

# A/C-HEATER SYSTEM - AUTOMATIC

1994 Volvo 960

1994 Auto. A/C-Heater System

Volvo 960

## A/C SYSTEM SPECIFICATIONS

### AUTOMATIC A/C SYSTEM SPECIFICATIONS TABLE

Application	Specification
Compressor Type .....	Sanden SD-7H15 7-Cyl. Or Seiko-Seiki SS-121DS5
Compressor Belt Deflection (1)	
Refrigerant Capacity (R-134a) .....	32-34 ozs.
Compressor Oil Capacity	
Sanden SD-7H15 (2) .....	8.5 ozs.
Seiko-Seiki SS-121DS5 (3) .....	7.8 ozs.
System Operating Pressures (4)	
(1) - Belt tension is automatically adjusted by belt tensioner.	
(2) - Use PAG Oil (Part No. 11 61 425-0).	
(3) - Use PAG Oil (Part No. 11 61 426-0).	
(4) - Information is not available from manufacturer.	

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

**CAUTION:** When battery or radio is disconnected, radio will go into anti-theft protection mode. Obtain radio code anti-theft protection code from owner prior to servicing vehicle.

## DESCRIPTION

The Electronic Climate Control (ECC) system is an automatic A/C-heater system that monitors in-vehicle temperature through 2 sensors located in passenger compartment. One (solar) sensor is located on top of dashboard and senses sunlight. The second sensor is located in courtesy light fixture and senses temperature in center of vehicle.

In addition to basic A/C-heater system components, system includes air intake temperature sensor, water (coolant) temperature sensor, servomotor and vacuum actuators. See Fig. 4.

System is engaged when A/C button on control panel is pressed. See Fig. 1. Pressure switch on accumulator cycles compressor clutch on and off. Airflow modes are selected by center knob on control panel. Doors are controlled by vacuum motors on left side of heater case.

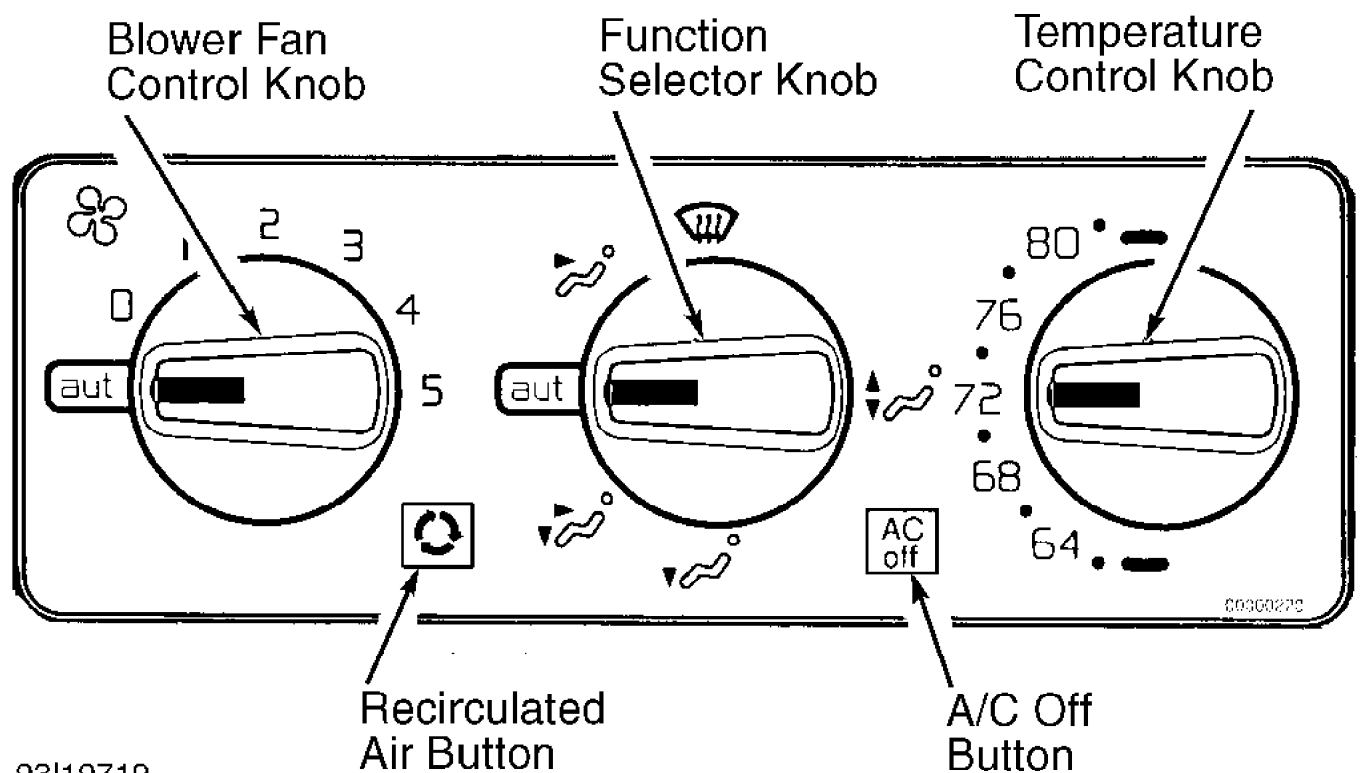


Fig. 1: Automatic A/C-Heater System Control Panel  
 Courtesy of Volvo Cars of North America

## OPERATION

### CONTROL PANEL

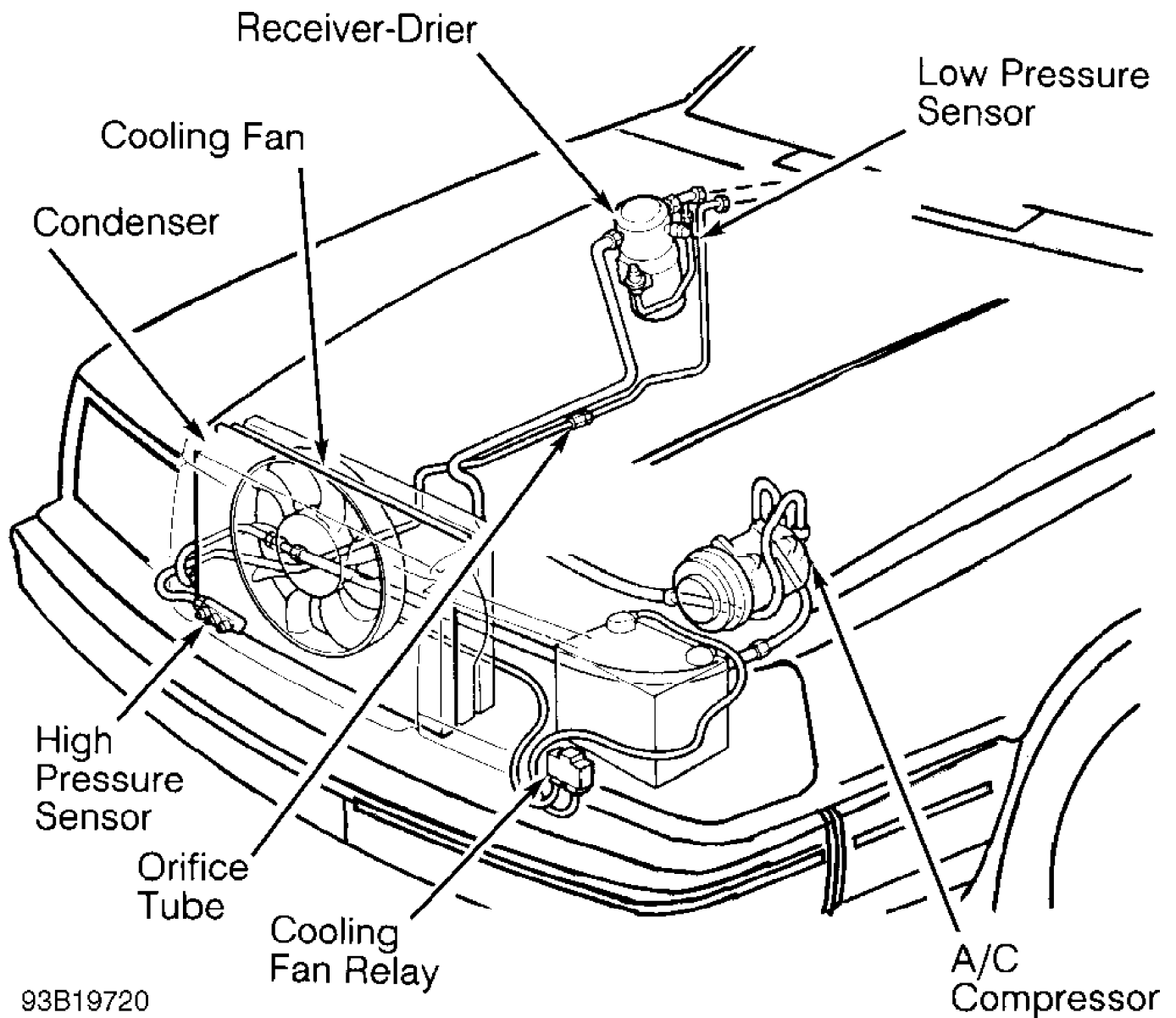
The automatic A/C-heater system control panel permits manual operation of system by placing blower control knob or function selector knob in any position other than AUT (automatic). See Fig. 1.

Blower fan may be automatically controlled by placing control knob in AUT position. Fan speed can also be manually controlled by placing control knob in any position except AUT or 0 (off) position.

Function selector knob may be placed in defrost, vent, AUT, bi-level, or floor position. In AUT position, air distribution is automatically regulated. Air distribution may also be to floor, windshield and side windows.

Temperature control knob may be used to select desired temperature. The recirculated air button may be pressed to recirculate passenger compartment air. This function, however, will not work in defrost position. Pressing A/C OFF button will turn automatic A/C system off.

NOTE: Operational description of other components is not available from manufacturer. See Fig. 2.



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Fig. 2: Identifying A/C-Heater System Components  
 Courtesy of Volvo Cars of North America

## TROUBLE SHOOTING

### SELF-DIAGNOSTIC SYSTEM

The EEC system incorporates a self-diagnostic function that indicates system faults through a series of trouble codes. The presence of fault(s) is indicated by flashing A/C OFF button. The control panel is programmed to enter a pre-programmed mode when a fault is detected. Under fault condition, control panel ignores the faulty signal, selects an alternative pre-programmed value and prevents delivery of faulty output signals.

#### Entering Self-Diagnostics

- 1) To enter mode, ensure engine is running. Shine a non-

fluorescent, bright light on solar sensor. Place blower fan control knob in AUT position and function selector knob in vent position.

2) Place temperature control knob to maximum cooling (pointing straight down). Ensure recirculated air switch is depressed and A/C OFF button is released. Depress and release A/C OFF button within 5 seconds to start self-diagnostic mode.

3) Each fault code consists of 3 digits. For example, Code 132 is displayed by a single flash of the A/C OFF button for the first digit (number 1). After a pause, the second digit of code (number 3) is indicated by 3 flashes. After another pause, the third digit of code (number 2) is indicated by 2 flashes. See TROUBLE CODE IDENTIFICATION table.

4) Three different fault codes may be stored in memory. However, only one code may be displayed upon request. It may be necessary to request display of fault codes a number of times to ensure all fault codes are displayed.

#### Exiting Self-Diagnostics & Clearing Codes

To exit self-diagnostics, turn ignition off. All codes are cleared when ignition is turned off. Fault codes are not stored in memory. Even if a code has occurred several times during a period of time, code will only be stored until ignition is turned off.

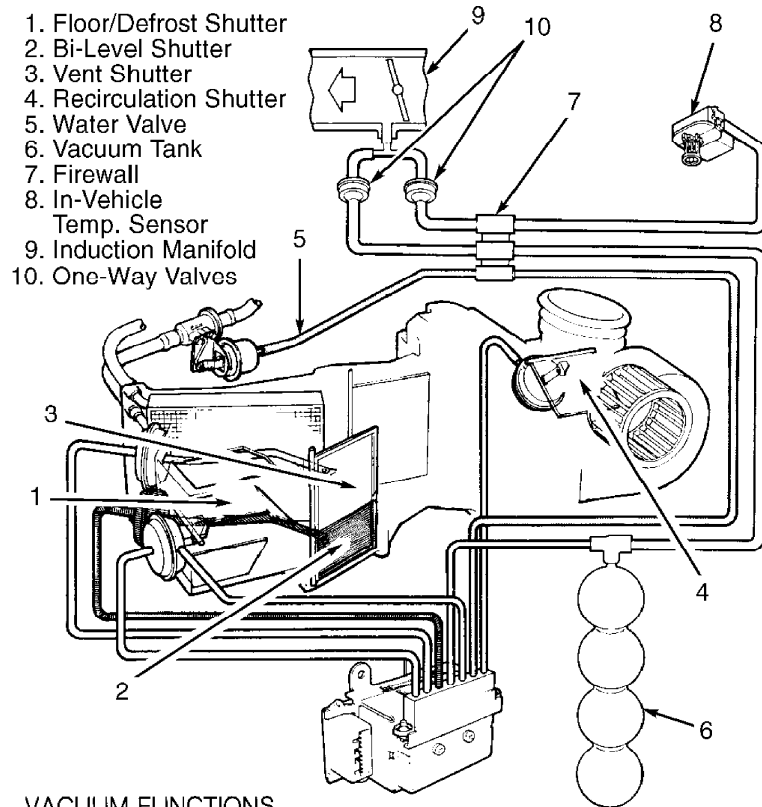
#### TROUBLE CODE IDENTIFICATION TABLE

Affected Circuit/Sensor	Code
Fault Free System .....	111
Outside Temperature Sensor	
Short Circuit To Ground .....	121
Open Circuit Or Short Circuit To 12 Volts .....	122
In-Vehicle Temperature Sensor	
Short Circuit To Ground .....	131
Open Circuit Or Short Circuit To 12 Volts .....	132
Water (Coolant) Temperature Sensor	
Short Circuit To Ground .....	141
Open Circuit Or Short Circuit To 12 Volts .....	142
Alternator (D+ Signal Fault) .....	151
Solar Sensor .....	161
Servomotor/Potentiometer	
Open Circuit Or Short Circuit To Ground .....	211
Short Circuit To 12 Volts .....	212
Servomotor	
Incorrect 12-Volt Supply To Pins No. 17 & 18 .....	213
Servomotor	
Fails To Operate Within 10 Seconds .....	214
ECC Control Panel	
Faulty Temperature Control .....	231
Fan Motor Excessive Starting Current .....	233
Power Unit - Incorrect 12-Volt Supply	
Affected Output:	
Coolant Valve .....	241
Bi-Level .....	242
Vent .....	243
Recirculated Air .....	244
Defrost .....	245
Floor .....	246
Fan (Maximum Speed Relay) .....	247
A/C Compressor .....	248
Radiator Fan Relay .....	249

## TESTING

### VACUUM CIRCUITS

Using vacuum schematic and vacuum functions table, test for proper operation of vacuum circuits. See Fig. 3.



### VACUUM FUNCTIONS

Component	Vacuum hose	Vacuum on	Vacuum off
Water valve	Grey	Closed (cold)	Open (warm)
Recirculation	Orange	Recirculation	Outside air
Vent shutter	Red	Open, also operates bilevel shutter mechanically	Closed
Bi-level	Transparent/beige	Open	Closed
Defrost	Blue	Shutter in lower position	Middle* position
Floor shutter	Yellow	Shutter in upper position	Middle **

\* In upper position if floor duct is under vacuum

\*\* In lower position if defroster duct is under vacuum

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Fig. 3: Testing Vacuum Circuits  
Courtesy of Volvo Cars of North America

## REMOVAL & INSTALLATION

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

## **BLOWER MOTOR**

### Removal & Installation

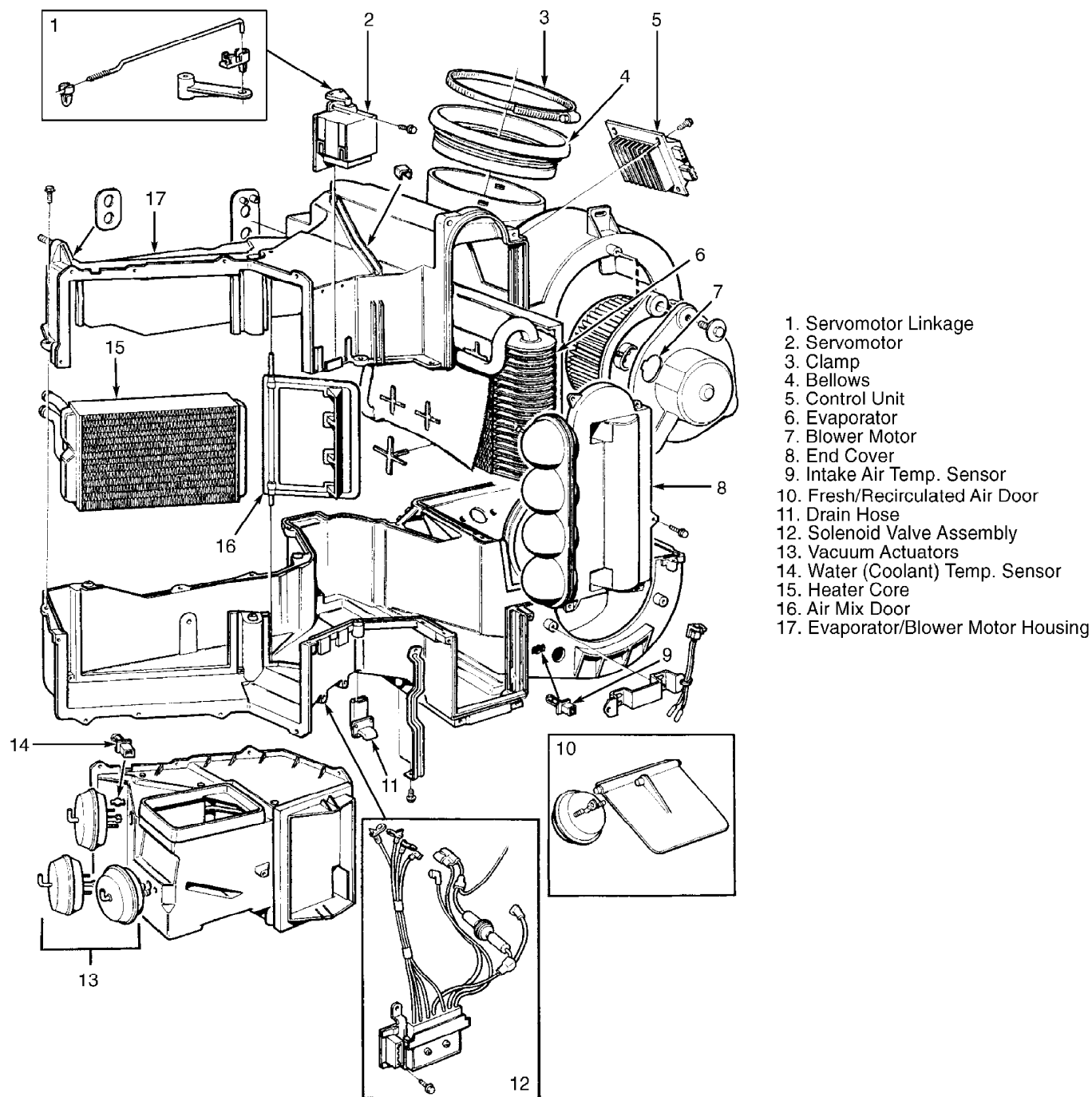
- 1) Obtain radio anti-theft code before servicing vehicle. Disconnect negative battery cable. Remove trim panel below glove box. Open glove box door. Remove glove box screws and glove box.
- 2) Detach wiring harness and bracket from blower motor housing. Disconnect blower motor. Remove blower motor screws and blower motor. To install, reverse removal procedure.

## **EVAPORATOR CORE**

### Removal & Installation

- 1) Obtain radio anti-theft code before servicing vehicle. Disconnect negative battery cable. Discharge A/C system using approved refrigerant recovery/recycling equipment. Remove receiver-drier from engine compartment firewall. Remove cover plate and foam rubber seal from firewall.
- 2) Remove trim panel below glove box. Open glove box door. Remove glove box screws and glove box. Remove evaporator housing end cover. See Fig. 4. Carefully remove evaporator core. To install, reverse removal procedure.

**NOTE:** Additional removal and installation procedures are not available from manufacturer.



- 1. Servomotor Linkage
- 2. Servomotor
- 3. Clamp
- 4. Bellows
- 5. Control Unit
- 6. Evaporator
- 7. Blower Motor
- 8. End Cover
- 9. Intake Air Temp. Sensor
- 10. Fresh/Recirculated Air Door
- 11. Drain Hose
- 12. Solenoid Valve Assembly
- 13. Vacuum Actuators
- 14. Water (Coolant) Temp. Sensor
- 15. Heater Core
- 16. Air Mix Door
- 17. Evaporator/Blower Motor Housing

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Fig. 4: Exploded View Of Evaporator/Blower Motor Housing  
 Courtesy of Volvo Cars of North America

**WIRING DIAGRAM**

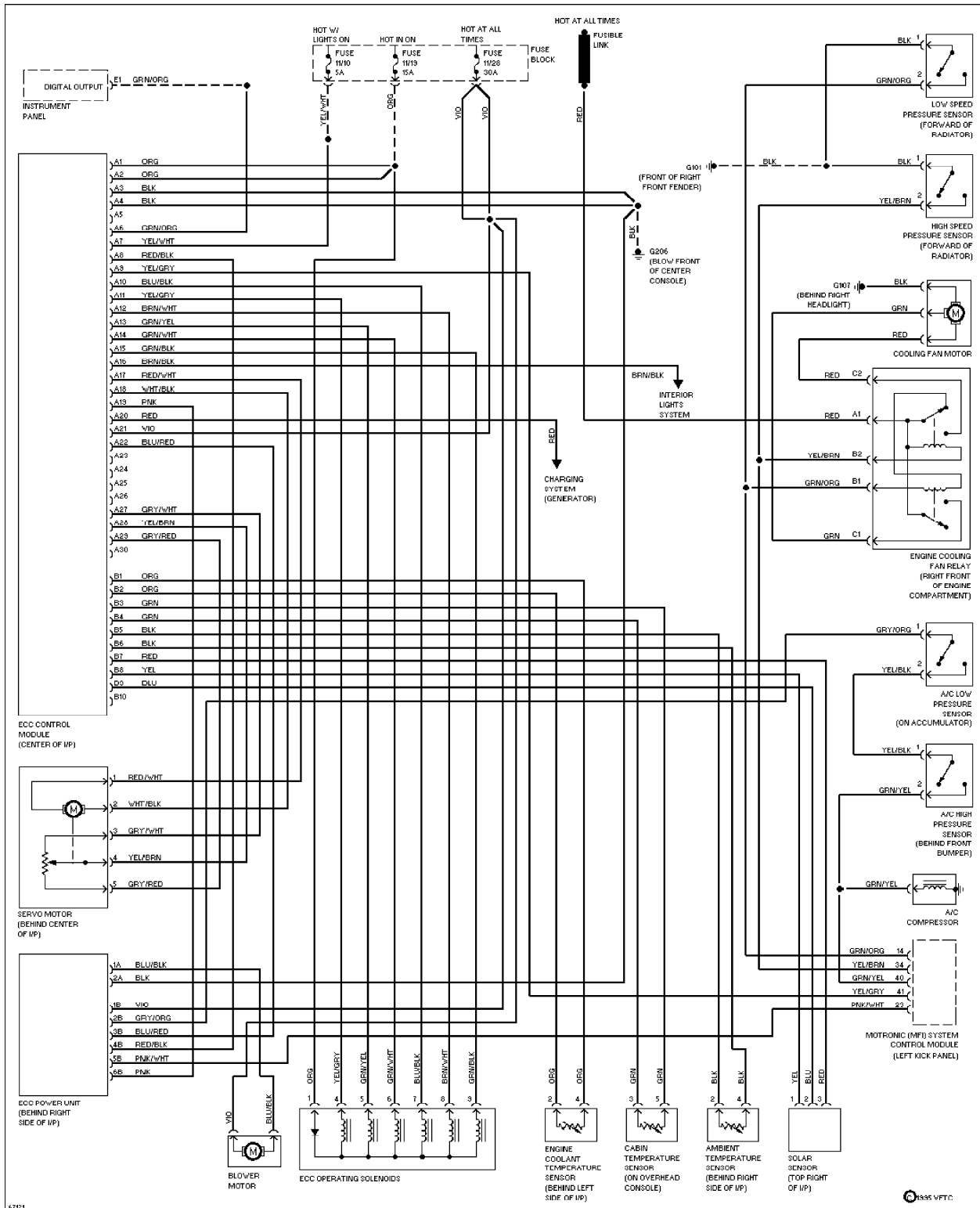


Fig. 5: Automatic A/C-Heater System Wiring Diagram