

A/C-HEATER SYSTEM - MANUAL

Article Text

1993 Volkswagen Passat

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Wednesday, March 22, 2000 10:00PM

ARTICLE BEGINNING

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

Passat GL & GLX

SPECIFICATIONS

SPECIFICATIONS TABLE

AA

Application	Specification
Compressor Type	Sanden SD7-V16 or SD7-V16L 7-Cyl.
Compressor Belt Tension (1)	
System Oil Capacity (2)	3.9-4.4 ozs.
Refrigerant (R-134a) Capacity	41.0-42.8 ozs.
System Operating Pressures	
High Side	203 psi (13.8 kg/cm ²)
Low Side	17 psi (1.1 kg/cm ²)

(1) - Ribbed belt uses automatic belt tensioner.

(2) - Use PAG Compressor 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

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.

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- * 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

The air conditioning system is a cycling clutch type. Compressor is cycled on and off by a thermostatic switch to maintain constant cooling rate. System components include evaporator, expansion valve, receiver-drier, control panel and condenser. A dual-pressure switch includes a high-pressure cut-out switch and a low-pressure cut-out switch.

Control panel includes 3 rotary knobs over 2 push buttons. See Fig. 1. Left knob controls the fan and increases fan speed when turned clockwise. Center knob is the temperature control and increases heat by turning clockwise. Right knob controls air distribution.

The 2 push buttons are ON/OFF switches controlling A/C. Left button controls normal A/C (outside air). Right button gives maximum A/C using recirculating air. See Fig. 1.

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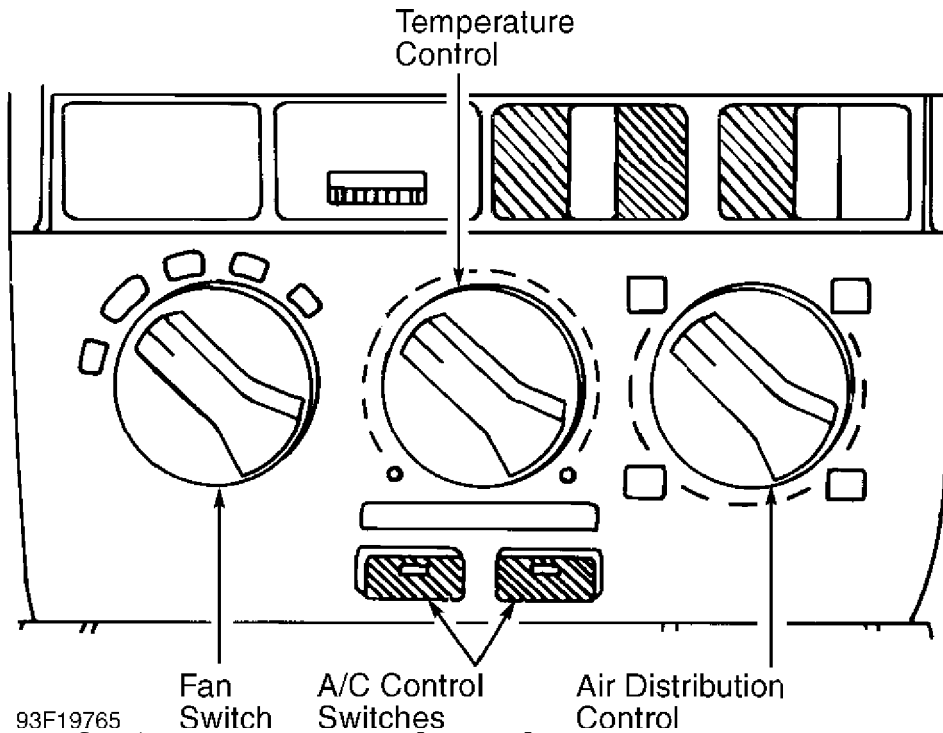


Fig. 1: View Of A/C-Heater Control Panel
Courtesy of Volkswagen United States, Inc.

OPERATION

SYSTEM CONTROLS

Air Distribution

Air distribution control knob directs airflow. With knob at 7 o'clock position, floor vents are open. With knob at 10 o'clock position, defrost vents are open. At 2 o'clock position dash vents are open. At 5 o'clock position, floor and dash vents are open.

Fan Speed Control

Fan switch increases fan speed when turned clockwise.

Temperature Control Knob

Temperature control knob increases heat by turning clockwise and increases cooling by turning counterclockwise.

DUAL-PRESSURE SWITCH

High-Pressure Cut-Out Switch

This switch shuts compressor off if high pressure reaches about 464 psi (32.6 kg/cm²). High-pressure cut-out switch will reset when pressure decreases to about 348 psi (24.5 kg/cm²).

Low-Pressure Cut-Out Switch

This switch shuts compressor off when pressure in system is

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too low. This protects compressor if not enough refrigerant is in system. Low-pressure cut-out switch shuts compressor off at about 29 psi (2.0 kg/cm²).

THERMOSWITCH

Thermoswitch shuts compressor off if coolant temperature is greater than 248°F (120°C).

ADJUSTMENTS

AIR DISTRIBUTION CONTROL

1) Move air distribution control knob to defrost position. Connect 3-foot long control cable to footwell/defrost flap lever. Push flap lever toward cable and secure cable sheath with retainer clip.

2) Move air distribution control knob to panel (vent) position. Connect 2-foot long control cable to center flap lever. Push flap lever away from cable and secure cable sheath with retainer clip.

TEMPERATURE CONTROL

Move temperature knob to full cool position. Connect temperature control cable (Blue sheath) to temperature flap lever. Push flap lever away from cable and secure cable sheath with retainer clip.

TROUBLE SHOOTING

NO COOLING

1) Ensure blower fan motor operates in all 4 speeds. Ensure air duct closes off outside air and heater water valve is closed. Clean condenser.

2) Inspect receiver-drier pressure seal. If seal is good, go to step 3). If seal is broken, replace seal. Evacuate and recharge system. If system cools properly, testing is complete. If system does not cool, connect pressure gauges.

3) 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.

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. 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

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both gauges read too low, locate leak and recharge system. If both gauges read too high, replace expansion valve. If low side is too high and high side is too low, replace compressor.

INSUFFICIENT COOLING

1) Ensure blower fan motor operates at all 4 speeds. Ensure air duct closes off outside air intake and heater water valve is closed. Clean condenser.

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

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 13" (330 mm).

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

6) Check condenser fins and clean or straighten. If operation is still not correct, discharge system until bubbles appear in sight glass. Recharge system until bubbles disappear, and recheck pressures. If operation is 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 bubbles are present, repair leaks and recharge system. If no bubbles are present, check condenser-to-expansion valve line for kinks and repair if necessary. Check line (from condenser to expansion valve) for restrictions by feeling line for cold spots. 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 blower fan motor operates in all 4 speeds. Ensure air duct closes off outside air and heater water valve is closed. Clean condenser.

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

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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 reading is incorrect, place 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 temperature is lower than 39°F (4°C), ensure capillary tube installed length is 13" (330 mm). If capillary tube installation is correct, replace thermostatic switch.

NO RECIRCULATE (FRESH AIR AT ALL TIMES)

1) Start engine. Turn blower motor off. Check fresh 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 is faulty, repair or replace as required. If door is okay, replace servomotor and retest.

TESTING

A/C SYSTEM PERFORMANCE

1) Park vehicle out of direct sunlight. Start engine and operate engine at 2500 RPM. Set A/C controls to outside air, panel (vent) mode, full cold, and A/C button on.

2) Set blower/fan on high speed and open windows. Operate system for 6-7 minutes to allow system to stabilize. Insert thermometer in center vent, and measure temperature. Temperature at center vent must be 19-40°F (-7 to 4°C) at center vent, with high side and low side pressures within specification. See SPECIFICATIONS table at beginning of article.

AMBIENT TEMPERATURE SWITCH

1) Remove air intake grille from right side cowl. Remove switch from panel on right side of tray area. Place switch in freezer.

2) Using a DVOM, check switch resistance. Switch resistance must be infinite (no continuity) below 30°F (-1°C). Allow switch to warm above 45°F (7°C). Switch resistance must be zero ohms (continuity). Replace switch if necessary.

COMPRESSOR CLUTCH COIL

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

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DUAL-PRESSURE SWITCH

High-Pressure Cut-Out Switch

Locate dual-pressure switch on refrigerant line (right strut tower). Switch is identified by its 4 wires. Ensure switch opens at 464 psi (32 kg/cm²). Ensure switch closes at 348 psi (24 kg/cm²).

NOTE: Dual-pressure switch may be removed without discharging refrigerant from A/C system.

Low-Pressure Cut-Out Switch

Locate A/C pressure switch on refrigerant line (right strut tower). Switch is identified by its 4 wires. Ensure switch opens below 29 psi (2.0 kg/cm²). Ensure switch closes above 43.5 psi (3.0 kg/cm²). Replace switch if necessary.

THERMOSWITCH

GLX

Locate thermoswitch on thermostat housing. Switch is identified by its Brown housing. Ensure switch turns radiator fan on high speed above 234°F (112°C). Radiator fan should go to medium speed below 226°F (108°C). Also check that thermoswitch opens circuit to A/C compressor relay above 246°F (119°C). Thermoswitch will allow A/C compressor relay operation below 234°F (112°C). Replace switch if necessary.

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.

A/C-HEATER CONTROL PANEL

Removal & Installation

Remove control panel trim. Remove control panel mounting screws and pull cover forward out of dashboard. Disconnect harness connector and control cables. Remove A/C-heater control panel. To install, reverse removal procedures.

BLOWER MOTOR

Removal & Installation

Remove glove box. Disconnect wiring and remove blower assembly. To install, reverse removal procedure.

COMPRESSOR

Removal & Installation

Remove ribbed belt. Discharge A/C system using approved

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refrigerant recovery/recycling equipment. Remove hoses and plug. Remove compressor. To install, reverse removal procedure.

CONDENSER

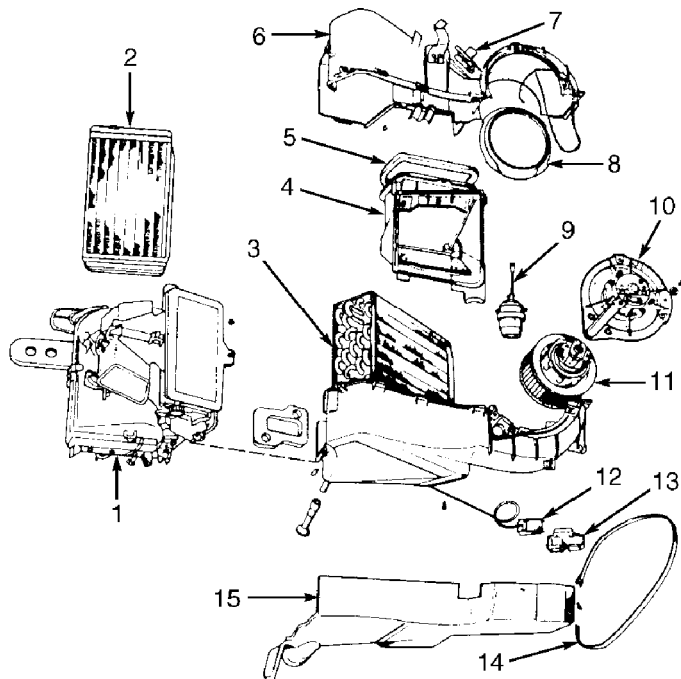
Removal & Installation

Discharge A/C system using approved refrigerant recovery/recycling equipment. Remove hood lock assembly, front air intake grille, front bumper, air duct and A/C hoses. Remove A/C condenser. To install, reverse removal procedure.

EVAPORATOR & HEATER CORE

Removal & Installation

Discharge A/C system using approved refrigerant recovery/recycling equipment. Drain coolant. Remove instrument panel. See INSTRUMENT PANEL. Remove support bracket and evaporator/heater housing assembly. Remove evaporator and/or heater core. See Fig. 2. To install, reverse removal procedure.



- | | |
|-----------------------------|-----------------------------|
| 1. Air Distribution Housing | 9. Recirculation Servomotor |
| 2. Heater Core | 10. Blower Housing |
| 3. Evaporator | 11. Blower Motor |
| 4. Intake Air Duct | 12. A/C Thermostat |
| 5. Seal | 13. Thermostat Cover |
| 6. Evaporator Housing | 14. Strap |
| 7. Blower Resistor | 15. Housing Cover |
| 8. Air Ring | |

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Fig. 2: Exploded View Of Evaporator Housing
Courtesy of Volkswagen United States, Inc.

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INSTRUMENT PANEL

Removal & Installation

1) Remove center console. Remove storage trays on both sides, A/C-heater control panel trim and control panel screws. Push control panel away from instrument panel.

2) Lower steering column. Disconnect wiring harnesses for instrument panel at fuse/relay panel. Disconnect speedometer cable. Remove screws at both sides of instrument panel and at center support.

3) Detach instrument panel retainers (2 at top and 2 at center support). Fold back support and remove instrument panel. To install, reverse removal procedure.

THERMOSTAT

Removal & Installation

1) Remove thermostat cover. See Fig. 2. Remove thermostat mounting screw and disconnect harness connector. Remove thermostat by pulling sensing (capillary) tube through grommet.

2) To install, reverse removal procedures. Measure back 13" (330 mm) from end of sensing tube and tape spot. Insert sensing tube into evaporator guide channel up to tape.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

AA

Application	Ft. Lbs. (N.m)
-------------	----------------

A/C Compressor Bolt/Nut

GL

8 mm	18 (25)
------	---------

10 mm	33 (45)
-------	---------

GLX	33 (45)
-----	---------

A/C Compressor Bracket Bolt/Nut

GL	22 (30)
----	---------

GLX	18 (25)
-----	---------

A/C Compressor Hoses

Discharge	18 (25)
-----------	---------

Suction	25 (35)
---------	---------

AA

VACUUM DIAGRAM

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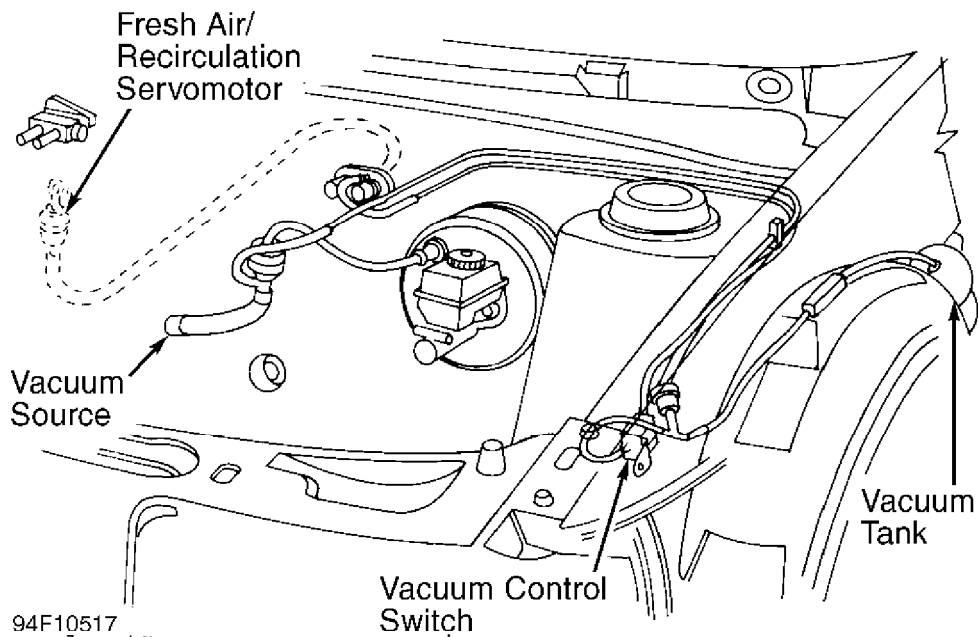
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Fig. 3: Manual A/C-Heater Vacuum Diagram
Courtesy of Volkswagen United States, Inc.

WIRING DIAGRAMS

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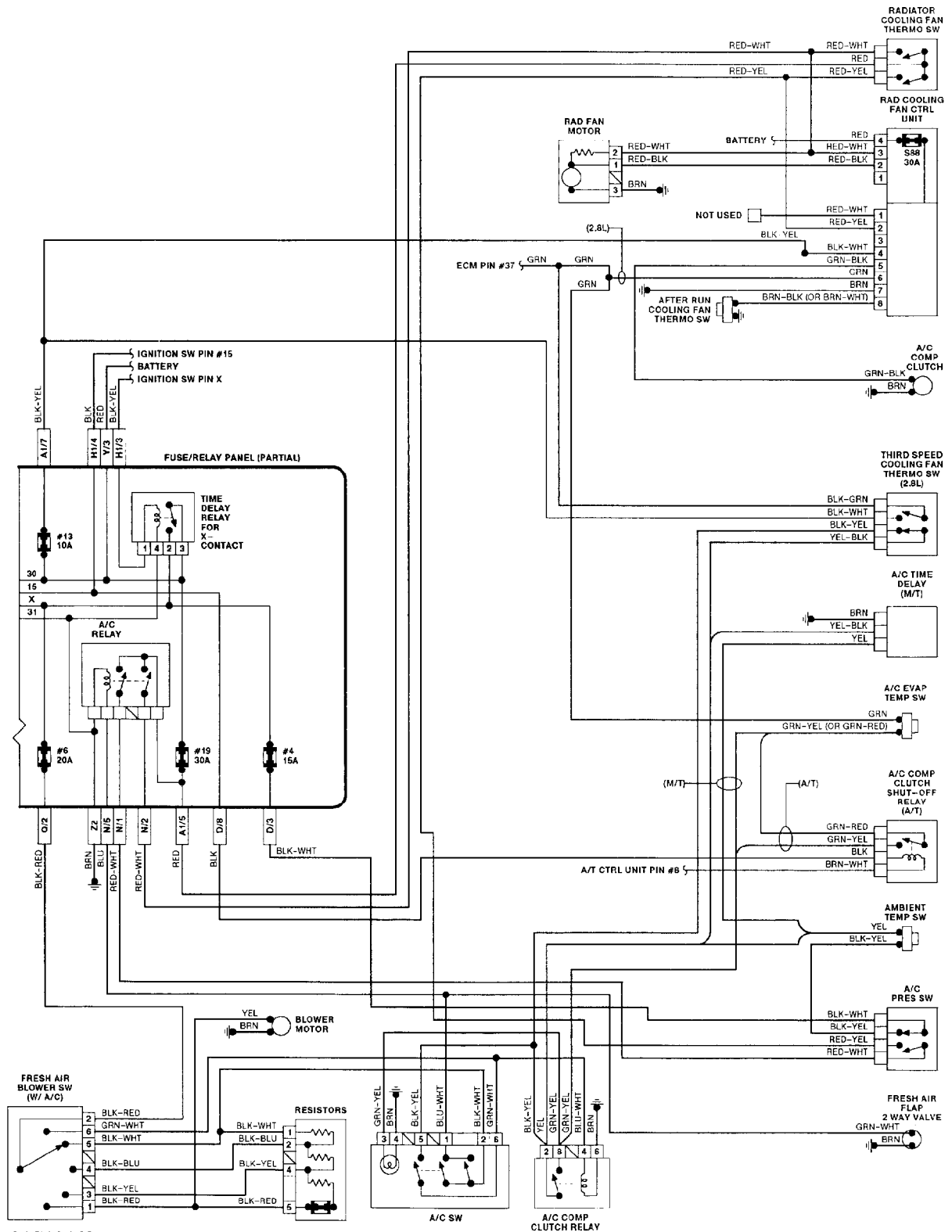
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Fig. 4: Manual A/C-Heater System Wiring Diagram

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