



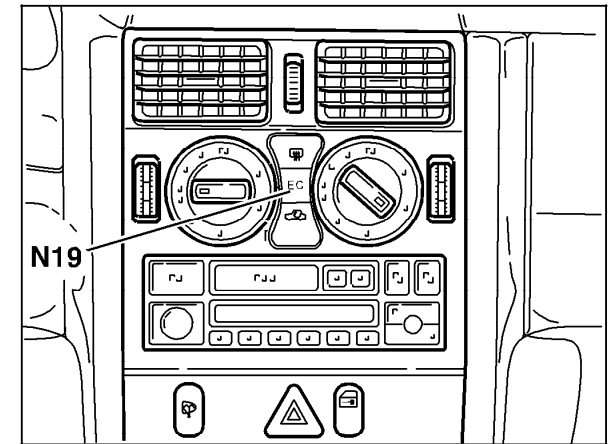
2.4 Model 170

Diagnosis	Page
Function Test	11/1
Reading Actual Values	12/1
Diagnostic Trouble Code (DTC) Memory	15/1
 Electrical Test Program	
Component Locations	20/1
Connection of Components	21/1
Preparation for Test	22/1
Test	23/1
 Pneumatic Test Program	
Component Locations	31/1
Test	32/1
 Refrigeration System Test Program	
Component Locations	41/1

Diagnosis – Function Test

Preparation for Test

1. Review 11, 15, 20, 21, 22, 23, 31, 32, 41
2. Check condition of fuses: F1-33, F1-36, F1-37, F1-M4
3. Run engine at closed throttle (idle) and operating temperature (approx. 80 °C engine coolant temperature) during entire test (ensure that the shift lever is in “P” and that the parking brake is engaged).
4. Outside air temperature > 15° C (58° F).
5.  button indicator lamp located in N19 is not illuminated.
6. Manually open center and side air outlets.
7. Ensure that the  button located in N19 is not depressed.
8. Set blower fan to stage 3.



P83.30-0540-01

N19 A/C pushbutton control module

Diagnosis – Function Test


Test step/Test sequence	Test condition	Nominal value	Possible cause/Remedy ¹⁾
⇒ 1.0 Defrost	Temperature selector wheel in "white range". EC button indicator lamp is not illuminated. Air distribution dial set at 12 o'clock position (vertical).	Air venting from center vents. Air venting from defroster outlets. A/C compressor engaged.	23 ⇒ 1.0 – 15.0, 32
⇒ 2.0 Normal ventilation in regulating mode	Temperature selector wheel in "white range". EC button indicator lamp is not illuminated. Air distribution dial set at 4 o'clock position.	Air venting from lower and upper outlets. A/C compressor engaged . Tempered air from center air outlet. Duovalve cycles at the same time.	23 ⇒ 10.0 – 15.0
⇒ 3.0 Economy setting not in heating mode	Temperature selector wheel in "blue range". EC button indicator lamp is illuminated. Air distribution dial set at 9 o'clock position.	Air venting from center air outlets (ambient temperature) A/C compressor not engaged.	23 ⇒ 9.0 – 13.0
⇒ 4.0 Economy setting in heating mode	Temperature selector wheel in "red range". EC button indicator lamp is illuminated. Air distribution dial set at 4 o'clock position.	Heated air venting from lower, upper and center air outlets. A/C compressor not engaged.	23 ⇒ 9.0, 12.0
⇒ 5.0 Residual engine heat utilization (as of 10/97)	Ignition: OFF Press REST button Selected temperature: > 25°C	Heated air venting from footwell and side outlets. leak air from defroster outlets. Blower runs at lower speed. Coolant circulation pump (M13) runs.	23 ⇒ 16.0, 10.0, 11.0

¹⁾ Observe Preparation for Test, see 22.

Diagnosis – Reading Actual Values – via Hand-Held tester (HHT)

Preparation for Test

- Review 11, 15, 20, 21, 22, 23, 31, 32, 41

	Possible cause	Test step/Remedy ¹⁾
02	Outside temperature indicator temperature sensor (B14)	23 ⇒ 14.0
03	Heater core temperature sensor left (B10/1)	23 ⇒ 5.0
04	Heater core temperature sensor right (B10/2)	23 ⇒ 6.0
05	Evaporator temperature sensor (B10/6)	23 ⇒ 4.0
06	ECT sensor (DFI, IFI) (B11/4)	23 ⇒ 14.0
07	Refrigerant pressure sensor (B12)	23 ⇒ 7.0
12	Software version (example: 37)	–
12	Software version (example: 08)	–

1) Observe Preparation for Test, see 22.

Diagnosis – Diagnostic Trouble Code (DTC) Memory

Notes regarding Diagnostic trouble Code Memory

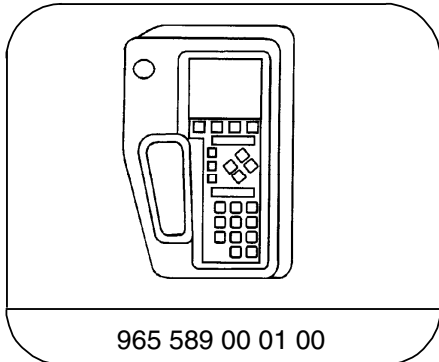
- To each fault (short circuit, open circuit etc) a certain numerical code has been assigned, i.e. Diagnostic Trouble Code (DTC). Additionally, current and intermittently appearing DTC's are differentiated from each other.
- When retrieving DTC's from the A/C pushbutton control module (N19), short circuits and open circuits can not be differentiated from each other in every case.
- If no DTC's are stored in DTC memory, but a complaint exists, it is possible that there may be a problem of incompatible tolerances between components. Since DTC memory can not read these tolerance variations, it is recommended that the entire system be completely checked, using the socket box and multimeter.

Prerequisite for reading out DTC Memory

Electrical wiring diagrams:

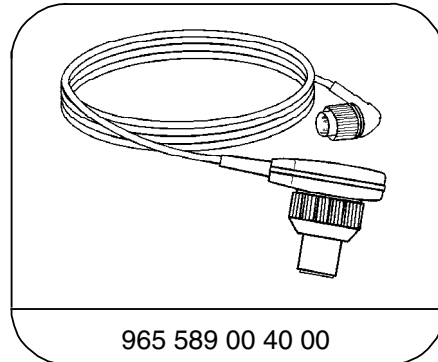
Electrical Troubleshooting Manual, Model 170, Group 83

Special Tools



965 589 00 01 00


Hand-Held-Tester



965 589 00 40 00

Test cable

Diagnosis – Diagnostic Trouble Code (DTC) Memory

Diagnostic trouble code (DTC) 	Possible cause	Test step/Remedy ¹⁾
B1227	Outside temperature indicator temperature sensor (B14)	23⇒ 14.0
B1228	Heater core temperature left (B10/1)	23⇒ 5.0
B1229	Heater core temperature right (B10/2)	23⇒ 6.0
B1230	Evaporator temperature sensor (B10/6)	23⇒ 4.0
B1231	ECT sensor (B11/4)	23⇒ 14.0
B1232	Refrigerant pressure sensor (B12)	23⇒ 7.0
B1416	Coolant circulation pump (M13)	23⇒ 16.0
B1417	Left-side water valve (Y21y1)	23⇒ 10.0
B1418	Right-side water valve (Y21y2)	23⇒ 11.0
B1419	Electromagnetic clutch (A9k1)	23⇒ 9.0
B1420	Idle speed regulator	23⇒ 15.0
B1422	Serial Interface K1	23⇒ 14.0
B1454	Fresh/recirculated air flap switch over valve (Y13)	23⇒ 13.0
B1459	Serial Interface K2	23⇒ 15.0

1) Observe Preparation for Test, see 22.

Electrical Test Program – Component Locations

Component Locations in Engine Compartment

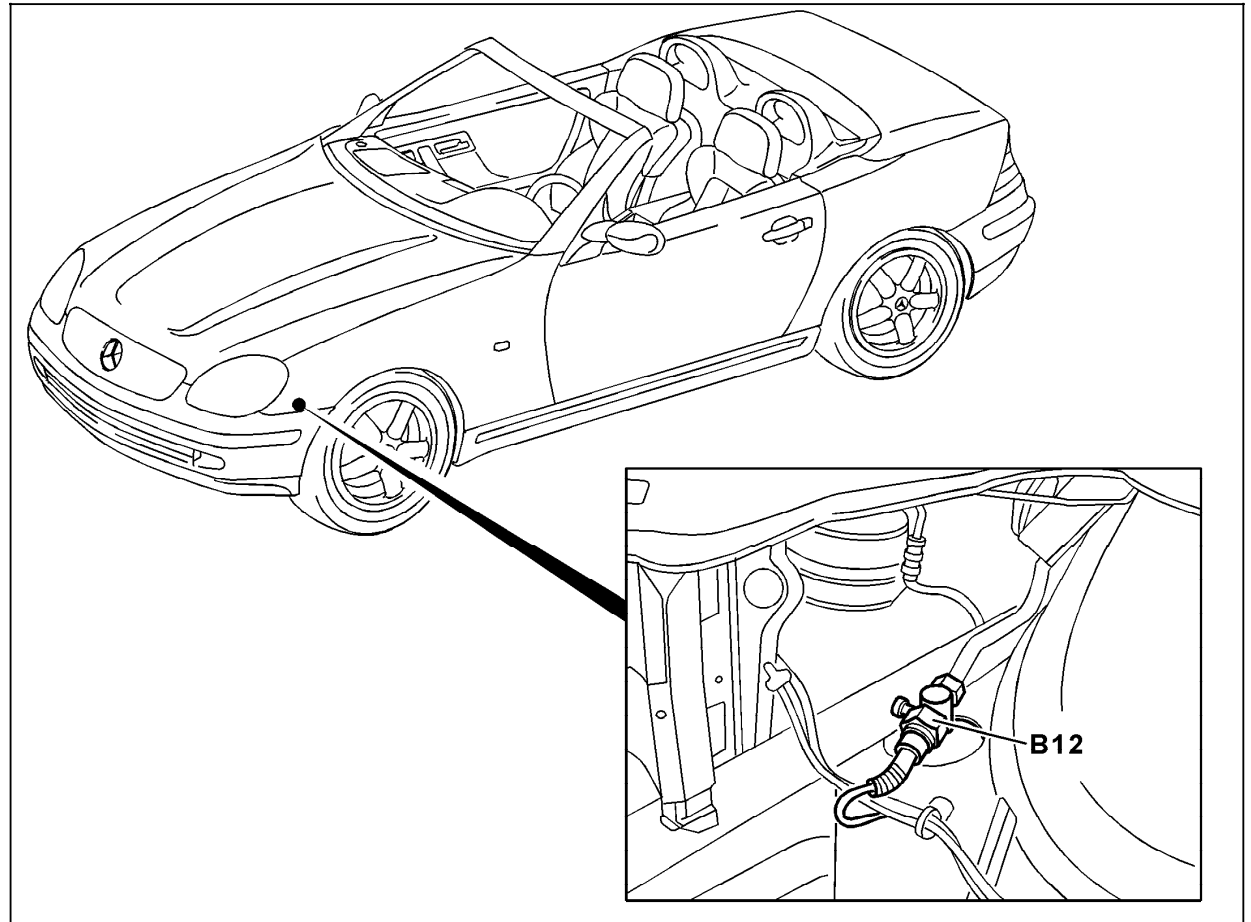


Figure 1

B12 Refrigerant pressure sensor

P83.30-0573-06

Electrical Test Program – Component Locations

Components Location in Engine Compartment

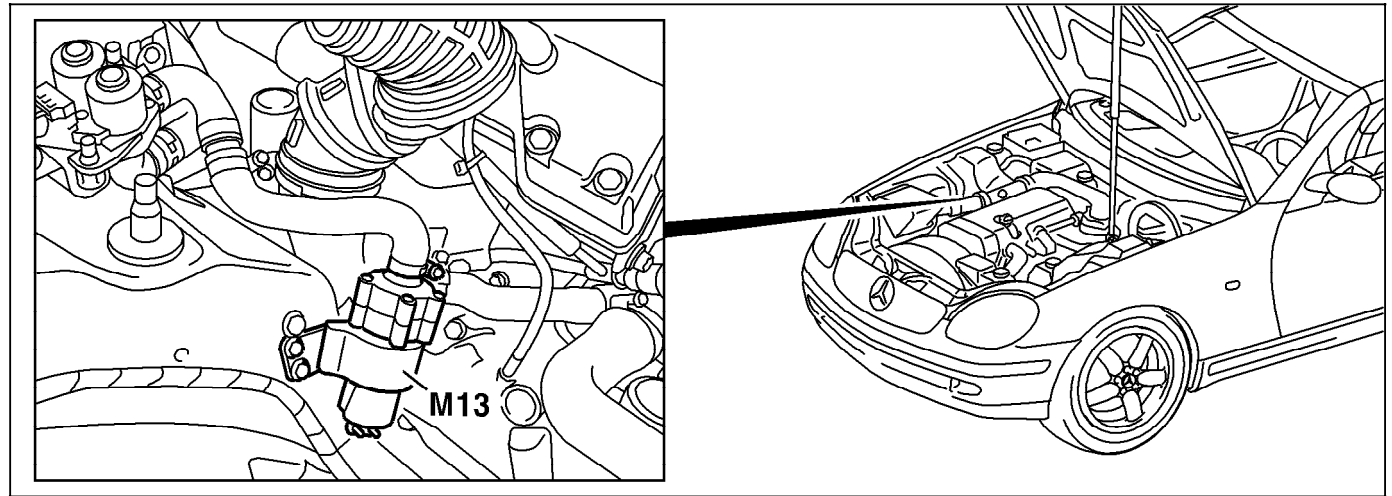


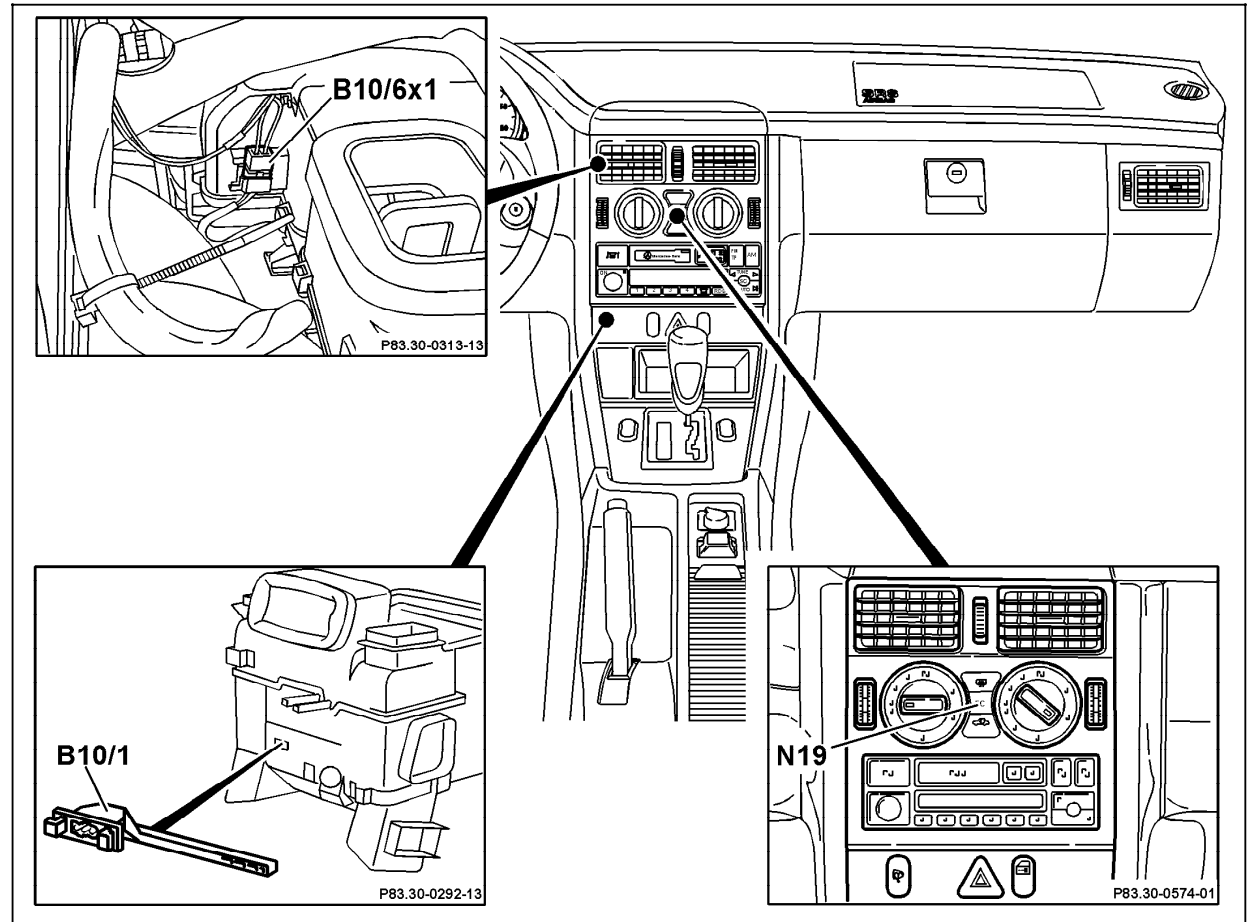
Figure 2

M13 Coolant circulation pump

P83.20-2035-04

Electrical Test Program – Component Locations

Components Location in Passenger Compartment



P83.30-0568-06

Figure 3

- B10/1 Heater core temperature sensor
- B10/6x1 Evaporator temperature sensor connector
- N19 A/C pushbutton control module

Electrical Test Program – Connection of Components

Connection of Components

Arrows indicate the flow of information or component activation.

The following information is communicated via Serial Interface K1:

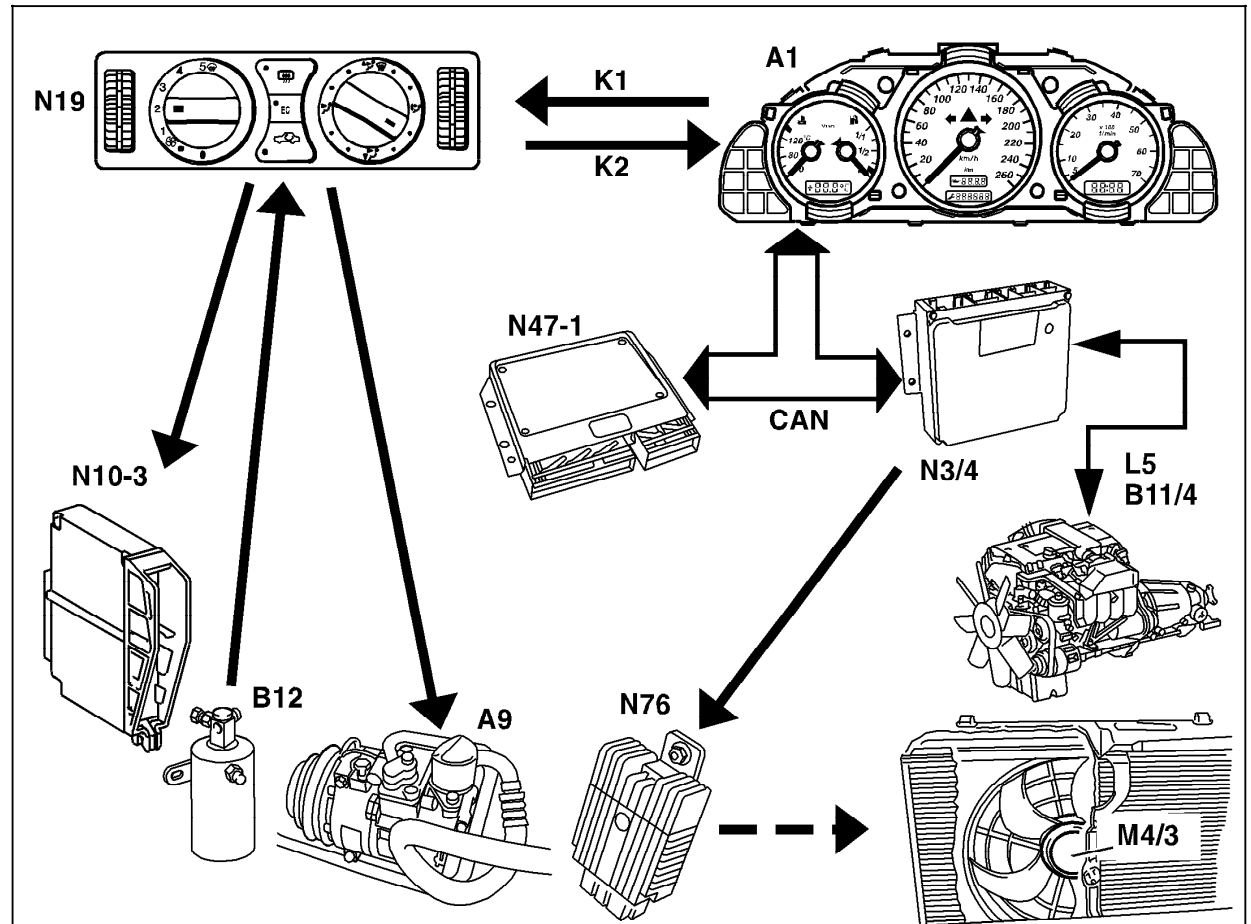
Outside Air Temperature, Coolant Temperature, Vehicle Speed, Engine Rpm, Illumination (circuit 58d), °F/°C, Acceleration Recognition, A/C Compressor (engagement), Emergency-stop

The following information is communicated via Serial Interface K2:

Idle Speed Increase, Refrigerant Pressure

Figure 1

- A1 Instrument cluster
- A9 A/C compressor
- B11/4 ECT sensor (DIFI, IFI)
- B12 Refrigerant pressure sensor
- L5 CKP sensor
- K1 Serial Interface
- K2 Serial Interface
- M4/3 Engine climate control electric cooling fan
- N3/4 Engine control module (HFM-SFI)
- N10-3 Combination control module
- N19 A/C pushbutton control module
- N47-1 ASR/SPS control module
- N76 Engine/climate control electric cooling fan control module



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Electrical Test Program – Connection of Components

Connection of Components for Temperature Regulation

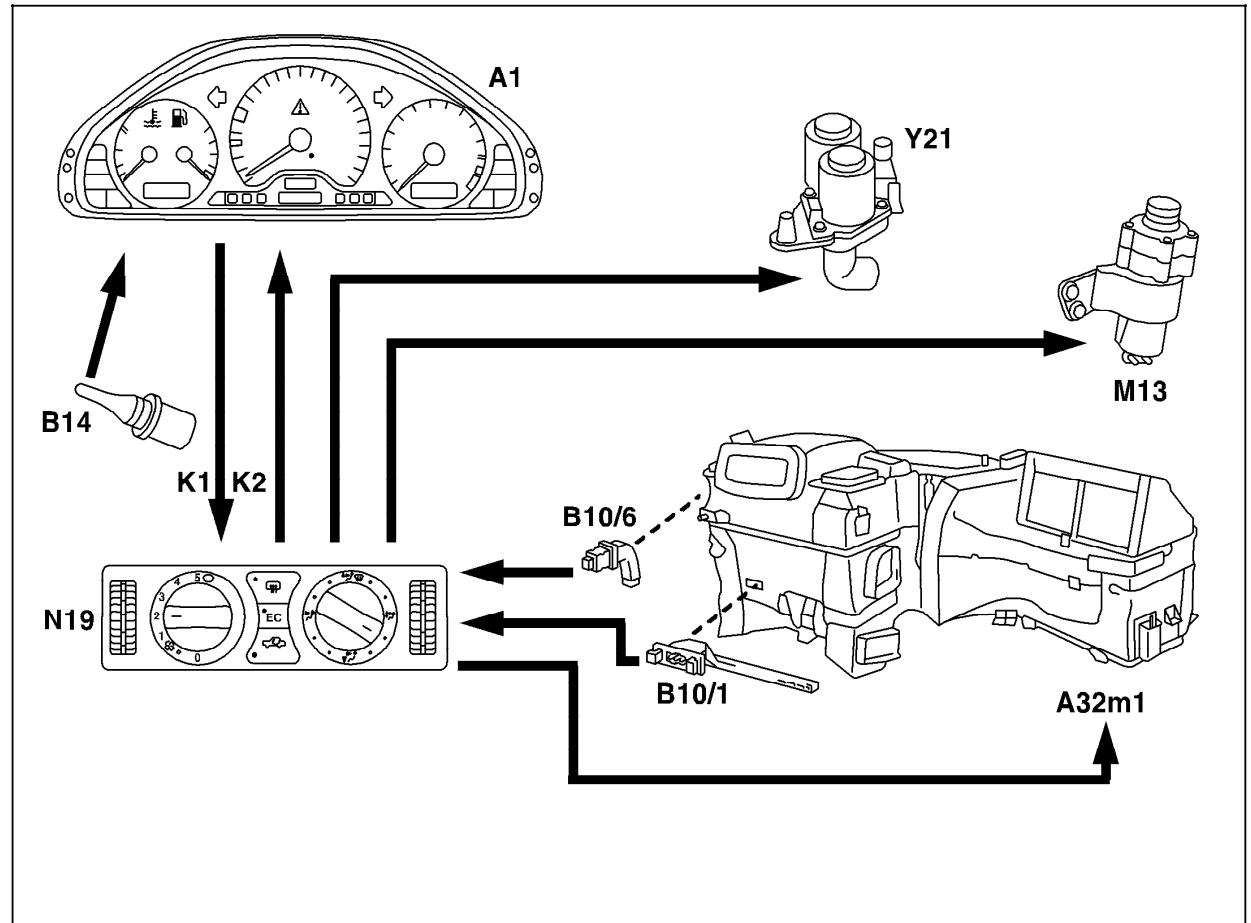


Figure 2

- A1 Instrument cluster
- A32m1 Blower motor
- B10/1 Heater core temperature sensor
- B10/6 Evaporator temperature sensor
- B14 Outside temperature indicator temperature sensor
- M13 Coolant circulation pump
- N19 A/C pushbutton control module
- Y21 Duovalve

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Electrical Test Program – Connection of Components

Connection of Components for Engine/climate control electric cooling fan (M4/3) regulation

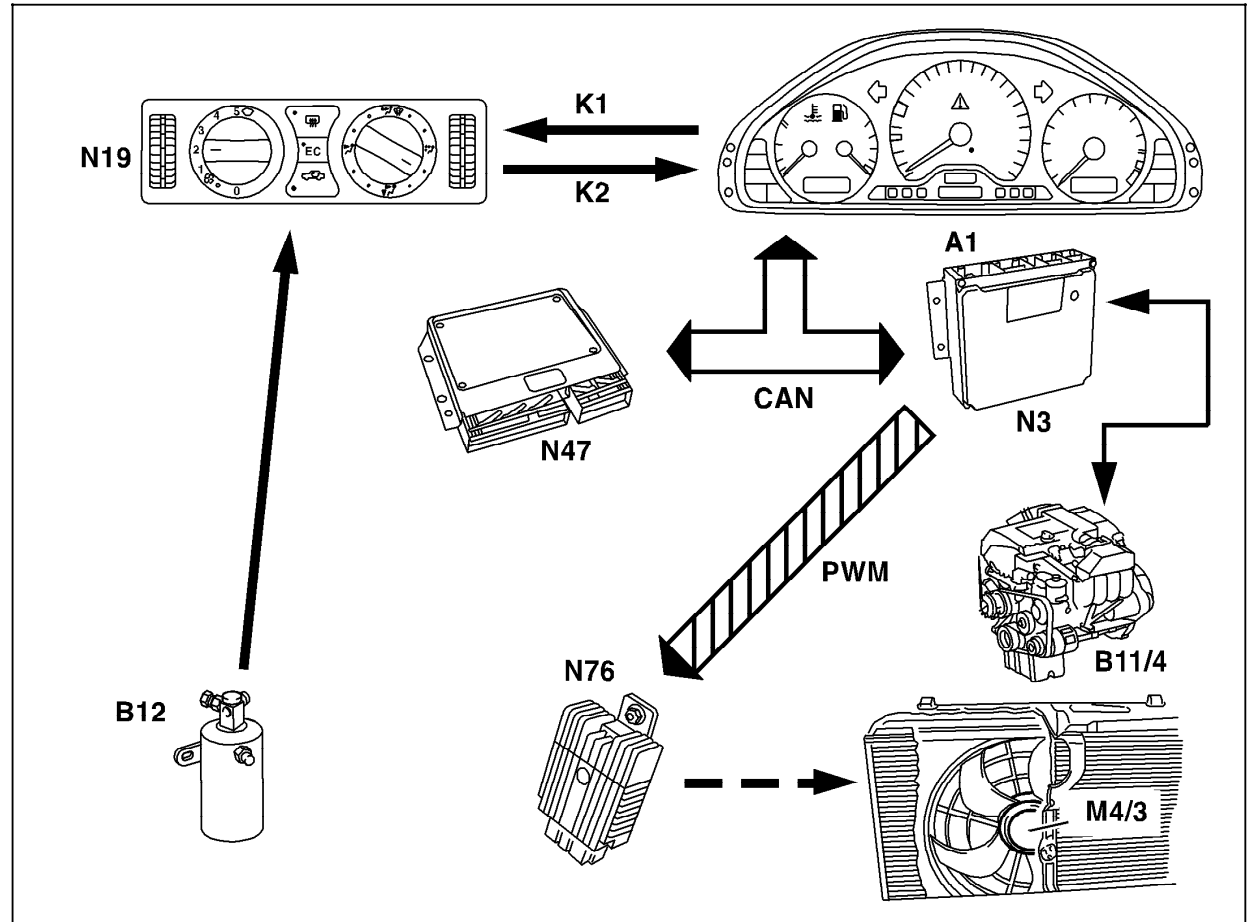


Figure 3

- A1 Instrument cluster
- B11/4 ECT sensor
- B12 Refrigerant pressure sensor
- M4/3 Engine/climate control electric cooling fan
- N3 Injection system control module
- N19 A/C pushbutton control module
- N65/1 AIR control module

P83.30-3126-06

Electrical Test Program – Preparation for Test

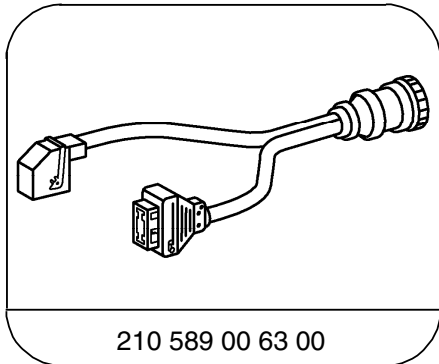
Preparation for Test

1. Review 11, 20, 21, 22, 31, 32, 41
2. Review electrical diagram, see PE83.30-P-2000D,
3. Review "Connection Diagram - Socket box", see 22/2,
4. See Special Tools, noted below.

Electrical wiring diagrams:

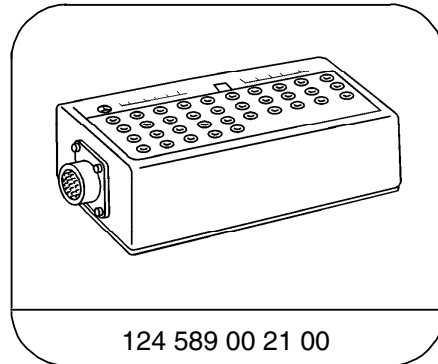
Electrical Troubleshooting Manual, Model 170, Group 83.

Special Tools



210 589 00 63 00

29-pin test cable



124 589 00 21 00

35-pin socket box

Test equipment; See MBUSA Standard Service Equipment Program

Description	Brand, model, etc.
Digital multimeter	Fluke models 23, 77 III, 83, 85, 87

Electrical Test Program - Preparation for Test

Connection Diagram - Socket box

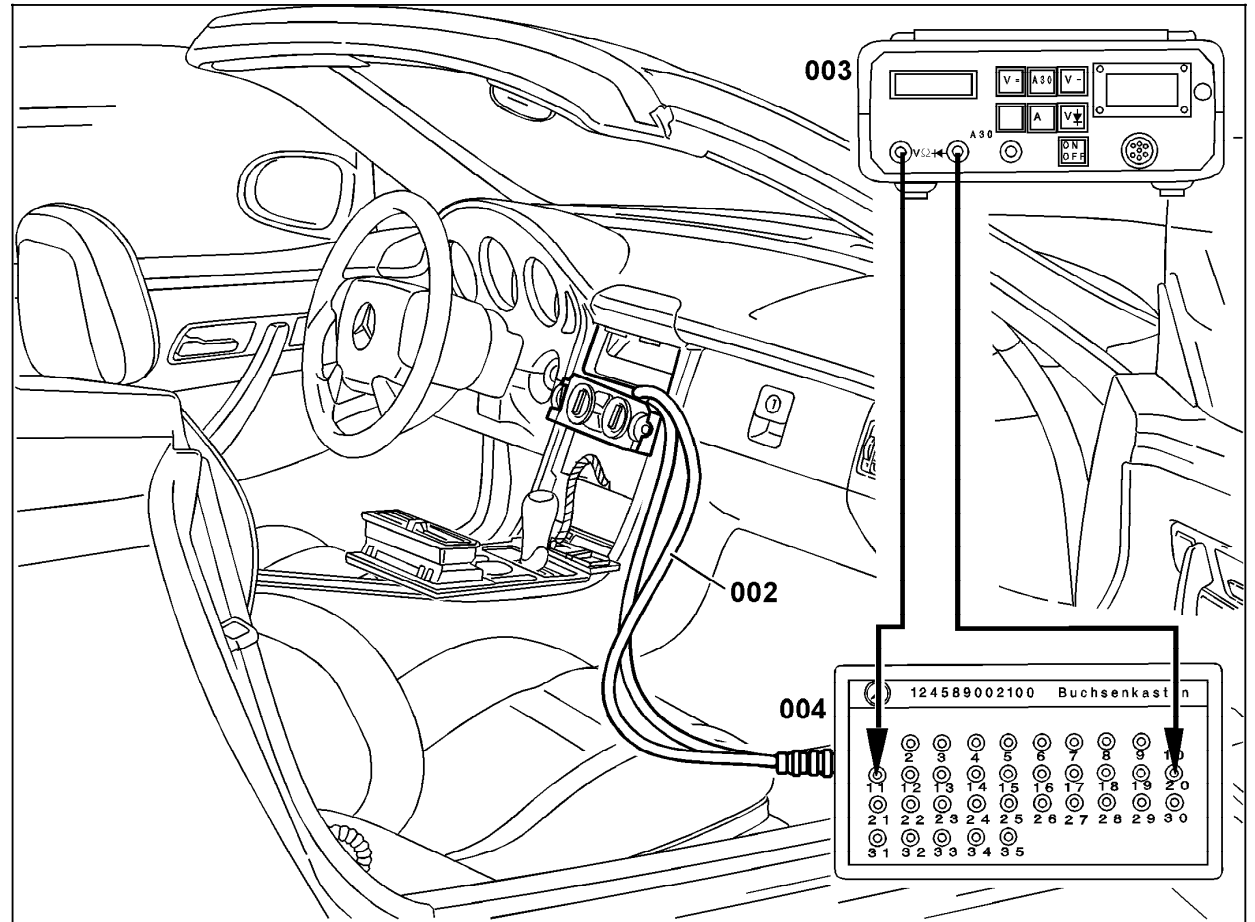

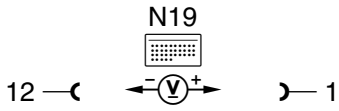
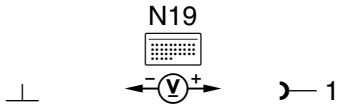
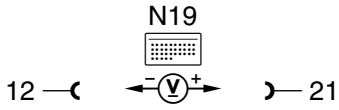
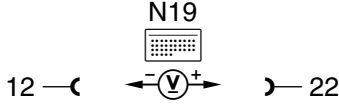
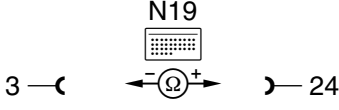



Figure 1






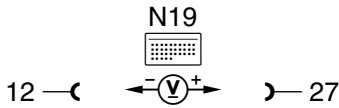
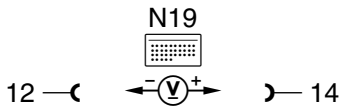
- 002 Test cable
- 003 Multimeter
- 004 Socket Box

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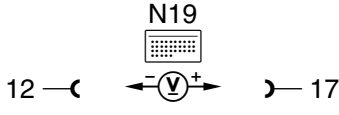
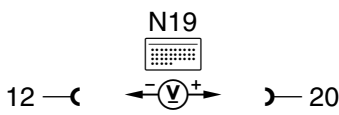


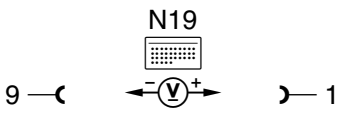
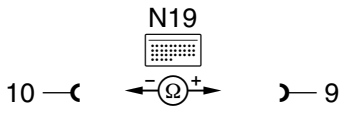

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0		Voltage supply Circuit 30			11-14 V	Wiring, Circuit 31, ⇒ 1.1
1.1		Circuit 30			11-14 V	Wiring.
2.0		Voltage supply Circuit 15		Ignition: ON	11-14 V	Wiring.
3.0		Voltage supply Circuit 15x		Ignition: ON	11-14 V	Wiring.
4.0	B1230	Evaporator temperature sensor (B10/6) Resistance		Ignition: OFF Disconnect N19 from  .	$^{\circ}\text{C} \hat{=} \text{k}\Omega$ 10 $\hat{=} 5.2 - 5.8$ 20 $\hat{=} 3.2 - 3.6$ 30 $\hat{=} 2.0 - 2.3$ 45 $\hat{=} 1.1 - 1.25$	Wiring, B10/6









Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
5.0	B1228	Left heater core temperature sensor (B10/1) Resistance		Ignition: OFF Disconnect N19 from  .	$^{\circ}\text{C} \hat{=} \text{k}\Omega$ 10 $\hat{=} 19.0\text{--}21.2$ 20 $\hat{=} 11.9\text{--}13.2$ 30 $\hat{=} 7.7\text{--}8.4$ 45 $\hat{=} 4.2\text{--}4.6$	Wiring, B10/1
6.0	B1229	Right heater core temperature sensor (B10/2) Resistance		Ignition: OFF Disconnect N19 from  .	$^{\circ}\text{C} \hat{=} \text{k}\Omega$ 10 $\hat{=} 9.0\text{--}21.2$ 20 $\hat{=} 1.9\text{--}13.2$ 30 $\hat{=} 7.7\text{--}8.4$ 45 $\hat{=} 4.2\text{--}4.6$	Wiring, B10/6
7.0	B1232	Refrigerant pressure sensor (B12) Voltage		Ignition: ON	$\text{bar} \hat{=} \text{V}$ 2 $\hat{=} 0.5\text{--}0.75$ 10 $\hat{=} 1.4\text{--}1.8$ 18 $\hat{=} 2.4\text{--}2.8$ 28 $\hat{=} 3.5\text{--}4.0$	Wiring, B12, ⇒ 7.1, N19
7.1		Voltage		Ignition: ON	4.75-5.25 V	Wiring, B12, N19


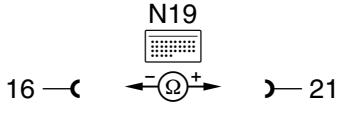

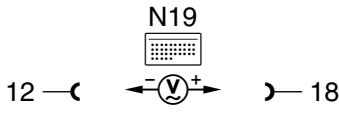
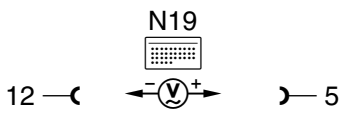
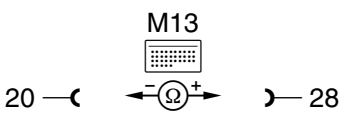


Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
8.0		Diagnostic output		Ignition: ON	8-11 V	Wiring, N19
9.0	B1419	A/C compressor (A9) Activation		Engine: At Idle A/C compressor:  is illuminated. A/C compressor:  is not illuminated.	<1 V 11-14 V	Wiring, A9, N19
10.0	B1417	Left-side water valve (Y21/1) Voltage		Ignition: ON Temperature selector wheels: Red range detent Blue range detent	After > 5 seconds: <1 V 11 – 14 V	Wiring, ⇒ 10.1, N19
10.1	B1417	Resistance		Ignition: OFF Disconnect N19 from  .	25-40 Ω	Y21

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy										
11.0	81418	Right-side water valve (Y21/2) Voltage	 10 —(—  —) — 1	Ignition: ON Temperature selector wheels: Red range detent Blue range detent	<1 V 11 – 14 V	Wiring, ⇒ 11.1, N19										
11.1		Resistance	 10 —(—  —) — 9	Ignition: OFF Disconnect N19 from  .	25-40 Ω	Y21										
12.0		Blower regulator (A32n1) Voltage	 12 —(—  —) — 7	Ignition: ON Blower switch in fan stage:	<table style="margin-left: auto; margin-right: auto;"> <tr><td style="padding-right: 10px;">1</td><td>1.1 – 1.8 V</td></tr> <tr><td style="padding-right: 10px;">2</td><td>2.0 – 2.6 V</td></tr> <tr><td style="padding-right: 10px;">3</td><td>2.8 – 3.3 V</td></tr> <tr><td style="padding-right: 10px;">4</td><td>3.6 – 4.3 V</td></tr> <tr><td style="padding-right: 10px;">5</td><td>5.0 – 6.0 V</td></tr> </table>	1	1.1 – 1.8 V	2	2.0 – 2.6 V	3	2.8 – 3.3 V	4	3.6 – 4.3 V	5	5.0 – 6.0 V	Wiring, N19
1	1.1 – 1.8 V															
2	2.0 – 2.6 V															
3	2.8 – 3.3 V															
4	3.6 – 4.3 V															
5	5.0 – 6.0 V															

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
13.0	B1454	Fresh/recirculated air flap switchover valve (Y13) Resistance		Disconnect N19 from  .	40-55 Ω	Wiring.
14.0	B1422	Serial Interface K1		Engine: At Idle	> 1.5 V ~	Wiring, See connection of components, 21
15.0	B1459	Serial Interface K2		Engine: At Idle	> 0.2 V ~	Wiring, See connection of components, 21
16.0	B1416	Coolant circulation pump (M13) Resistance (as of 09/97)		 to right hand connector, Ignition: OFF Disconnect  from N22	3-7 Ω	Wiring, M13

Pneumatic Test Program – Component Locations

Location of Components

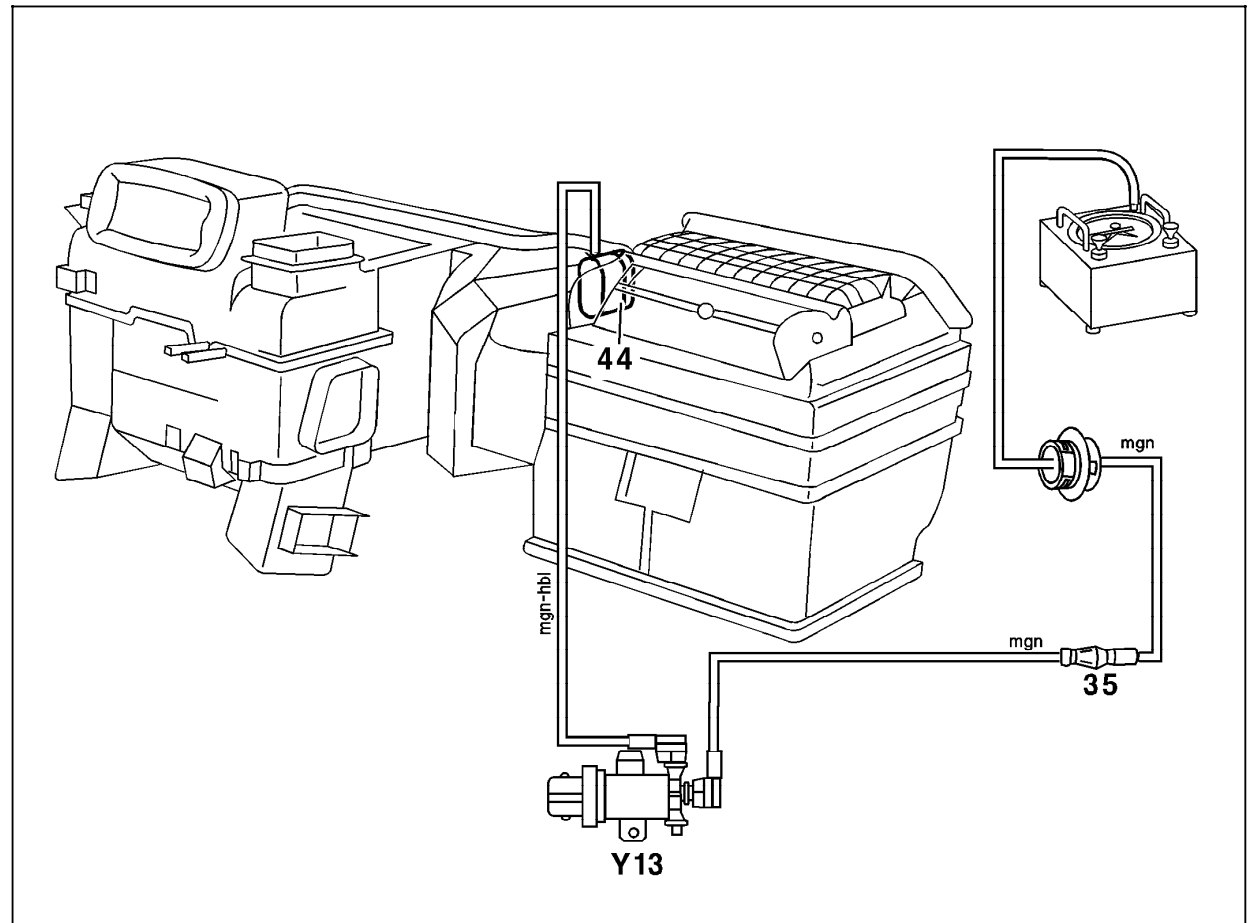


Figure 1

- 35 Cockpit separation point
- 44 Fresh/recirculating air flap vacuum actuator
- Y13 Fresh/recirculated air flap switchover valve
- mgn Medium green hose

P83.25-0303-06

Pneumatic Test Program - Test

Preparation for Test

1. Review 11, 20, 21, 22, 31, 32, 41,
2. Check gray vacuum line to intake manifold for leaks.

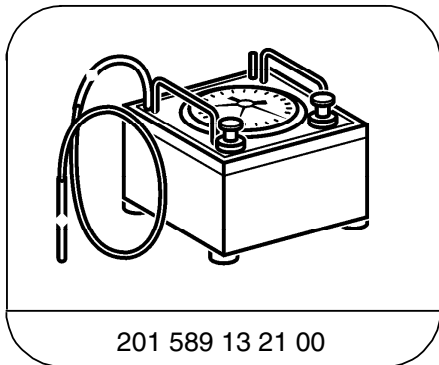


Permissible leakage of the elements with vacuum lines at 400 mbar vacuum per minute is 30 mbar.

Parts Required for Test:

- 1 Connector 129 800 95 15

Special Tools





201 589 13 21 00

Tester

Electrical Test Program – Test

Pneumatic system

1. Ignition: **ON**
2.  blower fan stage 1.
3.  button illuminated.
4. Medium green hose connected to connector "5" on vacuum/pressure tester.

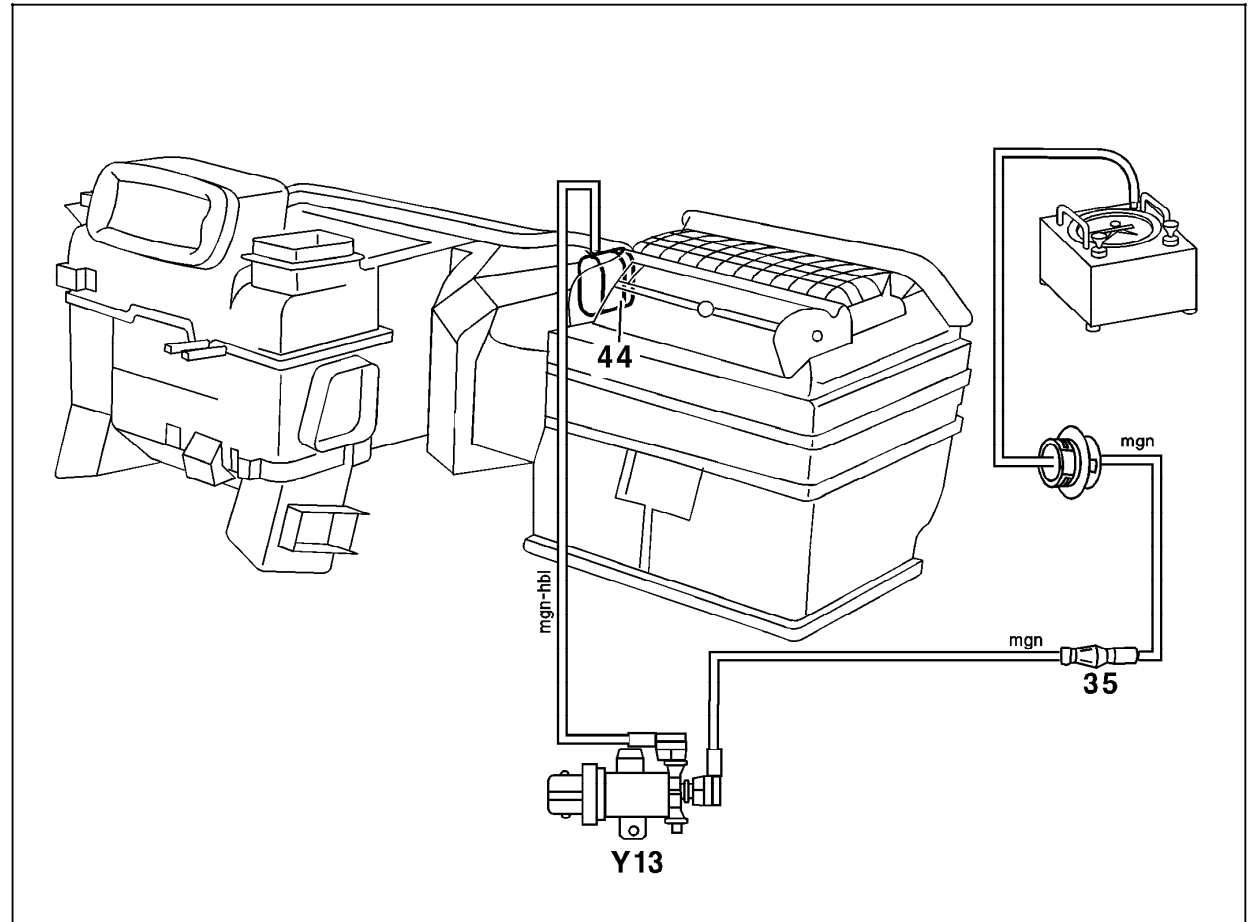



Figure 1

- | | |
|-----|--|
| 35 | Cockpit separation point |
| 44 | Fresh/recirculating air flap vacuum actuator |
| Y13 | Fresh/recirculated air flap switchover valve |
| mgn | Medium green hose |

P83.25-0303-06

Pneumatic Test Program – Test

Pneumatic System

⇒	Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0	Fresh/recirculating air flap vacuum actuator, (see Figure 1, 44)		 button illuminated. Evacuate system with 300 mbar vacuum	30 mbar pressure increase in 1 minute	Vacuum lines, Fresh/recirculating air flap vacuum actuator.

Refrigeration System Test Program – Component Locations

Location of Components

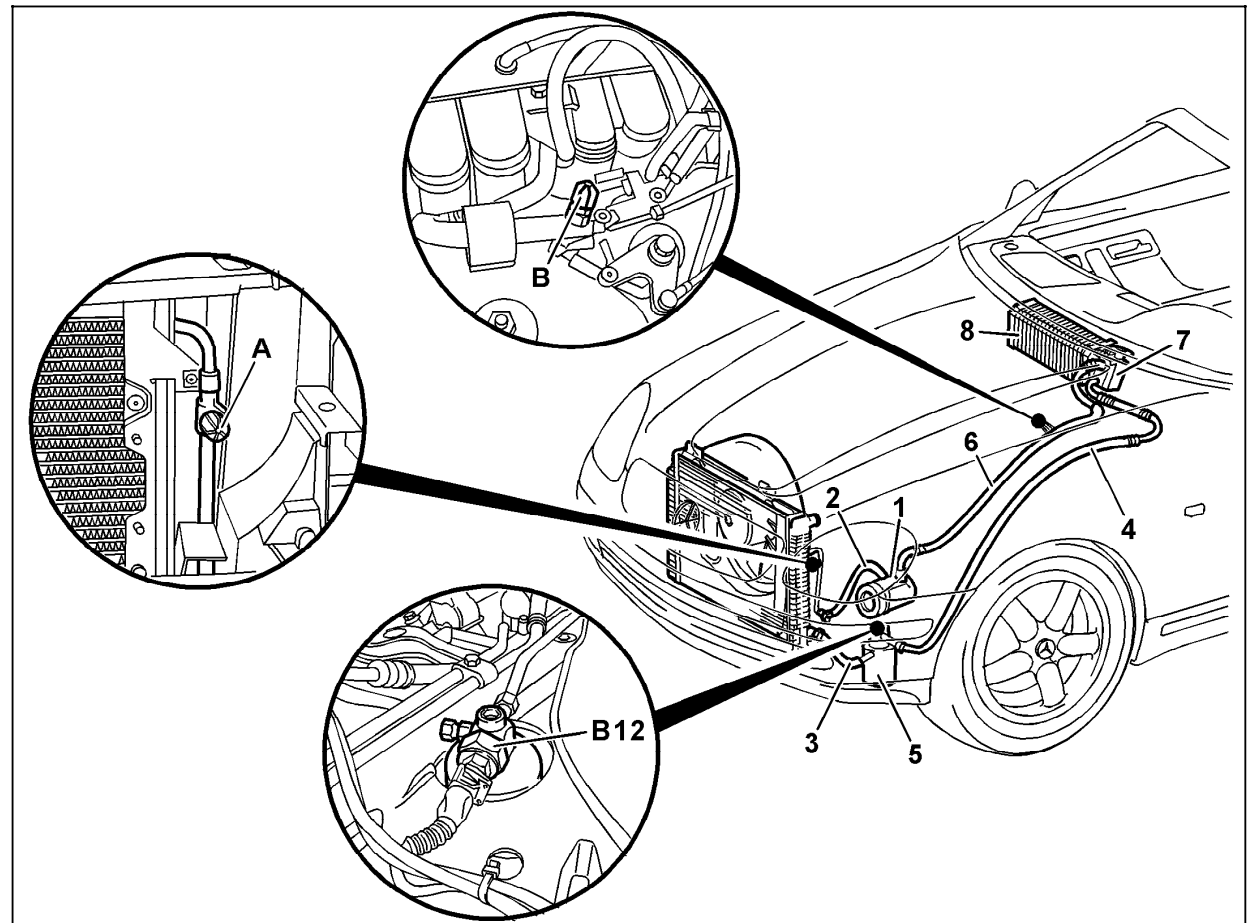


Figure 1

- A High pressure side connection
- B Low pressure side connection
- B12 Refrigerant pressure sensor
- 1 A/C compressor
- 2 High pressure vapor hose
- 3 High pressure hose to receiver/drier
- 4 High pressure hose to evaporator
- 5 Receiver/drier
- 6 Low pressure hose to A/C compressor
- 7 Expansion valve
- 8 Evaporator

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