17 mm to approx. 80 mm.



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Technical Bulletin to Workshop Manual Audi 80 1992 ►

Booklet

Heater, Air conditioner

Edition 09.91

Enter in Repair Group list

Repair Group 8.7

Bulletin No. **3**

Affected: Vehicles with air conditioner

Subject

SMELL COMING FROM AIR CONDITIONER
=====

Contents	Bulletin page	Booklet from page
Locating source of smell	1	
Tools and spare parts required	2	
Precautions when using spray gun V.A.G 1538 and cleaning solution D 100110 A2	3	
Preparing solution for use	4	
Cleaning evaporator	5	

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LOCATING SOURCE OF SMELL

Note:

A smell can occur for several different reasons:

- A smell of burnt oil from a leak in the engine or gearbox.
- A sulphur-like smell from a leak in the exhaust system.
- A fishy smell from a leak in the coolant system.
- A smell of burnt clutch.
- Fumes from floor mats, seat covers, etc.
- A foul, musty smell caused by leaves or dirt building up in the plenum chamber or on the evaporator fins.

Locating smell

• Before testing, check the following:

- The condensation drain hose must run steadily downwards and be free of kinks, and the connections between the separate components must be sealed.
- The condensation drain valve must not be blocked with wax or undercoating, and must close properly.
- The plenum chamber must be clean. Check for dirt and clean, if necessary.
- The water drain in the plenum chamber must not be blocked. Clean if necessary.

1

• Checking

- Test drive vehicle.
- Operate air conditioner in fresh air mode and recirculation mode alternately. If there is a musty, foul smell in both fresh air and recirculation modes, clean evaporator as described on page 5.

Note:

If there is a fishy smell in both fresh air and recirculation modes, check coolant system (heat exchanger) for leaks.

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TOOLS AND SPARE PARTS REQUIRED

- 25 mm hole cutter (normal commercial type).
- Spray gun V.A.G 1538 with flexible nylon probe V.A.G 1538/2.
- 50 ml cleaning solution for evaporator D 100110 A2 (see Parts Catalogue).
- Grommet 431 971 908 (see Parts Catalogue).

2

PRECAUTIONS WHEN USING SPRAY GUN V.A.G 1538
AND CLEANING SOLUTION D 100110 A2

- Use spray gun according to instructions provided and observe recommended safety precautions.

Note:

The spray gun used for spraying the cleaning solution must not contain any traces of other substances (use new gun).

- Wear rubber gloves and safety glasses for protection when working with cleaning solution.

Important

If cleaning solution gets into eyes, rinse thoroughly with water and then see a doctor immediately. Tell the doctor that the injury was caused by a cleaning solution (take original container). If cleaning solution gets onto skin or clothing, rinse immediately with plenty of water.

- Dilute cleaning solution with water before use (see page 4).
- Store cleaning solution in original container in a cool place.

3



PREPARING SOLUTION FOR USE

- Put 50 ml of solution D 100110 A2 for cleaning air conditioner evaporator into canister for spray gun V.A.G 1538 (canister holds 1 litre).
- Fill up canister with tap water.

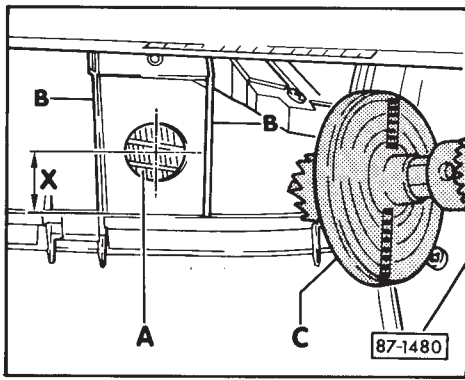
Notes:

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A 5 % concentration of the solution is sufficient for cleaning the evaporator fins. Do not use a more concentrated solution.



- The spray gun V.A.G 1538 which is to be used for cleaning the evaporator must not contain any other substances: use new spray gun only for spraying the cleaning solution; do not fill with other substances.



CLEANING EVAPORATOR

- Remove glove compartment (see Workshop Manual, General body repairs).
- ▶ - Drill a hole -A- 25 mm in diameter halfway between the two strengthening ribs -B- on the evaporator housing using hole cutter -C-. Dimension X = 25 mm.
- Smooth down both sides and round off edges.
- Cover carpeting, for example using absorbent paper.
- Place a basin for catching fluid under vehicle (near condensation drain valve).
- Fill spray gun with cleaning solution and water (page 4).
- Connect spray gun V.A.G 1538 to compressed-air system in workshop using pressure regulator (set maximum working pressure to 6 bar).
- Spray the cleaning fluid evenly all over the evaporator fins through hole -A-.

5

Notes:

- Use nylon probe V.A.G 1538/1.
- Use up contents of canister completely.
- Do not spray other components.
- Leave solution to take effect for about 15 minutes.
- Wash out spray gun.
- Fill spray gun canister with tap water and rinse cleaning solution from evaporator with at least 2 litres water.
- Plug hole with grommet (Part No. 431 971 908).
- Re-assemble vehicle.
- Start engine.
- Operate air conditioner for 5 minutes with maximum blower speed in fresh air mode.

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6

Technical Bulletin to Workshop Manual Audi 80 1992 ➤

Booklet Heating, Air Conditioner Edition 09.91

to be marked in Repair Group list
Repair Group 87 and Technical Bulletin No. 2

with Bulletin no. **4**

Affected: Vehicles with air conditioner

Subject

*Servicing refrigerant circuit **

Contents	Bulletin Page	Booklet from Page
Notes on general repairs	1	87-4
Refrigerant-circuit servicing work	2	
- Refrigerant R12 ➤ 09.92	2	
- Refrigerant R134a 10.92 ➤	16	
- Removing and installing air-conditioner compressor speed sender - G111	29	
- Removing and installing restrictor	30	
- Removing and installing air-conditioning unit	32	
- Removing and installing heat exchanger of air-conditioning unit	37	
- Removing and installing positioning motor for air-flow flap	38	
- Removing and installing air-flow flap	39	
- Removing and installing vacuum unit for air recirculation/fresh-air flap	40	
- Dismantling and assembling air-conditioning unit	41	
- Dismantling and assembling evaporator housing	42	

* The Workshop Manual "Air Conditioner with Refrigerant R134a" is being revised. At the same time, vehicle-specific operations are being deleted. Please heed the following:

- All vehicle-specific repair operations are described in this Workshop Manual.
- Repair operations applicable to all vehicles and the filling quantities required can still be found in the Workshop Manual "Air conditioner with Refrigerant R134a" or in the Workshop Manual "Air Conditioner with Refrigerant R12".

Notes on general repairs

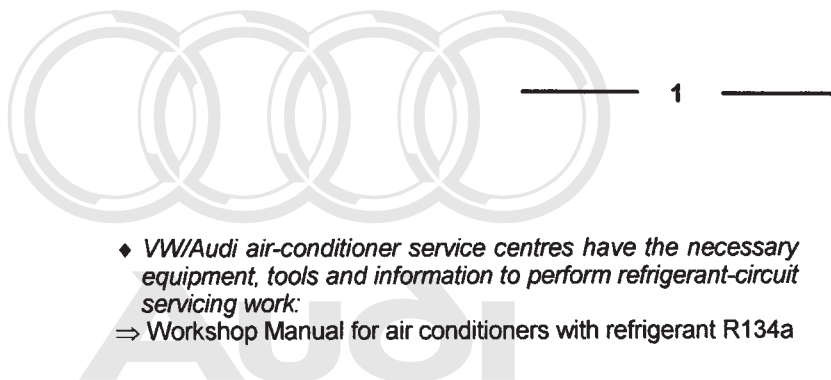
This Technical Bulletin describes vehicle-specific air-conditioner servicing work for which the refrigerant circuit has to be drained and which cannot therefore be performed in all VW/Audi workshops.

Vehicles are to be sent to VW/Audi air-conditioner service centres for refrigerant-circuit drainage.

Air-conditioner service work involving the refrigerant circuit can only be performed at a VW/Audi air-conditioner service centre.

Notes:

- ♦ *The Workshop Manual "Air conditioner with refrigerant R134a" is being revised and all vehicle-specific repair operations deleted from Part 2. These will be incorporated into the vehicle workshop manual "Heating, air conditioner".*
- ♦ *The Workshop Manual "Air conditioner with refrigerant R12" is being retained in its present form until further notice.*



- ♦ *VW/Audi air-conditioner service centres have the necessary equipment, tools and information to perform refrigerant-circuit servicing work:*

⇒ Workshop Manual for air conditioners with refrigerant R134a

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Refrigerant-circuit servicing work

Refrigerant R12 ➤ 09.92

Notes:

- ♦ *Basic information for working on refrigerant circuit R12:*
- ⇒ Air conditioner with refrigerant R12; Part 1; Basic information for working on refrigerant circuit
- ♦ *Pay attention to additional safety measures:*
- ⇒ Air conditioner with refrigerant R12; Part 1; Safety measures to be observed when working on vehicles with air conditioner and when handling refrigerant/purging agent

- ◆ *Conversion of air conditioner from refrigerant R12 to refrigerant R134a:*
 - ⇒ Air conditioner with refrigerant R12; Part 2; Converting refrigerant circuit with Nippondenso or Zexel compressor from refrigerant R12 to refrigerant R134a (retrofit)
- ◆ *Servicing refrigerant circuits converted from refrigerant R12 to refrigerant R134a:*
 - ⇒ Air conditioner with refrigerant R12; Part 2; Servicing refrigerant circuit with Nippondenso or Zexel compressor converted from refrigerant R12 to refrigerant R134a (retrofit)
- ◆ *Checking refrigeration capacity:*
 - *Manual air conditioner* ⇒ *Workshop Manual, Page 87-37*
 - *Fully automatic air conditioner* ⇒ *Workshop Manual, Page 87-58*
- ◆ *The refrigerant circuit has no inspection port; refrigerant is not to be topped up.*

- ◆ *Replacement compressor contains the entire quantity of refrigerant oil to be poured into the refrigerant circuit (300 cm³):*

- ⇒ Air conditioner with refrigerant R12; Part 2; Filling quantities; Filling quantity for refrigerant oil and oils released for use (for circuit with refrigerant R12)
- ⇒ Air conditioner with refrigerant R12; Part 2; Filling quantities; Filling quantity for refrigerant oil and oils released for use (for circuit with refrigerant R134a - retrofit)

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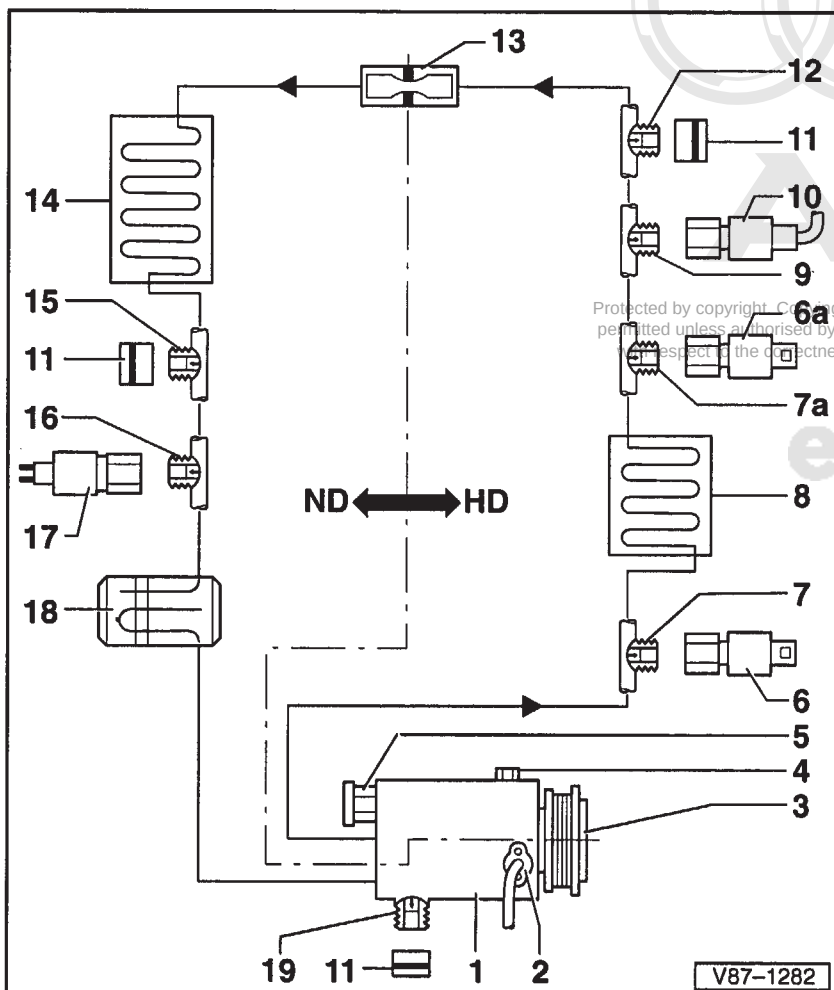
- ◆ *Possible problems with refrigerant circuit:*

- ⇒ Air conditioner with refrigerant R12; Part 2; Possible problems with refrigerant circuit

- ◆ *Checking pressures in refrigerant circuit with pressure gauge block:*

- ⇒ Air conditioner with refrigerant R12; Part 2; Checking pressures in refrigerant circuit with pressure gauge block

- ♦ **Renewing refrigerant-circuit components:**
 - ⇒ Air conditioner with refrigerant R12; Part 2; Renewing refrigerant-circuit components
- ♦ **Filling quantities:**
 - ⇒ Air conditioner with refrigerant R12; Part 2; Filling quantities; Filling quantity for refrigerant R12
 - ⇒ Air conditioner with refrigerant R12; Part 2; Filling quantities; Filling quantity for refrigerant R134a (retrofit)
 - ⇒ Air conditioner with refrigerant R12; Part 2; Filling quantities; Filling quantity for refrigerant oil and oils released for use (for circuit with refrigerant R12)
 - ⇒ Air conditioner with refrigerant R12; Part 2; Filling quantities; Filling quantity for refrigerant oil and oils released for use (for circuit with refrigerant R134a - retrofit)
- ♦ **Cleaning refrigerant circuit:**
 - ⇒ Air conditioner with refrigerant R12; Part 2; Blowing out refrigerant circuit with compressed air and nitrogen

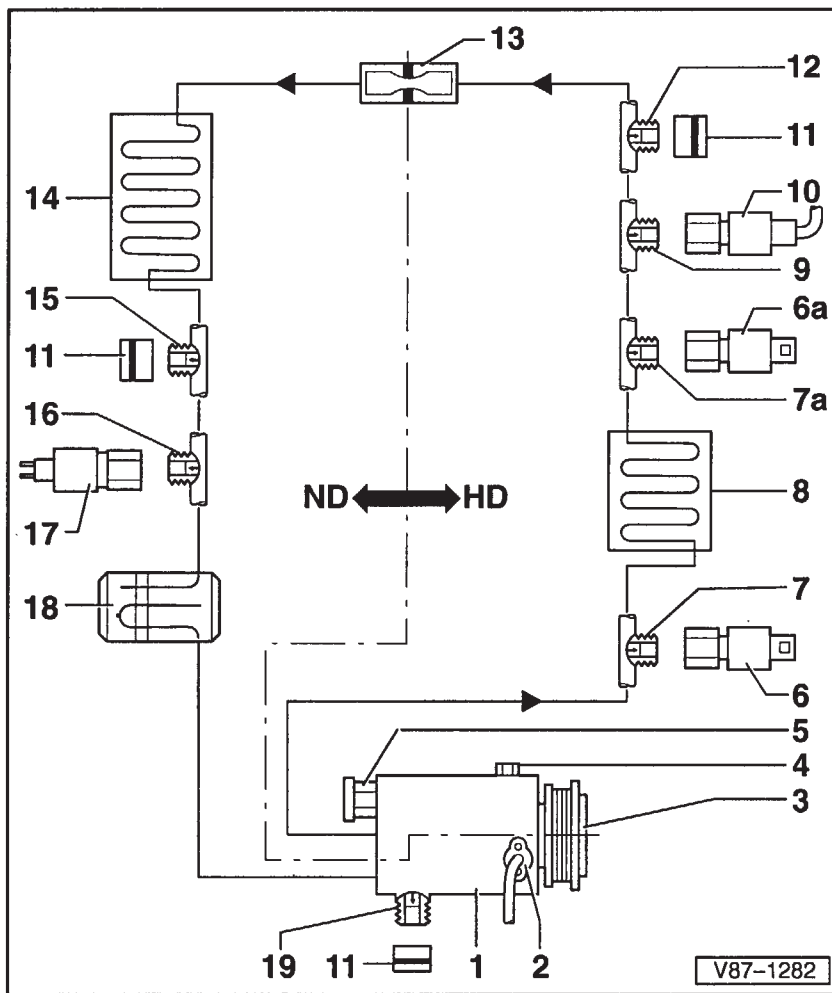


HD = High-pressure end (HP)

ND = Low-pressure end (LP)

1 - Compressor

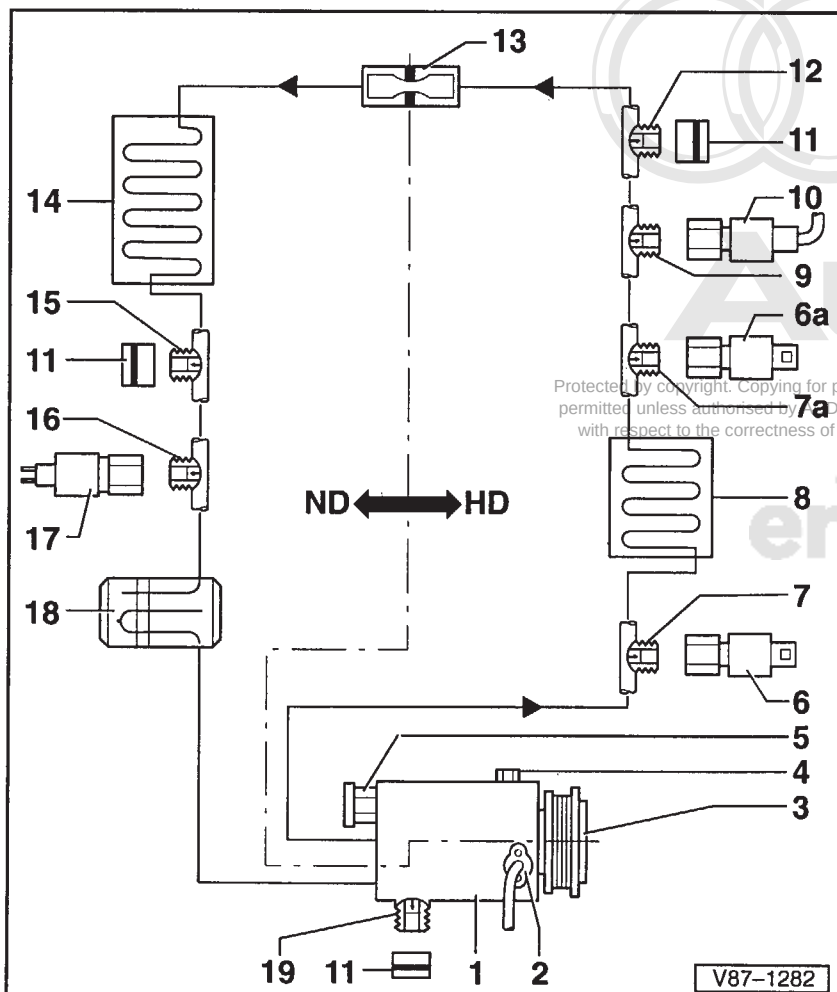
- ♦ With variable piston stroke; set as a function of required refrigeration capacity by way of pressure on low-pressure end
- ♦ Manufactured by Zexel
- ♦ O-ring seal for LP connection: 7.2 mm/1.8 mm
- ♦ O-ring seal for HP connection: 14.0 mm/1.8 mm
- ♦ Tightening torque
 - LP connection: 40 Nm
 - HP connection: 30 Nm
- ♦ Removing V-belt/ribbed belt
 - ⇒ Engine Mechanical Components; Repair Group 13
 - ♦ On vehicles with 6-cyl. engine, adjust alignment of belt pulleys before tightening compressor



⇒ Engine Mechanical Components;
Repair Group 13

- ◆ After installing new compressor or pouring in fresh refrigerant oil (e.g. after blowing out refrigerant circuit), crank compressor 10 times by hand following installation and prior to initial commissioning so as to prevent compressor damage.
- ◆ To protect O-ring seals against radiant heat of exhaust manifold, thermal insulation matting must be attached to refrigerant pipes with 6-cyl. engines

Part no.: ⇒ Parts list

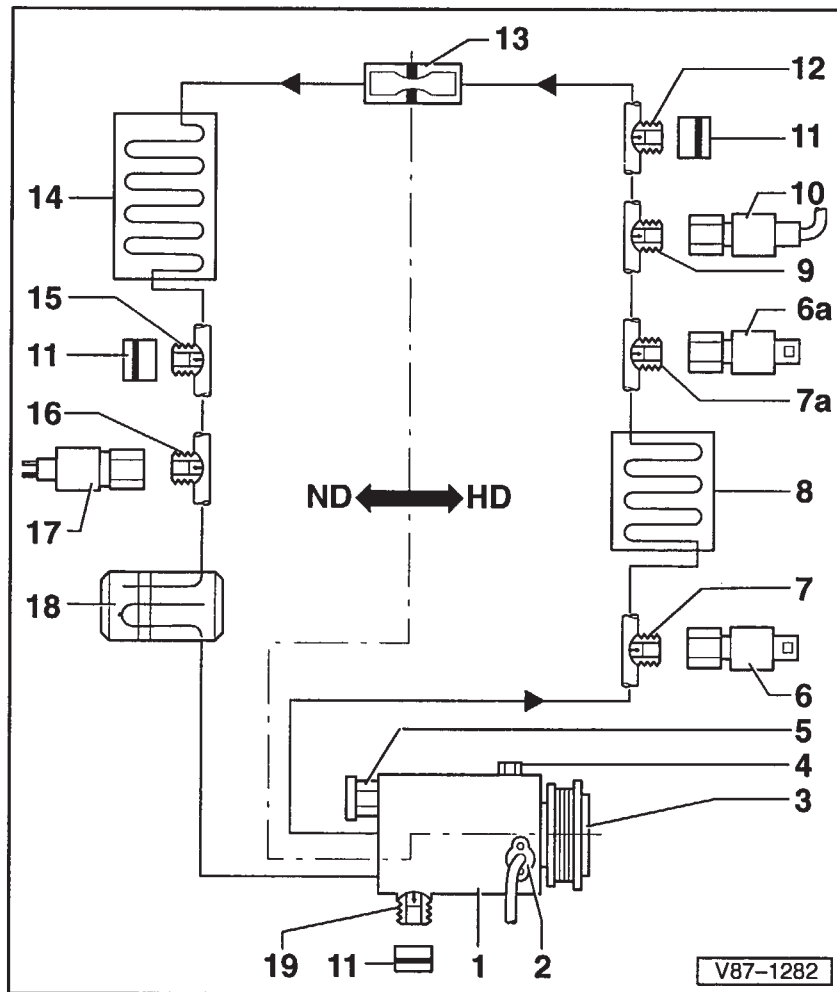


2 - Air-conditioner compressor speed sender -G111

- ◆ Only on vehicles with compressor driven by ribbed belt which also drives other auxiliaries
- ◆ O-ring seal: 15.6 mm/1.5 mm
- ◆ Checking ⇒ Workshop Manual, Page 87-9
- ◆ Removing and installing ⇒ Page 29
- ◆ Only to be unscrewed after draining refrigerant circuit

3 - Air-conditioner magnetic clutch -N25

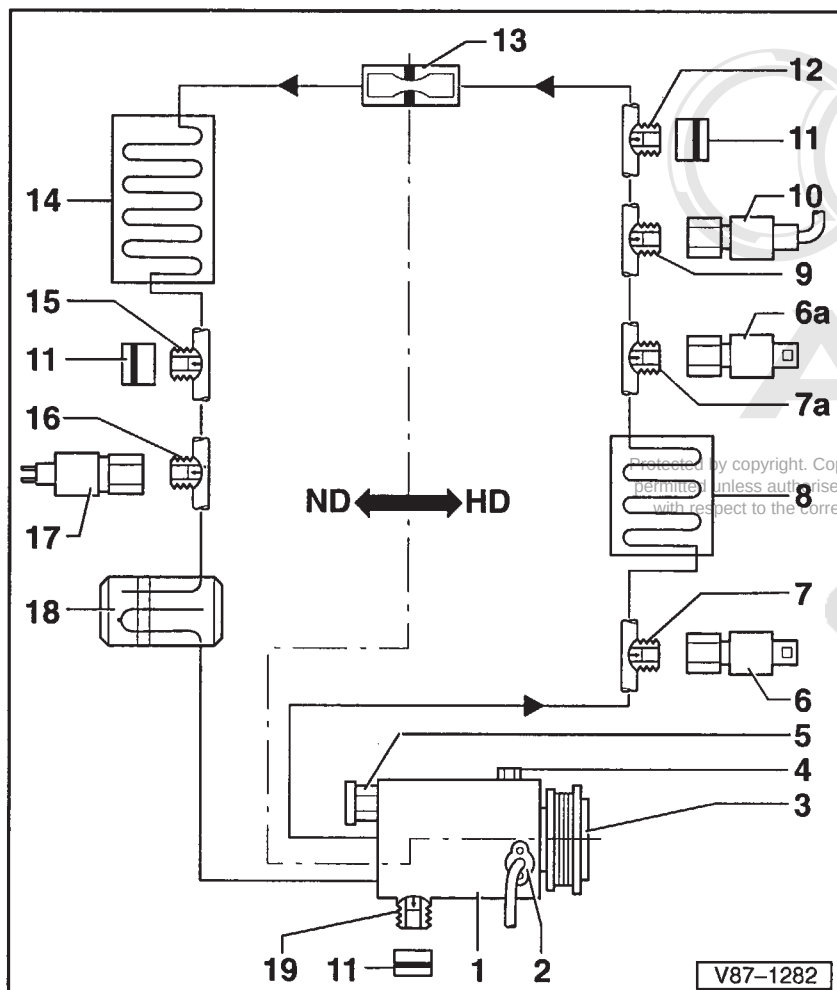
- ◆ Servicing ⇒ Workshop Manual, Page 87-13



4 - Oil drain screw - 10 Nm

- ◆ O-ring seal:
7.6 mm/1.9 mm
 - ◆ Only to be screwed out with compressor removed for draining refrigerant oil
 - After blowing out refrigerant circuit for draining old refrigerant oil and pouring fresh refrigerant oil into old compressor
 - In the case of compressor damage not requiring refrigerant circuit to be blown out for adjusting quantity of refrigerant oil in replacement compressor
- ⇒ Air conditioner with refrigerant R12;
Part 2; Renewing refrigerant circuit components

— 9 —



5 - Pressure relief valve

- ◆ Tighten to 10 Nm
- ◆ O-ring seal:
8.9 mm/1.9 mm
- ◆ Connection with no valve; only to be unscrewed after draining refrigerant circuit

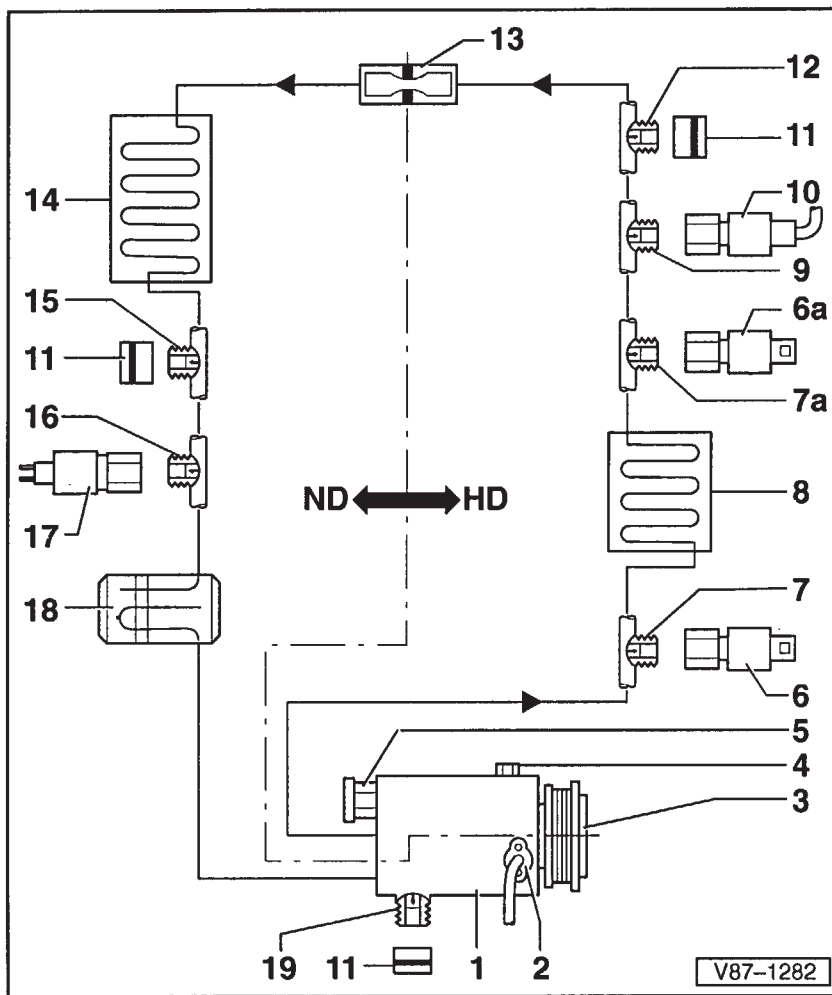
6 - Magnetic clutch high-pressure switch -F118

- ◆ Item 6 shows fitting location on 4 and 6-cyl. engine, item 6a location on 5-cyl. engine
- ◆ Cuts out at 28.2...31.0 bar (switch opens)
- ◆ Cuts in at 10.3...17.2 bar
- ◆ Red housing
- ◆ O-ring seal:
9.3 mm/1.8 mm
- ◆ Tighten to 5 Nm

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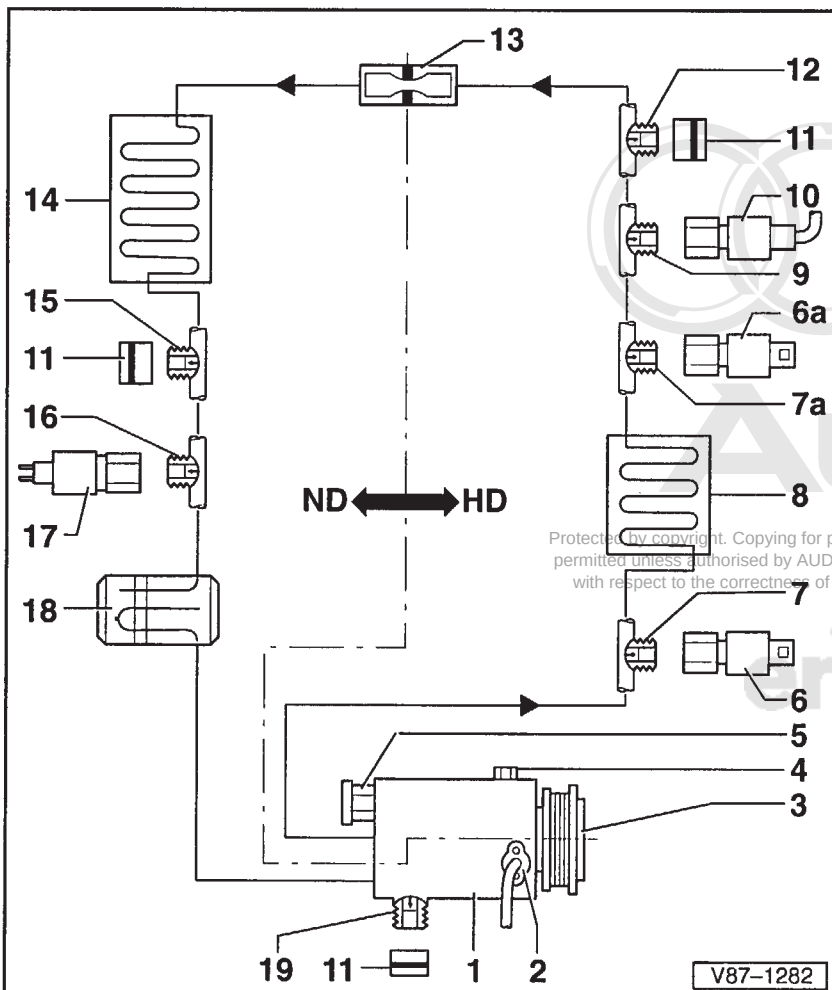


7 - Connection with valve

- ◆ Item 7 shows fitting location on 4 and 6-cyl. engine, item 7a location on 5-cyl. engine
- ◆ For magnetic clutch high-pressure switch -F118
- ◆ For pressure gauge block for measuring, draining and filling refrigerant circuit
- ◆ For measurement, connect magnetic clutch high-pressure switch -F118 removed to connector

8 - Condenser

- ◆ O-ring seal:
Inlet: 14.0 mm/1.8 mm
Outlet: 10.8 mm/1.8 mm
- ◆ Tightening torque:
Inlet: 30 Nm
Outlet: 15 Nm



9 - Connection with valve

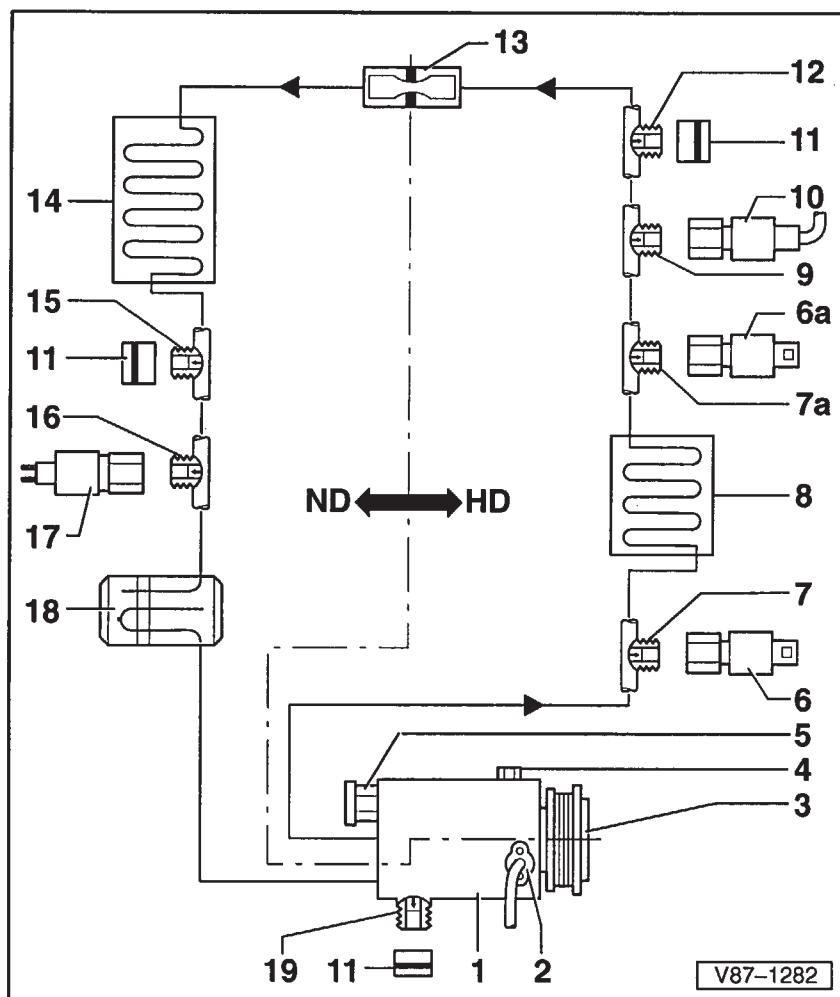
- ◆ For high-pressure switch for air conditioner -F23
- ◆ For pressure gauge block for measuring, draining and filling refrigerant circuit (on 4 and 6-cyl. engine)

10 - High-pressure switch for air conditioner -F23

- ◆ Cuts in at 13.1...17.5 bar (switch closes)
- ◆ Cuts out at 10.6...15.0 bar
- ◆ Pressure difference between switching points: min. 2 bar
- ◆ Green housing with welded-on connecting lines
- ◆ O-ring seal:
9.3 mm/1.8 mm
- ◆ Tighten to 5 Nm

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11 - Cap

- ◆ With seal
- ◆ Always to be screwed on

12 - Connection with valve

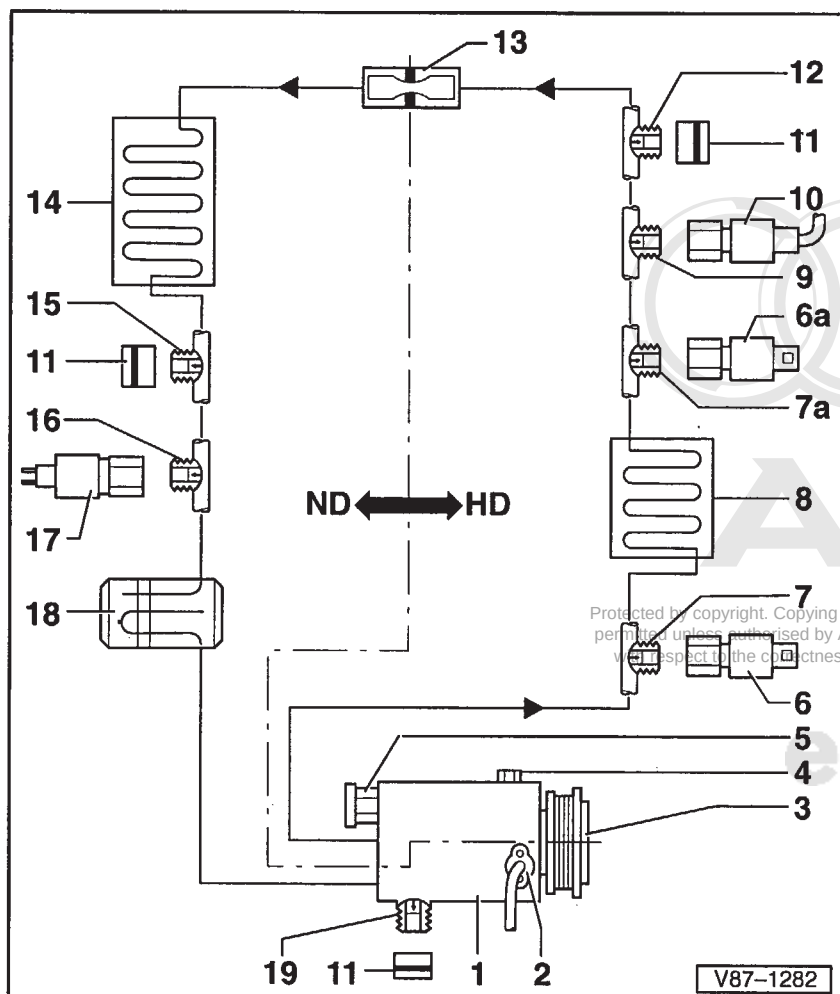
- ◆ Only fitted on vehicles with 5-cyl. engine
- ◆ For pressure gauge block for measuring, draining and filling refrigerant circuit

13 - Restrictor

- ◆ O-ring seal: 7.5 mm/1.5 mm
- ◆ Removing and installing ⇒ Page 30

14 - Evaporator

- ◆ O-ring seal: Inlet: 10.8 mm/1.8 mm
Outlet: 17.2 mm/1.8 mm



- ◆ Tightening torque of central bolt: 15 Nm
- ◆ Removing and installing air-conditioning unit ⇒ Page 32
- ◆ Dismantling and assembling air-conditioning unit ⇒ Page 41

15 - Connection with valve

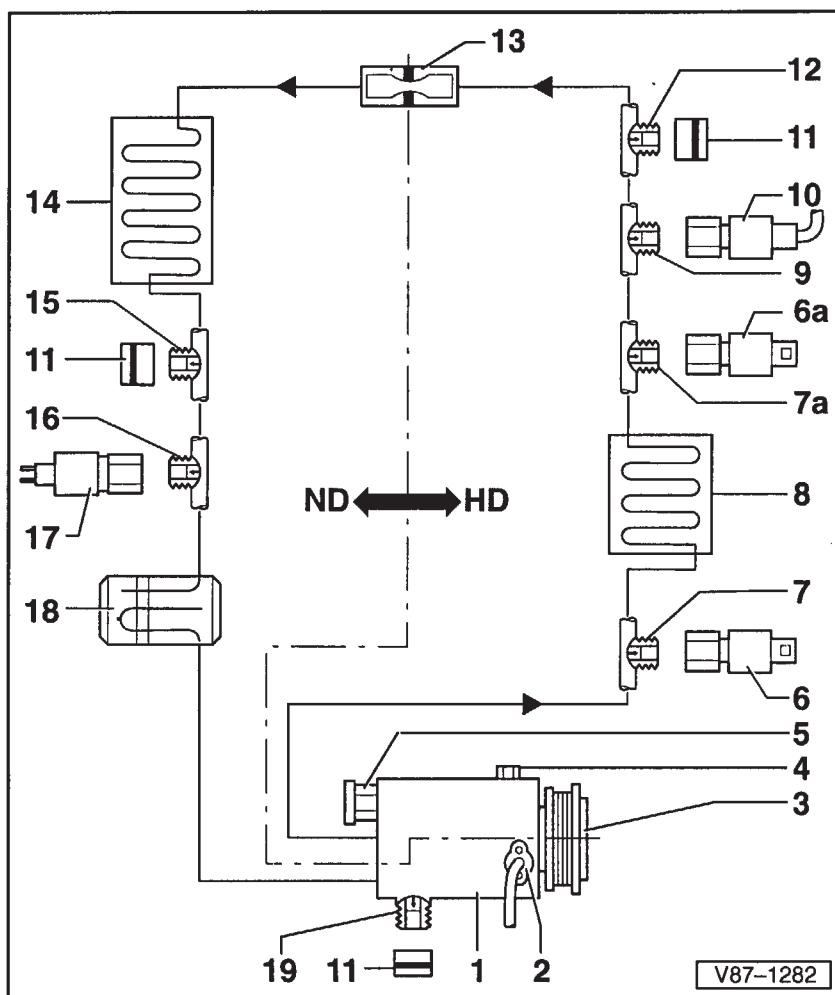
- ◆ Not accessible with air-conditioning unit in position

16 - Connection with valve

- ◆ For air-conditioner low-pressure switch -F73
- ◆ For pressure gauge block for measuring, draining and filling refrigerant circuit
- ◆ For measurement and filling, electrically jumper air-conditioner low-pressure switch -F73 removed

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17 - Air-conditioner low-pressure switch -F73

- ◆ Cuts out at 1.45...1.6 bar (switch opens)
- ◆ Cuts in at 2.9...3.2 bar
- ◆ Pressure difference between switching points: 1.4...1.6 bar
- ◆ O-ring seal: 9.3 mm/1.8 mm
- ◆ Tighten to 5 Nm

18 - Reservoir

- ◆ O-ring seal: Inlet: 17.2 mm; 1.8 mm
Outlet: 17.2 mm; 1.8 mm
- ◆ Tightening torque: Inlet: 40 Nm
Outlet: 40 Nm

19 - Connection with valve

- ◆ For pressure gauge block for measuring, draining and filling refrigerant circuit

15

Refrigerant R134a 10.92 ➤

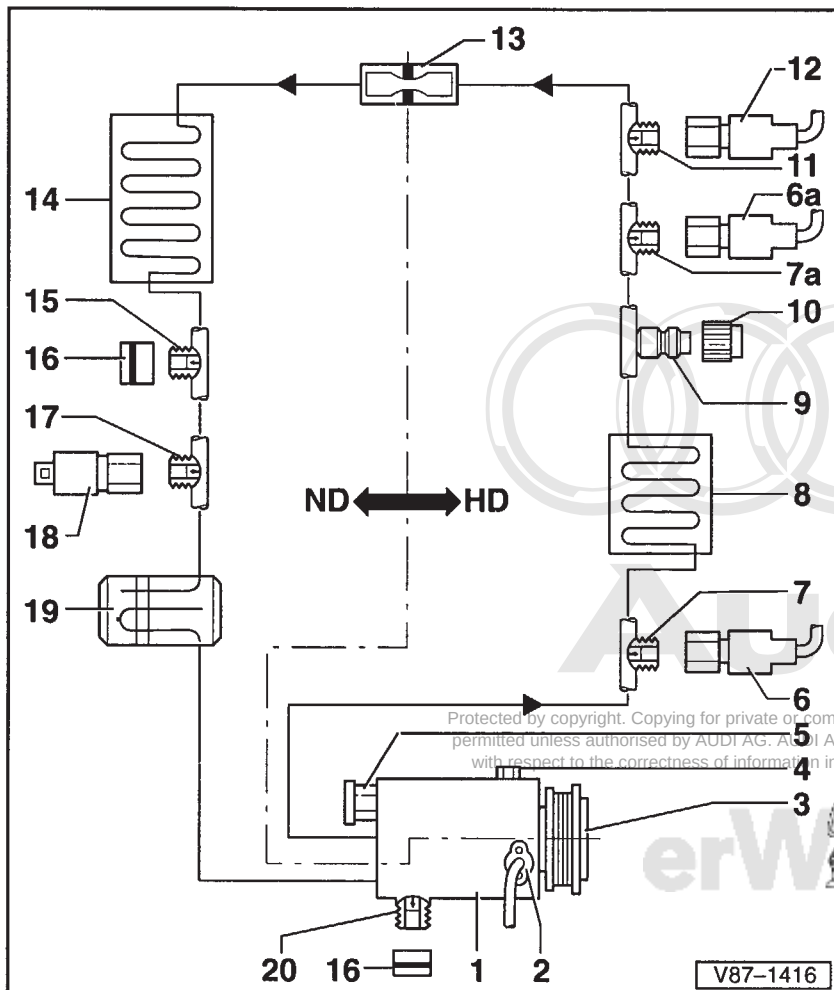
Notes:

- ◆ **Basic information for working on refrigerant circuit R134a:**
⇒ Air conditioner with refrigerant R134a; Part 1; Basic information for working on refrigerant circuit
- ◆ **Pay attention to additional safety measures:**
⇒ Air conditioner with refrigerant R134a; Part 1; Safety measures to be observed when working on vehicles with air conditioner and when handling refrigerant R134a
- ◆ **Checking refrigeration capacity:**
 - Manual air conditioner ⇒ Workshop Manual, Page 87-37
 - Fully automatic air conditioner ⇒ Workshop Manual, Page 87-58
- ◆ **Refrigerant circuit is not to be topped up with refrigerant (drain circuit, evacuate and re-fill).**

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- ◆ Replacement compressor contains the entire quantity of refrigerant oil to be poured into the refrigerant circuit (250 cm³).
- ◆ Different refrigerant oils are prescribed for Zexel and Nippondenso compressors
- ⇒ Air conditioner with refrigerant R134a; Part 2; Filling quantities; Refrigerant oils released for use
- ◆ Only fit O-ring seals released for use with refrigerant R134a:
- ⇒ Air conditioner with refrigerant R134a; Part 1; Refrigerant-circuit components
- ◆ There is no colour-coding of the O-ring seals on the Zexel compressor (for air-conditioner compressor speed sender - G111, oil drain screw and pressure relief valve). They are supplied as a set:
- ⇒ Parts list
- ◆ The stated O-ring seal diameters and tightening torques also apply to the refrigerant pipe/hose unions between the individual components.

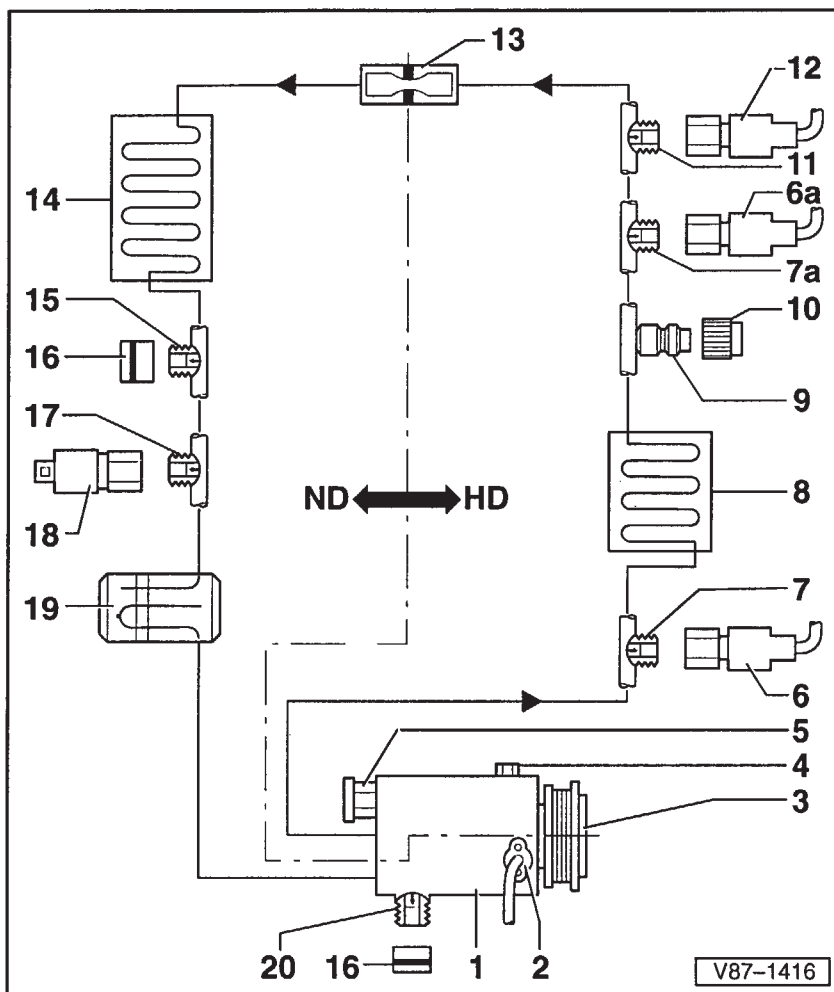


HD = High-pressure end (HP)

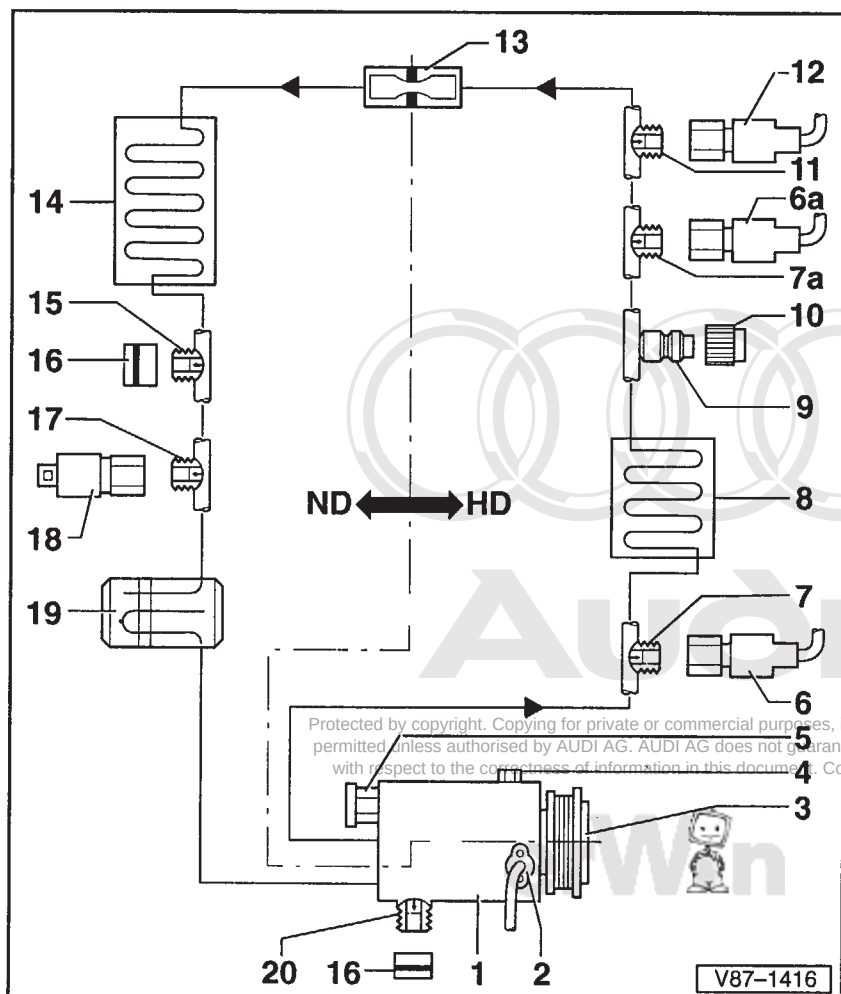
ND = Low-pressure end (LP)

1 - Compressor

- ◆ With variable piston stroke; set as a function of required refrigeration capacity by way of pressure on low-pressure end
- ◆ Manufactured by Zexel
- ◆ O-ring seal
 - for LP connection: 17.2 mm/1.8 mm
 - for HP connection: 14.0 mm/1.8 mm
- ◆ Tightening torque
 - LP connection: 40 Nm
 - HP connection: 30 Nm
- ◆ Removing V-belt/ribbed belt
- ⇒ Engine Mechanical Components; Repair Group 13



- ♦ On vehicles with 6-cyl. engine, adjust alignment of belt pulleys before tightening compressor
- ⇒ Engine Mechanical Components; Repair Group 13
- ♦ To protect O-ring seals against radiant heat of exhaust manifold, thermal insulation matting must be attached to refrigerant pipes with 6-cyl. engines
- Part no.: ⇒ Parts list
- ♦ After installing new compressor or pouring in fresh refrigerant oil (e.g. after blowing out refrigerant circuit), crank compressor 10 times by hand following installation and prior to initial commissioning so as to prevent compressor damage.



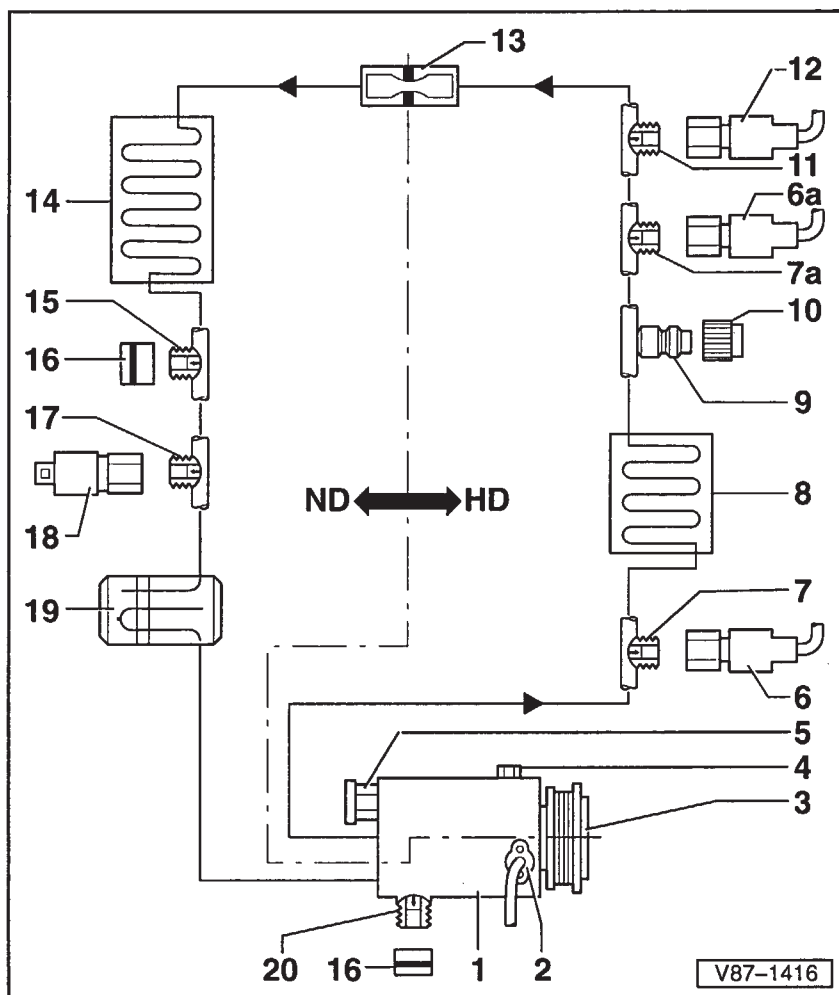
2 - Air-conditioner compressor speed sender -G111

- ♦ Only on vehicles with compressor driven by ribbed belt which also drives other auxiliaries
- ♦ O-ring seal: 15.5 mm/1.8 mm
- ♦ Checking ⇒ Workshop Manual, Page 87-9
- ♦ Removing and installing ⇒ Page 29
- ♦ Only to be unscrewed after draining refrigerant circuit
- ♦ Can only be replaced after removing compressor

3 - Air-conditioner magnetic clutch -N25

- ♦ Servicing ⇒ Workshop Manual, Page 87-13

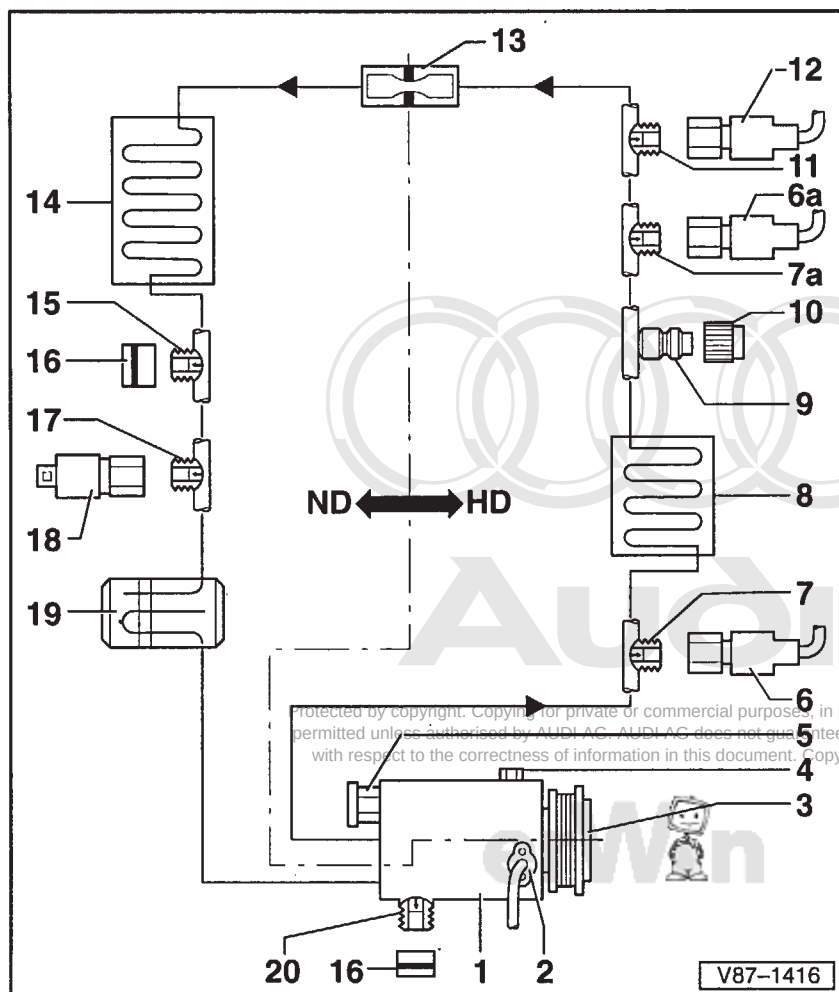
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4 - Oil drain screw - 10 Nm

- ◆ O-ring seal:
7.6 mm/1.9 mm
 - ◆ Only to be screwed out with compressor removed for draining refrigerant oil
 - After blowing out refrigerant circuit for draining old refrigerant oil and pouring fresh refrigerant oil into old compressor
 - In the case of compressor damage not requiring refrigerant circuit to be blown out for adjusting quantity of refrigerant oil in replacement compressor
- ⇒ Air conditioner with refrigerant R134a; Part 2; Renewing refrigerant circuit components

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- ◆ Different refrigerant oils for Zexel and Nippondenso compressors
- ⇒ Air conditioner with refrigerant R134a; Part 2; Filling quantities for refrigerant R134a and refrigerant oil as well as refrigerant oils released for use

5 - Pressure relief valve, 10 Nm

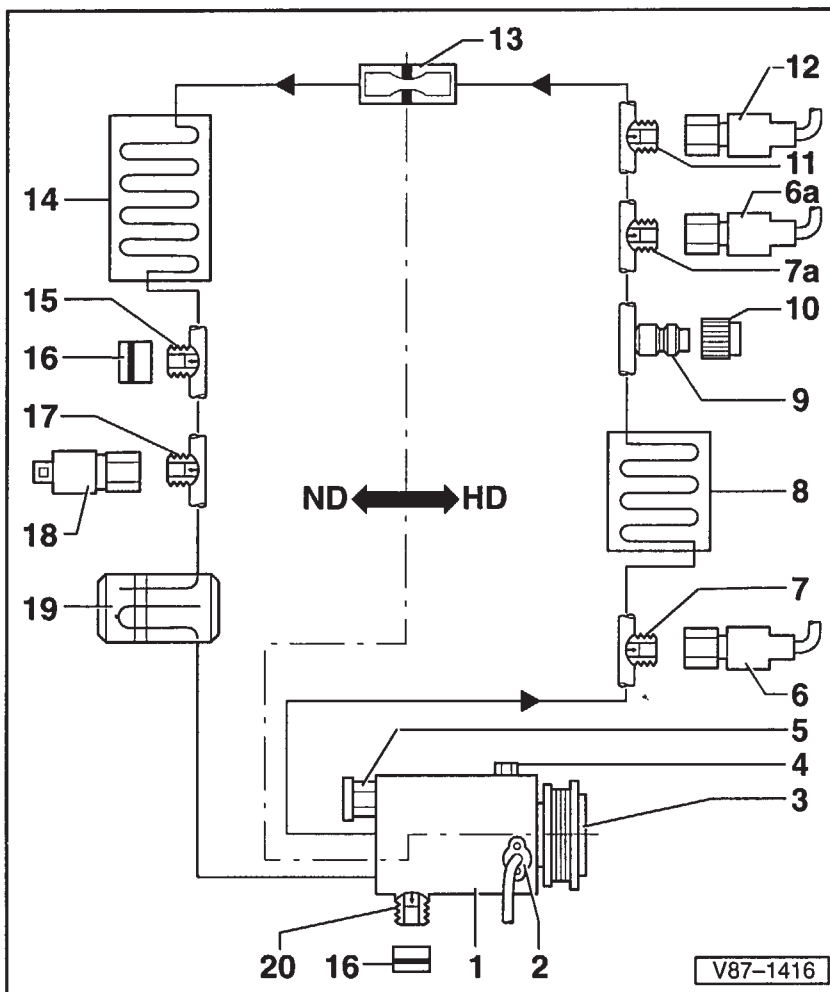
- ◆ O-ring seal:
8.8 mm/1.9 mm
- ◆ Tighten to 10 Nm
- ◆ Connection with no valve; only to be unscrewed after draining refrigerant circuit

6 - Connection with valve

- ◆ For magnetic clutch high-pressure switch -F118
- ◆ Item 6 shows fitting location on 4 and 6-cyl. engine, item 6a location on 5-cyl. engine

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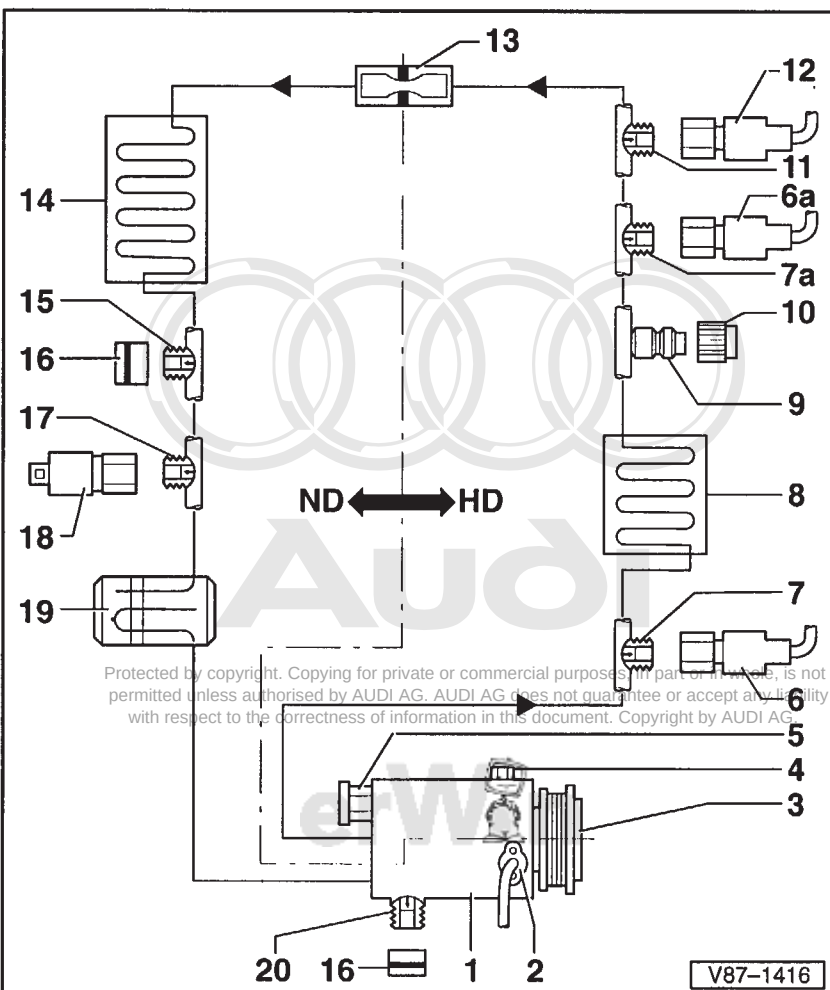
22



- ◆ For measuring pressure in refrigerant circuit, connect magnetic clutch high-pressure switch -F118 removed to plug and use adapter V.A.G 1785/9

7 - Magnetic clutch high-pressure switch -F118

- ◆ Item 7 shows fitting location on 4 and 6-cyl. engine, item 7a location on 5-cyl. engine
- ◆ Cuts out at 28.2...31.0 bar (switch opens)
- ◆ Cuts in at 10.3...17.2 bar
- ◆ Red housing with welded-on connecting lines
- ◆ O-ring seal:
7.6 mm/1.8 mm
- ◆ Tighten to 5 Nm



8 - Condenser

- ◆ O-ring seal:
Inlet: 14.0 mm/1.8 mm
Outlet: 10.8 mm/1.8 mm
- ◆ Tightening torque:
Inlet: 30 Nm
Outlet: 15 Nm

9 - Service connection

- ◆ For service unit for measuring pressure and draining/filling refrigerant circuit

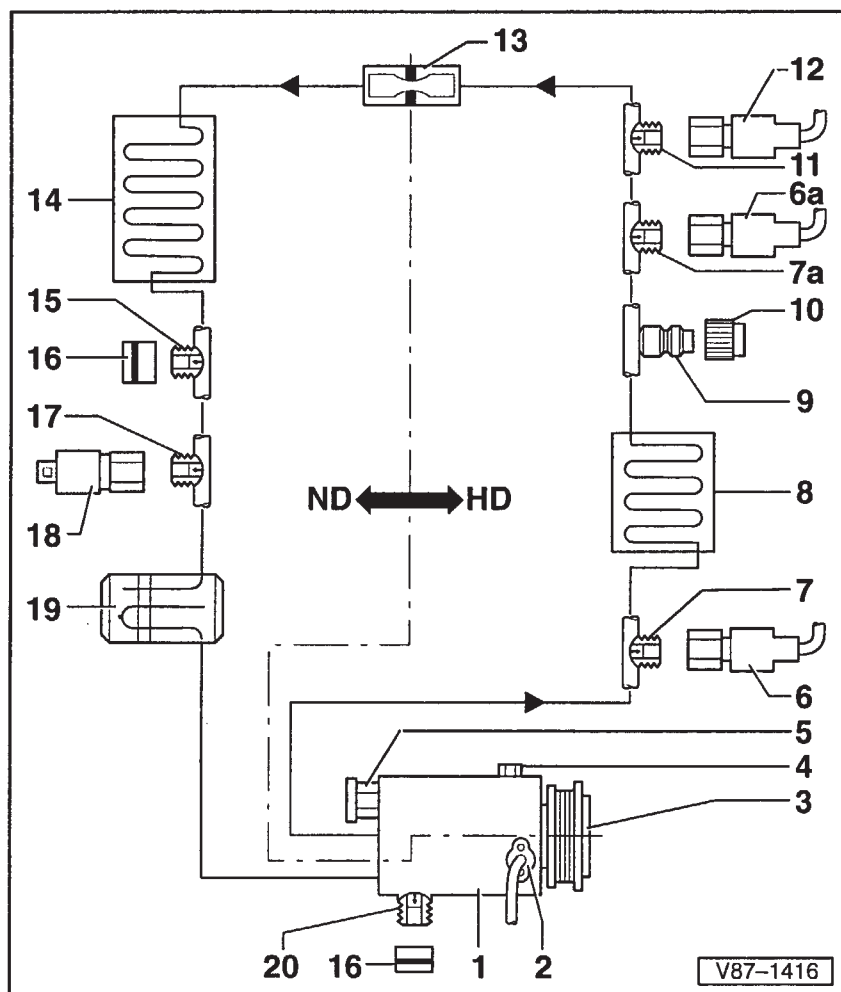
10 - Cap

- ◆ With seal
- ◆ Always to be screwed on

11 - Connection with valve

- ◆ For high-pressure switch for air conditioner -F23

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12 - High-pressure switch for air conditioner -F23

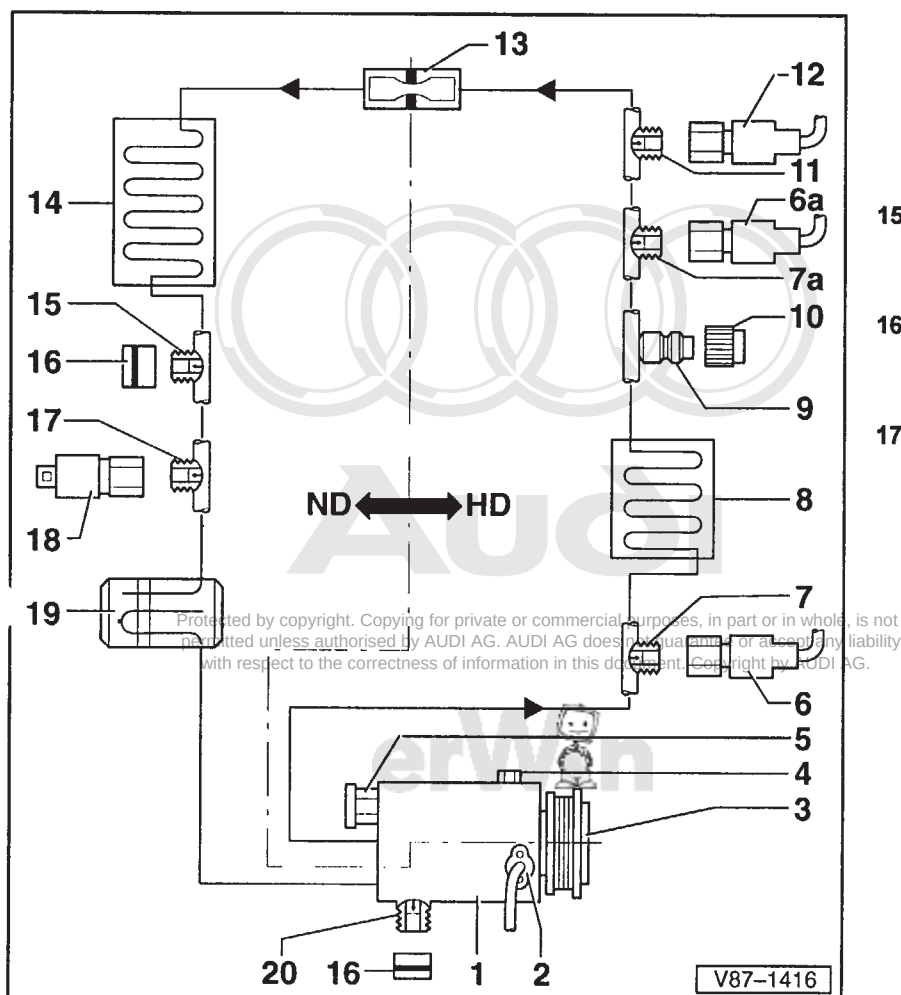
- ◆ Cuts in at 14.2...17.4 bar (switch closes)
- ◆ Cuts out at 15.7...15.0 bar
- ◆ Pressure difference between switching points: min. 2 bar
- ◆ Green housing with welded-on connecting lines
- ◆ Tighten to 5 Nm
- ◆ O-ring seal: 7.6 mm/1.8 mm

13 - Restrictor

- ◆ Removing and installing
⇒ Page 30

14 - Evaporator

- ◆ O-ring seal:
Inlet: 10.8 mm/1.8 mm
Outlet: 17.2 mm/1.8 mm



- ◆ Tightening torque of central bolt: 15 Nm
- ◆ Removing and installing air-conditioning unit ⇒ Page 32
- ◆ Dismantling and assembling air-conditioning unit ⇒ Page 41

15 - Connection with valve

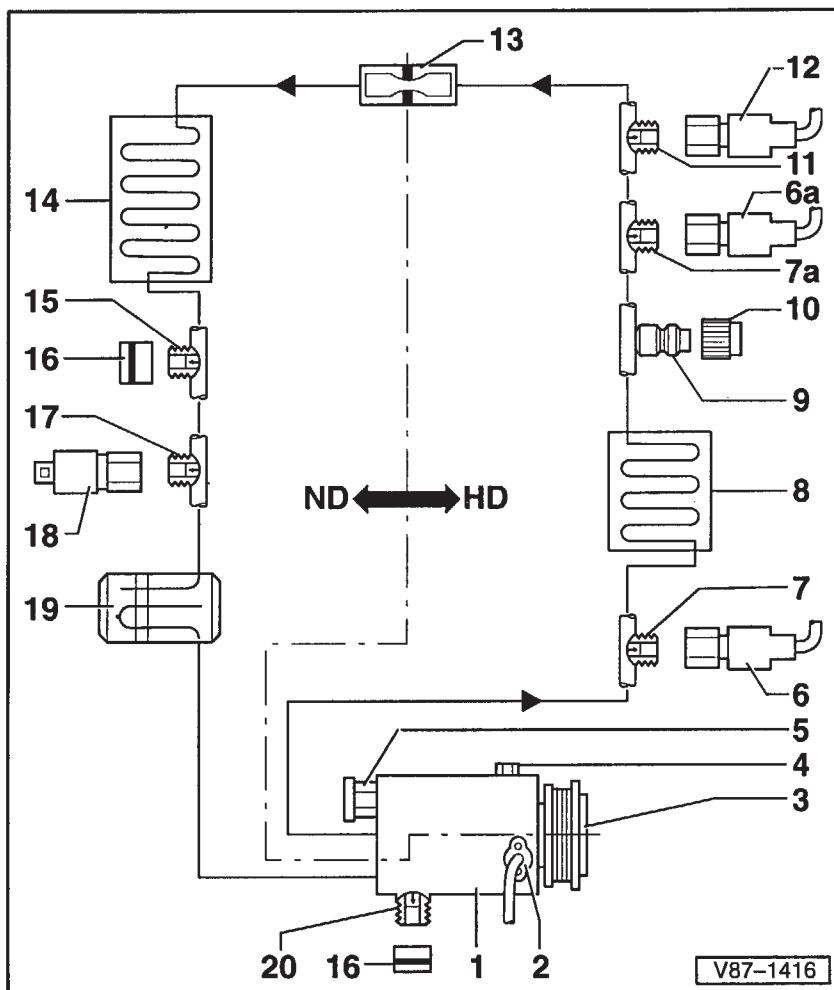
- ◆ Not accessible with air-conditioning unit in position

16 - Cap

- ◆ With seal
- ◆ Always to be screwed on

17 - Connection with valve

- ◆ For air-conditioner low-pressure switch -F73
- ◆ For service unit or pressure gauge block for measuring and draining
- ◆ For measurement, electrically jumper air-conditioner low-pressure switch -F73 removed



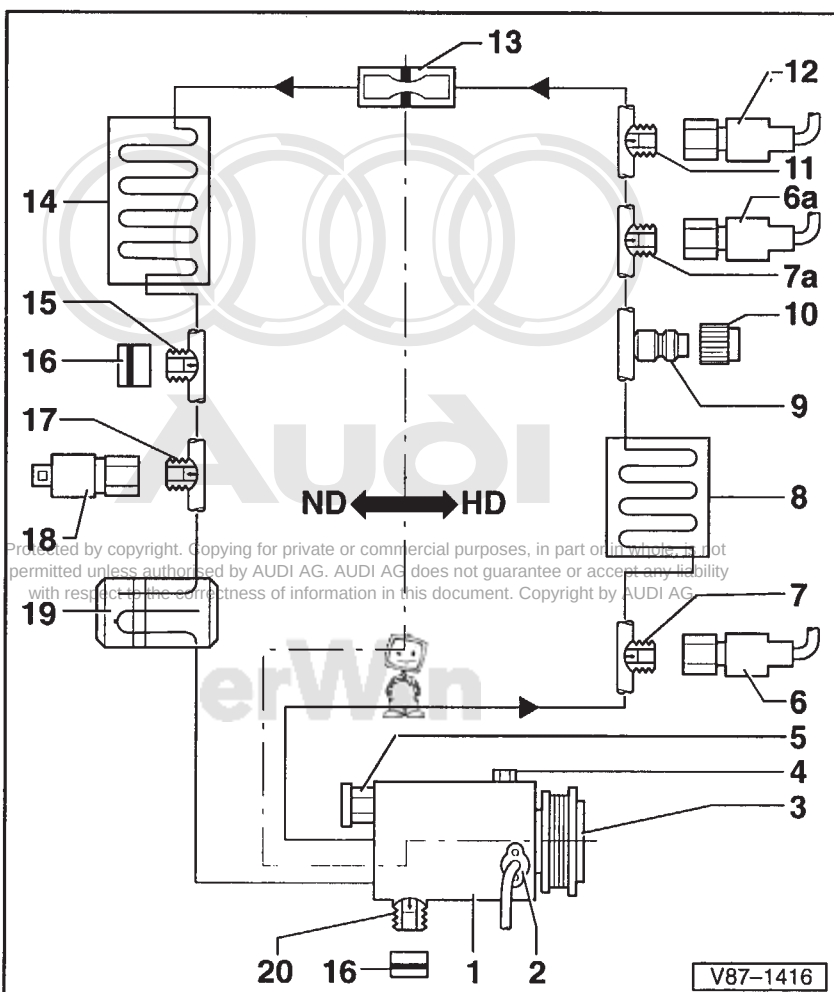
- ♦ For measurement, use valve adapter V.A.G 1785/10 or adapter set V.A.G 1786 (with filler hose)
- ⇒ Air conditioner with refrigerant R134a; Part 2; Connecting service unit for measurement and checking

18 - Air-conditioner low-pressure switch -F73

- ♦ Cuts out at 1.45...1.6 bar (switch opens)
- ♦ Cuts in at 2.9...3.4 bar
- ♦ O-ring seal: 8.9 mm/1.8 mm
- ♦ Tighten to 5 Nm

19 - Reservoir

- ♦ O-ring seal: Inlet: 17.2 mm; 1.8 mm Outlet: 17.2 mm; 1.8 mm
- ♦ Tightening torque: Inlet: 40 Nm Outlet: 40 Nm



20 - Connection with valve

- ♦ Not fitted on vehicles with diesel engine (use connection, item 17 on such vehicles)
- ♦ For service unit, for measuring pressure and draining/filling refrigerant circuit
- ♦ Use valve adapter V.A.G 1785/10, O-ring seal (8.9 mm/1.8 mm), adapter V.A.G 1786/2 and filler hose
- ⇒ Air conditioner with refrigerant R134a; Part 2; Connecting service unit for measurement and checking

Removing and installing air-conditioner compressor speed sender -G111

Removing:

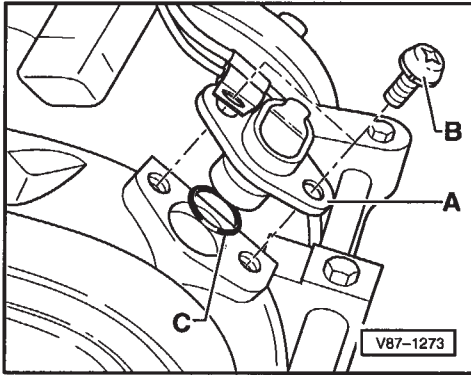
- Drain refrigerant circuit:
⇒ Air conditioner with refrigerant R12; Part 1
⇒ Air conditioner with refrigerant R134a; Part 1

- Detach connector.

- - Screw out bolts -B- (5 Nm).
- Pull sender -A- out of compressor.

Installing:

- Renew O-ring seal -C-.
- With sender removed, visually inspect studs at pulse wheel (4x around periphery).



Removing and installing restrictor

Removing:

- Drain refrigerant circuit:
⇒ Air conditioner with refrigerant R12; Part 1
⇒ Air conditioner with refrigerant R134a; Part 1

- - Remove central bolt -A-.
- Detach refrigerant pipes from evaporator.

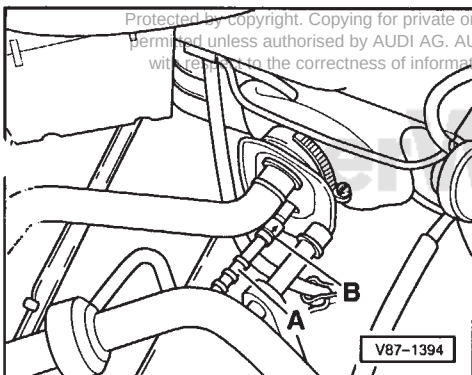
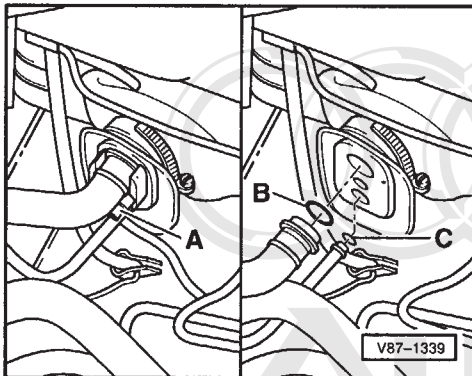
Note:

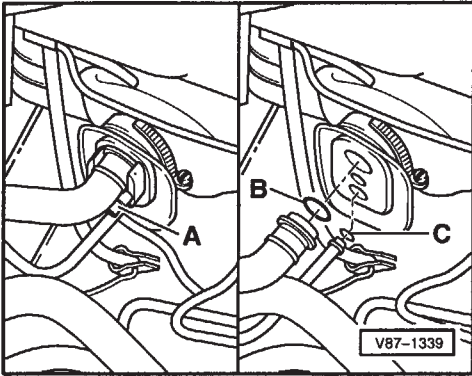
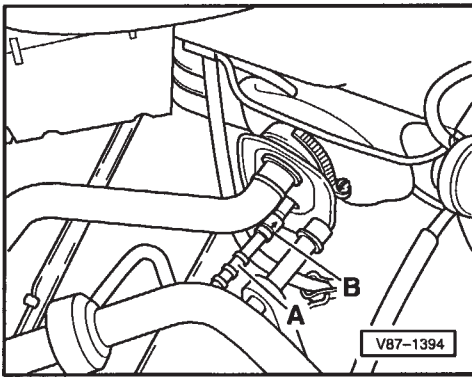
Seal off open pipe connections.

- - Use pointed-nose pliers, for example, to pull restrictor -B- out of evaporator.

Note:

In the case of a split refrigerant pipe (only possible as service remedy on vehicles with refrigerant R134a), restrictor is not located in evaporator, but rather in refrigerant pipe to evaporator.





Installing:

- Always renew restrictor and O-ring seal.
- ✦ - Check that O-ring seal -B- is properly positioned in restrictor groove.
- Apply small quantity of refrigerant oil to O-ring seal before fitting restrictor.
- Make sure restrictor -A- is properly installed in evaporator:
 - ◆ Arrow on restrictor points towards evaporator.
 - ◆ There must not be any restrictor play in evaporator (in refrigerant pipe).

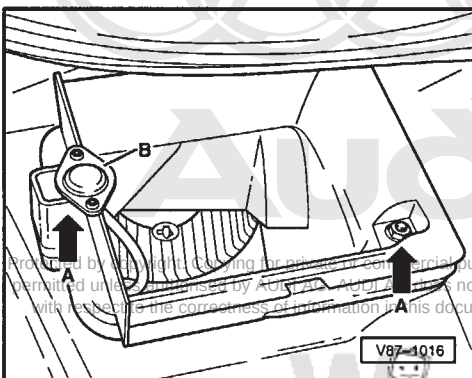
Notes:

- ✦ - Replace both O-ring seals -B- and -C- (for refrigerant pipes):
For refrigerant R12 ⇒ Page 2 onwards
For refrigerant R134a ⇒ Page 16 onwards
- ◆ Ensure stress-free installation of refrigerant pipes.

Removing and installing air-conditioning unit

Removing:

- Drain refrigerant circuit:
⇒ Air conditioner with refrigerant R12; Part 1
⇒ Air conditioner with refrigerant R134a; Part 1
- Remove plenum chamber trim on right.
- Remove dust and pollen filter ⇒ Workshop Manual, Page 80-17.
- ✦ - Unfasten ambient temperature switch -F38 -B- (vehicles with manual air conditioner only).
- Remove the two hexagon nuts -A- and detach intake duct.
- Remove the two hexagon-head bolts -A-.
- On vehicles with air-flow flap (fitted as of 08.91), start final control diagnosis and wait until air-flow flap closes.
- Terminate final control diagnosis with air-flow flap closed.



Note:

If air-flow flap is open, it may be damaged on removing and installing air-conditioning unit.

- Detach earth connection to battery.

Notes:

♦ If necessary, establish radio anti-theft code before disconnecting battery.

♦ If vehicle features electrically adjustable seats, move them as far back as possible before disconnecting battery.

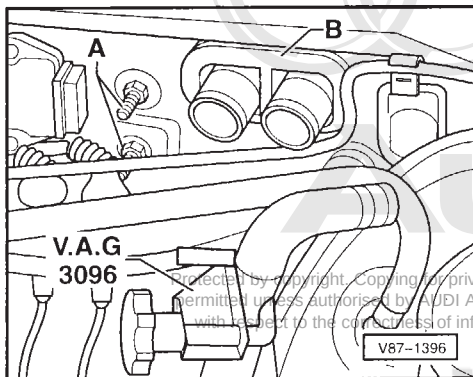
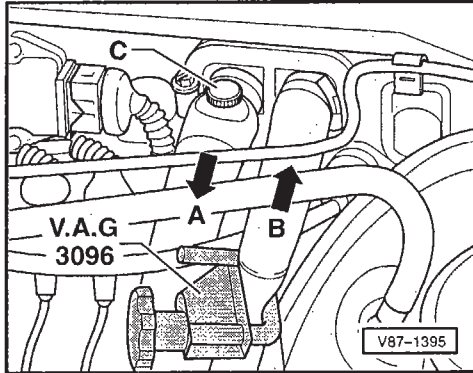
- Dissipate pressure in coolant circuit by opening plug on coolant expansion tank.

- Pinch off both coolant hoses to air-conditioning unit (e.g. using V.A.G 3094) and detach.

Notes:

♦ Ensure proper connection of coolant hoses:

- Coolant hose -A- (return) to water pump (with vent hole)
- Coolant hose -B- (inlet) from cylinder head



♦ Bleeding coolant circuit:

⇒ Engine, Mechanical Components; Repair Group 19

Place collector beneath connection for hose -A- and carefully blow (compressed air) coolant out of heat exchanger by way of connection for hose -B-

- Remove both hexagon nuts -A- at bulkhead.

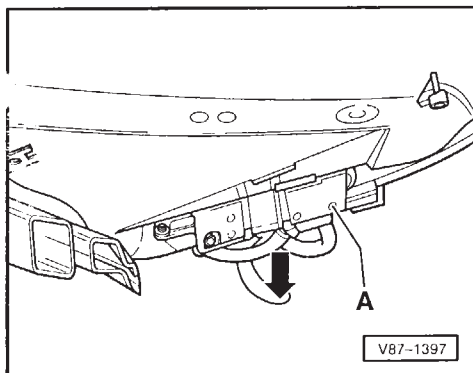
– Remove entire dash panel:

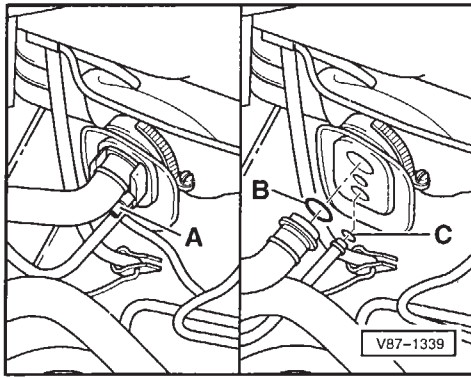
⇒ General Body Repairs; Repair Group 70; Dash panel; Removing and installing shelf and glove box

- Pull off vacuum hose to 2-way valve and condensate hose from air-conditioning unit.



Remove control unit -A-

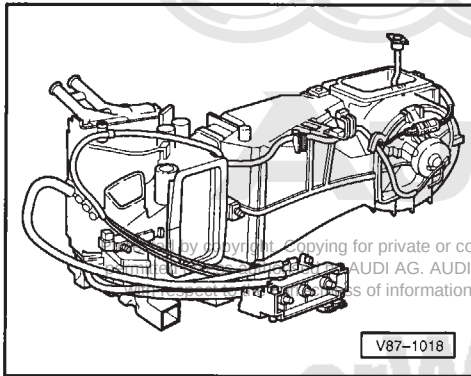




- – Remove bolt -A- (tightening torque 15 Nm).
- Detach refrigerant pipes from evaporator and secure (e.g. with tie band) such that they do not interfere with installation.

Notes:

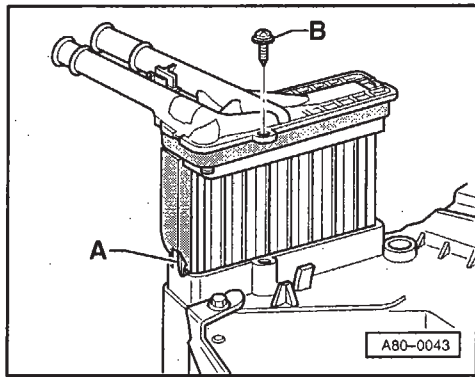
- ◆ Replace both O-ring seals -B- and -C- (for refrigerant pipes):
For refrigerant R12 ⇒ Page 2 onwards
For refrigerant R134a ⇒ Page 16 onwards
- ◆ Ensure stress-free installation of refrigerant pipes.
- ◆ Seal off open pipe connections.
- ◆ On installation, ensure proper attachment of rubber sleeve in bulkhead and make sure there are no leaks.



- – Detach all connections between air-conditioning unit and vehicle.
- Remove entire air-conditioning unit.

Notes on installation:

- ◆ Check correct positioning of condensate drain on installation.
- ◆ Evacuating/filling refrigerant circuit and filling quantity for refrigerant R134a
⇒ Workshop Manual, air conditioner with refrigerant R134a
- ◆ Before fitting, check all gaskets between air-conditioning unit and vehicle bodywork for damage and replace if necessary.
- ◆ After fitting, check correct positioning of all sockets and gaskets between air-conditioning unit and vehicle bodywork.
- ◆ On vehicles with manual air conditioner, check freedom of movement of Bowden cables and replace if necessary.

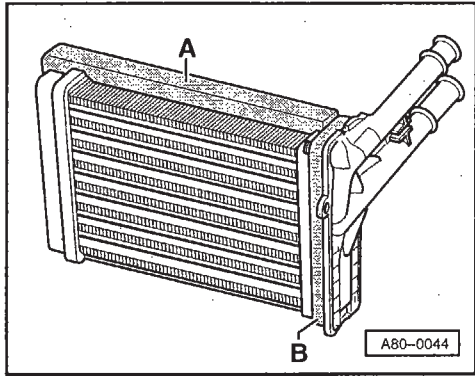


Removing and installing heat exchanger of air-conditioning unit

- Remove air-conditioning unit ⇒ Page 32.
- - Press back lugs -A- and pull heat exchanger out of heater.

Note:

If heat exchanger does not engage in heater box on installation, secure it with two suitable bolts -B-.



Attaching gaskets to heat exchanger

- - Attach gaskets to heat exchanger as shown.

Note:

Gaskets -A- and -B- must be bonded all round such that there is no gap.

Removing and installing air-flow flap positioning motor -V71

Note:

The positioning motor was fitted as of 08.91 in vehicles for certain countries:

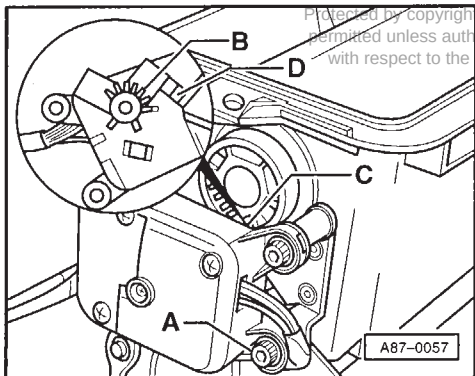
→ Parts list

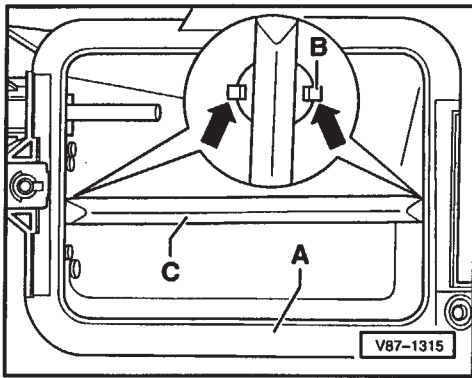
- Remove air-conditioning unit ⇒ Page 32.

- - Remove three bolts -A- and detach positioning motor.

Notes on installation:

- ♦ Marks on gearwheels of positioning motor -B- and air-flow flap -C- must coincide (longer tooth and continuous tooth gap).
- ♦ If lever of positioning motor is in contact with stop -D-, intake duct must be closed off by air-flow flap with positioning motor fitted (longer side of air-flow flap points in direction of travel).
- ♦ Following installation, always perform air conditioner self-diagnosis (⇒ Workshop Manual, Page 01-23).



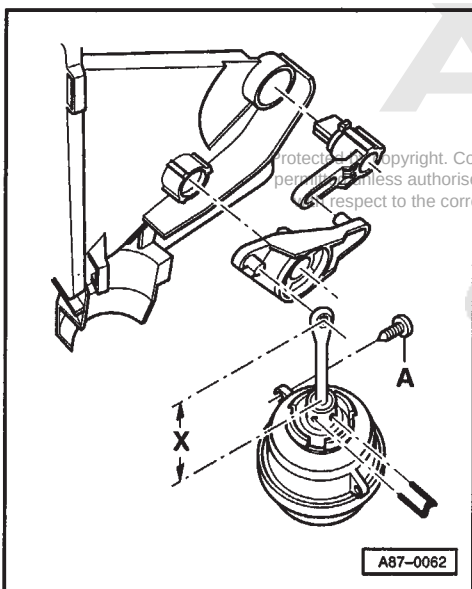


Removing and installing air-flow flap

- Remove positioning motor for air-flow flap ⇒ Page 38.
- ◀ - Detach intake duct -A- from evaporator housing ⇒ Page 42.
- Press back lugs -B- and remove both supports.
- Remove air-flow flap -C-.

Note:

Ensure correct installation of air-flow flap: Longer side of flap pointing in direction of travel and teeth of support facing downwards.

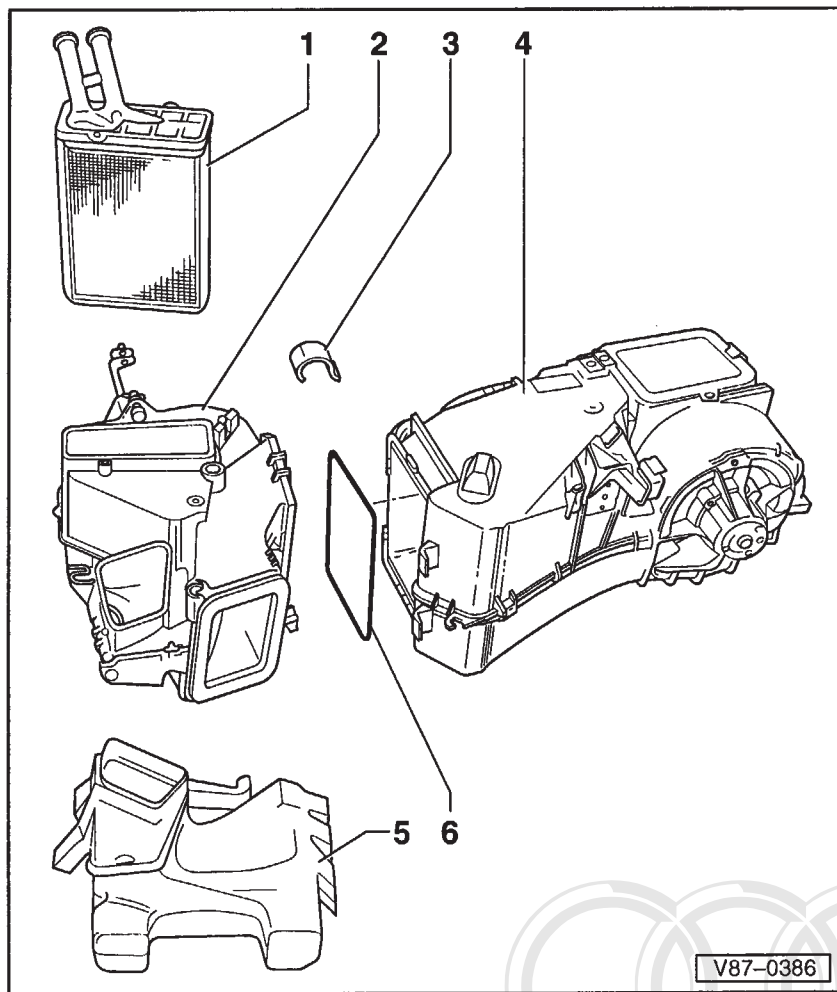


Removing and installing vacuum unit for air-recirculation/fresh-air flap

- Remove air-conditioning unit ⇒ Page 32.
- ◀ - Remove bolt -A-.
- Disengage vacuum unit.
- Setting dimension x = 50 mm.

Notes:

- ♦ Do not dismantle air-conditioning unit.
- ♦ Check for freedom of movement on assembly.
- ♦ Checking vacuum system ⇒ Workshop Manual, Page 87-28.

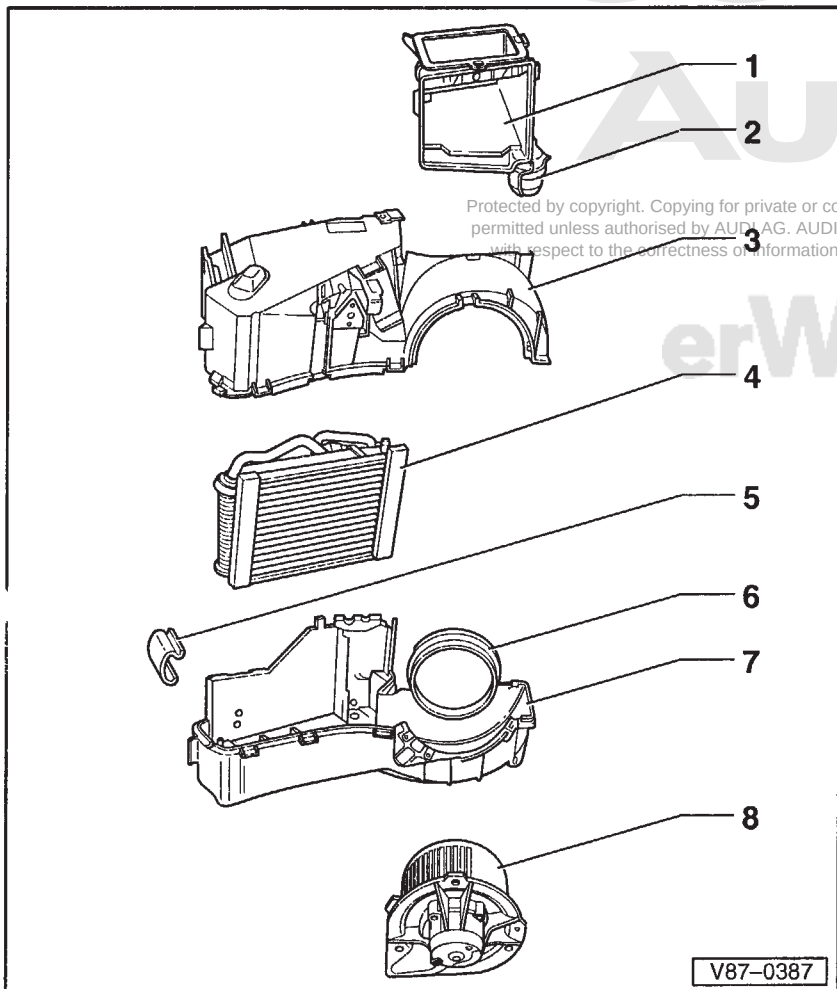


V87-0386

Dismantling and assembling air-conditioning unit

- 1 - Heat exchanger
 - ♦ Removing and installing
⇒ Page 37
- 2 - Heater distributor box
 - ♦ Do not dismantle
- 3 - Retaining clip
- 4 - Evaporator housing
 - ♦ Dismantling and assembling
⇒ Page 42
- 5 - Footwell vent
 - ♦ Removing and installing
⇒ Workshop Manual, Page 80-16
- 6 - Seal

41

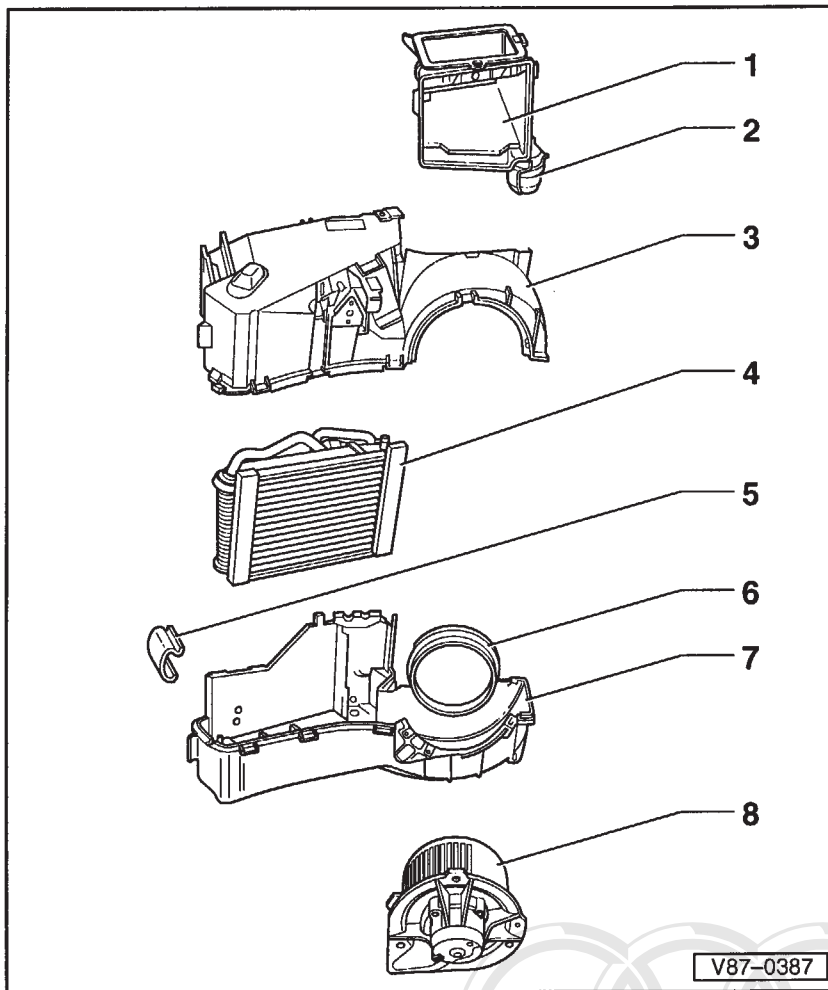


V87-0387

Dismantling and assembling evaporator housing

- 1 - Intake duct
- 2 - Vacuum unit for air-recirculation/fresh-air flap
 - ♦ Removing and installing
⇒ Page 40
- 3 - Top part of evaporator housing
- 4 - Evaporator
 - ♦ Check gasket between evaporator and halves of housing for damage
 - ♦ Make sure gasket is properly positioned on assembly

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5 - Retaining clip

6 - Intake ring

- ♦ Locked in position by cast lug at bottom half of housing

7 - Bottom part of evaporator housing

- ♦ Coat sealing surfaces for upper half of housing with silicone rubber prior to assembly

8 - Fresh-air blower -V2

- ♦ Removing and installing
⇒ Workshop Manual, Page 87-33