

07.3-0121 Testing electrical components of the KE injection system

Preceding work:
Testing, adjusting engine (07.3-1100).

Operation no. of operation texts and work units or standard texts
and flat rates:

The individual test steps (e.g. coolant temperature sensor, intake air temperature sensor, etc.) are combined in a test program. If a fault is found when performing engine diagnosis which indicates an individual test step, do not perform the complete test program but only the individual test step with the related time allowance.

Individual test steps:

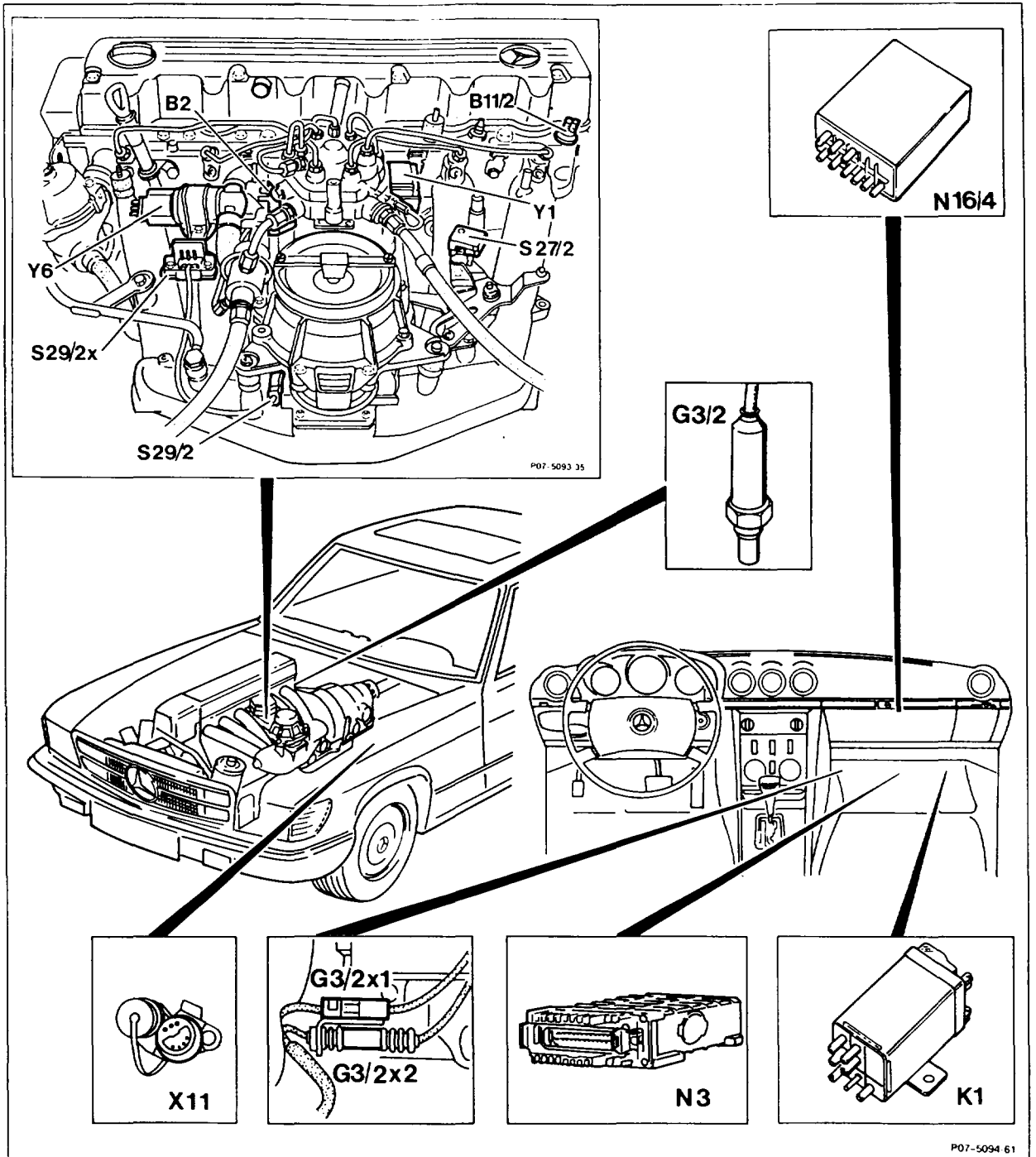
07-1613	Coolant temperature sensor
07-1614	Intake air temperature sensor
07-1615	Transmission shiftpoint retard
07-1618	Protective cut-out
07-1622	Throttle valve switch
07-1623	Part load mixture adaptation
07-1625	KE control unit
07-1626	TD/TN signal
07-1627	Overvoltage protection
07-1631	Acceleration enrichment
07-1633	Air flow sensor potentiometer
07-1634	Electrohydraulic actuator
07-1635	Road speed signal
07-1652	KE resistance trimming plug
07-5206	Oxygen sensor

A. Basic and national versions Standard, KAT, (CH) KAT, (S) KAT, without KAT, RÜF (AUS) (CH) (S) (except (J) (USA))

	Coordinates
a. Location of components	D 1
b. Electrical test data KE injection system (current at actuator mA)	D 2
c. Without fault diagnosis by means of on/off ratio	E 2
d. With fault diagnosis by means of on/off ratio	G 2
e. Diagnosis if engine systems control unit with pulse readout, engine 103.984 in model 129	N 2
f. Special tools, Commercially available tools and testers	O 2
g. Connecting testers according to connection diagram	A 3
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i. Test program with contact box	O 3
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k. Contact assignment of EZL ignition control unit (N1/2)	N 6
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m. Testing deceleration fuel shutoff	A 7
n. Testing KE resistance trimming plug (R17)	B 7
o. Testing part load mixture adaptation (only RÜF, or Standard/without KAT)	E 7
p. Testing setup of 4-pin coolant temperature sensor (B11/2)	F 7
q. Location of plug connections	G 7
r. Location of ground points	B 8
s. Location of Hall-effect road speed sensor (B6)	M 8

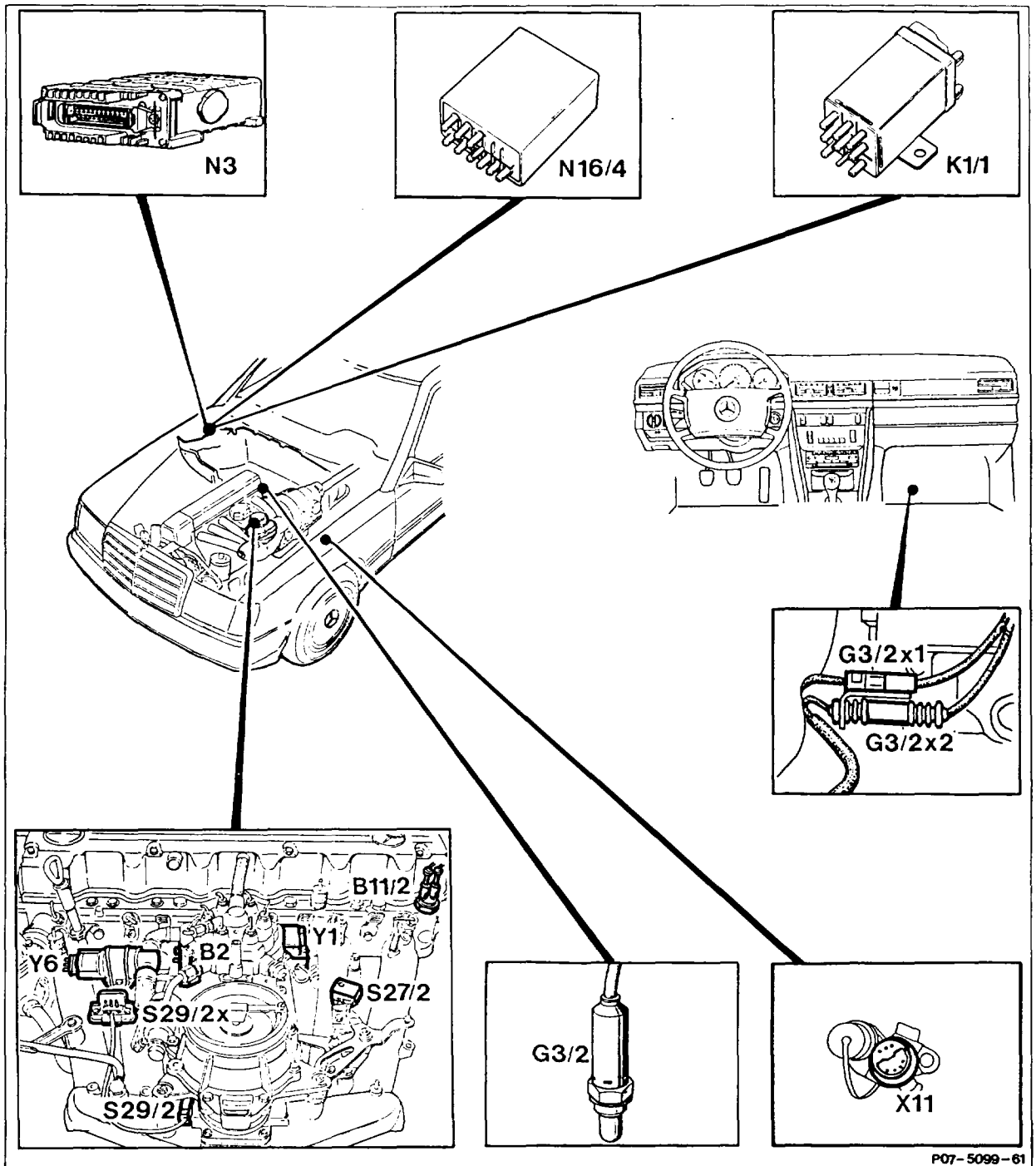
a. Location of components

Model 107



B2	Air flow sensor potentiometer	S27/2	Decel fuel shutoff microswitch
B11/2	Coolant temperature sensor	S29/2	Full load/idle speed recognition throttle valve switch
G3/2	Heated oxygen sensor		
G3/2 x 1	2-pin plug connection, oxygen sensor heating coil	S29/2 x	Plug connection, full load/idle speed recognition throttle valve switch
G3/2 x 2	1-pin plug connection, oxygen sensor signal		
K1	5-pin overvoltage protection relay	X11	Diagnostic socket/terminal block, terminal TD
N3	KE injection system control unit	Y1	Electrohydraulic actuator
N16/4	Fuel pump and kickdown shutoff relay	Y6	Idle speed air valve

Model 124



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B2	Air flow sensor potentiometer	S27/2	Decel fuel shutoff microswitch
B11/2	Coolant temperature sensor	S29/2	Full load/idle speed recognition throttle valve switch
G3/2	Heated oxygen sensor		
G3/2 x 1	2-pin plug connection, oxygen sensor heating coil	S29/2 x	Plug connection, full load/idle speed recognition throttle valve switch
G3/2 x 2	1-pin plug connection, oxygen sensor signal		
K1	5-pin overvoltage protection relay	X11	Diagnostic socket/terminal block, terminal TD
K1/1	7-pin overvoltage protection relay 87E	Y1	Electrohydraulic actuator
N3	KE injection system control unit	Y6	Idle speed air valve
N16/4	Fuel pump and kickdown shutoff relay		

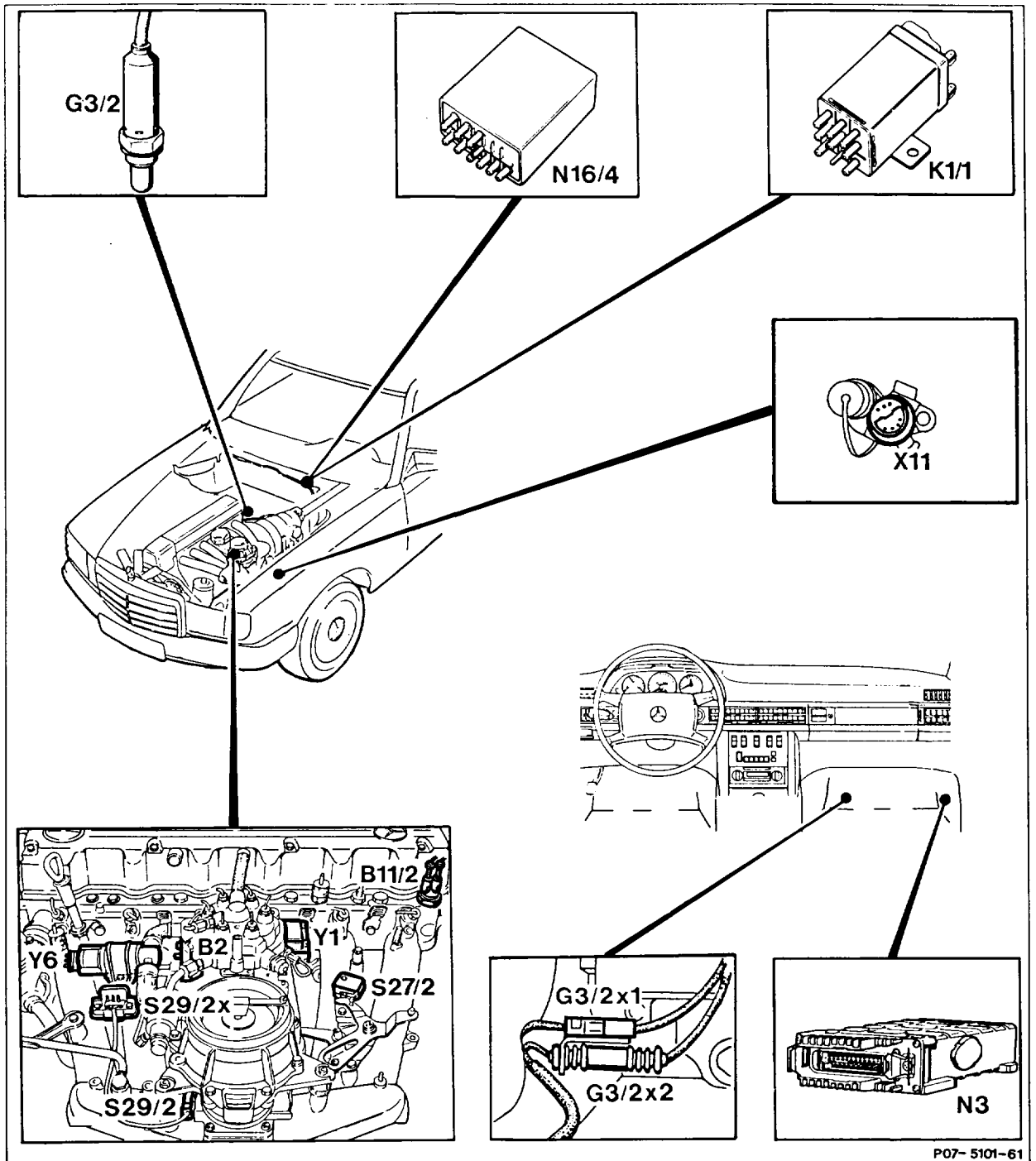
Note

Engine 103.980 Standard without oxygen sensor (G3/2).

Engine 103.980 (CH) (S) with exhaust gas recirculation (without oxygen sensor).

Engine 103.94/983 (CH) (DK) (N) (S) (SF) as of model year 1991 with oxygen sensor relay (K35) and air injection relay (K17/3).

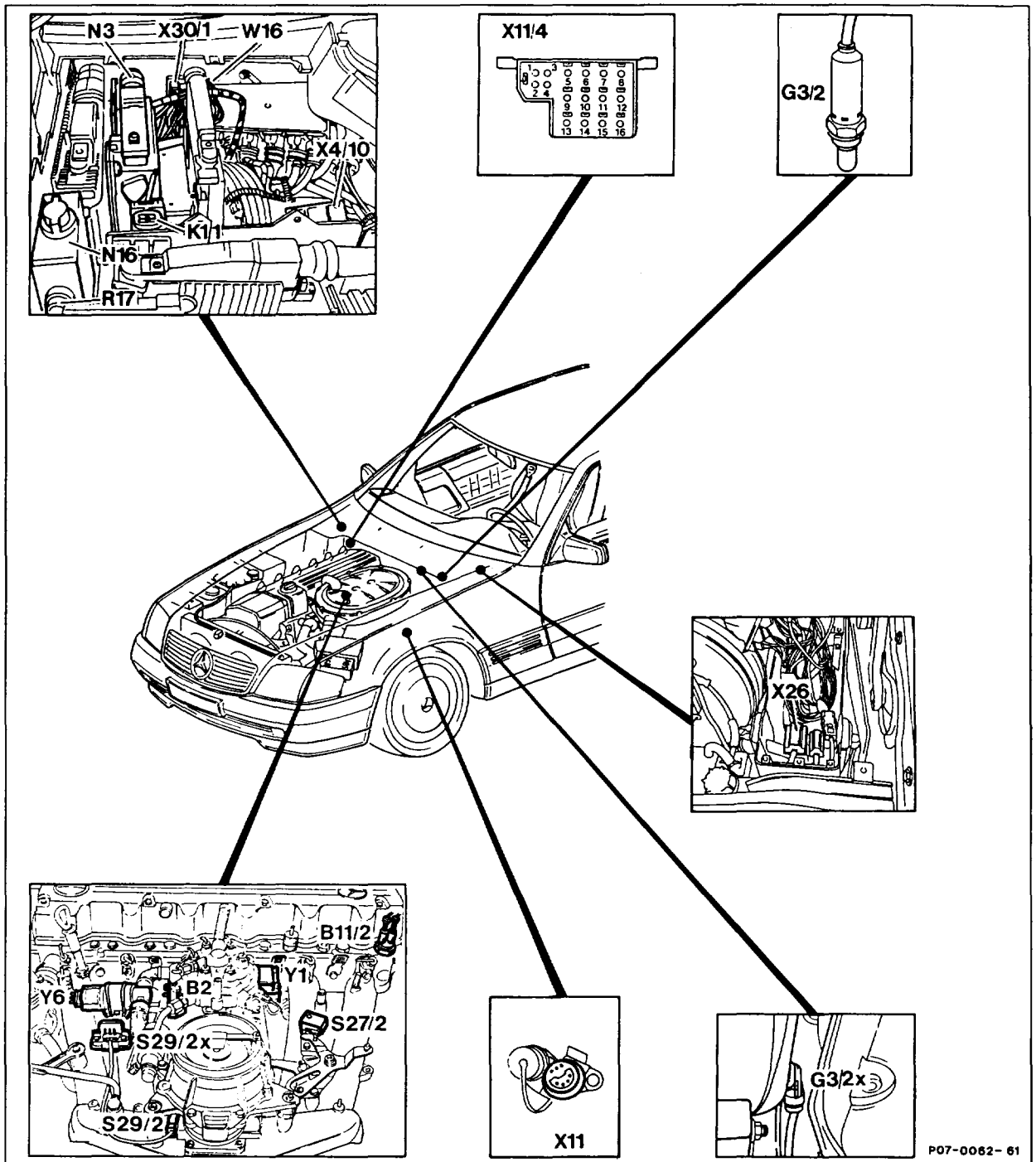




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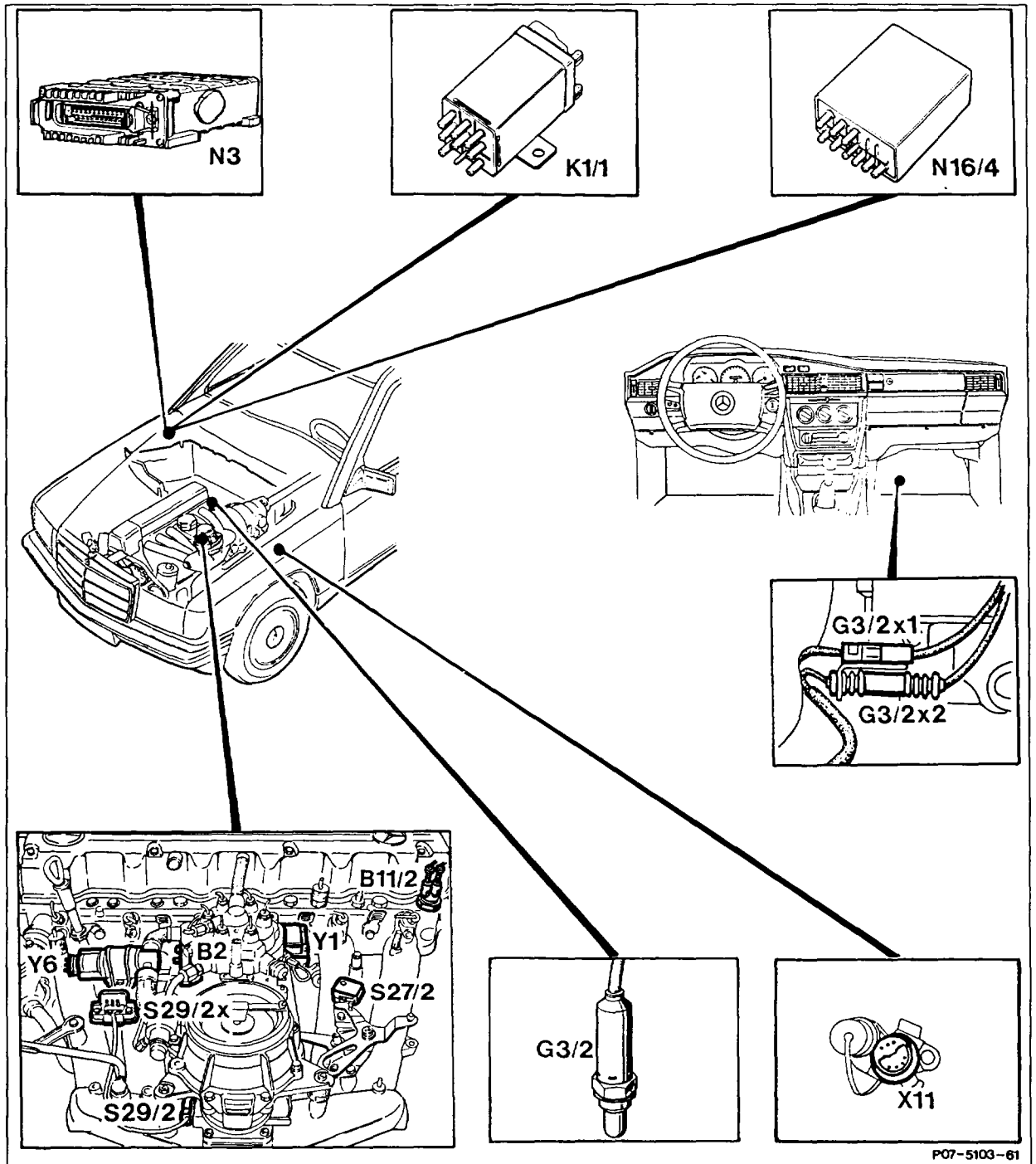
B2	Air flow sensor potentiometer	S27/2	Decel fuel shutoff microswitch
B11/2	Coolant temperature sensor	S29/2	Full load/idle speed recognition throttle valve switch
G3/2	Heated oxygen sensor		
G3/2 × 1	2-pin plug connection, oxygen sensor heating coil	S29/2 ×	Plug connection, full load/idle speed recognition throttle valve switch
G3/2 × 2	1-pin plug connection, oxygen sensor signal		
K1	5-pin overvoltage protection relay	X11	Diagnostic socket/terminal block, terminal TD
K1/1	7-pin overvoltage protection relay 87E	Y1	Electrohydraulic actuator
N3	KE injection system control unit	Y6	Idle speed air valve
N16/4	Fuel pump and kickdown shutoff relay		

Model 129



B2	Air flow sensor potentiometer	S29/2 ×	Plug connection, full load/idle speed recognition throttle valve switch
B11/2	Coolant temperature sensor	W16	Component compartment ground
G3/2	Heated oxygen sensor	X4/10	Terminal block, terminal 30
G3/2 × 1	3-pin plug connection, oxygen sensor heating coil	X11	9-pin diagnostic socket
K1/2	9-pin overvoltage protection relay	X11/4	16-pin test coupling for diagnosis (pulse signal)
N3	KE injection system control unit	X26	12-pin interior/engine plug connection
N16	MAS engine systems control unit	X30/1	Multifunction block plug connection
R17	KE resistance trimming plug	Y1	Electrohydraulic actuator
S27/2	Decel fuel shutoff microswitch	Y6	Idle speed air valve
S29/2	Full load/idle speed recognition throttle valve switch		

Model 201



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B2	Air flow sensor potentiometer	S27/2	Decel fuel shutoff microswitch
B11/2	Coolant temperature sensor	S29/2	Full load/idle speed recognition throttle valve switch
G3/2	Heated oxygen sensor	S29/2 x	Plug connection, full load/idle speed recognition throttle valve switch
G3/2 x 1	2-pin plug connection, oxygen sensor heating coil	X11	Diagnostic socket/terminal block, terminal TD
G3/2 x 2	1-pin plug connection, oxygen sensor signal	Y1	Electrohydraulic actuator
K1/1	7-pin overvoltage protection relay 87E	Y6	Idle speed air valve
N3	KE injection system control unit		
N16/4	Fuel pump and kickdown shutoff relay		

Note

Engine 103.94 (CH) (DK) (N) (S) (SF) as of model year 1991 with oxygen sensor relay (K35) and air injection relay (K17/3).



b. Electrical test data KE injection system (current at actuator mA)

Engine	Version	Current at actuator with ignition switched on mA	Coolant temperature sensor		Post-start enrichment at +20°C Current at actuator mA	Acceleration enrichment at +20°C and blipping throttle Current at actuator mA	Full load enrichment at approx. 2000/min and blipping throttle Current at actuator mA	Part load mixture adaptation Current at actuator mA
			Coolant temperature +20°C (warming up base value) Resistance 2.3–2.8 kΩ Current at actuator mA	Coolant temperature +80°C Resistance 290–370 Ω Current at actuator mA				
103.94	KAT as of 08/85 up to 08/87	20	2–6	0 ± 3	3–9	> 15	5–7	Readout fluctuates
	RÜF as of 08/85 up to 08/87	10	16–22	1–2	25–31		4–6	-7 to +4
	KAT as of 09/87	20	-1 to -5 60 s after start	Readout fluctuates	4–8 20 s constant		5–7	Readout fluctuates
	RÜF as of 09/87	10	16–22	1–2	25–31 20 s constant		4–6	-7 to +4
	KAT as of 09/90 1)	20	0 to -4 60 s after start	Readout fluctuates	4–8 20 s constant		4–9	Readout fluctuates
103.980	Std.	-	15–22	1–2	21–27	4–6	-7 to +4	
103.982	KAT	20	2–6	0 ± 3	8–12	5–7	Readout fluctuates	
	RÜF	10	15–22	1–2	21–27	5–7	-7 to +4	
103.983	KAT as of 09/90 1)	20	0 to -4 60 s after start	Readout fluctuates	4–8 20 s constant	4–9	Readout fluctuates	
103.981 103.983 103.985	KAT up to 08/87	20	2–6	0 ± 3	8–12	5–7	Readout fluctuates	
	RÜF up to 08/87	10	15–22	1–2	21–27	5–7	-7 to +4	
	KAT as of 09/87	20	-1 to -5 60 s after start	Readout fluctuates	4–8 20 s constant	5–7	Readout fluctuates	
	RÜF as of 09/87	10	15–22	1–2	21–27 20 s constant	4–6	-7 to +4	

Footnotes see next page.



Engine	Version	Current at actuator with ignition switched on mA	Coolant temperature sensor		Post-start enrichment at +20°C Current at actuator mA	Acceleration enrichment at +20 °C and blipping throttle Current at actuator mA	Full load enrichment at approx 2000/min and blipping throttle Current at actuator mA	Part load mixture adaptation Current at actuator mA
			Coolant temperature +20°C (warming up base value) Resistance 2,3–2,8 kΩ Current at actuator mA	Coolant temperature +80°C Resistance 290–370 Ω Current at actuator mA				
103.984	KAT	20	0 to –4 60–120 s after start	Readout fluctuates	4–0 0–20 s after start	> 15	4–9	Readout fluctuates
	without KAT	10	15–22 60–120 s after start	1–3	21–27 0–20 s after start		2–8	-7 to +4

Decel fuel shutoff: current at actuator approx. –60 mA.

1) (CH) (DK) (N) (S) (SF) as of model year 1991.

c. Without fault diagnosis by means of on/off ratio

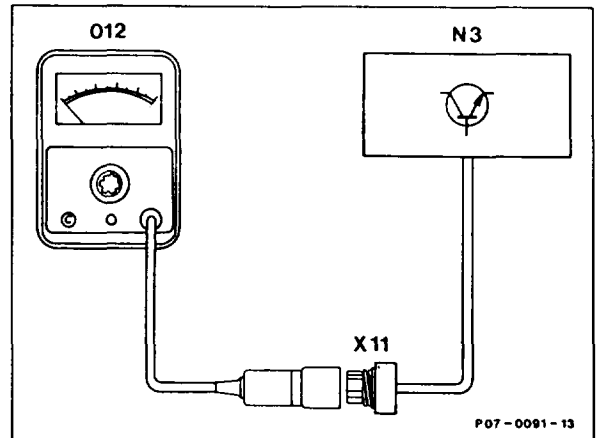
Up to 03/86 (production date 643) no fault recognition integrated in KE control unit (N3).


On these vehicles it is not possible to start off the test program by measuring the on/off ratio.

In this case, perform the test program without % readout, section "i" test program with contact box.

d. With fault diagnosis by means of on/off ratio

Since 04/86 faulty input signals have been recognized by the KE control unit (N3) and passed on to the lambda test output. Fault recognition is performed with a lambda control tester (012) at the diagnostic socket (X11).



Lambda control tester	Position
Bosch	100 % IR
Hermann	100 % 

Fault recognition enables various components of the KE injection system to be tested by measuring the on/off ratio. The faults are not stored and can only be displayed directly by measuring the on/off ratio (e.g. only if the fault exists at that moment).

Recognition of control units:

- 1 Connect lambda control tester.
- 2 Switch on ignition.

On/off ratio readout	Control units
70 %	With fault recognition
100 %	Without fault recognition

For wiring diagrams see appropriate wiring diagram volume (07.3-0128).

Note

Perform test (measuring on/off ratio) if complaint received regarding engine running, e.g. irregular idling.

Readout fluctuates:

No fault in system.

The test steps listed in the column Remedy are contained in section "i."

Test conditions:

Battery voltage 11–14 V.

Engine oil temperature approx. 80°C.

Engine idling.

On/off ratio %	Possible causes of fault	Test scope	Remedy/ Test step
0	Without lambda control: No voltage or ground at diagnostic socket (X11). Cable of diagnostic socket (X11), contact 3, has open circuit. Lambda control tester faulty.	Test voltage supply, ground and diagnostic socket (X11) cable.	1.0–1.2 2.0–2.7
	With lambda control: No voltage or ground at diagnostic socket (X11). Cable of diagnostic socket (X11), contact 3, has open circuit. Lambda control tester faulty.	Test voltage supply, ground and diagnostic socket (X11) cable.	1.0–1.2 2.0–2.7 5.0–5.2
	Mixture setting too rich.	Check lambda setting.	RA 07.3–2053
10	Air flow sensor position indicator (B2) incorrectly connected or faulty. Possible fast idling. Pin assignment of throttle valve switch (S29/2), idle speed/full load contact incorrectly connected or short circuit (full load contact closed if insufficient air throughput).	Test signal of air flow sensor position indicator (B2). Check routing of cables. Check idle speed contact.	6.0–6.3 7.0–7.4

On/off ratio %	Possible causes of fault	Test scope	Remedy/ Test step
20	Full load contact incorrectly connected or faulty. 20% readout only if throttle valve switch (S29/2) operated.	Test full load contact.	8.0–8.3
30	Short circuit or open circuit to KE control unit (N3). Coolant temperature sensor (B11/2) faulty.	Test coolant temperature sensor (B11/2). Test wiring.	9.0–9.8
40	Open circuit or short circuit to air flow sensor position indicator (B2) or position indicator (B2) faulty. Possible fast idling.	Test air flow sensor position indicator (B2). Test KE control unit. Test wiring.	10.0–10.3
50	Without lambda control: With lambda control: Oxygen sensor (G3/2) not operating or faulty. Open circuit in wiring.	No fault in the area of the monitored signals. Engine oil temperature approx. 80 °C. Test oxygen sensor (G3/2). Test wiring. Test oxygen sensor relay. ²⁾	12.0–12.8 21.0–24.0
60	Road speed signal at KE control unit (N3) implausible. ¹⁾	Test Hall-effect sensor (B6). Test wiring.	13.0–14.3
70	No TD/TN signal. Open circuit in wiring at KE control unit (N3).	Test TD/TN signal.	15.0–16.3
80	Open circuit in wiring or short to ground. Intake air temperature sensor (B17/2) faulty.	Test intake air temperature sensor (B17/2). Test wiring.	17.0–17.3

¹⁾ The plausibility of the road speed signal can **only** be checked by the KE control unit (N3) when driving (engine output dynamometer/road). If an implausible road speed signal is recognized when driving, the control unit (N3) "sets" the on/off ratio of 60% and stores this. The fault is not erased until the ignition is switched off. A "60% on/off ratio" test is performed e.g. in dealing with the complaint: jerking when vehicle moving and throttle valve closed.

²⁾ Engine 103.94/983 (CH) (DK) (N) (S) (SF) as of model year 1991.

On/off ratio %	Possible causes of fault	Test scope	Remedy/ Test step
90	Not assigned.	-	-
95	Decel fuel shutoff active.	-	-
100	<p>Without lambda control: No voltage or ground at KE control unit (N3) or KE control unit (N3) faulty. Overvoltage protection fuse or overvoltage protection (K1/1) faulty. Lambda control tester faulty.</p> <p>With lambda control: No voltage or ground at KE control unit (N3) or KE control unit (N3) faulty. Lambda setting too lean. Oxygen sensor (G3/2) faulty (short to ground). Overvoltage protection fuse or overvoltage protection (K1/1) faulty. Lambda control tester faulty.</p>	<p>Test overvoltage protection (K1/1). Test ground. Test KE control unit (N3).</p> <p>Test overvoltage protection (K1/1). Test ground. Check setting of lambda control. Text oxygen sensor signal. KE control unit (N3) faulty.</p>	<p>1.0-1.2 2.0-2.7 7.1</p> <p>1.0-1.2 2.0-2.7 RA 07.3-2053 12.0-12.8 13.1</p>
Readout fluctuates	<p>With lambda control: No fault in the monitored signals area.</p>	-	-

e. Diagnosis of engine systems control unit with pulse readout, engine 103.984 in model 129

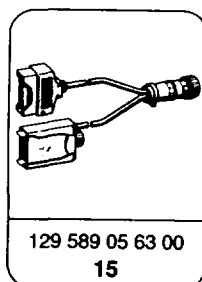
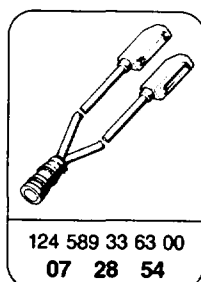
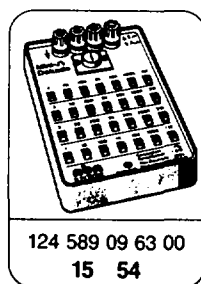
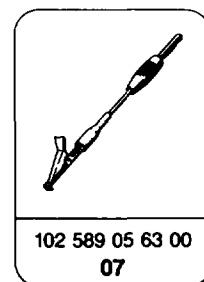
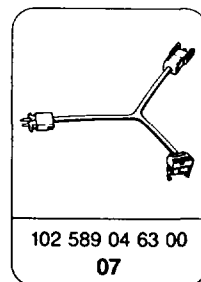
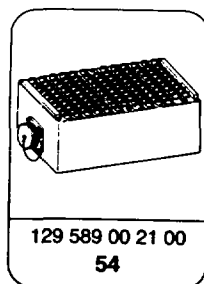
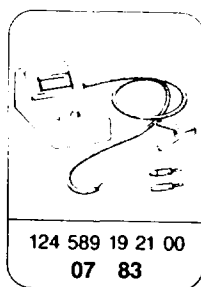
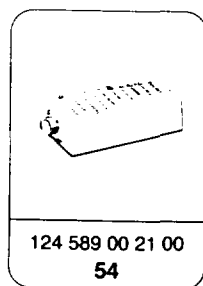
The faults listed below are recognized and stored in the engine systems control unit MAS.

The stored faults can be interrogated with the pulse counter at the test coupling (X11/4), contact 14.

The test steps listed in the column Remedy are presented in section "j."

Pulse readout	Possible cause	Remedy/ Test step
1	No fault in system.	–
2	Fuel pump relay not operating.	6.0
3	TD signal interrupted (not applicable as of 05/90).	8.0–9.2
4	Output stage for actuating oxygen sensor heater faulty.	10.0–11.5
5	Output stage for actuating air pump faulty.	15.0–15.2
6	Output stage for actuating kickdown switch faulty.	16.0–17.0
7	Not assigned.	–
8	Coolant temperature signal.	14.0
9	Not assigned (as of approx. 05/90 open circuit in oxygen sensor heater).	10.0–11.5
10	Output stage of start valve.	18.0–18.4
11	No cut-in signal for A/C compressor.	12.0–12.1
12	Output stage for actuating A/C compressor faulty.	13.0
13	A/C compressor slip too large.	13.0
14	Not assigned.	–
15	Short circuit recognition in fuel pump circuit.	2.0, 5.0

f. Special tools

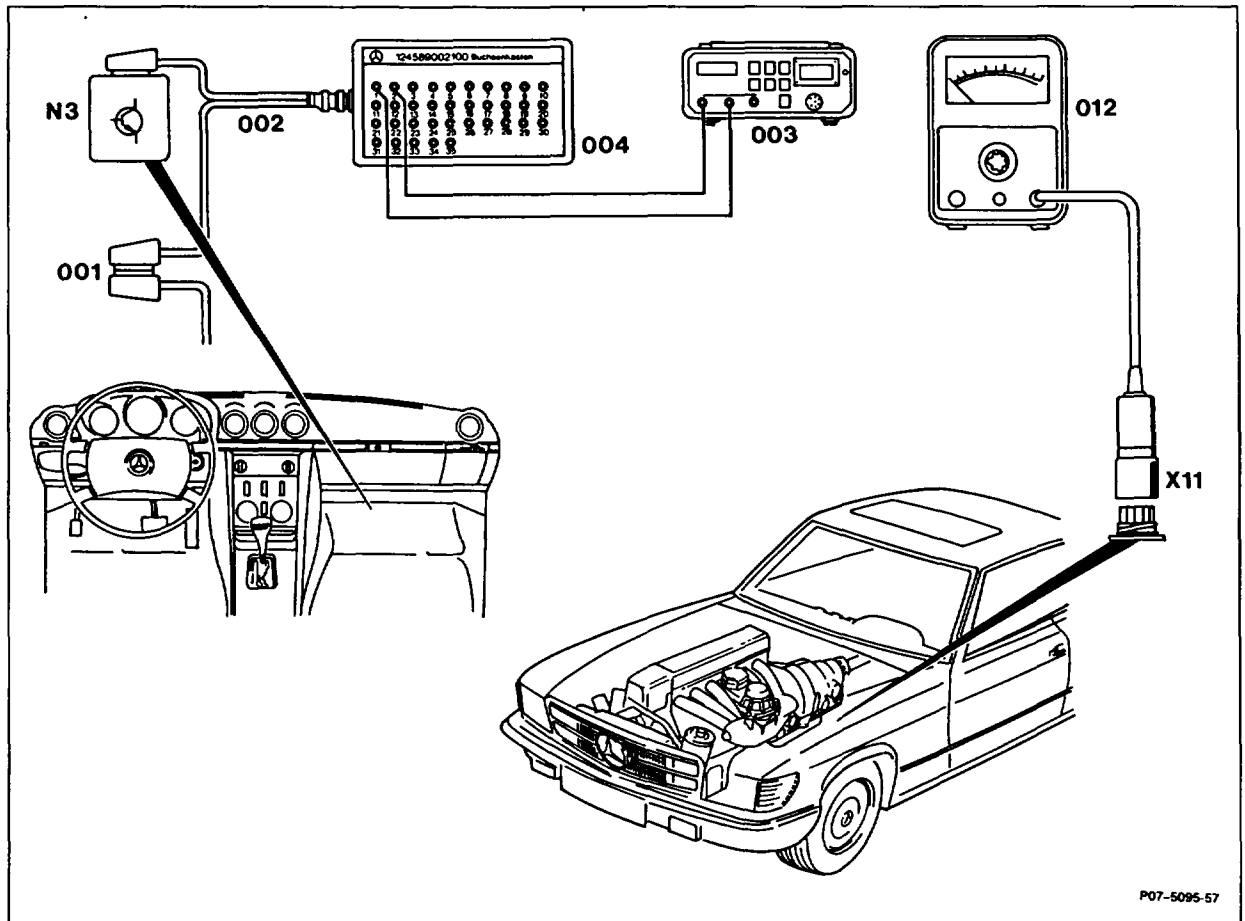


Commercially available tools and testers (see Workshop Equipment Manual)

Designation	e.g. Make, order no.
Multimeter	Sun, DMM-5
Twin socket	Hermann, ECD 53
Lambda control tester	Hermann, L 115
Engine tester	Bosch, MOT 002.02

g. Connecting testers according to connection diagram

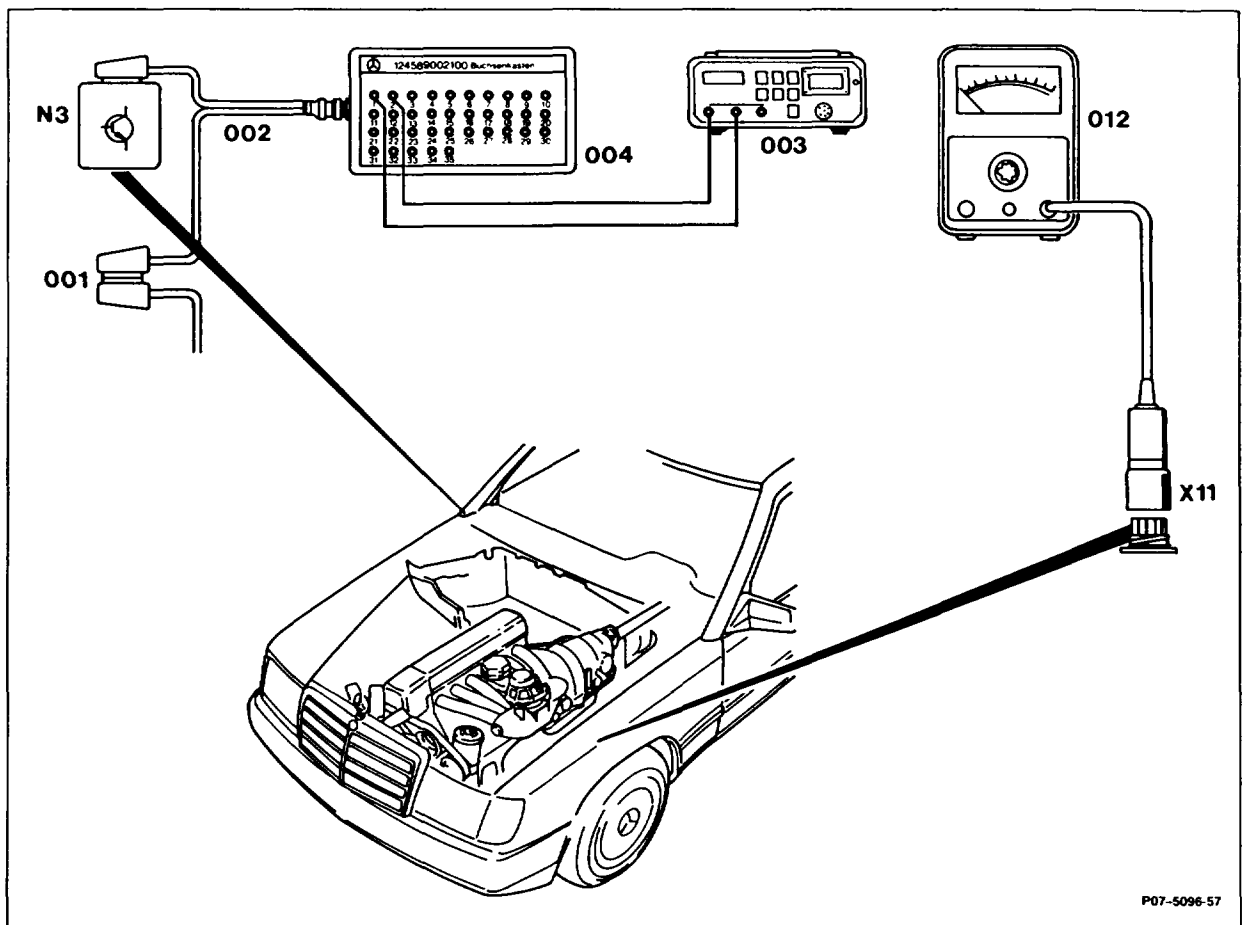
Model 107



001 KE control unit coupling
 002 Test cable
 003 Multimeter
 004 35-pin contact box

012 Lambda control tester
 N3 KE control unit
 X11 Diagnostic socket, terminal block, terminal TD

Models 124, 201

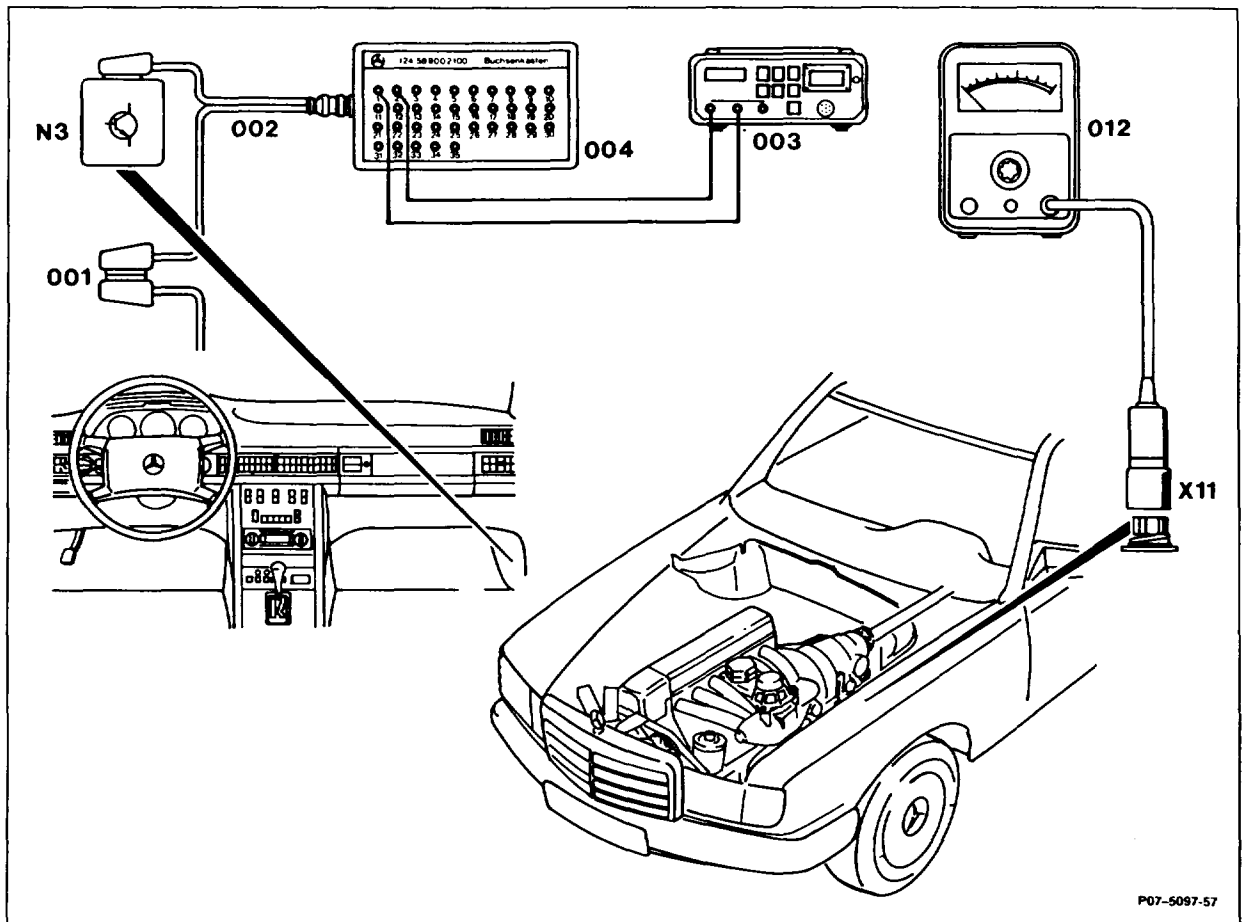


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001 KE control unit coupling
002 Test cable
003 Multimeter
004 35-pin contact box

012 Lambda control tester
N3 KE control unit
X11 Diagnostic socket, terminal block, terminal TD

Model 126

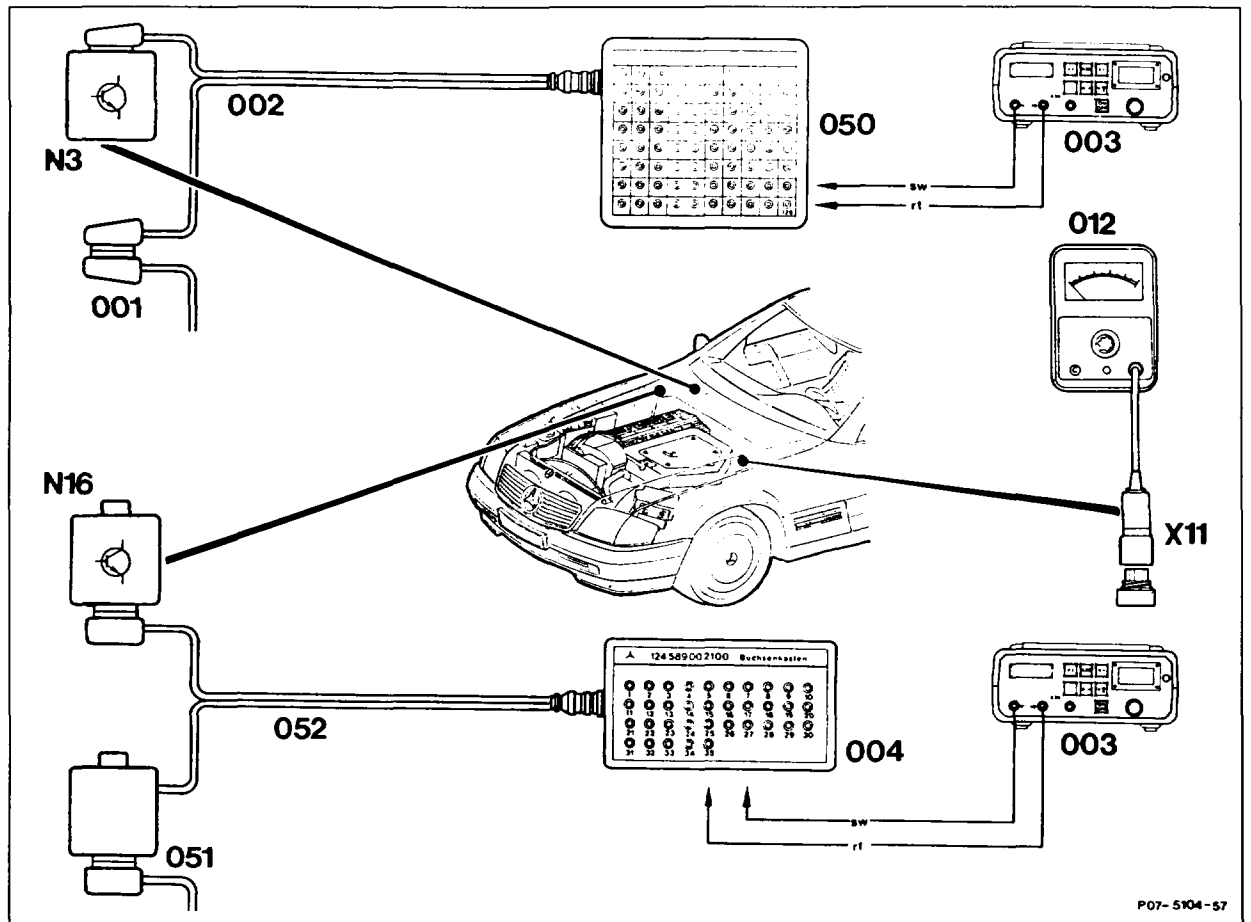


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- 001 KE control unit coupling
- 002 Test cable
- 003 Multimeter
- 004 35-pin contact box

- 012 Lambda control tester
- N3 KE control unit
- X11 Diagnostic socket, terminal block, terminal TD

Model 129

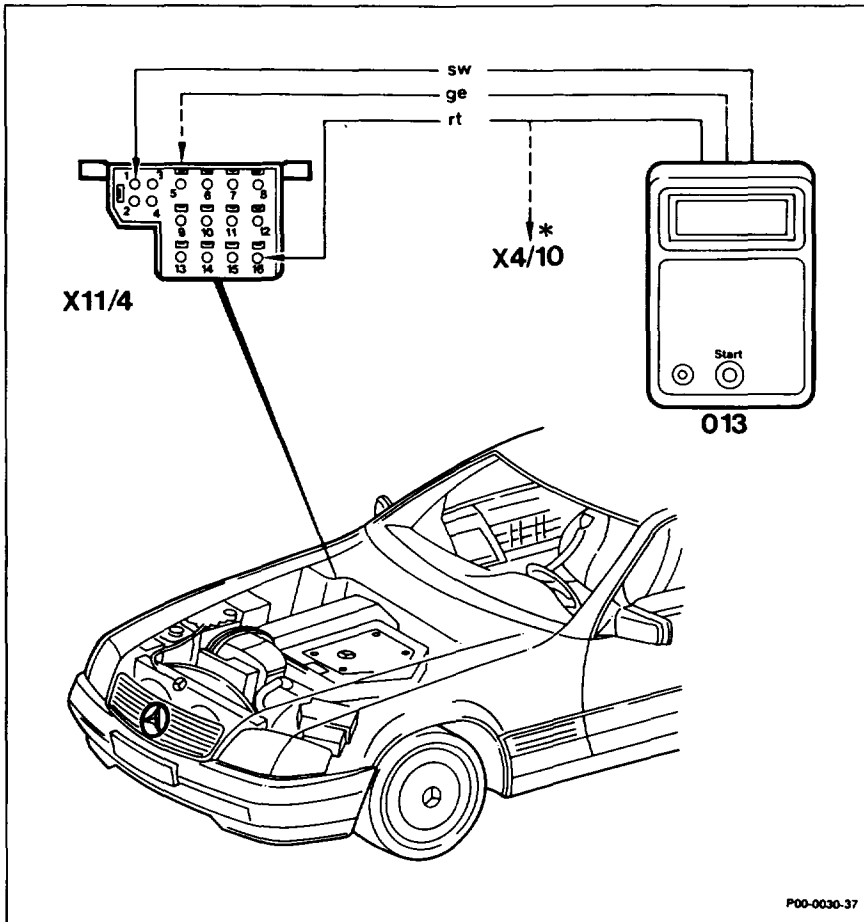


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- 001 KE control unit coupling
- 002 Test cable 124 589 33 63 00
- 003 Multimeter
- 004 35-pin contact box
- 012 Lambda control tester
- 050 126-pin contact box

- 051 Engine systems control unit coupling
- 052 Test cable 129 589 05 63 00
- N3 KE control unit
- N16 Engine systems control unit MAS
- X11 9-pin diagnostic socket

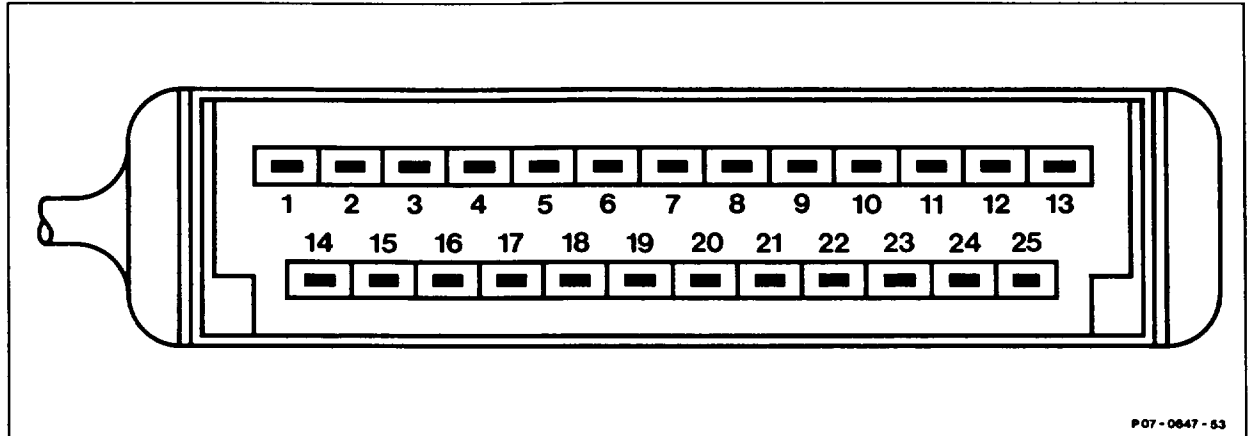
Model 129



- Contact 1 Terminal 31 (ground)
- Contact 16 Terminal 30 (positive)
- 013 Pulse counter
- X4/10 Terminal block, terminal 30/30Ü/61e/87L (alternatively)
- X11/4 Test coupling for diagnosis, 16-pin (pulse counter) alternatively

h. Contact assignment coupling KE control unit (N3) and engine systems control unit MAS (N16)

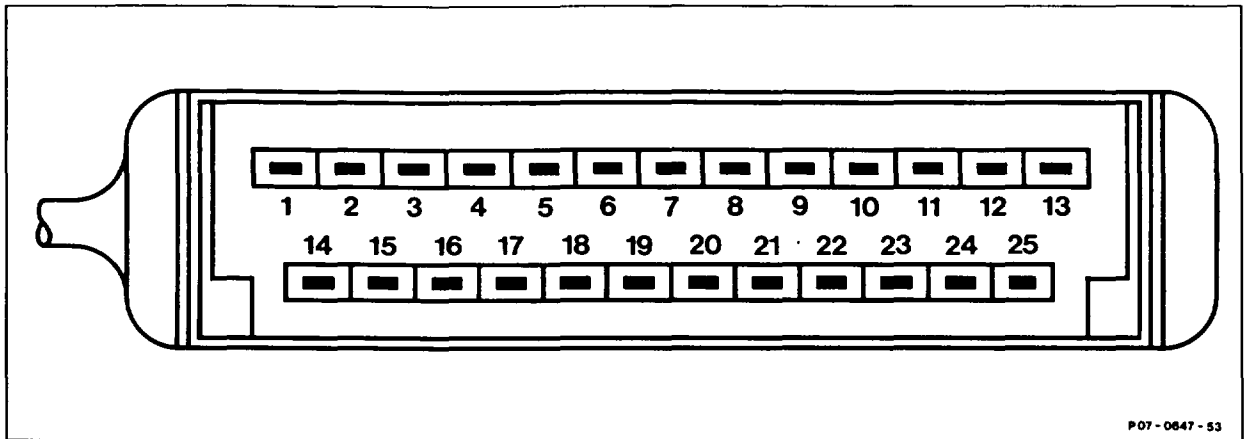
Contact assignment of coupling of KE control unit (N3)



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Engine 103.980 Standard model 124

1	Overvoltage protection relay (K1, K1/1), contact 2, terminal 87	14	Not assigned
2	Engine ground (W5)	15	Not assigned
3	Idle speed air valve (Y6), contact 1	16	Plug connection (X26), contact 7, manual transmission
4	Plug connection, trip computer (X61)		Plug connection (X26), contact 10, automatic transmission
5	Throttle valve switch (S29/2), contact 3, full load/idle speed recognition	17	Air flow sensor position indicator (B2), contact 2
6	Not assigned or Tempomat cruise control plug connection (X33)	18	Air flow sensor position indicator (B2), contact 3
7	Ground (W5)	19	A/C compressor cutout control unit (N6), contact 4, terminal 87Z
8	Not assigned	20	Model 124: battery ground (W10)
9	Fuel pump relay (N16/1), contact 2, terminal TF	21	Coolant temperature sensor (B11/2)
10	Electrohydraulic actuator (Y1), contact 2	22	KE resistance trimming plug (R17)
11	Not assigned	23	Not assigned
12	Electrohydraulic actuator (Y1), contact 1	24	Microswitch (S28)
13	Throttle valve switch (S29/2), contact 1, full load/idle speed recognition	25	Fuel pump relay (N16/1), contact 10, terminal TD

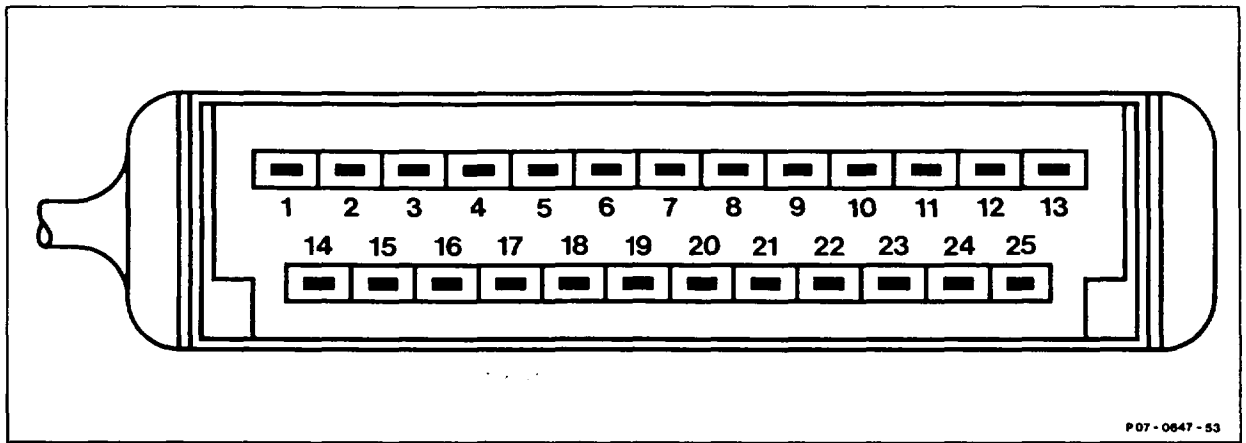


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Engine 103.94/98 (except engine 103.980/984) models 107, 124, 126, 201

1	Overvoltage protection relay (K1/1), contact 2, terminal 87	16	Model 107: Plug connection, interior/engine (X26), contact 4, gear recognition
2	Engine ground (W11)		Model 124: Plug connection, interior/engine (X26), contact 10, gear recognition
3	Idle speed air valve (Y6), contact 1		Model 126: Plug connection, interior/engine (X26), contact 10, gear recognition
4	Not assigned		Model 201 manual transmission: battery ground (W10)
5	Throttle valve switch (S29/2), contact 3, full load recognition		Model 201 automatic transmission: Plug connection, engine wiring harness/taillamp harness, 2-pin (X26/3)
6	Hall-effect road speed sensor (B6)	17	Air flow sensor position indicator (B2), contact 2
7	Ground of connector 7 is linked internally to ground of connector 2	18	Air flow sensor position indicator (B2), contact 3
8	Heated oxygen sensor (G3/2), sensor signal	19	A/C compressor cutout control unit (N6), contact 4
9	Fuel pump relays (N16/3, N16/4), TF signal	20	Battery ground (W10)
10	Electrohydraulic actuator (Y1), contact 2	21	Coolant temperature sensor (B11/2)
11	Intake air temperature sensor ((B17/2), contact 3	22	KE resistance trimming plug (R17)
12	Electrohydraulic actuator (Y1), contact 1	23	Diagnostic socket (X11), contact 3, on/off ratio
13	Throttle valve switch (S29/2), contact 1, idle speed recognition	24	Decel fuel shutoff microswitch (S27/2), contact 1
14	Not assigned ¹⁾	25	Fuel pump relays (N16/3, N16/4), contact 10, TD signal
15	Not assigned		

1) Engine 103.94/983 (CH) (DK) (N) (S) (SF) air injection/transmission shift point retard relay (K17/3) as of model year 1991.



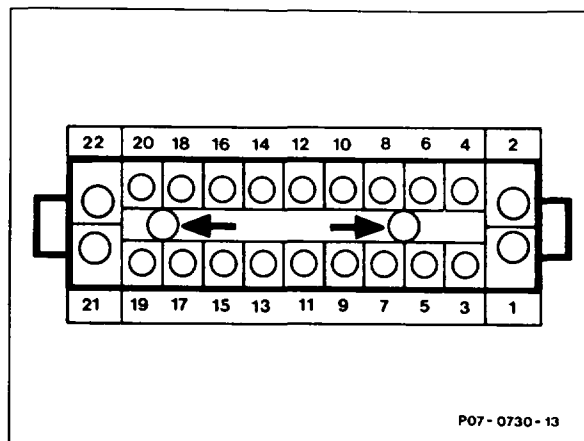
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Engine 103.984 model 129

1	Battery voltage, terminal 87 E (K1/1)	14	Air injection (control signal) to engine systems control unit (N16)
2	Engine ground (W11)	15	Not assigned
3	Idle speed air valve (Y6), contact 1	16	Plug connection, interior/engine (X26), contact 4, gear recognition/terminal 50
4	Fuel consumption signal (X26), contact 6	17	Air flow sensor position indicator (B2), contact 2
5	Throttle valve switch (S29/2), contact 3, full load recognition	18	Air flow sensor position indicator (B2), contact 3
6	Road speed signal (X30/1)	19	A/C compressor cut-in signal from (N16), terminal 87 Z
7	Ground of connector 7 is connected internally to ground of connector 2	20	Component compartment ground (W16)
8	Oxygen sensor signal (G3/2)	21	Coolant temperature sensor (B11/2)
9	TF signal (coolant temperature) to engine systems control unit (N16)	22	KE resistance trimming plug (R17)
10	Electrohydraulic actuator (Y1), contact 2	23	Diagnostic socket (X11), contact 3, on/off ratio
11	Intake air temperature sensor ((B17/2), contact 3	24	Decel fuel shutoff signal, microswitch/electronic accelerator pedal
12	Electrohydraulic actuator (Y1), contact 1	25	TDA signal from engine systems control unit (N16)
13	Throttle valve switch (S29/2), contact 1, idle speed recognition		



Contact assignment of coupling of engine systems control unit MAS










Engine 103.984 model 129




1E	Voltage supply, terminal 30 (battery)	14A	Diagnosis pulse output
2A	Fuel pumps actuation	15	Not assigned
3E	A/C compressor control signal	16E	TD signal from EZL/AKR ignition control unit
4E	Terminal 31, ground	17E	Air pump control signal
5E	Engine speed signal (+) for A/C compressor	18	Not assigned
6E	Engine speed signal (-) for A/C compressor	19A	Air pump actuation
7E	Kickdown cutoff	20A	Oxygen sensor heater actuation
8A	Start valve actuation	21E	Voltage supply, terminal 15, fused (ignition)
9A	A/C compressor cut-in signal (to KE control unit)	22A	A/C compressor coupling actuation
10E	Voltage supply, terminal 15, unfused (ignition)		
11A	TDA signal (engine speed)	A	Output signal
12E	Start signal (terminal 50)	E	Input signal
13E	Coolant temperature sensor	Arrow	Anti-twist lock

i. Test program of KE control unit (N3) with contact box

Symbols for testers

	Contact box
	Lambda control tester
	Multimeter
	Battery
	Contact
	Connector
	Bridge

Symbols for test mode with multimeter

	Voltage measurement (volts, DC)
	Current measurement (amperes, DC)
	Resistance measurement (ohms)



Note






If the on/off ratio readout is constant, first of all perform test steps 1–3.

If the specification of a test step, e.g. step 4, is in order, it is not necessary to perform test step 4.1.

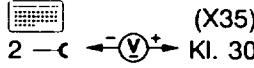
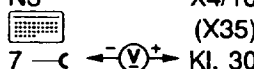


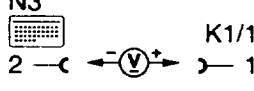
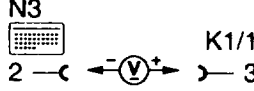
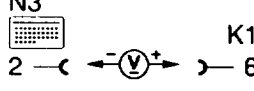
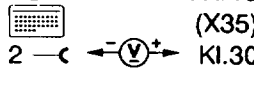
If in test step 7 the test values are achieved at the throttle valve switch (S29/2) during part load mixture adaptation, the full load enrichment is also active.

Overvoltage protection K1/2 is installed on vehicles with optional equipment (e.g. ASD) in place of overvoltage protection K1/1.

Test steps 1–20 apply to basic and national versions (except  .

Tests 21–28, oxygen sensor relay (K35) and air injection/transmission shift point retard relay (K17/3), apply only to models 124, 201  
   as of model year 1991.

The oxygen sensor relay (K35) on model 124 is installed in position "E" in the fuse and relay box; on model 201 in position "F" in the relay box in front of the electrical centre.

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
-	1.0 Ground points	N3  X4/10 (X35) 2 —c ←-V+→ Kl. 30	Ignition: ON	11–14 V	Ground connection W11, loose, Open circuit in wiring
	1.1	N3  X4/10 (X35) 7 —c ←-V+→ Kl. 30	Ignition: ON	11–14 V	KE control unit (N3) faulty
	1.2	N3  X4/10 (X35) 20 —c ←-V+→ Kl. 30	Ignition: ON	11–14 V	Ground connection W10 (model 107: W1, model 129: W16) loose, Open circuit in wiring
-	2.0 Supply voltage of N3	 N3 2 —c ←-V+→ }— 1	Ignition: ON	11–14 V	Fuse in overvoltage protection K1/1 ¹⁾ , overvoltage protection K1/1 ¹⁾ faulty or not plugged in, Open circuit in wiring
	2.1 Voltage, terminal 30	N3  K1/1 2 —c ←-V+→ }— 1	Ignition: OFF Overvoltage protection relay (K1/1) ¹⁾ removed	11–14 V	Open circuit in wiring
	2.2 Voltage, terminal 15 ²⁾	N3  K1/1 2 —c ←-V+→ }— 3 N3  K1 2 —c ←-V+→ }— 6	Ignition: ON Overvoltage protection relay (K1/1) ¹⁾ removed	11–14 V	Open circuit in wiring
	2.3 Cable, terminal 30	N3  X4/10 (X35) 2 —c ←-V+→ Kl.30	Ignition: ON Overvoltage protection relay (K1/1) removed ¹⁾	11–14 V	Open circuit in wiring

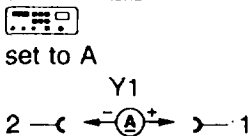

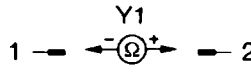
1) K1, K1/1 or K1/2

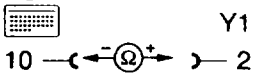
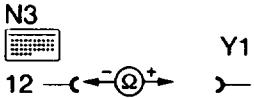
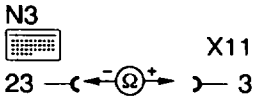
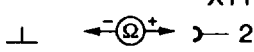
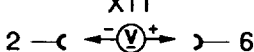
2) For 5-pin overvoltage protection relay (K1), → at contact 6
For 7-pin overvoltage protection relay (K1/1), → at contact 3
For 9-pin overvoltage protection relay (K1/2), → at contact 3

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	2.4 Cable terminal 15		Ignition: ON Fuel pump relays (N16/4, N16/3) removed	11–14 V	Open circuit in wiring
–	2.5 Cable terminal 87E or 87		Ignition: OFF Overvoltage protection relay (K1/1) ¹⁾ removed	< 1 Ω	Open circuit in wiring
	2.6 Cable terminal 31 (ground)		Ignition: OFF Overvoltage protection relay (K1/1) ¹⁾ removed	< 1 Ω	Open circuit in wiring
–	3.0 Overvoltage protection relay (K1/1) ¹⁾		Fuse at overvoltage protection (K1/1) ¹⁾ removed, visual inspection		Fuse
	3.1		Ignition: ON Overvoltage protection relay (K1/1) ¹⁾ removed	11–14 V	Test voltage supply
	3.2 ²⁾		Ignition: ON Overvoltage protection relay (K1/1) ¹⁾ removed	11–14 V	Test voltage supply

¹⁾ K1, K1/1 or K1/2

²⁾ For 5-pin overvoltage protection relay (K1), → at contact 6
For 7-pin overvoltage protection relay (K1/1), → at contact 3
For 9-pin overvoltage protection relay (K1/2), → at contact 3

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specification	Possible cause/Remedy
-	4.0 Current at electro-hydraulic actuator (Y1)	 <p>set to A</p> <p>Y1</p> <p>2 — ← — (A) — → — 1</p>	<p>Ignition: OFF</p> <p>Connect test cable 102 589 04 63 00 to actuator (Y1)</p> <p>Ignition: ON</p> <p>Engine: idling at operating temperature</p>	<p>KAT: 20 mA</p> <p>RÜF, without KAT: 10 mA</p> <p>Std.: 0 mA</p> <p>KAT: fluctuates 0 ± 3 mA</p> <p>RÜF, without KAT, Std.: 1–2 mA</p> <p>Engine 103.984: without KAT: 1–3 mA</p>	<p>Electrohydraulic actuator (Y1), KE control unit (N3), KE resistance trimming plug (R17), Open circuit in wiring</p> <p>Set lambda control, Test oxygen sensor (test step 12.0–12.8)</p>
	4.1 Fault circuit electro-hydraulic actuator (Y1)	 <p>N3</p> <p>10 — ← — (Ω) — → — 12</p>	<p>Ignition: OFF</p> <p>Disconnect test cable, KE control unit (N3) unplugged</p>	<p>$19.5 \pm 1 \Omega$</p>	<p>Electrohydraulic actuator (Y1), Open circuit in wiring</p>
	4.2 Electro-hydraulic actuator (Y1)	 <p>Y1</p> <p>1 — ← — (Ω) — → — 2</p>	<p>Ignition: OFF</p> <p>Coupling (Y1) unplugged</p>	<p>$19.5 \pm 1 \Omega$</p>	<p>Electrohydraulic actuator (Y1)</p>

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	4.3 Cable	N3 	Ignition: OFF Coupling (Y1) unplugged	< 1 Ω	Open circuit in wiring
	4.4 Cable	N3 	Ignition: OFF Coupling (Y1) unplugged	< 1 Ω	Open circuit in wiring
-	5.0 Cable from control unit (N3) to diagnostic socket (X11) ¹⁾	N3 	Ignition: OFF KE control unit (N3) unplugged	< 1 Ω	Open circuit in wiring
	5.1 Cable		Ignition: OFF	< 1 Ω	Open circuit in wiring
	5.2 Cable		Ignition: ON	11-14 V	Open circuit in wiring, Fuse F1

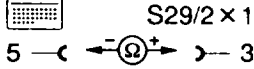
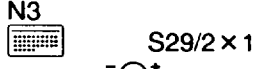



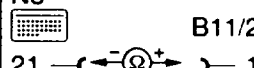

¹⁾ except engine 103.980 Std.

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
10	6.0 Air flow sensor position indicator (B2)	<p>N3 7 — c ← (V) → 18</p>	Engine: start	4.6–5.1 V	Air flow sensor position indicator, KE control unit (N3), Open circuit in wiring ¹⁾
		<p>N3 7 — c ← (V) → 17</p>	Engine runs at idle speed	0.55– 0.95 V Engine 103.980 0.75– 1.05 V	Air flow sensor position indicator, KE control unit (N3), Open circuit in wiring ¹⁾
	6.1 Cable	<p>B2 1 — c ← (Ω) → 7</p>	Ignition: OFF KE control unit (N3) unplugged	< 1 Ω	Open circuit in wiring
	6.2 Cable	<p>B2 2 — c ← (Ω) → 17</p>	Ignition: OFF KE control unit (N3) unplugged	< 1 Ω	Open circuit in wiring
	6.3 Cable	<p>B2 3 — c ← (Ω) → 18</p>	Ignition: OFF KE control unit (N3) unplugged	< 1 Ω	Open circuit in wiring
10	7.0 Distinction test (except engine 103.980 Std.)		Ignition: ON Open microswitch (throttle valve must not be opened)		Readout 40%, see test step 10.0–11.1, Readout 20%, see test step 8.0–8.3, Readout 70%, see test step 15.0–16.3

¹⁾ See also test step air flow sensor position indicator (10.0–10.3).









On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	7.1 Fault circuit idle speed contact (S29/2)		Ignition: OFF KE control unit (N3) and connector B unplugged from EZL ignition control unit (N1/2) Depress accelerator	$< 1 \Omega$ ∞	Pin assignment of coupling (S29/2 × 1) incorrectly connected, Idle speed contact, Open circuit in wiring
	7.2 Idle speed contact (S29/2)		Coupling (S29/2 × 1) unplugged, idle speed position Depress accelerator	$< 1 \Omega$ ∞	Adjust throttle valve switch (S29/2)
	7.3 Cable		Ignition: OFF	$< 1 \Omega$	Open circuit in wiring
	7.4 Cable		Ignition: OFF	$< 1 \Omega$	Open circuit in wiring
20	8.0 Fault circuit full load contact (S29/2)		Ignition: OFF Coupling at KE control unit (N3) unplugged Accelerator in full throttle position	∞ $< 1 \Omega$	Pin assignment of coupling S29/2 × 1 incorrectly connected, Full load contact, Open circuit in wiring
	8.1 Full load contact (S29/2)		Ignition: OFF Coupling (S29/2 × 1) unplugged Accelerator in full throttle position	∞ $< 1 \Omega$	Adjust or replace throttle valve switch (S29/2)

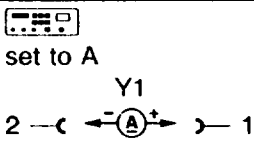


On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	8.2 Cable	N3 	Ignition: OFF	< 1 Ω	Open circuit in wiring
	8.3 Cable	N3 	Ignition: OFF	< 1 Ω	Open circuit in wiring
30	9.0 Fault circuit coolant temperature sensor (B11/2)	N3 	Engine: idling KE control unit (N3) connected	At + 80 °C 0.29–0.35 V, other values see table temperature sensor (B11/2)	Coolant temperature sensor (B11/2), Open circuit in wiring
	9.1 Coolant temperature sensor (B11/2) 2-pin	N3  N3 	Ignition: OFF Coupling at temperature sensor (B11/2) disconnected	See diagram temperature sensor (B11/2)	Coolant temperature sensor (B11/2)
	9.2 Cable	N3 	Ignition: OFF Coupling at temperature sensor (B11/2) disconnected	< 1 Ω	Open circuit in wiring
	9.3 Cable	N3 	Ignition: OFF	< 1 Ω	Open circuit in wiring

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	9.4 Coolant temperature sensor (B11/2) 4-pin	<p>B11/2 1 — ← Ω → — 3 B11/2 2 — ← Ω → — 4</p>	Ignition: OFF Coupling at temperature sensor (B11/2) disconnected, measure resistances 2 × diagonally and compare ¹⁾	See table temperature sensor (B11/2)	Coolant temperature sensor (B11/2)
	9.5 Cable	<p>N3 7 — ← Ω → — 4 B11/2</p>	Ignition: OFF Coupling at temperature sensor (B11/2) disconnected	< 1 Ω	Open circuit in wiring
	9.6 Cable	<p>N3 21 — ← Ω → — 2 B11/2</p>	Ignition: OFF Coupling at temperature sensor (B11/2) disconnected	< 1 Ω	Open circuit in wiring
	9.7 Cable	<p>⊥ — ← Ω → — 3 B11/2</p>	Ignition: OFF Coupling at temperature sensor (B11/2) disconnected	< 1 Ω	Open circuit in wiring
	9.8 Cable	<p>N1/2 1 — ← Ω → — 1 B11/2</p>	Ignition: OFF Coupling at temperature sensor (B11/2) disconnected	< 1 Ω	Open circuit in wiring

¹⁾ see section "p".

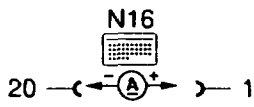
On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
40	10.0 Air flow sensor position indicator (B2)	<p style="text-align: center;">B2</p> <p>1 —  — 3</p> <p>1 —  — 2</p>	<p>Ignition: OFF Coupling at air flow sensor position indicator (B2) disconnected</p> <p>Slowly deflect air flow sensor plate by hand</p>	<p>3.6–4.4 kΩ</p> <p>Ohms value rises continuously up to approx. 2/3 of deflection and then drops off again</p>	Air flow sensor position indicator (B2)
	10.1 Cable	<p>N3</p> <p> B2</p> <p>7 —  — 1</p>	Ignition: OFF KE control unit (N3) disconnected	< 1 Ω	Open circuit in wiring
	10.2 Cable	<p>N3</p> <p> B2</p> <p>18 —  — 3</p>	Ignition: OFF KE control unit (N3) disconnected	< 1 Ω	Open circuit in wiring
	10.3 Cable	<p>N3</p> <p> B2</p> <p>17 —  — 2</p>	Ignition: OFF KE control unit (N3) disconnected	< 1 Ω	Open circuit in wiring

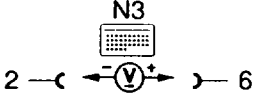


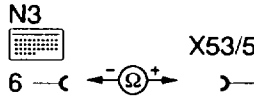
On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
40	11.0 Acceleration enrichment	 <p>set to A</p>	<p>Ignition: OFF</p> <p>Connect test cable 102 589 04 63 00 to actuator (Y1)</p> <p>Unplug coupling from coolant temperature sensor (B11/2)</p> <p>Coupling with resistance de- cade to 2.5 kΩ, between contacts 2 and 4-pin tempera- ture sensor (equals ap- prox. 20°C ¹⁾)</p> <p>KAT: Unplug connector G3/2 × 2 (oxygen sensor)</p> <p>Engine: start Engine runs at fast idle speed</p>	> 15 mA	Test air flow sensor position indicator (B2) (10.0–10.3)
	11.1		Increase engine speed sharply	Current value must rise	Test air flow sensor position indicator (B2) (10.0–10.3)

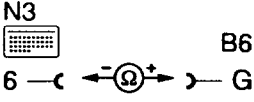
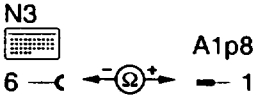



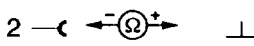
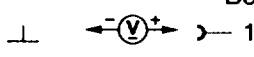
¹⁾ On model 129: two resistance decades: contact 1 – contact 3, contact 2 – contact 4.

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
50	12.0 Fault circuit oxygen sensor (G3/2) ¹⁾		Engine: idling	Fluctuates between 0.1–0.9 V	Oxygen sensor (G3/2), Open circuit in wiring KE resistance trimming plug (R17), Mixture setting, KE control unit (N3)
	12.1 Insulation oxygen sensor cable		Ignition: OFF KE control unit (N3) and coupling (G3/2 × 1) disconnected	∞	Open circuit in wiring
	12.2 Oxygen sensor (G3/2)		Engine: idling , Lambda control tester connected, coupling (G3/2 × 1) connected	moves toward 0–10% at	Oxygen sensor (G3/2)
	12.3 KE control unit (N3)		Engine: idling , Lambda control tester connected, coupling (G3/2 × 1) disconnected	moves toward 90–100% at	KE control unit (N3), Open circuit in wiring
	12.4 Cable		Ignition: OFF Coupling (G3/2x1) disconnected	< 1 Ω	Open circuit in wiring

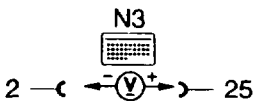
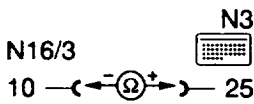
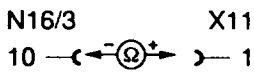
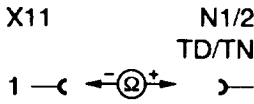

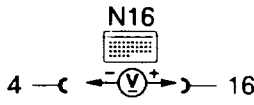
¹⁾ Drive vehicles of model 129 onto workshop platform or inspection pit.

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	12.5 Cable	G3/2 × 1 G3/2 1 —(←—→)— 1	Ignition: OFF Coupling (G3/2×1) disconnected		Open circuit in wiring, Overvoltage protection (K1 or K1/1), test steps 3.0 to 3.2, Fuel pump relays (N16/1 to N16/4)
		G3/2 G3/2×1 2 —(←—(A)—→)— 2	Engine: start	0.5–1.3 A	
50	12.6 Oxygen sensor heater	Engine 103.984 	Ignition: OFF Engine systems control unit (N16) disconnected, Coupling (G3/2 × 1) disconnected	0.5–1.7 A	Oxygen sensor (G3/2), Open circuit in wiring (see section "j" test step 11.0)
	12.7 Cable	G3/2 × 1 N16 2 —(←—(Ω)—→)— 20	Ignition: OFF Engine systems control unit (N16) disconnected, Coupling (G3/2 × 1) disconnected	< 1 Ω	Open circuit in wiring
	12.8 Cable	G3/2 × 1 W16 1 —(←—(Ω)—→)— ⊥	Ignition: OFF Coupling (G3/2 × 1) disconnected	< 1 Ω	Open circuit in wiring

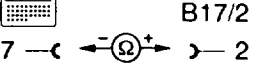
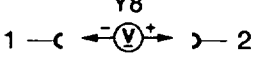
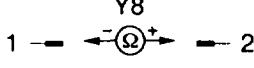
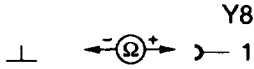
On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
60	13.0 Road speed signal	<p>Mod. 124, 201, 129</p>  <p>Mod. 107, 126</p> 	<p>Ignition: ON</p> <p>Mod. 107,126, 129:</p> <p>Run vehicle on dynamometer (> 20 km/h)</p> <p>Mod. 124, 201</p> <p>roll vehicle approx. 1 m</p>	<p>Models 124, 201</p> <p>Readout fluctuates</p> <p>0–12 V w/o ancillaries</p> <p>0–9 V with ancillaries</p> <p>Models 107, 126, 129</p> <p>> 1 V</p>	<p>Models 124, 201</p> <p>Hall-effect sensor (B6),</p> <p>Open circuit in wiring</p> <p>Models 107, 126, 129</p> <p>Electronic speedometer,</p> <p>Open circuit in wiring</p> <p>Test see Group 54</p>
	13.1 KE control unit (N3)	 connect to (X11)	<p>Run vehicle in 3rd gear/ Drive mode 3 on road/dynamometer, accelerate fully at approx. 2000 /min (approx. 6 sec)</p>	<p>On/off ratio fluctuates after accelerator released</p>	<p>Readout 60%:</p> <p>Replace KE control unit (N3)</p>
	13.2 Cable	<p>Models 124, 201 with multiple plug connection</p> <p>N3</p> 	<p>Ignition: Off</p> <p>Unplug X53/5x</p>	<p>< 1 Ω</p>	<p>Open circuit in wiring</p>

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	13.3 Cable	Models 124, 201 without multiple plug connection N3  6 — Ω — G	Ignition: OFF Coupling at Hall-effect sensor (B6) disconnected	< 1 Ω	Open circuit in wiring
	13.4 Cable	Models 107, 126 N3  6 — Ω — 1 Model 129 N3  6 — Ω — 1	Connector (A1p8) unplugged	< 1 Ω	Open circuit in wiring Test see Group 54
60	14.0 Hall-effect road speed sensor (B6)	Models 124 ¹⁾, 201 N3  2 — Ω — V — 6	Ignition: ON Coupling at KE control unit (N3) un- plugged, roll vehicle approx 1 m	Readout fluctu- ates 0–12 V	Hall-effect sensor (B6), Open circuit in wiring
	14.1 Cable	B6  G — Ω — 6 N3	Ignition: OFF	< 1 Ω	Open circuit in wiring
	14.2 Cable	B6  2 — Ω — ⊥	Ignition: OFF	< 1 Ω	Open circuit in wiring
	14.3 Cable	 ⊥ — V — 1 B6	Ignition: ON	11–14 V	Fuse, Open circuit in wiring


¹⁾ except engine 103.980 Std., engine 103.982/983 as of approx. 09/87

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specification	Possible cause/Remedy
70	15.0 TD/TN signal	Models 107, 124, 126, 201 	Ignition: ON Engine idling at operating temperature, KE control unit (N3) connected	6–12 V	EZL ignition control unit (N1/2), contact assignment see section "k", Open circuit in wiring
	15.1 Cable		Ignition: OFF Fuel pump relay (N16/3 or N16/4) removed	< 1 Ω	Open circuit in wiring
	15.2 Cable		Ignition: OFF	< 1 Ω	Open circuit in wiring
	15.3 Cable		Ignition: OFF	< 1 Ω	Open circuit in wiring
70	16.0 TDA signal	Engine 103.984 	Engine: Idling at operating temperature, KE control unit (N3) connected	6–12 V	EZL ignition control unit (N1/2), contact assignment see section "k", Engine systems control unit (N16), Open circuit in wiring
	16.1 TD signal		Ignition: ON Engine idling	6–12 V	EZL ignition control unit (N1/2), Open circuit in wiring

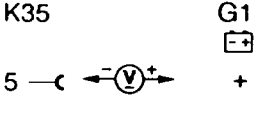
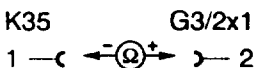
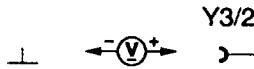
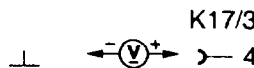
On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	16.2 Cable (TDA)		Ignition: OFF	< 1 Ω	Open circuit in wiring
	16.3 Cable (TD)		Ignition: OFF Connector (N1/2) unplugged	< 1 Ω	Open circuit in wiring
80	17.0 Fault circuit intake air temperature sensor (B17/2)		Engine: idling , KE control unit (N3) connected	At + 20°C 1.32– 1.62 V, other values see table tempera- ture sensor (B17/2)	Intake air temperature sensor (B17/2), Open circuit in wiring
	17.1 Intake air temperature sensor (B17/2)		Ignition: OFF Coupling at temperature sensor (B17/2) disconnected	See diagram tempera- ture sensor (B17/2)	Intake air temperature sensor (B17/2)
	17.2 Cable		Ignition: OFF Coupling at temperature sensor (B17/2) disconnected	< 1 Ω	Open circuit in wiring

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	17.3 Cable	N3  B17/2	Ignition: OFF Coupling at temperature sensor (B17/2) disconnected	< 1 Ω	Open circuit in wiring
90	Not assigned	-	-	-	-
95	18.0 Decel fuel shutoff	-	-	-	See section "m" test steps 1.0-1.3
100 ¹⁾	19.0				See test steps 1, 2, 3, 11. Test on/off ratio, RI 07.3-2053
-	20.0 Start valve (Y8) Actuation via fuel pump relay	Y8 	Connect ohms decade with 10 kΩ into circuit at coolant temperature sensor (B11/2), Unplug cape of position sensor at EZL ignition control unit (N1/2), Engine: start	approx. 10 V during starting	Fuel pump relays (N16/3 or N16/4) Model 129: Engine systems control unit (N16), Open circuit in wiring Terminal 50
	20.1 Start valve (Y8) Resistance	Y8 	Ignition: OFF Coupling at start valve (Y8) disconnected	10-25 Ω	Start valve (Y8)
	20.2 Cable	Y8 	Ignition: OFF Coupling at start valve (Y8) disconnected	< 1 Ω	Open circuit in wiring

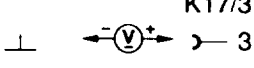
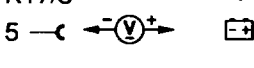
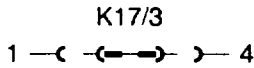
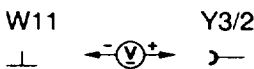
¹⁾ Idle speed too high.

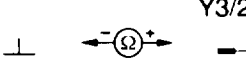
On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	20.3 Cable	N16/3 4 — $\leftarrow \text{---} \Omega \text{---} \rightarrow$ — 2	Y8 Ignition: OFF Coupling at start valve (Y8) disconnected	< 1 Ω	Open circuit in wiring
	20.4 Cable	N16/3 2 — $\leftarrow \text{---} \Omega \text{---} \rightarrow$ — 9 	N3 Ignition: OFF Coupling at start valve (Y8) disconnected	< 1 Ω	Open circuit in wiring
50	21.0 Operation of oxygen sensor heater	G3/2x1 1 — $\leftarrow \text{---} A \text{---} \rightarrow$ — 1	Oxygen sensor operating temperature Engine: idling Do not read off specification until stable	1.0–1.8 A	Voltage and ground supply for oxygen sensor relay (K35), Oxygen sensor relay (K35) faulty, Oxygen sensor faulty
50	22.0 Voltage supply oxygen sensor relay (K35) 1)	\perp — $\leftarrow \text{---} V \text{---} \rightarrow$ — 4 K35	Oxygen sensor relay (K35) removed, Engine: idling	11–14 V	Open circuit in wiring, Oxygen sensor relay (K35), Fuel pump relay and kickdown cutoff (N16/4) faulty
	22.1 Voltage supply oxygen sensor relay (K35)	\perp — $\leftarrow \text{---} V \text{---} \rightarrow$ — 3 K35	Oxygen sensor relay (K35) removed, Ignition: ON	11–14 V	Model 124 Fuse 7 faulty, Oxygen sensor relay (K35), Open circuit in wiring Model 201 Fuse 10 faulty, Oxygen sensor relay (K35), Open circuit in wiring

1) K17/3, K35 on model 124, 201      as of 1991

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
50	23.0 Ground, oxygen sensor relay (K35)	K35 	Oxygen sensor relay (K35) disconnected, Ignition: OFF	11-14 V	Open circuit in wiring, Oxygen sensor relay (K35), Ground (W3)
50	24.0 Cable of oxygen sensor relay (K35) to plug connection of oxygen sensor heating coil (G3/2x1)	K35 	Oxygen sensor relay (K35) disconnected	< 1 Ω	Open circuit in wiring
-	25.0 Actuation of shiftpoint retard solenoid valve (Y3/2)		Coolant temperature sensor disconnected, simulate +20°C with 2.5 kΩ. Engine: idling	11-14 V approx. 80 s	Voltage and ground supply for air injection/transmission shift point retard relay (K17/3), Air injection/transmission shift point retard relay (K17/3) faulty, Open circuit in wiring, No coolant temperature signal Wiring diagrams transmission shiftpoint retard/air injection see M103, Combustion III, 14-7165
-	26.0 Voltage supply air injection/transmission shift point retard relay (K17/3) 1)		Air injection/transmission shift point retard relay (K17/3) removed Ignition: ON	11-14 V	7-pin overvoltage protection relay 87E (K1/1), Air injection/transmission shift point retard relay

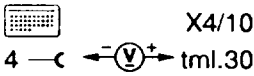




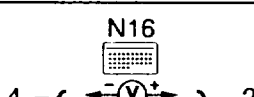
1) K17/3, K35 on model 124, 201      as of 1991

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	26.1		Air injection/ transmission shift point retard relay (K17/3) removed, Ignition: ON	11-14 V	<p>Model 124 Fuse 2 faulty, Open circuit/short circuit air injection/transmission shift point retard relay (K17/3), Open circuit in wiring</p> <p>Model 201 Fuse 7 faulty, Open circuit/short circuit air injection/transmission shift point retard relay (K17/3), Open circuit in wiring</p>
	27.0 Ground supply of air injection/ transmission shift point retard relay (K17/3)		Air injection/ transmission shift point retard relay (K17/3) removed, Ignition: ON	11-14 V	Open circuit in wiring, Air injection/transmission shift point retard relay (K17/3), KE injection system control unit (N3) faulty, No ground output via contact 14. Test ground signal with contact box
	28.0 Cable to shift point retard solenoid valve (Y3/2)	 	Air injection/ transmission shift point retard relay (K17/3) removed, Ignition: ON	11-14 V	Open circuit in wiring, Air injection/transmission shift point retard relay (K17/3), Coupling of shiftpoint retard solenoid valve (Y3/2)

On/off ratio readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	28.1 Shiftpoint retard solenoid valve (Y3/2)		Coupling at shift point retard solenoid valve disconnected, Ignition: OFF	10–18 Ω	Replace shift point retard solenoid valve (Y3/2)

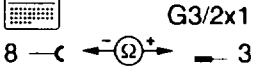
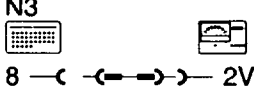

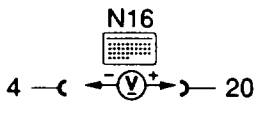
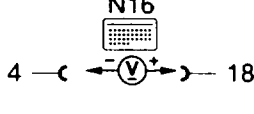


j. Test program of engine systems control unit MAS with contact box
engine 103.984 in model 129

Pulse readout	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
-	1.0 Engine systems control unit MAS (N16) Ground	N3 	Ignition: OFF	11-14 V	Open circuit in wiring Ground connection W16
15	2.0 MAS (N16) terminal 30	N16 	Ignition: OFF	11-14 V	Open circuit in wiring
-	3.0 MAS (N16) terminal 15 unfused	N16 	Ignition: ON	11-14 V	Open circuit in wiring, Terminal block at fuse and relay box (F1) loose
-	4.0 MAS (N16) terminal 15	N16 	Ignition: ON	11-14 V	Open circuit in wiring, Relay box (F1) loose
15	5.0 Fuel pumps (M3m1, M3m2) operation	N16 	Ignition: ON Engine systems control unit (N16) disconnected	11-14 V	Open circuit in wiring, 1-pin plug connection of fuel pump harness (X36), M3m1 or M3m2
2	6.0 Fuel pumps (M3m1, M3m2) actuation MAS	N16 	Engine systems control unit (N16) connected. Control cable coupling 2 at EZL control unit (N1/2) disconnected. Engine: start	10 ± 2 V during starting	Open circuit in wiring, Relay box (F1) loose

Pulse readout	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
9	7.0 Control signal terminal 50		Control cable coupling 2 at EZL control unit (N1/2) disconnected. Engine: start	10 ± 2 V during starting	Open circuit in wiring, Relay box (F1) loose
3	8.0 TDA signal		Engine: idling	6–12 V	Open circuit in wiring, TD signal implausible ¹⁾
	8.1 Wiring		Ignition: OFF	< 1 Ω	Open circuit in wiring
3	9.0 TD signal		Engine: idling	6–12 V	Open circuit in wiring, EZL ignition control unit (N1/2)
	9.1 Engine systems control unit MAS (N16)		Coupling (A) of EZL control unit (N1/2) connected. Engine: idling	6–12 V	Engine systems control unit (N16)
	9.2 Cable TD signal		Ignition: OFF Coupling (A) of EZL control unit (N1/2) disconnected	< 1 Ω	Open circuit in wiring

¹⁾ The plausibility of the road speed signal can **only** be checked by the KE control unit (N3) when driving (engine output dynamometer/road). If an implausible road speed signal is recognized when driving, the control unit (N3) "sets" the on/off ratio of 60% and stores this. The fault is not erased until the ignition is switched off. A "60% on/off ratio" test is performed e.g. in dealing with the complaint: jerking when vehicle moving and throttle valve closed.

Pulse readout	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
4	10.0 Oxygen sensor cable ¹⁾)	N3 	Ignition: OFF KE control unit (N3) and 3-pin plug connection of heated oxygen sensor (G3/2x1) disconnected	< 1 Ω	Open circuit in wiring
	10.1 Oxygen sensor (G3/2)	N3 	Lambda tester connected Engine: idling Coupling G3/2x1 disconnected	0–10 % at lambda tester after 30 s	Oxygen sensor G3/2
	10.2 KE control unit (N3)	N3 	Lambda tester connected Engine: idling Coupling G3/2x1 disconnected	90– 100 % at lambda tester after 30 s	KE control unit (N3)
4	11.0 Oxygen sensor heater actuation	N16 	Engine: idling	11–14 V	Open circuit in wiring, KE control unit (N3), Engine systems control unit (N16)
	11.1 Control signal of oxygen sensor heater	N16 	Engine: idling	11–14 V	Open circuit in wiring, KE control unit (N3)

¹⁾ Drive model 129 onto workshop platform or inspection pit.

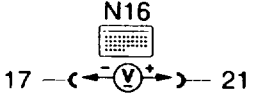
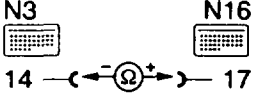

Pulse readout	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	11.2 Cable		Ignition: OFF KE control unit (N3) and engine systems control unit (N16) disconnected.	< 1 Ω	Open circuit in wiring
	11.3 Oxygen sensor heater		Ignition: OFF Engine systems control unit (N16) disconnected. 3-pin plug connection of oxygen sensor (G3/2x1) connected	0.5–1.7 A	Open circuit in wiring, Oxygen sensor (G3/2)
	11.4 Cable ¹⁾		Ignition: OFF Engine systems control unit (N16) disconnected. Oxygen sensor plug connection (G3/2x1) disconnected	< 1 Ω	Open circuit in wiring
	11.5 Cable ¹⁾		Ignition: OFF Plug connection G3/2x1 disconnected	< 1 Ω	Open circuit in wiring
11	12.0 Cut-in signal of A/C compressor		Engine: idling Air conditioner "switch on"	5–10 V	Open circuit in wiring, Engine systems control unit (N16), Test compressor cutoff

¹⁾ Drive vehicle onto workshop platform or inspection pit.

Pulse readout	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	12.1 Cable	<p>N16 N3 9 — Ω — 19</p>	Ignition: OFF KE control unit (N3) and coupling at compressor cutoff control unit (N6) disconnected	< 1 Ω	Open circuit in wiring
12 13	13.0 A/C compressor actuation	<p>N16 4 — V — 22</p>	Engine: idling Air conditioner "switch on"	11–14 V	Engine systems control unit (N16)
8	14.0 TF signal (coolant tempera- ture)	<p>N16 4 — V — 13</p>	Engine: idling	At + 80°C 0.29– 0.35 V, other values see table coolant tempera- ture sensor (B11/2)	Coolant temperature sensor (B11/2), KE control unit (N3), Open circuit in wiring
5	15.0 Air pump actuation	<p>N16 4 — V — 19</p>	4-pin coolant temperature sensor coupling (B11/2) disconnected and simulate with 2.5 kΩ ¹⁾ Engine: idling Air hose downstream of non-return valve detached	approx. 2 min 11–14 V Percep- tible air flow at air hose	Engine systems control (N16) Open circuit in wiring, Air pump, Air hose

1) Two resistance decades: contact 1 – contact 3, contact 2 – contact 4.



Pulse readout	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
5	16.0 Air injection control signal		4-pin coolant temperature sensor coupling (B11/2) disconnected and simulate with 2.5 k Ω ¹⁾ Engine: idling	For approx. 2 min 11–14 V	Open circuit in wiring, KE control unit (N3)
	16.1 Cable		Ignition: OFF KE control unit (N3) and engine systems control unit (N16) disconnected	< 1 Ω	Open circuit in wiring
6	17.0 Fault circuit kickdown cutoff		Ignition: OFF Engine systems control unit (N16) disconnected. Kickdown switch (S16/6) or second mode kickdown switch (S16/7) operated	450 \pm 50 mA ²⁾ 850 \pm 50 mA ²⁾	Open circuit in wiring, S16/6 or S16/7, Automatic transmission kickdown valve (Y3)

¹⁾ Two resistance decades: contact 1 – contact 3, contact 2 – contact 4.

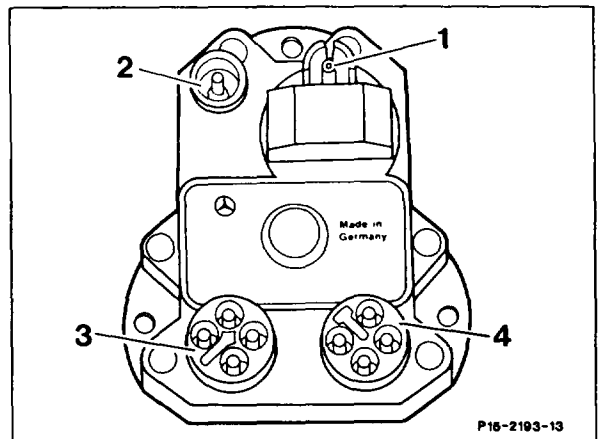
²⁾ Test data of switchover valve depending on manufacturer.

Pulse readout	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
10	18.0 Actuation of engine systems control unit MAS (N16)		Connect ohms decade with 10 k Ω to coolant temperature sensor (B11/2), unplug cable from position sensor at EZL control unit (N1/2), operate starter	approx. 10 V when starting	Engine systems control unit (N16), Open circuit in wiring Terminal 50
	18.1 Start valve (Y8) Resistance		Ignition: OFF Coupling at start valve (Y8) disconnected	10–25 Ω	Start valve (Y8)
	18.2 Cable		Ignition: OFF Coupling at start valve (Y8) disconnected	< 1 Ω	Open circuit in wiring
	18.3 Cable		Ignition: OFF Coupling at start valve (Y8) disconnected	< 1 Ω	Open circuit in wiring
	18.4 Cable		Ignition: OFF Coupling at start valve (Y8) disconnected	< 1 Ω	Open circuit in wiring

k. Contact assignment of EZL control unit (N1/2)

Models 107, 124, 126, 201

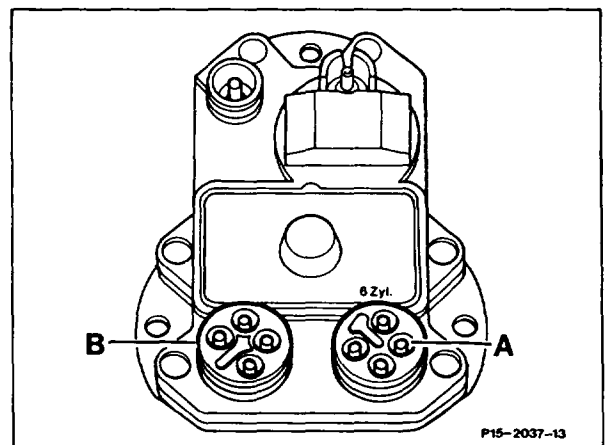
- 1 Vacuum connection
- 2 Coaxial connector for control cable from position sensor
- 3 4-pin sensor connector
 - 1 Coolant temperature sensor
 - 2 Throttle valve switch
 - 3 EZL resistance trimming plug
 - 4 Vacant (cable ends in harness)
- 4 4-pin supply connector
 - 15 = Terminal 15
 - 16 = Ignition coil terminal 1
 - TD = TD signal
 - 31 = Ground



Model 129

The cable from the EZL control unit (N1/2) connector B, contact 4, is connected to ground W3 on vehicles with automatic transmission in order to detect activation of the respective ignition map.

On vehicles with manual transmission the cable ends in the wiring harness.



- A 4-pin supply connector
 - 15 = Terminal 15
 - 16 = Ignition coil terminal 1
 - TD = TD signal
 - 31 = Ground
- B 4-pin sensor connector
 - 1 Coolant temperature sensor
 - 2 Throttle valve switch
 - 3 EZL resistance trimming plug
 - 4 Vacant (cable ends in harness)

I. Table of voltage values of EZL/KE coolant temperature sensor (B11/2) and KE intake air temperature sensor (B17/2)

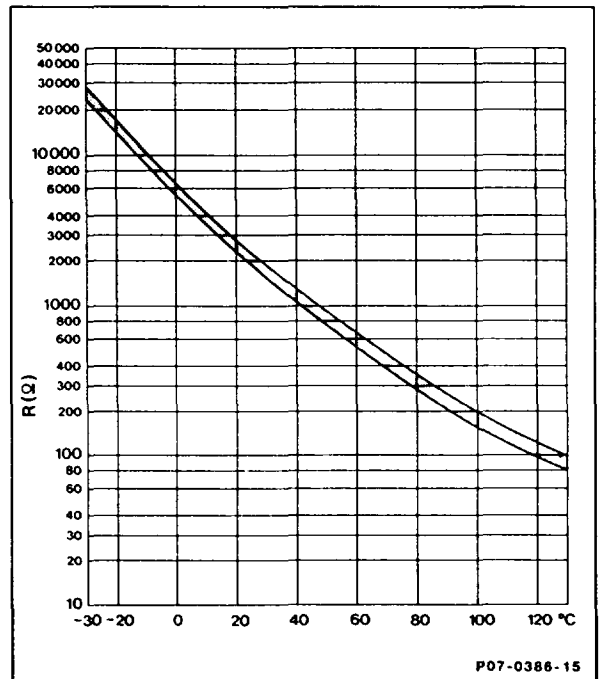
Temperature (°C)	Resistance (kΩ)	Voltage at contact 21 coolant (V)	Voltage at contact 11 intake air (V)
-20	15.7	3.2-3.9	2.8-3.5
-10	9.2	2.8-3.5	2.5-3.1
0	5.9	2.4-2.9	2.1-2.6
10	3.7	1.9-2.4	1.7-2.1
20	2.5	1.5-1.8	1.3-1.6
30	1.7	1.2-1.4	1.0-1.3
40	1.18	0.9-1.1	0.8-0.9
50	0.84	0.7-0.8	0.6-0.7
60	0.60	0.5-0.6	0.4-0.5
70	0.435	0.4-0.5	0.3-0.4
80	0.325	0.3-0.4	0.2-0.3
90	0.247	0.2-0.3	0.1-0.2

Diagram of temperature sensors


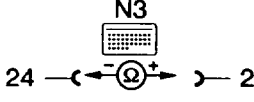
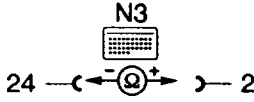
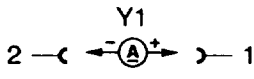
Resistances of EZL/KE coolant temperature sensor (B11/2) and KE intake air temperature sensor (B17/2).

Note

Since 08/88 specification at 80°C: 290-350 Ω.



m. Testing decel fuel shutoff

Pulse readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
-	1.0 Decel fuel shutoff	 connect to diagnostic socket (X11)	Increase engine speed to approx. 3500/min then close throttle valve	On/off ratio jumps briefly to 50%	Accelerator control setting, Throttle valve switch setting, Microswitch (S27/2), Open circuit
	1.1 Microswitch (S27/2) (vehicle without ASR)		Idle position Accelerator depressed	< 1 Ω ∞	Microswitch, Open circuit in wiring Microswitch, Open circuit in wiring
	1.2 Idle switching signal (vehicle with ASR)		Ignition: ON Depress accelerator once, measure in idle position	< 1 Ω	Position sensor (R25), Electronic accelerator pedal control unit (N4/1), see group 30
	1.3 Current at electro-hydraulic actuator (Y1)	 set to A	Ignition: OFF Connect test cable 102 589 04 63 00 to actuator (Y1) Ignition: ON Increase engine speed to 2000 to 2500/min then close throttle valve	approx. - 60 mA until combustion restored	Road speed signal, see 60%

n. Testing KE resistance trimming plug (R17)

Connection diagram of contact box, see section "g".



The KE resistance trimming plug must be re-sealed with the lead seal pliers 124 589 01 37 00 and the embossing set 124 589 24 63 00 after being installed.

Pulse readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
-	1.0 KE resis- tance trim- ming plug (R17) ¹⁾		Ignition: ON Engine idling	2.81 V in position 1, other values see table	KE resistance trimming plug (R17), Open circuit in wiring
	1.1 Cable ¹⁾		Ignition: OFF	953 Ω in position 1, other values see table	KE resistance trimming plug (R17), Open circuit in wiring
	1.2 Cable ¹⁾		Ignition: OFF	< 1 Ω	Open circuit in wiring
	1.3 Cable ¹⁾	<p>Model 129</p>	Ignition: OFF	< 1 Ω	Open circuit in wiring
	2.0 KE resistance trimming plug (R17) ²⁾		Ignition: ON Engine idling	0.33 V ± 0.1 in position 1, other values see table	KE resistance trimming plug (R17), Open circuit in wiring

¹⁾ Only KAT.

²⁾ Only RÜF or Standard, without KAT.

Pulse readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
	2.1 Cable ¹⁾		Ignition: OFF	51 Ω in position 1, other values see table	KE resistance trimming lug (R17), Open circuit in wiring
	2.2 Cable ¹⁾		Ignition: OFF	< 1 Ω	Open circuit in wiring
	2.3 Cable ¹⁾		Ignition: OFF	< 1 Ω	Open circuit in wiring

¹⁾ Only RÜF or Standard, without KAT.

Table of test values of KE resistance trimming plug (R17), KAT

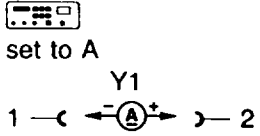
Item no.	Voltage (V) ± 0.1	Resistance ± 10%	Fault
1	2.81	953 Ω	none (original state)
2	3.16	1.27 kΩ	-
3	3.43	1.62 kΩ	-
4	3.77	2.26 kΩ	slight pickup faults in warming-up phase
5	4.10	3.32 kΩ	poor throttle response when cold
6	4.40	5.36 kΩ	poor throttle response and response in warming-up phase
7	4.72	11.5 kΩ	very poor throttle response when cold driving faults in warming-up phase

Table of test values of KE resistance trimming plug (R17), RÜF/without KAT/Standard

Item no.	Voltage (V) ± 0.1	Resistance (Ω) ± 10%	Fault
1	0.33	51	none (original state)
2	0.61	105	excessive part load consumption when engine at operating temperature
3	0.92	169	pickup faults when engine at operating temperature
4	1.26	249	slight pickup faults in warming-up phase
5	1.61	348	poor throttle response when cold
6	1.88	442	poor throttle response and pickup faults in warming-up phase
7	2.22	590	very poor throttle response when cold driving faults in warming-up phase

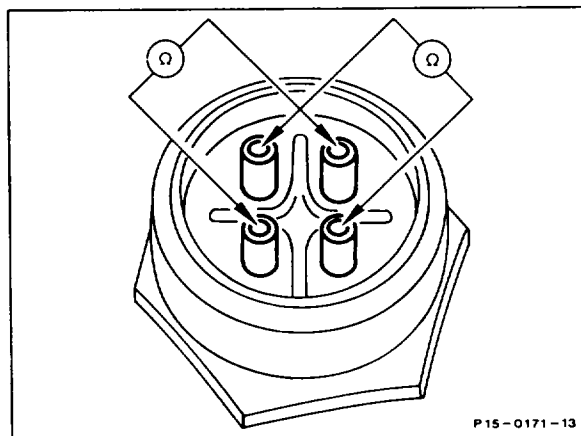
o. Testing part load mixture adaptation (nly RÜF or Std., without KAT)

Connection diagram of contact box, see section "g".

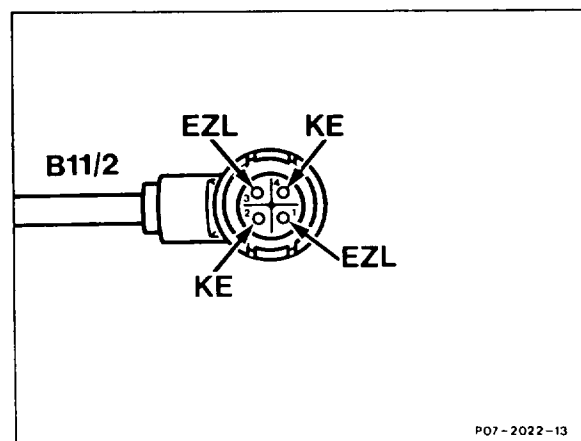
Pulse readout in %	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
-	1.0 Part load mixture adaptation	 set to A Y1 1 —(A)— 2	Ignition: OFF Connect test cable 102 589 04 63 00 to actuator (Y1) Ignition: ON Engine speed 2500 /min	- 7 to + 4 mA	KE resistance trimming plug (R17), Open circuit in wiring

p. Test setup of 4-pin coolant temperature sensor (B11/2)

4-pin coolant temperature sensor (B11/2)

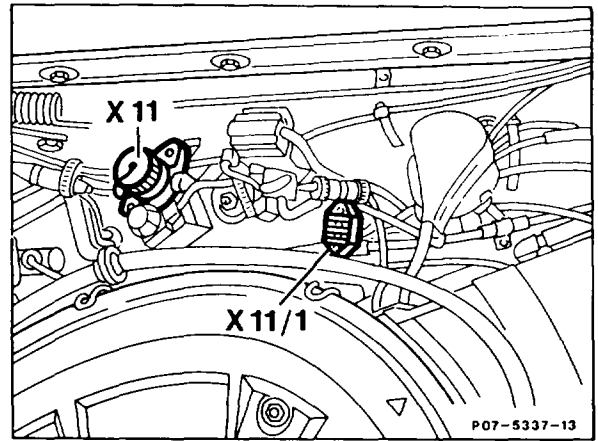


4-pin coolant temperature sensor coupling (B11/2)

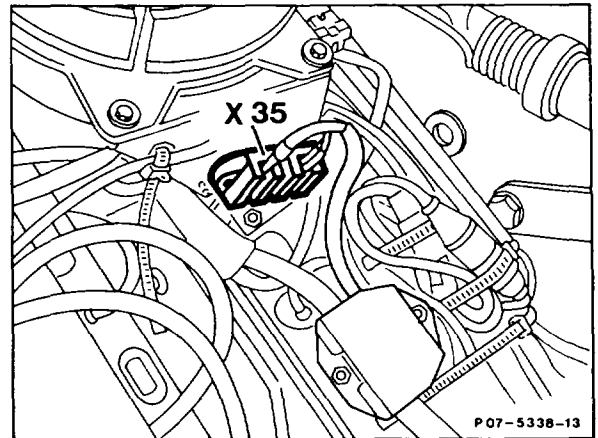


q. Location of plug connection
Model 107

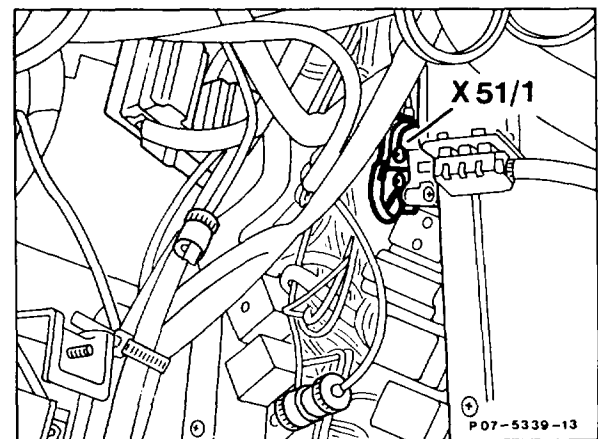
X11 Diagnostic socket/terminal block terminal TD
X11/1 Diagnostic socket/terminal block terminal 30/KE,
2-pin



X35 Terminal block terminal 30/terminal 61
(X4/10) (battery)

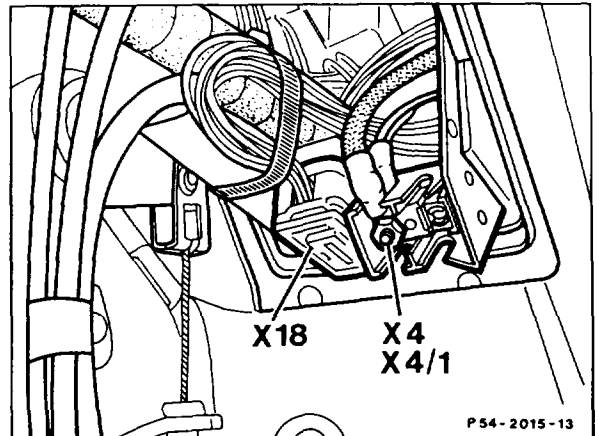


X51/1 Terminal block terminal 87/terminal 30,
2-pin

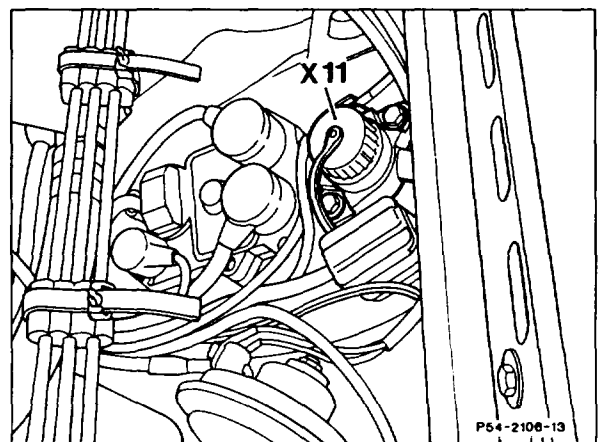


Model 124

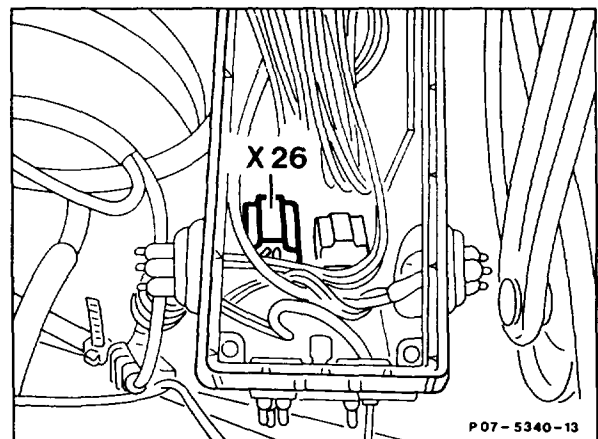
- X4 Terminal block terminal 30, fuse and relay box, 2-pin
- X4/1 Terminal block terminal 30, interior, 2-pin



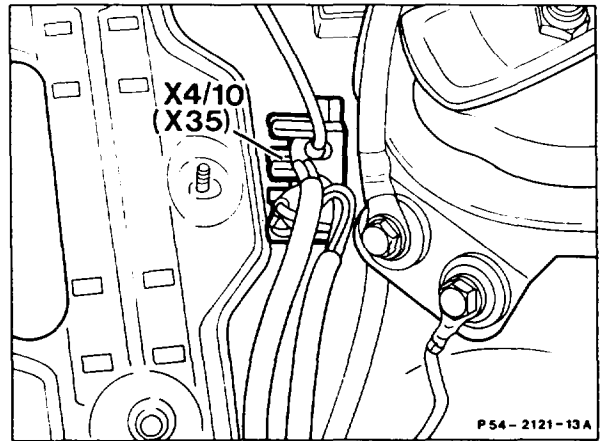
- X11 Diagnostic socket/terminal block terminal TD



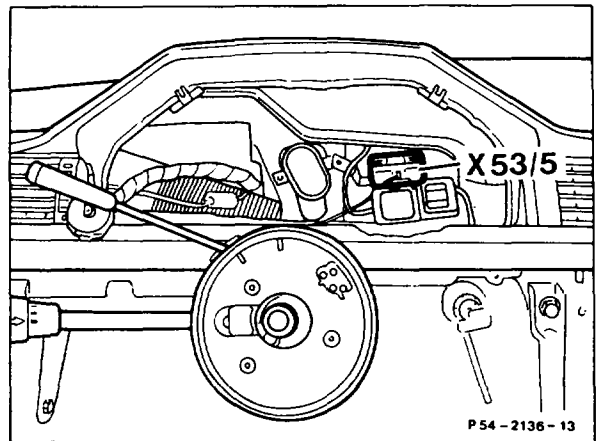
- X26 Plug connection, interior, engine (in fuse box)



X4/10 Terminal block terminal 30/terminal 61
(X35) (battery)

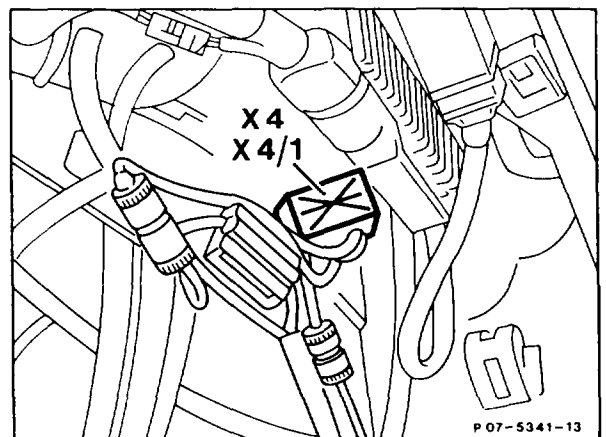


X53/5 Multi-point plug connection/Hall-effect
sensor

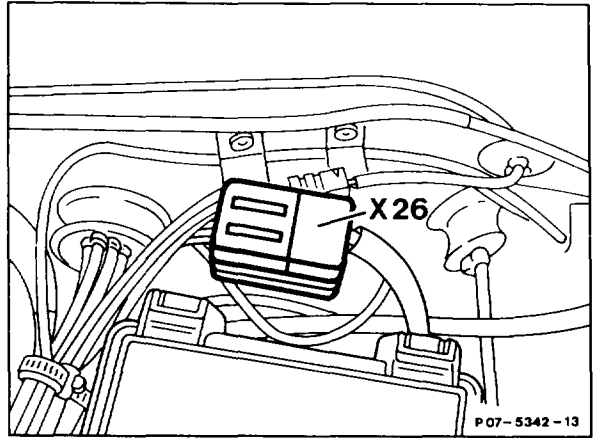


Model 126

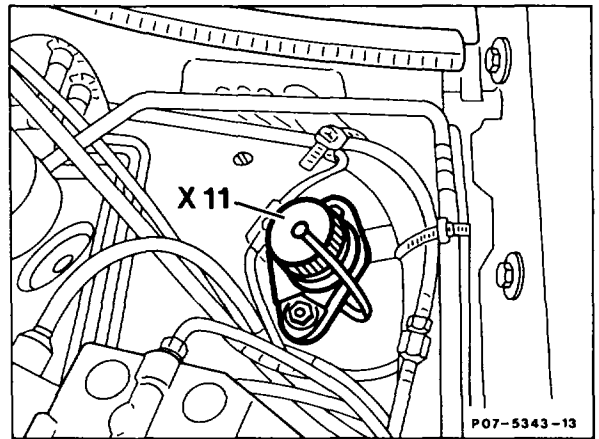
X4 Terminal block terminal 30, fuse and relay
box, 2-pin
X4/1 Terminal block terminal 30, interior, 2-pin



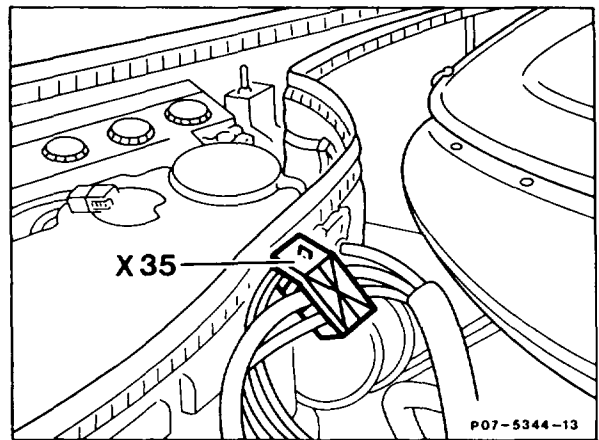
X26 Plug connection, interior, engine (in fuse box)



X11 Diagnostic socket/terminal block terminal TD

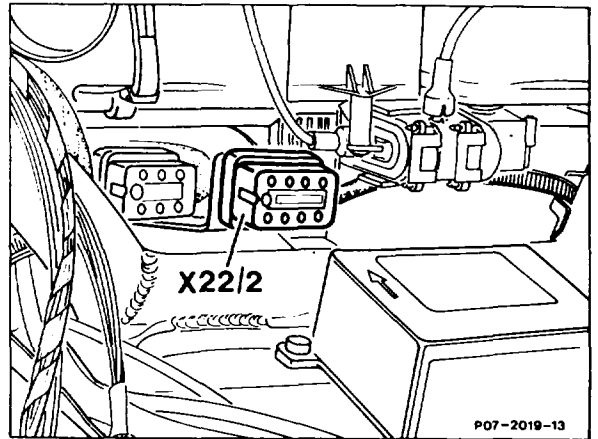


X35 Terminal block terminal 30/terminal 61 (X4/10) (battery)

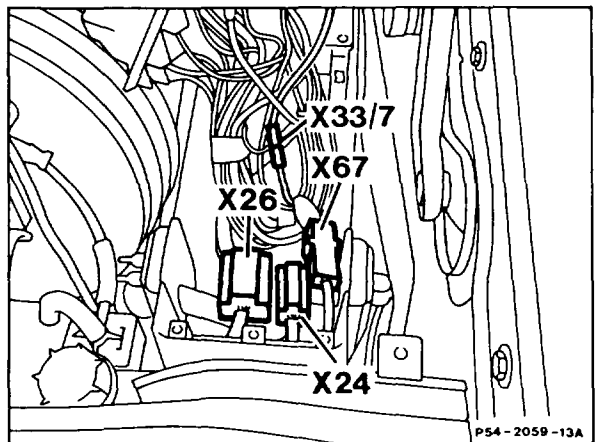


Model 129

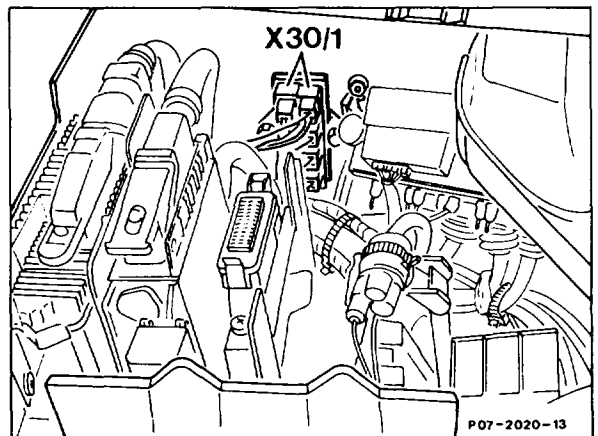
X22/2 Plug connection, automatic transmission/engine, 8-pin, behind radio



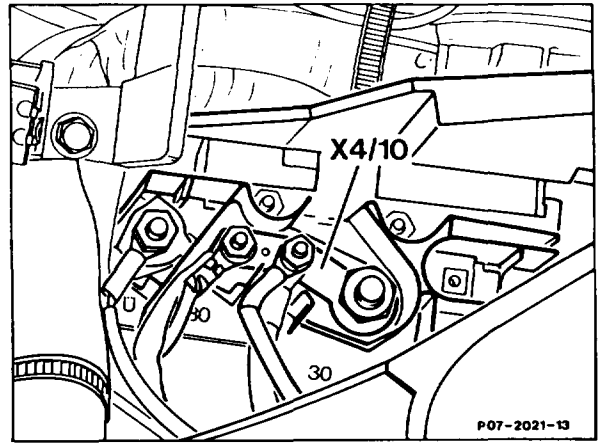
X24 Plug connection, headlight harness, 8-pin
X26 Plug connection, interior, engine (in fuse box)
X67 Plug connection, outside temperature display, 2-pin



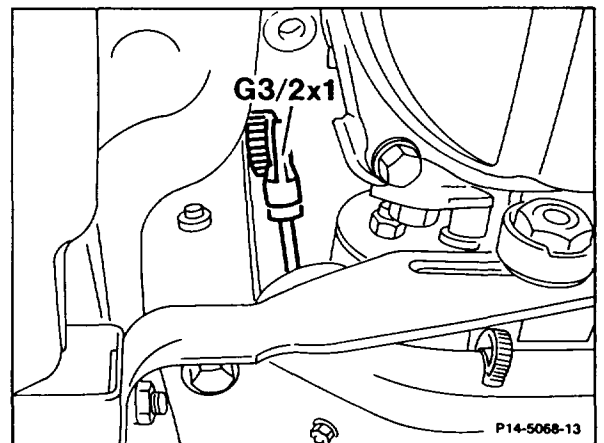
X30/1 Plug connection, multi-function block (in component compartment)



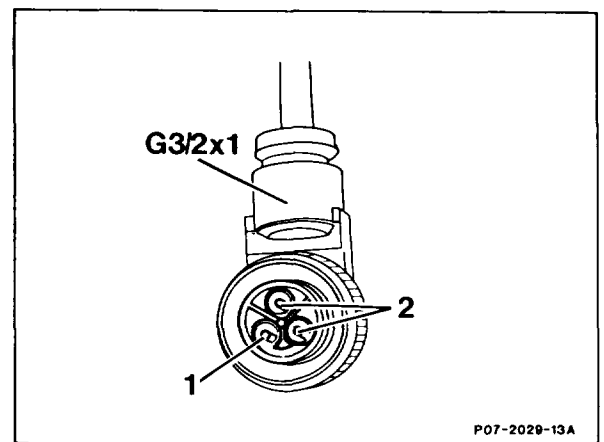
X4/10 Terminal block terminal 30/30Ue/61e/87L (in component compartment)



G3/2x1 Oxygen sensor plug connection

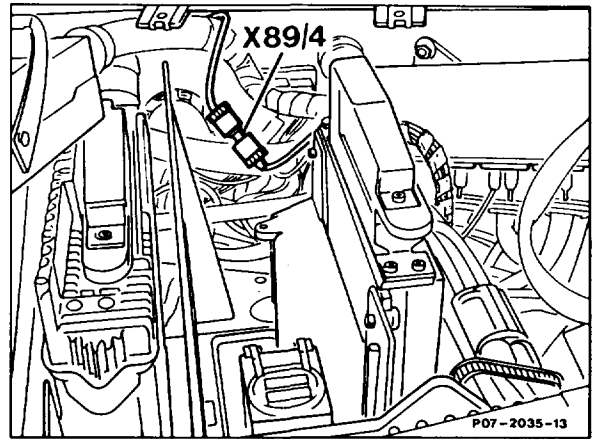


G3/2x1 Oxygen sensor plug connection
1 Oxygen sensor signal
2 Oxygen sensor heater

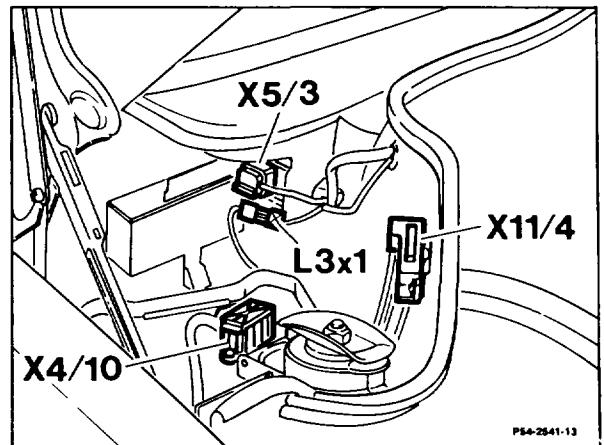


The microswitch (S27/2) is not fitted to vehicles with ASR. The cable is tied back in the harness. The signal for the decel fuel shutoff is formed by the position sensor (R25) and input into the KE control unit via the electronic accelerator pedal control unit. The separation point between the control units is the plug connection (X89/4).

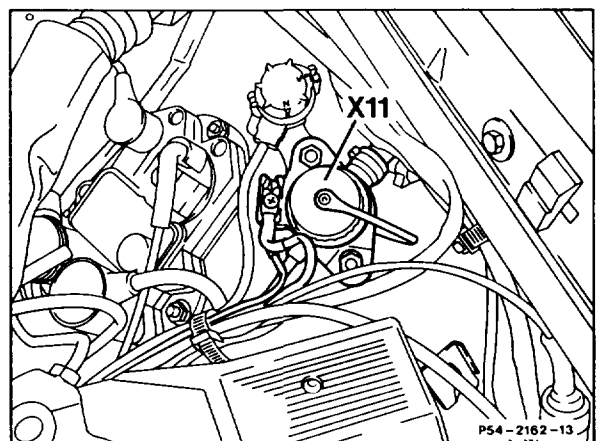
X89/4 Plug connection, electronic accelerator pedal control unit/KE control unit



Model 201

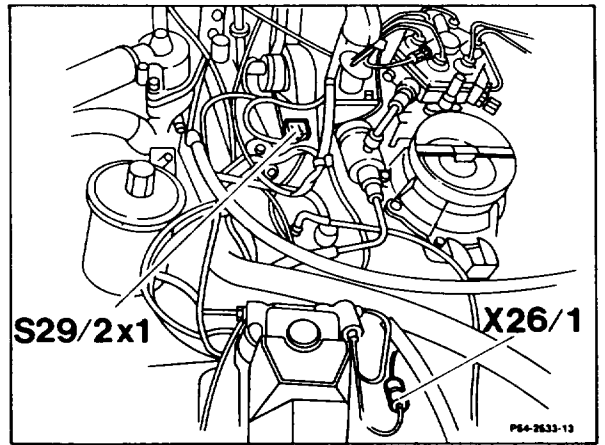


X4/10 Terminal block terminal 30/terminal 61 (battery)

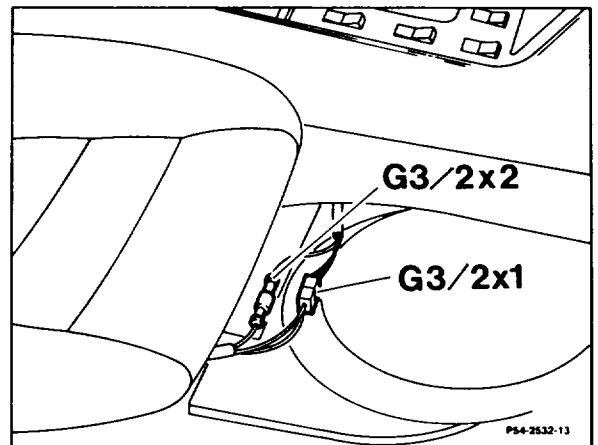


X11 Diagnostic socket/terminal block terminal TD

X26/1 Plug connection, engine wiring harness/
headlight harness, diagnosis, 1-pin

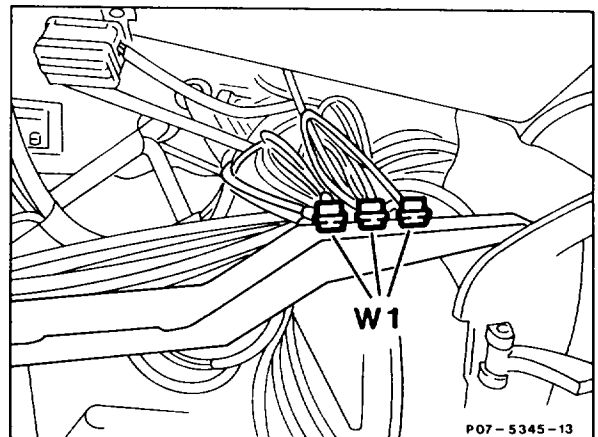


G3/2x1 Plug connection, oxygen sensor heating
coil
G3/2x2 Plug connection, oxygen sensor signal

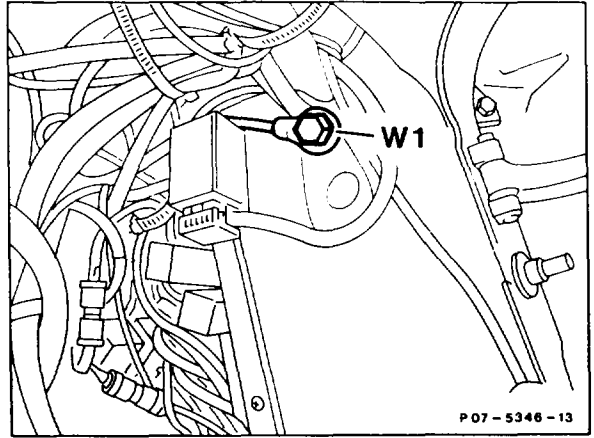


r. Location of ground points
Model 107

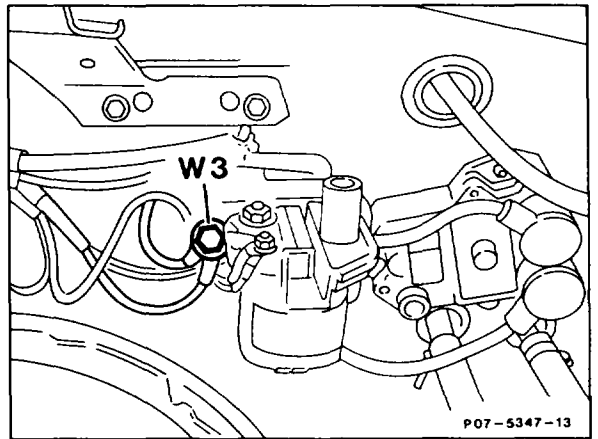
W1 Main ground (right cross member)



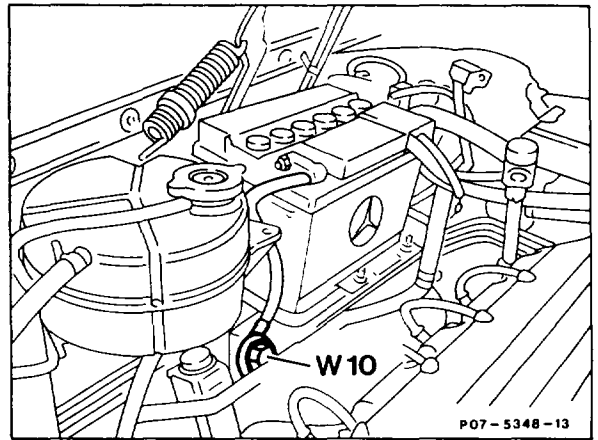
W1 Main ground (right footwell)



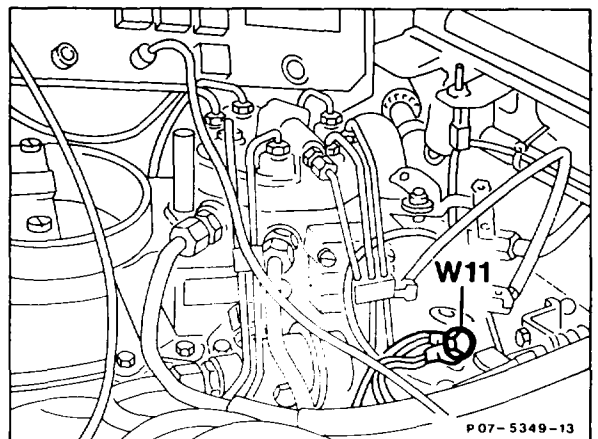
W3 Ground, front left (ignition coil)



W10 Ground, battery

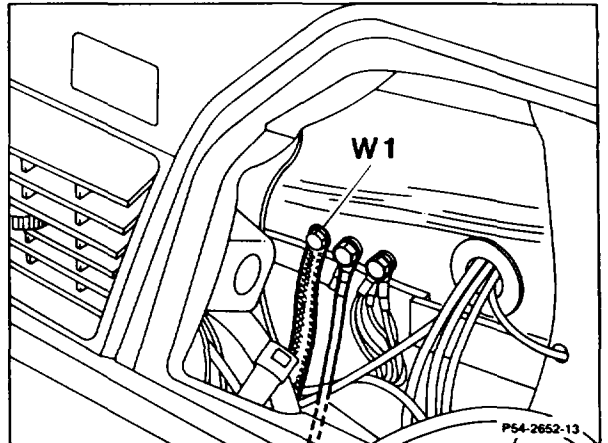


W11 Ground, engine (wiring bolted on)

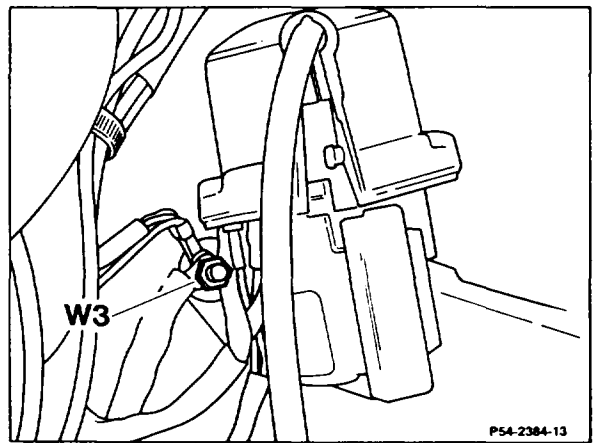


Model 124

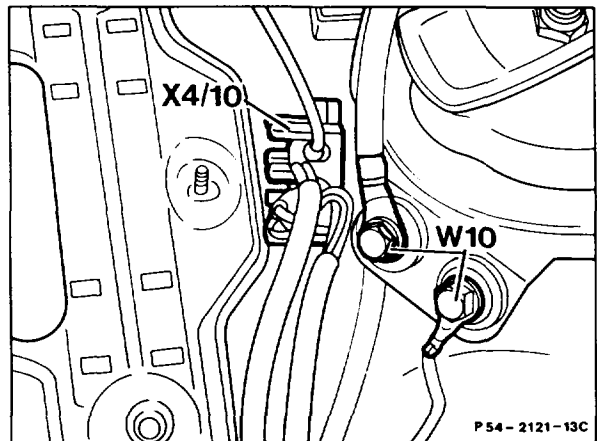
W1 Main ground (right footwell)



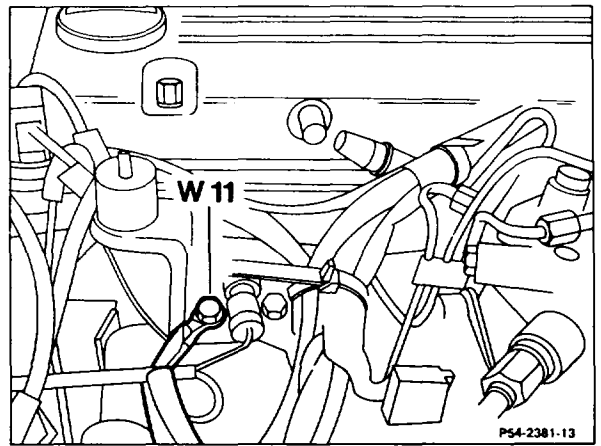
W3 Ground, front left wheelhouse (ignition coil)



W10 Ground, battery

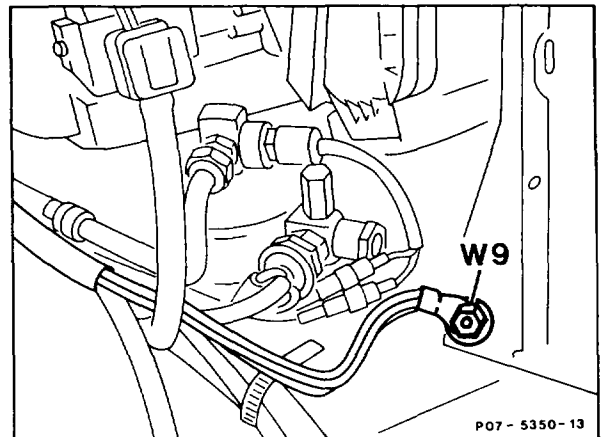


W11 Ground, engine (electric cable bolted on)

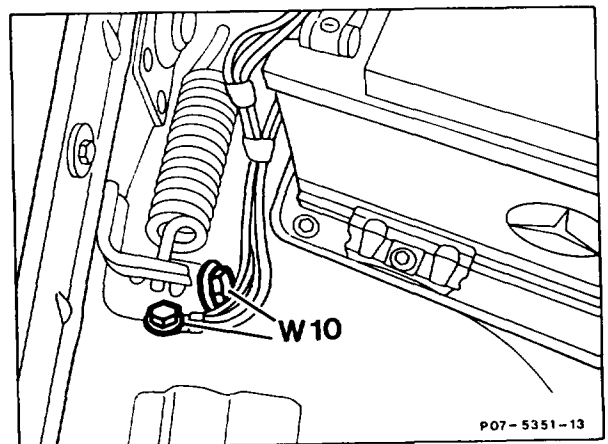


Model 126

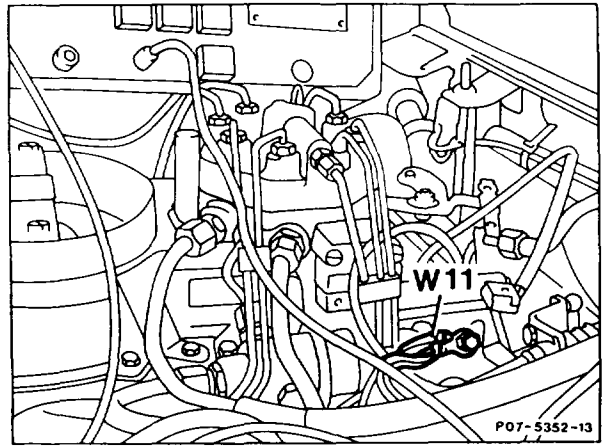
W9 Ground, front left (at headlight unit)



W10 Ground, battery

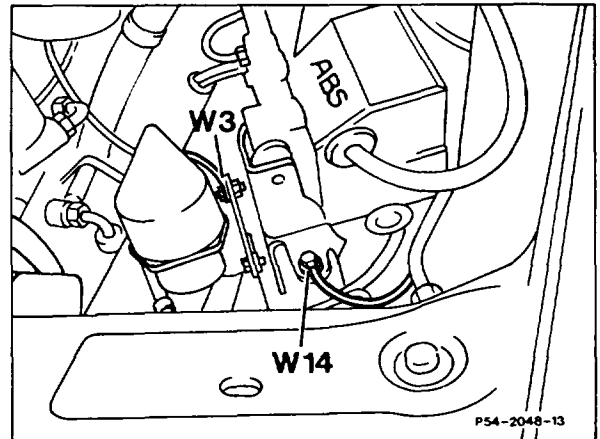


W11 Ground, engine (electric cables bolted on)

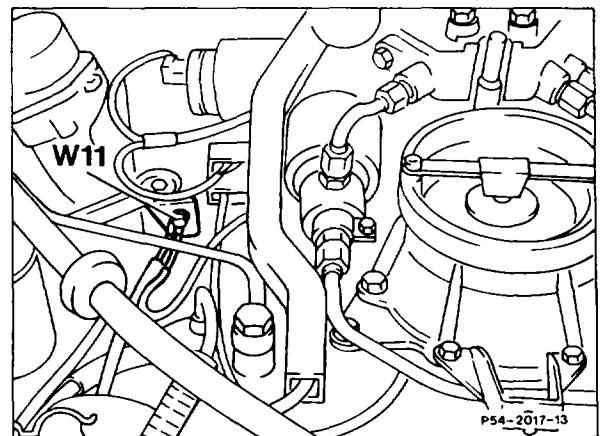


Model 129

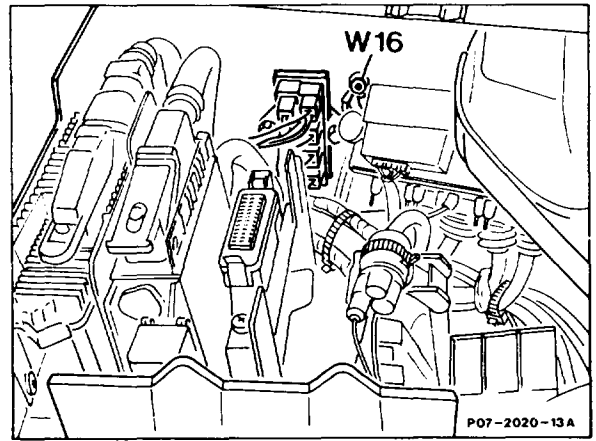
W3 Ground, front left wheelhouse (ignition coil)
W14 Ground, hydraulic unit bracket



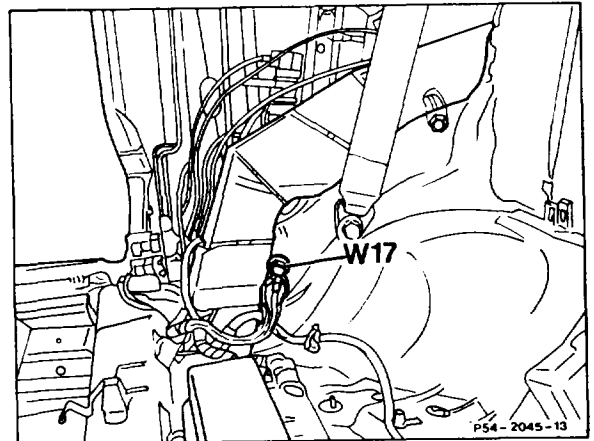
W11 Ground, engine, electric cable bolted on



W16 Ground, component compartment

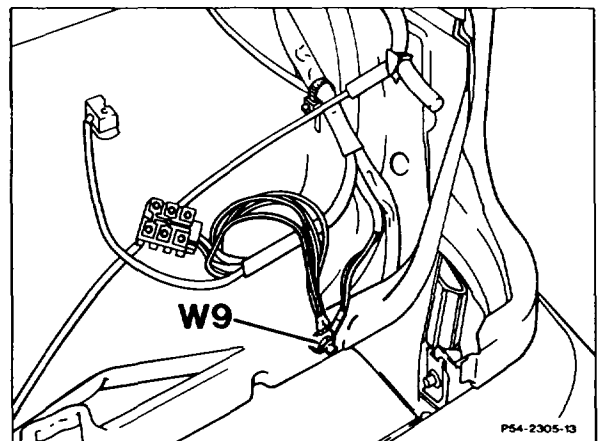


W17 Ground, right rear seat

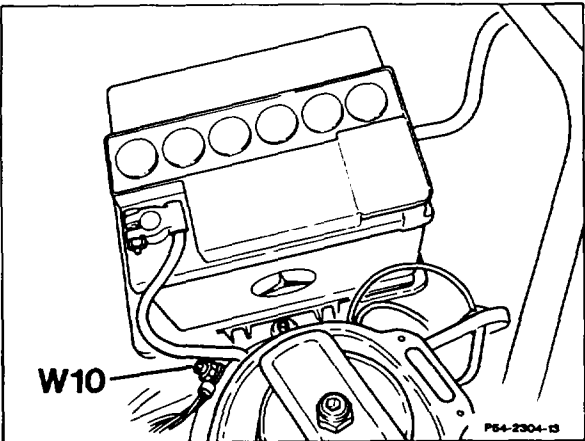


Model 201

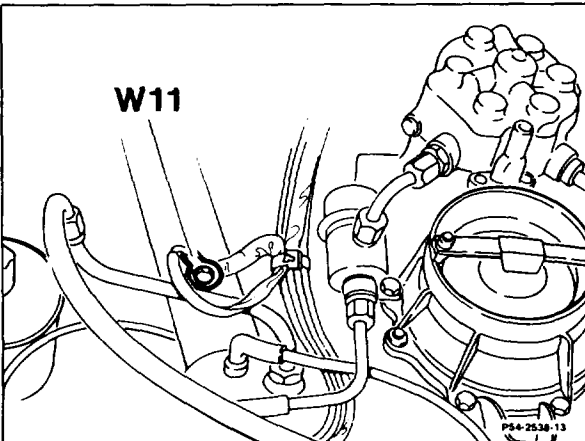
W9 Ground, front left (at headlight unit)



W10 Ground, battery

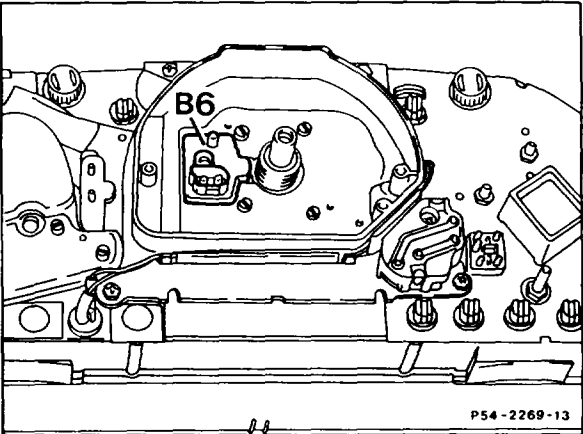


W11 Ground, engine (electric cables bolted on)



s. Location of Hall-effect road speed sensor (B6)

Models 124, 201
B6 Hall-effect road speed sensor



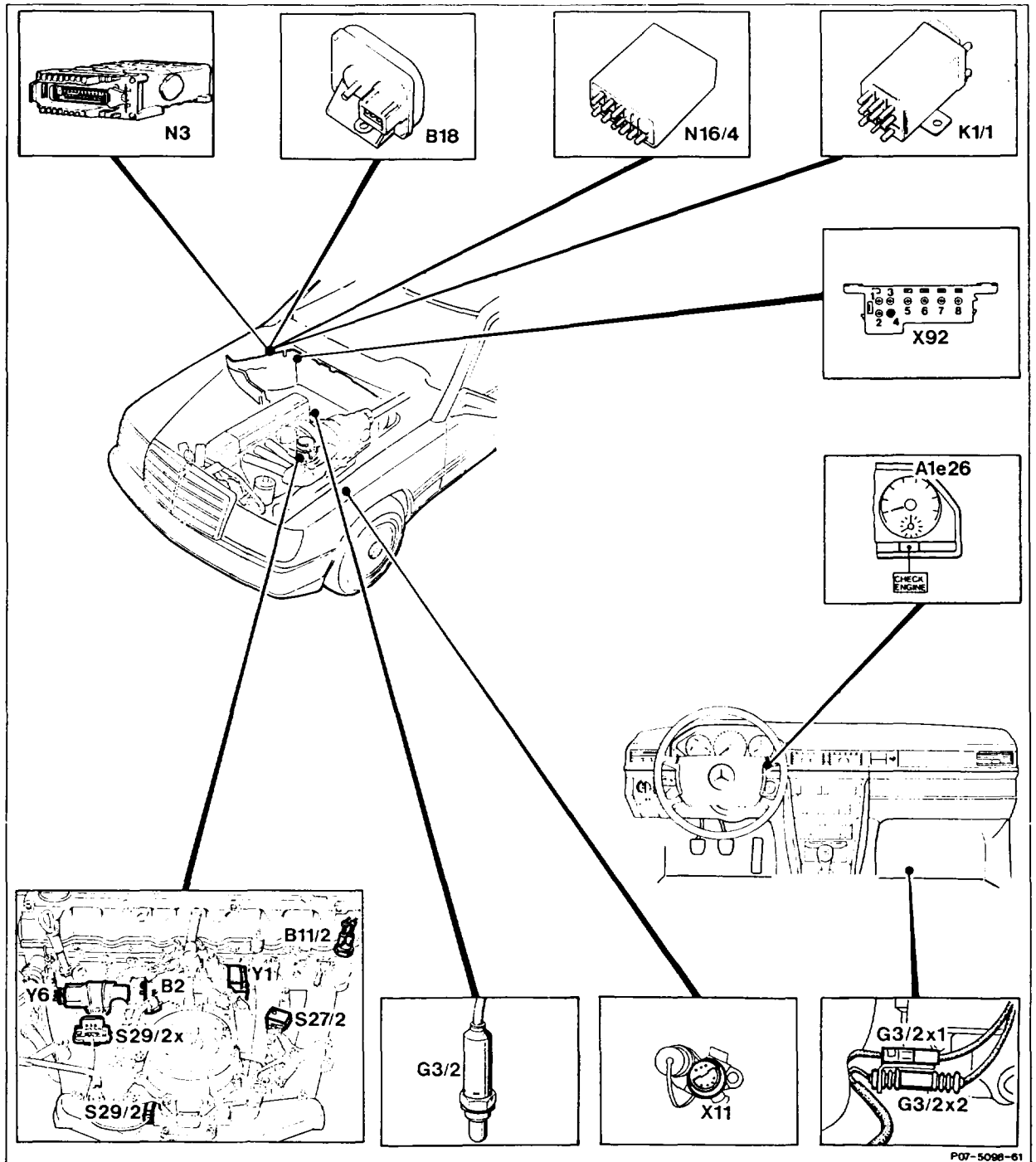
B. National versions J USA

		Coordinates
a.	Location of components	B 9
b.	Electrical test data of KE injection system (current at actuator mA)	A 10
c.	Without fault diagnosis by means of on/off ratio, up to model year 1987 ...	B 10
d.	With fault diagnosis by means of on/off ratio and on-board diagnosis system, model year 1988–1989	D 10
	1 On-board diagnosis	D 10
	2 With fault diagnosis by means of on/off ratio	N 10
e.	Special tools, Commercially available tools and testers, up to model year 1989	E 11
f.	Connecting testers according to connection diagram, up to model year 1989	G 11
g.	Contact assignment of coupling of KE control unit (N3), up to model year 1989	K 11
h.	Test program with contact box, up to model year 1989	L 11
i.	With fault diagnosis by means of on/off ratio and on-board diagnosis system, as of model year 1990	K 13
	1 On-board diagnosis	K 13
	2 With fault diagnosis by means of on/off ratio	H 14
j.	Special tools, Commercially available tools and testers, as of model year 1990	A 15
k.	Connecting testers according to connection diagram, as of model year 1990	B 15
l.	Contact assignment of coupling of KE control unit (N3) and of engine systems control unit MAS (N16), as of model year 1990	E 15
m.	Test program with contact box, as of model year 1990	H 15
n.	EZL ignition control unit (N1/2)	E 17
o.	Table of voltage values of EZL/KE coolant temperature sensor (B11/2) and of KE intake air temperature sensor (B17/2)	G 17
p.	Table of altitude sensor (B18) and KE reference resistor (R17/1)	H 17
q.	Test setup of 4-pin coolant temperature sensor (B11/2)	K 17
r.	Location of plug connections	L 17
s.	Location of ground points	B 18
t.	Location of Hall-effect road speed sensor (B6)	G 18



a) Location of components

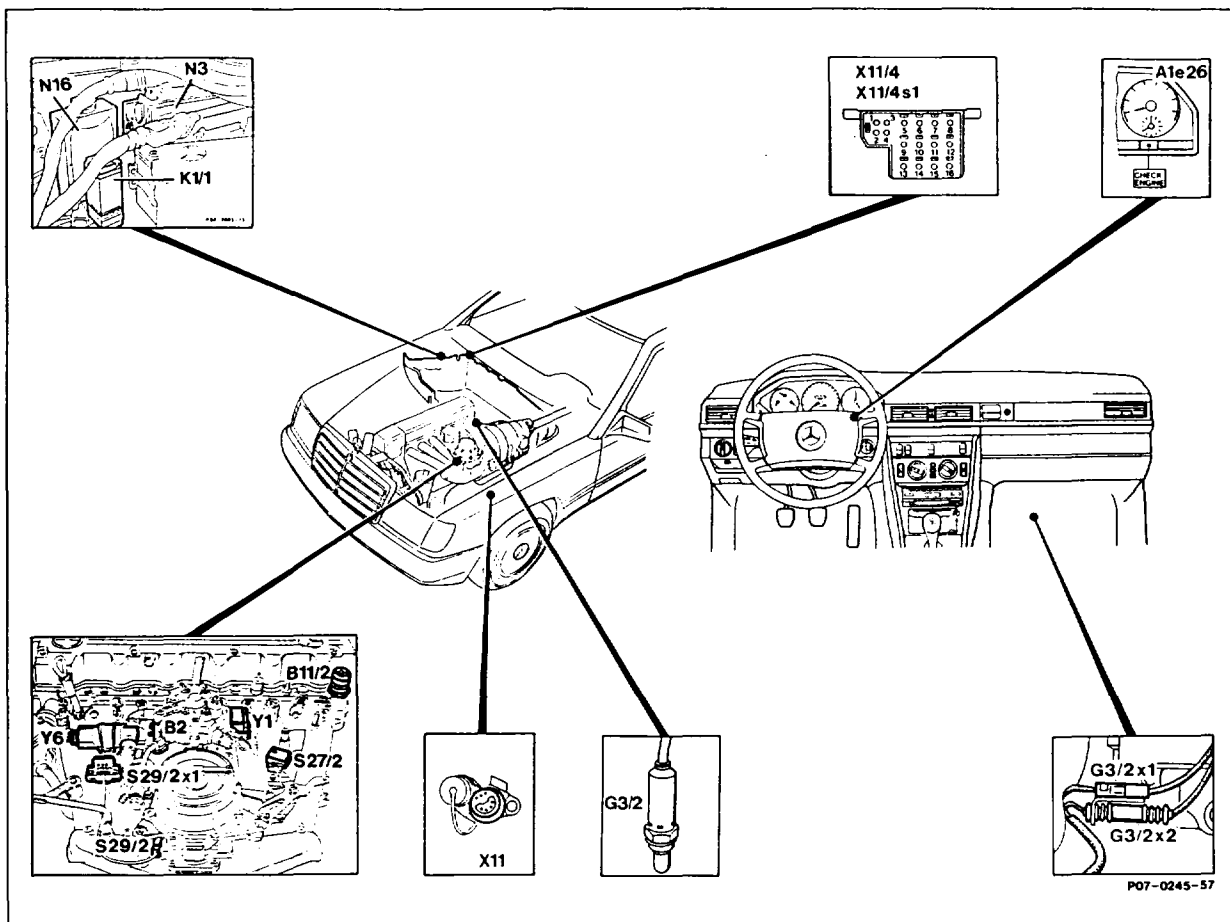
Model 124, up to model year 1989



A1e26	CHECK ENGINE indicator lamp	S27/2	Decel fuel shutoff microswitch
B2	Air flow sensor position indicator	S29/2	Throttle valve switch, full load/idle speed recognition
B11/2	4-pin coolant temperature sensor (EZL)	S29/2x	Plug connection, full load/idle speed recognition throttle valve switch
B18	Altitude sensor	X11	Diagnostic socket/terminal block, terminal TD
G3/2	Heated oxygen sensor	X92	Test coupling for diagnosis, 8-pin (flash code)
G3/2x1	2-pin plug connection, oxygen sensor heating coil	Y1	Electrohydraulic actuator
G3/2x2	1-pin plug connection, oxygen sensor signal	Y6	Idle speed air valve
K1/1	7-pin overvoltage protection relay 87E		
N3	KE injection system control unit		
N16/4	Fuel pump and kickdown shutoff relay		

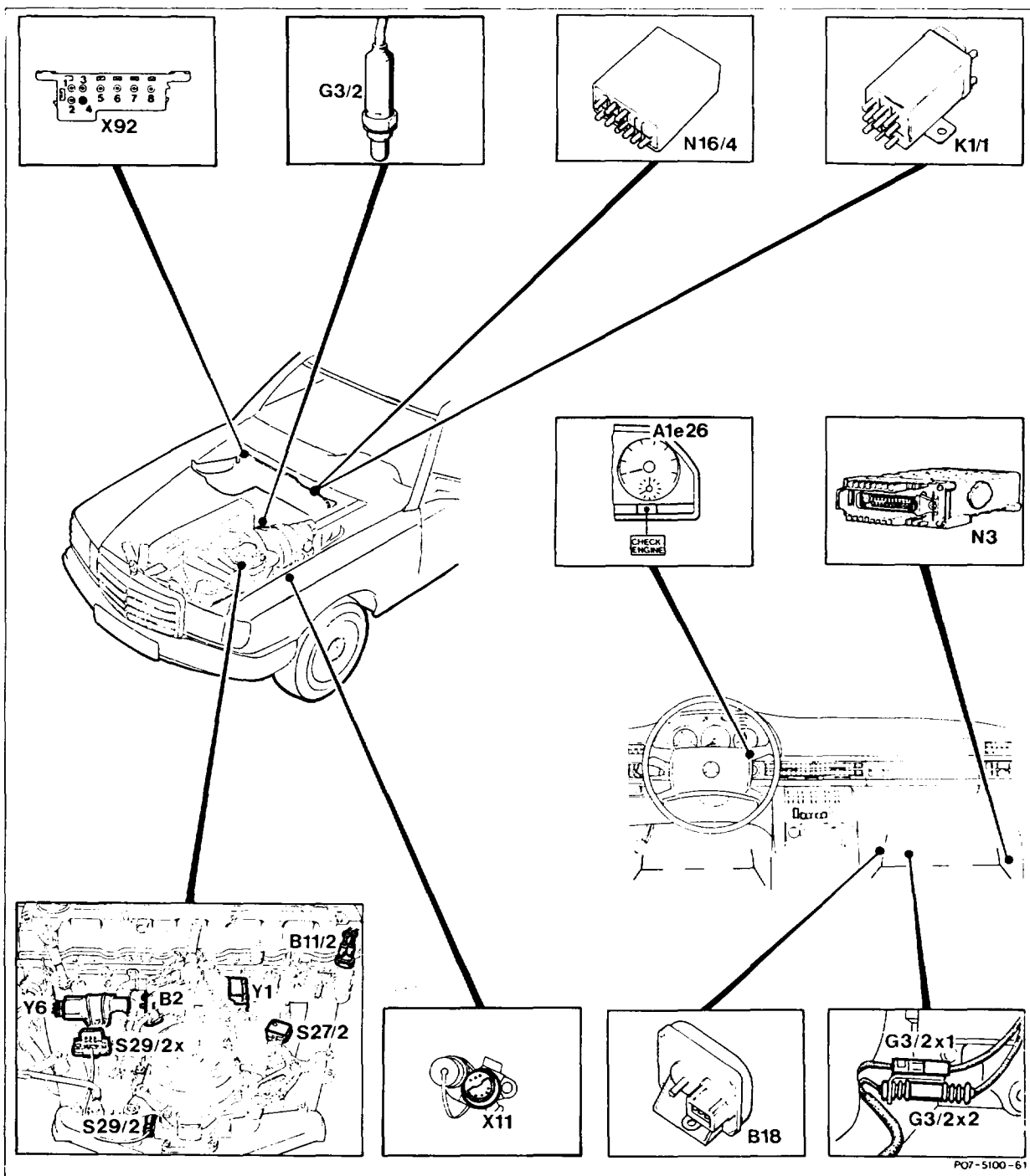


Model 124, as of model year 1990



- | | | | |
|--------|--|---------|---|
| A1e26 | CHECK ENGINE indicator lamp | S27/2 | Decel fuel shutoff microswitch |
| B2 | Air flow sensor position indicator | S29/2 | Throttle valve switch, full load/idle speed recognition |
| B11/2 | Coolant temperature sensor (EZL/KE/2 E-E) | S29/2x1 | Plug connection, full load/idle speed recognition throttle valve switch |
| G3/2 | Heated oxygen sensor | X11 | 9-pin diagnostic socket |
| G3/2x1 | Plug connection, oxygen sensor heating coil | X11/4 | 16-pin test coupling for diagnosis (pulse signal) |
| G3/2x2 | Plug connection, oxygen sensor sensor signal | X11/4s1 | Pushbutton for LED for California |
| K1/1 | 7-pin overvoltage protection relay 87E | Y1 | Electrohydraulic actuator |
| N3 | KE injection system control unit | Y6 | Idle speed air valve |
| N16 | Engine systems control unit MAS | | |

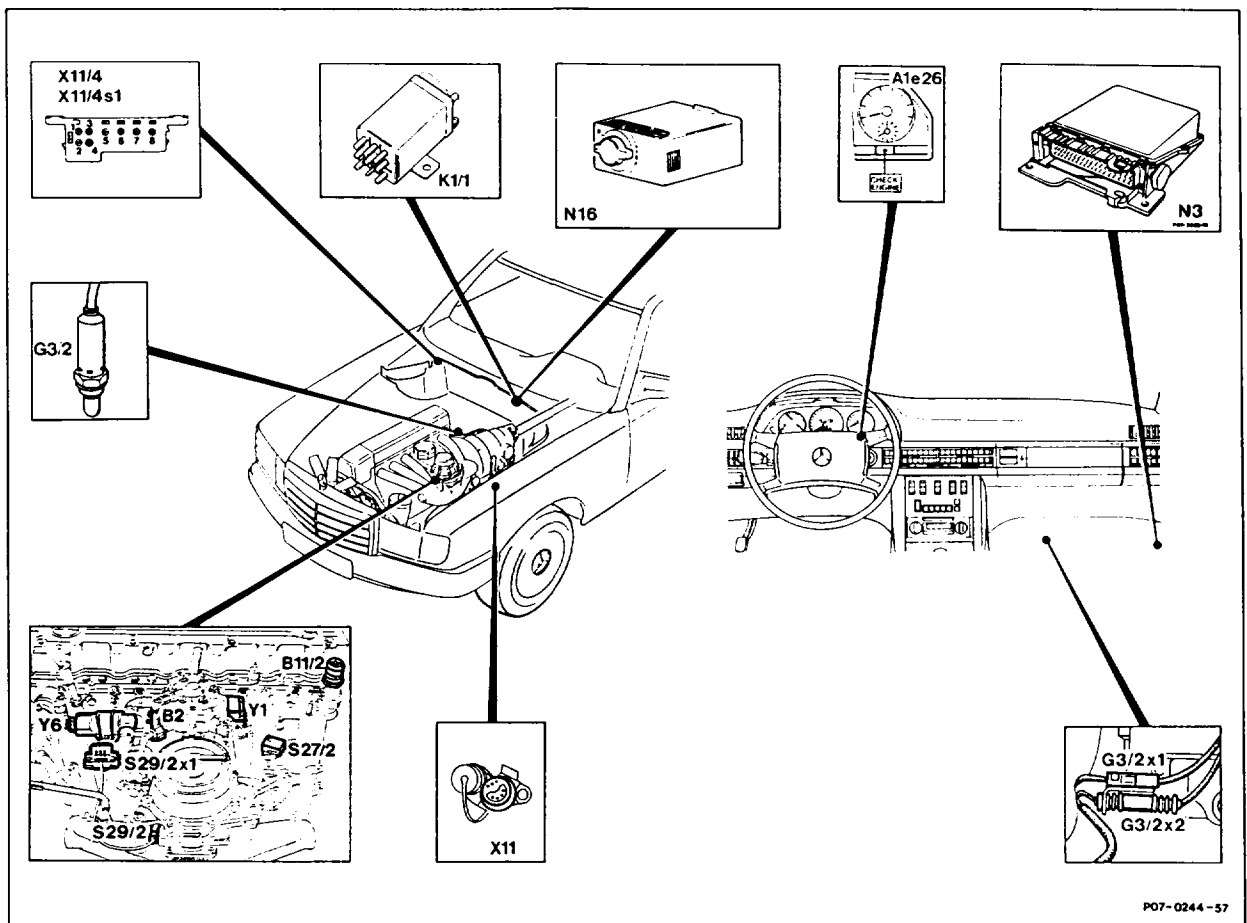
Model 126, up to model year 1989



A1e26	CHECK ENGINE indicator lamp	S27/2	Decel fuel shutoff microswitch
B2	Air flow sensor position indicator	S29/2	Throttle valve switch, full load/idle speed recognition
B11/2	4-pin coolant temperature sensor (EZL)	S29/2x	Plug connection, full load/idle speed recognition throttle valve switch
B18	Altitude sensor	X11	Diagnostic socket/terminal block, terminal TD
G3/2	Heated oxygen sensor	X92	Test coupling for diagnosis, 8-pin (flash code)
G3/2x1	2-pin plug connection, oxygen sensor heating coil	Y1	Electrohydraulic actuator
G3/2x2	1-pin plug connection, oxygen sensor signal	Y6	Idle speed air valve
K1/1	7-pin overvoltage protection relay 87E		
N3	KE injection system control unit		
N16/4	Fuel pump and kickdown shutoff relay		



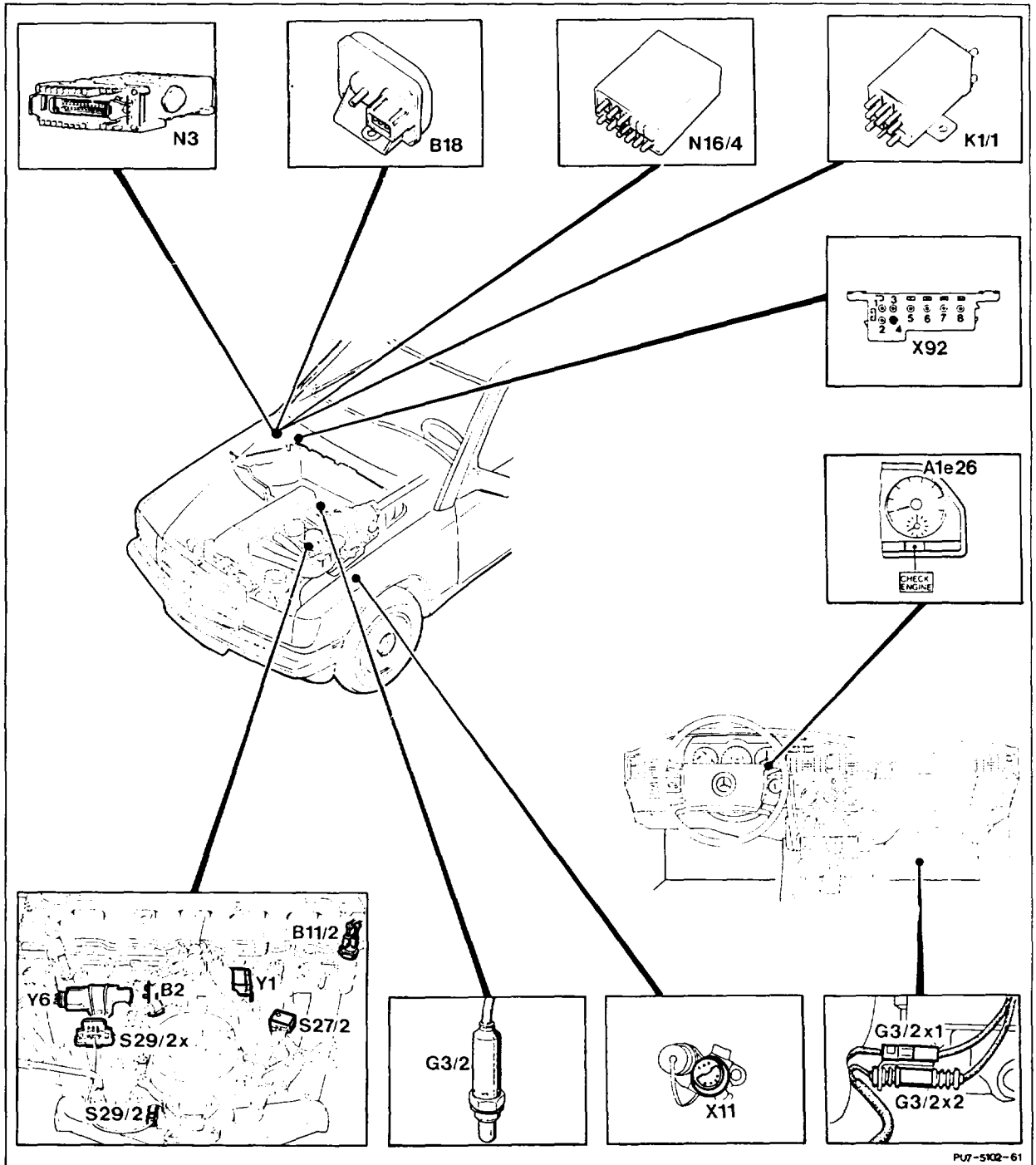
Model 126, as of model year 1990



P07-0244 - 57

A1e26	CHECK ENGINE indicator lamp	S27/2	Decel fuel shutoff microswitch
B2	Air flow sensor position indicator	S29/2	Throttle valve switch, full load/idle speed recognition
B11/2	Coolant temperature sensor (EZL/KE/2 E-E)	S29/2x1	Plug connection, full load/idle speed recognition throttle valve switch
G3/2	Heated oxygen sensor	X11	9-pin diagnostic socket
G3/2x1	Plug connection, oxygen sensor heating coil	X11/4	16-pin test coupling for diagnosis (pulse signal)
G3/2x2	Plug connection, oxygen sensor signal	X11/4s1	Pushbutton for LED for California
K1/1	7-pin overvoltage protection relay 87E	Y1	Electrohydraulic actuator
N3	KE injection system control unit	Y6	Idle speed air valve
N16	Engine systems control unit MAS		

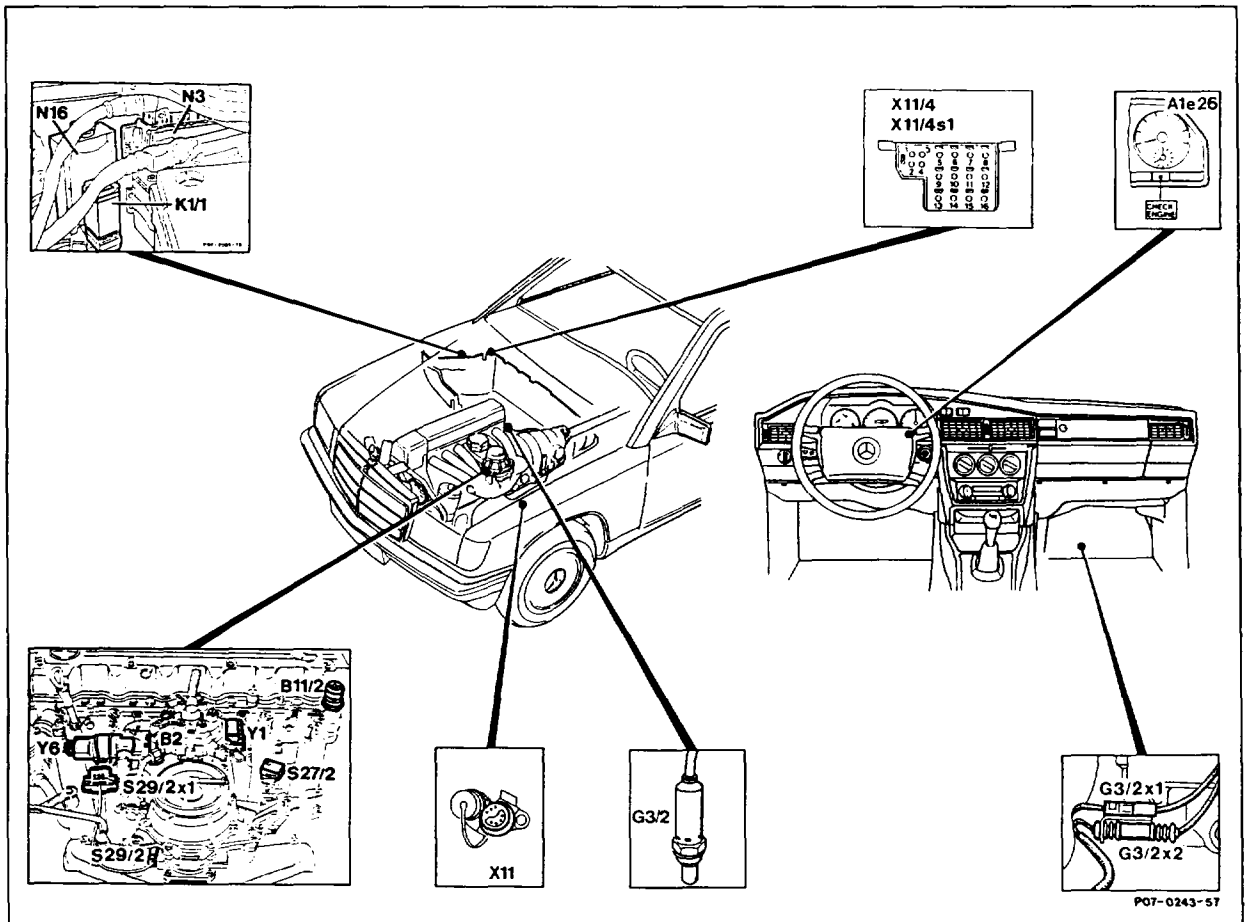
Model 201, up to model year 1989



PU7-5102-61

A1e26	CHECK ENGINE indicator lamp	S27/2	Decel fuel shutoff microswitch
B2	Air flow sensor position indicator	S29/2	Throttle valve switch, full load/idle speed recognition
B11/2	4-pin coolant temperature sensor (EZL)	S29/2x	Plug connection, full load/idle speed recognition throttle valve switch
B18	Altitude sensor	X11	Diagnostic socket/terminal block, terminal TD
G3/2	Heated oxygen sensor	X92	Test coupling for diagnosis, 8-pin (flash code)
G3/2x1	2-pin plug connection, oxygen sensor heating coil	Y1	Electrohydraulic actuator
G3/2x2	1-pin plug connection, oxygen sensor signal	Y6	Idle speed air valve
K1/1	7-pin overvoltage protection relay 87E		
N3	KE injection system control unit		
N16/4	Fuel pump and kickdown shutoff relay		

Model 201, as of model year 1990



A1e26 CHECK ENGINE indicator lamp
 B2 Air flow sensor position indicator
 B11/2 Coolant temperature sensor (EZL/KE/2 E-E)
 G3/2 Heated oxygen sensor
 G3/2x1 Plug connection, oxygen sensor heating coil
 G3/2x2 Plug connection, oxygen sensor signal
 K1/1 7-pin overvoltage protection relay 87E
 N3 KE injection system control unit
 N16 Engine systems control unit MAS

S27/2 Decel fuel shutoff microswitch
 S29/2 Throttle valve switch, full load/idle speed recognition
 S29/2x1 Plug connection, full load/idle speed recognition throttle valve switch
 X11 9-pin diagnostic socket
 X11/4 16-pin test coupling for diagnosis (pulse signal)
 X11/4s1 Pushbutton for LED for California
 Y1 Electrohydraulic actuator
 Y6 Idle speed air valve

b. Electrical test data KE fuel injection system (current at actuator mA)

Engine	National version model years	Current at actuator with ignition switched on mA	Coolant temperature sensor		Post-start enrichment at +20°C Current at actuator mA	Acceleration enrichment at +20°C and blipping throttle Current at actuator mA	Full load enrichment at approx. 2000/min Current at actuator mA	Part load mixture adaptation Current at actuator mA
			Coolant temperature +20°C (warming-up base value) resistance 2.3–2.8 kΩ Current at actuator mA	Coolant temperature +80°C Resistance 290–370 Ω Current at actuator mA				
103.94	(J) (USA) 1987	20	2–6	0 ± 3	4–8	> 15	4–8	Readout fluctuates
	(J) (USA) as of 1988 up to 1989		0 ± 1	0 ± 3	4–8		4–8	
	(USA) as of 1990		0–1 14–110 s after start	Readout fluctuates	8–12 0–8 s after start		4–8	
103.98	(J) (USA) 1987		2–6	0 ± 3	4–8		5–9	
	(J) (USA) as of 1988 up to 1989	0 ± 1	0 ± 3	4–8	5–9			
	(J) as of 1990	0 ± 1	0 ± 3	4–8	4–8			
	(USA) as of 1990	0–1 14–110 s after start	Readout fluctuates	8–12 0–8 s after start	4–8			

Decel fuel shutoff: current at actuator approx. –60 mA



c. Without fault diagnosis by means of on/off ratio, up to model year 1987

Up to 03/86 (production date 643) no fault recognition is integrated in the KE control unit (N3).

On these vehicles it is not possible to perform the test program by measuring the on/off ratio.

In this case perform the test program, section "h", test program with contact box up to model year 1989.

- d. With fault diagnosis by means of on/off ratio and on-board diagnosis system, model year 1988–1989

1 On-board diagnosis

Only California

All exhaust-relevant components of the KE fuel injection system and of the exhaust gas recirculation are monitored by the control unit. Malfunctions caused by open circuit in the wiring or failure of one of these components are indicated by the indicator lamp in the "CHECK ENGINE" instrument cluster and at the same time stored in the KE control unit.

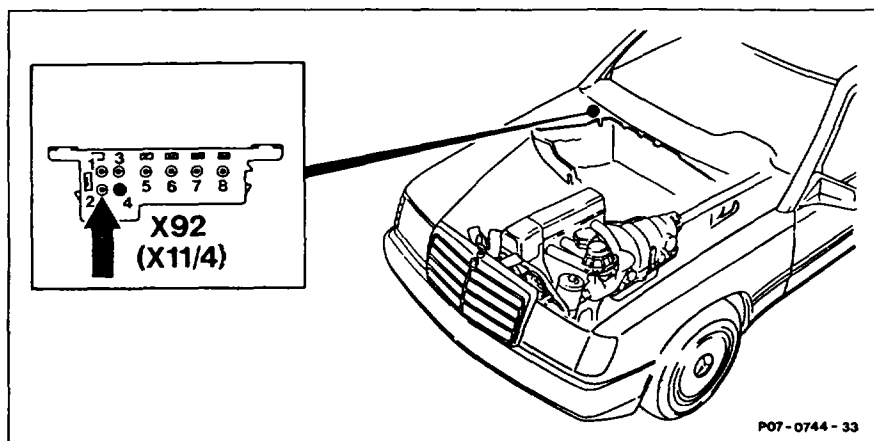
Reading fault memory with pushbutton switch and LED

A test coupling (X92) with pushbutton switch (2) and LED (4) is fitted to the right of the component compartment partition wall for this purpose. When the pushbutton switch is pressed (ignition: **ON**) for between 2 and 4 seconds, the flash pulse readout is initiated and the fault path indicated by the number of flashes.

After completion of the flash pulse output, the LED shows a steady light. If the pushbutton switch is once again pressed for between 2 and 4 seconds, any further fault path can be displayed. If no more faults are recognized, the KE control unit switches over to on/off ratio output.



X92 Test coupling for diagnosis, 8-pin (flash code)
Model year 1988–1989



Erasing fault memory

Once a fault has been rectified without having disconnected the KE control unit, the fault memory must be erased as follows:

- Press pushbutton switch when flash pulse output displayed for 6–8 seconds.

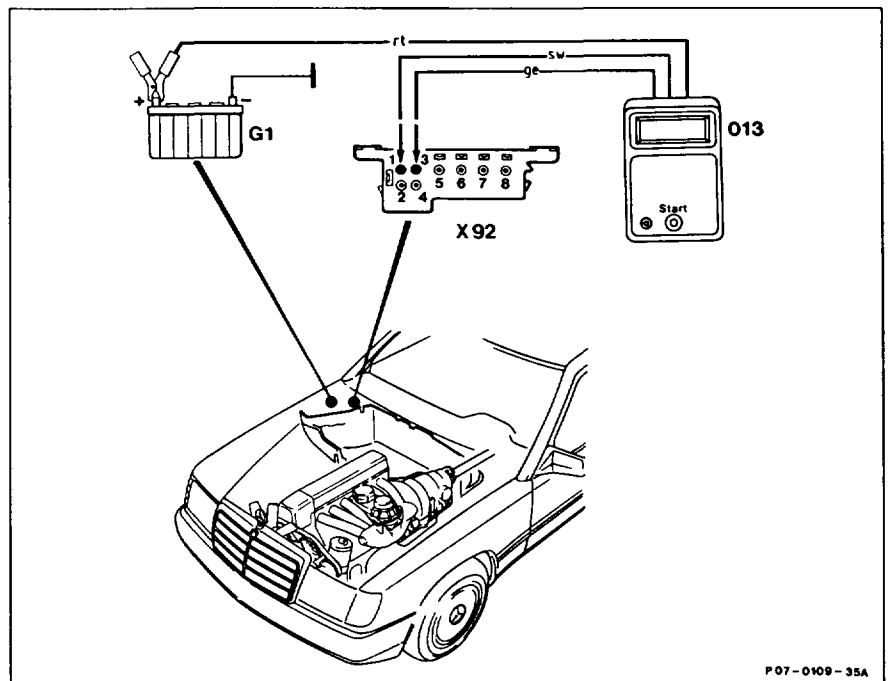
Note

Each fault displayed must be erased individually.

- LED flashes once, stored fault has been erased.

Reading fault memory with pulse counter

Connect pulse counter to test coupling (X92) for this purpose.



- 013 Pulse counter
- G1 Battery
- X92 Test coupling for diagnosis, 8-pin (flash code)

P 07 - 0109 - 35A

- If the LED U_{BATT} appears after connecting, pulse counter and voltage supply for pulse counter are in order.
- Press start button for between 2 and 4 seconds.
- Read off pulse output and note.
The figure 1 means no fault is stored in the system. All other numbers are assigned to a certain fault group. If there are several faults in the system, the fault with the lowest pulse count is output first. Numbers from 1 to 12 appear in the display panel of the pulse counter.
- Once again, press start button for between 2 and 4 seconds, note any further fault. If there is no further fault in the system, no readout appears.

- Rectify noted faults (pulse readout) according to troubleshooting diagram. Connect contact box for this purpose as stated in the connection diagram.

The test steps listed in the column Remedy are listed in section "j".

Erasing fault memory

Once a fault has been rectified, the pulse displayed must be erased as follows:

- Press start button with pulse displayed for 6–8 seconds.

Note

Each pulse displayed must be erased individually.

- No readout:
Stored fault has been erased.
- A number > 1 displayed:
Further faults in the system.



When dealing with an engine running complaint, read the fault memory as part of Op. no. 07–1100 before any repair work and also note the fault. This ensures that a distinction is made between faults which actually occur and "simulated faults" as faults are stored when performing test operations with the engine running which may be caused by a simulation or by a disconnected cable.


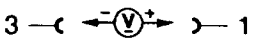
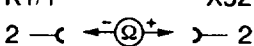
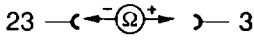
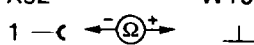
The fault memory must be erased after completing the test operations.

Table for fault recognition with pulse readout

Pulse readout	Possible cause	Test step/Remedy
1	No fault in system	–
2	Throttle valve switch, full load contact	7.0–7.3
3	Coolant temperature sensor	8.0–8.2
4	Air flow sensor position indicator	9.0–9.3
5	Oxygen sensor	11.0–11.6
6	Not assigned	–
7	TD signal	14.0–14.3
8	Altitude correction sensor	16.0–16.4
9	Electric actuator	3.0–3.4
10	Throttle valve switch, idle speed contact	6.0–6.4

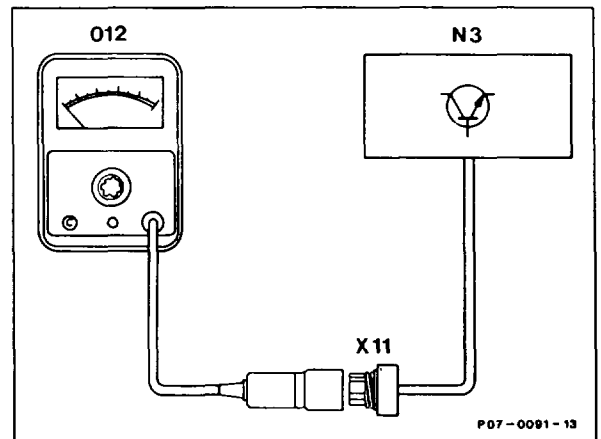
Note


LED U_{BATT} must light up in the display panel. If not, perform the following test.

Pulse readout	Test step/ Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
-	1.0 Ground point	G1 	Ignition: ON Unplug coupling at X92	11–14 V	Ground connection W10 loose, Open circuit in wiring from test coupling (X92) Contact 1 to W10
-	2.0 Test coupling (X92) actuation	X92 3 — 	Ignition: ON Unplug coupling at X92	0.7–2.5 V	Test coupling (X92) Open circuit in wiring
-	3.0 Cable terminal 87E	K1/1 2 — 	Ignition: OFF Unplug coupling at X92, Unplug coupling at overvoltage protection (K1/1)	< 1 Ω	Open circuit in wiring
	3.1 Cable	N3 	Ignition: OFF Unplug coupling at X92	< 1 Ω	Open circuit in wiring
	3.2 Cable	X92 1 — 	Ignition: OFF Unplug coupling at X92	< 1 Ω	Open circuit in wiring

2 With fault diagnosis by means of on/off ratio



Since 04/86 faulty input signals have been recognized by the KE control unit (N3) and passed to the lambda test output. Fault recognition is performed with the lambda control tester (012) at the diagnostic socket (X11).




Lambda control tester	Position
Bosch	100% IR
Hermann	100% 

Fault recognition enables various components of the KE injection system to be checked by measuring the on/off ratio. The faults are not stored and can only be displayed directly by measuring the on/off ratio (i.e. only if the fault exists at that moment).

Output of on/off ratio

On the national versions  and  Federal the on/off ratio can be read out directly after connection.




On the national version  California, the output for the fault diagnosis by means of the on/off ratio is only performed after the fault memory has been read.

If the pulse readout is "1" or after the last fault has been read, the pushbutton switch in the diagnostic socket or at the pulse counter must once again be pressed (for 2–4 seconds) in order to output the on/off ratio.

Before reading the fault memory, the display with the engine running is at 0% or 85% of the CHECK ENGINE indicator lamp lights up.

Recognition of the control units:

- 1 Connect lambda control tester.
- 2 Switch on ignition.

National version	On/off ratio readout	KE control unit
 and  Federal	70%	w/o pulse readout
 California	85%	with pulse readout

Note

The control unit is switched over to on/off ratio output by pressing the pushbutton switch in order to test the lambda control.

For wiring diagram, see appropriate wiring diagram volume (07.3-0128).

Perform test (measuring on/off ratio) for dealing with engine running complaints, e.g. irregular idling.


Readout fluctuates:
No fault in system.

Test conditions:

Battery voltage 11-14 V,
Engine oil temperature, approx. 80°C,
Engine idling.

The test steps listed in the column Remedy are contained in section "h".

Table for fault recognition with on/off ratio readout

On/off ratio in %	Possible causes of faults	Test scope	Test step/Remedy
0	<p>No voltage or ground at diagnostic socket (X11). Cable of diagnostic socket (X11), contact 3, has open circuit. Lambda control tester faulty.</p> <p>Mixture setting too rich.</p>	<p>Test voltage supply, ground and diagnostic socket (X11) cable.</p> <p>Check lambda setting.</p>	<p>1.0–1.2 2.0–2.8</p> <p>RI 07.3–2053, or 07.3–5203 with </p>
10	<p>Air flow sensor position indicator (B2) incorrectly connected or faulty. Possible fast idling speed. Contact assignment of throttle valve switch (S29/2), idle/full load contact incorrectly connected or short circuit (full load contact closed with insufficient throughput).</p>	<p>Test signal of air flow sensor position indicator (B2). Leitungsverlegung prüfen. Check cable routing.</p>	<p>5.0–5.3 9.0–9.3</p>
20	<p>Full load contact incorrectly connected or faulty. 20% readout only if throttle valve switch (S29/2) operated.</p>	<p>Test full load contact</p>	<p>7.0–7.3</p>
30	<p>Short circuit or open circuit to KE control unit (N3). Coolant temperature sensor (B11/2) faulty.</p>	<p>Test coolant temperature sensor (B11/2). Test wiring.</p>	<p>8.0–8.7</p>



On/off ratio in %	Possible causes of faults	Test scope	Test step
40	Open circuit or short circuit to air flow sensor position indicator (B2) or air flow sensor position indicator (B2) faulty. Possible fast idling speed.	Test air flow sensor position indicator (B2). Test KE control unit. Test wiring.	9.0–9.4
50	Oxygen sensor (G3/2) not operational or faulty. Open circuit in wiring.	Engine oil temperature approx. 80°C. Test oxygen sensor (G3/2). Test wiring.	11.0–11.6
60	Road speed signal at KE control unit (N3) implausible. ¹⁾	Test Hall-effect sensor (B6). Test wiring.	12.0–13.3
70	No TNA signal implausible ¹⁾ . Open circuit in wiring at KE control unit (N3).	Test TNA signal.	14.0–14.3
80	Open circuit or short to ground Intake air temperature sensor (B17/2) faulty. Altitude correction sensor (B18) faulty.	Test intake air temperature sensor (B17/2). Test altitude correction sensor (B18). Test wiring.	15.0–16.4
85	Only (USA) California	–	–
90	Current to electrohydraulic actuator (Y1) implausible ¹⁾	Test electrohydraulic actuator.	–

¹⁾ The plausibility of the road speed signal can **only** be checked by the KE control unit (N3) when driving (engine output dynamometer/road). If an implausible road speed signal is recognized when driving, the control unit (N3) "sets" the on/off ratio of 60% and stores this. The fault is not erased until the ignition is switched off. A "60% on/off ratio" test is performed e.g. in dealing with the complaint: jerking when vehicle moving and throttle valve closed.

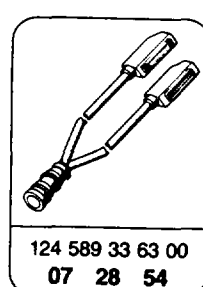
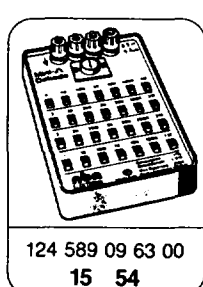
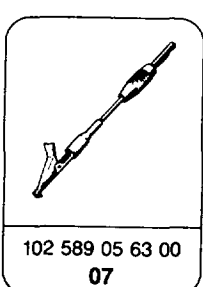
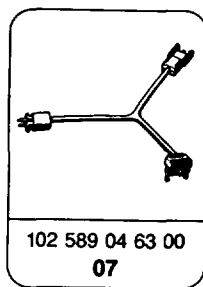
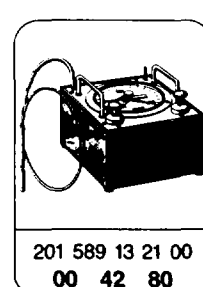
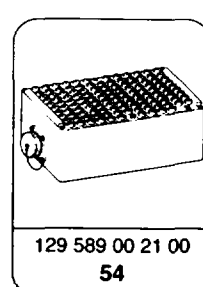
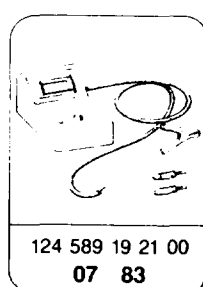
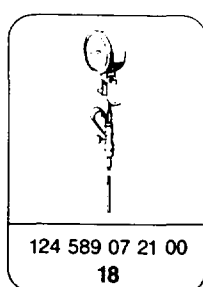
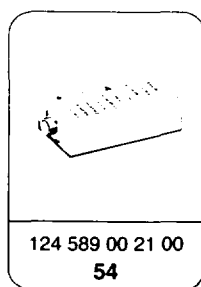
On/off ratio in %	Possible causes of faults	Test scope	Test step
95	Decel fuel shutoff active.	–	–
100	No voltage or ground at KE control unit (N3) or KE control unit (N3) faulty. Lambda setting too lean. Oxygen sensor (G3/2) faulty (short to ground). Overvoltage protection fuse (K1/1) faulty. Lambda control tester faulty.	Test overvoltage protection (K1/1). Test ground. Check setting of lambda control. Test oxygen sensor signal. KE control unit (N3) faulty.	1.0–1.2 2.0–2.8 RI 07.3–2053, or 07.3–5203 with (USA) 11.0–11.10 12.1
Readout fluctuates	With lambda control: No fault in the area of the monitored signals.	–	–

1) The plausibility of the road speed signal can **only** be checked by the KE control unit (N3) when driving (engine output dynamometer/road). If an implausible road speed signal is recognized when driving, the control unit (N3) "sets" the on/off ratio of 60% and stores this. The fault is not erased until the ignition is switched off. A "60% on/off ratio" test is performed e.g. in dealing with the complaint: jerking when vehicle moving and throttle valve closed.

2) Engine 103.94/983 (CH) (DK) (N) (S) (SF) as of model year 1991.



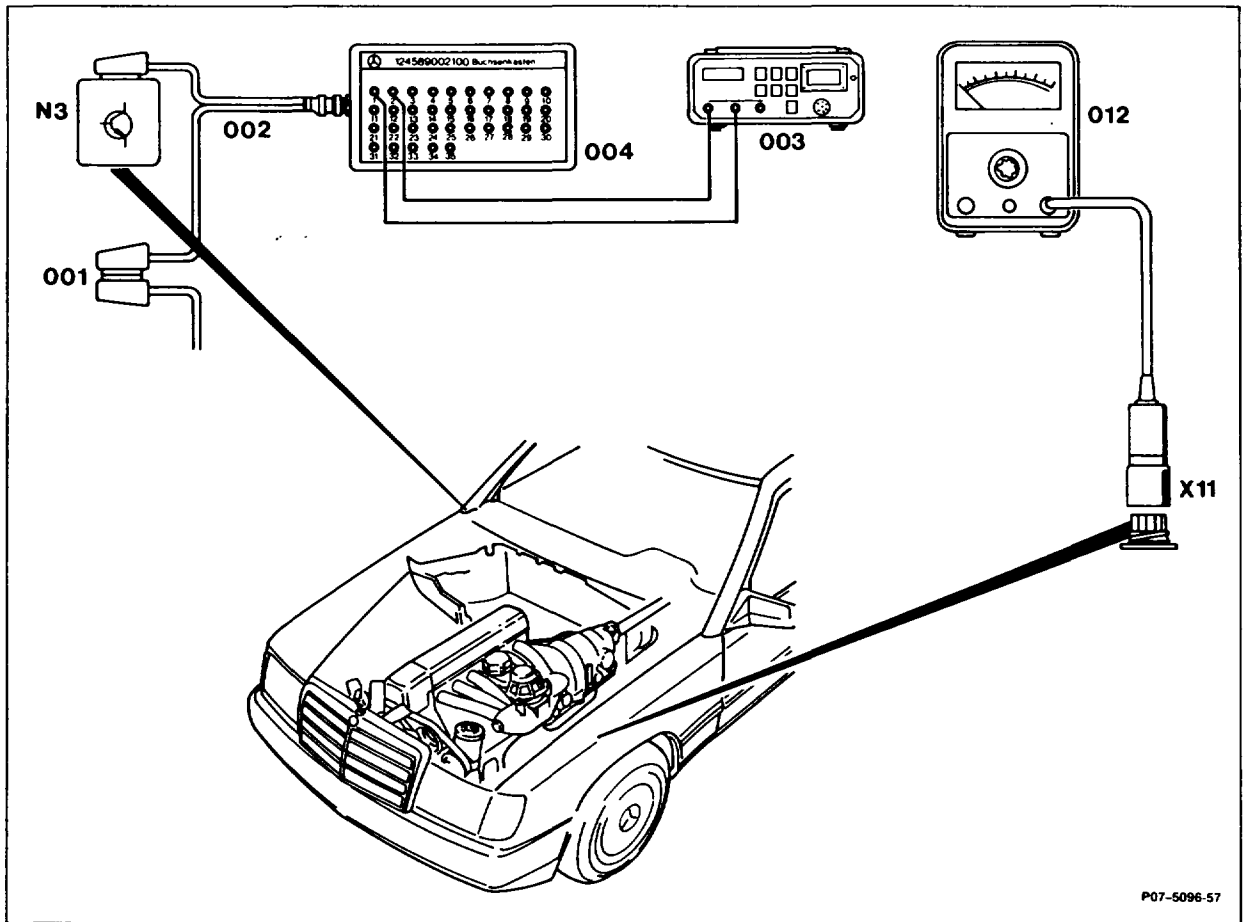
e. Special tools up to model year 1989



Commercially available tools and testers (see Workshop Equipment Manual)

Designation	e.g. Make, order no.
Multimeter	Sun, DMM-5
Twin socket	Hermann, ECD 53
Engine tester	Bosch, MOT 002.02

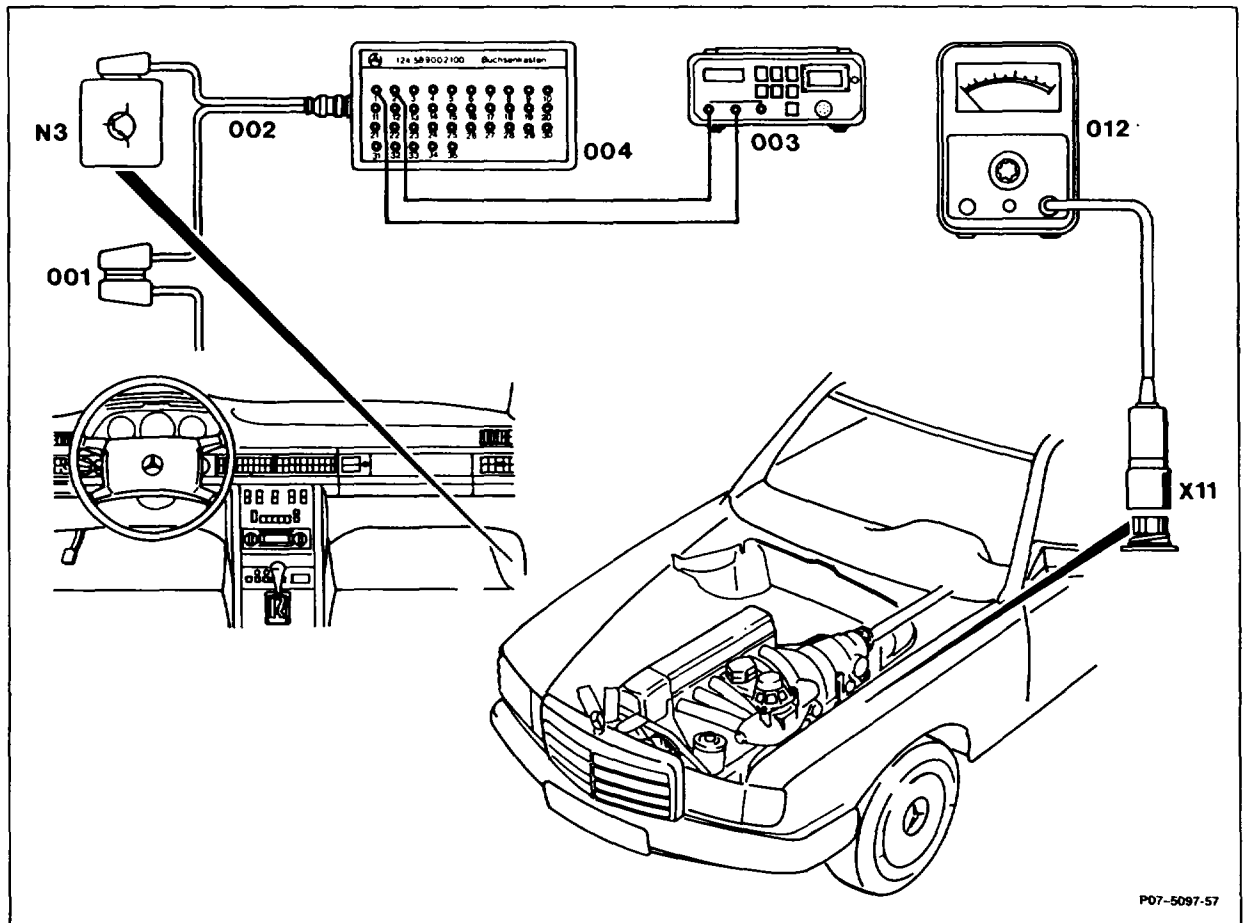
f. Connecting testers according to connection diagram, up to model year 1989 models 124, 201



001 KE control unit coupling
 002 Test cable
 003 Multimeter
 004 35-pin contact box

012 Lambda control tester
 N3 KE control unit
 X11 Diagnostic socket/terminal block, terminal TD

Model 126

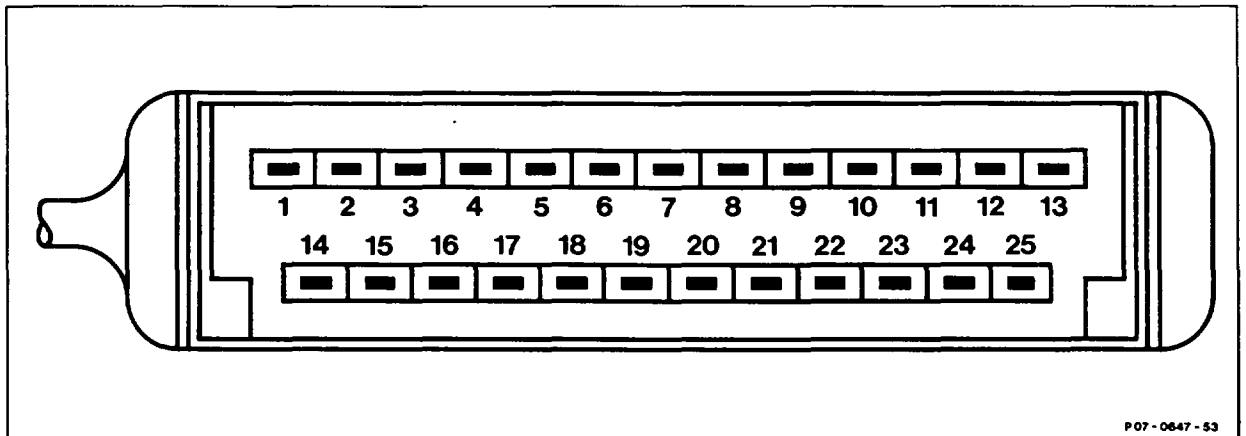


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- 001 KE control unit coupling
- 002 Test cable
- 003 Multimeter
- 004 35-pin contact box

- 012 Lambda control tester
- N3 KE control unit
- X11 Diagnostic socket/terminal block, terminal TD

g. Contact assignment of coupling of KE control unit (N3), up to model year 1989







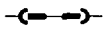


Engine 103.94/98




1	Overvoltage protection relay (K1, K1/1), contact 2, terminal 87	14	Not assigned
2	Engine ground (W11)	15	(USA) California: Actuation terminal 30A at K1/1,
3	Idle speed air valve (Y6)		(USA) Federal: OXYGEN SENSOR indicator lamp (A1e10) up to 1987
4	Not assigned		CHECK ENGINE indicator lamp (A1e26) as of 1988
5	Throttle valve switch (S29/2), contact 3, full load recognition	16	Gear recognition plug connection
6	Hall-effect road speed sensor (B6)	17	Air flow sensor position indicator (B2), contact 2
7	Ground of connector 7 is connected internally to ground of connector 2	18	Air flow sensor position indicator (B2), contact 3
8	Heated oxygen sensor	19	Compressor cutoff control unit (N6), contact 4
9	Fuel pump relay (N16/1), contact 2, terminal TF	20	Battery ground (W10)
10	Electrohydraulic actuator (Y1), contact 2	21	Coolant temperature sensor (B11/2)
11	Altitude sensor (B18), contact 1	22	Not assigned
12	Electrohydraulic actuator (Y1), contact 3	23	(USA) California: Lambda signal, CHECK-ENGINE indicator lamp (A1e26)
13	Idle speed control unit (N8), contact 4, idle speed recognition	24	Decel fuel shutoff microswitch (S27/2)
		25	TD signal

h. Test program with contact box, up to model year 1989

Symbols for testers

	Contact box
	Lambda control tester
	Multimeter
	Battery
	Contact
	Connector
	Bridge

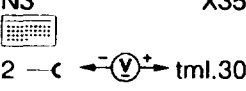
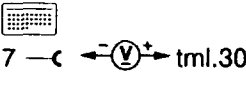
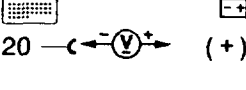

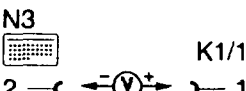
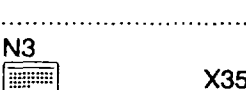
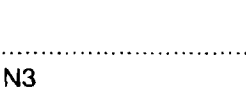
Symbols for test mode with multimeter

	Voltage measurement (volts, DC)
	Current measurement (amperes, DC)
	Resistance measurement (ohms)

Note

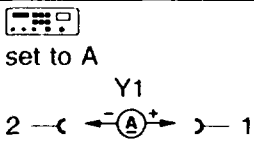
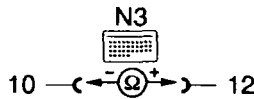
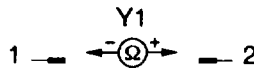
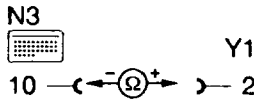
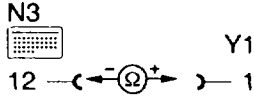
If the on/off ratio readout is constant, first of all perform test steps 1–3. If the specification of a test step is in order, e.g. step 4, it is not necessary to perform step 4.1.

If the test values at the throttle valve switch (S29/2) are achieved in test step 6 during part load mixture adaptation, full load enrichment is also active.

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
1.0	Ground points	N3  2 — c ← — (V) — tml.30	Ignition: OFF	11–14 V	Ground connection W11 loose, Open circuit in wiring
1.1	Ground points	N3  7 — c ← — (V) — tml.30	Ignition: OFF	11–14 V	KE control unit (N3) faulty, Open circuit in wiring
1.2	Ground points	N3  20 — c ← — (V) — (+)	Ignition: OFF	11–14 V	Ground connection W10 loose, Open circuit in wiring
2.0	Supply voltage of N3, connector 1	N3  2 — c ← — (V) — 1	Ignition: ON	11–14 V	Fuse in overvoltage protection K1/1, overvoltage protection K1/1 faulty or not plugged in, Open circuit in wiring
2.1	Voltage terminal 30	N3  2 — c ← — (V) — 1	Ignition: OFF Overvoltage protection (K1/1) disconnected	11–14 V	Open circuit in wiring
2.2	Cable terminal 30	N3  2 — c ← — (V) — tml.30	Ignition: ON Overvoltage protection (K1/1) disconnected	11–14 V	Open circuit in wiring
2.3	Voltage terminal 15	N3  2 — c ← — (V) — 3	Ignition: OFF Overvoltage protection (K1/1) disconnected	11–14 V	Open circuit in wiring

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
2.4	Cable terminal 15		Ignition: ON X26 disconnected	11–14 V	Open circuit in wiring
2.5	Cable terminal 87E or 87		Ignition: OFF Overvoltage protection (K1/1) disconnected	< 1 Ω	Open circuit in wiring
2.6	Cable terminal 31 (ground)		Ignition: OFF Overvoltage protection (K1/1) disconnected	< 1 Ω	Open circuit in wiring
2.7	Supply voltage of N3, terminal 30a		Ignition: ON	11–14 V	Overvoltage protection K1/1 faulty, Open circuit in wiring
2.8	Cable		Ignition: OFF Overvoltage protection (K1/1) disconnected	< 1 Ω	Open circuit in wiring




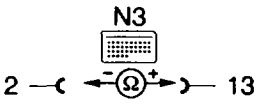
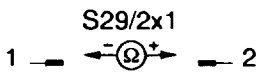
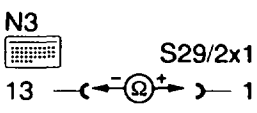
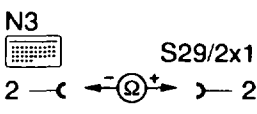
Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
3.0	Current at electro- hydraulic actuator (Y1)		Ignition: OFF Connect test cable 102 589 04 63 00 to actuator (Y1) Ignition: ON	20 mA 0 ± 3 mA	Electrohydraulic actuator (Y1), Open circuit in wiring KE control unit (N3), Set lambda control, Test oxygen sensor (G3/2) (test step 11.0–11.10)
3.1	Fault circuit electro- hydraulic actuator (Y1)		Ignition: OFF Disconnect test cable, KE control unit (N3) disconnected	19.5 ± 1 Ω	Electrohydraulic actuator (Y1), Open circuit in wiring
3.2	Electro- hydraulic actuator (Y1)		Ignition: OFF Coupling (Y1) disconnected	19.5 ± 1 Ω	Replace electrohydraulic actuator (Y1)
3.3	Cable		Ignition: OFF Coupling (Y1) disconnected	< 1 Ω	Open circuit in wiring
3.4	Cable		Ignition: OFF Coupling (Y1) disconnected	< 1 Ω	Open circuit in wiring



Test step	Test scope	Test connection	Operation/Requirement	Specification	Possible cause/Remedy
4.0	Cable from KE control unit (N3) to diagnostic socket (X11)		Ignition: OFF KE control unit (N3) disconnected	< 1 Ω	Open circuit in wiring
4.1	Cable		Ignition: OFF	< 1 Ω	Open circuit in wiring
4.2	Cable		Ignition: ON	11–14 V	Open circuit in wiring Fuse F1
5.0	Air flow sensor position indicator (B2)	 	Engine: start , KE control unit (N3) connected Engine: idling	4.6–5.1 V 0.55–0.95 V	Air flow sensor position indicator, KE control unit (N3), Open circuit in wiring ¹⁾ Air flow sensor position indicator, KE control unit (N3), Open circuit in wiring ¹⁾
5.1	Cable		Ignition: OFF KE control unit (N3) disconnected	< 1 Ω	Open circuit in wiring
5.2	Cable		Ignition: OFF KE control unit (N3) disconnected	< 1 Ω	Open circuit in wiring
5.3	Cable		Ignition: OFF KE control unit (N3) disconnected	< 1 Ω	Open circuit in wiring

¹⁾ See also test step 9.0–9.4.



Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
6.0	Distinguish- ing test		Ignition: ON Open microswitch (throttle valve must not be open)		Readout 40%, see test step 9.0–10.1, Readout 20%, see test step 7.0–7.3, Readout 70%, see test step 14.0–14.4
6.1	Fault circuit idle speed contact (S29/2)		Ignition: OFF Depress accelerator	< 1 Ω ∞	Contacts of coupling (S29/2x1) incorrectly connected, Idle speed contact, Open circuit in wiring
6.2	Idle speed contact (S29/2)		Coupling (S29/2x1) disconnected, idle speed position Depress accelerator	< 1 Ω ∞	Adjust throttle valve switch (S29/2)
6.3	Cable		Ignition: OFF	< 1 Ω	Open circuit in wiring
6.4	Cable		Ignition: OFF	< 1 Ω	Open circuit in wiring

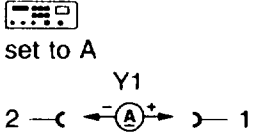
Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
7.0	Fault circuit full load contact (S29/2)		Ignition: OFF Coupling at KE control unit (N3) disconnected Accelerator in full throttle position	∞ $< 1 \Omega$	Contacts of coupling S29/2x1 incorrectly connected, Full load contact, Open circuit in wiring
7.1	Full load contact (S29/2)		Coupling (S29/2x1) disconnected Accelerator in full throttle position	∞ $< 1 \Omega$	Adjust or replace throttle valve switch (S29/2)
7.2	Cable		Ignition: OFF	$< 1 \Omega$	Open circuit in wiring
7.3	Cable		Ignition: OFF	$< 1 \Omega$	Open circuit in wiring

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
8.0	Fault circuit coolant temperature sensor (B11/2)		Engine: idling , KE control unit (N3) connected	At + 80°C 0.29– 0.35 V, other values see table tempera- ture sensor (B11/2)	Coolant temperature sensor (B11/2), Cable
8.1	Coolant temperature sensor (B11/2) 2-pin	 	Ignition: OFF Coupling at temperature sensor (B11/2) disconnected	See diagram tempera- ture sensor (B11/2)	Coolant temperature sensor (B11/2)
8.2	Cable	 	Ignition: OFF	< 1 Ω	Open circuit in wiring

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
8.3	Coolant temperature sensor (B11/2) 4-pin		Ignition: OFF Coupling at temperature sensor (B11/2) disconnected, measure resistances 2 x diagonally and compare ¹⁾	See table temperature sensor (B11/2)	Coolant temperature sensor (B11/2)
8.4	Cable		Ignition: OFF Coupling at temperature sensor (B11/2) disconnected	< 1 Ω	Open circuit in wiring
8.5	Cable		Ignition: OFF Coupling at temperature sensor (B11/2) disconnected	< 1 Ω	Open circuit in wiring
8.6	Cable		Ignition: OFF Coupling at temperature sensor (B11/2) disconnected	< 1 Ω	Open circuit in wiring
8.7	Cable		Ignition: OFF Coupling at temperature sensor (B11/2) disconnected	< 1 Ω	Open circuit in wiring

1) See section "q".

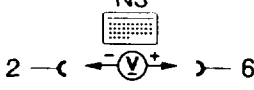



Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
9.0	Air flow sensor position indicator (B2)		Ignition: OFF Coupling at air flow sensor position indicator (B2) disconnected	3.6– 4.4 kΩ	Air flow sensor position indicator (B2), KE control unit (N3), Wiring
			Slowly deflect air flow sensor plate by hand	Ω value rises continuously up to half deflection and then drops off again	Air flow sensor position indicator (B2)
9.1	Cable		Ignition: OFF KE control unit (N3) disconnected	< 1 Ω	Open circuit in wiring
9.2	Cable		Ignition: OFF KE control unit (N3) disconnected	< 1 Ω	Open circuit in wiring
9.3	Cable		Ignition: OFF KE control unit (N3) disconnected	< 1 Ω	Open circuit in wiring

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
10.0	Acceleration enrichment	 <p>set to A</p>	<p>Ignition: OFF</p> <p>Connect test cable 102 589 04 63 00 to actuator (Y1)</p> <p>Unplug connector from coolant temperature sensor (B11/2)</p> <p>Lay connector to ground with 2.5 kΩ test resistor or with ohms decade (equals approx. 20°C)</p> <p>KAT: Unplug connector G3/2x2 of oxygen sensor</p> <p>Engine: start</p> <p>Engine runs at fast idling</p>	> 15 mA	Test air flow position indicator (B2) (9.0–9.4)
10.1			Increase engine speed sharply	Current level must rise	Test air flow position indicator (B2) (9.0–9.4)

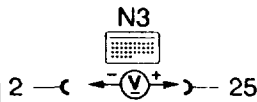
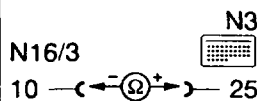
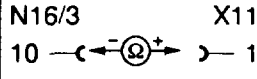
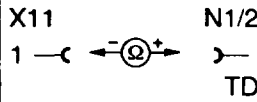
Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
11.0	Fault circuit oxygen sensor (G3/2)		Engine: idling	fluctu- ates between 0.1–0.9 V	Oxygen sensor (G3/2), Open circuit in wiring Mixture setting, KE control unit (N3)
11.1	Insulation of oxygen sensor cable		Ignition: OFF KE control unit (N3) and coupling (G3/2x1) disconnected	∞	Open circuit in wiring
11.2	Oxygen sensor (G3/2)		Engine: idling , Lambda control tester connected, coupling (G3/2x1) connected	0–10% on	Oxygen sensor (G3/2)
11.3	KE control unit (N3)		Engine: idling , Lambda control tester connected, coupling (G3/2x1) disconnected	90–100% on	KE control unit (N3), Open circuit in wiring

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
11.4	Oxygen sensor heater	<p>G3/2x1 G3/2 1 — c ← — — — — — 1</p> <p>G3/2x G3/2 2 — c ← — (A) — — — 2</p>	<p>Ignition: OFF Coupling (G3/2x1) disconnected</p> <p>Engine: start</p>	0.5–1.3 A	Oxygen sensor, Overvoltage protection K1/1, Fuel pump relay (N16/4), Open circuit in wiring
11.5	Cable	<p>1 — c ← — (Ω) — — — — — 1</p>	<p>Ignition: OFF Coupling at KE control unit (N3) disconnected</p>	< 1 Ω	Open circuit in wiring
11.6	Cable	<p>G3/2x1 N16/4 2 — c ← — (Ω) — — — — — 7</p>	<p>Ignition: OFF Coupling (G3/2x1) disconnected</p>	< 1 Ω	Open circuit in wiring




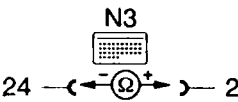
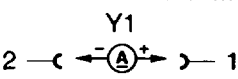
Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
12.0	Road speed signal	<p>Mod. 124, 201, 129</p>  <p>Mod. 107, 126</p> 	<p>Ignition: ON</p> <p>Models 107, 126, 129: drive vehicle on dynamometer (> 20 km/h)</p> <p>Models 124, 201 roll vehicle about 1 m</p>	<p>Models 124, 201 readout fluctuates 0–12 V without components</p> <p>0–9 V with components</p> <p>Models 107, 126 > 1 V</p>	<p>Models 124, 201 Wiring, Hall-effect sensor (B6)</p> <p>Models 107, 126, 129 Wiring, Electronic speedometer Test see Group 54</p>
12.1	KE control unit (N3)	Connect  to X11	<p>Drive vehicle in 3rd gear/ Drive position 3 on road/ dynamometer, accelerate fully at approx. 2000/min (approx. 6s)</p>	<p>On/off ratio fluctuates after accelerator released</p>	<p>Readout 60%: Replace KE control unit (N3)</p>
12.2	Cable	<p>Models 124, 201 with multi-pin plug connection</p> <p>N3</p> 	<p>Ignition: OFF Disconnect X53/5x</p>	<p>< 1 Ω</p>	<p>Open circuit in wiring</p>

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
12.3	Cable	Models 124, 201 without multi-pin plug connection N3 	Ignition: OFF B6x disconnected	< 1 Ω	Open circuit in wiring
12.4	Cable	Models 107, 126 N3 Model 129 N3 	X30/1 disconnected	< 1 Ω	Open circuit in wiring Test see Group 54
13.0	Hall-effect road speed sensor (B6)	 USA Models 124, 201	Coupling at KE control unit (N3) disconnected, Ignition: ON Roll vehicle approx. 1m	Readout fluctuates 0–12 V	Wiring, replace Hall-effect sensor (B6) if necessary
13.1	Cable		Ignition: ON	11–14 V	Fuse, Open circuit in wiring
13.2	Cable	B6 	Ignition: OFF	< 1 Ω	Open circuit in wiring
13.3	Cable	B6 	Ignition: OFF	< 1 Ω	Open circuit in wiring

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
14.0	TD signal		Ignition: ON Engine idling at operating temperature, KE control unit (N3) connected	6-12 V	EZL ignition control unit (N1/2), Wiring
14.1	Cable		Ignition: OFF Remove fuel pump relay (N16/3 or N16/4)	< 1 Ω	Open circuit in wiring
14.2	Cable		Ignition: OFF	< 1 Ω	Open circuit in wiring
14.3	Cable		Ignition: OFF Disconnect coupling (TD signal) at ignition control unit (N1/2)	< 1 Ω	Open circuit in wiring

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
15.0	Fault circuit intake air temperature sensor (B17/2)		Engine: idling , KE control unit (N3) connected	At + 20° C 1.32– 1.62 V, other values see table tempera- ture sensor (B17/2)	Intake air temperature sensor (B17/2), Open circuit in wiring
15.1	Intake air temperature sensor (B17/2)		Ignition: OFF Coupling at temperature sensor (B17/2) disconnected	See diagram tempera- ture sensor (B17/2)	Intake air temperature sensor (B17/2)
15.2	Cable		Ignition: OFF Coupling at temperature sensor (B17/2) disconnected	< 1 Ω	Open circuit in wiring
15.3	Cable		Ignition: OFF Coupling at temperature sensor (B17/2) disconnected	< 1 Ω	Open circuit in wiring

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
16.0	Altitude correction sensor (B18)		Ignition: ON KE control unit (N3) connected	5 V	Altitude correction sensor (B18), Air flow sensor position indicator (B2), KE control unit (N3), Open circuit in wiring
16.1	Altitude correction sensor (B18)		Ignition: ON KE control unit (N3) connected	See table altitude sensor (B18) "n"	Altitude correction sensor (B18), Open circuit in wiring
16.2	Cable		Ignition: OFF Disconnect coupling at altitude correction sensor (B18)	< 1 Ω	Open circuit in wiring
16.3	Cable		Ignition: OFF Disconnect coupling at altitude correction sensor (B18)	< 1 Ω	Open circuit in wiring
16.4	Cable		Ignition: OFF Disconnect coupling at altitude correction sensor (B18)	< 1 Ω	Open circuit in wiring

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
17.0	Decel fuel shutoff	Connect  to (X11)	Lambda control fluctuates. Increase engine speed to approx. 3500/min, then close throttle valve	On/off ratio jumps briefly to 95%	Check accelerator control setting, Check throttle valve switch setting, Microswitch, Wiring
17.1	Microswitch		Idle position Depress accelerator	< 1 Ω ∞	Microswitch, Wiring
17.2	Test current at electro-hydraulic actuator (Y1)		Connect test cable 102 589 04 63 00 to electro-hydraulic actuator. Increase engine speed to approx. 3500/min, then close throttle valve	approx. -60 mA until combustion resumed	See test steps 1.0 to 4.0, otherwise replace KE control unit

- i. **With fault diagnosis by means of on/off ratio and on-board diagnosis system, as of model year 1990**

1 On-board diagnosis

Only California

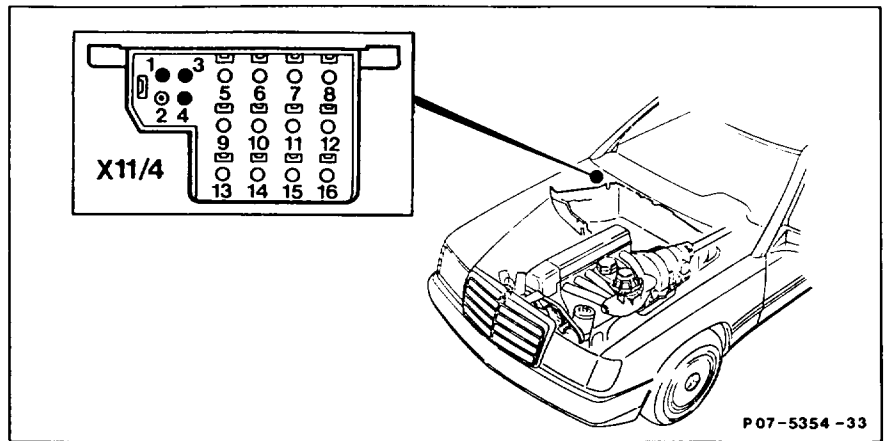
All exhaust-relevant components of the KE fuel injection system and of the exhaust gas recirculation system are monitored by the control unit. Malfunctions caused by open circuit in wiring or failure of one of these components are indicated by the indicator lamp in the "CHECK ENGINE" instrument cluster and at the same time stored in the KE control unit.

Reading fault memory with push-button switch and LED

A test coupling (X11/4) with pushbutton (2) and LED (4) is provided for this purpose on the right of the component compartment partition wall. When the pushbutton is pressed (ignition: **ON**) for between 2 and 4 seconds, the flash pulse output is initiated and the fault path indicated by the number of flashes.

At the completion of the flash pulse output, the LED shows a steady light. If the pushbutton is once again pressed for between 2 and 4 seconds, any further fault path can be indicated. If no further fault is recognized, the KE control unit switches over to on/off ratio output.

X11/4 Test coupling for
diagnosis, 16-pin
(flash code)
Model year 1990



Erasing fault memory

Once a fault has been rectified without having disconnected the KE control unit, the fault memory must be erased as follows:

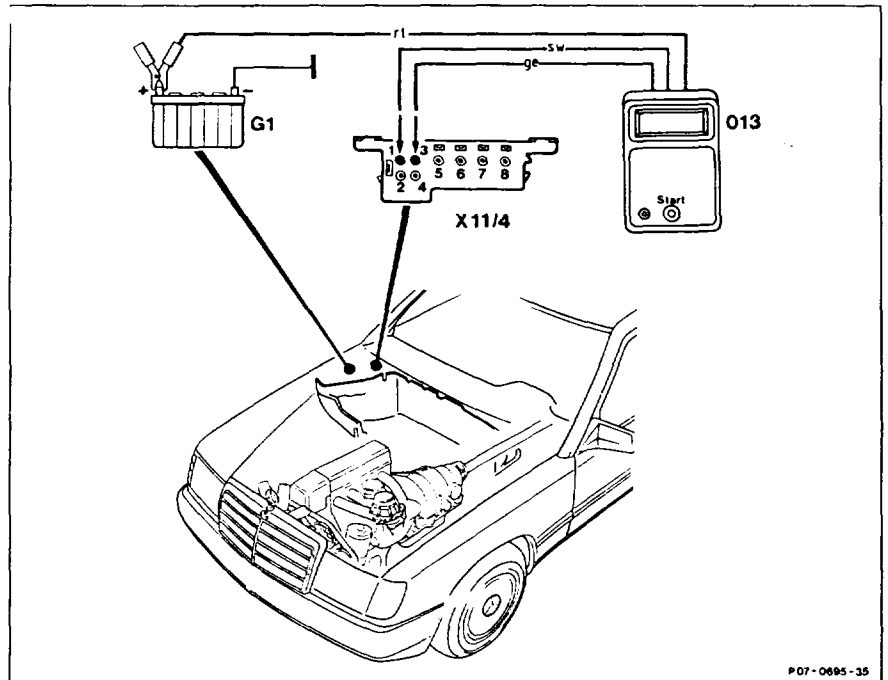
- Press pushbutton switch for 6–8 seconds with the flash pulse output displayed.

Note

Each fault displayed must be erased individually.

- LED flashes once, stored fault has been erased.

Reading fault memory with pulse counter
 Connect pulse counter to test coupling (X11/4)
 for this purpose.



- If the LED U_{BATT} appears after connecting, pulse counter and voltage supply for pulse counter are in order.
- Press start button for between 2 and 4 seconds.
- Read off pulse output display and note. The figure 1 indicates no fault is stored in the system. All other figures are assigned to a certain fault group. If there are several faults in the system, the fault with the lowest pulse count is output first of all. Numbers from 1 to 12 appear in the display field of the pulse counter.
- Once again press start button for between 2 and 4 seconds, note any further fault. If there is no further fault in the system, no further display appears.

- Rectify noted faults (pulse display) according to troubleshooting diagram. Connect contact box as stated in the connection diagram for this purpose.

The test steps listed in the column Remedy are contained in section "m".

Erasing fault memory

Once a fault has been rectified, the displayed pulse must be erased as follows:

- Press start button for 6–8 seconds with the pulse displayed.

Note

Each pulse displayed must be erased individually.

- No display:
Stored fault has been erased.
- A number (> 1) is displayed:
Further faults in the system.



When dealing with an engine running complaint, the fault memory should be read and the faults noted before performing repairs as part of Op. no. 07–1100. This ensures that a distinction can be made between faults which actually occur and "simulated faults" as faults are stored when performing test work with the engine running, which may be caused by simulation or by a disconnected cable.

The fault memory must be erased after completing test work.

Table for fault recognition with pulse readout

Pulse readout	Fault circuit/Fault type	Test step/Remedy
1	No fault in system	-
2	Full load contact, throttle valve switch (S29/2) implausible	11.0-11.3
3	Coolant temperature in KE control unit (N3) implausible	12.0-12.3
4	Potentiometer voltage of air flow sensor position indicator (B2) implausible	13.0-13.6
5	Oxygen sensor signal implausible	20.0-20.8
6	Not assigned	-
7	TNA signal (engine speed signal) at KE control unit (N3) implausible	14.0-14.1
8	Altitude pressure signal from EZL ignition control unit (N1/2) implausible	18.0
9	Current to electrohydraulic actuator (Y1) implausible	10.0-10.4
10	Idle speed contact, throttle valve switch (S29/2) implausible	16.0-16.3
11	Air injection system implausible	22.0-22.6
12	Absolute pressure valves from EZL ignition control unit (N1/2) implausible	18.0
13	Intake air temperature implausible	19.0-19.3
14	Road speed signal at KE control unit (N3) implausible	17.0-17.2
15	Not assigned	-

Pulse readout	Fault circuit/Fault type	Test step/Remedy
16	Exhaust gas recirculation implausible	20.0–20.8
17	Oxygen sensor signal cable has short to positive or to ground	20.0–20.8
18	Current to idle speed air valve (Y6) implausible	24.0–24.3
19	Not assigned	–
20	Not assigned	–
21	Not assigned	–
22	Oxygen sensor heating current implausible	20.0–20.8
23	Short circuit to positive in regeneration switchover valve (Y58/1) circuit	25.0–25.4
24	Not assigned	–
25	Short circuit to positive to start valve (Y8) circuit	23.0–23.3
26	Short circuit to positive in shift point retard circuit	–
27	Fault in data interchange KE control unit (N3) ↔ EZL ignition control unit (N1/2)	18.0 ¹⁾
28	Loose contact in coolant temperature sensor (B11/2) circuit	–
29	Difference in coolant temperatures between KE control unit (N3) ↔ EZL ignition control unit (N1/2)	12.0–12.3
30	Not assigned	–
31	Loose contact in intake air temperature sensor (B17/2) circuit	19.0–19.3
32	Not assigned	–
33	Not assigned	–
34	Coolant temperature from EZL ignition control unit (N1/2) implausible	18.0 ¹⁾

¹⁾ Test matching of KE ↔ EZL control units.

Fault table pulse readout engine systems control unit MAS

Diagnosis

The faults listed below are recognized and stored in the engine systems control unit MAS. The faults remain stored even after the battery has been disconnected and connected, and also after unplugging the control unit.

The faults can be interrogated with the pulse counter on models 124 and 201 at the test coupling (X11/4), contact 14.

On model 126, the test cable set with contact box must be connected for reading the faults (test cable is not connected to an X11/4).

Following this, connect black cable of pulse counter to contact 4 and yellow cable to contact 14.

The test steps listed in the column Remedy are contained in section "m".



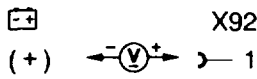

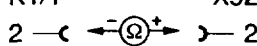
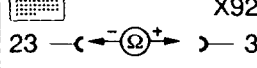
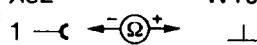
Table for fault recognition by pulse readout

Pulse readout	Possible cause	Remedy/ Test step
1	No fault in system.	-
2	Fuel pump relay not operating.	9.0
3	TD signal interrupted (N.A. as of 05/90).	15.0-15.2
4	Output stage for oxygen sensor heater actuation faulty.	20.0-20.8
5	Output stage for air pump actuation faulty.	22.0-22.6
6	Output stage for kickdown switch actuation faulty.	30.0-30.1
7	Not assigned.	-
8	Coolant temperature signal.	12.0-12.3
9	Not assigned (as of approx. 05/90 open circuit in oxygen sensor heater).	20.0-20.8
10	Output stage of start valve.	23.0-23.3
11	No cut-in signal for A/C compressor.	21.0-21.2
12	Output stage for A/C compressor actuation faulty.	21.1
13	Excessive slip of A/C compressor.	21.1
14	Not assigned.	-
15	Short circuit recognition in fuel pump circuit.	8.0



Note

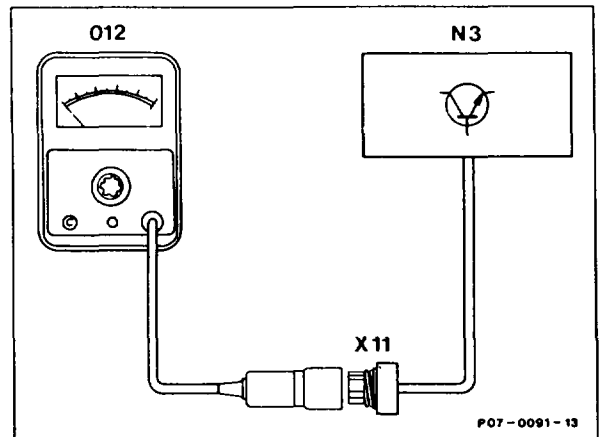
LED U_{BATT} must light up in display field. If not, perform the following test:


Pulse readout	Test step Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
-	1.0 Ground point	G1 	Ignition: ON Disconnect coupling at X92	11-14 V	Ground connection W10 loose, Open circuit in wiring from test coupling (X92) Contact 1 to W10
-	2.0 Test coupling (X92) actuation	X92 3 — 	Ignition: ON Disconnect coupling at X92	0,7-2,5 V	Test coupling (X92), Open circuit in wiring
-	3.0 Cable terminal 87E	K1/1 2 — 	Ignition: OFF Disconnect coupling at X92, Disconnect coupling at overvoltage protection (K1/1)	< 1 Ω	Open circuit in wiring
	3.1 Cable	N3 	Ignition: OFF Disconnect coupling at X92	< 1 Ω	Open circuit in wiring
	3.2 Cable	X92 1 — 	Ignition: OFF Disconnect coupling at X92	< 1 Ω	Open circuit in wiring



2 With fault diagnosis by means of on/off ratio

Since 04/86 faulty input signals are recognized by the KE control unit (N3) and passed to the lambda test output. Fault recognition is performed with the lambda control tester (012) at the diagnostic socket (X11).



Lambda control tester	Position
Bosch	100% IR
Hermann	100% 

Fault recognition enables various components of the KE fuel injection system to be checked by measuring the on/off ratio. The faults are not stored and can only be displayed directly by measuring the on/off ratio (i.e. only if the fault exists at that moment).

Output of on/off ratio




The output for fault diagnosis by means of the on/off ratio is performed only after the fault memory has been interrogated.

If the pulse readout is "1" or after the fault last read out, the on/off ratio output is only performed after the pushbutton switch in the diagnostic socket or at the pulse counter has once again been pressed (2-4 seconds).

Before reading the fault memory, the readout with the engine running is at 0% or 85% if the CHECK ENGINE indicator lamp lights up.

Recognition of the control units:

- 1 Connect lambda control tester.
- 2 Switch on ignition.

National version	On/off ratio readout	KE control unit
 and  Federal	70%	w/o pulse readout
 California	85%	with pulse readout

Note

The control unit is switched over to on/off ratio output for testing the lambda control by pressing the pushbutton.

For wiring diagram see appropriate wiring diagram volume (07.3-0128).

Perform test (measuring on/off ratio) for dealing with engine running complaint, e.g. irregular idling.

Readout fluctuates:

No fault in system.

Test conditions:


Battery voltage 11–14 V,
 Engine oil temperature approx. 80°C,
 Engine idling.

The test steps listed in the column Remedy are contained in the section "m".


Fault recognition by on/off ratio readout

On/off ratio in %	Possible cause of fault	Test scope	Test step/Remedy
0	No voltage or ground at diagnostic socket (X11). Open circuit in cable on diagnostic socket (X11), contact 3, lambda control tester faulty. Mixture setting too rich.	Test voltage supply, ground and diagnostic socket (X11) cable. Check lambda setting.	1.0–1.1 2.0–2.8 RI 07.3–2053, or 07.3–5203 for (USA)
10	Air flow sensor position indicator (B2) wrongly connected or fault. Possible fast idling. Contacts of throttle valve switch (S29/2), idle speed/full load contact wrongly connected or short circuit (full load contact closed if insufficient air throughput).	Test signal of air flow sensor position indicator (B2). Check routing of wiring.	13.0–13.6
20	Full load contact incorrectly connected or faulty. Readout 20% only if throttle valve switch (S29/2) operated.	Test full load contact.	11.0–11.3
30	Short circuit or open circuit to KE control unit (N3). Coolant temperature sensor (B11/2) faulty.	Test coolant temperature sensor (B11/2). Test wiring.	12.0–12.3



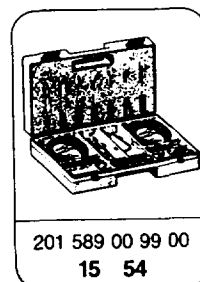
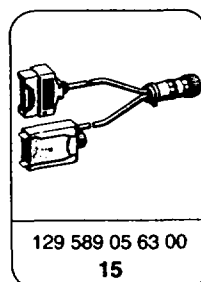
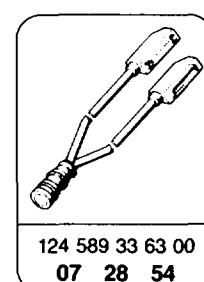
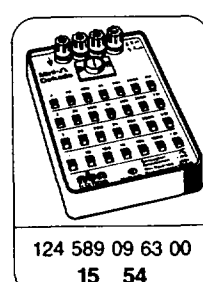
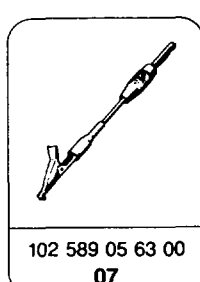
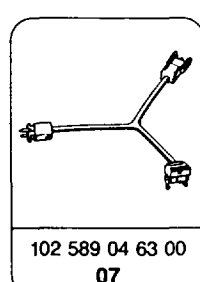
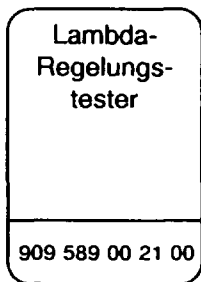
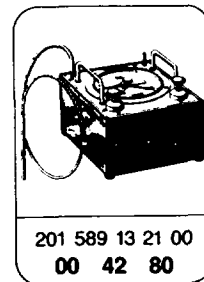
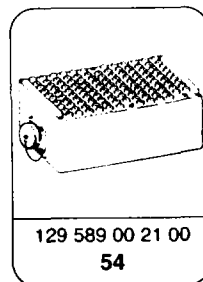
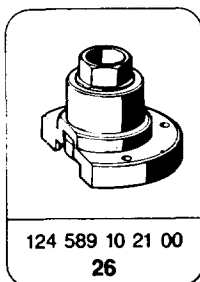
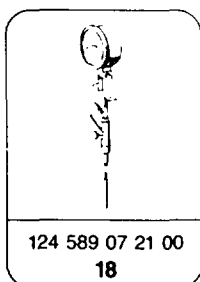
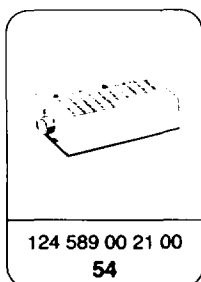
On/off ratio in %	Possible cause of fault	Test scope	Test step/Remedy
40	Open circuit in wiring or short circuit to air flow sensor position indicator (B2) or air flow sensor position indicator (B2) faulty. Possible fast idling speed.	Test air flow sensor position indicator (B2). Test KE control unit. Test wiring.	13.0–13.6
50	Oxygen sensor (G3/2) not operational or faulty. Open circuit in wiring.	Engine oil temperature approx. 80°C. Test oxygen sensor (G3/2). Test wiring.	20.0–20.8
60	Road speed signal at KE control unit (N3) implausible. ¹⁾	Test Hall-effect sensor (B6). Test wiring.	17.0–17.2
70	No TNA signal implausible ¹⁾ . Open circuit in wiring to KE control unit (N3).	Test TNA signal.	14.0–14.1
80	Open circuit in wiring or short to ground (B17/2). Intake air temperature sensor (B17/2) faulty. Fault in data interchange between EZTL ignition control unit and KE control unit (N3).	Test intake air temperature sensor (B17/2). Test wiring.	18.0–19.3
85	Only  California.	–	–

¹⁾ The plausibility of the road speed signal can **only** be checked by the KE control unit (N3) when driving (engine output dynamometer/road). If an implausible road speed signal is recognized when driving, the control unit (N3) "sets" the on/off ratio of 60% and stores this. The fault is not erased until the ignition is switched off. A "60% on/off ratio" test is performed e.g. in dealing with the complaint: jerking when vehicle moving and throttle valve closed.

On/off ratio in %	Possible cause of fault	Test scope	Test step/Remedy
90	Current to electrohydraulic actuator (Y1) implausible ¹⁾	Test electrohydraulic actuator	29.2
95	Decel fuel shutoff active.	-	-
100	No voltage or ground at KE control unit (N3) or KE control unit (N3) faulty. Lambda setting too lean. Oxygen sensor (G3/2) faulty (short to ground). Fuse of overvoltage protection (K1/1) faulty. Lambda control tester faulty.	Test overvoltage protection (K1/1). Test ground. Check setting of lambda control. Test oxygen sensor signal. KE control unit (N3) faulty.	1.0-1.2 2.0-2.8 RI 07.3-2053, or 07.3-5203 for  20.0-20.8
Readout fluctuates	With lambda control: No fault in the area of the monitored signals.	-	-

¹⁾ The plausibility of the road speed signal can **only** be checked by the KE control unit (N3) when driving (engine output dynamometer/road). If an implausible road speed signal is recognized when driving, the control unit (N3) "sets" the on/off ratio of 60% and stores this. The fault is not erased until the ignition is switched off. A "60% on/off ratio" test is performed e.g. in dealing with the complaint: jerking when vehicle moving and throttle valve closed.

j. Special tools as of model year 1990

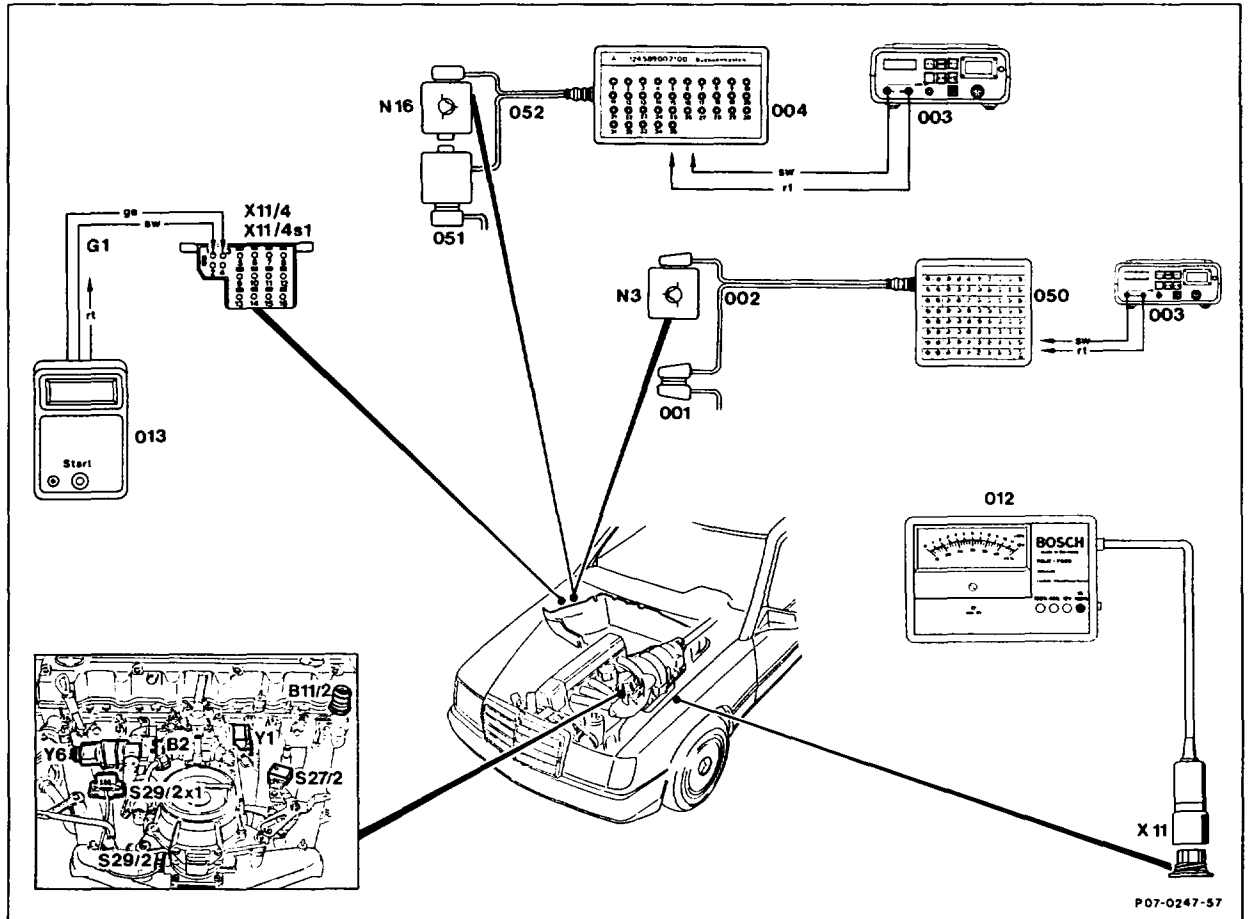


Commercially available tools and testers (see Workshop Equipment Manual)

Designation	e.g. Make, order no.
Multimeter	Sun, DMM-5
Twin socket	Hermann, ECD 53
Engine tester	Bosch, MOT 002.02

k. Connecting testers according to connection diagram, as of model year 1990

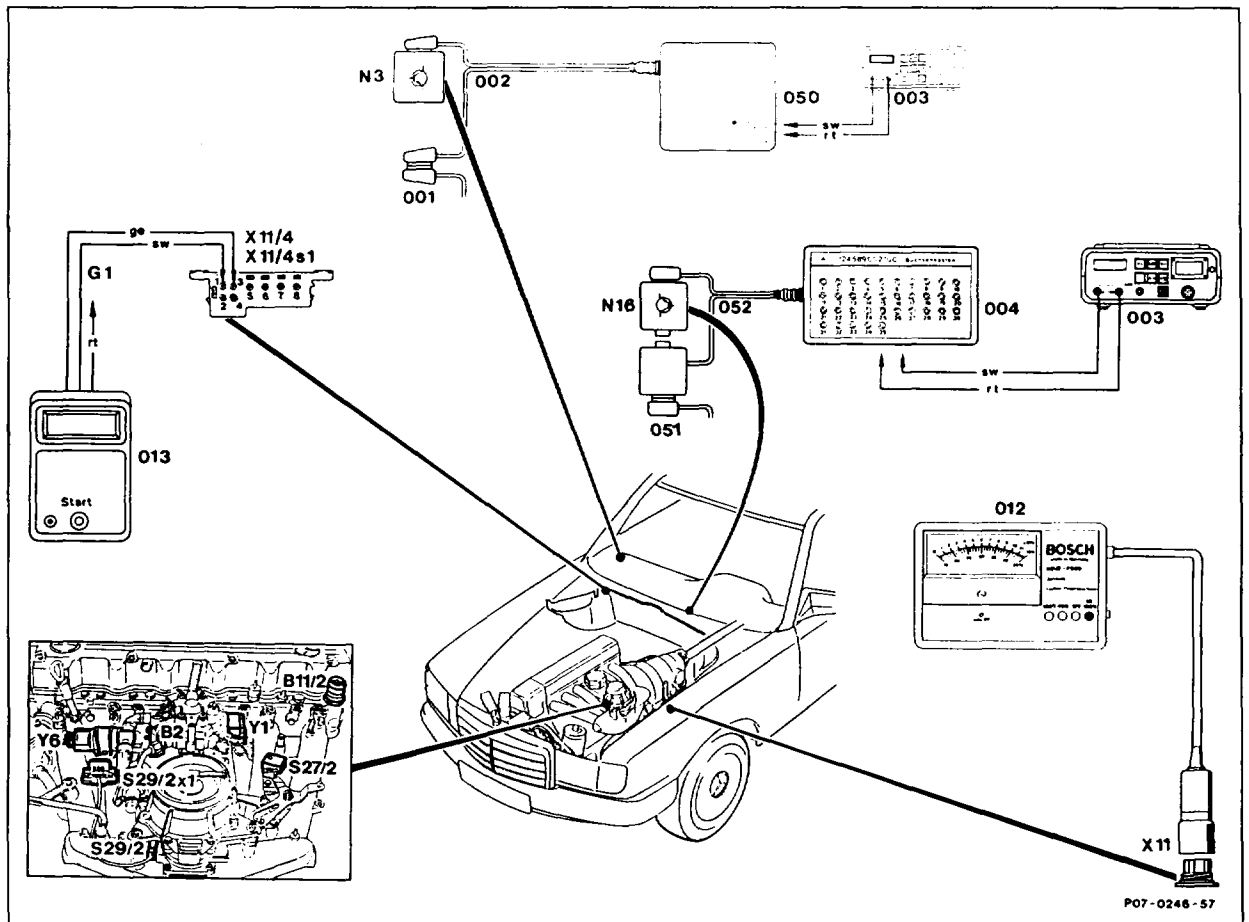
Models 124, 201



- 001 KE control unit coupling
- 002 Test cable 104 589 00 63 00
- 003 Multimeter
- 004 35-pin contact box
- 012 Lambda control tester
- 013 Pulse counter
- 050 126-pin contact box
- 051 Coupling, engine systems control unit
- 052 Test cable 129 589 05 63 00

- G1 Battery, terminal 30
- N3 KE control unit
- N16 Engine systems control unit MAS
- X11 9-pin diagnostic socket
- X11/4 Diagnosis test coupling

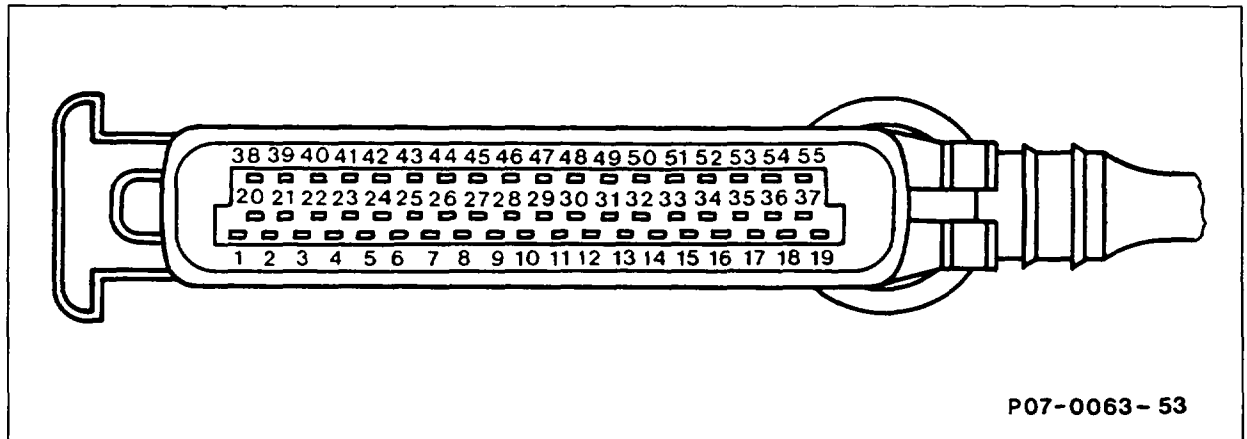
Model 126



- | | | | |
|-----|---------------------------------------|-------|---------------------------------|
| 001 | KE control unit coupling | G1 | Battery, terminal 30 |
| 002 | Test cable 104 589 00 63 00 | N3 | KE control unit |
| 003 | Multimeter | N16 | Engine systems control unit MAS |
| 004 | 35-pin contact box | X11 | 9-pin diagnostic socket |
| 012 | Lambda control tester | X11/4 | Diagnosis test coupling |
| 013 | Pulse counter | | |
| 050 | 126-pin contact box | | |
| 051 | Coupling, engine systems control unit | | |
| 052 | Test cable 129 589 05 63 00 | | |

I. Contact assignment of coupling of KE control unit (N3) and engine systems control unit MAS (N16), as of model year 1990

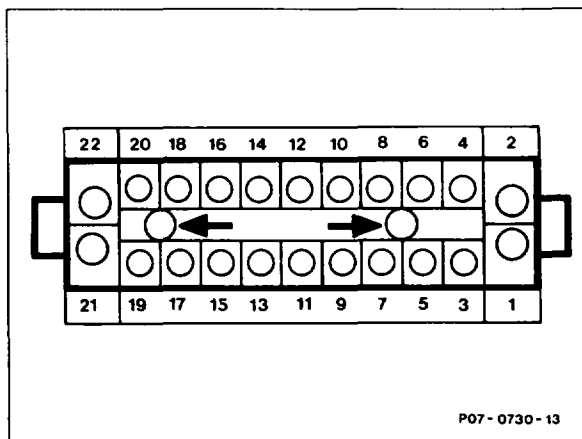
Contact assignment of coupling of KE control unit (N3)



Engine 103.94/98 as of model year 1990

1	E	Voltage supply, terminal 30a	30	A	Lambda test output, on/off ratio to X11
2	A	Regeneration switchover valve	31	A	Air flow sensor position indicator, contact 3
3	A	Control signal, oxygen sensor heater	32	A	Oxygen sensor cable screening
4	A	Idle speed air valve (+)	33	E	-
5	E	Intake air temperature sensor (ground)	34	E	Air flow sensor position indicator, contact 1
6	E	Ground W10 (output stage)	35	A	Ground, B11/2 contact 4
7	A/E	Fault memory pulse output	36	-	-
8	A	Fuel consumption signal for vehicles with optional trip computer	37	A	Electrohydraulic actuator (+)
9	E	Voltage supply, components	38	-	Exhaust gas recirculation switchover valve (Y27)
10	E	Decel fuel shutoff microswitch	39	A	Transmission shift point control
11	E	Start signal, starter, terminal 50	40	A	-
12	-	-	41	E	Voltage supply, components
13	E	Oxygen sensor signal	42	-	Air pump control signal
14	E	Intake air temperature sensor (signal)	43	-	-
15	-	-	44	-	-
16	E	Coolant temperature sensor B11/2 contact 2	45	E	A/C compressor cut-in signal
17	-	-	46	E	Throttle valve switch, full load
18	E	Diagnosis signal, sensor heater	47	E	Throttle valve switch, idle speed
19	E	Ground W11 (electronics)	48	-	-
20	A	Start valve actuation	49	A	-
21	-	-	50	-	-
22	-	-	51	-	-
23	A	Idle speed air valve (-)	52	E	Air flow sensor position indicator, contact 2
24	A	CHECK-ENGINE indicator lamp	53	-	-
25	-	-	54	-	-
26	E/A	Data interchange with N1/2	55	E	Electrohydraulic actuator (-)
27	E	Engine speed signal (TNA)			
28	E	Selecter lever position	A		Output signal
29	E	Road speed signal	E		Input signal

Contact assignment of coupling of engine systems control unit MAS (N16)










Engine 103.94/98 as of model year 1990

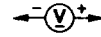
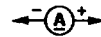

1E	Voltage supply, terminal 30 (battery)	14A	Diagnosis pulse output
2A	Fuel pumps actuation	15	Not assigned
3E	A/C compressor control signal	16E	TD signal from EZL/AKR ignition control unit
4E	Terminal 31, ground	17E	Air pump control signal
5E	Engine speed signal (+) for A/C compressor	18	Not assigned
6E	Engine speed signal (-) for A/C compressor	19A	Air pump actuation
7E	Kickdown cutoff	20A	Oxygen sensor heater actuation
8A	Start valve actuation	21E	Voltage supply, terminal 15 fused (ignition)
9A	A/C compressor cut-in signal (to KE control unit)	22A	A/C compressor coupling actuation
10E	Voltage supply terminal 15 unfused (ignition)		
11A	TDA signal of engine speed	A	Output signal
12E	Start signal (terminal 50)	E	Input signal
13E	Coolant temperature sensor	Arrow	Anti-twist protection

m. Test program with contact box, as of model year 1990

Symbols for testers

	Contact box
	Lambda control tester
	Multimeter
	Battery
	Contact
	Connector
	Bridge

Symbols for test mode with multimeter



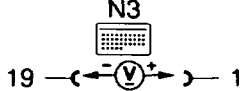
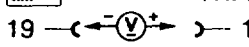
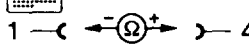
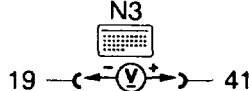
	Voltage measurement (volts, DC)
	Current measurement (amperes, DC)
	Resistance measurement (ohms)

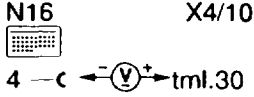

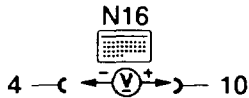


Note

If the on/off ratio readout is constant, first of all perform test steps 1–3. If the specification of a test step is in order, e.g. step 4, it is not necessary to perform test step 4.1.

If the test values at the throttle valve switch (S29/2) are achieved in test step 12 during part load mixture adaptation, full load enrichment is also active.

As of model year 1992 the CHECK ENGINE indicator lamp is no longer fitted to (USA) Federal.

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
1.0	Ground points	N3 X4/10 	Ignition: ON	11-14 V	Ground connection (W11), Open circuit in wiring
1.1	Ground points	N3 X4/10 	Ignition: ON	11-14 V	Ground connection (W10), Open circuit in wiring
2.0	Voltage supply from KE control unit (N3)	N3 	Ignition: ON	11-14 V	Fuse in overvoltage protection (K1/1), Overvoltage protection (K1/1) faulty or not connected, Open circuit in wiring
2.1	Cable from terminal 30 overvoltage protection (K1/1)	N3 K1/1 	Ignition: OFF	11-14 V	Open circuit in wiring
2.2	Voltage supply from KE control unit (N3)	N3 K1/1 	Ignition: OFF K1/1 disconnected	< 1 Ω	Open circuit in wiring
3.0	Voltage supply of components from KE control unit terminal 87E	N3 	Ignition: ON K1/1 connected	11-14 V	Connected components have short to terminal 31, open circuit in wiring to overvoltage protection (K1/1)

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
4.0	Ground at engine systems control unit (N16)		Ignition: ON	11–14 V	Ground connection, Open circuit in wiring
5.0	Voltage supply of engine systems control unit (N16) terminal 30		Ignition: ON	11–14 V	Open circuit in wiring
6.0	Voltage supply of engine systems control unit (N16) terminal 15 unfused		Ignition: ON	11–14 V	Cable connection at fuse box (F1) loose, Open circuit in wiring
7.0	Voltage supply of engine systems control unit (N16) terminal 15		Ignition: ON	11–14 V	Cable connection at fuse box (F1) loose, Open circuit in wiring
8.0	Operation of fuel pumps (M3m1/ M3m2)		Ignition: ON Engine systems control unit (N16) disconnected	Model 126 6–10 A Models 124, 201 4–8 A	Fuel pumps (M3) Open circuit in wiring

Test step	Test scope	Test connection	Operation/Requirement	Specification	Possible cause/Remedy
9.0	Actuation of fuel pumps (M3m1/M3m2)		Engine systems control unit (N16) connected. Control cable coupling 1 at ignition control unit disconnected. Engine: start	10 ± 2 V during starting	Open circuit in wiring Relay box (F1) loose
10.0	Test current at electro-hydraulic actuator (Y1)		Ignition: ON Connect test cable 102 589 04 63 00 to electro-hydraulic actuator (Y1)	20 mA	Test wiring to KE control unit (N3), Electrohydraulic actuator
10.1	Fault circuit electro-hydraulic actuator (Y1)		Ignition: OFF Coupling at KE control unit disconnected	19.5 ± 1 Ω	Electrohydraulic actuator (Y1), Wiring
10.2	Electro-hydraulic actuator (Y1)		Coupling at electro-hydraulic actuator (Y1) disconnected	19.5 ± 1 Ω	Electrohydraulic actuator (Y1)
10.3	Wiring		Coupling at electro-hydraulic actuator (Y1) disconnected	< 1 Ω	Open circuit in wiring, Cable in coupling (Y1) wrongly connected (see wiring diagram)
10.4	Wiring		Coupling at electro-hydraulic actuator (Y1) disconnected	< 1 Ω	Open circuit in wiring, Cable in coupling (Y1) wrongly connected (see wiring diagram)






Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
11.0	Fault circuit full load contact of throttle valve switch (S29/2)		Ignition: OFF KE control unit disconnected		
			Accelerator in idle speed position	∞	Full load contact throttle valve switch (S29/2), contacts (S29/2x1) wrongly connected, Open circuit in wiring
			Accelerator in full throttle position	$< 1 \Omega$	
11.1	Full load contact of throttle valve switch (S29/2)		Ignition: OFF KE control unit disconnected		
			Accelerator in idle speed position	∞	Adjust or replace throttle valve switch (S29/2)
			Accelerator in full throttle position	$< 1 \Omega$	
11.2	Wiring		Ignition: OFF	$< 1 \Omega$	Open circuit in wiring
11.3	Wiring		Ignition: OFF	$< 1 \Omega$	Open circuit in wiring to (W11), ground connection (W11) loose

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
12.0	Fault circuit coolant temperature sensor (B11/2)		Ignition: ON	See table tempera- ture sensor	Coolant temperature sensor (B11/2), Wiring, KE control unit (N3)
12.1	Coolant temperature sensor (B11/2)		Ignition: OFF Coupling at temperature sensor disconnected. Measure temperature sensor connections diagonally and compare both readings ¹⁾ .	See table tempera- ture sensor, both readings must be identical	Replace temperature sensor (B11/2)
12.2	Wiring		Ignition: OFF Coupling at KE control unit disconnected Connector contact assign- ment B11/2.	< 1 Ω	Open circuit in wiring
12.3	Wiring		Ignition: OFF Coupling at KE control unit disconnected	< 1 Ω	Open circuit in wiring
13.0	Fault circuit air flow sensor position indicator (B2)		Engine: idling	4.6–5.1 V	Air flow sensor position indicator (B2), KE control unit (N3)
13.1	Fault circuit air flow sensor position indicator (B2)		Engine: idling at operating temperature	0.55– 0.95 V	Air flow sensor position indicator (B2), KE control unit (N3), Wiring

¹⁾ see section "q".

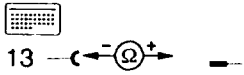
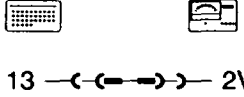
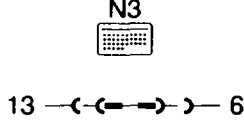

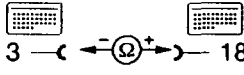

Test step	Test scope	Test connection	Operation/Requirement	Specification	Possible cause/Remedy
13.2	Air flow sensor position indicator (B2)		Ignition: OFF Coupling at air flow sensor position indicator (B2) disconnected	3.6–4.4 k Ω	Replace air flow sensor position indicator (B2)
13.3	Air flow sensor position indicator (B2)		Slowly deflect air flow sensor plate by hand	Ω value rises continuously up to 2/3 of deflection and then drops off again	Replace air flow sensor position indicator (B2)
13.4	Wiring		Ignition: OFF	< 1 Ω	Open circuit in wiring
13.5	Wiring		Ignition: OFF	< 1 Ω	Open circuit in wiring
13.6	Wiring		Ignition: OFF	< 1 Ω	Open circuit in wiring
14.0	TNA signal		Engine: idling	5–7 V	Engine systems control unit (N16), Cable, EZL/AKR control unit, other connected components faulty
14.1	Wiring		Ignition: OFF	< 1 Ω	Open circuit in wiring

Test step	Test scope	Test connection	Operation/Requirement	Specification	Possible cause/Remedy
15.0	TN signal		Engine: idling	6–12 V	EZL ignition control unit (N1/2), Open circuit in wiring
15.1	Cable TN signal		Ignition: OFF Coupling "A" of ignition control unit N1/2 disconnected	< 1 Ω	Open circuit in wiring
15.2	Engine systems control unit (N16)		Coupling "A" (N1/2) connected, Engine: idling	6–12 V	Engine systems control unit (N16)
16.0	Fault circuit idle contact of throttle valve switch (S29/2)		Ignition: OFF KE control unit and coupling "B" of ignition control unit (N1/2) disconnected, Accelerator in idle position Depress accelerator	< 1 Ω ∞	Idle speed contact, Open circuit in wiring
16.1	Idle contact		Ignition: OFF Coupling (S29/2x1) disconnected, Accelerator in idle position Depress accelerator	< 1 Ω ∞	Adjust or replace throttle valve switch (S29/2)

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
16.2	Wiring	<p>N3  47 — ◀ — (Ω) — ▶ — 1</p>	<p>Ignition: OFF Coupling (S29/2x1) disconnected</p>	< 1 Ω	Open circuit in wiring
16.3	Wiring	<p>W11  — ◀ — (Ω) — ▶ — 2</p>	<p>Ignition: OFF Coupling (S29/2x1) disconnected</p>	< 1 Ω	Open circuit in wiring to (W11), Ground connection (W11) loose
17.0	Road speed signal	<p>N3  19 — ◀ — (V) — ▶ — 29</p>	<p>Ignition: ON Drive vehicle onto brake dynamometer or run on output dynamometer (> 20 km/h) or Move vehicle back and forward</p>	> 1 V	Wiring
	Models 124, 201			Voltage jumps from 0 V to 12 V and vice versa (only models 124 and 201)	
17.1	Wiring	<p>Models 124, 201 N3  29 — ◀ — (Ω) — ▶ — 3</p>	<p>Ignition: OFF Coupling (X53/5) disconnected</p>	< 1 Ω	Open circuit in wiring, Test Hall-effect sensor
17.2	Wiring	<p>Model 126 N3  29 — ◀ — (Ω) — ▶ — 1</p>	<p>Ignition: OFF Coupling (A1p8) disconnected</p>	< 1 Ω	Open circuit in wiring, Test electronic speedometer



Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
18.0	Data line KE control unit ↔ EZL ignition control unit		Ignition: OFF Coupling "B" at EZL ignition control unit (N1/2) disconnected	< 1 Ω	Open circuit in wiring KE control unit (N3), EZL ignition control unit (N1/2)
19.0	Fault circuit intake air temperature sensor (B17/2)		Ignition: ON	See table tempera- ture sensor	Coolant temperature sensor (B17/2), Wiring, KE control unit (N3)
19.1	Intake air temperature sensor (B17/2)		Ignition: OFF Coupling (B17/2) disconnected	See table tempera- ture sensor	Replace coolant temperature sensor (B17/2)
19.2	Wiring		Ignition: OFF Coupling (B17/2) disconnected	< 1 Ω	Open circuit in wiring
19.3	Wiring		Ignition: OFF Coupling (B17/2) disconnected	< 1 Ω	Open circuit in wiring
20.0	Fault circuit oxygen sensor		Engine: idling at operating temperature	Fluctuates between 0.1–0.9 V	Oxygen sensor, Open circuit in wiring, KE control unit (N3), Mixture setting
20.1	Insulation oxygen sensor cable		Ignition: OFF Coupling at KE control unit and coupling (G3/2x2) disconnected	∞	Open circuit in wiring

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
20.2	Oxygen sensor cable	<p>N3 G3/2x2</p> 	Ignition: OFF Coupling (G3/2x2) disconnected	< 1 Ω	Open circuit in wiring
20.3	Oxygen sensor	<p>N3</p> 	Coupling at KE control unit connected Engine: idling Lambda tester connected Coupling (G3/2x2) connected	Runs 0–10% on lambda tester	Oxygen sensor
	KE control unit	<p>N3</p> 	Engine: idling Lambda tester connected Coupling (G3/2x2) disconnected	Runs 90–100% on lambda tester	KE control unit (N3) faulty
20.4	Control signal oxygen sensor heater	<p>N3</p> 	Engine: idling	11–14 V	KE control unit (N3) Cable
20.5	Cable	<p>N3 N16</p> 	Ignition: OFF	< 1 Ω	Open circuit in wiring
20.6	Oxygen sensor heater	<p>N16</p> 	Engine systems control unit (N16) disconnected Coupling (G3/2x1) connected	0.5–1.7 A	Oxygen sensor (G3/2) Open circuit in wiring



Test step	Test scope	Test connection	Operation/Requirement	Specification	Possible cause/Remedy
20.7	Cable	<p>G3/2x1 N16 2 — Ω — 20</p>	Ignition: OFF Engine systems control unit (N16) disconnected, coupling (G3/2x1) disconnected	< 1 Ω	Open circuit in wiring
20.8	Cable	<p>G3/2x1 1 — Ω — ⊥</p>	Ignition: OFF Coupling (G3/2x1) disconnected	< 1 Ω	Open circuit in wiring
21.0	A/C compressor cut-in signal	<p>N3 6 — V — 45</p>	Engine: idling Air conditioner "switch on"	8–12 V	Open circuit in wiring Engine systems control unit (N16), A/C compressor see Group 83
21.1	A/C compressor actuation	<p>N16 4 — V — 22</p>	Engine: idling Air conditioner "switch on"	11–14 V	Engine systems control unit (N16)
21.2	Cable	<p>N16 N3 9 — Ω — 45</p>	Ignition: OFF	< 1 Ω	Open circuit in wiring
22.0	Air injection control signal	<p>N16 17 — V — 21</p>	Coupling of coolant temperature sensor (B11/2) disconnected and simulate with 2.5 kΩ. ¹⁾ Engine: idling	110 s 11–14 V	Open circuit in wiring KE control unit (N3)
22.1	Cable	<p>N3 N16 42 — Ω — 17</p>	Ignition: OFF	< 1 Ω	Open circuit in wiring

¹⁾ Two resistance decades: contact 1 – contact 3, contact 2 – contact 4.



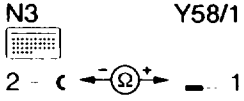
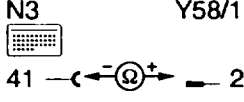
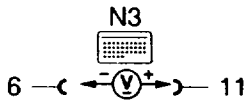
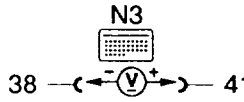
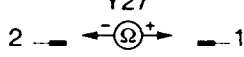
Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
22.2	Air pump actuation		Coupling of coolant temperature sensor (B11/2) disconnected and simulate with 2.5 k Ω . ¹⁾ Engine: idling Air hose downstream of non-return valve detached	110 s 11–14 V	Engine systems control unit (N16) Air pump, Air hose, Switchover valve (Y32) see Group 14
22.3	Air pump electric switchover valve (Y32)		Coupling of coolant temperature sensor (B11/2) disconnected and simulate with 2.5 k Ω . ¹⁾	110 s 11–14 V	Open circuit in wiring
22.4	Switchover valve (Y32)		Ignition: OFF Coupling at switchover valve disconnected	25 ± 5 Ω	Switchover valve (Y32)
22.5	Actuation of air pump electromagnetic clutch (Y33)		Coupling of coolant temperature sensor (B11/2) disconnected and simulate with 2.5 k Ω . ¹⁾	110 s 11–14 V	Open circuit in wiring
22.6	Air pump electromagnetic clutch (Y33)		Ignition: OFF Coupling at air pump electromagnetic clutch disconnected	5 ± 1 Ω	Air pump electromagnetic clutch (Y33)

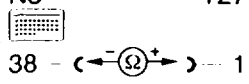
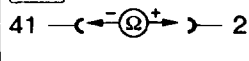

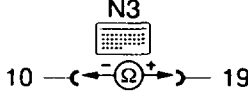

¹⁾ Two resistance decades: contact 1 – contact 3, contact 2 – contact 4.

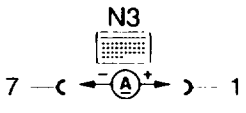
Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
23.0	Start valve (Y8) actuation		Coolant temperature sensor coupling (B11/2) disconnected and simulate with 10 k Ω . ¹⁾ Engine: start	Briefly 10 \pm 2 V	KE control unit (N3), Coolant temperature sensor (B11/2), Start valve (Y8), Open circuit in wiring
23.1	Start valve (Y8)		Start valve (Y8) coupling disconnected	10–15 Ω	Replace start valve (Y8)
23.2	Cable		Ignition: OFF	< 1 Ω	Open circuit in wiring
23.3	Cable		Ignition: OFF	< 1 Ω	Open circuit in wiring
24.0	Test current at idle speed air valve (Y6)		Connect test cable 102 589 04 63 00 to idle speed air valve (Y6) Engine: idling at operating temperature Air conditioning "switch on" Drive mode engaged	600 \pm 50 mA approx. 50 mA higher than before without air conditioner approx. 20 mA less than before without Drive mode	Open circuit in wiring to idle speed air valve (Y6), KE control unit (N3)

1) Between contact 1 and contact 3.

Test step	Test scope	Test connection	Operation/Requirement	Specification	Possible cause/Remedy
24.1	Resistance at idle speed air valve (Y6)		Ignition: OFF	7.5–10 Ω	Idle speed air valve (Y6)
24.2	Cable		Ignition: OFF	< 1 Ω	Open circuit in wiring
24.3	Cable		Ignition: OFF	< 1 Ω	Open circuit in wiring
25.0	Operation of regeneration	Vacuum/over-pressure tester connected to regeneration switchover valve (Y58/1)	Regeneration line from activated charcoal filter detached at regeneration valve Engine: idling Slowly increase engine speed to max. 3000/min	Rising engine speed, rising vacuum	KE control unit (N3), Regeneration switchover valve (Y58/1), Open circuit in wiring, Vacuum lines, Coolant temperature sensor (B11/2), see test steps 6.0–6.3
25.1	Actuation of regeneration switchover valve (Y58/1)		Engine: idling Set engine speed > 800/min	11–14 V	KE control unit (N3), Regeneration valve (Y58/1) Wiring
25.2	Regeneration switchover valve (Y58/1)		Ignition: OFF Coupling at switchover valve (Y58/1) disconnected	25 ± Ω	Regeneration valve (Y58/1)

Test step	Test scope	Test connection	Operation/Requirement	Specification	Possible cause/Remedy
25.3	Wiring	N3  2 - Ω^+ - 1	Ignition: OFF Coupling at regeneration valve (Y58/1) disconnected	< 1 Ω	Open circuit in wiring
25.4	Wiring	N3  41 - Ω^+ - 2	Ignition: OFF Coupling at regeneration valve (Y58/1) disconnected	< 1 Ω	Open circuit in wiring
26.0	Actuation terminal 50	N3  6 - V - 11	Engine: start	9–12 V	Open circuit in wiring to starter terminal 50
27.0	ARF valve (static)	Vacuum tester connected to ARF valve	Apply 500 mbar vacuum Detach vacuum line at ARF valve	ARF valve closes audibly	ARF valve
27.1	ARF valve (dynamic)	Vacuum tester connected to ARF valve	Engine: idling Engine speed > 1000/min	> 400 mbar	Vacuum lines, Vacuum supply, Switchover valve, Throttle valve body
28.0	Actuation ARF switchover valve (Y27)	N3  38 - V - 41	Engine: idling Set engine speed > 3000/min	approx. 12 V	KE control unit (N3), ARF switchover valve (Y27), Open circuit in wiring
28.1	ARF switchover valve (Y27)	Y27  2 - Ω^+ - 1	Ignition: OFF	30 \pm 5 Ω	ARF switchover valve (Y27)

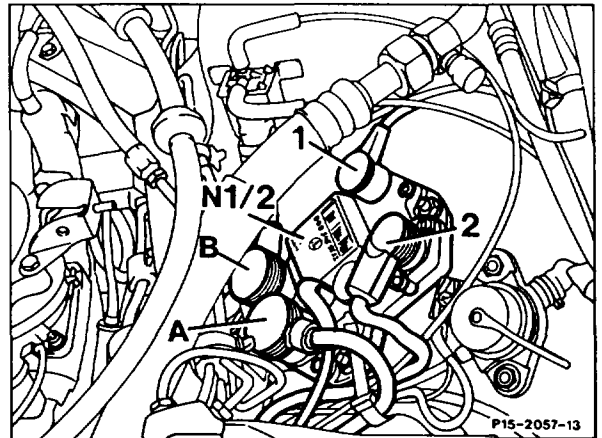
Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
28.2	Cable	N3  38 - $\leftarrow \text{---} \Omega \text{---} \rightarrow$ - 1	Ignition: OFF Coupling at switchover valve (Y27) disconnected	< 1 Ω	Open circuit in wiring
28.3	Cable	N3  41 - $\leftarrow \text{---} \Omega \text{---} \rightarrow$ - 2	Ignition: OFF Coupling at switchover valve (Y27) disconnected	< 1 Ω	Open circuit in wiring
29.0	Decel fuel shutoff	Connect to diagnostic socketet  (X11)	Lambda control fluctuates. Increase engine speed to approx. 3500/min, then close throttle valve	On/off ratio jumps briefly to 95%	Check accelerator control setting, Check throttle valve switch setting, Microswitch, Wiring
29.1	Microswitch	N3  10 - $\leftarrow \text{---} \Omega \text{---} \rightarrow$ - 19	Idle position Depress accelerator	< 1 Ω ∞	Microswitch, Wiring
29.2	Test current at electro-hydraulic actuator (Y1)	Y1  2 - $\leftarrow \text{---} \text{A} \text{---} \rightarrow$ - 1	Connect test cable 102 589 04 63 00 to electro-hydraulic actuator. Increase engine speed to approx. 3500/min, then close throttle valve	approx. -60 mA until combustion resumed	See test steps 1.0 to 4.0, otherwise replace KE control unit

Test step	Test scope	Test connection	Operation/ Requirement	Specifi- cation	Possible cause/Remedy
30.0	Fault circuit kickdown cutoff		Ignition: OFF Engine systems control unit (N16) disconnected. Second mode kickdown switch (S16/7) operated	450 ± 50 mA ¹⁾ 850 ± 50 mA ¹⁾	Open circuit in wiring, S16/6 or S16/7, Kickdown valve automatic transmission (Y3)

¹⁾ Test data of switchover valve depending on manufacturer.

n. EZL ignition control unit (N1/2)

On vehicles with automatic transmission, the cable from EZL ignition control unit (N1/2) connector B, contact 4, is connected to ground (N3) in order to recognize activation of the respective ignition map. On vehicles with manual transmission the cable ends in the wiring harness.



- 1 Coaxial connector for control cable of position sensor
- 2 Vacuum connection
- A Supply connector, 4-pin
 - 15 = Terminal 15
 - 16 = Ignition coil terminal 1
 - TD = TD signal
 - 31 = Ground
- B Sensor connector, 4-pin
 - 1 Coolant temperature sensor
 - 2 Throttle valve switch
 - 3 EZL resistance trimming plug
 - 4 Vacant, cable ends in harness

o. Table of voltage values of EZL/KE coolant temperature sensor (B11/2) and KE intake air temperature sensor (B17/2)

up to model year 1989

Temperature °C	Resistance kΩ	Voltage at contact 21 coolant (V)	Voltage at contact 11 intake air (V)
-20	15.7	3.2-3.9	2.8-3.5
-10	10.0	2.8-3.5	2.5-3.1
0	5.9	2.4-2.9	2.1-2.6
10	3.7	1.9-2.4	1.7-2.1
20	2.5	1.5-1.8	1.3-1.6
30	1.7	1.2-1.4	1.0-1.2
40	1.17	0.9-1.1	0.8-0.9
50	0.830	0.7-0.8	0.6-0.7
60	0.600	0.5-0.6	0.4-0.5
70	0.435	0.4-0.5	0.3-0.4
80	0.325	0.3-0.4	0.2-0.3
90	0.245	0.2-0.3	0.1-0.2
100	0.185	0.8-0.9	0.1-0.2

as of model year 1990

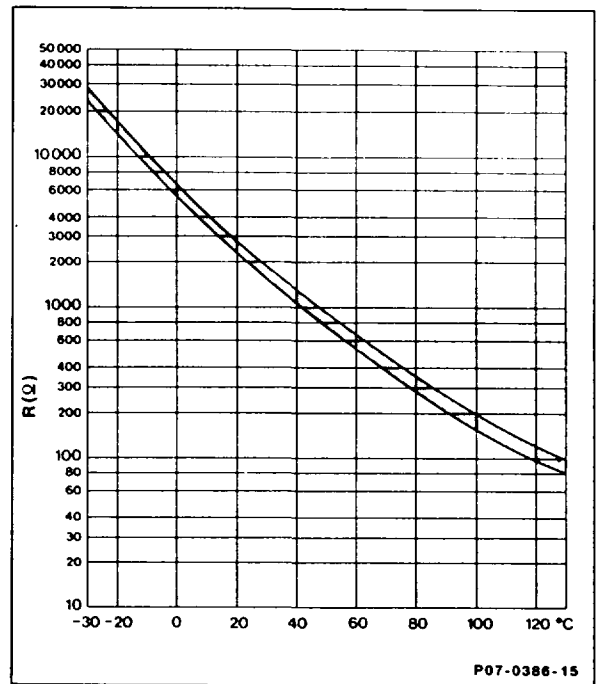
Temperature °C	Resistance kΩ	Voltage at contact 16 coolant (V)	Voltage at contact 14 intake air (V)
- 20	15.7	5.1-5.6	2.8-3.5
- 10	10.0	4.5-5.1	2.5-3.1
0	5.9	4.1-4.5	2.1-2.6
10	3.7	3.8-4.1	1.7-2.1
20	2.5	3.4-3.8	1.3-1.6
30	1.7	2.9- 3.3	1.0-1.2
40	1.17	2.5-2.9	0.5-1.0
50	0.830	2.1-2.5	0.6-0.7
60	0.600	1.7-2.1	0.4-0.5
70	0.435	1.4-1.7	0.3-0.4
80	0.325	1.1-1.3	0.2-0.3
90	0.245	0.9-1.1	0.1-0.2
100	0.185	0.7-0.9	0.1-0.2

Diagram of temperature sensors

Resistances of EZL/KE coolant temperature sensor (B11/2) KE intake air temperature sensor (B17/2).

Note

As of 08/88 specification at 80°C: 290–350 Ω.



p. Table of altitude sensor (B18) and KE reference resistor (R17/1)

Table of altitude sensor (B18)

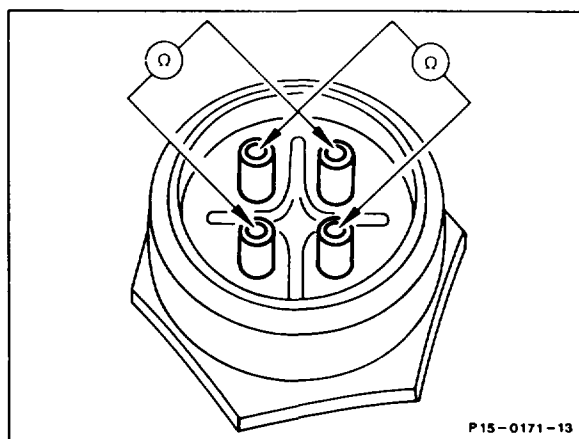
Height above MSL/m	Air pressure P absolute in mbar	Voltage approx. V
0	1013	4 ± 1
1000	899	3 ± 1
2000	795	2 ± 1

Table of KE reference resistor (R17/1) as of 09/87 Engine 103.94/981/983/985 (AUS) (J)

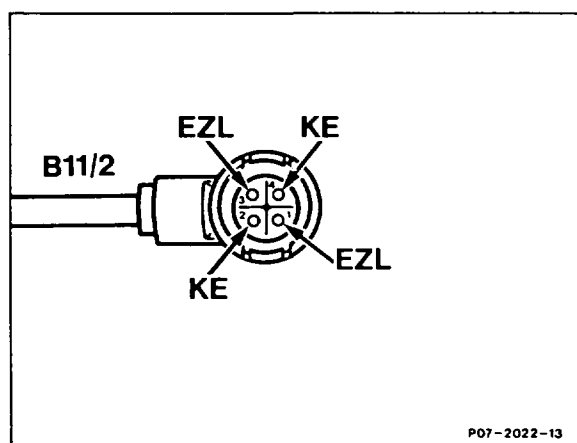
KE reference resistor Part no.	Resistance Ω (± 10 %)	Remarks
000 540 21 81	0	– none (original state)
000 540 22 81	220	– as resistances rise,
000 540 23 81	470	increasingly enrich mixture
000 540 24 81	750	
000 540 25 81	1300	
000 540 26 81	2400	
–	∞	

q. Test setup of 4-pin coolant temperature sensor (B11/2)

4-pin coolant temperature sensor (B11/2)



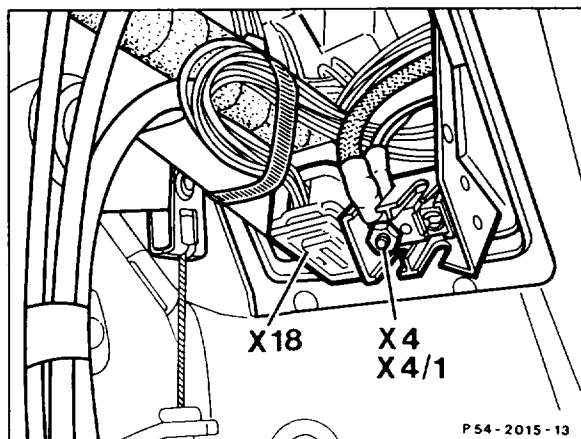
Coupling of 4-pin coolant temperature sensor (B11/2)



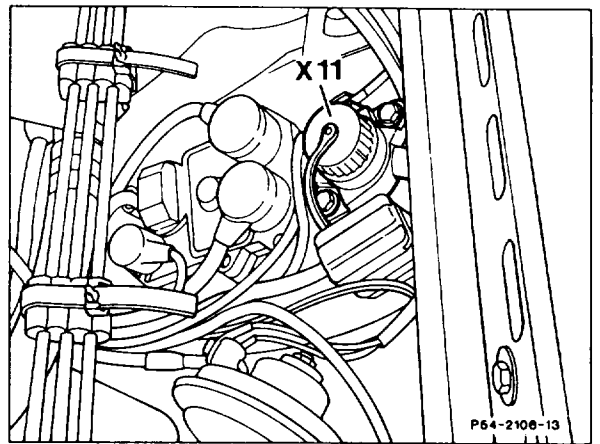
r. Locations of plug connections

Model 124

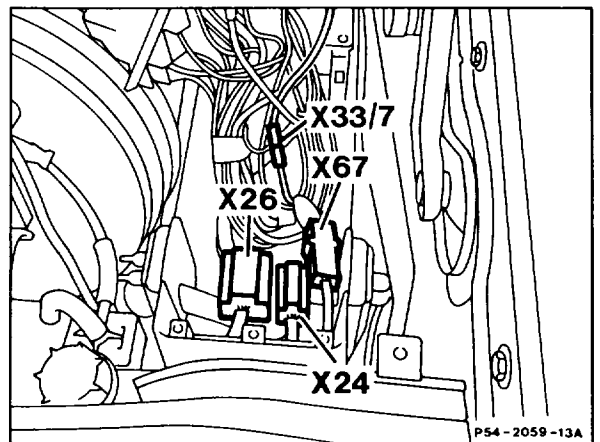
- X4 Terminal block terminal 30, fuse and relay box, 2-pin
- X4/1 Terminal block terminal 30, interior, 2-pin



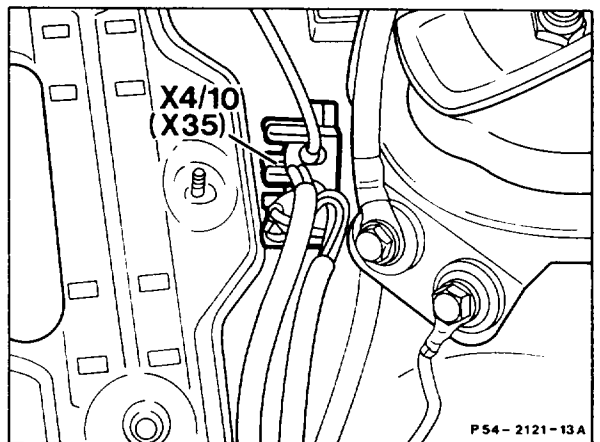
X11 Diagnostic socket/terminal block, terminal TD



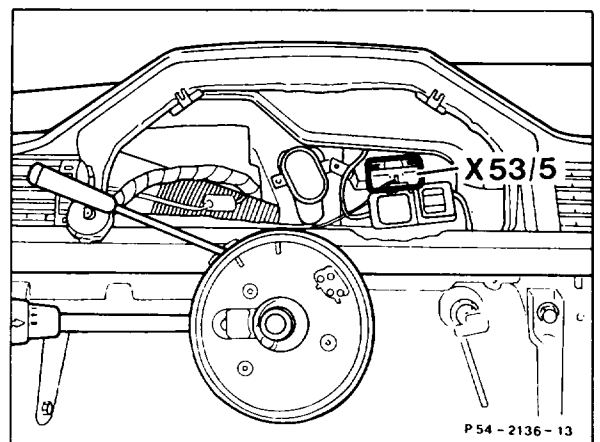
X26 Plug connection, interior/engine (in fuse box)



X4/10 Terminal block terminal 30/terminal 61 (X35) (Battery)

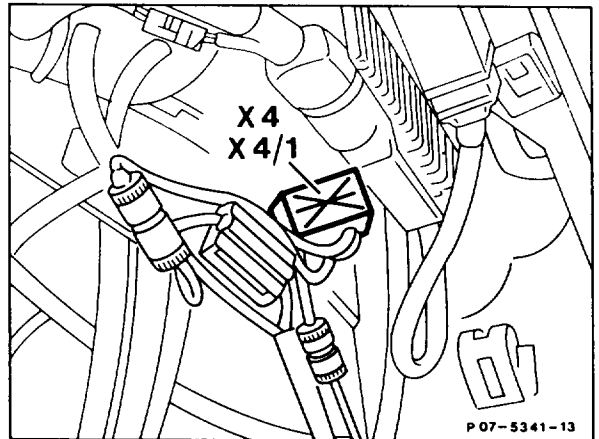


X53/5 Multi-pin plug connection/Hall-effect sensor

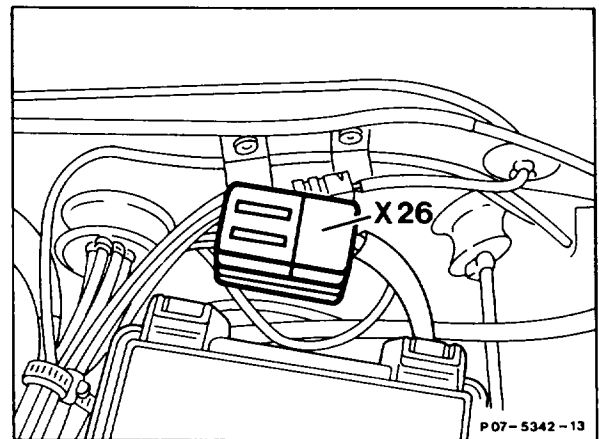


Model 126

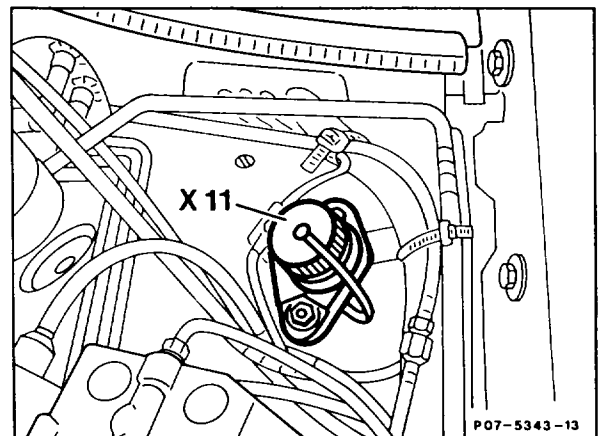
- X4 Terminal block terminal 30, fuse and relay box, 2-pin
- X4/1 Terminal block terminal 30, interior, 2-pin



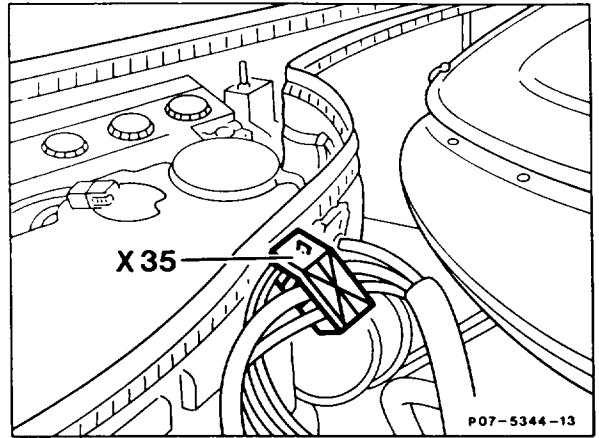
- X26 Plug connection, interior/engine (in fuse box)



- X11 Diagnostic socket/terminal block, terminal TD

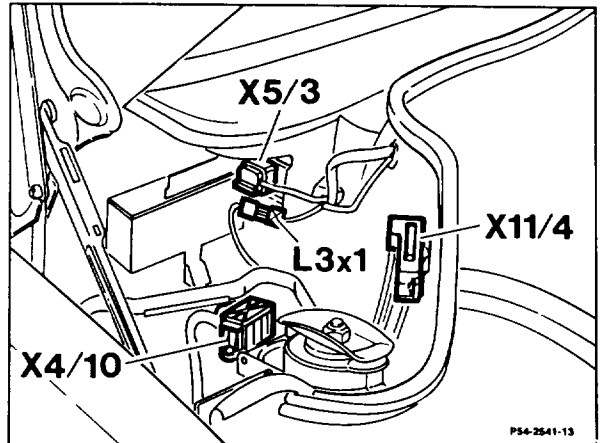


X35 Terminal block terminal 30/terminal 61
(X4/10) (Battery)

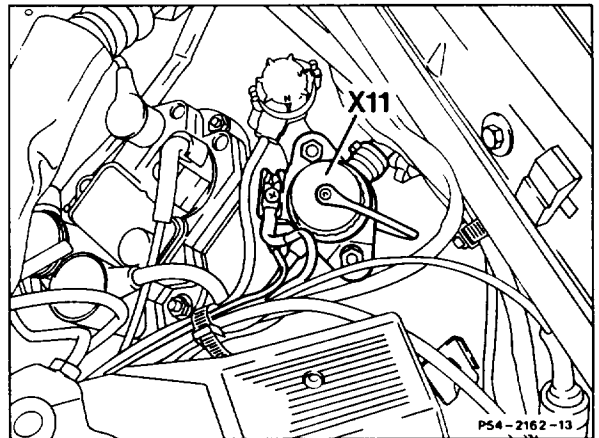


Model 201

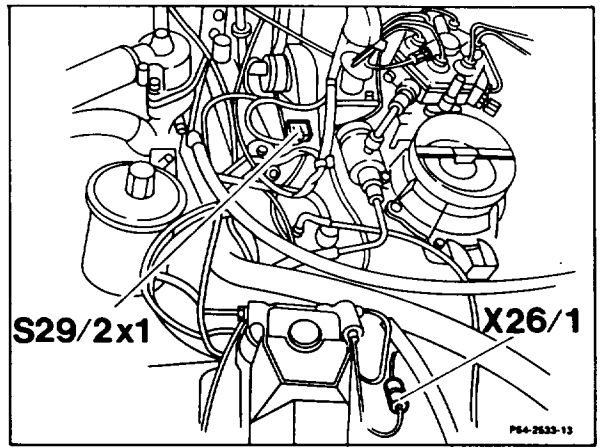
X4/10 Terminal block terminal 30/terminal 61
(Battery)



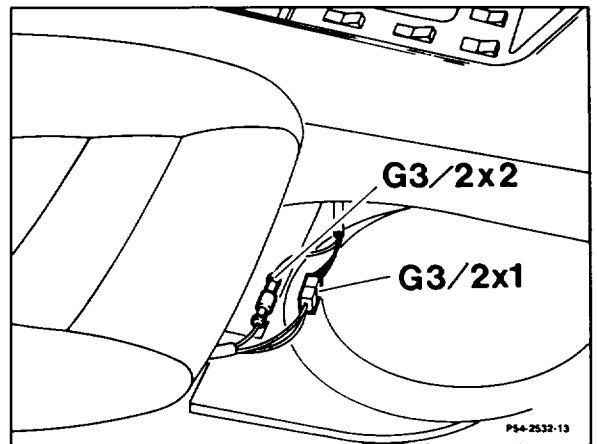
X11 Diagnostic socket/terminal block, terminal TD



X26/1 Plug connection engine wiring harness/
headlight harness, diagnosis, 1-pin



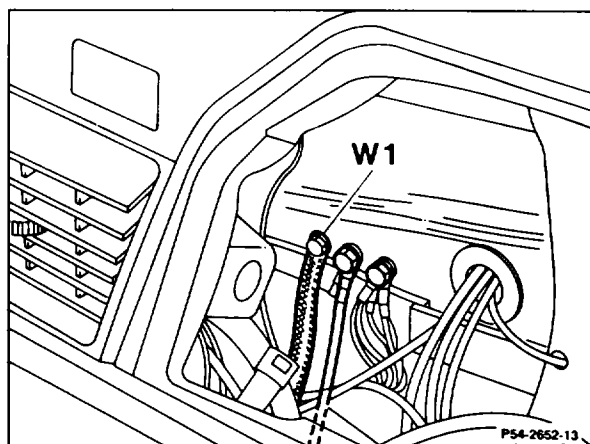
G3/2x1 Plug connection, oxygen sensor heating
coil
G3/2x2 Plug connection, oxygen sensor signal



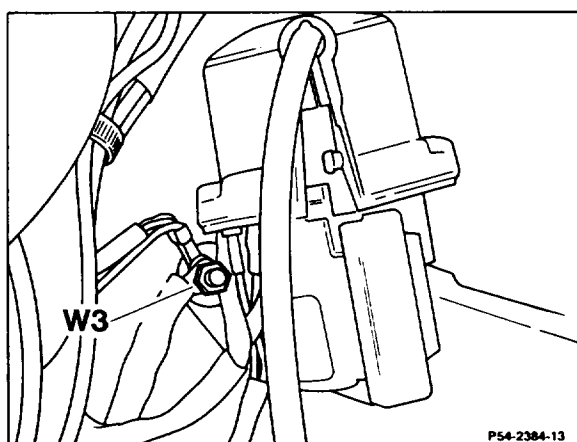
s. Location of ground points

Model 124

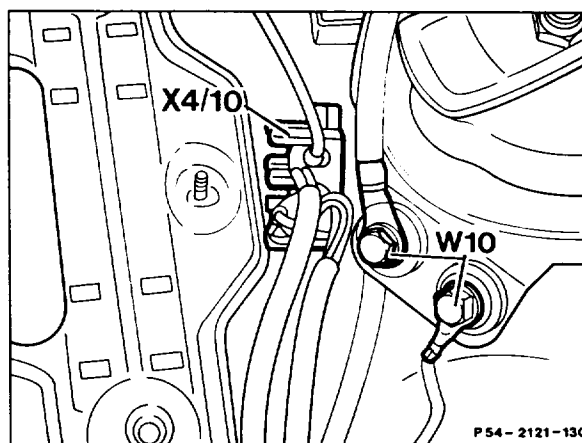
W1 Main ground (right footwell)



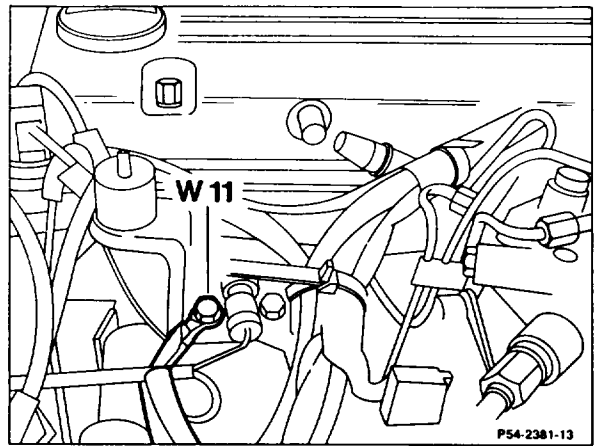
W3 Ground, front left wheelhouse (ignition coil)



W10 Ground, battery

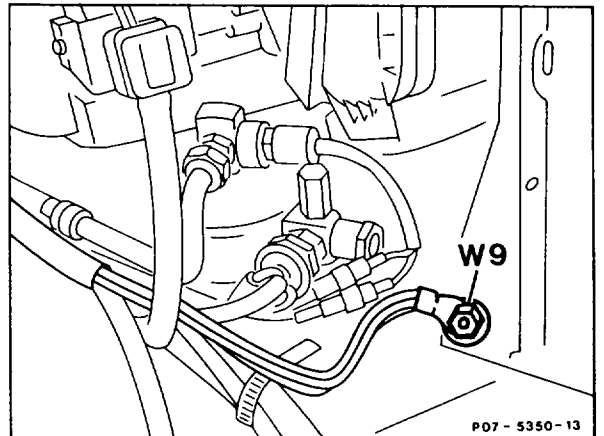


W11 Ground, engine (electric cable bolted on)

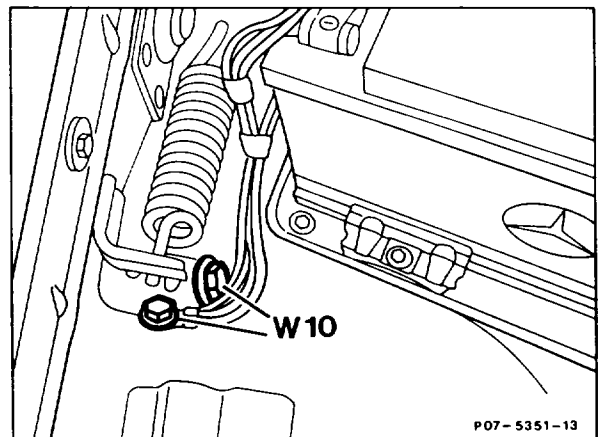


Model 126

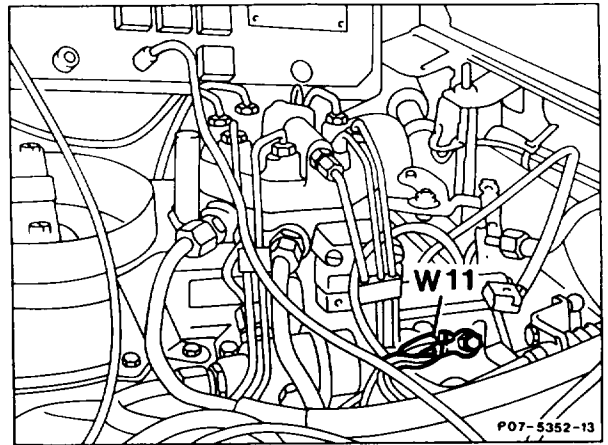
W9 Ground, front left (at headlight unit)



W10 Ground, battery

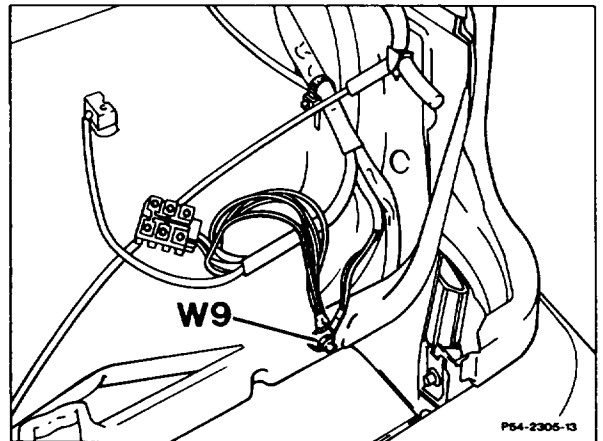


W11 Ground, engine (electric cables bolted on)

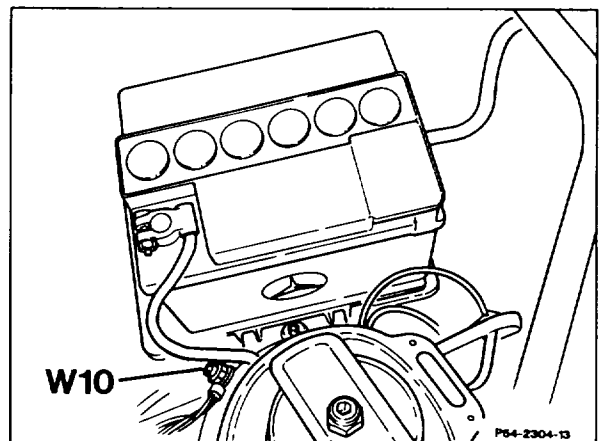


Model 201

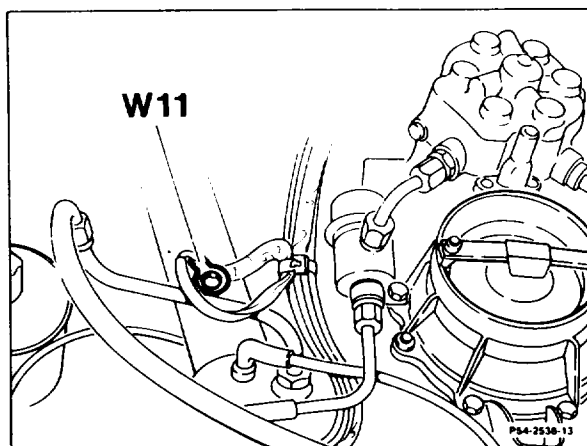
W9 Ground, front left (at headlight unit)



W10 Ground, battery



W11 Ground, engine (electric cables bolted on)



t. Location of Hall-effect road speed sensor (B6)

B6 Hall-effect road speed sensor

