

A/C-HEATER SYSTEM - MANUAL

Article Text

1991 Volkswagen Vanagon
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ARTICLE BEGINNING

1990-92 AIR CONDITIONING & HEATING
Volkswagen Manual A/C-Heater Systems

1990-92 Passat
1991-92 Cabriolet, Corrado, Fox, Golf, GTI, Jetta, Vanagon

* PLEASE READ THIS FIRST *

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in AIR BAG article in the ACCESSORIES/SAFETY EQUIPMENT Section.

CAUTION: When discharging air conditioning system, use only approved refrigerant recovery/recycling equipment. Make every attempt to avoid discharging refrigerant into the atmosphere.

A/C SYSTEM SPECIFICATIONS

SPECIFICATIONS TABLE

AA

Application	Specification
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Compressor Type	Sanden 5 or 7-Cylinder
-----------------------	------------------------

Compressor Belt Deflection	(1) 3/16" (4.8 mm)
----------------------------------	--------------------

System Oil Capacity	
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Corrado & Passat	4.6 ozs.
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Cabriolet	6.0 ozs.
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Vanagon	7.0 ozs.
---------------	----------

All Others	4.5 ozs.
------------------	----------

Refrigerant (R-12) Capacity	
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Corrado	37-40 ozs.
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Passat	41-44 ozs.
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Vanagon	50 ozs.
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All Others	38-42 ozs.
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System Operating Pressures	
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High Side	150-210 psi (10.5-19 kg/cm ²)
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Low Side	26-40 psi (1-2 kg/cm ²)
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(1) - Deflection is measured at center of belt, between A/C compressor pulley and crankshaft pulley.

AA

DESCRIPTION

The air conditioning system is a cycling clutch type. The compressor is cycled on and off by a thermostatic switch to maintain constant cooling rate.

System components include evaporator, expansion valve,

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receiver-drier, control panel, condenser, high-pressure switch and a low-pressure switch. On Vanagon, the A/C thermostat can be found on left rear pillar, above relay panel assembly (behind trim panel). See Fig. 1.

The control panel includes a pair of levers and a fan control switch. The upper lever operates air distribution flap. The lower lever controls temperature selection. The rotary fan control switch controls fan speed selection.

OPERATION

SYSTEM CONTROLS

Air Distribution Lever

When in A/C position, cool air is routed to registers and side air vents. In BI-LEVEL position, cool air is routed to floor vents as well as registers and side air vents. In HEAT position, warm air is routed to windshield vents, side window nozzles and floor and center registers. In DEFOG position, warm air is routed to windshield vents, side window nozzles and side registers.

Fan Control Knob

The fan control knob controls airflow. As knob is turned clockwise, air intake opens and fan operates, increasing speed as knob is moved to extreme right position.

Temperature Control Lever

The temperature control lever controls heating and cooling. When moved to the left, lever turns compressor on. When moved to the right, a heater water valve is opened, supplying coolant to heater core.

HIGH-PRESSURE SWITCH

High-pressure switch shuts compressor off if high pressure reaches approximately 210 psi (14.8 kg/cm²). High-pressure switch will reset when pressure decreases to approximately 174 psi (12.2 kg/cm²).

LOW-PRESSURE SWITCH

Low-pressure switch cuts off system operation when abnormally low pressure exists in system. This protects the compressor if not enough refrigerant is in system. Low-pressure switch shuts compressor off at approximately 26 psi (1.8 kg/cm²).

THERMOSWITCH

Thermoswitch shuts compressor off if coolant temperature rises above 248°F (120°C).

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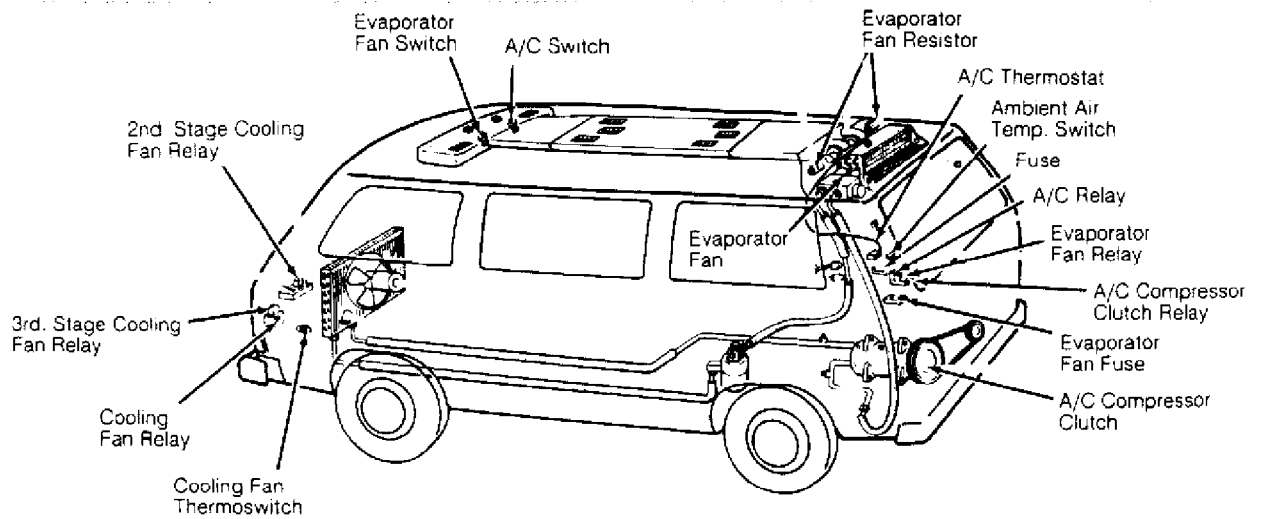
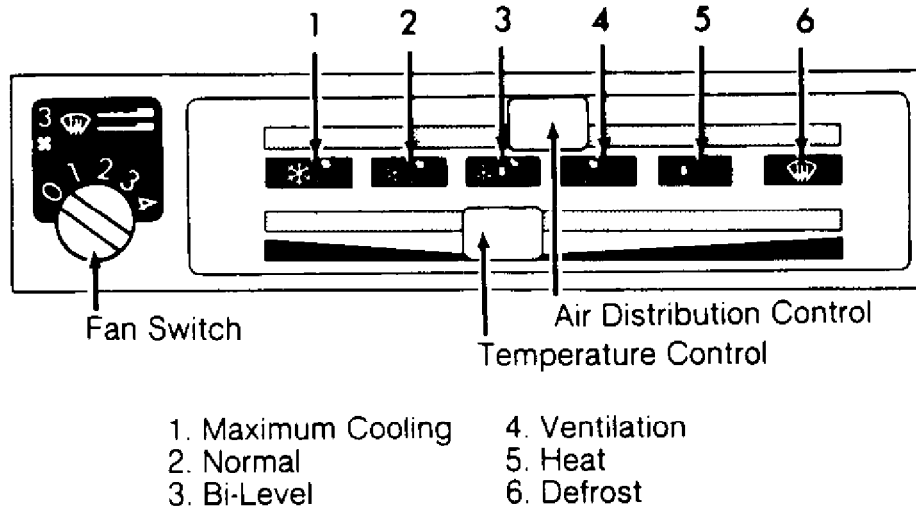


Fig. 1: Locating A/C Components (Vanagon)
Courtesy of Volkswagen United States, Inc.



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Fig. 2: A/C-Heater Control Panel ID Components (Except Fox & Passat)
Courtesy of Volkswagen United States, Inc.

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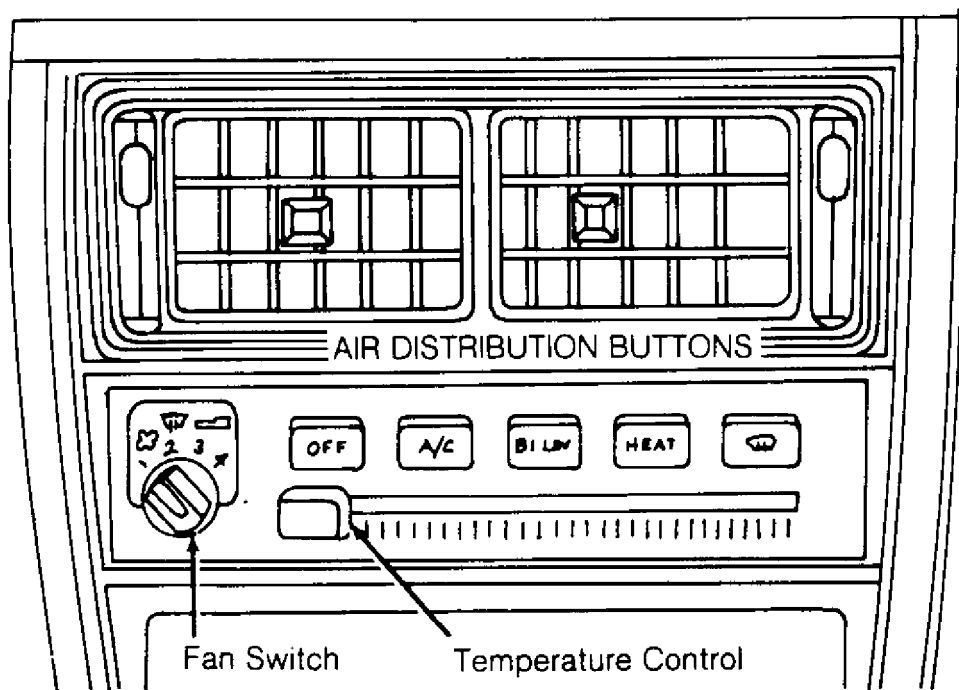
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Fig. 3: A/C-Heater Control Panel ID Components (Fox)
Courtesy of Volkswagen United States, Inc.

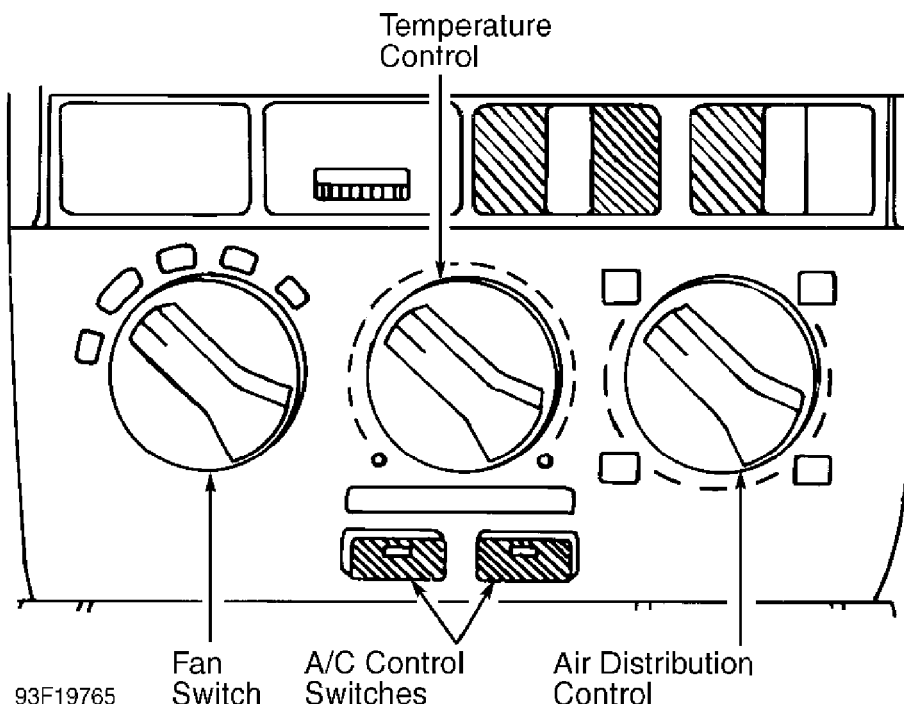


Fig. 4: A/C-Heater Control Panel ID Components (Passat)
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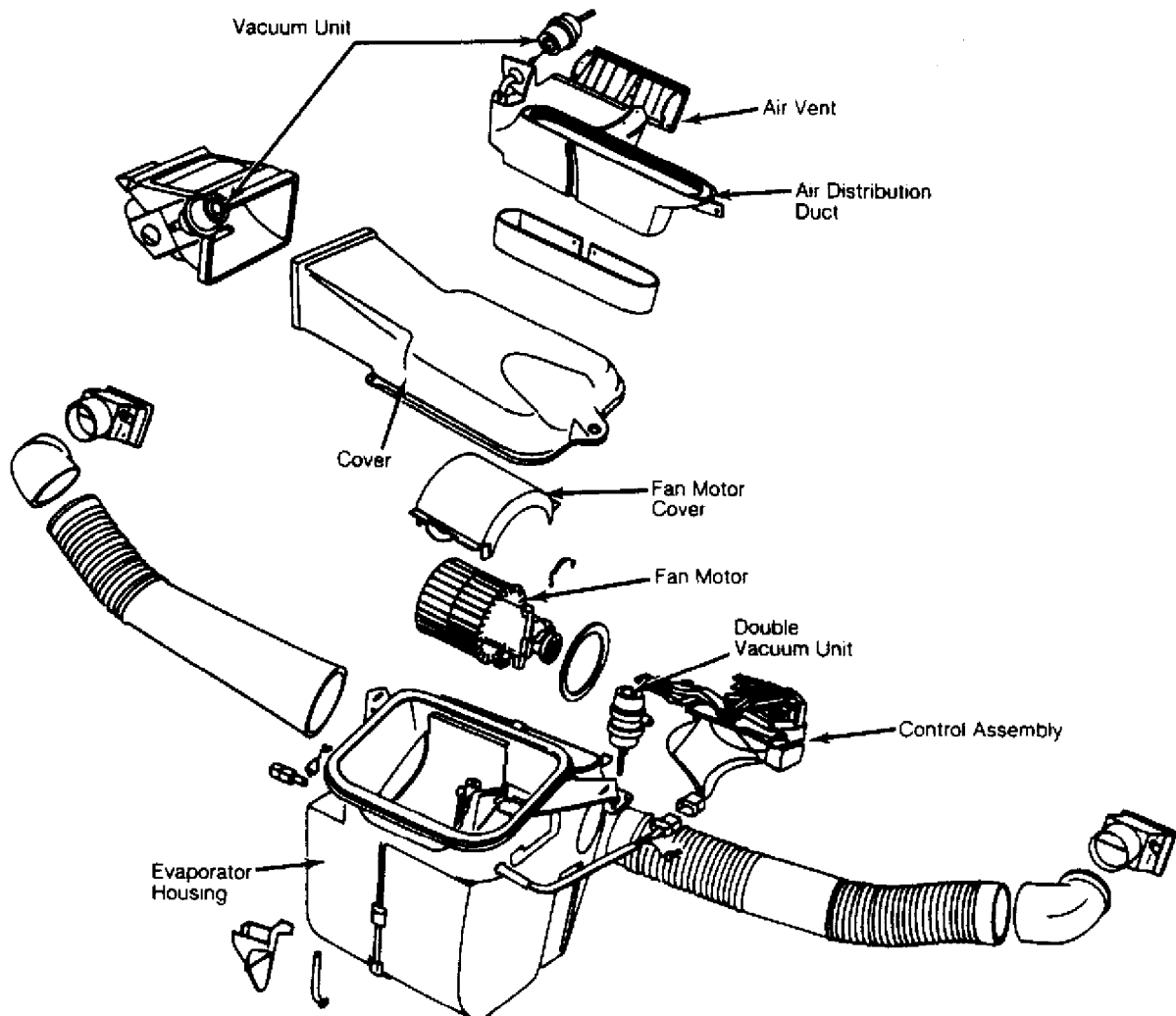


Fig. 5: Exploded View of A/C-Heater System Components (Cabriolet)
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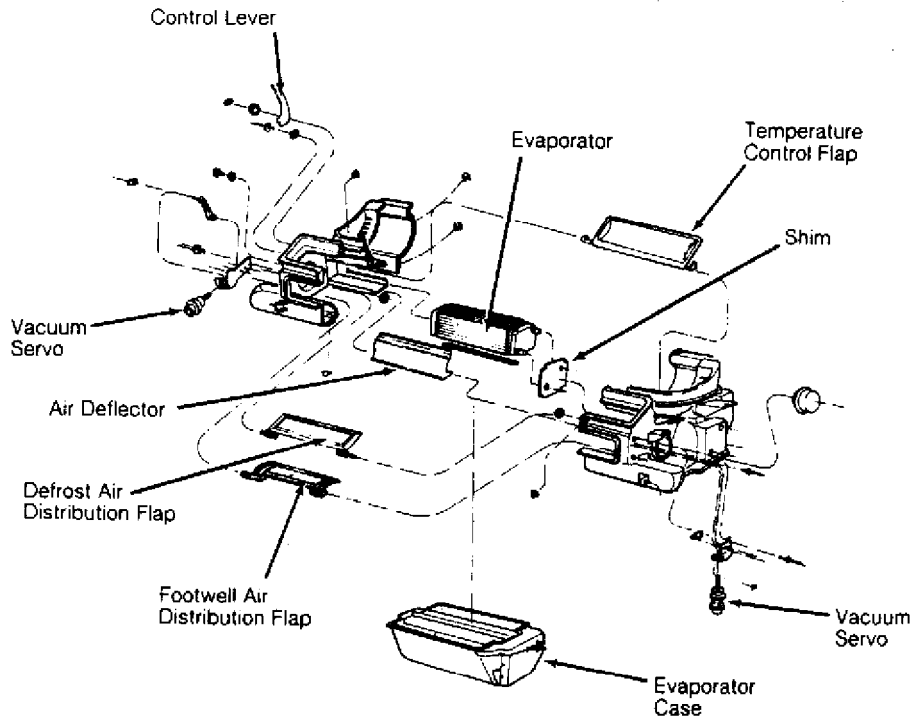
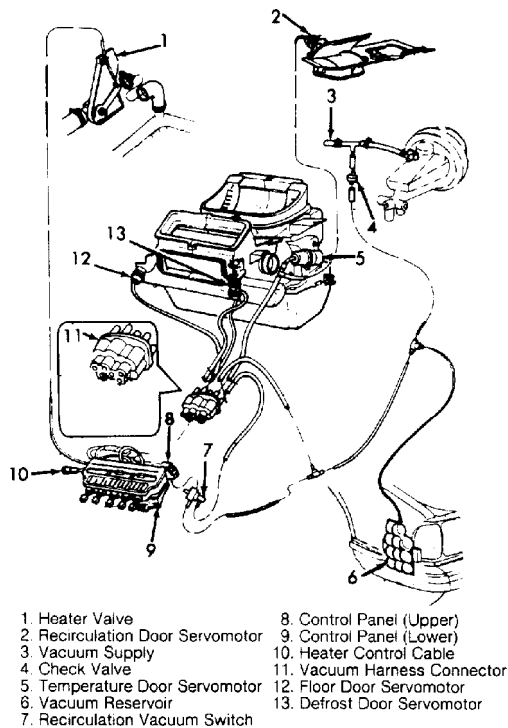


Fig. 6: Exploded View of A/C-Heater System Components (Fox)
Courtesy of Volkswagen United States, Inc.



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Fig. 7: A/C-Heater System Vacuum Control & Component ID (Fox)
Courtesy of Volkswagen United States, Inc.

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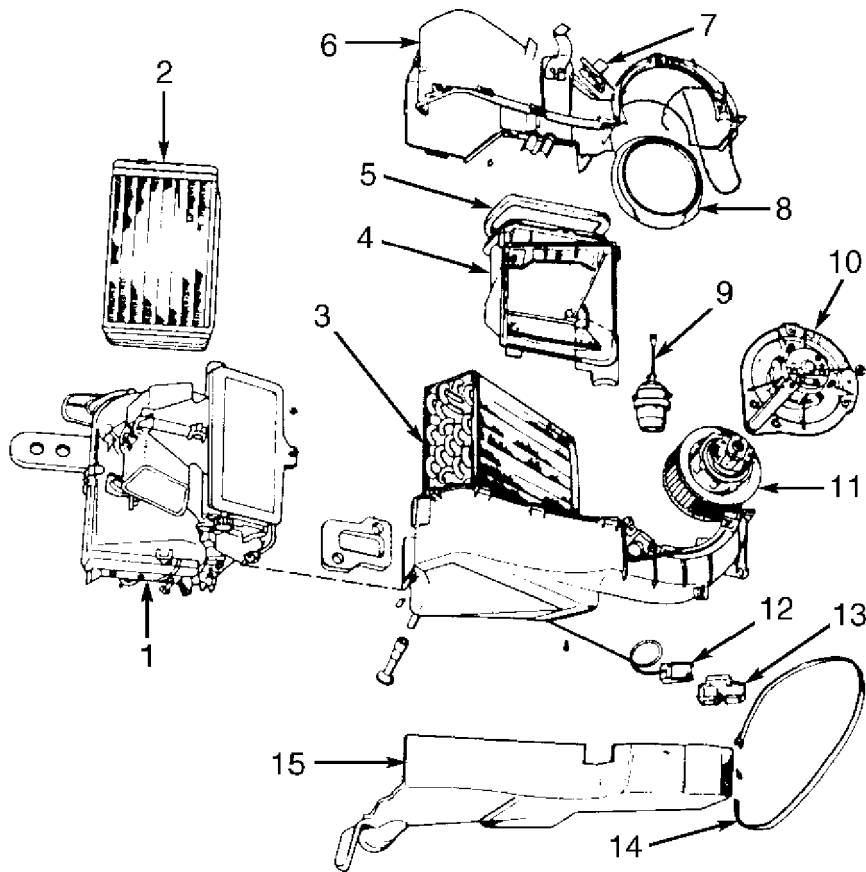
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1. Air Distribution Housing
2. Heater Core
3. Evaporator
4. Intake Air Duct
5. Seal
6. Evaporator Housing
7. Blower Resistor
8. Air Ring

9. Recirculation Servomotor
10. Blower Housing
11. Blower Motor
12. A/C Thermostat
13. Thermostat Cover
14. Strap
15. Housing Cover

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Fig. 8: Exploded View of A/C-Heater System Components (Passat)
Courtesy of Volkswagen United States, Inc.

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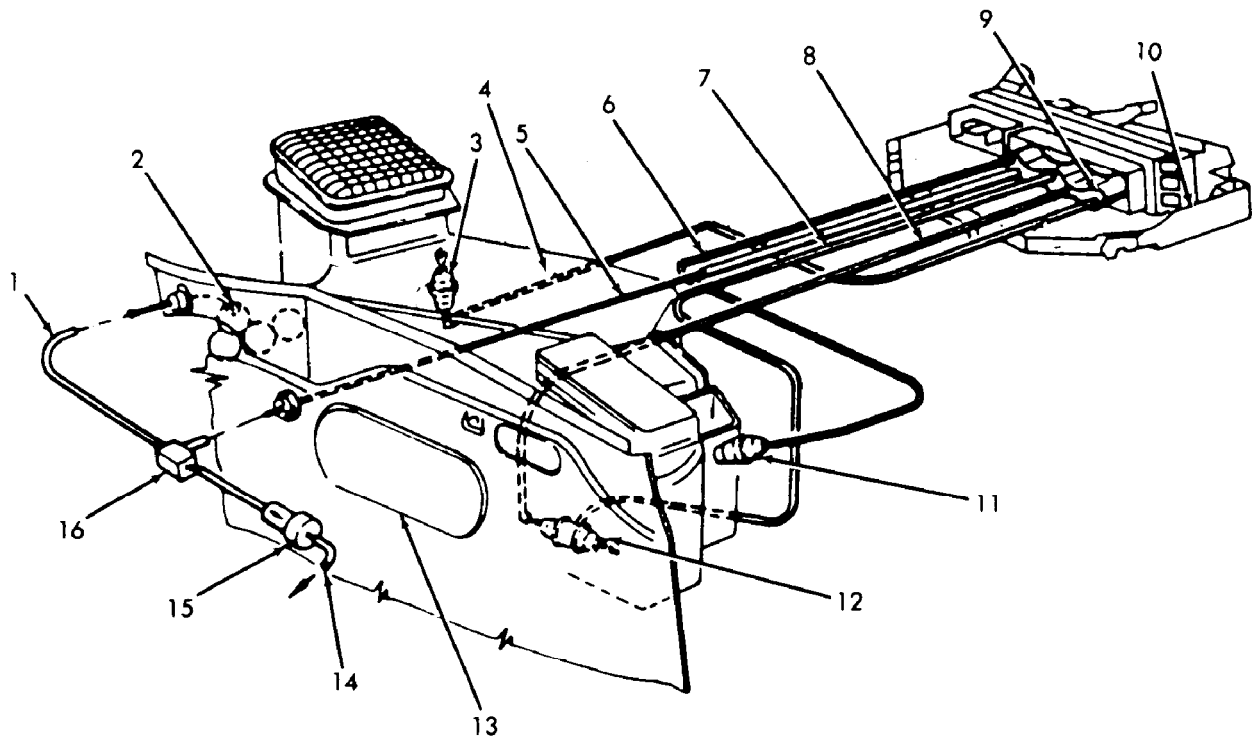
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- | | |
|-------------------------------------|--------------------------|
| 1. To Vacuum Reservoir | 9. Vacuum Hose Connector |
| 2. Vacuum Reservoir | 10. A/C Control Head |
| 3. Fresh Air/Recirculation Servo | 11. Heater/Defrost Servo |
| 4. To Fresh Air/Recirculation Servo | 12. Mode Door Servo |
| 5. To Vacuum Source | 13. Firewall |
| 6. To Heat/Defrost Servo | 14. Vacuum Source |
| 7. To Mode Door Servo (Side Port) | 15. Check Valve |
| 8. To Mode Door Servo (Top Port) | 16. "T" Fitting |

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Fig. 9: A/C-Heater System Vacuum Control & Component ID (Corrado)
Courtesy of Volkswagen United States, Inc.

ADJUSTMENTS

MICROSWITCH

Loosen microswitch mounting screw. Move microswitch so switch is on when lever is at maximum A/C, NORM (normal), BI-LEVEL or extreme right position and off when lever is at VENT or HEAT position. Tighten microswitch mounting screw. Recheck operation.

TEMPERATURE SWITCH

Move temperature lever to full cool position. Loosen temperature switch mounting screw. Move temperature switch counterclockwise to full stop position. Tighten temperature switch mounting screw.

TROUBLE SHOOTING

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NO COOLING

1) Ensure fan motor operates in all 4 speeds. Ensure air duct closes off outside air and heater water valve is closed. Adjust belt tension and clean condenser.

2) Inspect receiver-drier pressure seal. If seal is good, go to step 5). If seal is broken, evacuate and recharge system. If system cools properly, testing is complete. If system does not cool, connect pressure gauges.

3) Set engine speed at 2500 RPM. Insert thermometer in left register and close all others. Place controls on high blower and maximum cooling. With vehicle out of direct sunlight, close all windows. Radiator fan should come on with system pressure at 200 psi (14 kg/cm²).

NOTE: If system doors allow air leaks, evaporator will freeze up and testing will not be possible.

4) If fan does not operate, replace pressure switch. Ensure system is okay. If fan does come on, turn engine off, and check for condenser obstructions and blocked airflow.

5) Turn air conditioner on and off with temperature control lever. Ensure compressor clutch engages. Push lever to extreme right position and back again. A click should be heard from compressor clutch. If a click is not heard, check for voltage at clutch coil wire with switch on. If voltage is present, replace clutch coil. If voltage is not present, check wiring or replace thermostatic switch.

6) If compressor clutch operates, check gauge readings. If both readings are low, locate leak and recharge system. If both readings are high, replace expansion valve. If low side is too high and high side reads too low, replace or rebuild compressor.

INSUFFICIENT COOLING

1) Ensure fan motor operates at all 4 speeds. Ensure air duct closes off outside air intake and heater water valve is closed. Adjust compressor belt tension and clean condenser.

NOTE: If system doors allow air leaks, evaporator will freeze up and testing will not be possible.

2) Adjust engine speed to 2500 RPM. Position controls for maximum cooling and high blower. Insert thermometer in left register and close all other ducts. With vehicle out of sun, close all windows and doors. Connect pressure gauges and check readings.

3) If both gauges read too high, replace expansion valve. If both gauges read too low, recharge system after locating leak. If both readings are normal, go to next step. If pressure side is too high and suction side is normal, go to step 5). If pressure side is too low and suction side is too high, go to step 6). If pressure side is normal and suction side is too low, go to step 7).

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4) Turn compressor off and observe gauges. If readings equalize in 30 seconds, replace compressor. If readings take longer to equalize, ensure capillary tube installed length is 7" (178 mm).

5) If installation is correct, run system at maximum cooling for 15 minutes. If thermometer indicates temperature below 36°F (2°C) when compressor is turned off, or temperature is above 48°F (9°C) with compressor on, replace temperature switch.

6) Check condenser fins and clean or straighten. If operation is still not correct, discharge system using approved refrigerant recovery/recycling equipment, until bubbles appear in sight glass. Recharge system until bubbles disappear, and recheck pressures. If still incorrect, locate leaks and tighten fittings. Discharge A/C system using approved refrigerant recovery/recycling equipment. Evacuate system to remove all air and recharge system.

7) Check for bubbles at sight glass. If present, repair leaks and recharge system. If no bubbles are present, check condenser-to-expansion valve line for kinks and repair if necessary. Feel along line from condenser to expansion valve. If there are no cold spots, replace expansion valve.

8) If cold spot is felt, remove and flush out lines and condenser. Check for bubbles at sight glass. If there are no bubbles present, replace compressor. If bubbles are present, check for leaks. Repair and recharge system.

INTERMITTENT COOLING

1) Ensure fan motor operates in all 4 speeds. Ensure air duct closes off outside air and heater water valve is closed. Adjust belt tension and clean condenser.

NOTE: If system doors allow air to leak by, evaporator will freeze up and testing will no longer be possible.

2) Adjust engine speed to 2500 RPM. Set controls for maximum cooling and high fan. Insert thermometer in left air duct and close all other ducts. With vehicle in shade, close windows and doors and connect pressure gauges. Operate system for 10 minutes.

3) Check for cool air from left duct. Low-pressure gauge should read more than 16 psi (1.1 kg/cm²). If low-pressure gauge is incorrect, hold hands around expansion valve to warm valve. If pressure rises, moisture is present in system. Discharge A/C system using approved refrigerant recovery/recycling equipment. Evacuate and recharge system. If pressure does not rise, go to next step.

4) Check temperature on thermometer when thermostatic switch turns compressor off. If temperature is 39°F (4°C), system is okay. If lower than 39°F (4°C), ensure capillary tube installed length is 7" (178 mm). If installation is correct, replace thermostatic switch.

NO RECIRCULATE (FRESH AIR AT ALL TIMES)

Passat

1) Start engine. Turn blower motor off. Check fresh

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air/recirculate servomotor. Servomotor should be retracted. If servomotor is not as specified, check vacuum supply.

2) If vacuum does not exist, repair vacuum supply. If vacuum exists, check fresh air/recirculate door. If door faulty repair or replace as required. If door is okay, replace servomotor and retest.

TESTING

* PLEASE READ THIS FIRST *

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in AIR BAG article in the ACCESSORIES/SAFETY EQUIPMENT Section.

AMBIENT TEMPERATURE SWITCH

Passat

Using an ohmmeter, connect leads to sensor connector terminals. Continuity should exist with temperature greater than 45°F (7°C). If ohmmeter reading is not as specified, replace switch.

COMPRESSOR CLUTCH COIL

Passat

Disconnect compressor clutch harness connector. Using ohmmeter, check resistance between clutch connector terminals. Resistance reading should be 3.6 ohms. If resistance reading is not as specified, replace clutch coil.

PRESSURE SWITCH

Corrado

1) Connect manifold gauge set to A/C system. Using ohmmeter, connect leads between 2 Blue terminals in switch connector. Start engine, and turn A/C on. Switch should close (zero ohm continuity reading) when pressure gauge reads 29-43.5 psi (2.0-3.0 kg/cm²).

2) Allow system to operate and observe gauge set and ohmmeter. Switch should open (infinite resistance reading) when system pressure is 348-464 psi (24.4-32.6 kg/cm²). Connect ohmmeter between Red and Black terminals.

3) With system pressure less than 181-232 psi (12.7-16.3 kg/cm²), resistance reading should be infinite ohms and radiator cooling fan should be at low speed. With system pressure greater than 181-232 psi (12.7-16.3 kg/cm²), resistance reading should be zero ohms and radiator cooling fan should be at high speed. If switch does not operate as specified, replace switch.

Passat

1) Connect manifold gauge set to A/C system. Using an ohmmeter, connect leads between 2 Blue terminals in switch connector. Start engine and turn A/C on. Switch should close (zero ohm continuity

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reading) when pressure gauge reads 29-43.5 psi (2.0-3.0 kg/cm²).

2) Allow system to operate and observe gauge set and ohmmeter. Switch should open (infinite resistance reading) when system pressure is between 181-232 psi (12.7-16.3 kg/cm²). Connect ohmmeter between Red and Black terminals.

3) With system pressure less than 181-232 psi (12.7-16.3 kg/cm²), resistance reading should be infinite ohms and radiator cooling fan should be at low speed. With system pressure greater than 181-232 psi (12.7-16.3 kg/cm²), resistance reading should be zero ohms and radiator cooling fan should be at high speed. If switch does not operate as specified, replace switch.

VACUUM SERVOMOTORS

Corrado

Start engine. Connect a vacuum gauge to appropriate servomotor vacuum line and slide mode lever to specified position. Compare vacuum reading to specification. See VACUUM SERVOMOTOR TESTING table.

VACUUM SERVOMOTOR TESTING TABLE

AA

Application	Vacuum
-------------	--------

OFF

Heat/Defrost	.....	None
Mode Door		
1st Stage	.....	Present
2nd Stage	.....	Present
Recirculation	.....	Present

MAX

Heat/Defrost	.....	None
Mode Door		
1st Stage	.....	Present
2nd Stage	.....	Present
Recirculation	.....	Present

NORM

Heat/Defrost	.....	None
Mode Door		
1st Stage	.....	Present
2nd Stage	.....	Present
Recirculation	.....	None

BI-LEVEL

Heat/Defrost	.....	Present
Mode Door		
1st Stage	.....	Present
2nd Stage	.....	None
Recirculation	None

VENT

Heat/Defrost	Present
Mode Door		
1st Stage	Present

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2nd Stage	Present
Recirculation	None
HEAT		
Heat/Defrost	Present
Mode Door		
1st Stage	.....	None
2nd Stage	.....	None
Recirculation	.....	None
DEFROST		
Heat/Defrost	.....	None
Mode Door		
1st Stage	.....	None
2nd Stage	.....	None
Recirculation	.....	None

AA

REMOVAL & INSTALLATION

* PLEASE READ THIS FIRST *

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in AIR BAG article in the ACCESSORIES/SAFETY EQUIPMENT Section.

NOTE: Removal and installation procedures are not available from manufacturer for all models or components. For exploded view of Cabriolet or Fox manual A/C-heater system, see Fig. 2 or 3.

A/C-HEATER CONTROL PANEL

Removal & Installation (Passat)

Remove control panel trim. Remove control panel mounting screws and pull panel forward out of dashboard. Disconnect harness connector and control cables. Remove control panel. To install, reverse removal procedure.

BLOWER MOTOR

Removal & Installation (Fox)

1) Disconnect negative battery cable. Remove front cover gasket and water deflector. Release front fresh air housing cover clips and remove front and rear fresh air housing covers.

2) Disconnect vacuum hoses. Disconnect blower resistor harness connector and remove resistor. Loosen blower mounting screw. Disconnect blower motor harness connector.

3) Remove blower motor upper and lower housing covers. Rotate blower motor toward front of vehicle and remove motor. To install, reverse removal procedure.

Removal & Installation (Corrado, Golf & Jetta)

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Disconnect blower motor harness connector. Depress blower motor retaining clip and rotate motor clockwise to disengage lug on motor from clip. Remove motor. To install, reverse removal procedure.

EVAPORATOR

Removal & Installation (Vanagon)

1) Discharge A/C system using approved refrigerant recovery/recycling equipment. Remove sun visors and sun visor retaining clips. Lower front housing and front air duct.

2) Disconnect wiring connectors to A/C switches. Remove front housing, front air ducts, center air duct, rear air duct, left rear trim panel and right rear trim panel.

3) Support evaporator housing. Remove left and right side evaporator housing mounting screws. Lower evaporator housing. Remove evaporator housing covers. Remove evaporator. See Fig. 10. To install, reverse removal procedure. Evacuate and recharge system.

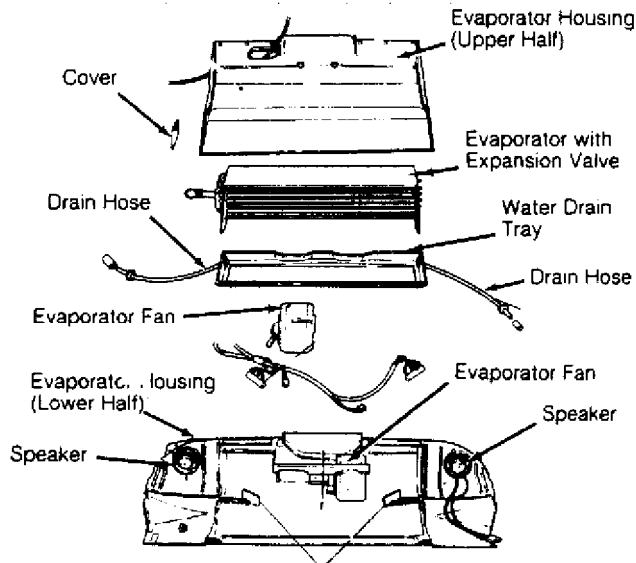


Fig. 10: Exploded View of Evaporator Assembly (Vanagon)
Courtesy of Volkswagen United States, Inc.

THERMOSTAT

Removal & Installation (Passat)

Remove thermostat cover. See Fig. 4. Remove thermostat mounting screw, and disconnect harness connector. Remove thermostat by pulling sensing (capillary) tube through grommet. To install, reverse removal procedure. Measure back 13" (330 mm) from end of sensing tube and tape mark point. Insert sensing tube into evaporator guide channel up to tape mark.

WIRING DIAGRAMS

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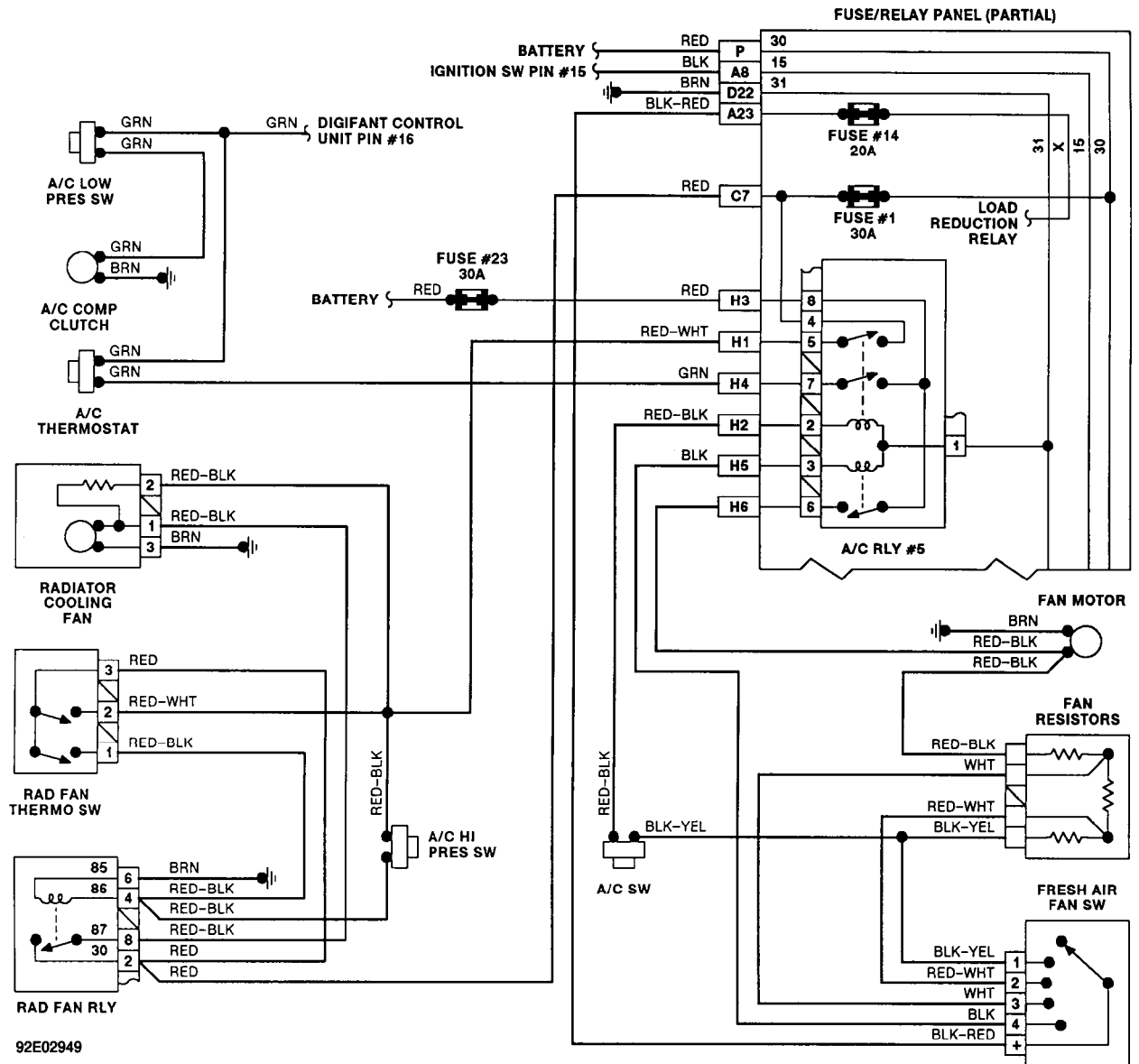


Fig. 11: A/C-Heater System Wiring Diagram (Cabriolet)

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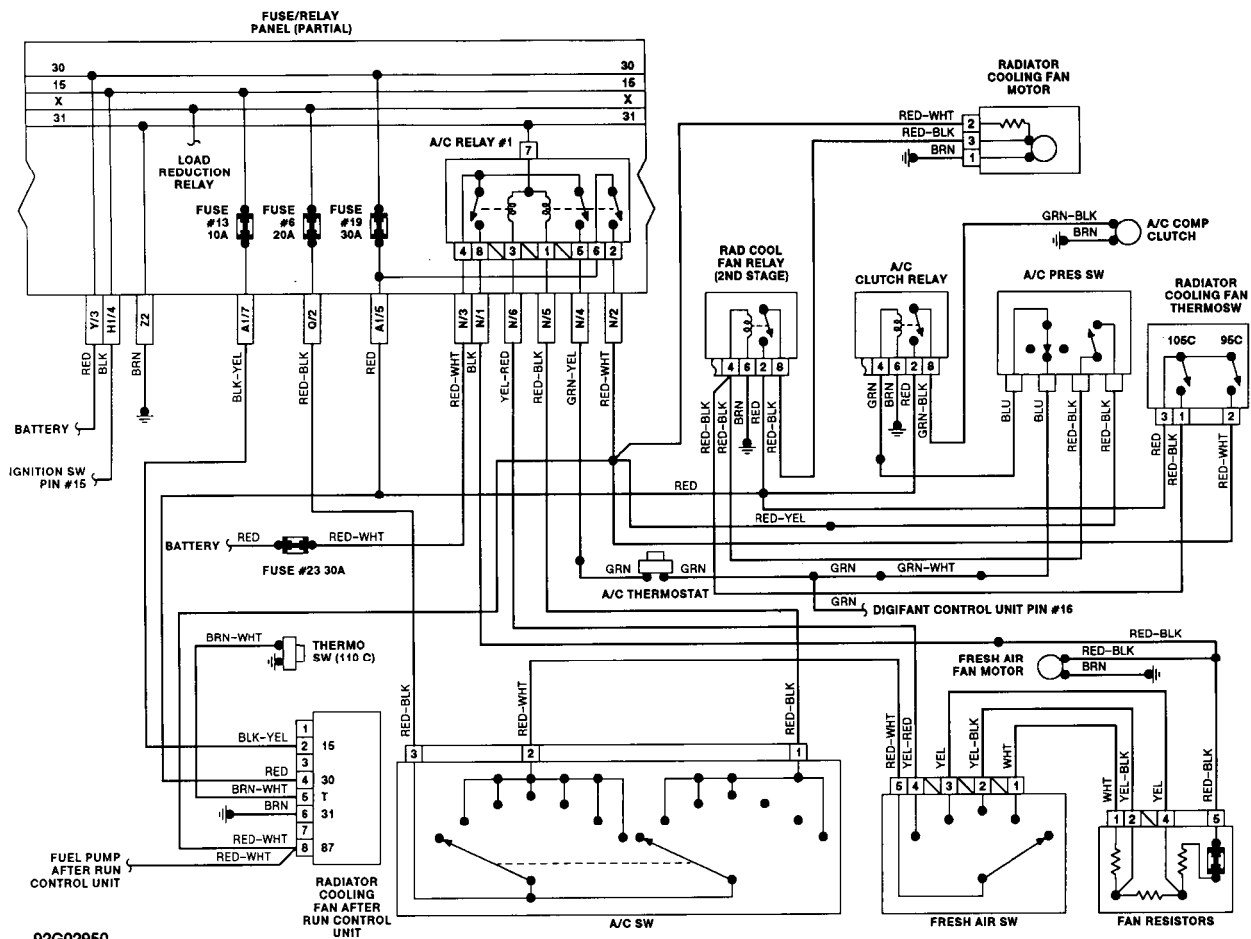


Fig. 12: A/C-Heater System Wiring Diagram (Corrado)

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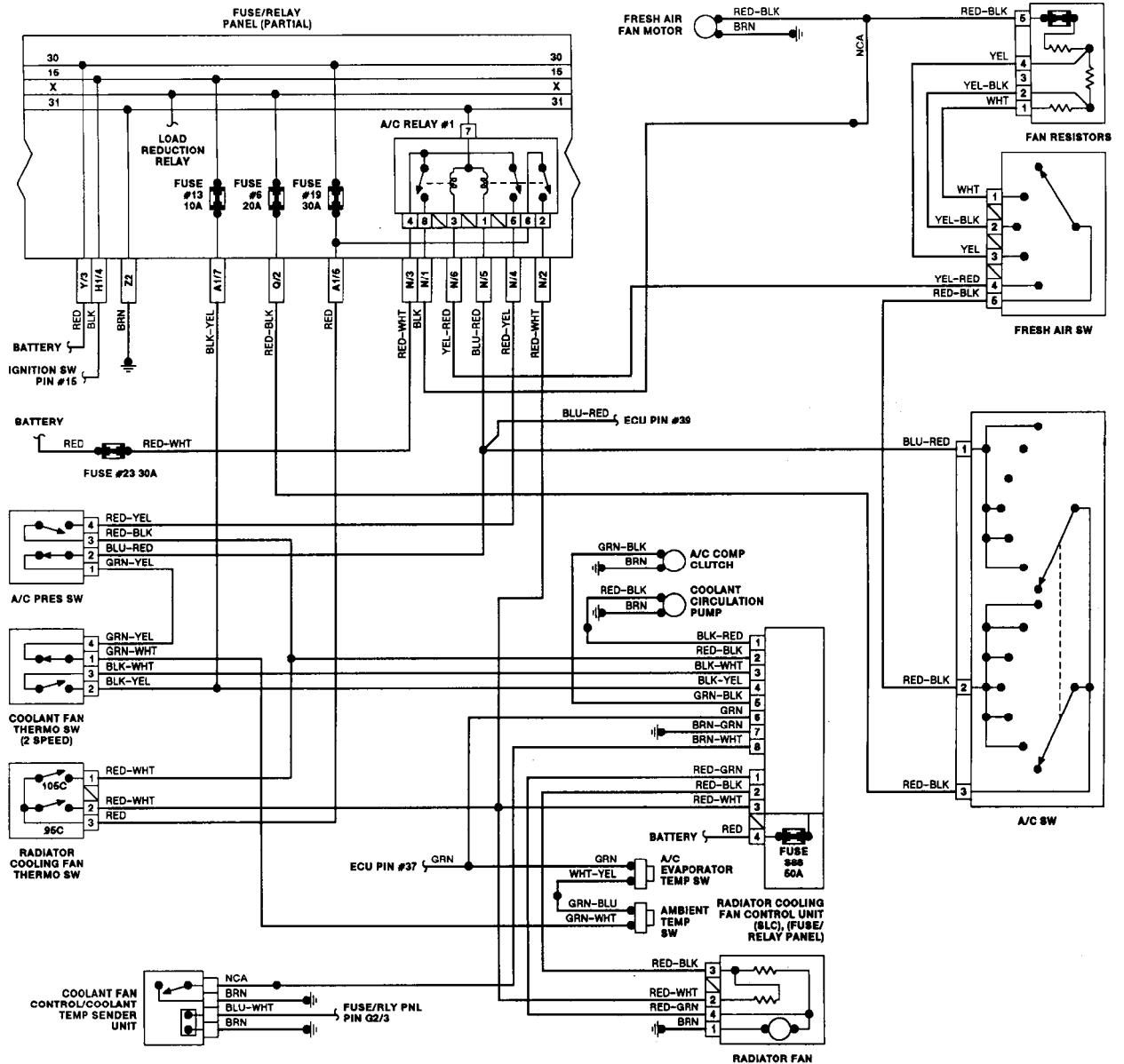
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Fig. 13: A/C-Heater System Wiring Diagram (Corrado SLC)

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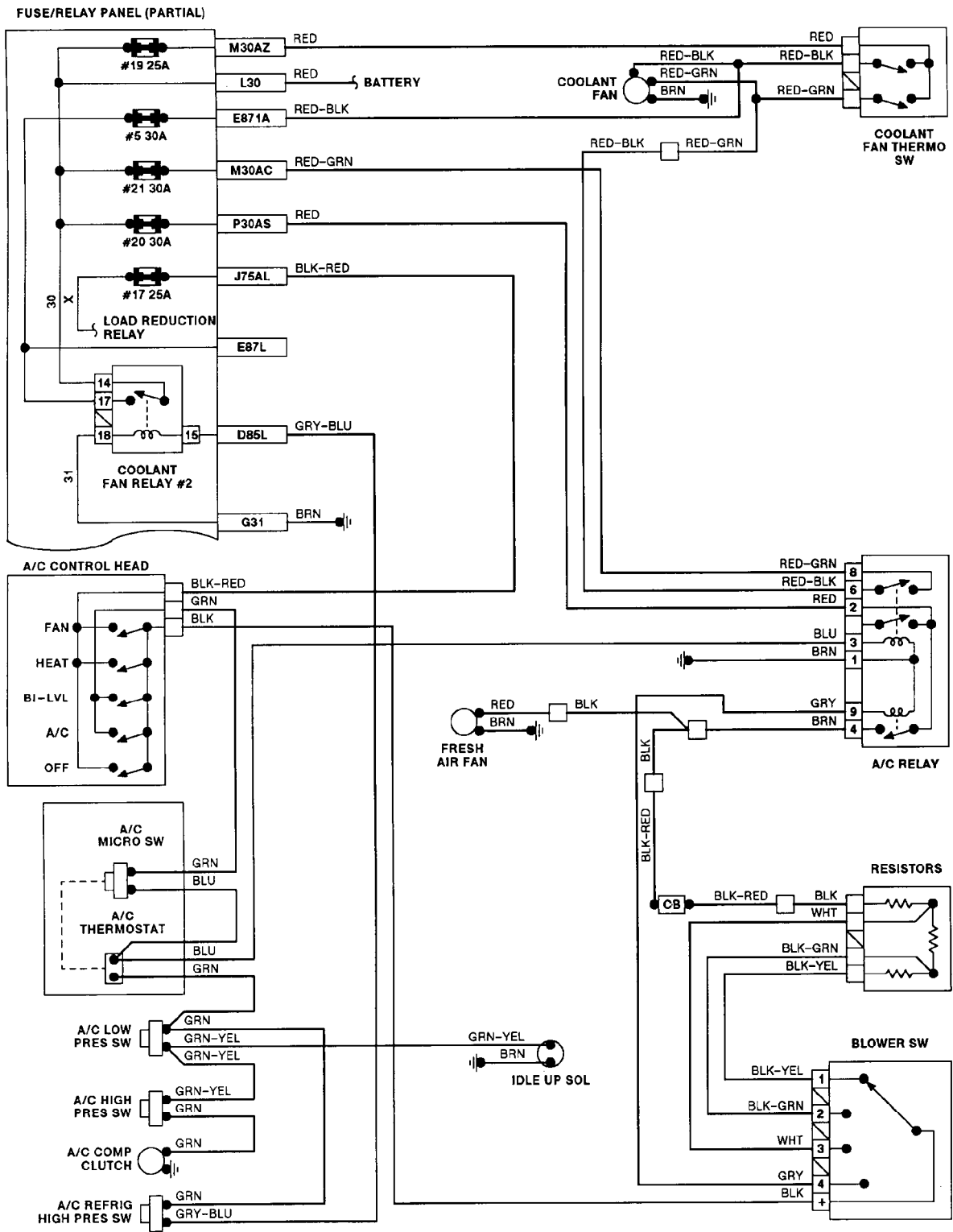
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Fig. 14: A/C-Heater System Wiring Diagram (Fox)

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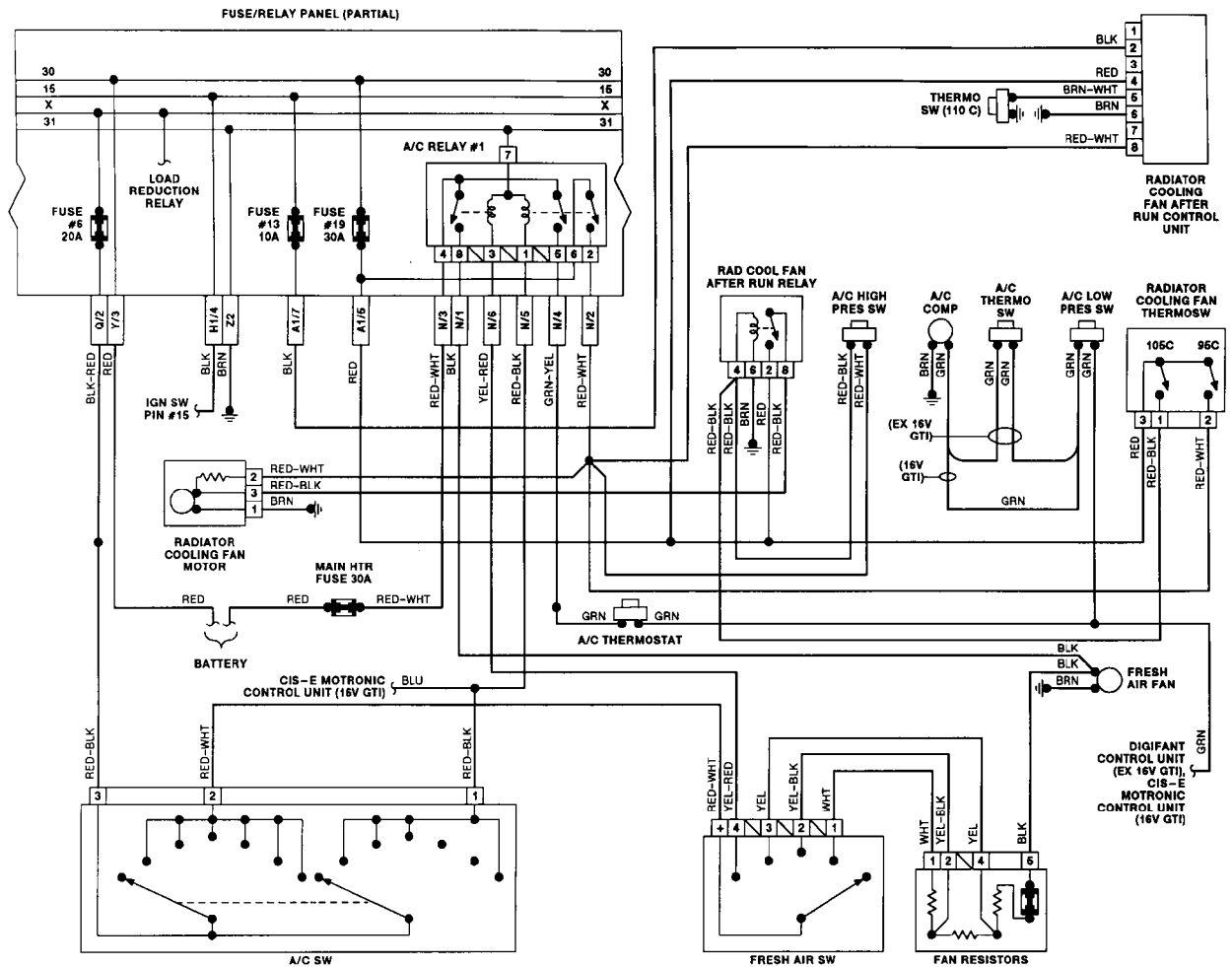
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Fig. 15: A/C-Heater System Wiring Diagram (Golf GL & GTI)

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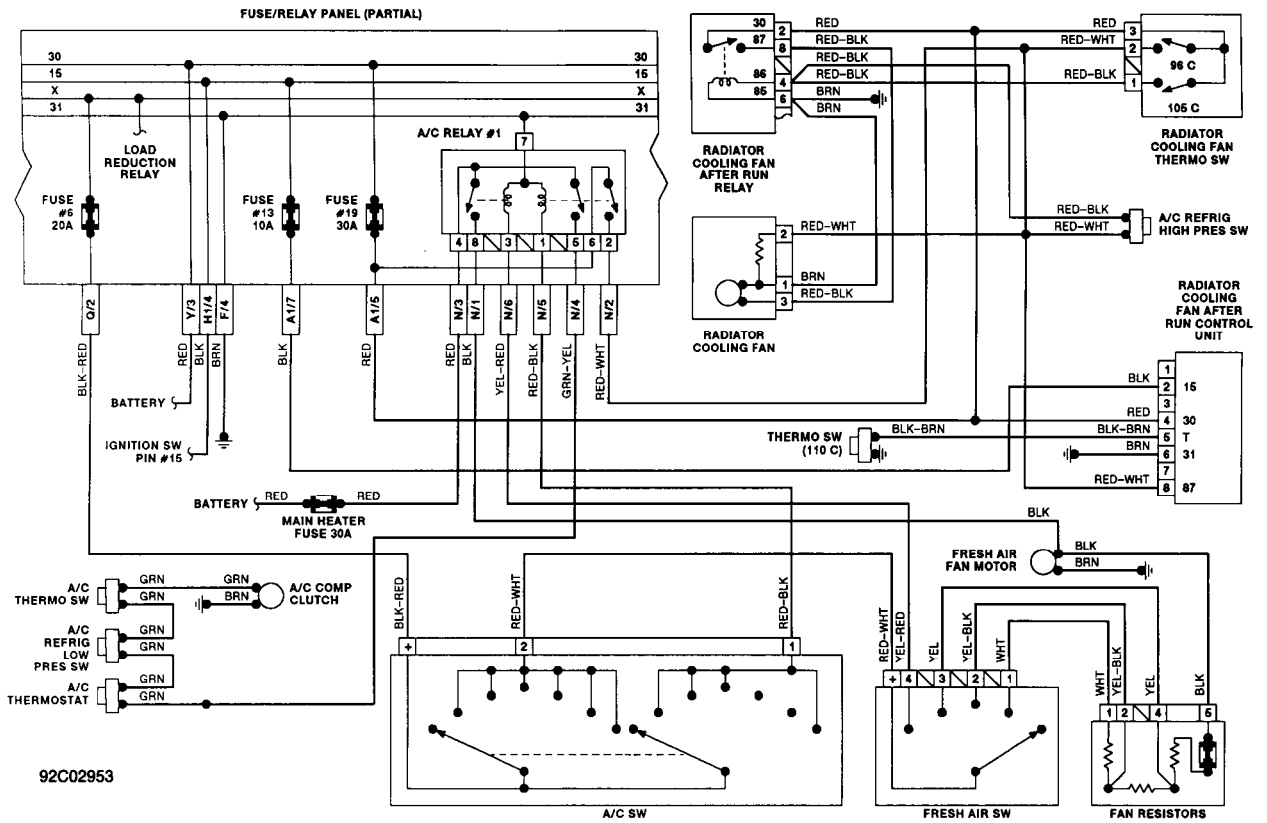


Fig. 16: A/C-Heater System Wiring Diagram (Jetta - Digifant)

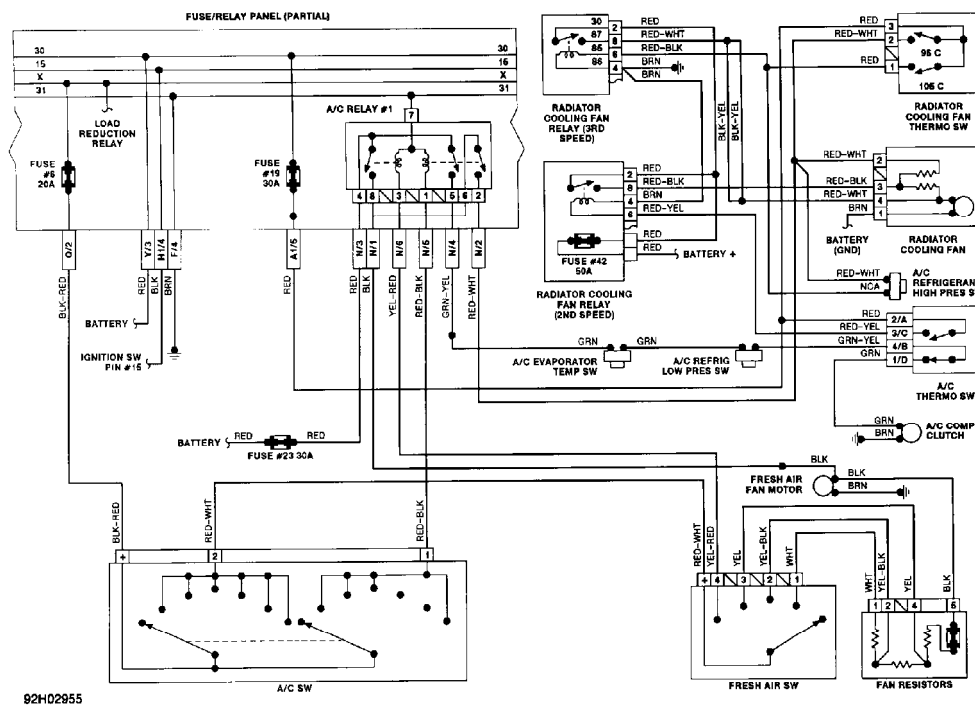


Fig. 17: A/C-Heater System Wiring Diagram (Jetta - Diesel)

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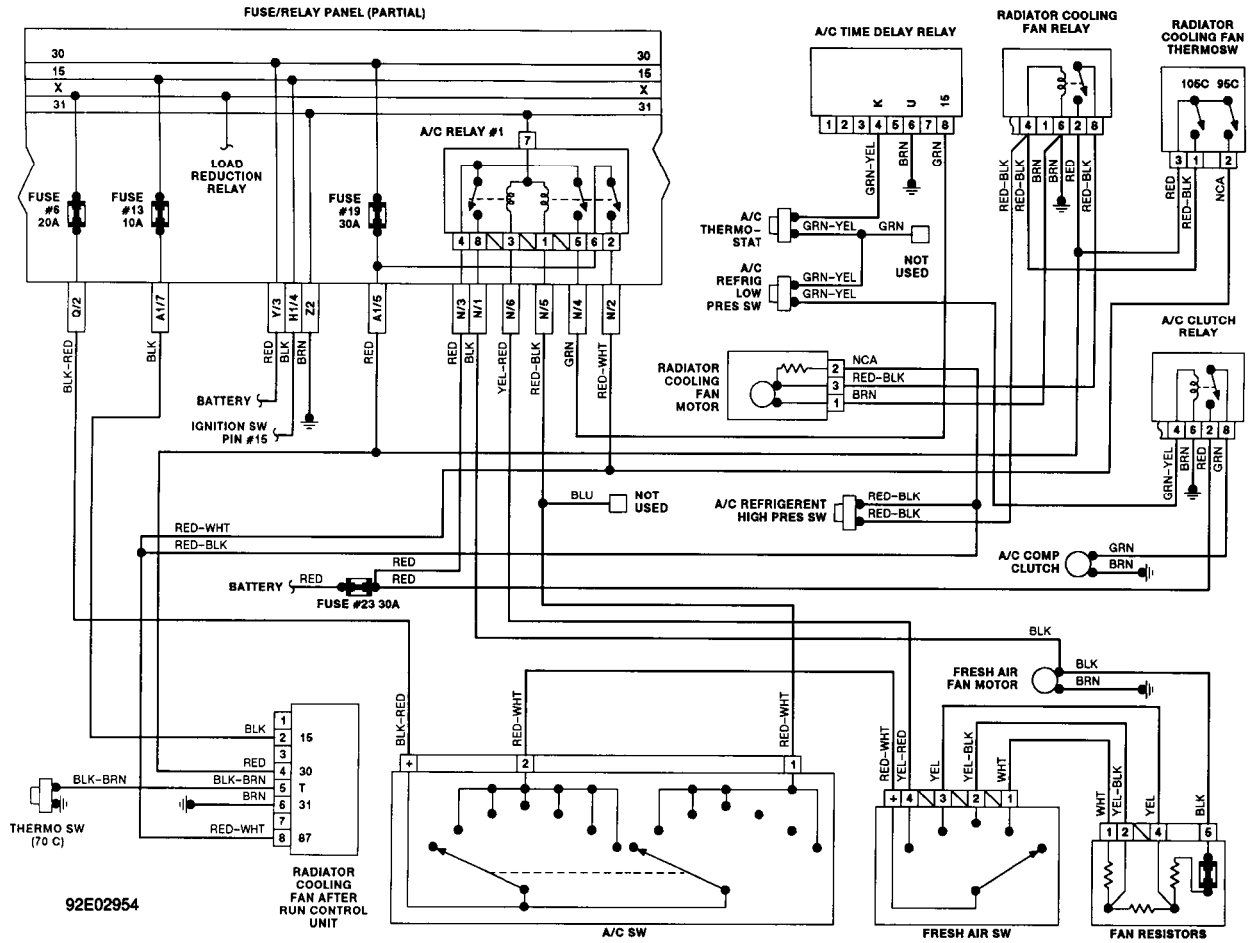


Fig. 18: A/C-Heater System Wiring Diagram (Jetta GLi)

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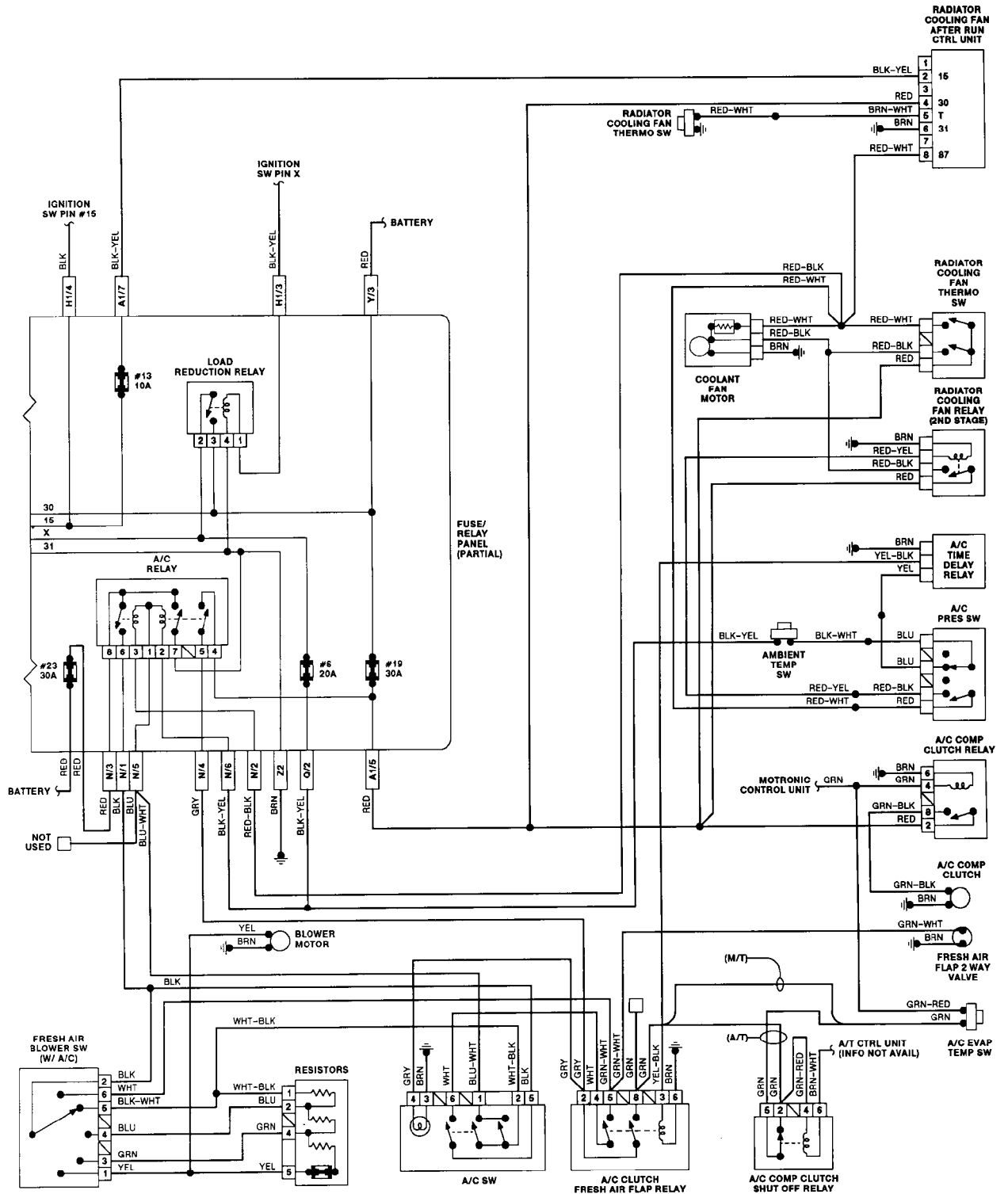
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Fig. 19: A/C-Heater System Wiring Diagram (Passat)

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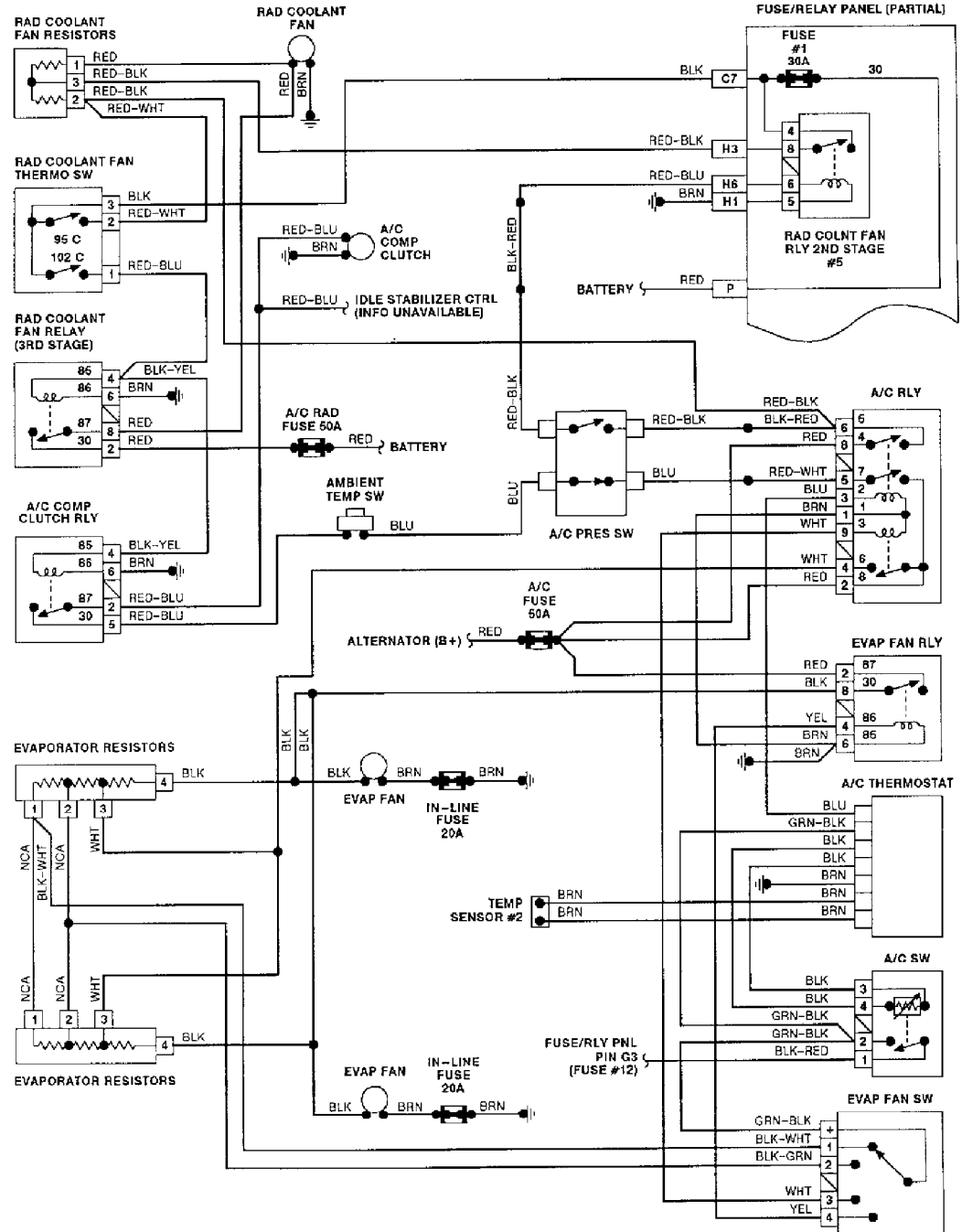


Fig. 20: A/C-Heater System Wiring Diagram (Vanagon)

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