







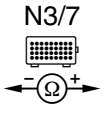
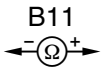
Electrical Test Program – Test

Prior to Testing:



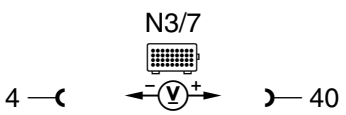

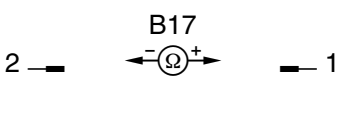
1. Review 22

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
1.0	PIBIS	Engine control module (IFI) (N3/7) Voltage supply Circuit 87	<p>N3/7</p>  <p>19 — ◀ — (-) V (+) — ▶ — 37</p> <p>18 — ◀ — (-) V (+) — ▶ — 55</p>	Ignition: ON	11 – 14 V 11 – 14 V	⇒ 1.1, Wiring/connectors, Passenger side fuse and relay module box (K40/4), ⇒ 2.0, W16/5, W16/6
1.1		Power harness ground, electronic	<p>N3/7</p>  <p>18 — ◀ — (-) V (+) — ▶ — —</p> <p>X12/3</p>  <p>19 — ◀ — (-) V (+) — ▶ — —</p> <p>X12/3</p>	Ignition: OFF X12/3 (Figure 2).	11 – 14 V 11 – 14 V	Power ground, electronic
2.0		Passenger side fuse and relay module box (K40/4) Voltage supply Terminal 30	<p>K40/4</p> <p>C</p>  <p>⊥ — (-) V (+) — ▶ — 1</p>	Ignition: OFF Disconnect connector C from the passenger side fuse and relay module box (K40/4), (Figure 1 and 17).	11 – 14 V	Fuses, Wiring/connectors, Passenger side fuse and relay module box (K40/4).


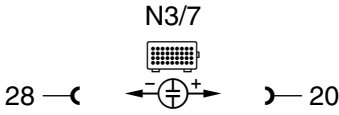
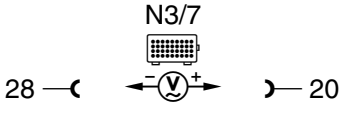


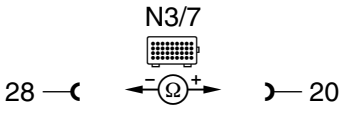
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy																				
5.1		Resistance		Ignition: OFF Disconnect connector on engine control module (IFI) (N3/7), (Figure 1).	<table border="0"> <tr> <td>°C</td> <td>Ω</td> </tr> <tr> <td>20</td> <td>2500</td> </tr> <tr> <td>30</td> <td>1700</td> </tr> <tr> <td>40</td> <td>2600</td> </tr> <tr> <td>50</td> <td>830</td> </tr> <tr> <td>60</td> <td>600</td> </tr> <tr> <td>70</td> <td>435</td> </tr> <tr> <td>80</td> <td>325</td> </tr> <tr> <td>90</td> <td>245</td> </tr> <tr> <td></td> <td>± 10%</td> </tr> </table>	°C	Ω	20	2500	30	1700	40	2600	50	830	60	600	70	435	80	325	90	245		± 10%	⇒ 5.2 Wiring/connectors.
°C	Ω																									
20	2500																									
30	1700																									
40	2600																									
50	830																									
60	600																									
70	435																									
80	325																									
90	245																									
	± 10%																									
5.2		B11		Ignition: OFF Disconnect connector on B11 (Figure 4).	Nominal values: see ⇒ 5.1	B11																				







Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy										
6.0		IAT sensor (B17) Voltage		Engine: at idle	<table border="0"> <tr> <td>°C</td> <td>V</td> </tr> <tr> <td>20</td> <td>3.8</td> </tr> <tr> <td>30</td> <td>3.3</td> </tr> <tr> <td>40</td> <td>2.9</td> </tr> <tr> <td colspan="2" style="text-align: center;">± 5%</td> </tr> </table>	°C	V	20	3.8	30	3.3	40	2.9	± 5%		⇒ 6.1, Engine control module (IFI) (N3/7).
°C	V															
20	3.8															
30	3.3															
40	2.9															
± 5%																
6.1		Resistance		Ignition: OFF Disconnect plug on engine control module (IFI) (N3/7), (Figure 1).	<table border="0"> <tr> <td>°C</td> <td>Ω</td> </tr> <tr> <td>20</td> <td>6060</td> </tr> <tr> <td>30</td> <td>3900</td> </tr> <tr> <td>40</td> <td>2600</td> </tr> <tr> <td colspan="2" style="text-align: center;">± 5%</td> </tr> </table>	°C	Ω	20	6060	30	3900	40	2600	± 5%		⇒ 6.2, Wiring/connectors.
°C	Ω															
20	6060															
30	3900															
40	2600															
± 5%																
6.2		B17		Ignition: OFF Disconnect plug on IAT sensor (B17), (Figure 5).	Nominal values see ⇒ 6.1	B17										


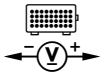
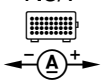
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
8.0	P1335	CKP sensor (L5/6)	 	<p>Engine: at idle</p> <p> Test via oscilloscope. Testing with Hermann Datascope is only possible during the start or shut-down phase. With DACE tester, testing is possible during idle, during which the time axis must be set to 25ms and the voltage to 40 V AC.</p> <p>Engine: at idle</p> <p> Test with multimeter only if oscilloscope is not available.</p> <p>Start rpm > 200rpm</p>	<p>Signal (Figure 7)</p> <p>> 0.8 V ~ rising rpm equals rising voltage</p> <p>> 0.3 V ~</p>	<p>Installation position of CKP sensor (L5/6), Dirt on L5/6 (metal chips), Segments on flywheel, ⇒ 8.1</p>
8.1		Resistance of sensor L5/6		<p>Ignition: OFF</p> <p>Remove connector on engine control module (IFI) (N3/7)</p>	<p>610 – 1300 Ω</p>	<p>Connector L5/6x1 (Figure 7), Wiring/connectors, CKP sensor (L5/6).</p>


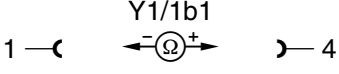




Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
11.0	P1222	IFI/DFI accelerator pedal position sensor (R25/2) Nominal value potentiometer Actual value potentiometer	N3/7  6 —  — 39 18 —  — 15 15 —  — 24 15 —  — 29	Ignition: ON CTP (idle) position: Full load position: CTP (idle) position: Full load position: CTP (idle) position: Full load position: CTP (idle) position: Full load position:	0.2 ± 0.5 V 3.7 ± 4.8 V > 4.5 V <0.5 V <0.5 V > 4.5 V <0.5 V > 4.5 V	Wiring/connectors, IFI/DFI accelerator pedal position sensor (R25/2) (Figure 9), Engine control module (IFI) (N3/7).

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
13.0	P1470	<p>Boost pressure control/pressure control flap vacuum transducer (Y31/5)</p> <p>Test connections: Connect vacum/pressure tester with Y- fitting, between Y31/5 "OUT" outlet and boost pressure control valve. Intake manifold pressure can be observed as well using the HHT.</p>	<p>53 —  — 37</p> <p style="text-align: center;">N3/7</p>	<p>Check vacuum at Y31/5 "OUT" outlet (Figures 8 and 10) Engine: at CTP (idle)</p> <p>Accelerate briefly from 1,500 rpm to 3,500 rpm:</p>	<p>> 4.0 V >350 mbar</p> <p>< 3 V < 400 mbar Intake manifold pressure rises.</p>	<p>31/1, Vent filter dirty (Figure 12), Vacuum lines, Vacuum supply ⇒ 13.2, Wiring.</p>
13.1		Current draw	<p>18 —  — 53</p> <p style="text-align: center;">N3/7</p>	Ignition: ON	0.8 - 1.2 A	Wiring/connectors, Y31/5 (Figure 2).
13.2		<p>Vacuum supply</p> <p>Test connections: Connect vacum/pressure tester with Y- fitting between vacuum supply lines.</p>		Engine: At CTP (idle)	>700 mbar	Vacuum lines, Vacuum pump.


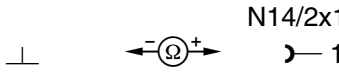
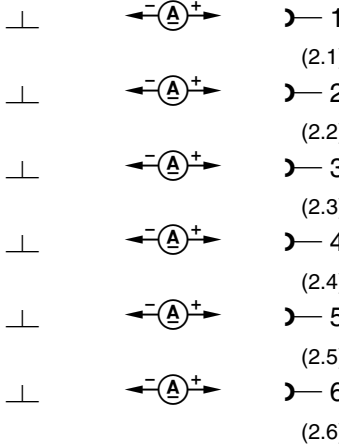
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
15.2		Y1/1b1		Ignition: OFF Remove connector at fuel temperature sensor (Y1/1)	Actual values see ⇒ 15.1	Fuel temperature sensor (Y1/1b1), Replace IFI electrohydraulic shut-off actuator (Y1/1).
16.0		CAN-Data bus Wiring resistance		Ignition: OFF	58 – 62 Ω	Wiring/connectors, X25/7, CAN-bus, DAS control module (N54/1), Engine control module (IFI) (N3/7).
17.0		P/N signal from ETC control module (N15/3)		Ignition: ON Gear selector lever in position: P or N YES <0.5 V NO > 9.0 V		Wirng, Ground, (electronics, right footwell) (W15/1), ETC control module (N15/3).


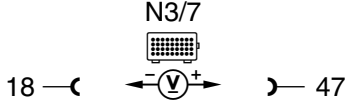

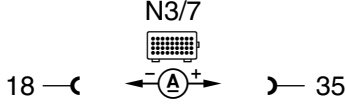
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
18.0	P0703	Stop lamp switch (S9/1)		Ignition: ON Brake pedal position via CAN (Select actual values tests, engine tests, page 3): Brake pedal depressed : ON Brake pedal released : OFF		⇒ 18.1 Wiring, CAN-Bus
18.1		Resistance	<p>S9/1</p> <p>1 — — 4</p>	Ignition: OFF Disconnect stop lamp switch connector (S9/1x1): Brake pedal depressed : Brake pedal released :	< 1 Ω >100 kΩ	Stop lamp switch (S9/1), (Figure 14).
19.0	P1480	Preglow control Communication wire between engine control module (IFI) (N3/7) and preglow control module (N14/2) Resistance	<p>N3/7</p> <p>33 — — 2</p> <p>N14/2x1</p>	Ignition: OFF Remove connector (N14/2x1) from preglow control module (N14/2) (Figures 1, 2 and 3), Remove engine control module (IFI) (N3/7).	< 1 Ω	Wiring, Preglow control module (N14/2).
20.0	P1482	Preglow control module (N14/2) Voltage supply Circuit 30	<p>N14/2x3</p>	Ignition: OFF	11 – 14 V	⇒ 20.1, Preglow control module (N14/2) (Figure 2).


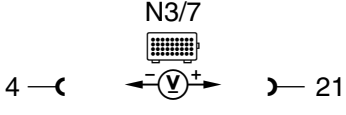
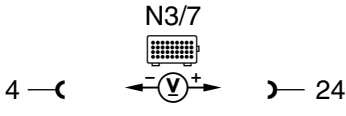

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
20.1		Ground, electronics output ground - right footwell (W15)		Ignition: OFF Remove connector (N14/2x1) from preglow control module (N14/2) (Figure 3).	< 1 Ω	Ground (electronics output ground - right footwell) (W15), Wiring/connectors.
21.0	P1481	Glow plug failure Glow plug and harness test		Measure with DC current pickup. Remove windshield washer reservoir, remove cable cover, loosen cable ties, pull back protective sleeve from cable, for each measurement turn ignition key again to position 2.	8 – 25 A The current draw is dependent on the coolant temperature.	Glow plugs, Wiring, Preglow output (N14/2).
22.0		Test step for NON-USA vehicles only				






Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
23.0	P1612	Circuit 15E		Ignition: ON	11 – 14 V	Voltage supply, see ⇒ 1.0, Wiring/connectors, Electronic ignition-starter switch (EIS) control module (N73), Passenger-side fuse and relay module box (K40/4) (Figure 1), Starter relay (K40/4k2), (Figure 17).
24.0	P1403	EGR valve pressure transducer (Y31/1)		Engine: at idle Pressure regulation (see Menu: Actual values, Engine test, page 3) >1000 rpm Accelerate briefly to 3,300 rpm:	ON OFF	⇒ 24.1, Vent filter dirty (Figure 12), Pressure lines, Pressure supply, see ⇒ 13.0, Wiring, EGR valve pressure transducer (Y31/1), ⇒ 24.2
24.1		Current draw		Ignition: ON	0.8 – 1.2 A	Wiring/connectors, EGR valve pressure transducer (Y31/1) (Figure 11).
24.2		EGR valve leak test		Ignition: OFF Remove vacuum line and connect pressure/vacuum tester, apply 400mbar to EGR valve	EGR valve closes audibly.	EGR valve

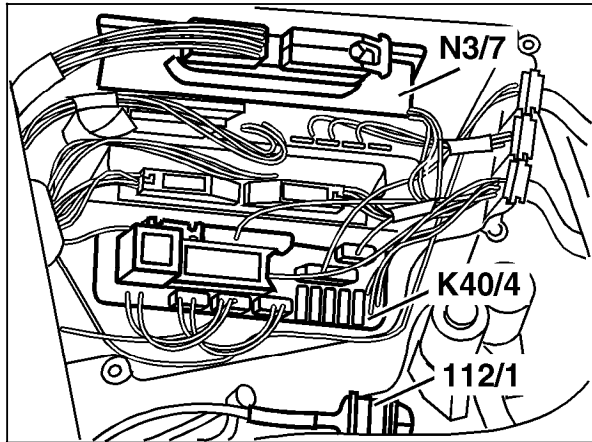
Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
25.0	P1401	EGR lifting sender (B28/3)		Engine: at idle at 2000 rpm	< 1.5 V > 3.0 V	⇒ 25.1, see 31/1, (Figure 1).
25.1		EGR lifting sender (B28/3) Voltage supply			4.8 – 5.2 V	Separation point (X35/63), Wiring/connectors
26.0	P0100	Hot film MAF sensor (B2/5) Voltage from Hot Film		Run engine between 1,200 and 2,500 rpm to check air mass (see Menu: Actual values, Engine test, page 5)	Actual/nominal values comparison	Unmetered air leak, Wiring/connectors, (B2/5), (see Figure 16).

Electrical Test Program – Test

⇒		Test scope	Test connection	Test condition	Nominal value	Possible cause/Remedy
27.0	P1330	Starter control Activate starter relay (K40/4k2)	17 —  — 55 N3/7 	Engine: Start	> 9.0 V, During the start procedure.	⇒ 27.1, Wiring/connectors, Starter relay (K40/4k2) (Figure 17), Passenger-side fuse and relay module box (K40/4) (Figure 1), Engine control module (IFI) (N3/7).
27.1		Circuit 50 of Electronic ignition-starter switch (EIS) control module (N73)	13 —  — 55 N3/7 	Engine: Start	< 1.0 V, During the start procedure.	Wiring/connectors, Driver-side fuse and relay module box (K40/2), Electronic ignition-starter switch (EIS) control module (N73), Engine control module (IFI) (N3/7).

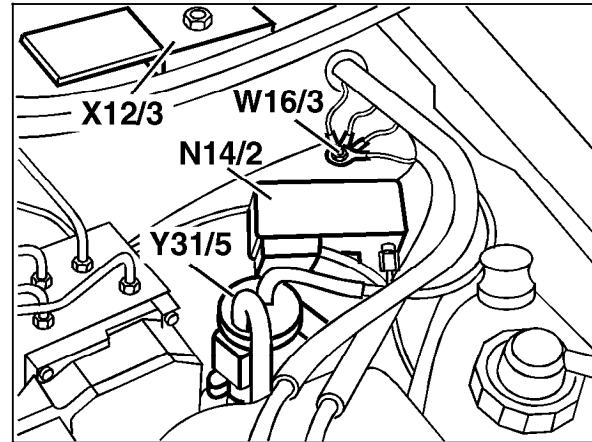
Electrical Test Program – Test



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Figure 1

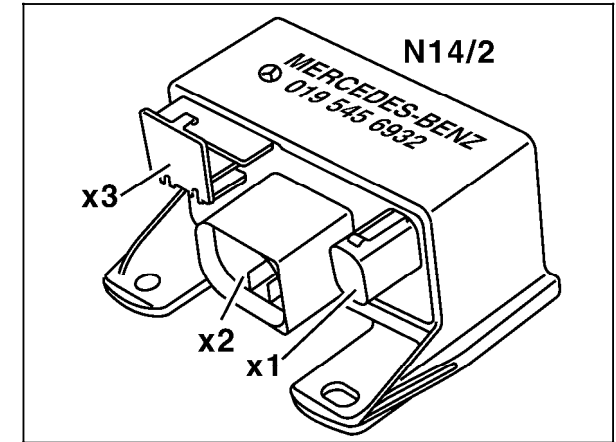
- 112/1 Ventillation filter for EGR valve pressure transducer (Y31/1)
- K40/4 Passenger-side fuse and relay module box
- N3/7 Engine control module (IFI)



P07.12-0408-13

Figure 2

- N14/2 Preglow output stage module
- W16/3 Ground (output ground - left wheel housing)
- X12/3 Terminal block circuit 30
- Y31/5 Boost pressure control/pressure control flap vacuum transducer

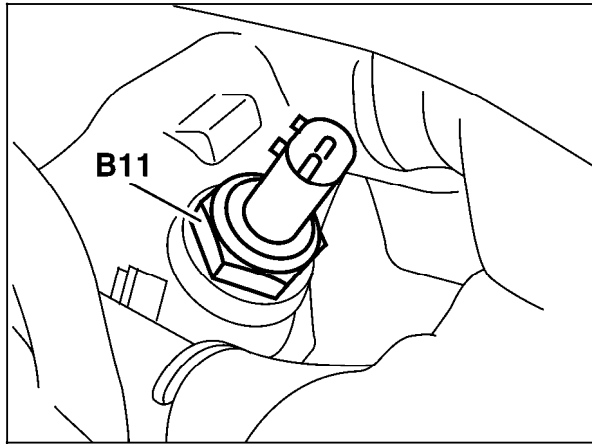


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Figure 3

- N14/2 Preglow output
- N14/x1 Preglow output connector to control wire from engine control module (IFI) (N3/7)
- N14/x2 Preglow output glow plug connector
- N14/x3 Preglow output circuit 30 connector

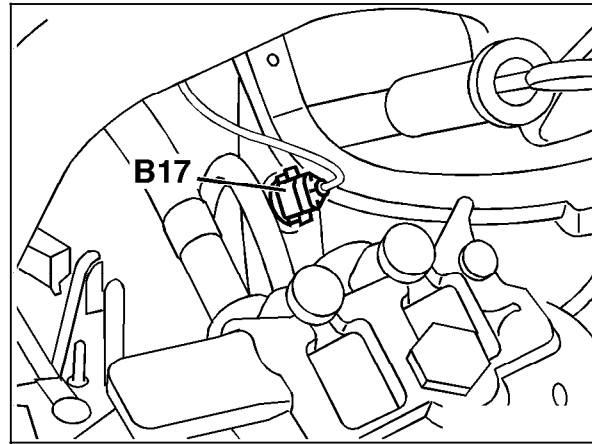
Electrical Test Program – Test



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Figure 4

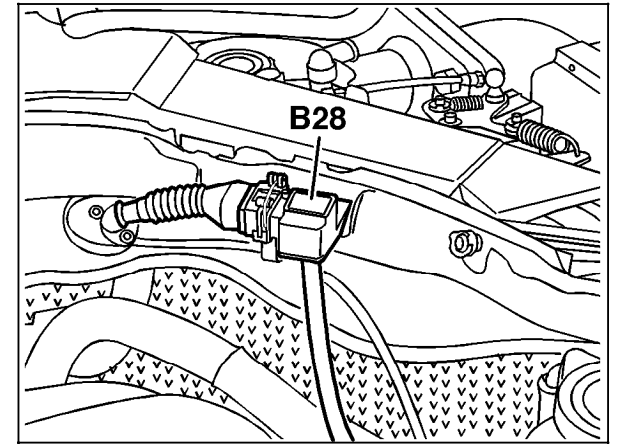
B11 ECT sensor



P07.12-0351-13

Figure 5

B17 IAT sensor

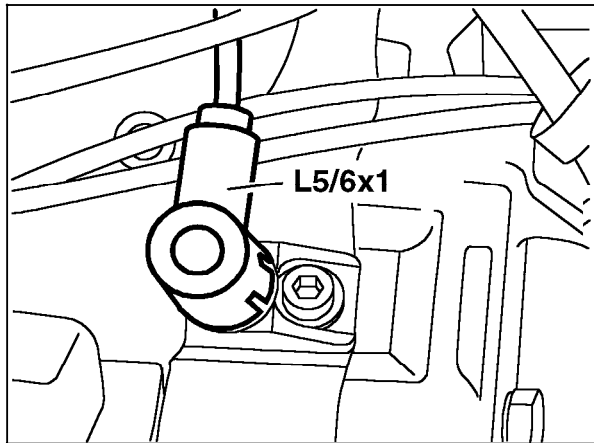


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Figure 6

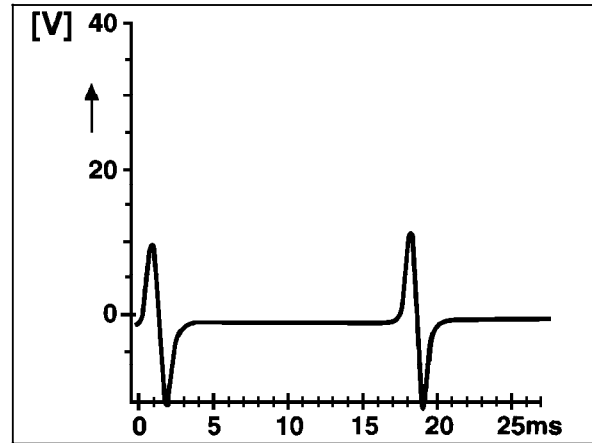
B28 Pressure sensor

Electrical Test Program – Test



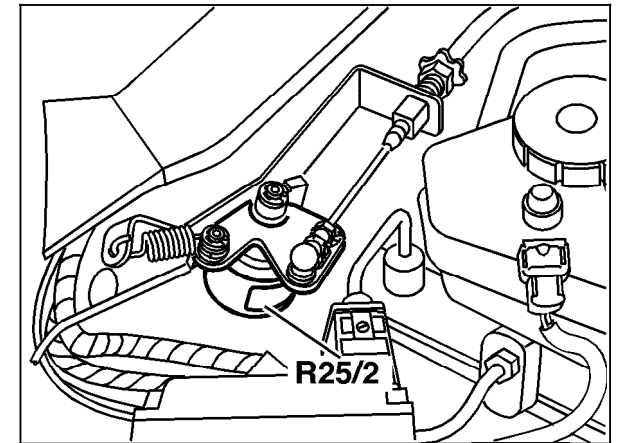
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Figure 7
L5/6x1 CKP sensor connector (IFI/DFI)



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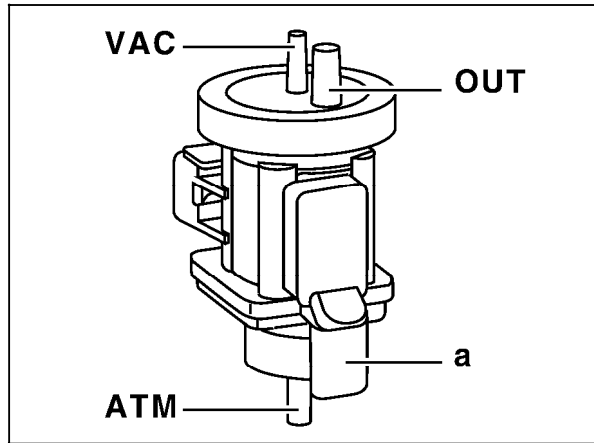
Figure 8
L5/6 CKP sensor (IFI/DFI) signal



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Figure 9
R25/2 IFI /DFI accelerator pedal position sensor

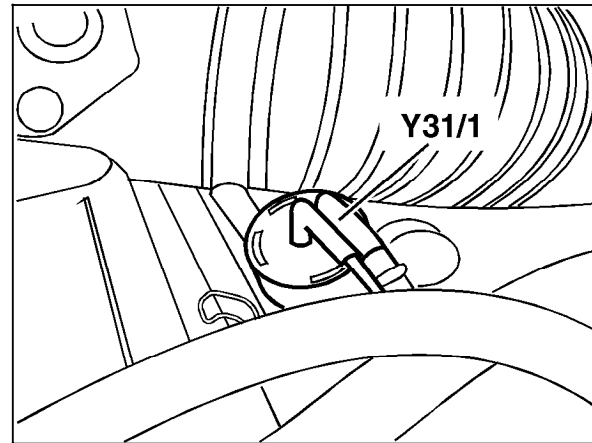
Electrical Test Program – Test



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Figure 10

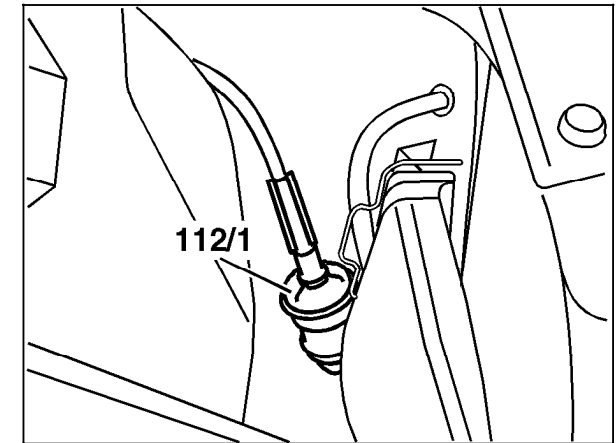
ATM	Vent
OUT	Vacuum outlet to consumer
VAC	Vacuum supply
a	Electrical connection



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Figure 11

Y31/1 EGR valve pressure transducer

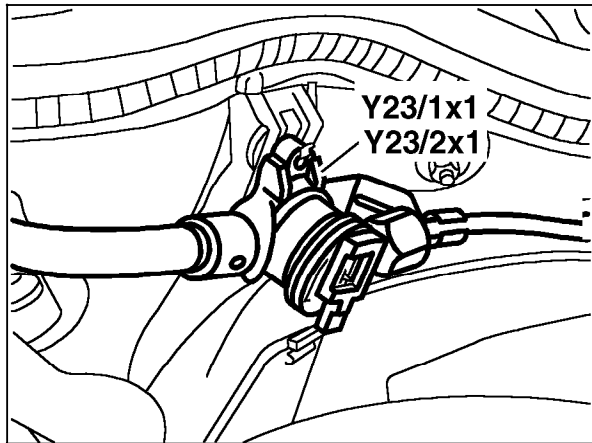


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Figure 12

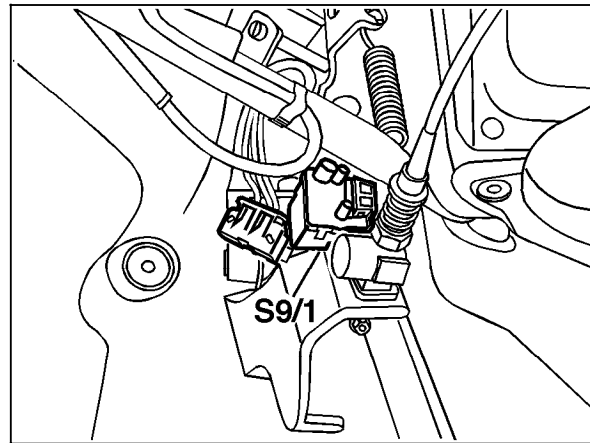
112/1 Ventillation filter for EGR valve pressure transducer (Y31/1)

Electrical Test Program – Test



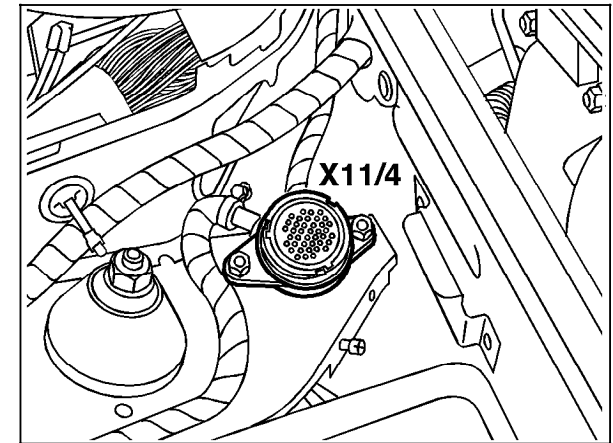
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Figure 13
Y23/1x1 Fuel quantity actuator (IFI) connector



P07.12-0354-13

Figure 14
S9/1 Stop lamp switch



P07.12-0374-13

Figure 15
X11/14 Data link connector (DTC readout)

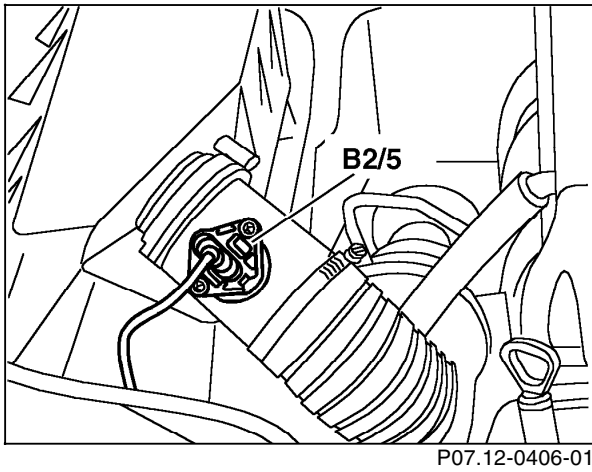


Figure 16

B2/5 Hot film MAF sensor

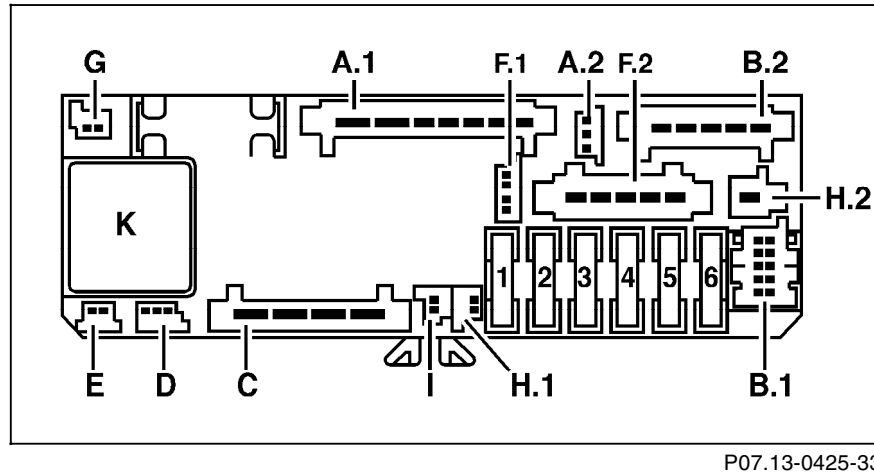


Figure 17

- K40/4 Passenger side fuse and relay module box
- K Starter relay (K40/4k2)
- A.1 Pin 6: Starter (M1) activation
- C Pln 3: Terminal 15U from Electronic ignition-starter switch (EIS) control module (N73)
- I Pin 1: Starter relay (K40/4k2) activation