A/C-HEATER SYSTEM - AUTOMATIC

Article Text

1988 Audi 5000S

For chip

Monday, October 18, 1999 05:29PM

ARTICLE BEGINNING

1988 AUTOMATIC A/C-HEATER SYSTEMS
Audi

5000 Series

*** PLEASE READ THIS FIRST ***

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

DESCRIPTION

The A/C-heater control panel has buttons to control system. Blower speed is controlled automatically according to difference between set temperature and interior temperature. Blower speed can also be controlled manually. Depressing the "HI" or "LO" buttons will raise or lower blower speed while in any selected mode. The "WARMER" or "COOLER" buttons are used to raise or lower selected temperature.

The digital climate control system automatically maintains temperatures set between 64øF (18øC) and 85øF (29øC). If a temperature above 85øF (29øC) is selected, the word "HI" appears in temperature display. If a temperature below 64øF (18øC) is selected, the word "LO" is displayed. Selection of these temperatures overrides automatic climate control system.

The system has self-diagnostic ability contained in control panel. Up to 23 fault channels can be accessed to aid in trouble shooting.

OPERATION

A/C SYSTEM

If the vehicle interior is hot and the climate control is programmed to maintain a temperature of 75øF (24øC), climate control will function as follows: recirculation doors open, fresh air door will close and 85% of inside air will be recirculated. Heater control valve will close and air will flow from registers. Temperature control door should be closed. No air should flow through heater core. Blower speed will increase from low to high over a 10 second period. As interior cools down, recirculation door will close as fresh air door begins to open.

If needed, heater control valve will open, the temperature control door will begin to open and blower speed will slow. Air flowing from registers warms slightly. There are 3 factors that control system operation: outside temperature, inside temperature, and temperature setting.

HEATER SYSTEM

If vehicle is very cold and climate control is programmed to maintain a temperature of 75øF (24øC), climate control will function as follows: recirculation door will close, and outside air will flow into system. Heater control valve will open, allowing coolant to flow through heater core. Air will flow from floor vents. Temperature control door will open, and all air will flow through heater core. Blower speed can be controlled manually, regardless of heater setting, by pushing "HI" or "LO" buttons.

NOTE: The blower delay feature is overridden when the defroster button is depressed. Hot air does not flow from registers. If system is in bi-level mode, warm air flows from floor vents and cooler air from registers.

A/C-HEATER CONTROL & AIR DISTRIBUTION

"OFF" Mode

When the "OFF" button is pressed, the system is switched off. See Fig. 1. Fresh air intake is closed and temperature display is turned off. Outside temperature is shown on display.

NOTE: If vacuum system fails, climate control automatically switches to maximum defrost.

"ECON" Mode

In this mode, the A/C compressor is turned off. Temperature, blower speed, and air distribution are automatically regulated. Air distribution is determined by difference between actual interior temperature and selected temperature.

"AUTO" Mode

With "AUTO" button actuated, the A/C compressor is turned on. See Fig. 1. Temperature, blower speed, and air distribution are automatically regulated. Air distribution is determined by difference between actual interior temperature and selected temperature.

"BI-LEV" Mode

With bi-level mode activated, the A/C compressor is turned on. Temperature, blower speed, and air distribution are automatically regulated. Air distribution is fixed at center and footwell outlets.

Defrost Mode

In this setting, temperature and blower speed are automatically regulated. All air is directed toward windshield.

"HI" & "LO" Settings

These settings are used to raise or lower blower speed in all operating modes. The "HI" or "LO" settings are cancelled by pressing another mode button.

A/C-HEATER CONTROL PANEL

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Article Text (p. 3)

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The A/C-heater control panel receives input from driver, system components, processes input signals and operates system accordingly. See Fig. 1.

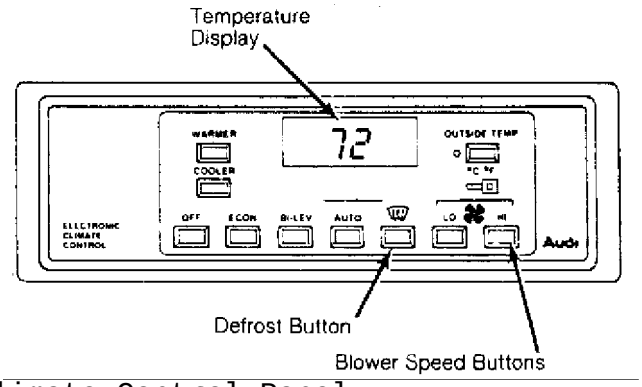


Fig. 1: Climate Control Panel
Courtesy of Audi of America, Inc.

A/C PROGRAMMER

The A/C programmer receives input signals from A/C-heater control panel. The programmer, in turn, controls position of heater temperature regulation flaps through DC motor and cable.

The A/C programmer operates air distribution vacuum servo motors through the use of 4 vacuum solenoids. The programmer also controls A/C compressor clutch relay operation, based on input signals from A/C-heater control panel.

On 5000S models, the A/C programmer switches radiator cooling fan relay when A/C system is on. The A/C programmer is located under instrument panel, behind glove box.

A/C BLOWER CONTROL UNIT

The A/C blower control unit regulates the amount of power supplied to the fresh air blower motor depending on signal it receives from A/C-heater control panel. The A/C blower control unit is located on top of evaporator. See Fig. 2.

OUTSIDE TEMPERATURE SENSORS

Sensors measure the outside air temperature and send an input signal to the A/C-heater control panel. The A/C-heater control panel measures both sensor readings and uses the lowest temperature value to calculate correction factor for interior temperature regulation. One sensor is located in front of radiator, the other is located in evaporator plenum chamber. See Fig. 2.

IN-CAR TEMPERATURE SENSOR

The in-car temperature sensor measures interior air temperature and sends this signal to the A/C-heater control panel. A

small fan drives air over sensor to ensure an accurate measurement. The in-car temperature sensor is mounted on top of instrument panel.

REFRIGERANT LOW PRESSURE SWITCH

The refrigerant low pressure switch disengages A/C compressor clutch if refrigerant pressure drops below 15 psi (1.1 kg/cmý). Switch is located in suction line from A/C accumulator.

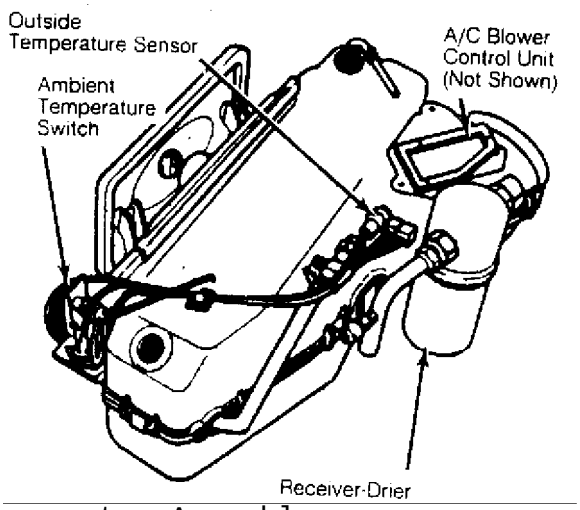


Fig. 2: Evaporator Assembly
Courtesy of Audi of America, Inc.

REFRIGERANT HIGH PRESSURE SWITCH

This switch controls operation of cooling fan 2nd stage. Switch closes when pressure reaches 200 psi (14.1 kg/cmý). Switch is located in high pressure line to A/C compressor.

A/C HIGH PRESSURE SENSOR

Sensor measures refrigerant temperature and sends resistance signal to A/C-heater control panel. If refrigerant pressure goes too high, the A/C-heater control panel will shut A/C compressor off to prevent system damage. The A/C high pressure sensor is located in plenum chamber, near left side of heat exchanger housing.

A/C THERMOSTAT

The A/C thermostat controls power supply to A/C compressor clutch relay to prevent ice from forming on evaporator. If evaporator temperature falls below 32øF (0øC) the A/C thermostat switch opens, the A/C compressor clutch relay opens, and the A/C compressor clutch disengages. The A/C thermostat is located on evaporator housing, with its capillary tube inserted in evaporator.

AMBIENT TEMPERATURE SWITCH

The ambient temperature switch interrupts ground signal, preventing the A/C-heater control panel from engaging the A/C compressor clutch. The switch opens when ambient temperature falls below 37øF (3øC). The ambient temperature switch is located on top, left corner of evaporator housing. See Fig. 2.

A/C KICK-DOWN SWITCH

The switch closes and sends a ground signal to terminal No. 9 of A/C-heater control panel when accelerator pedal is floored. This will turn the A/C compressor on for about 12 seconds. The A/C kick-down switch is located under accelerator pedal on vehicles equipped with automatic transmissions.

ENGINE COOLANT OVERHEAT SWITCH

When coolant temperature goes over 247øF (120øC), this switch sends a ground signal to terminal No. 20 of A/C-heater control panel. The A/C-heater control panel then sends a signal to A/C programmer, which in turn disengages the A/C compressor clutch. The engine coolant overheat switch is part of the electronic thermoswitch, located on cylinder head coolant flange.

TESTING

A/C-HEATER CONTROL PANEL

Check continuity of wires between panel and A/C programmer. See A/C-HEATER CONTROL PANEL SIGNALS table. Terminals No. 3, 10, 21, and 22 form a multiple connection with A/C programmer. The input signals at these terminals cannot be checked. See Fig. 3.

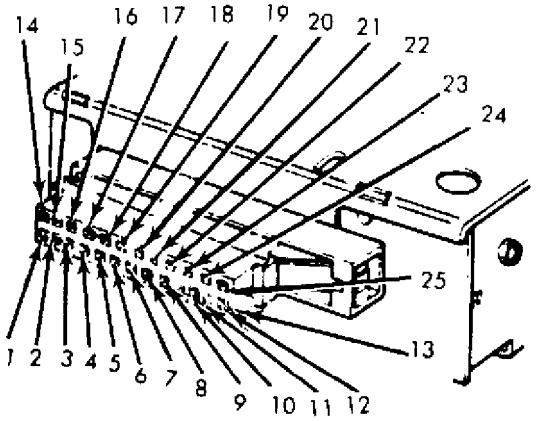


Fig. 3: A/C-Heater Control Panel Connector
Courtesy of Audi of America, Inc.

A/C PROGRAMMER

1) Check continuity of wire terminals No. 4, 6, 9, and 12 with A/C-heater control panel. Check for correct output signals from

A/C-heater control panel.

2) Terminals No. 4, 6, 9, and 10 form a multiple connection with A/C-heater control panel. The input signals at these terminals cannot be checked. See A/C PROGRAMMER SIGNALS table.

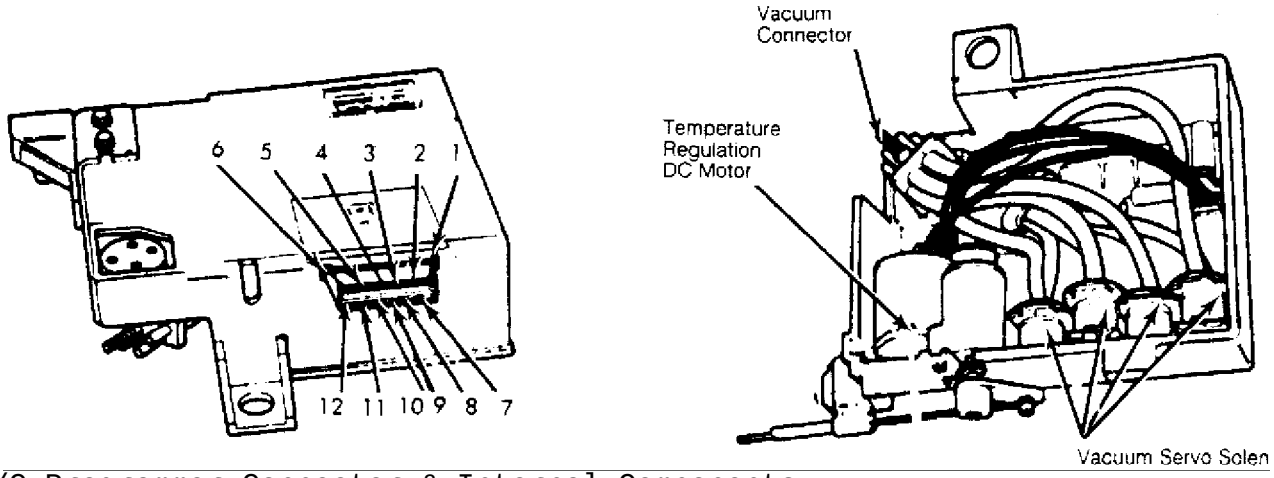


Fig. 4: A/C Programmer Connector & Internal Components
Courtesy of Audi of America, Inc.

OUTSIDE TEMPERATURE SENSOR

Unplug outside temperature sensor connector. Using ohmmeter, check sensor resistance and compare reading with specifications. See Fig. 4. If incorrect, replace sensor.

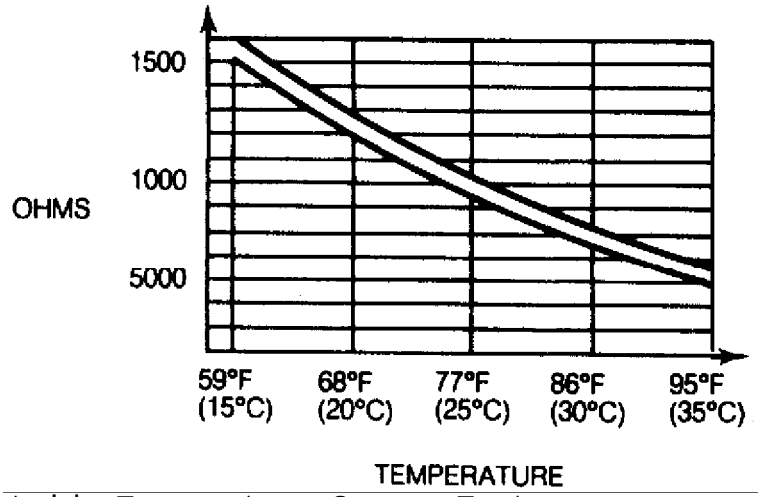


Fig. 5: Outside Temperature Sensor Test
Courtesy of Audi of America, Inc.

A/C THERMOSTAT

Unplug A/C thermostat connector. Using ohmmeter, check sensor resistance and compare reading with specifications. See Fig. 6. If incorrect, replace sensor.

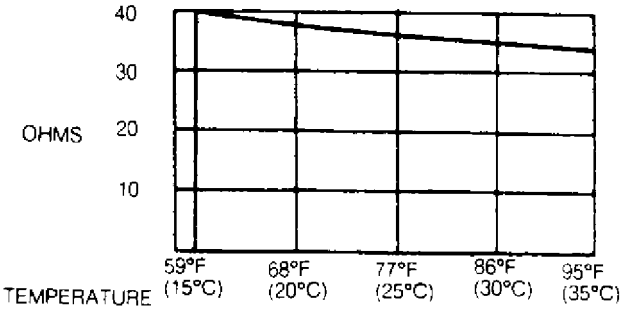


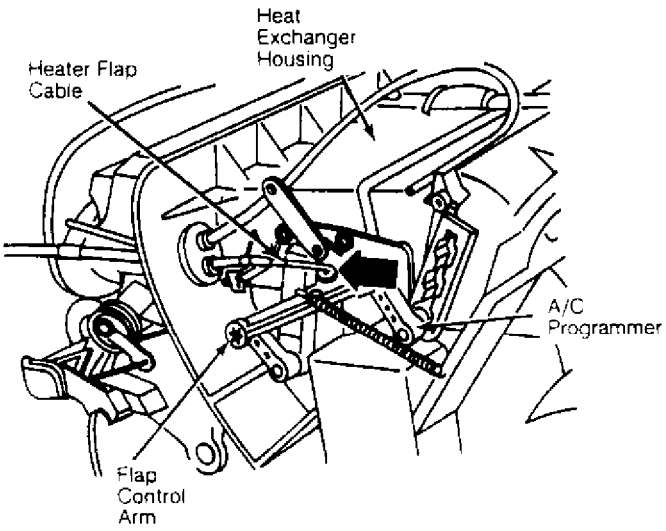
Fig. 6: A/C Thermostat Resistance Test
Courtesy of Audi of America, Inc.

ADJUSTMENTS

HEATER FLAP

1) Disconnect heater flap cable at A/C programmer. Inner cable end must not come up against lever arm. See Fig. 7. Loosen cable clip on heat exchanger housing and start engine.

2) Set A/C-heater control panel to "AUTO" position and temperature at 90øF (32øC). Wait 2 minutes. Install heater flap cable on A/C programmer. Push cable sleeve in direction of arrow until heater flap for temperature regulation comes up against stop. Install cable clip.



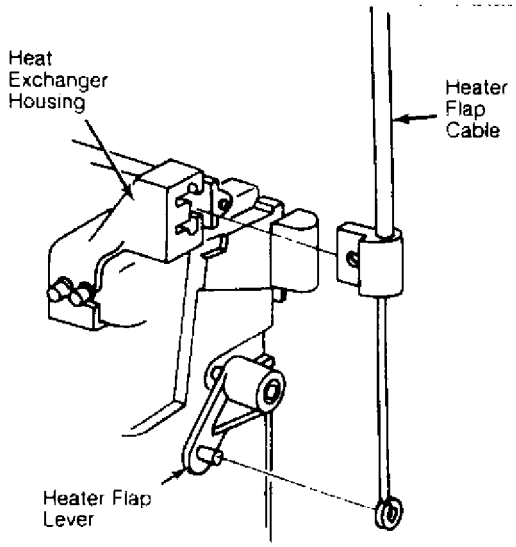


Fig. 7: Heater Flap Control Cable Adjustment
Courtesy of Audi of America, Inc.

TROUBLE SHOOTING

MEMORY FAULT CHANNEL ACCESS

Start engine and operate A/C-heater system in automatic mode.

Press and hold down "OUTSIDE TEMP" button while pressing and releasing "OFF" button. Display panel should read 01. Fault channel numbers are displayed with a short vertical line before first fault channel number.

Pressing the "WARM" button will advance display to fault channel 02. Each time "WARM" button is pressed, system will advance to next fault channel until last number (23) is reached, and then return to 01. Memory fault channels are not trouble codes, but do identify individual circuits. See MEMORY FAULT CHANNEL CODES table.

MEMORY FAULT CHANNEL CODES

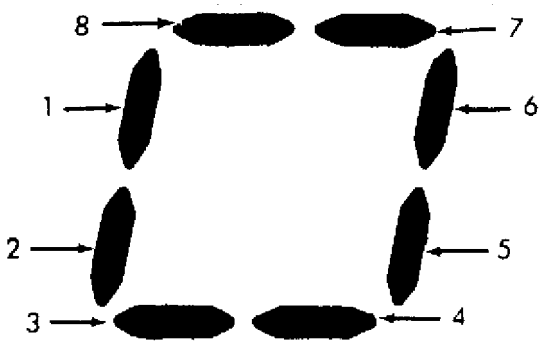
Channel Code	Circuit
01	System Faults
02	Not Used
03	In-Car Temperature Sensor
04	Ambient Temperature Sensor
05	Outside Temperature Sensor
06	Not Used
07	Graphic Display
08	Specified Blend Air Door Position
09	Actual Blend Air Door Position
10	Blower Motor Voltage
11	Vehicle Charging Voltage
12	Not Used
13	Ambient Temperature Switch
14	Not Used
15	Kick-Down Switch (Auto. Trans.)
16	Engine Coolant Override Switch Input
17-20	Not Used
21	A/C ON Signal
22	Number of Low Voltage Occurrences
23	Not Used

FAULT CODE ACCESS

Access memory fault channel codes. While display is in any channel code used, press "COOL" button. If no fault code is present in memory, display panel will change to previous channel code. If a fault code is present, fault code (a number other than previous channel code) will be displayed. Circuit or sensor of that channel code is faulty. See MEMORY FAULT CHANNEL CODES table.

CONTROL PANEL OUTPUT CHECK

Start engine and operate A/C-heater in automatic mode. Access memory fault channel. Press "WARM" button until 07 appears on display. Press "COOLER" button. Display will show horizontal and vertical lines indicating output signals. See Fig. 8.



1. Cooling Fan On
2. A/C Compressor On
3. Blend Air Door Towards Cooler
4. Floor Vents Open
5. Bi-Level Vents Open
6. Center Vents Open
7. Recirculation Door Closed
8. Blend Air Door Towards Warmer

Fig. 8: Control Panel Output Check Display
Courtesy of Audi of America, Inc.

REMOVAL & INSTALLATION

A/C-HEATER CONTROL PANEL

Removal & Installation

Remove upper half of middle console, glove compartment, and lower dashboard cover. Remove 2 screws below control panel. Push panel forward and remove from below. To install, reverse removal procedure.

EVAPORATOR ASSEMBLY

Removal

1) From engine compartment, loosen water drain hose retainer and push hose into plenum chamber. Disconnect vacuum unit hose and thermostat wires. Discharge A/C system using approved refrigerant recovery/recycling equipment. Remove refrigerant hoses, and plug openings.

2) From inside vehicle, remove lower dash panel. Remove 4 evaporator housing screws around air vent on evaporator unit.

3) From engine compartment, carefully loosen assembly. Pull evaporator assembly up and toward center of vehicle to remove. Separate housing halves to service evaporator.

Installation

Assemble evaporator case. Insert assembly into plenum chamber. Place drain hose through hole without kinking it. Clamp into place. Attach refrigerant lines loosely, and cement gasket into place around opening. Install screws, tighten hoses, and recharge system.

HEATER ASSEMBLY

Removal

1) From engine compartment, disconnect battery cable, thermostat wiring, evaporator-heater duct clamp, temperature control cable and vacuum hose.

2) Remove electrical wiring, loosen restraining strap and remove coolant reservoir cap. Clamp heater hoses closed near heater core. Disconnect hoses from core. Upper hose goes to water pump, lower to cylinder head.

3) From inside vehicle, disconnect vacuum lines. Disconnect air ducts and electrical wiring. Remove 4 screws around evaporator housing opening. Lift heater assembly up into engine compartment. Remove grommet and control cable. Loosen clips and wiring harness.

Installation

To install, reverse removal procedure. Seal all air duct connections carefully to prevent air leaks.

A/C SYSTEM SPECIFICATIONS

A/C SYSTEM SPECIFICATIONS TABLE

Application	Specification
Compressor Type	Nippondenso 6 or 10-Cyl.
R-12 Capacity	(1) 37 oz.
Oil Capacity	
Large Condenser	1.8 oz.
Small Condenser	1.5 oz.
Evaporator	4.0 oz.
Compressor	3.8 oz.
Normal System Pressure	
Low Side	(2) 18.9-24.7 psi (1.3-1.7 kg/cmý)
High Side	(2) Approx. 170 psi (12 kg/cmý)
A/C Belt Tension	
New	100 lbs.
Used	80-90 lbs.

(1) - When recharging system, add at least 18 oz. of refrigerant to low side port BEFORE operating compressor.
(2) - Operating pressures at 77øF (25øC).

VACUUM DIAGRAMS

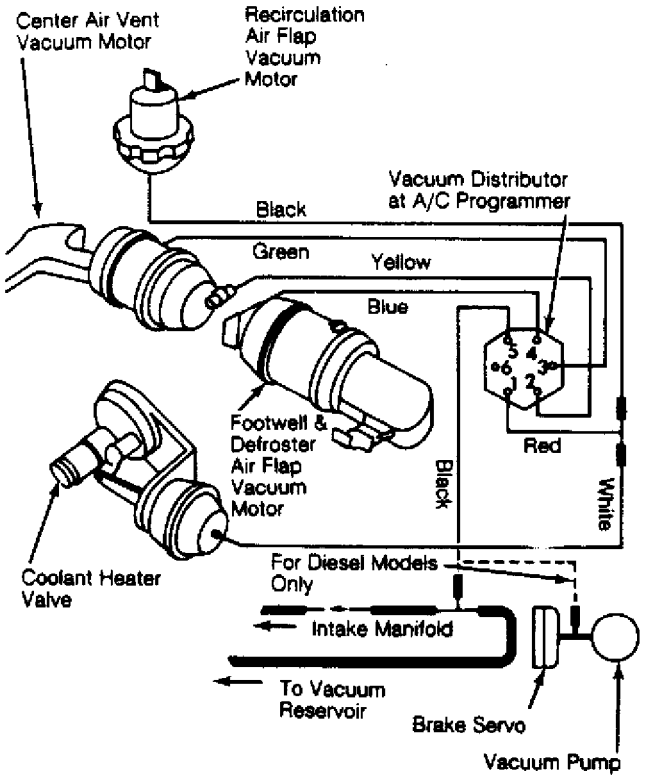


Fig. 9: 5000 Auto. A/C-Heater Systems Vacuum Diagram

WIRING DIAGRAMS

A/C-HEATER SYSTEM - AUTOMATIC

Article Text (p. 12)

1988 Audi 5000S

For chip

Monday, October 18, 1999 05:29PM

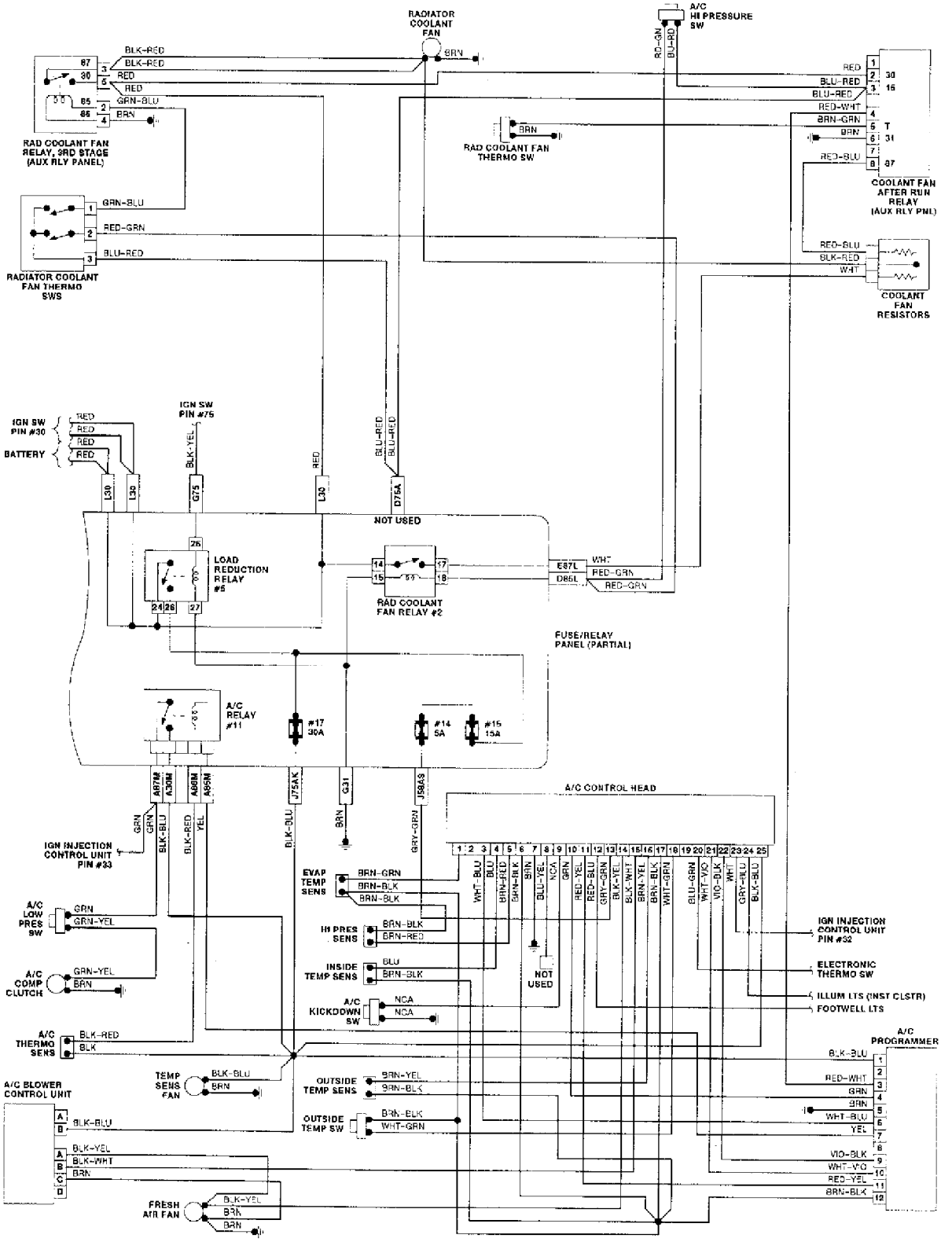


Fig. 10: 5000S Automatic A/C-Heater System Wiring Diagram

A/C-HEATER SYSTEM - AUTOMATIC

Article Text (p. 13)

1988 Audi 5000S

For chip

Monday, October 18, 1999 05:29PM

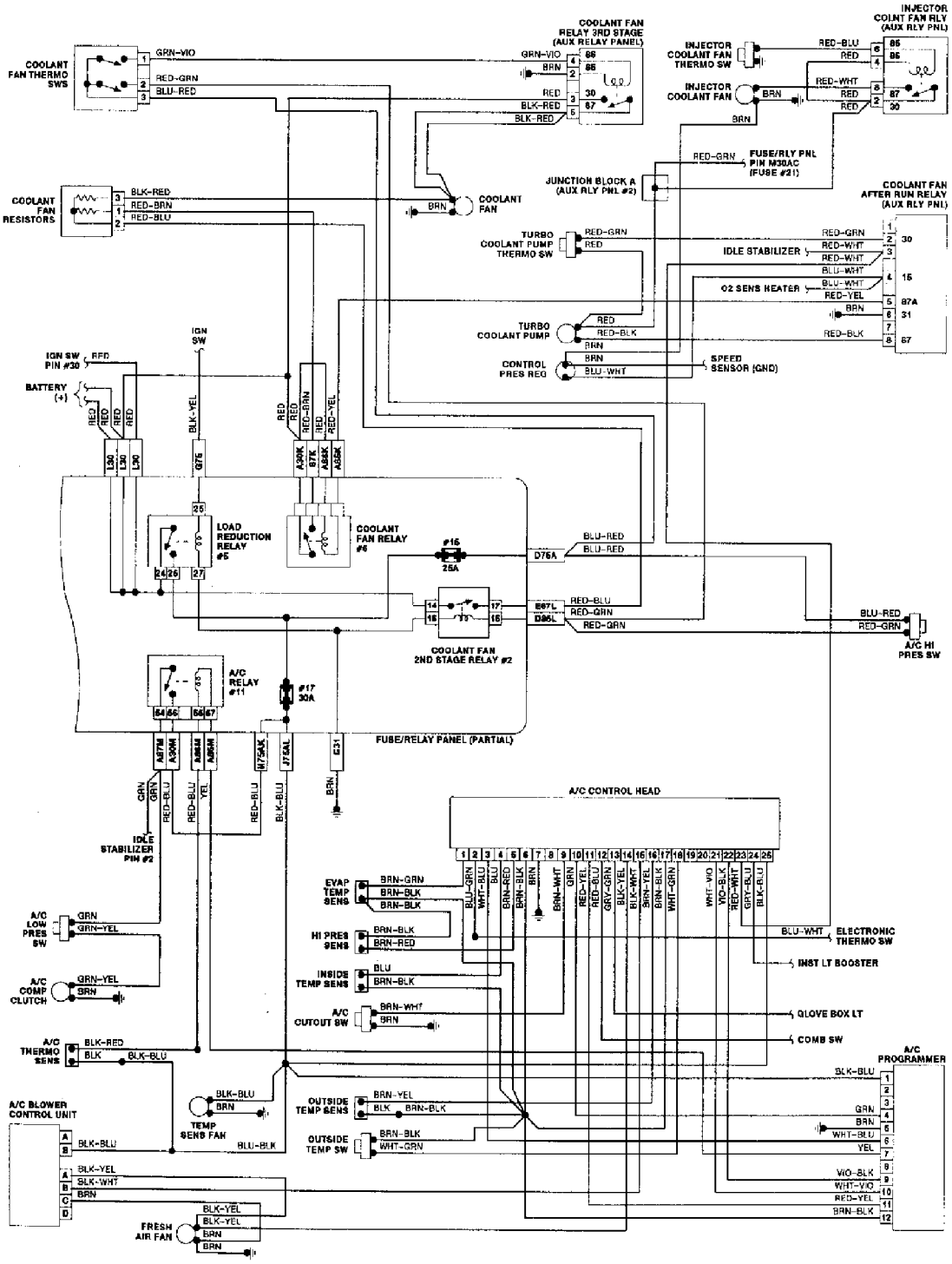


Fig. 11: 5000CS Turbo & 5000CS Quattro Automatic A/C-Heater System Wiring Diagram

A/C-HEATER SYSTEM - AUTOMATIC
Article Text (p. 14)
1988 Audi 5000S
For chip

Monday, October 18, 1999 05:29PM

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