A/C-HEATER SYSTEM - AUTOMATIC
Article Text
1997 Audi A6
For chip

Monday, October 18, 1999 06:24PM

ARTICLE BEGINNING

1997 A/C-HEATER SYSTEMS
Audi - Automatic A/C-Heater Systems

A6

*** PLEASE READ THIS FIRST ***

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

A/C SYSTEM SPECIFICATIONS

SPECIFICATIONS TABLE

Application	Specifications
Compressor Type	Zexel 6-Cyl. Or Nippondenso
Compressor Belt Tension (1)	
System Oil Capacity	(2) 7.8-9.2 ozs.
Refrigerant (R-134a) Capacity	
Nippondenso Compressor	26.5-28.2 ozs.
Zexel Compressor	23.0-24.8 ozs.
System Operating Pressures (3)	
Low Side	26-29 psi (1.8-2.0 kg/cmý)
High Side	79.8 psi (5.61 kg/cmý)

(1) - Belt tension is automatically adjusted by belt tensioner.
(2) - Use SP-10 Oil (Part No. G 052 154 A2) on Zexel compressor. Use SP-10 Oil (Part No. G 052 300 A2) on Nippondenso compressor.
(3) - Measured at 77øF (25øC). High side pressure increases from base pressure (engine off) to maximum of 350 psi (24.6 kg/cmý).

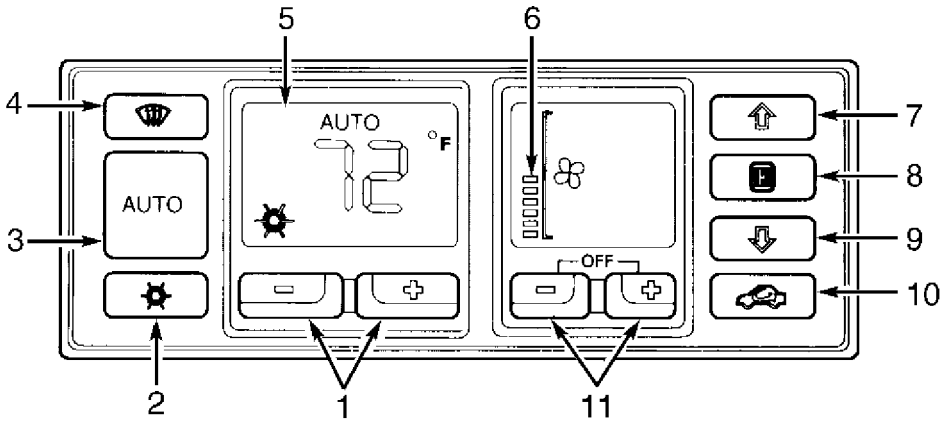
DESCRIPTION

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 A/C-heater control panel, has a self-

diagnostic feature.

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



1. Temperature Control Buttons
2. Compressor On/Off Button
3. Automatic Mode Button
4. Defrost Button
5. Display
6. Fan Speed Indicator
7. Air Distribution Button (Directs Air To Windows)
8. Air Distribution Button (Directs Air To Dashboard Outlets & Rear Of Center Console)
9. Air Distribution Button (Directs Air To Footwells)
10. Air Recirculation Button
11. Fan Speed Button

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

OPERATION

A/C COMPRESSOR SPEED SENSOR

Zexel Compressors

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 flap 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.

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 A/C 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.

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 airflow to instrument panel vents or to footwell/defroster outlets. A potentiometer, inside motor, indicates position of air distribution flap to A/C-heater control panel as a feedback value.

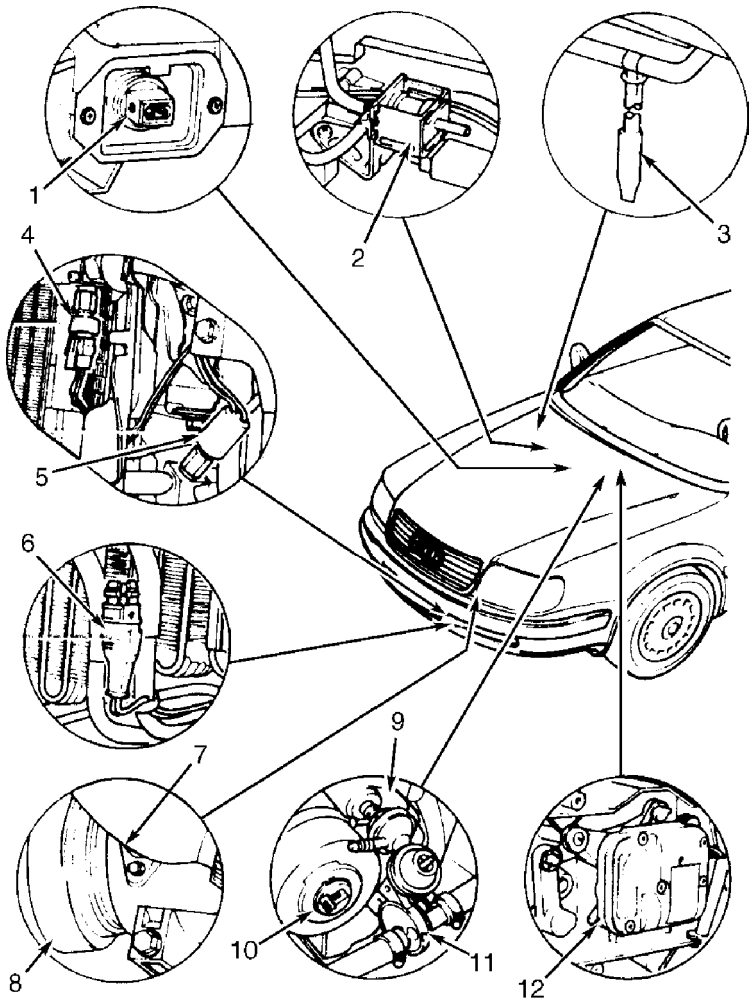
Fresh Air/Recirculating Flap Motor (Vacuum Servo)

This vacuum-operated actuator is located on left side of evaporator assembly, in air plenum. A two-way vacuum valve is used to control the amount of vacuum applied to fresh air/recirculating flap motor. See TWO-WAY VACUUM VALVES.

Temperature Regulator Flap Motor

This actuator (motor) is mounted on left side of heater box. See Fig. 2. A potentiometer, inside motor, indicates position of air distribution flap to 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 turbulence flap.



1. Fresh Air Blower Temp. Sensor
2. Heater Control (Engine Coolant Two-Way Vacuum) Valve
3. Evaporator Drain Hose
4. High Pressure Cut-Out Switch
5. High Pressure Switch
6. Outside (Ambient) Temp. Sensor
7. A/C Compressor Speed Sensor
8. A/C Compressor Clutch
9. Vacuum Check Valve & Reservoir
10. Fresh Air Blower
11. Engine Coolant Cut-Off Valve
12. Temperature Regulator Flap Motor

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Fig. 2: Identifying Automatic A/C-Heater System
Courtesy of Audi of America, Inc.

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 temperature of air leaving evaporator to provide 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 airflow through evaporator housing. See Fig. 3.

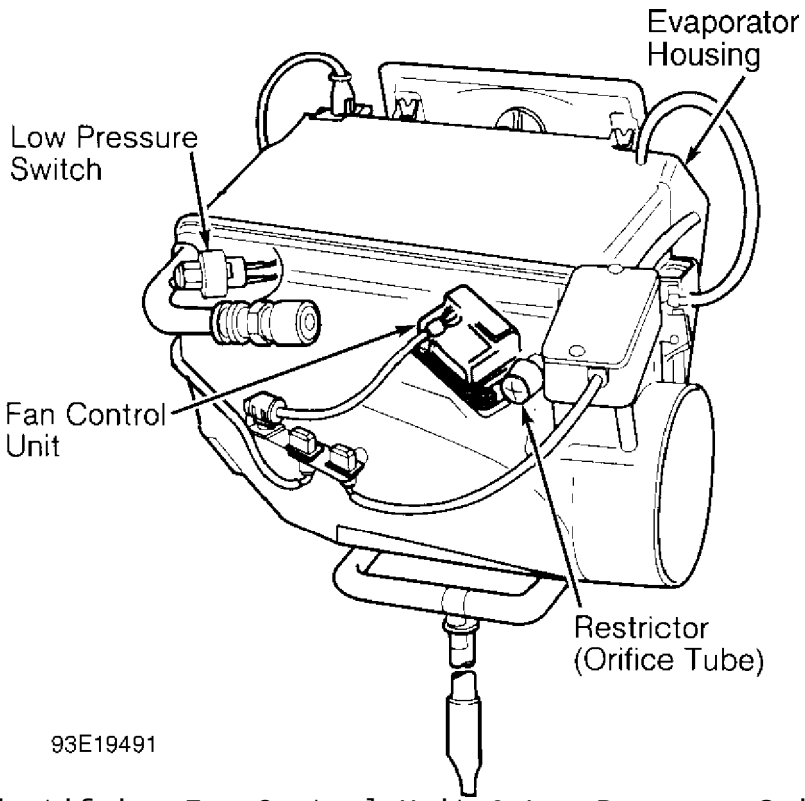


Fig. 3: Identifying Fan Control Unit & Low Pressure Switch
Courtesy of Audi of America, Inc.

HIGH PRESSURE SWITCH

Switch controls cooling fan high speed operation. Switch is

located on high pressure switch refrigerant line. Switch is identified by its Green housing. Ensure switch closes at 206-252 psi (14.48-17.72 kg/cmý). Ensure switch opens at 170-218 psi (12-15 kg/cmý). Difference between opening and closing points must be at least 29.0 psi (2.04 kg/cmý). 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. Cut-out switch turns off A/C compressor clutch when refrigerant pressure reaches 409.0-450.0 psi (28.76-31.60 kg/cmý). Switch can be replaced without discharging system. Ensure switch closes at 149.0-250.0 psi (10.45-17.58 kg/cmý). Replace switch if necessary.

IN-CAR TEMPERATURE SENSORS

In-car temperature sensors measure interior air temperature and send signals to A/C-heater control panel. 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

Refrigerant low pressure switch disengages A/C compressor clutch if refrigerant pressure drops below specified pressure. Ensure switch opens at 21.0-23.0 psi (1.48-1.62 kg/cmý). Ensure switch closes at 42.0-49.0 psi (2.95-3.45 kg/cmý). Replace switch if necessary.

TWO-WAY VACUUM VALVES

Fresh/Recirculated Air Flap

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

Heater Control (Coolant) Valve

This vacuum valve is located on right side of heater box, in air plenum. See Fig. 2. Two-way vacuum valve is electrically controlled by signals from A/C-heater control panel, which 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 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 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).

Intermittent Failures

If 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 A/C compressor switch-off conditions, temperature regulator flap motor, central flap motor, footwell/defroster flap motor, airflow flap motor, and motor potentiometers.

Measuring value block function monitoring includes display andmeasuring values of all ambient, fresh air intake duct, and in-cartemperature sensors. Voltage at fresh air blower, engine speed, A/C compressor speed, and vehicle speed are monitored. Inputs from Engine Coolant Temperature (ECT) sensor, kick-down switch, A/C compressor engagement, and A/C high pressure switch are alsomonitored.

OUTPUT DIAGNOSTIC TEST MODE

Since 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, temperature regulator flap motor, central flap motor, footwell/defroster flap motor, airflow 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 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 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

Diagnostic	Display

Channel No.	
1	System Malfunction Displayed As Diagnostic Trouble Code (See DIAGNOSTIC TROUBLE CODES Table)
2	Digital Value Of In-Car Temperature Sensor (Headliner) 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 Airflow Flap Motor Potentiometer
16	Specified Value Of Airflow Flap
17	Vehicle Speed (Kilometers Per Hour)
18	Actual Fresh Air Blower Voltage
19	Specified Fresh Air Blower Voltage
20	A/C Compressor Clutch Voltage

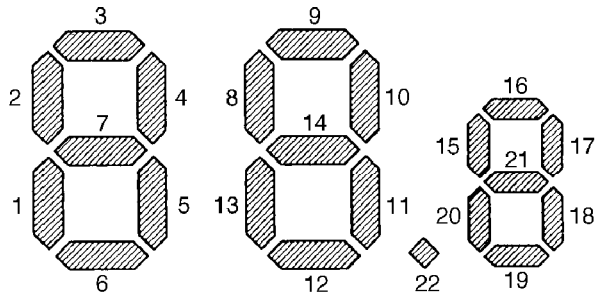
21	Number Of Low Voltage Occurrences (Non-Transient)
22	Cycle Condition Of A/C Refrigerant High Pressure Cut-Out Switch
23	Cycling Of A/C Refrigerant High Pressure Cut-Out Switch
24	Cycling Of Switches, Absolute & Non-Fluctuating
25	Kick-Down Switch Analog/Digital Value
26	Engine Coolant Temperature (ECT) Sensor Warning Light Analog/Digital Value
27	Coding Value
28	Engine Speed (RPM)
29 (1)	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	Airflow 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	Airflow Flap Motor Potentiometer Feedback Value (Cold End Stop)
43	Airflow 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 øC (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 øC
52	(2) Graphics Channel Number 1 - 88.8 Display
53	(2) Graphics Channel Number 2 - 88.8 Display
54	Control Characteristics
55	Outside (Ambient) Temperature, In Degrees øF Or øC, Depending On A/C-Heater Control Panel Setting
56	In-Car Temperature Sensor Temperature In Degrees øC (Headliner)
57	In-Car Temperature Sensor Temperature In Degrees øC (Instrument Panel)
58	Fresh Air Duct Temperature Sensor Temperature In Degrees øC

59	Front Outside (Ambient) Temperature Sensor Temperature In Degrees øC
60	Fresh Air Blower Ambient Temperature Sensor Temperature In Degrees øC
61	Software Version (Latest)

(1) - Not applicable to vehicles equipped with a Nippondenso compressor.

(2) - 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.



CHANNEL 52
1. High Pressure Occurrences More Than 30 Times
2. Ambient Temperature Sensor At Fresh Air Blower Less Then 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 DIAGNOSTIC TROUBLE CODES table. After malfunction is corrected, clear diagnostic trouble codes. To clear codes, VAG 1551 must be used.

DIAGNOSTIC TROUBLE CODES TABLE

Diagnostic Trouble Code	Affected Circuit
00.0	No Malfunctions
02.1-02.4	In-Car Temp. Sensor (Headliner)
03.1-03.4	In-Car Temp. Sensor (Instrument Panel)
04.1-04.4	Fresh Air Intake Duct Temp. Sensor
05.1-05.4	Outside (Ambient) Temp. Sensor (Front)
06.1-06.4	Engine Coolant Temp. (ECT) Sensor
07.1-07.4	Fresh Air Blower Ambient Temp. Sensor
08.1-08.7	(1) Temp. Regulator Flap Motor Potentiometer
11-1-11.7	(1) Central Flap Motor Potentiometer
13.1-13.7	(1) Footwell/Defroster Flap Motor Potentiometer
15.1-15.7	Airflow Flap Motor Potentiometer
17.0	Vehicle Speed Signal
18.1-18.3	Fresh Air Blower (Incorrect Voltage)
20.1-20.3	(2) A/C Compressor (Incorrect Voltage)
22.1-22.5	(3) A/C High Pressure Cut-Out Switch
29.1-29.4	A/C Belt Slip

(1) - Motors will no longer be controlled automatically.
(2) - The A/C compressor remains off until voltage is greater than 10.8 volts for at least 25 seconds.
(3) - The A/C compressor remains off until switch closes.

TESTING

* PLEASE READ THIS FIRST *

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

A/C SYSTEM PERFORMANCE

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.

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 øF (øC)	Outlet Air Temperature øF (øC)
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/cmý). 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/cmý). 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 or low side pressures are incorrect, check refrigerant and A/C system for malfunctions (low refrigerant charge, faulty compressor, kinked/plugged A/C hose, etc.).

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

Ambient Temp. øF (øC)	(1) psi (kg/cmý)

59 (15)	56.6 (3.9)
68 (20)	68.2 (4.7)
77 (25)	81.2 (5.6)
86 (30)	97.2 (6.7)
95 (35)	113.1 (7.8)
104 (40)	132.0 (9.1)
113 (45)	152.3 (10.5)

(1) - Pressures listed are with engine off.

A/C SYSTEM LOW SIDE PRESSURE SPECIFICATIONS

Ambient Temp. øF (øC)	Pressure psi (kg/cmý)
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)

11) Check Diagnostic Trouble Code (DTC) memory. See DIAGNOSTIC TROUBLE CODE MEMORY under SELF-DIAGNOSTICS. 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" buttons 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/cmý). 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/cmý). 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.

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.

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

NOTE: Manufacturer recommends the use of VAG 1551 scan tester for circuit and component testing.

1) Ensure all fuses are okay. Turn ignition off. Remove A/C-heater control panel. Connect Adapter Harness (VAG 1598/11) or Adapter Harness (VAG 1598/12) to A/C-heater control panel wiring harness when indicated in testing procedure. See Fig. 5.

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. 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.

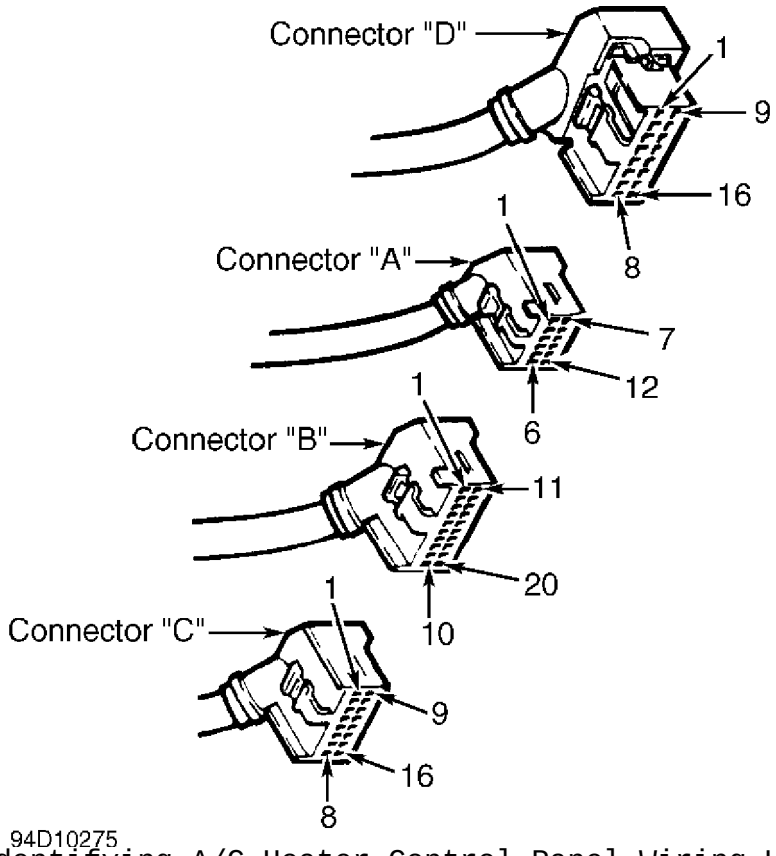


Fig. 5: Identifying A/C-Heater Control Panel Wiring Harness Terminals
Courtesy of Audi of America, Inc.

AUTOMATIC A/C-HEATER SYSTEM COMPONENT TESTING TABLE

Component Being Tested (VAG 1598 Pin No.)	Test Condition	Resistance Voltage Value
In-Car Temp. Sensor Headliner 43 & 52 (1)	Ambient Temp. At Sensor	(2) 3513 Ohms @ 68øF (20øC)
In-Car Temp. Sensor Dash (50 & 52 (1))	(3) Ambient Temp. At Sensor	(2) 3513 Ohms @ 68øF (20øC)
Fresh Air Temp. Sensor (47 & 52 (1))	Ambient Temp At Sensor	(2) 1250 Ohms @ 68øF (20øC)
Ambient Temp. Sensor (48 & 52 (1))	Ambient Temp. At Sensor	(2) 1250 Ohms @ 68øF (20øC)
Temp. Regulator Flap Motor (2 & 10 (4))		20-100 Ohms
Central Air Distribution Flap Motor (4 & 12 (4))		20-100 Ohms

Footwell/Defroster Flap Motor (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 (11 & 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). See 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. See OUTPUT DIAGNOSTIC TEST MODE 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).

AMBIENT, IN-CAR & FRESH AIR TEMP SENSOR RESISTANCE VALUES TABLE

Temp.øF (øC) At Sensor	Ambient & Fresh Air Temp. Sensors (Ohms)	In-Car Temp. Sensors (Ohms)
14 (-10)	5591	16,159
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

REMOVAL & INSTALLATION

* PLEASE READ THIS FIRST *

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

A/C COMPRESSOR

Removal & Installation

1) Discharge A/C system, using approved refrigerant recovery/recycling equipment. Mark direction of drive belt. Loosen drive belt tensioner and remove drive belt. Remove bracket for refrigerant line. Remove bolts and A/C compressor. Remove and plug high and low pressure lines from A/C compressor.

2) To install, reverse removal procedure. Tighten connections to specification. See TORQUE SPECIFICATIONS. Evacuate and chargeA/C system.

A/C COMPRESSOR SPEED SENSOR

Removal & Installation (Zexel Compressors)

Discharge A/C system, using approved refrigerant recovery/recycling equipment. Disconnect speed sensor connector. Remove screws and sensor. To install, reverse removal procedure. Tighten screws to specification. See TORQUE SPECIFICATIONS.

A/C-HEATER CONTROL PANEL

NOTE: Before removing A/C-heater control panel, check for codes. See SELF-DIAGNOSTICS.

Removal & Installation

Turn ignition off. Carefully pry off A/C-heater control panel trim. Remove screws and A/C-heater control panel. To install, reverse removal procedure. Tighten screws to specification. See TORQUE SPECIFICATIONS.

ACTUATORS

Removal & Installation

1) To remove fresh air/recirculating flap vacuum motor, remove plenum tray. Rotate vacuum motor 90 degrees, and pull from

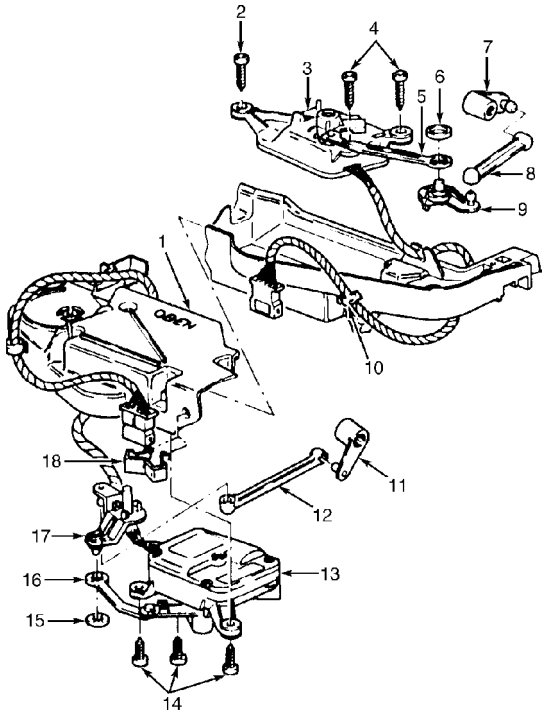
mount. Disconnect vacuum hose, and secure aside. DO NOT allow vacuum hose to slide into evaporator housing. Remove fresh air/recirculating flap motor (vacuum servo).

2) To remove temperature regulator flap motor, remove plenum tray. Entirely remove windshield wiper motor and linkage assembly. Remove cover and temperature regulator flap motor.

3) To remove central flap and footwell/defroster flap motor, remove center console. See CENTER CONSOLE. Remove glove box and driver's side tray. Remove defroster hoses from left and right sides of heater box.

4) Remove central flap and footwell/defroster flap motor support tray screws from left and right sides of heater box. Disconnect wiring harness Blue connector at central flap motor. See Fig. 6.

5) Disconnect wiring harness Red connector at footwell/defroster flap motor. Remove central flap and footwell/defroster flap motor support tray. Remove motor(s) from support tray. To install, reverse removal procedure.



1. Support Tray
2. Screw
3. Central Flap Motor With Potentiometer (Blue Connector)
4. Screw
5. Connecting Arm
6. Retaining Washer
7. Lever (Blue)
8. Connecting Arm
9. Relay Lever
10. Clip
11. Lever (Red)
12. Connecting Arm
13. Footwell/Defroster Flap Motor With Potentiometer (Red Connector)
14. Screw
15. Retaining Washer
16. Connecting Arm
17. Relay Lever
18. Retaining Clip

Fig. 6: Removing Footwell/Defroster & Central Flap Motors
Courtesy of Audi of America, Inc.

CENTER CONSOLE

Removal & Installation (Rear)

1) Obtain radio anti-theft protection code. Disconnect negative battery cable. Unscrew and remove gearshift knob. Disengage gearshift lever trim from retaining clip. Remove gearshift lever trim.

2) Unclip cigarette trim plate, and remove self-tapping screws. Lift up lining, and remove self-tapping screw. Pull out rear air duct and disconnect electrical connectors. Remove rear air duct.

3) Slide driver's and passenger's seats fully forward. Pull parking brake lever up as far as possible. Carefully pry handle from parking brake lever. Remove screws and clip securing front of console. Remove bolts securing rear center console. Remove rear center console. To install, reverse removal procedure.

NOTE: Front center console can be removed without removing center section of instrument panel.

Removal & Installation (Front)

Remove rear center console. Unclip cover and remove nut. Remove radio. Pull out center air outlet, and remove bolts. Remove trim plates. Remove bolts and ashtray. Loosen bolts at front of console. Remove front center console. To install, reverse removal procedure.

EVAPORATOR

Removal & Installation

1) Discharge A/C system, using approved refrigerant recovery/recycling equipment. Remove glove box. Remove 4 evaporator cover bolts. Remove plenum tray. Disconnect and plug refrigerant lines. Disconnect evaporator housing electrical connections. Remove evaporator housing.

2) To install, reverse removal procedure. Use NEW seal between evaporator and firewall. Use NEW "O" rings. Tighten connections to specification. See TORQUE SPECIFICATIONS. Ensure water drain hose connections and tightly sealed, and hose is not kinked. Ensure water drain valve operates properly. Ensure no air leaks exist.

FRESH AIR BLOWER

Removal & Installation

Remove plenum tray. Remove heater box. See HEATER BOX. Remove intake duct with fresh air flap. Remove locking clip, retaining washer and grommet. To install, reverse removal procedure. Lubricate mounting tabs with petroleum jelly.

FRESH AIR BLOWER 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, reverse removal procedure.

FRESH AIR TEMPERATURE SENSOR

Removal & Installation

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.

HEATER BOX

NOTE: Heater box can be removed without discharging A/C system.

Removal

1) Remove plenum tray. Remove wiper motor/linkage assembly. Remove center console. See CENTER CONSOLE. Remove glove box and driver's side tray. Remove footwell air outlet on driver's and passenger's side.

2) Remove rubber coupling between evaporator housing and heater box. Remove hoses and connecting bellows to rear heater duct. Remove connections between heater box and evaporator housing. Loosen cap on coolant expansion tank. Disconnect coolant hoses from heater box. Remove screw and tensioning strap.

3) Disconnect heater box electrical connections. Attach Engine Support Bridge (10-222 A/1) and Heater Claw (2075) to lip of heater box. Tighten nut on engine support bridge to loosen heater box. Remove engine support bridge and heater claw. Remove heater box.

Installation

To install, reverse removal procedure. Replace adhesive sealing tape, positioning sealing tape ends at top of heater box. Check rubber coupling for leaks. When assembling housing, apply silicon rubber to area of housing above temperature flap.

HEATER CONTROL (COOLANT) VALVE

Removal & Installation

Remove plenum tray. Loosen coolant expansion tank cap to relieve pressure. Disconnect coolant hoses from heater core. Plug coolant hoses to prevent contamination. Remove coolant hoses from valve. Remove screw and heater control valve. To install, reverse removal procedure.

IN-CAR TEMPERATURE SENSOR

NOTE: In-car temperature sensor fan servicing requires removal of instrument cluster. See INSTRUMENT CLUSTER.

Removal & Installation

Remove glove box. Disconnect hose and wiring harness from

sensor. Remove screws and in-car temperature sensor. To install, reverse removal procedure. Ensure hose is securely attached.

INSTRUMENT CLUSTER

Removal & Installation

Remove rear and front center consoles. See CENTER CONSOLE. Remove center section of instrument panel. Remove steering wheel. Remove steering column switch. Remove bolts and trim strip. Remove screws and instrument cluster. To install, reverse removal procedure.

ORIFICE TUBE

Removal & Installation

1) Discharge A/C system, using approved refrigerant recovery/recycling equipment. Loosen refrigerant line clamp and remove lines from evaporator. Using needle nose pliers, remove restrictor (orifice tube) from evaporator inlet. Plug openings to prevent contamination.

2) To install, reverse removal procedure. Use NEW "O" rings. Insert orifice tube with arrow pointing toward evaporator, and push until firmly seated.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
A/C Compressor Bolts	18 (25)
A/C Compressor Bracket Bolts	18 (25)
A/C Compressor High Pressure Connection	22 (30)
A/C Compressor Low Pressure Connection	30 (40)
Accumulator Lines	30 (40)
Condenser	
Inlet Line	22 (30)
Outlet Line	11 (15)
Evaporator	
Inlet Line	11 (15)
Outlet Line	30 (40)
Refrigerant Line Clamp Bolt	11 (15)
	INCH Lbs. (N.m)
A/C Compressor Speed Sensor	44 (5)
Compressor Oil Drain Plug	89 (10)
Compressor Pressure Relief Valve	89 (10)
Heater Controls Trim Plate Screws	18 (2)
High Pressure Cut-Out Switch (1)	44 (5)
High Pressure Switch (1)	44 (5)
Low Pressure Switch (1)	44 (5)

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(1) - High pressure switch, high pressure cut-out switch,
      and low pressure switch may be removed without
      discharging A/C system.
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WIRING DIAGRAMS

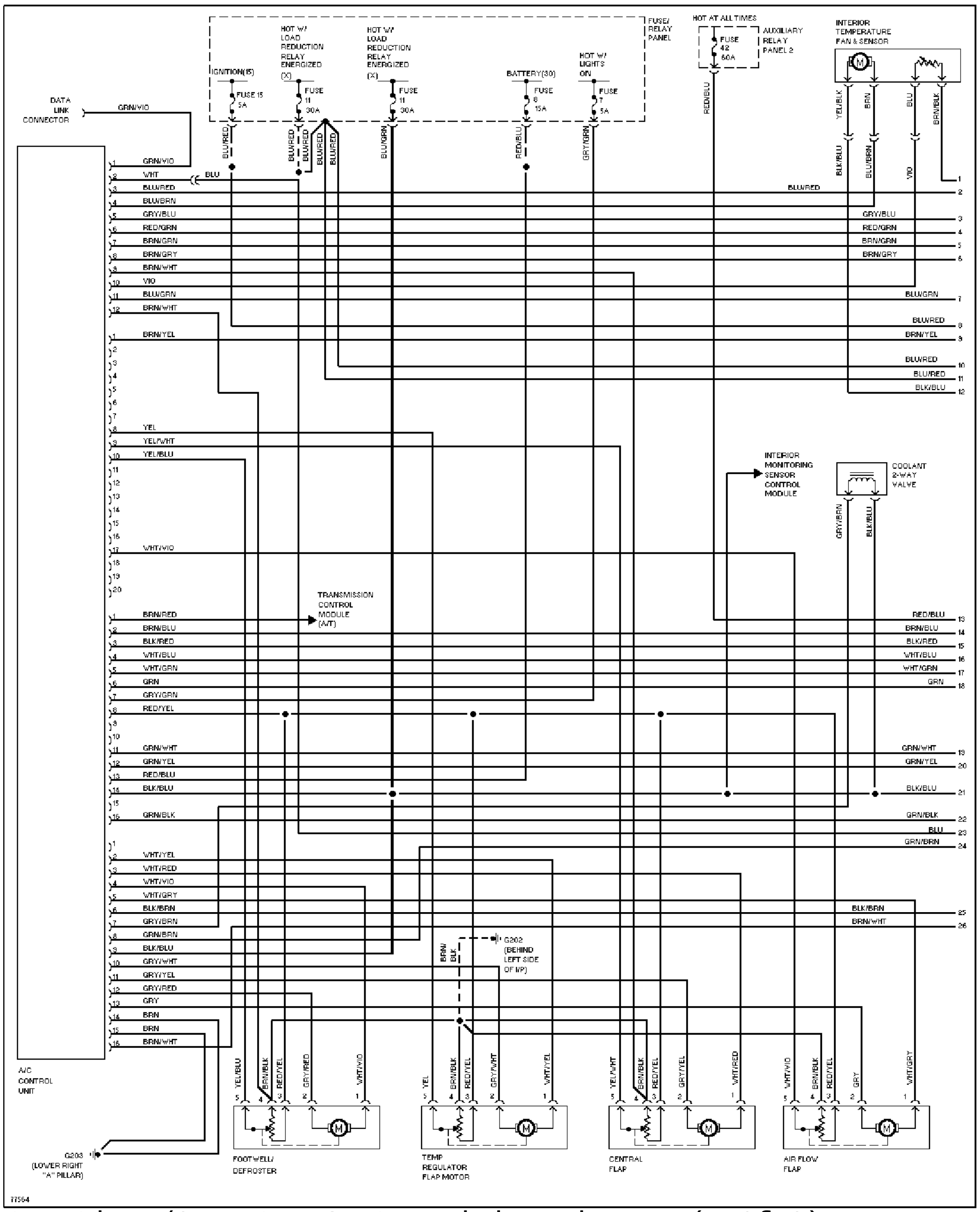

Fig. 7: Automatic A/C-Heater System Wiring Diagram (1 Of 2)

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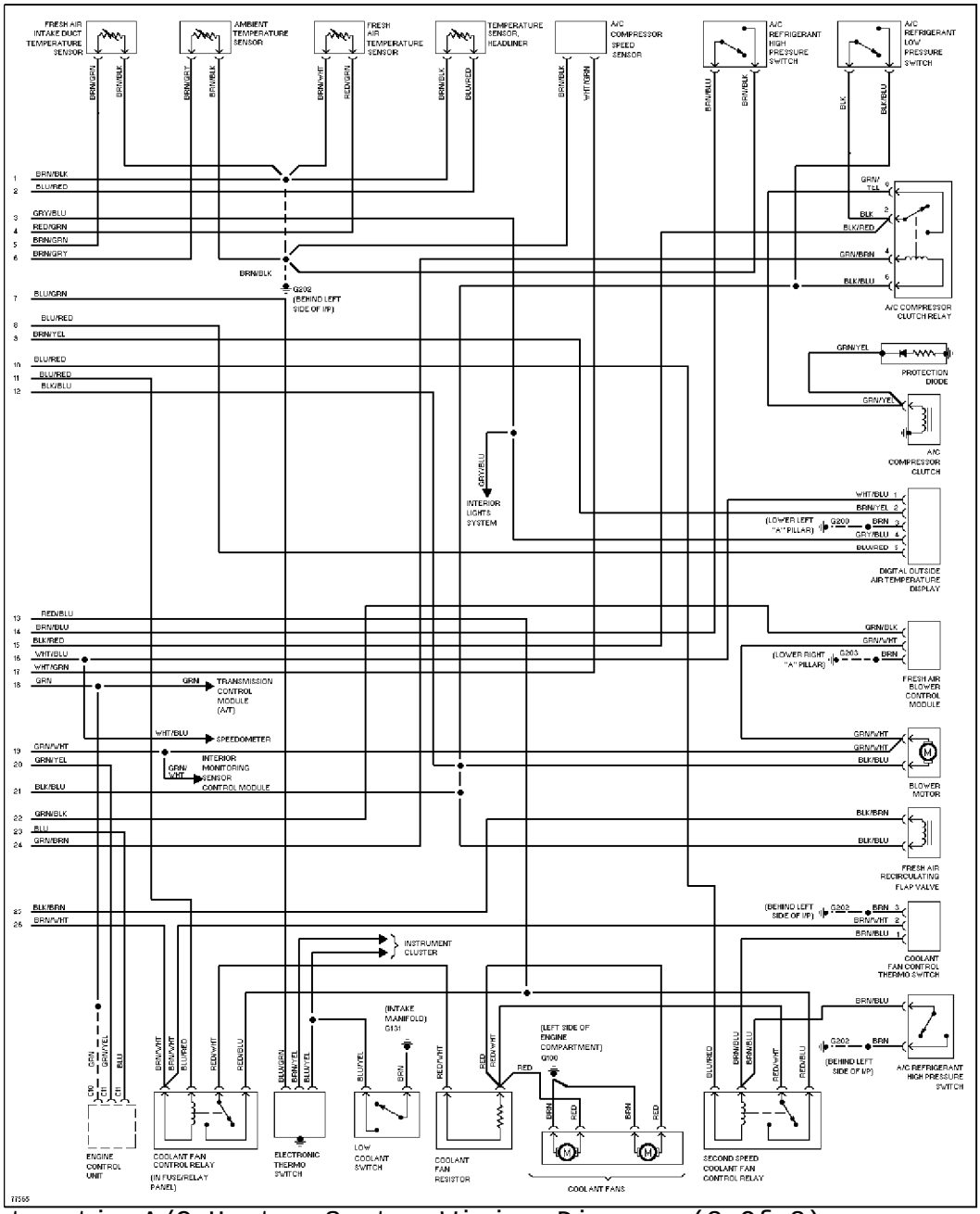

Fig. 8: Automatic A/C-Heater System Wiring Diagram (2 Of 2)

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