

# GROUP 80

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### Air conditioning system

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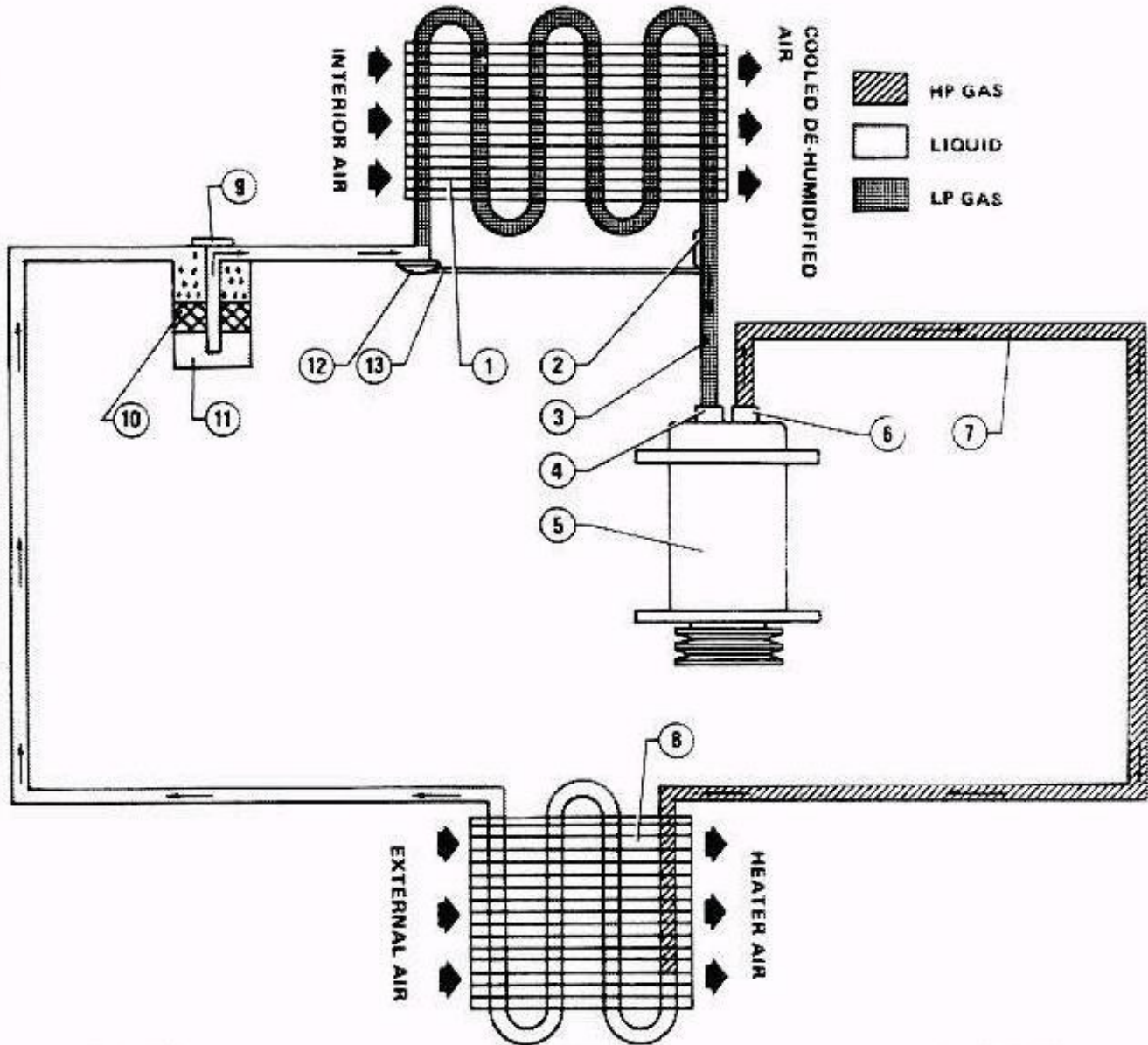
### Heating system

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Air conditioning system

DESCRIPTION

GENERAL



- 1 Evaporator
- 2 Temp. sensor
- 3 In line
- 4 In connection

- 5 Compressor
- 6 Out connection
- 7 Out line
- 8 Condenser

- 9 Sight glass
- 10 Receiver - drier
- 11 Receiver tank
- 12 Expansion valve
- 13 Thermal tube

Air conditioning system is provided to cool and dehumidify interior air

- Operation is that of the normal refrigerating cycle using Freon 12 (R12) refrigerant, based on liquid-to-gas and gas-to-liquid conversion principle to shed or build up heat to a considerable extent.

- Freon 12 was chosen for its favorable characteristics as a non-toxic, non-flammable, non-explosive non-corrosive and odorless fluid.
- During operation the system provides two distinct levels of pressure sustained by compressor (5) on one side and ex-

- pansion valve (12) on evaporator (1) inlet on the other.
- Refrigerant leaves compressor (5) as a high-temperature high-pressure gas (80 to 100°C, 10 to 18 bar) (176 to 212°F, 142 to 256 p.s.i), enters condenser (8) where it is cooled (in certain conditions also by fan), and leaves in liquid at

## HEATER

40 to 50°C (104 to 122°F).

From here, refrigerant is fed through receiver - drier (10) where it is filtered and dehumidified to prevent moisture from clogging expansion valve which would adversely affect cooling cycle efficiency.

- Expansion valve (12) on evaporator inlet atomizes the fluid, thereby reducing pressure and temperature.

Fluid then enters evaporator (1) where it is vaporized, thereby removing heat from air directed on heat exchanger fins by centrifugal fan. Cooled air is

subsequently admitted to vehicle interior.

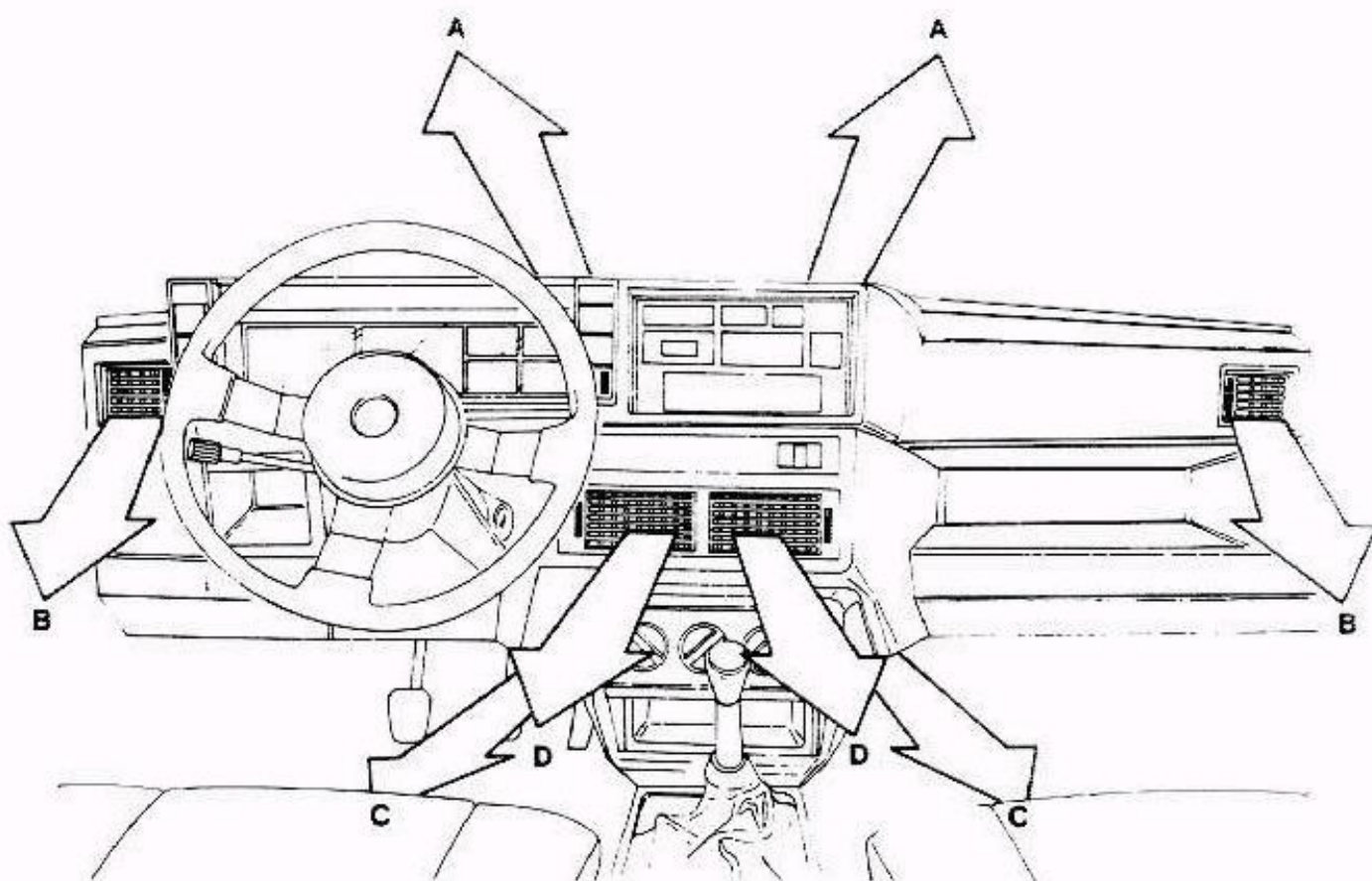
Moreover, upon contact with cold evaporator walls, air loses most of its moisture which is drained from the vehicle through a condensate line. Gas from evaporator is drawn by compressor and cycle is repeated.

- One or two Trinary pressure switches pick up min. and max. circuit pressure to monitor correct system operation. Pressure switches are housed in receiver-drier.

- System is controlled from a panel cluster (see symbols below) including:

- Air distribution control
- Heating control
- Conditioning thermostat for evaporator temperature control to maintain desired interior conditions at all times.
- Air recirculation control to admit fresh or recirculated air to condenser.
- Three - position fan control switch.

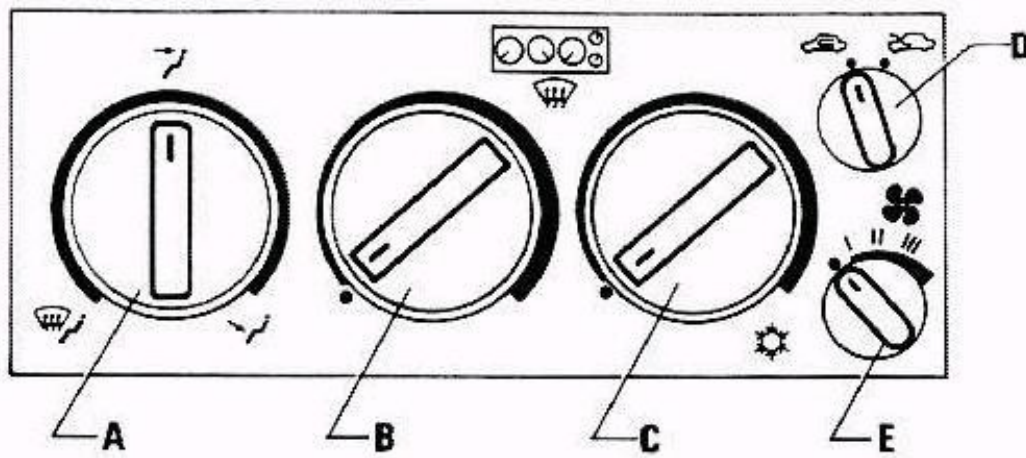
## AIR FLOW DIAGRAM











- A Windshield defrost
- B Side defrost
- C Floor
- D Ventilation

# HEATER

## AIR CONDITIONER CONTROL CLUSTER



							
Windshield	Ventilation	Floor	Defrosting	Recirculation air flow	Dynamic air flow	Blower fan	Thermostat

**FUNCTIONAL DIAGRAMS**

**CAUTION:**

Before starting engine ensure that conditioner is switched off (control C in position D) to prevent overloading starter and battery.

**1. DEFROSTING/DEMISTING**

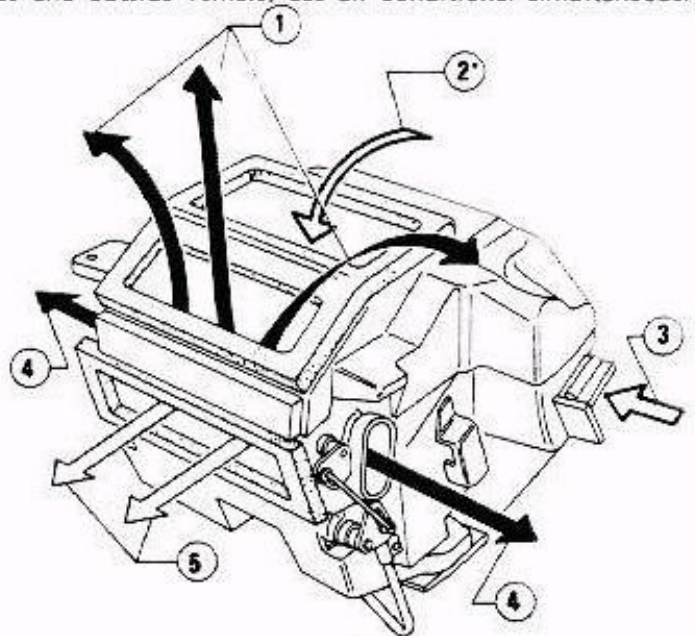
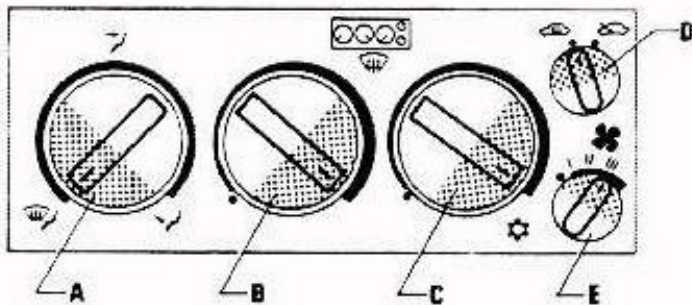
**CAUTION:**

To obtain the maximum air flow from the defrost louvers, the central air ventilation vents must be closed and the side vents directed towards the front door windows.

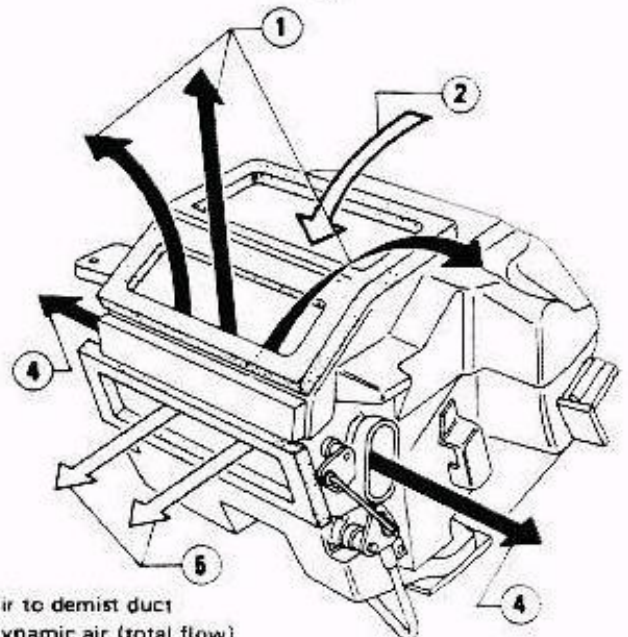
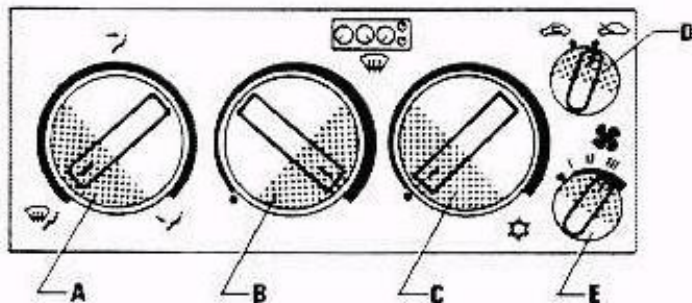
When the air conditioning and heating systems are operated simultaneously, and demisting has been performed, first switch off the heater and then the air conditioner to prevent the glass suddenly and dangerously misting up.

For prompt defrosting in extreme damp conditions both inside and outside vehicle, use air conditioner simultaneously with heating system.

Position of controls for fast defrosting/demisting



Position of controls for demisting with air conditioner off



- A Air distribution control
- B Heating control
- C Conditioner control
- D Air recirculation control
- E Fan control

- 1 Air to demist duct
- 2 Dynamic air (total flow)
- 2\* Dynamic air (partial flow: approx 15%)
- 3 Recirculation air
- 4 Air to side demisting vents
- 5 Air to central vents

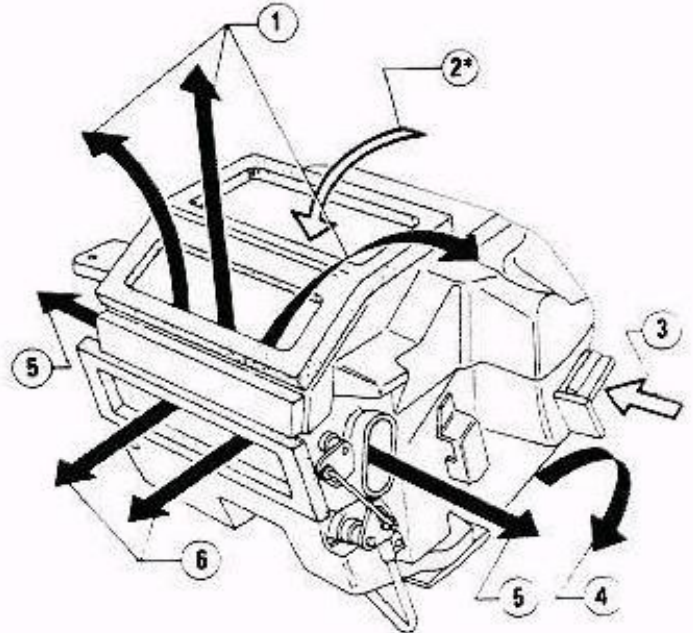
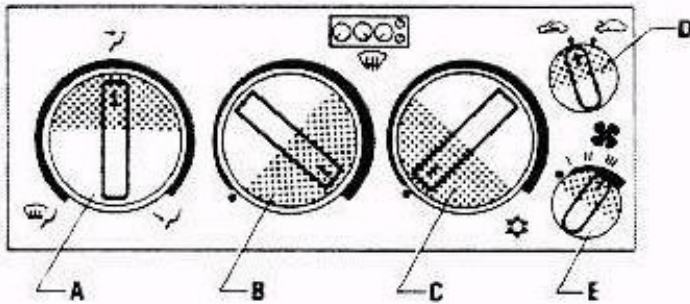
# HEATER

## 2. HEATING

### CAUTION:

To obtain maximum heating, move control D to the "Air Recirculation" position and open the central vents.

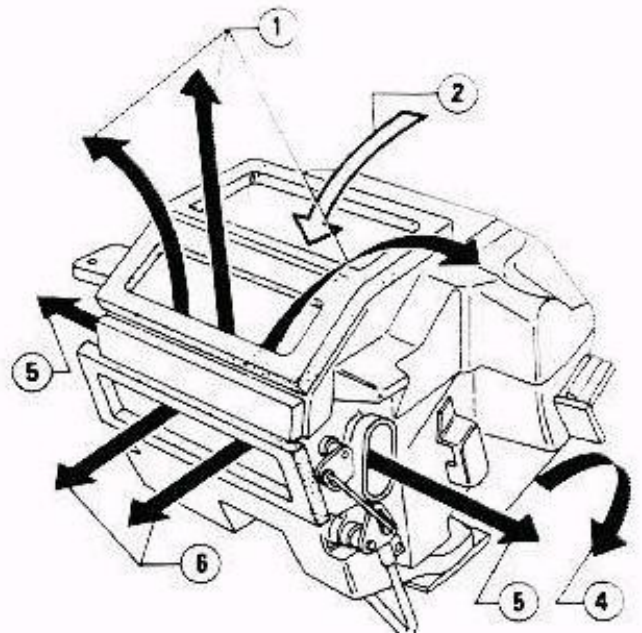
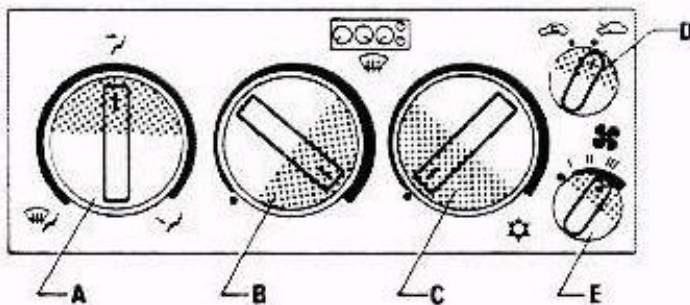
Position of controls for maximum hot air flow.



### NOTE

The maximum air flow to floor (4) can be obtained by turning control A fully and simultaneously closing the windshield defrost flow (1).

Position of controls in mild weather conditions



### NOTE

The maximum air flow to floor (4) can be obtained by turning control A fully and simultaneously closing the windshield defrost flow (1).

- A Air distribution control
- B Heating control
- C Conditioner control
- D Air recirculation control
- E Fan control

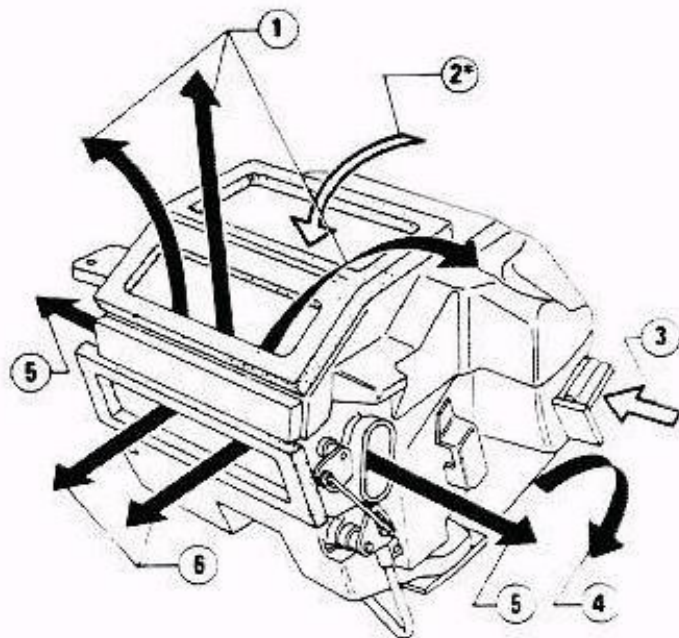
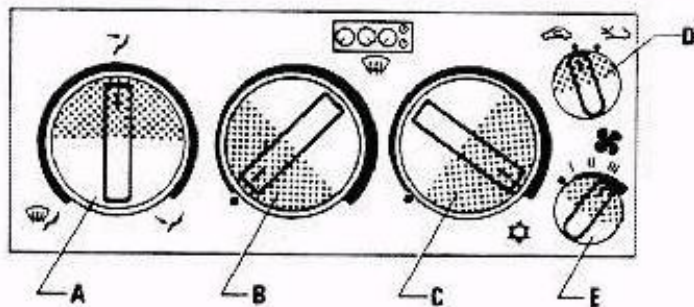
- 1 Air to demist duct
- 2 Dynamic air (total flow)
- 2\* Dynamic air (partial flow, approx 15%)
- 3 Recirculation air
- 4 Air to floor
- 5 Air to side demisting vents
- 6 Air to central vents

## 3. AIR CONDITIONING

### CAUTION

To obtain the maximum and quickest cold air flow, move control D to the "Air Circulation" position and open the central vents.

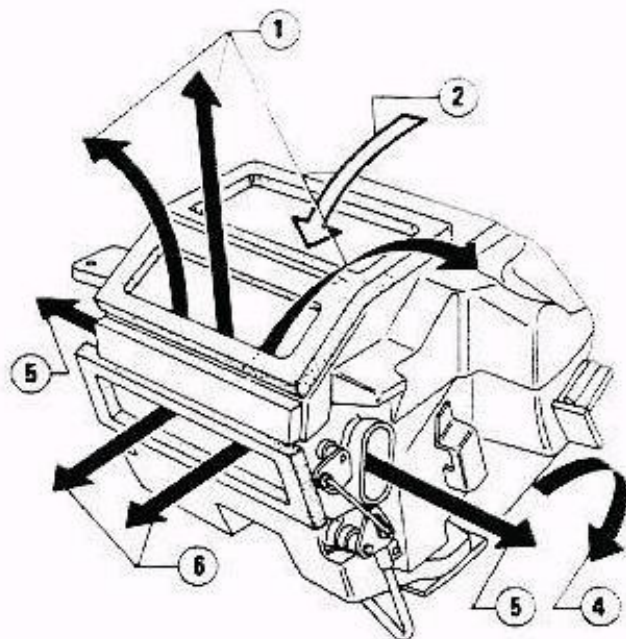
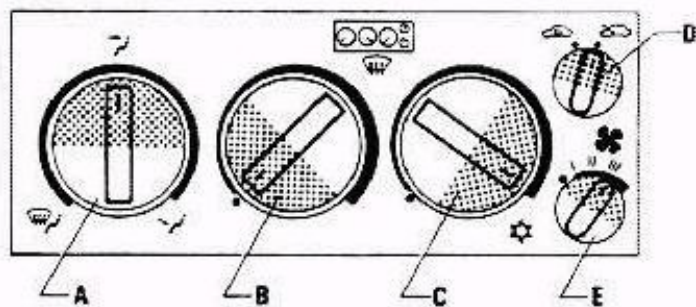
Position of controls for maximum air conditioning flow.



### NOTE

The maximum air flow to floor (4) can be obtained by turning control A fully and simultaneously closing the windshield defrost flow (1).

Position of controls for mild weather conditions.



### NOTE

The maximum air flow to floor (4) can be obtained by turning control A fully and simultaneously closing the windshield defrost flow (1).

- A Air distribution control
- B Heating control
- C Conditioner control
- D Air recirculation control
- E Fan control

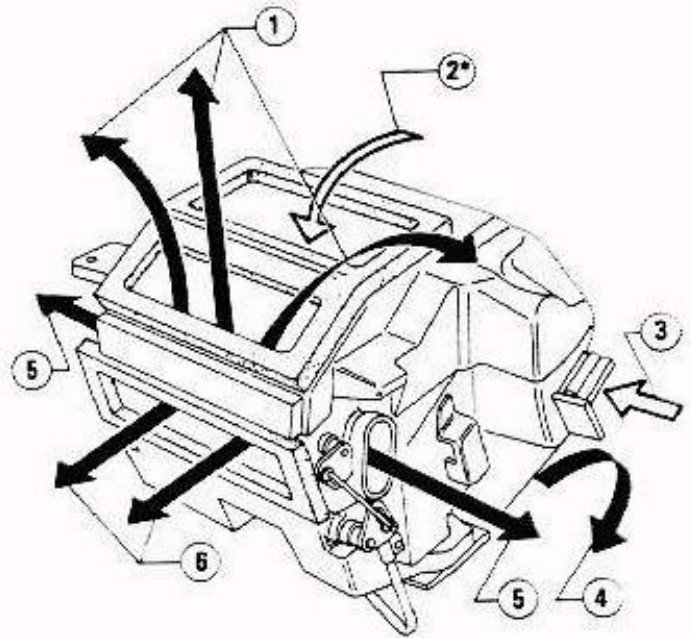
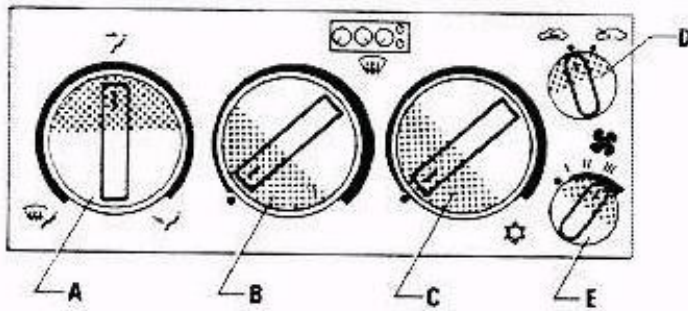
- 1 Air to demist duct
- 2 Dynamic air (total flow)
- 2\* Dynamic air (partial flow approx 15%)
- 3 Recirculation air
- 4 Air to floor
- 5 Air to side demisting vents
- 6 Air to central vents

4. VENTILATION

CAUTION

To obtain the maximum air flow, all the air ventilation vents on the dashboard must be opened completely.

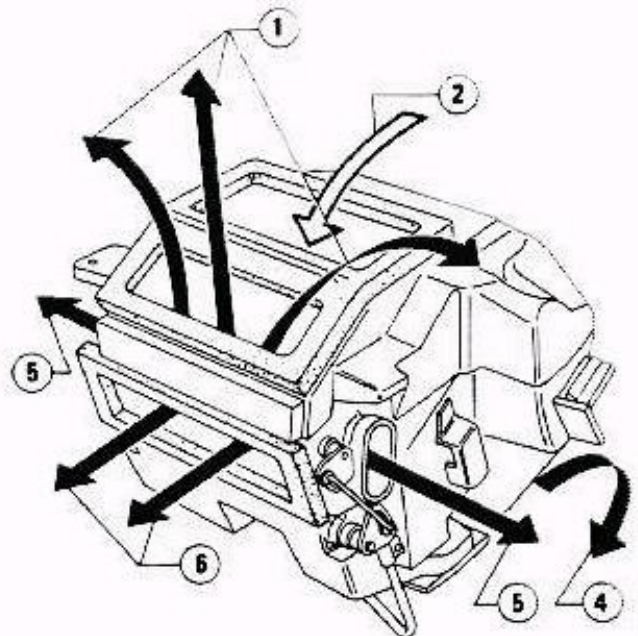
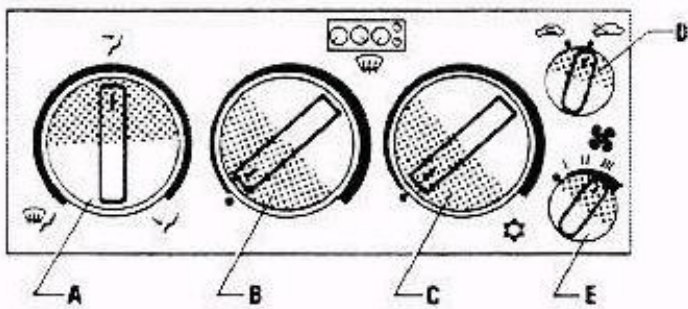
Position of controls for air flow with recirculation air



NOTE

The maximum air flow to floor (4) can be obtained by turning control A fully and simultaneously closing the windshield defrost flow (1).

Position of controls for air flow with dynamic air.



NOTE

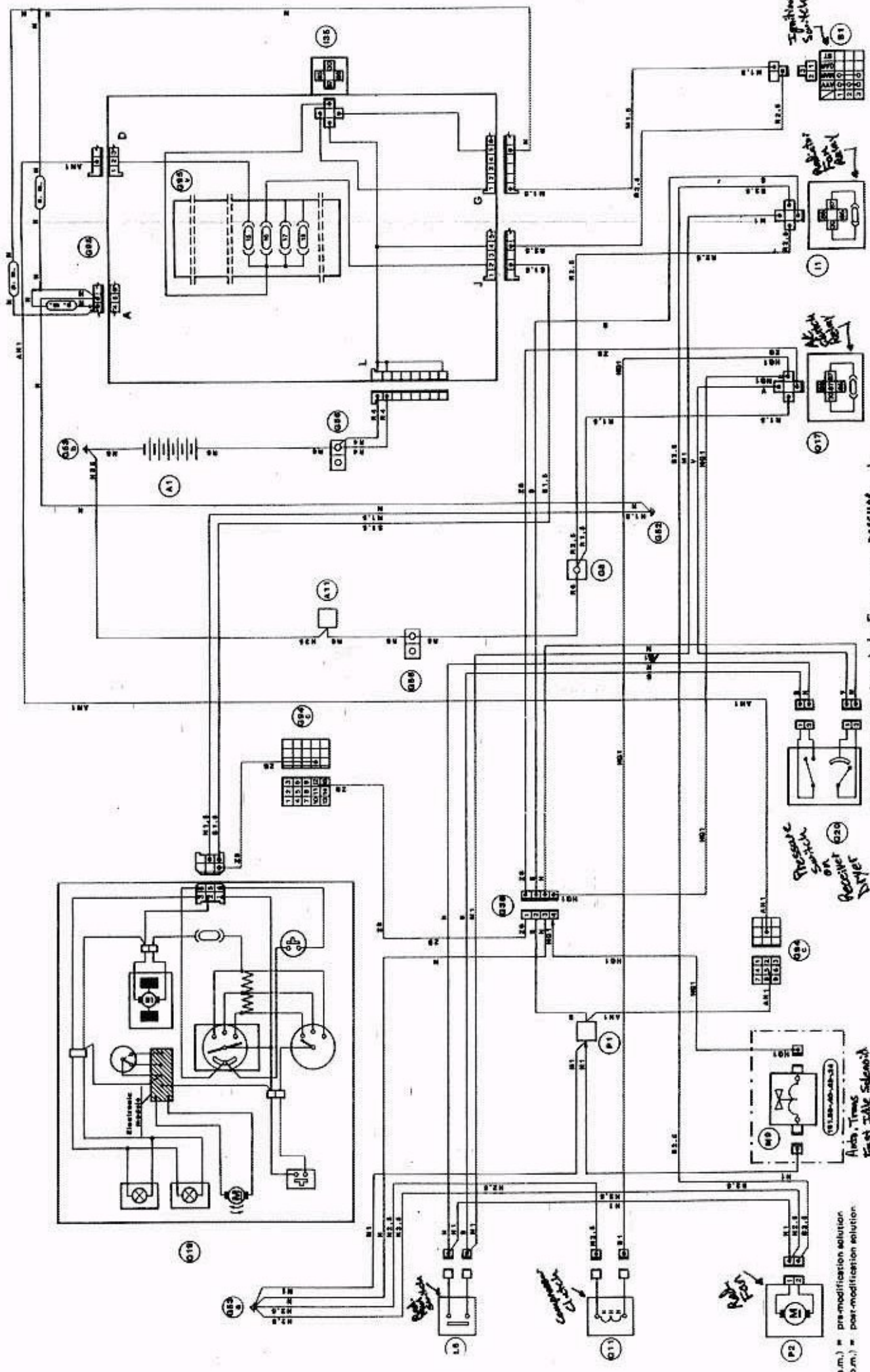
The maximum air flow to floor (4) can be obtained by turning control A fully and simultaneously closing the windshield defrost flow (1).

- A Air distribution control
- B Heating control
- C Conditioner control
- D Air recirculation control
- E Fan control

- 1 Air to demist duct
- 2 Dynamic air (total flow)
- 2\* Dynamic air (partial flow, approx 15%)
- 3 Recirculation air
- 4 Air to floor
- 5 Air to side demisting vents
- 6 Air to central vents



WIRING DIAGRAM



(a.m.) = pre-modification solution  
 (p.m.) = post-modification solution

Top Contacts are for Tubular Fan, High or Low Pressure  
 Bottom Contacts are Compressor PA384300000002 for A/C clutch.

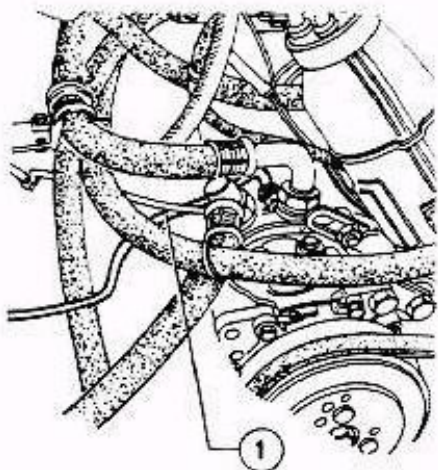
## MAINTENANCE

### SYSTEM DISCHARGING

#### CAUTIONS:

- Refrigerant spills are not dangerous but may become toxic in the vicinity of naked flames. Drain refrigerant away from open flames in ventilated premises.
- Avoid prolonged exposure of skin to vaporizing refrigerant as expanding gas at ambient pressure and temperature freezes to  $-29.8^{\circ}\text{C}$  ( $-22^{\circ}\text{F}$ ) and can cause frostbite.
- Protect eyes from refrigerant splashes as extremely low temperature fluid can cause blindness.

1. Remove plug from LP line union on compressor.
2. Insert drain pipe (1) with needle fitting in union and drain refrigerant completely.



1 Refrigerant discharge pipe

### SYSTEM CHARGING

#### CAUTIONS:

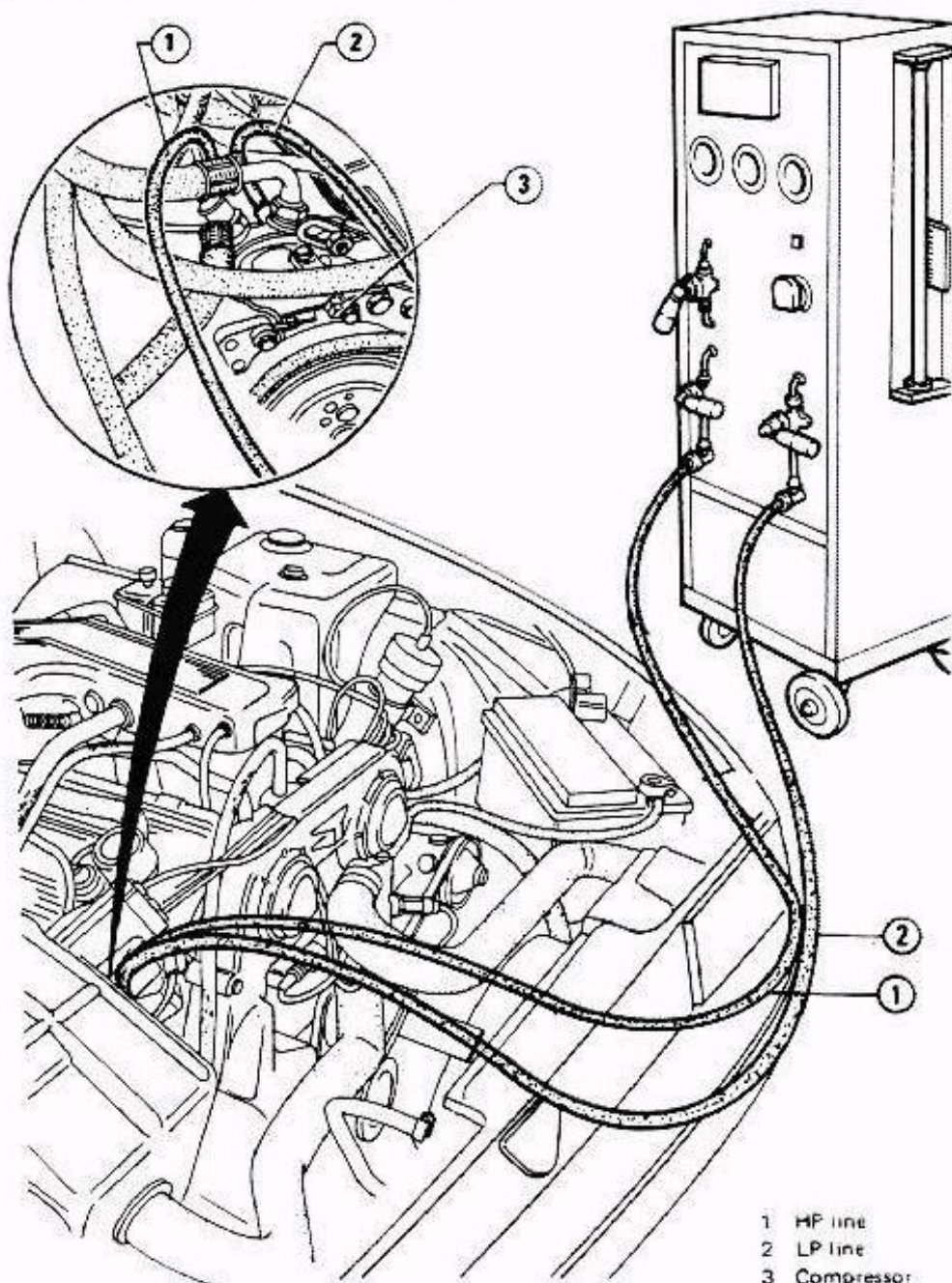
- Refrigerant is not in itself dangerous but because it is used under pressure, certain precautions must be taken to avoid injury and damage should the physical changes taking place fail to be strictly controlled.

- Refrigerant is normally kept in metal bottles, which should be stored away from sunlight to prevent heat from raising internal pressure above the safety limit.
- In the cold season refrigerant transfer from bottle to charging station may prove difficult owing to low internal pressure. Before transferring the fluid, allow bottle to stand for 20 minutes in heated premises at  $35^{\circ}\text{C}$  ( $95^{\circ}\text{F}$ ). Do not use open flames to heat bottle. Do not leave full bottle in charging station for long periods.

System charging should be carried out using proper charging equipment.

1. Connect refrigerant charging lines as follows:

- LP line (2) to compressor rear cover connection on engine side.
- HP line (1) to compressor rear cover connection on outward side.



1 HP line  
2 LP line  
3 Compressor

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2. Connect opposite end of lines (5) and (6), low and high pressure respectively, to connections of cocks (4) and (7) on charger.

3. Turn on charger and open vacuum cock (8) and HP cock (7) to draw air from conditioner.

4. Allow to run for 10 minutes, then shut and turn vacuum cock on and off a few times, checking that pointer of LP gauge (2) remains steady. Pointer fluttering is evidence of system leakage. Therefore, before continuing check that all connections are tight. If leakage persists pour 200 g (0.44 lb) of Freon 12 in system and trace point of leakage using a leak detector zeroed with Freon 11. Drain Freon previously introduced.

5. Before filling dehydrate system at

0,05 to 0,08 kPa  
0,4 to 0,6 mmHg

to be read off vacuum gauge, for 30 minutes. Shut off cocks (7) and (8) and turn off charger.

6. Align zero on reference pointer (3) to refrigerant level on transparent column. Slowly turn on LP cock (4) for the time needed to introduce in system the specified amount of Freon 12, as read off scale of pointer previously zeroed.

### CAUTION:

Turn on LP cock slowly to prevent hydraulic hammer effect in circuit

System pipe fitting threads

Fluid:

RIVOIRA Freon 12

Quantity:

0.90 kg (1.98 lb)

If required amount of refrigerant cannot be admitted to system, start engine and activate compressor to draw refrigerant into system.

7. Shut off LP cock (4) and keep compressor connected to charger. Start engine and run at 1000 to 1200 rpm. Activate conditioner. Check through sight glass on R-D unit for air bubbles. If air bubbles are noticed discharge system and recharge.

8. After conditioner has been on for ten minutes check pressure on LP gauge (2) of charger as clutch causes compressor to drop off. Pressure reading should be

80 to 250 kPa  
(0.8 to 2.5 kg/cm<sup>2</sup>)  
(11.38 to 35.55 p.s.i.)

- Pressure reading below 80 kPa (0.8 kg/cm<sup>2</sup>) (11.38 p.s.i.) may be due to insufficient refrigerant. Discharge system and repeat entire sequence and hold vacuum for 40 minutes.

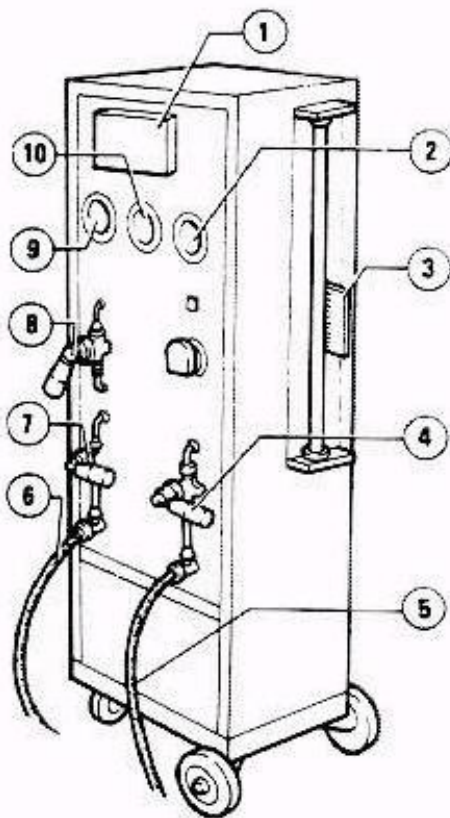
- Pressure reading above 250 kPa (2.5 kg/cm<sup>2</sup>) (35.55 p.s.i.) may be due to excessive refrigerant (compressor noise) or evaporator thermostat inefficiency (thermostat does not enable clutch disengagement for compressor drop-off). Discharge excess refrigerant. If thermostat is defective ensure that sensor is properly inserted in evaporator.

9. Disconnect lines (5) and (6) from charging points of conditioner system and install plugs.

10. Zero leak detector with Freon 11 and check for leakage at system connections.

Before checking for leakage, blow compressed air in engine compartment to eliminate any trace of refrigerant possibly splashed on engine during needle valve disconnection.

11. If traces of refrigerant are noticed on connections, tighten connection(s) affected, blow compressed air to eliminate refrigerant residues and recheck with leak detector. If leakage persists discharge system, back off connector and check that O-ring is properly seated in connection. Install connector and repeat system charging sequence.



- 1 Vacuum gauge
- 2 LP gauge
- 3 Fluid level ref. pointer
- 4 LP cock
- 5 LP line
- 6 HP line
- 7 HP cock
- 8 Vacuum cock
- 9 Meter
- 10 HP gauge

# SERVICE DATA AND SPECIFICATIONS

## TECHNICAL DATA

### DRIVE BELT TENSION

Versions		6 - cylinder injection
<b>Drive belts</b>		
<b>Alternator - water pump</b>		
Load	N (kg) (lb)	147 to 294 (15 to 30) (33 to 66)
Yield	mm (in)	16 (0.63)
<b>Steering pump</b>		
Load	N (kg) (lb)	147 to 294 (15 to 30) (33 to 66)
Yield	mm (in)	13 (0.51)
<b>Conditioner compressor</b>		
Load	N (kg) (lb)	196 to 343 (20 to 35) (7.87 to 13.78)
Yield	mm (in)	14 (0.55)

## GENERAL SPECIFICATIONS

### FLUIDS AND LUBRICANTS

Application	Type	Description	Quantity kg (lb)
Conditioner system capacity	FREON	RIVOIRA Freon 12 Part. No. 3681-69910	0.90 (1.98)
Conditioner system line connection threads	OIL	SUN OIL COMPANY Suniso 46 Part. No. 3631-69526	—

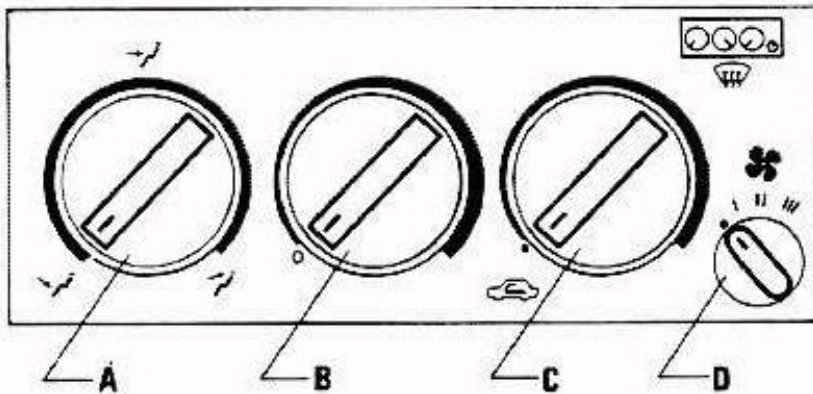
Heating system

**DESCRIPTION**







**AIR FLOW DIAGRAM**

The flow diagram is the same as the one illustrated on page 80-3.

**CONTROL SYMBOLS**



- A Air distribution control
- B Control for heater core liquid cock
- C Control for dynamic air intake shutter
- D Fan control

					
Windshield	Floor	Ventilation	Defrosting	Recirculation air flow	Blower fan

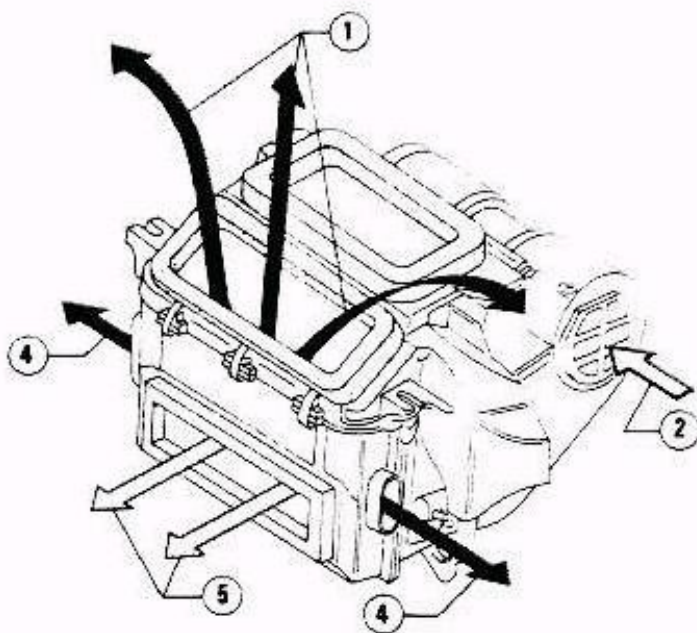
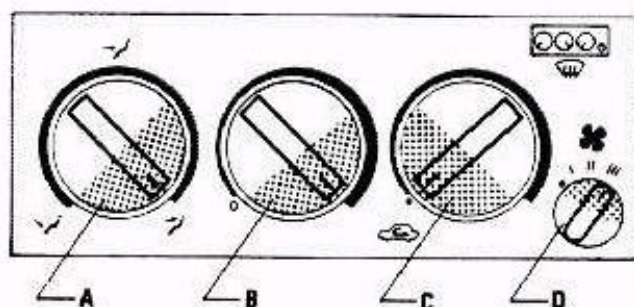
## FUNCTIONAL DIAGRAMS

### 1. DEFROSTING

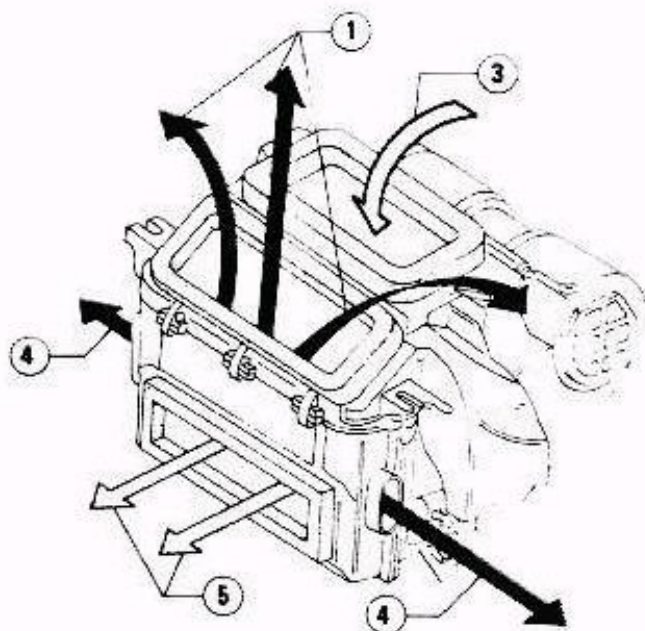
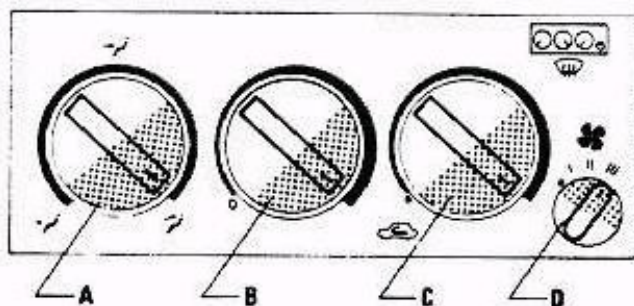
#### CAUTION

To obtain the maximum air flow from the defrost louvers, the central air ventilation vents must be closed and the side vents directed towards the front door windows.

Position of controls for recirculation air flow



Position of controls for dynamic air flow



- A Air distribution control
- B Control for heater core liquid cock
- C Control for dynamic air intake shutter
- D Fan control

- 1 Air to demist duct
- 2 Recirculation air
- 3 Dynamic air
- 4 Air to side demisting vents
- 5 Air to central vents

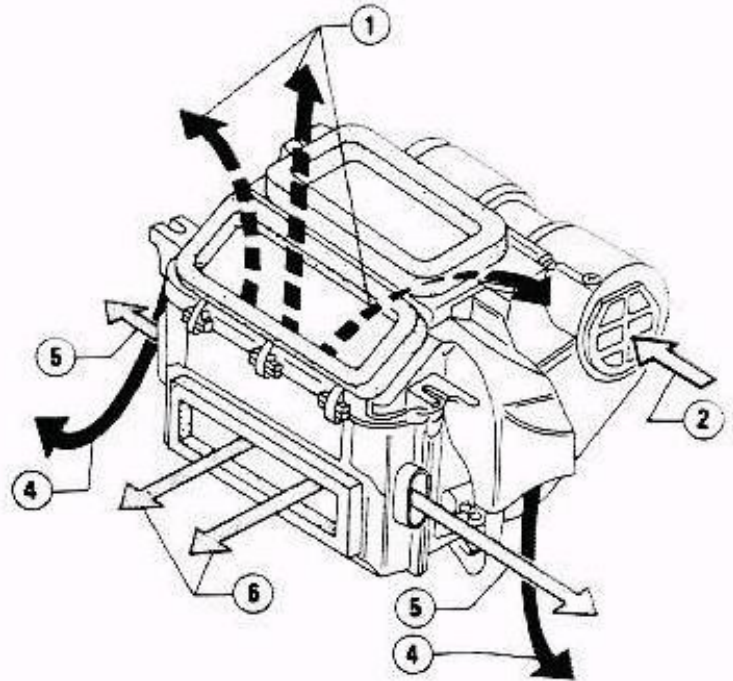
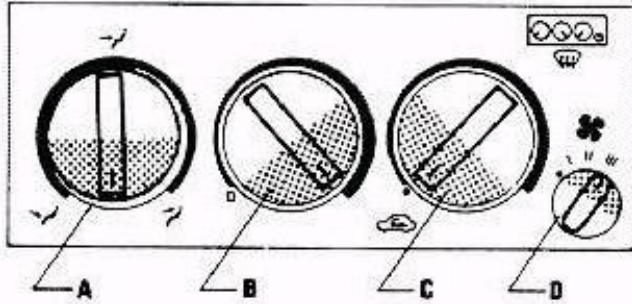
# HEATER

## 2. FLOOR

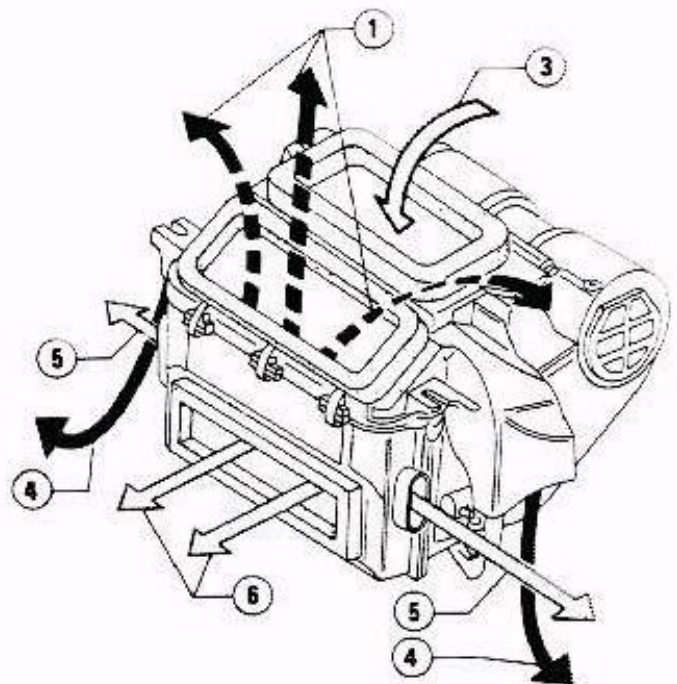
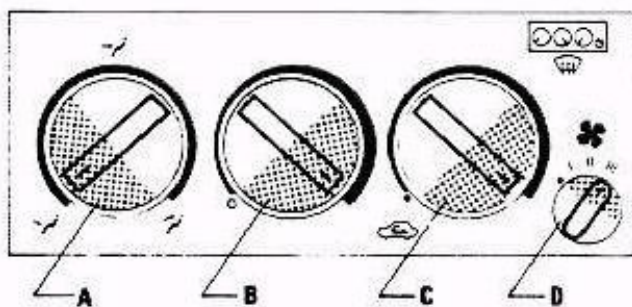
### CAUTION:

To obtain the maximum air flow to the floor, the central air ventilation vents and the side defrost vents must be closed.

### Position of controls for recirculation air flow



### Position of controls for dynamic air flow



- A Air distribution control
- B Control for heater core liquid cock
- C Control for dynamic air intake shutter
- D Fan control

- 1 Air to demist duct (partial flow)
- 2 Recirculation air
- 3 Dynamic air
- 4 Air to floor
- 5 Air to side demisting vents
- 6 Air to central vents

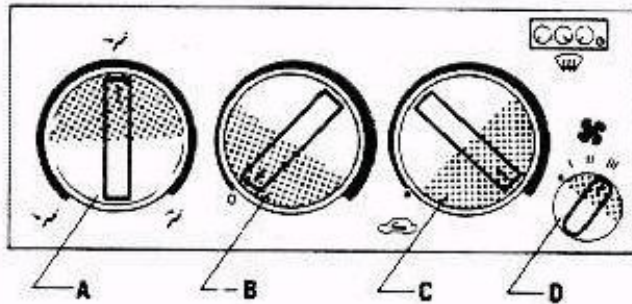
# HEATER

## 3. VENTILATION

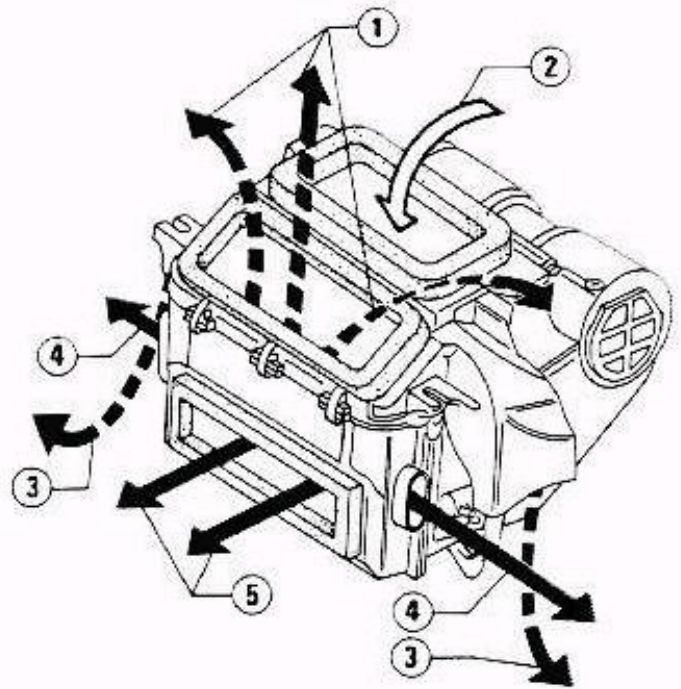
### CAUTION:

To obtain the maximum air flow, all the air ventilation vents located on the dashboard must be completely opened.

Position of control for dynamic air flow



- A Air distribution control
- B Control for heater core liquid cock
- C Control for dynamic air intake shutter
- D Fan control

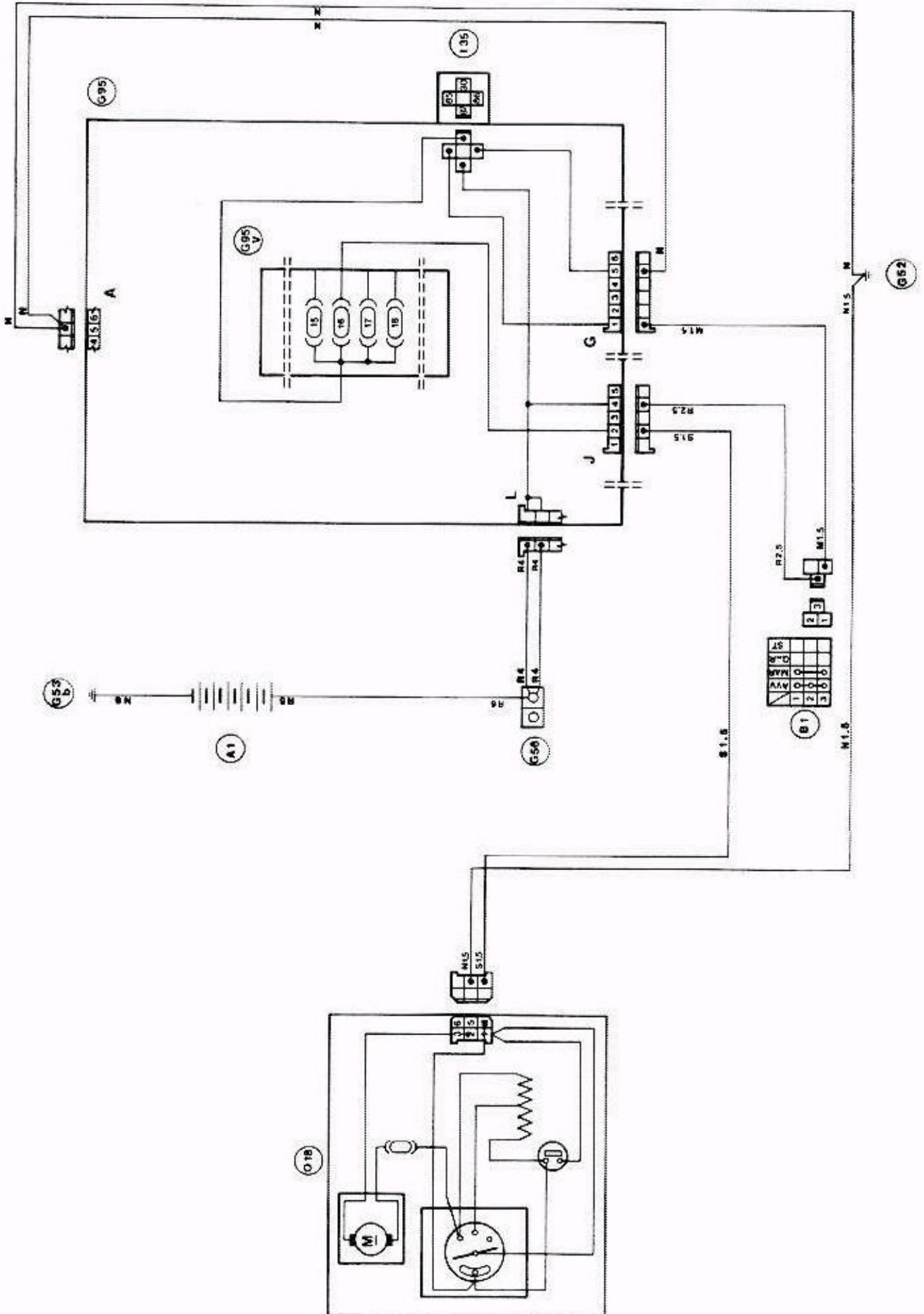


- 1 Air to demist duct (partial flow)
- 2 Dynamic air
- 3 Air to floor (partial flow)
- 4 Air to side demisting vents
- 5 Air to central vents



# HEATER

## WIRING DIAGRAM



**Alfa Romeo Auto S.p.A.**

**DIREZIONE ASSISTENZA TECNICA  
20020 - ARESE (Milano)**

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