

A/C-HEATER SYSTEM - MANUAL

Article Text

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Saturday, March 18, 2000 10:29PM

ARTICLE BEGINNING

1993 MANUAL A/C-HEATER SYSTEMS
Volkswagen United States, Inc.

EuroVan

SPECIFICATIONS

SPECIFICATIONS TABLE

AA

Application	Specification
Compressor Type	Sanden SD7H15 7-Cyl.
Compressor Belt Tension (1)	
System Oil Capacity (2)	
Without Rear A/C	4.6 ozs.
With Rear A/C	8.2 ozs.
Refrigerant (R-134a) Capacity	
Without Rear A/C	34-35 ozs.
With Rear A/C	48-49 ozs.
System Operating Pressures	
High Side	203 psi (14.3 kg/cm ²)
Low Side	17-26 psi (1.2-1.8 kg/cm ²)

(1) - Serpentine belt tension is automatically adjusted by tensioner pulley.

(2) - Use SP-10 PAG Oil (Part No. G 052 154 A2).

AA

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures.

AIR BAG SYSTEM PRECAUTIONS

SYSTEM OPERATION CHECK

Two lights pertaining to air bag system are located directly above air bag symbol in instrument cluster. Control light is used to indicate readiness of system. With ignition on, control light comes on for about 5-8 seconds then goes out, while diagnosis unit in air bag control unit performs an electronic test cycle of system.

If control light does not function as described, a fault probably exists in system. If fault occurs while ignition is on, it will be stored in fault memory. Warning light will then come on, and air bag system will be switched off. If warning light comes on or flickers while driving, air bag system should be tested.

SERVICE PRECAUTIONS

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Observe these precautions when working with air bag systems:

- * DO NOT use computer memory saver tool. Using computer memory tool will keep air bag system active and may cause accidental deployment of air bag unit.
- * Disable air bag system before servicing any air bag system or steering column component. See DISABLING & ACTIVATING AIR BAG SYSTEM.
- * Because of critical operating requirements of system, DO NOT attempt to service any air bag system component.
- * DO NOT leave air bag parts unattended. Install parts in vehicle immediately after obtaining.
- * DO NOT use air bag components that have been dropped from height of more than 18 inches.
- * DO NOT allow chemical cleaners, oil and grease to contact vinyl covering on air bag unit.
- * DO NOT place stickers or covers on steering wheel.
- * Always disable air bag system before performing electric welding on vehicle.
- * Air bag system can only be tested using Diagnostic Tester (VAG 1551) and Multimeter (US-1119). Never use test light on air bag system.
- * DO NOT expose air bag unit to temperatures greater than 194°F (90°C).

DISABLING & ACTIVATING AIR BAG SYSTEM

WARNING: System voltage is retained for about 20 MINUTES after system is deactivated. Wait about 20 MINUTES after system is disabled before servicing, as air bag may accidentally deploy, causing personal injury.

Disabling & Activating System

To disable system, disconnect negative battery cable. Wait 20 MINUTES before working on vehicle. To activate system, reconnect negative battery cable. Verify system is functioning properly. See SYSTEM OPERATION CHECK.

CAUTION: When battery is disconnected, radio will go into anti-theft protection mode. Obtain radio anti-theft protection code from owner prior to servicing vehicle.

DESCRIPTION

This vehicle uses a flow-through ventilation, blend air-type A/C-heating system. Air flows through grille below engine compartment hood and into passenger compartment. See Fig. 1. Interior compartment air is drawn out of vehicle through vents at rear of vehicle. The vents are located at bottom of each "D" pillar.

OPERATION

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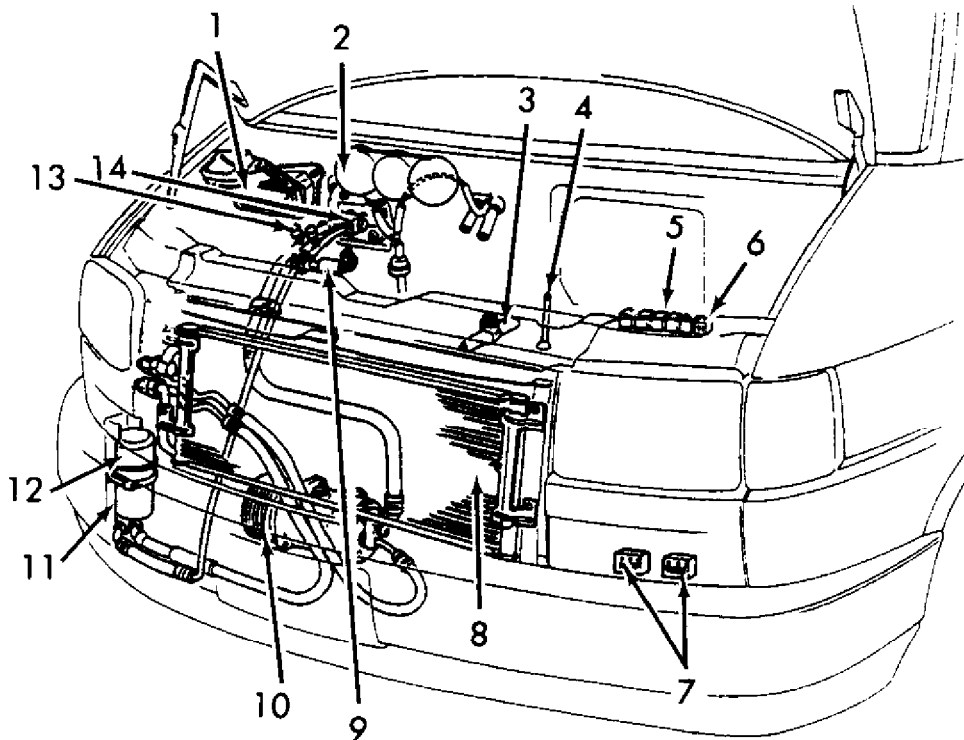
A/C-HEATER CONTROL PANEL/SYSTEM

Front

The front A/C-heater system is of the blend-air type design. Heated coolant flows through the heater core at all times. Interior temperature is controlled by a temperature regulation flap which regulates the amount of air being passed through or around heater core. A heater control valve is not used.

Bottom lever on A/C-heater control panel controls temperature regulation flap. The top lever on A/C-heater control panel determines mode of operation and air distribution.

This lever operates a combination vacuum/electrical switch. The vacuum portion of the switch determines air distribution. the electrical portion supplies power to the A/C compressor clutch, blower motor, and evaporator fan for the rear A/C-heater system.



- | | |
|--------------------------|---------------------------|
| 1. Air Intake Duct | 8. Condenser |
| 2. Vacuum Reservoir | 9. A/C Pressure Switch |
| 3. A/C Thermoswitch | 10. A/C Compressor |
| 4. Drain Tube | 11. Pressure Relief Valve |
| 5. Relays | 12. Receiver-Drier |
| 6. Cooling Fan Fuses | 13. Service Valves |
| 7. Cooling Fan Resistors | 14. Expansion Valve |

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Fig. 1: Identifying A/C-Heater System Components (Engine Compartment)
Courtesy of Volkswagen United States, Inc.

Rear

The rear A/C-heater system only works when the main (front)

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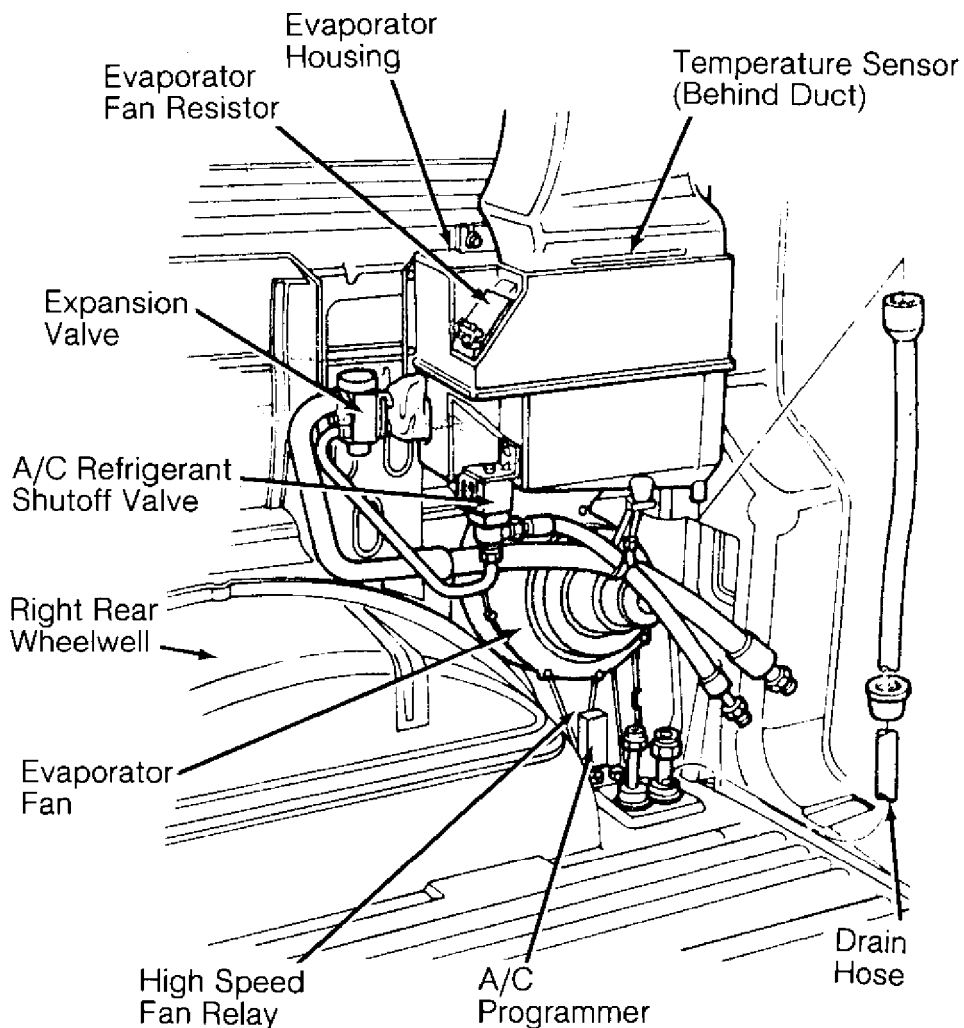
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A/C-heater system is switched on. The temperature of the rear A/C-heater system is independent of the main A/C-heater system. Air distribution is accomplished through 6 vents in headliner. The vents are located above each rear seat and are individually adjustable.

A temperature control knob is located next to fan switch rotary knob. To prevent windows from fogging, the rear blower motor will not operate when A/C or defrost modes are selected.

A potentiometer inside rear A/C-heater control panel supplies a pulsed voltage signal to the electrically controlled heater control valve. The heater control valve supplies heated engine coolant to rear heater core. See Fig. 2.



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Fig. 2: Identifying Rear A/C-Heater System Components
Courtesy of Volkswagen United States, Inc.

A/C PRESSURE SWITCH

The A/C pressure switch is a triple-pressure type. Switch is located on refrigerant line, near expansion valve. See Fig. 1.

If refrigerant pressure is too low, the A/C compressor is

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turned off (low pressure cutout). Switch opens when system pressure is less than 29.0 psi (2.0 kg/cm²). Switch closes when system pressure is more than 43.5 psi (3.1 kg/cm²).

If refrigerant pressure is too high, the A/C compressor is turned off (high pressure cutout). Switch opens when system pressure is more than 464 psi (32.6 kg/cm²). Switch closes when system pressure is less than 348 psi (24.5 kg/cm²).

The high pressure portion of A/C pressure switch controls cooling fan high speed operation. Switch closes, and cooling fan operates on second speed, when system pressure is more than 232 psi (16.3 kg/cm²). The switch opens when system pressure is less than 181 psi (12.7 kg/cm²).

A/C PROGRAMMER

The A/C programmer (temperature control unit) is located at bottom brace of rear evaporator (if equipped). See Fig. 2. The A/C programmer receives inputs from rear temperature control potentiometer and temperature sensor located at rear evaporator.

Depending on the temperature selected and the temperature of the air at rear evaporator, the A/C programmer will either open or close the A/C refrigerant shutoff valve.

A/C REFRIGERANT SHUTOFF VALVE

This valve, as controlled by A/C programmer, controls refrigerant flow to rear evaporator. See Fig. 2. The A/C programmer controls A/C refrigerant shutoff valve when evaporator temperature drops to 32°F (0°C) to prevent rear evaporator freeze-up.

AIR RECIRCULATION SWITCH

A rotary knob air recirculation switch is located above heater control panel. This switch, through a solenoid and vacuum servo, opens and closes a flap that is located in air inlet duct. When flap is open, outside air enters vehicle. When flap is closed, the vehicle's interior compartment air is recirculated to help prevent exhaust or harmful fumes from entering vehicle.

A/C THERMOSWITCH

The A/C thermoswitch (evaporator temperature switch) senses front evaporator temperature. See Fig. 1. Thermoswitch turns off A/C compressor when evaporator temperature drops to 32°F (0°C) to prevent evaporator freeze-up.

EXPANSION VALVES

An "H" type expansion valve is used for both front and rear evaporator. See Fig. 1. The rear A/C lines are connected to the front expansion valve. The rear A/C lines are routed under right side of vehicle and are attached to frame. The service ports and sight glass

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are also located near the expansion valve.

HEATER CONTROL VALVE

The electrically controlled heater control valve is located on left side of engine compartment, below brake booster. The valve is controlled by a pulsed voltage signal which closes or opens valve plunger. The higher the selected temperature, the longer the plunger stays open.

PRESSURE RELIEF VALVE

Pressure relief valve is located on refrigerant line fitting at bottom of receiver-drier. See Fig. 1. If system pressure reaches 580 psi (40.8 kg/cm²), the pressure relief valve will briefly open, then close when pressure has dropped. The system is not completely discharged. If an excessive system pressure is reached, the plastic washer on pressure relief valve breaks. Check system for cause of excessive pressure.

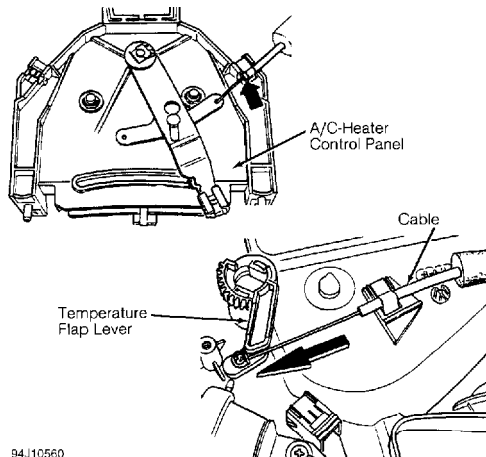
ADJUSTMENTS

TEMPERATURE FLAP CABLE

1) Attach temperature flap cable to lower control lever of A/C-heater control panel. Position cable sleeve on stop of A/C-heater control panel and secure with clip. Install A/C-heater control panel.

2) Slide temperature control lever fully left (cool position). Connect other end of temperature flap cable to temperature flap lever. Push lever away from cable until it stops. See Fig. 3.

3) Hold temperature flap lever in this position and secure cable with retaining clip. To check adjustment, slide temperature control lever back and forth from stop to stop. Temperature flap must audibly contact stops.



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Fig. 3: Adjusting Temperature Flap Cable
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TESTING

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures.

A/C SYSTEM PERFORMANCE

Park vehicle out of direct sunlight. Attach manifold gauge set to service valves. Start and run engine at 1500 RPM. Set A/C switch for maximum cooling. Set blower fan on high speed. Note low-side and high-side pressure readings. Service refrigerant system as necessary.

A/C PRESSURE SWITCH

NOTE: A/C pressure switch may be removed without discharging A/C system.

High Pressure (Condenser Fan) Circuit

1) Locate A/C pressure switch on refrigerant line, near expansion valve. See Fig. 1. Cycling of high pressure (condenser fan) circuit occurs between Red and Black wires.

2) Ensure switch closes, and cooling fan operates on second speed, when system pressure is more than 232 psi (16.3 kg/cm²). Ensure switch opens when system pressure is less than 181 psi (12.7 kg/cm²). Replace switch if necessary.

High Pressure Cut-Out Circuit

Cycling of high pressure cut-out circuit occurs between Blue wires. Ensure switch opens when system pressure is more than 464 psi (32.6 kg/cm²). Ensure switch closes when system pressure is less than 348 psi (24.5 kg/cm²). Replace switch if necessary.

Low Pressure Cut-Out Circuit

Cycling of low pressure cut-out circuit occurs between Blue wires. Ensure switch opens when system pressure is less than 29.0 psi (2.0 kg/cm²). Ensure switch closes when system pressure is more than 43.5 psi (3.1 kg/cm²). Replace switch if necessary.

NOTE: Additional testing information is not available from manufacturer. Use wiring diagram as a guide. See WIRING DIAGRAMS.

REMOVAL & INSTALLATION

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures.

NOTE: For removal and installation procedures not covered in this article, see HEATER SYSTEM article.

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A/C COMPRESSOR

Removal & Installation

1) Mark rotation direction of serpentine belt for installation reference. Using Lever (3299), loosen serpentine belt tensioner pulley. Remove serpentine belt.

2) Discharge A/C system using approved refrigerant recovery/recycling equipment. Detach refrigerant lines from A/C compressor. Remove A/C compressor bracket and/or A/C compressor as necessary. To install A/C compressor, reverse removal procedure.

CONDENSER

Removal & Installation

Discharge A/C system using approved refrigerant recovery/recycling equipment. Remove front radiator grille. Detach refrigerant lines from condenser. Remove condenser. To install condenser, reverse removal procedure.

EVAPORATOR & HEATER CORE

Removal & Installation

1) Evaporator and heater core removal and installation procedure is not available from manufacturer. If it is necessary to remove instrument panel, see INSTRUMENT PANEL.

2) Discharge A/C system using approved refrigerant recovery/recycling equipment. Use exploded view of evaporator assemblies as a guide. See Figs. 4 and 5. Manufacturer recommends that rear evaporator not be disassembled further than shown.

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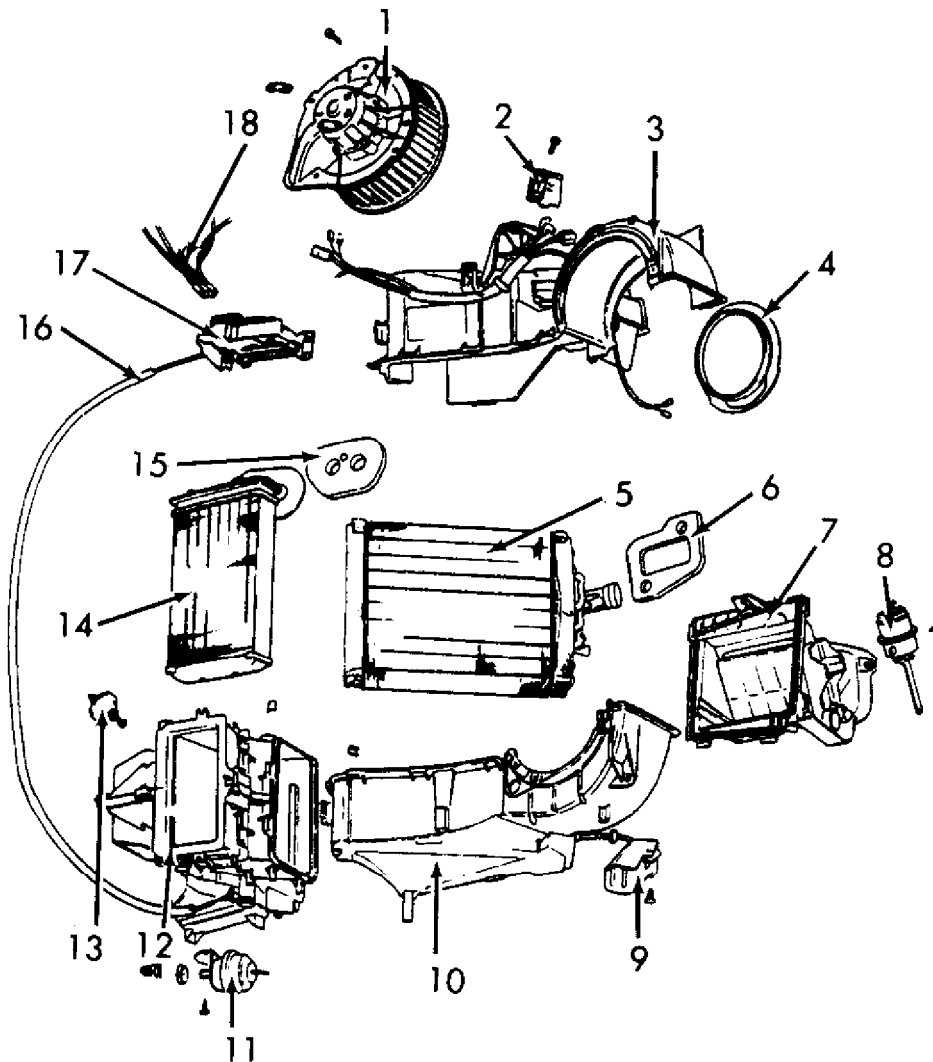
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- | | |
|--|---|
| 1. Blower Motor | 10. Lower Evaporator Housing |
| 2. Blower Motor Resistor | 11. Central Flap Vacuum Servo |
| 3. Upper Evaporator Housing | 12. Air Distribution Case |
| 4. Air Intake Ring | 13. Footwell/Defroster
Flap Vacuum Servo |
| 5. Evaporator | 14. Heater Core |
| 6. Seal | 15. Grommet |
| 7. Air Intake Duct | 16. Temperature Flap Cable |
| 8. Fresh/Recirculated Air
Flap Vacuum Servo | 17. A/C-Heater Control Panel |
| 9. A/C Thermostat | 18. Vacuum Hoses |

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Fig. 4: Exploded View Of Front Evaporator Assembly
Courtesy of Volkswagen United States, Inc.

EVAPORATOR TEMPERATURE SWITCH

Removal & Installation

1) Locate evaporator temperature switch along bottom of evaporator housing. Remove screw(s) and evaporator temperature switch

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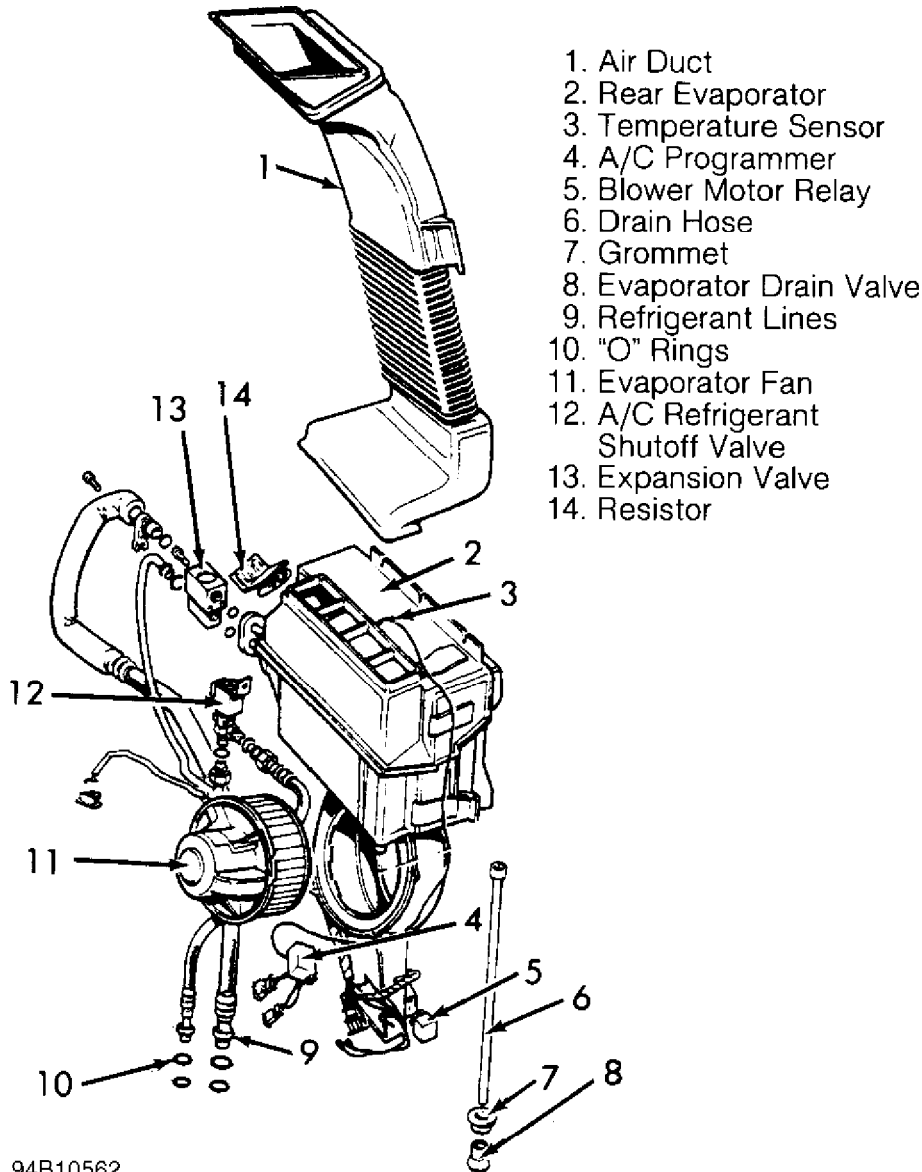
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from evaporator housing.

2) When installing evaporator temperature switch, apply tape 13" (330 mm) from end of sensor tube and install sensor tube into evaporator up to tape. DO NOT bend sensor tube.



1. Air Duct
2. Rear Evaporator
3. Temperature Sensor
4. A/C Programmer
5. Blower Motor Relay
6. Drain Hose
7. Grommet
8. Evaporator Drain Valve
9. Refrigerant Lines
10. "O" Rings
11. Evaporator Fan
12. A/C Refrigerant Shutoff Valve
13. Expansion Valve
14. Resistor

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Fig. 5: Exploded View Of Rear Evaporator Assembly
Courtesy of Volkswagen United States, Inc.

FRESH/RECIRCULATING AIR FLAP VACUUM SERVO

Removal & Installation

Remove glove box. Remove screws, and rotate vacuum servo to disengage it from arm and lever. Remove vacuum servo. To install vacuum servo, reverse removal procedure.

INSTRUMENT PANEL

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Removal

1) Obtain radio anti-theft protection code from owner prior to servicing vehicle. Disconnect negative battery cable. Open engine compartment hood. Remove bolt from air duct and cross panel. Bolt is located on engine compartment side of firewall, near windshield wiper linkage.

2) Mark position of steering wheel for installation reference. Remove steering wheel. Remove steering column trim and combination switch. Remove instrument cluster trim. Disconnect speedometer cable from instrument cluster.

3) Carefully remove vent from left and right air outlets. Remove screw, and carefully pry out left and right air outlets. Remove switch panel located below air outlet on driver's side. Disconnect wiring from speakers.

4) Rotate knob on center of storage bin (fuse/relay panel cover) and open bin. Carefully disengage storage bin from pivot points and remove bin. Carefully remove vent from center air outlet. Remove screws and carefully pry out center air outlet.

5) Remove A/C-heater control panel. See Fig. 6. Remove radio. Disconnect antenna, switches, and cigarette lighter wiring harness. Ensure all switches and/or harnesses are disconnected from center part of instrument panel.

6) Open glove box. Remove glove box light, and disconnect wiring harness. Remove 7 screws and glove box. Remove covers and bolts from ends of instrument panel. Remove instrument panel.

Installation

To install instrument panel, reverse removal procedure. Ensure wiring harnesses are not pinched during installation.

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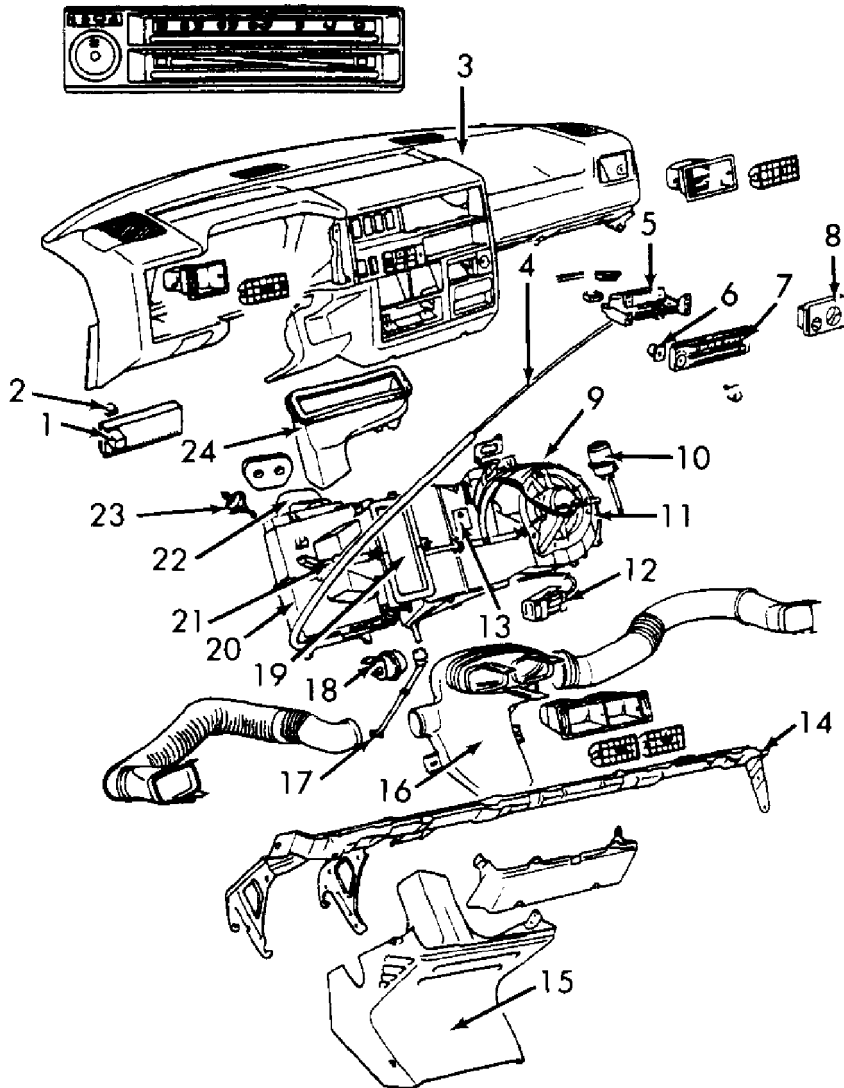
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- | | |
|--|---|
| 1. A/C Relay | 13. Blower Motor Resistor |
| 2. A/C-Heater System Fuse | 14. Bracket |
| 3. Instrument Panel | 15. Footwell Air Outlet Console |
| 4. Temperature Flap Cable | 16. Center Air Duct |
| 5. A/C-Heater Control Panel | 17. Drain Hose |
| 6. Blower Motor Switch (Front) | 18. Center Flap Vacuum Servo |
| 7. Trim Panel | 19. Center Flap |
| 8. Blower Motor Switch (Rear) | 20. Heater/Evaporator Housing |
| 9. Air Intake Duct & Fresh/
Recirculated Air Flap | 21. Footwell/Defroster Flap |
| 10. Fresh/Recirculated Air
Flap Vacuum Servo | 22. Heater Core |
| 11. Blower Motor | 23. Footwell/Defroster
Flap Vacuum Servo |
| 12. A/C Thermostat | 24. Defroster Duct |

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Fig. 6: A/C-Heater System Component ID (Passenger Compartment)
Courtesy of Volkswagen United States, Inc.

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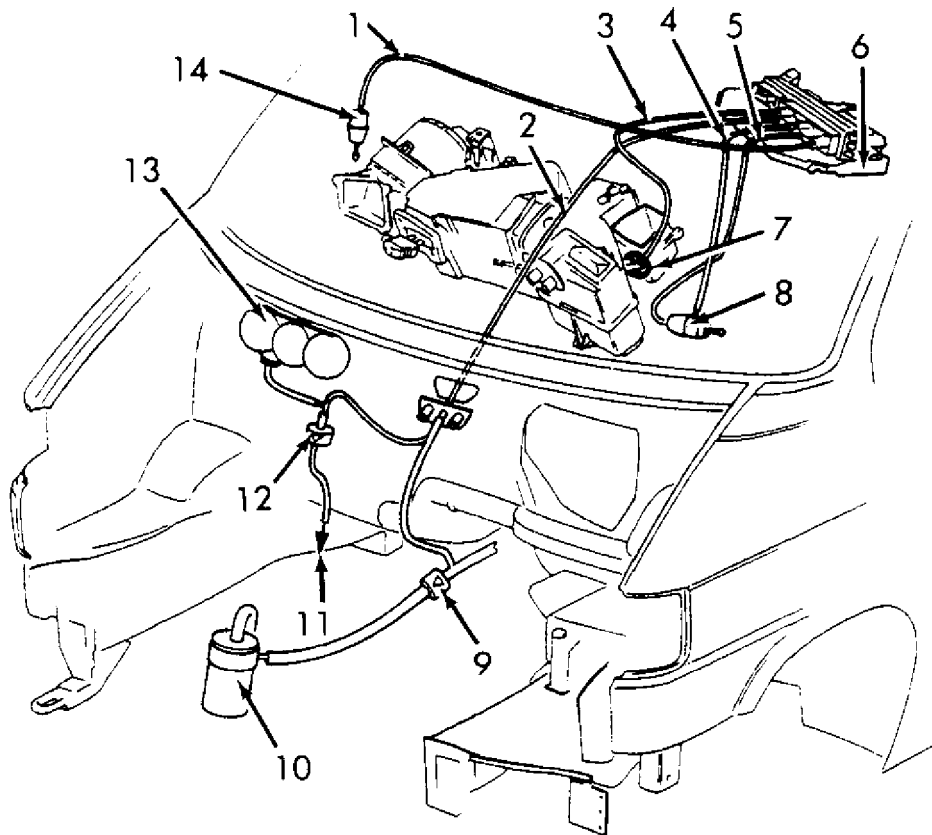
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VACUUM DIAGRAM



- | | |
|--|---|
| 1. Vacuum Hose (White) | 8. Central Flap Vacuum Servo |
| 2. Vacuum Hose (Black) | 9. Check Valve (If Equipped) |
| 3. Vacuum Hose (Red) | 10. Vacuum Pump (If Equipped) |
| 4. Vacuum Hose (Green) | 11. Engine Vacuum Supply Hose |
| 5. Vacuum Hose (Yellow) | 12. Check Valve |
| 6. A/C-Heater Control Panel | 13. Vacuum Reservoir |
| 7. Footwell/Defroster
Flap Vacuum Servo | 14. Fresh/Recirculated Air
Flap Vacuum Servo |

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Fig. 7: Vacuum Diagram

Courtesy of Volkswagen United States, Inc.

WIRING DIAGRAMS

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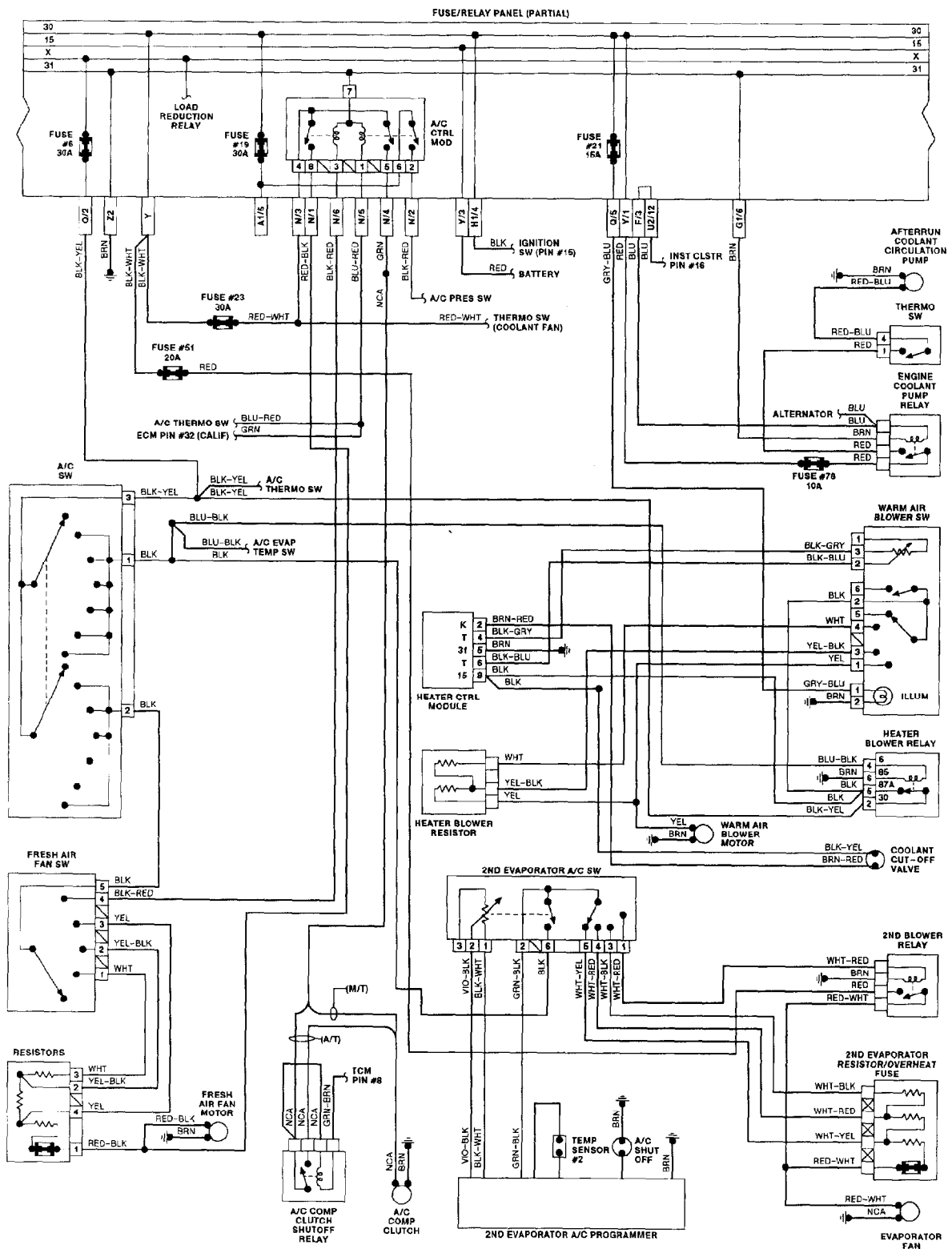
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Fig. 8: Manual A/C-Heater System Wiring Diagram (1 Of 2)

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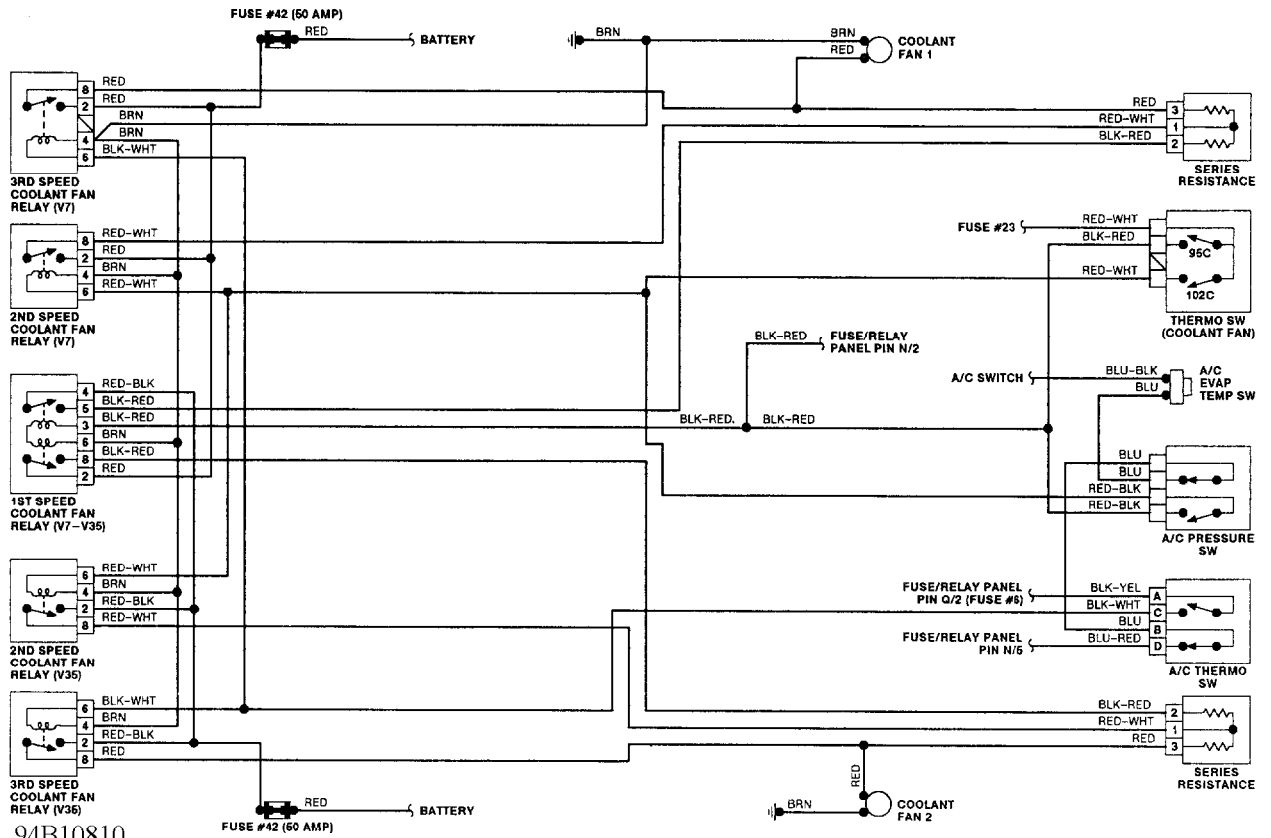


Fig. 9: Manual A/C-Heater System Wiring Diagram (2 Of 2)

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