

A/C-HEATER SYSTEM - AUTOMATIC (CS)

Article Text

1993 Audi 90

For chip

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ARTICLE BEGINNING

1993 AUTOMATIC A/C-HEATER SYSTEMS
Audi

90 CS

SPECIFICATIONS

SPECIFICATIONS TABLE

AA

Application	Specification
Compressor Type	Zexel 6-Cyl.
Compressor Belt Tension (1)	
System Oil Capacity	(2) 7.8-9.2 ozs.
Refrigerant (R-134a) Capacity	23.0-24.8 ozs.
System Operating Pressures (3)	
Low Side	26-29 psi (1.8-2.0 kg/cm ²)
High Side	79.8 psi (5.61 kg/cm ²)

- (1) - Belt tension is automatically adjusted by belt tensioner.
- (2) - Use Polyalkylene Glycol (PAG) oil.
- (3) - Measured at 77°F (25°C). High side pressure increases from base pressure (engine off) to a maximum of 290 psi (20.4 kg/cm²).

AA

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 BAGS article in ACCESSORIES & ELECTRICAL section.

DESCRIPTION

The A/C-heater control panel has buttons to control system. Blower speed is controlled automatically according to difference between selected temperature and interior temperature. Blower speed can also be controlled manually.

The A/C-heater control panel left side display shows selected temperature and automatic functions. See Fig. 1. The right side display indicates manual functions. The A/C-heater system microprocessor, located within the A/C-heater control panel, has a self-diagnostic feature.

The A/C-heater system automatically maintains temperatures from 64°F (18°C) to 85°F (29°C). If a temperature greater than 85°F (29°C) is selected, the word HI appears in temperature display. If a temperature less than 64°F (18°C) is selected, the word LO is displayed. Selection of these temperatures overrides automatic climate control system.

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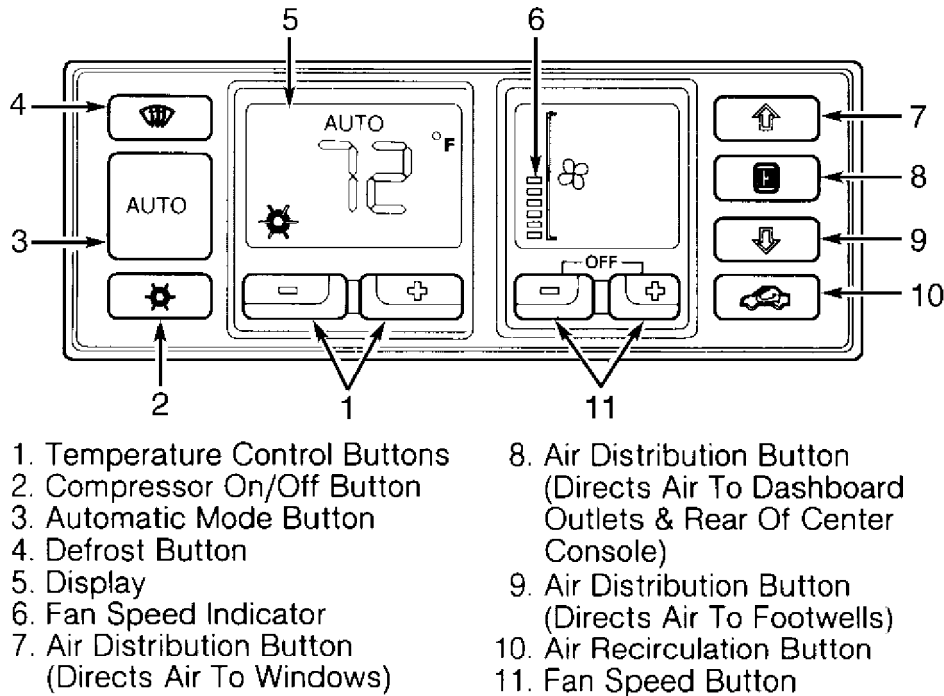
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93D19490
Fig. 1: Identifying A/C-Heater Control Panel
Courtesy of Audi of America, Inc.

OPERATION

A/C COMPRESSOR SPEED SENSOR

Sensor is located on compressor and determines A/C compressor speed. A/C-heater control panel then compares compressor speed to engine speed and calculates belt slippage (as a percentage). If slippage is excessive, control panel switches compressor off.

A/C-HEATER CONTROL PANEL & AIR DISTRIBUTION

A/C-Heater Control Panel

A/C-heater control panel has a digital microprocessor that compares values from various sensors. Microprocessor then activates appropriate adjustment motor and A/C compressor clutch to maintain desired temperature. A/C clutch, blower speed, temperature/blend air door position, and mode doors are all controlled by A/C-heater control panel.

Air Distribution

Three buttons control air distribution. See Fig. 1. When selected, uppermost air distribution button directs air to windows. When middle air distribution button is selected, air is directed to dashboard outlets and rear of center console. When lowermost air distribution button is selected, air is directed to footwells.

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Automatic Mode

In this setting, air temperature, air delivery and air distribution are regulated automatically to achieve and maintain desired interior temperature. All previously selected settings are cancelled.

Blower Speed Settings

Blower speed buttons can be used to raise or lower blower speed in all operating modes. Blower speed plus (+) button is used to raise blower speed. Minus (-) button lowers blower speed. If minus (-) button is pushed after blower speed is set at its lowest setting, climate control system will be deactivated.

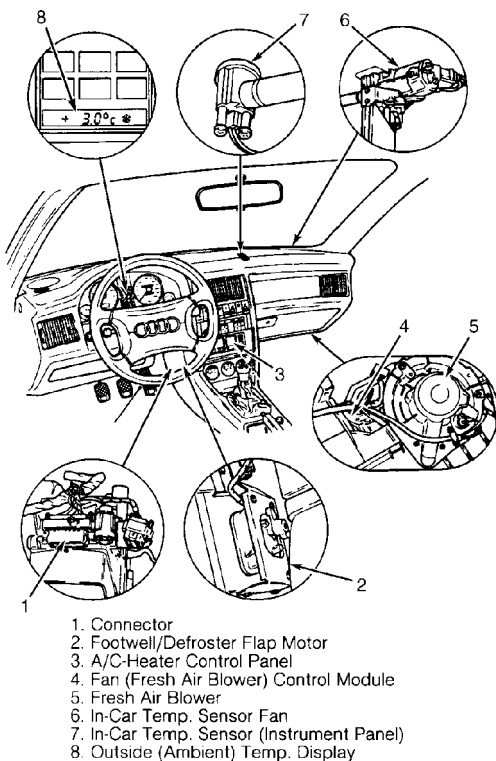
Climate control system will also be deactivated if minus (-) and plus (+) buttons are pushed simultaneously. To reactivate system, press AUTO button, defrost button, one of temperature control buttons or blower speed plus (+) button.

Compressor On/Off Button

This button controls compressor operation.

Defrost Mode

In this setting, recirculation door is open. Blower runs at highest speed and temperature is automatically regulated. All air is directed toward windshield.



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Fig. 2: Identifying Automatic A/C-Heater System Components (90 CS)
Courtesy of Audi of America, Inc.

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ACTUATORS

Central Air Distribution Flap Motor

This actuator (motor) is located on front of heater box. The central air distribution flap is used to distribute air flow to instrument panel vents or to footwell/defroster outlets. A potentiometer, inside motor, indicates the position of the air distribution flap to the A/C-heater control panel as a feedback value.

Footwell/Defrost Flap Motor

This actuator (motor) is located on front of heater box. See Fig. 2. The footwell/defrost flap distributes air to footwell or defroster outlets depending on mode selected. A potentiometer, inside motor, indicates the position of the air distribution flap to the A/C-heater control panel as a feedback value.

Temperature Regulator Flap Motor

This actuator (motor) is mounted on left side of heater box. See Fig. 4. A potentiometer, inside motor, indicates the position of the air distribution flap to the A/C-heater control panel as a feedback value.

The temperature regulator flap is used to control air temperature in vehicle passenger compartment. Air temperature regulation is accomplished by using two flaps, one flap before and one flap after heater core. The temperature-regulating flap actuating mechanism also operates the turbulence flap.

AMBIENT TEMPERATURE SENSORS

Two sensors measure outside air temperature and send input signals to A/C-heater control panel. A/C-heater control panel measures sensor readings and lowest temperature value to calculate correction factor for interior temperature regulation. One sensor is located in front of vehicle, behind lower air grille. Second sensor is located in evaporator, next to fresh air flap.

FRESH AIR TEMPERATURE SENSOR

Temperature sensor is located on heater box, downstream of fresh air fan. Sensor measures the temperature of the air leaving the evaporator, to provide a quicker response time to changes of interior temperature.

FAN CONTROL UNIT

Air to passenger compartment is supplied and regulated by fan control unit. Fan control unit is mounted to evaporator box, in air plenum, and is cooled by air flow through evaporator housing. See Fig. 3.

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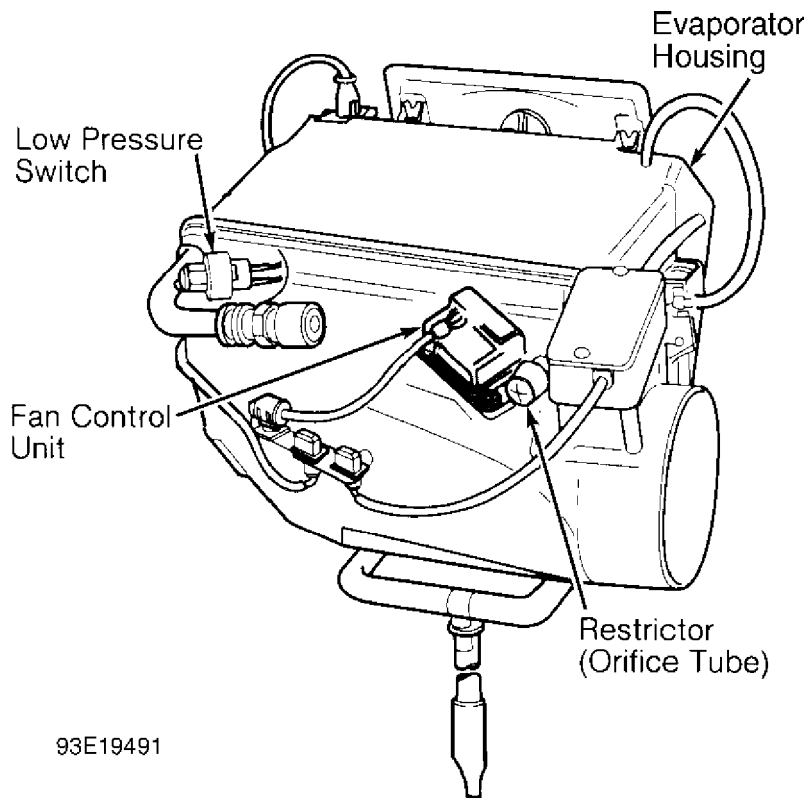


Fig. 3: Identifying Fan Control Unit & Low Pressure Switch
Courtesy of Audi of America, Inc.

HIGH PRESSURE SWITCH

Switch controls cooling fan high speed operation. Switch is located on high pressure switch refrigerant line. See Fig. 4. Switch is identified by its Green housing. Ensure switch closes at 190.0-254.0 psi (13.36-17.86 kg/cm²). Ensure switch opens at 153.7-217.5 psi (10.81-15.29 kg/cm²). Switch can be removed without discharging system.

HIGH PRESSURE CUT-OUT SWITCH

Switch is identified by Red housing and located on right/left side of condenser. See Fig. 4. Cut-out switch turns off A/C compressor clutch when refrigerant pressure reaches 409.0-449.5 psi (28.76-31.60 kg/cm²). Switch can be replaced without discharging system.

IN-CAR TEMPERATURE SENSORS

In-car temperature sensors measure interior air temperature and send signals to A/C-heater control panel. See Fig. 2. A small fan drives air over instrument panel sensor to ensure accurate measurement. One sensor is mounted on top of instrument panel and a second sensor is located next to front dome light.

LOW PRESSURE SWITCH

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Refrigerant low pressure switch disengages A/C compressor clutch if refrigerant pressure drops below specified pressure. On Audi 90, ensure switch opens at 21.0-23.2 psi (1.48-1.63 kg/cm²).

TWO-WAY VACUUM VALVES

Fresh/Recirculated Air Flap

This two-way vacuum valve is used to control the vacuum applied to fresh/recirculated air flap door vacuum servo. Valve is located on left side of evaporator assembly, in air plenum.

Two-way vacuum valve is electrically controlled by signals from A/C-heater control panel. When vacuum is applied to fresh/recirculated air flap door vacuum servo, the flap door closes and no fresh air enters vehicle.

Heater Control Valve

This vacuum valve is located on right side of heater box, in air plenum. See Fig. 4. Two-way vacuum valve is electrically controlled by signals from A/C-heater control panel and directs or vents vacuum to heater control valve. When vacuum is applied to heater control valve, no coolant flows through heater core.

SELF-DIAGNOSTICS

NOTE: Scan Tester (VAG 1551) must be used to make full use of the system's self-diagnostic capabilities.

The complete self-diagnostics functions and operating instructions of the VAG 1551 scan tester are not covered in this article. Follow VAG 1551 operator's manual and accompanying trouble shooting manual. The following text highlights the functions available when using VAG 1551 scan tester.

DIAGNOSTIC TROUBLE CODE MEMORY

NOTE: Diagnostic trouble code memory is cleared when ignition is turned off. DO NOT turn ignition off after driving vehicle, as this will erase fault codes.

If a malfunction occurs in a monitored sensor or component, a Diagnostic Trouble Code (DTC) is stored in memory. This function may be used by technician to access and erase DTCs. Codes may be either hard or intermittent failures.

Hard Failures

If A/C-heater system malfunctions are present for more than 5 seconds, they are stored as Diagnostic Trouble Codes (DTCs). The A/C compressor control module distinguishes data between 19 different trouble codes and stores malfunctions until ignition is turned off (volatile memory).

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Intermittent Failures

If a malfunction occurs intermittently, they are stored and considered to be "sporadic" (intermittent) failures. When displayed on scan tester, intermittent malfunctions will have "SP" (sporadic) on right side of display.

MEASURING VALUE BLOCK

Ten measuring value blocks, with 4 measuring channels each, are used. Monitored sensors and components include the A/C compressor switch-off conditions, temperature regulator flap motor, central flap motor, footwell/defroster flap motor, air flow flap motor, and motor potentiometers.

Measuring value block function monitoring also includes the display and measuring values of all ambient, fresh air intake duct, and in-car temperature sensors. Voltage at fresh air blower, engine speed, A/C compressor speed, and vehicle speed are monitored. In addition, inputs from the Engine Coolant Temperature (ECT) sensor, kick-down switch, A/C compressor engagement, and A/C high pressure switch are also monitored.

OUTPUT DIAGNOSTIC TEST MODE

Since the VAG 1551 scan tester is a bi-directional tester, it may be used to actuate a number of A/C-heater system components. The output diagnostic test mode may be used to actuate A/C compressor clutch, fresh air blower, temperature sensor blower fan, and cooling fan.

The A/C-heater control panel segment displays, outside temperature indicator (display), and Idle Air Control (IAC) may also be actuated.

In addition, the temperature regulator flap motor, central flap motor, footwell/defroster flap motor, air flow flap motor, and fresh/recirculated air flap two-way valve may also be actuated.

A/C CONTROL HEAD CODING

Replacement A/C control heads (A/C-heater control panel) are sold with Code 000 and must be properly coded after installation. Contact nearest Audi parts department to determine correct application.

TROUBLE SHOOTING

ON-BOARD DIAGNOSTICS (OBD)

NOTE: While OBD information is being displayed on A/C-heater control panel, A/C system operation does not take place (A/C compressor, radiator fan, etc. are not controlled).

Accessing Memory Diagnostic Channels

1) Turn ignition switch on or start engine. Simultaneously

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press and hold down air recirculation button and air distribution (up arrow) button. See Fig. 1. Release both buttons. Display panel should read "01c", indicating diagnostic channel No. 1.

2) Pressing temperature plus (+) button will advance display of diagnostic channel by one. Display panel should read "02c", indicating diagnostic channel No. 2. Each time plus (+) button is pressed, system will advance to next diagnostic channel until last number is reached; display will then return to channel No. 1.

3) Memory diagnostic channels identify individual circuits, and are not fault codes. See MEMORY DIAGNOSTIC CHANNELS table. To retrieve information about a particular channel, select desired channel then press air recirculation button.

4) If channel No. 52 is selected and an A/C compressor switch-off condition exists, a segment of "88.8" display will illuminate indicating cause of condition. See Fig. 4.

5) Channel No. 53 is used to identify which A/C electrical components (outputs) are activated. When channel No. 53 is selected, a segment of "88.8" display will illuminate. See Fig. 4.

6) On both channels No. 52 and 53, segments 7, 14 and 21 of "88.8" display must illuminate simultaneously to indicate system function is okay. See Fig. 4.

Exiting On-Board Diagnostics

To exit memory diagnostic channel display, press AUTO button or turn ignition off.

MEMORY DIAGNOSTIC CHANNELS TABLE

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Diagnostic Channel No.	Display
------------------------	---------

1 System Malfunction	Displayed As Diagnostic Trouble Code (See DIAGNOSTIC TROUBLE CODES table)
2	.....	Digital Value Of In-Car Temperature Sensor (Headliner)
3	....	Digital Value Of In-Car Temperature Sensor (Instrument Panel)
4	.....	Digital Value Of Fresh Air Intake Duct Temperature Sensor
5	....	Digital Value Of Outside (Ambient) Temperature Sensor (Front)
6	.....	Digital Value Of Outside (Ambient) Temperature Sensor
7	..	Digital Value Of Ambient Temperature Sensor At Fresh Air Blower
8	..	Digital Value Of Temperature Regulator Flap Motor Potentiometer
9	.....	Delta Value Of Temperature Regulator Flap
10	....	Non-Corrected Specified Value Of Temperature Regulator Flap
11	.....	Digital Value Of Central Flap Motor Potentiometer
12	.....	Specified Value Of Central Flap
13	....	Digital Value Of Footwell/Defroster Flap Motor Potentiometer
14	.....	Specified Value Of Footwell/Defroster Flap
15	.....	Digital Value Of Air Flow Flap Motor Potentiometer
16	.....	Specified Value Of Air Flow Flap
17	.....	Vehicle Speed (Kilometers Per Hour)
18	Actual Fresh Air Blower Voltage
19	Specified Fresh Air Blower Voltage

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20 A/C Compressor Clutch Voltage
21 Number Of Low Voltage Occurrences (Non-Transient)
22 Cycle Condition Of A/C Refrigerant High Pressure Switch
23 Cycling Of A/C Refrigerant High Pressure Switch
24 Cycling Of Switches, Absolute & Non-Fluctuating
25 Kick-Down Switch Analog/Digital Value
26 ... Engine Coolant Temperature (ECT) Sensor Warning Light Analog/
Digital Value
27 Coding Value
28 Engine Speed (RPM)
29 A/C Compressor Speed In RPM (Equals Engine Speed x 1.28)
30 Software Version
31 . Segment Display Check (All Segments Of A/C-Heater Control Panel
Light Up)
32 Temperature Regulator Flap Potentiometer Malfunction Counter
33 Central Flap Potentiometer Malfunction Counter
34 Footwell/Defroster Flap Potentiometer Malfunction Counter
35 Air Flow Flap Potentiometer Malfunction Counter
36 . Temperature Regulator Flap Motor Potentiometer Feedback Value (
Cold End Stop)
37 . Temperature Regulator Flap Motor Potentiometer Feedback Value (
Hot End Stop)
38 . Central Flap Motor Potentiometer Feedback Value (Cold End Stop)
39 .. Central Flap Motor Potentiometer Feedback Value (Hot End Stop)
40 Footwell/Defroster Flap Motor Potentiometer Feedback Value
(Cold End Stop)
41 . Footwell/Defroster Flap Motor Potentiometer Feedback Value (Hot
End Stop)
42 Air Flow Flap Motor Potentiometer Feedback Value (Cold End Stop)
43 . Air Flow Flap Motor Potentiometer Feedback Value (Hot End Stop)
44 Vehicle Operation Cycle Counter
45 .. Calculated Interior Temperature, In Digits (Internal Software)
46 Outside (Ambient) Temperature, Filtered For Regulation
(Internal Software)
47 Outside (Ambient) Temperature, Unfiltered In Degrees °C
(Internal Software)
48 Outside (Ambient) Temperature, Unfiltered In Digits
49 Malfunction Counter For Speedometer (Vehicle Speed) Signal
50 Standing Time (In Minutes)
51 Engine Coolant Temperature (ECT) In Degrees °C
52 (1) Graphics Channel Number 1 Through 88.8
53 (1) Graphics Channel Number 1 Through 88.8
54 Control Characteristics
55 ... Outside (Ambient) Temperature, In Degrees °F Or °C, Depending
On A/C-Heater Control Panel Setting
56 . In-Car Temperature Sensor Temperature In Degrees °C (Headliner)
57 In-Car Temperature Sensor Temperature In Degrees °C
(Instrument Panel)
58 Fresh Air Duct Temperature Sensor Temperature In Degrees °C
59 Front Outside (Ambient) Temperature Sensor Temperature In
Degrees °C
60 Fresh Air Blower Ambient Temperature Sensor Temperature In

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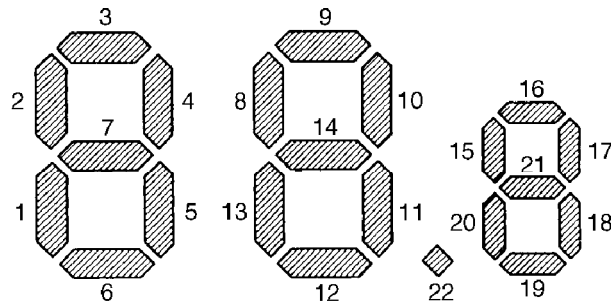
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Degrees °C

61 Software Version (Latest)

(1) - When diagnostic channel No. 52 or 53 is selected, "_ _ . _" is displayed first. The A/C compressor switch-off conditions are identified by the illuminated segments of display. See Fig. 4.

AA



CHANNEL 52

1. High Pressure Occurrences More Than 30 Times
2. Ambient Temperature Sensor At Fresh Air Blower Less Than 27° (-3C°)
3. ECON Mode Selected
4. Off Selected
5. Ambient Temperature Too Low
6. Engine Management System (Compressor Will Remain Off For 3-12 Seconds)
7. * System Function Okay
8. A/C Refrigerant High Pressure Cut-Out Switch
9. A/C Manually Switched Off (A/C Standby Cancelled)
10. Low Voltage
11. Kickdown Switch (Via Transmission Control Module, Compressor Off For 12 Seconds Maximum)
12. Engine Coolant Temperature Warning Light Switch
13. A/C Refrigerant Low Pressure Switch
14. * System Function Okay
15. Not Used
16. Slippage Or Blockage
17. Engine Speed Less Than 200-500 RPM
18. Not Used
19. Engine Speed Greater Than 6000 RPM
20. Not Used
21. * System Function Okay
22. Visible With A/C Compressor On Not Visible With A/C Compressor Off

CHANNEL 53

1. Temperature Flap In Cold Air Position
2. Temperature Flap In Warm Air Position
3. Not Used
4. Central Flap In Instrument Panel Outlet Position
5. Central Flap In Footwell/Defrost Outlet Position
6. Not Used
7. * System Function Okay
8. Footwell/Defroster Flap In Defrost Position
9. Not Used
10. Airflow Flap Open
11. Airflow Flap Closed
12. Not Used
13. Footwell/Defroster Flap In Footwell Position
14. * System Function Okay
15. First Speed Of Coolant Fan On
16. Fan For In-Car Temperature Sensor
17. Fresh Air/Recirculation Flap Closed
18. Heater Valve Closed
19. Bi-Directional Wiring Harness
20. A/C Compressor On
21. * System Function Okay
22. Not Used

* Segments 7, 14 and 21 must illuminate simultaneously to indicate system function is okay.

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Fig. 4: Identifying Diagnostic Channel No. 52 & 53
Courtesy of Audi of America, Inc.

RETRIEVING & CLEARING FAULT CODES

1) To retrieve fault codes using A/C-heater control panel, access memory diagnostic channels. See ON-BOARD DIAGNOSTICS (OBD). If a diagnostic fault code exists, fault code will be displayed in channel No. 1. If no fault code exists, "00.0" will be displayed.

2) If a fault code exists, repair malfunction indicated. See

- 1) Park vehicle out of direct sunlight. Ensure condenser and radiator are free of obstructions. Ensure compressor drive belt is in good condition. Ensure engine is at normal operating temperature. Close engine hood.
- 2) Start engine and run it at 2000 RPM. Turn A/C system on and press AUTO mode button. See Fig. 1. Press minus (-) button until "LO" temperature setting is displayed.
- 3) Press air recirculation button until recirculated air symbol is displayed. Press compressor on/off button until ice crystal symbol is displayed. See Fig. 1.
- 4) Open all instrument panel air outlets. Ensure cooling fan and A/C compressor run. Ensure blower motor runs on high speed and air flows out of instrument panel vents.

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5) Using VAG 1551 scan tester, check DTC memory. Close doors, windows, and sun roof. Record ambient temperature and check outlet air temperature at center instrument panel vent after A/C system has run for 5 minutes. See A/C SYSTEM PERFORMANCE SPECIFICATIONS table.

NOTE: If A/C compressor clutch disengages during performance test, go to step 11).

A/C SYSTEM PERFORMANCE SPECIFICATIONS TABLE

Ambient Temperature °F (°C)		Outlet Air Temperature °F (°C)
59 (15)	.....	37-43 (3-6)
68 (20)	.....	37-43 (3-6)
77 (25)	.....	37-43 (3-6)
86 (30)	.....	37-43 (3-6)
95 (35)	.....	39-45 (4-7)
104 (40)	.....	41-48 (5-8)

6) If outlet air temperature is not as specified, remove low pressure switch and jumper connector terminals. Remove high pressure switch, leaving its wiring harness connected. Connect manifold gauge set to high and low pressure service valves.

7) Repeat A/C system performance test. High side (discharge) pressure should increase from base pressure (engine off) to a maximum of 290 psi (20.4 kg/cm²). See A/C SYSTEM BASE (HIGH SIDE) PRESSURE SPECIFICATIONS table.

8) The high pressure switch should switch cooling fan to second speed between 190-254 psi (13.4-17.9 kg/cm²). If cooling fan does not switch to second speed, check cooling fan circuit.

9) Low side (suction) pressure should be as specified in A/C SYSTEM LOW SIDE PRESSURE SPECIFICATIONS table. If both high and low side pressures are okay, A/C system cooling performance is okay. Check low pressure and high pressure switches as necessary.

10) If either high and low side pressures are incorrect, check refrigerant and A/C system for malfunctions (low refrigerant charge, faulty A/C compressor, kinked/plugged A/C hose, etc.).

A/C SYSTEM LOW SIDE PRESSURE SPECIFICATIONS TABLE

Ambient Temp. °F (°C)	Pressure psi (kg/cm ²)
50 (10)	..... 30-32 (2.1-2.2)
59 (15)	..... 29-32 (2.0-2.2)
68 (20) 28-30 (1.9-2.1)
77 (25) 26-29 (1.8-2.0)
86 (30) 25-29 (1.7-2.0)
95 (35) 25-30 (1.7-2.1)
104 (40) 28-33 (1.9-2.3)

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11) Check Diagnostic Trouble Code (DTC) memory. See DIAGNOSTIC TROUBLE CODE MEMORY. Repair A/C system malfunctions (if any). Erase DTC memory. End session using RAPID DATA TRANSFER, leaving VAG 1551 connected. Repeat A/C system performance test.

12) Ensure scan tester is in A/C/HEATING ELECTRONICS function. With RAPID DATA TRANSFER displayed on scan tester, press "0" and "8" button to select READ MEASURING VALUE BLOCK function. Press "Q" button to enter input.

13) With INPUT DISPLAY GROUP NUMBER displayed on scan tester, press "0" and "1" buttons to select COMPRESSOR SWITCH-OFF CONDITIONS. Press "Q" button to enter input.

14) Read display group No. 1, channel No. 1. If Code 2 (high pressure cut-out switch) is displayed, go to next step. If Code 3 (low pressure switch) is displayed, go to step 20). If other codes are displayed, go to MEASURING VALUE BLOCK under SELF-DIAGNOSTICS.

15) End session using RAPID DATA TRANSFER. Remove high pressure cut-out switch, leaving its wiring harness connected. Connect manifold gauge set to high pressure cut-out switch Schrader valve.

16) Repeat A/C system performance test and check A/C system high side pressure. High side (discharge) pressure should increase from base pressure (engine off) to a maximum of 290 psi (20.4 kg/cm²). See A/C SYSTEM BASE (HIGH SIDE) PRESSURE SPECIFICATIONS table.

17) The high pressure switch should switch cooling fan to second speed between 190-254 psi (13.4-17.9 kg/cm²). If cooling fan does not switch to second speed, check cooling fan circuit.

18) If required cooling performance is attained and no other malfunction is detected, replace high pressure cut-out switch. If high side pressure is exceeded, check refrigerant and A/C system for malfunctions.

19) If A/C compressor clutch still does not engage, check wiring harness between A/C control panel and high pressure cut-out switch. Repair wiring harness as necessary.

A/C SYSTEM BASE (HIGH SIDE) PRESSURE SPECIFICATIONS TABLE

AA

Ambient Temp. °F (°C)	(1) psi (kg/cm ²)
-----------------------	-------------------------------

59 (15)	56.5 (3.97)
68 (20)	68.2 (4.79)
77 (25)	79.8 (5.61)
86 (30)	95.7 (6.73)
95 (35)	108.8 (7.65)
104 (40)	127.6 (8.97)
113 (45)	142.1 (9.99)

(1) - Pressures listed are with engine off.

AA

20) End session using RAPID DATA TRANSFER. Remove low pressure switch and jumper connector terminals. Connect manifold gauge set to low pressure switch Schrader valve.

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21) Repeat A/C system performance test and check A/C system low side pressure. Low side (suction) pressure should be as specified in A/C SYSTEM LOW SIDE PRESSURE SPECIFICATIONS table.

22) If required cooling performance is attained and no other malfunction is detected, replace low pressure switch. If low side pressure is incorrect, check refrigerant and A/C system for malfunctions (low refrigerant charge, faulty A/C compressor, kinked/plugged A/C hose, etc.).

23) If A/C compressor clutch disengages during test, check wiring harness between A/C control panel and low pressure switch. Repair wiring harness as necessary.

24) If A/C compressor clutch does not disengage during test, check heater box and evaporator assembly for air leaks. If no leaks are found, A/C system may be low on refrigerant. Check refrigerant lines and components for leaks. Repair leaks as necessary.

ACTUATORS, SENSORS & FAN CONTROL MODULE

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1) Ensure all fuses are okay. Turn ignition off. Remove A/C-heater control panel. Connect Adapter Harness (VAG 1598/11) and Adapter Harness (VAG 1598/12) to A/C-heater control panel wiring harness.

2) Leave A/C-heater control panel disconnected. While performing tests, DO NOT connect adapter harnesses to A/C-heater control panel. The A/C-heater control panel will be damaged.

3) Adapter harnesses cannot be connected simultaneously to Test Box (VAG 1598). Set measuring range on DVOM before connecting it to test box sockets, as damage to components may result.

CAUTION: When using Adapter Harness (VAG 1598/11), test box socket terminal numbers and A/C-heater control panel wiring harness terminal numbers are not the same. Connector "A" terminals No. 1-12 are identified as socket terminals No. 41-52 on test box. See Fig. 5. Connector "B" terminals No. 1-20 are identified as socket terminals No. 21-40. Connector "C" and "D" terminal No. 1-16 are identified as socket terminals No. 1-16.

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Voltage Value In-Car Temp.
Sensor - Headliner
(43 & 52 (1)) ..... Ambient Temp.
                        At Sensor . (2) 3513 Ohms @ 68°F (20°C)

In-Car Temp. Sensor -
Dash (50 & 52 (1)) ..... Ambient Temp.
                        At Sensor (3) (2) 3513 Ohms @ 68°F (20°C)

Fresh Air Temp. Sensor
(47 & 52 (1)) ..... Ambient Temp.
                        At Sensor . (2) 1250 Ohms @ 68°F (20°C)

Ambient Temp. Sensor
(48 & 52 (1)) ..... Ambient Temp.
                        At Sensor . (2) 1250 Ohms @ 68°F (20°C)

Temp. Regulator Flap Mtr.
(2 & 10 (4)) ..... 20-100 Ohms

Central Air Dist. Flap Mtr.
(4 & 12 (4)) ..... 20-100 Ohms

Footwell/Defroster Flap Mtr.

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(3 & 11 (4)) 20-100 Ohms
Fan Control Module
(16 & Ground (5)) Ignition On Less Than 0.5 Volt
(Blower Motor Off)
Blower Motor Voltage
Supply (14 & Ground (5)) . Ignition On Battery Voltage
Fan Control Module
Voltage Supply (& Ground (5)) .. Ignition On Battery Voltage
Fan Control Module
(13 & 16 (6)) Ignition On LED Tester Lights
Up (Blower Motor On)

- (1) - Connect Adapter Harness (VAG 1598/11) to Test Box (VAG 1598).
Set DVOM to 20,000 ohm range.
- (2) - See AMBIENT, IN-CAR & FRESH AIR TEMPERATURE SENSOR RESISTANCE
VALUES table for complete temperature range specifications.
- (3) - Check temperature sensor fan using DIAGNOSTIC TEST MODE (DTM)
under SELF-DIAGNOSTICS.
- (4) - Connect Adapter Harness (VAG 1598/12) to Test Box (VAG 1598).
Set DVOM to 200 ohm range.
- (5) - Connect Adapter Harness (VAG 1598/11) to Test Box (VAG 1598).
Set DVOM to 20 volt range.
- (6) - Connect Adapter Harness (VAG 1598/11) to Test Box (VAG 1598)
and use LED Tester (US 1115).

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AMBIENT, IN-CAR & FRESH AIR TEMPERATURE SENSOR RESISTANCE VALUES

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Temp. °F (°C) At Sensor	Ambient & Fresh Air Temp. Sensors (Ohms)	In-Car Temp. Sensors (Ohms)
----------------------------	---	--------------------------------

14 (-10)	5591	1,6159
32 (0)	3281	9406
41 (5)	2544	7273
50 (10)	1991	5666
59 (15)	1571	4446
68 (20)	1250	3513
77 (25)	998	2795
86 (30)	804	2237
95 (35)	652	1801
104 (40)	533	1459
113 (45)	437	1188
122 (50)	361	972
131 (55)	300	803
140 (60)	250	667
149 (65)		556
158 (70)		466

AA

REMOVAL & INSTALLATION

WARNING: To avoid injury from accidental air bag deployment, read

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and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in AIR BAGS article in ACCESSORIES & ELECTRICAL section.

NOTE: For removal and installation of components not covered in this article, see MANUAL A/C-HEATER SYSTEMS article.

A/C-HEATER CONTROL PANEL

Removal & Installation

Turn ignition off. Carefully pry off A/C-heater control panel trim. Remove A/C-heater control panel. To install, reverse removal procedure.

ACTUATORS

Removal & Installation (90)

1) Remove center console. See CENTER CONSOLE in MANUAL A/C-HEATER SYSTEM article. Remove glove box, driver's side tray, and ashtray. Remove instrument panel center support. Remove screws and footwell air outlets.

2) To remove central air distribution flap motor, disconnect wiring harness Black connector and linkage at motor. See Fig. 6. Remove screws and flap motor.

3) To remove footwell/defroster flap motor, disconnect wiring harness Red connector and linkage at motor. See Fig. 7. Remove screws and flap motor.

4) To remove temperature regulator flap motor, disconnect wiring harness Brown connector and linkage at motor. See Fig. 8. Remove screws and flap motor. To install motors, reverse removal procedure.

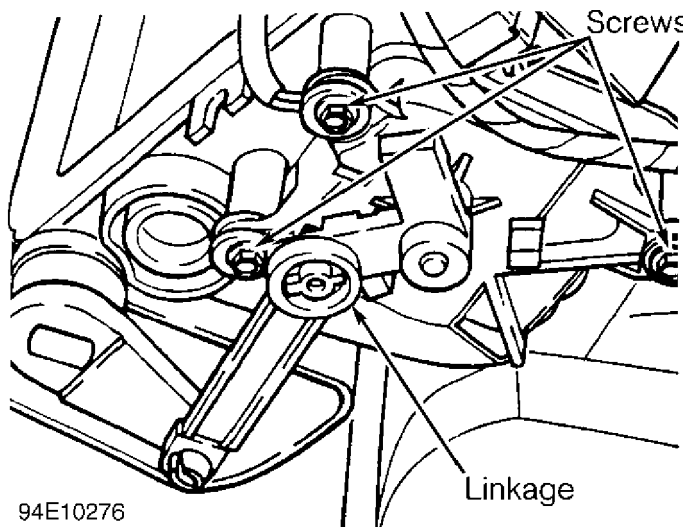


Fig. 6: Removing Central Air Distribution Flap Motor (90 CS)
Courtesy of Audi of America, Inc.

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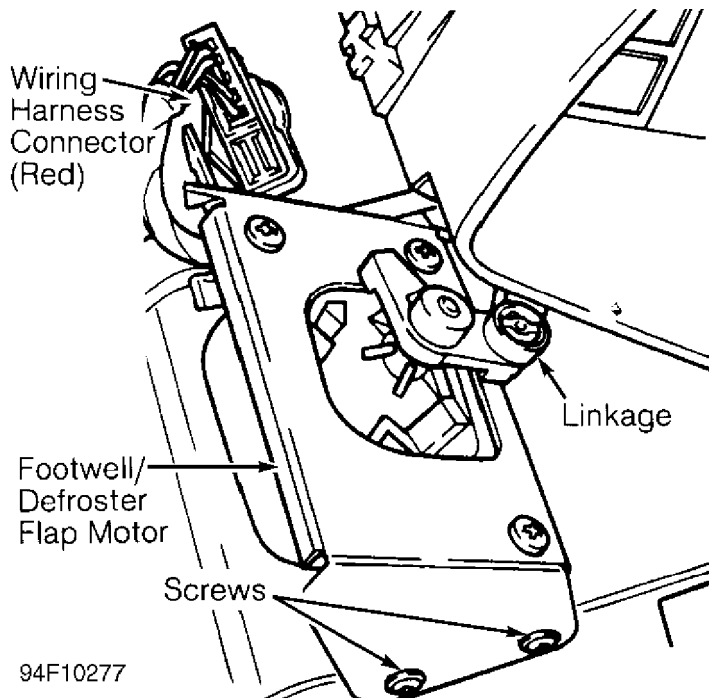


Fig. 7: Removing Footwell/Defroster Flap Motor (90 CS)
Courtesy of Audi of America, Inc.

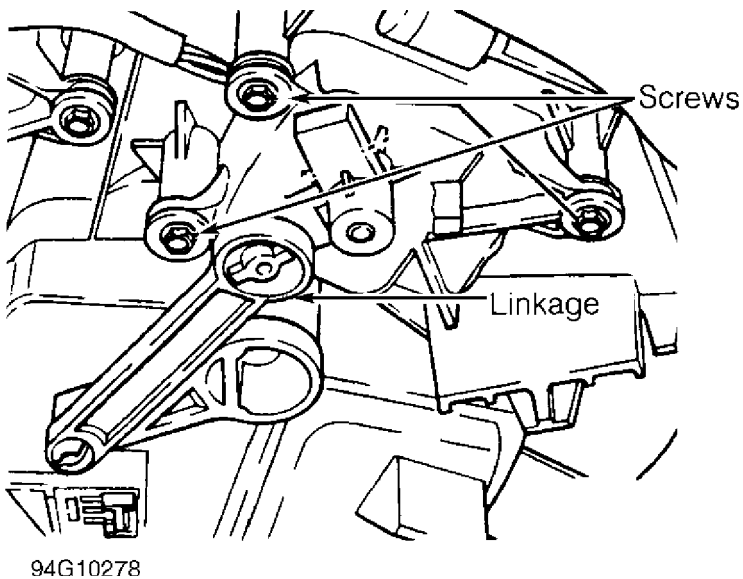


Fig. 8: Removing Temperature Regulator Flap Motor (90 CS)
Courtesy of Audi of America, Inc.

FRESH AIR TEMPERATURE SENSOR

Removal & Installation (90)

Remove right side plenum tray. Remove fresh air intake duct grille. Remove glove box. Twist temperature sensor and remove from fresh air duct. To install sensor, spray sensor seal with silicone. Reverse removal procedure to complete installation.

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FAN CONTROL MODULE

Removal & Installation

Remove glove box. Disconnect wiring harness connector from fan control (fresh air blower) control module. Carefully remove fan control module (heat sink may be hot). To install module, reverse removal procedure.

IN-CAR TEMPERATURE SENSOR

Removal & Installation (90)

Remove glove box. Remove screws and hose. Disconnect wiring harness connector. Remove temperature sensor and fan. To install, reverse removal procedure. Ensure hose is securely attached.

WIRING DIAGRAMS

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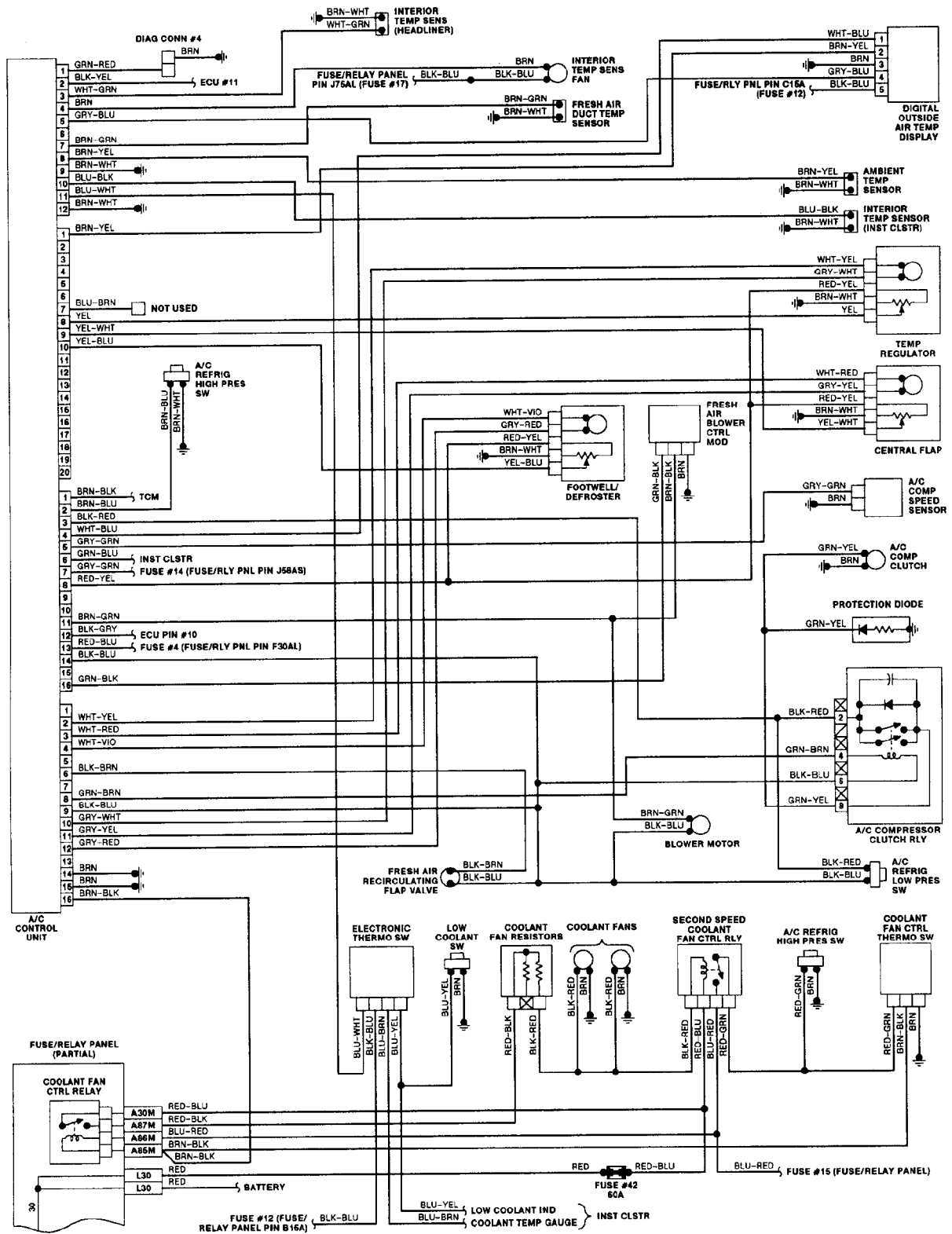


Fig. 9: Automatic A/C-Heater System Wiring Diagram (90 CS)

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