A/C-HEATER SYSTEM - AUTOMATIC
Article Text
1986 Audi 5000S
For chip

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ARTICLE BEGINNING

1986 Auto. A/C Heater Systems
AUDI

5000S, 5000CS Turbo, 5000CS Quattro

*** 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 Climate Control system for Audi is a fully automatic heating/air conditioning system that consists of:

* Ambient Temperature Sensor (On evaporator)
* Coolant Temperature Cycling Switch (In coolant hose)
* Coolant Overheat Switch (In cylinder head)
* High Pressure Switch (On condenser)
* Low Pressure Switch (In evaporator output tube)
* Refrigerant Restrictor (In-line between evaporator and condenser)
* Superheat Switch (On compressor)
* Superheat Fuse (On compressor hose)
* Full Throttle Kickdown Switch and Relay (Automatic Transmission Models)
* Air Recirculation Flap Vacuum Solenoid and Relay

The air distribution portion of the system is controlled by a fan switch, control buttons, a vacuum unit with vacuum solenoid valve and air distribution flaps.

Climate Control is programmed to maintain a temperature of 75øF (24øC). The electronic system consists of a control head, programmer (computer) and blower control unit.

OPERATION

SYSTEM OPERATION

A/C Operation

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. On a hot day, the system may operate in maximum cold mode for a long time. On milder days, system may operate any place in the intermediate range.

Heater Operation

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, coolant will flow through heater core. Air will flow from floor vents. Temperature control door will open, and all air will flow through the heater core. If engine temperature is under 104øF (40øC), the fan will operate at high speed, and then gradually decrease as interior warms.

NOTE: The blower delay feature is over-ridden 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.

SYSTEM CONTROLS

To operate the system in automatic depress the "Auto" button on the climate control panel and select the desired interior temperature using the temperature "Warmer" or "Cooler" buttons. See Fig. 1. When this is done the system will function automatically whenever the vehicle is in operation.

The system can also be put in one of 5 alternate modes which tailor the system operation more towards the user's needs.

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

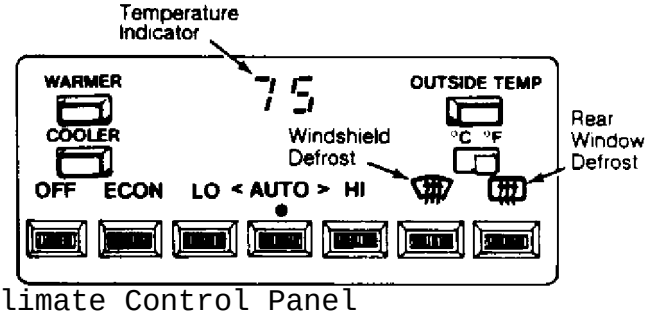

Fig. 1: Climate Control Panel

"ECON"

In this mode, the air conditioning compressor remains inoperative. The reduced engine load will improve fuel economy. This setting should be used in mild weather. Interior temperature control

is provided and maintained approximately at the temperature displayed on control head.

In mild weather, air will flow from open registers. On cooler days, air will flow from footwell vents. During warmer weather, interior temperatures cannot be controlled with this setting as the A/C compressor is inoperative.

"LO"

In this setting, the fan motor operates at fixed low speed. Automatic temperature control and automatic air distribution control are provided. Air volume remains within the limits of "LO" mode operation.

"AUTO"

In this setting, the fan motor automatically operates at changing speeds. Interior temperature control is automatic. As temperature approaches the degrees displayed on control head, the fan motor speed is reduced.

In cold weather, heated air will flow from footwell vents after the engine has warmed up. In warm weather, cooled air will flow from open registers.

During hot weather, the "AUTO" setting is capable of recirculating up to 85% of interior air for fast cooling.

NOTE: The "AUTO" mode operation overrides heating and cooling capability of "LO" mode operation.

Control Settings	Temp.	System Operates as Follows:
"DEF"	90°F (32°C)	Warm air is delivered from defroster outlets at fixed high blower speed. Slight air flow from footwell vents.
"HI"	90°F (32°C)	Warm air is delivered from heater outlet with only small amount from defroster outlets. Blower operates at high speed.
"AUTO"	75°F (24°C)	After a short delay, blower speed gradually decreases. Discharged air should become cooler. Depending on temperature in work area air delivery mode changes to dash vents from floor vents. Intermediate delivery mode is bi-level when transition occurs.
"AUTO"	60°F (15°C)	Blower speed increased to fixed high value. Discharged air becomes maximum cold. Air recirculation door slowly closes, recirculating passenger compartment air.
"LO"	60°F (15°C)	A/C compressor is off. Blower speed gradually increases at very slow rate. Discharged air should remain cold and come from dash vents.
"ECON"	60°F (15°C)	A/C compressor is off. Blower speed gradually increases to fixed high rate. Discharged air should continue to come from dash vents and be warmer.
"OFF"		Blower is off. Air recirculation door is closed.
"REAR DEFOG"	NONE	LED above button lights up. Heat is applied to rear Window.
"OUTSIDE"	NONE	LED to left of button lights up and outside temperature is displayed on control panel.

Fig. 2: Control Panel Operation Table

"HI"
In this setting, the system operates as in the "AUTO" mode. The fan motor operates at a fixed high speed to achieve maximum heating or cooling. There is an acceleration interval of about 10 seconds before the fan motor can reach maximum speed. This feature is provided to avoid sudden gusts of warm or cold air. When the system is off or set in "LO" mode, this feature does not operate.

Defrost (Windshield)
In this setting maximum air volume is directed toward the windshield. A portion of this airflow is emitted from the side window defroster nozzles. Temperature should be set to 90øF (32øC) to defrost or defog windshield and side windows.

Defrost (Rear Window)
When the rear window defroster button is pushed, current will flow to the defroster heating elements for 10 minutes. Current will then switch off automatically to save fuel and conserve battery power. On vehicles equipped with electrically heated, remote control outside mirrors, current will flow to the mirrors at the same time.

NOTE: Blower delay feature is overridden when 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.

SYSTEM COMPONENTS

Evaporator Air Temperature Sensor
This sensor measures the temperature of air at the evaporator housing. The evaporator air temperature sensor is wired in series. A combined resistance value operates this system.

Outside Ambient Temperature Sensor
This sensor is located near the hood latch in front of radiator. Sensor measures the outside air temperature and sends a signal to the programmer.

High Pressure Switch
This switch controls operation of cooling fan 2nd stage. Switch closes at pressures of 190-240 psi (13.3-16.8 kg/cmý). Switch opens at 152-203 psi (10.6-14.2 kg/cmý).

Outside Temperature Switch
This switch disengages the A/C clutch at low temperatures. Switch closes at 45øF (7øC) and opens at 30øF (-1øC).

Full Throttle Switch
This switch disengages A/C compressor clutch at full throttle via the A/C time delay relay.

Refrigerant Low Pressure Switch

This switch disengages A/C compressor clutch when refrigerant charge is low. The refrigerant low pressure switch opens at 33-42 psi (2.3-3.0 kg/cmý) and closes at 11.6-16.0 psi (.80-1.1 kg/cmý).

Evaporator Temperature Sensor

This sensor prevents evaporator freeze-up. This sensor opens at 29-34øF (-1.5-1.5øC) and closes at 34-40øF (1.5-4.5øC).

Transmission Switch

This switch cuts out A/C compressor via delay relay when 1st gear is engaged. When 1st gear is engaged, switch must be closed.

Fresh Air Fan Thermoswitch

The fresh air fan thermoswitch stops operation of fresh air fan when coolant is cold. Switch is located in water pipe below the warm-up regulator on 5000S models. On 5000 Turbo models, thermoswitch is located in water pipe below warm-up regulator. Switch opens at 104øF (40øC) and closes at 122øF (50øC).

A/C Muffler

Muffler helps reduce pressure surge when magnetic clutch cycles. It helps reduce noise and feeling of power loss when magnetic clutch cycles.

Expansion Tube (Restrictor)

The expansion tube has a fixed opening and ensures that maximum amount of refrigerant is delivered to the evaporator.

TESTING & DIAGNOSIS

NOTE: Unless stated, perform all tests with electrical components connected. Workshop temperature must be approximately 68øF (20øC). Vehicle windows should be open and vehicle not parked in sunlight.

NOTE: Watch temperature gauge on instrument panel during testing. DO NOT allow engine to overheat.

CONTROL HEAD INPUT SIGNALS TABLE

Terminal	Reading	Function
1	12.0V	Voltage input for background illumination. Voltage is supplied from instrument panel.
2	12.0V	Voltage input from parking light circuit. When park lights are switched on, control head display automatically dims.
4	12.0V	Voltage input from terminal 30. Terminal supplies constant power for control head memory.
5	-	Input from outside temperature sensor for

outside temperature display.

J ..... 8.0V .... Constant 8 volt signal from a voltage stabilizer in programmer 8 volt signal powers all control head electronic circuits.

3 .... 0.0 ohms - warm
Infinite ohms - cold
Input from engine temperature switch. Below approximately 104øF (27øC) switch is open and control head will not activate blower fan. Test with plug removed.

12 . 0.0 ohms ground Ground for control head. Test with plug removed.

Terminal	Setting 60°F			Setting 90°F			Control Mode			Function
	LO	AUTO	HI	LO	AUTO	HI	90° DEF	ECON	OFF	
10	less than 1.0V	-	4.3V	less than 1.0V	-	4.3V	4.3V	-	-	Output to programmer for blower speed control. Output voltage is fixed in "LO", "HI" and "DEF". Output voltage can vary between "LO" and "HI" readings in "AUTO" and "ECON".
11	0.0 to 0.5V	0.0 to 0.5V	0.0 to 0.5V	0.0 to 0.5V	0.0 to 0.5V	0.0 to 0.5V	0.0 to 0.5V	0.0 to 0.5V	0.0 to 0.5V	Ouput to programmer. Tells programmmer to activate blower. Ground signal causes programmer to activate blower. A reading of less than 0.5V may appear at terminal 11.
B	2.5 to 5.0V	2.5 to 5.0V	2.5 to 5.0V	2.5 to 5.0V	2.5 to 5.0V	2.5 to 5.0V	more than 5.0V	-	less than 1.0V	Output to programmer. for mode selection. Voltage is fairly constant around 3V and always less than 5V when in any mode except defrost. Voltage increases to 7.7V when defrost is pressed.
A	4.75V	4.75V	4.75V	3.0V	3.0V	3.0V	-	-	-	Output signal for temperature control. Control head applies voltage signal to temperature sensor loop. This voltage signal varies as set temperature is varied, changing resistance of sensor loop and causing programmer to adjust interior temperature.
D	0.0 to 1.0V	0.0 to 1.0V	0.0 to 1.0V	0.0 to 1.0V	0.0 to 1.0V	0.0 to 1.0V	0.0 to 1.0V	more than 10.0V	more than 10.0V	Output signal for compressor clutch drive. When system is operating, a ground is provided at terminal D. In "OFF" or "ECON", voltage signal is used to tell blower control to switch compressor off.

Fig. 3: Control Head Output Signals Table

CONTROL HEAD

Background LEDS Not Working

NOTE: If only one control head LED does not work, replace control head assembly.

1) Turn ignition and parking lights on. Set background lighting to maximum brightness. If background lights do not work, go to step 4). If background lights work, go to step 2).

2) Turn light switch off. Connect test lamp between control head terminal 4 and ground. If test lamp does not light check fuse 3, if okay repair open circuit between control head terminal 4 and fuse 3. If the test lamp lights, connect test lamp between control head terminal J and ground. If test lamp does not light again , connect test lamp between programmer terminal L and ground. If test lamp does not light repair open circuit between programmer terminal L and fuse 17.

3) If test lamp lights between terminal L and fuse 17, connect test lamp between programmer terminal M and ground. If test lamp now lights, repair open circuit between programmer terminal M and control head terminal J. If test lamp does not light, check programmer ground through programmer terminal N. If okay, replace programmer.

4) Connect test lamp between control head terminal 1 and ground. If test lamp lights, check wire from control head terminal 12 and ground for open circuits. If background lights are not working, replace control head. See Fig. 4.

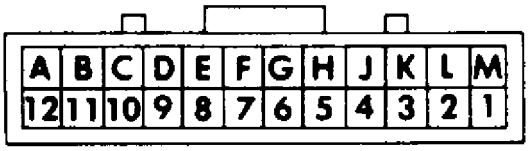

Fig. 4: Control Head Connector

FRESH AIR BLOWER

Does Not Work

1) Turn ignition on, set control head to "Defrost" mode. Set the temperature controls to 90øF (32øC). Check fuse 17. If fuse is okay, go to step 2). If fuse is not okay, replace and check wiring for shorts to ground or excessive current draw.

2) Check blower control ground connection terminal H for open circuit. If okay, go to step 3). If not okay, repair as necessary.

3) Pull connector off blower control unit. Connect terminal G of 6 point connector to ground with jumper and switch ignition on. If fresh air blower runs, go to step 4). If fresh air blower does not run, check blower power circuits. If circuits are not okay, repair as necessary. If circuits are okay, replace blower motor.

4) Connect test lamp between blower control terminal B and ground. If test lamp does not light, repair open circuit between

blower control terminal B and fuse 17. If test lamp lights, go to step 5).

5) Connect test lamp between blower control terminal E and ground. If test lamp does not light, repair wiring between blower control terminal E and programmer terminal M. If test lamp lights, check the voltage between blower control terminal F and ground. If voltage is more than 0.4 Volt, replace blower control. If voltage is less than 0.4 Volt, go to step 6)

6) Reconnect plug to blower control, and bridge programmer terminals M and T with test lamp. If fresh air blower runs, go to step 7). If fresh air blower does not run check for open circuit between programmer terminal T and blower control terminal F. If okay, replace blower control. If not okay, repair open circuit.

7) Measure voltage at programmer terminal R. If more than 0.4 volt, go to step 8). If less than 0.4 volt, check the wire from programmer terminal R to control head terminal 10 for open circuit. If okay, replace control head. If not, okay repair wire.

8) Connect programmer terminal V to ground with jumper. If blower does not run, replace programmer. If blower now runs, check the wire from programmer terminal V to control head terminal 11 for open circuit. If okay, replace control head. If not okay, repair open circuit.

Works Only in Defrost Mode

1) Warm engine to operating temperature and let engine idle. Set control head to "AUTO" and program temperature to 90øF (32øC). If fresh air blower is not running, pull connector off fresh air blower thermoswitch and bridge terminals. If fresh air blower runs, replace fresh air blower thermoswitch. If fresh air blower is not running, go to step 2).

2) Bridge contacts of fresh air blower thermoswitch connectors. Using ohmmeter, check for continuity between control head terminal 3 and ground. If there is continuity, go to step 3). If there is no continuity, repair open circuit between control head and thermoswitch ground. See Fig. 5.

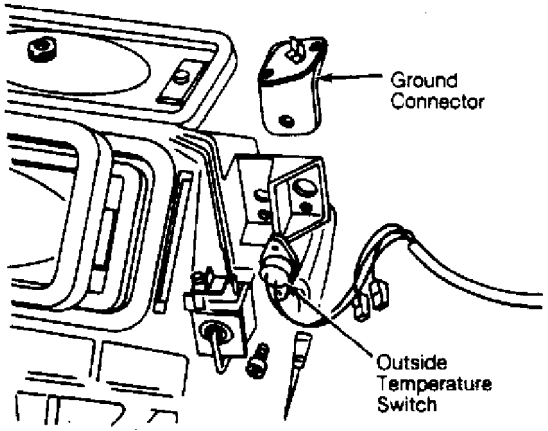

Fig. 5: Location of Fresh Air Fan Thermoswitch

3) If continuity is found, reconnect plug to blower control.

Bridge programmer terminals M and T with test lamp. If blower motor runs, go to step 4). If blower does not run, check for open circuit between programmer terminal T and blower control terminal F. If circuit found defective, repair. If circuit is found complete, replace blower motor.

4) Measure voltage at programmer terminal R. If less than 0.4 volt, check wire from programmer terminal R to control head terminal 10 for open circuit. If an open circuit is found, repair. If the circuit is complete replace control head. If the voltage found is more than 0.4 volt, connect programmer terminal V to ground. If the blower does not run, replace programmer. If blower runs, check for continuity from terminal V of programmer terminal connector to terminal 11 of control head connector. If no continuity is found, repair circuit. If continuity is found, replace control head.

Runs Only at High Speed

1) Turn ignition switch on and set control head to "OFF" position. Check terminals of blower control for tightness. If fresh air blower runs, replace blower control. If fresh air blower does not run, go to step 2).

2) Change control head setting to "LO" and program temperature to 60øF (15øC). If very little air flows from defroster vents, check voltage between programmer terminal T and ground. If more than 1 volt, go to step 3). If less than 1 volt, check wire from blower control terminal G for short circuit. If okay, replace blower control.

3) Check voltage between programmer terminal R and ground. If less than 1 volt, replace programmer. If more than 1 volt, measure the voltage between control head terminal 10 and ground. If more than 1 volt, replace control head. If less than 1 volt, repair open circuit between programmer terminal R and control head terminal 10.

Terminal	Reading	Function
B	12.0V	Power supply when ignition is on.
C	0.0V "AUTO", "LO", "HI" 12.0V "OFF", "ECON"	Compressor drive input from control head. Control head grounds terminal C and then blower controls compressor clutch. A reading of less than 1 volt may appear at terminal C in "AUTO", "LO" and "HIGH".
D	12.V	Power supply when ignition is on.
E	8.0V	Stablized voltage input signal from programmer.
F	0.65V to 1.5V "LO" 4.0 to 5.0V	Blower speed control signal from programmer. Voltage is fixed in "LO", "HI", and "DEF". Voltage can vary in "AUTO" and "ECON" but should be between "LO" and "HI" readings.

Fig. 6: Blower Control Input Signals Table

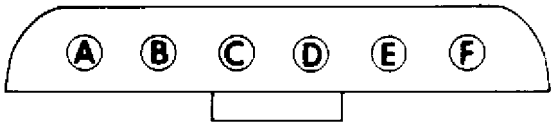

Fig. 7: Blower Control Connector

Runs Only at Low Speed

1) Turn ignition on and set control head to "HI". Remove connector from blower control and check voltage between programmer terminal T and ground. If more than 1 volt, replace blower control.

2) If less than 1 volt, check the voltage between programmer terminal R and ground. If the voltage found is more than 1 volt, replace programmer. If less than 1 volt, check the wire between programmer terminal R and control head terminal 10 for short to ground. If no short is found, replace control head.

PROGRAMMER INPUT SIGNALS

NOTE: For each component, all inputs must be okay before correct outputs will be obtained. All voltage specifications are for a workshop ambient temperature of 70øF (21øC). Use a digital voltmeter for all tests. All tests are performed with all components connected unless otherwise indicated.

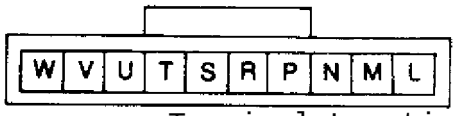

Fig. 8: Programmer Terminal Locations

AIR DISTRIBUTION

No Airflow from Center Registers During Cooling

1) Warm up engine to operating temperature and let engine idle. Set control head to "AUTO" and program temperature to 60øF (15øC). Check vacuum supply at programmer vacuum plug. If there is vacuum at programmer go to step 2). If there is no vacuum at programmer, repair vacuum supply.

	Setting 60°F			Setting 90°F			Control Mode			
Terminal	LO	AUTO	HI	LO	AUTO	HI	90° DEF	ECON	OFF	Function
P	0.0 to 1.0V	0.0 to 1.0V	0.0 to 1.0V	0.0 to 1.0V	0.0 to 1.0V	0.0 to 1.0V	0.0 to 1.0V	More than 10.0V	More than 10.0V	Input from control head. Tells programmer that compressor is on. When system is on, ground is provided at control head terminal D.
R	Less than 1.0V	-	4.3V	Less than 1.0V	-	4.3V	4.3V	-	0.0V	Input from control head for blower speed control. Input voltage is fixed in "LO", "HI" and "DEF". Voltage can vary between "LO" and "HI" reading in "AUTO" and "ECON".
S	3.3V	3.3V	3.3V	2.1V	2.1V	2.1V	2.1V	-	-	Input from temperature sensors. Look mainly for voltage change between "MAX". heat. If problem is suspected, check temperature sensors first.
U	2.5V to 5.0V	2.5V to 5.0V	2.5V to 5.0V	2.5V to 5.0V	2.5V to 5.0V	2.5V to 5.0V	More than 5.0V	-	Less than 1.0V	Input from control head for mode selected. Voltage is fairly constant at 3V when system is on and increases to around 7.7V when system is on defrost.
V	0.0 to 0.5V	0.0 to 0.5V	0.0 to 0.5V	0.0 to 0.5V	0.0 to 0.5V	0.0 to 0.5V	0.0 to 0.5V	0.0 to 0.5V	2.95V to 0.5V	Input from control head. A ground signal causes programmer to activate blower.

Fig. 9: Programmer Input Signals Table

2) Check that all vacuum units and hoses hold vacuum. If vacuum units and hoses hold vacuum, go to step 3). If vacuum units and hoses do not hold vacuum, replace defective hoses and vacuum units. Check for proper vacuum hose layout.

3) Check air distribution and vacuum unit positions. Check vacuum hose layout. If warm air flows from footwell vents, and there is slight airflow to defroster vents, see FULL HEAT OUTPUT AT HIGHEST BLOWER SPEED IN AUTO SETTING test. If cold air flows from defroster vents, go to step 4).

Terminal	Setting 60°F			Setting 90°F			Control Mode			Function
	LO	AUTO	HI	LO	AUTO	HI	90° DEF	ECON	OFF	
M	8.0V	8.0V	8.0V	8.0V	8.0V	8.0V	8.0V	8.0V	8.0V	Output to control head and blower control. This stabilized voltage signal is used to power all electronic components in system.
T	0.65V to 1.5V	-	4.0V to 5.0V	0.65V to 1.5V	-	4.0V to 5.0V	4.0V to 5.0V	-	-	Output to blower control. This signal controls blower speed. Voltage is fixed in "LO", "HI", and "DEF". Voltage can vary in "AUTO" and "ECON" but should be between "LO" and "HI" readings.
W	0.6V	0.6V	0.6V	7.0V	7.0V	7.0V	-	-	-	Program voltage signal. This signal is generated by programmer and is used to drive small motor inside programmer. This motor controls position of temperature control flaps. Signal also indirectly controls operation of vacuum solenoids for air distribution.

Fig. 10: Programmer Output Signals Table

4) Change control head setting to "AUTO" and program temperature to 90øF (32øC). If hot air flows from defroster vents, and there is slight airflow to footwell vents, go to step 5). If hot air flows from footwell vents, and there is slight airflow to defroster vents, turn ignition switch off. Remove control head connector and turn ignition on. Check voltage between terminal B and ground. If more than 1 volt, replace programmer. If less than 1 volt, replace control head.

5) Check voltage between control head terminal B and ground. If more than 5 volts, replace control head. If less than 5 volts, check for circuit in wire between control head terminal B and programmer terminal U. If okay, replace programmer. If not okay, repair wire. See Fig. 11.

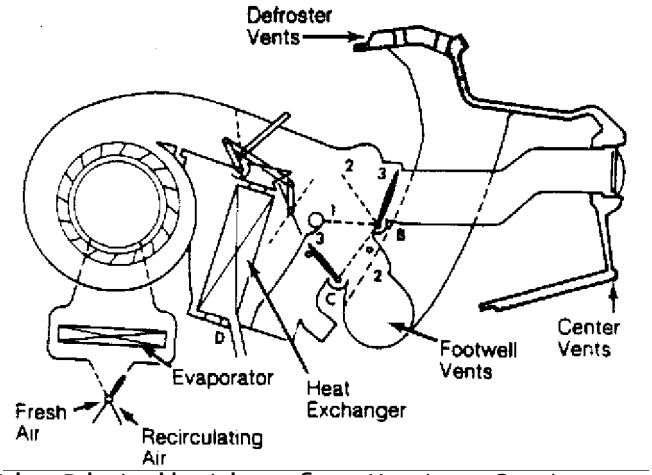

Fig. 11: Air Distribution for Heater System

Full Heat Output at Highest Blower Speed in "AUTO" Setting

1) Warm engine to operating temperature and let engine idle. Set control head to "AUTO" and program temperature to 60øF (15øC). Fresh air blower should run at high speed.

2) Disconnect wires for evaporator air temperature sensor. Connect test lamp between programmer terminals M and S. If no air flows from instrument panel vents, reconnect wires to evaporator air temperature sensor. Connect test lamp to control head terminal A and programmer terminal M. Go to step 4). If air flows from instrument panel vents, go to step 3).

3) Reconnect evaporator air temperature sensor wires. Check for good connection at programmer terminal S. Check wire from programmer terminal S to evaporator air temperature sensor for short circuit. If okay, replace programmer.

4) If air flows from instrument panel vents, check for good connection at control head terminal A. If okay, replace control head. If no air flows from instrument panel vents, pull connector off evaporator air temperature sensor. Connect test lamp from programmer terminal M and control head terminal A. If test lamp lights, repair short circuit to ground between programmer terminal S and control head terminal A. If test lamp does not light, go to step 5).

5) Check for open circuit between control head terminal A and evaporator air temperature sensor. If there is no open circuit, repair as necessary. If there is an open circuit, measure evaporator air temperature sensor resistance. If okay, replace resistor. If not okay, measure resistance of inside air temperature sensor. Check wiring for open or shorted circuits in temperature sensor wiring and repair as necessary.

COMPRESSOR

Not Working

1) Warm engine to operating temperature and let engine idle. Set control head to "AUTO" and program temperature to 68øF (15øC). Check magnetic clutch operation. Check for voltage at magnetic clutch with test lamp. If test lamp does not light go to step 2). If test

lamp does light, replace compressor clutch.

2) Connect test lamp to power supply of outside air temperature switch (Black and Yellow wire) and ground. If test lamp does not light, go to step 4). If test lamp lights, go to step 3).

3) Use wiring diagram and check for current flow at the following: Outside ambient air temperature switch, evaporator temperature switch, refrigerant low pressure switch, coolant temperature switch, A/C kickdown switch, coolant low level switch and A/C clutch relay. Repair system as necessary.

4) Connect control head terminal D to ground with jumper wire. If compressor runs, remove programmer terminal P from connector. If compressor runs, replace programmer. If compressor does not run, check the wire from blower control terminal C to control head terminal D for open circuit. If okay, replace control head.

Runs in "ECON" Setting

1) Warm engine to operating temperature and let engine idle. Set control head to "ECON" and program temperature to 60øF (15øC).

2) Pull connector from blower control. If compressor runs, replace clutch control relay or A/C time delay relay. If compressor does not run, go to step 3).

3) Reconnect blower control plug. Measure voltage between blower control terminal C and ground. If more than 10 volts, replace blower control. If 0 volts, disconnect control head plug. If compressor doesn't run, replace control head. If compressor runs, check wire from blower control terminal C for short circuit. If okay, replace programmer. If not okay, repair wire as necessary.

Insufficient Cooling

1) Attach pressure gauges to A/C system. Warm engine to operating temperature and let engine idle. Set control head to "AUTO" and program temperature to 60øF (15øC). Check refrigerant charge. If system pressure is low, see SYSTEM PRESSURE/TEMPERATURE test. If system pressure is okay, go to step 2).

2) Check temperature cable adjustment. If adjustment is not okay, go to test 3). If cable adjustment is okay, check evaporator for icing. Check position of capillary tube in evaporator. Check evaporator case for air leaks.

3) Connect programmer terminals M and S with jumper wire. Re-check cable adjustment. If cable and flaps are in maximum position, go to step 4). If cable and flaps are not in maximum cool position, make sure air flaps and cable move freely. If not okay, repair flaps or cables. If okay, replace programmer.

4) Connect programmer terminal M and control head terminal A with test lamp. Re-check cable adjustment. If cable and flaps are in maximum cool position, check for good connection at programmer terminal A. If okay, replace control head.

5) If cable and flaps are not in maximum cool position, turn ignition off and disconnect programmer. Check resistance of inside air temperature sensor and evaporator air temperature sensor. Check for open or short circuit in temperature sensor wiring and repair as necessary.

Air Recirculation Flap Not Working

1) Warm engine to operating temperature and let engine idle. Set control head to "AUTO" and program temperature to 60øF (15øC). Measure voltage between programmer terminal P and ground. If more than 1 volt, go to step 3).

2) If less than 1 volt, check for open circuit in wire from control head terminal 10 and programmer terminal P. If okay, check vacuum units for leaks. Check vacuum hose layout. If there is no vacuum present at recirculation vacuum unit, replace programmer.

3) Measure voltage between control head terminal D and ground. If less than 1 volt, repair open circuit between programmer terminal P and control head terminal D. If more than 1 volt, replace control head.

HEATER SYSTEM

Insufficient Heat at 90øF (32øC) Setting

1) Warm engine to operating temperature and let engine idle. Set control head to "AUTO" position and program temperature to 90øF (32øC).

2) Check position of heater valve. If heater valve is closed, go to step 3). If heater valve is open, check temperature cable operation and adjustment. Adjust cable if necessary and check operation. If operation is not correct, replace programmer. If cable operation is okay, but heat is still insufficient, replace the engine thermostat.

3) Pull vacuum hose off heater valve and check position of valve. If heater valve is open, check vacuum line layout. If heater valve is okay, replace programmer. If heater valve is closed, replace heater valve.

Insufficient Heat at 85øF (29øC) Setting

1) Warm engine to operating temperature and let engine idle. Set control head to "AUTO" position and temperature to 85øF (29øC).

2) If fresh air blower does not run go to FRESH AIR BLOWER DOES NOT WORK test. If fresh air blower runs, disconnect outside ambient temperature switch (on evaporator). Check that air flaps are in maximum heat position. If in maximum heat position, using ohmmeter, check resistance of inside air temperature sensor and outside ambient temperature sensor. If resistance is not okay, replace sensor. If resistance is okay, go to step 3).

3) Check for open or shorted circuits in temperature sensor wiring. If not okay, repair wiring. If okay, check programmer calibration. If calibration is okay, replace programmer. If calibration is not okay, adjust programmer.

Windshield Defroster Not Working But Fresh Air Blower Works

1) Warm engine to operating temperature and let engine idle. Set control head to "DEFROST" position and program temperature to 90øF (32øC).

2) Check voltage between programmer terminal "U" and ground.

If voltage is zero, go to step 3). If voltage is 8 volts, check vacuum hose layout. If vacuum hose layout is correct, replace programmer. If vacuum hose layout is incorrect, repair and check the footwell defroster flap for free movement.

3) Check that climate control operates properly in "AUTO" and "OFF" positions. If climate control operates properly, replace control head. If climate control does not operate properly, go to step 4).

4) Remove plug from control head. If hot air flows from defroster vents, replace control head. If no hot air flows from defroster vents, check wire between programmer terminal U and control head terminal B for short circuit to ground. If okay, replace programmer.

Climate Control Always Runs at Defrost

1) Warm engine to operating temperature, and let engine idle. Set control head to "AUTO" position and program temperature to 60øF (32øC).

2) Check vacuum supply. If vacuum supply is not okay, repair vacuum unit or hoses. Check for proper vacuum hose layout. If vacuum hose is okay, go to step 3).

3) Check wire from programmer terminal U to control head terminal B for open circuit. Check connections for tightness. If okay, pull plug from programmer. Measure voltage between control head terminal U and ground. If voltage is 8 volts, replace control head. If voltage is less than 5 volts, replace programmer.

Heated Rear Window Not Working

1) Turn ignition on and switch on rear window defrost. Check fuse 16. If defective, replace fuse and check wiring for shorts. If fuse is okay, go to step 2).

2) If digital indicator on control head does not light up go to CONTROL HEAD BACKGROUND LED'S NOT WORKING test. If the digital indicator on control head lights up, remove defogger relay. Connect test lamp between terminal No. 85 and 86. If test lamp lights, go to step 3). If test lamp does not light, go to step 4).

3) Install relay and connect test lamp between power supply wire at rear window and ground. If test lamp lights, check ground wire at rear window for open circuit. If test lamp does not light, check wiring from relay to rear window. If okay, replace relay. If not okay, repair wiring.

4) Connect test lamp between terminal 85 (White and Yellow wire) and ground. If test lamp does not light, repair open circuit between fuse 16 and relay. If test lamp lights, check wire from terminal No. 86 of relay (Black and White wire) to control head terminal No. 9 for open circuit. If okay, replace control head.

Heated Rear Window Works Continuously

1) Remove relay for heated rear window. Turn ignition switch on. Connect test lamp between relay socket No. 87 (White wire) and ground. If test lamp does not light, go to step 2). If test lamp lights, repair power supply wire to heated rear window.

2) Install rear window relay. Check voltage between terminal No. 86 of relay (Brown and White wire) and ground. If voltage is less than 7 volts, go to step 3). If voltage is more than 7 volts, replace relay.

3) Check wire from control head terminal No. 9 to relay for short circuit to ground. If not grounded, replace control head.

Inside Air Temperature Sensor

Bridge evaporator air sensor terminals at 6 point connector (T6a, on evaporator). Remove connector on control head and measure resistance between terminals S and A. Connector T4c is near passenger kick panel. Inside air temperature suction can be checked with smoke. See Fig. 12.

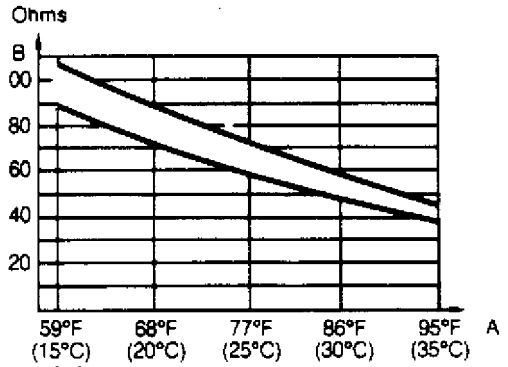

Fig. 12: Inside Temperature Sensor Graph

Outside Temperature Display Reads Very High or Very Low

1) Turn ignition switch on. Set control head to "ON" position and push outside temperature button.

2) Check wire from control head terminal No. 5 to outside temperature sensor for open or short circuit. If okay, check ground wire from outside temperature sensor for open circuit. If okay, check resistance of outside temperature sensor. If resistance is okay, replace control head. If resistance is not okay, replace sensor. See Fig. 13.

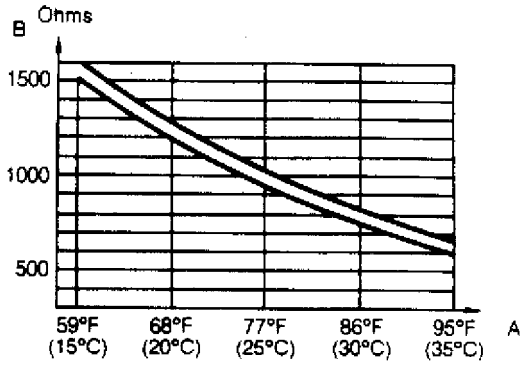

Fig. 13: Outside Temperature Sensor Graph

1) Connect A/C pressure gauge to low side of service port on compressor unit. Start and run engine at 2000 RPM. Open all registers, insert thermometer in center register and place fan switch to highest speed position.

2) Set temperature knob to maximum cooling position and air distribution lever to "REC" position. Open passengers door. Using a mirror and flashlight, check A/C sight glass. Occasional bubbles are okay, but a steady stream of bubbles indicates a system leak or low state of charge.

3) Disconnect radiator (condenser) fan switch (located in coolant hose). Radiator fan should be switch on by high pressure within 3 minutes. If not, stop engine and check electrical wiring.

4) Continue running engine at 2000 RPM for a total of 5 minutes. Check low pressure side of A/C system. Pressure should be 29-34 psi (2-2.4 kg/cmý) and should not fluctuate. Temperature at center register should be approximately 45øF (7øC).

5) If temperature is slightly more than specified, check air ducts for leaks. If system pressure is much higher than specified, check low pressure gauge with engine running at 3000 RPM. If pressure is 28 psi (2 kg/cmý), replace expansion valve. If higher or lower than 28 psi (2 kg/cmý), replace POA valve.

ADJUSTMENTS

PROGRAMMER

NOTE: Always check air temperature sensors before checking programmer calibration.

1) Remove plug from evaporator air temperature sensor (on evaporator). Apply 113 ohms of resistance between terminals S and A of 4 point step plug (Blue and Blue/White wires) using a variable resistor (VW 1301 set to position 208).

2) Connect Digital Voltmeter (KM J29125-A) between terminals W and N (Red/Green and Brown wire). Turn ignition on and wait 2 minutes. Voltage should read 3.95-4 volts. If voltage reading is not correct, go to step 3). If reading is okay, check is complete.

3) Insert small screwdriver with a flat blade into opening of programmer. Turn potentiometer until voltmeter reads 3.95-4 volts.

NOTE: An error of .2 volts causes a temperature variation of 1øF (.58øC). If voltage is under 3.95 volts, system will run too cool. If voltage is over 4.0 volts, system will run too warm.

HEATER FLAP

1) Disconnect the heater flap cable at programmer. Inner cable end must not come up against lever arm. See Fig. 14.

2) Start engine. Set heat output to "AUTO" position at 90øF (32øC) on control head and wait 2 minutes. Install heater flap cable on programmer. Push cable sleeve in direction of arrow until heater flap for temperature regulation comes up against stop. Install cable

clip.

REMOVAL & INSTALLATION

EVAPORATOR ASSEMBLY

Removal

1) From inside engine compartment, loosen water drain hose retainer and push hose into plenum chamber. Disconnect vacuum unit hose and thermostat wires. Remove refrigerant hoses from VIR after discharging system using approved refrigerant recovery/recycling equipment and cap hoses.

2) From inside vehicle, remove lower dash panel. Remove 4 evaporator housing screws around air vent on evaporator unit. From engine compartment, carefully loosen assembly. Pull up and toward the center of vehicle to remove.

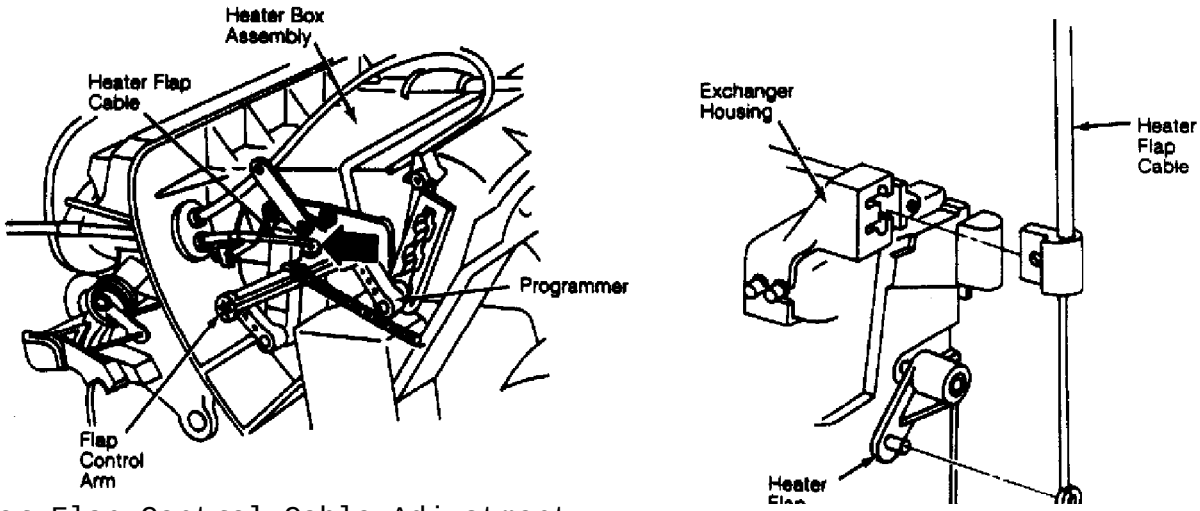

Fig. 14: Heater Flap Control Cable Adjustment

3) Remove VIR hoses and plug openings. Remove VIR and separate housing halves to service evaporator.

Installation

Reassemble evaporator case. Install VIR unit. 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.

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. Remove connections. To install, reverse removal procedure.

HEATER ASSEMBLY

Removal

1) In engine compartment, disconnect battery cable, thermostat wiring, evaporator-heater duct clamp, temperature control cable and vacuum hose. Remove electrical wiring, loosen restraining strap and remove coolant reservoir cap.

2) Clamp heater hoses closed near heater core. Disconnect hoses from core. Upper hose goes to water pump, lower to cylinder head.

3) In passenger compartment, disconnect vacuum lines. Disconnect air ducts and electrical wiring. Remove 4 screws around evaporator housing opening.

4) 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	Harrison (Frigidaire) 6-Cyl.
R-12 Capacity	(1) 38 oz.
Oil Capacity	
Large Condenser	1.8 oz.
Small Condenser	1.5 oz.
Evaporator	4.0 oz.
Compressor	3.0 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 liquid refrigerant to low side port BEFORE operating compressor.
(2) - Operating pressures at 77øF (25øC).

VACUUM DIAGRAMS

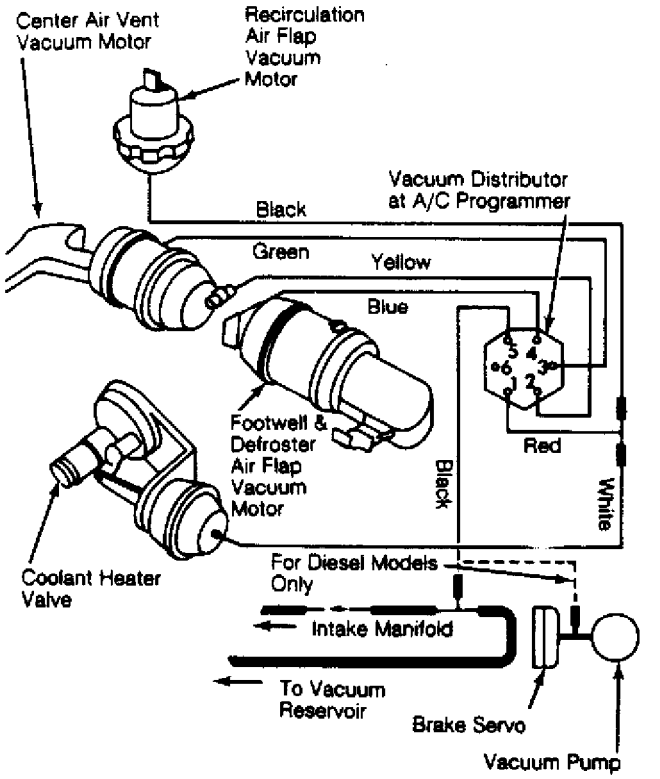

Fig. 15: 5000 Auto. A/C-Heater Systems Vacuum Diagram

WIRING DIAGRAMS

A/C-HEATER SYSTEM - AUTOMATIC
Article Text (p. 22)
1986 Audi 5000S
For chip

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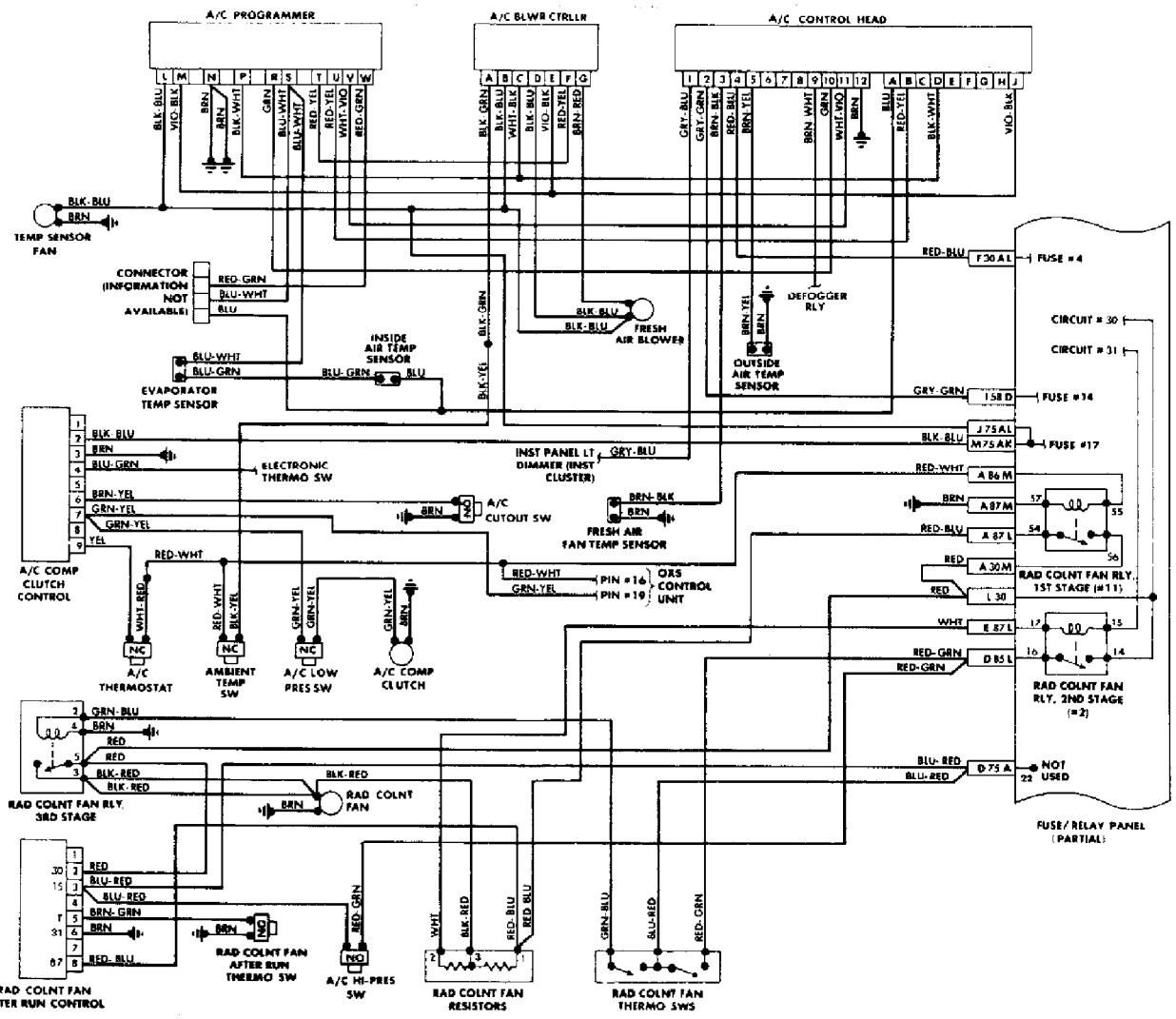

Fig. 16: 5000S (Early) Auto. A/C-Heater Systems Wiring Diagram

A/C-HEATER SYSTEM - AUTOMATIC

Article Text (p. 23)

1986 Audi 5000S

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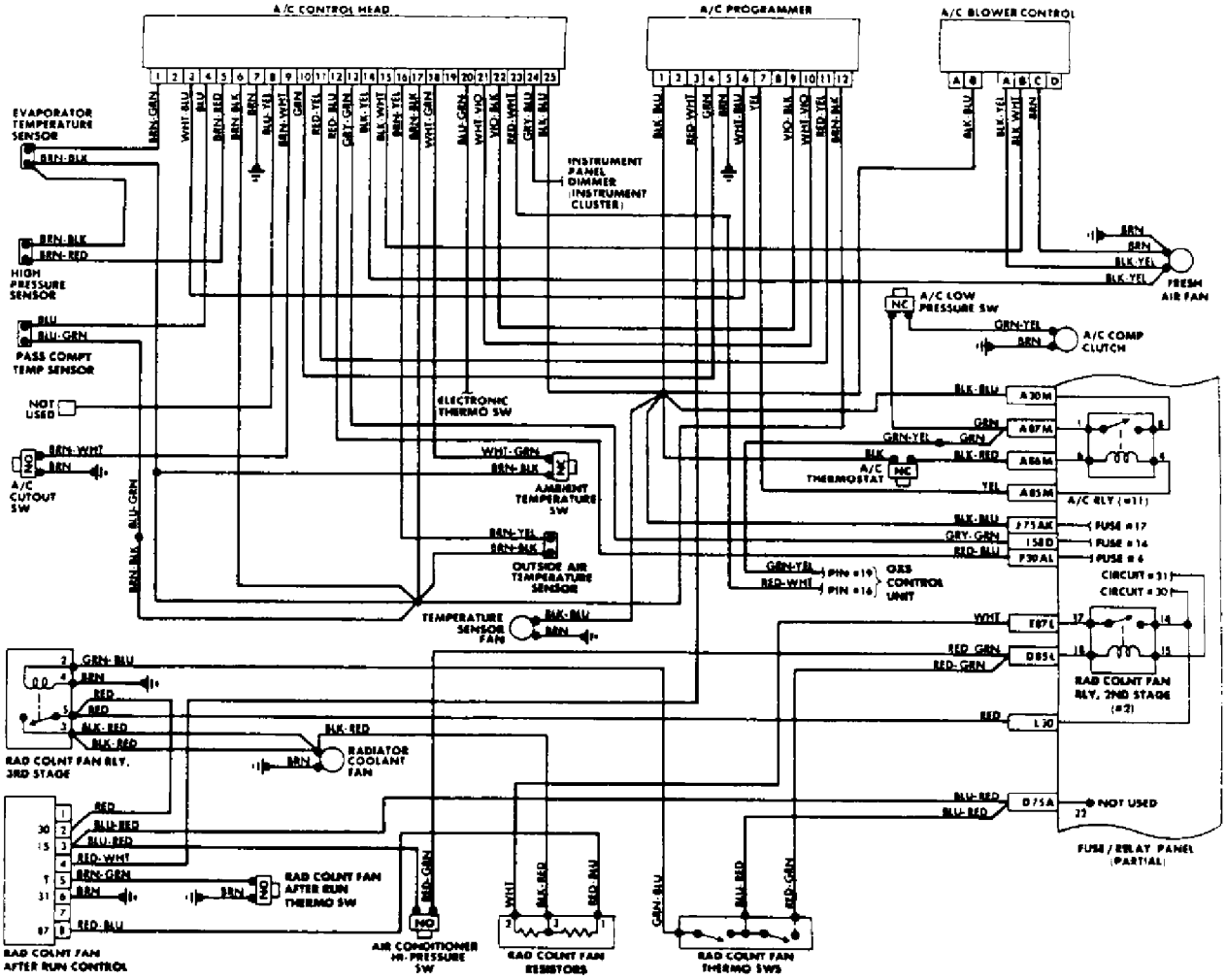

Fig. 17: 5000S (Late) Automatic A/C-Heater Systems Wiring Diagram

A/C-HEATER SYSTEM - AUTOMATIC
Article Text (p. 24)
1986 Audi 5000S
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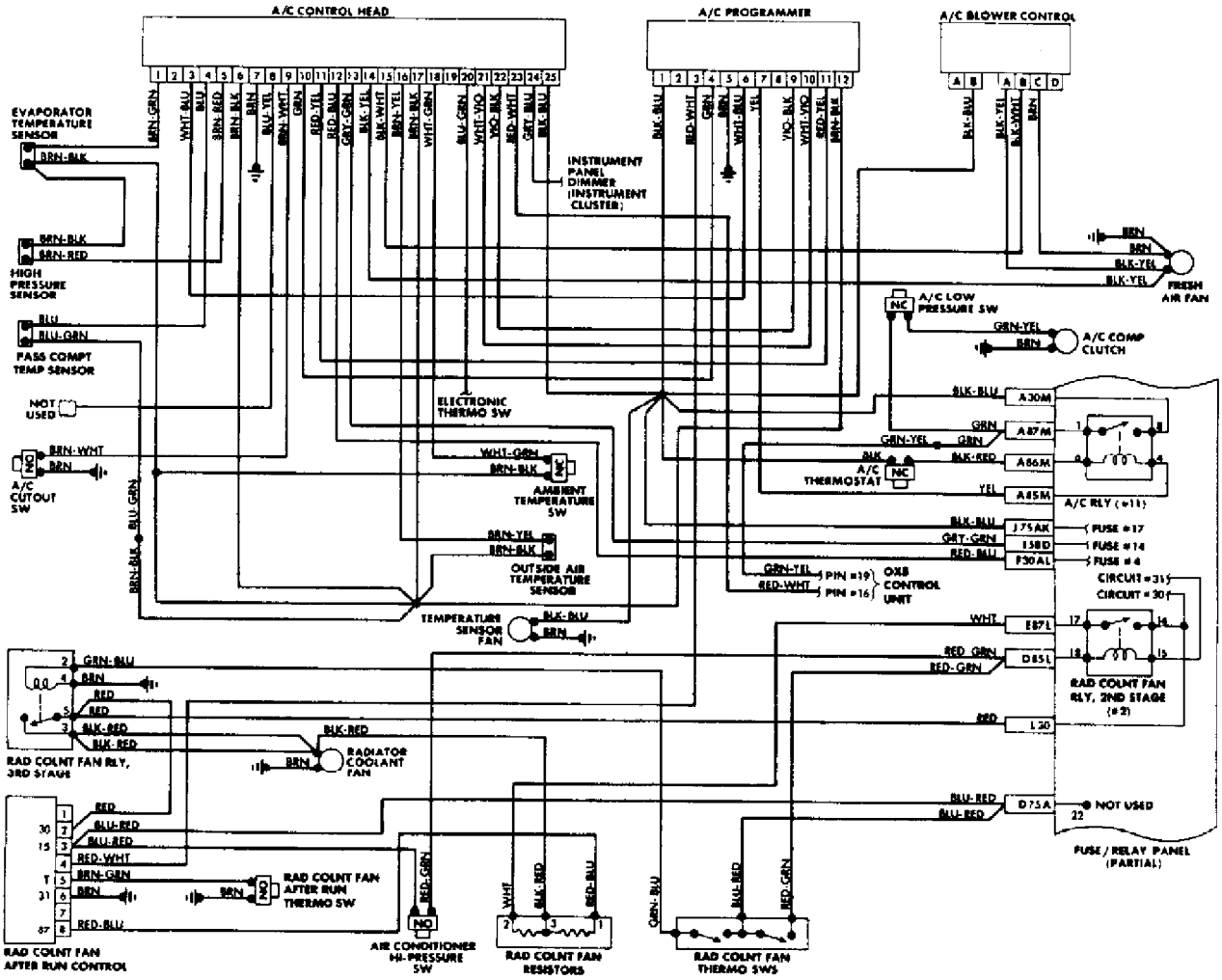

Fig. 18: 5000CS Turbo (Early) Auto. A/C-Heater Systems Wiring Diagram

A/C-HEATER SYSTEM - AUTOMATIC
Article Text (p. 25)
1986 Audi 5000S
For chip

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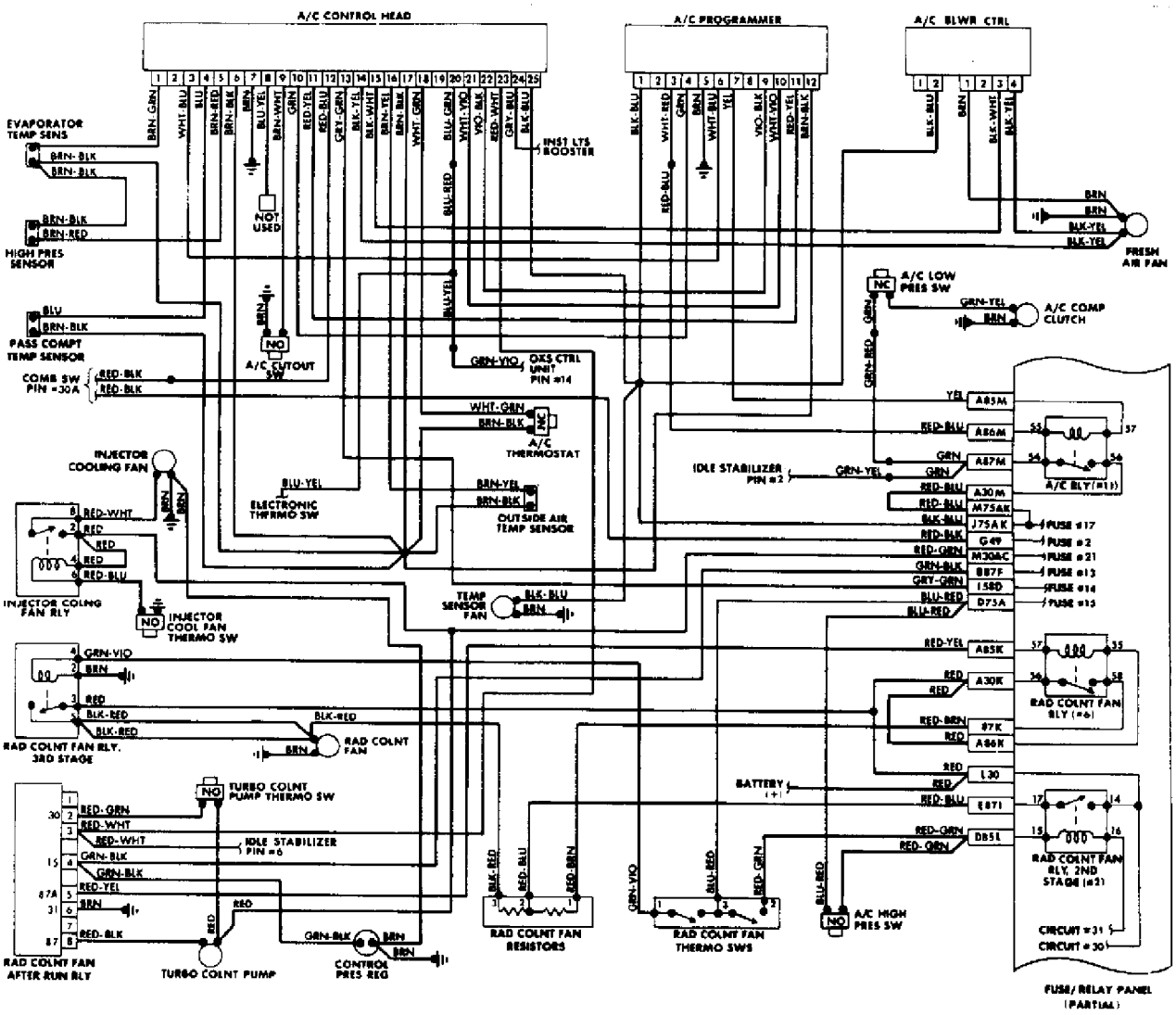

Fig. 19: 5000CS Turbo (Late) & 5000CS Quattro Auto. A/C-Heater Systems Wiring Diagram

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