



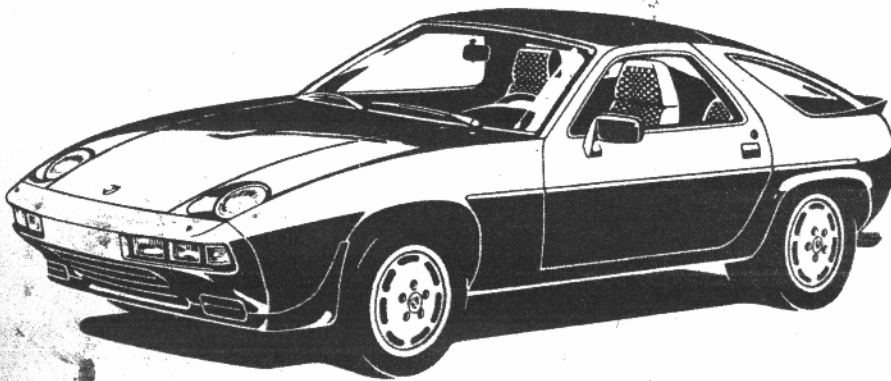
# SERVICE

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## HEATING

## VENTILATING and

## AIR-CONDITION SYSTEM



### 928

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# INFORMATION

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## TECHNIK

## P 80

## CONTENTS

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The new edition of the test plan for the automatic heating and air conditioning system in Type 928 cars contains the following information.

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# FRESH AND HEATED AIR CONTROLS – Type 928 Up To 1979 Models

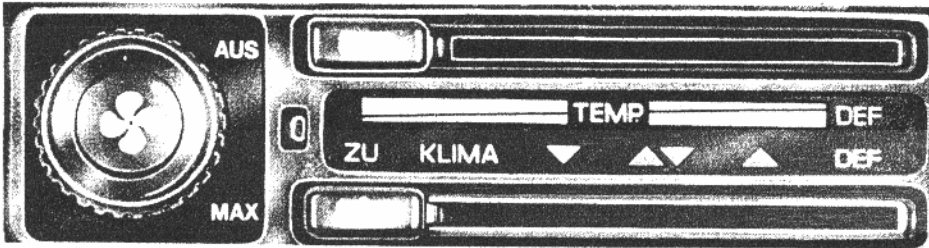
## Flap Control

Here is a survey of sliding control lever and flap positions.

Requirements: engine running and vacuum built up.

Heating is only effective when the upper sliding control lever is pushed to the right and the lower control lever is positioned at an air distribution symbol.

B – Control Flap Pos.	closed	open			
Heating power		ca. 10 %	ca. 50 %	ca. 90%	max.
Control Lever Pos.					



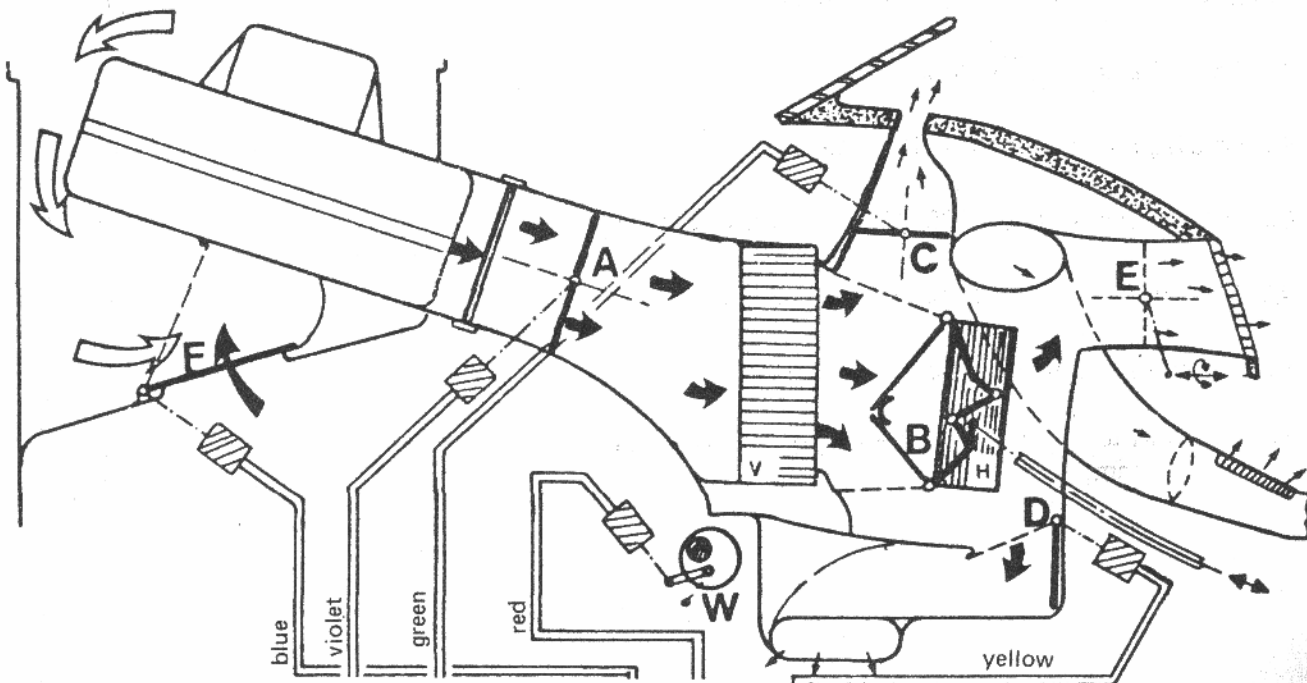
Upper lever controls heater valve "W" and contr. flaps "B"

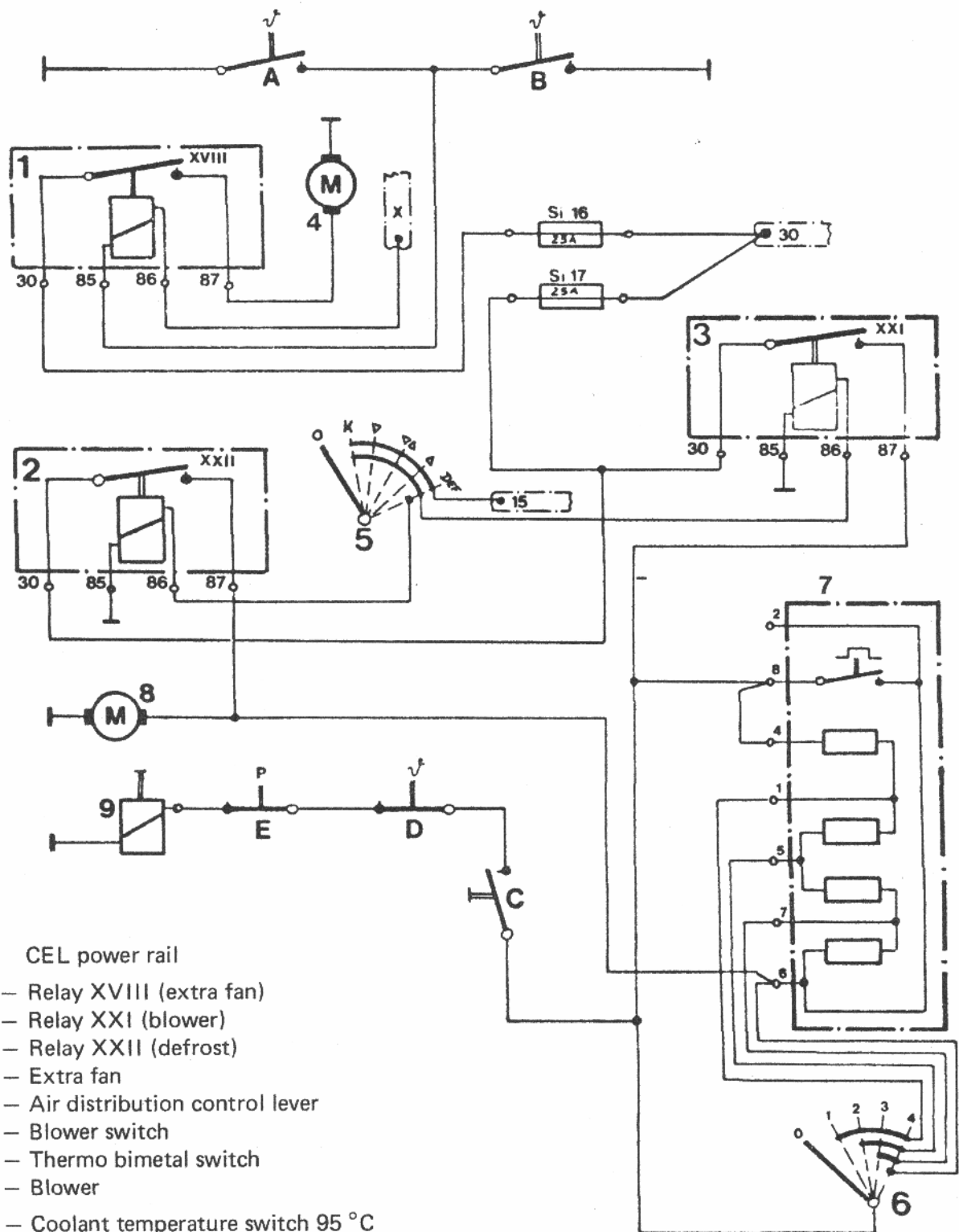
Both levers must be on right end for defrost

Lower lever controls air distribution, turning on AC and opens heater valve "W" in "DEF" pos.

Control Lever Pos.		↑	↑	↑	↑	↑	↑
Blower switch in 0 pos.	off	on	on	on	on	on	max.
A – Main shutoff flap	closed	open	open	open	open	open	open
C – Defroster flaps	closed	closed	closed	open	open	open	open
D – Footwell flap	open	closed*	open	open	closed	closed	* open since Ch. No. 928 810 1535
E – Center nozzle flap	open	open*	closed	closed	closed	closed	* manual regulation since Ch. No. 928 810 1884
F – Circulating air flap	closed	open*	closed	closed	closed	closed	* only when upper contr. lever is far left
W – Heating valve	closed	closed	closed	closed	closed	closed	Control flaps closed (max. cooling effect)

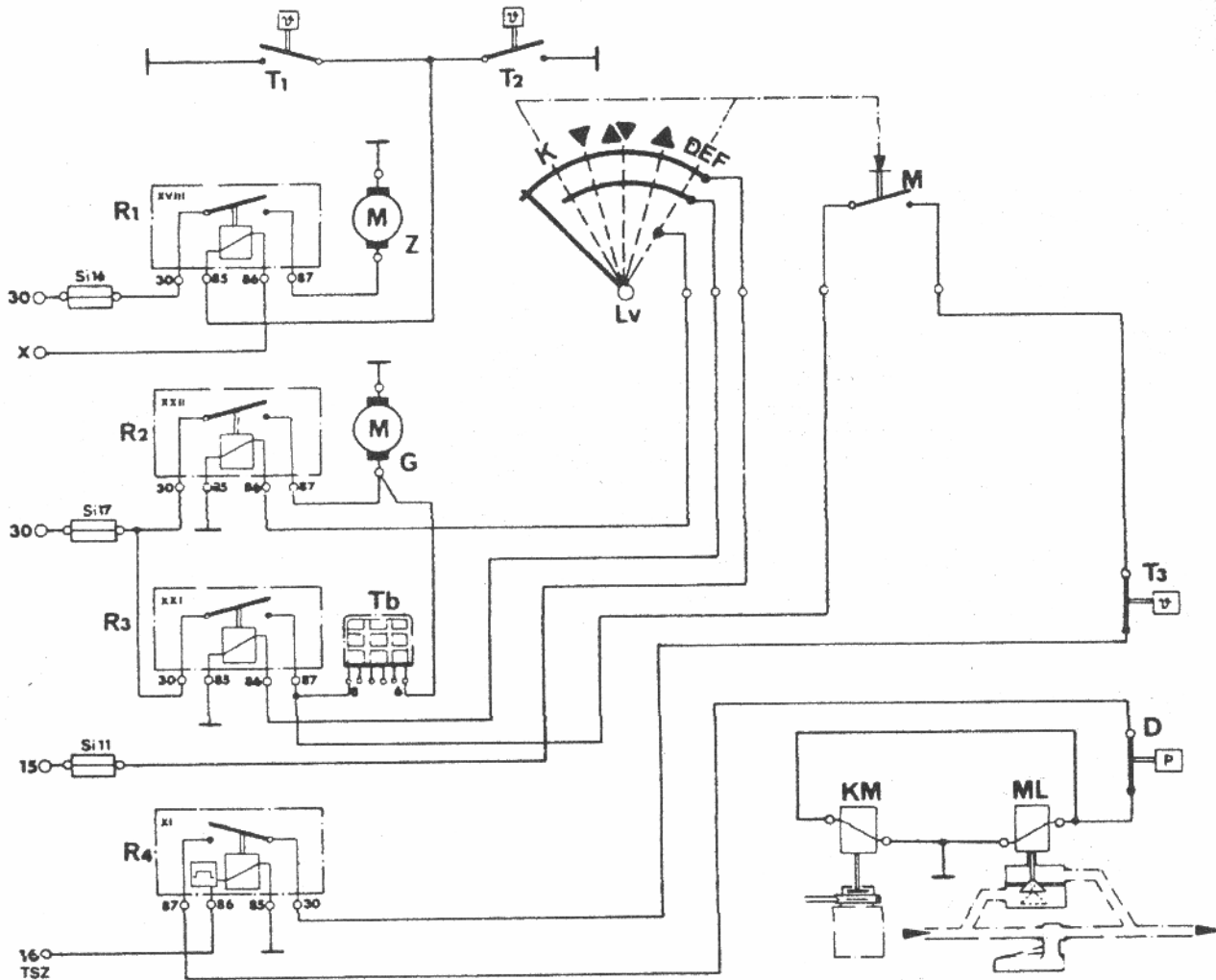
## Vacuum System Layout





- CEL power rail
- 1 – Relay XVIII (extra fan)
  - 2 – Relay XXI (blower)
  - 3 – Relay XXII (defrost)
  - 4 – Extra fan
  - 5 – Air distribution control lever
  - 6 – Blower switch
  - 7 – Thermo bimetal switch
  - 8 – Blower
  - A – Coolant temperature switch 95 °C
  - B – Frigen temperature switch 52 °C (on riser tube at top)
  - C – Microswitch (air distribution control lever)
  - D – Thermo switch (icing-up protection for evaporator between -1 °C and +3 °C)
  - E – Low pressure switch (Frigen 2.2 bar on side of liquid tank)
  - K – A/C compressor clutch

# AIR CONDITIONER (1979 Model)

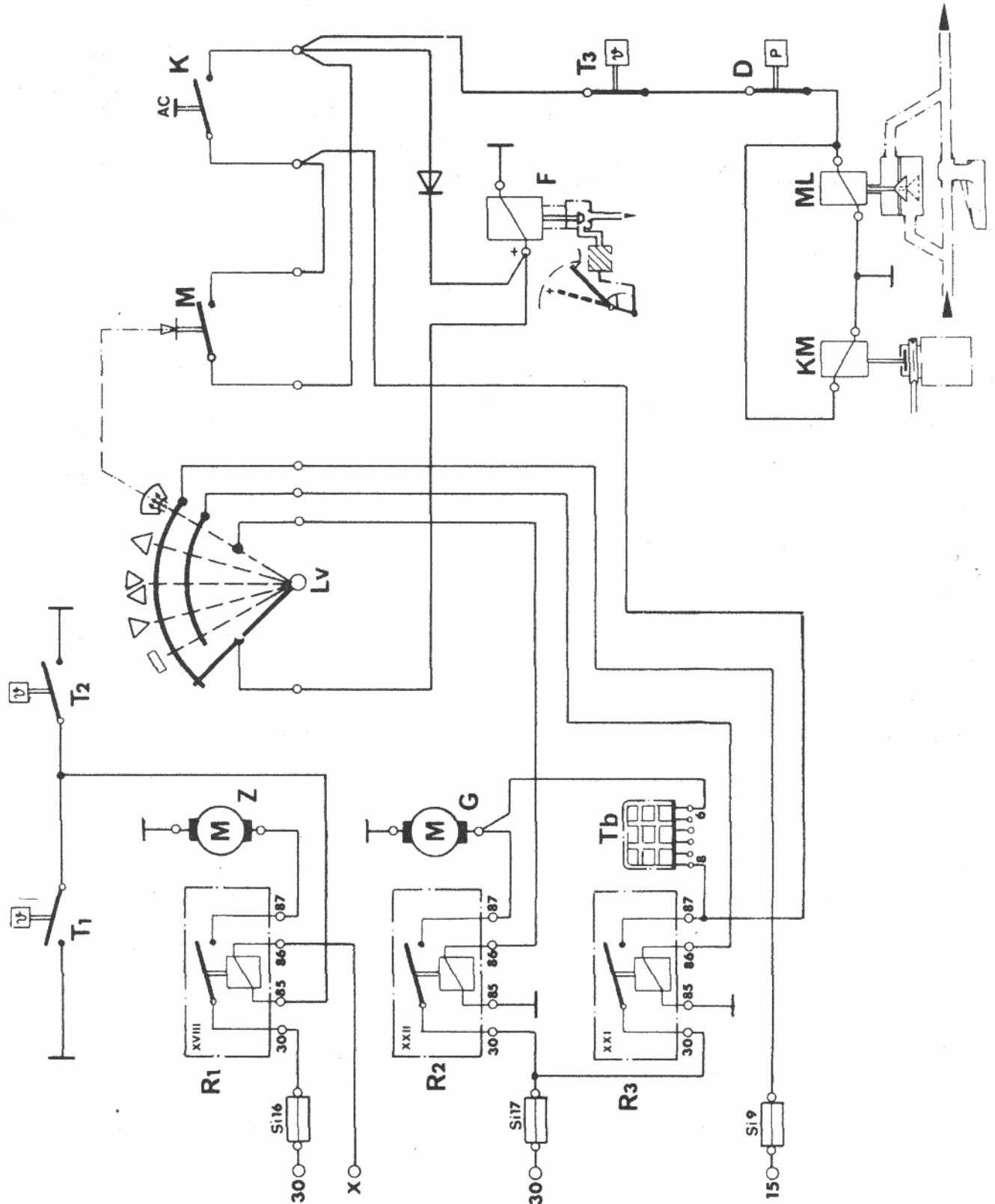


- T<sub>1</sub> – Coolant temperature switch (95 °C)
- T<sub>2</sub> – Frigen temperature switch (52 °C)
- T<sub>3</sub> – Evaporator temperature switch (–1 °C to +3 °C)
- R<sub>1</sub> – Extra fan relay
- R<sub>2</sub> – Defrost relay
- R<sub>3</sub> – Blower relay
- R<sub>4</sub> – Speed relay

- Z – Extra fan
- G – Blower
- T<sub>b</sub> – Thermo bimetal switch
- L<sub>v</sub> – Program control lever
- M – Microswitch
- D – Low pressure switch for Frigen (2.2 bar)
- KM – Compressor magnetic clutch
- ML – Solenoid air valve

Speed relay XI is connected via term. 31 b with control unit term. 16 of the ignition system. 16 of the ignition system. The electronics of relay XI open the relay contacts when the engine speed is higher than approx. 5500 + 100 rpm, through which the compressor clutch is switched off to prevent excessive loads on the compressor.

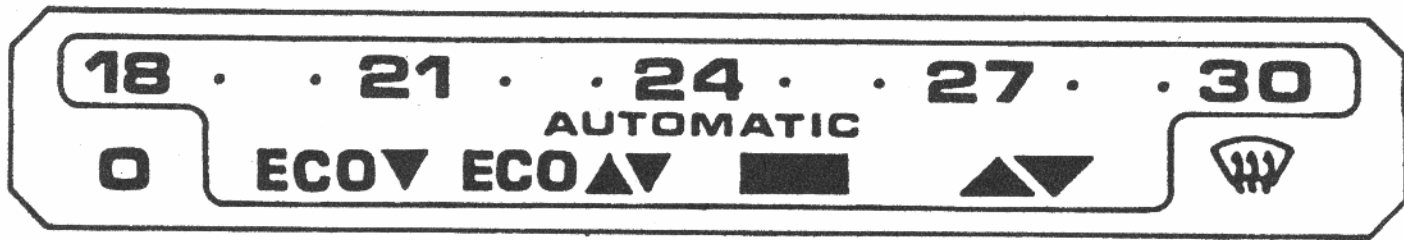
The A/C compressor is also switched on in the "DEF" program control lever position, in order to remove moisture from the incoming fresh air via the evaporator. This reduces fogging of the windshield with moist fresh air.



- T<sub>1</sub> - Temperature switch - coolant (95 °C)
- T<sub>2</sub> - Temperature switch - Frigen (52 °C)
- T<sub>3</sub> - Temperature switch - evaporator (-1 °C to +3 °C)
- R<sub>1</sub> - Extra fan relay
- R<sub>2</sub> - Defrost relay
- R<sub>3</sub> - Blower relay
- Z - Extra fan

- G - Blower
- T<sub>b</sub> - Thermo bimetal switch
- L<sub>v</sub> - Program control lever
- M - Microswitch
- D - Lower pressure switch - Frigen (2.2 bar)
- KM - Compressor magnetic clutch
- ML - Solenoid air valve
- K - Compressor switch
- F - Solenoid valve

## AUTOMATIC AIR CONDITIONER – Up To 1983 Model



The automatic air conditioner will maintain a set (preselected) inside temperature, regardless of the outside temperature.

This is accomplished by constant heating and cooling, and is monitored by outside and inside temperature sensors.

An electric motor (on left side of the air conditioner box or right side for RHD cars) operates the heating flaps (open/closed) depending on the program selected with the control switch.

Air conditioner compressor cooling of the passenger compartment is only possible from "AUTOM." program position on.

Cooling will only be in accordance with the instantaneous outside temperature in "ECO" position, since the compressor is not switched on.

### Components:

- Inside sensor with blower (in instrument panel).
- Outside sensor (in alternator cooling hose).
- Control switch with temperature selection lever (reacts to a potentiometer).
- Control switch with program selection lever.

Motor on left side of air conditioner box (right side for RHD cars).

6 solenoid valves underneath the air conditioner box control vacuum to the vacuum units of the air flaps.

### Note: (since 1982 models)

In temperature selection lever position 18 (left stop) there is only cooling, no heating – max. cooling.

In temperature selection lever position 30 (right stop) there is only heating, no cooling – max. heating.

This test plan can be used to check the function of the M 563 automatic air conditioning system and to pinpoint any faults quickly.

Proceed step by step when checking and make sure that each test is performed with the correct tester at the correct test point. A wiring diagram is also provided.

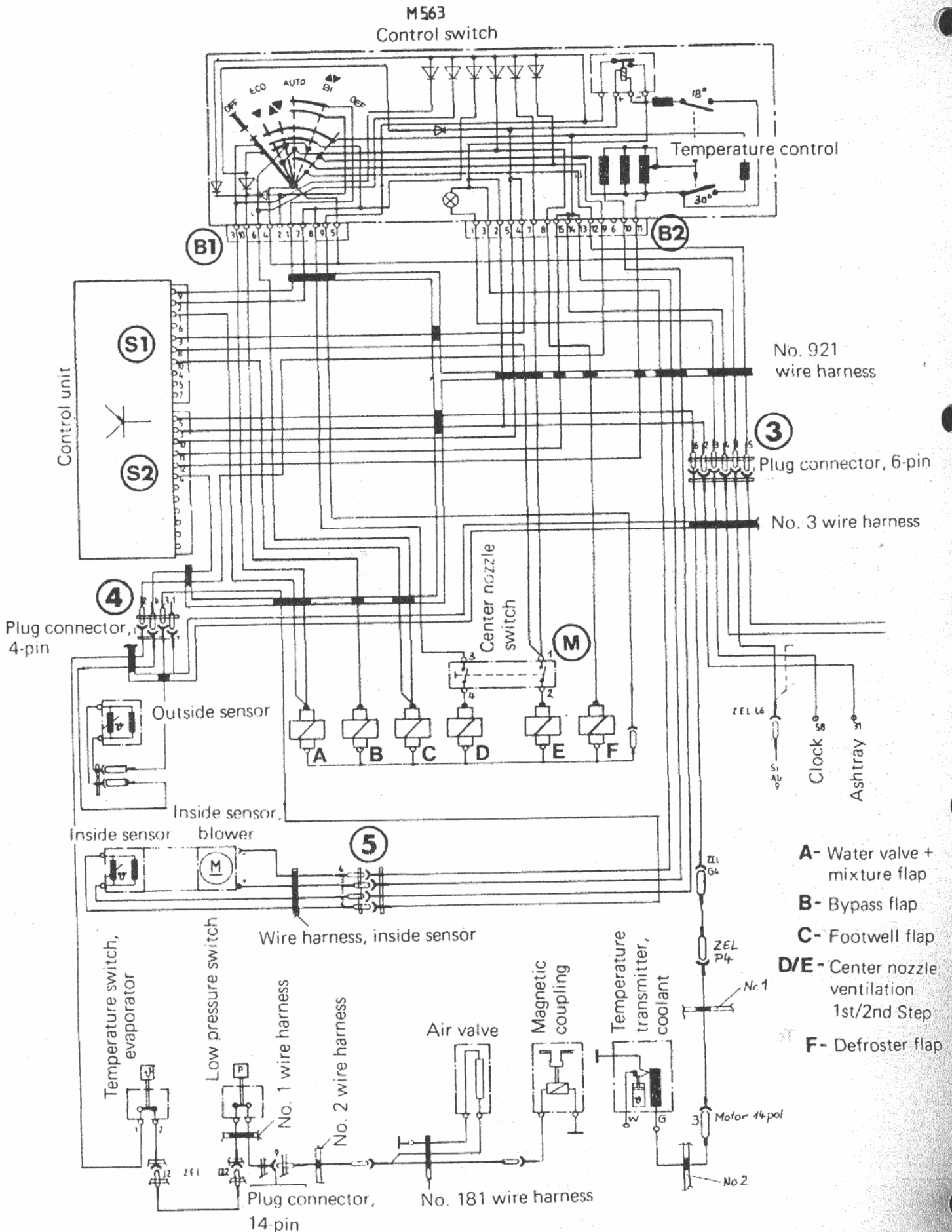
Only an ohmmeter and a test lamp are required for testing.

**Where What Is:**

Test	Test Point	Page
Power supply	A 1-5	9
Ground connections	A 6-8	9
Sensors	B	11
All sensors	B 1	
Inside sensor	B 2	
Inside sensor blower	B 2 a	
Outside sensor	B 3	
Temperature potentiometer	B 4	
Control switch removal	B 4 a	
Control unit/flap function	C	19
Operating motor	C 1	
Solenoid valves	C 2	
Flap function	C 3	
Cold start interlock	D	25
with cold engine	D 1	
with warm engine	D 2	
Compressor magnetic clutch	E	27
Test box for operating motor	F	28
Flap program	G	29-31
Wiring diagram up to 1983	H	32



# TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1980 to 1983)



No. 921 wire harness

3 Plug connector, 6-pin

No. 3 wire harness

4 Plug connector, 4-pin

- A - Water valve + mixture flap
- B - Bypass flap
- C - Footwell flap
- D/E - Center nozzle ventilation 1st/2nd Step
- F - Defroster flap

5 Wire harness, inside sensor

Plug connector, 14-pin

No. 181 wire harness

Motor 44-pol

- Meaning of codes in wiring diagram:
- B1 — Control switch plug, small (10 pins)
  - B2 — Control switch plug, large (15 pins)
  - S1 — Control unit plug, small (10 pins)
  - S2 — Control unit plug, large (12 pins)
  - M — Center nozzle switch
  - 3-5 — Plug connections

#### A) POWER SUPPLY (Test Lamp)

The electric part of the air conditioner is supplied with power from term. 15 (ignition lock) via fuse no. 9.

##### Testing

- Remove CEL cover; remove both side trim panels on center console.
- Turn on the ignition.

##### Power To:

1. Fuse no. 9.
2. CEL plugs F1 und L6.
3. A 6-pin flat male plug (3) seen on right side of the center console: term. 1 (black/white).
4. On control switch plug (B1) term. 4 (black/white) and term. 5 (black/white). Plug is accessible only after removing the switch unit. Test point 5 only has to be performed, if the flap positions are not changed when operating the program control lever.

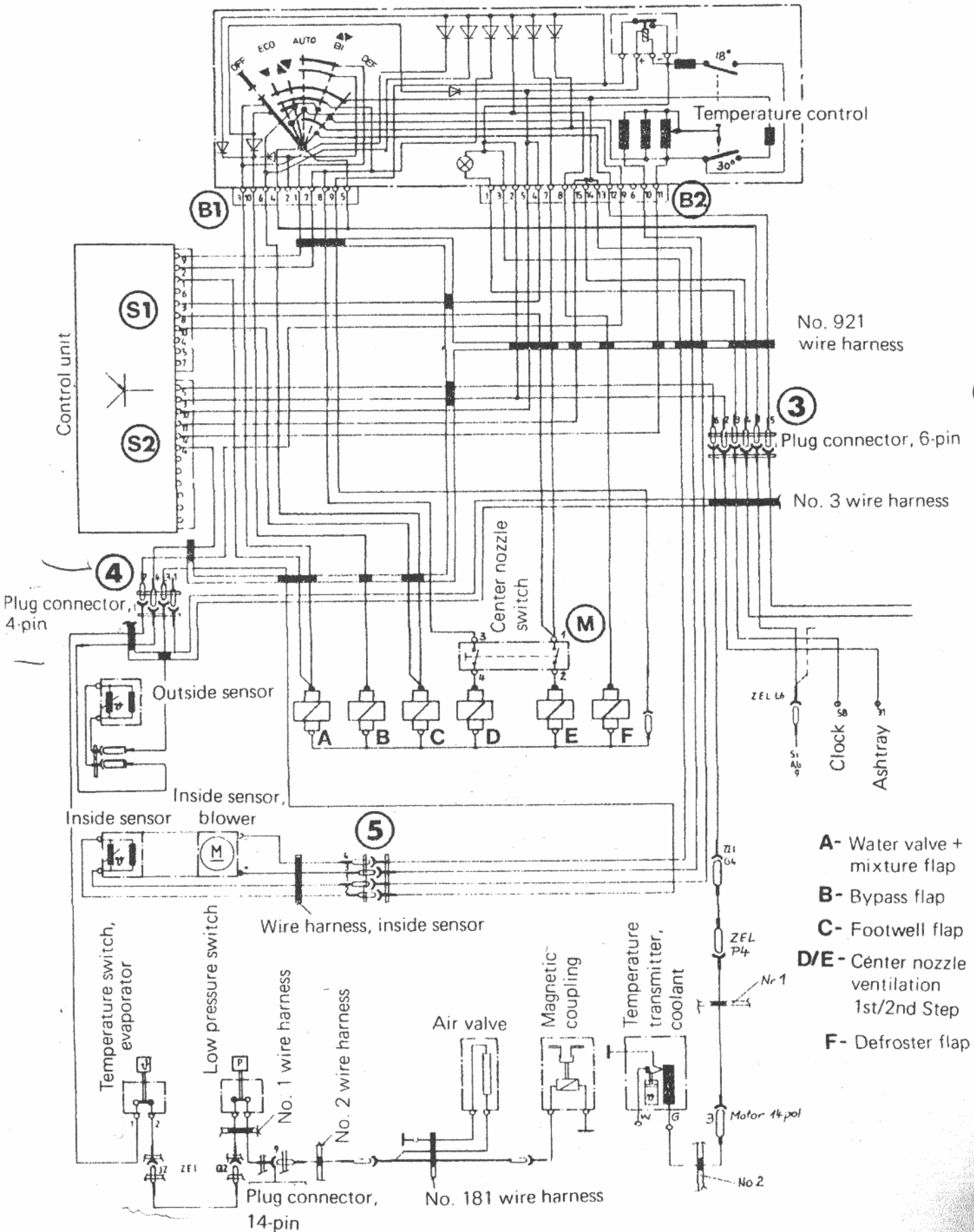
5. Term.	of Plug	With Program Lever in Position
3	B1	OFF
10	B1	OFF
4	B2	OFF
5	B2	OFF
13	B2	ECO/AUTOM/ $\Delta$ $\nabla$ /DEF
14	B2	ECO/AUTOM/ $\Delta$ $\nabla$ /DEF
15	B2	ECO/AUTOM/ $\Delta$ $\nabla$ /DEF
11	B2	DEF
7	B1	ECO/AUTOM/ $\Delta$ $\nabla$
8	B1	ECO/AUTOM/ $\Delta$ $\nabla$
6	B1	ECO/ $\Delta$ $\nabla$ (operate temperature switch)
8	B2	AUTOM/ECO
9	B2	AUTOM/ $\Delta$ $\nabla$ /DEF $\nabla$
12	B2	DEF

##### Ground To:

6. Six-pin flat male plug (3) term. 2 (brown).
7. Control switch plug (B2) term. 2 and 3 (each brown). Plug is accessible from the left side.
8. Control unit plug (S2) term. 3 (brown). S2 is the large 12-pin plug; right plug connection on the control unit.

TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1980 to 1983)

M563  
Control switch



No. 921 wire harness

3 Plug connector, 6-pin

No. 3 wire harness

- A- Water valve + mixture flap
- B- Bypass flap
- C- Footwell flap
- D/E- Center nozzle ventilation 1st/2nd Step
- F- Defroster flap

Motor 4-pol

Plug connector, 14-pin

No. 181 wire harness

Wire harness, inside sensor

No. 1 wire harness

No. 2 wire harness

Low pressure switch

Air valve

Magnetic coupling

Temperature transmitter, coolant

Temperature switch, evaporator

Inside sensor blower

Inside sensor

Outside sensor

Control unit

Plug connector, 6-pin

Plug connector, 4-pin

ZEL L6  
Clock  
Ashtray

Motor 4-pol

No. 2

Nr. 1

ZEL P4

Z1 G4

ZEL L6

S1

S2

S3

S4

S5

S6

S7

S8

S9

S10

S11

S12

S13

S14

S15

S16

S17

S18

S19

S20

S21

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S44

S45

S46

S47

S48

S49

S50

S51

S52

S53

S54

## B) SENSORS (Ohmmeter)

### 1. All Sensors

The complete sensor system can be checked for breaks without removing various trim panels.

#### Testing

Pull off plug (S2) on control unit.

Connect ohmmeter between plug term. 4 (yellow) and 12 (blue).  
Ohmmeter range: x 100.

The ohmmeter should display any random resistance value.  
Move the temperature control lever from 18° to 30° to 18°. The displayed resistance value must change (approx. 1000 ohms).

No resistance value change: see section B4.

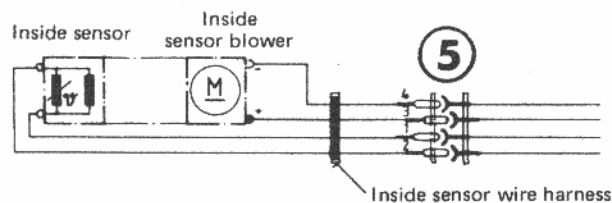
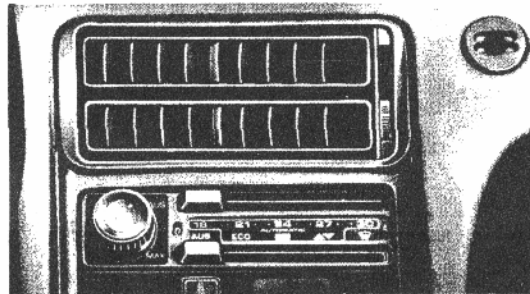
Ohmmeter displaying ∞ ohms: break in the sensor system.

Testing Procedures:

**Note:** Breaks could be on the wire connections, on plug connections (4), (5), (B2), on inside sensor or outside sensor as well as on the control switch.

### 2. Inside Sensor

The inside temperature sensor is located in the sensor housing (to the right of the center nozzle) in the draft of a small blower). The electric connection is made via a 4-pin flat male plug (5) on the right side of the center console.



## TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1980 to 1983)

### Testing

Remove trim panel on right side of center console.  
Disconnect 4-pin flat male plug (5).

Connect a calibrated ohmmeter (range: x 100) between terminals 1 and 2 (both yellow).

Ohmmeter should display the following values:

at 20 °C = approx. 2570 ohms	} Blow through sensor housing during test; test value must drop due to heating of the sensor resistor.
25 °C = approx. 2220 ohms	
30 °C = approx. 1900 ohms	

Replace the sensor, if there is no display or no change in resistance. Repeat test before installing a new sensor.

### Blower Test

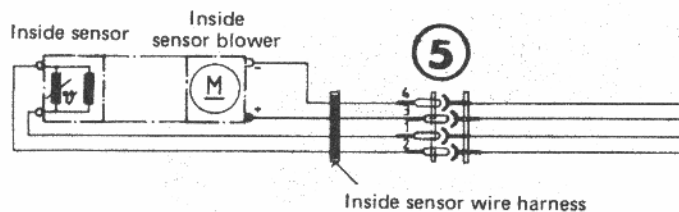
Connect plug (5).

Turn on ignition and set program switch optionally to ECO, AUTOM.,  $\Delta$  or DEF.

### The sensor blower must work!

Check by holding a small piece of paper on the intake opening or, insofar as you smoke and smoking is permitted, blow cigarette smoke against the intake opening.

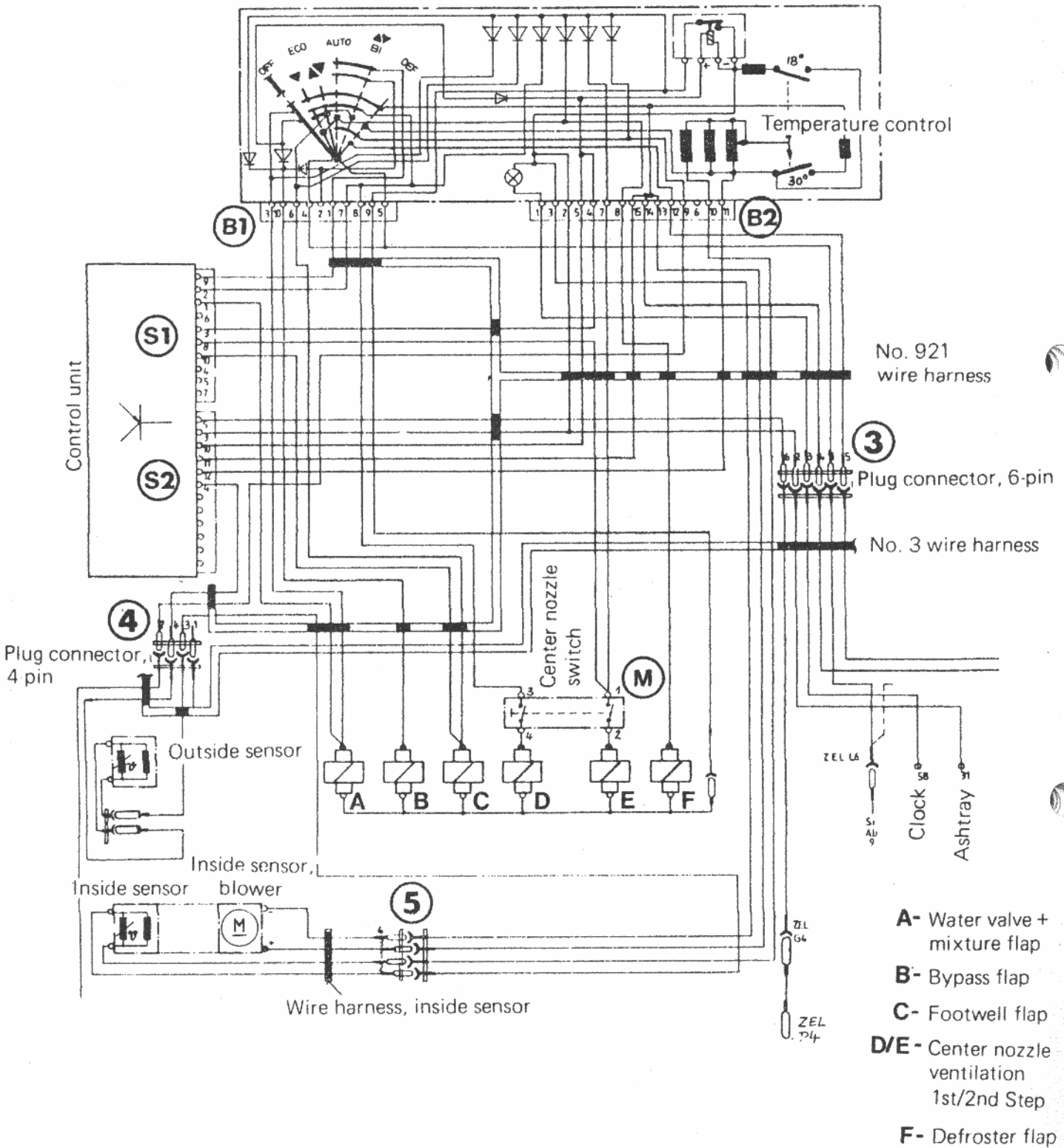
If the paper is not held or the smoke is not drawn in, check whether the blower is running or a wire has a break or power supply is missing.



**Note:** The system will be regulated in heating direction and the temperature will no longer be regulable (18 to 30 °C) on the temperature control lever, if the sensor wire has a break.  
The system will be regulated in cold direction (not in 30° position), if the sensor has a short.

TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1980 to 1983)

M563  
Control switch



### 3. Outside Sensor

The outside temperature sensor is located in the alternator's cooling air hose at front left. Electric connection is made via a plug in the left headlight housing and an additional 4-pin flat male plug (4) underneath the center console on the right side.

#### Testing

Remove trim panel on right side of center console.

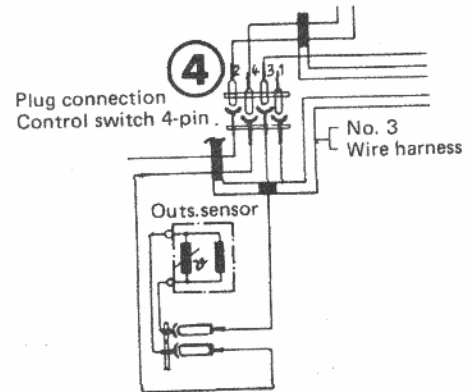
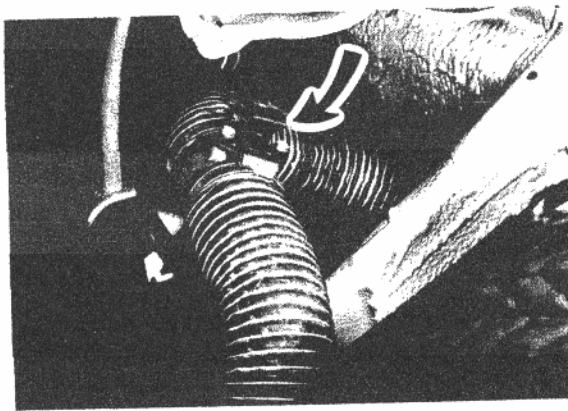
Disconnect 4-pin plug (4).

Connect a calibrated ohmmeter (range: x 10) between terminals 3 (yellow) and 4 (yellow) (on wire harness to sensor).

Ohmmeter should display the following values:

at 0 °C = approx. 933 ohms	} The resistance can be changed by disconnecting the cooling air hose on the alternator. Blow through hose with a hot air blower — test value must drop.
20 °C = approx. 588 ohms	
30 °C = approx. 457 ohms	

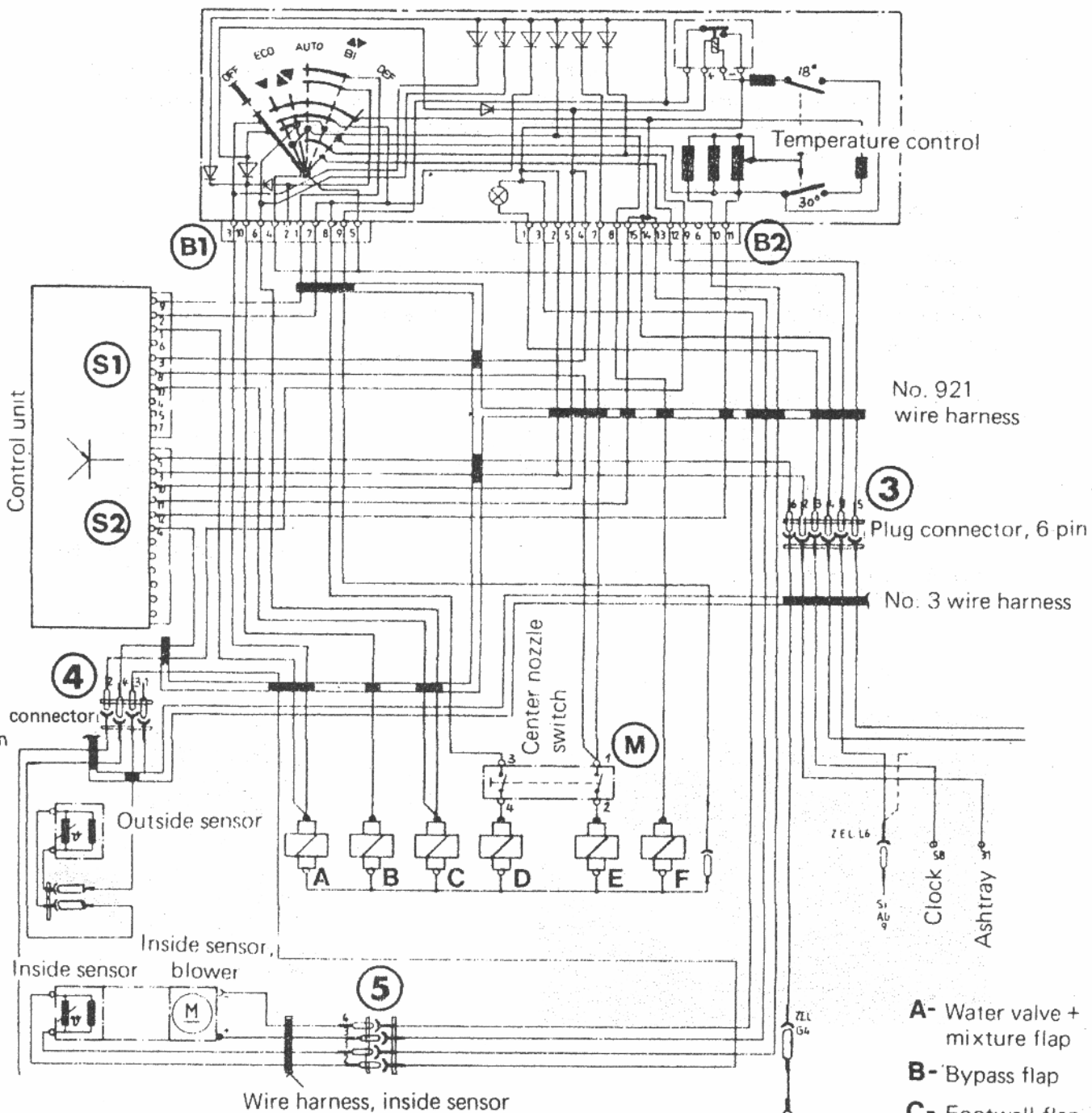
If the test values are not reached, repeat the test on the sensor itself (headlight housing plug connection). Higher wire resistance: loose wire, etc.  
Display of ∞ ohms indicates a break.



**Note:** The system will be regulated in heating direction and the temperature (19 – 30 °C) can no longer be regulated on the temperature control lever, if the sensor wire has a break.  
The system will be regulated in warm direction, but only half of the range, if the sensor has a short.

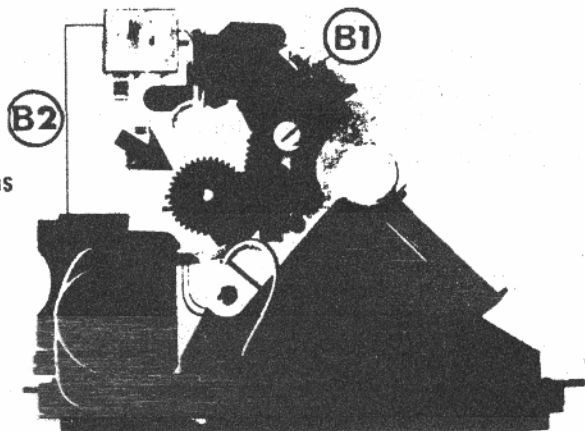
# TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1980 to 1983)

M563  
Control switch



- A- Water valve + mixture flap
- B- Bypass flap
- C- Footwell flap
- D/E- Center nozzle ventilation 1st/2nd Step
- F- Defroster flap

Plug connections  
Control switch





#### 4. Temperature Adjusting Potentiometer in Control Switch

A potentiometer, which is set with the temperature selection switch, is installed in the control switch. The potentiometer can be set to a nominal value.

##### Testing

- Remove trim panels on left and right sides of the center console.
- Disconnect 4-pin plug (5).
- Connect a calibrated ohmmeter (range: x 10) on term. 1 (yellow).
- Pull off plug (S2) on control unit and connect ohmmeter on term. 12 (blue).
- Set temperature control lever to 24 °C — read the resistance value.

**Nominal value = 1264 ± 100 ohms.**

Set temperature control lever to 18 °C = 760 ± 100 ohms.

Set temperature control lever to 30 °C = 1760 ± 100 ohms.

It is important that the resistance value changes each time by approx. 500 ohms.

Remove the control switch, if the nominal value is not reached or there is no change in resistance from 18 °C to 30 °C to 18 °C.

##### a) Removing Control Switch

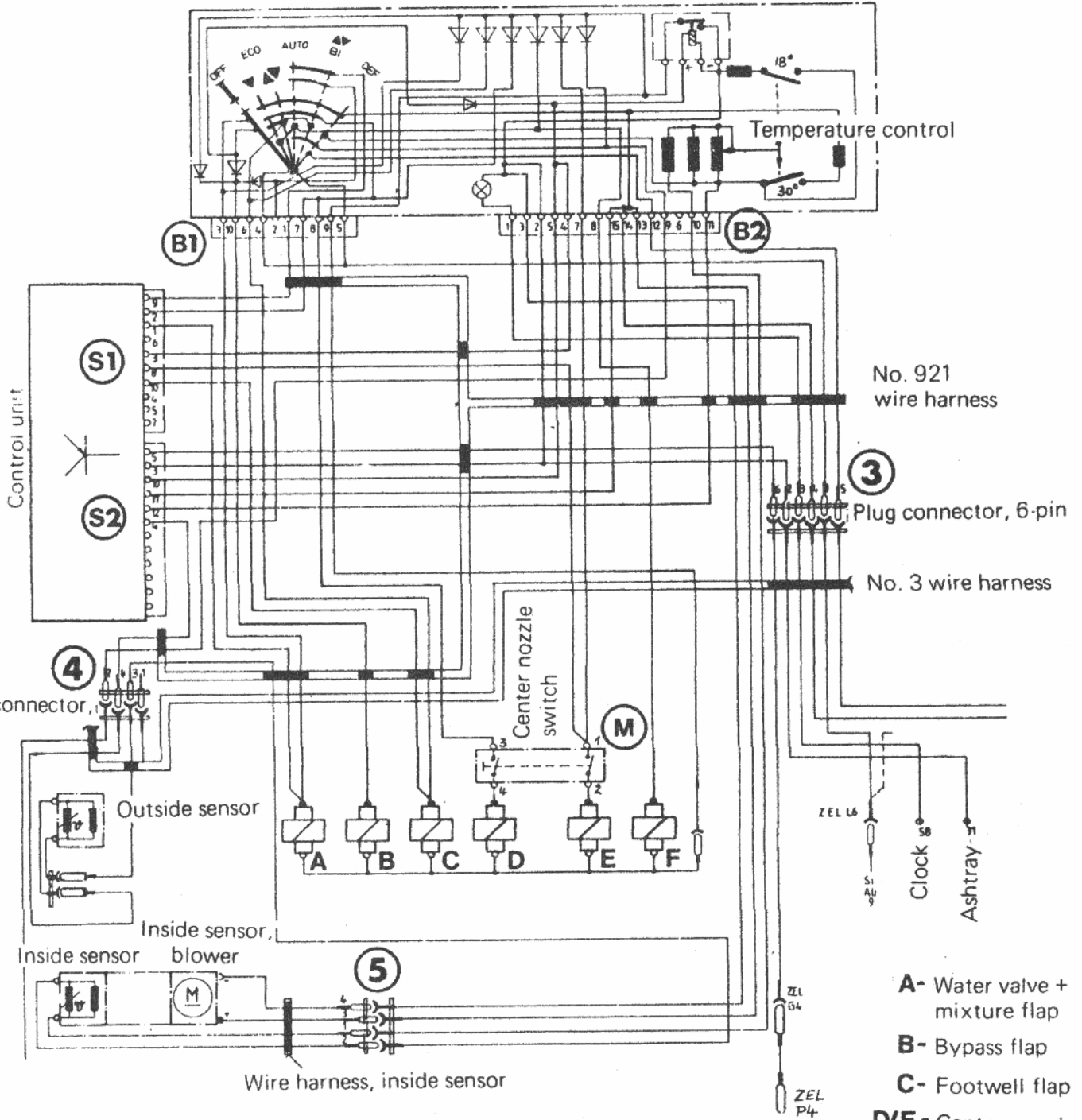
- Lift out center console frame cover.
- Unscrew display panel screws and pull out display.
- (Wires remain connected.) Unscrew four control switch screws and pull out control switch.
- Pull off plugs (B1 and B2) on control switch and the blower plug.

##### Testing

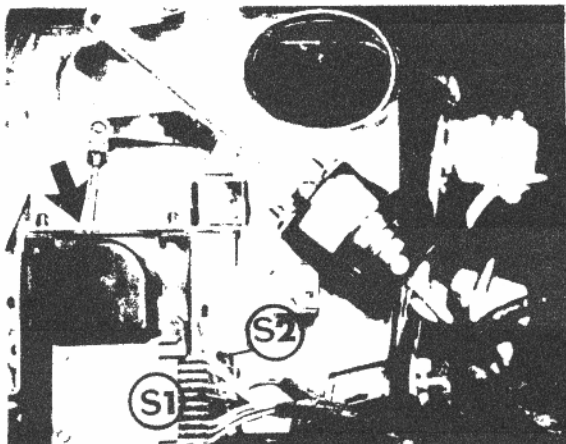
- Connect ohmmeter on platinum paths 10 and 11 of the large platinum path (B2) (left). (These are the 4th and 5th platinum paths as counted from the blower plug connection.)
- Repeat test as described above.
- No display — replace control switch.
- Value not within nominal value tolerances:
- Remove upper cover of switch (loosen 2 screws and clamps on housing edge).
- A toothed element, which is mounted on the lever with a screw, will be visible.
- Set temperature control lever to 24 °C. Loosen toothed element screw, connect ohmmeter, turn toothed element until tester shows 1264 ± 100 ohms.
- Tighten screw and repeat test in 24 °C position.
- Test approx. ± 500 ohms. Check change in 18 °C and 30 °C positions of the temperature control lever.

# TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1980 to 1983)

M563  
Control switch



- A-** Water valve + mixture flap
- B-** Bypass flap
- C-** Footwell flap
- D/E-** Center nozzle ventilation 1st/2nd Step
- F-** Defroster flap



## C) CONTROL UNIT / FLAP FUNCTION

The control unit is mounted on the left side of the air box and has two electric plug connections (S1 and S2).

The control unit comprises an electronic control for activation of the solenoid valves and a motor for operation of the temperature control flaps.

The control unit can be checked with a the control switch or a simple (locally made) tester.

### 1. Operating Motor Test

Turn on ignition and set program lever optionally to ECO, AUTOM. or  $\Delta\nabla$  position. The temperature selection lever has a microswitch in each of both final positions (18 °C and 30 °C), which is closed in these positions and shorts the regulating potentiometer. This means that the air conditioner switches to max. cooling in the 18 °C position or max. heating in the 30 °C position. The operating motor of the control unit must be running in its lowest position (cooling) in the 18 °C position or highest position (heating) in the 30 °C position.

The position of the temperature control flaps can be checked through the center nozzle duct in the heating position. They must be opened fully.

If the operating motor does not run, check the voltage on terminals 3 and 11 of plug (S2) – sensor system is okay – then replace the control unit.

**Note:** The microswitch of the 30 °C position (max. heating) is standard only since about 7.80.

### 2. Solenoid Valve Activation Test (Test Lamp)

It is recommended to remove the control switch and trim panels on the sides of the center console (see B 4a), to be able to check the activation of solenoid valves.

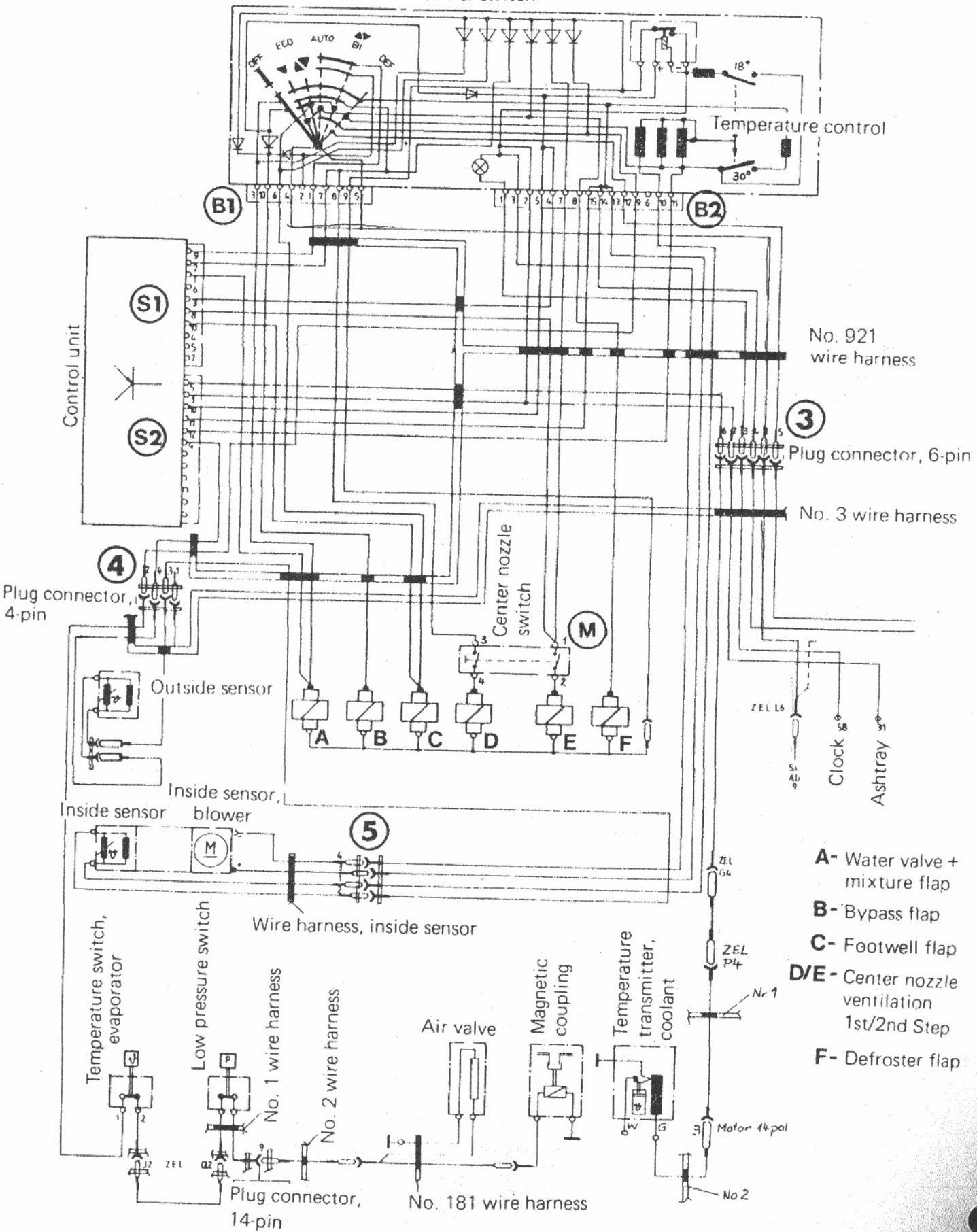
Connect test lamp on car ground (never use the solenoid valve holding bar). Place test tip on each electric wire connection.

**Note:** The cold start interlock must be switched off.  
Coolant temperature above 40 °C.  
This temperature is guaranteed, if the needle of the coolant temperature gage has reached the end of the first white section.

Valves are arranged with 180° displacement since 1983 models. It is recommended to remove the entire center console for testing.

TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1980 to 1983)

M563  
Control switch

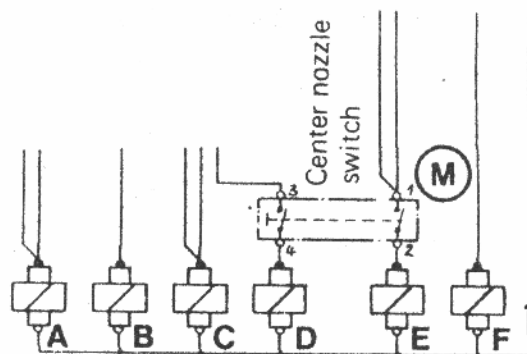


Set center nozzle switch to up (open), pull off plug S1 on control unit and turn on ignition. Set temperature control lever to 18 °C.

**A) Testing Switch Contacts in Control Switch – Program Selection Switch**

Connect test lamp between body ground and valve being tested.

Valve		Test Lamp Must Come On in Switch Position
(heater valve + mixing flap)	A—red	OFF
(circulating air flap)	B—blue	OFF
(footwell flap)	C—yellow	ECO $\Delta\nabla$ , $\Delta\nabla$
1st stage (center nozzle)	D—orange	ECO, AUTO, $\Delta\nabla$
2nd stage (defroster flap)	E—brown	—
	F—green	ECO $\nabla$ , AUTO



The test lamp must go out when operating the center nozzle switch.

**B) Testing Switch Contacts in Control Unit (Operating Motor)**

Connect plug S1, set center nozzle switch to up (open) and turn on ignition. Connect test lamp between body ground and valve being tested.

Valve	Test Lamp Must Be On/Off in Switch Position	
A—red	ECO, AUTO, $\Delta\nabla$	Temperature selection switch must be moved from 18° to 30° or from 30° to 18° for each test position. The operating motor runs once during this time, whereby the contact path of a pertinent valve will be run over or bridged.
B—blue	AUTO, $\Delta\nabla$	
C—yellow	AUTO	
E—brown	ECO, AUTO, $\Delta\nabla$	

**C) Testing Control Unit (Operating Motor) Function (Temperature Control Switch Set To 18 °C)**

Connect test lamp on body ground and terminal . . . of plug S1 (S2). Turn on ignition. Test lamp should come on.

Plug S1	Contr. Sw. in Pos.	Plug S2	Contr. Sw. in Pos.
Term. 3	OFF	Term. 10	OFF
Term. 9	AUTO	Term. 11	ECO to DEF
		Term. 12	DEF

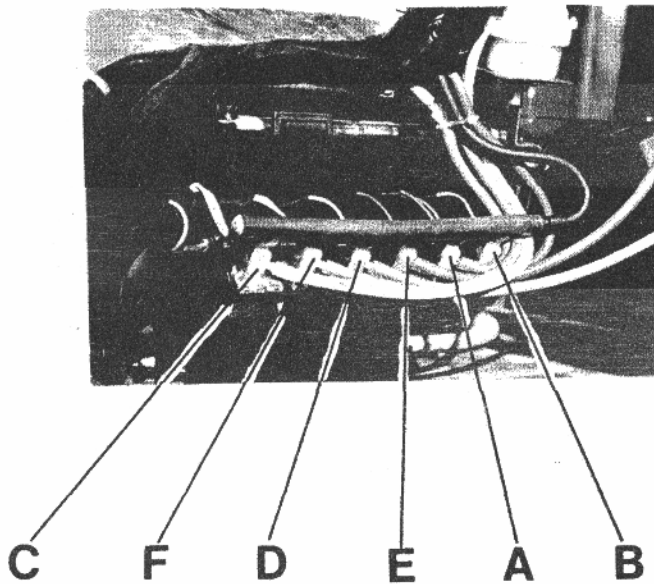
Check wire connections (see wiring diagram), if there is no activation in the one or other case. If the control switch or control unit has a fault, these parts must be replaced.

## TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1980 to 1983)

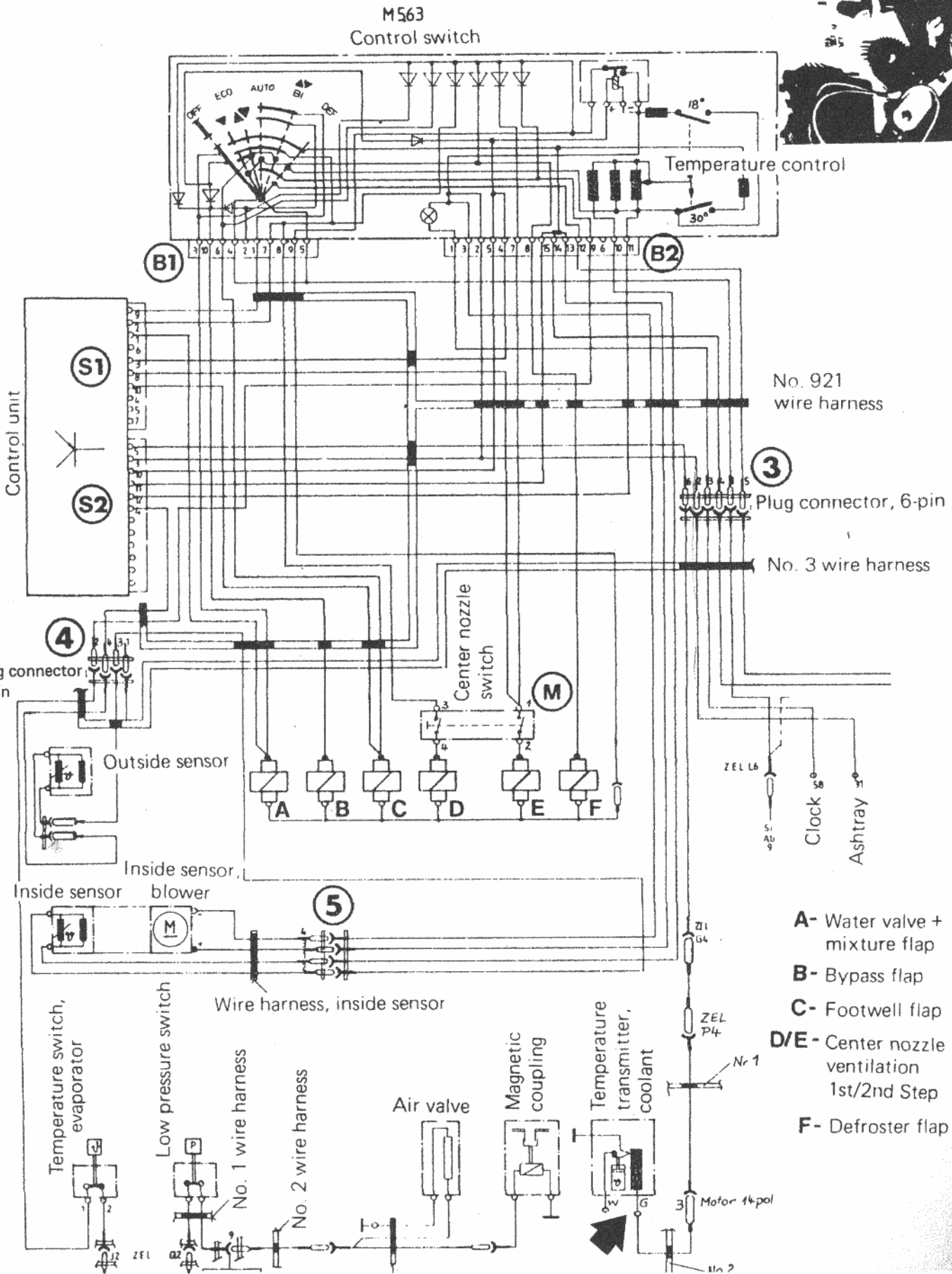
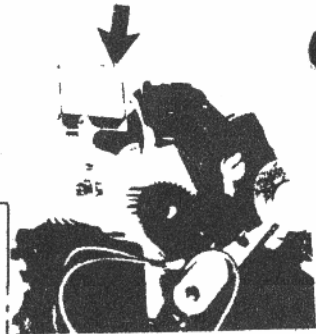
### 3. Flap Function

The vacuum units used to regulate the flaps are activated by the solenoid valves. The flap regulation can be checked together with the above mentioned test. The pertinent flap must be in the following position when the test lamp lights up on a certain valve and vacuum is available.

Valve / Wire Color	Flap
C yellow	Footwell open
F green	Defroster closed
D orange	Center nozzle open 1st stage (switch must be in upper pos.)
E brown	Center nozzle open 2nd stage (switch must be in upper pos.)
A red	Temperature mixing flap open
A red	Heater valve closed
B blue	Circulating air flap open (air circulation)



TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1980 to 1983)



No. 921 wire harness

3 Plug connector, 6-pin

No. 3 wire harness

4 Plug connector pin

5 Wire harness, inside sensor

ZEL L6

Clock

Ashtray

- A- Water valve + mixture flap
- B- Bypass flap
- C- Footwell flap
- D/E- Center nozzle ventilation 1st/2nd Step
- F- Defroster flap

## D) COLD START INTERLOCK (Test Lamp / Ohmmeter)

The cold start interlock has the task of regulating the flap program to DEF flap position in positions ECO, AUTO and BI ( $\Delta\nabla$ ), without blower speed 4, when the engine is cold (coolant temperature below 40 °C).

Opening the circulating air flap (fresh air closed) prevents cold fresh air from entering the passenger compartment. Cold start interlock is switched off when reaching a coolant temperature of 40 °C and flaps are regulated to the pertinent program switch position (ECO, AUTO, BI ( $\Delta\nabla$ )).

### Testing

#### 1. Cold Engine

- a) Connect test lamp on solenoid valve bar and B +.
- b) Set program switch to ECO, AUTO or BI ( $\Delta\nabla$ ). Turn on ignition.
- c) Set temperature control lever to 30 °C. Operating motor should run up fully (disconnect plug 4, if the motor does not run up).

**Test lamp must not come on.**

(coolant temp. below 40 °C = sensor resistance greater than 285 ohms)

- d) Pull term. g wire (large plug connector) off of coolant temperature sensor in engine compartment.

**Test lamp must come on.**

- e) Connect plug term. G again (test lamp goes out) and operate the engine.

**Test lamp must come on after brief time.**

(coolant temp. above 40 °C = sensor resistance less than 285 ohms)

#### 2. Warm Engine

- a) Connect test lamp on solenoid valve bar and B +.
- b) Set program switch to ECO, AUTO or BI ( $\Delta\nabla$ ). Turn on ignition.
- c) Set temperature control lever to 30 °C. Operating motor must run up fully (disconnect plug 4, if motor does not run up).

**Test lamp must come on.**

(coolant temp. above 40 °C = sensor resistance less than 285 ohms).

- d) Pull off term. G wire (large plug connector) on coolant temperature sensor in engine compartment.

**Test lamp must remain on.**



## TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1980 to 1983)

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### E) COMPRESSOR MAGNETIC CLUTCH (Test Lamp)

Turn on ignition.

Set temperature control lever to 18 °C.

Set program switch optionally to AUTOM,  $\Delta\nabla$  or DEF.

(A click must be heard from the switching magnetic clutch in every program switch position.)

Connect test lamp on ground (engine/body), if clutch does not function.

Test lamp must come on at following test points.

1. Compressor clutch plug (in front of camshaft cover, right).
2. Connection on electric air valve (on engine cross member, right).
3. Term. 9 of engine multiple-pin plug (in engine compartment, right).
4. On both connections of low pressure switch (on side of filter drier).
5. CEL plug Q 2.
6. On both connections of icing-up protection switch (on blower housing).
7. CEL plug J 2.
8. Term. 2 (purple/yellow) of plug (4).
9. Term. 9 (purple/yellow) of control switch (B 2).
10. Term. 4 (black/white) of control switch (B 1) (program switch in AUTOM,  $\Delta\nabla$ , DEF position).
11. Term. 1 (black/white) of plug (3).
12. CEL plug L6 – F 1 – fuse no. 9.
13. CEL plug A 4 / A 5.
14. Ignition lock term. 15.

**Note:** This test only covers the electric activation of the compressor clutch.  
Always work step by step when troubleshooting!

**Note:** The control unit can be checked to the following procedures, if the above mentioned tests indicate a fault, which cannot be found on the control switch or wires.

Connect test lamp on term. 3 (brown) and term. 10 (green) of connected plug S2.

Set temperature control lever to 30 °C.

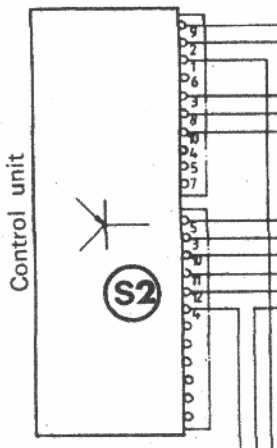
Set program switch optionally to AUTO or BI ( $\Delta\nabla$ ).

Test lamp must come on with coolant temperature above 40 °C.

Test lamp must go out with coolant temperature below 40 °C.

Set program switch to OFF position.

The valve holding bar must have ground.



# TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1980 to 1983)

## F) TEST BOX FOR CONTROL UNIT – OPERATING MOTOR

The function of the operating motor or that of the motor activated solenoid valves A, C, D and E can be checked with a simple, locally made test box, regardless of the instantaneous temperature conditions. It is also possible to run the operating motor to any position with this test box, so that the above mentioned tests will be considerably easier to perform.

The test box is connected on the car's electric system with the positive and negative leads. Pull off plug (S2) on the control unit and connect the test box plug.

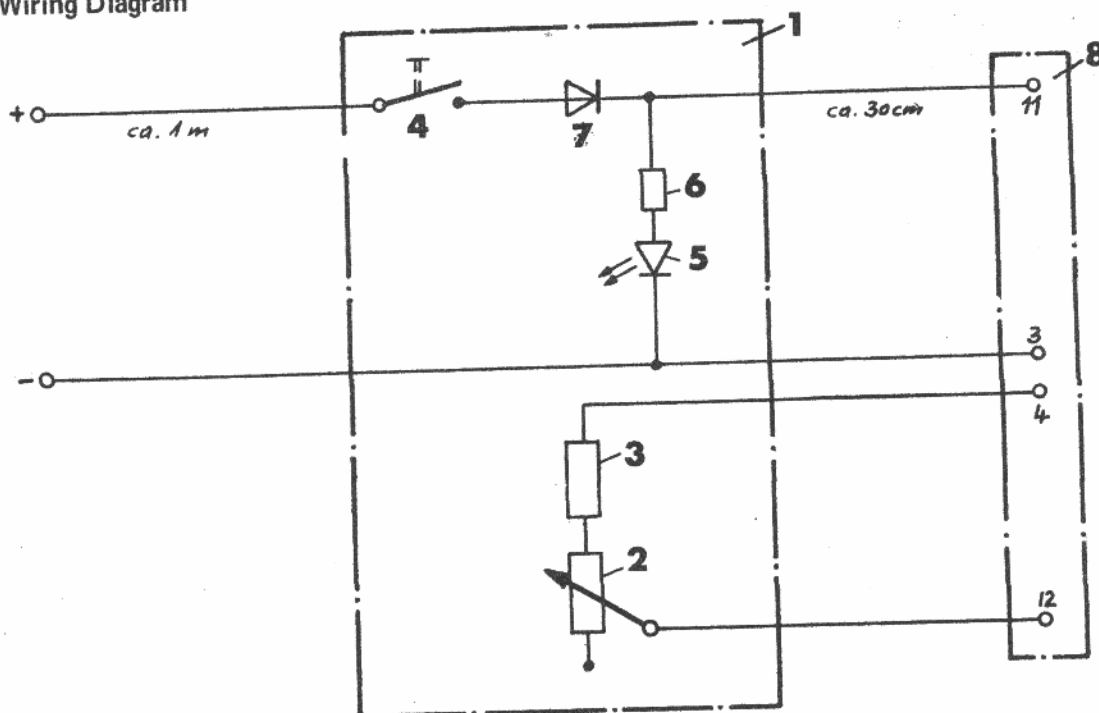
Switch on the test box – the LED must light up. If not, the positive and negative leads have been mixed up. The operating motor must run depending on the potentiometer position. The operating motor can be set to any desired position.

The test box output leads can be connected on the car as follows, if a multiple-pin plug is not available.

Test box lead	term. 3 – on car ground
	term. 4 – on plug 4 term. 4
	term. 11 – on plug 5 term. 3
	term. 12 – on plug 5 term. 3


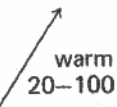




} disconnect plug

Wiring Diagram



### Required Parts

- |   |   |
|---|---|
| 1 – Box housing approx. 60 x 40 x 20 mm | 6 – Resistor 360 ohms   |
| 2 – Potentiometer 2 k-ohms/2 watts      | 7 – Diode 1 N 4001 or 1 N 4004 or similar   |
| 3 – Resistor 3 k-ohms/2 watts           | 8 – 12-pin multiple plug (AMP 583 371-1 or plug from wire harness 928.612.921.00) |
| 4 – Switch 911.613.321.01               |   |
| 5 – LED 5 mm red with holder            |   |

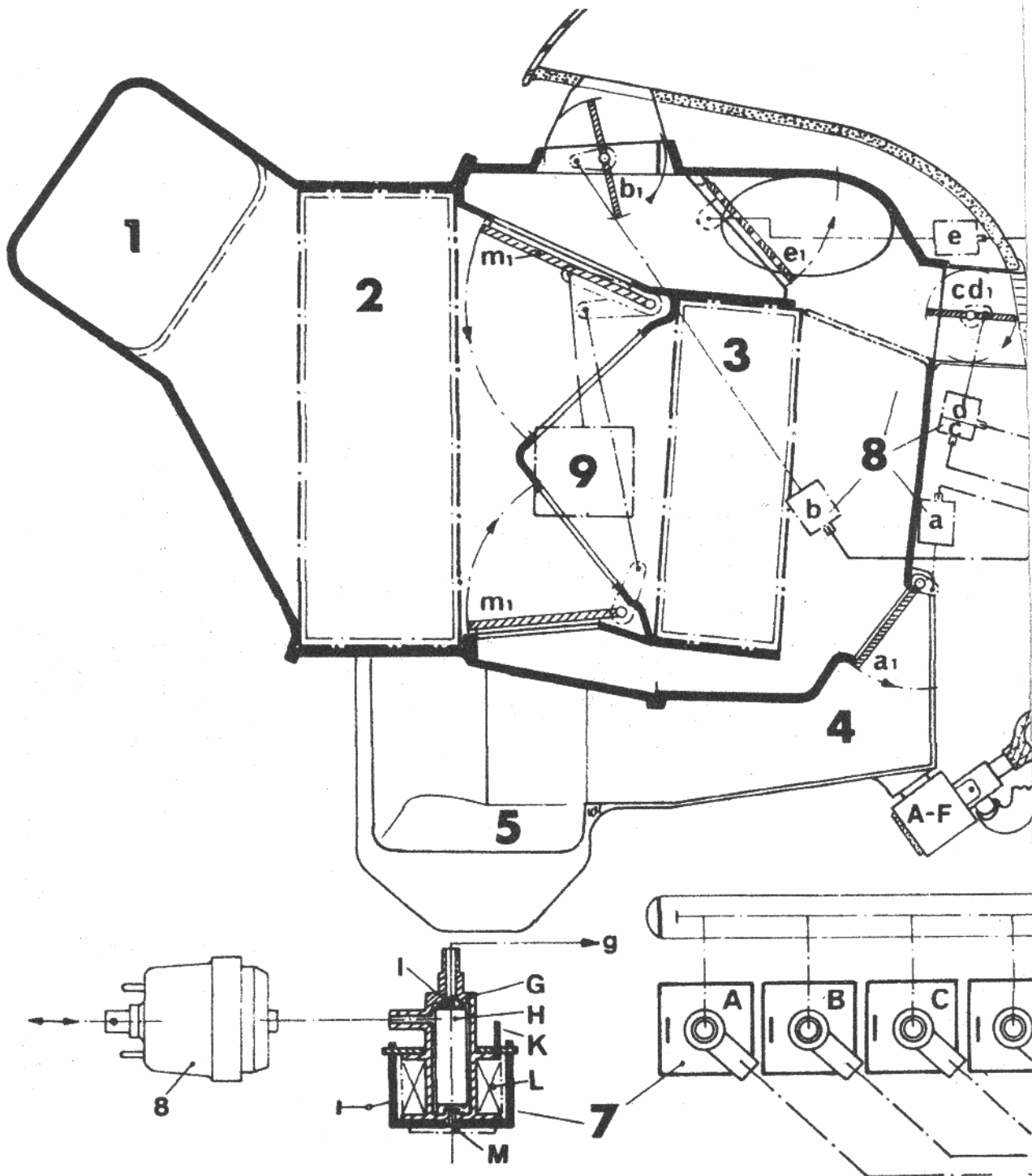
Control Switch Pos.		OFF	ECO		ECO ▲▼		AUTO ▬		BI ▲▼		DEF 	
TEMPERATURE CONTROL	Compressor	off	off		off		on		on		on	
	Water valve	closed	closed 0-20	open 20-100	closed 0-20	open 20-100	closed 0-20	open 20-100	closed 0-20	open 20-100	closed 0-20	open 20-100
	Temp. mixing flaps	cold 0-20 									max. heating	
	Circ. air flap	open (air circ.)	closed (fresh air)		closed		open 0-10	closed 10-100	open 0-10	closed 10-100	closed	
	Defroster flap	open	closed		open		closed		open		open	
	Cold start interlock	off	off 0-65	possible 65-100	off 0-65	possible 65-100	off 0-65	possible 65-100	off 0-65	possible 65-100		
AIR GUIDE	Mixing flap	open	open 0-20	closed 20-100	open 0-20	closed 20-100	open 0-20	closed 20-100	open 0-20	closed 20-100	open 0-20	closed 20-100
	Center nozzle flap	Stage: 1 + 2 closed	1+2 open 0-30	1 closed 30-90	1 + 2 open 90-100	1+2 open 0-30	1 open 30-90	1 + 2 closed 90-100	1+2 open 0-30	1 open 30-90	1 + 2 closed 90-100	1 + 2 closed
	Footwell flap	closed	open		open		closed 0-50	open 50-100	open		closed	
	Blower	off	manual possible up to speed 4 1 = lowest speed		=		=		=		(no speed 4 with cold start interlock) 4	
	Stage:				1		1		1			

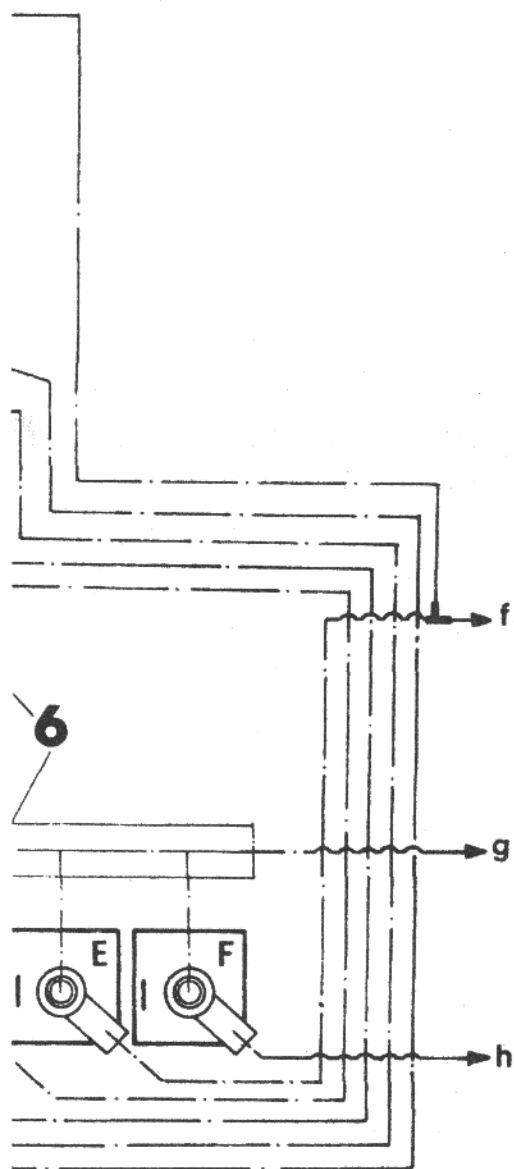
The numbers 0 - 100 indicate the operating motor control in per cent.

Operating motor position 0 % = COOLING (operating motor linkage is moved down)  
100 % = HEATING (operating motor linkage is moved up)

Consequently the operating motor runs from down 0 % to up 100 % or vice versa, which means from COOLING to HEATING or vice versa.  
The per cent positions are provided as marks on the operating motor housing in 5 % graduations.

AIR CONDITIONER (1980 to 1983) – FLAP/AIR FLOW LAYOUT





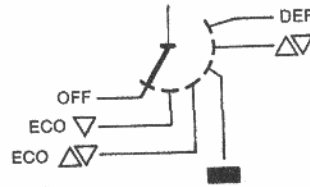
- 1 – Blower connection  
Fresh air/circulated air inlet
- 2 – Evaporator
- 3 – Heater
- 4 – Footwell nozzle box
- 5 – Footwell nozzle outlet
- 6 – Vacuum distribution hose
- 7 – Electric vacuum solenoid valves
- 8 – Vacuum control boxes
- 9 – Motor with electronic control

- G – Coil body
- H – Magnetic core
- I – Seal
- K – Electric connection
- L – Coil winding
- M – Vent

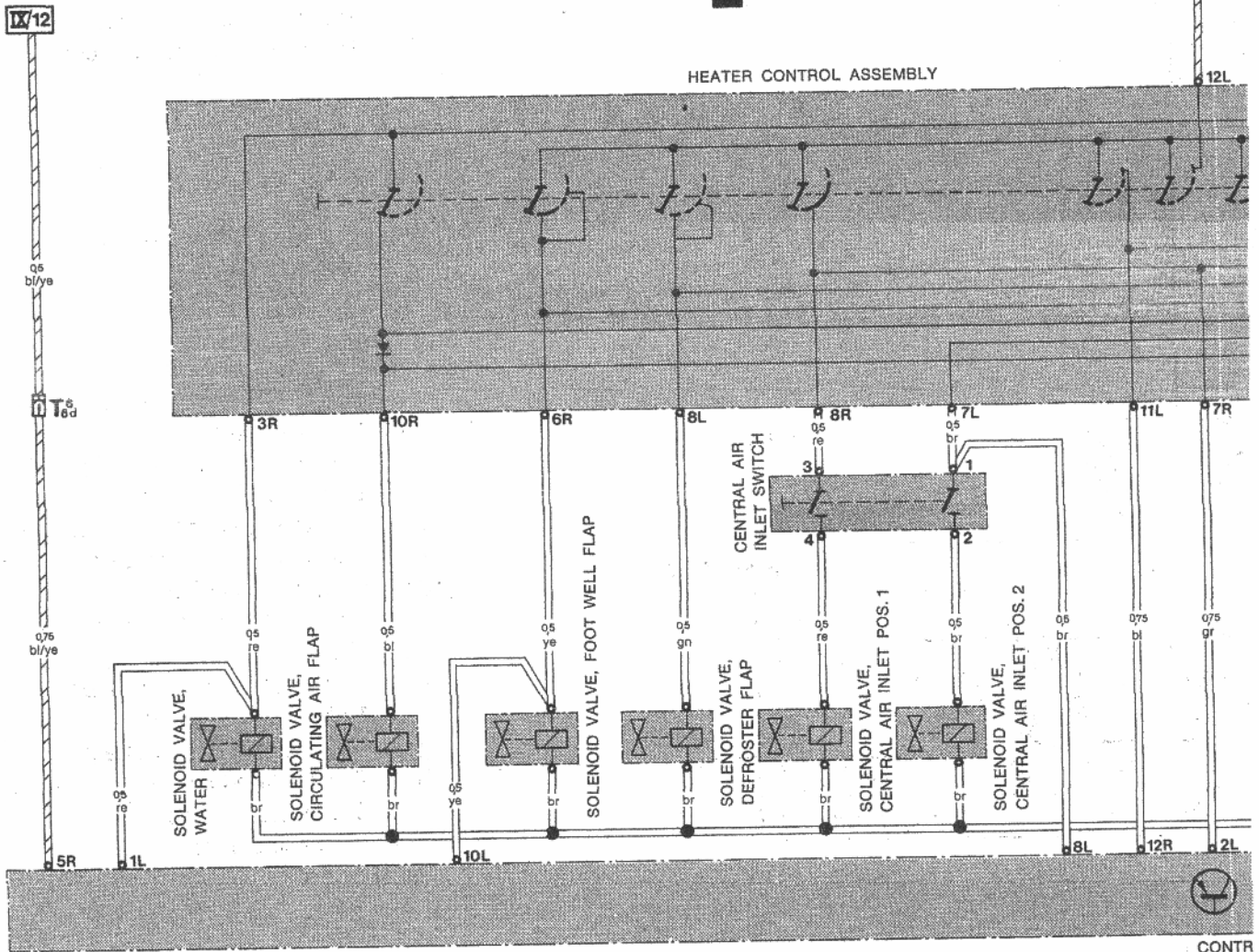
- a – Footwell control box (yellow)
- a1 – Footwell flap
- b – Defroster control box (green)
- b1 – Defroster flaps
- c – Center nozzle double box (orange)
- d – Center nozzle double box (brown)
- cd1 – Center nozzle flap
- e – Mixing flap control box (red)
- e1 – Mixing flap
- m1 – Temperature control flaps
- f – To heater valve (red)
- g – To vacuum tank/intake pipe
- h – To circulated air control box (blue)  
Circulated air flap
- ( ) hose colors

# AIR CONDITIONER (up to 1983 model) – WIRING DIAGRAM

30  
16  
X  
31

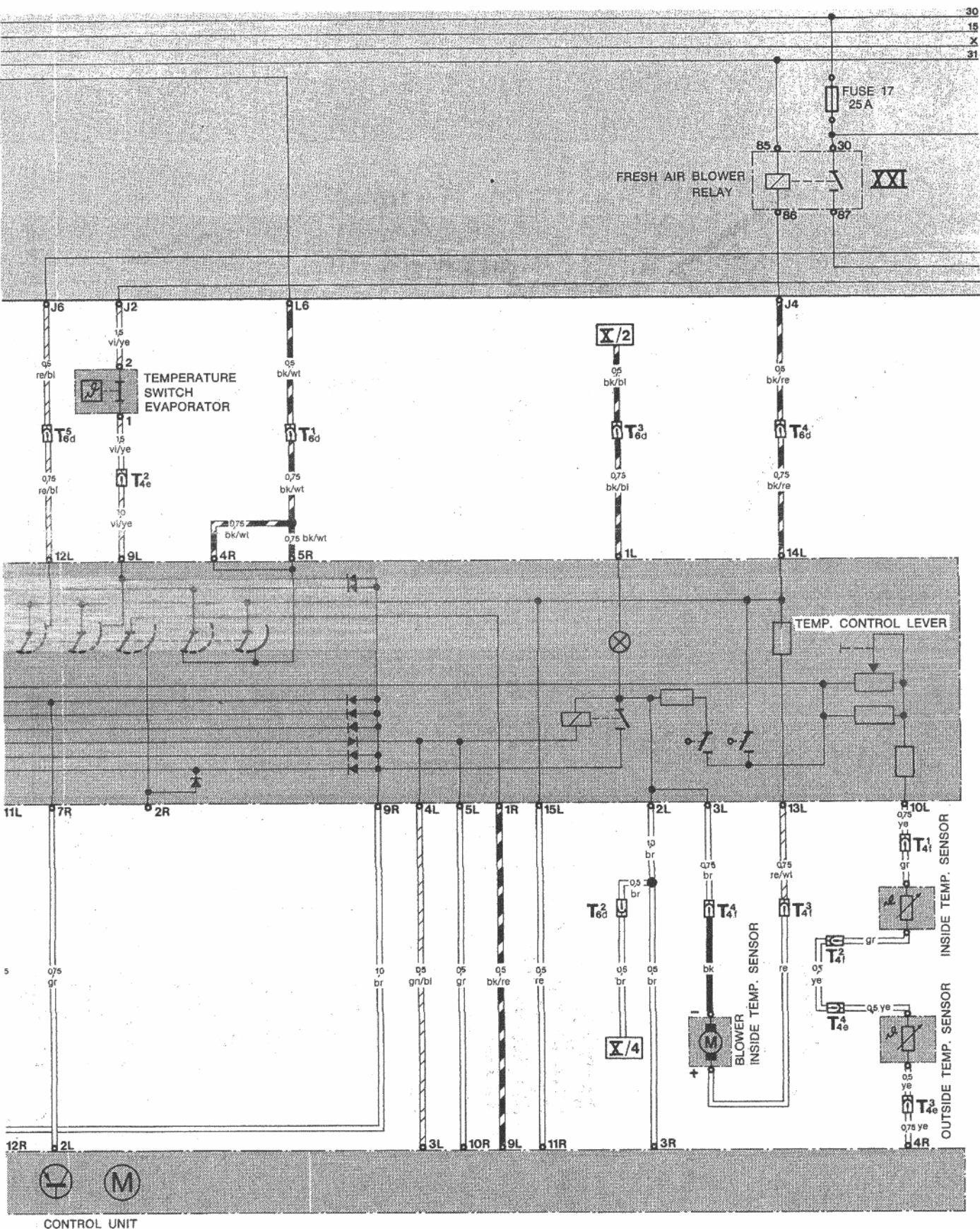


## HEATER CONTROL ASSEMBLY



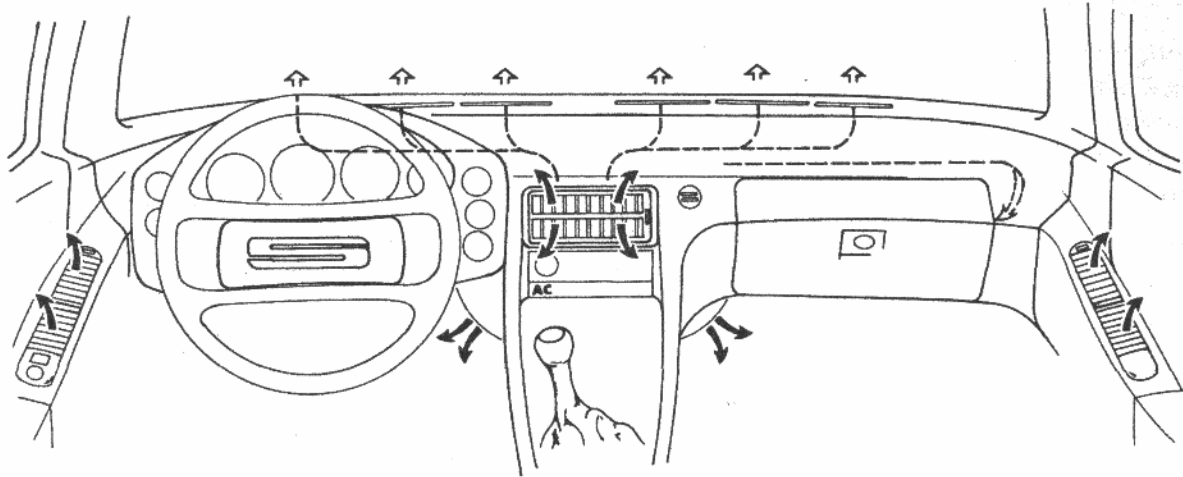
CONTR

1 2 3 4 5 6 7 8 9 10



9 10 11 12 13 14 15 16 17 18 19 20 21 22 23





#### Changes on Air Conditioner Housing Since 1984 Model

The air conditioner housing itself has new or revised air guide plates and modified defroster flaps, to further improve the air flow and distribution.

All nozzles supply either

- fresh air,
- heated air or
- mixed air.

The door nozzles can be adjusted manually to any position.

The center nozzle can be opened or closed depending on the air distribution program.

## AIR CONDITIONER (1984 Model)

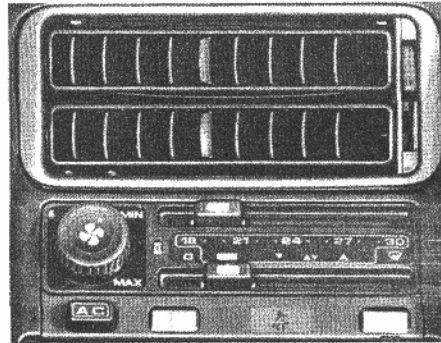
The following changes were introduced on the 1984 model to have individual regulation of air distribution as well as heated or cooled air.

The control switch is new (and cannot be installed in earlier models). The internal circuitry and program symbols have been changed.

The former ECO ▽, ECO ▴▽ and Automatic ■ positions have been omitted.

### New Positions:

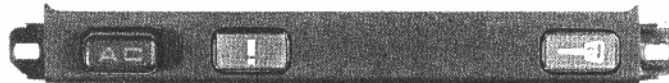
1. ■ — Air distribution only via center nozzle and door side nozzles (if they are opened manually).
2. ▽ — Air distribution to footwell and as in 1.
3. ▴▽ — Air distribution to windshield, footwell and as in 1.
4. ▴ — Air distribution to windshield and as in 1.



### Center Nozzle

The center nozzle is used for ventilation of the passenger compartment. The air volume can be regulated infinitely with a lever on the side of the nozzle. The nozzle can also be closed with this lever, if the draft is found to be annoying.

The AC switch is located in the center console below the control switch. The AC compressor is switched on with the AC switch. This makes it possible to distribute cooled air individually depending on the selected program.



If the AC switch is not operated, fresh air (not cooled) can also be distributed individually.

The air temperature in the passenger compartment can be increased accordingly with the temperature selection switch of the control switch.

The air shutoff valve of the center nozzle can now be regulated manually with the side control switch, with which the air flow volume can be regulated.

A microswitch connected with the shutoff valve control switch opens or closes the center nozzle mixing flap.

This mixing flap, when closed, has the task of mixing cold or fresh air with heated air again in front of the center nozzle outlet, to avoid great differences in air temperature.

Control switch in bottom position = shutoff valve closed and center nozzle mixing flap open.

Control switch in top position = shutoff valve open and center nozzle mixing flap closed.

### Changes On Electrical System

Control switch with only one plug connection — new part. Consequently also modified wire harness — new part. Control unit and operating motor with different circuitry (program) — new part.

Number of solenoid valves reduced to 5 (was 6). (No solenoid valve for center nozzle shutoff flap.)

Other parts, such as sensors, blower switch, icing-up protection switch, thermo bimetal switch and lower pressure switch, have not been changed.

This section is a brief description of troubleshooting procedures for the electrical system of the air conditioner in Type 928 cars since 1984 model. We recommend a digital multimeter (e. g. Fluke 75) and a test lamp for testing. Always make sure that the tester is connected on the correct connections for a pertinent test and be conscious of which section of the circuit and which potentials are being checked. Always use a valid wiring diagram for all tests, since this troubleshooting plan only points out the location of components. Comprehensive tests must be made analog the wiring diagram. Information on CEL plug connections and relay designations are in reference to the 1985 model (with new CEL). All other information is identical for 1984 and 1985 models.

The air conditioner in Type 928 cars was changed from 1984 models on. However, introduction already took place in cars of the 1983 model beginning with chassis numbers

and	92 DS 84 1850 (10.6.83)
for RHD cars	96 DS 86 1952 (10.6.83)
	92 DS 84 1861 (13.6.83).

Major Changes:

- a) New control switch  
(now only one 15-pin plug connection)
- b) New operating motor  
(different circuitry)
- c) "AC" compressor switch in center console
- d) Five solenoid valves  
(formerly six solenoid valves)
- e) New microswitch for center nozzle
- f) New wire harness

**Note:** The operating motor must never be mixed up with an older operating motor or vice versa!

Motor, Part No. 928.573.150.03	old	}	Up to 1983 models
until Ch. No. 92 DS 84 1849			
92 DS 84 9562 J.			
Motor, Part No. 928.624.129.00	new	}	Since 1984 models
until Ch. No. 92 DS 84 1850			
92 DS 84 9563 J.			

## TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1984 / 1985)

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### CHECKING FUNCTION OF ENTIRE REGULATION

It is recommended to check the function of the air conditioner to find a fault, i. e. to find the point where a fault is assumed to be. Deviations from nominal function specifications will normally indicate the faulty circuit or component for initial testing.

#### Fundamentally

If the air conditioner is without power or vacuum supply, the defroster flap will be open and the circulating air flap set to fresh air and the heater valve will also be open. All other flaps will be closed.

#### Nominal Functions

##### A) SENSOR CIRCUIT

Turn on ignition.

Set program switch to .

Set temperature switch to 24.

The temperature mixing flap control unit operating motor is mounted on the left side (right side for RHD) of the air guide housing and operates the mixing flaps by way of a lever and linkage. The position of the operating motor can be felt with a finger between the operating motor and air guide housing.

Now move the temperature switch slowly in direction of 18 – the operating motor lever must move down (cooling) at the same speed. In position 18 the lever should be all the way down (max. cooling).

Now move the temperature switch slowly toward 30.

The lever must also move slowly upwards (heating).

At position 30 the lever must be all the way up.

There is a fault in the sensor circuit or operating motor, if there is no step-by-step regulation.

The sensor circuit comprises the outside sensor, inside sensor, control switch and control unit operating motor.

See test point 1.

##### B) COMPRESSOR MAGNETIC CLUTCH

Turn on ignition.

Set program switch to .

Press AC switch – magnetic clutch must be heard (click).

The compressor clutch drive must be evident with the engine running.

The circuit has a fault, if the compressor clutch is not activated.

This circuit comprises CEL, AC switch, control switch, evaporator temperature switch, low pressure switch and compressor magnetic clutch.

See test point 2.



**C) BLOWER**

Turn on ignition.

Set program switch to □, ▽, Δ▽ or Δ.

Turn blower speed switch to 1 - 2 - 3 - 4.

The blower must be running at the different speeds in all switch positions.

Turn speed switch to 0.

Set program switch to DEF.

Blower must be running at maximum speed.

There is a fault in the blower circuit, if there is no function or malfunction of the blower.

Blower circuit comprises CEL, blower switch (on control switch), thermo bimetal switch and blower.

See test point 3.

**D) FLAP CONTROL**

Close door and center nozzles manually.


Start and run engine at idle speed.

Set blower switch to speed 4.

Set temperature switch to 18.

Set program switch to □, ▽, Δ▽, Δ and  one after the other.

Air Distribution in Position:

- only via manually opened center nozzle and/or door window nozzles to footwell
- Δ▽ to footwell and windshield
- Δ to windshield
-  to windshield (blower must still run at maximum speed when setting blower switch to "0")

Flap operation is accomplished with engine vacuum via electromagnetic switching valves, which are activated by the control switch.

See test point 4.

## TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1984 / 1985)

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### Test Point 1 – SENSOR CIRCUIT (Ohmmeter)

#### 1. Total Sensor Circuit

The entire sensor circuit can be checked for breaks on the control unit operating motor after removing the footwell shelf on the driver's side.

##### Testing

Pull off 12-pin plug on the control unit operating motor.

Connect ohmmeter (range: x 100) on plug terminals 4 (yellow) and 12 (yellow).

Ohmmeter should display some resistance. Move temperature switch from 18° to 30° to 18°. The displayed resistance value must change (approx. 1000 ohms). No change in test value – see section 1.4.

If ohmmeter shows  $\infty$  ohms, there is a break in the sensor circuit.

**Note:** Breaks could be on wire connections in plug, on plug connections, on inside or outside sensor and on the control switch.

#### 1.2 Outside Sensor

The outside temperature sensor is located front left in the alternator's cooling air hose. Electric connection is made with a 2-pin plug in the left headlight housing and a 4-pin flat male plug behind the right center console trim panel.

##### Testing

Remove trim panel on right side of center console.

Disconnect 4-pin plug (term. 3/4 both with yellow wire).

Connect ohmmeter (range: x 10) on term. 3 (yellow) and 4 (yellow) on socket end of plug.

Ohmmeter should display following values:

approx. 933 ohms at 0 °C

approx. 588 ohms at 20 °C

approx. 457 ohms at 30 °C

**Important:** To change the resistance, the cooling air hose can be disconnected on the alternator and air blown into the hose with a hot air blower – the displayed value must drop.

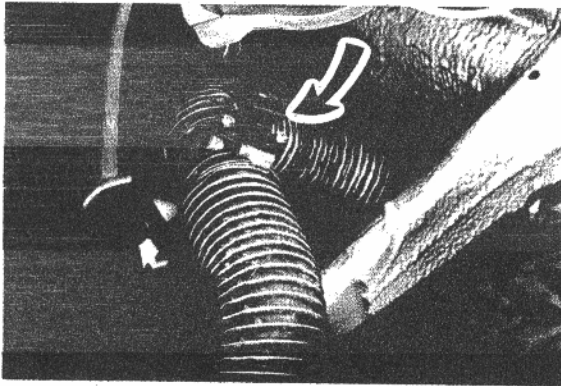
## Test Point 1 – SENSOR CIRCUIT

ref.

### 1.2 Outside Sensor

Repeat tests on the sensor itself (plug in headlight housing), if test values are not reached.  
(Possibly high resistance, loose wires, etc.)

Display of  $\infty$  ohms indicates a break.



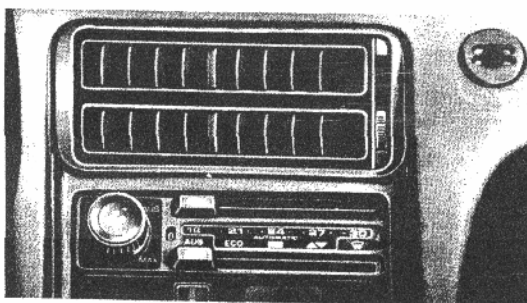
Outside Sensor (M563)



**Note:** If the sensor wire has a break, the system will be regulated in heating direction and can no longer be regulated with the temperature switch (18 – 30 °C).  
If the sensor has a short, the system will be regulated in warm direction, but only half of the control distance.

### 1.3 Inside Sensor

The inside temperature sensor is located in the sensor housing (to the right of the center nozzle) in the draft of a small blower. The electric connection is made with a 4-pin flat male plug behind the right center console trim panel.



# TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1984 / 1985)

## Test Point 1 – SENSOR CIRCUIT

ref.

### 1.3 Inside Sensor

#### Testing

Remove trim panel on right side of center console.

Disconnect 4-pin flat male plug (term. 1/2 both with yellow wire).

Connect ohmmeter (range: x 100) on plug pins of term. 1 and 2 (both yellow).

Ohmmeter must display the following values.

approx. 2570 ohms at 20 °C

approx. 2220 ohms at 25 °C

approx. 1900 ohms at 30 °C

**Important:** The test value measured in the sensor housing must drop by heating up the sensor resistor with a hot air blower.

Replace the sensor, if there is not display or no change in resistance.

Repeat this test before installing a new sensor.

#### Blower Test

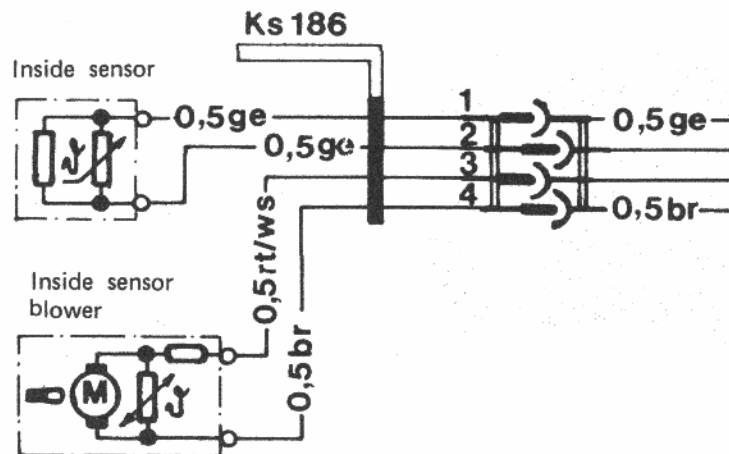
Connect plug.

Turn on ignition. Set program switch optionally to .

#### The sensor blower must be running!

Place a small piece of paper on the inlet opening or, if you smoke and smoking is permitted, blow cigarette smoke against the intake opening.

If the paper is not held or the smoke not drawn in, check whether blower is running or wire has a break or power supply is missing.





### Test Point 1 – SENSOR CIRCUIT

**Note:** If the sensor wire has a break, the system will be regulated in heating direction and it can no longer be regulated with the temperature switch (18 – 30 °C).  
If the sensor has a short, the system will be regulated in cold direction (not in 30° position).  
If the sensor blower does not run, even only sometimes, there will be very sluggish temperature regulation in the passenger compartment.

#### 1.4 Temperature Adjusting Potentiometer in Control Switch

A potentiometer, which is adjusted by the temperature switch, is installed in the control switch.

##### a) Test

Remove trim panel on right side of center console.

Disconnect 4-pin plug of inside sensor. Connect ohmmeter (range: x 10) on socket end term. 1 (yellow).

Temp. lever at 18 °C = approx. 760 ± 100 ohms

Temp. lever at 30 °C = approx. 1760 ± 100 ohms

**It is important,** that the resistance value changes by approx. 1000 ohms each time.

Remove control switch, if values are not reached or there is no change in resistance between 18 °C – 30 °C – 18 °C.

##### b) Test

Connect ohmmeter on platinum paths 13 and 14 of the platinum connection. Repeat test described above.

No display – replace control switch.

Display – break in wire.

#### 1.5 Control Unit – Operating Motor

See nominal functions in point A.

It is recommended to connect a new part for comparison, if there is no function and the sensor circuit (test points 1.1 to 1.4) is okay. If the operating motor crank moves as described in point A or if the crank moves when changing the temperature of the inside or outside sensor (control switch/temperature switch in position Δ), it can be assumed that the installed operating motor is faulty.

## TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1984 / 1985)

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### Test Point 2 – COMPRESSOR MAGNETIC CLUTCH

#### 2. Compressor Magnetic Clutch (Test Lamp) (⊕)

Turn on ignition.

Set temperature switch to 18 °C.

Set program switch to any position. Press AC switch.

The magnetic clutch must be heard (click) when pressing the AC switch.

Connect test lamp on ground (engine/body), if the clutch does not function.

Test lamp must come on at following test points.

- a) Compressor clutch plug (in front of camshaft cover on right side).
- b) Connection on electric air valve (on right engine cross member).
- c) Socket end term. 9 of engine multiple-pin plug (in engine compartment, right).
- d) On both connections of low pressure switch (on side of filter drier).
- e) On CEL plug M 12, K 21 and G 21.
- f) On both connections of icing-up protection switch (on blower housing).
- g) On term. 2 (purple/yellow) and term. 1 (red/white) of 4-pin plug for outside sensor (center console).
- h) On term. 6 (purple/yellow) and term. 5 (red/white) and term. 7 (green/blue) of connected control switch plug.
- i) CEL fuse no. 17.

**Note:** This test only covers the electric activation of the compressor clutch – perform trouble-shooting procedures step by step!

Test Point 3 – BLOWER


3. Blower (Test Lamp (⊕) / Voltmeter (V))

Turn on ignition.

Set program switch to  .

Blower should be running at maximum speed. If not, check fuse no. 17.

Blower not running, check:

- a) CEL plug G 15: approx. 12 V (control switch okay).
- b) Pull off DEF relay VIII, bridge term. 30 and 87 – blower running or approx. 12 V on CEL plug G 22 (check relay socket/relay).
- c) The 2-pin blower plug must have approx. 12 V (blower motor); set control switch to .
- d) Approx. 12 V on CEL plug G 14 (control switch okay).
- e) Pull off blower relay X, bridge term. 30 and 87 – blower running or approx. 12 V on CEL plug G 21 (check relay socket/relay).
- f) There must be between 4 and approx. 12 V on the 2-pin blower plug (depending on speed switch position).

## TEST PLAN FOR AUTOMATIC AIR CONDITIONER M 563 (1984 / 1985)

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### Test Point 4 – FLAP CONTROL

#### 4. Flap Control (Test Lamp) (⊕)

Remove control switch; plug remains connected.

Run engine at idle speed and set blower switch to maximum speed.

##### 4.1 Circulating Air Flap

Program switch in off position.

Control switch plug term. 9 and 10 must have approx. 12 V and circulating air flap must be open (air circulated).

If not: Check 6-pin plug term. 1 (black/white) (center console) approx. 12 V.

Check voltage on blue connection of circulating air solenoid valve (approx. 12 V).

Replace solenoid valve, if vacuum is okay and flap vacuum box works.

Circulating air flap must close when setting program switch to  (fresh air).

##### 4.2 Defroster Flap

Program switch in off//▽.

Approx. 12 V on control switch term. 2 and 10; defroster flap must be closed.

If not: Check 6-pin plug term. 1 (black/white) (center console) (approx. 12 V).

Check for approx. 12 V on green connection of defroster solenoid valve.

Replace solenoid valve if vacuum is okay and flap vacuum box works.

Defroster flap must be open, when program switch is set to Δ▽/Δ/.

##### 4.3 Footwell Flap



Set program switch to Δ▽/▽.

There should be approx. 12 V on control switch plug term. 1 and 10; footwell flap must be open.

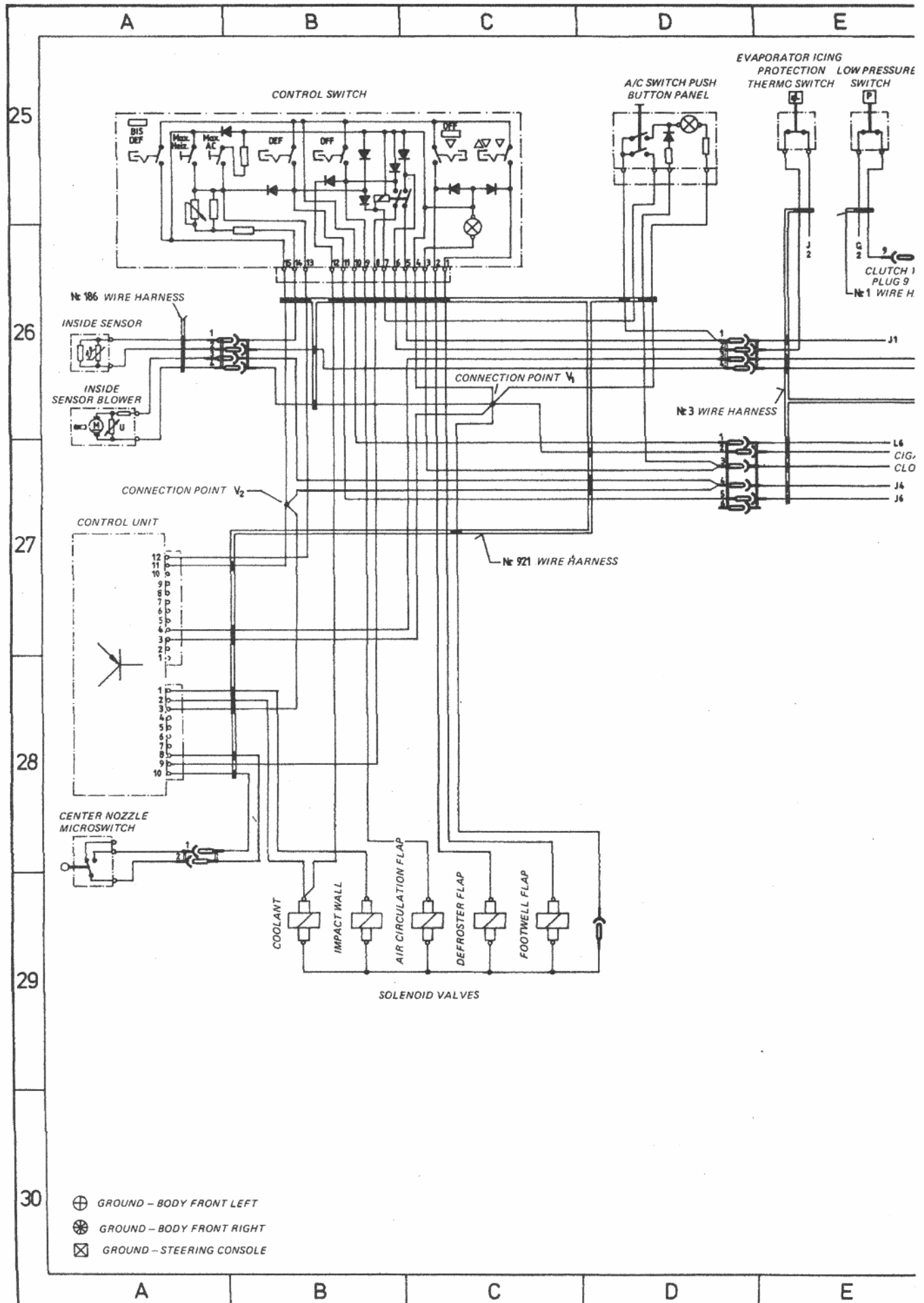
If not: Check 6-pin plug term. 1 (black/white) (center console) (approx. 12 V).

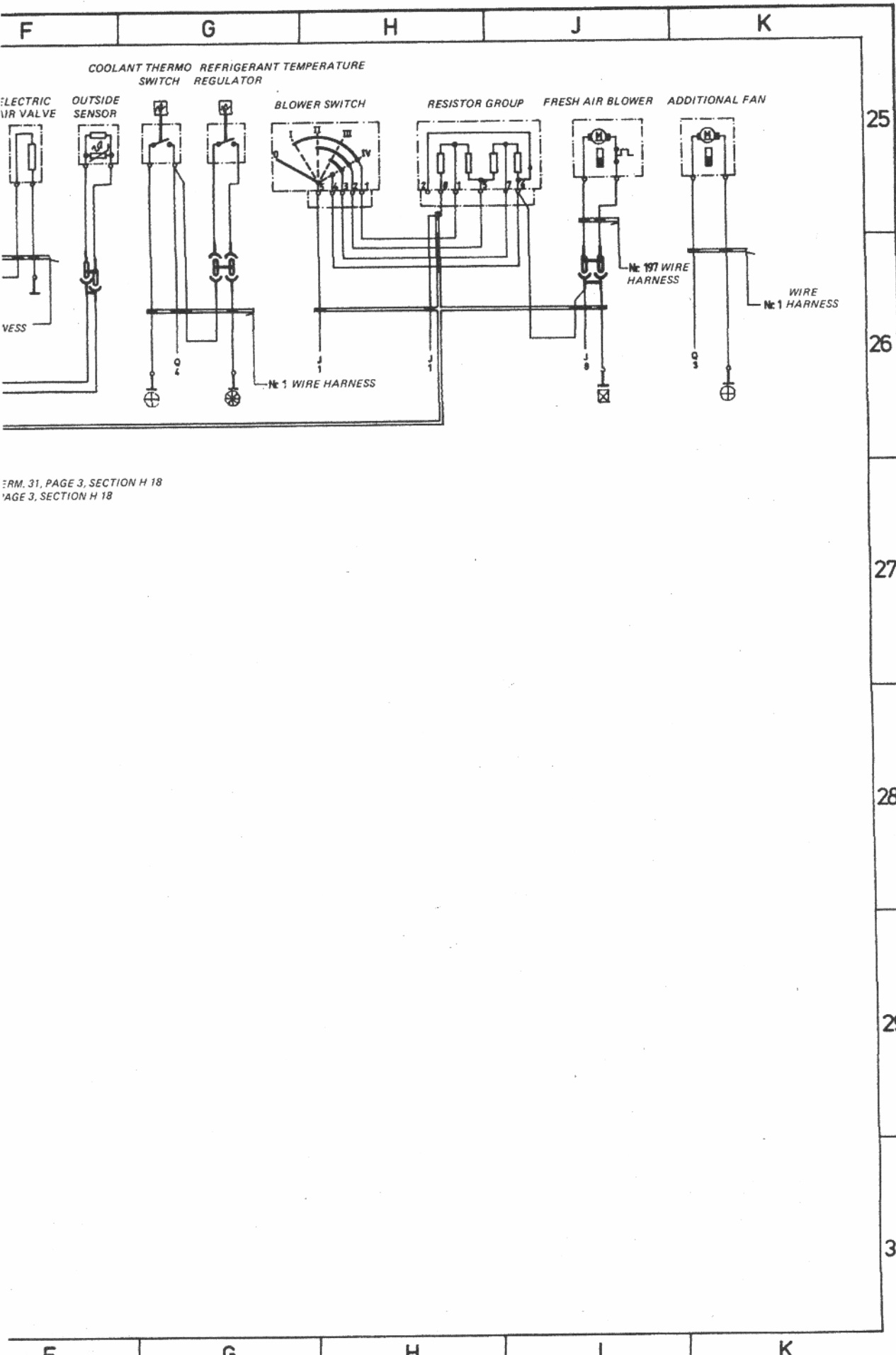
Check for approx. 12 V on yellow connection of footwell solenoid valve.

Replace solenoid valve, if vacuum is okay and flap vacuum box works.

Footwell flap must close, when program switch is moved to off//Δ/.

WIRING DIAGRAM FOR TYPE 928 S - 1984 Model HEATING-VENTILATING-AIR CONDITIONING SYSTEM





FORM. 31, PAGE 3, SECTION H 18  
PAGE 3, SECTION H 18

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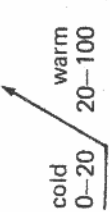
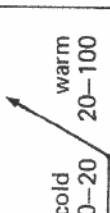
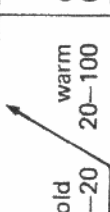
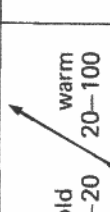

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AIR CONDITIONER (1984 Model) – FLAP PROGRAM

Program Switch Position							
Compressor	OFF	Compressor ON, if "AC" switch is ON! Compressor OFF, if "AC" switch is OFF!					ON
Heater water valve	CLOSED	closed 0-20	open 20-100	closed 0-20	open 20-100	closed 0-20	open 20-100
Temperature mixing flap position							
Circulating air flap OPEN (circulated air) CLOSED (fresh air)	OPEN	open 0-10	closed 10-100	open 0-10	closed 10-100	open 0-10	closed 10-100
Defroster flap	CLOSED	CLOSED		OPEN		OPEN	
Mixing flap/center nozzle (if center nozzle is closed, mixing flap remains open)		open 0-20	closed 20-100	open 0-20	closed 20-100	open 0-20	closed 20-100
Center nozzle flap	CLOSED/OPEN manual regulation						
Footwell flap	CLOSED	CLOSED	OPEN	OPEN	CLOSED	CLOSED	
Fresh air blower	OFF	ON (minimum speed) manual speed regulation from 1 to 4					max. speed

The numbers 0 – 100 indicate the control unit operating motor movement in %.

Operating motor position 0 % = cooling (operating motor linkage moved down)

100 % = heating (operating motor linkage moved up)

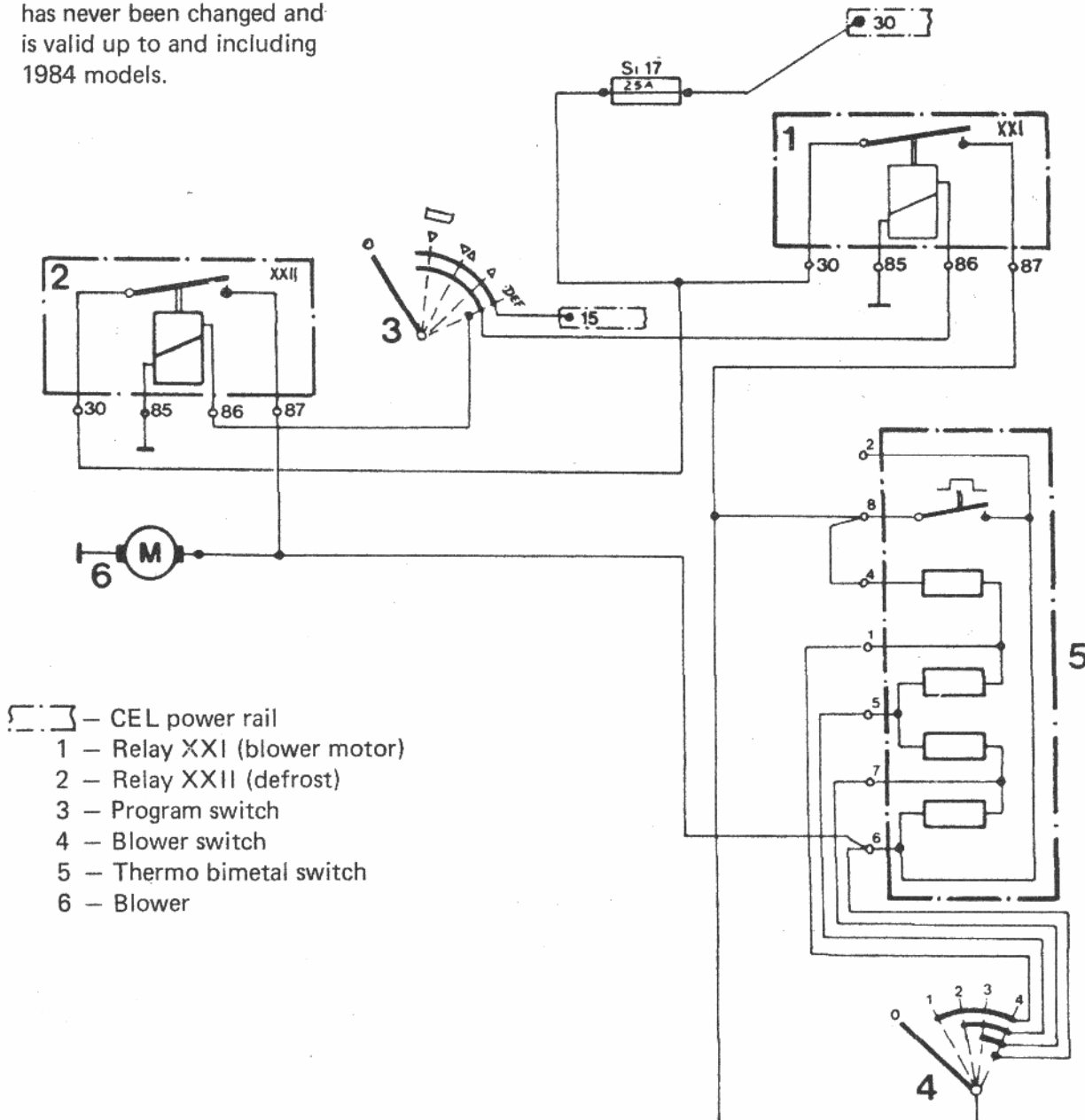
The operating motor runs from down 0 % to up 100 % or vice versa, which means from cooling to heating or vice versa. These % positions are marked on the operating motor housing in graduations of 5 %.

## AIR CONDITIONER (1980 to 1984) – BLOWER

Blower (6) is switched in with **relay XXI** and a **thermo bimetal switch** (5) in the blower housing. The blower runs at five different speeds, which can be selected manually by the driver. The lowest speed is switched on as soon as program switch (3) is moved out of "off" position. The blower speed can be set to any of 4 different speed stages with the blower speed switch (4) for any of the following program switch positions. Moving the program switch (3) all the way to the right in position "DEF" will cause the ballast resistors of thermo bimetal switch (5) to be bridged by **relay XXII**, so that the blower will run at maximum speed.

**Note:** The blower is also switched off when the program switch (3) is in "off" position. The blower runs at minimum speed when the program switch (3) is in any program position, even with the blower speed switch set to "0", with exception of program switch position "DEF", where the blower runs at maximum speed, even when the blower speed switch is at "0".

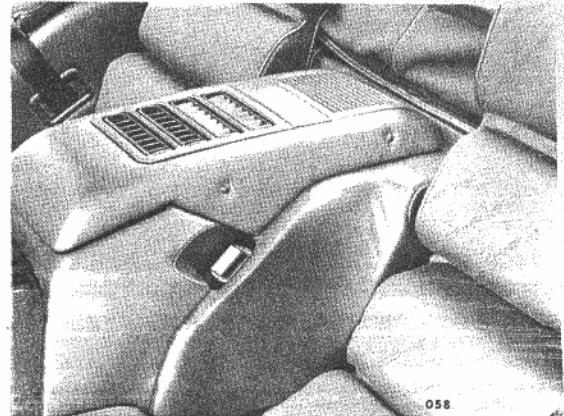
The circuit of the blower has never been changed and is valid up to and including 1984 models.





An extra evaporator for better cooling is available as optional extra equipment (M 570). The extra evaporator with a 3-speed blower is installed in place of the rear tray.

With the automatic air conditioner switched on (AC switch pressed), the rear evaporator can be turned on by turning the left knob on the center console clockwise and the blower speed regulated between 1 and 3.



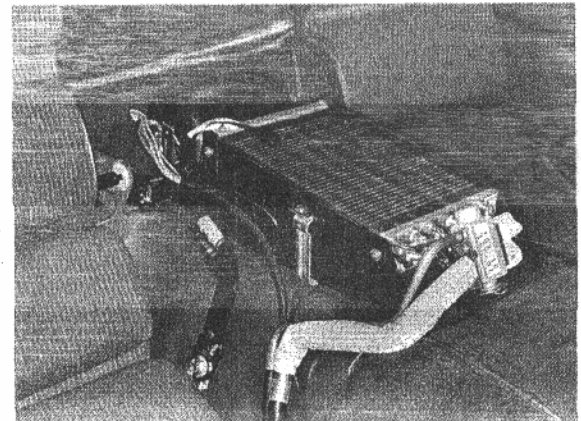
The passenger compartment air is taken in through the rear grill, cooled and distributed in the rear seat area through the front plate grill.

If the AC switch has not been pressed, there is only circulation of the air.

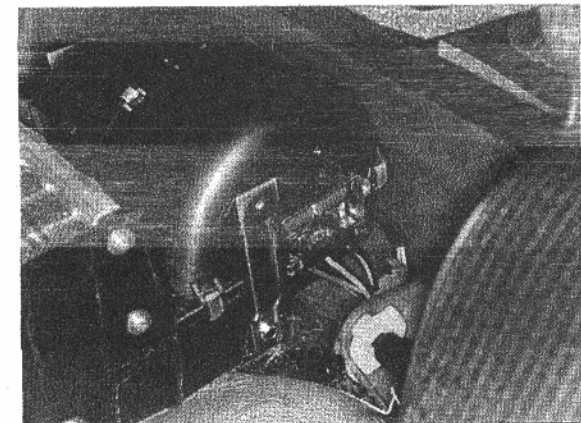
The cooling power of the rear evaporator can be increased by turning the right knob clockwise.



Blower is located behind the evaporator.

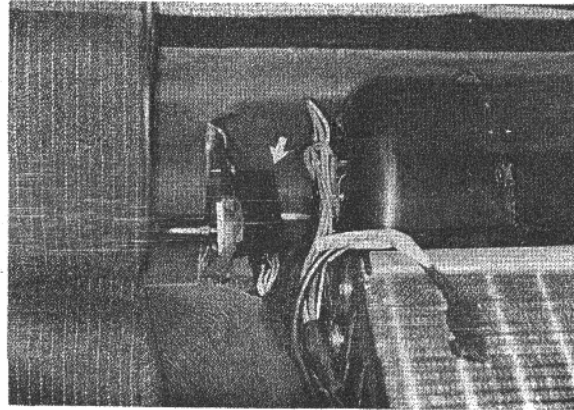


The different speeds are switched via ballast resistors located on the left blower intake side.

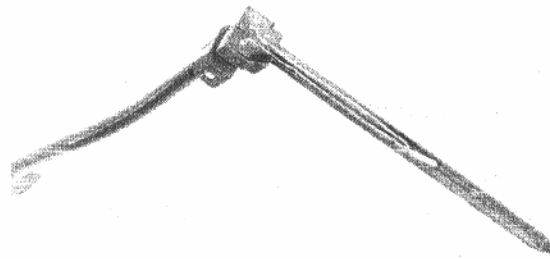
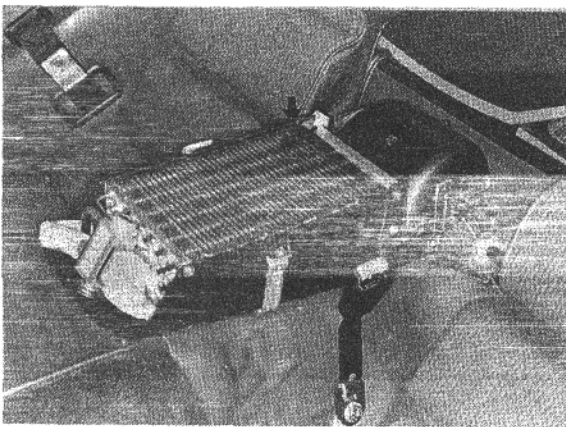


## AIR CONDITIONER (1985 Model)

A nominal/actual value regulator is located to the right of the blower.



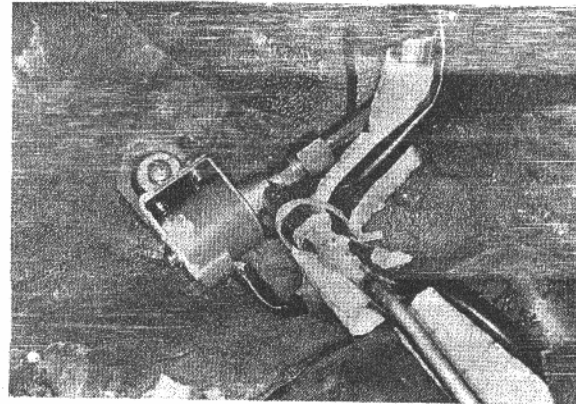
An evaporator temperature sensor is inserted in the evaporator plates from above.



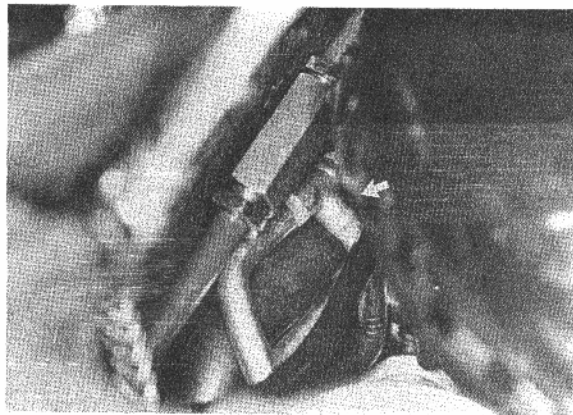
1385

A solenoid valve is inserted in the pressure line of the rear evaporator underneath the right rear seat cushion.

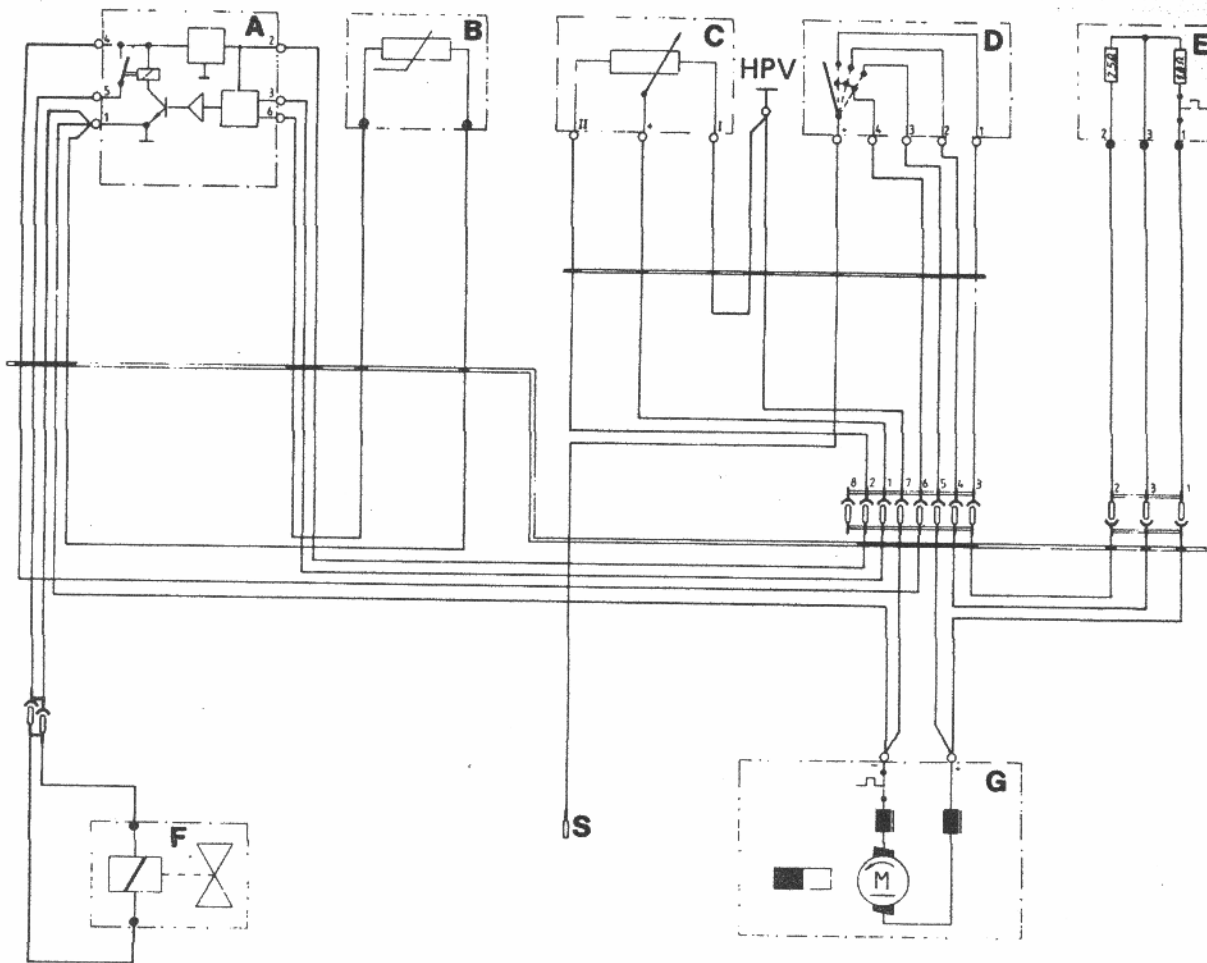
The pressure and suction lines go from the evaporator along the tunnel and mouth outdoors underneath the right passenger's seat . . .



. . . forward into the engine compartment, where they are connected with the pressure and suction pipes close to the fuel cooler.



# AIR CONDITIONER (1985 Model) – CIRCUIT



- A – Control switch
- B – Evaporator sensor
- C – Temperature potentiometer (center console)
- D – Blower switch (center console)
- E – Blower ballast resistors
- F – Solenoid valve
- G – Blower motor
- S – To fuse no. 13– 15 A (CEL)

## Component Function

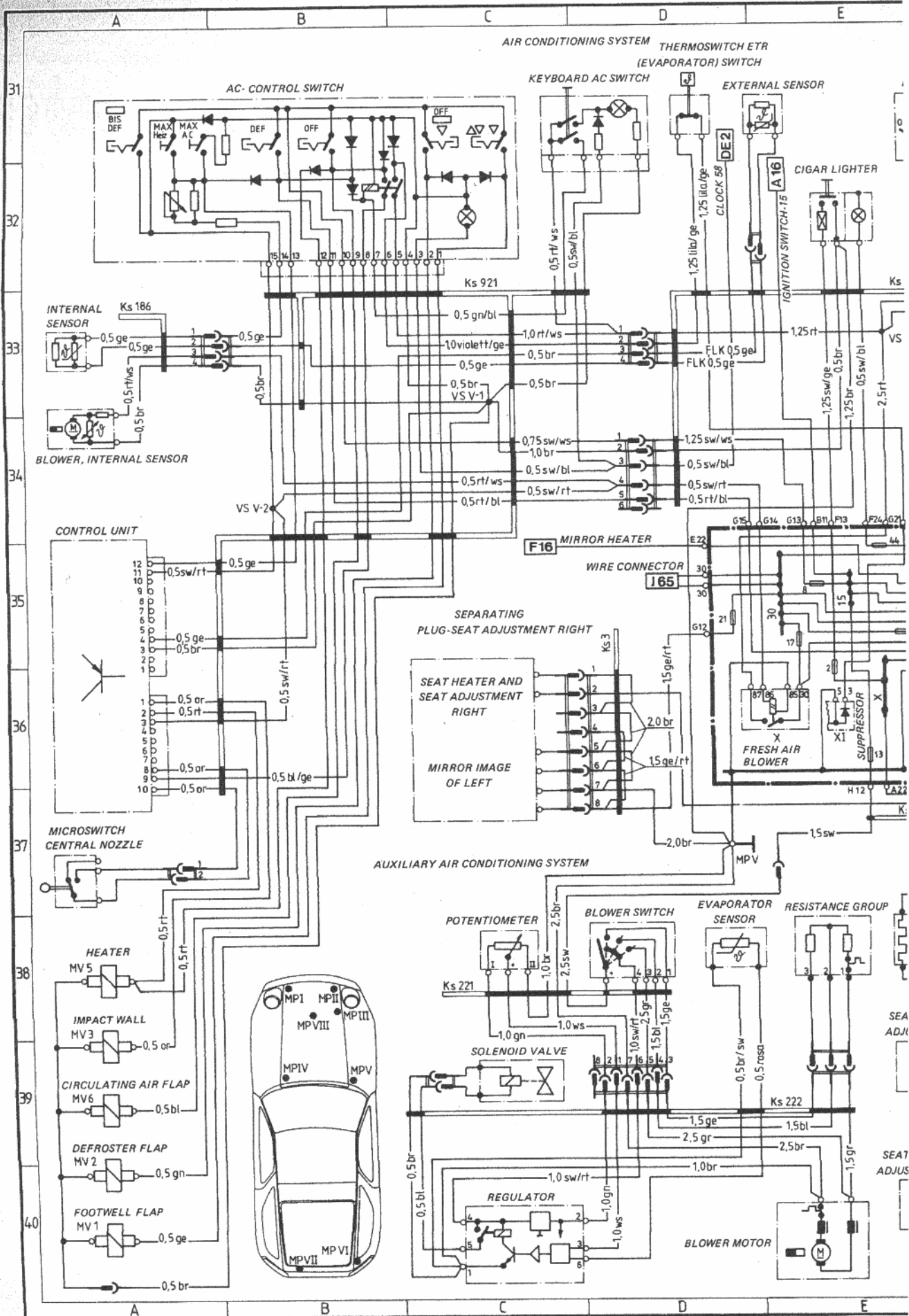
The control switch (A) consists of a switching relay, voltage regulator and voltage comparer. The circuit compares the instantaneous voltage signals of potentiometer (C) and evaporator sensor (B). As long as the actual value of the evaporator sensor (B) does not conform with the selected nominal value of potentiometer (C), the regulator relay is activated and opens a solenoid valve (F) in the pressure line to the rear evaporator, so that the cooling circuit to the rear is maintained. If the actual value and selected nominal value are identical, the regulator relay opens and the solenoid valve closes, so that the cooling circuit to the rear evaporator is interrupted.

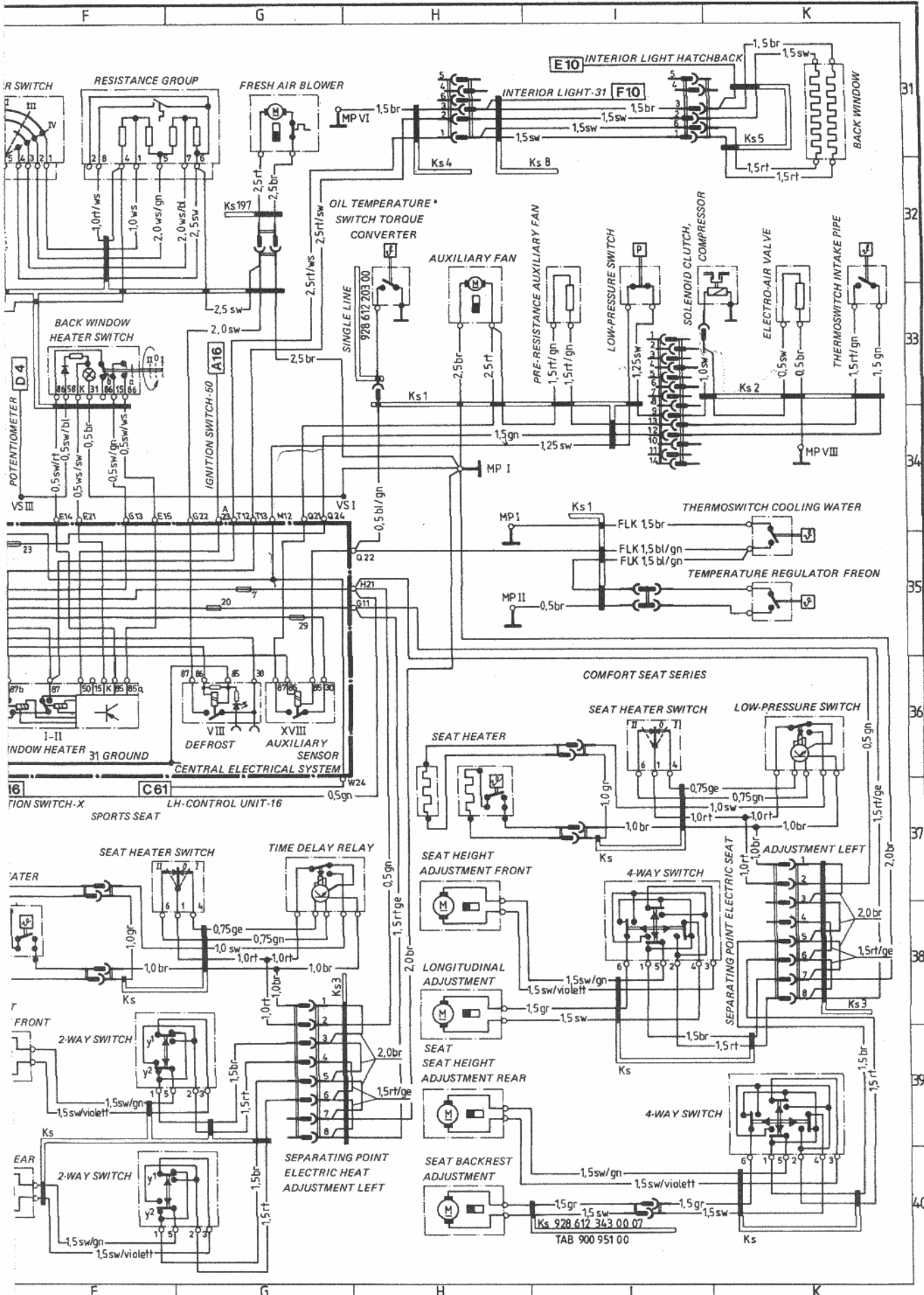
To avoid fluctuating voltage of the car's system in the regulator circuit, the regulator switch works together with a voltage regulator. Two ballast resistors (E) are series connected in front of the blower motor (G), through which the blower is switched in speeds I and II.

Resistance Test Values:	Evaporator Sensor
	–5 °C = 11.7 k-ohms
	0 °C = 9 k-ohms
	10 °C = 5.5 k-ohms
	20 °C = 3.5 k-ohms
	25 °C = 2.8 k-ohms
	30 °C = 2.2 k-ohms

Temperature Potentiometer	
term. I and II =	10 k-ohms
term. II and + =	0 – 10 k-ohms

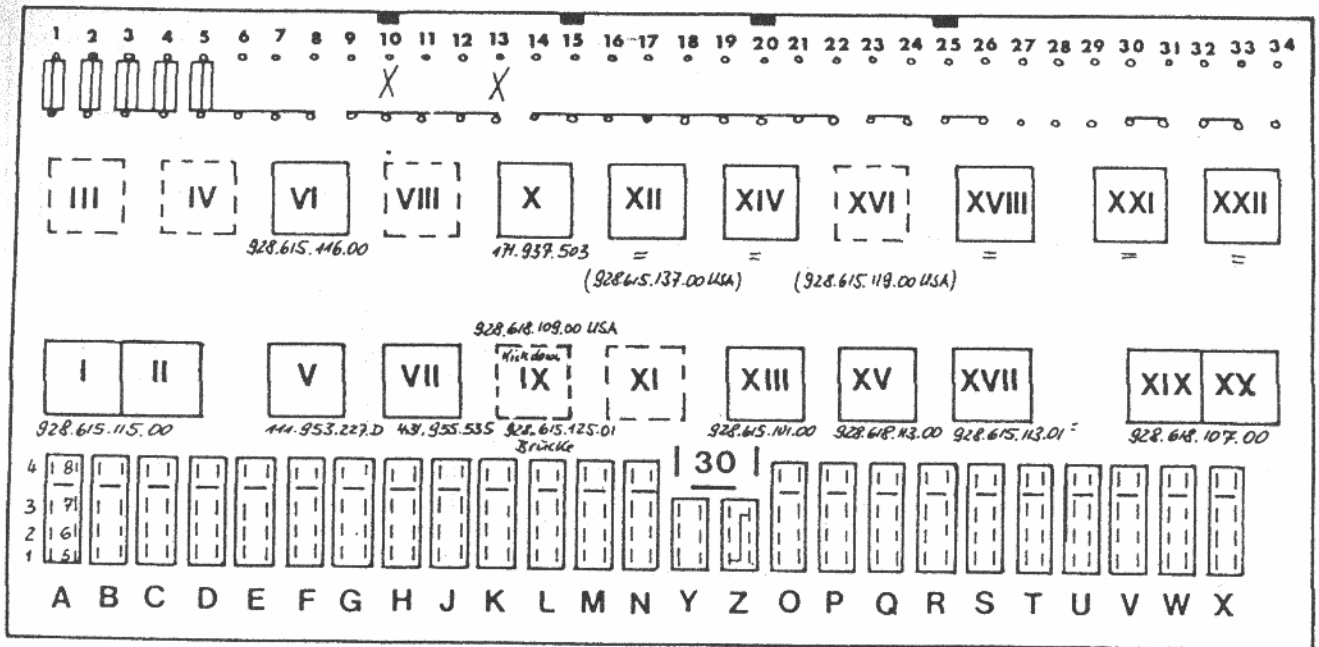
VENTILATION AND HEATING





# AIR CONDITIONER – CENTRAL ELECTRIC (1983 Model)

(928.610.105.06)



## Fuses

- 1- Front fog lights
- 2- Additional high beams (not USA)
- 3- Engine compartment, license plate light
- 4- Instruments, ashtray light
- 5- Cigar lighter
- 6- Windshield wipers
- 7- Stop lights, cruise control
- 8- Sun roof
- 9- Air conditioner, mirrors, backup lights, rear window wiper
- 10- Not used
- 11- Resetting button, light switch light
- 12- Instrument control lamps
- 13- Not used
- 14- Power seats
- 15- Two-tone horns, power antenna, rear window wiper return
- 16- Extra fan
- 17- Blower

- 18- Rear window defogger
- 19- Headlight motor
- 20- Headlight washer
- 21- Power windows, central locks
- 22- Fuel pump, throttle bypass valve
- 23- Inside lights, clock
- 24- High beam left
- 25- High beam right
- 26- Low beam left
- 27- Low beam right
- 28- Parking light left
- 29- Parking light right
- 30- Turn signal front left
- 31- Turn signal rear left
- 32- Turn signal front right
- 33- Turn signal rear right
- 34- Tail fog light

## Relays

- I-II - Rear window defogger
- III - Not used
- IV - Not used
- V - Flasher\*
- VI - Power windows, central locks
- VII - Headlight cleaners
- VIII - Not used
- IX - Kickdown (only automatics USA)
- X - Two-tone horns
- XI - Not used
- XII - Front fog lights (USA light flasher)
- XIII - Wipe/wash intermittent control
- XIV - Starter interlocking relay
- XV - Extra washing fluid pump
- XVI - L-Jetronic (only USA)
- XVII - Fuel pump, throttle bypass valve
- XVIII - Extra fan
- XIX - Concealed headlights
- XX - Concealed headlights
- XXI - Blower
- XXII - Defroster

### Note:

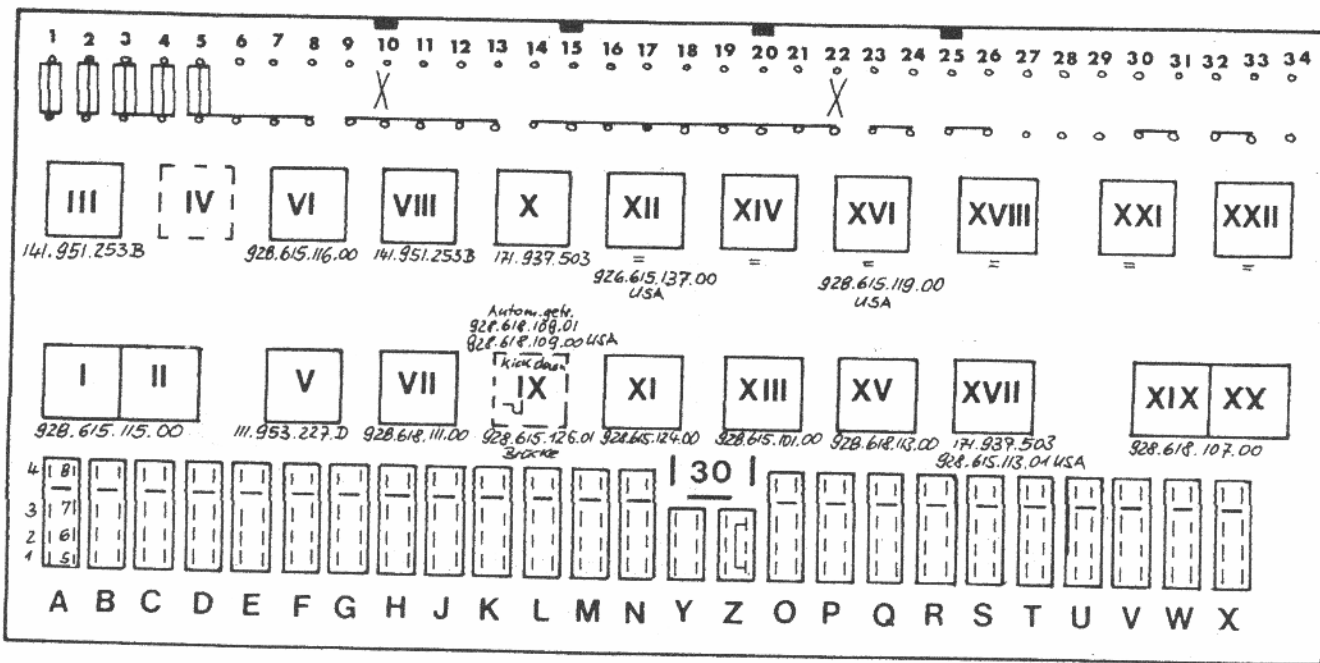
Timing relay underneath center console, rear window wiper relay next to rear wiper motor.

CEL 928.610.105.06 is for Rest of World cars and can even be installed in 1982 model cars!

Fuses 10 and 13 are not used.

# AIR CONDITIONER – CENTRAL ELECTRIC (1984 Model)

(928.610.105.08)



## Fuses

- |  |                                       |
|--|---------------------------------------|
| 1— Front fog lamps 16 A                                    | 16— Extra fan 25 A                    |
| 2— Extra high beams 16 A (not USA)                         | 17— Blower 25 A                       |
| 3— License plate lights, engine compartment light 8 A      | 18— Rear window defogger 25 A         |
| 4— Instruments, ashtray light A                            | 19— Headlight motor 16 A              |
| 5— Cigar lighter 16 A                                      | 20— Headlight washer 16 A             |
| 6— Windshield wipers 16 A                                  | 21— Power windows, central locks 25 A |
| 7— Stop lights, cruise control 8 A                         | 22— Not used                          |
| 8— Sun roof 16 A   | 23— Inside lights, clock 8 A          |
| 9— Backup lights, mirrors, rear wiper, air conditioner 8 A | 24— High beam left 8 A                |
| 10— Not used   | 25— High beam right 8 A               |
| 11— Resetting button, light switch 8 A                     | 26— Low beam left 8 A                 |
| 12— Instrument control lamps 8 A                           | 27— Low beam right 8 A                |
| 13— Fuel pump, throttle bypass valve 16 A                  | 28— Side marker left 8 A              |
| 14— Power seats 25 A                                       | 29— Side marker right 8 A             |
| 15— Two-tone horns, rear wiper return, power antenna 16 A  | 30— Turn signal front left 8 A        |
|  | 31— Turn signal rear left 8 A         |
|  | 32— Turn signal front right 8 A       |
|  | 33— Turn signal rear right 8 A        |
|  | 34— Rear fog lights 8 A               |

## Relays

- |       |  |
|-------|--|
| I—II  | — Rear window defogger                 |
| III   | — Power windows (door unlocking)       |
| IV    | — Not used                             |
| V     | — Flasher                              |
| VI    | — Power windows, door locking          |
| VII   | — Headlight cleaners                   |
| VIII  | — EFZ ignition system                  |
| IX    | — Kickdown, bridge — Two-tone horns    |
| XI    | — ABS                                  |
| XII   | — Front fog lights (USA light flasher) |
| XIII  | — Wiper intermittent control           |
| XIV   | — Starter interlocking relay           |
| XV    | — Intensive cleaning fluid pump        |
| XVI   | — LH-Jetronic (USA Jetronic)           |
| XVII  | — Fuel pump, throttle bypass valve     |
| XVIII | — Extra fan                            |
| XIX   | — Concealed headlights                 |
| XX    | — Blower                               |
| XXI   | — Blower                               |
| XXII  | — Defroster                            |

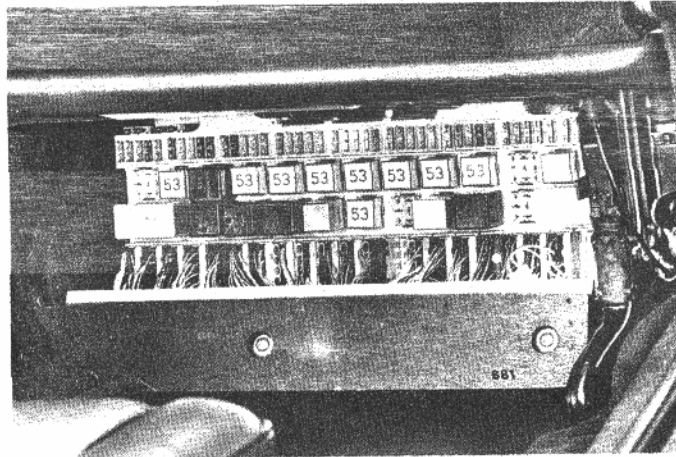
## Note:

Timing relay underneath center console, rear wiper relay next to battery ground point.  
 Replace relay V with relay 928.616.131.00 when installing a trailer hitch.

CEL 928.610.105.08 is **not** for installation in older models.

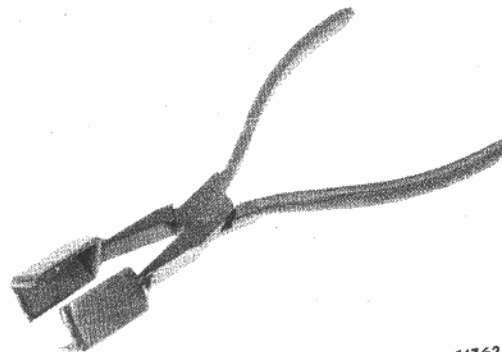
Fuses 10 and 22 are not used.

Central electric (CEL) is new.  
(928.610.105.09)



The fuse plate holds 45 fuses (was 35). This was made possible by using flat fuses. The fuses are compiled into blocks of 5 fuses each and are no longer marked with numbers. The fuses must be counted off from left to right, in order to check a certain fuse.

The number of relays has been increased to 26 (was 22). The CEL no longer uses roman numerals to identify relays. The identification is on a card which is placed in the cover. The spacing between relays is smaller because of the additional relays, which makes the removal of a relay slightly more difficult. We recommend using Special Tool 9235 to make the removal of relays easier.



11362



## AIR CONDITIONER – CENTRAL ELECTRIC 928 – SURVEY / CHANGES

Car Model	CEL Final No. 928.610.105 . . .	Installed in Model
1978	..00	only '78
1979	.01	'78/79
1980	.03	only '80
1981	.04	'80/81
1982	.05	only '82
1983	.06	only '83 for USA / 4-speed automatic '82/83 for Rest of World
1984	.07/08	07 – only '84 for USA/Japan 08 – only '84 for Rest of World
1985		

### How Do Various CELs Differ?

- CEL 1978 – Was fitted with a diode group in relay socket XI.  
Fuse no. 13 not used.
- CEL 1979 – Diode group omitted. Speed relay (air conditioner) used in socket XI.  
Terminals 30 and 87 bridged if car is without air conditioner.  
Fuse no. 13 not used.
- CEL 1980 – Speed relay XI omitted. New circuitry because of new main light wiring  
(combination relay instead of separate relays).  
Fuse no. 13 and 7 not used.
- CEL 1981 – Fuse positions changed (instrument light regulation changed).  
Fuse no. 13 and 10 not used.
- CEL 1982 – Changed circuitry. Starter relay XIV for all models (bridge on plug in spare  
wheel well for cars with manual transmission).  
Fuse no. 13 and 10 not used.
- CEL 1983 – Changed circuitry – NEW! Relay IX (kickdown relay) only for 4th gear  
automatic transmission, relay XII (fog lamps for US cars). CEL 05 can be installed  
in 1983 models, insofar as they are not fitted with a 4-speed automatic  
transmission or US equipment.  
CEL 06 can be used in place of CEL 05.
- CEL 1984 – USA – new circuitry for ABS.  
Fuse no. 10 and 22 not used.
- CEL 1984 – Completely new circuitry for ABS, LH-Jetronic and EZF ignition. 2nd ground  
lead from CEL ABS relay.  
4-pin plug socket Y used for ABS.  
Fuse no. 10 and 22 not used.

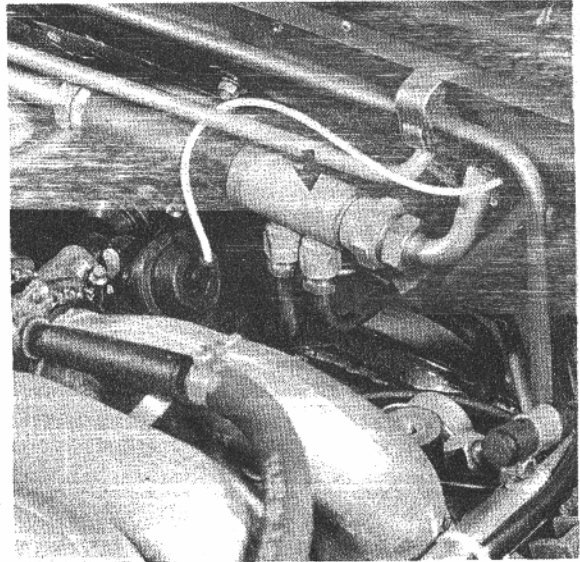
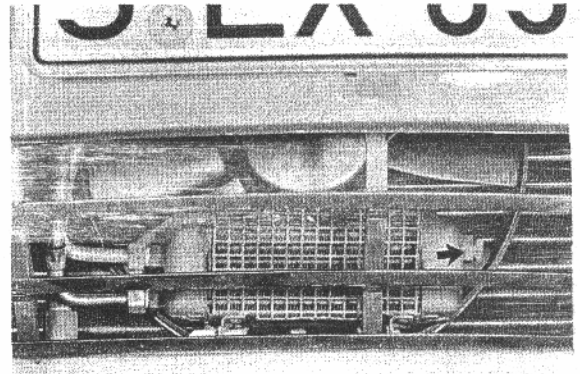
## AIR CONDITIONER – CHANGES

Cars with a 4-speed automatic transmission have an additional ATF cooler in front of the radiator. If a trailer hitch is service installed, the plug in the ATF cooler must be replaced with a temperature switch (928.606.309.01). The temperature switch switches in an additional fan from an ATF/oil temperature of 95 °C on.

The viscous fan clutch has a higher switching-on temperature of 75 °C (was 65 °C) and a different drive ratio.

0.98 for Germany, R. o. W. and USA  
1.20 for Japan and Hot Countries

The fuel cooler is connected on the cooling circuit of the air conditioner. This prevents vapor lock in the fuel system at high outside temperatures when switching on the air conditioner. The return is from the fuel cooler to the fuel tank.



## AIR CONDITIONER – CONDITIONS AND CORRECTIONS

Condition	Cause	Correction
1. Cold start interlock not working, i. e. air blown into footwell with a "cold" engine.	Solenoids not insulated (ground out via radio!).	Insulate solenoids with an insulating tape.
2. Flap control not guaranteed (e. g. in case of vibration).	Solenoids have insufficient ground contact.	Tighten solenoids with screws.
3. a) Shutoff flap for center nozzle cannot be opened or closed.	– Operating lever does not touch tonque of microswitch and therefore cannot switch.	Move microswitch to correct position and secure with a lockplate.
"	– Operating lever is located underneath tonque of microswitch.	Check position of operating lever when installing center nozzle.
"	– Vacuum hoses for vacuum unit disconnected on center console (brown and orange hoses!).	Check whether hoses have flow and connect hoses correctly.
"	– Shutoff flap seized because of strong pressure of speedfixes on shaft or center console.	Loosen speedfix.
b) Shutoff flap can only be moved to "open" or "closed" position.	Tonque on microswitch bent, so that only one cam can be operated.	Replace tonque of microswitch.

## AIR CONDITIONER – CONDITIONS AND CORRECTIONS

---

Condition	Cause	Correction
4. Heating or cooling insufficient.	Operating motor for control flaps faulty.	Replace operating motor. When connecting plug on the operating motor, make sure that plug has coding pins, since the operating motor would be destroyed were the plug offset 180°.
5. Footwell flap does not shut.	Spring in vacuum box for footwell flap too weak.	Replace vacuum box.
6. System always heating.	– Plug or outside sensor faulty. – Inside sensor faulty.	Replace plug or outside sensor. Replace inside sensor.
7. Overheating and sluggish regulation.	Inside sensor blower not running.	Replace inside sensor blower.
8. Difference in up/down temperature excessive.	Control flaps not adjusted correctly.	Run operating motor to "max. heating", loosen screw in connecting lever, press lever up or forward and tighten screw again.

## AIR CONDITIONER – CONTROL FLAPS

---

### ADJUSTING CONTROL FLAPS


(only for manual air conditioner M 573)

The adjustment of control flaps in cars with a manually regulated air conditioner is very important for the air outlet temperature on the nozzles.

Procedures for Adjusting Flaps in Car:

1. Disconnect cable on unit (left).
2. The shafts of the upper and lower control flaps are connected with a lever on the right side of the air distribution housing. To take up tolerances, the mounting screw must be loosened, the upper lever pressed up and the lower lever forward and finally the mounting screw can be tightened again.
3. The control flaps remain in "max. heating" position. The temperature switch is moved to the right and the cable is connected on the unit again with a clamp.

#### 4. Checking Flap Adjustment

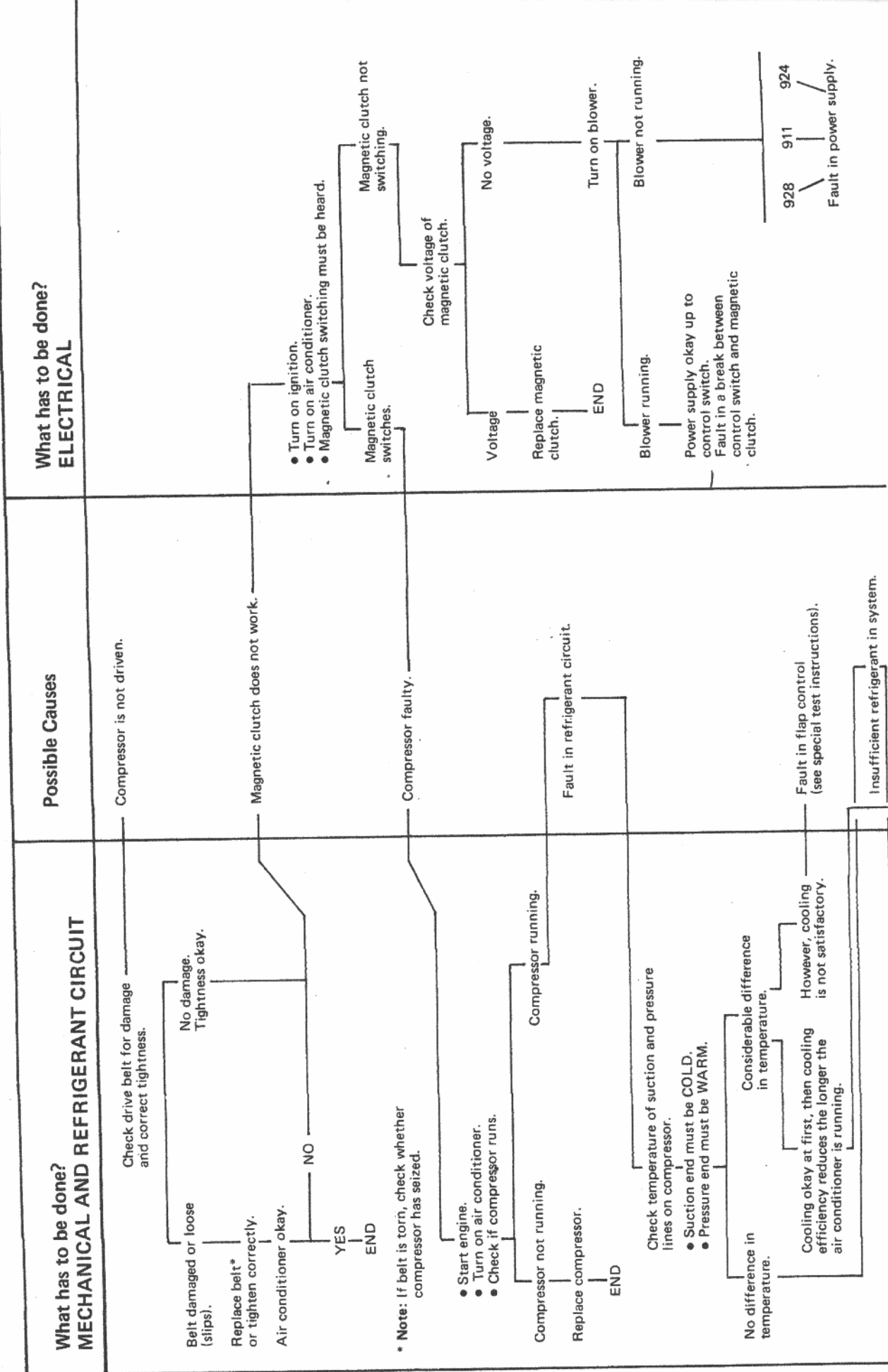
Run engine of car warm. Move temperature switch lever to the right and set temperature switch to „“.

The temperature of the air leaving the defroster nozzles should be uniform over the entire width of the windshield.

#### For Automatic Air Conditioners:

5. Set temperature lever to 30 °C – the operating motor must run up completely. If not, disconnect outside sensor plug.
6. Same procedures as in point 2.

# TROUBLESHOOTING PROGRAM FOR CONDITION OF INSUFFICIENT COOLING





even with circuit filled correctly (911: ball must float).

System is not filled correctly, if bubbles do not disappear after several minutes.

No bubbles seen (no flow), system is empty. Low pressure switch will have stopped the system.

System filled correctly.

- Connect discharging and charging machine (low pressure too low, high pressure too high).
- Replace expansion valve.
- Replace filter drier.
- Discharge system.
- Check system for leaks.
- END

Connect discharging and charging machine (low pressure too high, high pressure too low).  
Liquid level too low.

Check for leaks visually and with leak detector.

- Eliminate leaks.
- Replace filter drier.
- Discharge system.
- Perform leak test.
- Charge system.
- END

- Replace damaged parts.
- Replace filter drier.
- Discharge and charge system.
- Perform leak test.
- END

Check seating of capillary tube for icing-up protection switch.  
Installed depth 911: 155 mm  
924: 130 mm  
928: 160 mm

Check switching points of switch in iced water (-1 to +2 °C) (interruption in iced water, flow at room temperature).

Expansion valve faulty.

-Lines or connections leak.

System emptied through damage (e. g. accident).  
System was overheated, bursting seal has bursted \*\*.

\*\* Check turning direction and function of condenser fan in case of bursted seal.

Evaporator is iced up.  
Icing-up protection switch does not switch off A/C compressor.

Dr.-Ing. h. c. F. Porsche  
Aktiengesellschaft

Postfach 400 640  
D - 7000 Stuttgart 40

Service Division  
Technical Service Dept.  
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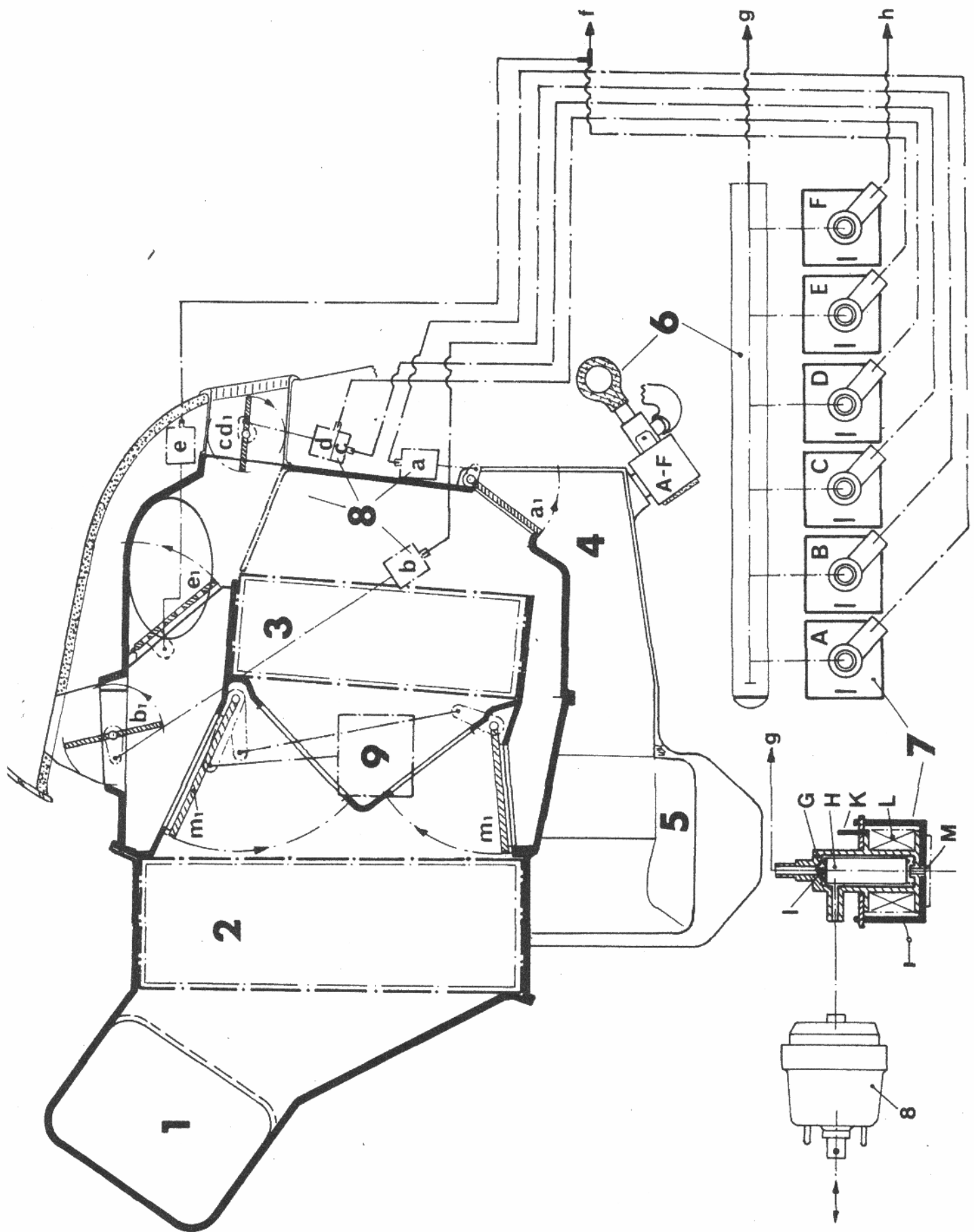


- 1 — Blower connection  
(fresh air / circulating air inlet)
- 2 — Evaporator
- 3 — Heater
- 4 — Foot well outlet box
- 5 — Foot well outlet
- 6 — Vacuum distributor hose
- 7 — Electr. vacuum solenoid valves
- 8 — Vacuum control cells
- 9 — Servo motor with electronic control

- G — Coil former
- H — Magnetic core
- I — Seal
- K — Electr. connection
- L — Coil winding
- M — Ventilation

- a — Foot well control cell (yellow)
- a1 — Foot well flap
- b — Defroster control cell (green)
- b1 — Defroster flaps
- c — Centre vent, double cell (orange)
- d — Centre vent, double cell (brown)
- cd1 — Centre vent flap
- e — Mixer flap, control cell (red)
- e1 — Mixer flap
- m1 — Temp. control flaps
- f — to heater valve (red)
- g — to vacuum reservoir intake pipe
- h — to circ. air control cell (blue)  
circulating air flap

( ) = Hose colours



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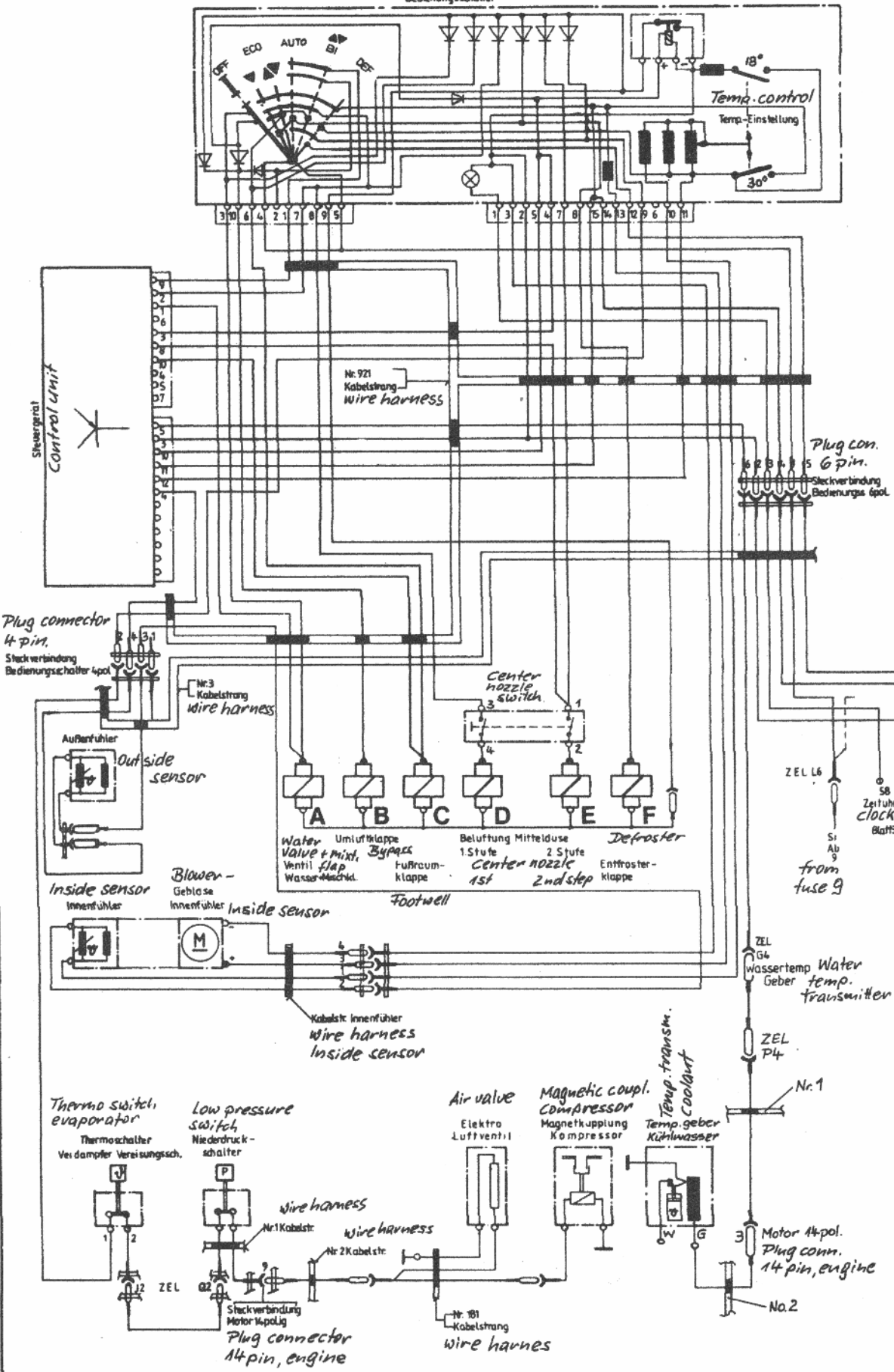
29

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M563  
control switch  
Bedienungsschalter

Fres:  
Gabel

Fres:  
X  
Frashlu  
30 E  
Mas  
ZE  
Gew  
CE  
Si  
Ab  
17



Plug con.  
6 pin.  
Steckverbindung  
Bedienungsschalter

Plug connector  
4 pin.  
Steckverbindung  
Bedienungsschalter 4-pol.

Nr. 3  
Kabelstrang  
wire harness

Nr. 921  
Kabelstrang  
wire harness

Water Valve + mix. Ventil flap Wasser-Mechd.

Umluftklappe

By-pass

Fußraumklappe

Belüftung 1. Stufe

Center nozzle 1st

Außenfühler  
Outside sensor

Innenfühler  
Inside sensor

Blower -  
Gebläse  
Innenfühler

Center nozzle  
2. Stufe

Defroster

Entfrosterklappe

Footwell

Water temp. transmitter

Thermo switch evaporator  
Thermoschalter  
Verdampfer Vereisungssch.

Low pressure switch  
Niederdruckschalter

Air valve  
Elektro Luftventil

Magnetic coupl. Compressor  
Magnetkupplung Kompressor

Temp. transm. Coolant  
Temp. geber Kühlwasser

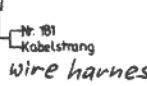
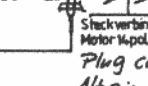
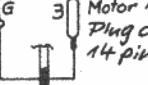
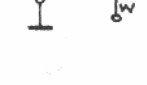
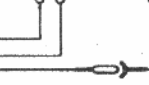
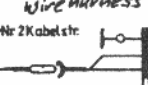
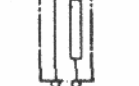
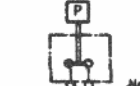
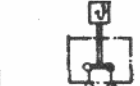
Wire harness

Wire harness

Wire harness

Wire harness

Wire harness



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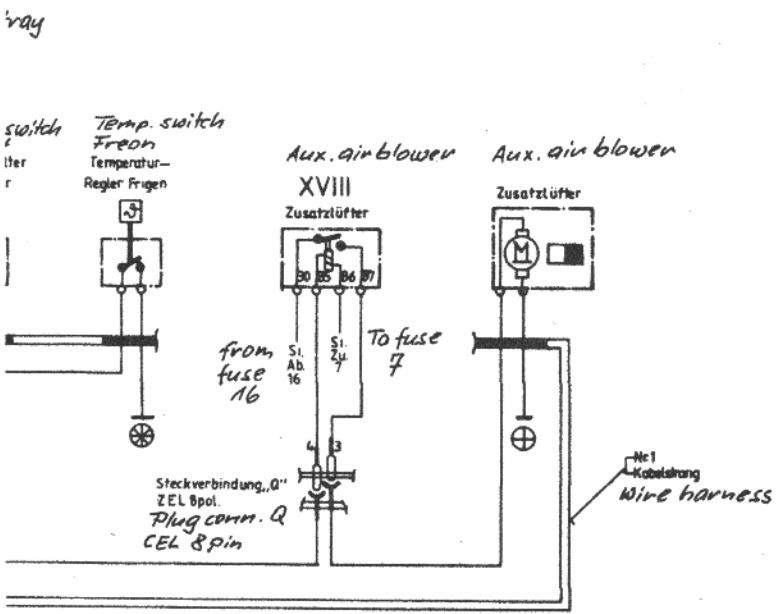
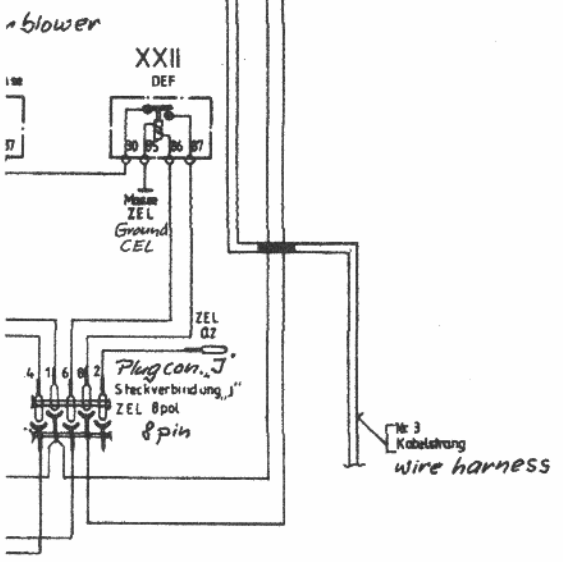
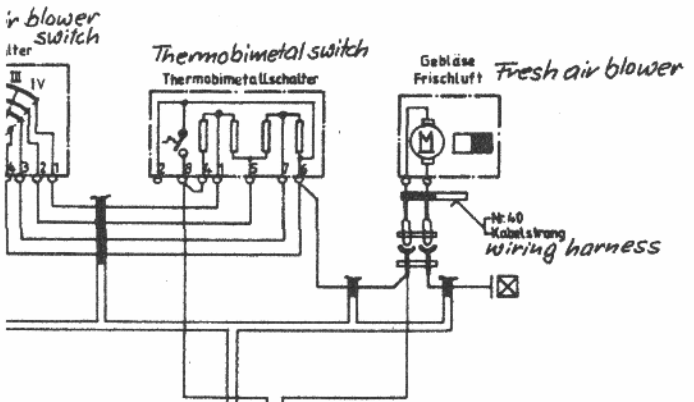
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5

nks vorn Ground body left front  
chts vorn — " — right front