

### ELECTRONIC AIR CONDITIONING BLOWER AND COMPRESSOR CONTROLS

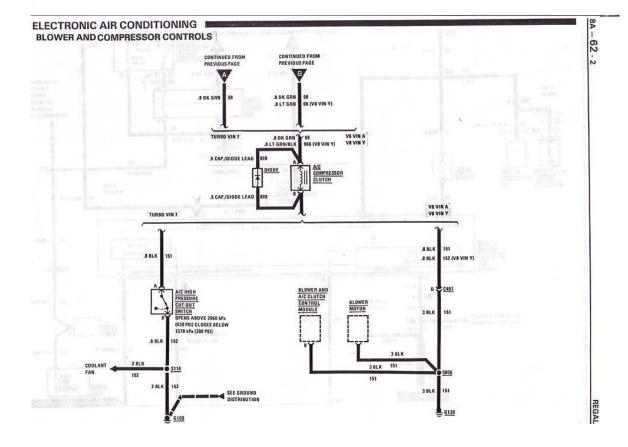
3	I STEW CHECK
1.	With the engine warm and running at idle, press the "Off" button on the A/C CONTROL HEAD.

- · Blower is off.
- No air is flowing from any outlet.
- Steady LED display indicates "Off" is selected. A steady LED for each mode indicates normal operation.
- A blinking LED indicates that an air door is not working properly.
- Press the "Mode Auto" button and repeatedly press the "Cooler" button until the LED light under the 65 is on.
  - Engine idle speed increases and compressor comes on.
  - · Blower runs at high speed.
  - Air flows from instrument panel outlets.
  - · Air from outlets gets colder.
- 3. Press the fan "Lo" button.
  - · Blower runs at low speed.
- 4. Press the "Econ" and Fan "Auto" button.
  - Engine idle speed decreases, compressor goes off.
  - High speed outside air comes from outlets,
- 5. Press the "Bi-Level" button.

\* REVISED 3/86

- Engine idle speed increases, compressor comes on.
- High speed cold air comes from both floor and instrument panel outlets.

COMPONENT LOCATION		Page-Figure
A/C Compressor Clutch (VIN 7)	LH front of engine, below generator	. 201-21-B
A/C Compressor Clutch (VIN A)	Part of A/C compressor	. 201- 0-A
A/C Compressor Clutch (VIN Y)	Engine compartment, part of A/C compressor	
A/C Cut-Out Relay (VIN 7)	On RH front fender, above wheel well	. 201-14-C
Ambient Sensor (VIN 7)	Behind RH side of dash, above blower motor	. 201-13-C
Ambient Sensor (VIN A) (VIN Y) Blower and A/C Clutch Control	Behind RH side of dash, above blower motor	. 201-13-В
Module (VIN 7)	RH rear of engine compartment, left of blower	
	motor	. 201-13-C
Blower and A/C Clutch Control		
Module (VIN A)(VIN Y)	Heater module, left of blower motor	. 201-13-B
Blower Motor (VIN 7)	RH side of front of dash on A/C module	. 201-13-A
Blower Motor (VIN A) (VIN Y)	RH front dash, on A/C module	. 201- 3-D
Brake Switch	Top of brake pedal support	. 201- 6-A
Electronic Control Module	RH shroud, near lower access hole	. 201- 2-E
Fuse Block	Under LH side of I/P	. 201- 6-A
	I/P, part of RH speaker grill assembly	
Pressure Cycling Switch (VIN 7)	On A/C accumulator	. 201-13-A
Pressure Cycling Switch (VIN A).		
(VIN Y)	RH rear of engine compartment, front of blower	
	motor	. 201-13-B
Radio Capacitor	Lower LH corner of fuse block	. 201- 7-B
C100 (45 cavities)	LH side of rear engine, behind wiper motor	. 201-12-C
C219 (1 cavity)	Behind I/P, near control head	. 201-11-B
C369 (1 cavity)	Behind I/P, left of radio	. 201- 8-C
C497 (4 cavities) (VIN 7)	Behind RH side of I/P, to right of radio	. 201-21-C
C497 (4 cavities) (VIN A)	Below front of RH valve cover	. 201- 0-A
C497 (4 cavities) (VIN Y)	Behind RH side of I/P, to right of radio	. 201- 8-D
C892 (15 cavities)	Behind I/P, center of glove box	. 201-11-B
G107	Below RH side of I/P, near shroud	. 201-11-B
G130 (VIN A)(VIN Y)	Behind RH side of I/P	. 201- 8-D
S102 (VIN 7)	Engine harness, near starter	. 201-18-B
S102 (VIN A)	Engine harness, near front of RH valve cover	. 201- 0-A
S102 (VIN Y)	Engine harness, near end of LH valve cover	. 201- 2-C
S103	A/C harness, behind glove box	. 201-11-B



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 Set Mode Selector to "Auto" and temperature to 75°F. Close car doors and windows. Set Fan Mode to "Auto"

- System brings temperature in car to 75°F and maintains temperature at that point.
- Blower speed decreases to minimum as temperature nears 75°F.
- At 75°F, air flows from instrument panel outlets and floor outlets.
- 7. Press the fan "Hi" button
  - · Blower runs at high speed
- 8. Press the "Warmer" button repeatedly until the LED light under the 85 is lit.
  - Engine idle speed decreases, compressor goes off.
  - · Blower runs at maximum speed.
  - Warm air flows out of the floor and instrument panel outlets.
- 9. Press the "Def" button.
  - Warm air flows from the upper outlets to the front windshield.

Preliminary A/C Diagnosis, for "not enough cooling."

Since there are several systems that can cause this condition, first perform the following preliminary tests below. They will help you to isolate the system needing troubleshooting.

With the engine warmed and idling, press

COMPONENT LOCATION	War arm rough marries Player day	Page-Figure
S806 (VIN 7)	A/C harness, behind blower motor	201-13-A
	A/C harness, forward of blower motor	
	A/C harness, right of radio	

- The TEMPERATURE DOOR should hit each stop after it travels from one position to the other. If it does, the door is working, continue to step 2.
- If the TEMPERATURE DOOR motor does not travel from stop to stop refer to Section 1C for A/C component diagnosis.
- 2. Check that the A/C COMPRESSOR CLUTCH engages. Set the temperature to 65° and press the "Auto" pushbutton. Engine warm and idling.
  - If the clutch does engage, check that the compressor is operating. Feel the suction pipe (cold) and the high pressure pipe (hot) at the compressor.
  - If there is a significant temperature difference, the compressor is operating properly. Look for an obstruction of the air flow past the A/C Evaporator Core.
  - If the pipes have little or no temperature difference, refer to Section 1B for refrigerant or compressor diagnosis.
  - If the A/C COMPRESSOR CLUTCH does not engage when the A/C is turned on, connect a fused jumper from the

Battery positive terminal to the DK GRN wire at the connector to the clutch. Leave the connector connected.

- If the clutch engages with the jumper connected, the clutch is good. The electrical circuits supplying the clutch need troubleshooting. For the Turbo VIN 7, refer to Section 6E1. For the V6 VIN A and the V8 VIN Y, refer to page 8A 62-2 for compressor control schematic and diagnostics.
- If the clutch does not engage with the jumper connected, connect another jumper from the BLK wire at the clutch connector to ground. Repair the open in the ground circuit if the clutch engages.
- If the clutch does not engage with both jumpers in place, install a new A/C COMPRESSOR CLUTCH.

#### TROUBLESHOOTING HINTS

#### Blower

If the BLOWER MOTOR does not operate, remove the connector from the motor and measure the voltage to ground at the PPL wire. Turn the IGNITION SWITCH to "Run" and press the "Hi" button on the

### ELECTRONIC AIR CONDITIONING BLOWER AND COMPRESSOR CONTROLS

# VOLTAGE BLOWER MOTOR CONNECTOR Ignition Switch in "Run" Mode Selector in "Hi"

Terminal (Wire Color)	Voltage
A (PPL)	Battery

- Check that the BLK wire to the connector is a good ground. Repair it if it is not grounded.
- If the voltage and ground at the connector are correct and the motor does not run, install a new BLOWER MOTOR.
- If Battery voltage is not at the connector check voltages at the module in the next step.
- Remove connector Cl from the BLOWER and A/C CLUTCH CONTROL MODULE and measure the voltage to ground at the following terminals of the connector. Put the IGNITION SWITCH in "Run," the Mode Selector in "Hi," and set the temperature to 65.".

# VOLTAGE BLOWER AND A/C CLUTCH CONTROL MODULE CONNECTOR C1 Ignition Switch in "Run" A/C in "Hi." 65°

Terminal (Wire Color)	Voltage
E (RED)	Battery
D (LT GRN/BLK)	Battery
A (PPL)	Battery
C (BRN/WHT)	Battery
B (LT GRN)	Battery

- If the voltages above are correct and voltage is not supplied to the BLOWER MOTOR, install a new BLOWER and A/C CLUTCH CON-TROL MODULE.
- If the voltage at any of the terminals is not correct, check the wiring to that terminal. Test the voltages at the A/C CONTROL HEAD in step 3 if no problem is found.
- Remove all three connectors from the A/C CONTROL HEAD and measure the voltage to ground at the following terminals. Put the IGNITION SWITCH in "Run."

## VOLTAGE A/C CONTROL HEAD CONNECTOR Ignition Switch in "Run"

Connector	Terminal (Wire Color)	Voltage
Cı	B (BRN)	Battery
Сз	B (ORN)	Battery
C3	D(GRY)	4 to 12 Volts

- Check that terminals E and D (both BLK wires) of connector C2 are grounded. If the voltages and grounds at a terminal are not correct, troubleshoot the wiring to that terminal. If the voltages to the BLOWER SEN-SORS and A/C COMPRESSOR CLUTCH MODULE at terminals A and D in step 2 were not present, and battery voltage is supplied to the A/C CONTROL HEAD, install a new A/C CONTROL HEAD.
- Measure the resistance between the following terminals of the connectors removed from the A/C CONTROL HEAD.

#### ELECTRONIC AIR CONDITIONING

#### BLOWER AND COMPRESSOR CONTROLS

### RESISTANCE

A/C CONTROL HEAD CONNECTORS Ignition Switch "Off"

Connector	Terminal (Wire Color)	Resistance	
СЗ	E (LT GRN/ BLK) and A (BLK)	5 to 20K Ohms	
C2	H (PNK/BLK) and E (BLK)	6 to 9K Ohms	

- · If the resistance at a pair of terminals is not correct, check the wiring to those terminals. If the wires are good, replace the sensor.
- 5. Compressor Clutch does not operate.
  - . If the A/C COMPRESSOR CLUTCH does not engage perform the following tests. For the Turbo VIN 7 refer to Section 6E1.
  - Check that the A/C COMPRESSOR CLUTCH is good by connecting a fused jumper from the battery positive to the DK GRN wire at the clutch connector, as described in the Preliminary Diagnosis on page 8A-62-4. Remove the jumper after the test.
  - · If the clutch does not operate with the IGNITION SWITCH in "Run," the temperature set to 65°, the "Auto" pushbutton depressed, and the engine warm and idling, measure the volt at the DK GRN wire at the A/C COM-PRESSOR CLUTCH connector.

- If Battery voltage is present, there must be an open in the ground circuit. Check the BLK wire at the compressor clutch connector down to G130.
- If there is no voltage or low voltage at the DK GRN wire, troubleshoot the circuit back through the PRESSURE CYCLING SWITCH to the BLOWER and A/C CLUTCH CONTROL MOD-ULE.
- If the PRESSURE CYCLING SWITCH is open, check the refrigerant pressure at the low pressure side service valve with the ignition "Off". If the pressure is below 172 kPa (25 psi) see Section 113 for refrigerant diagnostics. If pressure is higher replace the PRESSURE CYCLING SWITCH
- · Check the voltages at the module and the control head as described in steps 2 and 3. Replace the modules if they do not supply voltage to the compressor clutch circuit.

#### CIRCUIT OPERATION

#### Introduction

Temperatures and operating modes are selected by pressing buttons on the surface of the A/C CONTROL HEAD. Light Emitting Diodes (L.E.D.'s) indicate the selected temperature and mode

The A/C CONTROL HEAD uses an information processor to control the A/C system. When the IGNITION SWITCH is turned to "Off," the information processor "remen bers" the last temperature and mode selected.

When the IGNITION SWITCH is turned on again, the A/C CONTROL HEAD does not have to be reset.

If the A/C CONTROL HEAD is unable to perform what is selected, the indicator flashes at the selected temperature. Reselecting the temperature causes the circuit to try again. If the indicator still flashes, the circuit shuts

#### A/C Control Head

With the IGNITION SWITCH in "Run." voltage is applied through the A/C FUSE to the A/C CONTROL HEAD.

Current flows at all times through the CIG-CLK FUSE and the ORN wire, to the A/C CONTROL HEAD. This retains the information in the processor memory when the IGNI-TION SWITCH is turned to "Off."

With the IGNITION SWITCH in "Head" or "Park," voltage is applied through the INSTRUMENT PANEL DIMMER SWITCH, the INST LPS FUSE, and the GRY wire, to the A/C CONTROL HEAD display. Voltage is applied to the bulbs in the A/C CONTROL HEAD which provide display lighting.

#### **Blower Motor Control**

Voltage is applied at all times through FUSIBLE LINK A and the RED wire, to the BLOWER and A/C CLUTCH CONTROL MODULE.

With any mode except "Off" selected on the A/C CONTROL HEAD, voltage is applied through the LT GRN/BLK wire to the Blower Control Input of the BLOWER and A/C

#### **ELECTRONIC AIR CONDITIONING BLOWER AND COMPRESSOR CONTROLS**

CLUTCH CONTROL MODULE, Current flows through the module, and the BLOWER MOTOR to ground G130. The BLOWER MOTOR runs.

The A/C CONTROL HEAD regulates the speed of the BLOWER MOTOR. The voltage at the LT GRN/BLK wire is pulsed between 0 and 12 volts. Timing of the pulses is varied to change BLOWER MOTOR speed. The speed varies according to the selected mode and the position of the TEMPERATURE DOOR.

When the A/C system calls for heat, the BLOWER MOTOR is delayed from turning on until the engine coolant is warm enough.

The IN-CAR SENSOR contains a thermistor that measures the temperature inside the car. The sensors feed temperature information to the A/C CONTROL HEAD. The A/C CONTROL HEAD then makes adjustments to the A/C system, according to the difference between the sensor temperature and the selected temperature. As the difference becomes greater, BLOWER MOTOR speed is

### Compressor Clutch Control

With the IGNITION SWITCH in "Run," voltage is applied from the A/C CONTROL HEAD, through the BRN/WHT wire to the BLOWER and A/C CLUTCH CONTROL MODULE.

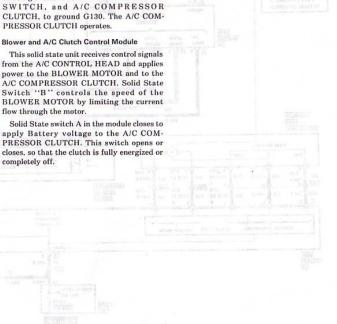
When the A/C CONTROL HEAD "decides to turn on the compressor, voltage is applied through the PPL wire to the BLOWER and A/C CLUTCH CONTROL MODULE.

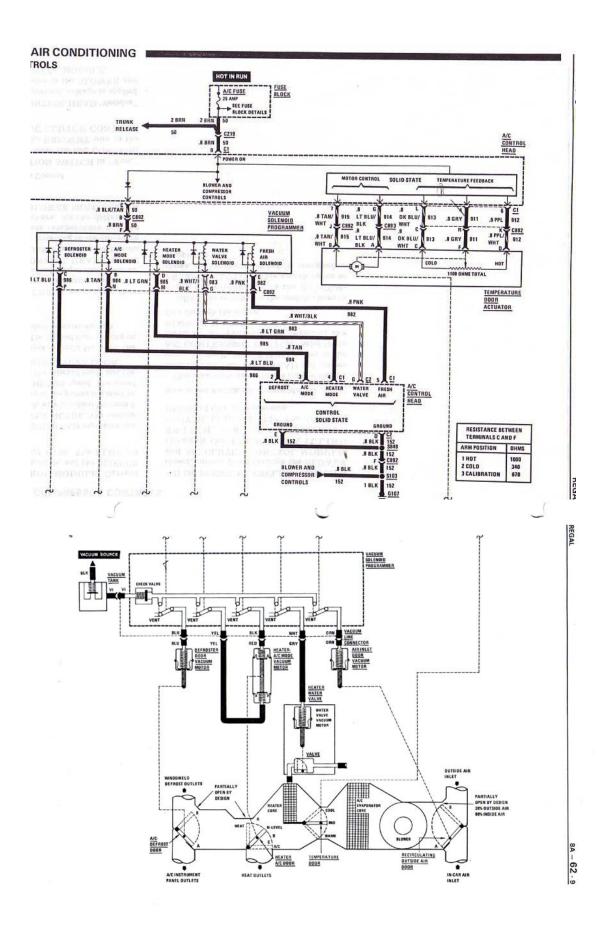
If the PRESSURE CYCLING SWITCH is closed, current flows through the BLOWER and A/C CLUTCH CONTROL MODULE through the PRESSURE CYCLING SWITCH, and A/C COMPRESSOR CLUTCH, to ground G130. The A/C COM-PRESSOR CLUTCH operates.

#### Blower and A/C Clutch Control Module

from the A/C CONTROL HEAD and applies power to the BLOWER MOTOR and to the A/C COMPRESSOR CLUTCH. Solid State Switch "B" controls the speed of the BLOWER MOTOR by limiting the current

apply Battery voltage to the A/C COM-PRESSOR CLUTCH. This switch opens or closes, so that the clutch is fully energized or completely off.





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### ELECTRONIC AIR CONDITIONING I

#### TROUBLESHOOTING HINTS

- Before starting electrical troubleshooting check that vacuum is supplied to the VAC-UUM SOLENOID PROGRAMMER and that the vacuum hoses to the vacuum motors are connected.
- If an air door does not operate (blinking temperature light), check that the door is free and not blocked.

#### SYSTEM DIAGNOSIS

- If the TEMPERATURE DOOR does not operate, refer to Section IC for diagnosis.
- 2. If one or more of the air doors does not operate properly, first check that the door is not blocked and that vacuum is supplied to the system. Next. test the operation of the solenoids that control the vacuum valves. Backprobe connectors Cl and C2 on the A/C CONTROL HEAD and a fused jumper to ground the terminals for the following doors. The engine should be off with the IGNITION SWITCH in "Run" and the Mode Selector in "Off."

COMPONENT LOCATION		Page-Figure
Air Inlet Door Vacuum Motor	Below I/P, top RH side of A/C module	. 201-12-A
Defroster Door Vacuum Motor	Behind I/P, to the left of glove box	. 201-12-A
	Under LH side of I/P	. 201- 9-A
Heater Water Valve	RH rear part of engine on heater line hose	
Heater-A/C Mode Vacuum Motor	LH side of A/C module	. 201-12-A
Temperature Door Actuator	Behind I/P, near glove box	. 201-14-B
Vacuum Solenoid Programmer	Behind RH side of I/P (Electronic A/C)	. 201-14-B
Vacuum Tank (VIN Y)	LH front of car, below battery	. 201-18-D
Vacuum Tank (With Cruise Control) (VIN A)	On LH side of radiator shroud	. 201- 3-C
Control)	RH of dash, next to blower motor	
C219 (1 cavity)	Behind I/P, near control head	. 201-14-B
C892 (15 cavities)	Behind I/P, center of glove box	. 201-14-B
C893 (1 cavity)	Behind I/P, center of glove box	. 201-14-B
G107	Below RH side of I/P, near shroud	. 201-14-B
S103	A/C harness, behind glove box	. 201-14-B
S848	A/C harness, right of radio	. 201- 7-F

#### FUSED JUMPER TO GROUND A/C CONTROL HEAD

Connector/	
Terminal (Wire Color)	Solenoid
C1: 5 (PNK)	Fresh Air
C1: 4 (LT GRN)	Heater Mode
C1: 3 (TAN)	A/C Mode
C1: 2 (LT BLU)	Defrost
C2: G (WHT/BLK)	Water Valve

- When a terminal above is grounded, the solenoid should be energized, vacuum applied to the motor, and the air door should move to the position shown in the schematic.
- If a solenoid and valve does not operate, install a new VACUUM SOLE-NOID PROGRAMMER.
- If a vacuum motor does not operate, but its solenoid and valve do operate, troubleshoot the vacuum hose to the motor and the motor itself. Replace the hose or motor as needed.
- If an air door operates when the jumper to ground is connected, but does not operate in the A/C system, install a new A/C CONTROL HEAD.

## ELECTRONIC AIR CONDITIONING VACUUM CONTROLS

 Measure the resistance between the following terminals of the connectors when removed from the A/C Control Head.

#### RESISTANCE A/C CONTROL HEAD CONNECTORS Ignition Switch "Off"

Connector	Terminal (Wire Color)	Resistance	
Cı	(TAN/WHT) and G (LT. BLU/ BLK)	2 to 20 ohms	
Cı	L (DK BLU/ WHT) and 6 (PPL)	1100 ohms	
Cı	L (DK BLU/ WHT) and 4 (GRY)	340 to 1000 ohms	

 If the resistance at a pair of terminals is not correct check the wiring to those terminals. If the wires are good, replace the sensor or component that they lead

#### CIRCUIT OPERATION

#### A/C Control Head

With the IGNITION SWITCH in "Run." voltage is applied through the A/C FUSE to the A/C CONTROL HEAD.

#### Temperature Door Actuator

The TEMPERATURE DOOR ACTUATOR contains the motor that drives the TEMEPERATURE DOOR. Motor Control voltage is applied from the A/C CONTROL HEAD through the TAN/WHT wire and LT BLU/BLK wire.

A potentiometer in the TEMPERATURE DOOR ACTUATOR feeds TEMPERATURE DOOR position information in volts to the A/C CONTROL HEAD.

#### Vacuum Solenoid Programme

The VACUUM SOLENOID PROGRAM-MER contains the solenoid valves that control the vacuum motors. When the solenoids are de-energized, the valves vent the vacuum motors. Voltage from the A/C CONTROL HEAD is applied to the solenoid through the BRN wire. The solenoids are energized when they are grounded through the A/C CONTROL HEAD. The sensed temperatures (see IN-CAR and AMBIENT sensors in Blower and Compressor Controls circuit), selected temperature, and mode determine which solenoids are energized.

Operation of the solenoids and vacuum motors for each mode follows:

OFF—Air flow is adjusted according to selected temperature, and circulated. The compressor and blower do not operate. Outside air comes through the RECIRCULATING/OUTSIDE AIR DOOR (no vacuum at motor). TEMPERATURE DOOR position controls the amount of air across the Heater Core. The HEATER-A/C DOOR directs all air to the heat outlets (vacuum at motor).

HEATER-A/C DOOR directs all air to the heat outlets (vacuum at motor).

ECONOMY—Air is adjusted according to selected temperature, and circulated at a variable blower speed. The compressor does not operate. Outside air comes through the RECIRCULATING/OUTSIDE AIR DOOR (no vacuum at motor). TEMPERATURE DOOR position controls the amount of air across the Heater Core. There is no cooling of air below the outside temperature. If heating is required, air is passed through the Heater Core.

AUTO—In all three of the "AUTO" settings, temperature is continually adjusted according to selected and sensed temperatures. In the center position, BLOWER MOTOR speed is controlled by the A/C CONTROL HEAD, according to TEMPERATURE DOOR position. In "LO" and "HI," the BLOWER MOTOR runs at a continuous low or high seed, respectively.

When cooling is required, outside air passes through the RECIRCULATING/OUTSIDE AIR DOOR (no vacuum at motor). Air passes through the blower and is cooled by the A/C Evaporator. The HEATER WATER VALVE is closed. TEMPERATURE DOOR position determines air flow through the Heater Core. The HEATER-A/C MODE VACUUM MOTOR closes the heat outlets (vacuum through YELLOW hose to motor). The DEFROSTER DOOR VACUUM MOTOR closes the defrost vents (vacuum through BLU hose). Air flows through the A/C Outlets. The compressor operates.

#### **ELECTRONIC AIR CONDITIONING VACUUM CONTROLS**

When heating is required, outside air passes through the Blower and a part of it is heated in the Heater Core, as set by the TEM-PERATURE DOOR. The HEATER WATER VALVE is open. The HEATER-A/C DOOR directs all air to the Heat Outlets (vacuum through RED hose). The compressor operates.

When the temperature is set to 65°F, in-car air (80%) recirculates for maximum cooling. Vacuum is applied through the ORN hose to the AIR INLET DOOR VACUUM MOTOR.
Vacuum through the GRY hose closes the HEATER WATER VALVE. The HEATER-A/C MODE VACUUM MOTOR closes the HEATER-A/C DOOR to the Heat Outlets (vacuum through YELLOW hose to motor). The DEFROSTER DOOR VACUUM MOTOR closes the A/C-DEFROST DOOR to the Windshield Defrost Outlets. Air flows through the A/C Outlet. The compressor operates.

BI-LEVEL-Outside air comes through the RECIRCULATING/OUTSIDE AIR DOOR (no vacuum at motor). No vacuum is applied to either port of the HEATER-A/C MODE VAC-UUM MOTOR. This puts the HEATER-A/C DOOR in the middle position. Vacuum is applied through the BLU hose to close the Windshield Defrost Outlets. Part of the air is directed to the Heat Outlet. The remaining air flows through the A/C outlets, with the A/C-DEFROST DOOR blocking the Windshield Defrost Outlets. The compressor operates.

DEFROST—Vacuum is applied to the ORN hose to bring inside air to the blower. Vacuum is applied through the YELLOW hose to the HEATER-A/C MODE VACUUM MOTOR to

close the Heat Outlets. With no vacuum at the DEFROSTER DOOR VACUUM MOTOR, air flows out the defrost vents.

The following table shows the position of each air door in each of the mode settings:

Touch Control Settings	Blower Speed	A/C Defrost Door	Heater A/C Door	Outside Air Door
Off	Off	В	A	A
Econ	Variable	В	A. B. or C	Α
Lo	Fixed Low	В	A, B, or C	A or B
Auto	Variable	В	A.B. or C	A or B
Hi	Fixed High	В	A, B, or C	A or B
Bi- Level	Variable	В	В	A or B
Def	Fixed High	A	С	A or B

The TEMPERATURE DOOR responds to the temperature sensors in all touch control settings. It can move to any of its positions to control the air temperature.

The RECIRCULATING/OUTSIDE AIR DOOR is always in position A, allowing outside air to flow in, unless 65° is selected. Then it moves to position B to recirculate in-car air.

The PRESSURE CYCLING SWITCH prevents ice formation on the evaporator coil. The switch opens when the coolant pressure is below 172 kPa (26 psi).

For cars with Turbo engines, when the Turbo System is operating, the ELECTRONIC CON-TROL MODULE (ECM) does not ground the A/C CUT-OUT RELAY coil. This opens the relay contacts. The A/C compressor stops during turbo operation.

When current to the A/C COMPRESSOR CLUTCH is cut off, the magnetic field surrounding the coil collapses. The A/C compressor clutch diode across the coil suppresses these spikes by supplying a low resistance conducting path.

#### ELECTRONIC AIR CONDITIONING HARNESS CONNECTOR FACES





BLK 2977048 C497 (Socket Half)



NAT 12020213 C892 (Socket Half)



To A/C Compressor Clutch



BLK 12004700 To A/C Control Head (C1)



BLK 8917767 To A/C Control Head (C2)



BL# 2004706 To A/C Control Head (C3)



BLK 12020015 To A/C Cut Out Relay - 62 - 13

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