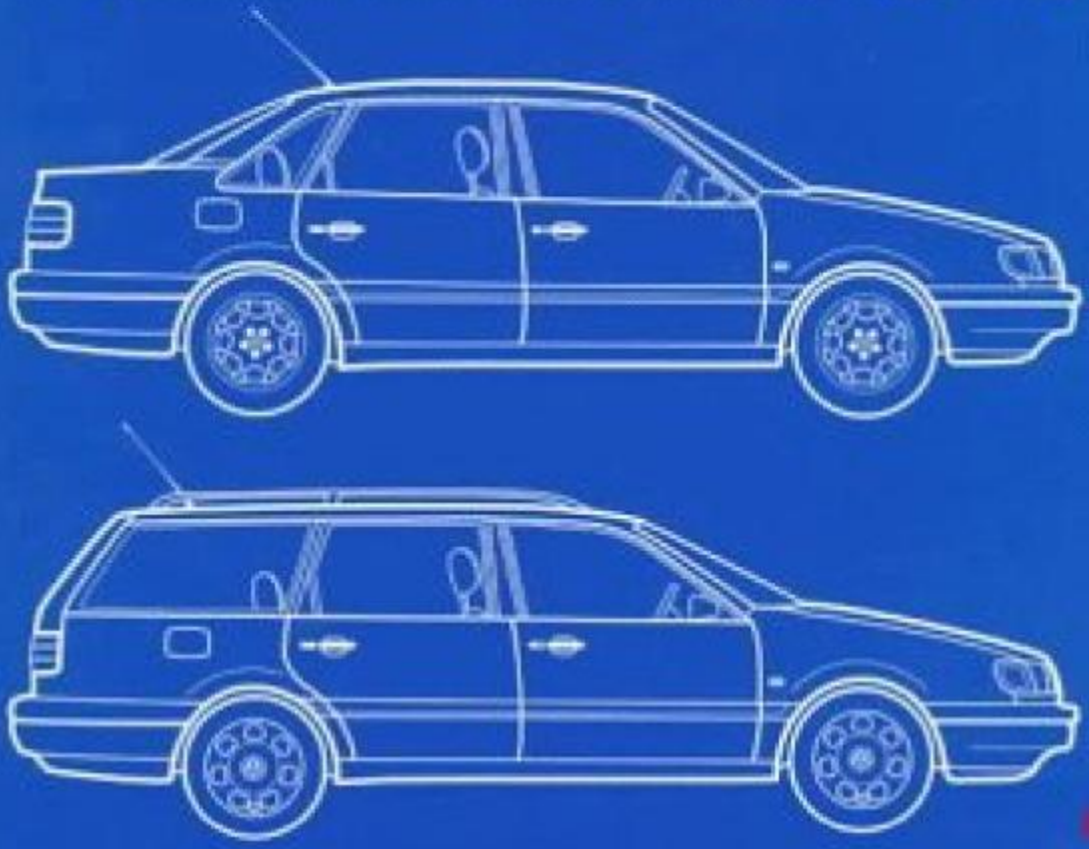
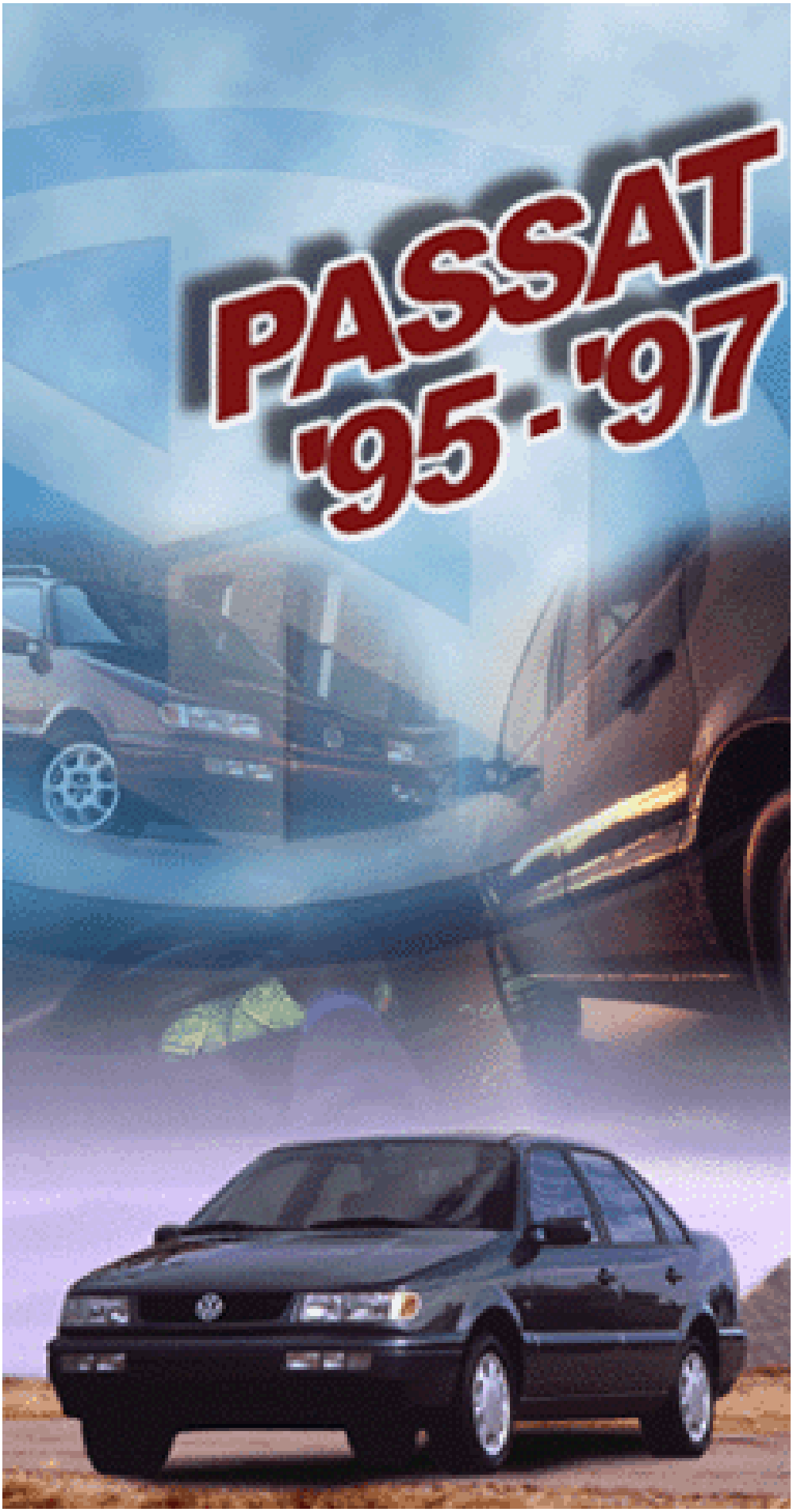
Volkswagen Passat

Official Factory Repair Manual

1995, 1996, 1997
Gasoline, Turbo Diesel, TDI
4-cylinder and VR6, including wagon



Robert Bentley


PASSAT
'95 - '97

Heating & Air Conditioning

80 - Heating, Ventilation

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Heating and ventilation unit, assembly
Heating and ventilation cables, installing and adjusting
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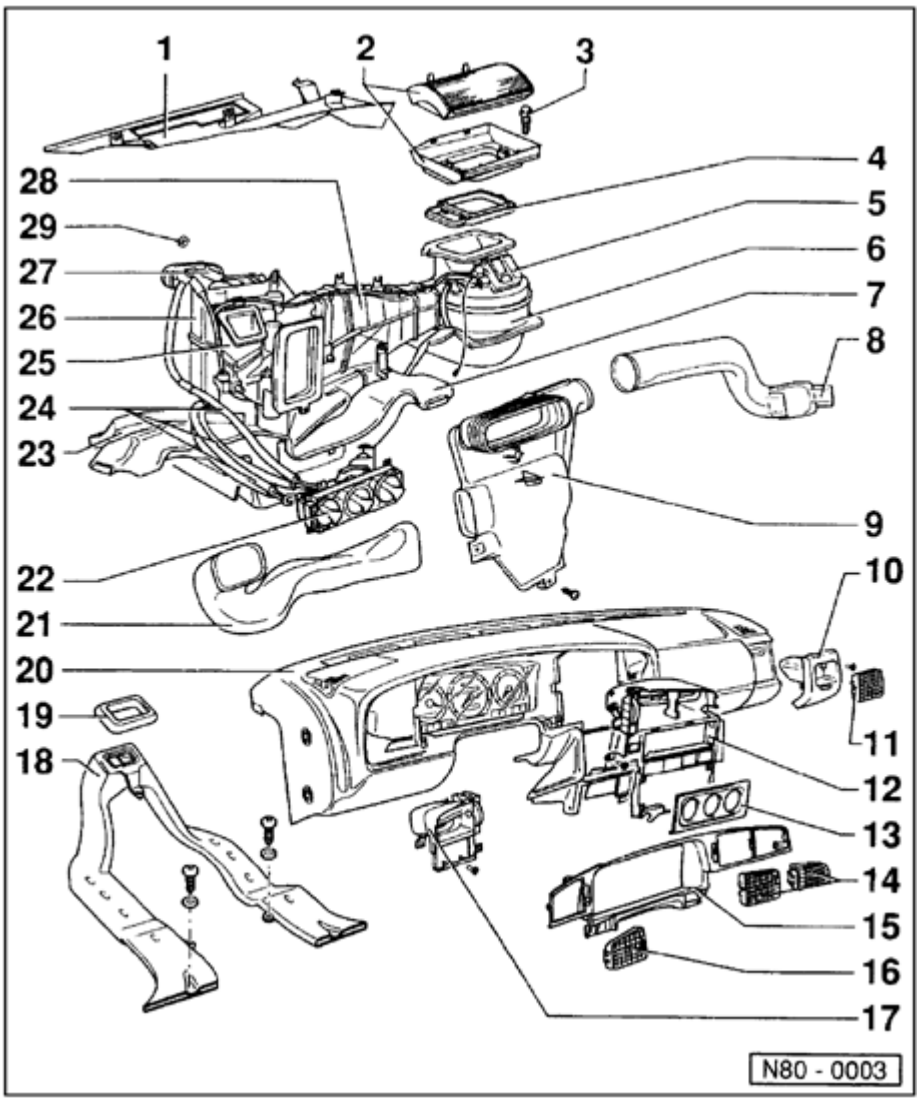


Heating and ventilation system

Heating and ventilation system, assembly

CAUTION!

- ***Obtain the anti-theft radio security code.***
- ***Switch the ignition off.***
- ***Disconnect the battery Ground (GND) strap.***
- ***After reconnecting battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.***

1 - Plenum chamber cover

2 - Dust and pollen filter

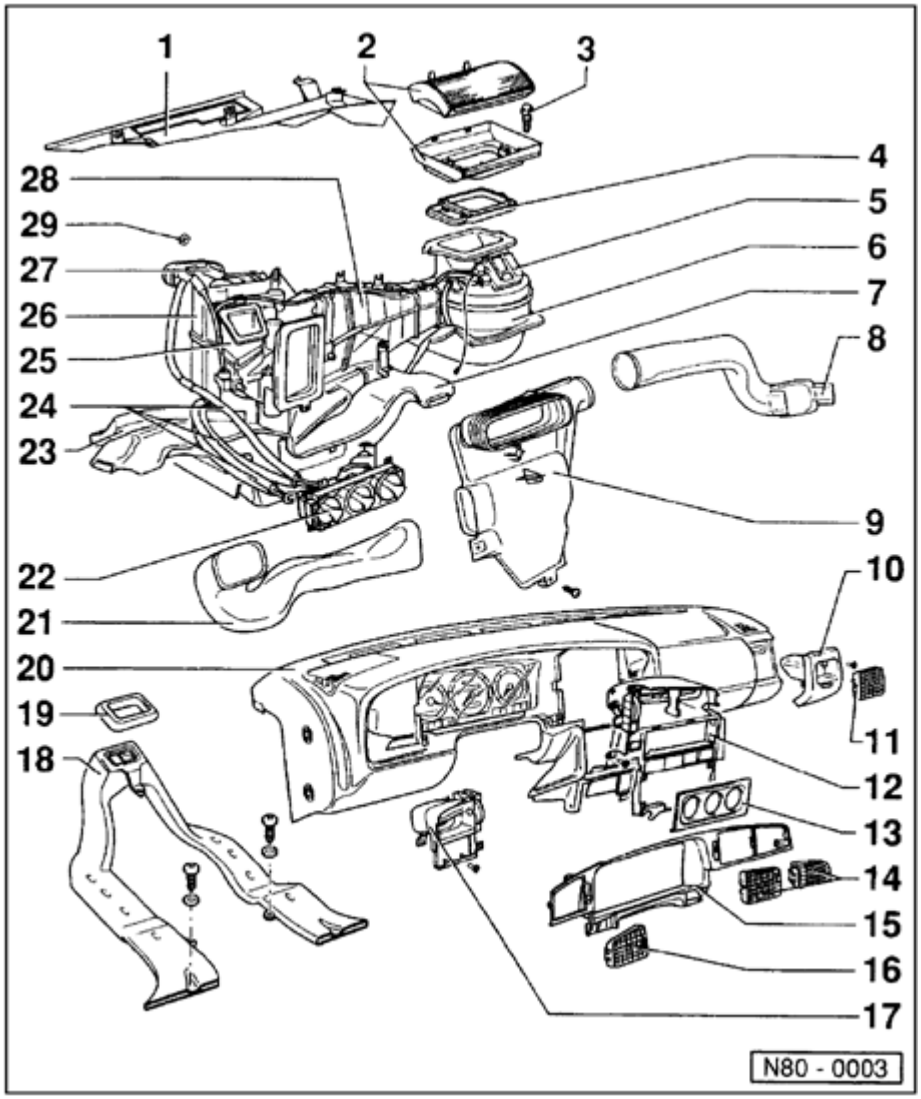
- Removing ⇒ Fig. 5

3 - Hex screw with shank M6x22

- 5 Nm (44 in lb)

4 - Gasket

80-2



5 - Fresh Air Blower Series Resistance with Fuse -N24-

- Removing and installing ⇒ Fig. 1

6 - Fresh air blower -V2-

- Removing ⇒ Fig. 2

7 - Footwell outlet

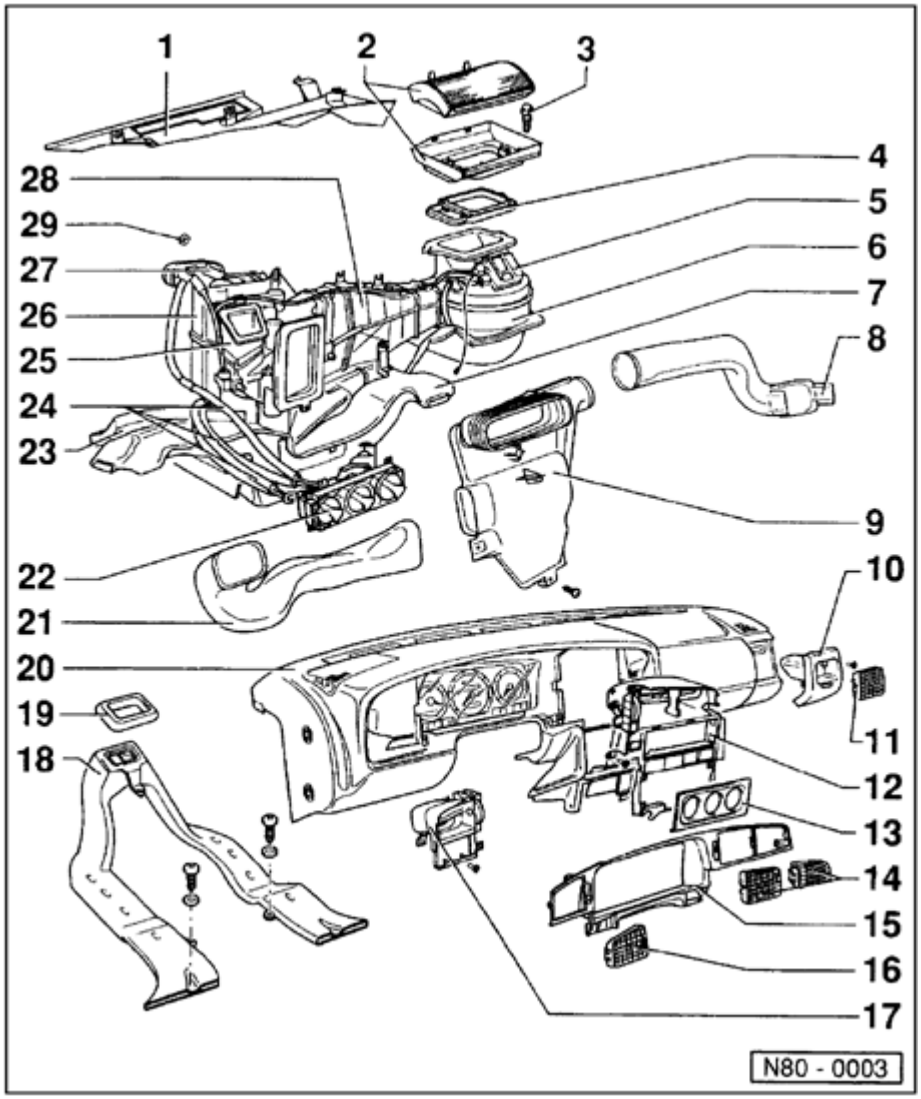
- Replacing: Remove shelf on drivers' and passenger side, center console, instrument panel bracket and pedal cluster cover - 23 -

8 - Air duct

9 - Air distribution duct

- Replacing center outlet -12-, heating and fresh air controls -22-, remove shelf on passenger side; Loosen instrument panel -20- and lift

80-3



10 - Right air outlet

- Removing ⇒ Fig. 8

11 - Grille

- For right air outlet

12 - Center air outlet

- Removing ⇒ Fig. 7

13 - Control panel trim

14 - Grilles

- For center outlet

15 - Instrument panel trim

- Removing ⇒ Fig. 4

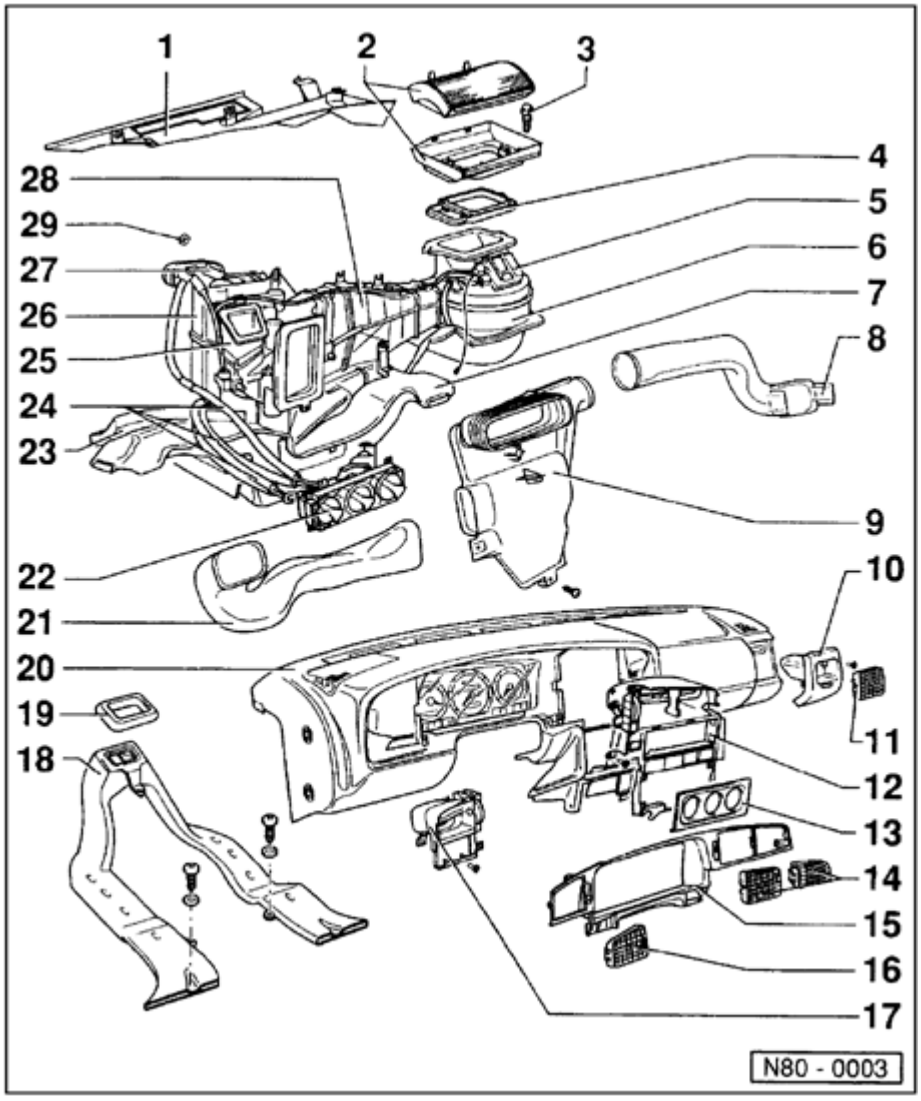
16 - Grille

- For left air outlet

17 - Left air outlet

- Removing ⇒ Fig. 6

80-4



18 - Rear duct

- Replacing: Remove console, instrument panel bracket, pedal cluster cover - 23 -, footwell outlet - 7 -

19 - Rear duct seal

- Replacing: Remove console, instrument panel bracket, pedal cluster cover - 23 -, footwell outlet - 7 -

20 - Instrument panel

- Removing and installing

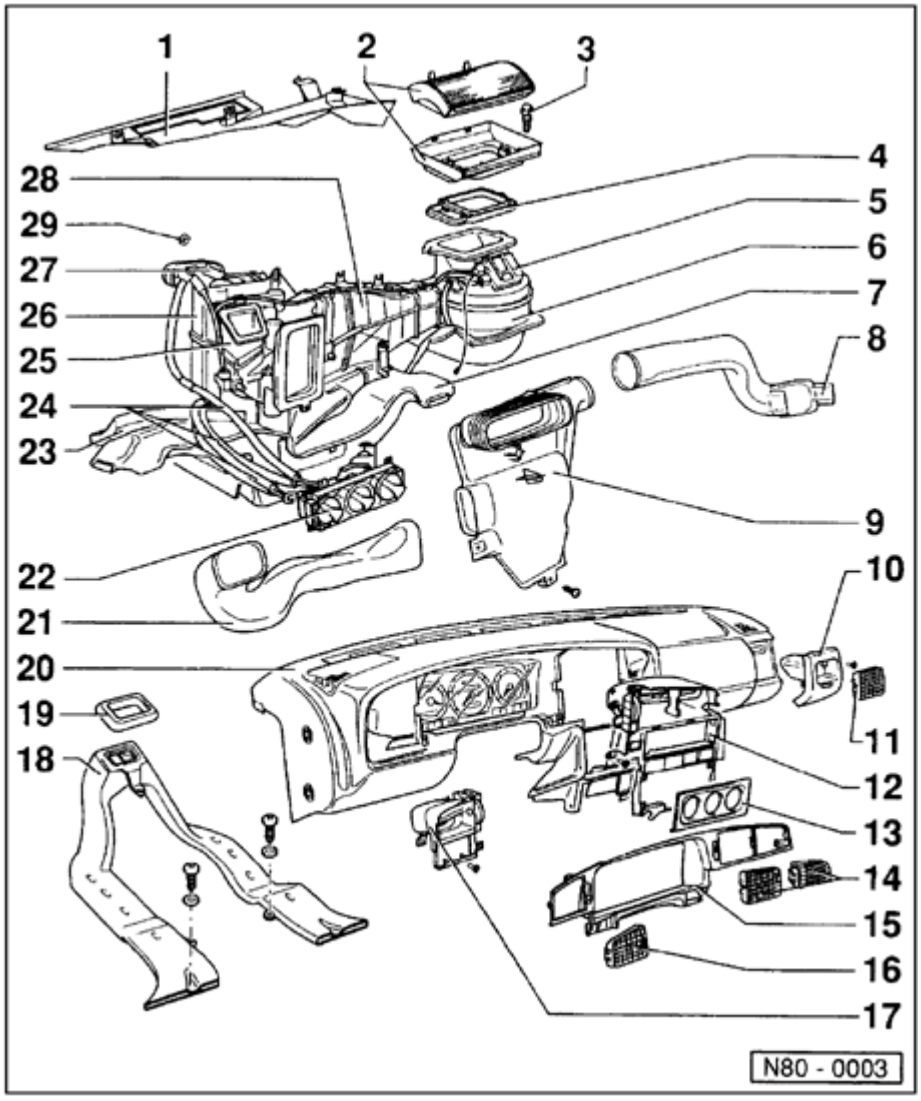
⇒ *Repair Manual, Body Exterior, Interior, Repair Group 70; Removing and installing instrument panel*

21 - Left air duct

22 - Heating and ventilation controls

- Removing and installing ⇒ Fig. 3
- Assembly ⇒ Page 80-21
- Installing and adjusting cables ⇒ Page 80-15

80-5



23 - Pedal cluster cover

24 - Heating and ventilation cables

- Replacing: First remove pedal cluster cover - 23 - and foot well outlet - 7 -
- Removing and installing ⇒ Page 80-15

25 - Intermediate duct

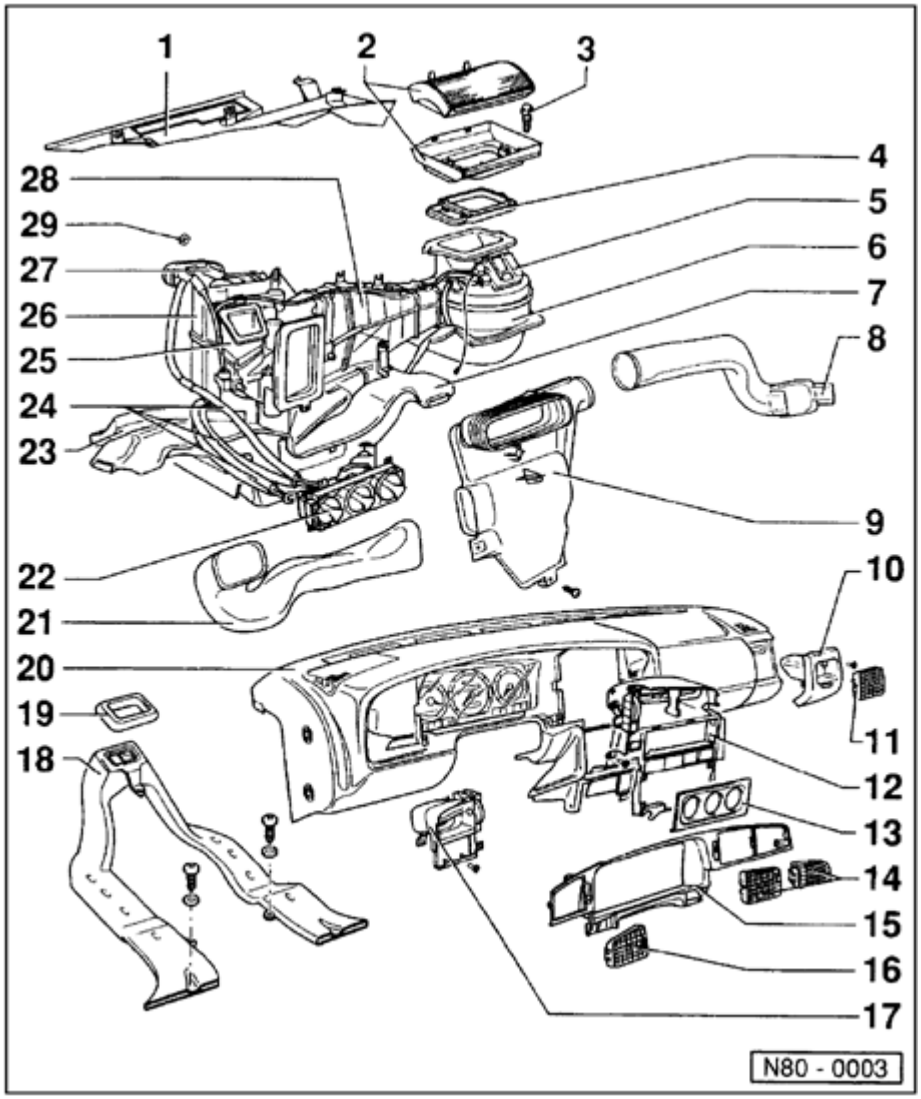
- With gasket
- Replacing - remove instrument panel first

26 - Heating and ventilation unit

Contains:

- Heater core
- Temperature flap
- Center flap
- Footwell/defrost flap
- Do not disassemble further
- Assembly ⇒ Page 80-12
- Removing: Remove instrument panel &items -22- to 28- ⇒ Fig. 9

80-6



27 - Heater core

- Replacing ⇒ Page 80-12
- Always replace coolant after removal/replacement.

28 - Air duct with main shut-off flap

- Replacing: Remove instrument panel and items -22- to 28- ⇒ Fig. 9
- Installing: ⇒ Page 80-12

29 - Hex nut M6

- 5 Nm (44 in lb)

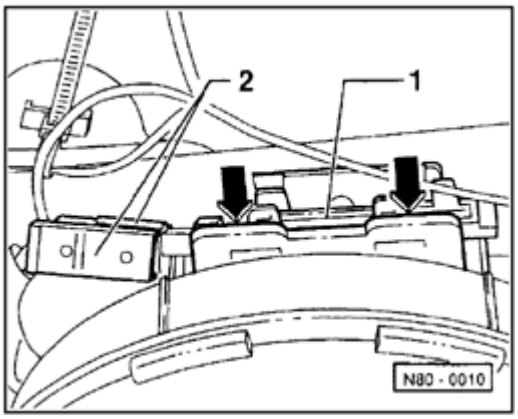


Fig. 1 Fresh Air Blower Series Resistance with Fuse -N24-, removing

Removing:

- Remove shelf on passenger side
- Pull off connections -2-
- Press retainer -arrow- down and remove series resistor -1-

Installing:

- Seal surface between series resistor -1- and air duct before installing with AMV 176 000 05.

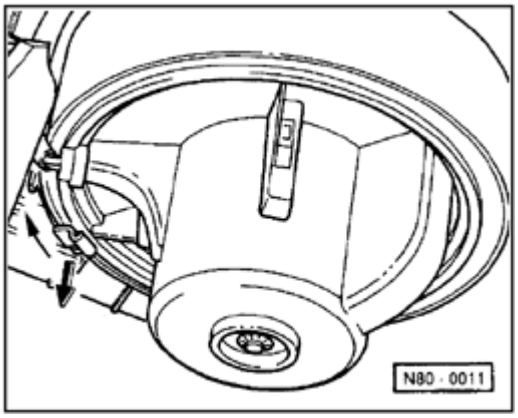


Fig. 2 Fresh Air Blower -V2-, removing

- Shelf on right side, remove
- Move air duct cover to side.
- Push retaining clips down with a screwdriver, turn fresh air blower clockwise and remove.

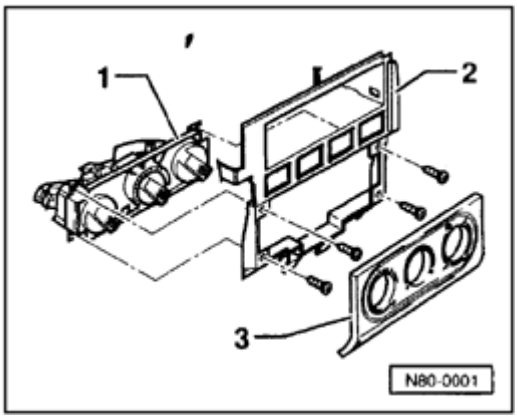


Fig. 3 Heating and ventilation controls, removing and installing

Removing:

- Heater control trim panel -3-, pull off
- Central outlet -2- ⇒ Fig. 7 , remove
- Heater controls -1- with cables attached, pull out of instrument panel.

Installing:

- Secure cables to removed controls.

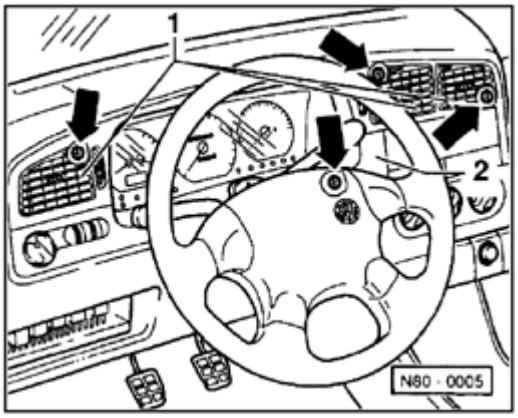


Fig. 4 Instrument panel trim, removing

- Carefully lift and remove adjustable grilles -1- with long nose pliers.
- Remove trim -2-.
- Remove 4 screws -arrows- and take out instrument panel trim housing.

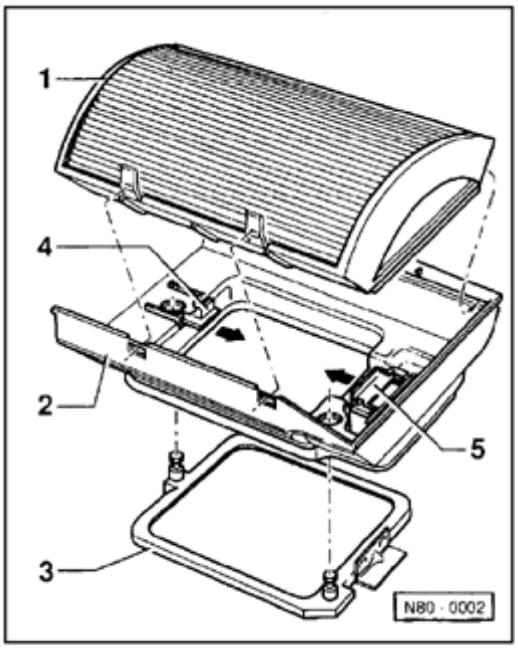


Fig. 5 Dust and pollen filter, removing.

1 - Filter element

2 - Filter housing

3 - Gasket

4 - Clip

5 - Clip

- Filter element, remove.
- Press clips -4- and -5- in direction of arrow and remove filter housing.

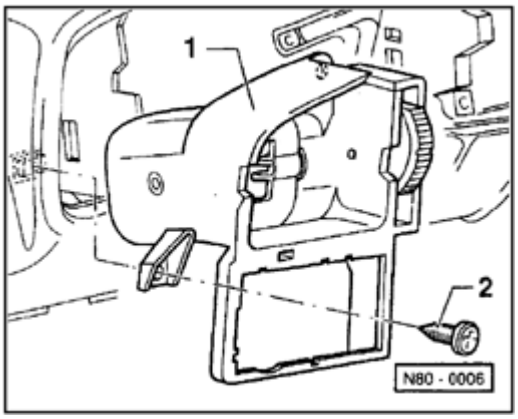


Fig. 6 Left air outlet, removing

- Instrument panel trim ⇒ Fig. 4 , remove.
- Light switch, remove.

⇒ *Repair Manual, Electrical Equipment, Repair Group 96*

- Bolt -2-, remove.
- Vent housing -1-, remove.

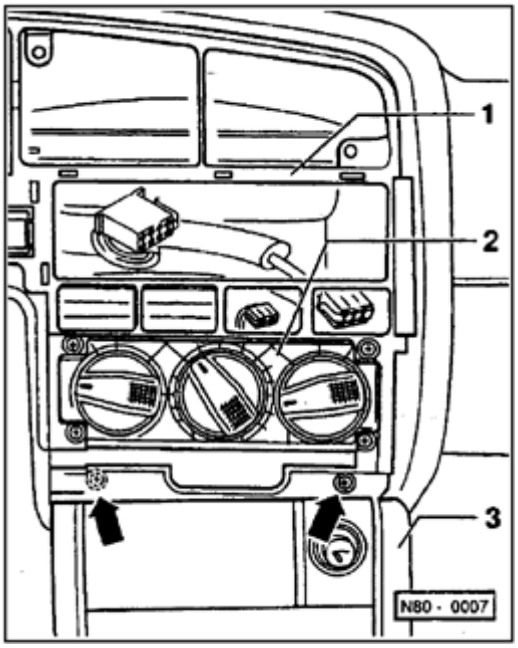


Fig. 7 Center air outlet, removing

- Instrument panel trim ⇒ Fig. 4 , remove.
- Radio, remove.
- Switch, remove.
- Remove control panel trim.
- Control -2-, remove
- Center console -3-, loosen
- Remove 2 screws -arrows- and take out central outlet -1-.

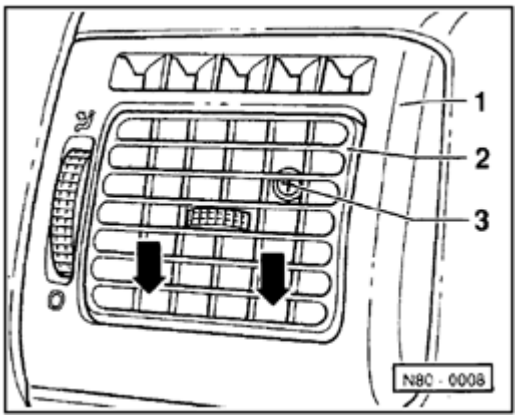


Fig. 8 Left air outlet, removing

- Carefully lift and remove adjustable grilles -2- with long nose pliers
- Remove screw -3- and disengage locating tabs -arrows-.
- Vent housing -1-, remove

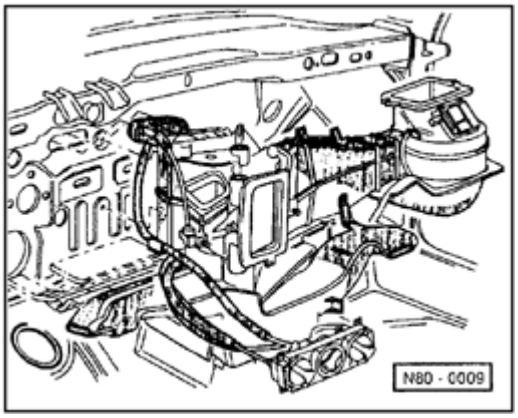


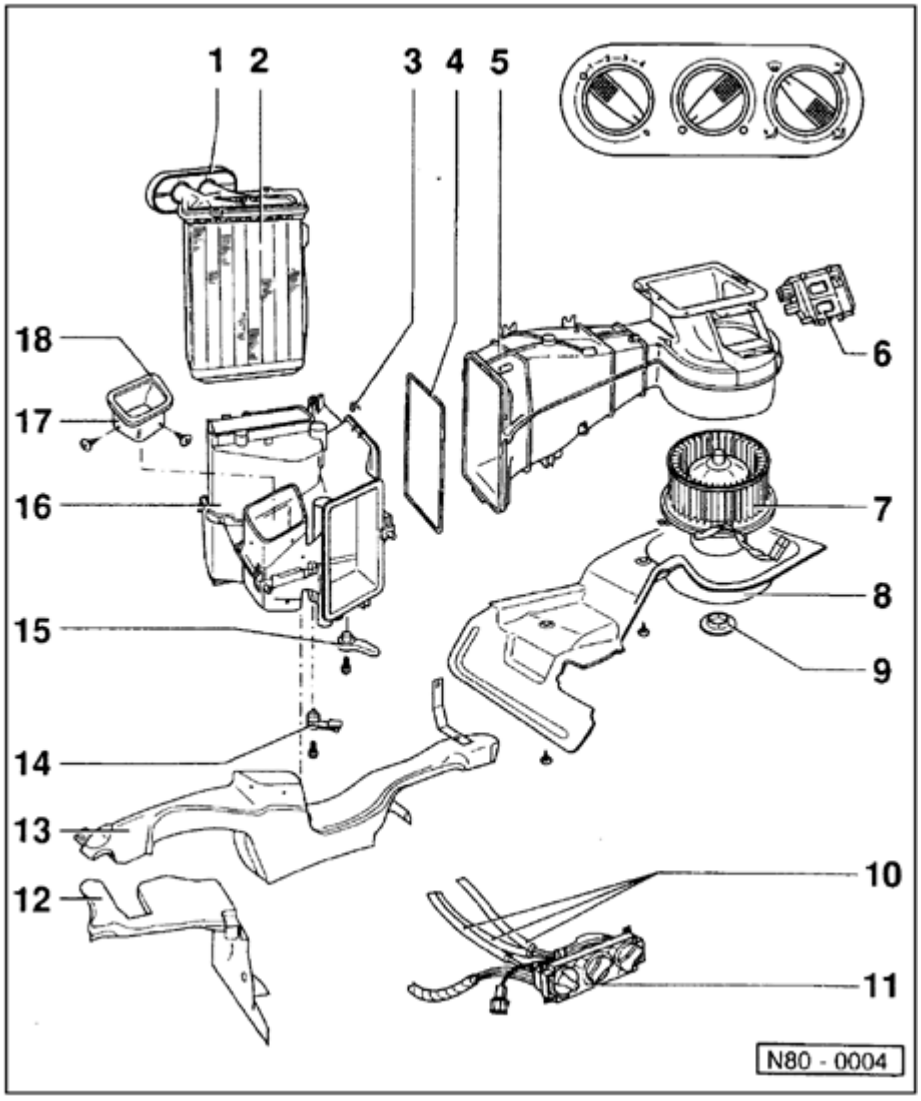
Fig. 9 Heating and ventilation unit installing

Note:

Close evaporator connections to ensure that no coolant enters passenger compartment when removing.

Installing:

- Pre-assemble hex nuts on engine bulkhead.
- Tighten hex nut with shank, in plenum chamber.
- Tighten engine bulkhead Hex nuts.



Heating and ventilation unit, assembly

1 - Gasket

- Replace

2 - Heater core

- Always replace coolant after removal/replacement
- Replacing:

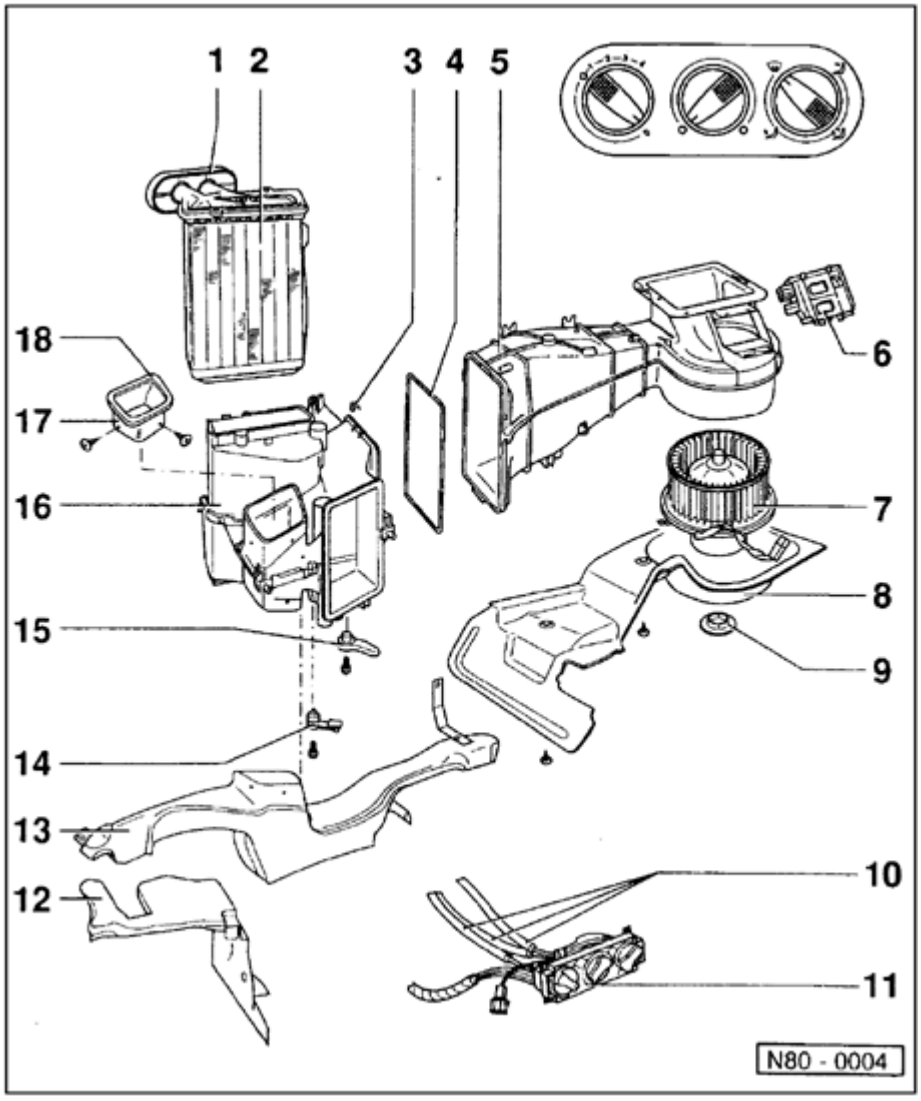
  - Remove instrument panel.

⇒ *Repair Manual, Body-Interior, Repair Group 70*

  - Carefully pinch off both coolant hoses to heater core and disconnect hoses.
  - Seal off heater core to prevent coolant from running out.

CAUTION!

The cooling system is pressurized when the engine is warm. Wear gloves and other protection and carefully release system pressure if necessary, before performing repairs.



- Partially remove heating and ventilation unit.
- Press retainer clips and remove heater core.

♦ Gaskets must be glued, free of gaps all around.

♦ If catches do not engage when installing, then secure heat exchanger with screws.

3 - Clip

4 - Gasket

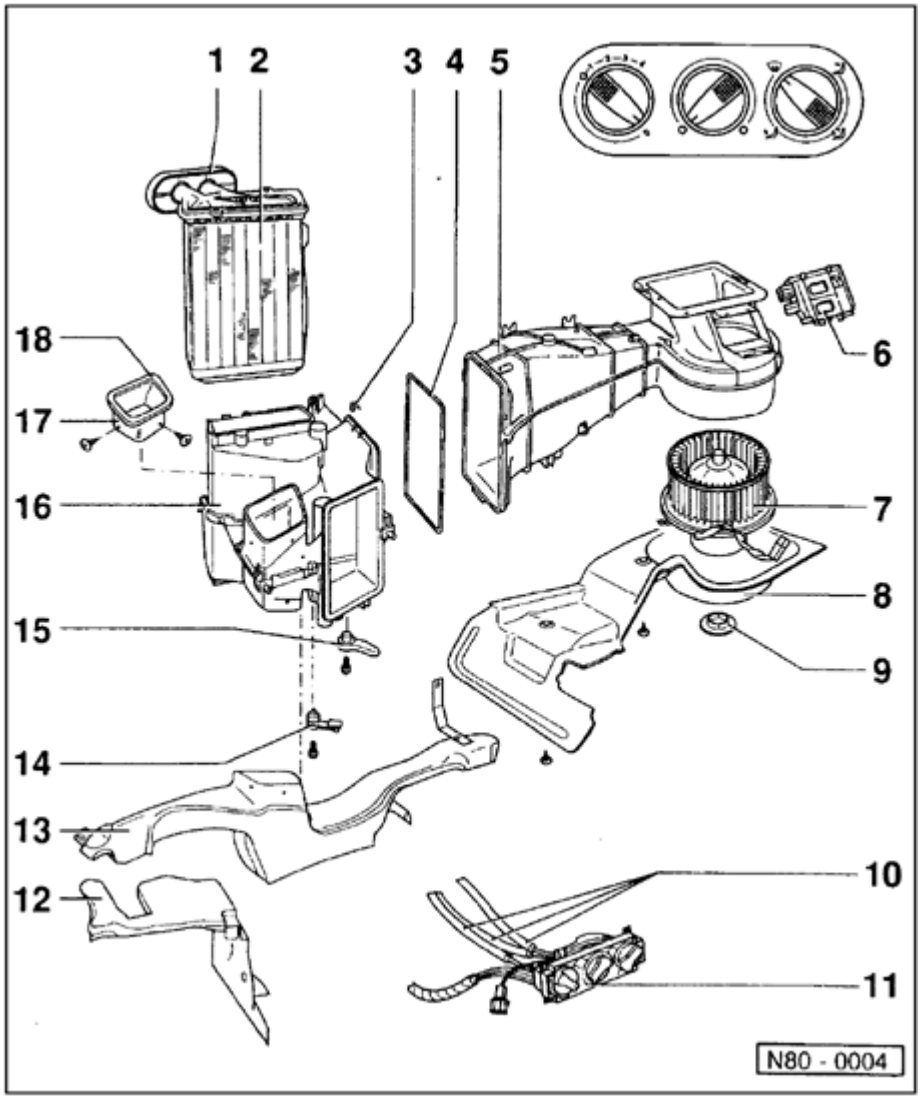
5 - Air duct with main shut-off flap

♦ Do not disassemble further

6 - Fresh Air Blower Series Resistance with Fuse -N24-

7 - Fresh air blower -V2-

80-14



8 - Air duct cover

9 - Plug

10 - Cables

11 - Fresh air and heated air controls

12 - Pedal cluster cover

13 - Footwell outlet

14 - Temperature flap lever

15 - Center flap lever

16 - Air distribution housing

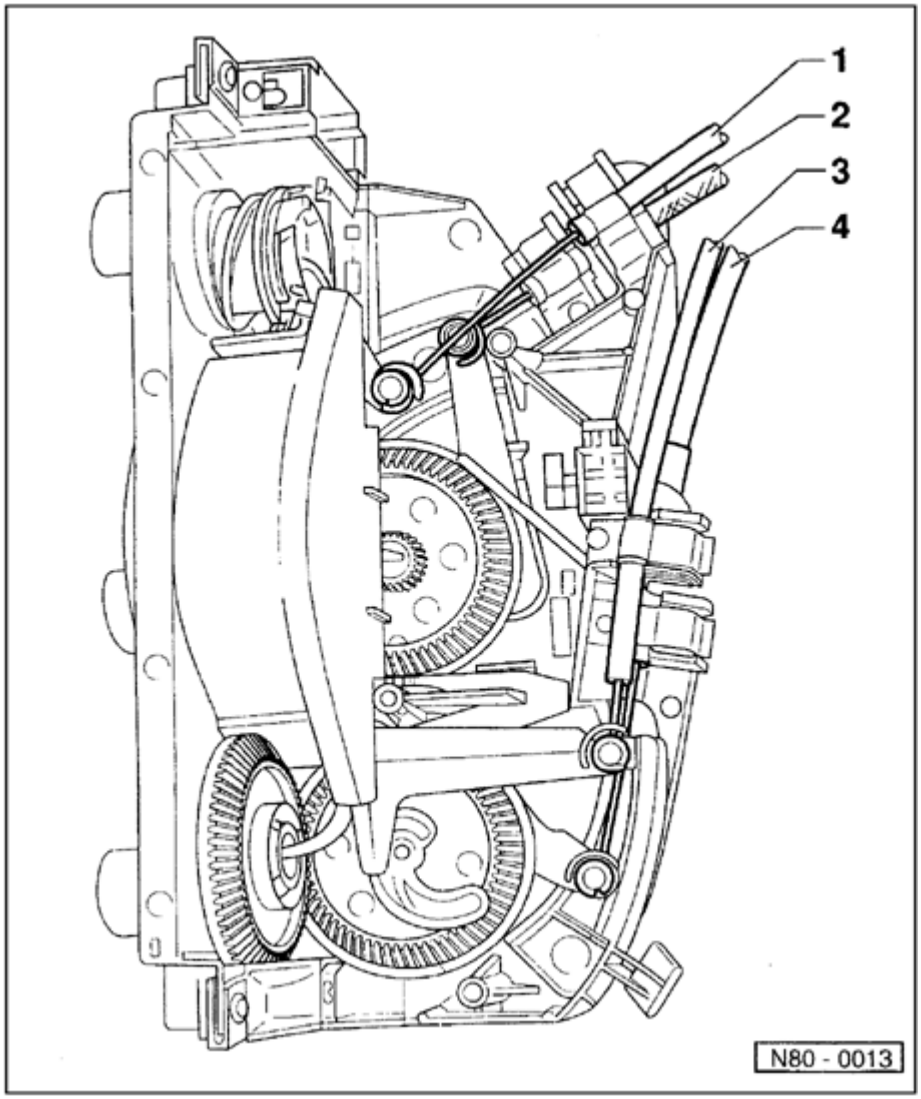
- Do not disassemble further

17 - Intermediate piece

18 - Gasket

- Always replace

80-15

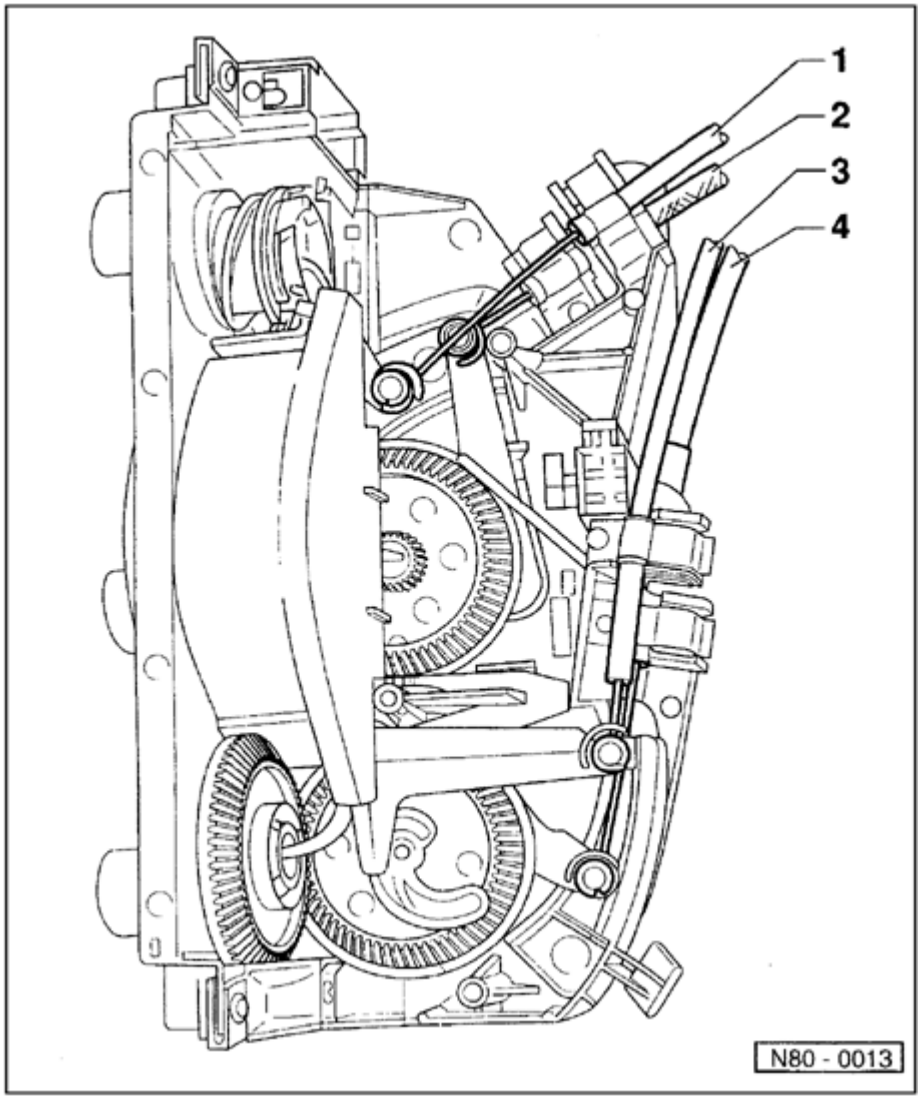


Heating and ventilation cables, installing and adjusting

Notes:

- *Attach cables to removed controls first and then adjust on heater levers and secure.*
- *Ends of sleeves on cables, which are marked with a stripe of paint, must be secured to the controls.*
- *Position sleeves of cables -1-, -2- and -4- at stops on the controls and then secure. Secure sleeve for cable -3- ⇒ Fig. 5 .*
- *With controls installed, adjust cables at flap levers.*
- *When turning control knobs all flaps must be heard to contact the stops.*

80-16



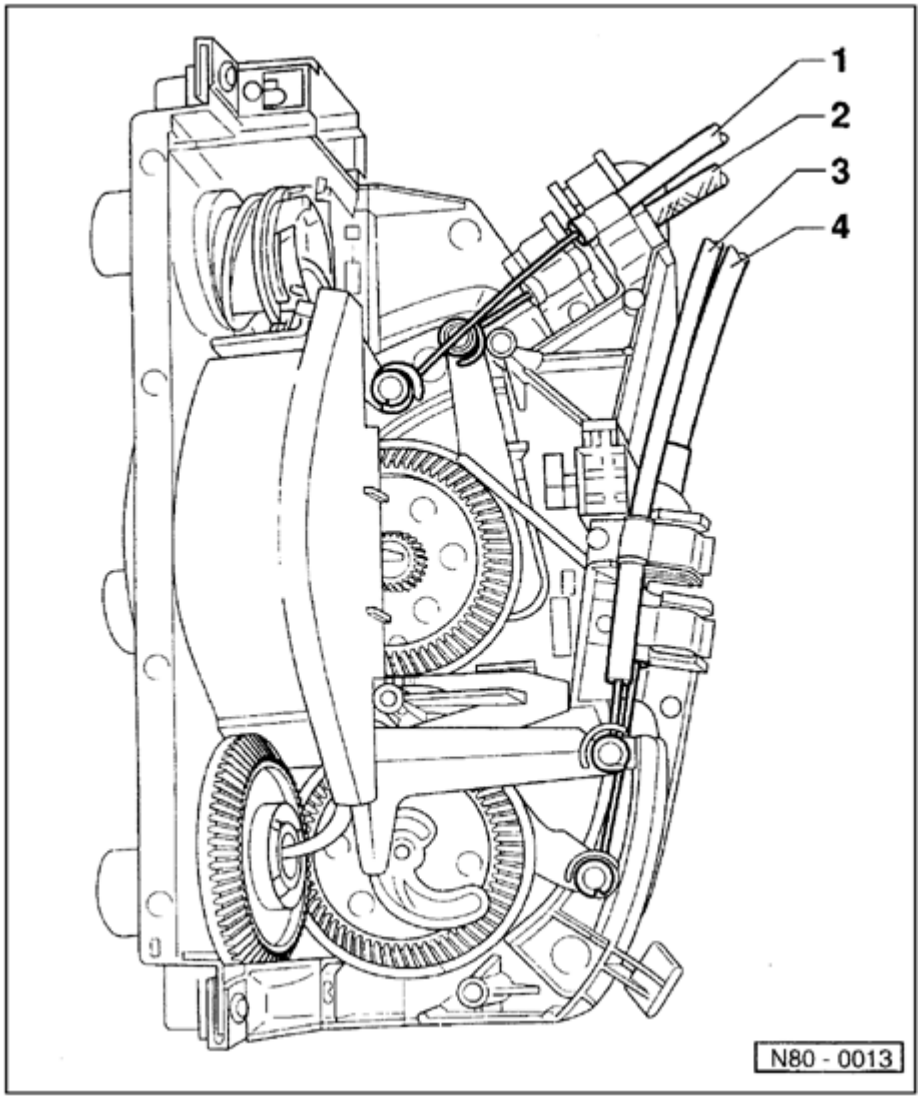
1 - Main shut-off flap cable

- From blower rotary control to main shut-off flap
- Black sleeve, white marking
- Adjusting cable at main shut-off flap ⇒ Fig. 1

2 - Temperature flap cable

- From temperature rotary control to temperature flap
- Blue sleeve, white marking
- Adjusting cable at temperature flap ⇒ Fig. 2

80-17



3 - Footwell/defrost flap cable

- From air distribution rotary control to footwell/defrost flap
- Black sleeve, blue marking
- Adjusting cable at footwell/defrost flap ⇒ Fig. 3

4 - Center flap cable

- From air distribution rotary control to center flap
- Black sleeve
- Adjusting cable at center flap ⇒ Fig. 4

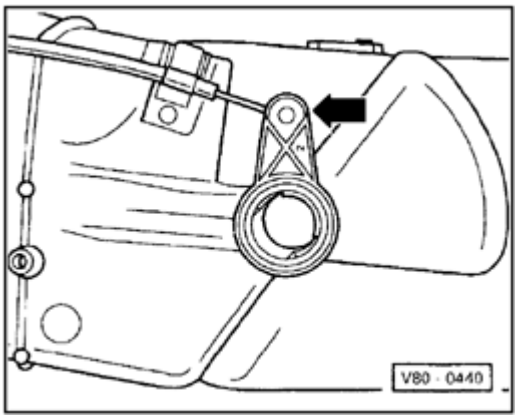


Fig. 1 Main shut-off flap cable, adjusting

- Install heated air and fresh air blower controls.
- Turn blower rotary control onto stop at "0" position.
- Push main shut-off flap lever onto stop (arrow) and secure cable sleeve.

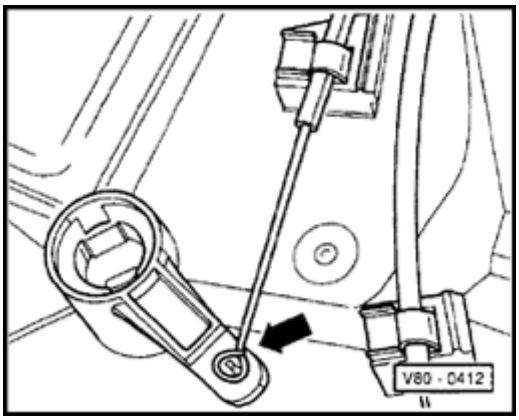


Fig. 2 Temperature flap cable, adjusting

- Install heated air and fresh air blower controls.
- Turn temperature rotary control onto stop at "cold" position.
- Push temperature flap lever onto stop (arrow) and secure blue cable sleeve.

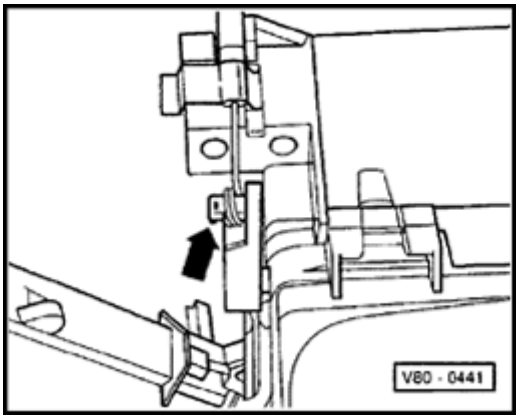


Fig. 3 Footwell/defrost flap cable, adjusting

- Install heated air and fresh air blower controls.
- Turn air distribution rotary control onto stop in defrost position.
- Push footwell/defrost flap lever onto stop -arrow- and secure black cable sleeve.

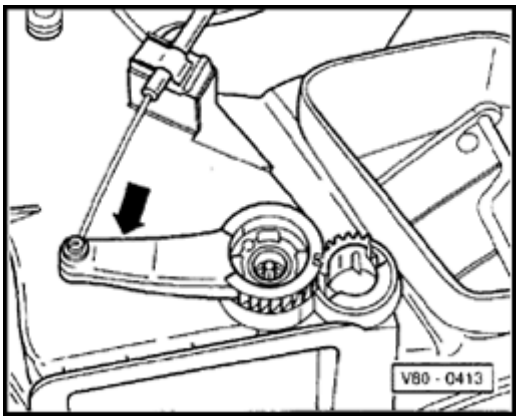


Fig. 4 Center flap cable, adjusting

- Install heated air and fresh air blower controls.
- Turn air distribution rotary control onto stop in defrost position.
- Push center flap lever onto stop -arrow- and secure black cable sleeve.

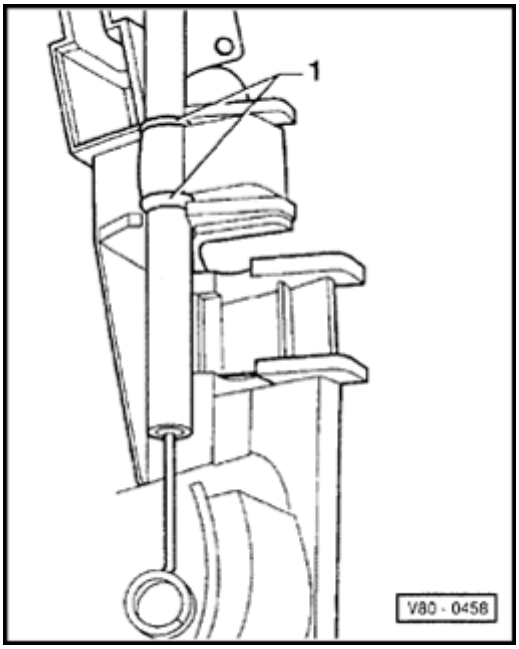
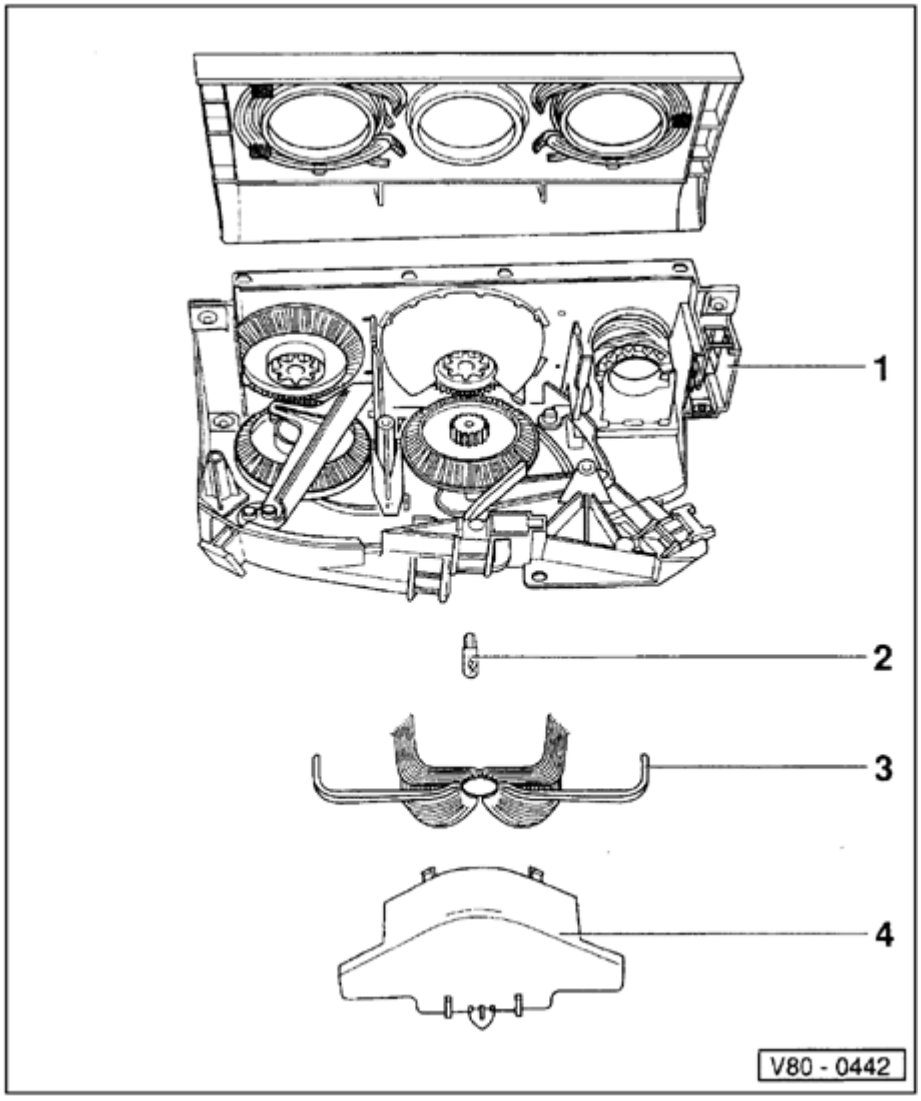


Fig. 5 Footwell/defrost flap cable, securing to control

- Secure cable sleeve at blue marking -1- on control.
- Secure inner cable to upper lever.
- Adjusting cable at footwell/defrost flap ⇒ Fig. 3



Heating and ventilation controls, assembly

1 - Controls

- Including fresh air blower switch -E9-

2 - Fresh air control light bulb -L16-

3 - Light conductor

4 - Cap

A/C refrigerant system, notes

Safety measures

The subassemblies and lines of the air conditioner are filled with Tetrafluoroethane also known as refrigerant R-134a.

Refrigerant R-134a replaces refrigerant R-12.

R-134a and R-12 systems are similar in design but there are very important differences in the refrigerant, lubricating oils, service equipment and A/C system components.

A label on the lock carrier in the engine compartment indicates the refrigerant type and capacity.

WARNING!

- ***Always use an Underwriter's Laboratory (UL) approved refrigerant recovery/ recycling/recharging unit such as Kent-Moore ACR^4, or equivalent, whenever discharging an R-134a A/C system.***

- ***As of January 1, 1992 any person who services a motor vehicle air conditioner MUST, by law, be properly trained and certified and use approve refrigerant recycling equipment. Technicians must complete an EPA approved recycling course to be certified.***

- ***State and Provincial governments may have additional requirements regarding air conditioning servicing. Always comply with local laws.***

87-2

WARNING!

A/C system is filled with refrigerant gas which is under pressure.

Always be careful that refrigerant does not come in contact with your skin.

If liquid refrigerant has come in contact with your skin or eyes:

- ***do not rub skin or eyes***
- ***immediately flush with cool water for 15 minutes***
- ***rush to a doctor or hospital***
- ***do not attempt to treat yourself***

Switch on existing exhaust/ventilation systems when working on the refrigerant system.

Work in a well ventilated area because refrigerant gases are heavier than air, displace oxygen and may cause suffocation in areas of poor air circulation, like under the car.

Avoid breathing refrigerant vapors. Exposure may irritate eyes, nose and throat.

Always wear hand and eye protection (gloves and goggles) when working around the A/C refrigerant system.

Do not expose any component of the A/C system to high temperatures (above 80° C/176° F) or open flames. Excessive heat will cause a pressure increase which could burst the system.

87-3

WARNING!

- ***Keep refrigerant containers stored below 50° C (122° F) and never drop from high places. DO NOT warm refrigerant containers with an open flame. If refrigerant needs to be warmed, place bottom of tank in warm water.***
- ***Keep refrigerant away from open flames because poisonous gas will be produced if it burns. Do not smoke when refrigerant gases are present for the same reason.***
- ***Electric welding near refrigerant hoses causes R-134a to decompose from ultraviolet light. Discharge system before electric welding.***
- ***Pressurized R-134a refrigerant in the presence of oxygen may form a combustible mixture. Never introduce compressed air into any closed R-134a container (full or empty), A/C component or piece of service equipment.***
- ***DO NOT exceed maximum rated capacity of refrigerant containers. Never fill a container to more than 60% of its gross weight rating (for example, 18 lb. in a 30 lb. container.) Without sufficient room for expansion of R-134a (gas cushion), the container could explode when the temperature rises causing serious injury.***
- ***Do not steam clean condensers or evaporators. Use only cold water or compressed air.***

87-4

CAUTION!

- ***R-12 and R-134a refrigerant are NOT compatible. Never add R-12 refrigerant to an R-134a system or R-134a refrigerant to an R-12 system. If the refrigerants are mixed, total system contamination will occur and compressor failure may result.***

- ***Refrigerant oils used for the R-134a system and R-12 system are NOT compatible. Use only the specified synthetic oil (Polyalkylene Glycol/PAG) for the R-134a refrigerant system. DO NOT use R-12 system oil in an R-134a system or R-134a system oil in an R-12 system. If the refrigerant oils are mixed, system contamination will occur and compressor failure may result.***

- ***R-134a refrigerant system oil (PAG oil) absorbs moisture very rapidly. Moisture combines with the refrigerant to form acids which will damage the system. Use only the specified oil from a sealed container and ALWAYS reseal oil container immediately after use. DO NOT use oil if it has become contaminated with moisture or if container has been left open.***

- ***Immediately plug open connections on A/C components to prevent dirt and moisture contamination. Likewise, DO NOT remove new component from packaging until ready to install. Immediately tighten component connections after installation.***

87-5

CAUTION!

- ***Always use separate refrigerant recovery/recycling/recharging servicing equipment for R-12 and R-134a systems. DO NOT use one piece of equipment for both R-12 and R-134a systems. The residual traces of refrigerant will contaminate and damage the equipment. Servicing equipment includes recovery/ recycling/recharging unit, charging station, vacuum pump, manifold gauges, etc.***

- ***DO NOT use R-12 servicing equipment on R-134a systems or R-134a equipment on R-12 systems or damage to both the vehicle A/C system and servicing equipment may result. Use only equipment designed to meet Society of Automotive Engineers (SAE) standards.***

- ***R-134a and R-12 systems use different size service fittings. NEVER use adaptors to convert an R-12 fitting to R-134a size or R-134a fitting to R-12 size.***

- ***R-134a and R-12 A/C components including compressor, hoses, O-rings, evaporator, condenser, receiver-drier, etc. are NOT interchangeable. Components of the R-134a system are identified by lettering "R-134a" or by a green label (or stripe). In addition, a label on the evaporator housing (below plenum tray) identifies which type of refrigerant is used. Use only the correct system component for each refrigerant type.***

CAUTION!

- ***Always replace damaged and/or leaking A/C system components. Do not attempt repair by soldering, brazing or welding.***
- ***Work area must be extremely clean when working on A/C system components.***
- ***Use only tools, equipment and parts specified for use with R-134a.***
- ***Switch on existing exhaust/ventilation systems when working on the refrigerant system.***
- ***Discharge A/C system using refrigerant recovery/ recycling/recharging unit Kent-Moore ACR^4, or equivalent, before removing any A/C system component.***
- ***Always replace O-rings, DO NOT reuse. Use only the correct size and type of O-rings specified for use with R-134a refrigerant. Lubricate O-ring with refrigerant oil before installing.***
- ***Always reinstall cap(s) over A/C service valve(s).***

87-7

A/C refrigerant R-134a, properties

Commercial designation

Obtain R-134a refrigerant from a local A/C supplier under one of the following names:

- R-134a
- Tetrafluoroethane
- CH_2 F CF_3
- H-FKW 134a
- SUVA® TRANS A/C
- ARCTON® 134a

Note

R-134a refrigerant is packaged in different containers. One variation is SUVA® COLD MP used only for commercial applications. This type of R-134a is sold in cylinders using a 1/4 flare fitting which will not connect to the 1/2"-16 ACME fittings used on the vehicle and servicing equipment. Use only R-134a which comes in containers having the correct type of service fitting.

Color

Refrigerant R-134a is colorless and is invisible as a gas. R-134a when viewed through a sight glass (if installed) may appear milky due to the mixture of refrigerant and lubricating oil (PAG oil).

87-8

Temperature/pressure relationship

Similar to R-12 refrigerant, R-134a in an enclosed container will have a specific temperature/pressure relationship as follows:

Temperature in °C (°F)	Pressure in bar (psi)
-30 (-22)	0.0 (0.0)
-20 (-4)	0.3 (4.4)
-10 (14)	1.0 (14.5)
0 (32)	1.9 (27.5)
10 (50)	3.1 (45.0)
20 (68)	4.7 (68.2)
30 (86)	6.7 (97.2)
40 (104)	9.1 (132.0)
50 (122)	12.2 (177.0)
60 (140)	15.8 (229.2)
70 (158)	20.2 (293.0)

Refrigerant oil

A special Polyalkylene Glycol (PAG) synthetic oil is used in R-134a systems. This oil is NOT compatible with mineral based oils used in R-12 systems. See safety precautions starting ⇒ Page 87-1 , for Warnings and Cautions regarding proper oil usage.

Airborne properties

Escaped refrigerant gases are heavier than air and will gather first in low places, like under the car. R-134a refrigerant gas displaces oxygen and may cause suffocation in low areas of poor air circulation.

Effects on the environment

Because R-134a does not contain chlorine atoms, the major catalyst in ozone depletion, R-134a has no ozone depletion potential.

R-134a does not cause smog and has a considerably lower global warming potential (greenhouse effect) than R-12 refrigerant. Nonetheless, do not release R-134a into the environment and always recover/recycle using approved service equipment.

Effects on plastics

Refrigerant R-134a will deteriorate some plastics. When system temperature drops, these plastics can be deposited at the expansion valve or restrictor causing blockage. Therefore, when making system repairs, use only genuine Audi replacement parts which are specified for use with R-134a refrigerant.

Effects on metal

In its pure state, refrigerant R-134a is chemically stable and will not attack iron or aluminum. However, the mixture of R-134a and PAG oil may deteriorate certain metals (copper) which could lead to blockage, leaks or deposits on the compressor piston. Therefore, when making system repairs, use only genuine Audi replacement parts which are specified for use with R-134a refrigerant.

Water solubility

Liquid R-134a refrigerant will absorb only very minute quantities of moisture. However, R-134a vapor can absorb large amounts of moisture.

Water in the system forms ice in the expansion valve or restrictor causing the system to stop cooling. In addition, moisture combines with the refrigerant to form acids which will damage the system.

Toxicity

Refrigerant R-134a is non-toxic up to a temperature of 101° C (214° F) and is safe when handled and used properly.

Above 101° C (214° F), gas pressure is above 39.5 bar (573 psi) and R-134a begins to decompose into poisonous gases (hydrogen fluoride, carbonyl fluoride and fluorine). These gases give adequate warning of their presence since they cause irritation of the mucous membrane (throat).

Refrigerant R-134a gas has no effect on foodstuffs; it does not poison food or make it inedible.

Flammability

R-134a refrigerant is not flammable. In fact, it tends to inhibit combustion and has a fire extinguishing effect. However, a flame or glowing hot surface, as well as ultraviolet light (from electric welding), will decompose the refrigerant into poisonous gases (hydrogen fluoride, carbonyl fluoride and fluorine). These gases give adequate warning of their presence since they cause irritation of the mucous membrane (throat).

R-134a can become flammable at pressures above ambient pressure in conjunction with air concentrations greater than 60% by volume.

Refrigerant containers

DO NOT exceed maximum rated capacity of refrigerant containers. Never fill a container to more than 60% of its gross weight rating (for example, 18 lb in a 30 lb container.)

Without sufficient room for expansion of R-134a (gas cushion), the container could explode when the temperature rises causing serious injury.

Leak detection

Use halogen leak detector Hitec HI400A-TEL, or equivalent, to check for R-134a system leaks. This tool can also be used to detect leaks in R-12 systems. Many currently available R-12 leak detectors cannot detect R-134a refrigerant leaks.

R-134a refrigerant oil

A special Polyalkylene Glycol (PAG) synthetic oil is used in R-134a systems. This oil is NOT compatible with mineral based oils used in R-12 systems.

CAUTION!

- ***Refrigerant oils used for the R-134a system and R-12 system are NOT compatible. Use only the specified synthetic oil for the R-134a refrigerant system. DO NOT use R-12 system oil in an R-134a system or R-134a system oil in an R-12 system. If the refrigerant oils are mixed, system contamination will occur and compressor failure may result.***

- ***R-134a refrigerant system oil (PAG oil) absorbs moisture very rapidly. Moisture combines with the refrigerant to form acids which will damage the system. Use only the specified oil from a sealed container and ALWAYS reseal oil container immediately after use. DO NOT use oil if it has become contaminated with moisture or if container has been left open..***

- ***Do not allow refrigerant oil to come in contact with engine oil or transmission fluid (for example when disposing). Dispose of used PAG refrigerant oil separately following laws governing hazardous waste disposal.***

87-13

Basics when working on A/C refrigerant system R-134a

CAUTION!

- ***Keep work area and all tools clean.***
- ***Use only tools, equipment and parts specified for use with R-134a.***
- ***Always wear protectiveglasses and gloves when working on A/C refrigerant system.***
- ***Switch on existing exhaust/ventilation systems when working on the refrigerant system.***
- ***Discharge A/C system before removing any A/C refrigerant system component.***
- ***Always use an Underwriter's Laboratory (UL) approved refrigerant recovery/ recycling/recharging unit such as Kent-Moore ACR^4, or equivalent, whenever discharging an R-134a A/C system.***
- ***Immediately plug openconnections on A/C components to prevent dirt and moisture contamination. Likewise, DO NOT remove new component from packaging until ready to install. Immediately tighten component connections after installation.***

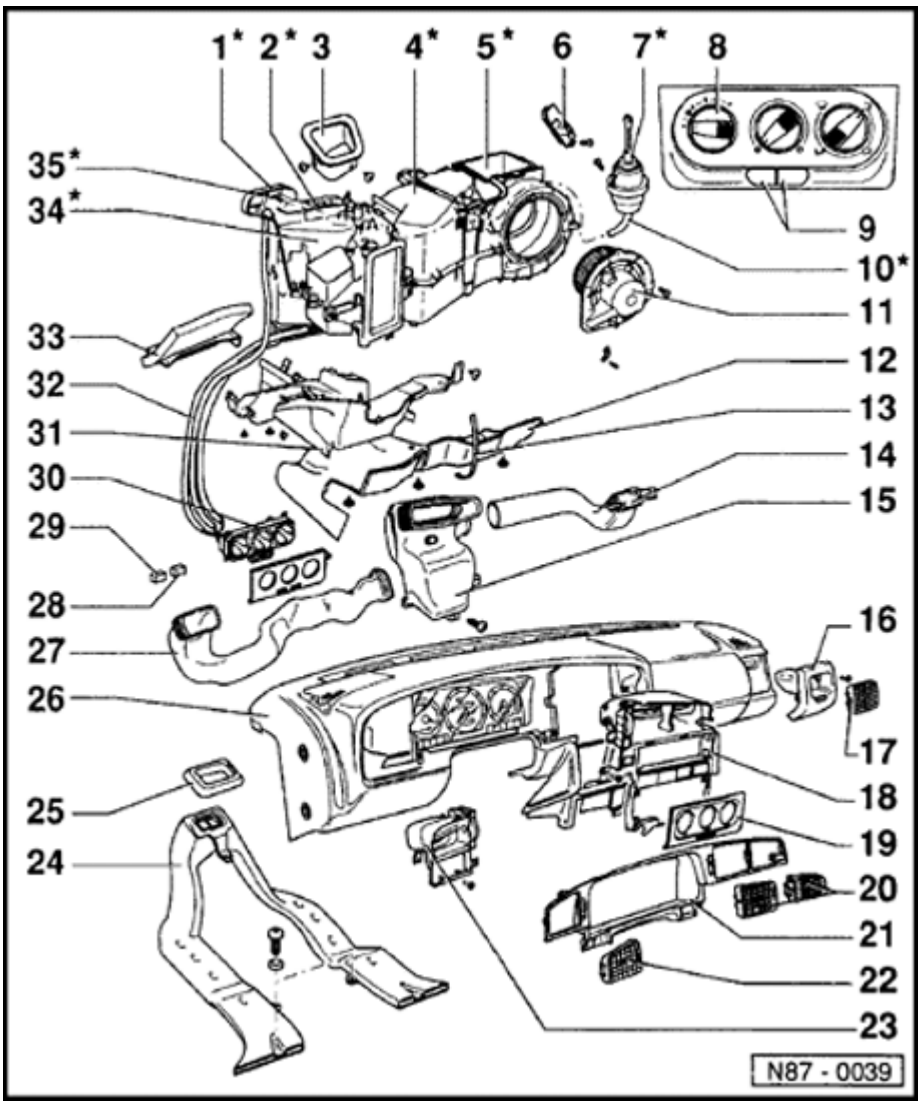
87-14

CAUTION!

- ***Always replace O-rings, DO NOT reuse. Use only the correct size and type of O-rings specified for use with R-134a refrigerant. Lubricate O-ring with refrigerant oil before installing.***
- ***Use only the specified PAG oil from a sealed container and ALWAYS reseal oil container immediately after use. DO NOT use oil if it has become contaminated with moisture or if oil container has been left open.***
- ***Always reinstall cap(s) over A/C service valve(s).***
- ***DO NOT flush refrigerant system with R-11.***
- ***Evacuate refrigerant system for a minimum of 30 minutes.***
- ***After system recharge, manually rotate A/C compressor approx. 10 turns before starting engine. Start engine with A/C OFF. After idle speed has stabilized, switch A/C ON and let engine idle (compressor running) for a minimum of two minutes before raising engine speed.***
- ***DO NOT top-off a charged refrigerant system. Instead, discharge, evacuate and recharge system.***

Note:

- *For information on A/C wiring see applicable wiring diagram.*
- *See also A/C refrigerant system safety precautions starting ⇒ Page 87-1 .*
- *Green label in engine compartment indicates A/C system is charged with refrigerant R-134a.*
- *Only a high pressure service valve is used for A/C system servicing. A low pressure service valve is not installed in the A/C system. Perform all A/C system service operations (i.e. discharging, evacuating, recharging) through the high pressure service valve only.*



Manual A/C

Heating and A/C components in passenger compartment, servicing

CAUTION!

- ***Obtain the anti-theft radio security code.***
- ***Switch the ignition off.***
- ***Disconnect the battery Ground (GND) strap.***
- ***After reconnecting battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.***

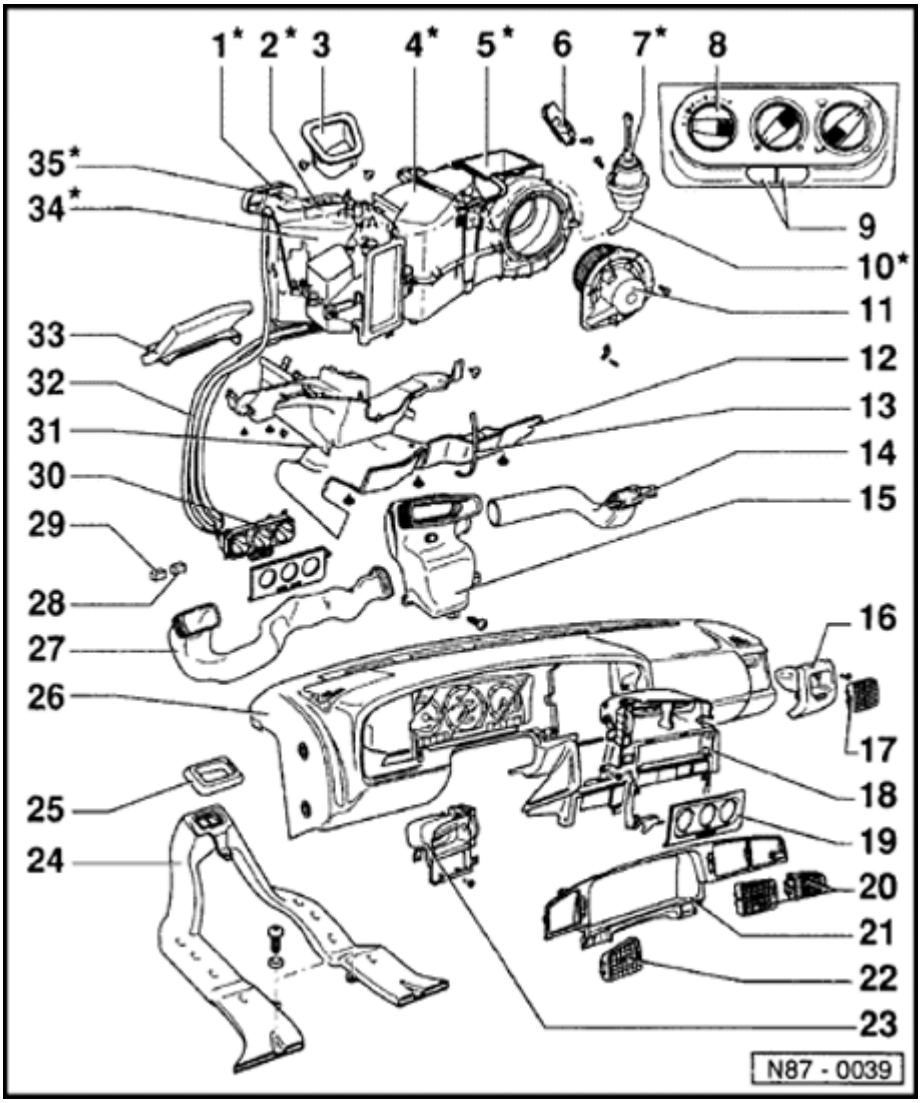
Note:

*System components identified with an * must only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.*

1 - Gasket*

- Always replace

87-17



2 - Heater core*

- Gaskets must be bonded gap-free all around.
- If retaining tabs do not engage when assembling, secure heat exchanger with screws.
- Always replace coolant after replacement.
- Removing ⇒ Page 87-84 (Heating and A/C unit, assembly)

3 - Connecting duct

- With gasket
- Replacing - remove instrument panel beforehand

4 - Heating and A/C unit*

Contains:

- Heater core
- Evaporator
- Assembly ⇒ Page 87-84 .

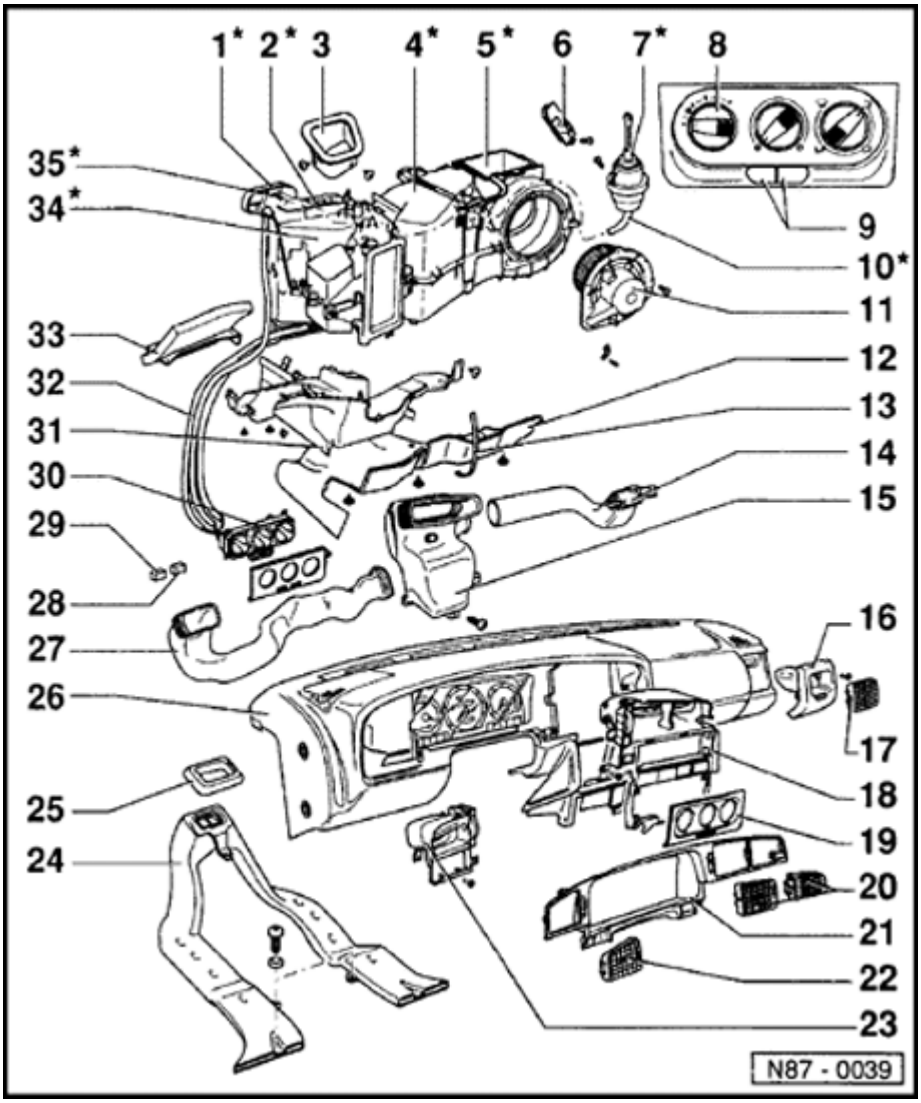
5 - Air intake*

- With fresh/recirculating air flap

6 - Fresh air blower series resistance with fuse - N24-

- Replacing ⇒ Fig. 2

87-18



7 - Vacuum unit for fresh/recirculating air flap*

- Ventilated: Fresh air operation

8 - Fresh air blower switch -E9-

9 - A/C switch -E35-

- With switch for fresh/recirculating air flap -E159-
- With control light for lighting - Air conditioner switch - L43-
- Removing ⇒ Fig. 1

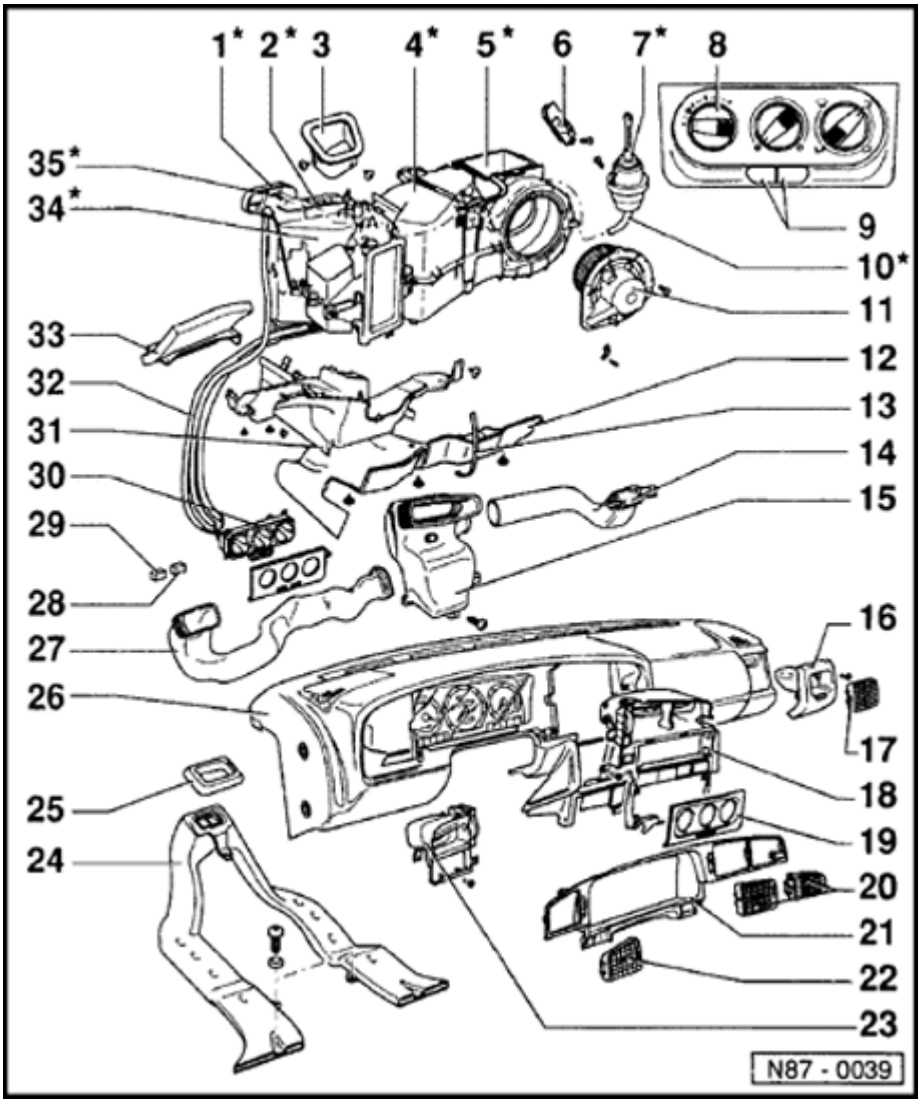
10 - Vacuum line*

- Vacuum hose connection diagram ⇒ Page 87-40

11 - Fresh air blower -V2-

- Removal and installation ⇒ Fig. 3

87-19



12 - Evaporator housing cover

- Replacing: First remove instrument panel and footwell outlets - 31 -

13 - Retaining strap

- Replacing: First remove instrument panel and footwell outlets - 31 -

14 - Right air duct

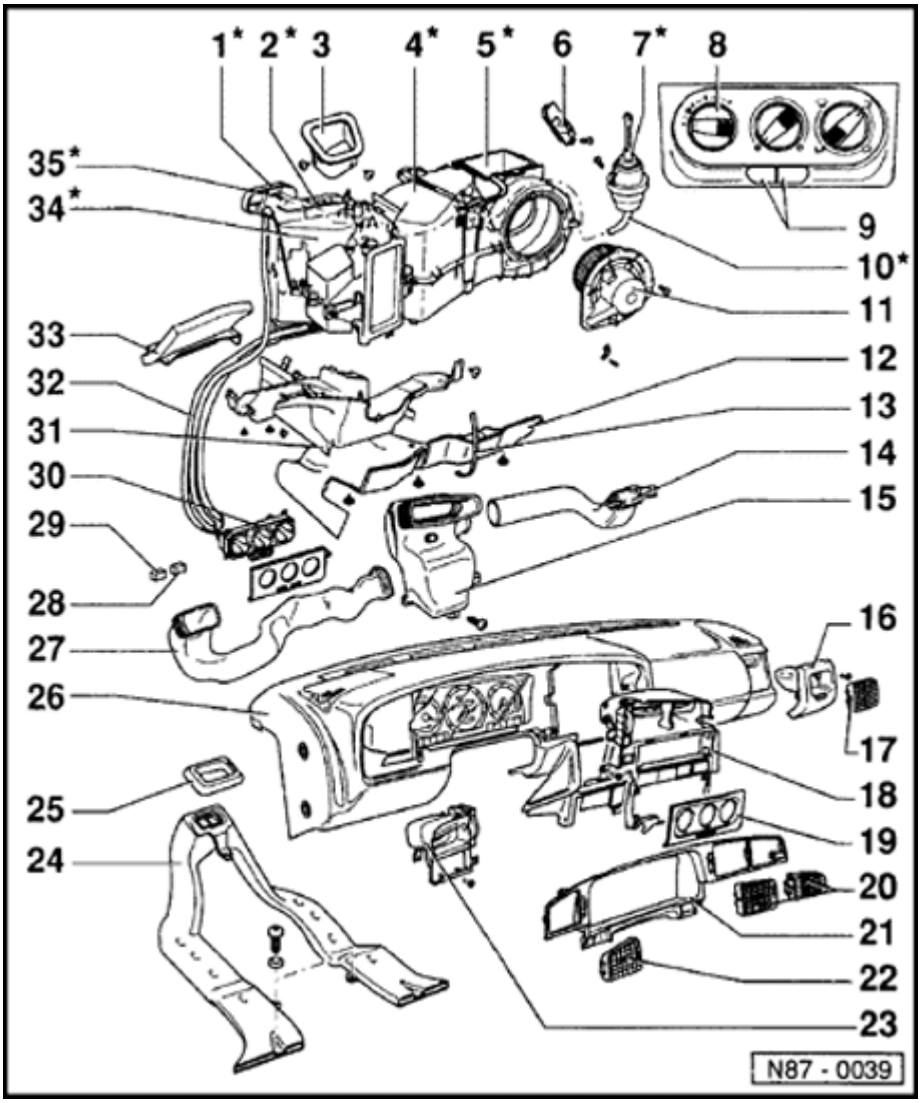
15 - Air distributor

- Replacing: Remove center console, instrument panel bracket, center vent - 13-, heating and fresh air controls -30-, remove shelf on passenger side; loosen instrument panel -26- and lift

16 - Right air outlet

- Removing ⇒ Page 80-1 , ⇒ Fig. 8

87-20



17 - Grille

- For right vent

18 - Center air outlet

- Removing ⇒ Page 80-1 , ⇒ Fig. 7

19 - Control panel trim

20 - Grilles

- For center vent

21 - Instrument panel trim

- Removing ⇒ Page 80-1 , ⇒ Fig. 4

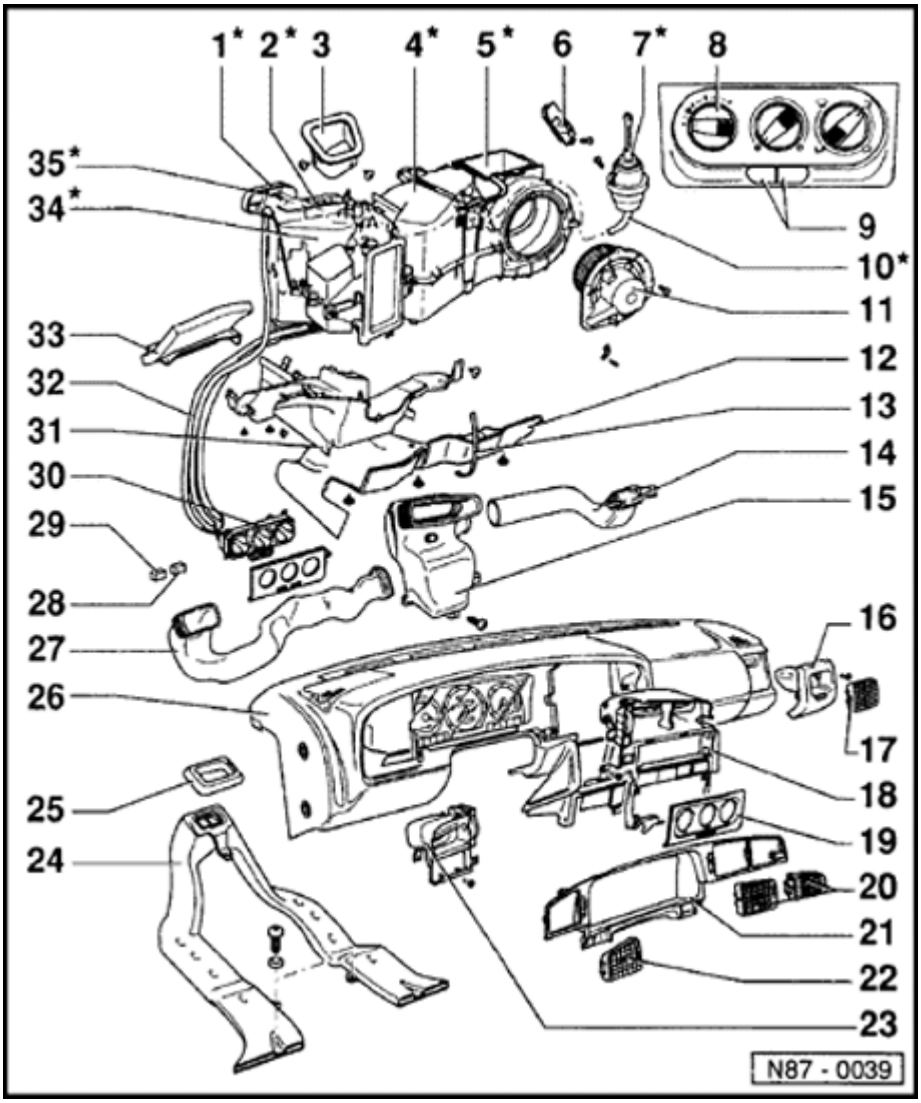
22 - Grille

- For right vent

23 - Left air outlet

- Removing ⇒ Page 80-1 , ⇒ Fig. 6

87-21



24 - Rear heater duct

- Replacing: First remove center console, instrument panel bracket, pedal cluster cover - 33 -, footwell outlet - 31 -, seats and carpet

25 - Gasket

26 - Instrument panel

- Removing and installing

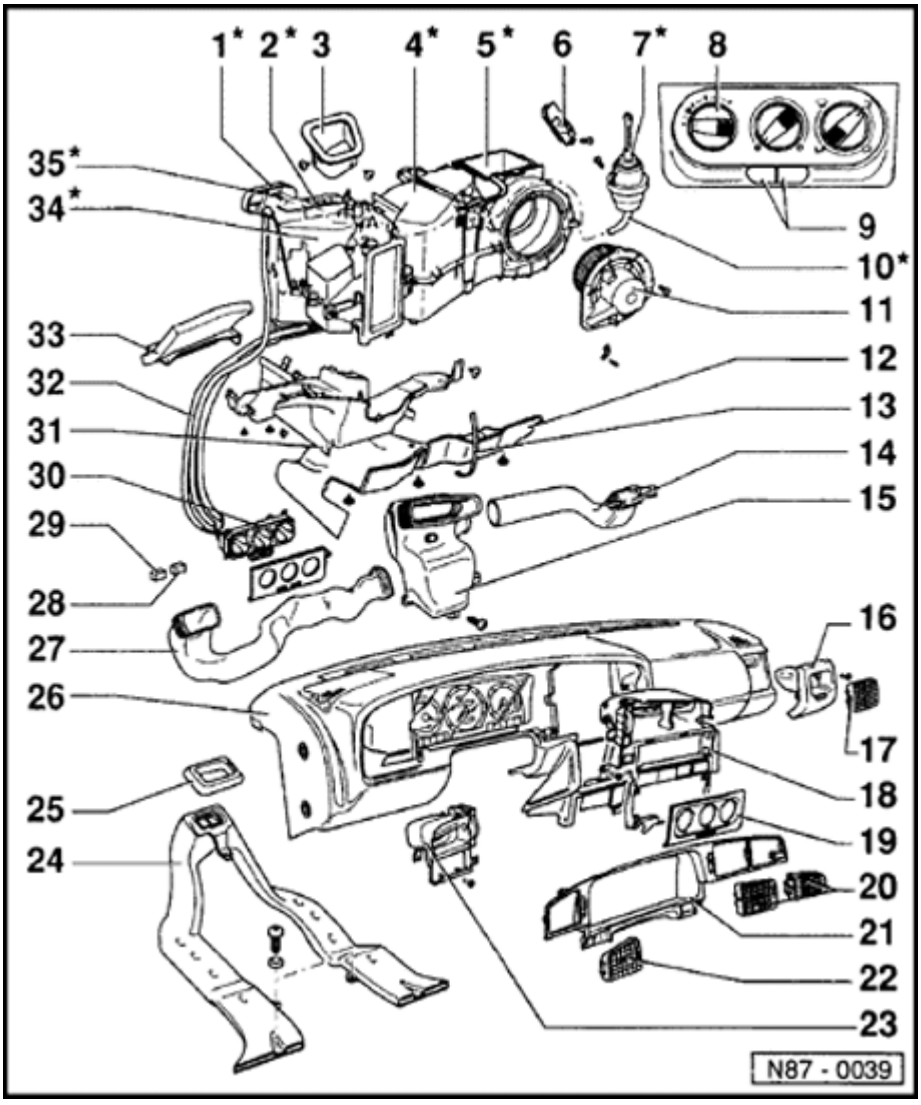
⇒ *Repair Manual, Body Exterior, Interior, Repair Group 70; Removing and installing instrument panel*

27 - Left air duct

28 - A/C cut-off control module -J314-

- Only on vehicles with Diesel engine and manual transmission
- Behind the center console
- Control number 129

87-22



29 - A/C clutch cut-off relay -J246-

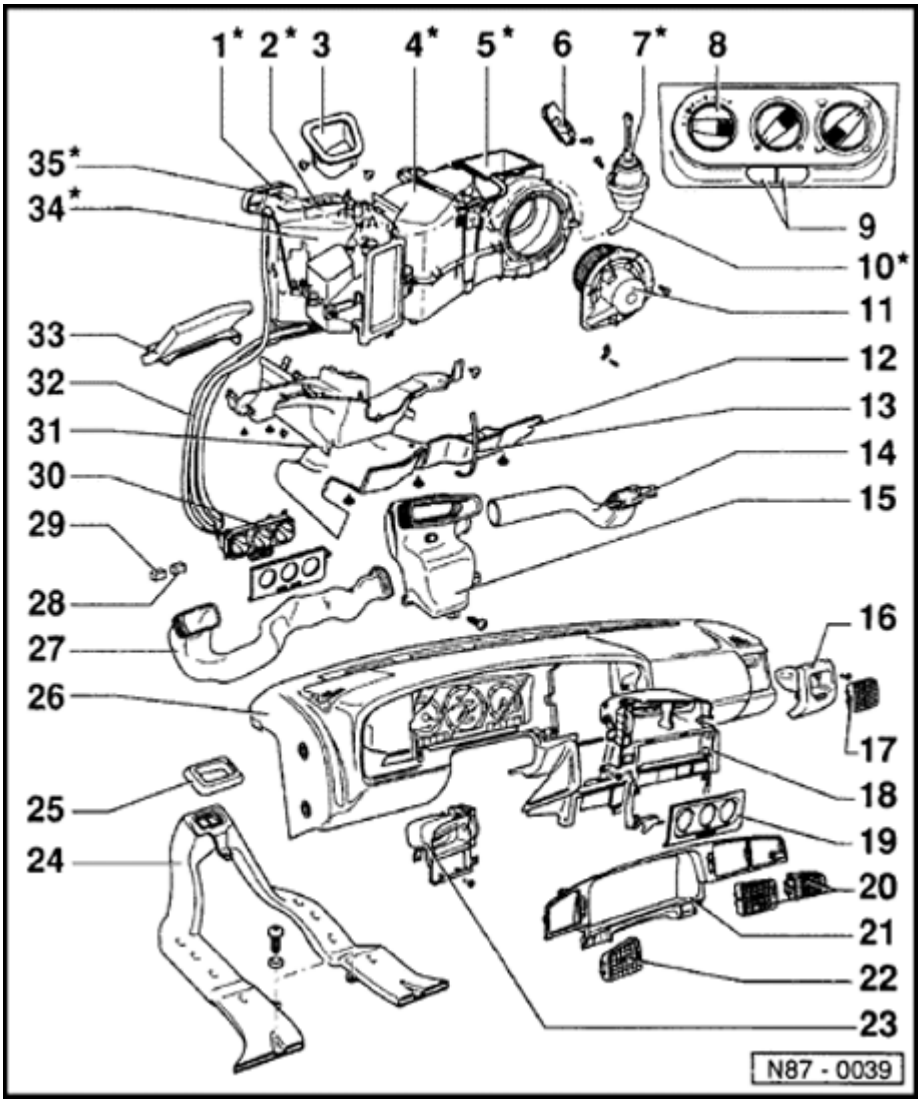
- Only on vehicles with automatic transmission
- Behind the center console
- Control number 135

30 - Heating and A/C controls

- With A/C switch -E35-
- Installing and adjusting cables ⇒ Page 87-26
- Removing and installing ⇒ Page 80-1 , ⇒ Fig. 3
- Disassembling and assembling ⇒ Page 80-21

31 - Footwell outlet

- Replacing: Remove shelf on drivers' side and passenger side, center console, instrument panel bracket and pedal cluster cover -33-



32 - Heating and A/C cables

- Replacing: First remove pedal cluster cover - 33 - and footwell outlet - 31 -
- Installing and adjusting ⇒ Page 87-26

33 - Pedal cluster cover

34 - Air distribution housing*

- With temperature flap
- With center flap
- With footwell/defrost flap
- Do not disassemble further

35 - Vacuum line connection*

87-24

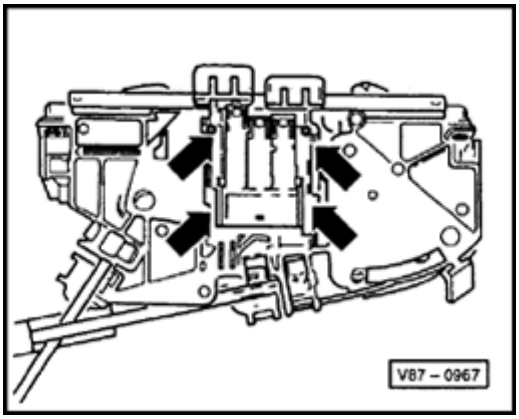


Fig. 1 A/C switch -E35-, removing

Press the switch unit (at the four locating points) against the controls and at the same time toward the buttons.

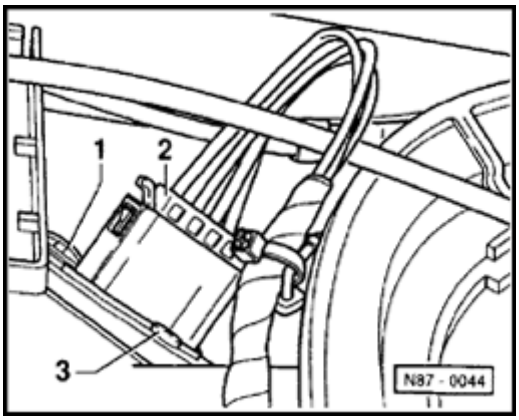


Fig. 2 Fresh air blower series resistance with fuse -N24-, replacing

- Remove shelf on passenger side
- Remove glove box.
- Pull off connector -2- and remove screws -3-.
- Seal surface between series resistor -1- and air duct before installing with AMV 176 000 05.

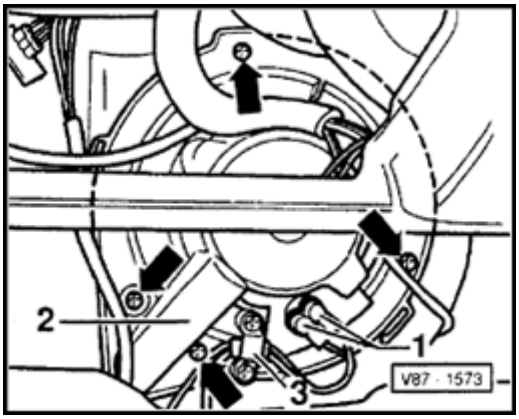
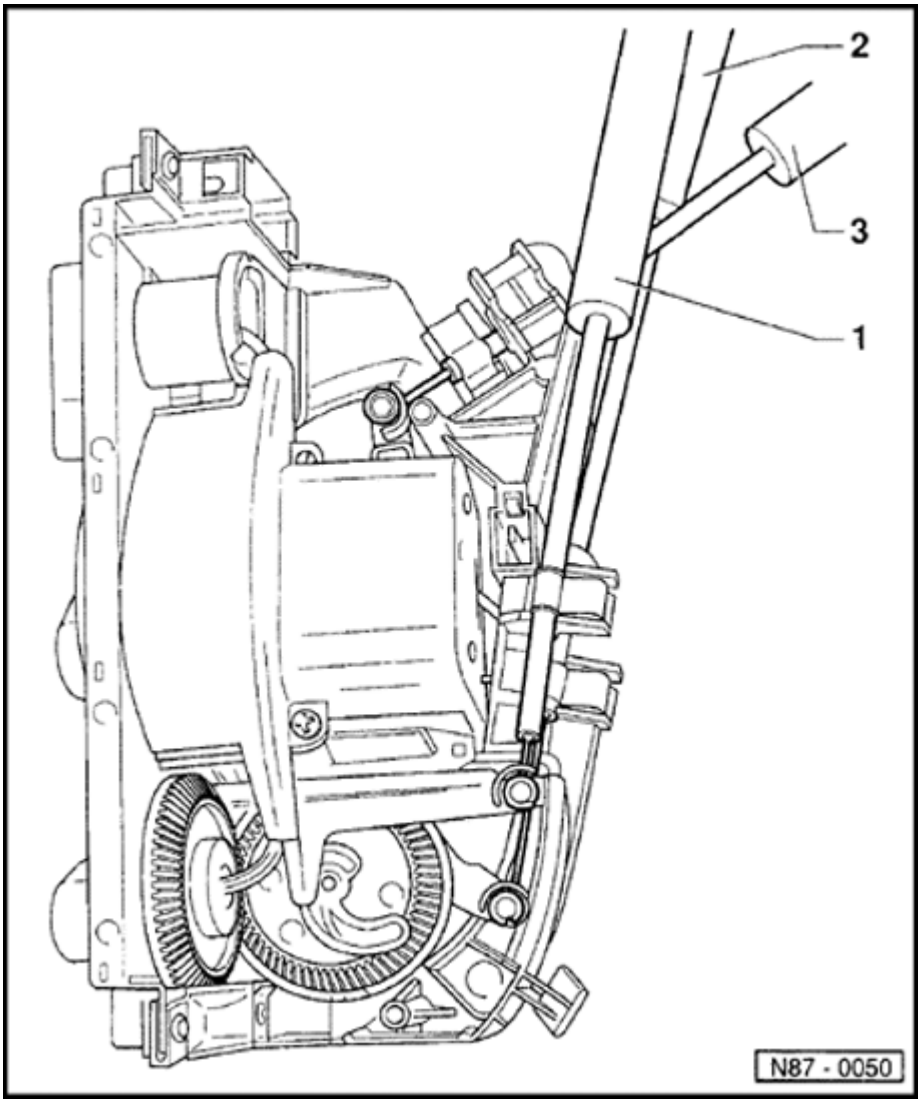


Fig. 3 Fresh air blower -V2-, removing and installing

- Remove right side shelf.
- Remove glove box.
- Disconnect electrical connection -1-.
- Remove clamp -3-.
- Remove screws -arrows- and remove fresh air blower -2- downward.

87-26

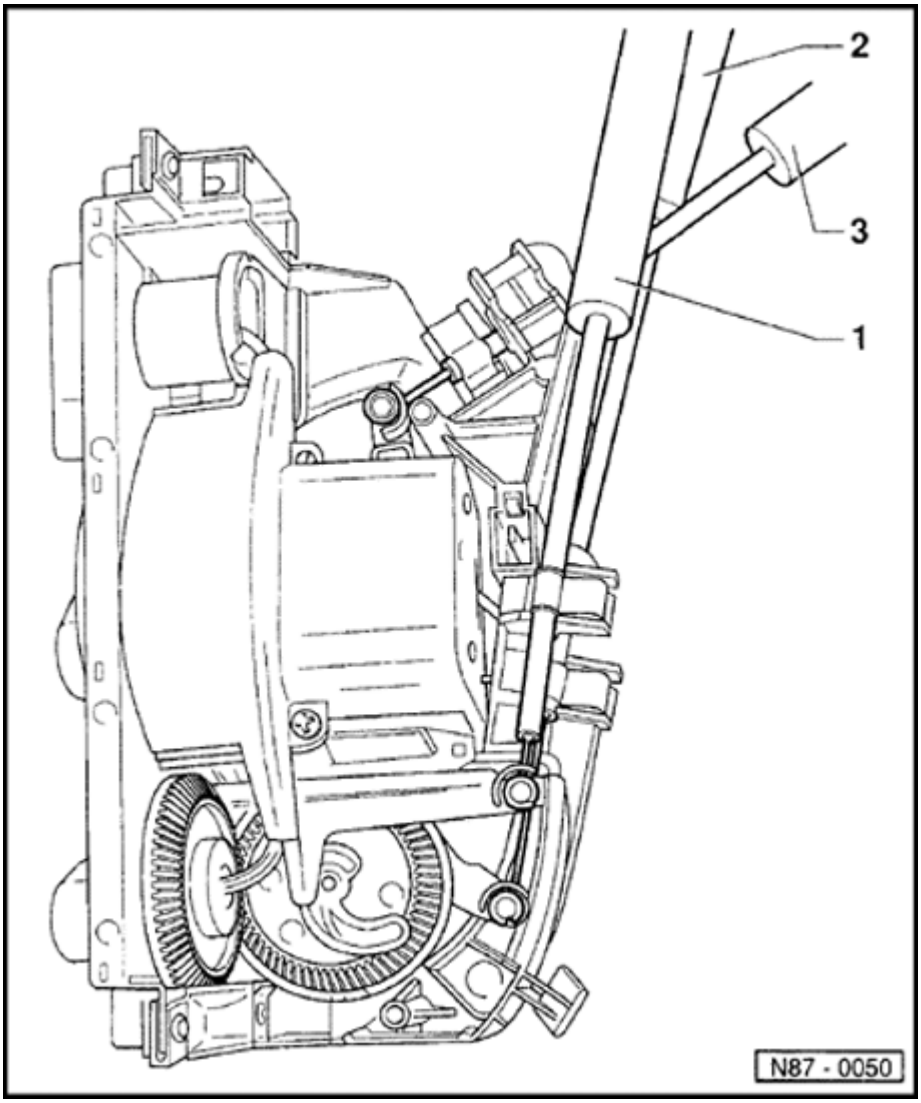


Heating and A/C cables, installing and adjusting

Notes:

- *First connect cables to removed controls then adjust and secure cables to levers on air conditioner.*
- *Sleeve ends of cables which are marked with a colored line are attached to the controls.*
- *Position cable sleeves -2- and -3- at stops on the controls and then secure. Secure sleeve for cable -1- ⇒ Fig. 4 .*
- *Adjust cables at flap levers with the controls installed.*
- *All flaps must audibly contact stop when controls are turned.*

87-27



1 - Footwell/defrost flap cable

- From air distribution rotary control knob to footwell/defrost flap
- Black sleeve
- Adjusting cable at footwell/defrost flap ⇒ Fig. 1

2 - Cable for center flap

- From air distribution rotary control knob to center flap
- Black sleeve
- Adjusting cable at central flap ⇒ Fig. 2

3 - Temperature control flap cable

- From temperature rotary control knob to temperature control flap
- Blue sleeve
- Adjusting cable at temperature control flap ⇒ Fig. 3

87-28

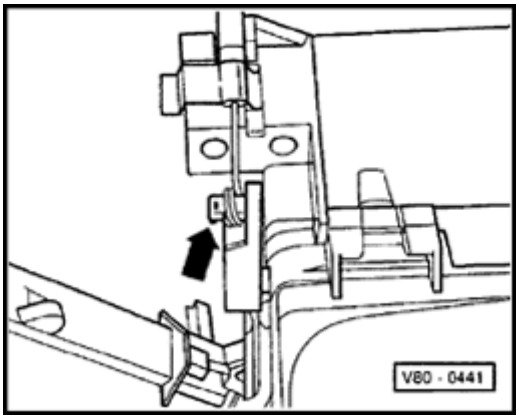


Fig. 1 Footwell/defrost flap cable, adjusting

- Install warm and fresh air controls.
- Turn air distribution rotary control knob to stop at "defrost" position.
- Press footwell/defrost flap lever onto stop -arrow- and secure black cable sleeve.

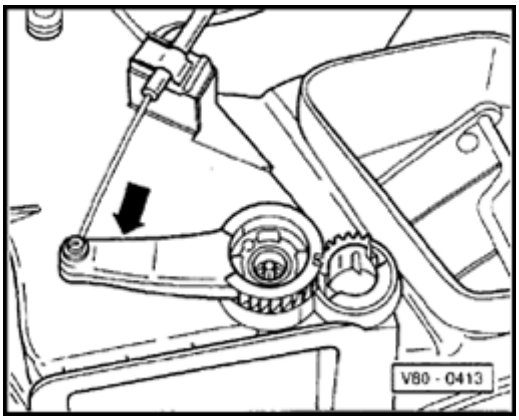


Fig. 2 Center flap cable, adjusting

- Install warm and fresh air blower controls.
- Turn air distribution rotary control knob onto stop at "defrost" position.
- Press center flap lever onto stop -arrow- and secure black sleeve.

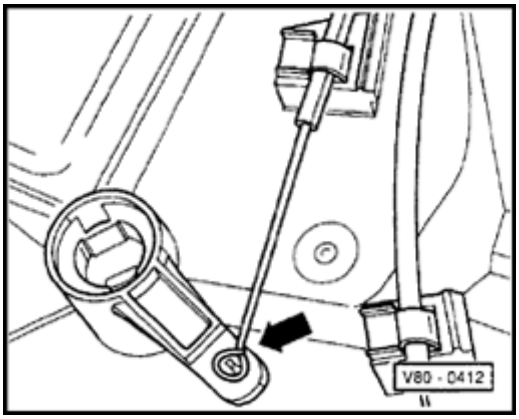


Fig. 3 Temperature flap cable, adjusting

- Install warm and fresh air blower controls.
- Turn temperature rotary control knob to stop at "cold" position.
- Press temperature flap lever onto stop -arrow- and secure blue cable sleeve.

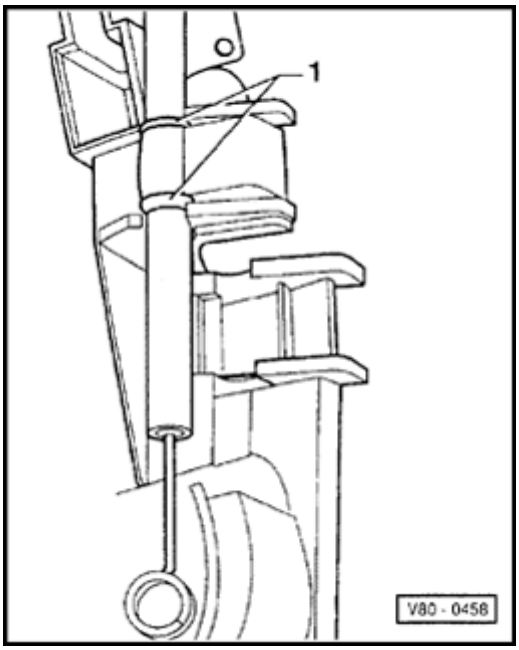
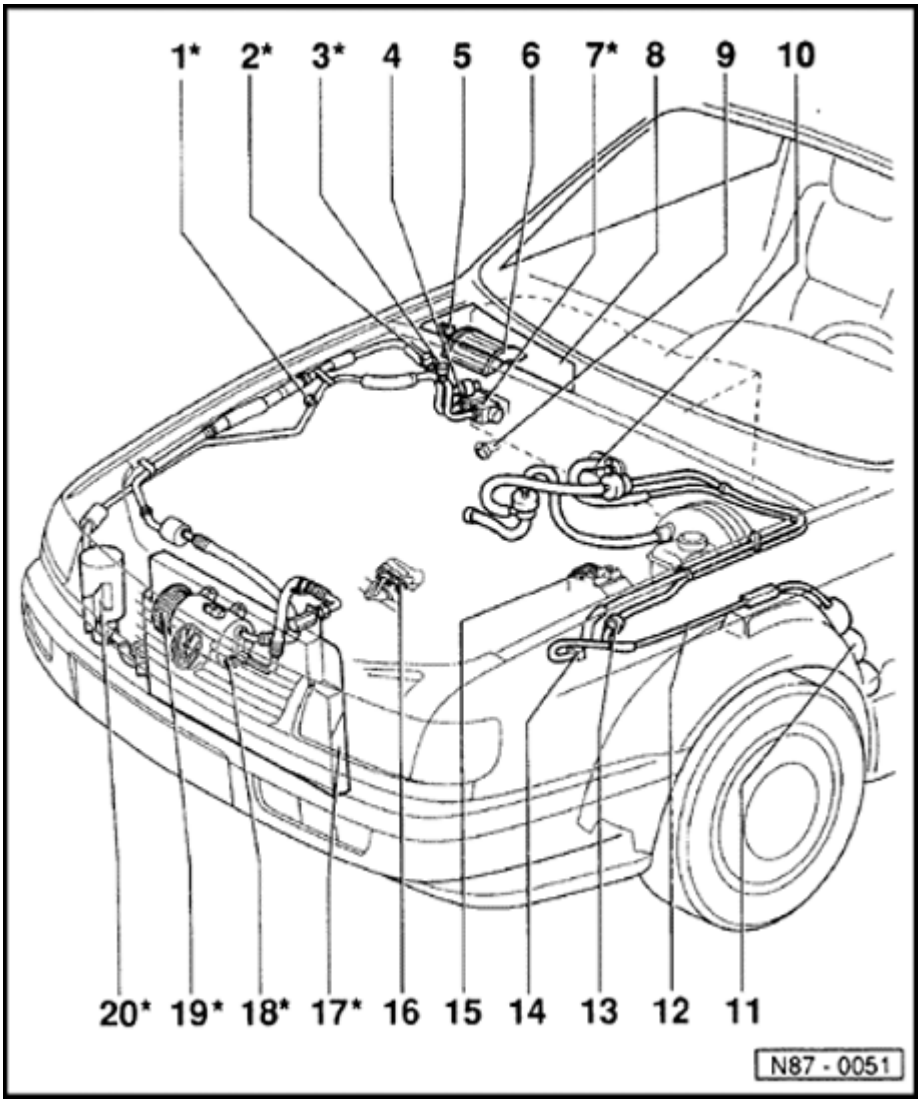


Fig. 4 Footwell/defrost flap cable to control, securing

- Secure cable sleeve at blue marking -1- on control.
- Secure inner cable to upper lever.
- Adjusting cable on footwell/defrost flap ⇒ Fig. 1

87-30



Heating and A/C components in engine compartment, servicing

CAUTION!

- ***Obtain the anti-theft radio security code.***
- ***Switch the ignition off.***
- ***Disconnect the battery Ground (GND) strap.***
- ***After reconnecting battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.***

Note:

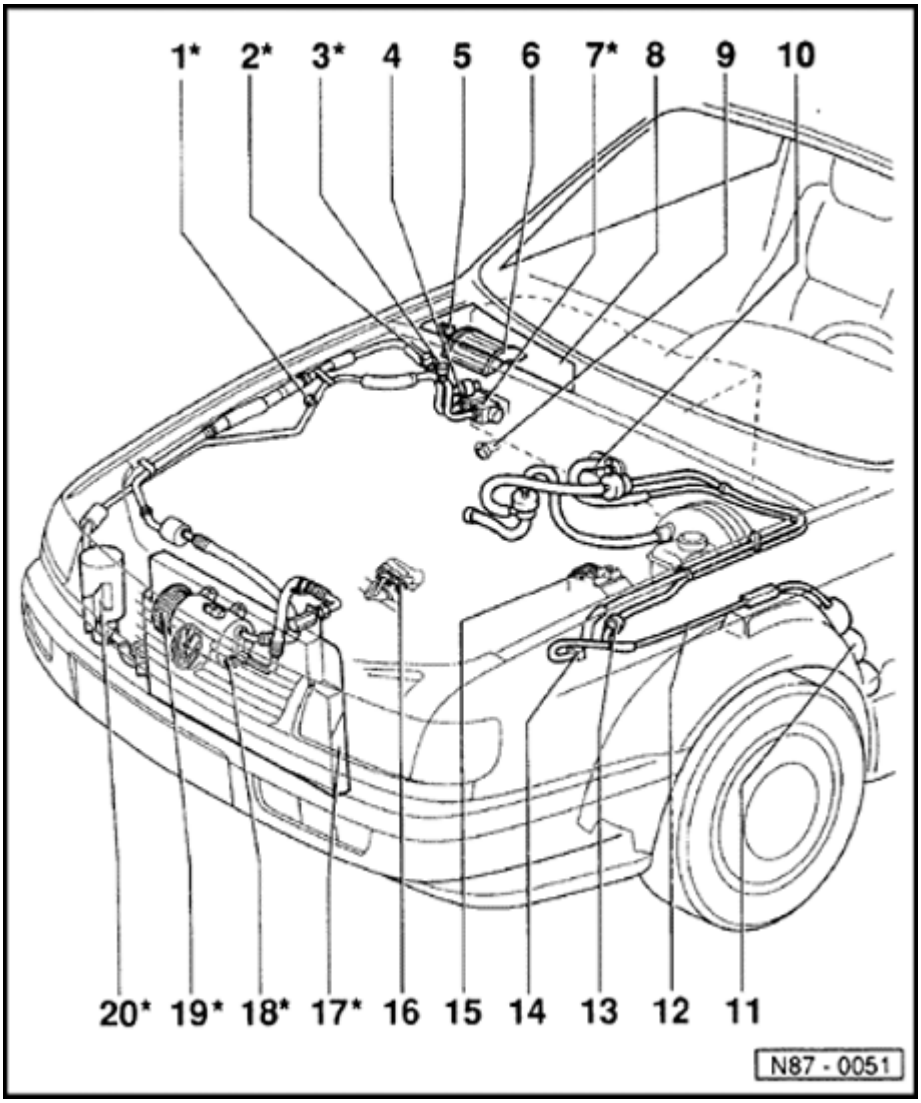
*System components identified with an * must only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.*

1 - Sight glass*

2 - Low pressure service valve*

3 - High pressure service valve*

87-31



4 - A/C pressure switch - F129-

- Testing ⇒ Fig. 2
- Removing and installing:
  - Tightening torque 8 Nm (70 in lb)
  - Replace O ring seal (note Part No.).

5 - Ambient temperature switch -F38-

- Switches off A/C clutch -N25- at low ambient temperature (off at -1 °C -34 °f-, on at +7 °C -45 °f).
- Removing and installing ⇒ Fig. 4

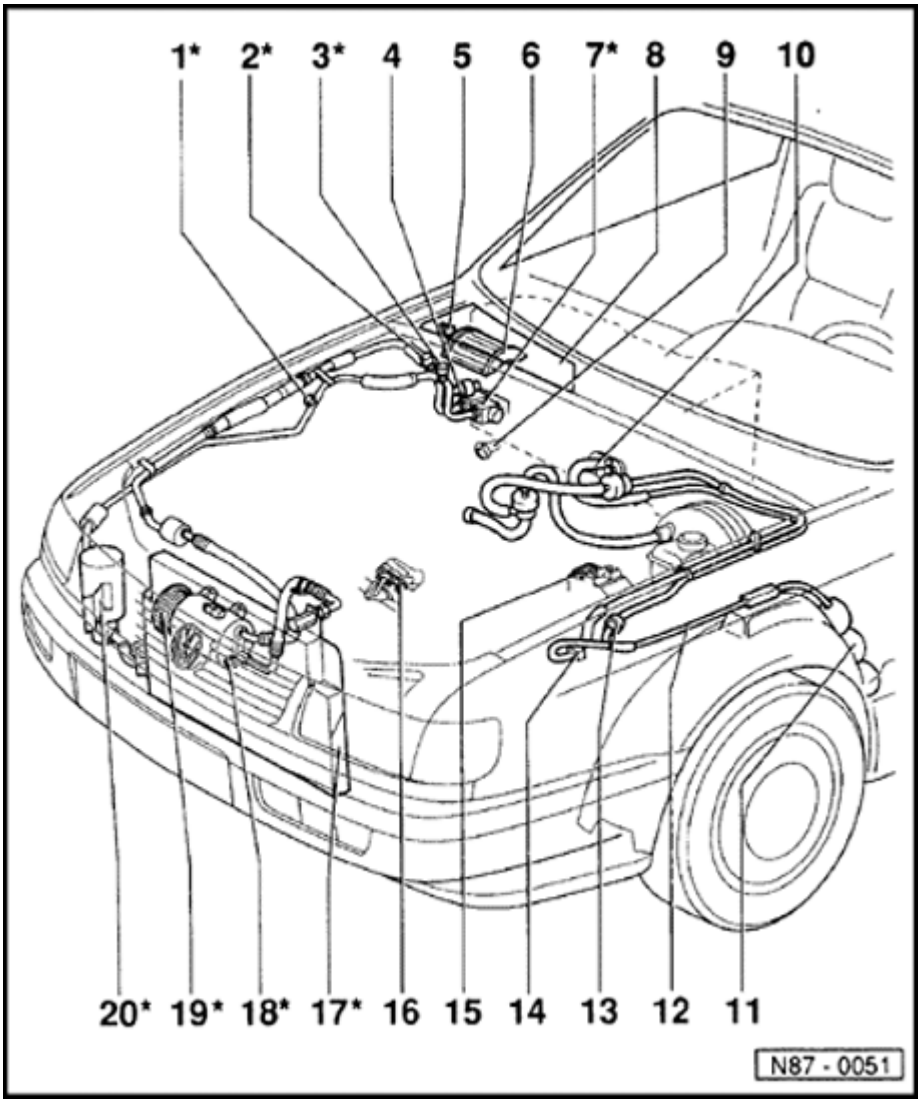
6 - Dust and pollen filter

- Removing ⇒ Page 80-1 , ⇒ Fig. 5

7 - Expansion valve*

- Opening must be sealed sufficiently to stop water ingress
- Checking insulation piece for expansion valve ⇒ Fig. 6
- Removing ⇒ Page 87-79 .

87-32



8 - Plenum chamber cover

9 - Evaporator water drain valve

- Behind bulkhead insulation
- Removing and installing ⇒ Fig. 3
- Valve mating surfaces must be clean and dry

10 - Heat exchanger and vacuum hose guide

11 - Vacuum reservoir

- Insertion depth for vacuum hose: 30 mm
- Removing and installing ⇒ Fig. 7

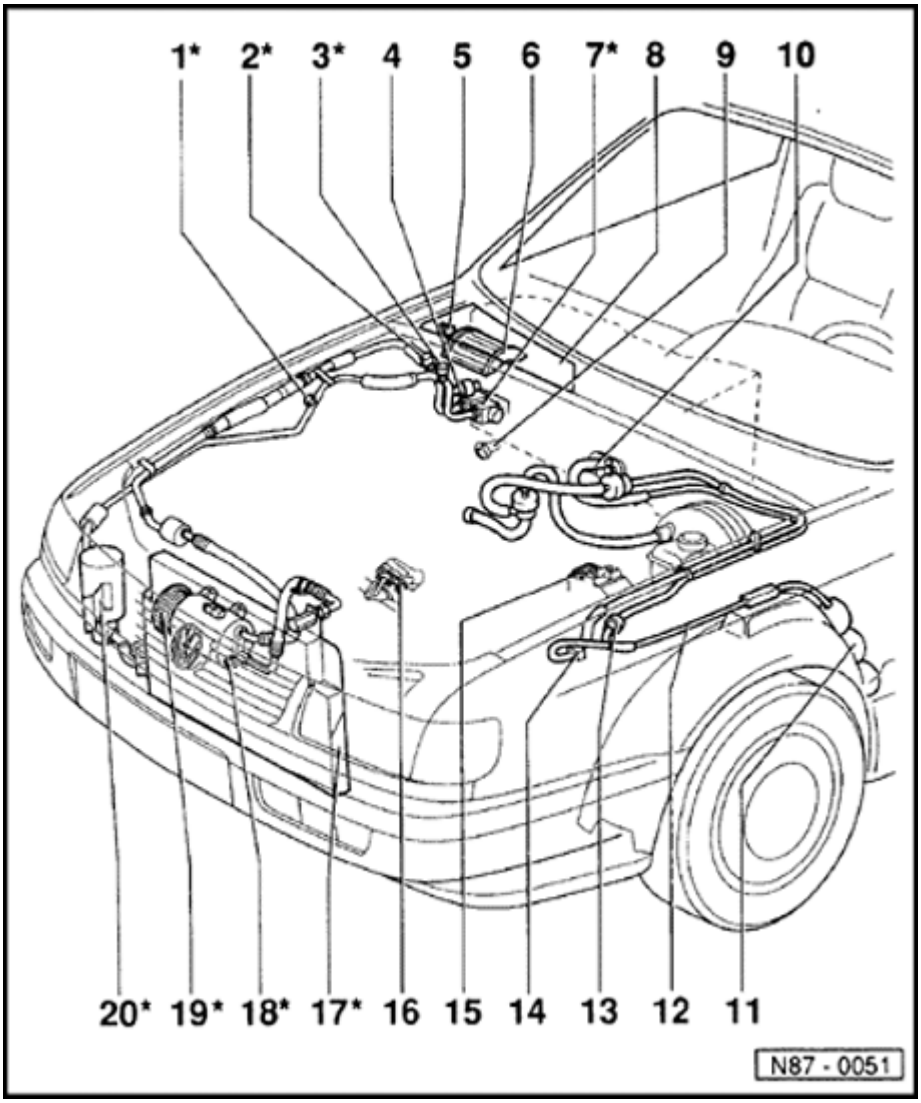
12 - Vacuum hose

- Vacuum hose connection diagram ⇒ Page 87-40

13 - Non-return valve

Direction of suction indicated by arrow

87-33



14 - Fresh air/recirculating flap two-way valve - N63-

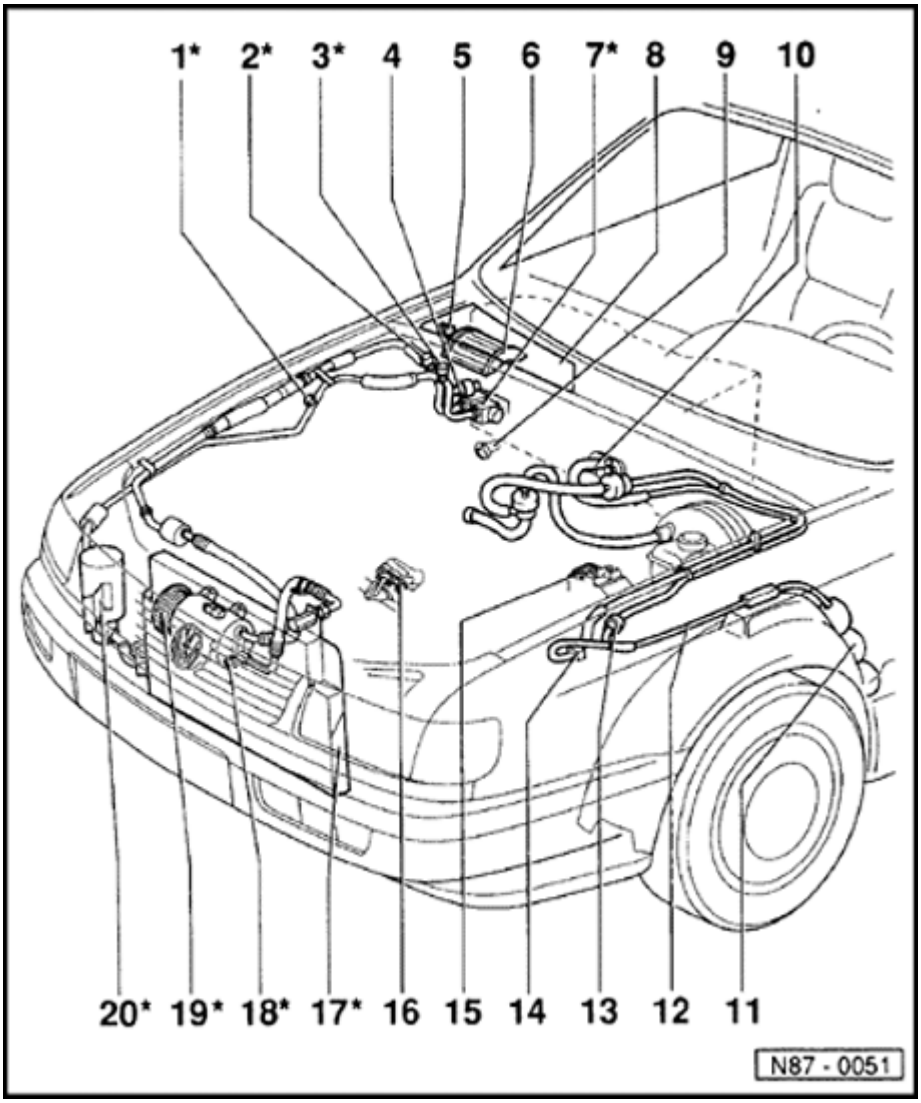
- Open when electrically completed
- Vacuum hose connection diagram ⇒ Page 87-40
- Installing ⇒ Fig. 5

15 - Coolant FC (Fan Control) Control Module -J293-

16 - A/C cut-out thermal switch -F163- and third speed coolant fan control (FC) thermal switch-F165-

- -F163- only on vehicles with engine codes AAA, AAZ or ABF
- -F165- only on vehicles with 3-speed fan motor
- -F165- switches coolant fan: into 3rd speed as temperature increases (on at 112 °C -234 °f-, off at 108 °C -227 °f-).
- -F163- switches off A/C clutch -N25- at excessively high coolant temperature off at (119 °C -245 °f-, on at 112 °C -232 °f-).
- Removing and installing on vehicles with engine code AAA ⇒ Fig. 1

87-34



17 - Condenser*

18 - Pressure relief valve*

- Checking ⇒ Fig. 8

19 - A/C clutch -N25-*

20 - Receiver drier*

87-35

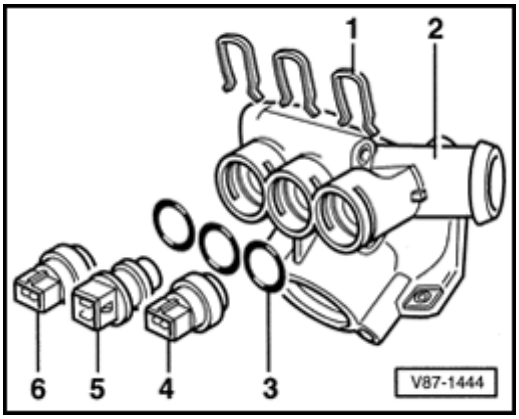


Fig. 1 A/C cut-out thermal switch -F163- and third speed coolant fan control (FC) thermal switch -F165- (engine code AAA), removing and installing

WARNING!

Cooling system is pressurized when engine is warm. Wear gloves and other protection and carefully release system pressure if necessary, before performing repairs.

Note:

Refill cooling system with fresh coolant after installing thermal switch.

1 - Clip

2 - Thermostat housing

3 - O ring

4 - Thermal switch -F163-/-F165-, brown

5 - Temperature sensor switch -G2-/-F87-, yellow

6 - Coolant temperature sensor -G62-, blue

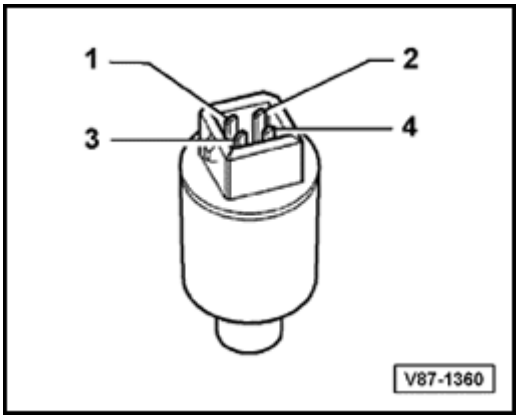


Fig. 2 A/C pressure switch -F129-, checking

- Visual check: Ensure that O-ring (color: red) 10.8 mm x 1.8 mm is seated in groove

Switch part between contacts -T4a/1- and -T4a/2 of connector housing switches magnetic coupling -N25- off when refrigerant system insufficiently filled or pressure too high.

- Opens below 1.2 bar (17.4 psi) and closes again above 2.4 bar (34.8 psi) (switching threshold)
- Opens above 32 bar (464 psi) and closes again below 24 bar (348 psi) (switching threshold)
- Briefly bridge circuit between chambers 1 and 2 with engine running. If the compressor clutch -N25- switches on, the refrigerant system is empty. Take vehicle to specialist service workshop.

Switch part between contacts 3 and 4 of connector housing

- Closes above 16 bar (232 psi) and opens below 12.5 bar (181.3 psi) (switching threshold)

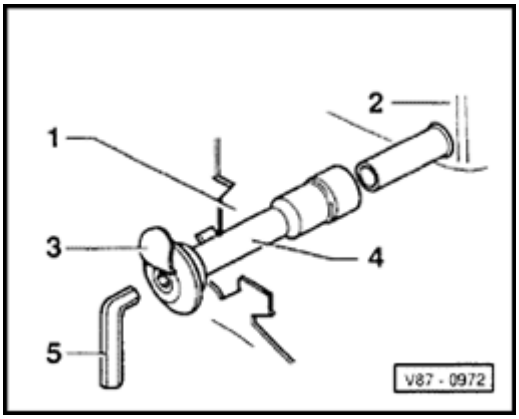


Fig. 3 Evaporator water drain valve, removing and installing

1 - Bulkhead

2 - Evaporator housing

3 - Valve flap, shown raised

4 - Water drain valve

5 - Hex key 14 mm

Removing:

- Turn valve 45° with hex key -5- and pull out.

Installing:

- When installing ensure lip faces downward.

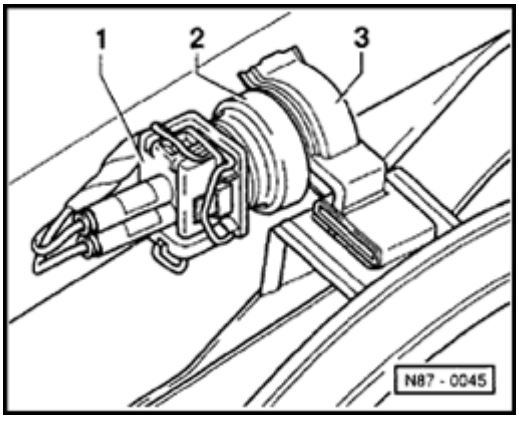


Fig. 4 Ambient temperature switch -F38-, removing and installing

Installed in plenum chamber right

1 - Connector

2 - Ambient temperature switch

3 - Retainer

87-38

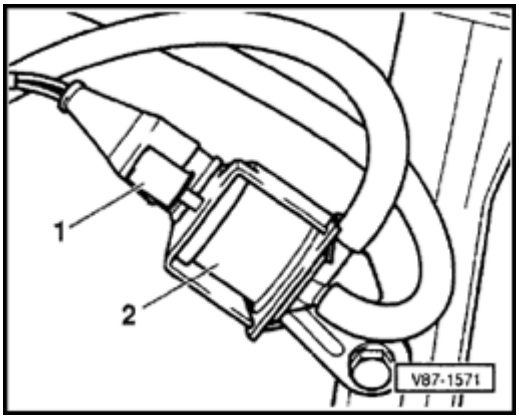


Fig. 5 Fresh air/recirculating air flap two-way valve -N63-, installing

1 - Cap

Check air passage slot

2 - Two-way valve (other designs possible)

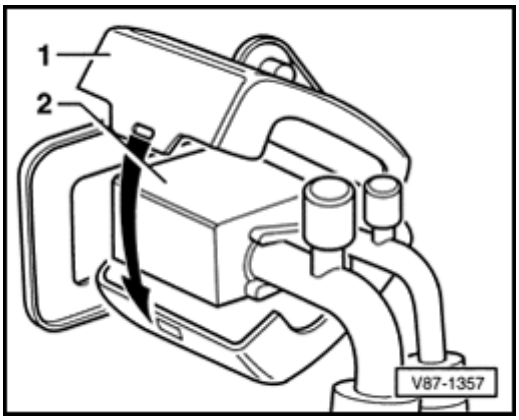


Fig. 6 Expansion valve insulation piece, checking

1 - Insulator

2 - Expansion valve

- The insulator prevents drop in air conditioner efficiency caused by increasing temperatures in the engine compartment.

87-39

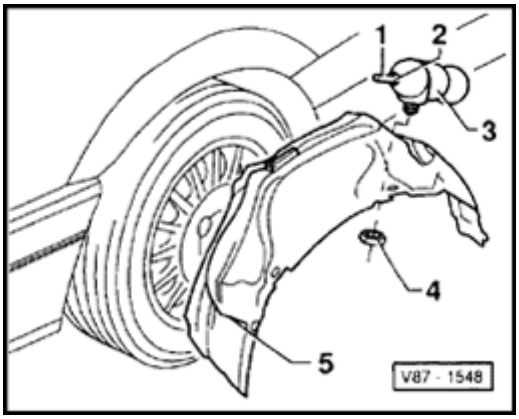


Fig. 7 Vacuum reservoir, removing and installing

1 - Plastic line

Installation depth: 30mm

2 - Rubber seal

3 - Vacuum reservoir

4 - Nut

5 - Wheel housing liner

- Wheel housing liner, removing and installing

⇒ *Repair Manual, Body Exterior, Interior, Repair Group 66; removing and installing wheel housing liner*

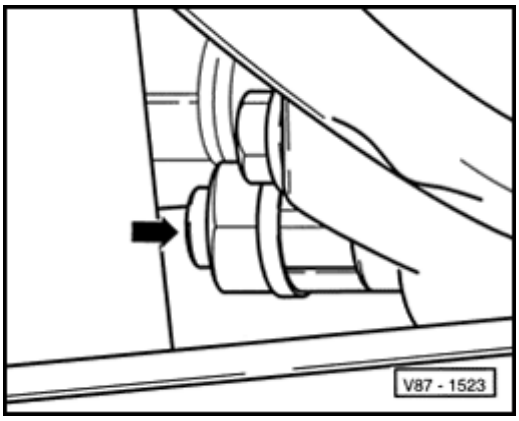
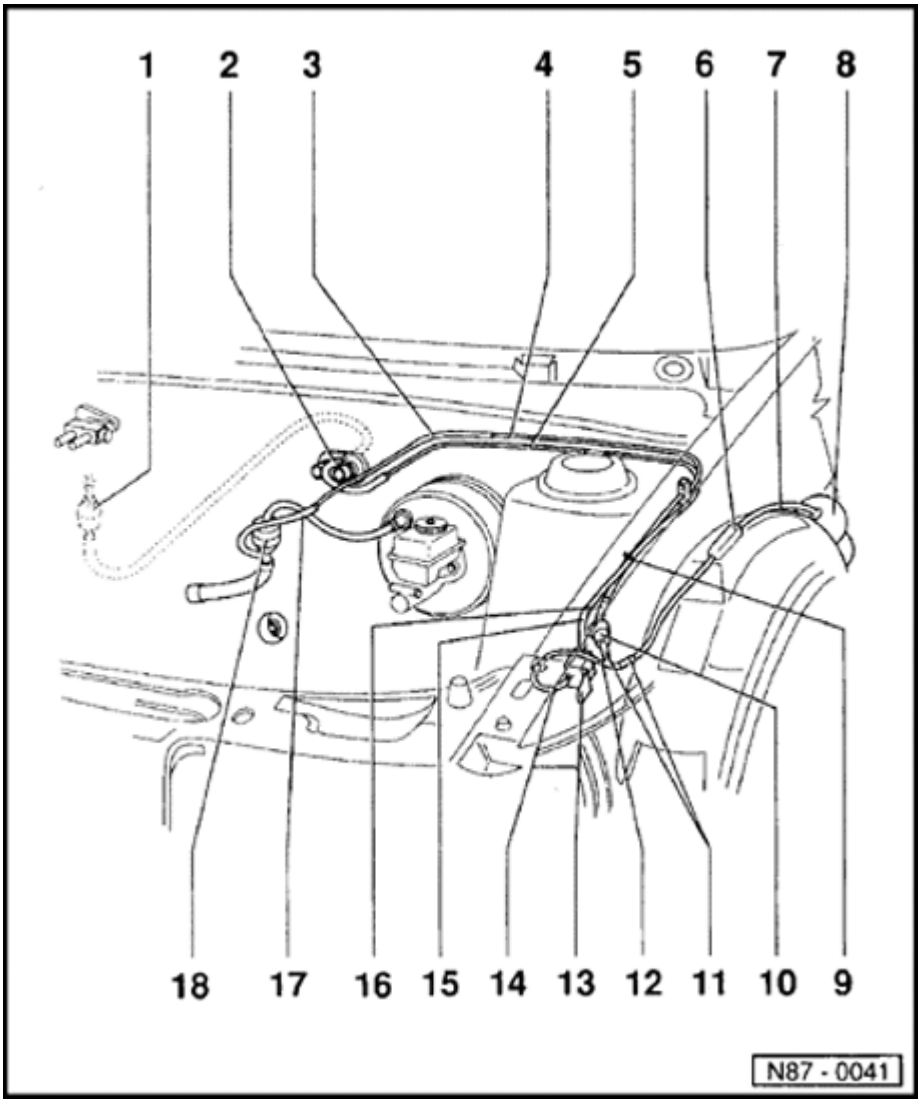


Fig. 8 Pressure relief valve on compressor, checking

- Task: protects refrigerant system against over-pressure
- The pressure relief valve indicates if valve has operated. An adhesive attached plate is pushed out. In this case take vehicle to specialist workshop.

87-40



Vacuum hose layout

Note:

- *Insertion depth of vacuum hose in vacuum reservoir: 30 mm. Overlap of vacuum hose on plastic line: onto stop (approx. 15 mm)*

1 - Fresh air/recirculating air flap vacuum unit

2 - Reduction hose

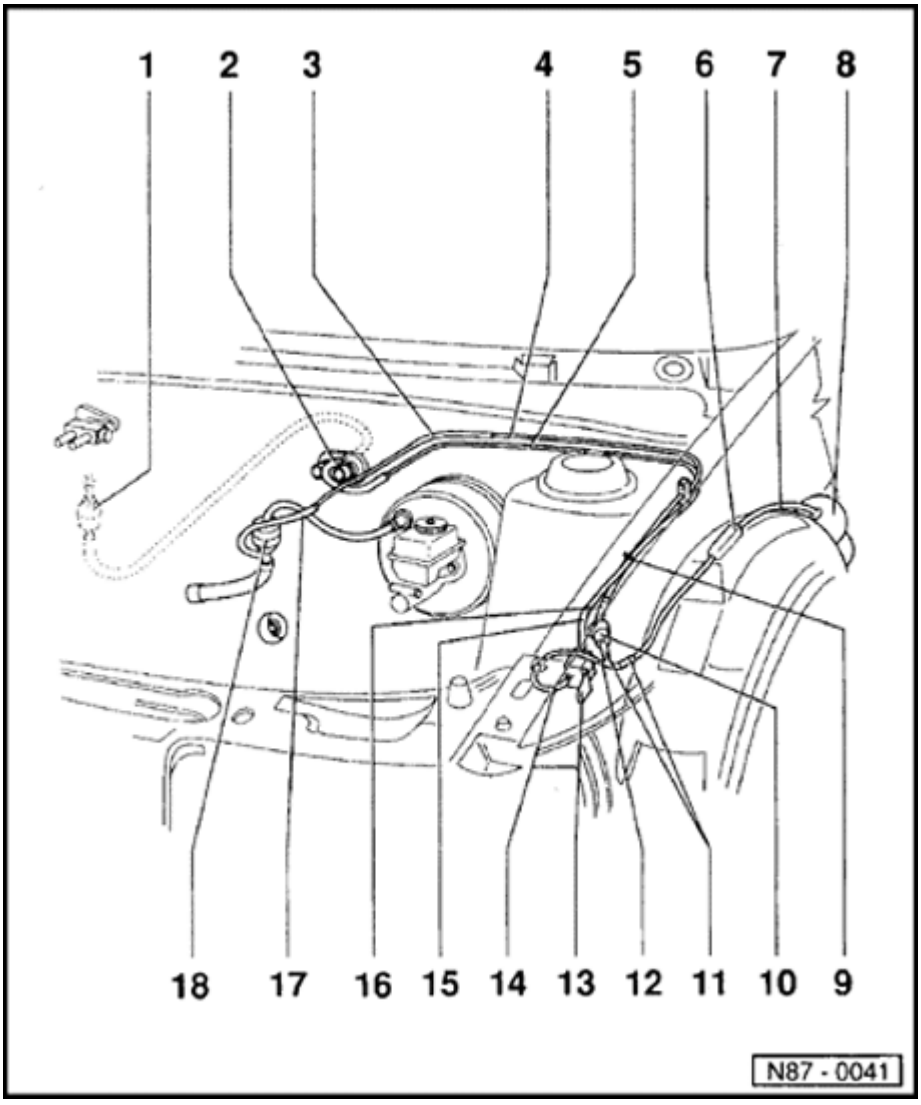
3 - Hose

3.5 x 2 x 90 mm

4 - Plastic line

4 x 1 x 950 mm

87-41



5 - Plastic line

4 x 1 x 1030 mm

6 - Foam line

7 - Plastic line

4 x 1 x 490 mm

8 - Vacuum reservoir

9 - Cable tie

10 - Non-return valve

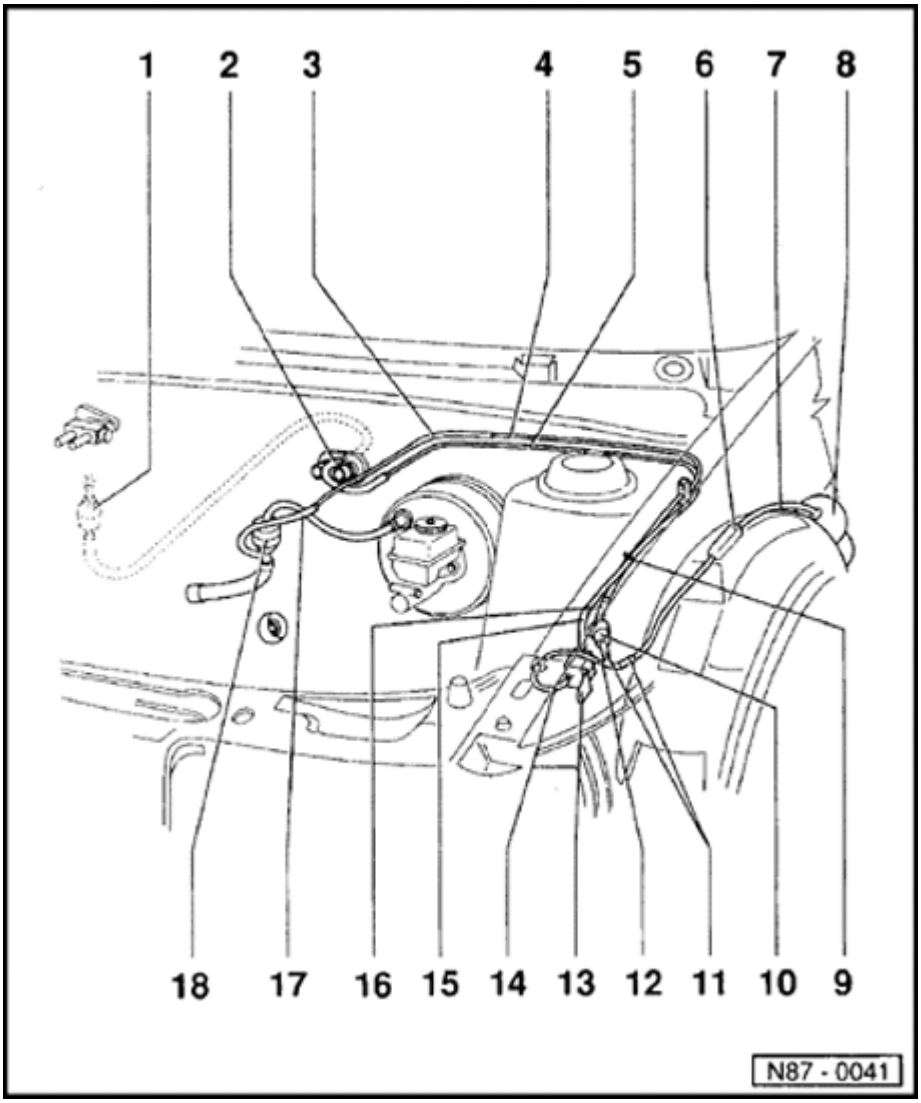
Direction of suction indicated by arrow

11 - Hose

3.5 x 2 x 40 mm

12 - T-connection

13 - Fresh air/recirculating flap two-way valve - N63-



14 - Hose

3.5 x 2 x 350 mm

15 - Hose

3.5 x 2 x 245 mm

16 - Hose

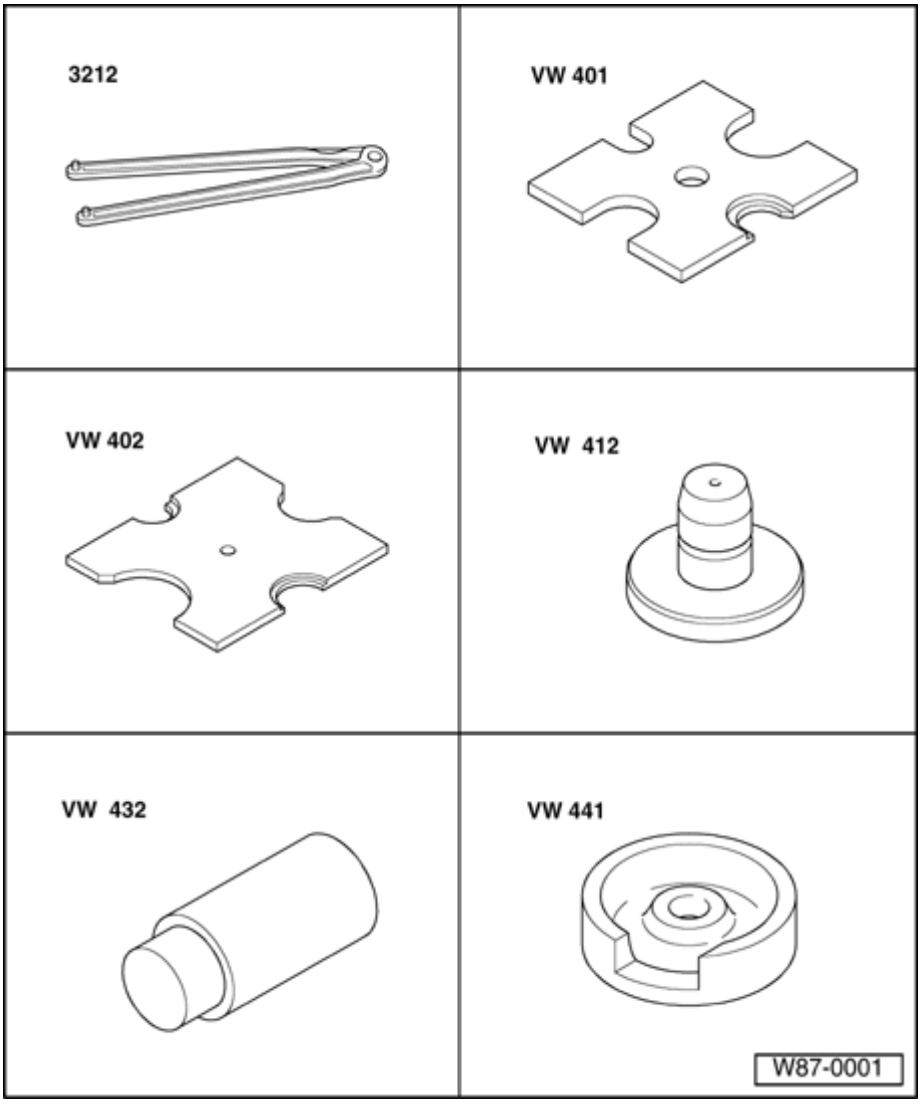
3.5 x 2 x 116 mm

17 - Hose

3.5 x 2 x 116 mm

18 - Non-return valve

87-43



A/C clutch -N25- (Sanden), servicing (compressor removed)

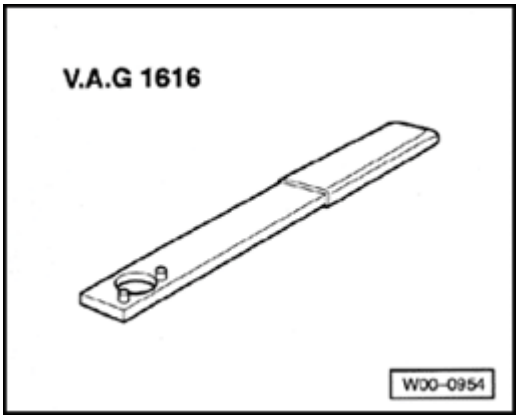
Special tools, testers, measuring instruments and auxiliary items required

- 3212 Pin wrench
- VW 401 Thrust plate
- VW 402 Thrust plate
- VW 412 Thrust disc
- VW 432 Arbor (50 mm)
- VW 441 Base block

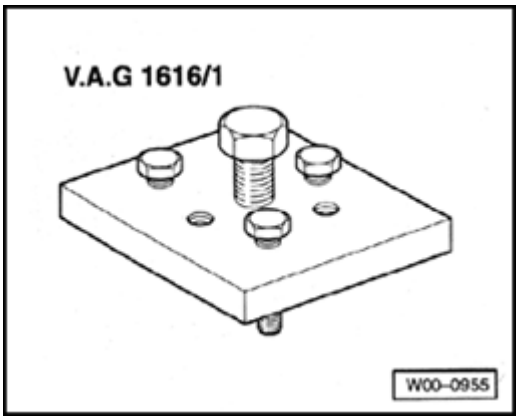
Not shown

- Two-arm puller with 100 mm span depth, such as Kukko 20-10 or equivalent (locally available)
- Depth gauge (locally available)

87-44

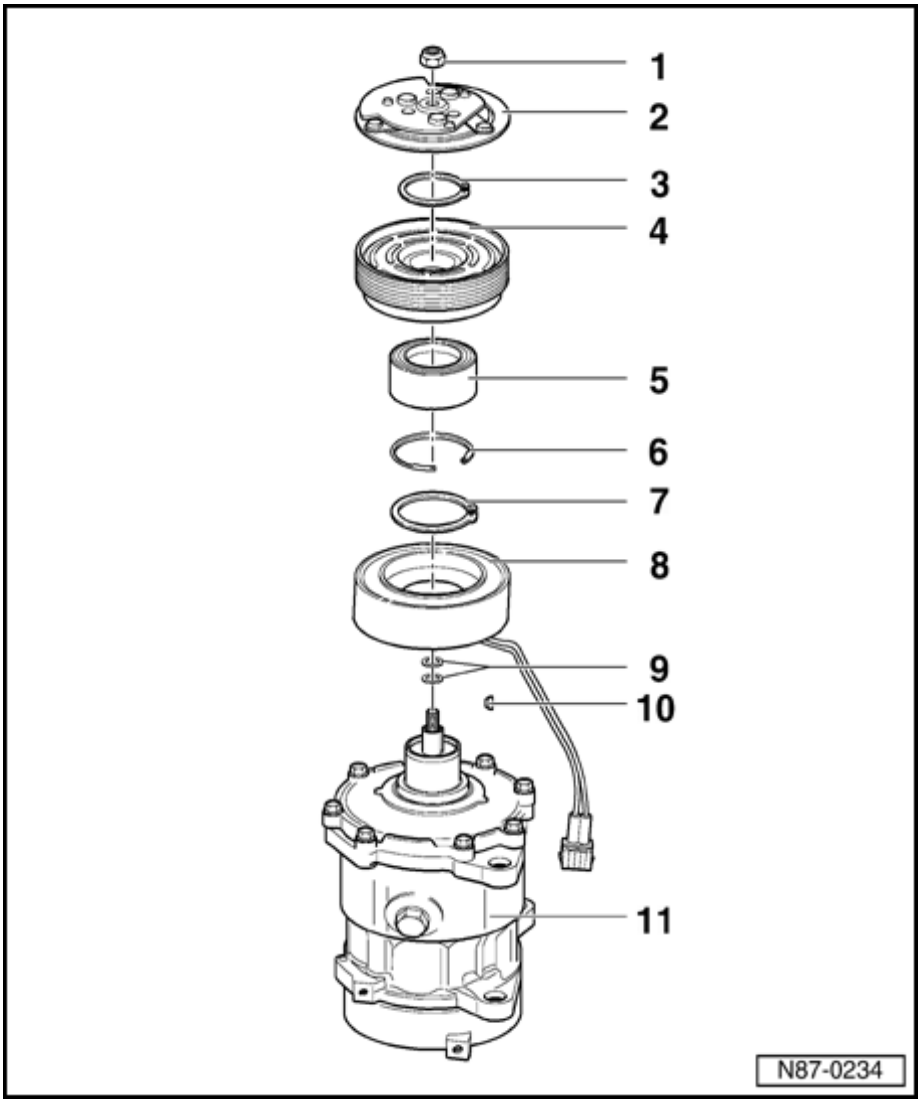


- VAG 1616 Retainer (for clutch plate)



- VAG 1616/1 Puller (for A/C clutch)

87-45



First do the following:

- Discharge A/C refrigerant system ⇒ Page 87-96
- Disconnect electrical connection for A/C clutch -N25-.
- Remove compressor from bracket,

- 4-cylinder gasoline engine page ⇒ Page 87-54 .
- 4-cylinder TDI engine page ⇒ Page 87-57 .
- 6-cylinder engine page ⇒ Page 87-60 .

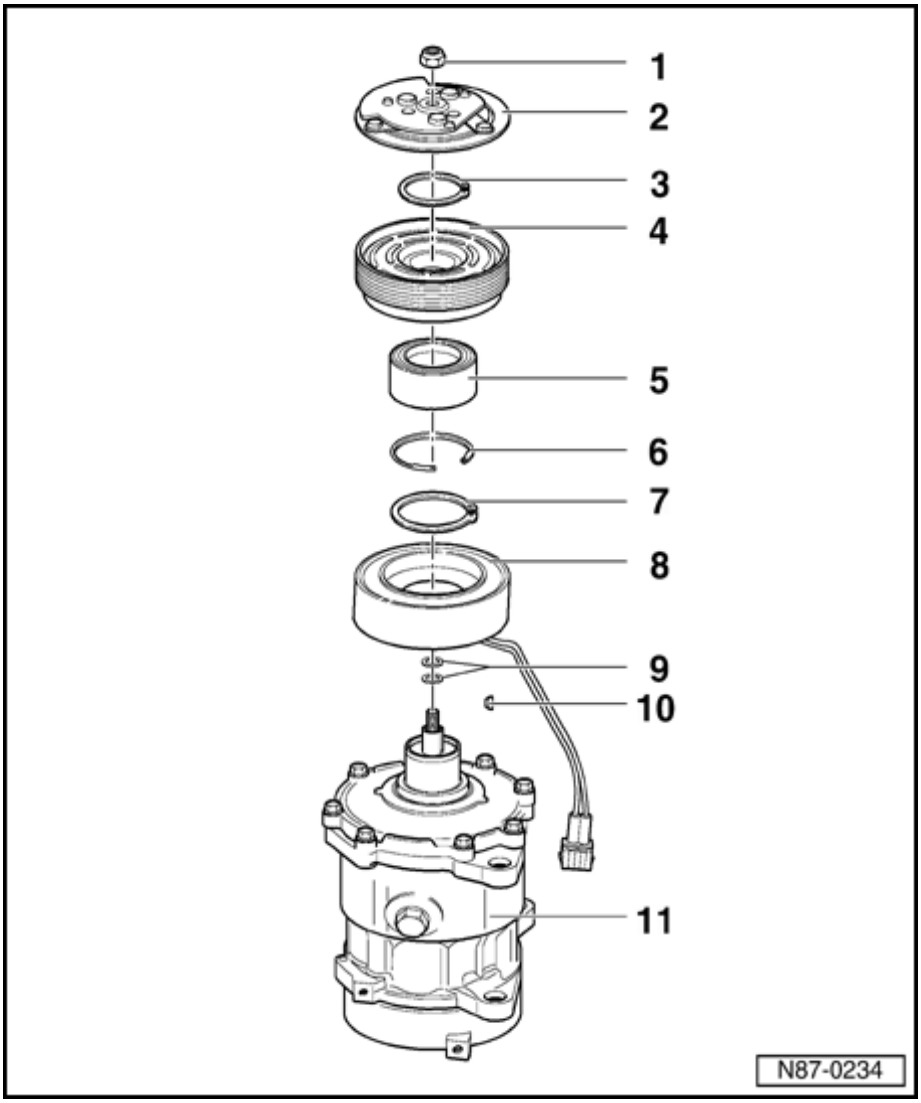
1 - Self-locking nut

- Tightening torque 20 Nm (15 ft. lb.)
- Always replace
- Removing ⇒ Fig. 1

2 - Clutch plate

- Removing ⇒ Fig. 2
- Checking/adjusting clearance ⇒ Fig. 7

87-46



3 - Circlip

- Always replace
- Install correctly: Flat side faces compressor
- Ensure correct seating in groove

4 - Ribbed belt pulley

- Removing ⇒ Fig. 3
- Installing ⇒ Fig. 6

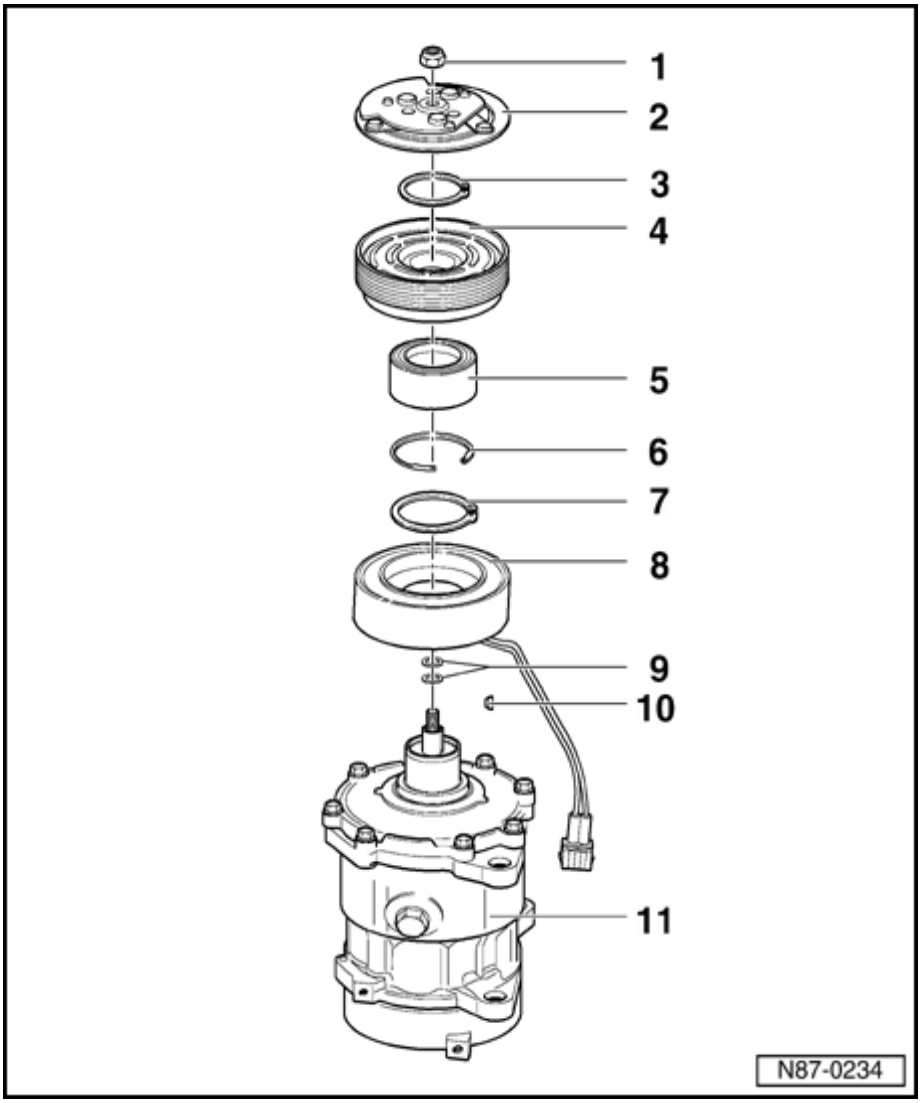
5 - Bearing

- Removing ⇒ Fig. 4
- Installing ⇒ Fig. 5

6 - Circlip

- Always replace
- Install correctly: Flat side faces compressor
- Ensure correct seating in groove

87-47



7 - Circlip

- Always replace
- Install correctly: Flat side faces compressor
- Ensure correct seating in groove

8 - Clutch coil

- Secured with fitted pin and circlip -7-

Note:

A thermo-fuse is incorporated into the clutch coil. Current to the clutch coil is interrupted in the event of compressor overheating (E.g.: a binding compressor).

9 - Shims

- Provide clearance between clutch plate and pulley
- Checking/adjusting clearance ⇒ Fig. 7

10 - Key

11 - Compressor

87-48

A/C Clutch -N25-, removing and installing

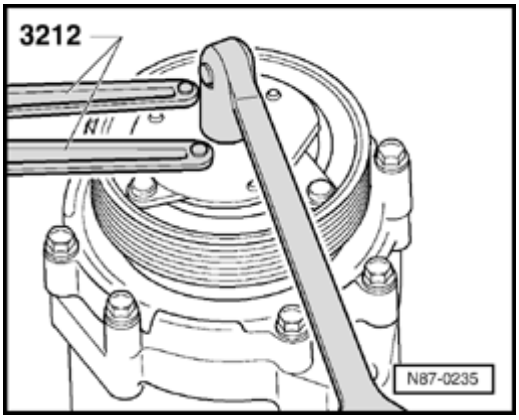


Fig. 1 Self-locking nut, removing

- Counter-hold clutch plate using pin wrench 3212 or VAG 1616 and remove nut.

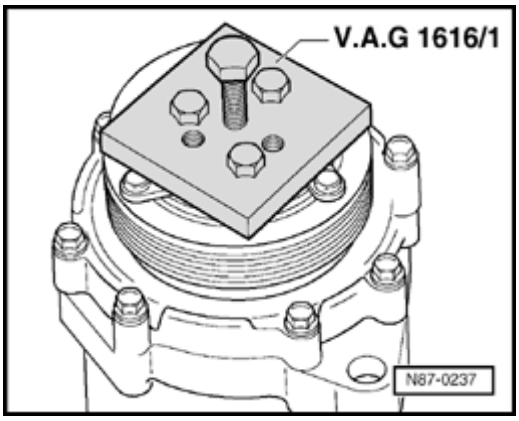


Fig. 2 Clutch plate, removing

- Use puller VAG 1616/1.

Note:

Three retaining bolts on VAG 1616/1 have 1/4"thread.

87-49

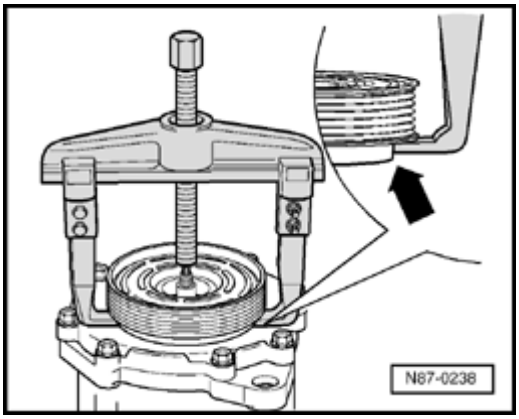


Fig. 3 Ribbed-belt pulley, removing

- Remove circlip ⇒ Page 87-46 , key 3 .
- Use locally available two-arm puller with 100 mm span depth (E.G.: Kukko 20-10 or equivalent).
- Place puller arm under pulley as illustrated -arrow-.

CAUTION!

Place puller arms under pulley only far enough so as to not damage clutch coil upon removal.

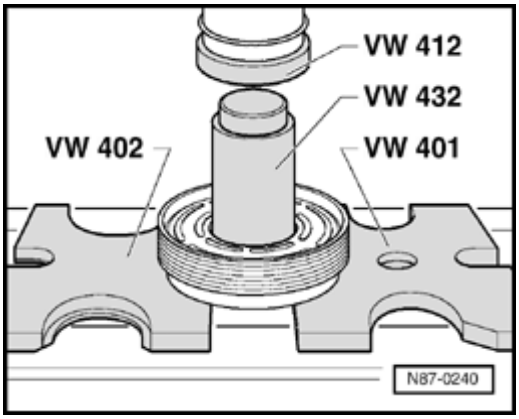


Fig. 4 Bearing, removing

87-50

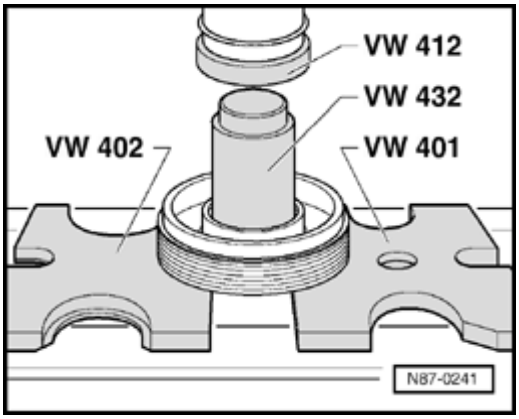


Fig. 5 Bearing, installing

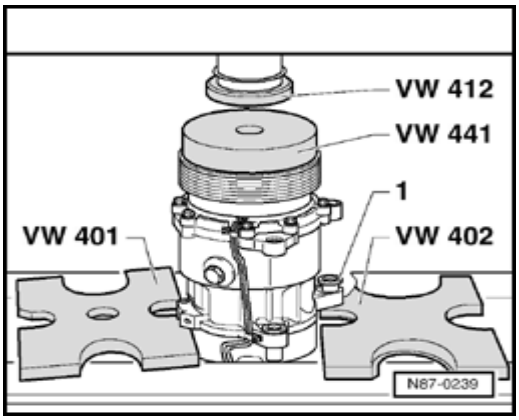


Fig. 6 Ribbed-belt pulley, installing

CAUTION!

In order to prevent pulley deformation while pressing, ensure compressor remains flat at all times.

- Displace threaded bushing -1-.
- Install circlip ⇒ Page 87-46 , key 3 .

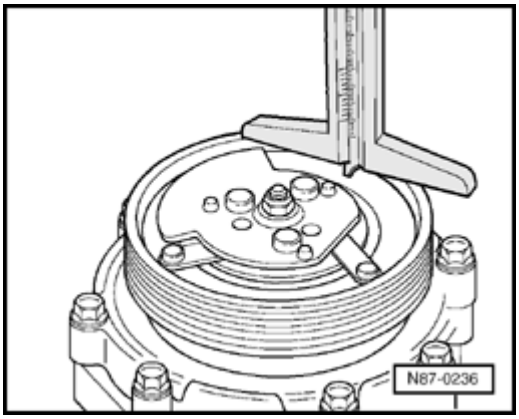


Fig. 7 Clutch plate, checking/adjusting clearance

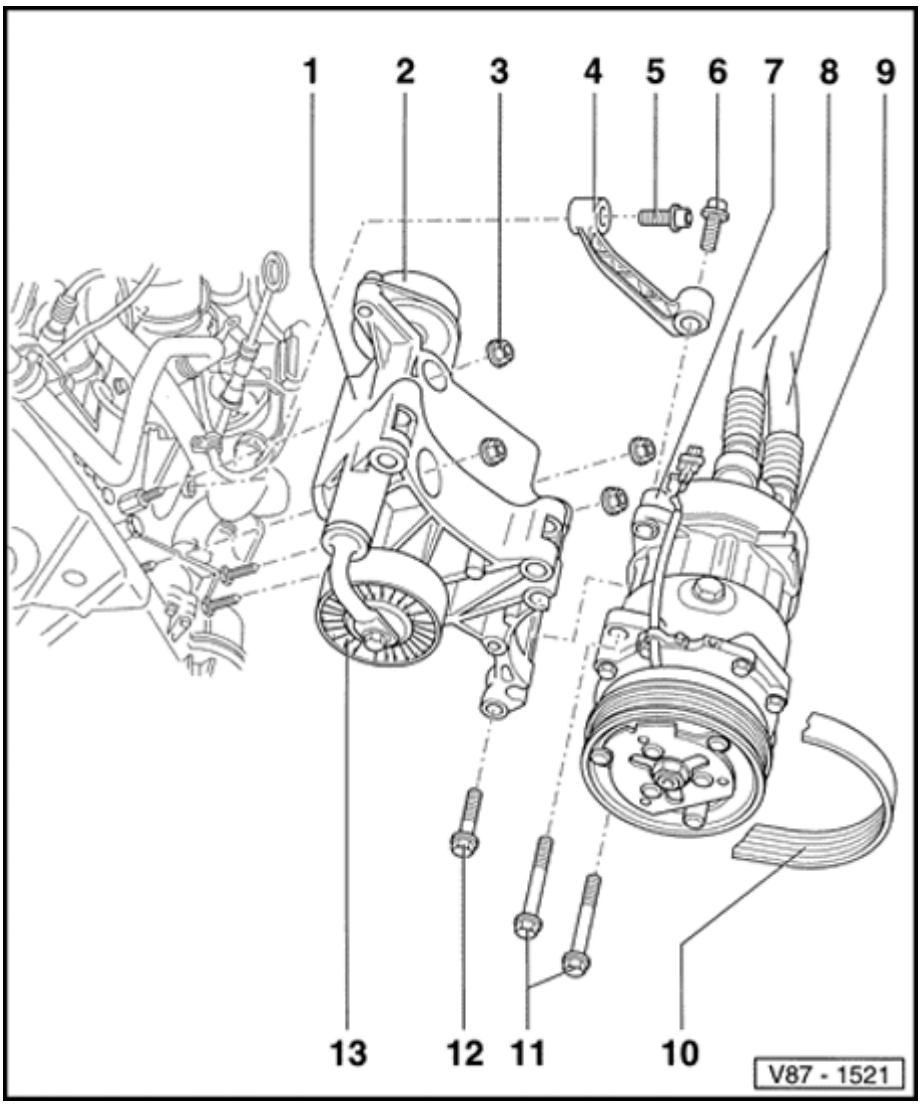
- With compressor grounded, repeatedly apply 12V to clutch coil terminal connection.
- Measure clearance between clutch plate and pulley around entire circumference.

♦ Specification: 0.4.....0.8 mm

Notes:

♦ *Clearance must be within tolerance around entire circumference.*

♦ *If clearance is outside the allowable tolerance, remove clutch plate and adjust clearance by removing or installing shims* ⇒ *Page 87-47* *, key 9 .*



Compressor bracket, removing and installing

4-cyl. gasoline engine

Note:

The compressor bracket and related components can be removed and installed without having to open the refrigerant system

1 - Generator (GEN) and compressor bracket

- Generator, removing and installing

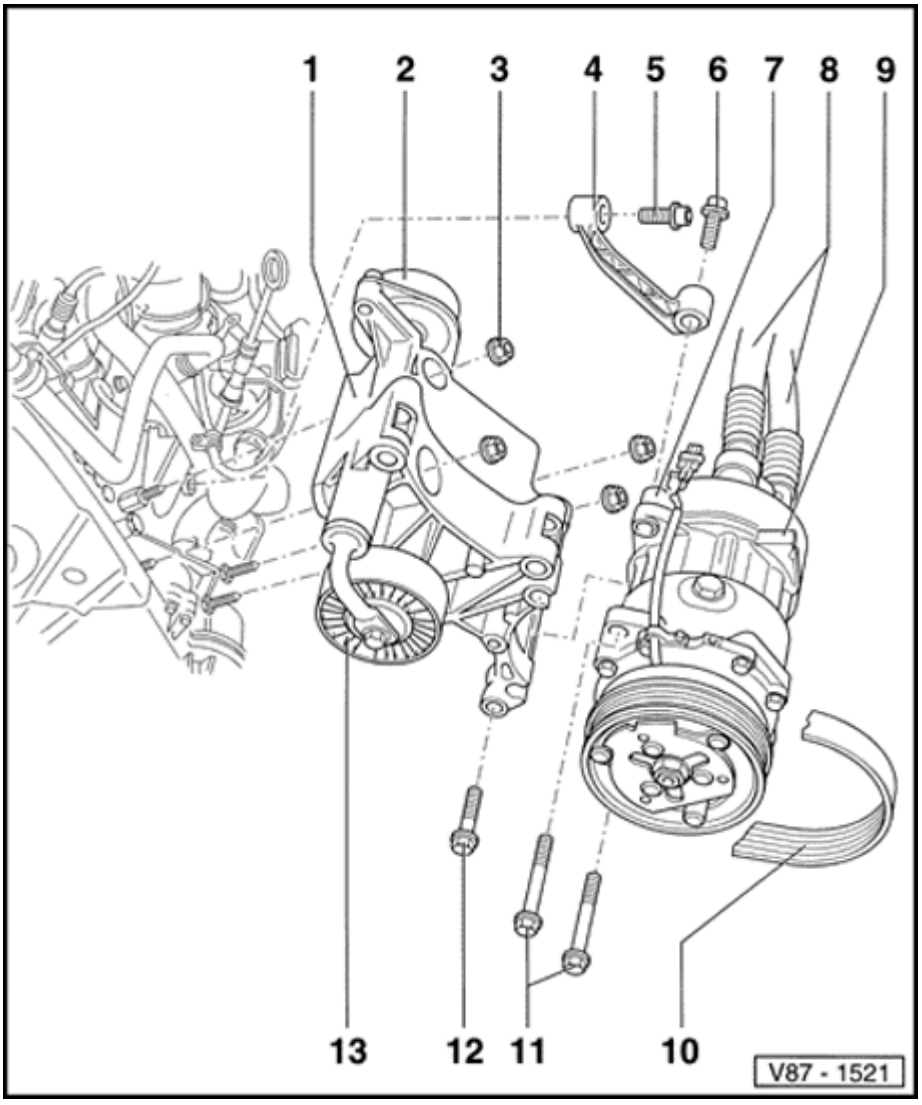
⇒ *Repair Manual, Electrical Equipment, Repair Group 27*

2 - Tensioning element for tensioner

3 - Hex nut M8

- 30 Nm (22 ft. lb)

87-53



4 - Compressor bracket

- Installing:
  - Insert bolts - 5 - and - 6 - 2 to 5 turns.
  - Screw in bolt -6- until bracket contacts threaded bushing - 7 -.
  - First tighten bolt - 5 - to 45 Nm (4 to 33 ft. lb), then tighten bolt - 6 - to 45 Nm. (4 to 33 ft. lb)

5 - Socket head bolt M10x30

- 45 Nm (33 ft. lb)

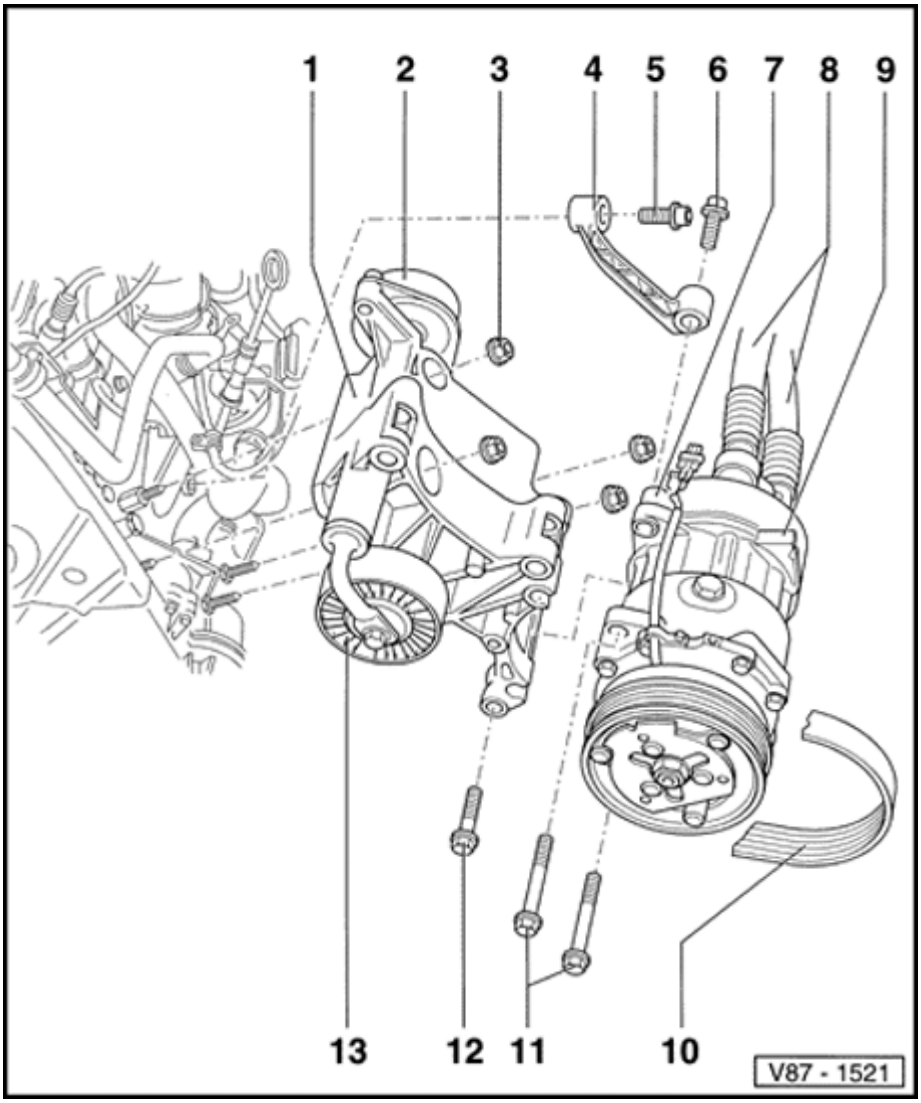
6 - Socket head bolt M10x30

- 45 Nm (33 ft. lb)

7 - Threaded sleeve

8 - Refrigerant hoses

87-54



9 - Compressor

- Removing:
  - Loosen hex bolt - 11 - two turns and knock-back threaded sleeve - 7 - from compressor. Then remove hex bolts.

10 - Ribbed belt

- Removing and installing

⇒ *Repair Manual, 2.0 Liter 4-Cyl. 2V Engine Mechanical, Engine Code(s): ABA m.y. 1995, Repair Group 13*

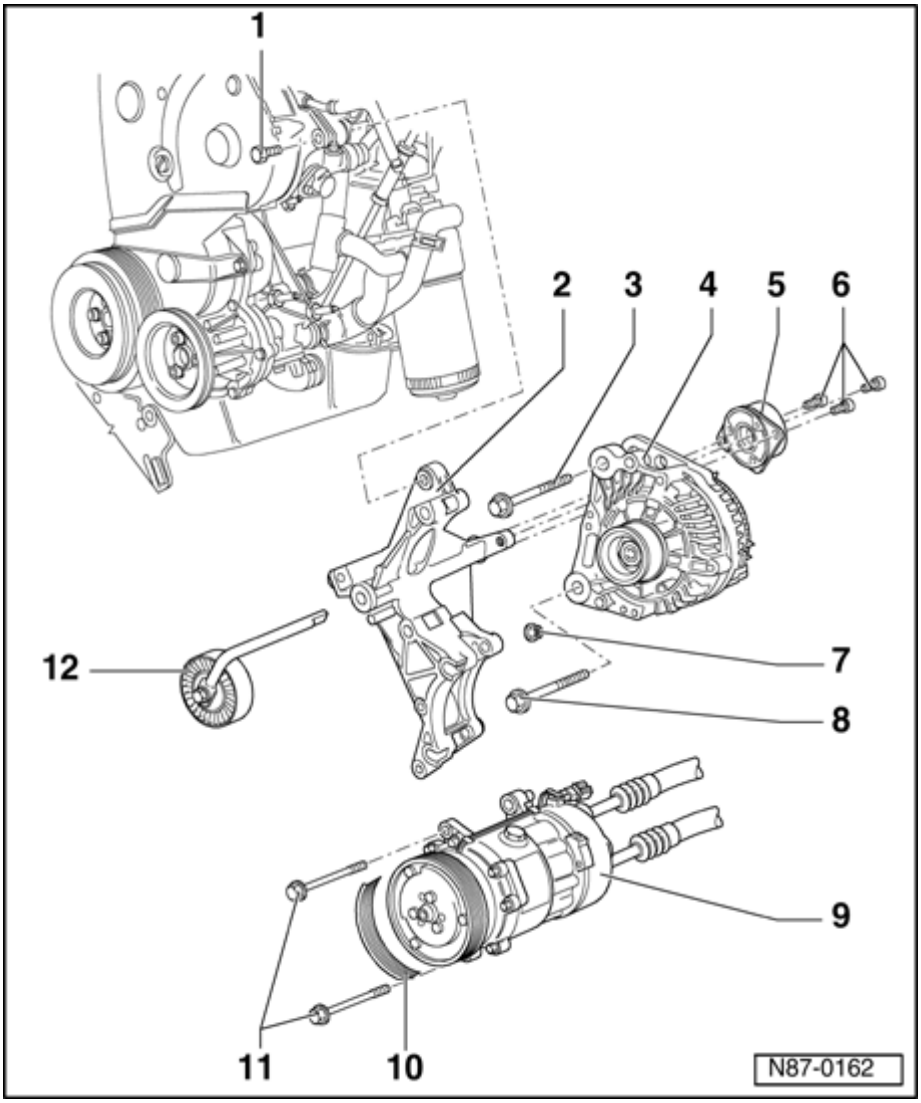
11 - Hex bolt M10x112

- 45 Nm (33 ft. lb)

12 - Hex bolt M8x42

- 25 Nm (18 ft. lb)

13 - Tensioner



4-cyl. TDI engine

Note:

The compressor bracket and related components can be removed and installed without having to open the refrigerant system

1 - Hex bolt M8x22

- 25 Nm (18 ft. lb)

2 - Generator (GEN) and compressor bracket

- Removing: first remove generator -4-

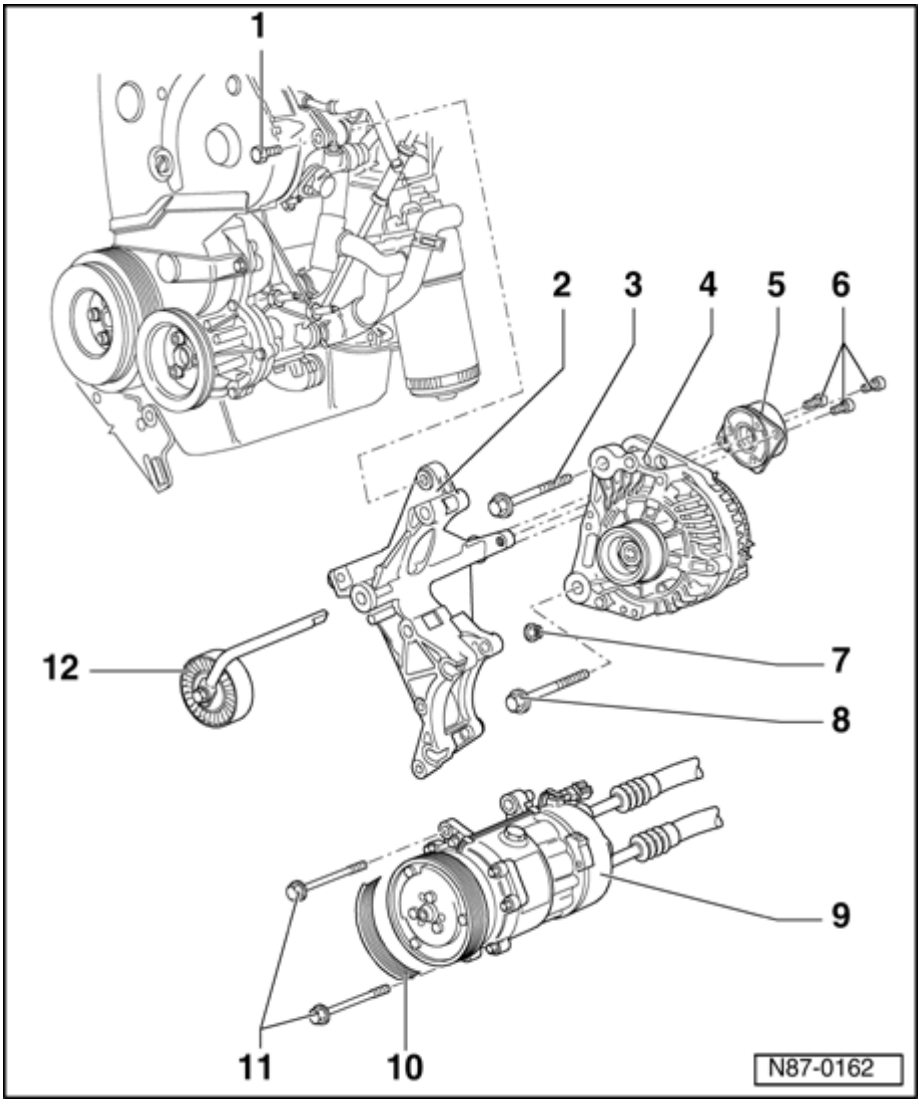
⇒ *Repair Manual, Electrical Equipment, Repair Group 27*

- Then remove compressor -9-

3 - Hex bolt M8x85

- 25 Nm (18 ft. lb)

87-56



4 - Generator (GEN)

- Removing:

⇒ *Repair Manual, Electrical Equipment, Repair Group 27*

5 - Tensioning element for tensioner roller

6 - Hex socket bolt M8x22

- 25 Nm (18 ft. lb)
- Qty.: 3

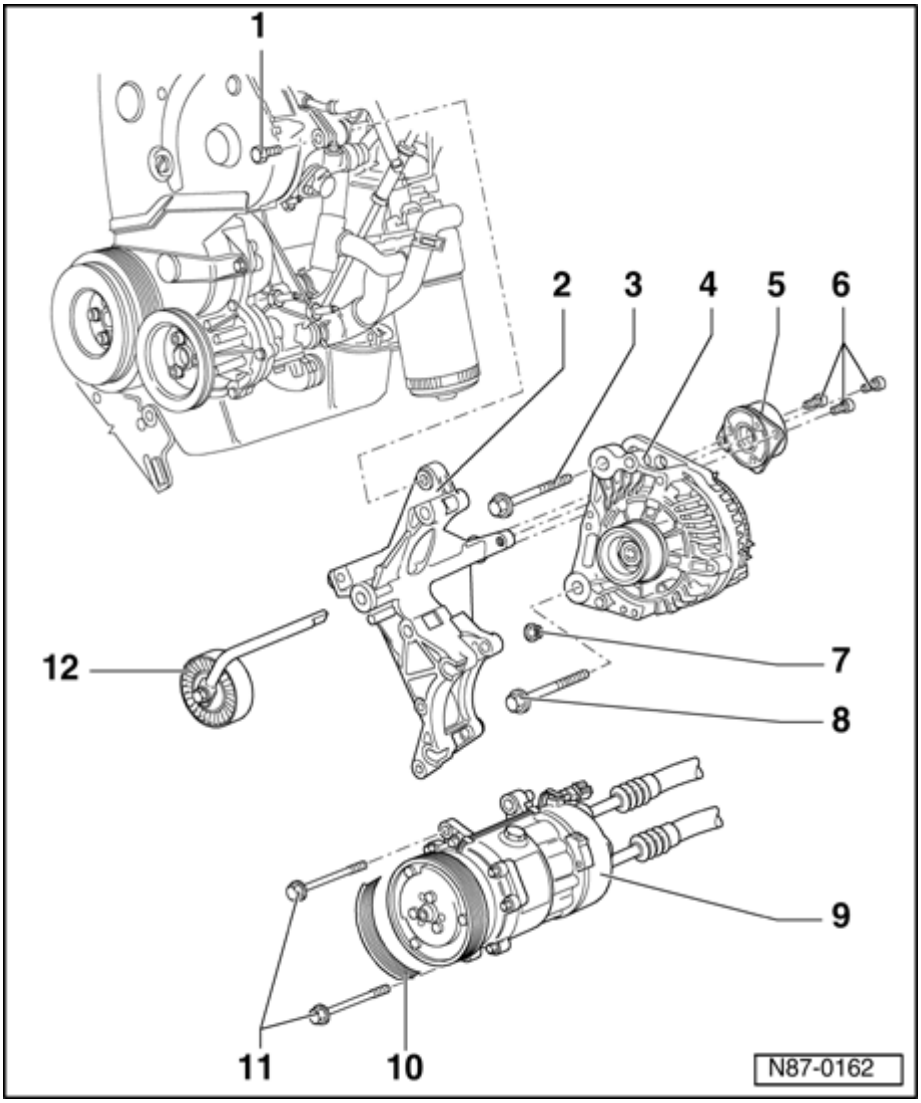
7 - Hex nut M8

- 30 Nm (22 ft. lb)
- Qty.: 4

8 - Hex bolt M8x85

- 25 Nm (18 ft. lb)

87-57



9 - Compressor

- Removing:
  - Loosen hex bolt - 11 - two turns and knock-back threaded sleeve from compressor. Then remove hex bolts.

10 - Ribbed belt

- Removing and installing

⇒ *Repair Manual, 1.9 Liter 4-Cyl. 2V TDI Engine Mechanical, Engine Code(s): AAZ, 1Z, Repair Group 13*

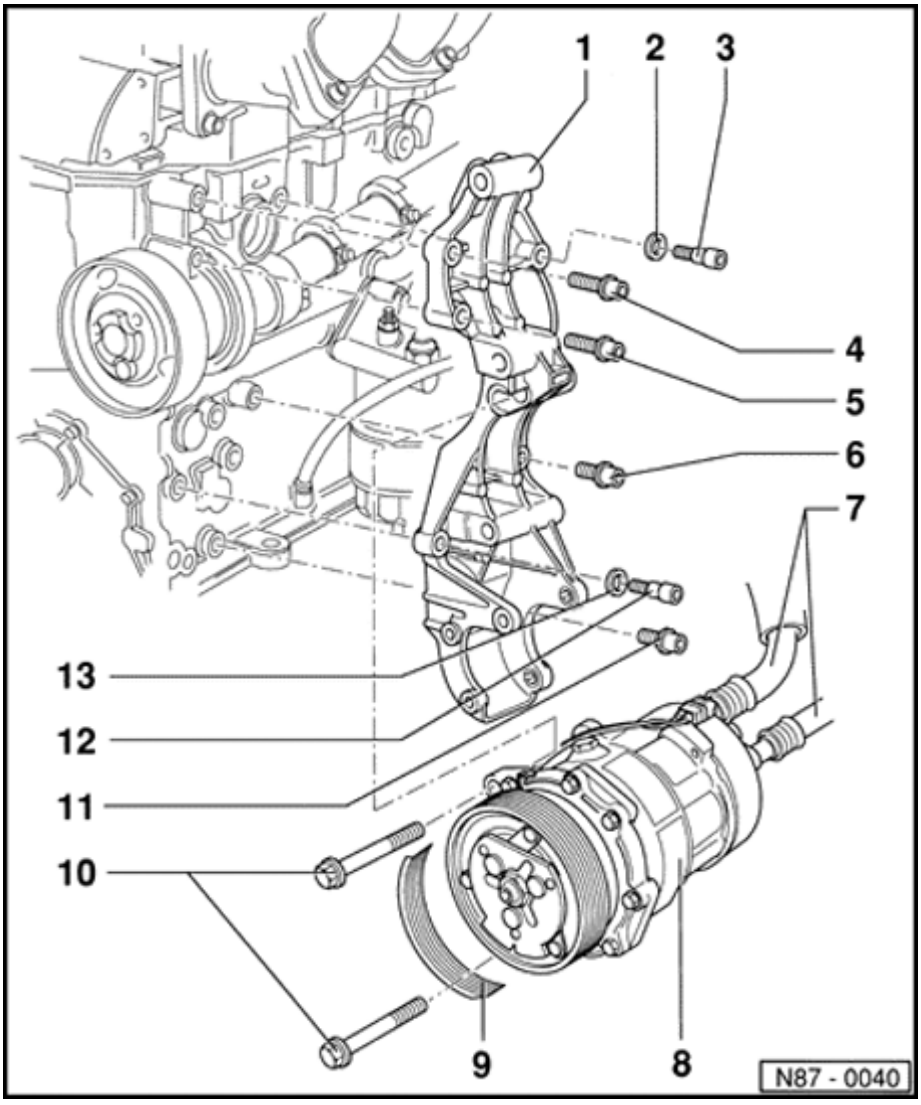
11 - Hex bolt M10x112

- 45 Nm (33 ft. lb)
- Qty.: 2

12 - Tensioning roller

- Removing:
  - Loosen M6X16 hex bolt at tensioning element and force out from housing with hammer.

87-58



6-cyl. engine

Note:

Compressor and related parts can be removed and installed without having to open refrigerant system

1 - Generator (GEN), compressor and power steering pump bracket

♦ Removing:

- First remove generator (GEN), compressor - 8 - and Power steering pump
- Removing and installing generator (GEN)

⇒ *Repair Manual, Electrical Equipment, Repair Group 27; Removing and installing generator (GEN).*

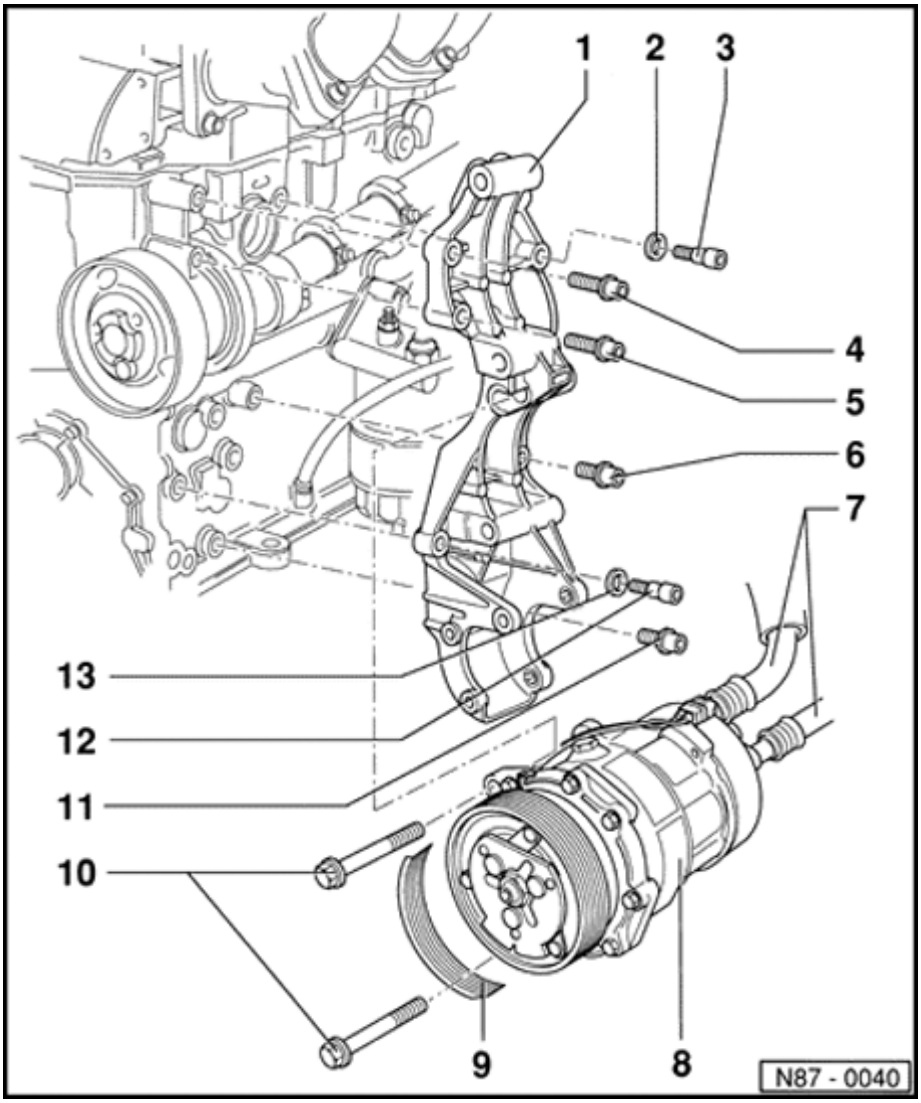
- Remove power steering pump

⇒ *Repair Manual, Suspension, Wheels, Brakes, Steering, Repair Group 48*

♦ Installing:

- First, fit "fitted bolts.

⇒ *Repair Manual, Suspension, Wheels, Brakes, Steering, Repair Group 48*



2 - Washer 8.4x16x1.6

3 - Fitting bolt M8x28

- 25 Nm (18 ft. lb)

4 - Socket head bolt M8x30

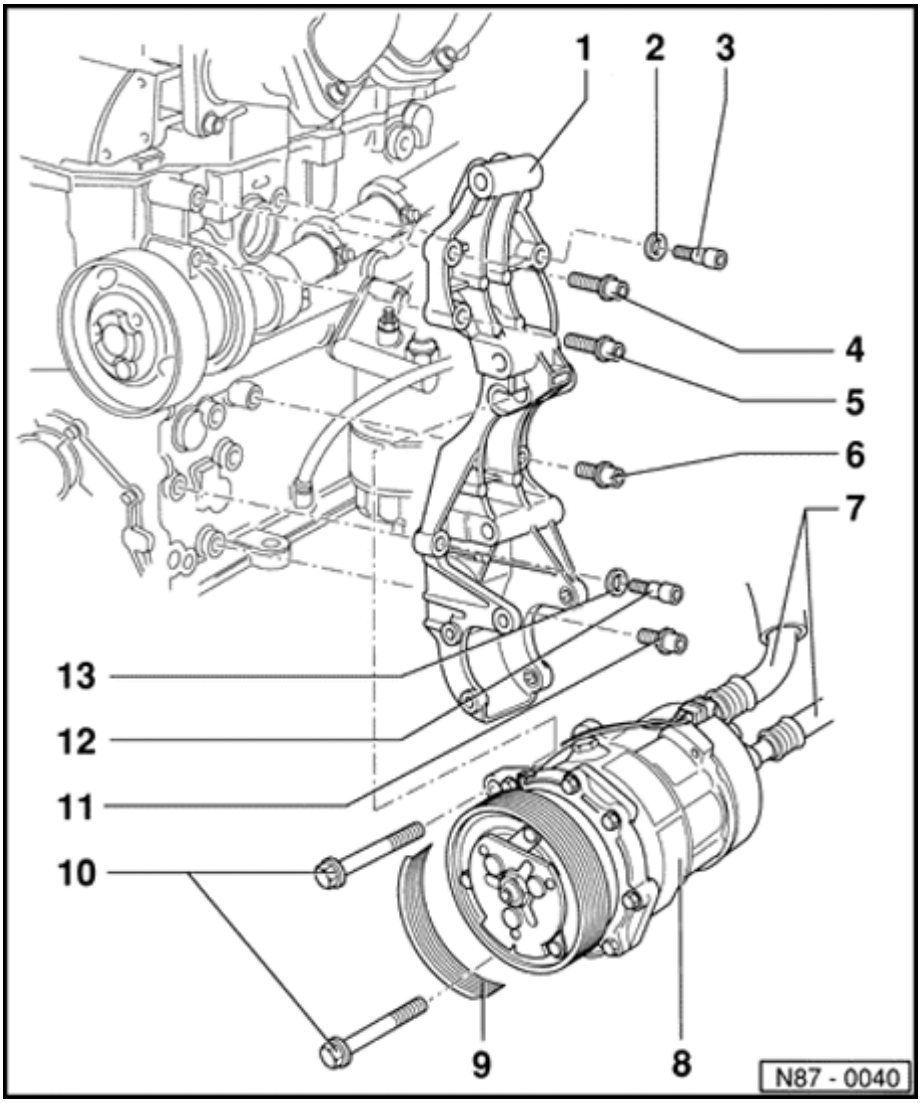
- 25 Nm (18 ft. lb)

5 - Socket head bolt M8x30

- 25 Nm (18 ft. lb)

6 - Socket head bolt M8x38

- 25 Nm (18 ft. lb)



7 - Refrigerant hoses

8 - Compressor

- Removing:

  - First discharge refrigerant circuit ⇒ Page 87-96 .

  - Remove front bumper

⇒ *Repair Manual, Body Exterior, Interior, Repair Group 63*

  - Loosen hood lock carrier and pull forward.

⇒ *Repair Manual, Body Exterior, Interior, Repair Group 50*

  - Remove headlight housing

⇒ *Repair Manual, Electrical Equipment, Repair Group 94*

  - Remove ribbed belts - 9 -

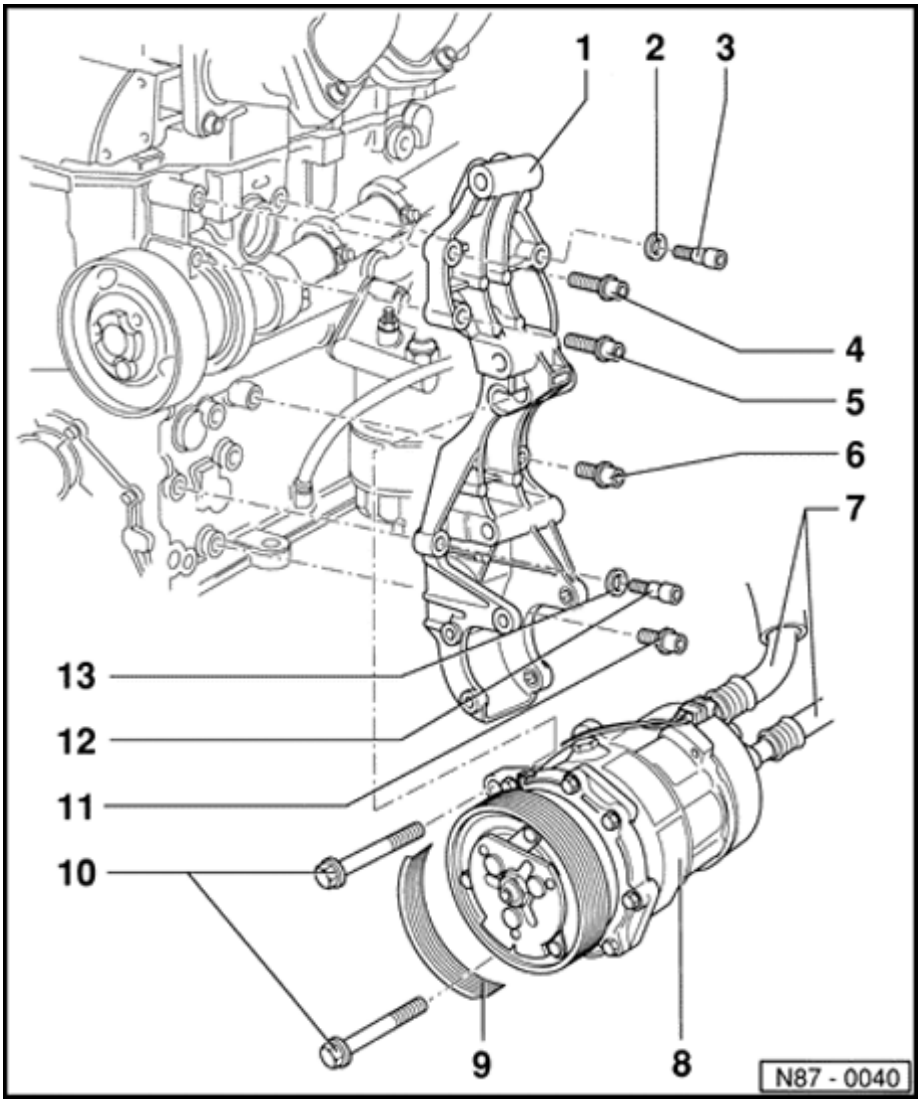
⇒ *Repair Manual, 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AAA, Repair Group 13*

  - Generator (GEN), remove

⇒ *Repair Manual, Electrical Equipment, Repair Group 27*

  - Loosen hex bolts - 10 - a couple of turns and knock-

back threaded sleeves from compressor. Then remove hex bolts.



9 - Ribbed belts

- Removal and installing

⇒ *Repair Manual, 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AAA, Repair Group 13*

10 - Hex bolt M10x112

- 45 Nm (33 ft. lb)

11 - Socket head combi-bolt M8x30

- 25 Nm (18 ft. lb)

12 - Fitted bolt M8x20

- 25 Nm (18 ft. lb)

13 - Washer 8.4x16x1.6

A/C refrigerant system

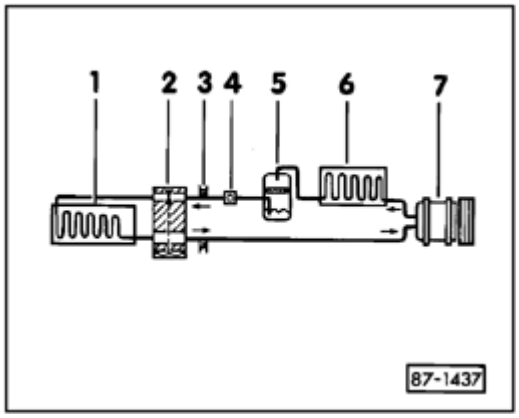
A/C refrigerant system, identification

Note:

Before carrying out any work on the A/C refrigerant system, refer to A/C system safety measures ⇒ *Page 87-1* .

A/C refrigerant systems on Passat models are charged with refrigerant R-134a.

Labels specifying refrigerant type are located on the compressor or radiator support. Before proceeding with refrigerant system servicing or repairs, always confirm refrigerant type used.



A/C refrigerant circuit with expansion valve and receiver drier

1 - Evaporator

2 - Expansion valve

3 - Service valve

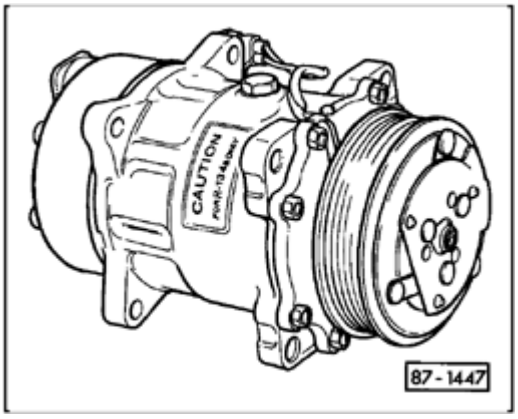
4 - Sight glass

5 - Receiver drier

6 - Condenser

7 - Compressor

A/C refrigerant system, component overview



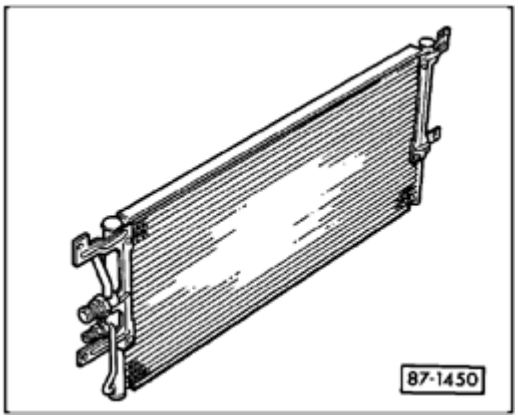
Compressor

The compressor is driven via a belt on the engine when power is applied to the the A/C clutch -N25- (A/C "ON").

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

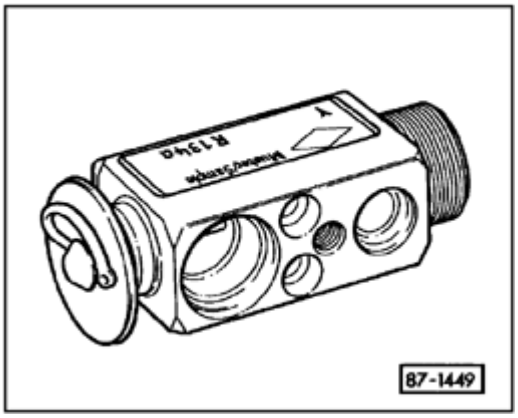
Notes:

- *The compressor contains refrigerant oil that is mixable under all temperatures with the refrigerant.*
- *A label on the compressor indicates that compressor is for R-134a systems only.*



Condenser

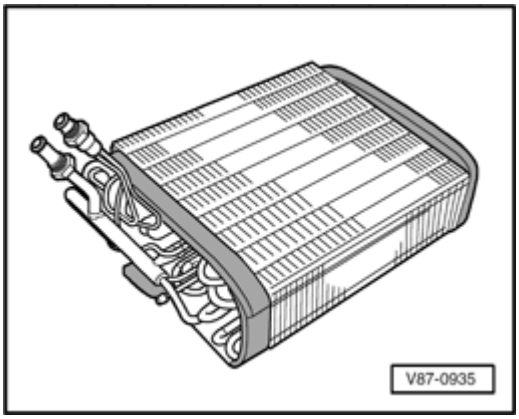
The condenser transfers heat from the compressed refrigerant gas to the outside air which causes the refrigerant to change state from a gas to a liquid.



Expansion valve

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

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



Evaporator

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

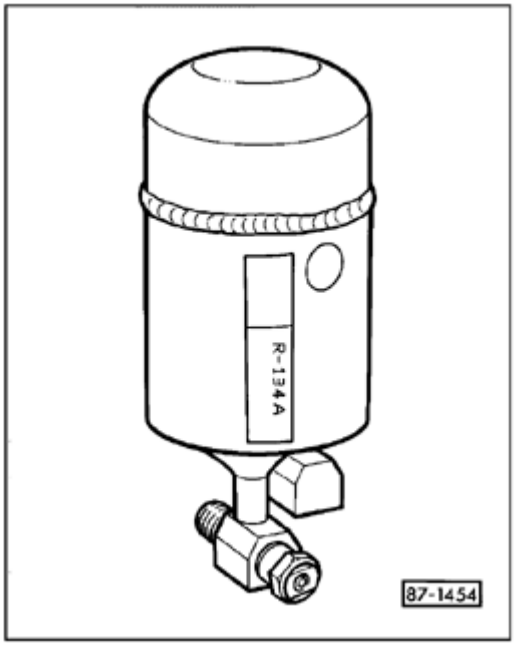
A/C system hoses and lines

The mixture of refrigerant oil (PAG oil) and refrigerant R-134a attacks some metals and alloys (for example, copper) and breaks down certain hose material. Where applicable, hoses and lines may be identified with a green mark (stripe) or the lettering "R-134a".

Hoses and lines are fastened together with threaded couplings/fittings and are retained (to bodywork or components) with specially isolated hose clamps.

Notes:

- *During servicing, all couplings, fittings and related fasteners must be torqued to specifications* ⇒ *Page 87-69* .
- *Ensure that only special tools (as specified) are used while servicing.*



Receiver drier

The receiver drier accumulator acts as a refrigerant reservoir for the system. Any moisture in the refrigerant system is absorbed by drier desiccantr.

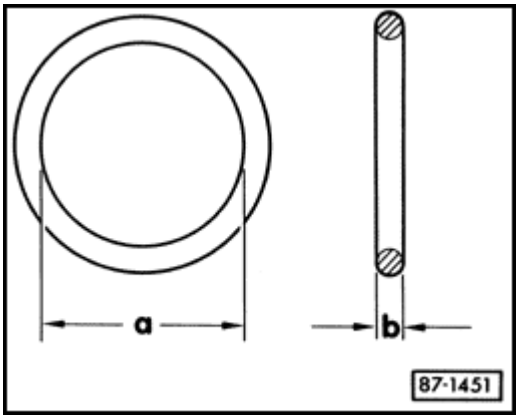
Note:

Replace the receiver drier each time the refrigerant circuit is opened.

CAUTION!

The receiver drier may be identified with a green R-134a label and MUST NOT be used in R-12 systems (the drier desiccant inside is only compatible with R-134a refrigerant). Likewise, NEVER use an R-12 receiver drier in an R-134a system.

87-67

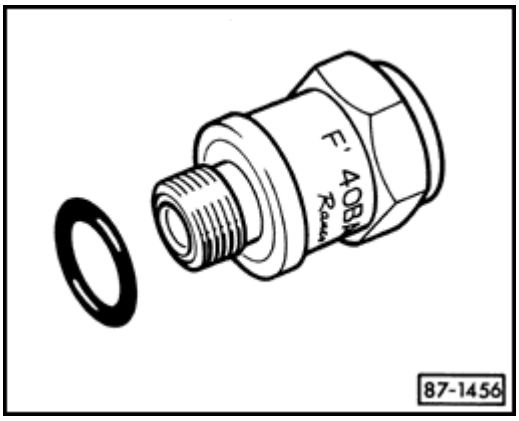


O-rings

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

Notes:

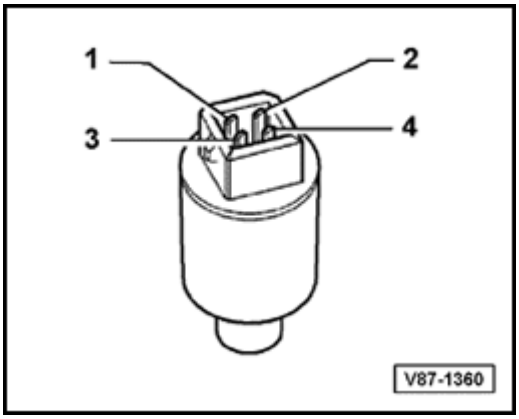
- *Always use correct size O-rings (dimensions -a- and -b-).*
- *Do not reuse O-rings, always replace. Use only new O-rings that are compatible with R-134a refrigerant and refrigerant (PAG) oil on R-134a systems.*
- *Lubricate O-rings with the appropriate refrigerant oil before installing (only use PAG oil).*



Pressure relief valve

The pressure relief valve is mounted on the compressor or compressor inlet/outlet manifold. At pressures above 40 bar (580 psi), the pressure relief valve opens to vent excessive pressure. When the system pressure is reduced, the valve closes to prevent total refrigerant loss.

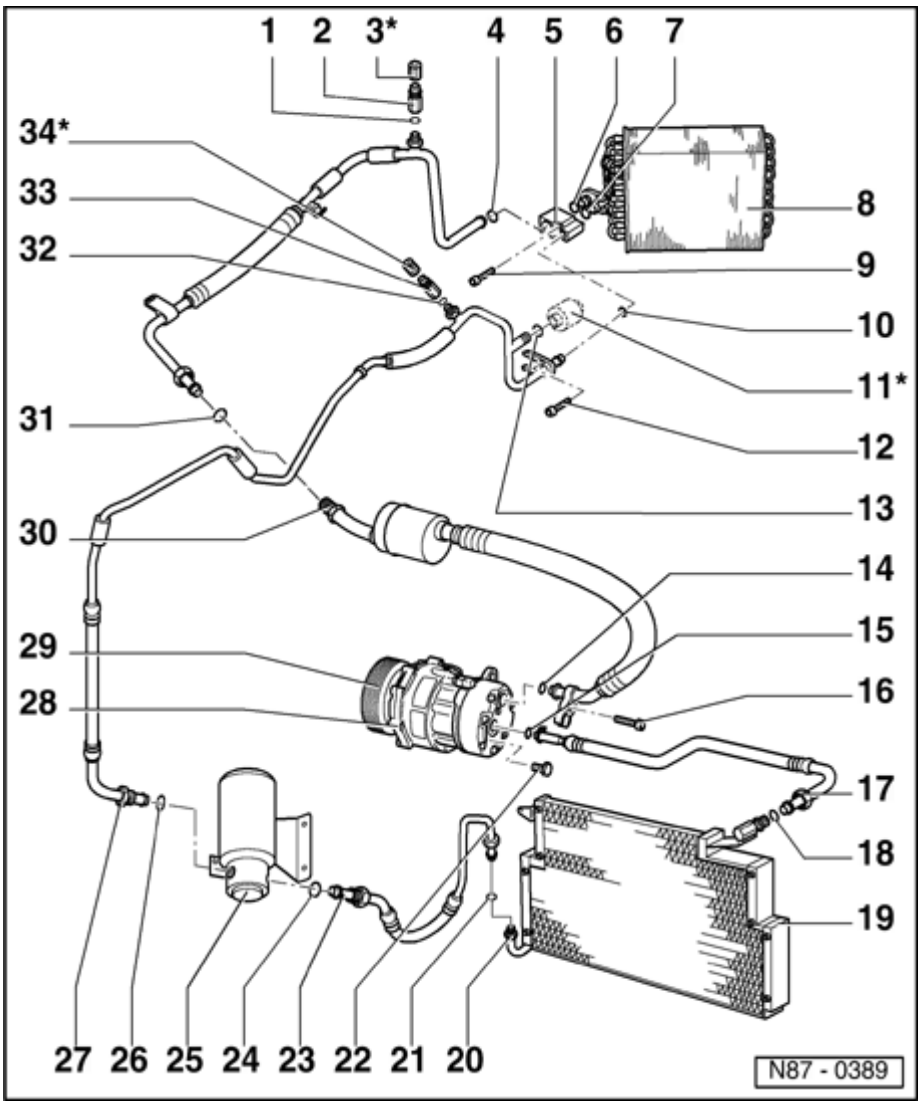
On some models, a cap on the pressure relief valve will pop out if the valve has opened.



A/C pressure switch -F129-

The A/C pressure switch is a combination switch (two switching components) that protects refrigerant circuit components from malfunctioning due to excessive or insufficient refrigerant system pressures.

- Switch part between terminals 1 and 2 switches off the A/C clutch -N25- when the system pressure is too high or when there is not enough refrigerant in the system .
- Switch part between terminals 3 and 4 switches coolant fan -V7- to the next higher fan speed when system pressures increase.



A/C refrigerant system, servicing

Notes:

- *Before carrying out any work on the A/C refrigerant system, refer to A/C refrigerant system safety measures* ⇒ *Page 87-1* .
- *Service refrigerant system using Kent More ACR 4 or equivalent.*
- *Only system components identified with an * can be serviced or replaced without discharging refrigerant system.*
- *During servicing, all couplings, fittings and related fasteners must be torqued to specifications.*

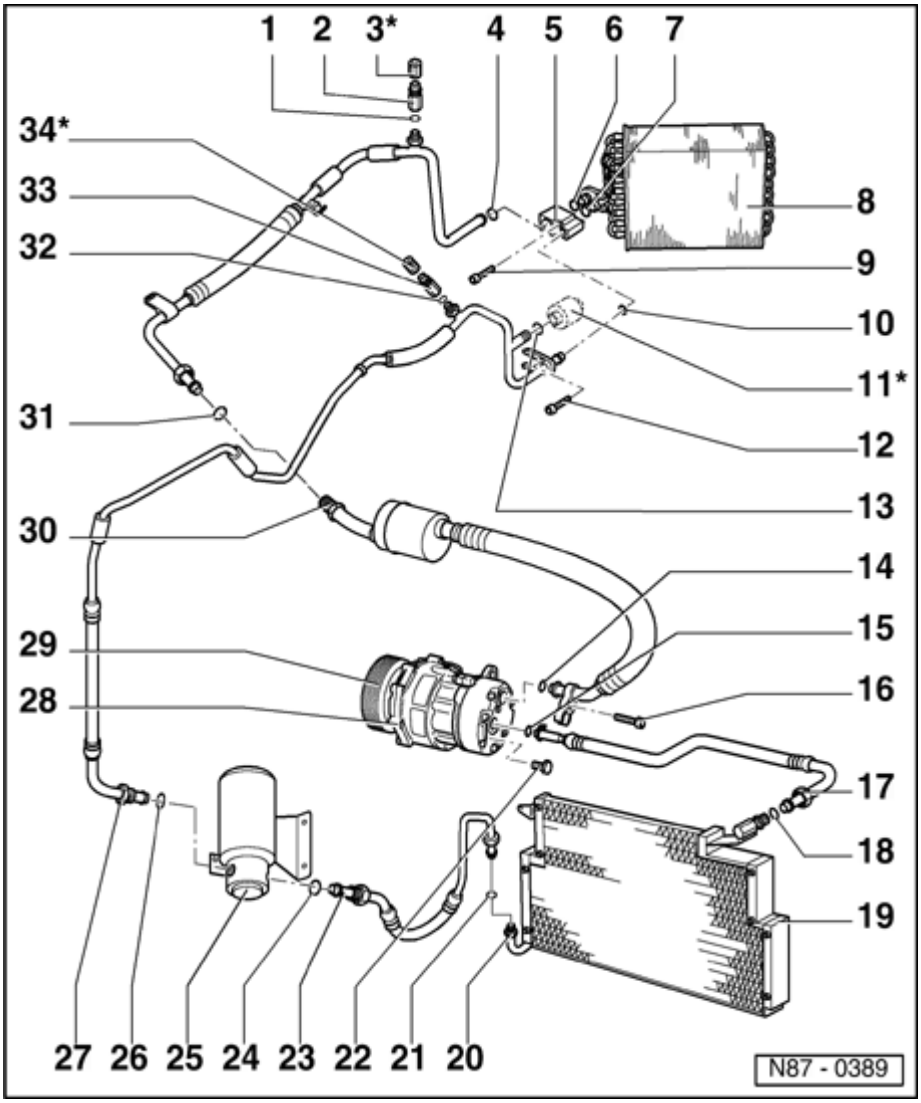
1 - O-ring

- 7.6 mm; 1.8mm

2 - Low pressure service valve

- Only use Kent Moore ACR4 or equivalent
- Removing and installing ⇒ Fig. 2 .
- Refrigerant system capacity ⇒ Page 87-114 .

3 - Cap*



4 - O-ring

- 17.7 mm; 1.8mm

5 - Expansion valve

- In engine compartment at bulkhead, right
- Must be sealed against water spray.
- Removing ⇒ Page 87-79 .

6 - O-ring

- 14 mm; 1.8mm

7 - O-ring

- 10.8 mm; 1.8mm

8 - Evaporator

- In heating and a/c unit
- Removing ⇒ Page 87-84 .

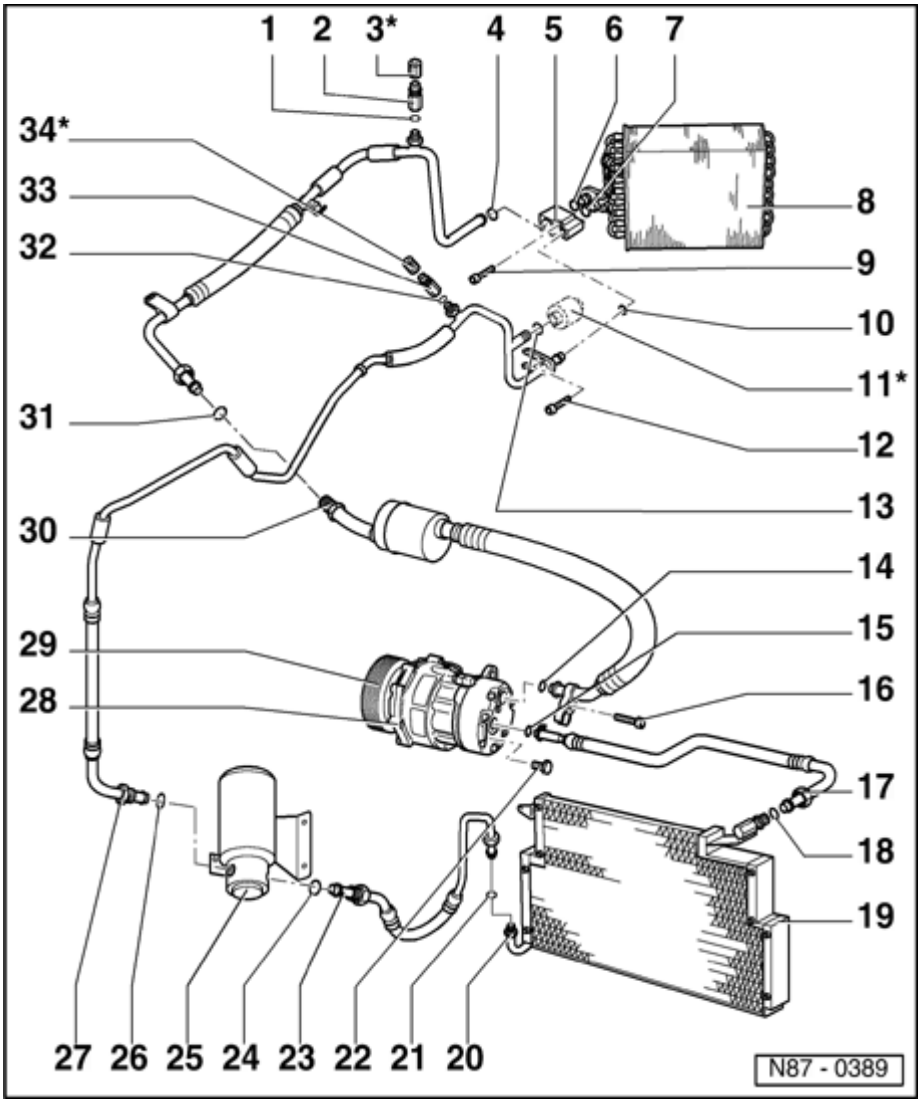
9 - Bolt

- 7 Nm (62 in. lb.)

10 - O-ring

- 7.6 mm; 1.8mm

87-71



11 - A/C pressure switch - F129-*

- Checking -F129- ⇒ Fig. 3 .
- Removing and installing - tightening torque: 8 Nm (71 in. lb.)
- Component can be removed without discharging refrigerant system

12 - Bolt

- 7 Nm (62 in. lb.)

13 - O-ring

- 10.8 mm; 1.8mm

14 - O-ring

- 20.5 mm; 1.8mm

15 - O-ring

- 20.5 mm; 1.8mm

16 - Bolt

- 30 Nm (22 ft. lb.)

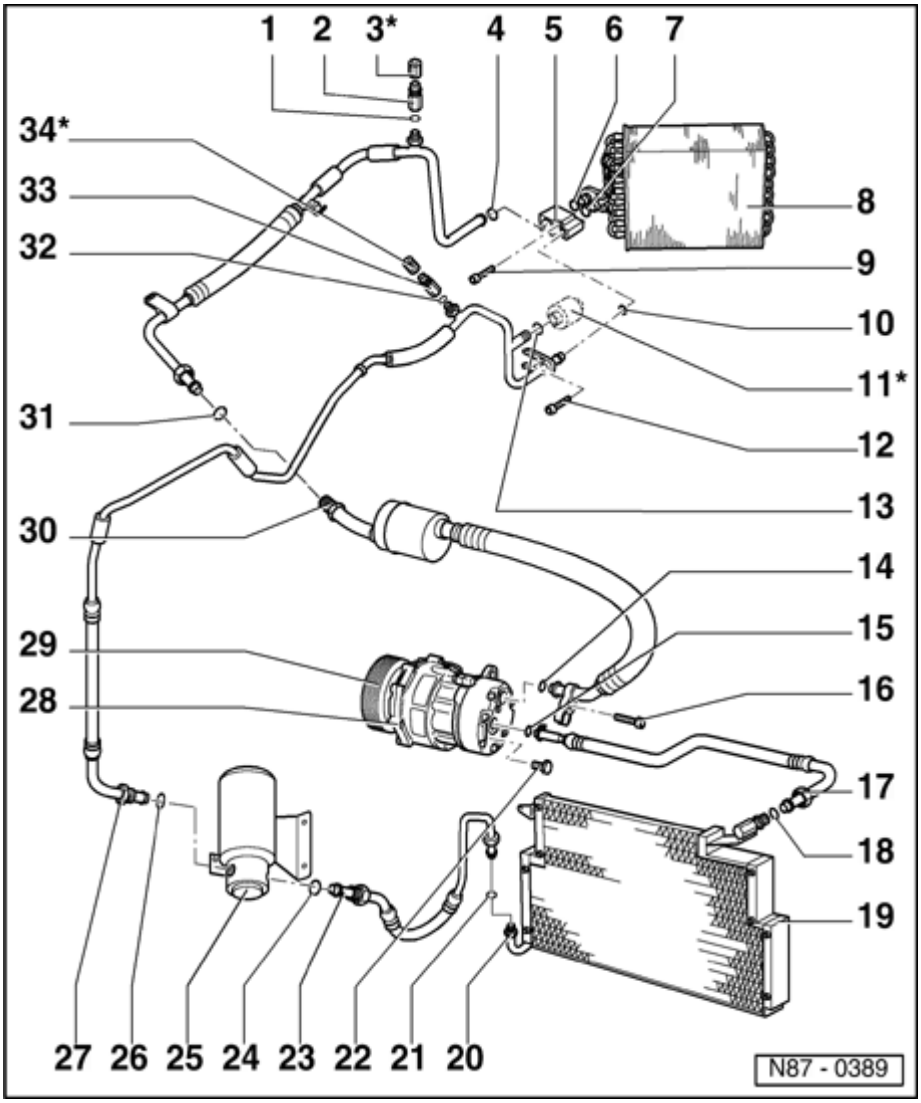
17 - Coupling

- Thread 3/4" - 16 UNF
- 35 Nm (26 ft. lb.)

18 - O-ring

- 10.8 mm; 1.8mm

87-72



19 - Condenser

- Removing and installing ⇒ Page 87-81 .

20 - Coupling

- Thread 5/8" - 18 UNF
- 15 Nm (11 ft. lb.)

21 - O-ring

- 7.6 mm; 1.8mm

22 - Pressure relief valve

- On compressor
- Checking ⇒ Fig. 4 .

23 - Coupling

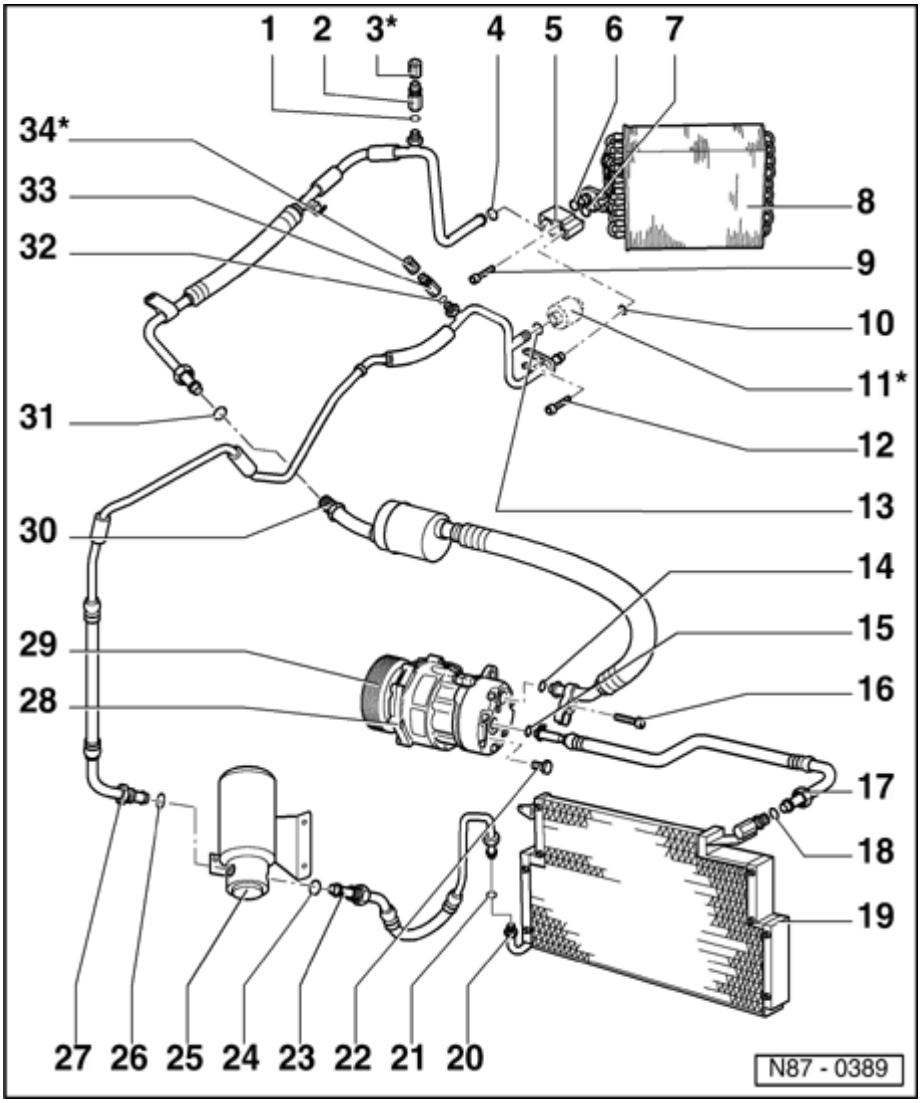
- Thread 3/4" - 16 UNF
- 15 Nm (11 ft. lb.)

24 - O-ring

- 10.8 mm; 1.8mm

25 - Receiver drier

- Function ⇒ Page 87-66 .



26 - O-ring

- 7.6 mm; 1.8mm

27 - Coupling

- Thread 5/8" - 18 UNF
- 15 Nm (11 ft. lb.)

28 - Compressor

- Sanden SD7-V16

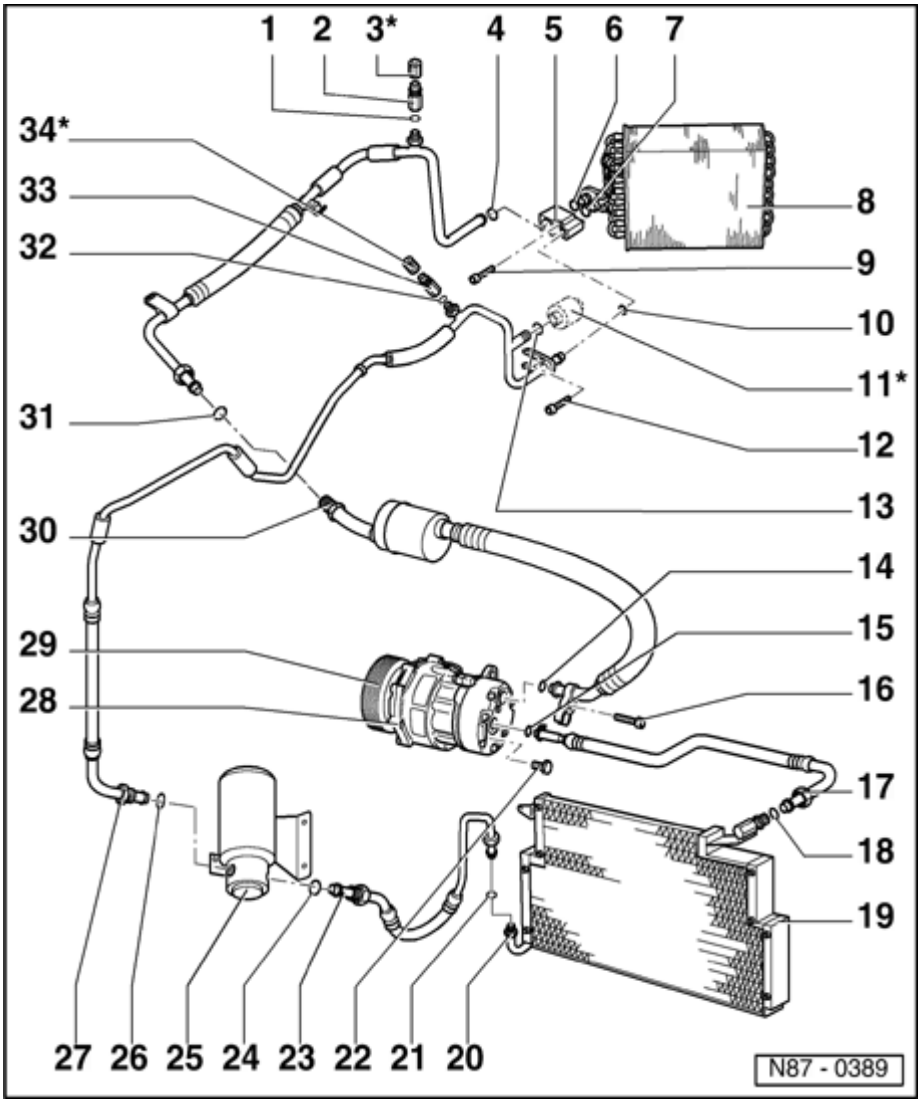
29 - A/C clutch -N25-*

- Clutch assembly can be serviced without discharging refrigerant system.
- Servicing ⇒ Page 87-43 .

30 - Coupling

- Thread 7/8" - 14 UNF
- 30 Nm (22 ft. lb.)

87-74



31 - O-ring

- 14 mm; 1.8mm

32 - O-ring

- 10.8 mm; 1.8mm

33 - High pressure service valve

- Only use Kent Moore ACR4 or equivalent
- Removing and installing ⇒ Fig. 1 .
- Refrigerant system capacity ⇒ Page 87-114 .

34 - Cap*

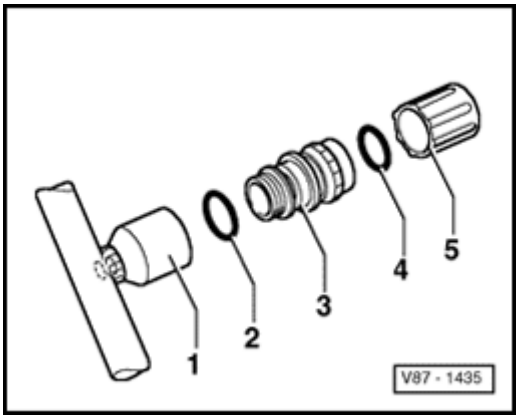


Fig. 1 High pressure service valve, removing

- Discharge refrigerant system ⇒ Page 87-96 .
- Unscrew and remove high pressure service valve - 3-.

1 - Connection with internal thread

2 - O-ring, 10.8 mm; 1.8 mm

3 - High pressure service valve, with groove for O-ring and internal thread for cap

4 - O-ring, 10.8 mm; 1.8 mm

5 - Cap

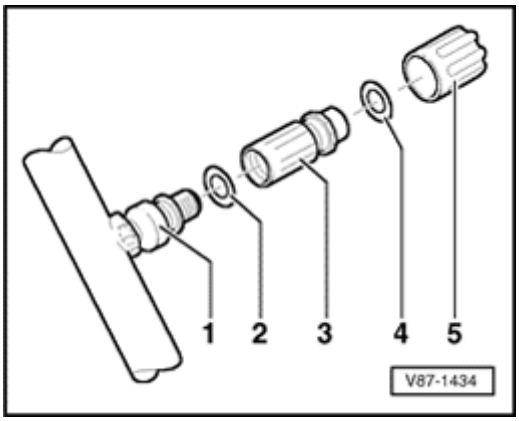


Fig. 2 Low pressure service valve, removing

- Discharge refrigerant system ⇒ Page 87-96 .
- Unscrew and remove low pressure service valve - 3-.

1 - Connection with external thread and groove for O-ring

2 - O-ring, 7.6 mm; 1.8 mm

3 - Low pressure service valve

4 - O-ring, 7.6 mm; 1.8 mm

5 - Cap

87-76

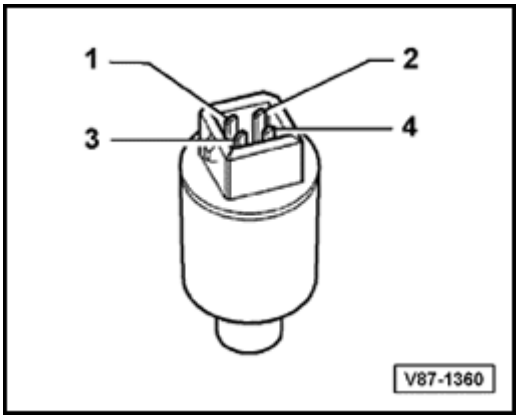


Fig. 3 A/C pressure switch -F129-, checking

- The pressure switch can be removed without discharging refrigerant system.
- Visually check that O-ring 10,8 mm x 1,8 mm is positioned correctly in the groove.

Function

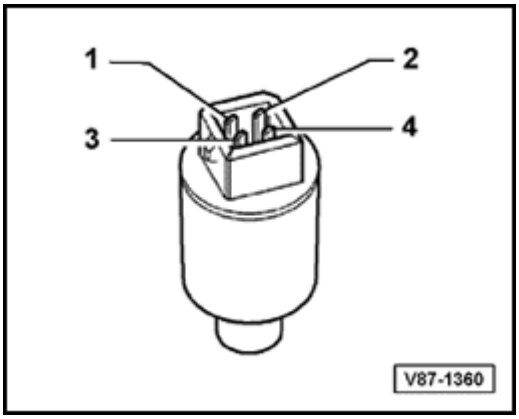
Switch part between terminals 1 and 2 switches off the A/C clutch -N25- when the system pressure is too high or when there is not enough refrigerant in the system .

- Switch opens when the pressure is below 1.2 bar and closes again above 2.4 bar (switch point).
- Switch opens above 32 bar and closes again below 24 bar (switch point).

Switch part between terminals 3 and 4 switches coolant fan -V7- (via the coolant fan control module -J293-) to the next higher fan speed when system pressures increase.

- Switch closes above 16 bar and opens again below 12.5 bar (switch point).

Checking, continued ⇒ Page 87-77



Checking:

- With the engine running, briefly bridge terminal 1 and 2 of connector. If the A/C clutch -N25- engages, the refrigerant circuit is empty.

-F129- functional checks

To determine proper A/C system performance, perform the following functional checks with the switch installed and connected.

- Check refrigerant capacity (fill). If system pressure is too low (refrigerant leakage), -F129- switches A/C clutch off.
- Check cooling fan function. When system pressure increases, -F129- causes coolant fan -V7- to switch to next higher fan speed.
- Check if A/C system switches off. At excessive system pressures (e.g.: caused by high ambient temperatures or if condensor is blocked), -F129- switches A/C clutch off.

87-78

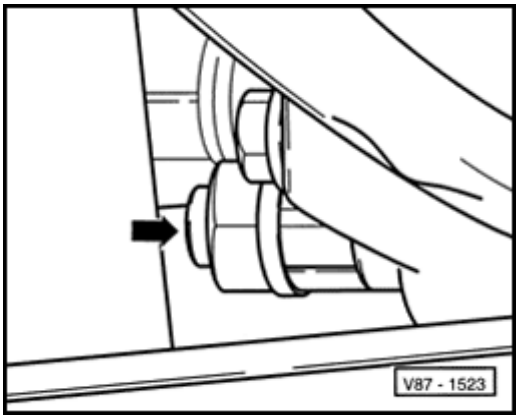
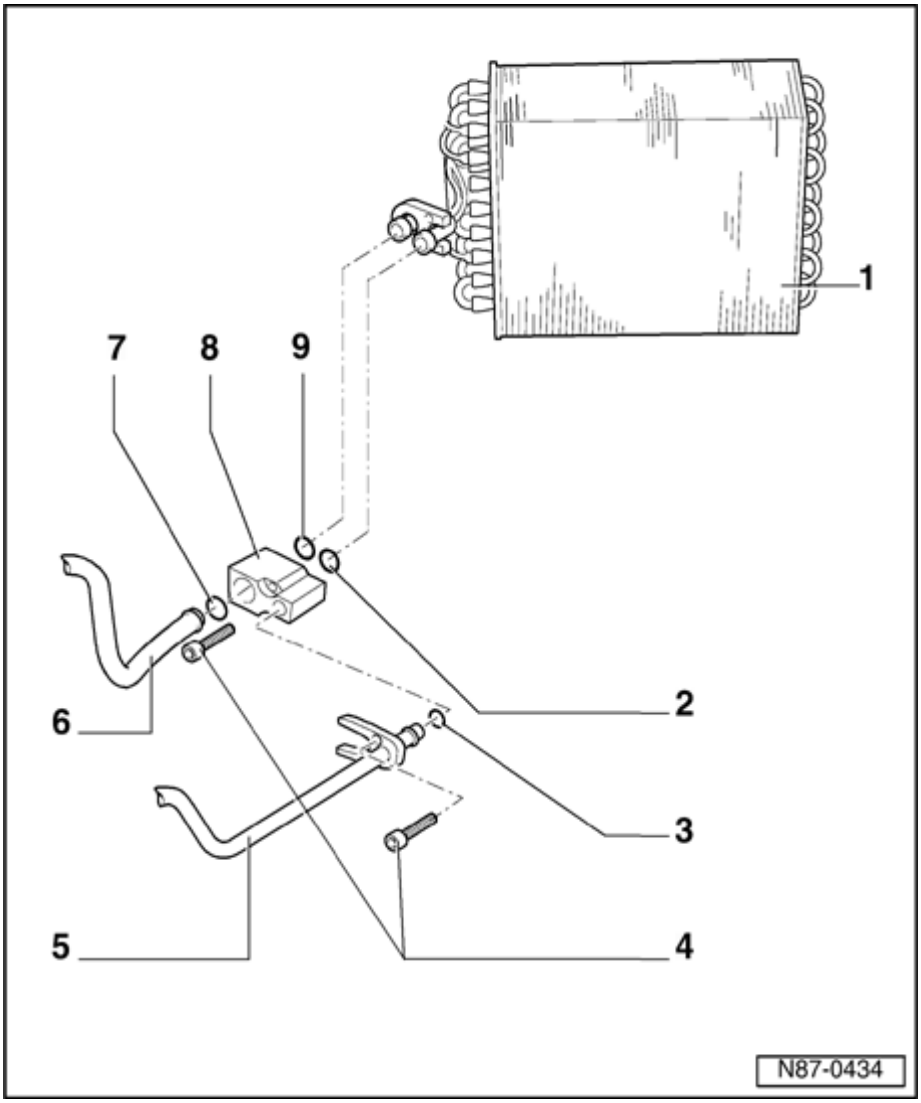


Fig. 4 Pressure relief valve, checking

- Function: Protects the refrigerant circuit from over-pressure.
- Refrigerant oil deposited on rear of compressor indicates pressure relief valve has opened to release pressure -arrow-. An adhesive plate is pushed out.

87-79



Expansion valve, removing

Notes:

- *Before carrying out any work on the A/C refrigerant system, refer to A/C refrigerant system safety measures ⇒ Page 87-1 .*
- *Service refrigerant system using Kent More ACR 4 or equivalent.*
- *During servicing, all couplings, fittings and related fasteners must be torqued to specifications.*

1 - Evaporator

- In heating and a/c unit

2 - O-ring

- 10.8 mm; 1.8mm

3 - O-ring

- 7.6 mm; 1.8mm

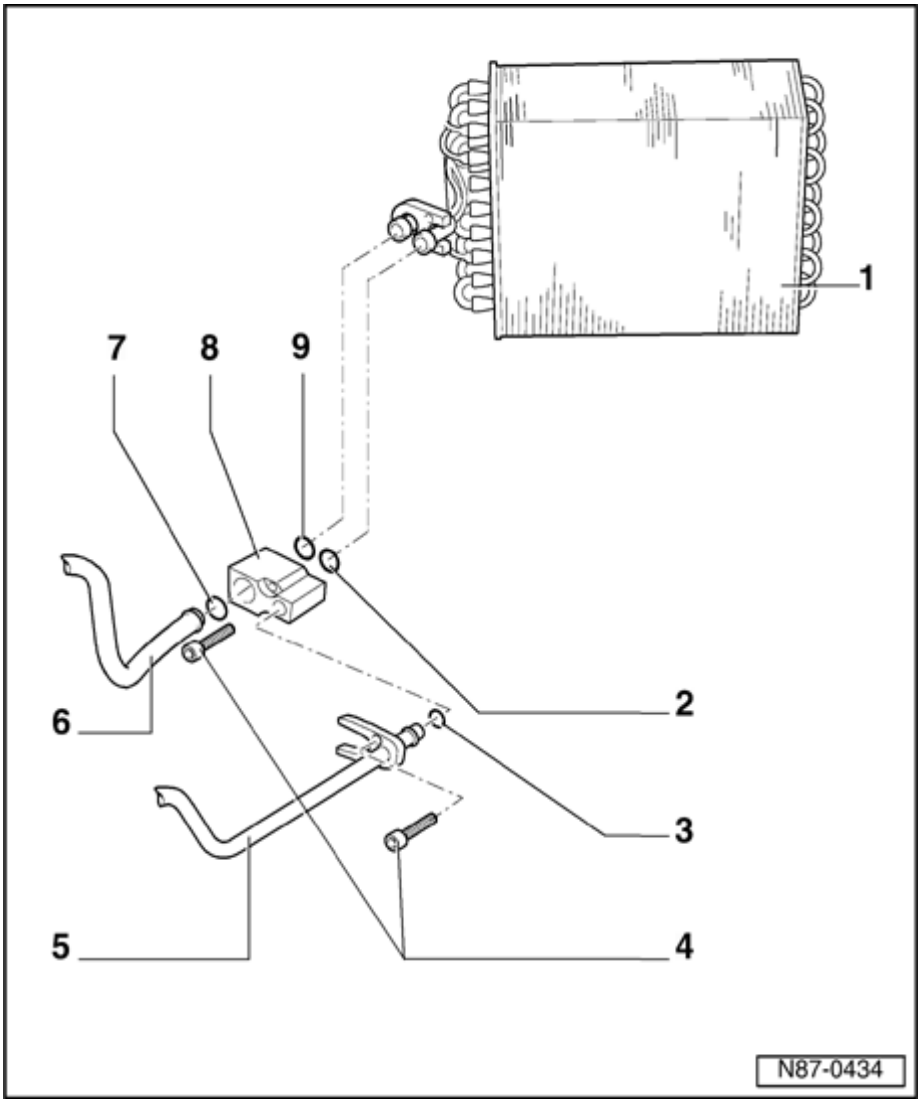
4 - Bolt

- 7 Nm (62 in. lb.)
- Qty.: 2

5 - Refrigerant hose

- From receiver drier to expansion valve

87-80



6 - Refrigerant hose

- From expansion valve to compressor
- With dampener

7 - O-ring

- 16.7 mm; 1.8mm

8 - Expansion valve

- In engine compartment at bulkhead, right
- Must be sealed against water spray.
- Checking insulation piece for expansion valve ⇒ Page 87-38 .

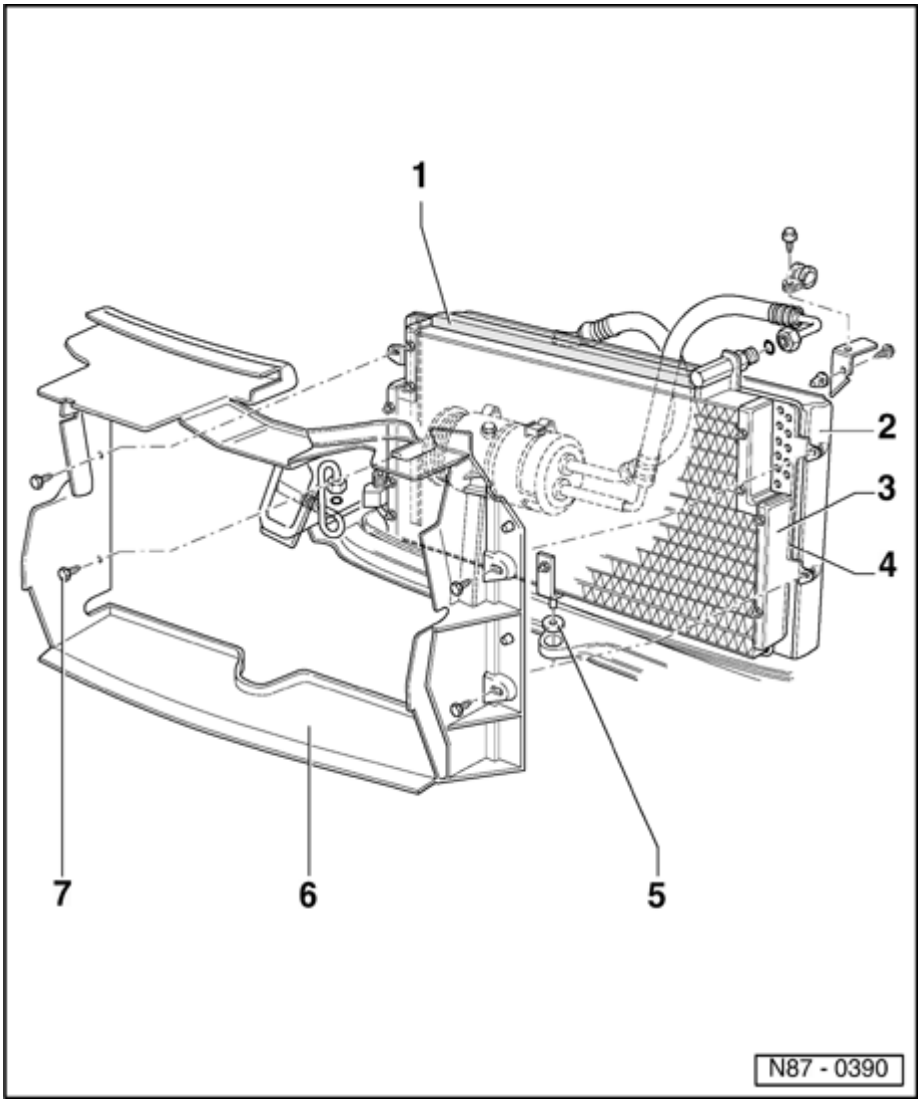
Removing:

- First discharge refrigerant circuit ⇒ Page 87-96 .
- Remove bolts -4-
- Pull out refrigerant hoses -5- and -6-.
- Replace O-rings -3- and -7-
- Pull out expansion valve -8-
- Replace O-rings -2- and -9-

9 - O-ring

- 14 mm; 1.8mm

87-81



Condensor, removing

CAUTION!

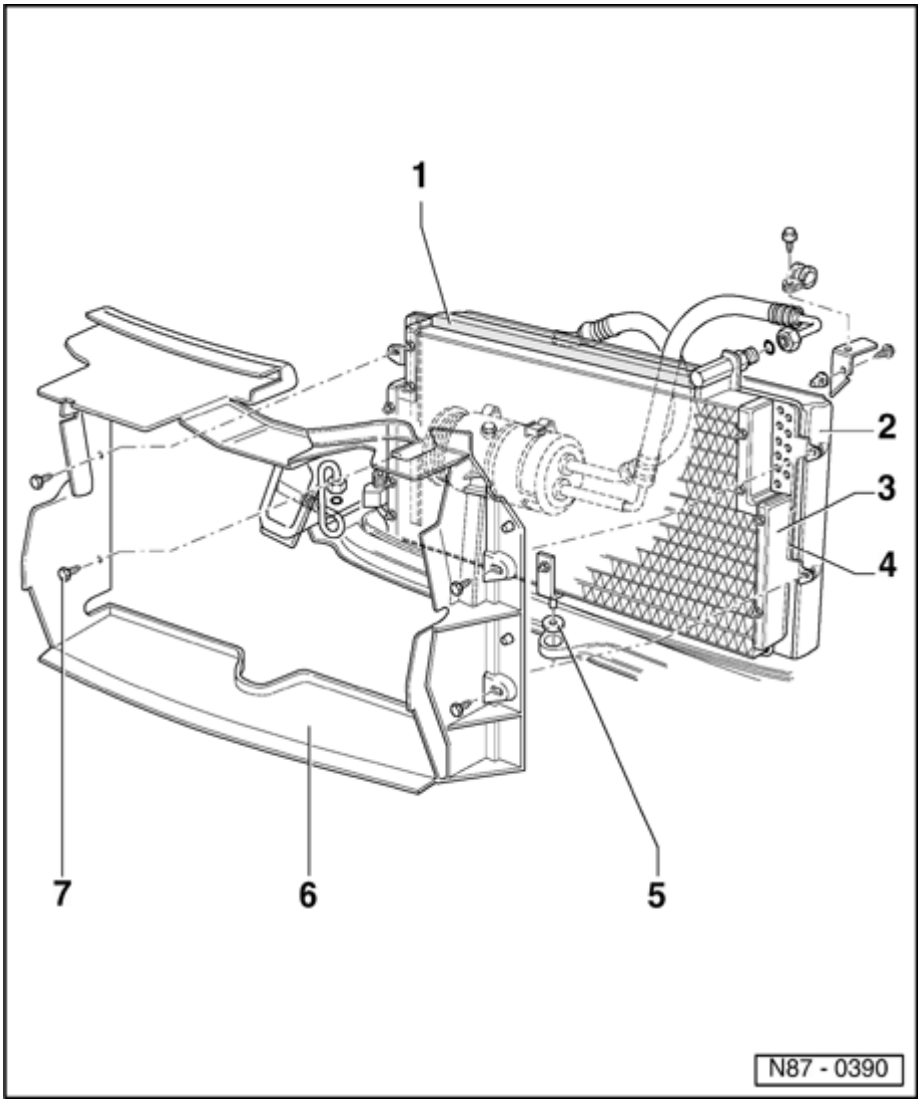
Before beginning repairs on the electrical system:

- ***Obtain the anti-theft radio security code.***
- ***Switch the ignition off.***
- ***Disconnect the battery Ground (GND) strap.***
- ***After reconnecting battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.***

Notes:

- *Before carrying out any work on the A/C refrigerant system, refer to A/C refrigerant system safety measures ⇒ Page 87-1 .*
- *Service refrigerant system using Kent More ACR 4 or equivalent.*
- *During servicing, all couplings, fittings and related fasteners must be torqued to specifications.*

87-82



- Discharge refrigerant system ⇒ Page 87-96 .
- Remove front bumper ⇒ *Repair Manual, Body Exterior, Interior, Repair Group 63* .
- Bring front end assembly (lock carrier) into service position ⇒ *Repair Manual, Body Exterior, Interior, Repair Group 50* .
- Loosen and separate refrigerant pipes/couplings from evaporator.

CAUTION!

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

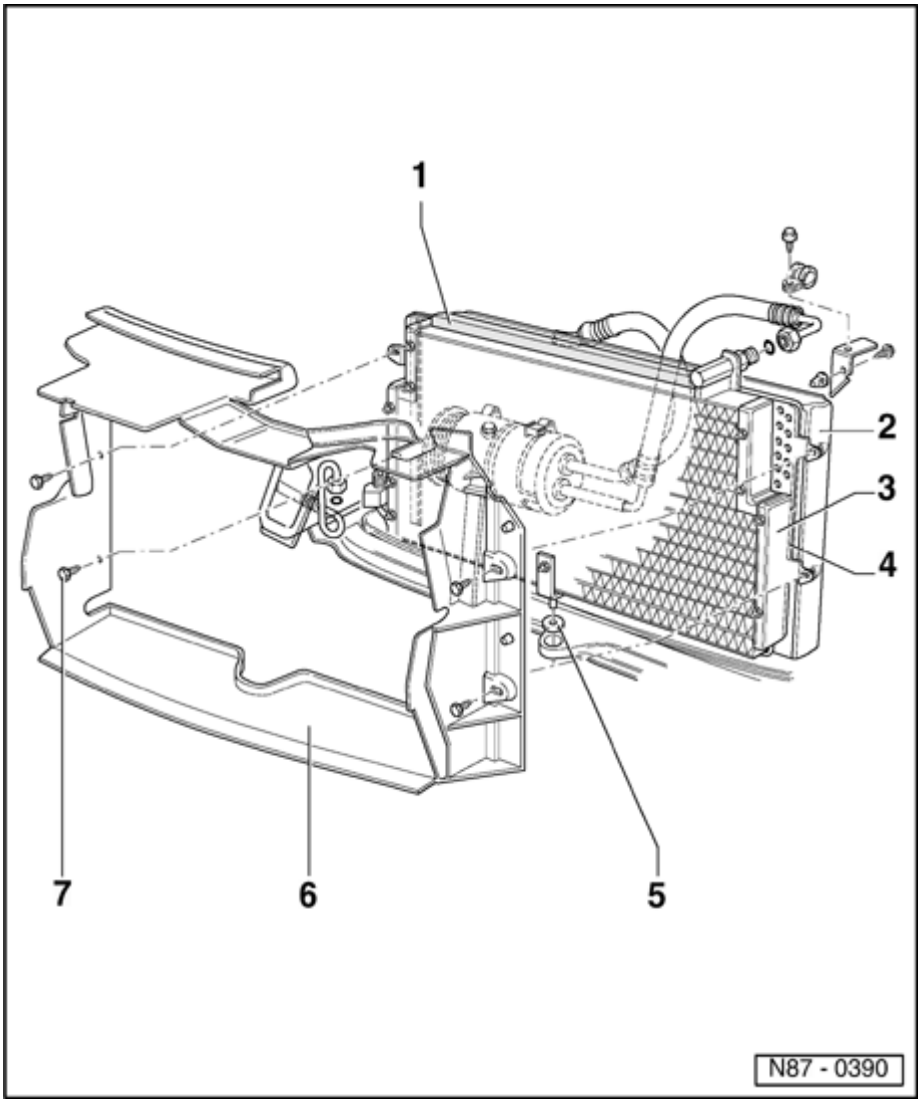
1 - Foam gasket

- 480 mm long
- Secure with adhesive prior to installation

2 - Radiator

3 - Condensor

87-83



4 - Foam gasket

- 480 mm long
- Secure with adhesive prior to installation

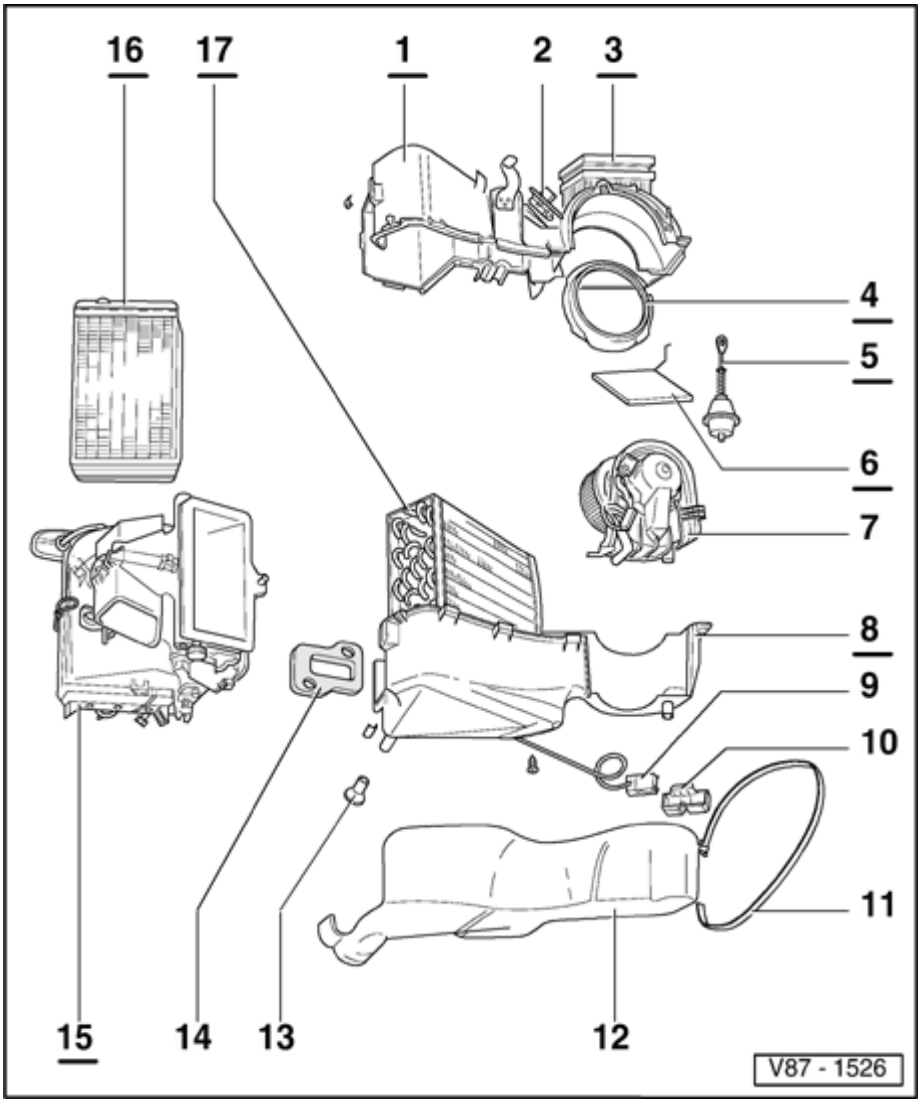
5 - Rubber grommet

6 - Air guide

7 - Screw

- Qty.: 4

87-84



Heating and A/C unit, removing and assembly

CAUTION!

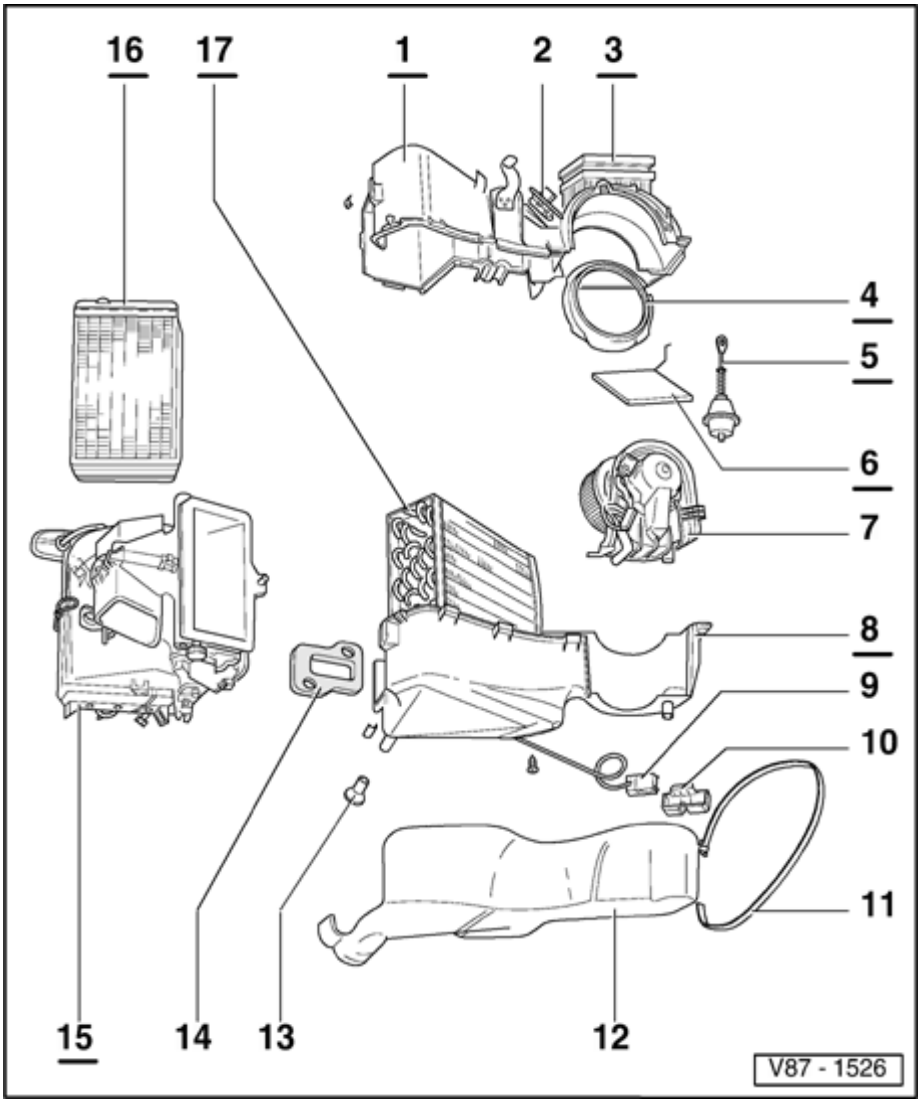
Before beginning repairs on the electrical system:

- ***Obtain the anti-theft radio security code.***
- ***Switch the ignition off.***
- ***Disconnect the battery Ground (GND) strap.***
- ***After reconnecting battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.***

Notes:

- *Before carrying out any work on the A/C refrigerant system, refer to A/C refrigerant system safety measures ⇒ Page 87-1 .*
- *Service refrigerant system using Kent More ACR 4 or equivalent.*
- *During servicing, all couplings, fittings and related fasteners must be torqued to specifications.*

87-85



Removing

- Discharge refrigerant system ⇒ Page 87-96 .
- Drain cooling system Repair Manual, Engine Mechanical, Repair Group 19.

CAUTION!

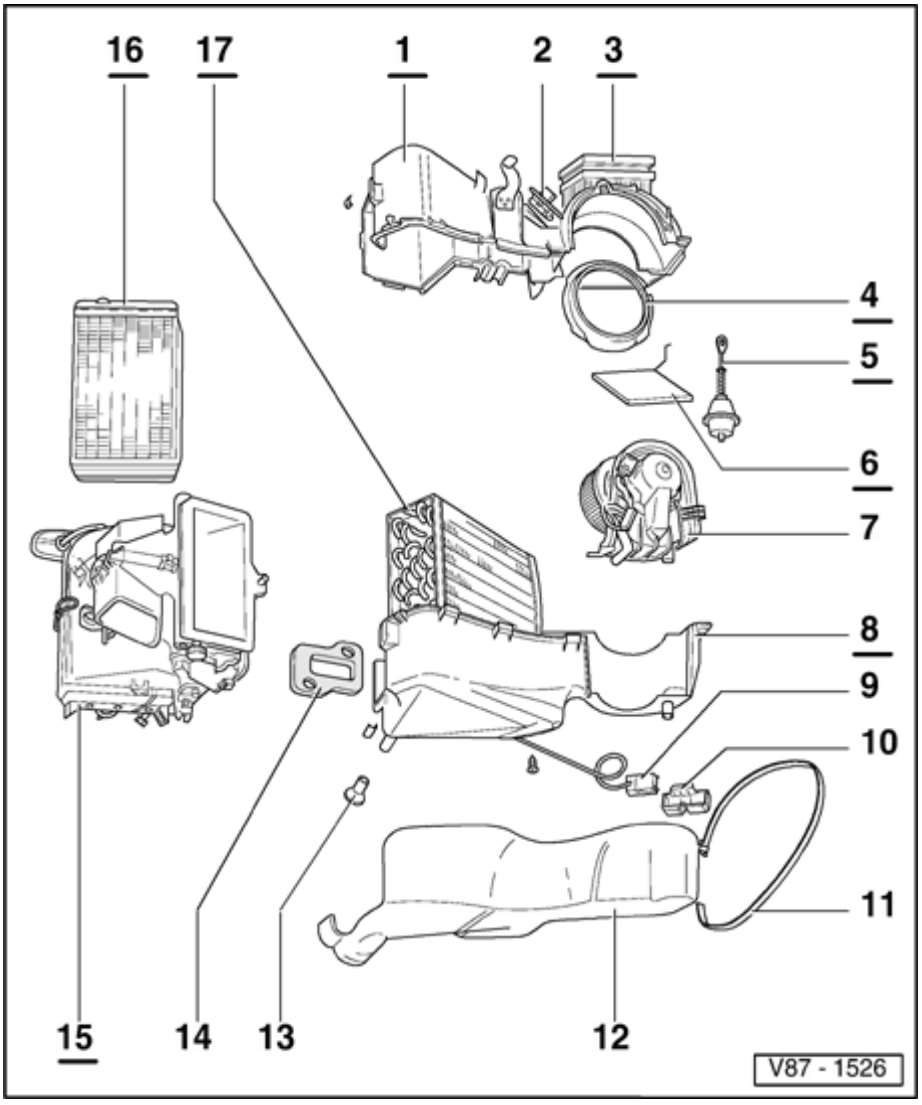
The cooling system is pressurized when the engine is warm. Wear gloves and other protection and carefully release system pressure if necessary, before performing repairs.

- Clamp off and disconnect coolant hoses to heater core
- Remove refrigerant lines to evaporator.

CAUTION!

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

87-86



- Remove instrument panel Repair Manual, Body Interior, Repair Group 70.
- Locate and remove heating and A/C unit fasteners at bulkhead.
- Remove heating and A/C unit.

Assembly

1 - Housing, upper part

- Separate upper and lower housing sections by removing clips.
- Coat fitted surface of housing with AMV 176 000 06 (or equivalent) prior to assembly.

2 - Fresh Air Blower Series Resistance with Fuse -N24-

3 - Gasket

4 - Intake guide

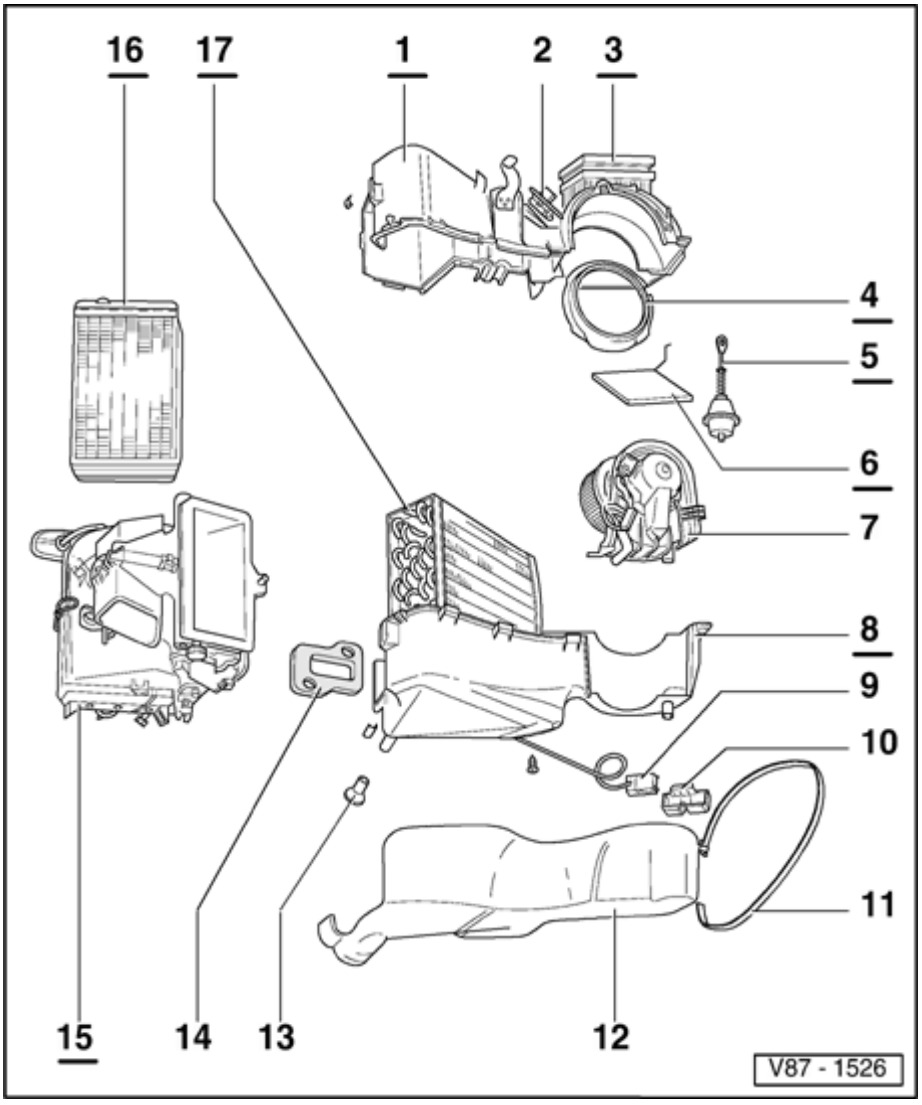
5 - Vacuum unit for fresh/recirculating air flap

- Ventilated: Fresh air operation
- Vacuum hose layout ⇒ Page 87-40 .

6 - Fresh/recirculation air flap

7 - Fresh air fan -V2-

87-87



8 - Housing, lower part

- Separate upper and lower housing sections by removing clips.
- Coat fitted surface of housing with AMV 176 000 06 (or equivalent) prior to assembly.

9 - A/C Evaporator Temperature Switch - E33-

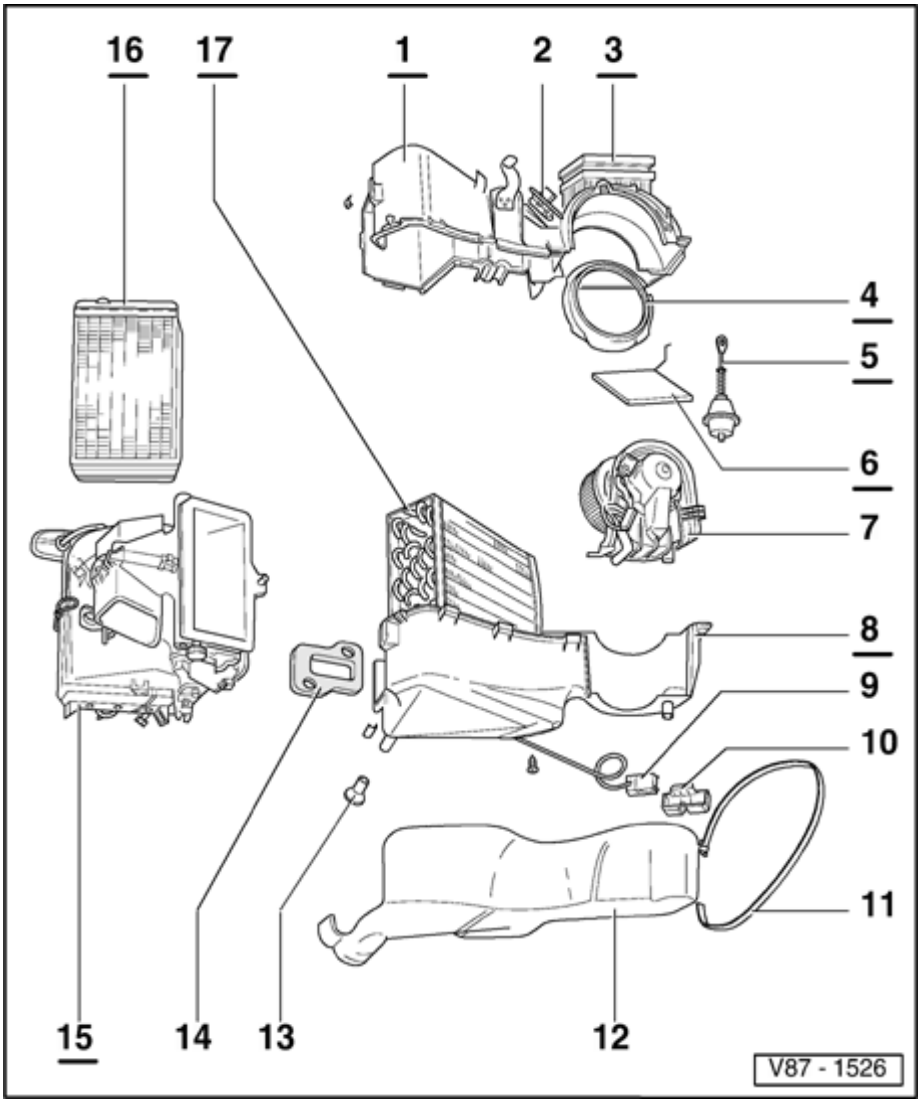
- Ensure temperature probe is inserted in evaporator to depth of 330 mm (13 in.)
- Prevents evaporator icing
- Switching temperature: opens at -2 degrees C and lower.

10 - Cap

- Where applicable

11 - Clamping band

87-88



12 - Lower trim cover

13 - Evaporator water drain

14 - Gasket

15 - Air distribution housing

- Air flaps are not serviceable.

16 - Heater core

- Gaskets must be bonded gap-free all around.
- If retaining tabs do not engage when assembling, secure heat exchanger with screws.
- Always replace coolant after replacement.

17 - Evaporator

87-89

A/C refrigerant system, replacing components

Replacement A/C compressors, evaporators and condensers supplied by the Parts Dept. are filled with Nitrogen. If gas (Nitrogen) does not escape when component is first opened, the component may be faulty (leaking), do not install.

Replacement A/C compressors are filled with the total refrigerant oil quantity needed for the entire refrigerant system.

Always replace the receiver drier whenever the refrigerant system has been left open. Install immediately after opening to prevent moisture contamination of drier desiccant. Moreover, keep refrigerant system and other replacement components sealed for as long as possible to minimize the chance of dirt and moisture contamination.

Always plug open refrigerant line connections to prevent dirt and moisture contamination.

If the system has been discharged due to a damaged or leaking component (refrigerant hose/line, compressor, evaporator, condenser, etc.), flush the refrigerant system first with compressed air, then with nitrogen (available locally) and collect the oil that runs out. This will remove the refrigerant oil which may be saturated with moisture.

87-90

CAUTION!

DO NOT flush R-134a refrigerant system with R-11. R-11 is not compatible with refrigerant R-134a and PAG oil and will cause total system contamination.

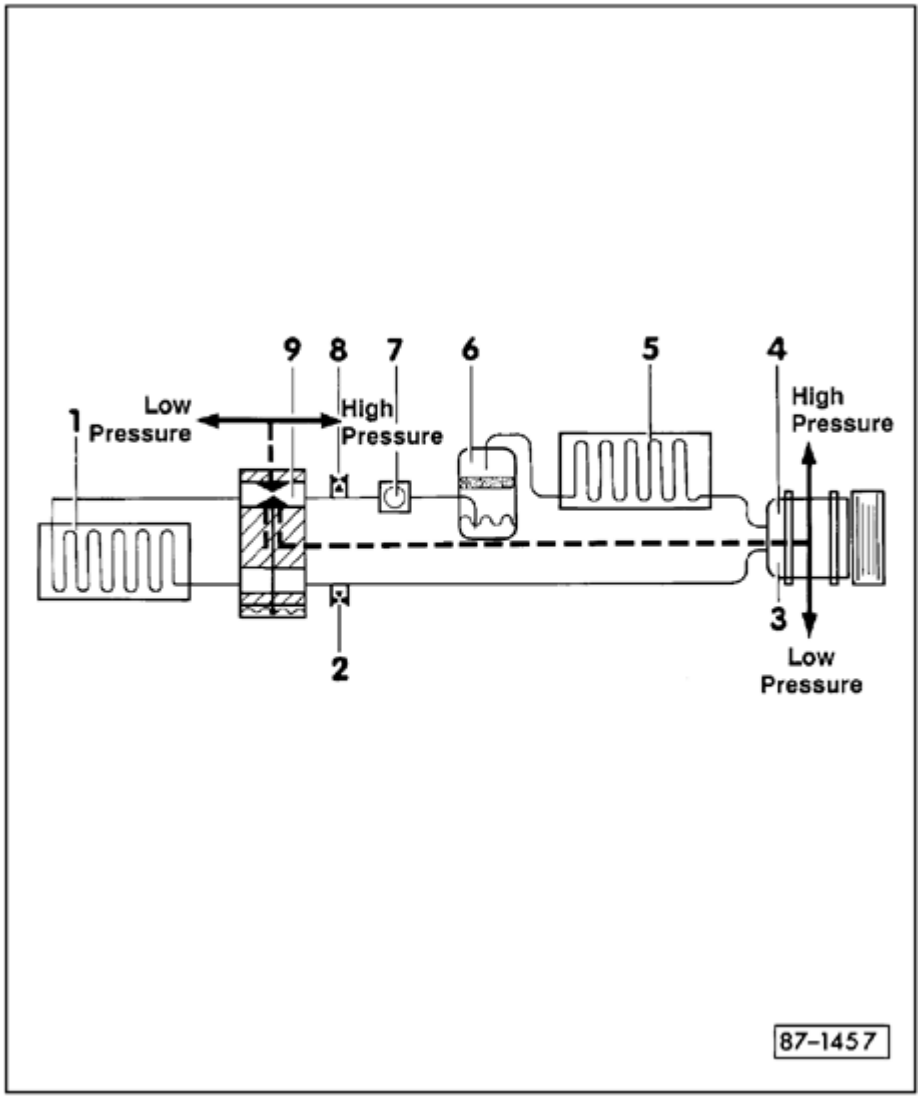
If the compressor is not replaced after flushing the system, fill compressor with the correct type and quantity of refrigerant oil as specified under A/C system capacities ⇒ Page 87-114 . Fill compressor with the total system oil capacity.

If the compressor is replaced, do not add any additional oil as the total amount of oil required is already in the compressor.

Dispose of contaminated refrigerant oil following laws governing hazardous waste disposal. Do not combine any refrigerant oil with any other old oils such as engine oil or transmission fluid.

Follow all applicable Warnings and Cautions when working on the A/C system.

87-91



A/C refrigerant system pressures and temperatures, checking

The pressures and temperatures in the A/C system will vary depending on engine speed (RPM), coolant fan speed, engine coolant temperature, A/C clutch engagement, outside temperature, humidity, etc.

Pressure and temperature specifications are based on the following:

- Engine speed (RPM) at 1500
- Fresh air blower on high speed
- A/C adjusted to Max. cooling

Pressure and temperature specifications ⇒ Page 87-93 .

1 - Evaporator

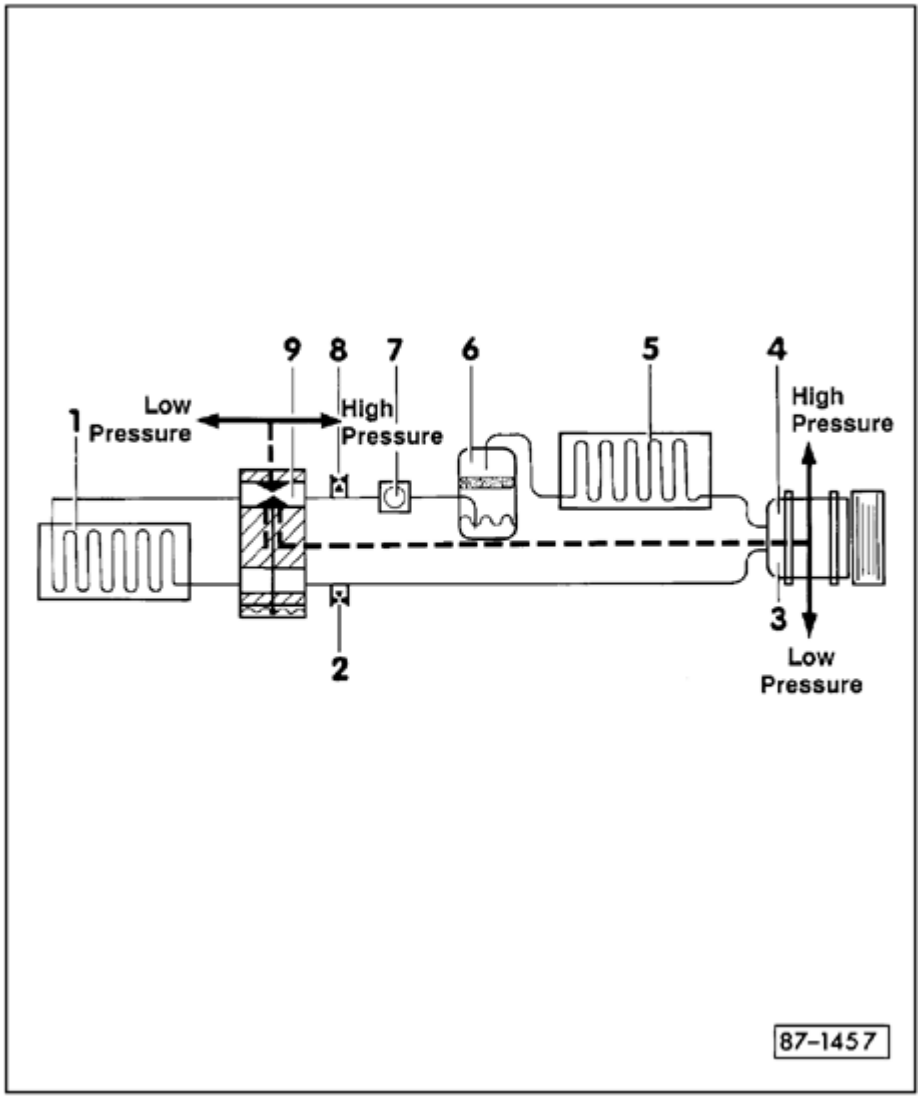
2 - Low pressure service valve

3 - Compressor, low pressure side

4 - Compressor, high pressure side

5 - Condenser

87-92



6 - Receiver drier

7 - Sight glass

- If equipped

8 - High pressure service valve

9 - Expansion valve

87-93

Pressure and temperature specifications

- Refer to pages ⇒ Page 87-91 and ⇒ Page 87-63 for component identification.

Component	Refrigerant state	Approximate pressure (bar/psi)	Approximate temperature
1 - Evaporator, inlet to outlet	Vapor to Gas		-7° C (19° F)[2)]
2 - Low pressure service valve	Gas	1.2 bar (17.4 psi)[1)]	-1° C (30° F)
3 - Compressor, low pressure side	Gas		
4 - Compressor, high pressure side	Gas		65° C (149° F)
5 - Condenser	Gas		
	to Vapor		55° C (131° F) at outlet
	to Liquid	14 bar (203 psi)	
6 - Receiver drier	Liquid		
7 - Sight glass (if equipped)	Liquid		55° C (131° F)
8 - High pressure service valve	Liquid		
9 - Expansion valve	Liquid to Vapor	Inlet: 14 bar (203 psi) Outlet: 1.2 bar (17.4 psi)	Inlet: 55° C (131° F) Outlet: -7° C (19° F)

[1)] Pressure maintained in the refrigerant system by the variable displacement compressor despite variables in temperature, load and engine speeds (RPM).

[2)] Temperature maintained in the refrigerant system by the variable displacement compressor despite variables in temperature, load and engine speeds (RPM).

A/C refrigerant system, testing with pressure gauges

Due to the constant temperature/pressure relationship of refrigerant R-134a, approximate high-side system temperature can be determined based on system pressure.

Pressure gauges may have one or more temperature scales in addition to the pressure scale. Since various refrigerants have different temperature/pressure relationships, each gauge is specific for a particular refrigerant.

Measuring pressure and temperature in a "switched-on" refrigerant system

Use the A/C refrigerant high-pressure gauge to measure high pressure between the compressor and restrictor (including condenser) with the A/C switched on.

Use the A/C refrigerant low-pressure gauge to measure low pressure between the restrictor and the compressor inlet (including evaporator) with the A/C switched on.

The temperature displays of the low- and high-pressure gauges apply only to a portion of the low- and high-pressure sides. The low-pressure gauge displays approximate temperature between the restrictor and evaporator outlet. The high-pressure gauge displays approximate temperature between the compressor outlet and restrictor.

Note:

The temperature/pressure relationship only holds true when the refrigerant system contains liquid and vapor, but not when it contains only gas. In the gaseous state, the temperature is approx. 10-30° C (18-54° F) higher than indicated on the pressure gauge.

Measuring pressure and temperature in a closed container or "switched-off" refrigerant system

Due to the constant temperature/pressure relationship of R-12 and R-134a, approximate temperature in a closed container or in a switched-off A/C system can be determined based on its pressure.

If the temperature displayed on a gauge is lower than the actual temperature of the refrigerant, the refrigerant container or system is empty (discharged).

Note:

The temperature/pressure relationship only holds true when the refrigerant system contains liquid and vapor, but not when it contains only gas. In the gaseous state, the temperature is approx. 10-30° C (18-54° F) higher than indicated on the pressure gauge.

87-96

A/C refrigerant system, discharging

WARNING!

- ***Always use an Underwriter's Laboratory (UL) approved refrigerant recovery/recycling/recharging unit such as Kent-Moore ACR^4, or equivalent, whenever discharging an R-134a A/C system.***
- ***Any person who services a motor vehicle air conditioner MUST, by law, be properly trained and certified and use approved refrigerant recycling equipment. Technicians must complete an EPA approved recycling course to be certified.***
- ***State and local governments may have additional requirements regarding air conditioning servicing. Always comply with state and local laws.***
- ***Always wear safety goggles when charging or discharging system.***

87-97

CAUTION!

- ***Always use separate refrigerant recovery/recycling/recharging servicing equipment for R-12 and R-134a systems. DO NOT use one piece of equipment for both R-12 and R-134a systems. The residual traces of refrigerant inside the equipment will contaminate and damage the equipment. Servicing equipment includes recovery/recycling/recharging unit, charging station, vacuum pump, manifold gauges, etc.***

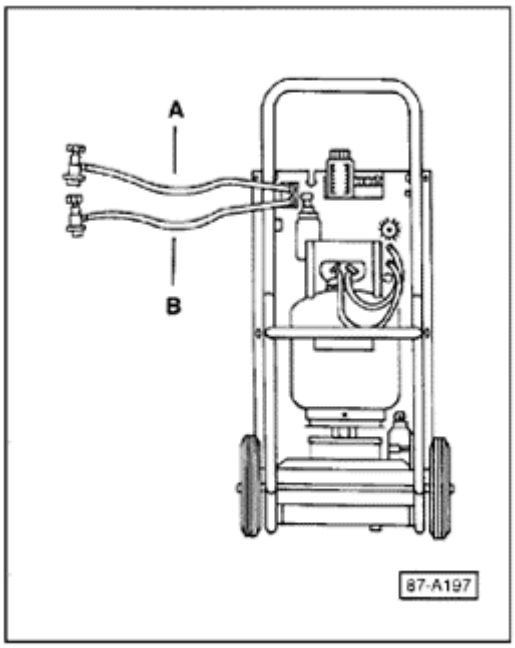
- ***DO NOT use R-12 servicing equipment on R-134a systems or R-134a equipment on R-12 systems or damage to both the vehicle A/C system and servicing equipment may result. Use only equipment designed to meet Society of Automotive Engineers (SAE) standards.***

- ***R-134a and R-12 systems use different size service fittings. NEVER use adaptors to convert an R-12 fitting to R-134a size or R-134a fitting to R-12 size.***

Note:

Refer to safety measures starting on ⇒ Page 87-1 prior to discharging or charging A/C refrigerant system.

87-98



Note:

Make sure that initial set-up of the refrigerant recovery/recycling/recharging unit has been completed before discharging the A/C system.

- Connect red high-pressure hose -A- of refrigerant recovery/recycling/recharging unit to high side fitting on vehicle and open coupler valve.
- Connect blue low-pressure hose -B- of refrigerant recovery/recycling/recharging unit to low side fitting on vehicle and open coupler valve.

CAUTION!

Always follow manufacturer's instructions when using a refrigerant recovery/recycling/recharging unit.

- Following refrigerant recovery/recycling/recharging unit manufacturer's instructions, discharge A/C system into refrigerant recovery/recycling/recharging unit.
- Disconnect power supply from A/C clutch to prevent accidental compressor operation with A/C system discharged.

87-99

A/C refrigerant system, flushing with compressed air and nitrogen

CAUTION!

- ***When using compressed nitrogen always use a pressure regulator and the proper adaptor hoses and fittings (available locally). During flushing, use existing exhaust/ventilation systems to draw off the gas mixture escaping from the A/C system.***

- ***DO NOT flush R-134a refrigerant system with R-11. R-11 is not compatible with R-134a refrigerant and PAG oil and will cause total system contamination.***

- Use compressed air and nitrogen (available locally) to remove moisture, impurities and old refrigerant oil from A/C refrigerant system.

- First blow out old refrigerant oil and dirt with compressed air, then dry components with nitrogen.

- DO NOT blow compressed air and nitrogen through the compressor or expansion valve. Only blow compressed air and nitrogen through disconnected, free flowing components (i.e. disconnected hose, condenser, evaporator, etc.)

- DO NOT blow compressed air and nitrogen into a capped off A/C component. Pressurized R-134a refrigerant in the presence of oxygen may form a combustible mixture.

87-100

- Always flush components in opposite direction of refrigerant flow.
- Flush evaporator through the low-pressure line with the high-pressure line removed.
- If any component has dark thick deposits that cannot be removed with compressed air, replace component.
- Thin light gray deposits in refrigerant lines and hoses are normal and do not impair the function of the system.
- Always replace receiver drier and restrictor after flushing.
- Dispose of contaminated refrigerant (PAG) oil following laws governing hazardous waste disposal. Do not combine PAG oil with any other old oils such as engine oil or transmission fluid.

87-101

Flush refrigerant system with compressed air and nitrogen if:

- Refrigerant oil is dark and viscous (thick)
- Too much refrigerant oil is in the system following compressor replacement
- Unclear or do not know how much refrigerant oil is in the system
- Moisture, dirt or other impurities have entered the refrigerant system (i.e. following an accident)
- Unable to pull a constant vacuum during evacuation of a leak-free system due to excessive moisture in the system
- Refrigerant system has been open longer than the time required for normal repairs (i.e. following an accident)
- Based on temperature and pressure measurements, system is diagnosed with moisture contamination
- Compressor is replaced due to noises or internal damage
- Flushing is required after replacing certain components in certain situations ⇒ Page 87-89

87-102

A/C refrigerant system, evacuating and recharging

WARNING!

- ***Always use an Underwriter's Laboratory (UL) approved refrigerant recovery/ recycling/recharging unit such as Kent-Moore ACR^4, or equivalent, when evacuating and recharging an R-134a A/C system.***

- ***Any person who services a motor vehicle air conditioner MUST, by law, be properly trained and certified and use approved refrigerant recycling equipment. Technicians must complete an EPA approved recycling course to be certified.***

- ***State and local governments may have additional requirements regarding air conditioning servicing. Always comply with state and local laws.***

- ***Always wear safety goggles when discharging, evacuating and recharging an A/C system.***

CAUTION!

Always follow manufacturer's instructions when using a refrigerant recovery/recycling/recharging unit.

87-103

Notes:

- *Refer to R-134a safety measures prior to discharging or charging A/C refrigerant system ⇒ Page 87-1 .*
- *Follow refrigerant recovery/recycling/recharging unit manufacturer's instructions for evacuating and recharging A/C system.*
- *Evacuate refrigerant system for a minimum of 30 minutes.*
- *When recharging A/C system, add correct amount of refrigerant and PAG oil to system ⇒ Page 87-114 .*
- *After system recharge, manually rotate A/C compressor approx. 10 turns before starting engine. Start engine with A/C OFF. After idle speed has stabilized, switch A/C ON and let engine idle (compressor running) for a minimum of two minutes before raising engine speed.*

A/C refrigerant system, troubleshooting

Requirements

- Electrical systems OK
- Air flow distribution systems (controls and cables) OK

Correct and repair as necessary before proceeding.

If any one of the following system conditions exists, check A/C refrigerant system pressures ⇒ Page 87-106 .

- A/C does not cool (cooling has stopped completely)
- Insufficient cooling during all driving speeds or engine speeds (RPM)
- No cooling or insufficient cooling after a period of driving

87-105

Compressor noisy

- Tighten compressor and compressor bracket mounting bolts using torque wrench.

- Check routing of A/C refrigerant hoses and lines; hoses and lines must not contact other components and must be installed without tension or kinks, reposition or realign as necessary.

A/C compressor noisy immediately after switching A/C ON and/or when driving around corners or braking (refrigerant shock)-system overcharged

- Discharge A/C refrigerant system ⇒ Page 87-96 , then evacuate and recharge ⇒ Page 87-102 .

With an otherwise properly operating A/C system, water sprays out of instrument panel vents

- Check evaporator drain pipe for proper routing (should not be kinked or pinched).

- Check evaporator water drain valve.

  - Must not be plugged with wax, dirt or undercoating (clean if necessary)

  - Valve flap must open/close properly

- Check plenum tray.

  - Must be properly installed and not damaged

87-106

A/C refrigerant system pressures, checking

Check A/C refrigerant system pressures using these three tests:

1 - Air temperature drop from center instrument panel outlet (A/C system cooling performance)

2 - A/C system high pressure

3 - A/C system low pressure

The combined results of all three steps determine which part of the A/C system is causing the problem, see table ⇒ Page 87-110 .

Test conditions

- A/C refrigerant system fully charged; discharge, evacuate and recharge system if necessary
- Condenser and radiator clean and free of obstructions (spray clean if necessary)
- Air distribution can be adjusted correctly using control knobs (all air distribution flaps reach end positions)
- Wiring OK per wiring diagram
- Outside (ambient) air temperature between 20-30 ° C (68-86 ° F)
- Drive belts for A/C compressor and Generator in good condition and properly tensioned

Test 1: Air temperature drop from center instrument panel outlet, checking (A/C system cooling performance)

- Start engine.
- Set temperature control to maximum "cold".
- Press "A/C" button and select second blower speed.
- Adjust air distribution to instrument panel outlets.
- Insert thermometer into center instrument panel outlet and raise engine speed to approximately 1500 RPM.

Specified result

With humidity normal and outside (ambient) temperature between 20-25 ° C (68-77 ° F), system is cooling satisfactorily if air temperature from center instrument panel vent drops below 10 ° C (50 ° F) within 1 minute.

For higher ambient temperatures and/or higher humidity, specified air temperature from center instrument panel vent can be slightly higher.

If specified reading is not obtained, perform tests 2 and 3, then compare results of all three tests ⇒ table, ⇒ Page 87-110 .

Test 2: A/C system high pressure, checking

- Connect high- and low-pressure hoses of refrigerant recovery/ recycling/recharging unit Kent-Moore ACR^4 or equivalent, to high- and low-pressure service valves.
- Disconnect electrical connector from coolant fan.
- Start engine.
- Set temperature control to maximum "hot".
- Press "A/C" button and select highest blower speed.
- Adjust air distribution to footwell outlets.
- Raise engine speed to approximately 1500 RPM.

Specified result

System high pressure is normal if high-pressure gauge reads 232 psi (16 bar) within 30 seconds.

If specified reading is not obtained, also perform test 3 and compare results of all three tests ⇒ table, ⇒ Page 87-110 .

Test 3: A/C system low pressure, checking

- Connect high- and low-pressure hoses of refrigerant recovery/recycling/recharging unit Kent-Moore ACR^4, or equivalent, to high- and low-pressure service valves.

- Start engine.

- Set temperature control to maximum "cold".

- Press "A/C" button and select first blower speed.

- Adjust air distribution to instrument panel outlets.

- Raise engine speed to 1500 RPM.

Specified result

System low pressure is normal if low-pressure gauge reads 22-36 psi (1.5-2.5 bar) within 30 seconds.

If specified reading is not obtained, compare results of all three tests ⇒ table, ⇒ Page 87-110 .

87-110

Test 1 Temperature from center air vent[1)]	Test 2 High pressure[2)]	Test 3 Low pressure[2)]	Possible causes of incorrect readings	Corrective measures
Normal	Normal	Normal	None	---
Too high	Normal	Normal	Temperature flap position incorrect	Adjust temperature flap cable
Too high	Too low	Normal	Compressor	Replace compressor
Normal	Too low	Normal	Compressor	Replace compressor
Normal	Normal	Too high or too low		
Too high	Normal	Too high or too low	Expansion valve or compressor	Clean/replace expansion valve or replace compressor
Normal	Too high or too low	Too high or too low		

1) Normal air outlet temperature approx. 6 ° C (43 ° F). For higher ambient temperatures and/or higher humidity, specified air temperature from center instrument panel vent can be slightly higher.

2) For normal system temperatures and pressures ⇒ Page 87-93 .

87-111

A/C refrigerant system cooling performance, checking

Note:

A/C evaporator temperature switch -E33- (if equipped) switches A/C compressor OFF only in special instances so evaporator does not ice up; variable displacement A/C compressor maintains temperature of 0° C (32° F) in evaporator.

Test conditions

- A/C refrigerant system fully charged
- A/C clutch -N25- and compressor function OK
- Condenser and radiator clean and free of obstructions
- Air distribution can be adjusted properly
- Wiring OK as per wiring diagram
- Outside (ambient) temperature 20° C-30° C (68° F-86° F)

87-112

Checking

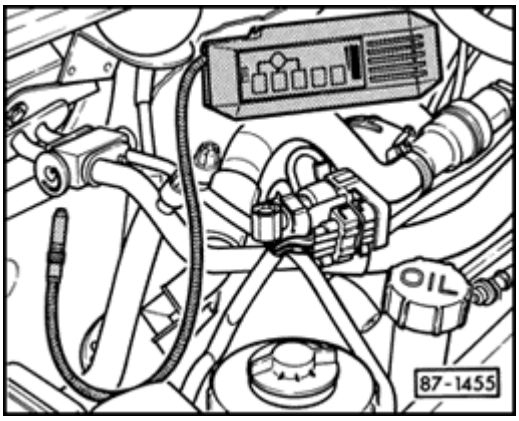
- Start engine.
- Set temperature control to maximum "cold".
- Press A/C button and select second blower speed.
- Adjust air distribution to instrument panel outlets.
- Insert thermometer into center instrument panel outlet.
- Raise engine speed to approximately 1500 RPM.

Specified result

With normal humidity and outside (ambient) temperature between 20 ° -25 ° C (68 ° -77 ° F), system is sufficiently charged if air temperature from center instrument panel vent drops below 10 ° C (50 ° F) within one minute.

For higher ambient temperatures and/or higher humidity, specified air temperature from center instrument panel vent can be slightly higher.

A/C refrigerant system, checking for leaks



Use halogen leak detector, Hitec HI400A-TEL or equivalent, to check for refrigerant leaks, following the leak detector manufacturer's instructions.

Refrigerant gas dissipates very quickly. To make the job easier, avoid drafty or windy areas when checking for leaks.

If the refrigerant system is discharged (empty), re-charge the system with approx. 100 g (3.5 oz.) of refrigerant in order to check for leaks.

A/C refrigerant system, capacities

Refrigerant R-134a, capacity

Compressor	Quantity
Sanden SD7-V16 (Passat 1995 - 1997)	1150 g ± 50 g (40.5 oz ± 1.8 oz)

Obtain R-134a refrigerant from a local A/C supplier under one of the following names:

- R-134a
- Tetrafluoroethane
- $CH_2F\ CF_3$
- H-FKW 134a
- SUVA® TRANS A/C
- ARCTON® 134a

Note:

R-134a refrigerant is packaged in different containers. Some are used only for commercial applications which are sold in cylinders using a 1/4" flare fitting. This does not connect to the vehicle fittings and servicing equipment. Use only R-134a which come in containers having the correct type of service fitting.

87-115

Refrigerant (PAG) oil R-134a, capacity

Model	Total system capacity
Passat from 1995 to 1997	115 cc (4.6fl. oz.)

Replacement A/C compressors supplied by the Parts Department are filled with 115 cc (fl. oz.) of refrigerant oil. This is the total A/C system refrigerant oil capacity.

Refrigerant (PAG) oil R-134a, identification

Use only the correct type of refrigerant oil (PAG oil) specified for use with R-134a and compressor type.

Compressor	Refrigerant oil Part No.
Sanden SD7-V16	G 052 154 A2

CAUTION!

Part numbers are for reference only. Always check with for Parts Department for latest parts information.

Refrigerant (PAG) oil R-134a, distribution

The total refrigerant oil quantity is distributed in the refrigerant circuit as follows:

Compressor approx. 50%

Condensor approx. 10%

Suction pipe approx. 10%

Discharge pipe --

Evaporator approx. 20%

Receiver drier approx. 10%

Note:

When replacing refrigerant circuit components, fill an appropriate amount of refrigerant oil (as indicated above) into the new part before installation.